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Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport –Environmental Study Report

Prepared by:

AECOM
30 Leek Crescent, Floor 4
Richmond Hill, ON, Canada L4B 4N4
www.aecom.com

905 882 4401 tel
905 882 4399 fax

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Authors

Report Prepared By:

Megan Ketchabaw, MPl
Environmental Planner

Report Reviewed By:

Marc Rose, MES, MCIP, RPP
Senior Environmental Planner

Executive Summary

This Environmental Assessment (EA) was undertaken by PortsToronto to examine the following two Future Airport Scenarios at the Billy Bishop Toronto City Airport (BBTCA):

1. **Future Baseline Scenario:** .....The runway is not extended and jets are not permitted at BBTCA; a Runway End Safety Area (RESA) is constructed approximately 43 m into the lake at both ends of the existing main runway (Runway 08-26) to address Transport Canada's requirements,
2. **Proposed Future Scenario:** .....Tripartite Agreement is amended to permit commercial jet operations and the main runway (Runway 08-26) is extended by 200 m at each end, as per Porter Airlines' proposal.

As a result of the level of public interest in the proposal, PortsToronto elected to develop and consult on a Study Design document prior to conducting an assessment of the proposed runway extension. The Study Design document was developed and consulted on to provide a guide for the effects assessments of the proposed runway extension presented in this Environmental Study Report (ESR).

The process included an assessment of environmental, social and economic effects (positive and negative) of the two Future Airport Scenarios. Key steps in the EA process included:

- Determining the Future Airport Scenarios;
- Outlining existing environmental conditions and constraints;
- Conducting the effects assessment;
- Comparing the net effects; and,
- Preparing the ESR.

The following table summarizes how the Future Airport Scenarios were defined.

Table E-1: Summary of Future Airport Scenarios Compared to Existing Conditions

BBTCA Details	Existing Conditions *(2014)*	Future Baseline Scenario *(based on 2012 Master Plan)*	Proposed Future Scenario *(Runway Extension and Jets based on draft 2015 Master Plan)*
Land Mass Extension Required	No	Yes, for *RESA* (approx. 43 m)	Yes, for jets (200 m) Includes RESA
Runway Length (Take-Off Run Available)	1,216 m	1,216 m	1,658 m
# of Daily Commercial Slots	202	202	242
# of Total Passengers/Year Groundside *Number in brackets reflects total passengers moving through the airport**	2.0 million (2.43 million)	2.7 million (3.8 million)	4.1 million (5.5 million)
# of Total Annual Aircraft Movements	114,428	140,700	138,170
# of Total Annual Non-commercial Aircraft Movements	Approx. 53,166	Approx. 66,098	Approx. 64,778
# of Passengers in Peak Hour Groundside *Number in brackets reflects total passengers moving through the airport**	708 (944)	1,085 (1,447)	1,306 (1,741)
Type of Commercial Aircraft	Q400	Q400	Q400, CS100 & other qualifying jets
Changes to the Marine Exclusion Zone (MEZ)	No change	No change	No change in length, 10 to 25 m increase in width

*Note: * Total passengers includes those "in transit" that do not exit BBTCA*

Existing environmental conditions and net effects were documented for the following disciplines:

- Air Quality;
- Noise;
- Public Health;
- Marine Navigation;
- Marine Physical;
- Water Quality;
- Built Form and Land Use;
- Archaeology and Cultural Heritage;
- Socio-Economic;
- Natural Environment; and,
- Transportation.

Table E-2 below documents the comparison of net effects, which considers the remaining effects after mitigation has been applied. Overall, the Proposed Future Scenario improves conditions related to noise and air quality compared to the Future Baseline Scenario. However, it results in greater effects on marine navigation, water quality, the socio-economic environment, and the natural environment.

Table E-2: Comparison of Net Effects Between Future Airport Scenarios

Discipline	Comparison of Operational Effects between Future Airport Scenarios	Preferred Scenario
Air Quality	Effects are generally similar between the Future Airport Scenarios, although there are fewer effects anticipated as a result of the Proposed Future Scenario compared to the Future Baseline Scenario. • Fewer contaminants have predicted concentrations higher than their Toxicity Reference Values (TRV). • Fewer tonnes of CO_2 are predicted to be emitted in the Air Quality Study Area.	Proposed Future.
Noise	Effects are generally similar between the Future Airport Scenarios, although noise levels are slightly lower in the Proposed Future Scenario as compared to the Future Baseline Scenario.	Proposed Future.
Public Health	Effects are generally similar between the Future Airport Scenarios, although: • The Future Baseline Scenario results in a slightly increased likelihood of experiencing environmental insomnia and increased likelihood of experiencing hypertension and ischemic heart disease compared to the Proposed Future Scenario; and, • The Proposed Future Scenario results in a slightly increased risk of developing lesions in the upper airway compared to the Future Baseline Scenario.	No preference.
Marine Navigation	Effects are greater for the Proposed Future Scenario as compared to the Future Baseline Scenario for the following reasons: • Jet blast has a considerable effect on small recreational boats near the edge of the MEZ boundary (this effect does not exist with the Q400 turboprop planes); and, • The runway extension will have a considerable effect on maneuverability in the Western Channel for both small and large recreational boats, whereas the RESA will not require a change to the MEZ.	Future Baseline.
Marine Physical	Effects are similar between the Future Airport Scenarios.	No preference.
Water Quality	Effects are generally similar between the Future Airport Scenarios, although the Proposed Future Scenario will result in a greater reduction of average flow through the Inner Harbour, and an increased residence time, as compared to the Future Baseline Scenario.	Future Baseline.
Built Form and Land Use	Effects are similar between the Future Airport Scenarios.	No preference.
Archaeology and Cultural Heritage	Effects are similar between the Future Airport Scenarios.	No preference.

Table E-2: Comparison of Net Effects Between Future Airport Scenarios

Discipline	Comparison of Operational Effects between Future Airport Scenarios	Preferred Scenario
Socio-Economic	Effects are greater for Proposed Future Scenario as compared to the Future Baseline Scenario for the following reasons: • Extending the runway, and increasing the number of passengers and aircraft movements, will further exacerbate the relationship between local residents and the airport. • The introduction of jets will change the look and feel of the waterfront, and the proposed land mass extension will reduce the area of navigable water available for recreational boaters. • The introduction of jet aircraft and runway extension is expected to change how the waterfront is perceived by non-users.	Future Baseline.
Natural Environment	Effects are greater for the Proposed Future Scenario as compared to the Future Baseline Scenario, as the runway extension results in a much greater loss of aquatic habitat than the RESA.	Future Baseline.
Transportation	Effects are similar between the Future Airport Scenarios after mitigation is proposed	No preference.

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Acronym

AAC ..... Agency Advisory Committee
ACRP ..... Airport Co-operative Research Program-Transportation Research Board
ADCP ..... Acoustic Doppler Current Profile
ADSB ..... Archaeological Sites Database
AGL ..... Above Ground Level
AHT ..... Aquatic Habitat Toronto
ANSI ..... Areas of Natural and Scientific Interest
AOC ..... Areas of Concern
APU ..... Auxiliary Power Unit
ASI ..... Archaeological Services Inc.
AWMPs ..... Airport Wildlife Management Plans
AZR ..... Airport Zoning Regulations
BBO1 ..... Open Beach
BBTCA ..... Billy Bishop Toronto City Airport
BC ..... Before Christ
BHZ ..... Bird Hazard Zone
BIA ..... Business Improvement Area
BQNP ..... Bathurst Quay Neighbourhood Plan – City of Toronto
BSC ..... Bird Studies Canada
CAR ..... Civil Aviation Regulation
CCRW ..... Canadian Council on Rehabilitation and Work
CD ..... Lake Chart Datum
CE ..... Common Era
CEA Agency ..... Canadian Environmental Assessment Agency
CEAA ..... Canadian Environmental Assessment Act
CFD ..... Computational Fluid Dynamics
CH_4 ..... Methane
CHAR ..... Cultural Heritage Assessment Report
CHS ..... Canadian Hydrographic Survey
CLO ..... Cornell Laboratory of Ornithology
CMMN ..... Canadian Migration Monitoring Network
CO_2 ..... Carbon Dioxide
COSSARO ..... Committee on the Status of Species at Risk in Ontario
Council ..... Toronto City Council
CS100 ..... Jets proposed by Porter Airlines
CSO ..... Combined Sewer Overflow
CUH ..... Cultural Hedgerow
CUM1-1 ..... Cultural Meadow
CUT1 ..... Cultural Thicket
CUW1 ..... Cultural Woodland
CWB ..... Community Well-Being
CWS ..... Canadian Wildlife Service
CWSP ..... Central Waterfront Secondary Plan – City of Toronto
DDT ..... Dichlorodiphenyltrichloroethane
DFO ..... Fisheries and Oceans Canada

DMNP Project ..... Don Mouth Naturalization and Port Lands Flood Project
DSAO ..... Disabled Sailing Association of Ontario
EA ..... Environmental Assessment
EBPP..... East Bayfront Precinct Plan – City of Toronto
EC ..... Environment Canada
ELC ..... Ecological Land Classification
EMS ..... Emergency Medical Services
END..... Endangered
ESA ..... Endangered Species Act
ESAs ..... Environmentally Significant Areas
FAA ..... U.S. Federal Aviation Administration
FLAP ..... Fatal Light Awareness Program
GA ..... General Aviation
GBBC ..... Great Backyard Bird Count
GBE..... Government Business Enterprise
GDP ..... Gross Domestic Product
GHG ..... Greenhouse Gas
GIS ..... Geographic Information System
GLWQA..... Great Lakes Water Quality Agreement
GTA..... Greater Toronto Area
GTHA ..... Greater Toronto Hamilton Area
HAAT..... Habitat Alteration Assessment Tool
HCC ..... Harbourfront Community Centre
HEAT..... Habitat and Environmental Assessment Tool
HIA ..... Heritage Impact Assessment
IBA ..... Important Bird Areas
ICAO ..... International Civil Aviation Organization
IGLD..... International Great Lakes Datum
ILS..... Instrument Landing System
INM..... Integrated Noise Model
JBD ..... Jet Blast Deflector
JFK..... John F. Kennedy International Airport
LDN ..... Average Sound Pressure Level over a whole day
LDPP..... Lower Don lands Precinct Plan – City of Toronto
LIO ..... Land Information Ontario
LOA ..... Length of Overall
LOC..... Localizer
LOS ..... Level-of-service
LRT ..... Light Rail Transit
LSA ..... Local Study Area
LSW ..... Locally Significant Wetland
MEZ..... Marine Exclusion Zone
MNRF..... Ministry of Natural Resources and Forestry (Province of Ontario)
MOECC..... Ministry of the Environment and Climate Change (Province of Ontario)
MTCS..... Ministry of Tourism, Culture and Sport (Province of Ontario)
N70..... Degree of Speech Interruption
NAR..... Not at Risk

NEF ..... Noise Exposure Forecast
NHIC ..... Natural Heritage Information Centre
NO_2..... Nitrous Oxide
NOAA ..... National Ocean and Atmospheric Administration
NPD..... Noise-Power-Distance
NRVIS ..... Natural Resources Values Information System
OBBA ..... Ontario Bird Banding Association
OEAA ..... Ontario Environmental Assessment Act
OLS ..... Obstacle Limitation Surface
ORNAMENT..... Ontario Road Noise Analysis Method for Environment and Transportation
PANYNJ ..... Port Authority of New York and New Jersey
PEC ..... Port Lands Energy Centre
PILT..... Payments-in-Lieu of Taxes
PMS ..... Parabolic Mild Slope
PPS ..... Provincial Policy Statement
PSW ..... Provincially Significant Wetland
Q400 ..... Turbo Propeller Planes currently used by Porter Airlines and Air Canada
QCYC..... Queen City Yacht Club
RAP..... Toronto and Region Remedial Action Plan
RCYC ..... Royal Canadian Yacht Club
RESA ..... Runway End and Safety Area
RSA..... Regional Study Area
S1..... Extremely Rare (SARO)
S2..... Very Rare (SARO)
S3..... Rare to Uncommon (SARO)
SAC..... Stakeholder Advisory Committee
SAR..... Species at Risk
SARA ..... Species at Risk Act
SARO ..... Species at Risk in Ontario
SC ..... Special Concern
SDO1-1 ..... Little Bluestem – Switchgrass – Beachgrass Open Dune
SLCDA ..... Salt Lake City Department of Airports
SOCC..... Species of Conservation Concern
STEAM..... Sound from Trains Environmental Analysis Method
TBA ..... Toronto Boaters' Alliance
TDSB..... Toronto District School Board
THC..... Toronto Harbour Commissioners
THR..... Threatened
TNIP ..... Australian Transparent Noise Information Package
TORA ..... Take-off Run Available
TP312..... Aerodrome Standards and Recommended Practices
TPA ..... Toronto Port Authority
TPH…….. Toronto Public Health
TRCA ..... Toronto and Region Conservation Authority
TREB..... Toronto Real Estate Board
TTBRS ..... Tommy Thompson Bird Research Station
TTC ..... Toronto Transit Commission

TTP ..... Tommy Thompson Park
UP ..... Union to Pearson Express
US EPA ..... United States Environmental Protection Agency
USI ..... Urban Strategies Inc.
WHMPs ..... Wildlife Hazard Management Plans
WSR ..... Weather Surveillance Radar
YTZ ..... Billy Bishop Toronto City Airport
YYZ ..... Toronto Pearson International Airport

Units

% ..... Per cent
° ..... Degrees
Hm0 ..... Significant wave height
km/h ..... Kilometres per hour
m ..... Metre
m/s ..... Metres per second
m/sec ..... Metres per second
m^3/s ..... Cubic metres per second
$m^3/year$ ..... Cubic metres per year
mASL ..... Metres above sea level
vph ..... Vehicles per hour
ha ..... Hectare

Glossary

Acoustic Doppler Current Profile Meters	Meters installed by PortsToronto to measure water current velocity and direction in the Western and Eastern Channels and offshore of Gibraltar Point.
Active Recreational Space	An area that is designated for active recreation (i.e., for organized sports, planned events, and individual exercise).
Active Transportation	Any form of human-powered transportation (i.e., walking, cycling, etc.)
Agency Advisory Committee (AAC)	A committee formed with the purpose of providing a place where representatives of various government divisions, ministries and agencies can share their perspectives and advice with PortsToronto at key points throughout the EA process.
Angle of Heel	A boat's angle of tilt.
Area of Natural and Scientific Interest (ANSI)	An area of land and water that represents significant geological and biological features.
Areas of Concern	Sites where water quality has been significantly degraded and beneficial uses are impaired. Areas of Concern were formally recognized by the governments of Canada and the United States in the Great Lakes Water Quality Agreement (GLWQA) amendments of 1987 (GLWQA Annex 2).
Automated Coastal Engineering System	A model used to predict jet blast wind-generated waves.
Backfill	The material that has been used to refill an excavation.
Bathymetry	The study of underwater depth of lake or ocean floors.
Berm	A level space, shelf or raised barrier separating two areas.
Built Heritage Feature	A site with one or more significant buildings, structures, monuments, installations or remains associated with architectural, cultural, social, political, economic or military history and identified as being important to a community.
Business Improvement Area	An association of commercial property owners and tenants within a defined area who work in partnership with the City of Toronto to create thriving, competitive and safe business areas that attract shoppers, diners, tourists, and new businesses.
Central Waterfront Plan	Titled: Making Wave – Central Waterfront Plan Pat II. A plan that spells out key public priorities, opportunities, and an implementation plan for Toronto's Central Waterfront Area.
City of Toronto Official Plan	A plan to ensure that the City of Toronto evolves, improves and realizes its full potential in areas such as transit, land use development, and the environment.

City of Toronto Parks Plan 2013-2017	A guide to the development, management and operation of the system of public parkland in the City of Toronto over a five-year period, with initiation in 2013.
Clean Water, Clear Choices	The Stage 2 report of the Toronto and Region Remedial Action Plan detailing goals, specific targets, and recommended actions.
Climate Change	A change in the statistical distribution of weather over periods of time that range from decades to millions of years.
Combined Sewer Overflow (CSO)	An event where stormwater exceeds the capacity of a combined sewer and stormwater/sewage are released to an adjacent water body.
Community Assets	A feature that may be affected by the proposal that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent.
Computational Fluid Dynamics Study	A study performed to determine the velocity and pressure fields for an Airbus A320 at take-off power and to determine how the jet blast, as well as a 15 knot headwind, interact with one of the proposed jet blast deflectors at the end of the main runway at BBTCA.
Constructability	The feasibility of constructing a given project component.
Council Item EX40.1	The City of Toronto Council Resolution adopted item “Request to Amend the Tripartite Agreement for Billy Bishop Toronto City Airport” with amendments. This Council resolution included a number of requirements that PortsToronto must fulfill, prior to Council considering the requested amendments to the existing Tripartite Agreement.
Creative City Planning Framework	The City of Toronto’s planning framework that advocates for a cultural planning model that leverages the connections between place, culture and the economy, encourages investment in emerging sectors and nurtures creative hubs and districts in the City.
Cumulative Effects	An assessment to identify the net effects of the proposal, taking into account the reasonably foreseeable future effects from other actions/projects anticipated within the same time and space as the proposed project.
Dead Heading	When a passenger vehicle either arrives or departs from a location empty.
Delft3D	A 2D/3D modelling system to investigate hydrodynamics, sediment transport and morphology and water quality for fluvial, estuarine and coastal environments.
Double Dead Heading	When a passenger vehicle both arrives to and departs from a location empty.
Draft (boat)	The vertical distance between the waterline and the bottom of a boat’s hull.
Dynamic Angle of Heel	When a boat is exposed to a sudden (or instantaneous) heeling moment (such as wind gust or jet blast) the boat will incline with certain angular velocity. The boat will continue to incline until the righting energy equals the heeling moment energy; this corresponding roll angle is called dynamic angle

	of heel (also known as the angle of maximum roll).
Dynamic Stability	A boat's ability to resist external healing forces (i.e., the force causing the boat to tilt to one side).
East Bayfront Precinct Plan	A planning precinct that is generally bound by the rail corridor to the north, Parliament Street to the east, Lake Ontario to the south and Lower Jarvis Street to the west. The Plan for the precinct establishes the location, scale and character of blocks and streets, buildings, parks and green spaces, and community facilities within the precinct area.
Eastern Channel	The north-south channel found on the eastern side of the Inner Harbour between Ward's Island (Toronto Islands) and the Port Lands (mainland).
Endangered	A species facing imminent extinction or extirpation in Ontario.
Environment	The *EA Act* defines "environment" as *the components of the Earth, and includes:* • *Land, water and air, including all layers of the atmosphere,* • *All organic and inorganic matter and living organisms, and* • *The interacting natural systems that include [the components listed above].*
Environmental Assessment	A process for identifying project and environment interactions, predicting environmental effects, identifying mitigation measures, evaluating significance, reporting and following-up to verify accuracy and effectiveness.
Environmentally Sensitive Area (ESA)	An area with values which are identified to be of local interest and is designated and managed by a municipality.
Erosion	A condition in which the Earth's surface is worn away by the action of water and wind.
Fetch	The horizontal distance over which wave-generating winds blow.
Film Studio District Precinct Plan	The City of Toronto is developing a precinct plan for the Film Studio area in the Port Lands. The area is bounded by the Don Roadway to the west, Lake Shore Boulevard East to the north, Carlaw Avenue to the east and the Ship Channel to the south.
Flight Slot	A scheduled aircraft take-off or landing.
Geographic Information System (GIS)	A computerized system that captures, stores, analyzes, manages, and presents data that are linked to location.
Geomorphology	The study of landforms and the processes that shape them.
Gibraltar Point Erosion Control Project	A project undertaken by the TRCA to provide long-term remedial erosion control works along the southwestern tip of the Toronto Islands known as Gibraltar Point in the City of Toronto.
Government Business Enterprise	A separate legal entity that has been delegated by the federal government the financial and operational authority to carry on a business that may sell goods and services to individuals and organizations outside of the government, maintain its own operations and meet its liabilities from

	revenues received from sources outside of the government.
Habitat Alteration Assessment Tool (HAAT)	A model which is used for assessing productivity of fish habitat based on substrate and other criteria.
Heeling Moment	The heeling force multiplied by the distance to the longitudinal axis of a boat.
Hydraulic Residence Time	The time required to replace/flush the total volume of water in the harbour, and is used as an indicator of water quality
Hydrographic Survey	A survey to measure the depth and bottom configuration of water bodies.
Impact Assessment Summary Tool	A summary tool used to illustrate the overall effects of the proposal in a manner that assists interested parties to understand the trade-offs between both Scenarios. It is conducted in two steps. Step 1 consists of determining the direction of the effects and Step 2 then reviews impacts on user experiences and balance of uses throughout the Waterfront and Island communities.
In the dry	Construction activities completed in generally dry conditions.
In the wet	Construction activities completed in generally wet conditions (i.e., completely or partially under water).
Inner Harbour	The area of Lake Ontario bound by the Toronto Islands and the northern shore of Lake Ontario. The Inner Harbour is accessed by the Western and Eastern Channels.
Jet Ban	The prohibition of the use of jet aircraft at BBTCA under the Tripartite Agreement.
Jet Blast	The phenomenon of rapid air movement produced by the jet engines of aircraft, particularly on or before take-off.
Keating Channel	A 1,000 m long waterway that connects the Don River to the Inner Harbour.
Lakefill/Lakefilling	The placement of clean fill (material) into a lake to extend an existing land mass.
Length of Overall	The maximum length of a boat's hull measured parallel to the waterline.
Leslie Street Spit	A 5 km long peninsula, built by lakefilling, that juts into Lake Ontario east of downtown Toronto. Originally constructed as a breakwater, it is now a car-free urban wilderness park (Tommy Thompson Park) open to the public on weekends.
Letters Patent	Outlines the activities that can be undertaken by PortsToronto as an organization.
Lower Don Lands	The area of land generally bound by Lake Shore Boulevard/Gardiner Expressway to the north, the Inner Harbour to the west, the Ship Channel to the south, and the Don Roadway to the east.
Making Waves – Central	A plan that spells out key public priorities, opportunities and an

Waterfront Secondary Plan II	implementation processes for the Central Waterfront Area.
Marine Exclusion Zone	An in-water marked area in which no vessel shall enter for any purpose without the authorization of PortsToronto.
Mass Balance Model	Used to understand potential changes in water flows into the Inner Harbour.
Maximum Allowable Angles of Heel	Refers to the angle at which if exceeded a boat will become unstable.
MIKE21 Parabolic Mild-Slope (PMS) Model	A model used to simulate growth, decay, and transformation of wind-generated waves. Wave height, peak wave period and mean wave direction can be determined from the model.
Mitigation	An attempt to offset potential adverse effects of human activity on the environment.
Mitigation Measure	An action or program intended to offset known impacts to an existing natural resource such as a stream, wetland or endangered species.
Mode Split	The percentage of travellers using a particular type of transportation or number of trips using said type.
Negative Environmental Effects	The negative effects that a project has, or could potentially have, directly or indirectly on the environment at any stage in the project life cycle.
Net Effects	Negative environmental effects of a project and related activities that will remain after mitigation and impact management measures have been applied.
Non-use Values	Values ascribed to aspects of the environment that exist independent of people's use or enjoyment of them. They include options for future generations to develop and use the waterfront, and impacts on Toronto's "brand" as a waterfront city.
Not at Risk	A species that has been evaluated and found to be not at risk.
Nuisance Effect	An effect of a project that is considered to be inconvenient or annoying (e.g., noise and traffic).
Obstacle Limitation Surface	The surface or series of surfaces that define the limits to which objects may project into airspace.
Outer Harbour	The area of Lake Ontario found between the Port Lands to the north and the Leslie Street Spit to the south. It is accessed by the Main Harbour Channel.
Passive Recreational Space	Open/natural recreational space where activities can be self-directed.
Planning Horizon	The year in which it is anticipated the full effects of the Project can be felt.
Port Lands	The Port Lands is a 356 hectare district bound by the Keating Channel/Don River and Lake Shore Boulevard to the north, the Inner Harbour to the west, Ashbridges Bay to the east and Lake Ontario and Tommy Thompson Park/Leslie Street Spit to the south.

Port Lands Acceleration Initiative	An initiative by the City of Toronto, Waterfront Toronto and the Toronto and Region Conservation Authority to refine the Don Mouth Naturalization and Port Lands Flood Protection Project Environmental Assessment (DMNP EA) and develop a business and implementation plan with the objective of accelerating development opportunities in the Port Lands.
Porter Airlines Proposal	A proposal submitted by Porter Airlines to the City of Toronto, copying PortsToronto, requesting to extend the runway and introduce jet aircraft at the BBTCA.
Precinct Plan	A plan that provides guidance for future changes to an area. It is published after extensive public consultation and usually acts as a preceptor to Secondary Plan and Zoning By-law amendments.
Primary Bird Hazard Zone (BHZ)	The primary BHZ, defined by Transport Canada includes the following: • In the vicinity of the BBTCA, the northern and southern boundaries of the primary BHZ include the areas within 2 km of and adjacent to the runway (including the extension of the land mass); • The eastern and western boundaries of the primary BHZ extend 9 km from each end of the main runway (including the extension of the land mass). At these limits, the northern and southern boundaries of the primary BHZ extend 4 km from the centreline of the runway in each direction (8 km in total); and, • This results in a primary BHZ that resembles a bowtie.
Provincially Significant Wetland (PSW)	A wetland that is protected by the Province of Ontario under the Provincial Policy Statement (PPS). The Ontario MNRF uses an evaluation system to classify wetlands in Ontario as either Provincially Significant or Locally Significant.
Recreational Fisheries Plan	A plan created to enhance fishing opportunities, protect and restore fish habitat, promote fishing and support the creation of quality public access sites along the Lake Ontario north shore.
Reserve Dynamic Stability	The righting energy which enables a boat to withstand any additional heeling moment.
Revetment	A sloping structure placed on banks or shorelines to absorb the energy of incoming water.
Righting Energy	The energy a boat possesses or its ability to right itself.
Righting Moment	Restoring a boat to its previous position.
Righting Moment Curve	The relationship between the angle of heel and the righting moment.
Rip-rap	Rock or other material used to armour (protect) shorelines, streambeds, bridge abutments, pilings and other shoreline structures against scour, water or ice erosion.
Runway 08-26	The main runway at BBTCA.

Runway End Safety Area (RESA)	A level graded area which extends beyond the runway threshold to provide an additional measure of safety in the event of an aircraft undershooting or overrunning the runway.
Scouring and deposition	The wearing a way of a material due to the movement of water and the associated settling of the material elsewhere.
Secondary Bird Hazard Zone (BHZ)	The secondary BHZ, defined by Transport Canada, includes the following: • A 4 km buffer applied to the primary BHZ.
Ship Channel	The Toronto shipping channel located in the Port Lands.
Shoreline Morphology	The study of the origin and evolution of shoreline features. It refers to the geomorphology of the shoreline.
Special Concern	A species that may become threatened or endangered due to a combination of biological characteristics and identified treats.
Stakeholder Advisory Committee (SAC)	A committee formed with the purpose of providing a place where representatives from interested organizations can share their perspectives, concerns and advice with PortsToronto at key points throughout the EA process.
Static Angle of Heel	When the righting moment of a boat equals the heeling moment. Can also be referred to as the semi-permanent heel.
The Toronto Waterfront Scan and Environmental Improvement Strategy Study	A study completed to assist the Government of Canada, the Province of Ontario and the City of Toronto in their joint efforts to achieve the revitalization of the Toronto Waterfront.
Threatened	Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a large portion of its Ontario range if the limiting factors are not reversed.
Toronto and Regional Remedial Action Plan	A plan that which outlines the clean-up, or remediation, of Areas of Concern throughout Toronto and surrounding regions through a mandated process called a Remedial Action Plan, or RAP.
Toronto Bike Plan	A plan that establishes a vision for cycling in Toronto. The plan sets out integrated principles, objectives and recommendations regarding safety, education, infrastructure and a bikeway network.
Toronto Waterfront Aquatic Habitat Restoration Strategy	A strategy to create a more sustainable waterfront by using an ecosystem approach to increase ecological integrity, to provide suitable conditions for the maintenance of self-sustaining aquatic communities and to improve ecological connectivity.
TP 312 - 5th Edition	The 5th edition of Transport Canada's Aerodrome Standards and Recommended Practices. In effect as of September 15, 2015.
Transit Headway	The time between vehicles past a given point is known as the headway (or time headway), usually measured in minutes. The inverse of the headway is called the frequency. Frequency is capturing the number of vehicles per unit time past a certain point on a route and it is usually measured in vehicles per hour.

Tripartite Agreement	An agreement originally drafted and signed by the City of Toronto, Transport Canada and PortsToronto in 1983. The Agreement details the conditions under which the BBTCA operates; such as the flight curfew, the noise limitations, the prohibition of the use of jet aircraft, the prohibition against any lengthening of the operational portion of the runway and the rights and responsibilities of each signatory.
Use Values	Community assets that exist because people use them, such as places, goods, and services associated with tourism and recreation opportunities.
Villiers Island (Cousins Quay) Precinct Plan	The Precinct has an area of approximately 54.28 acres (21.96 hectares) and is bounded by the Keating Channel to the north, Munition Street to the east, the Polson Slip to the south and the Toronto Harbour to the West. The Villiers Island Precinct Plan will establish design and development objectives, secondary streets and blocks, linkages between local parks and open spaces, built form controls, and other mechanisms needed to create the basis of a regulatory framework to facilitate the comprehensive revitalization and high-quality development of Cousins Quay.
Wake Turbulence	Turbulence that forms behind and aircraft as it passes through the air. This turbulence includes wing tip vortices.
West Don Lands Precinct Plan	A planning precinct found in the southeast corner of Downtown Toronto. Generally, it is bound by Eastern Avenue and Queen Street East to the north, the Don River and the Don Valley Parkway to the east, the rail corridor to the south, Parliament Street to the west and does not include the Distillery District. The Plan establishes the location, scale and character of blocks and streets, buildings, parks and green spaces, and community facilities within the precinct area.
Western Channel	The east-west channel found at the western end of the Inner Harbour between the BBTCA lands (Toronto Islands) and the Bathurst Quay Neighbourhood (mainland).
Wing Tip Vortices	The circular patterns of rotating air left behind an airplane wing as it generates lift. One wing tip vortex trails from the tip of each wing.

1. Introduction

PortsToronto undertook an environmental assessment (EA) at the request of Toronto City Council to objectively understand the impacts, benefits and mitigation measures of introducing jet aircraft and extending the operational portion of the main runway (Runway 08-26) at Billy Bishop Toronto City Airport (BBTCA). The BBTCA is owned and operated by PortsToronto and is located in the City of Toronto on the Toronto Islands. Porter Airlines, which operates out of the BBTCA, proposed the introduction of jets and the runway extension to allow for planned growth of its business.

The intent of the EA is to provide information that will allow all stakeholders involved to objectively consider Porter Airlines' proposal and make a decision independently on the choices that need to be made in terms of the impacts, benefits, and mitigation measures associated with the potential implementation of the proposal.

1.1 Background and Introduction to the Billy Bishop Toronto City Airport

The BBTCA is a certified aerodrome under Transport Canada. It is operated by PortsToronto on lands owned by PortsToronto, and leased to PortsToronto from the City of Toronto and Transport Canada. The airport operates on a total land area of approximately 85 hectares (ha), of which 66.8 ha are owned by PortsToronto, 17 ha by the City of Toronto and 1.2 ha by Transport Canada (PortsToronto, 2017).

The airport has been in operation since 1939, and today it serves a wide range of uses including scheduled passenger service, charter and business aviation, air ambulance and recreational flying. It has become Canada's fastest growing airport in recent years, with respect to passenger activity. Between 2006 and 2011, annual passenger activity increased from 22,321 to 1,584,652 passengers and today the BBTCA serves more than 2.3 million passengers annually (PortsToronto, 2015 and 2017). This growth has led to significant investment in terminal facilities, the construction of a pedestrian tunnel, and to the submission of a proposal by Porter Airlines in 2013 to the City of Toronto, requesting to introduce jet aircraft and extend the runway at the BBTCA, which is the subject of this Environmental Study Report (ESR).

1.1.1 History of the Billy Bishop Toronto City Airport

The BBTCA was founded in 1937 and has been in operation since 1939. Throughout the airport's history, it has served as an important commercial aviation centre, a training ground, a hub for general aviation and Medevac services, and as a key driver of Toronto's economy.

In the late 1920s, City of Toronto officials and members of the Department of Transportation began discussions to decide on a suitable location for a major city airport. A special committee was formed and tasked with surveying a number of proposed locations. In the summer of 1937, the recommendation was made to have the Toronto Island property adjacent to the Western Channel developed as a combined airplane and seaplane base.

On July 9, 1937, Toronto City Council approved the Island site and Malton site (now known as Pearson International). Construction began on the Island Airport in 1937 and operations began in 1939. It officially opened as Port George VI Island Airport, but was more commonly known as the Toronto Island Airport. Infrastructure included runways, taxiways, a wood-frame terminal building, and facilities to accommodate seaplanes. A cable ferry was the first to operate, and was used to convey passengers and vehicles to and from the airport, which remained

in operation until 1963. The first commercial passenger flight into the airport landed on September 8, 1939. During the first year of operation the airport had a total of 7,252 landings and take-offs.

In 1939, the declaration of war changed the operation of the airport into a training facility for the Royal Norwegian Air Force from 1940-1943 and then later for the Royal Canadian Air Force. By 1945, Air Force activities ended and civilian flying resumed. Various operations were then established at the airport, including flight schools, flying clubs and small charter service.

Throughout the years demand and operations increased at the BBTCA and in the early 1960s the Island Airport expanded, with a new 4,000-ft. runway and additional taxiways. In 1961, the Island Airport was the busiest in Canada with nearly 213,000 movements, with most of this being flight training. In 1962, the Toronto Harbour Commission (Toronto Port Authority, referred to as PortsToronto) assumed responsibility for the management and operation of the airport.

With the addition of landing lights, night-time flights began on April 15, 1963, extending the closing hour to midnight. In March of 1965, ferry operations were expanded with a ferry (Maple City) capable of carrying vehicles in addition to pedestrians, replacing the 20 year old cable ferry. An instrument flight landing system for Short Take-Off and Landing (STOL) aircraft was successfully tested at the BBTCA in 1973. At the same time, de Havilland Aircraft of Canada, makers of the new DHC-7 (Dash 7) STOL plane, proposed to the Government of Ontario and the Government of Canada, a network of STOL airports around Ontario, with the Island Airport as its hub. The first scheduled commercial flights were initiated by Otonobee Airways in 1975. The airline provided scheduled flights to Montreal via Peterborough, operating a 19 seat aircraft. In the early 1980s the airline was recognized as City Express and expanded its operations providing direct flights to Ottawa and Montreal using DHC Dash-7 and Dash-8 aircraft.

On June 30, 1983, a Tripartite Agreement was signed between the Federal Government, the City of Toronto and the Toronto Port Authority (PortsToronto). It has since been amended twice, with the first amendment in 1985, to allow the currently used Bombardier Q400 (known then as the Dash-8), and again in 2003, to allow the pedestrian tunnel to be constructed. The Agreement requires PortsToronto to operate BBTCA as a permanent public airport for a period of 50 years (until June 2033). As required under the agreement, a number of special conditions must be adhered to, all of which have a very significant impact on the future development of the airport and the nature and extent of aviation activity. These conditions include:

- The construction of additional runways or extensions to existing runways is not permitted;
- Expansion of lands comprising the airport beyond the present land area is not permitted;
- Jet-powered aircraft are not permitted to operate from the airport, with the exception of medical evacuations and other emergency uses; and
- To regulate the potential noise impacts of aviation activity, the actual 28 Noise Exposure Forecast (NEF) Contour associated with aviation activity must remain within the boundary of the official 25 NEF Contour for 1990.

STOL service was initiated in 1984 by City Express Airlines using a Dash-7 aircraft with service from Toronto Island Airport to Ottawa. In 1990, the Toronto Island Airport was renamed Toronto City Centre Airport, and renamed again in 2009, to Billy Bishop Toronto City Airport. Air Ontario (later becoming Air Canada Jazz) introduced scheduled service at the airport in 1990, providing service to Ottawa and Montreal using Q400 aircraft. Intense competition from Air Canada contributed to City Express ceasing their operations in 1991.

Air Canada Jazz continued its operations until 2006 when it lost access to the terminal building, which had been acquired by REGCO Holdings, the parent company of Porter Airlines. Porter Airlines began their operations in 2006, operating 70-seat Bombardier Q400 series aircraft. At the same time, Porter Airlines announced plans to construct and operate a new 10-gate airport terminal building, which opened in 2011 and has the capacity to

accommodate upwards of three million annual passengers. In 2006, the Airport put into commission the David Hornell ferry, which carries 150 passengers on its upper deck and 20 vehicles below, allowing for improved service. It replaced the Maple City ferry which was used as a back-up when required. In 2010, a new ferry, the Marilyn Bell I went into service.

In order to better facilitate pedestrian movement and access to the airport, construction of a pedestrian tunnel to BBTCA began with the completion of the related environmental screening report in March of 2011. The tunnel officially opened on July 30, 2015. This pedestrian tunnel is an under-lake tunnel that spans the Western Channel in the Toronto Harbour to allow pedestrians access between the BBTCA's mainland and island terminal buildings. It is 853 feet long, 10 storeys deep, and takes approximately six minutes to traverse. In addition to the pedestrian tunnel, the project involved the construction of a new one-storey pavilion at the foot of Eireann Quay, an addition to the existing terminal building on the Island, and the construction of water and sewage service lines to service the Island on behalf of the City of Toronto. A major benefit of the tunnel is that it serves to reduce passenger demand on the ferry, permits a more constant flow of passengers, and reduces passenger travel time.

The first of two proposed noise barriers was constructed at the Airport in 2012. The barrier runs 93 m, is 6 m wide, and acts to mitigate aircraft taxi noise at the BBTCA. In 2014, BBTCA launched WebTrak, an important advancement in the airport's noise management strategy. WebTrak is an Internet-based service that allows individuals to locate and track aircraft on their computer or tablet, and receive information such as the aircraft type, the destination and point of departure. These advancements support PortsToronto's commitment to continually working on minimizing the noise footprint of the airport.

1.1.2 Current Role and Operations of the Billy Bishop Toronto City Airport

Today, the BBTCA is used for scheduled air carrier operations, general aviation activities, including corporate aviation and recreational flying, and for Medevac services. The BBTCA serves as a gateway to Toronto, offering the travelling public direct access to and from the city's downtown core, providing non-stop scheduled flights to a number of Canadian and US destinations including Ottawa, Montreal, Thunder Bay, Sudbury, Timmins, New York, Chicago, and Boston. The airport is home to Porter Airlines, and is served by Air Canada Express.

In addition to scheduled air service, the airport provides a number of non-scheduled general aviation activities. These activities include (PortsToronto, 2017):

- A number of smaller air charter and corporate aviation firms are based at the airport or use the airport on a regular basis;
- Air ambulance operators use the airport to transfer patients to and from downtown hospitals and treatment facilities. ORNGE has a base of operations at the airport providing fixed-wing (airplane) and rotary-wing (helicopter) air ambulance service to south and central Ontario;
- Trans Capital Air, which operates flight operations around the world for United Nations, has a base of operations and an aircraft overhaul facility located at the airport; and,
- The BBTCA is home to a number of privately operated aircraft, which are operated for both business and recreation, and is used by visiting itinerant aircraft. With direct access to Toronto Harbour, this includes floatplanes.

1.2 Proponent

First established in 1911 as the Toronto Harbour Commissioners (THC), the Toronto Port Authority (TPA) was renamed in 1999 as part of a broader federal government restructuring strategy to modernize the administration and operation of Canadian ports, which is explained in further detail below. The TPA rebranded itself as

PortsToronto in January 2015 to better reflect the modern priorities of the organization, which are grounded in customer and community service, innovation, modernization and collaboration.

The Toronto Port Authority (PortsToronto) was established by the Federal Government under the Canada *Marine Act* in 1999. PortsToronto is a federally assigned Government Business Enterprise (GBE)[1] that provides regulatory controls of marine and air transportation in the port and harbour, grants permits for powered boating activities, oversees land development and engages in trade development for the port's terminals. PortsToronto owns and operates the BBTCA, formerly the Toronto City Centre Airport, which welcomes more than 2.3 million passengers each year; the Outer Harbour Marina, one of Canada's largest freshwater marinas; and Terminals 51 and 52, which provide transportation, distribution, storage and container services to businesses at the Port of Toronto (**Figure 1-1**).

PortsToronto operates in accordance with the Canada *Marine Act* and its Letters Patent[2], in addition to a series of specific by-laws, policies and procedures. PortsToronto's Letters Patent outlines the activities that can be undertaken by the organization. PortsToronto is responsible for the management of the movement, navigation, and berthing of vessels using the port and harbour to ensure safety and compliance with by-laws and regulations, and the effective management of land operations in accordance with their Letters Patent. PortsToronto monitors navigable channels and navigational aids to comply with the standards of the St. Lawrence Seaway. PortsToronto is responsible for the provision of services concerning navigation in the port and harbour of Toronto which includes the safe operation of various smaller watercraft under the *Navigation Protection Act*.

According to the Canada *Marine Act*, PortsToronto is obliged to "manage the marine infrastructure and services in a commercial manner that encourages, and takes into account, input from users and the community in which a port or harbour is located" (Canada Marine Act, Section 4(f), 1998, p. 4). As such, in managing the BBTCA, PortsToronto must consider and assess proposed changes to the BBTCA operations and infrastructure in consultation with local communities and stakeholders.

1.3 Project Goals and Objectives

PortsToronto operates the BBTCA under the conditions of an agreement called the Tripartite Agreement which was originally drafted and signed in 1983 by the City of Toronto, Transport Canada and PortsToronto. The Tripartite Agreement details the conditions under which the BBTCA operates; such as the flight curfew, the noise limitations, the prohibition of the use of jet aircraft ("jet ban"), the prohibition against any lengthening of the operational portion of the runway and the rights and responsibilities of each signatory. Without the consensus of all three signatories, no changes can be made to the Tripartite Agreement.

In 2013, Porter Airlines submitted a proposal to the City of Toronto, copying PortsToronto, requesting to introduce jet aircraft at the BBTCA. Part of this proposal included an extension of the land mass at each end of the main runway (Runway 08-26), hereafter referred to as the runway extension, in order to lengthen the operational portion of the runway to accommodate the use of the requested jet aircraft for scheduled commercial flight operations. As the Tripartite Agreement does not allow the use of jet aircraft for scheduled commercial travel or the lengthening of the operational portion of the runway, the terms of the Tripartite Agreement would need to be amended to approve Porter's proposal.

The City of Toronto undertook a review of the potential impacts of Porter's proposal in 2013, and the results of that review were presented to the public and to Toronto City Council in late 2013 and early 2014. In consideration of the outcome of the City's review and concerns raised by the public regarding existing airport operations, and prior to

1. *According to the CPA Canada Public Sector Accounting Handbook (ISBN: 0-88800-287-4) a government business enterprise is a separate legal entity that has been delegated by the federal government the financial and operational authority to carry on a business that may sell goods and services to individuals and organizations outside of the government, maintain its own operations and meet its liabilities from revenues received from sources outside of the government.*
2. *http://www.portstoronto.com/About-TPA/Governance/Letters-Patent.aspx*

entering into negotiations to amend the Tripartite Agreement, City Council, in an April 1, 2014 resolution (City of Toronto, 2014), requested, in part, that further study and analysis of the effects of jet aircraft at the BBTCA and associated mitigation measures be completed. This request consisted of four key components and included:

1. Commencement of an Airport Master Plan for the BBTCA;
2. Development of a Precinct Plan for the Bathurst Quay neighbourhood (now called the Bathurst Quay Neighbourhood Plan);
3. Commencement of design work for the proposed runway extension; and,
4. Completion of an EA.

Items 1 to 3 are further described in **Section 1.7**. Item 4, the completion of an environmental assessment (EA), has been completed through the effects assessment studies described in this ESR.

PortsToronto undertook this EA at the request of the City of Toronto to identify the effects of the proposed changes on the surrounding environment and to inform their position related to the proposal. The EA will allow PortsToronto to understand the costs, potential impacts, and required mitigation measures associated with the proposed runway extension and the requested lifting of the jet ban in the Tripartite Agreement.

It is important to note that this EA is not an approval of Porter Airlines' proposal, nor does it imply support for or against any aspect of the proposal. The result of the EA is information that will allow all stakeholders to objectively consider the proposal and to make a decision for themselves on the choices that need to be made in terms of impacts, benefits, and mitigation measures associated with the potential implementation of the proposal. The EA addresses one of many requests made by Toronto City Council on April 1, 2014, in debating the City's position on the request to amend the Tripartite Agreement.

1.4 Study Areas

The BBTCA is located on the Toronto Islands, adjacent to an urbanized waterfront. The area surrounding the airport is used by local residents, non-residents, and visitors to the City of Toronto for a variety of purposes, such as, residential living, recreation and tourist activities, commercial operations and institutional uses (such as schools).

1.4.1 Project Study Area

The Project Study Area includes all lands on which the BBTCA is located, including the Marine Exclusion Zone (MEZ), and immediately surrounding areas. The MEZ is an area of the lake marked by buoys in which no vessel shall enter for any purpose without PortsToronto's authorization (PortsToronto, 2000). The Project Study Area is shown in **Figure 1-1**.

1.4.2 Impact Assessment Study Area

Existing environmental conditions have been reviewed in detail as part of each effects assessment study, and focus on a geographic area where the particular impact under investigation can reasonably be assumed to be measurable. This geographic area is referred to as the Impact Assessment Study Area. The Impact Assessment Study Area depicted in **Figure 1-2** combines each of the individual effects assessment Local Study Areas (LSA) developed for the supporting technical studies. Therefore, the Impact Assessment Study Area includes lands adjacent to the BBTCA, as well as lands extending across the waterfront, the islands or to other parts of the City of Toronto. The Impact Assessment Study Area is outlined in **Figure 1-2**. The individual effects assessment Study Areas which may include a single Study Area or the combination of a LSA and a Regional Study Area (RSA) for the supporting technical studies and review of existing conditions form the basis for the effects assessment of the EA.

Figure 1-1: Project Study Area

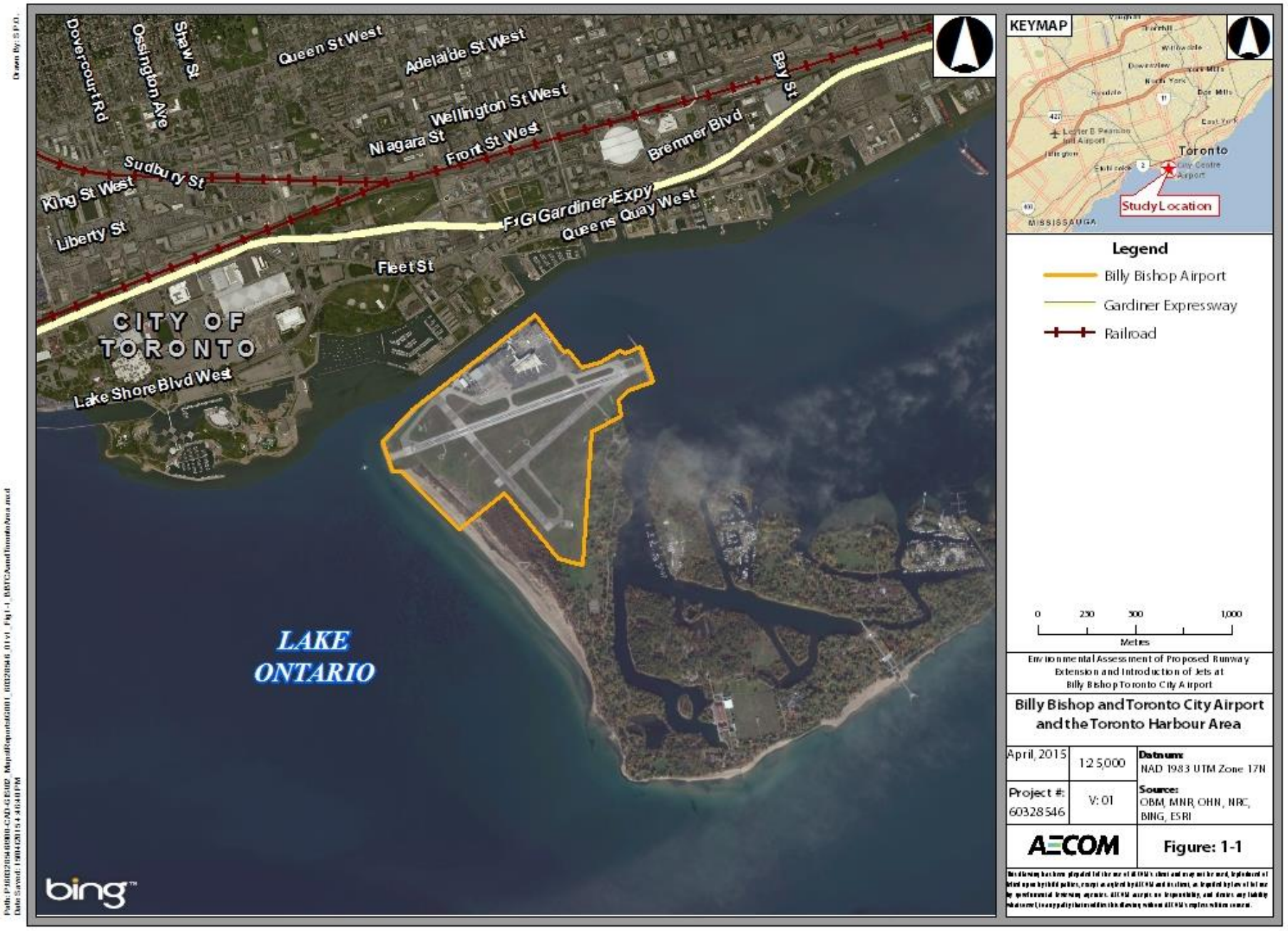
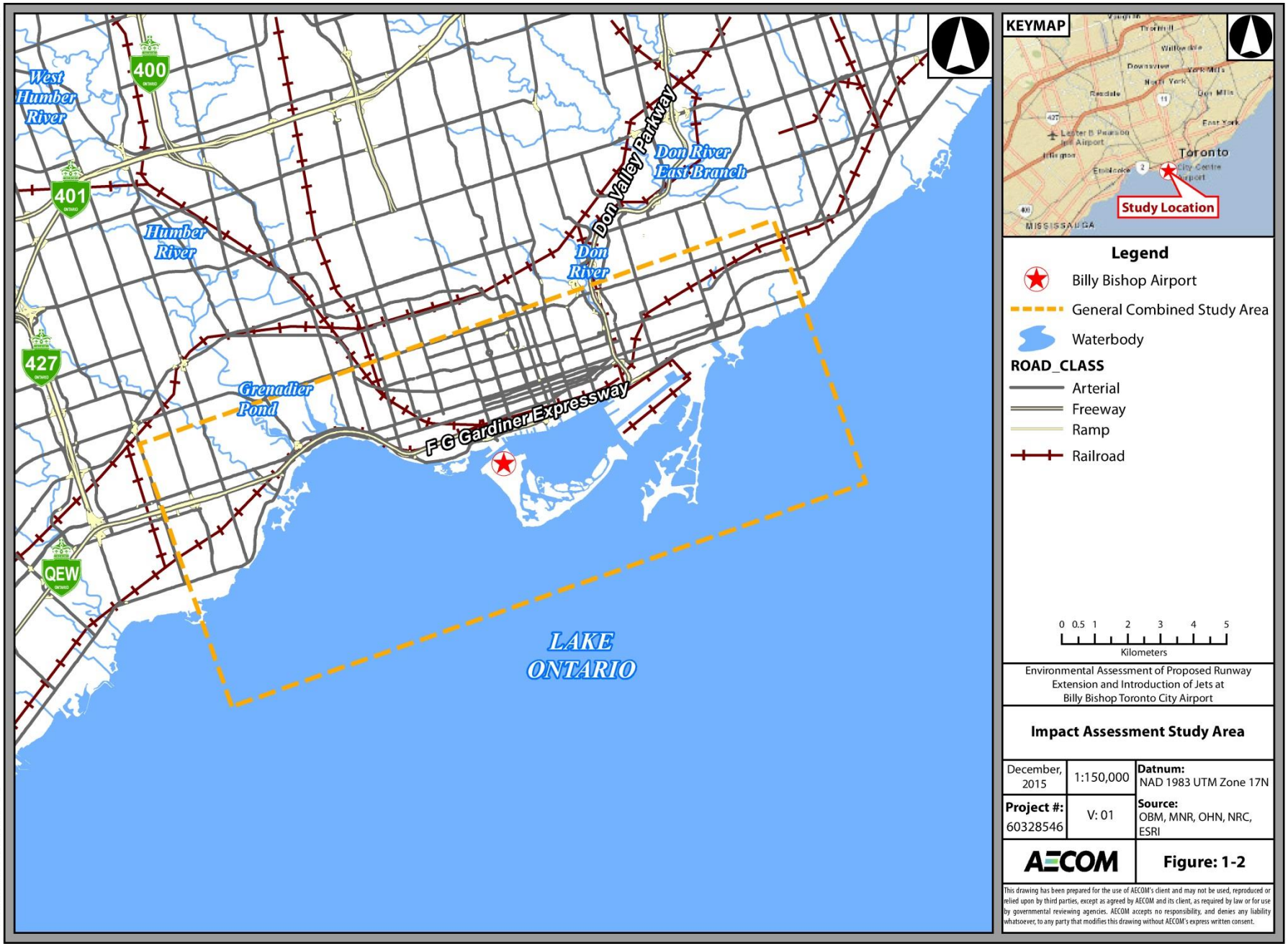


Figure 1-2: Impact Assessment Study Area



1.5 Temporal Boundaries

The temporal boundaries for the BBTCA EA, which will be used as the basis for the effects assessment, are as follows:

- Detailed Design, Permit Approvals, Land Acquisition and Construction: 2017 to 2019; and,
- Operation: defined as the time frame for operation of the airport for the purpose of the assessment (from 2019 until approximately 2031[3]).

1.6 Environmental Assessment Framework

An EA is typically triggered by a requirement under the Canadian *Environmental Assessment Act* (CEAA) or the *Ontario EA Act (EAA)*. As described in further detail below, the proposal is not subject to the requirements of either Act. As there are no regulatory requirements defining the EA process for this proposal, the scope of work (also known as the Study Design) was developed based on engagement with stakeholders and on experience with other EAs at both the Provincial and Federal levels. This approach blends the key elements of both the Federal and Provincial EA Acts, taking into consideration input from stakeholders. The Study Design document is included as **Appendix A** to this ESR.

1.6.1 The Ontario Environmental Assessment Act

The *EAA* establishes a planning and decision-making process for the proponents of a proposed undertaking. This process requires proponents to evaluate the potential environmental effects of their undertaking and document the results of the EA for submission to the Minister of the Environment and Climate Change for approval. The first step in an EA (also known as an Individual EA) is to prepare a Terms of Reference document which details and guides the EA. Key components of the Terms of Reference include a description of the alternatives to be assessed, how impacts will be evaluated, and how the public, agencies and Indigenous communities will be engaged through the process. The Terms of Reference document must be presented to the public prior to submission to the Minister for approval.

The second step of an EA is to undertake the studies and analysis described in the approved Terms of Reference. Once the process is complete, a report is prepared outlining the project approach, engagement opportunities, and study outcomes, and is then circulated for public and stakeholder review. Assuming no significant concerns are raised during the review period, the project is approved by the Minister.

In a letter dated December 15, 2014, the Ministry of the Environmental and Climate Change (MOECC) confirmed that "*as the operation and expansion of airports is the Federal government's responsibility, the Province of Ontario has no jurisdiction under the EAA and accordingly, there are no requirements under the EAA for the proposed extension of the airport's runway*". As such, the proposal is not subject to a Provincial EA. A copy of this letter is provided as **Appendix B-1**.

1.6.2 The Canadian Environmental Assessment Act

The *CEAA* is required when a proposed project is described in the Act's *Regulations Designating Physical Activities* or if the Minister of the Environment and Climate Change determines that an EA is required. Under the CEAA 2012, a proponent, Federal ministry or agency will determine impacts and associated mitigation measures, conduct a cumulative effects assessment and undertake Indigenous community consultation (Government of Canada, 2014).

3. The operational timeframe is not intended to indicate that operations will end after this period.

In a letter dated February 25, 2015, the Canadian Environmental Assessment Agency confirmed that the proposal "is not described in the *Regulations"* and therefore the proposal is not subject to a Federal EA.

However, the Canadian Environmental Assessment Agency indicated that due to the proposal's location, in part, on federal lands (owned by Transport Canada); there is a requirement to comply with Section 67 of the *CEAA 2012*, as follows:

> *67. An authority must not carry out a project on federal lands, or exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a project to be carried out, in whole or in part, on federal lands, unless*
>
> *(a) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or,*
>
> *(b) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides that those effects are justified in the circumstances under subsection 69(3).*

A copy of this letter is provided as **Appendix B-2**.

It is PortsToronto's position that Section 67 of the *CEAA, 2012* is being addressed through the completion of this EA, which identifies whether the proposal has the potential to cause significant adverse environmental effects. PortsToronto has maintained communication with Transport Canada throughout the EA. Transport Canada has been actively involved in the EA process, and participated on the Agency Advisory Committee.

1.6.3 Environmental Assessment Process Followed

As a result of the level of public interest in the proposal, PortsToronto elected to develop and consult on a Study Design document prior to conducting an assessment of the proposed runway extension. The Study Design (also known as a terms of reference) document was developed and consulted on to provide a guide for the effects assessments studies for the proposed runway extension presented in this ESR. The Study Design document was released to the public in August 2015 (**Appendix A**).

In addition, the EA process undertaken has been enhanced with elements of the Federal EA Act. Thus, the EA process undertaken by PortsToronto incorporates procedural elements from both the Federal (*CEAA*) and Provincial EA Acts.

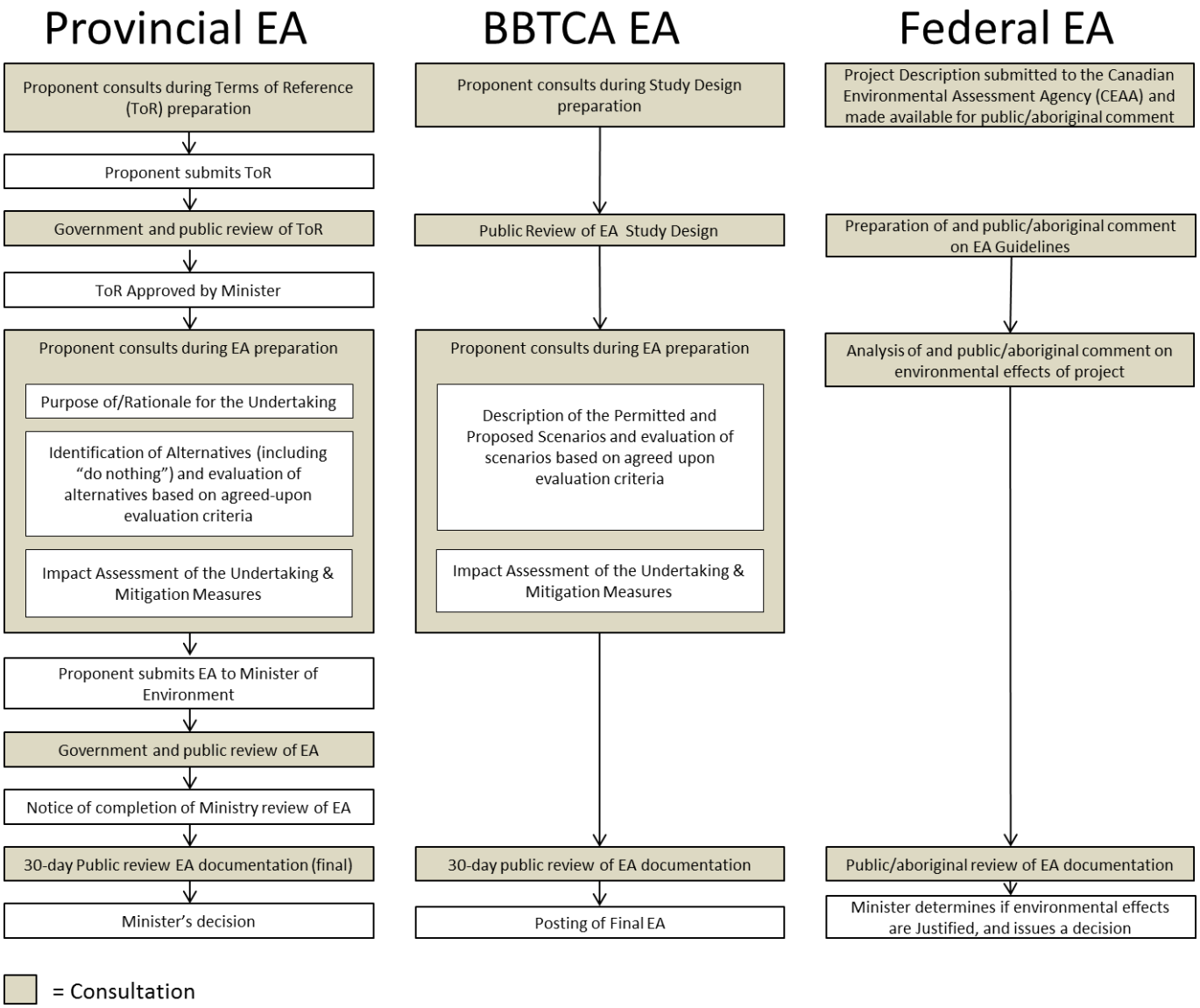
The process includes an assessment of environmental, social and economic effects (positive and negative) of two Future Airport Scenarios. These two scenarios are detailed in **Section 3** and are as follows:

Future Baseline Scenario: .....The operational portion of the runway is not extended and jets are not permitted at BBTCA; and a Runway End Safety Area (RESA) is constructed approximately 43 m into the lake at both ends of the main runway (Runway 08-26) to address Transport Canada's requirements.

Proposed Future Scenario: ...The Tripartite Agreement is amended to permit commercial jet operations and the extension of the land mass by 200 m at each end of the main runway (Runway 08-26).

As illustrated in **Figure 1-3**, the EA process included a number of opportunities for review and comment during preparation of the Study Design and allowed for the engagement process to receive and address public, Indigenous community, stakeholder and agency feedback and comments. The engagement process for the EA did not continue past the release of the Study Design for public review.

Figure 1-3: Summary of Key Federal and Provincial EA Requirements



Key steps in the EA process are shown in **Figure 1-4** and include:

1. **Determining the Future Airport Scenarios**
   - Describe the Future Baseline and Proposed Future Scenarios, as outlined in the existing 2012 Master Plan for the BBTCA and the 2015 Master Planning Exercise.
2. **Outlining Existing Environmental Conditions and Constraints**
   - Identify and describe the existing environmental conditions potentially affected by the proposal as they relate to each effects assessment study.
     - In addition, the EA describes the potential future environmental conditions that may not be related to changes at the airport as this forms the basis for the effects assessment studies of the Future Baseline and Proposed Future Scenarios.
     - Existing conditions must first be described in order to understand future environmental conditions.

- The effects assessment studies include:
  - Air Quality;
  - Noise;
  - Public Health;
  - Marine Navigation;
  - Marine Physical;
  - Water Quality;
  - Built Form and Land Use;
  - Archaeology and Cultural Heritage;
  - Socio-Economic;
  - Natural Environment; and,
  - Transportation.

3. Conducting the Effects Assessment

- Identify and assess potential environmental effects of the Future Baseline and the Proposed Future Scenarios in consideration of future environmental conditions. To document future environmental conditions, take into account other past, present and certain or reasonably foreseeable future effects from other actions/projects within the same geographic and temporal boundaries of this assessment. In addition to integrating effects from other actions/projects, the effects assessments also consider effects identified from the other effects assessment studies conducted for this project.
  - Construction effects are assessed in consideration of existing conditions as these conditions will be similar to those if the proposal should proceed.
  - Operational effects are assessed in consideration of future environmental conditions as this timeframe represents the full impact of the operational stage of the Project.
- Document potential effects through the studies listed above and detailed in the Work Plans of the Study Design (refer to **Appendix A**).
- Develop appropriate avoidance/mitigation measures to address the effects and identify net (also known as “residual”) effects.

4. Comparing Net Effects

- Compare the net effects of the Proposed Future Scenario to the net effects of the Future Baseline Scenario.

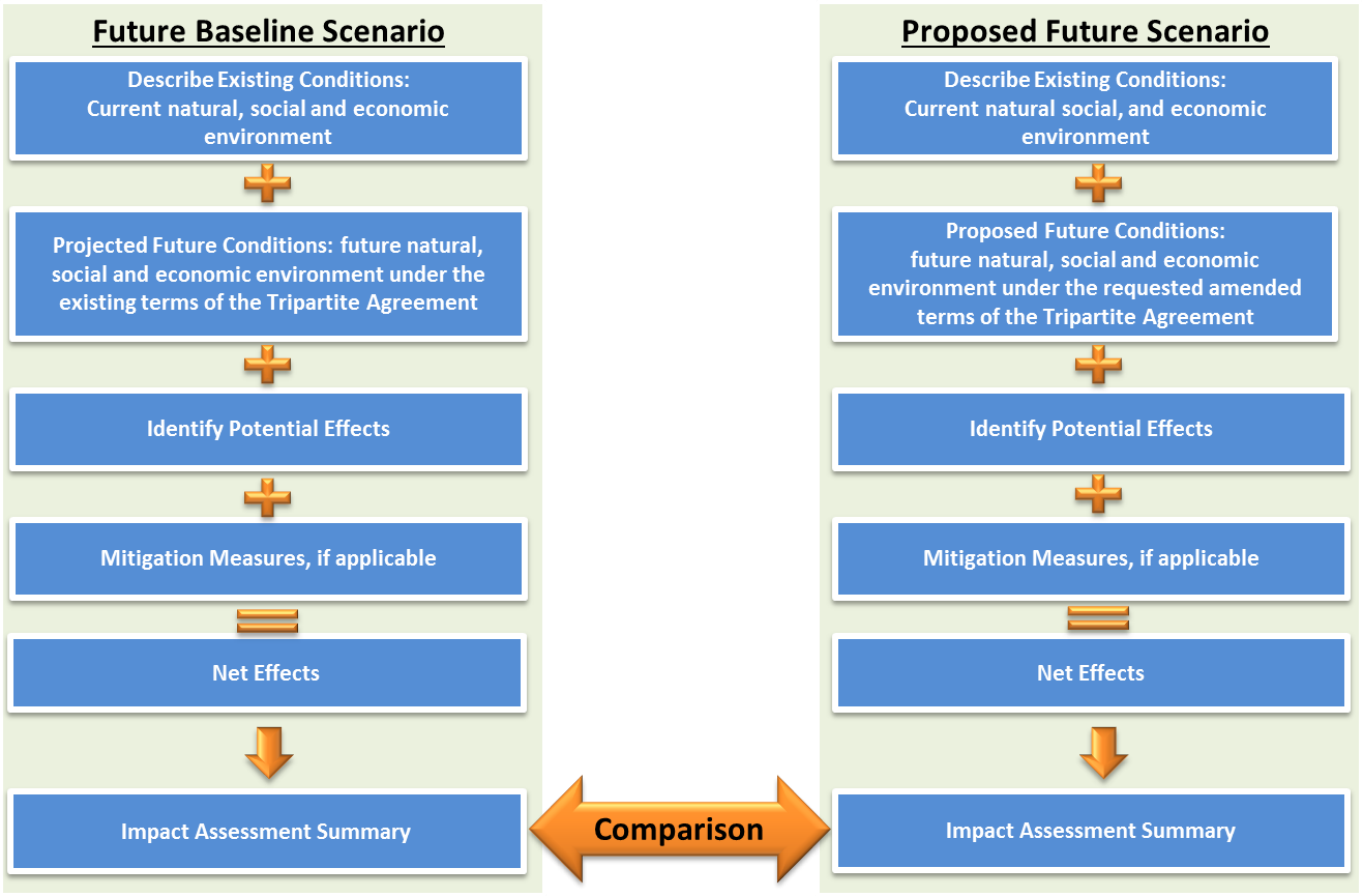
5. Conducting Ongoing Engagement

- Engage with stakeholders (residents; interest groups; municipal, provincial and federal representatives; etc.) and Indigenous communities throughout the planning process.
- Hold Public Meetings at key decision points.
- Note that the engagement process for the EA did not continue past the release of the Study Design for public review.

6. Preparing the Environmental Study Report

- Prepare an ESR to document the EA.

Figure 1-4: Effects Assessment Evaluation and Comparison Process



1.7 Co-ordination with Other Planning Efforts

As outlined above, on April 1, 2014, Toronto City Council (Council) adopted Item EX40.1 “Request to Amend the Tripartite Agreement for Billy Bishop Toronto City Airport” with amendments. This council resolution included a number of requirements that PortsToronto must fulfill, and these requirements were to be completed in three phases, prior to Council considering the requested amendments to the existing Tripartite Agreement.

The four key components of the requirements outlined in the first phase include the:

1. Commencement of an Airport Master Plan for the BBTCA;
2. Commencement of the Preliminary Runway Design;
3. Development of the Bathurst Quay Neighbourhood Plan (by City of Toronto staff); and,
4. Completion of an EA.

The first two items are being undertaken by PortsToronto concurrently alongside this EA and are described in the following subsections. The third item is being undertaken by the City of Toronto, also concurrently with the first two items. The fourth component (EA) is the subject of this ESR.

PortsToronto has finalized the draft 2015 Master Planning Exercise and design documents in order to provide the details of the elements for the EA to assess. The impacts of those elements have been assessed by the EA, and could affect the final design or operational elements of the airport. As a result, PortsToronto committed to waiting to finalize the Master Plan and Preliminary Runway Design until after the effects assessment studies for the EA were complete.

1.7.1 BBTCA Master Planning

PortsToronto's 2012 Master Plan describes the existing infrastructure at the BBTCA, provides aviation forecasts, infrastructure requirements and recommendations for the phasing and implementation of airport improvements. The 2012 Master Plan is a planning framework used to ensure that short-term developments do not impede longer term objectives at the BBTCA (PortsToronto, 2017). The 2012 Master Plan was prepared under conditions outlined in the current Tripartite Agreement and as such, provides a framework for future anticipated growth of the airport.

PortsToronto is currently undertaking the 2015 Master Planning Exercise to document future passenger volumes and the conceptual design of the airport should a runway extension and commercial jets be permitted at the BBTCA through an amendment to the Tripartite Agreement. Key considerations regarding the construction of the runway extension and details regarding operational changes, such as revised passenger volumes, established through the 2015 Master Planning Exercise have been incorporated into this EA for the purposes of the effects assessment studies. The 2015 Master Planning Exercise included consultation with aviation and community stakeholders, as well as a public consultation session in the spring of 2015.

1.7.2 Preliminary Runway Design

As per the April 1, 2014, request from Toronto City Council, PortsToronto is undertaking a runway design, among other initiatives, to identify the conceptual design details of the proposed runway extension. The runway design will be based on the requirements of TP 312 - 4th Edition as this has been the standard in place since 1993 and throughout the past 16 months of runway design activities.

On July 31, 2015, Transport Canada announced the release of TP 312 - 5th Edition which was in effect as of September 15, 2015. It has been confirmed by Transport Canada that airports that have begun runway design and construction under TP 312 - 4th Edition, can continue to plan and build to this Edition standard, in accordance with the details laid out in Transport Canada Advisory Circulars. Further, airports already in the design process may consider the merits of the two versions according to what best suits the airport's unique needs. In addition, airports that may not meet the time limitations set out in Transport Canada Advisory Circulars may be given a favourable consideration on a case by case basis, and granted a ministerial exemption to continue to build to the TP 312 - 4th Edition.

As such, the EA has considered the effects of the proposal and compliance with TP 312 - 4th Edition. PortsToronto is committed to the safe operations of all the facilities it manages, including the BBTCA. All operations will continue to comply with the applicable legislation.

Initial investigations by the design team supporting PortsToronto in the design of the proposed runway extension included two alternative design options. The first was based on a runway extension using lakefill, and the second was based on a runway extension through over-water decking supported by piles or piers. Upon further investigation by the design team, it was confirmed that the second option would not be feasible due to the force and height of waves in the vicinity of the Outer Harbour. As such, the EA has evaluated the impacts associated with the first runway design alternative.

The EA has also assessed the potential impacts associated with the inclusion of a RESA in the future runway design. The RESA is a level graded area which extends beyond the runway threshold to provide an additional measure of safety in the event of an aircraft undershooting or overrunning the runway. RESAs are required where the runway length exceeds 1,200 m or where a runway is utilized by scheduled passenger operations utilizing aircraft with more than nine seats.

In 2010, Transport Canada identified the requirement to implement a RESA at qualifying airports as an additional safety consideration. The installation of a RESA at the BBTCA would result in an amendment to the Tripartite

Agreement (WSP Group, 2014), but will be required to comply with Transport Canada regulations. The RESA at the BBTCA would consist of a land mass extension at both ends of the main runway (Runway 08-26) by lake-fill within the airport's MEZ thereby not affecting marine navigation. Although not required under the *CEAA*, an EA report for lakefilling in the area where the RESA will be required, "Lakefill within Marine Exclusion Zone (Keep-out-Area) Toronto Harbour", was completed in January, 2013 (Dillon Consulting, 2013).

Transport Canada has confirmed that runway approach lighting will not be a requirement at BBTCA if the proposal is approved, because the proposal does not result in a change in the type of runway approach at the airport. BBTCA is a non-precision approach airport, and this will not change as a result of the proposed changes to operations or the runway.

1.7.3 Bathurst Quay Neighbourhood Plan

In January 2015, the City of Toronto commenced the Bathurst Quay Neighbourhood Plan (BQNP) study in order to identify a long-term plan for the community immediately adjacent to the BBTCA. As per the study's website, the study will identify improvements relating to:

- Public realm;
- Transportation;
- Pedestrian and cycling connections and facilities; and,
- Parks and open spaces.

Although this study is being conducted by the City of Toronto separate from the two studies previously described, it is linked to the 2015 Master Planning Exercise insofar as the study will recognize the interrelationship of the neighbourhood and the airport, and aims to develop an approach to address access issues at the airport (City of Toronto, 2015). The BQNP is scheduled to be finalized in 2017.

1.7.4 Other Relevant Planning Processes

In order to understand the future context in which the proposed changes at BBTCA could take place, PortsToronto has considered planning documents, including, but not limited to:

- City of Toronto Official Plan;
- City of Toronto Parks Plan 2013 - 2017;
- Creative City Planning Framework;
- Toronto Bike Plan;
- Clean Water, Clear Choices;
- Making Waves – Central Waterfront Secondary Plan ll;
- The Toronto Waterfront Scan and Environmental Improvement Strategy Study;
- Toronto Waterfront Aquatic Habitat Restoration Strategy;
- Recreational Fisheries Plan;
- Port Lands Profile;
- West Don Lands Precinct Plan;
- East Bayfront Precinct Plan;
- Villiers Island Precinct Plan; and,
- Port Lands Acceleration Initiative – Film Studio District.

These documents cover a variety of topics relating to:

- Land use development;
- Transportation;
- Pedestrian and cycling connections and facilities;
- Parks and open space;
- Environmental sustainability;
- Waterfront revitalization;
- Waterfront planning; and,
- Precinct planning and urban development.

1.7.5 Integration of Master Plan, Preliminary Runway Design and Environmental Assessment

The Study Team received many questions relating to the relationship between the 2015 Master Plan, Preliminary Runway Design and the EA. The purpose of **Table 1-1** is to highlight which components fall under the jurisdiction of each process.

Table 1-1: Relationship between the Master Plan, Preliminary Runway Design and the EA

2015 Master Planning Exercise	Preliminary Runway Design	Environmental Assessment
Will determine changes to: - Number of daily commercial slots; - Total passengers/year; - Total annual aircraft movements; - Total annual non-commercial aircraft movements; - Passengers in peak hour; - Groundside infrastructure; - Control or approach surfaces; - Airport safety as it relates to Transport Canada's regulations that guide airport design and operation; - Marine Exclusion Zone; - Volume of fuel trucks or other delivery trucks; - Demand, operations and functional improvements to the existing Passenger Pick-up/drop-off zone; - Flight paths, heights; and, - Growth opportunities and market demand.	Will confirm key conceptual design details such as: - Runway extension; - Parallel taxiway; - Starter strip; - Jet blast fence; - Potential noise barrier (to be confirmed); - Localizer antenna and associated shelter; - Rock break walls; and, - Parallel Taxiway A, relocation of Glide Path 26, and relocation of marine radar.	Will assess impacts of: - Changes identified in the 2015 Master Planning Exercise; - Changes identified in the 2012 Master Plan; and, - Design details developed through the Preliminary Runway Design.

1.8 Overview of the Environmental Study Report

The ESR is organized into the following section:

Section 1..... Introduces the project, proponent, the EA process followed, and decision making as a result of the EA. Provides an overview of the purpose of the EA and the process of the undertaking. It outlines the Study Areas, describes the process for the effects assessment studies and details the EA's co-ordination with other planning efforts.

Section 2..... Outlines and gives a description of the existing and future conditions of the potentially affected environment for each of the effects assessment studies conducted.

Section 3..... Describes the Future Airport Scenarios by outlining the past, present and future role and operations of the BBTCA, as well as anticipated future growth. It explains the details of both the Future Baseline and Proposed Future Scenarios being assessed as part of this EA.

Section 4..... Provides the net effects analysis for each effects assessment study under the Future Airport Scenarios, and describes the methodology used for analysis.

Section 5..... Identifies the overall direction of effect on all assets for each of the effects assessment studies.

Section 6..... Provides the next steps in regard to the Tripartite Agreement and any future commitments to be made by PortsToronto.

2. Potentially Affected Environment – Existing and Future Conditions

2.1 Air Quality

RWDI AIR Inc. (RWDI) completed the Air Quality Effects Assessment for the EA. Their report is found in **Appendix C-1** of the ESR.

The Air Quality Study Area along with the 50 receptor locations where contaminant concentrations were assessed is shown in **Figure 2-1**. The Study Area covers an approximately 12 km long section of the Toronto waterfront, extending from the Toronto Sailing and Canoe Club in the west to Woodbine Beach in the east. The Study Area encompasses the Toronto Islands, the Leslie Street Spit, areas of proposed development in the Port Lands, residential areas in the vicinity of Little Norway Park and along Queens Quay, the southern portions of Wards 19 and 20 (from approximately King Street West southward), the Music Garden, Harbourfront Centre, West-Jet Stage and various other public areas of interest along the waterfront.

For the purpose of presenting detailed results of the analysis, several representative residences, schools, parks, and other locations of concern within this area were identified in consultation with the public during the development of the Study Design. These representative locations are referred to as discrete receptors, and are shown in **Figure 2-2**.

Existing air quality conditions refers to the concentrations of contaminants in the Air Quality Study Area produced by other sources besides those associated with the Project. Background concentrations of contaminants can be established through ambient monitoring, and/or from computer models (dispersion modelling). The contaminants assessed included nitrogen dioxide, carbon monoxide, $PM_{2.5}$, acrolein, benzene, cadmium, Benzo(a)Pyrene (BaP) and Ozone. The Air Quality Effects Assessment used a combined approach where monitoring data were used to represent general background levels of air contaminants, and computer dispersion modelling was used to predict the additional impact from sources related to the BBTCA such as aircraft emissions (landings, take-offs, taxiing, and idling) and other local sources such as main roads in the vicinity of the BBTCA.

The background contaminant concentrations used to establish existing air quality conditions were also used to determine future air quality conditions. This assumes that background contaminant levels will persist into the future at their current levels. This assumption represents a conservative approach to estimating future air quality conditions. It is likely an overestimate of future background levels, as contaminant levels at monitoring sites in Ontario have generally been on a declining trend that is likely to continue into the future.

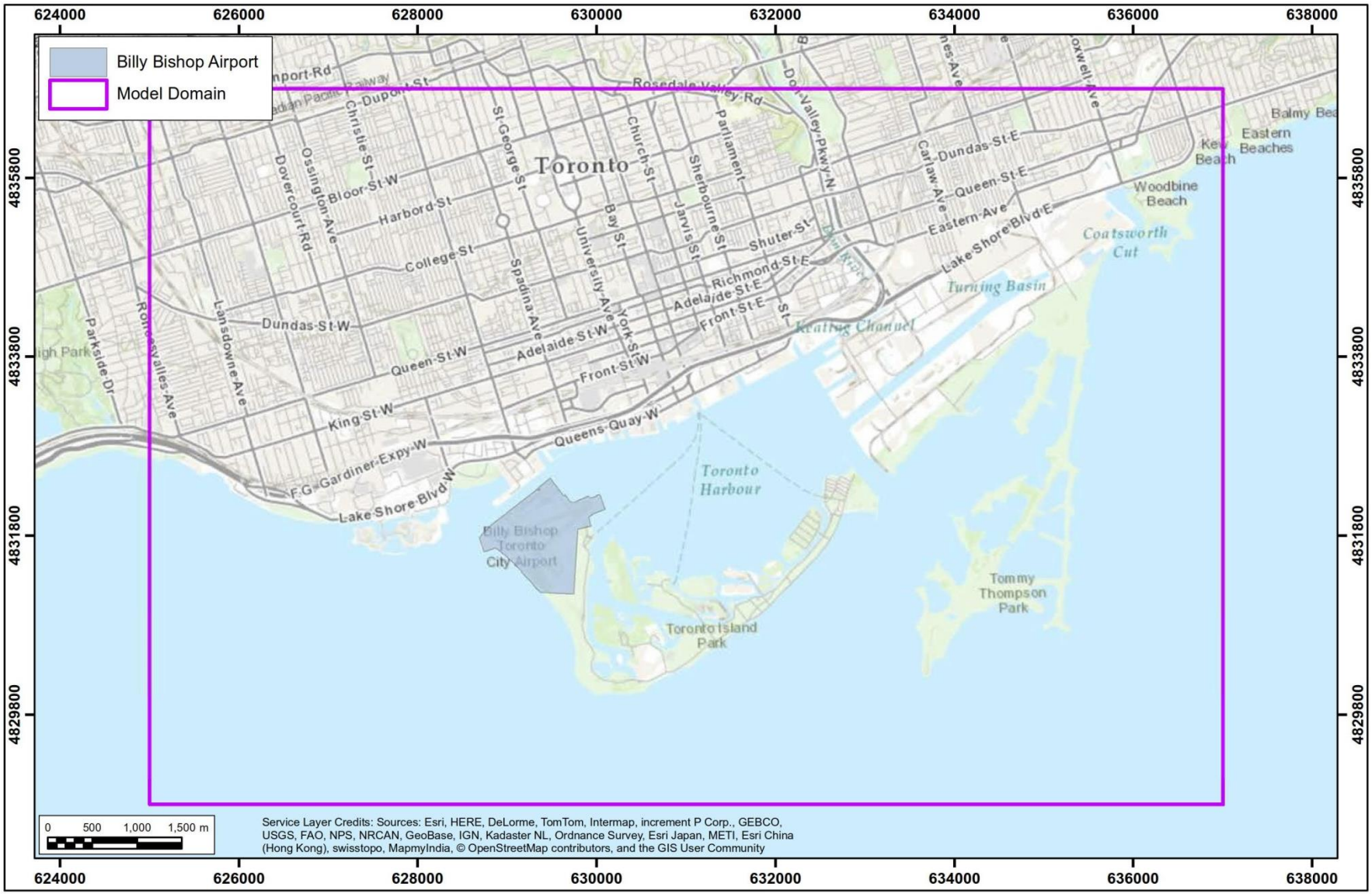
For complete details on existing and future air quality conditions within in the Air Quality Study Area refer to **Appendix C-1**.

2.2 Noise

RWDI also completed the Noise Effects Assessment for the EA. Their report is found in **Appendix C-2** of the ESR.

The Study Area for the Noise Effects Assessment is shown in **Figure 2-3**. It extends northwards from the BBTCA to the Gardiner Expressway, eastwards to Rees Street, westwards to the Exhibition Park lands, southward to include the residential part of the Toronto Islands and as far south as South Island.

Figure 2-1: Air Quality Study Area



Study Area

Map Projection: NAD 1983 UTM Zone 17N

Air Quality Assessment of Billy Bishop Airport, Toronto, Ontario

True North

Project #1402032

Drawn by:	DJH
Approx. Scale:	1:60,000
Date Revised:	Nov. 29, 2016

RWDI

Figure 2-2: Discrete Receptor Locations

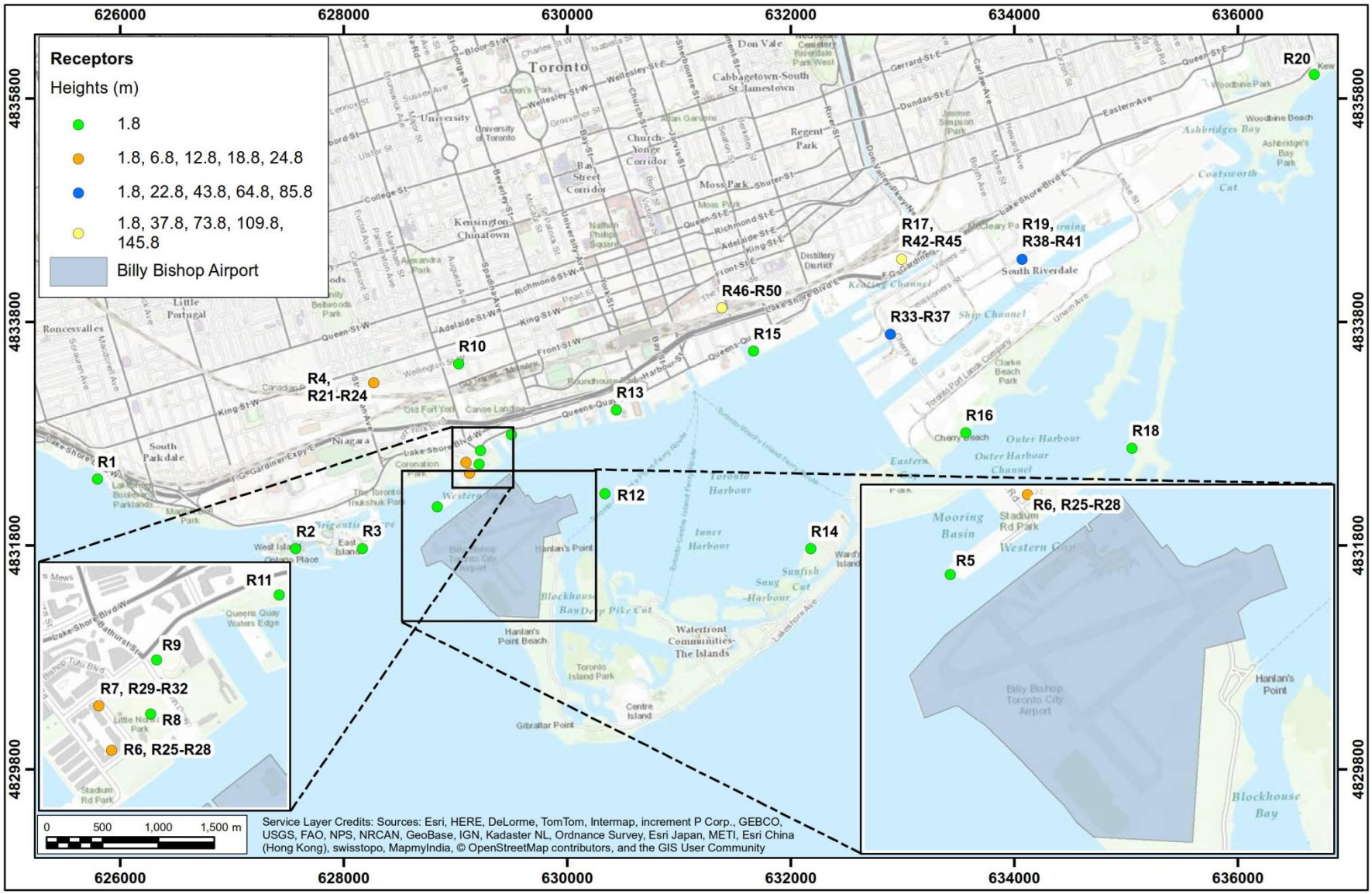


Figure 2-3: Noise Study Area



The principal descriptors of sound for the Noise Effects Assessment were the Noise Exposure Forecast (NEF) and the energy-equivalent sound level (L_{EQ}). Sound from airborne aircraft is described in terms of NEF. This includes sound that occurs on the runway for takeoff, while the aircraft is airborne and during landing. All other sources of sound for the assessment are described using the L_{EQ}. L_{EQ} represents the average sound level occurring over a period of time.

The evaluation of sound to determine existing conditions was performed at locations that are considered sensitive to sound. The MOECC NPC-300 guidelines identify residential uses and schools as sensitive locations. Representative sensitive locations for the Noise Effects Assessment are shown in **Figure 2-4**. While NPC-300 does not include parks as sensitive locations, Little Norway Park was included to be consistent with previous noise studies.

Key sound sources associated with the BBTCA are airborne aircraft, aircraft on the ground (i.e., taxiing, engine run-up, and engine-braking upon landing), airport ground support equipment and the Marilyn Bell Ferry. Vehicles holding for the airport (i.e., cars and trucks queuing, taxis and buses in the holding pen) are not considered significant and have therefore not been modelled. Sources of ambient sound in the area include on-street-vehicles and Light Rail Transit (i.e., streetcars). Mechanical equipment for heating, ventilation and air conditioning can also be sources of ambient sound but are not considered significant for this assessment. Ambient sounds from on-street construction or nearby entertainment events are also not included. Modelled cumulative existing sound levels from the BBTCA and ambient sources as experienced at points of reception in the vicinity of the BBTCA are included in **Appendix C-2**.

Existing conditions have been used as a conservative proxy for future conditions that would occur without the introduction of jet aircraft at the BBTCA. Future conditions were projected to a horizon year of 2032. See **Appendix C-2** for details.

2.3 Public Health

The Public Health Effects Assessment is found in **Appendix C-3** of the ESR. The Study Area used to assess public health effects reflects the Noise and Air Quality Study Areas.

A summary of existing conditions from the Noise and Air Quality assessments that are relevant to existing public health effects is provided in **Appendix C-3**. For additional details on existing conditions refer to the Air Quality and Noise Effects Assessments prepared by RWDI which can be found in **Appendix C-1 and C-2**.

2.4 Marine Navigation

The Marine Navigation Effects Assessment is found in **Appendix C-4** of the ESR.

The Marine Navigation Effects Assessment included both a LSA and a RSA. The LSA was used to assess the physical impacts of jet blast and wake turbulence at the edge of the MEZ on boat navigation. The Study Areas are shown in **Figure 2-5**

Existing background wind and wave conditions data were provided by WSP Canada Inc. and were used to determine wind intensity and nearshore wave distribution frequency which can influence boat stability and maneuverability. For details on existing marine navigation conditions refer to **Appendix C-4**.

Figure 2-4: Representative Points of Reception

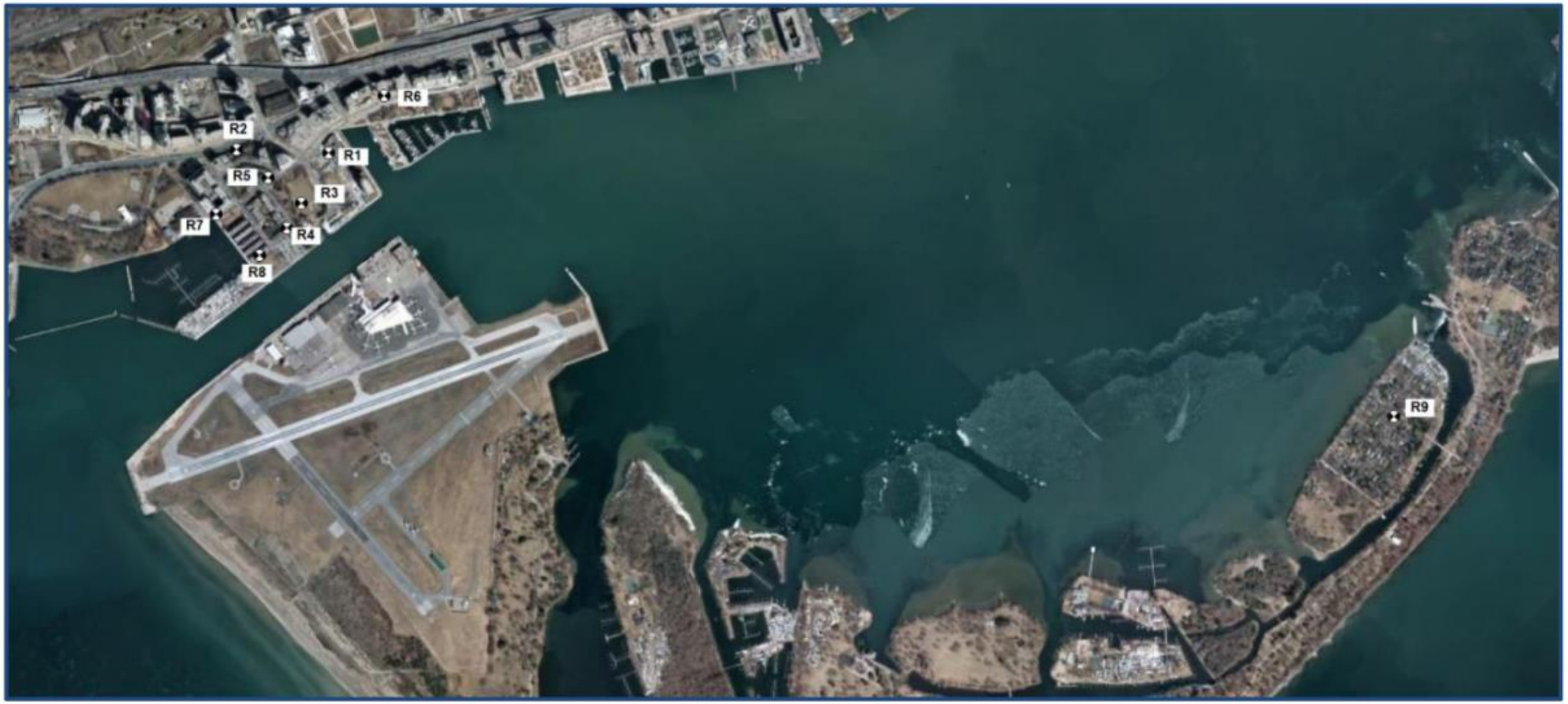


Figure 2-5: Marine Navigation Study Areas



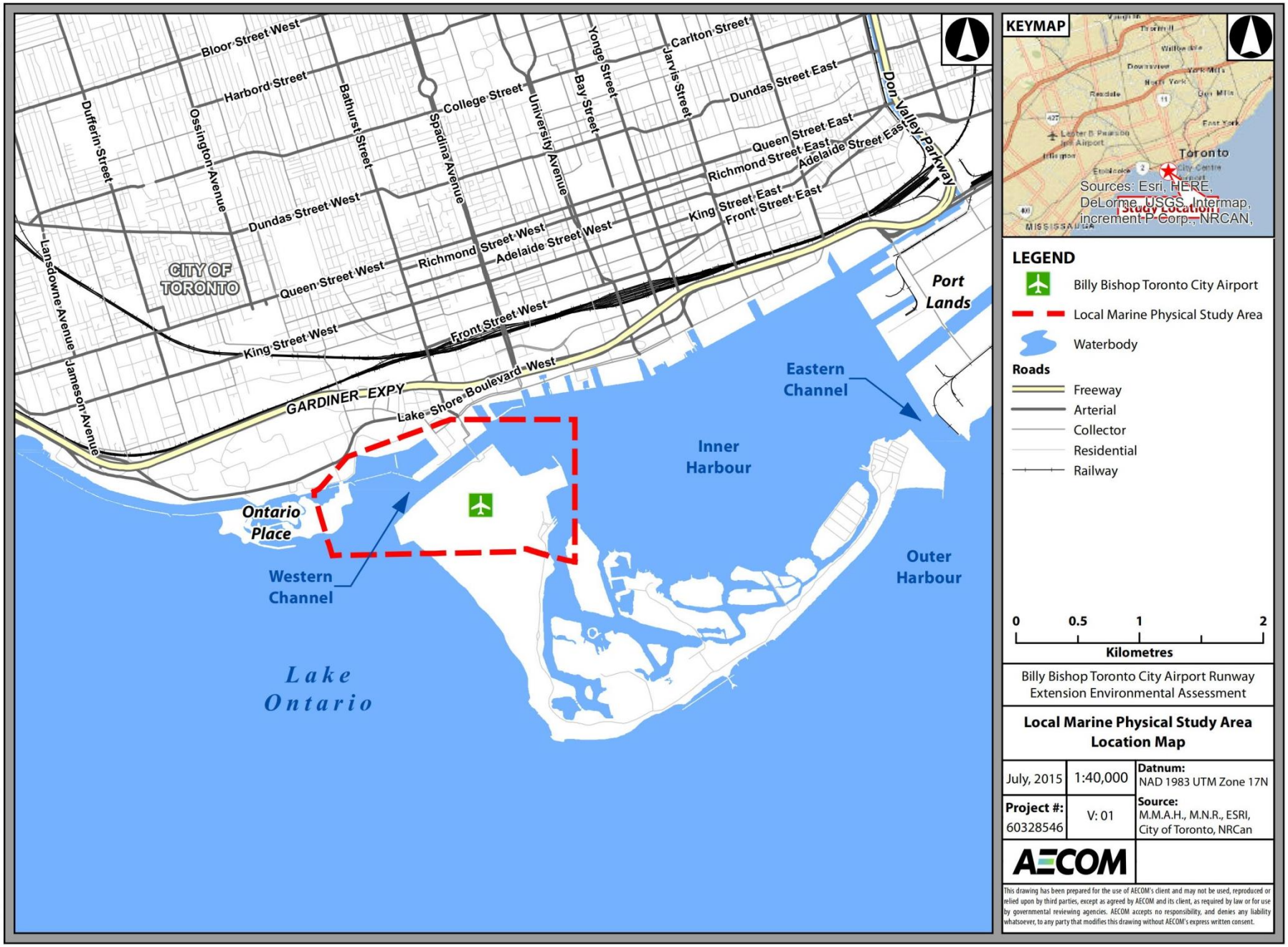
The description of existing conditions pertaining to wind and wave distribution frequencies was taken from a compilation of data over an approximately 40 year period. It is not anticipated that wind, currents, waves and water depth will significantly change over the course of the planning horizon for this project. As such, the data provided under the existing conditions portion of **Appendix C-4** were used to determine future conditions.

2.5 Marine Physical

The Marine Physical Effects Assessment is found in **Appendix C-5** of the ESR.

The Study Area for the Marine Physical Effects Assessment includes the areas in the immediate vicinity of the runway extension, including the west and east ends of Runway 08-26, the Western Channel, and the eastern shoreline of the West Island (**Figure 2-6**). If the extension of the runway proceeds, additional studies are recommended during the detailed design phase to document the effects within the Inner Harbour and the Eastern Channel.

Figure 2-6: Marine Physical Study Area



A background review of previous environmental reports for the BBTCA and an air photo analysis were completed to determine existing marine physical environment conditions including wave formation, water levels, currents, sediment sources, sediment transport and sediment deposition.

To document future environmental conditions, other past, present and certain or reasonably foreseeable future effects from other actions or projects within the same geographic and temporal boundaries of this assessment were considered. The future naturalization of the Don River Mouth, as stated by Baird and Associates (2012), will not significantly change the sediment sources in the vicinity of the BBTCA. As such, it is anticipated that future environmental conditions pertaining to the marine physical environment will be similar to those conditions experienced today. For details on existing and future marine physical environment conditions refer to **Appendix C-5**.

2.6 Water Quality

The Water Quality Effects Assessment is found in **Appendix C-6** of the ESR.

The Water Quality Study Area includes the areas in the immediate vicinity of the proposed runway extension, including the west and east ends of Runway 08-26, the Western Channel, the Eastern Channel, the Keating Channel, and the Inner Harbour. Refer to **Figure 2-7** for an overview of the Water Quality Study Area.

A background review of previous environmental reports for the BBTCA and other relevant studies was completed to summarize existing information on water quality, bathymetry, water levels, Don River inflows, and Inner Harbour and Lake Ontario circulation patterns. For details on existing water quality conditions refer to **Appendix C-6**.

Future infrastructure works along the Toronto Waterfront to address wet weather flows and sanitary servicing needs are intended to improve water quality and delist Toronto and the surrounding Region as an Area of Concern (AOC). It is expected that Combined Sewer Overflows (CSOs) and pollutant sources in the Don River will be significantly decreased and the overall water quality of the Inner Harbour enhanced for future environmental conditions. The future naturalization of the Don Mouth as part of the Don Mouth Naturalization and Port Lands Flood Project (DMNP Project) will include a new Don River valley system located approximately halfway between the Ship Channel and Keating Channel (TRCA, 2014). Improved water quality is expected within proposed lake-connected wetlands (TRCA, 2014). Future works will not impact the magnitude of Don River inflow to the Inner Harbour. It is assumed that future circulation patterns due to the Don River flow component will remain similar to existing conditions and will not significantly change in the vicinity of the BBTCA.

2.7 Built Form and Land Use

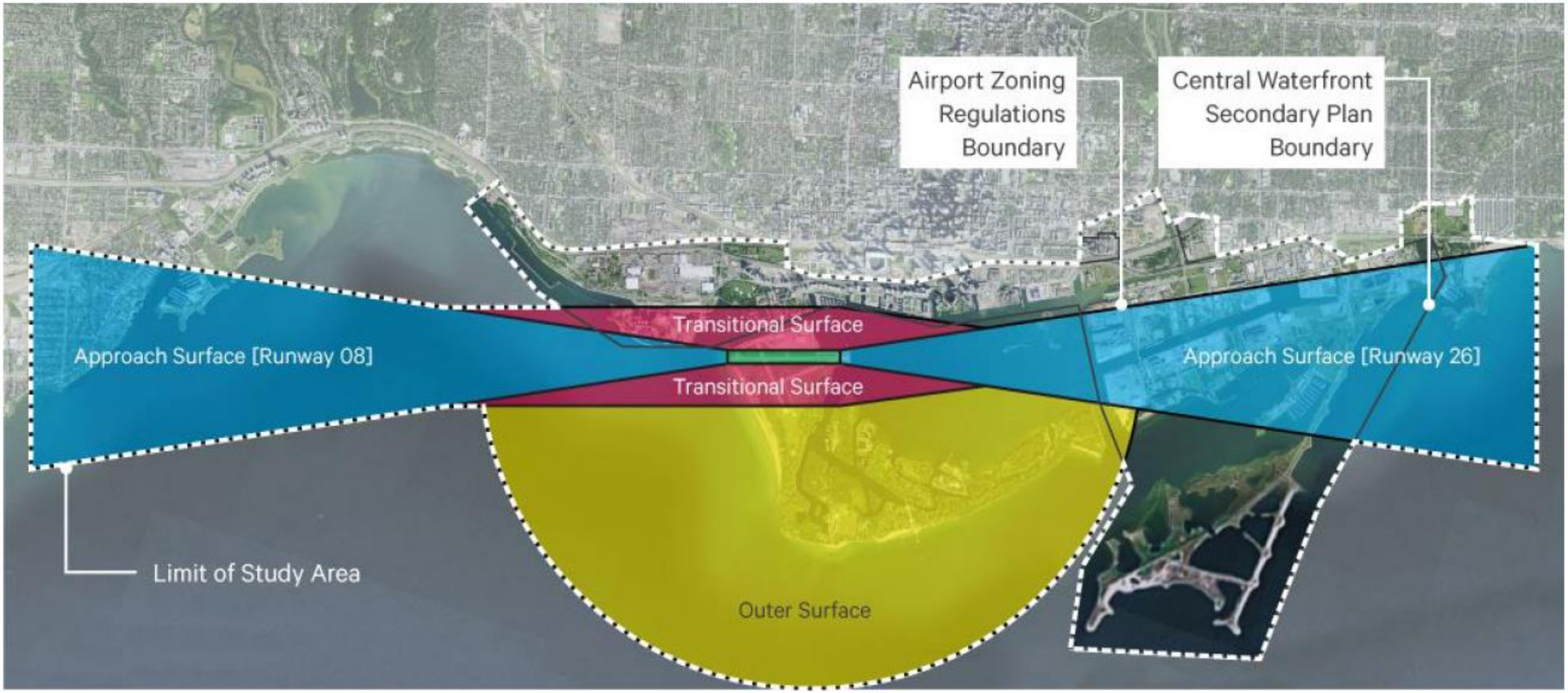
SvN Architects and Planners (SvN) completed the Built Form and Land Use Effects Assessment for the EA. Their report is found in **Appendix C-7** of the ESR.

The Study Area (**Figure 2-8**) for the Built Form and Land Use Effects Assessment was primarily derived from two key areas of concern arising from the City of Toronto review: the lands that fall within the Airport Zoning Regulations, and the lands that fall within the City of Toronto's Central Waterfront Secondary Plan. The former was used as a guide for the Study Area as it has the capability to designate or control land outside the boundaries of the BBTCA. The latter was used to inform the Study Area as it is the primary statutory planning document for the lands along Toronto's waterfront and has been used by the City and Waterfront Toronto to guide planning that will enable the long-term revitalization of Toronto's waterfront.

Figure 2-7: Water Quality Study Area



Figure 2-8: Built Form and Land Use Study Area



Over the course of the Study Design phase of the EA, the Study Area for the Built Form and Land Use Effects Assessment was enlarged to incorporate areas of interest or concern identified by participants in the consultation process. The enlarged Built Form and Land Use Study Area included the Distillery District, the Unilever site north of Lake Shore Boulevard to the east of the Don Valley Parkway and Woodbine Park in the Beaches neighbourhood. Due to the locations of these areas of interest or concern, minimal potential for compatibility issues (related to the BBTCA) were identified for these areas and, as such, a detailed description of existing and planned uses and potential impacts has not been included in **Appendix C-7**.

A review of policy, regulatory and planning tools, location and extent of planned built form and land uses was completed to determine any potential for compatibility concerns between the proposed runway extension and introduction of jets at the BBTCA and planned built form and land uses within the vicinity of the BBTCA. For details of this review refer to **Appendix C-7**.

A review of future planning objectives was conducted to determine future planned built form and land uses within the Built Form and Land Use Study Area. For additional details refer to **Appendix C-7**.

2.8 Archaeology and Cultural Heritage

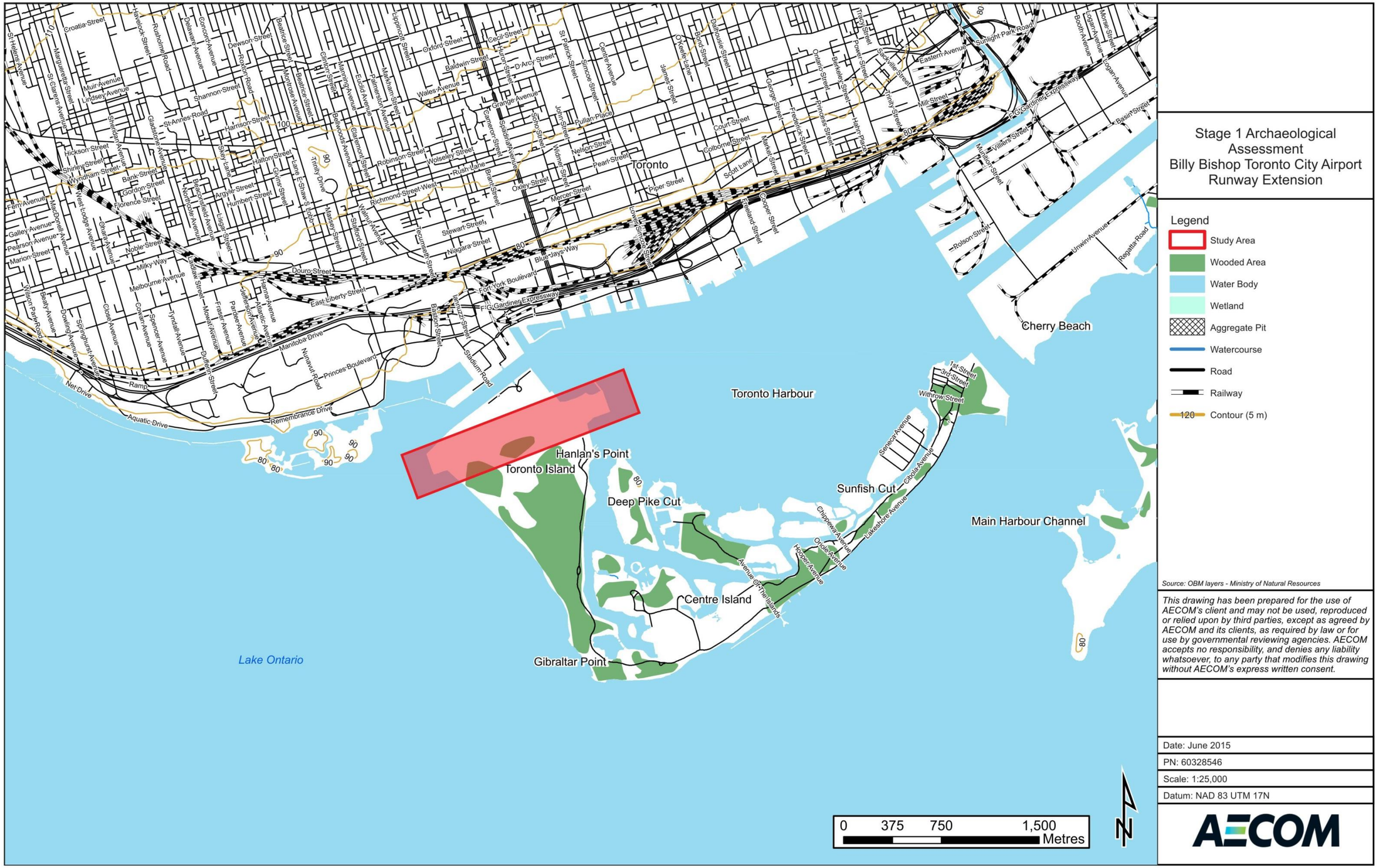
The Archaeological and Cultural Heritage Effects Assessment is split out into a Terrestrial Stage 1 Archaeological Assessment Report, a Marine Stage 1 Archaeological Assessment Report and a Cultural Heritage Resources Review. All documents can be found in **Appendix C-8** of the ESR.

The Archaeology Effects Assessment (Stage 1 Archaeology Assessment) Study Area consists of the areas which may be physically affected by the proposed runway extension (**Figure 2-9**). As the proposed runway extension impacts land and lakebed, both a terrestrial and marine archaeological assessment were undertaken. A Cultural Heritage Resources Review was undertaken within the same Study Area to determine existing cultural heritage resources.

The Stage 1 Archaeological Assessments were conducted to meet the Ministry of Tourism, Culture and Sport's (MTCS) *Standards and Guidelines for Consultant Archaeologists*. A background review was undertaken to determine existing terrestrial and marine archaeological conditions. The review included a scan of: MTCS's Archaeological Database for a listing of registered archaeological sites within a 1 km radius of the Archaeology and Cultural Heritage Study Area; the Northern Shipwreck Database and Great Lakes Shipwrecks File for known shipwrecks in the vicinity of the Archaeology and Cultural Heritage Study Area; reports of previous archaeological assessments within 50 m of the Archaeology and Cultural Heritage Study Area, recent and historical maps of the Archaeology and Cultural Heritage Study Area and other archaeological plans or mapping where available.

To determine existing cultural heritage conditions including designated and listed heritage buildings/properties, national historic sites, historical places, cultural landscapes and additional cultural heritage features within the Archaeology and Cultural Heritage Study Area, a cultural heritage resources review was conducted. For this review, the City of Toronto Inventory of Heritage Properties, Ontario Heritage Properties Database, Canadian Register of Historic Places, Ontario Historical Plaques database, Ontario Heritage Trust's Online Plaques Guide, the registered Cemeteries and Crematoriums Database, and Ontario Genealogical Society's (OGS) list of unregistered cemeteries by County/District were utilized. Consultations with the MTCS also took place to determine existing cultural heritage conditions. For additional details on existing archaeological and cultural heritage conditions see **Appendix C-8**.

Figure 2-9: Archaeology and Cultural Heritage Study Area



2.9 Socio-Economic

The Socio-Economic Effects Assessment is found in **Appendix C-9** of the ESR.

The Socio-Economic Effects Assessment includes both a LSA and RSA. The boundaries for the LSA were developed to include all relevant features along the waterfront and to ensure that potential effects within key areas of the waterfront were assessed. The boundaries include:

- The Gardiner Expressway to the north;
- The Port Lands to the east;
- The Leslie Street Spit to the south; and,
- Ontario Place to the west.

The LSA was used for the purpose of assessing use values and can be seen in **Figure 2-10**. "Use values" include assets that exist because people use them, such as places, goods, and services associated with tourism and recreation opportunities. A larger, RSA, which consists of the whole of the City of Toronto, was identified for assessing non-use values. "Non-use values" are values ascribed to aspects of the environment that exist independent of people's use or enjoyment of them. Such values include options for future generations to develop and use the waterfront, and potential effects on Toronto's "brand" as a waterfront city. Non-use values are believed to be highly valued by City residents (and others) irrespective of whether they use the BBTCA or visit the waterfront.

Figure 2-10: Socio-Economic Local Study Area



Socio-economic existing conditions within the LSA were determined through desktop research, intercept and telephone survey administration and individual stakeholder interviews. The following categories were examined to

determine active uses of the waterfront area (LSA): residential uses; recreational uses; institutional uses; economy; tourism; municipal implications; and, property values. Existing conditions for non-use values were determined via the telephone survey as it captured residents within the whole of the City of Toronto, some of whom have never visited the waterfront. The results of the desktop research and survey and interview results used to establish existing socio-economic conditions in the LSA and RSA can be found in **Appendix C-9**.

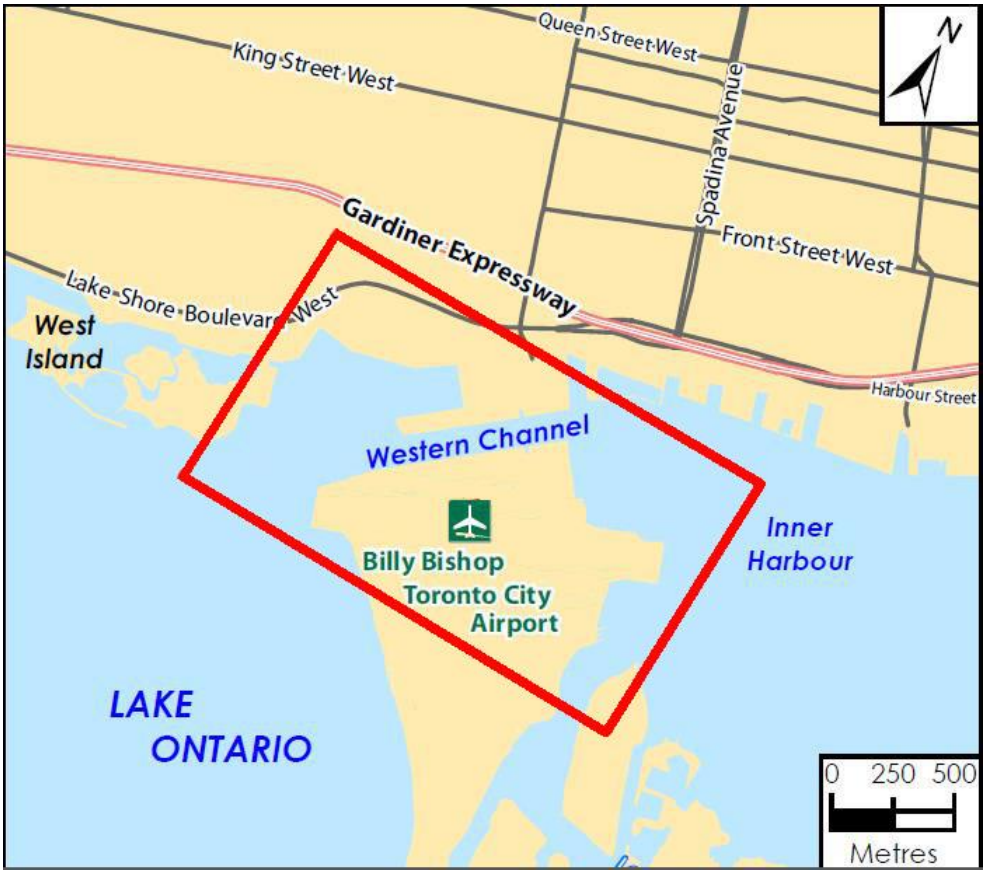
In order to document future socio-economic conditions, other past, present and certain or reasonably foreseeable future effects from other projects within the same geographic and temporal boundaries of the assessment were considered for the above mentioned categories. The assumed future LSA socio-economic conditions aimed to anticipate differences between today's existing conditions and the anticipated future conditions upon which the effects assessment is based (the year 2033). See **Appendix C-9** for a description of future conditions for each use value category mentioned above.

2.10 Natural Environment

The Natural Environment Effects Assessment is found in **Appendix C-10** of the ESR and includes effects to both the aquatic and terrestrial environment.

The Aquatic Environment Study Area includes areas within the vicinity of the proposed runway extension as this is the area where potential effects to the aquatic environment from construction are anticipated. See **Figure 2-11** for the Aquatic Environment Study Area. Aquatic field investigations were conducted within the footprint of the proposed runway extension within the Aquatic Environment Study Area.

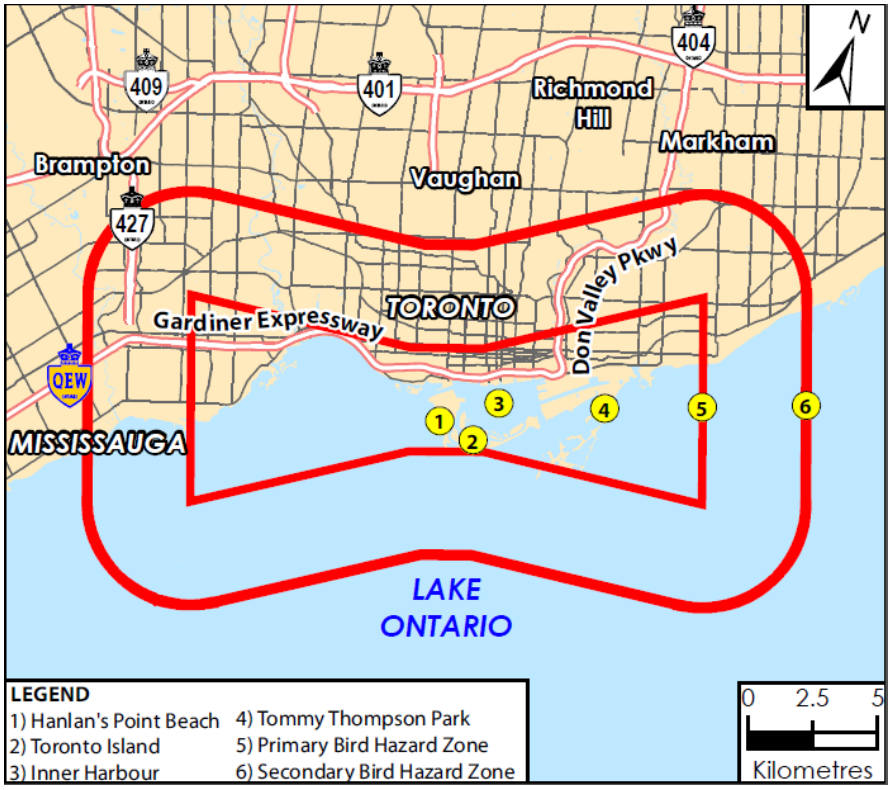
Figure 2-11: Aquatic Environment Study Area



The Terrestrial Environment Study Area used for the background information review to determine existing conditions can be seen in **Figure 2-12** and includes:

- The primary Bird Hazard Zone (BHZ), defined by Transport Canada as follows:
  - In the vicinity of the BBTCA, the northern and southern boundaries are within 2 km of and adjacent to the runway (including the extension of the runway); and,
  - The eastern and western boundaries extend 9 km from each end of the main runway (including the extension of the runway). At these limits, the northern and southern boundaries of the primary BHZ extend 4 km from the centreline of the runway in each direction (8 km in total), resulting in a primary BHZ that resembles a bowtie.
- The secondary BHZ, defined by Transport Canada, which represents a 4 km buffer applied to the primary BHZ.

Figure 2-12: Terrestrial Study Area for the Background Information Review



The Study Area for terrestrial field investigations was localized to the area of the proposed runway extension. This included all vegetated areas within 120 m of the proposed runway extension. The Study Area for the seasonal avian field surveys included approximately 500 m from the ends of the runway extension, wherein seasonal and spatial distribution of bird species was assessed.

Background information was obtained from a variety of sources to develop a comprehensive understanding of the existing fish community that could potentially be affected by the proposed runway extension. Additional information on the existing fish habitat conditions in the vicinity of the proposed runway extension was collected through two field visits to determine substrate composition and aquatic vegetation presence. A background information review was also conducted to develop a comprehensive understanding of the existing terrestrial environment and wildlife that could potentially be affected by the proposed land mass extension. Special consideration was also given to identifying Species of Conservation Concern (SOCC), Species at Risk (SAR) and Significant Wildlife Habitat.

Terrestrial field investigations were conducted in addition the background review to identify and determine the magnitude of potential effects on the terrestrial environment from the proposed runway extension. Field investigations included terrestrial habitat and vegetation surveys and seasonal avian surveys. The results of the background information review and field investigations used to establish existing conditions for the Natural Environment Effects Assessment can be found in **Appendix C-10**.

Future conditions for the aquatic environment are expected to be similar to existing conditions as significant changes in the Aquatic Environment Study Area in terms of habitat restoration or additional construction activities within the MEZ are not anticipated. Factors that influence the aquatic habitat within the vicinity of the BBTCA today are likely to be factors that influence the aquatic habitat upon completion of the runway extension. The existing terrestrial environment at the BBTCA is also not expected to substantially differ in 2033 from existing conditions. Future conditions in the Terrestrial Environment Study Area generally cannot be easily predicted with certainty due to the number of confounding variables such as possible habitat creation, restoration and enhancement projects and management of Double-crested Cormorants at Tommy Thompson Park (TTP)/Leslie Street Spit. For details on the future conditions for the Natural Environment Effects Assessment see **Appendix C-10**.

2.11 Transportation

The Transportation Effects Assessment is found in **Appendix C-11** of the ESR.

The Transportation Effects Assessment has both a LSA and RSA. The LSA was determined based on previously-completed traffic impact assessments and in consultation with the City of Toronto and other stakeholders. The LSA, depicted in **Figure 2-13**, is bounded by Lake Shore Boulevard to the north, Dan Leckie Way to the east, the Western Channel to the south, and Stadium Road to the west.

Figure 2-13: Transportation Study Area



Based on feedback received through consultation a RSA was added for the Transportation Effects Assessment and was used to determine the broader effects of the proposal on pedestrian, cycling, transit, active transportation, ferry and heavy rail linkages outside the LSA. The RSA includes the Central Waterfront; Downtown Toronto; and, The Greater Toronto Area.

Existing transportation facilities in the LSA provide access to the BBTCA and other land uses including residential areas to the west and recreational and institutional (including the City School) areas in the central and eastern portions of the LSA. A description of the following existing transportation facilities is found in **Appendix C-11**: road network; parking; public transit; active transportation; mode split; traffic volumes; and, traffic operations.

Future traffic volumes in the LSA are expected to increase as a result of increased passenger activity levels to and from the airport. The transportation infrastructure in the LSA is assumed to be unchanged from existing conditions. While design alternatives are currently being considered to provide better access to the BBTCA in the future, no improvements to the existing transportation facilities or construction of new transportation facilities have been considered herein. For a description of future conditions as they relate to an anticipated increase in passenger activity levels to and from the BBTCA, see **Appendix C-11**.

2.12 Balance of Land Uses and Users in the Waterfront Area

Balance of land uses and users considers how the BBTCA relates to the city-building initiatives that are being undertaken in the Central Waterfront, East Bayfront, West Don Lands and Port Lands precincts.

The Study Area for the balance of land uses and users includes the areas defined as the “Central Waterfront”, “East Bayfront”, “West Don Lands” and the “Port Lands” by Waterfront Toronto. It also generally includes the area covered by the Socio-Economic LSA and the Built Form and Land Use Study Area. Waterfront Toronto defines the Central Waterfront as extending from Bathurst Street to Lower Jarvis Street, south of Lakeshore Boulevard to Lake Ontario; East Bayfront as the area from Lower Jarvis Street to Parliament Street and south of Lake Shore Boulevard to Lake Ontario; West Don Lands as extending from Parliament Street to the Don River and south of King Street to the rail corridor; and, the Port Lands as the area bounded by the Keating Channel/Don River and Lake Shore Boulevard in the north, the Toronto Inner Harbour in the west, Ashbridges Bay in the east and Lake Ontario and TTP/Leslie Street Spit in the south (Waterfront Toronto, 2017c).

The Government of Canada, the Province of Ontario and the City of Toronto created Waterfront Toronto in 2001 to oversee and lead the renewal of Toronto’s waterfront (Waterfront Toronto, 2017c). Waterfront Toronto (2013) set out their priority projects for the waterfront over 10 years (2014-2023) into four categories:

- Transit;
- Flood protection and enabling infrastructure;
- Land servicing; and,
- Public realm.

Together with the City of Toronto, Waterfront Toronto completed the East Bayfront Transit EA in 2010. The result of the EA determined that the preferred option to provide high quality transit services for the eastern portion of the waterfront was a light rail transit (LRT) line along Queens Quay East, in a dedicated right of way, connecting to Union Station. This would be the first LRT to service the eastern waterfront area, with any future extensions to be integrated into redevelopment plans for the West Don Lands, Port Lands, and any future commercial development along the Don Valley Parkway and Lake Shore Boulevard. The LRT line was anticipated to be constructed over a period of four years (2014-2017), and was identified as a key priority requirement for realizing Waterfront Toronto’s revitalization mandate.

At present, Waterfront Toronto, in partnership with the City of Toronto and the Toronto Transit Commission (TTC) is undertaking the Waterfront Transit Reset study to establish a vision and plan for a comprehensive waterfront transit

network. Phase 1 of the study was completed in 2016 and Phase 2 of the study is anticipated to be complete in 2017. The area under study extends from Long Branch GO Station and the City of Mississauga border in the west to Woodbine Avenue in the east, and south of the Queensway/Queen Street corridor to Lake Ontario (Waterfront Toronto, 2017a). Construction of the Queens Quay East line is currently on hold until the completion of the Waterfront Transit Reset study (Waterfront Toronto, 2017a).

Waterfront Toronto is also undertaking flood protection and strategic infrastructure investment to bring development potential and private sector investment to the Port Lands. Their plan for the Port Lands will see the development of public parks and open spaces providing public access to the water's edge. The plan is being initiated as the Port Lands Flood Protection and Enabling Infrastructure Project. At completion the project will create two new outlets for the Don River that will allow for flood waters to safely be conveyed to Lake Ontario. It will also create a new island community (Villiers Island), new infrastructure (roads, bridges and services) and 29 ha of naturalized area, new parks and 14 ha of aquatic habitat (Waterfront Toronto, 2017a).

To date Waterfront Toronto has substantially completed land servicing requirements for the East Bayfront and West Don Lands precincts, with the exception of three additional waterfront land parcels (Quayside within East Bayfront, the western portion of the North Keating precinct, and Phase 3 of the West Don Lands). Waterfront Toronto intends to continue work on land servicing requirements for these three parcels (Waterfront Toronto, 2013).

Waterfront Toronto put a great deal of investment into parks and the public realm throughout the first phase of revitalization with the opening of 23 new or improved parks or public spaces. Since 2004, Waterfront Toronto has opened 25 new or improved parks or public spaces, some of which include (Waterfront Toronto, 2017b):

- Rees / Simcoe / Spadina WaveDecks – 2008/2009;
- Canada's Sugar Beach – 2010;
- East Bayfront Water's Edge Promenade – 2010;
- Sherbourne Common – 2011;
- Corktown Common – 2013;
- Underpass Park – 2015; and,
- Outer Harbour Recreation Node – 2015.

In terms of remaining public realm projects, four of their priority initiatives are outlined below (Waterfront Toronto, 2013; 2017a):

- Waterfront North-South Connections: Improved streetscaping and public art along major north-south arteries to the waterfront from the core, to provide an inviting and attractive experience to gain access to Toronto's waterfront.
- Central Waterfront Continuous Water's Edge Promenade: This involves the construction of five footbridges to carry pedestrians over water barriers throughout the Central Waterfront precinct. The completion of these footbridges will create direct connectivity between destinations along the water's edge.
- Foot of Yonge Street Park: This park will continue Waterfront Toronto's vision of great public spaces at the foot of major streets leading to the lake and along the waterfront. It will be able to host large ships and will be built at the water's edge.
- Jack Layton Memorial Ferry Terminal and Harbour Square Park: The Jack Layton ferry terminal will be reconstructed to be double the current size and have the same look and general feel as the water's edge promenade in nearby precincts. It will have an improved waiting area, amenities, and streamlined ticketing facilities to increase passenger capacity. Harbour Square Park is also planned to be redesigned.

These public realm improvements are to be implemented over an eight-year time horizon (2014-2022).

For details on the future uses, facilities, organizations, businesses and land uses within the waterfront area refer to the socio-economic and built form and land use future conditions outlined in **Appendix C-5** and **C-9** respectively.

3. Description of the Future Airport Scenarios

The EA focuses on the assessment and evaluation of two Future Airport Scenarios at the BBTCA.

1. **Future Baseline Scenario:** .....The runway is not extended and jets are not permitted at BBTCA; and a RESA is constructed approximately 43 m into the lake at both ends of the main runway (Runway 08-26) to address Transport Canada's requirements.
2. **Proposed Future Scenario:** .....The Tripartite Agreement is amended to permit commercial jet operations and the land mass is extended by 200 m at each end of the main runway.

Additional details regarding the approach for the assessment of the scenarios is described in **Section 4**.

3.1 Greater Toronto Area Growth and Regional Airport Strategy Development

Toronto Pearson International Airport (Toronto Pearson) is the Greater Toronto Area's (GTA) and south-central Ontario's primary airport for commercial air service activity, a role that it is expected to maintain for the foreseeable future. Toronto Pearson is also Canada's busiest airport, and is the country's principal hub for domestic, transborder and international air travel. The Greater Toronto Airports Authority's (GTAA) current Master Plan (2007) for Toronto Pearson assessed the capacity limits of Toronto Pearson's airside system under two scenarios. The first being the existing five-runway system, and the second being the six-runway system which represents the maximum capacity of airside buildout within the existing Toronto Pearson site. The Master Plan indicated that the maximum capacity of aircraft movements for the five-runway system would be reached by 2019. Similarly, it is estimated that the six-runway system, if constructed, would reach maximum capacity by 2023 (GTAA, 2007).

The Master Plan suggests that under either the five or six-runway scenario, as Toronto Pearson surpasses its practical airside capacity and nears its maximum capacity, severe degradations in service levels caused by increased runway delays will be expected for shippers and travellers alike. These anticipated delays at Toronto Pearson will in turn cause delays for the whole of the airspace system of Canada and the northeastern United States (GTAA, 2007).

The Master Plan identifies some measures that have the potential to increase airside capacity by 5-10 % (GTAA, 2007). One of the identified actions includes the implementation of demand management measures, which would divert some segments of air traffic away from Toronto Pearson, to be met with capacity elsewhere in the area. It may also require some passengers to fly at non-preferred times or cause passengers to use alternative airports or modes. The GTAA has made it clear in their current Master Plan that Toronto Pearson has a finite capacity which will be reached regardless of any demand management and increased efficiency measures put in place, before the end of the Master Plan horizon of 2030. Viable alternatives to help relieve some of the demand and handle spillover at Toronto Pearson once it has reached capacity are needed to ensure that all components of aviation demand continue to be met within the GTA and south-central Ontario.

Further to this, in an interview conducted by HLT Advisory for the City of Toronto, Vice-President, Strategy of the GTAA, restated the GTAA's position that the expansion of BBTCA with jet service to selected long haul markets would have no impact on Toronto Pearson (HLT, 2013). Toronto Pearson presently serves nearly 35 million

passengers compared to the two million that BBTCA currently serves. It was also stated that the direct downtown service provided at BBTCA would not compete with the international and transborder routes provided by Toronto Pearson for all of southern Ontario, Quebec, eastern Canada, and to Europe for passengers embarking from Western Canada or the central and western United States (HLT, 2013).

3.2 Anticipated Future Growth at the BBTCA

The description of the Future Baseline Scenario is derived from PortsToronto's 2012 revised Master Plan which details the growth that can occur within the requirements of the existing Tripartite Agreement. The Proposed Future Scenario is derived from PortsToronto's 2015 Master Planning Exercise which includes future passenger volumes that can be accommodated should the Tripartite Agreement be amended to permit commercial jets to operate from the BBTCA.

Under the current Tripartite Agreement, there are no limitations on the number of flight slots (scheduled aircraft take-offs and landings) or passengers that the BBTCA can serve. It should be noted that PortsToronto has imposed internal restrictions of 202 slots per day for current commercial flights in order to maintain compliance with the noise restrictions currently imposed by the Tripartite Agreement.

The Future Airport Scenarios described below could be limited or conversely, achieved in shorter time frames, depending on the amount and type of supporting infrastructure that will serve passengers and aircraft accessing the BBTCA, market demand and other feasibility considerations. This infrastructure falls under three general types and includes:

Groundside Infrastructure:

- Mainland parking – location, number of long-term spots, number of short-term spots;
- Island parking – location, number of long-term spots, number of short-term spots;
- Taxi corral – location, number of spots;
- Curb-side pick-up/drop-off – location, capacity per hour;
- Terminal building – airport security processing (peak passenger/hour), customs processing (peak passenger/hour), passenger check-in/bag drop (peak passenger/hour);
- Pedestrian tunnel – passenger/hour capacity;
- Ferry terminal building – location, capacity; and,
- Ferry – vehicle capacity/trip, pedestrian capacity/trip, trips/hour, operation start time/end time.

Airside Infrastructure:

- Number of daily slots;
- Runway 08-26 length, width, location, orientation;
- RESA;
- Taxiways – location, capacity;
- Engine run-up housing – location, use (tests per month); and,
- Flight paths and associated control or approach surfaces.

Support Infrastructure:

- Fuel storage – capacity, location, refilling requirements; and,
- De-icing – location, fluid containment.

The Future Airport Scenarios noted above and discussed in detail below also account for potential limitations to passenger volumes during peak periods which could occur as a result of land use development on areas near the airport terminal (e.g., at the south end of Eireann Quay or within the vicinity of the waterfront). The land

development and potential for impacts will vary depending on the supporting mainland infrastructure including development beyond the control of PortsToronto such as:

- Public Transit (routes, capacity, schedules);
- Residential Development (location, density);
- Commercial/Retail development (location, density of jobs);
- Roadways (vehicle capacity); and,
- Active Transportation (location and use of bicycle paths, sidewalks, multi-use trails).

3.2.1 Future Baseline Scenario: Current Runway Configuration, Additional Passengers

As noted, under the current Tripartite Agreement there are no limitations placed on the number of slots or passenger volumes at BBTCA; however, PortsToronto has voluntarily limited the number of flight slots available per day at the BBTCA to 202 for scheduled commercial flights in order to comply with noise restrictions.

The degree to which airport operations can continue to grow within the current Tripartite Agreement has been assessed in PortsToronto's current Master Plan, referred to as the 2012 Master Plan. Based on the 2012 Master Plan, anticipated growth at the airport is as follows:

Table 3-1: 2012 Airport Master Plan: Anticipated Growth Compared to Current Operations

BBTCA Details	2014	Anticipated Growth based on 2012 Master Plan
Land Mass Extension Required	No	Yes, for *RESA* (approx. 43 m)
Runway Length (Take-Off Run Available (TORA))	1,216 m	1,216 m
# of Daily Commercial Slots	202	202
# of Total Passengers/Year Groundside *Number in brackets reflects total passengers moving through the airport**	2.0 million (2.43 million)	2.7 million (3.8 million)
# of Total Annual Aircraft Movements	114,428	140,700
# of Total Annual Non-commercial Aircraft Movements	Approx. 53,166	Approx. 66,098
# of Passengers in Peak Hour Groundside *Number in brackets reflects total passengers moving through the airport**	708 (944)	1,085 (1,447)
Type of Commercial Aircraft	Q400	Q400
Changes to the MEZ	No change	No change

*Note: * Total passengers includes those "in transit" that don't exit BBTCA*

The RESA is the only project component assessed as part of the Future Baseline Scenario.

3.2.2 Proposed Future Scenario: Tripartite Agreement Amended to Allow Jet-Powered Aircraft and a Runway Extension

The proposed amendment to the Tripartite Agreement would allow for the operation of commercial jet aircraft and an extension of the land mass at each end of the main runway by 200 m. As noted, a Master Planning Exercise, as requested by City Council, has recently been completed for the BBTCA and it identifies the future passenger volumes that can be accommodated at BBTCA should jets be allowed and the runway extended.

Based on the 2015 Master Planning Exercise, proposed growth at the airport is as follows:

Table 3-2: 2015 Master Planning Exercise: Proposed Growth Compared to Current Operations

BBTCA Details	2014	PROPOSED GROWTH With Runway Extension and Jets
Land Mass Extension Required	No	Yes, for jets (200 m) Includes RESA
Runway Length (TORA)	1,216 m	1,658 m
# of Daily Commercial Slots	202	242
# of Total Passengers/Year Groundside *Number in brackets reflects total passengers moving through the airport**	2.0 million (2.43 million)	4.1 million (5.5 million)
# of Total Annual Aircraft Movements	114,428	138,170
# of Total Annual Non-commercial Aircraft Movements	Approx. 53,166	Approx. 64,778
# of Passengers in Peak Hour Groundside *Number in brackets reflects total passengers moving through the airport**	708 (944)	1,306 (1,741)
Type of Commercial Aircraft	Q400	Q400, CS100 & other qualifying jets
Changes to the MEZ	No change	No change in length, 10 to 25 m increase in width

*Note: * Total passengers includes those "in transit" that don't exit BBTCA*

Project components assessed as part of the Proposed Future Scenario include:

- RESA;
- Runway extension;
- Parallel taxiway;
- Starter strip;
- Jet blast fence;
- Ground run-up enclosure;
- Potential noise barrier; and,
- Localizer antenna and associated shelter, and rock break walls.

In addition, the project scope outside of the runway extension includes parallel Taxiway Alpha, relocation of Glide Path 26, and relocation of marine radar.

3.2.3 Alignment of the Future Baseline and Proposed Future Scenarios with the April 1 Council Resolution

The April 1, 2014 City Council resolution authorized the Deputy City Manager, Cluster B to negotiate a phased framework with the Toronto Port Authority (PortsToronto) and Transport Canada for managing growth at Billy Bishop Toronto City Airport, subject to a number of conditions being met in advance of negotiation. The phased framework for growth included proposed limits on airport operations during the first two phases. The Future Airport Scenarios assessed as part of the EA align with these phases, as follows.

April 1, 2014 Council-Adopted Growth Limitations	BBTCA Runway and Jets EA Operational Scenarios
Phase One:	**Existing Conditions**
i. Annual origin/destination passenger cap of 2.4 million;	i. Annual groundside passenger volume of 2.0 million;
ii. Peak hour flight (slot) cap of 16;	ii. Peak hour flight slots of 16;
iii. Peak hour origin/destination passenger cap of 884; and,	iii. Peak hour groundside passenger volume of 708; and,
iv. Daily flight (slot) cap of 202.	iv. Daily slots of 202.

April 1, 2014 Council-Adopted Growth Limitations	BBTCA Runway and Jets EA Operational Scenarios
Phase Two:	**Future Baseline Scenario**
i. Annual origin/destination passenger cap of 2.7 million; ii. Peak hour flight (slot) cap of 20; iii. Peak hour/destination passenger cap of 1,178; and, iv. Daily flight (slot) cap of 202.	i. Annual groundside passenger volume of 2.7 million; ii. Peak hour flight slots of 24; iii. Peak hour groundside passenger volume of 1,085; and, iv. Daily slots of 202.
Phase Three:	**Proposed Future Scenario**
i. Passenger and flight (slot) caps, based on transportation capacity, community impacts and experience with Phases One and Two.	i. Annual groundside passenger volume of 4.1 million; ii. Peak hour flight slots of 24; iii. Peak hour groundside passenger volume of 1,306; and, iv. Daily slots of 242.

The April 1 City Council resolution also included a request for the implementation of additional measures as part of the three-phased framework for managing growth at the BBTCA. The measures included in Phase One are summarized below:

- Passenger wayfinding and route planning tools for users of the airport;
- Taxi operational adjustments to achieve increased passenger efficiency;
- Enhancement of shuttle service to achieve an increased modal split and regular monitoring and reporting of shuttle usage to the City;
- Traffic monitoring for Eireann Quay and reporting to the City;
- Airport noise monitoring system and reporting protocol;
- Restrictions on ground-based airport noise;
- Review of de-icing and chemical management programs;
- Air quality monitoring and reporting to the City;
- Construction of aircraft run-up barrier or enclosure and alternate procedures for mitigating run-up noise in the interim; and,
- Robust plan for public and stakeholder input into all planning exercises including the Airport Master Plan and runway extensions environmental assessment.

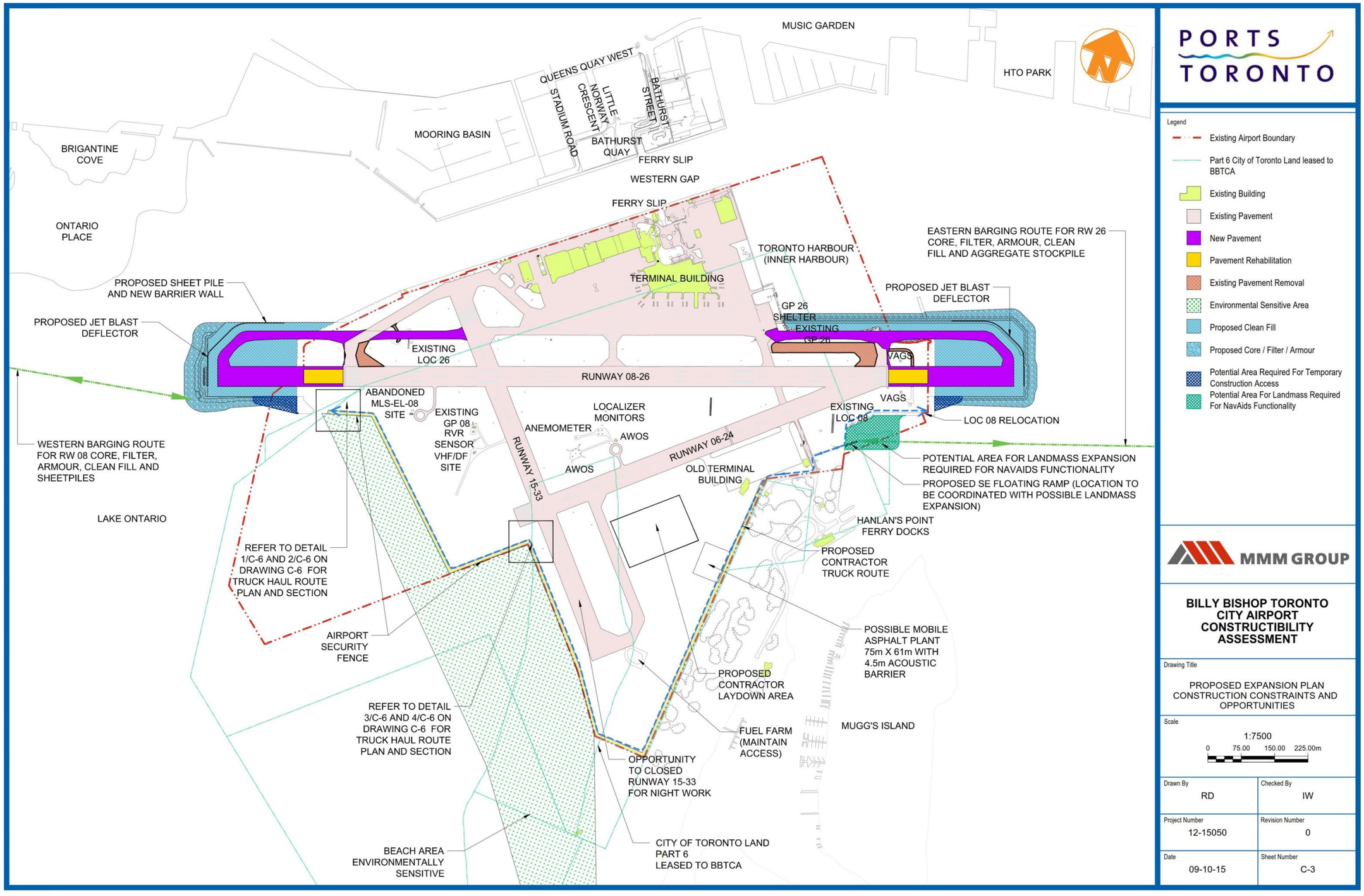
PortsToronto has committed to undertaking the actions listed above that are anticipated to result in groundside operational improvements, and reduce the impacts of current airport operations on the surrounding community. A number of these actions were underway as of December 2016. In particular, PortsToronto began construction of the ground run-up enclosure facility in the summer of 2016. These activities are in direct response to issues that have been raised by the City and the local community, and have been incorporated into the projection of the Future Baseline Scenario, which is detailed above.

3.3 Construction Activities

The following section describes construction activities associated with the proposed land mass extension and includes best management practices, where applicable. The information in this section is based primarily on the *Proposed Runway Extension Constructability Report for Billy Bishop Toronto City Airport* by MMM Group (2015).

For the purposes of the effects assessment studies, it is assumed that construction activities are the same for the Future Baseline and Proposed Future Scenarios. Refer to **Figure 3-1** for details of the proposed expansion plan.

Figure 3-1: Proposed Expansion plan Construction Constraints and Opportunities



3.3.1 Timing of Construction

Most of the proposed construction will occur at night. At present, the BBTCA operates from 06:45 to 23:00 local time, seven days a week. From current air carrier schedules for the BBTCA, scheduled air services operate between:

- **Monday to Friday:** 06:45 to 23:00;
- **Saturday:** 06:45 to 21:00; and,
- **Sunday:** 08:30 to 23:00.

As the BBTCA has a nighttime closure window, construction activities will be able to occur outside of the above times with suitable allowances in place, and will not impact daily scheduled flights. Opportunities for construction activities to occur during daytime hours are identified where applicable in the subsections below.

According to the City of Toronto Municipal Code (Chapter 591, Noise), construction noise is prohibited between 19:00 one day to 07:00 the next day, 09:00 on Saturdays, and all day on Sundays and statutory holidays. Exemptions to the Noise By-Law are permitted provided that "The sound emitted from any equipment shall not exceed an L_{EQ} of 85 dBA when measured 20 m from the source over a five-minute period". A permit for exemption can be obtained by submitting an application to the City of Toronto's Commissioner of Urban Development Services (City of Toronto, 2009). A review of the construction equipment and operation noise levels from the U.S. Department of Transportation Federal Highway Administration showed that most of the equipment typically used for the construction of the proposed extension of the runway will not exceed 85 dBA. Equipment that does not meet the 85 dBA requirement is identified in **Section 3.3.3.3**.

3.3.2 Construction Staging Areas

Two locations are being considered for use as mainland construction yards (**Figure 3-2**) to provide an area for stockpiling, staging of aggregates and other construction materials. A western yard is proposed to be located in the vicinity of the Runway 08 threshold, and will need to be accessible by both marine vessels and trucks. This yard will accommodate stock piles for the aggregate materials used for the breakwater and clean fill areas of the runway extension. A dock area will also be necessary at this location for loading the barges for delivery of construction materials for the western runway extension.

An eastern construction yard is proposed to be located in the Port Lands east of the BBTCA to provide a staging area for aggregates, stone and marine vessels. The Port Lands mostly consist of industrial lands and has access to the Ship Channel. If PortsToronto in unable to secure a western yard, the eastern yard could provide marine support for both ends of the runway extension.

Existing ferry service could be utilized to provide access to the Island for the transportation of land-based equipment and materials needed for construction. However, this method of transportation has some associated drawbacks which include the following:

- Crossing of existing airside surfaces which will cause the need for clean-up prior to resuming scheduled aircraft operations;
- Increased risk of foreign object debris on airside surfaces and runway incursion;
- Co-ordination with Air Traffic Control for daytime airside surface crossing;
- Increased overall congestion in the vicinity of public facilities;
- Increased general wear and tear of existing paved surfaces due to repeated truck use; and,
- Noise from ferry operations during nighttime hours.

Figure 3-2: Mainland Construction Yards



It is therefore recommended that a floating barge ramp be used to address the above drawbacks. A floating barge ramp will be constructed next to the breakwater and immediately south of the existing threshold of Runway 26 to provide access to the south side of the BBTCA and uninterrupted access to the Island construction yard. This location will eliminate any crossings of airside surfaces.

It is estimated that the floating barge ramp will be approximately 12 m wide and 30 m long. It will include the following features:

- Bulkhead/abutment;
- Temporary dolphins (a marine structure that is not connected to shore) for stopping and mooring the barge;
- Floating ramp; and,
- Pontoons.

An Island construction yard will need to be established for the laydown and storage of materials, stockpiles, site offices, equipment and other uses. A possible construction yard could be established on the south side of Runway 06-24 and east of Runway 15-33. Equipment deliveries to the Island construction yard will be made by the proposed floating barge ramp or across the airside surfaces with the use of airport escorts.

The paving required for the runway extension could be completed by: using existing ferry service carried out overnight; installation of a mobile asphalt plant located at the south end of the airport on PortsToronto property; or transporting asphalt trucks by barge at nighttime.

3.3.3 Marine Construction Activities

This section outlines the proposed methodology for construction activities that are to take place in the water surrounding the airport land mass.

3.3.3.1 Preparing the Lakebed for Fill

There are two possible approaches for readying the lakebed for the placement of in-water fill materials. The first option is to use a conventional dredge to remove soft lakebed materials to a suitable depth and then place the fill on top of stable ground. A typical dredge operation utilizes a marine spud barge, crane, clamshell bucket, spoil scow and tug support. A silt screen will be required to control sediment produced from the dredging.

At present it is not known if the lakebed contains significant organic material. If present, the material will need to be dredged prior to fill placement. Borehole investigations conducted elsewhere in the Harbour including the Western Channel have showed the presence of little to no organic material. It is therefore expected that dredging will not be required, although this will need to be confirmed during the detailed design stage. Finally, dredging could also be expensive if the dredged material is found to contain contaminants.

The second option for readying the lakebed for the placement of in-water fill is to densify the lakebed using Vibro-Compaction. There are two types of Vibro-Compaction – bottom feed and top feed. Top-feed Vibro-Compaction floods the lake bottom with densification stone using a material barge to create a stone mat. A vibroflot probe is then lowered up-and-down through the stone mat and into the existing lakebed soils to draw down and densify the granular fill.

In comparison, bottom feed Vibro-Compaction requires the loading of granular fill into a hollow stem probe to construct a densified stone column. The probe is then lowered up-and-down through the fill profile and into the existing lakebed soils to compact the stones and the lake bottom soil to the desired density.

Given that Vibro-Compaction equipment is approximately 32 to 37 m in height, densification will need to be carried out at night during closure of the runway in order to comply with the requirements of the Obstacle Limitation Surface (OLS) while the runway is in operation. Densification operations are not expected to exceed 85 dBA at 20 m from the emitting source.

A floating turbidity barrier will be required to mitigate potential sedimentation for both dredging and the Vibro-Compaction method of preparing the lakebed for the placement of the various in-water fill materials.

3.3.3.2 Pile Wall Construction

A sheet pile wall will need to be constructed for the land mass extension along the north side to prevent fill migration into the Western Channel. To minimize noise associated with the construction of the sheet pile wall, it is suggested that a Combi-Wall be constructed in areas with minimal overburden (i.e., areas with limited soil or rock overlying the bedrock). A Combi-Wall consists of tubular king piles combined with sheet piles between them. The tubular king pile is installed into the bedrock using a vibro driver to drill a hole into the rock. A structural section is then inserted into the drilled hole, grouted in place and the king pile is filled with concrete. No dewatering is required with this method. Where there is sufficient overburden a normal sheet pile wall will be constructed.

It is likely that piling construction equipment will be located within the Western Channel. A NOTSHIP (notice to shipping) will need to be in place because of the anticipated constriction at the mouth of the Western Channel.

Given an approximate boom height of 30 m, construction of the pile wall will need to be carried out at night during closure of the runway in order to comply with the requirements of the OLS while the runway is in operation. The construction of the pile wall is not anticipated to exceed 85 dBA at 20 m from the emitting source.

3.3.3.3 In-Water Fill

The runway extension is proposed to be constructed on in-water fill and it is estimated that fill placement will be up to 12 m thick on top of the densified lake bottom described in **Section 3.3.3.1**. Please refer to **Figure 3-3** for details of the in-water fill placement. The first stage of the in-water fill placement involves the construction of the armoured breakwater through the placement of a bulk core berm which will contain the fill material. The second stage involves placing filter stone to hold and protect the outside slope of the berm. The third stage consists of placing armour stone on the outer slope of the filter layer. The fourth stage includes placing clean bulk fill behind the protected berm until an optimal height is achieved. Stages one to four are repeated until the rock and fill are above the waterline for both the east and west runway extensions.

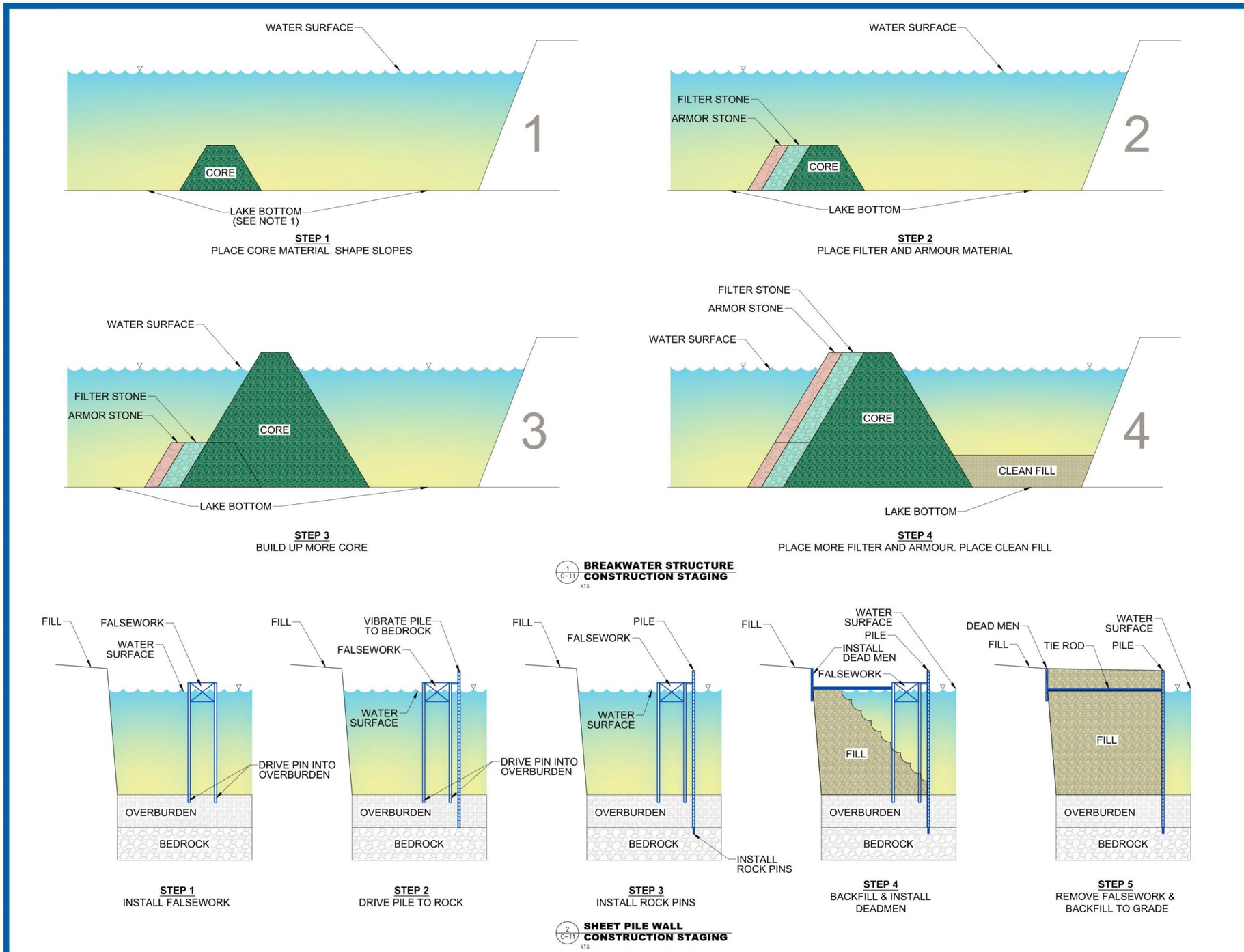
Once the clean fill has been placed up to the waterline, densification of the fill could be conducted using the Wet Top Feed Vibro-Compaction operation methodology described in **Section 3.3.3.1**. After compaction, daylighting of the fill (i.e., exposing the clean fill above the waterline) will then take place using both marine and land based methods. Marine based methods could include using a clam shell operation to bail clean fill over the side of the berm for spreading and compaction by land based equipment. A land based operation of dump trucks will then be used to dump clean fill above the waterline. Spreading and compacting this material above the waterline will be conducted using bulldozers, graders, trucks, vibratory rollers, and backhoes.

In the *Foundation Investigation and Design Report* by Golder Associates Ltd. (2015), it was recommended that a 25 m long transition zone be created to ensure consistent foundation properties between the existing runway and the runway extension. Please refer to **Figures 3-4** and **3-5** for details of the west and east marine based construction plan. These figures also show the proposed area of sea wall removal. To construct the transition, the existing sea wall will be removed to a depth of 1.6 m below the runway surface. First, the existing sheet pile and concrete slab of the sea wall will be removed across the width of the runway. Backfill will then be installed along the 25 m transition zone using a vibratory compactor mounted on a backhoe.

As with other construction activities the majority of the work associated with the placement of in-water fill will be conducted at night. Due to the height of the clam shell operation to place the fill and the Wet Top Feed Vibro-Compaction operation used to densify the clean fill, these works will need to be conducted at night during closure of the runway. The use of conventional construction equipment for land based fill daylighting will take place during daylight hours as the required equipment for spreading and compacting is not expected to interfere with airport operations. Saw cutting equipment used for the removal of the existing sea wall for the transition zone could exceed the nighttime noise exemption guidelines and may need to be used during daytime hours. However, this equipment can be used under the OLS. In-water fill construction equipment to be used at night is not anticipated to exceed 85 dBA at 20 m from the emitting source.

Sediment control for the in-water fill operations is not expected to be needed, as clean fill will be placed behind the new armoured breakwater. The new armoured breakwater will help to contain any silt within the area, but if necessary turbidity barriers may be used. A fish net may be installed to delineate the work area and remove fish from the work zone prior to in-water timing windows.

Figure 3-3: Construction Stages of In-Water Fill



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Legend

NOTES:

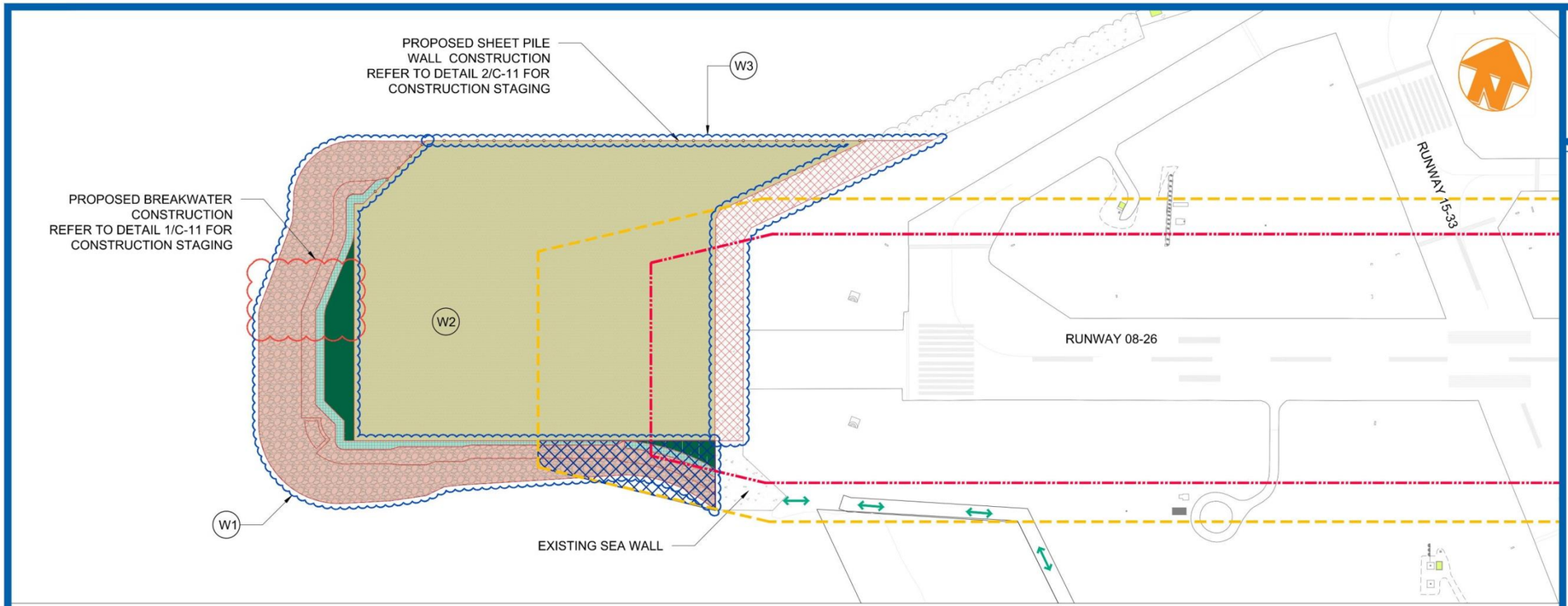
1. THE BERM BOTTOM SHALL BE COMPACTED BY VIBRO COMPACTION PRIOR TO THE PLACEMENT OF CORE, FILTER AND ARMOR STONE.

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Project Number: 12-15050	Revision Number: 0
Date: 09-10-15	Sheet Number: C-11

Figure 3-4: Marine Based Construction Staging Plan – West



CONSTRUCTION STAGING - MARINE CONSTRUCTION (WEST)

STAGE	SUB-STAGE	TASK NAME	DURATION (days)	CLOSURE/IMPACTS	RESTRICTIONS
W1	A	GROUND IMPROVEMENT WORK UNDER BREAKWATER AREA, INCLUDES IMPORTATION OF GROUND MATERIAL AND STONE HAUL	25	NIGHT WORK WITH RUNWAY CLOSED	
	B	BREAKWATER - CORE STONE PLACEMENT	44		
	C	BREAKWATER - FILTER STONE PLACEMENT	69		
	D	BREAKWATER - ARMOUR STONE PLACEMENT	34		
W2	A	IN-WATER CLEAN FILL PLACEMENT - BELOW WATER LEVEL	50	NIGHT WORK WITH RUNWAY CLOSED	
	B	CLEAN FILL PLACEMENT - LAND OPERATION	10		RESTRICTED OPERATION UNDER OLS DURING DAY TIME
	C	COMPACTION OF CLEAN FILL USING WET TOP FEED VIBRO-COMPACTION	75		
W3	A	INSTALL SHEETPILE WALL ALONG THE NORTH EDGE	60	NIGHT WORK WITH RUNWAY CLOSED	
	B	PARTIAL REMOVAL OF EXISTING SEAWALL - 1.6m DEEP	8		

PORTS TORONTO

Legend

- Breakwater Structure - Core
- Breakwater Structure - Filter
- Breakwater Structure - Armour
- Clean Fill Placement
- Existing Sea Wall Removal
- Restriction On Dumping During Daytime (7m Clearance)
- Restriction On Trucking During Daytime (4m Clearance)
- Access To Restricted Work Zone
- Potential Area Required For Temporary Construction Access

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Drawing Title: MARINE BASED CONSTRUCTION STAGING PLAN - WEST

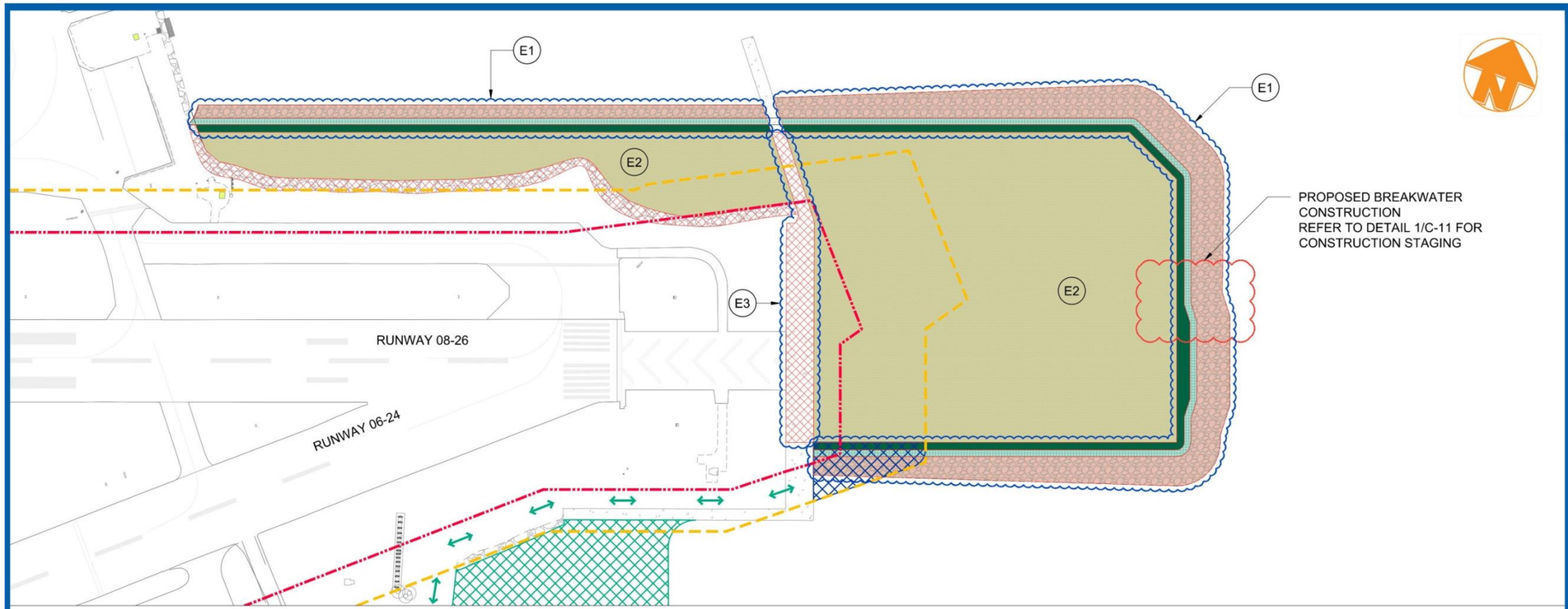
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Project Number	Revision Number
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Date	Sheet Number
09-10-15	C-7

Figure 3-5: Marine Based Construction Staging Plan – East



CONSTRUCTION STAGING - MARINE CONSTRUCTION (EAST)

STAGE	SUB-STAGE	TASK NAME	DURATION (days)	CLOSURE/IMPACTS	RESTRICTIONS
E1	A	GROUND IMPROVEMENT WORK UNDER BREAKWATER AREA, INCLUDES IMPORTATION OF GROUND MATERIAL AND STONE HAUL	33	NIGHT WORK WITH RUNWAY CLOSED	
	B	BREAKWATER - CORE STONE PLACEMENT	53		
	C	BREAKWATER - FILTER STONE PLACEMENT	30		
	D	BREAKWATER - ARMOUR STONE PLACEMENT	23		
E2	A	IN-WATER CLEAN FILL PLACEMENT - BELOW WATER LEVEL	70	NIGHT WORK WITH RUNWAY CLOSED	
	B	CLEAN FILL PLACEMENT - LAND OPERATION	24		RESTRICTED OPERATION UNDER OLS DURING DAY TIME
	C	COMPACTION OF CLEAN FILL USING WET TOP FEED VIBRO-COMPACTION	100		
E3	A	PARTIAL REMOVAL OF EXISTING SEAWALL - 1.6m DEEP	18	NIGHT WORK WITH RUNWAY CLOSED	

PORTS TORONTO

Legend

- Breakwater Structure - Core
- Breakwater Structure - Filter
- Breakwater Structure - Armour
- Clean Fill Placement
- Existing Sea Wall Removal
- Existing Breakwater Structure Removal
- Restriction On Dumping During Daytime (7m Clearance)
- Restriction On Trucking During Daytime (4m Clearance)
- Access To Restricted Work Zone
- Potential Area Required For Temporary Construction Access
- Potential Area For Landmass Required For NavAids Functionality

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Drawing Title: MARINE BASED CONSTRUCTION STAGING PLAN - EAST

Scale: 1:2500 (0, 25, 50, 75m)

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RD	IW

Project Number	Revision Number
12-15050	0

Date	Sheet Number
09-10-15	C-8

3.3.4 Land Construction Activities

This section outlines the proposed methodology for construction activities that are to take place on the existing airport land mass. Please refer to **Figures 3-6** and **3-7** for the west and east land based construction staging plan. For the land based construction activities, aggregate and construction materials will need to be delivered via marine based operations.

3.3.4.1 New Taxiway Construction and Removals

Key construction activities on the existing land mass include:

- Extension of Taxiway Alpha;
- Rehabilitation and widening of pre-threshold pavement;
- Removal of existing Taxiway Delta;
- Removal of existing Fillet on Taxiway Alpha; and,
- Airfield electrical work.

3.3.4.2 Extension of Taxiway Alpha

Construction of the easterly and westerly extensions of Taxiway Alpha could be completed through a combination of night and daytime work. Where construction equipment does not extend into the OLS, work could be done during daytime hours. For example, the use of bulldozers, graders and compactors for spreading and compacting fill could be carried out during the day. Due to the height of excavation equipment and the height of the OLS on the south side of the westerly extension of Taxiway Alpha, unimpeded excavation will need to be conducted at night to avoid infringing on the OLS. Similarly, due to the height of the dumping equipment, unimpeded dumping will generally occur at night. Otherwise, through the use of careful planning, non-standard techniques and some restrictions, excavating and dumping could occur during the day.

Tie-ins to existing Taxiway Alpha could be conducted during the day or at night. If tie-ins are to be conducted during the day, pull-back of construction equipment will be required for the passage of aircraft on the taxiway. Tie-ins to the apron taxiway and the elbow on Taxiway Delta will have to occur entirely at night due to its close proximity to the extension of Taxiway Alpha.

3.3.4.3 Rehabilitation and Widening of Pre-Threshold Pavement

The existing pre-threshold pavements located at each end of the runway will be rehabilitated and widened. This work will need to be carried out entirely at night given its close proximity to the end of each runway.

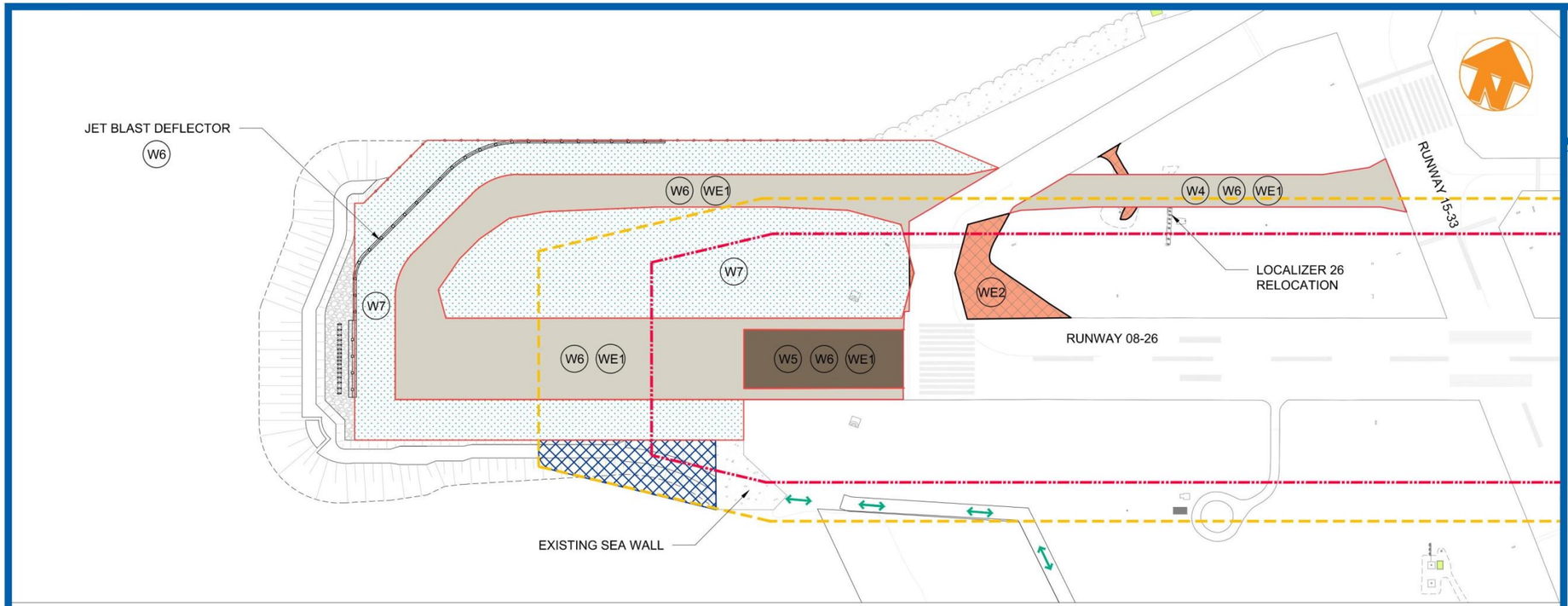
3.3.4.4 Removal of Taxiway Delta

Following construction of the new Taxiway Alpha east of the main apron, Taxiway Delta can be removed. Given its proximity to the new Taxiway Alpha, Taxiway Delta should be removed at night with suitable closures put in place.

3.3.4.5 Removal of Existing Fillet on Taxiway Alpha

Removal of a section of fillet on Taxiway Alpha at its intersection with the threshold of Runway 08 is planned as part of the runway extension project. Given its proximity to Runway 08-26 and existing Taxiway Alpha, both of which are heavily used during the day, it is recommended that this section of pavement be removed at night.

Figure 3-6: Land Based Construction Staging Plan – West



CONSTRUCTION STAGING - LAND CONSTRUCTION (WEST)

STAGE	SUB-STAGE	TASK NAME	DURATION (days)	CLOSURE/IMPACTS	RESTRICTIONS
W4	A	TOPSOIL STRIPPING	4	NIGHT WORK WITH RUNWAY CLOSED	
	B	COMMON EXCAVATION	5		
W5	A	EXISTING PAVEMENT REMOVAL - PRE-THRESHOLD STRIP	2	NIGHT WORK WITH RUNWAY CLOSED	
W6	A	PLACE AND COMPACT GRANULAR SUBBASE	11	NIGHT WORK WITH RUNWAY CLOSED	RESTRICTED OPERATION UNDER OLS DURING DAY TIME
	B	PLACE AND COMPACT GRANULAR BASE	6		RESTRICTED OPERATION UNDER OLS DURING DAY TIME
	C	ASPHALT PAVING WEST - BASE COURSE	2		
	D	ELECTRICAL WORK - EDGE LIGHTS	5		
	E	ELECTRICAL WORK - INSET LIGHTS - BASE	20		
	F	ELECTRICAL WORK - THRESHOLD LIGHTS	2		
	G	ELECTRICAL WORK - SIGNS (INSTALLED AND BAGGED)	10		
	H	ELECTRICAL WORK - PAPI (INSTALLED AND BAGGED)	1		
	I	JET BLAST DEFLECTOR	28		RESTRICTED OPERATION UNDER OLS DURING DAY TIME
W7	A	FINE GRADING	6	NIGHT WORK WITH RUNWAY CLOSED	RESTRICTED OPERATION UNDER OLS DURING DAY TIME
	B	TOPSOIL PLACEMENT AND SEEDING	4		RESTRICTED OPERATION UNDER OLS DURING DAY TIME
WE1	A	ASPHALT PAVING EAST & WEST - SURFACE COURSE	4	NIGHT WORK WITH RUNWAY CLOSED	
	B	LINE PAINTING - BOTH EAST AND WEST	3		
	C	ELECTRICAL WORK - INSET LIGHTS FINAL ADJUSTMENT	10		
WE2	A	EXISTING PAVEMENT REMOVAL - TAXIWAY BRAVO	6	NIGHT WORK WITH RUNWAY CLOSED	

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Legend

- New Asphalt Pavement Construction
- Pavement Rehabilitation
- Pavement Removal
- Airfield Grading
- Restriction On Dumping During Daytime (7m Clearance)
- Restriction On Trucking During Daytime (4m Clearance)
- Access To Restricted Work Zone
- Potential Area Required For Temporary Construction Access
- Potential Area For Landmass Required For NavAids Functionality

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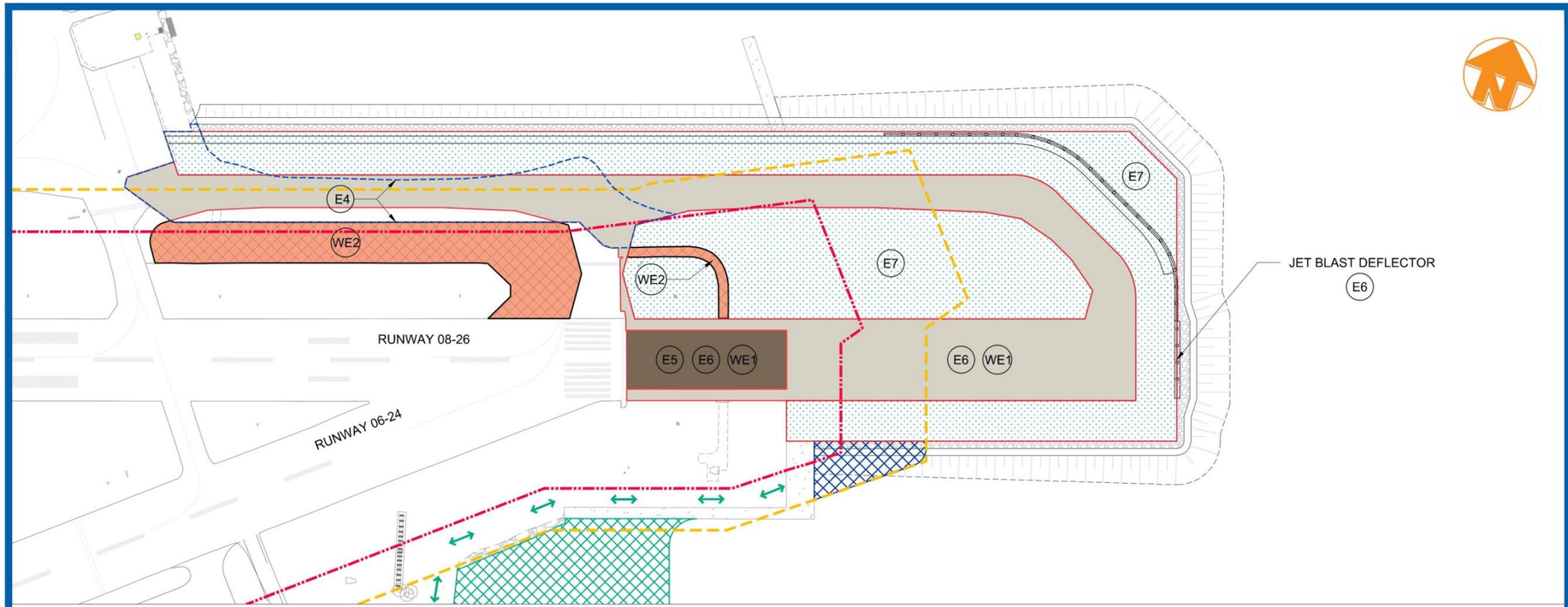
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Drawing Title: LAND BASED CONSTRUCTION STAGING PLAN - WEST

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09-10-15	C-9

Figure 3-7: Land Based Construction Staging Plan – East



CONSTRUCTION STAGING - LAND CONSTRUCTION (EAST)

STAGE	SUB-STAGE	TASK NAME	DURATION (days)	CLOSURE/IMPACTS	RESTRICTIONS
E4	A	TOPSOIL STRIPPING	4	NIGHT WORK WITH RUNWAY CLOSED	
	B	COMMON EXCAVATION	5		
E5	A	EXISTING PAVEMENT REMOVAL - RUNWAY 26 PRE-THRESHOLD STRIP	2	NIGHT WORK WITH RUNWAY CLOSED	
E6	A	PLACE AND COMPACT GRANULAR SUBBASE	11	NIGHT WORK WITH RUNWAY CLOSED	RESTRICTED OPERATION UNDER OLS DURING DAY TIME
	B	JET BLAST DEFLECTOR FOUNDATION	10		RESTRICTED OPERATION UNDER OLS DURING DAY TIME
	C	PLACE AND COMPACT GRANULAR BASE	8		RESTRICTED OPERATION UNDER OLS DURING DAY TIME
	D	ASPHALT PAVING EAST - BASE COURSE	2		
	E	ELECTRICAL WORK - INSET LIGHTS - BASE	20		
	F	ELECTRICAL WORK - EDGE LIGHTS	5		
	G	ELECTRICAL WORK - THRESHOLD LIGHTS	2		
	H	ELECTRICAL WORK - SIGNS (INSTALLED AND BAGGED)	10		
	I	ELECTRICAL WORK - PAPI (INSTALLED AND BAGGED)	1		
	J	JET BLAST DEFLECTOR	18		RESTRICTED OPERATION UNDER OLS DURING DAY TIME
E7	A	FINE GRADING	9	NIGHT WORK WITH RUNWAY CLOSED	RESTRICTED OPERATION UNDER OLS DURING DAY TIME
	B	TOPSOIL PLACEMENT AND SEEDING	6		RESTRICTED OPERATION UNDER OLS DURING DAY TIME
WE1	A	ASPHALT PAVING EAST & WEST - SURFACE COURSE	4	NIGHT WORK WITH RUNWAY CLOSED	
	B	LINE PAINTING - BOTH EAST AND WEST	3		
	C	ELECTRICAL WORK - INSET LIGHTS FINAL ADJUSTMENT	10		
WE2	A	EXISTING PAVEMENT REMOVAL - TAXIWAY ALPHA, DELTA	6	NIGHT WORK WITH RUNWAY CLOSED	

PORTS TORONTO

Legend

- New Asphalt Pavement Construction
- Pavement Rehabilitation
- Pavement Removal
- Airfield Grading
- Restriction On Dumping During Daytime (7m Clearance)
- Restriction On Trucking During Daytime (4m Clearance)
- Access To Restricted Work Zone
- Potential Area Required For Temporary Construction Access
- Potential Area For Landmass Required For NavAids Functionality

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Drawing Title: LAND BASED CONSTRUCTION STAGING PLAN - EAST

Scale: 1:2500 (0, 25, 50, 75m)

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Project Number	Revision Number
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Date	Sheet Number
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3.3.4.6 Airfield Electrical Work

Electrical works associated with the runway extension will include:

- Airfield guidance signs;
- Runway and taxiway edge lights;
- Runway end lights; and,
- Runway centreline lights.

Although the details of the electrical work will be finalized during detailed design, it is expected that most of the work will be conducted at night due to the OLS restrictions. It should be noted however, that in some cases the electrical work can be carried out during the day when the equipment is in compliance with the height of the OLS.

3.3.4.7 Jet Blast Deflector Construction

Fibreglass jet blast deflectors are proposed at each end of the main runway, and around the bend in the connecting taxiways. It is estimated that the west end deflector will be approximately 5.8 m in height and the east end deflector will be approximately 4.3 m in height. The jet blast deflectors for the connecting taxiway at each end of the runway extension will be approximately 3.6 m in height. The design of the jet blast deflectors will be carried out in the detailed design stage.

Due to the height of the equipment used to construct the jet blast deflectors, construction can occur during the day without impeding the OLS.

3.3.4.8 Localizer Antenna Installation

New localizers for each end of the runway extension will be constructed using drilled piles. The drilled piles will be constructed through the breakwater fill into the top of the shale bedrock. A permanent casing is required to prevent the loss of grout into the adjacent, open, cobble-sized breakwater fills. This work will be conducted at night due to the height of the pile and associated rig.

3.3.5 Construction Timing and Schedule

Assuming a January 2nd construction award, an approximate 2.5 year timeline is required to complete this project. Timelines for the various activities have been established based on discussions with specialty contractors and pro-rated as necessary based on the short production windows available during the nightly runway closures that will be required for this project.

Key assumptions impacting the overall timeline in the schedule include:

- The possible requirement to isolate the work area from fish prior to the warm weather spawning period from March 15 to July 15;
- A one month shutdown of production due to freeze-over of the lake for each year of construction;
- A wind and wave allowance of 1 day per month;
- A 5-day work week; and,
- Reduced nighttime working hours.

On the assumption that activity restrictions were to be placed on the project due to the warm weather spawning period between March 15 and July 15, isolation of the marine fill areas will need to occur prior to March 15th;

otherwise construction will need to be delayed until after July 15th when construction could resume. PortsToronto is a partner of Aquatic Habitat Toronto, which is jointly chaired by the Toronto and Region Conservation Authority and the Department of Fisheries and Oceans Canada. As an active member of the committee, PortsToronto will consult with the various provincial and federal government agencies to ensure any approvals are in place well in advance of any work commencing. Any potential dredging work will require review and approval of the Department of Fisheries and Oceans Canada.

If the construction contract were to be awarded in mid-July of any given year the overall schedule of approximately 2.5 years could still be achieved despite this shift in the start date.

4. Net Effects of Future Airport Operations

This section summarizes the findings of the effects assessment studies completed for the following disciplines:

- Air Quality;
- Noise;
- Public Health;
- Marine Navigation;
- Marine Physical;
- Water Quality;
- Built Form and Land Use;
- Archaeology and Cultural Heritage;
- Socio-Economic;
- Natural Environment; and,
- Transportation.

In order to identify potential effects, each effects assessment study considered the potential future environmental conditions in which the Future Baseline Scenario and the Proposed Future Scenario could occur. Mitigation measures were then proposed to reduce or eliminate any potential effects, and the resulting net effects (i.e., those effects remaining once mitigation measures are applied) were identified.

The following sub-sections provide a description of methods undertaken for each effects assessment study. The effects assessment studies have identified and assessed the potential environmental effects of the Future Airport Scenarios on the identified community assets. Many of the effects assessment studies considered the results obtained by other disciplines, and/or studies completed for other projects.

4.1 Air Quality

The below sections provide an overview of the Air Quality Effects Assessment completed by RWDI. For complete details of the assessment refer to **Appendix C-1**.

4.1.1 Methodology

The Air Quality Effects Assessment used a combined approach where monitored concentrations from several locations around the City of Toronto (**Figure 2-2**) were used to represent general background levels of air contaminants, and computer dispersion modelling was used to predict the additional impact from sources related to the BBTCA, and other major local sources such as main roadways in the vicinity of the airport. After air contaminant concentrations were established through ambient monitoring and dispersion modelling, the levels were compared to health risk thresholds.

4.1.2 Net Effects Analysis - Operation

4.1.2.1 Future Baseline Scenario

Table 4-1 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.1.2.2 Proposed Future Scenario

Table 4-2 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

Table 4-1: Future Baseline Scenario Net Effects Analysis for Air Quality – Operation

Asset	Measure of Effect	Key Design Considerations & Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
• **Recreational Uses** • **Residential Uses** • **Tourism** • **Institutional Uses**	▶ Levels of: NO_2; particulate (PM_{10} and $PM_{2.5}$); BaP; benzene and acrolein concentrations. ▶ Odours and soot.	▶ None.	▶ Emissions from the Airport Ferry assume continuous operation of the ferry during the hours that the airport is operating. The emissions are distributed along the transportation route and between the two stations based on the times spent at each location. Emissions from the Hanlan's Point Ferry are based on the summer operating schedule distributing the emissions evenly along the transportation route. ▶ Background concentrations of contaminants from 2012 were assumed to persist into the future at their current levels, which is likely to result in an overestimate of future background levels, as contaminant levels at monitoring sites in Ontario have generally been on a declining trend that is likely to continue into the future.	▶ For 24-hour NO_2, 8-hour CO, 24-hour and annual benzene, and 24-hour cadmium, the predicted concentrations are below their Toxicity Reference Values (TRV). ▶ For annual NO_2, 24-hour and annual $PM_{2.5}$, 24-hour and annual acrolein, and annual BaP, the predicted concentrations at the locations of highest impact are higher than their TRVs as a result of emissions from the ferries and roadways, and 24-hour and annual acrolein and 24-hour benzene are well above the general background concentrations.	▶ Encourage increased use of the BBTCA pedestrian tunnel to reduce frequency of ferry trips.	▶ For 24-hour NO_2, 8-hour CO, 24-hour and annual benzene, and 24-hour cadmium, the predicted concentrations are below their TRVs. ▶ For annual NO_2, 24-hour and annual $PM_{2.5}$, 24-hour and annual acrolein, and annual BaP, the predicted concentrations at the locations of highest impact are higher than their TRVs as a result of emissions from the ferries and roadways, and 24-hour and annual acrolein and 24-hour benzene are well above the general background concentrations.
• **Climate Change**	▶ Levels of: carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4).	▶ None.	▶ None.	▶ Approximately 194,000 tonnes of CO_2 will be emitted in the Air Quality Study Area per year, representing 0.11 % of Ontario's total annual emissions. ▶ Roadways are the largest contributor of greenhouse gas (GHG) emissions, representing 93 % of the total tonnes of CO_2 in the Air Quality Study Area per year.	▶ None.	▶ Approximately 194,000 tonnes of CO_2 will be emitted in the Air Quality Study Area per year, representing 0.11 % of Ontario's total annual emissions. ▶ Roadways are the largest contributor of GHG emissions, representing 93 % of the total tonnes of CO_2 in the Air Quality Study Area per year.

Table 4-2: Proposed Future Scenario Net Effects Analysis for Air Quality – Operation

Asset	Measure of Effect	Key Design Considerations & Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
• **Recreational Uses** • **Residential Uses** • **Tourism** • **Institutional Uses**	▶ Levels of: NO_2; particulate (PM_{10} and $PM_{2.5}$); BaP; benzene and acrolein concentrations. ▶ Odours and soot.	▶ Sound barriers have been proposed in the vicinity of the land mass extension. These barriers are expected to provide some mitigation of odour potential, as they will enhance the dispersion of vapours from unburnt fuel released during take-off.	▶ Emissions from the Airport Ferry assume continuous operation of the ferry during the hours that the airport is operating. The emissions are distributed along the transportation route and between the two stations based on the times spent at each location. ▶ Emissions from the Hanlan's Point Ferry are based on the summer operating schedule distributing the emissions evenly along the transportation route. ▶ Background concentrations of contaminants from 2012 were assumed to persist into the future at their current levels, which is likely to result in an overestimate of future background levels, as contaminant levels at monitoring sites in Ontario have generally been on a declining trend that is likely to continue into the future.	▶ For annual NO_2, annual $PM_{2.5}$, 24-hour and annual acrolein, and annual BaP, the predicted concentrations at the locations of highest impact are higher than their TRVs as a result of emissions from the ferries and roadways, and 24-hour and annual acrolein and 24-hour benzene are well above the general background concentrations. ▶ Potential for a small increase in odour is anticipated as jet engines provide more complete combustion of odorous hydrocarbons in the fuel, but consume more fuel.	▶ Encourage increased use of the BBTCA pedestrian tunnel to reduce frequency of ferry trips.	▶ For annual NO_2, annual $PM_{2.5}$, 24-hour and annual acrolein, and annual BaP, the predicted concentrations at the locations of highest impact are higher than their TRVs as a result of emissions from the ferries and roadways, and 24-hour and annual acrolein and 24-hour benzene are well above the general background concentrations. ▶ A small increase in the potential for odorous, unburnt hydrocarbons to be detected is anticipated.
• **Climate Change**	▶ Levels of: carbon dioxide (CO2), nitrous oxide (N2O) and methane (CH4).	▶ None.	▶ None.	▶ Approximately 144,000 tonnes of CO_2 will be emitted in the Air Quality Study Area per year, representing 0.08 % of Ontario's total annual emissions. ▶ Roadways are the largest contributor of GHG emissions, representing 81 % of the total tonnes of CO_2 in the Air Quality Study Area per year.	▶ None.	▶ Approximately 144,000 tonnes of CO_2 will be emitted in the Air Quality Study Area per year, representing 0.08 % of Ontario's total annual emissions. ▶ Roadways are the largest contributor of GHG emissions, representing 81 % of the total tonnes of CO_2 in the Air Quality Study Area per year.

4.1.2.3 Summary of Net Effects for Future Airport Scenarios – Operation

The potential air quality impacts resulting from the proposed runway extension were assessed through the comparison of the Proposed Future Scenario to the Future Baseline Scenario.

Concentrations of most air contaminants are predicted to remain relatively unchanged (less than 1% increase or decrease) as a result of the proposed runway extension across the Air Quality Study Area. This is because the emission sources that have the greatest influence on contaminant levels at sensitive receptors in the Air Quality Study Area (public roadways and ferry activity) are not expected to experience a significant change in activity level due to the runway extension.

Concentrations of some contaminants for some averaging times exceed their respective TRVs in the Air Quality Study Area, specifically annual NO_2, annual $PM_{2.5}$, annual BaP, 24-hour and annual acrolein. In the case of BaP and acrolein, background levels alone exceed the TRVs. Generally, however, the runway extension does not alter the number of locations where contaminant levels are predicted to exceed the TRVs, nor the magnitude of any exceedance, except that there are a few receptor locations in close proximity to the airport where the annual BaP and 24-hour acrolein concentrations are predicted to increase by between 2 and 10%.

A small increase in odour potential is anticipated due to the runway extension. The jet engines provide more complete combustion of odorous hydrocarbons in the fuel, but consume more fuel. The net effect is a small increase in the potential for odorous, unburnt hydrocarbons to be detected.

The overall potential for soot impacts, which are predominately from road and ferry traffic, is expected to remain the same for the Proposed Future Scenario as the Future Baseline Scenario.

4.1.3 Net Effects Analysis – Construction

4.1.3.1 Future Airport Scenarios

Table 4-3 details the net effects assessment for the Future Baseline and Proposed Future Scenarios as air quality effects during the construction phase are anticipated to be similar for both scenarios.

4.1.3.2 Summary of Net Effects for Future Airport Scenarios – Construction

It is anticipated that there will be nuisance effects related to construction activities in the vicinity of the BBTCA. The above noted mitigation measures are to be employed to reduce potential effects where possible. It is anticipated that short-term, infrequent and highly localized nuisance effects associated with dust and combustion emissions will be experienced in the vicinity of construction activities and the BBTCA.

4.2 Noise

The below sections provide an overview of the Noise Effects Assessment completed by RWDI. For complete details of the assessment refer to **Appendix C-2**.

4.2.1 Methodology

The assessment of sound levels associated with the proposal is based on modelled cumulative sound from the airport and ambient sources as experienced at points of reception in the vicinity of the airport. Both the Future Baseline and Proposed Future Scenarios are modelled. The significance of the proposal is based on the change in cumulative sound level.

For a complete description of the methods used for the Noise Effects Assessment refer to **Appendix C-2**.

Table 4-3: Future Airport Scenarios Net Effects Analysis for Air Quality – Construction

Asset	Measure of Effect	Potential Effects	Mitigation Measures	Net Effects
• **Recreational Uses** • **Residential Uses** • **Tourism** • **Institutional Uses**	▶ Nuisance effects due to construction.	▶ Nuisance effects on recreational, residential, tourism and institutional uses in the vicinity of the construction activities may include: dust and combustion emissions which will be short-term (during construction only), infrequent (primarily overnight) and will have no effects outside of the construction area.	▶ Discourage and, when practical, limit on-site vehicle and equipment idling. ▶ Use water spray or similar techniques to control dust generation from construction activities, storage piles and exposed soils/surfaces. ▶ Minimize the tracking of earth or soil from the site on trucks through the use of mud mats (e.g., granular pads located at site entrances). Where a mud mat is not effective in controlling the tracking of earth or soil onto adjacent roads, the physical removal of earth from vehicles is to be implemented. ▶ Cover vehicles hauling soil, aggregates or fine or dusty material to minimize the generation of dust. ▶ Schedule or plan construction activities to limit areas of exposed soil at any given time. ▶ Monitor exposed soil areas and adjacent roads for dust generation potential, with attention paid to areas used for pedestrian walkways and vehicle traffic. ▶ Perform on-site (including roadways) flushing, sweeping and cleaning on a regular basis, with consideration for the containment and management of any wash water. ▶ Cover exposed fill/stock piles that may be a source of fugitive dust with tarpaulins, soil binders or other appropriate means, where practical. ▶ Restore and re-vegetate soil surfaces as soon as possible. ▶ Schedule and plan construction activities such as cutting and grinding to limit the release of dust to adjacent properties. ▶ Schedule transportation and delivery of construction materials to minimize the amount of bulk construction materials stored on-site at a given time. ▶ Make speed limits within the site 20 km/h to limit dust generation. ▶ Use new or well-maintained heavy equipment and machinery with mandatory fully functional emission control systems/muffler/exhaust system baffles, engine covers, etc.	▶ Short-term, infrequent and highly localized nuisance effects associated with dust and combustion emissions.

4.2.2 Net Effects Analysis – Operation

4.2.2.1 Future Baseline Scenario

Table 4-4 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.2.2.2 Proposed Future Scenario

Table 4-5 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

4.2.2.3 Summary of Net Effects for Future Airport Scenarios – Operation

For both Future Airport Scenarios noise levels associated with airborne aircraft remain within the criteria of the Tripartite Agreement. The proposed 6 m noise barrier along the north side of the taxiway extension under both Future Airport Scenarios will serve to reduce sound levels from aircraft on the ground. In addition, the Proposed Future Scenario includes the construction of a ground run-up enclosure. As a result of this enclosure, future sound levels will be less than existing conditions for airport engine run-up testing. When comparing cumulative sound levels for the Future Airport Scenarios, reductions for some sensitive points of reception (R3, R4, R7, R8 and R9) will be significant.

4.2.3 Net Effects Analysis – Construction

4.2.3.1 Future Airport Scenarios

Table 4-6 details the net effects assessment for the Future Baseline and Proposed Future Scenarios as noise effects during the construction phase are anticipated to be similar for both scenarios.

4.2.3.2 Summary of Net Effects for Future Airport Scenarios – Construction

It is anticipated that nuisance effects related to construction activities in the vicinity of the BBTCA will occur. The above noted mitigation measures are to be employed to reduce potential effects where possible. It is anticipated that short-term, frequent and highly localized nuisance effects associated with noise will be experienced in the vicinity of construction activities and the BBTCA. These effects will be minimized where possible.

Table 4-4: Future Baseline Scenario Net Effects Analysis for Noise – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
• **Recreational Uses** • **Residential Uses** • **Tourism** • **Institutional Uses**	▶ A weighted sound levels (L_{EQ} dBA and LDN). ▶ NEF. ▶ Number of Events above 70 dBA (N70).	▶ No ground run-up enclosure for aircraft engine run-up testing is present.	▶ Maintenance of the Q400 aircraft requires engine run-up activity, which can occur at night from time to time. The worst-case one-hour test length has been modelled to occur during daytime and nighttime hours. ▶ Sound level data for the ferry reflect data from 2014. ▶ The quantity of each piece of ground support equipment used (i.e., fuel trucks, baggage handling equipment, water and lavatory service carts, and air supply equipment) is directly proportional to the number of aircraft used in NEF modelling.	▶ For airborne aircraft, NEF contours remain within the criteria of the Tripartite Agreement. ▶ Sound levels from aircraft on the ground and ferry exceed NPC-300 target values. ▶ Daytime and/or nighttime sound levels from aircraft on the ground and ferry exceed 70 dBA values at five of nine points of reception. ▶ Sound from ground support equipment is less than the NPC-300 criteria during daytime, evening and nighttime hours when the airport activity is at its highest and corresponding road traffic sound is at its lowest.	▶ New residential development would be provided with warning clauses and possibly mitigation measures. ▶ Provide ground run-up enclosure for aircraft engine run-up testing. ▶ Provide noise barrier at a height of 6 m along the north side of the taxiway extension to address sound levels from aircraft as they hold on the taxiway prior to take-off.	▶ NEF contours remain within the criteria of the Tripartite Agreement. ▶ Reduction in sound levels from aircraft on the ground due to installation of noise barrier. ▶ Sound from ground support equipment is less than the NPC-300 criteria.

Table 4-5: Proposed Future Scenario Net Effects Analysis for Noise – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
• **Recreational Uses** • **Residential Uses** • **Tourism** • **Institutional Uses**	▶ A weighted sound levels (L_{EQ} dBA and LDN). ▶ NEF. ▶ Number of Events above 70 dBA (N70).	▶ Ground run-up enclosure for aircraft engine run-up testing will be constructed before ultimate completion of the proposal.	▶ Sound level data for the ferry assumes installation of improved mufflers. ▶ The quantity of each piece of ground support equipment used (i.e., fuel trucks, baggage handling equipment, water and lavatory service carts, and air supply equipment) is directly proportional to the number of aircraft used in NEF modelling.	▶ For airborne aircraft, NEF contours remain within the criteria of the Tripartite Agreement. ▶ Sound levels from aircraft on the ground and ferry will be reduced compared to existing conditions due to ground run-up enclosure, but exceed NPC-300 target values. ▶ Daytime and/or nighttime sound levels from aircraft on the ground and ferry do not exceed 70 dBA values at any of the points of reception ▶ Sound from ground support equipment is less than the NPC-300 criteria during daytime, evening and nighttime hours when the airport activity is at its highest and corresponding road traffic sound is at its lowest.	▶ New residential development would be provided with warning clauses and possibly mitigation measures. ▶ Provide noise barrier at a height of 6 m along the north side of the taxiway extension to address sound levels from aircraft as they hold on the taxiway prior to take-off.	▶ NEF contours remain within the criteria of the Tripartite Agreement. ▶ Overall, sound levels from aircraft on the ground and the ferry will be reduced compared to existing conditions due to the ground run-up enclosure, but will still exceed NPC-300 target values. For some sensitive points of reception reductions will be significant. ▶ Reduction in sound levels from aircraft on the ground due to installation of noise barrier. ▶ Sound from ground support equipment is less than the NPC-300 criteria.

Table 4-6: Future Airport Scenarios Net Effects Analysis for Noise - Construction

Asset	Measure of Effect	Potential Effects	Mitigation Measures	Net Effects
• **Recreational Uses** • **Residential Uses** • **Tourism** • **Institutional Uses**	▶ Nuisance effects due to construction.	▶ Nuisance effects on recreational, residential, tourism and institutional uses in the vicinity of the construction activities may include noise emissions, which will be short-term (during construction only), frequent during overnight hours and localized to the construction areas.	▶ Conform to local noise by-laws. ▶ Notify residents of planned events that may cause disturbance.	▶ Short-term, frequent and highly localized nuisance effects associated with construction noise will be minimized where possible.

4.3 Public Health

The below sections provide an overview of the Public Health Effects Assessment. For complete details of the assessment refer to **Appendix C-3**.

4.3.1 Methodology

The Public Health Effects Assessment compared noise and air quality (i.e., contaminant) levels associated with the Future Airport Scenarios to thresholds and/or guidelines where health effects have been observed. For details on the thresholds/guidelines used for potential health effects associated with sound and contaminant levels refer to **Appendix C-3**.

4.3.2 Net Effects Analysis – Operation

4.3.2.1 Future Baseline Scenario

Table 4-7 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.3.2.2 Proposed Future Scenario

Table 4-8 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

4.3.2.3 Summary of Net Effects for Future Airport Scenarios – Operation

Noise levels and contaminant concentrations associated with the Future Baseline and Proposed Future Scenarios have the potential to result in health effects. There are few differences between the two Future Airport Scenarios. However:

- Noise levels during daytime hours are lower in the Proposed Future Scenario than the Future Baseline Scenario and are below the threshold for increased risk of hypertension and ischemic heart disease;
- Noise levels during nighttime hours are marginally lower in the Proposed Future Scenario than the Future Baseline Scenario; and,
- There is a marginally higher risk of health effects due to air emissions with the Proposed Future Scenario compared to the Future Baseline Scenario.

4.3.3 Net Effects Analysis – Construction

4.3.3.1 Future Airport Scenarios

Refer to the construction net effects assessments tables under the air quality and noise **Sections 4.2.3.1 and 4.4.3.1** as they relate to public health.

Table 4-7: Future Baseline Scenario Net Effects Analysis for Public Health – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Public Health is an Asset that is affected by: • **Air Quality; and,** • **Noise Levels**	▶ Changes to noise levels.	▶ No ground run-up enclosure for aircraft engine run-up testing is present.	▶ Maintenance of the Q400 aircraft requires engine run-up activity, which can occur at night from time to time. The worst-case one-hour test length has been modelled to occur during daytime and nighttime hours. ▶ Sound level data for the ferry are from 2014. ▶ The quantity of each piece of ground support equipment used (i.e., fuel trucks, baggage handling equipment, water and lavatory service carts, and air supply equipment) is directly proportional to the number of aircraft used in NEF modelling.	Airborne Aircraft ▶ NEF contours remain within the criteria of the Tripartite Agreement so no effects to public health from airborne aircraft are anticipated. Aircraft on the Ground and the Ferry ▶ Sounds levels from aircraft on the ground and the ferry at all receptor locations are greater than 42 L_{EQ} during night-time hours and could result in environmental insomnia or sleep disturbance. ▶ Sound levels from aircraft on the ground and the ferry at receptor locations R3, R4, R7, and R8 are greater than 70 L_{EQ} during daytime hours and could result in hypertension and ischemic health disease. Ground Support Equipment ▶ Sound levels from ground support equipment at receptor locations R1, R4, R5, and R8 are greater than 42 L_{EQ} during night-time hours and could result in environmental insomnia or sleep disturbance. Road and LRT ▶ Sound levels from road and LRT are greater than 42 L_{EQ} during night-time hours at all receptor locations and could result in environmental insomnia or sleep disturbance. ▶ Sound levels from road and LRT are greater than 70 L_{EQ} during daytime hours at receptor location R2 and could result in hypertension and ischemic health disease.	▶ Provide ground run-up enclosure for aircraft engine run-up testing. ▶ Provide noise barrier at a height of 6 m along the north side of the taxiway extension to address sound levels from aircraft as they hold on the taxiway prior to take-off. ▶ Ensure that the City requires new residential development be provided with warning clauses and most likely mitigation measures.	▶ Sound levels from aircraft on the ground and the ferry at all receptor locations, from ground support equipment at receptor locations R1, R4, R5, and R8, and from road and LRT at all receptor locations could result in environmental insomnia or sleep disturbance. ▶ Sound levels from aircraft on the ground and the ferry at receptor locations R3, R4, R7, and R8 and from road and LRT at receptor location R2 could result in hypertension and ischemic health disease.
	▶ Changes to air quality.	▶ None.	Background concentrations of the following contaminants are above or close to their TRVs: NO_2 ▶ Background concentrations for the annual averaging period are 78 % of the TRV. $PM_{2.5}$ ▶ Background concentrations for the 24-hour averaging period are 59 % of the TRV. ▶ Background concentrations for the annual averaging period are 88 % of the TRV. Acrolein ▶ Background concentrations for the 24-hour averaging period are 75 % of the TRV. ▶ Background concentrations for the annual averaging period are 650 % of the TRV, which can result in an increased risk of developing nasal lesions. BaP ▶ Background concentrations for the annual averaging period are 1400% of the TRV, which can result in an increased risk of developing respiratory tract tumours.	NO_2 ▶ Five of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period, which may result in increased risks of respiratory illness. $PM_{2.5}$ ▶ Three of 50 have predicted concentrations higher than the TRV for the annual averaging period, which may result in an increased risk of cardiopulmonary and lung cancer. Acrolein ▶ 28 of 50 receptors have predicted concentrations higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways. ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of developing nasal lesions. BaP ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of developing respiratory tract tumours.	▶ None.	NO_2 ▶ 5 of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period, which may result in increased risks of respiratory illness. $PM_{2.5}$ ▶ 3 of 50 have predicted concentrations higher than the TRV for the annual averaging period, which may result in an increased risk of cardiopulmonary and lung cancer. Acrolein ▶ 28 of 50 receptors have predicted concentrations higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways. ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of developing nasal lesions. BaP ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of developing respiratory tract tumours.

Table 4-8: Proposed Future Scenario Net Effects Analysis for Public Health – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Public Health is an Asset that is affected by: • **Air Quality; and,** • **Noise Levels**	▶ Changes to noise levels.	▶ Ground run-up enclosure for aircraft engine run-up testing is present.	▶ Maintenance of the Q400 aircraft requires engine run-up activity, which can occur at night from time to time. The worst-case one-hour test length has been modelled to occur during daytime and nighttime hours. ▶ Sound level data for the ferry from 2014. ▶ The quantity of each piece of ground support equipment used (i.e., fuel trucks, baggage handling equipment, water and lavatory service carts, and air supply equipment) is directly proportional to the number of aircraft used in NEF modelling.	Airborne Aircraft ▶ NEF contours remain within the criteria of the Tripartite Agreement so no effects to public health from airborne aircraft are anticipated. Aircraft on the Ground and the Ferry ▶ Sound levels from aircraft on the ground and the ferry at all receptor locations except for R9 are greater than 42 L_{EQ} during night-time hours and could result in environmental insomnia or sleep disturbance. Ground Support Equipment ▶ Sound levels from ground support equipment at receptor locations R1, R4, R5, and R8 are greater than 42 L_{EQ} during night-time hours and could result in environmental insomnia or sleep disturbance. Road and LRT ▶ Sound levels from road and LRT are greater than 42 L_{EQ} during night-time hours at all receptor locations and could result in environmental insomnia or sleep disturbance. ▶ Sound levels from road and LRT are greater than 70 L_{EQ} during daytime hours at receptor location R2 and could result in hypertension and ischemic health disease.	▶ Provide noise barrier at a height of 6 m along the north side of the taxiway extension to address sound levels from aircraft as they hold on the taxiway prior to take-off. ▶ Ensure that the City requires new residential development be provided with warning clauses and most likely mitigation measures.	▶ Sound levels during night-time hours from aircraft on the ground and the ferry at all receptor locations except for R9, from ground support equipment at receptor locations R1, R4, R5, and R8, and from road and LRT at all receptor locations could result in environmental insomnia or sleep disturbance. ▶ Sound levels during daytime hours from road and LRT at receptor location R2 could result in hypertension and ischemic health disease.
	▶ Changes to air quality.	▶ None.	Background concentrations of the following contaminants are above or close to their TRVs: NO_2 ▶ Background concentration for the annual averaging period is 78 % of the TRV. $PM_{2.5}$ ▶ Background concentration for the 24-hour averaging period is 59 % of the TRV. ▶ Background concentration for the annual averaging period is 88 % of the TRV. Acrolein ▶ Background concentration for the 24-hour averaging period is 75 % of the TRV. ▶ Background concentration for the annual averaging period is 650 % of the TRV, which can result in an increased risk of developing nasal lesions. BaP ▶ Background concentration for the annual averaging period is 1400 % of the TRV, which can result in an increased risk of developing respiratory tract tumours.	NO_2 ▶ 5 of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period, which may result in increased risks of respiratory illness. $PM_{2.5}$ ▶ 3 of 50 have predicted concentrations higher than the TRV for the for the annual averaging period, which may result in an increased risk of cardiopulmonary and lung cancer. Acrolein ▶ 29 of 50 receptors have predicted concentrations higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways. ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging periods, which can result in an increased risk of developing nasal lesions. BaP ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging periods, which can result in an increased risk of developing respiratory tract tumours.	▶ None.	NO_2 ▶ 5 of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period, which may result in increased risks of respiratory illness. $PM_{2.5}$ ▶ 3 of 50 have predicted concentrations higher than the TRV for the annual averaging period, which may result in an increased risk of cardiopulmonary and lung cancer. Acrolein ▶ 29 of 50 receptors have predicted concentrations higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways. ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of developing nasal lesions. BaP ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of developing respiratory tract tumours.

4.4 Marine Navigation

The below sections provide an overview of the Marine Navigation Effects Assessment. For complete details of the assessment refer to **Appendix C-4**.

4.4.1 Methodology

The approach for assessing potential effects of the runway and the runway extension on vessel navigation, stability and crowding are summarized below:

- Based on information from the 2015 Master Plan (including the layout of airport, runway extension, MEZ, etc.), perform a Computational Fluid Dynamics (CFD) Study to determine the jet blast wind distribution in consideration of the proposed Jet Blast Deflectors (JBDs) at the end of each runway.
- Obtain dimensions of typical boats navigating in the area, from interviews with stakeholders conducted as part of the Socio-Economic Effects Assessment and other data collection activities.
- Comment on the effects of likely changes to waves, currents, water levels, and sedimentation caused by the proposed runway extension with regard to marine navigation, and based on the assessment results of the Marine Physical Effects Assessment.
- Perform a navigation assessment pertaining to effects on dynamic stability and maneuverability of recreational boats at the edge of the MEZ, using engineering judgement and, where appropriate, a mathematical calculation.
- Review any proposed changes to the dimensions of the MEZ and width of the Western Channel to comment on effects to marine navigation.

Based on the above, the marine navigation assessment comments on the impact of the runway extension on boat navigation when entering or exiting the Western Channel. It does not include an effects assessment for the Future Baseline Scenario. For further details regarding the methodology used to conduct the Marine Navigation Effects Assessment, see **Appendix C-4**.

4.4.2 Net Effects Analysis – Operation

The net effects analysis for the Proposed Future Scenario was assessed through a review of the dynamic stability of representative boats. This effects assessment pertains only to the Proposed Future Scenario as the predominant effect for marine navigation is wind-generated jet blast. Therefore, it is assumed that there would be limited effects on navigation as a result of the Future Baseline Scenario. The discussion regarding effects from the increase in the size of the MEZ also relates only to the Proposed Future Scenario as the MEZ is not proposed to expand under the Future Baseline Scenario.

4.4.2.1 Proposed Future Scenario

Table 4-9 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

Table 4-9: Proposed Future Scenario Net Effects Analysis for Marine Navigation – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Recreation – Boating	▶ Impacts of jet blast, wake turbulence, and altered wave conditions on stability (also referred to as the dynamic stability) of vessels.	▶ The jet blast wind speed generated by the design airplane at the MEZ boundary is in the range of 7.2 m/sec to 10.8 m/sec (26 km/h to 39 km/h) after the jet blast deflector is installed.	▶ No anticipated changes to proposed future considerations and assumptions.	▶ Jet blast wind speed at the edge of the MEZ boundary could cause small recreational boats to become unstable or to be at risk of capsizing when the jet blast wind is in the range of 7.2 m/sec to 10.8 m/sec. ▶ The impact of the runway extension on the dynamic stability of large recreational boats is limited even when these boats are located close to the MEZ boundary.	▶ Consider extending the MEZ boundary on the east side of the runway extension to protect small recreational boats from instability. ▶ No mitigation is available for small recreational boats on the west side of the runway extension as there is limited space to further expand the MEZ boundary. ▶ Post a notice indicating that small recreational boats should avoid the MEZ boundary.	▶ The net effect of jet blast wind on the dynamic stability of small recreational boats is significant at the edge of the MEZ boundary. ▶ The net effect of jet blast wind on the dynamic stability of larger recreational boats is not considered significant at the edge of the MEZ boundary.
Recreation – Boating	▶ Changes to the ability of boats to navigate the Western Channel and close to the runway extension (also referred to as the maneuverability of a vessel).	▶ Land mass extension of 200 m on each end of the main runway. ▶ Proposed expansion of MEZ boundary at west side and east side of runway extension.	▶ No anticipated changes to proposed future considerations and assumptions.	▶ Navigating the entrance to the Western Channel is already challenging for some recreational boaters. ▶ Small recreational boats will be further constrained at the entrance to the Western Channel as they must avoid the MEZ boundary. ▶ Larger recreational boats will not be as constrained as small recreational boats as they do not have to avoid the MEZ boundary; however, they will still experience further challenges with navigating the already narrow entrance to the Western Channel.	▶ No mitigation is available to ease the challenge of navigating the entrance to the Western Channel.	▶ The net effect of the runway extension on maneuverability in the Western Channel is significant for both small and large recreational boats.

4.4.2.2 Summary of Net Effects for Proposed Future Scenario – Operation

Under the Proposed Future Scenario the impact of jet blast wind on the dynamic stability of small recreational boats, such as canoes, is significant when these boats are located close to the MEZ boundary. To safely navigate, these small recreational boats should avoid the MEZ boundary. Conversely, the impact of jet blast wind speed on the dynamic stability of large recreational boats is limited even when these boats are located close to the MEZ boundary. The impact of the runway extension on boat maneuverability at the entrance of the Western Channel is considerable for small recreational boats given that these boats need to avoid the MEZ boundary. The impact of the runway extension on boat maneuverability at the entrance of the Western Channel is limited for large recreational boats.

4.4.3 Net Effects Analysis – Construction

4.4.3.1 Proposed Future Scenario

Table 4-10 details the net effects assessment for the Proposed Future Scenario only, as the MEZ is not anticipated to change with the Future Baseline Scenario, thus avoiding potential impacts on boat navigation.

Table 4-10: Proposed Future Scenario Net Effects Analysis for Marine Navigation – Construction

Asset	Measure of Effect	Potential Effects	Mitigation Measures	Net Effects
Recreation – Boating	▶ Changes to the ability of boats to navigate the Western Channel and the area close to the runway extension (also referred to as the maneuverability of a vessel).	▶ Reduced navigability during in-water construction activities, including: dredging/ lakebed densification; pile wall construction; and placement of in-water fill.	▶ Mark areas of in-water works for navigation safety. ▶ Maintain safe access during construction activities and install proper signage where recreational marine users are permitted to go. ▶ Consult with the Canadian Coast Guard when installing the sheet-pile wall on the north side of the western runway extension to determine if a Notice to Shipping is required (NOTSHIP).	▶ Construction will restrict navigation in some areas, particularly within the Western Channel.

4.4.3.2 Summary of Net Effects for Future Airport Scenarios – Construction

Construction will restrict navigation in some areas during in-water construction activities, and particularly within the Western Channel. Mitigation measures, such as proper signage indicating where recreational marine users are permitted to go, will assist marine users during construction activities.

4.5 Marine Physical

The below sections provide an overview of the Marine Physical Environment Effects Assessment. For complete details of the assessment refer to **Appendix C-5**.

4.5.1 Methodology

The Future Baseline and the Proposed Future Scenarios were assessed based on a review of existing background information and a qualitative assessment of aerial imagery to identify trends in sediment movement, deposition, and erosion.

4.5.2 Net Effects Analysis – Operation

4.5.2.1 Future Baseline Scenario

Table 4-11 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.5.2.2 Proposed Future Scenario

Table 4-12 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

4.5.2.3 Summary of Net Effects for Future Airport Scenarios – Operation

Based on the results of the current qualitative analysis, a comparison of the Future Baseline to the Proposed Future Scenario shows that in the long term, neither the RESA or the land mass extension will have a significant impact on marine physical parameters within the Marine Physical Study Area but will cause short term local erosion and deposition linked to barrier induced sediment transport disruption.

4.5.3 Net Effects Analysis – Construction

Assets assessed as part of the Marine Physical Effects Assessment reflect changes that would occur over an extended period of time. Therefore, no construction effects are anticipated.

Table 4-11: Future Baseline Scenario Net Effects Analysis for the Marine Physical Environment – Operation

Asset	Measure of Effect	Key Design Considerations & Assumptions	Future Baseline Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Wave Formation	▶ Changes in wave height, wave period (i.e., time between two waves) and wave direction.	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to future baseline considerations and assumptions relative to current.	▶ Small localized changes to wave height, wave period, and wave direction will occur as a result of the RESA. ▶ Minor changes to the waves entering into the Western Channel around the western runway will occur due to the reduction in size of wave energy window for the southwesterly waves by the expansion.	▶ None required.	▶ Effects anticipated to be minor and localized. ▶ Detailed numerical modelling during detailed design will confirm the reduction in size of wave energy window for the southwesterly waves.
Water Levels	▶ Changes in water levels in the Western Channel and nearby marina.	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to future baseline considerations and assumptions relative to current.	▶ Changes in water levels in the Western Channel and nearby marina will be negligible.	▶ None required.	▶ No net effects on water levels in the Western Channel and nearby marina.
Currents	▶ Changes in flow patterns and current speed.	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to future baseline considerations and assumptions relative to current.	▶ Areas where water velocity is lowered due to the fill used to create the extension for the RESA will see areas of sediment accumulation. ▶ Areas with concentrated currents will likely experience some scour as the relatively low velocities needed to move fine sand will, on occasions, be exceeded.	▶ None required.	▶ Localized changes to currents resulting in potential sediment deposition or erosion. ▶ Detailed numerical modelling during detailed design stage will determine the locations, rates and volumes of sediment accumulation and scour.
Sediment Transport	▶ Sediment deposition/accumulation in West Island, Western Channel and in the immediate vicinity of the extension of the land mass (to identify where sediment may deposit). ▶ Long shore sedimentation patterns (whether sediment moves along the shoreline). ▶ Sediment deposition/accumulation in the inner harbor. ▶ Changes to type of sediment that could be moved by the currents (if currents speeds change, it can affect the size of sediment that moves).	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to future baseline considerations and assumptions relative to current.	▶ Short term effects include sediment deposition at the northern end of Hanlan's Point Beach, with sediment loss occurring in the Western Channel and areas to the east of West Island. ▶ Sediment starved areas where bank protection is not present may experience some erosion along the shoreline. ▶ Over time, sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the Western Channel. ▶ Provided processes remain generally the same, it would be expected that adaption to the RESA would occur over approximately the same timeframe. ▶ Any effects on sediment erosion and deposition within the Inner Harbour are likely to be very minor and may be considered negligible.	▶ None required.	▶ No net effects are anticipated on sediment transport within the Marine Physical Study Area as over time (approximately 10 years) sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the Western Channel. ▶ Detailed numerical modelling is required as part of the detailed design stage, to determine the locations, rates and volumes of sediment accumulation and scour. ▶ Areas susceptible to sediment loss and accumulation will need to be confirmed in the field through a reconnaissance level field walk along various shoreline locations to identify signs of instability and to identify evidence of sediment transport and change, and should include a review of ecological response to present patterns of erosion and deposition.

Table 4-12: Proposed Future Scenario Net Effects Analysis for the Marine Physical Environment – Operation

Asset	Measure of Effect	Key Design Considerations & Assumptions	Proposed Future Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Wave Formation	▶ Changes in wave height, wave period (i.e., time between two waves) and wave direction.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ Small localized changes to wave height, wave period, and wave direction will occur as a result of the RESA. ▶ Minor changes to the waves entering into the Western Channel around the western runway will occur due to the reduction in size of wave energy window for the southwesterly waves by the runway extension.	▶ None required.	▶ Effects anticipated to be minor and localized. ▶ Detailed numerical modelling conducting during detailed design will confirm the size of the reduction in size of wave energy window for the southwesterly waves.
Water Levels	▶ Changes in water levels in the Western Channel and nearby marina.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ Changes in water levels in the Western Channel and nearby marina will be negligible.	▶ None required.	▶ No net effects on water levels in the Western Channel and nearby marina.
Currents	▶ Changes in flow patterns and current speed.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ Areas where water velocity is lowered due to the fill used to create the runway extension will see areas of sediment accumulation. ▶ Areas with concentrated currents will likely experience some scour as the relatively low velocities needed to move fine sand will, on occasions, be exceeded.	▶ None required.	▶ Localized changes to currents resulting in potential sediment deposition or erosion. ▶ Detailed numerical modelling during the detailed design stage will determine the locations, rates and volumes of sediment accumulation and scour.
Sediment Transport	▶ Sediment deposition/accumulation in West Island, Western Channel and in the immediate vicinity of the extension of the land mass (to identify where sediment may deposit). ▶ Long shore sedimentation patterns (whether sediment moves along the shoreline). ▶ Sediment deposition/accumulation in the inner harbor. ▶ Changes to type of sediment that could be moved by the currents (if current speeds change, it can affect the size of sediment that moves).	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ Short term effects include sediment deposition at the northern end of Hanlan's Point Beach, with sediment loss occurring in the Western Channel and areas to the east of West Island. ▶ Sediment starved areas where bank protection is not present may experience some erosion along the shoreline. ▶ Over time, sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the Western Channel. ▶ Provided processes remain generally the same, it would be expected that adaption to the new runway extension would occur over approximately the same timeframe. ▶ Any effects on sediment erosion and deposition within the Inner Harbour are likely to be very minor and may be considered negligible.	▶ None required.	▶ No net effects are anticipated on sediment transport with the Marine Physical Study Area as over time (approximately 10 years) sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the Western Channel. ▶ Detailed numerical modelling is required as part of the detailed design stage, to determine the locations, rates and volumes of sediment accumulation and scour. ▶ Areas susceptible to sediment loss and accumulation will need to be confirmed in the field through a reconnaissance level field walk along various shoreline locations to identify signs of instability and to identify evidence of sediment transport and change, and should include a review of ecological response to present patterns of erosion and deposition.

4.6 Water Quality

The below sections provide an overview of the Water Quality Effects Assessment. For complete details of the assessment refer to **Appendix C-6**.

4.6.1 Methodology

To evaluate potential water quality impacts to the Inner Harbour as a result of the proposed runway extension, an assessment of inflow to the Inner Harbour and hydraulic residence time was conducted. Hydraulic residence time is the time required to replace/flush the total volume of water in the Inner Harbour, and is used as an indicator of water quality. Specific objectives of this assessment were to:

- Gather and review existing information and data on water quality, bathymetry, water levels, Don River inflows, and Inner Harbour and Lake Ontario circulation patterns as changes can affect the water quality of the Inner Harbour.
- Assess the impact of the proposed runway extension on flow dynamics at the Eastern and Western Channel harbour inlets through a mass balance assessment of the Inner Harbour.
- Identify whether the proposed runway extension will result in a noticeable change in water quality due to changes to the water circulation into the Inner Harbour.
- Identify the boundaries and methodology required to complete a numerical model that will further assess the effects of the land mass extension based on the detailed design, should the proposal be approved.

For a complete description of the methods used for the Water Quality Effects Assessment refer to **Appendix C-6**.

4.6.2 Net Effects Analysis - Operation

4.6.2.1 Future Baseline Scenario

Table 4-13 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.6.2.2 Proposed Future Scenario

Table 4-14 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

4.6.2.3 Summary of Net Effects for Proposed Future Scenario – Operation

Under the Proposed Future Scenario it is anticipated that there will be a reduction of average flow through the Inner Harbour which will increase the average Inner Harbour residence time from 6.7 to 12.3 days. A similar, albeit reduced, impact is expected for the Future Baseline Scenario. The anticipated increases in residence time will have a high potential for negative impacts to water quality in the Inner Harbour, through reduced dilution and flushing of pollutant laden water from Don River discharges, storm sewer outfalls and combined sewer overflows. Detailed numerical monitoring is recommended to assess changes to flow patterns and current speed and confirm impacts to the Inner Harbour's water quality in conjunction with ongoing water quality enhancement initiatives.

Table 4-13: Future Baseline Scenario Net Effects Analysis for Water Quality – Operation

Variable	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Potential Mitigation Measures	Net Effects
Water Levels	▶ Changes in water levels in the Western Channel and nearby marina.	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to future baseline considerations and assumptions relative to current.	▶ None.	▶ None required.	▶ None.
Currents	▶ Changes in flow patterns and current speed.	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to near shore currents of Lake Ontario. ▶ East end RESA will reduce the Western Channel harbour opening by 50 %.	▶ Reductions to the Western Channel flow by approximately less than 50 % due to constriction of Western Channel opening. ▶ Localized changes to flow patterns at east end extension may reduce circulation between the east end RESA and Muggs Island.	▶ Directing more lake current to the Western Channel through breakwater construction. ▶ Consider construction of the runway extension on a pile-supported deck structure. ▶ Consider shifting the runway extension eastward. ▶ Consider construction of new channels through the Toronto Islands.	▶ Reduction of average flow through the harbour, increasing the average Inner Harbour residence time from 6.7 to 12.3 days. ▶ Detailed numerical modelling during detailed design stage is recommended to assess changes to flow patterns and current speed.
Water Quality	▶ Changes to the harbour residence time (i.e., dilution and flushing). ▶ Average concentration of pollutants in harbour.	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ E Coli bacteria water quality concerns due to combined sewer overflows and stormwater runoff. Additional pollutants include phosphorus, heavy metals, toxic organics, and contaminated sediments. ▶ Future water quality enhancement through completion of the Toronto and Region Remedial Action Plan (RAP) and the City of Toronto's Don and Waterfront Trunk Sewers and Combined Sewer Overflow Control Strategy.	▶ Increase harbour residence time, with reduced dilution and flushing of pollutant laden water. ▶ Potential reduction in water circulation, causing dead-zones between the east end RESA and Muggs Island.	▶ Reduce pollutants entering harbour.	▶ Increases in residence time will have a high potential for negative impacts to water quality in the Inner Harbour, through reduced dilution and flushing of pollutant laden water from the Don River discharges, storm sewer outfalls and combined sewer overflows. ▶ Detailed numerical modelling is recommended to confirm impacts to Inner Harbour water quality in conjunction with ongoing water quality enhancement initiatives.

Table 4-14: Proposed Future Scenario Net Effects Analysis for Water Quality – Operation

Variable	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Potential Mitigation Measures	Net Effects
Water Levels	▶ Changes in water levels in the Western Channel and nearby marina.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ None.	▶ None required.	▶ None.
Currents	▶ Changes in flow patterns and current speed.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to near shore currents of Lake Ontario. ▶ East end runway extension will reduce the Western Channel harbour opening by 50 %.	▶ Reductions to the Western Channel flow by approximately 50 % due to constriction of Western Channel opening. ▶ Localized changes to flow patterns at east end extension may reduce circulation between the east end runway extension and Muggs Island.	▶ Directing more lake current to the Western Channel through breakwater construction. ▶ Consider construction of the runway extension on a pile-supported deck structure. ▶ Consider shifting the runway extension eastward. ▶ Consider construction of new channels through the Toronto Islands.	▶ Reduction of average flow through the harbour, increasing the average Inner Harbour residence time from 6.7 to 12.3 days. ▶ Detailed numerical modelling during detailed design stage is recommended to assess changes to flow patterns and current speed.
Water Quality	▶ Changes to the harbour residence time (i.e., dilution and flushing). ▶ Average concentration of pollutants in harbour.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ E Coli bacteria water quality concerns due to combined sewer overflows and stormwater runoff. Additional pollutants include phosphorus, heavy metals, toxic organics, and contaminated sediments. ▶ Future water quality enhancement through completion of the Toronto and Region RAP and the City of Toronto's Don and Waterfront Trunk Sewers and Combined Sewer Overflow Control Strategy.	▶ Increase harbour residence time, with reduced dilution and flushing of pollutant laden water. ▶ Potential reduction in water circulation, causing dead-zones between the east end runway extension and Muggs Island.	▶ Reduce pollutants entering harbour.	▶ Increases in residence time will have a high potential for negative impacts to water quality in the Inner Harbour, through reduced dilution and flushing of pollutant laden water from the Don River discharges, storm sewer outfalls and combined sewer overflows. ▶ Detailed numerical modelling is recommended to confirm impacts to Inner Harbour water quality in conjunction with ongoing water quality enhancement initiatives.

4.6.3 Net Effects Analysis – Construction

4.6.3.1 Future Airport Scenarios

Table 4-15 details the net effects assessment for the Future Baseline and Proposed Future Scenarios as the effects to water quality during the construction phase are anticipated to be similar for both scenarios.

Table 4-15: Future Airport Scenarios Net Effects Analysis for Water Quality – Construction

Asset	Measure of Effect	Potential Effects	Mitigation Measures	Net Effects
Water Quality	▶ Source of pollutants. ▶ Type of pollutants.	▶ Potential for release of sediment plume during dredging/lakebed densification; pile wall construction; and placement of in-water fills which may result in increased turbidity in the Inner Harbour and Western Channel. ▶ Potential degradation of water quality as a result of spills (oil, gas and lubricants) associated with construction activities.	▶ Install a floating turbidity barrier to delineate the marine work zone. ▶ Install sediment screens to control sediment if dredging is required to prepare the lakebed for the in-water fills. ▶ Prepare and follow a spill response plan, including immediately reporting and managing any leakage or spillage.	▶ Installation of floating turbidity barrier and sediment screens will minimize sediment plume release during construction activities. ▶ Implementation of best management practices (BMPs) and a spill response plan will mitigate any effects on water quality.

4.6.3.2 Summary of Net Effects for Future Airport Scenarios – Construction

Installation of a floating turbidity barrier and sediment screens will minimise any sediment plumes released during in-water construction activities such as dredging/lakebed densification; pile wall construction and placement of clean in-water fills. Implementation of BMPs and the generation of a spill response plan will mitigate any potential effects on water quality during construction activities.

4.7 Built Form and Land Use

The below sections provide an overview of the Built Form and Land Use Effects Assessment completed by SvN Architects and Planners. For complete details of the assessment refer to **Appendix C-7**.

4.7.1 Methodology

The Built Form and Land Use Effects Assessment examined the compatibility of a runway extension with planned built form and land uses. The first step in the process was to identify the policy, regulatory and planning tools that regulate, shape or guide effects that occur outside the BBTCA property, and the second step was to provide detail on the location and extent of planned built form and land uses. For further details regarding the methodology used to conduct the Built Form and Land Use Effects Assessment, see **Appendix C-7**.

4.7.2 Net Effects Analysis – Operation

4.7.2.1 Future Baseline Scenario

Table 4-16 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.7.2.2 Proposed Future Scenario

Table 4-17 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

4.7.2.3 Summary of Net Effects for Future Airport Scenarios – Operation

There are no anticipated net effects for built form and land use under both Future Airport Scenarios as proposed building heights in areas located within the AZR will comply with the AZR. For areas where maximum building heights may exceed the allowable heights of the AZR, PortsToronto will work with the City to ensure that proposals comply with building heights of the AZR. Similarly, for areas where building heights exceed the height of the current Controlling Obstacle, PortsToronto will request a reduction in proposed building heights. [redacted].

4.7.3 Net Effects Analysis – Construction

4.7.3.1 Future Airport Scenarios

There are no effects from construction activities for the Future Baseline or Proposed Future Scenario on the Built Form and Land Use environment.

Table 4-16: Future Baseline Scenario Net Effects Analysis for Built Form and Land Use – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Regulatory Compliance: Existing Federal, Provincial and Municipal Plans and Policies	▶ Compliance with in-force and emergent policies and regulatory restrictions within areas planned for new private sector development and/or public sector investment in public spaces and trail systems.	▶ None.	▶ Airport Zoning Regulations (AZR) remains as it is today. ▶ Projected 28 NEF does not exceed the 25 NEF for 1990. ▶ Exemptions to the approach surfaces that are in place today remain in place in the future.	Port Lands Planning Framework ▶ Non-compliance is possible as maximum building heights envisioned as part of Port Lands Acceleration Initiative may exceed allowable height of the AZR and of current Controlling Obstacle. Lake Ontario Park Master Plan ▶ Compliant, as no new buildings are contemplated. Villiers Island Precinct Plan ▶ Non-compliance is possible as maximum building heights envisioned as part of Precinct Plan may exceed allowable height of the AZR and of current Controlling Obstacle. East Bayfront Precinct Plan ▶ Proposed 150 m building at 143 Lake Shore Boulevard East exceeds height of current Controlling Obstacle of 127.1 m. Lower Yonge Precinct Plan ▶ Precinct Plan and Official Plan Amendments (OPA) set a maximum height of 303 m for the tallest tower within the proposed development at 1-7 Yonge Street, which exceeds current Controlling Obstacle height of 53 m; zoning also permits a maximum height of 85 m. Bathurst Quay Neighbourhood Plan ▶ Non-compliance is possible as maximum building heights envisioned as part of Neighbourhood Plan may exceed allowable height of the AZR and of current Controlling Obstacle. Fort York Neighbourhood Secondary Plan ▶ Proposed 130.8 m building at 500 Lake Shore Boulevard West exceeds height of current Controlling Obstacle of 48.1 m. Ontario Place Revitalization ▶ Non-compliance is possible as maximum building heights are not yet identified and may exceed allowable height of the AZR and of current Controlling Obstacle.	▶ For areas where maximum building heights may exceed allowable heights of the AZR, PortsToronto and City are to ensure that proposals comply with building heights in the AZR. ▶ For areas where building heights exceed height of current Controlling Obstacle, PortsToronto is to request a reduction in building height. [redacted]	▶ Building heights in areas located within the AZR will comply with the AZR.

Table 4-17: Proposed Future Scenario Net Effects Analysis for Built Form and Land Use - Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Regulatory Compliance: Existing Federal, Provincial and Municipal Plans and Policies	▶ Compliance with in-force and emergent policies and regulatory restrictions within areas planned for new private sector development and/or public sector investment in public spaces and trail systems.	▶ None.	▶ AZR remains as it is today. ▶ Projected 28 NEF does not exceed the 25 NEF for 1990. ▶ Exemptions to the approach surfaces that are in place today remain in place in the future.	Port Lands Planning Framework ▶ Non-compliance is possible as maximum building heights envisioned as part of Port Lands Acceleration Initiative may exceed allowable height of the AZR and of current Controlling Obstacle. Lake Ontario Park Master Plan ▶ Compliant, as no new buildings are contemplated. Villiers Island Precinct Plan ▶ Non-compliance is possible as maximum building heights envisioned as part of Precinct Plan may exceed allowable height of the AZR and of current Controlling Obstacle. East Bayfront Precinct Plan ▶ Proposed 150 m building at 143 Lake Shore Boulevard East exceeds height of current Controlling Obstacle of 127.1 m. Lower Yonge Precinct Plan ▶ Precinct Plan and OPA set a maximum height of 303 m for the tallest tower within the proposed development at 1-7 Yonge Street, which exceeds current Controlling Obstacle height of 53 m; zoning also permits a maximum height of 85 m. Bathurst Quay Neighbourhood Plan ▶ Non-compliance is possible as maximum building heights envisioned as part of Neighbourhood Plan may exceed allowable height of the AZR and of current Controlling Obstacle. Fort York Neighbourhood Secondary Plan ▶ Proposed 130.8 m building at 500 Lake Shore Boulevard West exceeds height of current Controlling Obstacle of 48.1 m. Ontario Place Revitalization ▶ Non-compliance is possible as maximum building heights are not yet identified and may exceed allowable height of the AZR and of current Controlling Obstacle.	▶ For areas where maximum building heights may exceed allowable heights of the AZR, PortsToronto and City to ensure that proposals comply with building heights in the AZR. ▶ For areas where building heights exceed height of current Controlling Obstacle, PortsToronto to request a reduction in building height. [redacted]	▶ Building heights in areas located within the AZR will comply with the AZR.

4.8 Archaeology and Cultural Heritage

The below sections provide an overview of the Archaeology and Cultural Heritage Effects Assessment (Stage 1 Marine and Terrestrial Archaeological Assessments and Cultural Heritage Resource Review). For complete details of the assessment refer to **Appendix C-8**.

4.8.1 Methodology

Stage 1 Terrestrial and Marine Archaeological Assessments were conducted to meet the requirements of the MTCS's *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). The objective of the Stage 1 background studies were to document the archaeological and land use history and present conditions of the Archaeology and Cultural Heritage Study Area. This information was used to support recommendations regarding cultural heritage value or interest as well as assessment and mitigation strategies. A Cultural Heritage Resource Review was conducted for the Cultural Heritage Effects Assessment.

4.8.2 Net Effects Analysis – Operation

There are no anticipated net effects to archeological or cultural heritage resources during the operation phase of the Project, as resources will either be avoided or effects will be mitigated during construction.

4.8.3 Net Effects Analysis – Construction

4.8.3.1 Future Baseline Scenario

Table 4-18 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.8.3.2 Proposed Future Scenario

Table 4-19 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

4.8.3.3 Summary of Net Effects for Future Airport Scenarios – Construction

The Stage 1 Archaeology Assessment determined that there are no potential effects on terrestrial archaeological sites or resources as the Archaeology and Cultural Heritage Study Area does not retain any archaeological potential. However, it was determined that there is high potential for the recovery of marine archaeological resources in the vicinity of the Archaeology and Cultural Heritage Study Area. Therefore, it is recommended that a survey of the projected lake-fill area and a 100 m buffer zone be performed with a sub-bottom profiler and an underwater magnetometer to determine if any marine archaeological resources, particularly shipwrecks, are present under the existing lakebed. The depth of the Archaeology and Cultural Heritage Study Area will probably make this survey difficult and may necessitate remotely operated equipment. If the result of the survey proves that no cultural resources are present, lake filling can be executed as projected. If anomalies are present, a visual confirmation of the resources is to be executed through direct diving or by a remotely operated vehicle equipped with an underwater camera. If cultural remains are buried within the lakebed, an underwater excavation is to be completed in order to visually confirm and identify the presence of cultural remains. Only after a proper validation can appropriate protective measures be proposed. It is also recommended that a qualified underwater archaeologist with scientific competence appropriate to the Project be present at all times during the physical survey.

There are no potential effects to cultural heritage features within the vicinity of the Archaeology and Cultural Heritage Study Area.

Table 4-18: Future Baseline Scenario Net Effects Analysis for Archaeology and Cultural Heritage – Construction

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Archaeological Features	▶ Effects on areas with archaeological potential and known archaeological sites.	**Terrestrial:** ▶ The Archaeology Study Area is already disturbed as it is located under existing airport runways and tarmac. **Marine:** ▶ A portion of the Archaeology Study Area is already disturbed by lake dredging activity.	**Terrestrial & Marine:** ▶ No change to future baseline considerations and assumptions relative to current.	**Terrestrial:** ▶ No potential effects on archaeological resources as the Archaeology Study Area does not retain any archaeological potential. ▶ No potential effects on known archaeological sites as none are present in the Archaeology Study Area. **Marine:** ▶ No potential effects on archaeological potential where the lakebed has been dredged within the Archaeology Study Area. ▶ Possible loss or disturbance of a portion of the Archaeology Study Area that has not been dredged and has high archaeological potential. ▶ Possible loss or disturbance of known archaeological sites within the portion of the Study Area that has not been dredged.	**Terrestrial:** ▶ None required. **Marine:** ▶ Sub-bottom profiler and underwater magnetometer studies must be conducted to determine if any shipwrecks are present. ▶ If sub-bottom profiler and underwater magnetometer studies indicate no archaeological resources are present, lake-filling can be executed as projected. If anomalies are present a visual confirmation of the resources is to be executed through direct diving or by remotely operated vehicle equipped with an underwater camera. Only after a proper validation can appropriate protective measures be proposed. ▶ A qualified underwater archaeologist with scientific competence appropriate to the Project should be present at all times during the physical survey.	**Terrestrial:** ▶ No net effects on known archaeological resources or potential. **Marine:** ▶ Loss or disturbance of areas with archaeological potential or known archaeological sites will be avoided or mitigated through appropriate protective measures.
Cultural Heritage Features	▶ Effects on identified cultural heritage resources, including buildings and cultural heritage landscapes.	▶ None.	▶ No change to future baseline considerations and assumptions relative to current.	▶ No potential effects to listed built heritage structure/property (Ned Hanlan Memorial) or National Historic Site of Canada (The Toronto Island Airport Terminal Building) adjacent to the Cultural Heritage Study Area to the south. ▶ No potential effects to three historical plaques located adjacent to the Cultural Heritage Study Area at Hanlan's Point. ▶ No potential effects to undesignated cultural heritage landscape (Toronto Islands) and other landscape features adjacent to the Cultural Heritage Study Area (BBTCA, Hanlan's Point Beach, the ferry docks and passenger facility at Hanlan's Point, and surrounding public parkland).	▶ None required	▶ No effects on cultural heritage resources and landscape adjacent to the Cultural Heritage Study Area as they will be avoided.

Table 4-19: Proposed Future Scenario Net Effects Analysis for Archaeology and Cultural Heritage – Construction

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Archaeological Features	▶ Effects on areas with archaeological potential and known archaeological sites.	**Terrestrial:** ▶ The Archaeology Study Area is already disturbed as it is located under existing airport runways and tarmac. **Marine:** ▶ A portion of the Archaeology Study Area is already disturbed by lake dredging activity.	**Terrestrial & Marine:** ▶ No change to proposed future considerations and assumptions relative to current.	**Terrestrial:** ▶ No potential effects on archaeological resources as the Archaeology Study Area does not retain any archaeological potential. ▶ No potential effects on known archaeological sites as none are present in the Archaeology Study Area. **Marine:** ▶ No potential effects on archaeological potential where the lakebed has been dredged within the Archaeology Study Area. ▶ Possible loss or disturbance of a portion of the Archaeology Study Area that has not been dredged and has high archaeological potential. ▶ Possible loss or disturbance of known archaeological sites within the portion of the Archaeology Study Area that has not been dredged.	**Terrestrial:** ▶ None required. **Marine:** ▶ Sub-bottom profiler and underwater magnetometer studies must be conducted to determine if any shipwrecks are present. ▶ If sub-bottom profiler and underwater magnetometer studies indicate no archaeological resources are present, lake-filling can be executed as projected. If anomalies are present a visual confirmation of the resources is to be executed through direct diving or by remotely operated vehicle equipped with an underwater camera. Only after a proper validation can appropriate protective measures be proposed. ▶ A qualified underwater archaeologist with scientific competence appropriate to the Project should be present at all times during the physical survey.	**Terrestrial:** ▶ No net effects on known archaeological resources or potential. **Marine:** ▶ Potential net effects on areas with archaeological potential or known archaeological sites will be avoided or mitigated through appropriate protective measures as determined through validation measures when complete.
Cultural Heritage Features	▶ Effects on identified cultural heritage resources, including buildings and cultural heritage landscapes.	▶ None.	▶ No change to future baseline considerations and assumptions relative to current.	▶ No potential effects to listed built heritage structure/property (Ned Hanlan Memorial) and one National Historic Site of Canada (The Toronto Island Airport Terminal Building) adjacent to the Cultural Heritage Study Area to the south. ▶ No potential effects to three historical plaques located adjacent to the Cultural Heritage Study Area at Hanlan's Point. ▶ No potential effects to undesignated cultural heritage landscape (Toronto Islands) and other landscape features adjacent to the Cultural Heritage Study Area (BBTCA, Hanlan's Point Beach, the ferry docks and passenger facility at Hanlan's Point, and surrounding public parkland).	▶ None required. ▶	▶ No effects on cultural heritage resources and landscape adjacent to the Cultural Heritage Study Area as they will be avoided.

4.9 Socio-Economic

The below sections provide an overview of the Socio-Economic Effects Assessment. For complete details of the assessment refer to **Appendix C-9**.

4.9.1 Methodology

The overall methodology for the Socio-Economic Effects Assessment of the operations associated with Future Baseline and Proposed Future Scenarios was driven by social values related to a range of "use" and "non-use" values. Use values (as the term implies) relate to the following active uses of the waterfront:

- Residential Uses;
- Recreational Uses;
- Institutional Uses;
- Economy;
- Tourism;
- Municipal Implications; and,
- Property Values.

Non-Use values refer to passive values associated with the waterfront, which were identified as being important to the wider City such as:

- Preservation of options for future City generations to develop and use the waterfront;
- Ensuring a "living legacy" for future generations; and,
- Enhancing the "brand" of Toronto.

A number of data gathering exercises, including surveys, interviews and desktop research were completed for this assessment. Secondary data collection included a review of existing reports, websites and Statistics Canada data. For a complete description of the methods used for the Socio-Economic Effects Assessment refer to **Appendix C-9**.

4.9.2 Net Effects Analysis – Operation

4.9.2.1 Future Baseline Scenario

Table 4-20 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.9.2.2 Proposed Future Scenario

Table 4-21 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

Table 4-20: Future Baseline Scenario Net Effects Analysis for the Socio-Economic – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Residential Uses	▶ Changes to the use and enjoyment of private property as it relates to airport operations (e.g., having to keep windows closed during periods of high BBTCA activity). ▶ Changes to noise levels. ▶ Changes to air quality. ▶ Changes to the viewshed. ▶ Changes to frequency of interruptions of use and enjoyment of living spaces.	▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to residential uses will generally remain similar to existing conditions even with the addition of residential uses in the Lower Don Lands and Keating Channel precincts once build out is complete.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion will affect residents' use and enjoyment of property. ▶ Increased number of aircraft movements will increase the frequency of disturbances of residential activities and also affect the visual landscape.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage City and Metrolinx to implement transit improvements. ▶ Consider capping flight volumes during certain prescribed times of the day.	▶ Some residents will experience an increase in the number and frequency of interruptions and disturbances from increased flight volumes.
Recreational Uses	▶ Changes to the use and enjoyment of recreational spaces as it relates to airport operations (e.g., ability to listen to concerts at the Music Garden). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed. ▶ Changes to the frequency and number of interruptions of recreational activities.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to recreational uses will generally increase with the addition of the 63 ha revitalization of Ontario Place and 375 ha Lake Ontario Park.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased number of aircraft movements will increase the frequency of disturbances of recreational activities and also affect the visual landscape.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶ Consider capping flight volumes during certain prescribed times of the day.	▶ Recreational users will experience an increase in the number and frequency of noise and sight interruptions from increased operational flight volumes.
Institutional Uses	▶ Changes to the uses of institutional spaces as it relates to airport operations (e.g., at the City School). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to institutional uses will generally remain similar to existing conditions even with the addition of institutions and services associated with build out of the Lower Don Lands.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion will likely affect access and egress to local institutions.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.
Economy	▶ Increases or decreases in business activity associated with changes in airport operations.	▶ None.	▶ None.	▶ Increased business activity catering to the increased volume of passengers including transportation, accommodation, food, and beverage services. ▶ Increased access for business travelers to the City's business core as well as increased and more convenient access for tourists to the City's entertainment venues and LSA. ▶ Loss in LSA business activity because of constrained access and limited parking for business clientele.	▶ Provide additional on-site parking and/or establish off-site parking for BBTCA passengers away from LSA businesses. ▶ Establish a monitoring and permitting system to enforce the above off-site parking and traffic accommodation for BBTCA passengers.	▶ Increased business activity catering to the increased volume of passengers. ▶ Negligible negative net effects during operations are anticipated.
Tourism	▶ Changes in tourist-behaviour linked to changes to BBTCA operations. ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to tourism will generally remain similar to existing conditions.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased passenger volume and aircraft movements may affect tourists' propensity to visit the area due to an increase in the frequency of disturbances. ▶ Conversely, the downtown core may be more easily accessed by visitors due to increased flight service.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.

Table 4-20: Future Baseline Scenario Net Effects Analysis for the Socio-Economic – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Municipal Implications	▶ Changes to the municipal tax base. ▶ Changes to response time for municipal services.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to municipal services will generally remain similar to existing conditions.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased land based congestion may affect general pedestrian safety and slow response times. ▶ Increased number of passengers may affect emergency services through an increased demand for services. ▶ Presence of the RESA may create further congestion in the water, which may affect the service provided by the Toronto Police Marine Unit.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Presence of the RESA may affect response times of the Toronto Police Marine Unit.
Property Values	▶ Changes to property values within the waterfront for both existing and planned waterfront communities.	▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Property values in the City of Toronto will continue to increase at a rate greater than the rest of the country.	▶ Greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. ▶ Residents who are already frustrated with BBTCA operations will become even more dissatisfied and may move from the area. ▶ However, new residents are expected to replace any residents who move.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.
Non-use Values	▶ Change to non-use values as it relates to airport operations.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ None.	▶ Greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. ▶ The growth in airport operations and increased congestion will change the look and feel of the LSA.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.

Table 4-21: Proposed Future Scenario Net Effects Analysis for the Socio-Economic – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Scenario Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Residential Uses	▶ Changes to the use and enjoyment of private property as it relates to airport operations (e.g., having to keep windows closed during periods of high BBTCA activity). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements.	▶ Proposed future conditions pertaining to residential uses will generally remain similar to existing conditions even with the addition of residential uses in the Lower Don Lands and Keating Channel precincts once build out is complete.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion, extension of the runway, the introduction of jets, and the increased frequency of air traffic will affect residents' use and enjoyment of property. ▶ The extended runway will create a visual disturbance. ▶ Local residents who are already frustrated with BBTCA operations will become even more dissatisfied with their place of residence and contribute to a decreased use and enjoyment of private property.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶ Consider capping flight volumes during certain prescribed times of the day.	▶ Residents will experience an increase in the number and frequency of interruptions and disturbances from increased flight volumes. ▶ Use and enjoyment of residential areas will be affected by the introduction of jets, which will change the look and feel of the LSA.
Recreational Uses	▶ Changes to the use and enjoyment of recreational spaces as it relates to airport operations (e.g., ability to listen to concerts at the Music Garden). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements.	▶ Proposed future conditions pertaining to recreational uses will generally increase with the addition of the 63 ha revitalization of Ontario Place and 375 ha Lake Ontario Park.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion, extension of the runway, the introduction of jets, and the increased frequency of air traffic will affect recreational users' enjoyment of the area. ▶ The runway extension will create a visual disturbance and encroach on the area available for water-based recreation, resulting in increased congestion for boaters within the Inner Harbour and Western Channel. ▶ Recreational users who are already frustrated with BBTCA operations will become even more dissatisfied and may choose to visit other areas.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶ Consider capping flight volumes during certain prescribed times of the day.	▶ Recreational users will experience an increase in the number and frequency of interruptions and disturbances from increased flight volumes. ▶ Use and enjoyment of recreational areas will be affected by the introduction of jets, which will change the look and feel of the LSA, and will reduce the area of navigable water for recreational boaters.
Institutional Uses	▶ Changes to the uses of institutional spaces as it relates to airport operations (e.g., at the City School). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements.	▶ Proposed future conditions pertaining to the institutional uses will generally remain similar to existing conditions even with the addition of institutions and services associated with build out of the Keating Channel and Lower Don Lands precincts.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion will likely affect access and egress to local institutions.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.
Economy	▶ Increases or decreases in business activity associated with changes in airport operations.	▶ None.	▶ None.	▶ Increased business activity catering to the increased volume of passengers including transportation, accommodation, food, and beverage services. ▶ Increased access for business travelers to the City's business core as well as increased and more convenient access for tourists to the City's entertainments venues and LSA. ▶ Loss in LSA business activity because of constrained access and limited parking for business clientele.	▶ Provide additional on-site parking and/or establish off-site parking for BBTCA passengers away from the LSA businesses. ▶ Establish a monitoring and permitting system to enforce the above off-site parking and traffic accommodation for BBTCA passengers. ▶	▶ Positive effects on local area businesses and economic activity as a result of increased volume of passengers. ▶ Negligible negative net effects during operations are anticipated.

Table 4-21: Proposed Future Scenario Net Effects Analysis for the Socio-Economic – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Scenario Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Tourism	▶ Changes in tourist-behaviour linked to changes to the BBTCA operations. ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed. ▶	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements.	▶ Proposed future conditions pertaining to tourist-behaviour will generally remain similar to existing conditions.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased passenger volume and aircraft movements may affect tourists' propensity to visit the area due to an increase in the frequency of disturbances. ▶ Conversely, additional tourists travelling to Toronto from existing and new destinations, who will spend money on tourism-related businesses, attractions and accommodations in the LSA.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.
Municipal Implications	▶ Changes to the municipal tax base. ▶ Changes to response time for municipal services. ▶	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements. ▶	▶ Future baseline conditions pertaining to municipal services will generally remain similar to existing conditions.	▶ Greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. ▶ Increased land based congestion may affect general pedestrian safety and slow response times. ▶ Increased number of passengers may affect emergency services through an increased demand for services. ▶ Presence of the runway extension will create further congestion in the water and increase wake turbulence, which will affect the service provided by the Toronto Police Marine Unit.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶	▶ Presence of the runway extension will affect response times of the Toronto Police Marine Unit.
Property Values	▶ Changes to property values within the waterfront for both existing and planned waterfront communities.	▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements. ▶	▶ Property values in the City of Toronto will continue to increase at a rate greater than the rest of the country.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Residents who are already frustrated with BBTCA operations will become even more dissatisfied and may move from the area. ▶ However, new residents are expected to replace any residents who move.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶	▶ Negligible net effects during operations are anticipated.
Non-use Values	▶ Changes to non-use values as it relates to airport operations.	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements.	▶ None. ▶	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ The growth in airport operations, increased congestion, increased frequency of air traffic, and presence of the runway extension, will change the look and feel of the LSA.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Introduction of jet aircraft, ongoing congestion and runway extension will change people's perception of the LSA.

4.9.2.3 Summary of Net Effects for the Future Airport Scenarios – Operation

When compared to the Future Baseline Scenario, the effects associated with the Proposed Future Scenario are generally similar. The use and enjoyment of public and private spaces will continue to be affected by noise, odour, and traffic congestion, although the latter will be minimized through mitigation measures including improved transit. The biggest difference between the two Future Airport Scenarios is the impact of lakefill associated with the runway extension on recreational boaters and emergency response.

Under both Future Airport Scenarios residential and recreational uses and municipal emergency services will be impacted.

Under the Proposed Future Scenario notable net effects compared to the Future Baseline Scenario include:

- Extending the runway, and increasing the number of passengers and aircraft movements, will further exacerbate the relationship between local residents and the airport.
- The introduction of jets will change the look and feel of the waterfront, and the proposed runway extension will reduce the area of navigable water available for recreational boaters.
- The presence of the runway extension may affect response times of the Toronto Police Marine Unit.
- The introduction of jet aircraft and the runway extension is expected to change how the waterfront is perceived by non-users.

4.9.3 Net Effects Analysis – Construction

4.9.3.1 Future Airport Scenarios

Table 4-22 details the net effects assessment for the Future Baseline and Proposed Future Scenarios as the effects to the socio-economic environment during the construction phase are anticipated to be similar for both scenarios.

4.9.3.2 Summary of Net Effects for Future Airport Scenarios – Construction

It is anticipated that short-term, frequent and highly localized nuisance effects associated with dust, combustion emissions and noise will be experienced in the vicinity of construction activities and the BBTCA. These effects will be minimized where possible using the mitigation measures noted in **Sections 4.1.3** and **4.2.3**. In addition, it is anticipated that in-water construction activities will restrict navigation in some areas, particularly within the Western Channel for recreational boat users and marine emergency service providers. Areas of in-water work will be marked to ensure navigation safety and safe access will be maintained via proper signage indicating where marine users are permitted to go.

Table 4-22: Future Airport Scenarios Net Effects Analysis for the Socio-economic Environment – Construction

Asset	Measure of Effect	Potential Effects	Mitigation Measures	Net Effects
• **Residential Uses** • **Institutional Uses** • **Tourism** • **Business Uses**	▶ Nuisance effects (noise, dust and combustion emissions) from construction activities in the vicinity of residential, institutional, tourism, and business uses.	▶ Nuisance effects on residential, institutional, tourism and business uses in the vicinity of construction activities may include: ▪ Dust and combustion emissions which will be short-term (during construction only), infrequent (primarily overnight) and will have no effects outside of the construction area. ▪ Noise emissions, which will be short-term (during construction only), frequent during overnight hours and localized to the construction areas.	▶ See construction activity mitigation measures under Air Quality and Noise **Sections 4.1.3** and **4.2.3**.	▶ Short-term, infrequent and highly localized nuisance effects associated with dust and combustion emissions. ▶ Short-term, frequent and highly localized nuisance effects associated with noise will be minimized where possible.
Recreational Uses	▶ Nuisance effects (noise, dust and combustion emissions) from construction activities in the vicinity of recreational uses. ▶ Changes to the ability of boats to navigate the Western Channel and the area close to the runway extension for recreational users.	▶ Nuisance effects on recreational uses in the vicinity of the construction activities may include: ▪ Dust and combustion emissions which will be short-term (during construction only), infrequent (primarily overnight) and will have no effects outside of the construction area. ▪ Noise emissions, which will be short-term (during construction only), frequent during overnight hours and localized to the construction areas. ▶ Reduced navigability during in-water construction activities, including: dredging/lakebed densification; pile wall construction; and placement of in-water fills.	▶ See construction activity mitigation measures under Air Quality and Noise **Sections 4.1.3** and **4.2.3**. ▶ Mark areas of in-water works for navigation safety. ▶ Maintain safe access during construction activities and install proper signage where recreational marine users are permitted to go.	▶ Short-term, infrequent and highly localized nuisance effects associated with dust and combustion emissions. ▶ Short-term, frequent and highly localized nuisance effects associated with noise will be minimized where possible. ▶ Construction will restrict navigation in some areas, particularly within the Western Channel for recreational boat users.
Economy	▶ Increases or decreases in business activity associated with construction.	▶ Nuisance effects on tourism and business uses in the vicinity of the construction activities may include: ▪ Dust and combustion emissions which will be short-term (during construction only), infrequent (primarily overnight) and will have no effects outside of the construction area. ▪ Noise emissions, which will be short-term (during construction only), frequent during overnight hours and localized to the construction areas. ▶ No disruptions to local business activities as a result of construction activities are anticipated.	▶ See construction activity mitigation measures under Air Quality and Noise **Sections 4.1.3** and **4.2.3**.	▶ Short-term, infrequent and highly localized nuisance effects associated with dust and combustion emissions. ▶ Short-term, frequent and highly localized nuisance effects associated with noise will be minimized where possible. ▶ No disruptions to local business activities as a result of construction activities are anticipated.
Municipal Implications	▶ Nuisance effects (noise, dust and combustion emissions) from construction activities in the vicinity of municipal services. ▶ Changes to the ability of boats to navigate the Western Channel and the area close to the runway extension for emergency service providers.	▶ Nuisance effects on the Toronto Police Marine Unit in the vicinity of the construction activities may include: ▪ Dust and combustion emissions which will be short-term (during construction only), infrequent (primarily overnight) and will have no effects outside of the construction area. ▪ Noise emissions, which will be short-term (during construction only), frequent during overnight hours and localized to the construction areas. ▶ Reduced navigability during in-water construction activities, including: dredging/lakebed densification; pile wall construction; and placement of in-water fills.	▶ See construction activity mitigation measures under Air Quality and Noise **Sections 4.1.3** and **4.2.3**. ▶ Mark areas of in-water works for navigation safety. ▶ Maintain safe access during construction activities and install proper signage where marine emergency service (i.e., Toronto Police Marine Unit) marine users are permitted to go.	▶ Short-term, infrequent and highly localized nuisance effects associated with dust and combustion emissions. ▶ Short-term, frequent and highly localized nuisance effects associated with noise will be minimized where possible. ▶ Construction will restrict navigation in some areas, particularly within the Western Channel for marine emergency service providers (i.e., Toronto Police Marine Unit).

4.10 Natural Environment

The below sections provide an overview of the Natural Environment Effects Assessment completed. For complete details of the assessment refer to **Appendix C-10**.

4.10.1 Methodology

The Natural Environment Effects Assessment was conducted for both the aquatic and terrestrial environment. It was completed by first documenting the existing conditions within the Aquatic and Terrestrial Study Areas. After existing conditions were established, future conditions were projected. Finally, a net effects assessment for both the Future Baseline Scenario and Proposed Future Scenario was conducted. For complete details on the methods used for the Natural Environment Effects Assessment see **Appendix C-10**.

4.10.2 Net Effects Analysis – Operation

4.10.2.1 Future Baseline Scenario

Table 4-23 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.10.2.2 Proposed Future Scenario

Table 4-24 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

4.10.2.3 Summary of Aquatic Environment Net Effects for Future Airport Scenarios – Operation

For both Future Airport Scenarios there will be a net loss of aquatic habitat considering the RESA and runway extension, however, the effects of the net loss for the Future Baseline Scenario are considerably less than the Proposed Future Scenario due to the relatively small size of the infill required. It is anticipated that the decreased stability of the substrate for both Future Airport Scenarios may result in an excess of fragmented organic and inorganic material which is transported by water, wind, ice and gravity. These sediments, which contain nitrifying elements can capture or absorb contaminants and either settle or collect in the lake, reducing the availability and quality of habitat for both Future Airport Scenarios.

Under the Future Baseline Scenario all potential impacts to aquatic species will be low to moderate in severity considering the relatively small size of the infill. Impacts are not expected to result in serious harm to the resident fish populations in the immediate vicinity. For both Future Airport Scenarios it is anticipated that there could be a possible increase in predation of certain species.

4.10.2.4 Summary of Terrestrial Environment Net Effects for Future Airport Scenarios – Operation

For both Future Airport Scenarios no net loss of significant terrestrial features or habitat is anticipated with the implementation of mitigation measures.

With the RESA and runway extension for both Future Airport Scenarios, it is anticipated there will be a shift in waterfowl stopover, staging and overwintering as a result of improvements of waterfowl habitat off-site, therefore no

Table 4-23: Future Baseline Scenario Net Effects Assessment for the Natural Environment – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Aquatic Habitat or Functions	▶ Temporary and/or long-term loss of aquatic habitat within the footprint of the RESA, including areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species.	▶ Infill into Lake Ontario for construction of the RESA is required consisting of: Loss of a minimum of 2,500 m^2 (e.g., 50 m x 50 m) of aquatic habitat (direct and indirect).	▶ Future baseline conditions pertaining to the aquatic environment will generally remain similar to or the same as the existing conditions. ▶ Infill to occur at both the east and west ends of the runway to accommodate the RESA, resulting in a loss of approximately 50 m of habitat extending from the existing runway (relatively minor).	▶ Loss of approximately 2,500 m^2 of habitat considering both RESA extensions. Vegetation removal at both ends of the runway could cause changes in nutrient inputs to the water which in turn may alter food supply and nutrient concentrations for the fishery. The removal of aquatic vegetation will decrease the amount of cover available which will in turn, allow certain species to be susceptible to predation and limit the amount of diverse and stable environments. ▶ The RESA will partially constrict the water flow at the east and west ends of the runway. Changes in lake morphology may take place as water and flow adapt to the new structure below the water. The change in flow will have an effect on substrate composition which may in turn change the food supply, habitat cover, and nutrient concentrations.	▶ Continue consultation with Toronto and Region Conservation Authority (TRCA) regarding offsetting harm to fish and fish habitat. Offsetting measures are intended to counterbalance unavoidable serious harm to fish and/or fish habitat, and shall be developed to support and enhance the sustainability and ongoing productivity of fish within the disturbance area. ▶ No mitigation available to prevent vegetation removal effects and disturbance of substrate. ▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during all phases of the project.	▶ There will be a net loss of approximately 2,500 m^2 considering the RESA; however, effects are considered minor due to the relatively small size of the infill. ▶ The decreased stability of the substrate may result in an excess of fragmented organic and inorganic material which is transported by water, wind, ice, and gravity. These sediments, which contain nitrifying elements can capture or absorb contaminants and either settle or collect in the lake, reducing the availability and quality of habitat.
Aquatic Species	▶ Temporary and/or long-term effects on aquatic species, including fish, Endangered Species and Species at Risk (SAR) such as the American Eel.	▶ Infill into Lake Ontario for construction of the RESA is required consisting of: Loss of approximately 2,500 m^2 of aquatic habitat (direct and indirect).	▶ Future baseline conditions pertaining to the aquatic environment will generally remain similar to or the same as the existing conditions. ▶ Infill to occur at both the east and west ends of the runway to accommodate the RESA, resulting in a loss of approximately 50 m of habitat extending from the existing runway (relatively small).	▶ Temporary sedimentation of the surrounding environment which may cause disruption to critical life processes. ▶ Permanent loss of aquatic habitat (minimal infill) within the footprint of the RESA, however: areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species are not expected to be negatively affected. ▶ Displacement of fish after loss of immediate habitat which may result in increased predation due to reduced refuge areas.	▶ None.	▶ All potential impacts will be low to moderate in severity considering the relatively small size of the infill. Impacts are not expected to result in serious harm to the resident fish populations in the immediate vicinity. ▶ Possible increased predation of certain species; however, no long term loss of year class is expected.
Significant Features or Functions	▶ Temporary and/or long-term loss of significant natural heritage features or functions, such as: ▪ Provincially Significant Wetlands, ▪ Areas of Natural and Scientific Interest (ANSIs), or ▪ Significant Wildlife Habitats.	▶ Extension of land mass for the RESA (approximately 43 m on each end). ▶ It is assumed that construction activities for the 43 m land mass extensions will occur only within the BBTCA grounds and Lake Ontario, and will not extend onto Hanlan's Point Beach.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ It is assumed that the provincially significant sand dune community will not transform into another vegetation community through natural succession. ▶ It is assumed that the provincially significant candidate Toronto Islands Life Science ANSI will be confirmed as provincially significant.	▶ Damage to or loss of the provincially significant candidate Toronto Islands Life Science ANSI, provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community, habitat for a SOCC (Short-liguled Beach Grass), and Migratory Butterfly Stopover Area on Hanlan's Point Beach is not anticipated. ▶ Potential change in the spatial configuration of the provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community as a result of changes in sediment movement processes due to the RESA at the west end of the runway. ▶ Waterfowl Stopover and Staging (Aquatic) Area will be slightly displaced within the area of the RESA. However, this open water habitat type is abundant in the vicinity of the BBTCA.	▶ It is recommended that off-setting for removal of aquatic habitat (to be implemented off-site in order to reduce potential risk to waterfowl associated with bird strikes) consider improvements to the quality of waterfowl habitat (e.g., through increased food/prey abundance, wetland creation or rehabilitation, or shoreline improvements).	▶ No net loss of significant features is anticipated. ▶ With RESA and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas; however, no net effect is anticipated.
Terrestrial Habitats or Functions	▶ Temporary and/or long-term loss of sensitive terrestrial habitat or functions, including wetlands, woodlands and dune environments, or features known to support sensitive species.	▶ Extension of land mass for the RESA (approximately 43 m). ▶ Increase in the number of total annual aircraft movements from 114,428 to 140,700 per year. ▶ Continued use of Q400 Series turboprop aircrafts.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ It is assumed that the provincially significant sand dune community will not transform into another vegetation community through natural succession. ▶ Land use changes within the Terrestrial Study Area may result in an increase or decrease of suitable terrestrial habitat including bird habitat.	▶ Increase in number of total annual aircraft movements may result in an increased risk (estimated to be 30 %) to birds within the BBTCA grounds, including bird SAR (Barn Swallow and Bank Swallow) which may forage in mowed grassy areas. ▶ Increase in number of total annual aircraft movements may result in an increased risk (30 %) to birds within the BBTCA grounds, including birds attracted to temporary areas of pooled water in the spring. ▶ Potential change in spatial configuration of the provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community as a result of changes in sediment movement processes due to the RESA at the west end of the existing runway. ▶ Waterfowl Stopover and Staging (Aquatic) Area and overwintering habitat for waterfowl will be displaced within	▶ Translocate locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail to suitable habitat outside of BBTCA property, if possible elsewhere on the Toronto Islands. ▶ Update the BBTCA Wildlife Management Plan to include measures to reduce risk to Barn Swallow and Bank Swallow (e.g., through passive or active management techniques to prevent foraging within grassy areas on the BBTCA grounds). Train wildlife control officers to recognize Barn Swallow and Bank Swallow, as well as characteristics of their foraging habitat.	▶ No net loss of terrestrial habitats is anticipated following the implementation of mitigation measures, provided that construction activities do not extend onto Hanlan's Point Beach. ▶ With the RESA and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas as well as waterfowl overwintering habitat; however, no net effect is anticipated. ▶ Minimal net effect on birds within the BBTCA grounds is anticipated as a result of increased number of bird strikes because the increase will not significantly affect local bird populations.

Table 4-23: Future Baseline Scenario Net Effects Assessment for the Natural Environment – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
				the area of the land mass extensions. However, this open water habitat type is abundant in the vicinity of the BBTCA. ▶ Potential loss of habitat for locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail, within the BBTCA grounds.	▶ Improve drainage on the BBTCA grounds in order to prevent pooling of rainwater or snowmelt, which may attract birds. ▶ It is recommended that off-setting for removal of aquatic habitat (to be implemented off-site in order to reduce potential risk to waterfowl associated with bird strikes) consider improvements to the quality of waterfowl habitat (e.g., through increased food/prey abundance, wetland creation or rehabilitation, or shoreline improvements).	
Terrestrial Species	▶ Temporary and/or long-term effects on sensitive terrestrial species including plants, birds, monarch butterflies and other wildlife, rare species and Species at Risk.	▶ Extension of land mass for the RESA (approximately 43 m). ▶ Increase in the number of total aircraft movements from 114,428 to 140,700 per year. ▶ The OLS and flight heights will remain the same or similar to current conditions. ▶ Continued use of Q400 Series turboprop aircrafts.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ Bird populations may change at TTP/Leslie Street Spit as a result of TRCA management activities including potential increases in Common Tern, marsh birds, resident land birds and songbirds, and nesting raptors. ▶ Bird populations may also change due to natural population growth and decline, but are expected to remain similar to existing conditions. ▶ There is minimal natural vegetation within the BBTCA grounds. The cultural thicket at the west end of the existing runway and the vegetation within the rip-rap along the shoreline at the east end of the runway are both disturbed and contain many weedy species that generally do not provide high quality habitats.	▶ Increased number of total annual aircraft movements may result in an increased risk (30 %) to birds, including SAR and SOCC, near the BBTCA grounds.	▶ Incorporate current and historical population, migration and bird strike data of hazard birds into the BBTCA Wildlife Management Plan to predict and anticipate potential threats as they relate to hazard birds near the BBTCA as well as develop and implement use of a radar-detecting system to detect and monitor hazard birds near the BBTCA grounds to minimize bird strikes.	▶ Minimal net effect on birds near the BBTCA grounds is anticipated as a result of increased number of bird strikes because the increase will not significantly affect local bird populations.

Table 4-24: Proposed Future Scenario Net Effects Analysis for the Natural Environment – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Aquatic Habitat or Functions	▶ Temporary and/or long-term loss of aquatic habitat within the footprint of the proposed runway extension, including areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species.	▶ Infill into Lake Ontario for construction of runway extension is required consisting of: Loss of approximately 20,000 m^2 of aquatic habitat (direct and indirect) with an extension of 200 m from both the east and west runways.	▶ Future baseline conditions pertaining to the aquatic environment will generally remain similar to or the same as the existing conditions. ▶ Infill to occur at both the east and west ends of the existing runway, resulting in a loss of approximately 200 m of habitat extending from the runway.	▶ Loss of approximately 20,000 m^2 of fish habitat considering the runway extension. ▶ Vegetation removal at both ends of the runway could cause changes in nutrient inputs to the water which in turn may alter food supply and nutrient concentrations for the fishery. The removal of aquatic vegetation will decrease the amount of cover available which will in turn, allow certain species to be susceptible to predation and limit the amount of diverse and stable environments. ▶ The runway extension will partially constrict the water flow at the east and west ends of the runway. Changes in lake morphology may take place as water and flow adapt to the new structure below the water. The change in flow will have an effect on substrate composition which may in turn change the food supply, habitat cover, and nutrient concentrations.	▶ Continue consultation with TRCA regarding offsetting harm to fish and fish habitat. Offsetting measures are intended to counterbalance unavoidable serious harm to fish and/or fish habitat, and shall be developed to support and enhance the sustainability and ongoing productivity of fish within the disturbance area. ▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during all phases of the project.	▶ There will be a permanent net loss of approximately 20,000 m^2 considering the runway extension. ▶ The decreased stability of the substrate may result in an excess of fragmented organic and inorganic material which is transported by water, wind, ice, and gravity. These sediments, which contain nitrifying elements can capture or absorb contaminants and either settle or collect in the lake, reducing the availability and quality of habitat.
Aquatic Species	▶ Temporary and/or long-term effects on aquatic species, including fish, Endangered Species and SAR such as the American Eel.	▶ Infill into Lake Ontario for construction of runway extension is required consisting of: Loss of approximately 20,000 m^2 of aquatic habitat (direct and indirect) with an extension of 200 m from both the east and west runways.	▶ Fish species diversity and abundance may increase, decrease or remain the same depending on habitat creation and offsetting projects nearby.	▶ Possible displacement of fish after loss of immediate habitat which may result in increased predation. ▶ Permanent loss of aquatic habitat within the footprint of the proposed runway extension, however: areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species are not expected to be negatively affected. ▶ Temporary sedimentation of surrounding aquatic habitats which may cause disruption to critical life processes.	▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during all phases of the project.	▶ Possible increased predation of certain species.
Significant Features or Functions	▶ Temporary and/or long-term loss of significant natural heritage features or functions, such as: ▪ Provincially Significant Wetlands, ▪ ANSIs, or ▪ Significant Wildlife Habitats.	▶ Runway extension (approximately 200 m on each end) to accommodate an increase in runway length.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ It is assumed that the provincially significant sand dune community will not transform into another vegetation community through natural succession. ▶ It is assumed that the provincially significant candidate Toronto Islands Life Science ANSI will be confirmed as provincially significant.	▶ Potential effects identified for the Future Baseline Scenario are the same for the Proposed Future Scenario. Refer to Table 4-23 for potential effects.	▶ Mitigation measures recommended for the Future Baseline Scenario are the same for Proposed Future Scenario. Refer to Table 4-23 for potential effects.	▶ No net loss of significant features is anticipated, provided that construction activities do not extend onto Hanlan's Point Beach. ▶ With the runway extension and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas; however, no net effect is anticipated.
Terrestrial Habitats or Functions	▶ Temporary and/or long-term loss of sensitive terrestrial habitat or functions, including wetlands, woodlands and dune environments, or features known to support sensitive species.	▶ Runway extension (approximately 200 m on each end) to accommodate an increase in runway length. ▶ Increase in number of total annual aircraft movements from 114,428 to 138,170 per year. ▶ It is assumed that construction activities for the runway extension will occur only within the BBTCA grounds and Lake Ontario, and will not extend onto Hanlan's Point Beach.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ It is assumed that the provincially significant sand dune community will not transform into another vegetation community through natural succession. ▶ Land use changes within the Terrestrial Study Area may result in an increase or decrease of suitable terrestrial habitat including bird habitat.	▶ Increase in number of total annual aircraft movements may result in an increased risk (24 %) to birds within the BBTCA grounds, including bird SAR (Barn Swallow and Bank Swallow) which may forage in mowed grassy areas. ▶ Increase in number of total annual aircraft movements may result in an increased risk (24 %) to birds within the BBTCA grounds, including birds attracted to temporary areas of pooled water in the spring. ▶ Other potential effects identified for the Future Baseline Scenario are the same for the Proposed Future Scenario. Refer to Table 4-23 for potential effects.	▶ Mitigation measures recommended for Future Baseline Scenario are the same for Proposed Future Scenario. Refer to Table 4-23 for potential effects.	▶ With the runway extension and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas as well as waterfowl overwintering habitat; however, no net effect is anticipated.

Table 4-24: Proposed Future Scenario Net Effects Analysis for the Natural Environment – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Terrestrial Species	▶ Temporary and/or long-term effects on sensitive terrestrial species including plants, birds, monarch butterflies and other wildlife, rare species and SAR.	▶ Runway extension (approximately 200 m on each end) to accommodate an increase in runway length. ▶ Increase in number of total annual aircraft movements from 114,428 to 138,170 per year. ▶ The OLS and flight heights will remain the same or similar to current conditions.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ Bird populations may change at TTP/Leslie Street Spit as a result of TRCA management activities including potential increases in Common Tern, marsh birds, resident land birds and songbirds, and nesting raptors. ▶ Bird populations may also change due to natural population growth and decline but are expected to remain similar to existing conditions. ▶ There is minimal natural vegetation within the BBTCA grounds. The cultural thicket at the west end of the existing runway and the vegetation within the rip-rap along the shoreline at the east end of the runway are both disturbed and contain many weedy species that generally do not provide high quality habitats.	▶ Potential loss of locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail, within the BBTCA grounds. ▶ Increased number of total annual aircraft movements may result in an increased risk (24 %) to birds, including SAR and SOCC, near the BBTCA grounds. ▶ In the unlikely event that damaging strikes with aircrafts cause aviation safety concerns, off-ground wildlife management could be considered by BBTCA to mitigate or minimize wildlife hazardous risk which may affect bird populations at TTP/Leslie Street Spit.	▶ Translocate locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail to suitable habitat outside of BBTCA property, if possible elsewhere on the Toronto Islands. ▶ No additional mitigation measures are required for removal of the cultural thicket at the west end of the existing runway and vegetation within the rip-rap along the shoreline near the east-end of the existing runway. ▶ Incorporate current and historical population, migration and bird strike data of hazard birds into the BBTCA Wildlife Management Plan to predict and anticipate potential threats as they relate to hazard birds near the BBTCA as well as develop and implement use of a radar-detecting system to detect and monitor hazard birds near the BBTCA grounds to minimize bird strikes. ▶ Develop the future Wildlife Management Plan for BBTCA in consultation with TRCA, in order to ensure that concerns regarding bird populations at TTP/Leslie Street Spit are appropriately addressed in the event that off-ground wildlife management activities at TTP/Leslie Street Spit are considered in order to mitigate risks of bird strikes to aviation safety.	▶ Short-term, frequent and highly localized nuisance effects on terrestrial species will be minimized by BMPs. ▶ No net effect is anticipated from the removal of disturbed cultural thicket and weedy vegetation given the general lack of natural vegetation on the BBTCA grounds, which consist primarily of mowed grassy fields and weedy herbaceous species. ▶ Minimal net effect on birds near the BBTCA grounds is anticipated as result of increased number of bird strikes because this increase will not significantly affect local bird populations. ▶ No net effect on bird populations at TTP/Leslie Street Spit in the unlikely event that off-ground management is considered, provided that the Wildlife Management Plan for BBTCA is developed in consultation with TRCA.

net effect is anticipated. For both Future Airport Scenarios minimal net effect on birds within the BBTCA grounds is anticipated as a result of increased number of bird strikes because the increase will not significantly affect local bird populations. There is also no anticipated net effect on bird populations at TTP/Leslie Street Spit in the unlikely event that off-ground management is considered under the Proposed Future Scenario, provided that the BBTCA Wildlife Management Plan is developed in consultation with the TRCA.

4.10.3 Net Effects Analysis – Construction

4.10.3.1 Future Baseline Scenario

Table 4-25 details the net effects assessment for the Future Baseline Scenario during the construction phase.

4.10.3.2 Proposed Future Scenario

Table 4-26 details the net effects assessment for the Proposed Future Scenario during the construction phase.

4.10.3.3 Summary of Aquatic Environment Net Effects for Future Airport Scenarios – Construction

For both Future Airport Scenarios there will be a net loss of aquatic habitat considering construction for the RESA and runway extension; however, the effects of the net loss for the Future Baseline Scenario are considerably less than the Proposed Future Scenario due to the relatively small size of the infill required. Both Future Airport Scenarios will see localized sedimentation, construction disturbance beyond the infill and potential displacement of fish; however, it is expected that once construction is complete these effects will cease in a short period of time for the Future Baseline Scenario and over a longer period of time for the Proposed Future Scenario. It is anticipated that the decreased stability of the substrate for both Future Airport Scenarios may result in an excess of fragmented organic and inorganic material which is transported by water, wind, ice and gravity. These sediments, which contain nitrifying elements can capture or absorb contaminants and either settle or collect in the lake, reducing the availability and quality of habitat for both Future Airport Scenarios.

Under the Future Baseline Scenario all potential impacts to aquatic species will be low to moderate in severity considering the relatively small size of the infill. Impacts are not expected to result in serious harm to the resident fish populations in the immediate vicinity. Short-term, frequent and highly localized nuisance effects related to construction activities on aquatic species will be minimized by adhering to BMPs for both Future Airport Scenarios. For both Future Airport Scenarios it is anticipated that there could be a possible increase in predation of certain species. Disturbance to fish will naturally occur from construction activities (i.e., from noise and vibration). For Proposed Future Scenario disturbance to fish will be mitigated by conducting fish rescues within the work area prior to any dewatering activities.

4.10.3.4 Summary of Terrestrial Environment Net Effects for Future Airport Scenarios – Construction

For both Future Airport Scenarios no net loss of significant terrestrial features or habitat is anticipated with the implementation of mitigation measures and provided that construction activities do not extend to Hanlan's Point Beach. Such mitigation measures include off-site improvements of waterfowl habitat to compensate for the loss of stopover and staging areas that will be removed due to construction of the RESA and runway extension. It is anticipated that there may be short-term, frequent and highly localized nuisance effects related to construction activities on terrestrial species under both Future Airport Scenarios, however, effects will be minimized by BMPs. There is also no anticipated net effect on bird populations at TTP/Leslie Street Spit in the unlikely event that off-ground management is considered under the Proposed Future Scenario, provided that the BBTCA Wildlife Management Plan is developed in consultation with the TRCA.

Finally, no net effect is anticipated from the removal of disturbed cultural thicket and weedy vegetation under both Future Airport Scenarios, given the general lack of natural vegetation on the BBTCA grounds, which consist primarily of mowed grassy fields and weedy herbaceous species.

Table 4-25: Future Baseline Scenario Net Effects Analysis for the Natural Environment – Construction

Asset	Measure of Effect	Potential Effects	Mitigation Measures	Net Effects
Aquatic Habitat or Functions	▶ Temporary and/or long-term loss of aquatic habitat within the footprint of the RESA, including areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species.	▶ Loss of approximately 2,500 m^2 of low to moderate quality habitat associated with lake filling for the construction of the RESA. ▶ Vegetation removal for the RESA could cause changes in nutrient inputs to the water which in turn may alter food supply and nutrient concentrations for the fishery. The removal of aquatic vegetation will decrease the amount of cover available which will in turn, allow certain species to be susceptible to predation and limit the amount of diverse and stable environments. ▶ Accidental spills of oil and grease due to the presence of heavy machinery working on land, barges, and in the water. The machinery, operating on the substrate, could also decrease the stability of the substrate. ▶ Increase in sediment concentrations due to the removal of aquatic vegetation and the dredging required to remove any rocks, bottom sediments, plants, debris, sand, and refuse from the lake bed prior to excavation for construction.	▶ Continue consultation with TRCA regarding offsetting harm to fish and fish habitat. Offsetting measures are intended to counterbalance unavoidable serious harm to fish and/or fish habitat, and shall be developed to support and enhance the sustainability and ongoing productivity of fish within the disturbance area. ▶ No mitigation available to prevent vegetation removal effects and disturbance of substrate. ▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during construction. Regularly inspect and maintain erosion and sediment control measures such as a silt boom or silt curtain until all construction has been completed. ▶ Construction equipment and machinery should arrive on site in clean condition and be maintained free of leaks. ▶ All construction equipment and machinery should be refueled at least 30 m from the lake to prevent accidental spills. ▶ Minimize the length of time that machinery is on the lake bed and below the high-water mark.	▶ There will be a net loss of approximately 2,500 m^2 considering RESA; however, effects are considered minor due to the low to moderate quality of the habitat and the relatively small size of the infill. ▶ There will likely be short term effects, including, localized sedimentation, construction disturbance beyond the infill, and potential displacement of fish; however, it is expected that once the construction is complete these effects will cease in a short period of time. ▶ The decreased stability of the substrate may result in an excess of fragmented organic and inorganic material which is transported by water, wind, ice, and gravity. These sediments, which contain nitrifying elements can capture or absorb contaminants and either settle or collect in the lake, reducing the availability and quality of habitat.
Aquatic Species	▶ Temporary nuisance effects on aquatic species from construction (noise, dust, vibration, sediment release, etc.). ▶ Temporary and/or long-term effects on aquatic species, including fish, Endangered Species and SAR such as the American Eel.	▶ Temporary nuisance to aquatic species due to lake filling activities. ▶ Temporary sedimentation of the surrounding environment which may cause disruption to critical life processes. ▶ Permanent loss of aquatic habitat (minimal infill) within the footprint of the RESA; however areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species are not expected to be negatively affected. ▶ Possible displacement of fish after loss of immediate habitat which may result in increased predation.	▶ Install a fish net around the work zone and retain a qualified biologist to remove fish from the isolated work area, if any dewatering is to take place to allow the work to occur in the dry, all water intakes must be screened to prevent entrainment or impingement of fish. ▶ Complete all in water work outside of the cold water timing window between October 1 and May 31 to avoid vulnerable fish life stages. ▶ Machinery must arrive on site in clean condition and be maintained free of leaks. ▶ A floating barge would be recommended to drive piles to isolate the work area. This will prevent increased disturbance of the lake bed and limit sedimentation of the lake. ▶ All equipment and machinery should be refuelled at least 30 m from the lake to prevent accidental spills. ▶ Minimize the length of time that machinery is on the lake bed and below the high-water mark. ▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during the construction phase of the Project. ▶ Regularly inspect and maintain erosion and sediment control measures such as a silt boom or silt curtain until all construction has been completed. ▶ Salvage fish once area has been enclosed.	▶ Short-term, frequent and highly localized nuisance effects on aquatic species will be minimized by adhering to BMPs. ▶ All potential impacts will be low to moderate in severity considering the relatively small size of the infill. Impacts are not expected to result in serious harm to the resident fish populations in the immediate vicinity. ▶ Possible increased predation of certain species; however, no long term loss of year class expected.
Significant Features or Functions	▶ Temporary and/or long-term loss of significant natural heritage features or functions, such as: ▪ Provincially Significant Wetlands, ▪ ANSIs, or ▪ Significant Wildlife Habitats.	▶ Damage to or loss of the provincially significant candidate Toronto Islands Life Science ANSI, provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community, habitat for a SOCC (Short-liguled Beach Grass), and Migratory Butterfly Stopover Area on Hanlan's Point Beach is not anticipated as a result of construction activities for the RESA at the west end of the existing runway, provided these activities do not extend onto Hanlan's Point Beach. ▶ Potential change in the spatial configuration of the provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community as a result of changes in sediment movement processes due to the RESA at the west end of the existing runway. ▶ Waterfowl Stopover and Staging (Aquatic) Area will be slightly displaced within the area of the RESA. However, this open water habitat type is abundant in the vicinity of the BBTCA.	▶ No mitigation measures are required, provided that construction activities do not extend onto Hanlan's Point Beach. ▶ It is recommended that off-setting for removal of aquatic habitat (to be implemented off-site in order to reduce potential risk to waterfowl associated with bird strikes) consider improvements to the quality of waterfowl habitat (e.g., through increased food/prey abundance, wetland creation or rehabilitation, or shoreline improvements).	▶ No net loss of significant features is anticipated.

Table 4-25: Future Baseline Scenario Net Effects Analysis for the Natural Environment – Construction

Asset	Measure of Effect	Potential Effects	Mitigation Measures	Net Effects
Terrestrial Habitats or Functions	▶ Temporary and/or long-term loss of sensitive terrestrial habitat or functions, including wetlands, woodlands and dune environments, or features known to support sensitive species.	▶ Damage to or loss of the provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community, habitat for a SOCC (Short-liguled Beach Grass), and Migratory Butterfly Stopover Area on Hanlan's Point Beach is not anticipated as a result of construction activities for the RESA at the west end of the existing runway, provided these activities do not extend onto Hanlan's Point Beach. ▶ Potential change in spatial configuration of the provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community as a result of changes in sediment movement processes due to the RESA at the west end of the existing runway. ▶ Waterfowl Stopover and Staging (Aquatic) Area and overwintering habitat for waterfowl will be displaced within the area of the RESA. However, this open water habitat type is abundant in the vicinity of the BBTCA. ▶ Potential loss of habitat for locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail, within the BBTCA grounds.	▶ Translocate locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail to suitable habitat outside of BBTCA property, if possible elsewhere on the Toronto Islands. ▶ No additional mitigation measures are required, provided that construction activities do not extend onto Hanlan's Point Beach. ▶ It is recommended that off-setting for removal of aquatic habitat (to be implemented off-site in order to reduce potential risk to waterfowl associated with bird strikes) consider improvements to the quality of waterfowl habitat (e.g., through increased food/prey abundance, wetland creation or rehabilitation, or shoreline improvements).	▶ No net loss of terrestrial habitats is anticipated.
Terrestrial Species	▶ Temporary nuisance effects on terrestrial species from construction (noise, dust, vibration, sediment release, etc.). ▶ Temporary and/or long-term effects on sensitive terrestrial species including plants, birds, monarch butterflies and other wildlife, rare species and SAR.	▶ Temporary displacement of a few species due to nuisance effects during construction. ▶ Potential loss of locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail, within the BBTCA grounds. ▶ Loss of disturbed cultural thicket and vegetation along rip-rap within the BBTCA grounds is anticipated for a construction staging area.	▶ Adhere to BMPs to reduce and minimize dust, sedimentation and noise as a result of construction activities. ▶ Translocate locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail to suitable habitat outside of BBTCA property, if possible elsewhere on the Toronto Islands. ▶ No additional mitigation measures are required for removal of the cultural thicket at the west end of the existing runway and vegetation within the rip-rap along the shoreline near the east-end of the existing runway.	▶ Short-term, frequent and highly localized nuisance effects on terrestrial species will be minimized by BMPs. ▶ No net effect is anticipated from the removal of disturbed cultural thicket and weedy vegetation given the general lack of natural vegetation on the BBTCA grounds, which consist primarily of mowed grassy fields and weedy herbaceous species.

Table 4-26: Proposed Future Scenario Net Effects Analysis for the Natural Environment – Construction

Asset	Measure of Effect	Potential Effects	Mitigation Measures	Net Effects
Aquatic Habitat or Functions	▶ Temporary and/or long-term loss of aquatic habitat within the footprint of the proposed runway extension, including areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species.	▶ Loss of approximately 20,000 m^2 of low to moderate quality habitat considering the runway extension. ▶ Vegetation removal at both ends of the runway could cause changes in nutrient inputs to the water which in turn may alter food supply and nutrient concentrations for the fishery. The removal of aquatic vegetation will decrease the amount of cover available which will in turn, allow certain species to be susceptible to predation and limit the amount of diverse and stable environments. ▶ Construction methods will involve heavy machinery working on land, barges, and the water. With the presence of the machinery, there is the possibility of accidental spills of oil and grease. The machinery, operating on the substrate, could also decrease the stability and allow increased sedimentation to occur. ▶ Construction activities could cause an increase in sediment concentrations due to the removal of aquatic vegetation and the dredging required to remove any rocks, bottom sediments, plants, debris, sand, and refuse from the lake bed prior to excavation for construction.	▶ Continue consultation with TRCA regarding offsetting harm to fish and fish habitat. Offsetting measures are intended to counterbalance unavoidable serious harm to fish and/or fish habitat, and shall be developed to support and enhance the sustainability and ongoing productivity of fish within the disturbance area. ▶ No mitigation available to prevent vegetation removal effects and disturbance of substrate. ▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during construction. Regularly inspect and maintain erosion and sediment control measures such as a silt boom or silt curtain until all construction has been completed. ▶ Construction equipment and machinery should arrive on site in clean condition and be maintained free of leaks. ▶ All construction equipment and machinery should be refueled at least 30 m from the lake to prevent accidental spills. ▶ Minimize the length of time that machinery is on the lake bed and below the high-water mark.	▶ There will be a permanent net loss of approximately 20,000 m^2 considering the runway extension; however, with appropriate offsetting, similar or increased habitat productivity may be created, however; this will take time to establish. ▶ There will likely be short term effects, including, localized sedimentation, construction disturbance beyond the infill, and potential displacement of fish; however, it is expected that once the construction is complete these effects will cease in a short period of time. ▶ The decreased stability of the substrate may result in an excess of fragmented organic and inorganic material which is transported by water, wind, ice, and gravity. These sediments, which contain nitrifying elements can capture or absorb contaminants and either settle or collect in the lake, reducing the availability and quality of habitat.
Aquatic Species	▶ Temporary nuisance effects on aquatic species from construction (noise, dust, vibration, sediment release, etc.). ▶ Temporary and/or long-term effects on aquatic species, including fish, Endangered Species and SAR such as the American Eel.	▶ Potential effects identified for the Future Baseline Scenario are the same for the Proposed Future Scenario. Refer to **Table 4-25** for potential effects	▶ Retain a qualified biologist to remove fish from the isolated work area, if any dewatering is to take place to allow the work to occur in the dry. All water intakes must be screened to prevent entrainment or impingement of fish. ▶ Complete all in water work outside of the cold water timing window between October 1 and May 31 to avoid vulnerable fish life stages. Machinery must arrive on site in clean condition and maintained free of leaks. A floating barge would be recommended to drive piles to isolate the work area. This will prevent increased disturbance of the lake bed and limit sedimentation of the lake. ▶ All equipment and machinery should be refuelled at least 30 m from the lake to prevent accidental spills. ▶ Minimize the length of time that machinery is on the lake bed and below the high-water mark. ▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during the construction phase of the project. ▶ Regularly inspect and maintain erosion and sediment control measures such as a silt boom or silt curtain until all construction has been completed. ▶ Salvage fish once area has been enclosed.	▶ Short-term, frequent and highly localized nuisance effects on aquatic species will be minimized by adhering to BMPs. ▶ Possible increased predation of certain species; however, no long term loss of year class expected. ▶ Disturbance to fish will naturally occur from construction activities (i.e., from noise and vibration); however fish rescues should occur within work area prior to dewatering.
Significant Features or Functions	▶ Temporary and/or long-term loss of significant natural heritage features or functions, such as: ▪ Provincially Significant Wetlands, ▪ ANSIs, or ▪ Significant Wildlife Habitats.	▶ Potential effects identified for the Future Baseline Scenario are the same for the Proposed Future Scenario. Refer to **Table 4-25** for potential effects.	▶ Potential effects identified for the Future Baseline Scenario are the same for the Proposed Future Scenario. Refer to **Table 4-25** for potential effects.	▶ No net loss of significant features is anticipated, provided that construction activities do not extend onto Hanlan's Point Beach. ▶ With the runway extension and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas; however, no net effect is anticipated.
Terrestrial Habitats or Functions	▶ Temporary and/or long-term loss of sensitive terrestrial habitat or functions, including wetlands, woodlands and dune environments, or features known to support sensitive species.	▶ Potential effects identified for the Future Baseline Scenario are the same for the Proposed Future Scenario. Refer to **Table 4-25** for potential effects.	▶ Mitigation measures recommended for Future Baseline Scenario are the same for Proposed Future Scenario. Refer to **Table 4-25** for potential effects.	▶ No net loss of terrestrial habitats is anticipated following the implementation of mitigation measures, provided that construction activities do not extend onto Hanlan's Point Beach. ▶ With the runway extension and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas as well as waterfowl overwintering habitat; however, no net effect is anticipated.
Terrestrial Species	▶ Temporary nuisance effects on terrestrial species from construction (noise, dust, vibration, sediment release, etc.). ▶ Temporary and/or long-term effects on sensitive terrestrial species including plants, birds, monarch butterflies and other wildlife, rare species and Species at Risk.	▶ Potential effects identified for the Future Baseline Scenario are the same for the Proposed Future Scenario. Refer to **Table 4-25** for potential effects.	▶ Mitigation measures recommended for Future Baseline Scenario are the same for Proposed Future Scenario. Refer to **Table 4-25** for potential effects.	▶ Short-term, frequent and highly localized nuisance effects on terrestrial species will be minimized by BMPs. ▶ No net effect is anticipated from the removal of disturbed cultural thicket and weedy vegetation given the general lack of natural vegetation on the BBTCA grounds, which consist primarily of mowed grassy fields and weedy herbaceous species.

4.11 Transportation

The below sections provide an overview of the Transportation Effects Assessment. For complete details of the assessment refer to **Appendix C-11**.

4.11.1 Methodology

The Transportation Effects Assessment utilized Dillon Consulting's ongoing Strategic Transportation Study which includes the development of micro-simulation models in VISSIM software to analyze the traffic operations for both the Future Baseline and Proposed Future Scenarios. The transportation metrics used were requested by AECOM from Dillon Consulting in order to inform the effects assessment.

In addition to the Dillon model outputs, the Transportation Effects Assessment described other effects on a qualitative basis based on increases in passenger activity levels; these include public safety, access to parking, changes to transit operations and active transportation modes. These metrics were then applied with the intent of qualitatively assessing the impacts of the Proposed Future Scenario compared to the Future Baseline Scenario.

4.11.2 Net Effects Analysis Operation

4.11.2.1 Future Baseline Scenario

Table 4-27 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers and the Tripartite Agreement amended for the RESA.

4.11.2.2 Proposed Future Scenario

Table 4-28 outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

4.11.2.3 Summary of Net Effects for Future Airport Scenarios – Operation

For both Future Airport Scenarios, with mitigation measures in place such as increasing non-auto modal split and improving taxi operations, traffic volumes on Eireann Quay will return to existing levels. The increased risk of collisions will therefore be negligible. Intersection delays are expected to return to existing levels. With mitigation, travel times are also expected to return to existing levels, and traffic spillover is expected to be negligible. Increases in non-auto mode share will potentially require improvements to transit service, pedestrian and cycling infrastructure.

4.11.3 Net Effects Analysis Construction

4.11.3.1 Future Airport Scenarios

Table 4-29 details the net effects assessment for the Future Baseline and Proposed Future Scenarios as the transportation-related effects during the construction phase are anticipated to be similar for both scenarios.

Table 4-27: Future Baseline Scenario Net Effects Analysis for Transportation – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Public Safety	▶ Estimated increased risk of collisions.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ No major improvements to roadway geometry, cross-sections or pedestrian facilities were considered to be in place.	▶ If modal split and vehicle occupancy levels remain at existing levels, future baseline traffic volumes would be increased by up to 100 % over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not assumed to change.	▶ Higher traffic and pedestrian volumes will increase the number of interactions between road users, thereby increasing exposure and potential for collisions.	▶ Increase non-auto modal split by providing transit improvements and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. The increased risk of collisions will therefore be negligible.
Residential Uses Community Services Tourism - Local Economy	▶ Changes to access to residences, businesses and recreational facilities and activities.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Increased traffic levels may cause congestion and increase travel times in the Transportation LSA.	▶ Future baseline traffic volumes will be increased over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ The increase in traffic volumes will cause traffic congestion and an average travel time increase of approximately 3 minutes for non-airport trips. ▶ Traffic spillover may occur as vehicles avoid the Transportation LSA and detour into adjacent communities.	▶ Increase non-auto modal split by providing transit improvements and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. Travel times are expected to return to existing levels and traffic spillover is expected to be negligible.
Transportation	▶ Changes to modal split.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Changes to modal split may be required in order to mitigate the effects of increased traffic volumes in the Transportation LSA.	▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ In order to mitigate effects on other community assets, non-auto modal split will be increased by providing transit improvement and increasing shuttle frequency and ease of use.	▶ No mitigation required. Changes to modal split result from the mitigation measures proposed for other measures of effect (MOE).	▶ Increases in non-auto mode share, potentially requiring improvements to transit service, pedestrian and cycling infrastructure.
Convenience	▶ Changes to access to the airport.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Increased traffic levels may cause congestion and increase travel times to and from the airport.	▶ Future baseline traffic volumes will be increased over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ The increase in traffic volumes will cause traffic congestion and an average travel time increase of approximately 3 minutes for trips to and from the airport.	▶ Increase non-auto modal split by providing transit improvement and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. Travel times are expected to return to existing levels.

Table 4-28: Proposed Future Scenario Net Effects Analysis for Transportation – Operation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Public Safety	▶ Estimated increased risk of collisions.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ No major improvements to roadway geometry, cross-sections or pedestrian facilities were considered to be in place.	▶ If modal split and vehicle occupancy levels remain at existing levels, future baseline traffic volumes would be increased by up to 150 % on Eireann Quay over existing conditions due to increases in the number of flights arriving and departing in the peak hours and the presence of higher capacity jet aircraft. ▶ Mode shares for users arriving and departing the airport are not assumed to change.	▶ With the addition of jets, vehicle and pedestrian volumes will further increase, therefore increasing exposure and potential for collisions.	▶ Increase non-auto modal split by providing transit improvements and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. The increased risk of collisions will therefore be negligible.
Residential Uses Community Services Tourism - Local Economy	▶ Changes to access to residences, businesses and recreational facilities and activities.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Increased traffic levels may cause congestion and increase travel times in the Transportation LSA.	▶ Proposed future traffic volumes will be increased over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ With the addition of jets, vehicle volumes are expected to increase, causing traffic congestion and an average increase in travel time of approximately 3 minutes for non-airport trips over existing conditions. ▶ Traffic spillover may occur as vehicles avoid the Transportation LSA and detour into adjacent communities.	▶ Increase non-auto modal split by providing transit improvement and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. Travel times are expected to return to existing levels, and traffic spillover is expected to be negligible.
Transportation	▶ Changes to modal split.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Changes to modal split may be required in order to mitigate the effects of increased traffic volumes in the Transportation LSA.	▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ In order to mitigate effects on other community assets, non-auto modal split will be increased by providing transit improvement and increasing shuttle frequency and ease of use.	▶ No mitigation required. Changes to modal split result from the mitigation measures proposed for other MOEs.	▶ Increases in non-auto mode share, potentially requiring improvements to transit service, pedestrian and cycling infrastructure. ▶
Convenience	▶ Changes to access to the airport.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Increased traffic levels may cause congestion and increase travel times to and from the airport.	▶ Proposed future traffic volumes will be increased over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ With the addition of jets, vehicle volumes are expected to increase, causing traffic congestion and an average increase in travel time for trips to and from the airport of 4 minutes.	▶ Increase non-auto modal split by providing transit improvement and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. Travel times are expected to return to existing levels.

Table 4-29: Future Airport Scenarios Net Effects Analysis for Transportation – Construction

Asset	Measure of Effect	Potential Effects	Mitigation Measures	Net Effects
Public Safety	▶ Estimated increased risk of collisions.	▶ Potential safety concerns exist where pedestrians and cyclists may come into proximity of construction activities adjacent to existing roadways.	▶ Plan to be developed prior to construction to inform the public of construction activities and schedule, as well as address any public concerns. ▶ Special directional signage may also be considered to indicate alternative access routes to areas. ▶ Safety measures will be used where necessary to separate the work area from pedestrians and cyclists. ▶ Signage indicating the presence of construction crews and / or activities will also be utilized.	▶ Effects will be short-term, and will be minimized where possible.
Residential Uses Community Services Tourism - Local Economy	▶ Changes to access to residences, businesses and recreational facilities and activities.	▶ Pedestrian access to areas in the vicinity of the BBTCA and construction yards may also be closed temporarily during various stages of construction. ▶ Motorists, cyclists and transit users may be affected by narrowed lanes surrounding construction sites which may cause potential delays in service.	▶ Plan to be developed prior to construction to inform the public of construction activities and schedule, as well as address any public concerns. ▶ Special directional signage may also be considered to indicate alternative access routes to areas.	▶ Effects will be short-term, and will be minimized where possible.
Transportation	▶ Changes to modal split.	▶ No effects to the road network or modal split as a result of construction activities.	▶ Not required.	▶ None.
Convenience	▶ Changes to access to the airport.	▶ Potential for traffic congestion and an average increase in travel time for trips to and from the airport during construction activities.	▶ Special directional signage may be considered to indicate alternative access routes to areas.	▶ Effects will be short-term, and will be minimized where possible.

Potential effects related to public safety, residential uses, community services, tourism – local economy and convenience will be short term and will be minimized where possible. No effects to the road network are anticipated as a result of construction activities for both Future Airport Scenarios. Potential safety concerns exist where pedestrians and cyclists may come into proximity of construction activities adjacent to existing roadways. Pedestrian access to areas in the vicinity of the BBTCA and construction yards may also be closed temporarily during various stages of construction. Motorists, cyclists and transit users may be affected by narrowed lanes surrounding construction sites which may cause potential delays in service.

A plan will be developed prior to construction to inform the public of construction activities and schedule, as well as address any public concerns. Special directional signage may also be considered as a means to indicate alternative access routes to areas. Safety measures will be used where necessary to separate the work area from pedestrians and cyclists. Signage indicating the presence of construction crews and / or activities will also be utilized. Other mitigation measures such as special directional signage may also be considered when temporary road closures occur as part of construction activities, if required.

4.12 Public Safety

This section considers effects on the Project that may result from potential accidental events and malfunctions associated with airport operations.

Airport infrastructure and vehicles have the potential to cause serious accidents or malfunctions that may have adverse economic, social, or environmental effects. As noted in previous sections, the Proposed Future Scenario includes an increase in aircraft traffic and a change in aircraft technology. Along with these changes there will be an associated increase in the use and storage of hazardous substances and fluids. Accidents that could occur, and which are considered to have sufficient consequence and likelihood to be addressed within this section, include:

- Aircraft accidents in the air or on the ground;
- Aircraft-wildlife collisions; and,
- Vehicle collisions;

4.12.1 Aircraft Incidents

The most high profile accident or malfunction that can occur with the operation of an airport is that of an aircraft incident. According to Transport Canada, aircraft incidents that must be reported include:

- Risk of collision, or a loss of separation, between two aircraft;
- Declared emergency;
- Engine failure;
- Smoke or fire; and
- Difficulty in controlling the aircraft.

Aircraft crashes can result in casualties, which includes serious injuries and deaths. The nature of BBTCA functioning as a regional airport means that medium-sized commercial airliners with many passengers on board are one of the major forms of traffic resulting from airport operations. An increase in traffic under the Proposed Future Scenario will increase the potential for aircraft incidents or accidents.

An aircraft crash can also result in contamination through spills of hazardous substances or generating accidental fires. The potential effects and mitigation of such incidents are discussed in further detail below.

The scope of effects from an air incident or accident can be broken down into two broad areas:

- Human casualties associated with aircraft crashes or malfunctions; and,
- Economic effects— both direct (such as the cost of lost or damaged capital) and indirect (such as costs associated with delays in operations).

The land uses along the northern portion of the area of interest are predominantly residential with some commercial, industrial and institutional uses; and to the east are predominantly industrial designations with low density or vacant lands, and recreational/natural areas. Thus, an aircraft accident could result in significant damage to the residential, institutional, or recreational areas surrounding the airport, leading to direct and indirect adverse effects on the local community or economy. While aircraft incidents and accidents have the potential to cause significant environmental, economic, or social harm, the likelihood of their occurrence is considered low.

Rather than mitigation, the primary focus for aircraft crashes generally deals in prevention. PortsToronto maintains an Emergency Response Plan, which outlines a variety of emergency contingency plans to deal with the possible event of an aircraft crash in a timely and effective manner. These procedures continue to be updated to ensure they are current with best practice response and management. PortsToronto also has in place facilities, practices and procedures to respond quickly and effectively to spills, fires, emergencies, and health situations that may result from an aircraft crash or other emergency (PortsToronto, 2016).

The BBTCA has a fully functioning, on-island fire hall and emergency response centre, in addition to the Toronto Fire Service. It is staffed by more than double the number of emergency personnel required by Transport Canada. The airport's fire department does regular internal and external emergency services training throughout the year. A full-scale simulation is conducted every two years, with a full simulation table-top exercise in intervening years. These exercises are aimed to test the airport's protocols, procedures, communications and planning for emergency and security related incidents, and to ensure that the airport is equipped to respond to any situation. Given the BBTCA's proximity to water, the Billy Bishop Fire Department, Toronto Fire Services Squad and the Toronto Police Services Marine Unit hold joint ice and cold water rescue training to practice water specific rescue operations, beyond the standard safety measure requirements (PortsToronto, 2016).

In addition to the on-island emergency response centre and crew at the airport, Toronto's emergency responders can access the airport within minutes by water, through the Toronto Marine Units, and by the airport ferry. The Province of Ontario's ORNGE Air Ambulance and Paramedics is also permanently based at the airport. The new pedestrian tunnel provides further access to the airport and can be utilized during emergency situations. All of these measures are part of the airport's Emergency Response System which is in place to ensure preparedness and ability to respond in a rapid and co-ordinated manner in the event of a large-scale emergency at the airport. These measures have been successful in mitigating any serious environmental effects occurring as a result of minor aircraft or equipment malfunctions (PortsToronto, 2016). Moreover, several international airports around the world that support substantially more traffic than that which is anticipated at BBTCA have successfully used the same best practice procedures to effectively mitigate the risk of aircraft accidents or malfunctions having serious effects on the environment and the economy.

In the air, the approach and missed approach surfaces for instrument procedure landings have been designed using the International Civil Aviation Organization's (ICAO) collision risk model and take into account the risks associated with collisions. The collision risk model assesses the risks associated with undershooting (an aircraft landing before the runway), over shooting (an aircraft running off the end of the runway) and lateral excursion (an aircraft running off the side of the runway). The protection surfaces at BBTCA have been designed in response to the ICAO's collision risk modelling, and address the risks associated with potential obstacles to flight in the vicinity of the airport. Any aircraft permitted at the BBTCA is certified to operate in compliance with the protection surfaces and approach procedures. If an aircraft cannot be certified to operate in compliance with these surfaces, it cannot use BBTCA.

As the existing practices and procedures are updated and new infrastructure is built to accommodate the increase in traffic in the vicinity of the BBTCA, it is not anticipated that the Future Airport Scenarios will result in an increase in aircraft crashes once mitigation measures are implemented. In particular, the proposed parallel taxiway and the vehicle causeway below Runway 26 will further improve safety as the potential for collisions between aircraft and ground-based vehicles accessing the south end of the property will be removed. The parallel taxiway is proposed to reduce holding patterns and aircraft interactions on the main runways, further reducing the chances of aircraft collisions on the tarmac.

4.12.2 Aircraft-Wildlife Collisions

Collisions between wildlife and aircraft occur at airports around the world. Although aircraft do occasionally collide with mammals, the most common wildlife collisions occur with birds, either single individuals or groups. This type of collision is referred to as *bird strike*. Aircraft-wildlife collisions have the potential to cause social, economic, and environmental effects.

The most significant environmental effect of a bird strike is on bird populations. Thus, the primary effect within the vicinity of the BBTCA is that bird strikes may result in bird mortality. To address this potential risk to aviation safety, Transport Canada has developed a regulation under the *Aeronautics Act* that requires airport operators to develop wildlife management plans incorporating active and passive control techniques to minimize wildlife activity in the vicinity of airports.

Consequently, PortsToronto maintains and implements a wildlife management plan. Under the Proposed Future Scenario, the existing BBTCA Wildlife Management Plan is to be updated, and any associated risk assessment work required to do so should be completed at that time to determine what mitigation measures are required as part of the plan to reduce the potential for risks from bird strikes.

The economic effect of a bird strike is considerable. It is, therefore, considered acceptable to implement passive measures such as habitat modification, and active measures such as pyrotechnics to keep birds away from ascending and descending planes to mitigate the effect of potential bird strikes. These measures are currently employed by wildlife control officers at BBTCA. While PortsToronto's primary concern is aviation safety, ongoing partnerships with the TRCA and other organizations to improve wildlife habitat a safe distance from BBTCA have helped to provide much-needed nesting and migration stop-over habitat for a variety of birds.

In summary, the implementation of habitat management and active wildlife exclusion techniques on BBTCA property, as described in the Wildlife Management Plan, will enable the management of bird hazards on and around BBTCA while mitigating potential effects on birds. Please refer to **Appendix C-4** for more information about mitigation measures to address aircraft-wildlife collisions.

4.12.3 Vehicle Collisions

Vehicle collisions can occur due to a variety of causes, including:

- Driver error;
- Vehicle malfunction; and,
- Weather conditions.

At the BBTCA, vehicle collisions can occur both on the ground side and airside.

Based on the modelling undertaken as part of the assessment of effects, mitigation measures will be required to address increased passenger volume accessing the mainland terminal of BBTCA. According to the Transportation Effects Assessment included in **Appendix C-11**, these mitigation measures will reduce the risk of collisions to current levels.

In regard to airside lands, there are risks associated with vehicle-aircraft interactions during operation and construction. Currently, ground-based vehicles requiring access to airport facilities to the south of Runway 08-26, must cross the runway when it is safe to do so. This includes fuel vehicles, as well as municipal vehicles such as waste management trucks and school buses that access the Toronto Islands community by crossing the Western Channel at Eireann Quay from time-to-time. Similarly, construction of either the RESA or runway extension would require a considerable volume of vehicles to travel on airside lands.

During construction, a plan will be in place to provide BMPs for vehicles travelling within the BBTCA lands. The plan will outline the practices for vehicles being used for construction including guidelines for maintaining road entries and exits to the construction site, traffic management practices, and other important mitigation and management practices that will maintain the construction site in a safe way.

During operation, BBTCA air traffic controllers restrict access to the runway and only allow vehicles to cross the runway when they have permission to do so.

5. Conclusions of the Effects Assessment

The comparison between effects associated with operation of the two Future Airport Scenarios is presented in **Table 5-1**. It indicates whether the Proposed Future Scenario or Future Baseline Scenario is the preferred scenario for each discipline..

Table 5-1: Comparison of Future Airport Scenarios

Discipline	Comparison of Operational Effects between Future Airport Scenarios	Preferred Scenario
Air Quality;	Effects are generally similar between the Future Airport Scenarios, although there are fewer effects anticipated as a result of the Proposed Future Scenario compared to the Future Baseline Scenario. • Fewer contaminants have predicted concentrations higher than their Toxicity Reference Values. • Fewer tonnes of CO_2 are predicted to be emitted in the Air Quality Study Area	Proposed Future Scenario.
Noise	Effects are generally similar between the Future Airport Scenarios, although noise levels are slightly lower in the Proposed Future Scenario as compared to the Future Baseline Scenario.	Proposed Future Scenario.
Public Health	Effects are generally similar between the two scenarios, although: • The Future Baseline Scenario results in a slightly increased likelihood of experiencing environmental insomnia and increased likelihood of experiencing hypertension and ischemic heart disease compared to Proposed Future Scenario; and, • The Proposed Future Scenario results in a slightly increased risk of developing lesions in the upper airway compared to Future Baseline Scenario.	No preference.
Marine Navigation	Effects are greater for the Proposed Future Scenario as compared to the Future Baseline Scenario for the following reasons: • Jet blast has a considerable effect on small recreational boats near the edge of the MEZ boundary (this effect does not exist with the turboprop planes); and, • The runway extension will have a considerable effect on maneuverability in the Western Channel for both small and large recreational boats, whereas the RESA will not require a change to the MEZ.	Future Baseline Scenario.
Marine Physical	Effects are similar between the Future Airport Scenarios.	No preference.
Water Quality	Effects are generally similar between the Future Airport Scenarios, although the Proposed Future Scenario will result in a greater reduction of average flow through the harbour, and an increased residence time, as compared to the Future Baseline Scenario.	Future Baseline Scenario.
Built Form and Land Use	Effects are similar between the Future Airport Scenarios.	No preference.
Archaeology and Cultural Heritage	Effects are similar between the Future Airport Scenarios.	No preference.

Table 5-1: Comparison of Future Airport Scenarios

Discipline	Comparison of Operational Effects between Future Airport Scenarios	Preferred Scenario
Socio-Economic	Effects are greater for Proposed Future Scenario as compared to the Future Baseline Scenario for the following reasons: • Extending the runway, and increasing the number of passengers and aircraft movements, will further exacerbate the relationship between local residents and the airport; • The introduction of jets will change the look and feel of the waterfront, and the runway extension will reduce the area of navigable water available for recreational boaters; and, • The introduction of jet aircraft and the runway extension is expected to change how the waterfront is perceived by non-users.	Future Baseline Scenario.
Natural Environment	Effects are greater for Proposed Future Scenario as compared to the Future Baseline Scenario, as the runway extension results in a much greater loss of aquatic habitat than the RESA.	Future Baseline Scenario.
Transportation	Effects are similar between the Future Airport Scenarios.	No preference.

Overall, the Proposed Future Scenario improves conditions related to noise and air quality compared to the Future Baseline Scenario. However, it results in greater effects on marine navigation, water quality, the socio-economic environment, and the natural environment.

6. Next Steps

6.1 Tripartite Agreement

In 2010, Transport Canada identified the requirement to implement a RESA at qualifying airports as an additional safety consideration. The installation of a RESA at the BBTCA would result in an amendment to the Tripartite Agreement (WSP Group, 2014), but will be required to comply with Transport Canada regulations. The RESA at the BBTCA would consist of a 43 m land mass extension at both ends of the main runway (Runway 08-26) by lake-fill within the airport's MEZ thereby not affecting marine navigation. Although not required under the CEAA, an EA report for lakefilling in the area where the RESA will be required, "Lakefill within Marine Exclusion Zone (Keep-out-Area) Toronto Harbour", was completed in January, 2013 (Dillon Consulting, 2013).

An amendment to the Tripartite Agreement will need to be sought by PortsToronto for the implementation and construction of the Transport Canada required RESA.

6.2 Commitments

This ESR identifies specific items to be reviewed and confirmed during the detailed design and construction phases of this project. Items to be addressed are included in **Table 6-1** below.

Table 6-1: Commitments for Future Work

Category	Project Phase	Applicable Scenario	Commitments for Future Work
Built Form and Land Use	Detailed design	Proposed Future Scenario	Additional detailed investigation to examine compatibility issues should the Proposed Future Scenario be realized. These potential compatibility issues include: • Planning areas that fall under the AZR area or Missed Approach Surface and for which no maximum building height has yet been defined; • Planning areas that feature a maximum building height that exceeds that of the current Controlling Obstacle; and, • Planning areas that contain sensitive land uses above the projected 25 NEF.
Marine Physical Environment	Detailed design	Proposed Future Scenario	Detailed numerical modelling is required to fully quantify the impacts of the runway extension on wave heights, currents, and sediment transport. A wave model and near shore hydrodynamic model are recommended to analyze sediment transport and assess changes in the wave environment, and how it impacts erosion, currents, and water quality.
	Detailed design	Proposed Future Scenario	Conduct a field assessment including a reconnaissance level field walk along various shoreline locations to identify any signs of instability (scour and erosion, as well as the size of material eroding), and identify evidence of sediment transport and change. The survey should also review ecological response to present patterns of erosion and deposition assessing how new habitats are forming linked to sediment dynamics.
Water Quality	Detailed design	Future Baseline and Proposed Future Scenarios	Detailed hydrodynamic modeling of the Inner Harbour to more accurately quantify changes to currents and residence time is recommended to be completed. A new 2-D or 3-D hydrodynamic model could be developed for the Water Quality Study Area, or one of the existing MIKE-3 (Dewy, 2012), ELCOM (University of

Table 6-1: Commitments for Future Work

Category	Project Phase	Applicable Scenario	Commitments for Future Work
			Waterloo, 2009), or Delft3D (Baird, 2010) models could be further refined and utilized for additional investigations. This detailed numerical modelling may also be used to assess changes in the wave environment and sediment transport.
	Detailed design	Proposed Future Scenario	Detailed field measurement program (spring through fall period) is recommended to be undertaken to obtain additional measured velocities (ADCP measurements) along the Western and Eastern Channel, Don River, and near shore areas. This will allow the hydrodynamic model to be calibrated and validated to observe flows in the Water Quality Study Area and reduce the amount of uncertainty in the results.
Natural Environment – Aquatic	Detailed design	Future Baseline and Proposed Future Scenarios	Continue consultation with TRCA regarding offsetting harm to fish and fish habitat.
	Detailed design	Future Baseline and Proposed Future Scenarios	Develop and implement an erosion and sediment control plan to minimize the risk of sedimentation during all phases of the project.
	Construction	Future Baseline and Proposed Future Scenarios	Regularly inspect and maintain erosion and sediment control measures such as a silt boom or silt curtain until all construction has been completed.
	Prior to construction	Future Baseline and Proposed Future Scenarios	Install a fish net around the work zone and remove all fish from within the work zone should construction activities be required during cold water timing window. A qualified biologist must be retained to remove fish from the isolated work area.
Natural Environment – Terrestrial	Detailed design	Future Baseline and Proposed Future Scenarios	Continue consultation with TRCA regarding offsetting for removal of aquatic habitat (to be implemented off-site in order to reduce potential risk to waterfowl associated with bird strikes) and consider improvements to the quality of waterfowl habitat.
	Prior to construction	Future Baseline and Proposed Future Scenarios	Develop a plan for translocating locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail to suitable habitat outside of BBTCA property, if possible elsewhere on the Toronto Islands.
	Detailed design	Future Baseline and Proposed Future Scenarios	Update the BBTCA Wildlife Management Plan to include measures to reduce risk to Barn Swallow and Bank Swallow (e.g., through passive or active management techniques to prevent foraging within grassy areas on the BBTCA grounds). Also incorporate current and historical population, migration and bird strike data of hazard birds into the BBTCA Wildlife Management Plan to predict and anticipate potential threats as they relate to hazard birds near the BBTCA as well as develop and implement use of a radar-detecting system to detect and monitor hazard birds near the BBTCA grounds to minimize bird strikes.
	Prior to construction	Future Baseline and Proposed Future Scenarios	Conduct training for BBTCA wildlife control officers so they are able to recognize Barn Swallow and Bank Swallow, as well as characteristics of their foraging habitat.
Noise	Detailed design	Future Baseline and Proposed Future	Engage the City of Toronto to ensure that they require new residential development be provided with warning clauses and most likely mitigation measures regarding noise in the vicinity of the BBTCA.

Table 6-1: Commitments for Future Work

Category	Project Phase	Applicable Scenario	Commitments for Future Work
		Scenarios	
Archaeology – Marine	Detailed design	Future Baseline and Proposed Future Scenarios	Complete a survey of the projected lake-fill area and its 100 m buffer zone with a sub-bottom profiler and an underwater magnetometer. This should determine if any archaeological resources, particularly shipwrecks, are present under the existing lakebed. If anomalies are present, a visual confirmation of the resources is to be executed through direct diving or by remotely operated vehicle equipped with an underwater camera. It is also recommended that a qualified underwater archaeologist with scientific competence appropriate to the Project be present at all time during the physical survey.

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Appendix A

Final Study Design Report

PORTS TORONTO
Environmental Assessment
PROPOSED RUNWAY EXTENSION AND INTRODUCTION OF JETS AT BILLY BISHOP TORONTO CITY AIRPORT

AECOM

PortsToronto

Environmental Assessment of a Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport Final Study Design Report

Prepared by:

AECOM
105 Commerce Valley Drive West, Floor 7 905 886 7022 tel
Markham, ON, Canada L3T 7W3 905 886 9494 fax
www.aecom.com

Project Number:

60328546

Date:

August, 2015

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C2. 30-Day Review Period Comments and Responses
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Acronym

AAC..... Agency Advisory Committee
ACRP ..... Airport Cooperative Research Program-Transportation Research Board
ADSB ..... Archaeological Sites Database
AHT..... Aquatic Habitat Toronto
ANSI..... Areas of Natural and Scientific Interest
APU..... Auxiliary Power Unit
AZR..... Airport Zoning Regulations
BBTCA ..... Billy Bishop Toronto City Airport
BHZ..... Bird Hazard Zone
BIA ..... Business Improvement Area
BQNB..... Bathurst Quay Neighbourhood Plan – City of Toronto
CEA Agency..... Canadian Environmental Assessment Agency
CEAA ..... Canadian Environmental Assessment Act
CH4..... Methane
CHAR..... Cultural Heritage Assessment Report
CO2..... Carbon Dioxide
Council ..... Toronto City Council
CS100 ..... Jets proposed by Porter Airlines
CWB..... Community Well-Being
CWS..... Canadian Wildlife Service
CWSP ..... Central Waterfront Secondary Plan – City of Toronto
DFO ..... Fisheries and Oceans Canada
EA ..... Environmental Assessment
EBPP..... East Bayfront Precinct Plan – City of Toronto
EC..... Environment Canada
ELC..... Ecological Land Classification
ESA..... Endangered Species Act
FAA..... U.S. Federal Aviation Administration
FLAP ..... Fatal Light Awareness Program
GA..... General Aviation
GBE ..... Government Business Enterprise
GHG..... Greenhouse Gas
GTA..... Greater Toronto Area
GTHA..... Greater Toronto Hamilton Area
HEAT..... Habitat and Environmental Assessment Tool
HIA..... Heritage Impact Assessment
ICAO ..... International Civil Aviation Organization
INM ..... Integrated Noise Model
LDN..... Average Sound Pressure Level over a whole day
LDPP..... Lower Don lands Precinct Plan – City of Toronto
LIO ..... Land Information Ontario
MEZ ..... Marine Exclusion Zone
MNRF..... Ministry of Natural Resources and Forestry
MOECC..... Ministry of the Environment and Climate Change

MTCS ..... Ministry of Tourism, Culture and Sport
N70 ..... Degree of Speech Interruption
NEF ..... Noise Exposure Forecast
NHIC ..... Natural Heritage Information Centre
NO2 ..... Nitrous Oxide
NPD ..... Noise-Power-Distance
NRVIS ..... Natural Resources Values Information System
OBBA ..... Ontario Bird Banding Association
OEAA ..... Ontario Environmental Assessment Act
ORNAMENT ..... Ontario Road Noise Analysis Method for Environment and Transportation
Q400 ..... Turbo Propeller Planes currently used by Porter Airlines and Air Canada
RESA ..... Runway End and Safety Area
SAC ..... Stakeholder Advisory Committee
SAR ..... Species at Risk
STEAM ..... Sound from Trains Environmental Analysis Method
TNIP ..... Australian Transparent Noise Information Package
TP312 ..... Aerodrome Standards and Recommended Practices
TPA ..... Toronto Port Authority
TPH ..... Toronto Public Health
TRCA ..... Toronto and Region Conservation Authority
TTP ..... Tommy Thompson Park
TTPBRS ..... Tommy Thompson Park Bird Research Station
UP ..... Union to Pearson Express
US EPA ..... United States Environmental Protection Agency
YTZ ..... Billy Bishop Toronto City Airport

1. Study Background and Purpose

1.1 Background and Introduction to the Billy Bishop Toronto City Airport

PortsToronto, formerly the Toronto Port Authority, was established by the Federal Government under the Canada *Marine Act* in 1999. They are a federally assigned Government Business Enterprise (GBE)[1] that provides regulatory controls of marine and air transportation in the port and harbour, grants permits for powered boating activities, oversees land development and engages in trade development for the port's terminals. PortsToronto is responsible for managing the entire Toronto Harbour area, including the Billy Bishop Toronto City Airport (BBTCA), formerly called the Toronto City Centre Airport (**Figure 1-1**).

PortsToronto operates in accordance with the Canada Marine Act and its Letters Patent[2], in addition to a series of specific bylaws, policies and procedures. PortsToronto's Letters Patent outlines the activities that can be undertaken by the organization. PortsToronto is responsible for the management of the movement, navigation, and berthing of vessels using the port and harbour to ensure safety and compliance with by-laws and regulations and the effective management of land operations in accordance with their Letters Patent. PortsTorono monitors navigable channels and navigational aids to comply with standards of the St. Lawrence Seaway. PortsToronto is responsible for the provision of services concerning navigation in the port and harbour of Toronto which includes the safe operation of various smaller watercraft under the Navigable Waters Protection Act.

According to the Canada Marine Act, PortsToronto is obliged to "manage the marine infrastructure and services in a commercial manner that encourages, and takes into account, input from users and the community in which a port or harbour is located" (Canada Marine Act, Section 4(f), 1998, p. 4). As such, in managing the BBTCA, PortsToronto must consider and assess proposed changes to the BBTCA operations and infrastructure in consultation with local communities and stakeholders.

1.2 Study Background

PortsToronto operates the BBTCA under the conditions of an agreement called the Tripartite Agreement which was originally drafted and signed in 1983 by the City of Toronto, Transport Canada and PortsToronto. The Tripartite Agreement details the conditions under which the BBTCA operates; such as the flight curfew, the noise limitations, the prohibition of the use of jet aircraft, the prohibition against any lengthening of the operational portion of the runway and the rights and responsibilities of each signatory. Without the consensus of all three signatories, no changes can be made to the Tripartite Agreement.

In 2013, Porter Airlines submitted a proposal to the City of Toronto, copying PortsToronto, requesting to introduce jet aircraft at the BBTCA. Part of this proposal included an extension of the land mass at each end of the main runway in order to lengthen the operational portion of the runway to accommodate the use of the requested jet aircraft for scheduled flight operations. As the Tripartite Agreement does not allow the use of jet aircraft for scheduled commercial travel or the lengthening of the operational portion of the runway, the terms of the Tripartite Agreement would need to be amended to approve Porter's proposal. In 2013 the City of Toronto undertook a review of the

1. *According to the CPA Canada Public Sector Accounting Handbook (ISBN: 0-88800-287-4) a government business enterprise is a separate legal entity that has been delegated by the federal government the financial and operational authority to carry on a business that may sell goods and services to individuals and organizations outside of the government, maintain its own operations and meet its liabilities from revenues received from sources outside of the government.*
2. *http://www.portstoronto.com/About-TPA/Governance/Letters-Patent.aspx*

potential impacts of Porter's Proposal, which were presented to the public and to Toronto City Council in late 2013 and early 2014. In consideration of the outcome of the City's review and concerns raised by some members of the community regarding existing airport operations, and prior to entering into negotiations to amend the Tripartite Agreement, the City of Toronto, in an April 1, 2014, City of Toronto Council resolution (City of Toronto, 2014), requested, in part, that further study and analysis of the effects of jet aircraft at the BBTCA and associated mitigation measures be completed. This request consisted of four key components and included:

1. Commencement of an Airport Master Plan for the BBTCA;
2. Development of a Precinct Plan for the Bathurst Quay neighbourhood (now called the Bathurst Quay Neighbourhood Plan);
3. Commencement of design work for the proposed runway extension; and
4. Completion of an environmental assessment.

Items 1 to 3 are further described in **Section 2.1**. Item 4, the completion of an environmental assessment (EA), is proposed to be completed through the studies described in this report.

1.3 Purpose of the Environmental Assessment

PortsToronto is undertaking this EA at the request of the City of Toronto to identify the effects of the proposed changes on the surrounding environment and to inform their position related to the proposal.

It is important to note that this EA is not an approval of Porter Airline's proposal, nor does it imply support for or against any aspect of the proposal. The result of the EA will be information that will allow all stakeholders to objectively consider the proposal and to make a decision for themselves on the choices that need to be made in terms of impacts, benefits, and mitigation measures associated with the potential implementation of the proposal.

The EA will address one of many requests made by Toronto City Council on April 1, 2014, in debating the City's position on the request to amend the Tripartite Agreement.

1.4 Purpose of the Study Design Report

This Study Design Report outlines the framework for the preparation of the EA. It has been prepared with input from stakeholders, including members of the public, agencies and interest groups, as described in **Section 4**.

The purpose of this Study Design Report is three-fold:

1. Outline the study process that PortsToronto proposes to follow for the EA and provide a focus for early engagement.
2. Document, for stakeholder review and comment, the planning decisions that have been made on a preliminary basis with respect to:
   - the scenarios to be assessed by the EA;
   - the measures to assess the effects of the proposal; and
   - the methods for conducting the effects assessment.
3. Provide the basis for moving the study forward once stakeholder comments regarding the above have been considered.

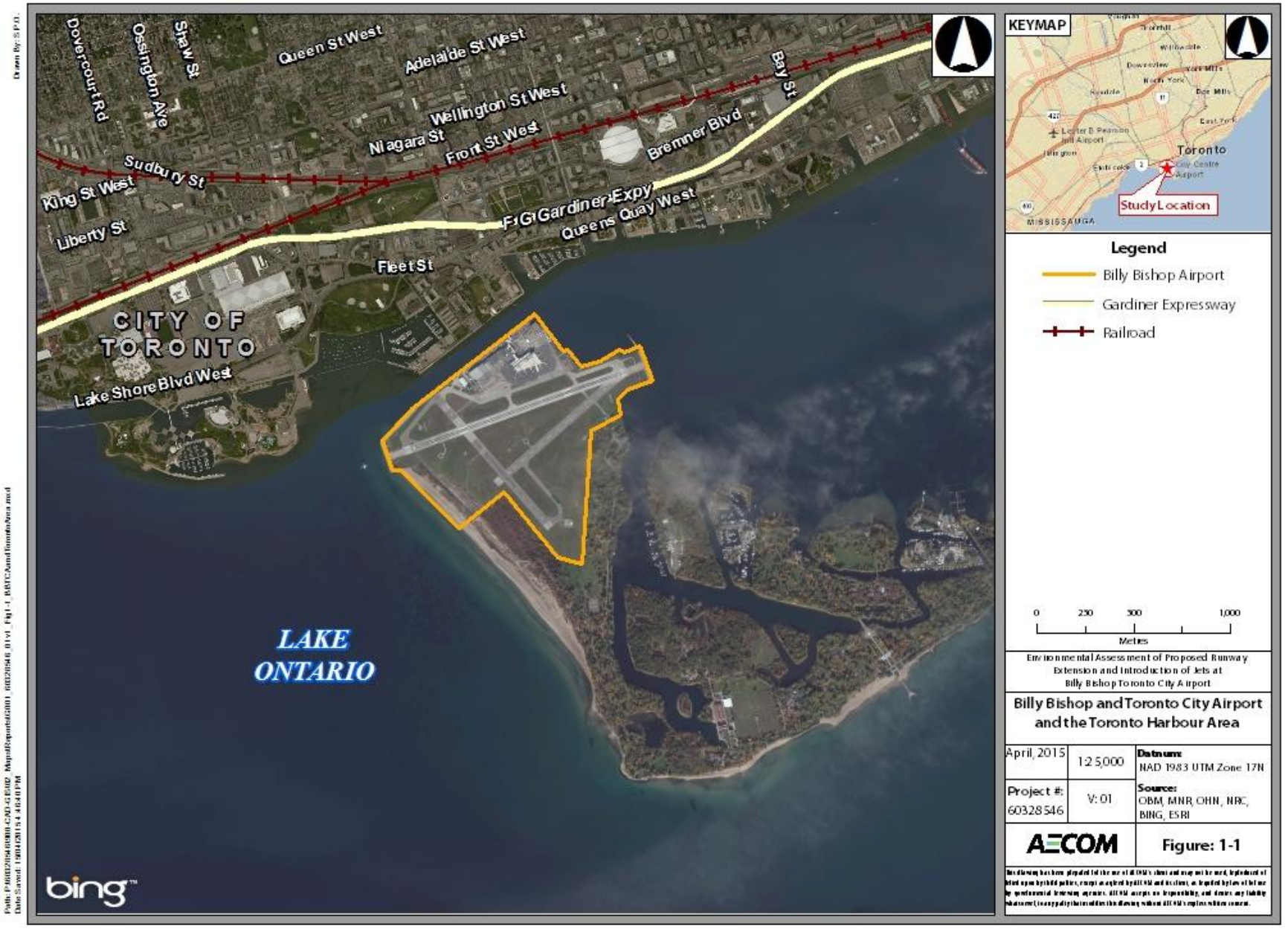


Figure 1-1: Billy Bishop and Toronto City Airport and the Toronto Harbour Area

The scope of the EA will focus on the following effects assessment studies:

- Air Quality;
- Public Health;
- Noise;
- Marine Navigation;
- Marine Physical Conditions and Water Quality;
- Built Form and Land Use;
- Archaeology and Built Heritage;
- Socio-Economic Conditions;
- Natural Environment; and,
- Transportation.

The study will follow the evaluation process and decisions outlined in this document; however, it is possible that during the EA, PortsToronto will determine that minor changes to the process are required based on new and directly applicable information from the Study Team or through discussions with a regulatory authority or agency. These changes to the process may include modifications or additions to the impact assessment evaluation methodologies or to the engagement methods, for example. If this should occur, affected parties will be notified of the proposed changes.

Up to this point, numerous meetings with a broad range of stakeholders and agencies have been held to review objectives, define the scope of the various studies and to determine the assessment methods. This Study Design has been informed and guided by many contributors and commenters. A list of stakeholders and agencies engaged throughout the process is presented in **Section 4**.

The work defined in the following subsections of this Study Design Report will result in a comprehensive analysis of the airport's existing and potential future operations and the local environment which may impact upon or be impacted by potential changes in operating procedures and changes to infrastructure at the BBTCA.

1.5 What has Changed in this Document?

Since August of 2014, PortsToronto has undertaken significant consultation activities with members of the public, with stakeholders, with agencies and with the City of Toronto and Waterfront Toronto to develop the scope of work for the EA study that describes herein the studies to be undertaken as part of the EA, the methodologies for undertaking those studies, and the means for reporting on the results of those studies. This Study Design document has been developed with input and feedback on a multitude of issues and concerns raised by hundreds of people, agencies and stakeholder groups throughout the past 12 months. On April 20, 2015 a draft of this document was released for public review and comment. In addition, Waterfront Toronto hired a third party peer reviewer to review and comment on the draft Study Design. The peer reviewer provided draft and final comments on the draft Study Design to PortsToronto. This document has been updated to address the comments received from the public, stakeholders and agencies during the 30-day review period, as well as comments received from the peer reviewer. Comments received on the Draft Study Design since its release are reflected throughout this document and its appendices. The key changes made to the Study Design methods are summarized in the table below. The details of every comment received on the draft Study Design and the response to each individual comment are included in **Appendix C**.

Subject Area	Summary of Comments Received	Summary of Changes Made
EA Process	A number of requests were made for the EA to assess different scenarios than those detailed in the Draft Study Design Document, including a scenario in which no airport exists in the future, and a scenario in which the airport does not grow beyond current conditions.	The Study Design has been updated in Section 3.1.1 and 3.1.2 to clarify the details of the scenarios to be assessed, including identifying the ways in which the scenarios proposed for review align with the April 1, 2014 resolution of Toronto City Council. As noted by the peer reviewer, "This approach, which includes the consideration of two (2) alternative scenarios (future baseline without the project, and future with the proposed runway extension and jet aircraft), is reasonable and consistent with best practice when no specific federal or provincial EA process is triggered."

Subject Area	Summary of Comments Received	Summary of Changes Made
	Clarification has been requested on how the outcome of this EA will be used by decision-makers.	The Study Design has been updated in Section 5 to explain that the proposal constitutes infrastructure and operational changes that cannot be undertaken without amendments to the Tripartite Agreement, and as such, any of the proposed changes presented in this document that are not currently allowed under the Tripartite Agreement will require agreement from the City of Toronto, Transport Canada, and PortsToronto to be included in an amended agreement before being implemented. This section also indicates that the EA is not a decision-making mechanism, but a decision-support tool for the three signatories of the Tripartite Agreement to refer to in deciding whether or how to amend the Agreement.
Air Quality	It was requested that the Study Area be altered to include areas to the north of the draft Study Area, and that more sensitive receptors be placed to the north of the Gardiner Expressway.	The Study Area for the air quality impact assessment has been developed to assess the areas where receptors could be most affected by potential changes to emissions that could result from the introduction of jet aircraft at BBTCA. Two sensitive receptor locations have been added to the north of the Gardiner Expressway in Wards 19 and 20 in the Air Quality Study Area figure presented in Section 3.3.2 and Appendix B.
	It was requested that different meteorological conditions be considered in the assessment of both noise and air quality impacts.	The Study Design has been updated in Appendix B, Attachment A, for both air quality and noise. The air quality methodology has been updated to indicate that air quality modelling will be based on 1-year of hourly meteorological data process using CALMET software. As such, this covers a wide range of weather conditions With respect to noise, the assessment methodologies are generally based on a standard weather condition. However, the Noise Assessment Report will include information on the sensitivity of the measured noise levels to weather conditions, and on the frequency of certain key weather conditions, such as those associated with temperature inversions, low cloud and fog.
	Questions were asked about the composition of reported black particulate matter (sometimes referred to by respondents as “soot”) that appeared to be collecting on balconies and boat parts in the Central Waterfront area.	After the release of the draft Study Design, the Study Team became aware of an analysis of the black soot undertaken by the MOECC at the request of Toronto Public Health. The Study Design has been updated in Appendix B, Attachment A, in the air quality section to include review of, and reference to the results of this lab analysis in the methodology for the assessment of black soot.
Noise	More details on the assessment methodology were requested.	The Study Design has been updated in Appendix B, Attachment A, to clarify the sources of and methods for data collection, the software to be used to model existing conditions, and the methods to be employed to project future conditions.
	It was requested that noise monitoring equipment be installed at 34 Little Norway Crescent.	This equipment has been installed and noise readings have been taken from that location.
Public Health	A number of questions were asked about how impacts of the proposal would be assessed with regard to public health.	The draft Study Design proposed to assess public health as part of the Noise and Air Quality disciplines. The Study Team has engaged, and continues to engage, Toronto Public Health regarding the criteria to be used for this assessment. As a result of the comments received, the Study Design has been updated to make public health a separate discipline assessment in Section

Subject Area	Summary of Comments Received	Summary of Changes Made
		3.3.3 and Appendix B, Attachment A. Details of the methods for assessment have been included in Attachment B, and include impacts associated with both noise effects and changes to air quality.
Livability and Sense of Place on the Waterfront	Questions were asked about how the proposal could affect the waterfront revitalization efforts, and how those impacts may alter the anticipated future balance of uses and users along the waterfront.	The Study Design has been updated in Section 3.6 to add clarity to a section that describes the assessment methodology proposed to determine how impacts on specific waterfront uses could alter the overall balance of uses in the Central Waterfront area.
Transportation	It was requested that commercial/delivery vehicles be accounted for in the transportation impact assessment, and that the Study Area be enlarged to include Fleet Street.	The Study Design has been updated in Appendix B, Attachment A, to reflect that fuel delivery and other and commercial vehicles will be accounted for in the transportation and safety impact assessments, and the Study Area has been enlarged, as shown in Section 3.3.11.1 and Appendix B, to include the Fleet Street and Bathurst Street intersection.
Socioeconomic Environment	More detail was requested regarding methodological details of the social impact assessment and existing conditions survey methodology.	The draft Study Design indicated that specific survey questions would be developed in the winter/spring 2015. Following the release of the draft Study Design, these details were developed by socio-economic specialists experienced in creating surveys. The draft surveys have been presented to the SAC as well as the City of Toronto for review and comments have been incorporated into revisions. The Study Design has been updated in Appendix B, Attachment A, to clarify and provide more details about the information to be obtained from respondents and methods, as well as potential respondents.
	Details on the methods proposed to assess economic impacts were requested.	The Study Design has been updated in Appendix B, Attachment A, to clarify how the existing economic models will be used to support a qualitative assessment of the likely direction of economic effects, which will be based on social impacts.
	It was requested that construction impacts be considered on the social and economic environment.	The Study Design has been updated in Section 3 to clarify that effects will be assessed for both the construction and operations phases of the project.
Natural Environment	Additional methodological details for the aquatic environment section.	The Study Design has been updated in Appendix B, Attachment A, to provide more detail and clarity on the methods employed to survey aquatic habitat.

1.5.1 Third Party Peer Review

As a result of comments received during the development of the Draft Study Design, and as a step to further enhance the transparency of the overall environmental assessment process, PortsToronto is funding a third party peer review, which Waterfront Toronto is leading as the master developer of waterfront revitalization. Waterfront Toronto has led the selection and oversight of an independent consultant to conduct this review. The peer reviewer has reviewed the Study Design to evaluate whether: 1) the study methodology follows Federal and Provincial EA processes and best practices; 2) a sound agency, public and stakeholder engagement process was undertaken; and 3) agency, public and stakeholder comments have been adequately addressed. The Peer Review's comments and recommendations and PortsToronto's responses to those comments are provided in **Appendix C**.

2. Regulatory Environment

An EA is typically triggered by a requirement under the Canadian *Environmental Assessment Act* (CEAA) or the Ontario *EA Act*. As is further detailed in **Section 2.2** and **2.3**, the proposal is not subject to the requirements of either Act. Because there are no regulatory requirements defining the EA process for this proposal, the scope of work was developed based on engagement with stakeholders and on experience with other EAs at both the Provincial and Federal levels. This proposed approach blends the key elements of both the Federal and Provincial EA processes, taking into consideration input from stakeholders.

2.1 Co-ordinated Planning Process

As outlined above, on April 1, 2014, Toronto City Council (Council) adopted Item EX40.1 "Request to Amend the Tripartite Agreement for Billy Bishop Toronto City Airport" with amendments. This council resolution included a number of requirements that PortsToronto must fulfill, and these requirements were to be completed in three phases, prior to Council considering the requested amendments to the existing Tripartite Agreement. Additional details on the three phases and how they relate to the Scenarios being assessed in this EA are provided in **Section 3.1.2**.

The four key components of the requirements outlined in the first phase include the:

1. Commencement of an Airport Master Plan for the BBTCA;
2. Commencement of the Preliminary Runway Design;
3. Development of the Bathurst Quay Neighbourhood Plan (by City of Toronto staff); and
4. Completion of an environmental assessment.

The first two items are being undertaken by PortsToronto concurrently alongside this EA and are described in the following subsections. The third item is being undertaken by the City of Toronto, also concurrently with the first two items. The fourth component (environmental assessment) is the subject of this Study Design Report.

PortsToronto will finalize the draft 2015 Master Planning Exercise and design documents in order to provide the details of the elements for the EA to assess. The impacts of those elements will be determined by the EA, and could affect the final design or operational elements of the airport. As a result, PortsToronto has committed to waiting to finalize the Master Plan and Preliminary Runway Design until after the impact assessment studies for the EA are complete.

2.1.1 BBTCA Master Plan

PortsToronto's 2012 Master Plan describes the existing infrastructure at the BBTCA, provides aviation forecasts, infrastructure requirements and recommendations for the phasing and implementation of airport improvements. The 2012 Master Plan is a planning framework used to ensure that short-term developments do not impede longer term objectives at the BBTCA (WSP, 2014). The 2012 Master Plan was prepared under conditions outlined in the current Tripartite Agreement and as such, provides a framework for the future anticipated growth of the airport.

PortsToronto is currently undertaking the 2015 Master Planning Exercise to document future passenger volumes and the conceptual design of the airport should an extension of the land mass at each end of the main runway by 200 metres and commercial jets be permitted at the BBTCA through an amendment to the Tripartite Agreement. Key considerations regarding the construction of the land mass extension and details regarding operational changes, such as revised passenger volumes, established through the 2015 Master Planning Exercise are being incorporated into this EA for the purposes of the effects assessments. The 2015 Master Planning Exercise has included consultation with aviation and community stakeholders, as well as a public consultation session in the spring of 2015. The Exercise is anticipated to be completed in 2015.

2.1.2 Preliminary Runway Design

As per the April 1, 2014, request from Toronto City Council, PortsToronto is undertaking a runway design, among other initiatives, to identify the conceptual design details of the proposed 200-metre land mass extension at both ends of the main runway. The runway design will be based on the requirements of TP 312 - 4th Edition as this has been the standard in place since 1993 and throughout the past 16 months of runway design activities.

On July 31, 2015, Transport Canada announced the release of TP 312 - 5th Edition which will be in effect as of September 15, 2015. It has been confirmed by Transport Canada that airports that have begun runway design and construction under TP 312 - 4th Edition, can continue to plan and build to this Edition standard, in accordance with the details laid out in Transport Canada Advisory Circulars. Further, airports already in the design process may consider the merits of the two versions according to what best suits the airport's unique needs. In addition, airports that may not meet the time limitations set out in Transport Canada Advisory Circulars may be given a favourable consideration on a case by case basis, and granted a ministerial exemption to continue to build to the TP 312 - 4th Edition.

As such, the Environmental Assessment will consider the effects of the proposal and compliance with TP 312 - 4th Edition. PortsToronto is committed to the safe operations of all the facilities it manages, including the BBTCA. All operations will continue to comply with the applicable legislation.

Initial investigations by the design team supporting PortsToronto in the design of the proposed runway extension included two alternative design options. The first was based on a runway extension using lakefill, and the second was based on a runway extension through over-water decking supported by piles or piers. Upon further investigation by the design team, it was confirmed that the second option would not be feasible due to the force and height of waves in the vicinity of the outer harbour. As such, the EA will evaluate the impacts associated with the first runway design alternative.

The EA will also assess the potential impacts associated with the inclusion of a runway end safety area (RESA) in the future runway design. The RESA is a level graded area which extends beyond the runway threshold to provide an additional measure of safety in the event of an aircraft undershooting or overrunning the runway. RESAs are required where the runway length exceeds 1,200 meters or where a runway is utilized by scheduled passenger operations utilizing aircraft with more than nine seats.

In 2010, Transport Canada identified the requirement to implement a RESA at qualifying airports as an additional safety consideration. The installation of a RESA at the BBTCA would result in an amendment to the Tripartite Agreement (WSP Group, 2014), but will be required to comply with Transport Canada regulations. The RESA at the BBTCA would consist of a land mass extension at both ends of the main runway (Runway 06-26) which includes lakefilling in the Toronto Harbour within the Marine Exclusion Zone (MEZ). Although not required under the CEAA, an EA report for lakefilling in the area where the RESA will be required, "Lakefill within Marine Exclusion Zone (Keep-out-Area) Toronto Harbour", was completed in January, 2013 (Dillon Consulting, 2013).

Transport Canada has confirmed that runway approach lighting will not be a requirement at BBTCA if the proposal is approved, because the proposal does not result in a change in the type of runway approach at the airport. BBTCA is a non-precision approach airport, and this will not change as a result of the proposed changes to operations or the runway.

2.1.3 Bathurst Quay Neighbourhood Plan

In January 2015, the City of Toronto commenced the Bathurst Quay Neighbourhood Plan (BQNP) study in order to identify a long-term plan for the community immediately adjacent to the BBTCA. As per the study's website, the study will identify improvements relating to:

- Public realm;
- Transportation;
- Pedestrian and cycling connections and facilities; and
- Parks and open spaces.

Although this study is being conducted by the City of Toronto separate from the two studies previously described, it is linked to the 2015 Master Planning Exercise insofar as the study will recognize the interrelationship of the neighbourhood and the airport, and aims to develop an approach to address access issues at the airport (City of Toronto, 2015). The BQNP is scheduled to be finalized in 2015.

2.1.4 Other Relevant Planning Processes

In order to understand the future context in which the proposed changes at BBTCA could take place, PortsToronto will consult additional relevant planning documents, including, but not limited to:

- City of Toronto Official Plan;
- City of Toronto Parks Plan 2013 - 2017;
- Creative City Planning Framework;
- Toronto Bike Plan;
- Clean Water, Clear Choices;
- Making Waves – Central Waterfront Secondary Plan ll;
- The Toronto Waterfront Scan and Environmental Improvement Strategy Study;
- Toronto Waterfront Aquatic Habitat Restoration Strategy;
- Recreational Fisheries Plan;
- Port Lands Profile;
- West Don Lands Precinct Plan;
- East Bayfront Precinct Plan;
- Villiers Island Precinct Plan; and
- Port Lands Acceleration Initiative – Film Studio District.

These documents cover a variety of topics relating to:

- Land use development;
- Transportation;
- Pedestrian and cycling connections and facilities;
- Parks and open space;
- Environmental sustainability;
- Waterfront revitalization;
- Waterfront planning; and
- Precinct planning and urban development.

2.1.5 Summary of Master Plan, Preliminary Runway Design and Environmental Assessment

The Study Team has received many questions relating to the relationship between the Master Plan, Preliminary Runway Design and the Environmental Assessment. The purpose of the following table is to highlight the components of the project that fall under the jurisdiction of each process.

2015 Master Planning Exercise	Preliminary Runway Design	Environmental Assessment
Will determine changes to: - Number of daily commercial slots; - Total passengers/year; - Total annual aircraft movements; - Total annual non-commercial aircraft movements; - Passengers in peak hour; - Groundside infrastructure; - Control or approach surfaces; - Airport safety as it relates to Transport Canada's regulations that guide airport design and operation; - Marine Exclusion Zone; - Volume of fuel trucks or other delivery trucks; - Demand, operations and functional improvements to the existing Passenger Pick-up/drop-off zone; - Flight paths, heights; and, - Growth opportunities and market demand.	Will confirm key conceptual design details such as: - Runway extension; - Parallel taxiway; - Starter strip; - Jet blast fence; - Potential noise barrier (to be confirmed); - Localizer antenna and associated shelter; - Rock break walls; and - Parallel Taxiway A, relocation of Glide Path 26, and relocation of marine radar.	Will assess impacts of: - Changes identified in the 2015 Mater Planning Exercise - Changes identified in the 2012 Master Plan - Design details developed through the Preliminary Runway Design

The 2015 Master Planning and Preliminary Runway Design documents will provide the details of proposed changes at the BBTCA that will be assessed for impacts by the Environmental Assessment. Any identified impacts could affect the final design or operational elements of the airport if the Environmental Assessment identifies the requirement for mitigation measures. As a result, PortsToronto has committed to waiting to finalize the 2015 Master Planning Exercise and Preliminary Runway Design until after the effects assessment studies for the Environmental Assessment are complete.

2.2 Canadian Environmental Assessment Act

The Federal EA process generally involves a review of a project's impacts completed by or on behalf of the proponent, a Federal ministry or agency. The process involves the determination of impacts and associated mitigation measures, a cumulative effects assessment and First Nation and Métis consultation (Government of Canada, 2014).

The process consists of the Canadian Environmental Assessment Agency (CEA Agency) approving a Project Description at the initial stages of the EA and reviewing the final Environmental Study Report after the EA has been conducted. In rare cases, the CEA Agency may determine that public hearings are required to assess whether impacts of the proposed project are acceptable in consideration of the project's benefits. In these cases, the CEA Agency will make a decision on the justification of a project after consideration of all material submitted at the hearing.

The Federal EA process is outlined in the Canadian Environmental Assessment Act (CEAA). The CEAA is triggered when a proposed project is described in the Act's *Regulations Designating Physical Activities* or if the Minister of the

Environment determines that an EA is required. In a letter dated February 25, 2015, the CEA Agency confirmed that the proposal "is not described in the *Regulations*". This means that the proposal is not subject to a Federal EA. A copy of this letter is provided in **Appendix A**.

The CEA Agency also indicated that due to the proposal's location, in part, on federal lands (owned by Transport Canada); there is a requirement to comply with Section 67 of CEAA 2012, as follows:

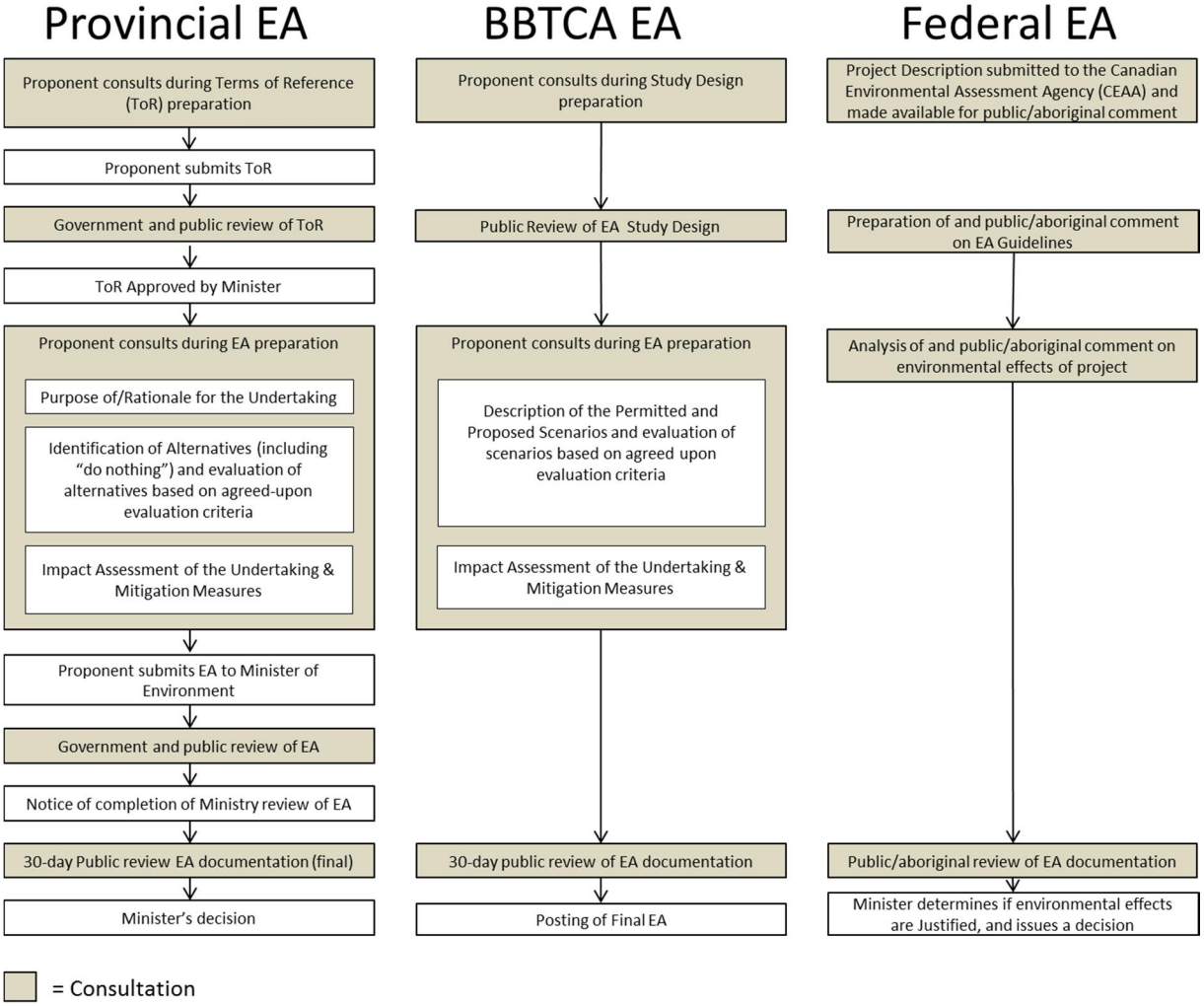


Figure 2-1: Summary of the Key Federal and Provincial EA Requirements

67. An authority must not carry out a project on federal lands, or exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a project to be carried out, in whole or in part, on federal lands, unless

(a) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or

(b) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides that those effects are justified in the circumstances under subsection 69(3).

It is PortsToronto's position that Section 67 of the CEAA, 2012 is being addressed through the completion of this EA, which will identify whether the proposal has the potential to cause significant adverse environmental effects. PortsToronto has maintained communication with Transport Canada throughout the development of the Study Design and will continue to do so for the duration of the EA. Transport Canada have been actively involved in the EA process to date, participating in the Agency Advisory Committee, as detailed in **Section 4**.

2.3 Ontario *Environmental Assessment Act*

The Provincial process is outlined in the Ontario EA Act which is a public impact review process and is completed by provincial ministries and agencies, municipalities and public bodies, such as conservation authorities (Government of Ontario, 2015). Once the process is complete, a report is prepared and released for a mandatory period of stakeholder review. Assuming no significant concerns are raised during the review period, the project is approved by the Ministry of the Environment and Climate Change (MOECC).

The Ontario EA Act mandates public, First Nation and Métis review and, for significant projects (assessed through a process called an Individual EA), the MOECC approves a Terms of Reference document which details and guides the EA process. Environmental Study Reports, outlining the project approach and engagement opportunities, and study outcomes are then prepared according to the process laid out in the Terms of Reference.

Key components of the Terms of Reference include a description of the alternatives to be assessed, how impacts will be evaluated, and how the public, agencies and First Nation and Métis communities will be engaged through the process. Some EAs under the Provincial process do not consider alternatives; these are called "Focused" EAs. The EA process proposed by PortsToronto will not include the consideration of alternatives.

In a letter dated December 15, 2015, the MOECC confirmed that "*as the operation and expansion of airports is the Federal government's responsibility, the Province of Ontario has no jurisdiction under the EAA and accordingly, there are no requirements under the EAA for the proposed extension of the airport's runway*". As such, the proposal is not subject to a Provincial EA. A copy of this letter is provided in **Appendix A**.

3. Proposed Environmental Assessment Methodology

As a result of the magnitude of public interest in the choices and trade-offs associated with the proposal, PortsToronto elected to follow the general framework set out under the Ontario EA Act due to the robustness of the engagement process enabled by the Act. In addition, the EA process being undertaken here has been enhanced with elements of the Federal EA process, as described in the CEAA that are useful to understanding the implications of the proposal. Thus, the EA process proposed by PortsToronto will incorporate procedural elements from both the Federal and Provincial EA Acts and will include an assessment of environmental, social and economic effects (positive and negative) of two future growth scenarios. These two scenarios are detailed in **Section 3.1** and include the following:

Future Baseline Scenario: The operational portion of the runway is not extended and jets are not permitted at BBTCA; and

Proposed Future Scenario: Tripartite Agreement is amended to permit commercial jet operations and the extension of the land mass by 200 metres at each end of the main runway.

The purpose of this Study Design Report is in part to outline the study process that PortsToronto proposes to follow for the EA and to demonstrate modifications made to the process based on engagement with stakeholders and agencies. The Study Design Report was released in draft in advance of finalization to solicit comments and feedback from the public, agencies, and stakeholders, and has been modified to address the comments received.

As illustrated in **Figure 2-1** above, the EA process includes a number of opportunities for review and comment and allows for the engagement process to receive and address public, First Nation and Métis, stakeholder and agency feedback and comments. **Figure 3-1** below, depicts the effects assessment evaluation and comparison process proposed for this project and is described in the steps below.

Key steps in the study process include:

1. **Determine the Future Growth Scenarios**
   - Describe the Future Baseline and Proposed Future Scenarios, as outlined in the existing 2012 Master Plan for the BBTCA and the 2015 Master Planning Exercise.
2. **Outline Existing Environmental Conditions and Constraints**
   - Identify and describe the existing environmental conditions potentially affected by the undertaking as they relate to each effects assessment study.
     - In addition, the EA will describe the potential future environmental conditions that may not be related to changes at the airport as these will form the basis for the effects assessment of the Future Baseline and Proposed Future Scenarios.
     - Existing conditions must first be described in order to understand the future environmental conditions.
   - The effects assessment studies include:
     - Air Quality;
     - Public Health;
     - Noise;
     - Marine Navigation;
     - Marine Physical and Water Quality;
     - Built Form and Land Use;
     - Archaeology and Built Heritage;
     - Socio-Economic;
     - Natural Environment; and,
     - Transportation.

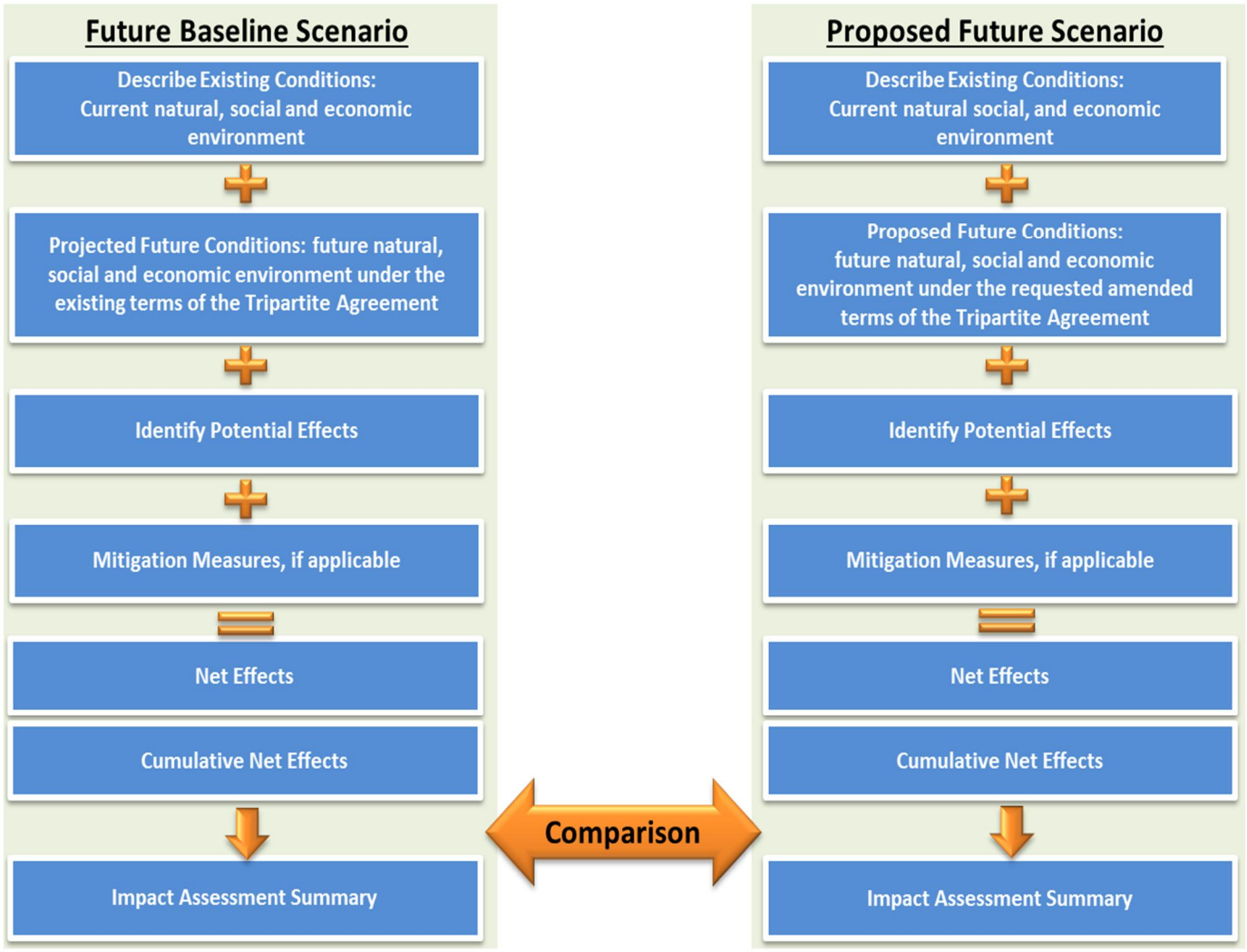


Figure 3-1: Effects Assessment Evaluation and Comparison Process

3. Conduct the Cumulative Effects Assessment

- Identify and assess potential environmental effects of the Future Baseline and the Proposed Future Scenarios in consideration of future environmental conditions. To document future environmental conditions, take into account other past, present and certain or reasonably foreseeable future effects from other actions/projects within the same geographic and temporal boundaries of this assessment. In addition to integrating effects from other actions/projects, the cumulative effects assessment also considers effects identified from the other effects assessment studies conducted for this project.
  - Construction effects will be assessed in consideration of existing conditions as these conditions will be similar to those if the Proposal should proceed.
  - Operational effects will be assessed in consideration of future environmental conditions as this timeframe represents the full impact of the operational stage project.

- Document potential effects on community assets through the studies listed above and detailed in the Work Plans (See **Appendix B**). A community asset is a feature that may be affected by the proposal that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent.
- Develop appropriate avoidance/mitigation measures to address the effects and identify net (also known as "residual") effects.
- The process for identifying net effects is depicted in **Figure 3-1**.

4. Compare Cumulative Net Effects

- The cumulative net effects of the Proposed Future Scenario on community assets will be compared to the cumulative net effects of the Future Baseline Scenario on community assets.
- It is anticipated that numerous additional changes to the ambient, or background conditions within the urban and natural environments within each study area will take place between now and the end of the planning horizon that are likely to be unrelated to the proposed airport growth. These changes will include major population growth in the Central Waterfront and Port Lands, major changes to transportation infrastructure and travel behaviour in and around the Central Waterfront, ongoing implementation of environmental remediation measures, ongoing improvements to sanitary and stormwater infrastructure, and local and regional demographic changes. These and other potential changes over time represent confounding factors that could dilute or amplify the perceived effects of the Proposed Future Scenario as compared to existing conditions. Because the ambient conditions today will be different from the ambient conditions in the future, comparing the effects of future proposed growth to current operations results in a comparison of "apples to oranges." The Future Baseline Scenario will be modelled using the same ambient conditions as the Proposed Future Scenario, allowing for a comparison of cumulative net effects that can isolate the impacts of the proposed growth at the airport from the impacts of other future changes to the urban and natural environment. This approach yields a more robust "apples to apples" comparison of cumulative net effects.

5. Prepare the Impact Assessment Summary

- Identify the overall direction of effect on all assets (i.e., will the asset be diminished, enhanced or maintained as a result of the proposal to allow jets and the extension of the land mass at each end of the main runway) by comparing the identified net effects of the Proposed Future Scenario to the Future Baseline Scenario. See **Section 3.6**, Step 1 for more information.
- Consolidate effects from effects assessment studies by representative location and activity in order to describe the possible changes to "user experiences" as a result of the proposal in a series of vignettes. See **Section 3.6**, Step 2 for more information.

6. Conduct Ongoing Engagement

- Engage with stakeholders (residents; interest groups; municipal, provincial and federal representatives; etc.) and First Nation and Métis communities throughout the planning process.
- Public Meetings at key decision points. Note that the Engagement Plan is described in **Section 4**.

7. Prepare the Environmental Assessment Study Report

- Prepare an Environmental Assessment Study Report to document the EA.

Each of these steps is described in the following sections.

The intent of this EA is to present a thorough and transparent analysis of potential environmental effects of the Future Growth Scenarios and not to make a recommendation for the future operations at the BBTCA.

3.1 Determine the Future Growth Scenarios:

The EA will focus on the assessment and evaluation of two future scenarios at the BBTCA.

1. **Future Baseline Scenario:** ..... The runway is not extended and jets are not permitted at BBTCA; and
2. **Proposed Future Scenario:**..... Tripartite Agreement is amended to permit commercial jet operations and the extension of the land mass by 200 metres at each end of the main runway.

The EA will also include consideration and documentation of the comments and concerns from participants in the engagement process. Additional details regarding the approach for the assessment of the scenarios is described in **Section 4.3**.

3.1.1 Generation of the Future Baseline and Proposed Future Scenarios

The description of the Future Baseline Scenario is derived from PortsToronto's 2012 revised Master Plan which details the growth that can occur within the requirements of the existing Tripartite Agreement. The Proposed Future Scenario is derived from PortsToronto's 2015 Master Planning Exercise (currently being finalized) which includes future passenger volumes that can be accommodated should the Tripartite Agreement be amended to permit commercial jets to operate from the BBTCA.

Under the current Tripartite Agreement, there are no limitations on the number of flight slots (scheduled aircraft take-offs and landings) or passengers that the BBTCA can serve. It should be noted that PortsToronto has imposed internal restrictions of 202 slots per day for current commercial flights in order to maintain compliance with the noise restrictions currently imposed by the Tripartite Agreement.

The Future Scenarios described below could be limited or conversely, achieved in shorter time frames, depending on the amount and type of supporting infrastructure that will serve passengers and aircraft accessing the BBTCA, market demand and other feasibility considerations. This infrastructure falls under three general types and includes:

Groundside Infrastructure:

- Mainland parking – location, number of long-term spots, number of short-term spots;
- Island parking – location, number of long-term spots, number of short-term spots;
- Taxi corral – location, number of spots;
- Curb-side pick-up/drop-off – location, capacity per hour;
- Terminal building – airport security processing (peak passenger/hour), customs processing (peak passenger/hour), passenger check-in/bag drop (peak passenger/hour);
- Pedestrian tunnel – passenger/hour capacity;
- Ferry terminal building – location, capacity;
- Ferry – vehicle capacity/trip, pedestrian capacity/trip, trips/hour, operation start time/end time.

Airside Infrastructure:

- Number of daily slots;
- Runway 08-26 length, width, location, orientation;
- Runway End Safety Area
- Taxiways – location, capacity;
- Engine run-up housing – location, use (tests per month);
- Flight paths and associated control or approach surfaces.

Support Infrastructure:

- Fuel storage – capacity, location, refilling requirements;
- De-icing – location, fluid containment.

The Scenarios noted above and discussed in detail below also account for potential limitations to passenger volumes during peak periods which could occur as a result of land use development on areas near the airport terminal (e.g., at the south end of Eireann Quay or within the vicinity of the waterfront). The land development and potential for impacts will vary depending on the supporting mainland infrastructure including development beyond the control of PortsToronto such as:

- Public Transit (routes, capacity, schedules);
- Residential Development (location, density);
- Commercial/Retail development (location, density of jobs);
- Roadways (vehicle capacity); and
- Active Transportation (location and use of bicycle paths, sidewalks, multi-use trails).

3.1.1.1 Future Baseline Scenario: Current Runway Configuration, Additional Passengers

As noted, under the current Tripartite Agreement there are no limitations placed on the number of slots or passenger volumes at BBTCA; however, PortsToronto has voluntarily limited the number of flight slots available per day at the BBTCA to 202 for scheduled commercial flights in order to comply with noise restrictions.

The degree to which airport operations can continue to grow within the current Tripartite Agreement has been assessed in PortsToronto's current Master Plan, referred to as the 2012 Master Plan. Based on the 2012 Master Plan, anticipated growth at the airport is as follows:

Table 3-1: 2012 Airport Master Plan: Anticipated Growth Compared to Current Operations

BBTCA Details	Today 2014	ANTICIPATED GROWTH 2012 Master Plan
Land Mass Extension Required	No	Yes, for *Runway End safety Area* (approx. 43 m)
Runway Length (TORA)	1,216 m	1,216 m
# of Daily Commercial Slots	202	202
# of Total Passengers/Year Groundside *Number in brackets reflects total passengers moving through the airport**	2.0 million (2.43 million)	2.7 million (3.8 million)
# of Total Annual Aircraft Movements	114,428	140,700
# Total Annual Non-commercial Aircraft Movements	Approx. 53,166	Approx. 66,098
# of Passengers in Peak Hour Groundside *Number in brackets reflects total passengers moving through the airport**	708 (944)	1,085 (1,447)
Type of Commercial Aircraft	Q400	Q400
Changes to the MEZ	No change	No change

*Note: * Total passengers includes those "in transit" that don't exit BBTCA*

Project components to be assessed as part of this scenario include:

- Anticipated growth listed above; and
- RESA.

3.1.1.2 Proposed Future Scenario: Tripartite Agreement Amended to Allow Jet-Powered Aircraft and a Runway Extension

The proposed amendment to the Tripartite Agreement would allow for the operation of commercial jet aircraft and an extension of the land mass at each end of the main runway by 200 metres. As noted, a new 2015 Master Planning Exercise is currently underway for the BBTCA, as requested by City Council, and it will contemplate the future passenger volumes that can be accommodated at BBTCA should jets be allowed and the runway extended.

Based on the 2015 Master Planning Exercise, proposed growth at the airport is as follows:

Table 3-2: 2015 Master Planning Exercise: Proposed Growth Compared to Current Operations

BBTCA Details	Today 2014	PROPOSED GROWTH With Runway Extension and Jets
Land Mass Extension Required	No	Yes, for jets (200 m) Includes RESA
Runway Length (TORA)	1,216 m	1,658 m
# of Daily Commercial Slots	202	242
# of Total Passengers/Year Groundside *Number in brackets reflects total passengers moving through the airport**	2.0 million (2.43 million)	4.1 million (5.5 million)
# of Total Annual Aircraft Movements	114,428	138,170
# Total Annual Non-commercial Aircraft Movements	Approx. 53,166	Approx. 64,778
# of Passengers in Peak Hour Groundside *Number in brackets reflects total passengers moving through the airport**	708 (944)	1,306 (1,741)
Type of Commercial Aircraft	Q400	Q400, CS100 & other qualifying jets
Changes to the MEZ	No change	No change in length, 10 to 25 m increase in width

*Note: * Total passengers includes those "in transit" that don't exit BBTCA*

Project components to be assessed as part of this scenario include:

- Anticipated growth listed above;
- RESA;
- Runway extension;
- Parallel taxiway;
- Starter strip;
- Jet blast fence;
- Potential noise barrier (to be confirmed); and
- Localizer antenna and associated shelter, and rock break walls.

In addition, the project scope outside of the landmass extension includes parallel Taxiway A, relocation of Glide Path 26, and relocation of marine radar.

3.1.2 Alignment of the Future Baseline and Proposed Future Scenarios with the April 1 Council Resolution

The April 1, 2014 City Council resolution authorized the Deputy City Manager, Cluster B to negotiate with the Toronto Port Authority and Transport Canada a phased framework for managing growth at Billy Bishop Toronto City Airport, subject to a number of conditions being met in advance of negotiation. The phased framework for growth included proposed limits on airport operations during the first two phases. The Scenarios being assessed as part of the EA align with these phases, as follows.

April 1, 2014 Council-Adopted Growth Limitations	BBTCA Runway and Jets EA Operational Scenarios
Phase One: i. Annual origin/destination passenger cap of 2.4 million; ii. Peak hour flight (slot) cap of 16; iii. Peak hour origin/destination passenger cap of 884; and iv. Daily flight (slot) cap of 202.	**Existing Conditions** i. Annual groundside passenger volume of 2.0 million; ii. Peak hour flight slots of 16; iii. Peak hour groundside passenger volume of 708; and iv. Daily slots of 202.
Phase Two: i. Annual origin/destination passenger cap of 2.7 million; ii. Peak hour flight (slot) cap of 20; iii. Peak hour/destination passenger cap of 1,178; and iv. Daily flight (slot) cap of 202.	**Future Baseline Scenario** i. Annual groundside passenger volume of 2.7 million; ii. Peak hour flight slots of 24; iii. Peak hour groundside passenger volume of 1,085; and iv. Daily slots of 202.
Phase Three: i. Passenger and flight (slot) caps, based on transportation capacity, community impacts and experience with Phases One and Two.	**Proposed Future Scenario** i. Annual groundside passenger volume of 4.1 million; ii. Peak hour flight slots of 24; iii. Peak hour groundside passenger volume of 1,306; and iv. Daily slots of 242.

The April 1 council resolution also included a request for the implementation of additional measures as part of the three-phased framework for managing growth at the BBTCA. The measures included in Phase One are summarized below:

- Passenger wayfinding and route planning tools for users of the airport;
- Taxi operational adjustments to achieve increased passenger efficiency;
- Enhancement of shuttle service to achieve an increased modal split and regular monitoring and reporting of shuttle usage to the City;
- Traffic monitoring for Eireann Quay and reporting to the City;
- Airport noise monitoring system and reporting protocol;
- Restrictions on ground-based airport noise;
- Review of de-icing and chemical management programs;
- Air quality monitoring and reporting to the City;
- Construction of aircraft run-up barrier or enclosure and alternate procedures for mitigating run-up noise in the interim; and
- Robust plan for public and stakeholder input into all planning exercises including the Airport Master Plan and runway extensions environmental assessment.

PortsToronto has committed to undertaking the actions listed above that are anticipated to result in groundside operational improvements, and reduce the impacts of current airport operations on the surrounding community. Regardless of the outcome of the decision on the request to amend the Tripartite Agreement, PortsToronto wishes

to continue to work with the City of Toronto and other stakeholders to undertake the activities outlined above. These activities are in direct response to issues that have been raised by the City and the local community. These will be incorporated into the projection of the Future Baseline Scenario, which is detailed above.

3.2 Outline Existing Environmental Conditions and Constraints:

The BBTCA is located on the Toronto Islands, adjacent to an urbanized waterfront. The area surrounding the airport is used by local residents, non-residents, and visitors to the City of Toronto for a variety of purposes, such as, residential living, recreational and tourist activities, commercial operations and institutional uses (such as for the operation of schools). Existing environmental conditions will be reviewed in detail as part of each effects assessment study, which will focus on a geographic area where the particular impact under investigation can reasonably be assumed to be measurable. This geographic area is called the Study Area. All study areas include lands adjacent to the BBTCA and some Study Areas extend more broadly across the waterfront, the islands or to other parts of the City of Toronto. The general area within which the effects assessment Study Areas fall are outlined in **Figure 3-2**. The Study Areas and review of existing conditions will form the basis for the effects assessment during the EA and may be updated throughout the planning process based on new information identified by the Study Team or a regulatory authority, if applicable.

It is important to note that this EA will not document or assess a “no-airport” scenario. The baseline future projections will focus on existing conditions, including the uses, benefits and impacts of current airport operations. Potential future environmental conditions for each effects assessment study will also be described as these will form the basis for the cumulative net effects assessment of the Future Baseline and Proposed Future Scenarios within each effects assessment study.

A key step in outlining the existing environmental conditions and constraints involves reviewing applicable background information. The background information and previous studies reviewed to date are listed in the Work Plans in **Appendix B** and in the reference list in **Section 7** of this report.

Background information review, in addition to data collected through the processes outlined in the work plans for each effects assessment study will inform the description of the existing conditions and constraints.

3.3 Conduct the Effects Assessment

As previously indicated, in order to identify potential effects, each effects assessment study will consider the potential future environmental conditions in which the Future Baseline Scenario and the Proposed Future Scenario could occur.

The below sub-sections provide a description of methods for undertaking each effects assessment study as detailed in the associated work plans (included as **Appendix B**). The effects assessment studies will identify and assess the potential environmental effects of the Future Growth Scenarios on the identified community assets. Many of the effects assessment studies will consider the results obtained through the work completed by other effects assessment studies, or studies completed by others through different projects.

3.3.1 Work Plans

This section summarizes the study areas and provides a general description of the effects assessment study methodologies outlined in the work plans. Details of the effects assessment study methodologies can be found in **Appendix B, Attachment A**.

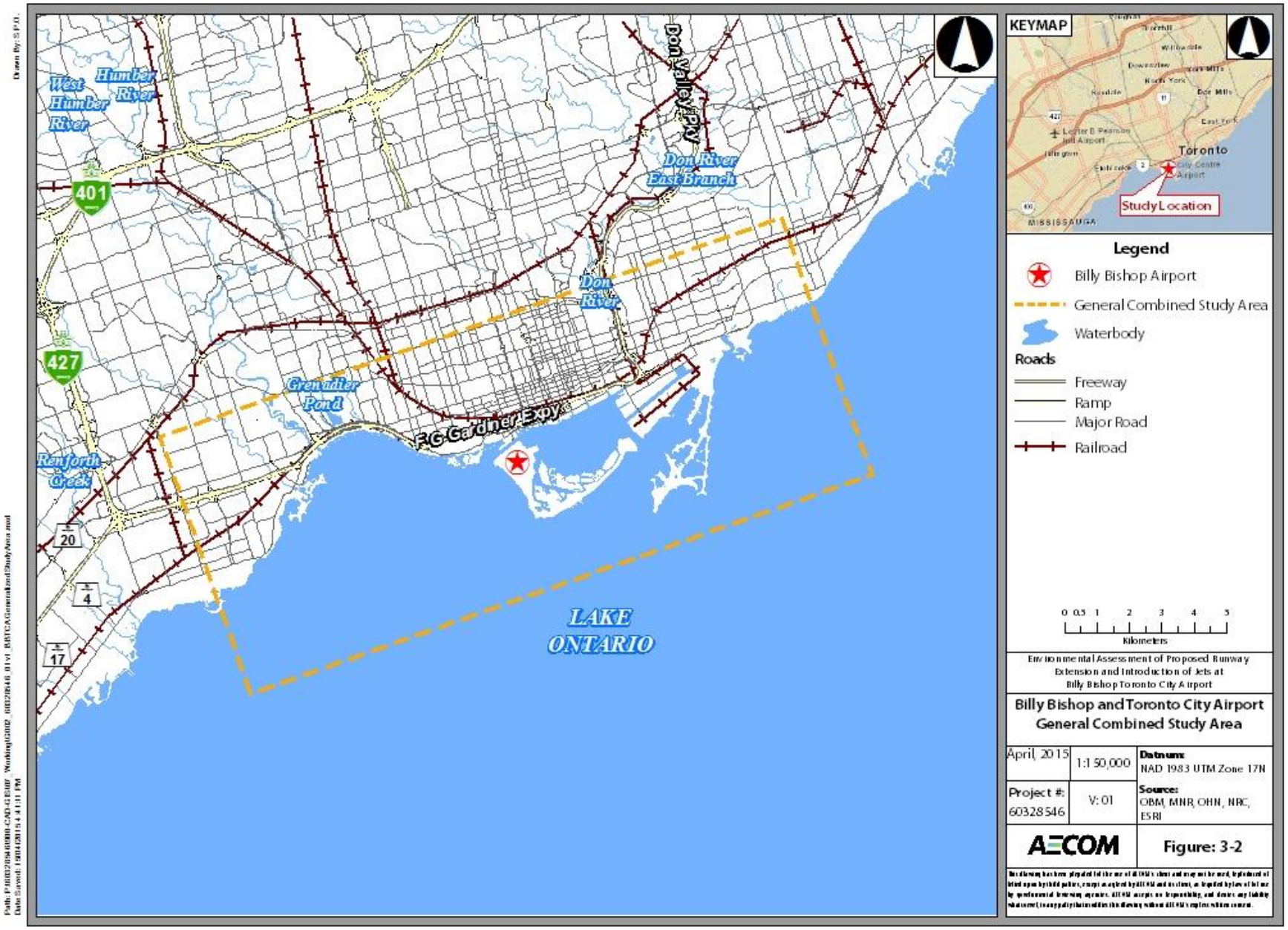


Figure 3-2: Billy Bishop and Toronto City Airport General Combined Study Area

3.3.2 Air Quality

3.3.2.1 Study Area

The air quality Study Area was defined to ensure that representative residential, recreational (parks and public spaces) and institutional locations most affected by changes to air quality were included in the area of analysis. The Study Area boundaries were also defined in consideration of the comments received to-date and encompass:

- The Music Garden, Sugar Beach, the National Yacht Club, and Wards 19 and 20 to the north;
- Woodbine Beach, the Harbour and Clark Beach Park to the east;
- Algonquin Island to the south; and
- Ontario Place and the Toronto Sailing & Canoe Club to the west.



Figure 3-3: Air Quality Study Area

3.3.2.2 Summary of Effects Assessment Methods:

To assess potential impacts on air quality associated with the Future Growth Scenarios, the Study Team will use collected monitoring and modelling data; quantify aviation and vehicle emissions modelling data; conduct dispersion modelling; and determine cumulative air quality concentrations. The assessed changes to air quality could affect the following community assets: public health, recreation, residential uses, parks and open space, and institutional uses.

Additional details regarding the Air Quality Work Plan, including the background resources that will be used and the proposed methodology for modelling of the existing conditions and the Future Growth Scenarios are provided in **Appendix B, Attachment A**.

3.3.3 Public Health

3.3.3.1 Study Area

The public health Study Area was defined to ensure that representative residential, recreational (parks and public spaces) and institutional locations most affected by changes to public health related to air quality and noise were included in the area of analysis. The Study Area boundaries encompass:

- The Music Garden, Sugar Beach, the National Yacht Club, and Wards 19 and 20 to the north;
- Woodbine Beach, the Harbour and Clark Beach Park to the east;
- Algonquin Island to the south; and
- Ontario Place and the Toronto Sailing & Canoe Club to the west.

3.3.3.2 Summary of Effects Assessment Methods

To assess potential impacts on public health associated with the future scenarios, the Study Team has engaged in ongoing discussions with the City of Toronto's Department of Public Health. Based on these conversations, it was determined that the EA would continue the assessment methodology previously developed by the Department of Public Health and their consultants in the November, 2013 "Health Impact Assessment" (Golder Associates, 2013). The impacts of changes to air quality associated with the proposal on various criteria for defining public health can be assessed by comparing air quality impacts to regulatory or policy-based thresholds. As such, the Department of Public Health has developed guidelines for air quality thresholds, known as toxicity reference values, as they relate to illnesses associated with both long-term and short-term exposure to certain contaminants. The results of the air quality modelling conducted in accordance with the air quality effects assessment study will be compared to Toronto Public Health's Toxicity Reference Values in addition to the Ministry of the Environment and Climate Change ambient air quality criteria and Canadian ambient air quality standards. In addition, the Department of Public Health has provided the Study Team with noise reference values, against which current and predicted future noise levels will also be compared.



Figure 3-4: Public Health Study Area

3.3.4 Noise

3.3.4.1 Study Area

The noise Study Area was selected to include residential uses, recreational locations (including parks and public spaces) and schools that are representative of areas that are most affected by changes to noise levels. After considering the comments received to date, the Study Area boundaries have been defined to encompass:

- The Music Garden, Sugar Beach and the National Yacht Club to the north;
- Woodbine Beach, the Harbour and Clark Beach Park to the east;
- Algonquin Island to the south; and
- Ontario Place and the Toronto Sailing & Canoe Club to the west.



Figure 3-5: Noise Study Area

3.3.4.2 Summary of Effects Assessment Methods

As passenger throughput increases, additional noise from the increased ground traffic and differences in the noise profile of the aircraft in the Proposed Future Scenario could result in changes to the existing conditions.

To assess potential impacts on noise associated with the identified Scenarios, the Study Team will use sound modelling techniques; perform a comparative analysis of modelled sound levels with new monitoring results and historic data; and evaluate sound levels at various receptor locations using key indicators. The assessed changes to noise conditions could affect the following community assets: public health; recreation; residential uses; parks and open space; institutional uses; and cultural assets. Additional details regarding the Noise Work Plan, including the development of exiting conditions and noise impact assessment are provided in **Appendix B, Attachment A**.

3.3.5 Natural Environment

3.3.5.1 Study Area

The Natural Environment assessment includes identifying effects on both the terrestrial and aquatic environments. The aquatic Study Area is defined as the areas anticipated to be either temporarily or permanently affected by the proposed extension of the land mass at each end of the main runway by 200 metres, including the footprint of the proposed extension as well as adjacent habitat areas which may be disturbed during construction or operation of the extension.

Work related to the aquatic environment will focus on the areas in the immediate vicinity of the land mass extension as this is the area where potential effects from construction are anticipated to occur.

The terrestrial Study Area was developed in consideration of wildlife, particularly birds, in addition to comments received to-date. The boundaries of the Study Area for the terrestrial environment study are based on the BBTCA Bird Hazard Zone (BHZ) and considerations such as the calculated aircraft flight paths, glide slopes and missed approach points associated with the airport and changes to operations. Specifically, the Study Area for the terrestrial environment includes:

- The primary BHZ as defined by Transport Canada and which includes the following:
  - The northern and southern boundaries of the primary BHZ include the areas within 2 km of and adjacent to the runway (including the extension of the land mass at each end of the main runway by 200 metres).
  - The eastern and western boundaries of the primary BHZ extend 9 km from each end of the main runway (including the extension of the land mass at each end of the main runway by 200 metres). At these limits, the northern and southern boundaries of the primary BHZ extend 4 km from the centreline of the runway in each direction (8 km in total).
- The secondary BHZ as defined by Transport Canada and which includes:
  - A 4 km buffer applied in all directions surrounding the primary BHZ.

3.3.5.2 Summary of Effects Assessment Methods:

To assess potential effects on the natural environment (aquatic and terrestrial) associated with the identified Scenarios, the Study Team will estimate potential impacts on aquatic and terrestrial habitat and species (including birds); conduct field observations for both terrestrial and aquatic habitats; and estimate potential impacts on migratory and breeding birds, terrestrial habitats, in addition to aquatic species and habitats in the Study Area.

The potential effects on natural environment issues could affect the following community assets: significant features or functions; terrestrial habitats or functions; terrestrial species; aquatic habitats or functions; and aquatic species.

Additional details regarding how this stage will be completed for the aquatic and terrestrial components of the natural environment are provided in **Appendix B, Attachment A**.

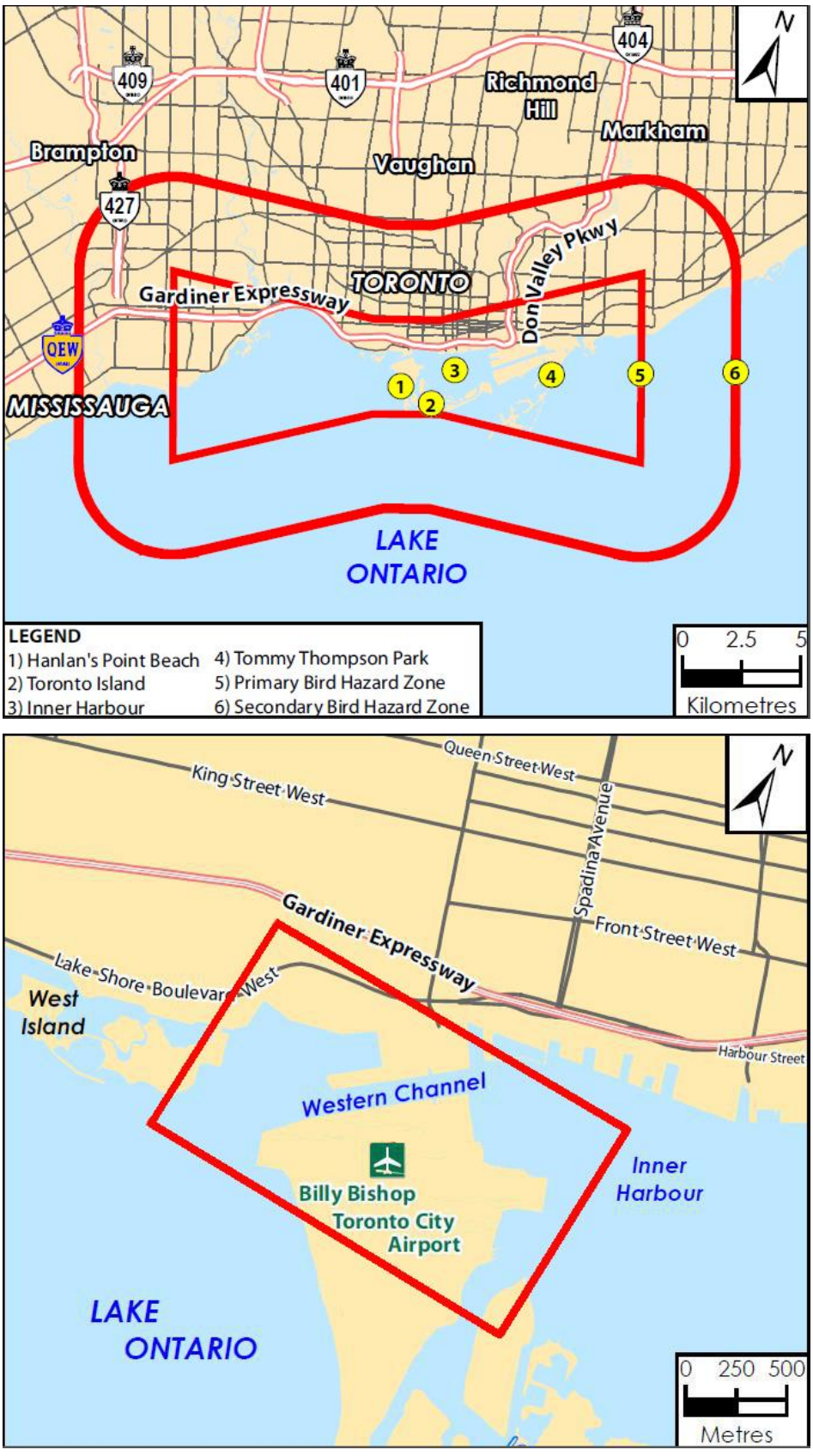


Figure 3-6: Terrestrial (top) and Aquatic (bottom) Study Areas

3.3.6 Socio-Economic Environment

3.3.6.1 Study Area:

The socio-economic Study Area boundaries have been determined so as to include all relevant features along the waterfront and to ensure that potential impacts within key areas of the waterfront are assessed. The boundaries include:

- The Gardiner Expressway to the north;
- Port Lands to the east;
- Leslie Street Spit to the south; and
- Ontario Place to the west.

The Study Area described above represents the Local Study Area for assessing use values. A larger, Regional Study Area, which consists of the City of Toronto, was identified for the discussion pertaining to non-use values. Use and non-use values are further described in **Appendix B**, **Attachment A**.



Figure 3-7: Socio-Economic Environment Study Area

3.3.6.2 Summary of Effects Assessment Methods:

To assess potential impacts on the socio-economic environment associated with the identified Scenarios, the Study Team will identify current information on waterfront users and their attitudes through intercept and phone surveys; and conduct business, residential and institutional interviews. Surveys and interviews will identify what community assets are valued by residents and non-residents, as well as waterfront, island and harbor users and non-users in order to help determine which environmental effects could result in social or economic impacts. The assessed changes on the socio-economic environment could affect the following community assets: the balance of uses along the waterfront and island communities, including recreational, residential and institutional uses; the economy; tourism; and could have municipal implications.

Additional details regarding the socio-economic Work Plan is provided in **Appendix B, Attachment A**.

3.3.7 Marine Physical Environment and Water Quality

3.3.7.1 Study Area

The Marine Physical and Water Quality Study Area is bounded by:

- The area at each end of the proposed extension of the land mass;
- The eastern shoreline of the West Island; and
- The Western Channel.

The Local Study Area is described above; however, a revised Regional Study Area for the Marine Physical Environment and Water Quality was developed which includes the original study area plus:

- The Inner Harbour;
- The Eastern Channel

Work related to the marine physical environment and water quality is recommended to be completed in two phases. During the EA, the Study Team will conduct a background review of existing studies to document effects to the marine physical environment and water quality in the Local Study Area, which includes the areas in the immediate vicinity of the land mass extension. If the Proposed Future Scenario is approved, additional studies are recommended during the detailed design phase to document effects in the Regional Study Area, which includes the Inner Harbour and the Eastern Channel.

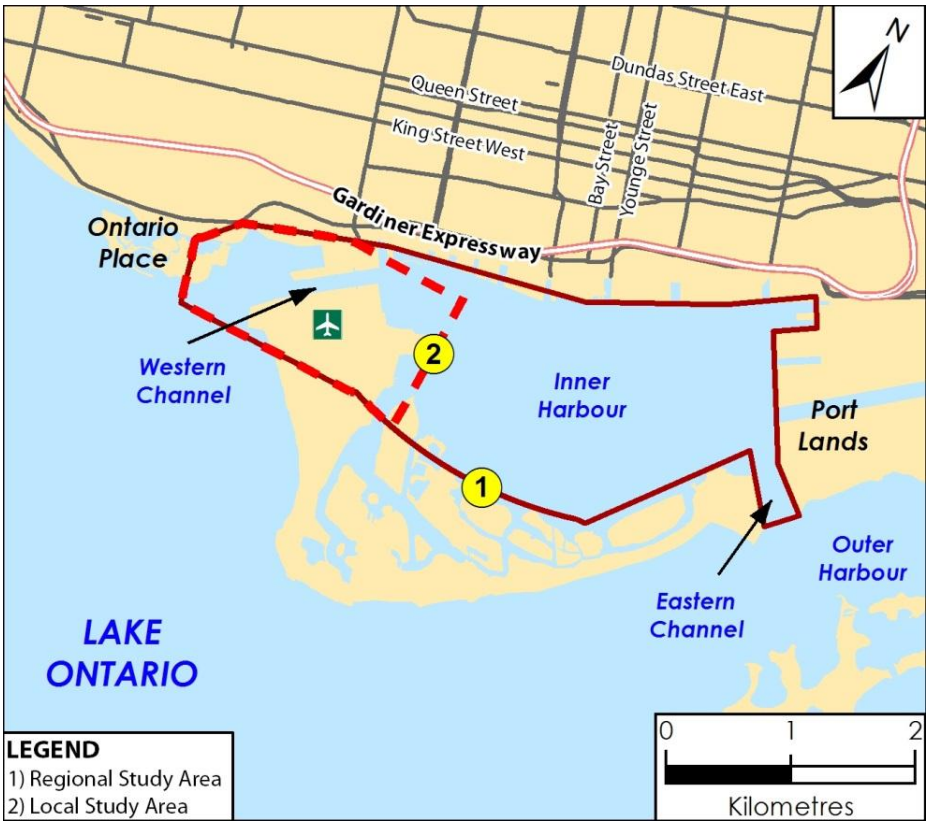


Figure 3-8: Marine Physical Environment and Water Quality Study Area

3.3.7.2 Summary of Effects Assessment Methods:

To assess potential impacts on the marine physical environment and water quality associated with the Proposed Future Scenario, the Study Team will review existing quantitative models and indicators of shoreline changes within the study area to estimate physical changes in bathymetry, and sediment transport and deposition that could be caused by the proposed extension of the land mass at each end of the main runway. A mass-balance model will be developed to understand potential changes in water flow into the inner harbor. It is anticipated that additional hydrodynamic and wave modelling may be required as a part of the detailed design of the proposal, should the three signatories choose to amend the Tripartite Agreement.

More information on the proposed Work Plan for the marine physical environment and water quality is provided in **Appendix B, Attachment A**.

3.3.8 Marine Navigation

3.3.8.1 Study Area

The marine navigation Study Area was selected to encompass areas in which different-sized marine vessels could be affected by changes to the coastline or to airport operations. The marine navigation local study area includes:

- The end of the runway;
- Beyond the Marine Exclusion Zone (MEZ); and
- Within the Western Channel.



Figure 3-9: Marine Navigation Study Area

Concerns about potential effects relating to the Study Area have tended to focus on the effects of noise and air quality on user experiences in the inner and outer harbours and Humber Bay; the potential effects of jet blast or wake turbulence (sometimes called "wing tip vortices") at the edge of the MEZ; and, the potential impacts on navigation associated with any proposed changes to the width or location of the opening of the Western Channel. The marine navigation study will assess the physical impacts of jet blast and wake turbulence at the edge of the MEZ and navigation impacts associated with changes to the land mass within the Local Study Area described above. The potential for effects to boat navigation from jet blast and wake turbulence beyond this Study Area will be confirmed through the information received from the Master Planning exercise. Other studies conducted as part of this EA will assess the effects of potential changes to noise, air quality, user experience, and recreational opportunities associated with the proposal within the Regional Study Area and will be commented on under the associated effects assessment studies.

3.3.8.2 Summary of Effects Assessment Methods:

To assess potential impacts on marine navigation associated with the identified Scenarios, the Study Team will review and comment on results from the jet blast and wake turbulence assessments (prepared as part of the 2015 Master Planning Exercise); and assess information on typical boats navigating through the Study Area. An estimate of the impacts of jet blast and wake turbulence on different types of vessels will be undertaken based on professional engineering judgment. Potential changes to the navigability of the Western Channel will also be assessed based on any potential changes to the size and configuration of the channel, including those associated with any changes in bathymetry. The assessed effects on marine navigation could affect the recreational boating asset.

More information on the proposed Work Plan for the marine navigation assessment is provided in **Appendix B, Attachment A**.

3.3.9 Built Form and Land Use

3.3.9.1 Study Area

The built form and land use Study Area has been defined to capture potential regulatory impacts of the proposed works to the various waterfront revitalization efforts completed to date and currently underway by waterfront planning agencies and authorities having jurisdiction, including the City of Toronto and Waterfront Toronto. The study area therefore consists generally of an amalgamation of both the City of Toronto's Central Waterfront Secondary Plan planning area (inclusive of the various precinct plans therein), and the outer limits of in-force Airport Zoning Regulations (AZR). This original study area was subsequently expanded to incorporate stakeholder feedback requesting that an examination of potential built form and land use impacts ought also include the Distillery District, the Unilever site on Lakeshore Boulevard at the Don Valley Parkway and Woodbine Park in the Beaches neighbourhood.

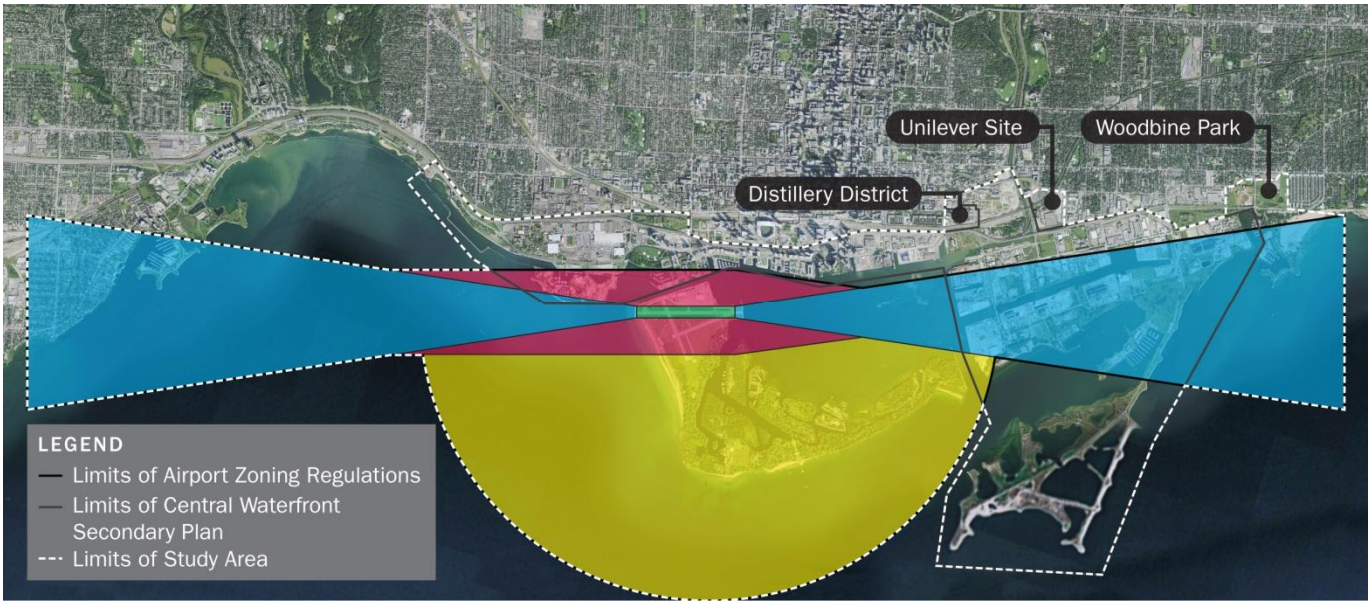


Figure 3-10: Built Form and Land Use Study Area

3.3.9.2 Summary of Effects Assessment Methods

To assess potential regulatory impacts on land use and the built environment associated with the identified Scenarios, the Study Team will review the multi-tiered regulatory framework; evaluate potential impacts, merits and policy compliance issues; identify any built form and/or height restrictions; identify possible visual and view corridor impacts using renderings, 3-dimensional visualizations and/or mapping diagrams.

The assessed regulatory effects on land use and built form could affect the following community assets: regulatory restrictions affecting proposed building heights, and/or restrictions affecting adjacency of various sensitive land uses to the proposed works; and existing federal, provincial and municipal priorities and polices. Other qualitative factors affecting viability of waterfront revitalization efforts will additionally be captured within the socio-economic analysis and the user experience vignettes.

More information on the proposed Work Plan for built form and land use are provided in **Appendix B, Attachment A**.

3.3.10 Archaeological and Cultural Heritage Features

3.3.10.1 Study Area

The preliminary Study Area defined for assessment of archaeological and cultural heritage conditions consists of all



Figure 3-11: Archaeological and Cultural Heritage Features Study Area

areas that will be physically affected by the proposed extension of the land mass at each end of the main runway by 200 metres and includes the areas at each end of the runway extending into the lake and the area of proposed works on the island involving excavation.

3.3.10.2 Summary of Effects Assessment Methods

To assess potential effects on archaeology and cultural heritage features associated with the identified Scenarios, the Study Team will conduct a marine and terrestrial Stage 1 Archaeological Assessment and create an inventory of cultural heritage features and recommend whether a detailed Cultural Heritage Assessment should be conducted. The potential effects identified could include impacts on the following community assets: archaeology and cultural heritage assets. A cultural heritage asset is defined for the purposes of this EA as a residence older than 40 years; industrial, commercial or institutional buildings; engineering works; and parks, gardens or prominent natural features that could have special value to people as list by the Ministry of Tourism, Culture and Sports' (MTCS) *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* document, as well as any building or landscape listed in a provincial or federal heritage database. Other cultural venues of the waterfront, harbor, and islands, such as recreational facilities (like the Music Garden), and civic spaces will be assessed through the socio-economic effects assessment study under the "recreation" asset.

Additional details regarding the archaeological and cultural heritage Work Plan are provided in **Appendix B, Attachment A**.

3.3.11 Transportation

3.3.11.1 Study Area

Based on previously-completed traffic impact assessments and consultation with the City of Toronto and other stakeholders, it was determined that the Local Study Area (outlined below in red) would be enhanced by including an overview of policy and broad directions in transportation and goods and people movement in the vicinity of the southwest downtown and waterfront area. This will include a review of the potential impacts of the proposal on policy for pedestrian, cycling, transit, active transportation, ferry, and heavy rail linkages within a Regional Study Area that will include:

- The Central Waterfront;
- Downtown Toronto; and
- The Greater Toronto Area.

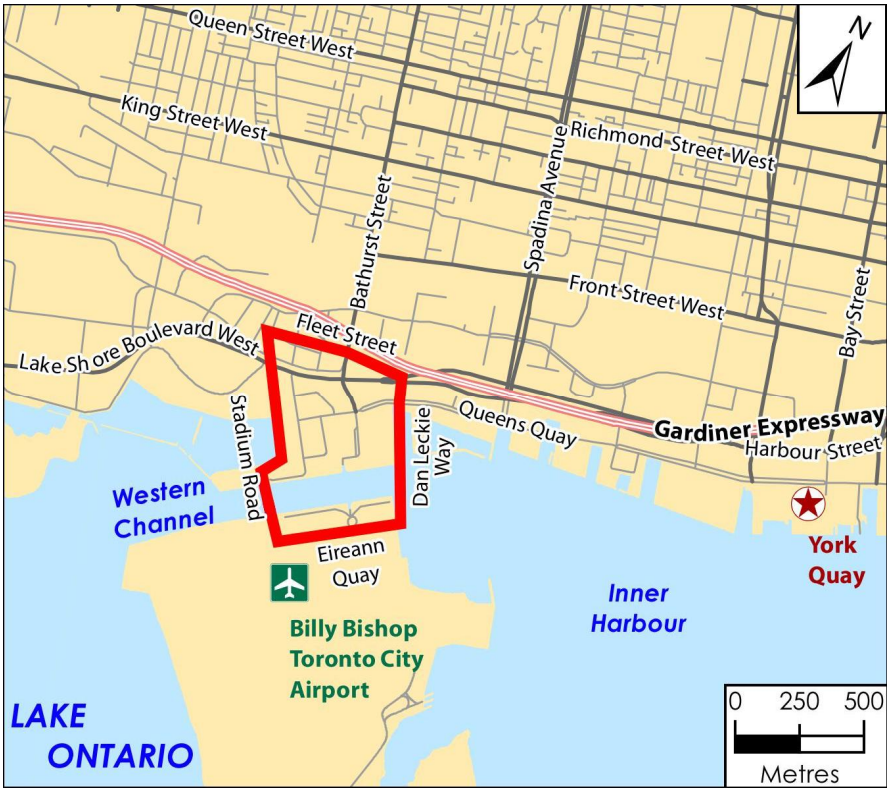


Figure 3-12: Transportation Study Area

The purpose of examining policies affecting a broader area than the Study Area boundaries is to ensure effects on the key areas are assessed in the EA.

3.3.11.2 Summary of Effects Assessment Methods

To assess potential impacts on transportation associated with the identified Scenarios, the Study Team will conduct a review of existing studies to provide information regarding future modal split requirements; transportation network and current traffic; transportation plans, including active transportation and transit plans; and review new traffic studies or models for Eireann Quay. The assessment will then use projections from existing traffic assessments/models, developed by the City of Toronto and others, to estimate changes in collision risks between vehicles, pedestrians and cyclists, traffic congestion, public transit, modal split and airport access, as well as potential traffic impacts outside of the Local Study Area. The assessed effects on transportation could affect the following community assets: public safety, public health, residential uses, transportation, community services, tourism, local economy and convenience.

Additional details regarding the transportation Work Plan are provided in **Appendix B, Attachment A**.

3.4 Conduct the Cumulative Effects Assessment

The purpose of the cumulative effects assessment is to identify the net effects of the proposal, taking into account the reasonably foreseeable future effects from other actions/projects anticipated within the same time and space as the proposed project. The process for conducting this assessment will incorporate elements from the CEA Agency's Draft Operational Policy Statement (Government of Canada, 2014) on Assessing Cumulative Environmental Effects. This Policy Statement requires examining the cumulative effects of a project on "valued components" of the environment (referred to in the BBTCA EA as community assets, described above in **Section 3.3**). PortsToronto has adapted the CEA Agency's methodology to include the following three steps in the assessment of cumulative effects for this EA:

Step 1: Scoping ..... Identification of valued components for which residual environmental effects are predicted, determining spatial and temporal boundaries to capture potential cumulative environmental effects on these valued components, and examining the relationship of the residual environmental effects (also known as net effects) of the project with those of other physical activities.

Step 2: Analysis ..... The methodologies used to predict the cumulative environmental effects must be clearly described to provide an understanding of how the analysis was conducted and what rationale supports the reached conclusions. A complete picture and analysis of the potential types and scale of cumulative environmental effects should be presented.

Step 3: Mitigation ..... Technically and economically feasible measures must be identified that would mitigate any significant adverse cumulative environmental effect. This can take two forms: elimination, reduction or control (preferred); or where not possible, restitution for damage caused should be considered.

The cumulative effects assessment is done as a part of each effects assessment study in order to determine if the incremental residual effects of the proposal on a community asset are influenced by the potential effects of other actions or projects to either offset or multiply the effect. Thus, the cumulative effects assessment provides an understanding of the overall impacts on applicable community assets of not just the Proposed Future Scenario, but other projects within the same time and space as the Proposed Future Scenario. The cumulative effects

assessments take into account associated effects from all relevant effects assessment studies. For example, transportation impacts will be taken into account in the assessments of noise and air quality impacts, while noise and air quality impacts will be taken into account in the assessments of social impacts. For more details on how different effects will be accounted for in each study, see **Appendix B**.

3.5 Compare Cumulative Net Effects of the Future Baseline Scenario to the Proposed Future Scenario

The cumulative net effects of the Proposed Future Scenario on community assets will be compared to the cumulative net effects of the Future Baseline Scenario on community assets. Some stakeholders have requested a comparison of both Future Scenarios to existing conditions; however, the results of that comparison would not be considered valid because they would not be able to isolate the effects of either scenario from the effects of other projects taking place in the same time and space as the scenarios. Thus, it would be difficult to attribute the impacts of either scenario to that particular scenario, as opposed to on other projects. As an example, both Baseline and Proposed Future Scenarios anticipate an increase in annual passenger volumes. During the planning horizon, other changes may be anticipated in the same area to residential and commercial development, as well as transit and transportation infrastructure. A comparison of either Future Growth Scenario to current conditions may show impacts to traffic movement; however, it will not be possible to determine with certainty the degree to which those impacts can be attributed to increased passenger volumes, versus the other anticipated changes.

3.6 Prepare the Impact Assessment Summary

The proposal has the potential to cause changes to a number of environmental, economic and social community assets important to the local communities. PortsToronto is proposing to present these effects using an Impact Assessment Summary tool. The summary will illustrate the overall effects of the proposal in a manner that assists interested parties to understand the trade-offs between the Future Baseline Scenario and the Proposed Future Scenario. Each effects assessment study will compare the net effects of the Proposed Future Scenario to the Future Baseline Scenario.

The Impact Assessment Summary process will be conducted in two stages, as described below:

Step 1: Determine the Direction of the Effects

Each of the effects assessment studies, described in **Section 3.3**, will include an assessment of the specific effects of the proposal on the various community assets associated with the environmental features under investigation. Effects on these assets are assessed using a series of measures which have been reviewed by government agencies, special interest groups, and the public throughout the preparation of the EA scope. For example, as part of the Socio-Economic effects assessment study, effects on residential assets are being assessed by reviewing the following measures: changes to the use and enjoyment of private property resulting from changes to noise levels, changes to air quality and changes to views and vistas (amongst others). The impacts of the proposal on this and other assets will be determined by assessing the way in which each measure may change between the Future Baseline Scenario and the Proposed Future Scenario in the future environmental conditions. The assets and measures for each effects assessment study are listed in **Appendix B**, **Attachment A**, and will be described in detail in the EA report. Residential use is just one of the community assets identified to be examined by the Socio-Economic study.

The Impact Assessment Summary will consolidate the net effects of each measure assessed by each effects assessment study into an overall direction of effect to describe whether community assets will be diminished,

maintained or enhanced in the Proposed Future Scenario, as compared to the Future Baseline Scenario. The determination of the direction of effect will be based on empirical study, professional judgement, and in some cases, numerical computer modelling. “Diminish” means a specific measure of effect will be less preferable in the Proposed Future Scenario than in the Future Baseline Scenario, “maintain” means that there will be no anticipated measurable difference between the two scenarios, and enhance means that a specific measure of effect will be more preferable in the Proposed Future Scenario than in the Future Baseline Scenario.

The outcome of all the effects assessment studies will be presented in tabular format, so that interested parties can easily compare results and understand the trade-offs. The format for the direction of effect is illustrated in **Table 3-3** below.

Table 3-3: Direction of Effect - Proposed Future Scenario Compared to the Future Baseline Scenario

Asset	Measure of Effect	Diminish	Maintain	Enhance
Asset 1	*Measure 1*	X		
	Measure 2			X
	Measure 3			X
Asset 2	*Measure 1*		X	
	Measure 2		X	
	Measure 3	X		

The purpose of using the Impact Assessment Summary tool is to present the findings of the various impact assessment studies in a manner which allows the reader to easily identify the trade-offs associated with the Proposed Future Scenario.

Step 2: Review Impacts on User Experiences and the Balance of Uses Throughout Waterfront and Island Communities

The Study Team recognizes the changes that have occurred along the waterfront over the past decade and the investments that have gone into making Toronto’s waterfront a world-class place to live, work, and play. While redevelopment in the area has been substantial, future proposed development aims to build on the successes of the past to create a balanced and complete community. A balanced community is one in which no one, single use or user dominates the entire area, and through the assessment of the impacts of the proposal, the Study Team aims to determine if the Proposed Future Scenario will be one that tips this balance in a way that makes the waterfront and island communities a place where people no longer wish to live, work and play.

The waterfront area is characterized by a mix of uses, including commercial, recreational, residential, and travel-based uses. The airport represents just one of these uses. Whether or not airport operations are perceived as dominating over other waterfront uses will depend on the degree to which users perceive a disruption to their daily activities while living, working, or playing in the waterfront area.

Throughout the scoping phase of the EA, and as part of the assessment of existing conditions, the Study Team has and will continue to engage with a range of interested stakeholders on their experiences living, working, and playing in the vicinity of the BBTCA. The results of the engagement will inform the Study Team about what is important to various users, and will allow for a more holistic understanding of the varying perceptions of airport operations and infrastructure amongst community members. This information will be used to produce a series of user experience vignettes that illustrate the current, perceived experience of a broad cross-section of waterfront and island users,

while engaging in various waterfront, Lake Ontario, and island-based uses. Based on the outcome of the impact assessments, changes to each asset measure will be combined to determine the potential changes to these user experiences that might be anticipated as a result of the proposal. These user experience vignettes provide a specific, place-based, and easily relatable method for synthesizing potential changes to opportunities to live, work and play at key locations within the Study Area, and show how impacts on specific uses could affect the overall balance of uses along the waterfront.

Potential locations for place-based user experiences have been developed through engagement with the Stakeholder and Agency Advisory Committees as part of the engagement process of this EA. Each marker in the figure below highlights a key location that represents the multitude of activities that occur within more focused geographic regions of the Study Area. The lenses of live, work and play will be used to understand potential changes to user experience in these locations for the Future Baseline and Proposed Future Scenarios. Examples of uses that may be selected can include, but will not be limited to:

- Picnicking on Centre Island;
- Learning to sail in the Inner Harbour;
- Listening to a concert at the Music Garden;
- Drinking a morning coffee on the balcony of a waterfront residence;
- Strolling through Villiers Island neighbourhood;
- Hiking through Ontario Place;
- Recreational fishing;
- Cycling along the waterfront trail;
- Birdwatching at the Leslie Street Spit; or
- Eating a meal at a waterfront restaurant patio.

Potential locations for place-based user experiences are shown in **Figure 3-13**, on the following page, for illustration purposes, and have been developed based on engagement with the community to-date.

The locations, numbered 1-12, are as follows:

1. Mimico and Humber Bay Park
2. Ontario Place and Exhibition Place
3. Bathurst Quay Neighbourhood
4. Toronto Islands (excluding Billy Bishop Toronto City Airport)
5. Inner Harbour
6. Central Waterfront (Harbourfront Centre)
7. East Bayfront
8. West Don Lands, Unilever Site and Distillery District
9. Villier's Island, Port Lands and Keating Channel Precincts
10. Cherry Beach and Outer Harbour
11. Tommy Thompson Park (Leslie Street Spit)
12. Ashbridge's Bay, Woodbine Park and Woodbine Beach

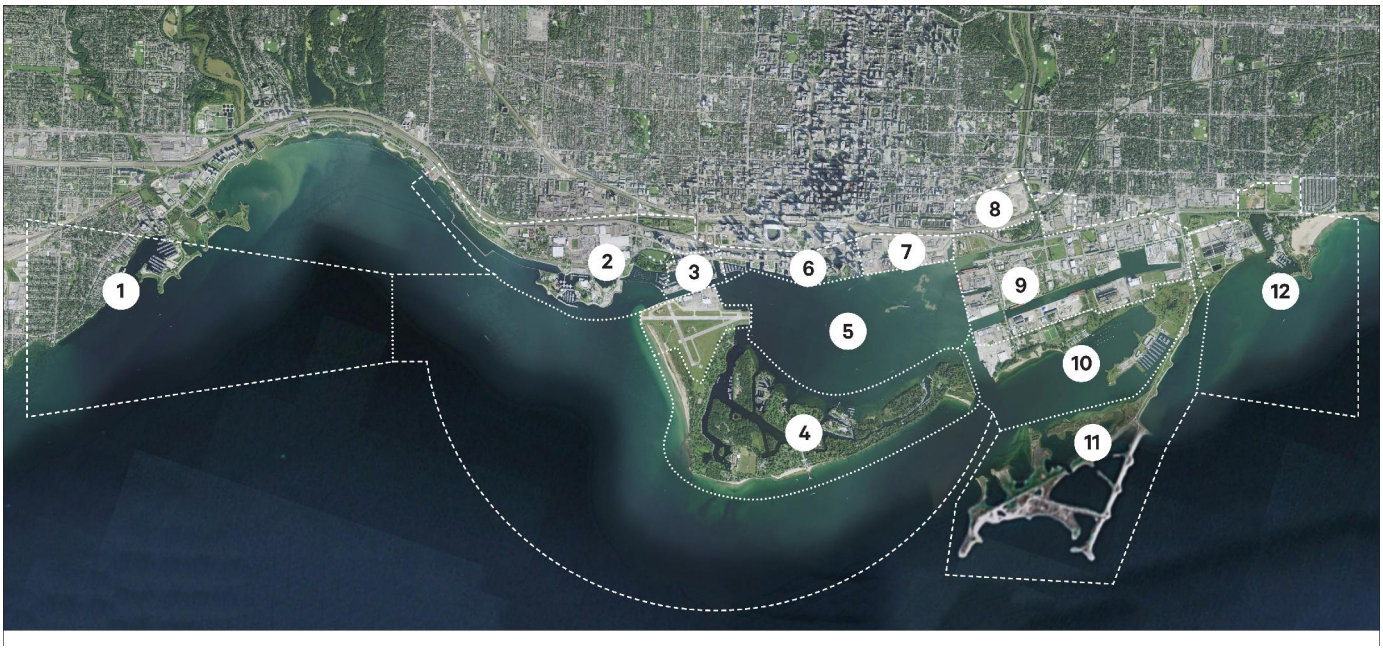


Figure 3-12: Proposed User Experience Vignette Locations

3.7 Public Safety

3.7.1 Impacts of Accidents and Malfunctions

As part of the EA, the Study Team will review and comment on the Emergency Response Plan and associated protocols at the BBTCA EA. The airport's Emergency Response Plan, protocols and procedures meet or exceed Transport Canada's and other regulatory requirements.

The BBTCA has a fully functioning, on-island fire hall and emergency response centre, in addition to the Toronto Fire Service. It is staffed by more than double the number of emergency personnel required by Transport Canada. The airport's fire department does regular internal and external emergency services training throughout the year. A full-scale simulation is conducted every two years, with a full simulation table-top exercise in intervening years. These exercises are aimed to test the airport's protocols, procedures, communications and planning for emergency and security related incidents, and to ensure that the airport is equipped to respond to any situation.

Given the BBTCA's proximity to water, the Billy Bishop Fire Department, Toronto Fire Services Squad and the Toronto Police Services Marine Unit hold joint ice and cold water rescue training to practice water specific rescue operations, beyond the standard safety measure requirements.

In addition to the on-island emergency response centre and crew at the airport, Toronto's emergency responders can access the airport within minutes by water, through the Toronto Marine Units, and by the airport ferry. The Province of Ontario's Ornge Air Ambulance and Paramedics are also permanently based at the airport. The opening of the new pedestrian tunnel will provide further access to the airport and can be utilized during emergency situations. All of these measures are part of the airport's Emergency Response System which is in place to ensure preparedness and ability to respond in a rapid and co-ordinated manner in the event of a large-scale emergency at the airport.

The protection surfaces at the BBTCA are developed based on work conducted by the International Civil Aviation Organization's (ICAO) collision risk model and take into account the risks associated with collisions. The collision risk model assesses the risks associated with undershooting (an aircraft landing before the runway), over shooting (an aircraft running off the end of the runway) and lateral excursion (an aircraft running off the side of the runway). The protection surfaces at BBTCA have been designed in response to the ICAO's collision risk modelling, and address the risks associated with potential obstacles to flight in the vicinity of the airport. Any aircraft permitted at the BBTCA is certified to operate in compliance with the protection surfaces and approach procedures. If an aircraft cannot be certified to operate in compliance with these surfaces, it cannot use BBTCA.

Pedestrian safety will be reviewed through a review of projected future traffic volumes and projected future infrastructure in the vicinity of Eireann Quay. More information on the methods for assessing transportation impacts and effects on automobile, pedestrian and cyclist activity can be found in **Section 3.3.11**.

It is understood that recreational users often sail or paddle within close proximity of the MEZ, and the proposal could result in changes to typical boating conditions that could cause safety concerns. By assessing the impacts of jet blast and wake turbulence on vessels in the vicinity of the airport, as well as the impacts of changes in noise or air quality in the Inner Harbour, this study will review how those changes could affect the safety of Inner Harbour users. The safety implications or any potential changes to the Western Channel with respect to navigability will also be reviewed. More information on methods for assessing navigation impacts can be found in **Section 3.3.8**.

Finally, the EA will also review past trends in bird strike occurrences for various species at the BBTCA and compare this to a comprehensive bird list compiled from the agency records and bird surveys conducted in 2014 and 2015 to understand the potential impacts of the airport on bird populations. The EA will consider jet flight paths and height, as well as frequency of flights information (to be provided in the 2015 Master Planning Exercise) to identify where bird strikes are likely to occur. This information will also be used to understand and comment on the risk to planes from bird strikes occurring in the vicinity of the airport, and will be related to the potential effects of bird strikes on public safety. More information on methods for assessing impacts on the natural environment and birds can be found in **Section 3.3.5**.

3.8 Prepare the Environmental Assessment Study Report

The study process and findings will be outlined in an EA Study Report which will be provided to members of the public, agencies, interest groups and First Nation and Métis communities for review and comment. The EA Study Report will document each step of the EA process, as outlined in the sections above, in addition to input received through the engagement efforts and how the EA was amended to address comments received, if applicable.

3.9 Approvals Required

The EA will include an analysis of required approvals from discussions with regulatory agencies such as the Ministry of Natural Resources and Forestry (MNRF); the Ministry of Tourism, Culture and Sport (MTCS); Fisheries and Oceans Canada (DFO); and the Toronto and Region Conservation Authority (TRCA). It is anticipated that the proposal would require Stage 1 Archaeological Assessment sign-off from the MTCS and Fisheries Act Authorization from the DFO. Consultation with all interested government review agencies will be conducted to confirm approval requirements.

4. Engagement Plan

Engagement is critical to completing an effective EA. It is only with an understanding of the priorities, perspectives and experiences of a range of different interests that the potential effects of the Proposed Future Scenario can be fully understood. With this in mind, the EA engagement process has been designed in consideration of the following principles:

Accountability

Accountability to participants will be maintained by providing accurate, timely information throughout the engagement process and by demonstrating how participants' views and perspectives have informed the Study Design, technical work and final report.

Clarity

The purpose and scope of the EA, the engagement process, and each part of the process will be clearly communicated and roles and responsibilities will be clearly defined, including: those of PortsToronto, the City of Toronto and Transport Canada as co-signatories to the Tripartite Agreement; those of PortsToronto as the proponent of the EA in listening to participants' feedback and demonstrating how it was considered (PortsToronto also acknowledges that the participation of any individual or organization in the engagement process does not imply an endorsement of the ultimate outcome of the EA); and those of the public, First Nation and Métis communities, stakeholders, and others in seeking information from PortsToronto and sharing their perspectives and values with PortsToronto. EA Info Sheet 4 found on the project website, will provide more detail on the roles and responsibilities of these and other key players.

Timeliness

The engagement process will begin as early as possible in the EA to allow a greater range of opportunities and issues to emerge and to raise the chances of successful issue resolution and implementation.

Openness and Inclusivity

The engagement process will be open to any member of the public, members of First Nation and Métis communities, or a stakeholder organization that wants to be involved. A broad cross-section of Torontonians will be encouraged to participate, share their perspectives and values, and hear those of others. Engagement materials and information will be made publicly available through the project website and other appropriate means.

Flexibility

The engagement process will strive to accommodate the needs of participants taking into account their different abilities, areas of expertise, geographic distribution, and availability.

Co-ordination

The EA engagement process will be co-ordinated with concurrent PortsToronto-led (e.g., Preliminary Runway Design, 2015 Master Planning Exercise) and City-led (i.e., Bathurst Quay Neighbourhood Plan) projects to enhance knowledge sharing, ensure coherence in decision-making, avoid duplication, and reduce the risk of "consultation fatigue" among citizens and stakeholders.

Evaluation

Throughout the EA, PortsToronto will seek feedback from the public, First Nation and Métis communities, and stakeholders regarding the engagement process and may modify the Engagement Plan in order to respond to feedback received or changing conditions.

The engagement process has and will continue to match the structure of the EA process. The EA, and therefore the engagement process, is being completed in two parts:

- In Part 1, engagement efforts have been focused on getting feedback from the public, key stakeholders and public agencies on the scope of the EA;
- In Part 2, engagement efforts will focus on assessing the impacts of the Future Baseline Scenario and the Proposed Future Scenario as well as identifying potential mitigation measures.

4.1 Part 1 Engagement Activities

The following is a high level summary of the engagement activities that were completed in Part 1 of the engagement process, including:

1. Pre-Consultation Conversations;
2. Stakeholder Briefing;
3. Agency Advisory Committee;
4. Stakeholder Advisory Committee;
5. Public Meetings; and,
6. First Nation and Métis Engagement.

It is critical that this summary of activities be considered as a supplement to the more extensive summary reports which have been prepared for each engagement activity referenced in this report, and which included the feedback received from participants in each of these activities. These summaries can be found on the project website: www.bbtcarunwayandjetsea.org

4.1.1 Pre-Consultation Conversations

4.1.1.1 Overview

Engagement began with the facilitation team holding a number of pre-consultation conversations with a broad cross-section of stakeholders with a track record of contributing to waterfront revitalization discussions. A copy of the team's report summarizing those conversations is available at bbtcarunwayandjetsea.org/pre-consultation-conversations/.

4.1.2 Purpose

The pre-consultation conversations were initiated to help inform the first draft/framework of the EA scope and the EA engagement process. More specifically, the pre-consultation conversations were held to do three things:

1. Introduce the facilitation team and the role of the independent facilitator;
2. Understand what issues should be considered and assessed in the EA; and
3. Understand expectations regarding the EA engagement process.

4.1.2.1 Chronology and Participation

A total of 20 pre-consultation conversations, involving 28 organizations and 48 people were held in August and September, 2014. Several participants requested that their names and organizations not be included in any documentation of the pre-consultation conversations as they were still contemplating if/how they would engage in the EA process. In order to ensure this anonymity, the facilitation team did not record the names or organizations of any of the pre-consultation conversation participants.

4.1.3 Stakeholder Briefing

4.1.3.1 Overview

Just over 100 organizations were identified as either on the public record regarding Porter Airlines' Proposal and/or were identified by participants in the pre-consultation conversations as being potentially interested in participating in the EA engagement process.

4.1.3.2 Purpose

One representative from each of the organizations identified was invited to an update briefing/introduction to the EA. The purpose of the briefing was to provide participants an opportunity to ask questions about the EA and to distribute information which they could pass on to their constituencies and members in order to encourage people become involved in the EA process. A copy of the Stakeholder Briefing Summary is available at bbtcarunwayandjetsea.org/4-stakeholder-advisory-committee/.

4.1.3.3 Chronology and Participation

The stakeholder briefing was held on November 17, 2014. A total of 34 stakeholder organizations, comprising of over 50 people, participated in the meeting. Participants included representatives from PortsToronto, the City of Toronto, Waterfront Toronto and the Toronto District School Board, among others.

4.1.4 Agency Advisory Committee

4.1.4.1 Overview & Purpose

As part of the EA engagement process, an Agency Advisory Committee (AAC) has been formed. The purpose of the AAC is to provide a place where representatives of various government divisions, ministries and agencies can share their perspectives and advice with PortsToronto at key points throughout the EA process. A copy of all AAC summaries are available at bbtcarunwayandjetsea.org/agency-advisory-committee/.

4.1.4.2 Chronology and Participation

A total of nine Agency Advisory Committee meetings have been held to date, from October 2014 to March 2015. A total of 17 organizations are members of the AAC (see list below).

Agency Advisory Committee Members	
1. City of Toronto – Waterfront Secretariat	10. Toronto Transit Commission
2. City of Toronto – Community Planning	11. Toronto Port Lands Company
3. City of Toronto – Toronto Public Health	12. Province of Ontario – Ministry of Tourism, Culture and Sport
4. Transport Canada – Environmental Office, Ontario Region	13. Province of Ontario – Ministry of Municipal Affairs and Housing
5. Transport Canada - Civil Aviation, Ontario Region	14. Ontario Place Corporation
6. Waterfront Toronto	15. Greater Toronto Airports Authority
7. Build Toronto	16. Metrolinx
8. Toronto and Region Conservation Authority	17. Exhibition Place
9. Toronto District School Board	

4.1.5 Stakeholder Advisory Committee

4.1.5.1 Overview & Purpose

As part of the EA engagement process, a Stakeholder Advisory Committee (SAC) has been formed. The purpose of the SAC is to provide a place where representatives from interested organizations can share their perspectives, concerns and advice with PortsToronto at key points throughout the EA process. A copy of all SAC summaries are available at www.BBTCArunwayandjetsEA.org.

4.1.5.2 Chronology and Participation

The SAC consists of 35 organizations. Applications to join the SAC were provided at the December 9th, 2014 public meeting and the application process concluded on December 17th, 2014. The full list of SAC participating organizations is included in the table below. A total of 4 SAC meetings have been held to date, from January to March, 2015.

Stakeholder Advisory Committee Members	
1. Air Canada	19. Ontario Aerospace Council
2. Arcadia Housing Co-operative	20. Ontario Restaurant Hotel & Motel Association
3. Bathurst Quay Neighbourhood Association	21. ORNGE
4. Canadian National Exhibition	22. Mississauga Residents' Associations Network (MIRANET)
5. Canadian Owners and Pilots Association	23. Transport Action Ontario
6. Carpenters and Allied Workers Local 27	24. Toronto Boaters' Alliance
7. Code Blue TO	25. Toronto Field Naturalists
8. Community Air	26. Toronto Financial District BIA
9. Council of Commodores	27. Tourism Industry Association of Ontario
10. Credit Reserve Association	28. Toronto Island Community Association
11. Don Watershed Regeneration Council	29. Toronto Island Pilots Association
12. Federation of North Toronto Residents Association	30. Toronto Youth Cabinet
13. Friends of Billy Bishop Airport	31. West Don Lands Committee
14. Friends of the Spit	32. York Quay Neighbourhood Committee
15. Gooderham & Worts Neighbourhood Association	33. Trans Capital Air / Stolport Corporation
16. Greater Waterfront Coalition	34. Toronto Passenger Vessel Association
17. Porter Airlines	35. Waterfront BIA
18. Ontario Chamber of Commerce	

4.1.6 Public Meetings

4.1.6.1 Public Meeting 1: December 9th

Overview, Purpose & Participation

PortsToronto hosted a kick-off public meeting on December 9th, 2014 to provide information on the purpose of the EA; review the areas to be studied and the process by which the study will be completed; offer an overview of how the public can participate throughout the process; and provide a forum to ask questions and participate in the process. A copy of the public meeting report is available at: bbtcarunwayandjetsea.org/5-public-meetings/. Approximately 500 people attended the meeting.

4.1.6.2 Public Meeting 2: January 24th and 26th

Overview, Purpose & Participation

PortsToronto hosted an all-day public meeting on January 24th, 2015 and a Feedback Workshop on January 26th, 2015. The purpose of the two-part public meeting was to share information and seek feedback on the EA team's preliminary draft of the effects assessment scope. A copy of the public meeting report is available at: bbtcarunwayandjetsea.org/5-public-meetings/. Approximately 350 participants attended one or both of the meetings.

4.1.6.3 Public Meeting 3: April 11

Overview, Purpose & Participation

PortsToronto hosted an all-day public meeting on April 11th, 2015 to review and discuss the revisions to the draft EA scope based on comments received to-date. At this meeting, PortsToronto and the Study Team shared and sought feedback on the updated assessment methods which had been updated since the January 24th and 26th public meetings. Approximately 200 people attended the meeting.

4.1.7 First Nation and Métis Engagement

4.1.7.1 Overview, Purpose & Participation

During Part 1 of the EA process, PortsToronto and the EA facilitation team have sought to involve First Nations and Métis in discussions regarding the EA scope. From September to December 2014, the EA facilitation team undertook initial correspondence with the Mississaugas of the New Credit, the Haudensaune of Six Nations, and the Métis Nation of Ontario to introduce the EA and to understand the level of interest in being involved in further conversations throughout the EA process. Further to the initial correspondence, on March 30th, 2015, PortsToronto held a meeting with the Mississaugas of the New Credit to discuss the EA scope in more detail and listen to how the Mississaugas of the New Credit would like to be involved in the EA process. The Mississaugas of the New Credit First Nation have expressed an interest in archaeological and cultural heritage studies being conducted as part of this Project. PortsToronto will review the results of the Stage 1 Archaeological Assessment and the cultural heritage summary with the Mississaugas of the New Credit. Additional detail on the archeological and cultural heritage studies is provided in **Section 3.3.10**. Meetings with First Nation and Métis will become increasingly detailed as community values and concerns are articulated. During the meetings every effort will be made to follow the engagement approach described in the Engagement Plan (available for review on the project website), as well as following case law that determines how and when consultation happens.

4.1.8 Consultation Summary

A summary of Phase 1 consultation activities is provided below in **Table 4.1** which captures the information outlined in **Section 4.1** above.

Table 4-1: Chronology of Engagement Activities

Activity	Date
Pre-Consultation Conversations	August – September, 2014
Initial Correspondence with First Nation and Métis communities	September – December 2014
Agency Advisory Committee (AAC) Meeting 1	October 16, 2014
AAC Meeting 2	November 6, 2014
Stakeholder Briefing	November 15, 2014
AAC Meeting 3	November 20, 2014
AAC Meeting 4	November 26, 2014
Public Meeting 1	December 9, 2014
AAC Meeting 5	December 10, 2014
AAC Meeting 6	January 12, 2015
Stakeholder Advisory Committee Meeting 1	January 15, 2015
Public Meeting 2	January 24 & 26, 2015
AAC Meeting 7	February 9, 2015
SAC Meeting 2	February 17, 2015
AAC Meeting 8	March 2, 2015
SAC Meeting 3A	March 3, 2015
SAC Meeting 3B	March 10, 2015
AAC Meeting 9	March 25, 2015
Meeting with Mississaugas of the New Credit	March 30, 2015
Public Meeting 3	April 11, 2015
Release of Draft Study Design	April 20, 2015
Release of Final Study Design	August 25, 2015

4.2 Part 2 Engagement Activities

Part 2 of the EA engagement process will begin with the finalization of the Study Design and commencement of the assessment work. The public, stakeholder organizations, public agencies and First Nation and Métis communities will continue to be engaged throughout Part 2. Meeting materials – including agendas, presentations and summaries – will continue to be posted to the project website. Due to the integrated nature of the various studies being undertaken, the next public meeting will take place once all of the studies have been completed so that all of the inputs into the cumulative effects assessment can be obtained and comprehensive cumulative effects can be presented publicly at that time. Currently this is anticipated to take place in the late autumn or early winter of this year. In addition, update meetings with the SAC and AAC will be scheduled as necessary throughout this time as project milestones are reached and feedback is sought on milestones. The precise timing and format of these meetings will be determined during Part 2.

5. Next Steps

The Study Design report was made available for a 30-day review period from April 20 to May 20, by the end of the day. During this time, members of the public, agencies, interest groups and First Nation and Métis communities were invited to review the document and to submit questions and comments to the Study Team. Upon receipt of all comments, including comments from the Peer Reviewer, the Study Team assessed comments received in order to determine what changes needed to be made to the assessment process outlined in this report. This report has been revised in response to the comments received.

The Study Team will commence the effects assessment studies, according to the methods outlined in this report, determine the cumulative effects of the Proposed Future Scenario on community assets, and present the results of the EA publicly, and to the City of Toronto and Transport Canada for their review. Data collection and analysis for the EA and effects assessment studies will be ongoing throughout the summer months. It is anticipated that preliminary results from the effects assessment studies will be complete in 2015.

Cumulative Net Effects Summaries will be made available for public, First Nations and Metis, and stakeholder review in advance of finalizing the EA Study Report for submission to the City of Toronto. This EA does not constitute a decision on whether or not to move forward with the requested amendments to the Tripartite Agreement, but may be used in support of a decision by the three signatories to the Tripartite Agreement. The proposal constitutes infrastructure and operational changes that cannot be undertaken without amendments to the Tripartite Agreement, and as such, any of the proposed changes presented in this document that are not currently allowed under the Tripartite Agreement will require agreement from the City of Toronto, Transport Canada, and PortsToronto to be included in an amended agreement before being implemented.

The final EA Study Report will be reviewed, along with documentation of other planning processes, as described in **Section 3.1**, by City of Toronto staff, who may decide to make a recommendation to Council on next steps based on the documentation received. If the Proposed Future Scenario is found to have unacceptable environmental impacts that cannot be mitigated, it may be decided that lifting the jet ban or making other associated changes to the Tripartite Agreement cannot be approved by City Council. Should this be the case, the Tripartite Agreement will continue to be the governing document that limits operations at BBTCA. Although growth within the limits of the Tripartite Agreement may continue to take place (Future Baseline Scenario), PortsToronto has committed, regardless of the outcome of the EA and any subsequent Council decisions that rely thereupon, to implement the measures described in **Section 3.1.2** of this document.

6. EA Schedule

The proposed EA schedule, subject to change, is as follows:

Timeline	Activity
Spring, 2015	30-day public review of this Study Design document
Summer to Autumn, 2015	Data collection and analysis
Autumn, 2015	EA Reporting
Winter, 2016	30-day public review of EA Study Report

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Urban Strategies Inc., 2013:
Consultant Report - BBTCA Expansion Review Summary Report.

WSP Group, 2014:
Airport Master Plan 2012 – updated July 2014 prepared for Toronto Port Authority.

WSP Group, 2014:
Consultant Report – Strategic Vision for Peak Hour Passenger Forecast for BBTCA.

Appendix A

Correspondence from CEAA and MOECC

Canadian Environmental Assessment Agency
Agence canadienne d'évaluation environnementale

Ontario Region
55 St. Clair Avenue East,
Room 907
Toronto ON M4T 1M2

Région de l'Ontario
55, avenue St. Clair Est,
pièce 907
Toronto ON M4T 1M2

RECEIVED MAR 03 2015

February 25, 2015

Sent by mail

K.A. Lundy
Director, Infrastructure, Planning and Environment
PortsToronto
60 Harbour Street
Toronto, Ontario M5J 1B7

Dear Mr. Lundy:

Re: Information on the *Canadian Environmental Assessment Act, 2012*

Thank you for your correspondence of December 17, 2014 regarding PortsToronto's proposed runway extension at the Billy Bishop Toronto City Airport.

As part of the Government of Canada's plan for Responsible Resource Development, the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) focuses federal environmental reviews on projects that have the potential to cause significant adverse environmental effects in areas of federal jurisdiction.

The CEAA 2012 applies to projects described in the *Regulations Designating Physical Activities* (the Regulations). Based on the information provided to the Canadian Environmental Assessment Agency (the Agency), your project is not described in the Regulations. Should any components of your project change, kindly contact the Agency.

Since the Project will be carried out in part on federal lands, the Agency would like to remind you of requirements pursuant to Section 67 of CEAA 2012:

67. An authority must not carry out a project on federal lands, or exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a project to be carried out, in whole or in part, on federal lands, unless

(*a*) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or

(*b*) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides that those effects are justified in the circumstances under subsection 69(3).

.../2

PortsToronto is encouraged to contact Transport Canada officials to discuss and ensure compliance with obligations pursuant to Section 67 of CEAA 2012.

The Agency, in collaboration with several federal departments, has prepared guidance to help federal authorities discharge their obligations under Section 67 of CEAA 2012. This guidance is available on the Agency's website: https://www.ceaa-acee.gc.ca/default.asp?lang=en&n=6E01A733-1&offset=&toc=hide

If you have any questions, please get in touch with our office through the switchboard at 416-952-1576.

Sincerely,

Anjala Puvananathan
Regional Director, Ontario Region

c.c: Geoffrey Wilson, President & Chief Executive Officer, PortsToronto
Monique Mousseau, Regional Manager, Environment and Engineering, Transport Canada

Ministry of the Environment and Climate Change

Environmental Approvals Branch

2 St. Clair Avenue West
Floor 12A
Toronto ON M4V 1L5
Tel.: 416 314-8001
Fax: 416 314-8452

Ministère de l'Environnement et de l'Action en matière de changement climatique

Direction des autorisations environnementales

2, avenue St. Clair Ouest
Étage 12A
Toronto ON M4V 1L5
Tél : 416 314-8001
Téléc. : 416 314-8452

Ontario

December 15, 2014

K.A. Lundy, PEng
Director, Infrastructure, Planning and Environment
Toronto Port Authority
60 Harbour Street
Toronto ON M5J 1B7

Dear K.A. Lundy:

Thank you for your letter dated December 9, 2014, concerning the Toronto Port Authority's proposed runway extension at the Billy Bishop Toronto City Airport.

In your letter, you have requested that the Ministry of the Environment and Climate Change confirm the applicability of the provincial Environmental Assessment Act (EAA) to the proposed runway extension at the Billy Bishop Toronto City Airport.

As the operation and expansion of airports is the Federal government's responsibility, the Province of Ontario has no jurisdiction under the EAA and accordingly, there are no requirements under the EAA for the proposed extension of the airport's runway.

The ministry is aware that the Toronto Port Authority is pursuing an environmental study process as per a request made by the City of Toronto to assess the potential environmental, social and economic effects of the project. However, this study is not being carried out under the requirements of the EAA.

I trust this responds to your inquiry satisfactorily.

Yours sincerely,

Agatha Garcia-Wright
Director
Environmental Approvals Branch

Cc: Geoffrey Wilson, President and Chief Executive Officer, Toronto Port Authority
Dolly Goyette, Director, Central Region, Ontario Ministry of the Environment and Climate Change

Appendix B

Effects Assessment Work Plans

Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport

Effects Assessment Study Work Plan Package

August, 2015 – Version 4

The Proposal:

In 2013, Porter Airlines submitted a proposal to the City of Toronto, copying PortsToronto and outlining their request to introduce jet aircraft at the Billy Bishop Toronto City Airport (BBTCA). This proposal includes an extension of the land mass at each end of the main runway by 200 metres in order to accommodate a longer runway and the use of jet aircraft for scheduled flight operations. As part of its assessment of Porter's proposal, PortsToronto developed a conceptual design that could accommodate the requested runway extension, as well as noise and other mitigation measures that could be required as a result of commercial jet flights. The proposed design and operational changes to the runway will be described in PortsToronto's 2015 Master Planning Exercise.

This EA will assess effects from the following two Future Growth Scenarios:

1. Future Baseline Scenario: No amendments to the Tripartite Agreement are implemented; and
2. Proposed Future Scenario: Tripartite Agreement is amended to permit commercial jet operations and the extension of the land mass at each end of the main runway by 200 metres.

The Work Plans:

The scope of the studies to assess the effects of the above Future Growth Scenarios are summarized in this document, in the sections outlined below. The "Asset" column in the table on the following page lists features and areas of concern as noted by participants in the consultation process undertaken to date. This column will assist the reader in identifying which section assesses their topic of interest.

The assets and the methods for studying impacts on assets have been changed since the first version of the summaries was presented to the public. They were changed in response to public comments and questions received to better reflect public concerns and to answer public questions. The changes made to the assets and methods are outlined in **Appendix C1 – Key Comments Received and Resulting Changes to the Scope**.

How Effects will be Described:

A number of individual effect assessment studies will be undertaken as part of the EA. Each assessment will focus on specific types of environmental impacts that can be reasonably anticipated as a result of the Future Growth Scenarios.

The table on the following page describes the different community assets noted to be of importance by participants in the scoping phase of the EA, and outlines which effects assessment studies will identify impacts to those assets. A community asset is a feature of the environment that may be affected by the project and that has been identified to be of concern by the public, government agencies or the proponent. A page number for each effects assessment section is also provided to help the reader quickly find those studies of particular interest.

The details of the specific environmental effects (called a measure of effect) to be studied for each asset, and the methods for studying those effects, are listed in **Attachment A – Work Plans: data sources and methods**.

Note that the EA scope will be informed by feedback received through the consultation process on the EA Study Design.

Section	Effects Assessment Study	Asset	Page Number
1	Impact Assessment Summary		1
2	Socio Economic Assessment Overview	▶ Residential uses ▶ Recreational uses (such as boating, cycling, picnicking, bird watching, etc.) ▶ Institutional uses (such as schools in the Study Area, particularly the City School) ▶ Economy ▶ Tourism ▶ Municipal implications ▶ Property values ▶ Non-use values ▶ Land value and future development	4
3	Land Use & Built Environment Assessment Overview	▶ Future development ▶ Regulatory compliance: existing Federal, Provincial and municipal plans and policies	10
4	Natural Environment Assessment Overview	▶ Significant features or functions (Provincially Significant Wetlands, Areas of Scientific and Natural Interest, and Significant Wildlife Habitats) ▶ Terrestrial habitats or functions (wetlands, woodlands, dune environments, habitats known to support sensitive terrestrial species) ▶ Terrestrial species (plants, birds and other wildlife rare species and Species at Risk) ▶ Aquatic habitats or functions (spawning, rearing, feeding areas, coastal processes and areas known to support sensitive species) ▶ Aquatic species (fish, rare and endangered species)	13
5	Air Quality Assessment Overview	▶ Climate change ▶ Recreational uses ▶ Residential uses (such as individual condominium units) ▶ Tourism ▶ Institutional uses (such as the Waterfront School and City School)	18
6	Public Health	Public health is an asset that is affected by: ▶ Air quality ▶ Noise levels	22
7	Noise Assessment Overview	▶ Recreational uses ▶ Residential uses (such as individual condominium units) ▶ Tourism ▶ Institutional uses (such as the City School)	24
8	Marine Physical and Water Quality Assessment Overview	▶ Wave formation ▶ Water levels ▶ Currents ▶ Sediment transport	28
9	Transportation Assessment Overview	▶ Public safety ▶ Public health ▶ Residential uses ▶ Transportation ▶ Community services ▶ Tourism ▶ Local economy ▶ Convenience	32
10	Marine Navigation Assessment Overview	▶ Recreation – boating	35
11	Archaeology and Cultural Heritage Assessment Overview	▶ Archaeological and cultural heritage features	38
12	Attachment A	▶ Work Plans – data sources and methods	40

Impact Assessment Summary

How the Results of the Effects Assessment Studies will be Presented

The proposal has the potential to cause changes to a number of environmental, economic and social assets important to the local communities. PortsToronto is proposing to present these effects using an Impact Assessment Summary tool. This summary illustrates the overall effects of the proposal in a manner that assists interested parties to understand the trade-offs between the Future Baseline Scenario and the Proposed Future Scenario. Each effects assessment study will compare the net effects of the Proposed Future Scenario to the Future Baseline Scenario.

The Impact Assessment Summary process will be conducted in two stages, as described below:

Step 1: Determine the Direction of the Effects

Each of the effects assessment studies, described in this Work Plan Package, will include an assessment of the specific effects of the proposal on the various community assets associated with the environmental features under investigation. Effects on these assets are assessed using a series of measures which have been reviewed by government agencies, special interest groups, and the public throughout the preparation of the EA scope. As an example, as part of the Socio-Economic effects assessment study, effects on residential assets are being assessed by reviewing the following measures: changes to the use and enjoyment of private property resulting from changes to noise levels, changes to air quality and changes to views and vistas (amongst others). The impacts of the proposal on this and other assets will be determined by assessing the way in which each measure may change between the Future Baseline Scenario and the Proposed Future Scenario in the future environmental conditions. The assets and measures for each effects assessment study are listed in **Attachment A**, and will be described in detail in the EA Study Report. The residential use is just one of the community assets identified to be examined by the Socio-Economic study.

The Impact Assessment Summary will consolidate the net effects of each measure assessed by each effects assessment study into an overall direction of effect to describe whether community assets will be diminished, maintained or enhanced in the Proposed Future Scenario, as compared to the Future Baseline Scenario. The determination of the direction of effect will be based on empirical study, professional judgement, and in some cases, numerical computer modelling. “Diminish” means a specific measure of effect will be less preferable in the Proposed Future Scenario than in the Future Baseline Scenario, “maintain” means that there will be no anticipated measurable difference between the two scenarios, and enhance means that a specific measure of effect will be more preferable in the Proposed Future Scenario than in the Future Baseline Scenario.

The outcome of all the effects assessment studies will be presented in tabular format, so that interested parties can easily compare results and understand the trade-offs. The format for the direction of effect is illustrated in **Table 1-1** below.

Table 1-1: Direction of Effect - Proposed Future Scenario compared to the Future Baseline Scenario

Asset	Measure of Effect	Diminish	Maintain	Enhance
Asset 1	*Measure 1*	X		
	Measure 2			X
	Measure 3			X
Asset 2	*Measure 1*		X	
	Measure 2		X	
	Measure 3	X		

The overall purpose of using the Impact Assessment Summary tool is to present the findings of the various impact assessment studies in a manner which allows the reader to easily identify the trade-offs associated with the Proposed Future Scenario.

Step 2: Combine Impact Assessments with User Experiences

Throughout the scoping phase of the EA, and as part of the assessment of existing conditions, the Study Team has and will continue to consult with a range of interested stakeholders on their experiences living, working, and playing in the vicinity of the BBTCA. The results of the consultation will inform the Study Team about what is important to various users, and also to better understand the varying perceptions of airport operations and infrastructure amongst community members. This information will be used to produce a series of user experience vignettes that illustrate the current, perceived experience of a broad cross-section of waterfront and island users, while engaging in various waterfront, Lake Ontario, and island uses. Based on the outcome of the impact assessments, changes to each asset measure will be combined to determine the potential changes to these user experiences that might be anticipated as a result of the proposal to extend the land mass at each end of the main runway by 200 metres and to lift the jet ban. These user experience vignettes provide a specific, place-based, and easily relatable method for synthesizing potential changes to opportunities to live, work and play at key locations within the study area.

Potential locations for place-based user experiences have been developed through consultation with the Stakeholder and Agency Advisory Committees as part of the consultation process of this EA. Each marker in the figure, below represents a key location that represents the multitude of activities that occur within more focused geographic regions of the Study Area. The lenses of live, work and play will be used to understand potential changes to user experience in these locations for the Future Baseline and Proposed Future Scenarios. Examples of uses that may be selected can include, but will not be limited to:

- Picnicking on Centre Island;
- Learning to sail in the Inner Harbour;
- Listening to a concert at the Music Garden;
- Drinking a morning coffee on the balcony of a waterfront residence;
- Strolling through Villiers Island neighbourhood;
- Hiking through Ontario Place;
- Birdwatching at the Leslie Street Spit; or
- Eating a meal at a waterfront restaurant patio.



Figure 1: Potential Locations for Place-based User Experience Vignettes

The locations, numbered 1 to 12, are as follows:

1. Mimico and Humber Bay Park
2. Ontario Place and Exhibition Place
3. Bathurst Quay Neighbourhood
4. Toronto Islands (excluding Billy Bishop Toronto City Airport)
5. Inner Harbour
6. Central Waterfront (Harbourfront Centre)
7. East Bayfront
8. West Don Lands, Unilever Site and Distillery District
9. Villier's Island, Port Lands and Keating Channel Precincts
10. Cherry Beach and Outer Harbour
11. Tommy Thompson Park (Leslie Spit)
12. Ashbridge's Bay, Woodbine Park and Woodbine Beach

This EA will not make a recommendation regarding whether the jet ban should be lifted and the land mass extended. The purpose of tabulating and illustrating the effects of the proposal is to present the findings of the various effects assessment studies in a manner which allows the reader to easily identify the trade-offs associated with each Future Growth Scenario.

Socio-Economic Assessment Overview

The Study Area

Where will the Environmental Assessment (EA) study effects on the **Socio-economic Environment**?

The original Study Area included all relevant features along the waterfront within the following boundaries:

- The Gardiner Expressway to the north;
- Leslie Street to the east;
- Toronto Island to the south; and
- Strachan Avenue to the west.



We've heard that people are also concerned about potential effects extending to these additional areas:

- The Toronto Music Garden;
- Ontario Place;
- The City School;
- The Inner/ Outer Harbour and the Eastern Channel;
- Residences and businesses on the Toronto Island, along Lake Shore Boulevard and Queens Quay;
- Recreational activities in the harbour, on the Island and the Leslie Street Spit;
- Parts of North York, Scarborough and Etobicoke under flight paths; and
- Future development impacts and land valuation.

After considering comments received to date, the boundary of the Study Area has been expanded to include the original study area plus:

- Ontario Place to the west; and,
- The Leslie Street Spit to the south.

The Study Area described above represents the Local Study Area for assessing use values. A larger, Regional Study Area, which consists of the City of Toronto, was identified for the discussion pertaining to non-use values.

The purpose of expanding the Study Area boundaries is to ensure likely impacts on the key areas are assessed in the EA. It is important to note that the Study Design will capture input from waterfront users across Toronto and beyond. The boundaries of the revised Socio-economic Assessment Study Area are depicted in the figure above.

What will be studied?

In general, the EA study's scope includes undertaking the following tasks:

1. Conduct a review of background information, review findings from the air quality, noise and marine navigation, land use & built form, transportation, and natural environment assessments and conduct interviews/surveys to document current social and economic conditions;
2. Identify changes to residential/recreational/institutional areas and uses and to Toronto's brand/the ability to leave a legacy for future generations, etc., from the Future Baseline and Proposed Future Scenarios in consideration of future environmental conditions;
3. Identify cumulative effects taking into account other past, present and certain or reasonably foreseeable future effects from other actions/projects within the same geographic and temporal boundaries of this assessment; and,
4. Compare effects from the Future Baseline and Proposed Future Scenarios.

If potential negative effects on the socio-economic environment are identified, they will be described and possible mitigation measures will be assessed to prevent or minimize the effects, where feasible.

From consultation that has occurred to-date, we understand that people are concerned about a wide range of effects on their ability to:

- Promote economic benefits related to employment, businesses and government revenues;
- Encourage tourism associated with a wide range of waterfront activities;
- Keep their windows open in their residences;
- Enjoy a variety of events such as at the Toronto Music Garden and other cultural venues in the vicinity of the BBTCA;
- Enjoy various waterfront activities (such as boating, cycling, walking, birding, picnicking, sitting at restaurants, etc.);
- Leave a legacy or options for future generations to develop, use and enjoy the waterfront;
- Safe access for children to school;
- Travel to and from the waterfront (as a resident of Toronto, visitor to the area or tourist);
- Access convenient air travel for business and pleasure; and
- Support or grow local employment and business opportunities.

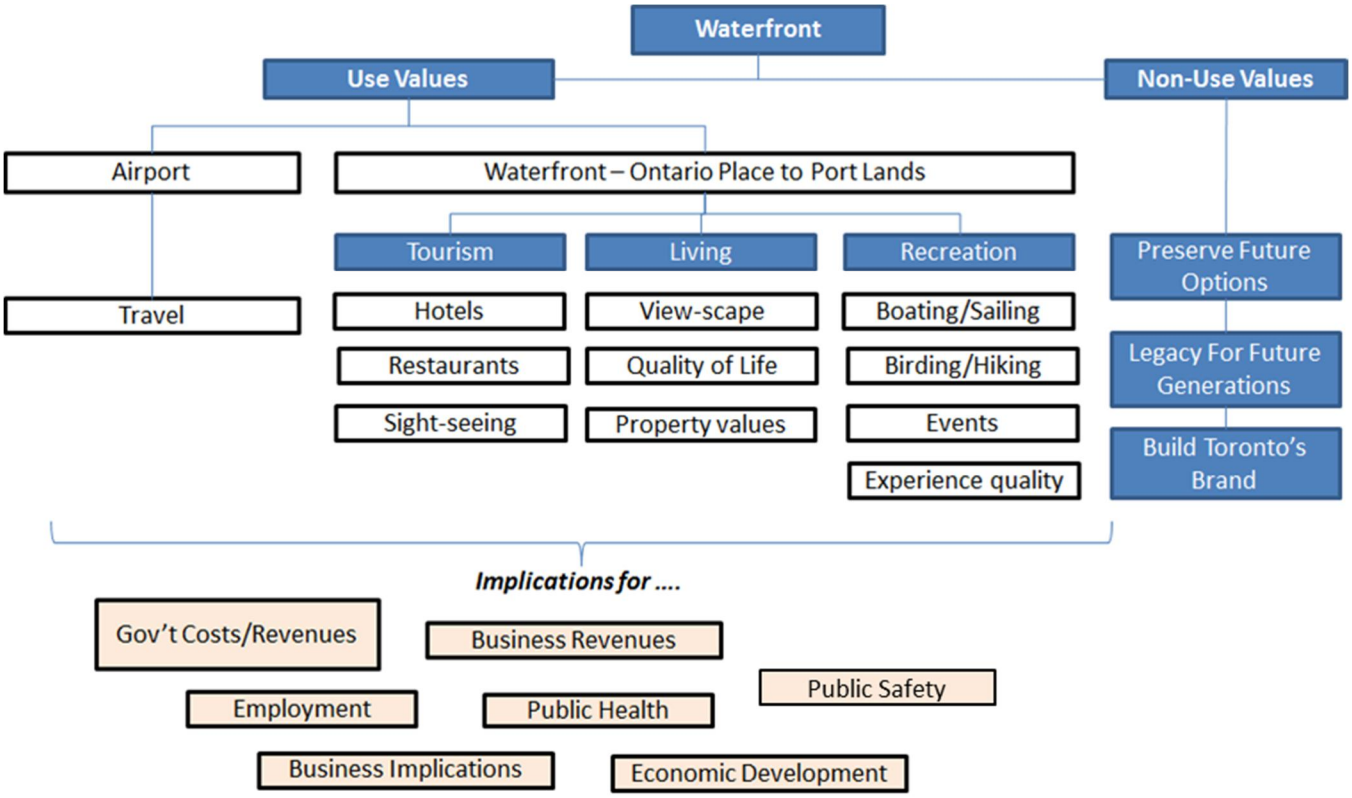
The list above includes only a sample of the most common issues we've heard so far. Additional issues raised are provided in ***Appendix C1 - Key Comments Received and Resulting Changes to the Scope*** for review.

The socio-economic effects study will examine the effects of the proposal on a number of social and economic community assets.

There have been numerous economic benefit studies linked to airport operations. These studies will be reviewed and analysed to understand the potential incremental economic impacts of the proposal. The social assets have been categorized by the value placed upon them by interested parties. The two general categories include: use and non-use values, which are further sub-divided into categories as depicted in the figure on the following page.

The first category, "use values", includes assets that exist because people use them, such as tourism and recreation opportunities. Use values will be categorized into Airport and Waterfront activities, which all hold a set of common implications for businesses and governments, public health and safety, and employment and economic development opportunities. "Non-use values" are values ascribed to aspects of the environment that exist independent of people's use or enjoyment of them.

Non-use values include: options for future generations to develop and use the waterfront and impacts on Toronto's "brand" as a waterfront city. These non-use values, as the name implies, refers to important considerations that are believed to be highly valued by City residents (and others) irrespective of whether they use the airport or visit the waterfront. This collection of values will be assessed together in this EA.



The table below lists a sample of the key use and non-use values, how the EA will evaluate them and describes updates made to the scope of work based on comments received. Other issues detailed in **Appendix C1** will also be included the assessment.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
Airport Use	Impact of the current and projected airport operation on employment, businesses, and government revenues	Yes	Yes	▪ The economic assessment will be drawn in large part from existing studies. ▪ The intent of the economic assessment is to synthesize key findings of these economic studies and to place their conclusions in the context of the EA. ▪ Our own interpretation of the analyses will be provided using input gained through interviews with airport-related businesses as well as intercept surveys with airport users.
Tourism Use	Impact of the current and projected airport operations and other waterfront uses on tourism and tourists	Yes	Yes	▪ Tourists to Toronto arrive from many destinations over the course of a year and some visit the waterfront for a variety of reasons. Intercept surveys will enable us to capture user attitudes and perspectives about the mix of waterfront use activities and how changes to both airport operations and recreational waterfront use activities might influence their future attraction to this area, as well as their likelihood of recommending Toronto and its waterfront to others as a positive experience. ▪ These intercept surveys will be conducted along the waterfront at various venues and during different times during the summer (2015) and will capture views and perspectives linked to a variety of issues such as: • Noise; • Air Quality; and • Quality of experience.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
				▪ Interviews with a sample of hotels, restaurant establishments, and sight-seeing business operators along or closely associated with the waterfront will be conducted to obtain their perspectives regarding tourism and its influence from airport operations and all other waterfront activities. These business-related interviews will capture views and perspectives linked to a variety of issues such as: • Importance of BBTCA to business clientele; and • Importance of the "waterfront experience" (such as recreation, dining, noise, air quality, etc.) to clientele.
Residential Use *(including parks and public spaces)*	Impact on waterfront residents' use and enjoyment of their property	Yes	Yes with additions	▪ Many residents of waterfront properties have expressed concerns about the effects of noise and poor air quality, such as: • Ability to use balconies because of noise and odour; • Ability to open windows and doors or reliance on indoor air conditioning; • Ability to sleep, hold conversations or undertake other activities when planes pass; • Impacts on property values; and • Impacts on traffic and associated noise and air quality impacts from ground-level transportation. ▪ The original EA scope will assess impacts on the use and enjoyment of private property from airport operations. This will be completed through interviews with condominium boards and local residents within the Study Area. The interviews would include questions pertaining to any changes in how residents use their properties resulting from different levels of activity at the airport. These interviews will also pose questions to address the overall quality of their living experience, to the extent possible, to determine its association with changes in airport operations. ▪ After reviewing comments received to-date, as previously mentioned, the western boundary of the Study Area expanded to encompass additional condominiums.
Recreational Use (*including cultural venues*)	Impacts on outdoor events such as concerts at cultural venues such as the Toronto Music Garden, Harbourfront Centre, etc.	Yes	Yes with additions	▪ The original EA scope proposed to assess impacts on the use and enjoyment of recreational spaces; including the Toronto Music Garden and other venues. This was to be completed through intercept surveys, where members of the Study Team would survey people using recreational and cultural spaces and ask them about changes to their experiences linked to activity at the airport. The survey team will capture people at the Toronto Music Garden in these surveys. ▪ After reviewing comments received to-date, the scope of the intercept surveys increased in terms of total number of surveys, the location and duration. The surveys will now be conducted from the Port Lands to Ontario Place and will be extended beyond the summer of 2015. This will allow the Study Team to survey a greater variety of waterfront users at the height of the recreation season and during the shoulder season.
	Use and enjoyment (experience quality) of various waterfront activities such as: boating, cycling, sailing, hiking, birding, picnicking, walking, etc.	Yes	Yes with additions	▪ Many comments and concerns were expressed about the consequences and effects of airport operations on a wide range of recreational activities on or near the waterfront. Most concerns relate to adverse effects from noise, odour, potential jet blasts, and marine navigation outside the Marine Exclusion Zone linked to airport operations. Some of the specific concerns expressed include, for example: • Health and safety of recreational users; • Ability of sailing instructors to communicate with student sailors when planes pass overhead; • Ability to maintain conversations when planes pass overhead when walking, picnicking, enjoying nature, etc.; and • Implications for sustainability of waterfront businesses such as sailing clubs. ▪ A combination of pre-arranged meetings and user intercept surveys are planned for the summer of 2015. The intent is to interview people that represent a diversity of waterfront users to obtain their perceptions and

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
				attitudes about the above issues and consequences for their activities. The intercept surveys will also attempt to capture input from a variety of users from: • Local neighbourhoods; • Throughout the City of Toronto; • GTA; and • Outside the GTA. ▪ After reviewing comments received to-date, the scope of the intercept surveys increased in terms of total number of surveys, the location and duration. The surveys will now be conducted from the Port Lands to Ontario Place and will be extended beyond the summer of 2015. This will allow the Study Team to survey a greater variety of waterfront users at the height of the recreation season and during the shoulder season.
Non-use Values	Implications to: Preserve future options; leave a legacy for future generations; and enhance Toronto's "Brand"	No	Yes	▪ Many people may not use the waterfront or the airport for any reason; however, this does not mean that they do not value it. ▪ This study will capture and consider the perceived non-use values of environmental elements within the Study Area from non-users across the City. ▪ Consequently, the scope of the EA has been expanded to include a City-wide survey to obtain attitudes and perspectives of a sample of Toronto residents regarding this topic. Details of the questions to be asked will be developed during the winter 2015. The survey will be conducted by phone in Summer 2015 through the services of a specialty polling service agency.
Transportation	Access to the waterfront	Yes	Yes with additions	▪ The original EA scope proposed to assess effects from changes in traffic volume. This was to be completed through intercept surveys with waterfront users and would focus on their experience getting to and from the waterfront, what influences when they use the waterfront and when they arrive or leave the waterfront. ▪ After reviewing comments received to-date, the scope of the intercept surveys increased in terms of total number of surveys, the location and duration. This will result in a greater opportunity to survey waterfront users from outside Toronto and beyond.

Information Sources

The following studies were reviewed to inform the effects assessment, this information also allowed the Study Team to determine which additional studies should be conducted.

- CommunityAIR, 2013. Reviewing Deluce's Jets Proposal: What the City Has (and Hasn't) Done;
- Environics Research Group, 2013. Toronto Resident Survey: Billy Bishop Toronto City Airport;
- Golder Associates, 2013. Health Impact Assessment Proposed Billy Bishop Expansion;
- HLT Advisory, 2013. Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport; and
- InterVISTAS Consulting, 2012. Billy Bishop Toronto City Airport (YTZ) Economic Impact Study.

The studies conducted to-date generally focused on the economic effects associated with the proposal; critiques of the studies noted an inadequate review of social effects.

To address the gaps in information, this EA will focus social effects linked to the BBTCA airport and will collect information from the following sources:

- Intercept surveys;
- Business, residential and institutional interviews;
- City-Wide Phone Survey; and

- Findings from the marine navigation, noise, air quality, land use & built form, natural environment and transportation assessments, described in the associated work plans in **Attachment A – *Work Plans***.

Survey and interview details such as the specific questions and the total number will be developed as part of the detailed methodology for the Environmental Assessment.

Effects Assessment

The information collected will allow the Study Team to assess potential effects on the socio-economic issues listed above and in **Appendix C1**. These issues have been organized into broader community assets to categorize community input for the EA. A community asset is a feature that may be affected by the proposal and that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent. Community assets that may be affected by the proposal include:

- Residential uses;
- Recreational uses (such as boating, cycling, picnicking, bird watching, and events at cultural venues, etc.);
- Institutional uses (such as schools in the Study Area, particularly the City School);
- Economy;
- Tourism;
- Municipal Implications;
- Property Values; and
- Non-use Values.

Attachment A details how effects on the assets will be measured and what information sources will be used.

Please note that the EA Scope has been informed by feedback received through the consultation process.

Land Use & Built Environment Assessment Overview

The Study Area

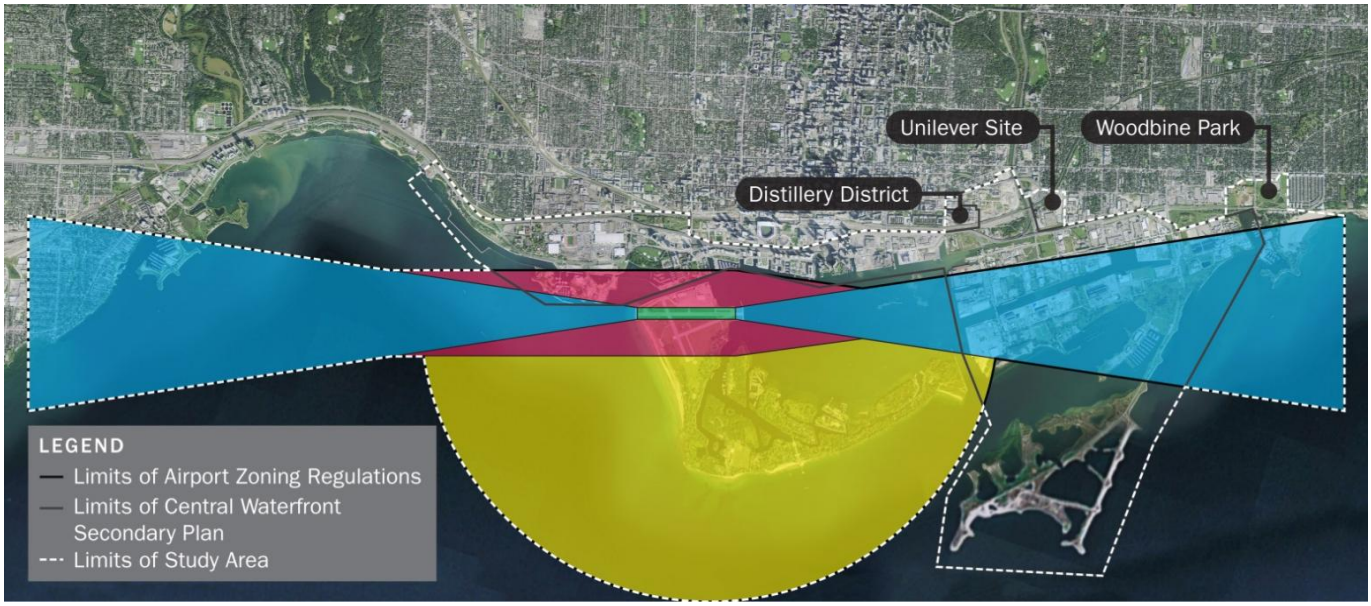
Where will the Environmental Assessment (EA) study effects on **Land Use & the Built Environment**?

The original Study Area for land use and the built environment comprised an amalgamation of:

- The City of Toronto's Central Waterfront Secondary Plan (CWSP) area; and
- All lands within the limits of Billy Bishop Toronto City Airport's (BBTCA) Obstacle Limitation Surfaces, as regulated by Transport Canada through statutory Airport Zoning Regulations (AZR).

We've heard that people are also concerned about potential effects extending to these additional areas:

- The Distillery District;
- The Unilever Site on Lakeshore Boulevard at the Don Valley; and
- Woodbine Park in the Beach(es) neighbourhood.



After reviewing comments received to-date, the Study Area has been expanded to include the above additional areas of concern/interest. These areas include sensitive uses (planned or existing) outside of the extents of the AZR and the CWSP that could be affected by the proposed changes to the airport/airport operations. The boundaries of the revised Land Use & Built Form Study Area are depicted in the figure above.

What will be studied?

In general, the EA study's scope includes undertaking the following tasks:

1. Conduct a review of background information of the multi-tiered regulatory framework shaping growth and investment in the City of Toronto, the Waterfront and Port Lands;
2. Use the regulatory framework review to evaluate potential built form and land use impacts, merits and policy compliance (or non-compliance) issues associated with near and long-term development scenarios; and
3. Identify built form and/or height restrictions associated with changes to either of BBTCA's regulated Obstacle Limitation Surfaces and Missed Approach Surfaces from the proposal (i.e. lifting the jet ban to allow commercial jets to operate out of the BBTCA and an extension of the land mass at each end of the main runway by 200 metres).

From consultation that has occurred to-date, we understand that people are concerned with:

- Existing, approved (but unbuilt) and planned residential and commercial uses (in terms of noise, height restrictions and property values); and
- Important view corridors (existing and planned) that serve to visually link important waterfront places and destinations.

The list above includes a sample of the top issues we've heard so far. Additional issues raised are provided in ***Appendix C1 - Key Comments Received and Resulting Changes to the Scope*** for review.

The table below documents the issues raised, how the EA will evaluate the issue and any updates made to the land use & built form scope of work based on comments received.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
Built Environment	Future residential or commercial uses	Yes	Yes	▪ The EA will assess effects on future residential or commercial uses through a review of noise effects, impacts on future development and property values. ▪ Future indoor noise impacts at sensitive receptor locations will be assessed through modelling efforts. Noise measurements will be taken at residential and other locations. ▪ Impacts on future development will be assessed in terms of reviewing potential new height restrictions. Property value impacts have been assessed by N. Barry Lyon Consultants Ltd. in the study "Condominium Market Value Impact Analysis: Billy Bishop Airport " (November, 2013). This report found that property values have continued to increase along the waterfront while flight and passenger volumes have increased at the BBTCA. Property values will be discussed as part of the socio-economic scope of work.
Built Environment	Viewshed from both the water and land	Yes	Yes	▪ The EA will create rendered visualizations of future development models to ascertain the visual impacts of the proposal from different important vantage points. ▪ These vantage points (also being referred to as vignettes) have been determined through consultation with members of the public, stakeholders and public agencies.

Information Sources

The following studies were reviewed to inform the effects assessment, this information also allowed the Study Team to determine which additional studies should be conducted.

- Urban Strategies Inc., 2013. Consultant Report - BBTCA Expansion Review Summary Report;
- WSP Group, 2014. Consultant Report – Strategic Vision for Peak Hour Passenger Forecast for BBTCA;
- N. Barry Lyon Consultants Ltd. 2013. Condominium Market Value Impact Analysis: Billy Bishop Airport (found in Appendix of Economic Impact Considerations of an Expanded BBTCA); and
- BA Group, 2013. BBTCA Transportation Assessment of Proposed Jet Activity Summary Report.

The studies completed to date raised several issues/questions for which additional information and analysis was needed. These issues include: need to establish a framework for assessing overall impacts to enjoyment of the waterfront; confirmation of potential impact on development permissions, including building heights and land use compatibility restrictions; and visual impacts associated with possible facility/infrastructure changes at the airport.

To address the gaps in information, this EA will collect information from the following sources:

- Relevant Federal, Provincial and Municipal statutes and legislation;
- Relevant built form and land use policies;
- Relevant local policies;
- Current waterfront mapping and models;
- 3D model of airport zoning regulation;
- Policy and regulatory documents; and
- Waterfront planning documents.

Effects Assessment

The information collected will allow the Study Team to assess potential effects on the built environment issues listed above and in **Appendix C1**. These issues have been categorized into broader assets for the purposes of the EA. A community asset is a feature that may be affected by the proposal and that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent. Community assets that may be affected by the proposal include:

- Regulatory Compliance (existing Federal, Provincial and Municipal Plans and Policies)
- Future development

Attachment A - Work Plans details how effects on the assets will be measured and what information sources will be used.

Please note that the EA Scope has been informed by feedback received through the consultation process.

Natural Environment Assessment Overview

The Study Area

Where will the Environmental Assessment (EA) study the effects on the **Natural Environment**?

The original Study Area for the Aquatic and Terrestrial Environment included the following boundaries:

- Inner Harbour to the north;
- Tommy Thompson Park (TTP) to the east;
- Toronto Island to the south; and
- Hanlan's Point Beach to the west.

We've heard that people are also concerned about potential effects extending to these additional areas:

Terrestrial Environment:

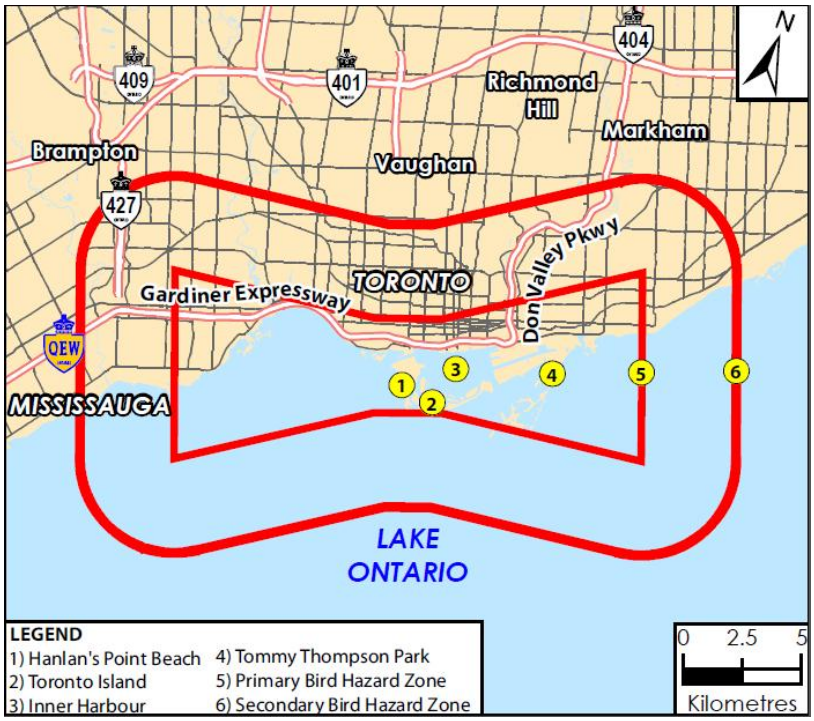
- Toronto Islands;
- Jet flight paths and missed approach decision points; and
- The Bird Hazard Zone (BHZ) as identified in the Billy Bishop Toronto City Airport (BBTCA) Wildlife Management Plan.

Aquatic Environment:

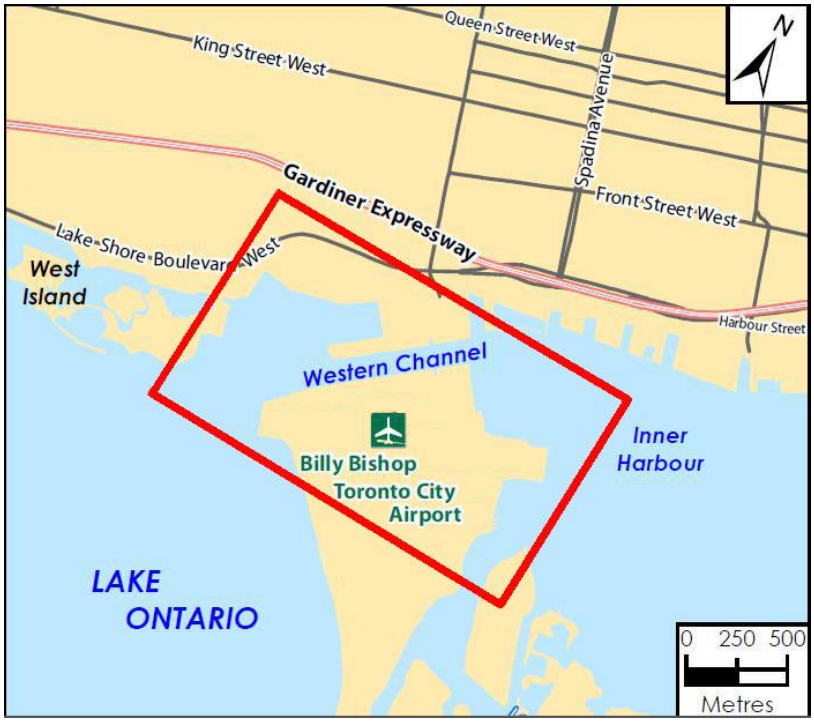
- Footprints of the proposed extension of the land mass and adjacent aquatic habitat;
- Outer harbour;
- Western Channel; and
- Lake Ontario in the vicinity of Ontario Place.

After considering comments received to date, the boundaries of the Study Area for the Terrestrial Environment study have been expanded based on the BBTCA BHZ, calculated aircraft flight paths, glide slopes and missed approach points. The Study Area for the Terrestrial Environment study will include the BBTCA BHZ, with the expectation that this

Terrestrial Assessment Study Area



Aquatic Assessment Study Area



area will encompass the projected jet flight paths at altitudes where bird strikes are most likely to occur, as well as missed approach decision points for BBTCA (to be provided in the 2015 Master Planning Exercise). Areas of concern for the terrestrial environment identified above have been included in the revised study area.

The revised Study Area for the Terrestrial Environment includes the original Study Area plus:

- The primary BHZ is defined by Transport Canada to include the following:
  - In the vicinity of the BBTCA, the northern and southern boundaries of the primary BHZ include the areas within 2 km of and adjacent to the runway (including the extension of the land mass);
  - The eastern and western boundaries of the primary BHZ extend 9 km from each end of the main runway (including the extension of the land mass). At these limits, the northern and southern boundaries of the primary BHZ extend 4 km from the centreline of the runway in each direction (8 km in total); and
  - This results in a primary BHZ that resembles a bowtie.
- The secondary BHZ is defined by Transport Canada to include the following:
  - A 4 km buffer applied to the primary BHZ.

Work related to the aquatic environment will focus on the areas in the immediate vicinity of the land mass extension as this is the area where potential effects from construction are anticipated to occur.

What will be studied?

In general, the EA study's scope includes undertaking the following tasks:

1. Conduct a review of background information and additional field studies to document current natural environment conditions;
2. Identify changes to the natural environment conditions from the Future Baseline and Proposed Future Scenarios in consideration of future environmental conditions;
3. Identify cumulative effects taking into account other past, present and certain or reasonably foreseeable future effects from other actions/projects within the same geographic and temporal boundaries of this assessment; and,
4. Compare effects from the Future Baseline and Proposed Future Scenarios.

In addition to supporting a wide variety of non-sport fish (baitfish, coarse fish, etc.) the Toronto Islands including the inner and outer harbour areas are also known to support a diverse recreational fishery that includes Yellow Perch, Walleye, Northern Pike, Largemouth Bass, Brown Trout, Rainbow Trout, and Chinook Salmon[1]. The Toronto Islands are also known to support an Endangered Species, the American Eel.

As regulated by the federal *Fisheries Act* (as amended, 2012), any work conducted in or near water bodies that support fish would require a review to determine any impacts on the sustainability and ongoing productivity of recreational, commercial and Aboriginal fisheries as well as the habitats that support them. The Aquatic Environment Study has been developed in order to assess the potential effects of the proposed extension of the land mass at each end of the main runway by 200 metres on fish and fish habitat, including aquatic Species at Risk. The study will focus on aquatic habitats and species which may be disturbed either temporarily during construction or permanently during operation, including the footprint of the proposed extension of the land mass as well as adjacent aquatic habitat areas.

Terrestrial features within the Study Area include the Provincially Significant Toronto Islands Coastal Wetlands Complex and TTP, a globally significant Important Bird Area. Terrestrial habitats in the vicinity of the proposed

1. *City of Toronto, 2013. Fishes of Toronto: A Guide to Their Remarkable World. City of Toronto Biodiversity Series, Toronto, 77 pp*

extension of the land mass include wetlands, woodlands and dunes. These areas are known to support a diversity of bird species, as well as plants and other wildlife. The Terrestrial Environment study has been developed in order to assess the potential effects of the proposed extension of the land mass on terrestrial habitats and species, including birds. The study will focus on terrestrial habitats and species which may be disturbed either temporarily during construction or permanently during operation, including vegetation and wildlife on and adjacent to the BBTCA grounds and Hanlan's Point beach. Background bird information will be collected and analyzed for the entire Study Area and additional bird surveys will be completed in the areas within 500 m of the proposed extension of the land mass in order to develop a comprehensive understanding of the bird populations potentially affected.

If potential effects on the natural environment are identified, they will be described and mitigation measures will be proposed to prevent or minimize the potential effects.

From consultation that has occurred to-date, we understand that people are concerned about the following issues relating to the natural environment:

Terrestrial Environment:

- Risk to bird populations associated with bird strikes, including birds at TTP;
- Risk to bird populations associated with wildlife management actions that may be taken to prevent bird strikes (i.e., based on human safety concerns); and
- Ensure that the bird studies are designed appropriately to complete the impact assessment (e.g. spatial extent relative to bird strikes, timing to capture important windows).

Aquatic Environment:

- Direct impacts of the proposal on aquatic habitat and associated mitigation measures.

The list above includes a sample of the top issues we've heard so far. Additional issues raised are provided in ***Appendix C1 - Key Comments Received and Resulting Changes to the Scope*** for review.

The table below documents the issue raised, how the EA will evaluate the issue and any updates made to the scope of work based on comments received.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
Risks to Birds	Review risks to bird populations associated with bird strikes, including waterbirds at the Toronto Islands and TTP (e.g. cormorants)	Yes	Yes	▪ A review of past trends in bird strike occurrences for various species at the BBTCA will be compared to a comprehensive bird list compiled from the records and background information received from various agencies to understand the potential impacts of the airport on bird populations. The EA will consider jet flight paths and height, as well as frequency of flights information (to be provided by the 2015 Master Planning Exercise) to identify where bird strikes are likely to occur and relate this to the potential effects on birds recorded in the identified area. ▪ If the proposed changes to the runway are approved, the existing BBTCA Wildlife Management Plan will be updated by PortsToronto. To do so, the risks of bird strikes will be examined to determine what mitigation measures are required as part of the plan to reduce the potential for risks from bird strikes. This and the current Wildlife Management Plan will be reviewed and commented on as part of the EA.
Risks to Birds	Identify wildlife management actions that could be implemented if bird strikes pose a risk to human safety and assess potential effects of management actions on bird populations (including those that could be implemented beyond the airport grounds and at TTP)	No	Yes	▪ The original scope of work included an assessment of the impacts of mortality from bird strikes to bird populations, including birds at TTP. Based on the comments received, the scope of work will be expanded to include a literature review of off-site wildlife management at North American airports and/or airports located on islands or adjacent to large bodies of water to identify potential mitigation or management techniques that could be implemented at BBTCA and TTP. ▪ It is recommend that the 2015 Master Planning Exercise include an explanation of how the Wildlife Management Plan

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
				mitigates risks associated with bird strikes, and that the plan will be updated to address any change to the risk profile if the land mass is extended and the jet ban is lifted. ▪ This and the current Wildlife Management Plan will be reviewed and commented on as part of the EA.
Risks to Birds	Ensure bird surveys capture peak timing windows for: (1) waterbirds in spring and fall, (2) flocks of blackbirds, starlings and aerial insectivores at TTP in spring and early summer, (3) peak songbird migration and raptors in September, and (4) peak migration for owls in October/November	1. Yes 2. No 3. No 4. Yes	1. Yes 2. No 3. No 4. Yes	1. Spring and fall migration surveys are recommended to be completed near the airport, to supplement available background information. 2. Background information provided from multiple agencies, including TRCA, is considered to be sufficient to assess potential effects on these species at TTP. No additional surveys within TTP are proposed. 3. Four rounds of fall migration surveys have been completed in October and November 2014. Together with the spring migration surveys recommended in the work plan, these are considered to be sufficient to address potential effects on migratory songbirds. 4. No owls were observed during these surveys; however, available background information will be reviewed to identify if owls are present in the vicinity of the BBTCA.
Aquatic Habitat	Direct impacts of proposed expansion on aquatic habitat and associated mitigation and compensation measures	Yes	Yes	▪ To assess effects on the aquatic environment, the Study Team will use TRCA's Habitat and Environmental Assessment Tool (HEAT) to quantify the amount and assess the quality of habitat that would be removed or disturbed by the proposed runway expansion. ▪ Once this habitat assessment is complete, conceptual mitigation/compensation measures will be identified based on the needs of the areas. These plans will be developed in consultation with Aquatic Habitat Toronto (AHT).

Information Sources

The following studies were reviewed to inform the effects assessment; this information also allowed the Study Team to determine which additional studies should be conducted.

- CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments.
- Dillon Consulting Limited, 2011. Toronto Port Authority Proposed Pedestrian/Services Tunnel and Perimeter Road Project.
- Dr. Davidson-Arnott, R. 2013. Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment.

The studies conducted to-date generally focused on the existing shoreline and coastal environment assessed for fish and bird habitat within the immediate vicinity of a proposed 168 m extension of the landmass (as opposed to the currently proposed 200 m extension). A peer review of the *Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments* (CH2M Hill Canada Limited, 2013) identified that the information presented in this study was preliminary in nature and more detailed studies are required.

To address the gaps in information, this EA will collect information from the following sources:

Terrestrial Environment:

- Field studies to gather information on existing terrestrial features, plants, wildlife and wildlife habitats in the vicinity of the BBTCA;
- Rare species and designated area information from the Ministry of Natural Resources and Forestry (MNRF) Natural Heritage Information Centre (NHIC) database;

- Natural Resources Values Information System (NRVIS) mapping from Land Information Ontario (LIO);
- City of Toronto Official Plan;
- Available information about terrestrial features, habitats and species for the Study Area, including bird data, from various sources
- Bird surveys (fall migration, overwintering, spring migration and breeding season);
- Bird strike information from BBTCA and Transport Canada;
- Bird records from Fatal Light Awareness Program (FLAP), if available;
- Bird information for the Toronto Islands from the Harbourfront Kayak Centre, if available;
- Turtle information for the Toronto Islands from the Kawartha Turtle Trauma Centre, if available;
- Fish and fish habitat information for the Toronto Islands from Ontario Streams, if available;
- BBTCA Wildlife Management Plan; and
- Consultation with the TRCA and Canadian Wildlife Service (CWS) regarding suitable mitigation measures.

Aquatic Environment:

- Field studies to gather information on existing aquatic habitat within the footprint of the proposed extension of the land mass and MEZ;
- Available fisheries data and monitoring reports from various sources;
- Conservation Ontario Aquatic Species at Risk distribution mapping; and
- Consultation with the MNRF and DFO in order to identify possible mitigation and/or compensation measures.

Effects Assessment

The information collected will allow the Study Team to assess potential effects on the natural environment issues listed above and in **Appendix C1**. These issues have been organized into broader assets to categorize community input for the EA. A community asset is a feature that may be affected by the proposal and that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent. Natural Environment assets that may be affected by the proposed extension of the land mass include:

- Significant features or functions (such as Provincially Significant Wetlands, Areas of Scientific and Natural Interest, and Significant Wildlife Habitats);
- Terrestrial habitats or functions (such as wetlands, woodlands, dune environments and habitats known to support sensitive terrestrial species);
- Terrestrial species (such as plants, birds, monarch butterflies and other wildlife, rare species and Species at Risk);
- Aquatic habitats or functions (such as spawning, rearing, feeding areas, coastal processes and areas known to support sensitive species); and
- Aquatic species (such as fish, rare and endangered species).

Attachment A - Work Plans details how effects on the assets will be measured and what information sources will be used.

Please note that the EA Scope has been informed by feedback received through the consultation process.

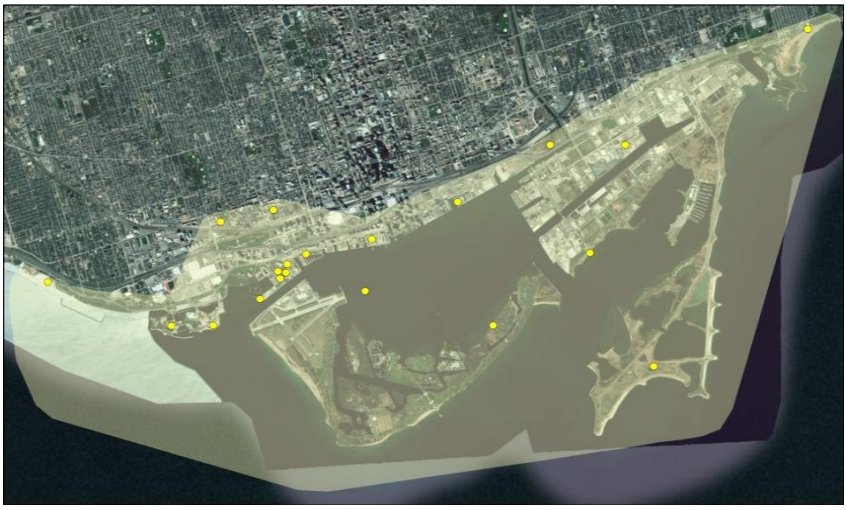
Air Quality Assessment Overview

The Study Area

Where will the Environmental Assessment (EA) study effects on **Air Quality?**

The original Study Area was defined by key receptor locations, which included:

- Residences along Bathurst Street south of Queens Quay; and
- Stadium Road south of Queens Quay, Waterfront School and City Schools at Queen's Quay, Bathurst Street and Toronto Island, as well as other receptors.



This Study Area was selected as it included representative residential, recreational (parks and public spaces) and institutional locations most affected by changes to air quality.

We've heard that people are concerned about effects extending to these key areas:

- The Toronto Waterfront from Ontario Place to the Beaches;
- The National Yacht Club;
- Condominiums along Queens Quay; and
- The Harbour, Islands, Leslie Street Spit and Port Lands.

After considering comments received to date, the Study Area boundaries have been expanded to include:

- The Music Garden, Sugar Beach, National Yacht Club and Wards 19 and 20 to the north;
- Woodbine Beach, the Harbour and Clark Beach Park to the east;
- Algonquin Island to the south; and
- Ontario Place and the Toronto Sailing & Canoe Club to the west.

The purpose of expanding the Study Area boundaries is to ensure effects on the key areas are assessed in the EA. The boundaries of the revised Air Quality Study Area are depicted in the figure above.

What will be studied?

In general, the EA study's scope includes undertaking the following tasks:

1. Conduct a review of background information. Characterize background air quality conditions based on ambient air quality monitoring data from the Ministry of the Environment and Climate Change (MOECC), Environment Canada (EC) and Metrolinx monitoring stations supplemented with data from regional models, as information allows.

2. Quantify air contaminant emission rates using airport-specific U.S. Federal Aviation Administration and U.S. Air Force model for airport sources and United States Environmental Protection Agency (U.S. EPA) MOVES models to account for vehicle emissions on local roads. Ferry emissions will be determined based on U.S EPA emission factor information.
3. Conduct dispersion modelling using the U.S. EPA CALPUFF model, which is approved by the MOECC. Determine the downwind concentrations of the contaminants (i.e. how they disperse).
4. Evaluate the cumulative air quality concentrations from background and airport, traffic and ferry sources under the future scenario with jets and the future scenario without jets at sensitive receptor locations. The modelling will be based on 1-year of meteorological data using CALMET. As such, this covers a wide range of weather conditions. The sensitive receptor locations throughout the Study Area were selected to include representative residential, recreational (parks and public spaces) and institutional locations most affected by changes to air quality. They were identified by stakeholders and community members, and are intended to be the modelled locations; however, some additions and/or small changes may be made.
5. Compare results to MOECC ambient air quality criteria and Canadian ambient air quality standards as well as to Toronto Public Health Toxicity Reference Values that the City of Toronto is currently developing, as available.
6. Qualitatively assess odour and soot impacts for Proposed Future Scenario with jets relative to the Future Baseline Scenario.
7. Estimate greenhouse gas emissions for baseline conditions, future conditions with jets and future conditions without jets. The emissions will be compared to relevant benchmarks such as total greenhouse gas (GHG) emissions from the City of Toronto and the transportation sector.

From consultation that has occurred to-date, we understand that people are concerned with:

- Health effects;
- Aesthetic related to black carbon/soot on balconies; and
- Odour impacts at east end of the Island and at the National Yacht club.

The list above is a sample of the top issues we've heard so far. Additional issues raised are provided in ***Appendix C1 – Key Comments Received and Resulting Changes to the Scope*** for review.

The table below documents the issues raised, how the EA will evaluate the issues and any updates made to the scope based on comments received.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
Public Health	Effects to public health from a decrease in air quality	Yes	Yes	▪ The original scope included comparing the results of the dispersion modelling to established ambient air quality criteria from the MOECC, to Canadian ambient air quality standards from Environment Canada, and to Health Canada thresholds, which are established to be protective of human health. ▪ The scope of the assessment has been updated to include comparing the results of the dispersion modelling to Toxicity Reference Values being developed by the City of Toronto.
Air Quality	Aesthetic related to black carbon/soot on balconies	No	Yes	▪ This will be reviewed and assessed qualitatively through a comparison of similar experiences at other airports and a review of land uses (such as the Gardiner Expressway). The assessment will refer to the particulate material sampling results of the Ministry of the Environment and Climate Change (MOECC) report completed for Toronto Public Health. Commentary on how the future scenarios may impact soot levels will be provided.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
	Extend the study area to the north of the Gardiner Expressway to demonstrate that the cumulative effects will not lead to exceedances of ambient air quality criteria in areas to the north of BBTCA (i.e., Wards 19 and 20).	No	Yes	▪ Receptors has been added north of the Gardiner to assess changes in air quality in Wards 19 and 20. Locations to include Stanley Park and Victoria Memorial Park.
	Climate Change	Yes	Yes	▪ Climate change is a global phenomenon. The environmental assessment will consider policy guidance from the Provincial Policy Statement and recommendations from the City of Toronto's Climate Change Committee. As well, the impacts of the proposal on climate change will be assessed qualitatively by undertaking a relative comparison of GHGs. GHG emissions of relevance to the study include carbon dioxide (CO2), nitrous oxide (N2O) and methane (CH4). ▪ GHG emissions under baseline and future scenarios (with and without jets) will be estimated using U.S. EPA models for both airport activity and associated surrounding traffic. The changes in GHG emissions due to the proposal will be compared to relevant benchmarks, such as total GHG emissions from the City of Toronto and the transportation sector. The results will be expressed as total GHG emissions and tabulated for baseline conditions and the future with jets and without jets. Commentary on the significance of the GHG emissions due to the proposal relative to other sources will also be provided.
Air Quality and Odour	Odour impacts at east end of the Island and at the National Yacht Club	No	Yes	▪ This will be reviewed and assessed qualitatively through a literature review and a review of previous odour studies conducted at the BBTCA.

Information Sources

The following studies were reviewed to inform the effects assessment, this information also allowed the Study Team to determine which additional studies should be conducted.

- RWDI. “BBTCA Final Report Air Quality Review”, November 15, 2013.
- Golder Associates, Health Impact Assessment Proposed Billy Bishop Expansion, November 2013.

These studies informed the selection of contaminants and the Study Area to be assessed.

To address the gaps in information, this EA will collect additional air quality and emissions information from the following sources:

- Model output from the City-Wide air quality model;
- MOECC, Environment Canada and Metrolinx Air Quality Monitoring Stations;
- Aircraft and corresponding ground support equipment activity from PortsToronto;
- Existing and future vehicular traffic volumes on local roads from the City of Toronto;
- Ferry activity data from PortsToronto and the City of Toronto;
- Taxi idling activity at BBTCA from PortsToronto; and
- Jet aircraft emissions data from Bombardier.

Effects Assessment

The information collected as part of the EA will allow the Study Team to assess potential effects from changes in air quality listed above and in **Appendix C1**. These changes could affect community assets. A community asset is a feature that may be affected by the proposal and that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent. Air quality change could affect the following community assets:

- Climate Change;
- Public health;
- Recreational uses;
- Residential uses (such as individual condominium units);
- Tourism; and
- Institutional uses (such as the Waterfront School and City School).

Attachment A – Work Plans details how effects on the assets will be measured and what information sources will be used.

Please note that the EA Scope has been informed by feedback received through the consultation process.

Public Health Assessment Overview

The Study Area

Where will the Environmental Assessment (EA) study effects on **Public Health?**

The Study Area boundaries encompass:

- The Music Garden, Sugar Beach, National Yacht Club and Wards 19 and 20 to the north;
- Woodbine Beach, the Harbour and Clark Beach Park to the east;
- Algonquin Island to the south; and
- Ontario Place and the Toronto Sailing & Canoe Club to the west.



This Study Area was selected to ensure that representative residential, recreational (parks and public spaces) and institutional locations most affected by changes to public health related to air quality and noise were included in the area of analysis.

What will be studied?

In general, the EA study's scope includes undertaking the following tasks:

1. Engage in ongoing discussions with the City of Toronto's Department of Public Health
2. Assess the impacts of changes to air quality associated with the proposal on hospitalization rates or incidence of air quality-related illnesses by comparing air quality impacts to regulatory or policy-based thresholds
3. Compare results of the air quality modelling conducted in accordance with the air quality effects assessment study to Toronto Public Health's Toxicity Reference Values in addition to the Ministry of the Environment and Climate Change ambient air quality criteria and Canadian ambient air quality standards.
4. Compare current and future modelled noise levels to the Department of Public Health noise reference values.

Information Sources

The results from the air quality, noise and socio-economic assessments will be used to determine impacts to public health. These sources include:

- Noise model output
- Public perceptions of noise and self-reported concerns with noise levels
- Air quality model output

Effects Assessment

The information collected as part of the EA will allow the Study Team to assess potential impacts on public health associated with the Future Growth Scenarios.

Attachment A – Work Plans details how effects on the assets will be measured and what information sources will be used.

Please note that the EA Scope has been informed by feedback received through the consultation process.

Noise Assessment Overview

The Study Area



Where will the Environmental Assessment (EA) study the effects on the **Noise** component of the environment?

The original Study Area was defined by key receptor locations, which included:

- Residences in Eireann, Bathurst and York Quays;
- Recreational areas in the vicinity of the airport, including parks and public spaces;
- Waterfront School and City School at Queen's Quay; and
- Residences and recreational areas on Toronto Island, including parks and public spaces.

The original Study Area was selected to include residential uses, recreational locations (including parks and public spaces) and schools that are representative of areas that are most affected by changes to noise.

We've heard that people are concerned about effects extending to these key areas:

- Beyond Noise Exposure Forecast (NEF) contours;
- Along flight paths; and
- The Toronto Waterfront, the Beaches, Harbour, Islands, Leslie Street Spit and Port Lands.

After considering comments received to-date, the Study Area boundaries have been expanded to include:

- The Music Garden, Sugar Beach, Harbourfront Centre and the National Yacht Club to the north;
- Woodbine Beach, the Harbour and Clark Beach Park to the east;
- Algonquin Island to the south; and
- Ontario Place and the Toronto Sailing & Canoe Club to the west.

The purpose of expanding the Study Area boundaries is to ensure effects on the key areas are assessed in the EA. The boundaries of the revised Noise Study Area are depicted in the figure above.

What will be studied?

In general, the EA study's scope includes undertaking the following tasks:

1. Conduct a review of background information and additional sound modelling to document current noise conditions;

2. Identify changes in cumulative sound levels from the proposal (i.e. lifting the jet ban to allow commercial jets to operate out of the Billy Bishop Toronto City Airport (BBTCA) and an extension of the land mass at each end of the main runway by 200 metres);
3. The assessment will use the following models: the Noise Exposure Forecast (NEF), the Integrated Noise Model (INM), the Ministry of the Environment and Climate Change's (MOECC) models Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT), the Sound from Trains Environmental Analysis Method (STEAM), STAndard Method in Noise Analysis (STAMINA), and the ISO 9613 sound propagation model as incorporated into Cadna/A;
4. Noise modelling will be supplemented with data from new and historic ambient noise monitoring data;
5. Compare the resulting noise levels to criteria provided in the Tripartite Agreement and the MOECC guideline. The steps for completing the comparison include:
    a. RWDI takes historical data from a base year (the "existing conditions" year) on scheduled and unscheduled flights that have taken off and landed from BBTCA in that year, the flight path profiles for that year, and the specifications of each aircraft type and inputs them into the INM model;
    b. The INM model calculates an LDN value at each receptor point and over a grid, which is an average sound level, based on the data that was input;
    c. The INM model also provides an output matrix that describes the sound level impacts by location and aircraft; and
    d. RWDI then inputs this matrix into TNIP software, which provides a geographic representation of noise impacts in the form of contour lines which represent the N70, or the number of times per day that noise levels will exceed 70dBA within each contour line.
6. Consider the sound that people typically experience in terms of criteria such as degree of speech interruption (N70) as aircraft fly over, and thresholds from WHO (World Health Organization), Health Canada, and Health Council of the Netherlands publications Sound levels will also be evaluated at schools using the key indicators LDN (average sound pressure level over a whole day) and N70; and
7. Describe the results in a Noise Assessment Report.

Note that the assessment methodologies are generally based on a standard weather condition. However, the Noise Assessment Report will include information on the sensitivity of the measured noise levels to weather conditions, and on the frequency of certain key weather conditions, such as those associated with temperature inversions, low cloud and fog.

From consultation that has occurred to-date, we understand that people are concerned with:

- In-the-moment experiences regarding noise levels at recreational areas, including the Music Garden and Tommy Thompson Park (TTP);
- Ground-truthing the noise models and in-the-moment experience with actual noise measurements at key areas; including: City School, residential balcony near Little Norway Park, the National Yacht Club and a 30th floor balcony on Queens Quay; and
- Understanding the difference in sound between Q400 (turbo propeller planes currently used by Porter Airlines and Air Canada) and CS100 jets (proposed by Porter Airlines).

The list above includes a sample of the issues we've heard so far. Additional issues raised are provided in ***Appendix C1 – Key Comments Received and Resulting Changes to the Scope*** for review.

The table below documents the issues raised, how the EA will evaluate the issue and any updates made to the scope of work based on comments received.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
Noise Effects	In the moment noise levels in recreational areas	No	Yes	▪ The original EA scope included modelling noise levels at various recreation areas; including the City Park. However the NEF model is a regulatory model that is not intended to address in the moment noise levels. The U.S. Federal Aviation Administration's (FAA) INM model will be used as the basis for further analysis to address in the moment experience such as the degree of speech interruption (N70) as aircraft fly over. ▪ Similar key indicators (N70 and LDN) will be the key indicators in evaluation at the schools. ▪ As a result of consultation to-date, locations were added to the study; including the Music Garden, the Beaches, Toronto Harbour and the National Yacht Club.
Noise Effects	Comparing the noise model with actual noise measurements at key areas	Yes	Yes, with additions	▪ The NEF model is a regulatory model that describes the daily-average sound levels from aircraft on the runway and in the air on a peak predicted day, but is not intended for comparison with ground-truth measurements. As such, measurements have only limited meaning in comparison with the modelled NEF results. The FAA's INM model will be used as an alternative for modelled sound levels of aircraft in the air and on the runways to facilitate comparison with measurements and other criteria such as degree of speech interruption (N70) as aircraft fly over. Sound levels will also be evaluated at schools using the key indicators LDN and N70. ▪ Noise monitoring will be undertaken at several locations within the Study Area. ▪ The influences of special local conditions, including weather conditions at the time of measurement would be considered.
Noise Effects	Compare the sound from the Q400 and CS100	Yes	Yes, with additions	▪ Sound level data for the Bombardier Q400 and CS100, beyond the certification data, will be requested from Bombardier to provide a more comprehensive comparison of sound from the Q400 turbo-prop and CS100 jet planes.

Background Studies Reviewed and Additional Information Sources

The following studies were reviewed to inform the effects assessment, this information also allowed the Study Team to determine which additional studies should be conducted.

- ACRP, 2014. Document 16 - Assessing Aircraft Noise Conditions Affecting Student Learning Volume 1 Final Report;
- AirBiz, 2013. Billy Bishop Toronto City Airport Porter Airlines Proposal Review Final Report;
- Dillon Consulting, 2011. Proposed Noise Barriers and Engine Run-Up Enclosure Environmental Screening Report;
- Golder Associates, 2013. Health Impact Assessment Proposed Billy Bishop Expansion, Appendices C (Noise Assessment) and D (Air Quality Assessment);
- RWDI, 2005. Noise Impact Assessment, Ferry Passenger Transfer Facility, TCCA. Report No. W06-5022A; and
- RWDI, 1997. TCCA Aircraft Noise Study. Report No. 96-351-09.

These studies assessed current noise conditions, mitigation measures for current conditions, effects of noise on sensitive receptors, and the potential changes to noise associated with the operation of CS100 jets at the airport. Some studies indicated that projected noise levels would not exceed NEF boundaries, but CS100 noise certification data was not available at the time of the studies.

To address the gaps in information, this EA will collect information from the following sources:

- 2014 WebTrak, community noise monitors (shows aircraft movements to and from airports and associated noise levels);
- New noise monitoring program;
- Existing noise impact assessments and engine run-up reports will be reviewed;
- Integrated Noise Model;
- Noise Exposure Forecast model; and
- CS100 noise certification data, if available.

Effects Assessment

The information collected as part of the EA will allow the Study Team to assess potential effects from changes in noise listed above and in **Appendix C1**. These changes could affect community assets. A community asset is a feature that may be affected by the proposal and that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent. Noise change could affect the following community assets:

- Public health;
- Recreational uses;
- Residential uses (such as individual condominium units);
- Tourism; and
- Institutional uses (such as the City School).

Attachment A – Work Plans details how effects on the assets will be measured and what information sources will be used.

Please note that the EA Scope has been informed by feedback received through the consultation process.

Marine Physical and Water Quality Assessment Overview

The Study Area

Where will the Environmental Assessment (EA) study effects on the **Marine Physical Environment and Water Quality**?

The original Study Area included:

- The area at each end of the proposed extension of the land mass;
- The eastern shoreline of the West Island; and
- The Western Channel.

We've heard that people are also concerned about potential effects extending to these additional areas:

- The Inner Harbour; and
- The Eastern Channel.



The Local Study Area will remain the same as originally proposed; however, a revised Regional Study Area for Marine Physical Environment and Water Quality assessment was developed which includes the original Study Area plus:

- The Inner Harbour;
- The Eastern Channel

Work related to the marine physical environment and water quality assessment is recommended to be completed in two phases. During the EA, the Study Team will conduct a background review of existing studies and prepare a mass-balance model to document effects to the marine physical environment and water quality in the Local Study Area, which includes the areas in the immediate vicinity of the land mass extension. If the proposal is approved, additional studies are recommended during the detailed design phase to document effects in the Regional Study Area, which includes the Inner Harbour and the Eastern Channel. The Regional Study Area is depicted in the figure above.

What will be studied?

The EA study's scope includes undertaking the following tasks to be completed for the Local Study Area:

1. Conduct a review of background information to document current water circulation, erosion and sediment deposition conditions within the immediate vicinity of the proposed land mass extension;
2. Identify potential changes to the water circulation, erosion and sediment deposition conditions resulting from the Proposed Future Scenario, based on existing studies, a mass-balance model, and professional engineering judgement;
3. Identify potential risks to water quality from surface sources such as runoff from the airport or leakage from conveyance or storage infrastructure, or from airborne sources, and appropriate mitigation measures;
4. Identify cumulative effects taking into account other past, present and certain or reasonably foreseeable future effects from other actions/projects within the same geographic and temporal boundaries of this assessment;
5. Compare effects from the Future Baseline and Proposed Future Scenarios; and
6. Identify the boundaries and methodology required for numerical modelling to assess the effects of the land mass expansion based on detailed design, should the proposal be approved.

If the proposal is approved, additional studies are recommended during detailed design within the Regional Study Area. At that time, an assessment of the impacts on the Marine Physical Environment and Water Quality will include the following tasks:

1. Conduct quantitative modelling and a review the results regarding flow velocity, wave height, period and direction from the wave and hydrodynamic model, air photos and field data results to document existing conditions related to the marine physical environment and water quality;
2. Interpret potential effects on sediment transport and deposition (where sediment may deposit or accumulate) if the land mass is extended by 200 metres on each end;
3. Interpret potential effects on water movement, mixing and dilution in key areas of concern;
4. Identify changes to the marine physical environment and water quality from the Future Baseline and Proposed Future Scenarios in consideration of future environmental conditions;
5. Identify cumulative effects taking into account other past, present and certain or reasonably foreseeable future effects from other actions/projects within the same geographic and temporal boundaries of this assessment; and
6. Compare effects from the Future Baseline and Proposed Future Scenarios.

We've heard that people are concerned about the following effects:

- Surface runoff, leaks, and atmospheric deposition effects on water quality
- Lake current effects on water quality;
- Sediment transport and deposition;
- Shoreline erosion; and
- Wave conditions in the Western Channel.

The list above is a sample of the top issues we've heard so far. The complete list of top issues is provided in ***Appendix C1 – Key Comments Received and Resulting Changes to the Scope*** for review.

The table below documents the issues raised, how the EA will evaluate the issues and any updates made to the scope of work based on comments received.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
Water Quality	Review potential impacts of ground-	No	Yes	• The revised scope of work will include a review of potential sources of pollutants related to the proposal and the general effect those could

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
	side infrastructure and airborne pollutants on water quality in the inner harbour			have on water quality if released into the water column. • A mass-balance model will determine if water flow into the Inner Harbour through the Western Channel is likely to become constrained, resulting in lower dilution ratios and the potential for decreased circulation or longer residence time. • Existing and proposed mitigation measures will be recommended based on the review, and future studies may also be recommended.
Water Circulation	Assess changes to water circulation	Yes	No	• The original scope of work recommended a 2-dimensional numerical model to assess localized impacts to water circulation resulting from the proposed extension of the land mass. As a result of consultation with the City of Toronto, the Toronto and Region Conservation Authority and Fisheries and Oceans Canada, a more detailed scope of work is proposed. As part of this updated scope of work, it is recommended that the 3-dimensional model of water movement in and around the Inner Harbour and Western Channel be developed during the detailed design phase. This model should take into account the flow of lake water into the harbour through the Western Channels, river water into the harbour from the Don River, and out through the Eastern Channel, as well as through the channels of the Toronto Islands. • The 3-dimensional model requires detailed design input for the proposed extension of the land mass. As such, this work can only be completed with adequate input from the detailed design effort.
Study Area	Expand study area to include the area at the mouth of the Don River and the Eastern Channel	No	No	• The 3-dimensional model of the movement of water will take into account the Inner Harbour, the Eastern and Western Channels and the Islands, and will be conducted as part of the detailed design efforts.
Modelling Approach	Use quantitative modelling and assessment to determine impacts to water circulation	No	No	• A quantitative model will be developed using a software program such as Delft 3D or MIKE3, to estimate flow impacts associated with the proposed design of the land mass expansion.
	Use 3-D model to assess water quality impacts within a broader study area, and the entire inner harbour	No	No	• The proposed 3-dimensional model will identify circulation-related water quality impacts by identifying areas of low flow that could result in stagnant conditions. The modelling will be undertaken as part of the detailed design efforts.

Information Sources

The following studies were reviewed to inform the effects assessment, this information also allowed the Study Team to determine which additional studies should be conducted.

- CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments;
- Dillon, 2013. Lakefill Within MEZ for the TPA; and
- Dr. Davidson-Arnott, R., 2013. Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment.

The studies reviewed addressed physical impacts to the lake and coastal environment. The assessments were generally qualitative and require more comprehensive study to provide a detailed assessment of impacts. This assessment will be completed during the detailed design phase and will draw on additional information from the following sources:

- Results from the wave and hydrodynamic model; specifically, flow velocity and wave height, period and direction;
- Air photo interpretation using photos over a 30-year period;

- Analyzing the photos for changes in the shoreline and identify areas of erosion and deposition; and
- Conduct field investigations in the vicinity of the proposed extension of the land mass, Western Channel, and West Island. Additional documentation from Aquatic Habitat Toronto, Toronto Water and Toronto and Region Conservation Authority.

Effects Assessment

The information collected will allow the Study Team to assess potential effects on the marine physical environment and water quality. These effects relating to the marine physical environment and water quality could impact community assets. A community asset is a feature that may be affected by the proposal and that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent.

Marine-based community assets that may be affected by the proposed changes to the airport include:

- Wave formation;
- Water levels;
- Currents; and
- Sediment transport.

Attachment A – Work Plans details how effects on the assets will be measured and what information sources will be used.

Please note that the EA Scope has been informed by feedback received through the consultation process.

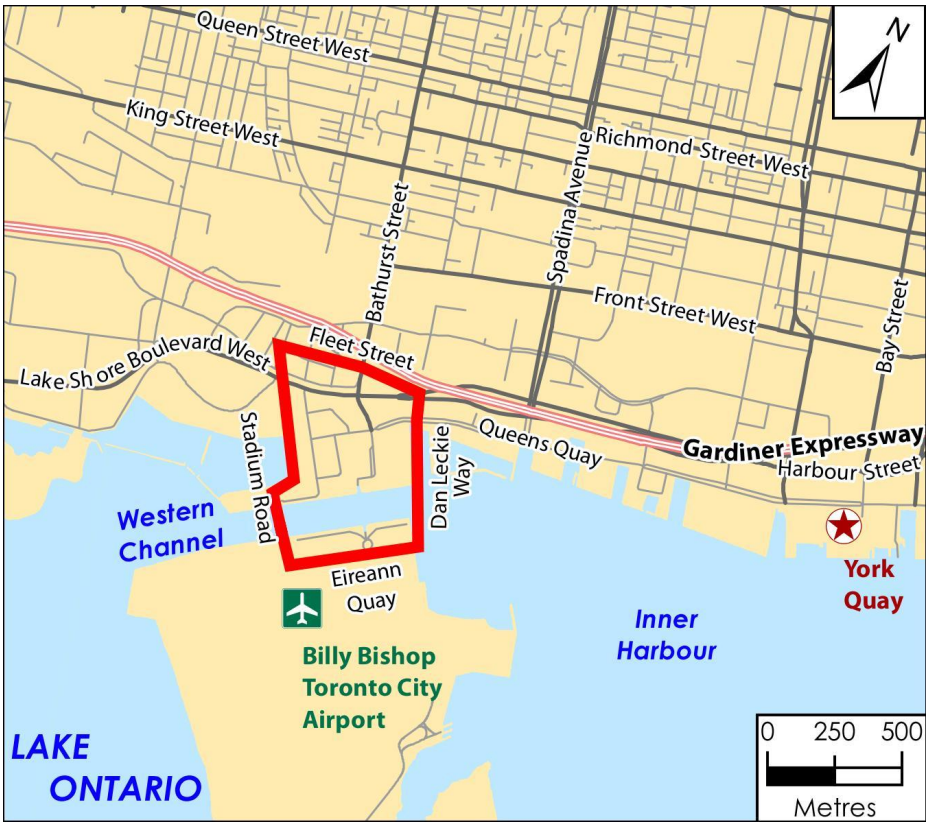
Transportation Overview

The Study Area

Where will the Environmental Assessment (EA) study effects on **Transportation**?

The original Study Area was determined based on the information that would be available from the traffic impact studies being undertaken by the City of Toronto, and included all relevant transportation features within the following boundaries:

- Lake Shore Boulevard and Fleet Street to the north.
- Dan Leckie Way to the east;
- The Western Channel to the south; and
- Stadium Road to the west.



We've heard that people are concerned about effects extending to these key areas:

- The intersection of Lakeshore Boulevard and Bathurst Street;
- Eireann Quay and York Quay neighbourhoods; and
- Queens Quay.

Based on previously-completed traffic impact assessments and consultation with the City of Toronto and other stakeholders, it was determined that the Local Study Area (outlined above in red) would be enhanced by including an overview of policy and broad directions in transportation and goods and people movement in the vicinity of the southwest downtown and waterfront area. This will include a review of the impacts of the proposal on policies regarding pedestrian, cycling, transit, active transportation, ferry, and heavy rail linkages within a Regional Study Area that will include:

- The Central Waterfront;
- Downtown Toronto; and
- The Greater Toronto Area.

The purpose of examining policies affecting a broader area than the Study Area boundaries is to ensure effects on the key areas are assessed in the EA. The boundaries of the transportation Study Area are depicted in the figure above.

What will be studied?

The EA study's scope includes undertaking the following tasks:

1. Conduct a review of background information to document existing traffic and transportation conditions;
2. Identify changes to the traffic and transportation conditions from the Future Baseline and Proposed Future Scenarios in consideration of future environmental conditions;
3. Identify cumulative effects taking into account other past, present and certain or reasonably foreseeable future effects from other actions/projects within the same geographic and temporal boundaries of this assessment; and
4. Compare effects from the Future Baseline and Proposed Future Scenarios.

If potential effects on transportation are identified, they will be described and mitigation measures will be proposed to prevent or minimize the potential effects.

From consultation that has occurred to-date, we understand that people are concerned about the effects of the proposal on their ability to:

- Access private properties and businesses;
- Access parking areas;
- Travel to and from the waterfront (as a resident of Toronto, visitor to the area or tourist) due to changes in traffic volume; and
- Use the active transportation network for walking, cycling, etc.

The list above is a sample of the top issues we've heard so far. The complete list of top issues is provided in ***Appendix C1 – Key Comments Received and Resulting Changes to the Scope*** for review.

Information Sources

The following studies were reviewed to inform the effects assessment, this information also allowed the Study Team to determine which additional studies should be conducted.

- BA Group, 2013. BBTCA Transportation Assessment of Proposed Jet Activity Summary Report;
- CommunityAIR, 2014. Reviewing Deluce's Jets Proposal: What the City Has (and Hasn't) Done; and
- Urban Strategies Inc., 2013. BBTCA Review Urban Planning & Design Assessment of Potential Transportation Impacts & Mitigation Measures.

The above-listed studies were based on then-current traffic conditions and estimated future airport passenger volumes. Recommended mitigation measures for alleviating future congestion were derived from the outcome of the studies, including proposed opportunities for improving modal split and minor changes to intersection features at Lakeshore Boulevard and Dan Leckie Way. In addition to this EA and other on-going studies, PortsToronto and the City of Toronto are undertaking two separate studies that will build upon the above-listed studies. As the above-listed studies were not based on projected passenger volumes from the 2015 Master Planning Exercise for the BBTCA, the on-going studies will provide updated traffic volume estimates based on current and projected future permitted traffic volumes, and mitigation measures based on these updated passenger volume projections under the Tripartite Agreement. In addition, PortsToronto plans to undertake permanent real-time traffic monitoring in the Eireann Quay neighbourhood to help optimize mitigation measures to address current or potential traffic congestion

and safety issues in the area. The effects of potential mitigation measures and infrastructure changes on the community's transportation assets will be assessed as part of this EA and will use information from the following sources:

- Transportation network and current traffic conditions information;
- Traffic capacity on Study Area road network;
- Urban form and land use information;
- Projections of future traffic volumes;
- Transportation plans, including active transportation and transit plans; and
- Future modal split requirements.

Effects Assessment

The information collected will allow the Study Team to assess the potential effects of changes to transportation infrastructure or operations on a variety of community assets. A community asset is a feature that may be affected by the proposal and that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent. Community assets that could be affected by the proposed changes to transportation operations or infrastructure include:

- Public safety;
- Public health;
- Residential uses;
- Transportation;
- Community services;
- Tourism;
- Local economy; and
- Convenience.

Attachment A - Work Plans details how effects on the assets will be measured and what information sources will be used. The study methods are also outlined.

Please note that the EA Scope has been informed by feedback received through the consultation process.

Marine Navigation Assessment Overview

The Study Area

Where will the Environmental Assessment (EA) study effects on the **Marine Navigation Environment**?

The original Study Area included:

- The end of the runway;
- Beyond the Marine Exclusion Zone (MEZ); and
- Within the Western Channel.

We've heard that people are concerned about effects extending to these key areas:

- The Inner Harbour;
- The Outer Harbour;
- The Leslie Street Spit; and
- Humber Bay.



Concerns about potential effects relating to the Study Area have tended to focus on the effects of noise and air quality on user experiences in the inner and outer harbours and Humber Bay; the potential effects of jet blast or wake turbulence (sometimes called "wing tip vortices") at the edge of the MEZ; and, the potential impacts on navigation associated with any proposed changes to the width or location of the opening of the Western Channel. The marine navigation study will assess the physical impacts of jet blast and wake turbulence at the edge of the MEZ and navigation impacts associated with changes to the land mass within the Local Study Area. Effects to boat navigation from jet blast and wake turbulence beyond this Study Area will be confirmed through the information received from the Preliminary Runway Design. Other studies conducted as part of this EA will assess the effects of potential changes to noise, air quality, user experience, and recreational opportunities associated with the proposal within the Regional Study Area and will be commented on using information obtained through the associated effects assessment studies.

The boundaries of the Marine Navigation Study Area are depicted in the figure above.

What will be studied?

In general, the draft scope of assessment includes undertaking the following tasks:

1. Conduct a review of background information and the results from jet blast and wake turbulence assessments from the 2015 Preliminary Runway Design to determine the anticipated wind speed and lifting force at the edge of the MEZ; conduct interviews with boaters and boating clubs regarding recreational boating and the types of boats involved (to be conducted under the socio-economic scope of work);

2. Identify changes to the marine navigation from jet blast, altered wave conditions, changes to the ability to navigate the Western Channel and on the enjoyment of the boating experience on a variety of boats, from the Future Baseline and Proposed Future Scenarios in consideration of future environmental conditions;
3. Identify cumulative effects taking into account other past, present and certain or reasonably foreseeable future effects from other actions/projects within the same geographic and temporal boundaries of this assessment; and,
4. Compare effects from the Future Baseline and Proposed Future Scenarios.

From consultation that has occurred to-date, we understand that people are concerned with:

- Potential for extension of the land mass and jet blast to make steering of a boat difficult, or even leading to capsize under various meteorological conditions;
- Potential for extension of the land mass to require an in-water lighting system;
- Potential of jet noise to make speaking on a boat difficult or impossible;
- Potential of extension of the land mass to make navigation more difficult in the Inner Harbour, Western Channel, and Humber Bay; and
- Potential for extension of the land mass and jet blast to make for a less relaxing experience for boaters because of aesthetic and noise impacts.

The list above includes a sample of the top issues we've heard so far. Additional issues raised are provided in ***Appendix C1 – Key Comments Received and Resulting Changes to the Scope*** for review.

The table below documents the issues raised, how the EA will evaluate the issues and any updates made to the scope of work based on comments received.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
Navigation	Impacts of the extension of the land mass and jet blast/wake turbulence on the maneuverability or stability of a boat	Yes	Yes	▪ The preliminary runway design will determine the jet blast/wake turbulence envelope (where jet blast/wake turbulence may occur) and the force within that envelope. ▪ The EA will use that information to review the potential impacts of jet blast/wake turbulence at the edge of the MEZ on different boat types. To do so, the EA will review the different types of boats that are frequently used in the vicinity of the airport and apply a mathematical formula and engineering judgement to determine how the motion of each type of boat could be affected by the jet blast and wake turbulence. This is called a dynamic stability assessment. The dynamic stability of a boat in water is the ability of the boat to remain upright even if pushed around by forces such as wind or waves.
Navigation	Requirement for approach lighting and impacts of lighting on navigation	No	No	▪ According to Transport Canada an approach lighting system is not a standard for non-precision approaches ▪ The reason BBTCA is non-precision is driven by the built form environment around the airport. Due to the location of buildings in close proximity to the airport – like the Hearn, the Malting Silos and the buildings downtown – commercial pilots must make a decision to not land when they are higher up in the air. A precision airport would mean the pilot could wait until they were lower to the runway to make this decision. Pilots make the decision about whether to land higher up at the BTTCA to ensure they have room to manoeuvre if they decide not to land.
Recreation	Impacts of jet noise on ability to hold a conversation on a boat when a plane flies overhead	No	Yes	▪ After reviewing comments received to-date, the Study Team understands that boaters are concerned with jet noise making it difficult to hear speech while boating in the area. ▪ The Noise assessment will include receptor locations in the inner harbour where boaters could be affected by the proposal
Navigation	Navigability of Inner Harbour, Western Channel, and Humber Bay as a result of land mass changes	Yes	Yes	▪ This study will examine any proposed changes to the dimensions of the MEZ and width of the Western Channel in order to comment on crowding of vessels entering or exiting the Western Channel. ▪ No changes to water levels or the shoreline of the Inner Harbour or Humber Bay are expected beyond the MEZ.

Issue	Detail	In Original EA Scope?	In Draft Revised EA Scope?	Study Methods/Rationale
Recreation	Ability of boaters to relax while boating	Yes	Yes	▪ Under the socio-economic scope of work, surveys and interviews will be conducted in the spring and summer, 2015, with recreational users including people boating in the area. ▪ Survey and interview questions will include how BBTCA operations affect their use and enjoyment of recreational spaces. ▪ Details such as the specific questions and the total number of surveys and interviews will be developed in the winter of 2015. ▪ The results will be tabulated to provide an overall indication of the recreational users' perception of the effect of the BBTCA on their use and enjoyment of the waterfront. ▪ In addition, the EA will create rendered visualizations of future development models to ascertain the visual impacts of the proposal from different important vantage points. These will be presented through a series of user experience vignettes. One proposed vignette location is within the Inner Harbour. The purpose of this location is to document effects on the boating experience. ▪ The results of the Noise, Air Quality and Built Environment/Land Use studies will be reviewed in order to provide a commentary on the effect that changes in these areas of the environment could have on the use and enjoyment of recreational spaces, which includes boating areas.

Information Sources

The following studies were reviewed to inform the effects assessment, this information also allowed the Study Team to determine which additional studies should be conducted.

- CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments; and
- Dr. Davidson-Arnott, R., 2013. Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment.

Additional information regarding the marine navigation environment will be collected from the following sources:

- National Ocean and Atmospheric Administration and Environment;
- Canada wave and wind data;
- Stakeholder interviews conducted as part of the Socio-Economic study for this EA (regarding typical boat size, length and width);
- Billy Bishop Toronto City Airport runway design; and
- Billy Bishop Toronto City Airport 2015 Master Planning Exercise.

Effects Assessment

The information collected will allow the Study Team to assess potential effects on the marine navigation issues listed above. These issues have been categorized into broader "community assets" for the purposes of the EA. A community asset is a feature that may be affected by the proposal and that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent. Assets that may be affected by the proposed changes include:

- Recreation – boating

Attachment A – Work Plans details how effects on the assets will be measured and what information sources will be used.

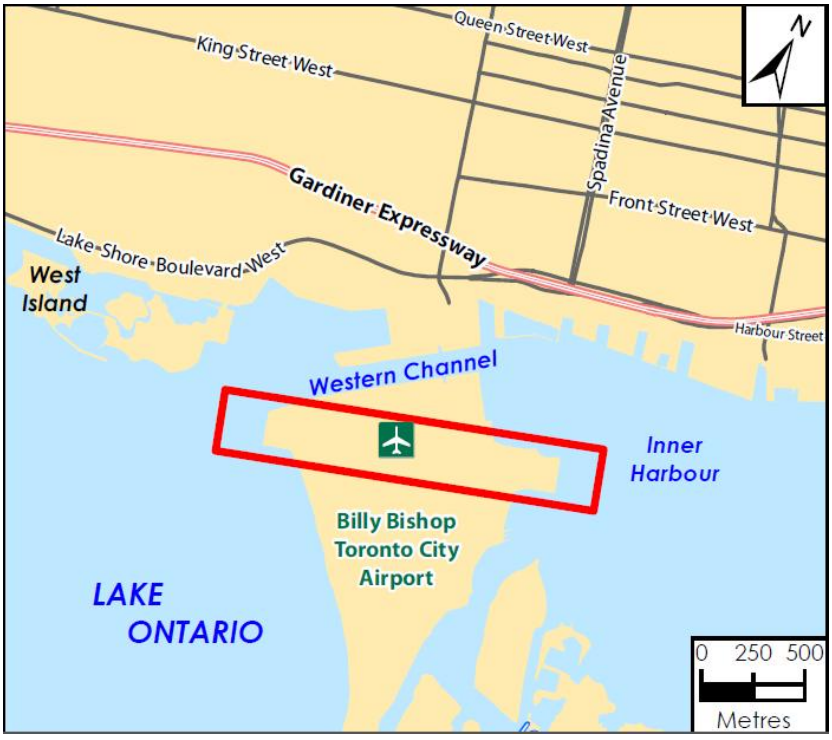
Please note that the EA Scope have been informed by feedback received through the consultation process.

Archaeology and Cultural Heritage Assessment Overview

The Study Area

Where will the Environmental Assessment (EA) study the effects on **Archeology and Cultural Heritage**?

The original Study Area for Archaeology and Cultural Heritage included the following:



Archaeology:

- Areas that will be physically affected by the extension of the land mass at each end of the main runway by 200 metres, into the lake and inner harbour and any proposed areas where ground disturbance may occur as these are areas where archaeological artifacts could be disturbed.

Cultural Heritage:

- The airport and areas of extension of the land mass at each end of the main runway by 200 metres as this is the only area where changes are proposed. Effects on cultural heritage resources beyond these areas are not anticipated.

To-date, no comments from participants in the consultation process regarding the Study Area have been received. The boundaries of the Archaeology and Cultural Heritage Study Area are depicted in the figure above.

What will be studied?

In general, the EA study's scope includes undertaking the following tasks:

1. Conduct a review of background information to summarize the potential for buried artifacts and the current condition of cultural heritage features;
2. Conduct a marine and terrestrial Stage 1 Archaeological Assessment to identify areas with archaeological potential and to determine whether further archaeological analysis is required; and
3. Create an inventory of cultural heritage features and recommend whether a Cultural Heritage Assessment Report (CHAR), also known as a Heritage Impact Assessment (HIA), is required as part of the detailed design, should the project proceed.

Information Sources

The following resources were reviewed to inform the effects assessment. This information will also allow the Study Team to determine which additional studies should be conducted.

Archaeology:

- Archaeological Sites Database (ADSB);
- A database detailing all known archaeological sites across Ontario;
- City of Toronto Archives;
- Maps of early settlement areas;
- City of Toronto Archaeological Master Plan;
- Identifies areas of archaeological potential requiring archaeological study prior to development;
- Northern Shipwreck Database;
- Detailing more than 100,000 shipwrecks covering 400 years;
- Great Lakes Shipwreck file; and
- A search for other archaeological reports already completed for the area.

Cultural Heritage:

- City of Toronto Inventory of Heritage Properties;
- Ontario Heritage Properties Database (current as of 2005, no further updates were made after this);
- Canada Register of Historic Places;
- Cemetery Register;
- Inventory of Historical Plaques;
- Consultation with the Ministry of Tourism Culture and Sport Heritage Unit on listed, designated or otherwise recognized heritage properties or landscapes that have cultural heritage value or interest to the community;
- Consultation with the City of Toronto Heritage Planner and local historical societies; and
- A search for other reports pertaining to heritage features in the vicinity.

Effects Assessment

The information collected will allow the Study Team to assess potential effects on archaeology and cultural heritage features. Archaeology and cultural heritage issues are also being described as “Assets” in this EA. A community asset is a feature that may be affected by the proposal and that has been identified to be of concern by the public, government agencies, First Nation and Métis communities, or the proponent.

Attachment A - Work Plans details how effects on the archaeology and cultural heritage assets will be measured and what information sources will be used.

Please note that the EA Scope has been informed by feedback received through the consultation process.

Attachment A: Work Plans – Measures of Effect and Data Sources

The table below outlines measures of effect and data sources used to determine whether there will be a negative, positive or no effect resulting from the proposed extension of the land mass and lifting the jet ban.

Asset	Measure of Effect	Additional Data Sources/Methods	
Socio-Economic			
Residential Uses	▶ Changes to the use and enjoyment of private property as it relates to airport operations (e.g. having to keep windows closed during periods of high BBTCA activity, or changes to access to residential property due to changed traffic patterns) ▶ Changes to noise ▶ Changes to air quality ▶ Changes to the view shed	*Data Source:*	▶ Golder Associates, 2013. Health Impact Assessment Proposed Billy Bishop Expansion. ▶ Pre-arranged interviews with condominium boards, residential associations and residents. ▶ Intercept surveys, including surveys of residents. ▶ Findings from the Noise and Air Quality effects assessment studies regarding changes in noise/air quality levels. ▶ Findings from the Built Environment and Land Use effects assessment study regarding changes in the view shed between the Future Growth Scenarios. ▶ Other desktop reports, as appropriate.
		Method:	▶ Conduct targeted stakeholder interviews, a statistically representative phone survey and approximately 250 intercept surveys, including some residents, in the summer, 2015. ▶ Intercept survey will seek participants (including residents) in various locations across the Local Study Area; potential locations generally include: Ontario Place and surrounding area; locations within Bathurst and Eireann Quays; the Music Garden and surrounding area including Marina Quay West; HTO Park, the Harbourfront Centre, and surrounding areas; Jack Layton Ferry Terminal and surrounding area; locations within East Bayfront; locations within the Distillery Historic District; locations within the Lower Don Lands and the Port Lands; locations within the Port Lands including the Leslie Street Spit; locations within the Toronto Islands. The intercept surveys will gain an understanding of the local environment, current BBTCA operations and anticipated construction and operation effects of the proposed expansion on residents' use and enjoyment of property, satisfaction with living in the area, and outdoor use of their residence. ▶ Pre-arranged stakeholder interviews with condominium boards/residents/resident associations to gain an understanding of the local environment, current BBTCA operations and anticipated construction and operation effects of the proposed expansion on residents' use and enjoyment of property, satisfaction with living in the area, and outdoor use of their residence. ▶ Telephone surveys with a sample of local area residents to gain an understanding of the local environment, current BBTCA operations and anticipated construction and operation effects of the proposed expansion on residents' use and enjoyment of property, satisfaction with living in the area, and outdoor use of their residence. ▶ Tabulate and review interview/survey results to provide an indication of residents' attitudes towards the direction of effect from the current BBTCA operations and the proposed expansion on their use and enjoyment of their properties, their satisfaction with living in the area and their outdoor use of space in the area. ▶ Review results of the Noise, Air Quality and Built Environment/Land Use studies in order to provide a commentary on the effect that changes in these areas of the environment could have on residential uses.
Recreational Uses	▶ Changes to the use and enjoyment of recreational spaces as it relates to airport operations (e.g. ability to listen to concerts at the Music Garden or changes to access to amenities due to changed traffic patterns) ▶ Changes to noise ▶ Changes to air quality ▶ Changes to the viewshed	*Data Source:*	▶ Golder Associates, 2013. Health Impact Assessment Proposed Billy Bishop Expansion. ▶ Pre-arranged interviews with yacht clubs, boaters and other recreational groups. ▶ Intercept surveys, including recreational users at the waterfront. ▶ Findings from the Noise and Air Quality effects assessment studies regarding changes in noise/air quality levels between the Future Growth Scenarios. ▶ Findings from the Built Environment and Land Use effects assessment study regarding changes to the viewshed between the Future Growth Scenarios. ▶ Other desktop reports, as appropriate.
		Method:	▶ Conduct targeted stakeholder interviews, a statistically representative phone survey and approximately 250 intercept surveys, including some recreational users, in the summer, 2015. ▶ Intercept survey will include recreational users, such as people boating, walking, running, bird watching, cycling, picnicking and attending concerts at waterfront venues. ▶ Seek intercept survey participants in various locations across the Local Study Area; potential locations generally include: Ontario Place and surrounding area; locations within Bathurst and Eireann Quays; the Music Garden and surrounding area including Marina Quay West; HTO Park, the Harbourfront Centre, and surrounding areas; Jack Layton Ferry Terminal and surrounding area; locations within East Bayfront; locations within the Distillery Historic District; locations within the Lower Don Lands and the Port Lands; locations within the Port Lands including the Leslie Street Spit; locations within the Toronto Islands. The intercept surveys will gain an understanding of the local environment, current BBTCA operations and anticipated construction and operation effects of the proposed expansion on recreational opportunities and use. ▶ Conduct stakeholder interviews with a sample of marinas/boating clubs and other recreational groups to assess effects on their members including an understanding of the local. environment, current BBTCA operations and anticipated construction and operation effects of the proposed expansion on recreational opportunities and use. ▶ Information on recreational use will also be collected in the phone survey of local and wider Study Area residents, should respondents state that they visit the waterfront area for recreational purposes. ▶ Tabulate and review interview/survey results to provide an indication of recreational users' attitudes towards the direction of effect from the BBTCA operations and the proposed expansion on recreational opportunities and use. ▶ Review results of the Noise, Air Quality and Built Environment/Land Use studies in order to provide a commentary on the effect that changes in these areas of the environment could have on the use and enjoyment of recreational spaces.
Institutional Uses	▶ Changes to the uses of or access to institutional spaces as it relates to airport operations (e.g. at the City School) ▶ Changes to noise ▶ Changes to air quality ▶ Changes to the viewshed	*Data Source:*	▶ Golder Associates, 2013. Health Impact Assessment Proposed Billy Bishop Expansion. ▶ Pre-arranged interviews with school board and official school representatives. ▶ Findings from the Noise and Air Quality effects assessment studies regarding changes in noise/air quality levels between the Future Growth Scenarios. ▶ Findings from the Built Environment and Land Use effects assessment study regarding changes in the view shed between the Future Growth Scenarios. ▶ Other desktop reports, as appropriate.
		Method:	▶ Conduct stakeholder interviews in the spring and summer, 2015. ▶ Interview school board and official school representatives to gain an understanding of the local environment, current BBTCA operations and anticipated construction and operation effects of the proposed expansion on the function and operation of the schools , in particular, the City School, Waterfront School and the Island Public/Natural Science School. ▶ Tabulate and review interview results to provide an indication of institutional attitudes towards the direction of effect from the BBTCA operations and the proposed expansion on institutional uses and operations. ▶ Review results of the Noise, Air Quality and Built Environment/Land Use studies in order to provide a commentary on the effect that changes in these areas of the environment could have on institutional uses and operations.

Attachment A: Work Plans – Measures of Effect and Data Sources

Asset	Measure of Effect	Additional Data Sources/Methods	
Economy	▶ Increases or decreases in business activity associated with changes in airport operations	*Data Source:*	▶ Environics Research Group, 2013. Toronto Resident Survey: Billy Bishop Toronto City Airport. ▶ InterVISTAS Consulting, 2012. Billy Bishop Toronto City Airport (YTZ) Economic Impact Study. ▶ HLT Advisory, 2013. Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport. ▶ Other desktop reports, as appropriate. ▶ Pre-arranged interviews with a sample of local businesses and business associations such as hotels, restaurants and taxi operators to allow the Study Team to interpret the above report findings and further assess existing conditions and possible economic effects associated with the Future Growth Scenarios. ▶ Intercept surveys, including business users at the waterfront area. ▶ Findings from the Noise and Air Quality effects assessment studies regarding changes in noise/air quality levels in the future scenario with and without jets.
		Method:	▶ Review and synthesize the background reports listed above /comment on the findings as they relate to economic implications for businesses across the City of Toronto ▪ The existing economic studies were developed using an Input/Output modelling methodology which conforms to accepted economic impact assessments of this nature. The economic multipliers resulting from these studies enable the Study Team to scale economic impacts according to projected passenger volumes in a linear manner. ▶ Conduct targeted stakeholder interviews, and approximately 250 intercept surveys, including some business users, in the summer, 2015 ▶ Interview businesses and business associations to gain an understanding of the influence of the waterfront area, current BBTCA operations, and anticipated construction and operational effects of the proposed expansion on the function and operation of local businesses ▶ Specific businesses to be interviewed include hotels, restaurants and taxis. This will include effects on business expansion/investment intentions and on business customers. ▶ Business associations and business improvement areas will be interviewed to gain an understanding of effects on a wider range of business interests ▶ Intercept surveys at a range of locations in the waterfront area will be conducted with a variety of users, including business users to gain an understanding of the local environment, current BBTCA operations and anticipated construction and operation effects of the proposed expansion on business operations and opportunities ▪ Qualitative questions allow the Study Team to identify potential directional effects (either positive, negative or neutral effects) of the proposal on business activity in the area, including effects on business expansion/investment intentions and on business customers. ▶ Tabulate and review interview/survey results to provide an indication of business users' attitudes towards the direction of effect from the BBTCA operations and the proposed expansion on business operations and opportunities. ▶ Review results of the Noise, Air Quality and Built Environment/Land Use studies in order to provide a commentary on the effect that these changes could have on local businesses.
Tourism	▶ Changes in tourist-behaviour linked to changes to the BBTCA operations ▶ Changes to noise ▶ Changes to air quality ▶ Changes to the viewshed	*Data Source:*	▶ Intercept surveys with tourists at the waterfront to gather qualitative information on current experiences at the waterfront, as well as perceived effects of the Project on those experiences. ▶ Findings from the Noise and Air Quality effects assessment studies regarding changes in noise/air quality levels between the Future Growth Scenarios. ▶ Findings from the Built Environment and Land Use effects assessment study regarding changes in the viewshed between the Future Growth Scenarios.
		Method:	▶ Conduct approximately 250 intercept surveys, including some tourists, in the summer, 2015. ▶ Conduct surveys with tourists from the GTA, Ontario and from outside Canada in the survey. ▶ Intercept surveys will be conducted in various locations across the Local Study Area; potential locations generally include: Ontario Place and surrounding area; locations within Bathurst and Eireann Quays; the Music Garden and surrounding area including Marina Quay West; HTO Park, the Harbourfront Centre, and surrounding areas; Jack Layton Ferry Terminal and surrounding area; locations within East Bayfront; locations within the Distillery Historic District; locations within the Lower Don Lands and the Port Lands; locations within the Port Lands including the Leslie Street Spit; locations within the Toronto Islands. ▶ Include respondents' views on the waterfront and how BBTCA operations influence their views of the waterfront in the survey questions. ▶ Tabulate and review interview/survey results to provide an indication of tourist attitudes towards the direction of effect of the BBTCA and the proposed expansion on tourist experiences and tourist visitation. ▶ Review results of the Noise, Air Quality and Built Environment/Land Use studies in order to provide a commentary on the effect that changes in these areas of the environment could have on the waterfront and tourists to the waterfront.
Municipal Implications	▶ Capital investment requirements	*Data Sources:*	▶ Environics Research Group, 2013. Toronto Resident Survey: Billy Bishop Toronto City Airport. ▶ InterVISTAS Consulting, 2012. Billy Bishop Toronto City Airport (YTZ) Economic Impact Study. ▶ HLT Advisory, 2013. Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport. ▶ Bathurst Quay Neighbourhood Study. ▶ Other desktop reports, as appropriate.
		Methods :	▶ Review and synthesize the background reports listed above and comment on possible implications to municipal finance. ▶ Consult with City of Toronto officials. ▶ Conduct a qualitative economic assessment of potential costs of infrastructure required by the City, as identified by the Bathurst Quay Neighbourhood Study, as well as the potential impacts on property tax revenues from possible changes to property values, if any.
Property Values	▶ Potential impacts to property values within the waterfront (for both existing and planned waterfront communities) ▶ Future development could be altered based on impacts of the Proposal affecting people's desire to locate within the Waterfront	*Data Source:*	▶ N. Barry Lyon Consultants Ltd. 2013. Condominium Market Value Impact Analysis: Billy Bishop Airport (found in Appendix of HLT Advisory, 2013. Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport). ▶ Central Waterfront Secondary Plan (CWSP). ▶ East Bayfront Precinct Plan (EBPP). ▶ Lower Don Lands Precinct Plan (LDPP). ▶ Bathurst Quay Neighborhood Plan (BQNB). ▶ Villiers Island Precinct Plan. ▶ Others as deemed appropriate by agencies. ▶ Pre-arranged interviews with professionals involved closely in the development and sales of commercial and residential properties in the waterfront area including real estate brokers and developers.

Attachment A: Work Plans – Measures of Effect and Data Sources

Asset	Measure of Effect	Additional Data Sources/Methods	
		Method:	▶ Review and synthesize the background studies listed above and comment on changes in property values within the waterfront. The relevancy of these studies will also be commented on and documented in the environmental study report. ▶ Insights and information from real estate and development professionals will be obtained through direct interviews, in groups or individually, as availability permits. Information will be gathered regarding past and potential future changes to sales of existing and new waterfront floor area with and without the proposed project.
Non-use Values	▶ Potential impacts to non-use values as it relates to airport operations	*Data Source:*	▶ City-wide phone survey in the spring and summer, 2015 designed to reach out to cell phone and land line users across the City of Toronto. ▶ Intercept surveys with a variety of users along the waterfront area.
		Method:	▶ The phone survey will capture a statistically representative sample of City of Toronto residents both within the Local Study Area and the Regional Study Area, to consider the perceived non-use values of environmental elements within the Local Study Area from both users and non-users across the City. ▶ The phone survey will obtain attitudes and perspectives of a sample of Toronto residents to understand how they use the waterfront area (if at all) and how they value the waterfront area, regardless of their frequency of use of the area. The survey will be conducted by phone in Summer 2015 through the services of a specialty polling service agency. ▶ Intercept surveys will also ask all users about how they value the waterfront area.
Built Environment			
Regulatory Compliance: Existing Federal, Provincial and Municipal Plans and Policies	▶ Compliance with in-force and emergent policies and regulatory restrictions within areas planned for new private sector development and/or public sector investment in public spaces and trail systems ▶ Future ground floor area development	*Data Source:*	▶ Multi-tiered regulatory framework, inclusive of: ▪ Federal: TP 1247 – Land Use in the Vicinity of Airports; ▪ Federal: TP 312 – Aerodromes Standards and Recommended Practices; ▪ Provincial: 2014 Provincial Policy Statement; ▪ Provincial: Places to Grow Plan; ▪ Municipal (City-wide): City of Toronto Official Plan; ▪ Municipal (City-wide): Applicable Zoning By-laws; ▪ Municipal (Precinct – Statutory): Central Waterfront Secondary Plan; and ▪ Municipal (Precinct – Non-statutory): various precinct plans and studies within limits of the Study Area.
		Method:	▶ Analysis of framework to evaluate potential built form and land use impacts, merits and policy compliance (or non-compliance) issues associated with the Future Growth Scenarios. ▶ Use mapping to identify any possible compliance concerns with land use restrictions respecting sensitive land uses adjacent to an airport.
Future Development		*Data Source:*	▶ Background reports: ▪ Urban Strategies Inc., 2013. Consultant Report - BBTCA Expansion Review Summary Report; ▪ WSP Group, 2014. Consultant Report – Strategic Vision for Peak Hour Passenger Forecast for BBTCA; ▪ N. Barry Lyon Consultants Ltd. 2013. Condominium Market Value Impact Analysis: Billy Bishop Airport (found in Appendix of Economic Impact Considerations of an Expanded BBTCA); and ▪ BA Group, 2013. BBTCA Transportation Assessment of Proposed Jet Activity Summary Report. ▶ City of Toronto CAD files will be used to provide a foundation for all future modeling and visualization studies. ▶ Airport operational control surfaces.
		Method:	▶ Assess effects on future residential or commercial uses through a review of noise effects, impacts on future development and property values. ▶ Assess future noise impacts at sensitive receptor locations to be assessed through modelling efforts. ▶ Review and identify potential new height restrictions associated with the intersection of planned future development and future flight control surfaces. ▶ Review assessment of future property value impacts from the study conducted by N. Barry Lyon Consultants Ltd. ▶ Create rendered visualizations of future development models to ascertain the visual impacts of the proposal from different important vantage points. ▶ Determine vantage points through consultation with members of the public, stakeholders and public agencies.
Natural Environment			
Significant Features or Functions	▶ Temporary and/or long-term loss of significant natural heritage features or functions, such as: ▶ Provincially Significant Wetlands, ▶ Areas of Natural and Scientific Interest (ANSIs), or ▶ Significant Wildlife Habitats	*Data Source:*	▶ CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments. ▶ Dillon Consulting Limited, 2011. Toronto Port Authority Proposed Pedestrian/Services Tunnel and Perimeter Road Project. ▶ Terrestrial plant and wildlife habitat field observations: ▪ Vegetation community mapping; and ▪ Significant wildlife habitat assessment. ▶ Background information on significant natural heritage features from: ▪ Toronto and Region Conservation Authority (TRCA); ▪ Ministry of Natural Resources and Forestry (MNRF); ▪ Natural Resources Values Information System (NRVIS) mapping from Land Information Ontario (LIO); ▪ Designated area information from the MNRF Natural Heritage Information Centre (NHIC) database; and ▪ City of Toronto Official Plan.
		Method:	▶ Review and analyze background information to identify significant natural heritage features potentially affected by the proposed extension of the land mass and introduction of jets. ▶ Conduct terrestrial habitat field observations by a one-day field visit to collect visual observations in the immediate vicinity of the BBTCA and from the shoreline of the Toronto Islands, including: ▪ Complete vegetation community mapping using the Ecological Land Classification (ELC) system for Southern Ontario; and ▪ Complete significant wildlife habitat assessment in accordance with the “Significant Wildlife Habitat Technical Guide” from MNRF. ▶ Identify area of impact associated with works proposed in sensitive or listed features.

Attachment A: Work Plans – Measures of Effect and Data Sources

Asset	Measure of Effect	Additional Data Sources/Methods	
Terrestrial Habitats or Functions	▶ Temporary and/or long-term loss of sensitive terrestrial habitat or functions, including wetlands, woodlands and dune environments, or features known to support sensitive species	*Data Source:*	▶ Terrestrial plant and wildlife habitat field observations: ▪ Vegetation community mapping; ▪ Plant species inventory; ▪ Significant wildlife habitat assessment; and ▪ Incidental wildlife observations. ▶ Background information on terrestrial habitats from: ▪ TRCA; ▪ MNRF; ▪ NRVIS mapping from LIO; ▪ Designated area information from the MNRF NHIC database; and ▪ City of Toronto Official Plan.
		Method:	▶ Review and analyze background information to identify terrestrial habitats potentially affected by the proposed extension of the land mass and introduction of jets. ▶ Conduct terrestrial habitat field observations by a one-day field visit to collect visual observations in the immediate vicinity of the BBTCA and from the shoreline of the Toronto Islands, including: ▪ Complete vegetation community mapping using the ELC system for Southern Ontario; ▪ Complete significant wildlife habitat assessment in accordance with the “Significant Wildlife Habitat Technical Guide” from the MNRF; ▪ Record any observed wildlife; and ▪ Determine area of effect for the terrestrial habitats identified.
Terrestrial Species	▶ Temporary and/or long-term effects on sensitive terrestrial species including plants, birds, monarch butterflies and other wildlife, rare species and Species at Risk.	*Data Source:*	▶ Terrestrial plant and wildlife habitat field observations: ▪ Vegetation community mapping; ▪ Plant species inventory; ▪ Significant wildlife habitat assessment; and ▪ Incidental wildlife observations. ▶ Bird surveys: ▪ Fall migration; ▪ Overwintering; ▪ Spring migration; ▪ Breeding surveys; and ▪ Summer Cormorant behaviour surveys. ▶ Background terrestrial species data, including bird data, from: ▪ NHIC rare species records; ▪ MNRF; ▪ TRCA, including date from Tommy Thompson Park Bird Research Station (TTPBRS) and off-site wildlife management options; ▪ Canadian Wildlife Service (Lake Ontario Winter Waterfowl Survey data); ▪ Toronto Ornithological Club; ▪ Toronto Naturalist Club; ▪ Bird Studies Canada; ▪ eBird; ▪ Toronto Bird Observatory of the Ontario Bird Banding Association (OBBA); ▪ Fatal Light Awareness Program (FLAP) bird data for Toronto, if available; ▪ Bird information for the Toronto Islands from the Harbourfront Kayak Centre, if available; ▪ Turtle information for the Toronto Islands from the Kawartha Turtle Trauma Centre, if available; ▪ Breeding Bird Atlas of Ontario (Cadman et al. 2007); and ▪ Migratory Birds in the City of Toronto: A Literature Review and Data Assessment (Dougan & Associates Ecological Consulting and Design with North-South Environmental Inc., 2009). ▶ Transport Canada bird strike information and off-site wildlife management options. ▶ BBTCA bird strike data. ▶ BBTCA Wildlife Management Plan. ▶ Academic institutions and/or published scientific studies. ▶ Reports, studies and/or wildlife management plans for other airports in North America and/or airports located on islands or adjacent to large bodies of water documenting wildlife management actions used on and off the airport grounds. ▶ 2015 Master Planning Exercise: ▪ Anticipated jet flight paths and heights; ▪ Frequency of flights; and ▪ Missed approach decision point.

Asset	Measure of Effect	Additional Data Sources/Methods	
		Method:	▶ Review and analyze background terrestrial species data to provide a comprehensive list of species, including birds, potentially affected by the proposed extension of the land mass. ▶ Conduct terrestrial habitat field observations by a one-day field visit to collect visual observations in the immediate vicinity of the BBTCA and from the shoreline of the Toronto Islands, including: ▪ Complete vegetation community mapping using the ELC system for Southern Ontario; ▪ Complete significant wildlife habitat assessment in accordance with the "Significant Wildlife Habitat Technical Guide" from the MNRF; and ▪ Record any observed wildlife. ▶ Complete bird surveys to develop an understanding of bird habitat use within the immediate vicinity of the proposed runway expansions: ▪ Conduct fall migration surveys between October and November, on a total of four occasions; ▪ Conduct overwintering surveys between December and February, on a total of two occasions; ▪ Conduct spring migration surveys between March and May, on a total of four occasions; ▪ Conduct breeding surveys between May and July, on a total of three occasions; ▪ Conduct summer Cormorant behaviour surveys, on a total of four occasions; ▪ On each occasion, bird surveys will be completed by a qualified biologist from a point count location at each end of the existing runway; ▪ All birds observed within 500 m will be recorded including species, number of individuals, location, and approximate altitude of flight during a 20-minute survey duration; ▪ Bird surveys will be conducted between sunrise and noon and will capture a wide range of weather conditions to the extent possible; and ▪ Use the projected flight paths and flight frequency (from the 2015 Master Planning Exercise), relative risk of strikes for different groups of birds (based on published studies), and existing bird strike data from the BBTCA to determine potential effects of the proposed extension of the land mass and jets on birds recorded in the Study Area. ▶ Complete a literature review of off-site wildlife management at North American airports to identify potential mitigation or management techniques that could be implemented at BBTCA and TTP. ▶ Consult with TRCA and Transport Canada regarding off-site wildlife management options for BBTCA.
Aquatic Habitat or Functions	▶ Temporary and/or long-term loss of aquatic habitat within the footprint of the proposed runway extension of the land mass, including areas known to support key life cycle stages (e.g. spawning areas), or areas known to support sensitive aquatic species	*Data Source:*	▶ Background aquatic habitat data from: ▪ TRCA; ▪ MNRF; ▪ Fisheries and Oceans Canada (DFO); and ▪ Aquatic Habitat Toronto (AHT). ▶ Aquatic habitat field observations: ▪ Submerged vegetation; ▪ Substrate (e.g. sand, gravel); and ▪ Cover (e.g. submerged woody debris).
		Method:	▶ Review and analyze existing background aquatic habitat data to identify aquatic habitats potentially affected by the proposed extension of the land mass. ▶ Complete detailed aquatic habitat surveys within the footprint of the proposed extension of the land mass and the MEZ. ▪ Conduct a two-day field investigation with the use of an underwater camera to document existing fish habitat conditions including substrate, submerged and emergent aquatic vegetation, and cover types (e.g. submerged woody debris); and ▪ Record sampling sites in a grid and assign each location a unique identification number. Take photos and identify aquatic macrophytes, substrate, and cover at each sample location. ▶ Complete aquatic habitat impact assessment using TRCA's Habitat and Environmental Assessment Tool (HEAT) to quantify the amount and assess the quality of habitat that would be removed or disturbed by the proposed extension of the land mass.
Aquatic Species	▶ Temporary and/or long-term effects on aquatic species, including fish, Endangered Species and Species at Risk (SAR) such as the American Eel.	*Data Source:*	▶ Background fish collection data from: ▪ Fish and fish habitat information for the Toronto Islands from Ontario Streams, if available; ▪ TRCA, including warm and cold water surveys conducted by TRCA in the MEZ; ▪ MNRF; ▪ DFO; and ▪ Conservation Ontario Aquatic Species at Risk Distribution Mapping.
		Method:	▶ Review existing background fish collection data to provide a comprehensive list of aquatic species potentially affected by the proposed extension of the land mass. ▶ Identify existing habitat (as described above) that would be removed or disturbed by the proposed extension of the land mass. ▶ Compare habitat requirements of individual species, including Endangered Species (ESA) and Species at Risk (SAR), to the existing habitats to identify potential effects on aquatic species.
Air Quality			
Recreational Uses; Residential Uses; Tourism; Institutional Uses	▶ Levels of: Nitrogen Dioxide; particulate (PM10 and PM2.5); benzo-a-pyrene; benzene and acrolein concentrations	*Data Source:*	▶ Model road traffic in the Study Area, including the Gardiner Expressway and Lakeshore Blvd, as well as smaller arterial streets in the immediate vicinity of the airport (Stadium Road, southern part of Bathurst). ▶ Ambient air quality data from: MOECC and Environment Canada Monitoring Stations; as well as monitoring data collected by Metrolinx as part of the Georgetown South Project; Aircraft and corresponding ground support equipment activity from PortsToronto; Existing and future vehicular traffic volumes on local roads from the City of Toronto; Ferry activity data from PortsToronto and the City of Toronto; Taxi idling activity at BBTCA from PortsToronto; Jet aircraft emissions data from Bombardier.
		Method:	▶ Establish background air quality conditions based on the road traffic modelling supplemented with ambient air quality monitoring data collected by the Ministry of the Environment and Climate Change (MOECC) and Environment Canada at Hanlan's Point, the intersections of Bay Street and Wellesley Street and Ruskin and Perth Street, and the University of Toronto and Metrolinx data from the Georgetown South Monitoring Station. ▶ The EA will predict levels of air contaminant concentrations, such as nitrogen Dioxide; particulate (PM10 and PM2.5); benzo-a-pyrene; benzene and acrolein concentrations. The contaminants will be confirmed based on information from Toronto Public Health. Chromium (including Chromium VI) will also be considered to the extent that information is available. CAS numbers will be provided for all contaminants. ▶ The spatial variability of ambient background concentrations and the applicability of the data to the Study Area will be investigated through the use of regional models if information allows Any available regional model may be used to characterize background levels for contaminants for which there is little or no ambient monitoring data (i.e., PM10 and acrolein).

Attachment A: Work Plans – Measures of Effect and Data Sources

Asset	Measure of Effect	Additional Data Sources/Methods	
			▶ Quantify air contaminant emission rates using airport-specific U.S. Federal Aviation Administration and U.S. Air Force model for airport sources. The model accounts for aircraft activity (queuing, taxiing, takeoffs and descents), ground support equipment (e.g., baggage tugs, catering trucks, fuel trucks etc.), auxiliary power units (APUs), stationary sources including boilers and emergency gensets. ▶ Apply U.S. EPA MOVES models to account for vehicle emissions on local roads where traffic will be affected by the proposal and taxi activity at Eireann Quay. Ferry emissions will be determined based on U.S EPA emission factor information. ▶ Conduct dispersion modelling using the US EPA's CALPUFF model, which is approved by the MOECC. Determine the downwind concentrations of the contaminants, i.e. how they disperse, accounting for varying meteorological conditions. ▶ Evaluate the cumulative air quality concentrations from background and airport, traffic and ferry sources under baseline conditions, the future scenario with jets and the future scenario without jets at sensitive receptor locations. Computer modelling results for all air contaminants at a receptor point apply equally well to other locations in the vicinity of that point. ▶ The modelling will be based on 1-year of hourly meteorological data process using CALMET. As such, this covers a wide range of weather conditions. ▶ Develop contour plot of NOx based on a receptor grid to illustrate spatial variations in predicted contaminant concentrations. ▶ Compare results to MOECC ambient air quality criteria and Canadian ambient air quality standards as well as to Toronto Public Health Toxicity Reference Values that the City of Toronto is currently developing, as available. ▶ Compare results for ambient particulate matter for published threshold relative to impacts on vegetation. ▶ Ground level ozone will be assessed in accordance with the Ontario Ministry of Transportation guidelines. ▶ Qualitatively assess odour and atmospheric deposition impacts for future with jets scenario relative to future baseline conditions. ▶ Odour will be assessed qualitatively in terms of anticipated changes in fuel use, changes in locations of activities relative to wind direction frequencies, etc. ▶ Review the MOECC's assessment of "black soot" and discuss the results.
Climate Change	▶ Levels of: carbon dioxide (CO2), nitrous oxide (N2O) and methane (CH4)		▶ Greenhouse gas emissions will be estimated for baseline conditions, future conditions with jets and future conditions without jets. The emissions will be compared to relevant benchmarks such as total GHG emissions from the City of Toronto and the transportation sector. ▶ Discuss initiatives to reduce GHG emissions in the airline industry.
Public Health			
Public Health is an Asset that is affected by: Air Quality; Noise Levels	▶ Changes to noise levels ▶ Changes to air quality	*Data Source:*	▶ Noise model output. ▶ Public perceptions of noise and self-reported concerns with noise levels obtained via intercept surveys, telephone surveys and interviews conducted as part of the Socio-Economic scope of work. ▶ Air quality model output.
		Method:	▶ Air quality model output will be compared against toxicity reference values provided by the City of Toronto. ▶ Noise model output will be compared against reference values for social and health impacts provided by the City of Toronto. ▶ Through intercept surveys, telephone surveys, and interviews with various users and non-users of the waterfront area, those perceptions regarding noise or air quality concerns, including odours, associated with the airport, or other sources, will be included in the public health assessment with regards to perceptions of nuisance.
Noise			
Recreational Uses; Residential Uses; Tourism; Institutional Uses	▶ A weighted sound levels (Leq dBA and LDN) ▶ Noise Exposure Forecast (NEF) ▶ Number of Events above 70 dBA (N70)	*Data Source:*	▶ Noise Exposure Forecast model. ▶ US FAA Integrated Noise Model (INM). ▶ ISO 9613 model as incorporated into Cadna/A. ▶ ORNAMENT, STAMINA, and STEAM models. ▶ 2014 WebTrak, community noise monitors (shows aircraft movements to and from airports and associated noise levels). ▶ Existing noise impact assessments and engine run-up reports will be reviewed. ▶ New and historic noise monitoring data. ▶ CS100 and Q400 noise certification data, supplemented by additional data from Bombardier.
		Method:	▶ Assess sound levels, including changes in cumulative sound levels between the future scenario with jets and without jets. The following sources will be considered: aircraft in the air, on the runways, taxiing; performing run-ups (engine testing); the ferry; ground support equipment; road traffic and light rail transit. ▶ The assessment will use the following models: the Noise Exposure Forecast model (NEF), the Integrated Noise Model (INM), the Ministry of the Environment and Climate Change's (MOECC) Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) and the Sound from Trains Environmental Analysis Method (STEAM), the ISO 9613 sound propagation model as incorporated into Cadna/A. ▶ Noise modelling will be supplemented with data from new and historic ambient noise monitoring data. ▶ Compare the resulting noise levels to noise levels specified in Tripartite Agreement, the MOECC guideline NPC -300 and other criteria such as degree of speech interruption (N70) as aircraft fly over. Sound levels will also be evaluated at schools using the key indicators LDN and N70. The steps for completing the comparison include: ▪ RWDI takes historical data from a base year (to be used as the "existing conditions" year) on scheduled and unscheduled flights that have taken off and landed from BBTCA in that year, the flight path profiles for that year, and the specifications of each aircraft type, and inputs them into the INM model; ▪ The INM model calculates an LDN value at each receptor point and over a grid, which is an average sound level, based on the data that was input; ▪ The INM model also provides an output matrix that describes the sound level impacts by location and aircraft; and ▪ RWDI then inputs this matrix into TNIP software, which provides a geographic representation of noise impacts in the form of contour lines which represent the N70, or the number of times per day that noise levels will exceed 70dBA within each contour line. ▶ Note that the assessment methodologies are generally based on a standard weather condition. However, the Noise Assessment Report will include information on the sensitivity of the measured noise levels to weather conditions, and on the frequency of certain key weather conditions, such as those associated with temperature inversions, low cloud and fog.
Marine Physical Environment and Water Quality			
Wave Formation	▶ Changes in wave height, wave period (i.e. time between two waves) and wave direction	*Data Source:*	▶ CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments. ▶ Dillon, 2013. Lakefill Within MEZ for the TPA.

Attachment A: Work Plans – Measures of Effect and Data Sources

Asset	Measure of Effect	Additional Data Sources/Methods	
		Method:	▶ Review the above noted studies and analyze results regarding changes in wave formation. ▶ Use this information to identify potentially required mitigation measures to protect the shoreline.
Water Levels	▶ Changes in water levels in the western gap and nearby marina	*Data Source:*	▶ CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments. ▶ Dillon, 2013. Lakefill Within MEZ for the TPA.
		Method:	▶ Review the above noted studies and analyze results for information which will allow the comparison of current water levels to future water levels. Changes in water levels can affect erosion and cause storm surges under storm conditions.
Currents	▶ Changes in flow patterns and current speed	*Data Source:*	▶ CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments. ▶ Dillon, 2013. Lakefill Within MEZ for the TPA. ▶ Dr. Davidson-Arnott, R., 2013. Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment.
		Method:	▶ Review the above noted studies for results regarding changes in flow patterns as changes in flow patterns and current speeds could affect water quality, circulation, sediment transport and navigation.
Sediment Transport	▶ Sediment deposition/accumulation in West Island, Western Gap and in the immediate vicinity of the extension of the land mass (to identify where sediment may deposit) ▶ Long shore sedimentation patterns (whether sediment moves along the shoreline) ▶ Sediment deposition/accumulation in the inner harbor ▶ Changes to type of sediment that could be moved by the currents (if currents speeds change, it can affect the size of sediment that moves)	*Data Source:*	▶ CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments. ▶ Dillon, 2013. Lakefill Within MEZ for the TPA. ▶ Dr. Davidson-Arnott, R., 2013. Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment.
		Method:	▶ Review the above noted studies and comment on changes to flow velocity, wave height, period and direction, to interpret where sediment may deposit or accumulate if the land mass is extended.
Water Quality	▶ Source of pollutants ▶ Type of pollutants ▶ Changes to water flow	*Data Source:*	▶ As-built drawings. ▶ 2015 Master Planning Exercise. ▶ Runway preliminary design and/or detailed design drawings. ▶ Flow into the inner harbour through the Western Channel from Assessment of Receiving Water Responses to Alternative Wet Weather Flow Control Options, City of Toronto's Don River and Central Waterfront Project - Class ESR, Dr. Ray Dewey, Modelling Surface Water Limited, April 2013. ▶ Potential flows of contaminated stormwater runoff into Lake Ontario from the airport property.
		Method:	▶ Review the above-noted and other relevant studies and analyze results for information which will allow the comparison of current pollutant sources to future pollutant sources. Changes in pollutant sources or pollutant types can affect water quality without appropriate mitigation measures, so existing and proposed mitigation measures will also be reviewed, and additional measures or further detailed studies may also be recommended. ▶ Evaluate typical measured and calibrated currents (velocity and direction) in Western and Eastern Gaps during typical operation conditions (Lake currents dominate) and storm conditions. ▶ Create mass balance model in inner harbour to reflect inflow/outflow through Western and Eastern Gaps, inflow from Don River Flows/velocities in western and eastern gaps. ▶ Perform mass-balance calculations assessing the potential approximate changes to water flow into the inner harbour from the Western Channel, as compared to estimated outflow from the Don River, as the major source of effluent into the harbour. ▶ Estimate change in residence time in Inner Harbour, assuming 'plug' flow and no recirculation assuming % recirculation based on previous modeled flow patterns. ▶ Review and comparison of existing and proposed future stormwater management plan, and spills containment plans.
Transportation			
Public Safety	▶ Estimated increased risk of collisions	*Data Source:*	▶ Available data and studies to provide information regarding existing safety conditions. ▶ The existing studies may include: ▪ BA Group, 2013. BBTCA Transportation Assessment of Proposed Jet Activity Summary Report ▪ Urban Strategies Inc., 2013. BBTCA Review Urban Planning & Design Assessment of Potential Transportation Impacts & Mitigation Measures ▶ New traffic studies and model for Eireann Quay, including forecast projections. ▶ 2015 Master Planning Exercise
		Method:	▶ Review proposed changes to traffic volumes associated with airport passengers and operations (including delivery and commercial vehicles) ▶ Review proposed changes to traffic volumes and pedestrian/cyclist amenities associated with other development from the Bathurst Quay Neighbourhood Study ▶ Use projections from existing traffic assessments/models to estimate changes in collision risks between vehicles, pedestrians, and cyclists
Access to important uses	▶ Changes to access to residences, businesses and recreational facilities and activities	*Data Source:*	▶ Existing studies to provide information regarding: traffic congestion, public transit, and modal split.
		Method:	▶ Review existing traffic and transportation studies to provide comment on effects to people's ability to access their residences, businesses, active transportation, and recreational facilities.
Transportation Options	▶ Changes to modal split	*Data Source:*	▶ Existing studies to provide information regarding: projections from existing traffic assessments, future modal split requirements, transportation network and current traffic information, and transportation plans, including active transportation and transit plans. ▶ New traffic studies and model for Eireann Quay.
		Method:	▶ Use projections from existing traffic assessments/models to determine changes to, and future modal split requirements. ▶ Review BA Group's 2015 Updated Traffic Report and model. ▶ Review traffic monitoring and modelling from Dillon Consulting. ▶ Assess the potential for changes to modal split and determine the degree to which these changes will free up network capacity.

Attachment A: Work Plans – Measures of Effect and Data Sources

Asset	Measure of Effect	Additional Data Sources/Methods
		▶ Outline the study recommendations and proposed mitigation measures.

Attachment A: Work Plans – Measures of Effect and Data Sources

Asset	Measure of Effect	Additional Data Sources/Methods	
Convenience	▶ Changes to access to the airport	*Data Source:*	▶ Existing studies to provide information regarding: traffic congestion, public transit, and modal split.
		Method:	▶ Use projections from existing traffic assessments/models to estimate changes to airport access.
▶ Marine Navigation			
Recreation – Boating	▶ Impacts of jet blast, wake turbulence, and altered wave conditions on stability (also referred to as the dynamic stability) of vessels	*Data Source:*	▶ CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments. ▶ Dr. Davidson-Arnott, R., 2013. Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment. ▶ National Ocean and Atmospheric Administration and Environment. ▶ Canada wave and wind data. ▶ Stakeholder interviews conducted as part of the Socio-Economic study for this EA (regarding typical boating activity). ▶ Billy Bishop Toronto City Airport Preliminary Runway Design. ▶ Billy Bishop Toronto City Airport 2015 Master Planning Exercise.
		Method:	▶ Conduct a review of background information and the results from jet blast and wake turbulence assessments from the 2015 Master Planning Exercise to determine the anticipated wind speed and lifting force at the edge of the MEZ. ▶ Assess information on typical boats navigating in the area, including ferry operations, from interviews with stakeholders conducted as part of the Socio-Economic study and other data collection activities. ▶ Outline the size, length and width of different typical vessels using the Inner Harbour. ▶ Comment on likely changes to waves and currents caused by the extension of the land mass based on previous and ongoing studies and design details provided by PortsToronto as part of the Preliminary Runway Design. ▶ Estimate the degree to which changes in waves and jet blast could alter the course of or affect the balance of various boats at the edge of the MEZ, using engineering judgement and, where appropriate, a mathematical calculation.
Recreation – Boating	▶ Changes to the ability of boats to navigate the western gap and close to the runway expansion (also referred to as the maneuverability of a vessel)	*Data Source:*	▶ 2015 Master Planning Exercise. ▶ Preliminary Runway Design. ▶ Estimates of sediment deposition.
		Method:	▶ Review any proposed changes to the dimensions of the MEZ and width of the Western Channel as a result of built infrastructure and potential sediment deposition in order to understand potential changes to the bathymetry of the Western Channel. ▶ Based on the above, comment on crowding of vessels entering or exiting the Western Channel.
Archaeology and Cultural Heritage			
Archaeological Features	▶ Effects on areas with terrestrial and marine archaeological potential and known archaeological sites	*Data Source:*	▶ Archaeological Sites Database (ADSB): a database containing known archaeological sites across Ontario. ▶ City of Toronto Archives: Maps of early settlement areas. ▶ City of Toronto Archaeological Master Plan: identifies areas of archaeological potential requiring archaeological study prior to development. ▶ Northern Shipwreck Database: contains more than 100,000 shipwrecks covering 400 years. ▶ Great Lakes Shipwreck file. ▶ A search for other archaeological reports already completed for the area.
		Method:	▶ Conduct a terrestrial and marine Stage 1 Archaeological Assessment to meet the requirements of the Ministry of Tourism, Culture and Sport's (MTCS) 2011 Standards and Guidelines for Consultant Archaeologists in accordance with the Ontario Heritage Act. ▶ Conduct a background study as part of this, which will consist of research using the sources listed above to identify known archaeological sites in the vicinity and areas subject to previous assessments, as well as an evaluation of the potential for archaeological resources to be present in the Study Area. ▶ Map areas where there is a high potential for archaeological finds and determine where proposed construction works could affect areas of archaeological potential and whether additional archaeological studies are required according to best practices and Ontario Ministry of Tourism, Culture and Sport regulations.
Cultural Heritage Features	▶ Effects on identified cultural heritage resources, including buildings and cultural heritage landscapes	*Data Source:*	▶ City of Toronto Inventory of Heritage Properties. ▶ Ontario Heritage Properties Database (current as of 2005, no further updates were made after this). ▶ Canada Register of Historic Places. ▶ Cemetery Register. ▶ Inventory of Historical Plaques. ▶ Consultation with the Ministry of Tourism Culture and Sport Heritage Unit on listed, designated or otherwise recognized heritage properties or landscapes that have cultural heritage value or interest to the community. ▶ Consultation with the City of Toronto Heritage Planner and local historical societies. ▶ A search for other reports pertaining to heritage features in the vicinity.
		Method:	▶ Prepare a list of listed, designated or otherwise recognized heritage properties in the Study Area based on a review of the sources listed above. ▶ Compare location of cultural heritage resources to location of proposed construction disturbance, and recommend mitigation measures, if appropriate.

Appendix C

Comments Received and Responses

C1. Key Comments Received and Resulting Changes to the Scope

C2. 30-Day Review Period

C3. 30-Day Review Period from the Peer Reviewer

C1. Key Comments Received and Resulting Changes to the Scope

C1: Key Comments Received and Resulting Changes to the Scope

The table below outlines changes made to this scope based on feedback from participants in the consultation process.

How to read this table:

Issue	Details	In original EA scope	In draft revised EA scope	Key Study (supporting study)	Study Methods
The type of concern people have raised.	Outlines the specifics of each question or concern that people want to see addressed.	Identifies that it was an issue which was originally anticipated to be addressed by the EA, as outlined in the EA scope presented to the public on January 24, 2015.	Indicates whether or not the issue has been added to the EA scope of work.	Key study identifies the specific effects assessment study from which effects will be derived, and supporting study lists the studies from which additional information may be derived. Additional information from supporting studies will be used by the key study as data inputs.	Summarize the way in which the effects assessment will be conducted, or, in the case of elements not included in the EA study scope, explains how other studies or planning processes will address the issue or question.

More detailed information on the effects assessment methods can be found in **Appendix B**.

Issue	Details	In original EA scope?	In draft revised EA scope?	Key Study (supporting studies)	Study Methods
Baseline for Assessment	need to understand impacts of current operations	yes	yes	all studies	▶ The Environmental Assessment (EA) will assess the current environmental conditions to understand the contribution of current airport operations to all elements of the environment being studied. The elements of the environment being studied include: ▪ Air Quality; ▪ Noise Quality; ▪ Public Health; ▪ Marine Navigation; ▪ Built Form and Land Use; ▪ Archaeology and Built Heritage; ▪ Socio-Economic Conditions; ▪ Natural Environment; and, ▪ Marine Physical Environment and Water Quality. ▶ The Study Design and its appendices explain how and what information is being collected for each of the above-listed effects assessment studies, and how it will be used to understand the impacts of the proposal.
Scenarios to be Assessed	review a tripartite scenario	yes	yes	all studies	▶ The EA will assess the impacts of future airport operations under an operating scenario both with jets (to be detailed in the 2015 Master Planning Exercise) and without jets (as detailed in the 2012 Master Plan). ▶ The Study Design and its appendices explain the details of each scenario and how the impacts of the proposal will be assessed in the EA.
	review a tripartite + Runway End and Safety Area (RESA) scenario	yes	yes	all studies	▶ A runway end safety area is a space at the end of a runway that allows a plane some extra space to stop upon landing in case of emergency. In 2010, Transport Canada identified the requirement to implement a RESA at qualifying airports as an additional safety consideration. The installation of a RESA at the BBTCA would result in an amendment to the Tripartite Agreement (WSP Group, 2014), but would be required to comply with anticipated Transport Canada regulations. The RESA at the BBTCA would consist of an approximate 50 m by 100 m land mass extension which includes lakefilling at both ends of runway 08-26 in the Toronto Harbour within the Marine Exclusion Zone (MEZ). Although not required under the CEA Act, an EA report for lake fill in the vicinity of the proposed RESA, “Lakefill within Marine Exclusion Zone (Keep-out-Area) Toronto Harbour”, was completed in January, 2013 (Dillon Consulting, 2013). ▶ The Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport will assess the impacts of future airport operations under an operating scenario both with jets (to be detailed in the 2015 Master Planning Exercise) and without jets (as detailed in the 2012 Master Plan). ▶ This includes the understanding that RESAs will be required elements of future airport runways, and that a Tripartite Agreement amendment will be necessary in order to allow the construction of the RESA, whether or not the proposed extension of the land mass is allowed to move forward to detailed design.
	review a runway extension + jets scenario	yes	yes	all studies	▶ The EA will assess the impacts of future airport operations under an operating scenario both with jets (to be detailed in the 2015 Master Planning Exercise) and without jets (as detailed in the 2012 Master Plan).
	review a no airport scenario	no	no	N/A	▶ The EA will not assess the impacts to the environment of closing down the airport as this is not being considered by the operator as a likely scenario.
	assess different scenarios than those detailed in the Draft Study Design Document, including a scenario in which no airport exists in the future, and a scenario in which the airport does not grow beyond current conditions	no	no	N/A	▶ The Study Design has been updated in Section 3.1.1 and 3.1.2 to clarify the details of the scenarios to be assessed, including identifying the ways in which the scenarios proposed for review align with the April 1, 2014 resolution of Toronto City Council. As noted by the peer reviewer, “This approach, which includes the consideration of two (2) alternative scenarios (future baseline without the project, and future with the proposed runway extension and jet aircraft), is reasonable and consistent with best practice when no specific federal or provincial EA process is triggered.”
	clarify how the outcome of this EA will be used by decision-makers.	yes	yes, with updates	N/A	▶ The Study Design has been updated in Section 5 to explain that the proposal constitutes infrastructure and operational changes that cannot be undertaken without amendments to the Tripartite Agreement, and as such, any of the proposed changes presented in this document that are not currently allowed under the Tripartite Agreement will require agreement from the City of Toronto, Transport Canada, and PortsToronto to be included in an amended agreement before being implemented. This section also indicates that the EA is not a decision-making mechanism, but a decision-support tool for the three signatories of the Tripartite Agreement to refer to in deciding whether or how to amend the Agreement.
	comply with Toronto City Council’s April 1 direction with regards to phased caps on airport growth	No	Yes	N/A	▶ PortsToronto understands the request for a phased framework for managing growth at the BBTCA, as recommended by City staff and adopted by City Council on April 1, 2014 and is committed to completing the studies required, including the EA, and implementing improvements associated with Phase 1. PortsToronto acknowledges there is a caps and phasing framework which will be discussed with the Tripartite signatories after Phase 1 work has been completed. ▶ The Study Design has been updated to detail the alignment of the scenarios in the EA to the caps and phasing framework outlined by Toronto City Council in the April 1, 2014 Council resolution. These details are found in Section 3.1.2 of the Study Design.
Study Area	assess impacts along the waterfront from Ontario Place to Port Lands and the Leslie Street Spit	yes	yes, with updates	all studies	▶ Each effects assessment team has reviewed information received from participants in the consultation process. Part of reviewing this feedback involved determining whether any changes needed to be made to the Study Area boundaries. The updated work plans for each effects assessment study describe and illustrate refinements made to the Study Area based on the comments received. ▶ For example, the Built Form and Land Use Study Area has been expanded to include the Unilever Site and portions of The Beach neighbourhood. ▶ Please see each individual Effects Assessment Overview sheet for a description of specific updates to the Study Areas.

C1: Key Comments Received and Resulting Changes to the Scope

Issue	Details	In original EA scope?	In draft revised EA scope?	Key Study (supporting studies)	Study Methods
	include Scarborough, North York and Etobicoke in the Study Areas	no	yes	air quality and noise	▶ Effects extending to Scarborough, Etobicoke and North York are not anticipated due to the distance of these locations from the airport and associated flight paths; however, the air quality and noise Study Areas were updated to include receptor locations in Woodbine Beach, the Harbour and Clark Beach Park to the east and Ontario Place and the Toronto Sailing & Canoe Club to the west. Finally, Ashbridge's Bay, Woodbine Park and Woodbine Beach in the east and Mimico and the Humber Bay Park in the west are proposed locations for the User Experience Vignettes to illustrate effects in these specific Areas.
Marine Exclusion Zone (MEZ)	assess impact of proposal on location of MEZ buoys	no	no	2015 Master Planning Exercise	▶ Assessing the impact of the proposal on the location of MEZ buoys is outside the scope of work of the EA; however, the 2015 Master Planning Exercise (currently being developed) will determine the need to alter the airport zoning regulations and approach surfaces, which will determine the potential for changes to the MEZ and the location of the buoys. This will be based on the regulations of the 4th Edition of Transport Canada's TP312. ▶ The EA will examine effects on recreation and boating from potential changes to the MEZ. This will be done through surveys and interviews with waterfront users and sailing clubs to understand the implication of changing the MEZ on boating.
Boating and Water Sports	assess need for change to width of or location of opening of western channel	no	no	socio-economic	▶ The Marine Physical and Water Quality effects assessment includes a review of the configuration of the Western Channel, including the MEZ. ▶ As part of the 2015 Master Planning Exercise (currently being developed), any changes to the land mass of the airport will be identified. This will determine if changes (e.g. to the width of or location of opening) to the Western Channel could take place. ▶ The socio-economic scope of work in this EA will assess the impacts of potential changes as they relate to boating. In order to understand boating activity, the Study Team is proposing to interview local boaters who use the waterfront.
	assess impacts of the proposal on boaters, not just boats	yes	Yes, with updates	socio-economic	▶ The EA will assess impacts of changes to noise, air quality, views and jet blast on boaters using the Inner Harbour and Western Channel. ▶ A combination of pre-arranged meetings and user intercept surveys are planned for summer, 2015. The interviews will aim to capture the perceptions and attitudes of a diversity of waterfront users on issues and consequences for boaters. ▶ After reviewing comments received to-date, the scope of the intercept surveys increased in terms of total number of surveys, the location and duration. The surveys will now be conducted from the Port Lands to Ontario Place and will be extended into the autumn of 2015. This will allow the Study Team to survey a greater variety of waterfront users at the height of the recreation season as well as during the shoulder season.
Jet Blast / "Wing Tip Vortex" *(wake turbulence)*	assess impact of jets on boaters near the MEZ	yes	yes	marine navigation	▶ The Preliminary Runway Design and 2015 Master Planning Exercise will determine the jet blast envelope (where jet blast could occur) and the force of jet blast and vortices within that envelope. ▶ The EA will use that information to review the potential impacts of jet blast at the edge of the MEZ on different boat types. To do so, the EA will review the different types of boats that are frequently used in the vicinity of the airport and apply a mathematical formula or engineering judgement to determine how the motion of each type of boat could be affected by the jet blast. This is called a dynamic stability assessment. The dynamic stability of a boat in water is the ability of the boat to remain upright even if pushed around by forces such as wind or waves.
Public Safety	review risks associated with aircraft accidents	no	no	2015 Master Planning Exercise, Detailed Design	▶ Although a formal risk assessment is not currently proposed for the EA, the EA will confirm compliance with the applicable Transport Canada regulations that guide airport design and operation (such as TP312 – Aerodrome Standards and Recommended Practices). ▶ Airside risks are to be addressed in the 2015 Master Planning Exercise.
	review risks associated with fuel transportation, handling and storage	yes	yes	EA Report – Impacts of Accidents and Malfunctions section	▶ A technical study of regulatory requirements associated with the storage and handling of aircraft fuel currently used at the airport was completed by CH2M HILL in the study "Porter Airlines Runway Extension Proposal Review, Coastal Processes and Environments" (November, 2013). This study found that no changes to risk from fuel handling and storage would occur as these activities are regulated through the Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal or Aboriginal Lands Regulations (SOR/2008-197 — November 30, 2011) and the Technical Standards and Safety Authority. ▶ Risks associated with the transportation of fuel have been reviewed by Golder Associates in the study "Health Impact Assessment – Proposed Expansion to Billy Bishop Toronto City Airport" (November, 2013). ▶ Although it is not proposed to recreate these studies, they will be referenced as part of this EA under the section pertaining to Accidents and Malfunctions. ▶ Fuel delivery and other commercial vehicle traffic will be included in the assessment of transportation impacts, which will include a review of potential pedestrian safety considerations associated with the proposal.
	review risks associated with bird strikes	yes	yes	natural environment	▶ A review of past trends in bird strike occurrences for various species at the BBTCA will be compared to a comprehensive bird list compiled from the records and background information received from various agencies to understand the potential impacts of the airport on bird populations. The EA will consider jet flight paths and height, as well as frequency of flights information (to be provided in the 2015 Master Planning Exercise) to identify where bird strike are likely to occur and relate this to the potential effects on birds recorded in this identified area. Although estimating impacts on birds is not directly related to public safety, the study will help to show the potential for changes to bird strike occurrences and associated public safety implications. ▶ If the proposed changes to the runway are approved, the existing BBTCA Wildlife Management Plan will be updated, and any associate risk assessment work required to do so will be completed to at that time to determine what mitigation measures are required as part of the plan to reduce the potential for risks from bird strikes.
	clarify the methods proposed for assessing the public safety impacts associated with potential airside accidents, as well as safety impacts on land and in the water.	yes	yes, with updates	public safety	▶ The Study Design has been updated to include additional detail on the assessment of potential public safety impacts in Section 3.7.1. This detail includes information on the BBTCA's airside protection surfaces, pedestrian safety, navigation impacts and bird strikes. ▶ The Canadian Coast Guard has also been added to the contact list for outreach and engagement.
Airport Operations	assess changes to angle of ascent/descent	no	no	2015 Master Planning Exercise	▶ All required operational changes associated with the proposal, including protection surfaces and airport zoning regulations, will be determined as part of the 2015 Master Planning Exercise. ▶ The impacts of any changes to protection surfaces will be assessed as part of the EA, through the Land Use and Built Form, Socioeconomic, Marine Navigation, and Natural Environment effects assessment studies.
	assess need for approach lighting	no	no	N/A	▶ According to Transport Canada an approach lighting system is not a standard for non-precision approaches ▶ The reason BBTCA is non-precision is driven by the built form environment around the airport. Due to the location of buildings in close proximity to the airport – like the Hearn Stack, the Malting Silos and the buildings downtown – commercial pilots must make a decision whether or not to land when they are higher up in the air than when approaching an airport without nearby tall structures. A precision airport would mean the pilot could wait until they were lower to the runway to make this decision. Pilots make the decision about whether to land higher up at the BTTCA to ensure they have room to manoeuvre if they decide not to land. ▶ As a result of the above, there is no regulatory requirement for approach lighting at BBTCA.

C1: Key Comments Received and Resulting Changes to the Scope

Issue	Details	In original EA scope?	In draft revised EA scope?	Key Study (supporting studies)	Study Methods
	describe how TP312 will be met	no	no	2015 Master Planning Exercise	▶ As per the April 1, 2014 request from Toronto City Council, PortsToronto is undertaking an exercise to identify the design details of the proposed 200 metre land mass extension at each end of the main runway. The preliminary runway design will be based on the requirements of TP312 4th Edition, as it has been the standard in force throughout the past 12 months of design activities. TP312 5th Edition has been released and is set to come into force on September 15th, 2015. It is PortsToronto's understanding that, given the significant work that has been undertaken for the preliminary runway design to date under the requirements of the 4th Edition, and the anticipated grandfathering allowances to be included as part of the regulations or guidelines associated with the 5th Edition (details are anticipated to be released in August) that it is acceptable to Transport Canada to continue to undertake the preliminary runway design in compliance with the current regulations of the 4th Edition of TP312. Although the EA will not undertake design activities, it will consider the effects of the proposed Preliminary Runway Design with regards to compliance with TP312 4th edition.
Built Environment	assess impacts on future residential or commercial uses (in terms of noise, height restrictions and property values)	yes	yes	land use &built environment (with input from the socio-economic, noise and transportation studies)	▶ The EA will assess effects on future residential or commercial uses through a review of noise effects, impacts on future development and property values. ▶ The EA will assess future noise impacts at sensitive receptor locations through modelling efforts. Noise measurements will be taken at residential locations as well. The specific locations of these residences are being determined with input from consultation to-date. There will be additional opportunities to provide input on these locations as part of the Study Design review period. ▶ Impacts on future development will be assessed in terms of reviewing potential new height restrictions imposed by changes to the Airport Zoning Regulations and limitation surfaces and the desirability and marketability of new development in the Port Lands. ▶ Property value impacts have been assessed by N. Barry Lyon Consultants Ltd. in the study "Condominium Market Value Impact Analysis: Billy Bishop Airport " (November, 2013). This report found that property values have continued to increase along the waterfront while flight and passenger volumes have increased at the BBTCA. Property values will be discussed as part of the socio-economic effects assessment study.
	determine existing, proposed and future buildings that fit within the Airport Zoning Regulations (AZR)	yes	yes	land use &built environment	▶ Impacts on future development will be assessed in terms of potential height restrictions compared to plans for future development plans; and by assessing the desirability and marketability of future development according to development and real estate professionals.
	assess effects of flight path changes on existing or future neighbourhoods	no	no	N/A	▶ Based on preliminary work conducted as part of the 2015 Master Planning Exercise, changes to flight paths are not currently anticipated; however, changes to airside operations such as flight profiles or flight frequency, as well as aircraft technology, will be reviewed for environmental impacts in the EA, as described above.
	assess impacts on existing residential or commercial uses	yes	Yes, with additions	socio-economic (with input from the transportation, noise and air quality studies)	▶ Many residents of waterfront properties have expressed concerns about the effects of noise and poor air quality, such as: ▪ Ability to use balconies because of noise and odour; ▪ Ability to open windows and doors or reliance on indoor air conditioning; ▪ Ability to sleep, hold conversations or undertake other activities when planes pass; ▪ Impacts on property values; and ▪ Impacts on traffic and associated noise and air quality impacts from ground-level transportation. ▶ The original EA scope proposed to assess impacts on the use and enjoyment of private property from airport operations. This was to be completed through interviews with condominium boards and/or local residents within the Study Area. The interviews would include questions pertaining to any changes in how residents use their properties resulting from different levels of activity at the airport. These interviews will also pose questions to address the overall quality of their living experience, to the extent possible, to determine its association with changes in airport operations. ▶ After reviewing comments received to-date, as previously mentioned, the western boundary of the Study Area expanded and additional condominiums were identified to be included within the assessment Study Area. ▶ The EA will also assess likely indoor noise impacts at sensitive receptor locations through modelling efforts. ▶ Noise measurements will be taken at residential locations as well. The specific locations of these residences have been determined with input from consultation to-date, and include: a residential balcony on Little Norway Crescent and a residential balcony on Queens Quay. ▶ This EA will also review air quality impacts that could affect people's use of their private outdoor space. Air quality impacts will be assessed through air quality and emissions dispersion modelling, and will include gathering data on people's perspectives on air quality or other issues pertinent to them in interviews with condominium boards and/or local residents within the Study Area. ▶ Traffic and transportation studies will be reviewed to provide comment on effects to people's ability to access their properties, parking and active transportation.
	assess impacts on aesthetics and views from water and land	yes	yes	built environment (socio-economic)	▶ The EA will create rendered visualizations of future development models to ascertain the visual impacts of the proposal from different important vantage points. ▶ These vantage points have been determined through consultation with members of the public, stakeholders and public agencies.
	Expand the study area beyond the AZRs and the Central Waterfront Secondary Plan to include areas further east	no	yes	land use &built environment	▶ The land use & built environment Study Area has been expanded to include the Unilever Site and portions of The Beach neighbourhood. Both of these areas include sensitive uses (planned or existing) outside of the extents of the Airport Zoning Regulations and the Central Waterfront Secondary Plan that could be affected by the proposed changes to the airport/airport operations.
	undertake precedent analysis of other airports and their associated adjacent land uses	no	yes	land use &built environment	▶ Land use controls and guidelines for settlement areas adjacent to comparable airports will be reviewed.
Noise	assess current noise levels during taxiing, take-off and landing	yes	yes	noise	▶ Sound levels from aircraft activity on runways, as well as during take-off and landing will be modelled through the use of the U.S. Federal Aviation Administration's INM Model.
	assess future noise levels during taxiing, take-off and landing	yes	yes	noise	▶ Sound levels during taxiing, take-off and landing will be modelled to predict changes to these levels at multiple receptor points in a future environment.
	impacts of noise on outdoor activities	yes	yes, with additions	noise	▶ Modelled noise levels at various sensitive outdoor receptor locations will be analysed to determine how changes to noise levels affect the use and enjoyment of outdoor community amenities and private outdoor space.
	measure current and future noise levels	yes	yes, with additions	noise	▶ Noise levels at several sensitive receptor locations were monitored to understand how the noise from flight activities, including taxiing, take-off and landing, are experienced at different locations. These recorded sound levels will supplement the modelled noise levels to determine the anticipated impacts from the jet aircraft, based on noise certification data.
	assess impacts of noise on indoor environment	yes	yes	noise	▶ Modelled noise levels at various sensitive outdoor receptor locations will be analysed to determine how changes to noise levels affect the use and enjoyment of various waterfront assets. This includes the assessment of indoor noise impacts, taking into account the difference in volume likely with open or closed windows, and with different building techniques.
	assess impacts of noise and vibration on upper floors of existing and new buildings	no	yes	noise	▶ Different locations will have different experiences of noise, and it is acknowledged that upper floor balconies or open windows with a line-of-sight to airport activities, including plane taxiing, take-off and landing may not experience noise in the same way as those receptors at ground level equidistant to the upper floor receptor, especially when taking into account a proposed noise barrier. These effects will be discussed in the assessment report.
	assess impacts of noise on learning outcomes at City School	yes	yes, with additions	noise	▶ Sound levels from the airport will be modelled using the FAA's INM model. The metrics LDN and N70 will be used to compare with the findings of the impacts of noise on school children as reported in ARCP Document 16.

C1: Key Comments Received and Resulting Changes to the Scope

Issue	Details	In original EA scope?	In draft revised EA scope?	Key Study (supporting studies)	Study Methods
	measure noise in dBC and assess low frequency noise	no	no	noise	▶ dBC measurements are typically used for low frequency sources such as military jet aircraft. The EA team has requested frequency data from the manufacturer of the CS100 and Q400 to better understand the need for this type of noise measurement; however, at this time it is not anticipated that this will materially affect the outcome of the noise assessment and therefore it is recommended to measure noise using the approved standard of measure for this type of application which is a dBA measurement.
	measure noise in "real time" instead of averaging noise levels over a period of time	no	yes	noise	▶ Measurement of noise levels in real time has been undertaken, including in residential areas, as part of the collection of background data for this study. The collection of noise monitoring data will build on and supplement the noise study done by Jacob's Consultancy in the study “Billy Bishop Toronto City Airport Noise Management Study – Interim Report” (February, 2010).
	expand the study area to include areas eastwards, westwards, and closer to the Marine Exclusion Zone (MEZ)	no	yes	noise	▶ Additional receptors within the range of the NEF model can be added; however, the NEF model is limited outwards to the geographic extent of the NEF 25 contour. ▶ A larger study area will be accommodated by using Federal Aviation Administration’s (FAA) Integrate Noise Model (INM).
	calibrate Noise Exposure Forecast (NEF) model with measured noise levels	no	yes	noise	▶ The NEF model is a regulatory model that describes the daily-average sound levels from aircraft on the runway and in the air on a peak predicted day, but is not intended for comparison with ground-truth measurements. As such, measurements have only limited meaning in comparison with the modelled NEF results. The FAA’s INM model will be used as an alternative for comparison with measured sound levels at select locations.
	assess noise impacts using newer guidelines and models from other airports or jurisdictions (e.g. UK, Germany and Hong Kong)	no	yes	noise	▶ The NEF model is the only noise model required under Transport Canada's consideration airport activity, and therefore is the only regulatory tool for addressing airport noise at the BBTCA. The FAA’s INM will be employed to look at sound from the airport using other international criteria. INM was developed by the U.S. FAA, and is based on international standards. The specific international criteria from WHO (World Health Organization), and Health Council of the Netherlands publications will be referenced.
	show difference between noise profile of turboprops and jets	no	yes	noise	▶ The noise profile from flight testing of the CS100 will be requested from Bombardier and compared to the noise profile from the Q400 turbo propeller planes, if available.
	evaluate current noise compliance	yes	yes	noise	▶ Compliance with the Tripartite Agreement will be assessed through an examination of NEF compliance.
	assess cumulative impact of all noise sources	yes	yes	noise	▶ Impacts of changes to noise will not be assessed individually, but rather cumulatively. This means that the assessment of future noise levels will take into account other certain or reasonably foreseeable future noise sources within or in the vicinity of the Study Area. Noise sources will include noise from airport operations, including run-up engine testing, as well as noise from adjacent land uses.
	include more details on the assessment methodology	yes	yes, with additions	noise	▶ The Study Design has been updated in Appendix B, Attachment A, to clarify the sources of and methods for data collection, the software to be used to model existing conditions, and the methods to be employed to project future conditions.
	it was requested that noise monitoring equipment be installed at 34 Little Norway Crescent.	no	yes	Noise	▶ This equipment has been installed and noise readings have been taken from that location.
Natural Environment	Review potential impacts of ground-side infrastructure and airborne pollutants on water quality in the inner harbour	no	yes	marine physical and water quality	▶ The revised scope of work will include a review of potential sources of pollutants related to the proposal and the general effect those could have on water quality if released into the water column. Existing and proposed mitigation measures will be recommended based on the review, and future studies may also be recommended. ▶ The MOECC laboratory analysis of atmospheric deposition in the vicinity of the airport will be referenced in the review of sources of pollutants.
Run up Engine Testing	assess impacts of run up engine testing on air quality	no	yes	air quality	▶ The air quality model will include emissions associated with run up engine testing.
Quality of Life	assess impacts on recreational uses/activities at various locations, including cultural venues	yes	yes, with additions	socio-economic (with input from the air quality and noise studies)	▶ Physical impacts to recreational amenities will be determined, as well as changes to the user experience of those amenities, based on changes to noise and air quality. ▶ The original EA scope proposed to assess impacts on the use and enjoyment of recreational spaces; including the Toronto Music Garden and other cultural venues. This was to be completed through intercept surveys, where members of the Study Team would survey people using recreational and cultural spaces and ask them about changes to their experiences linked to activity at the airport. The survey team will capture people at the Toronto Music Garden in these surveys. ▶ After reviewing comments received to-date, the scope of the intercept surveys increased in terms of total number of surveys, the location and duration. The surveys will now be conducted from the Port Lands to Ontario Place and will be extended into the summer of 2015. This will allow the Study Team to survey a greater variety of waterfront users at the height of the recreation season. ▶ The work plans developed for noise, air quality and the socio-economic environment detail how these assessments will be conducted.
	assess impacts on public space and parks	yes	yes, with additions	socio-economic (with input from the air quality and noise studies)	▶ The EA will assess quality of life impacts to users of parks and public spaces in terms of noise and air quality impacts, views and impacts to the physical space (such as area, amenities or infrastructure). ▶ The original EA scope proposed to assess impacts on the use and enjoyment of recreational spaces; including the Toronto Music Garden and other venues. This was to be completed through intercept surveys, where members of the Study Team would survey people using recreational and cultural spaces and ask them about their experiences linked to these activities. The survey team will capture opinions from people at the Toronto Music Garden in these surveys, as well as locations throughout the expanded Study Area. ▶ After reviewing comments received to-date, the scope of the intercept surveys increased in terms of total number of surveys, the location and duration. The surveys will now be conducted from the Port Lands to Ontario Place and will be extended into the autumn of 2015. This will allow the Study Team to survey a greater variety of waterfront users at the height of the recreation season as well as during the shoulder season. ▶ The methods proposed to assess noise, air quality and other socio-economic effects (e.g. for effects pertaining to views and jet blast on boaters) are detailed in Appendix B.
	assess impacts on experience of existing and future users related to noise, air quality, and quality of life	yes	yes	socio-economic (with input from the air quality and noise studies)	▶ Participants undertaking various recreational activities available in the waterfront area, inner harbour, and islands will be surveyed to understand current use patterns and factors affecting those uses. ▶ Changes to the factors affecting those uses, including but not limited to noise, air quality and transportation that may arise from the proposed changes to the airport will be compared to determine how the user experience could be affected by those changes. ▶ The methods proposed to assess noise, air quality and other socio-economic effects (e.g. for effects pertaining to views and jet blast on boaters) are detailed in Appendix B.
	address “Water Uses” as well as “Land Uses” in assessment	yes	yes	socio-economic (land use & built environment)	▶ Impacts to recreational, institutional, economic and residential uses on land, including water uses within the inner harbour will be assessed through user surveys and interviews to ascertain the values of and areas of concern for each user group. ▶ Input on physical changes to land uses will be obtained from the built environment effects assessment study.
	Non-use Values	no	Yes	socio-economic	▶ Many people may not use the waterfront or the airport for any reason; however, this does not mean that they do not value it. ▶ This study will capture and consider the perceived non-use values of environmental elements within the Study Area from non-users across the City. ▶ Consequently, the scope of the EA has been expanded to include a City-wide survey to obtain attitudes and perspectives of a sample of Toronto residents regarding this topic. The survey will be conducted by phone in Summer 2015 through the services of a specialty polling service agency.

C1: Key Comments Received and Resulting Changes to the Scope

Issue	Details	In original EA scope?	In draft revised EA scope?	Key Study (supporting studies)	Study Methods
	assess waterfront revitalization efforts, and how those impacts may alter the anticipated future balance of uses and users along the waterfront	yes	yes, with additions	N/A	▶ The Study Design has been updated in Section 3.6 to add clarity to a section that describes the assessment methodology proposed to determine how impacts on specific waterfront uses could alter the overall balance of uses in the Central Waterfront area.
	include more detail regarding methodological details of the social impact assessment and existing conditions survey methodology.	yes	yes, with additions	socio-economic	▶ The draft Study Design indicated that specific survey questions would be developed in the winter/spring 2015. Following the release of the draft Study Design, these details were developed by socio-economic specialists experienced in creating surveys. The draft surveys have been presented to the SAC as well as the City of Toronto for review and comments have been incorporated into revisions. ▶ The Study Design has been updated in Appendix B, Attachment A, to clarify and provide more details about the information to be obtained from respondents and methods, as well as potential respondents.
Air Quality	compare emissions from jets to emissions from turbo props	yes	yes	air quality	▶ The proposed air quality model will include the most up-to-date aircraft emissions data available. This will include emissions data from flight testing of the CS100 if available. The emissions will be compared to those from the Q400 turbo-prop planes.
	assess current and potential changes to odour from fuel storage or unburnt fuel from planes	no	yes	air quality	▶ A qualitative assessment of potential odour impacts due to unburnt fuel from planes and fuelling operations will be conducted for the future baseline and proposed future scenarios. ▶ Potential changes in odour impacts will be examined in terms of anticipated changes in fuel use, changes in locations of activities relative to wind direction frequencies, etc. This will provide information on how the current odour experience may change in the future, with and without jets.
	sample current air quality	yes	yes	air quality	▶ Ambient air quality measurements are being taken from existing air quality sampling stations. ▶ Background contributions from non-roadway sources will be characterized using ambient monitoring data from the MOECC's stations (Hanlan Point, Bay and Wellesley) and NAPS data at the University of Toronto.
	assess source of deposited material described as "black soot" in the vicinity of the airport	no	yes	air quality	▶ In January 2014, Toronto Public Health (TPH) informed the MOECC that it had received several calls from residents in the vicinity of Eireann Quay regarding unknown particulate material that had been deposited on their balconies. The residents were concerned that this material may be composed of combustion by-products from planes and could impact their health. TPH requested assistance from MOECC in determining the nature of this material and confirming if the material could contain combustion by-products from planes. MOECC staff collected samples to determine the nature of the material. The samples were sent to the Ministry's laboratory for analysis. The results indicated that the material was comprised mainly of fine ground material (dust), paint scrapings, vegetation and fabric fibers. TPH relayed this information to the residents. The MOECC recognizes that there are many possible emissions sources downtown including highways, roads and high-rise construction activities. PortsToronto has made a Freedom of Information Act (FOI) request to TPH to review the detailed results of the sampling undertaken. ▶ The EA study will review and refer to the sampling results of the Ministry of the Environment and Climate Change's (MOECC) report
	assess impacts on ground level ozone	no	yes	air quality	▶ Ground level ozone will be assessed in accordance with Ontario Ministry of Transportation guidelines.
	assess air quality effects on vegetation	no	yes	air quality	▶ Review published literature to establish threshold values for ambient particulate matter relative to impacts on vegetation and compare the predicted concentrations to these threshold values
	assess direct health impacts	no	yes	air quality	▶ The impacts of changes to air quality associated with the proposal on various public health criteria will be assessed by comparing air quality impacts to toxicity reference values for air quality contaminants. These values have been provided to the Study Team by Toronto Public Health.
	Expand the study area to include areas to the north of the draft Study Area, and that more sensitive receptors be placed to the north of the Gardiner Expressway	no	yes	air quality, public health	▶ The Study Area for the air quality impact assessment has been developed to assess the areas where receptors could be most affected by potential changes to emissions that could result from the introduction of jet aircraft at BBTCA. Two sensitive receptor locations have been added to the north of the Gardiner Expressway in Wards 19 and 20 in the Air Quality Study Area figure presented in Section 3.3.2 and Appendix B.
	include different meteorological conditions in the assessment of both noise and air quality impacts	yes	yes	air quality and noise	▶ The Study Design has been updated in Appendix B, Attachment A, for both air quality and noise. ▶ The air quality methodology has been updated to indicate that air quality modelling will be based on 1-year of hourly meteorological data process using CALMET software. As such, this covers a wide range of weather conditions ▶ With respect to noise, the assessment methodologies are generally based on a standard weather condition. However, the Noise Assessment Report will include information on the sensitivity of the measured noise levels to weather conditions, and on the frequency of certain key weather conditions, such as those associated with temperature inversions, low cloud and fog.
Public Health	assess air quality and water quality impacts	yes	yes	air quality, and marine physical and water quality	▶ Air quality impacts will be assessed, and water quality considerations will be reviewed based on potential changes to contaminant release and dispersion/dilution. ▶ Public health impacts will be based on Toxicity Reference Values provided by the City of Toronto's Department of Public of Health.
	assess noise pollution	yes	yes	noise	▶ Noise impacts will be assessed at various sensitive receptor sites. For details on the methods for assessing noise impacts, see Appendix B.
	clarify how impacts of the proposal would be assessed with regard to public health.	Yes	Yes, with additions	public health	▶ The draft Study Design proposed to assess public health as part of the Noise and Air Quality disciplines. The Study Team has engaged, and continues to engage, Toronto Public Health regarding the criteria to be used for this assessment. As a result of the comments received, the Study Design has been updated to make public health a separate area of assessment, and is described in Section 3.3.3 and Appendix B, Attachment A. Details of the methods for assessment have been included in Attachment B, and include impacts on public health associated with both noise effects and changes to air quality.
Transportation	assess current congestion	yes	yes	transportation (with input from the socio-economic study)	▶ As part the Bathurst Quay Neighbourhood Study (currently being conducted), traffic impacts associated with changes to the airport and other foreseeable trip generators will be assessed. Traffic monitoring work done by Dillon Consulting for PortsToronto includes 2015 traffic counts. ▶ Future congestion levels will be assessed by Dillon Consulting for PortsToronto, based on the 2015 traffic monitoring. The EA will refer to the outcome of these studies.
	assess future congestion	yes	yes	transportation (with input from the socio-economic study)	▶ As part the Bathurst Quay Neighbourhood Study (currently being conducted), traffic impacts associated with changes to the airport and other foreseeable trip generators will be assessed. Traffic work done by Dillon Consulting based on the 2015 traffic counts and existing conditions will also be assessed. This will include an assessment of indicators of traffic congestion such as the degree to which the available capacity of the road network is being utilized by vehicles. The EA will refer to the outcomes of these studies.
	assess modal split	yes	yes	transportation	▶ As part of the Bathurst Quay Neighbourhood Study (currently being conducted) and for this EA, the traffic impacts associated with changes to the airport and other trip generations will be assessed. Integral to this is the assessment of the ability to mitigate any impacts through shifting modal split by introducing additional measures (e.g. increased shuttle buses, optimize taxi use, etc.).
	assess impacts on cyclists	yes	yes	transportation (with input from the land use & built form study)	▶ Proposed infrastructure changes recommended by the Bathurst Quay Neighbourhood Study (currently being conducted) will be reviewed for potential impacts on cyclists and the cycle network along the waterfront.

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Issue	Details	In original EA scope?	In draft revised EA scope?	Key Study (supporting studies)	Study Methods
	assess impacts on pedestrian safety	yes	yes	transportation (with input from the land use & built form study)	▶ Proposed infrastructure changes recommended by the Bathurst Quay Neighbourhood Study (currently being conducted) will be reviewed for potential impacts on pedestrian safety and active transportation within the context of City policy and changes to traffic congestion and modal split.
	assess commercial/delivery vehicles in the transportation impact assessment, and enlarge he Study Area to include Fleet Street	yes	yes, with additions	transportation	▶ The Study Design has been updated in Appendix B, Attachment A, to reflect that fuel delivery and other and commercial vehicles will be accounted for in the transportation and safety impact assessments, and the Study Area has been enlarged, as shown in Section 3.3.11.1 and Appendix B, to include the Fleet Street and Bathurst Street intersection.
Regional Transportation	assess impacts of proposal on Toronto Pearson International Airport	yes	yes	socio-economic	▶ The impacts of the proposal, in general terms, on the growth of passenger volumes at Toronto Pearson International Airport were reviewed by HLT Advisory in the study "Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport" (November, 2013). ▶ The GTAA also reviewed the anticipated growth in regional demand for air travel in their study "Global Hub Economic Impact Study" (2014). ▶ The EA will not recreate this assessment, but will refer to key findings of these studies in the assessment of economic impacts. Specifically, impacts to both Pearson and the Union Pearson (UP) express from a future jets scenario at the BBTCA will be reviewed.
	account for Union to Pearson (UP) Express in assessment	yes	yes	socio-economic	▶ The impacts of the proposal, in general terms, on the use of the UP Express or of Pearson Airport were assessed by HLT Advisory in the study "Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport" (November, 2013). ▶ The GTAA also reviewed the anticipated growth in regional demand for air travel in their study "Global Hub Economic Impact Study" (2014). ▶ The EA will not recreate this assessment, but will refer to key findings of these studies in the assessment of economic impacts. Specifically, impacts to both Pearson and the UP express from a future jets scenario at the BBTCA will be reviewed.
Parking	assess demand for parking	no	yes	transportation	▶ Proposed infrastructure changes recommended by the Bathurst Quay Neighbourhood Study (currently being conducted) will be reviewed if available for potential impacts on the availability of parking infrastructure within the Study Area. Proposed groundside infrastructure changes recommended as part of the 2015 Master Planning Exercise will be reviewed for localized parking impacts on PortsToronto-owned or managed property, as well as in adjacent neighbourhoods.
	assess illegal parking/idling	no	yes	transportation	▶ Ascertaining the potential future impacts of infrastructure changes on human behaviour as it relates to illegal parking or idling is difficult and depends on a number of potentially unpredictable factors such as changes to by-laws. Monitoring data from PortsToronto's traffic monitoring work will show trends in illegal parking and idling behaviour and this will be reviewed for the EA study in order to make general statements about the likelihood of a worsening or improving situation within the Study Area.
General Aviation	assess hangar and tie-down space impacts	no	no	2015 Master Planning Exercise	▶ The provision of airside and groundside infrastructure at BBTCA will be outlined in the 2015 Master Planning Exercise. ▶ The EA will review the 2015 Master Planning Exercise to comment on impacts.
	assess impacts on availability of General Aviation use at BBTCA and other airports	no	no	2015 Master Planning Exercise	▶ The provision of airside and groundside infrastructure at BBTCA will be outlined in the 2015 Master Planning Exercise. ▶ The EA will review the 2015 Master Planning Exercise to comment on impacts.
Economic Impacts	assess impacts on availability and convenience of short-haul business travel	no	no	2015 Master Planning Exercise	▶ The service levels at and destinations from BBTCA will be outlined in the 2015 Master Planning Exercise. ▶ The EA will review the 2015 Master Planning Exercise to comment on impacts.
	assess impacts on jobs	yes	yes	socio-economic	▶ Job impacts associated with the proposal have been assessed by InterVISTAS Consulting Group in the study "Billy Bishop Toronto City Airport (YTZ) Economic Impact Study" (October, 2012). This study will be referred to as part of the EA. ▶ This and other studies will be reviewed in conjunction with undertaking interviews with the business community to understand economic impacts and impacts to development trends and property values. The Study Team's interpretation of the analyses will be provided using input gained through interviews with airport-related businesses and other businesses as well as intercept surveys with airport users.
	assess impacts on economic development for Toronto	yes	yes	socio-economic	▶ Economic development associated with current airport operations was assessed by InterVISTAS Consulting Group in the study "Billy Bishop Toronto City Airport (YTZ) Economic Impact Study" (October, 2012). This study will be referred to as part of the EA assessment. ▶ Impacts on waterfront revitalization efforts and new or infill construction along the waterfront (which can have economic impacts) will be reviewed through interviews with development and real estate professionals.
	assess impacts on tourism and use of tourist amenities	yes	yes	socio-economic	▶ Tourists to Toronto arrive from many destinations over the course of a year and some visit the waterfront for a variety of reasons. Intercept surveys will enable us to capture user attitudes and perspectives about the mix of waterfront use activities and how changes to both airport operations and recreational waterfront use activities might influence their future attraction to this area. ▶ These intercept surveys will be conducted along the waterfront at various venues and during the peak summer season as well as the shoulder season to capture views and perspectives linked to a variety of issues of importance to each respondent, which may include: ▪ Noise; ▪ Air Quality; and ▪ Quality of experience. ▶ Interviews with a sample of hotel, restaurant, and sight-seeing business stakeholders along or closely associated with the waterfront will be conducted to obtain their perspectives regarding tourism and its influence from airport operations and all other waterfront activities. These business-related interviews will capture views and perspectives linked to a variety of issues of importance to each respondent and may include: ▪ Influence of the waterfront on the function and operation of local businesses – either positive or negative; ▪ Influence of the current BBTCA on the function and operation of local businesses – either positive or negative; ▪ Anticipated construction and operational effects of the proposed expansion on the function and operation of local businesses.
	assess impacts on municipal finances	yes	yes	socio-economic	▶ Municipal revenues associated with current airport operations were assessed by InterVISTAS Consulting Group in the study "Billy Bishop Toronto City Airport (YTZ) Economic Impact Study" (October, 2012). This will be referred to in the EA study.
	assess effects to future uses or intrinsic value of waterfront and islands	no	yes	socio-economic	▶ Many people may not use the waterfront or the airport for any reason; however, this does not mean that they do not value it. ▶ This study will consider the perceived non-use values of environmental elements within the Study Area from both users and non-users across the City. ▶ Consequently, the scope of the EA has been expanded to include a City-wide survey to obtain attitudes and perspectives of a sample of Toronto residents regarding this topic. The survey will be conducted by phone in summer and autumn 2015 through the services of a specialty polling service agency.
	expand on the methods proposed to assess economic impacts	yes	yes, with additions	socio-economic	▶ The Study Design has been updated in Appendix B, Attachment A, to clarify how the existing economic models will be used to support a qualitative assessment of the likely direction of economic effects, which will be based on social impacts.

C1: Key Comments Received and Resulting Changes to the Scope

Issue	Details	In original EA scope?	In draft revised EA scope?	Key Study (supporting studies)	Study Methods
	include construction impacts in the assessment of the social and economic environment.	yes	yes	All	▶ The Study Design has been updated in Section 3 to clarify that effects will be assessed for both the construction and operations phases of the project, for all areas of study.
Private Interest	describe PortsToronto's financial interest in the proposal.	no	no	N/A	▶ PortsToronto publishes their financial performance every autumn at their Annual General Meeting. This EA will not assess their financial interest in the outcome of the EA, as their financial obligations and objectives can be viewed through these documents, available on their website.
Public Benefit	describe the public benefits associated with this proposal.	yes	yes	socio-economic	▶ Perceived benefits will be ascertained through extensive surveys of and interviews with waterfront users, airport users and city residents. ▶ The assessment of impacts on waterfront users, airport users and city residents will be informed through the various studies being conducted as part of this EA, such as, noise, air quality and the socio-economic environment.
	assess impacts on arts and entertainment, and cultural heritage	yes	yes	socio-economic	▶ Noise, air quality and view impacts will be assessed at cultural venues.
Natural Environment	assess impacts on natural features (terrestrial and aquatic) and their ecological integrity	yes	yes	natural environment	▶ The EA will assess potential impacts to natural features including terrestrial and aquatic habitats within Study Area. Natural features potentially affected will be identified through a review of available background information as well as field studies completed in the vicinity of the BBTCA.
	assess impacts on aquatic life and aquatic habitat	yes	yes	natural environment	▶ The EA will determine the potential impacts to aquatic life and aquatic habitat through a review of fisheries data and monitoring reports for the Study Area, through visual observations of the aquatic habitat, and by applying the Toronto and Region Conservation Authority's Habitat and Environmental Assessment Tool (HEAT) model for determining impacts to habitat. ▶ Appropriate mitigation measures and compensation requirements will be recommended.
	include additional methodological details for the aquatic environment section	yes	yes, with additions	natural environment	▶ The Study Design has been updated in Appendix B, Attachment A, to provide more detail and clarity on the methods employed to survey aquatic habitat.
	assess effects of the runway expansion and jets on wildlife, including rare species and Species at Risk	yes	yes	natural environment	▶ The EA will assess potential impacts to natural features including wildlife, rare species and Species at Risk occurring within the Study Area. Species potentially affected will be identified through a review of available background information as well as field studies completed in the vicinity of the BBTCA.
	investigate contaminated soil at the spit	no	no	natural environment	▶ Soil contaminants are unlikely to be altered by changes to airport operations.
	show changes to visual impacts of sediment transport and disposition of soil at the spit	no	yes, during detailed design	Detailed Design	▶ Quantitative modelling and a review the results regarding flow velocity, wave height, period and direction from the wave and hydrodynamic model, air photos and field data will be conducted during the detailed design phase if the proposal is approved. The results of these studies will allow for the determination and interpretation of detailed effects on sediment transport and deposition in the Regional Study Area, which includes the western shore and the inner harbour, allowing for the design of specific mitigation measures.
	determine changes to sediment transport and deposition along the western shore and in the inner harbour	yes	yes, during detailed design	Detailed Design	▶ Quantitative modelling and a review the results regarding flow velocity, wave height, period and direction from the wave and hydrodynamic model, air photos and field data will be conducted during the detailed design phase if the proposal is approved. The results of these studies will allow for the determination and interpretation of detailed effects on sediment transport and deposition in the Regional Study Area, which includes the western shore and the inner harbour, allowing for the design of specific mitigation measures.
Water Quality	assess risk of fuel, glycol or other chemical spills and runoff into the lake	no	no	2015 Master Planning Exercise	▶ The 2015 Master Planning Exercise will include proposed changes to groundside and airside infrastructure. Should changes be required to the facilities for handling, storing, or disposing of fuel or other chemicals, the EA will review these changes for regulatory compliance.
	assess changes to water circulation	yes	yes	Detailed Design	▶ The original scope of work recommended a 2-dimensional numerical model to assess localized impacts to water circulation resulting from the proposed extension of the land mass. As a result of consultation with the City of Toronto, the Toronto and Region Conservation Authority and Fisheries and Oceans Canada, a more detailed scope of work is proposed. As part of this updated scope of work, it is recommended that the 3-dimensional model of water movement in and around the Inner Harbour and Western Channel be developed during the detailed design phase. This model should take into account the flow of lake water into the harbour through the Western Channels, river water into the harbour from the Don River, and out through the Eastern Channel, as well as through the channels of the Toronto Islands. ▶ The 3-dimensional model requires detailed design input for the proposed extension of the land mass. As such, this work should be completed as part of the detailed design effort. ▶ A mass-balance model will be completed by the EA to understand potential changes to the volume of water entering the Inner Harbour through the Western Channel to indicate potential changes to the dilution of outflow from the Don River and storm/combined sewers, the main sources of pollutants into the Inner Harbour.
	expand the study area to include the area at the mouth of the Don River and the Eastern Channel	no	no	Detailed Design	▶ The 3-dimensional model of the movement of water will take into account the Inner Harbour, the Eastern and Western Channels and the Islands, and will be conducted as part of the detailed design efforts.
	use quantitative modelling and assessment to determine impacts to water circulation	no	no	Detailed Design	▶ The quantitative model recommended is a software program called Delft 3D, which has been used to estimate flow impacts associated with the proposed naturalization of the mouth of the Don River. The modelling will be undertaken as part of the detailed design efforts.
	use 3-D model to assess water quality impacts within a broader study area, and the entire inner harbour	no	no	Detailed Design	▶ The proposed 3-dimensional model will identify circulation-related water quality impacts by identifying areas of low flow that could result in stagnant conditions. The modelling will be undertaken as part of the detailed design efforts.
Risks to Birds	review risks to bird populations associated with bird strikes, including waterbirds at the Toronto Islands and TTP (e.g. cormorants)	yes	yes	natural environment	▶ A review of past trends in bird strike occurrences for various species at the BBTCA will be compared to a comprehensive bird list compiled from the records and background information received from various agencies to understand the potential impacts of the airport on bird populations. The EA will consider jet flight paths and height, as well as frequency of flights information (to be provided in the 2015 Master Planning Exercise) to identify where bird strike are likely to occur and relate this to the potential effects on birds recorded in this identified area. ▶ If the proposed changes to the runway are approved, the existing BBTCA Wildlife Management Plan will be updated. To do so, a risk assessment of bird strikes will be completed to determine what mitigation measures are required as part of the plan to reduce the potential for risks from bird strikes.
	assess effects of jet blast on birds	no	no	natural environment	▶ The spatial extent of jet blast and possible mitigation measures will be determined by the runway design. At this time, we do not anticipate that there will be a potential effect on birds associated with jet blast since it is likely that the birds will be scared off from the noise before the jet blast affects them. We will rely on the runway design to confirm potential effects from jet blasts, if any.
	Ensure bird surveys capture peak timing windows capture peak times for: (1) waterbirds in spring and fall, (2) flocks of blackbirds, starlings and aerial insectivores at TTP in spring and early summer, (3) peak songbird migration and raptors in September, and (4) peak migration for owls in October/November.	1. yes 2. no 3. no 4. yes	1. yes 2. no 3. no 4. yes	natural environment	1. Spring and fall migration surveys will be completed near the airport, to supplement available background information. 2. Background information provided from multiple agencies including TRCA is considered to be sufficient to assess potential effects on these species at TTP. No additional surveys are proposed. 3. Four rounds of fall migration surveys have been completed in October and November 2014, in consultation with the Toronto and Region Conservation Authority. Together with the spring migration surveys completed as requested by the TRCA, these are considered to be sufficient to address potential effects on migratory songbirds. 4. Avian surveys were completed in October and November 2014. No owls were observed during these surveys. The EA will rely on available background information provided by various agencies to identify if owls are present in the vicinity of the BBTCA.
	Complete a risk analysis and proposed wildlife management recommendations to avoid bird strikes	yes	yes	natural environment	▶ This is addressed in the BBTCA Wildlife Management Plan. The EA will use bird strike data collected from the Wildlife Management Program at BBTCA to estimate the relative risk of strikes for different bird species and relate this to the comprehensive bird list compiled from the records and background information received from various agencies. Recommendations regarding potential mitigation will also be included.

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Issue	Details	In original EA scope?	In draft revised EA scope?	Key Study (supporting studies)	Study Methods
	Review the following background sources or records: – Information from Toronto Field Naturalists – Information from Toronto Orthinological Club – TTPBRS records – E-birds records – Migratory Birds in the City of Toronto (Dougan Associates et al, 2009) – Canadian Wildlife Service for standards for airport EAs – Transport Canada for standards for airport EAs and requirements for bird management	yes	yes	natural environment	▶ These resources will be consulted for available background information to be included in the EA.
	identify wildlife management actions that could be implemented if bird strikes, pose a risk to human safety, and assess potential effects of management actions on bird populations (including those that could be implemented beyond the airport grounds and at TTP)	no	yes	natural environment	▶ The original scope of work included an assessment of the impacts of mortality from bird strikes to bird populations, including birds at TTP. Based on the comments received, it is recommended that the scope be expanded to include a literature review of off-site wildlife management at North American airports to identify potential mitigation or management techniques that could be implemented at BBTCA and TTP. Subject matter experts will conduct additional consultation with TRCA and Transport Canada regarding off-site wildlife management options for BBTCA. ▶ This and the current Wildlife Management Plan will be reviewed and commented on as part of the EA.
	expand the bird study area to include the Bird Hazard Zone (BHZ)	no	yes	natural environment	▶ After considering comments received to date, the boundaries of the Study Area for the Terrestrial Environment study will be expanded based on the BBTCA Bird Hazard Zone (BHZ), calculated aircraft flight paths, glide slopes and missed approach points. We propose to expand the Study Area for the Terrestrial Environment study to include the BBTCA BHZ, with the expectation that this area will encompass the projected jet flight paths at altitudes where bird strikes are most likely to occur, as well as missed approach decision points for BBTCA (to be provided in the 2015 Master Planning Exercise).
	expand bird studies to include summer surveys for Cormorant, to capture Cormorant behaviour during the peak time for fledglings (late July to mid-August)	no	yes	natural environment	▶ The original scope of work recommended breeding season surveys near the BBTCA in May and June. Based on the comments received, additional surveys have been completed to document Cormorant behaviour near the BBTCA on four occasions in July and August. Cormorants are associated with a higher risk of bird strikes, and there is a large nesting colony at Tommy Thompson Park.
	perform overwintering, spring and fall migration, and breeding surveys during a variety of weather conditions to capture associated changes in bird behaviour	no	yes	natural environment	▶ The original scope of work recommended that all bird surveys be conducted under clear, calm weather conditions. Under the revised scope of work, bird surveys will be conducted under a variety of weather conditions to the extent possible.
Archaeological Finds	assess archaeological resources found on and around the study area	yes	yes	archaeology and cultural heritage	▶ A marine and terrestrial stage 1 archaeological assessment will be performed.
Cultural Resources	Clarify that people are concerned with cultural features, other than designated or listed buildings	yes	yes	socio-economic	▶ A cultural heritage asset is defined for the purposes of this EA as a building or landscape listed in a provincial or federal heritage database. Other cultural features and venues of the waterfront, harbor, and islands, such as parks, recreational facilities, and civic spaces will be assessed through the socio-economic effects assessment study under the “recreation” asset.
Cumulative Effects	assess cumulative impacts of the proposal in addition to other impacts of existing and future operations and other environmental changes	yes	yes	all studies	▶ All studies proposed will assess future conditions in terms of both the incremental change anticipated as a result of the proposal as well as the cumulative impact of that change when accounting for a reasonably foreseeable future with impacts associated with other projects within the same geographic and temporal scope of the study.

C2. 30-Day Review Period

C2: Comments Received on the Draft Study Design During the 30-day Public Review Period

Issue	Sub Issue	Comment	Source (Stakeholder)	Date	Format	Response
Air Quality	Atmospheric Deposition	Assessment of deposited materials ("black soot") in the vicinity of BBTCA: TPH is aware of these concerns, together with the MOE we have taken samples of the "black soot" for lab analysis – has any consideration been given to taking actual samples?	City of Toronto	01/06/2015	Letter to PortsToronto	▶ In January 2014, Toronto Public Health (TPH) informed the Ministry of the Environment and Climate Change (MOECC) that it had received calls from residents in the vicinity of Eireann Quay regarding unknown particulate material that had been deposited on their balconies. The residents were concerned that this material may be composed of combustion by-products from planes and could impact their health. TPH requested assistance from MOECC in determining the nature of this material and confirming if the material could contain combustion by-products from planes. MOECC staff collected samples to determine the nature of the material. The samples were sent to the Ministry's laboratory for analysis. The results indicated that the material was comprised mainly of fine ground material (dust), paint scrapings, vegetation and fabric fibers. TPH relayed this information to the residents. The MOECC recognizes that there are many possible emissions sources downtown including highways, roads and high-rise construction activities. PortsToronto has made a Freedom of Information Act (FOI) request to TPH to review the detailed results of the sampling undertaken. The Environmental Assessment will refer to the results of the MOECC's report.
Air Quality	Methodology	Utilize City's AQ model data to establish the baseline across the same six Wards • EED has offered to make available results of recent city wide modelling of 30 substances. Available to establish the baseline (managed on Golder computer bank system). • This may be augmented by the chemistry of the AQ modelling undertaken by RWDI for Peel Region. Local and site specific sensitive receptor AQ monitoring be undertaken to verify and refine the AQ baseline modelled data. Related land vehicle traffic (and especially taxis) be modeled – including congestion and idling emission issues by location issues – and incorporated. RWDI model the AQ resulting from various "plane-and-runway" scenarios as a set of varying conditions that add to the base case. The existing monitoring data from the MOE & NAPS stations has limitations – e.g. the closest acrolein monitoring station is in Windsor – these data may not be representative of the site conditions and it may overestimate or underestimate potential impacts.	City of Toronto	01/06/2015	Letter to PortsToronto	▶ RWDI was hoping to have access to an updated version of the City Wide model that addresses changes in emissions in the region that have occurred in recent years. However the updated version will not be available in time for the assessment. RWDI's revised approach to characterize ambient background air quality conditions is to explicitly model the road traffic in the Study Area, including the Gardiner Expressway and Lakeshore Blvd, as well as smaller arterial streets in the immediate vicinity of the airport (Stadium Road, southern part of Bathurst). Background contribution from non-roadway sources will be characterized using ambient monitoring data from the MOECC's stations (Hanlan Point, Bay and Wellesley) and NAPS data at the University of Toronto. RWDI will also look at the ambient monitoring data collected by Metrolinx as part of the Georgetown South Project. Given the limited coverage of ambient monitoring stations, there has been some concern raised about the spatial variability of ambient background concentrations and the applicability of the data to the Study Area. The validity of this concern will be investigated through the use of previous regional airshed modelling work conducted by RWDI, if information allows. The regional modelling is available for a subset of the contaminants. For the remaining contaminants, we will refer to the previous version of the City-wide model. Ambient background concentrations may be adjusted across the Study Area pending the results of the investigation. The regional and City-wide models will also be used to characterize background levels for contaminants for which there is little or no ambient monitoring data (i.e., PM10 and acrolein). To assess potential impacts on air quality associated with the Future Growth Scenarios, the Study Team will use collected monitoring and modelling data; quantify aviation and vehicle emissions modelling data; conduct dispersion modelling; and determine cumulative air quality concentrations. ▶ Traffic and transportation conditions will be assessed by studies other than the EA, including traffic studies done by the City of Toronto for the Bathurst Quay Neighbourhood Plan study, and by Ports Toronto in response to a request for traffic monitoring and evaluation by the City of Toronto. The EA will refer to these studies and comment on the impacts of the proposal on traffic and transportation conditions and future needs. ▶ The proposed air quality model will include the most up-to-date aircraft emissions data available. Potential changes to concentrations of acrolein and other contaminants will be ascertained through dispersion modelling.
Air Quality	Odour	We recommend you include that in the scope of work, TPH has received a number of reports of fuel odours in the residential area adjacent to the BBTCA. Use the emission profile & associated odour thresholds of various substances to predict odour impacts at key locations.	City of Toronto	01/06/2015	Letter to PortsToronto	▶ Potential changes in odour impacts will be examined in terms of anticipated changes in fuel use, changes in locations of activities relative to wind direction frequencies, etc.
Air Quality	Public Health	Comparison of results to health benchmarks: In addition to the Ontario AAQCs, evaluate the projected AQ impacts against health based carcinogenic and non-carcinogenic benchmarks, and the AQBAT risk coefficients to evaluate health risk from criteria air pollutants. Use of toxicity reference values (TRVs) that have been endorsed by TPH. In addition to evaluating chronic exposures, consider the evaluation of acute exposures if there are times during the day with more intense airport/associated traffic activity that would result in elevated emissions.	City of Toronto	01/06/2015	Letter to PortsToronto	▶ The intent is to compare results to toxicity reference values endorsed by Toronto Public Health. Air quality impacts will be assessed, and public health impacts will be based on Toxicity Reference Values developed by the City of Toronto's Department of Public of Health, if available.
Air Quality	Public Health	As stated previously, we recommend the use of appropriate TRVs to quantify the impacts from both chronic and acute exposures; in addition, the use of AQBAT risk coefficients to assess impact from criteria pollutants.	City of Toronto	01/06/2015	Letter to PortsToronto	▶ The intent is to compare results to toxicity reference values endorsed by Toronto Public Health.
Air Quality	Study Area	The proposed study area is limited to key receptors along the Waterfront – we recommend expanding the study area across the same large city areas (six Wards) as were examined by Golder Associates in 2013 or provide a detailed rationale as to why the previous study area is neither suitable nor necessary.	City of Toronto	01/06/2015	Letter to PortsToronto	▶ The sensitive receptor locations throughout the Study Areas for the Air Quality and Noise Assessments were selected as they include representative residential, recreational (parks and public spaces) and institutional locations most affected by changes to air quality and noise. ▶ In response to comments received from the Peer Reviewer, receptors were added north of the Gardiner to assess changes in air quality in Wards 19 and 20. Locations to include Stanley Park and Victoria Memorial Park.

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Issue	Sub Issue	Comment	Source (Stakeholder)	Date	Format	Response
Air Quality and Noise	Monitoring	In regard to the Air Quality Study and the Noise Study, I am concerned that there is only one yellow dot on all of the Toronto Islands (at Wards Island) and only one yellow on Tommy Thompson Park. The Toronto Islands (approximately 230 hectares in size) and are a huge park system and the jewel in the crown of our public park system and to have only one sample testing area on all of the Toronto Islands is a huge oversight. For both Air Quality and Noise, there needs to be at least two more sample areas on the Toronto Islands. Please also include Hanlan's Point Beach and the north shore of Olympic Island in both studies. In addition there needs to be at least two more sample testing areas on Tommy Thompson Park (500 hectares in size) which is an unofficial bird sanctuary and which was before Porter, an amazing place to escape the noise of the city. Please also include Vicki Kieth Point and the entrance to Tommy Thompson Park as sample sites for both the Noise and Air Quality studies. In addition, today I was at HTO Park which is located in Harbourfront at the foot of Spadina. This is the park that has all the yellow umbrellas. Under the current situation, the noise from the Porter planes was quite disturbing. At the time I was there, approximately 2PM (I did not stay long as the noise levels were unpleasant) there were about 3 planes in line for takeoff. The noise from the waiting planes was quite loud. And it became more annoyingly loud as each of the planes took off. If the runway is extended into the harbour as proposed, I assume that the noise of the waiting planes will be pushed further east into the harbour. Will the line-up of planes waiting to take off also be extended and how long will this line up be? I am concerned as each of the awaiting planes creates noise and air pollution for people trying to enjoy our central waterfront. I would like both the Noise Study and Air Quality Study to indicate how many planes will be in-line for their turn to take off at various times throughout the day, the length of the line of planes in meters and how the Air Quality and Noise Quality will be impacted at HTO park (by the yellow umbrellas) and at a point further east on the water's edge by West Jet Stage.	Public	5/3/2015	Email to Facilitator	▶ The shaded areas of the Study Area figures show that the Study Area includes Hanlan's Point Beach and all of Tommy Thompson Park, and also includes HTO Park and West Jet Stage. The yellow dots are meant to reflect specific points of interest placed on a map by members of the community during the 1st presentation of draft work plans. Computer modelling results for all air contaminants and noise metrics of the assessment will be presented for each of these points. The results for a particular point apply equally well to other locations in the vicinity of that point. Therefore, there will be no need to have lots of points in close proximity to each other throughout the Study Area. For selected key contaminants and averaging periods, and selected noise metrics, contour maps will be presented that allow the reader to see what the impacts will be at any point in the Study Area, not just those represented by the yellow dots. With respect to queuing of aircraft, the air emissions and noise from the aircraft in the queue will be included in the analyses. Information on anticipated maximum queue lengths in numbers of aircraft will also be provided if they are determined as a part of the 2015 Master Planning Exercise.
Air Quality and Noise	Meteorological conditions	Can you add meteorological conditions and how these conditions affect: -Air Quality -Noise I am afraid this Draft Study will try and bury the connection of meteorology to air quality and noise	Public	4/20/2015	Email to Facilitator	▶ The air quality assessment will use modelling techniques to predict air contaminant levels on an hour-by-hour basis for a full year of hourly meteorological conditions. As such, it covers a wide range of weather conditions. The results for whichever weather conditions are worst-case will be presented. With respect to noise, the assessment methodologies are generally based on a standard weather condition. However, our report will include information on the sensitivity of the measured noise levels to weather conditions, and on the frequency of certain key weather conditions, such as those associated with temperature inversions, low cloud and fog.
Air Quality and Noise	Study Area	Figure 3-3 Air Quality Study Area and Figure 3-4 Noise Study Area seem to be avoiding the Harbourfront Center (apparently from their website 17,000,000 people visit this area in a year). It would seem obvious that the tourist attraction area that draws 17,000,000 people would be part of the air quality study (yellow dots). Maybe I don't understand the boundaries.	Public	4/20/2015	Email to Facilitator	▶ The shaded areas of the Study Area figures show that the Harbourfront Centre is included within the Study Area. The yellow dots are meant to reflect ones placed on a map by members of the community during the 1st presentation of draft work plans. Computer modelling results for all air contaminants and noise metrics of the assessment will be presented for each of these points. The results for a particular point apply equally well to other locations in the vicinity of that point. Therefore, there will be no need to have lots of points in close proximity to each other throughout the study area. The Study Area figures did include a dot near the Harbourfront Centre. For selected key contaminants and averaging periods, and selected noise metrics, contour maps will be presented that allow the reader to see what the impacts will be at other points within the Study Area. In this manner, all points within the Study Area will be covered, not just those represented by the yellow dots.
Air Quality and Noise	Regulatory	Given that the context of the airport is unique and regulations relate to a normal airport, which has a large land area and is surrounding by industrial uses, there must be recognition that the normal regulations will not be adequate here where the land area is very small so the main close by neighbouring uses are residential, parkland, recreational and cultural as well as the many water-based recreational uses. Traditional measures or standards used for measuring impacts of noise levels, air quality, jet blast etc. are not adequate and other measures need to be used.	Stakeholder	5/20/2015	Email to Facilitator	▶ The EA study will assess the potential impacts of noise on quality of living, by assessing cumulative impacts to noise levels associated with the proposal and other reasonably foreseeable projects in the vicinity of the Study Area. Current noise levels during take-off, landing, taxiing, and engine run-up procedures will be assessed (including monitoring of noise levels at various points within the Study Area) and modelled for future changes. In-the-moment noise levels will be compared to threshold values for quality of living impacts, provided to the Study Team by the City of Toronto's Department of Public Health. ▶ In addition to assessing impacts to noise, the study is also proposing a detailed scope of work relating to air quality. The EA will predict levels of Nitrogen Dioxide; particulate (PM10 and PM2.5); benzo-a-pyrene; benzene and acrolein concentrations. These contaminants were selected based on the results of studies previously commissioned by Toronto Public Health. The original EA scope included comparing the results of the dispersion modelling to established ambient air quality criteria from the Ministry of the Environment and Climate Change, to Canadian ambient air quality standards from Environment Canada, and to Health Canada thresholds, which are established to be protective of human health. The scope of the assessment has also been updated to include comparing the results of the dispersion modelling to Toxicity Reference Values developed by the City of Toronto, at the request of the City's Department of Public Health.
Archaeology and Cultural Heritage	Methodology	The EA does not adequately address the issue of archaeology and culture heritage of the area.	Public	5/17/2015	E-mail to Facilitator	▶ A Stage 1 Archaeological Assessment will be conducted to meet the requirements of the Ministry of Tourism, Culture and Sport's (MTCS) 2011 Standards and Guidelines for Consultant Archaeologists in accordance with the Ontario Heritage Act. A review of cultural heritage impacts will also be completed based on consultation with local heritage planners. The assessment of cultural heritage impacts will evaluate effects of the proposed undertaking on cultural heritage resources.

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Issue	Sub Issue	Comment	Source (Stakeholder)	Date	Format	Response
Archaeology and Cultural Heritage	Stage 1 Report	Heritage Preservation Services staff will review the Stage 1 Archaeological reports for both land and water areas and provide comments at that time.	City of Toronto	01/06/2015	Letter to PortsToronto	▶ Comment noted.
Climate change	Climate Change	I am pleased to see that Toronto Public Health will be involved in this in a substantial way. I would like to comment however, on the limited way that climate change is being considered. It is expectedly and very importantly included in the air quality emissions studies but appears to be limited to this. The Chief Public Health Officer's Report on the State of Public Health in Canada, 2014: Public Health in the Future, makes climate change the most important issue determining public health in the near future. This report recommends clearly that urban centres need to increase green and pollution free space to mitigate against climate change for all urban dwellers, especially for the more vulnerable populations. This is a much more holistic approach than using air quality only as an indicator. I quote from this report (footnotes removed): "As mentioned, strategic and smart land-use planning is essential. The design of cities and roadways, and the location of places of work and home and other aspects of land use all affect the health of Canadians.. .For example, planning can influence how much Canadians need to use motor vehicles to get around, which also influences transportation's role as one of the major sources of air pollution. Neighbourhood designs that include high-quality pedestrian environments and a mix of land uses (e.g. planting trees, increasing green spaces, patterns of subdivisions, housing and buildings, etc.) can improve health by promoting active forms of transportation, reducing air pollution and associated respiratory ailments and lowering the risk of motor vehicle-related accidents. While these measures are not direct public health functions, there is still a role for public health to play. Public health officials can inform and educate the public about health risks, advocate for changes that promote and improve health and work together with land-use and building planners, community and regional officials to encourage the adoption of health-promoting changes in urban planning and community infrastructure." Our waterfront is a space that can be precisely the kind of space that will be needed now and increasingly in the future. It is a mixture of natural environment and high quality and highly utilized recreational spaces for pedestrians, bicyclists and boaters especially for those who do not have options to escape from the urban environment. It is totally in contravention of recommendations for future urban design at a time of climate change to expand an airport in this space (or arguably have any kind of airport) which not only causes air pollution and interferes with these purposes, but which in itself contributes to climate change. Here is the link to the report I have referenced: http://www.phac-aspc.gc.ca/cphorsphc-respcacsp/2014/climat-eng.php	Public	4/27/2015	Email to Facilitator	▶ The EA work plans were designed to examine how the proposed runway expansion and changes to the Tripartite Agreement might result in noise, air quality or other effects that would interfere with the various existing and planned waterfront uses mentioned. The will not assess the impacts of closing down the airport. The impacts of the proposal on climate change will be assessed qualitatively by undertaking a relative comparison of greenhouse gas emissions (GHGs). GHG emissions of relevance to the study include carbon dioxide (CO2), nitrous oxide (N2O) and methane (CH4). ▶ GHG emissions under the Future Baseline and Proposed Future Scenarios (with and without jets) will be estimated using U.S. EPA models for both airport activity and surrounding traffic. The changes in GHG emissions due to the proposal will be compared to relevant benchmarks, such as total GHG emissions from the City of Toronto and the transportation sector. The results will be expressed as total GHG emissions and tabulated for baseline conditions and the future with jets and without jets. Commentary on the significance of the GHG emissions due to the proposal relative to other sources will also be provided.
Climate Change	Climate Change	The assessment must also include consideration of the environmental challenge of climate change, which is immediate and dire, and, by all informed analysis, will require significant reductions in the emission of greenhouse gases in the very near future. The aviation industry, as a significant and currently growing contributor to those emissions, will be obliged to do its share. Tim Johnson, Director of the UK's Aviation Environment Federation, put this succinctly in a letter in the Independent recently, in relation to the proposed fourth runway at Heathrow: "With a new runway potentially locking the UK into an emissions path entirely at odds with our long-term climate commitments, politicians will very soon need to face up to the CO2 consequences of sanctioning airport growth." This document ignores that imperative, which is equally applicable to this proposal, and has ignored CommunityAIR's request for climate change to be included in the proposed work as a central environmental concern, submitted to Swerhun Facilitation on January 8, 2015. That request, Island Airport Expansion & Climate Change - Learning from the UK, is attached as an Appendix to this letter.	Stakeholder	5/20/2015	Email to Facilitator	▶ Climate change is a global phenomenon. The environmental assessment will consider policy guidance from the Provincial Policy Statement and recommendations from the City of Toronto's Climate Change Committee. As well, the impacts of the proposal on climate change will be assessed qualitatively by undertaking a relative comparison of greenhouse gas emissions (GHGs). GHG emissions of relevance to the study include carbon dioxide (CO2), nitrous oxide (N2O) and methane (CH4). ▶ GHG emissions under the Future Baseline and Proposed Future Scenarios (with and without jets) will be estimated using U.S. EPA models for both airport activity and surrounding traffic. The changes in GHG emissions due to the proposal will be compared to relevant benchmarks, such as total GHG emissions from the City of Toronto and the transportation sector. The results will be expressed as total GHG emissions and tabulated for baseline conditions and the future with jets and without jets. Commentary on the significance of the GHG emissions due to the proposal relative to other sources will also be provided.
Climate Change	Climate Change	As the UK environmental organizations said in that letter: Unmitigated climate change poses huge risks to the global economy, human development, and the natural environment and the costs are potentially enormous. Failure to act now to constrain aviation emissions will present the UK with higher economic and environmental costs of climate change later on. Climate change needs to be a central consideration in any examination of the environmental and other impacts of the Island Airport proposed Jets expansion.	Stakeholder	5/20/2015	Email to Facilitator	▶ Climate change is a global phenomenon. The environmental assessment will consider policy guidance from the Provincial Policy Statement and recommendations from the City of Toronto's Climate Change Committee. As well, the impacts of the proposal on climate change will be assessed qualitatively by undertaking a relative comparison of greenhouse gas emissions (GHGs). GHG emissions of relevance to the study include carbon dioxide (CO2), nitrous oxide (N2O) and methane (CH4). ▶ GHG emissions under the Future Baseline and Proposed Future Scenarios (with and without jets) will be estimated using U.S. EPA models for both airport activity and surrounding traffic. The changes in GHG emissions due to the proposal will be compared to relevant benchmarks, such as total GHG emissions from the City of Toronto and the transportation sector. The results will be expressed as total GHG emissions and tabulated for baseline conditions and the future with jets and without jets. Commentary on the significance of the GHG emissions due to the proposal relative to other sources will also be provided.
Climate Change	GHG	In addition to emission respecting air quality, an inventory of all GHG emissions under both present and future purposed uses should be included.	City of Toronto	01/06/2015	Letter to PortsToronto	▶ In addition to emission respecting air quality, GHG emissions will be estimated.
Climate Change	GHG	With the establishment of a Carbon Tool, Waterfront Toronto is not only tracking the carbon emissions related to the revitalization effort, but is also exploring ways to reduce those impacts. As such, Waterfront Toronto recommends that an analysis of the carbon impacts of a proposed runway extension and the introduction of jets be undertaken.	Waterfront Toronto	5/19/2015	Email	▶ GHG emissions for both future scenarios (with and without jets) will be estimated using the air quality modelling approach requested by the City of Toronto. This model includes both airport activity and surrounding traffic. The changes in GHG emissions due to the proposal will be compared to relevant benchmarks, such as total GHG emissions from the City of Toronto and the transportation sector. The results will be expressed as total GHG emissions and tabulated for baseline conditions and the future with jets and without jets. Commentary on the significance of the GHG emissions due to the proposal relative to other sources will also be provided.

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Issue	Sub Issue	Comment	Source (Stakeholder)	Date	Format	Response
Climate Change	Emissions	• How can Canada achieve the necessary reductions in carbon emissions? • What contribution to those necessary reductions does the Canadian aviation industry need to make? Will the “forcing” effect from higher-flying jets using the Island Airport contribute disproportionately to climate change? • What air travel passenger volume can reasonably be anticipated to be generated from the Greater Toronto Area given an appropriate application of supply and demand constraints to enable that contribution? • If it is it increasingly likely that regulations are forthcoming that would “price” carbon, thus increasing the price of operating airlines and the cost to consumers, what is the likelihood that the demand for flights decreases commensurate with these price increases? Of what use would the expansion be given lower demand?	Stakeholder	5/20/2015	Email to Facilitator	▶ Climate change is a global phenomenon. The environmental assessment will consider policy guidance from the Provincial Policy Statement and recommendations from the City of Toronto's Climate Change Committee. As well, the impacts of the proposal on climate change will be assessed qualitatively by undertaking a relative comparison of greenhouse gas emissions (GHGs). GHG emissions of relevance to the study include carbon dioxide (CO2), nitrous oxide (N2O) and methane (CH4). ▶ GHG emissions under the Future Baseline and Proposed Future Scenarios (with and without jets) will be estimated using U.S. EPA models for both airport activity and surrounding traffic. The changes in GHG emissions due to the proposal will be compared to relevant benchmarks, such as total GHG emissions from the City of Toronto and the transportation sector. The results will be expressed as total GHG emissions and tabulated for baseline conditions and the future with jets and without jets. Commentary on the significance of the GHG emissions due to the proposal relative to other sources will also be provided. ▶ Canada's carbon emissions and carbon pricing are considered beyond the scope of this EA.
Consultation	Consultation	I have chosen not to attend any further Toronto Port Authority public meetings on Airport Expansion and the potential use of Jets. The current process has absolutely NO VALIDITY. For those of us who attended public meeting sponsored by Waterfront Toronto (then Toronto Waterfront Revitalization), the Toronto public made it clear that they were fed up with the "stealing of public waterfront lands for corporate developments" (Westin Harbour Castle/York Quay Condominiums/Queen's Quay condos and a host of other condo developments along Queen's Quay East & West). I have great respect for the efforts of Nicole Swerhun and her efforts in the previous Waterfront Toronto public process and the Queen Street East Visioning study, both of which I attended. I do feel however that in agreeing to facilitate this Port Authority/Deluce process, Swerhun & Associates have compromise their integrity. The Port Authority/Deluce Process reeks of the selfishness of certain key individuals who put their own personal objectives ahead of the public's vision for the Waterfront. Surely the comments of Greenberg, Crombie, Miller, Bedford, Golden, McKeown, Campbell and Diamond speak for the Toronto public. Deluce and the Port Authority have distorted their objectives from the onset. The addition of AECOM and WSP together with the consortium purchasing the terminal speak to a much larger project than first suggested (namely a TRANSPORTATION HUB). This is a Vanity Project of Robert Deluce and the Port Authority (which dies without it). It's time for myself and others to stop providing this so-called Public Consultation charade with validity by attending these Show and Tell meetings. I intend to move on to a much more vigorous process to put an end to this damaging, costly and time-wasting process.	Public	4/13/2015	E-mail to Facilitator	▶ Comment noted.
Consultation	Bias	I must point out that I am extremely disturbed by the attitude and bias (in favour of jets) that was displayed by the facilitators at the EA meeting that was held on April 11, 2015. I was under the impression that the facilitators were supposed to be neutral.	Public	5/17/2015	E-mail to Facilitator	▶ Comment noted.
Consultation	Study schedule	The Part 1 Engagement summary did not note that time intervals between public meetings were so short that the project team did not have time to review or address public comments already submitted during and after the previous public meetings. The draft scope for noise study shows that the team has still not had a chance to review the comments provided during the initial pre-consultation meetings for this study. A Stakeholder Advisory Committee meeting was scheduled to coincide on the same date as the end of the 30 day public review period for the Draft Scope, which limited off-hours discussion opportunity between the volunteer stakeholder representatives, and illustrates Ports Toronto desire to ‘get a study done’ in as short a time as possible. It was not stated that PIC materials were not distributed to the public at least 2 weeks prior to meetings to ensure fulsome informed discussion. The PIC 1 presentation materials, not available to the public prior to the public meeting, contained several issues which have not yet been addressed. This effectively wasted one of the 3 official public meetings, leaving stakeholders short-changed. The PIC 3 meeting agenda appeared to be extremely valuable, but was so loaded given the available public meeting time limit that it had to be aborted, resulting in little of the detailed focused input sought and needed by the Study Team to inform the draft scope of the study. The Part 2 Engagement Plan does not include a flowchart and timeline summary as to the frequency and magnitude of public input through the Summer 2015 vacation season and Fall 2015 election period. In keeping with past studies, no input framework has been provided by Ports Toronto for an airport expansion study.	Public	5/20/2015	Email to Facilitator	▶ Public comments have been reviewed throughout the first phase of the EA process and changes to the Study Design have been made in response to those changes, where appropriate. As part of the 30-day review of the draft Study Design, further comments have been collected, and additional changes will be made to the Study Design document, where appropriate. PortsToronto has taken the advice of numerous commentators to allow sufficient time to collect and address comments, and to prepare a rigorous assessment of the potential impacts of the proposal, and have elongated the project schedule to do so. All of the public consultation materials are available on the project website for public review and comment. Ongoing public consultation will be planned to coincide with the availability of study results. PortsToronto’s commitment to take the time necessary to collect the data required to prepare a rigorous assessment of impacts means that future consultation events may be rescheduled until the study has conclusions to present.

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Issue	Sub Issue	Comment	Source (Stakeholder)	Date	Format	Response
Consultation	Agency Contacts	The list of agencies on page 36 does not include the MOE. It needs to be clarified which agency is reviewing which environmental factor, and specifically which agencies are responsible for commenting on noise study components.	Public	5/20/2015	Email to Facilitator	The agencies listed in the draft version of the Study Design in the consultation section were only those who are represented on the Agency Advisory Committee (AAC). The purpose of the AAC is to provide a place where representatives of various government divisions, ministries and agencies can share their perspectives and advice with PortsToronto at key points throughout the EA process. The Ministry of the Environment and Climate Change has been contacted regarding this EA and they have confirmed that they will not be reviewing it, as it is not a legislative requirement to complete this EA. All agencies on the AAC, as well as various departments at the City of Toronto will review the outcome of all studies of interest to them.
Draft Study Design	Appendices	Please add December 9th 2014 letter by PT (Ken Lundy) found here: http://static1.squarespace.com/static/53e28890e4b05bc6da0e173b/t/54e39d8de4b0fdf9a91514b6/1424203149056/Correspondence+with+MOECC.pdf to the Final Draft Appendices also include any other correspondence between December 15 2014 to February 25 2015 between Ministry of Environment and CC and PT	Public	4/20/2015	Email to Facilitator	Comment noted.
Draft Study Design	Flight Slots	"Current Tripartite Agreement Restrictions, Additional Passengers As noted, under the current Tripartite Agreement there are no limitations placed on the number of slots or passenger volumes at BBTCA; however, PortsToronto has voluntarily limited the number of flight slots available per day at the BBTCA to 202 for scheduled commercial flights in order to comply with noise restrictions." Another main reason why there is a limitation on daily flights is..... See Ports Toronto - http://www.portstoronto.com/About-TPA/Media-Room/Press-Releases/Update-on-slot-allocations-at-Billy-Bishop-Toronto.aspx TPA appointed ACL to independently manage the commercial carrier demand and allocate the available slots for the BBTCA to applicant carriers, implementing a methodology that is similar to those used at other North American airports. After an extensive analysis that evaluated the key factors affecting airport operations, TPA determined in consultation with ACL and Jacobs Consulting, that 202 commercial slots could be made available for use at the popular airport during the 2012 allocation period. Having determined historic rights to the 186 slots allocated for 2011, the 16 remaining slots per day were available for allocation between the applicant carriers, Porter Airlines and Air Canada. ACL received competing requests from the two existing carriers, which in total exceeded the 202 slots available for allocation. Based on the requirement to allocate slots in a fair manner, including taking into account the priorities for allocation contained in the Allocation Rules, a decision has been taken by ACL to allocate the 16 new slots to Porter Airlines. The priorities for allocation of new slots by ACL were along the following lines: 1. Priority will be given to carriers wishing to operate slots on a year-round basis. 2. The ongoing TPA corporate objective to increase and diversify the number and choice of destinations to meet the demands of the BBTCA's business and leisure travellers. 3. ACL should try to ensure that the needs of the travelling public are met as far as possible. Please have this ACL reference and short specifics added to this somewhat misleading part of the Draft.	Public	4/20/2015	Email to Facilitator	The Study Design includes sections which describes the Future Baseline Scenario as described in the 2012 Master Plan and the Proposed Future Scenario as described in the 2015 Master Planning Exercise, which would require amendments to the Tripartite Agreement. These sections include details on the scenarios to be assessed such as runway length, number of daily commercial slots, total passengers/year, total annual aircraft movements, total annual non-commercial aircraft movements, passengers in peak hour groundside and changes to the Marine Exclusion Zone.
Draft Study Design	Operations	Please have the note below this table adjusted to read "Total passengers includes those arriving, departing and connecting at BBTCA." Connecting passengers do not leave BBTCA. Reasoning - "in-transit" is too vague and many will not grasp. 8. In Table 3.1 row 6...it states ... "# Total Annual Non-commercial Aircraft Movements...." Why would it not state "Total annual Commercial Aircraft Movements.... as per the whole meaning of this chart being for commercial aircrafts. If I am correct in the analysis; please replace with total number of Q400 aircraft take-off and landings (Air Canada & Porter Airlines) for 2014 at BBTCA	Public	4/20/2015	Email to Facilitator	The Study Design indicates both connecting passenger movements and movements of passengers who arrive and/or depart from the BBTCA. The number of commercial aircraft movements is equal to the total number of aircraft movements minus the total number of non-commercial aircraft movements.
EA Process	Need	Airport assets capable of serving the city are scarce. Realistically there are only two, Pearson and Billy Bishop, so they must be used prudently. Since both are publicly owned, an overall aviation plan is needed to ensure they complement each other and together serve the city in the best manner. It is incumbent on government organizations and airport operators to develop the aviation plan that Transport Canada and others have talked about conceptually for many years. It is not about the best solution for any one airport or airline, it is about the best solution for the city as a whole. The first step to any runway extension - and a prerequisite to the EA - is to develop the "big picture" and role for each airport.	Public	4/24/2015	Email to Facilitator	This is considered outside the scope of the environmental assessment; however, the 2015 Master Planning Exercise will review the market conditions and demand for air travel, amongst other elements, in the determination of slot provision and passenger volumes.

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Issue	Sub Issue	Comment	Source (Stakeholder)	Date	Format	Response
EA Process	Need	The EA must include an examination of the underlying need for the expansion within the context of the aviation plan noted above and alternatives to the expansion. What transportation problem will the expansion solve? To date the debate has focused on the impact of a solution without having identified the underlying need or problem to be solved. Revenue and profit by themselves are not sufficient justification for the runway expansion. This approach would be appropriate for a privately owned airport but since Billy Bishop is publicly owned all options must be explored. The air transportation and community needs of the city as a whole must take precedence over the financial or market share wants of Porter or the TPA.	Public	4/24/2015	Email to Facilitator	▶ In 2013, Porter Airlines submitted a proposal to the City of Toronto, copying PortsToronto and outlining their request to introduce jet aircraft at the BBTCA. Part of this proposal included an extension of the land mass at each end of the main runway in order to lengthen the operational portion of the runway to accommodate the use of jet aircraft for scheduled flight operations. As the Tripartite Agreement does not allow the use of jet aircraft for scheduled commercial travel or the lengthening of the operational portion of the runway, the terms of the Tripartite Agreement would need to be amended to approve Porter's proposal. In consideration of the concerns already raised by some members of the community regarding existing airport operations, and prior to entering into negotiations to amend the Tripartite Agreement, the City of Toronto, in an April 1, 2014 City of Toronto Council resolution (City of Toronto, 2014), requested that further study and analysis of the effects of jet aircraft at the BBTCA and associated mitigation measures be completed. Part of this request included the completion of an environmental assessment, and thus the EA aims to address the impacts of the proposal. While this does not represent the identification of a solution to a particular problem, the 2015 Master Planning Exercise will review the market conditions and demand for air travel, amongst other elements, in the determination of slot provision and passenger volumes.
EA Process	Legislation	Given repeated declarations (as in the Study Design document prepared for the EA) that an EA is not required by Provincial or Federal legislation (as in Section 2, as well as in Section 2.1 and in Section 2.2 and also in Section 3 etc) – consider eliminating the repetitions or complement them. Clarifying why the EA is being followed is it is because City Council's approval for runway extensions and jets etc is required before their agreeing to consider changing their Tripartite Agreement? (which is stated once – as in Section 1.2)	City of Toronto	01/06/2015	Letter to PortsToronto	▶ The Study Design document will be updated to remove repetitive information, and to improve the clarity of the purpose and reason for conducting the EA. See updates to section 1.3.
EA Process	Cumulative Effects	The EA must include a description and examination of all related projects and projected costs flowing from the runway extension. These may include: approach lighting, navigational aids, de-icing pads, taxi and apron expansion on the airside; terminal improvements such as pre-clearance or enlarged baggage area; groundside improvements such as curbs, short and long term parking and roadways. Collectively all projects must show that the airside, terminal and groundside systems are in balance.	Public	4/24/2015	Email to Facilitator	▶ Project costs are considered outside the scope of the EA.
EA Process	Caps and phasing	The EA showcased caps of 242 with a larger amount of passengers as proposed by city staff. I would explicitly like to see how the TPA will enforce 25% of volume by jets (if the approval is provided) and manage the caps on passengers and slots to the number in the interim for Phase 1 and 2.	Public	4/25/2015	Email to Facilitator	▶ PortsToronto seeks to understand the potential impacts of the proposal before agreeing to the City's proposed caps and phasing. Operational restrictions will not be recommended by the EA, which seeks to understand the potential impacts of the proposed future operations, as developed through the Master Planning exercise. These proposed future operations include a mix of aircraft as described in the 2015 Master Planning Exercise. Enforcement of aircraft mix is beyond the scope of the EA.
EA Process	Need	The EA MUST contain the Problem we are trying to solve with Expansion. A single carrier proposing Expansion isn't a strong enough business case considering multiple priorities in the city.	Public	4/25/2015	Email to Facilitator	▶ In 2013, Porter Airlines submitted a proposal to the City of Toronto, copying PortsToronto and outlining their request to introduce jet aircraft at the BBTCA. Part of this proposal included an extension of the land mass at each end of the main runway in order to lengthen the operational portion of the runway to accommodate the use of jet aircraft for scheduled flight operations. As the Tripartite Agreement does not allow the use of jet aircraft for scheduled commercial travel or the lengthening of the operational portion of the runway, the terms of the Tripartite Agreement would need to be amended to approve Porter's proposal. In consideration of the concerns already raised by some members of the community regarding existing airport operations, and prior to entering into negotiations to amend the Tripartite Agreement, the City of Toronto, in an April 1, 2014 City of Toronto Council resolution (City of Toronto, 2014), requested that further study and analysis of the effects of jet aircraft at the BBTCA and associated mitigation measures be completed. Part of this request included the completion of an environmental assessment, and thus the EA aims to address the impacts of the proposal. While this does not represent the identification of a solution to a particular problem, the 2015 Master Planning Exercise will review the market conditions and demand for air travel, amongst other elements, in the determination of slot provision and passenger volumes. ▶ PortsToronto is undertaking this EA at the request of the City of Toronto to identify the effects of the proposed changes on the surrounding environment and to inform their position related to the proposal.
EA Process	Study schedule	Congratulations to the team on getting this together in amazingly short time. My comment is this: The scope must contain the commitment that the EA work will be allowed to take the time necessary for the work to be done thoroughly and not rushed to meet any council deadline; that there will be periodic assessments of the state of work so that the implications of work completed for continuing study may be evaluated and study design modified if necessary. If it is absolutely necessary to report to Council before the end of 2015, that should be an interim report not the final one.	Public	5/10/2015	Email to Facilitator	▶ Comments noted.

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Issue	Sub Issue	Comment	Source (Stakeholder)	Date	Format	Response
EA Process	Legislation	I am very very concerned with the whole EA process (100% excluding Swerhun's work in this matter) According to David Suzuki, Bill C-38 gutted environmental protection in many ways. David Suzuki - see the following web-address http://www.davidsuzuki.org/publications/downloads/2012/C-38%20factsheet.pdf From David Suzuki "Bill C-38: What you need to know Canada's Finance Minister, Jim Flaherty, introduced Bill C-38 on March 29, 2012, ostensibly to implement measures announced in Budget 2012. In reality, amendments to environmental laws account for about half of the 452-page bill. These amendments will weaken Canada's capacity for environmental governance, threatening our land, climate and water." "Environmental assessments – less common and more political Bill C-38 overwrites the entire Canadian Environmental Assessment Act. The new Act no longer requires environmental assessments of projects proposed or regulated by the federal government – except if the Environment Minister designates a project for assessment. We do not yet have information about which types of projects (if any) the Minister intends to designate. But the politicization of this process opens the door for intense lobbying by industry proponents keen on keeping their projects off the list." "When a project is designated for environmental assessment, the new Act allows provincial assessments to replace federal assessments. The federal government may then base its decision on the conclusions of the provincial assessment or decide to exempt the project from the federal Act altogether. This is of concern because in some cases provincial environmental assessments may have a narrower scope and more limited opportunities for public participation." I am enclosing 3 letters/documents: • Letter from Ken Lundy PT/TPA - December 9 2014 (especially see page 3, last paragraph) • Letter from Provincial Environmental Approvals Branch - December 15 2014 (see whole letter) • Letter/Statement from Cheri DiNovo – MPP, Parkdale-High Park -sometime in 2015 (no date given) For first 2 letters go again to..... http://static1.squarespace.com/static/53e28890e4b05bc6da0e173b/t/54e39d8de4b0fdf9a91514b6/1424203149056/Correspondence+with+MOECC.pdf For last letter/statement go to..... enclosed word document Last 2 paragraphs...requesting something that may be impossible. Airports fall under federal jurisdiction, but Section 32 of the Canadian Environmental Assessment Act allows for the substitution of a provincial EA process. Given the crucial provincial interests at stake, and the federal government's shameful record of weakening environmental oversight, we ask the provincial government to exercise its options under the CEAA, and designate the BBTCA expansion project for a full provincial Environmental Assessment. signed Cheri DiNovo – MPP, Parkdale-High Park Peter Tabuns – MPP, Toronto-Danforth	Public	4/15/2015	Email to Facilitator	▶ Comments noted.
EA Process	Legislation	The EA makes no mention of TPA's' declared intention to have Tripartite Agreement extended another 50 years, although this topic is not under consideration by City (nor was it part of the Porter Proposal).	Public	5/17/2015	E-mail to Facilitator	▶ The planning horizon for the EA is a standard 20-year planning horizon. The EA does not consider any changes to the Tripartite Agreement beyond those requested to accommodate Porter's proposal.
EA Process	Scenarios	The comparators need to be more extensive than just comparing the future situations with jets against an allowable future situation without jets. Both should be compared against the present situation and all three situations should be compared against acceptable standards. Simply saying the Jets scenario is no worse or just marginally worse than what is presently allowed is a false comparator as both could be unacceptable, as could the present situation.	Stakeholder	5/18/2015	Email to Facilitator	▶ The conditions of the Future Baseline Scenario has been selected to allow the cumulative net effects assessment to appropriately isolate the impacts of the proposal from impacts of other projects occurring in the same geographic and temporal space as the proposed growth at BBTCA. Therefore, the cumulative net effects of the Proposed Future Scenario on community assets will be compared to the cumulative net effects of the Future Baseline Scenario on community assets. It is anticipated that numerous additional changes to the ambient, or background conditions within the urban and natural environments within each Study Area will take place between now and the end of the planning horizon that are likely to be unrelated to the proposed airport growth. These changes will include major population growth in the Central Waterfront and Port Lands, major changes to transportation infrastructure and travel behaviour in and around the Central Waterfront, ongoing implementation of environmental remediation measures, ongoing improvements to sanitary and stormwater infrastructure, and local and regional demographic changes. These and other potential changes over time represent confounding factors that could dilute or amplify the perceived effects of the Proposed Future Scenario as compared to current conditions. Because the ambient conditions today will be different from the ambient conditions in the future, comparing the effects of future proposed growth to current operations results in a comparison of "apples to oranges." The Future Baseline Scenario will be modelled using the same ambient conditions as the Proposed Future Scenario, allowing for a comparison of cumulative net effects that can isolate the impacts of the proposed growth at the airport from the impacts of other future changes to the urban and natural environment. This approach yields a more robust "apples to apples" comparison of cumulative net effects.

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Issue	Sub Issue	Comment	Source (Stakeholder)	Date	Format	Response
EA Process	Need	Although the Canada Marine Act is silent on the matter, as a public agency, PortsToronto is by necessary implication, obliged to pursue the public interest. Surely any assessment of the Porter proposal must start with an assessment of the public interest, evaluating the need for the Proposal, in relation to the other competing needs and desires our City and its citizens have for their Waterfront, and considering alternatives to the proposal, including expansion at Pearson. Further, consideration of alternatives to air travel, such as improved passenger rail service, which is far more environmentally friendly, are absent entirely. Certainly the scope of this work should, as a matter of public interest, include possible harm to other public assets and activities.	Stakeholder	5/20/2015	Email to Facilitator	▶ As there are no regulatory requirements defining the EA process for this proposal, the scope of work was developed based on consultation with stakeholders and on experience with other EAs at both the Provincial and Federal levels. As a result of the magnitude of public interest in the choices and trade-offs associated with the proposal, PortsToronto elected to follow the general framework set out under the Ontario EA Act due to the robustness of the public consultation process enabled by the Act. The EA process includes a number of opportunities for review and comment and allows for consultation throughout the study to receive and address public, First Nation and Métis, stakeholder and agency feedback and comments. The EA will also include consideration and documentation of the comments and concerns from participants in the consultation process.
EA Process	Decision-making	Under a provincial environmental assessment, the proponent does not determine the scope and acceptability of the assessment – the Ontario government does. Here, by contrast, the proponent – PortsToronto/Porter - determines the scope and approves its hand-picked consultants' work. And, unlike provincial EAs, there is only a 30-day window for the public to review the report. Not the "robust" public engagement required by the City. What happened to the iterative process that was promised, that would share the EA work and its interplay with the "Master Plan", the runway design and the Bathurst Quay Precinct Study, as they all evolve?	Stakeholder	5/20/2015	Email to Facilitator	▶ As there are no regulatory requirements defining the EA process for this proposal, the scope of work was developed based on consultation with stakeholders and on experience with other EAs at both the Provincial and Federal levels. As a result of the magnitude of public interest in the choices and trade-offs associated with the proposal, PortsToronto elected to follow the general framework set out under the Ontario EA Act due to the robustness of the public consultation process enabled by the Act. The EA process includes a number of opportunities for review and comment and allows for consultation throughout the study to receive and address public, First Nation and Métis, stakeholder and agency feedback and comments. The EA will also include consideration and documentation of the comments and concerns from participants in the consultation process. ▶ Results from the 2015 Master Planning Exercise, Preliminary Runway Design and Bathurst Quay Neighbourhood Study will be incorporated into the EA. With regard to the Bathurst Quay Neighbourhood Study, traffic impacts associated with changes to the airport and other foreseeable trip generators will be assessed. This will include an assessment of indicators of traffic congestion such as the degree to which the available capacity of the road network is being utilized by vehicles. The EA will refer to the outcome of this study. Should mitigation measures be identified as required to address any impacts of the proposal, these will be provided to the 2015 Master Planning Exercise team for consideration.
EA Process	Scenarios	Only one alternative is proposed to jet expansion: massive expansion within the existing NEF contours. Maintaining the status quo without expansion – or, for that matter, the absence of the Airport, are alternatives that could be explored under a provincial EA, and should be explored here. This work is designed to force acceptance of an expanded airport operation – one way or another.	Stakeholder	5/20/2015	Email to Facilitator	▶ As outlined in the Draft Study Design, the EA will only consider two potential Future Growth Scenarios, one with jets and a runway extension (to be detailed in the 2015 Master Planning Exercise) and one without jets and the current runway configuration (as detailed in the 2012 Master Plan). The Future Baseline Scenario includes operations (slots and passenger volumes) that are permitted under the current Tripartite Agreement, under the NEF requirements. ▶ The EA will not assess the impacts to the environment of closing down the airport as this is not being considered by the operator as a likely scenario.
EA Process	Scenarios	Beginning on page 12, "Permitted and Proposed Growth Scenarios" are defined and discussed, both assuming vast increases in passenger numbers through the Airport. This has an air of fantasy, as even Porter's Master Planner advised the recent public meeting that Porter's business is currently "mature" – it has ceased to grow, and, without additional destinations, would not be anticipated to grow materially.	Stakeholder	5/20/2015	Email to Facilitator	▶ Comment noted. The EA is assessing future scenarios provided by the existing 2012 Master Plan and the 2015 Master Planning Exercise.
EA Process	Risk	All risk assessments must take place prior to the approval of the runway extension.	Public	5/20/2015	Email to Facilitator	▶ A formal risk assessment is not currently proposed for the EA; however, it is recommended that the 2015 Master Planning Exercise address public safety considerations as part of the Transport Canada regulations that guide airport design and operation (such as TP312 – Aerodrome Standards and Recommended Practices), and that the runway design be prepared in accordance with these safety standards.
EA Scope	Safety	I reviewed the proposed EA scope and I am concerned that safety is not being adequately covered. Due to the fact that an airport expansion is being proposed in a very high population density zone, I wanted to understand if the following analysis is being conducted: - Impacts of runway overrun by aircraft - Crash location model - Crash consequence model - Calculated increase in potential death and injury by allowing jets to fly, and the rate of increase based on volume of traffic I hope you find my input as reasonable additions to the scope of the EA. Please let me know the above will be added.	Public	4/16/2015	Email to Facilitator	▶ A formal risk assessment is not currently proposed for the EA; however, it is recommended that the 2015 Master Planning Exercise address public safety considerations as part of the Transport Canada regulations that guide airport design and operation (such as TP312 – Aerodrome Standards and Recommended Practices), and that the runway design be prepared in accordance with these safety standards.
EA Scope	Caps and Phasing	The City of Toronto has reviewed the draft study design and scope for the Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport. Enclosed are comments on the draft document dated April 2015. Please be advised that we expect that City staff will provide additional comments as the study unfolds, and will conduct a detailed review of the draft final report in the fall. City staff are available to discuss these comments further if required. The April 1, 2 and 3, 2014 City Council decision provided clear direction on a negotiating framework for moving forward the review of the BBTCA expansion proposal. This framework outlined conditions precedent that included, amongst other items, agreement on a caps and phasing framework for BBTCA. It is the City's expectation that the studies being undertaken by PortsToronto will address the conditions adopted by City Council, including the caps and phasing framework.	City of Toronto	01/06/2015	Letter to PortsToronto	▶ PortsToronto understands the request for a phased framework for managing growth at the BBTCA, as recommended by City staff and adopted by City Council on April 1, 2014 and is committed to completing the studies required, including the EA, and implementing improvements associated with Phase 1. PortsToronto acknowledges there is a caps and phasing framework which will be discussed with the Tripartite signatories after Phase 1 work has been completed.

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EA Scope	Caps and Phasing	There is no mention that City wants slot and passenger caps, and voted UNANIMOUSLY to that effect.	Public	5/17/2015	E-mail to Facilitator	▶ PortsToronto understands that the phased framework for managing growth at the BBTCA included: **Phase one:** i. Annual origin/destination passenger cap of 2.4 million; ii. Peak hour flight (slot) cap of 16; iii. Peak hour origin/destination passenger cap of 884; and iv. Daily flight (slot) cap of 202; **Phase two:** i. Annual origin/destination passenger cap of 2.7 million; ii. Peak hour flight (slot) cap of 20; iii. Peak hour/destination passenger cap of 1,178; and iv. Daily flight (slot) cap of 202; and **Phase three:** i. Passenger and flight (slot) caps, based on transportation capacity, community impacts and experience with Phases One and Two. ▶ The BBTCA Runway and Jets EA is proposing to assess two scenarios: the Future Baseline and the Proposed Future Scenario. The effects of the Phase Two framework are being evaluated through the Future Baseline Scenario, as follows: i. Annual groundside passenger volume of 2.7 million ii. Peak hour flight slots of 24 iii. Peak hour groundside passenger volume of 1,085 iv. Daily slots of 202 ▶ The Future Baseline Scenario will assess effects of potential operations, given projected general aviation activity and the requested changes to the Tripartite Agreement. The impacts of these operations will be assessed by the EA, including impacts on transportation capacity and community impacts. Effects of the Phase Three requirements are captured in the evaluation of the Proposed Future Scenario.
EA Scope	RESA	The Toronto Boater's Alliance is concerned that the PortsToronto study "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at BBTCA" fails to fully consider valid options for creating Runway End Safety Areas (RESAs) at the BBTCA under the "Permitted Growth" scenario. Current discussion of expanding BBTCA often contains statements that a soon-to-be-implemented Transport Canada (TC) requirement to implement RESAs means that whether jet aircraft are approved or not, an amount of lake filling will be needed - this statement is inaccurate and fails to analyze options availble to meet this TC requirement. The Tripartite Agreement also does not permit this without an ammendment. The study plan for the 2012 Master Plan Scenario should be considering only RESA implementation options that conform to the Tripartite Agreement. To meet TP213 5th edition requirements, BBTCA would need 150m RESAs at each end of Runway 08/26 - the current runway configuration has no RESAs but does have approx. 100m of unused land at each end of the runway. Possible RESA Implementation Solutions for BBTCA: Option 1 - Reducing Declared Runway Distances: RESAs could be implemented at BBTCA by using some of the existing runway. This option was described but bypassed in the Porter Proposal. It also conforms with the Tripartite Agreement. Option 2 - Implementing Engineered Material Arresting Surfaces (EMASes): EMASes could provide an alternative to RESAs, subject to TC approval. This option was described but discarded by Porter Airlines in their submission to the City. It was thought to be too expensive and high maintenance. Serious consideration of this option would at least look at its cost and technical feasibility. This does not require an ammendment to the Tripartite Agreement. Option 3 - Lake Filling to Implement RESAs: The lake filling option was described in Porter Airlines submission to the City. It is the only option currently being considered. This option has be described as "required" by PortsToronto Chairman Mark McQueen in a speech given to Toronto Region Board of Trade on Oct. 21, 2013. Mr. McQueen's opinion has been adopted by Robert Deluce, CEO of Porter Airlines in talks given to various organizations. The lake filling option descirbed by PortsToronto uses the exsiting landmass and supplements that with about 43m. The EA offers confusing notes on this matter. In some documents lake filling for RESA purposed is recognized as needing Tripartite Ammendment and in other EA documents lake filling for RESA is incorrectly portrayed as "Permitted Growth" as in the BBTCA Details Public Meeting Display Panel. The PortsToronto 2012 Airport Master Plan incorrectly states "Should RESAs be mandated by TC, the Tripartite Agreement would require an amendment allowing for an expansion of airport lands to accommodate the RESA requirements. Option 4 - Revising Taxiway Design: Despite frequent assertions from those favoring airport expansion that lake filling is necessary at BBTCA to accommodate RESAs, this necessity is not in fact the case. The runway and taxiway	Stakeholder	5/19/2015	Email to Facilitator	▶ Both the Future Baseline and Proposed Future Scenarios in the EA will include the assessment of potential impacts associated with the inclusion of a runway end safety area (RESA) in the future runway design. The RESA is a level graded area which extends beyond the runway threshold to provide an additional measure of safety in the event of an aircraft undershooting or overrunning the runway. As proposed, RESAs will be required where the runway length exceeds 1,200 meters or where an instrument runway is utilized by scheduled passenger operations utilizing aircraft with more than nine seats. ▶ In 2010, Transport Canada identified the requirement to implement a RESA at qualifying airports as an additional safety consideration. The installation of a RESA at the BBTCA would result in an amendment to the Tripartite Agreement (WSP Group, 2014), but would be required to comply with anticipated Transport Canada regulations. The RESA at the BBTCA would consist of a land mass extension at both ends of the main runway (Runway 06-26) which includes lakefilling in the Toronto Harbour within the Marine Exclusion Zone (MEZ). Although not required under the CEAA, an EA report for lakefill in the vicinity of the proposed RESA (for the existing runway 08-26 configuration), “Lakefill within Marine Exclusion Zone (Keep-out-Area) Toronto Harbour”, was completed in January, 2013 (Dillon Consulting, 2013). ▶ The Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport will assess the impacts of future airport operations under an operating scenario both with jets (to be detailed in the 2015 Master Planning Exercise) and without jets (as detailed in the 2012 Master Plan). This includes the assumption that RESAs will be included in the proposed design of a future airport runway, and that a Tripartite Agreement amendment will be necessary in order to allow the construction of the RESA, whether or not the proposed extension of the land mass is allowed to move forward to detailed design.

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		design for extended runways that has been created by the PortsToronto airport consultant, WSP, shows how this can be achieved. It is possible that some lake filling would be required under this option on the eastern end of the runway, to the north only. This taxiway reconfiguration option would: a) create a RESA of 150m at each end of the runway, b) slightly increase declared distances, c) meet the need for a parallel taxiway, d) be less expensive for PortsToronto than filling 43 metres each end, e) not require change to the Tripartite Agreement. Revising taxiway design does not require amendment to the Tripartite Agreement governing operations at BBTCA. None of the four RESA implementation solutions discussed here adds sufficient runway to accommodate the jet aspirations of Porter Airlines; those designs are for “PROPOSED GROWTH”, not the “PERMITTED GROWTH” scenario.				
EA Scope	MEZ	In April I attended the Citizen's advisory meeting with the group that was contracted to write "The Draft Study Design for Ports Toronto's BBTCA Runway and Jets Environmental Assessment." At two break-out sessions, I suggested that the Canadian Coast Guard should be contacted regarding the Marine Exclusion Zone that accompanies the proposed runway, especially because it extends far into the harbour and will restrict marine traffic. Toronto Harbour is an important site for sailing and other boating activities as well as commercial traffic. At the session, my suggestion was accepted as valuable. The moderator of one session said to the recorders that "we will look into that" or words to that effect yet I cannot find a reference to contacting the Coast Guard in the Draft Design Study. I believe this is a serious oversight or omission.	Public	5/19/2015	Email to Facilitator	▶ Based on the 2015 Master Planning Exercise, the potential changes to the MEZ do not include an extension of the MEZ into the Inner or Outer Harbours. Public consultation documents will be shared with all interested organizations, and the Coast Guard will be added to our contact list
EA Scope	Bias	Bias of the primary consultant for this work, Aecom, appears clearly on the first page of this document. It states: "The Canada Marine Act … requires PortsToronto, as a GBE, to uphold the federally-appointed mandate to ensure the continued commercial viability of PortsToronto assets." It does not. There is no mention of non-marine assets (i.e. related to port operations) in that Act. The Island Airport is certainly not a marine asset. Of the purposes for Port Authorities listed in section 4 of that Act, only these two apply to Ports Toronto's operations generally: (d) provide for a high level of safety and environmental protection; (e) provide a high degree of autonomy for local or regional management of components of the system of services and facilities and be responsive to local needs and priorities;	Stakeholder	5/20/2015	Email to Facilitator	▶ Comment noted.
EA Scope	Caps and phasing	As an umbrella group for 32 residents associations covering the area generally from Bloor to north of the 401 and from Bathurst to the Don Valley Parkway, FoNTRA’s membership both use Porter Airlines and use the Waterfront areas for recreational (boating, walking, picnicking, birding biking etc.), cultural (art, theatre, concerts etc.), special events, and restaurant purposes. Parking and transit access are also important. This membership is typical of Toronto residents who make the Waterfront their backyard. Their key concerns about the jets proposal is the impact it would have on the waterfront as a place for these uses, given the airport activities are so closeby. While the scope of the EA has been substantially broadened through public input and should provide good information about impacts on many aspects of the waterfront, for us there are several omissions and clarifications still required. In our first submission (February 4) we stressed the importance of using City Council’s required cap levels as reporting senarios, in addition to the full development of prop planes and of jets. The use of these measures will help us better understand what Council seems to accept as a way to ensure balanced growth, especially given that the EA does not include alternatives, normally of EAs. This measure is important is ensuring the balance of airport and other waterfront uses.	Stakeholder	5/20/2015	Email to Facilitator	▶ Comment noted. PortsToronto understands that the phased framework for managing growth at the BBTCA included: Phase one: i. Annual origin/destination passenger cap of 2.4 million; ii. Peak hour flight (slot) cap of 16; iii. Peak hour origin/destination passenger cap of 884; and iv. Daily flight (slot) cap of 202; Phase two: i. Annual origin/destination passenger cap of 2.7 million; ii. Peak hour flight (slot) cap of 20; iii. Peak hour/destination passenger cap of 1,178; and iv. Daily flight (slot) cap of 202; and Phase three: i. Passenger and flight (slot) caps, based on transportation capacity, community impacts and experience with Phases One and Two. ▶ The BBTCA Runway and Jets EA is proposing to assess two scenarios: the Future Baseline and the Proposed Future Scenarios. The effects of the Phase One framework are being evaluated through the Future Baseline Scenario, as follows: i. Annual groundside passenger volume of 2.7 million ii. Peak hour flight slots of 24 iii. Peak hour groundside passenger volume of 1,085 iv. Daily slots of 202 ▶ The Proposed Scenario will assess effects of potential operations, given projected GA activity and the requested changes to the Tripartite Agreement. The impacts of these operations will be assessed by the EA, including impacts on transportation capacity and community impacts. Effects of the Phase Three requirements are captured in the evaluation of the Proposed Scenario.

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EA Scope	Study schedule	The West Don Lands Committee is a coalition of community, business, environmental, heritage and service organizations. At its meeting on April 27, 2015 it asked us to forward the following response to the draft of the proposed scope of the island airport runway expansion study. We would like the document to contain these two commitments. • First, if the results of the study are to be acceptable to the citizens of Toronto, the EA team must be allowed to take all the time necessary to examine thoroughly the multitude of questions that the project raises. The study should not set an unrealistic deadline for completion of the work and reporting to Council. • Second, we would add to this that the EA team must commit to modifying the scope document, the research programmes, or even repeating early work, as the study proceeds. Since so many areas are to be studied simultaneously, early results must be fed into later work to achieve the greatest possible validity and acceptability of the final document.	Stakeholder	5/20/2015	Email to Facilitator	▶ Comments noted.
EA Scope	Background Reports	Many of the reports adopted into the PortsToronto "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport" were written about two years ago and were universally based on passenger and slot assumptions (5.5 million passengers per annum; 242 slots per day) that have been invalidated by the PortsToronto Master Planning Exercise presented to the public on March 31, 2015. Impacts cannot be reassessed by simply multiplying impacts based on 202 slots by 20% to create a 242 slot impact assessment; impacts cannot be assumed to be linear. Adopting these reports as Information Sources is methodologically poor, without a thorough re-analysis. That work is not indicated or defined in the scope of the PortsToronto's "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport". Other adopted materials are older, up to 18 years old, and of highly questionable value. Porter Airlines did not even exist at that time. A number of reports have been omitted from the PortsToronto "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport", most notably including TPA studies conducted by RDWI on noise1 and air quality2 in 2010, and the 2012 Airport Master Plan3, the basis for the baseline consideration of this study. The Work Plan proposed for the PortsToronto "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport" is seriously flawed based on the Information Sources it adopts. • Some material is severely out of date. • Some material is omitted. • Some material is deeply compromised by slot and passenger assumptions at wide variance from the PortsToronto's projected slot and passenger numbers presented in its 2015 Airport Master Planning Exercise. This "Environmental Assessment" needs up to date, complete, and valid materials to support it. Those materials are lacking. Back to the drawing board.	Stakeholder	5/20/2015	Email to Facilitator	▶ The Draft Study Design listed several reports which have been referenced in the development of the scope of the EA. Many of these documents also provide useful background information about past conditions that will help to frame the context within which existing airport operations are taking place. Additional surveys, modelling and assessments are also being conducted for each effects assessment study as part of this EA to provide information, and in some cases, the results will be used to comment on the validity of the findings of some of these reports. The subject matter experts will review the methods of the reports and will note any potential issues with their assumptions.
EA Scope	MEZ	When PorterPlans was initially advanced, it was presented as a design that would not move the buoys demarcating the Marine Exclusion Zones (MEZs) of the airport. City Council directed "that any of the requested studies to be conducted exclude any consideration of either a runway or an extension of the Marine Exclusion Zone as currently configured, that would materially encroach upon the western channel shipping channel."5 Through the ongoing process the Toronto Boaters' Alliance has observed the weakening of this resolution, and the increasing movement of the buoys of the MEZs in iterations of designs. This topic has been placed in the Master Planning Exercise rather than in the "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport". Given that the Master Planning Exercise is demonstratively NOT CONSULTATIVE (as noted above), this topic should be placed into the consideration of the "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport" where it can receive public analysis and input. Statements that the Runway Design, Master Planning Exercise, and "Environmental Assessment" are interlinked and mutually informing are deceiving, and the Toronto Boaters' Alliance believes public input essential on this topic.	Stakeholder	5/20/2015	Email to Facilitator	▶ Any required changes to the MEZ will be determined through the 2015 Master Planning Exercise. The EA will then assess impacts of any changes to the MEZ on navigation through the marine navigation scope of work. Should any mitigation measures be identified by the EA to address potential impacts, these will be provided to the 2015 Master Planning Exercise team.
Economics	Business case	The EA needs to examine the financial sustainability of the airport. To date the infrastructure costs that will ultimately be borne by passengers exceed $1 billion. Does the TPA have the resources and authority to support its own share? Can costs by all parties be recovered within the remaining term of the Tri Partite Agreement? Will the term of the agreement or passenger capacity limits have to be increased for the complete program to be viable? TPA's revenue stream is very dependant on Porter. What are the risks and consequences if Porter ceased operations? The International Marine Passenger Terminal has been idle since the Toronto – Rochester ferry ceased operations.	Public	4/24/2015	Email to Facilitator	▶ This is considered outside the scope of an Environmental Assessment.

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Economics	Economic Impact	The economic impact must only consider the net new incremental impacts of Porter flying long haul routes from of the island. i.e. passengers who would not fly long haul from Pearson. Also, it must not include the impact of passengers: • currently flying long haul from Pearson shifting to Porter at the island, • who would use Porter if it flew long haul from Pearson or • currently flying Porter's short haul routes.	Public	4/24/2015	Email to Facilitator	▶ The Greater Toronto Airport Authority is undertaking studies to assess overall air travel demand throughout the Greater Toronto region. Studies completed recently or during the EA timeframe will be reviewed. Should these studies show significant overlap between the YYZ and YTZ passenger markets, this will be included in the overview of potential economic impacts.
Economics	Business case	The EA must also share the business case for the Island Airport Expansion proposal (Cost to Taxpayers, Displacement to Pearson, Risk to Development at Portlands etc.) The EA must look at alternatives such as Porter operating at Pearson through UP Express and maintaining the Status quo at the Island Airport. If not, this proposal feels like you are putting lipstick on a pig and ramming this proposal down the public's throat. The EA must elaborate on the cost breakdown and the business case that the Toronto Port Authority (and other tests) to see if this worth their time. These costs include changes to groundside (Parking spots, taxi staging area) and the terminal costs changes - ie bringing US customs, changes to hangar to accommodate the CS100 etc. The Toronto Port Authority will proceed with this business case AFTER the EA is done and after city council votes. It would be more advantageous for the city to have all the necessary information prior to the vote. and should be done in the context of the EA.	Public	4/25/2015	Email to Facilitator	▶ This is considered outside the scope of an Environmental Assessment.
Economics	Background Reports	Ask yourself.....over the years...has the Toronto Port Authority been nice/fair/reasonable to the City of Toronto? • Pilt non-payments • Pilt resolution/s and years to achieve the resolution (Federal Dispute Advisory) • Tax issues at 80 Cherry Street and Outer Harbour etc. • $1 billion lawsuit against city (early 2000's - Lisa Raitt was most likely directly/indirectly involved) • Transportation costs and problems on land-side of airport • Fair representation on PT's board of directors • Lawsuits and threatened lawsuits (e.g. bridge fiasco) • Transparency in the past and present	Public	5/19/2015	Email to Facilitator	▶ Comment noted.
Economics	Subsidies	The "Socio-Economic Environment" [page 22] ignores consideration of the immense subsidies provided to the Airport by the City and the Federal Government. These subsidies have a direct impact on those governments by depriving them of revenue that they would otherwise receive: • The queuing lanes on the west side of Eireann Quay and the parking lot on Little Norway Crescent and a significant portion of the Airport lands are City-owned, but leased to PortsToronto for only nominal rent – until 2033, or earlier, if the Island Airport is closed. • The balance of the Airport lands were Federal Government assets, transferred to its agency, PortsToronto, without charge. • Porter has been given the right to use those valuable lands by Ports Toronto without any charges for their use, other than payment of Airport operating costs – see Commercial Carrier Operating Agreement dated April 9, 2010, and released as part of Porter's failed Initial Public Offering . Unlike every other property owner in Toronto, property taxes are paid to the City for the Airport lands, not based on the current market value of those lands, but on a per-passenger basis, at a rate yielding payments far less than other taxpayers pay. PortsToronto has allowed property tax arrears, based upon that current market value regime, to exceed $50,000,0001. The Island Airport lands, situated in downtown Toronto, are exceedingly valuable, with MPAC assessment for 2012 of $144,423,000. At the Toronto commercial tax rate of about three percent, property taxes payable on the Island Airport lands should have been $4,332,690 for 2012. PortsToronto's proposed per-passenger payment would amount to about $1,786,000, based on 2012 Island Airport passenger levels. That's $2,546,690 less than any other City taxpayer would have to pay as owner of those 215 acres in that year.	Stakeholder	5/20/2015	Email to Facilitator	▶ It is considered outside the scope of the Environmental Assessment to comment on property taxes collected by the City from land uses occupying the Toronto Islands.

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Economics	Economic Impact	In the Appendices, this statement is found, under Socio-Economic Assessment Overview: The economic assessment will be drawn in large part from existing studies. Those studies were deeply flawed, as described in this economist's devasting critique. According to a recent study, airport economic benefits are often overstated, and can be ascribed to aspects of an airport's location, such as nearby industry and transport links, which often serve as job creators, rather than the airport itself. This work clearly will not include a proper economic analysis of the damaging impact that the Island airport has had, and will have, on property values along the waterfront, and therefore on property tax revenues to the City. There is ample evidence of that damaging impact elsewhere: In two paired moderately priced neighborhoods north of Los Angeles International Airport, the study found "an average 18.6 percent higher property value in the quiet neighborhood, or 1.33 percent per dB of additional quiet.	Stakeholder	5/20/2015	Email to Facilitator	▶ The Draft Study Design lists several reports which will be referenced as part of the EA. Additional surveys, modelling and assessments are also being conducted for each effects assessment study as part of this EA to provide information, and in some cases, the results will be used to comment on the applicability of the findings of some of the previous reports. The subject matter experts will review the methods of the reports and will note any potential issues with their assumptions. Updates to clarify the methods of the economic effects assessment study can be found in Appendix B.
Economics	capacity	• Is there capacity now without Island Airport expansion to meet that anticipated volume in the foreseeable future? • Or, if new capacity is added to the Island Airport, does Pearson's growth need to be constrained to achieve those necessary reductions? • Generally, given that constraints on supply and demand for air travel will be necessary, does capital investment in the Island Airport to increase supply make sense? What happens when prospective investors participate in carbon-divestment campaigns? An October study by PricewaterhouseCoopers found that 58% of investors were "dissatisfied" with U.S. companies' understanding of climate change risks—a figure that rose to 64 per cent among investors managing more than US$100 billion in assetsxi. How does that affect Porter's ability to get the financing and investment it needs for expansion?	Stakeholder	5/20/2015	Email to Facilitator	▶ This is considered outside the scope of an Environmental Assessment. The 2015 Master Planning Exercise examines growth opportunities at BBTCA, and includes an analysis of anticipated market demand, and the capacity to accommodate additional flights and/or additional passengers at BBTCA. As per the April 1, 2014 Toronto City Council resolution, the 2015 Master Planning Exercise must align with the ongoing work being undertaken for the Bathurst Quay Neighbourhood Study (currently being undertaken by the City of Toronto), and this will include an assessment of the impacts of changes to passenger volumes on local road networks. ▶ Porter's business operations and finances are not a part of this EA.
Economics	Financing	We suggest a need for the PortsToronto business plan for financing the airport to be fed into the EA study information. As financing will be through Airport Improvement Fees paid by each passenger it can be assumed that there will be a minimum passenger level required to adequately finance the intended improvements. That level is an important factor in assessing the traffic impacts of expansion. The proposed AIF that would be required to finance the improvements would also be an important input into the socio-economic impact as it could potentially affect the projected market share that could be expected under an expansion scenario and affect an assessment of the attractiveness of an expanded BBTCA relative to Pearson and other regional airports.	Stakeholder	5/20/2015	Email to Facilitator	▶ PortsToronto publishes their financial performance every autumn at their Annual General Meeting. This EA will not assess their financial interest in the outcome of the EA, as their financial obligations and objectives can be viewed through these documents, available on their website.
Economics	Business case	We would suggest that the socio-economic analysis include an assessment of whether there is a point at which passenger growth and expansion of the focus from a primarily business travel airport to mixed vacation and business travel airport would adversely affect the value of BBTCA as an asset to downtown businesses.	Stakeholder	5/20/2015	Email to Facilitator	▶ The socio-economic assessment includes an assessment of the non-financial value of the airport to airport users.
Economics	Land value	Conduct a robust economic analysis that considers impacts to land value and marketability (including developer willingness / desire to build on the waterfront in a jets / runway extension scenario).	Waterfront Toronto	5/19/2015	Email	▶ The EA will review existing studies on the marketability of and desire to develop available lands in the waterfront and Port Lands area, and will provide updated information using a similar study methodology to factor the proposed changes at BBTCA into this assessment. For more details on the methods for assessing land marketability and developability, please see Appendix B.
Land Use and Built Form	Study Area	I don't understand why the yellow shading does not include a full circle. Can this be included in the Figure?	Public	4/20/2015	Email to Facilitator	▶ The Study Area for the Land Use and Built Environment scope is defined by the extents of the federally enacted Airport Zoning Regulations (AZR) at Billy Bishop Toronto City Airport which impose restrictions on title for affected lands involving the limitation of building heights. The AZR is composed of Obstacle Limitation Surfaces which protect air space for the safe operation of the airport. The existing AZR protects for an Outer Surface at 76 m above the Airport Reference Point with a radius of 4,000 m and a minimum 180 degree sector along the runway centre line. This Outer Surface is the Obstacle Limitation Surface represented by the yellow circle in the figure identified by the commenter and is compliant with the TP312 requirements in place at the time of developing that surface. We have not represented a full circle because it is not currently protected by the AZR and does not impact the Land Use and Built Environment scope.
Land Use and Built Form	Approach Procedures	Should there not be an official cut-off minimum angle for approaching aircraft into BBTCA coming in over the waters of Lake Ontario and the Toronto Harbour? Question – If there is a minimum approach angle in place and if it is/has been breached at BBTCA; why has it not been enforced?	Public	4/20/2015	Email to Facilitator	▶ As part of the 2015 Master Planning Exercise, any necessary changes to the existing operations at the airport, including to any control surfaces or approach procedures, will be determined according the relevant safety regulations. Where changes are anticipated, the impacts of these changes on community assets will be assessed by the EA.

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Land Use and Built Form	Development	WaterfrontToronto's redevelopment plans involve multi-billion dollar investments. Will an expanded Island Airport threaten these plans by discouraging that investment?	Stakeholder	5/20/2015	Email to Facilitator	▶ Potential physical impacts to recreational amenities will be determined, as well as changes to the user experience of those amenities, based on changes to noise, air quality and views. To determine this, participants in the various recreational activities available in the waterfront, inner harbour, and island area will be surveyed or interviewed to understand current use patterns and factors affecting those uses. This will be conducted as part of the socio-economic scope of work for the EA. Impacts to the built environment, natural environment, and marine environment will also be assessed to understand effects on the balance of uses and users in the waterfront area. ▶ The EA will review existing studies on the marketability of and desire to develop available lands in the waterfront and Port Lands area, and will provide updated information using a similar study methodology to factor the proposed changes at BBTCA into this assessment. For more details on the methods for assessing impacts, please see Appendix B.
Legislation	Tripartite Agreement	Underlying this document is an assumption that the Q400 is compliant with the Tripartite Agreement, and that, if the CS100 is equivalently noisy, it will also comply. However, Porter/PortsToronto have persistently ignored the following requirements of that Agreement: Q400 is not a Dash-8, or STOL, and is not permitted for commercial service. The Tripartite Agreement restricts PortsToronto's use of the Airport to "general aviation and limited commercial STOL service operations". "General aviation" is defined[1] to consist of: all civil aviation activities, other than a limited commercial STOL service, undertaken …. in the operation of civil, state and private (personal and business) aircraft; [and] the operation of … the de Havilland Dash-8 aircraft. This is patently wrong. When the Dash 8 was added to the Tripartite Agreement as a permitted aircraft (for "general aviation" purposes) in 1985, the only Dash 8 plane that could have been in the contemplation of the parties was the Series 100/200 – a 37 to 40passenger plane – about half the capacity, and about 60% of the weight of the Q400[4], which was developed in the 1990s, and has very different performance characteristics[5]. The understanding of the parties at the time as to what they considered to be a Dash-8 is determinative, in law. The fact that the aircraft industry, and Transport Canada, consider the Q400 a derivative of the earlier Dash-8 models (and therefore within the family of Dash-8s) is strictly an administrative qualification and quite irrelevant to the correct interpretation of the Tripartite Agreement. Transport Canada has confirmed that the Q400 is not STOL. Both PortsToronto [2] and Transport Canada[3] take the position that, as the Q400 is classified "aeronautically" as part of the Dash-8 family of aircraft, and is therefore a Dash-8 for the purposes of the Tripartite Agreement. The prohibition on aircraft generating excessive noise: A February 2009 PowerPoint presentation by PortsToronto to a now-defunct community advisory committee meeting admitted that even the Q400 (technically the Q402, flown by Porter and Air Canada) offends the Tripartite Agreement's definition of aircraft generating excessive noise on two of the three limits. Breach of any one prohibits the aircraft. Even PortsToronto's own study shows that noise from the Q400 [technically, Q402] violates the Tripartite Agreement. It also should be remembered that even a small increase in decibels means a significant increase in noise, as decibels are measure on a logarithmic scale. It is clear that to date, PortsToronto has failed its duty to the public to enforce that prohibition. How can Porter and PortsToronto say the Q400 "meet the noise restrictions at the airport"? They cannot – on the facts. Instead, PortsToronto claims it can "trade-off" one breach with another's compliance, borrowing from one parameter that is not breached to address a breach of another. The "trade-off" concept does exist – but only to enable aircraft to meet the maximum noise levels fixed by the ICAO. The concept of "trade-off" does not appear in the Tripartite Agreement.	Stakeholder	5/20/2015	Email to Facilitator	▶ It is PortsToronto's position that the Dash 8 family of aircraft, including the Q400, which has been operating for a number of years at BBTCA, is allowed to operate at BBTCA according to the requirements of the Tripartite Agreement.
Legislation	Tripartite Agreement	PortsToronto is on record as requiring an extension of the Tripartite Agreement from its current end date of 2033 another 50 years, to 2083. In the event that Council votes in favor of the Porter proposal, the TPA< Transport Canada, and the City of Toronto should agree that amendments to the governing Tripartite Agreement would naturally include items that would enable these objectives. The extension of the Tripartite Agreement beyond its current expiration in 19 years provides for a capacity to finance and amortize the runway extension. To be clear, the absence of such an amendment makes it unlikely that the airport could undertake such large scale, long term capital investments as proposed. - Mark McQueen, Chairman Toronto Port Authority January 20, 2014 to James Flaherty (Minister of Finance) and Denis Lebel (Minister of Infrastructure) Despite this statement of intent, no such statement appears in any of the "EA" Work Plan Package, the PortsToronto 2012 Master Plan, or the PortsToronto 2015 Master Planning Exercise. At the same time, PortsToronto (as the Toronto Port Authority) has executed a lease agreement with an option of renewal until 2055 in the notice of lease. This topic on three separate occasions in airport expansion consultations and stakeholders' meetings, yet no reference to any of those observations has appeared in even the consultation notes, never mind in the Work Plans. Why is this? The Toronto Boaters' Alliance is going on record at this point to state that they expect this topic to be at the very least publicly ruled out of consideration, if not properly dealt with.	Stakeholder	5/20/2015	Email to Facilitator	▶ The planning horizon for the EA is a standard 20-year planning horizon. The EA does not consider any changes to the Tripartite Agreement beyond those requested to accommodate Porter's proposal.

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Marine Navigation	Jet Blast	Jet blast deflectors as described in the materials presented to date would be of doubtful efficacy in protecting marine uses. The illustrated deflector is modelled on one found at Pearson International Airport (PIA), to protect automobiles and other vehicles on Airport Road and the airport's perimeter road. The deflector at PIA is also located far from the aircraft and close to the roadway; such a configuration would not be possible at BBTCA. The WSP consultant showing the proposed deflector stated at the January 26, 2015 public meeting that he was unaware of jet blast deflectors being used to protect marine uses at any airport. The boaters of Toronto have no wish to be Guinea pigs in this proposed experimental implementation. Any jet blast deflector being proposed for BBTCA must be tested away from live boating, in a design that reflects the proposed implementation at BBTCA, and against objects that accurately reflect an 18 metre sailboat, with sails raised, at the edge of the Marine Exclusion Zone. Other boat types — canoes, kayaks, paddleboards, and so forth — should also be tested. A thorough jet blast study and results of deflector testing should be included in the PortsToronto "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport", where the public can assess its design and potential impacts. Jet blast and deflector considerations should not be deferred to the Runway Design phase of this expansion study, as is currently proposed.	Stakeholder	5/20/2015	Email to Facilitator	▶ Preliminary Runway design will determine the jet blast envelope (where jet blast could occur) and the force of jet blast within that envelope. The EA will use that information to review the potential impacts of jet blast at the edge of the MEZ on different boat types. To do so, the EA will review the different types of boats that are frequently used in the vicinity of the airport and apply a mathematical formula or engineering judgement to determine how the motion of each type of boat could be affected by the jet blast. This is called a dynamic stability assessment. The dynamic stability of a boat in water is the ability of the boat to remain upright even if pushed around by forces such as wind or waves.
Master Plan	Scenarios	Scenarios must reflect exisiting (2014) Q400 take-off and landings of Air Canada & Porter Airlines. Not based upon an assumed number of 65,000+ especially when the maximum BBTCA 202 slots multiplied by 365 days = 73,730 maximum take-off and landings. "The Proposed Scenario is derived from PortsToronto's 2015 Master Planning Exercise (currently being finalized) which includes future passenger volumes that can be accommodated should the Tripartite Agreement be amended and commercial jets permitted to operate from the BBTCA." The proposed scenario above must be based upon volume (number) of BBTCA 2014 take-offs and landings for Air Canada and Porter Airlines passenger flights. The year for 2014 should be very close to 58,000 as growth from 2012-2014 was pretty well "flat-lined". The final volume of take-off and landings for BBTCA should be verified by several sources. Note – present BBTCA Master Plan take-off and landing slot assumptions are unrealistic due to the fact BBTCA is achieving in and around 80% of the maximum 202 slots per day. Just an example: 73,730 X 80% = 58,984 This number has seen little to no growth between 2012-2014 inclusive	Public	4/20/2015	Email to Facilitator	▶ The two Future Growth Scenarios are based on the anticipated operations envisioned in the 2012 Master Plan and the 2015 Master Planning Exercise. The EA does not develop these scenarios, but will assess the impacts of the proposed future operations on community assets.
Master Plan	2012 Master Plan	The 2012 Master Plan sets out a host of unsolvable barriers to either of the expansion alternatives being considered. These are excerpts from that 2012 Master Plan [our emphasis]: 1. "The provision of public parking is significantly undersized given the level of passenger activity. Industry planning guidelines suggest a provision of approximately 1,000 – 3,000 parking stalls per 1 million enplaned passengers." "With approximately 1.5 million passengers, the unrestrained demand for parking at BBTCA would be approximately 750 – 2,000 parking stalls." 2. "The terminal was designed to support a planning peak hour passenger (PPHP) capacity of 336 in either the domestic or transborder sector." "…Given that the existing terminal is designed to accommodate a peak hour demand of approximately 336 passengers, it is likely that areas of the terminal building already exceed demand during peak periods." 3. "The area of the combined services building allocated for airport maintenance is comprised of four equipment bays and support areas. This facility is not sufficient to accommodate the full needs of the Airport." 4. "Given the tight physical constraints of the Airport, particularly in the vicinity of the terminal building, there is no opportunity to provide a centralized de-icing facility." 5. "With the rapid increase in air carrier activity over the past two years and the allocation of all of the 202 slots available for scheduled air carriers, it is very likely that BBTCA has reached its theoretical capacity of 140,703 movements." "Even with modest (1-2%) growth in the other general aviation sectors, the TPA may have to implement measures next year to manage aviation activities." 6. "At a length of approximately 60m, the drop-off/pick-up curb at the ferry terminus is significantly undersized as compared to airports with comparable passenger activity." " As comparison, the following is a list of similar Canadian Airports, including the number of annual passengers and the length of their terminal curb-side: - Kelowna Airport: 1.3 million annual passengers, curb length of 122m,	Stakeholder	5/20/2015	Email to Facilitator	▶ The 2015 Master Planning Exercise is separate from the EA, however the EA will assess the impacts of the proposed changes developed as part of the 2015 Master Planning Exercise.

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		- Saskatoon Airport: 1.3 million annual passengers, curb length of 150m, and - Victoria Airport: 1.4 million annual passengers, curb length of 200m." 7. "The current capacity of the two taxi queuing lanes is approximately thirty-four vehicles, which during peak periods is at over-capacity." "As a result, taxis often stand on the northbound curb lane of Eireann Quay, which presents a significant congestion and safety concern. …As a result, the TPA is left with an overall taxi system that has far more demand than capacity, and is without any realistic short-term and cost effective mitigating solutions." There were no answers from PortsToronto or its consultants on any of these in any of the public meetings, and no indication that any of them are being considered. We had fully expected the "community consultation" held on March 31 on the Master Plan would, at least, address all of these issues identified by the same PortsToronto consultant presenting at the meeting. They were not even referred to at the meeting.				
Master Plan	Public Consultation	While this, strictly speaking, is not a part of the PortsToronto "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport", the Toronto Boaters' Alliance wishes to observe that the PortsToronto 2015 Master Planning Exercise is proceeding with no public consultation, despite the explicit and unanimous request by the Toronto City Council on April 1, 2014.	Stakeholder	5/20/2015	Email to Facilitator	▶ Comment noted.
Natural Environment	Chemical storage and handling	When an aircraft undergoes de icing at the Island Airport, what happens to the run off of these chemicals? If the volume of aircraft to this runway is increased, what is the proposed plan to deal with the run off of these chemicals?	Public	4/29/2015	Email to Facilitator	▶ This is an issue that several people have raised concerns about and a similar question was asked during the December 9th Public Meeting. PortsToronto provided a response in the Public Meeting Report. Their response is included below as well as a link to the public meeting report, which includes this response. You will find the response on page 13, question 14 in the second paragraph. ▶ PortsToronto's Response: "The airport manages aircraft de-icing fluids with a dedicated glycol containment system which traps surface runoff containing glycol from de-icing operations. This runoff effluent is pumped to the City of Toronto Sanitary Sewer System for treatment under contract with the City of Toronto, and does not flow into Lake Ontario". ▶ Link to Public Meeting Report: http://static1.squarespace.com/static/53e28890e4b05bc6da0e173b/t/54c28984e4b04884b360b6e6/1422035332355/Dec+9%2C+2014+Public+Meeting+Report+-+Plus+Attachment+A%2C+B%2C+and+C+%28FINAL%29.pdf ▶ With regards to the future management of de-icing practices, PortsToronto will continue to manage de-icing through methods described in the response given at the December 9th public meeting. Additionally, as part of the City Council's motion from April 2014 council meeting PortsToronto will be providing a review of de-icing and chemical management programs at the Billy Bishop Toronto City Airport, this work is being undertaken by Stantec Consulting. I have included the December 9th response from PortsToronto below for quick reference: *"The airport manages aircraft de-icing fluids with a dedicated glycol containment system which traps surface runoff containing glycol from de-icing operations. This runoff effluent is pumped to the City of Toronto Sanitary Sewer System for treatment under contract with the City of Toronto, and does not flow into Lake Ontario".*
Natural Environment	Chemical storage and handling	Support Infrastructure: • Fuel storage – capacity, location, refilling requirements; • De-icing – location, fluid containment I may be wrong....but could you add anti-icing to the above (there is "spray" to remove ice and "spray" to protect from potential of icing)- 2 different conditions	Public	4/20/2015	Email to Facilitator	▶ The airport manages aircraft de-icing fluids with a dedicated glycol containment system which traps surface runoff containing glycol from de-icing operations. This runoff effluent is pumped to the City of Toronto Sanitary Sewer System for treatment under contract with the City of Toronto, and does not flow into Lake Ontario. ▶ There are two kinds of de-icing fluids. One that is sprayed on the plane first to remove contaminants from the aircraft body, and another that is sprayed to limit further build-up. Both are applied on the apron where all runoff of any liquids is collected in catch basins and sent to the City's sewage treatment plant. The first liquid is a low-viscosity fluid that is heated and sprayed at high pressure to remove ice/snow etc. that has built up on the plane, and drains off immediately. The second is only sprayed if there is ongoing precipitation that could build up on the aircraft as it moves from the spraying location to take-off location. The second is a higher viscosity fluid used in smaller quantities, and it sticks to the surface of the plane to keep new ice or snow from building up on it before landing. This type of fluid shears off of the plane when it reaches a certain velocity (the one used at BBTCA typically shears off at around 70 knots or 130 km/h), which is reached before the plane lifts off, while it is still on the runway. It sheers off onto the runway, and runs off into the grassy swale or available catch basins. If it freezes or is absorbed into new snow falling on the runway, it is ploughed with everything else off the runway and stockpiled in the grassy swale.

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Issue	Sub Issue	Comment	Source (Stakeholder)	Date	Format	Response
Natural Environment	Bird Strikes	there seems to be a misunderstanding out there (Twitter)...that comments (paper) had a deadline of 5pm on Saturday (April 11 2015). I am 99.9% sure that we have a 30 day extension as per my last session " Natural Environment Effects Assessment'...you may have been the one who talked to me about this.....I am not worried...however the 5pm deadline seemed to upset people and they felt undue pressure to try and fill forms out....I did not even attempt to...as I wanted to get my monies worth with info and questions. Yesterday morning there were 2 flocks of birds that I saw at 10:21 and 10:27 First flock about 25 birds in a somewhat of a formation. Second flock about 60-100 birds in a somewhat of a formation. They both were north of the main 08-26 runway...if they were 100 meters (1st flock) and 50 meters (2nd flock) further south and in reverse direction of flight they would have been in direct line of a "jet" engine on approach. I am mentioning this because a few of us had detailed discussions on the dangers of birds and jets in last session in Natural Environment Effects Assessment room April 11 2015. Also in this final session we talked about Copenhagen airport near the water; I said it may be found in the HLT report (it was not; the HLT report was on Stockholm)...just for the record or clarification on notes that may have included this conversation. Study shows few bird strikes at island airport PETER CHENEY From Saturday's Globe and Mail Published Saturday, Jan. 17 2009, 12:00 AM EST Last updated Friday, Apr. 10 2009, 7:34 AM EDT "These issues have been examined many times," said Porter CEO Robert Deluce. "There isn't an airport in the world that doesn't have to deal with birds. We are using many of the best practices that have been developed worldwide." Mr. Deluce said the risk Porter faces from bird strikes is reduced by the type of aircraft it flies. "We're using turboprops," he said. "They handle bird strikes better than jets." With Mr. Deluce's many years of aviation experience; he himself (above) has made it crystal clear, jets (jet engines) do not handle "bird strikes" better than turboprops. I will work on this subject and tie in all in together.	Public	4/15/2015	Email to Facilitator	▶ Comments noted.
Natural Environment	Bird Strikes	Further to my email of May 17, 2015 concerning the environmental assessment being conduced by the TPA, I would also like to add to my list of concerns that this draft makes no mention of what your plans concerning wildlife management are. For example - the number of birds that would have to be culled.	Public	5/18/2015	Email to Facilitator	▶ The BBTCA maintains a Wildlife Management Plan. If the proposed changes to the runway are approved, the existing BBTCA Wildlife Management Plan will be updated. To do so, a review of the potential changes to bird strikes will be completed to determine what mitigation measures are required as part of the plan to reduce the potential for risks to birds.
Natural Environment	Bird Strikes	In 2003, the United Kingdom Civil Aviation Authority amended its Air Navigation Order "to mandate the reporting of all birdstrikes" by any aircraft commander flying in UK airspace. Further, it stated "This wider requirement will increase the existing knowledge base of birdstrike events and support improved strategies to reduce the growing number of these incidents in the UK." In contrast, birdstrike statistics in Canada are not required to be reported. Perhaps this accounts for why the Billy Bishop Toronto City Airport (BBTCA) Environmental Assessment has not yet identified that the highest priority among all the proposed studies is the risk of death or injury to humans. Birdstrikes are known to be a significant threat to human lives that continues to increase in many parts of the world. For further information on birdstrikes see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/329285/operational-feasibility.pdf titled Operational Feasibility and Attitudes to Moving to an Estuary Airport. A new London airport was proposed and rejected.	Public	5/20/2015	Email to Facilitator	▶ The EA will consider jet flight paths and height, as well as frequency of flights information (to be provided in the 2015 Master Planning Exercise) to identify where bird strike are likely to occur and relate this to the potential effects on birds recorded in this identified area. Although estimating impacts on birds is not directly related to public safety, the study will help to show the potential for changes to bird strike occurrences and associated public safety implications.
Natural Environment	Background Reports	The current Wildlife Management Plan, current airport risk assessments and the bird strike data over the years of operation ought to be part of the Final Draft EA Study Design/Scope and available as part of the public EA.	Public	5/20/2015	Email to Facilitator	▶ The BBTCA maintains a Wildlife Management Plan. If the proposed changes to the runway are approved, the existing BBTCA Wildlife Management Plan will be updated. To do so, a review of the potential changes to bird strikes will be completed to determine what mitigation measures are required as part of the plan to reduce the potential for risks to birds.

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Natural Environment	Bird Strikes	I am a Director of Animal Alliance of Canada and the Leader of the Animal Alliance Environment Voters Party of Canada. For a number of years, I was a member of Transport Canada's GTA Canada Goose Working Group, tasked with assessing the risk of bird strikes involving Canada goose populations around airports in the GTA. My colleague, Barry MacKay is employed by Born Free and is a naturalist specializing in migratory bird issues, particularly as they relate to human/wildlife conflicts. Bird strikes and risk assessments are critical regarding the expansion of the runways at Billy Bishop airport. We have reviewed the Final Draft EA Study Design/Scope and the Final Draft Appendices. As the PortsToronto Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport Draft Study Design Report, Natural Environment section indicates, the area of study, particularly as it involves birds includes both the primary and the secondary Bird Hazard Zones (BHZ). We support the inclusion of both hazard zones in the study design. It is certainly important that the study incorporate the impact of the runway extensions on "aquatic and terrestrial habitat and species (including birds)". However, it largely considers the impact of the runway extensions on the birds but not the risk of flying jet planes over a dense waterbird colony, through migratory bird routes and where wintering waterfowl tend to congregate. In Appendix B, Attachment B, the text in the first box under Study Methods/Rationale in the Table on page 15 states, "If the proposed changes to the runway are approved, the existing BBTCA Wildlife Management Plan will be updated by Ports Toronto. To do so, a risk assessment of bird strikes will be completed to determine what mitigation measures are required as part of the plan to reduce the potential for risks from bird strikes. This and the current Wildlife Management Plan will be reviewed and commented on as part of the EA." Finally, the Final Draft EA Study Design/Scope must include an examination of what mitigation measures would be considered to reduce the potential risks from bird strikes prior to any approval decision. We are pleased to see that the scope of the work has been extended as set out in the text in the second box under Study Methods/Rationale. However, we urge you to expand the scope of the work beyond a literature review but to include, as mentioned above, current management plan, airport risk assessments and bird strike data so that a comprehensive risk evaluation can be made with all available material.	Public	5/20/2015	Email to Facilitator	▶ A review of past trends in bird strike occurrences for various species at the BBTCA will be compared to a comprehensive bird list compiled from the records and background information received from various agencies to understand the potential impacts of the airport on bird populations. The EA will consider jet flight paths and height, as well as frequency of flights information (to be provided in the 2015 Master Planning Exercise) to identify where bird strikes are likely to occur and relate this to the potential effects on birds recorded in this identified area. Although estimating impacts on birds is not directly related to public safety, the study will help to show the potential for changes to bird strike occurrences and associated public safety implications. The natural environmental scope of work also includes the use of background information from multiple agencies including the TRCA to assess potential impacts on species at Tommy Thompson Park. Spring and fall migration surveys will also be completed near the airport to supplement this background information. ▶ As noted, formal changes to wildlife management protocols would be considered by PortsToronto if the proposed changes are approved. A formal risk assessment relating to wildlife management is considered outside the scope of this EA.
Natural Environment	Methodology	TRCA supports the final draft of the EA Study Design/Scope report as provided.	TRCA	5/20/2015	Email to Facilitator	▶ Comment noted.
Noise	Monitoring	Important Information for TPA EA Noise Consultants: I attended an April 11, 2015, Port Authority EA public meeting on noise. At that meeting, several of us at Arcadia Co-op, 680 Queens Quay W., volunteered to have the noise consultants put a noise monitor on our balconies to test the amount of noise coming from the airport. It is much more important to test noise on the balconies of neighbours closer to the airport, however, so two households at Windward Co-op, 34 Little Norway Crescent, have now volunteered to have noise monitors put on their balconies to test the amount of noise from the airport. This is important information to get to the noise consultants, if you can please convey it. The two households for noise monitors at 34 Little Norway Crescent are: • [redacted]. Their phone is [redacted]. Their e-mail is [redacted]. • [redacted]. Her phones are [redacted] (H), and [redacted] (C). Her e-mail is [redacted]. Would you kindly please confirm that you have received this e-mail and conveyed the information on the two volunteer households at Windward Co-op to the noise consultants?	Public	4/17/2015	Email to Facilitator	▶ This information came to our attention, and a noise monitor has been installed at 34 Little Norway Crescent, as well as a location on Stadium Road, the National Yacht Club and on Queen's Quay in line with east end of the existing runway.
Noise	Modelling	The NEF and INM systems are complex and difficult for a general audience to understand. A contour line can pass down the middle of the street but the effects on one side are not perceivably different from those on the other side. Unfortunately there are no noise management tools used in Canada today. A tool needs to be developed to allow simple ongoing assessment and annual budgeting of actual noise. It could be patterned on the quota system at London Heathrow.	Public	4/24/2015	Email to Facilitator	▶ Comment noted.
Noise	Monitoring	Finally, the noise tests for the CS100 should be done factoring a weight that reflects passengers on a short runway like a Code 3 runway (along with the landscape resembling our mixed waterfront with condos) to factor an accurate noise tests.	Public	4/25/2015	Email to Facilitator	▶ Aircraft noise characterization data has been requested from the Manufacturer to reflect conditions representative of the proposed runway at BBTCA. ▶ The noise certification data would reflect the operating conditions required by the certification process.

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Noise	Ground Noise	The Tripartite Agreement was a legal (I believe) agreement between the Federal Government, City of Toronto and the Toronto Harbour Commission/Toronto Port Authority/Ports Toronto. The time-frame of this agreement was and still is, 50 years. The Tripartite Agreement was in part, was based on NO JETS...NO EXPANSION of RUNWAYS for the term of the Agreement with Noise restrictions (below): Noise not to exceed 84.0 EPNdB on takeoff (flyover), Noise not to exceed 83.5 EPNdB on sideline at takeoff (lateral to the flight path), Noise not to exceed 92.0 EPNdB on approach. The cumulative noise level requirements described in the Tripartite Agreement (259.5 EPNdB) are within restrictions set in the ICAO's Annex 16 Chapter 14 standards. AIRBIZ Report page 85 http://www.toronto.ca/legdocs/mmis/2014/ex/bgrd/backgroundfile-66847.pdf NOISE in the Tripartite Agreement did not take into consideration JETS and RUNWAY/TAXIWAY/ APRON expansion....therefore... any talk of JETS and EXPANSION at BBTCA must include GROUND NOISE being addressed for multiple reasons.	Public	4/20/2015	Email to Facilitator	▶ We agree with the comment about including ground noise, and the proposed work plan for noise includes all important sources of ground noise at the airport, including run-ups, taxiing and idling of aircraft, and ground support equipment, and also includes noise from the airport ferry and other mainland sources.
Noise	Indoor Environments	Assess impacts of noise on indoor environments, this should include sensitive settings such as the waterfront school.	City of Toronto	6/1/2015	Letter to PortsToronto	▶ Modelled noise levels at various sensitive outdoor receptor locations will be analysed to determine how changes to noise levels affect the use and enjoyment of outdoor community amenities, private outdoor space, as well as enjoyment of indoor space taking into account the difference in volume likely with open or closed windows and with different building types.
Noise	Short Duration Nosie	Include noise measurements at key sensitive locations, this should entail an assessment of "short duration" noise from activities such as run up engine testing.	City of Toronto	01/06/2015	Letter to PortsToronto	▶ Noise measurements are part of the scope of work, and include short duration noise events. Noise assessments will be undertaken at key sensitive receptor locations including the Inner Harbour, Centre Island, the Port Lands, and the Leslie Street Spit (in the vicinity of the Outer Harbour).
Noise	Health	Compare the noise modelling/measurements with health-based noise guidelines provided by Toronto Public Health [table provided in letter].	City of Toronto	01/06/2015	Letter to PortsToronto	▶ The scope of work includes health-based guidelines. Noise measurements are part of the scope of work, and include short duration noise events.
Noise	Monitoring	That all noise impact studies need to include a wider spectrum of sound frequencies than is apparently now done using standard decibel measurements. A more realistic noise impact measure needs to include lower frequency sounds to better measure its impact on humans. Low frequency sound waves, at low decibel levels can still be intolerable. Not only should the magnitude of the generated noise from the airport be studied but also the number of times per hour it occurs. I was on the Bay on Saturday on my boat and airplanes flew overhead to land at the airport continually all day long every 5 to 10 minutes. Conversation was interrupted each time. The location of sound measurements on the Island need to be more realistically located closer to the airport and in the Island community. The location at the fire hall is too far south on the island. Measurements on the Island should be in the park adjacent to the airport as well as on the north shore of Wards and Algonquin Island adjacent to the community.	Stakeholder	5/18/2015	Email to Facilitator	▶ dBC measurements are typically used for low frequency sources such as military jet aircraft. The EA team has requested frequency data from the manufacturer of the CS100 and Q400 to better understand the need for this type of noise measurement; however, at this time it is not anticipated that this will materially affect the outcome of the noise assessment and therefore it is recommended to measure noise using the approved standard of measure for this type of application which is a dBA measurement.
Noise	Noise	Please watch youtube video and pass along..... You think noise on Holiday Monday (May 18 2015) was bad at 115 feet above street level...try going along Toronto's Waterfront at ground level and have a beer at Amsterdam Brewhouse....what did you say!!!!! 1st video from my camera - picture quality is poor due to • camera limitations • and mostly me youtube.com/watch?v=tgCh7Oa-8gs Now try and imagine jets, 656 further out into Toronto's Waterfront every 3 minutes between 9-16 hours per day Ports Toronto (formally Toronto Port Authority) math does not add up...they are desperate to ram this deal through at all costs....councilors... stand up for "your" Waterfront.	Public	5/19/2015	Email to Facilitator	▶ Comment noted.
Noise	Sound Insulation	The impact of noise on the residential community of Bathurst Quay is profound, and ignored to date by Porter/PortsToronto. Will it continue to be ignored in this work? Or will there be consideration of providing sound insulation, as has become necessary at an airport often compared to the Island airport, the UK's London City Centre Airport? That Airport now offers sound insulation for eligible properties within a specified noise contour. The sound insulation works involve the treatment of habitable rooms (defined as bedrooms and living rooms within eligible dwellings) to upgrade relevant external windows and doors to provide an average sound reduction of not less than 25 dB.	Stakeholder	5/20/2015	Email to Facilitator	▶ The noise assessment Study Area of the Environmental Assessment includes Bathurst Quay. Key receptor locations for the noise assessment also include residences in Eireann, Bathurst and York Quays. Various mitigation measures for potential changes in noise levels will be reviewed.

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Noise	Methodology	The standards, requirements, guidelines and bylaws to which the modelled or measured noise is to be assessed is not complete, totally clear, or specific in the draft scope. For example, according to the draft scope, Ports Toronto believes that a constant level of 70dB at point of reception is an acceptable assessment standard for a residential community, even though the onset of speech interference occurs at approx 50dB per noise literature. The draft scope of noise study does not clearly state that the technical work will be certified to meet LU-131 and/or NPC-300. It does not discuss the airborne noise vibration standard that will be met. The draft scope does not state that stationary source vibrations will be certified to NPC-207.	Stakeholder	5/20/2015	Email to Facilitator	▶ The NEF model is the only noise model required under Transport Canada's consideration of airport activity, and therefore is the only regulatory tool for addressing airport noise at the BBTCA. The FAA's INM will be employed to look at sound from the airport using other international criteria. INM was developed by the U.S. FAA, and is based on international standards. The specific international criteria from WHO (World Health Organization), and Health Council of the Netherlands publications will be referenced. The standards will be applied to the type of sound to which they apply.
Noise	Methodology	The definition of 'assessment' has not been provided. Past noise studies introduced criteria, contained incomplete analysis, but then did not properly assess the study findings against the criteria. The materials appear to blur the words assess and analyze. In Spring 2011, Ports Toronto approved a 202 slots per day operation by relying on an incomplete uncertified noise report, which was not professionally sealed (see RWDI Study Nov 2010 and TPA Press Release April 4, 2011). The draft scope failed to note if a Final Noise Study on the proposed noise effects of the approved 202 slot per day operation of Q400 planes will ever be completed. The approval of 202 slots appears to be a major assumption of and requirement for the baseline of this study. Given the arbitrary nature of the past airport expansion approvals by the Signatories, the materials do not confirm if the technical support documents informing the study findings will be labelled Final (not Draft), stamped by professional engineers licensed in Ontario and working in the GTA, and certified to fully meet the intentions of Section 16 of the Tripartite Agreement.	Stakeholder	5/20/2015	Email to Facilitator	▶ The noise work for the Environmental Assessment is not a determination of the number of slots. Evaluation of the number of slots is part of the Master Planning exercise. The use of an engineering stamp is limited to appropriate situations and cannot be arbitrarily applied.
Noise	Methodology	The complete scope of all stationary noise caused by all airport activities collectively will not be modelled or studied by Ports Toronto. The specific descriptions provided in the scope omit some activities and movements which collectively result in very significant existing impact.	Stakeholder	5/20/2015	Email to Facilitator	▶ The scope of work intends to demonstrate that all the sources of noise will be modelled collectively as well as in groups by source type.
Noise	Methodology	Actual noise measurements at sensitive outdoor locations will be modelled but not field verified by Ports Toronto. There appears to be a discrepancy between the Appendix table columns regarding this. The approved escalated noise levels and constant roar from 202 slots per day of Q400 noise has not yet been experienced in the field, given the current approximate 50% under-utilization of the slots. The draft scope does not state that the findings for various uses will be assessed to all applicable outdoor noise standards including LU-131 or NPC-300. It appears only the proposed changes to approved noise levels, but not the actual magnitudes themselves, will be assessed by Ports Toronto.	Stakeholder	5/20/2015	Email to Facilitator	▶ Both the sound level magnitudes and the changes in sound level will be assessed to the applicable standards. In addition to the regulatory assessment, additional information will be provided to support the understanding of the experience. This will include actual noise measurements at sensitive outdoor locations.
Noise	Methodology	The material indicates confusion as to the appropriate use of dBA noise weighted design criteria, which is supposed to be used as a planning design tool to lower the risk of community unrest due to the actual noise to eventually be received from an approved design. Noise measurements consist of sound pressures obtained simultaneously across a broad range of frequencies measured in Hertz (Hz). dBA and other noise weighting systems de-emphasize (or give lower weight to) the measured bass frequencies. Bass Hz can take longer to dissipate in air than high frequencies (ie. bass travels farther), and general audiologist literature shows that treble and high frequency hearing worsens relative to bass frequencies through aging, making people more sensitive to the bass frequency impacts coming from existing and projected airport activities. Designing with dBA weighting is a conservative measure. Using random field measurements obtained in dBA benefit the Signatories as they significantly reduce, on paper, the bass frequencies that are actually experienced by waterfront stakeholders, property owners, and residents, some of whom have complained of rattling windows due to noise. The material does not state that the various airport noise contributions will be documented in the 1/3 octave bands per noise standards. It appears that Ports Toronto still does not want to study why rattling windows exist in the pre-planned community since 2007.	Stakeholder	5/20/2015	Email to Facilitator	▶ The NEF metric is a planning tool that has become a criterion for the BBTCA. Both the NEF and a dBA noise weighting use both the high and low frequencies of the sound level spectrum. NEF, dBA, and other sound level weightings can be correlated to community noise response. International study suggests that there is statistically very little difference in the ability of any one to predict community noise response.
Noise	Methodology	Aircraft noise certification data will be referenced even though certification offset from flyover lies beyond the siting of the adjacent residential towers. The Signatories have not provided a rationale.	Stakeholder	5/20/2015	Email to Facilitator	▶ The difference between the sound level at the measured distance from the aircraft and the sound level at the modelled distance to the points of reception is a primary function of the model. It is therefore addressed in the modelling.
Noise	Methodology	A sitewalk with residents in the various directly affected areas is not being proposed, in order to identify required and acoustically significant monitoring locations needed for this study and in perpetuity. The material does not state that targeted elevations and runway offsets will be identified to the satisfaction of all Signatories and stakeholders. There is little overlap in past noise studies as to receptor and/or measurement locations, leading to challenges in reviewing the historical record of noise effects under-estimation. To date since 1983, the Signatories have yet to decide on the acoustically relevant monitoring locations to be used in perpetuity by each of them to protect stakeholders from various airport activities.	Stakeholder	5/20/2015	Email to Facilitator	▶ The locations used in the previous study will continue to be used in this study. In addition, the public provided feedback regarding locations considered to be significant. This was addressed in expanding the Study Area.
Noise	Methodology	The draft scope does not discuss establishing a feasibility project to permanently mount web enabled noise monitors on the sides of buildings at targeted elevations and runway offsets to pro-actively and continuously monitor airport noise in perpetuity. Why model the 95th busiest day when it can simply be measured.	Stakeholder	5/20/2015	Email to Facilitator	▶ Measurement only captures existing conditions. Modelling is necessary to predict what is proposed for the future.

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Noise	Methodology	The Signatories agreed amongst themselves that the 95% busiest day in aircraft movements should be estimated for NEF modelling purposes. The draft scope does not include a summary of the actual airport noise effects that are experienced during the 18 busiest days per year (5% of 365 days) which are not considered in the Island Airport NEF Contour Studies. The noise complaints on the actual 18 busiest days need to be reviewed for airport operations learning and scheduling refinement purposes. The noise effects on those 18 days may be so overwhelming that they are haunting resident memories for years. An incomplete assessment of sound levels from aircraft activity is proposed. Very significant stationary noise impacts from taxiing between hanger, terminal, and runway are not included in NEF contour modelling process. The short engine blast prior to takeoff is also not covered. At a typical airport site this noise generation would be dissipated prior to reaching residential zoned areas beyond land buffer, commercial belt, and 25NEF Control Contour line. Normally the 25 NEF residential limit is further offset from runways eg. over 1km away, as opposed to Island Airport. Tripartite Signatories approved residential zoning to overlook an offset 75m-300m from terminals and runway. There is confusion in the scope material with respect to the NEF modelling process. The material does not acknowledge that the NEF contour modelling process does not provide an accurate illustration of the actual noise environment in an urban marine environment. The NEF process was developed as land management tool to avoid residential conflict in future horizon years. The EPNL data contained within the NEF modelled noise contour map cannot be plotted on a water surface without calibration, as has been done in recent Noise Contour Studies prepared by Transport Canada at request of Ports Toronto. The Signatories are relying on these reports with respect to 'compliance' with the noise level provisions of the Tripartite Agreement. Note that it is understood that the 25NEF Control Contour attached to the Tripartite Agreement accounts for all noise considerations which exist naturally on the water surfaces (eg. see Points X and Y discussed in detail in the Tripartite Agreement). Residential towers were approved for construction with unprotected bedroom windowpanes and walls looking down on the Island Airport with the understanding that residential noise standards will be met beyond the 25NEF Control Contour plotted on the water surface. The material indicates that Ports Toronto wants to avoid comparing in-field measurements to the 25NEF Control Contour as required to meet compliance requirements with the Tripartite Agreement. The material fails to clarify that a measured noise under ideal conditions in a testing facility will be lower than the noise level predicted by an NEF noise map for that same location. The NEF modelling process contains a number of 'safety' provisions to avoid future noise conflict as much as possible and to guide appropriate land planning. As such, assuming calm conditions, the net Leq noise measured in field on the shoreline (after subtracting varying ambient background noise) is supposed to be lower than a net 25dB, by definition (ie. lower than the 25NEF contour line shown on the official noise map for the Island Airport on the adjacent water surface). It currently is not and it appears Ports Toronto is reluctant to investigate. The NEF modeling process is based on available aircraft noise databases for specified and surrogate aircraft at specified loading. Also the flight paths that are modeled assume pilots will follow correct approach and take off angles. It has emerged that pilots are routinely using flatter angles to and from runway which increases noise impacts. The draft scope does not include a modeling sensitivity review on noise of various angles or payloads to confirm these unmitigatable effects on stakeholders. There is a significant discrepancy in NEF planning contours modelled using 1983 software and current software, such that the noise map contours generated using the current software are considerably tighter to the runways. This increases the theoretical available remaining slot capacity at the airport when compared to the 25NEF Control Contour that was modelled using retired software. Recent Ports Toronto presentation material appears to assume this additional slot capacity will be available. The draft scope of noise study does not include a sensitivity analysis showing how many additional hundreds of additional slots, exceeding 202 slots per day, could be 'created' using current software in relation to the Control Contour noise map.	Stakeholder	5/20/2015	Email to Facilitator	The procedure to calculate the number of aircraft is a Transport Canada specification for all airports in Canada. The determination specifically looks at the busiest days of the year, rather than ignoring them. ▶ The proposed scope of work includes modelling of the movement of aircraft on the airport between hanger, terminal and runway even though those aspects are not part of the NEF model. ▶ The NEF contour line in the Tripartite Agreement provides the level above which the airport cannot go, as well as the standard to which the City of Toronto should require that residential uses be built in the area. ▶ The NEF is a metric that is not intended for field measurements. The NEF number is not a measurable sound level (i.e. NEF 25 is not 25 dBA even in the absence of background). ▶ The NEF is modelled using the software provided by Transport Canada. Software that has been developed more recently, or is used in other countries, can be helpful to describe the experience but is not the approved model for Canadian NEF.
Noise	Methodology	The material does not provide the test conditions to which noise monitoring or field measurement will be completed, indicating that only random data will be collected and sampled. For example, any field data needs to be correlated to slot utilization intensity and to a number of previously submitted operational, meteorological, and marine test conditions. No rationale has been provided as to why a random data sampling approach, used for Greenfield subdivision noise design, is appropriate for Toronto's waterfront with its fluctuating daily airport slot utilizations, seasonal tourist venue impacts, and varying marine environmental noise conditions.	Stakeholder	5/20/2015	Email to Facilitator	▶ The supplemental sound level measurement program is continuous over the course of a month. It captures the effect of the meteorological and marine conditions over that time.

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Noise	Night Impacts	Based on the operating hours in the Tripartite Agreement, the Signatories agreed amongst themselves that the then proposed, now existing, residential community should have less than 8 hours of sleep. In 2007, Ports Toronto approved an earlier start to the daily ferry operation schedule which guarantees adjacent residents only 5 hours of undisturbed quiet. The noise generated during sleeping hours by the airport significantly exceeds MOE noise criteria, despite best efforts, due to closer proximity constructed by Ports Toronto. The draft scope is consistent with past studies in that it does not include that night time impacts will be broken out for modeling or review. The ongoing airport effects causing sleep interference and sleep deprivation include: curfew violations, Medevac helicopters and aircraft, ferry operation during sleeping hours, routine airport overnight maintenance, regular airport overnight construction, overnight trucking through the community, and overnight heavy equipment transfers on the ferry. Ports Toronto has never requested the typical maximum net Leq (3 seconds) be confirmed with respect to the pre-scheduled sleep interference and sleep deprivation impacts by the airport between the hours of 2200-0700.	Stakeholder	5/20/2015	Email to Facilitator	▶ Many residents of waterfront properties have expressed concerns about the effects of noise related to ability to sleep, hold conversations or undertake other activities. The socio-economic scope of work for the Environmental Assessment will assess impacts on the use and enjoyment of private property from airport operations. This will be completed through interviews with condominium boards and local residents within the Study Area. The interview will include questions pertaining to any changes in how residents use their properties resulting from different levels of activity at the airport. These interviews will also pose questions to address the overall quality of their living experience, to the extent possible, to determine its association with changes in airport operations. ▶ Some of the criterion suggested by the Toronto Department of Public Health specifically consider night-time sound levels, and have been incorporated into the study.
Noise	Slot Schedule	The draft scope does not show the assumed slot schedule and utilization for each horizon year to be analyzed. This will impact the frequency of takeoff noise peaks projected during sensitive hours and the projected magnitude of constant roar from combined airport stationary noise sources, depending on actual slot utilization. The number of assumed utilized slots needs to be broken down into 15 minute intervals for noise and traffic review. This will greatly assist in papering over existing, projected, and proposed noise effects.	Stakeholder	5/20/2015	Email to Facilitator	▶ The Study Design includes sections which describes the Future Baseline Scenario under the current Tripartite Agreement and 2012 Master Plan and the Proposed Future Scenario under a revised Tripartite Agreement and 2015 Master Planning Exercise. These sections include details on the scenarios to be assessed such as runway length, number of daily commercial slots, total passengers/year, total annual aircraft movements, total annual non-commercial aircraft movements, passengers in peak hour groundside and changes to the Marine Exclusion Zone.
Noise	Methodology	The scope does not include the existing prolonged speech interference impacts on the water surface experienced by recreational and other stakeholders along the perimeter of the existing and proposed marine exclusion zone.	Stakeholder	5/20/2015	Email to Facilitator	▶ The Environmental Assessment will consider the sound that people typically experience in terms of criteria such as degree of speech interruption (N70) as aircraft fly over, and thresholds from WHO (World Health Organization), Health Canada, and Health Council of the Netherlands publications Sound levels will also be evaluated at schools using the key indicators LDN (average sound pressure level over a whole day) and N70. The results will be described in a Noise Assessment Report.
Noise	Cumulative Effects	The material indicates ongoing confusion in Ports Toronto EA documentation with respect to cumulative effects. The cumulative effect is one which includes the existing effects from all sources combined, in addition to the approved projected effects not yet experienced in field, plus the proposed effects of the project. The noise material appears to use the word cumulative in a manner which escapes from having to fulfill typical EA assessment requirements which are clearly of tremendous concern to waterfront stakeholders. There does not appear to be discussion of specific horizon years in the noise scope. This is needed with respect to assessing cumulative noise effects of various existing conditions and of future land development approvals/ improvements with trip generation rates.	Stakeholder	5/20/2015	Email to Facilitator	▶ A cumulative effects assessment will be conducted as a component of the Environmental Assessment. The purpose of the cumulative effects assessment is to identify the net effects of the proposal, taking into account the reasonably foreseeable future effects from other actions/projects anticipated within the same time and space as the proposed project. The process for conducting this assessment will incorporate elements from the Canadian Environmental Assessment Agency's Draft Operational Policy Statement (2014) on Assessing Cumulative Environmental Effects. This Policy Statement requires examining the cumulative effects of a project on "valued components" of the environment (referred to in the BBTCA EA as community assets).
Noise	Methodology	The material suggests that terrain noise modelling will not be completed as required to address the previously approved and now constructed residential tower corridor along the waterfront. Only modeling at ground elevation will be reviewed by Ports Toronto, ignoring the majority of residents.	Stakeholder	5/20/2015	Email to Facilitator	▶ Different locations will have different experiences of noise, and it is acknowledged that upper floor balconies or open windows with a line-of-sight to airport activities, including plane taxiing, take-off and landing may not experience noise in the same way as those receptors at ground level equidistant to the upper floor receptor, especially when taking into account a proposed noise barrier. These effects will be discussed in the assessment report.
Noise	Modelling	Based on the draft scope, Ports Toronto continues to believe that documentation of model calibration and modelling error is not required. Standard engineering modeling report requirements will not be done. Without calibration, the modelled results can be viewed as having been fabricated or merely the result of system defaults not applicable to the unique local conditions.	Stakeholder	5/20/2015	Email to Facilitator	▶ The NEF model is a regulatory model that describes the daily-average sound levels from aircraft on the runway and in the air on a peak predicted day, but is not intended for comparison with ground-truth measurements. As such, measurements have only limited meaning in comparison with the modelled NEF results. The FAA's INM model will be used as an alternative for comparison with measured sound levels at select locations. Monitoring locations are provided in the Noise Overview.
Noise	Methodology	The draft scope does not establish a study to review the as-constructed building materials in adjacent waterfront towers and their ability to meet noise protection requirements from existing, projected, and proposed noise from airport activity. Several buildings do not have a ducted system for conversion to central air conditioning so that windows can remain closed for noise protection. For example, the STC values of the unprotected walls and windows, the internal room noise criteria per LU-131, and the approved as-constructed percent window/ floor areas parallel and perpendicular to noise source, need to be reviewed for the purposes of reverse calculation of the maximum airport noise previously envisioned by the Signatories in 2003 to be reaching the existing unprotected external bedroom walls and windows facing the airport.	Stakeholder	5/20/2015	Email to Facilitator	▶ The City of Toronto is responsible for ensuring that buildings are constructed to meet the needs of residential users in a specific location, as per requirements of the Ontario Building Code. The NEF contour line in the Tripartite Agreement provides the standard to which the City of Toronto should require that residential uses be built in the area, in addition to the average noise levels allowable at the airport over the course of a year. As such, establishing new NEF criteria is outside the scope of this EA.

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Noise	Ambient Noise	The draft noise study scope regarding traffic and ambient noise will ensure that ambient noise assumptions for waterfront stakeholders will continue to be significantly to very significantly over-estimated. The 'benefits' of this are that the Signatories can conclude that 'the area is already noisy', but most importantly this helps to reduce the magnitude of airport impacts on paper. All noise standards are assessed relative to ambient background noise. This is the standard formula typically applied: Airport Noise = Total Noise Measured minus Assumed Ambient Noise. The higher the assumed Ambient, the less the Airport Noise. Ambient noise is the urban hum from traffic, lights, ventilation, etc. Ambient noise excludes all aircraft noise by definition per noise standards. All recent noise studies prepared by Signatories have attempted to model the ambient noise (rather than studying it) using specialized software which uses traffic data eg. ORNAMENT. The purpose of these models is to inform the design of noise barriers along roads among other things. The noise generation results of models are typically higher than they actual will be as they include safety factors to avoid future conflict resulting from the design for which the model was developed. By re-purposing the road traffic noise model results as assumed Ambient Noise for the waterfront, the Signatories are lowering the airport noise effects on paper, to a significant to very significant extent, that will in fact be experienced by stakeholders in real life. Past noise studies have assumed an unreasonably high average percentage of heavy trucks on local waterfront roads, which has increased the assumed Ambient Noise level used in past for noise assessment of airport noise. This has lowered the airport noise impacts on paper. The material does not state that only reasonable truck volumes, % truck types, day/ night splits, and projected fluctuating truck speeds on given days will be used in the study of existing local waterfront conditions and projected effects. Based on past studies and the draft scope, the Signatories have avoided studying the ambient noise profiles which exist in every urban waterfront. A 3D Ambient Noise profile for the Toronto Waterfront is needed to assess any noise impacts. For example, past night walks in Bathurst Quay after all airport related activities have ceased have shown an approx 15dB difference increase in ambient noise between the edge of Western Gap water edge (lowest reading) to the south sidewalk on Queens Quay in front of the Community Center where one is closer to the Lakeshore Boulevard and City core. Ambient noise is also highest at ground and lower elevations and decreases toward the top storeys of a tower, as one gets further removed from the urban hum far below. These profiles need to be mapped in order for any assessment of existing or projected noise change impacts. This urban marine phenomenon is enhanced by 'urban hum noise shielding' whereby the ambient background noise on the water side of a building is significantly lower than on the land City side of the same building. This phenomenon does not happen to same extent inside residential communities at typical airports surrounded by land, as large lake water surfaces do not emit urban hum. Ambient noise in some waterfront locations has actually lowered (gotten quieter) in the field over years due to the construction and ambient noise shielding of subsequent towers. The draft scope is consistent with past Ports Toronto reports in that it does not address these important noise standard compliance and noise change sensitivity related issues. The scope does not explicitly note that the actual minimum Leq (3 seconds) will be measured in field at targeted acoustically significant elevations and runway offsets, and the variations plotted over a 24 hour period, in order to understand the significant to very significant fluctuation in ambient noise assessed impacts. These measurements need to be made under the following test conditions which may not always be present: calm weather, excluding all: aircraft or helicopter noise, ferry or construction noise, and unusual sounds like airport parking car alarms. Without considering these conditions, the calm ambient measurements will be too high and not fair and reasonable to be used for airport noise impact assessment.	Stakeholder	5/20/2015	Email to Facilitator	▶ The EA study will assess the potential impacts of noise on quality of living, by assessing cumulative impacts to noise levels associated with the proposal and other reasonably foreseeable projects in the vicinity of the Study Area. Current noise levels during take-off, landing, taxiing, and engine run-up procedures will be assessed (including monitoring of noise levels at various points within the Study Area) and modelled for future changes. In-the-moment noise levels will be compared to threshold values for quality of living impacts, provided to the project team by the City of Toronto's Department of Public Health. ▶ The modelling of ambient conditions is based on data provided by the City of Toronto. Truck volumes, % truck types, etc., will be based on data for that specific street or similar streets in the area. The effect of buildings in shielding areas from road traffic is considered. However, the modelling of ambient conditions does not include background sound from water wave action and wind effects around buildings or through vegetation.
Noise	Ambient Noise	The draft scope shows that all noise complaint data filed by residents to Ports Toronto (formerly Toronto Port Authority) since 2009 will not be reviewed or correlated with respect to the study conditions or goals (eg. time of day, nature of concern, postal code location, etc.) This includes approximately 9 months of noise complaints in 2010 which were never acknowledged or responded to by Ports Toronto. Ports Toronto remains 'aircraft agnostic' with respect to its operations, which means that it seeks to avoid learning proactively about their operations from the stakeholder complaint data. The complaint data needs to be reviewed to inform the study otherwise responsibility for it needs to be transferred to a Responsible Authority.	Stakeholder	5/20/2015	Email to Facilitator	▶ The baseline for noise work does not go back as far as 2009 and 2010 since airport operations have changed since that time.
Noise	Ambient Noise	The scope notes that the new WebTrak noise data and other remotely obtained data will be reviewed for noise impacts. Ports Toronto staff have noted in past that a high 63dBA is being assumed as ambient noise for Toronto's waterfront (see concerns about ambient noise assumptions). This is understood to be the high level of the noise filter settings on the two existing noise monitors being used by WebTrak, which can effectively filter out much of the airport generated noise. The draft study scope is not clear if the same or higher filter setting will be used by Ports Toronto during the proposed random uncontrolled data sampling in the waterfront.	Stakeholder	5/20/2015	Email to Facilitator	▶ A review of the WebTrak data shows sound levels significantly below the 63 dBA. The supplementary sound level measurement systems record all sound levels and do not use a threshold below which sound levels are not recorded.

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Noise	Engine Run-up	The draft scope does not provide the assumed maintenance program and run ups to occur at Island Airport for each of the horizon years. The noise profiles included in the 2010 Jacobs Study appendices appear to have been filtered to exclude regular engine runup peaks of 80dBA at bedroom windowpane. The number of these high magnitude runups has decreased during sensitive hours since the downturn in airport traffic since Fall 2012. Past Ports Toronto reports have either ignored or under estimated these impacts.	Stakeholder	5/20/2015	Email to Facilitator	▶ The EA study will assess the potential impacts of noise on quality of living, by assessing cumulative impacts to noise levels associated with the proposal and other reasonably foreseeable projects in the vicinity of the Study Area. Current noise levels during take-off, landing, taxiing, and engine run-up procedures will be assessed (including monitoring of noise levels at various points within the Study Area) and modelled for future changes. In-the-moment noise levels will be compared to threshold values for quality of living impacts, provided to the project team by the City of Toronto's Department of Public Health.
Noise	Background Reports	The draft scope for Noise Study contains an incomplete list of background reports and resources that the study team will need to be familiar with in order to complete this work. Please add the following reports to the list of reports shown on page 23. - Dillon Consulting, Oct 2011. Noise Barriers and Engine Ground Run up Enclosure Environmental Screening Report. - Dillon Consulting, March 2011. Proposed Pedestrian Services Tunnel and Perimeter Road Project Environmental Screening Report. - Airbiz, Feb 2011. Airport Capacity Report Peer Review. - RWDI, Nov 2010. Draft BBTCA Noise Impact Assessment. - Jacobs Consultancy, Feb 2010. Draft BBTCA Noise Management Study – Interim Report. - Jacobs Consultancy, Feb 2010. BBTCA Airport Capacity Report - Sypher Mueller International, Dec 2001. Toronto City Centre Airport General Aviation and Airport Feasibility Study. - Dillon Consulting, April 1998. Fixed Link to Toronto City Center Airport Environmental Assessment. There are significant discrepancies and omissions contained in each report and between the reports contained in the draft scope and noted above, that will need to be addressed during this study. We also expect the consultant to be fully conversant and/or able to complete and professionally certify engineering work to meet the following requirements, standards, guidelines, bylaws. Please also add these documents to the Work Plan list. - MOE, Aug 2013. Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300. - MOE, Oct 1997. Noise Assessment Criteria in Land Use Planning, Publication LU-131, including the Annex, and the Requirements, Procedures, and Implementation. NRC, Dec 1996. NEF Validation Study (Part 1, Calculation of Airport Noise Contours; Part 2 Aircraft Noise and Its Effects; Part 3, Final Report). - FAA. Federal Aviation Regulations (FARS, 14, CFR), Appendix A2, Section A36.4 - Calculation of Effective Perceived Noise Level from Measured Data. - City of Toronto, Municipal Code, Chapter 591 Noise. - City of Toronto, Bylaw 514-2008, Building Construction and Demolition. - Several years ago, the City was involved in a legal case with the Docks Nightclub regarding noise propagation in Toronto's marine urban environment. Presumably, the City prepared noise guidelines and requirements specifically for the land uses in Toronto's waterfront to avoid future legal battles. Please post a copy of what the City learned through this legal case with respect to waterfront noise approvals.	Stakeholder	5/20/2015		▶ The noise study will use reports and information beyond the key documents referenced in the draft scope of work. This will include the applicable and appropriate regulatory criteria. The use of an engineering stamp is limited to appropriate situations and cannot be arbitrarily applied.
Noise	Sleep Disturbance	I'm not sure if this is being studied in the EA for the Toronto Island Airport but I was awoken this morning at 6:45 by an engine run-up. My sleep was cut short and so was the sleep of thousands of others. We know that insufficient sleep is a great determent to health. Is anybody calculating the health costs of this sleep interruption. Is anybody calculating the economic costs from all of its ramifications like sickness causing people to miss work, people making poor economic decisions due to lack of sleep, etc.	Public	5/25/2015	Email to Facilitator	▶ Many residents of waterfront properties have expressed concerns about the effects of noise related to ability to sleep, hold conversations or undertake other activities. The socio-economic scope of work for the Environmental Assessment will assess impacts on the use and enjoyment of private property from airport operations. This will be completed through interviews with condominium boards and local residents within the Study Area. The interview will include questions pertaining to any changes in how residents use their properties resulting from different levels of activity at the airport. These interviews will also pose questions to address the overall quality of their living experience, to the extent possible, to determine its association with changes in airport operations. ▶ The engine run-ups that occur during nighttime hours will be included in the noise study.

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Noise	Methodology	The noise assessment must: - Include an evaluation of body stress. He said the team doing the noise assessment should use the methodology used to measure body stress in Cologne, Germany. - Include a video of the current planes taking off / landing during concerts or other events on the waterfront (such as at Harbourfront Centre). For the EA to be credible, the noise assessment has to include these two methods.	Public	4/20/2015	Call with Facilitator	▶ The German study has been incorporated into the WHO guidelines on noise which, on the suggestion of the Toronto Department of Public Health, have been incorporated into the study. Rather than recording video footage, we incorporated a computer simulation known as INM into the work plan. The INM simulation takes noise measurement data for the relevant types of aircraft and uses it to calculate short-term noise levels at various locations in the Study Area during take-offs and landings, so that the in-the-moment experience during outdoor concerts and at other times can be understood.
Operations	Chemical storage and handling	Has anyone requested if Q400 aircrafts use the same fuel as CS100 aircrafts? Note – please ensure that it is clear in the scope what type of fuel is used for present Porter Q400 aircrafts and also clear what type of fuel Porter would use with CS100 aircrafts at BBTCA.	Public	4/20/2015	Email to Facilitator	▶ The fuel type for Q400's and CS100 aircraft is the same, Jet A fuel.
Operations	Jet Blast	With respect to jet blast, the draft states “it will be likely that the birds will be scared off by the noise before jet blast will affect them”. What about people? It is critical to ensure that the noise and jet blast impacts are carefully measured for boaters, especially for people in kayaks and small sail boats as they will be very close to the MEZs and cannot get away so quickly.	Stakeholder	5/20/2015	Email to Facilitator	▶ Effects from jet blast are being assessed in the EA through the socio-economic and marine navigation scope of work. The Preliminary Runway Design will determine the jet blast envelope (where jet blast could occur) and the force of jet blast within that envelope. The EA will use that information to review the potential impacts of jet blast at the edge of the Marine Exclusion Zone (MEZ) on different boat types. To do so, the EA will review the different types of boats that are frequently used in the vicinity of the airport and apply a mathematical formula or engineering judgement to determine how the motion of each type of boat could be affected by the jet blast. This is called a dynamic stability assessment.
Policy	Need	I have been living in Toronto for the last 14 years and I love it. In the summer I take full advantage of the Harbourfront and Music Garden events as well as trips to the Toronto Islands and the many natural parks all along the lakeshore. Toronto is a very busy and often intense city, with growing pollution problems that at times make it quite exhausting. Unfortunately I am a person who doesn't have the ability to get out of the city. I need all these places I mentioned before for recovering and replenishing my energy and for keeping healthy mentally and physically. These are also the places that, with great pride, I take visitors from outside of Toronto to enjoy. Unfortunately, the BBTCA is adding to the pollution and noise. For example, going to or coming from the Toronto Islands frequently involves airplanes flying low over us. The noise and pollution is also harming the parks which are natural assets that should be cherished and which belong to us all. Toronto already has a huge airport, the Toronto Pearson International Airport (YYZ), which is reasonably close to the city. It is used by the majority of the people of Toronto and its visitors, while the BBTCA serves only a considerably small population. Unfortunately, although a lot of money was spent on building the YYZ, providing affordable and fast public transportation to get there was neglected. That is why it would make more sense to invest our tax dollars in creating public transportation to get there rather than in developing the BBTCA. Toronto is strapped for money; the maintenance of the BBTCA is expensive and is paid for with taxpayer dollars. Instead, this money should be used to develop our public transportation, affordable housing, infrastructure and many other services a successful city should be providing. To conclude, I fail to see the need for any airport on the island, and even less the need to extend it and bring in jets, which will make it even more harmful. The existing airport already adds to the pollution in Toronto. It negatively impacts the enjoyment of both the many beautiful parks and the wonderful performances at Harbourfront and the Music Garden. It also harms the local tourist attractions which many businesses in Toronto depend on. For the benefit of all Torontonians and the people visiting this city, the BBTCA should be discontinued and transformed into another beautiful park like the many parks already surrounding it.	Public		E-mail to Facilitator	▶ Comment noted.
Policy	Use of Waterfront	I am very interested in the future of the Toronto Waterfront and I have been an active member of the Toronto Field Naturalists. I am also a senior citizen in good health and at my stage of life one has a very sincere interest in good health. I have not now nor will I ever be a proponent of the Island Airport. I don't think there is any way that the problems that have been raised with regard to waterfront enjoyment, wildlife conservation, marine eco- system, boating, noise pollution, air pollution, safety, traffic worsening, neighbourhood destruction and human health can be addressed in a positive way. The little planes that wandered in and out of the Island Airport decades ago were not too invasive and sometimes were picturesque. But since it has become a Private Commercial Airport in the midst of public lands with more and more traffic the spread of noise and pollution are really too much. The very title of the document is wrong. It is impossible to put "BBCTA Runway and Jets" in the same title as "Environmental Assessment". The proposed jetport is in the wrong place. The waterfront should be recreational land. The waterfront should be for fish and birds and pleasure boats. The Music Garden should be able to fulfill its promise of outdoor music. The parks at either end of the "approach" and "take off" should not be doomed to noise, pollution and safety issues, neither Woodbine Park and Beach nor the Ontario Place and its "proposed" "new park" under the jet drafts. The Environment will not be improved it can only be damaged.	Public	4/20/2015	E-mail to Facilitator	▶ The EA will assess quality of life impacts to users of parks and public spaces in terms of noise and air quality impacts, views and impacts to the physical space (such as area, amenities or infrastructure). The work plans developed for noise, air quality and the socio-economic/built form environment (e.g. for effects pertaining to views and jet blast on boaters) will explain how these assessments will be conducted.

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Policy	Public Interest	This work should examine whether it is in the public interest to have Porter operate its jets out of Pearson instead, given the expense and possible environmental and economic disruptions of lengthening the runways, and filling Toronto Harbour and Lake Ontario that the expansion will require.	Stakeholder	5/20/2015	Email to Facilitator	▶ As part of the socio-economic scope of work, a combination of pre-arranged meetings and user intercept surveys are planned for the summer, 2015. The intent is to interview people that represent a diversity of waterfront users, to obtain their perceptions and attitudes about the waterfront, including recreational activities in the area, and consequences of the Project for their activities. Information on how people use or do not use the BBTCA, and their opinions on the Proposal will also be gathered. The intercept surveys will attempt to capture input from a variety of users from: ‣ Local neighbourhoods; ‣ Throughout the City of Toronto; ‣ GTA; and ‣ Outside the GTA.
Policy	Public Interest	This document is silent on any public interest or policy considerations.	Stakeholder	5/20/2015	Email to Facilitator	▶ As part of the socio-economic scope of work, a combination of pre-arranged meetings and user intercept surveys are planned for the summer, 2015. The intent is to interview people that represent a diversity of waterfront users, to obtain their perceptions and attitudes about the waterfront, including recreational activities in the area, and consequences of the Project for their activities. Information on how people use or do not use the BBTCA, and their opinions on the Proposal will also be gathered. The intercept surveys will attempt to capture input from a variety of users from: ‣ Local neighbourhoods; ‣ Throughout the City of Toronto; ‣ GTA; and ‣ Outside the GTA. ▶ Policies for built Form and land use, the natural environment, transportation, and health will be reviewed in the assessment of environmental impacts. ▶ To assess potential impacts on land use and the built environment associated with the identified Scenarios, the Study Team will review the multi-tiered regulatory framework; evaluate potential impacts, merits and policy compliance issues; identify any built form and/or height restrictions; identify possible visual and view corridor impacts using renderings, 3-dimensional visualizations and/or mapping diagrams. The assessed effects on land use and built form could affect the following community assets: regulatory restrictions; property values; use and enjoyment of public facilities and institutions; and existing federal, provincial and municipal priorities and polices.
Public Health	Air Quality, Noise	Health issues need to be addressed - for example the effects from jet noise on children's hearing. Also needed to be studied is the overall effect of the air quality on those who are most vulnerable - the elderly, children, pregnant women, those who have respiratory difficulties such as asthma or emphysema. Also needed to be addressed is the issue of how the noise of jet aircraft affects children's learning.	Public	5/17/2015	E-mail to Facilitator	▶ The EA study will assess the potential impacts of noise on quality of living, by assessing cumulative impacts to noise levels associated with the proposal and other reasonably foreseeable projects in the vicinity of the Study Area. Current noise levels during take-off, landing, taxiing, and engine run-up procedures will be assessed (including monitoring of noise levels at various points within the Study Area) and modelled for future changes. In-the-moment noise levels will be compared to threshold values for quality of living impacts, provided to the project team by the City of Toronto's Department of Public Health. The impacts of noise on learning outcomes will be assessed at the City School. ▶ With regard to air quality, the EA will predict levels of Nitrogen Dioxide; particulate (PM10 and PM2.5); benzo-a-pyrene; benzene and acrolein concentrations. These contaminants were selected based on the results of studies previously commissioned by Toronto Public Health. The original EA scope included comparing the results of the dispersion modelling to established ambient air quality criteria from the Ministry of the Environment and Climate Change, to Canadian ambient air quality standards from Environment Canada, and to Health Canada thresholds, which are established to be protective of human health. The scope of the assessment is being updated to include comparing the results of the dispersion modelling to Toxicity Reference Values being developed by the City of Toronto.
Public Safety	TC Exemptions	The EA MUST explain the NEW Transport Canada Exemptions that will be requested by Porter Airlines and/or Toronto Port Authority and the implications from a safety and a business case standpoint. The EA MUST explain the rationale to continue the existing Transport Canada Exemptions for the existing runway and share the implications from a safety and business case standpoint.	Public	4/25/2015	Email to Facilitator	▶ Details on current and future operations at the airport will be provided to the EA study from the 2012 Master Plan and 2015 Master Planning Exercise. Any existing or future exemptions required of Transport Canada will be examined through the 2015 Master Planning Exercise, and are therefore outside of the scope of the EA.
Public Safety	TC Exemptions	Please make sure this is addressed in the Scope: *8 -Motion to Amend Item (Additional) moved by Councillor Mike Layton (Carried)That:* 1. City Council request the Deputy City Manager, Cluster B to review all existing safety documents related to Billy Bishop Toronto City Airport and report to City Council with a comprehensive review of all Transport Canada exemptions and rationale for these exemptions. 2. City Councol request that Transport Canada to communicate any future safety exemptions related to runway expansion and the rationale for these exemptions	Public	4/20/2015	Email to Facilitator	▶ This motion directs the Deputy City Manager, Cluster B review safety documents, and that Council request further information from Transport Canada. This motion is unrelated to the EA.
Public Safety	Runway Approach Lighting	The EA ignores safety recommendations (TP312) on runway approach lighting ("Transport Canada didn't make us do it. Safety issues need to be addressed.	Public	5/17/2015	E-mail to Facilitator	▶ The applicable TP312 regulations will be addressed as part of the 2015 Master Planning Exercise. According to Transport Canada, approach lighting is not a standard for non-precision approaches and the BBTCA is a non-precision approach airport. As such, approach light will not be installed at the airport.

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Public Safety	RESA	300m RESAs (or an equivalently-effective backup method) were strongly recommended for all commercial airports in Canada after Air France Flight 358 ran off the end of the runway at Pearson in 2005. The United States has required RESAs of 300m since 1989. Internationally, 300m has been the standard since 1999. Transport Canada has dithered on this key safety requirement for, now, decades. The Island Airport has minimal RESAs. It can meet international standards now, by shortening the existing runway. By continuing to ignore a basic safety standard, it places unacceptable risk of injury or death on its passengers. It is only a matter of time before an aircraft runs off the end of the Island Airport's runway, into the deep water off each end of the runway. CommunityAIR endorses the analysis and conclusions of the Toronto Boaters' Alliance in its submission on the scope of this work, Meeting RESA Requirements at BBTCA.	Stakeholder	5/20/2015	Email to Facilitator	▶ Both the Future Baseline and Proposed Future Scenarios in the EA will include the assessment of potential impacts associated with the inclusion of a runway end safety area (RESA) in the future runway design. The RESA is a level graded area which extends beyond the runway threshold to provide an additional measure of safety in the event of an aircraft undershooting or overrunning the runway. As proposed, RESAs would be required where the runway length exceeds 1,200 meters or where an instrument runway is utilized by scheduled passenger operations utilizing aircraft with more than nine seats. ▶ In 2010, Transport Canada identified the requirement to implement a RESA at qualifying airports as an additional safety consideration. The installation of a RESA at the BBTCA would result in an amendment to the Tripartite Agreement (WSP Group, 2014), but would be required to comply with Transport Canada regulations. The RESA at the BBTCA would consist of a land mass extension at both ends of the main runway (Runway 06-26) which includes lakefilling in the Toronto Harbour within the Marine Exclusion Zone (MEZ). Although not required under the CEAA, an EA report for lake fill in the vicinity of the proposed RESA, "Lakefill within Marine Exclusion Zone (Keep-out-Area) Toronto Harbour", was completed in January, 2013 (Dillon Consulting, 2013). ▶ The Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport will assess the impacts of future airport operations under an operating scenario both with jets (to be detailed in the 2015 Master Planning Exercise) and without jets (as detailed in the 2012 Master Plan). This includes the understanding that RESAs will be required elements of future airport runways, and that a Tripartite Agreement amendment will be necessary in order to allow the construction of the RESA, whether or not the proposed extension of the land mass is allowed to move forward to detailed design.
Public Safety	Bird Strikes	This Airport virtually abuts a major bird sanctuary, and thousands of geese and cormorants populate the Toronto waterfront. The UK Government's Airports Commission Document titled Inner Thames estuary airport: summary and decision, 2 September 2014, determined that a proposed airport development in that location should not proceed, in part because of the risk of bird strikes. Here are its conclusions: "The operational risk to the airport posed by birdstrike could increase the scale of compensatory habitat required as it would require it to be sited further away, ideally to a minimum of 20km away from the site, and certainly outside of the 13km bird safeguarding circle, increasing the uncertainty as to its suitability as replacement for the habitat lost." If this degree of caution is necessary in the UK, why is it not on our waterfront?	Stakeholder	5/20/2015	Email to Facilitator	▶ A review of past trends in bird strike occurrences for various species at the Billy Bishop Toronto City Airport (BBTCA) will be compared to a comprehensive bird list compiled from the records and background information received from various agencies to understand the potential impacts of the airport on bird populations. The EA will consider jet flight paths and height, as well as frequency of flights information (to be provided in the 2015 Master Planning Exercise) to identify where bird strikes are likely to occur and relate this to the potential effects on birds recorded in this identified area. If the proposed changes to the runway are approved, the existing BBTCA Wildlife Management Plan will be updated. To do so, a risk assessment of bird strikes will be completed to determine what mitigation measures are required as part of the plan to reduce the potential for risks from bird strikes. ▶ The original natural environment scope of work for the Environmental Assessment recommended breeding season surveys near the BBTCA in May and June. Based on the comments received, additional surveys were undertaken to document Cormorant behaviour near the BBTCA be completed on four occasions in late July and August. Cormorants are associated with a higher risk of bird strikes, and there is a large nesting colony at Tommy Thompson Park.
Public Safety	EMS	[Page 32] Appropriate and sufficient emergency response and access in the event of a major disaster are essential components for any consideration of expansion, let alone current operations.This document only sets out PortsToronto's arguments, which ignore the 1993 experts' report, previously delivered to Swerhun Facilitation, that concludes that a bridge to the Island Airport is essential for adequate emergency access.	Stakeholder	5/20/2015	Email to Facilitator	▶ As part of the EA, the Study Team will review and comment on the Emergency Response Plan and associated protocols at the BBTCA EA with regards to regulatory compliance. The airport's emergency response plan, protocols and procedures meet or exceed Transport Canada's regulatory requirements. The BBTCA has a fully functioning, on-site fire hall and emergency response centre, in addition to the Toronto Fire Service. It is staffed by more than double the number of emergency personnel required by Transport Canada. The airport's fire department does regular internal and external emergency services training throughout the year. A full-scale simulation is conducted every two years, with a full simulation table-top exercise in intervening years. These exercises are aimed to test the airport's protocols, procedures, communications and planning for emergency and security related incidents, and to ensure that the airport is equipped to respond to any situation.
Public Safety	Runway Approach Lighting	1. Lack of cosideration of approach lighting: It is not acceptable for the PortsToronto "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport" to omit consideration of this element on the basis that such approach lighting is "not required" in TP312 4th edition. Toronto deserves an airport on its waterfront that conforms to the highest safety standards, not to bare minimums. Runway approach lighting is recommended for the runway design under consideration, under the current regulations, and is so for safety reasons. According to the Transportation Safety Board of Canada, TP312 recommendations are safety recommendations: TP 312 uses the ICAO phraseology of "standard" or "recommended practice" to identify specifications considered to have a direct impact on the safety of flight from those that affect only operational efficiency. Only the standards contained in TP 312 are mandatory for the certification of Canadian airports; recommended practices are optional and might or might not be implemented. BBTCA is an unusual airport in a number of characteristics that should reinforce the need for safety, not minimize it. These include: • the airport runways are near the minimums for the commercial uses being proposed the airport runway ends are water, and the airport is surrounded on three sides by water • the airport is frequently fogbound	Stakeholder	5/20/2015	Email to Facilitator	▶ PortsToronto has had extensive consultation with Transport Canada through the project planning phase. As well, the Stakeholder Advisory Committee requested that Transport Canada staff attend a meeting and many issues including approach lighting were discussed with the members of the committee. According to Transport Canada, approach lighting is not a standard for non-precision approaches and the BBTCA is a non-precision approach airport. Approach lighting at BBTCA is not required in TP312 4th edition (on which the current preliminary runway design activities are based) and does not compromise the high level of safety standards that exist at the airport today. As such, approach lights will not be considered or installed at the airport.

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		• the airport abuts the most heavily trafficed recreational waterway in Canada, and boating activity occurs near the runway ends • the airport is located adjacent to the most dense high rise urban core in Canada Moreover, the contemplated expansion is about the future. The requirements for runway approach lighting are substantial in that the lighting arrays are specified as being from 420 metres to 720 metres in length extending from each end of the runway. Such lighting arrays, now or at any time in the future, would be devastating to the Inner Harbour and would make use of the Western Gap impossible. If such lighting could ever be demanded in order to maintain or meet future requirements, or to satisfy demands in the future for greater safety at BBTCA, then they should be studied NOW.				
RESA	Lake filling	The EA pretends that land filling is necessary for RESAs, jets or no jets - a falsehood to put a foot in the door on lake filling ("Transport Canada made us do it.")	Public	5/17/2015	E-mail to Facilitator	▶ There is an understanding that RESAs will be required elements of future airport runways, and that a Tripartite Agreement amendment will be necessary in order to allow the construction of the RESA, whether or not the proposed extension of the land mass is allowed to move forward to detailed design.
Social impacts	events	The EA should include feedback from those running events/festivals at Harbourfront Centre. One of them did express concerns at the TPA annual meeting in September.	Public	4/25/2015	Email to Facilitator	▶ Interviews with a sample of hotel, restaurant, and sight-seeing business operators along or closely associated with the waterfront will be conducted to obtain their perspectives regarding influence from airport operations and all other waterfront activities. These business-related interviews will capture views and perspectives linked to a variety of issues such as: ‣ Importance of BBTCA to business clientele; and ‣ Importance of the "waterfront experience" (such as recreation, dining, noise, air quality, etc.) to clientele. ▶ These interviews are being conducted as part of the Socio-Economic scope of work for the EA. Additional information on the Socio-Economic scope of work can be found in Appendix B.
Social impacts	Policy	I would like ask the Toronto Port Authority to consider this .....if cottage residents and all their friends and family on Lake Rosseau, Lake Muskoka and Lake Joseph are all allowed to fly up to the lakes in a float plane and land at the end of each and every dock on the lake, how do they think this would be received by the residents?? I'm sure there would be an outcry over noise, water pollution and safety for swimmers and water sports. I would like remind The Toronto Port Authority that Lake Ontario is my 'cottage country' along with the residents of this city. Please do not exploit it.	Public	4/29/2015	Email to Facilitator	▶ Comment noted.
Social impacts	Recreation	Recreational facilities in the Island Park, Ontario Place and boating in Toronto Harbour and Lake Ontario. Increasing number of people are settling in the downtown core of the city. They will need recreational facilities.	Stakeholder	5/20/2015	Email to Facilitator	▶ The EA will assess quality of life impacts to users of parks and public spaces in terms of noise and air quality impacts, views and impacts to the physical space (such as area, amenities or infrastructure). For further details on the methods for assessing impacts, please refer to Appendix B.
Social impacts	Local economics	With respect to economic benefits, tourists seem to be highlighted as a group. A much larger group are Toronto residents (like FoNTRA members), as they will make up the majority of users of parks, cultural facilities, events, boating, etc. and businesses across the City that serve them. Tourists are a smaller group but seem to be given prominence. Local residents are a subgroup and have local neighbourhood businesses.	Stakeholder	5/20/2015	Email to Facilitator	▶ The EA will include consideration and documentation of the comments and concerns from participants in the consultation process, including agency, First Nation and Métis, members of the public (both local stakeholders and tourists). ▶ A combination of pre-arranged meetings and user intercept surveys are planned for the summer, 2015. The intent is to interview people that represent a diversity of waterfront users, to obtain their perceptions and attitudes about the waterfront, including recreational activities in the area, and consequences of the Project for their activities. The intercept surveys will also attempt to capture input from a variety of users from: ‣ Local neighbourhoods; ‣ Throughout the City of Toronto; ‣ GTA; and ‣ Outside the GTA.
Social impacts	Parks and Public Realm	What are the specific quantitative and qualitative metrics that will be utilized to measure the potential impacts on waterfront parks and public realm, including Queens Quay Boulevard	Waterfront Toronto	5/19/2015	Email	▶ The EA will assess quality of life impacts to users of parks and public spaces in terms of noise and air quality impacts, views and impacts to the physical space (such as area, amenities or infrastructure). The effects assessment studies for noise, air quality and the socio-economic/built form environment (e.g. for effects pertaining to views and jet blast on boaters) detail how these assessments will be conducted, and can be found in Appendix B.
Social impacts	Balance	What are the metrics / indicators that will be utilized to measure "balance" of future waterfront users? By "balance", Waterfront Toronto is referring to the point at which the airport remains one component / use of the waterfront and not the dominant one, with all other uses and experiences becoming secondary.	Waterfront Toronto	5/19/2015	Email	▶ The Study Design has been updated to add clarity to section 3.6 that describes the assessment methodology proposed to determine if impacts on specific waterfront uses could alter the overall balance of uses and users in the Central Waterfront area.
Study Design	2015 Master Planning Exercise	The Airport Master Plan update should be drafted and circulated in advance of the completion of the EA. Agreement on the vision and role of the BBTCA, the future volume of scheduled commercial and general aviation activities and passenger and flight forecasts should be finalized and assessed as part of the EA scenarios. Staff are particularly interested in the impact on general aviation users of the airport in a scenario with jet-powered aircraft, runway-extensions and an increase in daily slots for commercial scheduled aircraft and passenger volumes.	City of Toronto	1/6/2015	Letter to PortsToronto	▶ The 2015 Master Planning Exercise will outline the vision for BBTCA. This vision will include operational and infrastructure changes required to meet the vision, and these, along with design details will form the project description in the EA study. These have also been described in the Study Design.

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Study Design	Scenarios	The City of Toronto has a strong interest in understanding the potential impacts of airport growth under existing and expanded (jet-powered aircraft and runway extensions) operations prior to any decision to amend the Tripartite Agreement. The City has raised concerns about current airport operations consistently during the review and requests that the EA include an assessment of existing conditions against the proposed scenarios. A "Do Nothing" scenario that assesses the continuation of existing conditions without any improvement to airside and groundside operations should be assessed as part of the EA. This scenario should incorporate current issues that have been raised by the City and the local community such as, but not limited to: groundside traffic, noise and air quality. These issues should be documented and assessed as part of the establishment of a base condition.	City of Toronto	1/6/2015	Letter to PortsToronto	▶ PortsToronto acknowledges that area and other City residents and visitors have concerns with the current operations at BBTCA, and is committed to addressing these concerns in cooperation with the City of Toronto. All mitigation measures will be reflected in the EA study's consideration of net effects. ▶ PortsToronto has committed to completing an EA which will compare the impacts of planned passenger growth permitted under the current Tripartite Agreement and proposed passenger growth with an extension of the main runway and jets. A baseline of operations today will need to be established to extrapolate future conditions. The existing conditions will also be shared publicly. PortsToronto is committed to working with the City to address local community issues (i.e. traffic, noise and complaint response) and has made commitments to groundside and airside operations.
Study Design	Scenarios	The "Proposed Growth" scenario (which includes jet-power aircraft, runway extensions, and an increase in daily slots) is not consistent with the caps and phasing framework that was approved by City Council on April 1, 2 and 3, 2014. Staff are concerned that this growth scenario cannot be realistically accommodated given constraints imposed by airport and groundside facilities, and the context of the airport on Toronto's Central Waterfront. The EA scoping document should clearly describe the project and the project components (runway extension, landfill, navigational aids, etc.), in addition to the scenarios proposed under the 2012 permitted and 2015 proposed growth scenarios. The EA should be precise about the project design standards (i.e, TP312 version 4) in order to clarify the scope of the various scenarios.	City of Toronto	1/6/2015	Letter to PortsToronto	▶ The EA is doing this by testing the Proposed Future Scenario to determine if it can be realistically accommodated within the constraints of the anticipated future waterfront environment. The Study Design document has been amended to clearly describe the details of the various project components for which impacts will be assessed, including the project design standards, described in Section 2.1.2.
Study Design	Study Area	Thank you for now including Ontario Place in the study area boundaries for Noise, Air Quality, and Socio-Economic.	Waterfront Toronto	5/29/2015	Email	▶ Comment noted.
Transportation	Fuel Transportation	It was stated at our Transportation session on April 11 2015 that fuel trucks take 1 hr 20 minutes to have fuel come and unload and back (from Victor Stolport). Are there actual transportation numbers for this study? (actual percentages of people using TTC/Porter Bus/walking-riding/taxis etc). Please see if it can be implemented.	Public	4/20/2015	Email to Facilitator	▶ The information for existing traffic conditions will include an outline of modal split (percentages of different types of vehicles).
Transportation	Methodology	Curbside – referring to the mainland, I don't believe I have seen any specifics of creating a more specific mathematical area in handling passengers. I saw a study (maybe AIBIZ. HLT) that illustrated the Kelowna BC had a much better proportion of curbside in relationship with the number of passengers. Question – Why have there not been more specific transportation mode tabulations completed versus guessing/assuming etc. (Porter buses/taxi/drop-off/TTC/other), especially when BBTCA has recorded 2.4 million passengers that departed and arrived in 2014? Note – if an organization (PT) wants to be somewhat responsible for transportation, one must understand transportation trends with specific data in order improve transportation congestion. Data that I have seen in regards to modes of transportation at BBTCA is vague and non-precise to say the least. Note -it was brought to my/our attention in this session (transportation) that "Victor" Stolport stated it takes 1 hr 20 minutes for fuel trucks at BBTCA to come-unload-back.	Public	4/20/2015	Email to Facilitator	▶ As part of the ongoing traffic monitoring and modelling work being undertaken by PortsToronto in the Eireann Quay and the Bathurst neighbourhood, separate to the EA, recommended changes to modal split will be highlighted to determine the degree to which these recommendations will free up network capacity. PortsToronto has committed to monitoring any groundside operational changes for effectiveness on an ongoing basis, beyond the completion of the EA. Recommendations for improvements to transportation issues will include improvements that are within the ability of PortsToronto to implement, and will be made with regard to the information provided by the Bathurst Quay Neighbourhood Study. This study will be referred to in the EA. Proposed infrastructure changes recommended by the Bathurst Quay Neighbourhood Study (currently being conducted) will be reviewed for potential impacts on cyclists and the cycle network along the waterfront, if available within the timeframe of the EA study. ▶ Proposed groundside infrastructure changes recommended as part of the 2015 Master Planning Exercise will be reviewed for localized parking impacts on PortsToronto-owned or managed property, as well as in adjacent neighbourhoods.
Transportation	Other Studies	The EA needs to clearly show how it is linked to other related studies such as the Bathurst Quay Neighbourhood Plan (BQNP) and the Airport Master Update. The BQNP has a different set of assumptions for airport growth based on the Council-approved caps and phasing framework.	City of Toronto	6/1/2015	Letter to PortsToronto	▶ The EA will assess the impacts of the proposed future scenario, which will be developed through the 2015 Master Planning Exercise and the preliminary design activities. These two efforts have been, and continue to be undertaken in coordination with City efforts to prepare a future vision for the Bathurst Quay neighbourhood through the Bathurst Quay Neighbourhood Study.
Transportation	Scenarios	The caps and phasing framework approved by City Council is based on the vehicle capacity of the local road network around the airport. If the EA is going to examine scenarios beyond the caps and phasing framework, it must (i) acknowledge existing conditions, (ii) examine how the additional passengers and traffic will be accommodated, and (iii) demonstrate that there will be no greater impact on existing traffic conditions.	City of Toronto	6/1/2015	Letter to PortsToronto	▶ PortsToronto understands the current community concerns regarding congestion in the local road network in the vicinity of the Airport, and has committed to continuing to work with the City to address these concerns.
Transportation	Study Area	The boundary of the transportation assessment should extend further north to include Fleet Street as the effect may have an impact on transit service along Fleet Street. In addition, Fleet Street should be assessed as part of the Bathurst/Lake Shore Boulevard intersection.	City of Toronto	6/1/2015	Letter to PortsToronto	▶ The transportation effects assessment will include Fleet Street as part of the Bathurst Street and Lakeshore Boulevard intersection.
Transportation	UPExpress	Will the expansion of the Island Airport threaten the economic viability of the UP Express?	Stakeholder	5/20/2015	Email to Facilitator	▶ The impacts of the proposal, in general terms, on the use of the UP Express or of Pearson Airport were assessed by HLT Advisory in the study "Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport" (November, 2013). The EA will not recreate this assessment, but will refer to key findings of these studies in the assessment of economic impacts. The EA has included and will continue to include extensive consultation with both the GTAA and Metrolinx. Concerns about potential impacts on Pearson, in general, or the UPExpress, specifically, will be gathered from these agencies.
Transportation	Traffic	[Page 27] As the 2012 Master Plan confirmed, road access, parking and drop-off space for the Island Airport is severely constrained, and cannot be fixed. The result is a traffic mess - with existing passenger volumes. The only realistic solution - requiring all access to the airport to be by shuttle bus or other forms of public transit - is ignored.	Stakeholder	5/20/2015	Email to Facilitator	▶ As part of the ongoing traffic monitoring and modelling work being undertaken by PortsToronto in the Eireann Quay and the Bathurst neighbourhood, separate to the EA, recommended changes to modal split will be highlighted to determine the degree to which these recommendations will free up network capacity. PortsToronto has committed to monitoring any groundside operational changes for effectiveness on an ongoing basis, beyond the completion of the EA. Recommendations for improvements to transportation issues will include improvements that are within the ability of PortsToronto to implement, and will be made with regard to the information provided by the Bathurst Quay Neighbourhood Study. This study will be referred to in the EA. Proposed infrastructure changes recommended by the Bathurst Quay Neighbourhood Study (currently being conducted) will be reviewed for potential impacts on cyclists and the cycle network along the waterfront, if available within the timeframe of the EA study.

C3. 30-Day Review Period from the Peer Reviewer

C3: Comments Received from the Peer Reviewer on the Draft Study Design

	Issue	Sub Issue	Comment	Source	Response
Responses to Peer Reviewer's Table 4.1 Summary of Recommendations of AECOM's Draft Study design Report					
1	**Public Consultation and Stakeholder Engagement**	First Nations and Metis consultation	More detail should be included with respect to First Nation and Métis consultation, including a list of comments and issues raised.	Final Peer Review of Draft Study Design	Section 4.1.7 of the Study Design was updated to reflect that the Mississaugas of the New Credit expressed an interest in the results of the Stage 1 Archaeological Assessment and the cultural heritage summary. As First Nations and Métis outreach and engagement continues, and official comments or specific issues are raised, these will be documented and made available for review in the draft Environmental Study Report (ESR).
2	**Public Consultation and Stakeholder Engagement**	Part 2 engagement activities	Detail on approximate timing and extent of Part 2 Engagement Activities should be added. (For example, what consultation mechanisms will be used at each decision point).	Final Peer Review of Draft Study Design	Due to the integrated nature of the various studies being undertaken, the next Public Information Centre (PIC) will take place once all of the studies have been completed so that all of the inputs into the cumulative effects assessment can be obtained and comprehensive cumulative effects can be presented publicly at that time. Currently this is anticipated to take place in the late autumn or early winter of this year. In addition, update meetings with the Stakeholder Advisory Committee (SAC) and Agency Advisory Committee (AAC) will be scheduled as necessary throughout this time as project milestones are reached and feedback is sought on milestones. This additional detail has been added to Section 4.2.
3	**Public Consultation and Stakeholder Engagement**	Reporting	Table 4.1 seems to be out of place in the Draft Study Design Report.	Final Peer Review of Draft Study Design	A new section called "4.1.8 Consultation Summary" was added to the Study Design which introduces Table 4.1 as a summary of consultation activities undertaken During Phase 1.
4	**Public Consultation and Stakeholder Engagement**	Stakeholder Comments	A summary of comments raised should be added to all subsections within Section 4.1 of the Draft Study Design Report.	Final Peer Review of Draft Study Design	All comments and summaries of key comments are available on the Project website, which is also listed in the Study Design report: http://bbtcarunwayandjetsea.org/
5	**Public Consultation and Stakeholder Engagement**	Master Planning Exercise	There seems to be confusion between what is part of the EA and what is part of the Master Plan and what the public can comment on. In keeping with best practices, we would suggest that the master plan should be open to public comments. This issue was clearly indicated at the June 24th meeting.	Final Peer Review of Draft Study Design	Section 2.1.5 – Summary of Master Plan, Preliminary Runway Design and Environmental Assessment was added to the Study Design to describe the components of the project that fall under the jurisdiction of each process. As noted in Section 2.1.1, the 2015 Master Planning Exercise has included public and stakeholder consultation. Comments on the 2015 Master Planning consultation process are outside the scope of the Environmental Assessment, which will not review the Master Planning process.
6	**Air Quality**	Study Area	The latest information of the study design states that road traffic will be modelled including the Gardiner Expressway, Lakeshore Blvd. and arterial streets. However, it is unclear which portions of these roadways will be included in the study. For example, will only the portion of the Gardiner Expressway that falls within the Study Area (from approximately Bathurst St. to York St.) be included? This should be clarified.	Final Peer Review of Draft Study Design	Vehicle emissions will be estimated using the U.S. EPA MOVES model, which is largely based on actual on-road emission measurement data. Key model inputs include climate data and vehicle classification information. The ferry emissions will be based on published emission factors from the U.S. EPA. The sections of the roadways that will be included in the model are as follows: Gardiner Expressway between Parkside Drive to the west and Don Valley Parkway to the east. Lakeshore Blvd between Parkside Drive to the west and Woodbine Avenue to the East.
7	**Air Quality**	Study Area	Consideration should be given to extending the study area north of the Gardiner Expressway, particularly if emissions from this roadway will be modelled.	Final Peer Review of Draft Study Design	Receptors have been added north of the Gardiner to assess changes in air quality in Wards 19 and 20. Locations to include Stanley Park and Victoria Memorial Park.
8	**Public Health**	Assessment	It is expected that the scope of work would provide more detail in how the assessment will actually be carried out; for example what are the regulatory or policy-based thresholds that are going to be used? What are the public health noise reference values that are going to be used?	Final Peer Review of Draft Study Design	Toronto Public Health has developed and provided to the Study Team lists of reference values against which air quality and noise parameters will be compared. These include toxicity reference values for air quality contaminant impacts on public health, and comparators for noise level impacts on public health. The results of the air quality assessment will be compared to these reference values as well as Federal and Provincial ambient air quality standards and criteria. These air quality thresholds are a surrogate to impacts on human health.
9	**Public Health**	Assessment	It should be noted that a comparison to the Ministry of the Environment and Climate Change ambient air quality standards or to Canadian ambient air quality standards are not considered to be adequate for evaluating potential health impacts as many of them are not based on the protection of human health and some of them are dated and do not reflect current understanding on health effects.	Final Peer Review of Draft Study Design	Predicted air quality contaminant concentrations will also be compared to reference values provided by Toronto Public Health. The references for the threshold values include the World Health Organization (WHO), California Environmental Protection Authority, Health Canada, and the State of New Jersey.
10	**Noise**	Methodology	The proposed modelling approach will result in the prediction of 24-hour LDN values, while the presented criteria values are primarily energy equivalent sound levels (Leq) calculated over an interval of less than 24-hours. AECOM should clarify how the LDN and N70 model outputs will be converted for direct comparison to the adopted criteria, which use metrics other than LDN and N70.	Final Peer Review of Draft Study Design	The LDN and N70 data will not be used or adapted for comparison with the adopted NEF contours criteria. The Transport Canada model and modelling approach will be used to generate results for assessment against the NEF contours criteria. The FAA model will be used to generate LDN and energy-equivalent average sound level comparators.
11	**Noise**	Assumptions	The latest information provided by AECOM outlines that the assessment will be based on an average traffic day with regard to the flight data input to the model, as per the approach utilized by the FAA. Noise complaints are more likely to be associated with busier days than the average condition. For example, Transport Canada utilizes the 95th percentile daily traffic data for modelling assessments.	Final Peer Review of Draft Study Design	The EA will use the Transport Canada model to generate NEF contours using the Transport Canada method for "95th percentile day". Supplementary illustration of the typical experience will done using the FAA model and modelling approach – which uses a "mean day" to generate LDN. The output of the FAA model will also be used to generate the N70 contours.
12	**Noise**	Methodology	The latest information provides additional detail on only a portion of the study scope. The study design outlined that the assessment would utilize models that were not mentioned in the new information. For instance, the scope outlines that the Cadna-A model will factor into the assessment; however, it is not clear how it will be utilized in the assessment. Each model should be identified with the source(s) it will be used to assess.	Final Peer Review of Draft Study Design	The Cadna/A software's ISO 9613 model will be used for sources at the airport which are not modeled in the NEF or INM models, such as aircraft taxiing, aircraft runup activity, ground support equipment, and the ferry. Road traffic modelling of background sound levels for regulatory purposes will not be done in Cadna/A. Illustration of road traffic sound levels over the extents of the study area, using contour plots, will be done using the RLS90 model incorporated into Cadna/A.
13	**Noise**	Methodology	The latest information identifies that the public is interested in in-the moment sound levels, and that this concern will be addressed through the use of N70. The N70 will only indicate whether 70dBA was exceeded or not; it does not identify the actual peak levels that may be experienced, which may be of	Final Peer Review of Draft	The actual criteria to be used in the assessment are those specified in the regulatory guidelines listed. Some of the criteria are specific numbers, while others need to be determined as part of the assessment. For example, the background sound levels that NPC-300 uses as criteria need to be determined as part of the study. Similarly, the sound levels associated with

C3: Comments Received from the Peer Reviewer on the Draft Study Design

	Issue	Sub Issue	Comment	Source	Response
			greater interest to the public. However, as noted in the additional information, the monitoring data will be useful for providing information on actual in-the moment sound levels during BBTCA operations.	Study Design	Health Canada's criteria cannot be determined until some of the study is completed.
14	**Noise**	Methodology	▶ There is a possibility that the use of LDN at the school location could result in an invalid comparison if the baseline condition is calculated in such a way that the night-time ambient condition (i.e., due to local road and rail traffic) at this location is included and penalized by +10dB. This would be unreasonable with no occupants at night, and would overestimate baseline conditions. Such an over-estimated baseline would serve to lessen the predicted impact of the project. This approach should be reconsidered.	Final Peer Review of Draft Study Design	▶ The LDN and N70 are the key metrics identified in the ARCP study (2014). This recent study identifies these metrics as having correlation with learning outcomes in US schools. The metrics will be applied in the same way as the ARCP study so that the model outcome is directly comparable with the study results. Actual flight operations will be used in developing the LDN; however, nighttime flights are not expected to skew the LDN in consideration of the nighttime flight curfew in place at BBTCA. The airport is closed to scheduled flights and general aviation during all nighttime hours, except for the 15 nighttime minutes from 6:45 to 7:00 am. The same restriction is not applied during the 960 daytime minutes. The number of nighttime flights is very small in comparison with the number of daytime flights, therefore any nighttime flights will not materially affect the model output. ▶ Consistent with the ARCP study, background sound is not the comparator for LDN in the evaluation of school-related sound levels.
15	**Noise**	Methodology	▶ The latest information provided does not speak to whether an assessment of noise-induced vibration will be considered. The potential for this effect was one of the concerns raised by the public and this should be considered as part of the EA.	Final Peer Review of Draft Study Design	▶ Noise-induced vibration is typically the result of low frequency noise. Low frequency noise will be considered in the EA based on a qualitative assessment of sources of low frequency noise at BBTCA and how those sources may change with the proposal. The EA team has requested frequency data from the manufacturer of the CS100 and Q400 to better understand the need for this type of noise measurement; however, at this time it is not anticipated that this will materially affect the outcome of the noise assessment.
16	**Natural Environment**	Aquatic	▶ Although the latest information provided is generally acceptable, further information on methods should have been included. For example, an underwater camera was used to identify substrate, emerging and submerged vegetation using a grid based system. However, the sensitivity of the camera (in lux) for underwater monitoring has not been defined, and the size of the grid and proposed number of samples are also not available. The hydroacoustic (sonar) study also should have more detail (transducer frequency, mode of operation- horizontal or fixed, length of monitoring period etc.) or at least the details referenced.	Peer Review of Draft Study Design	▶ The following detail has been added to Appendix B, Attachment A: Aquatic field work investigations included the following: Aquatic habitat conditions within the proposed footprint for the runway extensions were documented through a two-day field investigation with the use of an underwater camera. The purpose of this investigation was to document existing fish habitat conditions including substrate, submerged and emergent aquatic vegetation, and other cover types (e.g. submerged woody debris). ▶ A grid was travelled and sampling sites were recorded. Each location was assigned a unique identification number. A photo was taken and aquatic macrophytes, substrate, and cover were identified at each sample location. ▶ The grid consisted of 29 sample locations on the east die of the runway and 34 on the west. The grid included the 200 m land mass extension plus an additional 30 m. ▶ The camera used was a Go-Pro Hero 3+ outfitted with an underwater light producing 126 lumens. ▶ The hydroacoustic study was performed by the TRCA. The details of the study methodology have been requested from the TRCA for publication in the ESR.
17	**Natural Environment**	Terrestrial	▶ The methodology for the terrestrial environment is better described but more detail should be provided.	Peer Review of Draft Study Design	▶ AECOM completed a site visit to the BBTCA grounds and reviewed the vegetation communities and any wildlife habitat within 120 m of each runway extension. ▶ Additionally, AECOM has received fauna records (including reptiles and amphibians) from agencies such as the TRCA and MNRF from the Toronto Islands and Tommy Thompson Park. AECOM also received fauna records from Falcon Environmental. These records are sufficient in providing an understanding of the species present in the BBTCA property. ▶ Additional details regarding the location and timing of bird surveys have been added to Appendix B, Attachment A
18	**Natural Environment**	Methodology	▶ Technical references should have been provided to support methods. Details of the methods are important since results and data interpretation is based on the sample collections, and the reviewer should be aware of any limitations which may influence conclusions (e.g. camera limited in turbid environment). In the final report, it is expected that additional information will be provided on methodology and possible limitations of approaches.	Peer Review of Draft Study Design	▶ Additional study methodology and information for both aquatic and terrestrial studies has been added to Appendix B, Attachment A of the final report.
19	**Socio-Economic Conditions**	General Approach	▶ A greater focus in the current study is placed on the potential impacts to the social environment and the inter-relationships between the City of Toronto, air passengers, local business and waterfront users as it has not been adequately addressed previously. Although we agree, economic impacts and benefits influence planning and decision making and as such are also important and need to be fully understood.	Peer Review of Draft Study Design	▶ Agreed. AECOM is reviewing available studies already completed as well as undertaking interviews with the business community to understand economic impacts and impacts to development trends and property values.
20	**Socio-Economic Conditions**	General Approach	▶ Any claims regarding impacts or benefits in the EA will need to be supported by the existing economic studies.	Peer Review of Draft Study Design	▶ Agreed. The economic impact assessment portion of the study will leverage existing studies, which have been conducted in a rigorous manner and conform to accepted economic modelling practices. The relevancy of these studies will be commented on in the environmental assessment report as the EA will draw on this body of information as a starting point for our socio-economic assessment. What is absent from all of these studies is the social impacts related to airport operations – both current and proposed, and this is the focus of the socioeconomic effects assessment study.
21	**Socio-Economic Conditions**	Cumulative Effects	▶ Section 3.4 states that, "The cumulative net effects of the proposed future scenario on community assets will be compared to the cumulative net effects of the permitted future scenario on community assets". However, there is no methodology outlined for how cumulative effects will be assessed.	Peer Review of Draft Study Design	▶ The proposed methods for assessing cumulative effects are adapted from CEAA guidelines, and are described in Section 3.4 of the Study Design.

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	Issue	Sub Issue	Comment	Source	Response
22	**Socio-Economic Conditions**	Assets	▶ Appendix B, page ii – Section 2 in the table – Land Value assessment and investment generation are missing from the list of assets.	Peer Review of Draft Study Design	▶ Property values are listed in this section, as are municipal implications, which include the indicators of municipal expenditures and property taxes.
23	**Socio-Economic Conditions**	Study Area Definition	▶ Appendix B page 4, 3rd paragraph – Study Area definition should also consider journey times to the development area alongside travel patterns.	Peer Review of Draft Study Design	▶ The socioeconomic effects assessment study will refer to the transportation effects assessment study, which will review the impacts of the proposed changes on traffic congestion, as well as pedestrian safety and access to residences, businesses and amenities within the waterfront area. ▶ Preliminary traffic modelling completed for the City of Toronto in 2013 by BA Group (BA Group, 2013) is currently being updated based on revised anticipated passenger volumes accessing BBTCA's mainland terminal, and will account for proposed infrastructure and other development in Bathurst Quay. This updated modelling will be referenced by the EA study. ▶ For more detail on the methodology for the transportation effects assessment study, please refer to Appendix B, Attachment A. ▶ The scope of the study does not assess regional impacts or looks to address how the proposed works will affect other airports within the GTHA, or *visa versa* as regional travel studies and journey time analyses are currently being undertaken by the GTAA. The GTAA studies are standalone studies.
24	**Land Use and Built Form**	Waterfront Revitalization	▶ The land use policies and efforts of particular importance to the proposed airport expansion is Waterfront Toronto's revitalization efforts. The study design currently does not specifically reference this important work. We recommended the scope of the EA expand to include the assessment of the potential of the proposed future expansion scenario to influence waterfront revitalization efforts, and elevating waterfront revitalization to a separate discipline for study. Recognizing the airport is only one component of the waterfront, how will its expansion potentially impact the balance of other waterfront land uses. Based on the subsequent information provided by AECOM through PortsToronto, it appears the key line of questioning during the intercept and pre-arranged interviews would result in qualitative data applicable to this assessment.	Peer Review of Draft Study Design	▶ The EA will assess direct impacts on future revitalization efforts through three mechanisms: 1) any changes in airport operations will be assessed for their potential impacts on building heights, and consequently gross floor area (GFA) and density; and 2) the interest amongst those in the land development profession in undertaking redevelopment projects will be assessed through direct, qualitative interviews; and 3) trends in real estate and the attitudes and wants of buyers and/or renters in the waterfront area will be assessed through direct, qualitative interviews. The Study Design has been updated to reflect this addition to the EA scope, with details outlined in Appendix B, Attachment A. ▶ The EA will assess indirect impacts on ongoing revitalization efforts through the description of place-based impacts and how these impacts may be perceived by people living, working, or playing in various locations throughout the Central Waterfront area. The method proposed for understanding potential impacts on the balance of uses and users in the Waterfront area is described in Section 3.6 of the Study Design and has been updated to clarify how this task will be undertaken.
25	**Marine Physical Conditions and Water Quality**	Water Quality	▶ There is no obvious discussion on how the consultant will control stormwater (100 year storm). What method of containing the stormwater will be used to ensure at least 90% removal of solids?	Peer Review of Draft Study Design	▶ This environmental assessment will review the impacts of proposed works, including any design details for the conveyance or treatment of storm flows. Should the storm conveyance and treatment design be found to be deficient, in that it does not meet regulatory requirements such as solids removal requirements, AECOM will highlight this and recommend mitigation measures or further study.
26	**Transportation**	Safety	▶ The public has expressed concern that safety is not being adequately covered, including analysis of: impacts of runway overrun by aircraft; crash location model; crash consequence model; calculated increase in potential death and injury by allowing jets to fly, and the rate of increase based on volume of traffic. This is a valid and critical factor related to accidents in the water and revised plans need to be addressed before new aircraft are introduced.	Peer Review of Draft Study Design	▶ Section 3.7.1 has been updated to explain how collision and other flight risks are accounted for in all airport design, and therefore will be addressed as part of the 2015 Master Planning Exercise and Preliminary Design work. ▶ Section 3.1 lists the proposed changes that will be assessed for impacts. These changes were developed as part of the 2015 Master Planning Exercise, and include any changes to the protection surfaces developed under ICAO guidelines (such as the Obstacle Limitation Surface and the Missed Approach Surface).
27	**Transportation**	Master Planning Exercise	▶ The 2015 Master Planning Exercise must address public safety considerations such as the above as part of the Transport Canada regulations that guide airport design and operation (such as TP312 – Aerodrome Standards and Recommended Practices), and that the runway design be prepared in accordance with these safety standards.	Peer Review of Draft Study Design	▶ As per the April 1, 2014, request from Toronto City Council, PortsToronto is undertaking a runway design, among other initiatives, to identify the design details of the proposed 200-metre land mass extension at each end of the main runway. The runway design will be based on the requirements of TP 312 - 4th Edition as this has been the standard in place since 1993 and throughout the past 16 months of runway design activities. ▶ On July 31, 2015, Transport Canada announced the release of TP 312 - 5th Edition which will be in effect as of September 15, 2015. It has been confirmed by Transport Canada that airports that have begun runway design and construction under TP 312 - 4th Edition, can continue to plan and build to this Edition standard, in accordance with the details laid out in Transport Canada Advisory Circulars. Further, airports already in the design process may consider the merits of the two versions according to what best suits the airport's unique needs. In addition, airports that may not meet the time limitations set out in Transport Canada Advisory Circulars may be given a favourable consideration on a case by case basis, and granted a ministerial exemption to continue to build to the TP 312 - 4th Edition. ▶ As such, the Environmental Assessment will consider the effects of the proposal and compliance with TP 312 -4th Edition.
28	**Transportation**	Marine Exclusion Zone (MEZ)	▶ The Canadian Coast Guard (CCG) should be consulted due to potential changes in the ATONS (Aids to Navigation). We recommend also including / consulting with PortsToronto personnel, any other affected marine pilot agencies, commercial operations, Navigation Canada if required, and Toronto Polices Services Marine Unit.	Peer Review of Draft Study Design	▶ The Canadian Coast Guard has been added to the Project Contact List as well as the Canadian Marine Pilots' Association - Great Lakes Region.
29	**Transportation**	Western Channel	▶ Any changes to the western shipping channel must be consistent with navigational safety standards and take into account all aspects of practical vessel navigation including vessel sizes, including draft and air draft restrictions, changes in channel widths and the length of reaches in the channel. Further, the MEZ must be part of the EA scope to ensure it undergoes a consultative process.	Peer Review of Draft Study Design	▶ Any potential changes to the Marine Exclusion Zone (MEZ) will be determined through the 2015 Master Planning Exercise and Preliminary Runway Design, as they will be directly associated with proposed changes to infrastructure, approach procedures, and obstacle limitation surfaces, which are related to aviation safety. The EA will then assess impacts of any changes to the MEZ on navigation through the marine navigation scope of work. Methods for assessing impacts on navigation are described in Section 3.3.8 of the Study Design, as well as in Appendix B, Attachment A. ▶ As outlined in Appendix B, Attachment A, any proposed or anticipated changes to the Western Channel (including bathymetric changes) associated with the construction of the land mass extension will be reviewed qualitatively for potential effects on boating activities in the vicinity of the Western Channel, including the potential for changes to the number or type of vessels that can be accommodated within the channel at any given time due to potential physical changes to navigation routes.

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	Issue	Sub Issue	Comment	Source	Response
30	**Transportation**	Land Use & Built Form (Approach)	▶ The approach zone characteristics have a substantial impact on aircraft safety as well as vessel safety. Airports have approach glide paths that also require breakaway paths. These can be impacted by vessels navigating near runway ends. Boston approach to 11/22 at Logan from the west is a good example of this. The approaches need to be designed in alignment with the runway so as to minimize impacts on vessels and aircraft.	Peer Review of Draft Study Design	▶ As part of the 2015 Master Planning Exercise, any necessary changes to the existing operations at the airport, including changes to any control surfaces or approach procedures, will be determined. Where changes are anticipated, the impacts of these changes on community assets will be assessed.
31	**Transportation**	Public Safety (Runway Approach Lighting)	▶ We understand that "according to Transport Canada, approach lighting is not a standard for non-precision approaches and the BBTCA is a non-precision approach airport. As such, approach light will not be installed at the airport". Plans should include the potential for new approach lighting that may impact marine navigation channels.	Peer Review of Draft Study Design	▶ According to Transport Canada, approach lighting is not a standard for non-precision approaches and the BBTCA is a non-precision approach airport. As such, approach light will not be installed at the airport. ▶ Section 1.1 of the Study Design notes that PortsToronto is responsible for the provision of services concerning navigation in the port and harbour of Toronto which includes the safe operation of various smaller watercraft under the Navigable Waters Protection Act. The EA proposal will not require in-water approach lighting as the runway approach requirement is not changing, which has been confirmed by Transport Canada and documented in the Study Design in Section 2.1.2. As per EA best practices and standards, this EA will not assess a proposal for in-water approach lighting, which may not ever become a regulatory requirement.
32	**Transportation**	Commercial Vehicles	▶ The BBTCA may expect a significant increase in demand for commercial vehicles, including fuel trucks. The EA should address this issue in detail.	Peer Review of Draft Study Design	▶ The 2015 Master Planning Exercise will identify the potential need for an increase in fuel trucks or other delivery vehicles. The impacts of these changes to vehicles accessing BBTCA will be assessed as part of the Transportation effects assessment study.
33	**Transportation**	Study Area	▶ The study area for the transportation assessment should extend to Fleet Street – Lakeshore Blvd West in the north (the east and west boundary of the area are sufficient). The anticipated increase in passenger volume documented in 2015 Master Plan Exercise will cause proportional increase in demand for ground transportation including transit.	Peer Review of Draft Study Design	▶ Agreed, the Study Area has been extended to include Fleet Street.
34	**Transportation**	Parking	▶ Parking demand at Stadium Rd/Little Norway Crescent parking lot and on the BBTCA grounds should be assessed. Need for structure parking should be assessed.	Peer Review of Draft Study Design	▶ Potential changes to parking demand associated with the proposal will be assessed as part of the Transportation effects assessment study. ▶ Parking facilities are being identified as part of the Bathurst Quay Neighbourhood Study, and will be referenced if available.
35	**Transportation**	Pick up/drop off zone	▶ Demand, operations and functional improvement to the existing passenger pick up/drop off zone should be assessed.	Peer Review of Draft Study Design	▶ This is being assessed as part of the 2015 Master Planning Exercise. ▶ Any changes proposed to passenger pick-up/drop-off facilities identified in the 2015 Master Planning Exercise will be reviewed for traffic or other community impacts as part of the Environmental Assessment.
36	**Transportation**	Construction Impacts	▶ Considering limited accessibility to the BBTCA, there is a need to assess (if only at a conceptual level) construction impacts on area traffic and on passenger access to the airport.	Peer Review of Draft Study Design	▶ Agreed, construction impacts will be assessed as part of the Environmental Assessment.
37	**Transportation**	Transit	▶ Transit accessibility and transit service impacts should be looked at in much more detail. Provision of additional shuttle buses and functional solutions to promote higher transit use are essential to address.	Peer Review of Draft Study Design	▶ Transit facilities are being assessed as part of the Bathurst Quay Neighbourhood Study and will be included in the EA.
38	**Transportation**	Commercial Vehicles	▶ Impact on the commercial vehicle demand and operations should be assessed	Peer Review of Draft Study Design	▶ As noted above, the impacts of potential changes to the number of commercial and other delivery vehicles accessing BBTCA will be assessed as part of the Transportation effects assessment study.
39	**Archaeology & Cultural Heritage**	Underwater Resources	▶ One of the comments from the City of Toronto was that the Heritage Preservation Services staff will review the Stage 1 reports for both land and water areas, but the review found no mention in the Draft Study Design Report of conducting a separate report on the underwater archaeological environment. There is also no discussion of any framework for addressing underwater archaeological resources within the Stage 1 report, except for a brief note in the lists of Information Sources that shipwreck databases will be checked. The potential for there being additional types of archaeological resources offshore is probably significant (given the location of the study area) so the types of underwater archaeological resources being considered should be broadened to include more than just known shipwrecks. This aspect of the study needs to be better addressed, in terms of identifying the many possible types of underwater archaeological resources that could be present and how it will be determined if there is enough potential to warrant an underwater archaeological study at the next stage of investigations.	Peer Review of Draft Study Design	▶ The Study Design has been updated to indicate that a terrestrial and marine Stage 1 Archaeological Assessment will be conducted. ▶ A Stage 1 marine Archaeological Assessment is a review of the potential for underwater archaeological finds.
40	**Archaeology & Cultural Heritage**	Information Sources	▶ The information sources being used for this study should also include First Nations, who often have historical documents, oral histories, and other useful information in their archives to contribute to our understanding of prior uses of the lands within the study area.	Peer Review of Draft Study Design	▶ The Study Team will reach out to First Nation communities for comments on the archaeological and cultural heritage assessments.
▶ **Responses to Peer Reviewer's Section 3.0 Findings of Peer Review of AECOM's Draft Study Design Report**					
41	**Public Consultation and Stakeholder**	First Nations and Metis consultation	▶ More detail should be included with respect to First Nation and Métis consultation, including a list of comments and issues raised.	Peer Review of Draft Study	▶ Section 4.1.7 of the Study Design was updated to reflect that the Mississaugas of the New Credit expressed an interest in the results of the Stage 1 Archaeological Assessment and the cultural heritage summary. ▶ As First Nations and Métis outreach and engagement continues, and official comments or specific issues are raised, these

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	Issue	Sub Issue	Comment	Source	Response
	Engagement			Design	will be documented and made available for review in the draft Environmental Study Report (ESR).
42	**Public Consultation and Stakeholder Engagement**	Part 2 engagement activities	▶ Detail on approximate timing and extent of Part 2 Engagement Activities should be added. (For example, what consultation mechanisms will be used at each decision point).	Peer Review of Draft Study Design	▶ Due to the integrated nature of the various studies being undertaken, the next Public Information Centre (PIC) will take place once all of the studies have been completed so that all of the inputs into the cumulative effects assessment can be obtained and comprehensive cumulative effects can be presented publicly at that time. Currently this is anticipated to take place in the late autumn or early winter of this year. In addition, update meetings with the Stakeholder Advisory Committee (SAC) and Agency Advisory Committee (AAC) will be scheduled as necessary throughout this time as project milestones are reached and feedback is sought on milestones. This additional detail has been added to Section 4.2.
43	**Public Consultation and Stakeholder Engagement**	Reporting	▶ Table 4.1 seems to be out of place in the Draft Study Design Report.	Peer Review of Draft Study Design	▶ A new section called "4.1.8 Consultation Summary" was added to the Study Design which introduces Table 4.1 as a summary of consultation activities undertaken During Phase 1.
44	**Public Consultation and Stakeholder Engagement**	Stakeholder Comments	▶ A summary of comments raised should be added to all subsections within Section 4.1 of the Draft Study Design Report.	Peer Review of Draft Study Design	▶ All comments and summaries of key comments are available on the Project website: http://bbtcarunwayandjetsea.org/
45	**Public Consultation and Stakeholder Engagement**	Master Planning Exercise	▶ There seems to be confusion between what is part of the EA and what is part of the Master Plan and what the public can comment on. In keeping with best practices, we would suggest that the master plan should be open to public comments. This issue was clearly indicated at the June 24th meeting.	Peer Review of Draft Study Design	▶ Comments on the 2015 Master Planning consultation process are outside the scope of the Environmental Assessment, which will not review the Master Planning process. ▶ Section 2.1.5 – Summary of Master Plan, Preliminary Runway Design and Environmental Assessment was added to the Study Design to describe the components of the project that fall under the jurisdiction of each process.
46	**Air Quality**	Study Area	▶ The study area was defined based on locations expected to be most affected by air quality. Since most emission sources associated with the project will be ground-based, maximum concentrations are expected to occur within close proximity to the BBTCA where key areas of concern have already been identified. It should be noted that the combined effect of the BBTCA with other local emission sources (e.g., local road traffic) has the potential to reach areas north of the study area defined in Figure 3-3. This was demonstrated in Appendix E of the Health Impact Assessment completed by Golder Associates in 2013. In other words, the study area does not appear to be large enough to be able to quantify whether or not the combined effect of the project with other local sources will lead to exceedances of ambient air quality criteria in areas to the north of the Gardiner Expressway.	Peer Review of Draft Study Design	▶ The sensitive receptor locations throughout the Study Area were selected to include representative residential, recreational (parks and public spaces) and institutional locations most affected by changes to air quality. These locations were developed in direct consultation with members of the public, stakeholders, and agencies. ▶ Receptors have been added north of the Gardiner to assess changes in air quality in Wards 19 and 20. This increases the overall size of the Study Area. Locations to include Stanley Park and Victoria Memorial Park. These can be seen in Study Design Section 3.3.2.1.
47	**Air Quality**	Study Area	▶ Consideration should be made to extend the study area to the north to the Gardiner Expressway in order to demonstrate that the cumulative effects of the proposed project will not lead to exceedances of ambient air quality criteria in areas to the north of BBTCA (i.e., Wards 19 and 20).	Peer Review of Draft Study Design	▶ Receptors have been added north of the Gardiner to assess changes in air quality in Wards 19 and 20. This increases the overall size of the Study Area. Locations to include Stanley Park and Victoria Memorial Park. These can be seen in Study Design Section 3.3.2.1.
48	**Air Quality**	Study Area	▶ Figure 3-3 identifies receptors of concern related to air quality. It is unclear whether or not these receptors are the only receptors that will be considered in the air quality study, or if this figure is intended to highlight areas of concern identified by stakeholders and community members. If a single receptor is chosen to represent one area (e.g., Ward's Island), then the receptor should be placed at the residence on Ward's Island located closest to the project, not in the middle of the island. This approach will result in a more conservative estimate of air quality concentrations for residents in this area, for example.	Peer Review of Draft Study Design	▶ The yellow dots shown as sensitive receptor points are meant to reflect specific areas of interest placed on a map by members of the community during the January 24 public meeting to present draft work plans. Computer modelling results for all air contaminants and noise metrics of the assessment will be presented for each of these points. The results for a particular point apply equally well to other locations in the vicinity of that point. Therefore, there will be no need to have lots of points in close proximity to each other throughout the Study Area; the dot on Ward's Island represents any location on Ward's Island. ▶ For selected key contaminants and averaging periods, and selected noise metrics, contour maps will be presented that allow the reader to see what the impacts will be at any point in the Study Area, not just those represented by the yellow dots. ▶ Details on methods for air quality modelling can be found in Appendix B.
49	**Air Quality**	Study Area	▶ It is also unclear as to whether a full model receptor grid will be used in the dispersion modelling. A receptor grid is typically used in for the purpose of presenting contour plots of air pollutant concentrations across the entire study area, which aid in the interpretation of model results.	Peer Review of Draft Study Design	▶ The receptor locations have been developed in direct consultation with the public, agencies and stakeholders, who have identified to the study team their key areas of concern throughout the study area. Receptor locations include those in Wards 19 and 20, and north of the Gardiner Expressway, as recommended by the Peer Reviewer. ▶ The model for most of the contaminants will be based on discreet receptors, rather than a grid. However for NOx (which represents the worst case contaminant) the model will be based on a receptor grid of between 0.5 – 1.0km. Modelling this key contaminant in this manner over an averaging time, will allow for the creation of a concentration contour plot to better illustrate spatial variations in predicted contaminant concentrations.
50	**Air Quality**	Background Data	▶ It is understood that background concentrations will be established using the results of the City-wide air quality model which will be validated with monitoring data. While monitoring data for NOx and PM2.5 is readily available for recent years from local Ministry of the Environment and Climate Change (MOECC) and Environment Canada (EC) stations, data for PM10, acrolein, benzene and benzo(a)pyrene are not. It is unclear if the Hanlon's Point Research Station has data for PM10, acrolein, benzene or benzo(a)pyrene.	Peer Review of Draft Study Design	▶ The Hanlon's Point Research Station operated jointly by Environment Canada, the Ministry of the Environment and Climate Change, and the University of Toronto does not collect data for PM10, acrolein, benzene or beno(a)pyrene. The available City-wide models will be provided to RWDI by the City of Toronto. These will be used to characterize background levels for contaminants for which there is little or no ambient monitoring data such as PM10, acrolein and others.
51	**Air Quality**	Background Data	▶ Consideration should be given to using data collected by Metrolinx as part of the Georgetown South Ambient Air Quality Monitoring Program (http://www.gotransit.com /gts/en/monitoring/aamrp.aspx).	Peer Review of Draft Study	▶ Metrolinx monitoring data will be used to supplement ambient air conditions data.

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	Issue	Sub Issue	Comment	Source	Response
			Three stations exist in total. One station is located at 10 Ordance Avenue (about 1 km north of the BBTCA).	Design	
52	**Air Quality**	Selected Contaminants	▶ The study notes that consideration will also be given to chromium. The study design should include the rationale for the selection of these contaminants. It is common practice in transportation projects to consider carbon monoxide (CO) and sulphur dioxide (SO2). These contaminants should be considered in this study or the rationale for their exclusion should be clearly stated.	Peer Review of Draft Study Design	▶ Air contaminants were selected based on a screening exercise whereby the following criteria were applied to the results of the previous Air Quality Assessment for the BBTCA conducted by Golder: - The AAQC is exceeded for the cumulative concentrations (i.e., background and airport (either under existing or proposed future operations)), or if the cumulative concentration is greater than 50% of the AAQC and there is more than a 10% change (with airport either under existing or proposed future operations) from background (i.e., without airport). ▶ The EA will be updating this screening criteria based on Toronto Public Health Threshold Risk Values. CO and SO2 did not meet the~~se~~ screening criteria provided. As such, the results of the screening will be included in the Air Quality Assessment report as rational for exclusion of contaminants.
53	**Air Quality**	Selected Contaminants	▶ The Draft Study Design Report also states that odour and black carbon/soot impacts will be qualitatively assessed. Odour and black carbon are possible to quantify using published emission factors and can also be easily included in dispersion modelling. Given that there is concern from stakeholders about odour and black soot, consideration should be made to include these constituents as part of the quantitative analysis (i.e., emissions estimates and modelling). Otherwise, the study design should clearly describe the rationale for not completing a quantitative assessment.	Peer Review of Draft Study Design	▶ The EA team is not aware of odour emission data for aircraft. Odour emissions from aircraft are likely a result of a mixture of compounds, not a single compound (such as H2S from wastewater treatment operations). The quantification of odour emission rates requires at source sampling and subjecting the samples to an odour panel to determine the number of dilutions to achieve the odour detection limit. Such a program would be very difficult to conduct at an airport, necessitating the need for more of a qualitative approach. Potential changes in odour impacts will be examined in terms of anticipated changes in fuel use, changes in locations of activities relative to wind direction frequencies, etc. This will provide information on how the current odour experience may change in the future, with and without jets. ▶ In January 2014, Toronto Public Health (TPH) informed the Ministry of the Environment and Climate Change (MOECC) that it had received several calls from residents in the vicinity of Eireann Quay regarding unknown particulate material that had been deposited on their balconies. The residents were concerned that this material may be composed of combustion by-products from planes and could impact their health. TPH requested assistance from MOECC in determining the nature of this material and confirming if the material could contain combustion by-products from planes. MOECC staff collected samples to determine the nature of the material. The samples were sent to the Ministry's laboratory for analysis. The results indicated that the material was comprised mainly of fine ground material (dust), paint scrapings, vegetation and fabric fibers. TPH relayed this information to the residents. The MOECC recognizes that there are many possible emissions sources downtown including highways, roads and high-rise construction activities. The Environmental Assessment will refer to the sampling analysis and results conducted by the MOECC and TPH.
54	**Air Quality**	Selected Contaminants	▶ Appendix B of the Draft Study Design Report states that the qualitative assessments of odour and soot will assess “future with jets scenario relative to baseline”. It appears that odour studies of the BBTCA have been previously conducted, while a recent study conducted by the MOECC will be used to establish baseline soot levels. However, the MOECC data set appears to be limited and should be evaluated for its representativeness in establishing baseline soot levels.	Peer Review of Draft Study Design	▶ RWDI is not aware of odour emission data for aircraft. Odour emissions from aircraft are likely a result of a mixture of compounds, not a single compound (such as H2S from wastewater treatment operations). The quantification of odour emission rates requires at source sampling and subjecting the samples to an odour panel to determine the number of dilutions to achieve the odour detection limit. Such a program would be very difficult to conduct at an airport, necessitating the need for more of a qualitative approach. Potential changes in odour impacts will be examined in terms of anticipated changes in fuel use, changes in locations of activities relative to wind direction frequencies, etc. This will provide information on how the current odour experience may change in the future, with and without jets. ▶ Based on a review of dust deposition monitoring programs at larger airports, the value of such a program was deemed to be limited. In the studies reviewed, a marker compound unique to aircraft could not be identified and it was not possible to discern whether the dust was attributable to vehicular traffic or to aircraft activity (Airport Cooperate Research Program ARCP 6, "Research Needs Associated with Particulate Emissions at Airports." 2008). Therefore conclusions of how dust deposition levels may change in future with changes to aircraft activity may be difficult to establish.
55	**Air Quality**	Emission Inventory	▶ It is unclear how vehicle emissions on local roads or ferry emissions will be estimated. The Draft Study Design Report states that United States Environmental Protection Agency (US EPA) models will be used, but does not state which model.	Peer Review of Draft Study Design	▶ Quantify air contaminant emission rates using airport-specific U.S. Federal Aviation Administration and U.S. Air Force model for airport sources and United States Environmental Protection Agency (U.S. EPA) MOVES models to account for vehicle emissions on local roads. Ferry emissions will be determined based on U.S EPA emission factor information.
56	**Air Quality**	Dispersion Modelling	▶ The Draft Study Design Report states that the air quality assessment will “conduct dispersion modelling using a US EPA and MOECC approved model to determine the downwind concentrations of the contaminants…” It does not explicitly state which model will be used (i.e., AERMOD or CALPUFF). It is recommended that the CALPUFF dispersion model be used since CALPUFF is better suited for modelling situations near a large body of water. It would also be consistent with the City-wide air quality study by Golder Associates which used CALPUFF.	Peer Review of Draft Study Design	▶ The air quality assessment will be based on CALPUFF modelling.
57	**Air Quality**	Dispersion Modelling	▶ The modelling period and source of meteorological data should also be included in the Draft Study Design Report. One year is typically acceptable if site-specific meteorological data are used.	Peer Review of Draft Study Design	▶ The modelling will be based on 1-year of meteorological data process using CALMET. Details will be provided in the Air Quality Assessment Report.
58	**Air Quality**	Climate Change	▶ The boundaries of the greenhouse gas inventory are not defined. Since climate change is a global phenomenon, greenhouse gas emissions from aircraft that occur beyond our provincial and national borders should be considered. It is expected that the addition of jets will allow airlines to fly further to an increased number of destination. Therefore, the effect of increased fuel consumption due to longer flight paths should be considered in the greenhouse gas inventory.	Peer Review of Draft Study Design	▶ GHG emissions for both future scenarios (with and without jets) will be estimated using the air quality modelling approach requested by the City of Toronto. This model includes both airport activity and surrounding traffic. The changes in GHG emissions due to the proposal will be compared to relevant benchmarks, such as total GHG emissions from the City of Toronto and the transportation sector. The results will be expressed as total GHG emissions and tabulated for baseline conditions and the future with jets and without jets. Commentary on the significance of the GHG emissions due to the

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					proposal relative to other sources will also be provided. ▶ The GHG emissions associated with longer flight paths may not represent new GHG emissions and, instead, may simply represent passenger travel that is displaced from other airports in the region (Toronto Pearson). Due to such complications, we propose to consider only the local GHG emissions.
59	**Public Health**	Assessment	▶ It is unclear how the existing condition will be evaluated in the EA. From a public health standpoint, it is important that the existing condition be evaluated so that the public understands their current health risks which can then be compared to the future condition. A high level discussion of how health will be addressed in the EA was provided in the study design in various sections. A concern is that the effects assessment does not include the evaluation of public health separately. It seems to be included under the air quality assessment, noise assessment and transportation assessment. However, Section 3.7.2 of the report indicates that the consultant is engaged with the City of Toronto Public Health Department and will continue the assessment methodology provided by the Golder 2013 Health Impact Assessment Report. Given the discussion in Section 3.7.2, it is recommended that a separate public health section, including an appendix be prepared that takes the information from the air quality, noise and transportation assessment and provides an assessment on public health within the EA. This allows for a more transparent evaluation of health effects for public consumption and would help address the public concerns, as noted in their comments.	Peer Review of Draft Study Design	▶ Toronto Public Health has developed and is providing the EA team with toxicity reference values for air quality contaminants for use in the assessment. The results of the air quality assessment will be compared to these reference values as well as Federal and Provincial ambient air quality standards and criteria. ▶ The draft Study Design proposed to assess public health as part of the Noise and Air Quality disciplines. The Study Team has engaged, and continues to engage, Toronto Public Health regarding the criteria to be used for this assessment. As a result of the comments received from, and ongoing discussions with Toronto Public Health, the Study Design has been updated to make public health a separate effects assessment study, as outlined in Section 3.3.3 and in Appendix B, Attachment A of the Study Design. Details of the methods for assessment have been included in Appendix B, Attachment B, and include public health impacts associated with both noise effects and changes to air quality. ▶ Public health reference values will be compared to current (existing conditions) modelled and monitored conditions, as well as the modelled future proposed and baseline future conditions.
60	**Noise**	Review Mechanism	▶ The scope of work for a large-scale noise assessment prepared to support an EA study is typically driven by guidelines developed under the provincial or federal EA Acts (Ontario EA Act or CEAA, as applicable). As noted in the Draft Study Design Report, this project does not trigger a requirement to complete an EA under either the Federal or Provincial EA Acts; however, Toronto City Council has requested that an EA be completed regardless, in order to inform its position on the proposed undertaking. As neither the Provincial nor Federal regulating bodies were officially engaged, it was up to the proponent (PortsToronto) to develop the scope of work with input from the City of Toronto, stakeholders and the public. The proponent opted to design the scope of work based on the Provincial assessment mechanism. ▶ The review mechanism to be employed by the City when rendering a decision on the project from a noise standpoint is unclear.	Peer Review of Draft Study Design	▶ The Noise Exposure Forecast (NEF) is a regulatory requirement under the Tripartite Agreement. Therefore compliance with the NEF requirements is the only metric available to the City to determine if noise levels are acceptable. Nonetheless, the noise modelling proposed to be completed by the EA will also allow for a qualitative assessment of the impacts of noise (as well as other impacts) on people's experiences of living, working, and playing at the Waterfront, as described in the Study Design in Section 3.6. PortsToronto encourages all stakeholders to refer to the outcome of the EA to understand the cumulative effects of the proposal in determining whether or not they feel the proposal is acceptable. ▶ Compliance with the NEF under the Tripartite Agreement will be determined as part of the 2015 Master Planning Exercise. ▶ The EA will review the outcome of the NEF modelling undertaken by the Master Planning team. ▶ Details of noise assessment methods can be found in Appendix B.
61	**Noise**	Assessment Scenarios	▶ The City of Toronto issued a letter to PortsToronto dated June 1st, 2015, outlining a number of issues to be addressed in the EA scope of work. With regard to noise (directly or indirectly), these included a full assessment of existing operations, consideration of a "do nothing" scenario, alteration of the "proposed growth" scenario to be consistent with the caps and phasing framework that was approved by City Council, an assessment of short-term impacts related to engine run-ups, an assessment of indoor noise impacts (including schools), and the application of health-based noise guidelines when evaluating effects of the project. It is assumed that the assessment scenarios will be updated in accordance with the City of Toronto request.	Peer Review of Draft Study Design	▶ PortsToronto has committed to undertaking a number of groundside operational improvements. Regardless of the outcome of the decision on the request to amend the Tripartite Agreement, PortsToronto will undertake traffic monitoring, curbside improvements, including improvements to taxi queuing areas and parking, and noise monitoring. These activities are in direct response to issues that have been raised by the City and the local community, and include a proposed noise barrier for run-up engine testing. These commitments will be incorporated into the assessment of the Future Baseline Scenario. ▶ PortsToronto acknowledges that area and other City residents and visitors have concerns with the current operations at BBTCA, and is committed to addressing these concerns in cooperation with the City of Toronto. All mitigation measures will be reflected in the EA study's consideration of net effects. ▶ The alignment of the scenarios being considered by the EA with the elements of the City's April 1 Council resolution is described in the Study Design in Section 3.1.2. ▶ PortsToronto has committed to completing an EA which will compare the impacts of planned passenger growth permitted under the current Tripartite Agreement and proposed passenger growth with an extension of the main runway and jets. A baseline of operations today will need to be established to extrapolate future conditions. The existing conditions will also be shared publicly. PortsToronto is committed to working with the City to address local community issues (i.e. traffic, noise and complaint response) and has made commitments to groundside and airside operations. ▶ As noted in PortsToronto's March 10, 2014 letter to the City, PortsToronto committed to an interim hourly cap of 20 slots per hour and 2.976 million local passengers "until the updated BBTCA Master Plan has been finalized and/or such caps are no longer necessary to address projected passenger volumes at BBTCA city-side access points." ▶ The EA will assess the impacts of the proposed daily slots and annual passenger volumes outlined in the 2015 Master Planning Exercise, and the impact of those on airport and groundside facilities, as well as the wider Central Waterfront.
62	**Noise**	Criteria	▶ In addition to the City of Toronto comments, the proponent received numerous comments from stakeholders and the public outlining issues of importance that they felt should be part of the noise assessment. These were communicated through public information sessions and feedback received after the 30-day review period of the study design. The noise study design currently lacks the detail required to comment on whether the proposed approach will be sufficient to address the scope of work that has been requested from the City of Toronto, stakeholders and the public. The study design provides a general overview of the noise assessment process (e.g., sources of criteria, models to be used), but does not get into any specifics (e.g., actual criteria to be applied and to which sources of noise).	Peer Review of Draft Study Design	▶ The actual criteria to be used in the assessment are those specified in the regulatory guidelines listed. Some of the criteria are specific numbers, while others need to be determined as part of the assessment. For example, the background sound levels that NPC-300 uses as criteria need to be determined as part of the study. Similarly, the sound levels associated with Health Canada's criteria cannot be determined until some of the study is completed.
63	**Noise**	Measurements	▶ In reviewing the Draft Study Design Report, it was noted that sound levels at schools will be assessed using the indicators Ldn (day-night sound level) and N70 (number of aircraft movement events that exceed 70 dBA); however, the actual criteria to be applied were not stated. The City of Toronto has	Peer Review of Draft Study	▶ The Ldn and N70 are the key metrics identified in the ARCP study. This recent study identifies these metrics as having correlation with learning outcomes in US schools. The metrics will be applied in the same way as the ARCP study so that the model outcome is directly comparable with the study results. Actual flight operations will be used in developing the Ldn;

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			specifically identified that noise impacts at schools should focus on an assessment of indoor environments. The Ldn is a 24-hour community noise exposure indicator that was specifically developed to account for increased noise sensitivity during sleeping hours by penalizing sounds that occur during night-time hours by +10 dB. Therefore, if a source under assessment operates 24 hours, its night-time operations will be penalized by +10 dB in the assessment of impacts. A school does not operate at night, so it is unclear whether night-time contributions from BBTCA will be considered in the assessment at this location. There is potential that this metric could be applied in a way that overstates the baseline ambient conditions (by penalizing the ambient night-time condition) and understate the impact of the source (by assuming its night-time operations are not relevant at this location). This would be an invalid comparison.	Design	however, nighttime flights are not expected to skew the Ldn in consideration of the nighttime flight curfew in place at BBTCA. Because there are no occupants at the school overnight, impacts will not be assessed at the school during unoccupied hours. ▶ Consistent with the ARCP study, background sound is not the comparator for Ldn in the evaluation of school-related sound levels.
64	**Noise**	Indoor Noise	▶ It should be noted that the World Health Organization (WHO) has an indoor guideline limit for noise inside of classrooms of 35 dBA during class hours, which was developed to protect speech intelligibility and message communication, and avoid disturbance of information extraction. The relevance of a 24-hour exposure criteria that was developed specifically to address night-time noise sensitivity is questionable at this location.	Peer Review of Draft Study Design	▶ Consideration will be given to the influence of the nighttime flight curfew. ▶ The WHO classroom criterion will be considered for addition to the scope of work.
65	**Noise**	Vibration	▶ Several public concerns have been raised pertaining to the assessment of low frequency noise, which is not currently addressed in the scope of work. One comment in particular identified that residents have been complaining of rattling windows. Noise-induced vibration should be considered as a potential noise effect of the project. Octave band data from the aircraft manufacturer and/or measurement programs can be compared to published sound pressure thresholds that would be expected to cause excitation of building components if exceeded.	Peer Review of Draft Study Design	▶ The EA Study Team has requested noise profile information from Bombardier. The information requested includes information on low frequency noise generation from the aircraft during various stages of flight, as well as when on the ground. The EA will consider all noise information provided by Bombardier, including low frequency noise, if available. It should be noted that the sound level data required for such an evaluation is not part of the data typically collected for aircraft certification, and would need to be taken at appropriate and representative conditions to be useful for this assessment. PortsToronto and the Study Team continue to work with Bombardier to obtain the data requested.
66	**Noise**	Assessment Approach	▶ The lack of detail in the scope makes it difficult to determine whether public concerns over the modelling scope will be addressed. Several comments convey concern that component operations at the BBTCA will be separated out and assessed individually rather than airport operations being assessed as a whole. For instance, the NEF and INM contours are stated to include only aircraft departure, arrival and flyover; however, taxiing, engine run-up and other supporting operations would occur within the same time period. The scope is not clear on whether the assessment approach will seek to combine the predicted impacts of all activities at the BBTCA in an effort to demonstrate the cumulative noise impact at the sensitive receptor locations when comparing to the health-based criteria requested by the City of Toronto.	Peer Review of Draft Study Design	▶ Appendix B, Attachment A - Work Plans: Measures of Effect and Data Sources indicates that the noise assessment will assess sound levels, including changes in cumulative sound levels between the Future Baseline Scenario and the Proposed Future Scenario. The following sources will be considered: aircraft in the air, on the runways, taxiing; performing run-ups (engine testing); the ferry; ground support equipment; road traffic and light rail transit.
67	**Natural Environment**	Aquatic	▶ The peer review found there was very little detail on the specific methodology they will be used to conduct field studies, so it is difficult to provide specific comments. In a general sense, the coarse scope of work provided by AECOM seems adequate, and we concur with the intent to use TRCA's Habitat and Environmental Assessment Tool (HEAT) to identify impacts, and that mitigation and compensation measures will be recommended for the altered habitat. It is also encouraging that the TRCA supports the study design for this work. In addition, we note the following: ▶ Additional information on the details of the field studies will be required to make a full assessment of the methodology. For example, it is stated that aquatic habitat will be assessed through visual observations. In one of the studies previously conducted at the airport (Dillon 2013), visual observations of aquatic habitat were made by personnel standing on shore. These type of observations provide limited information on the habitat and conditions present and would be inadequate for assessing the entire habitat area within the area of the proposed runway extension. However, if the visual observations will be made with, for example, an underwater camera, that would provide much more detailed and valuable information.	Peer Review of Draft Study Design	▶ The following detail has been added to Appendix B, Attachment A: Aquatic field work investigations included the following: Aquatic habitat conditions within the proposed footprint for the runway extensions were documented through a two-day field investigation with the use of an underwater camera. The purpose of this investigation was to document existing fish habitat conditions including substrate, submerged and emergent aquatic vegetation, and other cover types (e.g. submerged woody debris). ▶ A grid was travelled and sampling sites were recorded. Each location was assigned a unique identification number. A photo was taken and aquatic macrophytes, substrate, and cover were identified at each sample location. ▶ The grid consisted of 29 sample locations on the east die of the runway and 34 on the west. The grid included the 200 m land mass extension plus an additional 30 m. ▶ The camera used was a Go-Pro Hero 3+ outfitted with an underwater light producing 126 lumens. ▶ The hydroacoustic study was performed by the TRCA. The details of the study methodology have been requested from the TRCA for publication in the ESR.
68	**Natural Environment**	Terrestrial	▶ Since the natural environment methodology outlined is not very detailed, the following review comments are based on general methodology, not survey protocols. ▶ The study design is adequate provided it addresses amphibians and reptile surveys. This is not obvious in the design as there is no specific mention of amphibian and reptile surveys and it is not clear if they are included or if they have been completed as part of previous wildlife surveys.	Peer Review of Draft Study Design	▶ AECOM completed a site visit to the BBTCA grounds and reviewed the vegetation communities and any wildlife habitat within 120 m of each runway extension. Generally speaking, there's no amphibian breeding habitat on the grounds and no reptile hibernacula on the current runway or elsewhere on the grounds. ▶ Additionally, AECOM has received fauna records (including reptiles and amphibians) from agencies such as the TRCA and MNRF from the Toronto Islands and Tommy Thompson Park. AECOM also received fauna records from Falcon Environmental. These records are sufficient in providing an understanding of the species present in the BBTCA property.
69	**Socio-Economic Conditions**	General Approach	▶ The Study Design proposes a value based approach. Social assets' have been categorized according to the value placed on them by interested parties and are split into 'use values' and 'non-use values' to be assessed (which are set out in a graphic). "Use values are assets that exist because people use them such as tourism and recreation opportunities" and "Non-use values are aspects of the environment that exist independent of people's use or enjoyment of them". This approach then lists a mixture of activities (such as 'sight-seeing' and 'recreational activities'), indicators (such as 'property values'), concepts (such as 'quality of life') and commercial ventures (such as 'hotels' and 'restaurants') that it is inferred could be affected by the proposed project, and then	Peer Review of Draft Study Design	▶ Agreed.

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			identifies a range of topics for which there may be 'implications' from effects to these things, including: ▶ Government Costs/Revenues; ▶ Employment; ▶ Business Implications; ▶ Business Revenues; ▶ Public Health; ▶ Public Safety; and ▶ Economic Development. ▶ The defined study area for 'non-use values' incorporates the City of Toronto. Non-use values are listed as ▶ preserve future options; ▶ legacy for future generations; and ▶ build Toronto's brand.		
70	**Socio-Economic Conditions**	Social Analysis	▶ The socio-economic study area was expanded based on public input received which will provide a broader area for data collection and, consequently, a broader range of participants. ▶ A greater focus in the current study is placed on the potential impacts to the social environment and the inter-relationships between the City of Toronto, air passengers, local business and waterfront users as it has not been adequately addressed previously. Although we agree, economic impacts and benefits influence planning and decision making and as such are also important and need to be fully understood.	Peer Review of Draft Study Design	▶ Agreed. AECOM is reviewing available studies already completed as well as gathering data from the business and development communities to understand economic impacts and impacts to development trends and property values. ▶ Any implications of the proposal to municipal planning decision-making will be assessed through the inclusion of a qualitative economic assessment of potential costs of infrastructure required by the City, as identified by the Bathurst Quay Neighbourhood Study, as well as the potential impacts on property tax revenues associated with possible changes to property values, if any. ▶ Economic impacts as they relate to local businesses (e.g. effects on customers and potential business volume) and business revenues will also be explored through data collection from business owners and representatives from BIAs to determine the main concerns of those interviewed regarding the impacts of the proposal on business operations.
71	**Socio-Economic Conditions**	Social Analysis	▶ As per AECOM's Draft Study Design report, the data collection will be based predominantly on intercept survey and interviews which will provide important perspective from a wide range of stakeholders. Based on this, we have the following comments: The study design has been adopted to integrate feedback from pubic review, e.g. expansion of the study area to include Ontario Place and extension of data collection (e.g. interviews, surveys) into summer 2015.	Peer Review of Draft Study Design	▶ Correct.
72	**Socio-Economic Conditions**	Data Collection	▶ Has consideration been given to inclusion of seasonal residents residing on boats docked at marinas located within the study area, into either the intercept or pre-arranged interviews?	Peer Review of Draft Study Design	▶ AECOM will conduct interviews with a sample of marinas/boating clubs to assess effects on their members, which may include seasonal residents docked at the marinas. People who have directly requested to be interviewed have been or will be contacted for prearranged interviews. Furthermore, AECOM has scheduled an interview with a stakeholder residing on a boat in the waterfront. ▶ The intercept surveys are also designed to gather information from a variety of users, including residents and boaters. Seasonal residents residing on boats could be captured in either group, but will not be reported on separately. We do not plan to directly solicit seasonal residents residing on boats. Furthermore, telephone surveys of Toronto residents may also capture seasonal residents, though their responses will also not be reported on separately.
73	**Socio-Economic Conditions**	Data Collection	▶ Although stated in the Draft Study Design Report that an attempt will be made to capture input from a variety of users (e.g., users from local neighbourhoods, other Torontonians and residents from inside and outside the Greater Toronto Area (GTA)), it is not clear what this means, how these groups will be targeted and if the objective is a statistical representation.	Peer Review of Draft Study Design	▶ Phone surveys have been designed to reach out to cell phone and land line users across the City of Toronto. This will provide a statistically representative sample of City of Toronto residents both within a local Study Area and in the regional Study Area (as defined in the Study Design). In addition, intercept surveys will aim to obtain responses from visitors to the waterfront who have arrived from throughout the GTA and beyond. The intercept surveys are not statistically representative because their location-specific nature disallows them from being completely random. While anyone in the City of Toronto with a cell phone or land line has the same chance of being called through the phone survey, that is not the case for the intercept surveys, as not everyone in the City has the same chance of being intercepted by our surveyors for in-person intercept surveys. ▶ The intercept surveys will be located in several locations across the Study Area where it is known key receptors reside or participate in activities (as identified by the public and stakeholders). These locations generally include: Ontario Place and surrounding area; locations within Bathurst and Eireann Quays; the Music Garden and surrounding area including Marina Quay West; HTO Park, the Harbourfront Centre, and surrounding areas; Jack Layton Ferry Terminal and surrounding area; locations within East Bayfront; locations within the Distillery Historic District; locations within the Lower Don Lands and the Port Lands; locations within the Port Lands including the Leslie Street Spit; locations within the Toronto Islands. ▶ Every effort will be made to ensure that we assess a spectrum of waterfront experiences and users.
74	**Socio-Economic Conditions**	User Experience - Traffic	▶ The impact assessment on user experience on existing and future use is stated to relate to noise, air quality and quality of life; however, is consideration given to traffic patterns and the potential for increased traffic to/from airport to create increased nuisance and inconvenience to area residents and their quality of life.	Peer Review of Draft Study Design	▶ The socioeconomic effects assessment study will refer to the transportation effects assessment study, which will review the impacts of the proposed changes on traffic congestion, as well as pedestrian safety and access to residences, businesses and amenities within the waterfront area. A qualitative review of potential social or economic impacts associated with potential changes to traffic patterns will be undertaken, as is outlined in Appendix B.
75	**Socio-Economic Conditions**	Data Collection	▶ The key line of inquiry for both the intercept surveys and the pre-arranged surveys were provided in the subsequent information. Based on our review of this information we believe the line of questioning is comprehensive enough to measure and assess the socio-economic impact of the possible future scenarios.	Peer Review of Draft Study Design	▶ Comment noted.
76	**Socio-Economic**	Economic Analysis	▶ The proposed approach to economic effects states, "There have been numerous economic benefit studies linked to airport operations. These studies will be reviewed and analyzed to understand the	Peer Review of Draft Study	▶ Agreed. The economic impact assessment portion of the study will leverage the above existing studies, which have been conducted in a rigorous manner and conform to accepted economic modelling practices. The relevancy of these studies will

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	Conditions		potential incremental economic impacts of the proposal." The studies are listed in Appendix B as follows: ▶ CommunityAIR, 2013. Reviewing Deluce's Jets Proposal: What the City Has (and Hasn't) Done; ▶ Environics Research Group, 2013. Toronto Resident Survey: Billy Bishop Toronto City Airport; ▶ InterVISTAS Consulting, 2012. Billy Bishop Toronto City Airport (YTZ) Economic Impact Study; ▶ HLT Advisory, 2013. Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport.	Design	be commented on in the environmental assessment report as we intend to draw on this body of information as a starting point for our socio-economic assessment. What is absent from all of these studies is the assessment of the potential social impacts related to airport operations, and that is what the socioeconomic effects assessment study will focus on.
77	**Socio-Economic Conditions**	Economic Analysis	▶ As stated in the Draft Study Design Report, it is AECOM's intention to interpret the findings of these reports using inputs gained from interviews with airport related businesses and intercept surveys with airport users. Any claims regarding impacts or benefits in the EA will need to be supported by the existing economic studies. The additional information provided by AECOM through PortsToronto does clarify that potential displacement impacts will be considered. The AECOM review will include an assessment of the conclusions to determine if the economic study included the influence of Pearson International Airport. Interviews with the Greater Toronto Airport Authority (GTAA) to collect data on long term capacity capabilities and long-term plans for regional air travel have also been identified.	Peer Review of Draft Study Design	▶ Any claims regarding impacts or benefits in the EA will be supported, in part, by the existing economic studies. ▶ The existing economic studies were developed using an Input/Output modelling methodology which conforms to accepted economic impact assessments of this nature. The economic multipliers resulting from these studies enable the scaling of economic impacts according to alternative projected passenger volumes in a linear manner. ▶ In addition to the above, information will be gathered from a sample of BBTCA users and local (Study Area) businesses that will allow further assessment of economic effects. Some of the key lines of inquiry that enable the interpretation of previous findings and the projection of effects on businesses and the City of Toronto include the following: 1. Propensity of BBTCA users to use Pearson if flights not available, 2. Influence of the waterfront on the function and operation of local businesses – either positive or negative; 3. Influence of the current BBTCA on the function and operation of local businesses – either positive or negative; 4. Anticipated construction and operational effects of the proposed expansion on the function and operation of local businesses ▶ These qualitative questions allow the identification of potential directional effects (either positive, negative or neutral effects) of the proposal on business activity in the area, including effects on business expansion/investment intentions and on business customers.
78	**Socio-Economic Conditions**	Cumulative Net Effects Methodology	▶ Section 3.4 states that, "The cumulative net effects of the proposed future scenario on community assets will be compared to the cumulative net effects of the permitted future scenario on community assets". However, there is no methodology outlined for how cumulative effects will be assessed.	Peer Review of Draft Study Design	▶ The proposed methods for assessing cumulative effects are adapted from CEAA guidelines, and are described in Section 3.4 of the Study Design.
79	**Socio-Economic Conditions**	Cumulative Net Effects Methodology	▶ Appendix B, page ii – Section 2 in the table – Land Value assessment and investment generation are missing from the list of assets.	Peer Review of Draft Study Design	▶ Property values are listed in this section, as are municipal implications, which include the indicators of municipal expenditures and property taxes. Property values will be determined through two mechanisms: 1. the market value of parcels 2. the potential value of future development on vacant land both will be assessed as described in Appendix B Attachment A under the socioeconomic effects assessment scope of work.
80	**Socio-Economic Conditions**	Study Area Definition	▶ Appendix B page 4, 3rd paragraph – Study Area definition should also consider journey times to the development area alongside travel patterns.	Peer Review of Draft Study Design	▶ The scope of the study does not assess regional impacts or looks to address how the proposed works will affect other airports within the GTHA, or visa versa as regional travel studies and journey time analyses are currently being undertaken by the GTAA. The GTAA studies are standalone studies. The EA will include a review of available regional travel information, as well as data collection and analysis from the GTAA.
81	**Land Use and Built Form**	Waterfront Revitalization	▶ The land use policies and efforts of particular importance to the proposed airport expansion is Waterfront Toronto's revitalization efforts. The study design currently does not specifically reference this important work. We recommended the scope of the EA expand to include the assessment of the potential of the proposed future expansion scenario to influence waterfront revitalization efforts, and elevating waterfront revitalization to a separate discipline for study. Recognizing the airport is only one component of the waterfront, how will its expansion potentially impact the balance of other waterfront land uses? Based on the subsequent information provided by AECOM through PortsToronto, it appears the key line of questioning during the intercept and pre-arranged interviews would result in qualitative data applicable to this assessment.	Peer Review of Draft Study Design	▶ The EA will assess impacts on revitalization efforts through two mechanisms: 1) any changes in airport operations will be assessed for their potential impacts on building heights, and consequently gross floor area (GFA) and density; and 2) the interest amongst those in the land development and real estate community in undertaking redevelopment projects will be assessed through direct, qualitative interviews. ▶ The method proposed for understanding potential impacts on the balance of uses and users in the Waterfront area is described in Section 3.6 of the Study Design.
82	**Marine Physical Conditions and Water Quality**	Water Quality	▶ The consultant thoroughly discussed methods to assess impact on water quality, however, there is no obvious discussion on how the consultant will control stormwater (100 year storm). What method of containing the stormwater will be used to ensure at least 90% removal of solids?	Peer Review of Draft Study Design	▶ This environmental assessment will review the impacts of proposed works, including any design details for the conveyance or treatment of storm flows. Should the storm conveyance and treatment design be found to be deficient, in that it does not meet regulatory requirements, AECOM will highlight this and recommend mitigation measures.
83	**Transportation**	Safety	▶ Due to the fact that an airport expansion is being proposed in a very high population density zone, there is concern that safety is not being adequately covered, including analysis of: ▶ impacts of runway overrun by aircraft; ▶ crash location model; ▶ crash consequence model; ▶ calculated increase in potential death and injury by allowing jets to fly, and the rate of increase based on volume of traffic. This is a valid and critical factor related to accidents in the water and revised plans need to be addressed before new aircraft are introduced.	Peer Review of Draft Study Design	▶ Section 3.7.1 has been updated to explain how collision and other flight risks are accounted for in all airport design, and therefore will be addressed as part of the 2015 Master Planning Exercise and Preliminary Design work. ▶ Section 3.1 lists the proposed changes that will be assessed for impacts. These changes were developed as part of the 2015 Master Planning Exercise, and include any changes to the protection surfaces developed under ICAO guidelines (such as the Obstacle Limitation Surface and the Missed Approach Surface).
84	**Transportation**	Master Planning	▶ The 2015 Master Planning Exercise must address public safety considerations such as the above as part of the Transport Canada regulations that guide airport design and operation (such as TP312 –	Peer Review of Draft Study	▶ As per the April 1, 2014 request from Toronto City Council, PortsToronto is undertaking an exercise to identify the design details of the proposed 200 metre land mass extension at each end of the main runway. The preliminary runway design will

C3: Comments Received from the Peer Reviewer on the Draft Study Design

	Issue	Sub Issue	Comment	Source	Response
		Exercise	Aerodrome Standards and Recommended Practices), and that the runway design be prepared in accordance with these safety standards.	Design	be based on the requirements of TP312 4th Edition, as it has been the standard in force throughout the past 12 months of design activities. TP312 5th Edition has been released and is set to come into force on September 15th, 2015. It has been confirmed by Transport Canada that airports that have begun runway design and construction under TP 312 - 4th Edition, can continue to plan and build to this Edition standard, in accordance with the details laid out in Transport Canada Advisory Circulars. Further, airports already in the design process may consider the merits of the two versions according to what best suits the airport's unique needs. In addition, airports that may not meet the time limitations set out in Transport Canada Advisory Circulars may be given a favourable consideration on a case by case basis, and granted a ministerial exemption to continue to build to the TP 312 - 4th Edition.
85	**Transportation**	Marine Exclusion Zone (MEZ)	▶ It was suggested at a Citizen's Advisory Meeting that the Canadian Coast Guard (CCG) should be contacted regarding the Marine Exclusion Zone that accompanies the proposed runway, especially because it extends far into the harbour and will restrict marine traffic. The Toronto Harbour is an important site for sailing and other boating activities as well as commercial traffic. No reference to making contact with CCG has been included in the Draft Design Study Report. This is a valid point. CCG needs to be included due to potential changes in the ATONS (Aids to Navigation). We recommend also including / consulting with PortsToronto personnel, any other affected marine pilot agencies, commercial operations, Navigation Canada if required, and Toronto Polices Services Marine Unit.	Peer Review of Draft Study Design	▶ The Canadian Coast Guard will be added to the Project Contact List as well as the Canadian Marine Pilots' Association - Great Lakes Region. PortsToronto personnel and Navigation Canada have been, and will continue to be consulted throughout assessment activities. The Toronto Police Services is on the Project Contact List.
86	**Transportation**	Marine Exclusion Zone (MEZ)	▶ City Council directed "that any of the requested studies to be conducted exclude any consideration of either a runway or an extension of the Marine Exclusion Zone as currently configured, that would materially encroach upon the western shipping channel. This topic has been placed in the Master Planning Exercise, which has no consultative process, rather than in the "Environmental Assessment of Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport". The Toronto Boaters' Alliance believes public input essential on this topic. This is a valid point. The changes must be consistent with navigational safety standards and take into account all aspects of practical vessel navigation including vessel sizes, including draft and air draft restrictions, changes in channel widths and the length of reaches in the channel. Further, the MEZ must be part of the EA scope to ensure it undergoes a consultative process.	Peer Review of Draft Study Design	▶ Any potential changes to the Marine Exclusion Zone (MEZ) will be determined through the 2015 Master Planning Exercise and Preliminary Runway Design, as they will be directly associated with proposed changes to infrastructure, approach procedures, and obstacle limitation surfaces, which are related to aviation safety. The EA will then assess impacts of any changes to the MEZ on navigation through the marine navigation scope of work. Methods for assessing impacts on navigation are described in Section 3.3.8 of the Study Design, as well as in Appendix B, Attachment A. ▶ As outlined in Appendix B, Attachment A, any proposed or anticipated changes to the Western Channel (including bathymetric changes) associated with the construction of the land mass extension will be reviewed qualitatively for potential effects on boating activities in the vicinity of the Western Channel, including the potential for changes to the number or type of vessels that can be accommodated within the channel at any given time due to potential physical changes to navigation routes.
87	**Transportation**	Land Use & Built Form (Approach)	▶ The following was asked as part of the 30-day review process: "Should there not be an official cut-off minimum angle for approaching aircraft into BBTCA coming in over the waters of Lake Ontario and the Toronto Harbour? If there is a minimum approach angle in place and if it is/has been breached at BBTCA; why has it not been enforced?" ▶ The approach zone characteristics have a substantial impact on aircraft safety as well as vessel safety. Airports have approach glide paths that also require breakaway paths. These can be impacted by vessels navigating near runway ends. Boston approach to 11/22 at Logan from the west is a good example of this. The approaches need to be designed in alignment with the runway so as to minimize impacts on vessels and aircraft.	Peer Review of Draft Study Design	▶ As part of the 2015 Master Planning Exercise, any necessary changes to the existing operations at the airport, including changes to any control surfaces or approach procedures, will be determined. If changes are anticipated, the impacts of these changes on community assets will be assessed through the EA.
88	**Transportation**	Public Safety (Runway Approach Lighting)	▶ The following was noted in the comments of the 30-day review period: "The EA ignores safety recommendations (TP312) on runway approach lighting ("Transport Canada didn't make us do it. Safety issues need to be addressed." We understand that "according to Transport Canada, approach lighting is not a standard for non-precision approaches and the BBTCA is a non-precision approach airport. As such, approach light will not be installed at the airport". Plans should include the potential for new approach lighting that may impact marine navigation channels. ▶ The following was also recorded as one of the comments received during the 30-day review period: Lack of consideration of approach lighting – The requirements for runway approach lighting are substantial in that the lighting arrays are specified as being from 420 metres to 720 metres in length extending from each end of the runway. Such lighting arrays, now or at any time in the future, would be devastating to the Inner Harbour and would make use of the Western Gap impossible. If such lighting could ever be demanded in order to maintain or meet future requirements, or to satisfy demands in the future for greater safety at BBTCA, then they should be studied. ▶ As per above, plans should include the potential for new approach lighting that may impact marine navigation channels.	Peer Review of Draft Study Design	▶ According to Transport Canada, approach lighting is not a standard for non-precision approaches and the BBTCA is a non-precision approach airport. As such, approach light will not be installed at the airport. ▶ Section 1.1 of the Study Design notes that PortsToronto is responsible for the provision of services concerning navigation in the port and harbour of Toronto which includes the safe operation of various smaller watercraft under the Navigable Waters Protection Act. The EA proposal will not require in-water approach lighting as the runway approach requirement is not changing, which has been confirmed by Transport Canada and documented in the Study Design in Section 2.1.2. As per EA best practices and standards, this EA will not assess a proposal for in-water approach lighting, which may not ever become a regulatory requirement.
89	**Transportation**	Commercial Vehicles	▶ The BBTCA may expect a significant increase in demand for commercial vehicles, including fuel trucks. The EA should address this issue in detail.	Peer Review of Draft Study Design	▶ The 2015 Master Planning Exercise will identify the potential need for an increase in fuel trucks or other delivery vehicles. The impacts of these changes to vehicles accessing BBTCA will be assessed as part of the transportation effects assessment study. This will include potential increases in vehicles accessing the site during construction activities.
90	**Transportation**	Study Area	▶ The study area for the transportation assessment should extend to Fleet Street – Lakeshore Blvd West in the north (the east and west boundary of the area are sufficient). The anticipated increase in	Peer Review of Draft Study	▶ Agreed, the Study Area has been extended to include Fleet Street.

C3: Comments Received from the Peer Reviewer on the Draft Study Design

	Issue	Sub Issue	Comment	Source	Response
			passenger volume documented in 2015 Master Plan Exercise will cause proportional increase in demand for ground transportation including transit.	Design	
91	**Transportation**	Parking	▶ Parking demand at Stadium Rd/Little Norway Crescent parking lot and on the BBTCA grounds should be assessed. Need for structure parking should be assessed.	Peer Review of Draft Study Design	▶ Parking facilities are being identified as part of the Bathurst Quay Neighbourhood Study.
92	**Transportation**	Pick up/drop off zone	▶ Demand, operations and functional improvement to the existing Passenger Pick up/drop off zone should be assessed.	Peer Review of Draft Study Design	▶ This is being assessed as part of the 2015 Master Planning Exercise. ▶ Any changes proposed to passenger pick-up/drop-off facilities identified in the 2015 Master Planning Exercise will be reviewed for traffic or other community impacts as part of the Environmental Assessment.
93	**Transportation**	Construction Impacts	▶ Considering limited accessibility to the BBTCA, there is a need to assess (if only at a conceptual level) construction impacts on area traffic and on passenger access to the airport.	Peer Review of Draft Study Design	▶ Agreed, construction impacts will be assessed as part of the Environmental Assessment.
94	**Transportation**	Transit	▶ Transit accessibility and transit service impacts should be looked at in much more detail. Provision of additional shuttle buses and functional solutions to promote higher transit use are essential to address.	Peer Review of Draft Study Design	▶ Transit facilities are being assessed as part of the Bathurst Quay Neighbourhood Study and all relevant information available from the Neighbourhood Study will be included in the EA.
95	**Transportation**	Commercial Vehicles	▶ Impact on the commercial vehicle demand and operations should be assessed.	Peer Review of Draft Study Design	▶ As noted above, the impacts of potential changes to the number of commercial and other delivery vehicles accessing BBTCA will be assessed as part of the transportation effects assessment.
96	**Archaeology & Cultural Heritage**	Cultural Heritage Features	▶ Three main areas will need to be addressed to enhance the study design: Their definition of a "cultural heritage feature" should be revised and broadened to include all the types of cultural heritage resources that are defined in the Ontario Heritage Act, rather than just buildings or landscapes that are listed in a provincial or federal heritage database (which is what this study says it is using as its definition of a cultural heritage feature or asset). There is a checklist document used by the Ministry of Tourism, Culture and Sports (MTCS) called "Screening for Impacts to Built Heritage and Cultural Heritage Landscapes" which states that both known and potential cultural heritage resources need to be identified. Examples of these kinds of resources include: ▶ residences older than 40 years; ▶ industrial, commercial or institutional buildings; ▶ engineering works; ▶ parks, gardens, or prominent natural features that could have special value to people. If a resource meets the criteria in Ontario Regulation 9/06 under the Ontario Heritage Act, it is a cultural heritage resource.	Peer Review of Draft Study Design	▶ The assessment of cultural heritage features has been updated to include the definition provided by the Peer Reviewer.
97	**Archaeology & Cultural Heritage**	Cultural Heritage Features	▶ One of the comments from the City of Toronto was that the Heritage Preservation Services staff will review the Stage 1 reports for both land and water areas, but the review found no mention in the Draft Study Design Report of conducting a separate report on the underwater archaeological environment. There is also no discussion of any framework for addressing underwater archaeological resources within their Stage 1 report, except for a brief note in the lists of Information Sources that shipwreck databases will be checked. Again, the potential for there being additional types of archaeological resources offshore is probably significant (given the location of the study area) so the types of underwater archaeological resources being considered should be broadened to include more than just known shipwrecks. This aspect of the study needs to be better addressed, in terms of identifying the many possible types of underwater archaeological resources that could be present and how it will be determined if there is enough potent al to warrant an underwater archaeological study at the next stage of investigations.	Peer Review of Draft Study Design	▶ The Study Design has been updated to indicate that a terrestrial and marine Stage 1 Archaeological Assessment will be conducted. ▶ A Stage 1 marine Archaeological Assessment is a review of the potential for underwater archaeological finds.
98	**Archaeology & Cultural Heritage**	Information Sources	▶ The information sources being used for this study should also include First Nations, who often have historical documents, oral histories, and other useful information in their archives to contribute to our understanding of prior uses of the lands within the study area. Many First Nations are now asking archaeological and cultural heritage consultants to contact them in this regard so that they can contribute to the background research stage of assessments and other heritage studies.	Peer Review of Draft Study Design	▶ The Study Team will reach out to First Nation communities for comments on the archaeological and cultural heritage assessments.

Appendix B-1

Response Letter from the MOECC

Ministry of the Environment and Climate Change

Environmental Approvals Branch

2 St. Clair Avenue West
Floor 12A
Toronto ON M4V 1L5
Tel.: 416 314-8001
Fax: 416 314-8452

Ministère de l'Environnement et de l'Action en matière de changement climatique

Direction des autorisations environnementales

2, avenue St. Clair Ouest
Étage 12A
Toronto ON M4V 1L5
Tél : 416 314-8001
Téléc. : 416 314-8452

Ontario

December 15, 2014

K.A. Lundy, PEng
Director, Infrastructure, Planning and Environment
Toronto Port Authority
60 Harbour Street
Toronto ON M5J 1B7

Dear K.A. Lundy:

Thank you for your letter dated December 9, 2014, concerning the Toronto Port Authority's proposed runway extension at the Billy Bishop Toronto City Airport.

In your letter, you have requested that the Ministry of the Environment and Climate Change confirm the applicability of the provincial Environmental Assessment Act (EAA) to the proposed runway extension at the Billy Bishop Toronto City Airport.

As the operation and expansion of airports is the Federal government's responsibility, the Province of Ontario has no jurisdiction under the EAA and accordingly, there are no requirements under the EAA for the proposed extension of the airport's runway.

The ministry is aware that the Toronto Port Authority is pursuing an environmental study process as per a request made by the City of Toronto to assess the potential environmental, social and economic effects of the project. However, this study is not being carried out under the requirements of the EAA.

I trust this responds to your inquiry satisfactorily.

Yours sincerely,

Agatha Garcia-Wright
Director
Environmental Approvals Branch

Cc: Geoffrey Wilson, President and Chief Executive Officer, Toronto Port Authority
Dolly Goyette, Director, Central Region, Ontario Ministry of the Environment and Climate Change

AECOM

Appendix B-2

Response Letter from the CEAA

Canadian Environmental Assessment Agency
Agence canadienne d'évaluation environnementale

Ontario Region
55 St. Clair Avenue East,
Room 907
Toronto ON M4T 1M2

Région de l'Ontario
55, avenue St. Clair Est,
pièce 907
Toronto ON M4T 1M2

RECEIVED MAR 03 2015

February 25, 2015

Sent by mail

K.A. Lundy
Director, Infrastructure, Planning and Environment
PortsToronto
60 Harbour Street
Toronto, Ontario M5J 1B7

Dear Mr. Lundy:

Re: Information on the *Canadian Environmental Assessment Act, 2012*

Thank you for your correspondence of December 17, 2014 regarding PortsToronto's proposed runway extension at the Billy Bishop Toronto City Airport.

As part of the Government of Canada's plan for Responsible Resource Development, the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) focuses federal environmental reviews on projects that have the potential to cause significant adverse environmental effects in areas of federal jurisdiction.

The CEAA 2012 applies to projects described in the *Regulations Designating Physical Activities* (the Regulations). Based on the information provided to the Canadian Environmental Assessment Agency (the Agency), your project is not described in the Regulations. Should any components of your project change, kindly contact the Agency.

Since the Project will be carried out in part on federal lands, the Agency would like to remind you of requirements pursuant to Section 67 of CEAA 2012:

67. An authority must not carry out a project on federal lands, or exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a project to be carried out, in whole or in part, on federal lands, unless

(*a*) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or

(*b*) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides that those effects are justified in the circumstances under subsection 69(3).

.../2

PortsToronto is encouraged to contact Transport Canada officials to discuss and ensure compliance with obligations pursuant to Section 67 of CEAA 2012.

The Agency, in collaboration with several federal departments, has prepared guidance to help federal authorities discharge their obligations under Section 67 of CEAA 2012. This guidance is available on the Agency's website: https://www.ceaa-acee.gc.ca/default.asp?lang=en&n=6E01A733-1&offset=&toc=hide

If you have any questions, please get in touch with our office through the switchboard at 416-952-1576.

Sincerely,

Anjala Puvananathan
Regional Director, Ontario Region

c.c: Geoffrey Wilson, President & Chief Executive Officer, PortsToronto
Monique Mousseau, Regional Manager, Environment and Engineering, Transport Canada

AECOM

Appendix C-1

Air Quality Effects Assessment

Tel: 519.823.1311
Fax: 519.823.1316

RWDI AIR Inc.
600 Southgate Drive
Guelph, Ontario, Canada
N1G 4P6

CONSULTING ENGINEERS & SCIENTISTS

CANADA'S BEST MANAGED COMPANIES Platinum member

Billy Bishop Toronto City Airport (BBTCA)

Toronto, Ontario

Report

Air Quality Assessment

RWDI #1402032
April 25, 2017

SUBMITTED TO:

Marc Rose, MES, MCIP, RPP
Senior Environmental Planner
Marc.Rose@aecom.com

AECOM Canada Ltd.
105 Commerce Valley Drive
Suite 700
Markham, ON L3T 7W3

SUBMITTED BY:

Sharon Schajnoha, P.Eng.
Senior Project Manager, Associate
Sharon.Schajnoha@rwdi.com

Mike Lepage, M.Sc., ACM, CCM
Project Director, Principal
Mike.Lepage@rwdi.com

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1. INTRODUCTION

RWDI AIR Inc. (RWDI) was retained by AECOM to conduct an air quality assessment of the Billy Bishop Toronto City Airport (BBTCA). The BBTCA is currently operated by PortsToronto and is governed by a "Tripartite Agreement" between the City of Toronto, PortsToronto (formerly known as the Toronto Port Authority), and the Government of Canada. This agreement currently includes a ban on jet aircraft, the expansion of existing runways, and the construction of new runways.

PortsToronto is seeking approval to expand the existing runway and to permit commercial jet aircraft. The purpose of this study is to assess the impact of the proposed expansion of the airport on the local air quality in the region. The project's contribution to Greenhouse Gas Emissions (GHGs, expressed as CO_{2e}) is also assessed.

2. PROJECT DESCRIPTION

The BBTCA is located on Toronto Island, in Downtown Toronto. The existing operations of the airport accommodate approximately 3.8 million passengers per year and about 202 commercial flights per day with the Q400 turboprop aircraft.

Some of the key activities concerning air quality occurring at the BBTCA include:

- Aircraft operations (landings, take-offs, taxiing, and idling)
- Ground support equipment movements including aircraft refueling;
- Ferry crossings; and,
- Passenger pick-up, drop-off and vehicle parking operations.

The proposed expansion to the BBTCA includes:

- An increase in the number of flight passengers and the associated airport activity;
- The introduction of the commercial CS100 jet aircraft; and,
- The extension of the existing runway by 200 m on each end.

3. ASSESSMENT METHODOLOGY

3.1 Legislative Framework

As the BBTCA is regulated by a tripartite agreement, it does not fall within a specific jurisdiction with respect to being required to follow any air quality environmental assessment requirements. This air quality assessment generally follows the guidance provided by the Ontario Ministry of Transportation for air quality assessments of transportation projects in Ontario. The guidance requires analysis of contaminant concentrations at worst-case residences or other locations of concern (schools, hospitals, etc.), both under existing conditions as well as for potential future scenarios with and/or without the project in place. The guidance also requires consideration of both the impact from the project as well as background concentrations from other unrelated sources.

3.2 Overview of Approach

As contaminants are emitted from a source, the emissions will drift downwind and disperse as they travel. The degree to which the contaminants disperse depends on the weather-related factors, such as wind speed and amount of turbulence.

There are a number of approaches to determine the downwind concentrations. The most direct approach is to measure specific air contaminant levels through an ambient monitoring program. This approach is useful when multiple ambient monitoring stations are set up both upwind and downwind of key sources, such as an airport, so that the influence of the sources can be established. Ambient monitoring, however, cannot be used where future air quality is of interest. In these situations, a computer simulation that predicts the dispersal of air contaminants as they drift away from the sources can be used. These simulations are referred to as dispersion models.

This assessment uses a combined approach where monitored concentrations from several locations around the city of Toronto are used to represent general background levels of air contaminants, and computer dispersion modelling is used to predict the additional impact from sources related to the BBTCA, and other major local sources such as main roadways in the vicinity.

Once air contaminant concentrations are established through ambient monitoring and dispersion modelling, the levels are compared to health risk thresholds, described further in the section below.

Toronto Public Health (TPH) has compiled a list of 39 different contaminants of concern, including a selection of criteria air contaminants, metals, and organic compounds. This full list of contaminants was considered in this assessment, however most of these contaminants were screened out early in the analysis and a short list of seven key contaminants was included in the detailed modelling.

3.3 Contaminant Thresholds and Risk Factors

To assess whether or not certain contaminants are of significant risk, the maximum modelled or monitored concentrations are compared against contaminant-specific thresholds. In general, if the concentration of an airborne contaminant can be maintained below its threshold, then either no health effect is observed or the effect is small enough that it presents an acceptably low risk to the population and the environment. Thresholds have been set by various jurisdictions, but they are generally comparable.

The Province of Ontario has established criteria for concentrations of airborne contaminants. The Ambient Air Quality Criteria (AAQC's) are effects-based levels in air, based on health and/or other effects. They are used in environmental assessments, special air monitoring studies, and assessments of general air quality to determine the potential for adverse effects.

In addition to provincial AAQC's, the Federal Government has established Canadian Ambient Air Quality Standards (CAAQS). These are health-based air quality objectives for pollutant concentrations in outdoor air. These objectives are being phased in, with the final and most stringent objective becoming active in the year 2020. Since these assessments also concern future concentrations, they typically use the most stringent 2020 CAAQSs as the relevant objectives, as is the case here.

Toronto Public Health (TPH) has also compiled a list of contaminants of concern along with acute and chronic Toxic Reference Values (TRVs). The acute TRVs are for short-term (8-hour or 24-hour) concentrations, and the chronic TRVs are for long-term (annual) concentrations. Many of these TRVs are based on the Ontario AAQC or the Federal CAAQS values, but others are based on other sources such as the World Health Organization (WHO), or the Agency for Toxic Substances and Disease Registry (ATSDR).

The TRVs compiled by TPH were primarily used in this assessment unless one was not listed for a particular contaminant, in which case the Ontario AAQC or the Federal CAAQS was used.

In addition to the TRVs, TPH also provided unit risk factors for 23 of these contaminants. The unit risk factors represent the increased cancer or premature mortality risk associated with an increase in concentration by 1 µg/m^3. These values were used in the screening process described below to help identify the contaminants of significant risk.

3.4 Contaminants Assessed

Like most other forms of transportation, aircraft emissions include inorganic gases (carbon monoxide, oxides of nitrogen, and sulphur dioxide), airborne particles (particulate matter or PM), organic gases (i.e., volatile organic compounds), various trace metals found within the PM, and a class of organic compounds that is mainly associated with the PM (polycyclic aromatic hydrocarbons or PAH's). In order to conduct a thorough air quality assessment, all contaminants associated with the Project operations must be considered. However, the detailed modelling can be limited to a selection of key contaminants that serve as benchmarks or surrogates for all of the contaminants. Related contaminants can be grouped together and be represented by "worst-case" representative(s).

Toronto Public Health (TPH) highlighted a list of 39 contaminants of concern that have been assigned a specific TRV with respect to either chronic or acute exposure. TPH also provided unit risk factors for 23 of these contaminants.

Contaminants were included in the detailed modelling assessment if they had available aircraft emissions data, and they were found to be a worst-case representative in their group in terms of their aircraft emissions relative to their TRV or unit risk factor. The worst-case representative contaminant in each group was the one with the highest ratio of emission rate to TRV, considering TRV's for both acute and chronic exposures, and/or the highest product of emission rate and unit risk factor. In most cases there was one contaminant from each group that appeared to be significantly higher risk than the others in the same group, but if more than one contaminant appeared to be of similar risk, then more than one contaminant from each group was selected. Further details showing the screening results are included in Appendix A.

Table 1 shows the groups of contaminants and the worst-case representative(s) of each group that were included in the detailed modelling assessment, along with their relevant TRV.

Table 1: Worst-Case Contaminants Included in the Detailed Modelling Assessment

Contaminant Group	Worst-Case Representative(s)	TRV ($\mu g/m^3$)	Unit Risk Factor (person/($\mu g/m^3$))
Inorganic Gases	Nitrogen Dioxide	200 (24-hr); 40 (annual)	7.48E-04
	Carbon Monoxide	6000 (8-hr)	1.90E-03
Particulate Matter	$PM_{2.5}$	27 (24-hr); 8.8 (annual)	6.76E-03
Organic Gases	Acrolein	0.4 (24-hr); 0.02 (annual)	N/A
	Benzene	29 (24-hr); 3 (annual)	2.90E-05
Metals	Cadmium	0.03 (24-hr)	9.80E-03
Polycyclic Aromatic Hydrocarbons	Benzo(a)Pyrene (BaP)	0.00001 (annual)	8.70E-02

Members of the public specifically raised health concerns about chromium VI, however, aircraft emissions of chromium VI are not available. Cadmium is used in this study as a representative for all metals, including chromium VI. In addition to concerns about potential human health effects, members of the public also raised concerns about nuisance effects from aircraft emissions. Specifically, the concerns were about soot and odours. These potential nuisance effects were not assessed by means of dispersion modelling, but were evaluated qualitatively. The approach used to evaluate soot and odours is discussed further in Section 3.14.

Greenhouse gases were also assessed, but unlike the contaminants listed above, it is the total emissions of greenhouse gases that are of concern, and not local concentrations. Therefore, greenhouse gases are not compared to threshold concentrations, but rather the total annual emissions of greenhouse gases from the airport with and without the expansion in place is compared against the total Ontario emissions of greenhouse gases from specific sources, such as from roadways, or total air transport.

3.5 Atmospheric Chemical Transformations

Once emitted, pollutants can chemically react in the atmosphere to form other compounds. Pollutants emitted directly from a source are known as primary pollutants, whereas other pollutants that may be formed from chemical reactions in the atmosphere are known as secondary pollutants. With the exception of nitrogen dioxide as described below, this assessment only considers primary pollutants and does not consider any chemical transformations. Chemical transformation of contaminants is in general a fairly slow process and is not significant at local scale.

The analysis of nitrogen dioxide (NO_2) is an exception. Emissions from combustion sources, such as from aircraft exhausts emit both nitrogen oxide (NO) and nitrogen dioxide (NO_2). Together these two pollutants are referred to as nitrogen oxides (NOx). Once emitted, NO quickly reacts with ozone (O_3) to form NO_2. The concentration of NO_2 therefore depends on the amount of O_3 present in the atmosphere. The ozone limiting method (OLM) is used to estimate this conversion.

The OLM assumes that the conversion of NO to NO_2 is limited only by the amount of O_3 present in the outside air. If the concentration of available O_3 (ppm) is less than that of the NO contributed by the modelled emissions, then the portion of NO that is converted to NO_2 equals the available O_3. On the other hand, if the concentration of available O_3 exceeds that of the NO contributed by the modelled emissions, then all of the NO is converted to NO_2. A variable concentration of O_3 was used in the OLM, based on historical monitoring data as described below.

3.6 Scenarios Assessed

This assessment considered three scenarios:

1. Current Conditions – year 2012
2. Future No-Build (without the expansion in place) – year 2032
3. Future Build (with the expansion in place) – year 2032

The Current Conditions scenario is included for reference purposes. The potential impact of the proposed expansion on air quality is assessed through the comparison of the Future-Build to the Future No-Build Scenarios.

3.7 Study Area

The study area along with the 50 receptor locations where the contaminant concentrations were assessed is shown in Figure 1. It covers approximately a 12 km long section of the Toronto waterfront, extending from the Toronto Sailing and Canoe Club in the west to Woodbine Beach in the east. The study area encompasses the Toronto Islands, the Leslie Street Spit, areas of proposed development in the Port Lands, residential areas in the vicinity of Little Norway Park and along Queens Quay, the southern portions of Wards 19 and 20 (from approximately King Street West southward), the Music Garden, Harbourfront Centre, West-Jet Stage and various other public areas of interest along the waterfront. This study area is more than adequate to provide a good indication of the upper bound of air quality impact due to the airport operations at sensitive impact locations in the surrounding area.

For the purpose of presenting detailed results of the analysis, several representative residences, schools, parks, and other locations of concern within this area were identified in consultation with the public. These representative locations are referred to as discrete receptors, and are shown in Figure 5. A grid of receptors was also used to gain an understanding of the spatial distribution of the predicted contaminant concentrations. The grid was used for a single, worst-case contaminant, for illustrative purposes.

3.8 General Background Air Quality Conditions

The term background air quality refers to the concentrations of contaminants in the study area produced by other sources besides those associated with the Project. The background concentrations of contaminants can be established through ambient monitoring, and/or from computer models. Ambient monitoring has the advantage of providing direct concentration measurements rather than model predictions; however, monitoring can only be done at a limited number of locations, and could potentially miss contributions from certain local background sources near the Project.

This study takes a hybrid approach where monitoring data have been used to assess the general background concentrations, while major local background sources of contaminants, such as large roadways, have been included in the dispersion modelling.

The general background air quality was characterized with archived monitoring data from the Ontario Ministry of Environment and Climate Change (MOECC), and from Environment Canada as part of the National Air Pollution Surveillance (NAPS) program. The monitoring data from the MOECC and NAPS were also supplemented with data from three Metrolinx monitoring stations located in Toronto along a major rail line. These stations are operated by Metrolinx as part of the Georgetown South Project. All monitoring locations used in this assessment are shown in Figure 2.

This analysis included data from some stations that are fairly far from the study area (up to ~20 km from the airport). This provides an indication of the spatial variation in background air quality levels around the city.

For nitrogen dioxide and $PM_{2.5}$, data from four MOECC monitoring stations located throughout Toronto and the three Metrolinx stations were used in this assessment. For carbon monoxide, data were only available from two of the four MOECC monitoring stations as well as the three Metrolinx stations. For benzene, data from three NAPS monitoring stations located throughout Toronto, and the three Metrolinx stations were used. For benzo(a)pyrene and cadmium, data were only available from two of the three NAPS monitoring stations as well as the three Metrolinx stations. For acrolein, data were only available from a single NAPS monitoring station located in Toronto, and the data are older as this station is currently decommissioned. Although ozone is not emitted directly from any of the sources of concern, background ozone concentrations have also been assessed because it was used to predict the formation of NO_2 from NO_X emissions. For ozone, data were available from the Bay/Wellesley monitoring station located in downtown Toronto. The monitoring stations and years of data used in this assessment for each contaminant are summarized in Table 2.

Table 2: Summary of Monitoring Stations

Station ID	Name	Location	Contaminants	Years Assessed
MOE 31103	Toronto Downtown	Bay St. / Wellesley St. W	nitrogen dioxide, $PM_{2.5}$, ozone	2009-2013
			carbon monoxide	2009-2010
MOE 33003	Toronto East	Kennedy Rd. / Lawrence Ave. E	nitrogen dioxide, $PM_{2.5}$	2009-2013
MOE 34020	Toronto North	Hendon Ave. / Yonge St.	nitrogen dioxide, $PM_{2.5}$	2009-2013
MOE 35125	Toronto West	125 Resources Rd.	nitrogen dioxide, carbon monoxide, $PM_{2.5}$	2009-2013
NAPS 60413	Toronto Elmcrest	Elmcrest Road	benzene	2009-2013
NAPS 60427	Toronto College	223 College St.	benzene, benzo(a)pyrene, cadmium	2009-2013
NAPS 60435	Toronto Kipling	461 Kipling Ave.	benzene, cadmium	2009-2013
			benzo(a)pyrene	2009-2011

Station ID	Name	Location	Contaminants	Years Assessed
NAPS 60418	Ruskin/Perth	Ruskin/Perth St.	Acrolein	2002-2006
MTRLX 35020	Wallace	372 Wallace Ave.	nitrogen dioxide, carbon monoxide, $PM_{2.5}$, benzene, benzo(a)pyrene, cadmium	2012-2014
MTRLX 35021	Weston	1865 Weston Rd.	nitrogen dioxide, carbon monoxide, $PM_{2.5}$, benzene, benzo(a)pyrene, cadmium	2011-2014
MTRLX 35022	Strachan	10 Ordnance St.	nitrogen dioxide, carbon monoxide, $PM_{2.5}$, benzene, benzo(a)pyrene, cadmium	2012-2014

Summary statistics of the monitoring data from these stations are presented in Appendix B. For the purpose of this assessment, a single value was used to represent the background level for each contaminant and relevant averaging period. A reasonable upper bound value from within the range of observed values was chosen, which excluded outliers and represents the maximum value likely to coincide in time with the maximum predicted concentrations contributed by the sources included in the dispersion modeling. For short averaging periods (1 hour, 8 hours, 24 hours), observed 90th percentile of 1-hour (NO_2, CO and $PM_{2.5}$) and 24-hour (benzene, acrolein, benzo(a)pyrene, and cadmium) concentrations in the monitoring data were used for this purpose, in keeping with common practice. In particular, since spatial variations in 90th percentile values were generally not large, the mean of the 90th percentile values from among the stations was used. For the one year averaging period, the mean of the annual average values from among the stations was used. For most contaminants the spatial variability of contaminant concentrations across the several monitoring locations studied is minimal, justifying the use of an average value.

Table 3 shows the general background concentration values that were adopted. The table also shows the TRVs for comparison. For the most part, the background concentration values corresponding to the annual averaging period are either approaching the applicable chronic exposure TRVs, or in a couple of cases, they are exceeding the TRVs significantly (acrolein and BaP). Thus, the annual averaging period is of particular concern, and acrolein and BaP are two contaminants of special concern. The background levels for the shorter averaging periods are generally well below the applicable acute exposure thresholds.

Table 3: General Background Concentrations

Contaminant	Averaging Period	Background Concentration ($\mu g/m^3$)	TRV ($\mu g/m^3$)	Background Concentration (% of TRV)
Nitrogen Dioxide	24-hour	58	200	29%
	Annual	31	40	78%
Carbon Monoxide	8-hour	392	6000	6%
$PM_{2.5}$	24-hour	16	27	59%
	Annual	7.7	8.8	88%

Contaminant	Averaging Period	Background Concentration (µg/m^3)	TRV (µg/m^3)	Background Concentration (% of TRV)
Acrolein	24-hour	0.30	0.4	75%
	Annual	0.13	0.02	650%
Benzene	24-hour	0.93	29	3%
	Annual	0.70	3	23%
Cadmium	24-hour	0.0075	0.03	25%
Benzo(a)Pyrene (BaP)	Annual	0.00014	0.00001	1400%
Ozone	24-hour	variable	N/A	N/A
	Annual	variable	N/A	N/A

For simplicity, the background concentrations in Table 3 were used for both the Current and Future-Build scenario. This implicitly assumes that background contaminant levels will persist into the future at their current levels. This assumption represents a conservative approach to estimating future air quality conditions. It is likely to result in an overestimate of future background levels, as contaminant levels at monitoring sites in Ontario have generally been on a declining trend that is likely to continue into the future.

3.9 Sources Included in the Dispersion Model

The dispersion modelling included sources directly and indirectly associated with airport operations, as well as other local sources that are unrelated to airport operations. The sources associated directly or indirectly with airport operations consisted of the following:

- Aircraft emissions (landings, take-offs, taxiing, and idling);
- Ground support equipment including aircraft refueling;
- Taxi queuing; and,
- Airport ferry crossings.

The other local sources that were included in the modelling were as follows:

- Major roadways (Gardiner Expressway, Lake Shore Boulevard, Queens Quay, Bathurst Street, Stadium Road, and Dan Leckie Way); and,
- Hanlan's Point Ferry.

Sources modelled in the Current scenario (2012) and the Future No-Build scenario (2032) are shown in Figure 3, and sources modelled in the Future Build (2032) scenario are shown in Figure 4.

3.10 Emissions Inventory

In order to include the above listed sources in the dispersion model, an estimate of their emission rates must first be obtained. The emission rates are estimated differently depending on the source of the emissions. The sections below describe how the emission rates were estimated for the various sources included in the modelling.

3.10.1 Aircraft and Ground Support Equipment

The standard approach for estimating emissions from airports is to use computer simulation techniques that are based on extensive testing of a wide range of aircraft emissions, ground support equipment, and other key sources. The primary tool used in compiling the emissions inventory was the Emissions and Dispersion Modeling System (EDMS). EDMS is a combined emissions and dispersion model for assessing air quality at civilian airports and military air bases that was developed by the Federal Aviation Administration (FAA) in cooperation with the United States Air Force (USAF).

When running EDMS to provide input files for a dispersion model, it is necessary to run it using a performance-based approach to estimating time spent by the aircraft in different modes of operation (taxiing, take-off, climb-out, or descent). In this approach, the fuel flow and the fuel flow-specific emission rates (known as emission indices) are derived for each aircraft movement from the calculated aircraft performance (thrust, air speed, etc.). The aircraft performance calculations are based on methods set out by the Society of Automotive Engineers (SAE) in SAE-AIR-1845, the fuel flow calculations are based on the methods set out in the Base of Aircraft Data (BADA), and the emission indices are adjusted based on the Boeing fuel flow Method 2 (BFFM2). The emissions calculated in this manner can vary from one hour to the next within the simulation, depending on weather conditions, and can differ from the nominal values provided by the manufacturer.

The emissions from aircraft were estimated for CO_{2e}, NO_X, CO, particulate matter, acrolein, and benzene using the EDMS model. For modelling purposes, EDMS separates each landing and take-off (LTO) cycle into six categories, referred to as modes of operation: approach, taxi in, start-up, taxi out, takeoff and climb out.

Emissions of cadmium and benzo(a)pyrene were not available directly within EDMS, however they were calculated from the estimated emissions of particulate matter. Data on the composition of particulate matter have been compiled by the U.S. Environmental Protection Agency (EPA) in a large database known as SPECIATE. For cadmium and benzo(a)pyrene, data for aircraft emissions from SPECIATE Version 4.4 were used to estimate the percentage of cadmium and benzo(a)pyrene in particulate matter.

EDMS was also used to estimate the emissions from ground support equipment (GSE). However, the GHG emissions (CO_{2e}) from GSE were not provided by EDMS and, instead, were calculated based on the equipment horsepower ratings, which were specified by EDMS. The horsepower ratings were

combined with a fuel consumption rate of 7,000 BTU/hp-hr, from US EPA[1], and CO_{2e} emission factors published by Environment Canada[2]. Details of the inputs to EDMS and GHG calculations for the GSE are provided in Appendix E.

3.10.2 Motor Vehicles

Emissions from all motor vehicles including parking lots, taxis, and roadways, have been estimated using the US UPA model MOVES.

The standard approach for estimating vehicular emissions is to use computer simulation techniques that are based on extensive previous testing of a wide range of vehicles. MOVES is one such model that has been developed for this purpose by the U.S. Environmental Protection Agency. This model was used in this assessment to predict the emission rates for parking lots, taxis, and roadways. For the Current scenario, MOVES was programmed to provide emission rates for the year 2012. For the Future Build and Future No-Build scenarios, it was programmed to provide emission rates for the year 2032.

Vehicle exhaust emissions are sensitive to outside temperature conditions. For the present assessment, MOVES was programmed to provide emissions under summer conditions to represent worst-case emissions for the majority of contaminants assessed.

Exhaust emissions also vary widely by type of vehicle, and MOVES provides emission factors for several different categories. These individual emission factors were aggregated to produce a composite emission factor for each pollutant, representing the average vehicle. This requires information on the mix of different vehicle types on each roadway.

For particulate matter, emissions result from the re-suspension of dust as vehicles travel over a roadway surface, in addition to tailpipe emissions. The road dust emissions were calculated based on estimations provided by the U.S. EPA's AP-42, Chapter 13.2.1, released in January 2011. The tailpipe emission factor for particulate matter, from MOVES, is added to the road dust emission factor to account for both emission sources.

Emissions of cadmium were not available directly from MOVES, however, similarly to what was done for the aircraft emissions, data from SPECIATE Version 4.4 were used to estimate the percentage of cadmium in particulate matter, from vehicle emissions.

The inputs and outputs to MOVES are shown in Appendix C.

[1]US Environmental Protection Agency. AP-42 Fifth Edition Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Chapter 3.3: Gasoline and Diesel Industrial Engines. 1996.
[2] Environment Canada. National Inventory Report 1990 - 2012: Greenhouse Gas Sources and Sinks in Canada. 2013.

3.10.3 Ferry Crossings

The emissions from the Ferries were calculated based on Canadian marine emission standards, as documented in the Federal Vessel Pollution and Dangerous Chemicals Regulations, as well as published data on ship emissions[3]. The engine size was based on information from Transport Canada's vessel registration Query System for the vessels that are used at the airport and on the Hanlan Point ferry route. Ship emissions data as well as ferry schedules are provided in Appendix D.

3.11 Dispersion Model Selection

The dispersion of pollutants between the time they are emitted from the source to the time that they arrive at the receptor locations, was modelled using the CALPUFF dispersion model. This is one of the most advanced dispersion models approved by the U.S. EPA, as well as several provinces in Canada, and an alternate model for use in Ontario.

CALPUFF is a computer model that simulates transport and dispersion of air contaminants. It is a 3-dimensional, non-steady state model that accounts for the effects of time-varying and space-varying meteorological conditions. Wind, air temperature, and other meteorological parameters can vary significantly from place to place in the urban lakeshore environment of the study area, where lake breezes and other shoreline effects occur, and CALPUFF has the capability of accounting for these effects.

3.12 Meteorological Data

The meteorological data used by CALPUFF were processed using meteorological processing software known as CALMET. The CALMET model is essentially a sophisticated interpolation algorithm that processes terrain information, meteorological observations from surface stations, and either upper air measurements or upper air data from a weather forecast model to create 3-D meteorological fields for every hour of the model year. For this assessment, the recommended approach of using a weather forecast model for the upper air data was selected. The Weather Research Forecasting Model (WRF) was used for this purpose. The model grid spacing was 1 km and the model year was 2012. The surface weather observations used in the analysis came from the weather station located at BBTCA, as well as from Pearson International Airport.

3.13 Activity Data

In order to correctly incorporate the emission rates into the dispersion model, activity data are also required, such as flight schedules for the airport, or traffic volumes for the roadways.

3.13.1 Aircraft and Ground Support Equipment

The dispersion modelling of the airport accounted for commercial aircraft as well as general aviation activities at the airport. For the baseline modeling, the records of individual movements for the year 2012, provided by Ports Toronto[4], were used as input to the EDMS model. The records included information on the type of aircraft, type of movement and runway used for each movement (local or itinerant). The listing

[3] Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data, United States Environmental Protection Agency, February 2000.
[4] Received through Leah Weller of AECOM on June 8, 2015

included over 200 types of aircraft that used the airport in 2012. The analysis covered 31 of these aircraft types, which accounted for over 95% of the movements. These 31 types of aircraft were matched to 9 aircraft types available within EDMS. For the Future Build case, the projected average daily number of movements by aircraft type were provided by Ports Toronto[5]. The listing included 72 aircraft types that were matched to 7 aircraft types available within EDMS. The CS100 aircraft was not available in EDMS and was therefore modelled in EDMS as a user-created aircraft. Table 4 provides a summary of the aircraft activity data, expressed in terms of the number of landing-and-take-off cycles (LTO's) and touch-and-go aircraft movements (TGO's). The aircraft and GSE activity data for the Future No-Build scenario were assumed to be identical to the Current scenario.

Table 4: Summary of Aircraft Traffic and Fuel Consumption

Aircraft Type	Annual LTO		Annual TGO		Fuel Consumption (tonnes/year)	
	Current and Future No Build	Future Build	Current and Future No Build	Future Build	Current and Future No Build	Future Build
Agusta A-109	2289	0	0	0	24	NA
Bell 206 JetRanger	471	1693	0	0	1	12
Cessna 172 Skyhawk	14479	12758	27756	13196	822	492
Cessna 206	1244	1435	0	0	17	19
Pilatus PC-12	1559	2021	0	0	57	74
Piper PA-30 Twin Comanche	505	779	0	0	9	14
Robinson R44 Raven	2937	0	0	0	9	NA
Dassault Falcon 10	0	382	0	0	NA	21
Q400	30082	31054	0	0	1732	1804
CS100	0	9855	0	0	NA	3723
Total	**53566**	**59977**	**27756**	**13196**	**2671**	**6159**

For each commercial aircraft movement, EDMS accounted not only for the aircraft's emissions but also emissions from an aircraft tractor, a belt loader, a fuel truck, and a lavatory truck. These are the only diesel-powered ground support equipment in use at the BBTCA. All other ground support equipment in use at the BBTCA are electric-powered. For the future scenario with the CS100, EDMS default GSE for a similar type of aircraft (the Boeing 737) were used. A summary of all EDMS inputs is provided in Appendix E.

[5] Received through Julia Cushing of AECOM on June 1, 2016

3.13.2 Motor Vehicle Traffic Data

Traffic data were needed in order to model emissions from vehicles travelling on the significant roadways within the study area. Annual average daytime traffic volumes (AADT) for the large roads (Gardiner Expressway, Lakeshore Boulevard, and Queen's Quay) were obtained from the City of Toronto[6] and are summarized in Table C6 of Appendix C. Hourly diurnal traffic distributions, car and truck percentages, and AM and PM peak-hour traffic values for the local roadways (Bathurst Street, Stadium Road, and Dan Leckie Way) were obtained from Dillon Consulting[7]. Hourly traffic data for the roads were developed based on the average diurnal profile of traffic in the area, which is shown in Table C5 of Appendix C. The study assumed that 96% of the total vehicles were cars, 2.5% were medium trucks, and 1.5% were heavy trucks. All vehicle speeds were assumed to be 50 km/hr except for the Gardener Expressway which was assumed to be 60 km/hr.

Emissions from idling taxis or other pickup/drop-off vehicles were also accounted for, based on the peak-hour airport traffic volume and the modal split of transportation method (taxis, passenger pickup, etc.) provided by Dillon Consulting[8]. Each passenger pickup/drop-off vehicle is assumed to idle for two minutes and each taxi for five minutes in the queuing area. The traffic assumptions used for the taxis and pickup/drop-off vehicles are also shown in Table C7 of Appendix C.

3.13.3 Ferry Crossings

Emissions from the Airport Ferry assume continuous operation of the ferry during the hours that the airport is operating. The emissions are distributed along the transportation route and between the two stations based on the times spent at each location. Emissions from the Hanlan's Point Ferry are based on the summer operating schedule distributing the emissions evenly along the transportation route. Appendix D provides further information on ferry emissions and ferry schedules.

3.14 Odours and Soot

Predicted levels of $PM_{2.5}$ were used as a surrogate for soot. The predicted emissions and concentrations of $PM_{2.5}$ from aircraft operations, discussed in section 4.4, were compared to those from background sources, to get an indication of the relative impact of aircraft operations on soot levels in the study area.

It is also understood that residents living in proximity to the airport experience fuel odours, which may be related to unburned fuel emitted from the aircraft engines when revving up at the start of the take-off roll, and/or during refuelling operations. Although not modelled explicitly, odours are discussed in section 4.3.

[6] Average Weekday, 24 Hour Traffic Volume, City of Toronto, Transportation Services, Sept. 30, 2013.
[7] Received through Leah Weller of AECOM on September 22 and 30, 2015.
[8] Received through Leah Weller of AECOM on September 22 and 30, 2015.

4. RESULTS AND DISCUSSION

4.1 Emissions

4.1.1 Aircraft Emissions

Annual emissions for each surrogate aircraft type are presented in tables 5a and 5b. The Cessna 12 Skyhawk is the aircraft type emitting the most CO, $PM_{2.5}$, BaP and cadmium, and the Q400 is the aircraft type emitting the most benzene and acrolein, in the Current, Future No-Build and Future Build scenarios. The Q400 is the highest emitter of NOx for the Current and Future No-Build Scenarios. The CS100 is the highest emitter of NOx for the Future Build scenario.

Table 5a: Summary of Aircraft Emissions: Key Representatives of Inorganic Gases and Particulate Matter

Aircraft Type	CO Emissions (tonnes/year)		NO_x Emissions (tonnes/year)		$PM_{2.5}$ (tonnes/year)	
	Current and Future No Build	Future Build	Current and Future No Build	Future Build	Current and Future No Build	Future Build
Agusta A-109	2	NA	0.1	NA	0.0	NA
Bell 206 JetRanger	0	1	0.0	0.0	0.0	0.0
Cessna 172 Skyhawk	805	483	0.8	0.4	0.9	0.5
Cessna 206	23	25	0.0	0.0	0.0	0.0
Pilatus PC-12	1	2	0.3	0.5	0.0	0.0
Piper PA-30 Twin Comanche	9	13	0.0	0.0	0.0	0.0
Robinson R44 Raven	11	NA	0.0	NA	0.0	NA
Dassault Falcon 10	NA	1	NA	0.2	NA	0.0
Q400	23	24	11.2	11.7	0.2	0.2
CS100	NA	8	NA	83.3	NA	0.2
Total	**873**	**556**	**12.4**	**96.1**	**1.1**	**0.9**

Table 5b: Summary of Aircraft Emissions: Key Representatives of Organic Gases, PAH's and Metals

Aircraft Type	Benzene Emissions (tonnes/year)		BaP Emissions (tonnes/year)		Cd Emissions (tonnes/year)		Acrolein Emissions (tonnes/year)	
	Current and Future No Build	Future Build	Current and Future No Build	Future Build	Current and Future No Build	Future Build	Current and Future No Build	Future Build
Agusta A-109	6.2E-03	NA	3.5E-06	NA	1.2E-06	NA	9.0E-03	NA
Bell 206 JetRanger	4.7E-04	3.8E-03	0.0E+00	1.5E-06	0.0E+00	5.1E-07	6.9E-04	5.5E-03
Cessna 172 Skyhawk	1.3E-01	8.1E-02	4.4E-04	2.6E-04	1.5E-04	8.9E-05	2.0E-01	1.2E-01
Cessna 206	4.1E-03	4.6E-03	9.5E-06	1.1E-05	3.2E-06	3.6E-06	5.9E-03	6.6E-03
Pilatus PC-12	1.6E-03	2.5E-03	1.5E-06	3.0E-06	5.1E-07	1.0E-06	2.3E-03	3.6E-03
Piper PA-30 Twin Comanche	1.4E-03	2.1E-03	4.5E-06	6.5E-06	1.5E-06	2.2E-06	2.0E-03	3.1E-03
Robinson R44 Raven	5.5E-03	NA	3.5E-06	NA	1.2E-06	NA	8.0E-03	NA
Dassault Falcon 10	NA	4.4E-03	NA	5.0E-07	NA	1.7E-07	NA	6.5E-03
Q400	1.8E-01	1.9E-01	9.5E-05	8.3E-05	3.2E-05	2.8E-05	2.7E-01	2.8E-01
CS100	NA	1.5E-03	NA	9.1E-05	NA	3.1E-05	NA	2.1E-03
Total	**3.4E-01**	**2.9E-01**	**5.5E-04**	**4.6E-04**	**1.9E-04**	**1.6E-04**	**4.9E-01**	**4.3E-01**

4.1.2 Other Sources

Emissions from other sources included in the dispersion modelling (APU, GSE, Roadways and Ferries) are summarized and compared to aircraft emissions in Table 6a and 6b.

From Table 6a and 6b, it can be seen that the Roadways are the largest contributor of CO, NO_X, $PM_{2.5}$, benzene and cadmium for the Current (2012) scenario. For the Future Build and Future No-Build (2032) scenarios, the roadway emissions for these contaminants are reduced significantly compared to the Current scenario. This is due to the ongoing effect of the federal On-Road Vehicle and Engine Emissions Regulations, which are intended to reduce emissions from on-road vehicles and will continue to have an effect in the future, as older vehicles are gradually replaced by newer, cleaner vehicles. As result of declining emissions from on-road vehicles, the aircraft at BBTCA take over as the dominant source of CO in the Future No-Build and Future Build scenarios and NOx in the Future Build (2032) scenario. For the Future No-Build scenario ferries become the dominant source of NOx. The aircraft are the dominant source of BaP in all scenarios. Ferries are the dominant emitters of acrolein for all scenarios. Overall emissions of acrolein and BaP in the study area do not change significantly between the Current, Future Build and Future No -Build scenarios. Overall emissions of all contaminants, with the exception of NOx, are expected to either decrease or remain unchanged for the Future Build scenario relative to the Future No-Build scenario.

In Table 6a, it can be seen that the Future Build CO emissions from GSE decrease significantly compared to the Current and Future No-Build scenarios. This is mostly due to the introduction of newer and cleaner GSE associated with the CS100 aircraft.

Table 6a: Summary of Overall Study Area Emissions: Key Representatives of Inorganic Gases and Particulate Matter

Source Type	CO			NO_x			$PM_{2.5}$		
	Current	**Future No-Build**	**Future Build**	**Current**	**Future No-Build**	**Future Build**	**Current**	**Future No – Build**	**Future Build**
Aircraft	873	873	556	12	12	96	1.1	1.1	0.9
APU	0	0	1	0	0	4	0.0	0.0	0.3
GSE	119	119	39	13	13	3	0.4	0.4	0.2
Roadways	2295	548	549	494	53	53	25.4	14.8	14.9
Ferries	93			84			4.1		
Total	**3381**	**1633**	**1238**	**603**	**162**	**240**	**31.0**	**20.4**	**20.3**

Table 6b: Summary of Overall Study Area Emissions: Key Representatives of Organic Gases, PAH's and Metals

Source Type	Benzene			BaP			Cd			Acrolein		
	Current	Future No Build	Future Build	Current	Future No Build	Future Build	Current	Future No Build	Future Build	Current	Future No Build	Future Build
Aircraft	0.34	0.34	0.29	0.00055	0.00055	0.00046	0.00019	0.00019	0.00016	0.4920	0.4920	0.4251
APU	0.00	0.00	0.00	0.00000	0.00000	0.00013	0.00000	0.00000	0.00005	0.0000	0.0000	0.0018
GSE	0.07	0.07	0.03	0.00020	0.00020	0.00011	0.00007	0.00007	0.00004	0.0997	0.0997	0.0396
Roadways	4.21	0.42	0.42	0.00003	0.00000	0.00000	0.00381	0.00222	0.00223	0.1654	0.0200	0.0201
Ferries		2.33			0.00045			0.0004			1.32	
Total	**6.94**	**3.16**	**3.07**	**0.00123**	**0.00120**	**0.00116**	**0.0044**	**0.0028**	**0.0028**	**2.08**	**1.93**	**1.80**

4.1.3 Emission Summary for GHG

GHG Emissions from aircraft, GSE, Roadways and Ferries in the Study Area for the Current Case (2012) and the Future Build and No Build Case (2032) are summarized in Table 7.

Table 7: Summary of GHG Emissions in the Study Area

Source Type	CO_2e (tonnes/year)		
	Current	Future No Build	Future Build
Aircraft	8,427	8,427	19,432
GSE	2,584	2,584	3,929
Roadways	179,551	117,142	117,475
Ferries	4,890		
Total	195,452	133,042	145,726

Table 7 indicates that the Roadways are the largest contributor of GHG emissions for all scenarios. GHG emissions from roadways are expected to be significantly lower in the Future Build and No Build scenarios compared to the Current scenario, due an average improvement in fuel economy for the year 2032, compared to 2012. Therefore, the overall GHG emissions will be lower. The GHG emissions for the Aircraft and associated GSE will increase in the future with the addition of the CS100 due to increase air traffic, but this is more than offset by the projected decrease in emissions from roadways in the study area.

The overall GHG emissions in the study area are compared to provincial totals in Table 8. The annual emissions from the study area represents tiny fraction of the provincial totals.

Table 8: Total Annual Emissions Compared to Ontario's Total Annual Emissions

Scenario	CO_2e (Megatonnes)	Total Ontario Emissions (Megatonnes/year) [1]	Total Ontario Emissions from Transportation Sources (Megatonnes/year)	% of Ontario	% of Transportation
Current	0.20	170.2	59	0.11%	0.33%
Future No Build	0.13			0.08%	0.23%
Future Build	0.15			0.09%	0.25%

Notes:

[1] The GHGs emissions for Ontario were taken from "National Inventory Report: Greenhouse Gas Sources and Sinks in Canada 1990-2011, Part 3. The Canadian Government's Submission to the UN Framework Convention on Climate Change.

4.2 Air Quality

4.2.1 Current Conditions 2012 Scenario

Maximum predicted concentrations at all discrete receptors for the Current (2012) scenario are presented in Appendix F. As a summary of the data, maximum predicted concentrations at the discrete receptors that received the highest impact are presented in Table 9 (refer to Figure 5 for a map showing the locations of discrete receptors). For 24-hour NO_2, 8-hour CO, 24-hour and annual benzene, and 24-hour cadmium, the predicted concentrations are below their Toxicity Reference Values (TRV). For annual NO_2, 24-hour and annual $PM_{2.5}$, 24-hour and annual acrolein, and annual BaP, the predicted concentrations at the locations of highest impact are higher than their TRV's. They are also well above the general background concentrations.

The contributions of individual source groups to the predicted maximum concentrations are presented in Table 10. The ferries and/or the roadways that were included in the dispersion model are the major contributors to the maximum concentrations of all contaminants.

In order to illustrate the spatial pattern of the predicted contaminant concentrations, isopleths of maximum predicted concentrations were drawn for one of the contaminants. Acrolein was selected for this purpose, as the predicted concentrations for this contaminant are relatively high in relation to its TRV's. Acrolein isopleths for the Current (2012) scenario are presented in Figures 6 and 7. The dominant sources of acrolein in the study area are the ferries, and the isopleths clearly illustrate how the relatively high predicted concentrations for maximum 24-hour and annual average acrolein are localized around the ferry routes.

Table 9: Summary of Maximum Predicted Concentrations – Current 2012 Scenario

Contaminant	Averaging Period	Receptor ID	Background Concentration (µg/m^3)	Maximum Modelled Concentration (µg/m^3)	Modelled + Background (µg/m^3)	TRV (µg/m^3)	Modelled + Background (% of TRV)
Nitrogen Dioxide	24-hour	6	58	123	181	200	90%
	Annual	6	31	33.1	64	40	160%
Carbon Monoxide	8-hour	6	392	1848	2240	6000	37%
$PM_{2.5}$	24-hour	6	16	12.3	28.3	27	105%
	Annual	6	7.7	2.40	10.1	8.8	115%
Acrolein	24-hour	25	0.3	2.08	2.4	0.4	595%
	Annual	25	0.13	0.27	0.4	0.02	1980%
Benzene	24-hour	25	0.93	3.99	4.9	29	17%
	Annual	25	0.7	0.73	1.4	3	48%
Cadmium	24-hour	6	0.0075	0.002	0.009	0.03	30%
Benzo(a)Pyrene (BaP)	Annual	25	0.00014	0.000103	0.000243	0.00001	2428%

Table 10: Contributions of Individual Source Groups – Current Case (2012) Scenario

Contaminant	Averaging Period	Receptor ID	Maximum Modelled Concentration (µg/m^3)	Airport Contribution (µg/m^3)	Taxi and Drop-off / Pickup Contribution (µg/^{m3})	Roadways Contribution (µg/m^3)	Ferries Contribution (µg/m^3)
Nitrogen Oxides (NOx)	24-hour	6	324.8	4.9	1.3	150.3	168.3
Carbon Monoxide	8-hour	6	1848	14	34	1787	14
$PM_{2.5}$	24-hour	6	12.3	0.2	0.03	7.0	5.0
Acrolein	24-hour	25	2.08	0.03	0.002	0.01	2.04
Benzene	24-hour	25	3.99	0.02	0.10	0.28	3.59
Cadmium	24-hour	6	1.52E-03	2.71E-05	4.29E-06	1.05E-03	4.34E-04
Benzo(a)Pyrene (BaP)	Annual	25	0.000103	0.0000064	0.0000003	0.000002	0.000097

Future No-Build 2032 Scenario Maximum predicted concentrations at all discrete receptors for the Future No-Build (2032) scenario are presented in Appendix F, alongside those of the Current (2012) scenario. As a summary of the Future No-Build data, maximum predicted concentrations at the discrete receptors that received the highest impact are presented in Table 11.

For 24-hour NO_2, 8-hour CO, 24-hour and annual benzene, and 24-hour cadmium, the predicted concentrations are below their Toxicity Reference Values (TRV). For annual NO_2, 24-hour and annual $PM_{2.5}$, 24-hour and annual acrolein, and annual BaP, the predicted concentrations at the locations of highest impact are higher than their TRV's. They are also well above the general background concentrations.

The contributions of individual source groups to the predicted maximum concentrations in the Future No-Build (2032) scenario are presented in Table 12. The ferries and/or the roadways are the major contributors to the maximum concentrations of all contaminants.

Table 11: Summary of Maximum Predicted Concentrations – Future No-Build 2032 Scenario

Contaminant	Averaging Period	Receptor ID	Background Concentration (µg/m^3)	Maximum Modelled Concentration (µg/m^3)	Modelled + Background (µg/m^3)	TRV (µg/m^3)	Modelled + Background (% of TRV)
Nitrogen Dioxide	24-hour	25	58	117	175	200	88%
	Annual	6	31	15.5	46.5	40	116%
Carbon Monoxide	8-hour	6	392	448	840	6000	14%
$PM_{2.5}$	24-hour	6	16	9.0	25.0	27	93%
	Annual	6	7.7	1.69	9.39	8.8	107%
Acrolein	24-hour	25	0.3	2.07	2.37	0.4	592%
	Annual	25	0.13	0.26	0.39	0.02	1946%
Benzene	24-hour	25	0.93	3.65	4.58	29	16%
	Annual	25	0.7	0.47	1.17	3	39%
Cadmium	24-hour	6	0.0075	0.001	0.009	0.03	28%
Benzo(a)Pyrene (BaP)	Annual	25	0.00014	0.000102	0.000242	0.00001	2416%

Table 12: Contributions of Individual Source Groups – Future No-Build 2032 Scenario

Contaminant	Averaging Period	Receptor ID	Maximum Modelled Concentration (µg/m³)	Airport Contribution (µg/m³)	Taxi and Drop-off / Pickup Contribution (µg/m³)	Roadways Contribution (µg/m³)	Ferries Contribution (µg/m³)
Nitrogen Oxide (NOx)	24-hour	25	232.3	3.3	0.2	3.5	225.3
Carbon Monoxide	8-hour	6	448	52	7	333	57
$PM_{2.5}$	24-hour	6	9.0	0.16	0.02	3.83	5.04
Acrolein	24-hour	25	2.07	0.029	0.000	0.001	2.037
Benzene	24-hour	25	3.65	0.020	0.008	0.028	3.595
Cadmium	24-hour	6	0.001035	2.71E-05	2.30E-06	5.74E-04	4.34E-04
Benzo(a)Pyrene (BaP)	Annual	25	0.000102	0.0000043	0.0000000	0.0000001	0.0000973

4.2.2 Future Build 2032 Scenario

Maximum predicted concentrations at all discrete receptors for the Future Build (2032) scenario are presented in Appendix F, alongside those of the Current (2012) and the Future No-Build scenarios. As a summary of the Future Build data, maximum predicted concentrations at the discrete receptors that received the highest impact are presented in Table 13.

Predicted concentrations for annual NO_2, annual $PM_{2.5}$, maximum 24-hour and annual acrolein, and annual BaP are above their TRV's at the discrete receptors that received the highest impact.

The contributions of individual source groups to the predicted maximum concentrations in the Future Build (2032) scenario are presented in Table 14. The ferries and/or the roadways are the major contributors to the maximum concentrations of all contaminants.

Isopleths showing maximum predicted concentrations of acrolein for the Future No-Build (2032) scenario are presented in Figures 8 and 9.

Table 13: Summary of Maximum Predicted Concentrations – Future Build 2032 Scenario

Contaminant	Averaging Period	Receptor ID	Background Concentration (µg/m³)	Maximum Modelled Concentration (µg/m³)	Modelled + Background (µg/m³)	TRV (µg/m³)	Modelled + Background (% of TRV)
Nitrogen Dioxide	24-hour	25	58	117	175	200	88%
	Annual	25	31	15.7	46.7	40	117%
Carbon Monoxide	8-hour	6	392	470	862	6000	14%
$PM_{2.5}$	24-hour	6	16	9.3	25.3	27	94%
	Annual	6	7.7	1.72	9.42	8.8	107%
Acrolein	24-hour	25	0.3	2.08	2.38	0.4	594%
	Annual	25	0.13	0.26	0.39	0.02	1959%
Benzene	24-hour	25	0.93	3.66	4.59	29	16%
	Annual	25	0.7	0.47	1.17	3	39%
Cadmium	24-hour	6	0.0075	0.001	0.009	0.03	29%
Benzo(a)Pyrene (BaP)	Annual	25	0.00014	0.000114	0.000254	0.00001	2541%

Table 14: Contributions of Individual Source Groups – Future Build 2032 Scenario

Contaminant	Averaging Period	Receptor ID	Maximum Modelled Concentration (µg/m^3)	Airport Contribution (µg/m^3)	Taxi and Drop-off / Pickup Contribution (µg/m^3)	Roadways Contribution (µg/m^3)	Ferries Contribution (µg/m^3)
Nitrogen Oxide (NOx)	24-hour	25	234.3	5	0.2	3.5	225.3
Carbon Monoxide	8-hour	6	470	73	8	333	57
$PM_{2.5}$	24-hour	6	9.3	0.4	0.02	3.83	5.04
Acrolein	24-hour	25	2.08	0.04	0.000	0.001	2.037
Benzene	24-hour	25	3.66	0.03	0.010	0.028	3.595
Cadmium	24-hour	6	0.001	0.000	2.74E-06	5.74E-04	4.34E-04
Benzo(a)Pyrene (BaP)	Annual	25	0.000114	0.000017	0.0000000	0.0000001	0.0000973

4.2.3 Comparison of Future-Build to Future No-Build Scenarios

The potential air quality impacts resulting from the proposed expansion are assessed through the comparison of the Future-Build to the Future No-Build Scenarios based on the results provided in Appendix F for each of the contaminants.

CO

Piston aircraft generate significantly more CO emissions than turboprop or jet aircraft. CO emissions are expected to be lower in the Future Build Scenario than in the No-Build Scenario, due to a reduction in the amount of piston aircraft activity. In spite of the lower emissions, predicted CO concentrations at sensitive receptors in the surrounding area change very little between the two scenarios. The maximum predicted 8-hour CO concentrations either increase or decrease slightly at most receptor locations (less than 1%) as a result of the proposed expansion. Very little change occurs as a result of the proposed expansion because CO levels are dominated by roadway activity, with the ferries and airport operations having a lesser influence. Concentrations at all locations remain well below the TRV.

NO_2

Although the Future Build Scenario entails significantly higher NO_x emissions than the Future No-Build Scenario, the maximum predicted 24-hour and annual NO_2 concentrations increase by only 1% or less across the study area as a result of the proposed expansion. Very little change occurs as a result of the proposed expansion because NO2 levels are dominated by ferry activity at locations in close proximity to the airport and by roadways at locations farther away. The NO_X emissions from the roadways and the airport ferry vary little between the two scenarios. The 24-hour NO_2 concentrations remain below the TRV at all locations. The annual NO_2 concentrations remain below the TRV at most locations. There are several locations where the annual NO_2 concentrations exceed the TRV, but these exceedances occur in both the Future-Build and Future No-Build Scenarios. There are no additional locations that are predicted to exceed the annual TRV nor does the magnitude of any exceedance change as a result of the proposed expansion.

$PM_{2.5}$

The maximum predicted 24-hour and annual $PM_{2,.5}$ concentrations increase by 1% or less across the study area as a result of the proposed expansion. \$PM_{2.5}$ emissions are dominated by the public roadways and, and to some extent, the ferry activity. The 24-hour $PM_{2.5}$ concentrations remain below the TRV at all locations. The annual $PM_{2.5}$ concentrations remain below the TRV at all receptors with the exception of one located at a residence adjacent to Little Norway Park. This exceedance occurs in both the Future-Build and Future No-Build Scenarios and the magnitude of the exceedance does not change as a result of the proposed expansion.

Cadmium

The maximum predicted 24-hour cadmium concentrations increase slightly at all receptor locations (less than 1%) as a result of the proposed expansion. Concentrations at all locations remain well below the TRV.

Benzene

The maximum predicted 24-hour and annual benzene concentrations either increase or decrease slightly at all receptor locations (less than 1%) as a result of the proposed expansion. Very little change in benzene levels occur as a result of the proposed expansion because benzene emissions in both future scenarios are dominated by the ferry activity, which does not change between scenarios. Concentrations at all locations remain well below their respective TRVs as a result of the proposed expansion.

BaP

The maximum predicted annual BaP concentrations increase slightly at most receptor locations (less than 1%) as a result of the proposed expansion. Several locations experience increases in the range of 2 to 10% in localized areas closer to the airport. The annual BaP concentrations are above the TRV at all receptors. The background levels alone exceed the TRV.

Acrolein

The maximum predicted 24-hour and annual acrolein concentrations remain relatively unchanged as a result of the proposed expansion. This is because most of the acrolein emissions in the study area come from the ferries and the activity from the ferries will not change as a result of the expansion. A 2% increase in the maximum predicted 24-hour acrolein concentrations is predicted to occur at one receptor near the National Yacht Club as a result of the proposed expansion.

There are many locations where the 24-hour acrolein concentrations exceed the TRV, but these exceedances occur in both the Future-Build and Future No-Build Scenarios. There is one additional receptor that is predicted to exceed the 24-hour TRV as a result of the proposed expansion. The annual acrolein concentrations are above the TRV at all receptors. The background levels alone exceed the TRV.

4.3 Odours

Historically, residents living in close proximity to BBTCA have expressed concerns about fuel odours. Among the operations at the airport, the main potential sources of odour are as follows:

- Vapours arising from hot unburnt fuel discharged from aircraft engine exhausts.
- Vapours arising from hot unburnt fuel discharged from the exhaust funnel of the ferry that services the airport.
- Vapours emitted during aircraft refuelling and fuel transfer operations.

Of the three sources listed above, the third (vapours emitted during refuelling and fuel transfer) is the least likely to contribute noticeable odours at residences. The predominant fuel used at the airport is Jet A, which is very similar to diesel fuel. At normal temperatures, it generates relatively little vapour. As a result, the detection of odours during fuel transfer is usually limited to within a relatively short distance. At a temperature of 20^{o}C, the vapour pressure of Jet A fuel is on the order of 2.2 mmHg, or approximately one hundredth of that for gasoline.

However, the fuel produces significantly more vapour when it is heated. Thus, hot unburnt fuel emitted in the exhaust of an aircraft engine or the engine of the ferry has a greater potential to produce odorous vapour. The amount of unburnt fuel present in the exhaust is greatest at times when the engine is operating at a relatively high fuel consumption rate and relatively low efficiency. This occurs when the engine is being revved, such as at the start of a take-off, during a run-up of an aircraft engine, or when the ferry is departing the terminal with a full load. Such events have potential to produce noticeable odours off-site.

The residences in closest proximity to the airport, where the potential for odours is greatest, are in the vicinity of Little Norway Crescent. Odorous vapours originating from airport operations have the potential to reach this area when the wind comes from direction between south and south-southeast. Long-term historical weather data (1996 to 2016) from the weather station located at BBTCA indicate that these wind directions are relatively infrequent, occurring approximately 7% of the time. Thus, the potential for fuel odours from airport operations can be characterized as occasional.

The future scenario with jets entails approximately the same number of Q400 movements as the base case (approximately 31,000 annually), but has additional CS100 movements on top of that (approximately 10,000 annually). Based on data provided by Bombardier, the CS100 has a higher fuel consumption rate than the Q400 during taxiing, landing, take-off and climb-out (approximately double). However, the jet engine provides more complete combustion, and the emission rate of unburnt hydrocarbons, per litre of fuel consumed, is significantly lower (around a factor of 10 lower during take-off, and a factor of 3 during taxiing). Therefore, a CS100 has less potential to produce odours than a Q400. Considering all of these factors, the potential for odours to be detected on days when the wind comes from the relevant directions is expected to increase with the introduction of CS100 jets, but the increase in potential can be characterized as small.

Sound barriers have been proposed in the vicinity of the runway extensions. These barriers are expected to provide some mitigation of odour potential, as they will enhance the dispersion of vapours from unburnt fuel released during take-off. This measure may not eliminate the potential to detect odours, but will reduce it.

4.4 Soot

Some residents living in proximity to BBTCA have expressed concerns about visible soot. Soot consists of airborne black carbon particles, arising mainly from incomplete combustion of fuel in the diesel engines of heavy trucks, buses, etc. The particles settle onto the surfaces of buildings and build up over time, causing the surfaces to have a soiled appearance.

Soot is a component of airborne particulate matter. Emissions of particulate matter from BBTCA operations and major roadways in the study area were estimated and included in the CALPUFF dispersion modelling. Predicted concentrations at the most-impacted receptor locations are shown in the tables of Section 4.2 of the report (Tables 9 through 14). Those predictions indicate that, in the Little Norway Crescent area, the dominant contributors to airborne particulate matter are traffic on the major public roads and the airport ferry operation. The aircraft engines, and in particular the jets, emit relatively little particulate matter. Introduction of jet operations at the airport, therefore, does not significantly alter the overall emissions.

The predicted concentrations shown in Table 9 through 14 for respirable particulate matter (PM2.5) show a slight decrease in the worst-case concentration in the Future Build scenario, compared to the Current scenario, due to future improvement in particulate matter emissions from on-road motor vehicles, as older vehicles are gradually replaced by newer, lower-emission vehicles. This translates to a slight decrease in potential for soot impacts. This result is based on the assumption of no change to the ferry that operates at the airport. Should the ferry engine be replaced with a newer engine that meets more stringent emission limits for particulate matter, then the PM concentrations in the vicinity of Little Norway Crescent will decline to a greater extent than what is shown in Tables 13 and 14.

5. CONCLUSIONS

The potential air quality impacts resulting from the proposed expansion were assessed through the comparison of the Future-Build to the Future No-Build Scenarios as summarized below:

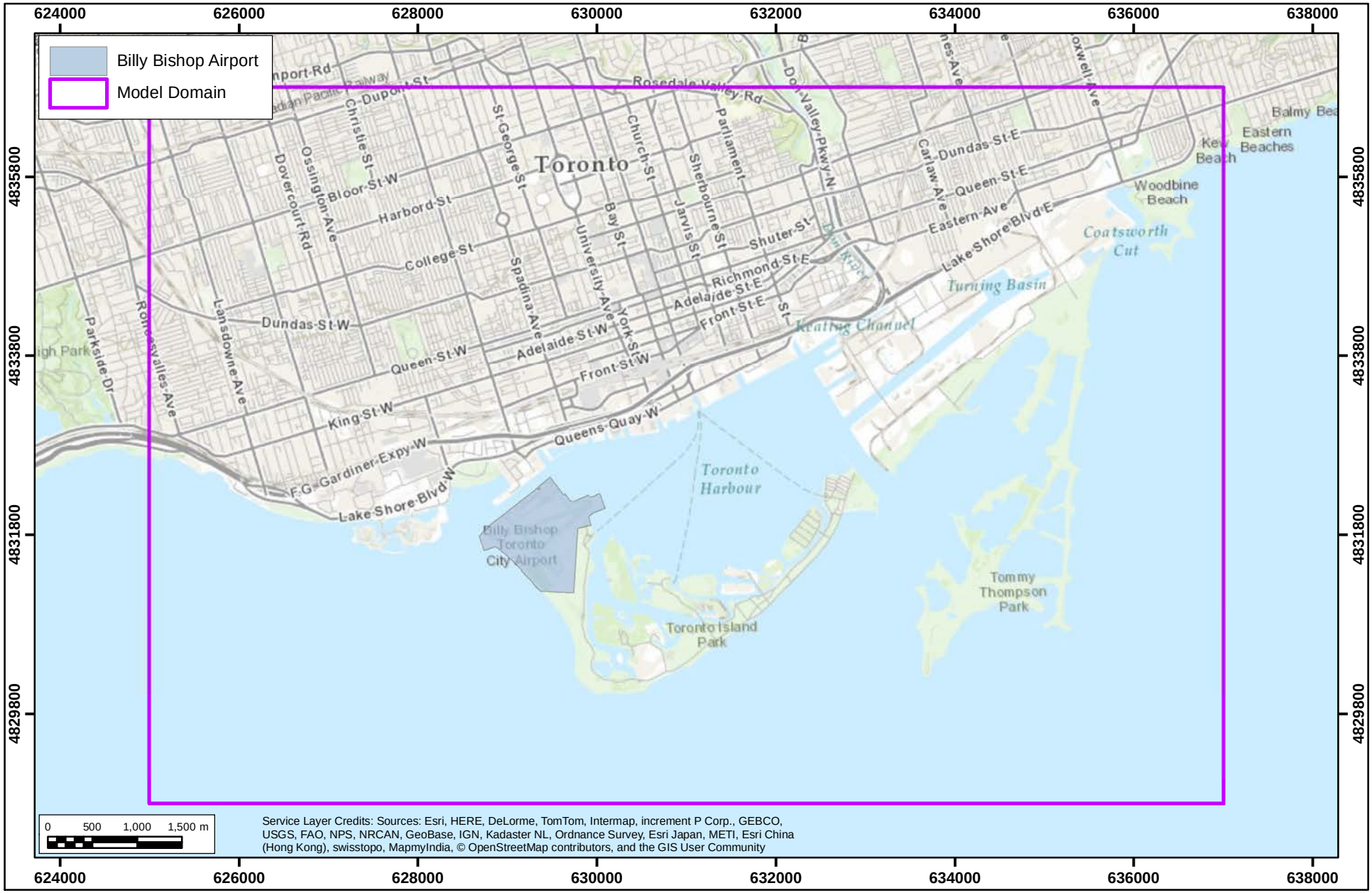
- Concentrations of most air contaminants are predicted to remain relatively unchanged (less than 1% increase or decrease) as a result of the proposed expansion across the study area. This is because the emission sources that have the greatest influence on contaminant levels at sensitive receptors in the study area (public roadways and ferry activity) are not expected to experience a significant change in activity level due to the project.

- Concentrations of some contaminants for some averaging times exceed their respective toxic reference values in the study area, specifically annual NO_2, annual $PM_{2.5}$, annual BAP, 24-hour and annual acrolein. In the case of BaP and acrolein, background levels alone exceed the TRVs. Generally, however, the proposed expansion does not alter the number of locations where contaminant levels are predicted to exceed the TRVs, nor the magnitude of any exceedance, except that there are a few receptor locations in close proximity to the airport where the annual BaP and 24-hour acrolein concentrations are predicted to increase by between 2 and 10%.

- A small increase in odour potential is anticipated due to the proposed expansion. The jet engines provide more complete combustion of odorous hydrocarbons in the fuel, but consume more fuel. The net effect is a small increase in the potential for odorous, unburnt hydrocarbons to be detected.

- The overall potential for soot impacts is expected to remain the same for the proposed expansion.

FIGURES



Study Area

Map Projection: NAD 1983 UTM Zone 17N

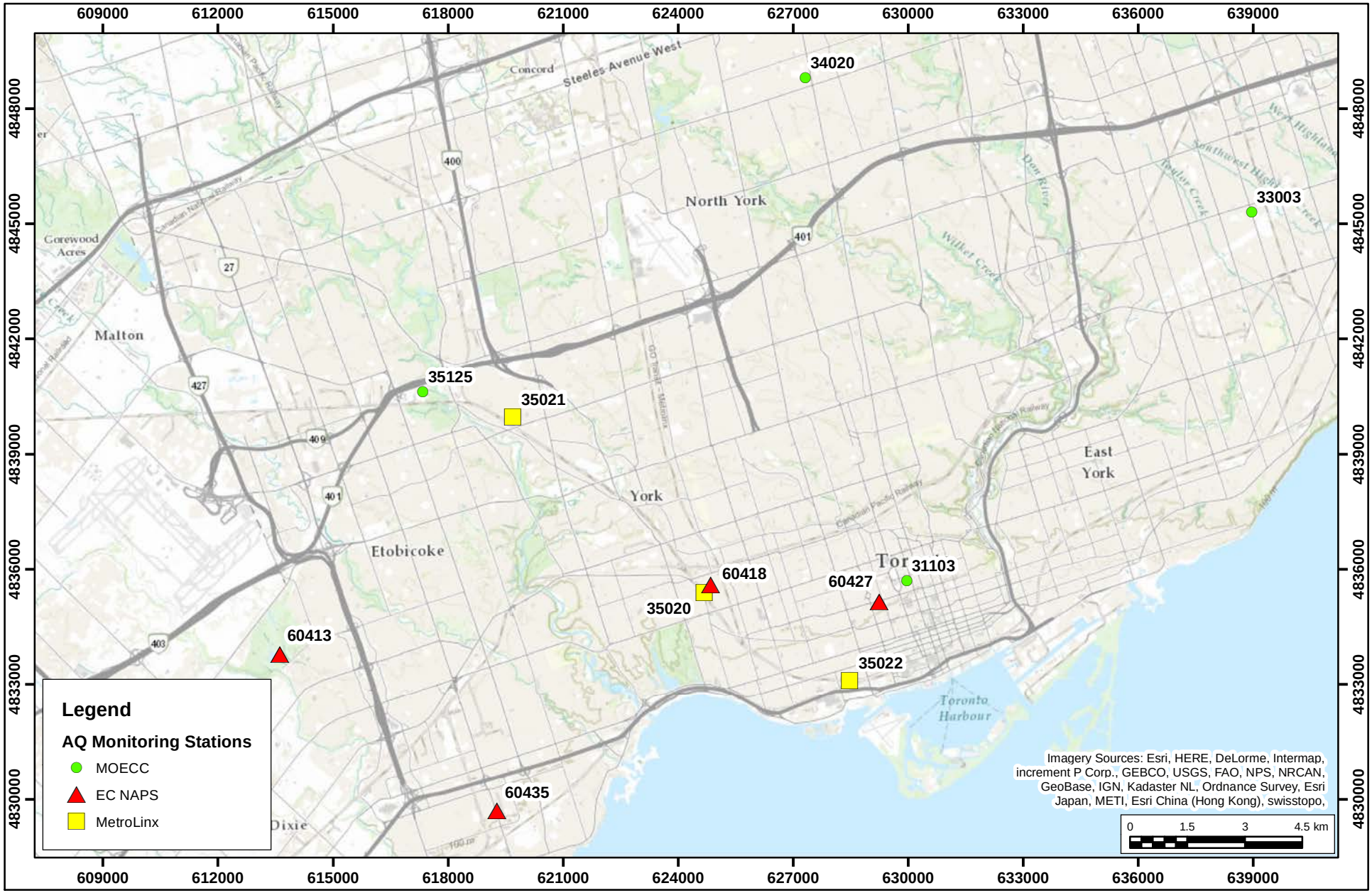
Air Quality Assessment of Billy Bishop Airport, Toronto, Ontario

True North

Project #1402032

Drawn by:	DJH	Fig:	1
Approx. Scale:	1:60,000		
Date Revised:	Nov. 29, 2016		

RWDI



Air Quality Monitoring Stations Used in Assessment

True North

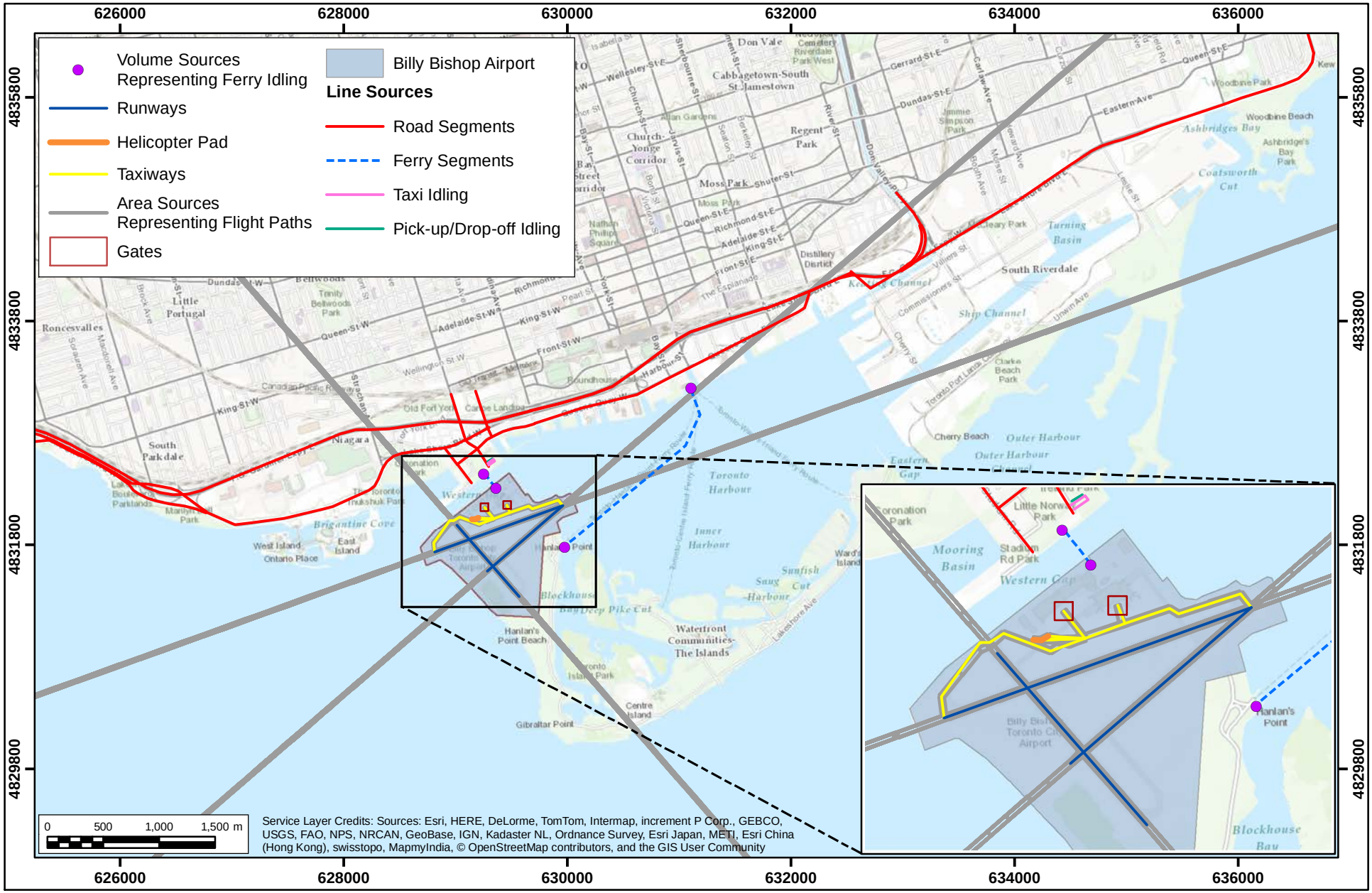
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Emissions Study for Billy Bishop Airport - Toronto, Ontario

Project #1402032

Drawn by:	NBN	Figure:	2
Approx. Scale:			1:140,000
Date Revised:			Oct. 23, 2015

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Modelled Sources for the Current Case (2012) and Future No Build (2032) scenario

True North

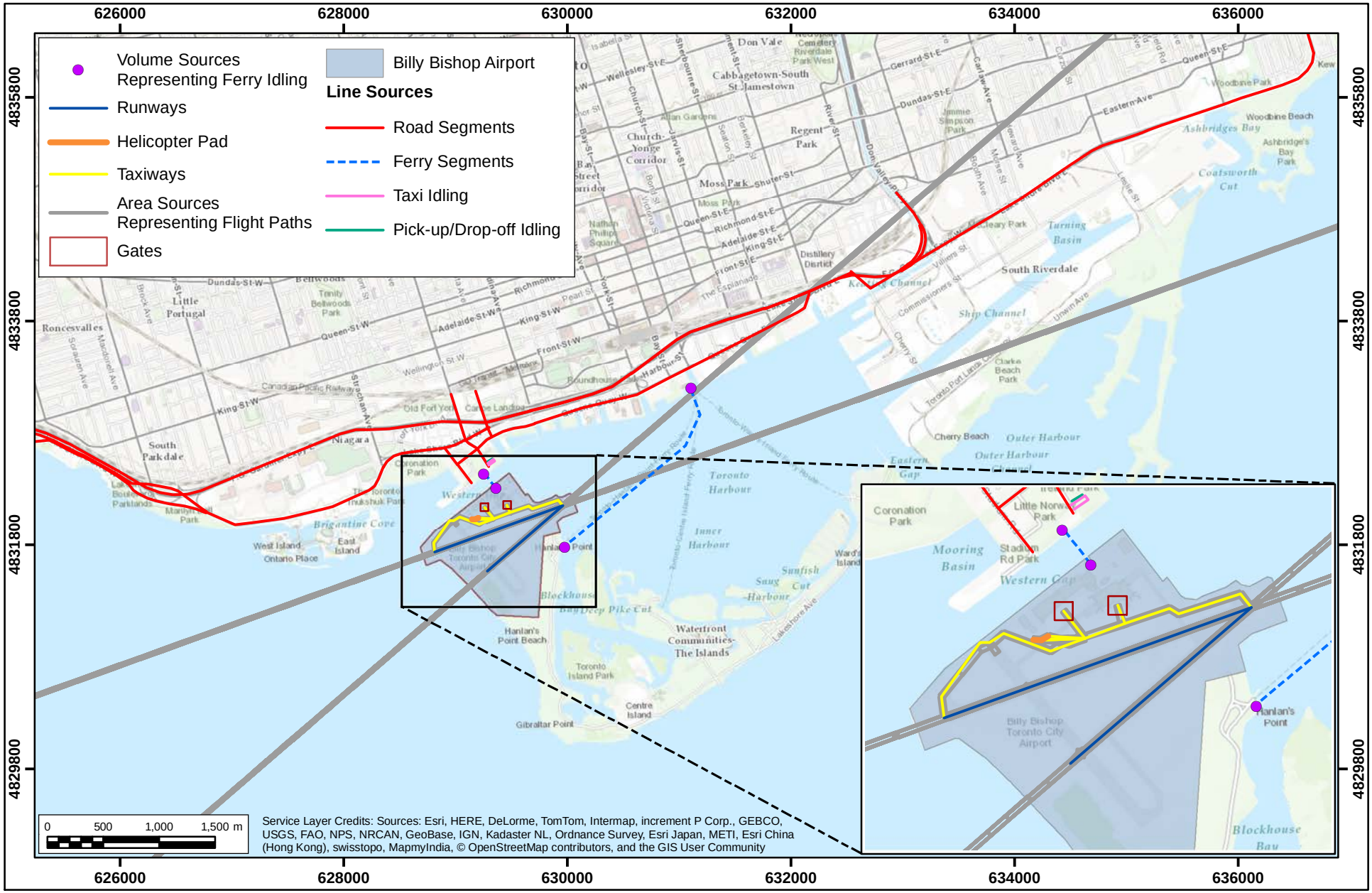
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Air Quality Assessment of Billy Bishop Airport, Toronto, Ontario

Project #1402032

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Approx. Scale:	1:48,000		
Date Revised:	Dec. 13, 2016		

RWDI



Modelled Sources for the Future Build Case (2032)

True North

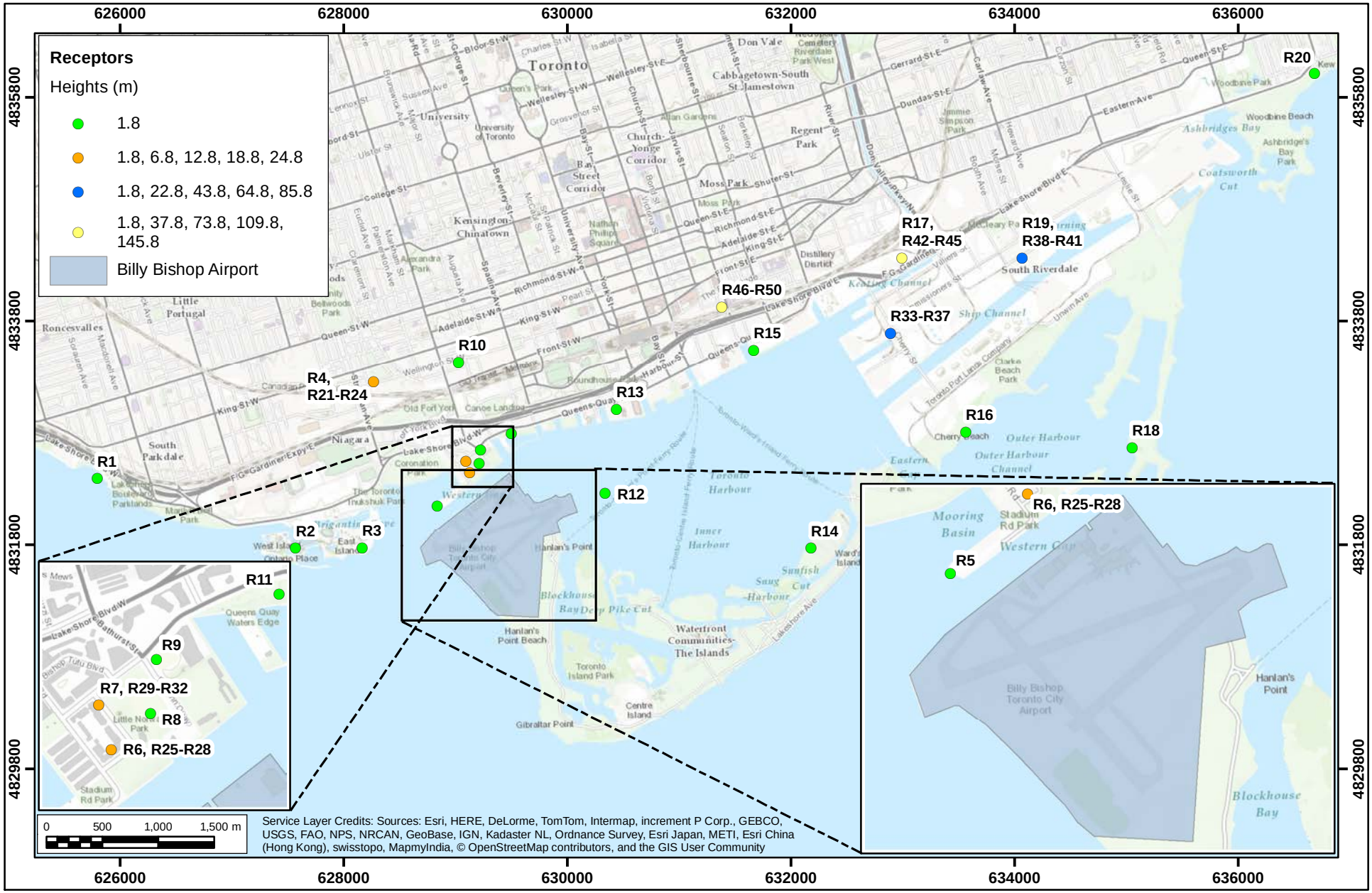
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Air Quality Assessment of Billy Bishop Airport, Toronto, Ontario

Project #1402032

Drawn by:	DJH	Fig:	4
Approx. Scale:	1:48,000		
Date Revised:	Dec. 13, 2016		

RWDI



Discrete Receptors

Map Projection: NAD 1983 UTM Zone 17N

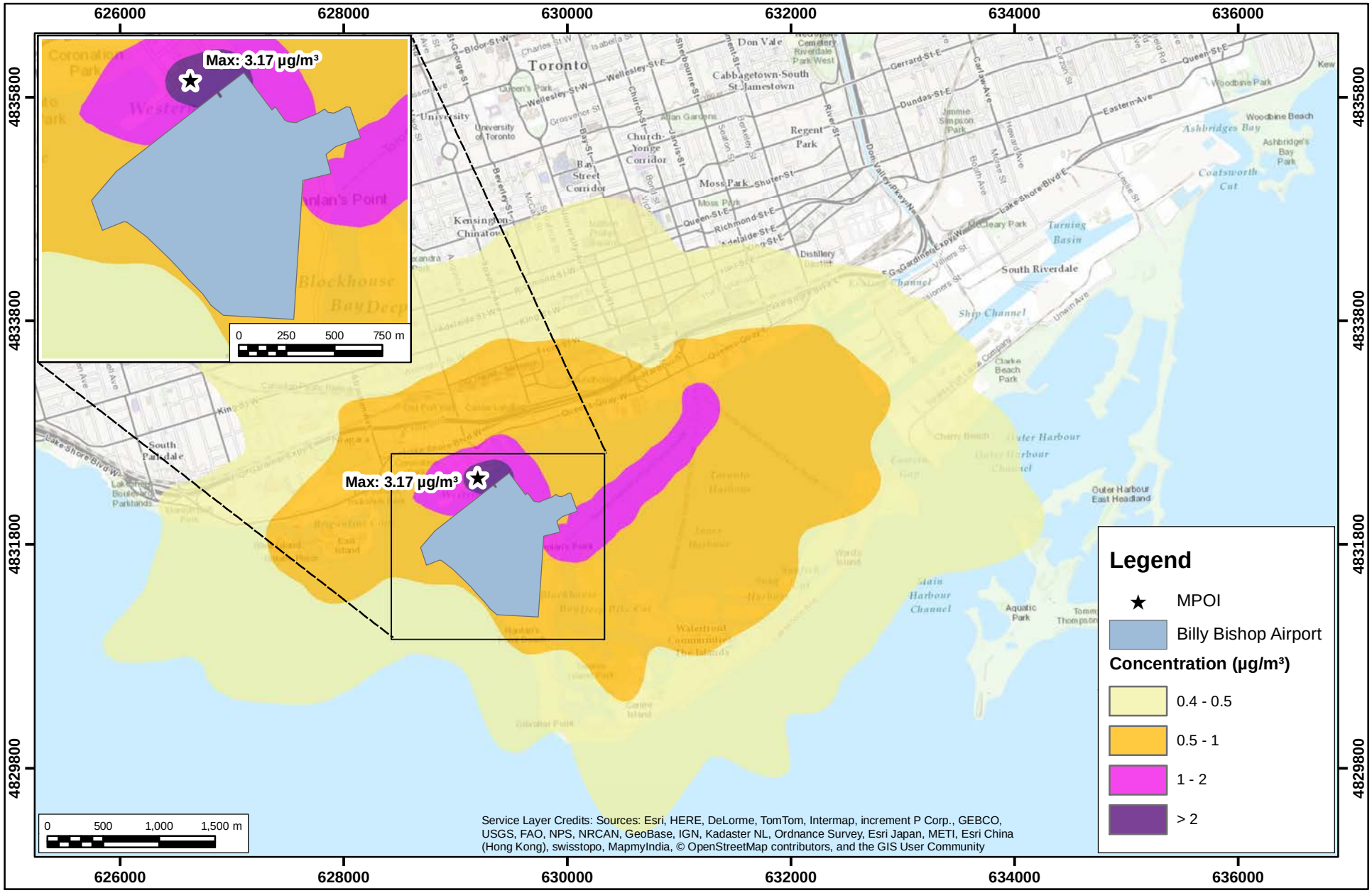
Air Quality Assessment of Billy Bishop Airport, Toronto, Ontario

True North

Project #1402032

Drawn by:	DJH	Fig:	5
Approx. Scale:	1:48,000		
Date Revised:	Dec. 1, 2016		

RWDI



Maximum 24-Hour Predicted Acrolein Concentrations with Background

Current Conditions - 2012

Toronto Public Health TRV = 0.4 µg/m^3

Map Projection: NAD 1983 UTM Zone 17N

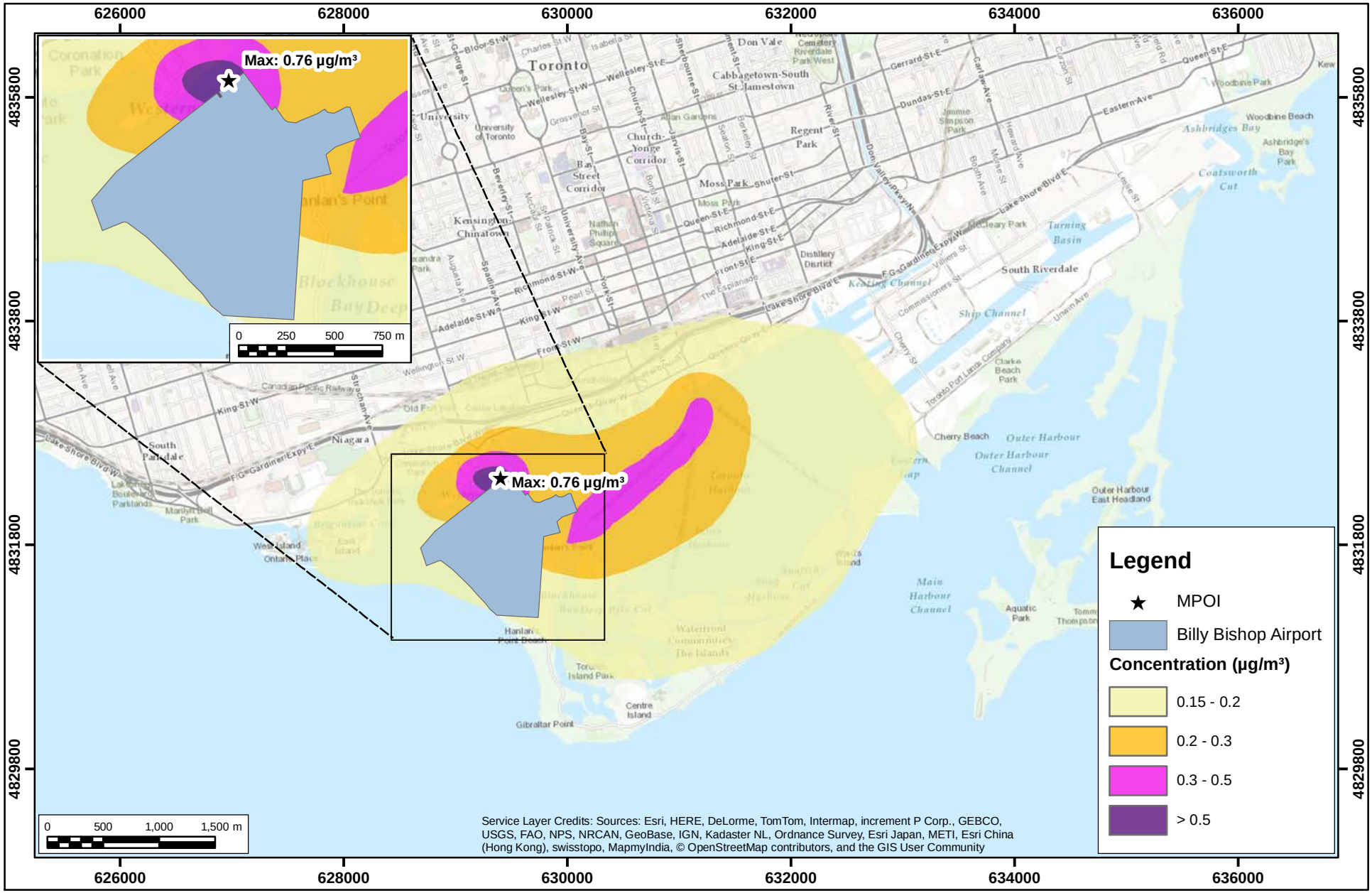
Air Quality Assessment of Billy Bishop Airport, Toronto, Ontario

True North

Project #1402032

Drawn by:	DJH	Fig:	6
Approx. Scale:	1:48,000		
Date Revised:	Nov. 30, 2016		

RWDI



Maximum Annual Predicted Acrolein Concentrations with Background

Current Conditions - 2012

Toronto Public Health TRV = 0.02 µg/m^3

Map Projection: NAD 1983 UTM Zone 17N

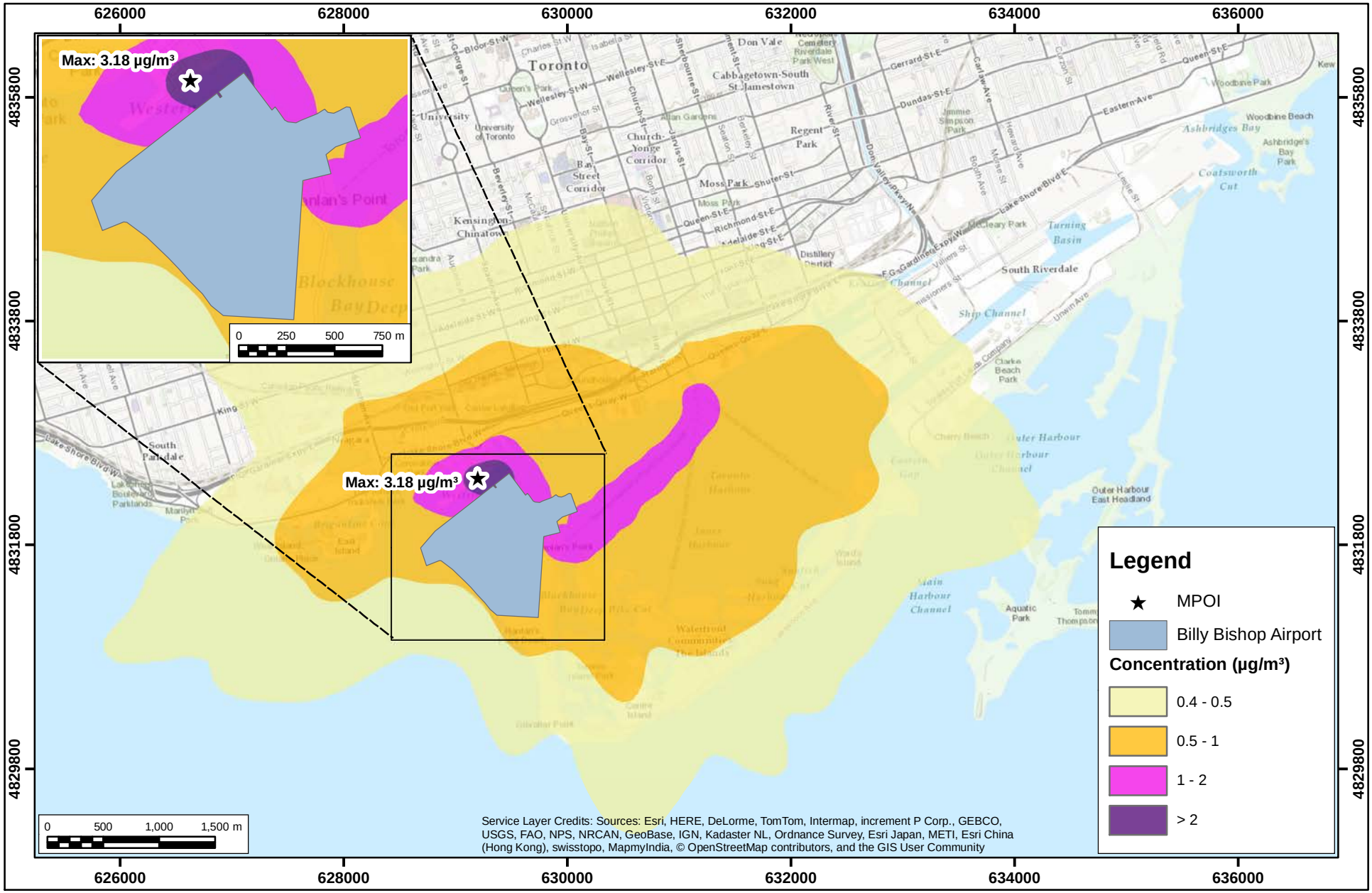
Air Quality Assessment of Billy Bishop Airport, Toronto, Ontario

True North

Project #1402032

Drawn by:	DJH	Fig:	7
Approx. Scale:	1:48,000		
Date Revised:	Nov. 30, 2016		

RWDI



Maximum 24-Hour Predicted Acrolein Concentrations with Background

Future Build - 2032

Toronto Public Health TRV = 0.4 µg/m^3

Map Projection: NAD 1983 UTM Zone 17N

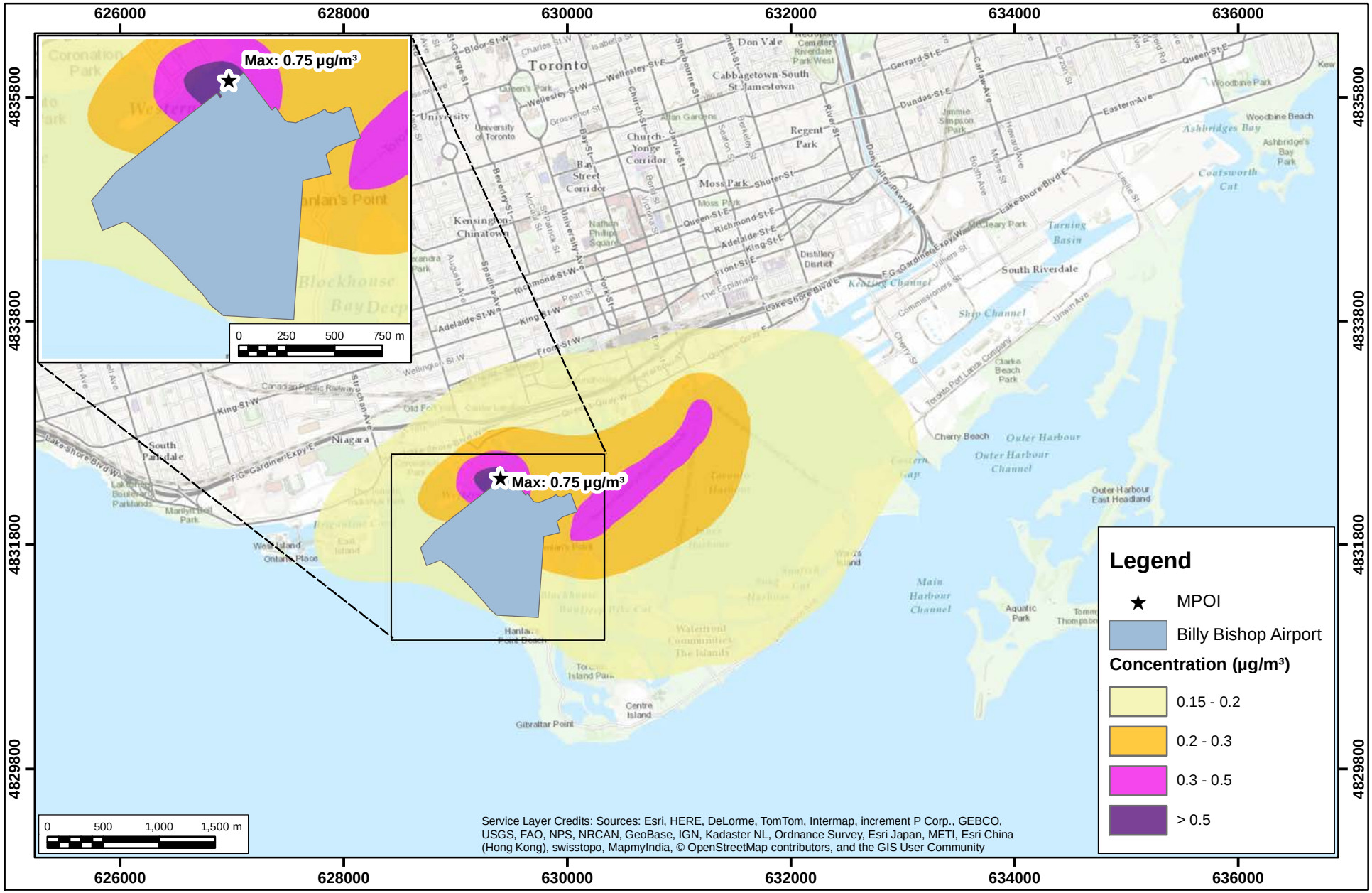
Air Quality Assessment of Billy Bishop Airport, Toronto, Ontario

True North

Project #1402032

Drawn by:	DJH	Fig:	8
Approx. Scale:	1:48,000		
Date Revised:	Nov. 30, 2016		

RWDI



Maximum Annual Predicted Acrolein Concentrations with Background

Future Build - 2032

Toronto Public Health TRV = 0.02 µg/m^3

True North

Map Projection: NAD 1983 UTM Zone 17N

Air Quality Assessment of Billy Bishop Airport, Toronto, Ontario

Project #1402032

Drawn by:	DJH	Fig:	9
Approx. Scale:	1:48,000		
Date Revised:	Nov. 30, 2016		

RWDI

APPENDIX A

Table 1: Contaminants of Acute Concern (24-hr Thresholds Unless Otherwise Specified)

Group	Contaminant	Aircraft Emissions Data Available?	Threshold ($\mu g/m^3$)	Source	Speciation % of PM	Speciation % of VOCs	Emissions (g/LTO)	Emission to Threshold Ratio
Inorganic Gases	Carbon Monoxide	yes	6000	TPH - 8hr	N/A	N/A	1894	0.32
	Nitrogen Oxides	yes	200	TPH	N/A	N/A	5917	30
	Sulphur dioxide	yes	275	TPH	N/A	N/A	489	1.8
	Ozone		100	TPH - 8hr	N/A	N/A	N/A	N/A
Particulate Matter	PM2.5	yes	27	TPH	N/A	N/A	0.99	0.037
	PM10	yes	50	TPH	N/A	N/A	0.99	0.020
Organic Gases	Total Hydrocarbons	yes	N/A	N/A	N/A	N/A	11	N/A
	Acetaldehyde	yes	500	TPH	N/A	4.5%	0.50	0.0010
	Acrolein	yes	0.4	TPH	N/A	2.3%	0.25	0.63
	Benzene	yes	29	TPH	N/A	3.6%	0.40	0.014
	1,4-Dichlorobenzene		95	TPH	N/A	N/A	N/A	N/A
	Dichloromethane		220	TPH	N/A	N/A	N/A	N/A
	Formaldehyde	yes	65	TPH	N/A	14%	1.6	0.024
	Tetrachloroethylene		360	TPH	N/A	N/A	N/A	N/A
	Toluene	yes	3800	TPH	N/A	0.98%	0.11	0.000028
	Trichloroethylene		12	TPH	N/A	N/A	N/A	N/A
	Vinyl chloride		1	TPH	N/A	N/A	N/A	N/A
Metals	Antimony	yes	25	TPH	0.064%	N/A	0.00064	0.000026
	Arsenic	yes	0.3	TPH	0.0055%	N/A	0.000055	0.00018
	Beryllium		0.01	TPH	N/A	N/A	N/A	N/A
	Boron		300	TPH	N/A	N/A	N/A	N/A
	Cadmium	yes	0.03	TPH	0.017%	N/A	0.00017	0.0055
	Chromium (total)	yes	0.5	TPH	0.091%	N/A	0.00090	0.0018
	Chromium (VI)		0.0007	TPH	N/A	N/A	N/A	N/A
	Cobalt	yes	0.1	TPH	0.0059%	N/A	0.000058	0.00058
	Manganese	yes	0.4	TPH	0.020%	N/A	0.00020	0.00049
	Selenium		10	TPH	N/A	N/A	N/A	N/A
	Strontium	yes	120	TPH	0.0014%	N/A	0.000014	0.00000012

Note:

The worst-case representatives from each group for contaminants of acute concern are highlighted in orange.

Table 2: Contaminants of Chronic Concern

Group	Contaminant	Aircraft Emissions Data Available?	Annual Threshold ($\mu g/m^3$)	Source	Speciation % of PM	Speciation % of VOCs	Emissions (g/LTO)	Emission to Threshold Ratio
Inorganic Gases	Carbon Monoxide	yes	N/A	N/A	N/A	N/A	1894	N/A
	Nitrogen Oxides	yes	40	WHO	N/A	N/A	5917	148
	Sulphur dioxide	yes	55	AAQC	N/A	N/A	489	8.9
	Ozone		N/A	N/A	N/A	N/A	N/A	N/A
Particulate Matter	PM2.5	yes	8.8	CAAQS - as of 2020	N/A	N/A	0.99	0.11
	PM10	yes	N/A	N/A	N/A	N/A	0.99	N/A
Organic Gases	Total Hydrocarbons	yes	N/A	N/A	N/A	N/A	11	N/A
	Acetaldehyde	yes	140	TPH	N/A	4.52%	0.50	0.0035
	Acrolein	yes	0.02	TPH	N/A	2.29%	0.25	13
	Benzene	yes	3	TPH	N/A	3.62%	0.40	0.13
	1,4-Dichlorobenzene		60	TPH	N/A	N/A	N/A	N/A
	Dichloromethane		400	TPH	N/A	N/A	N/A	N/A
	Formaldehyde	yes	9	TPH	N/A	14.24%	1.6	0.17
	Toluene	yes	5000	TPH	N/A	0.98%	0.11	0.000022
	Trichloroethylene		2	TPH	N/A	N/A	N/A	N/A
	Vinyl chloride		60	TPH	N/A	N/A	N/A	N/A
	1,3-Butadiene	yes	2	TPH	N/A	1.78%	0.20	0.098
	Carbon tetrachloride		100	TPH	N/A	N/A	N/A	N/A
	Chloroform		100	TPH	N/A	N/A	N/A	N/A
	Chloromethane		N/A		N/A	N/A	N/A	N/A
	1,2-Dichloroethane		400	TPH	N/A	N/A	N/A	N/A
	Ethylene dibromide		0.8	TPH	N/A	N/A	N/A	N/A
	Perchloroethylene		40	TPH	N/A	N/A	N/A	N/A
Metals	Cadmium	yes	0.005	TPH	0.017%	N/A	0.00017	0.033
	Chromium III	yes (assumed to be total)	0.5	TPH	0.091%	N/A	0.00090	0.0018
	Chromium VI		0.1	TPH	N/A	N/A	N/A	N/A
	Manganese	yes	0.05	TPH	0.020%	N/A	0.00020	0.0039
	Lead	yes	0.15	TPH	0.0018%	N/A	0.000018	0.00012
	Mercury compounds		0.03	TPH	N/A	N/A	N/A	N/A
	Nickel compounds	yes	0.014	TPH	0.013%	N/A	0.00013	0.0094
Polycyclic Aromatic Hydrocarbons	Benzo[a]Pyrene	yes	0.00001	AAQC	0.051%	N/A	0.00050	50

Note:

The worst-case representatives from each group for contaminants of chronic concern are highlighted in orange.

Table 3: Contaminants of Chronic Concern - Unit Risk Factors

Group	Contaminant	Aircraft Emissions Data Available?	Unit Risk Coefficient (person/(µg/m^3))	Source	Speciation % of PM	Speciation % of VOCs	Emissions (g/LTO)	Emission Unit Risk Product
Inorganic Gases	CO	yes	1.90E-03	N/A	N/A	N/A	1894	3.6E+00
	NO2	yes	7.48E-04	TPH	N/A	N/A	5917	4.4E+00
	SO2	yes	4.59E-04	TPH	N/A	N/A	489	2.2E-01
	Ozone		8.39E-04	TPH	N/A	N/A	N/A	N/A
Particulate Matter	PM2.5	yes	6.76E-03	TPH	N/A	N/A	0.99	6.7E-03
	PM10	yes	N/A	N/A	N/A	N/A	0.99	N/A
Organic Gases	Total Hydrocarbons	yes	N/A	N/A	N/A	N/A	11	N/A
	Acetaldehyde	yes	2.70E-06	TPH	N/A	4.52%	0.50	1.3E-06
	Acrolein	yes	N/A	N/A	N/A	2.29%	0.25	N/A
	Benzene	yes	2.90E-05	TPH	N/A	3.62%	0.40	1.2E-05
	1,4-Dichlorobenzene		1.10E-05	TPH	N/A	N/A	N/A	N/A
	Dichloromethane		1.00E-06	TPH	N/A	N/A	N/A	N/A
	Formaldehyde	yes	6.00E-06	TPH	N/A	14.24%	1.6	9.4E-06
	Toluene	yes	N/A	N/A	N/A	0.98%	0.11	N/A
	Trichloroethylene		4.10E-06	TPH	N/A	N/A	N/A	N/A
	Vinyl chloride		7.80E-05	TPH	N/A	N/A	N/A	N/A
	1,3-Butadiene	yes	5.00E-07	TPH	N/A	1.78%	0.20	9.8E-08
	Carbon tetrachloride		6.00E-06	TPH	N/A	N/A	N/A	N/A
	Chloroform		5.30E-06	TPH	N/A	N/A	N/A	N/A
	Chloromethane		N/A	N/A	N/A	N/A	N/A	N/A
	1,2-Dichloroethane		2.60E-05	TPH	N/A	N/A	N/A	N/A
	Ethylene dibromide		6.00E-04	TPH	N/A	N/A	N/A	N/A
	Perchloroethylene		2.60E-07	TPH	N/A	N/A	N/A	N/A
Metals	Cadmium	yes	9.80E-03	TPH	0.017%	N/A	0.00017	1.6E-06
	Chromium III	yes (assumed to be total)	N/A	N/A	0.091%	N/A	0.00090	N/A
	Chromium VI		7.60E-02	TPH	N/A	N/A	N/A	N/A
	Manganese	yes	N/A	N/A	0.020%	N/A	0.00020	N/A
	Lead	yes	1.20E-05	TPH	0.0018%	N/A	0.000018	2.1E-10
	Mercury compounds		N/A	N/A	N/A	N/A	N/A	N/A
	Nickel compounds	yes	2.60E-04	TPH	0.013%	N/A	0.00013	3.4E-08
Polycyclic Aromatic Hydrocarbons	Benzo[a]Pyrene	yes	8.70E-02	TPH	0.051%	N/A	0.00050	4.4E-05

Note:

The worst-case representatives from each group for contaminants of chronic concern are highlighted in orange.

For the inorganic gases, both CO and NO2 are highlighted as worst-case representatives as they show a comparable risk.

APPENDIX B

Summary of Ambient Air Quality Measurements for Nitrogen Dioxide

Toronto City Airport Runway Extension - Air Quality Assessment

Station ID	Station Name	Location	Year	Concentration (ppb)						
				1-hr Percentiles				Annual	MAX	
				50th	70th	90th	99th	Mean	1-hr	24-hr
MOE 31103	Toronto Downtown	Bay St. / Wellesley St. W	2009	14	20	29	44	16.5	67	40
			2010	14	19	29	48	16.1	69	41
			2011	13	18	27	42	14.9	54	36
			2012	11	16	25	38	13.4	57	36
			2013	12	16	24	40	13.5	60	33
MOE 33003	Toronto East	Kennedy Rd. / Lawrence Ave. E	2009	12	18	29	49	14.9	79	39
			2010	12	18	28	46	14.8	67	35
			2011	13	18	30	44	15.2	60	41
			2012	12	17	27	40	14.0	52	34
			2013	11	16	26	41	13.6	79	31
MOE 34020	Toronto North	Hendon Ave. / Yonge St.	2009	14	20	31	47	15.8	71	46
			2010	12	18	29	46	14.3	65	44
			2011	13	19	30	46	15.4	61	44
			2012	11	17	27	41	13.4	60	35
			2013	11	16	25	40	12.9	56	34
MOE 35125	Toronto West	125 Resources Rd.	2009	17	23	34	50	19.0	68	42
			2010	18	24	35	51	20.1	66	44
			2011	17	23	34	49	19.1	71	42
			2012	14	20	31	44	16.3	70	35
			2013	14	20	30	46	16.1	76	38
MTRLX 35020	Wallace	372 Wallace Avenue	2012	12	19	31	45	16	65	39
			2013	12	17	26	47	14	88	53
			2014	12	17	27	50	15	118	57
MTRLX 35021	Weston	1865 Weston Road	2011	15	21	32	50	18	83	48
			2012	15	21	33	46	17	66	39
			2013	15	21	32	49	17	80	51
			2014	13	19	31	55	17	91	59
MTRLX 35022	Strachan	10 Ordnance Street	2012	15	20	31	47	17	106	41
			2013	14	19	28	45	16	85	44
			2014	13	18	27	44	15	95	46
		AVERAGE (ppb):		13	19	29	46	15.7	73	42
		AVERAGE (µg/m^3):		26	37	58	90	31.1	144	82

Summary of Ambient Air Quality Measurements for Carbon Monoxide

Toronto City Airport Runway Extension - Air Quality Assessment

Station ID	Station Name	Location	Year	Concentration (ppm)						
				1-hr Percentiles				Annual	MAX	
				50th	70th	90th	99th	Mean	1-hr	8-hr
MOE 31103	Toronto Downtown	Bay St. / Wellesley St. W	2009	0.16	0.21	0.3	0.49	0.17	1.1	0.93
			2010	0.24	0.29	0.39	0.58	0.26	1.52	1.2
MOE 35125	Toronto West	125 Resources Rd.	2009	0.20	0.25	0.36	0.76	0.22	1.56	1.08
			2010	0.20	0.25	0.34	0.72	0.21	1.77	1.53
			2011	0.18	0.23	0.33	0.61	0.20	1.39	0.76
			2012	0.23	0.26	0.38	0.70	0.25	1.39	1.20
			2013	0.23	0.27	0.36	0.63	0.25	1.41	1.21
MTRLX 35020	Wallace	372 Wallace Avenue	2012	0.13	0.18	0.27	0.66	0.15	1.95	0.85
			2013	0.16	0.21	0.30	0.64	0.19	2.30	1.72
			2014	0.19	0.22	0.32	0.64	0.21	2.18	1.38
MTRLX 35021	Weston	1865 Weston Road	2011	0.15	0.20	0.31	0.71	0.18	2.12	1.24
			2012	0.16	0.20	0.32	0.69	0.18	1.70	1.19
			2013	0.17	0.21	0.31	0.63	0.19	1.88	1.38
			2014	0.17	0.21	0.31	0.65	0.19	1.90	1.21
MTRLX 35022	Strachan	10 Ordnance Street	2012	0.17	0.22	0.30	0.55	0.19	1.59	0.91
			2013	0.18	0.22	0.30	0.59	0.20	2.34	0.94
			2014	0.20	0.24	0.33	0.65	0.22	2.89	1.12
		AVERAGE (ppm):		0.18	0.23	0.33	0.64	0.20	1.82	1.17
		AVERAGE ($\mu g/m^3$):		221	274	392	773	245	2197	1407

Summary of Ambient Air Quality Measurements for $PM_{2.5}$

Toronto City Airport Runway Extension - Air Quality Assessment

Station ID	Station Name	Location	Year	Concentration (µg/m^3)						
				1-hr Percentiles				Annual	MAX	
				50th	70th	90th	99th	Mean	1-hr	24-hr
MOE 31103	Toronto Downtown	Bay St. / Wellesley St. W	2009	4	7	12	23	5.6	44	35
			2010	4	7	14	28	6.0	44	29
			2011	5	8	14	24	6.2	45	21
			2012	5	8	14	25	6.4	45	26
			2013	7	10	16	30	8.3	75	33
MOE 33003	Toronto East	Kennedy Rd. / Lawrence Ave. E	2009	4	7	12	24	5.9	55	36
			2010	5	8	15	31	6.7	63	32
			2011	5	8	14	24	6.2	37	21
			2012	5	8	14	24	6.3	70	21
			2013	6	9	16	34	8.2	64	33
MOE 34020	Toronto North	Hendon Ave. / Yonge St.	2009	4	7	13	23	5.9	43	36
			2010	4	8	14	28	6.2	38	28
			2011	6	10	17	31	7.7	47	30
			2012	6	9	16	27	7.3	43	24
			2013	7	10	16	33	8.3	54	32
MOE 35125	Toronto West	125 Resources Rd.	2009	5	7	13	23	6.1	45	34
			2010	5	8	15	27	6.5	46	26
			2011	5	9	15	26	6.9	45	24
			2012	6	9	15	26	7.1	45	23
			2013	7	10	18	33	8.8	75	34
MTRLX 35020	Wallace	372 Wallace Avenue	2012	7	11	18	35	9	54	35
			2013	7	11	19	36	9	90	33
			2014	8	12	20	43	10	223	39
MTRLX 35021	Weston	1865 Weston Road	2011	6	11	20	36	9	52	36
			2012	7	11	18	36	9	104	36
			2013	7	11	19	34	9	59	33
			2014	8	11	19	38	10	87	38
MTRLX 35022	Strachan	10 Ordnance Street	2012	7	11	19	35	9	97	37
			2013	8	11	19	36	9	113	35
			2014	8	12	20	38	10	103	33
		$PM_{2.5}$ AVERAGE (µg/m^3):		6	9	16	30	7.7	67	31

Summary of Ambient Air Quality Measurements for Ozone

Toronto City Airport Runway Extension - Air Quality Assessment

Station ID	Station Name	Location	Year	Concentration (ppb)						
				1-hr Percentiles				Annual Mean	MAX	
				50th	70th	90th	99th		1-hr	24-hr
MOE 31103	Toronto Downtown	Bay St. / Wellesley St. W	2009	24	31	42	58	24.6	89	61
			2010	25	32	44	66	26.1	102	61
			2011	25	32	42	61	25.4	88	58
			2012	25	32	46	69	26.6	90	62
			2013	25	32	43	60	26.2	90	54
MOE 33003	Toronto East	Kennedy Rd. / Lawrence Ave. E	2009	21	29	40	57	22.1	82	54
			2010	22	29	41	61	23.0	104	58
			2011	23	30	40	61	23.3	82	57
			2012	23	30	44	69	24.6	89	65
			2013	24	30	40	60	24.1	87	58
MOE 34020	Toronto North	Hendon Ave. / Yonge St.	2009	22	29	38	55	22.1	83	57
			2010	25	31	41	60	24.8	98	57
			2011	23	30	40	61	23.6	85	57
			2012	25	32	44	70	25.7	92	61
			2013	25	31	40	60	25.3	87	56
MOE 35125	Toronto West	125 Resources Rd.	2009	18	26	39	58	19.5	85	53
			2010	19	27	40	63	20.6	95	56
			2011	19	27	38	61	20.1	87	53
			2012	20	27	42	69	21.5	94	58
			2013	20	28	39	60	21.5	83	53
		AVERAGE (ppb):		23	30	41	62	23.5	90	57
		AVERAGE ($\mu g/m^3$):		47	61	85	128	48.6	185	119

Summary of Ambient Air Quality Measurements for Benzene

Toronto City Airport Runway Extension - Air Quality Assessment

Station ID	Station Name	Location	Year	Concentration (µg/m^3)					
				24-hr Percentiles				Annual Mean	MAX 24-hr
				50th	70th	90th	99th		
NAPS 60413	Centennial Park	Elmcrest Road	2009	0.4893	0.6051	0.9142	1.244	0.5589	1.3176
			2010	0.4875	0.5632	0.7929	1.279	0.5062	1.6252
			2011	INS	INS	INS	INS	INS	INS
			2012	0.4088	0.6639	0.8362	1.1919	0.4975	1.2791
			2013	0.4394	0.5587	0.8171	1.0408	0.4981	1.1179
NAPS 60427	Gage Institute	223 College St.	2009	0.7381	0.898	1.2124	1.5143	0.7686	1.557
			2010	0.7619	0.9181	1.1586	1.4715	0.7691	1.5708
			2011	0.5553	0.6494	0.9002	1.0894	0.5915	1.1194
			2012	0.5633	0.7406	0.9804	1.244	0.6221	1.3435
			2013	0.5701	0.6939	0.9165	1.4733	0.6107	2.0300
NAPS 60435	Etobicoke South	461 Kipling Ave.	2009	0.5476	0.6048	0.8784	1.2938	0.5352	1.3829
			2010	0.5242	0.6585	0.9209	1.5393	0.5742	1.5571
			2011	INS	INS	INS	INS	INS	INS
			2012	0.4476	0.5783	0.8672	1.31	0.5129	1.3980
			2013	0.4564	0.5593	0.8575	1.2482	0.5065	1.2733
MTRLX 35020	Wallace	372 Wallace Avenue	2012	N/A	N/A	N/A	N/A	0.93	3.20
			2013	N/A	N/A	N/A	N/A	0.91	5.40
			2014	N/A	N/A	N/A	N/A	0.83	4.70
MTRLX 35021	Weston	1865 Weston Road	2011	N/A	N/A	N/A	N/A	0.93	2.50
			2012	N/A	N/A	N/A	N/A	1.10	4.40
			2013	N/A	N/A	N/A	N/A	0.86	4.40
			2014	N/A	N/A	N/A	N/A	0.75	2.20
MTRLX 35022	Strachan	10 Ordnance Street	2012	N/A	N/A	N/A	N/A	0.82	2.30
			2013	N/A	N/A	N/A	N/A	0.72	1.50
			2014	N/A	N/A	N/A	N/A	0.73	3.30
		AVERAGE (µg/m^3):		0.54	0.67	0.93	1.30	0.70	2.28

Notes:

INS - Insufficient data to calculate valid statistics.

Summary of Ambient Air Quality Measurements for Acrolein

Toronto City Airport Runway Extension - Air Quality Assessment

Station ID	Station Name	Location	Year	Concentration (µg/m^3)					
				24-hr Percentiles				Annual Mean	MAX 24-hr
				50th	70th	90th	99th		
NAPS 60418	Junction Triangle	Ruskin/Perth St.	2002	0.11	0.13	0.20	0.29	0.12	0.29
			2003	INS	INS	INS	INS	INS	INS
			2004	0.06	0.09	0.14	0.29	0.09	0.35
			2005	0.05	0.08	0.57	1.11	0.19	1.17
			2006	INS	INS	INS	INS	INS	INS
		AVERAGE (µg/m^3):		0.07	0.10	0.30	0.56	0.13	0.61

Notes:

INS - Insufficient data to calculate valid statistics.

Summary of Ambient Air Quality Measurements for Benzo(a)Pyrene

Toronto City Airport Runway Extension - Air Quality Assessment

Station ID	Station Name	Location	Year	Concentration (ng/m^3)					
				24-hr Percentiles				Annual Mean	MAX 24-hr
				50th	70th	90th	99th		
NAPS 60427	Gage Institute	223 College St.	2009	0.0525	0.0668	0.1055	0.1578	0.0608	0.1612
			2010	0.0832	0.0923	0.1542	0.883	0.1168	1.0815
			2011	0.0613	0.0726	0.1466	0.5011	0.0884	0.5745
			2012	0.0481	0.0801	0.132	0.5207	0.0813	0.6237
			2013	0.0461	0.0655	0.1017	0.1764	0.0579	0.1926
NAPS 60435	Etobicoke South	461 Kipling Ave.	2009	INS	INS	INS	INS	INS	INS
			2010	0.0438	0.0841	0.1431	0.1928	0.0631	0.2044
			2011	INS	INS	INS	INS	INS	INS
MTRLX 35020	Wallace	372 Wallace Avenue	2012	N/A	N/A	N/A	N/A	0.18	0.51
			2013	N/A	N/A	N/A	N/A	<0.331	0.39
			2014	N/A	N/A	N/A	N/A	<0.492	10.00
MTRLX 35021	Weston	1865 Weston Road	2011	N/A	N/A	N/A	N/A	<0.330	<0.330
			2012	N/A	N/A	N/A	N/A	0.17	0.63
			2013	N/A	N/A	N/A	N/A	<0.330	<0.34
			2014	N/A	N/A	N/A	N/A	<0.330	<0.330
MTRLX 35022	Strachan	10 Ordnance Street	2012	N/A	N/A	N/A	N/A	0.44	0.54
			2013	N/A	N/A	N/A	N/A	<0.331	0.36
			2014	N/A	N/A	N/A	N/A	<0.330	0.35
		AVERAGE (ng/m^3):		0.06	0.08	0.13	0.41	0.14	1.20

Notes:

INS - Insufficient data to calculate valid statistics.

Summary of Ambient Air Quality Measurements for Cadmium

Toronto City Airport Runway Extension - Air Quality Assessment

Station ID	Station Name	Location	Year	Concentration (µg/m^3)					
				24-hr Percentiles				Annual Mean	MAX 24-hr
				50th	70th	90th	99th		
NAPS 60427	Gage Institute	223 College St.	2009	0.0024	0.0077	0.011	0.013	0.0042	0.017
			2010	0.0019	0.0037	0.0053	0.0078	0.0023	0.0078
			2011	0.0017	0.0025	0.0049	0.0072	0.0020	0.0073
			2012	0.0022	0.0044	0.010	0.015	0.0037	0.017
			2013	0.0016	0.0029	0.0046	0.0082	0.0020	0.010
NAPS 60435	Etobicoke South	461 Kipling Ave.	2009	0.0031	0.0078	0.010	0.013	0.0044	0.013
			2010	0.0023	0.0039	0.0058	0.0092	0.0027	0.0097
			2011	INS	INS	INS	INS	INS	INS
			2012	0.0017	0.0032	0.013	0.017	0.0038	0.020
			2013	0.0015	0.0029	0.0035	0.0075	0.0018	0.0082
MTRLX 35020	Wallace	372 Wallace Avenue	2012	N/A	N/A	N/A	N/A	<0.0012	<0.0012
			2013	N/A	N/A	N/A	N/A	<0.0012	<0.0012
			2014	N/A	N/A	N/A	N/A	<0.0012	<0.0012
MTRLX 35021	Weston	1865 Weston Road	2011	N/A	N/A	N/A	N/A	<0.0012	<0.0012
			2012	N/A	N/A	N/A	N/A	<0.0012	<0.0012
			2013	N/A	N/A	N/A	N/A	<0.0012	<0.0012
			2014	N/A	N/A	N/A	N/A	<0.0012	0.0019
MTRLX 35022	Strachan	10 Ordnance Street	2012	N/A	N/A	N/A	N/A	<0.0012	<0.0012
			2013	N/A	N/A	N/A	N/A	<0.0012	<0.0012
			2014	N/A	N/A	N/A	N/A	<0.0012	<0.0012
		AVERAGE (µg/m^3):		0.0020	0.0043	0.0075	0.0109	0.0030	0.0111

Notes:

INS - Insufficient data to calculate valid statistics.

Summary of Ambient Air Quality Measurements for Ozone

Toronto City Airport Runway Extension - Air Quality Assessment

Station ID	Station Name	Location	Year	Concentration (ppb)						
				1-hr Percentiles				Annual Mean	MAX	
				50th	70th	90th	99th		1-hr	24-hr
MOE 31103	Toronto Downtown	Bay St. / Wellesley St. W	2009	24	31	42	58	24.6	89	61
			2010	25	32	44	66	26.1	102	61
			2011	25	32	42	61	25.4	88	58
			2012	25	32	46	69	26.6	90	62
			2013	25	32	43	60	26.2	90	54

Note : Hourly ozone concentrations for year 2012 was used for the modelling assessment

APPENDIX C

Table C1: MOVES Key Model Input Parameters

Parameter	Input
Pollutants	CO, NO_X, $PM_{2.5}$, Benzene, Acrolein, Benzo(a)Pyrene
Operating Year	2012 and 2032
Evaluation Month	July
Ambient Temperature	Minimum Daily Temperature: July = 62.0 °F (16.7°C) Maximum Daily Temperature: July = 78.0 °F (25.5°C) (Canadian Climate Normal, Toronto Island Airport, ON)
Altitude	Low
Relative Humidity at 6:00 LST	July = 81.9%
Relative Humidity at 15:00 LST	July = 65.8%
Fuel Volatility	Reid Vapor Pressure (RVP) = 9 psi
Fuel Program	Conventional Gasoline East
Vehicle Speed	Gardiner Expressway = 60 km/h ; All other roads = 50 km/h
Idling Emissions	Only for taxi and pick-up / drop off
Intersection Delay	Not considered
Vehicle Distribution	Passenger Cars = 96%; Medium Trucks = 2.5%; and Heavy trucks = 1.5%

Table C2: Roadway Sections included in the Study

Road Name	Section
Lakeshore Blvd.	From Woodbine Ave to Parkside Dr.
Gardiner Expressway	From DVP to Parkside Dr.
Queens Quay	From Parliament St. to Stadium Rd.
Dan Leckie Way	From Fort York Blvd. to Queens Quay
Bathurst Street	From Fort York Blvd. to Eireann Quay Ferry Terminal
Stadium Rd	From Lakeshore Blvd. to south of Little Norway Cr.

Table C3a: Summary of MOVES Output for the Month of July 2012 (Speed 60 km/h)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/vmt)	NOx (g/vmt)	PM2.5 (g/vmt)	Benzo-(a)-Pyrene (g/vmt)	Benzene (g/vmt)	Acrolein (g/vmt)	Cadmium [1] (g/vmt)
Gardiner	Morning (am)	Auto	400	4.90E+00	8.74E-01	1.50E-02	6.52E-08	9.85E-03	2.01E-04	2.26E-06
	Morning (am)	Medium	1019	1.09E+01	7.11E+00	4.49E-01	9.72E-08	2.07E-02	5.42E-03	6.73E-05
	Morning (am)	Heavy	1749	4.18E+00	1.52E+01	8.72E-01	7.20E-10	6.21E-03	5.15E-03	1.31E-04
	Afternoon (pm)	Auto	419	6.16E+00	8.71E-01	1.35E-02	6.83E-08	1.03E-02	2.11E-04	2.03E-06
	Afternoon (pm)	Medium	1075	1.09E+01	6.64E+00	4.47E-01	9.72E-08	2.07E-02	5.42E-03	6.71E-05
	Afternoon (pm)	Heavy	1829	4.18E+00	1.43E+01	8.72E-01	7.20E-10	6.21E-03	5.15E-03	1.31E-04
	Midday (md)	Auto	418	6.08E+00	8.70E-01	1.35E-02	6.81E-08	1.03E-02	2.10E-04	2.03E-06
	Midday (md)	Medium	1071	1.09E+01	6.66E+00	4.47E-01	9.72E-08	2.07E-02	5.42E-03	6.71E-05
	Midday (md)	Heavy	1824	4.18E+00	1.43E+01	8.72E-01	7.20E-10	6.21E-03	5.15E-03	1.31E-04
	Overnight (on)	Auto	400	4.90E+00	8.57E-01	1.45E-02	6.52E-08	9.85E-03	2.01E-04	2.17E-06
	Overnight (on)	Medium	1019	1.09E+01	7.01E+00	4.48E-01	9.72E-08	2.07E-02	5.42E-03	6.73E-05
	Overnight (on)	Heavy	1749	4.18E+00	1.50E+01	8.72E-01	7.20E-10	6.21E-03	5.15E-03	1.31E-04

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3b: Summary of MOVES Output for the Month of July 2012 (Speed 50 km/h)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/vmt)	NOx (g/vmt)	PM2.5 (g/vmt)	Benzo-(a)-Pyrene (g/vmt)	Benzene (g/vmt)	Acrolein (g/vmt)	Cadmium [1] (g/vmt)
Other Roads	Morning (am)	Auto	421	5.63E+00	8.94E-01	1.83E-02	7.73E-08	1.17E-02	2.34E-04	2.75E-06
	Morning (am)	Medium	1127	1.36E+01	7.84E+00	4.97E-01	1.35E-07	2.67E-02	5.81E-03	7.45E-05
	Morning (am)	Heavy	2075	4.86E+00	1.76E+01	1.13E+00	1.03E-09	6.85E-03	5.64E-03	1.70E-04
	Afternoon (pm)	Auto	442	7.08E+00	8.95E-01	1.66E-02	8.08E-08	1.22E-02	2.45E-04	2.50E-06
	Afternoon (pm)	Medium	1190	1.36E+01	7.31E+00	4.95E-01	1.35E-07	2.67E-02	5.81E-03	7.42E-05
	Afternoon (pm)	Heavy	2169	4.86E+00	1.65E+01	1.13E+00	1.03E-09	6.85E-03	5.64E-03	1.70E-04
	Midday (md)	Auto	440	6.98E+00	8.94E-01	1.66E-02	8.05E-08	1.22E-02	2.44E-04	2.50E-06
	Midday (md)	Medium	1185	1.36E+01	7.34E+00	4.95E-01	1.35E-07	2.67E-02	5.81E-03	7.42E-05
	Midday (md)	Heavy	2163	4.86E+00	1.66E+01	1.13E+00	1.03E-09	6.85E-03	5.64E-03	1.70E-04
	Overnight (on)	Auto	421	5.63E+00	8.77E-01	1.77E-02	7.73E-08	1.17E-02	2.34E-04	2.66E-06
	Overnight (on)	Medium	1127	1.36E+01	7.73E+00	4.96E-01	1.35E-07	2.67E-02	5.81E-03	7.44E-05
	Overnight (on)	Heavy	2075	4.86E+00	1.74E+01	1.13E+00	1.03E-09	6.85E-03	5.64E-03	1.70E-04

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3c: Summary of MOVES Output for the Month of July 2032 (Speed 60 km/h)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/vmt)	NOx (g/vmt)	PM2.5 (g/vmt)	Benzo-(a)-Pyrene (g/vmt)	Benzene (g/vmt)	Acrolein (g/vmt)	Cadmium [1] (g/vmt)
Gardiner	Morning (am)	Auto	246	1.19E+00	7.54E-02	8.86E-03	5.87E-09	9.71E-04	2.05E-05	1.33E-06
	Morning (am)	Medium	955	1.50E+00	9.91E-01	4.14E-02	1.05E-08	2.44E-03	6.04E-04	6.21E-06
	Morning (am)	Heavy	1664	6.79E-01	2.38E+00	1.22E-01	1.71E-13	1.19E-03	9.64E-04	1.83E-05
	Afternoon (pm)	Auto	257	1.50E+00	7.48E-02	8.85E-03	6.05E-09	1.00E-03	2.13E-05	1.33E-06
	Afternoon (pm)	Medium	1011	1.50E+00	9.24E-01	4.14E-02	1.05E-08	2.44E-03	6.04E-04	6.21E-06
	Afternoon (pm)	Heavy	1744	6.79E-01	2.23E+00	1.22E-01	1.71E-13	1.19E-03	9.64E-04	1.83E-05
	Midday (md)	Auto	257	1.48E+00	7.47E-02	8.85E-03	6.04E-09	1.00E-03	2.12E-05	1.33E-06
	Midday (md)	Medium	1007	1.50E+00	9.27E-01	4.14E-02	1.05E-08	2.44E-03	6.04E-04	6.21E-06
	Midday (md)	Heavy	1739	6.79E-01	2.24E+00	1.22E-01	1.71E-13	1.19E-03	9.64E-04	1.83E-05
	Overnight (on)	Auto	246	1.19E+00	7.40E-02	8.86E-03	5.87E-09	9.71E-04	2.05E-05	1.33E-06
	Overnight (on)	Medium	955	1.50E+00	9.77E-01	4.14E-02	1.05E-08	2.44E-03	6.04E-04	6.21E-06
	Overnight (on)	Heavy	1664	6.79E-01	2.35E+00	1.22E-01	1.71E-13	1.19E-03	9.64E-04	1.83E-05

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3d: Summary of MOVES Output for the Month of July 2032 (Speed 50 km/h)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/vmt)	NOx (g/vmt)	PM2.5 (g/vmt)	Benzo-(a)-Pyrene (g/vmt)	Benzene (g/vmt)	Acrolein (g/vmt)	Cadmium [1] (g/vmt)
Other Roads	Morning (am)	Auto	257	1.37E+00	7.37E-02	1.18E-02	6.75E-09	1.12E-03	2.33E-05	1.77E-06
	Morning (am)	Medium	1057	1.73E+00	1.04E+00	4.79E-02	1.51E-08	3.22E-03	6.29E-04	7.18E-06
	Morning (am)	Heavy	1974	7.58E-01	2.78E+00	1.60E-01	2.65E-13	1.34E-03	1.09E-03	2.40E-05
	Afternoon (pm)	Auto	270	1.74E+00	7.35E-02	1.18E-02	6.97E-09	1.15E-03	2.42E-05	1.77E-06
	Afternoon (pm)	Medium	1120	1.73E+00	9.71E-01	4.78E-02	1.51E-08	3.22E-03	6.29E-04	7.18E-06
	Afternoon (pm)	Heavy	2068	7.58E-01	2.60E+00	1.60E-01	2.65E-13	1.34E-03	1.09E-03	2.40E-05
	Midday (md)	Auto	269	1.71E+00	7.34E-02	1.18E-02	6.96E-09	1.15E-03	2.42E-05	1.77E-06
	Midday (md)	Medium	1115	1.73E+00	9.74E-01	4.78E-02	1.51E-08	3.22E-03	6.29E-04	7.18E-06
	Midday (md)	Heavy	2061	7.58E-01	2.61E+00	1.60E-01	2.65E-13	1.34E-03	1.09E-03	2.40E-05
	Overnight (on)	Auto	257	1.37E+00	7.23E-02	1.18E-02	6.75E-09	1.12E-03	2.33E-05	1.77E-06
	Overnight (on)	Medium	1057	1.73E+00	1.03E+00	4.79E-02	1.51E-08	3.22E-03	6.29E-04	7.18E-06
	Overnight (on)	Heavy	1974	7.58E-01	2.74E+00	1.60E-01	2.65E-13	1.34E-03	1.09E-03	2.40E-05

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3e: Summary of MOVES Output for the Month of July 2012 (Idling Emissions)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/hr)	NOx (g/hr)	PM2.5 (g/hr)	Benzo-(a)-Pyrene (g/hr)	Benzene (g/hr)	Acrolein (g/hr)	Cadmium [1] (g/hr)
Passenger Pickup and Dropoff	Morning (am)	Auto	3872	3.99E+01	2.60E+00	9.05E-02	1.02E-06	1.52E-01	3.26E-03	1.36E-05
	Afternoon (pm)	Auto	4262	4.11E+01	5.49E+00	8.16E-02	1.03E-06	1.55E-01	3.32E-03	1.22E-05
	Midday (md)	Auto	4236	4.10E+01	5.30E+00	8.16E-02	1.03E-06	1.55E-01	3.32E-03	1.22E-05
	Overnight (on)	Auto	3872	3.99E+01	2.55E+00	8.73E-02	1.02E-06	1.52E-01	3.26E-03	1.31E-05

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3f: Summary of MOVES Output for the Month of July 2032 (Idling Emissions)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/hr)	NOx (g/hr)	PM2.5 (g/hr)	Benzo-(a)-Pyrene (g/hr)	Benzene (g/hr)	Acrolein (g/hr)	Cadmium [1] (g/hr)
Passenger Pickup and Dropoff	Morning (am)	Auto	2345	2.56E+00	1.35E-01	3.05E-02	5.24E-08	8.73E-03	2.26E-04	4.58E-06
	Afternoon (pm)	Auto	2586	2.59E+00	2.52E-01	3.04E-02	5.27E-08	8.77E-03	2.29E-04	4.57E-06
	Midday (md)	Auto	2570	2.59E+00	2.45E-01	3.04E-02	5.26E-08	8.77E-03	2.29E-04	4.57E-06
	Overnight (on)	Auto	2345	2.56E+00	1.32E-01	3.05E-02	5.24E-08	8.73E-03	2.26E-04	4.57E-06

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C4a: Summary of Re-entrained Road Dust Parameters: Default Summer Surface Silt Loading [from AP-42 Table 13.2.1-2]

Traffic Volume	sL (g/m^2)
High Volume (AADT >10000, restricted access)	0.015
High Volume (AADT >10000)	0.03
Moderate Volume (AADT 5000 to 10000)	0.06
Low Volume (AADT 500 to 5000)	0.2
Other (AADT <500)	0.6

Table C4b: Summary of Re-entrained Road Dust Parameters: Average Weight of the Vehicles Traveling the Road
[Based on MOBILE6.2c VMT Distribution and Average Weight]

Model Year	Auto Weight (tons)	Medium Trucks Weight (tons)	Heavy trucks Weight (tons)
2012	1.76	14.50	23.32
2032	1.79	14.52	23.28

Notes:

Road dust emissions were calculated using AP-42 Chapter 13.2.1

$E = k\,(sL)^{0.91} \times (W)^{1.02}$

E = particulate emission factor (having units matching the units of k),
k = particle size multiplier for particle size range and units of interest ($PM_{2.5}$ = 0.25 g/VMT, and PM_{10} = 1 g/VMT)),
sL = road surface silt loading (grams per square meter) (g/m^2), and
W = average weight (tons) of the vehicles traveling the road.

C5: Hourly Traffic Distribution

Hour ID	Existing 2012 - 16 flights per hour				Future 2032 - 24 flights CS100			
	QQE	QQW	LSB	GARD	QQE	QQW	LSB	GARD
0.00	1.4%	1.6%	0.9%	1.5%	1.6%	1.7%	0.9%	1.5%
1.00	0.8%	0.7%	0.5%	0.7%	0.9%	0.7%	0.5%	0.7%
2.00	0.6%	0.5%	0.4%	0.6%	0.6%	0.5%	0.4%	0.6%
3.00	0.4%	0.6%	0.2%	0.5%	0.5%	0.6%	0.2%	0.5%
4.00	0.4%	0.4%	0.3%	0.7%	0.4%	0.4%	0.3%	0.7%
5.00	0.6%	0.5%	0.5%	2.1%	0.6%	0.6%	0.5%	2.1%
6.00	1.2%	1.6%	3.5%	5.2%	1.2%	1.7%	3.5%	5.2%
7.00	3.9%	3.3%	7.1%	6.3%	3.9%	3.5%	7.2%	6.3%
8.00	8.1%	7.1%	9.4%	6.2%	8.1%	7.4%	9.5%	6.2%
9.00	7.2%	6.0%	8.3%	5.6%	7.4%	6.3%	8.4%	5.6%
10.00	4.9%	5.2%	6.2%	5.3%	5.3%	5.6%	6.3%	5.3%
11.00	4.8%	5.1%	4.9%	5.4%	5.2%	5.5%	4.9%	5.4%
12.00	5.0%	5.4%	4.5%	5.5%	4.8%	5.2%	4.5%	5.5%
13.00	4.7%	4.8%	4.1%	5.5%	4.6%	4.7%	4.1%	5.5%
14.00	5.4%	5.0%	4.8%	5.6%	5.3%	4.8%	4.8%	5.6%
15.00	5.7%	5.9%	6.2%	5.8%	5.7%	5.8%	6.2%	5.8%
16.00	7.7%	7.4%	7.1%	5.9%	7.5%	7.1%	7.1%	5.9%
17.00	9.6%	9.1%	8.3%	6.2%	9.3%	8.8%	8.2%	6.2%
18.00	8.8%	9.7%	7.3%	5.8%	8.7%	9.4%	7.2%	5.8%
19.00	6.0%	5.6%	5.3%	5.2%	5.9%	5.5%	5.2%	5.2%
20.00	4.4%	4.3%	3.8%	4.2%	4.3%	4.1%	3.9%	4.2%
21.00	3.3%	3.7%	2.3%	4.2%	3.3%	3.6%	2.3%	4.2%
22.00	2.7%	3.4%	2.2%	3.4%	2.7%	3.3%	2.2%	3.4%
23.00	2.3%	3.2%	1.8%	2.6%	2.3%	3.2%	1.8%	2.6%

Note:
QQE = Queens Quay East of Bathurst; QQW = Queens Quay Wast of Bathurst; LSB = Lakeshore Blvd. East of Bathurst; Gardiner Expressway East of Bathurst
Dan Leckie Way was assigned the same hourly profile as QQE.
Bathurst Street and Stadium Road were assigned the same hourly profile as QQW.

C6: Daily Traffic Counts

Road Name	From	To	Existing 2012 16 flights per hour	Future 2032 24 flights CS100
Lakeshore Blvd.	Woodbine	Coxwell	28,896	28,896
Lakeshore Blvd.	Coxwell	Leslie	43,669	43,669
Lakeshore Blvd.	Leslie	DVP	48,544	48,544
Lakeshore Blvd.	DVP	Parliament	18,409	18,409
Lakeshore Blvd.	Parliament	Sherbourne	13,830	13,830
Lakeshore Blvd.	Sherbourne	Jarvis	24,796	24,796
Lakeshore Blvd.	Jarvis	Yonge	15,787	15,787
Lakeshore Blvd. WB	Yonge	York	31,154	31,154
Lakeshore Blvd.	York	Spadina	30,574	30,574
Lakeshore Blvd.	Spadina	Dan Leckie Way	37,800	34,710
Lakeshore Blvd.	Dan Leckie Way	Bathurst	38,225	32,420
Lakeshore Blvd.	Bathurst	Stadium	34,400	31,290
Lakeshore Blvd.	Stadium	Strachan	37,225	37,655
Lakeshore Blvd.	Strachan	Dunn	44,561	44,561
Lakeshore Blvd. WB	Dunn	Dowling	19,465	19465
Lakeshore Blvd. EB	Dowling	Dunn	29,413	29,413
Lakeshore Blvd. WB	Dowling	Parkside	18,866	18,866
Gardiner	DVP	Parliament	112,576	112,576
Gardiner	Parliament	Sherbourne	115,303	115,303
Gardiner	Sherbourne	Jarvis	87,907	87,907
Gardiner	Jarvis	Yonge	87,409	87,409
Gardiner	Yonge	York	105,272	105,272
Gardiner	York	Spadina	121,773	121,773
Gardiner	Spadina	Strachan	164,233	164,233
Gardiner	Strachan	Dunn	164,520	164,520
Gardiner	Dunn	Jameson	137,071	137,071
Gardiner	Jameson	Parkside	162,642	162,642
Queens Quay	Parliament	Sherbourne	10,010	10,010
Queens Quay	Sherbourne	Jarvis	10,010	10,010
Queens Quay	Jarvis	Yonge	11,803	11,803
Queens Quay	Yonge	York	14,408	14,408
Queens Quay	York	Spadina	11,860	11,860
Queens Quay	Spadina	Dan Leckie Way	9,186	9,186
Queens Quay	Dan Leckie Way	Bathurst	8,875	12,580
Queens Quay	Bathurst	Stadium	4,750	3,165
Dan Leckie	Fort York	Lakeshore	2,000	5,250
Dan Leckie	Lakeshore	Queens Quay	1,775	4,290
Burthurst	Fort York	Lakeshore	14,425	16,745
Burthurst	Lakeshore	Queens Quay	7,725	13,540
Burthurst	Queens Quay	Eireann Quay	5,225	13,015
Stadium	Lakeshore	Queens Quay	4,400	3,075
Stadium	Queens Quay	south of Little Norway	1,400	3,285

C7a: Hourly Traffic Distribution

Flight Information	Aircraft Type	Existing 2012 16 flights per hour	Future 2032 24 flights CS100
Flights per hour	Q400	16	16
Maximum passengers per aircraft		68	68
Load Factor (%)		85%	85%
Total passengers per hour		925	925
Flights per hour	CS100	0	8
Maximum passengers per aircraft		N/A	107
Load Factor (%)		N/A	85%
Total passengers per hour		N/A	728
Total passengers per hour	**N/A**	**925**	**1652**

C7b: Passenger Transportation Distribution

Transportation Type	Percent Split			Number of Passengers Per Hour	
	Arrival	Departure	Average	Existing 2012 16 flights per hour	Future 2032 24 flights CS100
Taxi	46%	49%	47.5%	439	785
Pickup / Drop-off	14%	19%	16.5%	153	273
Self Drive	5%	5%	5%	46	82
Airport Shuttle	25%	17%	21%	194	347
Other (walk, bike, etc.)	10%	10%	10%	93	165

C7c: Vehicle Counts

Transportation Type	Passengers per vehicle	Number of Vehicles Per Hour	
		Existing 2012 16 flights per hour	Future 2032 24 flights CS100
Taxi	1.3	338	604
Pickup / Drop-off	1.45	105	188

Table C1: MOVES Key Model Input Parameters

Parameter	Input
Pollutants	CO, NO_X, $PM_{2.5}$, Benzene, Acrolein, Benzo(a)Pyrene
Operating Year	2012 and 2032
Evaluation Month	July
Ambient Temperature	Minimum Daily Temperature: July = 62.0 °F (16.7°C) Maximum Daily Temperature: July = 78.0 °F (25.5°C) (Canadian Climate Normal, Toronto Island Airport, ON)
Altitude	Low
Relative Humidity at 6:00 LST	July = 81.9%
Relative Humidity at 15:00 LST	July = 65.8%
Fuel Volatility	Reid Vapor Pressure (RVP) = 9 psi
Fuel Program	Conventional Gasoline East
Vehicle Speed	Gardiner Expressway = 60 km/h ; All other roads = 50 km/h
Idling Emissions	Only for taxi and pick-up / drop off
Intersection Delay	Not considered
Vehicle Distribution	Passenger Cars = 96%; Medium Trucks = 2.5%; and Heavy trucks = 1.5%

Table C2: Roadway Sections included in the Study

Road Name	Section
Lakeshore Blvd.	From Woodbine Ave to Parkside Dr.
Gardiner Expressway	From DVP to Parkside Dr.
Queens Quay	From Parliament St. to Stadium Rd.
Dan Leckie Way	From Fort York Blvd. to Queens Quay
Bathurst Street	From Fort York Blvd. to Eireann Quay Ferry Terminal
Stadium Rd	From Lakeshore Blvd. to south of Little Norway Cr.

Table C3a: Summary of MOVES Output for the Month of July 2012 (Speed 60 km/h)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/vmt)	NOx (g/vmt)	PM2.5 (g/vmt)	Benzo-(a)-Pyrene (g/vmt)	Benzene (g/vmt)	Acrolein (g/vmt)	Cadmium [1] (g/vmt)
Gardiner	Morning (am)	Auto	400	4.90E+00	8.74E-01	1.50E-02	6.52E-08	9.85E-03	2.01E-04	2.26E-06
	Morning (am)	Medium	1019	1.09E+01	7.11E+00	4.49E-01	9.72E-08	2.07E-02	5.42E-03	6.73E-05
	Morning (am)	Heavy	1749	4.18E+00	1.52E+01	8.72E-01	7.20E-10	6.21E-03	5.15E-03	1.31E-04
	Afternoon (pm)	Auto	419	6.16E+00	8.71E-01	1.35E-02	6.83E-08	1.03E-02	2.11E-04	2.03E-06
	Afternoon (pm)	Medium	1075	1.09E+01	6.64E+00	4.47E-01	9.72E-08	2.07E-02	5.42E-03	6.71E-05
	Afternoon (pm)	Heavy	1829	4.18E+00	1.43E+01	8.72E-01	7.20E-10	6.21E-03	5.15E-03	1.31E-04
	Midday (md)	Auto	418	6.08E+00	8.70E-01	1.35E-02	6.81E-08	1.03E-02	2.10E-04	2.03E-06
	Midday (md)	Medium	1071	1.09E+01	6.66E+00	4.47E-01	9.72E-08	2.07E-02	5.42E-03	6.71E-05
	Midday (md)	Heavy	1824	4.18E+00	1.43E+01	8.72E-01	7.20E-10	6.21E-03	5.15E-03	1.31E-04
	Overnight (on)	Auto	400	4.90E+00	8.57E-01	1.45E-02	6.52E-08	9.85E-03	2.01E-04	2.17E-06
	Overnight (on)	Medium	1019	1.09E+01	7.01E+00	4.48E-01	9.72E-08	2.07E-02	5.42E-03	6.73E-05
	Overnight (on)	Heavy	1749	4.18E+00	1.50E+01	8.72E-01	7.20E-10	6.21E-03	5.15E-03	1.31E-04

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3b: Summary of MOVES Output for the Month of July 2012 (Speed 50 km/h)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/vmt)	NOx (g/vmt)	PM2.5 (g/vmt)	Benzo-(a)-Pyrene (g/vmt)	Benzene (g/vmt)	Acrolein (g/vmt)	Cadmium [1] (g/vmt)
Other Roads	Morning (am)	Auto	421	5.63E+00	8.94E-01	1.83E-02	7.73E-08	1.17E-02	2.34E-04	2.75E-06
	Morning (am)	Medium	1127	1.36E+01	7.84E+00	4.97E-01	1.35E-07	2.67E-02	5.81E-03	7.45E-05
	Morning (am)	Heavy	2075	4.86E+00	1.76E+01	1.13E+00	1.03E-09	6.85E-03	5.64E-03	1.70E-04
	Afternoon (pm)	Auto	442	7.08E+00	8.95E-01	1.66E-02	8.08E-08	1.22E-02	2.45E-04	2.50E-06
	Afternoon (pm)	Medium	1190	1.36E+01	7.31E+00	4.95E-01	1.35E-07	2.67E-02	5.81E-03	7.42E-05
	Afternoon (pm)	Heavy	2169	4.86E+00	1.65E+01	1.13E+00	1.03E-09	6.85E-03	5.64E-03	1.70E-04
	Midday (md)	Auto	440	6.98E+00	8.94E-01	1.66E-02	8.05E-08	1.22E-02	2.44E-04	2.50E-06
	Midday (md)	Medium	1185	1.36E+01	7.34E+00	4.95E-01	1.35E-07	2.67E-02	5.81E-03	7.42E-05
	Midday (md)	Heavy	2163	4.86E+00	1.66E+01	1.13E+00	1.03E-09	6.85E-03	5.64E-03	1.70E-04
	Overnight (on)	Auto	421	5.63E+00	8.77E-01	1.77E-02	7.73E-08	1.17E-02	2.34E-04	2.66E-06
	Overnight (on)	Medium	1127	1.36E+01	7.73E+00	4.96E-01	1.35E-07	2.67E-02	5.81E-03	7.44E-05
	Overnight (on)	Heavy	2075	4.86E+00	1.74E+01	1.13E+00	1.03E-09	6.85E-03	5.64E-03	1.70E-04

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3c: Summary of MOVES Output for the Month of July 2032 (Speed 60 km/h)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/vmt)	NOx (g/vmt)	PM2.5 (g/vmt)	Benzo-(a)-Pyrene (g/vmt)	Benzene (g/vmt)	Acrolein (g/vmt)	Cadmium [1] (g/vmt)
Gardiner	Morning (am)	Auto	246	1.19E+00	7.54E-02	8.86E-03	5.87E-09	9.71E-04	2.05E-05	1.33E-06
	Morning (am)	Medium	955	1.50E+00	9.91E-01	4.14E-02	1.05E-08	2.44E-03	6.04E-04	6.21E-06
	Morning (am)	Heavy	1664	6.79E-01	2.38E+00	1.22E-01	1.71E-13	1.19E-03	9.64E-04	1.83E-05
	Afternoon (pm)	Auto	257	1.50E+00	7.48E-02	8.85E-03	6.05E-09	1.00E-03	2.13E-05	1.33E-06
	Afternoon (pm)	Medium	1011	1.50E+00	9.24E-01	4.14E-02	1.05E-08	2.44E-03	6.04E-04	6.21E-06
	Afternoon (pm)	Heavy	1744	6.79E-01	2.23E+00	1.22E-01	1.71E-13	1.19E-03	9.64E-04	1.83E-05
	Midday (md)	Auto	257	1.48E+00	7.47E-02	8.85E-03	6.04E-09	1.00E-03	2.12E-05	1.33E-06
	Midday (md)	Medium	1007	1.50E+00	9.27E-01	4.14E-02	1.05E-08	2.44E-03	6.04E-04	6.21E-06
	Midday (md)	Heavy	1739	6.79E-01	2.24E+00	1.22E-01	1.71E-13	1.19E-03	9.64E-04	1.83E-05
	Overnight (on)	Auto	246	1.19E+00	7.40E-02	8.86E-03	5.87E-09	9.71E-04	2.05E-05	1.33E-06
	Overnight (on)	Medium	955	1.50E+00	9.77E-01	4.14E-02	1.05E-08	2.44E-03	6.04E-04	6.21E-06
	Overnight (on)	Heavy	1664	6.79E-01	2.35E+00	1.22E-01	1.71E-13	1.19E-03	9.64E-04	1.83E-05

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3d: Summary of MOVES Output for the Month of July 2032 (Speed 50 km/h)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/vmt)	NOx (g/vmt)	PM2.5 (g/vmt)	Benzo-(a)-Pyrene (g/vmt)	Benzene (g/vmt)	Acrolein (g/vmt)	Cadmium [1] (g/vmt)
Other Roads	Morning (am)	Auto	257	1.37E+00	7.37E-02	1.18E-02	6.75E-09	1.12E-03	2.33E-05	1.77E-06
	Morning (am)	Medium	1057	1.73E+00	1.04E+00	4.79E-02	1.51E-08	3.22E-03	6.29E-04	7.18E-06
	Morning (am)	Heavy	1974	7.58E-01	2.78E+00	1.60E-01	2.65E-13	1.34E-03	1.09E-03	2.40E-05
	Afternoon (pm)	Auto	270	1.74E+00	7.35E-02	1.18E-02	6.97E-09	1.15E-03	2.42E-05	1.77E-06
	Afternoon (pm)	Medium	1120	1.73E+00	9.71E-01	4.78E-02	1.51E-08	3.22E-03	6.29E-04	7.18E-06
	Afternoon (pm)	Heavy	2068	7.58E-01	2.60E+00	1.60E-01	2.65E-13	1.34E-03	1.09E-03	2.40E-05
	Midday (md)	Auto	269	1.71E+00	7.34E-02	1.18E-02	6.96E-09	1.15E-03	2.42E-05	1.77E-06
	Midday (md)	Medium	1115	1.73E+00	9.74E-01	4.78E-02	1.51E-08	3.22E-03	6.29E-04	7.18E-06
	Midday (md)	Heavy	2061	7.58E-01	2.61E+00	1.60E-01	2.65E-13	1.34E-03	1.09E-03	2.40E-05
	Overnight (on)	Auto	257	1.37E+00	7.23E-02	1.18E-02	6.75E-09	1.12E-03	2.33E-05	1.77E-06
	Overnight (on)	Medium	1057	1.73E+00	1.03E+00	4.79E-02	1.51E-08	3.22E-03	6.29E-04	7.18E-06
	Overnight (on)	Heavy	1974	7.58E-01	2.74E+00	1.60E-01	2.65E-13	1.34E-03	1.09E-03	2.40E-05

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3e: Summary of MOVES Output for the Month of July 2012 (Idling Emissions)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/hr)	NOx (g/hr)	PM2.5 (g/hr)	Benzo-(a)-Pyrene (g/hr)	Benzene (g/hr)	Acrolein (g/hr)	Cadmium [1] (g/hr)
Passenger Pickup and Dropoff	Morning (am)	Auto	3872	3.99E+01	2.60E+00	9.05E-02	1.02E-06	1.52E-01	3.26E-03	1.36E-05
	Afternoon (pm)	Auto	4262	4.11E+01	5.49E+00	8.16E-02	1.03E-06	1.55E-01	3.32E-03	1.22E-05
	Midday (md)	Auto	4236	4.10E+01	5.30E+00	8.16E-02	1.03E-06	1.55E-01	3.32E-03	1.22E-05
	Overnight (on)	Auto	3872	3.99E+01	2.55E+00	8.73E-02	1.02E-06	1.52E-01	3.26E-03	1.31E-05

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C3f: Summary of MOVES Output for the Month of July 2032 (Idling Emissions)

Road	Time of Day	Vehicle Class	CO2e (g/vmt)	CO (g/hr)	NOx (g/hr)	PM2.5 (g/hr)	Benzo-(a)-Pyrene (g/hr)	Benzene (g/hr)	Acrolein (g/hr)	Cadmium [1] (g/hr)
Passenger Pickup and Dropoff	Morning (am)	Auto	2345	2.56E+00	1.35E-01	3.05E-02	5.24E-08	8.73E-03	2.26E-04	4.58E-06
	Afternoon (pm)	Auto	2586	2.59E+00	2.52E-01	3.04E-02	5.27E-08	8.77E-03	2.29E-04	4.57E-06
	Midday (md)	Auto	2570	2.59E+00	2.45E-01	3.04E-02	5.26E-08	8.77E-03	2.29E-04	4.57E-06
	Overnight (on)	Auto	2345	2.56E+00	1.32E-01	3.05E-02	5.24E-08	8.73E-03	2.26E-04	4.57E-06

Note: [1] The cadmium emissions are not directly from MOVES but were calculated assuming that they represent 0.015% of the $PM_{2.5}$ emissions.

Table C4a: Summary of Re-entrained Road Dust Parameters: Default Summer Surface Silt Loading [from AP-42 Table 13.2.1-2]

Traffic Volume	sL (g/m^2)
High Volume (AADT >10000, restricted access)	0.015
High Volume (AADT >10000)	0.03
Moderate Volume (AADT 5000 to 10000)	0.06
Low Volume (AADT 500 to 5000)	0.2
Other (AADT <500)	0.6

Table C4b: Summary of Re-entrained Road Dust Parameters: Average Weight of the Vehicles Traveling the Road
[Based on MOBILE6.2c VMT Distribution and Average Weight]

Model Year	Auto Weight (tons)	Medium Trucks Weight (tons)	Heavy trucks Weight (tons)
2012	1.76	14.50	23.32
2032	1.79	14.52	23.28

Notes:

Road dust emissions were calculated using AP-42 Chapter 13.2.1

$E = k\,(sL)^{0.91} \times (W)^{1.02}$

E = particulate emission factor (having units matching the units of k),
k = particle size multiplier for particle size range and units of interest ($PM_{2.5}$ = 0.25 g/VMT, and PM_{10} = 1 g/VMT)),
sL = road surface silt loading (grams per square meter) (g/m^2), and
W = average weight (tons) of the vehicles traveling the road.

C5: Hourly Traffic Distribution

Hour ID	Existing 2012 - 16 flights per hour				Future No Build 2032 - 24 flights				Future Build 2032 - 24 flights CS100			
	QQE	QQW	LSB	GARD	QQE	QQW	LSB	GARD	QQE	QQW	LSB	GARD
0.00	1.4%	1.6%	0.9%	1.5%	1.5%	1.7%	0.9%	1.5%	1.6%	1.7%	0.9%	1.5%
1.00	0.8%	0.7%	0.5%	0.7%	0.9%	0.7%	0.5%	0.7%	0.9%	0.7%	0.5%	0.7%
2.00	0.6%	0.5%	0.4%	0.6%	0.6%	0.5%	0.4%	0.6%	0.6%	0.5%	0.4%	0.6%
3.00	0.4%	0.6%	0.2%	0.5%	0.5%	0.6%	0.2%	0.5%	0.5%	0.6%	0.2%	0.5%
4.00	0.4%	0.4%	0.3%	0.7%	0.4%	0.4%	0.3%	0.7%	0.4%	0.4%	0.3%	0.7%
5.00	0.6%	0.5%	0.5%	2.1%	0.6%	0.6%	0.5%	2.1%	0.6%	0.6%	0.5%	2.1%
6.00	1.2%	1.6%	3.5%	5.2%	1.2%	1.7%	3.5%	5.2%	1.2%	1.7%	3.5%	5.2%
7.00	3.9%	3.3%	7.1%	6.3%	3.9%	3.4%	7.2%	6.3%	3.9%	3.5%	7.2%	6.3%
8.00	8.1%	7.1%	9.4%	6.2%	8.0%	7.4%	9.5%	6.2%	8.1%	7.4%	9.5%	6.2%
9.00	7.2%	6.0%	8.3%	5.6%	7.3%	6.2%	8.4%	5.6%	7.4%	6.3%	8.4%	5.6%
10.00	4.9%	5.2%	6.2%	5.3%	5.2%	5.5%	6.3%	5.3%	5.3%	5.6%	6.3%	5.3%
11.00	4.8%	5.1%	4.9%	5.4%	5.1%	5.5%	4.9%	5.4%	5.2%	5.5%	4.9%	5.4%
12.00	5.0%	5.4%	4.5%	5.5%	4.9%	5.2%	4.5%	5.5%	4.8%	5.2%	4.5%	5.5%
13.00	4.7%	4.8%	4.1%	5.5%	4.6%	4.7%	4.1%	5.5%	4.6%	4.7%	4.1%	5.5%
14.00	5.4%	5.0%	4.8%	5.6%	5.3%	4.8%	4.8%	5.6%	5.3%	4.8%	4.8%	5.6%
15.00	5.7%	5.9%	6.2%	5.8%	5.7%	5.8%	6.2%	5.8%	5.7%	5.8%	6.2%	5.8%
16.00	7.7%	7.4%	7.1%	5.9%	7.5%	7.1%	7.1%	5.9%	7.5%	7.1%	7.1%	5.9%
17.00	9.6%	9.1%	8.3%	6.2%	9.4%	8.8%	8.2%	6.2%	9.3%	8.8%	8.2%	6.2%
18.00	8.8%	9.7%	7.3%	5.8%	8.7%	9.4%	7.2%	5.8%	8.7%	9.4%	7.2%	5.8%
19.00	6.0%	5.6%	5.3%	5.2%	6.0%	5.5%	5.2%	5.2%	5.9%	5.5%	5.2%	5.2%
20.00	4.4%	4.3%	3.8%	4.2%	4.3%	4.1%	3.8%	4.2%	4.3%	4.1%	3.9%	4.2%
21.00	3.3%	3.7%	2.3%	4.2%	3.3%	3.6%	2.3%	4.2%	3.3%	3.6%	2.3%	4.2%
22.00	2.7%	3.4%	2.2%	3.4%	2.7%	3.3%	2.2%	3.4%	2.7%	3.3%	2.2%	3.4%
23.00	2.3%	3.2%	1.8%	2.6%	2.3%	3.2%	1.8%	2.6%	2.3%	3.2%	1.8%	2.6%

Note:
QQE = Queens Quay East of Bathurst; QQW = Queens Quay Wast of Bathurst; LSB = Lakeshore Blvd. East of Bathurst; Gardiner Expressway East of Bathurst
Dan Leckie Way was assigned the same hourly profile as QQE.
Bathurst Street and Stadium Road were assigned the same hourly profile as QQW.

C6: Daily Traffic Counts

Road Name	From	To	Existing 2012 16 flights per hour	Future No Build 2032 24 flights	Future Build 2032 24 flights CS100
Lakeshore Blvd.	Woodbine	Coxwell	28,896	28,896	28,896
Lakeshore Blvd.	Coxwell	Leslie	43,669	43,669	43,669
Lakeshore Blvd.	Leslie	DVP	48,544	48,544	48,544
Lakeshore Blvd.	DVP	Parliament	18,409	18,409	18,409
Lakeshore Blvd.	Parliament	Sherbourne	13,830	13,830	13,830
Lakeshore Blvd.	Sherbourne	Jarvis	24,796	24,796	24,796
Lakeshore Blvd.	Jarvis	Yonge	15,787	15,787	15,787
Lakeshore Blvd. WB	Yonge	York	31,154	31,154	31,154
Lakeshore Blvd.	York	Spadina	30,574	30,574	30,574
Lakeshore Blvd.	Spadina	Dan Leckie Way	37,800	34,335	34,710
Lakeshore Blvd.	Dan Leckie Way	Bathurst	38,225	32,255	32,420
Lakeshore Blvd.	Bathurst	Stadium	34,400	30,980	31,290
Lakeshore Blvd.	Stadium	Strachan	37,225	32,355	37,655
Lakeshore Blvd.	Strachan	Dunn	44,561	44,561	44,561
Lakeshore Blvd. WB	Dunn	Dowling	19,465	19465	19465
Lakeshore Blvd. EB	Dowling	Dunn	29,413	29,413	29,413
Lakeshore Blvd. WB	Dowling	Parkside	18,866	18,866	18,866
Gardiner	DVP	Parliament	112,576	112,576	112,576
Gardiner	Parliament	Sherbourne	115,303	115,303	115,303
Gardiner	Sherbourne	Jarvis	87,907	87,907	87,907
Gardiner	Jarvis	Yonge	87,409	87,409	87,409
Gardiner	Yonge	York	105,272	105,272	105,272
Gardiner	York	Spadina	121,773	121,773	121,773
Gardiner	Spadina	Strachan	164,233	164,233	164,233
Gardiner	Strachan	Dunn	164,520	164,520	164,520
Gardiner	Dunn	Jameson	137,071	137,071	137,071
Gardiner	Jameson	Parkside	162,642	162,642	162,642
Queens Quay	Parliament	Sherbourne	10,010	10,010	10,010
Queens Quay	Sherbourne	Jarvis	10,010	10,010	10,010
Queens Quay	Jarvis	Yonge	11,803	11,803	11,803
Queens Quay	Yonge	York	14,408	14,408	14,408
Queens Quay	York	Spadina	11,860	11,860	11,860
Queens Quay	Spadina	Dan Leckie Way	9,186	9,186	9,186
Queens Quay	Dan Leckie Way	Bathurst	8,875	11,525	12,580
Queens Quay	Bathurst	Stadium	4,750	3,130	3,165
Dan Leckie	Fort York	Lakeshore	2,000	5,100	5,250
Dan Leckie	Lakeshore	Queens Quay	1,775	3,930	4,290
Burthurst	Fort York	Lakeshore	14,425	16,050	16,745
Burthurst	Lakeshore	Queens Quay	7,725	13,025	13,540
Burthurst	Queens Quay	Eireann Quay	5,225	9,695	13,015
Stadium	Lakeshore	Queens Quay	4,400	3,030	3,075
Stadium	Queens Quay	south of Little Norway	1,400	3,195	3,285

C7a: Hourly Traffic Distribution

Flight Information	Aircraft Type	Existing 2012 16 flights per hour	Future 2032 24 flights CS100
Flights per hour	Q400	16	16
Maximum passengers per aircraft		68	68
Load Factor (%)		85%	85%
Total passengers per hour		925	925
Flights per hour	CS100	0	8
Maximum passengers per aircraft		N/A	107
Load Factor (%)		N/A	85%
Total passengers per hour		N/A	728
Total passengers per hour	**N/A**	**925**	**1652**

C7b: Passenger Transportation Distribution

Transportation Type	Percent Split			Number of Passengers Per Hour		
	Arrival	Departure	Average	Existing 2012 16 flights per hour	Future 2032 24 flights per hour no jets	Future 2032 24 flights CS100
Taxi	46%	49%	47.5%	439	659	785
Pickup / Drop-off	14%	19%	16.5%	153	229	273
Self Drive	5%	5%	5%	46	69	82
Airport Shuttle	25%	17%	21%	194	291	347
Other (walk, bike, etc.)	10%	10%	10%	93	139	165

C7c: Vehicle Counts

Transportation Type	Passengers per vehicle	Number of Vehicles Per Hour		
		Existing 2012 16 flights per hour	Future 2032 No Build 24 flights	Future 2032 24 flights CS100
Taxi	1.3	338	507	604
Pickup / Drop-off	1.45	105	158	188

APPENDIX D

Table D1: Ship Data

Location	Vessel Name	Year Built	Speed (knot)	Fuel Type	Engine Power (kW)	Number of Engines
Airport Ferry	Marylin Bell	2009	11	Diesel	574	2
Hanlan's Point	Thomas Rennie	1951	11	Diesel	634	2

Table D2: Ship Emissions Data

Contaminant	Idling (51% Load)			Running (69% Load)		
	Emission Factor (g/kW-hr)	Emission Rate (g/hr)		Emission Factor (g/kW-hr)	Emission Rate (g/hr)	
		Airport Ferry	Hanlan's Point		Airport Ferry	Hanlan's Point
CO2	86.47	50,634	55,893	63.91	50,634	55,893
CO	1.64	963	1,063	1.22	963	1,063
NOx	17	9,953	10,994	17	13,466	14,874
$PM_{2.5}$	0.27	159	172	0.27	210	232
Cadmium [1]	N/A	0.014	0.015	N/A	0.018	0.020
Benzo(a)Pyrene [1]	N/A	0.017	0.019	N/A	0.023	0.026
THC	17	9,953	10,994	17	13,466	14,874
Acrolein [2]	N/A	85	93	N/A	114	126
Benzene [2]	N/A	149	165	N/A	202	223

Notes:

[1] Cadmium and benzo(a)pyrene emissions are assumed to represent 0.0086% and 0.011% of PM2.5, respectively.

[2] Acrolein and benzene emissions are assumed to represent 0.85% and 1.5% of THC, respectively.

Table D3: Ship Emissions Data

Hour Ending	Percent of Airport Ferry Emissions Assigned to Each Hour at Each Location			Percent of Hanlan's Point Emissions Assigned to Each Hour at Each Location		
	Running Between Airport and Mainland (% of Running Emission Rate)	Idling at Toronto Island Station (% of Idling Emission Rate)	Idling at Mainland Station (% of Idling Emission Rate)	Running Between Hanlan's Point and Mainland (% of Running Emission Rate)	Idling at Toronto Island Station (% of Idling Emission Rate)	Idling at Mainland Station (% of Idling Emission Rate)
1:00	2.5%	5%	5%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%
6:00	20%	40%	40%	0%	0%	0%
7:00	20%	40%	40%	0%	0%	0%
8:00	20%	40%	40%	0%	0%	0%
9:00	20%	40%	40%	75%	0%	25%
10:00	20%	40%	40%	75%	0%	25%
11:00	20%	40%	40%	75%	0%	25%
12:00	20%	40%	40%	100%	0%	0%
13:00	20%	40%	40%	100%	0%	0%
14:00	20%	40%	40%	100%	0%	0%
15:00	20%	40%	40%	100%	0%	0%
16:00	20%	40%	40%	100%	0%	0%
17:00	20%	40%	40%	100%	0%	0%
18:00	20%	40%	40%	100%	0%	0%
19:00	20%	40%	40%	75%	0%	25%
20:00	20%	40%	40%	75%	25%	0%
21:00	20%	40%	40%	50%	50%	0%
22:00	20%	40%	40%	75%	25%	0%
23:00	20%	40%	40%	50%	50%	0%
24:00	20%	40%	40%	25%	25%	0%

APPENDIX E

APPENDIX E1: Bombardier Aircrafts Emission Specifications

Aircraft	Q400
Engine	PW150A
Number of Engines	2

Mode	Time (mins)	Fuel Flow [kg/s]	Emission Indices [g/kg fuel]				
			CO	HC	Nox	PM	Smoke numbers
Taxi Out (2%)	9	0.037	26	11	3	ND*	1
Take off (90%)	0.5	0.274	0.9	0.4	19.3	ND*	6.3
Climbout (80%)	2.2	0.246	0.8	0.4	17.4	ND*	5.5
Approach (17%)	4.5	0.120	2.5	1	9.5	ND*	2.7
Taxi In (2%)	4	0.037	26	11	3	ND*	1

Note: PW150A power levels are shown for operation at Billy Bishop Airport

Aircraft	CS100	**Jet Engine Parameters**	
Engine	PW1500G	**Bypass Ratio**	12.5
Number of Engines	2	**Rated Thrust per Engine**	97.72

Mode	Time (mins)	Fuel Flow [kg/s]	Emission Indices [g/kg fuel]				
			CO	HC	Nox	PM	Smoke numbers
Taxi Out (7%)	9	0.075	13.45	0.04	5.57	ND*	0.1
Take off (100%)	0.7	0.673	0.25	0.03	24.41	ND*	2.0
Climbout (85%)	2.2	0.560	0.28	0.02	19.70	ND*	1.3
Approach (30%)	4	0.200	2.77	0.01	10.13	ND*	0.1
Taxi In (7%)	4	0.075	13.45	0.04	5.57	ND*	0.1

Note: Standard ICAO Landing Take-Off cycle power levels used for emissions specification.

ND* **No data available, PM emissions are calculated using secondary formation algorithms**

APPENDIX E2: EDMS Inputs Current Case 2012

EDMS 5.1.4.1 Model Inputs for BBTCA Study

Study Created:	Thu Nov 26 09:59:11 2015
Report Date:	Tue Jan 10 13:46:08 2017
Study Pathname:	I:\1402032\16\EDMS Modelling\base2012\otherTrials\base2012_Q400edms_default_noDisp\BBTCA\BBTCA.edm

Study Setup

Unit System:	Metric
Dispersion Modeling:	Dispersion is not enabled for this study
Speciated Organic Gas (OG) Modeling:	Speciated Organic Gas (OG) Emissions are included in this study.
Analysis Years:	2012

Scenarios

Scenario Name:	Description:	Add a description.
Baseline	Aircraft Times in Mode Basis:	Performance-Based
	Taxi Time Modeling:	Delay & Sequencing Model
	FOA3 Sulfur-to-Sulfate Conversion Rate:	2.400000 %

Airports

Airport Name:	City Centre
IATA Code:	YTZ
ICAO Code:	CYTZ
FAA Code:	
Country:	CA
State:	
City:	Toronto Island
Airport Description:	City Centre
Latitude:	43.627°
Longitude:	-79.396°
Northing:	4831751.07
Easting:	629393.00
UTM Zone:	17
Elevation:	251.00 feet
PM Modeling Methodology:	FOA3

Scenario-Airport: Baseline, City Centre

Weather

Baseline, City Centre

Mixing Height:	914.40 meters
Temperature:	8.64 °C
Daily High Temperature:	14.39 °C
Daily Low Temperature:	2.89 °C
Pressure:	100711.18 Pa
Sea Level Pressure:	101659.37 Pa
Relative Humidity:	74.05
Wind Speed:	17.21 kph
Wind Direction:	0.00 °
Ceiling:	30480.00 m
Visibility:	80.47 km

The user has used hourly meteorological data.

Base Elevation:	76.50 meters
Date Range:	Saturday, January 01, 2000 to Sunday, December 31, 2000
Source Data File Location:	
Upper Air Data File Location:	

Quarter-Hourly Operational Profiles

Baseline, City Centre

Name: DEFAULT (2)

Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight
12:00am to 12:14 am	1.000000	6:00am to 6:14am	1.000000	12:00pm to 12:14 pm	1.000000	6:00pm to 6:14pm	1.000000
12:15am to 12:29 am	1.000000	6:15am to 6:29am	1.000000	12:15pm to 12:29 pm	1.000000	6:15pm to 6:29pm	1.000000
12:30am to 12:44 am	1.000000	6:30am to 6:44am	1.000000	12:30pm to 12:44 pm	1.000000	6:30pm to 6:44pm	1.000000
12:45am to 12:59 am	1.000000	6:45am to 6:59am	1.000000	12:45pm to 12:59 pm	1.000000	6:45pm to 6:59pm	1.000000
1:00am to 1:14am	1.000000	7:00am to 7:14am	1.000000	1:00pm to 1:14pm	1.000000	7:00pm to 7:14pm	1.000000
1:15am to 1:29am	1.000000	7:15am to 7:29am	1.000000	1:15pm to 1:29pm	1.000000	7:15pm to 7:29pm	1.000000
1:30am to 1:44am	1.000000	7:30am to 7:44am	1.000000	1:30pm to 1:44pm	1.000000	7:30pm to 7:44pm	1.000000
1:45am to 1:59am	1.000000	7:45am to 7:59am	1.000000	1:45pm to 1:59pm	1.000000	7:45pm to 7:59pm	1.000000
2:00am to 2:14am	1.000000	8:00am to 8:14am	1.000000	2:00pm to 2:14pm	1.000000	8:00pm to 8:14pm	1.000000
2:15am to 2:29am	1.000000	8:15am to 8:29am	1.000000	2:15pm to 2:29pm	1.000000	8:15pm to 8:29pm	1.000000
2:30am to 2:44am	1.000000	8:30am to 8:44am	1.000000	2:30pm to 2:44pm	1.000000	8:30pm to 8:44pm	1.000000
2:45am to 2:59am	1.000000	8:45am to 8:59am	1.000000	2:45pm to 2:59pm	1.000000	8:45pm to 8:59pm	1.000000
3:00am to 3:14am	1.000000	9:00am to 9:14am	1.000000	3:00pm to 3:14pm	1.000000	9:00pm to 9:14pm	1.000000
3:15am to 3:29am	1.000000	9:15am to 9:29am	1.000000	3:15pm to 3:29pm	1.000000	9:15pm to 9:29pm	1.000000
3:30am to 3:44am	1.000000	9:30am to 9:44am	1.000000	3:30pm to 3:44pm	1.000000	9:30pm to 9:44pm	1.000000
3:45am to 3:59am	1.000000	9:45am to 9:59am	1.000000	3:45pm to 3:59pm	1.000000	9:45pm to 9:59pm	1.000000
4:00am to 4:14am	1.000000	10:00am to 10:14am	1.000000	4:00pm to 4:14pm	1.000000	10:00pm to 10:14pm	1.000000
4:15am to 4:29am	1.000000	10:15am to 10:29am	1.000000	4:15pm to 4:29pm	1.000000	10:15pm to 10:29pm	1.000000
4:30am to 4:44am	1.000000	10:30am to 10:44am	1.000000	4:30pm to 4:44pm	1.000000	10:30pm to 10:44pm	1.000000
4:45am to 4:59am	1.000000	10:45am to 10:59am	1.000000	4:45pm to 4:59pm	1.000000	10:45pm to 10:59pm	1.000000
5:00am to 5:14am	1.000000	11:00am to 11:14am	1.000000	5:00pm to 5:14pm	1.000000	11:00pm to 11:14pm	1.000000
5:15am to 5:29am	1.000000	11:15am to 11:29am	1.000000	5:15pm to 5:29pm	1.000000	11:15pm to 11:29pm	1.000000
5:30am to 5:44am	1.000000	11:30am to 11:44am	1.000000	5:30pm to 5:44pm	1.000000	11:30pm to 11:44pm	1.000000
5:45am to 5:59am	1.000000	11:45am to 11:59am	1.000000	5:45pm to 5:59pm	1.000000	11:45pm to 11:59pm	1.000000

Name: DEFAULT

Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight
12:00am to 12:14 am	1.000000	6:00am to 6:14am	1.000000	12:00pm to 12:14 pm	1.000000	6:00pm to 6:14pm	1.000000
12:15am to 12:29 am	1.000000	6:15am to 6:29am	1.000000	12:15pm to 12:29 pm	1.000000	6:15pm to 6:29pm	1.000000
12:30am to 12:44 am	1.000000	6:30am to 6:44am	1.000000	12:30pm to 12:44 pm	1.000000	6:30pm to 6:44pm	1.000000
12:45am to 12:59 am	1.000000	6:45am to 6:59am	1.000000	12:45pm to 12:59 pm	1.000000	6:45pm to 6:59pm	1.000000
1:00am to 1:14am	1.000000	7:00am to 7:14am	1.000000	1:00pm to 1:14pm	1.000000	7:00pm to 7:14pm	1.000000
1:15am to 1:29am	1.000000	7:15am to 7:29am	1.000000	1:15pm to 1:29pm	1.000000	7:15pm to 7:29pm	1.000000
1:30am to 1:44am	1.000000	7:30am to 7:44am	1.000000	1:30pm to 1:44pm	1.000000	7:30pm to 7:44pm	1.000000
1:45am to 1:59am	1.000000	7:45am to 7:59am	1.000000	1:45pm to 1:59pm	1.000000	7:45pm to 7:59pm	1.000000
2:00am to 2:14am	1.000000	8:00am to 8:14am	1.000000	2:00pm to 2:14pm	1.000000	8:00pm to 8:14pm	1.000000
2:15am to 2:29am	1.000000	8:15am to 8:29am	1.000000	2:15pm to 2:29pm	1.000000	8:15pm to 8:29pm	1.000000
2:30am to 2:44am	1.000000	8:30am to 8:44am	1.000000	2:30pm to 2:44pm	1.000000	8:30pm to 8:44pm	1.000000
2:45am to 2:59am	1.000000	8:45am to 8:59am	1.000000	2:45pm to 2:59pm	1.000000	8:45pm to 8:59pm	1.000000
3:00am to 3:14am	1.000000	9:00am to 9:14am	1.000000	3:00pm to 3:14pm	1.000000	9:00pm to 9:14pm	1.000000
3:15am to 3:29am	1.000000	9:15am to 9:29am	1.000000	3:15pm to 3:29pm	1.000000	9:15pm to 9:29pm	1.000000
3:30am to 3:44am	1.000000	9:30am to 9:44am	1.000000	3:30pm to 3:44pm	1.000000	9:30pm to 9:44pm	1.000000
3:45am to 3:59am	1.000000	9:45am to 9:59am	1.000000	3:45pm to 3:59pm	1.000000	9:45pm to 9:59pm	1.000000
4:00am to 4:14am	1.000000	10:00am to 10:14am	1.000000	4:00pm to 4:14pm	1.000000	10:00pm to 10:14pm	1.000000
4:15am to 4:29am	1.000000	10:15am to 10:29am	1.000000	4:15pm to 4:29pm	1.000000	10:15pm to 10:29pm	1.000000
4:30am to 4:44am	1.000000		1.000000	4:30pm to 4:44pm	1.000000		1.000000

		10:30am to 10:44am				10:30pm to 10:44pm	
4:45am to 4:59am	1.000000	10:45am to 10:59am	1.000000	4:45pm to 4:59pm	1.000000	10:45pm to 10:59pm	1.000000
5:00am to 5:14am	1.000000	11:00am to 11:14am	1.000000	5:00pm to 5:14pm	1.000000	11:00pm to 11:14pm	1.000000
5:15am to 5:29am	1.000000	11:15am to 11:29am	1.000000	5:15pm to 5:29pm	1.000000	11:15pm to 11:29pm	1.000000
5:30am to 5:44am	1.000000	11:30am to 11:44am	1.000000	5:30pm to 5:44pm	1.000000	11:30pm to 11:44pm	1.000000
5:45am to 5:59am	1.000000	11:45am to 11:59am	1.000000	5:45pm to 5:59pm	1.000000	11:45pm to 11:59pm	1.000000

Daily Operational Profiles

Baseline, City Centre

Name: DEFAULT (2)

Day	Weight	Day	Weight
Monday	1.000000	Friday	1.000000
Tuesday	1.000000	Saturday	1.000000
Wednesday	1.000000	Sunday	1.000000
Thursday	1.000000		

Name: DEFAULT

Day	Weight	Day	Weight
Monday	1.000000	Friday	1.000000
Tuesday	1.000000	Saturday	1.000000
Wednesday	1.000000	Sunday	1.000000
Thursday	1.000000		

Monthly Operational Profiles

Baseline, City Centre

Name: DEFAULT (2)

Month	Weight	Month	Weight
January	1.000000	July	1.000000
February	1.000000	August	1.000000
March	1.000000	September	1.000000
April	1.000000	October	1.000000
May	1.000000	November	1.000000
June	1.000000	December	1.000000

Name: DEFAULT

Month	Weight	Month	Weight
January	1.000000	July	1.000000
February	1.000000	August	1.000000
March	1.000000	September	1.000000
April	1.000000	October	1.000000
May	1.000000	November	1.000000
June	1.000000	December	1.000000

Aircraft

Baseline, City Centre

Default Taxi Out Time:	19.000000 min
Default Taxi In Time:	7.000000 min

Year:	Uses Schedule?	Schedule Filename:
2012	Yes	I:\1402032\16\EDMS Modelling\base2012 \otherTrials\base2012_Q400edms_default_noDisp\schedule2012_new2.txt

Aircraft Name:
Agusta A-109
Engine Type:
250B17B
Identification:
A109
Category:
SGTH

Take Off weight:	2599.00 Kgs
Approach Weight:	2599.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Air Conditioner (ACE 802)	Diesel	0.00	0.00	300.00	75.00	

Year:
2012

Annual Departures:	0
Annual Arrivals:	0
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	DEFAULT
Departure Daily Operational Profile:	DEFAULT
Departure Monthly Operational Profile:	DEFAULT
Arrival Quarter-Hourly Operational profile:	DEFAULT
Arrival Daily Operational Profile:	DEFAULT
Arrival Monthly Operational Profile:	DEFAULT
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

Aircraft Name:
Bell 206 JetRanger
Engine Type:
250B17B
Identification:
B06
Category:
SGTH

Take Off weight:	1814.00 Kgs
Approach Weight:	1814.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year

Year:
2012

Annual Departures:	0
Annual Arrivals:	0
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	DEFAULT
Departure Daily Operational Profile:	DEFAULT
Departure Monthly Operational Profile:	DEFAULT
Arrival Quarter-Hourly Operational profile:	DEFAULT
Arrival Daily Operational Profile:	DEFAULT
Arrival Monthly Operational Profile:	DEFAULT
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

Aircraft Name:
Bombardier de Havilland Dash 8 Q400
Engine Type:
PW150A

Take Off weight:	19504.00 Kgs
Approach Weight:	19051.00 Kgs
Glide Slope:	3.00°

Identification:
DH8D
Category:
LCTP

APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	Gate6

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Aircraft Tractor (Stewart & Stevenson TUG MC)	Diesel	0.00	5.00	86.00	80.00	
Baggage Tractor (Stewart & Stevenson TUG MA 50)	Gasoline	17.00	18.00	107.00	55.00	
Belt Loader (Stewart & Stevenson TUG 660)	Gasoline	15.00	15.00	107.00	50.00	
Cabin Service Truck (Hi-Way / TUG 660 chasis)	Diesel	5.00	5.00	71.00	53.00	
Catering Truck (Hi-Way / TUG 660 chasis)	Diesel	5.00	5.00	71.00	53.00	
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	20.00	175.00	25.00	
Ground Power Unit (TLD, 28 VDC)	Diesel	0.00	40.00	71.00	75.00	
Lavatory Truck (TLD 1410)	Diesel	15.00	0.00	56.00	25.00	
Service Truck (F250 / F350)	Diesel	7.00	8.00	235.00	20.00	

Year:
2012

Annual Departures:	0
Annual Arrivals:	0
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	DEFAULT (2)
Departure Daily Operational Profile:	DEFAULT (2)
Departure Monthly Operational Profile:	DEFAULT (2)
Arrival Quarter-Hourly Operational profile:	DEFAULT (2)
Arrival Daily Operational Profile:	DEFAULT (2)
Arrival Monthly Operational Profile:	DEFAULT (2)
Touch & Go Quarter-Hourly Operational profile:	DEFAULT (2)
Touch & Go Daily Operational Profile:	DEFAULT (2)
Touch & Go Monthly Operational Profile:	DEFAULT (2)

Aircraft Name:
Cessna 172 Skyhawk
Engine Type:
O-320
Identification:
C172
Category:
SGPP

Take Off weight:	1111.00 Kgs
Approach Weight:	1111.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	10.00	175.00	25.00	

Year:
2012

Annual Departures:	0
Annual Arrivals:	0
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

DEFAULT

Departure Quarter-Hourly Operational profile:	
Departure Daily Operational Profile:	DEFAULT
Departure Monthly Operational Profile:	DEFAULT
Arrival Quarter-Hourly Operational profile:	DEFAULT
Arrival Daily Operational Profile:	DEFAULT
Arrival Monthly Operational Profile:	DEFAULT
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

Aircraft Name:
Cessna 206
Engine Type:
TIO-540-J2B2
Identification:
C206
Category:
SGPP

Take Off weight:	1633.00 Kgs
Approach Weight:	1633.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	None

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	10.00	175.00	25.00	

Year:
2012

Annual Departures:	0
Annual Arrivals:	0
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	DEFAULT
Departure Daily Operational Profile:	DEFAULT
Departure Monthly Operational Profile:	DEFAULT
Arrival Quarter-Hourly Operational profile:	DEFAULT
Arrival Daily Operational Profile:	DEFAULT
Arrival Monthly Operational Profile:	DEFAULT
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

Aircraft Name:
Pilatus PC-12
Engine Type:
PT6A-67
Identification:
PC12
Category:
SGTP

Take Off weight:	3969.00 Kgs
Approach Weight:	3856.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	Gate6

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Aircraft Tractor (Stewart & Stevenson TUG MC)	Diesel	0.00	5.00	86.00	80.00	
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	20.00	175.00	25.00	
Ground Power Unit (TLD)	Gasoline	0.00	40.00	107.00	75.00	

Year:
2012

Annual Departures:	0
Annual Arrivals:	0
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	DEFAULT
Departure Daily Operational Profile:	DEFAULT
Departure Monthly Operational Profile:	DEFAULT
Arrival Quarter-Hourly Operational profile:	DEFAULT
Arrival Daily Operational Profile:	DEFAULT
Arrival Monthly Operational Profile:	DEFAULT
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

Aircraft Name:
Piper PA-30 Twin Comanche
Engine Type:
IO-320-D1AD
Identification:
PA30
Category:
SGPP

Take Off weight:	1633.00 Kgs
Approach Weight:	1633.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	10.00	175.00	25.00	

Year:
2012

Annual Departures:	0
Annual Arrivals:	0
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	DEFAULT
Departure Daily Operational Profile:	DEFAULT
Departure Monthly Operational Profile:	DEFAULT
Arrival Quarter-Hourly Operational profile:	DEFAULT
Arrival Daily Operational Profile:	DEFAULT
Arrival Monthly Operational Profile:	DEFAULT
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

Aircraft Name:
Robinson R44 Raven
Engine Type:
TIO-540-J2B2
Identification:
R44
Category:
SGPH

Take Off weight:	1089.00 Kgs
Approach Weight:	1089.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year

Annual Departures:	0

Year: 2012

Annual Arrivals:	0
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model
Departure Quarter-Hourly Operational profile:	DEFAULT
Departure Daily Operational Profile:	DEFAULT
Departure Monthly Operational Profile:	DEFAULT
Arrival Quarter-Hourly Operational profile:	DEFAULT
Arrival Daily Operational Profile:	DEFAULT
Arrival Monthly Operational Profile:	DEFAULT
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

GSE Population

Baseline, City Centre

None.

Parking Facilities

Baseline, City Centre

None.

Roadways

Baseline, City Centre

None.

Stationary Sources

Baseline, City Centre

None.

Training Fires

Baseline, City Centre

None.

Gates

Baseline, City Centre

Gate Name: Gate6

Elevation:	76.50 meters	
Release Height:	1.50 meters	
Initial Sigma-Z:	3.00 meters	
Initial Sigma-Y:	16.00 meters	
Point:	X (meters)	Y (meters)
1	646.00	419.00

Gate Name: GateP

Elevation:	76.50 meters	
Release Height:	1.50 meters	
Initial Sigma-Z:	3.00 meters	
Initial Sigma-Y:	16.00 meters	
Point:	X (meters)	Y (meters)
1	445.00	398.00

Taxiways

Baseline, City Centre

Taxiway Name: Taxiway 1

Width:	20.00 (meters)			
Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
1	512.00	-125.00	76.50	17.26
2	197.54	240.49	76.50	

Taxiway Name: Taxiway 1_1

Width:	20.00 (meters)			
Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
1	197.54	240.49	76.50	17.26
2	168.00	280.00	76.50	

Taxiway Name: Taxiway 1_2

Width:	20.00 (meters)			
Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)

	1	469.92	-169.69	76.50	17.26
	2	512.00	-125.00	76.50	

Taxiway Name: Taxiway 2	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	0.00	0.00	76.50	17.26
	2	-10.00	79.00	76.50	17.26
	3	133.00	253.00	76.50	17.26
	4	168.00	280.00	76.50	

Taxiway Name: Taxiway 25R	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	362.00	290.00	76.50	17.26
	2	525.00	296.00	76.50	

Taxiway Name: Taxiway 27R	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	362.00	290.00	76.50	17.26
	2	525.00	296.00	76.50	

Taxiway Name: Taxiway 3	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	168.00	280.00	76.50	17.26
	2	222.00	314.00	76.50	17.26
	3	396.00	249.00	76.50	17.26
	4	525.00	296.00	76.50	

Taxiway Name: Taxiway 4	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	525.00	296.00	76.50	17.26
	2	445.00	398.00	76.50	

Taxiway Name: Taxiway 5	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	525.00	296.00	76.50	17.26
	2	673.00	352.00	76.50	

Taxiway Name: Taxiway 6	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	673.00	352.00	76.50	17.26
	2	646.00	419.00	76.50	

Taxiway Name: Taxiway 7	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	1143.70	411.98	76.50	17.26
	2	1104.00	462.00	76.50	17.26
	3	874.00	387.00	76.50	17.26
	4	839.00	408.00	76.50	17.26
	5	673.00	352.00	76.50	

Taxiway Name: Taxiway 7L	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	332.00	291.00	76.50	17.26
	2	525.00	296.00	76.50	

Taxiway Name: Taxiway 9	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	755.09	-397.86	76.50	17.26
	2	512.00	-125.00	76.50	

Taxiway Name:	Width:	20.00 (meters)			
Taxiway 9L	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	388.00	304.00	76.50	17.26
	2	525.00	296.00	76.50	

Runways

Baseline, City Centre

Runway Name:	Name:	X (meters)	Y (meters)	Elevation (meters)	Glide Slope (°)
6	6	469.92	-169.69	76.50	3.00
7L	7L	332.00	291.00	76.50	3.00
8	8	0.00	0.00	76.50	3.50
9L	9L	388.00	304.00	76.50	3.00
15	15	197.54	240.49	76.50	3.00
24	24	1143.70	411.98	76.50	3.00
25R	25R	362.00	290.00	76.50	3.00
26	26	1143.70	411.98	76.50	4.80
27R	27R	362.00	290.00	76.50	3.00
33	33	755.09	-397.86	76.50	3.00

Taxipaths

Baseline, City Centre

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	Gate6	6		Taxiway 6 Taxiway 5 Taxiway 3 Taxiway 1_1 Taxiway 1 Taxiway 1_2
Inbound	Gate6	6	Taxiway 1_2	Taxiway 1_2 Taxiway 1 Taxiway 1_1 Taxiway 3 Taxiway 5 Taxiway 6
Outbound	Gate6	8		Taxiway 6 Taxiway 5

				Taxiway 3 Taxiway 2
Direction: Inbound	Gate: Gate6	Runway: 8	Runway Exit: Taxiway 2	Taxiways: Taxiway 2 Taxiway 3 Taxiway 5 Taxiway 6
Direction: Outbound	Gate: Gate6	Runway: 15	Runway Exit:	Taxiways: Taxiway 6 Taxiway 5 Taxiway 3 Taxiway 1_1
Direction: Inbound	Gate: Gate6	Runway: 15	Runway Exit: Taxiway 1_1	Taxiways: Taxiway 1_1 Taxiway 3 Taxiway 5 Taxiway 6
Direction: Outbound	Gate: Gate6	Runway: 24	Runway Exit:	Taxiways: Taxiway 6 Taxiway 7
Direction: Inbound	Gate: Gate6	Runway: 24	Runway Exit: Taxiway 7	Taxiways: Taxiway 7 Taxiway 6
Direction: Outbound	Gate: Gate6	Runway: 26	Runway Exit:	Taxiways: Taxiway 6 Taxiway 7
Direction: Inbound	Gate: Gate6	Runway: 26	Runway Exit: Taxiway 7	Taxiways: Taxiway 7 Taxiway 6
Direction: Outbound	Gate: Gate6	Runway: 33	Runway Exit:	Taxiways: Taxiway 6 Taxiway 5 Taxiway 3 Taxiway 1_1 Taxiway 1 Taxiway 9
Direction: Inbound	Gate: Gate6	Runway: 33	Runway Exit: Taxiway 9	Taxiways: Taxiway 9 Taxiway 1 Taxiway 1_1 Taxiway 3 Taxiway 5 Taxiway 6
Direction: Outbound	Gate: GateP	Runway: 6	Runway Exit:	Taxiways: Taxiway 4 Taxiway 3 Taxiway 1_1 Taxiway 1 Taxiway 1_2

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	6	Taxiway 1_2	Taxiway 1_2 Taxiway 1 Taxiway 1_1 Taxiway 3 Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	7L		Taxiway 4 Taxiway 7L

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	7L	Taxiway 7L	Taxiway 7L Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	8		Taxiway 4 Taxiway 3 Taxiway 2

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	8	Taxiway 2	Taxiway 2 Taxiway 3 Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	9L		Taxiway 4 Taxiway 9L

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	9L	Taxiway 9L	Taxiway 9L Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	15		Taxiway 4 Taxiway 3 Taxiway 1_1

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	15	Taxiway 1_1	Taxiway 1_1 Taxiway 3 Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	24		Taxiway 4 Taxiway 5 Taxiway 7

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	24	Taxiway 7	Taxiway 7 Taxiway 5 Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	25R		Taxiway 4 Taxiway 25R

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:

Inbound	GateP	25R	Taxiway 25R	Taxiway 25R Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	26		Taxiway 4 Taxiway 5 Taxiway 7

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	26	Taxiway 7	Taxiway 7 Taxiway 5 Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	27R		Taxiway 4 Taxiway 27R

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	27R	Taxiway 27R	Taxiway 27R Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	33		Taxiway 4 Taxiway 3 Taxiway 1_1 Taxiway 1 Taxiway 9

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	33	Taxiway 9	Taxiway 9 Taxiway 1 Taxiway 1_1 Taxiway 3 Taxiway 4

Configurations

Baseline, City Centre

Configuration Name:
Configuration1
Time Used:
0 %

	From	To
Wind Direction:	no bound (°)	no bound (°)
Wind Speed:	no bound (knots)	no bound (knots)
Hour of Day:	no bound (hh:mm)	no bound (hh:mm)
Ceiling:	no bound (feet)	0 (feet)
Visibility:	no bound (statute miles)	no bound (statute miles)
Temperature:	no bound (°F)	no bound (°F)

Point:	Arrivals Per Hour	Departures per Hour
1	100	200
2	200	100

Aicraft Size:	Runway	Arrivals (%)	Departures (%)	Touch & Gos (%)
Small	15	0 %	0.3 %	0 %
Small	24	1.9 %	0.8 %	0 %
Small	25R	0 %	8.3 %	0 %
Small	26	44.3 %	20.5 %	67 %
Small	27R	0 %	14.3 %	0 %
Small	33	4.3 %	0.2 %	0 %
Small	6	2.4 %	0.9 %	0 %
Small	7L	13.8 %	0 %	0 %
Small	8	24 %	54.7 %	33 %
Small	9L	9.3 %	0 %	0 %

Large	15	0 %	0 %	0 %
Large	24	0 %	0.1 %	0 %
Large	25R	0 %	0 %	0 %
Large	26	68.2 %	67.4 %	100 %
Large	27R	0 %	0 %	0 %
Large	33	0.2 %	0 %	0 %
Large	6	0 %	0 %	0 %
Large	7L	0 %	0 %	0 %
Large	8	31.6 %	32.5 %	0 %
Large	9L	0 %	0 %	0 %
Heavy	15	0 %	0 %	0 %
Heavy	24	0 %	0.1 %	0 %
Heavy	25R	0 %	0 %	0 %
Heavy	26	68.2 %	67.4 %	100 %
Heavy	27R	0 %	0 %	0 %
Heavy	33	0.2 %	0 %	0 %
Heavy	6	0 %	0 %	0 %
Heavy	7L	0 %	0 %	0 %
Heavy	8	31.6 %	32.5 %	0 %
Heavy	9L	0 %	0 %	0 %

Buildings

Baseline, City Centre

None.

Discrete Cartesian Receptors

Baseline, City Centre

Discrete Catersian Receptor Name: Rec01	X:	-3019.40 meters
	Y:	687.80 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec02	X:	-1243.50 meters
	Y:	34.90 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec03	X:	-649.80 meters
	Y:	37.10 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec04	X:	-544.60 meters
	Y:	1521.30 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec05	X:	23.00 meters
	Y:	411.50 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec06	X:	310.20 meters
	Y:	709.70 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec07	X:	281.30 meters
	Y:	808.80 meters
	Height:	1.80 meters
	Elevation:	76.50 meters

Discrete Catersian Receptor Name: Rec08	X:	396.90 meters
	Y:	790.90 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec09	X:	410.70 meters
	Y:	912.00 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec10	X:	212.40 meters
	Y:	1691.80 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec11	X:	685.00 meters
	Y:	1056.90 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec12	X:	1523.20 meters
	Y:	558.10 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec13	X:	1625.80 meters
	Y:	1276.00 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec14	X:	3364.20 meters
	Y:	36.90 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec15	X:	2852.40 meters
	Y:	1833.20 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec16	X:	4749.90 meters
	Y:	1073.70 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec17	X:	4179.00 meters
	Y:	2656.00 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec18	X:	6237.40 meters
	Y:	935.60 meters
	Height:	1.80 meters
	Elevation:	

APPENDIX E3: EDMS Inputs Future Case 2032 – CS100 Aircraft

EDMS 5.1 Model Inputs for BBTCA Study

Study Created:	Mon Nov 02 15:47:55 2015
Report Date:	Fri Nov 25 11:37:04 2016
Study Pathname:	C:\All\MG\BBTCA\CS100only\BBTCA\BBTCA.edm

Study Setup

Unit System:	Metric
Dispersion Modeling:	Dispersion is enabled for this study
Speciated Hydrocarbon Modeling:	Speciated Hydrocarbon Modeling is enabled for this study
Analysis Years:	2032

Scenarios

Scenario Name:	Description:	Add a description.
Baseline	Aircraft Times in Mode Basis:	Performance-Based
	Taxi Time Modeling:	Delay & Sequencing Model
	FOA3 Sulfur-to-Sulfate Conversion Rate:	2.400000 %

Airports

Airport Name:	City Centre
IATA Code:	YTZ
ICAO Code:	CYTZ
FAA Code:	
Country:	CA
State:	
City:	Toronto Island
Airport Description:	City Centre
Latitude:	43.627°
Longitude:	-79.396°
Northing:	4831751.07
Easting:	629393.00
UTM Zone:	17
Elevation:	251.00 feet
PM Modeling Methodology:	FOA3

Scenario-Airport: Baseline, City Centre

Weather

Baseline, City Centre

Mixing Height:	914.40 meters
Temperature:	8.64 °C
Daily High Temperature:	14.39 °C
Daily Low Temperature:	2.89 °C
Pressure:	100711.18 Pa
Sea Level Pressure:	101659.37 Pa
Relative Humidity:	74.05
Wind Speed:	17.21 kph
Wind Direction:	0.00 °
Ceiling:	30480.00 m
Visibility:	80.47 km

The user has used hourly meteorological data.

Base Elevation:	76.50 meters
Date Range:	Thursday, January 01, 2004 to Friday, December 31, 2004
Source Data File Location:	
Upper Air Data File Location:	

Quarter-Hourly Operational Profiles

Baseline, City Centre

Name: DEFAULT

Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight
12:00am to 12:14 am	1.000000	6:00am to 6:14am	1.000000	12:00pm to 12:14 pm	1.000000	6:00pm to 6:14pm	1.000000
12:15am to 12:29 am	1.000000	6:15am to 6:29am	1.000000	12:15pm to 12:29 pm	1.000000	6:15pm to 6:29pm	1.000000
12:30am to 12:44 am	1.000000	6:30am to 6:44am	1.000000	12:30pm to 12:44 pm	1.000000	6:30pm to 6:44pm	1.000000
12:45am to 12:59 am	1.000000	6:45am to 6:59am	1.000000	12:45pm to 12:59 pm	1.000000	6:45pm to 6:59pm	1.000000
1:00am to 1:14am	1.000000	7:00am to 7:14am	1.000000	1:00pm to 1:14pm	1.000000	7:00pm to 7:14pm	1.000000
1:15am to 1:29am	1.000000	7:15am to 7:29am	1.000000	1:15pm to 1:29pm	1.000000	7:15pm to 7:29pm	1.000000
1:30am to 1:44am	1.000000	7:30am to 7:44am	1.000000	1:30pm to 1:44pm	1.000000	7:30pm to 7:44pm	1.000000
1:45am to 1:59am	1.000000	7:45am to 7:59am	1.000000	1:45pm to 1:59pm	1.000000	7:45pm to 7:59pm	1.000000
2:00am to 2:14am	1.000000	8:00am to 8:14am	1.000000	2:00pm to 2:14pm	1.000000	8:00pm to 8:14pm	1.000000
2:15am to 2:29am	1.000000	8:15am to 8:29am	1.000000	2:15pm to 2:29pm	1.000000	8:15pm to 8:29pm	1.000000
2:30am to 2:44am	1.000000	8:30am to 8:44am	1.000000	2:30pm to 2:44pm	1.000000	8:30pm to 8:44pm	1.000000
2:45am to 2:59am	1.000000	8:45am to 8:59am	1.000000	2:45pm to 2:59pm	1.000000	8:45pm to 8:59pm	1.000000
3:00am to 3:14am	1.000000	9:00am to 9:14am	1.000000	3:00pm to 3:14pm	1.000000	9:00pm to 9:14pm	1.000000
3:15am to 3:29am	1.000000	9:15am to 9:29am	1.000000	3:15pm to 3:29pm	1.000000	9:15pm to 9:29pm	1.000000
3:30am to 3:44am	1.000000	9:30am to 9:44am	1.000000	3:30pm to 3:44pm	1.000000	9:30pm to 9:44pm	1.000000
3:45am to 3:59am	1.000000	9:45am to 9:59am	1.000000	3:45pm to 3:59pm	1.000000	9:45pm to 9:59pm	1.000000
4:00am to 4:14am	1.000000	10:00am to 10:14am	1.000000	4:00pm to 4:14pm	1.000000	10:00pm to 10:14pm	1.000000
4:15am to 4:29am	1.000000	10:15am to 10:29am	1.000000	4:15pm to 4:29pm	1.000000	10:15pm to 10:29pm	1.000000
4:30am to 4:44am	1.000000	10:30am to 10:44am	1.000000	4:30pm to 4:44pm	1.000000	10:30pm to 10:44pm	1.000000
4:45am to 4:59am	1.000000	10:45am to 10:59am	1.000000	4:45pm to 4:59pm	1.000000	10:45pm to 10:59pm	1.000000
5:00am to 5:14am	1.000000	11:00am to 11:14am	1.000000	5:00pm to 5:14pm	1.000000	11:00pm to 11:14pm	1.000000
5:15am to 5:29am	1.000000	11:15am to 11:29am	1.000000	5:15pm to 5:29pm	1.000000	11:15pm to 11:29pm	1.000000
5:30am to 5:44am	1.000000	11:30am to 11:44am	1.000000	5:30pm to 5:44pm	1.000000	11:30pm to 11:44pm	1.000000
5:45am to 5:59am	1.000000	11:45am to 11:59am	1.000000	5:45pm to 5:59pm	1.000000	11:45pm to 11:59pm	1.000000

Name: QHProfile Q400

Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight
12:00am to 12:14 am	0.000000	6:00am to 6:14am	0.210000	12:00pm to 12:14 pm	0.970000	6:00pm to 6:14pm	0.860000
12:15am to 12:29 am	0.000000	6:15am to 6:29am	0.210000	12:15pm to 12:29 pm	0.970000	6:15pm to 6:29pm	0.860000
12:30am to 12:44 am	0.000000	6:30am to 6:44am	0.210000	12:30pm to 12:44 pm	0.970000	6:30pm to 6:44pm	0.860000
12:45am to 12:59 am	0.000000	6:45am to 6:59am	0.210000	12:45pm to 12:59 pm	0.970000	6:45pm to 6:59pm	0.860000
1:00am to 1:14am	0.000000	7:00am to 7:14am	0.780000	1:00pm to 1:14pm	0.930000	7:00pm to 7:14pm	0.860000
1:15am to 1:29am	0.000000	7:15am to 7:29am	0.780000	1:15pm to 1:29pm	0.930000	7:15pm to 7:29pm	0.860000
1:30am to 1:44am	0.000000	7:30am to 7:44am	0.780000	1:30pm to 1:44pm	0.930000	7:30pm to 7:44pm	0.860000
1:45am to 1:59am	0.000000	7:45am to 7:59am	0.780000	1:45pm to 1:59pm	0.930000	7:45pm to 7:59pm	0.860000
2:00am to 2:14am	0.000000	8:00am to 8:14am	0.950000	2:00pm to 2:14pm	0.830000	8:00pm to 8:14pm	0.870000
2:15am to 2:29am	0.000000	8:15am to 8:29am	0.950000	2:15pm to 2:29pm	0.830000	8:15pm to 8:29pm	0.870000
2:30am to 2:44am	0.000000	8:30am to 8:44am	0.950000	2:30pm to 2:44pm	0.830000	8:30pm to 8:44pm	0.870000
2:45am to 2:59am	0.000000	8:45am to 8:59am	0.950000	2:45pm to 2:59pm	0.830000	8:45pm to 8:59pm	0.870000
3:00am to 3:14am	0.000000	9:00am to 9:14am	0.880000	3:00pm to 3:14pm	0.870000	9:00pm to 9:14pm	0.970000
3:15am to 3:29am	0.000000	9:15am to 9:29am	0.880000	3:15pm to 3:29pm	0.870000	9:15pm to 9:29pm	0.970000
3:30am to 3:44am	0.000000	9:30am to 9:44am	0.880000	3:30pm to 3:44pm	0.870000	9:30pm to 9:44pm	0.970000
3:45am to 3:59am	0.000000	9:45am to 9:59am	0.880000	3:45pm to 3:59pm	0.870000	9:45pm to 9:59pm	0.970000
4:00am to 4:14am	0.000000	10:00am to 10:14am	0.880000	4:00pm to 4:14pm	0.930000	10:00pm to 10:14pm	0.330000
4:15am to 4:29am	0.000000	10:15am to 10:29am	0.880000	4:15pm to 4:29pm	0.930000	10:15pm to 10:29pm	0.330000
4:30am to 4:44am	0.000000		0.880000	4:30pm to 4:44pm	0.930000		0.330000

		10:30am to 10:44am				10:30pm to 10:44pm	
4:45am to 4:59am	0.000000	10:45am to 10:59am	0.880000	4:45pm to 4:59pm	0.930000	10:45pm to 10:59pm	0.330000
5:00am to 5:14am	0.000000	11:00am to 11:14am	0.950000	5:00pm to 5:14pm	1.000000	11:00pm to 11:14pm	0.000000
5:15am to 5:29am	0.000000	11:15am to 11:29am	0.950000	5:15pm to 5:29pm	1.000000	11:15pm to 11:29pm	0.000000
5:30am to 5:44am	0.000000	11:30am to 11:44am	0.950000	5:30pm to 5:44pm	1.000000	11:30pm to 11:44pm	0.000000
5:45am to 5:59am	0.000000	11:45am to 11:59am	0.950000	5:45pm to 5:59pm	1.000000	11:45pm to 11:59pm	0.000000

Daily Operational Profiles

Baseline, City Centre

Name: DEFAULT

Day	Weight	Day	Weight
Monday	1.000000	Friday	1.000000
Tuesday	1.000000	Saturday	1.000000
Wednesday	1.000000	Sunday	1.000000
Thursday	1.000000		

Name: DailyP_Q400

Day	Weight	Day	Weight
Monday	0.740000	Friday	1.000000
Tuesday	0.970000	Saturday	0.970000
Wednesday	0.960000	Sunday	0.470000
Thursday	0.980000		

Monthly Operational Profiles

Baseline, City Centre

Name: DEFAULT

Month	Weight	Month	Weight
January	1.000000	July	1.000000
February	1.000000	August	1.000000
March	1.000000	September	1.000000
April	1.000000	October	1.000000
May	1.000000	November	1.000000
June	1.000000	December	1.000000

Name: MonthlyP_Q400

Month	Weight	Month	Weight
January	0.810000	July	0.960000
February	0.860000	August	0.980000
March	0.910000	September	0.940000
April	0.920000	October	0.950000
May	1.000000	November	0.980000
June	0.970000	December	0.820000

Aircraft

Baseline, City Centre

Default Taxi Out Time:	19.000000 min
Default Taxi In Time:	7.000000 min

Year:	Uses Schedule?	Schedule Filename:
2032	No	(None)

Aircraft Name: CS100

Take Off weight: 66270.00 Kgs

Engine Type:
User-Created
Identification:
CS100
Category:
LCJP

Approach Weight:	62505.00 Kgs
Glide Slope:	3.00°
APU Assignment:	APU GTCP 36-300 (80HP)
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	Gate6

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Air Start (ACE 180)	Diesel	0.00	7.00	425.00	90.00	
Aircraft Tractor (Stewart & Stevenson TUG GT-35, Douglas TBL-180)	Diesel	0.00	8.00	88.00	80.00	
Baggage Tractor (Stewart & Stevenson TUG MA 50)	Gasoline	37.00	38.00	71.00	55.00	
Belt Loader (Stewart & Stevenson TUG 660)	Gasoline	24.00	24.00	71.00	50.00	
Cabin Service Truck (Hi-Way F650)	Diesel	10.00	10.00	210.00	53.00	
Catering Truck (Hi-Way F650)	Diesel	7.00	8.00	210.00	53.00	
Hydrant Truck (F250 / F350)	Diesel	0.00	12.00	235.00	70.00	
Lavatory Truck (TLD 1410)	Diesel	15.00	0.00	56.00	25.00	
Service Truck (F250 / F350)	Diesel	7.00	8.00	235.00	20.00	

Year:
2032

Annual Departures:	9855
Annual Arrivals:	9855
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	QHProfile Q400
Departure Daily Operational Profile:	DailyP_Q400
Departure Monthly Operational Profile:	MonthlyP_Q400
Arrival Quarter-Hourly Operational profile:	QHProfile Q400
Arrival Daily Operational Profile:	DailyP_Q400
Arrival Monthly Operational Profile:	MonthlyP_Q400
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

GSE Population

Baseline, City Centre

None.

Parking Facilities

Baseline, City Centre

None.

Roadways

Baseline, City Centre

None.

Stationary Sources

Baseline, City Centre

None.

Training Fires

APPENDIX E4: EDMS Inputs Future Case 2032 – Other Aircrafts

EDMS 5.1.4.1 Model Inputs for future2032 Study

Study Created:	Thu Jul 30 12:59:21 2015
Report Date:	Tue Nov 29 13:41:46 2016
Study Pathname:	I:\1402032\16\EDMS Modelling\futureCase_June9_2016\future2032new\future2032.edm

Study Setup

Unit System:	Metric
Dispersion Modeling:	Dispersion is enabled for this study
Speciated Organic Gas (OG) Modeling:	Speciated Organic Gas (OG) Emissions are excluded from this study.
Analysis Years:	2032

Scenarios

Scenario Name:	Description:	Add a description.
future	Aircraft Times in Mode Basis:	Performance-Based
	Taxi Time Modeling:	Delay & Sequencing Model
	FOA3 Sulfur-to-Sulfate Conversion Rate:	2.400000 %

Airports

Airport Name:	City Centre
IATA Code:	YTZ
ICAO Code:	CYTZ
FAA Code:	
Country:	CA
State:	
City:	Toronto Island
Airport Description:	City Centre
Latitude:	43.627°
Longitude:	-79.396°
Northing:	4831751.07
Easting:	629393.00
UTM Zone:	17
Elevation:	251.00 feet
PM Modeling Methodology:	FOA3

Scenario-Airport: future, City Centre

Weather

future, City Centre

Mixing Height:	914.40 meters
Temperature:	8.64 °C
Daily High Temperature:	14.39 °C
Daily Low Temperature:	2.89 °C
Pressure:	100711.18 Pa
Sea Level Pressure:	101659.37 Pa
Relative Humidity:	74.05
Wind Speed:	17.21 kph
Wind Direction:	0.00 °
Ceiling:	30480.00 m
Visibility:	80.47 km
The user has used hourly meteorological data.	
Base Elevation:	76.50 meters
Date Range:	Sunday, January 01, 2012 to Monday, December 31, 2012
Source Data File Location:	C:\EDMSTEMP\TORONT~1.TXT
Upper Air Data File Location:	C:\EDMSTEMP\RAOB_S~1.TXT

Quarter-Hourly Operational Profiles

future, City Centre

Name: DEFAULT

Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight
12:00am to 12:14 am	1.000000	6:00am to 6:14am	1.000000	12:00pm to 12:14 pm	1.000000	6:00pm to 6:14pm	1.000000
12:15am to 12:29 am	1.000000	6:15am to 6:29am	1.000000	12:15pm to 12:29 pm	1.000000	6:15pm to 6:29pm	1.000000
12:30am to 12:44 am	1.000000	6:30am to 6:44am	1.000000	12:30pm to 12:44 pm	1.000000	6:30pm to 6:44pm	1.000000
12:45am to 12:59 am	1.000000	6:45am to 6:59am	1.000000	12:45pm to 12:59 pm	1.000000	6:45pm to 6:59pm	1.000000
1:00am to 1:14am	1.000000	7:00am to 7:14am	1.000000	1:00pm to 1:14pm	1.000000	7:00pm to 7:14pm	1.000000
1:15am to 1:29am	1.000000	7:15am to 7:29am	1.000000	1:15pm to 1:29pm	1.000000	7:15pm to 7:29pm	1.000000
1:30am to 1:44am	1.000000	7:30am to 7:44am	1.000000	1:30pm to 1:44pm	1.000000	7:30pm to 7:44pm	1.000000
1:45am to 1:59am	1.000000	7:45am to 7:59am	1.000000	1:45pm to 1:59pm	1.000000	7:45pm to 7:59pm	1.000000
2:00am to 2:14am	1.000000	8:00am to 8:14am	1.000000	2:00pm to 2:14pm	1.000000	8:00pm to 8:14pm	1.000000
2:15am to 2:29am	1.000000	8:15am to 8:29am	1.000000	2:15pm to 2:29pm	1.000000	8:15pm to 8:29pm	1.000000
2:30am to 2:44am	1.000000	8:30am to 8:44am	1.000000	2:30pm to 2:44pm	1.000000	8:30pm to 8:44pm	1.000000
2:45am to 2:59am	1.000000	8:45am to 8:59am	1.000000	2:45pm to 2:59pm	1.000000	8:45pm to 8:59pm	1.000000
3:00am to 3:14am	1.000000	9:00am to 9:14am	1.000000	3:00pm to 3:14pm	1.000000	9:00pm to 9:14pm	1.000000
3:15am to 3:29am	1.000000	9:15am to 9:29am	1.000000	3:15pm to 3:29pm	1.000000	9:15pm to 9:29pm	1.000000
3:30am to 3:44am	1.000000	9:30am to 9:44am	1.000000	3:30pm to 3:44pm	1.000000	9:30pm to 9:44pm	1.000000
3:45am to 3:59am	1.000000	9:45am to 9:59am	1.000000	3:45pm to 3:59pm	1.000000	9:45pm to 9:59pm	1.000000
4:00am to 4:14am	1.000000	10:00am to 10:14am	1.000000	4:00pm to 4:14pm	1.000000	10:00pm to 10:14pm	1.000000
4:15am to 4:29am	1.000000	10:15am to 10:29am	1.000000	4:15pm to 4:29pm	1.000000	10:15pm to 10:29pm	1.000000
4:30am to 4:44am	1.000000	10:30am to 10:44am	1.000000	4:30pm to 4:44pm	1.000000	10:30pm to 10:44pm	1.000000
4:45am to 4:59am	1.000000	10:45am to 10:59am	1.000000	4:45pm to 4:59pm	1.000000	10:45pm to 10:59pm	1.000000
5:00am to 5:14am	1.000000	11:00am to 11:14am	1.000000	5:00pm to 5:14pm	1.000000	11:00pm to 11:14pm	1.000000
5:15am to 5:29am	1.000000	11:15am to 11:29am	1.000000	5:15pm to 5:29pm	1.000000	11:15pm to 11:29pm	1.000000
5:30am to 5:44am	1.000000	11:30am to 11:44am	1.000000	5:30pm to 5:44pm	1.000000	11:30pm to 11:44pm	1.000000
5:45am to 5:59am	1.000000	11:45am to 11:59am	1.000000	5:45pm to 5:59pm	1.000000	11:45pm to 11:59pm	1.000000

Name: QHProfile Q400

Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight
12:00am to 12:14 am	0.000000	6:00am to 6:14am	0.210000	12:00pm to 12:14 pm	0.970000	6:00pm to 6:14pm	0.860000
12:15am to 12:29 am	0.000000	6:15am to 6:29am	0.210000	12:15pm to 12:29 pm	0.970000	6:15pm to 6:29pm	0.860000
12:30am to 12:44 am	0.000000	6:30am to 6:44am	0.210000	12:30pm to 12:44 pm	0.970000	6:30pm to 6:44pm	0.860000
12:45am to 12:59 am	0.000000	6:45am to 6:59am	0.210000	12:45pm to 12:59 pm	0.970000	6:45pm to 6:59pm	0.860000
1:00am to 1:14am	0.000000	7:00am to 7:14am	0.780000	1:00pm to 1:14pm	0.930000	7:00pm to 7:14pm	0.860000
1:15am to 1:29am	0.000000	7:15am to 7:29am	0.780000	1:15pm to 1:29pm	0.930000	7:15pm to 7:29pm	0.860000
1:30am to 1:44am	0.000000	7:30am to 7:44am	0.780000	1:30pm to 1:44pm	0.930000	7:30pm to 7:44pm	0.860000
1:45am to 1:59am	0.000000	7:45am to 7:59am	0.780000	1:45pm to 1:59pm	0.930000	7:45pm to 7:59pm	0.860000
2:00am to 2:14am	0.000000	8:00am to 8:14am	0.950000	2:00pm to 2:14pm	0.830000	8:00pm to 8:14pm	0.870000
2:15am to 2:29am	0.000000	8:15am to 8:29am	0.950000	2:15pm to 2:29pm	0.830000	8:15pm to 8:29pm	0.870000
2:30am to 2:44am	0.000000	8:30am to 8:44am	0.950000	2:30pm to 2:44pm	0.830000	8:30pm to 8:44pm	0.870000
2:45am to 2:59am	0.000000	8:45am to 8:59am	0.950000	2:45pm to 2:59pm	0.830000	8:45pm to 8:59pm	0.870000
3:00am to 3:14am	0.000000	9:00am to 9:14am	0.880000	3:00pm to 3:14pm	0.870000	9:00pm to 9:14pm	0.970000
3:15am to 3:29am	0.000000	9:15am to 9:29am	0.880000	3:15pm to 3:29pm	0.870000	9:15pm to 9:29pm	0.970000
3:30am to 3:44am	0.000000	9:30am to 9:44am	0.880000	3:30pm to 3:44pm	0.870000	9:30pm to 9:44pm	0.970000
3:45am to 3:59am	0.000000	9:45am to 9:59am	0.880000	3:45pm to 3:59pm	0.870000	9:45pm to 9:59pm	0.970000
4:00am to 4:14am	0.000000	10:00am to 10:14am	0.880000	4:00pm to 4:14pm	0.930000	10:00pm to 10:14pm	0.330000
4:15am to 4:29am	0.000000	10:15am to 10:29am	0.880000	4:15pm to 4:29pm	0.930000	10:15pm to 10:29pm	0.330000
4:30am to 4:44am	0.000000		0.880000	4:30pm to 4:44pm	0.930000		0.330000

		10:30am to 10:44am				10:30pm to 10:44pm	
4:45am to 4:59am	0.000000	10:45am to 10:59am	0.880000	4:45pm to 4:59pm	0.930000	10:45pm to 10:59pm	0.330000
5:00am to 5:14am	0.000000	11:00am to 11:14am	0.950000	5:00pm to 5:14pm	1.000000	11:00pm to 11:14pm	0.000000
5:15am to 5:29am	0.000000	11:15am to 11:29am	0.950000	5:15pm to 5:29pm	1.000000	11:15pm to 11:29pm	0.000000
5:30am to 5:44am	0.000000	11:30am to 11:44am	0.950000	5:30pm to 5:44pm	1.000000	11:30pm to 11:44pm	0.000000
5:45am to 5:59am	0.000000	11:45am to 11:59am	0.950000	5:45pm to 5:59pm	1.000000	11:45pm to 11:59pm	0.000000

Name: QHProfile CNA172

Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight	Quarter-Hour	Weight
12:00am to 12:14 am	0.000000	6:00am to 6:14am	0.020000	12:00pm to 12:14 pm	0.910000	6:00pm to 6:14pm	0.850000
12:15am to 12:29 am	0.000000	6:15am to 6:29am	0.020000	12:15pm to 12:29 pm	0.910000	6:15pm to 6:29pm	0.850000
12:30am to 12:44 am	0.000000	6:30am to 6:44am	0.020000	12:30pm to 12:44 pm	0.910000	6:30pm to 6:44pm	0.850000
12:45am to 12:59 am	0.000000	6:45am to 6:59am	0.020000	12:45pm to 12:59 pm	0.910000	6:45pm to 6:59pm	0.850000
1:00am to 1:14am	0.000000	7:00am to 7:14am	0.180000	1:00pm to 1:14pm	0.880000	7:00pm to 7:14pm	0.730000
1:15am to 1:29am	0.000000	7:15am to 7:29am	0.180000	1:15pm to 1:29pm	0.880000	7:15pm to 7:29pm	0.730000
1:30am to 1:44am	0.000000	7:30am to 7:44am	0.180000	1:30pm to 1:44pm	0.880000	7:30pm to 7:44pm	0.730000
1:45am to 1:59am	0.000000	7:45am to 7:59am	0.180000	1:45pm to 1:59pm	0.880000	7:45pm to 7:59pm	0.730000
2:00am to 2:14am	0.000000	8:00am to 8:14am	0.460000	2:00pm to 2:14pm	1.000000	8:00pm to 8:14pm	0.600000
2:15am to 2:29am	0.000000	8:15am to 8:29am	0.460000	2:15pm to 2:29pm	1.000000	8:15pm to 8:29pm	0.600000
2:30am to 2:44am	0.000000	8:30am to 8:44am	0.460000	2:30pm to 2:44pm	1.000000	8:30pm to 8:44pm	0.600000
2:45am to 2:59am	0.000000	8:45am to 8:59am	0.460000	2:45pm to 2:59pm	1.000000	8:45pm to 8:59pm	0.600000
3:00am to 3:14am	0.000000	9:00am to 9:14am	0.640000	3:00pm to 3:14pm	0.900000	9:00pm to 9:14pm	0.490000
3:15am to 3:29am	0.000000	9:15am to 9:29am	0.640000	3:15pm to 3:29pm	0.900000	9:15pm to 9:29pm	0.490000
3:30am to 3:44am	0.000000	9:30am to 9:44am	0.640000	3:30pm to 3:44pm	0.900000	9:30pm to 9:44pm	0.490000
3:45am to 3:59am	0.000000	9:45am to 9:59am	0.640000	3:45pm to 3:59pm	0.900000	9:45pm to 9:59pm	0.490000
4:00am to 4:14am	0.000000	10:00am to 10:14am	0.860000	4:00pm to 4:14pm	0.920000	10:00pm to 10:14pm	0.300000
4:15am to 4:29am	0.000000	10:15am to 10:29am	0.860000	4:15pm to 4:29pm	0.920000	10:15pm to 10:29pm	0.300000
4:30am to 4:44am	0.000000	10:30am to 10:44am	0.860000	4:30pm to 4:44pm	0.920000	10:30pm to 10:44pm	0.300000
4:45am to 4:59am	0.000000	10:45am to 10:59am	0.860000	4:45pm to 4:59pm	0.920000	10:45pm to 10:59pm	0.300000
5:00am to 5:14am	0.000000	11:00am to 11:14am	0.950000	5:00pm to 5:14pm	0.930000	11:00pm to 11:14pm	0.000000
5:15am to 5:29am	0.000000	11:15am to 11:29am	0.950000	5:15pm to 5:29pm	0.930000	11:15pm to 11:29pm	0.000000
5:30am to 5:44am	0.000000	11:30am to 11:44am	0.950000	5:30pm to 5:44pm	0.930000	11:30pm to 11:44pm	0.000000
5:45am to 5:59am	0.000000	11:45am to 11:59am	0.950000	5:45pm to 5:59pm	0.930000	11:45pm to 11:59pm	0.000000

Daily Operational Profiles

future, City Centre

Name: DEFAULT

Day	Weight	Day	Weight
Monday	1.000000	Friday	1.000000
Tuesday	1.000000	Saturday	1.000000
Wednesday	1.000000	Sunday	1.000000
Thursday	1.000000		

Name: DailyP_Q400

Day	Weight	Day	Weight
Monday	0.740000	Friday	1.000000
Tuesday	0.970000	Saturday	0.970000
Wednesday	0.960000	Sunday	0.470000

Thursday	0.980000

Name: DailyP_CNA172

Day	Weight	Day	Weight
Monday	1.000000	Friday	0.840000
Tuesday	0.730000	Saturday	0.800000
Wednesday	0.680000	Sunday	0.920000
Thursday	0.850000		

Monthly Operational Profiles

future, City Centre

Name: DEFAULT

Month	Weight	Month	Weight
January	1.000000	July	1.000000
February	1.000000	August	1.000000
March	1.000000	September	1.000000
April	1.000000	October	1.000000
May	1.000000	November	1.000000
June	1.000000	December	1.000000

Name: MonthlyP_CNA172

Month	Weight	Month	Weight
January	0.430000	July	0.970000
February	0.510000	August	1.000000
March	0.560000	September	0.750000
April	0.670000	October	0.510000
May	0.900000	November	0.580000
June	0.880000	December	0.320000

Name: MonthlyP_Q400

Month	Weight	Month	Weight
January	0.810000	July	0.960000
February	0.860000	August	0.980000
March	0.910000	September	0.940000
April	0.920000	October	0.950000
May	1.000000	November	0.980000
June	0.970000	December	0.820000

Aircraft

future, City Centre

Default Taxi Out Time:	19.000000 min
Default Taxi In Time:	7.000000 min

Year:	Uses Schedule?	Schedule Filename:
2032	No	(None)

Aircraft Name:
Bell 206 JetRanger
Engine Type:
250B17B
Identification:
B06
Category:
SGTH

Take Off weight:	1814.00 Kgs
Approach Weight:	1814.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year

Annual Departures:	1693
Annual Arrivals:	1693

Year:
2032

Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	QHProfile CNA172
Departure Daily Operational Profile:	DailyP_CNA172
Departure Monthly Operational Profile:	MonthlyP_CNA172
Arrival Quarter-Hourly Operational profile:	QHProfile CNA172
Arrival Daily Operational Profile:	DailyP_CNA172
Arrival Monthly Operational Profile:	MonthlyP_CNA172
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

Aircraft Name:
Bombardier de Havilland Dash 8 Q400
Engine Type:
PW150A
Identification:
Q400
Category:
LCTP

Take Off weight:	19504.00 Kgs
Approach Weight:	19051.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	Gate6_Q400

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Aircraft Tractor (Stewart & Stevenson TUG MC)	Diesel	0.00	5.00	86.00	80.00	
Baggage Tractor (Stewart & Stevenson TUG MA 50)	Gasoline	17.00	18.00	107.00	55.00	
Belt Loader (Stewart & Stevenson TUG 660)	Gasoline	15.00	15.00	107.00	50.00	
Cabin Service Truck (Hi-Way / TUG 660 chasis)	Diesel	5.00	5.00	71.00	53.00	
Catering Truck (Hi-Way / TUG 660 chasis)	Diesel	5.00	5.00	71.00	53.00	
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	20.00	175.00	25.00	
Ground Power Unit (TLD, 28 VDC)	Diesel	0.00	40.00	71.00	75.00	
Lavatory Truck (TLD 1410)	Diesel	15.00	0.00	56.00	25.00	
Service Truck (F250 / F350)	Diesel	7.00	8.00	235.00	20.00	

Year:
2032

Annual Departures:	31054
Annual Arrivals:	31054
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	QHProfile Q400
Departure Daily Operational Profile:	DailyP_Q400
Departure Monthly Operational Profile:	MonthlyP_Q400
Arrival Quarter-Hourly Operational profile:	QHProfile Q400
Arrival Daily Operational Profile:	DailyP_Q400
Arrival Monthly Operational Profile:	MonthlyP_Q400
Touch & Go Quarter-Hourly Operational profile:	QHProfile Q400
Touch & Go Daily Operational Profile:	DailyP_Q400
Touch & Go Monthly Operational Profile:	MonthlyP_Q400

Aircraft Name:
Cessna 172 Skyhawk
Engine Type:
O-320
Identification:
C172
Category:
SGPP

Take Off weight:	1111.00 Kgs
Approach Weight:	1111.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	10.00	175.00	25.00	

Year:
2032

Annual Departures:	12758
Annual Arrivals:	12758
Annual TGOs:	13196
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model
Departure Quarter-Hourly Operational profile:	QHProfile CNA172
Departure Daily Operational Profile:	DailyP_CNA172
Departure Monthly Operational Profile:	MonthlyP_CNA172
Arrival Quarter-Hourly Operational profile:	QHProfile CNA172
Arrival Daily Operational Profile:	DailyP_CNA172
Arrival Monthly Operational Profile:	MonthlyP_CNA172
Touch & Go Quarter-Hourly Operational profile:	QHProfile CNA172
Touch & Go Daily Operational Profile:	DailyP_CNA172
Touch & Go Monthly Operational Profile:	MonthlyP_CNA172

Aircraft Name:
Cessna 206
Engine Type:
TIO-540-J2B2
Identification:
C206
Category:
SGPP

Take Off weight:	1633.00 Kgs
Approach Weight:	1633.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	10.00	175.00	25.00	

Year:
2032

Annual Departures:	1435
Annual Arrivals:	1435
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model
Departure Quarter-Hourly Operational profile:	QHProfile CNA172
Departure Daily Operational Profile:	DailyP_CNA172
Departure Monthly Operational Profile:	MonthlyP_CNA172
Arrival Quarter-Hourly Operational profile:	QHProfile CNA172
Arrival Daily Operational Profile:	DailyP_CNA172
Arrival Monthly Operational Profile:	MonthlyP_CNA172
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
	DEFAULT

Touch & Go Monthly Operational Profile:

Aircraft Name: Dassault Falcon 10
Engine Type: TFE731-2-2B
Identification: FA10
Category: SGJB

Take Off weight:	8301.00 Kgs
Approach Weight:	6260.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	Gate6

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Aircraft Tractor (Stewart & Stevenson TUG MC)	Diesel	0.00	5.00	86.00	80.00	
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	20.00	175.00	25.00	
Ground Power Unit (TLD, 28 VDC)	Diesel	0.00	40.00	71.00	75.00	

Year: 2032

Annual Departures:	382
Annual Arrivals:	382
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model
Departure Quarter-Hourly Operational profile:	QHProfile CNA172
Departure Daily Operational Profile:	DailyP_CNA172
Departure Monthly Operational Profile:	MonthlyP_CNA172
Arrival Quarter-Hourly Operational profile:	QHProfile CNA172
Arrival Daily Operational Profile:	DailyP_CNA172
Arrival Monthly Operational Profile:	MonthlyP_CNA172
Touch & Go Quarter-Hourly Operational profile:	QHProfile CNA172
Touch & Go Daily Operational Profile:	DailyP_CNA172
Touch & Go Monthly Operational Profile:	MonthlyP_CNA172

Aircraft Name: Pilatus PC-12
Engine Type: PT6A-67
Identification: PC12
Category: SGTP

Take Off weight:	3969.00 Kgs
Approach Weight:	3856.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Aircraft Tractor (Stewart & Stevenson TUG MC)	Diesel	0.00	5.00	86.00	80.00	
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	20.00	175.00	25.00	
Ground Power Unit (TLD)	Gasoline	0.00	40.00	107.00	75.00	

Year: 2032

Annual Departures:	2021
Annual Arrivals:	2021
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model
Departure Quarter-Hourly Operational profile:	QHProfile CNA172

Departure Daily Operational Profile:	DailyP_CNA172
Departure Monthly Operational Profile:	MonthlyP_CNA172
Arrival Quarter-Hourly Operational profile:	QHProfile CNA172
Arrival Daily Operational Profile:	DailyP_CNA172
Arrival Monthly Operational Profile:	MonthlyP_CNA172
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

Aircraft Name:
Piper PA-30 Twin Comanche
Engine Type:
IO-320-D1AD
Identification:
PA30
Category:
SGPP

Take Off weight:	1633.00 Kgs
Approach Weight:	1633.00 Kgs
Glide Slope:	3.00°
APU Assignment:	None
APU Departure OP Time:	13.00 min
APU Arrival OP Time:	13.00 min
Gate Assignment:	GateP

Assigned GSE/AGE:	FUEL	Arrival Op Time (mins)	Departure Op Time (mins)	Horsepower (hp)	Load Factor (%)	Manufactured Year
Fuel Truck (F750, Dukes Transportation Services, DART 3000 to 6000 gallon)	Diesel	0.00	10.00	175.00	25.00	

Year:
2032

Annual Departures:	779
Annual Arrivals:	779
Annual TGOs:	0
Taxi Out Time:	Determined by Sequencing model
Taxi In Time:	Determined by Sequencing model

Departure Quarter-Hourly Operational profile:	QHProfile CNA172
Departure Daily Operational Profile:	DailyP_CNA172
Departure Monthly Operational Profile:	MonthlyP_CNA172
Arrival Quarter-Hourly Operational profile:	QHProfile CNA172
Arrival Daily Operational Profile:	DailyP_CNA172
Arrival Monthly Operational Profile:	MonthlyP_CNA172
Touch & Go Quarter-Hourly Operational profile:	DEFAULT
Touch & Go Daily Operational Profile:	DEFAULT
Touch & Go Monthly Operational Profile:	DEFAULT

GSE Population

future, City Centre

None.

Parking Facilities

future, City Centre

None.

Roadways

future, City Centre

None.

Stationary Sources

future, City Centre

None.

Training Fires

future, City Centre

None.

Gates

future, City Centre

Gate Name:
Gate6

Elevation:	76.50 meters
Release Height:	1.50 meters
Initial Sigma-Z:	3.00 meters
Initial Sigma-Y:	16.00 meters

	Point:	X (meters)	Y (meters)
	1	646.00	419.00

Gate Name: Gate6_Q400	Elevation:	76.50 meters	
	Release Height:	1.50 meters	
	Initial Sigma-Z:	3.00 meters	
	Initial Sigma-Y:	16.00 meters	
	Point:	X (meters)	Y (meters)
	1	646.00	419.00

Gate Name: GateP	Elevation:	76.50 meters	
	Release Height:	1.50 meters	
	Initial Sigma-Z:	3.00 meters	
	Initial Sigma-Y:	16.00 meters	
	Point:	X (meters)	Y (meters)
	1	445.00	398.00

Taxiways

future, City Centre

Taxiway Name: Taxiway 1	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	512.00	-125.00	76.50	17.26
	2	197.54	240.49	76.50	

Taxiway Name: Taxiway 10	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	-212.00	-64.00	76.50	17.26
	2	-200.00	17.00	76.50	17.26
	3	-10.00	79.00	76.50	

Taxiway Name: Taxiway 12	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	1355.00	476.00	76.50	17.26
	2	1309.00	524.00	76.50	17.26
	3	1104.00	462.00	76.50	

Taxiway Name: Taxiway 1_1	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	197.54	240.49	76.50	17.26
	2	168.00	280.00	76.50	

Taxiway Name: Taxiway 1_2	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	469.92	-169.69	76.50	17.26
	2	512.00	-125.00	76.50	

Taxiway Name: Taxiway 2	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	0.00	0.00	76.50	17.26
	2	-10.00	79.00	76.50	17.26
	3	133.00	253.00	76.50	17.26
	4	168.00	280.00	76.50	

Taxiway Name: Taxiway 25R	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	362.00	290.00	76.50	17.26
	2	525.00	296.00	76.50	

	Width:	20.00 (meters)

Taxiway Name: Taxiway 27R	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	362.00	290.00	76.50	17.26
	2	525.00	296.00	76.50	

Taxiway Name: Taxiway 3	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	168.00	280.00	76.50	17.26
	2	222.00	314.00	76.50	17.26
	3	396.00	249.00	76.50	17.26
	4	525.00	296.00	76.50	

Taxiway Name: Taxiway 4	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	525.00	296.00	76.50	17.26
	2	445.00	398.00	76.50	

Taxiway Name: Taxiway 5	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	525.00	296.00	76.50	17.26
	2	673.00	352.00	76.50	

Taxiway Name: Taxiway 6	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	667.00	359.00	76.50	17.26
	2	640.00	426.00	76.50	

Taxiway Name: Taxiway 7	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	1143.70	411.98	76.50	17.26
	2	1104.00	462.00	76.50	17.26
	3	874.00	387.00	76.50	17.26
	4	839.00	408.00	76.50	17.26
	5	673.00	352.00	76.50	

Taxiway Name: Taxiway 7L	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	332.00	291.00	76.50	17.26
	2	525.00	296.00	76.50	

Taxiway Name: Taxiway 9	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	755.09	-397.86	76.50	17.26
	2	512.00	-125.00	76.50	

Taxiway Name: Taxiway 9L	Width:	20.00 (meters)			
	Point:	X (meters)	Y (meters)	Elevation (meters)	Speed (mph)
	1	388.00	304.00	76.50	17.26
	2	525.00	296.00	76.50	

Runways

future, City Centre

Runway Name: 6	Name:	X (meters)	Y (meters)	Elevation (meters)	Glide Slope (°)
	6	469.92	-169.69	76.50	3.00

Runway Name: 7L	Name:	X (meters)	Y (meters)	Elevation (meters)	Glide Slope (°)
	7L	332.00	291.00	76.50	3.00

Runway Name: 8	Name:	X (meters)	Y (meters)	Elevation (meters)	Glide Slope (°)
	8	-212.00	-64.00	76.50	3.50

Runway Name:	Name:	X (meters)	Y (meters)	Elevation (meters)	Glide Slope (°)
9L	9L	388.00	304.00	76.50	3.00
Runway Name:	Name:	X (meters)	Y (meters)	Elevation (meters)	Glide Slope (°)
24	24	1143.70	411.98	76.50	3.00
Runway Name:	Name:	X (meters)	Y (meters)	Elevation (meters)	Glide Slope (°)
25R	25R	362.00	290.00	76.50	3.00
Runway Name:	Name:	X (meters)	Y (meters)	Elevation (meters)	Glide Slope (°)
26	26	1355.00	476.00	76.50	4.80
Runway Name:	Name:	X (meters)	Y (meters)	Elevation (meters)	Glide Slope (°)
27R	27R	362.00	290.00	76.50	3.00

Taxipaths

future, City Centre

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	Gate6	6		Taxiway 6 Taxiway 5 Taxiway 3 Taxiway 1_1 Taxiway 1 Taxiway 1_2
Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	Gate6	6	Taxiway 1_2	Taxiway 1_2 Taxiway 1 Taxiway 1_1 Taxiway 3 Taxiway 5 Taxiway 6
Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	Gate6	8		Taxiway 6 Taxiway 5 Taxiway 3 Taxiway 2
Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	Gate6	8	Taxiway 10	Taxiway 10 Taxiway 2 Taxiway 3 Taxiway 5 Taxiway 6
Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	Gate6	24		Taxiway 6 Taxiway 7
Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	Gate6	24	Taxiway 7	Taxiway 7 Taxiway 6
Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	Gate6	26		Taxiway 6 Taxiway 7

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	Gate6	26	Taxiway 12	Taxiway 12 Taxiway 7 Taxiway 6

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	Gate6_Q400	6		Taxiway 6 Taxiway 5 Taxiway 3 Taxiway 1_1 Taxiway 1 Taxiway 1_2

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	Gate6_Q400	6	Taxiway 1_2	Taxiway 1_2 Taxiway 1 Taxiway 1_1 Taxiway 3 Taxiway 5 Taxiway 6

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	Gate6_Q400	8		Taxiway 6 Taxiway 5 Taxiway 3 Taxiway 2

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	Gate6_Q400	8	Taxiway 2	Taxiway 2 Taxiway 3 Taxiway 5 Taxiway 6

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	Gate6_Q400	24		Taxiway 6 Taxiway 7

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	Gate6_Q400	24	Taxiway 7	Taxiway 7 Taxiway 6

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	Gate6_Q400	26		Taxiway 6 Taxiway 7

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	Gate6_Q400	26	Taxiway 7	Taxiway 7 Taxiway 6

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	6		Taxiway 4 Taxiway 3 Taxiway 1_1 Taxiway 1 Taxiway 1_2

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	6	Taxiway 1_2	Taxiway 1_2 Taxiway 1

				Taxiway 1_1 Taxiway 3 Taxiway 4
Direction: Outbound	Gate: GateP	Runway: 7L	Runway Exit:	Taxiways: Taxiway 4 Taxiway 7L
Direction: Inbound	Gate: GateP	Runway: 7L	Runway Exit: Taxiway 7L	Taxiways: Taxiway 7L Taxiway 4
Direction: Outbound	Gate: GateP	Runway: 8	Runway Exit:	Taxiways: Taxiway 4 Taxiway 3 Taxiway 2
Direction: Inbound	Gate: GateP	Runway: 8	Runway Exit: Taxiway 10	Taxiways: Taxiway 10 Taxiway 2 Taxiway 3 Taxiway 4
Direction: Outbound	Gate: GateP	Runway: 9L	Runway Exit:	Taxiways: Taxiway 4 Taxiway 9L
Direction: Inbound	Gate: GateP	Runway: 9L	Runway Exit: Taxiway 9L	Taxiways: Taxiway 9L Taxiway 4
Direction: Outbound	Gate: GateP	Runway: 24	Runway Exit:	Taxiways: Taxiway 4 Taxiway 5 Taxiway 7
Direction: Inbound	Gate: GateP	Runway: 24	Runway Exit: Taxiway 7	Taxiways: Taxiway 7 Taxiway 5 Taxiway 4
Direction: Outbound	Gate: GateP	Runway: 25R	Runway Exit:	Taxiways: Taxiway 4 Taxiway 25R
Direction: Inbound	Gate: GateP	Runway: 25R	Runway Exit: Taxiway 25R	Taxiways: Taxiway 25R Taxiway 4
Direction: Outbound	Gate: GateP	Runway: 26	Runway Exit:	Taxiways: Taxiway 4 Taxiway 5 Taxiway 7
Direction: Inbound	Gate: GateP	Runway: 26	Runway Exit: Taxiway 12	Taxiways: Taxiway 12 Taxiway 7 Taxiway 5 Taxiway 4

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Outbound	GateP	27R		Taxiway 4 Taxiway 27R

Direction:	Gate:	Runway:	Runway Exit:	Taxiways:
Inbound	GateP	27R	Taxiway 27R	Taxiway 27R Taxiway 4

Configurations

future, City Centre

Configuration Name: Configuration1
Time Used: 0 %

	From	To
Wind Direction:	no bound (°)	no bound (°)
Wind Speed:	no bound (knots)	no bound (knots)
Hour of Day:	no bound (hh:mm)	no bound (hh:mm)
Ceiling:	no bound (feet)	0 (feet)
Visibility:	no bound (statute miles)	no bound (statute miles)
Temperature:	no bound (°F)	no bound (°F)

Point:	Arrivals Per Hour	Departures per Hour
1	100	200
2	200	100

Aicraft Size:	Runway	Arrivals (%)	Departures (%)	Touch & Gos (%)
Small	24	1.2 %	1.94 %	0.8 %
Small	25R	0 %	0 %	0 %
Small	26	64.76 %	64.31 %	65.6 %
Small	27R	0 %	0 %	0 %
Small	6	0.17 %	0.01 %	0.1 %
Small	7L	0 %	0 %	0 %
Small	8	33.87 %	33.74 %	33.5 %
Small	9L	0 %	0 %	0 %
Large	24	0 %	0.01 %	0.8 %
Large	25R	0 %	0 %	0 %
Large	26	66.81 %	66.76 %	65.6 %
Large	27R	0 %	0 %	0 %
Large	6	0 %	0 %	0.1 %
Large	7L	0 %	0 %	0 %
Large	8	33.19 %	33.23 %	33.5 %
Large	9L	0 %	0 %	0 %
Heavy	24	0 %	0.01 %	0.8 %
Heavy	25R	0 %	0 %	0 %
Heavy	26	66.81 %	66.76 %	65.6 %
Heavy	27R	0 %	0 %	0 %
Heavy	6	0 %	0 %	0.1 %
Heavy	7L	0 %	0 %	0 %
Heavy	8	33.19 %	33.23 %	33.5 %
Heavy	9L	0 %	0 %	0 %

Buildings

future, City Centre

None.

Discrete Cartesian Receptors

future, City Centre

Discrete Catersian Receptor Name: Rec01		
	X:	-3019.40 meters
	Y:	687.80 meters
	Height:	1.80 meters
	Elevation:	76.50 meters

Discrete Catersian Receptor Name: Rec02		
	X:	-1243.50 meters
	Y:	34.90 meters

	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec03	X:	-649.80 meters
	Y:	37.10 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec04	X:	-544.60 meters
	Y:	1521.30 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec05	X:	23.00 meters
	Y:	411.50 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec06	X:	310.20 meters
	Y:	709.70 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec07	X:	281.30 meters
	Y:	808.80 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec08	X:	396.90 meters
	Y:	790.90 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec09	X:	410.70 meters
	Y:	912.00 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec10	X:	212.40 meters
	Y:	1691.80 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec11	X:	685.00 meters
	Y:	1056.90 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec12	X:	1523.20 meters
	Y:	558.10 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec13	X:	1625.80 meters
	Y:	1276.00 meters
	Height:	1.80 meters
	Elevation:	76.50 meters

Discrete Catersian Receptor Name: Rec14	X:	3364.20 meters
	Y:	36.90 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec15	X:	2852.40 meters
	Y:	1833.20 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec16	X:	4749.90 meters
	Y:	1073.70 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec17	X:	4179.00 meters
	Y:	2656.00 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec18	X:	6237.40 meters
	Y:	935.60 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec19	X:	5255.40 meters
	Y:	2624.40 meters
	Height:	1.80 meters
	Elevation:	76.50 meters
Discrete Catersian Receptor Name: Rec20	X:	7870.30 meters
	Y:	4281.40 meters
	Height:	1.80 meters
	Elevation:	76.50 meters

Discrete Polar Receptors — future, City Centre

None.

Cartesian Receptor Networks — future, City Centre

None.

Polar Receptor Networks — future, City Centre

None.

User-Created Aircraft — future, City Centre

None.

User-Created GSE — future, City Centre

None.

User-Created APU — future, City Centre

None.

APPENDIX E5: GHG Emissions From GSE

GHG Emissions From GSE

Summary of Results

2032 Annual GHG Emissions (tonnes CO_2e): **3,929**

Useful Data

		Diesel	Gasoline	Reference
Density (lb/gal)		7.30	6.17	Diesel: ASHRAE Fundamentals (2001), Chapter 18.6; Gasoline: AP-42- Appendix A
Brake Specific Fuel Consumption (BTU/hp-hr)		7000	7000	AP-42 - Table 3.3-1 Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines
Heating Value (BTU/lb)		19,300	20,300	
CO_2 Emission Factor (g/L)		2663	2289	Environment Canada National Inventory Report 1990-2006
CH_4 Emission Factor (g/L)		0.15	2.7	
N_2O Emission Factor (g/L)		1.1	0.05	

		CO_2	CH_4	N_2O
Global Warming Potential		1	25	298

ref:https://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=cad07259-1

Detailed Results

ID	Aircraft Name	GSE ID	GSE Type	GSE Description	Fuel Type	Operating Time (min)			HP	Load Factor	LTO	Annual Fuel Consumption (L)	2012 Annual Emissions (tonnes)			
						Departure	Arrival	LTO					CO_2	CH_4	N_2O	CO_2e
1	Q400	11	Aircraft Tractor	Stewart & Stevenson TUG MC	D	5	0	5	86	0.80	31,054	33,504	8.92E+01	5.03E-03	3.69E-02	**100**
1	Q400	14	Belt Loader	Stewart & Stevenson TUG 660	G	15	15	30	107	0.50	31,054	175,740	4.02E+02	4.74E-01	8.79E-03	**417**
1	Q400	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	20	0	20	175	0.25	31,054	85,220	2.27E+02	1.28E-02	9.37E-02	**255**
1	Q400	36	Lavatory Truck	TLD 1410	D	0	15	15	56	0.25	31,054	20,453	5.45E+01	3.07E-03	2.25E-02	**61**
1	Q400		Baggare Tractor	Stewart & Stevenson TUG MA-50	G	18	17	35	107	0.55	31,054	225,533	5.16E+02	6.09E-01	1.13E-02	**535**
1	Q400		Cabin Service Truck	Hi-Way F650	D	5	5	10	71	0.53	31,054	36,650	9.76E+01	5.50E-03	4.03E-02	**110**
1	Q400		Catering Truck	Hi-Way F650	D	5	5	10	71	0.53	31,054	36,650	9.76E+01	5.50E-03	4.03E-02	**110**
1	Q400		Service Truck	F250/350	D	8	7	15	235	0.20	31,054	68,663	1.83E+02	1.03E-02	7.55E-02	**206**
1	Q400		Ground Power Unit	TLD	D	40	0	40	71	0.75	31,054	207,451	5.52E+02	3.11E-02	2.28E-01	**621**
2	Cessna 172 Skyhawk	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	10	0	10	175	0.25	25,954	35,612	9.48E+01	5.34E-03	3.92E-02	**107**
3	Cessna 206	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	10	0	10	175	0.25	1,435	1,969	5.24E+00	2.95E-04	2.17E-03	**6**
4	PC-12	11	Aircraft Tractor	Stewart & Stevenson TUG MC	D	5	0	5	86	0.80	2,021	2,180	5.81E+00	3.27E-04	2.40E-03	**7**
4	PC-12	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	20	0	20	175	0.25	2,021	5,546	1.48E+01	8.32E-04	6.10E-03	**17**
4	PC-12		Ground Power Unit	TLD	G	40	0	40	107	0.75	2,021	22,874	5.24E+01	6.18E-02	1.14E-03	**54**
5	PA-30	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	10	0	10	175	0.25	779	1,069	2.85E+00	1.60E-04	1.18E-03	**3**
6	F10	11	Aircraft Tractor	Stewart & Stevenson TUG MC	D	5	0	5	86	0.80	382	412	1.10E+00	6.18E-05	4.53E-04	**1**
6	F10	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	20	0	20	175	0.25	382	1,048	2.79E+00	1.57E-04	1.15E-03	**3**
6	F10		Ground Power Unit	TLD 28 VDC	D	40	0	40	71	0.75	382	2,552	6.80E+00	3.83E-04	2.81E-03	**8**
7	CS100	5	Air Start	ACE 300/400	D	7	0	7	425	0.90	9,855	82,757	2.20E+02	1.24E-02	9.10E-02	**248**
7	CS100	11	Aircraft Tractor	Stewart & Stevenson TUG GT-35	D	8	0	8	88	0.80	9,855	17,408	4.64E+01	2.61E-03	1.91E-02	**52**
7	CS100		Baggare Tractor	Stewart & Stevenson TUG MA-50	G	38	37	75	71	0.55	9,855	101,769	2.33E+02	2.75E-01	5.09E-03	**241**
7	CS100	14	Belt Loader	Stewart & Stevenson TUG 660	G	24	24	48	71	0.50	9,855	59,211	1.36E+02	1.60E-01	2.96E-03	**140**
7	CS100		Cabin Service Truck	Hi-Way F650	D	10	10	20	210	0.53	9,855	68,802	1.83E+02	1.03E-02	7.57E-02	**206**
7	CS100		Catering Truck	Hi-Way F650	D	8	7	15	210	0.53	9,855	51,601	1.37E+02	7.74E-03	5.68E-02	**155**
7	CS100	29	Hydrant Truck	F250/350	D	12	0	12	235	0.70	9,855	61,013	1.62E+02	9.15E-03	6.71E-02	**183**
7	CS100	36	Lavatory Truck	TLD 1410	D	0	15	15	56	0.25	9,855	6,491	1.73E+01	9.74E-04	7.14E-03	**19**
7	CS100		Service Truck	F250/350	D	8	7	15	235	0.20	9,855	21,790	5.80E+01	3.27E-03	2.40E-02	**65**

GHG Emissions From GSE

Summary of Results

2012 Annual GHG Emissions (tonnes CO_2e): **2,584**

Useful Data

		Diesel	Gasoline	Reference
Density (lb/gal)		7.30	6.17	Diesel: ASHRAE Fundamentals (2001), Chapter 18.6; Gasoline: AP-42- Appendix A
Brake Specific Fuel Consumption (BTU/hp-hr)		7000	7000	AP-42 - Table 3.3-1 Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines
Heating Value (BTU/lb)		19,300	20,300	
CO_2 Emission Factor (g/L)		2663	2289	Environment Canada National Inventory Report 1990-2006
CH_4 Emission Factor (g/L)		0.15	2.7	
N_2O Emission Factor (g/L)		1.1	0.05	

		CO_2	CH_4	N_2O
Global Warming Potential		1	25	298

ref:https://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=cad07259-1

Detailed Results

ID	Aircraft Name	GSE ID	GSE Type	GSE Description	Fuel Type	Operating Time (min)			HP	Load Factor	LTO	Annual Fuel Consumption (L)	2012 Annual Emissions (tonnes)			
						Departure	Arrival	LTO					CO_2	CH_4	N_2O	CO_2e
1	Q400	11	Aircraft Tractor	Stewart & Stevenson TUG MC	D	5	0	5	86	0.80	30,082	32,455	8.64E+01	4.87E-03	3.57E-02	**97**
1	Q400	14	Belt Loader	Stewart & Stevenson TUG 660	G	15	15	30	107	0.50	30,082	170,239	3.90E+02	4.60E-01	8.51E-03	**404**
1	Q400	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	20	0	20	175	0.25	30,082	82,553	2.20E+02	1.24E-02	9.08E-02	**247**
1	Q400	36	Lavatory Truck	TLD 1410	D	0	15	15	56	0.25	30,082	19,813	5.28E+01	2.97E-03	2.18E-02	**59**
1	Q400		Baggare Tractor	Stewart & Stevenson TUG MA-50	G	18	17	35	107	0.55	30,082	218,474	5.00E+02	5.90E-01	1.09E-02	**518**
1	Q400		Cabin Service Truck	Hi-Way F650	D	5	5	10	71	0.53	30,082	35,502	9.45E+01	5.33E-03	3.91E-02	**106**
1	Q400		Catering Truck	Hi-Way F650	D	5	5	10	71	0.53	30,082	35,502	9.45E+01	5.33E-03	3.91E-02	**106**
1	Q400		Service Truck	F250/350	D	8	7	15	235	0.20	30,082	66,514	1.77E+02	9.98E-03	7.32E-02	**199**
1	Q400		Ground Power Unit	TLD	D	40	0	40	71	0.75	30,082	200,957	5.35E+02	3.01E-02	2.21E-01	**602**
2	Cessna 172 Skyhawk	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	10	0	10	175	0.25	42,235	57,952	1.54E+02	8.69E-03	6.37E-02	**174**
3	Cessna 206	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	10	0	10	175	0.25	1,244	1,707	4.55E+00	2.56E-04	1.88E-03	**5**
4	PC-12	11	Aircraft Tractor	Stewart & Stevenson TUG MC	D	5	0	5	86	0.80	1,559	1,682	4.48E+00	2.52E-04	1.85E-03	**5**
4	PC-12	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	20	0	20	175	0.25	1,559	4,278	1.14E+01	6.42E-04	4.71E-03	**13**
4	PC-12		Ground Power Unit	TLD	G	40	0	40	107	0.75	1,559	17,645	4.04E+01	4.76E-02	8.82E-04	**42**
5	PA-30	29	Fuel Truck	F750, Dukes Transportation Services, DART 3000 to 6000 gallon	D	10	0	10	175	0.25	1,480	2,031	5.41E+00	3.05E-04	2.23E-03	**6**

APPENDIX F

Table F1: Maximum Predicted 8-Hour Average CO Concentrations

Receptor	8-Hour CO Concentrations (µg/m^3)						
	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build
	Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario	
R1	882	209	219	1274	601	611	2%
R2	367	123	130	759	515	522	1%
R3	274	121	132	666	513	524	2%
R4	203	76	73	595	468	465	< 1% decrease
R5	438	200	225	830	592	617	4%
R6	1848	448	470	2240	840	862	3%
R7	1201	378	363	1593	770	755	-2%
R8	1249	345	364	1641	737	756	3%
R9	954	259	268	1346	651	660	1%
R10	335	107	113	727	499	505	1%
R11	680	187	212	1072	579	604	4%
R12	355	199	199	747	591	591	< 1% increase
R13	580	164	164	972	556	556	< 1% increase
R14	140	74	74	532	466	466	< 1% increase
R15	430	132	132	822	524	524	< 1% decrease
R16	102	47	48	494	439	440	< 1% increase
R17	577	143	143	969	535	535	< 1% increase
R18	69	28	27	461	420	419	< 1% decrease
R19	175	44	44	567	436	436	< 1% decrease
R20	965	227	227	1357	619	619	< 1% decrease
R21	188	71	69	580	463	461	< 1% decrease
R22	153	58	59	545	450	451	< 1% increase
R23	118	46	47	510	438	439	< 1% increase
R24	93	36	38	485	428	430	< 1% increase
R25	1122	330	348	1514	722	740	3%
R26	512	201	205	904	593	597	< 1% increase
R27	232	101	118	624	493	510	4%
R28	135	64	72	527	456	464	2%
R29	860	274	262	1252	666	654	-2%
R30	422	156	155	814	548	547	< 1% decrease
R31	212	90	92	604	482	484	< 1% increase
R32	150	56	62	542	448	454	1%
R33	209	66	65	601	458	457	< 1% decrease
R34	84	32	32	476	424	424	< 1% increase
R35	73	27	26	465	419	418	< 1% decrease
R36	60	23	22	452	415	414	< 1% decrease
R37	54	21	20	446	413	412	< 1% decrease
R38	65	24	24	457	416	416	< 1% increase
R39	44	16	16	436	408	408	< 1% decrease
R40	39	14	13	431	406	405	< 1% decrease
R41	37	13	13	429	405	405	< 1% decrease
R42	81	25	24	473	417	416	< 1% decrease
R43	54	18	17	446	410	409	< 1% decrease
R44	45	15	14	437	407	406	< 1% decrease
R45	38	14	13	430	406	405	< 1% decrease
R46	473	124	124	865	516	516	< 1% increase
R47	52	20	20	444	412	412	< 1% decrease
R48	44	16	14	436	408	406	< 1% decrease
R49	28	14	12	420	406	404	< 1% decrease
R50	22	12	11	414	404	403	< 1% decrease

Notes:

[1] The 8-Hour TRV for CO is 6000 µg/m^3.

Table F2: Maximum Predicted 24-Hour and Annual Average NO_2 Concentrations

Receptor	24-Hour NO_2 Concentrations ($\mu g/m^3$)							Annual NO_2 Concentrations ($\mu g/m^3$)						
	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build
	Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario		Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario	
R1	49	11	11	107	69	69	< 1% increase	9	1	1	40	32	32	< 1% increase
R2	32	18	18	90	76	76	< 1% increase	3	1	1	34	32	32	< 1% increase
R3	35	29	29	93	87	87	< 1% increase	3	2	2	34	33	33	< 1% increase
R4	21	13	14	79	71	72	< 1% increase	2	1	1	33	32	32	< 1% increase
R5	61	56	56	119	114	114	< 1% increase	7	5	6	38	36	37	< 1% increase
R6	122	117	117	180	175	175	< 1% increase	33	16	16	64	47	47	< 1% increase
R7	92	67	68	150	125	126	< 1% increase	20	7	7	51	38	38	< 1% increase
R8	111	110	111	169	168	169	< 1% increase	18	10	11	49	41	42	< 1% increase
R9	90	60	61	148	118	119	< 1% increase	18	8	8	49	39	39	< 1% increase
R10	39	19	20	97	77	78	1%	2	1	1	33	32	32	< 1% increase
R11	81	59	59	139	117	117	< 1% increase	11	6	6	42	37	37	< 1% increase
R12	33	28	28	91	86	86	< 1% decrease	6	5	5	37	36	36	< 1% increase
R13	40	21	21	98	79	79	< 1% increase	7	3	3	38	34	34	< 1% increase
R14	14	9	9	72	67	67	< 1% increase	2	1	1	33	32	32	< 1% increase
R15	36	10	10	94	68	68	< 1% increase	5	1	2	36	32	33	< 1% increase
R16	8	5	5	66	63	63	< 1% increase	2	1	1	33	32	32	< 1% increase
R17	36	7	8	94	65	66	< 1% increase	6	1	1	37	32	32	< 1% increase
R18	6	3	4	64	61	62	< 1% increase	1	0	0	32	31	31	< 1% increase
R19	14	4	4	72	62	62	< 1% decrease	2	0	1	33	31	32	< 1% increase
R20	70	10	10	128	68	68	< 1% increase	15	2	2	46	33	33	< 1% increase
R21	19	13	13	77	71	71	< 1% increase	2	1	1	33	32	32	< 1% increase
R22	17	11	12	75	69	70	< 1% increase	2	1	1	33	32	32	< 1% increase
R23	16	9	10	74	67	68	< 1% increase	2	1	1	33	32	32	< 1% increase
R24	12	7	8	70	65	66	< 1% increase	1	1	1	32	32	32	< 1% increase
R25	123	117	117	181	175	175	< 1% increase	29	15	15	60	46	46	< 1% increase
R26	109	106	106	167	164	164	< 1% increase	21	12	13	52	43	44	< 1% increase
R27	79	75	76	137	133	134	1%	15	10	10	46	41	41	< 1% increase
R28	61	58	59	119	116	117	< 1% increase	11	8	8	42	39	39	< 1% increase
R29	84	66	66	142	124	124	< 1% increase	17	6	7	48	37	38	< 1% increase
R30	65	64	64	123	122	122	< 1% increase	13	6	6	44	37	37	< 1% increase
R31	52	47	48	110	105	106	1%	10	5	5	41	36	36	< 1% increase
R32	37	32	33	95	90	91	1%	7	4	4	38	35	35	< 1% increase
R33	18	7	7	76	65	65	< 1% increase	2	1	1	33	32	32	< 1% increase
R34	10	5	5	68	63	63	< 1% increase	2	1	1	33	32	32	< 1% increase
R35	7	3	3	65	61	61	< 1% increase	1	0	0	32	31	31	< 1% increase
R36	5	2	2	63	60	60	< 1% increase	1	0	0	32	31	31	< 1% increase
R37	4	2	2	62	60	60	< 1% increase	1	0	0	32	31	31	< 1% increase
R38	8	3	3	66	61	61	< 1% decrease	1	0	0	32	31	31	< 1% increase
R39	6	2	2	64	60	60	< 1% increase	1	0	0	32	31	31	< 1% increase
R40	4	2	2	62	60	60	< 1% increase	1	0	0	32	31	31	< 1% increase
R41	3	1	1	61	59	59	< 1% increase	1	0	0	32	31	31	< 1% increase
R42	7	3	3	65	61	61	< 1% decrease	2	0	0	33	31	31	< 1% increase
R43	5	1	1	63	59	59	< 1% increase	1	0	0	32	31	31	< 1% increase
R44	4	1	1	62	59	59	< 1% increase	1	0	0	32	31	31	< 1% increase
R45	3	1	1	61	59	59	< 1% increase	0	0	0	31	31	31	< 1% increase
R46	32	9	9	90	67	67	< 1% increase	5	1	1	36	32	32	< 1% increase
R47	8	4	4	66	62	62	< 1% increase	2	1	1	33	32	32	< 1% increase
R48	4	3	3	62	61	61	< 1% increase	1	0	0	32	31	31	< 1% increase
R49	3	2	2	61	60	60	< 1% increase	1	0	0	32	31	31	< 1% increase
R50	3	2	2	61	60	60	< 1% increase	0	0	0	31	31	31	< 1% increase

Notes:

[1] The 24-Hour TRV for NO_2 is 200 $\mu g/m^3$.

[2] The Annual TRV for NO_2 is 40 $\mu g/m^3$.

Table F3: Maximum Predicted 24-Hour and Annual Average $PM_{2.5}$ Concentrations

Receptor	24-Hour $PM_{2.5}$ Concentrations ($\mu g/m^3$)							Annual $PM_{2.5}$ Concentrations ($\mu g/m^3$)						
	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build
	Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario		Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario	
R1	4.5	2.8	2.9	20.5	18.8	18.9	< 1% increase	0.7	0.4	0.4	8.4	8.1	8.1	< 1% increase
R2	2.1	1.6	1.7	18.1	17.6	17.7	< 1% increase	0.2	0.1	0.2	7.9	7.8	7.9	< 1% increase
R3	1.9	1.5	1.7	17.9	17.5	17.7	< 1% increase	0.2	0.2	0.2	7.9	7.9	7.9	< 1% increase
R4	1.2	0.9	0.9	17.2	16.9	16.9	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R5	3.7	3.3	3.5	19.7	19.3	19.5	1%	0.4	0.4	0.4	8.1	8.1	8.1	< 1% increase
R6	12.3	9.0	9.3	28.3	25.0	25.3	1%	2.4	1.7	1.7	10.1	9.4	9.4	< 1% increase
R7	8.5	6.0	6.2	24.5	22.0	22.2	< 1% increase	1.4	0.9	0.9	9.1	8.6	8.6	< 1% increase
R8	6.9	5.8	5.9	22.9	21.8	21.9	< 1% increase	1.3	1.1	1.1	9.0	8.8	8.8	< 1% increase
R9	6.2	4.5	4.6	22.2	20.5	20.6	< 1% increase	1.2	0.8	0.8	8.9	8.5	8.5	< 1% increase
R10	1.8	1.3	1.4	17.8	17.3	17.4	< 1% increase	0.2	0.1	0.1	7.9	7.8	7.8	< 1% increase
R11	4.9	3.7	4.0	20.9	19.7	20.0	1%	0.7	0.5	0.5	8.4	8.2	8.2	< 1% increase
R12	2.8	2.5	2.7	18.8	18.5	18.7	< 1% increase	0.7	0.6	0.6	8.4	8.3	8.3	< 1% increase
R13	3.0	2.0	2.0	19.0	18.0	18.0	< 1% increase	0.5	0.4	0.4	8.2	8.1	8.1	< 1% increase
R14	1.0	0.8	0.8	17.0	16.8	16.8	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R15	2.4	1.8	1.8	18.4	17.8	17.8	< 1% increase	0.4	0.3	0.3	8.1	8.0	8.0	< 1% increase
R16	0.6	0.5	0.5	16.6	16.5	16.5	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R17	3.4	2.3	2.3	19.4	18.3	18.3	< 1% increase	0.5	0.3	0.3	8.2	8.0	8.0	< 1% increase
R18	0.4	0.3	0.3	16.4	16.3	16.3	< 1% increase	0.1	0.0	0.0	7.8	7.7	7.7	< 1% increase
R19	0.9	0.6	0.6	16.9	16.6	16.6	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R20	4.2	2.2	2.2	20.2	18.2	18.2	< 1% increase	1.0	0.5	0.5	8.7	8.2	8.2	< 1% increase
R21	1.1	0.8	0.9	17.1	16.8	16.9	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R22	0.9	0.7	0.8	16.9	16.7	16.8	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R23	0.7	0.6	0.6	16.7	16.6	16.6	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R24	0.6	0.5	0.5	16.6	16.5	16.5	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R25	9.8	8.2	8.4	25.8	24.2	24.4	< 1% increase	1.9	1.5	1.5	9.6	9.2	9.2	< 1% increase
R26	6.2	5.7	5.9	22.2	21.7	21.9	< 1% increase	1.3	1.0	1.0	9.0	8.7	8.7	< 1% increase
R27	2.8	2.7	2.7	18.8	18.7	18.7	< 1% increase	0.7	0.6	0.6	8.4	8.3	8.3	< 1% increase
R28	1.9	1.8	1.9	17.9	17.8	17.9	< 1% increase	0.5	0.4	0.4	8.2	8.1	8.1	< 1% increase
R29	6.7	5.2	5.4	22.7	21.2	21.4	< 1% increase	1.1	0.8	0.8	8.8	8.5	8.5	< 1% increase
R30	4.0	3.3	3.4	20.0	19.3	19.4	< 1% increase	0.8	0.5	0.6	8.5	8.2	8.3	< 1% increase
R31	2.1	1.8	1.8	18.1	17.8	17.8	< 1% increase	0.5	0.4	0.4	8.2	8.1	8.1	< 1% increase
R32	1.4	1.1	1.2	17.4	17.1	17.2	< 1% increase	0.3	0.3	0.3	8.0	8.0	8.0	< 1% increase
R33	1.1	0.8	0.8	17.1	16.8	16.8	< 1% increase	0.2	0.1	0.1	7.9	7.8	7.8	< 1% increase
R34	0.6	0.5	0.5	16.6	16.5	16.5	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R35	0.4	0.3	0.3	16.4	16.3	16.3	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R36	0.3	0.3	0.3	16.3	16.3	16.3	< 1% increase	0.0	0.0	0.0	7.7	7.7	7.7	< 1% increase
R37	0.3	0.2	0.2	16.3	16.2	16.2	< 1% increase	0.0	0.0	0.0	7.7	7.7	7.7	< 1% increase
R38	0.5	0.3	0.3	16.5	16.3	16.3	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R39	0.3	0.2	0.2	16.3	16.2	16.2	< 1% increase	0.1	0.0	0.0	7.8	7.7	7.7	< 1% increase
R40	0.2	0.2	0.2	16.2	16.2	16.2	< 1% increase	0.0	0.0	0.0	7.7	7.7	7.7	< 1% increase
R41	0.2	0.1	0.1	16.2	16.1	16.1	< 1% increase	0.0	0.0	0.0	7.7	7.7	7.7	< 1% increase
R42	0.4	0.3	0.3	16.4	16.3	16.3	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R43	0.3	0.2	0.2	16.3	16.2	16.2	< 1% increase	0.1	0.0	0.0	7.8	7.7	7.7	< 1% increase
R44	0.2	0.2	0.2	16.2	16.2	16.2	< 1% increase	0.0	0.0	0.0	7.7	7.7	7.7	< 1% increase
R45	0.2	0.1	0.1	16.2	16.1	16.1	< 1% increase	0.0	0.0	0.0	7.7	7.7	7.7	< 1% increase
R46	2.3	1.5	1.5	18.3	17.5	17.5	< 1% increase	0.3	0.2	0.2	8.0	7.9	7.9	< 1% increase
R47	0.4	0.3	0.3	16.4	16.3	16.3	< 1% increase	0.1	0.1	0.1	7.8	7.8	7.8	< 1% increase
R48	0.2	0.2	0.2	16.2	16.2	16.2	< 1% increase	0.1	0.0	0.0	7.8	7.7	7.7	< 1% increase
R49	0.2	0.1	0.1	16.2	16.1	16.1	< 1% increase	0.0	0.0	0.0	7.7	7.7	7.7	< 1% increase
R50	0.1	0.1	0.1	16.1	16.1	16.1	< 1% increase	0.0	0.0	0.0	7.7	7.7	7.7	< 1% increase

Notes:

[1] The 24-Hour TRV for $PM_{2.5}$ is 27 $\mu g/m^3$.

[2] The Annual TRV for $PM_{2.5}$ is 8.8 $\mu g/m^3$.

Table F4: Maximum Predicted 24-Hour Average Cadmium Concentrations

Receptor	24-Hour Cadmium Concentrations (µg/m^3)						
	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build
	Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario	
R1	0.000669	0.000415	0.000435	0.008169	0.007915	0.007935	< 1% increase
R2	0.000277	0.000196	0.000211	0.007777	0.007696	0.007711	< 1% increase
R3	0.000220	0.000169	0.000195	0.007720	0.007669	0.007695	< 1% increase
R4	0.000147	0.000105	0.000112	0.007647	0.007605	0.007612	< 1% increase
R5	0.000399	0.000324	0.000362	0.007899	0.007824	0.007862	< 1% increase
R6	0.001518	0.001035	0.001082	0.009018	0.008535	0.008582	< 1% increase
R7	0.001078	0.000713	0.000743	0.008578	0.008213	0.008243	< 1% increase
R8	0.000897	0.000604	0.000630	0.008397	0.008104	0.008130	< 1% increase
R9	0.000821	0.000529	0.000558	0.008321	0.008029	0.008058	< 1% increase
R10	0.000232	0.000160	0.000171	0.007732	0.007660	0.007671	< 1% increase
R11	0.000610	0.000434	0.000472	0.008110	0.007934	0.007972	< 1% increase
R12	0.000309	0.000253	0.000283	0.007809	0.007753	0.007783	< 1% increase
R13	0.000417	0.000271	0.000279	0.007917	0.007771	0.007779	< 1% increase
R14	0.000110	0.000086	0.000089	0.007610	0.007586	0.007589	< 1% increase
R15	0.000328	0.000228	0.000228	0.007828	0.007728	0.007728	< 1% increase
R16	0.000069	0.000053	0.000054	0.007569	0.007553	0.007554	< 1% increase
R17	0.000497	0.000334	0.000335	0.007997	0.007834	0.007835	< 1% increase
R18	0.000045	0.000033	0.000033	0.007545	0.007533	0.007533	< 1% increase
R19	0.000121	0.000082	0.000084	0.007621	0.007582	0.007584	< 1% increase
R20	0.000621	0.000330	0.000330	0.008121	0.007830	0.007830	< 1% increase
R21	0.000138	0.000099	0.000105	0.007638	0.007599	0.007605	< 1% increase
R22	0.000115	0.000084	0.000090	0.007615	0.007584	0.007590	< 1% increase
R23	0.000089	0.000066	0.000072	0.007589	0.007566	0.007572	< 1% increase
R24	0.000067	0.000051	0.000056	0.007567	0.007551	0.007556	< 1% increase
R25	0.001092	0.000844	0.000882	0.008592	0.008344	0.008382	< 1% increase
R26	0.000624	0.000536	0.000572	0.008124	0.008036	0.008072	< 1% increase
R27	0.000301	0.000248	0.000266	0.007801	0.007748	0.007766	< 1% increase
R28	0.000170	0.000162	0.000170	0.007670	0.007662	0.007670	< 1% increase
R29	0.000798	0.000574	0.000599	0.008298	0.008074	0.008099	< 1% increase
R30	0.000450	0.000347	0.000364	0.007950	0.007847	0.007864	< 1% increase
R31	0.000232	0.000183	0.000196	0.007732	0.007683	0.007696	< 1% increase
R32	0.000178	0.000119	0.000135	0.007678	0.007619	0.007635	< 1% increase
R33	0.000155	0.000105	0.000107	0.007655	0.007605	0.007607	< 1% increase
R34	0.000079	0.000056	0.000058	0.007579	0.007556	0.007558	< 1% increase
R35	0.000056	0.000040	0.000042	0.007556	0.007540	0.007542	< 1% increase
R36	0.000042	0.000030	0.000032	0.007542	0.007530	0.007532	< 1% increase
R37	0.000036	0.000026	0.000026	0.007536	0.007526	0.007526	< 1% increase
R38	0.000062	0.000043	0.000045	0.007562	0.007543	0.007545	< 1% increase
R39	0.000045	0.000031	0.000032	0.007545	0.007531	0.007532	< 1% increase
R40	0.000031	0.000021	0.000022	0.007531	0.007521	0.007522	< 1% increase
R41	0.000024	0.000017	0.000017	0.007524	0.007517	0.007517	< 1% increase
R42	0.000062	0.000043	0.000043	0.007562	0.007543	0.007543	< 1% increase
R43	0.000037	0.000025	0.000026	0.007537	0.007525	0.007526	< 1% increase
R44	0.000030	0.000020	0.000021	0.007530	0.007520	0.007521	< 1% increase
R45	0.000024	0.000017	0.000017	0.007524	0.007517	0.007517	< 1% increase
R46	0.000343	0.000222	0.000224	0.007843	0.007722	0.007724	< 1% increase
R47	0.000051	0.000035	0.000038	0.007551	0.007535	0.007538	< 1% increase
R48	0.000033	0.000022	0.000022	0.007533	0.007522	0.007522	< 1% increase
R49	0.000021	0.000015	0.000016	0.007521	0.007515	0.007516	< 1% increase
R50	0.000016	0.000013	0.000014	0.007516	0.007513	0.007514	< 1% increase

Notes:

[1] The 24-Hour TRV for Cd is 0.03 µg/m^3.

Table F5: Maximum Predicted 24-Hour and Annual Average Benzene Concentrations

Receptor	24-Hour Benzene Concentrations (µg/m^3)							Annual Benzene Concentrations (µg/m^3)						
	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build
	Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario		Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario	
R1	0.7	0.1	0.1	1.6	1.1	1.1	< 1% increase	0.10	0.02	0.02	0.80	0.72	0.72	< 1% increase
R2	0.6	0.4	0.4	1.5	1.3	1.3	< 1% decrease	0.05	0.03	0.03	0.75	0.73	0.73	< 1% decrease
R3	0.7	0.6	0.5	1.6	1.5	1.5	< 1% decrease	0.07	0.05	0.05	0.77	0.75	0.75	< 1% decrease
R4	0.4	0.3	0.3	1.3	1.2	1.2	< 1% decrease	0.03	0.02	0.02	0.73	0.72	0.72	< 1% increase
R5	1.6	1.4	1.4	2.5	2.3	2.3	< 1% increase	0.17	0.14	0.15	0.87	0.84	0.85	< 1% increase
R6	4.0	3.2	3.2	4.9	4.1	4.1	< 1% increase	0.73	0.47	0.47	1.43	1.17	1.17	< 1% increase
R7	2.6	1.8	1.8	3.6	2.7	2.7	< 1% increase	0.37	0.20	0.20	1.07	0.90	0.90	< 1% increase
R8	2.8	2.6	2.6	3.7	3.6	3.6	< 1% increase	0.52	0.39	0.39	1.22	1.09	1.09	< 1% increase
R9	2.0	1.4	1.4	3.0	2.3	2.3	< 1% increase	0.34	0.20	0.20	1.04	0.90	0.90	< 1% increase
R10	0.5	0.4	0.4	1.5	1.3	1.3	< 1% increase	0.04	0.03	0.03	0.74	0.73	0.73	< 1% increase
R11	1.6	1.1	1.1	2.5	2.0	2.0	< 1% increase	0.21	0.14	0.14	0.91	0.84	0.84	< 1% increase
R12	1.4	1.3	1.3	2.3	2.3	2.3	< 1% decrease	0.35	0.34	0.34	1.05	1.04	1.04	< 1% increase
R13	0.6	0.5	0.5	1.6	1.4	1.4	< 1% increase	0.14	0.09	0.09	0.84	0.79	0.79	< 1% increase
R14	0.4	0.3	0.3	1.3	1.2	1.2	< 1% increase	0.06	0.05	0.05	0.76	0.75	0.75	< 1% increase
R15	0.6	0.5	0.5	1.6	1.4	1.4	< 1% increase	0.10	0.05	0.05	0.80	0.75	0.75	< 1% increase
R16	0.2	0.2	0.2	1.2	1.1	1.1	< 1% increase	0.03	0.02	0.02	0.73	0.72	0.72	< 1% increase
R17	0.5	0.1	0.1	1.4	1.1	1.1	< 1% increase	0.07	0.02	0.02	0.77	0.72	0.72	< 1% increase
R18	0.1	0.1	0.1	1.1	1.0	1.0	< 1% decrease	0.02	0.01	0.01	0.72	0.71	0.71	< 1% increase
R19	0.2	0.1	0.1	1.1	1.0	1.0	< 1% decrease	0.03	0.01	0.01	0.73	0.71	0.71	< 1% increase
R20	0.8	0.1	0.1	1.7	1.0	1.0	< 1% increase	0.18	0.02	0.02	0.88	0.72	0.72	< 1% increase
R21	0.3	0.3	0.3	1.3	1.2	1.2	< 1% increase	0.03	0.02	0.02	0.73	0.72	0.72	< 1% increase
R22	0.3	0.2	0.2	1.2	1.2	1.2	< 1% increase	0.03	0.02	0.02	0.73	0.72	0.72	< 1% increase
R23	0.3	0.2	0.2	1.2	1.1	1.1	< 1% increase	0.02	0.01	0.01	0.72	0.71	0.71	< 1% increase
R24	0.2	0.2	0.2	1.1	1.1	1.1	< 1% increase	0.02	0.01	0.01	0.72	0.71	0.71	< 1% increase
R25	4.0	3.7	3.7	4.9	4.6	4.6	< 1% increase	0.65	0.47	0.47	1.35	1.17	1.17	< 1% increase
R26	2.8	2.6	2.7	3.8	3.6	3.6	< 1% increase	0.47	0.38	0.38	1.17	1.08	1.08	< 1% increase
R27	1.4	1.3	1.3	2.3	2.3	2.3	< 1% increase	0.29	0.24	0.24	0.99	0.94	0.94	< 1% increase
R28	0.9	0.9	0.9	1.9	1.8	1.8	< 1% increase	0.19	0.16	0.16	0.89	0.86	0.86	< 1% increase
R29	2.4	1.8	1.8	3.3	2.7	2.8	< 1% increase	0.32	0.19	0.20	1.02	0.89	0.90	< 1% increase
R30	1.6	1.4	1.4	2.5	2.3	2.3	< 1% increase	0.24	0.16	0.16	0.94	0.86	0.86	< 1% increase
R31	0.9	0.7	0.8	1.8	1.7	1.7	< 1% increase	0.16	0.11	0.11	0.86	0.81	0.81	< 1% increase
R32	0.5	0.5	0.5	1.5	1.4	1.4	< 1% increase	0.11	0.07	0.07	0.81	0.77	0.77	< 1% increase
R33	0.3	0.2	0.2	1.2	1.2	1.2	< 1% decrease	0.04	0.02	0.02	0.74	0.72	0.72	< 1% increase
R34	0.2	0.1	0.1	1.1	1.1	1.1	< 1% decrease	0.03	0.02	0.02	0.73	0.72	0.72	< 1% increase
R35	0.1	0.1	0.1	1.1	1.0	1.0	< 1% increase	0.02	0.01	0.01	0.72	0.71	0.71	< 1% increase
R36	0.1	0.1	0.1	1.0	1.0	1.0	< 1% increase	0.01	0.01	0.01	0.71	0.71	0.71	< 1% increase
R37	0.1	0.1	0.1	1.0	1.0	1.0	< 1% increase	0.01	0.01	0.01	0.71	0.71	0.71	< 1% increase
R38	0.1	0.1	0.1	1.0	1.0	1.0	< 1% decrease	0.02	0.01	0.01	0.72	0.71	0.71	< 1% increase
R39	0.1	0.1	0.1	1.0	1.0	1.0	< 1% decrease	0.01	0.01	0.01	0.71	0.71	0.71	< 1% increase
R40	0.1	0.0	0.0	1.0	1.0	1.0	< 1% increase	0.01	0.01	0.01	0.71	0.71	0.71	< 1% increase
R41	0.0	0.0	0.0	1.0	1.0	1.0	< 1% increase	0.01	0.00	0.00	0.71	0.70	0.70	< 1% increase
R42	0.1	0.1	0.1	1.0	1.0	1.0	< 1% increase	0.02	0.01	0.01	0.72	0.71	0.71	< 1% increase
R43	0.1	0.0	0.0	1.0	1.0	1.0	< 1% decrease	0.01	0.01	0.01	0.71	0.71	0.71	< 1% increase
R44	0.1	0.0	0.0	1.0	1.0	1.0	< 1% decrease	0.01	0.00	0.00	0.71	0.70	0.70	< 1% increase
R45	0.0	0.0	0.0	1.0	1.0	1.0	< 1% decrease	0.01	0.00	0.00	0.71	0.70	0.70	< 1% increase
R46	0.4	0.3	0.3	1.4	1.2	1.2	< 1% increase	0.07	0.03	0.03	0.77	0.73	0.73	< 1% increase
R47	0.1	0.1	0.1	1.0	1.0	1.0	< 1% increase	0.03	0.02	0.02	0.73	0.72	0.72	< 1% increase
R48	0.1	0.1	0.1	1.0	1.0	1.0	< 1% increase	0.02	0.01	0.01	0.72	0.71	0.71	< 1% increase
R49	0.1	0.0	0.1	1.0	1.0	1.0	< 1% increase	0.01	0.01	0.01	0.71	0.71	0.71	< 1% increase
R50	0.1	0.0	0.0	1.0	1.0	1.0	< 1% increase	0.01	0.01	0.01	0.71	0.71	0.71	< 1% increase

Notes:

[1] The 24-Hour TRV for benzene is 29 µg/m^3.

[2] The Annual TRV for benzene is 3 µg/m^3.

Table F6: Maximum Predicted Annual Average BaP Concentrations

Receptor	Annual BaP Concentrations (µg/m^3)						
	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build
	Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario	
R1	0.0000023	0.0000018	0.0000023	0.0001423	0.0001418	0.0001423	< 1% increase
R2	0.0000070	0.0000069	0.0000093	0.0001470	0.0001469	0.0001493	2%
R3	0.0000122	0.0000121	0.0000169	0.0001522	0.0001521	0.0001569	3%
R4	0.0000040	0.0000040	0.0000051	0.0001440	0.0001440	0.0001451	< 1% increase
R5	0.0000353	0.0000351	0.0000531	0.0001753	0.0001751	0.0001931	10%
R6	0.0001010	0.0000993	0.0001132	0.0002410	0.0002393	0.0002532	6%
R7	0.0000422	0.0000411	0.0000505	0.0001822	0.0001811	0.0001905	5%
R8	0.0000855	0.0000846	0.0000976	0.0002255	0.0002246	0.0002376	6%
R9	0.0000436	0.0000427	0.0000516	0.0001836	0.0001827	0.0001916	5%
R10	0.0000059	0.0000058	0.0000074	0.0001459	0.0001458	0.0001474	1%
R11	0.0000313	0.0000309	0.0000408	0.0001713	0.0001709	0.0001808	6%
R12	0.0000624	0.0000623	0.0000685	0.0002024	0.0002023	0.0002085	3%
R13	0.0000172	0.0000169	0.0000199	0.0001572	0.0001569	0.0001599	2%
R14	0.0000097	0.0000097	0.0000108	0.0001497	0.0001497	0.0001508	< 1% increase
R15	0.0000099	0.0000096	0.0000107	0.0001499	0.0001496	0.0001507	< 1% increase
R16	0.0000048	0.0000048	0.0000054	0.0001448	0.0001448	0.0001454	< 1% increase
R17	0.0000031	0.0000028	0.0000033	0.0001431	0.0001428	0.0001433	< 1% increase
R18	0.0000028	0.0000028	0.0000032	0.0001428	0.0001428	0.0001432	< 1% increase
R19	0.0000023	0.0000022	0.0000025	0.0001423	0.0001422	0.0001425	< 1% increase
R20	0.0000018	0.0000007	0.0000008	0.0001418	0.0001407	0.0001408	< 1% increase
R21	0.0000039	0.0000038	0.0000049	0.0001439	0.0001438	0.0001449	< 1% increase
R22	0.0000036	0.0000035	0.0000046	0.0001436	0.0001435	0.0001446	< 1% increase
R23	0.0000032	0.0000032	0.0000041	0.0001432	0.0001432	0.0001441	< 1% increase
R24	0.0000028	0.0000028	0.0000036	0.0001428	0.0001428	0.0001436	< 1% increase
R25	0.0001028	0.0001016	0.0001141	0.0002428	0.0002416	0.0002541	5%
R26	0.0000824	0.0000818	0.0000915	0.0002224	0.0002218	0.0002315	4%
R27	0.0000534	0.0000530	0.0000602	0.0001934	0.0001930	0.0002002	4%
R28	0.0000360	0.0000358	0.0000414	0.0001760	0.0001758	0.0001814	3%
R29	0.0000419	0.0000411	0.0000498	0.0001819	0.0001811	0.0001898	5%
R30	0.0000342	0.0000337	0.0000407	0.0001742	0.0001737	0.0001807	4%
R31	0.0000231	0.0000227	0.0000282	0.0001631	0.0001627	0.0001682	3%
R32	0.0000162	0.0000160	0.0000203	0.0001562	0.0001560	0.0001603	3%
R33	0.0000048	0.0000047	0.0000054	0.0001448	0.0001447	0.0001454	< 1% increase
R34	0.0000036	0.0000035	0.0000041	0.0001436	0.0001435	0.0001441	< 1% increase
R35	0.0000024	0.0000023	0.0000028	0.0001424	0.0001423	0.0001428	< 1% increase
R36	0.0000017	0.0000017	0.0000021	0.0001417	0.0001417	0.0001421	< 1% increase
R37	0.0000013	0.0000013	0.0000016	0.0001413	0.0001413	0.0001416	< 1% increase
R38	0.0000019	0.0000019	0.0000022	0.0001419	0.0001419	0.0001422	< 1% increase
R39	0.0000015	0.0000015	0.0000018	0.0001415	0.0001415	0.0001418	< 1% increase
R40	0.0000012	0.0000011	0.0000014	0.0001412	0.0001411	0.0001414	< 1% increase
R41	0.0000009	0.0000009	0.0000011	0.0001409	0.0001409	0.0001411	< 1% increase
R42	0.0000019	0.0000019	0.0000023	0.0001419	0.0001419	0.0001423	< 1% increase
R43	0.0000013	0.0000012	0.0000015	0.0001413	0.0001412	0.0001415	< 1% increase
R44	0.0000010	0.0000009	0.0000012	0.0001410	0.0001409	0.0001412	< 1% increase
R45	0.0000008	0.0000008	0.0000010	0.0001408	0.0001408	0.0001410	< 1% increase
R46	0.0000054	0.0000052	0.0000061	0.0001454	0.0001452	0.0001461	< 1% increase
R47	0.0000033	0.0000032	0.0000038	0.0001433	0.0001432	0.0001438	< 1% increase
R48	0.0000022	0.0000022	0.0000027	0.0001422	0.0001422	0.0001427	< 1% increase
R49	0.0000017	0.0000017	0.0000021	0.0001417	0.0001417	0.0001421	< 1% increase
R50	0.0000014	0.0000014	0.0000017	0.0001414	0.0001414	0.0001417	< 1% increase

Notes:

[1] The Annual TRV for BaP is 0.00001 µg/m^3.

Table F7: Maximum Predicted 24-Hour and Annual Average Acrolein Concentrations

Receptor	24-Hour Acrolein Concentrations (µg/m^3)							Annual Acrolein Concentrations (µg/m^3)						
	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build	Modelled Concentrations			Cumulative Concentrations (Modelled+Background)			% Change of Future Build Relative to Future No Build
	Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario		Existing Scenario	Future No Build Scenario	Future Build Scenario	Existing Scenario	Future No Build Scenario	Future Build Scenario	
R1	0.07	0.05	0.05	0.37	0.35	0.35	< 1% decrease	0.01	0.00	0.00	0.14	0.13	0.13	< 1% decrease
R2	0.24	0.23	0.23	0.54	0.53	0.53	< 1% decrease	0.02	0.02	0.02	0.15	0.15	0.15	< 1% decrease
R3	0.33	0.33	0.32	0.63	0.63	0.62	< 1% decrease	0.03	0.03	0.03	0.16	0.16	0.16	< 1% decrease
R4	0.16	0.15	0.15	0.46	0.45	0.45	-1%	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R5	0.78	0.78	0.79	1.08	1.08	1.09	2%	0.08	0.08	0.09	0.21	0.21	0.22	1%
R6	1.78	1.77	1.79	2.08	2.07	2.09	1%	0.26	0.25	0.26	0.39	0.38	0.39	< 1% increase
R7	1.00	0.98	0.99	1.30	1.28	1.29	< 1% increase	0.11	0.10	0.11	0.24	0.23	0.24	< 1% increase
R8	1.51	1.50	1.51	1.81	1.80	1.81	< 1% increase	0.22	0.21	0.22	0.35	0.34	0.35	< 1% increase
R9	0.80	0.78	0.78	1.10	1.08	1.08	< 1% decrease	0.11	0.11	0.11	0.24	0.24	0.24	< 1% increase
R10	0.20	0.19	0.20	0.50	0.49	0.50	< 1% increase	0.02	0.01	0.01	0.15	0.14	0.14	< 1% increase
R11	0.63	0.61	0.62	0.93	0.91	0.92	< 1% increase	0.08	0.08	0.08	0.21	0.21	0.21	< 1% increase
R12	0.76	0.76	0.76	1.06	1.06	1.06	< 1% decrease	0.19	0.19	0.19	0.32	0.32	0.32	< 1% increase
R13	0.29	0.29	0.29	0.59	0.59	0.59	< 1% increase	0.05	0.05	0.05	0.18	0.18	0.18	< 1% increase
R14	0.18	0.18	0.18	0.48	0.48	0.48	< 1% increase	0.03	0.03	0.03	0.16	0.16	0.16	< 1% increase
R15	0.27	0.27	0.27	0.57	0.57	0.57	< 1% increase	0.03	0.03	0.03	0.16	0.16	0.16	< 1% increase
R16	0.12	0.12	0.12	0.42	0.42	0.42	< 1% increase	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R17	0.08	0.08	0.08	0.38	0.38	0.38	< 1% increase	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R18	0.06	0.06	0.06	0.36	0.36	0.36	< 1% decrease	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R19	0.07	0.07	0.06	0.37	0.37	0.36	< 1% decrease	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R20	0.04	0.02	0.02	0.34	0.32	0.32	< 1% increase	0.01	0.00	0.00	0.14	0.13	0.13	< 1% increase
R21	0.15	0.15	0.14	0.45	0.45	0.44	< 1% decrease	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R22	0.13	0.13	0.13	0.43	0.43	0.43	< 1% increase	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R23	0.11	0.11	0.11	0.41	0.41	0.41	< 1% increase	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R24	0.10	0.09	0.10	0.40	0.39	0.40	< 1% increase	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R25	2.08	2.07	2.08	2.38	2.37	2.38	< 1% increase	0.27	0.26	0.26	0.40	0.39	0.39	< 1% increase
R26	1.51	1.50	1.51	1.81	1.80	1.81	< 1% increase	0.21	0.21	0.21	0.34	0.34	0.34	< 1% increase
R27	0.76	0.76	0.76	1.06	1.06	1.06	< 1% increase	0.14	0.14	0.14	0.27	0.27	0.27	< 1% increase
R28	0.51	0.51	0.51	0.81	0.81	0.81	< 1% increase	0.09	0.09	0.09	0.22	0.22	0.22	< 1% increase
R29	1.03	1.03	1.03	1.33	1.33	1.33	< 1% increase	0.11	0.10	0.11	0.24	0.23	0.24	< 1% increase
R30	0.79	0.78	0.79	1.09	1.08	1.09	< 1% increase	0.09	0.09	0.09	0.22	0.22	0.22	< 1% increase
R31	0.43	0.43	0.43	0.73	0.73	0.73	< 1% increase	0.06	0.06	0.06	0.19	0.19	0.19	< 1% increase
R32	0.28	0.28	0.28	0.58	0.58	0.58	< 1% increase	0.04	0.04	0.04	0.17	0.17	0.17	< 1% increase
R33	0.14	0.14	0.13	0.44	0.44	0.43	-1%	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R34	0.09	0.09	0.08	0.39	0.39	0.38	-1%	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R35	0.05	0.05	0.05	0.35	0.35	0.35	< 1% increase	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R36	0.04	0.04	0.04	0.34	0.34	0.34	< 1% increase	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase
R37	0.03	0.03	0.03	0.33	0.33	0.33	< 1% increase	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase
R38	0.06	0.05	0.05	0.36	0.35	0.35	< 1% decrease	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R39	0.04	0.04	0.03	0.34	0.34	0.33	-1%	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase
R40	0.03	0.03	0.02	0.33	0.33	0.32	< 1% decrease	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase
R41	0.02	0.02	0.02	0.32	0.32	0.32	< 1% decrease	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase
R42	0.04	0.03	0.04	0.34	0.33	0.34	< 1% increase	0.01	0.00	0.01	0.14	0.13	0.14	< 1% increase
R43	0.03	0.03	0.02	0.33	0.33	0.32	< 1% decrease	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase
R44	0.02	0.02	0.02	0.32	0.32	0.32	< 1% decrease	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase
R45	0.02	0.02	0.02	0.32	0.32	0.32	< 1% decrease	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase
R46	0.15	0.15	0.15	0.45	0.45	0.45	< 1% increase	0.02	0.01	0.01	0.15	0.14	0.14	< 1% increase
R47	0.05	0.05	0.05	0.35	0.35	0.35	< 1% increase	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R48	0.04	0.03	0.04	0.34	0.33	0.34	< 1% increase	0.01	0.01	0.01	0.14	0.14	0.14	< 1% increase
R49	0.03	0.03	0.03	0.33	0.33	0.33	< 1% increase	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase
R50	0.03	0.03	0.03	0.33	0.33	0.33	< 1% increase	0.00	0.00	0.00	0.13	0.13	0.13	< 1% increase

Notes:

[1] The 24-Hour TRV for acrolein is 0.4 µg/m^3.

[2] The annual TRV for acrolein is 0.02 µg/m^3.

AECOM

Appendix C-2

Noise Effects Assessment

CONSULTING ENGINEERS & SCIENTISTS

Tel: 519.823.1311
Fax: 519.823.1316

RWDI AIR Inc.
600 Southgate Drive
Guelph, Ontario, Canada
N1G 4P6

CANADA'S BEST MANAGED COMPANIES
Platinum member

Billy Bishop Toronto City Airport

Toronto, Ontario

Final Report

Environmental Noise Report

RWDI #1402032
November 9, 2016

SUBMITTED TO:

Marc Rose, MES, MCIP, RPP
Senior Environmental Planner

AECOM
105 Commerce Valley Drive West, 7th Floor
Markham, ON L3T 7W3

SUBMITTED BY:

Sharon Schajnoha, B.Sc., P.Eng.
Senior Project Manager, Associate
Sharon.Schajnoha@rwdi.com

Peter VanDelden, Hons.B.Sc., P.Phys., INCE
Technical Director, Associate
Peter.VanDelden@rwdi.com

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CONSULTING ENGINEERS & SCIENTISTS

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1. INTRODUCTION

A proposal has been put forward to extend the Billy Bishop Toronto City Airport (BBTCA) runway and introduce passenger jet aircraft. BBTCA is operated by PortsToronto under a Tripartite Agreement (Transport Canada, 2003) between PortsToronto, the City of Toronto and Transport Canada. AECOM has retained RWDI on behalf of PortsToronto to conduct the following environmental noise assessment based on the initial study design. This assessment was intended to form part of the Environmental Assessment of the proposal which was requested by the City of Toronto. This report evaluates sound levels in terms of guidelines from local jurisdictions and sound-related criteria in the Tripartite Agreement.

1.1 Scenarios

The EA considers the change that would occur as a result of the proposal under consideration. The future sound levels without the proposal are compared with future sound levels if the proposal is implemented. The primary elements of the proposal in relation to sound levels are extension of the runway, extension of taxiways and introduction of limited Bombardier CS100 passenger jet traffic. Sound barriers have been proposed as a mitigation measure. The future case with the proposal has therefore been modelled with the barrier and without the barrier. A ground run-up enclosure for aircraft engine run-up testing will be constructed before ultimate completion of the proposal. Existing conditions have been used as a conservative proxy for future conditions that would occur without the proposal. Future conditions are projected to a horizon year of 2032.

1.2 Study Area

The study area for this evaluation, shown in Figure 1, extends northwards from the airport to the Gardiner Expressway, eastwards to Rees Street, westwards to the Exhibition Park lands, southward to include the residential part of the Toronto Islands and as far south as South Island. Representative points of reception within the study area are described in Section 3.1.

Figure 1: Study Area for Sound Level Assessment



1.3 Sound Level Descriptors

The principal descriptors of sound in this assessment are the Noise Exposure Forecast (NEF) and the energy-equivalent sound level (L_{EQ}). Both of these are described in this section. A glossary of commonly used sound level descriptors is provided in Appendix A.

Sound from airborne aircraft is described in terms of Noise Exposure Forecast (NEF). This covers sound that occurs on the runway for takeoff, while airborne until landing. The NEF is the sound over a 24 hour period on a day with nearly maximum flight activity. The NEF is adjusted for human response to aircraft sound and tonality, including penalties applied for sound occurring between 2200h and 0700h.

All other sources of sound are described using the energy-equivalent sound level (L_{EQ}), adjusted for human response to different tonal components. The L_{EQ} represents the average sound level occurring over the specified period of time, such as the $L_{EQ,24}$ for a 24-hour equivalent, or the $L_{EQ,day}$ for the daytime period (0700h-2300h) and the $L_{EQ,night}$ for the night-time period (2300h-0700h).

The units of sound level are the decibel (dB). When a single-number value of sound level has been adjusted for human response to the different tonal components, a letter is appended to the unit. An “A” is used for response to normal sound levels, while a “C” describes response to high sound levels. The dBA unit is used across Canada and is accepted internationally as descriptor of sound level, including the public experience of sound from airports.

2. GUIDELINES

The sound levels in this assessment are evaluated using local and national guidance as described in this section. The guidance provides criteria for individual sources of sound. The environmental assessment considers significance of the cumulative sound by the perception of change in sound level.

2.1 Airborne Aircraft

Operation of aircraft is the jurisdiction of Transport Canada. Transport Canada supports municipalities with a methodology and guidance so that local planning decisions provide separation between airports and sensitive land uses. The Ontario Provincial Policy Statement and Ministry of Environment and Climate Change (MOECC) also reference the guidance from Transport Canada. Limitations specific to BBTCA have been incorporated into the Tripartite Agreement (Transport Canada 2003).

2.1.1 Transport Canada

The key elements of Transport Canada noise guidance are the noise exposure forecast (NEF) for the local airport and publication “Aviation Land Use in the Vicinity of Airports, TP1247” (Transport Canada 2005). Transport Canada also provides the NEFcalc model used to calculate NEF.

NEF is a tool for the purposes of land use planning which accounts for the annoyance characteristics of aircraft sound, the number of occurrences and when they happen. The annoyance response is based on Effective Perceived Noise Level data used for certification of aircraft by Transport Canada or similar international organizations. The NEF system addresses aircraft departure from the runway, takeoff, and ascent as well as aircraft descent and landing. Aircraft over-flying the airport at higher elevations or those in more distant air corridors are not included. The quantity of aircraft used is a Peak Planning Day (PPD) calculated using historical flight quantity data from NAV Canada. PPD is an average of the daily quantity occurring on the busiest 7 days in each of the busiest 3 months of the year. Almost all of the days in a year have fewer aircraft movements than the modelled quantities. When the aircraft fly during nighttime hours (2200h-0700h) the NEF calculations apply a penalty by increasing the sound levels from nighttime movements by an amount equivalent to that associated with 16.67 times the number of aircraft.

The output from the NEF model is a line plot where the lines trace out equal noise exposures. NEF lines are typically provided from NEF40 for highest effects down to NEF25. Incompatible land use may begin as low as NEF25. New residential development is not compatible with NEF30 or above. Since not all land uses are equally sensitive, Transport Canada gives guidance on the compatibility of different land uses with the different noise exposures in Table 3 of publication TP1247, as attached in Appendix B.

2.1.2 Provincial Guidance

The provincial government provides guidance relating to sound from airports in the Provincial Policy Statement (MMAH 2014) and MOECC *Environmental Noise Guideline* NPC-300 (MOECC 2013).

The Provincial Policy Statement provides for the protection of airports from incompatible land use by:

- prohibiting new residential development and other sensitive land uses in areas above NEF30, and

- allowing infilling of sensitive land uses in areas above NEF30 only if there will be no negative impacts on long-term function of the airport.

Similarly, NPC-300 (MOECC 2013) provides an upper limit of NEF30 for development of new noise sensitive land uses, and suggests detailed noise studies for proposed development in areas above NEF25.

2.1.3 Tripartite Agreement

A Tripartite Agreement (Transport Canada 2003) between PortsToronto, the City of Toronto and Transport Canada defines criteria for sound from aircraft at BBTCA using sound level data for aircraft, and the NEF system. The current agreement restricts jet aircraft operation (outside of the period of the CNE Airshow) to those engaged in medivac or emergency use. Other than medivac flights, aircraft departures and arrivals are to occur between 0645h and 2200h.

The specification for aircraft sound level uses Effective Perceived Noise level data determined during certification of the aircraft. It is expressed in units of EPNdB. Aircraft are to meet the levels shown in Table 1. Variation of individual metrics is permitted as long as the excess above a single metric is less than 2 EPNdB and the sum of the excesses for an aircraft is less than 3 EPNdB.

Table 1: TriPartite Agreement Specification for Aircraft

Metric	Maximum Certification Sound Level (EPNdB)
Approach	92.0
Lateral	83.5
Flyover	84.0
Cumulative	259.5

The Tripartite Agreement further specifies the maximum influence from airport activity by a boundary within which the NEF28 must fall. The boundary is shown in Figure 2. The boundary was defined by the 1990 NEF25 contour, except for an unrestricted area to the west over Lake Ontario denoted by circles in Figure 2.

Figure 2: Triparite Agreement NEF Boundary



2.2 Aircraft on the Ground and Ferry

There are currently no federal guidelines that regulate sound from ferries or aircraft on the ground. These sources are also not provincially regulated e.g., under MOECC. However, MOECC guidance in the *Environmental Noise Guideline* NPC-300 (MOECC 2013) has been used in the absence of any other guidance.

2.2.1 Aircraft on the Ground

Aircraft on the ground are considered transportation sound-sources, and have been traditionally compared with other sources of transportation sound in NPC-300 (MOECC 2013). They are compared with the criteria provided for road and rail, as described further in Section 2.4 below.

2.2.2 Ferry

Like aircraft, ferries are sources of transportation sound. NPC-300 (MOECC 2013) identifies ships as a source of sound but provides no specific guidance. Ferries have traditionally been compared with guidelines for road and rail sources of transportation sound. The NPC-300 (MOECC 2013) criteria provided for road and rail are used as described further in Section 2.4 below.

2.3 Ground Support Equipment

Since airports are federally regulated, their sources typically do not fall under provincial jurisdiction. However ground support equipment and other similar sources of sound at the airport are somewhat comparable with the stationary sources described in MOECC guideline NPC-300. The stationary source criteria are different than those used for aircraft on the ground and ferry operations. For stationary sources NPC-300 uses ambient sound at the points of reception as the criterion, provided the ambient sound is above the exclusion limit provided in the guideline. The sounds of nature and the result of human activity, other than the facility under consideration, are considered ambient sound. The criteria are summarized in Table 2.

Table 2: Sound Level Criteria for Stationary Source Noise $L_{EQ,1\text{-}hr}$

Location	Time of Day	Sound Level
Outdoor Point of Reception	Daytime, Evening (0700h-2300h)	Higher of ambient sound or 50 dBA
Façade, in plane of window	Daytime, Evening (0700h-1900h)	Higher of ambient sound or 50 dBA
	Evening (1900h-2300h)	Higher of ambient sound or 50 dBA
	Nighttime (2300h-0700h)	Higher of ambient sound or 45 dBA

Demonstration of the ambient sound level, which is dominated by road traffic, is typically completed using modelling as set out in MOECC publication NPC-206 (MOECC 1995). NPC-206 provides modeling requirements for sound from road traffic using the ORNAMENT model (MOECC 1989). One-hour traffic volumes for the Gardiner Expressway, Lakeshore Boulevard, Queens Quay and Bathurst Street are used.

The comparison with criteria is based on the one-hour evaluation period during daytime, evening and nighttime where sound levels under consideration are highest in relation to the ambient sound at that time. Based on a comparison of hourly ground activity at the airport to hourly road traffic on the major roadways in the study area, this occurs at 1200h during daytime, at 2100h in the evening, and at 0600h of nighttime. Tables comparing the calculated ambient sound level with the exclusion limits to determine the criteria are provided in Appendix C.

2.4 Road and Light Rail Traffic

The MOECC has guidelines for sound from road traffic and light rail traffic on sensitive land uses set out in publication NPC-300. These objectives are applicable over the daytime and nighttime period as summarized in Table 3. Above the objective levels, the guideline gives warning clauses and abatement measures that may be applied to new residential uses to ensure that current and future sound level objectives are met.

Table 3: Objectives for Road and Rail Traffic Sound Levels

Location	Time of Day	Target Sound Level (dBA)
Outdoor living area	Daytime (0700h-2300h)	55
Façade, in plane of window	Daytime (0700h-2300h)	50
	Nighttime (2300h-0700h)	50

2.5 Cumulative Sound

The assessment of cumulative sound from all of the sources (road, LRT, airborne aircraft, aircraft on the ground, ferry activity, and ground support equipment) is based on the general practice of evaluating changes in sound level (MOECC 1998, 1997). Changes are ranked as shown in Table 4.

Table 4: Description of Increase or Decrease in Sound Level

Change (dB)	Human Perception of Change	Significance of Change
0 to 3	Imperceptible	Insignificant
3 to 5	Just noticeable	Moderate
6 to 9	Clearly noticeable	Significant
> 10	Perceived as a doubling (for increase) or halving (for decrease) in sound level	Very Significant

3. METHODOLOGY

The assessment of sound levels associated with the proposal is based on modelled cumulative sound from the airport and ambient sources as experienced at points of reception in the vicinity of the airport. Both the baseline and proposed future case are modelled. The significance of the proposal is based on the change in cumulative sound level.

Key sources associated with BBTCA are airborne aircraft, aircraft on the ground (i.e., taxiing, engine run-up, and engine-braking upon landing), airport ground support equipment and the Marilyn Bell ferry. Vehicles holding for the airport (i.e., cars and trucks queuing, taxis and buses in the holding pen) are not considered significant and have therefore not been modelled. Sources of ambient sound in the area include on-street-vehicles and LRT (i.e., streetcars). Mechanical equipment for heating, ventilation and air conditioning can be a source of ambient sound but is not considered significant here. Ambient sounds from on-street construction or nearby entertainment events are also not included.

The modelling of airport and ambient sources follow the approaches provided by the local, provincial, national or proxy guidance applicable to each sub-set of sources. The methods used and the determination of cumulative sound levels are described in the following sections.

3.1 Points of Reception

The evaluation of sound is performed at locations that are considered sensitive to sound. The guidelines identify residential uses and schools as sensitive. Some of the models produce plots of sound level over the study area while others are not capable of contour plots and only address specific locations. The evaluation of sound level is therefore done at representative points of reception. The representative locations are identified in Table 5 and are shown in Figure 3. A close-up of the locations on the mainland is shown in Figure 4. Publication NPC-300 does not include parks as sensitive spaces however Little Norway Park has been included, consistent with previous studies.

Figure 3: Representative Points of Reception

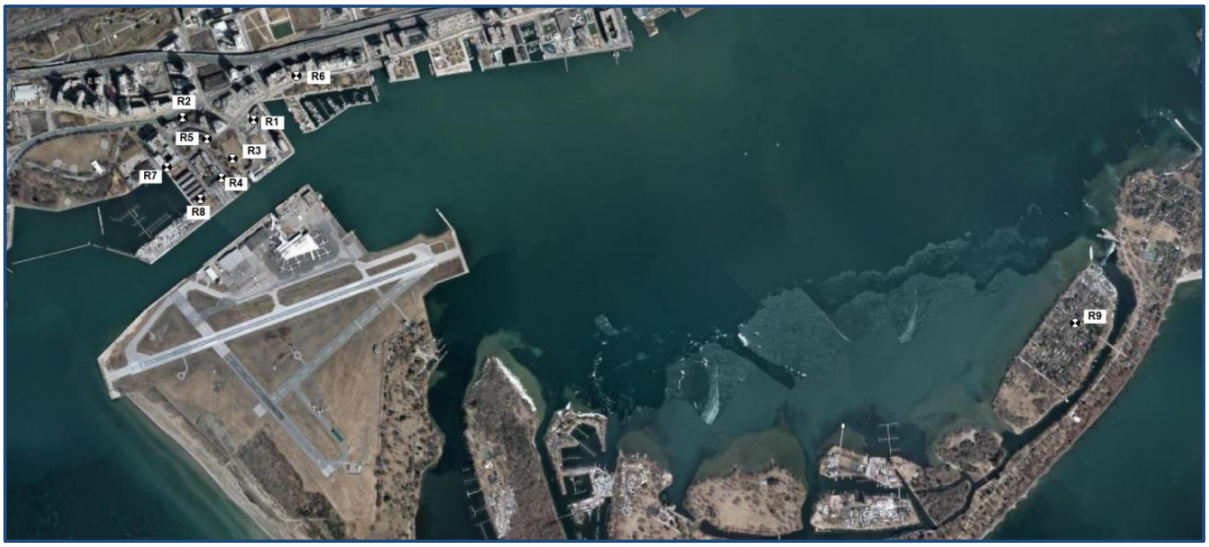


Figure 4: Close-up of Mainland Representative Points of Reception



Table 5: Representative Receptor Locations

Receptor Number	Description
R1	Waterfront School and City School, top storey
R2	Bishop Tutu Blvd. residences, 2nd storey
R3	Little Norway Park, at grade
R4	Norway Cres. Residences, 7th storey
R5	680 Queens Quay, 4th storey
R6	500 Queens Quay, 5th storey
R7	90 Stadium Road, 7th storey
R8	28 Stadium Road, 4th storey
R9	Oneida Ave., Algonquin Island, 1st storey

3.2 Airborne Aircraft

The modelling of airborne aircraft follows the Transport Canada system. The Transport Canada model NEFcalc addresses aircraft departure from the runway, takeoff, and ascent as well as aircraft descent and landing. The model does not account for local influences from buildings such as reflections from facades or barrier effects that would occur from points of reception that are partially or fully screened from activity.

This assessment is based on the 2012 NEF modelling by SNC (SNC 2012) and the proposed case NEF modelling by WSP (WSP 2016), which are provided in Appendix D. Results of the modelling are provided as a contour plot of NEF, and are shown with the Tripartite Agreement criteria line in the SNC and WSP reports. NEF values for specific points of reception are estimated from the contour plots.

Aircraft engine run-up, taxiing and engine braking upon landing are not included in the NEF model, but are modelled separately as discussed in Section 3.3.

In addition to evaluating the overall influence of airborne aircraft from BBTCA, data for the two key aircraft are also evaluated. The existing Q400 turboprop and proposed CS100 jet sound level information are compared with the specification in the Tripartite Agreement.

3.3 Aircraft on the Ground, Ferry, and Ground Support Equipment

The methodologies for sound from aircraft on the ground, the ferry, and ground support equipment are developed to address the relevant guidance as described in the sections below.

3.3.1 Aircraft on the Ground

The modelling of aircraft activity on the ground addresses sound that is not modelled for the NEF in Section 3.2. This activity includes:

- sound from the engines during braking after touchdown;
- taxiing from the runway to the terminal;
- engine run-up for checks and maintenance; and
- taxiing from the terminal to the runway, including holding prior to takeoff.

The quantity and location of aircraft touchdown and taxiing activity is taken from the same data as the NEF modelling. Sound from the engines after touchdown and taxiing have been modelled for the Q400 and CS100 using data from Bombardier, on-site measurements and observations. Source information is provided in Appendix D. Similar sound from the smaller aircraft has been calculated using published methods (ACRP 2013).

Maintenance of the Q400 aircraft requires engine run-up activity, which can occur at night from time to time. The worst-case one-hour test length has been modelled to occur during daytime and nighttime hours. The proposed future case incorporates the relocation of ground run-up activity for both Q400 and CS100 aircraft to a ground run-up enclosure to be constructed as shown in Figure 5 (WSP 2015).

Figure 5: Proposed Ground Run-Up Enclosure



Daytime and nighttime sound occurring at the points of reception, due to aircraft on the ground is compared with the NPC-300 transportation criteria, together with sound from the ferry.

3.3.2 Barrier

The use of additional sound barriers has been proposed as potential mitigation of sound from aircraft on the ground. An existing barrier is constructed along the south side of the airport, to the east of runway 15. The proposed barriers would be constructed adjacent on the north side of the taxiway extensions that would be constructed along the north side of the proposed runway extensions. They would therefore primarily address sound from aircraft as they hold on the taxiway prior to take-off. Drawings of the barrier are provided in Appendix D. A height of 6m was assumed based on the drawings. Future sound levels with the barrier are compared with sound levels in the absence of the barrier. A reduction of 5 dB is typically the criterion used to determine technical feasibility (MTO, 1992).

3.3.3 Ferry

The *Marilyn Bell 1* ferry serves the airport between terminals at Eireann Quay and BBTCA. The ferry operates a 15-minute return trip schedule between 0515h and 0015h currently, and will continue to do so in the future. Sound level data for the ferry in 2014 has been used for the future without jets case, but data following installation of improved mufflers has been incorporated into the future with jets case (RWDI 2015). Source sound level information is provided in Appendix D.

Daytime and nighttime sound occurring at the points of reception, due to the ferry is compared with the NPC-300 transportation criteria, together with sound from aircraft on the ground.

3.3.4 Ground Support Equipment

Ground support equipment activity at the airport currently addresses primarily Q400 aircraft, and in the proposed case will serve Q400 and CS100 aircraft. Activity supporting smaller and general aviation aircraft is considered insignificant. The modelled activity includes:

- Fuel trucks;
- Baggage handling equipment;
- Water and lavatory service carts;
- Air supply equipment.

The sources are located or move around the parked aircraft as shown in Figure 6. One piece of each type of equipment was observed to support each aircraft. The quantity of each piece of equipment used is therefore directly proportional to the number of Q400 and CS100 aircraft used in NEF modelling. Sound levels were measured on site. Source sound level information is provided in Appendix D.

Sound levels from ground support equipment occurring at the points of reception, are compared with $L_{EQ,1\text{-}hr}$ NPC-300 criteria for stationary sources.

Figure 6: Ground Source Equipment Area



3.3.5 Modelling of Aircraft on the Ground, Ferry and Ground Support Equipment

The determination of how sound goes from the sources to points of reception was completed using the ISO 9613 (ISO 1994 and 1996) algorithms implemented in the Cadna/A software package produced by Datakustik GmbH. The modelling accounts for:

- How much sound the source creates;
- Directions that the sound travels from the source;
- 3-dimensional geometry of the source and receptor locations, including height, orientation and topography;
- Influences from surrounding structures;
- When and how long the sound occurs;
- Reductions of sound with distance;
- Reductions of sound through the atmosphere;
- Influences of the surface over which the sound travels; and
- Meteorological effects on sound.

The model setup incorporated specific details of the area. Water surfaces were modelled as completely reflective. The model considers meteorological effects that are favourable to sound propagation.

3.4 Road and LRT

3.4.1 Road

Road traffic sound levels were modelled using the ORNAMENT algorithms (MOECC 1989) specified in NPC-206 (MOECC 1995). The following factors were taken into account in determining sound levels at the representative points of reception:

- Horizontal and vertical road-receiver geometry;
- Ground absorption;
- Traffic volumes;
- Truck percentages;
- Vehicle speed; and
- Screening provided by existing buildings.

Road traffic volumes for the Gardiner Expressway, Lakeshore Boulevard, Queens Quay and Bathurst Street were used together with proxy data for Little Norway and Stadium Road. Existing traffic volumes from the City of Toronto and predicted future hourly traffic volumes were provided by AECOM. Traffic data and an example calculation are provided in Appendix E.

Daytime and nighttime road traffic sound is combined with LRT sound levels for comparison with the NPC-300 transportation criteria.

3.4.2 Rail

Sound levels from the TTC streetcar, or LRT, on the Harbourfront and Bathurst lines were modelled using the STEAM algorithms. Heavy rail activity occurring north of the Gardiner Expressway has not been considered. Modelling accounted for the following factors in determining sound levels at the representative points of reception:

- Horizontal and vertical streetcar-receiver geometry;
- Ground absorption;
- Traffic volumes;
- Vehicle speed; and
- Screening provided by existing buildings.

Rail traffic data quantities for existing conditions were taken from the streetcar schedules. Future traffic volumes were determined based on guidance provided by TTC, as attached in Appendix E. An example calculation is attached in Appendix E.

Daytime and nighttime LRT traffic sound is combined with road traffic sound levels for comparison with the NPC-300 transportation criteria.

3.5 Cumulative Sound

Cumulative sound levels were developed to assess the significance of sound from the proposed case at the representative points of reception.

The inclusion of aircraft noise exposure forecast values in cumulative sound levels requires estimation of NEF values at the representative points of reception and conversion of the NEF planning metric into A-weighted decibels. The most recent guidance from the MOECC (MOE, 2013) and National Research Council (NRC 2001) provides the following approximation to obtain a 24-hour sound level from an NEF value:

$$L_{EQ,24-hr}(dBA) = NEF + 32 \qquad \text{(Equation 1)}$$

The modelling results for aircraft on the ground, the ferry, ground support equipment, road traffic and LRT are directly generated in dBA. The cumulative sound level for the proposed with jets case is compared with the cumulative sound level for future without jets conditions.

4. RESULTS

4.1 Airborne Aircraft

Results of the NEF modelling are presented in Figure 7 for the future without jets case (SNC 2015) and in Figure 8 for the proposed case with jets (WSP 2016). The associated reports are provided in Appendix D. The NEF criteria from the Tripartite Agreement (Transport Canada 2003) are also shown in the figures. The figures show that the NEF contours for the future without jets case and the proposed case with jets remain within the criteria of the Tripartite Agreement. The Transport Canada, Provincial Policy Statement, and MOECC NPC-300 criteria of NEF30 would not be exceeded at any existing residential uses since the NEF 30 would be located inside the NEF28 which is shown. Table 6 provides estimates of the NEF values at the representative points of reception.

Figure 7: Noise Exposure Comparison with Tripartite Criterion Line, 2012



Figure 8: Noise Exposure Comparison with Tripartite Criterion Line, Future with Jets

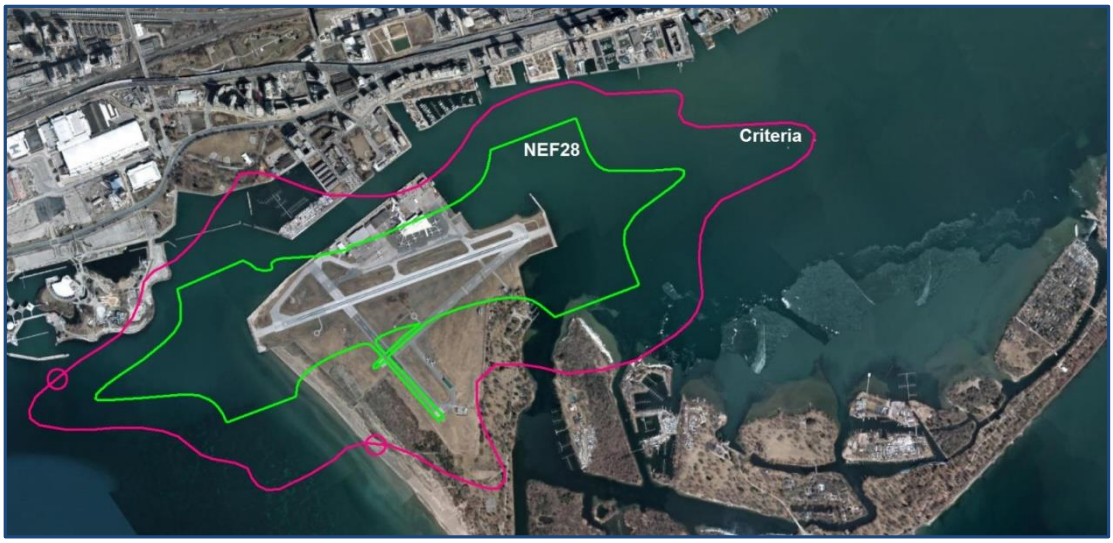


Table 6: Estimated NEF Values at Representative Points of Reception

Receptor Number	Future NEF Without Jets	Future NEF With Jets
R1	20	20
R2	19	19
R3	22	22
R4	22	22
R5	20	20
R6	20	20
R7	21	20
R8	23	23
R9	10	11

Aircraft sound level specifications for the key aircraft are provided in Table 7 together with the criteria in the Tripartite Agreement.

Table 7: Certification Specifications (EPNdB)

Metric	Tripartite Agreement	Q400	CS100[1]
Approach	92.0	93.1	91.9
Lateral	83.5	84.0	85.3
Flyover	84.0	78.6	82.2
Cumulative	259.5	255.7	259.4

Notes:

1. Data are based on the PW1519 engine.

The table shows that the cumulative EPNdB values in the Tripartite Agreement are not exceeded by the Q400 and CS100. The aircraft also both meet the provisions of the Tripartite Agreement that the excess above a single metric be less than 2 EPNdB and the sum of the excesses for an aircraft be less than 3 EPNdB.

4.2 Aircraft on the Ground and Ferry

The sound levels from aircraft on the ground and the ferry are combined for evaluation against the MOECC NPC-300 guidelines for transportation sources as shown in Table 8.

Table 8: Sound Levels from Aircraft on the Ground and Ferry

Point of Reception	Time[1]	Future Without Jets	Future With Jets	Transportation Criteria	Sound Above Criteria Without / With Jets
R1	Day	69	63	55	Yes / Yes
	Night	71	57	50	Yes / Yes
R2	Day	50	46	55	No / No
	Night	51	45	50	Yes / No
R3	Day	71	66	55	Yes / Yes
	Night	73	53	50	Yes / Yes
R4	Day	74	67	55	Yes / Yes
	Night	76	57	50	Yes / Yes
R5	Day	66	62	55	Yes / Yes
	Night	67	50	50	Yes / No
R6	Day	68	63	55	Yes / Yes
	Night	69	58	50	Yes / Yes
R7	Day	73	65	55	Yes / Yes
	Night	75	57	50	Yes / Yes
R8	Day	73	68	55	Yes / Yes
	Night	74	57	50	Yes / Yes
R9	Day	57	49	55	Yes / No
	Night	59	40	50	Yes / No

Notes:

1. Day is the $L_{EQ,\ 16\text{-}hr}$ from 7 am to 11 pm. Night is the $L_{EQ,\ 8\text{-}hr}$ from 11 pm to 7 am.
2. Aircraft activity on the ground comprises engine run-ups, taxiing, and engine-braking on landing.
3. All sound levels are in dBA.

Existing sound levels are above the target values in NPC-300, above which new residential development would be provided with warning clauses and possibly mitigation measures. The future case with jets shows reduced sound levels. The reductions are attributable to the ground run-up enclosure that would be constructed.

4.3 Ground Support Equipment

Sound levels from ground support equipment are compared with the NPC-300 stationary source limits.

Modelled sound levels from the ground support equipment are compared with the NPC-300 stationary source criteria in Table 9 for future without jets conditions and Table 10 for the future with jets conditions.

Table 9: Sound from Ground Support Equipment in Comparison with NPC-300 Criteria, Future Without Jets

Point of Reception	Time	Future Without Jets	NPC-300 Criteria	Ground Support Equipment Above Criteria?
R1	Day	53	61	No
	Evening	53	59	No
	Night	47	59	No
R2	Day	31	70	No
	Evening	31	68	No
	Night	25	70	No
R4	Day	56	60	No
	Evening	56	59	No
	Night	49	59	No
R5	Day	51	62	No
	Evening	51	60	No
	Night	45	60	No
R6	Day	48	65	No
	Evening	48	64	No
	Night	42	64	No
R7	Day	48	58	No
	Evening	48	57	No
	Night	42	57	No
R8	Day	53	57	No
	Evening	53	55	No
	Night	47	56	No
R9	Day	34	50	No
	Evening	34	50	No
	Night	28	45	No

Notes:

1. Day, evening and night values are $L_{EQ,\ 1\text{-}hr}$.

Table 10: Sound from Ground Support Equipment in Comparison with NPC-300 Criteria, Future with Jets

Point of Reception	Time	Future With Jets	NPC-300 Criteria	Ground Support Equipment Sound Above Criteria?
R1	Day	53	62	No
	Evening	53	60	No
	Night	47	59	No
R2	Day	31	70	No
	Evening	31	68	No
	Night	25	70	No
R4	Day	56	60	No
	Evening	56	59	No
	Night	49	59	No
R5	Day	51	62	No
	Evening	51	60	No
	Night	45	60	No
R6	Day	48	66	No
	Evening	48	65	No
	Night	42	64	No
R7	Day	48	58	No
	Evening	48	57	No
	Night	42	57	No
R8	Day	53	57	No
	Evening	53	55	No
	Night	47	56	No
R9	Day	34	50	No
	Evening	34	50	No
	Night	28	45	No

Notes:

1. Day, evening and night values are $L_{EQ, 1\text{-}hr}$.

Sound from ground support equipment is less than the NPC-300 criteria during daytime, evening and nighttime hours when the airport activity is at its highest and corresponding road traffic sound is at its lowest.

4.4 Road and LRT

The sound from road and LRT traffic is combined for evaluation against the MOECC NPC-300 guidelines for transportation sources as shown in Table 11.

Table 11: Sound Levels from Road and LRT

Point of Reception	Time[1]	Existing	Future With Jets	Transportation Criteria	Road and LRT Sound Above Criteria Existing / Future with Jets
R1	Day	62	63	55	Yes / Yes
	Night	56	57	50	Yes / Yes
R2	Day	72	72	55	Yes / Yes
	Night	65	65	50	Yes / Yes
R3	Day	61	61	55	Yes / Yes
	Night	56	56	50	Yes / Yes
R4	Day	60	60	55	Yes / Yes
	Night	57	57	50	Yes / Yes
R5	Day	62	62	55	Yes / Yes
	Night	56	56	50	Yes / Yes
R6	Day	68	69	55	Yes / Yes
	Night	62	63	50	Yes / Yes
R7	Day	58	58	55	Yes / Yes
	Night	53	53	50	Yes / Yes
R8	Day	56	56	55	Yes / Yes
	Night	52	52	50	Yes / Yes

Notes:

1. Day is the $L_{EQ, 16\text{-}hr}$ from 7 am to 11 pm. Night is the $L_{EQ, 8\text{-}hr}$ from 11 pm to 7 am.
2. All sound levels are in dBA.

Sound levels from road and LRT are above the NPC-300 criteria during existing conditions are predicted to remain essentially the same into the future. Above these criteria a municipality would typically require that new residential development be provided with warning clauses and most likely mitigation measures.

4.5 Cumulative Sound

Cumulative sound levels in Table 12 compare the future without jets conditions with the proposed future scenario that includes runway expansion and limited passenger jet traffic.

Table 12: Comparison of Cumulative Sound Levels and Assessment of Significance

Point of Reception	Future Without Jets	Future With Jets	Change	Human Perception of Change in Levels	Significance
R1	70	65	-5	Just Noticeable Decrease	Moderate
R2	71	71	0	No Change	Insignificant
R3	72	66	-6	Clearly Noticeable Decrease	Significant
R4	75	67	-8	Clearly Noticeable Decrease	Significant
R5	68	64	-4	Just Noticeable Decrease	Moderate
R6	71	69	-2	Imperceptible Decrease	Insignificant
R7	74	65	-9	Clearly Noticeable Decrease	Significant
R8	74	67	-7	Clearly Noticeable Decrease	Significant
R9	58	49	-9	Clearly Noticeable Decrease	Significant

Notes:

1. Day, evening and night values are $L_{EQ, 24\text{-}hr}$.
2. All sound levels are in dBA.

Sound levels remain the same or decrease from the future case without jets. The decreases ranged from insignificant to significant. Moderate to significant decreases are shown both at grade and at elevated points of reception. The reductions are largely attributable to the introduction of a ground run-up enclosure in the future and included in modelling of the proposal.

4.6 Barrier

The effect of additional barriers along the taxiway extensions, in addressing sound levels from aircraft on the ground is shown in Table 13. The reductions shown in the table are small due to the influence of the ground run-up enclosure. Sound levels presented in the table are the combination of a number of sources. Since the most significant of these is the aircraft run-up activity, reductions applied to sources which are somewhat quieter do not provide as large an apparent reduction. However, it should be noted that the barriers mitigate a source that occurs frequently, while the ground run-up enclosure mitigates a source which occurs much less frequently. The experience of the barrier reduction would therefore be larger than shown in Table 13.

Table 13: Sound Levels from Aircraft on the Ground, Proposal, With and Without Additional Barriers

Point of Reception	Time[1]	Without New Barriers	With New Barriers	Change
R1	Day	63	63	0
	Night	57	57	0
R2	Day	46	46	0
	Night	45	45	0
R3	Day	66	65	-1
	Night	53	53	0
R4	Day	67	67	0
	Night	57	57	0
R5	Day	62	61	-1
	Night	50	49	-1
R6	Day	63	62	-1
	Night	58	58	0
R7	Day	65	64	-1
	Night	57	57	0
R8	Day	68	67	-1
	Night	57	57	0
R9	Day	49	49	0
	Night	40	40	0

Notes:

1. Day is the $L_{EQ,\ 16\text{-}hr}$ from 7 am to 11 pm. Night is the $L_{EQ,\ 8\text{-}hr}$ from 11 pm to 7 am.
2. All sound levels are in dBA.

5. CONCLUSION

A proposal to modify the Billy Bishop Toronto City Airport and relax restriction on operation of jet aircraft has been evaluated in terms of the impact on cumulative sound levels. Existing conditions have been used in lieu of future conditions without the jets proposal. The proposed future case includes the construction of a ground run-up enclosure. As a result of this enclosure, future sound levels with the enclosure will be less than existing conditions. Reductions for some sensitive points of reception will be significant.

6. REFERENCES

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APPENDIX A

GLOSSARY

Ambient Sound	Sound occurring at a location from all sources except the activity under consideration. Sources include the sounds of nature and human activity. Sounds of nature include wind through trees or around buildings, animals, and insects such as crickets. The sound of human activity results from road and rail transportation activity, industrial facilities, heating ventilation and air conditioning equipment, construction activity and entertainment events.
CadnaA	Software that implements the ISO 9613 sound propagation algorithms, produced by Datakusik Gmbh.
dB (decibel)	A unit of measure of sound pressure that compresses a large range of numbers into a more meaningful scale. Hearing tests indicate that the lowest audible pressure is approximately 2 x 10-5 Pa (0 dB), while the sensation of pain is approximately 2 x 102 Pa (140 dB). Generally, an increase of 10 dB is perceived as twice as loud.
dBA	The decibel (dB) sound pressure level filtered through the A filtering network to approximate human hearing response at low sound levels.
dBC	The decibel (dB) sound pressure level filtered through the C filtering network to approximate human hearing response at higher sound levels.
Effective Perceived Noise Level	A single number unit of measure that incorporates human annoyance to sound from aircraft, including tones and duration. It uses the units EPNdB.
Energy equivalent sound level (L_{EQ})	The sound level over a specified period of time. It is a single-number representation of the cumulative acoustical energy measured over a time interval. If a sound level is constant over the measurement period, the L_{EQ} will equal the constant sound level where f is the fraction of time the constant level L is present.
EPNdB	The units of Effective Perceived Noise level in decibels (dB).
General Aviation (GA)	All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. General aviation flights range from gliders and powered parachutes to corporate business jet flights.

Ground support equipment	Airport equipment used to provide services to aircraft on the ground. This can include air handling equipment for the aircraft that operates while aircraft engines are not operating, fuel trucks, baggage handling equipment, catering, water and lavatory services, and equipment used to push aircraft back from the terminal.
ISO	International Standards Organization.
L_{Aeq}	The L_{Aeq} is the average A-weighted sound level over a specified period of time. It is a single-number representation of the cumulative acoustical energy measured over a time interval. If a sound level is constant over the measurement period, the L_{eq} will equal the constant sound level where f is the fraction of time the constant level L is present.
NEF	Noise Exposure Forecast is a measure of human response to sound used by Transport Canada to provide guidance for planning new sensitive land use in the vicinity of an airport.
NEFcalc	Software by Transport Canada for modelling sound propagation from aircraft in the vicinity of an airport, including takeoff, ascent, descent and landing.
Sound	A dynamic (fluctuating) pressure.
Spectrum	The description of a sound wave's resolution into its components of frequency and amplitude.
Taxiing	The movement of an aircraft on the ground, under its own power.

APPENDIX B

Table 3

LAND USE TABLES
AIRCRAFT NOISE CONSIDERATIONS ONLY

This land use tabulation should not be considered as an exhaustive listing, but merely as examples of how various land uses would be assessed in the Noise Exposure Forecast Zones in terms of community response predictions.

No	Indicates that new construction or development of this nature should not be undertaken.
No	Indicates that new construction or development of this nature should not be undertaken See Explanatory Note B.
Ⓐ	This particular land use may be acceptable in accordance with the appropriate note and subject o the limitations indicated therein.
Yes	The indicated land use is not considered to be adversely affected by aircraft noise and no special noise insulation should be required for new construction or development of this nature.

Ⓐ

Noise Exposure Forecast Values	>40	40-35	35-30	<30
Response Areas	1	2	3	4
Residential				
Detached, Semi-Detached	No	No	No	Ⓐ
Town Houses, Garden Homes	No	No	No	Ⓐ
Apartments	No	No	No	Ⓐ

Ⓑ

Noise Exposure Forecast Values	>40	40-35	35-30	<30
Response Areas	1	2	3	4
Recreational - Outdoor				
Athletic Fields	No	Ⓙ	Ⓚ	Yes
Stadiums	No	No	Ⓚ	Yes
Theatres - Outdoor	No	No	No	Ⓗ
Racetracks - Horses	No	Ⓚ	Ⓚ	Yes
Racetracks - Autos	Yes	Yes	Yes	Yes
Fairgrounds	Ⓚ	Ⓚ	Yes	Yes
Golf Courses	Yes	Yes	Yes	Yes
Beaches & Pools	Yes	Yes	Yes	Yes
Tennis Courts	No	Ⓚ	Yes	Yes
Playgrounds	Ⓚ	Ⓚ	Yes	Yes
Marinas	Yes	Yes	Yes	Yes
Camping Grounds	No	No	No	Ⓗ
Park & Picnic Areas	No	Ⓚ	Yes	Yes

C

Noise Exposure Forecast Values	>40	40-35	35-30	<30
Response Areas	1	2	3	4
Commercial				
Offices	F	E	D	Yes
Retail Sales	F	D	Yes	Yes
Restaurants	F	D	D	Yes
Indoor Theatres	No	G	D	Yes
Hotels & Motels	No	F	G	Yes
Parking Lots	Yes	Yes	Yes	Yes
Gasoline Stations	Yes	Yes	Yes	Yes
Warehouses	Yes	Yes	Yes	Yes
Outdoor Sales	E	K	Yes	Yes

D

Noise Exposure Forecast Values	>40	40-35	35-30	<30
Response Areas	1	2	3	4
Public				
Schools	No	No	D	C
Churches	No	No	D	C
Hospitals	No	No	D	C
Nursing Homes	No	No	D	C
Auditoriums	No	No	D	C
Libraries	No	No	D	C
Community Centres	No	No	D	C
Cemeteries	N	N	N	N

E

Noise Exposure Forecast Values	>40	40-35	35-30	<30
Response Areas	1	2	3	4
Municipal Utilities				
Electric Generating Plants	Yes	Yes	Yes	Yes
Gand & Oil Storage	Yes	Yes	Yes	Yes
Garbage Disposal	Yes	Yes	Yes	Yes
Sewage Treatment	Yes	Yes	Yes	Yes
Water Treatment				
Water Storage	Yes	Yes	Yes	Yes

F

Noise Exposure Forecast Values	>40	40-35	35-30	<30
Response Areas	1	2	3	4
Industrial				
Factories	I	I	Yes	Yes
Machine Shops	I	I	Yes	Yes
Rail Yards	Yes	Yes	Yes	Yes
Ship Yards	Yes	Yes	Yes	Yes
Cement Plants	I	I	Yes	Yes
Quarries	Yes	Yes	Yes	Yes
Refineries	I	I	Yes	Yes
Laboratories	No	D	Yes	Yes
Lumber Yards	Yes	Yes	Yes	Yes
Saw Mills	I	I	Yes	Yes

Ⓖ

Noise Exposure Forecast Values	>40	40-35	35-30	<30
Response Areas	1	2	3	4
Transportation				
Highways	Yes	Yes	Yes	Yes
Railroads	Yes	Yes	Yes	Yes
Shipping Terminals	Yes	Yes	Yes	Yes
Passenger Terminals	Ⓓ	Yes	Yes	Yes

Ⓗ

Noise Exposure Forecast Values	>40	40-35	35-30	<30
Response Areas	1	2	3	4
Agricultural				
Crop Farms	Yes	Yes	Yes	Yes
Market Gardens	Yes	Yes	Yes	Yes
Plant Nurseries	Yes	Yes	Yes	Yes
Tree Farms	Yes	Yes	Yes	Yes
Livestock Pastures	Ⓜ	Yes	Yes	Yes
Poultry Farms	Ⓛ	Ⓛ	Yes	Yes
Stockyards	Ⓜ	Yes	Yes	Yes
Dairy Farms	Ⓜ	Yes	Yes	Yes
Feed Lots	Ⓜ	Yes	Yes	Yes
Fur Farms	Ⓚ	Ⓚ	Ⓚ	Ⓚ

EXPLANATORY NOTES FOR TABLE 3

The location of the lines between noise zones cannot be fixed exactly. It will therefore be necessary for the responsible public authority to make an appropriate interpretation of what regulations are to apply at a specific location.

In cases where reference is made to a detailed on-site noise analysis, or to peak noise levels, it will be appreciated that the notes are intended to apply specifically at existing airports, where a field assessment is possible. For planning with respect to new airports, such zones should be considered cautionary. Before reaching a final decision with respect to permitting the particular land-use in question, the authority may wish to consider local topographic effects and ambient noise levels, in conjunction with generalized peak noise level "footprints" for the predominant aircraft types to be using the new airport.

A. Annoyance caused by aircraft noise may begin as low as NEF 25. It is recommended that developers be made aware of this fact and that they undertake to so inform all prospective tenants or purchasers of residential units. In addition, it is suggested that development should not proceed until the responsible authority is satisfied that acoustic insulation features, if required, have been considered in the building design.[2]

B. This Note applies to NEF 30 to 35 only. New residential construction or development should not be undertaken. If the responsible authority chooses to proceed contrary to Transport Canada's recommendation, residential construction or development between NEF 30 and 35 should not be permitted to proceed until the responsible authority is satisfied that:

   (1) appropriate acoustic insulation features have been considered in the building[3] and

   (2) a noise impact assessment study has been completed and shows that this construction or development is not incompatible with aircraft noise.

Notwithstanding point 2, the developer should still be required to inform all prospective tenants or purchasers of residential units that speech interference and annoyance caused by aircraft noise are, on average, established and growing at NEF 30 and are very significant by NEF 35.

C. These facilities should not be located close to the 30-NEF contour unless the restrictions outlined in Note D are applied.

D. These uses should not be approved unless a detailed noise analysis is conducted and the required noise insulation features are considered by the architectural consultant responsible for the building design.

E. When associated with a permitted land use, an office may be located in this zone provided that all relevant actors are considered and a detailed noise analysis is conducted to establish the noise reduction features required to provide an indoor environment suited to the specific office function.

F. It is recommended that this specific land use should be permitted only if related directly to aviation-oriented activities or services. Conventional construction will generally be inadequate and special noise insulation features should be included in the building design.

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2 National Research Council, working in conjunction with Canada Mortgage and Housing Corporation (CMHC) and Transport Canada Aviation, has developed a technique for selecting residential building components based on NEF values. This information is published in CMHC's New Housing and Airport Noise Handbook, NHA 5185 81/05. Authorities are referred to this document for assistance in determining appropriate noise insulation features for a particular residential development.

3 *ibid*

G. Generally, these facilities should not be permitted in this zone. However, where it can be demonstrated that such a land use is highly desirable in a specific instance, construction may be permitted to proceed provided that a detailed noise analysis is conducted and the required noise insulation features are included in the building design.

H. Facilities of this nature should not be located close to the NEF 30 contour unless a detailed noise analysis has been conducted.

I. Many of these uses would be acceptable in all NEF zones. However, consideration should be given to internally generated noise levels, and acceptable noise levels in the working area.

J. Undesirable if there is spectator involvement.

K. It is recommended that serious consideration be given to an analysis of peak noise levels and the effects of these levels on the specific land use under consideration.

L. The construction of covered enclosures should be undertaken if this use is to be newly introduced to the noise environment. (See Note M).

M. Research has shown that animals condition themselves to high noise levels. However, it is recommended that peak noise levels be assessed before this use is allowed.

N. This appears to be a compatible land use in all NEF zones.

APPENDIX C

Table C1: NPC-300 Guideline Sound Level Limit, Existing Conditions, $L_{EQ, 1\text{-}hr}$ (dBA)

Point of Reception	Time	Ambient Sound Level	NPC-300 Exclusion Limit	NPC-300 Criteria
R1	Day	61	50	61
	Evening	59	50	59
	Night	59	45	59
R2	Day	70	50	70
	Evening	68	50	68
	Night	70	45	70
R4	Day	60	50	60
	Evening	59	50	59
	Night	59	45	59
R5	Day	62	50	62
	Evening	60	50	60
	Night	60	45	60
R6	Day	65	50	65
	Evening	64	50	64
	Night	64	45	64
R7	Day	58	50	58
	Evening	57	50	57
	Night	57	45	57
R8	Day	57	50	57
	Evening	55	50	55
	Night	56	45	56
R9	Day	-[1]	50	50
	Evening	-[1]	50	50
	Night	-[1]	45	45

Notes: 1. Insufficient volumes of traffic occur in the vicinity of R9 to enable calculation of elevated ambient sound levels.

Table C2: NPC-300 Guideline Sound Level Limit, Proposed Conditions, $L_{EQ, 1\text{-}hr}$ (dBA)

Point of Reception	Time	Ambient Sound Level	NPC-300 Exclusion Limit	NPC-300 Criteria
R1	Day	62	50	62
	Evening	60	50	60
	Night	59	45	59
R2	Day	70	50	70
	Evening	68	50	68
	Night	70	45	70
R4	Day	60	50	60
	Evening	59	50	59
	Night	59	45	59
R5	Day	62	50	62
	Evening	60	50	60
	Night	60	45	60
R6	Day	66	50	66
	Evening	65	50	65
	Night	64	45	64
R7	Day	58	50	58
	Evening	57	50	57
	Night	57	45	57
R8	Day	57	50	57
	Evening	55	50	55
	Night	56	45	56
R9	Day	-[1]	50	50
	Evening	-[1]	50	50
	Night	-[1]	45	45

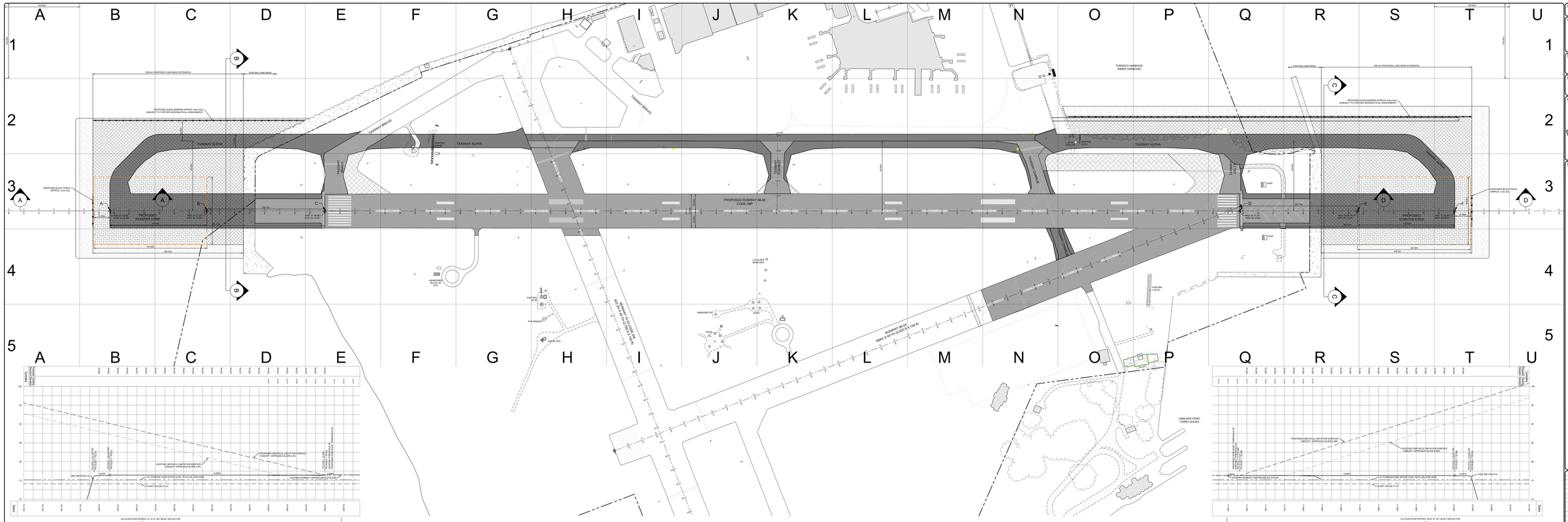
Notes: 1. Insufficient volumes of traffic occur in the vicinity of R9 to enable calculation of elevated ambient sound levels.

APPENDIX D

Source Sound Level Data

BBTCA, project # 1402032

Source Description	Sound Power Level Data by Octave Band (dB)							
	63	125	250	500	1000	2000	4000	8000
Q400 Taxiing	120	126	136	134	127	125	123	119
Q400 Startup	116	122	123	120	117	119	116	111
Q400 Prop Discing	137	139	138	130	127	129	127	118
Q400 runup	146	155	154	153	147	144	141	137
General Aviation Taxiing	122	127	119	113	105	98	94	86
Ferry before silencer upgrade, moving	118	119	105	104	97	96	88	78
Ferry before silencer upgrade, holding	109	109	98	95	90	86	79	74
Ferry after silencer upgrade, moving	122	115	107	102	95	89	82	78
Ferry after silencer upgrade, holding	115	108	99	92	89	82	76	74
Air Supply Type 1	111	107	107	108	106	104	100	96
Air Supply Type 2	109	106	110	111	105	103	101	101
Baggage Handler	99	95	91	92	97	95	88	79
Fuel Truck	99	95	91	92	97	95	88	79
Water/Lav Service	99	95	91	92	97	95	88	79


TAXIWAY ALPHA
PROPOSED RUNWAY 08-26
CODE 3NP
200.0m PROPOSED LAND MASS EXTENSION
EXISTING LAND MASS
PROPOSED NOISE BARRIER APPROX. 6.6m AGL
(SUBJECT TO FURTHER AERONAUTICAL ASSESSMENT)
PROPOSED BLAST FENCE APPROX. 9.3m AGL
PROPOSED BLAST FENCE APPROX. 4.3m AGL
PROPOSED STARTER STRIP
TAXIWAY BRAVO
TAXIWAY CHARLIE
TAXIWAY DELTA
TAXIWAY ECHO
TAXIWAY FOXTROT
TAXIWAY GOLF
TAXIWAY HOTEL
TAXIWAY JULIET
TORONTO HARBOUR
(INNER HARBOUR)
HANLANS POINT
FERRY DOCKS
RUNWAY 06-24
Blnks A, B, C, D, E, F, G, H, J, K, L, M, N, P, Q, R, S, T, U
RUNWAY 23-33 (CLOSED)
Blnks A, B, C, D, E, F, G, H, J, K, L, M, N, P, Q, R, S, T, U
ABANDONED
BLDG 4F
NTS
LOCALIZER
MONITOR
EXISTING
LOC 4F
EXISTING
GP 4F
ANEMOMETER
RVR SENSOR
AWOS
EXISTING
LOC 4R
EXISTING
GP 4R
HALO
PROPOSED
STARTER STRIP
EXISTING
LOC 22
EXISTING
GP 22
EXISTING
LOC 4R
EXISTING
GP 4R
EXISTING
LOC 4F
EXISTING
GP 4F

SNC·LAVALIN

FINAL REPORT

2012 Noise Exposure Contours Report for Billy Bishop Toronto City Airport

Transport Canada





SNC-LAVALIN INC.

JUNE 2015
Final Report
O/Ref n° 626687-2011_FV-00

SNC-LAVALIN INC.
2271 Fernand-Lafontaine Blvd.
Longueuil, Québec
Canada J4G 2R7

Telephone : 514-393-8000
Fax : 450-651-0885

June 5, 2015

Mrs. Mary Louise Canning
Funded Programs & Administration
TRANSPORT CANADA
300-4900 Yonge Street
North York, Ontario M2N 6A5

by email: marylouise.canning@tc.gc.ca

Subject: ***2012 Noise Exposure Contour Report for Billy Bishop Toronto City Airport***
O/Ref.: 626687-2012_FV-00

Mrs. Canning,

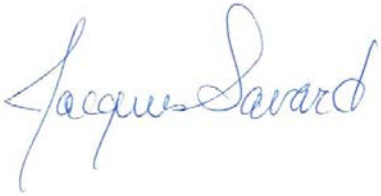
SNC-Lavalin Inc. is pleased to provide you with the final report in PDF format for the above mentioned project. In a few days, you will also receive, by mail, ten paper copies of the present document.

Please do not hesitate to contact us should you require any additional information.

SNC♦LAVALIN INC.



Prepared by : Nicolas Garcia, M. Eng
Acoustics and Vibration



Verified by: Jacques Savard, M.Sc.
Director, Acoustics and Vibration

/cg

Encl.

c.c. David Daniel, Airport & Mobile Equipment Technologist

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TEAM WORK

SNC-Lavalin Inc.

Prepared by:	Nicolas Garcia, M.Eng.	Acoustics and Vibration
Verified by:	Jacques Savard, M.Sc.	Director, Acoustics and Vibration

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EXECUTIVE SUMMARY

The noise exposure contours for Billy Bishop Toronto City Airport have been computed in accordance with Transport Canada's methodology for NEF (Noise Exposure Forecast). The surface area within contours was also compiled.

The analysis of the contours involved a review of the data to ascertain if the actual 28 Noise Exposure Contour is closer at any point, except in a direction westerly of the Billy Bishop Toronto City Airport between points "X" and "Y", to the official 25 NEF Contour for 1990, than to the official 28 NEF Contour for 1990 (reference Schedule F of the Tripartite Agreement). This condition pertains to Section 34 of the Tripartite Agreement on the preparation of NEF contours.

The Tripartite Agreement imposes a limit on the expansion of NEF contours. Section 27 of the Tripartite Agreement requires that the actual 28 NEF contour does not expand beyond the official 25 NEF contour for 1990, except between points "X" and "Y".

The analysis shows that the 28 NEF contour for calendar year 2012, with helicopters included in the calculation, slightly exceeds the 28 NEF Contour for 1990 for a small section of the contour to the north of the main runway. However, the extent of the actual 28 NEF contour is not sufficient to bring it closer at any point to the 25 NEF Contour for 1990 than to the 28 NEF Contour for 1990. The 28 NEF contour for calendar year 2012 does not expand beyond the official 25 NEF contour for 1990 and remains well within the limit set by the Tripartite Agreement for the expansion of the NEF contour.

When helicopters are excluded from the calculation, the NEF contours shrink slightly, achieving an even better compliance with the limits set in the Tripartite Agreement.

Table i Surface area inside 2012 noise contours

NEF	Surface area (km^2)	
	With helicopters	Without helicopters
35 +	0.27	0.26
30 - 35	0.55	0.50
28 - 30	0.44	0.42
25 - 28	1.13	1.09
Total	**2.39**	**2.27**

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1 INTRODUCTION

This document presents the noise contours for the year 2012 for Billy Bishop Toronto City Airport.

Environmental noise or community noise, including airports activities, is not regulated by Canada's government. Nevertheless Transport Canada has developed a methodology for assessing the perceived noise in the vicinity of airports. This method is established across Canada and is used for this study. The interpretation of results it produces will be used to establish the magnitude (intensity of noise) and extent (surface area) of areas affected by airport noise.

2 METHODOLOGY

2.1 METRICS AND PARAMETERS

The representation of noise generated by airport operations has been normalized by Transport Canada using NEF or "Noise Exposure Forecast" contours. The NEF methodology is not by itself a forecast, but a noise calculation based either on a forecast of future movements or on actual movements. The noise contours for 2012, presented in this report, have been produced using the NEF methodology on the basis of actual movements data from Transport Canada. The original data is provided to Transport Canada by Nav Canada, the country's civil air navigation services provider, for all airports where Nav Canada operates a control tower.

The index provided by the noise contours is used to show the public areas affected by airport noise. This single number rating is easy to interpret, but nevertheless, requires a complex evaluation process. It takes into account, for each movement of the whole year, the type of aircraft, the runway used, the flight path, the flight distance, and the period of day. Note that the night period is defined from 10 pm to 7 am.

Flight distances and departure flight path directions have been determined according to geographic coordinates of destination airports; themselves drawn from Transport Canada database and specialized publications.

The "Air Traffic Designators" entitled TP 143 published by Transport Canada, specialized databases published by aeronautical sector companies, as well as internal corporate databases, have been used to determine the aircraft caracteristics.

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2.2 METHOD OF CALCULATION

NEF-Calc 2.0.6.1 software was used to produce the noise contours. It has been developed by the National Research Council for Transport Canada. Nef-Calc 2.0.6.1 processes operation-related data from airport and calculates noise levels for the receptor grid. Noise exposure contours are then drawn for the whole study area.

The NEF methodology developed by Transport Canada uses the parameter “Peak Planning Day“, which will be used to calculate the noise contours. The number of movements of the Peak Planning Day is estimated by averaging the seven busiest days of the three busiest months of the year. The detailed calculation of the Peak Planning Day is presented in Section 3.1.1. The calculated noise contours are representative of a near to worst case 24 hour period.

3 NOISE CONTOURS

3.1 CALCULATION ASSUMPTIONS

The aircraft movements’ database from Transport Canada for Billy Bishop Toronto City Airport for 2012 was used to calculate the Peak Planning Day. The composition of the fleet and the average annual runway use have also been computed from the Transport Canada database.

3.1.1 Calculation of Peak Planning Day

Tables 1 and 2 below present the results of the calculation of the Peak Planning Day for itinerant and local movements in 2012 for Billy Bishop Toronto City Airport.

The number of movements of the Peak Planning Day is found to be 332 for itinerant movements and 179 for local movements. In comparison, the **averages** for 2012 are 237 itinerant movements and 82 local movements per day.

The number of circuits is half the number of local movements. A movement is either an arrival or a departure; overflights are excluded from the calculation. Overflights are flights transiting in the control zone of the control tower, going to another destination without landing at the airport. Since they have no real operation at the airport, they are excluded from the calculations. Local movements show much more daily variability than itinerant movements.

The calculation of the noise contours has been made for 332 itinerant movements and 179 local movements (90 circuits), with a total of 511 aircraft movements.

Helicopters accounted for 5,188 movements in 2012, of which 2,333 were runway operations, mostly Ornge flights using AgustaWestland AW139 helicopters, and 2,855 were helipad operations, mostly Heli Tours with Robinson R44 helicopters.

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Excluding helicopter movements, the number of movements of the Peak Planning Day is found to be 308 for itinerant movements and 179 for local movements. In comparison, the **averages** for 2012 are 223 itinerant movements and 82 local movements per day.

Table 1 Peak Planning Day with helicopters

Itinerant		Local	
Date	**Movements**	**Date**	**Movements**
May 11	342	May 17	226
May 18	327	May 5	212
May 15	323	May 26	190
May 17	317	May 24	168
May 24	310	May 18	160
May 25	309	May 12	146
May 30	308	May 1	138
July 5	342	June 16	326
July 13	335	June 5	168
July 29	331	June 28	164
July 6	329	June 15	160
July 27	329	June 13	152
July 20	325	June 23	150
July 11	322	June 22	142
August 31	371	August 8	238
August 24	363	August 7	198
August 8	351	August 18	198
August 3	348	August 3	180
August 15	329	August 1	170
August 17	327	August 25	142
August 21	324	August 15	138

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Table 2 Peak Planning Day without helicopters

Itinerant		Local	
Date	**Movements**	**Date**	**Movements**
May 18	312	May 17	226
May 15	311	May 5	212
May 24	304	May 26	190
May 17	303	May 24	168
May 11	302	May 18	160
May 30	300	May 12	146
May 31	290	May 1	138
July 5	324	June 16	326
July 11	307	June 5	168
July 30	304	June 28	164
July 27	302	June 15	160
July 6	301	June 13	152
July 12	301	June 23	150
July 20	298	June 22	142
August 31	321	August 8	238
August 24	319	August 7	198
August 8	319	August 18	198
August 3	317	August 3	180
August 7	309	August 1	170
August 15	309	August 25	142
August 21	308	August 15	138

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3.1.2 Fleet composition and runway use

The data on the composition of the fleet of all operations at Billy Bishop Toronto City Airport in 2012 is presented in Appendix A, including helicopters. The document TP-143 – Air Traffic Designators from Transport Canada is the primary source of information for the identification of aircraft types. Other sources, such as Transport Canada's aircraft registration database and commercial databases have also been used.

Figure 1 shows the configuration of runways, taken from the Canada Air Pilot. Figures 2 and 3 summarize the composition of fleet and runway use for the airport in 2012, compiled from the itinerant movements database from Transport Canada. Detailed data is presented in Appendix B.

The total number of movements in 2012 was 114,569, divided into 86,717 itinerants movements and 27,852 local movements.

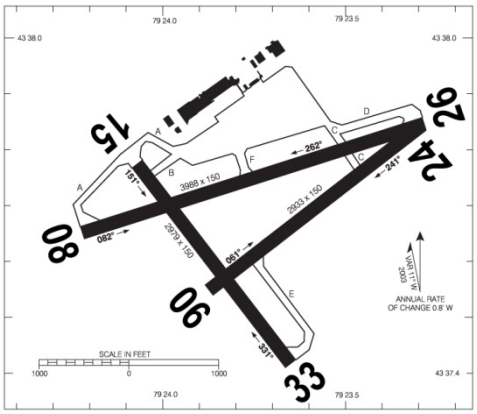


Figure 1 Runway identification

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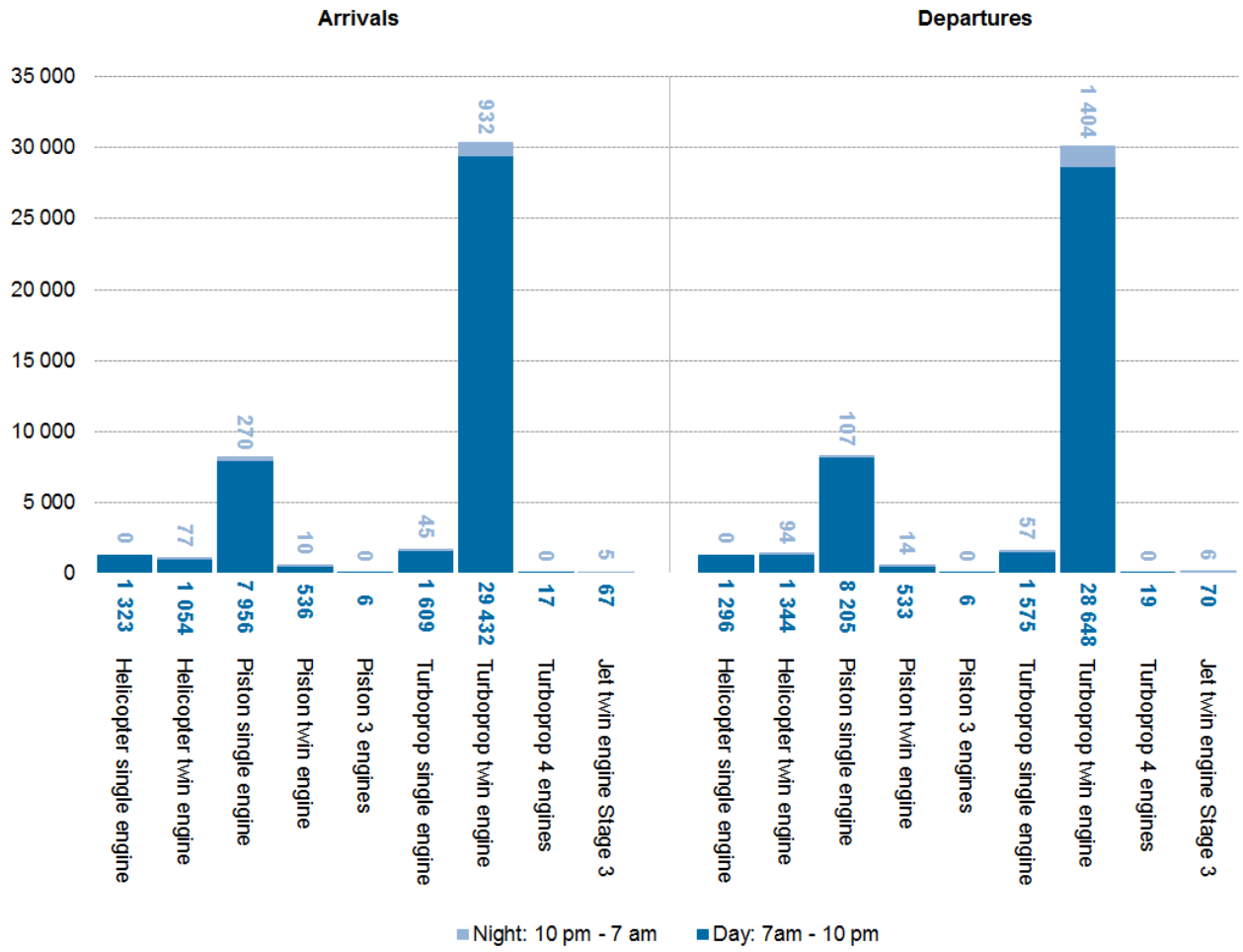


Figure 2 Summary of fleet composition

The movements during the night (10 pm to 7 am) accounted for 3.4% of total movements in 2012. For the calculation of noise contours, using the methodology of Transport Canada, each night-time movement is equivalent to 16.67 daytime movements. The 3,939 night-time movements recorded in 2012 are equivalent to 65,650 daytime movements. The night-time movements represent an important contribution to the noise contours.

Overall, twin engine turboprops (mostly DASH-8) are the most frequent aircrafts at Billy Bishop Toronto City Airport with 53% of all movements. They are followed by single engine piston aircrafts with 38% of operations.

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Figure 3 shows the summary of runway use and Table 2 presents the runway use by aircraft type.

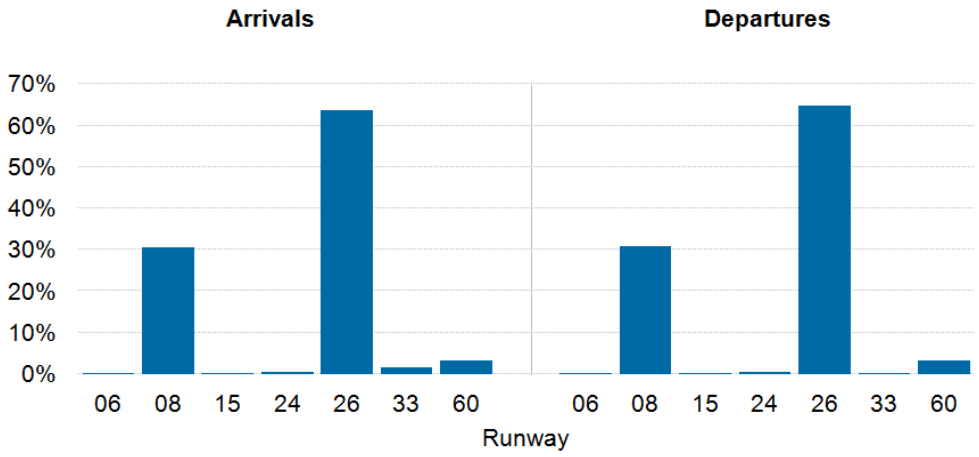


Figure 3 Summary of runway use

Table 3 Runway use by aircraft category

Runway	Global		Jets		Pistons		Turboprops	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
06	48 0.1%	3 0.01%	0 0%	0 0%	46 0.5%	1 0.01%	2 0.01%	2 0.01%
08	13,233 31%	13,384 31%	21 29%	25 33%	2,820 28%	2,879 29%	10,392 31%	10,480 32%
15	39 0.1%	102 0.2%	0 0%	0 0%	1 0.01%	90 1%	38 0.1%	12 0.04%
24	270 1%	252 1%	0 0%	0 0%	259 3%	248 2%	11 0.03%	4 0.01%
26	27,640 64%	28,162 65%	51 71%	51 67%	5,102 51%	5,580 55%	22,487 68%	22,531 68%
33	652 2%	77 0.2%	0 0%	0 0%	552 6%	69 1%	100 0.3%	8 0.02%
60	1,457 3%	1,398 3%	0 0%	0 0%	1,223 12%	1,189 12%	234 1%	209 1%
Total	43,339 100%	43,378 100%	72 100%	76 100%	10,003 100%	10,056 100%	33,264 100%	33,246 100%

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Table 4 shows the main types of aircraft in most represented categories defined in the calculation. Aircraft with a small number of movements in 2012 are not shown in this table; they can be found in detail in Appendix A.

Table 4 Aircraft categories

Aircraft categories	Aircraft types
Helicopter single engine	Robinson R44, etc.
Helicopter twin engine	AgustaWestland AW139, etc.
Piston single engine	Cessna series 150/152/172/182/185/206/400, Piper PA-24/26/28, Cirrus SR22, North American T-6 Texan, etc.
Piston twin engine	Piper PA-27/30/31/44, Cessna 421, etc.
Turboprop single engine	Pilatus PC-12, Cessna 208, Socata TBM-700, etc.
Turboprop twin engine	Dash 8, Piaggio P-180, Beech 200/350, Jetstream 31, Mitsubishi MU-2, etc.
Jet twin engine Stage 3	Dassault Falcon 10, etc.

3.1.3 Flight paths

Flight paths for departures, arrivals and circuits have been modelled from information gathered from the Canada Air Pilot and the Canada Flight Supplement.

Departure flight paths:

- Runways 06 and 08: right turn at 1.9 DME, heading 141
- Runway 15: right turn at 650’ ASL, heading 201
- Runways 24, 26 and 33: left turn at 650’ ASL, heading 201

Approach slopes:

- Runways 06, 15, 24 and 33: 3.0°
- Runway 08: 3.5°
- Runway 26: 4.8°

Runways 24, 26, and 33 have left hand circuits while runways 06, 08, and 15 have right hand circuits.

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3.2 RESULTS

Figure 4 shows the noise contours for Billy Bishop Toronto City Airport, year 2012 actual movements including helicopters, along with the 1990 NEF contours. The 1990 NEF contours were prepared in April 1978 by the Canadian Air Transport Administration of the Ministry of Transport for the Canada Mortgage and Housing Corporation. The noise contours without helicopters are shown on Figure 5.

The analysis of the contours involved a review of the data to, in the language of the Tripartite Agreement, ascertain if the actual 28 Noise Exposure Contour is closer at any point, except in a direction westerly of the Billy Bishop Toronto City Airport between points “X” and “Y”, to the official 25 NEF Contour for 1990, than to the official 28 NEF Contour for 1990 (reference Schedule F of the Tripartite Agreement).

The analysis shows that the 28 NEF Contour for calendar year 2012, with helicopters included in the calculation, slightly exceeds the 28 NEF Contour for 1990 for a small section of the contour to the north of the main runway. However, the extent of the actual 28 NEF contour is not sufficient to bring it closer at any point to the 25 NEF Contour for 1990 than to the 28 NEF Contour for 1990. The 28 NEF contour for calendar year 2012 does not expand beyond the official 25 NEF contour for 1990 and remains well within the limits set by the Tripartite Agreement for the expansion of the NEF contour.

When helicopters are excluded from the calculation, the NEF contours shrink slightly, achieving an even better compliance with the limits set in the Tripartite Agreement.

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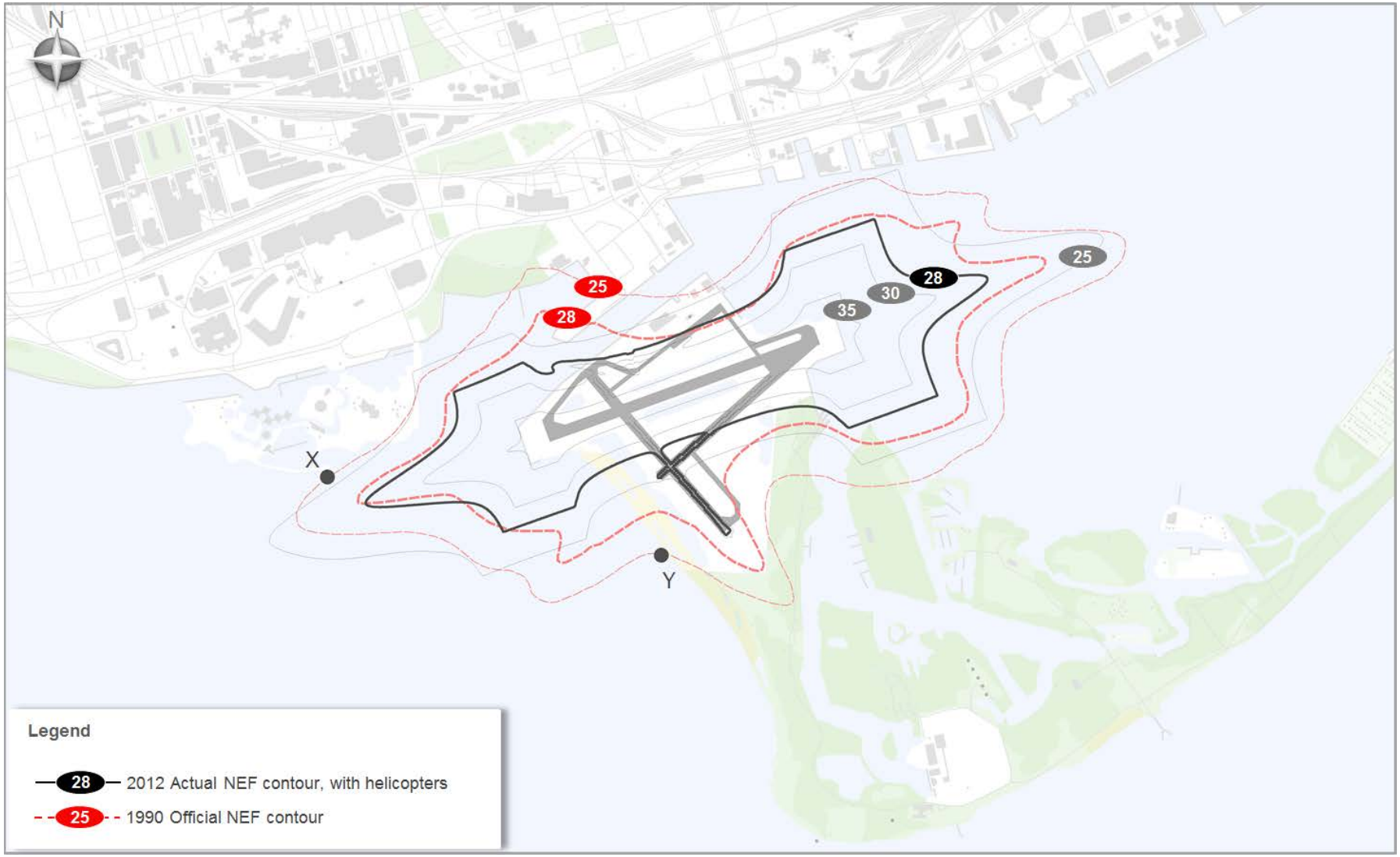


Figure 4 NEF Contours with helicopters

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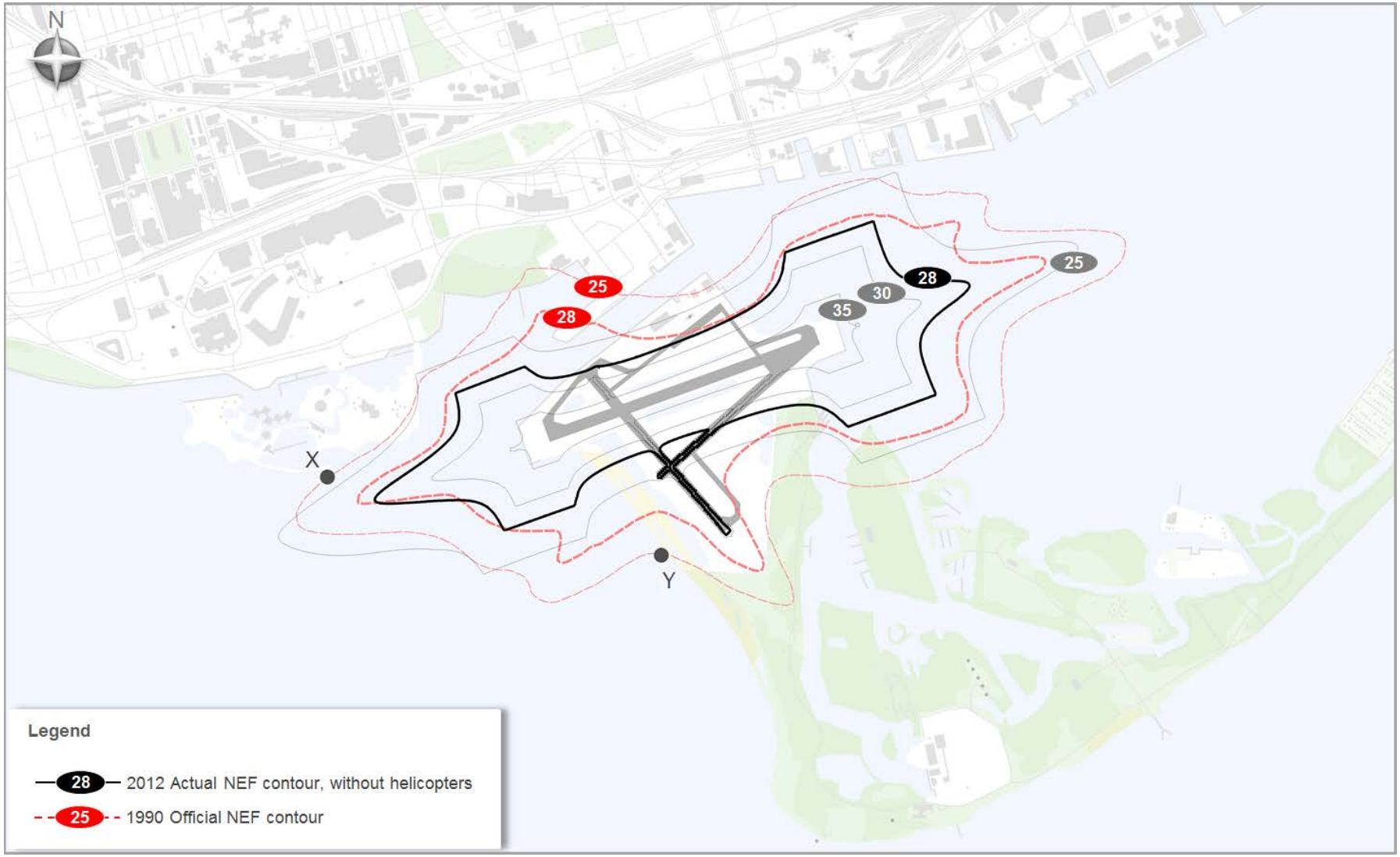


Figure 5 NEF Contours without helicopters

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Table 5 shows the surface area within the contours in 2012. It is the total surface area in each range of NEF values.

Table 5 Surface area (km^2)

NEF	Surface area (km^2)	
	With helicopters	Without helicopters
35 +	0.27	0.26
30 - 35	0.55	0.50
28 - 30	0.44	0.42
25 - 28	1.13	1.09
Total	**2.39**	**2.27**

4 CONCLUSION

The 2012 noise exposure contours for Billy Bishop Toronto City Airport have been computed in accordance with Transport Canada methodology. The surface area within contours was also compiled. These contours cover a total area of 2.39 square kilometers if helicopters are included in the calculation, and 2.27 square kilometers if helicopters are excluded. NEF 28 contour covers an area of 1.26 square kilometers if helicopters are included in the calculation, and 1.18 square kilometers if helicopters are excluded.

The actual (2012) 28 Noise Exposure Contours, with and without helicopters, are not closer at any point, including in a direction westerly of the Toronto City Centre Airport between points “X” and “Y”, to the 25 NEF Contour for 1990 than to the 28 NEF Contour for 1990.

The 28 NEF contours for calendar year 2012, with and without helicopters, do not expand beyond the official 25 NEF contour for 1990, and remains well within the limit set by the Tripartite Agreement for the expansion of the NEF contour.

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APPENDIX A

Fleet composition

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
A109	L	2	T	R		3,000	AGUSTA	A-109, Power	AS350	26
A119	L	2	T	R		3,175	AGUSTA	AW109SP	AS350	4
A139	M	2	T	R		6,400	AGUSTAWESTLAND	AW-139	AS332	2,382
AA5	L	1	P	F		1,000	AMERICAN	AA-5 Traveler	GASEPF	52
AC11	L	1	P	R		2,000	ROCKWELL	112, 114 Commander, Alpine Commander	RWCM14	9
AC90	L	2	T	R		5,000	ROCKWELL	690 Turbo Commander, Jetprop Commander 840	RWCM69	10
AC95	L	2	T	R		6,000	ROCKWELL	695 Jetprop Commander 980/1000	RWCM69	4
AEST	L	2	P	R		3,000	PIPER	PA-60, Aerostar	PA60	6
AS50	L	1	T	F		3,000	AEROSPATIALE	AS-350/550 Ecureuil, Astar, SuperStar, Fennec	AS350	31
AS55	L	2	T	F		3,000	AEROSPATIALE	AS-355/555 Ecureuil 2, TwinStar, Fennec	AS350	12
B06	L	1	T	F		2,000	BELL	206A/B/L, 406, LongRanger (CH-139 JetRanger)	AS350	98
B190	M	2	T	R		8,000	BEECH	1900 Airliner (C-12J)	BEC190	33
B212	L	2	T	F		6,000	BELL	212, Twin Two-Twelve (UH-1N, Twin Huey)	AS350	1
B222	L	2	T	R		4,000	BELL	222	AS350	2
B350	M	2	T	R		6,000	BEECH	B300 Super King Air 350	DHC6	214
B407	L	1	T	F		3,000	BELL	407	AS350	2
B412	L	2	T	F		6,000	BELL	412, Griffon (CH-146)	AS350	51
B427	L	2	T	F		3,000	BELL	427	AS350	2
B429	L	2	T	F		3,175	BELL	GlobalRanger	AS350	24
B430	L	2	T	R		5,000	BELL	430	AS350	21
BE10	L	2	T	R		6,000	BEECH	100 King Air (U-21F)	BEC100	81
BE19	L	1	P	F		1,000	BEECH	19 Musketeer Sport, Sport	GASEPF	10
BE20	L	2	T	R		6,000	BEECH	200, 1300 Super King Air, Commuter (C-12A)	BEC200	371
BE23	L	1	P	F		2,000	BEECH	23 Musketeer, Sundowner	GASEPF	18
BE24	L	1	P	R		2,000	BEECH	24 Musketeer Super, Sierra	GASEPF	4
BE30	M	2	T	R		7,000	BEECH	300 Super King Air	BEC300	49
BE33	L	1	P	R		2,000	BEECH	33 Bonanza (E-24)	BEC33	12
BE35	L	1	P	R		2,000	BEECH	35 Bonanza	GASEPV	44
BE36	L	1	P	R		2,000	BEECH	36 Bonanza	GASEPV	86
BE55	L	2	P	R		3,000	BEECH	55 Baron (T-42)	BEC55	12
BE58	L	2	P	R		3,000	BEECH	58 Baron	BEC58	77
BE60	L	2	P	R		4,000	BEECH	60 Duke	BEC60	6
BE9L	L	2	T	R		5,000	BEECH	90, A90-E90 King Air (T-44, VC-6)	BEC90	42
BE9T	L	2	T	R		5,000	BEECH	F-90 King Air	BEC9F	4
BL8	L	1	P	F		2,000	BELLANCA	8 Decathlon, Scout	GASEPF	13

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
C130	M	4	T	R		71,000	LOCKHEED	C-130	C130	9
C140	L	1	P	F		1,000	CESSNA	140	CNA150	2
C150	L	1	P	F		1,000	CESSNA	150, A150, Commuter, Aerobat	CNA150	15,861
C152	L	1	P	F		1,000	CESSNA	152, A152, Aerobat	CNA152	1,249
C170	L	1	P	F		1,000	CESSNA	170	CNA170	10
C172	L	1	P	F		2,000	CESSNA	172, P172, R172, Skyhawk, Cutlass (T-41)	CNA172	21,238
C175	L	1	P	F		2,000	CESSNA	175, Skylark	GASEPV	7
C177	L	1	P	F		2,000	CESSNA	177, Cardinal	CNA177	84
C180	L	1	P	F		2,000	CESSNA	180, Skywagon 180 (U-17C)	CNA180	69
C182	L	1	P	F		2,000	CESSNA	182, Skylane	CNA182	2,078
C185	L	1	P	F		2,000	CESSNA	185, A185 Skywagon, Skywagon 185 (U-17A/B)	CNA185	145
C205	L	1	P	F		2,000	CESSNA	205	CNA205	2
C206	L	1	P	F		2,000	CESSNA	206, P206, T206, TP206, (Turbo) Super Skywagon	CNA206	604
C208	L	1	T	F		4,000	CESSNA	208 Caravan 1, (Super)Cargomaster (C-98, U-27)	CNA208	666
C210	L	1	P	R		2,000	CESSNA	210, T210, (Turbo)Centurion	CNA210	39
C303	L	2	P	R		3,000	CESSNA	T303 Crusader	CNA303	2
C310	L	2	P	R		3,000	CESSNA	310, T310 (U-3, L-27)	CNA310	44
C337	L	2	P	R		2,000	CESSNA	337, M337 (Turbo)Super Skymaster (O-2)	CNA337	16
C340	L	2	P	R		3,000	CESSNA	340	CNA340	17
C404	L	2	P	R		4,000	CESSNA	404 Titan	CNA404	6
C414	L	2	P	R		3,000	CESSNA	414, Chancellor	CNA414	93
C421	L	2	P	R		4,000	CESSNA	421, Golden Eagle, Executive Commuter	CNA421	176
C425	L	2	T	R		4,000	CESSNA	425 Corsair, Conquest 1	CNA425	2
C441	L	2	T	R		5,000	CESSNA	441 Conquest, Conquest 2	CNA441	80
C550	M	2	J	R	3	7,000	CESSNA	550, S550, 552 Citation 2/S2/Bravo (T-47, U-20)	CNA550	14
C72R	L	1	P	R		2,000	CESSNA	172RG Cutlass RG	GASEPV	14
C77R	L	1	P	R		2,000	CESSNA	177RG Cardinal RG	CNA17B	88
C82R	L	1	P	R		2,000	CESSNA	R182, TR182 (Turbo)Skylane RG	CNA182	23
CAMP	L	1	P	F		490	PIETENPOL	Air Camper	GASEPF	1
CH60	L	1	P	F		1,000	ZENAIR	CH-600/601 Zodiac, Super Zodiac	GASEPV	2
CH7A	L	1	P	F		2,000	CHAMPION	7EC/ECA/FC/JC Citabria, Traveler, Tri-Con, Tri-Traveler	GASEPF	3
CH7B	L	1	P	F		2,000	BELLANCA	7GCBC/KCAB Citabria	BLCH10	2
CL60	M	2	J	R	3	15,000	CANADAIR	CL-600/601/604 Challenger (CC-144)	CL600	1
COL3	L	1	P	F		1,500	LANCAIR	LC40-550FG	BEC58P	8

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
COL4	L	1	P	F		1,633	CESSNA AIRCRAFT CO.	400 Corvalis TT	BEC58P	121
CRJ2	M	2	J	R	3	24,000	CANADAIR	RJ-200 Regional Jet	CLREGJ	1
DA40	L	1	P	F		1,150	DIAMOND	DA40	GASEPF	89
DA42	L	2	P	R		1,700	DIAMOND	DA42	GASEPV	3
DH2T	L	1	T	F		3,000	DE HAVILLAND	DHC-2 Mk3 Turbo Beaver	CNA441	81
DH3T	L	1	T	R		4,000	DE HAVILLAND	DHC-3 Turbo Otter	CNA441	1
DH8A	M	2	T	R		16,000	DE HAVILLAND	DHC-8-100 Dash 8 (E-9, CT-142, CC-142)	DHC8	16
DH8D	M	2	T	R		26,000	DE HAVILLAND	DHC-8-400 Dash 8	DHC830	58,525
DHC1	L	1	P	F		1,000	DE HAVILLAND	DHC-1 Chipmunk	GASEPV	2
DHC2	L	1	P	F		3,000	DE HAVILLAND	DHC-2 Mk1 Beaver (U-6, L-20)	DHC2	5
DHC7	M	4	T	R		20,000	DE HAVILLAND	DHC-7 Dash 7 (O-5, EO-5)	DHC7	27
DV20	L	1	P	F		1,000	DIAMOND	DA-20/22, DV-20 Katana, Speed Katana	GASEPF	43
EC20	L	1	T	F		2,000	EUROCOPTER	EC-120 Colibri	AS350	58
EC30	L	1	T	F		2,370	AEROSPATIALE	AS350 B3	AS350	7
EDGE	L	1	P	F		800	ZIVCO	Edge 540	GASEPV	12
EVSS	L	1	P	F		550	AEROTECHNIK	SPORTSTAR	GASEPF	8
EXPR	L	1	P	F		1,406	AURIGA	PHOENIX	GASEPF	1
FA10	M	2	J	R	3	9,000	DASSAULT	Falcon 10, Mystere 10	FAL10	132
FBA2	L	1	P	F		2,000	FOUND	FBA-2, Bush Hawk	GASEPV	7
FDCT	L	1	P	F		560	FLIGHT DESIGN	CTSW	GASEPF	6
G115	L	1	P	R		2,000	GROB	G-115A/B/C/D/E, Bavarian (Heron, Tutor)	GASEPF	4
G159	M	2	T	R		16,000	GRUMMAN	G-159 Gulfstream 1 (TC-4 Academe, VC-4)	GULF1	6
GLAS	L	1	P	F		1,043	GLASAIR	GLASAIR 11S-RG	GASEPF	2
H500	L	1	T	F		2,000	MCDONNELL DOUGLAS	MD-500, MD-530F/MG, Defender, Nightfox	AS350	2
HMBD	L	1	P	F		1,000	HOMEBUILT	Homebuilt	GASEPF	1
HUSK	L	1	P	F		1,000	CHRISTEN	A-1 Husky	GASEPV	18
J3	L	1	P	F		1,000	PIPER	J-3 Cub (L-4, NE)	GASEPF	2
JS31	M	2	T	R		7,000	BRITISH AEROSPACE	BAe-3100 Jetstream 31 (T.Mk.3)	BAEJ31	252
JU52	M	3	P	F		9,000	JUNKERS	JU 52	BEC58P	12
LA25	L	1	P	A		2,000	LAKE	LA-250/270 (Turbo)Renegade, Seawolf, Seafury	GASEPF	4
LA4	L	1	P	A		2,000	LAKE	LA-4/200, Buccaneer	LA42	45
LNC2	L	1	P	R		1,000	LANCAIR	Lancair 200/235/320/360	GASEPV	2
M20P	L	1	P	R		2,000	MOONEY	M-20, M-20A-J/L/R (non-turbocharged)	M20J	95
M20T	L	1	P	R		2,000	MOONEY	M-20K/M, Bravo, Encore (turbocharged)	M20K	13
M7	L	1	P	F		2,000	MAULE	M-7-235, MT-7 Super Rocket, Star Rocket	GASEPF	6

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
MU2	L	2	T	R		5,000	MITSUBISHI	MU-2, Marquise, Solitaire (LR-1)	MU2	245
P180	L	2	T	R		6,000	PIAGGIO	P-180 Avanti	SD330	456
P210	L	1	P	R		2,000	CESSNA	P210 Pressurized Centurion	CNA206	1
P28A	L	1	P	F		2,000	PIPER	PA-28-140/150/160/180 Archer, Cadet, Cherokee	PA28CA	331
P28B	L	1	P	F		2,000	PIPER	PA-28-201T/235/236 Cherokee, Dakota	PA28CA	44
P28R	L	1	P	R		2,000	PIPER	PA-28R-180/200/201 Cherokee Arrow, Turbo Arrow	PA28CA	121
P28T	L	1	P	R		2,000	PIPER	PA-28RT Arrow 4, Turbo Arrow 4	PA28CA	13
P32R	L	1	P	R		2,000	PIPER	PA-32R Cherokee Lance, Saratoga SP, Turbo	GASEPV	28
P32T	L	1	P	R		2,000	PIPER	PA-32RT Lance 2, Turbo Lance 2	GASEPV	63
P46T	L	1	T	R		2,000	PIPER	PA-46T Malibu Meridian	PA46	54
P68	L	2	P	F		2,000	PARTENAVIA	P-68, Victor, Observer	GASEPV	2
PA12	L	1	P	F		1,000	PIPER	PA-12 Super Cruiser	GASEPF	2
PA16	L	1	P	F		1,000	PIPER	PA-16 Clipper	GASEPF	2
PA18	L	1	P	F		1,000	PIPER	PA-18 Super Cub (L-18C, L-21, U-7)	PA18	16
PA22	L	1	P	F		1,000	PIPER	PA-22 Tri-Pacer, Caribbean, Colt	PA22CO	6
PA23	L	2	P	R		2,000	PIPER	PA-23-150/160 Apache	PA23AZ	2
PA24	L	1	P	R		2,000	PIPER	PA-24 Comanche	PA24	109
PA27	L	2	P	R		3,000	PIPER	PA-23-235/250 Aztec, Turbo Aztec (U-11)	PA23AZ	880
PA30	L	2	P	R		2,000	PIPER	PA-30/39 Twin Comanche, Turbo Twin Comanche	PA30	172
PA31	L	2	P	R		4,000	PIPER	PA-31/31P Navajo, Chieftain, Mojave, T-1020	PA31	145
PA32	L	1	P	F		2,000	PIPER	PA-32 Cherokee Six, Saratoga, Turbo Saratoga	GASEPV	36
PA34	L	2	P	R		3,000	PIPER	PA-34 Seneca	PA34	34
PA38	L	1	P	F		1,000	PIPER	PA-38 Tomahawk	PA38	4
PA44	L	2	P	R		2,000	PIPER	PA-44 Seminole, Turbo Seminole	PA44	104
PA46	L	1	P	R		2,000	PIPER	PA-46 Malibu, Malibu Mirage	PA46	108
PAY1	L	2	T	R		5,000	PIPER	PA-31T1-500 Cheyenne 1	PA31T	2
PAY2	L	2	T	R		5,000	PIPER	PA-31T-620/T2-620 Cheyenne, Cheyenne 2	CNA441	4
PAY3	L	2	T	R		6,000	PIPER	PA-42-720 Cheyenne 3	CNA441	2
PAY4	L	2	T	R		6,000	PIPER	PA-42-1000 Cheyenne 400	CNA441	2
PC12	L	1	T	R		5,000	PILATUS	PC-12, Eagle	CNA20T	2,309
PIVI	L	1	P	F		600	PIPISTREL	VIRUS SW	GASEPF	2
PTS1	L	1	P	F		1,000	PITTS	S-1 Special	GASEPF	13

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
PTS2	L	1	P	F		1,000	PITTS	S-2 Special	GASEPF	6
PTSS	L	1	P	F		700	PITTS	Super Stinker	GASEPV	7
R22	L	1	P	F		1,000	ROBINSON	R-22	AS350	1
R44	L	1	P	F		2,000	ROBINSON	R-44 Astro	AS350	2,415
R66	L	1	T	F		1,225	ROBINSON	R66	AS350	1
RV10	L	1	P	F		1,200	VAN'S	RV-10	GASEPV	2
RV6	L	1	P	F		1,000	VAN'S	RV-6	GASEPF	2
RV7	L	1	P	F		816	VAN'S	RV-7A	GASEPV	11
RV8	L	1	P	F		816	VAN'S	RV 8A	GASEPF	10
RV9	L	1	P	F		794	VAN'S	RV 9	GASEPF	4
S108	L	1	P	F		2,000	STINSON	108 Voyager, Station Wagon	GASEPF	3
S76	L	2	T	R		5,000	SIKORSKY	S-76, H-76, AUH-76, Spirit, Eagle (HE-24)	AS332	28
S92	M	2	T	R		12,000	SIKORSKY	S-92 Helibus	AS332	20
SKRA	L	1	P	F		450	SYNAIRGIE	Sky Ranger	GASEPF	1
SR20	L	1	P	F		2,000	CIRRUS	SR-20	GASEPF	68
SR22	L	1	P	F		1,500	CIRRUS	SR22	GASEPF	213
SREY	L	1	P	F		650	PROGESSIVE AERODYNE	SeaRay	GASEPF	2
SW4	M	2	T	R		7,000	FAIRCHILD SWEARINGEN	Merlin 4C, Metro2/2A, Metro 3, Metro 3A, Expediter, Merlin 23, 4	SAMER4	16
T6	L	1	P	R		4,000	NORTH AMERICAN	T-6, AT-6, BC-1, SNJ, Texan, Harvard	GASEPF	143
TAMP	L	1	P	F		2,000	SOCATA	TB-9 Tampico	GASEPF	2
TBM7	L	1	T	R		3,000	SOCATA	TBM-700	CNA441	130
TBM8	L	1	T	R		7,400	SOCATA	TBM850	CNA441	32
TEX2	L	1	T	R		4,000	RAYTHEON	T-6 Texan 2, CT-156 Harvard 2	GASEPV	11
TOBA	L	1	P	F		1,150	SOCATA	TB 200	GASEPF	2
TRF1	L	1	P	F		953	ROCKET	F1 ROCKET	GASEPF	2
TRIN	L	1	P	R		2,000	SOCATA	TB-20/21 Trinidad	GASEPF	18
VELO	L	1	P	F		1,315	VELOCITY AIRCRAFT	Velocity	GASEPV	2
Z42	L	1	P	F		2 000	ZLIN	Z-42/142/242	GASEPV	22
ZZZ1	L	1	T	A		1,996	BERNIER	G-BAIR 6T	CNA206	2
ZZZ2	L	1	P	F		925	EVO	EVO 1	GASEPV	2
ZZZ5	L	1	P	F		878	PETER DALE	PD12	GASEPF	1
ZZZZ	L	1	P	F		2,000	CESSNA	172, P172, R172, Skyhawk, Cutlass (T-41)	CNA172	1

*D1: Weight:
L – light
M – medium
H – heavy

*D2: Number of engine

*D3: Engine type:
P – pistons
T – turboprops
J – jets

*D4: Landing gear:
F – fixed
R – removable
A – amphibious

APPENDIX B

Movements summary

Fleet summary

Aircraft	Arrivals			Departures			Total
	Day	Night	Total	Day	Night	Total	
Helicopter single engine	1,323	0	1,323	1,296	0	1,296	2,619
Helicopter twin engine	1,054	77	1,131	1,344	94	1,438	2,569
Piston single engine	7,956	270	8,226	8,205	107	8,312	16,538
Piston twin engine	536	10	546	533	14	547	1,093
Piston 3 engines	6	0	6	6	0	6	12
Turboprop single engine	1,609	45	1,654	1,575	57	1,632	3,286
Turboprop twin engine	29,432	932	30,364	28,648	1,404	30,052	60,416
Turboprop 4 engines	17	0	17	19	0	19	36
Jet twin engine Stage 3	67	5	72	70	6	76	148
Total	**42,000**	**1,339**	**43,339**	**41,696**	**1,682**	**43,378**	**86,717**

- Day: 7 am - 10 pm
- Night: 10 pm - 7 am

Runway use - Arrivals

Aircraft	06		08		15		24		26		33		60	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Helicopter single engine					1				1				1 ,321	
Helicopter twin engine	1		257	27	36		1		620	48	5		134	2
Piston single engine	45		2,540	116			257		4,617	154	497			
Piston twin engine	1		157	1			2		324	6	52	3		
Piston 3 engines			6											
Turboprop single engine	1		499	15	1		9		1,020	30	79			
Turboprop twin engine			9,242	347	1		1		20,179	585	9			
Turboprop 4 engines			5						5		7			
Jet twin engine Stage 3			20	1					47	4				
Total	**48**	**0**	**12,726**	**507**	**39**	**0**	**270**	**0**	**26,813**	**827**	**649**	**3**	**1,455**	**2**

Runway use - Departures

Aircraft	06		08		15		24		26		33		60	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Helicopter single engine			2						3				1,291	
Helicopter twin engine	1		407	36	7		1		820	56	3		105	2
Piston single engine	1		2,664	46	86		243		5,142	61	69			
Piston twin engine			155	7	4		5		369	7				
Piston 3 engines			6											
Turboprop single engine			510	18	5		2		1,054	39	4			
Turboprop twin engine			9,061	439			1		19,585	965	1			
Turboprop 4 engines	1		8						10					
Jet twin engine Stage 3			22	3					48	3				
Total	**3**	**0**	**12,835**	**549**	**102**	**0**	**252**	**0**	**27,031**	**1,131**	**77**	**0**	**1,396**	**2**



SNC·LAVALIN
2271, Fernand-Lafontaine Blvd.
Longueuil (Québec) J4G 2R7
Tel.: (514) 393-8000
Fax: (450) 651-0885
www.snclavalin.com

TECHNICAL MEMORANDUM

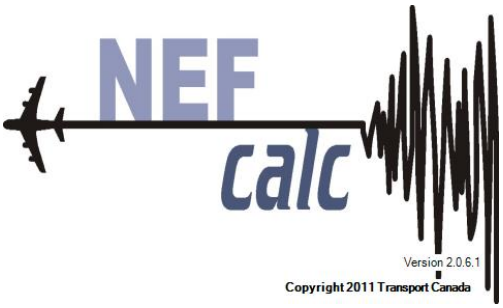
Date:	2016/05/10
To:	Gene Cabral - Ports Toronto
Copies:	Angela Homewood - Ports Toronto, Greg Balentine, Bojan Drakul, File
From:	Robert Paris
Project No.:	121-600088-01
Subject:	Environmental Assessment NEF Contours for 242 Slots with Jet Scenario

1. Introduction

The purpose of this technical memo is to present the Noise Exposure Projection (NEP) contours prepared as part of the Environmental Assessment (EA) process for Runway 08-26 Extensions Project at the Billy Bishop Toronto City Airport (BBTCA). The specific scenario which was modelled was a future (year 2032) scenario in which 242 Scheduled Passenger Slots were allocated to both Q400 turboprop and CS100 turbofan (jet) operations. Details on specific modelling assumptions and resulting traffic and runway distributions are presented in the following sections.

2. NEF Modeling Software

The contours were prepared using Transport Canada's current NEF software as depicted by screenshot below:



3. Key Modeling Assumptions / Approaches

Existing 2014 aircraft movement data obtained from NAV CANADA's TAMS were used to determine the existing conditions required as inputs for the NEF model. Key values derived from the existing data included peak planning day for itinerant and local movements, runway use distribution, day-night distribution and aircraft fleet mix.

3.1 Airport Infrastructure

The following summarizes the changes to the existing airport infrastructure that were modeled.

1. Runway 15-33 is assumed to have been decommissioned.
2. Runway 08-26 is assumed to have been extended resulting in the following key distances:
    a. Runways 08 and 26 Landing Distance Available (displaced threshold): 4,502ft;
    b. Runways 08 and 26 Takeoff Run Available: 5,440ft; and
    c. Runways 08 and 26 intersection departure Takeoff Run Available (starts at existing threshold / proposed displaced threshold): 4,502ft.

3. Runway 06-24 has been modeled at its current length.

3.2 Aircraft Traffic

The following details key assumptions and modeling parameters that were used to grow the traffic from the 2014 base values to the final numbers utilized to generate the attached contours.

1. Local traffic was assumed to remain static to the end of the forecast scenario with no change in the amount or composition of traffic.
2. Itinerant traffic was split into two broad categories:
    a. Scheduled Passenger traffic subject to the 242 slots available for allocation; and
    b. Other Itinerant traffic.
3. Scheduled Passenger traffic was further divided into two categories:
    a. Flights operated by Dash 8 Q400 turboprop aircraft; and
    b. Flights operated by the proposed Bombardier CS100 turbofan aircraft.
4. In terms of annual traffic growth the traffic segments outlined above were grown as follows:
    a. Local: 0% per annum;
    b. Itinerant – All Other: 2% per annum;
    c. Itinerant – Scheduled Passenger: assumed that on an annual basis, 90% of the 242 slots available per day would be utilized. This assumption is based on the fact that some days of the week are not expected to see 100% of the 242 slots actually used.
        i. 182 of the 242 slots were allocated to Q400 turboprop aircraft; and
        ii. 60 of the 242 slots were allocated to the CS100 turbofan aircraft.
    d. The final annual traffic numbers for 2032 are summarized below:

Forecast 2032 Annual Aircraft Movements					
Itinerant Traffic				Local	Total
Q400	CS100	Other	Total		
59,787	19,710	39,214	118,711	27,634	146,345

3.3 Runway Utilization

Generally speaking, the existing distribution of runway utilization was modeled based on existing 2014 utilization with the following modifications:

1. The limited amount of traffic operating on 15-33 prior to its proposed closure was proportionally redistributed to the runways which remain open.
2. All “other itinerant” traffic allocated to Runway 08-26 was modeled as using the full runway length available for departures and the reduced displaced threshold runway length for arrivals.
3. Itinerant scheduled passenger traffic representing CS100 aircraft movements was modeled as using the full runway length available for departures and the reduced displaced threshold runway length for arrivals.
4. Itinerant scheduled passenger traffic representing Q400 aircraft movements was modeled as using the reduced intersection departure runway length for departures and the reduced displaced threshold runway length for arrivals.

4. Summary of PPD Movements Modeled

Transport Canada's NEF-Calc software requires the use of peak planning day (PPD) data as its input. As such the forecast aircraft movement data outlined above must be converted into PPD movements. The following summarizes key aspects of how the annual numbers were converted into PPD numbers:

1. Local traffic: the existing 2014 PPD value for was maintained since 0 growth was forecast for this segment.
2. Itinerant – Other traffic: the average day to peak day ratio determined for 2014 was used to convert the forecast 2032 annual number to a PPD value.
3. Itinerant – Scheduled Passenger traffic: due to the nature of this traffic segment its "peakiness" is very different from both local and other itinerant traffic. For this reason a decision was made to model a "worst case scenario" where the PPD used by the model was set to full 242 (182 Q400 and 60 CS100) movements.
4. The following table summarizes the total PPD movements modeled for 2032.

Forecast 2032 PPD Aircraft Movements					
Itinerant Traffic				Local*	Total
Q400	CS100	Other	Total		
182	60	151	393	218	611

* 2 Local Movements are equal to 1 Circuit as modeled by NEF-Calc.

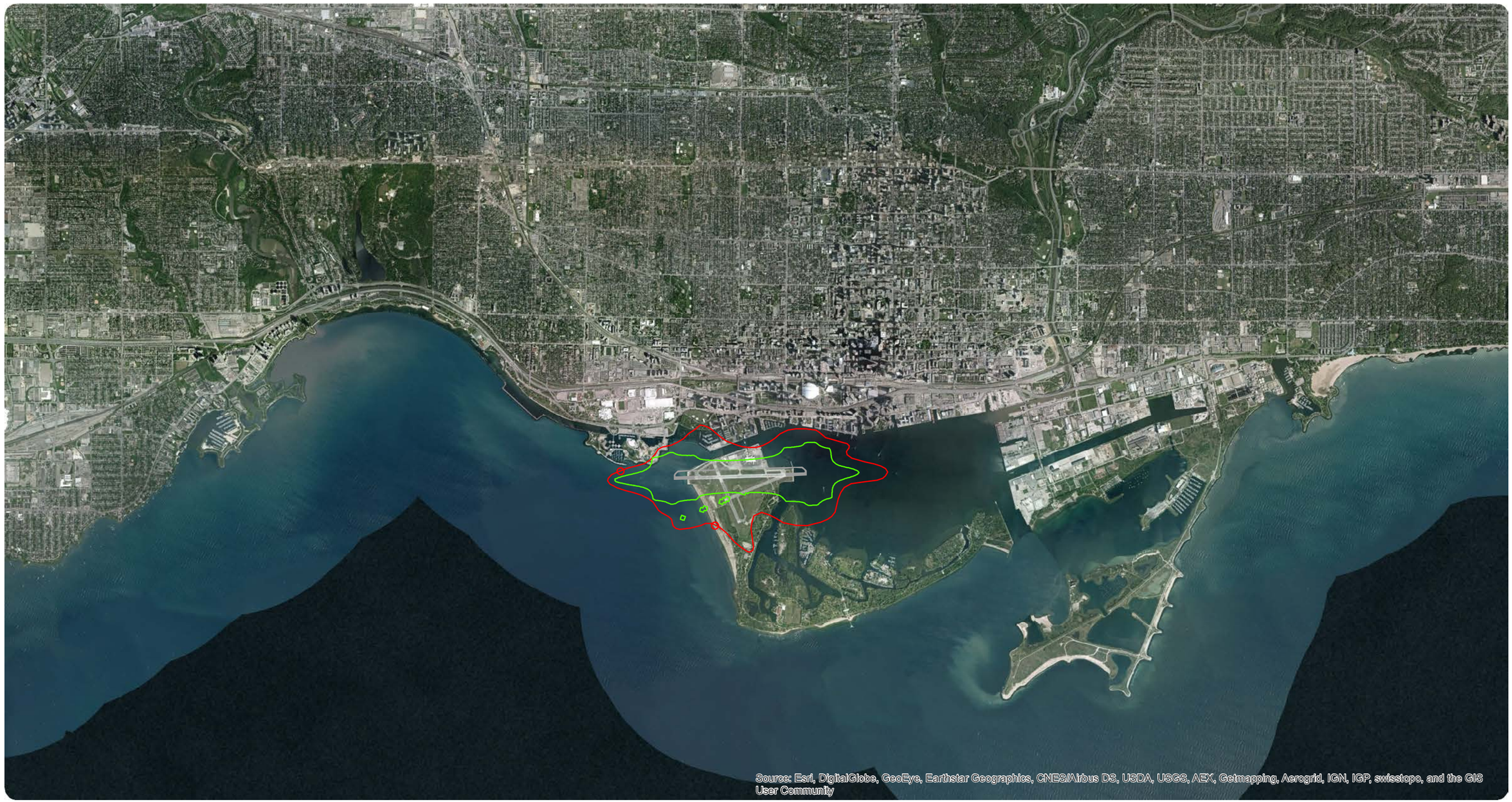
5. Summary Utilization Statistics

The PPD traffic that was derived as described above were distributed amongst runway ends, aircraft types and day/night as preparation for the import into NEF-Calc. The tables below summarize the resulting distributions.

Itinerant Runway Use Distribution				
Runway	Movement Type	Length Used	% of Day Mvts	% of Night Mvts
06	Arrival	Full Length	0.07%	0.00%
	Departure	Full Length	0.00%	0.00%
24	Arrival	Full Length	0.51%	0.05%
	Departure	Full Length	0.55%	0.00%
08	Arrival	Displaced	16.61%	16.72%
	Departure	Full Length	9.45%	4.54%
		Intersection	7.57%	12.42%
26	Arrival	Displaced	32.06%	30.77%
	Departure	Full Length	18.00%	8.86%
		Intersection	15.16%	26.64%
			100.00%	**100.00%**

6. Closing

The modelling assumptions and inputs used to generate the attached Noise Contours can be considered as having been conservative. The assumption of all 242 slots being used as part of the PPD numbers input into the system represent a "worst case" scenario. As can be seen in the attached figures, based on the above inputs, the 28 NEF contour as generated by the NEF-Calc software has been confirmed to fit within the 25 NEF Contour for 1990 as specified by the Tripartite Agreement.



Legend

242 Slot - 28 NEF

Tripartite - 25 NEF

Consultant

WSP

Client

PORTS TORONTO

Master Planning Exercise

PROPOSED RUNWAY EXTENSION AND INTRODUCTION OF JETS AT BILLY BISHOP TORONTO CITY AIRPORT

North Arrow

N

Scale

Kilometers

0 0.5 1 2 3 4

1:50,000

Scale based on sheet size 11"x17

Location

BILLY BISHOP TORONTO CITY AIRPORT (CYTZ)

Title

242 SLOTS WITH JETS
NOISE EXPOSURE PROJECTION (NEP)

Project #: 121-60088-01

Date: 10/05/2016



Legend

242 Slot - 28 NEF

Tripartite - 25 NEF

Consultant

WSP

Client

PORTS TORONTO

Master Planning Exercise

PROPOSED RUNWAY EXTENSION AND INTRODUCTION OF JETS AT BILLY BISHOP TORONTO CITY AIRPORT

North Arrow

N

Scale

Meters

250 125 0 250 500

1:10,000

Scale based on sheet size 11"x17

Location

BILLY BISHOP TORONTO CITY AIRPORT (CYTZ)

Title

242 SLOTS WITH JETS
NOISE EXPOSURE PROJECTION (NEP)

Project #: 121-60088-01

Date: 10/05/2016

APPENDIX E

Lake Shore Boulevard, east of Bathurst
Westbound

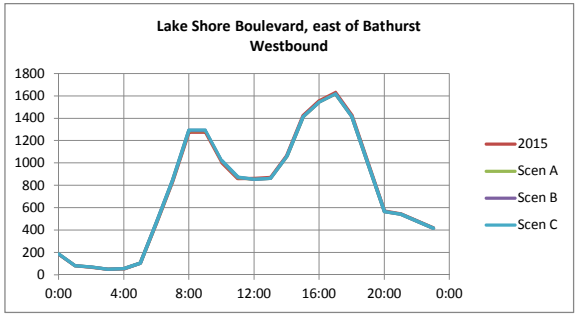
	Distributio	2015	Scen A	Scen B	Scen C
0:00	0.14	184	185	186	187
1:00	0.06	81	82	82	82
2:00	0.05	69	70	70	70
3:00	0.04	50	50	51	51
4:00	0.04	55	56	56	56
5:00	0.08	104	105	106	106
6:00	0.35	467	472	474	475
7:00	0.62	835	843	846	848
8:00	0.95	1275	1289	1293	1296
9:00	0.95	1275	1289	1293	1296
10:00	0.75	1006	1017	1021	1023
11:00	0.64	860	869	873	875
12:00	0.52	863	854	855	855
13:00	0.52	872	864	865	865
14:00	0.64	1070	1059	1061	1061
15:00	0.86	1428	1414	1415	1415
16:00	0.94	1560	1544	1546	1546
17:00	0.98	1633	1616	1618	1618
18:00	0.86	1429	1415	1416	1416
19:00	0.60	1000	990	991	991
20:00	0.34	572	566	567	567
21:00	0.33	547	542	543	543
22:00	0.29	484	479	480	480
23:00	0.25	421	416	417	417
Total		18140	18086	18125	18139
AM peak		1340	1354	1359	1362
PM peak		1665	1648	1650	1650

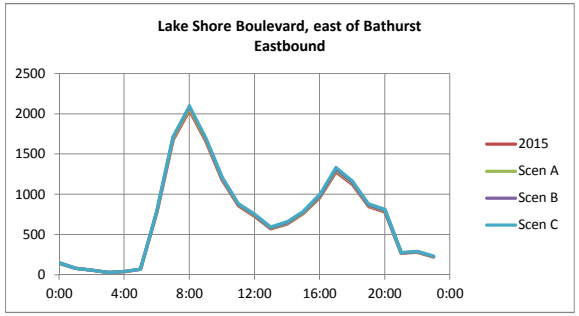
Lake Shore Boulevard, east of Bathurst
Eastbound

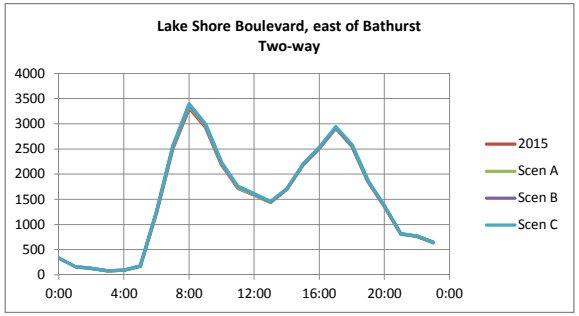
	Distributio	2015	Scen A	Scen B	Scen C
0:00	0.07	147	148	150	151
1:00	0.04	81	82	83	83
2:00	0.03	59	59	60	60
3:00	0.01	30	30	30	31
4:00	0.02	40	40	41	41
5:00	0.03	69	70	71	71
6:00	0.38	770	779	789	794
7:00	0.82	1674	1693	1713	1726
8:00	1.00	2040	2063	2088	2103
9:00	0.81	1656	1675	1695	1707
10:00	0.58	1180	1194	1208	1217
11:00	0.42	859	868	879	885
12:00	0.55	726	737	745	756
13:00	0.44	571	579	586	594
14:00	0.48	631	640	648	657
15:00	0.58	761	772	781	792
16:00	0.73	956	970	982	996
17:00	0.98	1280	1298	1314	1333
18:00	0.86	1123	1139	1153	1169
19:00	0.65	848	861	871	883
20:00	0.60	782	793	803	814
21:00	0.20	268	272	275	279
22:00	0.22	282	287	290	294
23:00	0.17	223	226	229	232
Total		17056	17275	17484	17668
AM peak		2040	2063	2088	2103
PM peak		1310	1329	1345	1364

Lake Shore Boulevard, east of Bathurst
Two-way

	2015	Scen A	Scen B	Scen C
0:00	331	333	336	338
1:00	162	164	165	165
2:00	128	129	130	130
3:00	80	80	81	82
4:00	95	96	97	97
5:00	173	175	177	177
6:00	1237	1251	1263	1269
7:00	2509	2536	2559	2574
8:00	3315	3352	3381	3399
9:00	2931	2964	2988	3003
10:00	2186	2211	2229	2240
11:00	1719	1737	1752	1760
12:00	1589	1591	1600	1611
13:00	1443	1443	1451	1459
14:00	1701	1699	1709	1718
15:00	2189	2186	2196	2207
16:00	2516	2514	2528	2542
17:00	2913	2914	2932	2951
18:00	2552	2554	2569	2585
19:00	1848	1851	1862	1874
20:00	1354	1359	1370	1381
21:00	815	814	818	822
22:00	766	766	770	774
23:00	644	642	646	649
Total	35196	35361	35609	35807
AM peak	3380	3417	3447	3465
PM peak	2975	2977	2995	3014







Queens Quay, east of Bathurst
Westbound

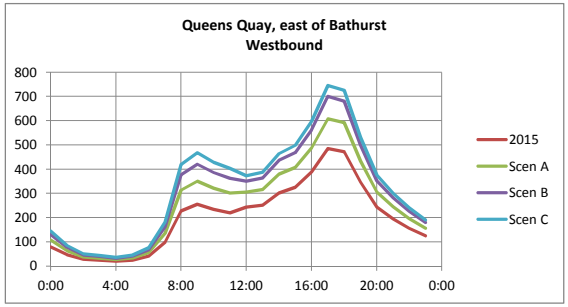
	Distribution	2015	Scen A	Scen B	Scen C
0:00	0.31	79	108	130	145
1:00	0.18	47	64	77	85
2:00	0.11	28	38	46	51
3:00	0.09	24	33	40	44
4:00	0.08	20	27	32	36
5:00	0.10	25	34	41	46
6:00	0.16	41	56	68	76
7:00	0.39	98	135	162	181
8:00	0.89	228	313	377	419
9:00	1.00	255	350	421	468
10:00	0.92	234	321	386	429
11:00	0.86	220	302	363	404
12:00	0.50	243	305	351	373
13:00	0.52	252	316	364	388
14:00	0.62	302	379	436	464
15:00	0.67	325	407	468	499
16:00	0.80	389	488	562	598
17:00	1.00	485	608	700	745
18:00	0.97	472	592	681	725
19:00	0.71	346	434	500	532
20:00	0.50	244	306	352	375
21:00	0.40	195	245	282	300
22:00	0.32	157	196	226	241
23:00	0.26	125	156	180	191
Total		4834	6213	7245	7815
AM peak		255	350	421	468
PM peak		485	608	700	745
	0.31				

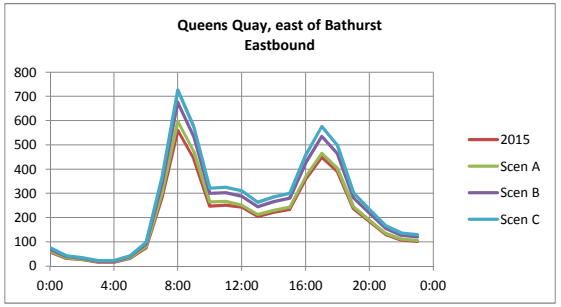
Queens Quay, east of Bathurst
Eastbound

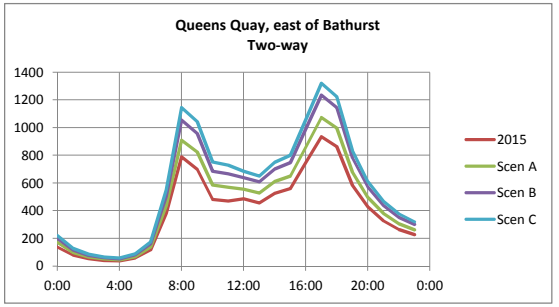
	Distribution	2015	Scen A	Scen B	Scen C
0:00	0.11	59	63	71	76
1:00	0.06	33	35	40	43
2:00	0.05	27	28	32	35
3:00	0.03	17	19	21	23
4:00	0.03	17	19	21	23
5:00	0.06	33	35	40	43
6:00	0.14	76	81	92	99
7:00	0.51	284	303	344	369
8:00	1.00	560	597	677	727
9:00	0.79	443	473	536	575
10:00	0.44	248	265	300	322
11:00	0.45	251	268	303	326
12:00	0.54	243	251	289	311
13:00	0.46	205	213	245	263
14:00	0.50	223	231	266	286
15:00	0.52	235	244	280	301
16:00	0.80	358	371	427	459
17:00	1.00	450	466	536	576
18:00	0.87	390	404	464	499
19:00	0.53	237	245	282	303
20:00	0.41	184	190	219	235
21:00	0.29	131	135	156	167
22:00	0.24	107	111	127	137
23:00	0.23	102	106	121	130
Total		4913	5153	5889	6328
AM peak		560	597	677	727
PM peak		450	466	536	576

Queens Quay, east of Bathurst
Two-way

	2015	Scen A	Scen B	Scen C
0:00	138	171	201	221
1:00	80	99	117	128
2:00	55	66	78	86
3:00	41	52	61	67
4:00	37	46	53	59
5:00	58	69	81	89
6:00	117	137	160	175
7:00	382	438	506	550
8:00	788	910	1054	1146
9:00	698	823	957	1043
10:00	482	586	686	751
11:00	471	570	666	730
12:00	486	556	640	684
13:00	457	529	609	651
14:00	525	610	702	750
15:00	560	651	748	800
16:00	747	859	989	1057
17:00	935	1074	1236	1321
18:00	862	996	1145	1224
19:00	583	679	782	835
20:00	428	496	571	610
21:00	326	380	438	467
22:00	264	307	353	378
23:00	227	262	301	321
Total	9747	11366	13134	14143
AM peak	815	947	1098	1195
PM peak	935	1074	1236	1321







Queens Quay, west of Bathurst
Westbound

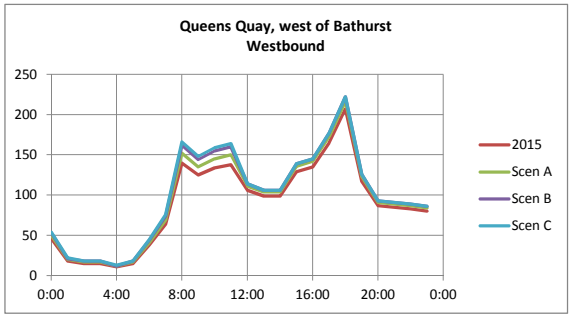
	Distribution	2015	Scen A	Scen B	Scen C
0:00	0.33	46	50	53	54
1:00	0.13	18	20	21	22
2:00	0.11	15	17	18	18
3:00	0.11	15	17	18	18
4:00	0.08	11	12	12	13
5:00	0.11	15	17	18	18
6:00	0.27	38	41	44	45
7:00	0.46	64	69	74	76
8:00	1.00	140	152	162	166
9:00	0.89	125	135	144	148
10:00	0.96	134	145	155	159
11:00	0.99	138	150	160	164
12:00	0.64	106	111	114	114
13:00	0.60	99	104	106	106
14:00	0.60	99	104	106	106
15:00	0.78	129	136	139	139
16:00	0.82	135	142	145	145
17:00	1.00	165	173	177	177
18:00	1.25	207	217	222	222
19:00	0.71	117	123	126	126
20:00	0.52	87	91	93	93
21:00	0.51	85	89	91	91
22:00	0.50	83	87	89	89
23:00	0.49	80	84	86	86
Total		2151	2286	2373	2395
AM peak		140	152	162	166
PM peak		165	173	177	177
	0.31				

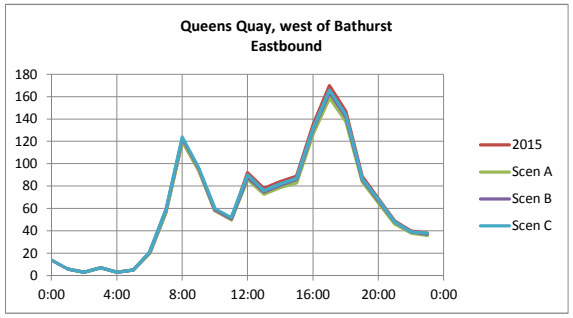
Queens Quay, west of Bathurst
Eastbound

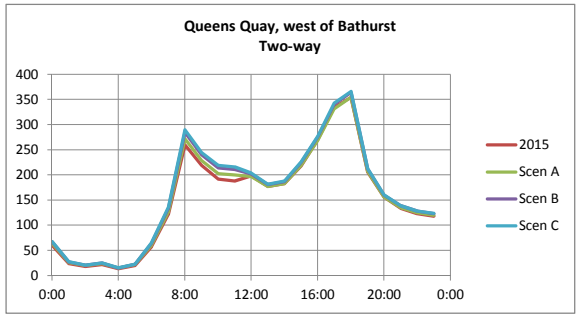
	Distribution	2015	Scen A	Scen B	Scen C
0:00	0.11	14	14	14	14
1:00	0.05	6	6	6	6
2:00	0.02	3	3	3	3
3:00	0.05	7	7	7	7
4:00	0.02	3	3	3	3
5:00	0.04	5	5	5	5
6:00	0.17	20	20	21	21
7:00	0.48	57	57	59	59
8:00	1.00	120	120	123	124
9:00	0.78	94	94	96	97
10:00	0.48	58	58	59	60
11:00	0.42	50	50	51	52
12:00	0.54	92	86	88	90
13:00	0.46	78	73	75	76
14:00	0.50	84	79	81	82
15:00	0.52	89	83	86	87
16:00	0.80	135	127	131	132
17:00	1.00	170	159	164	166
18:00	0.87	147	138	142	144
19:00	0.53	89	84	86	87
20:00	0.41	69	65	67	68
21:00	0.29	49	46	48	48
22:00	0.24	40	38	39	39
23:00	0.23	38	36	37	38
Total		1517	1451	1491	1508
AM peak		120	120	123	124
PM peak		170	159	164	166

Queens Quay, west of Bathurst
Two-way

	2015	Scen A	Scen B	Scen C
0:00	60	64	67	68
1:00	24	26	27	28
2:00	18	20	21	21
3:00	22	24	25	25
4:00	14	15	15	16
5:00	20	22	23	23
6:00	58	61	65	66
7:00	121	126	133	135
8:00	260	272	285	290
9:00	219	229	240	245
10:00	192	203	214	219
11:00	188	200	211	216
12:00	198	197	202	204
13:00	177	177	181	182
14:00	183	183	187	188
15:00	218	219	225	226
16:00	270	269	276	277
17:00	335	332	341	343
18:00	354	355	364	366
19:00	206	207	212	213
20:00	156	156	160	161
21:00	134	135	139	139
22:00	123	125	128	128
23:00	118	120	123	124
Total	3668	3737	3864	3903
AM peak	260	272	285	290
PM peak	335	332	341	343







Bathurst Street, south of Lake Shore
Southbound

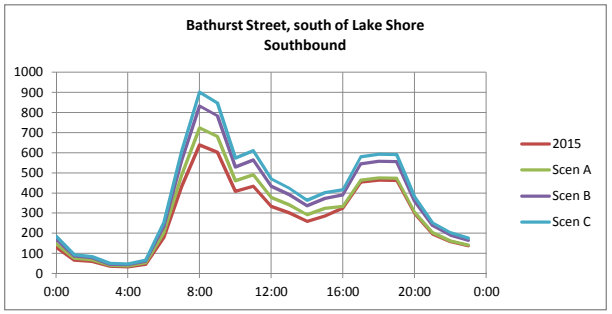
	Distribution	2015	Scen A	Scen B	Scen C	
0:00	0.20	131	148	170	184	131
1:00	0.10	67	76	87	94	67
2:00	0.09	61	69	79	85	61
3:00	0.06	36	41	47	51	36
4:00	0.05	34	39	45	48	34
5:00	0.07	47	54	62	67	47
6:00	0.28	178	202	232	251	178
7:00	0.68	432	489	562	608	432
8:00	1.00	640	724	833	901	640
9:00	0.94	602	681	784	848	602
10:00	0.64	408	461	530	574	408
11:00	0.68	434	491	565	611	434
12:00	0.52	334	378	435	471	334
13:00	0.47	302	342	393	425	302
14:00	0.40	259	293	337	364	259
15:00	0.45	286	324	373	403	286
16:00	0.70	326	334	391	416	326
17:00	0.98	455	465	545	580	455
18:00	1.00	465	476	558	593	465
19:00	1.00	463	474	556	591	463
20:00	0.64	299	306	359	381	299
21:00	0.43	198	203	238	253	198
22:00	0.34	159	163	191	203	159
23:00	0.30	138	141	166	176	138
Total		6754	7374	8538	9178	
AM peak		640	724	833	901	
PM peak		465	476	558	593	
	0.31					

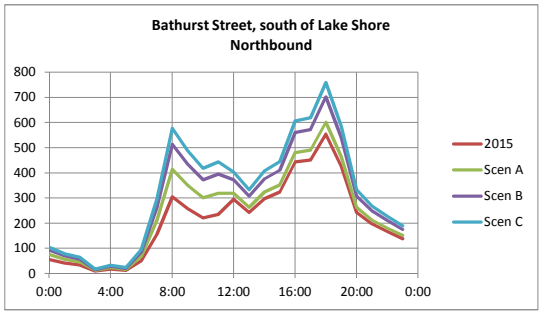
Bathurst Street, south of Lake Shore
Northbound

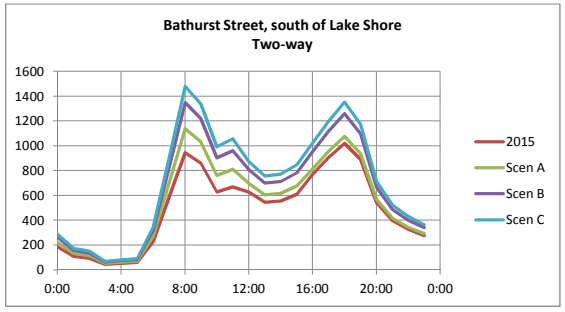
	Distribution	2015	Scen A	Scen B	Scen C
0:00	0.18	56	76	94	105
1:00	0.14	42	57	71	79
2:00	0.11	34	46	57	65
3:00	0.03	10	13	16	18
4:00	0.06	18	24	30	33
5:00	0.04	13	17	21	24
6:00	0.17	51	69	85	96
7:00	0.51	157	213	264	297
8:00	1.00	305	415	514	577
9:00	0.85	258	351	435	489
10:00	0.73	221	301	373	418
11:00	0.77	235	320	396	444
12:00	0.53	295	320	373	403
13:00	0.44	243	264	308	333
14:00	0.54	298	324	377	408
15:00	0.59	325	353	411	445
16:00	0.80	444	481	561	607
17:00	0.81	452	491	572	619
18:00	1.00	555	602	702	759
19:00	0.77	428	464	541	585
20:00	0.44	243	264	308	333
21:00	0.35	197	213	249	269
22:00	0.30	167	181	211	228
23:00	0.25	139	151	176	190
Total		5186	6010	7145	7824
AM peak		305	415	514	577
PM peak		555	602	702	759

Bathurst Street, south of Lake Shore
Two-way

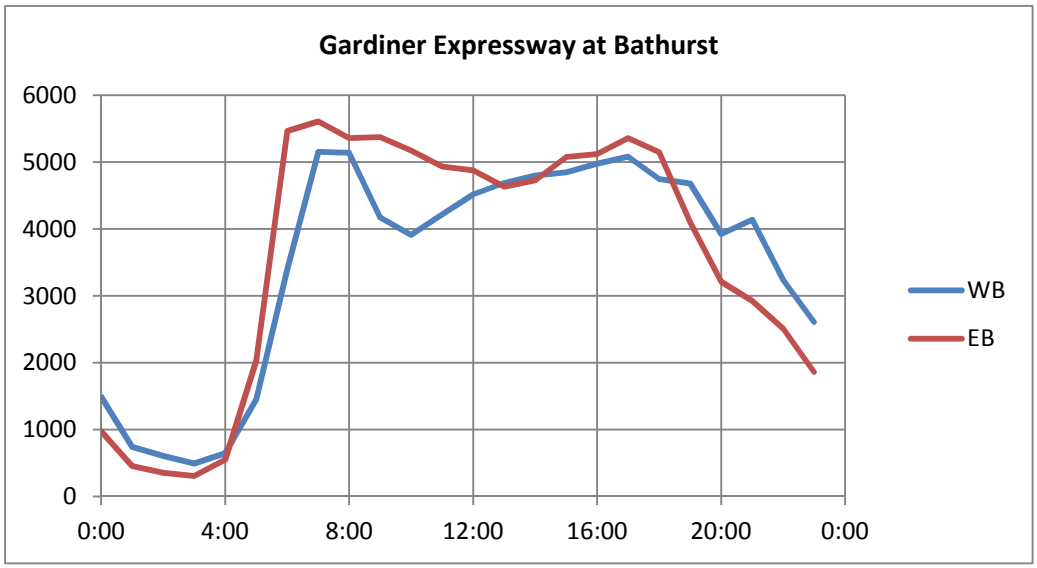
	2015	Scen A	Scen B	Scen C
0:00	187	224	264	289
1:00	109	133	158	173
2:00	95	115	136	150
3:00	46	54	63	69
4:00	52	63	75	81
5:00	60	71	83	91
6:00	229	271	317	347
7:00	589	702	826	905
8:00	945	1139	1347	1478
9:00	860	1032	1219	1337
10:00	629	762	903	992
11:00	669	811	961	1055
12:00	629	698	808	874
13:00	545	606	701	758
14:00	557	617	714	772
15:00	611	677	784	848
16:00	770	815	952	1023
17:00	907	956	1117	1199
18:00	1020	1078	1260	1352
19:00	891	938	1097	1176
20:00	542	570	667	714
21:00	395	416	487	522
22:00	326	344	402	431
23:00	277	292	342	366
Total	11940	13384	15683	17002
AM peak	945	1139	1347	1478
PM peak	1020	1078	1260	1352







	Gardiner Expressway at Bathurst	
	WB	EB
0:00	1492.286	978.5
1:00	743.5842	456.25
2:00	611.1238	353.75
3:00	494.0169	307.25
4:00	648.7546	550
5:00	1453.451	2032.75
6:00	3400.016	5466.5
7:00	5154.212	5608
8:00	5138.558	5361.25
9:00	4175.511	5374
10:00	3908.483	5175.25
11:00	4218.26	4936
12:00	4516.898	4878.75
13:00	4692.408	4631.5
14:00	4799.58	4730.5
15:00	4847.747	5080
16:00	4978.1	5120.5
17:00	5085.273	5362.25
18:00	4750.509	5152
19:00	4683.075	4102.75
20:00	3923.535	3211.75
21:00	4142.697	2924.5
22:00	3237.752	2510.5
23:00	2609.168	1863
Total	83705	86167.5
AM peak	1340	1354
PM peak	1665	1648



ORNAMENT

Ontario Road Noise Analysis Method for ENvironment and Transportation

version 2.07

Job No. 1402032
Job Name BBTCA

Scenario R2
Receptor Height = 5.5

	Autos	Medium	Heavy
GE Split	96%	3%	2%
LS Split	97%	2%	2%
BS Split	97%	2%	2%

ROAD CHARACTERISTICS | **SOURCE-RECEIVER-BARRIER-TOPOGRAPHY CHARACTERISTICS**

ID	Description	Time Period	Number of Vehicles			Speed (km/h)	Road Gradient (%)	Two Way? (y/n)	Pavement Type	Road Viewable Angle		Source-Receiver Distance (m)	Ground Type (Hard/Soft)	Topo-graphy Type	Source Height (m)	Road Elevation (m asl)	Receptor Height (m)	Receptor Elevation (m asl)	Ground Elevation Change (m)			No. of Rows of Houses	Density of Houses (% Houses)	Depth of Woods	Adjustment (dB)	Reason For Adjustment	**Total Segment L_{eq} (dBA)**
			Autos	Medium	Heavy					θ_1	θ_2								Elevation Change e (m)	Hor. Dist a (m)	Hor. Dist b (m)						
R2 -16	GE EB	16	71193	1854	1112	90	0	n	1	-90	90	218	Hard	A	1.1	13.7	5.5	0.0	0.0			2	70				60.76
	GE WB	16	69362	1806	1084	90	0	n	1	-90	90	234	Hard	A	1.1	13.7	5.5	0.0	0.0			2	70				60.37
	LS WB1	16	16124	334	251	60	0	n	1	-62	90	22	Hard	A	1.1	0.0	5.5	0.0	0.0								65.08
	LS WB2	16	16124	334	251	60	0	n	1	-90	-82	15	Hard	A	1.1	0.0	5.5	0.0	0.0								54.91
	LS EB1	16	15090	313	235	60	0	n	1	-78	90	15	Hard	A	1.1	0.0	5.5	0.0	0.0								66.93
	LS EB2	16	15090	313	235	60	0	n	1	0	82	15	Hard	A	1.1	0.0	5.5	0.0	0.0								63.79
	Bathurst	16	10504	218	163	50	0	y	1	-66	-6	90	Hard	A	1.1	0.0	5.5	0.0	0.0								51.29
																											71
R2 - 16 Future	GE EB	16	71193	1854	1112	90	0	n	1	-90	90	218	Hard	A	1.1	13.7	5.5	0.0	0.0			2	70				60.76
	GE WB	16	69362	1806	1084	90	0	n	1	-90	90	234	Hard	A	1.1	13.7	5.5	0.0	0.0			2	70				60.37
	LS WB1	16	16111	334	250	60	0	n	1	-62	90	22	Hard	A	1.1	0.0	5.5	0.0	0.0								65.07
	LS WB2	16	16111	334	250	60	0	n	1	-90	-82	15	Hard	A	1.1	0.0	5.5	0.0	0.0								54.90
	LS EB1	16	15638	324	243	60	0	n	1	-78	90	15	Hard	A	1.1	0.0	5.5	0.0	0.0								67.08
	LS EB2	16	15638	324	243	60	0	n	1	0	82	15	Hard	A	1.1	0.0	5.5	0.0	0.0								63.94
	Bathurst	16	14896	309	232	50	0	y	1	-66	-6	90	Hard	A	1.1	0.0	5.5	0.0	0.0								52.82
																											71
R2 - 8	GE EB	8	11528	300	180	90	0	n	1	-90	90	218	Hard	A	1.1	13.7	5.5	0.0	0.0			2	70				55.86
	GE WB	8	10994	286	172	90	0	n	1	-90	90	234	Hard	A	1.1	13.7	5.5	0.0	0.0			2	70				55.38
	LS WB1	8	1381	29	21	60	0	n	1	-62	90	22	Hard	A	1.1	0.0	5.5	0.0	0.0								57.39
	LS WB2	8	1381	29	21	60	0	n	1	-90	-82	15	Hard	A	1.1	0.0	5.5	0.0	0.0								47.22
	LS EB1	8	1369	28	21	60	0	n	1	-78	90	15	Hard	A	1.1	0.0	5.5	0.0	0.0								59.48
	LS EB2	8	1369	28	21	60	0	n	1	0	82	15	Hard	A	1.1	0.0	5.5	0.0	0.0								56.34
	Bathurst	8	1018	21	16	50	0	y	1	-66	-6	90	Hard	A	1.1	0.0	5.5	0.0	0.0								44.19
																											64
R2 - 8 Future	GE EB	8	11528	300	180	90	0	n	1	-90	90	218	Hard	A	1.1	13.7	5.5	0.0	0.0			2	70				55.86
	GE WB	8	10994	286	172	90	0	n	1	-90	90	234	Hard	A	1.1	13.7	5.5	0.0	0.0			2	70				55.38
	LS WB1	8	1393	29	22	60	0	n	1	-62	90	22	Hard	A	1.1	0.0	5.5	0.0	0.0								57.48
	LS WB2	8	1393	29	22	60	0	n	1	-90	-82	15	Hard	A	1.1	0.0	5.5	0.0	0.0								47.31
	LS EB1	8	1412	29	22	60	0	n	1	-78	90	15	Hard	A	1.1	0.0	5.5	0.0	0.0								59.65
	LS EB2	8	1412	29	22	60	0	n	1	0	82	15	Hard	A	1.1	0.0	5.5	0.0	0.0								56.51
	Bathurst	8	1511	31	23	50	0	y	1	-66	-6	90	Hard	A	1.1	0.0	5.5	0.0	0.0								45.84
																											64

TTC Street Car Traffic

509 Harbourfront		
	Day	Night
Direction	16	8
Westbound	174	22
Eastbound	173	23
Existing Total	347	45
Future	434	56

511 Bathurst		
	Day	Night
Direction	16	8
Eastbound	206	45
Southbound	205	46
Existing Total	411	91
Future	424	110

STAMSON 5.0 NORMAL REPORT Date: 13-10-2016 14:26:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2extk16.te Time Period: 16 hours
Description:

RT/Custom data, segment # 1: BS 509
---
1 - CLRV:
Traffic volume : 347 veh/TimePeriod
Speed : 50 km/h

Data for Segment # 1: BS 509

Angle1 Angle2 : -30.00 deg -6.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 90.00 m
Receiver height : 5.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟

RT/Custom data, segment # 2: BS 511
---
1 - CLRV:
Traffic volume : 411 veh/TimePeriod
Speed : 50 km/h

Data for Segment # 2: BS 511

Angle1 Angle2 : -66.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 90.00 m
Receiver height : 5.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟

RT/Custom data, segment # 3: LS 509 1
---
1 - CLRV:
Traffic volume : 347 veh/TimePeriod
Speed : 50 km/h

```
Data for Segment # 3: LS 509 1
------------------------------
Angle1   Angle2           : -58.00 deg   66.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  44.00 m
Receiver height           :   5.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```



```
RT/Custom data, segment # 4: LS 511 1
-------------------------------------
1 - CLRV:
Traffic volume    :   411 veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 4: LS 511 1
------------------------------
Angle1   Angle2           : -58.00 deg   66.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  44.00 m
Receiver height           :   5.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```



```
RT/Custom data, segment # 5: LS 509 2
-------------------------------------
1 - CLRV:
Traffic volume    :   347 veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 5: LS 509 2
------------------------------
Angle1   Angle2           : -90.00 deg   -75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  20.00 m
Receiver height           :   5.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

RT/Custom data, segment # 6: LS 511 2
---
1 - CLRV:
Traffic volume : 411 veh/TimePeriod
Speed : 50 km/h

Data for Segment # 6: LS 511 2

Angle1 Angle2 : -90.00 deg -75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 20.00 m
Receiver height : 5.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: BS 509

Source height = 0.50 m

RT/Custom (0.00 + 47.50 + 0.00) = 47.50 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	-6	0.00	64.03	-7.78	-8.75	0.00	0.00	0.00	47.50

Segment Leq : 47.50 dBA

Results segment # 2: BS 511

Source height = 0.50 m

RT/Custom (0.00 + 49.99 + 0.00) = 49.99 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-66	-30	0.00	64.76	-7.78	-6.99	0.00	0.00	0.00	49.99

Segment Leq : 49.99 dBA

Results segment # 3: LS 509 1

Source height = 0.50 m

RT/Custom (0.00 + 57.74 + 0.00) = 57.74 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-58	66	0.00	64.03	-4.67	-1.62	0.00	0.00	0.00	57.74

Segment Leq : 57.74 dBA

Results segment # 4: LS 511 1

Source height = 0.50 m

RT/Custom (0.00 + 58.47 + 0.00) = 58.47 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-58	66	0.00	64.76	-4.67	-1.62	0.00	0.00	0.00	58.47

Segment Leq : 58.47 dBA

Results segment # 5: LS 509 2

Source height = 0.50 m

RT/Custom (0.00 + 51.99 + 0.00) = 51.99 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-75	0.00	64.03	-1.25	-10.79	0.00	0.00	0.00	51.99

Segment Leq : 51.99 dBA

Results segment # 6: LS 511 2

Source height = 0.50 m

RT/Custom (0.00 + 52.72 + 0.00) = 52.72 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq

D08 R2EXK16

-90	-75	0.00	64.76	-1.25	-10.79	0.00	0.00	0.00	52.72

Segment Leq : 52.72 dBA

Total Leq All Segments: 62.55 dBA

TOTAL Leq FROM ALL SOURCES: 62.55

AECOM

Appendix C-3

Public Health Effects Assessment

AECOM
30 Leek Crescent, Floor 4
Richmond Hill, ON, Canada L4B 4N4
www.aecom.com
905 882 4401 tel
905 882 4399 fax

Memorandum

To	PortsToronto	Page	1 of 19
CC	Paul Murray		
Subject	Public Health Net Effects Assessment, BBTCA Environmental Assessment		
From	Marc Rose		
Date	March 17, 2017	Project Number	60447218

1. Introduction

This technical memorandum examines the potential impacts to public health that may result from changes to noise and air quality levels associated with the Future Baseline and Proposed Future Scenarios. Health effects associated with noise at certain levels can include annoyance, hearing impairment, learning performance in children, sleep disturbance, and cardiovascular disease (Golder, 2013). Similarly, research into air quality has indicated that health effects may include respiratory and cardiac hospital admissions, risk of ischemic heart disease, and congestive heart failure (Golder, 2013).

2. Description of the Potential Affected Environment – Current Conditions

2.1 Study Area

The Local and Regional Study Areas used to study public health effects reflect the study areas for the Acoustic and Air Quality Effects Assessments.

2.2 Description of Existing Conditions

A summary of existing conditions from the Acoustic and Air Quality assessments that are relevant to public health effects is provided below.

Noise

- For airborne aircraft, Noise Exposure Forecast (NEF) contours for existing conditions remain within the criteria of the Tripartite Agreement. The Transport Canada, Provincial Policy Statement, and Ministry of Environment and Climate Change (MOECC) NPC-300 criteria of NEF30 would not be exceeded by any existing residential uses.

- For aircraft on the ground and the ferry, existing sound levels are above the target values in NPC-300, which would require that new residential development be provided with warning clauses and possibly mitigation measures.

Please refer to the Acoustic Assessment Report prepared by RWDI for this project for more information on existing conditions.

Air Quality

Background concentrations of the following contaminants are above or close to their Toxicity Reference Values (TRVs):

NO_2
- Background concentrations for the annual averaging period are 78% of the TRV;

$PM_{2.5}$
- Background concentrations for the 24-hour averaging period are 59% of the TRV;
- Background concentrations for the annual averaging period are 88% of the TRV;

Acrolein
- Background concentrations for the 24-hour averaging period are 75% of the TRV;
- Background concentrations for the annual averaging period are 650% of the TRV, which can result in an increased risk of developing nasal lesions; and,

Benzo(a)Pyrene (BaP)
- Background concentrations for the annual averaging period are 1400% of the TRV, which can result in an increased risk of developing respiratory tract tumours.

Please refer to the Air Quality Assessment Report prepared by RWDI for this project for more information on existing conditions.

3. Net Effects of Future Airport Operations

3.1 Methodology

The assessment of net effects compared noise and air quality (i.e., contaminant) levels associated with the two future scenarios to thresholds and/or guidelines where health effects have been observed.

Table 1 lists the potential health effects that may result from exposure to sound levels above certain thresholds. These thresholds have been developed by regulatory agencies, including the World Health Organization (WHO) based on the results of epidemiological studies. These thresholds were provided to PortsToronto for use in this study by Toronto Public Health (Lachapelle, pers. comm., April 2 2015)

Table 1 – Potential Health Effects Associated with Sound Levels

Health Effect	Threshold/Guideline	Reference
Environmental insomnia	42 $L_{Aeq, 8hr}$ (23-07 hr)	WHO, 2009
Sleep disturbance, outside bedrooms	45 $L_{Aeq, 8hr}$ (23-07 hr)	WHO, 1999b
Sleep disturbance, night noise guideline	40 $L_{Aeq, 8hr}$ (23-07 hr)	WHO, 2009
Sleep disturbance, interim target	55 $L_{Aeq, 8hr}$ (23-07 hr)	WHO, 2009
Hypertension	70 $L_{Aeq, 16hr}$ (06-22 hr)	Health Council of the Netherlands, 1999
Ischemic health disease	70 $L_{Aeq, 16hr}$ (06-22 hr)	Health Council of the Netherlands, 1999
Sleep pattern	< 60 $L_{Aeq, 8hr}$ (23-07 hr)	Passchier-Vermeer and Passchier, 2000
Subjective sleep quality	40 $L_{Aeq, 8hr}$ (23-07 hr)	Health Council of the Netherlands, 1999
Mood next day	< 60 $L_{Aeq, 8hr}$ (23-07 hr)	Health Council of the Netherlands, 1999
Increased average movement during sleep	42 $L_{Aeq, 8hr}$ (23-07 hr)	WHO, 2009
Self-reported sleep disturbance	42 $L_{Aeq, 8hr}$ (23-07 hr)	WHO, 2009
Use of sleep-aid drugs and sedatives	42 $L_{Aeq, 8hr}$ (23-07 hr)	WHO, 2009
Moderate annoyance, outdoor living area	50 $L_{Aeq, 16hr}$	WHO, 1999b
Serious annoyance, outdoor living area	55 $L_{Aeq, 16hr}$	WHO, 1999b
Annoyance, difference between baseline and project	>6.5% difference in %HA	Health Canada, 2010

Human health thresholds for the worst-case contaminants included in the Air Quality Assessment prepared by RWDI are based on Toxicity Reference Values (TRVs) provided by Toronto Public Health. Table 2 summarizes the potential health effects associated with contaminant levels that exceed the TRVs, which is based on information contained within the Human Health Risk Assessment Report prepared for the Air Quality Study at Toronto Pearson International Airport (Intrinsik, 2015).

Table 2 - Potential Health Effects Associated with Contaminant Levels

Contaminant	Health Effect	TRV (µg/m^3)	Reference
Nitrogen Dioxide (24-hr)	Respiratory tract irritation	200	MOE, 2012
Nitrogen Dioxide (annual)	Adverse health effects (human)	40	WHO, 2006
Carbon Monoxide (8-hr)	Carboxyhemoglobin blood level of less than 1%	6000	Health Canada, 2006
$PM_{2.5}$ (24-hr)	Respiratory tract irritation	27	CCME, 2012
$PM_{2.5}$ (annual)	Cardiopulmonary and lung cancer mortality increase (human)	8.8	CCME, 2012
Benzo-a-pyrene (annual)	Respiratory tract tumour	0.00001	Cal EPA, 2009

Contaminant	Health Effect	TRV (µg/m^3)	Reference
	(hamster)		
Benzene (24-hr)	Reduced lymphocyte (white blood cell) proliferation	29	ATSDR, 2007
Benzene (annual)	Statistically significant decreased counts of B-lymphocytes (human)	3	Cal EPA< 2014
Acrolein (24-hr)	Development of lesions in the upper airways	0.4	MOE, 2012
Acrolein (annual)	Nasal lesions	0.02	US EPA IRIS, 2003

3.2 Net Effects Analysis

3.2.1 Future Baseline Scenario

3.2.1.1 Effects from Noise on Human Health

The results of the noise modelling indicate that sound levels from certain activities associated with airport operation could result in potential effects to human health. These activities include operation of aircraft on ground and the ferry, ground support equipment, and road and LRT traffic.

During nighttime hours:

- Sound levels from aircraft on the ground, the ferry, and road and LRT operations could result in environmental insomnia or sleep disturbance at all receptor locations; and,
- Sound levels from ground support equipment could result in similar health effects at receptors closest to the airport.

During daytime hours:

- Sound levels from aircraft on the ground and from the ferry could result in an increased risk of hypertension and ischemic health disease at 4 of 9 receptors
- Sound levels from the road and LRT operations during daytime hours are below the threshold resulting in increased risk of hypertension and ischemic health disease at all receptor locations.

No effects to public health from airborne aircraft are anticipated as the NEF contours remain within the criteria of the Tripartite Agreement. Those criteria were established to ensure that land uses in the vicinity of the airport are compatible with airport operations.

These effects and associated mitigation measures are described in further detail in **Table 3**.

3.2.1.2 Effects from Contaminants on Human Health

For annual NO_2, annual $PM_{2.5}$, 24-hour and annual acrolein, and annual BaP, the predicted concentrations at the locations of highest impact (receptors on Little Norway Crescent) are higher than their Toxicity Reference Values (TRVs). In particular:

NO_2

- 5 of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period (compared to 14 of 50 receptors under the existing scenario) which may result in increased risks of respiratory illness

$PM_{2.5}$

- 3 of 50 have predicted concentrations at or higher than the TRV for the annual averaging period (compared to 7 of 50 receptors under the existing scenario), which may result in an increased risk of cardiopulmonary and lung cancer

Acrolein

- 28 of 50 receptors have predicted concentrations higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways
- All receptors have predicted concentrations higher than the TRV for the annual averaging periods, which can result in an increased risk of developing nasal lesions

Benzo(a)Pyrene (BaP)

- All receptors have predicted concentrations higher than the TRV for the annual averaging periods, which can result in an increased risk of developing respiratory tract tumours.

These effects and associated mitigation measures are described in further detail in **Table 3**.

The below table outlines measures of effect used to determine where there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers.

Table 3: Future Baseline Scenario Net Effects Analysis – Public Health

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Public Health is an Asset that is affected by: • **Air Quality; and,** • **Noise Levels**	▶ Changes to noise levels.	▶ No ground run-up enclosure for aircraft engine run-up testing is present.	▶ Maintenance of the Q400 aircraft requires engine run-up activity, which can occur at night from time to time. The worst-case one-hour test length has been modelled to occur during daytime and nighttime hours. ▶ Sound level data for the ferry are from 2014. ▶ The quantity of each piece of ground support equipment used (i.e., fuel trucks, baggage handling equipment, water and lavatory service carts, and air supply equipment) is directly proportional to the number of aircraft used in NEF modelling.	Airborne Aircraft ▶ NEF contours remain within the criteria of the Tripartite Agreement so no effects to public health from airborne aircraft are anticipated. Aircraft on the Ground and the Ferry ▶ Sound levels from aircraft on the ground and the ferry at all receptor locations are greater than 42 L_{EQ} during night-time hours and could result in environmental insomnia or sleep disturbance. ▶ Sound levels from aircraft on the ground and the ferry at receptor locations R3, R4, R7, and R8 are greater than 70 L_{EQ} during daytime hours and could result in hypertension and ischemic health disease. Ground Support Equipment ▶ Sound levels from ground support equipment at receptor locations R1, R4, R5, and R8 are greater than 42 L_{EQ} during night-time hours and could result in environmental insomnia or sleep disturbance. Road and LRT ▶ Sound levels from road and LRT are greater than 42 L_{EQ} during night-time hours at all receptor locations and could result in environmental insomnia or sleep disturbance. ▶ Sound levels from road and LRT are greater than 70 L_{EQ} during daytime hours at receptor location R2 and could result in hypertension and ischemic health disease.	▶ Provide ground run-up enclosure for aircraft engine run-up testing. ▶ Provide noise barrier at a height of 6 m along the north side of the taxiway extension to address sound levels from aircraft as they hold on the taxiway prior to take-off. ▶ Ensure that the City requires new residential development be provided with warning clauses and most likely mitigation measures.	▶ Sound levels from aircraft on the ground and the ferry at all receptor locations, from ground support equipment at receptor locations R1, R4, R5, and R8, and from road and LRT at all receptor locations could result in environmental insomnia or sleep disturbance. ▶ Sound levels from aircraft on the ground and the ferry at receptor locations R3, R4, R7, and R8 and from road and LRT at receptor location R2 could result in hypertension and ischemic health disease.
	▶ Changes to air quality.	▶ None.	Background concentrations of the following contaminants are above or close to their TRVs: NO_2 ▶ Background concentrations for the annual averaging period are 78 % of the TRV. $PM_{2.5}$ ▶ Background concentrations for the 24-hour averaging period are 59 % of the TRV. ▶ Background concentrations for the annual averaging period are 88 % of the TRV. Acrolein ▶ Background concentrations for the 24-hour averaging period are 75 % of the TRV. ▶ Background concentrations for the annual averaging period are 650 % of the TRV, which can result in an increased risk of developing nasal lesions. BaP	NO_2 ▶ Five of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period, which may result in increased risks of respiratory illness. $PM_{2.5}$ ▶ Three of 50 have predicted concentrations higher than the TRV for the annual averaging period, which may result in an increased risk of cardiopulmonary and lung cancer. Acrolein ▶ 28 of 50 receptors have predicted concentrations higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways. ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of	▶ None.	NO_2 ▶ 5 of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period, which may result in increased risks of respiratory illness. $PM_{2.5}$ ▶ 3 of 50 have predicted concentrations higher than the TRV for the annual averaging period, which may result in an increased risk of cardiopulmonary and lung cancer. Acrolein ▶ 28 of 50 receptors have predicted concentrations higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways. ▶ All receptors have predicted concentrations

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
			▶ Background concentrations for the annual averaging period are 1400% of the TRV, which can result in an increased risk of developing respiratory tract tumours.	developing nasal lesions. BaP ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of developing respiratory tract tumours.		higher than the TRV for the annual averaging period, which can result in an increased risk of developing nasal lesions. BaP ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of developing respiratory tract tumours.

3.2.2 Proposed Future Scenario

3.2.2.1 Effects from Noise on Human Health

The results of the noise modelling indicate that sound levels from certain activities associated with airport operation could result in potential effects to human health. These activities include operation of aircraft on ground and the ferry, ground support equipment, and road and LRT traffic.

During nighttime hours:

- Sound levels from aircraft on the ground, the ferry, and road and LRT operations could result in environmental insomnia or sleep disturbance at all receptor locations; and,
- Sound levels from ground support equipment could result in similar health effects at residences closest to the airport.

During daytime hours:

- Sound levels from aircraft on the ground and from the ferry are below the threshold for increased risk of hypertension and ischemic health disease at all receptor locations; and,
- Sound levels from the road and LRT operations could result in an increased risk of hypertension and ischemic health disease at the receptor location nearest to Lake Shore Boulevard West.

No effects to public health from airborne aircraft are anticipated as the NEF contours remain within the criteria of the Tripartite Agreement. Those criteria were established to ensure that land uses in the vicinity of the airport are compatible with airport operations.

These effects and associated mitigation measures are described in further detail in **Table 4**.

3.2.2.2 Effects from Contaminants on Human Health

For annual NO_2, annual $PM_{2.5}$, 24-hour and annual acrolein, and annual BaP, the predicted concentrations at the locations of highest impact (receptors on Little Norway Crescent) are higher than their Toxicity Reference Values (TRVs). In particular:

NO_2

- 5 of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period which may result in increased risks of respiratory illness

$PM_{2.5}$

- 3 of 50 have predicted concentrations at or higher than the TRV for the annual averaging period, which may result in an increased risk of cardiopulmonary and lung cancer

Acrolein

- 29 of 50 receptors have predicted concentrations equal to or higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways;
- All receptors have predicted concentrations higher than the TRV for the annual averaging periods, which can result in an increased risk of developing nasal lesions;

Benzo(a)Pyrene (BaP)

- All receptors have predicted concentrations higher than the TRV for the annual averaging periods, which can result in an increased risk of developing respiratory tract tumours.

These effects and associated mitigation measures are described in further detail in **Table 4**.

The below table outlines measures of effect used to determine where there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-operated aircraft and a runway extension.

Table 4: Proposed Future Scenario – Public Health

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Public Health is an Asset that is affected by: • **Air Quality; and,** • **Noise Levels**	▶ Changes to noise levels.	▶ Ground run-up enclosure for aircraft engine run-up testing is present.	▶ Maintenance of the Q400 aircraft requires engine run-up activity, which can occur at night from time to time. The worst-case one-hour test length has been modelled to occur during daytime and nighttime hours. ▶ Sound level data for the ferry from 2014. ▶ The quantity of each piece of ground support equipment used (i.e., fuel trucks, baggage handling equipment, water and lavatory service carts, and air supply equipment) is directly proportional to the number of aircraft used in NEF modelling.	Airborne Aircraft ▶ NEF contours remain within the criteria of the Tripartite Agreement so no effects to public health from airborne aircraft are anticipated. Aircraft on the Ground and the Ferry ▶ Sound levels from aircraft on the ground and the ferry at all receptor locations except for R9 are greater than 42 L_{EQ} during night-time hours and could result in environmental insomnia or sleep disturbance. Ground Support Equipment ▶ Sound levels from ground support equipment at receptor locations R1, R4, R5, and R8 are greater than 42 L_{EQ} during night-time hours and could result in environmental insomnia or sleep disturbance. Road and LRT ▶ Sound levels from road and LRT are greater than 42 L_{EQ} during night-time hours at all receptor locations and could result in environmental insomnia or sleep disturbance. ▶ Sound levels from road and LRT are greater than 70 L_{EQ} during daytime hours at receptor location R2 and could result in hypertension and ischemic health disease.	▶ Provide noise barrier at a height of 6 m along the north side of the taxiway extension to address sound levels from aircraft as they hold on the taxiway prior to take-off. ▶ Ensure that the City requires new residential development be provided with warning clauses and most likely mitigation measures.	▶ Sound levels during night-time hours from aircraft on the ground and the ferry at all receptor locations except for R9, from ground support equipment at receptor locations R1, R4, R5, and R8, and from road and LRT at all receptor locations could result in environmental insomnia or sleep disturbance. ▶ Sound levels during daytime hours from road and LRT at receptor location R2 could result in hypertension and ischemic health disease.
	▶ Changes to air quality.	▶ None.	Background concentrations of the following contaminants are above or close to their TRVs: NO_2 ▶ Background concentration for the annual averaging period is 78 % of the TRV. $PM_{2.5}$ ▶ Background concentration for the 24-hour averaging period is 59 % of the TRV. ▶ Background concentration for the annual averaging period is 88 % of the TRV. Acrolein ▶ Background concentration for the 24-hour averaging period is 75 % of the TRV. ▶ Background concentration for the annual averaging period is 650 % of the TRV, which can result in an increased risk of developing nasal lesions. BaP ▶ Background concentration for the annual averaging period is 1400 % of the TRV, which	NO_2 ▶ 5 of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period, which may result in increased risks of respiratory illness. $PM_{2.5}$ ▶ 3 of 50 have predicted concentrations higher than the TRV for the for the annual averaging period, which may result in an increased risk of cardiopulmonary and lung cancer. Acrolein ▶ 29 of 50 receptors have predicted concentrations higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways. ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging periods, which can result in an increased risk of developing nasal lesions. BaP	▶ None.	NO_2 ▶ 5 of 50 receptors have predicted concentrations higher than the TRV for the annual averaging period, which may result in increased risks of respiratory illness. $PM_{2.5}$ ▶ 3 of 50 have predicted concentrations higher than the TRV for the annual averaging period, which may result in an increased risk of cardiopulmonary and lung cancer. Acrolein ▶ 29 of 50 receptors have predicted concentrations higher than the TRV for the 24-hour averaging period, which can result in an increased risk of developing lesions in the upper airways. ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
			can result in an increased risk of developing respiratory tract tumours.	▶ All receptors have predicted concentrations higher than the TRV for the annual averaging periods, which can result in an increased risk of developing respiratory tract tumours.		increased risk of developing nasal lesions. BaP ▶ All receptors have predicted concentrations higher than the TRV for the annual averaging period, which can result in an increased risk of developing respiratory tract tumours.

4. Mitigation and Recommendations

The Acoustic Assessment Report prepared by RWDI proposes several mitigation measures to reduce noise levels in certain locations. These include construction of a ground run-up enclosure (which will be completed in 2017) and the construction of barriers along the taxiway extensions. The reductions in noise levels are minimal from the barriers, and the barriers would have limited impact on reducing the noise levels below the thresholds that result in environmental insomnia or sleep disturbance. Nonetheless, they would mitigate a source (i.e., taxiing aircraft) that occurs frequently and there may be a perceived benefit from installing such barriers.

With regards to air quality, future advances in emission reductions for aircraft, GSE, and other vehicles will reduce concentrations of contaminants, which will have a positive effect on human health.

5. Conclusions

Noise levels and contaminant concentrations associated with the future baseline and proposed future scenarios have the potential to result in health effects. There are few differences between the two scenarios. However:

- Noise levels during daytime hours are lower in the proposed future scenario than the future baseline scenario and are below the threshold for increased risk of hypertension and ischemic heart disease;
- Noise levels during nighttime hours are marginally lower in the proposed future scenario than the future baseline scenario; and,
- There is a marginally higher risk of health effects due to air emissions with the proposed future scenario compared to the future baseline scenario.

6. References

Golder Associates. 2013. Health Impact Assessment for Proposed Expansion to Billy Bishop Toronto City Airport.

Intrinsik Environmental Sciences. 2015. Air Quality Study At Toronto Pearson International Airport – Human Health Risk Assessment.

AECOM

Appendix C-4

Marine Navigation Effects Assessment

AECOM
105 Commerce Valley Drive West, Floor 7 905 886 7022 tel
Markham, ON, Canada L3T 7W3 905 886 9494 fax
www.aecom.com

Memorandum

To	Marc Rose, AECOM	Page	1
CC	Julia Cushing, AECOM		
Subject	Marine Navigation Net Effects Assessment		
From	Steven Li, AECOM		
Date	January 29, 2016	Project Number	60447218

1. Introduction

The Marine Navigation scope of work includes:

- A summary of existing conditions related to wind and waves;
- An estimation of jet blast velocities of design/representative airplanes and wind-generated waves associated with jet blast; and
- An assessment of the impact of the runway extension on the vessel navigation.

1.1 Study Areas

The Study Areas for the Marine Navigation effects assessment are shown in **Figure 1** below.



Figure 1: Marine Navigation Study Areas

The original Local Study Area for Marine Navigation included:

- The end of the runway;
- Beyond the Marine Exclusion Zone (MEZ); and
- Within the Western Channel.

Comments about effects extending into the Inner Harbour, Outer Harbour and Humber Bay were expressed through consultation initiatives to-date. These comments tended to focus on the effects of noise and air quality on user experiences in the Inner and Outer Harbours and Humber Bay; the potential effects of jet blast or wake turbulence (also referred to as "wing tip vortices") at the edge of the MEZ; and, the potential impacts on navigation associated with any proposed changes to the width or location of the opening of the Western Channel.

The marine navigation study assessed the physical impacts of jet blast and wake turbulence at the edge of the MEZ and navigation impacts associated with changes to the land mass within the Local Study Area. Effects to boat navigation from jet blast and wake turbulence beyond this Study Area can be confirmed through additional modelling as part of the detailed design stage. Other studies conducted as part of this EA assessed the effects of potential changes to noise, air quality, user experience, and recreational opportunities associated with the proposal within the Regional Study Area and will be commented on under the associated effects assessment studies.

The boundaries of the Marine Navigation Study Area are depicted as Area 2 in **Figure 1**.

2. Description of Existing Conditions

2.1 Existing Background Wind and Waves

Wind

Wind is a key factor to be considered in all navigation impact assessments as wind intensity can influence boat stability and maneuverability. The wind distribution frequency at the BBTCA was provided by WSP Canada Inc. (2015). **Table 1**, below, shows the wind distribution frequency of each wind speed range and direction at the BBTCA. The distribution frequency is expressed in total hours of wind in each direction per wind intensity category from 1971 to 2014. **Figure 2** depicts this same information in a chart format, and is called a Wind Rose figure.

The joint probability of wind speed and wind direction for BBTCA is shown in **Table 1** and **Figure 2**. Based on **Table 1** and **Figure 2**, wind velocities are greatest in the west-to-southwesterly and easterly directions. Wind intensity is most frequently 15 to 20 km/h (over 20% of the time).

Table 1: Wind Distribution Frequency (number of hours) - Billy Bishop Toronto City Airport - All Months (1971 to 2014) (WSP Canada Inc., 2015)

Wind Intensity (km/h)	Calm	1 N	2 NNE	3 NE	4 ENE	5 E	6 ESE	7 SE	8 SSE	9 S	10 SSW	11 SW	12 WSW	13 W	14 WNW	15 NW	16 NNW	Total	%	% Cumul	% Exceed
Calm	16293																	16293	4.22	4.22	100.00
0 - 5		599	264	377	728	1862	936	743	749	1669	1411	1602	1972	2471	1070	1003	904	18360	4.76	8.99	95.78
5 - 10		2935	1107	1275	3696	9655	3009	2277	2197	5866	4781	5230	6660	8333	4140	5237	4399	70797	18.36	27.34	91.02
10 - 15		4128	1457	1642	4483	10838	2374	1466	1688	5278	3304	3288	4259	6677	3521	4745	5552	64700	16.78	44.12	72.66
15 - 20		5792	2124	2804	6848	12603	2157	963	1260	5774	4167	3814	4560	8742	5132	6161	7401	80302	20.82	64.94	55.89
20 - 25		3479	1250	1927	5997	7149	980	285	387	2563	3192	3337	4029	8145	4214	4332	4426	55692	14.44	79.37	35.07
25 - 30		1258	364	769	3354	3019	341	93	98	614	1534	2098	2991	5404	2616	2171	2095	28819	7.47	86.85	20.63
30 - 35		679	161	562	3043	2368	239	46	48	273	1037	2060	3507	5072	2019	1518	1227	23859	6.19	93.03	13.15
35 - 40		253	49	252	1893	1337	132	6	6	89	481	1442	2611	3053	1052	656	460	13772	3.57	96.60	6.97
40 - 45		61	13	98	1004	794	61	5	3	44	236	852	1566	1593	441	245	163	7179	1.86	98.46	3.40
45 - 50		11	3	47	390	328	26	0	1	9	79	374	778	617	175	91	48	2977	0.77	99.24	1.54
50 - 55		10	0	27	232	182	6	0	1	5	52	267	437	352	62	24	22	1679	0.44	99.67	0.76
55 - 60		4	0	5	89	105	10	2	2	3	28	142	236	158	46	11	7	848	0.22	99.89	0.33
60 - 65		0	0	3	22	25	2	0	0	0	11	41	65	38	7	4	0	218	0.06	99.95	0.11
65 - 70		0	0	0	9	23	1	0	0	0	1	37	40	22	1	2	0	136	0.04	99.98	0.05
70 - 75		0	0	0	0	4	0	0	0	0	0	10	14	13	0	1	0	42	0.01	99.99	0.02
75 - 80		0	0	0	0	0	0	0	0	0	0	4	3	5	0	0	0	12	0.00	100.00	0.01
80 - 85		0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4	0.00	100.00	0.00
85 - 90		0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	4	0.00	100.00	0.00
90 - 95		0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	3	0.00	100.00	0.00
95 - 100		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.00	100.00	0.00
100 - 105		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	100.00	0.00
Total	16293	19209	6792	9788	31788	50292	10274	5886	6440	22187	20316	24607	33728	50696	24496	26201	26704	385697			
Total (%)	4.22	4.98	1.76	2.54	8.24	13.04	2.66	1.53	1.67	5.75	5.27	6.38	8.74	13.14	6.35	6.79	6.92	100			

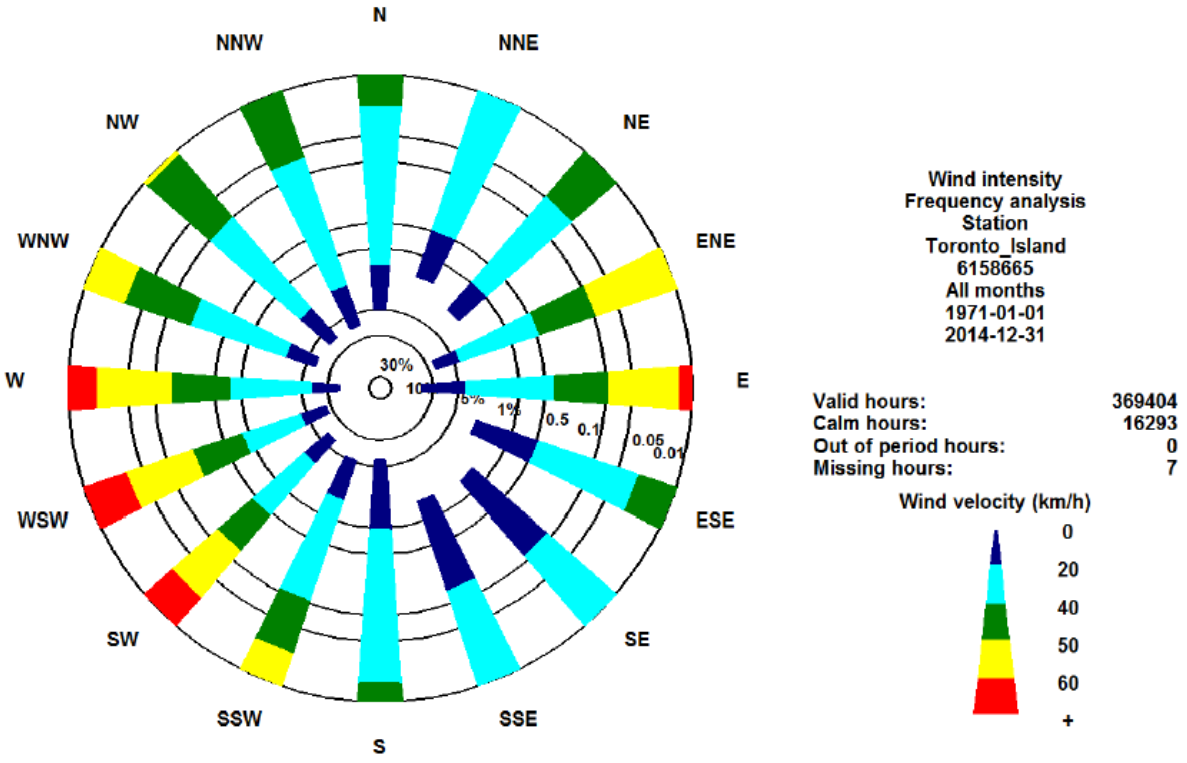


Figure 2: Wind Rose for Billy Bishop Toronto City Airport and Toronto City Center (1971 to 2014) (WSP Canada Inc., 2015)

Nearshore Waves

Nearshore waves are also a key factor to be considered in all navigation impact assessments. The nearshore wave distribution frequency at the BBTCA was provided by WSP Canada Inc. (2015).

Table 2, below, shows the nearshore wave distribution frequency of each wave height (Hm0). The Hm0 represents spectral significant wave height or the average of the highest one-third (33%) of waves (measured from trough to crest) that occur in a given period.

The distribution frequency is expressed in Hm0 per wave height category from 1971 to 2014. **Figure 3** depicts this same information in a chart format, and is called a Wave Rose figure. The joint probability of nearshore significant wave height and wave direction at the BBTCA is shown in **Table 2** and **Figure 3**.

Based on **Table 2** and **Figure 3** waves are most common in the southwesterly direction. Wave height is most frequently 0.05 to 0.20 Hm0 (M) (approximately 60% of the time).

Table 2: Nearshore Wave Distribution Frequency (Hm0) - Billy Bishop Toronto City Airport - All Month (1971 to 2014), (WSP Canada Inc., 2015)

Wave Height Hm0 (m)	Calm	1 N	2 NNE	3 NE	4 ENE	5 E	6 ESE	7 SE	8 SSE	9 S	10 SSW	11 SW	12 WSW	13 W	14 WNW	15 NW	16 NNW	Total	%	% Cumul	% Exceed
Calm	153910																	153910	40.01	40.01	100
0.05 - 0.20		0	0	0	0	0	0	15061	25541	12523	9588	23718	8372	0	0	0	0	94803	24.64	64.65	59.99
0.20 - 0.40		0	0	0	0	0	0	1397	13799	12511	14297	28276	5050	0	0	0	0	75330	19.58	84.23	35.35
0.40 - 0.60		0	0	0	0	0	0	0	1436	4446	10850	16667	325	0	0	0	0	33724	8.77	93.00	15.77
0.60 - 0.80		0	0	0	0	0	0	0	0	1067	4697	8243	0	0	0	0	0	14007	3.64	96.64	7.00
0.80 - 1.00		0	0	0	0	0	0	0	0	231	1798	5307	0	0	0	0	0	7336	1.91	98.54	3.36
1.00 - 1.20		0	0	0	0	0	0	0	0	22	634	2494	0	0	0	0	0	3150	0.82	99.36	1.46
1.20 - 1.40		0	0	0	0	0	0	0	0	6	317	1015	0	0	0	0	0	1338	0.35	99.71	0.64
1.40 - 1.60		0	0	0	0	0	0	0	0	0	128	464	0	0	0	0	0	592	0.15	99.86	0.29
1.60 - 1.80		0	0	0	0	0	0	0	0	0	16	266	0	0	0	0	0	282	0.07	99.94	0.14
1.80 - 2.00		0	0	0	0	0	0	0	0	0	6	130	0	0	0	0	0	136	0.04	99.97	0.06
2.00 - 2.20		0	0	0	0	0	0	0	0	0	2	46	0	0	0	0	0	48	0.01	99.99	0.03
2.20 - 2.40		0	0	0	0	0	0	0	0	0	1	31	0	0	0	0	0	32	0.01	99.99	0.02
2.40 - 2.60		0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	10	0.00	100.00	0.01
2.60 - 2.80		0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5	0.00	100.00	0.00
2.80 - 3.00		0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0.00	100.00	0.00
3.00 - 3.20		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.00	100.00	0.00
3.20 - 3.40		0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	7	0	100	0.00
3.40 - 3.60		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
3.60 - 3.80		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
3.80 - 4.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
4.00 - 4.20		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
4.20 - 4.40		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
4.40 - 4.60		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
4.60 - 4.80		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
4.80 - 5.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
5.00 - 5.20		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
5.20 - 5.40		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
5.40 - 5.60		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
5.60 - 5.80		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
Total	153910	0	0	0	0	0	0	16458	40776	30806	42334	86683	13747	0	0	0	0	384714			
Total (%)	40.01	0	0	0	0	0	0	4.28	10.6	8.01	11	22.53	3.57	0	0	0	0	100			

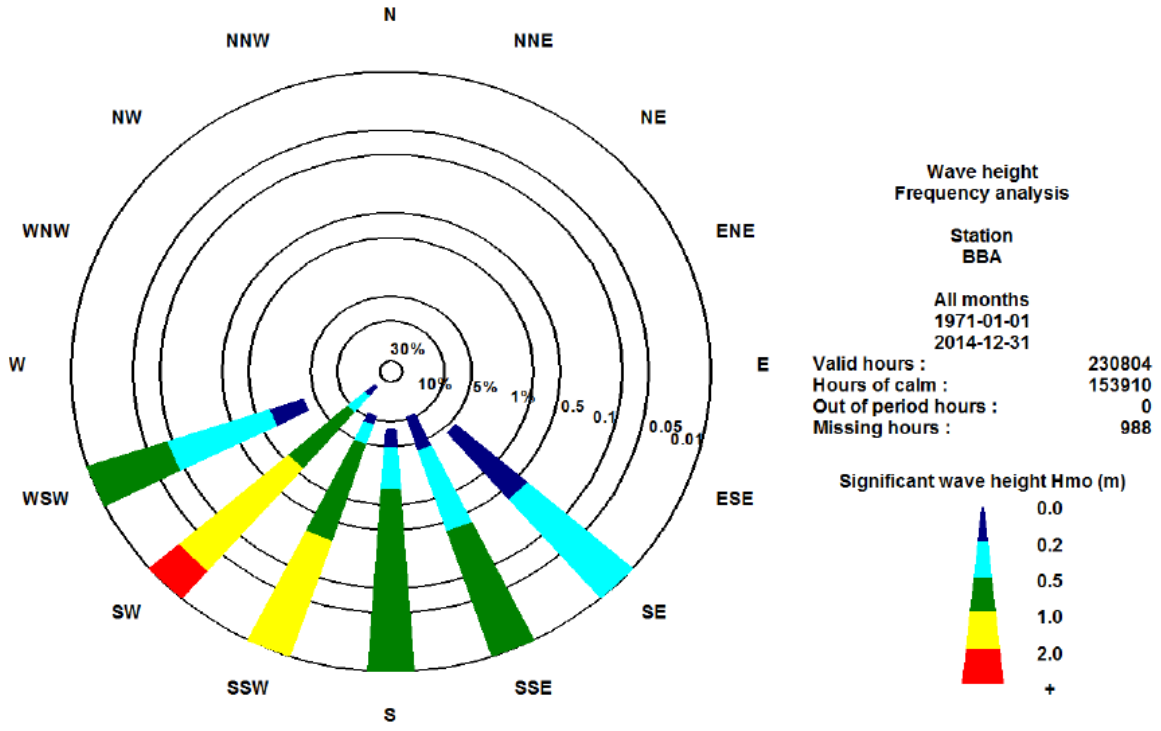


Figure 3: Nearshore Wave Rose (Hm0) for Billy Bishop Toronto City Airport and Toronto City Center (1971 to 2014) (WSP Canada Inc., 2015)

3. Description of Future Conditions

Wind, currents, waves and water depth all affect marine navigation. The description of existing conditions pertaining to wind and wave distribution frequencies was taken from a compilation of data over an approximately 40 year period. It is not anticipated that wind, currents, waves and water depth will significantly change over the course of the planning horizon for this project. As such, the data obtained under the existing conditions portion of this memo can be used as the basis of the effects assessment under the future conditions.

3.1 Methodology

The study approach for assessing potential effects of the runway and the corresponding landmass extension on vessel navigation, stability and crowding are summarized below:

- Based on information from the 2015 Master Plan (including the layout of airport, landmass extension, MEZ, etc.), perform a Computational Fluid Dynamics (CFD) Study to determine the jet blast wind distribution in consideration of the proposed Jet Blast Deflectors (JBDs) at the end of each runway.
- Obtain dimensions of typical boats navigating in the area, from interviews with stakeholders conducted as part of the Socio-Economic study and other data collection activities.
- Comment on the effects of likely changes to waves, currents, water levels, and sedimentation caused by the proposed extension of the land mass with regard to marine

navigation, and based on the assessment results of the Marine Physical Impact Assessment.

- Perform a navigation assessment pertaining to effects on dynamic stability and maneuverability of recreational boats at the edge of the MEZ, using engineering judgement and, where appropriate, a mathematical calculation.
- Review any proposed changes to the dimensions of the MEZ and width of the Western Channel to comment on effects to marine navigation.

Based on the above, this assessment will comment on the impact of the runway and landmass extension on boat navigation when entering or exiting the Western Channel.

3.1.1 Jet Blast of the Design Airplane

A diagram of the BBTCA landmass extension and proposed MEZ is shown in **Figure 4**.

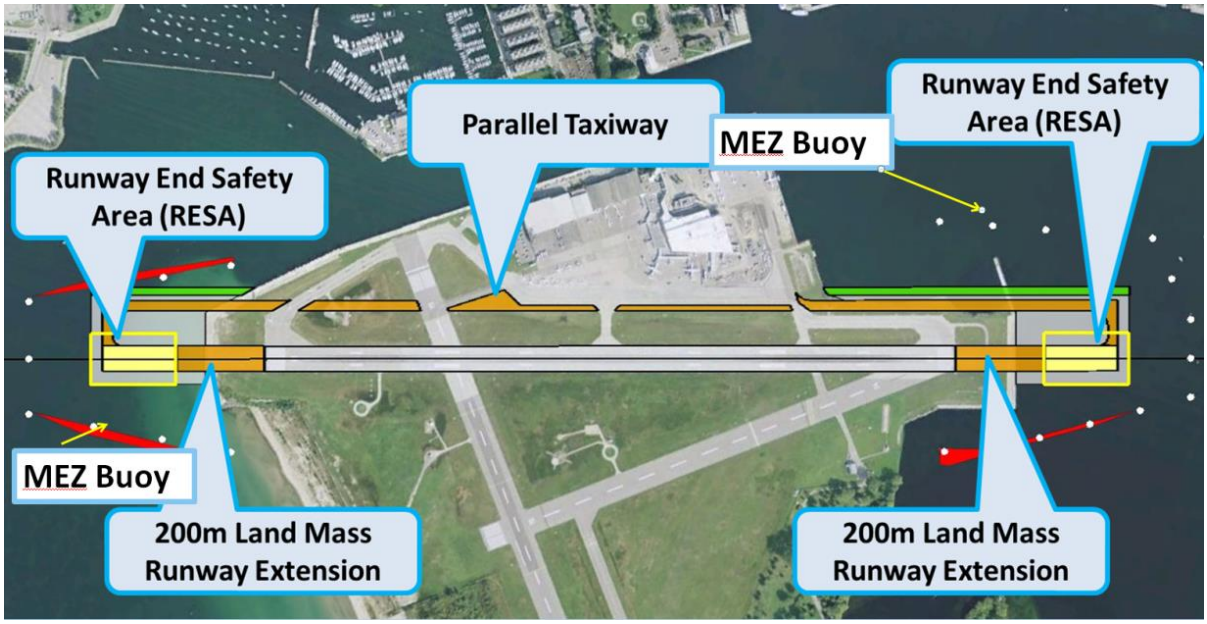


Figure 4: Airport Runway Expansion and Proposed Marine Exclusion Zone (MEZ)

A CFD Study was conducted by BDI (Blast Deflectors, Inc.) to examine potential impacts of the proposed landmass extension and new JBDs for each end of the runway.

Figure 5 below shows the modelled scenario at the west-southwest (WSW) end of the runway from different views. It can be assumed that jet blast at the east end of the runway would be similar. The CFD Study was performed to determine the velocity and pressure fields for an Airbus A320 at take-off power and to determine how the jet blast, as well as a 15 knot headwind, interact with one of the proposed JBDs at the end of the runway (BDI, 2015). The Airbus A320 was selected as it is similar to the CS100 airplane.

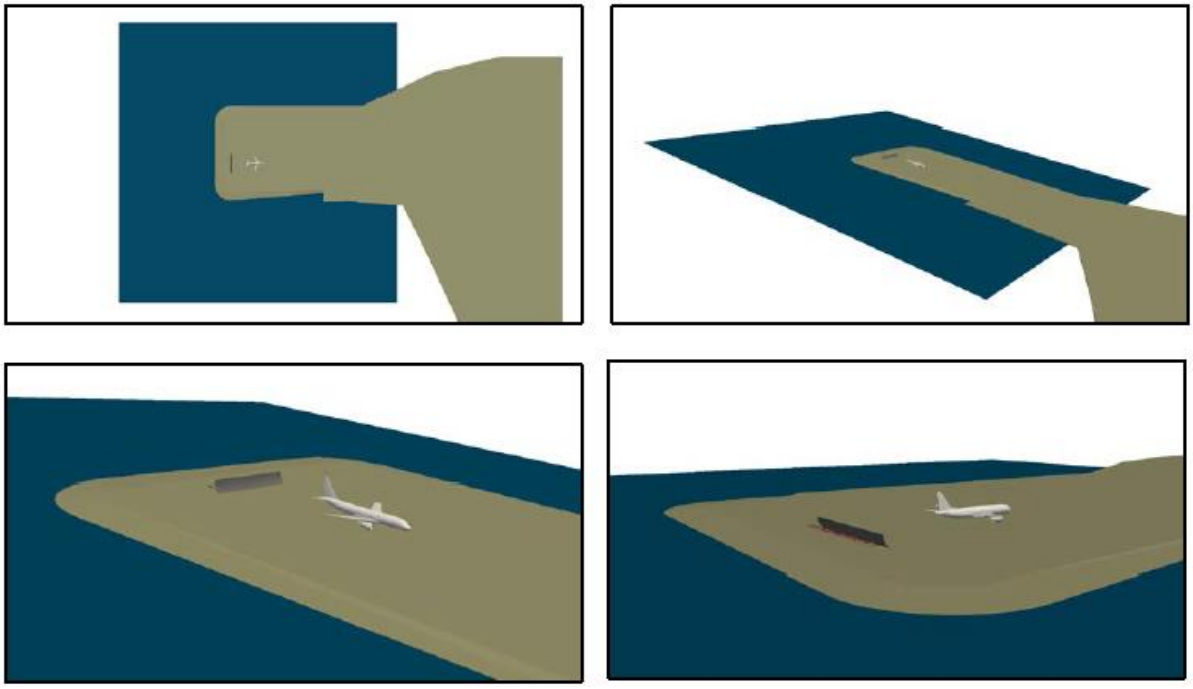


Figure 5: Plan View and Isometric Views of the 3D Solid Model of the Airport Surface, Water Surface, A320 Aircraft and JBD (BDI, 2015)

Figure 6 below shows the flow field of the airstream from the modelled airplane to the MEZ boundary.

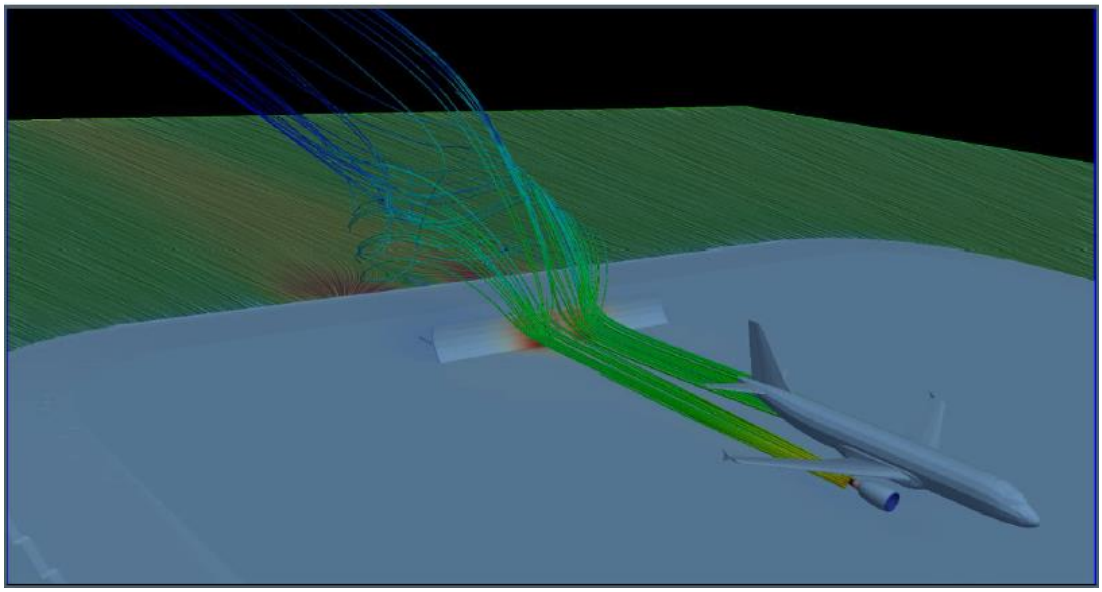


Figure 6: Isometric View of the Simulation Data Using Streamlines to View the Flow Field (BDI, 2015)

As depicted in **Figure 7**, below, the CFD Study also shows the velocity and pressure fields at the MEZ boundary due to the jet blast.

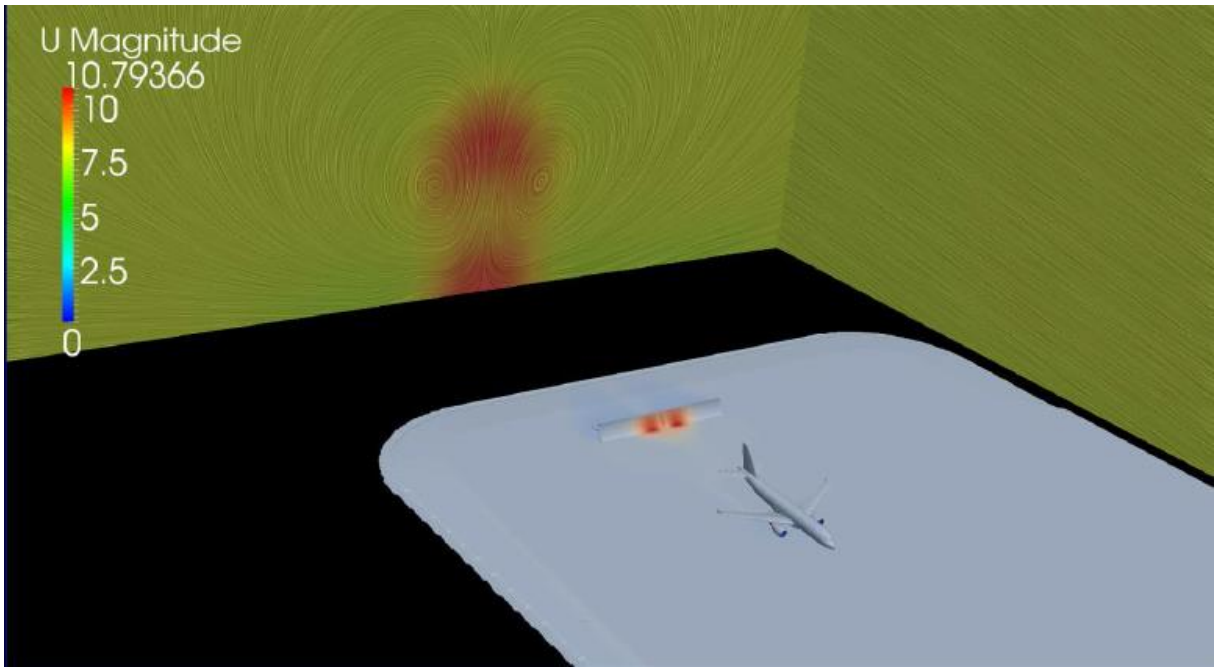


Figure 7: Elevation View of Vertical Planes of the Velocity Vector Field for a Portion of the Marine Exclusion Zone (MEZ) (BDI, 2015)

The simulation results show that the proposed JBDs would significantly lower velocity magnitudes at the MEZ boundary near the water surface. According to the CFD Study, the maximum blast wind speed with the installation of a JBD at the MEZ boundary is in the range of 7.2 m/sec to 10.8 m/sec (26 km/h to 39 km/h). The velocity magnitude at the MEZ boundary will be lower near the water surface level with the presence of the JBD than without. The proposed MEZ expansion and JBDs are shown in **Figure 8**.

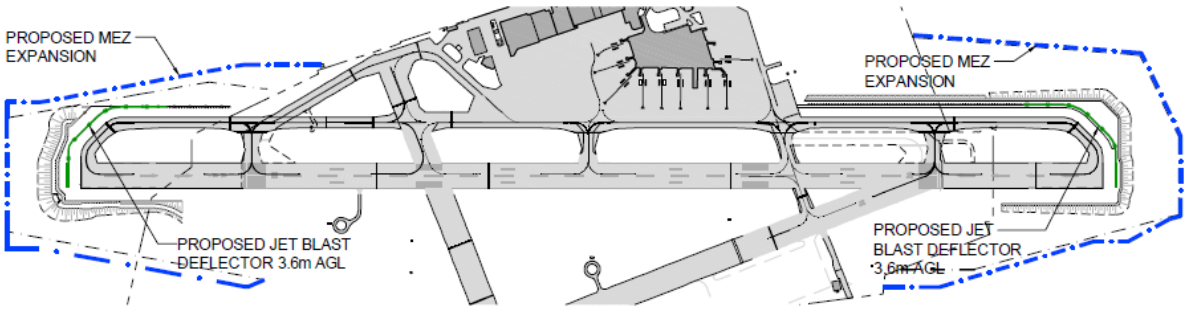


Figure 8: Proposed MEZ Expansion and Jet Blast Deflectors

Referring to **Table 1**, *Wind Distribution Frequency (number of hours) - Billy Bishop Toronto City Airport - All Months (1971 to 2014)*, the probability of background wind speed being 25 km/h or higher

is 20.63% (refer to column "%Exceed" in **Table 1** at the row corresponding with a Wind Intensity of 25-30 km/h). This means that the annual wind speed will exceed or be equal to the jet blast generated almost 20% of the time. In general, when the distance from the MEZ boundary increases, wind speed from the jet blast decreases.

3.1.2 Jet Blast Wind-Generated Waves

Wind-generated waves depend on the wind speed, duration and fetch (the distance over water of which a given wind has blown). Based on the results of an Automated Coastal Engineering System (ACES) model used to predict jet blast wind-generated waves and through engineering judgment, the jet blast wind-generated wave height at the MEZ boundary is not considered significant as the fetch is too short to generate waves with enough height to affect boat navigation. For a fetch length of 500 m (away from MEZ boundary), the jet blast wind-generated wave height is in the order 0.12 m for significant wave height, with the peak wave period in the order of 1.2 seconds or less. In general, the effect of jet blast wind-generated waves that are approximately 0.12 m for significant wave height is considered negligible as waves of this size are not large enough to impact vessel navigation.

Referring to **Table 2**, *Nearshore Wave Distribution Frequency (Hm0) - Billy Bishop Toronto City Airport - All Month (1971 to 2014)*, it can be concluded that there is approximately a 60% probability of background wind-generated waves having a wave height equal to, or greater than the jet blast wind-generated waves of 0.12 m from the design airplane (refer to column "%Exceed" in **Table 2** at the row corresponding with a Wave Height Hm0 of 0.05-0.20m).

4. Cumulative Net Effects of Future Proposed Airport Operations

The cumulative net effects analysis for the Proposed Future Scenario was assessed through a review of the dynamic stability of representative boats. This effects assessment pertains only to the Proposed Future Scenario as the predominant effect for marine navigation is wind-generated jet blast. The discussion regarding effects from the increase in the size of the MEZ also relates only to the Proposed Future Scenario as the MEZ is not proposed to expand under the Future Baseline Scenario.

4.1 Impact Assessment of Jet Blast and Landmass Extension on Marine Navigation

4.1.1 Representative Recreational Boats

The recreational boats described in **Table 3** were selected to assess the impact of jet blast on the dynamic stability of common recreational vessels which frequent the Western Channel.

Table 3: Main Dimensions of Representative Vessels

Category	Boat	Length (L.O.A) [m]	Width (Beam) [m]	Draft [m]
Canoe	Canoe 680	6.8	0.72	0.19
Sailing Boat	Sail Boat 34feet Sloop	6.8	0.72	2.2
Motorboat	Heavy-Duty Motorboat	14.0	4.7	0.9

Notes: LOA refers to Length of Overall, which is the maximum length of a boat's hull measured parallel to the waterline. The draft of a ship's hull is the vertical distance between the waterline and the bottom of the hull. Vessel dimension data were obtained from Delftship marine software.

4.1.2 Dynamic Stability

When considering the effect of jet blast wind on the navigation of recreational boats, the dynamic stability of boats is the most important factor for navigation safety.

Dynamic stability is the boat's ability to resist external heeling forces (i.e., the force causing the boat to tilt to one side). When a boat is exposed to a heeling moment (i.e., the heeling force multiplied by the distance to the longitudinal axis of a boat), the boat will incline. The relationship between the angle of heel (i.e., the angle of the tilt) and the righting moment (i.e., restoring a boat to its previous position) of a boat is called the Righting Moment Curve, as shown in **Figure 9**.

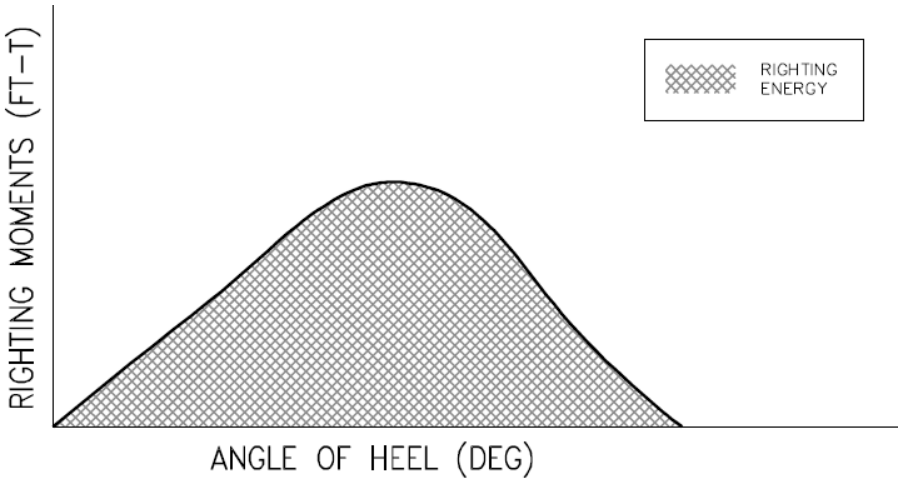


Figure 9: Righting Moment of a Boat

The area under the Righting Moment Curve is referred to as the Righting Energy the boat possesses or the boat's ability to right itself. The heeling moment curve can be projected onto this Righting Moment Curve to determine the maximum beam winds and waves the boat can withstand, as shown in **Figure 10**.

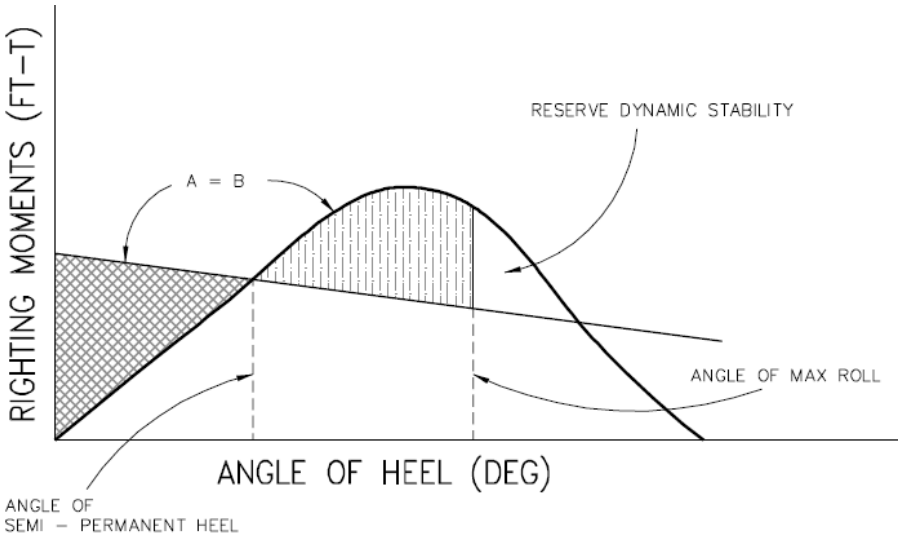


Figure 10: Heeling Moment and Dynamic Stability

If a boat experiences a constant beam wind, the boat will incline and the righting moment will increase with the increase of the angle of roll. When the righting moment equals the heeling moment, the boat will stop to incline and this corresponding roll angle is called a static angle of heel or semi-permanent heel.

When a boat is exposed to a sudden (or instantaneous) heeling moment (such as wind gust or jet blast) the boat will incline with certain angular velocity. The boat will continue to incline until the righting energy equals the heeling moment energy; this corresponding roll angle is called dynamic angle of heel (also known as the angle of maximum roll).

In general, the dynamic angle of heel is much larger than the static angle of heel. The larger the rotation angle (i.e., the dynamic or static angle of heel) of a boat, the less favourable the boat's stability. Therefore, the dynamic stability is more critical for the vessel's overall stability.

The reserve dynamic stability is the righting energy which enables the boat to withstand any additional heeling moment. If the heeling moment continues to increase and the righting energy is diminished, the boat will be in danger of capsizing.

4.1.3 Assessment the Impact of Jet Blast Wind on Boat Dynamic Stability

To assess the effects of jet blast wind on the dynamic stability of recreational boats, both the heeling moment of jet blast wind and the righting moment curves of representative boats need to be considered.

Based on the ISO 12217-1 standard (2013), the heeling moment due to wind can be calculated using formula below:

$$M_W=0.30A_{LV}(A_{LV}/L_{WL}+T_M)V^2$$

Where

- A_{LV} is the windage area (i.e., the projected wind area for the assessment of wind caused force on a boat) (but not less than $0.55L_HB_{H,}$ in which, L_H and B_H are the length and width of boat);
- L_{WL} is the length of boat at water surface;
- T_M is the draught at the mid-point of the waterline length, expressed in meters;
- V is the wind speed.

The righting moment curves for each of the representative boats are derived using the boat dimensions listed in **Table 3** and the formula above. **Figure 11** shows the righting moment curve for a Heavy-duty Motorboat under a fully loaded condition, as an example.

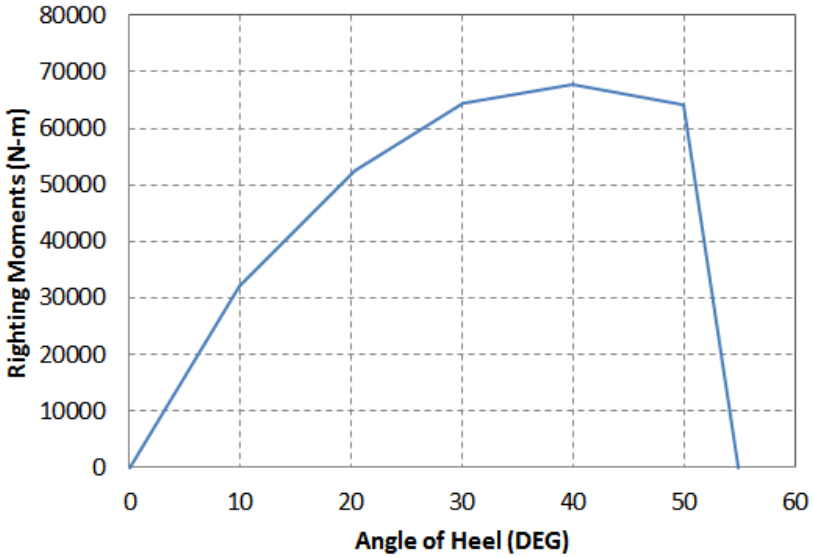


Figure 11: Righting Moment Curve for a Heavy-duty Motorboat under a Fully Loaded Condition

The heeling moments due to jet blast winds for each vessel and the corresponding dynamic angles of heel under different load conditions are summarized in **Table 4** below. The 'Dynamic Angles of Heel' and 'Maximum Allowable Angles of Heel' in the columns of **Table 4** are estimated using Delftship marine software. The Maximum Angle of Heel is the angle at which the boat would lose stability.

Note that the weight assigned is based on the ISO Standard.

Table 4: Dynamic Stability Assessment of Recreational Boats

Boats	Load Condition	Heeling Moments (N·m)	Dynamic Angles of Heel (degree)	Maximum Allowable Angles of Heel (degree)
Canoe 680	Fully Loaded (2 People +Equipment + Full Supply)	70	Critical	40
	Light Loaded (1 People +Equipment)	75	Unstable*	45
Sail Boat 34 feet Sloop	Fully Loaded (1 People + Equipment+ Full Supply)	1510	12	15
	Light Loaded (1 People + Equipment)	1510	12	15
Heavy-Duty Motorboat	Fully Loaded (2 People + Equipment+ Full Fuel+ Full Supply)	1911	8	55
	Light Loaded (1 People + Equipment+ Limited Fuel)	1917	8	55

Notes: *Heeling Moments – refers to the moment acted on a boat due to jet blast wind.*

Dynamic Angles of Heel – refers to the angle at which a boat will incline with certain angular velocity when it is exposed to an instantaneous heeling moment due to jet blast wind. The boat will continue to incline until the righting energy equals the work of the heeling moment. The corresponding roll angle is called the dynamic angle of heel.

Maximum Allowable Angles of Heel – refers the angle at which if exceeded the boat will become unstable. When dynamic angle of heel is smaller than the maximum allowable angles of heel, in the viewpoint of heel, the boat is considered safe.

Motor Canoe 680 can remain stable up to wind speed of 5.5 m/s.

Based on the above assessment, the impact of jet blast wind on small recreational boats (i.e., boats similar to the Canoe 680) is significant when these boats are close to the MEZ boundary, as depicted in **Figure 12** below at the 380 m area at the edge of the MEZ. As per **Table 4** above, the canoe could be unstable or at risk of capsizing at the edge of the MEZ boundary when jet blast wind is in the range of 7.2 to 10.8 m/sec.

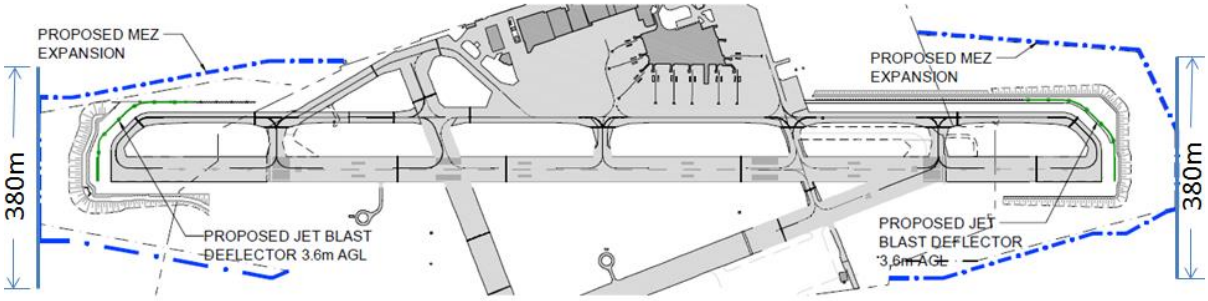


Figure 12: Assessment of Dynamic Stability of Boats along MEZ Boundary (380 m)

For large recreational boats, such as the Sail Boat or the Heavy-Duty Motorboat, the impact of jet blast wind on the dynamic stability of these recreational boats is limited, and these boats can therefore be considered stable at the MEZ boundary.

4.2 Impact Assessment of the Runway Extension on Maneuverability

The proposed MEZ boundary and the entrance at the Western Channel are shown in the **Figure 13**.

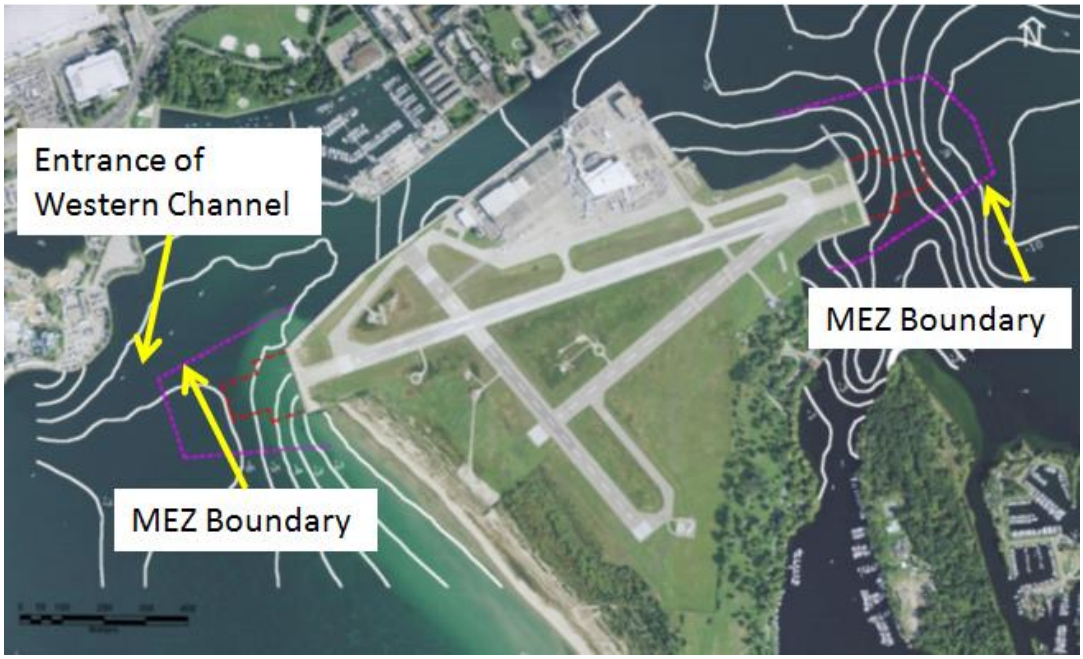


Figure 13: MEZ Boundary and Entrance of Western Channel (WSP, 2014)

Compared to the existing conditions, the width of the entrance to the Western Channel is considerably decreased with the proposed MEZ expansion by 10-25 m in width. The expansion of the MEZ could make the maneuverability of the Western Channel more challenging than local recreational boaters currently experience. The impact of the expansion of the MEZ in the Inner Harbour can be considered negligible, as the increase is not anticipated to impact the current conditions recreational boaters experience. Therefore, the following sections discuss changes to the maneuverability of the Western Channel due to the expansion of the MEZ and effects to the local bathymetry.

4.2.1 Marine Physical Impact on Maneuverability

Based on the results of the Marine Physical Assessment of the EA, changes to erosion and sediment deposition could include an initial barrier to sediment transport northward along the western shoreline of Hanlan's Point Beach. Short term impacts include increased sediment deposition at the northern end of Hanlan's Point Beach, with sediment loss occurring in the Western Channel and areas to the east of West Island. Sediment starved areas where bank protection is not present may experience some erosion along the shoreline. Susceptible areas will need to be confirmed in the field.

Over time, sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the Western Channel. Although detailed numerical modelling is required as part of the detailed design stage in order to determine the locations, rates and volumes of sediment accumulation and scour, short term local erosion and deposition linked to barrier induced sediment transport disruption may occur. Given that sediment deposition in the Western Channel is not anticipated, effects to maneuverability from erosion and sedimentation in the Western Cannel are considered negligible.

4.2.2 Effect of Modifications of the MEZ on Maneuverability

The proposed expansion of the MEZ boundary by 10-25 m in width will reduce the available navigable area at the Western Channel entrance. Through the interviews conducted in the summer of 2015 as part of the socio-economic scope of work for the EA, some respondents indicated that recreational boating into and out of the Western Channel is already challenging due to the narrow width of the entrance. A further reduction of the width of the entrance would make the navigability of the Western Channel entrance more difficult. Furthermore, it is noted above that small recreational boats should avoid the edge of the MEZ due to potential issues with dynamic stability; this will further reduce the area for boats to navigate the Western Channel entrance.

4.2.3 Boat Maneuverability

In general, the effect of wind on boat maneuverability varies according to the boat's characteristics (type, size, shape, draft, rudder, etc.) and the ratio of wind speed and boat ground navigation speed.

Though jet blast wind can affect boat maneuverability (drift and rudder angles) at all speeds, it will have its greatest effect at low boat speeds. In the case of weak relative wind (i.e. when the wind speed is less than two (2) times the ground navigation speed) the boat is balanced at any straight course at very small values of the rudder and drift angle. When the wind speed is several times (such as five times more) the ground navigation speed, the balancing drift angle will be relatively large and the required rudder angle can be as high as 35 degrees. If the latter is the maximum rudder angle for the given boat, the boat could lose controllability. For navigation safety, the allowable

maximum rudder angle for a given boat should not be used, because additional external factors (environment) could affect its performance and staying within this margin is necessary for safety.

4.3 Conclusions

The findings and conclusions of this navigation assessment study are summarized as follows:

- The jet blast wind speed generated by the design airplane at the MEZ boundary is in the range of 7.2 m/sec to 10.8 m/sec (26 km/h to 39 km/h) after the jet blast deflector is installed;
- The impact of jet blast wind speed by the design airplane on the dynamic stability of small recreational boats, such as canoes, is significant when these boats are located close to the MEZ boundary. To safely navigate, these small recreational boats should avoid the MEZ boundary;
- The impact of jet blast wind speed by the design airplane on the dynamic stability of large recreational boats is limited even when these boats are located close to the MEZ boundary;
- The impact of the runway extension on boat maneuverability at the entrance of the Western Channel is considerable for small recreational boats given that these boats need to avoid the MEZ boundary;
- The impact of the runway extension on boat maneuverability at the entrance of the Western Channel is limited for large recreational boats.

4.3.1 Net Effects Analysis

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Recreation – Boating	▶ Impacts of jet blast, wake turbulence, and altered wave conditions on stability (also referred to as the dynamic stability) of vessels.	▶ The jet blast wind speed generated by the design airplane at the MEZ boundary is in the range of 7.2 m/sec to 10.8 m/sec (26 km/h to 39 km/h) after the jet blast deflector is installed.	▶ No anticipated changes to proposed future considerations and assumptions.	▶ Jet blast wind speed at the edge of the MEZ boundary could cause small recreational boats to become unstable or to be at risk of capsizing when the jet blast wind is in the range of 7.2 m/sec to 10.8 m/sec. ▶ The impact of the runway extension on the dynamic stability of large recreational boats is limited even when these boats are located close to the MEZ boundary.	▶ Consider extending the MEZ boundary on the east side of the runway extension to protect small recreational boats from instability. ▶ No mitigation is available for small recreational boats on the west side of the runway extension as there is limited space to further expand the MEZ boundary. ▶ Post a notice indicating that small recreational boats should avoid the MEZ boundary.	▶ The net effect of jet blast wind on the dynamic stability of small recreational boats is significant at the edge of the MEZ boundary. ▶ The net effect of jet blast wind on the dynamic stability of larger recreational boats is not considered significant at the edge of the MEZ boundary.
Recreation – Boating	▶ Changes to the ability of boats to navigate the Western Channel and close to the runway extension (also referred to as the maneuverability of a vessel).	▶ Land mass extension of 200 m on each end of the main runway. ▶ Proposed expansion of MEZ boundary at west side and east side of runway extension.	▶ No anticipated changes to proposed future considerations and assumptions.	▶ Navigating the entrance to the Western Channel is already challenging for some recreational boaters. ▶ Small recreational boats will be further constrained at the entrance to the Western Channel as they must avoid the MEZ boundary. ▶ Larger recreational boats will not be as constrained as small recreational boats as they do not have to avoid the MEZ boundary; however, they will still experience further challenges with navigating the already narrow entrance to the Western Channel.	▶ No mitigation is available to ease the challenge of navigating the entrance to the Western Channel.	▶ The net effect of the runway extension on maneuverability in the Western Channel is significant for both small and large recreational boats.

5. References

Billy Bishop Toronto City Airport Runway Design.

Billy Bishop Toronto City Airport 2015 Master Planning Exercise.

BS EN ISO 12217-1: 2013 Small craft – Stability and buoyancy assessment and categorization – Part 1: Non-sailing boats of hull length greater than or equal to 6 m, The British Standards Institution 2013, ISBN 9780580692406.

BS EN ISO 12217-2: 2013 Small craft – Stability and buoyancy assessment and categorization – Part 2: Sailing boats of hull length greater than or equal to 6 m, The British Standards Institution 2013, ISBN 9780580692413.

BS EN ISO 12217-3: 2013 Small craft – Stability and buoyancy assessment and categorization – Part 3: Boats of hull length less than 6 m, The British Standards Institution 2013, ISBN 9780580692420.

CH2M HILL Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments.

Dr. Davidson-Arnott, R., 2013. Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment.

Draft Report of Coastal Environment Study Supporting the Expansion of Billy Bishop Airport, WSP Canada Inc., June 2015.

Stakeholder interviews conducted as part of the Socio-Economic study for this EA (regarding typical boat size, length and width).

WSP, 2014. Initial Conceptual Proposal Figure. Welcome to BBTCA Runway EA Public Meeting #1 Presentation. Prepared for PortsToronto.

AECOM

Appendix C-5

Marine Physical Effects Assessment

AECOM
105 Commerce Valley Drive West, Floor 7 905 886 7022 tel
Markham, ON, Canada L3T 7W3 905 886 9494 fax
www.aecom.com

Memorandum

To	Marc Rose, AECOM	Page	1
CC	George Heritage and Julia Cushing, AECOM		
Subject	Marine Physical Impact Assessment Cumulative Net Effects Assessment		
From	Rhonneke Van Riezen, AECOM		
Date	November 9, 2015	Project Number	60328546

1. Description of the Potentially Affected Environment – Current Conditions

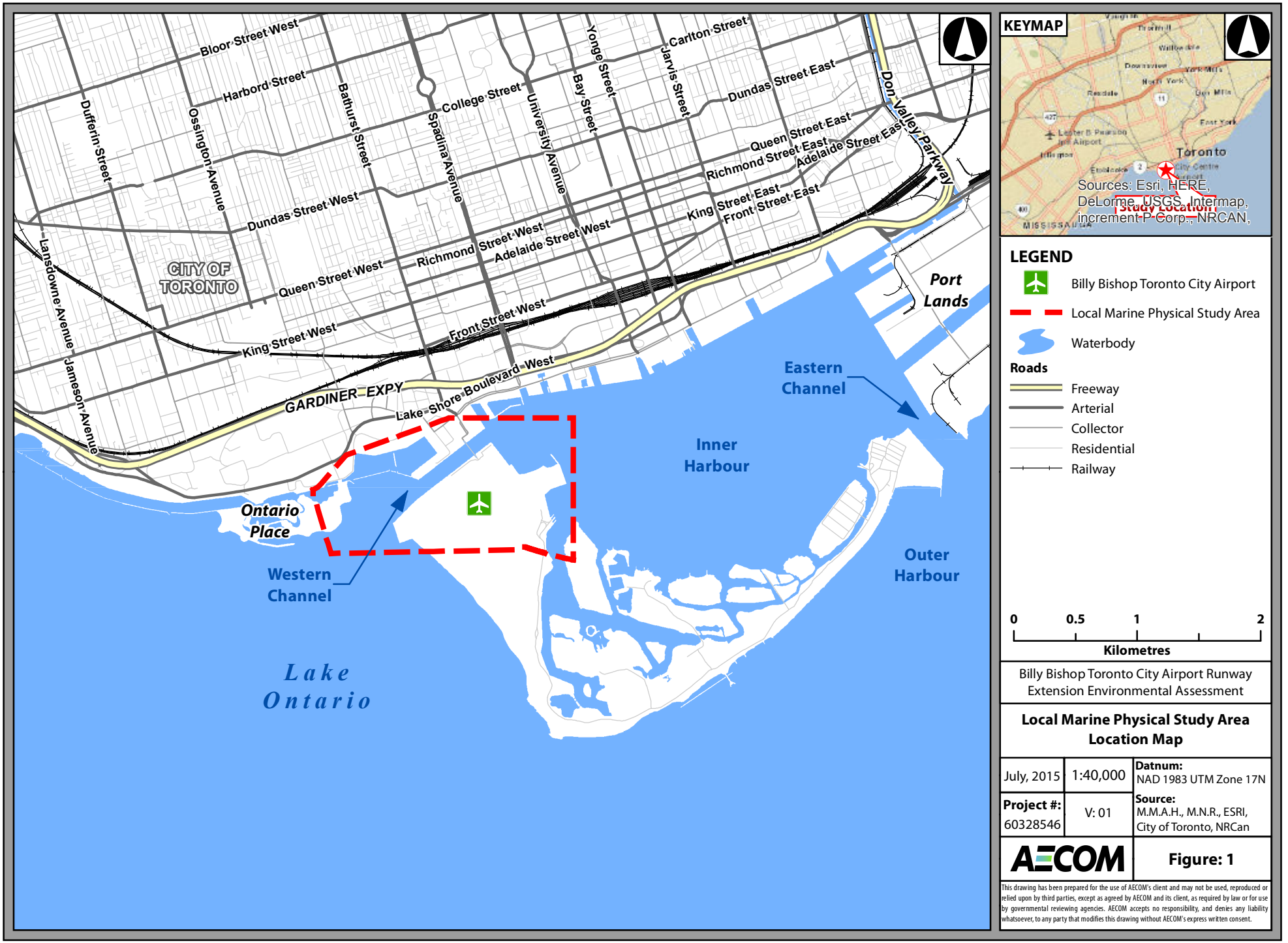
The purpose of this analysis is to review existing, relevant background information to document effects to the marine physical environment in the Local Study Area. A qualitative review of existing background information, as well as expert judgement will be used to document existing conditions and identify potential changes resulting from the proposed landmass extension. Air photo analysis is also fundamental in identifying local conditions and processes occurring within the study area. Specific objectives of this assessment are to:

- Gather and review existing information and data on wave formation, water levels, currents, and sediment transport as changes can affect water quality, circulation, sediment transport, and navigation.
- Complete an air photo analysis to assist in the identification of sediment sources, sediment transfer, and sediment deposition locations within the Local Study Area.
- Assess implication of landmass extension on sediment transport and depositional processes within the Local Study Area.
- Identify the boundaries and methodology required to complete a numerical model that will assess the effects of the land mass extension based on the detailed design, should the proposal be approved.

1.1 Marine Physical

1.1.1 Study Area

The study area for this current assessment is defined as the 'Local Study Area'. This includes the areas in the immediate vicinity of the land mass extension, including the west and east ends of Runway 08-26, The Western Channel, and the eastern shoreline of the West Island (**Figure 1**). If the proposal is approved, additional studies are recommended during the detailed design phase to document the effects in the Regional Study Area, which includes the Inner Harbour and the Eastern Channel.



Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

Local Marine Physical Study Area Location Map

July, 2015	1:40,000	**Datnum:** NAD 1983 UTM Zone 17N
Project #: 60328546	V: 01	**Source:** M.M.A.H., M.N.R., ESRI, City of Toronto, NRCan

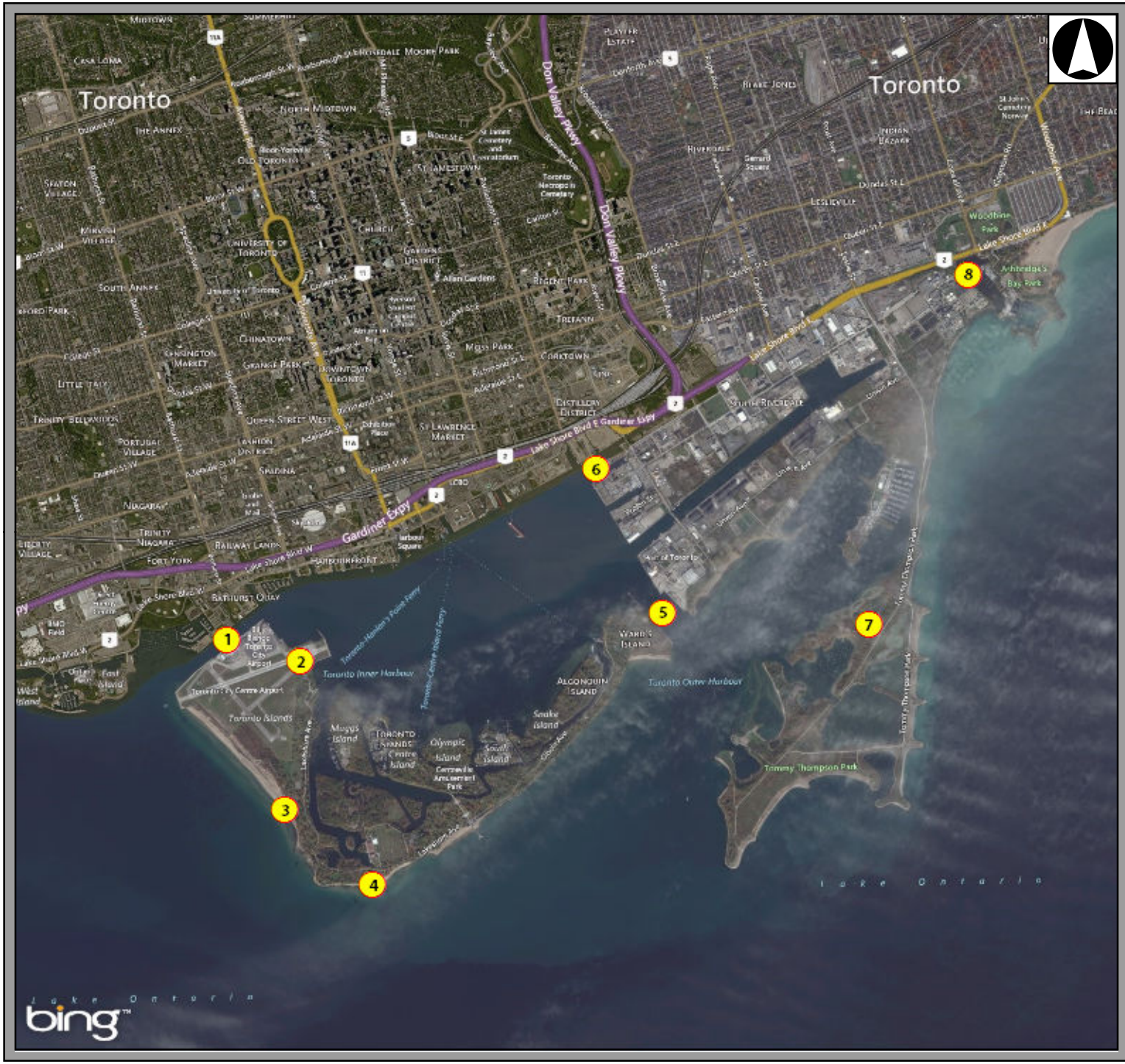
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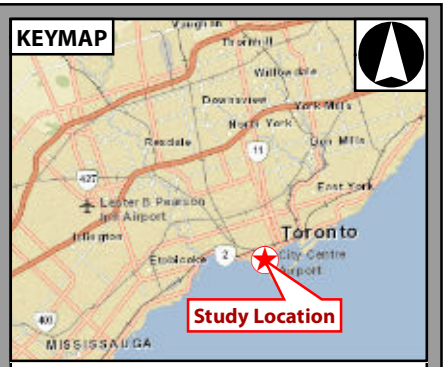
Figure: 1

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Drawn By: S.P.O.

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LEGEND

Numbered Map Features

1. Western Channel
2. Runway 08-26
3. Hanlan's Point Beach
4. Gibraltar's Point
5. Eastern Channel
6. Keating Channel
7. Leslie Street Split
8. Ashbridge's Bay

0 0.5 1

Kilometres

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

Location of Billy Bishop Toronto city Airport and Surrounding Features

July, 2015	1:50,000	**Source:** Microsoft, ESRI
Project #: 60328546	V: 01	
AECOM		**Figure: 2**

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1.1.2 Description of Existing Conditions

A background review of previous environmental reports for the Billy Bishop Toronto City Airport (BBTCA) has been completed to summarize existing information and identify remaining data gaps.

The following reports were reviewed:

- CH2M Hill Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments. Prepared for the City of Toronto.
- Davidson-Arnott, Robin. 2013. Peer Review of Porter Airlines Runway Extension Proposal Review – Coastal Processes and Environments.
- Dewey, Ray. April 2012. Toronto Inner Harbour Water Quality Modelling Report.
- Dillion Consulting Limited, 2012. Lakefill with Marine Exclusion Zone (keep out area) – Toronto Harbour – Draft Environmental Screening Report.
- Shoreplan Engineering Limited, December 2007. Gibraltar Point Erosion Control Project – Coastal Engineering Component.
- WSP Canada Inc. 2015. Draft Report: Coastal Environment Study Supporting the Expansion of Billy Bishop Airport.

1.1.2.1 Shoreline Morphology

Baird and Associates (2012) describe the formation of the Toronto Islands as occurring in the late-glacial and post glacial period by sediment supplied to Lake Ontario by rivers and erosion along the Scarborough Bluffs (refer to **Figure 2** for general locations). This formed the sand spit that extended from Ashbridge's Bay to the Toronto Islands due to the westerly direction of sediment transport (**Figure 3**).



Figure 3. Figure taken from Baird and Associates (2012) showing Toronto Harbour in 1906

The Toronto Islands are located in a physiographic region known as the Iroquois Plain and consists of clay till deposits and sand deposited in glacial Lake Iroquois (Dillion, 2012). Bedrock geology is of Upper Ordovician age Georgian Bay Formation, which consists of shale, limestone, dolostone and siltstone. Geotechnical investigations describe the overburden and bedrock to consist of approximately 8 m of silty sand fill, underlain primarily by shale with minor interbedded siltstone and limestone of the Georgian Bay Formation that slopes gently to the south (Dillion, 2012). Observations

made from shore by Dillion (2012) indicate that substrate within the Marine Exclusion Zone (MEZ), located at the end of the runway, consists primarily of silt with some limestone riprap close to shore. Historical boreholes from Toronto Harbour show that the lakebed consists of sand and mud deposits, varying in thickness from ~1 m to 10 m, overlying bedrock (Dillion, 2012).

The north, east, and west shores of the Toronto Inner Harbour consist of lakefill and are protected by timber cribs, concrete walls, and steel sheet piling (Baird and Associates, 2012). The south side of the harbour consists of sand deposits and is also protected with revetments and seawalls and therefore does not erode in response to wave action nor does it represent a sediment supply within the harbour (Baird and Associates, 2012).

Figure 4 shows the locations of hardened shorelines within the Inner Harbour, taken from Baird and Associates (2012). Shoreline changes on Hanlan's Point Beach were assessed by CH2M Hill (2013) using available aerial images. It was found that the shoreline extended into the water through the process of accretion at an average rate of 1.70 m/yr between 2002 and 2009 due to nearby longshore sediment transport. The validity of this statement is questioned by Davidson-Arnott (2013) suggesting that the potential error on shoreline mapping could be in the order of 10 to 20 m, due to the fact that seasonal lake level change and daily wave activity were not considered. As described in **Section 1.1.2.1,** a review of the historical aerial photographs concurs with the statement made by Davidson-Arnott (2013).



Figure 4. Figure taken from Baird and Associates (2012) showing locations of hardened shorelines within the Inner Harbour.

1.1.2.2 Sediment

The protected shorelines, the regular dredging of the Keating Channel and the limited sediment transport through the Eastern and Western Gaps results in very few sources of sediment (refer to **Figure 2** for general locations). Construction of the Leslie Street Spit (the "Spit") began in the late 1950s using fill, and today dredged material from the Inner Harbour and Keating Channel is placed within three embayments. The Spit now forms a major barrier to littoral transport from the east (Baird and Associates, 2012). Given that the net direction of sediment transport is in a westerly direction, the Spit now forms an area of deposition (Baird and Associates, 2012). Turbid water identified in the Toronto Outer Harbour in recent satellite imagery (2015, Microsoft Corporation) would suggest that some suspended material is continuing to move past the spit.

Sediment samples analyzed for grain size distribution as part of the Gibraltar Point Erosion Control project (TRCA, 2008) identified the average median grain size close to the western end of the runway as 0.23 mm. Thus, the sediment in this region is predominantly fine sand. Results of the analysis completed by Shoreplan (2007) indicate that the alongshore sediment transport rate in front of the western end of Runway 08-26 is approximately 7,400 m^3/year.

1.1.2.3 Currents

According to Baird and Associates (2012), wind generated surface currents may be estimated as about 3 percent of the wind speed (e.g., British Standards, 1984). For example, during the 1-year return period wind speed of 18.9 m/s surface currents are estimated to be 0.6 m/s. Quantification of current speed and direction within the study area will be refined during the proposed numerical modelling. The air photo analysis completed in **Section 1.1.3** provides a general assessment of flow patterns through the identification of erosional, depositional, and sediment transport areas.

1.1.2.4 Wave Formation

A one dimensional wave hindcast was completed using 39 years of wind data (1973 – 2012) collected from the Toronto Island Airport for the Inner Harbour (Baird and Associates, 2012). The winds from the southwest quadrant were not included due to the presence of the islands in relation to the study site within the Inner Harbour. Wind data for this study were not corrected for the overwater effects and assumed to be at an elevation of 10 m, although the station elevation was stated as 76.5 mASL (meters above sea level). The results from this study showed that significant wave heights are less than 0.4 m, 98% of the time within the Inner Harbour (Baird and Associates, 2012). The maximum wave height is 0.9 m propagating from the east (90°) while the most frequent wave directions are from the northwest (292.5 - 315°) and northeast-east (45 - 90°). Due to the possible errors in wind data used for this study, it is recommended that further refinement of these wind data be completed.

Shoreplan (2007) used wave hindcasting to estimate the wave climate offshore, where changes to water depth do not affect wave generation and propagation, for the Gibraltar Point erosion control project. Wind data that were recorded over a 33 year period (January 1973 to December 2005) at the BBTCA were used to predict wave conditions that would have been generated by those winds. It is noted that the wind speeds were scaled up by 20% based on extensive hindcast calibrations carried out on past projects (Shoreplan, 2007). Wind speed data should be reviewed and assumptions need to be validated through review of hindcasting.

This study found that generally the offshore wave height and the wave energy distributions showed two distinct peaks, one from the east and one from the southwest, and that there is significantly more wave energy associated with the easterly peak than the southwesterly peak (Shoreplan, 2007). To determine design wave conditions an extreme value analysis was completed and the 1:100 year condition has a significant wave height coming from the east of approximately 6.0 m and a peak wave period of 11 seconds. The southwesterly condition showed a significant wave height of 4.5 m with a peak wave period of 9 seconds for the 1:100 events (Shoreplan, 2007).

WSP (2015) used a wave hindcast model to generate the offshore wave climate for the BBTCA using wind measurements from the airport (1971 – 2014). A maximum wave height in the order of 4 to 4.5 m was provided by the wave hindcast model. East-northeast, east, southwest, west-southwest, and west were found to be the most frequent incoming direction and maximum wave height, with the southwest identified as the dominant wave direction.

The range of results for wave height and wave direction within the background documents reinforces the necessity to validate all the assumptions within the studies before the best results can be identified.

Shoreplan (2007) also assessed the nearshore wave climate around Gibraltar Point at the southernmost end of Hanlan's Point Beach by transferring offshore wave hindcast data from deep water into the nearshore area using DHI's MIKE21 Parabolic Mild Slope (PMS) numerical wave transformation model. Results showed that moving from an east to west direction around Gibraltar Point, the dominant portion of the wave energy distribution progressively changes from the easterly peak to the southwesterly peak (Shoreplan, 2007). Wave movement provides the energy to erode, transport, and deposit sediment and Shoreplan (2007) estimated the nearshore wave climate data from thirteen nodes. Node 13 is the closest nearshore point to the western extension of BBTCA, but wave conditions for Node 9 are more representative of conditions near the runway due to the fact that waves from the southwest direction are dominant near the western end of the runway (CH2M Hill, 2013). **Figure 5** shows the location of these nodes.

WSP (2015) also states that the nearshore waves are confined within a small direction range between southeast and west-southwest, with southwest identified as the most frequent incoming wave direction and where the maximum heights were observed.

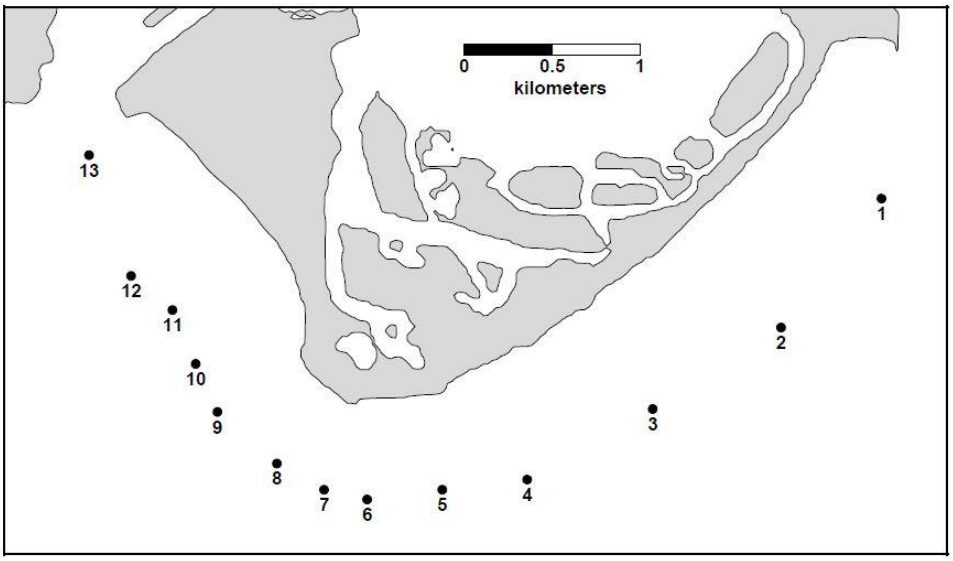


Figure 5. Figure taken from Shoreplan (2007) showing the location of 13 nearshore wave climates considered for the Gibraltar's Point Erosion Control Project. Each dot represents the location of the node.

1.1.2.5 Water Levels

Annual and seasonal water level variations occur in Lake Ontario due to climatic conditions and storm events. In the Inner Harbour, historic water level variations between maximum and minimum hourly levels is approximately 2 m, and in a typical year a variation of about 1 m occurs in lake levels with the low occurring in the Fall and the high point in the Summer (Baird and Associates, 2012). Hourly digital water level data (Toronto Gauge, Jan 1962 to Dec 2001) were analyzed in order to estimate extreme high water levels as a function of return period (Baird and Associates, 2012). In the analysis, storm surge events were separated out from the hourly water level records and the peak surge events were identified. Annual maximum average monthly water level was determined, and a combined probability analysis was performed to estimate the maximum monthly mean, surge and combined water level as a function of return period (Baird and Associates, 2012). The results are shown in **Table 1** below.

Table 1. High Water Levels as a Function of Return Period (m IGLD 1985)

Period	Water Level	Return Period (years)				
		5	10	25	50	100
Full Year	Static	75.34	75.47	75.62	75.73	75.84
	Surge	0.20	0.22	0.24	0.25	0.26
	Combined	75.51	75.64	75.78	75.89	75.99
Boating Season	Static	75.34	75.46	75.59	75.68	75.76
	Surge	0.15	0.17	0.19	0.20	0.21
	Combined	75.47	75.58	75.71	75.80	75.87

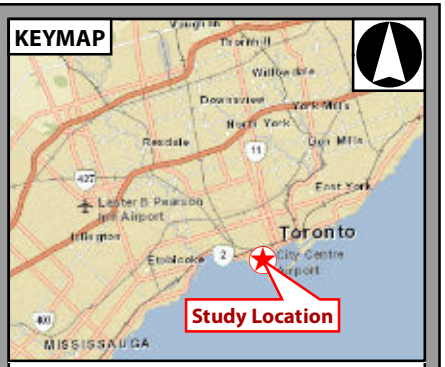
Source: Baird and Associates, 2012

1.1.3 Air Photo Analysis

In addition to the review of relevant background information, an aerial photograph assessment was completed. Shorelines are dynamic features that erode, transport and deposit sediment. Aerial photographs of the study area taken in 1950, 1960, 1970, and 1990, as well as a 2015 satellite image (2015, Microsoft Corporation) were reviewed for evidence of submerged sediment movement, shoreline deposition, and shoreline sediment erosion to help identify where sediment is coming from, where it is moving, and where it is depositing (**Appendix A**). The results are summarized in **Table 2** and the following sections discuss the key features identified during the air photo analysis.

The four epochs covered by the five aerial images show similar results of sediment movement, deposition, and erosion within the Study Area and are consistent with results identified in earlier studies (refer to **Appendix A**). Image quality on the aerial photographs was variable and occasionally poor due to the resolution and scale of the photograph; the results of the air photo analysis should be confirmed in the field, which can be completed during the detailed design stage. Each of the aerial photographs show some evidence of sediment movement off the coast of Hanlan's Point Beach in the form of submerged dunes. Indicators of stable deposition appear to be present along the western shoreline with the presence of vegetated dunes. Evidence of erosional areas also appears to occur in the same area throughout all the analysis years and is located at the southern end of the western shoreline and Gibraltar's Point. Turbid areas occur off the western shoreline, within the Western Channel, and also within the Inner Harbour (**Figure 6**).





LEGEND

Numbered Map Features

1. Dredged
2. Sediment Depositional Area
3. Erosional Area
4. Dredged
5. Sediment Depositional Area
6. Sediment Depositional Area

Sediment Transportation Direction

0 0.5 1
Kilometres

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

Location of Billy Bishop Toronto city Airport and Surrounding Features Part 2

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The air photo analysis shows that sediment eroding from the southern end of the Hanlan's Point Beach and Gibraltar's Point is likely being transported northward along the western shoreline, eventually making its way into the Western Channel. The 1950 aerial photograph shows that the northern end of Hanlan's Beach appears to be much narrower than the more recent years. The deposition of sediment likely resulted from the landmass extension that occurred around 1960 (Refer to **Figures A1** and **A2** in **Appendix A**).

Review of the historical aerial photographs concurs with the statement made by Davidson-Arnott (2013) in **Section 1.1.2.1**. A more detailed study should be conducted during the detailed design stage to review the lake level variation as depicted in the aerial photographs of record to confirm any shoreline changes.

The majority of the shorelines within the Inner Harbour is protected and therefore would not supply sediment within the harbour. Areas within the Inner Harbour were identified as turbid based on the air photo analysis and likely sources include the Western Channel, as well as the inner channels within the island, which will not be altered by the proposed landmass extension.

Table 2. Historic Observations of Sediment Characteristics Identified within the Study Area

Date of Imagery	Summary of Sediment Characteristics Identified in Aerial Photographs
9/71950 **Figure A1**	▪ Two runways present, Runway 08-26 is not present as it has not been constructed yet. ▪ Evidence of submerged sediment movement includes the presence of dunes that can be seen under the water along the western shore at Hanlan's Point Beach. ▪ Evidence of sediment deposition includes the vegetated dunes along the middle portion of the shoreline of Hanlan's Point Beach. ▪ Steep and/or narrowed beach profiles can be seen at both the north and south ends of Hanlan's Point Beach, indicating an erosional area. ▪ Turbid water can be seen both offshore of Hanlan's Point Beach, as well as within the Inner Harbour.
4/29/1960 **Figure A2**	▪ This air photo shows what looks to be the construction of runway 08-26. Landmass extensions can be seen on both sides. ▪ Evidence of submerged sediment movement includes the presence of dunes that can be seen under the water along the western shore at Hanlan's Point Beach. ▪ Vegetated dunes are difficult to see in this aerial photograph as it was taken in April, prior to vegetation emerging. ▪ Steep and/or narrowed beach profile can be seen at the south end of Hanlan's Point Beach, indicating an erosional area. ▪ Sediment deposition appears to be present in the area of the western extension, at the north end of Hanlan's Point Beach. ▪ There is no or very little material moving past runway extension. ▪ Turbid water can be seen both offshore of Hanlan's Point Beach, as well as within the inner harbour.
7/12/1970 **Figure A3**	▪ Runway 08-26 is present in this air photo. ▪ Evidence of submerged sediment movement includes the presence of dunes that can be seen under the water along the western shore at Hanlan's Point Beach. ▪ Evidence of sediment deposition includes the vegetated dunes along the shoreline of Hanlan's Point Beach. ▪ Steep and/or narrowed beach profile can be seen at the south end of Hanlan's Point Beach, indicating an erosional area. ▪ Turbid water can be seen both offshore of Hanlan's Point Beach, as well as within the Inner Harbour.

Table 2. Historic Observations of Sediment Characteristics Identified within the Study Area

Date of Imagery	Summary of Sediment Characteristics Identified in Aerial Photographs
7/25/1990 Figure A4, A5, A6	▪ Evidence of submerged sediment movement includes the presence of dunes that can be seen under the water along the western shore at Hanlan's Point Beach. ▪ Evidence of sediment deposition includes the vegetated dunes along the shoreline of Hanlan's Point Beach. ▪ Steep and/or narrowed beach profile can be seen at the south end of Hanlan's Point Beach, indicating an erosional area. ▪ Turbid water can be seen offshore of Hanlan's Point Beach, around the existing runway, within the Western Channel, as well as within the Inner Harbour.
2015 Figure A7	▪ Evidence of submerged sediment movement includes the presence of dunes that can be seen under the water along the western shore at Hanlan's Point Beach. ▪ Evidence of sediment deposition includes the vegetated dunes along the shoreline of Hanlan's Point Beach. ▪ Steep and/or narrowed beach profile can be seen at the south end of Hanlan's Point Beach, indicating an erosional area. ▪ Turbid water can be seen offshore of Hanlan's Point Beach, around the existing runway, within the Western Channel, as well as within the Inner Harbour.

1.1.4 Description of Future Conditions

The assessment of potential environmental effects from the Future Baseline and the Proposed Future Scenarios is conducted in consideration of the future environmental conditions. To document future environmental conditions, other past, present and certain or reasonably foreseeable future effects from other actions projects within the same geographic and temporal boundaries of this assessment are considered.

The future naturalization of the Don River Mouth, as stated by Baird and Associates (2012), will not significantly change the sediment sources in the vicinity of the BBTCA. As such, it is anticipated that future environmental conditions pertaining to the marine physical environment will be similar to those conditions today.

2. Net Effects of Future Proposed Airport Operations

2.1 Marine Physical

2.1.1 Methodology

The cumulative net effects analysis for the Future Baseline and the Proposed Future Scenarios was assessed using professional judgement in reviewing existing background information and a qualitative assessment of aerial imagery to identify trends in sediment movement, deposition, and erosion. The effects assessment pertains to both the Future Baseline and the Proposed Future Scenarios as effects from the 200 m landmass extension will be similar to those from the approximately 43 m landmass extension with the Runway End Safety Area.

It is recommended that the results of the net effects analysis be confirmed during detailed design by completing the studies described in Section 3 of this memo.

2.1.2 Net Effects Analysis

Based on the results of the background review and the air photo analysis conducted within the local study area, the following inferences can be made on the effects to the marine physical environment if the land mass is extended by 200 m on each end of the runway as part of the Proposed Growth Scenario and the Future Baseline Scenario which includes the Runway End Safety Area (RESA):

- Small localized changes to wave height, wave period, and wave direction will occur. Based on the review of background information, it is predicted that minor changes to the waves entering into the Western Channel around the western runway will occur due to the reduction in the size of the wave energy window for the southwesterly waves by the expansion (CH2M Hill, 2013). Sediment transport is dependent on velocity and shear stress. If there is a reduction in the size of the wave energy window for the southwesterly waves, there will be a similar magnitude impact on sediment transport resulting in deposition. Further information on the size of this reduction would be required to assess the resulting impacts.
- Changes in water levels in the Western Channel and nearby marina will be negligible.
- Changes to the water circulation and currents from lakefill are likely to result in potential sediment deposition or erosion. Areas where water velocity is lowered due to the fill used to create the extension will see areas of sediment accumulation, but areas with concentrated currents will likely experience some scour as the relatively low velocities needed to move fine sand will, on occasions, be exceeded. Detailed numerical modelling is required as part of the detailed design stage in order to determine the locations, rates and volumes of sediment accumulation and scour.
- Changes to erosion and sediment deposition include an initial barrier to sediment transport northward along the western shoreline of Hanlan's Beach. Short term impacts will see increased sediment deposition at the northern end of Hanlan's Beach, with sediment loss occurring in the Western Channel and areas to the east of West Island. Sediment starved areas where bank protection is not present may experience some erosion along the shoreline. Refer to **Figure 7** for probable areas of sediment loss and accumulation. Susceptible areas will need to be confirmed in the field. Over time, sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the western channel. Based on a comparison of the 1960 aerial photograph (**Figure A2** in **Appendix A**) and the 1970 aerial photograph (**Figure A3** in **Appendix A**) it appears that it took less than 10 years for sediment to be transported past the original construction of the runway 08-26 extension. This is based on the presence of turbid water and submerged dunes along the western shoreline and to the east of West Island in the 1970 aerial photograph. Provided processes remain generally the same, it would be expected that adaption to the new extension would occur over approximately the same timeframe. Within the Inner Harbour, the majority of the shorelines are hardened with revetments and seawalls (as seen in **Figure 4**) and therefore the shoreline does not represent a sediment supply within the Inner Harbour. Any effects on sediment erosion and deposition within the Inner Harbour are likely to be very minor and may be considered negligible.

Effects Assessment

The table below outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers.

Table 3. Future Baseline Scenario – Marine Physical Environment

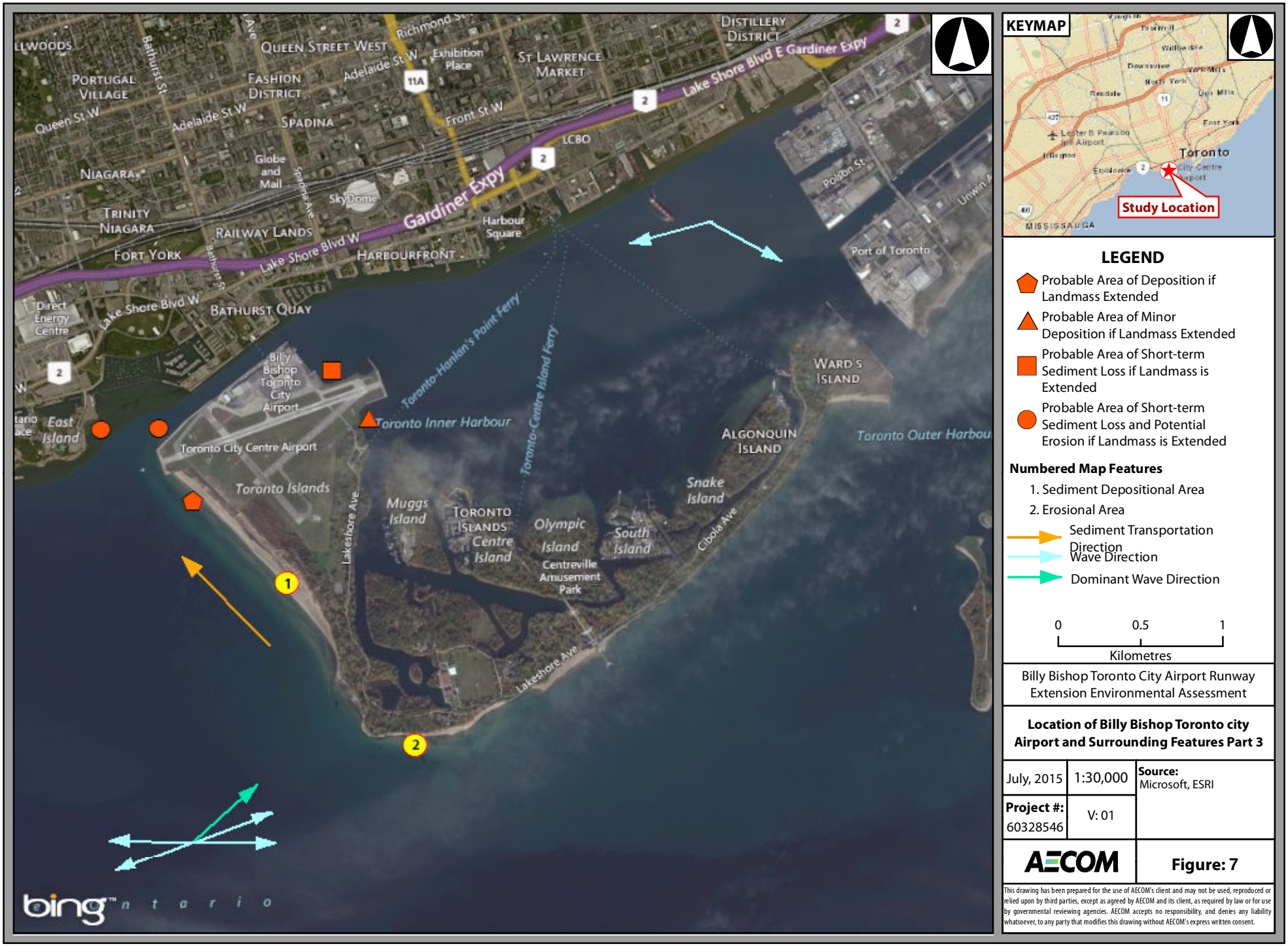
Asset	Measure of Effect	Key Design Considerations & Assumptions	Future Baseline Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Wave Formation	▶ Changes in wave height, wave period (i.e., time between two waves) and wave direction.	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to future baseline considerations and assumptions relative to current.	▶ Small localized changes to wave height, wave period, and wave direction will occur as a result of the RESA. ▶ Minor changes to the waves entering into the Western Channel around the western runway will occur due to the reduction in size of wave energy window for the southwesterly waves by the expansion.	▶ None required.	▶ Effects anticipated to be minor and localized. ▶ Detailed numerical modelling during detailed design will confirm the reduction in size of wave energy window for the southwesterly waves.
Water Levels	▶ Changes in water levels in the Western Channel and nearby marina.	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to future baseline considerations and assumptions relative to current.	▶ Changes in water levels in the Western Channel and nearby marina will be negligible.	▶ None required.	▶ No net effects on water levels in the Western Channel and nearby marina.
Currents	▶ Changes in flow patterns and current speed.	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to future baseline considerations and assumptions relative to current.	▶ Areas where water velocity is lowered due to the fill used to create the extension for the RESA will see areas of sediment accumulation. ▶ Areas with concentrated currents will likely experience some scour as the relatively low velocities needed to move fine sand will, on occasions, be exceeded.	▶ None required.	▶ Localized changes to currents resulting in potential sediment deposition or erosion. ▶ Detailed numerical modelling during detailed design stage will determine the locations, rates and volumes of sediment accumulation and scour.
Sediment Transport	▶ Sediment deposition/accumulation in West Island, Western Channel and in the immediate vicinity of the extension of the land mass (to identify where sediment may deposit). ▶ Long shore sedimentation patterns (whether sediment moves along the shoreline). ▶ Sediment deposition/accumulation in the inner harbor. ▶ Changes to type of sediment that could be moved by the currents (if currents speeds change, it can affect the size of sediment that moves).	▶ Land mass extension of 43 m on each end of the main runway (Runway 08-26) for the RESA.	▶ No change to future baseline considerations and assumptions relative to current.	▶ Short term effects include sediment deposition at the northern end of Hanlan's Point Beach, with sediment loss occurring in the Western Channel and areas to the east of West Island. ▶ Sediment starved areas where bank protection is not present may experience some erosion along the shoreline. ▶ Over time, sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the Western Channel. ▶ Provided processes remain generally the same, it would be expected that adaption to the RESA would occur over approximately the same timeframe. ▶ Any effects on sediment erosion and deposition within the Inner Harbour are likely to be very minor and may be considered negligible.	▶ None required.	▶ No net effects are anticipated on sediment transport within the Marine Physical Study Area as over time (approximately 10 years) sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the Western Channel. ▶ Detailed numerical modelling is required as part of the detailed design stage, to determine the locations, rates and volumes of sediment accumulation and scour. ▶ Areas susceptible to sediment loss and accumulation will need to be confirmed in the field through a reconnaissance level field walk along various shoreline locations to identify signs of instability and to identify evidence of sediment transport and change, and should include a review of ecological response to present patterns of erosion and deposition.

Effects Assessment

The table below outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

Table 4: Proposed Future Scenario – Marine Physical Environment

Asset	Measure of Effect	Key Design Considerations & Assumptions	Proposed Future Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Wave Formation	▶ Changes in wave height, wave period (i.e., time between two waves) and wave direction.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ Small localized changes to wave height, wave period, and wave direction will occur as a result of the RESA. ▶ Minor changes to the waves entering into the Western Channel around the western runway will occur due to the reduction in size of wave energy window for the southwesterly waves by the runway extension.	▶ None required.	▶ Effects anticipated to be minor and localized. ▶ Detailed numerical modelling conducting during detailed design will confirm the size of the reduction in size of wave energy window for the southwesterly waves.
Water Levels	▶ Changes in water levels in the Western Channel and nearby marina.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ Changes in water levels in the Western Channel and nearby marina will be negligible.	▶ None required.	▶ No net effects on water levels in the Western Channel and nearby marina.
Currents	▶ Changes in flow patterns and current speed.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ Areas where water velocity is lowered due to the fill used to create the runway extension will see areas of sediment accumulation. ▶ Areas with concentrated currents will likely experience some scour as the relatively low velocities needed to move fine sand will, on occasions, be exceeded.	▶ None required.	▶ Localized changes to currents resulting in potential sediment deposition or erosion. ▶ Detailed numerical modelling during the detailed design stage will determine the locations, rates and volumes of sediment accumulation and scour.
Sediment Transport	▶ Sediment deposition/accumulation in West Island, Western Channel and in the immediate vicinity of the extension of the land mass (to identify where sediment may deposit). ▶ Long shore sedimentation patterns (whether sediment moves along the shoreline). ▶ Sediment deposition/accumulation in the inner harbor. ▶ Changes to type of sediment that could be moved by the currents (if current speeds change, it can affect the size of sediment that moves).	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ Short term effects include sediment deposition at the northern end of Hanlan's Point Beach, with sediment loss occurring in the Western Channel and areas to the east of West Island. ▶ Sediment starved areas where bank protection is not present may experience some erosion along the shoreline. ▶ Over time, sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the Western Channel. ▶ Provided processes remain generally the same, it would be expected that adaption to the new runway extension would occur over approximately the same timeframe. ▶ Any effects on sediment erosion and deposition within the Inner Harbour are likely to be very minor and may be considered negligible.	▶ None required.	▶ No net effects are anticipated on sediment transport with the Marine Physical Study Area as over time (approximately 10 years) sediment transport processes will generate a lake shore morphology that has adapted to the barrier and sediment will continue to be transported into the Western Channel. ▶ Detailed numerical modelling is required as part of the detailed design stage, to determine the locations, rates and volumes of sediment accumulation and scour. ▶ Areas susceptible to sediment loss and accumulation will need to be confirmed in the field through a reconnaissance level field walk along various shoreline locations to identify signs of instability and to identify evidence of sediment transport and change, and should include a review of ecological response to present patterns of erosion and deposition.



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Based on the results of the current qualitative analysis, a comparison of the Baseline to the Proposed Future Scenario shows that in the long term, the landmass extension will not have a significant impact on marine physical parameters within the local study area but will cause short term local erosion and deposition linked to barrier induced sediment transport disruption (**Figure 7**).

3. Recommendations

The following methods, along with the results of the detailed air photo analysis, will help to identify more accurate results on sediment transport and deposition if the land mass is extended by 200 m on each end.

As recommended by CH2M Hill (2013), detailed numerical modelling is required to fully quantify the impacts of the proposed runway extension on wave heights, currents, and sediment transport. A wave model and near shore hydrodynamic model are recommended to analyze sediment transport and assess changes in the wave environment, and how it impacts erosion, currents, and water quality. The range of results for wave height and direction calculated from existing hindcast models suggests that these past studies should be reviewed to validate data assumptions before the best results can be identified.

Other studies recommended during the detailed design phase include increasing the size of the study area to encompass the Inner Harbour and the Eastern Channel to determine potential effects within a larger study area.

In addition to the quantitative modelling, a field assessment is also required. The field component would include a reconnaissance level field walk along various shoreline locations to identify any signs of instability (scour and erosion, as well as the size of material eroding), and identify evidence of sediment transport and change. This includes where the sediment is coming from, where it is moving, and where it is depositing. Identifying this information in the field will help validate previous study findings and assist with the interpretation of the output from the hydrodynamic model for the sediment transport analysis. The survey will also review ecological response to present patterns of erosion and deposition assessing how new habitats are forming linked to sediment dynamics.

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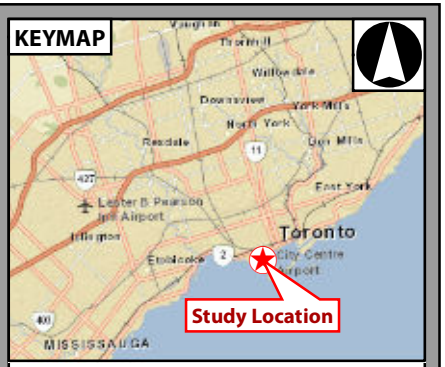
Draft Report: Coastal Environment Study Supporting the Expansion of Billy Bishop Airport.

Appendix A

Air Photo Analysis



KEYMAP



LEGEND

1. Steep Beach Profile
2. Turbid Water
3. Submerged Dunes
4. Vegetated Dunes

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

1950 Aerial Photograph

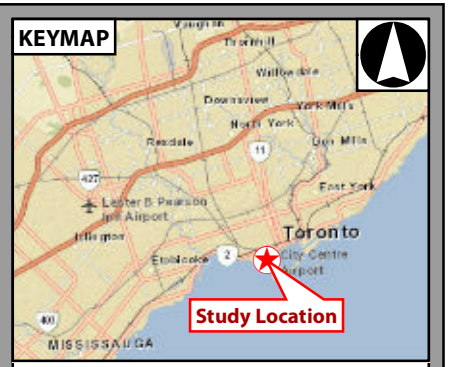
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LEGEND

1. Steep Beach Profile
2. Turbid Water
3. Submerged Dunes
4. Area of Deposition

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

1960 Aerial Photograph

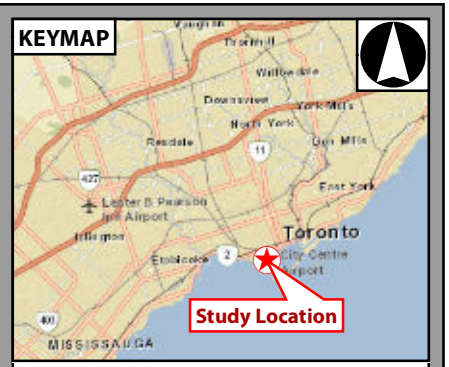
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AECOM		**Figure: A2**

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LEGEND

1. Steep Beach Profile
2. Turbid Water
3. Submerged Dunes
4. Vegetated Dunes

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

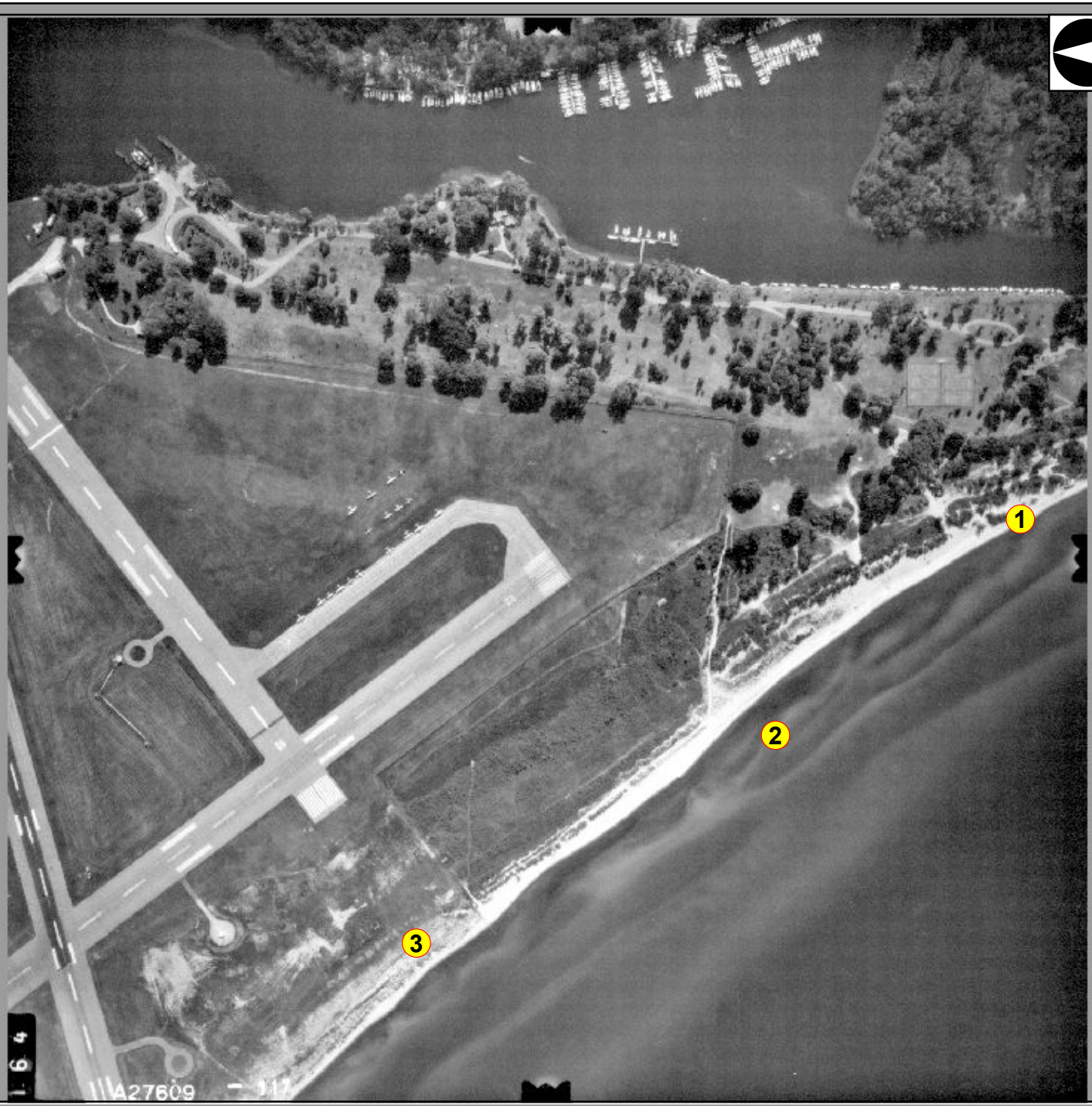
1970 Aerial Photograph

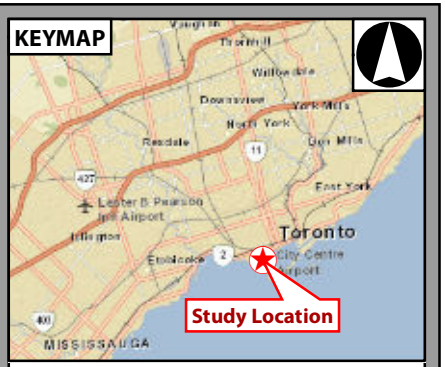
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Project #: 60328546	V: 01	
AECOM		**Figure: A3**

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LEGEND

1. Potential Area of Erosion
2. Submerged Dunes
3. Vegetated Dunes

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

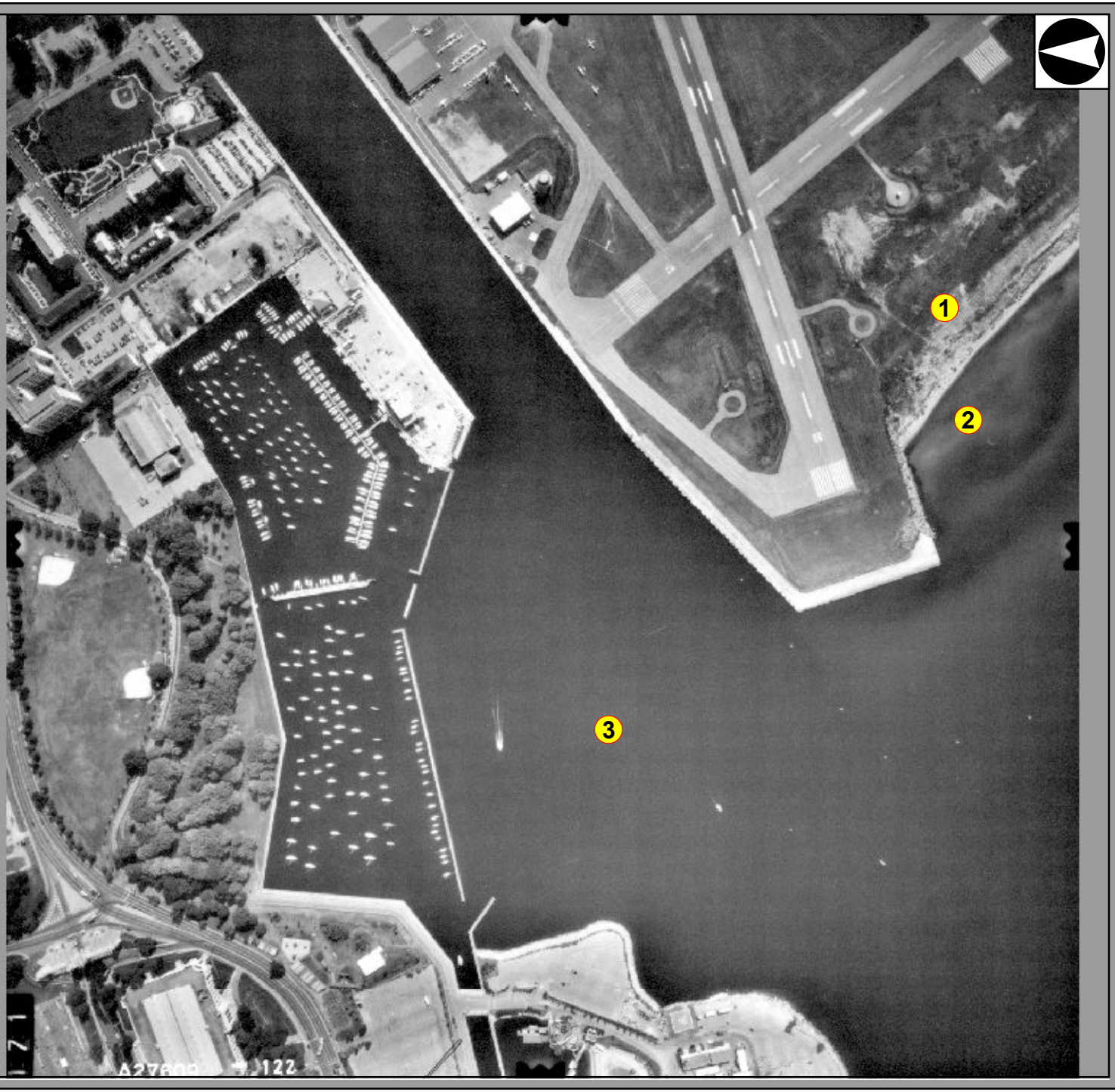
1990 West Side of the Island - Part 1 Aerial Photograph

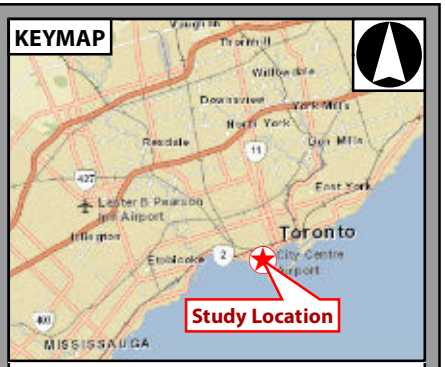
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AECOM		**Figure: A5**

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LEGEND

1. Vegetated Dunes
2. Submerged Dunes
3. Turbid Water

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

1990 West Side of the Island - Part 2 Aerial Photograph

July, 2015	**N.T.S.**	**Source:** National Air Photo Library, ESRI
Project #: 60328546	V: 01	
AECOM		**Figure: A6**

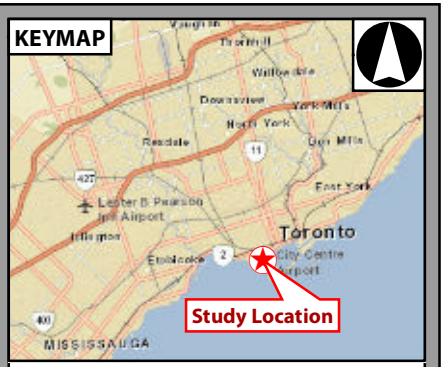
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KEYMAP



LEGEND

1 Turbid Water

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

1990 East Side of the Island Aerial Photograph

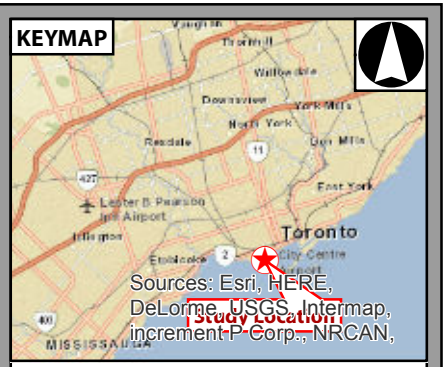
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AECOM		**Figure: A4**

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LEGEND

1. Steep Beach Profile
2. Submerged Dunes
3. Vegetated Dunes
4. Turbid Water

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

2015 Aerial Photograph

July, 2015	1:15000	**Source:** Microsoft, ESRI
Project #: 60328546	V: 01	
AECOM		**Figure: A7**

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Appendix C-6

Water Quality Effects Assessment

AECOM
105 Commerce Valley Drive West, Floor 7 905 886 7022 tel
Markham, ON, Canada L3T 7W3 905 886 9494 fax
www.aecom.com

Memorandum

To	Marc Rose, AECOM	Page	1
CC	Julia Cushing, AECOM		
Subject	BBTCA EA Phase II: Inner Harbour Circulation and Water Quality Cumulative Net Effects Assessment		
From	Bryanne Wouters E.I.T. and Brian Richert P.ENG., AECOM		
Date	November 27, 2015	Project Number	60447218

Summary

Proposed improvements to the Billy Bishop Toronto City Airport (BBTCA) include the extension of the land mass by 200 metres at each end of the main runway (Runway 08-26). To evaluate potential water quality impacts to the Inner Harbour as a result of the proposed runway extension, AECOM conducted an assessment of inflow to the harbour and hydraulic residence time. Hydraulic residence time is the time required to replace/flush the total volume of water in the harbour, and is used as an indicator of water quality. The proposed west end extension (Runway 08) will reduce the cross-sectional flow area and average inflow through the Western Gap by approximately 50%, and will double the average residence time of water in the Inner Harbour from 6.7 to 12.3 days. Sources of pollution in the Inner Harbour include Don River discharges, storm sewer outfalls and combined sewer overflows (CSO). The expected increase in residence time has a high potential of intensifying water quality problems in the Inner Harbour through reduced dilution and flushing of these pollutants from the harbour. The east end extension (Runway 26) also has the potential to reduce overall Inner Habour water circulation and produce water quality dead-zones between the east end extension and Muggs Island.

1. Background

The purpose of this analysis is to review background information and evaluate potential changes to the Inner Harbour water circulation and water quality resulting from the from the proposed landmass extension. Specific objectives of this assessment are to:

- Gather and review existing information and data on water quality, bathymetry, water levels, Don River inflows, and Inner Habour and Lake Ontario circulation patterns as changes can affect the water quality of the Inner Habour.
- Assess the impact of the proposed landmass extension on flow dynamics at the Eastern and Western Channel harbour inlets through a mass balance assessment of the Inner Harbour.

- Identify whether the proposed new land mass will result in changes to the water circulation into the Inner Harbour that will be great enough to result in a noticeable change in water quality.
- Identify the boundaries and methodology required to complete a numerical model that will further assess the effects of the land mass extension based on the detailed design, should the proposal be approved.

2. Description of the Potentially Affected Environment

2.1 Inner Harbour Circulation and Water Quality

2.1.1 Study Area

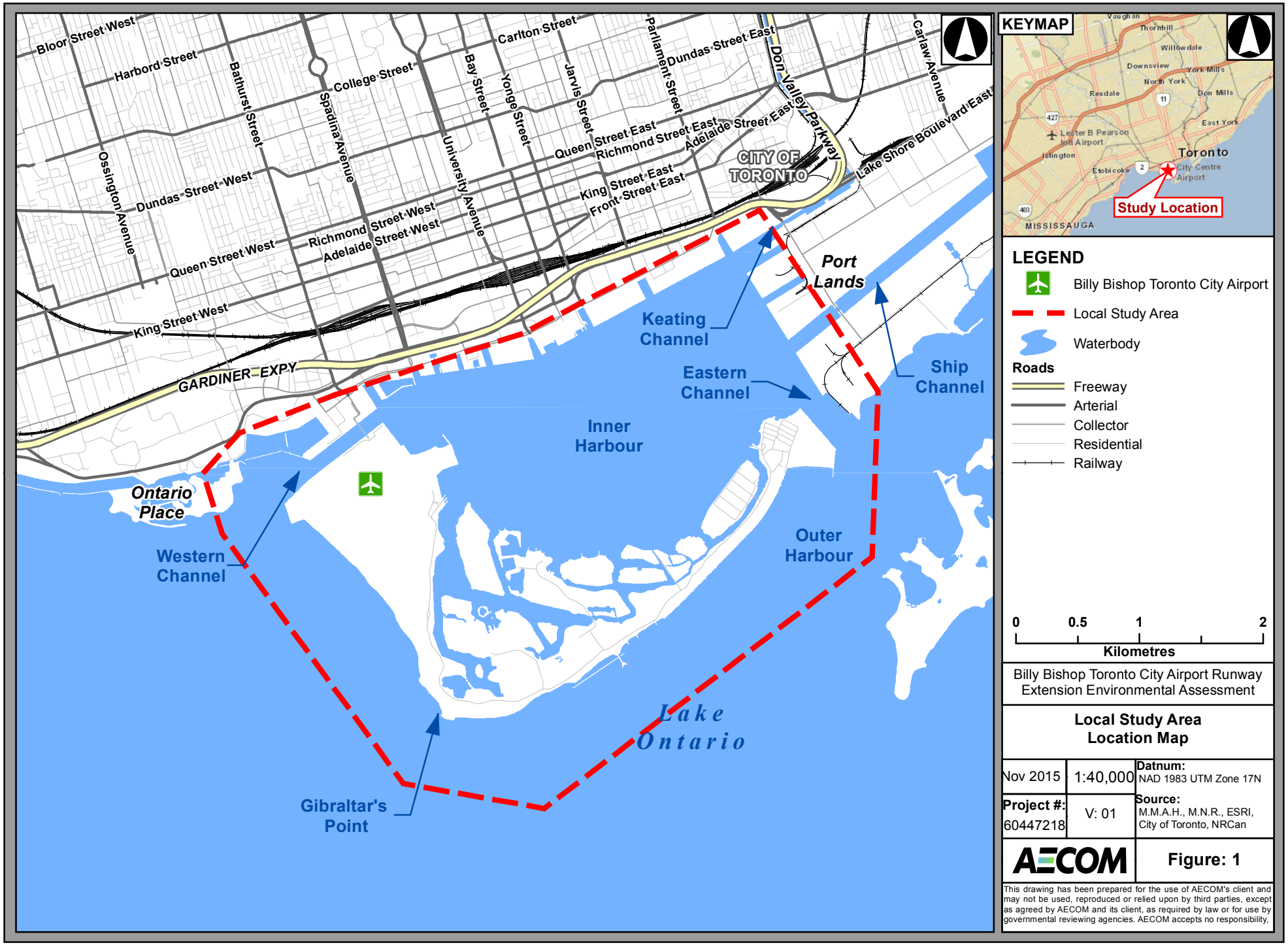
The study area for this assessment ('Local Study Area') are the areas in the immediate vicinity of the land mass extension, including the west and east ends of Runway 08-26, the Western Channel, the Eastern Channel, the Keating Channel, and the Inner Harbour. Refer to **Figure 1** for an overview of the Local Study Area.

2.1.2 Description of Existing Conditions

AECOM completed a background review of previous environmental reports for the BBTCA and other relevant studies to summarize existing information and identify remaining data gaps.

AECOM reviewed the following reports:

- CH2M Hill Canada Limited, 2013. Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments. Prepared for the City of Toronto.
- Davidson-Arnott, Robin. 2013. Peer Review of Porter Airlines Runway Extension Proposal Review – Coastal Processes and Environments.
- Dewy, Ray. 2012. Toronto Inner Harbour Water Quality Modelling Report. Prepared for the City of Toronto & MMM Group
- Dillion Consulting Limited, 2013. Lakefill with Marine Exclusion Zone (keep out area) – Toronto Harbour –Environmental Screening Report. Prepared for Toronto Port Authority.
- MMM Group Limited, 2012. Don River and Central Waterfront Project Municipal Class EA Environmental Study Report. Prepared for the City of Toronto
- Stantec Consulting Ltd, 2003. Aquatic Environment For the Proposed Portlands Energy Centre. Prepared for Portlands Energy Centre.
- W.F. Baird & Associates Coastal Engineers Ltd., 2010. Don Mouth Naturalization Project Hydrodynamic Modelling Technical Memorandum. Prepared for the Toronto and Region Conservation.
- WSP Canada Inc. 2015. Draft Report: Coastal Environment Study Supporting the Expansion of Billy Bishop Airport.



Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

Local Study Area Location Map

Nov 2015	1:40,000	**Datnum:** NAD 1983 UTM Zone 17N
Project #: 60447218	V: 01	**Source:** M.M.A.H., M.N.R., ESRI, City of Toronto, NRCan

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Figure: 1

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2.1.2.1 Water Quality

The Toronto Waterfront, including the Inner Harbour, is recognized as one of 43 polluted Areas of Concern (AOC) in the Great Lake Basin (Environment Canada, 2014). The Toronto and Region AOC was designated in 1987 under the Canada-United States Great Lakes Water Quality Agreement (GLWQA). AOC are sites where water quality has been significantly degraded and beneficial uses are impaired. Degraded water quality in the Inner Habour and Don River is largely due to CSOs and storm sewer discharges, as well as point sources of contaminates at Toronto Port Lands shipping channel (Environment Canada, 2010; Dillon 2013). Pollutants include bacterial, phosphorus, heavy metals, toxic organics, and contaminated sediments (Stantec, 2003). Continuing efforts under the Toronto and Region Remedial Action Plan (RAP) with the federal and provincial government agencies, Toronto and Region Conservation Authority, the City of Toronto, and local stakeholder groups are addressing environmental challenges from both historical factors and ongoing pressures from urban growth.

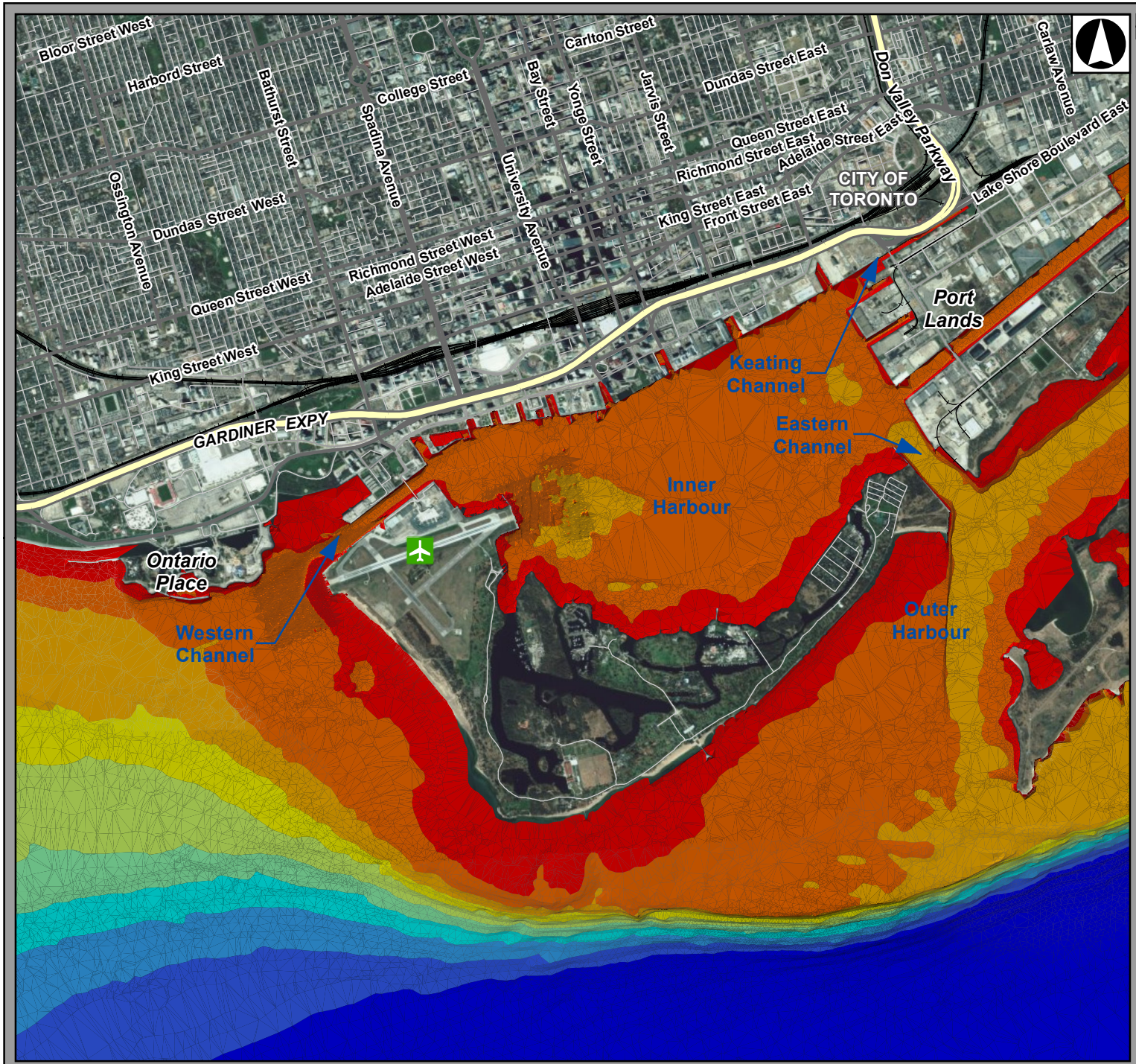
In efforts to delist the Toronto Waterfront as an AOC, the City of Toronto is implementing significant infrastructure improvement projects over the next 25-years to address wet weather flows and sanitary servicing needs. At the project completion the water quality and ecosystem health along on the Toronto waterfront will be significantly improved and it is anticipated that the Toronto and Region AOC will be delisted by 2025 (Environment Canada, 2014).

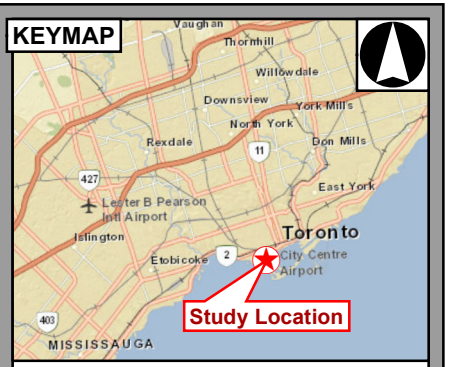
Potential changes to the water circulation of Inner Harbour, through less dilution and flushing of nutrient-laden water, may intensify existing water quality issues or hinder the effectiveness of ongoing remediation plans.

2.1.2.2 Bathymetry

The Inner Harbour water depths range from 8 to12 m to less than 1 m along the Toronto Islands. The Western and Eastern Channel maximum depths are approximately 9 and 10 m respectively. Bathymetric data was obtained from hydrographic surveys of the project site completed by the Toronto Port Authority on November 8th 2011, and December 5th, 9th and 21st, 2014 and supplemented by Lake Ontario bathymetry data extracted online from the National Oceanic and Atmospheric Administration (NOAA, 2012). Refer to **Figure 2** for overview of the Study Area Bathymetry. Depths are referenced to Lake Chart Datum (CD), 74.2 m International Great Lakes Datum (IGLD) 1985.

The proposed 200 m land extension at the east and west end of the main runway (Runway 08-26) will require lakefill up to 9 m below chart datum. Negligible decreases in Inner Harbour volume (0.1%) are expected due to the east end extension.





LEGEND

- Billy Bishop Toronto City Airport
- Local Study Area

Roads

- Freeway
- Arterial
- Collector
- Residential
- Railway

Elevation (m below CD)

0 - 5	25 - 30
5 -10	30 - 35
10 - 15	35 - 40
15 - 20	40 - 45
20 - 25	> 45

0 0.5 1 2

Kilometres

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

Local Study Area Bathymetry

Nov 2015	1:40,000	**Datnum:** NAD 1983 UTM Zone 17N
Project #: 60447218	V: 01	**Source:** M.M.A.H., M.N.R., ESRI, City of Toronto, NRCan NOAA, TPA

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Figure: 2

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2.1.2.3 *Water Levels*

Annual and seasonal water level variations occur in Lake Ontario due to climatic conditions and storm events. Daily water level data for the Inner Habour was obtained from the Toronto Gauge (#13320) from the Canadian Hydrographic Survey (CHS) from January 1962 to October 2015 (**Figure 3**). For the period of record the mean surface elevation of Lake Ontario and Inner Harbour is estimated at 74.8 metres above sea level (0.6 m CD). Historic water level variations between maximum and minimum levels is approximately 2 m, and in a typical year a variation of about 1 m occurs in lake levels with the low occurring in the fall and the high point in the summer (Baird and Associates, 2012)

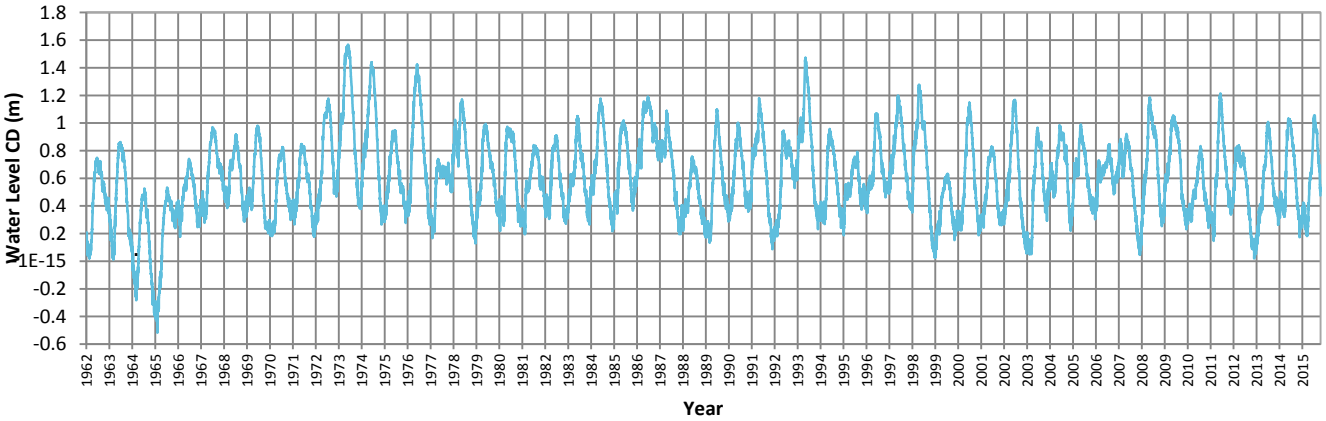


Figure 3. Lake Ontario Water Levels from 1962 to 2015 at Toronto Station #13320

2.1.2.4 *Don River Inflows*

The Don River flows enter the Inner Harbour through the Keating Channel. The Don River is the only river that discharges to the Inner Harbour and is considered as a significant pollutant source due to E Coli bacteria levels associated with stormwater discharges and CSOs (Dewy, 2012). Table 1 below summarizes the Don River flow return periods (Baird, 2012; TRCA, 2009)

Table 1: Summary of Don River Flows and Return Periods

Return Period	***Flow (m^3/s)***
Annual Daily Mean[1]	3.9
2 year	160
10 year	291
25 year	369
100 year	492
Regulatory	1694

1. *WSC Gauge # 02HC024 located on the Don River at Todmorden, 1962-2004. (TRCA, 2009)*

2.1.2.5 *Inner Harbour Hydrodynamics*

The net circulation of flow through the Inner Harbour is typically from the Western Channel Gap into the Inner Harbour and out the Eastern Gap. Discharges from the Don River via the Keating Channel

are conveyed toward the middle of the Inner Harbour and are typically redirected towards the Eastern Gap (Dewy, 2012).

Acoustic Doppler Current Profile meters (ADCP) were installed by the City of Toronto to measure current velocity and direction in the Western and Eastern Channel Gaps and offshore of Gibraltor Point from October to November 2007 (Dewy, 2012). Refer to **Appendix B** for ADCP records. The average current velocity in the Western and Eastern Channel gap was approximately 0.10 and 0.06 m/s respectively for the period of record. Maximum velocity in Western and Eastern Channel gap was measured at 0.52 and 0.14 m/s respectively. Offshore at Gibraltor Point the maximum and average velocity was 0.30 and 0.06 m/s respectively. This data was used by Dewy (2012) to calibrate 3D hydrodynamic model predictions.

Based on the model simulation by Dewy (2012), the residence time of the Inner Harbour is between 5.6 and 6.5 days, assuming plug flow conditions (i.e. complete displacement of water in the harbour with no 'dead' zones). Average flow through the Western Gap and Eastern Gap was estimated at 63.4 and 67.3 m^3/s respectively, with additional flow through the Eastern Channel due to Don River inflows, and stormwater and CSO contributions.

2.1.2.6 Lake Ontario Hydrodynamics

The flow through the Inner Harbour is generated by Lake Ontario currents. Circulation in Lake Ontario is driven by wind stress and density-driven currents due to seasonal thermal turnover processes (Beletsky et al., 1999). In general, water currents of Lake Ontario travel in a two-gyre rotational circulation pattern, at the east and west ends (**Figure 4**). The minimum, maximum and average annual current speeds are approximately 0.005, 0.043 and 0.019 m/s respectively (Beletsky, 1999). These values are consistent with the average offshore values obtained from the Toronto Harbour 2007 ADCP readings, and whole lake 3-D hydrodynamic and water quality models completed by Dewy (2012) and the University of Waterloo (2009).

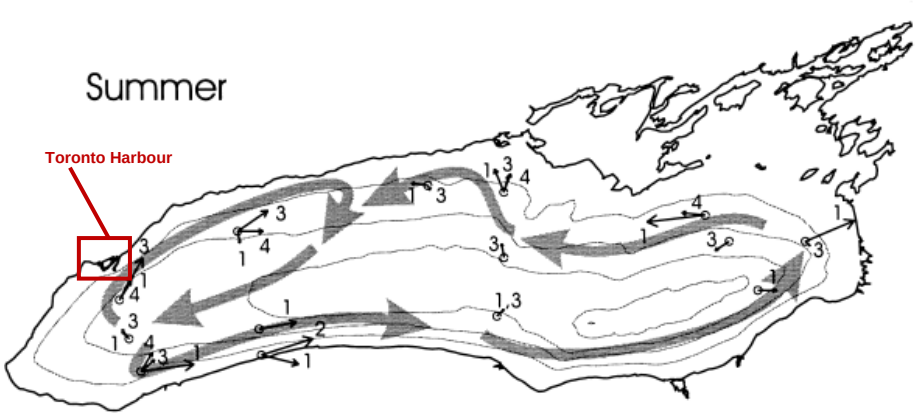


Figure 4. Lake Ontario Mean Summer Circulation Patterns (Beletsky, 1999)

In the vicinity of Toronto Harbour, near shore lake currents travel an eastern direction parallel to the shoreline. The overall current direction is consistent with the typical circulation direction through Toronto Harbour, from the Western Channel through to the Eastern Channel.

2.1.3 Description of Future Conditions

To document future environmental conditions, other past, present and certain or reasonably foreseeable future effects from other projects within the same geographic and temporal boundaries of this assessment are considered.

Future infrastructure works along the Toronto Waterfront to address wet weather flows and sanitary servicing needs are aimed to improve water quality and delist the Toronto and Region as an AOC. It is expected that CSOs and pollutant sources in the Don River will be significantly decreased and the overall water quality of Inner Harbour enhanced for future environmental conditions. Changes to the water circulation of Inner Harbour, due to the proposed land extension, may intensify water quality issues through less dilution and flushing and potentially hinder the effectiveness of ongoing remediation plans.

The future naturalization of the Don Mouth as part of the Don Mouth Naturalization and Port Lands Flood Project (DMNP Project) will include a new Don River valley system located approximately halfway between the Ship Channel and Keating Channel (TRCA, 2014). The design includes a naturalized overflow to the Ship Channel and spillway to the Keating Channel. Improved water quality is expected within proposed Lake-connected wetlands (TRCA, 2014). Future works will not impact the magnitude of Don River inflow to the Inner Harbour. It is assumed that circulation patterns due to the Don River flow component will remain similar to existing and will not significantly change in vicinity of the BBTCA.

3. Net Effects of Future Proposed Airport Operations

3.1 Inner Harbour Mass Balance

3.1.1 Methods

To evaluate the potential water quality impacts to the Inner Harbour as a result of the proposed runway extension, AECOM applied a mass balance model to assess inflow to the harbour and hydraulic residence time. Hydraulic residence time is the time required to replace/flush the total volume of water in the harbour, and is used as an indicator of water quality in the harbour. The general form of a mass balance is:

Outflow = Inflows + Precipitation - Evaporation - Increase in Storage

The analysis assumes:

- Steady state flow conditions (i.e. the assessment is conducted for average conditions, with flows not changing over time; the system is in equilibrium);
- Completed mixed flow in the harbour;
- Constant water density;
- Negligible evaporation and precipitation ;
- No change in Inner Harbour volume; and,
- Constant near shore lake currents, equivalent to the average conditions.

The assumption that the Inner Harbour flows are completely mixed is a simplification of actual conditions. It is recognized that the Inner Harbour does not meet ideal hydraulic characteristics of flow and mixing due to dispersion, short-circuiting and formation dead zones. However, since the

proposed land mass extension is not expected to significantly alter the overall circulation patterns in the Inner Harbour, the relative changes in residence time are still relevant results.

Under these assumptions the mass balance reduces to:

$$\sum_{Inlets} Q_{in} = \sum_{Outlets} Q_{out}$$

The circulation pattern of the Inner Harbour is prominently in a clockwise direction resulting in a net inflow to the Inner Harbour from the Western Channel Gap and outflow though the Eastern Channel Gap, as discussed in Section 2.1.2.5 above. Therefore the overall mass balance is:

$$Q_{Western\ Channel\ Gap} + Q_{Don\ River} = Q_{Eastern\ Channel\ Gap}$$

The flow through the Western Channel opening was estimated using flow continuity. Average channel velocities were determined from previous ADCP velocity recordings from October to November, 2007. An average Western Channel Gap velocity of 0.10 m/s was assumed from the period of record. Data provided for the Eastern Channel Gap was assumed inaccurate due to its location in the channel from shipping clearances (Dewy, 2012), and was not used in the analysis. Channel cross-sectional areas and volume of Inner Harbour were determined from bathymetry. Don River inflows were assumed at the annual mean daily flow of 3.9 m^3/s (TRCA, 2009). Refer to **Appendix A** for details.

Under existing conditions, the average flow into the Harbour through the Western Channel gap is 67.4 m^3/s, and the average flow from the Don River is 3.9 m^3/s. Therefore the outflow through the Harbour is approximately 71.3 m^3/s, and the average hydraulic residence time in the Harbour is 6.7 days. Based on flow continuity, the near shore current velocity in the vicinity of the BBTCA extension is estimated at 0.02 m/s, and is consistent with average lake currents presented by Beletsky (1999). Existing condition estimates for Inner Harbour flow dynamics are also consistent with previous 3-D hydrodynamic and water quality modeling completed by Dewy (2012).

The proposed west end extension (Runway 08) will reduce the cross-sectional flow area at the entrance to the Western Channel Gap by up to 50%, refer to **Appendix A** bathymetry cross-sections. It is assumed that the velocities of near-shore currents through the opening in the Western Channel Gap will not significantly change after extension of the runway. Therefore the average inflow to the Inner Harbour through the Western Gap will be reduced by approximately 50%, from 67.4 m3/s to 34.8 m^3/s. This flow reduction will increase the average Inner Harbour residence time from 6.7 to 12.3 days. Therefore the average time required to replace/flush the volume of water in the Inner Harbour may double. This increase in residence time will have a high potential for negative impacts to water quality in the Inner Harbour, through reduced dilution and flushing of pollutant laden water from the Harbour. In addition, increasing the residence time duration from approximately 1 week to 2 weeks could have further effects on water quality, such that the system may never flush completely between storm runoff events. Further degradation of water quality could occur from existing conditions and hinder the effectiveness of ongoing infrastructure works along the Toronto Waterfront to address water quality issues of wet weather flows and CSOs.

The east end extension (Runway 26) also has the potential to reduce overall Inner Harbour water circulation, causing dead-zones between the east end extension and Muggs Island. Detailed analysis using a 2-D or 3-D hydrodynamic model is required to further assess the impact of the east end extension on Inner Harbour circulation patterns.

3.1.2 Net Effects Analysis

Based on the results of the background review and the mass balance analysis conducted within the Local Study Area, the following inferences can be made on the effects to the Inner Harbour circulation and water quality if the land mass is extended by 200 m on each end of the existing runway:

- Changes to the lake bathymetry from lakefill at the west end extension (Runway 08) are likely to result in a 50% reduction of average inflow to the harbour, which will double the average Inner Harbour residence time from 6.7 to 12.3 days. The expected increase in residence time has a high potential of causing water quality problems in the Inner Harbour through reduced dilution and flushing of pollutant laden water from the Don River discharges, storm sewer outfalls and CSOs. The increase in residence time to approximately 2 weeks may also cause the system to never flush completely between storm runoff events. The east end extension (Runway 26) also has the potential to reduce overall Inner Habour water circulation and cause water quality dead-zones between the east end extension and Muggs Island. Detailed numerical modelling is required to fully quantify changes to currents, residence time and overall water quality.
- Changes to the Inner Harbour hydrodynamics may intensify existing water quality issues or hinder the effectiveness of the ongoing Toronto and Region Remedial Action Plan (RAP) to improve water quality and to delist the Toronto and Region Area of Concern (AOC).
- Changes in near shore currents will be negligible.

Based on the results of the net effects analysis, the landmass extension may have a significant impact on Inner Harbour circulation and water quality.

Effects Assessment

The table below outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the proposed runway extension.

Table 2: Potential Net Effects of Proposed Runway Extension on Inner Harbour Circulation and Water Quality

Variable	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Potential Mitigation Measures	Net Effects
Water Levels	▶ Changes in water levels in the Western Channel and nearby marina.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to proposed future considerations and assumptions relative to current.	▶ None.	▶ None required.	▶ None.
Currents	▶ Changes in flow patterns and current speed.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ No change to near shore currents of Lake Ontario. ▶ East end runway extension will reduce the Western Channel harbour opening by 50 %.	▶ Reductions to the Western Channel flow by approximately 50 % due to constriction of Western Channel opening. ▶ Localized changes to flow patterns at east end extension may reduce circulation between the east end runway extension and Muggs Island.	▶ Directing more lake current to the Western Channel through breakwater construction. ▶ Consider construction of the runway extension on a pile-supported deck structure. ▶ Consider shifting the runway extension eastward. ▶ Consider construction of new channels through the Toronto Islands.	▶ Reduction of average flow through the harbour, increasing the average Inner Harbour residence time from 6.7 to 12.3 days. ▶ Detailed numerical modelling during detailed design stage is recommended to assess changes to flow patterns and current speed.
Water Quality	▶ Changes to the harbour residence time (i.e., dilution and flushing). ▶ Average concentration of pollutants in harbour.	▶ Land mass extension of 200 m on each end of the main runway (Runway 08-26).	▶ E Coli bacteria water quality concerns due to combined sewer overflows and stormwater runoff. Additional pollutants include phosphorus, heavy metals, toxic organics, and contaminated sediments. ▶ Future water quality enhancement through completion of the Toronto and Region RAP and the City of Toronto's Don and Waterfront Trunk Sewers and Combined Sewer Overflow Control Strategy.	▶ Increase harbour residence time, with reduced dilution and flushing of pollutant laden water. ▶ Potential reduction in water circulation, causing dead-zones between the east end runway extension and Muggs Island.	▶ Reduce pollutants entering harbour.	▶ Increases in residence time will have a high potential for negative impacts to water quality in the Inner Harbour, through reduced dilution and flushing of pollutant laden water from the Don River discharges, storm sewer outfalls and combined sewer overflows. ▶ Detailed numerical modelling is recommended to confirm impacts to Inner Harbour water quality in conjunction with ongoing water quality enhancement initiatives.

4. Recommendations

The conclusions of this study are rooted in the mass balance approach, which has limitations in how it can accurately represent the complex flow patterns in the harbour. To more conclusively characterize impacts, AECOM recommends detailed hydrodynamic modeling of the Inner Harbour to more accurately quantify changes to currents and residence time. . A new 2-D or 3-D hydrodynamic model could be developed for the Local Study Area, or one of the existing MIKE-3 (Dewy, 2012), ELCOM (University of Waterloo, 2009), or Delft3D (Baird, 2010) models could be further refined and utilized for additional investigations. This detailed numerical modelling may also used to assess changes in the wave environment and sediment transport.

In addition to the recommended numerical modelling, AECOM recommends that a detailed field measurement program (spring through fall period) is undertaken to obtain additional measured velocities (ADCP measurements) along the Western and Eastern Channel, Don River, and near shore areas. This will allow the hydrodynamic model to be calibrated and validated to observed flows in the study area and reduce the amount of uncertainty in the results.

Potential mitigation measures should be assessed as part of the detailed modeling. Mitigation options may include directing more flow to the Western Channel Gap through breakwater construction, construction of the runway extension on a pile-supported deck structure, construction of new channels through Toronto Island, shifting runway location eastward, or otherwise improving water quality through reductions in pollutants to the harbour.

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Appendix A

Mass Balance

- *Calculations*
- *Cross-sections*

	Water Level		Western Channel Gap Inflow[1]											Don River Inflow[2]	Eastern Channel Gap Outflow[3]	Residence Time[4]
			XS 1			XS2			XS3			West Gap					
	CD	Elv	A	V	Q	A	V	Q	A	V	Q	Aw	Vw	Qw			
	(m)	(MASL)	(m^2)	(m/s)	(m^3/s)	(m^2)	(m/s)	(m^3/s)	(m^2)	(m/s)	(m^3/s)	(m^2)	(m/s)	(m^3/s)	(m^3/s)	(m^3/s)	(days)
Existing Mean Conitions	*0.2*	*74.4*	4005	0.02	67.4	3103	0.02	67.4	2710	0.02	67.4	674	*0.10*	67.4	3.9	71.3	6.7
Proposed Mean Conditions	*0.2*	*74.4*	2065	0.02	34.7	1821	0.02	34.7	2520	0.01	34.7	674	0.05	34.7	3.9	38.7	12.3

1. Refer to Figure A1 for Cross-section locations.
   Velocity of Western Channel Gap (Vw) is assumed at 0.10 m/s, as per average ADCP velocity readings from October to Novemeber 2007.
   Cross-sectional Area of Western Channel Gap (Aw) is assumed at 674 m^2, based on the minimum cross-sectional area (XS 10) at a water level of 74.4 m (0.2 m CD).
   Water level assumed at 74.4 m (0.2 m CD), as per the CHS Toronto Gauge (#13320) levels from October to November 2007.
2. Mean Annual Don River Flow as per WSC Gauge # 02HC024 located at Don River @ Todmorden, 1962-2004. (TRCA, 2009)
3. Eastern Channel Flow based on Mass Balance:

$$\Sigma_{inlets} Q_{in} = \Sigma_{outlets} Q_{out}$$

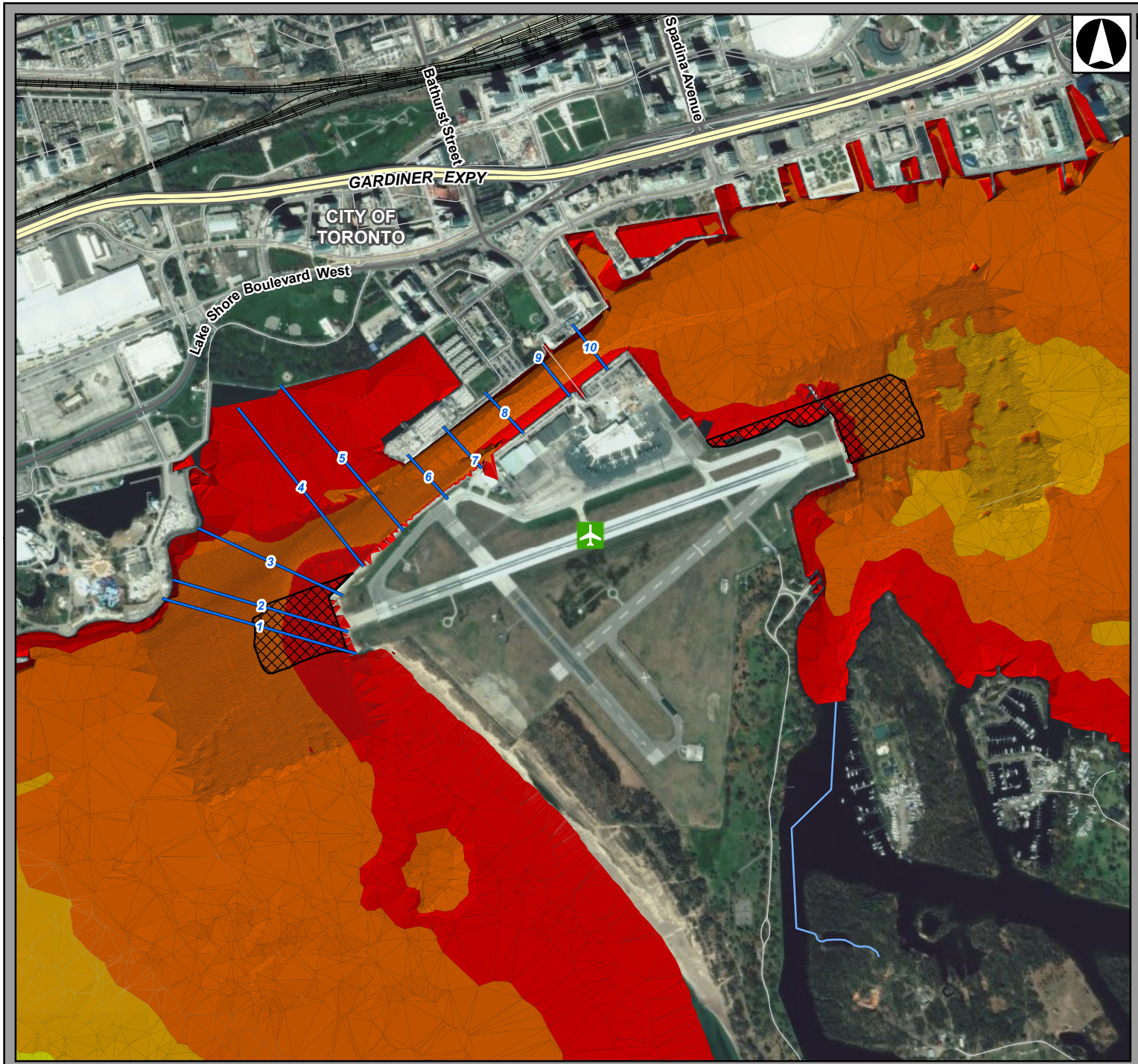
$$Q_{Western\ Channel\ Gap} + Q_{Don\ River} = Q_{Eastern\ Channel\ Gap}$$

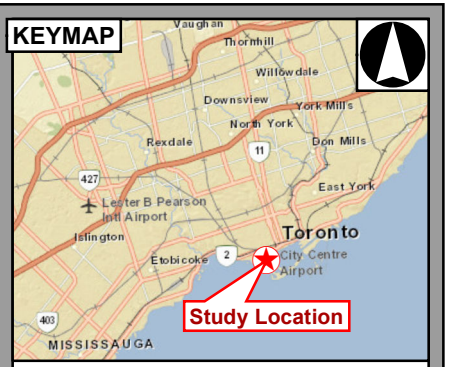
$$[\ V_{Western\ Channel\ Gap} \times A_{Western\ Channel\ Gap}\ ] + Q_{Don\ River} = Q_{Eastern\ Channel\ Gap}$$

4. Inner Harbour Residence Time:

$$R = Q_{Eastern\ Channel} / V_{Inner\ Harbour}$$

Where $V_{Inner\ Harbour}$ = 4.11E+07 m^3





LEGEND

- Billy Bishop Toronto City Airport
- Proposed Land Extention
- Cross-sections

Roads

- Freeway
- Arterial
- Collector
- Residential
- Railway

Elevation (m below CD)

- 0 - 5
- 5 -10
- 10 - 15

0 125 250 500

Meters

Billy Bishop Toronto City Airport Runway Extension Environmental Assessment

Western Channel Gap Cross-Section Location Map

Nov 2015	1:15,000	**Datnum:** NAD 1983 UTM Zone 17N
Project #: 60447218	V: 01	**Source:** M.M.A.H., M.N.R., ESRI, City of Toronto, NRCan

AECOM

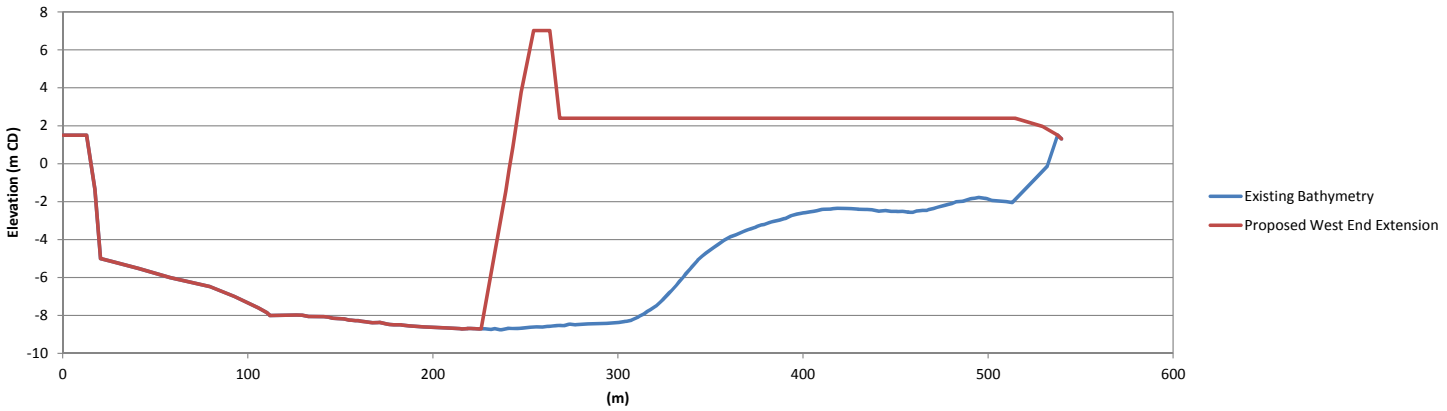
Figure: A1

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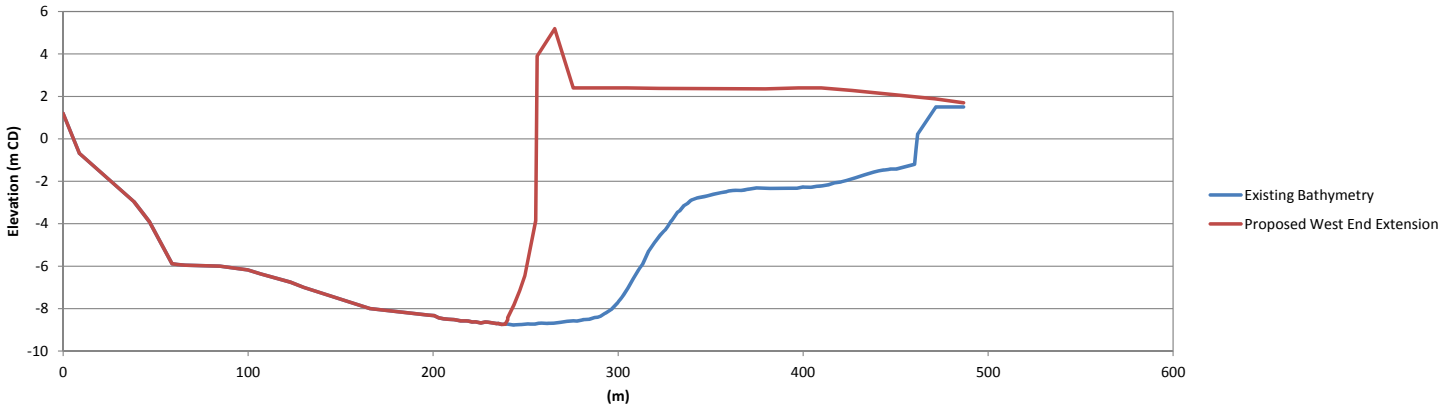
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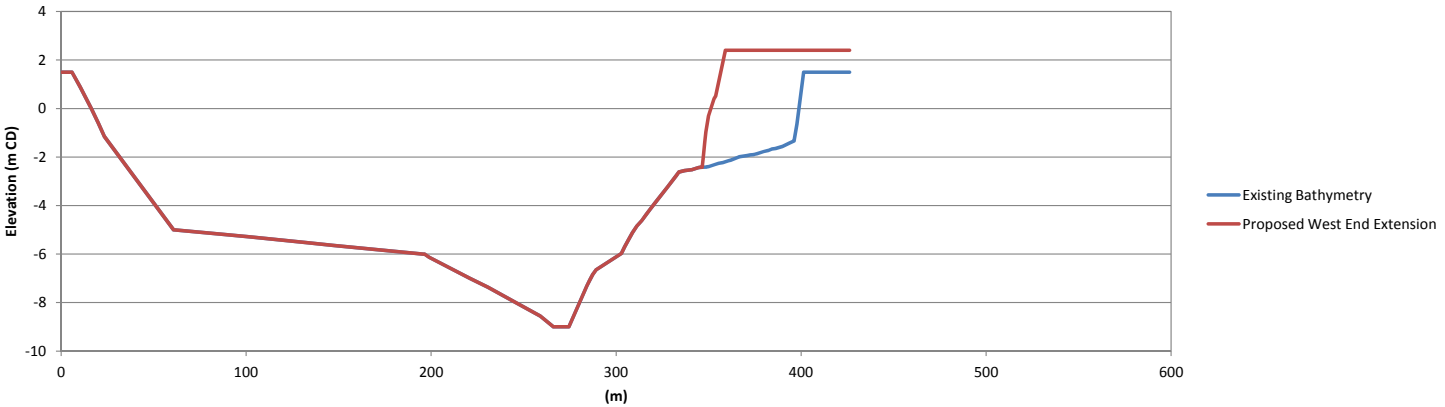
XS 1


8
6
4
2
0
-2
-4
-6
-8
-10
Elevation (m CD)
0
100
200
300
400
500
600
(m)
Existing Bathymetry
Proposed West End Extension

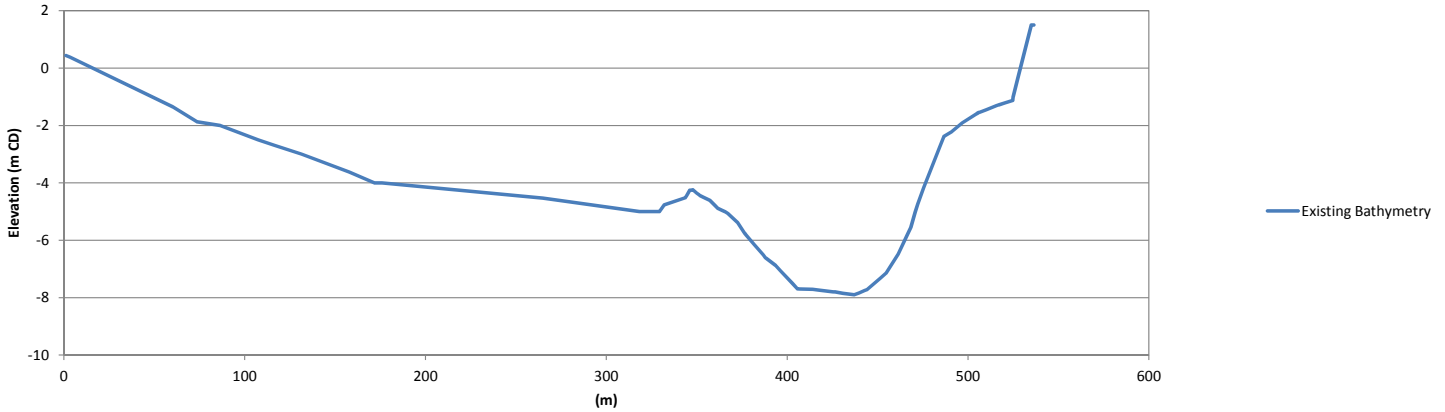
XS 2


6
4
2
0
-2
-4
-6
-8
-10
Elevation (m CD)
0
100
200
300
400
500
600
(m)
Existing Bathymetry
Proposed West End Extension

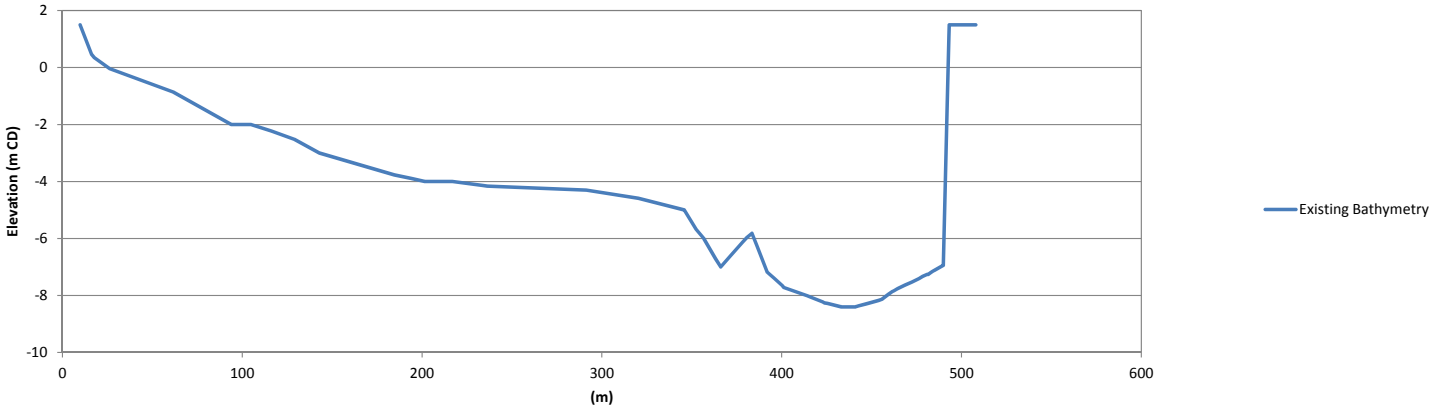
XS 3


4
2
0
-2
-4
-6
-8
-10
Elevation (m CD)
0
100
200
300
400
500
600
(m)
Existing Bathymetry
Proposed West End Extension

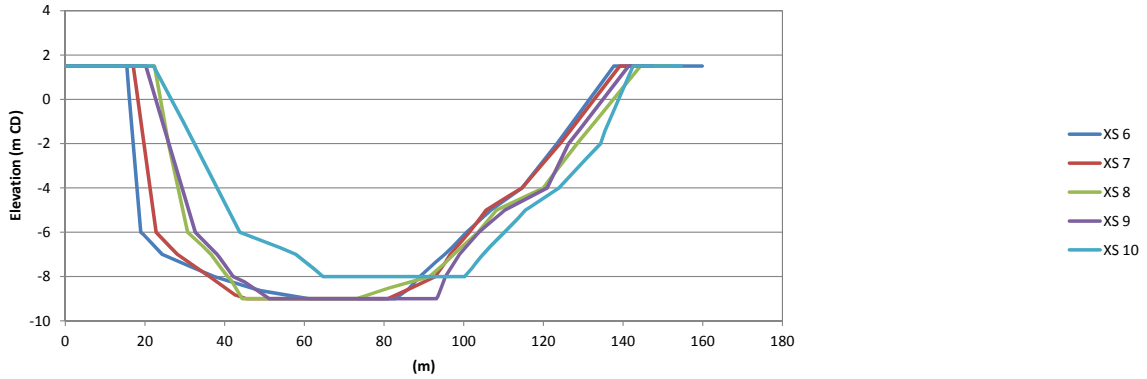
XS 4


2
0
-2
-4
-6
-8
-10
Elevation (m CD)
0
100
200
300
400
500
600
(m)
Existing Bathymetry

XS 5



West Gap
Existing Bathymetry: XS 6 - 10



Appendix B

Supplemental Data

- *ADCP 2007 Velocity Profiles*

ADCP profiles Measured ADCP (in Blue) and model predictions by Dewy (2012) (in Red) for current velocity and direction.

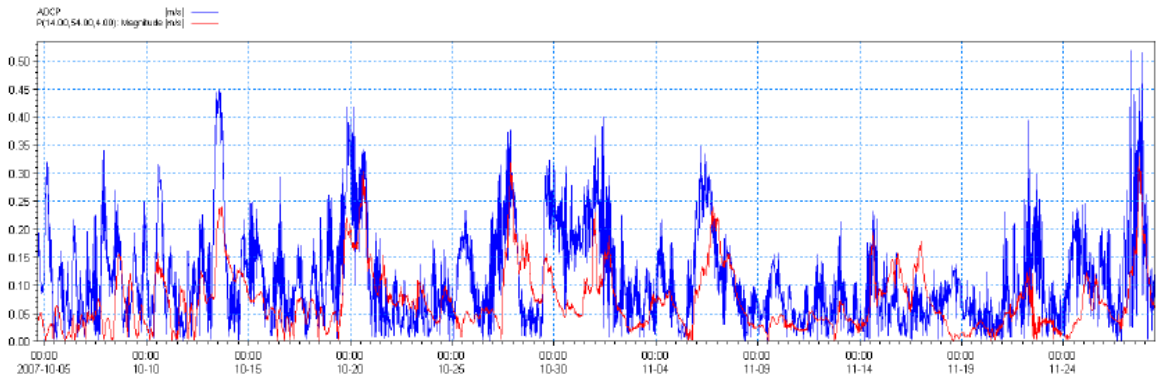


Figure 3-4 Western Gap Speed at surface

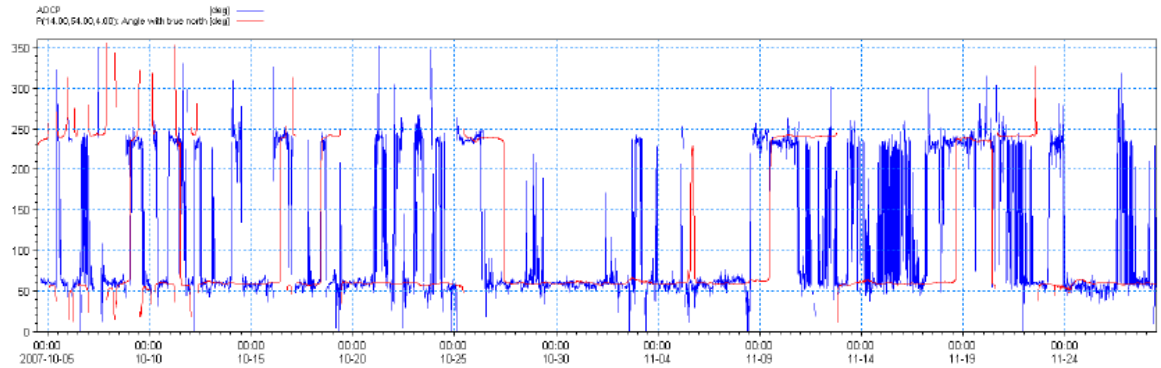


Figure 3-5 Western Gap Direction at surface

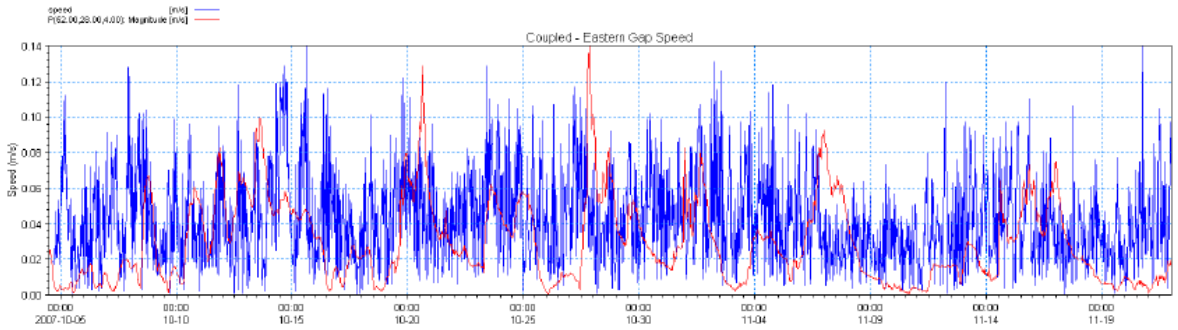


Figure 3-6 Eastern Gap Speed

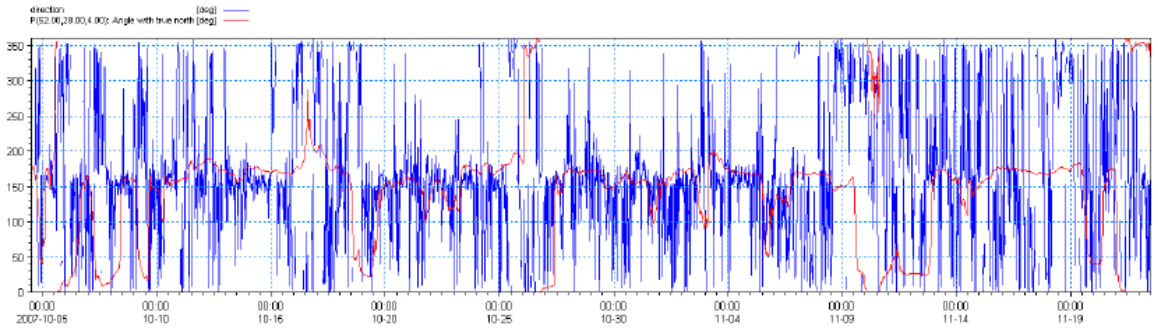


Figure 3-7 Eastern Gap Direction

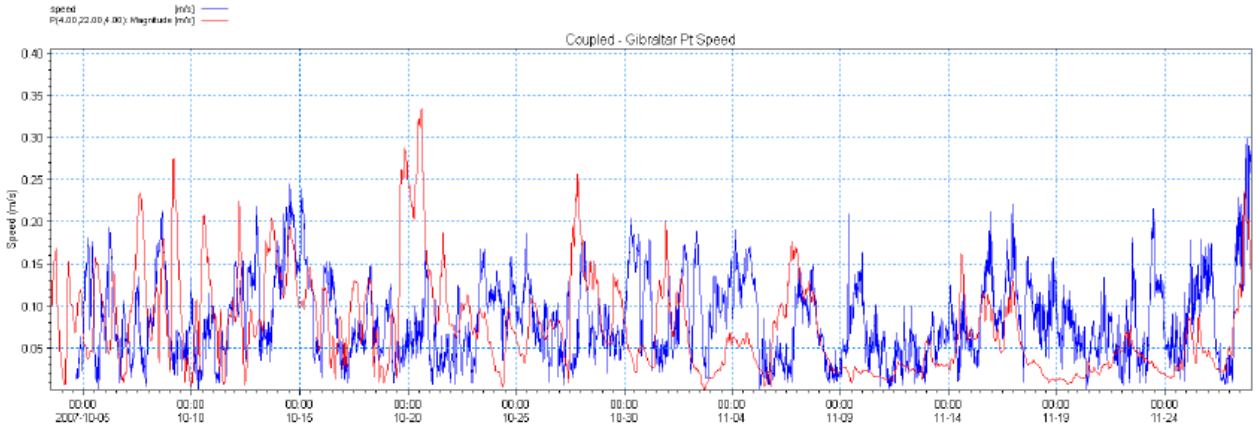


Figure 3-8 GP Speed

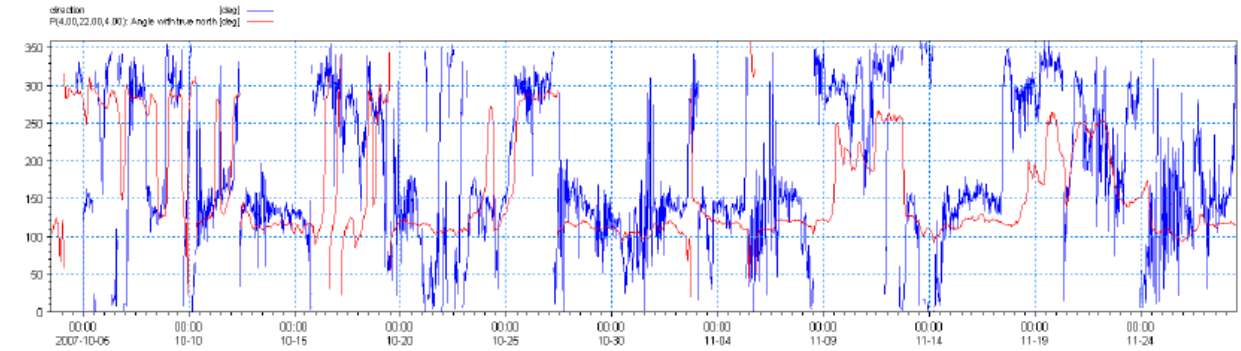


Figure 3-9 GP Direction

AECOM

Appendix C-7

Built Form and Land Use Effects Assessment

Built Form and Land Use Effects Assessment

Environmental Assessment of the Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport

Prepared by: SvN Architects and Planners
Submitted to: AECOM
Submission date: June 22, 2017

SvN

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Executive Summary

This Built Form and Land Use Assessment report builds on the preliminary analysis undertaken during the City of Toronto's Billy Bishop Toronto City Airport Review and seeks to provide additional information to aid in the assessment of potential adverse impacts on the residential and recreational environments within the vicinity of the airport. Specifically, this report will focus on potential compatibility concerns between the proposed airport expansion and planned built form and land uses within the vicinity of the airport. Potential adverse impacts on the residential and recreational environments within the vicinity of the airport that are not directly related to built form and land use compatibility concerns may be covered within other components of the Environmental Assessment (e.g. the Socio-Economic Assessment, the Noise Assessment).

This assessment is being undertaken in a defined Study Area. The Study Area is primarily derived from two key areas of concern arising from the City's Review: the lands that fall within the Airport Zoning Regulations, SOR/85-515, 1985, and the lands that fall within the City of Toronto's Central Waterfront Secondary Plan. The former was used as a guide to the Study Area as it has the capability to designate or control land outside the boundaries of an airport. The latter was used to inform the Study Area as it is the prime statutory planning document for the lands along Toronto's waterfront and has been used by the City and Waterfront Toronto to guide planning that will enable the long-term revitalization of Toronto's waterfront.

In order to understand the potential for compatibility concerns between the proposed airport expansion and planned built form and land uses within the vicinity of the airport, it is first necessary to establish two things: firstly, identify the policy, regulatory and planning tools that regulate, shape or guide effects that occur outside of the property of an airport; and secondly, provide detail on the location and extent of planned built form and land uses.

Collectively, these policy, regulatory and planning tools form a framework that provides a comprehensive list of statutory and non-statutory documents that govern the relationship between airports and areas that surround them. They also set up a dual lens approach for compatibility analysis: an airport lens and a built form and land use lens, each with their respective regulatory frameworks.

For the purposes of analysis of compatibility concerns, the two lenses have been adjusted to reflect the regulatory environment that would be in effect given the proposed airport expansion (i.e. they represent any necessary changes required to the framework in order for the expansion to occur). Based on information provided by PortsToronto, this report assumes that the Airport Zoning Regulation remains as it is today, the projected 28 NEF does not exceed the 25 NEF for 1990 and that the exemptions to the approach surfaces that are in place today also remain in place for the proposed airport expansion.

Each lens has been distilled into a series of critical questions that identify the required compliance checks of planning objectives against the framework. These questions have been formulated into test streams for each of the lenses. Each test stream consists of a number of key questions. Those that are analyzed through this report include the following:

- Is the planning area located within the Airport Zoning Regulation (AZR)?
- Do planned building heights exceed the allowable height of the AZR?
- Do the planned building heights exceed that of the current Controlling Obstacle?
- Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?
- Are there any planned sensitive land uses within the NEF 30 contour?
- Are there any planned sensitive land uses within the NEF 25 contour?

Existing and future planning objectives are then used as inputs in these test streams. By testing planning objectives against the regulatory framework required by the proposed airport expansion, this study identifies any potential compatibility concerns.

Based on the analysis undertaken, there are three types of potential compatibility issues that warrant further detailed investigation and/or mitigation measures should the proposed airport expansion go forward. These potential compatibility issues include:

1. Planning areas that fall under the Airport Zoning Regulation area or Missed Approach Surface and for which no maximum building height has as yet been defined;
2. Planning areas that feature a maximum building height that exceeds that of the current Controlling Obstacle; and
3. Planning areas that contain sensitive land uses above the projected 25 NEF.

The first type of potential compatibility concern applies to the following planning areas:

- the Port Lands Planning Framework;
- the Villiers Island Precinct Plan;
- the Bathurst Quay Neighbourhood Plan;
- and the Ontario Place Revitalization.

The second type of potential compatibility concern applies to the following planning areas:

- the East Bayfront Precinct Plan;
- the Lower Yonge Precinct Plan;
- and the Fort York Secondary Plan.

The third type of potential compatibility concern applies only to the Ontario Place Revitalization.

1.0 Introduction

1.1 Review of Work Done to Date

In 2013, the City of Toronto commenced the Billy Bishop Toronto City Airport (BBTCA) Review to assess the request from Porter Airlines to permit jet-powered aircraft operations at BBTCA. With regard to built form and land use, this review highlighted the City's Official Plan Site and Area Specific Policy (SASP) 194, which provides for improvements to BBTCA airport facilities and operations that can be made without adverse impact to the surrounding residential and recreational environment. Preliminary analysis of these matters was undertaken by a multi-disciplinary consultant team retained by the City, supplemented by reports provided on behalf of Porter Airlines. At the conclusion of the City's Review, it was noted that further information was required in order to confirm that the airport expansion could meet the policy tests outlined in SASP 194.

The City identified a number of unknowns that may have effects on the residential and recreational environment, including the potential for changes to aircraft approach paths, additional exemptions to standards, and changes to the Airport Zoning Regulations. These unknowns were due primarily to two factors: 1) the proposed expansion was in an early state, meaning certain specific changes were not yet fully developed and their associated implications could only be explored through scenario-based analysis; and 2) the analysis conducted was still preliminary in nature. An example of the former was the potential for changes to the location of visual approach aids which would, in turn, affect the location of surfaces associated with aircraft approach paths. An example of the latter was the potential for conflict between the Airport Zoning Regulations and planned built form.

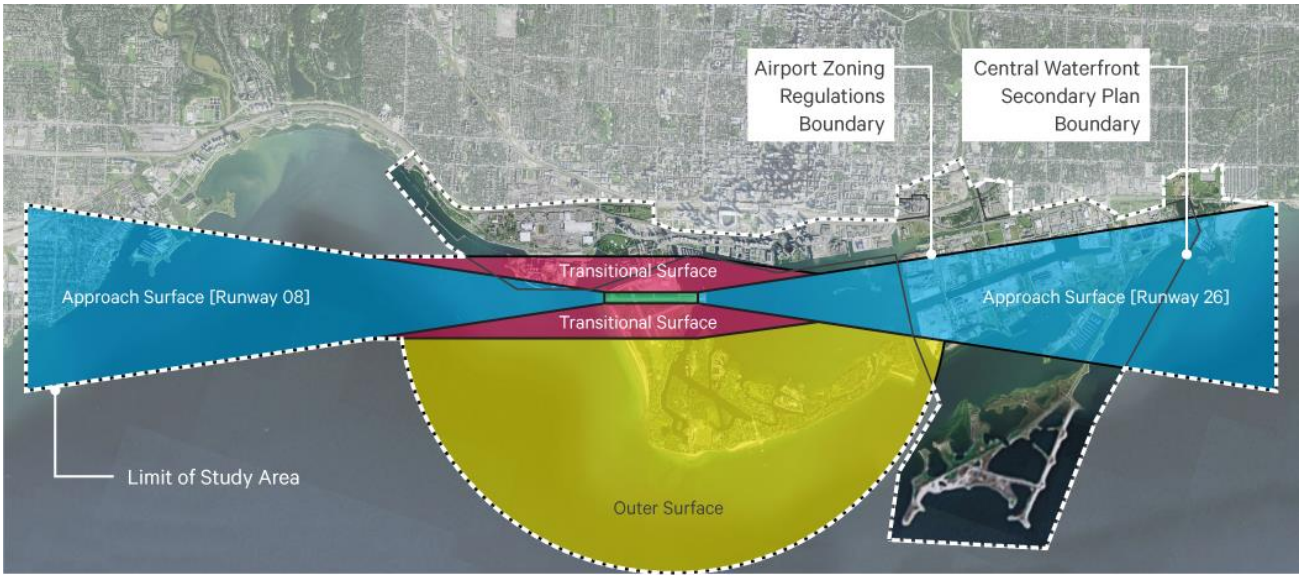
This report builds on the preliminary analysis undertaken during the City's Review and seeks to provide additional information to aid in the assessment of potential adverse impacts on the residential and recreational environments within the vicinity of the airport. Specifically, this report will focus on potential compatibility concerns between the proposed airport expansion and planned built form and land uses within the vicinity of the airport.

1.2 Description of Study Area

The Study Area for the Land Use and Built Environment Effects Assessment is primarily derived from two key areas of concern arising from the City's Review: the lands that fall within the Airport Zoning Regulations, SOR/85-515, 1985, and the lands that fall within the City of Toronto's Central Waterfront Secondary Plan. The former was used as a guide to the Study Area as it has the capability to designate or control land outside the boundaries of the airport. The latter was used to inform the Study Area as it is the primary statutory planning document for the lands along Toronto's waterfront and has been used by the City and Waterfront Toronto to guide the planning that will enable the long-term revitalization of Toronto's waterfront.

Over the course of the Study Design phase of the EA, the Study Area for the Land Use and Built Environment Effects Assessment was enlarged to incorporate areas of interest or concern identified by participants in the consultation process, including the Distillery District, the Unilever Site on Lakeshore Boulevard at the Don Valley, and Woodbine Park in the Beach(es) neigbourhood. Due to their locations, there is minimal potential for compatibility issues and, as such, a detailed description of existing and planned uses and potential impacts has not been included in this report.

Figure 1 Study Area



1.3 A Dual Lens Approach: A Focused Compatibility Review

In order to understand the potential for compatibility concerns between the proposed airport expansion and planned built form and land uses within the vicinity of the airport, it is first necessary to establish two things: firstly, identify the policy, regulatory and planning tools that regulate, shape or guide effects that occur outside of the property of an airport; and secondly, provide detail on the location and extent of planned built form and land uses.

The regulatory framework is a comprehensive list of statutory and non-statutory documents that govern the relationship between airports and areas that surround them. It consists of two scales: the macro and the micro. The macro scale contains policy, regulatory and planning tools that apply to airports across Canada, to land uses within the Province of Ontario, and to the City of Toronto as a whole. The micro scale consists of tools that apply specifically to areas within the vicinity of Billy Bishop Toronto City Airport.

The framework is further delineated by tiers representing different levels of government and different geographic scales. The framework consists of tools that elucidate the Federal, Provincial and Municipal roles in governing the relationship between airports and areas that surround them.

Through its scales and tiers, the framework also suggests two lenses – the airport lens and the built form and land use lens – that provide criteria that can be used to assess the compatibility of airport expansion with planned built form and land uses. The tools within these lenses provide thresholds for built form compatibility through the establishment of surfaces that protect from the penetration of obstacles into flight paths and for noise impacts through the prohibition and / or discouragement of noise-sensitive land uses within certain proximities of noise emission sources. Furthermore, the regulatory framework provides inputs into the compatibility test, namely the Secondary Plans, Precinct Plans, Neighbourhood Plans and Master Plans that provide the planned built form and land uses against which the compatibility of airport expansion can be tested.

Altogether, the regulatory framework both provides a comprehensive overview of all policy, regulatory and planning tools that govern the relationship between airports and the areas that surround them and sets up a dual lens approach for the analysis of compatibility between the proposed airport expansion and planned built form and land use.

The dual lens approach is then operationalized through a modified planning evaluation framework (illustrated in Figure 1-4) to conduct this assessment. Planning review frameworks are particularly well suited to the evaluation and analysis of complex proposals affecting the built environment. They do so by determining whether proposals are compatible with broader planning goals, examining key aspects of a proposal against the criteria of established planning objectives.

For the purposes of analysis of compatibility concerns, the two lenses have been adjusted to reflect the regulatory environment that would be in effect given the proposed airport expansion (i.e. they represent any necessary changes required to the framework in order for the expansion to occur). Required changes to the frameworks, if any, are described in detail at the end of section 2 and 3.

Each lens has been distilled into a series of critical questions that identify the required compliance checks of planning objectives against the framework. These questions have been formulated into test streams, illustrated with flowcharts, for each of the lenses. Existing and future planning objectives are then used as inputs in these test streams. By testing planning objectives against the regulatory framework required by the proposed airport expansion, this study identifies any potential compatibility concerns.

Sections 2 and 3 provide detail on the dual lenses, exploring their composition and relevance to an evaluation of potential impacts within the study area described above. Section 4 describes each of the planning areas within the study area and tests the key objectives of each one against the dual lens test streams, identifying compatibility concerns on a case by case basis.

Figure 2 Policy, Regulatory and Planning Tool Framework

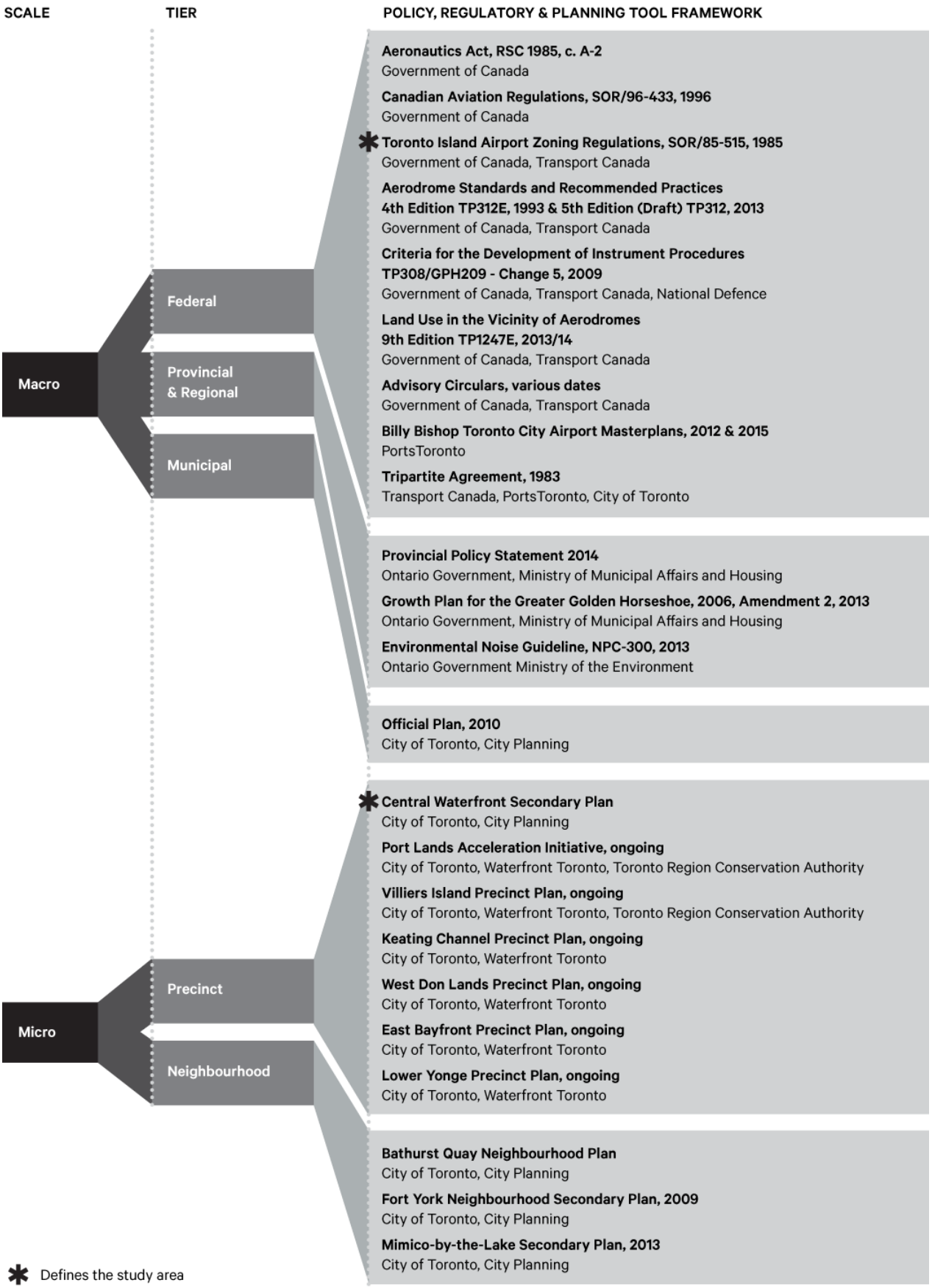
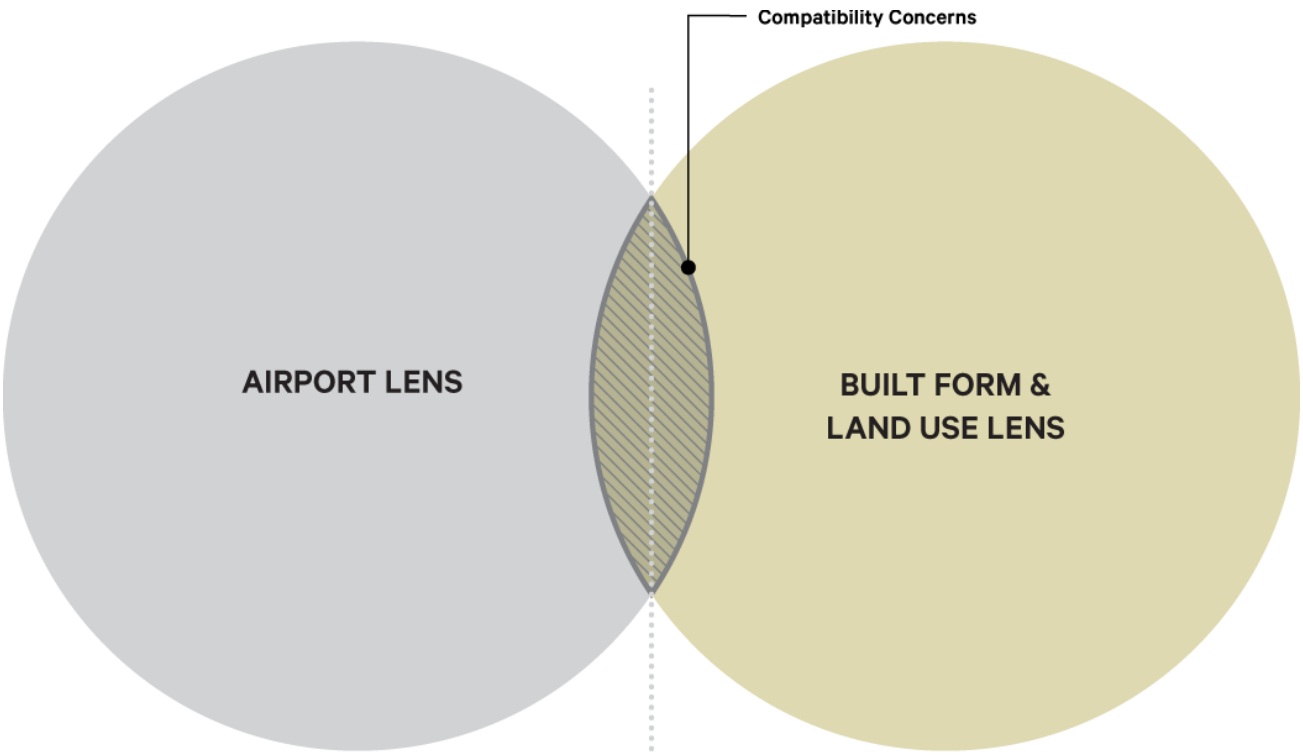


Figure 3 Regulatory Framework Lenses



Aeronautics Act, RSC 1985, c. A-2
Government of Canada

Canadian Aviation Regulations, SOR/96-433, 1996
Government of Canada

Toronto Island Airport Zoning Regulations, SOR/85-515, 1985
Government of Canada, Transport Canada

Aerodrome Standards and Recommended Practices, 4th Edition TP312E, 1993 & 5th Edition (Draft) TP312, 2013
Government of Canada, Transport Canada

Criteria for the Development of Instrument Procedures, TP308/GPH209 - Change 5, 2009
Government of Canada, Transport Canada, National Defence

Land Use in the Vicinity of Aerodromes 9th Edition TP1247E, 2013/14
Government of Canada, Transport Canada

Advisory Circulars, various dates
Government of Canada, Transport Canada

Billy Bishop Toronto City Airport Masterplans, 2012 & 2015
PortsToronto

Tripartite Agreement, 1983
Transport Canada, PortsToronto, City of Toronto

Provincial Policy Statement 2014
Ontario Government, Ministry of Municipal Affairs and Housing

Growth Plan for the Greater Golden Horseshoe, 2006, Amendment 2, 2013
Ontario Government, Ministry of Municipal Affairs and Housing

Environmental Noise Guideline, NPC-300, 2013
Ontario Government Ministry of the Environment

Official Plan, 2010
City of Toronto, City Planning

Central Waterfront Secondary Plan
City of Toronto, City Planning

Port Lands Acceleration Initiative, ongoing
City of Toronto, Waterfront Toronto, Toronto Region Conservation Authority

Villiers Island Precinct Plan, ongoing
City of Toronto, Waterfront Toronto, Toronto Region Conservation Authority

Keating Channel Precinct Plan, ongoing
City of Toronto, Waterfront Toronto

West Don Lands Precinct Plan, ongoing
City of Toronto, Waterfront Toronto

East Bayfront Precinct Plan, ongoing
City of Toronto, Waterfront Toronto

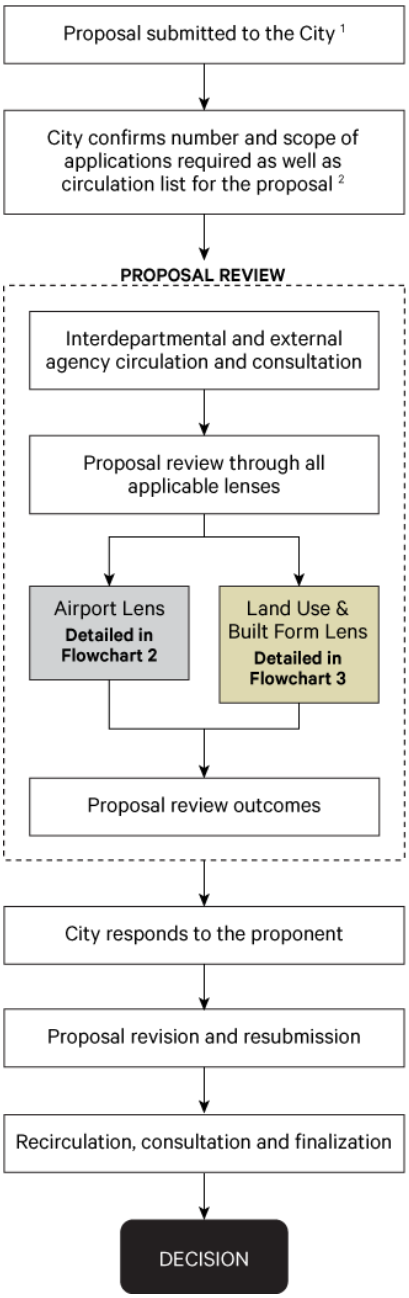
Lower Yonge Precinct Plan, ongoing
City of Toronto, Waterfront Toronto

Bathurst Quay Neighbourhood Plan
City of Toronto, City Planning

Fort York Neighbourhood Secondary Plan, 2009
City of Toronto, City Planning

Mimico-by-the-Lake Secondary Plan, 2013
City of Toronto, City Planning

Figure 4 Overall Proposal Process for Lands in the Vicinity of BBTCA



Notes for Flowcharts 1, 2 & 3

1. Proposals can take several forms, including, for example, Rezoning Applications. Waterfront applications that request an increase in allowable building height are of particular importance.
2. The City routinely includes agencies on its circulation list for planning applications. Examples include the Toronto and Region Conservation Authority and the Toronto Transit Commission.
3. Each segment of an Instrument Procedure has a Controlling Obstacle; in the vicinity of BBTCA it is typically the final approach segment that is affected. The height of this obstacle determines where the required Obstacle Clearance is measured from as well as impacts the altitude of the Height Minima, or the point at which the pilot must make a decision to land, or execute a Missed Approach procedure.
4. PortsToronto may request a reduction in building height because increases to the Height Minima have a negative impact on the efficiency of airport operations.
5. Section 26 of the Tripartite Agreement states that "the parties hereto shall not do or permit to be done...anything which would interfere with the safe use or operation of the Toronto City Centre Airport."

2.0 Airport Lens

2.1 Introduction

The airport lens is composed of macro scale framework elements that act in both a regulatory and non-regulatory manner, issued directly by the Government of Canada through Transport Canada, and legislated through the Aeronautics Act. Regulatory elements include the Canadian Aviation Regulations which are composed, in part, by standards such as TP308 and TP312 which govern the development of instrument procedures and aerodrome standards, described in more detail below. Non-regulatory elements, such as Advisory Circulars, serve an important role in the elaboration and interpretation of the standards, despite not being binding in and of themselves.

Of particular importance to the analysis at hand are the Toronto Island Airport Zoning Regulations, enacted federally by way of the Aeronautics Act and shaped by the CAR and its standards. The Airport Zoning Regulations (AZR) enable a degree of control over the lands in the immediate vicinity of the airport and form a central component of the compatibility tests performed. The relationships between the regulatory and non-regulatory elements of the airport regulations framework are illustrated in Figure 2-1.

In addition to the federal regulations outlined above, the Tripartite Agreement serves to bridge the macro and micro scales, joining the three parties of Transport Canada, PortsToronto and the City of Toronto in an agreement on the roles and responsibilities of each in the existence and operation of the airport.

The following section provides in-depth information on the relevance of the various elements of the airport lens to questions of built form and land use. Three critical test streams for the evaluation of potential compatibility concerns between the proposed airport expansion and existing and future planning objectives have been identified. These are illustrated in Figure 2-3 and include:

1. Airport Zoning Regulations
2. Missed Approach Surface
3. Tripartite Agreement

Streams 1 and 2 can be easily checked for compatibility against existing and planned built form and land use objectives within the scope of this report, and as such, form the basis of evaluation in section 4. Compatibility checks for Stream 3, the Tripartite Agreement, would have to be based on a legal interpretation of the agreement, which falls outside of the scope of this study. As such, it is excluded from evaluation, but included in the test stream flowchart for use as a tool for future analysis.

Figure 5 Airport Regulations Framework at Billy Bishop Toronto City Airport

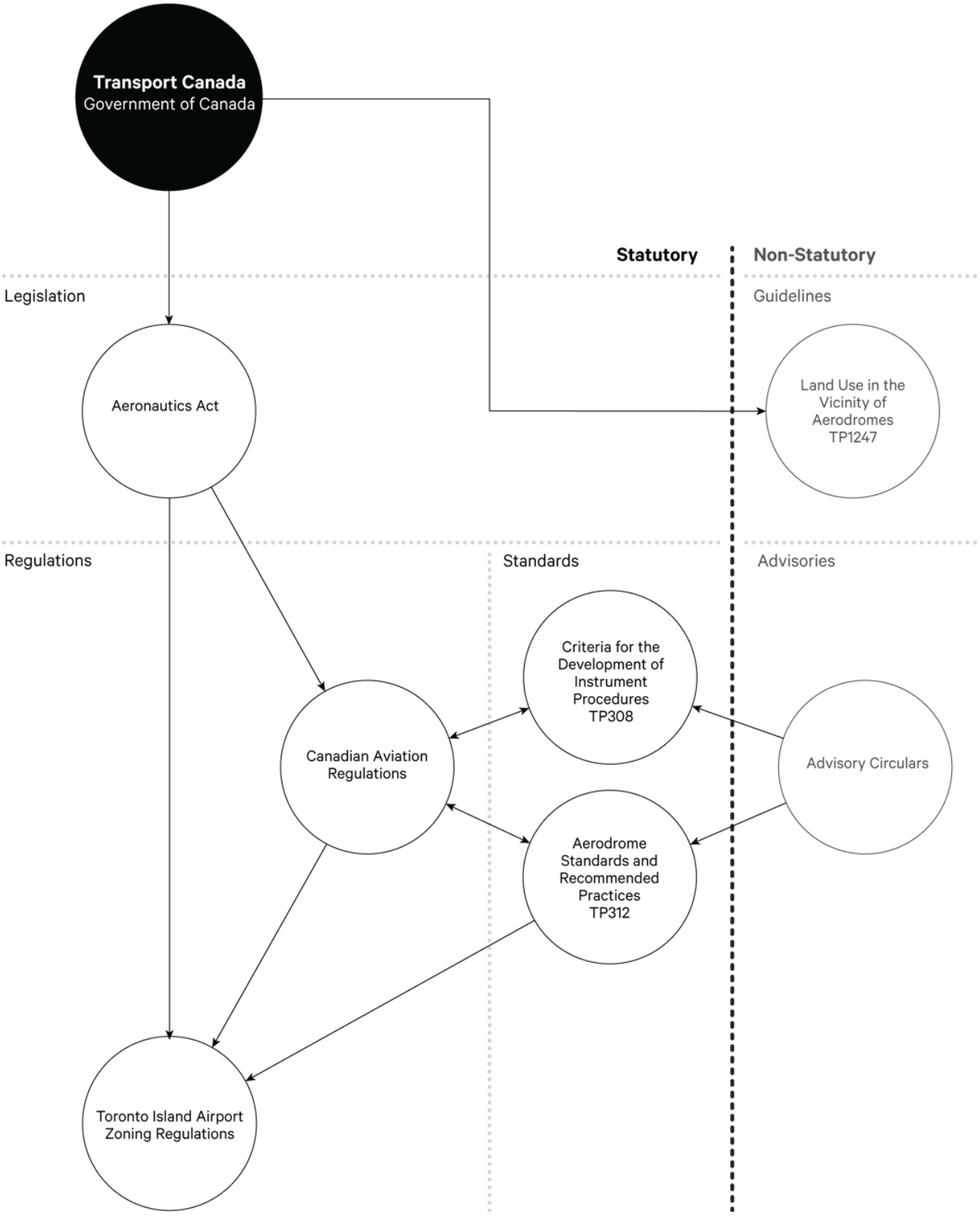
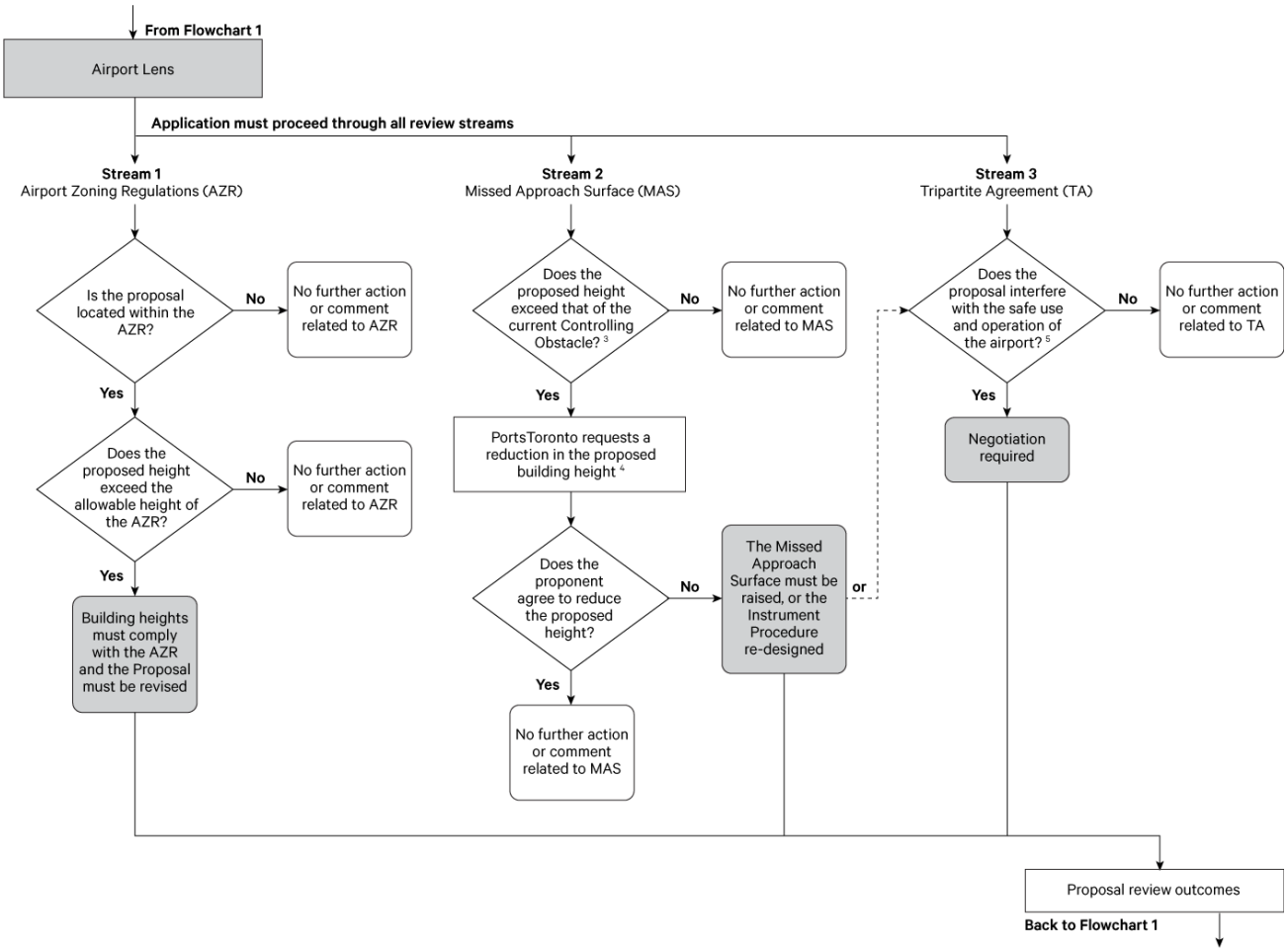


Figure 6 Proposal Review Process – Airport Lens



2.2 Aeronautics Act

Civil aviation in Canada is regulated by the Government of Canada through the enabling legislation of the Aeronautics Act. It sets out the Government's regulatory powers, including the power to make regulations regarding activities at airports and their location, certification and operation, and provides the legislative underpinning to both the Canadian Aviation Regulations and Airport Zoning Regulations. Furthermore, the Act contains provisions for exemptions to otherwise in-force regulations or standards, enabling, for example, exemptions to standards governing landing approaches to airports.

2.3 Canadian Aviation Regulations

The Canadian Aviation Regulations (CARs) are the rules by which civil aviation is governed in Canada. The CARs include regulations, standards, and advisory materials; regulations and standards must be complied with while advisory materials are not legally compulsory. Whereas there is a prescribed legal process for the creation, amendment and repealing of regulations, the creation and amendment of standards occurs through a more flexible process. There are two types of standards: those which set out criteria and conditions to be met for the issuance and maintenance of a Canadian aviation document (e.g. an airport certificate which all airports require to operate), and those which set out the 'how-to' of complying with a specific rule of conduct. In all cases, standards are associated with specific Parts of the CARs.

With regard to built form and land use compatibility, the CARs contain two key standards documents: TP 312 – Aerodrome Standards and Recommended Practices and TP 308 – Criteria for the Development of Instrument Procedures. TP 312 is associated with Part III of the CARs, which governs aerodromes, airports and heliports. TP 312 contains standards related to the design and operation of these facilities, including the physical characteristics, obstacle limitation surfaces, visual aids and technical services that are provided to support aircraft operations. Under section 302.03 of the CARs, airport operators must demonstrate that they have met the standards laid out in TP 312 (or where a standard is not met, a level of safety equivalent to that established by the standard) in order to secure an airport certificate from the Minister of Transportation.

Recognizing that airports are composed of many different parts and facilities which may have been constructed, implemented or upgraded over various periods of time, section 302.07 of the CARs permits airport operators to maintain their certification as long as these parts and facilities continuously comply to the standards applicable at the time of initial certification. This 'grandfathering' is allowed to persist up until a specific part or facility is replaced or improved, upon which the airport operator must ensure these specific systems or facilities adhere to the latest standards as they read on the date on which the part or facility is returned to service. The latest standards that applied at the time of writing of this report are the 4th Edition of TP 312.

Whereas TP 312 focuses on standards related to the design and operation of ground-based aircraft facilities, TP 308 provides criteria for the development of instrument procedures that enable the safe operation of aircraft within different airspace areas (e.g. approach, en route, departure). As such, TP 308 is associated with Part VII of the CARs, which governs all Air Navigation Services. Under section 803.02 of the CARs, all instrument procedures must meet the criteria specified in TP 308. From a built form and land use compatibility perspective, the key components of TP 308 are the Obstacle Clearance Surfaces (which includes the Missed Approach Surface) associated with departures from and approaches to an airport.

2.4 Advisory Circulars

Transport Canada publishes Advisory Circulars in order to assist the aviation industry in ensuring compliance with existing regulations and standards. These documents provide information and guidance regarding operational matters and describe acceptable, but not the only, means of demonstrating compliance. Advisory Circular (AC) 302-018 "Grandfathering at Airports Pursuant to Canadian Aviation Regulation 302.07" helps further elucidate the conditions under which airport systems and facilities can be grandfathered as spelled out in CAR 302.07, providing guidance and examples of when changes/works at an airport require adherence to the latest standards found in TP 312 – Aerodrome Standards and Recommended Practices.

AC 302-018 stipulates that compliance with the latest standards would be required when any part of the airport is being replaced or improved (e.g. reconstruction of a taxiway or runway), any facility of the airport is

being replaced or improved (e.g. replacement of edge lighting or approach lighting systems), or any part of the facility is being replaced or improved by a change to the operational level of service, change to the critical aircraft size, or runway status change (e.g. upgrade from Non-Precision to Precision). It also enumerates changes and activities where the standards in effect at the time of certification could be maintained, including maintenance activities such as runway and taxiway repaving (including localized works/repairs to the base and sub-base). In some cases, a blend of standards in effect at the time of certification and standards in effect at the time or return to service would apply to a specific part or facility. As an example, the AC 302-018 offers the reconstruction of a runway or taxiway as a whole to the same operational dimensions (length and width), noting that adherence to the latest standards would be for the surface slopes (e.g. slope of the Obstacle Limitation Surface) and ground markings.

A second Advisory Circular relevant to built form and land use compatibility is AC 302-021 "Introduction of TP 312 5th Edition". This Advisory Circular further clarifies the meaning of "the date on which the part or facility is returned to service" following replacement or improvement. It notes that improvements to airfield components are often significant undertakings, are complex in nature due to the need to satisfy regulatory requirements of multiple authorities and result in operational impacts during construction. As a result, project planning often requires long lead times that may extend up to two years or longer. To provide greater certainty to airport operators who may be in the planning or execution phases of capital works, AC 302-021 stipulates that airports may use the standards contained in TP 312 4th Edition subject to final project plans, including the Plan of Operations during Construction being submitted to Transport Canada before the 12 month anniversary of the coming into force of TP 312 5th Edition; and the works being completed in full and affected areas being fully operational within 24 months of the coming into force of TP 312 5th Edition.

2.5 TP 312 – Aerodrome Standards and Recommended Practices

TP 312 – Aerodrome Standards and Recommended Practices sets out standards for the design and operation of aerodromes, airports and heliports in Canada. Meeting the standards (or demonstrating an equivalent level of safety) is a prerequisite to the issuance of an airport certificate permitting the operation of an airport. Under TP 312 4th Edition, the standards and practices that apply to any given airport's runways are determined primarily according to the runway code number. Runway code numbers are related to the length of a runway, which in turn is based on the take-off distance of the design aircraft (the most demanding type of aircraft that uses the airport on a regular basis). Billy Bishop Toronto City Airport's (BBTCA) Runway 08-26 has a length of 1,216m. While TP 312 states that runways greater than 1,200m in length are to be classified as Code 3, Runway 08-26 is currently certified by Transport Canada as a Code 2 runway due to the certification being granted prior to 1993 when an earlier edition of TP 312 was in force. In addition to the code number, the standards that apply to OLS and OPS are also determined by the types of runway approach, including non-instrument, non-precision and precision. Runway 08-26 is currently certified as a non-precision runway.

From a built form and land use compatibility perspective, the two key elements of TP 312 are the Obstacle Limitation Surface (OLS) and Obstacle Protection Surface (OPS). The intention of these surfaces is to limit the construction of objects at a height below that which would interfere with the safe operation of an airport, particularly with regard to the take-off and approach of aircraft from/to an airport's runways. Obstacle Limitation Surfaces (OLS) are defined in TP 312 as surfaces that establish a limit to which objects may project into the airspace associated with an airport so that aircraft operations at the airport may be conducted safely. OLS are further defined as a surface used to minimize the danger presented by obstacles to an aircraft during an entirely visual approach or during the visual segment of an instrument approach.

OLS consist of three types of surfaces:

- The Outer Surface – located in a horizontal plane 45m above the airport and its environs, extending outward from the aerodrome reference point (ARP – a designated point or points normally located at or near the geometric centre of the runway complex) along a radius of 4000m, extending over an area not less than a 180° sector along the runway centre line, and recommended to extend a full 360° around the runway centre line.
- The Transitional Surface – a complex surface along the side of the runway and part of the side of the approach surface, that slopes upwards and outwards to the outer surface, or 45m above the ARP elevation where no outer surface has been established (e.g. where the outer surface only extends

180° along the runway centre line). The maximum slope of the Transitional Surface for both Code 2 and Code 3 runways is 14.3%

- The Take-Off/Approach Surface – an inclined plane extending beyond the end of a runway and preceding the threshold of a runway by a distance of 60m. The Take-Off/Approach Surface for Code 2 runways have an inner edge (i.e. the edge closest to the runway threshold) of 45m, a divergence rate of 10% from the inner edge to the outer edge, and an overall length of 2500m. The maximum slope of a Take-Off/Approach Surface for a Code 2 runway is 3.33%.

The Outer Surface, Transitional Surface and Take-Off/Approach Surface are required for non-precision and precision runways.

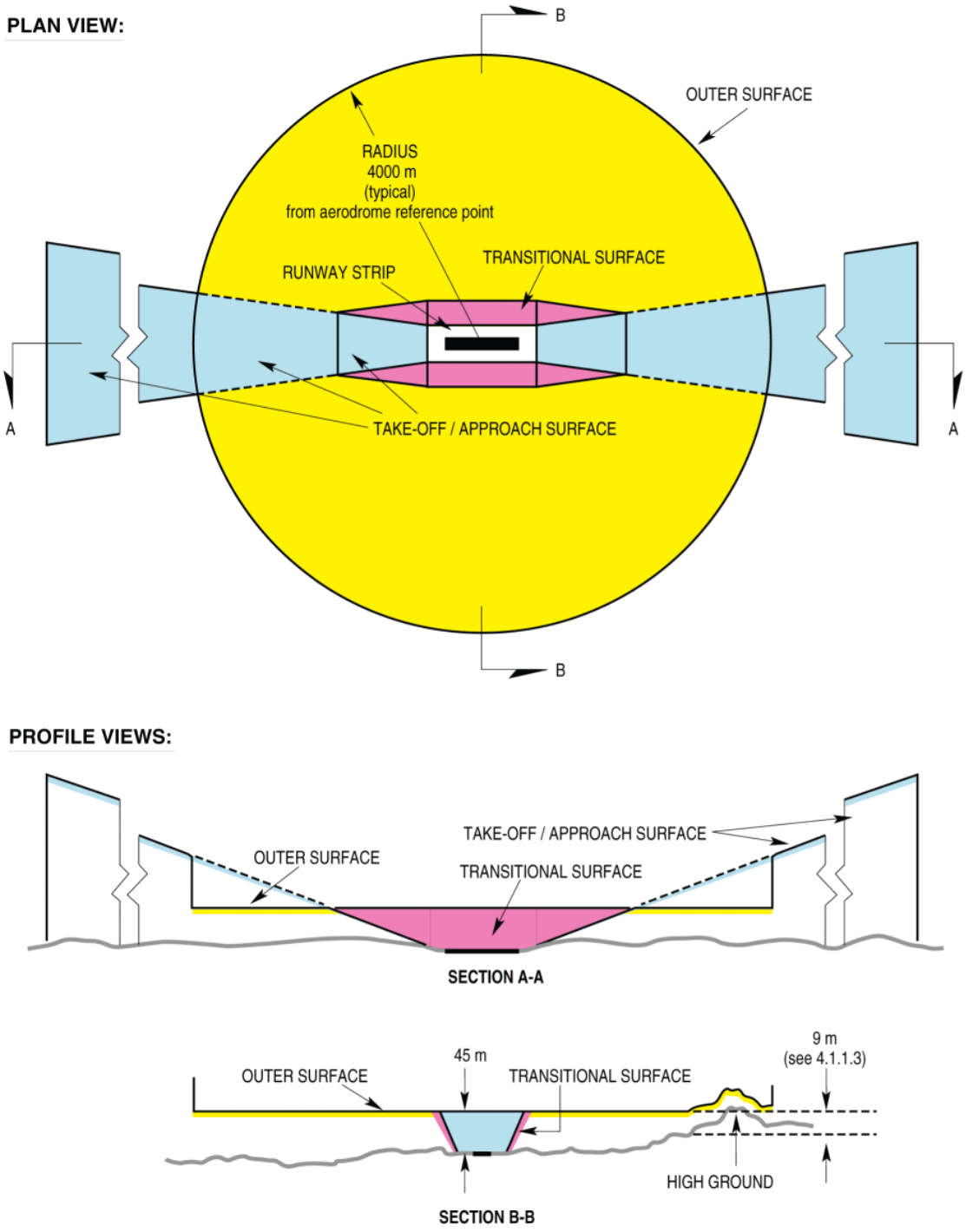
Obstacle Protection Surfaces (OPS) are associated with visual approach slope indicators systems (ground-based lighting arrays that provide pilots with a visual indication that the aircraft is approaching the runway at the correct angle. This angle is known as the approach/glide slope). There are two visual approach slope indicator systems: Precision Approach Path Indicator (PAPI) and Abbreviated Precision Approach Path Indicator (APAPI) systems. Under TP 312, a Code 2 runway can feature either a PAPI or APAPI system. Code 3 runways must feature PAPI systems.

As with the Approach/Take-Off Surface, OPS are inclined planes that extend beyond the end of runways and precede runway thresholds by a distance of 60m. For Code 2 runways, OPS likewise have an inner edge length of 45m. However, they have a broader rate of divergence at 15% and a length of 7500m, three times as long as the OLS Approach/Take-Off Surface. The maximum slopes for OPS for Code 2 runways are 1.93° and 1.85°, for PAPI and APAPI systems respectively. These slopes are stipulated relative to a 3° approach/glide slope.

As noted previously, the Aeronautics Act contains provisions for exemptions to certain standards permitting that an equivalent level of safety has been demonstrated. At BBTCA, exemptions are in place relating to the slopes of the Take-Off/Approach Surfaces associated with Runway 08-26. These exemptions permit a slope of 4.8% for Runway 08 and 6.38% for Runway 26.

There are also exemptions to the approach/glide slope at BBTCA. Runway 08, which features a PAPI system, has an exemption that provides for an approach/glide slope of 3.9° rather than 3°. Runway 26, which features an APAPI system, has an exemption that provides for an approach/glide slope of 4.8° rather than 3°.

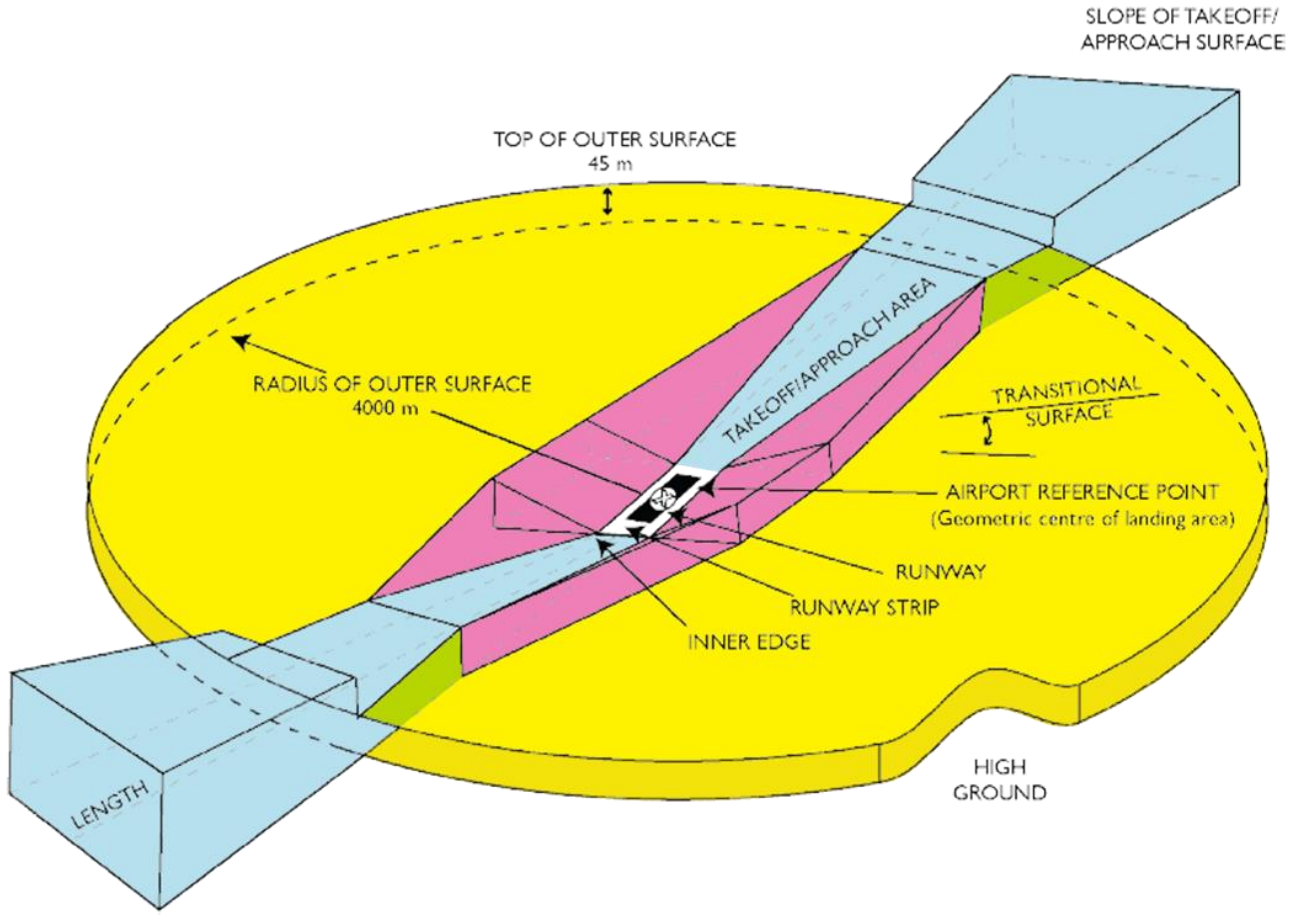
Figure 7 Obstacle Limitation Surfaces (OLS) – Orthographic Diagrams[1]



Notes

1. This diagram has been coloured to correspond with the Toronto Island Airport Zoning Regulations for clarity. The original version of this diagram can be found in TP312 section 4.1 Obstacle Limitation Surfaces (page 4-3 Figure 4-1. Obstacle Limitation Surfaces).

Figure 8 Obstacle Limitation Surfaces – Isometric Diagram[1]



Obstacle Limitation Surfaces

These surfaces delineate the required obstacle free airspace around an aerodrome. The required characteristics of these surfaces are dependent on the runway type and code number as dictated by TP312. These surfaces are often protected by an AZR as they do not legally restrict the heights of potential obstacles.[2]

Outer Surface

The Outer Surface protects airpsace for aircraft conducting a circling procedure or manoeuvring in the vicinity of an aerodrome. A semi-circular surface may be established permitting a circling procedure on only one side of the runway.[3]

Take-off/Approach Surface

This surface delineates the required obstacle free airspace on take-off and approach to a runway. An inner edge, perpendicular to the runway, begins at the end of the runway strip. The two sides originate at the ends of the inner edge and diverge uniformly until the required length is reached. The surface slopes upward at a required angle.[4]

Transitional Surface

The Transitional surface is a complex surface along the sides of the runway strip and pan of the Approach Surface that slopes up to the Outer Surface. Its purpose is to ensure the safety of aircraft at low altitudes displaced from the runway centre line in the approach or missed approach phase.[5]

Notes

1. This diagram has been coloured to correspond with the Toronto Island Airport Zoning Regulations for clarity. The original version of this diagram can be found in TP1247 section 1.4 Take-Off/Approach Areas and Surfaces (page 11 Figure 3. Obstacle Limitation Surfaces).
2. See TP312 section 4.1 Obstacle Limitation Surfaces.
3. See TP312 section 4.1.1 Outer Surface and TP1247 1.3 Outer Surface.
4. See TP312 section 4.1.2 Take-off/Approach Surface and TP1247 1.4 Take-off/Approach Areas and Surfaces.
5. See TP312 section 4.1.3 Transitional Surface and TP1247 1.5 Transitional Surface.

Figure 9 The Relationship Between Obstacle Limitation, Obstacle Protection and Airport Zoning Regulation Surfaces



Airport Zoning Regulation (AZR) - Approach Surface

Airport Zoning Regulations (AZRs) are not required by TP312 but may be enacted by Transport Canada in order to maintain the required obstacle free airspace in the vicinity of an airport. AZR surfaces legally restrict the heights of buildings, structures, and objects on regulated lands.[1]

Obstacle Limitation Surface (OLS) - Approach Surface

This surface delineates the required obstacle free airspace on approach to a runway. The required characteristics of this surface are dependent on the runway type and code number as dictated by TP312. This surface is typically protected by an AZR as it does not legally restrict the heights of potential obstacles.[2]

Obstacle Protection Surface (OPS)

This surface is established to provide for a visual approach slope indicator system, such as PAPI (Precision Approach Path Indicator), which assist the pilot in maintaining the correct glidepath on their approach. Its required characteristics are dependent on the runway type and code number as dictated by TP312.[3]

Typical Visual Approach Glidepath

A glidepath of 3.0° is the standard approach slope used by pilots on visual approach. If the approach is deemed to be clear of obstacles, the pilot may elect to approach at a lower angle. Some airports have steeper approach slopes based on topography, buildings, or other considerations.[4]

Notes

1. More information on Airport Zoning Regulations can be found on the Transport Canada website at https://www.tc.gc.ca/eng/ontario/air-azr-pickering-background-federal-1480.htm
2. See TP312 section 4.1 Obstacle Limitation Surfaces.
3. See TP312 section 5.3.6.23 Obstacle Protection Surface.
4. An approach glidepath of 3.0° is commonly accepted within the air navigation industry. See TP312 section 5.3.6.18 regarding standard slope settings for visual aids for navigation, for example. Transport Canada defines a steep slope as an approach path angle greater than or equal to 4.5° or 7.9% (see Advisory Circular 525-011 Approval of Steep Approach Landing Capability of Transport Category Aeroplanes from December 1, 2004). Airports with steep approach slopes are commonly found in mountainous environments, or built-up urban areas. Examples include Pangnirtung, Nunavut and London City Airport, UK, both of which have approach path angles of 5.5° or 9.63%.

2.6 Airport Zoning Regulation

Generally speaking, the authority to designate and control the use of lands outside the property boundaries of an airport rests with provincial and municipal levels of government. An exception to this rule occurs where an Airport Zoning Regulation (AZR) is in place, made pursuant to the Aeronautics Act, permitting the Federal Government to exercise authority over those lands that are covered by the AZR. For those airports at which an AZR has been enacted under the Aeronautics Act, details of the registered zoning plans are available from the Land Registry Office for the district within which the airport is located.

Airport Zoning Regulations contain restrictive clauses that describe activities and uses that are restricted or prohibited and contains a legal description of the lands to which it applies. Restrictions and/or prohibitions contained in a zoning regulation may range from limiting the height of structures to prohibiting specified land uses or to prohibiting facilities that may interfere with signals or communications to/from aircraft. Since Obstacle Limitation Surfaces normally extend beyond the boundaries of an airport, these surfaces can be protected from penetration through the enactment of an AZR that prohibits the erection of structures which would violate any component of the Obstacle Limitation Surface (i.e. take-off/approach, transitional, and outer surfaces). While the Obstacle Protection Surfaces associated with visual approach slope indicators systems are not explicitly protected by AZRs, in most cases the OPS lies above the OLS and therefore an object that

would penetrate the OPS would penetrate an OLS, with the exception of objects that lie outside of the outer edge of an OLS but within the outer edge of an OPS.

Where structures and/or uses contravene the restrictions and/or prohibitions contained within an AZR, the Federal Government may require the owner of such a property (or may undertake such actions itself as reasonably necessary) to permanently discontinue a contravening use and/or alter or remove the structure such that it does not violate the OLS. Where a use or structure exists prior to the enactment of an AZR, the AZR shall not apply to that use or structure, even if it does not conform to the zoning regulation. Uses and structures are deemed to exist where all approvals for construction required by law have been obtained prior to or on the day on which a zoning regulation comes into force. AZR come into force on the day that a copy signed by the Minister of Transport and a licensed land surveyor has been deposited in the local land titles office.

Airport Zoning Regulations are created through a five stage process. In the first stage, an 'appropriate authority' identifies a need to implement of amend an AZR. Transport Canada confirms the aeronautical requirements and Public Works and Government Services Canada produces draft regulations based on these requirements.

In the second stage, affected municipalities are formally advised of Transport Canada's intent to enact an AZR. Draft regulations are sent to municipalities for their review and Transport Canada meets with locally elected officials. A draft Regulatory Impact Analysis Statement (RIAS), which includes a summary of consultations and a cost-benefit analysis, is sent to the Minister. In the third stage, Transport Canada conducts public consultations (open houses and information sessions). Results of the public consultations are included in an updated RIAS.

In the fourth stage, the AZR and updated RIAS are circulated within the federal government and submitted to Privy Council for final approval. In the fifth and final stage, the regulation comes into force when it is deposited in the local Land Titles and Registry Offices and published in the local newspaper(s).

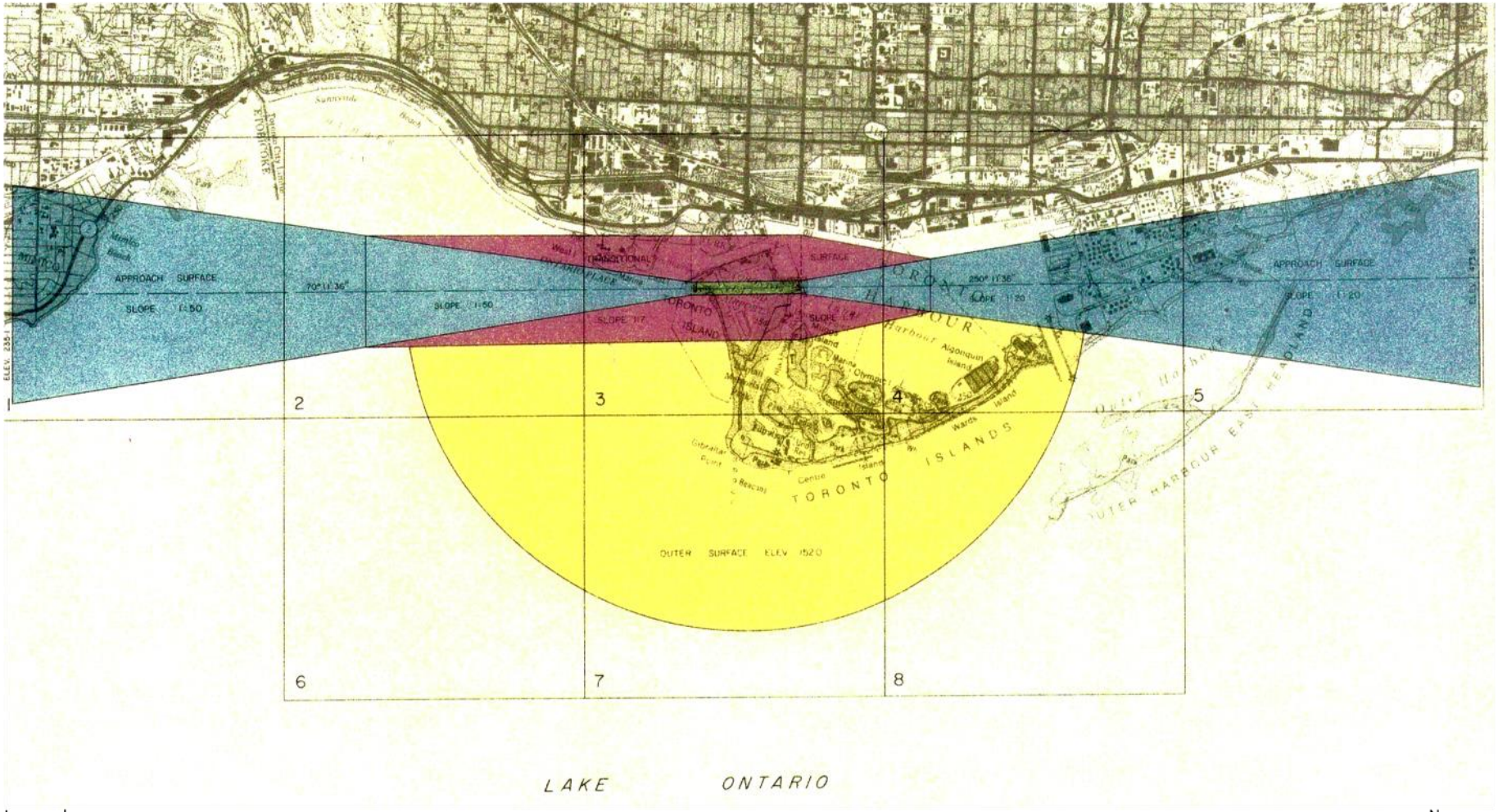
At BBTCA, the AZR protects the Outer Surface, Approach Surfaces and Transitional Surface for Runway 08-26. Notwithstanding that Runway 08-26 is certified as a Code 2 Non-Precision runway, the dimensions of the AZR are nearly identical to the OLS for a Code 3 Non-Precision Runway.

Figure 10 Original Airport Zoning Regulations, 1985

Scan of Original Airport Zoning Regulations, 1985

Protects for Code 3 Non-Precision, TP312E 3rd Edition was in effect

NTS



Legend

- AZR - Approach Surface - West @ 2.0% / 1.15° - East @ 5.0% / 2.86°
- AZR - Transitional Surface @ 14.3% / 8.13°
- AZR - Outer Surface @ 76m above Airport Reference Point

N

2.7 TP 308 – Criteria for the Development of Instrument Procedures

TP 308 – Criteria for the Development of Instrument Procedures serves two purposes: (1) to provide standards related to the development, publishing and monitoring of instrument approach procedures and (2) criteria to be used in determining the Obstacle Clearance Surface (OCS) requirements for a runway. With regard to OCS, TP 308 specifics the size and dimensions of the obstacle-free airspace required for both instrument approaches and missed approaches.

An instrument approach procedure outlines a series of maneuvers that an aircraft shall take under instrument flight conditions from the beginning of the initial approach through to a landing or the point at which a landing may be made visually at runways that are not equipped with systems to provide for fully instrument-guided landings. A missed approach is a procedure that is followed when an instrument approach cannot be completed to a full-stop landing or where visual contact with the runway cannot be made at the decision altitude for runways that are not equipped with systems to provide for fully instrument-guided landings.

OCS are used in the construction of instrument flight procedures and specify minimum safe altitudes for each segment of the procedure. OCS are designed to meet the needs of a particular runway environment based on the location and height of existing obstacles, aeroplane speed, the navigational aid being used and in some cases the equipment fitted to the aeroplane. Rarely would two sets of OCSs be the same for the same type of aircraft on instrument approach at different runways.

OCS specify the size and dimensions of the obstacle-free airspace needed for an instrument approach and a missed approach initiated at or above the Obstacle Clearance Altitude. Airplanes descending below the Obstacle Clearance Altitude have, by necessity, visually confirmed they are aligned with the runway and are then protected by the OLS specified in TP 312. The obstacle clearance an OCS provides is always based on existing obstacles. Whereas OLS are intended to be of a permanent nature with geometry fixed in relation to the proposed airport use, where a new obstacle appears within an OCS, the entire instrument approach procedure must be reviewed.

Figure 11 Obstacle Limitation Surfaces versus Obstacle Clearance Surfaces

When reviewing airport regulations and their potential impact on the built environment, it is important to understand the differences between Obstacle Limitation Surfaces and Obstacle Clearance Surfaces.[1] The following chart provides an overview of the key distinctions.

	Obstacle Limitation Surfaces	Obstacle Clearance Surfaces
Applicable standard	Aerodrome Standards and Recommended Practices TP312	Criteria for the Development of Instrument Procedures TP308
Purpose	Defines airspace around an airport to be kept free of obstacles for safety of operation during visual approach, or the visual segment of an instrument approach.	Used in the development of instrument flight procedures and for specifying minimum safe altitudes for each segment of the flight procedures.
Consistency across runways	High. Surfaces for runways of the same characteristics will be identical (except in cases where exemptions are granted).	Low. Surfaces for the same type of instrument approach will rarely be the same for two different runways. Instrument procedures are highly specific.
Surfaces and concepts involved	Outer Surface, Transitional Surface, Take-off/Approach Surface	Missed Approach Surface, Minimum Descent Altitude, Required Obstacle Clearance, Minimum Vertical Clearance
Flexibility	Permanent. Only change if the physical infrastructure of the airport changes.	Dynamic. Must be reviewed every time conditions change.
Regulatory ability	None, but form the basis for Airport Zoning Regulations which place binding limitations on the height of obstacles.	None. Must respond to the changing environment (natural and built) and have no control over obstacles.
Consequence of penetration by an obstacle	Depending on the degree of penetration remedial steps can be taken: raising the glidepath, object removal, threshold displacement, downgrading of operations, or marking of the obstacle with a hazard beacon.	When a new obstacle appears, the entire instrument procedure must be reviewed in order to maintain minimum required clearances. This can result in the raising of Minimum Descent Altitudes and Missed Approach Surfaces.

Notes

1. For more information on the distinctions between Obstacle Limitation and Obstacle Clearance Surfaces, see Annex F: OLS vs OCS, Criteria for the Development of Instrument Procedures TP 308 / GPH 209 - Change 4, 01 January 2009.

2.8 TP1247E – Land Use in the Vicinity of Aerodromes

TP1247E is a planning document produced by Transport Canada to assist planners and legislators at all levels of government in becoming familiar with issues related to land use in the vicinity of aerodromes. It describes the operational characteristics of aerodromes and different types of land uses that may exist outside of the property boundaries of aerodromes and recommends guidelines for those land uses. Through these guidelines, TP1247E seeks to promote compatible land use planning to minimize impacts on aerodrome safety and operations.

In addition to providing an overview of the Obstacle Limitation Surface and Airport Zoning Regulation, TP 1247E also provides information and recommended guidelines on minimizing impacts between noise generated from airport operations and noise sensitive uses that are in the vicinity of aerodromes. As Obstacle

Limitation Surfaces and Airport Zoning Regulations are discussed elsewhere in this report, this section will focus on the information that TP1247E provides with regard to minimizing noise impacts through the use of a Noise Exposure Forecast and the guidelines it recommends with regard to land uses that fall within NEF contours.

The primary purpose of a Noise Exposure Forecast is to encourage compatible land use planning in the vicinity of aerodromes. An NEF provides a summation of noise from all aircraft types operating at an aerodrome based on actual or forecast aircraft movements by runway and the time of day the movements occur. They are based on a forecast of aircraft traffic volume, type and mix for a period of between five and ten years and take into account both existing runway layout and runway layout changes that may occur within the forecast period. NEF are produced by aerodrome owners or operators and can be reviewed by Transport Canada to ensure accuracy should the aerodrome owner/operator make such a request.

An NEF consists of several numbered contour levels, each associated with a different level of estimated noise that would be experienced within the geographic area delimited by the contour. Each contour level is associated with: (1) different levels of impact and (2) predicted community responses to noise. For example, at NEF 30, speech interference and annoyance caused by aircraft noise are, on average, established and growing, and community response is predicted to consist of sporadic to repeated individual complaints with group action possible. At NEF 35, speech interference and annoyance caused by aircraft noise are very significant and individual complaints may be vigorous with possible group action and appeals to authorities occurring.

In light of the different levels of impact and predicted community response, TP1247E recommends a number of restrictions and mitigating measures for sensitive land uses depending on NEF contour level in which they are located. Residential uses are amongst the more sensitive land uses identified by Transport Canada in TP1247E. Transport Canada recommends that no residential use should be permitted in areas that are above the NEF 30 contour. Below the NEF 30 contour, residential uses may be acceptable if the developer of the residential use is made aware that annoyance caused by aircraft noise may begin as low as the NEF 25 contour and the developer undertakes to inform all prospective tenants or purchasers of residential units. Furthermore, it is suggested in TP1247E that residential uses should not proceed until the responsible planning authority is satisfied that acoustic insulation features, if required, have been considered in the building design.

TP1247E also contains recommendations with regards to locating a number of other sensitive land uses within NEF contours as follows:

Outdoor Theatres	• Should not be permitted above NEF 30. • Should not be permitted below and close to the NEF 30 unless a detailed noise analysis has been conducted.
Beaches and Pools	Permissible above NEF 40.
Marinas	Permissible above NEF 40.
Park and Picnic Areas	• Should not be permitted above NEF 40. • May be permitted between NEF 40 and 35 as long as serious consideration is given to an analysis of peak noise levels and the effects of these levels on this land use. • Permissible below NEF 35.
Playgrounds	• May be permitted above NEF 35 as long as serious consideration is given to an analysis of peak noise levels and the effects of these levels on this land use. • Permissible below NEF 35.
Athletic Fields	• Should not be permitted above NEF 40.

	• Undesirable between NEF 35 and 40 if there is spectator involvement. • May be permitted between NEF 35 and 30 as long as serious consideration is given to an analysis of peak noise levels and the effects of these levels on this land use.
Schools	• Should not be permitted above NEF 35. • May be permitted between NEF 35 and 30 as long as a detailed noise analysis is conducted and the required noise insulation features are considered by the architectural consultant responsible for the building design. • If a location below and close to NEF 30 is contemplated, a detailed noise analysis should be conducted and the required noise insulation features should be considered by the architectural consultant responsible for the building design.
Community Centres	• Should not be permitted above NEF 35. • May be permitted between NEF 35 and 30 as long as a detailed noise analysis is conducted and the required noise insulation features are considered by the architectural consultant responsible for the building design. • If a location below and close to NEF 30 is contemplated, a detailed noise analysis should be conducted and the required noise insulation features should be considered by the architectural consultant responsible for the building design.

NEF Contours and Municipal Land Use Planning – Mississauga's Official Plan

The City of Mississauga's Official Plan contains policies that specify limitations on residential land uses within the vicinity of the Lester B. Pearson International Airport as determined by NEF contours. These limitations, while not perfectly aligned with nevertheless broadly reflect the intent of the guidelines in TP1247e.

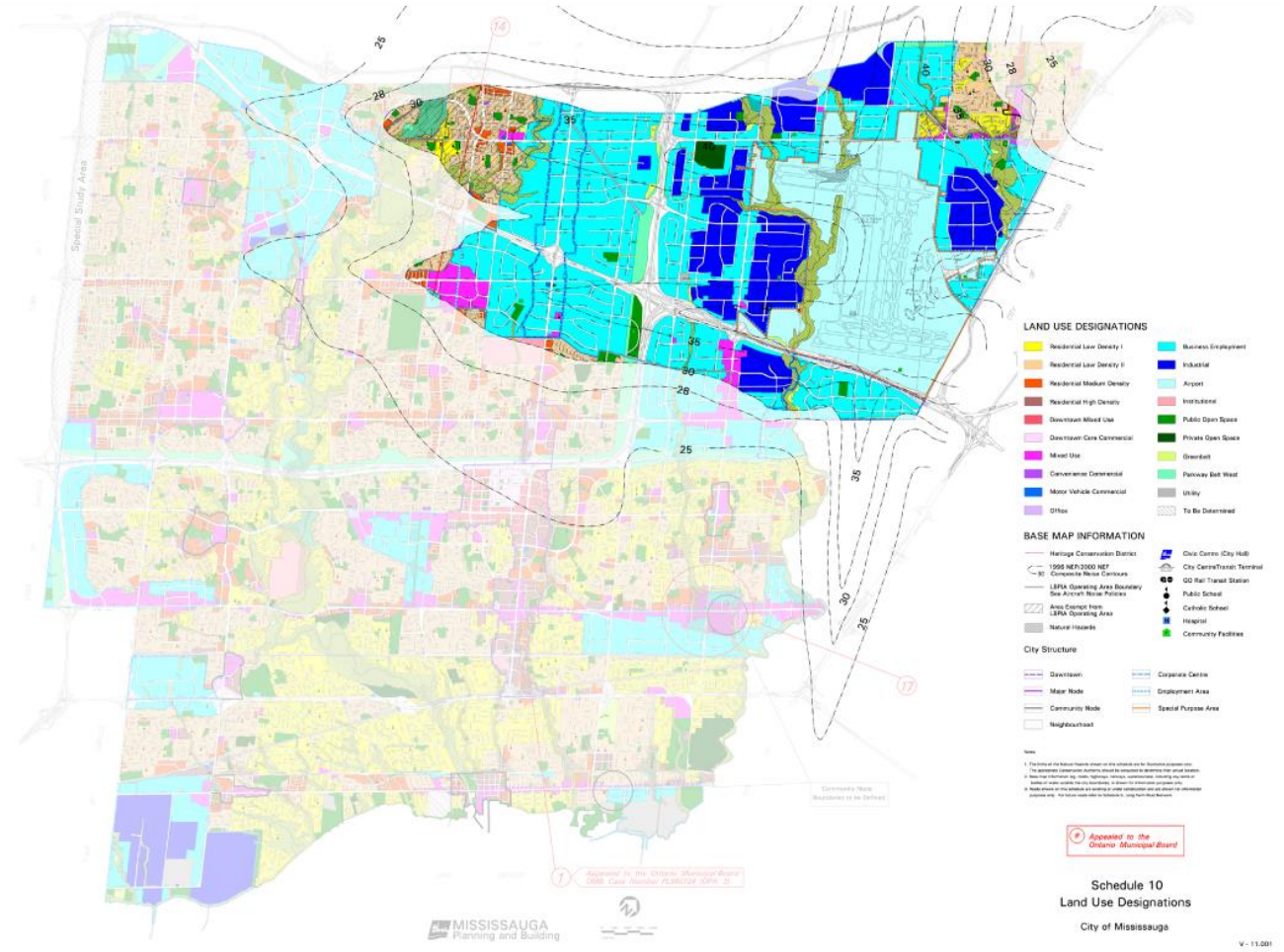
Within the Official Plan, NEF contours are explicitly shown on two maps: on a standalone map (Figure 6-22), and incorporated into Schedule 10: Land Use Designations. Furthermore, the perimeter of the Airport Operating Area depicted on Map 6-1 (and also on Schedule 10) is largely, but not entirely congruent with the perimeter of the NEF 30 contour.

Residential development, redevelopment and infill are not strictly disallowed within the Airport Operating Area. Development, redevelopment and infill that would increase the number of dwelling units beyond that permitted by existing zoning is disallowed (6.9.2.1). This policy, which provides a lower standard than that contained within TP 1247E (which recommends disallowing residential development outright above the NEF 30 contour), is likely due to the pre-existing residential uses in the Malton area that fall above the NEF 30 contour (and in some cases, above the NEF 35 and 40 contours). Notwithstanding the above, given the underlying zoning within the Airport Operating Area, it is likely that there are very few sites where an increase in dwelling units over the existing and not exceeding that specified by the zoning could be practically achieved.

Certain areas within the Airport Operating Area are exempt from the above dwelling unit restriction, including two areas in the western end (which are identified on Map 6-1 as an Exempt Area and Schedule 10 as an Area Exempt from Lester B. Pearson International Airport Operating Area) and the Malton Character Area at the northeastern end (the Malton Character Area is within the broader Malton neighbourhood and is identified on Schedule 9 and delimited on Schedule 10 by a black line representing the extent of the a Community Node). In both cases, residential development, redevelopment or infilling may be permitted subject to conditions, including that the site is located below the NEF 35 composite contour (6.9.2.1 and 6.9.2.3).

In order for residential development, redevelopment and infill to be permitted anywhere above the NEF 25 contour, notice of potential noise impacts must be provided to tenants and purchasers and a noise study to determine appropriate acoustic design criteria must be conducted (6.9.2.8, 6.9.2.9 and 6.9.2.10). The NEF 25 composite contour threshold for the latter of the above two conditions is more restrictive than the NEF 30 threshold recommended in TP 1247E.

Figure 12 Mississauga Official Plan Land Use Map with NEF 30 Contour Identified



2.9 Tripartite Agreement

In addition to the regulations, standards, criteria and guidelines that govern and inform operations at all airports within Canada, BBTCA is also subject to a tripartite agreement between PortsToronto, the City of Toronto and the Government of Canada (represented by the Minister of Transport). This tripartite agreement is the result of the shared ownership of the lands on which the airport is located and provides for the lease of City and Federal-owned lands to PortsToronto, and the terms upon which BBTCA is to be operated over the 50 year term of the lease (July 1, 1983 to June 30, 2033).

While the tripartite agreement contains a multitude of clauses governing airport operations (including the prohibitions on jet aircraft and runway extension), there are two critical components from the perspective of compatibility with proximate land uses. First, PortsToronto must regulate the overall frequency of aircraft movements at the airport in order to contain the actual 28 NEF contour within the boundary of the official 25 NEF contour for 1990. With reference to the 30 NEF threshold for residential uses recommended in TP 1247E, this component of the tripartite agreement minimizes the geographic extent of potential compatibility issues from an NEF perspective by placing a firm limit on the expansion of NEF contours. Second, the agreement limits actions that PortsToronto, the City, or the Minister of Transport may take or permit to be taken that would have the effect of interfering with the safe use and operation of the airport. Potential land use compatibility issues under this component could include matters related to things like airport access (e.g. where a proposed development restricts ground-side operations).

2.10 Baseline to Proposal – What Changes?

In 2013, Porter Airlines submitted a proposal to the City of Toronto outlining their request to introduce jet aircraft at the Billy Bishop Toronto City Airport (BBTCA). This proposal included an extension of the land mass at each end of the main runway by 200 metres in order to accommodate a longer runway and the use of jet aircraft for scheduled flight operations. As part of its assessment of Porter's proposal, PortsToronto developed a conceptual design that could accommodate the requested runway extension, as well as noise and other mitigation measures that could be required as a result of commercial jet flights. The proposed design and operations changes to the runway are described in PortsToronto's 2015 Master Planning Exercise.

As with all other elements of the EA, the Land Use and Built Environment Effects Assessment assesses the effects of two growth scenarios:

- The Baseline Permitted Scenario guided by the 2012 Master Plan in which no amendments to the Tripartite Agreement are implemented; and
- The Proposed Scenario guided by the 2015 Master Planning Exercise in which the Tripartite Agreement is amended to permit commercial jet operations and the extension of the land mass at each end of the main runway by 200 metres.

Under the Baseline Permitted Scenario, the Obstacle Limitation Surface (OLS), Airport Zoning Regulation (AZR) and NEF Contours would remain the same as exists today. Under the Proposed Scenario, the Obstacle Limitation Surface and NEF Contours would change. The extents of these changes have been documented by WSP in memos to PortsToronto with the key results summarized below:

Potential Changes to OLS and AZR

As noted in section 2.5 the OLS associated with the Runway 08-26 is consistent with the dimensions required of a Code 2 runway. Under the Proposed Scenario, the OLS would have to comply with the dimensions of a Code 3 runway. While the existing AZR largely protects for an OLS with dimensions consistent with a Code 3 runway (see section 2.6), two gaps between the proposed OLS and the existing AZR would occur:

- There is a 31m gap between the height of the existing Outer Surface or the AZR and the proposed Outer Surface of the OLS. However, due to the Outer Surface covering an area entirely over water or over the Toronto Islands, the risk of an object penetrating the proposed OLS Outer Surface has been deemed by WSP to be low.
- There is a 4.5m gap between the existing extent of the Approach Surface of the AZR and the proposed Approach Surface of the OLS, running along either side of the existing AZR. This gap results from the displacement of the runway threshold leading to the approach surface starting sooner than the existing OLS approach surface. The majority of this gap is over water except for a small section on the north side with dimensions of 158m x 4.5m. At a width 4.5m, it is the view of WSP there is little opportunity for any development to impact the proposed OLS approach surface.

Notwithstanding these identified gaps between the proposed OLS and existing AZR, WSP has not recommended updating the Airport Zoning Regulations and instead has suggested that potential encroachments into these areas that are not protected by the AZR should be managed in collaboration with the City of Toronto.

Figures 2-10 and 2-11 demonstrate a plan view evaluation of the existing Airport Zoning Regulations and the existing and proposed Obstacle Limitation Surface.

Potential Changes to NEF Contours

The effects of the Proposed Scenario on the NEF contours has been modelled to a future year of 2032 using the following assumptions:

- Runway 15-33 is decommissioned

- Runway 06-24 remains as exists
- Runway 08-26 is extended and features an allocation of 242 daily slots with 182 allocated to Q400 aircraft and 60 slots allocated to CS100 aircraft

The results of this modelling confirm that the 28 NEF contour fits within the 25 NEF contour for 1990 as specified by the Tripartite Agreement. Additionally, the modelled 25 NEF contour extends beyond the 25 NEF contour for 1990 in limited instances, covering portions of three planning areas (the Central Waterfront Precinct, the Bathurst Quay Neighbourhood Plan, and the Ontario Place Revitalization).

Potential Exemptions

As noted in section 2.5, BBTCA currently has exemptions in place for the TP 312 standards related to the OLS Approach Surface and glidepaths for Runway 08-26. The OLS Approach slopes permitted under these exemptions are 4.8% for Runway 08 and 6.38% for Runway 26. The glidepath slopes permitted under these exemptions are 3.9° for Runway 08 and 4.8° for Runway 26. Under the Proposed Scenario, exemptions would be sought to maintain the Approach Surface and glidepath slopes as they currently exist.

Figures 2-12 through 2-17 demonstrate diagrammatic comparisons and building height evaluations resulting from existing and proposed approach surfaces.

Figure 13 Evaluation of Existing Airport Zoning Regulations and Obstacle Limitation Surfaces

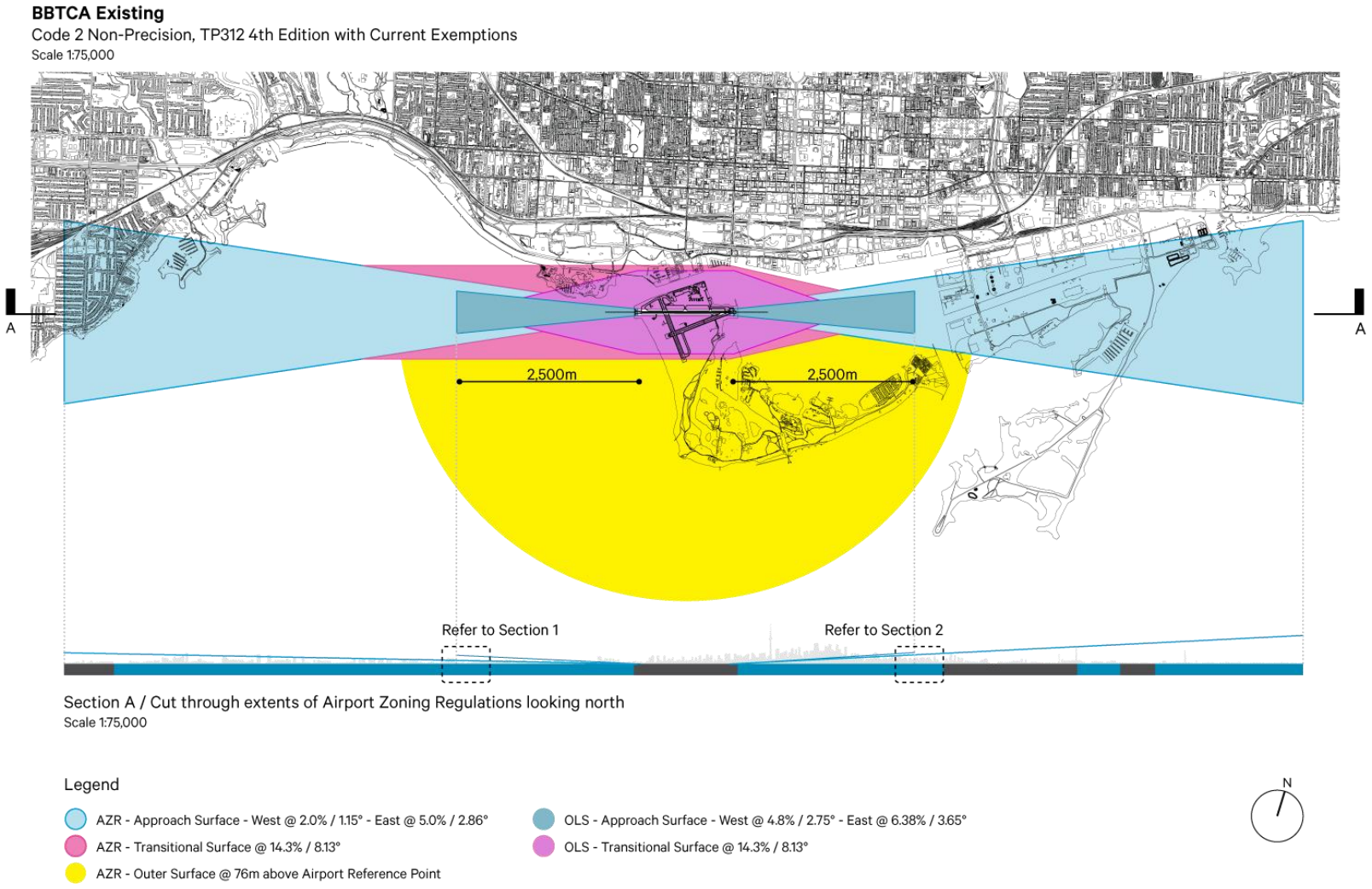


Figure 14 Evaluation of Proposed Airport Zoning Regulations and Obstacle Limitation Surfaces

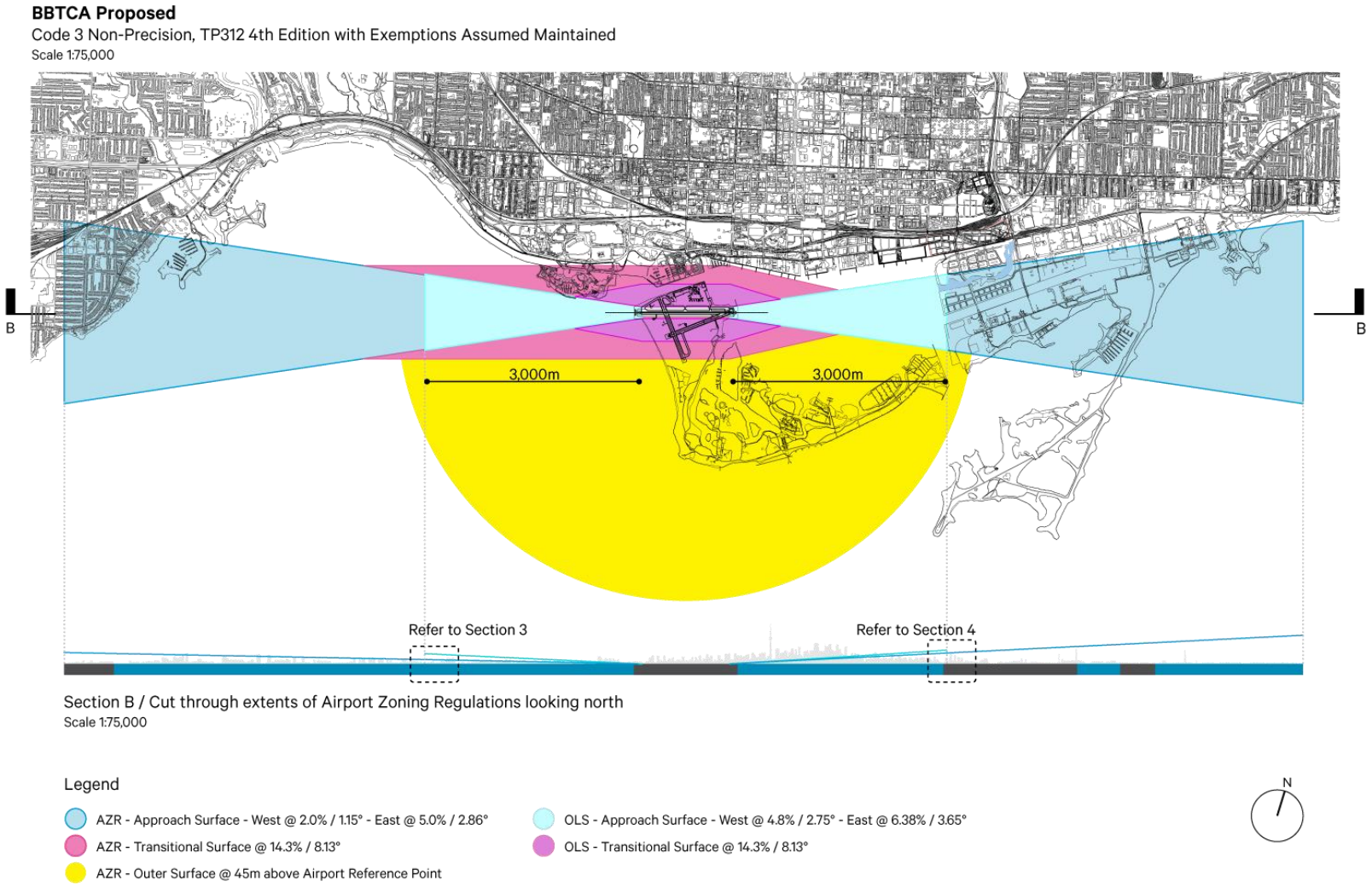
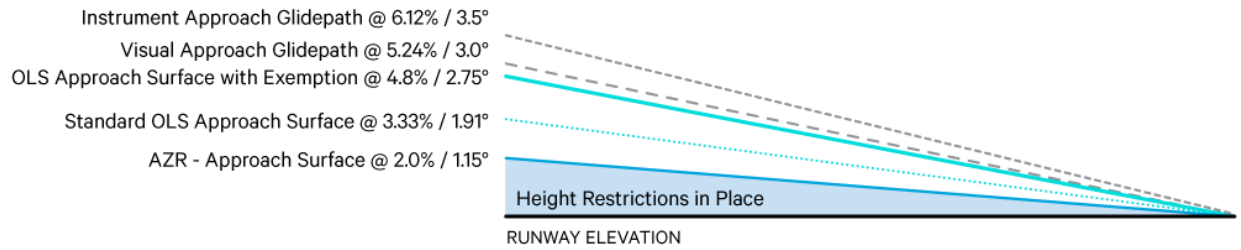


Figure 15 Diagrammatic Comparison of Existing and Proposed Approach Surfaces for Runway 08

BBTCA Existing Runway 08 Approach Surfaces

Code 2 Non-Precision, TP312 4th Edition with Exemptions

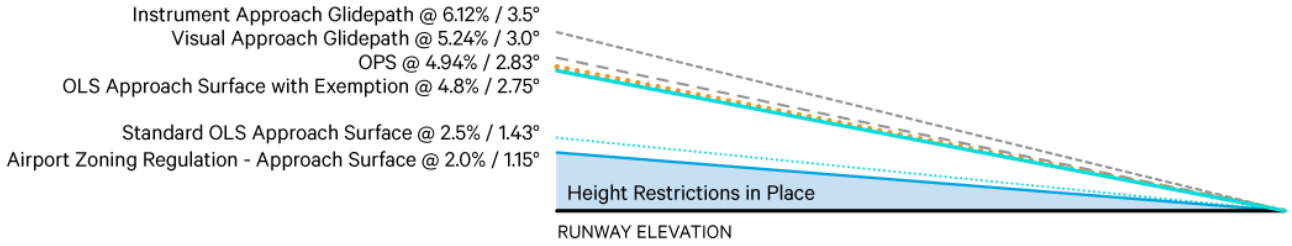
Note: Vertical scale increased 4x for clarity



BBTCA Proposed Runway 08 Approach Surfaces

Code 3 Non-Precision, TP312 4th Edition with Exemptions Assumed Maintained

Note: Vertical scale increased 4x for clarity



Airport Zoning Regulation (AZR) - Approach Surface

There is no change proposed to the AZR Approach Surface which results in no change to the height restrictions that are already implemented.

Obstacle Limitation Surface (OLS) - Approach Surface

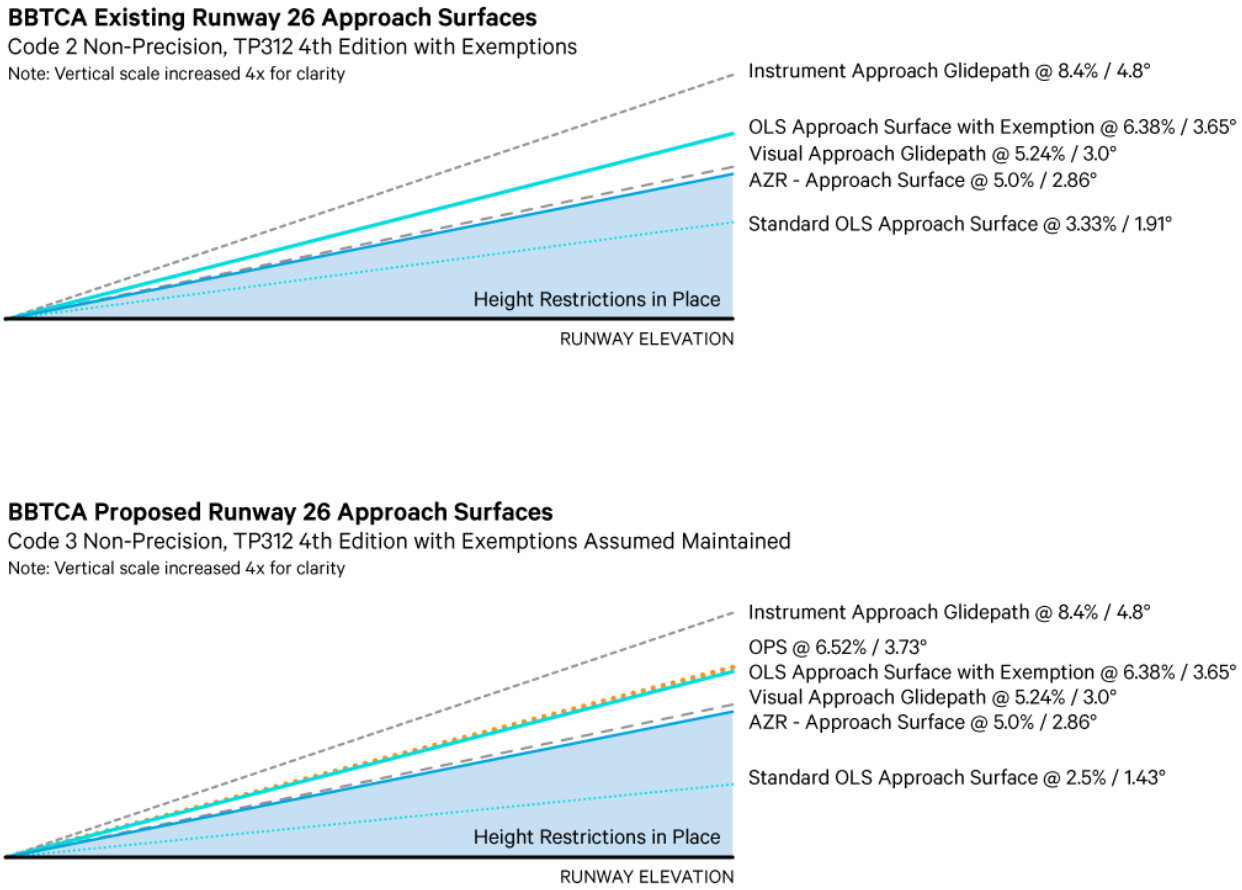
There is no change proposed to the Approach Surface but the proposal does assume that the existing exemption for the approach angle will be maintained (subject to approval by Transport Canada). The difference between the standard (as per TP312) and exemption angle increases in the proposal.

The existing Code 2 Non-Precision OLS Approach Surface requires an exemption from 3.33% (1.91°) to 4.8% (2.75°), a difference of 1.47% (0.84°).

The proposed Code 3 Non-Previsions OLS Approach Surface requires an exemption from 2.5% (1.43°) to 4.8% (2.75°), a difference of 2.3% (1.32°).

The proposed Approach Surface requires an exemption that is 56% greater than the existing exemption (2.3% - 1.47% = 0.83% or 1.32° - 0.84° = 0.48°).

Figure 16 Diagrammatic Comparison of Existing and Proposed Approach Surfaces for Runway 26



Airport Zoning Regulation (AZR) - Approach Surface

There is no change proposed to the AZR Approach Surface which results in no change to the height restrictions that are already implemented.

Obstacle Limitation Surface (OLS) - Approach Surface

There is no change proposed to the Approach Surface but the proposal does assume that the existing exemption for the approach angle will be maintained (subject to approval by Transport Canada). The difference between the standard (as per TP312) and exemption angle increases in the proposal.

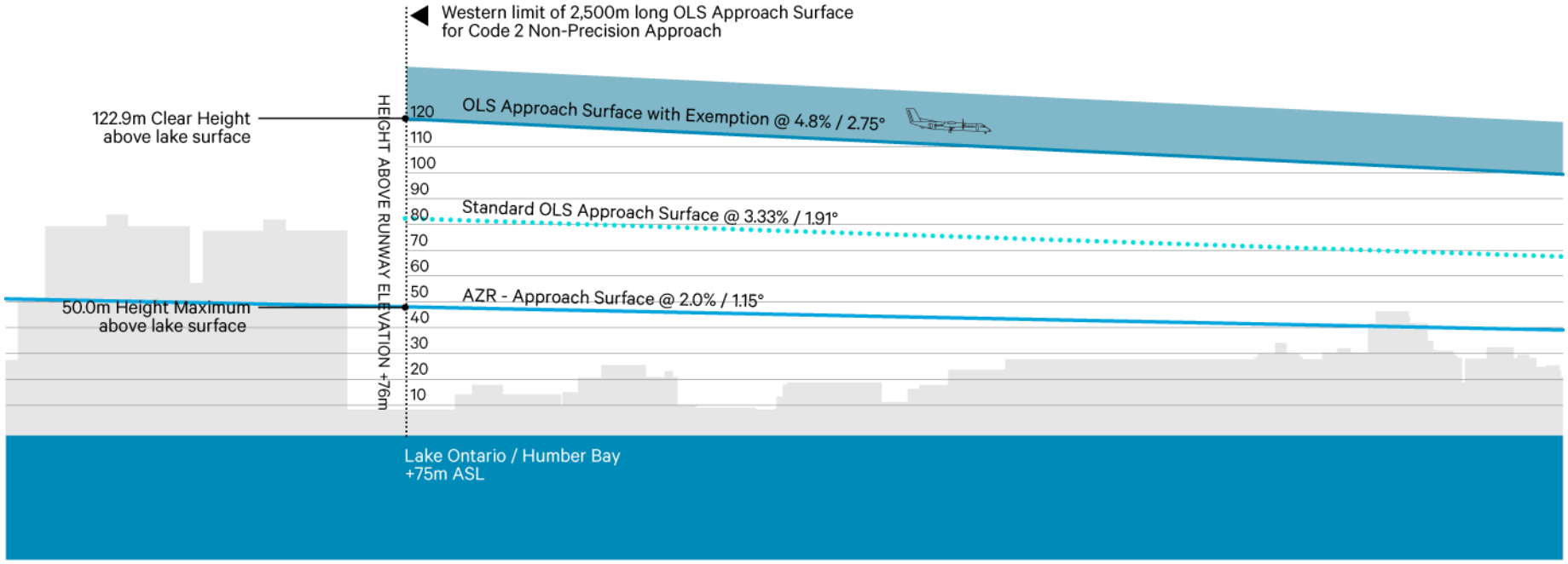
The existing Code 2 Non-Precision OLS Approach Surface requires an exemption from 3.33% (1.91°) to 6.38% (3.65°), a difference of 3.05% (1.74°).

The proposed Code 3 Non-Previsions OLS Approach Surface requires an exemption from 2.5% (1.43°) to 6.38% (3.65°), a difference of 3.88% (2.22°).

The proposed Approach Surface requires an exemption that is 28% greater than the existing exemption (3.88% - 3.05% = 0.83% or 2.22° - 1.74° = 0.48°).

Figure 17 Evaluation of Building height Limitations – Existing Western Limit of OLS for Runway 08

BBTCA Existing Runway 08 Approach Surface - Western Limit
Code 2 Non-Precision, TP312 4th Edition with Current Exemptions
Scale 1:2500



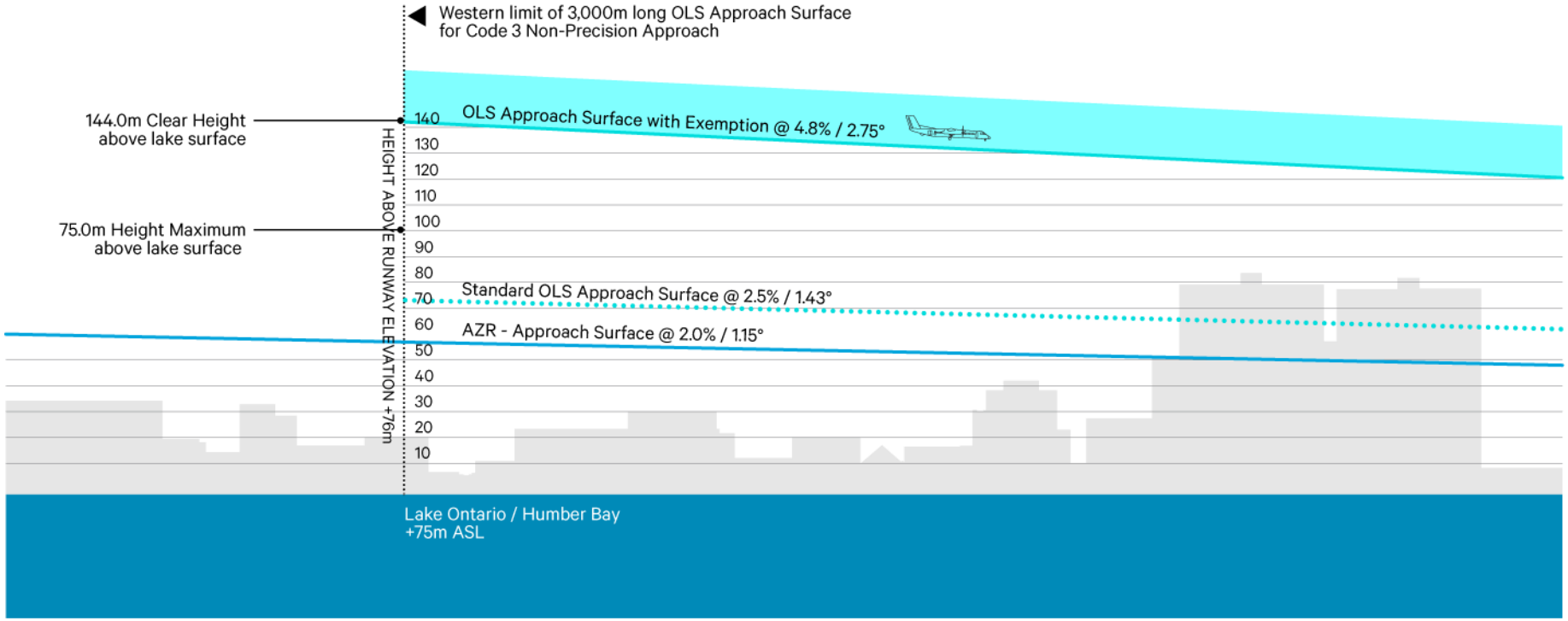
Section 1 / Looking north toward Marliyn Bell Park and Parkdale

Figure 18 Evaluation of Building height Limitations – Proposed Western Limit of OLS for Runway 08

BBTCA Proposed Runway 08 Approach Surface - Western Limit

Code 3 Non-Precision, TP312 4th Edition with Exemptions Assumed Maintained

Scale 1:2500



Section 3 / Looking north toward Humber Bay, Sunnyside and High Park

Figure 19 Evaluation of Building height Limitations – Existing Eastern Limit of OLS for Runway 26

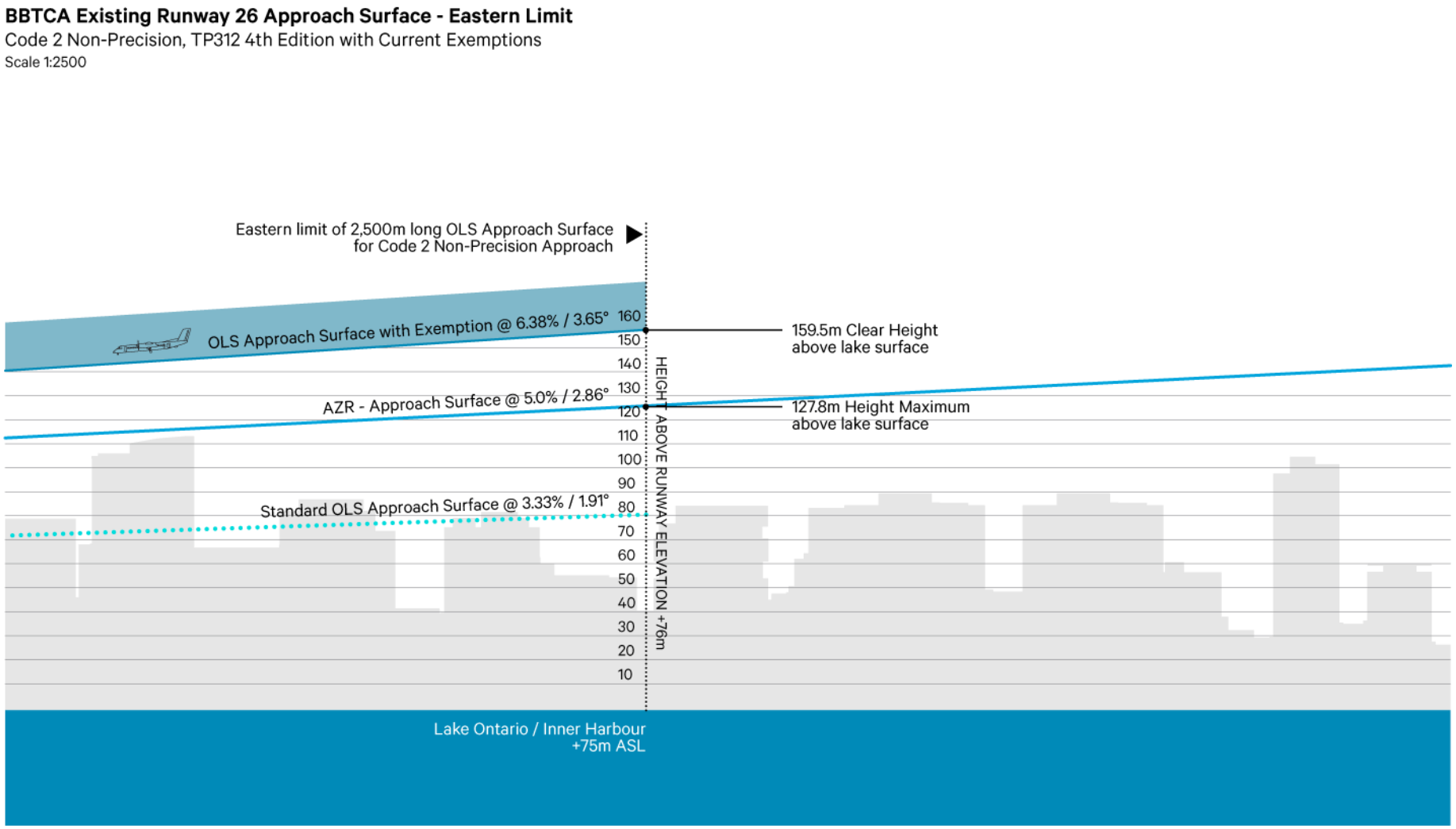
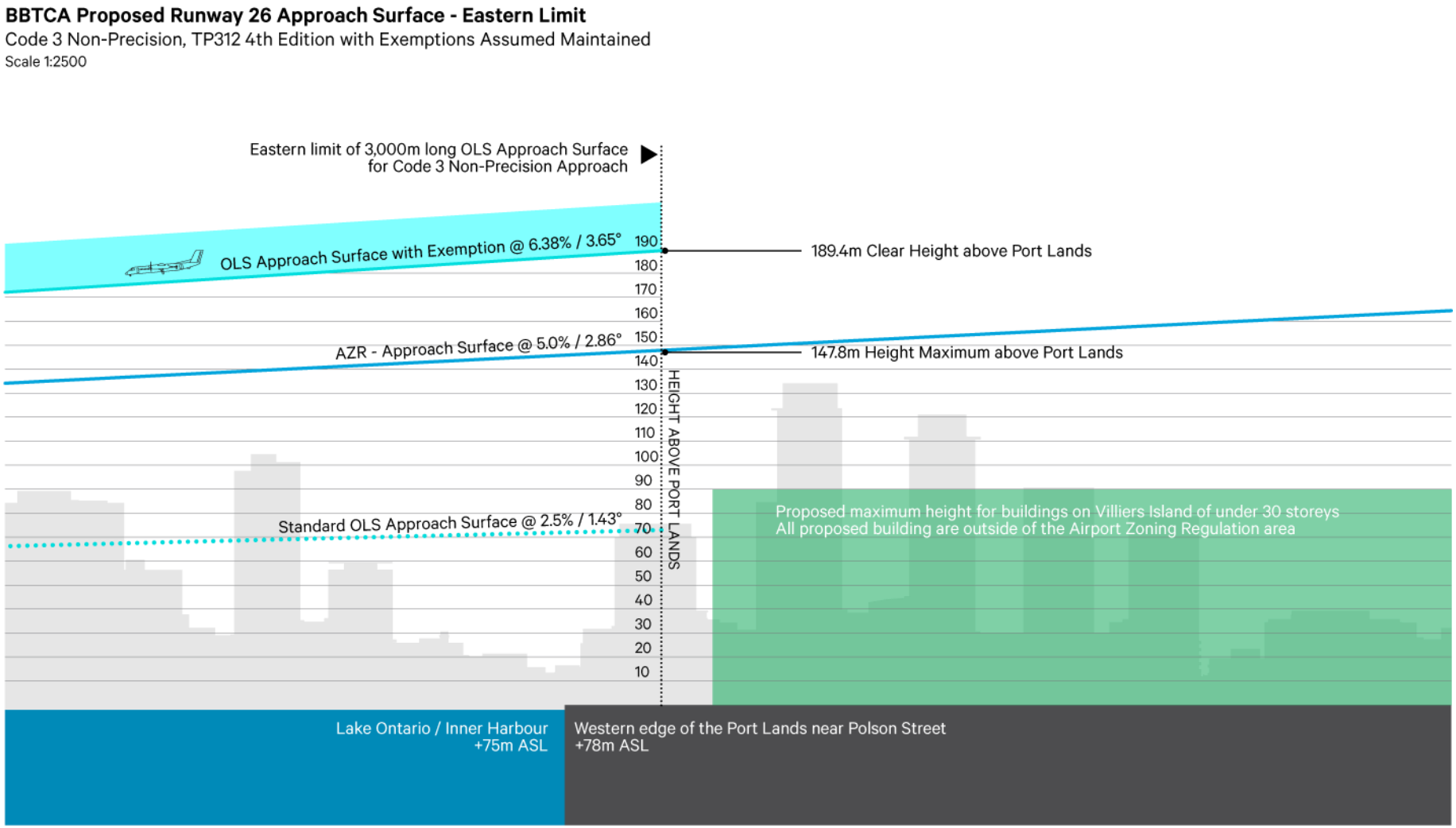


Figure 20 Evaluation of Building height Limitations – Proposed Eastern Limit of OLS for Runway 26



Section 4 / Looking north toward East Bayfront, Villiers Island and the Keating Channel Precinct

3.0 Built Form and Land Use Lens

3.1 Introduction

The built form and land use lens is composed of both macro and micro scale planning and policy documents within the provincial/regional, municipal, precinct and neighbourhood tiers. These planning and policy documents provide regulations and guidance regarding land use within the proximity of airports and provide criteria for the compatibility test.

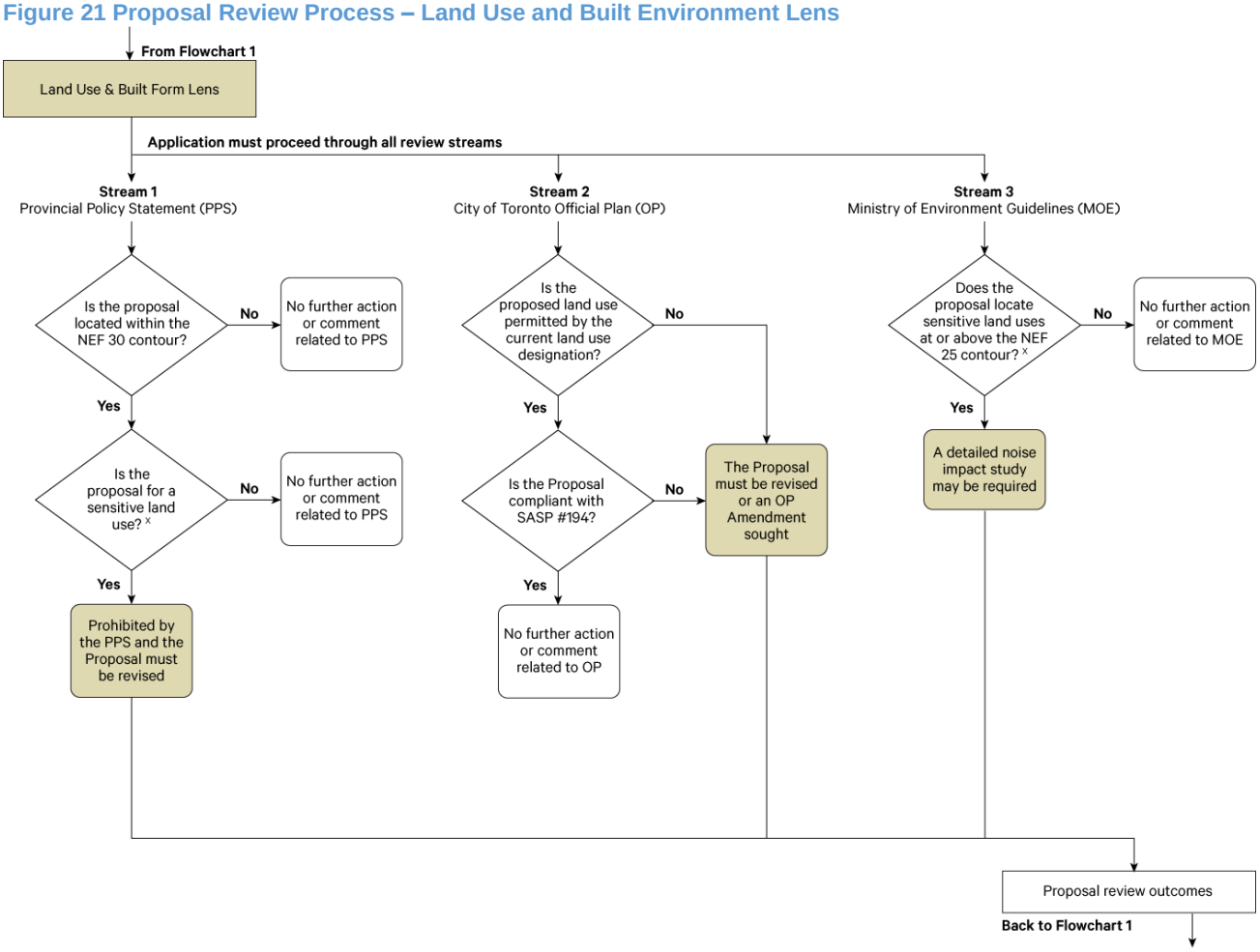
Of particular significance are the Provincial Policy Statement and the Ministry of Environment Environmental Noise Guideline – Stationary and Transportation Sources (NPC-300). These two policy documents include a prohibition on sensitive land uses above the NEF 30 contour and a recommendation that noise-sensitive uses located above the NEF 25 contour be subject to noise impact study prior to approval.

The following section provides in-depth information on the relevance of the various elements of this lens to questions of built form and land use compatibility. Three critical test streams for the evaluation of potential compatibility concerns between the proposed airport expansion and existing and future planning objectives have been identified. These are illustrated in Figure 3-1 and include:

1. Provincial Policy Statement
2. City of Toronto Official Plan
3. Ministry of Environment Guidelines

Streams 1 and 3 form the basis of land use compatibility analysis in this report. Testing compatibility under these streams is a matter of identifying the NEF contours resulting from the proposed airport expansion and overlaying these contours onto the planning areas identified in section 4, each of which contains details on the location of planned uses. This overlay can then be used to identify whether noise-sensitive uses fall within the NEF 30 or NEF 25. An analysis of compatibility under stream 2 has not been undertaken in this report as the proposed land uses in this case all flow from planning process in which the City of Toronto is the lead or a key collaborator and thus it is assumed that the proposed land uses are compatible with the designations found within the Official Plan (and where they are not it is assumed that the City would initiate and Official Plan Amendment to update designations to reflect those being proposed through these planning processes).

Figure 21 Proposal Review Process – Land Use and Built Environment Lens



3.2 Provincial Policy Statement (2014)

The Provincial Policy Statement (PPS) is the primary policy document in Ontario's legislative planning framework. It provides policy direction on matters of Provincial interest related to land use planning and development, setting out a policy foundation for the regulation of land use and development. All planning decisions made by the Province, local councils, authorities or boards must be consistent with the policies laid out in the PPS. The most recent version of the PPS was released by the Government of Ontario in April 2014.

The PPS contains a handful of policies that provide guidance on the compatible development of land within the vicinity of airports. These policies speak to the importance of planning land uses in a manner that will protect the long-term operation and economic role of airports. They also indicate that adverse effects (e.g. odour, noise) must be mitigated through the appropriate design, buffering and/or separation of airports and sensitive land uses (e.g. residences, daycare centres, educational and health facilities). Lastly, there are a number of specific provisions related to protecting airports from incompatible uses. These provisions effectively adopt some of the recommendations regarding land use and the Noise Exposure Forecast described in TP1247E. Specifically, the PPS identifies the 30 NEF as a threshold above which the development of new sensitive land uses is to be prohibited and the redevelopment or infill of these uses is to be considered only if it can be demonstrated that there will be no negative impacts on the long-term function of the airport.

3.3 Environmental Noise Guideline – Stationary and Transportation Sources (NPC-300)

The Environmental Noise Guideline – Stationary and Transportation Sources (NPC-300), produced by Ontario's Ministry of Environment and Climate Change (MOECC), are intended to be used by land use planning authorities, developers and consultants when considering the development, redevelopment or infill of noise sensitive land uses in proximity to noise emission sources. The MOECC does not have any direct role or statutory authority in the land use approvals process, nor does it have approval authority under the Environmental Protection Act for federally-regulated land uses such as airport facilities. Nevertheless, these guidelines are supportive of the Provincial Policy Statement's policies regarding the minimization of potential conflicts between noise sensitive land uses and noise sources and as such provide supplementary guidance in the land use approvals process.

Specifically, the intention of these guidelines is to provide a common framework that can be adopted into the land use approvals process to address environmental noise and promote compatibility. Under this framework, responsibility for ensuring compatibility is placed with the proponent of a new noise sensitive land use. The proponent's responsibilities include: assessing outdoor and indoor acoustical environments, investigating feasible means of noise impact mitigation, ensuring noise control measures are incorporated into the proposed development, and describing the technical details and clarifying responsibility for the implementation and maintenance of the noise control measures.

In terms of the implementation of this framework, it is suggested within NPC-300 that requirements for noise impact studies as a component of development applications can be included in the policies of land use planning authorities. Furthermore, the 25 NEF is identified as a potential threshold for requiring noise impact studies for new noise sensitive land use proposals.

3.4 Growth Plan for the Greater Golden Horseshoe

The Growth Plan for the Greater Golden Horseshoe is a Provincial plan that complements the PPS, building upon its policy foundation with policies that address transportation, infrastructure planning, land use planning, urban form, housing, natural heritage and resource protection. The overarching goal of the Growth Plan is to promote economic prosperity while guiding growth of the region's cities and communities in a coordinated manner. All planning decisions made by the Province, local councils, authorities or boards must conform to the policies contained within the Growth Plan. The Growth Plan was created in 2006 and is currently undergoing a legislated review that may result in updates to certain policies.

The Growth Plan contains two policies related to airports. The first of these policies encourages municipalities to plan for employment uses (manufacturing, warehousing, and associated retail, office and ancillary facilities) within the vicinity of existing airports. The second airport-related policy stipulates that land uses within the vicinity of airports should be compatible with the primary goods movement function of airports.

3.5 City of Toronto Official Plan

The City of Toronto's Official Plan sets out the vision for where and how the city will grow to 2031. It describes the general location for new housing, places of employment, retail, community services, parks and other land uses and contains objectives and policies related to all of these land uses and other elements of the built and natural environment. The Official Plan is a statutory document that is adopted by Toronto's City Council. The Official Plan is augmented by area-based plans (referred to as Secondary Plans under Ontario's legislative planning framework) and site and area specific policies. Official Plan policies can be changed through Council-adopted Official Plan Amendments (OPA) that are initiated by the City or by private landowners. OPAs that are initiated by the City are often preceded by comprehensive City-led studies such as precinct plans and neighbourhood plans. The current Official Plan was adopted by Council in 2002 and partially approved by the Ontario Municipal Board in 2006. Many areas within Toronto's waterfront were omitted from this partial approval and therefore are subject to the former City of Toronto's 1994 Official Plan.

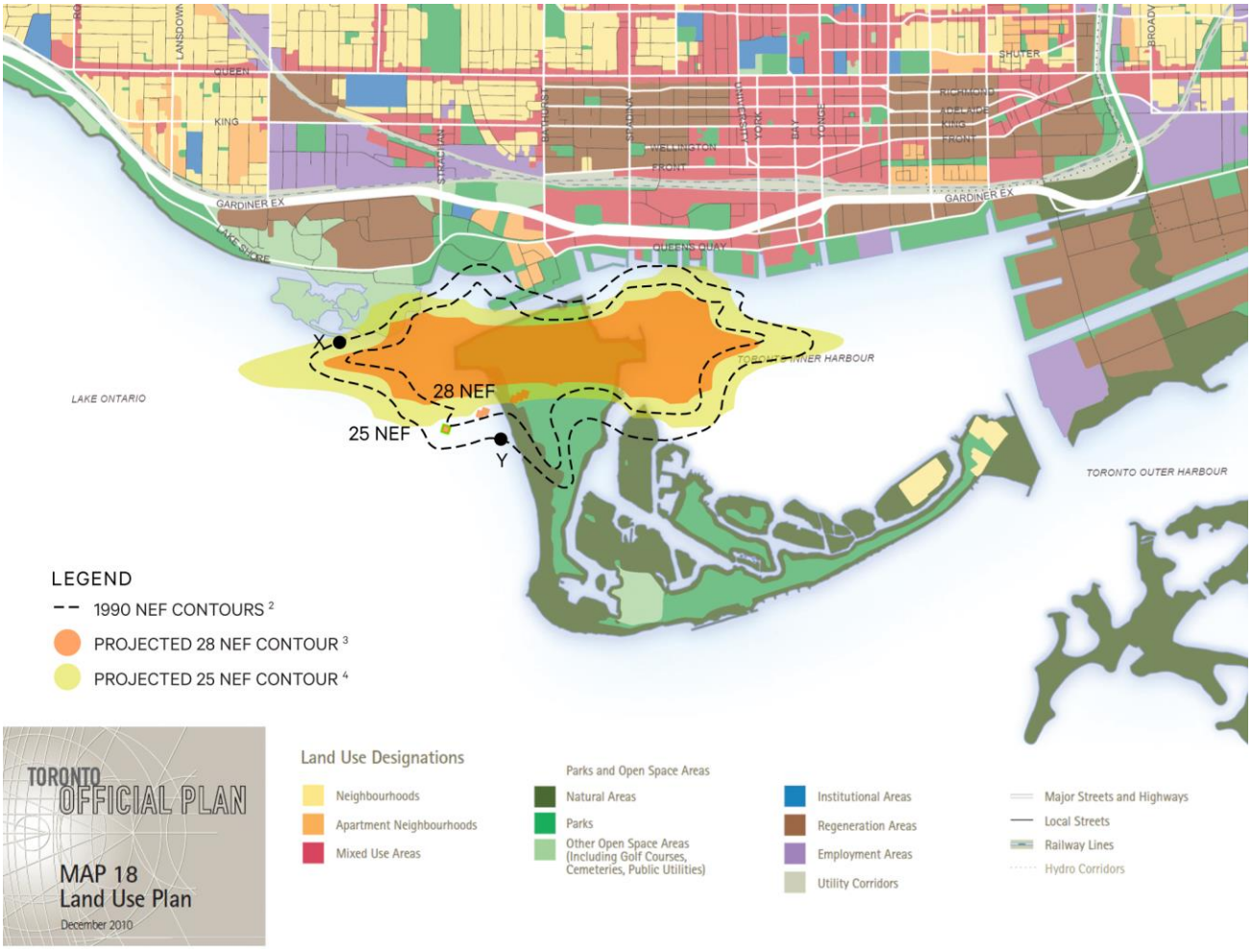
The 1994 Official Plan contains a number of policies that consistently refer to the unique character and special importance of the waterfront and identify the need to reduce barriers, improve connections and linkages, increase parkland and public access and activate the waterfront with a variety of uses. The primary goal of all of these policies is to promote increased and sustainable public enjoyment and use of the waterfront.

In many ways, the waterfront vision and policies laid out in the 1994 Official Plan are carried forward to the 2006 Official Plan. This latter plan envisions the waterfront as a spectacular place that is healthy, diverse, public and beautiful. The central waterfront is identified as a place that offers unique opportunities for substantial employment and residential growth and that can contribute in an important way to the image of the downtown and the broader city. The entirety of the waterfront, from Marie Curtis Park in the west to Rouge Beach Park in the east, is described as a major feature of Toronto's green space system, with the creation of a clean and green waterfront contributing to a better environment for the city as a whole.

This vision for the waterfront is articulated through a number of policies that seek to guide future development and the actions of public authorities (including the Toronto and Region Conservation Authority, Waterfront Toronto and Ports Toronto). These policies detail how development and public works along the water's edge and within its vicinity can be balanced with public enjoyment and use, including the minimization of physical and visual barriers between the city and Lake Ontario, increasing public access to lands along the water's edge and between parts of the waterfront, improving the public realm with more parks, public squares and natural settings and increasing the availability and choice of recreational opportunities and public activities throughout the year.

In terms of airport-related policies, the 2006 Official Plan speaks to the regional economic significance of Pearson International Airport and identifies how airports and sensitive land uses (e.g. residences, educational and health facilities) should be designed, buffered and/or separated from one another to prevent adverse effects (e.g. noise, vibration, odour). In addition to these general policies, the Official Plan contemplates BBTCA specifically through Site and Area Specific Policy #194. This policy permits aviation uses at the airport as long as these uses comply with the terms of the Tripartite Agreement. It supports the continued operation of the airport and the protection of existing flight paths and contemplates revisions to the Tripartite, provided that any improvement to airport facilities and operations do not adversely impacting the surrounding residential and recreational environment. In the event that the airport closes, the policy states that the lands should immediately convert to parkland. These BBTCA-specific policies were also featured in the 1994 Official Plan.

Figure 22 Toronto Official Plan Land Use Plan with Noise Exposure Forecast (NEF) Contours Overlay



Notes

1. The City of Toronto Official Plan Land Use Plan (Map 18) has been excerpted here for clarity. The legend has been reconfigured for legibility.
2. The 1990 NEF Contours form the basis of the Tripartite Agreement.
3. The projected 28 NEF Contour is taken from the Technical Memorandum *Environmental Assessment NEF Contours for 242 Slots with Jet Scenario* issued by WSP on May 10, 2016.
4. The Projected 25 NEF Contour is taken from a supplementary drawing issued by WSP on June 16, 2016.

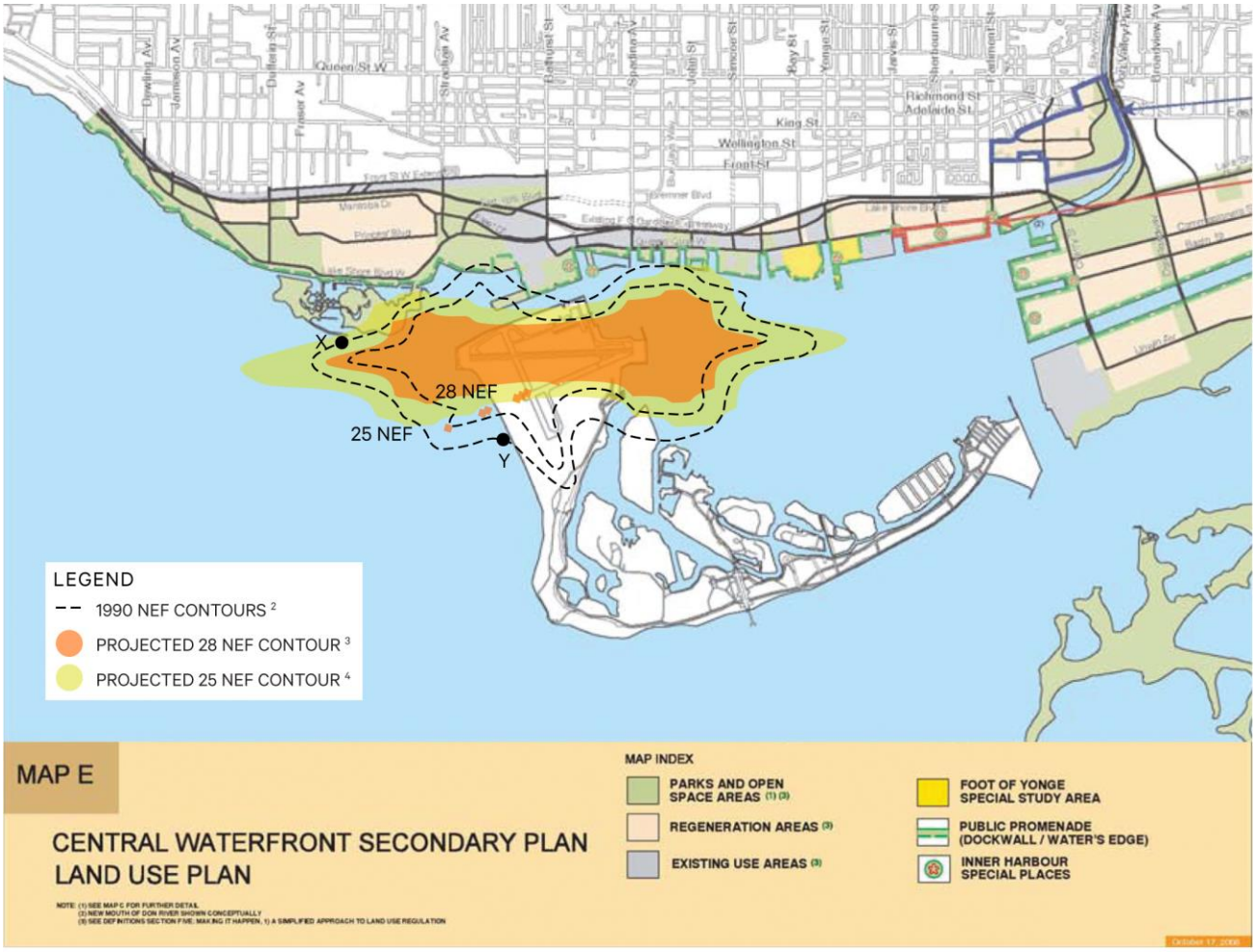
3.6 Central Waterfront Secondary Plan

The Central Waterfront Secondary Plan (CWSP) is the statutory area-based plan for Toronto's central waterfront, an area roughly bounded by the western edge of Marilyn Bell park in the west, Ashbridges Bay in the east, the Gardiner Express Way/ Lake Shore Boulevard in the north (with fingers extending north to encompass Fort York/Garrison Common and the West Don Lands), and the Lake Ontario shoreline in the south. The CWSP does not include the Toronto Islands or airport. The CWSP was adopted by Council in 2003 and subsequently appealed to the Ontario Municipal Board. Notwithstanding that it is only partially in effect to date (i.e. in the West Don Lands and portions of East Bayfront), the CWSP has been used as the guiding policy document for waterfront redevelopment and policy implementation.

The CWSP further articulates the waterfront vision and policy direction contained in the Official Plan. It has four principles at its core, including removing barriers/making connections, building a network of spectacular waterfront parks and public spaces, promoting a clean and green environment, and creating dynamic and diverse new communities. Building on the Official Plan policies regarding public use and enjoyment of the waterfront, the CWSP details how the water's edge should be preserved for public use through a continuous and highly accessible promenade that integrates a number of leisure and recreational uses. In addition to a revitalized public realm, the central waterfront is also envisaged as an area that will feature major cultural, entertainment and other tourist attractions. The renewed public realm and new cultural uses are anticipated to have a transformational effect on the central waterfront, turning it into a destination of local, national and international significance.

To facilitate redevelopment and a robust public realm, the CWSP identifies three categories of land use: regeneration areas, parks and open space areas, and existing use areas. A significant portion of lands within the central waterfront are identified as regeneration areas. These are areas where mixed-use development is to be directed and that are to be subject to precinct planning exercises to ensure comprehensive and orderly development and implementation of CWSP policies. An equally large portion of the central waterfront is identified as parks and open space areas. These are areas to be used for parks, open spaces, natural areas and plazas, and can include compatible community, recreation, cultural, restaurant and entertainment facilities. Existing use areas include those areas where the planning policy and regulations already in place are consistent with the aims of the CWSP and therefore are not required to undergo precinct planning exercises. A number of precinct plans within the CWSP boundaries have been completed or are currently underway. These precinct plans and other area-based plans are detailed in the sections that follow.

Figure 23 Central Waterfront Secondary Plan Land Use Plan with Noise Exposure Forecast (NEF) Contours Overlay



Notes

1. The City of Toronto Official Plan Land Use Plan (Map 18) has been excerpted here for clarity. The legend has been reconfigured for legibility.
2. The 1990 NEF Contours form the basis of the Tripartite Agreement.
3. The projected 28 NEF Contour is taken from the Technical Memorandum *Environmental Assessment NEF Contours for 242 Slots with Jet Scenario* issued by WSP on May 10, 2016.
4. The Projected 25 NEF Contour is taken from a supplementary drawing issued by WSP on June 16, 2016.

Figure 24 Planning Areas Key Map

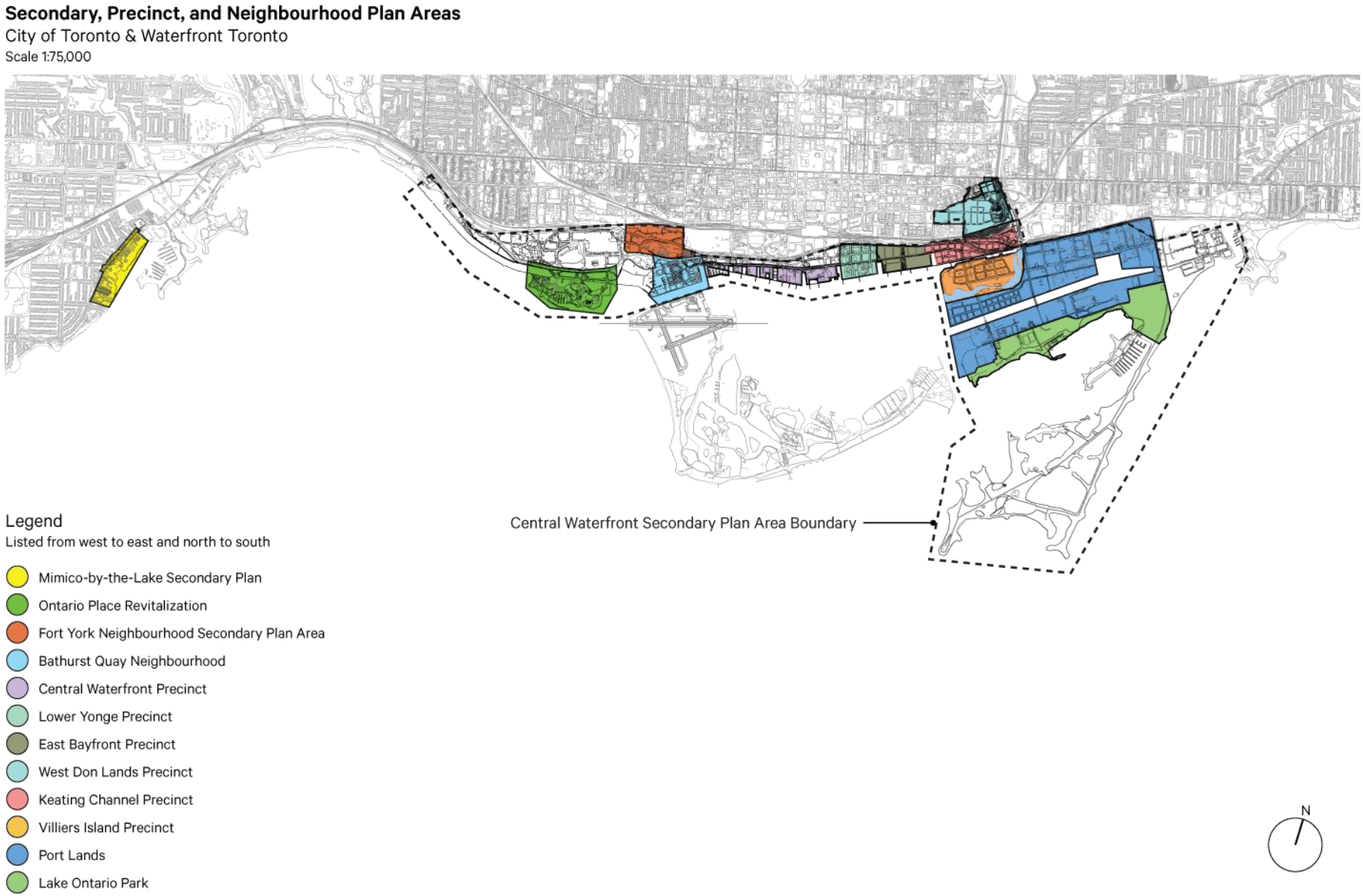


Figure 25 Planning Areas Key Map with Airport Zoning Regulations (AZR) Overlay

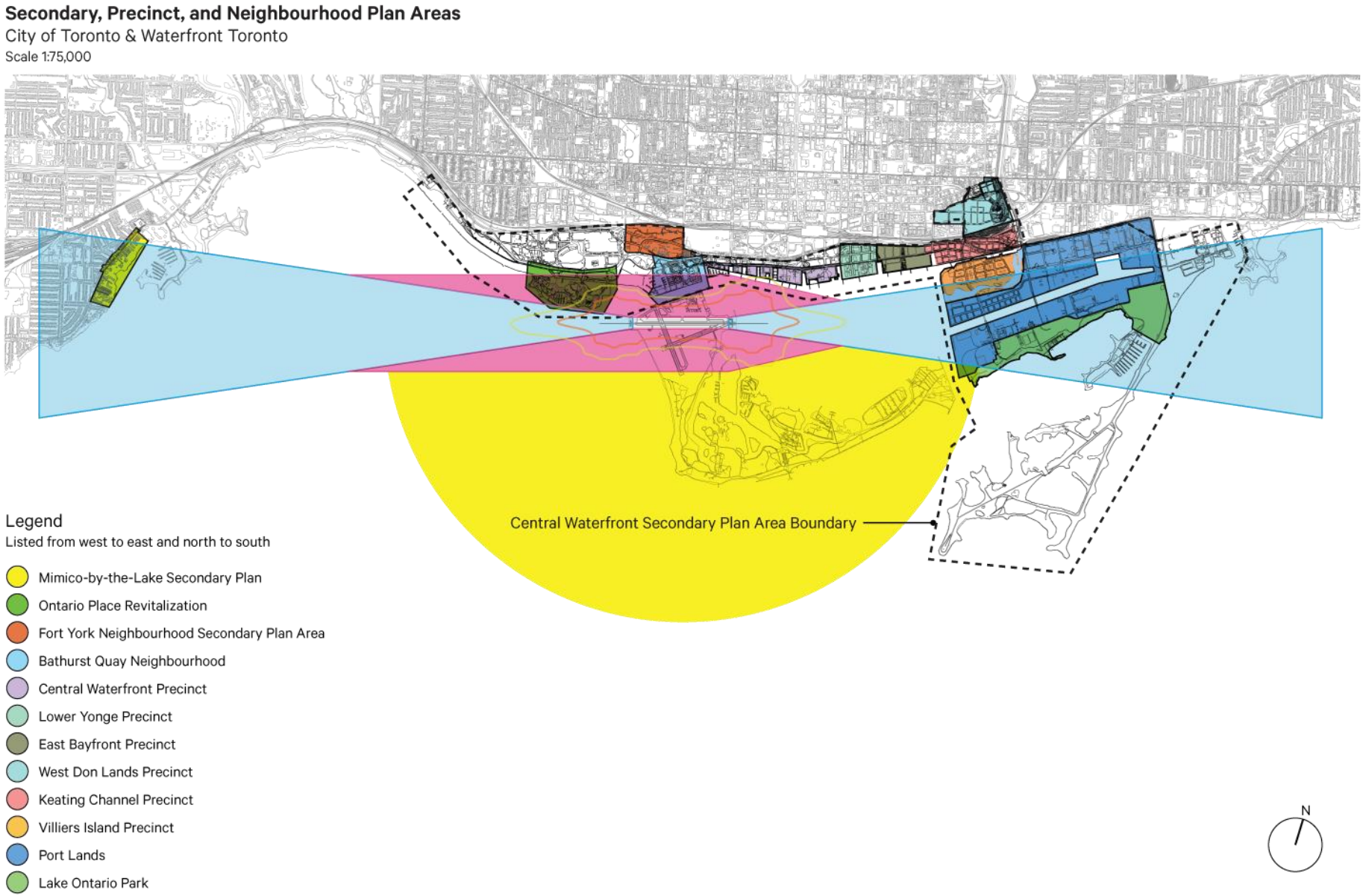


Figure 26 Planning Areas Key Map with Missed Approach Clear Height Grid Overlay
(See Appendix A for Missed Approach Surface Analysis Methodology)



4.0 Compatibility Analysis

4.1 Introduction

The third component of the dual lens approach focused compatibility review is an evaluation of those planning areas that fall within the Study Area and which are guided by specific regulations, recommendations and guidance regarding built form and land use arising from various planning studies. Whereas sections 2 and 3 outline the criteria that are used to assess the key compatibility questions regarding airport expansion and built form and land use, this section evaluates the specific built form and land use inputs using the compatibility frameworks developed above.

This section is organized by planning area. Each subsection contains a summary of the planning study associated with a given planning area – including an identification of maximum building heights and sensitive land uses as applicable. Each section also contains a summary of the analysis of compatibility concerns in the form of responses to the four streams of questions derived from the airport lens and built form and land use lens proposal review processes.

Based on the analysis undertaken, there are three types of potential compatibility issues that warrant further detailed investigation and/or mitigation measures should the proposed airport expansion go forward. These potential compatibility issues include:

1. Planning areas that fall under the Airport Zoning Regulation area or Missed Approach Surface and for which no maximum building height has as yet been defined;
2. Planning areas that feature a maximum building height that exceeds that of the current Controlling Obstacle; and
3. Planning areas that contain sensitive land uses above the projected 25 NEF.

The first type of potential compatibility concern applies to the following planning areas:

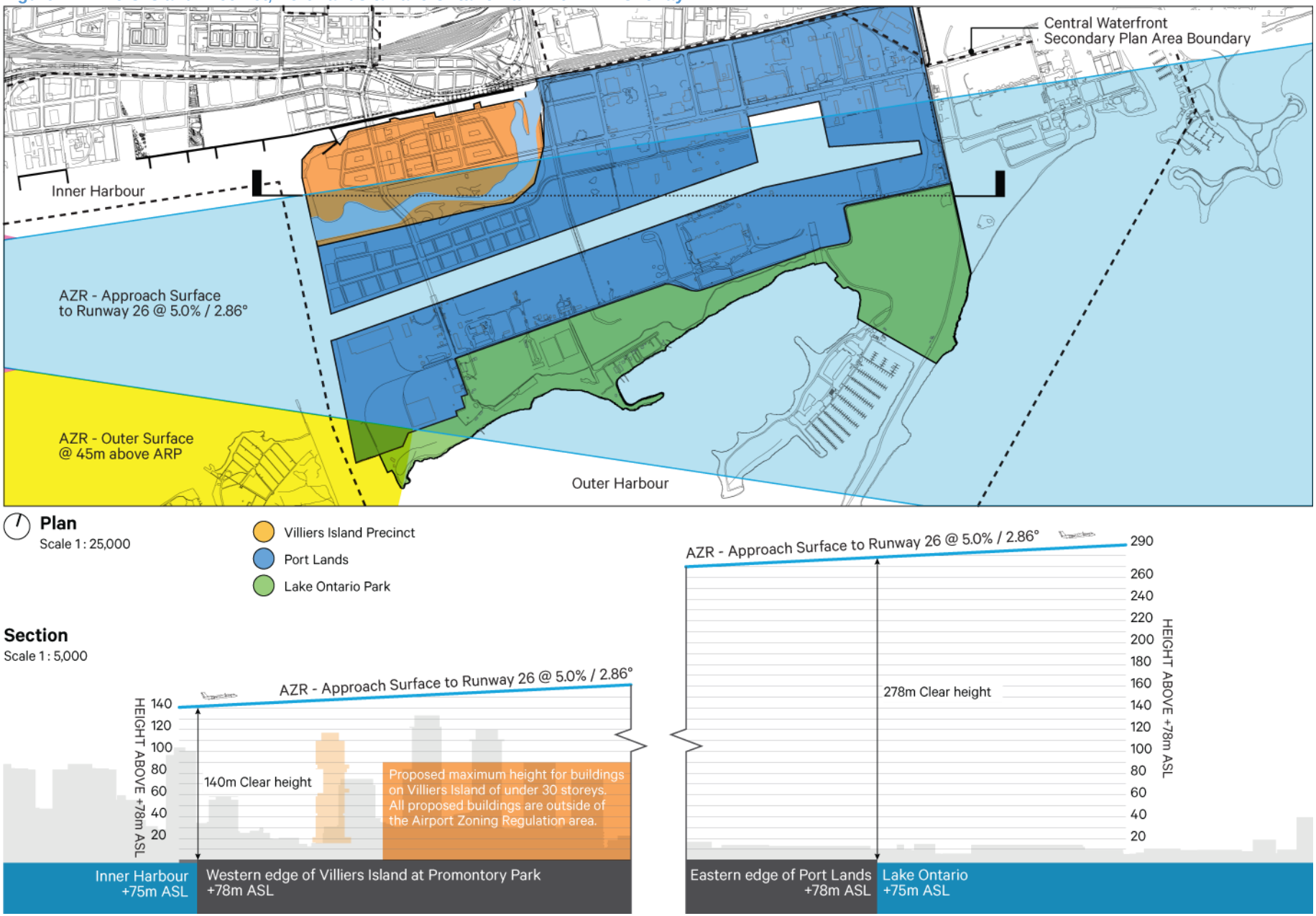
- the Port Lands Planning Framework;
- the Villiers Island Precinct Plan;
- the Bathurst Quay Neighbourhood Plan;
- and the Ontario Place Revitalization.

The second type of potential compatibility concern applies to the following planning areas:

- the East Bayfront Precinct Plan;
- the Lower Yonge Precinct Plan;
- and the Fort York Secondary Plan.

The third type of potential compatibility concern applies only to the Ontario Place Revitalization.

Figure 27 Villiers Island Precinct, Port Lands & Lake Ontario Park with AZR Overlay



4.2 Port Lands Planning Framework

Is the planning area located within the Airport Zoning Regulation (AZR)?	Yes – nearly the entirety of the Port Lands south of Commissioners Street falls within the Approach Surface to Runway 26
Do planned building heights exceed the allowable height of the AZR?	Unknown – maximum building height not provided, however vision is for predominantly mid-rise and clear height under AZR ranges from 140-278m
Do the planned building heights exceed that of the current Controlling Obstacle?	Unknown – maximum building height not provided, however vision is for predominantly mid-rise and current lowest Controlling Obstacle is at 106.3m above ground
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	N/A

In the fall of 2012, Council endorsed the results of the Port Lands Acceleration Initiative and directed City and Waterfront Toronto staff to commence a high-level planning framework for the Port Lands. The development of the Port Lands Planning Framework is in progress with current efforts focused on finalizing the vision, land uses and connections. Once complete, the Framework will establish a basis for amending the Central Waterfront Secondary Plan as it relates to the Port Lands. Additionally, the Framework will inform three related precinct plans for the Film Studio District, Polson Quay, and Villiers Island – the three areas in the Port Lands that are most likely to undergo development in the near to mid-term. Of these three, Villiers Island is the furthest advanced, with public meetings on land use options held in the spring of 2014. This precinct plan is described and assessed in greater detail in a subsequent section.

The Port Lands Planning Framework covers a large swath of the eastern extent of the central waterfront with a land mass roughly equivalent in size to the central business district. The boundaries of the study area include Keating Channel and Lake Shore Boulevard East in the north, Leslie Street in the east, Unwin Avenue and Cherry Beach in the south, and the Inner Harbour in the west. A large portion of the Port Lands Planning Framework study area falls within the eastern extent of the Airport Zoning Regulation, including all of Polson Quay and the South Ship Channel lands, and portions of the Film Studio District and East Port.

The purpose of the Framework is to refine the vision for the Port Lands and establish a framework to guide revitalization and redevelopment over the next several decades. The framework is intended to help guide growth by providing a more specific land use direction, identifying a transportation network to connect the Port Lands with the broader city, protecting lands for a range of parks and open spaces, and providing more detailed urban design and built form direction.

The Port Lands is currently subject to the former City of Toronto Zoning By-Law No. 438-86 with the majority of lands in the study area zoned Industrial, with small portions zoned as Industrial Commercial and Park District. Residential uses are not permitted under the in force By-Law. The land use directions currently proposed under the Port Lands Framework seek to introduce new uses – including increased employment, mixed-use communities and parks – while protecting port-related operations and businesses. The distribution of these proposed land use directions varies throughout the study area, with mixed-use predominant in Villiers Island and Polson Quay, a balance of creative industry-focused employment uses and mixed-uses in the Film Studio District, and the maintenance of port and employment uses in the East Port and South Ship Channel lands. In addition to these proposed land use directions, the framework identifies a number of sites where catalyst uses – educational, cultural or entertainment uses that could help spur redevelopment – could be

located, including sites on Villiers Island and Polson Quay, Pinewood Toronto Studios, the Hearn Generating Station and the entrance to Tommy Thompson Park.

The Framework in its current state of progress does not yet provide precise building height limits, only noting that the Port Lands will be predominantly mid-rise with a variety of other building forms to add interest and create a new skyline for the city. This preliminary direction is largely in keeping with the CWSP's policy regarding building heights in the Port Lands – that new neighbourhoods will be developed at a medium scale with some lower elements and higher buildings at appropriate locations.

4.3 Lake Ontario Park Master Plan

Is the planning area located within the Airport Zoning Regulation (AZR)?	Yes – nearly the entirety of the Master Plan area falls within the Approach Surface to Runway 26
Do planned building heights exceed the allowable height of the AZR?	N/A – the Master Plan does not contemplate any new buildings
Do the planned building heights exceed that of the current Controlling Obstacle?	N/A – the Master Plan does not contemplate any new buildings
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	N/A

The lands within Lake Ontario Park were identified as a significant park and open space area in the Central Waterfront Secondary Plan and were further highlighted in Waterfront Toronto's Public Space Framework, both adopted in 2003. Master planning work led by Waterfront Toronto commenced in 2006 and preliminary implementation initiated at Council's direction in the fall of 2012. The Master Plan sets out a guiding vision of Lake Ontario Park as one of the world's great large urban parks, transforming the lands within the Master Plan area into a defining destination for Toronto with new cultural and ecological landmarks of international significance. It contains a set of principles, directives and design impressions that will be used to shape the physical future of lands within the Master Plan area, providing a framework for future planning, design and decision-making. The Master Plan is described as the first step towards long-term implementation with further discussion and review of the design ideas and strategies anticipated to occur as funding is secured.

The Lake Ontario Park Master Plan area links together a number of existing and planned parks and open spaces along the waterfront into one contiguous 925-acre public park with over 37km of shoreline. The Master Plan area extends from Cherry Beach in the west to the R. C. Harris Water Treatment Plant in the east. Significant existing public parks and open spaces included in the Master Plan area include Tommy Thompson Park, Woodbine Park, Ashbridges Bay Park, Kew Gardens and Balmy Beach Park. Nearly the entirety of the Lake Ontario Park Master Plan area falls within the eastern extent of the Airport Zoning Regulation.

The Master Plan envisions a mixture of active and passive recreational uses, habitat and natural areas and boating and water sports uses. Under the Official Plan, lands within the Master Plan area are generally designated as Natural Areas, Parks and Other Open Spaces, with a few areas designated as Regeneration Areas and Employment Areas. The Master Plan notes that implementation will require updated land use designations in those areas where proposed uses are incompatible with existing designations.

The Master Plan does not contemplate any new buildings within the Lake Ontario Park lands other than those ancillary to parks uses. While the Master Plan does not include any information on planned building heights, it can be reasonably assumed that any new buildings would be of a very low scale.

4.4 Villiers Island Precinct Plan

Is the planning area located within the Airport Zoning Regulation (AZR)?	Yes – a small portion of the precinct to the south of Commissioners Street falls within the Approach Surface for Runway 26
Do planned building heights exceed the allowable height of the AZR?	Unknown – maximum building height not provided, however vision is for predominantly mid-rise form with tall buildings at strategic locations and clear height under AZR is approximately 140m
Do the planned building heights exceed that of the current Controlling Obstacle?	Unknown – maximum building height not provided, however vision is for predominantly mid-rise form with tall buildings at strategic locations and current lowest Controlling Obstacle is114.8m above ground
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	N/A

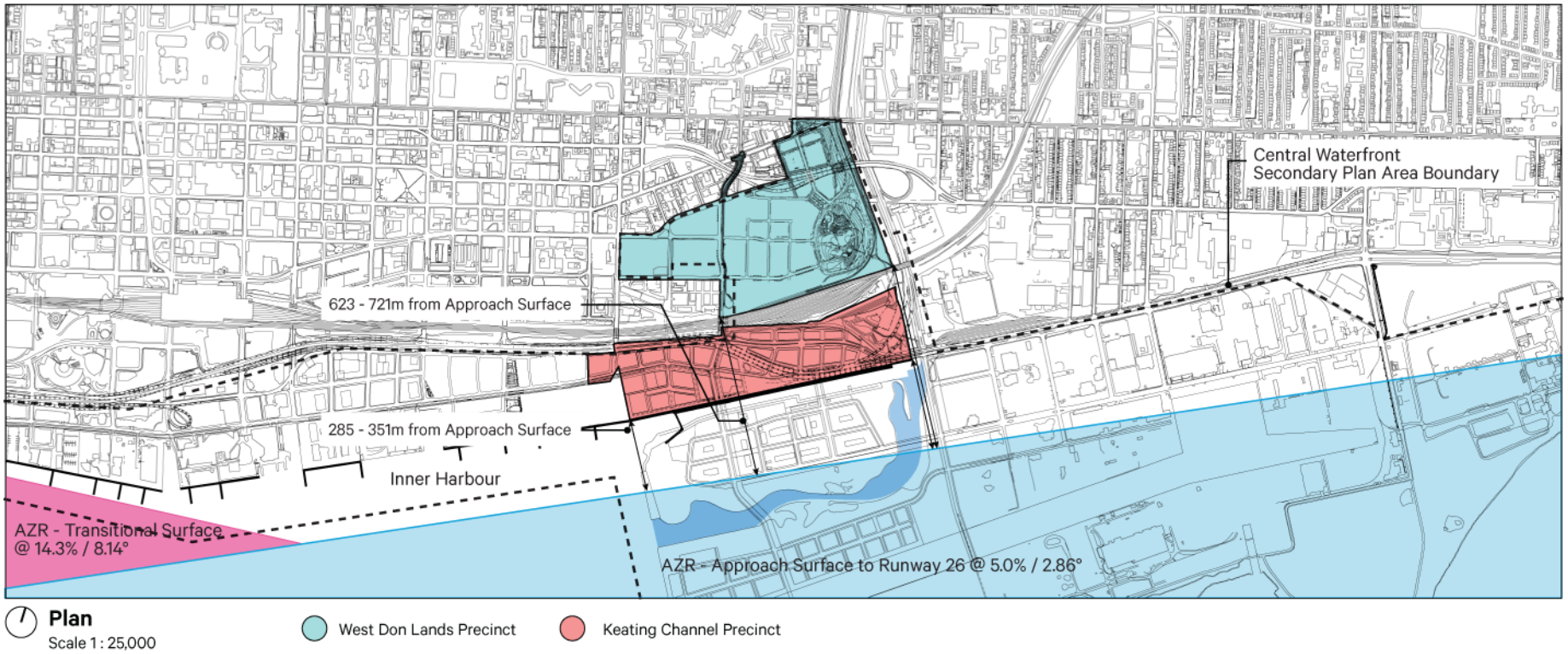
As with the broader Port Lands Planning Framework, the Villiers Island Precinct Plan was initiated at Council's direction following their endorsement of the results of the Port Lands Acceleration Initiative in the fall of 2012. The Precinct Plan is underway with guiding principles and street and block options having been most recently tested at public meetings in 2014. Through the work to date, a vision has been developed that sees Villiers Island transforming from an industrial district into a new sustainable and mixed-use community that will function as the gateway to the Port Lands, linking it to a series of lively waterfront districts and to the broader city beyond. The precinct plan project team is currently working to develop built form, height, massing and land use recommendations. The completed precinct plan will establish design and development objectives, local street patterns, block structures, linkages between local parks and open spaces and built form controls.

The precinct plan area encompasses an area defined by the Inner Harbour in the west, the Keating Channel in the north and the new mouth of the Don River in the west and south. While the Airport Zoning Regulation covers a portion of Villiers Island south of Commissioners Street, none of the street and block options developed to date indicate that development will occur in this area.

Villiers Island is currently composed of industrial and commercial uses and is zoned as such. The precinct plan envisages this mix of uses shifting to accommodate residential uses, new employment and office uses, retail uses, parks and open spaces and catalytic uses such as major cultural, recreation or education uses. A major component of the parks and open spaces that will frame the new Villiers Island includes the Promontory Park located along the western edge of the site facing into the Inner Harbour and a park lining the shores of the new Don River mouth.

Recommendations related to built form, height and massing are still under development however, the guiding principles of the precinct plan envision a predominantly mid-rise form with tall buildings in strategic locations to help define gateways, frame parks and optimize transit nodes. There has already been some development interest within the precinct plan area, with a zoning amendment application having been submitted in the spring of 2012. This application seeks to rezone the lands at 309 Cherry Street to permit an 80m tall mixed-use building. The application is currently being held in abeyance at the applicant's request pending completion of the precinct plan.

Figure 28 West Don Lands Precinct and Keating Channel Precinct



4.5 Keating Channel Precinct Plan

Is the planning area located within the Airport Zoning Regulation (AZR)?	No
Do planned building heights exceed the allowable height of the AZR?	N/A
Do the planned building heights exceed that of the current Controlling Obstacle?	No
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	N/A

The Keating Channel Precinct Plan was developed in concert with the Don Mouth Naturalization and Flood Protection Environmental Assessment and the Lower Don Lands Planning Framework. Study of the lands within the Keating Channel Precinct commenced with a design competition for the Don Mouth and Lower Don Lands initiated by Waterfront Toronto in 2007, culminating in Council's adoption of the precinct plan and an implementing zoning by-law in 2010. At the time of the plan's completion, the Keating Channel Precinct was anticipated to be the first community developed in the Lower Don Lands, forming a new gateway into the broader Port Lands area. It set out to shape the revitalization of a largely vacant former industrial area into a bold and harmoniously integrated neighbourhood with new residences, retail, infrastructure, and parks and open spaces framing the altered course of the Lower Don River. Following Council's adoption of the zoning by-law, a number of land owners within the Precinct Plan area filed appeals at the Ontario Municipal Board which remain unresolved.

The Precinct Plan area is located immediately north of Villiers Island and is bounded by the rail corridor in the north, the Don River in the east, the Keating Channel in the south, and Small Street in the west. The implementing zoning-bylaw covers a slightly smaller area of land, with an eastern boundary of Cherry Street rather than the Don River. The remainder of the precinct lands are to be rezoned once the Gardiner Environmental Assessment is further advanced. The Keating Channel Precinct falls outside of the Airport Zoning Regulation.

With the Precinct Plan's implementing zoning by-law under appeal, the former City of Toronto Zoning By-Law No. 438-86 is in force, industrial and commercial uses west of Cherry Street and industrial uses only east of Cherry Street. The zoning proposed to implement the Precinct Plan allows for mixed commercial residential development over the majority of the area with parks uses at the foot of Parliament Street and along the water's edge promenade. A number of amenities are permitted within these park uses, including outdoor cafes and markets.

The Precinct Plan and its implementing zoning largely envision and allow for predominantly mid-rise development with taller buildings up to a maximum height of 125 metres at five locations. It is possible that the zoning ultimately approved by the Ontario Municipal Board may more closely reflect the preliminary proposals submitted by the appellants, which generally provide for significantly taller buildings of an as of yet unspecified height.

4.6 West Don Lands Precinct Plan

Is the planning area located within the Airport Zoning Regulation (AZR)?	No
Do planned building heights exceed the allowable height of the AZR?	N/A
Do the planned building heights exceed that of the current Controlling Obstacle?	No
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	N/A

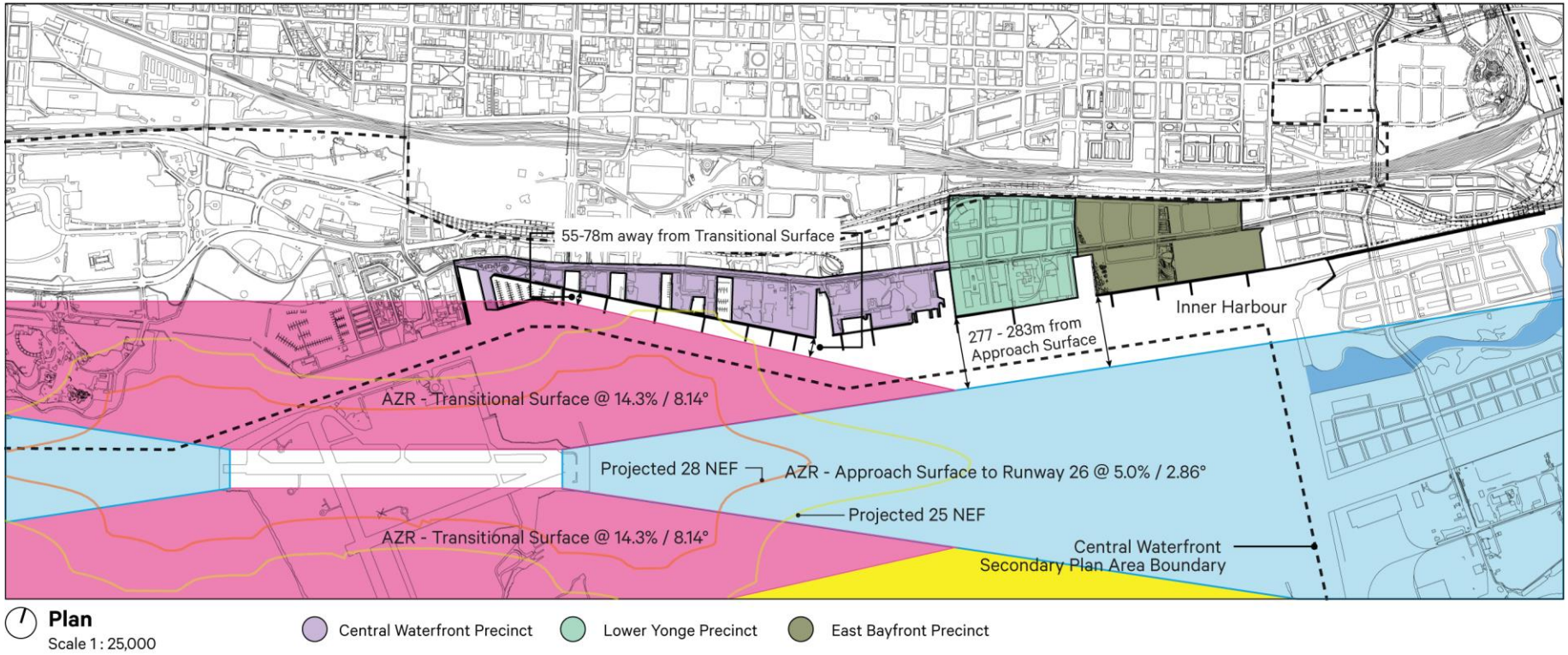
A former centre of heavy industrial activity, the West Don Lands has been targeted for revitalization since the late 1980s. The Precinct Plan and current development activity were realized in large part through the vision laid out in the Central Waterfront Secondary Plan which identified the area as one of a series of big moves that could be undertaken to create new dynamic communities within Toronto's waterfront. Waterfront Toronto-led Precinct planning began in 2003 and a Precinct Plan, Environmental Assessment, Block Plan, Design Guidelines and implementing Official Plan Amendments and Zoning By-Law Amendments endorsed by Council in 2005, 2006 and 2010. Together these planning documents and implementing tools envision the West Don Lands as a mixed-use precinct with an emphasis on urban living with loft-type residential and non-residential buildings, compact townhouses, a vibrant commercial node and an eclectic live/work area. The public realm is central to the precinct, with a wide promenade along Front Street as a central neighbourhood spine and a major new park on the eastern edge of the area that also serves as a flood protection land form, removing approximately 210 hectares of Toronto's east downtown from flood risk.

The West Don Lands Precinct is generally bordered by Eastern Avenue in the north, the Don River in the east, the rail yards to the south and Parliament Street to the east. The area extends north of Eastern Avenue to King Street East between Lawrence Street and Bayview Avenue and excludes the area west to Cherry Street and south of Mill Street. The Precinct falls outside of the Airport Zoning Regulations.

The West Don Lands are designated under the Central Waterfront Secondary Plan as a Regeneration Area, with Parks and Open Spaces covering the Corktown Common, Underpass Park, Lawrence Harris Square and other as yet undeveloped parks and open spaces at Parliament Street and Mill Street. The area is zoned as a RA Reinvestment Area, permitting a range of uses including residential, commercial, parks, institutional and compatible industrial and light industrial uses. The Phase 1 and Phase 2 lands have been partially built out, with market rate and affordable housing built north of the Eastern Avenue overpass and the Pan Am and Para Pan Am Athlete's Village partially occupying the lands roughly bounded by Eastern Avenue, Bayview Avenue, Mill Street and Cherry Street. With the conclusion of the Pan Am and Para Pan Am games, these buildings will be converted to a mixture of market rate and affordable housing units, a recreation facility run by the YMCA, and a student residence for George Brown College.

The in-force zoning in the West Don Lands permits a range of low to mid-rise building heights, up to a maximum of 36m north and south of Front Street and fronting the west side of Bayview Avenue. The zoning also designates three tower areas with a maximum building height of 48 metres at the northwest and southwest corners of Front Street and Bayview Avenue, 48 metres on the south side of Mill Street immediately east of Cherry Street and 78 metres slightly further east along the south side of Mill Street. The lands to the west of Cherry Street are zoned for a maximum height of 26 metres.

Figure 29 Central Waterfront, Lower Yonge & East Bayfront Precincts



4.7 East Bayfront Precinct Plan

Is the planning area located within the Airport Zoning Regulation (AZR)?	No
Do planned building heights exceed the allowable height of the AZR?	N/A
Do the planned building heights exceed that of the current Controlling Obstacle?	Yes – the proposed 150m building at 143 Lake Shore Boulevard East exceeds the height of the current Controlling Obstacle of 127.1m
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	N/A

The East Bayfront Precinct Plan was one of the first precinct plans developed following Council's adoption of the Central Waterfront Secondary Plan in 2003. The planning work was jointly led by Waterfront Toronto and the City with the plan completed and adopted by Council late in 2005. This plan envisions the East Bayfront as a mixed-use community with a diversity of employment and residential functions along with a public realm that makes the area a significant water-related public destination for city residents and visitors. The relationship between this planned community and its waterfront setting is underlined in the principles that speak to an active, continuous and varied lakefront promenade and a building pattern that maximizes views to the lake. Following the adoption of the Precinct Plan, an implementing zoning by-law was brought forward and adopted by Council in early 2006 with landowner appeals filed at the Ontario Municipal Board shortly thereafter.

The East Bayfront Precinct does not fall within the Airport Zoning Regulations. The Precinct area is bounded by Lake Shore Boulevard East in the north, Small Street in the east, the Inner Harbour to the south, and Lower Jarvis Street in the west. The implementing zoning has been partially approved by the Ontario Municipal Board and is in force for a number of sites within the area, including:

- South of Queens Quay East between Sugar Beach and Sherbourne Common
- North of Queens Quay East between Lower Jarvis Street and Richardson Street (including the southwest quadrant of the adjacent block east of Richardson Street)
- North of Queens Quay East between Sherbourne Common and Bonny Castle Street
- South of Queens Quay East between Sherbourne Common and the Parliament Street Slip

The implementing zoning by-law permits mixed-use development with parks and open space areas at key sties and along the water's edge. The commercial residential mixed-use zoning includes a requirement for a range of retail, restaurant and other uses along 70% of the frontages to better animate certain key building faces including those that face parks and open space areas and the water's edge promenade. Where the implementing zoning is not yet in force, only industrial uses are permitted.

The Precinct Plan and implementing zoning by-law largely envision and permit a range of heights with the taller buildings at a maximum of 120 metres just south of Lake Shore Boulevard, stepping down to a maximum height of 52 to 38 metres along Queens Quay East and finally down to 20 metres along the waterfront. The maximum height within the Precinct was recently updated by an Ontario Municipal Board decision for 143 Lake Shore Boulevard East, 130 Queens Quay East and 162 Queens Quay East. This decision permits two towers with heights of 150 and 120 metres at 143 Lake Shore, two shorter buildings of 58.8 metres and 47.4 metres at 130 Queens Quay, and a 60 metre building at 162 Queens Quay. There is no defined height limit in those areas where the implementing zoning is not yet in force, however buildings may only be developed up to a density three times the lot area.

4.8 Lower Yonge Precinct Plan

Is the planning area located within the Airport Zoning Regulation (AZR)?	No
Do planned building heights exceed the allowable height of the AZR?	N/A
Do the planned building heights exceed that of the current Controlling Obstacle?	Yes – the proposed maximum height of 303m exceeds the current lowest Controlling Obstacle height of 53m
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	N/A

Work on the Lower Yonge Precinct Plan has been underway since 2008, with an urban design report containing principles and recommendations on land use and built form having been recently completed. Further detailed planning and implementation work was then undertaken with a final Precinct Plan and proposed Official Plan Amendment being endorsed by Toronto City Council in June 2016. The purpose of the precinct planning work being undertaken is to establish a planning context for comprehensive and orderly development of former industrial lands located in close proximity to both the downtown and Lake Ontario. The future Lower Yonge Precinct is conceived of as a liveable, complete community with a fine-grained network of varied and distinct public spaces. North-south views and physical connections between the downtown and waterfront are emphasized throughout the preliminary Lower Yonge Precinct principles and recommendations document.

The Lower Yonge Precinct is immediately west of the East Bayfront Precinct and is bounded by Lake Shore Boulevard East in the north, Lower Jarvis Street on the east, Queens Quay East to the south and Yonge Street to the west. The Lower Yonge Precinct falls completely outside of the Airport Zoning Regulations.

The in-force zoning in the Lower Yonge Precinct allows for a mixture of commercial and industrial uses, with the former permitted west of and the latter east of Freeland Street. The policy directions for the emerging Precinct Plan call for a mix of uses in the precinct, including a significant proportion of employment and residential uses. The employment uses are expected to take the form of offices and are to be encouraged closer to the western boundary of the area and along Queens Quay. A large central park is also recommended to serve as a public space for local residents, workers and visitors to the waterfront. The park is currently shown located between Freeland and Cooper Streets, north of Queens Quay and south of the Harbour Street extension.

Existing zoning within the Precinct generally does not specify height limits with the exception of 1-7 Yonge Street where a previously adopted site-specific zoning permits a maximum height of 85 metres along the Yonge Street frontage. The Precinct Plan recommends updating the maximum heights over the entire extent of the Precinct, with heights generally transitioning down from the Gardiner/Lake Shore corridor towards the waterfront and from Yonge Street towards Lower Jarvis Street. The Precinct Plan and accompanying OPA generally do not specify maximum building heights. Instead, they propose that maximum building heights will be determined through site-specific zoning, subject to studies of sun/shadow, pedestrian-level wind and views and skyline views, and any other studies as necessary. The Precinct Plan and OPA do set out a height maximum for the proposed development at 1-7 Yonge Street, with the maximum height for the tallest tower set at 303 metres.

4.9 Central Waterfront Precinct

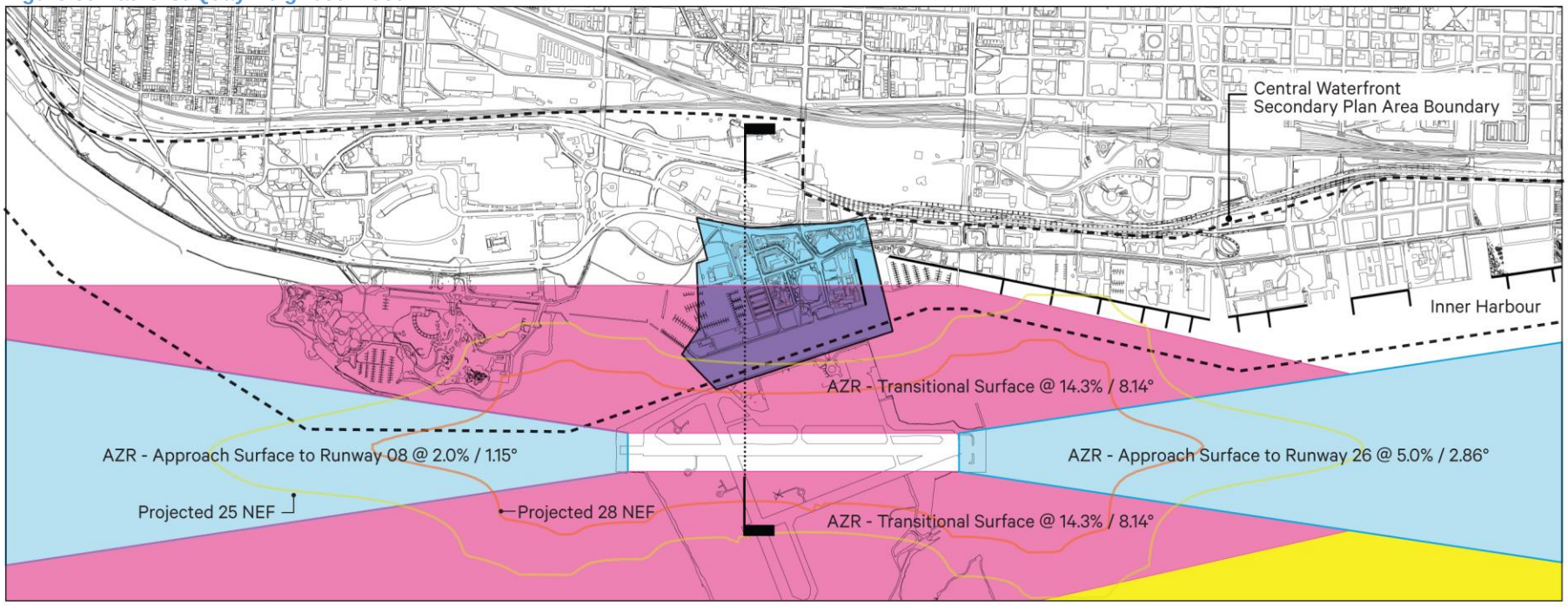
Is the planning area located within the Airport Zoning Regulation (AZR)?	Yes – a small portion of the south end of Spadina Quay falls within the Transitional Surface
Do planned building heights exceed the allowable height of the AZR?	N/A – planning work for the Precinct does not contemplate changes to building heights
Do the planned building heights exceed that of the current Controlling Obstacle?	N/A – planning work for the Precinct does not contemplate changes to building heights
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	No

The Central Waterfront Precinct has not been subject to the same degree of precinct planning as other precincts within the Central Waterfront Secondary Plan area. Whereas the planning efforts in other precincts identified in this report have included detailed analysis of and recommendations for land use and built form, the Central Waterfront, an area largely built out with private residential and commercial uses and public spaces and institutions, was instead the focus of a design competition held in 2006. The purpose of this design completion was to establish a vision for the Central Waterfront Precinct that would link major waterfront destinations, create new public spaces and reimagine Queens Quay as a grand waterfront boulevard.

The results of this design completion and resulting vision are threefold: (1) the implementation of the Rees, Simcoe and Spadina WaveDecks; (2) the continuing implementation of the water's edge promenade and boardwalk; (3) the design and construction of a new Queens Quay with a dedicated transit right-of-way, new multi-use path, expanded pedestrian space and enhanced greening; and (4) the York Quay revitalization.

All of these components have led to or contemplate changes to publicly-owned land and do not feature recommendations for changes to permitted heights or land uses. Furthermore, those privately-owned lots that fall within the Central Waterfront Precinct are built out in their entirety.

Figure 30 Bathurst Quay Neighbourhood



4.10 Bathurst Quay Neighbourhood Plan

Is the planning area located within the Airport Zoning Regulation (AZR)?	Yes – the southern half of the Neighbourhood Plan area falls within the Transitional Surface
Do planned building heights exceed the allowable height of the AZR?	Unknown – maximum building heights are not provided and the clear height under the AZR ranges from 54-81m
Do the planned building heights exceed that of the current Controlling Obstacle?	Unknown – maximum building heights are not provided and the current lowest Controlling Obstacle is 48.1m above ground
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	No

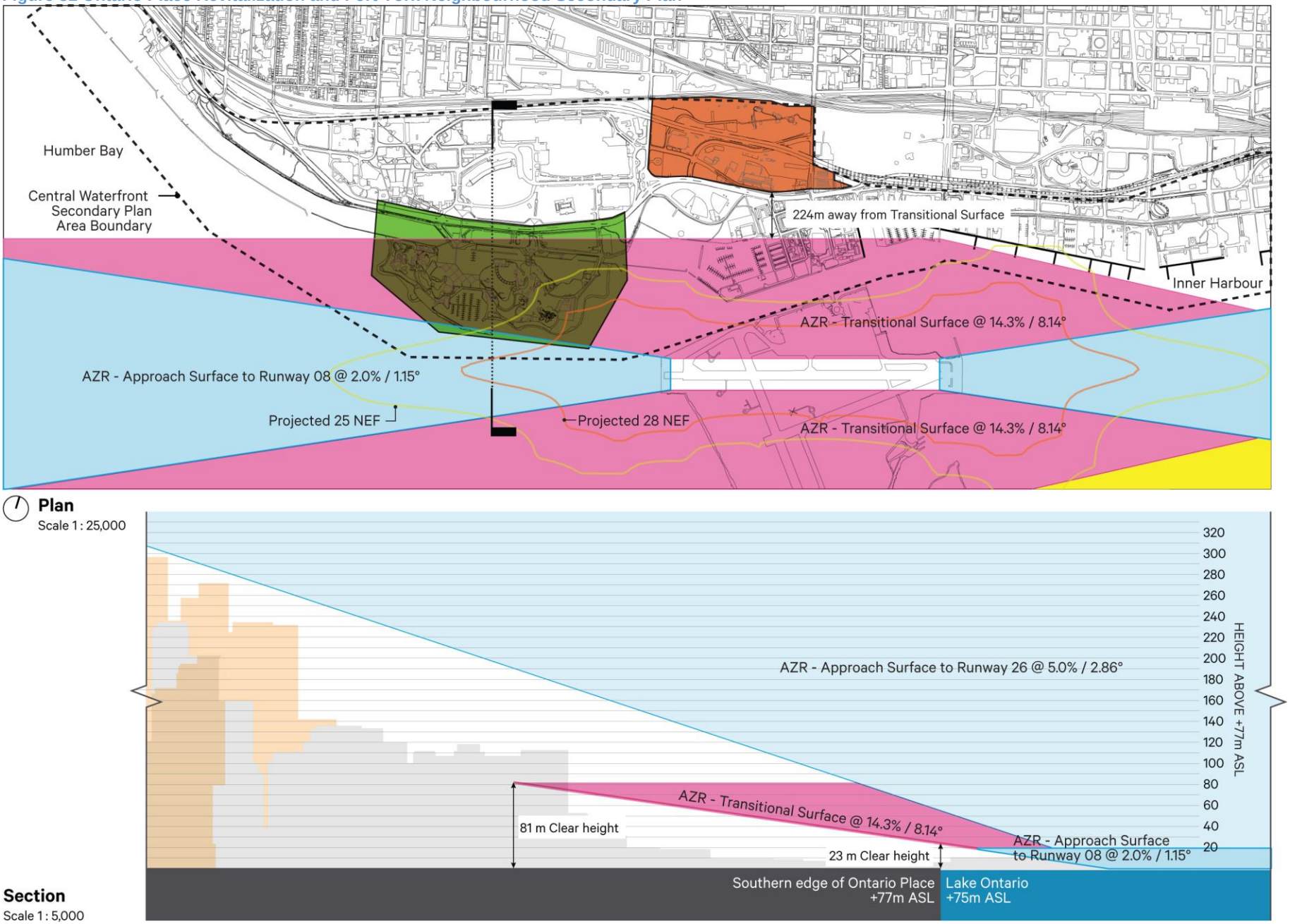
The Bathurst Quay Neighbourhood Plan had its genesis in the April 2014 report to Council on the City's BBTCA Review. At this meeting, Council adopted a motion directing City staff to undertake a planning study for the Bathurst Quay Neighbourhood in response to the need identified by staff to develop a vision to complete the neighbourhood. The study will seek to achieve improved connections to parks and open spaces, community facilities and services and public realm elements in the area, improved traffic and parking management, and opportunities to revitalize the Canada Malting Silos site. City staff also identified a need to develop directions to better align groundside airport operations with the City's policies and objectives for the waterfront. The study will update the planning policy framework to include more detailed direction on the scale, scope and fit of the airport in relation to its context and management of airport operations, ultimately resulting in revised site and area specific policies.

The Neighbourhood Plan study area is generally bounded by Lake Shore Boulevard West to the north, the eastern edge of Coronation Park to the west, Lake Ontario to the south and the western edge of the Music Garden to the east. The study area falls within both the transitional surface of the Airport Zoning Regulation and the NEF 25 and 28 Contours.

Bathurst Quay is largely built out and is comprised of multi-family residential buildings with limited commercial uses, a number of parks and open spaces and several community services and facilities including two public schools, a community centre and a child care centre. The Official Plan land use designations match these existing uses, with Apartment Neighbourhoods and Parks and Open Space Areas prevailing within the study area. One of the only potential redevelopment sites within the study area, the Rogers site at Queens Quay and Bathurst Street, is designated Mixed Use. A number of non-park uses are designated as Parks and Open Space Areas, including the Canada Malting Silos site, the schools and community centre site, the airport terminal lands and associated parking and pick-up and drop-off facilities as well as the surface parking lot on Stadium Road. The Neighbourhood Plan has not yet advanced to the stage of proposing updated land use or built form directions.

While the most recently completed phase of the study does not detail maximum building heights, it does provide some direction on where new development might occur. Two of the three concepts feature new development south of Queens Quay West and east of Little Norway Park, an area that falls within the transitional surface of the Airport Zoning Regulation.

Figure 31 Ontario Place Revitalization and Fort York Neighbourhood Secondary Plan



4.11 Fort York Neighbourhood Secondary Plan

Is the planning area located within the Airport Zoning Regulation (AZR)?	No
Do planned building heights exceed the allowable height of the AZR?	N/A
Do the planned building heights exceed that of the current Controlling Obstacle?	Yes – the proposed 130.8m building at 500 Lake Shore Boulevard West exceeds the height of the current Controlling Obstacle of 48.1m above ground
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	N/A

The Bathurst/Strachan Part II Plan, adopted by City Council in 1995, established the original framework for the redevelopment of the Fort York Neighbourhood. Many of this Part II Plan's policies were updated by the City in the early 2000s and the Fort York Neighbourhood Secondary Plan was approved and brought into force by the Ontario Municipal Board in the summer of 2008. The Secondary Plan describes the Fort York Neighbourhood as a primarily residential mixed use community which takes advantage of the large areas of existing public open space and its unique waterfront setting. Amongst the policies that speak to this waterfront setting are those that establish north-south views and physical connections to the lake front through streets, view corridors, pedestrian connections and open space. The Fort York Neighbourhood is now largely built out with only two sites remaining undeveloped.

The Secondary Plan area has a northern boundary of the railway corridor and the northern edge of the Fort York National Historic, an eastern boundary defined by Bathurst Street, Queen's Wharf Road and Dan Leckie Way, Lake Shore Boulevard West as its southern boundary, and Strachan Avenue as its western boundary. The Fort York Neighbourhood is located outside of the Airport Zoning Regulation.
The Secondary Plan contains a number of different uses, including those that are primarily or entirely residential, including Mixed Use Areas and Apartment Neighbourhoods, an Institutional Area that is currently occupied by the Fort York Armoury, and several Parks and Other Open Spaces, including Garrison Common, June Callwood Park, and The Gore Park.

The built form policies of the Secondary Plan envisioned a neighbourhood composed of mid-rise buildings ranging in height from seven to fifteen storeys with point towers ranging from seventeen to a maximum of thirty-six storeys. There are several constructed buildings that have exceeded this planned maximum height through Official Plan and Zoning By-Law Amendments. The two remaining undeveloped sites both have active planning applications seeking heights above the maximum set out in the Secondary Plan. These include a site at 65 Grand Magazine Street that is seeking an Amendment to develop a 106.5 metre residential building (existing zoning permits a maximum height of 59 metres). The second site at 500 Lake Shore Boulevard West recently had its Official Plan and Zoning By-Law Amendments adopted by Council to permit two towers located immediately south of the Gardiner Expressway with maximum heights of 120.2 and 130.8 metres.

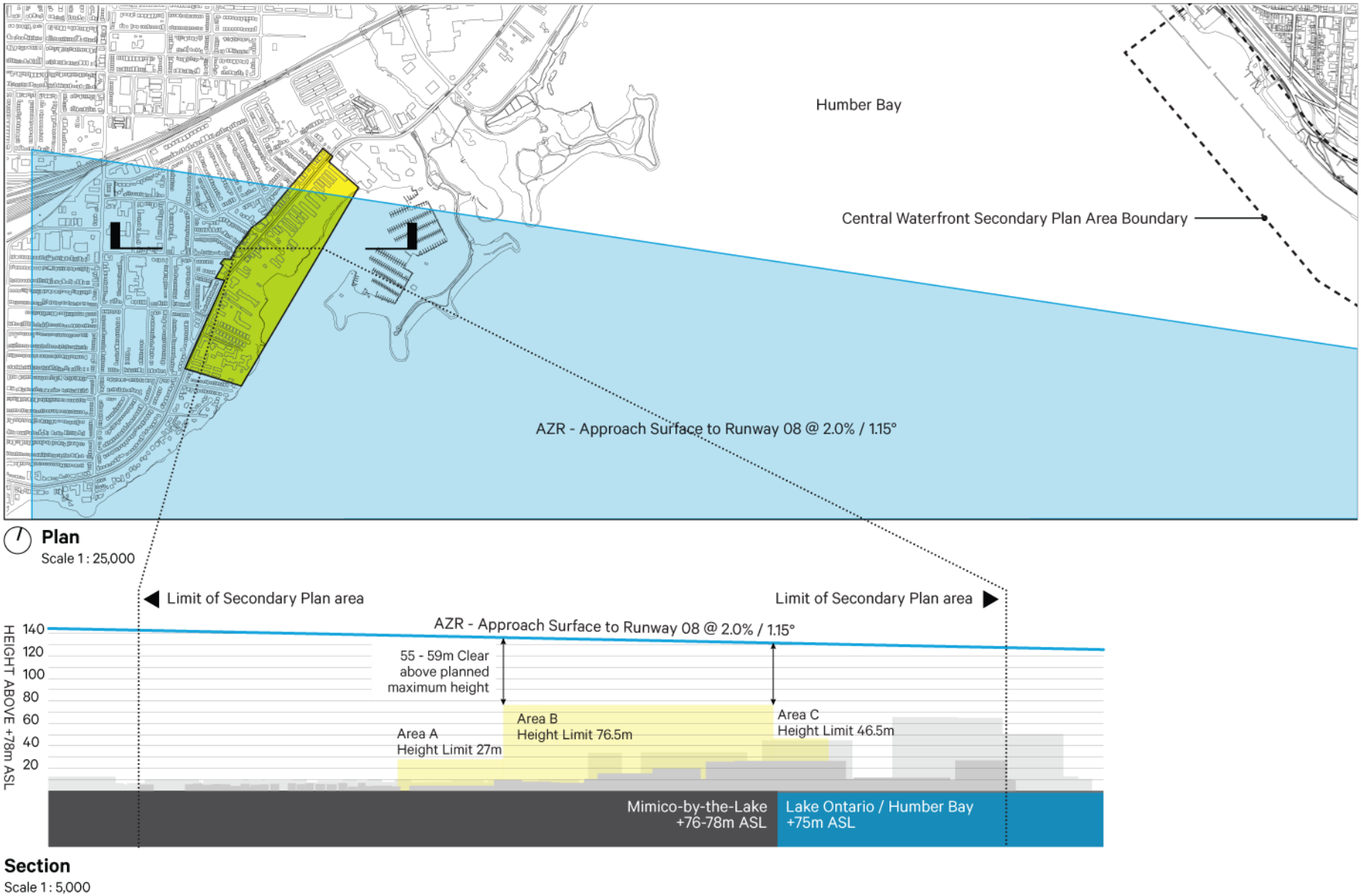
4.12 Ontario Place Revitalization

Is the planning area located within the Airport Zoning Regulation (AZR)?	Yes – the majority of the Revitalization area falls within the Transitional Surface
Do planned building heights exceed the allowable height of the AZR?	Unknown – maximum building heights are not provided and the clear height under the AZR ranges from 23-81m
Do the planned building heights exceed that of the current Controlling Obstacle?	Unknown – maximum building heights are not provided and the current lowest Controlling Obstacle is 25.2m above ground
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	Yes

In early 2012, the Province of Ontario tasked a panel to study and advise the government on options for the future of Ontario Place. In the summer of 2012, the panel released a report recommending that the Ontario Place lands be transformed into a year-round, multi-use waterfront community and urban park. The Province endorsed these recommendations and commenced planning and design work for a new urban park and waterfront trail on the eastern most portion of Ontario Place, including the lands south of Remembrance Drive and east of Ontario Place Boulevard. The park and trail will feature a number of passive recreation uses such as a garden, boardwalk and naturalized play areas. It will include a summit at its southern end providing vistas of the lake and the city. A large portion of the new urban park and waterfront trail falls within the NEF 25 Contour.

While design work for this park and trail is complete and construction will be commencing shortly, the broader revitalization initiative is still underway. While the panel report recommendations did envisage mixed use development within Ontario Place, including residential and commercial buildings, the latest vision released by the Province excludes residential development from a revitalized Ontario Place. The vision focuses on transforming Ontario Place with new parks, entertainment, cultural and recreational spaces, and a retail and restaurant district. Maximum building heights have not yet been devised however, nearly all of Ontario Place falls within the transitional surface of the BBTCA Airport Zoning Regulation.

Figure 32 Mimico-by-the-Lake Secondary Plan



4.13 Mimico-by-the-Lake Secondary Plan

Is the planning area located within the Airport Zoning Regulation (AZR)?	Yes – nearly all of the Secondary Plan area falls within the Approach Surface to Runway 08
Do planned building heights exceed the allowable height of the AZR?	No
Do the planned building heights exceed that of the current Controlling Obstacle?	N/A
Is the planning area located within the Noise Exposure Forecast (NEF) 30 contour?	No
Are there any planned sensitive land uses within the NEF 30 contour?	N/A
Are there any planned sensitive land uses within the NEF 25 contour?	No

The process to develop the Secondary Plan commenced in 2005. The City of Toronto identified a need to facilitate reinvestment and ensure redevelopment and infill occurs in a comprehensive manner in Mimico-by-the-Lake, a neighbourhood on the western waterfront that is largely built up. The Secondary Plan that was ultimately adopted by City Council in July 2013 seeks to guide growth and change towards the renewal of existing housing, the provision of infill development on underutilized lands and the creation of increased access through a new street and block pattern. Portions of the Secondary Plan have been appealed to the Ontario Municipal Board, including land use designation and maximum building height policies.

Almost all of the Mimico-by-the-Lake Secondary Plan falls within the western extent of the Airport Zoning Regulation where it crosses over the western shores of Humber Bay. The Secondary Plan area itself is generally bounded by Louisa Street in the north, the shoreline of Lake Ontario in the east, slightly north of Miles Road in the south, and Lake Shore Boulevard West in the east (Lake Shore Boulevard West runs in a north-south direction in this portion of Mimico).

The Secondary Plan area contains four land use designations: Mixed Use Areas, Apartment Neighbourhoods, Parks and Open Space Areas, and Natural Areas. Of these four land uses, only Mixed Use Areas are envisaged for a greater magnitude of change. All other land use designations have associated Official Plan policies that seek to maintain physical stability and limit the scale of change. The areas immediately outside the Secondary Plan area are also largely designated so as to maintain physical stability and limit the scale of change.

Policies regarding maximum building height are organized into three sub-areas in the Secondary Plan, with the tallest buildings permitted in Area B, where maximum building heights range from 50 metres or 16 storeys to 76.5 metres or 25 storeys. Area B applies to three portions of the overall Secondary Plan area, all of which are east of Lake Shore Boulevard West: an area east of Alexander Street; an area centred on Superior Avenue; and an area south of Douglas Boulevard.

Appendix A – Missed Approach Surface Analysis Methodology

An analysis was conducted to identify requirements for the review of potential conflict between planned development and the existing and proposed Missed Approach Surfaces. This analysis consisted of a series of data translations that are outlined below in order to arrive at a useful metric for the evaluation of planned heights in the various planning areas (secondary plans, precinct plans and neighbourhood studies) examined throughout this study. Please refer to Table 1 *Missed Approach Surface – Height Grid Analysis* and Figure 3-6 *Planning Areas Key Map with Missed Approach Clear Height Grid Overlay* in conjunction with this methodology description.

Background

Information regarding the Missed Approach Surfaces was provided by Air Navigation Data in the form of a reference document (*Toronto/Billy Bishop Toronto City Airport (CYTZ) Instrument Procedure Obstacle Identification Surface Reference Grid*, dated November 17, 2011), and a corresponding visual map with reference grid (*Toronto/Billy Bishop Toronto City Airport (CYTZ) Instrument Procedure Obstacle Identification Surface Reference Grid* dated November 21, 2011). The *Reference Grid* illustrates a series of numbered grid cells overlaid on a map of the vicinity of Billy Bishop Toronto City Airport. Each grid cell is labelled with a reference number starting at 1 in the northwest corner of the map and increasing sequentially in a southerly direction in each column, terminating at 153 in the southeast corner. Each grid cell represents an area of 2000 x 2000 feet and each area has been assigned a 'Max Height' value. The Max Height is provided in feet above Mean Sea Level, and represents the tallest structure that could be located within that area before a potential conflict with the Missed Approach Surface would trigger a review. The Max Height has been determined by Air Navigation Data through the agglomeration of all instrument procedures currently published for CYTZ in the Canada Air Pilot (CAP) and Restricted Canada Air Pilot (RCAP) and is updated periodically as instrument procedures are added, removed or modified. A version of this grid has been provided to City of Toronto planning staff to assist with both internal planning processes and the evaluation of planning applications, as well as to confirm agency circulation requirements.

SvN requested that Max Height values be provided for grid cells within the study area of this review. Air Navigation Data provided a table of values for relevant cells (dated September 30, 2015). As noted above, and as is consistent within the aviation industry, all values were provided in Imperial measurements as feet Above Sea Level.

Data Translations

Table 1 *Missed Approach Surface – Height Grid Analysis* documents a series of data translations performed to evaluate planned development against the Missed Approach Surface. Column A contains the original Grid Cell reference number and Column B contains the Max Height Value as provided by Air Navigation Data.

The City of Toronto employs the metric system and typically references dimensions in metres. As such, Column C converts the Max Height dimension from feet into metres Above Sea Level. Additionally, although precise building or structure heights are eventually documented with geodetic measurements, it is common to refer to heights in relation to the average grade upon which the building or structure will be constructed. As such, an approximate Average Terrain Elevation (Column F) was determined for each grid cell by averaging the lowest (Column D) and highest (Column E) terrain elevations through an examination of the area in Google Earth. As these values can only be considered representative approximations of the conditions in each grid cell area, more detailed review would need to be undertaken for specific locations of evaluation.

Evaluation

The Average Terrain Elevation (Column F) was then deducted from the Max Height in metres Above Sea Level (Column C) to arrive at a Resultant Clear Height for each grid cell (Column G). Resultant Clear Heights are illustrated in Figure 3-6 *Planning Areas Key Map with Missed Approach Clear Height Grid Overlay*. Each

grid cell contains a large number in bold text that represents the Clear Height in metres above ground as well as the original Grid Reference number for review against the original documentation.

The Resultant Clear Heights were then compared to Proposed Max Heights (Column H) in each of the grid cells, correlated with the geographic areas delineated by the various planning documents. Where the Proposed Max Height exceeds the Resultant Clear Height, additional detailed review is required, as indicated in Column I. Due to the unavoidable approximations involved in determining Resultant Clear Heights, Review Required should not be interpreted as certain conflict between planned development and the Missed Approach Surface, but rather the necessity for further, specific investigation of the respective area. Similarly, several of the planning areas have emerging frameworks that, to date, do not propose maximum building heights. As those frameworks mature, further study should be undertaken to confirm the relationship between planning and development objectives and the Missed Approach Surfaces associated with the airport.

Table 1 Missed Approach Surface - Height Grid Analysis

A	B	C	D	E	F	G	H	I	J	K
Grid #	Max Height	Max Height	Terrain Low Elevation	Terrain High Elevation	Terrain Avg. Elevation	Resultant Clear Height	Proposed Max Height	Review Required	Planning Area	Comments
	ft ASL	m ASL	m ASL	m ASL	m ASL	m	m			
5	556	169.5	89	96	92.5	77.0		No	Not within a planning area	Not reviewed
6	500	152.4	78	86	82.0	70.4		No	CWSP	No maximum building heights proposed by the CWSP
7	431	131.4	75	75	75.0	56.4		No	N/A	Area is Lake only
8	442	134.7	75	75	75.0	59.7		No	N/A	Area is Lake only
14	564	171.9	86	92	89.0	82.9		No	Not within a planning area	Not reviewed
15	470	143.3	78	86	82.0	61.3		No	Ontario Place Revitalization	No maximum building heights proposed to date
16	356	108.5	77	81	79.0	29.5		No	Ontario Place Revitalization	No maximum building heights proposed to date
22	470	143.3	88	91	89.5	53.8		No	Not within a planning area	Not reviewed
23	470	143.3	83	88	85.5	57.8		No	Not within a planning area	Not reviewed
24	352	107.3	77	84	80.5	26.8		No	Ontario Place Revitalization	No maximum building heights proposed to date
25	342	104.2	78	80	79.0	25.2		No	Ontario Place Revitalization	No maximum building heights proposed to date
31	582	177.4	84	89	86.5	90.9	108	Yes	Fort York Neighbourhood Secondary Plan Area	The Fort York Neighbourhood Secondary Plan proposes up to 36 storey point towers, estimated at 108 m in height
32	470	143.3	78	85	81.5	61.8	108	Yes	Fort York Neighbourhood Secondary Plan Area	The Fort York Neighbourhood Secondary Plan proposes up to 36 storey point towers, estimated at 108 m in height
33	251	76.5	78	78	78.0	0.0		No	Ontario Place Revitalization	No maximum building heights proposed to date
34	250	76.2	76	76	76.0	0.2		No	Ontario Place Revitalization	No maximum building heights proposed to date
35	715	217.9	76	76	76.0	141.9		No	N/A	Area is Lake only
40	715	217.9	77	88	82.5	135.4	108	No	Fort York Neighbourhood Secondary Plan Area	The Fort York Neighbourhood Secondary Plan proposes up to 36 storey point towers, estimated at 108 m in height
41	417	127.1	78	80	79.0	48.1	108	Yes	Fort York Neighbourhood Secondary Plan Area, Bathurst Quay Neighbourhood	The Fort York Neighbourhood Secondary Plan proposes up to 36 storey point towers, estimated at 108 m in height
42	250	76.2	76	78	77.0	0.0		No	Bathurst Quay Neighbourhood	This portion of the Bathurst Quay Neighbourhood is subject to height restrictions by the Airport Zoning Regulations
43	250	76.2	76	76	76.0	0.2		No	Not within a planning area	Not reviewed
49	337	102.7	78	86	82.0	20.7		No	Not within a planning area	Not reviewed
50	250	76.2	77	78	77.5	0.0		No	Central Waterfront Precinct	No maximum building heights proposed to date
51	250	76.2	76	76	76.0	0.2		No	Not within a planning area	Not reviewed
52	250	76.2	76	76	76.0	0.2		No	Not within a planning area	Not reviewed
58	374	114.0	77	84	80.5	33.5		No	Central Waterfront Precinct	No maximum building heights proposed to date
59	250	76.2	77	78	77.5	0.0		No	Central Waterfront Precinct	No maximum building heights proposed to date
67	428	130.5	77	78	77.5	53.0	120	Yes	Central Waterfront Precinct, Lower Yonge Precinct	Maximum building heights may be increased based on active planning applications for tall buildings
68	284	86.6	75	77	76.0	10.6		No	Central Waterfront Precinct	No maximum building heights proposed to date
75	673	205.1	78	78	78.0	127.1	150	Yes	Lower Yonge Precinct, East Bayfront Precinct	An OMB decision for 143 Lakeshore Boulevard East increased heights beyond the previous maximum of 120 m
76	483	147.2	78	78	78.0	69.2	150	Yes	Lower Yonge Precinct, East Bayfront Precinct	An OMB decision for 143 Lakeshore Boulevard East increased heights beyond the previous maximum of 120 m
84	719	219.2	78	80	79.0	140.2	150	Yes	East Bayfront, Keating Channel Precinct	An OMB decision for 143 Lakeshore Boulevard East increased heights beyond the previous maximum of 120 m
85	557	169.8	76	78	77.0	92.8	150	Yes	East Bayfront, Villiers Island Precinct	An OMB decision for 143 Lakeshore Boulevard East increased heights beyond the previous maximum of 120 m
92	790	240.8	77	80	78.5	162.3	125	No	West Don Lands Precinct, Keating Channel Precinct	A maximum of 78 m is proposed in the West Don Lands Precinct and 125 m in the Keating Channel Precinct
93	766	233.5	78	80	79.0	154.5	125	No	Keating Channel Precinct, Villiers Island Precinct	A maximum of 125 m is proposed in the Keating Channel Precinct; a maximum of 29 storeys has been proposed for Villiers Island
94	631	192.3	77	78	77.5	114.8	90	No	Villiers Island Precinct, Port Lands	No maximum building heights proposed to date in the Port Lands; a maximum of 29 storeys has been proposed for Villiers Island
95	603	183.8	77	78	77.5	106.3		No	Port Lands	No maximum building heights proposed to date
101	832	253.6	78	80	79.0	174.6	125	No	Keating Channel Precinct, Port Lands	A maximum of 125 m is proposed in the Keating Channel Precinct; no maximum buildings heights proposed to date in the Port Lands
102	813	247.8	78	81	79.5	168.3	90	No	Villiers Island Precinct, Port Lands	No maximum building heights proposed to date in the Port Lands; a maximum of 29 storeys has been proposed for Villiers Island
103	718	218.8	77	81	79.0	139.8		No	Port Lands, Lake Ontario Park	No maximum building heights proposed to date
104	700	213.4	77	79	78.0	135.4		No	Port Lands, Lake Ontario Park	No maximum building heights proposed to date
110	878	267.6	77	80	78.5	189.1		No	Port Lands	No maximum building heights proposed to date
111	855	260.6	77	81	79.0	181.6		No	Port Lands	No maximum building heights proposed to date
112	808	246.3	76	80	78.0	168.3		No	Port Lands, Lake Ontario Park	No maximum building heights proposed to date
113	812	247.5	76	77	76.5	171.0		No	Lake Ontario Park	No maximum building heights proposed to date
119	926	282.2	78	80	79.0	203.2		No	Port Lands	No maximum building heights proposed to date
120	908	276.8	78	80	79.0	197.8		No	Port Lands, Lake Ontario Park	No maximum building heights proposed to date
121	892	271.9	78	79	78.5	193.4		No	Lake Ontario Park	No maximum building heights proposed to date

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Appendix C-8

Archaeology and Cultural Heritage Effects Assessment

- Terrestrial Stage 1 Archaeological Assessment Report
- Marine Stage 1 Archaeological Assessment Report
- Cultural Heritage Resources Review

Environment

PortsToronto

Stage 1 Archaeological Assessment

Environmental Assessment of a Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport

Geographic Township of York South West, Toronto Islands, City of Toronto, York County, Ontario

Licensee: **Samantha Markham**
License: **P438**
PIF Number: **P438-0011-2014**

Prepared by:

AECOM
410 – 250 York Street, Citi Plaza
London, ON, Canada N6A 6K2
www.aecom.com

519 673 0510 tel
519 673 5975 fax

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Revision #	Revised By	Date	Issue / Revision Description

AECOM Signatures

Report Prepared By:

Jennifer Morgan, PhD
Archaeology Field and Lab Technician

Report Reviewed By:

Adria Grant, BA, CAHP
Archaeology Practice Lead

Executive Summary

AECOM Canada Ltd. (AECOM) was retained by PortsToronto to conduct a Stage 1 archaeological assessment for the proposed extension of the land mass at each end of the main runway of the Billy Bishop Toronto City Airport (BBTCA) by 200 metres. The BBTCA is located on the Toronto Islands, adjacent the Toronto Waterfront, within the Geographic Township of York South West, City of Toronto, York County, Ontario (Figure 1). The BBTCA study area consists of the areas which may be physically affected by the extension of the land mass at each end of the main runway by 200 metres (Figure 2). As the proposed development impacts both land and lakebed, both a terrestrial and marine archaeological assessment has been undertaken. The Stage 1 archaeological assessment has been split into two separate reports, a terrestrial and a marine archaeological report. This report refers to the terrestrial archaeological assessment only and a separate marine report has also been completed by AECOM (2015).

PortsToronto operates the BBTCA under the conditions of an agreement called the Tripartite Agreement which was originally drafted and signed in 1983 by the City of Toronto, Transport Canada and PortsToronto. The Tripartite Agreement details the conditions under which the BBTCA operates; such as the flight curfew, the noise limitations, the prohibition of the use of jet aircraft, the prohibition against any lengthening of the operational portion of the runway and the rights and responsibilities of each signatory. Without the consensus of all three signatories, no changes can be made to the Tripartite Agreement.

In 2013, Porter Airlines submitted a proposal to the City of Toronto, copying PortsToronto, requesting to introduce jet aircraft at the BBTCA. Part of this proposal included an extension of the land mass at each end of the main runway in order to lengthen the operational portion of the runway to accommodate the use of the requested jet aircraft for scheduled flight operations. As the Tripartite Agreement does not allow the use of jet aircraft for scheduled commercial travel or the lengthening of the operational portion of the runway, the terms of the Tripartite Agreement would need to be amended to approve Porter's proposal. In 2013 the City of Toronto undertook a review of the potential impacts of Porter's Proposal, which were presented to the public and to Toronto City Council in late 2013 and early 2014. In consideration of the outcome of the City's review and concerns raised by some members of the community regarding existing airport operations, and prior to entering into negotiations to amend the Tripartite Agreement, the City of Toronto, in an April 1, 2014, City of Toronto Council resolution, requested, in part, that further study and analysis of the effects of jet aircraft at the BBTCA and associated mitigation measures be completed. Although not subject to the requirements of the provincial or federal Environmental Assessment processes, PortsToronto is undertaking this EA at the request of the City of Toronto to identify the effects of the proposed changes on the surrounding environment and to inform their position related to the proposal.

Should it be decided not to proceed with the land mass extension for the purpose of scheduled jet aircraft operations, the land mass may still be extended on both ends to accommodate a Runway End Safety Area (RESA). The RESA is a level graded area which extends beyond the runway threshold to provide an additional measure of safety in the event of an aircraft undershooting or overrunning the runway. RESAs are required where the runway length exceeds 1,200 meters or where a runway is utilized by scheduled passenger operations utilizing aircraft with more than nine seats.

In 2010, Transport Canada identified the requirement to implement a RESA at qualifying airports as an additional safety consideration. The installation of a RESA at the BBTCA would result in an amendment to the Tripartite Agreement (WSP Group, 2014), but will be required to comply with Transport Canada regulations. The RESA at the BBTCA would consist of a land mass extension at both ends of the main runway which includes lakefilling in the Toronto Harbour within the Marine Exclusion Zone (MEZ). Although not required under the CEAA, an EA report for lakefilling in the area where the RESA will be required, "Lakefill within Marine Exclusion Zone

(Keep-out-Area) Toronto Harbour", was completed in January, 2013 (Dillon Consulting, 2013). It is assumed that the RESA would be contained within the construction disturbance area studied as part of this Stage 1 archaeological assessment and as such, a separate archaeological assessment for the RESA would not be required.

The proposed land mass extensions will impact part of Toronto Island that was created in the 1930s. Additionally, the areas identified as retaining archaeological potential that exist within the study area are currently located under existing airport runways and tarmac and do not retain any archaeological potential. Therefore, the study area lands above water do not retain any potential for archaeological resources and **no further archaeological assessment is recommended.**

The MTCS is asked to accept this report into the Ontario Public Register of Archaeological Reports thereby concurring with the recommendations presented herein.

Project Personnel

Project Director Environment,	Paul Murray, Senior Vice-President/Region Business Line Leader,
Project Manager	Leah Weller, Senior Environmental Planner
Technical Lead	Adria Grant, BA, CAHP (R131)
Licensed Archaeologist	Samantha Markham, MES (P438)
Report Production	Erik Phaneuf, MSc (P393), Jennifer Morgan, PhD, Samantha Markham, MES (P438)
Report Review	Adria Grant, BA, CAHP (R131)
Office Assistance	Chantelle Mills
GIS Analyst	Adam Spargo, BSc, Ben Clark, BAA

Acknowledgements

Proponent Contact	Ken Lundy, PortsToronto
Approval Authority	Sarah Eddy, Fisheries and Oceans Canada
Ministry of Tourism, Culture and Sport	Robert von Bitter, Archaeological Data Coordinator Archaeological Review Officer

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1. Project Context

1.1 Development Context

AECOM Canada Ltd. (AECOM) was retained by PortsToronto to conduct a Stage 1 archaeological assessment for the proposed extension of the land mass at each end of the main runway of the Billy Bishop Toronto City Airport (BBTCA) by 200 metres. The BBTCA is located on the Toronto Islands, adjacent the Toronto Waterfront, within the Geographic Township of York South West, City of Toronto, York County, Ontario (Figure 1). The BBTCA study area consists of the areas which may be physically affected by the extension of the land mass at each end of the main runway by 200 metres (Figure 2). As the proposed development impacts both land and lakebed, both a terrestrial and marine archaeological assessment has been undertaken. The Stage 1 archaeological assessment has been split into two separate reports, a terrestrial and a marine archaeological report. This report refers to the terrestrial archaeological assessment only and a separate marine report, under license Number 2015-16 has also been completed by AECOM (2015).

PortsToronto operates the BBTCA under the conditions of an agreement called the Tripartite Agreement which was originally drafted and signed in 1983 by the City of Toronto, Transport Canada and PortsToronto. The Tripartite Agreement details the conditions under which the BBTCA operates; such as the flight curfew, the noise limitations, the prohibition of the use of jet aircraft, the prohibition against any lengthening of the operational portion of the runway and the rights and responsibilities of each signatory. Without the consensus of all three signatories, no changes can be made to the Tripartite Agreement.

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lakefilling in the Toronto Harbour within the Marine Exclusion Zone (MEZ). Although not required under the CEAA, an EA report for lakefilling in the area where the RESA will be required, "Lakefill within Marine Exclusion Zone (Keep-out-Area) Toronto Harbour", was completed in January, 2013 (Dillon Consulting, 2013). It is assumed that the RESA would be contained within the construction disturbance area studied as part of this Stage 1 archaeological assessment and as such, a separate archaeological assessment for the RESA would not be required.

1.1.1 Objectives

The Stage 1 archaeological assessment has been conducted to meet the requirements of the MTCS's *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). The objective of the Stage 1 background study is to document the archaeological and land use history and present conditions of the study area. This information will be used to support recommendations regarding cultural heritage value or interest as well as assessment and mitigation strategies. The Stage 1 research information will be drawn from:

- MTCS's Archaeological Sites Database (ASDB) for a listing of registered archaeological sites within a 1 kilometre (km) radius of the study area;
- Reports of previous archaeological assessment within 50 m of the study area;
- Recent and historical maps of the study area; and
- Archaeological management plans or other archaeological potential mapping when available.

1.2 Historical Context

The study area is situated immediately across from the southern edge of the City of Toronto Waterfront (Figure 1 and **Error! Reference source not found.**). Previous archaeological and historical studies have resulted in a wealth of information regarding human settlement in the area; the following sections provide information on the types of settlement that has occurred here over the years.

1.2.1 Pre-Contact Aboriginal Settlement

It has been demonstrated that pre-contact Aboriginal peoples began occupying York County as the glaciers receded from the land, as early as 11,000 B.C. Table 1 provides a breakdown of the cultural and temporal history of the past occupations in York County.

Table 1: Cultural Chronology for York County

Archaeological Period	Characteristics	Time Period	Comments
Early Paleo-Indian	Fluted Points	9000-8400 BC	Arctic tundra and spruce parkland, caribou hunters
Late Paleo-Indian	Holcombe, Hi-Lo and Lanceolate Points	8400-8000 BC	Slight reduction in territory size
Early Archaic	Notched and Bifurcate base Points	8000-6000 BC	Growing populations
Middle Archaic	Stemmed and Brewerton Points, Laurentian Development	6000-2500 BC	Increasing regionalization
Late Archaic	Narrow Point	2000-1800 BC	Environment similar to present
	Broad Point	1800-1500 BC	Large lithic tools
	Small Point	1500-1100 BC	Introduction of bow

Terminal Archaic	Hind Points, Glacial Kame Complex	1100-950 BC	Earliest true cemeteries
Early Woodland	Meadowood Points	950-400 BC	Introduction of pottery
Middle Woodland	Dentate/Pseudo-scallop Ceramics	400 BC – AD 500	Increased sedentism
	Princess Point	AD 550-900	Introduction of corn horticulture
Late Woodland	Early Ontario Iroquoian	AD 900-1300	Agricultural villages
	Middle Ontario Iroquoian	AD 1300-1400	Increased longhouse sizes
	Late Ontario Iroquoian	AD 1400-1650	Early written records and treaties
Contact Aboriginal	Various Algonkian and Iroquoian Groups	AD 1600-1875	Early written records and treaties
Euro-Canadian	French and English Euro-Canadian	AD 1749-present	European settlement

Note: taken from Ellis and Ferris, 1990

As Chapman and Putnam (1984) illustrate, the modern physiography of southern Ontario is largely a product of events of the last major glacial stage and the landscape is a complex mosaic of features and deposits produced during the last series of glacial retreats and advances prior to the withdrawal of the continental glaciers from the area. Southern Ontario was finally ice free 12,500 years ago. With continuing ice retreat and lake regressions, the terrestrial area of southern Ontario progressively increased while barriers to the influx of plants and animals steadily diminished (Karrow and Warner, 1990).

The first human settlement can be traced back 11,000 years; these earliest well-documented groups are referred to as Paleo-Indians which literally means old or ancient Indians. Paleo-Indian people were non-agriculturalists who depended on hunting and gathering of wild food stuffs, they would have moved their encampments on a regular basis to be in the locations where these resources naturally became available and the size of the groups occupying any particular location would vary depending on the nature and size of the available food resources (Ellis and Deller, 1990). The picture that has emerged for early and late Paleo-Indian people is of groups at low population densities who were residentially mobile and made use of large territories during annual cycles of resource exploitation (Ellis and Deller, 1990).

The next major cultural period following the Paleo-Indian is termed the Archaic, which is broken temporally into the Early, Middle and Late. There is much debate on how the term Archaic is employed; general practice bases the designation off assemblage content as there are marked differences in artifact suites from the preceding Paleo-Indian and subsequent Woodland periods. As Ellis et al. (1990) note, from an artifact and site characteristic perspective, the Archaic is simply used to refer to non-Paleo-Indian manifestations that pre-date the introduction of ceramics. Throughout the Archaic period, the natural environment warmed and vegetation changed from closed conifer-dominated vegetation cover, to mixed coniferous and deciduous forest, to the mixed coniferous and deciduous forest in the north and deciduous vegetation in the south (Ellis et al., 1900). During the Archaic period there are indications of increasing populations and decreasing size of territories exploited during annual rounds; fewer moves of residential camps throughout the year and longer occupations at seasonal campsites; continuous use of certain locations on a seasonal basis over many years; increasing attention to ritual associated with the deceased; and, long range exchange and trade systems for the purpose of obtaining valued and geographically localized resources (Ellis et al., 1990).

In the 17th century two major language families, Algonquian and Iroquoian were represented by the diverse people of North America. Iroquoian speaking people were found in southern Ontario and New York State, with related dialects spoken in the mid-Atlantic and interior North Carolina; while Algonquian speaking peoples were located along the mid-Atlantic coast into the Maritimes, throughout the Canadian Shield of Ontario and Quebec and much of the

central Great Lakes region (Ellis et al 1990). Linguists and anthropologists have attempted to trace the origin and development of these two language groups and usually place their genesis during the Archaic period (Ellis et al., 1990).

The Early Woodland period is distinguished from the Late Archaic period primarily by the addition of ceramic technology, which provides a useful demarcation point for archaeologists but is expected to have made less difference in the lives of the Early Woodland peoples. The settlement and subsistence patterns of Early Woodland people shows much continuity with the earlier Archaic with seasonal camps occupied to exploit specific natural resources (Spence et al., 1990). During the Middle Woodland period, well-defined territories containing several key environmental zones were exploited over the yearly subsistence cycle. Large sites with structures and substantial middens appear in the Middle Woodland period associated with spring macro-band occupations focussed on utilizing fish resources and created by consistent returns to the same site (Spence et al., 1990). Groups would come together into large macro-bands during the spring-summer at lakeshore or marshland areas to take advantage of spawning fish; whereas, in the fall, inland sand plains and river valleys were occupied for deer and nut harvesting. Groups split into small micro-bands for winter survival (Spence et al., 1990). This is a departure from earlier Woodland times when macro-band aggregation is thought to have taken place in the winter (Ellis et al., 1988; Granger, 1978).

The period between the Middle and Late Woodland period was both technically and socially transitional for the ethnically diverse populations of southern Ontario and these developments laid the basis for the emergence of settled villages and agriculturally based lifestyles (Fox, 1990). The Late Woodland period began with a shift in settlement and subsistence patterns involving an increasing reliance on corn horticulture. Corn may have been introduced into Southwestern Ontario from the American Midwest as early as 600 A.D; however, it did not become a dietary staple until three to four hundred years later. The first agricultural villages in southwestern Ontario date to the 10th century A.D. Unlike the riverine base camps of the Middle Woodland period, these sites are located in the uplands, on well-drained sandy soils. Categorized as "Early Ontario Iroquoian" (900-1300 A.D.), many archaeologists believe that it is possible to trace a direct line from the Iroquoian groups which inhabited Southwestern Ontario at the time of first European contact, to these early villagers.

Village sites dating between 900 and 1300 A.D. share many attributes with the historically reported Iroquoian sites, including the presence of longhouses and sometimes palisades; however, these early longhouses were actually not all that large, averaging only 12.4 metres in length. It is also quite common to find the outlines of overlapping house structures, suggesting that these villages were occupied long enough to necessitate re-building. The Jesuits reported that the Huron moved their villages once every 10-15 years, when the nearby soils had been depleted by farming and conveniently-collected firewood grew scarce. It seems likely that Early Ontario Iroquoians occupied their villages for considerably longer, as they relied less heavily on corn than did later groups, and their villages were much smaller, placing less demand on nearby resources.

Judging by the presence of carbonized corn kernels and cob fragments recovered from sub-floor storage pits, agriculture was becoming a vital part of the Early Ontario Iroquoian economy; however, it had not reached the level of importance it would in the Middle and Late Ontario Iroquoian periods. There is ample evidence to suggest that more traditional resources continued to be exploited and comprised a large part of the subsistence economy. Seasonally occupied special purpose sites relating to deer procurement, nut collection, and fishing activities, have all been identified. While beans are known to have been cultivated later in the Late Woodland period, they have yet to be identified on Early Ontario Iroquoian sites. The Middle Ontario Iroquoian period (1300-1400 AD) witnessed several interesting developments in terms of settlement patterns and artifact assemblages. Changes in ceramic styles have been carefully documented, allowing the placement of sites in the first or second half of this 100-year period. Moreover, villages, which averaged approximately 0.6 hectares in extent during the Early Ontario Iroquoian period now consistently range between one and two hectares.

House lengths also changed dramatically, more than doubling to an average of 30 m, while houses of up to 45 m have been documented. This radical increase in longhouse length has been variously interpreted. The simplest possibility is that increased house length is the result of a gradual, natural increase in population; however, this does not account for the sudden shift in longhouse lengths around 1300 A.D. Other possible explanations involve changes in economic and socio-political organization. One suggestion is that during the Middle Ontario Iroquoian period, small villages were amalgamating to form larger communities for mutual defense. If this was the case, the more successful military leaders may have been able to absorb some of the smaller family groups into their households, thereby requiring longer structures. This hypothesis draws support from the fact that some sites had up to seven rows of palisades, indicating at least an occasional need for strong defensive measures; although, there are other Middle Ontario Iroquoian villages which had no palisades present.

The lay-out of houses within villages also changes dramatically by 1300 A.D. During the Early Ontario Iroquoian period, villages were haphazardly planned with houses oriented in various directions. During the Middle Ontario Iroquoian period, villages were organized into two or more discrete groups of tightly spaced, parallel aligned, longhouses. It has been suggested that this change in village organization may indicate the initial development of the clans which were a characteristic of the historically known Iroquoian peoples.

Initially, the Late Ontario Iroquoian period (1400-1650 A.D.) continued many of the trends which have been documented for the proceeding century. For instance, between 1400 and 1450 A.D., house lengths continued to grow, reaching an average length of 62 metres. One longhouse excavated on a site southwest of Kitchener stretched an incredible 123 metres. After 1450 A.D., house lengths begin to decrease, with houses dating between 1500-1580 A.D. averaging only 30 metres in length. Why house lengths decrease after 1450 A.D. is poorly understood; although it is believed that the even shorter houses witnessed on historic period sites can be at least partially attributed to the population reductions associated with the introduction of European diseases such as smallpox.

Village size also continues to expand throughout the Late Ontario Iroquoian period, with many of the larger villages showing signs of periodic expansions. The Late Middle Ontario Iroquoian period and the first century of the Late Ontario Iroquoian period was a time of village amalgamation. One large village situated just north of Toronto has been shown to have expanded on no fewer than five occasions. These large villages were often heavily defended with numerous rows of wooden palisades, suggesting that defence may have been one of the rationales for smaller groups banding together.

Archaeologists are able to trace archaeologically known groups from this time period to the historically documented people identified when French fur traders first arrived (Wright, 1994). The Ontario Iroquois from southern Ontario gave rise to the Huron, Petun, Neutral and Erie; the St. Lawrence Iroquois, a distinct population encountered by Jaques Cartier in 1535 that had disappeared by the time Samuel de Champlain returned to the same area in 1603; and from Northern Ontario the groups that gave rise to the Algonquian speaking Cree, Ojibwa and Algonquin people (Wright, 1994).

1.2.2 Post-Contact Aboriginal and Euro-Canadian Settlement

The post-contact Aboriginal occupation of southern Ontario was heavily influenced by the dispersal of Iroquoian speaking peoples, such as the Huron, Petun and Neutral by the New York State Confederacy of Iroquois, who had main settlements near the mouths of the Humber and Rouge Rivers. This dispersal was followed by the arrival of the Mississaugas, an Alonquian speaking people, who are known to have moved into southern Ontario and the Great Lakes watersheds (Konrad, 1981), while at the same time the members of the Three Fires Confederacy, the Chippewa, Ottawa and Potawatomi were immigrating from Ohio and Michigan (Feest and Feest, 1978).

As European settlers encroached on their territory, the nature of Aboriginal population distribution, settlement size, and material culture changed. Despite these changes it is possible to correlate historically recorded villages with archaeological manifestations and the similarity of those sites to more ancient sites reveals an antiquity to documented cultural expressions that confirms a long historical continuity to Iroquoian systems of ideology and thought (Ferris, 1009). First Nations people of southern Ontario have left behind archaeological resources throughout the Great Lakes region that show continuity with past peoples even if this was not recorded in Euro-Canadian documentation.

The study area falls within a portion of Ontario that was purchased by the Crown on September 23, 1787. The Toronto Purchase involved the surrender of 101,498 ha of land along Lake Ontario, which was to become York County, from the Mississaugas of New Credit to the British Crown (Figure 3). A revision to the 1787 Toronto Purchase was made in 1805 and both the 1787 Purchase and the 1805 revision were registered as Treaty No. 13 on August 1, 1805 (Figure 4).

Although the Toronto Islands were not a part of the original 1787 Purchase, the Crown included them in the 1805 revision (Morris, 1943; Smith, 1987). Treaty No. 13 was made between the Principal Chiefs, warriors, and People of the Mississauga New Credit First Nation and William Claus, Esquire, Deputy Superintendent General and Deputy Inspector General of Indians and their affairs, on behalf of King George the Third, His heirs, and successors (AANDC, 2013). Sir John Johnson, the Chief Superintendent of Indian affairs at the time, described the Toronto Purchase as:

> …all that tract or parcel of land commencing on the east bank of the south outlet of the River Etobicoke; thence up same, following the several windings and turning of the said river to a maple tree blazed on four sides at the distance of three miles and three-quarters, in a straight line from the mouth of the said river; thence north twenty-two degrees west twenty-four miles and one-quarter; then north sixty-eight degrees east fourteen miles; then south twenty-two degrees east twenty-eight miles, more or less, to Lake Ontario; then westerly along the water's edge of Lake Ontario to the eastern bank of the south outlet of the River Etobicoke, being the place of beginning, containing Two hundred and fifty thousand, eight hundred and eight acres, together with all the woods and waters thereon, lying and being and all the advantages, emoluments and hereditaments whatsoever to the said tract or parcel of land belonging or in anyways appertaining and the issue and profits of all and singular the said premises and every part and parcel thereof with the appartenances.
>
> AANDC, 2013

The land was purchased for the sum of ten shillings and several barrels of goods including gun flints, rum, mirrors, kettles, and laced hats. At the time, the Mississaugas believed that the agreement was not a purchase which would extinguish their rights to the land, but rather a rental of the lands for British use in exchange for gifts in perpetuity (Smith, 1987).

The Mississaugas of the New Credit First Nation considered the Toronto Islands as sacred land and documentation from early Euro-Canadian settlers suggests that many First Nations campsites were located between the base of the island peninsula and the Don River confluence. This indicates that there was extensive use of the Toronto Islands and surrounding shorelines by pre- and post-contact Aboriginal peoples. The sheltered harbour formed by the Toronto Islands peninsula created an ideal location for the set-up of temporary encampments across the northern shorelines of Lake Ontario as well as the Toronto Islands as part of important trade routes that linked the Great Lakes (Smith, 1987).

In 1986, the Mississaugas of the New Credit First Nation, who currently reside in Hagersville, Ontario, submitted the Toronto Purchase Specific Claim based on the 1805 revisions to the original Toronto Purchase that led to the unlawful surrender of lands covering most of present-day Toronto. The First Nation was able to successfully argue that the British Crown took more land than was indicated in the 1787 Purchase and had not indicated in the 1805 agreement that the revisions covered a much greater area than the original transaction. On October 8, 2010, the Government of Canada agreed to provide compensation to the Mississaugas of the New Credit First Nation for the land dispute in the amount of $145,000,000 (Edwards, 2010).

1.2.3 Euro-Canadian Settlement

French traders had established a modest presence at Toronto by the early 1700s. Competition with the British for control of the fur trade resulted in the founding of Fort Rouillé (also known as Fort Toronto) on the current Exhibition grounds in 1750, approximately 5 km east of the Humber River. After being defeated by the British during the Seven Years War (1756-1753), Fort Rouillé was burned and abandoned by the French in 1759. During the American Revolutionary War (1774-1783), the region saw an influx of British settlers as United Empire Loyalists fled for the unsettled lands north of Lake Ontario (Careless, 1984).

Establishment of the Town of York

At the conclusion of the American Revolutionary War, the British were forced to contend with the emergence of a new political frontier, which had to be maintained by a strong military presence. The increasing military presence led to the founding of both the Town of York and Fort York, a military establishment further to the west at the mouth of Garrison Creek in 1793. Fort York, also known as the Garrison of York, was intended to monitor and control entry into York's harbour (Careless, 1984). Figure 5 illustrates the locations of the Town of York and the Garrison of York on Bouchette's 1815 map of the Plan of York Harbour, adapted from the original 1793 survey mapping.

The Town of York was a relatively compact plot of land contained within present-day Front, George, Berkeley, and Duke Streets. The initial survey of York Township was completed by Augustus Jones in 1791, who divided the lands into East and West York, with Yonge Street being the dividing line. The concessions, which run north-south, are numbered east and west from Yonge Street with East York comprising four concessions and West York comprising seven. Early lot and concession lines can vaguely be seen in the 1815 Plan of York surveyed and drawn by Lieutenant George Phillpots of the Royal Engineers. It should be noted that the location of these lines may not be accurate as mapping done by the Royal Engineers was focused on military defense and lacked the detail observed in civilian surveyor maps.

Although settlement in the Toronto area was limited at this time, the very first parliament buildings were constructed for the colonial government of Upper Canada between 1794 and 1797 and were located south of present-day Front Street and west of Parliament Street (Careless, 1984; ASI, 2003). The growth and development of the Town of York continued throughout the early 19th century, expanding inland to present-day Queen Street by the 1830s, with additional lots having been added as far north as Bloor Street. By the 1840s and 1850s, the Town of York had grown substantially. Browne's 1851 map of the Township of York illustrates the division of lots and concessions and the development of the Town of York including the Parliament Buildings, City Hall, the University of Toronto, the Royal Observatory, the village of Yorkville, as well as Fort York and the new military Fort constructed to the southwest in 1842 (Figure 6).

Early Industry and Development of the York Waterfront

While the Town of York continued to grow throughout the early 19th century, use of the waterfront remained dominated by commercial, military, and transportation uses. Several commercial wharves and piers had been constructed along the shoreline to the east of John Street by 1841 and, to the west of John Street, the military dominated the waterfront with the development of the Navy, King's, Queen's, and Commissariat Wharves (Historica Research Ltd., 1989). By 1842, seven piers had been constructed along the Toronto shoreline. Into the second half of the 19th century, both commercial and industrial development of Toronto's waterfront intensified and several large factories were established, including the Gooderham and Worts Distillery and the associated Gooderham Wharf (Historica Research Ltd. 1989; ASI 2003). A portion of Browne's 1851 map of the Township of York illustrates this growth and development along the Toronto waterfront (Figure 6).

The waterfront was drastically changed in the 1850s when Toronto saw the arrival of the Northern, Great Western, and Grand Trunk railways which followed the shoreline and resulted in the development of trackways, railway terminals, freight stations, and additional wharves. Between 1850 and 1870, Toronto's waterfront formed the centre of rail operations for Canada's historic and present-day railways. The arrival of the Northern Railway in 1853 was quickly followed by that of the Grand Trunk and the Great Western Railways in 1855. In 1853, the Northern Railway developed freight handling facilities that were developed on lands created by harbor lake fill in order to link the railway to existing water transportation facilities. This was the first waterfront development to engage in the filling of Toronto's harbor; a process that would continue well into the 20th century (Historica Research Ltd., 1989). Tremaine's 1860 map of the County of York illustrates the location of these railways along the Toronto waterfront shoreline (Figure 7).

The lake-filling operations carried out along Toronto's waterfront intensified throughout the mid to late 19th century and the shoreline between present-day Bathurst and Parliament Streets was significantly altered by leveling and filling conducted for the development of railway right-of-ways. Lake-filling generally consisted of the "crib and fill" technique which involved the placement of timber cribbing around the perimeter of the area to be filled. The fill used during the early stages of waterfront expansion included municipal waste, sewage, and material dredged from the harbor bottom (Historica Research Ltd., 1989; ASI, 2003).

The city's shoreline continued to evolve and develop through the late 19th and early 20th centuries as rail systems consolidated and industrial and commercial operations along the waterfront continued to grow. As a result, increasing areas along the shoreline were filled, including large areas for the construction of Lake Street and at the foot of York Street in 1893. Between 1886 and 1909, Toronto Island became a focus for development (Reeves, 1992).

The Toronto Island and Billy Bishop Toronto City Airport

The Toronto Island was formed by the confluence of easterly flowing sand-bearing currents, westerly winds, and the outflow from the Don River, producing an 8 km long peninsula which stretches from present-day Woodbine Avenue to Gibralter Point. The peninsula and surrounding sand-bars that now form the Toronto Islands were first surveyed in 1792 by Lieutenant Joseph Bouchette of the Royal Navy. Despite its name, Toronto Island remained a peninsula until the 1850s when a series of storms breached the peninsula at the present location of the East Gap, separating the western part of the peninsula from the mainland.

According to Gibson (1984), a lighthouse, constructed in 1809, and a variety of hotels were present on the Island after the 1830s, mostly in the narrows area on the eastern portion of the Island. The lighthouse and the Peninsula Hotel are noted on Browne's historic map from 1851 within the narrows to the east of the BBTCA study area (Figure 6); however, with the exception of the lighthouse on the southwestern tip of the Island, no other structures are noted in the historic mapping and no landowners are listed. The Peninsula Hotel is no longer visible on the 1878 Miles and Co. *Illustrated Historical Atlas of York County* and was presumably washed away during the storms of the 1850s

which transformed the narrows area into the East Gap, now known as the Eastern Channel. The lighthouse and a new Wharf, Island Wharf, are also depicted to the east of the BBTCA study area in the 1878 map. A lack of documented structures is still noted (Figure 8). Although there are no structures depicted on the island, historical atlases were funded by subscription fees and landowners who did not subscribe were not always listed on the maps nor were all structures depicted or placed accurately (Gentilcore and Head, 1984).

In the late 19th and early 20th centuries, cottages flourished along Hanlan's Point, in the vicinity of the BBTCA study area and for some time, the Island became a resort for people with means (Careless, 1984). Eventually, plans were made to create public parklands on the Island and breakwaters were constructed to protect the Island from erosion. The addition of fill and alteration to the configuration of Toronto's new island and water channels continued for many years and, perhaps most dramatically, in the 1930s. A large area at Hanlan's Point was selected for the site of a new municipal airport. A considerable amount of fill was added to the northwestern portion of the island in order to provide the necessary land for the development of the airport. In 1939, the City of Toronto opened an airport on the Island, the Port George VI Airport. The airport is now known as the Billy Bishop Toronto City Airport (BBTCA).

1.2.4 Reports with Relevant Background Information

Previously conducted archaeological research projects and assessments in the vicinity of the study area have informed the current Stage 1 archaeological assessment. Table 2 provides a list of the reports referenced as part of the background research conducted for this study.

Table 2: Related Archaeological Assessment Reports

Year	Title	Author
2003	*The Archaeological Master Plan of the Central Waterfront City of Toronto, Ontario.* File No. 00TO-07	ASI
2003	*Archaeological Assessment for the Proposed Portlands Energy Centre*	D.R. Poulton & Associates Inc.
2004	*A Master Plan of Archaeological Resources for the City of Toronto: Interim Report*	ASI
2006	*Fort York Archaeological Project*	Spittal, D (P079)

The majority of the reports listed above provide details on the archaeological and environmental assessments that have been conducted on study areas in the vicinity of the BBTCA study area. The City of Toronto Archaeological Master Plan of the Central Waterfront was prepared by Archaeological Services Inc. (ASI) in association with Historica Research Ltd. and Cuesta Systems Inc. in 2003 to ensure the identification, management, development review, and conservation of known and potential archaeological resources (ASI 2003). The primary goal of the Master Plan was to review Toronto's settlement history as it pertains to archaeological resources in order to develop an Archaeological Potential Model for the Central Waterfront area of the City of Toronto. The model identified 19 surviving zones of archaeological potential in the Central Waterfront of the City of Toronto (ASI, 2003). Two areas within the BBTCA on Toronto Island were identified as areas with archaeological potential in the Archaeological Master Plan of the Central Waterfront. These areas include portions of the original sandbar that can be inferred from the historic mapping (Figure 9). The BBTCA study area has been under extensive development since the 1930s, preceding the legislation that requires conducting an archaeological assessment and is likely extensively disturbed by lake-fill operations and other airport developments.

In 2003, D.R. Poulton & Associates (D.R. Poulton) conducted a Stage 1 archaeological assessment for the proposed Portlands Energy Centre (PEC) at the Toronto Portlands to the east of the BBTCA study area. The archaeological background study for the proposed PEC included areas located on the outer edge of the marshland complex at the Don River estuary in Ashbridges marsh, which has been extensively disturbed by lake-fill. Historic maps indicated

that the PEC site straddles the peninsula that once connected the Toronto Islands with the Lake Ontario shoreline. After reconstructing the original environment D.R. Poulton determined that part of the PEC study area retains archaeological potential for the recovery of terrestrial historic Euro-Canadian resources from the late 18th to early 20th centuries as well as pre-contact Aboriginal resources. The determination of archaeological potential was based on the areas identified in the City of Toronto's Archaeological Master Plan for the Central Waterfront (ASI, 2003). Overall, the Stage 1 assessment concluded that the survival of archaeological remains was remote given the level of disturbance and destruction involved in the filling of the Ashbridges Bay and marsh after 1914 (D.R. Poulton, 2003). D.R. Poulton (2003) concluded that no further Stage 2 archaeological assessment was required for the proposed PEC study area.

An Interim report for the Master Plan of Archaeological Resources for the City of Toronto was prepared by ASI in 2004, and the final report is currently still in production. This Master Plan will include inventories of registered and unregistered archaeological sites, an overview of the city's settlement history as it pertains to archaeological resources, the development of an archaeological potential model, and a strategy for the conservation of valuable archaeological resources. ASI (2004) reported that there are 172 registered archaeological sites within the City of Toronto and that there are a number of areas retaining archaeological potential. Although no mapping in the Interim report includes the Toronto Islands, the City of Toronto website provides archaeological potential mapping for the City, including the Toronto Islands. The areas of potential within the BBTCA property correspond with those in the Archaeological Master Plan of the Central Waterfront (Figure 9).

Numerous efforts were made to locate and review additional archaeological assessment reports for the areas surrounding the BBTCA study area, specifically the Fort York Archaeological Project; however, given the age of several archaeological studies that have been done in the area, and the lack of standardization for archaeological reporting and report preservation, these reports could not be located for review.

1.3 Archaeological Context

1.3.1 Natural Environment

The modern physiography of Southern Ontario is largely a product of events of the last major glacial stage, the Wisconsinan and Late Wisconsinan time (ca. 25,000-10,000 B.P). The landscape in York County is made up of a complex arrangement of features and deposits produced during the last series of glacial advances and retreats by the Simcoe Lobe and Ontario Lobe of the North American Laurentide ice sheet prior to the withdrawal of the glacier from Southern Ontario (Ellis and Ferris, 1990). Those features and deposits that were formed by glacial action are represented by till plains, end moraines, and drumlins.

The estimated location of the glacial Lake Iroquois is situated just north of the BBTCA study area. Based on the strength of its shorecliffs and beaches, Lake Iroquois was much longer lived than any of the earlier glacial lakes. The lake was, essentially, an enlargement of present-day Lake Ontario which was formed as a result of the glacial blockage of the St. Lawrence River. Chapman and Putnam (1984:34) provide an approximate location of the northern shoreline of Lake Iroquois based on the presence of shorecliffs, known as the Iroquois Shoreline, which runs from west to east just south of present day St. Clair Avenue West. The Scarborough Bluffs also mark the edge of the glacial lake shoreline further to the east. The Iroquois shoreline rises from 365 feet above sea level at the present city of Hamilton to 700 feet east of Stirling. Another ancient shoreline exists between 2-4 km off of the Toronto Shoreline and is known as the Toronto Scarp. The Toronto Scarp is an underwater bluff which stretches from Bluffer's Park in Scarborough to just west of the BBTCA study area at Hanlan's point. The present day City of Toronto, as well as the Toronto Islands, would have been inundated by Lake Iroquois until the glaciers withdrew from the slope at Covey Hill in Quebec, uncovering lower outlets into the Hudson Valley (Chapman and Putnam, 1984). Figure 10 illustrates the ancient shoreline of glacial Lake Iroquois.

Soon after the glaciers, glacial lakes, and seas retreated approximately 10,000 years ago, forests spread throughout Southern Ontario and through the analysis of pollen profiles vegetation associations can be determined. Table 3 provides details on the post-glacial vegetation of this part of Ontario.

Table 3: Post Glacial Vegetation History of Southern Ontario

Time (BP)	Forest Characteristics
>10 600	Open spruce forest in dwarf-shrub tundra. Spruce (Picea) dominant, with willow (Salix) and pine (Pinus); weeds: wormwood and ragweed (Ambrosia)
10 600 - 7500	Climate changing from cold to cool and dry. Open pine forest. Pine dominant, declining spruce, modestly increasing oak (Quercus).
7500 - 4700	Climate changing from cool and dry to warm and wet. Mixed coniferous-deciduous forest. Moving towards Hemlock (Tsuga) dominance, with decreasing pine, rise of bassword (Tilia) and hickory (Carya)
4700 - 3000	Decline of hemlock and rise of birch (Betula)
3000 - 150	Recovery of hemlock. Hemlock dominance, increasing beech (Fagus), elm (Ulmus) and birch; declining pine and oak.
150 - present	Deforestation stage. Post-settlement vegetation. Increasing non-arboreal (not from trees) pollen, e.g., ragweed denoting time transgressive onset of impacts of lumbering, mining, and agriculture 1880 CE: Chestnut decline 1930 CE: Elm decline

Taken from Schoch and Rowsell (2013)

By 12,500 years ago, closed black and white spruce forests were well-established in Southern Ontario and provided residence for many migratory animals such as caribou and deer (Ellis ad Ferris, 1990; Karrow and Warner, 1990). By 9,000 years ago, white pine and deciduous trees dominated the forest cover and the Toronto area was located within predominantly deciduous forest, an ecological zone described as having the most diverse forest life in Ontario. This area is characterized by a wide range of tree and shrub species, including eastern white pine, red pine, white cedar, yellow birch, sugar and red maple, basswood, red oak, black walnut, butternut, tulip, magnolia, black gum, and many types of oaks and hickories. A number of species of mammals, birds, plants, and insects reside in the deciduous forest ecosystem. In pre-contact times, these dense forests would have been particularly bountiful. It is believed that the First Nations of the Great Lakes region exploited close to 500 plant and animal species since this diverse vegetation would have served as both home and food for a wide range of game animals, including white tailed deer, wild turkey, pigeon, cottontail rabbit, elk, muskrat, and beaver (Mason, 1981:59–60). Today, relatively little of the forest cover remains standing as a result of forest clearing by early Euro-Canadian agriculturalists and the present day urban and industrial expansion of the Greater Toronto Area (MNR, 2011).

The Toronto Islands were formed in the late glacial and post glacial periods by sediment supplied to Lake Ontario from the rivers and from bluff erosion along the Scarborough Bluffs (Sharpe, 1980). This supply of sediment resulted in the formation of a sand spit extending from Ashbridge's Bay to the Toronto Islands. A considerable amount of fill has been added to the islands and waterfront since the turn of the 20th century, including the west end of the Toronto Islands to create the present-day BBTCA (Figure 11). These harbor alterations resulted in the isolation of the inner harbor from past sediment sources although significant amounts of sediment still settles within the harbor. The Don River, once a source of sediment, now empties into the Keating Channel, which is regularly dredged.

1.3.2 Known Archaeological Sites and Surveys

Background studies have indicated that York County was intensively occupied by pre-contact Aboriginal people and early Euro-Canadian settlers. A request to the ASDB was made on August 21, 2014 to determine if there were any registered archaeological sites in close proximity to the BBTCA study area. A response was received from Robert von Bitter of the MTCS on September 2, 2014 which indicated the presence of seven registered archaeological sites within 1 km of the current study area. Of the seven registered sites, there are six Euro-Canadian historic sites and one site of undetermined type. Two of these sites, CjCl Tower (AjGu-20) and Dodds (AjGu-69) are located on the Toronto Islands, but are located to the southeast of the BBTCA study area. Table 4 provides additional information on these archaeological sites.

Table 4: Archaeological Sites within 1 km of the BBTCA Study Area

Site Borden	Site Name	Site Type	Cultural Affiliation	Researcher
AjGu-20	CJCL Tower	Dump	Euro-Canadian	Donald A. Brown (1985)
AjGu-24	Furniss Water Works Wharf	Navy Wharf	Euro-Canadian (Late)	Robert Mayer (1986)
AjGu-25	1894 Landfill	Dump	Euro-Canadian (Late)	Robert Mayer (1986)
AjGu-26	Historic Fort York	Fort	Euro-Canadian; pre-contact Aboriginal	David Spittal (2006)
AjGu-32	New Fort	Fort	Euro-Canadian	N/A
AjGu-69	Dodds	N/A	N/A	N/A
AjGu-74	Queens Wharf Station	N/A	Euro-Canadian	N/A

Information concerning specific site locations is protected by provincial policy, and is not fully subject to the Freedom of Information Act. The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. The MTCS will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

Registered archaeological site CjCl Tower (AjGu-20) is located on the Toronto Islands to the southeast of the BBTCA study property, on the peninsula narrows. According to the MTCS, CjCl Tower (AjGu-20) was identified by Donald A. Brown under the archaeological license issued to Scott Hamilton in 1985. The site was documented as a Euro-Canadian dump site circa 1860-1890 and included ceramics, glass vessels, bottles, bricks, and metal which were protruding from sand dunes. The area has reverted back to marsh and scrub vegetation as part of a park area. The second site located on the Toronto Islands is the Dodds site (AjGu-69) which was registered by Charles Garrad and is the supposed (though undetermined) location of a Mississauga campsite; however, the MTCS records do not contain any specific information on the type or cultural affiliation of this site.

The remaining five archaeological sites are dotted across the Toronto waterfront shoreline to the north of the BBTCA study area and include the Furniss Water Works Wharf (AjGu-24), a Late Euro-Canadian Navy wharf site used for unloading coal from ships and protecting water mains. No artifacts were collected, but the structural remains of lake-fill cribbing were observed. These structural remains were buried under 9 m of 19th century landfill mixed with lake sediment and were severely impacted by construction excavation in 1986. Archaeological site AjGu-25, the 1894 Landfill site, was identified by Robert Mayer in 1986 as a Euro-Canadian landfill area. The site was enclosed by Esplanade cribwork likely placed for the Grand Trunk Railway. Secondary deposits of late 19th century refuse material were buried beneath 9 m of fill. The majority of this site was destroyed by the construction excavation for the SkyDome Stadium, which is now the Rogers Centre. The Historic Fort York site (AjGu-26) is located between

present-day Bathurst and Strachan Avenue on Historic Fort York Property. Three pre-contact Aboriginal artifacts were recovered (2 chert, 1 pottery) along with approximately 250,000 Euro-Canadian artifacts associated with the British military Fort. AjGu-26 is protected from development as a national historic site of Canada and is managed by the City of Toronto. MTCS records contained no further information regarding the New Fort (AjGu-32) or the Queen's Wharf Station (AjGu-74) sites.

1.3.3 Determination of Archaeological Potential

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Criteria commonly used by the Ontario MTCS (Ontario Government, 2011) to determine areas of archaeological potential include:

- Proximity to previously identified archaeological sites;
- Distance to various types of water sources;
- Soil texture and drainage;
- Glacial geomorphology, elevated topography and the general topographic variability of the area;
- Resource areas including food or medicinal plants, scarce raw materials and early Euro-Canadian industry;
- Areas of early Euro- Canadian settlement and early transportation routes;
- Properties listed on municipal register of properties designated under the *Ontario Heritage Act* (Government of Ontario, 1990b);
- Properties that local histories or informants have identified with possible archaeological sites, historical events, activities or occupants; and
- Historic landmarks or sites.

Distance to modern or ancient water sources is generally accepted as the most important element for past human settlement patterns and when considered alone may result in a determination of archaeological potential. In addition any combination of two or more of the criteria listed above, such as well drained soils or topographic variability, may indicate archaeological potential.

Certain features indicate that archaeological potential has been removed, such as land that has been subject to extensive and intensive deep land alterations that have severely damaged the integrity of any archaeological resources. This includes landscaping that involves grading below the topsoil level, building footprints, quarrying and sewage, and infrastructure development (Ontario Government, 2011).

The potential for pre-contact and contact period Aboriginal archaeological resources in the general area of the Toronto Islands is high based on the vicinity to Lake Ontario and several river systems, important thoroughfares for trade and sources of potable water. In addition, the historical documentary evidence of the first European settlers and surveyors to the area indicate the long history of occupation in the general Toronto area as well as on the Toronto Islands by First Nations people. However, it should be noted that the shifting water levels of Lake Ontario are likely to have destroyed or submerged evidence of occupations along the shoreline in the Toronto waterfront and island areas prior to ca. 3000 B.C. More significantly, the extensive land development and lake-fill operations that took place during the 19th and 20th centuries, specifically the lake-fill used to develop the BBTCA area in the 1930s, are likely to have destroyed many archaeological deposits left by the pre-contact occupations along the original shoreline. Nevertheless, pre-contact occupations prior to this time are known to have occurred in many locations

within the rest of the City of Toronto, as is noted in the Interim report for the Master Plan of Archaeological Resources for the City of Toronto.

The potential for Euro-Canadian archaeological resources in the general area is also judged to be high based off of the early settlement of the area by Euro-Canadian pioneers. The presence of historic railways and the close proximity of the study area to the mainland city of Toronto indicate early settlement and development in the surrounding area. Additionally, six registered Euro-Canadian historical sites have also been identified within 1 km of the study area, including two on the Toronto Islands. Again, the use of significant lake-fill for the development of the BBTCA in the 1930s likely removed much of the potential for the recovery of terrestrial archaeological resources within the BBTCA study area.

1.3.4 Existing Conditions

The BBTCA study area is located on the western tip of the Toronto Islands, and includes the airport runways and buildings. The City of Toronto Master Plan has designated the majority of the Toronto Islands as parklands and natural areas and this includes small parts of the southern portion of the BBTCA study area. Hanlan's Point beach and sand dune areas are limited to the section of the shoreline that extends south from the western end of the BBTCA runway. The Inner Harbour and the Western Channel surrounding the eastern and northern shorelines of the BBTCA study area are commonly used by commercial, recreational, and ferry vessels.

2. Analysis and Conclusions

2.1.1 Known Archaeological Sites

Seven registered archaeological sites are situated within 1 km of the BBTCA study area, including 2 sites on the Toronto Islands, and archaeological potential is elevated in proximity to each of these known and registered sites.

2.1.2 Natural Environment Features

The evaluation of archaeological potential based on the proximity of the study areas to water sources must take into account a number of factors. A basic example would be the difference between an accessible shoreline versus an inaccessible shoreline, as the potential for archaeological sites to be present is elevated in areas where there is easy access to water. Archaeological site locations and site types are affected in varying degrees by proximity to different types of water sources and shorelines. Primary sources of water such as lakes, rivers, streams and creeks are reliable sources of drinking water and transportation and trade routes, while secondary water sources such as seasonal streams and creeks, springs, marshes and swamps are intermittent sources of potable water. Features indicating past water sources, for example glacial lake shorelines, relic river or stream channels, and shorelines of drained lakes or marshes are archaeologically significant features that indicate archaeological potential.

Lakes, large rivers, and glacial shorelines are probably the most important foci of pre-contact settlement and indicate high archaeological potential (ASI, 2006). The BBTCA study area is located entirely on the Toronto Islands in Lake Ontario, just west of the Don River Estuary. The Islands are also in close proximity to the remnant shorelines of glacial Lake Iroquois and, although the Islands would have been completely inundated by the lake until the glaciers retreated, nearshore deposits of sand and silt laid down during the Holocene would have made the island a habitable location for pre-contact and post-contact Aboriginal people.

2.1.3 Areas of Early Euro-Canadian Settlement and Industry

Areas of early Euro-Canadian settlement are indicated on the 19th century maps and from archival research conducted during the course of the study. The earliest roads in the vicinity of the study area are Yonge Street, visible on the historic mapping as early as 1818, Queen Street, and King Street. No early roads are located within the BBTCA study area as this area consisted only of two small portions of the original sandbar until the airport lands were created by lake-fill in the 1930s.

ASI (2003) notes that several temporary 19th century York military encampments, comprising a blockhouse and a storehouse, existed in the original Gibralter Point area within the BBTCA study area; however, given the extensive disturbance to the original sandbar of Gibralter Point to construct the BBTCA, it is unlikely that any evidence of these settlements still exist. The 1809 lighthouse and the associated lighthouse keeper's cottage represent areas of potential for the recovery of Euro-Canadian resources; however, these areas fall outside of the BBTCA study area to the south. Of similar interest would be the locations of the many 19th century cottages that were noted to have populated the original peninsula sandbars within the BBTCA study area (ASI, 2003).

2.2 Conclusions

The City of Toronto's Archaeological Master Plan (ASI, 2003) illustrates areas that retain archaeological potential on the Toronto Islands, including small sections of the study area (Figure 9); however, the proposed land massland mass extensions will impact parts of the island that were constructed on artificial lakefill in the 1930s. Additionally, the areas identified as retaining archaeological potential that exist within the study area are currently located under

existing airport runways and tarmac and, therefore, do not retain any archaeological potential. Both the Central Waterfront Archaeological Master Plan of the Toronto Islands (ASI, 2003) and the Interim Report for the City of Toronto Archaeological Master Plan (ASI, 2004) indicate that there is no potential for archaeological resources in the area of proposed impact. No impacts to land based archaeological resources by the proposed undertaking are anticipated.

3. Recommendations

The proposed land mass extensions will impact part of Toronto Island that was created in the 1930s. Additionally, the areas identified as retaining archaeological potential that exist within the study area are currently located under existing airport runways and tarmac and do not retain any archaeological potential. Therefore, the study area lands above water do not retain any potential for archaeological resources and **no further archaeological assessment is recommended.**

The MTCS is asked to accept this report into the Ontario Public Register of Archaeological Reports thereby concurring with the recommendations presented herein.

4. Advice on Compliance with Legislation

This report is submitted to the Ontario Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ontario Ministry of Consumer Services.

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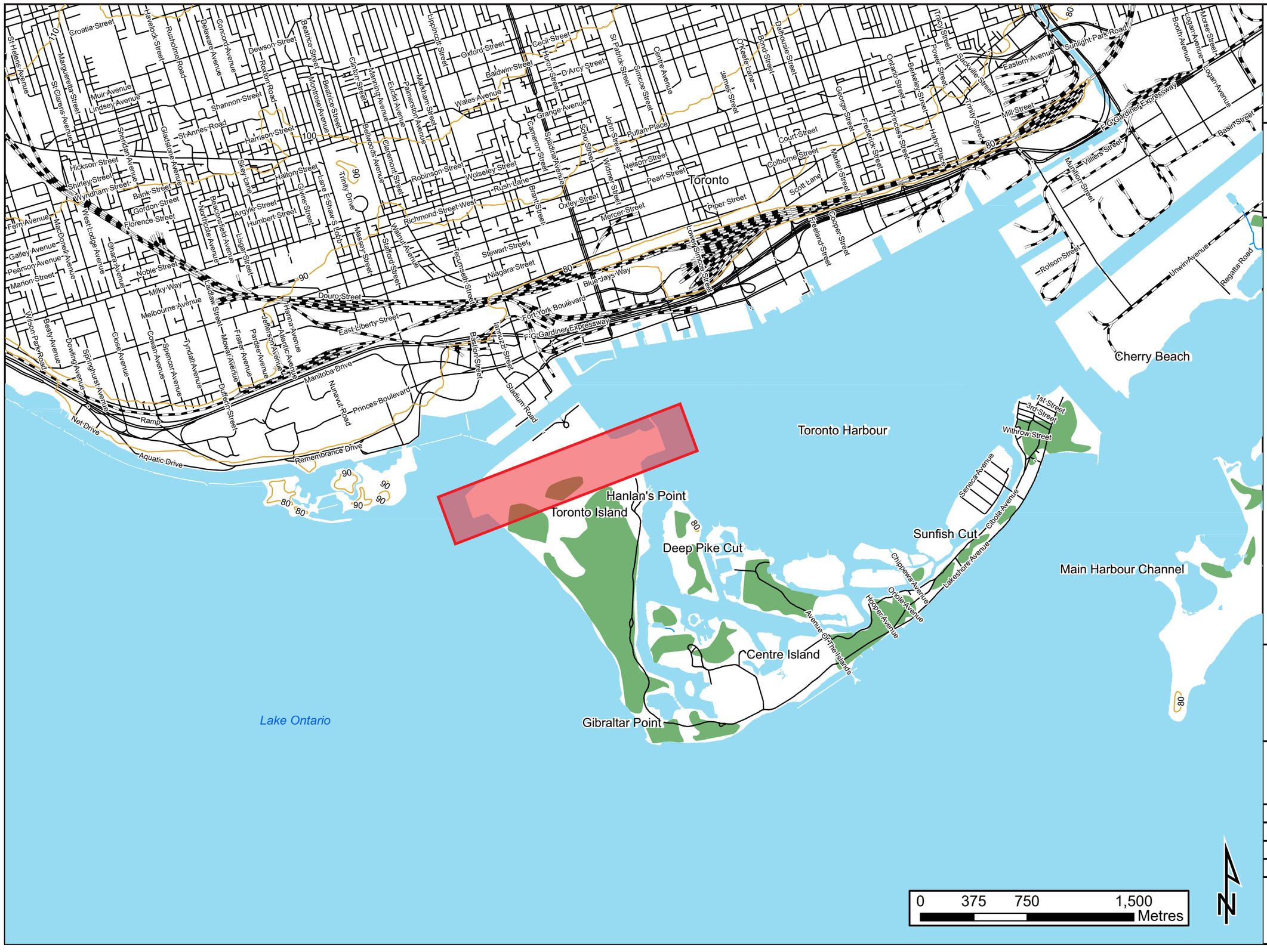
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6. Figures

All figures pertaining to the Stage 1 archaeological assessment for the areas of the land to be impacted by the proposed land mass extension at the BBTCA are provided on the following pages.



Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

- Study Area
- Wooded Area
- Water Body
- Wetland
- Aggregate Pit
- Watercourse
- Road
- Railway
- 120 Contour (5 m)

Source: OBM layers - Ministry of Natural Resources

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Figure 1:
Location of Study Area

Date: June 2015

PN: 60328546

Scale: 1:25,000

Datum: NAD 83 UTM 17N

AECOM



Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

- Study Area - Runway Extension Construction Footprint
- Proposed Runway Extension
- Existing Runway
- Roads
- Watercourse
- 190 Contour (5 m)

Source: OBM layers - Natural Resources Canada
Aerial Photo - 2013 CNES/Airbus DS, ESRI

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Figure 2:
Study Area in Detail

Date: June 2015

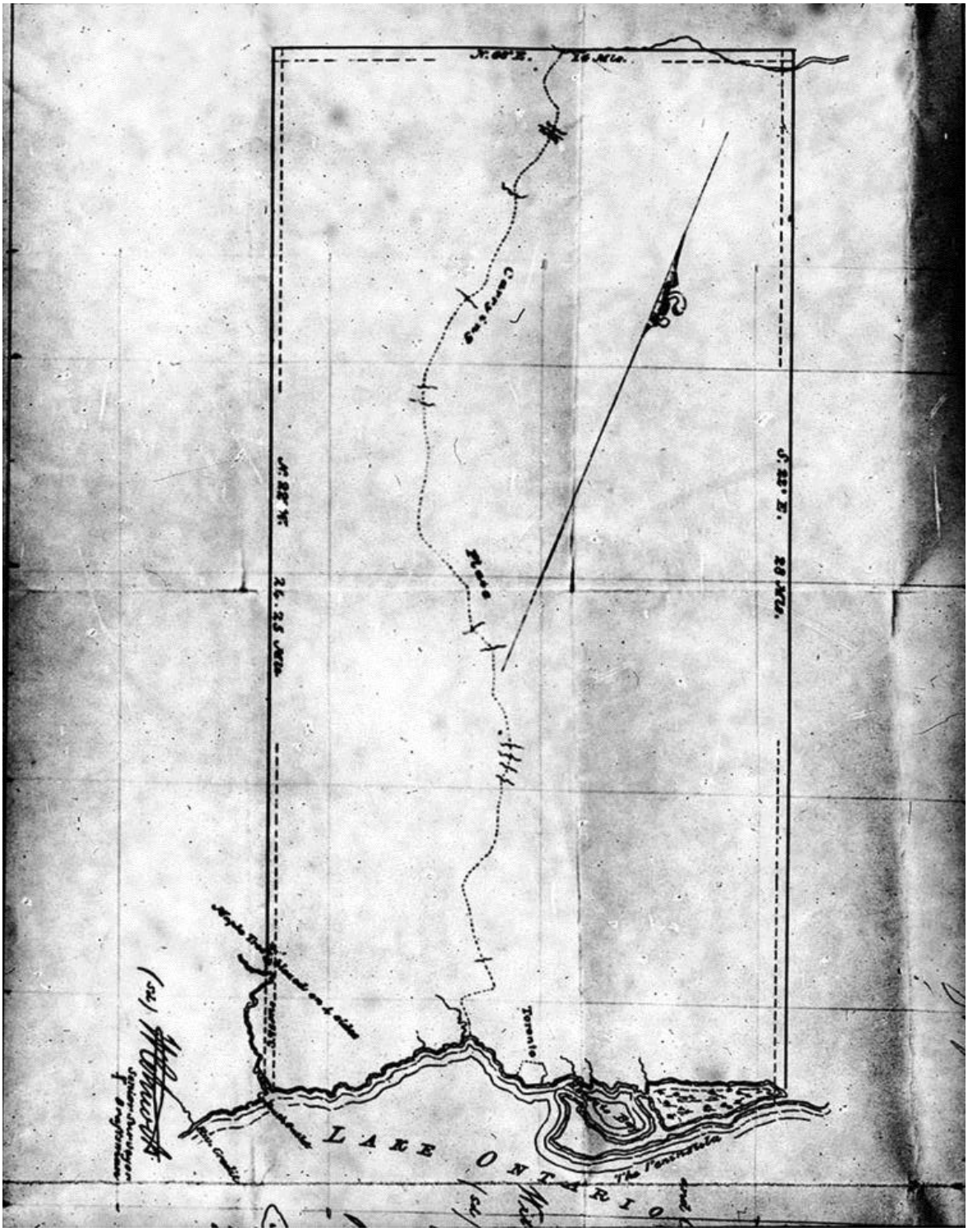
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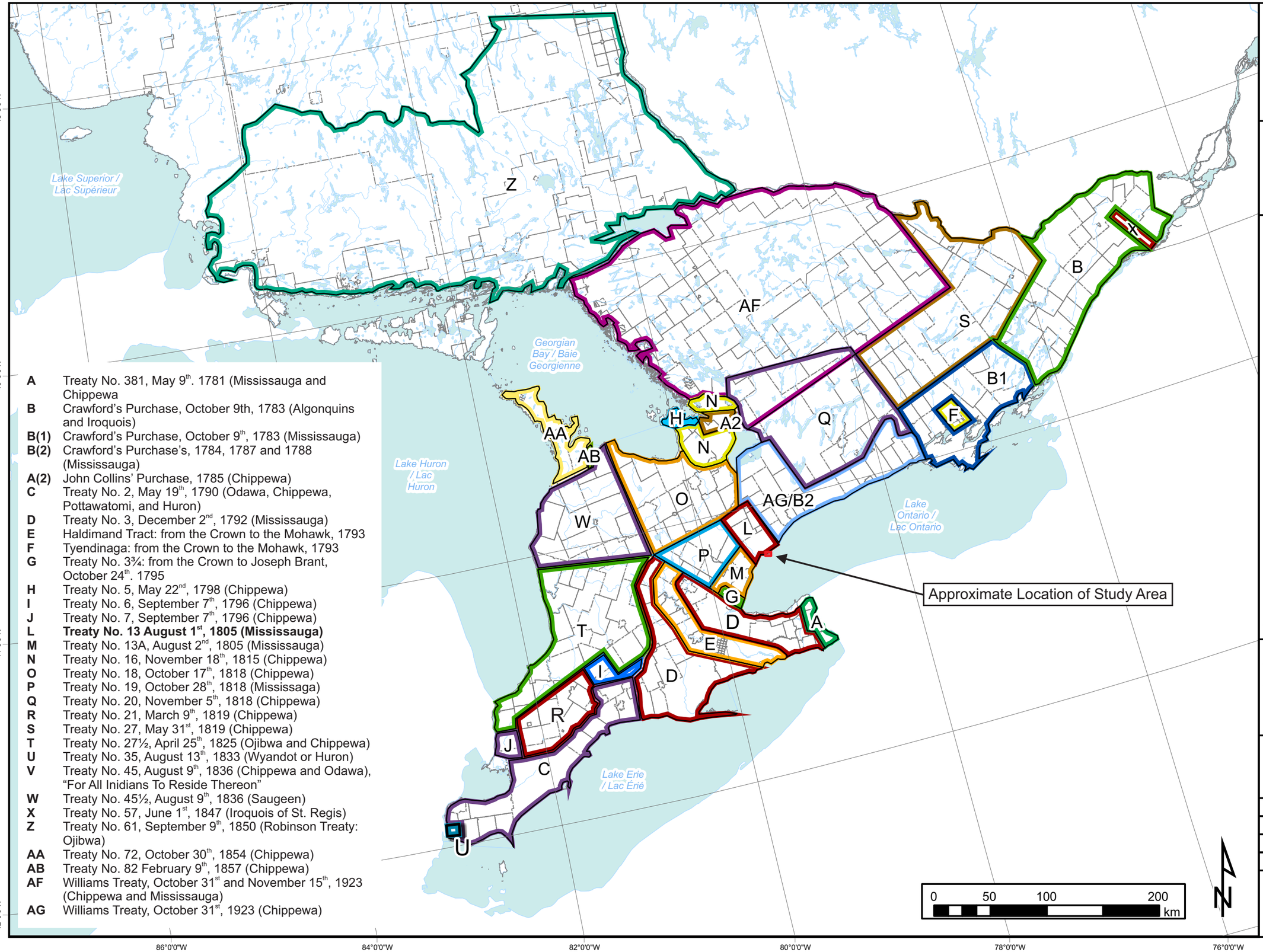
Datum: NAD 83 UTM 17N

AECOM

Figure 3: 1787 Map of the Toronto Purchase (surveyed by William Chewitt 1787-1805)



From City of Toronto Archives



A Treaty No. 381, May 9th. 1781 (Mississauga and Chippewa)
B Crawford's Purchase, October 9th, 1783 (Algonquins and Iroquois)
B(1) Crawford's Purchase, October 9th, 1783 (Mississauga)
B(2) Crawford's Purchase's, 1784, 1787 and 1788 (Mississauga)
A(2) John Collins' Purchase, 1785 (Chippewa)
C Treaty No. 2, May 19th, 1790 (Odawa, Chippewa, Pottawatomi, and Huron)
D Treaty No. 3, December 2nd, 1792 (Mississauga)
E Haldimand Tract: from the Crown to the Mohawk, 1793
F Tyendinaga: from the Crown to the Mohawk, 1793
G Treaty No. 3¾: from the Crown to Joseph Brant, October 24th. 1795
H Treaty No. 5, May 22nd, 1798 (Chippewa)
I Treaty No. 6, September 7th, 1796 (Chippewa)
J Treaty No. 7, September 7th, 1796 (Chippewa)
L **Treaty No. 13 August 1st, 1805 (Mississauga)**
M Treaty No. 13A, August 2nd, 1805 (Mississauga)
N Treaty No. 16, November 18th, 1815 (Chippewa)
O Treaty No. 18, October 17th, 1818 (Chippewa)
P Treaty No. 19, October 28th, 1818 (Mississaga)
Q Treaty No. 20, November 5th, 1818 (Chippewa)
R Treaty No. 21, March 9th, 1819 (Chippewa)
S Treaty No. 27, May 31st, 1819 (Chippewa)
T Treaty No. 27½, April 25th, 1825 (Ojibwa and Chippewa)
U Treaty No. 35, August 13th, 1833 (Wyandot or Huron)
V Treaty No. 45, August 9th, 1836 (Chippewa and Odawa), "For All Inidians To Reside Thereon"
W Treaty No. 45½, August 9th, 1836 (Saugeen)
X Treaty No. 57, June 1st, 1847 (Iroquois of St. Regis)
Z Treaty No. 61, September 9th, 1850 (Robinson Treaty: Ojibwa)
AA Treaty No. 72, October 30th, 1854 (Chippewa)
AB Treaty No. 82 February 9th, 1857 (Chippewa)
AF Williams Treaty, October 31st and November 15th, 1923 (Chippewa and Mississauga)
AG Williams Treaty, October 31st, 1923 (Chippewa)

Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend
- Study Area
- Water Body
- Watercourse
- Municipality Boundary - Upper
- Municipality Boundary - Lower
- Treaty Boundary

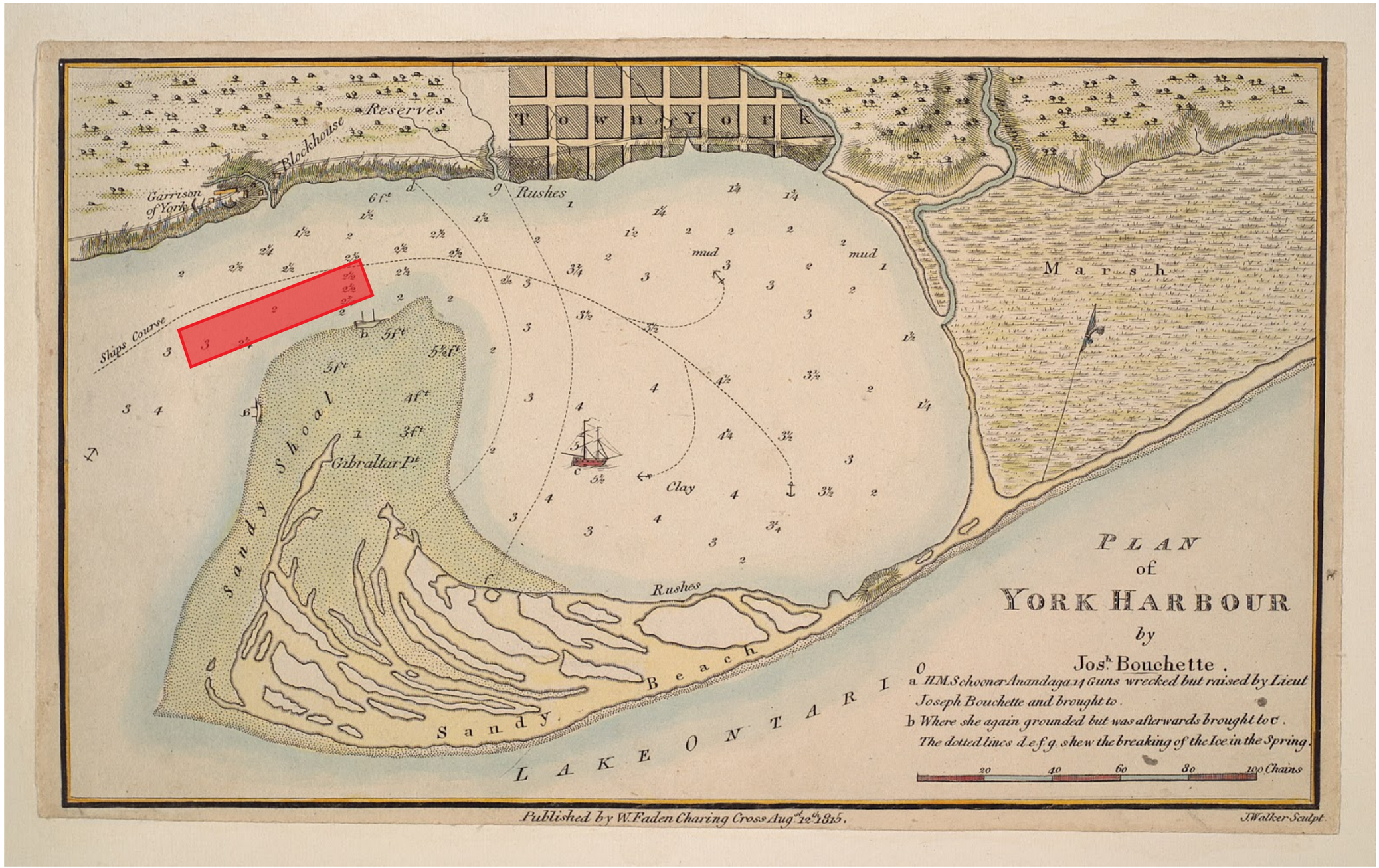
Source: OBM layers - Natural Resources Canada
Treaty Boundaries - Morris 1943

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Figure 4:
Treaties and Purchases
(Adapted from Morris 1943)

Date: June 2015
PN: 60328546
Scale: 1:3,000,000
Datum: NAD 83 CSRS Canada Atlas Lambert

AECOM



Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

Approximate Location of Study Area

Source: Historic Map - Boucehette 1815

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Figure 5:
Bouchette's 1815 Map of the Plan of York Harbour (adapted from the original 1793 map)

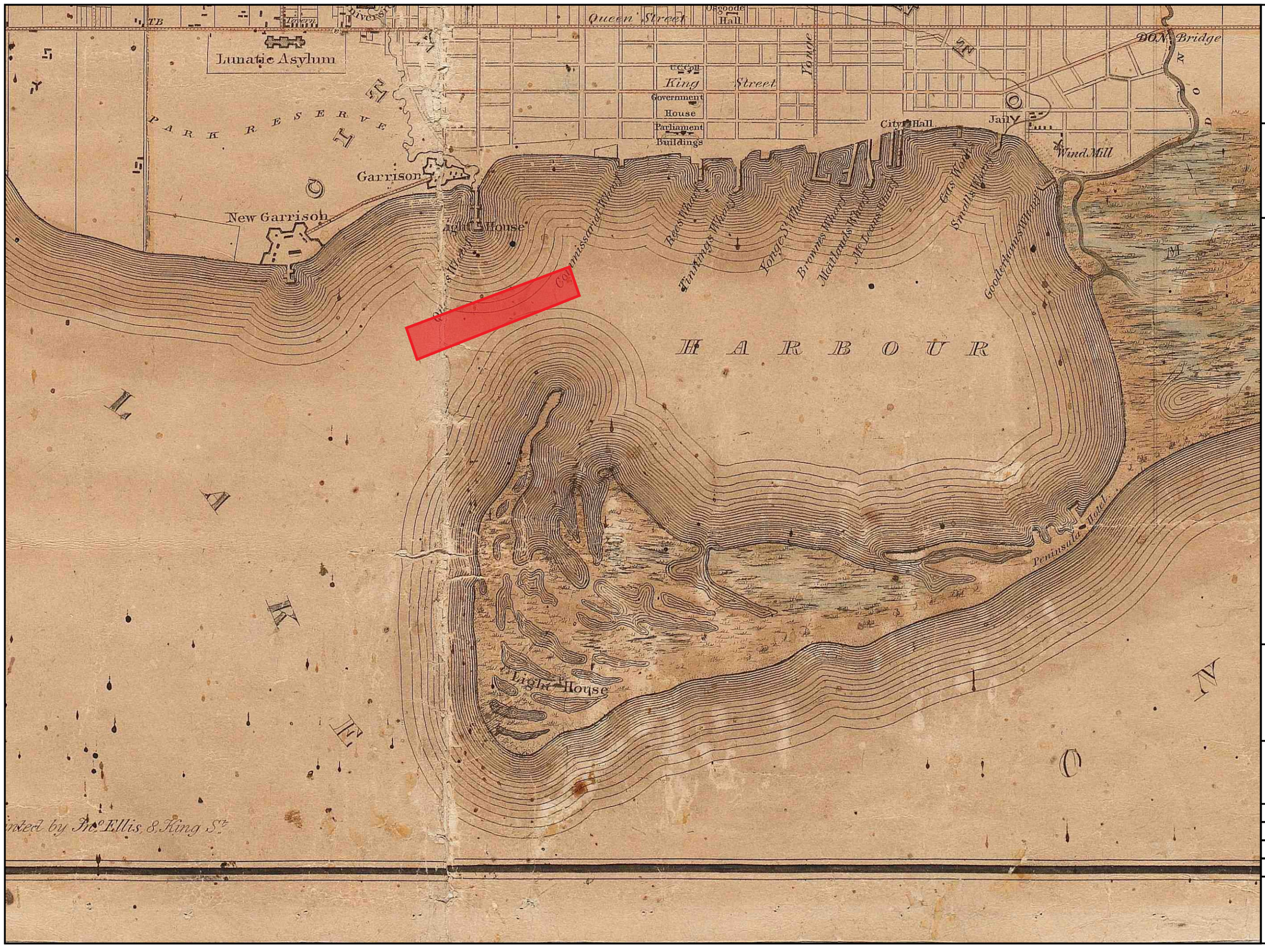
Date: June 2015

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Datum: NA

AECOM



Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

Approximate Location of Study Area

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Figure 6:
Browne's 1851 map of the Township of York

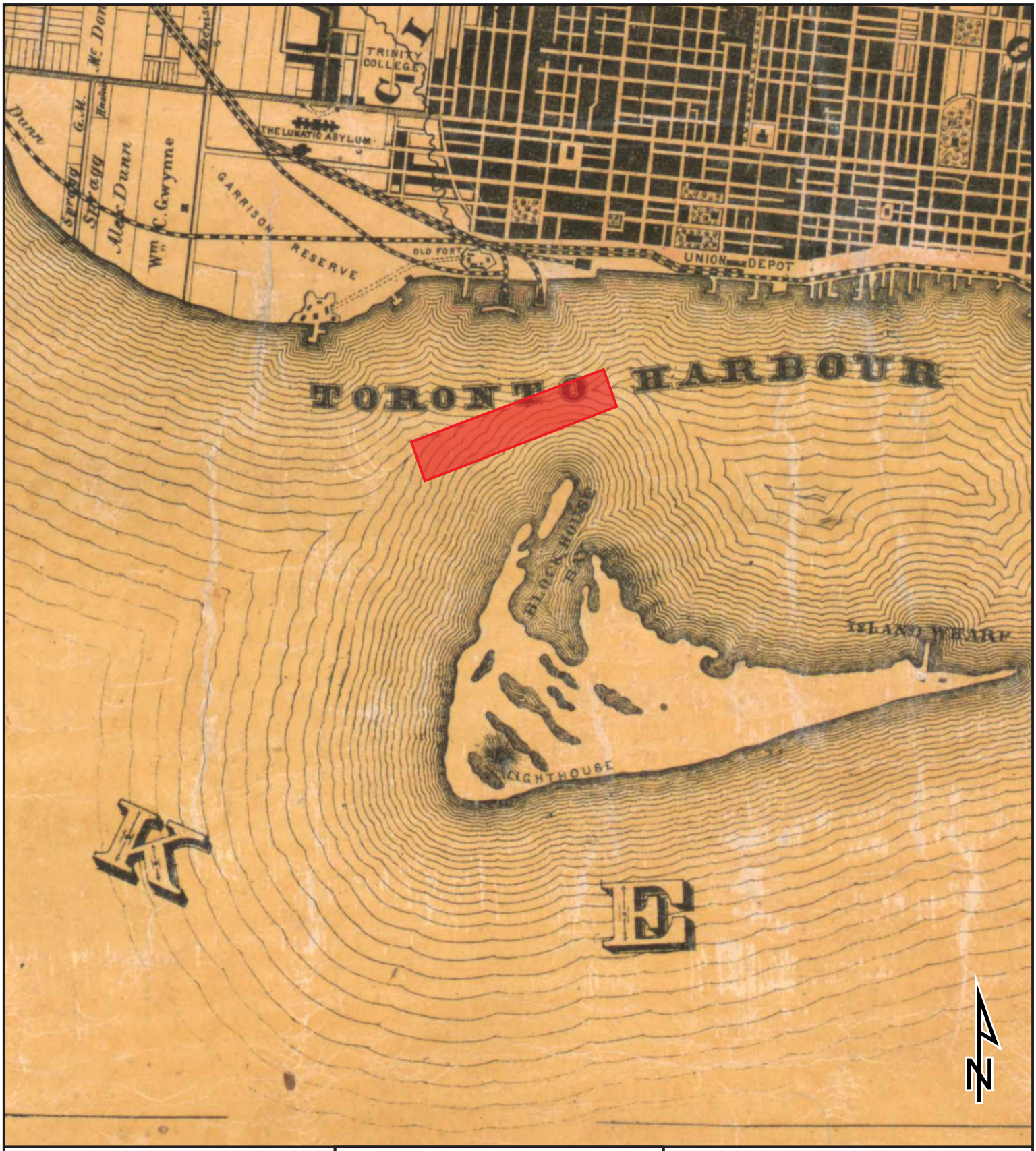
Date: June 2015

PN: 60328546

Scale: NTS

Datum: NA

AECOM



Legend

Study Area

AECOM

Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport
Runway Extension

Source: Historic Map - Tremaine 1860

Figure 7:
A Portion of Tremaine's 1860 Map of the County of York

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Date: June 2015	PN: 60328546
Scale: NTS	Datum: NA



Legend

Study Area

AECOM

Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport
Runway Extension

Source: Historic Map - Miles and Co. 1878

Figure 8:
A Portion of the 1878 Miles and Co. Illustrated Historical Atlas of York County

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Scale: NTS	Datum: NA



Legend

- Study Area
- Archaeological Potential
- 1820 Shoreline
- 1912 Shoreline

AECOM

Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport
Runway Extension

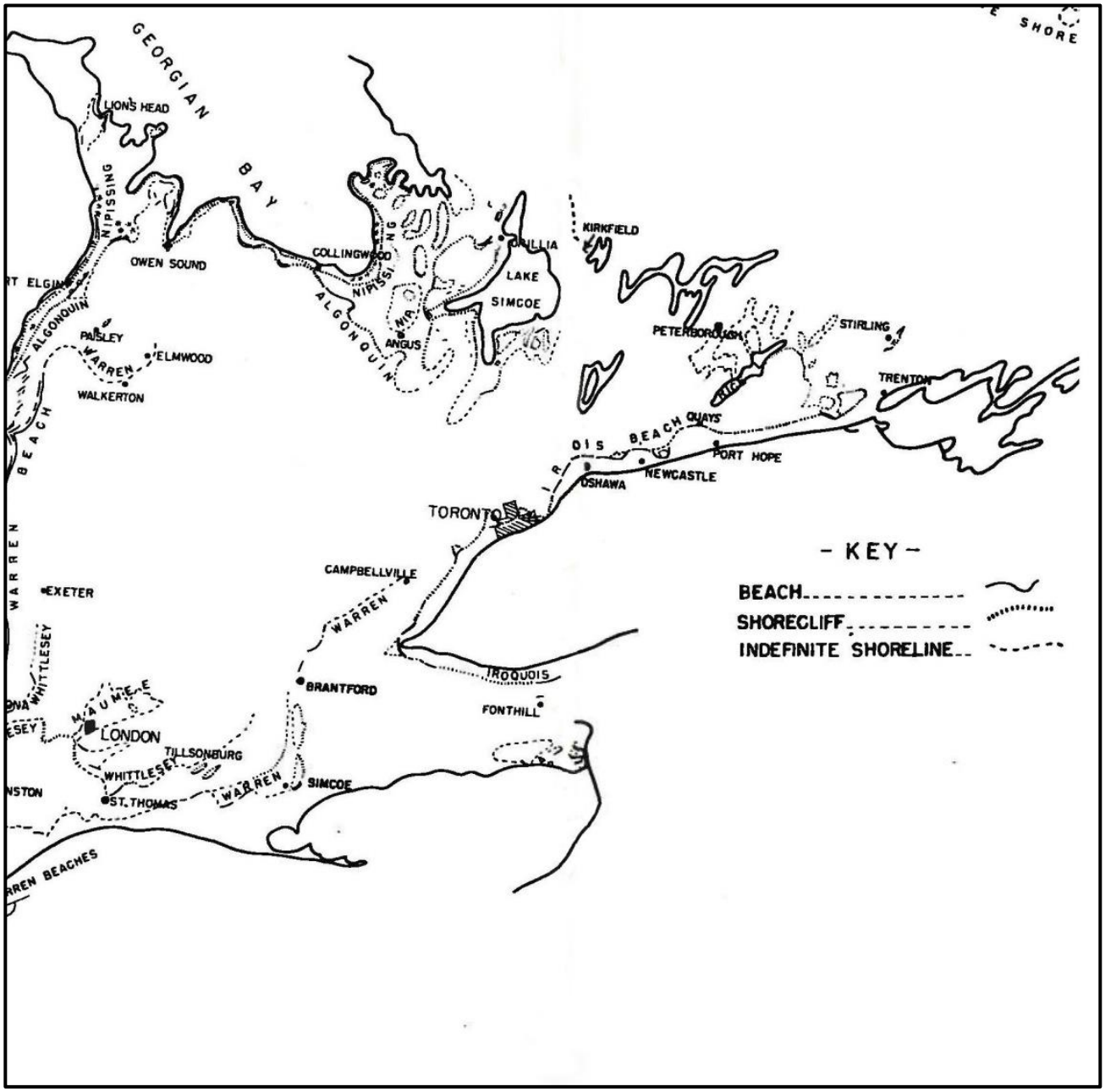
Source: Archaeological Master Plan of the Central Waterfront, City of Toronto, ASI 2003

Figure 9:
Central Waterfront Archaeological Master Plan of the Toronto Islands

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Date: June 2015	PN: 60328546
Scale: NTS	Datum: NA

Figure 10: Estimated Location of Glacial Lake Iroquois



Chapman and Putnam (1984)

Toronto

Toronto Harbour

Toronto Island

Lake Ontario

0 250 500 1,000
Metres

N

Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

- Study Area
- 1906 Approximate Area of Toronto Island
- Current Area of Toronto Island and Potential Location of Lake Fill
- Water Body

Source: OBM layers - Ministry of Natural Resources
Historical Area of Toronto Island - Atlas of Canada, No 35 Toronto, Department of the Interior 1906

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Figure 11:
Natural Environment versus Lake-Fill on the Toronto Island

Date: June 2015

PN: 60328546

Scale: 1:15,000

Datum: NAD 83 UTM 17N

AECOM

Environment

PortsToronto

Stage 1 Marine Archaeological Assessment

Environmental Assessment of a Proposed Runway Extension and Introduction of Jets at Billy Bishop Toronto City Airport

Geographic Township of York South West, Toronto Islands, City of Toronto, York County, Ontario

Licensee: **Erik Phaneuf**

License: **2015-16**

Prepared by:

AECOM
410 – 250 York Street, Citi Plaza
London, ON, Canada N6A 6K2
www.aecom.com

519 673 0510 tel
519 673 5975 fax

Project Number:

60306703

Date:

June 2017
REVISED REPORT

Distribution List

Hard Copy #	PDF	Association / Company Name
0	1	PortsToronto
0	1	Ontario Ministry of Tourism, Culture and Sport
1	1	AECOM

Revision Log

Revision #	Revised By	Date	Issue / Revision Description

AECOM Signatures

Report Reviewed By:

Adria Grant, MA, CAHP
Archaeology Practice Lead

Executive Summary

AECOM Canada Ltd. (AECOM) was retained by PortsToronto to conduct a Stage 1 archaeological assessment for the proposed extension of the land mass at each end of the main runway of the Billy Bishop Toronto City Airport (BBTCA) by 200 metres. The BBTCA is located on the Toronto Islands, adjacent the Toronto Waterfront, within the Geographic Township of York South West, City of Toronto, York County, Ontario (Figure 1). The BBTCA study area consists of the areas which may be physically affected by the extension of the land mass at each end of the main runway by 200 metres (Figure 2). As the proposed development impacts both land and lakebed, both a terrestrial and marine archaeological assessment has been undertaken. The Stage 1 archaeological assessment has been split into two separate reports, a terrestrial and a marine archaeological report. This report refers to the marine archaeological assessment only and a separate terrestrial report has also been completed by AECOM (2015).

PortsToronto operates the BBTCA under the conditions of an agreement called the Tripartite Agreement which was originally drafted and signed in 1983 by the City of Toronto, Transport Canada and PortsToronto. The Tripartite Agreement details the conditions under which the BBTCA operates; such as the flight curfew, the noise limitations, the prohibition of the use of jet aircraft, the prohibition against any lengthening of the operational portion of the runway and the rights and responsibilities of each signatory. Without the consensus of all three signatories, no changes can be made to the Tripartite Agreement.

In 2013, Porter Airlines submitted a proposal to the City of Toronto, copying PortsToronto, requesting to introduce jet aircraft at the BBTCA. Part of this proposal included an extension of the land mass at each end of the main runway in order to lengthen the operational portion of the runway to accommodate the use of the requested jet aircraft for scheduled flight operations. As the Tripartite Agreement does not allow the use of jet aircraft for scheduled commercial travel or the lengthening of the operational portion of the runway, the terms of the Tripartite Agreement would need to be amended to approve Porter's proposal. In 2013 the City of Toronto undertook a review of the potential impacts of Porter's Proposal, which were presented to the public and to Toronto City Council in late 2013 and early 2014. In consideration of the outcome of the City's review and concerns raised by some members of the community regarding existing airport operations, and prior to entering into negotiations to amend the Tripartite Agreement, the City of Toronto, in an April 1, 2014, City of Toronto Council resolution, requested, in part, that further study and analysis of the effects of jet aircraft at the BBTCA and associated mitigation measures be completed. Although not subject to the requirements of the provincial or federal Environmental Assessment processes, PortsToronto is undertaking this EA at the request of the City of Toronto to identify the effects of the proposed changes on the surrounding environment and to inform their position related to the proposal.

Should it be decided not to proceed with the land mass extension for the purpose of scheduled jet aircraft operations, the land mass may still be extended on both ends to accommodate a Runway End Safety Area (RESA). The RESA is a level graded area which extends beyond the runway threshold to provide an additional measure of safety in the event of an aircraft undershooting or overrunning the runway. RESAs are required where the runway length exceeds 1,200 meters or where a runway is utilized by scheduled passenger operations utilizing aircraft with more than nine seats.

In 2010, Transport Canada identified the requirement to implement a RESA at qualifying airports as an additional safety consideration. The installation of a RESA at the BBTCA would result in an amendment to the Tripartite Agreement (WSP Group, 2014), but will be required to comply with Transport Canada regulations. The RESA at the BBTCA would consist of a land mass extension at both ends of the main runway which includes lakefilling in the Toronto Harbour within the Marine Exclusion Zone (MEZ). Although not required under the CEAA, an EA report for lakefilling in the area where the RESA will be required, "Lakefill within Marine Exclusion Zone

(Keep-out-Area) Toronto Harbour", was completed in January, 2013 (Dillon Consulting, 2013). It is assumed that the RESA would be contained within the construction disturbance area studied as part of this Stage 1 archaeological assessment and as such, a separate archaeological assessment for the RESA would not be required.

The background research of the underwater portion of the BBTCA study area resulted in the identification of several ship wrecks that have been lost in Toronto Harbour and potentially in the vicinity of the study area. Based on these findings, there is high potential for the recovery of marine archaeological resources. It is possible that these resources may be impacted by the proposed land mass extension and mitigation measures are required.

Given that the preferred method of extending the runway is to construct it on lake-fill, we considered that capping the existing lakebed with lake-fill could in fact protect possible cultural remains. This unusual method has been proven efficient only through archaeological example in numerous coastal cities. In order to propose this measure as a relevant mitigation method, the compactness of the bottom sediment must be evaluated and proven to be of high density limiting compression of possible potential archaeological resources. Only following further studies of bottom sediment can we recommend this, out of the ordinary, method of mitigation

For this reason, we recommend that a survey of the projected lake-fill area and its 100 meters buffer zone be performed with a sub-bottom profiler and an underwater magnetometer. This should determine if any archaeological resources, particularly shipwrecks, are present under the existing lakebed. The depth of the study area will probably make this survey difficult and may necessitate remotely operated equipment. If the result of the survey proves that no cultural resources are present, lake filling can be executed as projected. If anomalies are present, a visual confirmation of the resources is to be executed through direct diving or by remotely operated vehicle equipped with an underwater camera. If the cultural remains are buried within the lakebed, an underwater excavation is to be completed in order to visually confirm and identify the presence of cultural remains. Only after a proper validation can we propose appropriate protective measures.

We also recommend that a qualified underwater archaeologist with scientific competence appropriate to the project be present at all time during the physical survey as specified in the general principals of the Convention on the Protection of the Underwater Cultural Heritage by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The MTCS is asked to accept this report into the Ontario Public Register of Archaeological Reports thereby concurring with the recommendations presented herein.

Project Personnel

Project Director Environment,	Paul Murray, Senior Vice-President/Region Business Line Leader,
Project Manager	Leah Weller, Senior Environmental Planner
Technical Lead	Adria Grant, MA, CAHP (P131)
Licensed Archaeologist	Erik Phaneuf, MSc
Report Production	Erik Phaneuf, MSc, Jennifer Morgan, PhD, Samantha Markham, MES (P438)
Report Review	Adria Grant, MA, CAHP (P131)
Office Assistance	Chantelle Mills
GIS Analyst	Adam Spargo, BSc, Ben Clark, BAA

Acknowledgements

Proponent Contact	Angela Homewood, Project Manager and EA Specialist, PortsToronto
Approval Authority	Sara Eddy, Fisheries and Oceans Canada
Ministry of Tourism, Culture and Sport	Robert von Bitter, Archaeological Data Coordinator

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1. Project Context

1.1 Development Context

AECOM Canada Ltd. (AECOM) was retained by PortsToronto to conduct a Stage 1 archaeological assessment for the proposed extension of the land mass at each end of the main runway of the Billy Bishop Toronto City Airport (BBTCA) by 200 metres. The BBTCA is located on the Toronto Islands, adjacent the Toronto Waterfront, within the Geographic Township of York South West, City of Toronto, York County, Ontario (Figure 1). The BBTCA study area consists of the areas which may be physically affected by the extension of the land mass at each end of the main runway by 200 metres (Figure 2). As the proposed development impacts both land and lakebed, both a terrestrial and marine archaeological assessment has been undertaken. The Stage 1 archaeological assessment has been split into two separate reports, a terrestrial and a marine archaeological report. This report refers to the marine archaeological assessment only and a separate terrestrial report has also been completed by AECOM (2015).

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(Keep-out-Area) Toronto Harbour", was completed in January, 2013 (Dillon Consulting, 2013). It is assumed that the RESA would be contained within the construction disturbance area studied as part of this Stage 1 archaeological assessment and as such, a separate archaeological assessment for the RESA would not be required.

1.1.1 Objectives

The Stage 1 archaeological assessment has been conducted to meet the requirements of the MTCS's *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). The objective of the Stage 1 background study is to document the archaeological and land use history and present conditions of the study area. This information will be used to support recommendations regarding cultural heritage value or interest as well as assessment and mitigation strategies. The Stage 1 research information will be drawn from:

- The Northern Shipwreck Database (2002) and the Great Lakes Shipwrecks File (Swayze 2014) for known shipwrecks in the vicinity of the study area;
- Reports of previous archaeological assessments within 50 m of the study area;
- Recent and historical maps of the study area; and
- Archaeological management plans or other archaeological potential mapping when available.

1.2 Historical Context

The study area is situated immediately across from the southern edge of the City of Toronto Waterfront (Figure 1 and Figure 2). Previous archaeological and historical studies have resulted in a wealth of information regarding human settlement in the area; the following sections provide information on the types of settlement that has occurred here over the years.

1.2.1 Pre-Contact Aboriginal Settlement

It has been demonstrated that pre-contact Aboriginal peoples began occupying York County as the glaciers receded from the land, as early as 11,000 B.C. Table 1 provides a breakdown of the cultural and temporal history of the past occupations in York County.

Table 1: Cultural Chronology for York County

Archaeological Period	Characteristics	Time Period	Comments
Early Paleo-Indian	Fluted Points	9000-8400 BC	Arctic tundra and spruce parkland, caribou hunters
Late Paleo-Indian	Holcombe, Hi-Lo and Lanceolate Points	8400-8000 BC	Slight reduction in territory size
Early Archaic	Notched and Bifurcate base Points	8000-6000 BC	Growing populations
Middle Archaic	Stemmed and Brewerton Points, Laurentian Development	6000-2500 BC	Increasing regionalization
Late Archaic	Narrow Point	2000-1800 BC	Environment similar to present
	Broad Point	1800-1500 BC	Large lithic tools
	Small Point	1500-1100 BC	Introduction of bow
Terminal Archaic	Hind Points, Glacial Kame Complex	1100-950 BC	Earliest true cemeteries
Early Woodland	Meadowood Points	950-400 BC	Introduction of pottery

Middle Woodland	Dentate/Pseudo-scallop Ceramics	400 BC – AD 500	Increased sedentism
	Princess Point	AD 550-900	Introduction of corn horticulture
Late Woodland	Early Ontario Iroquoian	AD 900-1300	Agricultural villages
	Middle Ontario Iroquoian	AD 1300-1400	Increased longhouse sizes
	Late Ontario Iroquoian	AD 1400-1650	Early written records and treaties
Contact Aboriginal	Various Algonkian and Iroquoian Groups	AD 1600-1875	Early written records and treaties
Euro-Canadian	French and English Euro-Canadian	AD 1749-present	European settlement

Note: taken from Ellis and Ferris, 1990

As Chapman and Putnam (1984) illustrate, the modern physiography of southern Ontario is largely a product of events of the last major glacial stage and the landscape is a complex mosaic of features and deposits produced during the last series of glacial retreats and advances prior to the withdrawal of the continental glaciers from the area. Southern Ontario was finally ice free 12,500 years ago. With continuing ice retreat and lake regressions, the terrestrial area of southern Ontario progressively increased while barriers to the influx of plants and animals steadily diminished (Karrow and Warner, 1990).

The first human settlement can be traced back 11,000 years; these earliest well-documented groups are referred to as Paleo-Indians which literally means old or ancient Indians. Paleo-Indian people were non-agriculturalists who depended on hunting and gathering of wild food stuffs, they would have moved their encampments on a regular basis to be in the locations where these resources naturally became available and the size of the groups occupying any particular location would vary depending on the nature and size of the available food resources (Ellis and Deller, 1990). The picture that has emerged for early and late Paleo-Indian people is of groups at low population densities who were residentially mobile and made use of large territories during annual cycles of resource exploitation (Ellis and Deller, 1990).

The next major cultural period following the Paleo-Indian is termed the Archaic, which is broken temporally into the Early, Middle and Late. There is much debate on how the term Archaic is employed; general practice bases the designation off assemblage content as there are marked differences in artifact suites from the preceding Paleo-Indian and subsequent Woodland periods. As Ellis et al. (1990) note, from an artifact and site characteristic perspective, the Archaic is simply used to refer to non-Paleo-Indian manifestations that pre-date the introduction of ceramics. Throughout the Archaic period, the natural environment warmed and vegetation changed from closed conifer-dominated vegetation cover, to mixed coniferous and deciduous forest, to the mixed coniferous and deciduous forest in the north and deciduous vegetation in the south (Ellis et al., 1900). During the Archaic period there are indications of increasing populations and decreasing size of territories exploited during annual rounds; fewer moves of residential camps throughout the year and longer occupations at seasonal campsites; continuous use of certain locations on a seasonal basis over many years; increasing attention to ritual associated with the deceased; and, long range exchange and trade systems for the purpose of obtaining valued and geographically localized resources (Ellis et al., 1990).

In the 17th century two major language families, Algonquian and Iroquoian were represented by the diverse people of North America. Iroquoian speaking people were found in southern Ontario and New York State, with related dialects spoken in the mid-Atlantic and interior North Carolina; while Algonquian speaking peoples were located along the mid-Atlantic coast into the Maritimes, throughout the Canadian Shield of Ontario and Quebec and much of the central Great Lakes region (Ellis et al 1990). Linguists and anthropologists have attempted to trace the origin and development of these two language groups and usually place their genesis during the Archaic period (Ellis et al., 1990).

The Early Woodland period is distinguished from the Late Archaic period primarily by the addition of ceramic technology, which provides a useful demarcation point for archaeologists but is expected to have made less difference in the lives of the Early Woodland peoples. The settlement and subsistence patterns of Early Woodland people shows much continuity with the earlier Archaic with seasonal camps occupied to exploit specific natural resources (Spence et al., 1990). During the Middle Woodland period, well-defined territories containing several key environmental zones were exploited over the yearly subsistence cycle. Large sites with structures and substantial middens appear in the Middle Woodland period associated with spring macro-band occupations focussed on utilizing fish resources and created by consistent returns to the same site (Spence et al., 1990). Groups would come together into large macro-bands during the spring-summer at lakeshore or marshland areas to take advantage of spawning fish; whereas, in the fall, inland sand plains and river valleys were occupied for deer and nut harvesting. Groups split into small micro-bands for winter survival (Spence et al., 1990). This is a departure from earlier Woodland times when macro-band aggregation is thought to have taken place in the winter (Ellis et al., 1988; Granger, 1978).

The period between the Middle and Late Woodland period was both technically and socially transitional for the ethnically diverse populations of southern Ontario and these developments laid the basis for the emergence of settled villages and agriculturally based lifestyles (Fox, 1990). The Late Woodland period began with a shift in settlement and subsistence patterns involving an increasing reliance on corn horticulture. Corn may have been introduced into Southwestern Ontario from the American Midwest as early as 600 A.D; however, it did not become a dietary staple until three to four hundred years later. The first agricultural villages in southwestern Ontario date to the 10th century A.D. Unlike the riverine base camps of the Middle Woodland period, these sites are located in the uplands, on well-drained sandy soils. Categorized as "Early Ontario Iroquoian" (900-1300 A.D.), many archaeologists believe that it is possible to trace a direct line from the Iroquoian groups which inhabited Southwestern Ontario at the time of first European contact, to these early villagers.

Village sites dating between 900 and 1300 A.D. share many attributes with the historically reported Iroquoian sites, including the presence of longhouses and sometimes palisades; however, these early longhouses were actually not all that large, averaging only 12.4 metres in length. It is also quite common to find the outlines of overlapping house structures, suggesting that these villages were occupied long enough to necessitate re-building. The Jesuits reported that the Huron moved their villages once every 10-15 years, when the nearby soils had been depleted by farming and conveniently-collected firewood grew scarce. It seems likely that Early Ontario Iroquoians occupied their villages for considerably longer, as they relied less heavily on corn than did later groups, and their villages were much smaller, placing less demand on nearby resources.

Judging by the presence of carbonized corn kernels and cob fragments recovered from sub-floor storage pits, agriculture was becoming a vital part of the Early Ontario Iroquoian economy; however, it had not reached the level of importance it would in the Middle and Late Ontario Iroquoian periods. There is ample evidence to suggest that more traditional resources continued to be exploited and comprised a large part of the subsistence economy. Seasonally occupied special purpose sites relating to deer procurement, nut collection, and fishing activities, have all been identified. While beans are known to have been cultivated later in the Late Woodland period, they have yet to be identified on Early Ontario Iroquoian sites. The Middle Ontario Iroquoian period (1300-1400 AD) witnessed several interesting developments in terms of settlement patterns and artifact assemblages. Changes in ceramic styles have been carefully documented, allowing the placement of sites in the first or second half of this 100-year period. Moreover, villages, which averaged approximately 0.6 hectares in extent during the Early Ontario Iroquoian period now consistently range between one and two hectares.

House lengths also changed dramatically, more than doubling to an average of 30 m, while houses of up to 45 m have been documented. This radical increase in longhouse length has been variously interpreted. The simplest

possibility is that increased house length is the result of a gradual, natural increase in population; however, this does not account for the sudden shift in longhouse lengths around 1300 A.D. Other possible explanations involve changes in economic and socio-political organization. One suggestion is that during the Middle Ontario Iroquoian period, small villages were amalgamating to form larger communities for mutual defense. If this was the case, the more successful military leaders may have been able to absorb some of the smaller family groups into their households, thereby requiring longer structures. This hypothesis draws support from the fact that some sites had up to seven rows of palisades, indicating at least an occasional need for strong defensive measures; although, there are other Middle Ontario Iroquoian villages which had no palisades present.

The lay-out of houses within villages also changes dramatically by 1300 A.D. During the Early Ontario Iroquoian period, villages were haphazardly planned with houses oriented in various directions. During the Middle Ontario Iroquoian period, villages were organized into two or more discrete groups of tightly spaced, parallel aligned, longhouses. It has been suggested that this change in village organization may indicate the initial development of the clans which were a characteristic of the historically known Iroquoian peoples.

Initially, the Late Ontario Iroquoian period (1400-1650 A.D.) continued many of the trends which have been documented for the proceeding century. For instance, between 1400 and 1450 A.D., house lengths continued to grow, reaching an average length of 62 metres. One longhouse excavated on a site southwest of Kitchener stretched an incredible 123 metres. After 1450 A.D., house lengths begin to decrease, with houses dating between 1500-1580 A.D. averaging only 30 metres in length. Why house lengths decrease after 1450 A.D. is poorly understood; although it is believed that the even shorter houses witnessed on historic period sites can be at least partially attributed to the population reductions associated with the introduction of European diseases such as smallpox.

Village size also continues to expand throughout the Late Ontario Iroquoian period, with many of the larger villages showing signs of periodic expansions. The Late Middle Ontario Iroquoian period and the first century of the Late Ontario Iroquoian period was a time of village amalgamation. One large village situated just north of Toronto has been shown to have expanded on no fewer than five occasions. These large villages were often heavily defended with numerous rows of wooden palisades, suggesting that defence may have been one of the rationales for smaller groups banding together.

Archaeologists are able to trace archaeologically known groups from this time period to the historically documented people identified when French fur traders first arrived (Wright, 1994). The Ontario Iroquois from southern Ontario gave rise to the Huron, Petun, Neutral and Erie; the St. Lawrence Iroquois, a distinct population encountered by Jaques Cartier in 1535 that had disappeared by the time Samuel de Champlain returned to the same area in 1603; and from Northern Ontario the groups that gave rise to the Algonquian speaking Cree, Ojibwa and Algonquin people (Wright, 1994).

1.2.2 Post-Contact Aboriginal and Euro-Canadian Settlement

The post-contact Aboriginal occupation of southern Ontario was heavily influenced by the dispersal of Iroquoian speaking peoples, such as the Huron, Petun and Neutral by the New York State Confederacy of Iroquois, who had main settlements near the mouths of the Humber and Rouge Rivers. This dispersal was followed by the arrival of the Mississaugas, an Alonquian speaking people, who are known to have moved into southern Ontario and the Great Lakes watersheds (Konrad, 1981), while at the same time the members of the Three Fires Confederacy, the Chippewa, Ottawa and Potawatomi were immigrating from Ohio and Michigan (Feest and Feest, 1978).

As European settlers encroached on their territory, the nature of Aboriginal population distribution, settlement size, and material culture changed. Despite these changes it is possible to correlate historically recorded villages with

archaeological manifestations and the similarity of those sites to more ancient sites reveals an antiquity to documented cultural expressions that confirms a long historical continuity to Iroquoian systems of ideology and thought (Ferris, 1009). First Nations people of southern Ontario have left behind archaeological resources throughout the Great Lakes region that show continuity with past peoples even if this was not recorded in Euro-Canadian documentation.

The study area falls within a portion of Ontario that was purchased by the Crown on September 23, 1787. The Toronto Purchase involved the surrender of 101,498 ha of land along Lake Ontario, which was to become York County, from the Mississaugas of New Credit to the British Crown (Figure 3). A revision to the 1787 Toronto Purchase was made in 1805 and both the 1787 Purchase and the 1805 revision were registered as Treaty No. 13 on August 1, 1805 (Figure 4).

Although the Toronto Islands were not a part of the original 1787 Purchase, the Crown included them in the 1805 revision (Morris, 1943; Smith, 1987). Treaty No. 13 was made between the Principal Chiefs, warriors, and People of the Mississauga New Credit First Nation and William Claus, Esquire, Deputy Superintendent General and Deputy Inspector General of Indians and their affairs, on behalf of King George the Third, His heirs, and successors (AANDC, 2013). Sir John Johnson, the Chief Superintendent of Indian affairs at the time, described the Toronto Purchase as:

> …all that tract or parcel of land commencing on the east bank of the south outlet of the River Etobicoke; thence up same, following the several windings and turning of the said river to a maple tree blazed on four sides at the distance of three miles and three-quarters, in a straight line from the mouth of the said river; thence north twenty-two degrees west twenty-four miles and one-quarter; then north sixty-eight degrees east fourteen miles; then south twenty-two degrees east twenty-eight miles, more or less, to Lake Ontario; then westerly along the water's edge of Lake Ontario to the eastern bank of the south outlet of the River Etobicoke, being the place of beginning, containing Two hundred and fifty thousand, eight hundred and eight acres, together with all the woods and waters thereon, lying and being and all the advantages, emoluments and hereditaments whatsoever to the said tract or parcel of land belonging or in anyways appertaining and the issue and profits of all and singular the said premises and every part and parcel thereof with the appartenances.
>
> AANDC, 2013

The land was purchased for the sum of ten shillings and several barrels of goods including gun flints, rum, mirrors, kettles, and laced hats. At the time, the Mississaugas believed that the agreement was not a purchase which would extinguish their rights to the land, but rather a rental of the lands for British use in exchange for gifts in perpetuity (Smith, 1987).

The Mississaugas of the New Credit First Nation considered the Toronto Islands as sacred land and documentation from early Euro-Canadian settlers suggests that many First Nations campsites were located between the base of the island peninsula and the Don River confluence. This indicates that there was extensive use of the Toronto Islands and surrounding shorelines by pre- and post-contact Aboriginal peoples. The sheltered harbour formed by the Toronto Islands peninsula created an ideal location for the set-up of temporary encampments across the northern shorelines of Lake Ontario as well as the Toronto Islands as part of important trade routes that linked the Great Lakes (Smith, 1987).

In 1986, the Mississaugas of the New Credit First Nation, who currently reside in Hagersville, Ontario, submitted the Toronto Purchase Specific Claim based on the 1805 revisions to the original Toronto Purchase that led to the unlawful surrender of lands covering most of present-day Toronto. The First Nation was able to successfully argue that the British Crown took more land than was indicated in the 1787 Purchase and had not indicated in the 1805

agreement that the revisions covered a much greater area than the original transaction. On October 8, 2010, the Government of Canada agreed to provide compensation to the Mississaugas of the New Credit First Nation for the land dispute in the amount of $145,000,000 (Edwards, 2010).

1.2.3 Euro-Canadian Settlement

French traders had established a modest presence at Toronto by the early 1700s. Competition with the British for control of the fur trade resulted in the founding of Fort Rouillé (also known as Fort Toronto) on the current Exhibition grounds in 1750, approximately 5 km east of the Humber River. After being defeated by the British during the Seven Years War (1756-1753), Fort Rouillé was burned and abandoned by the French in 1759. During the American Revolutionary War (1774-1783), the region saw an influx of British settlers as United Empire Loyalists fled for the unsettled lands north of Lake Ontario (Careless, 1984).

Early Industry and Development of the York Waterfront

While the Town of York continued to grow throughout the early 19th century, use of the waterfront remained dominated by commercial, military, and transportation uses. Several commercial wharves and piers had been constructed along the shoreline to the east of John Street by 1841 and, to the west of John Street, the military dominated the waterfront with the development of the Navy, King's, Queen's, and Commissariat Wharves (Historica Research Ltd., 1989). By 1842, seven piers had been constructed along the Toronto shoreline. Into the second half of the 19th century, both commercial and industrial development of Toronto's waterfront intensified and several large factories were established, including the Gooderham and Worts Distillery and the associated Gooderham Wharf (Historica Research Ltd. 1989; ASI 2003). A portion of Browne's 1851 map of the Township of York illustrates this growth and development along the Toronto waterfront (Figure 6).

The waterfront was drastically changed in the 1850s when Toronto saw the arrival of the Northern, Great Western, and Grand Trunk railways which followed the shoreline and resulted in the development of trackways, railway terminals, freight stations, and additional wharves. Between 1850 and 1870, Toronto's waterfront formed the centre of rail operations for Canada's historic and present-day railways. The arrival of the Northern Railway in 1853 was quickly followed by that of the Grand Trunk and the Great Western Railways in 1855. In 1853, the Northern Railway developed freight handling facilities that were developed on lands created by harbor lake fill in order to link the railway to existing water transportation facilities. This was the first waterfront development to engage in the filling of Toronto's harbor; a process that would continue well into the 20th century (Historica Research Ltd., 1989). Tremaine's 1860 map of the County of York illustrates the location of these railways along the Toronto waterfront shoreline (Figure 7).

The lake-filling operations carried out along Toronto's waterfront intensified throughout the mid to late 19th century and the shoreline between present-day Bathurst and Parliament Streets was significantly altered by leveling and filling conducted for the development of railway right-of-ways. Lake-filling generally consisted of the "crib and fill" technique which involved the placement of timber cribbing around the perimeter of the area to be filled. The fill used during the early stages of waterfront expansion included municipal waste, sewage, and material dredged from the harbor bottom (Historica Research Ltd., 1989; ASI, 2003).

The city's shoreline continued to evolve and develop through the late 19th and early 20th centuries as rail systems consolidated and industrial and commercial operations along the waterfront continued to grow. As a result, increasing areas along the shoreline were filled, including large areas for the construction of Lake Street and at the foot of York Street in 1893. Between 1886 and 1909, Toronto Island became a focus for development (Reeves, 1992).

The Toronto Island and Billy Bishop Toronto City Airport

The Toronto Island was formed by the confluence of easterly flowing sand-bearing currents, westerly winds, and the outflow from the Don River, producing an 8 km long peninsula which stretches from present-day Woodbine Avenue to Gibralter Point. The peninsula and surrounding sand-bars that now form the Toronto Islands were first surveyed in 1792 by Lieutenant Joseph Bouchette of the Royal Navy. Despite its name, Toronto Island remained a peninsula until the 1850s when a series of storms breached the peninsula at the present location of the East Gap, separating the western part of the peninsula from the mainland.

According to Gibson (1984), a lighthouse, constructed in 1809, and a variety of hotels were present on the Island after the 1830s, mostly in the narrows area on the eastern portion of the Island. The lighthouse and the Peninsula Hotel are noted on Browne's historic map from 1851 within the narrows to the east of the BBTCA study area (Figure 6); however, with the exception of the lighthouse on the southwestern tip of the Island, no other structures are noted in the historic mapping and no landowners are listed. The Peninsula Hotel is no longer visible on the 1878 Miles and Co. *Illustrated Historical Atlas of York County* and was presumably washed away during the storms of the 1850s which transformed the narrows area into the East Gap, now known as the Eastern Channel. The lighthouse and a new Wharf, Island Wharf, are also depicted to the east of the BBTCA study area in the 1878 map. A lack of documented structures is still noted (Figure 8). Although there are no structures depicted on the island, historical atlases were funded by subscription fees and landowners who did not subscribe were not always listed on the maps nor were all structures depicted or placed accurately (Gentilcore and Head, 1984).

In the late 19th and early 20th centuries, cottages flourished along Hanlan's Point, in the vicinity of the BBTCA study area and for some time, the Island became a resort for people with means (Careless, 1984). Eventually, plans were made to create public parklands on the Island and breakwaters were constructed to protect the Island from erosion. The addition of fill and alteration to the configuration of Toronto's new island and water channels continued for many years and, perhaps most dramatically, in the 1930s. A large area at Hanlan's Point was selected for the site of a new municipal airport. A considerable amount of fill was added to the northwestern portion of the island in order to provide the necessary land for the development of the airport. In 1939, the City of Toronto opened an airport on the Island, the Port George VI Airport. The airport is now known as the Billy Bishop Toronto City Airport (BBTCA).

Navigation and Shipping in the Waterfront

Navigation and shipping has played an essential role in the settlement and growth of Toronto's landscape and population. By 1801, the town of York was the port-of-entry for newly arrived immigrants and ever-growing cargo needs. From the early 19th century wharfs have been built to accommodate shipping traffic and by the 1840's, the waterfront was completely taken over by commercial and governmental wharfs. By the 1880's, more than one million passengers were travelling through Toronto harbour, and incalculable cargo was shipped (Wickson, 2002). With the expansion of the city at the expense of the harbour, new wharfs were being built and either old or abandoned ships were used within lake-fill material.

1.2.4 Reports with Relevant Background Information

Previously conducted archaeological research projects and assessments in the vicinity of the study area have informed the current Stage 1 archaeological assessment. Table 2 provides a list of the reports referenced as part of the background research conducted for this study.

Table 2: Related Archaeological Assessment Reports

Year	Title	Author

2003	*The Archaeological Master Plan of the Central Waterfront City of Toronto, Ontario.* File No. 00TO-07	ASI
2003	*Archaeological Assessment for the Proposed Portlands Energy Centre*	D.R. Poulton & Associates Inc.
2004	*A Master Plan of Archaeological Resources for the City of Toronto: Interim Report*	ASI
2006	*Fort York Archaeological Project*	Spittal, D (P079)

The majority of the reports listed above provide details on the archaeological and environmental assessments that have been conducted on study areas in the vicinity of the BBTCA study area. The City of Toronto Archaeological Master Plan of the Central Waterfront was prepared by Archaeological Services Inc. (ASI) in association with Historica Research Ltd. and Cuesta Systems Inc. in 2003 to ensure the identification, management, development review, and conservation of known and potential archaeological resources (ASI 2003). The primary goal of the Master Plan was to review Toronto's settlement history as it pertains to archaeological resources in order to develop an Archaeological Potential Model for the Central Waterfront area of the City of Toronto. The model identified 19 surviving zones of archaeological potential in the Central Waterfront of the City of Toronto (ASI, 2003). Two areas within the BBTCA on Toronto Island were identified as areas with archaeological potential in the Archaeological Master Plan of the Central Waterfront. These areas include portions of the original sandbar that can be inferred from the historic mapping (Figure 9). The BBTCA study area has been under extensive development since the 1930s, preceding the legislation that requires conducting an archaeological assessment and is likely extensively disturbed by lake-fill operations and other airport developments.

In 2003, D.R. Poulton & Associates (D.R. Poulton) conducted a Stage 1 archaeological assessment for the proposed Portlands Energy Centre (PEC) at the Toronto Portlands to the east of the BBTCA study area. The archaeological background study for the proposed PEC included areas located on the outer edge of the marshland complex at the Don River estuary in Ashbridges marsh, which has been extensively disturbed by lake-fill. Historic maps indicated that the PEC site straddles the peninsula that once connected the Toronto Islands with the Lake Ontario shoreline. After reconstructing the original environment D.R. Poulton determined that part of the PEC study area retains archaeological potential for the recovery of terrestrial historic Euro-Canadian resources from the late 18th to early 20th centuries as well as pre-contact Aboriginal resources. The determination of archaeological potential was based on the areas identified in the City of Toronto's Archaeological Master Plan for the Central Waterfront (ASI, 2003). Overall, the Stage 1 assessment concluded that the survival of archaeological remains was remote given the level of disturbance and destruction involved in the filling of the Ashbridges Bay and marsh after 1914 (D.R. Poulton, 2003). D.R. Poulton (2003) concluded that no further Stage 2 archaeological assessment was required for the proposed PEC study area.

An Interim report for the Master Plan of Archaeological Resources for the City of Toronto was prepared by ASI in 2004, and the final report is currently still in production. This Master Plan will include inventories of registered and unregistered archaeological sites, an overview of the city's settlement history as it pertains to archaeological resources, the development of an archaeological potential model, and a strategy for the conservation of valuable archaeological resources. ASI (2004) reported that there are 172 registered archaeological sites within the City of Toronto and that there are a number of areas retaining archaeological potential. Although no mapping in the Interim report includes the Toronto Islands, the City of Toronto website provides archaeological potential mapping for the City, including the Toronto Islands. The areas of potential within the BBTCA property correspond with those in the Archaeological Master Plan of the Central Waterfront (Figure 9).

Numerous efforts were made to locate and review additional archaeological assessment reports for the areas surrounding the BBTCA study area, specifically the Fort York Archaeological Project; however, given the age of several archaeological studies that have been done in the area, and the lack of standardization for archaeological reporting and report preservation, these reports could not be located for review.

1.3 Archaeological Context

1.3.1 Natural Environment

The modern physiography of Southern Ontario is largely a product of events of the last major glacial stage, the Wisconsinan and Late Wisconsinan time (ca. 25,000-10,000 B.P). The landscape in York County is made up of a complex arrangement of features and deposits produced during the last series of glacial advances and retreats by the Simcoe Lobe and Ontario Lobe of the North American Laurentide ice sheet prior to the withdrawal of the glacier from Southern Ontario (Ellis and Ferris, 1990). Those features and deposits that were formed by glacial action are represented by till plains, end moraines, and drumlins.

The estimated location of the glacial Lake Iroquois is situated just north of the BBTCA study area. Based on the strength of its shorecliffs and beaches, Lake Iroquois was much longer lived than any of the earlier glacial lakes. The lake was, essentially, an enlargement of present-day Lake Ontario which was formed as a result of the glacial blockage of the St. Lawrence River. Chapman and Putnam (1984:34) provide an approximate location of the northern shoreline of Lake Iroquois based on the presence of shorecliffs, known as the Iroquois Shoreline, which runs from west to east just south of present day St. Clair Avenue West. The Scarborough Bluffs also mark the edge of the glacial lake shoreline further to the east. The Iroquois shoreline rises from 365 feet above sea level at the present city of Hamilton to 700 feet east of Stirling. Another ancient shoreline exists between 2-4 km off of the Toronto Shoreline and is known as the Toronto Scarp. The Toronto Scarp is an underwater bluff which stretches from Bluffer's Park in Scarborough to just west of the BBTCA study area at Hanlan's point. The present day City of Toronto, as well as the Toronto Islands, would have been inundated by Lake Iroquois until the glaciers withdrew from the slope at Covey Hill in Quebec, uncovering lower outlets into the Hudson Valley (Chapman and Putnam, 1984). Figure 10 illustrates the ancient shoreline of glacial Lake Iroquois.

Soon after the glaciers, glacial lakes, and seas retreated approximately 10,000 years ago, forests spread throughout Southern Ontario and through the analysis of pollen profiles vegetation associations can be determined. Table 3 provides details on the post-glacial vegetation of this part of Ontario.

Table 3: Post Glacial Vegetation History of Southern Ontario

Time (BP)	Forest Characteristics
>10 600	Open spruce forest in dwarf-shrub tundra. Spruce (Picea) dominant, with willow (Salix) and pine (Pinus); weeds: wormwood and ragweed (Ambrosia)
10 600 - 7500	Climate changing from cold to cool and dry. Open pine forest. Pine dominant, declining spruce, modestly increasing oak (Quercus).
7500 - 4700	Climate changing from cool and dry to warm and wet. Mixed coniferous-deciduous forest. Moving towards Hemlock (Tsuga) dominance, with decreasing pine, rise of bassword (Tilia) and hickory (Carya)
4700 - 3000	Decline of hemlock and rise of birch (Betula)
3000 - 150	Recovery of hemlock. Hemlock dominance, increasing beech (Fagus), elm (Ulmus) and birch; declining pine and oak.
150 - present	Deforestation stage. Post-settlement vegetation. Increasing non-arboreal (not from trees) pollen, e.g., ragweed denoting time transgressive onset of impacts of lumbering, mining, and agriculture 1880 CE: Chestnut decline 1930 CE: Elm decline

Taken from Schoch and Rowsell (2013)

By 12,500 years ago, closed black and white spruce forests were well-established in Southern Ontario and provided residence for many migratory animals such as caribou and deer (Ellis ad Ferris, 1990; Karrow and Warner, 1990). By 9,000 years ago, white pine and deciduous trees dominated the forest cover and the Toronto area was located within predominantly deciduous forest, an ecological zone described as having the most diverse forest life in Ontario. This area is characterized by a wide range of tree and shrub species, including eastern white pine, red pine, white cedar, yellow birch, sugar and red maple, basswood, red oak, black walnut, butternut, tulip, magnolia, black gum, and many types of oaks and hickories. A number of species of mammals, birds, plants, and insects reside in the deciduous forest ecosystem. In pre-contact times, these dense forests would have been particularly bountiful. It is believed that the First Nations of the Great Lakes region exploited close to 500 plant and animal species since this diverse vegetation would have served as both home and food for a wide range of game animals, including white tailed deer, wild turkey, pigeon, cottontail rabbit, elk, muskrat, and beaver (Mason, 1981:59–60). Today, relatively little of the forest cover remains standing as a result of forest clearing by early Euro-Canadian agriculturalists and the present day urban and industrial expansion of the Greater Toronto Area (MNR, 2011).

The Toronto Islands were formed in the late glacial and post glacial periods by sediment supplied to Lake Ontario from the rivers and from bluff erosion along the Scarborough Bluffs (Sharpe, 1980). This supply of sediment resulted in the formation of a sand spit extending from Ashbridge's Bay to the Toronto Islands. A considerable amount of fill has been added to the islands and waterfront since the turn of the 20th century, including the west end of the Toronto Islands to create the present-day BBTCA (Figure 11). These harbor alterations resulted in the isolation of the inner harbor from past sediment sources although significant amounts of sediment still settles within the harbor. The Don River, once a source of sediment, now empties into the Keating Channel, which is regularly dredged.

1.3.2 Lakebed Natural Environment

In addition to the 35,000 to 40,000 cubic metres of sediment dredged each year from the Keating Channel, sediment still settles within the harbour. Large plumes of sand visible in aerial photography extend southerly at both ends of the BBTCA land mass at the ends of the current runways, readily demonstrating the silting process of the harbour. Furthermore, PortsToronto undertakes dredging not only annually in the Keating Channel, but also dredging from time to time in the Inner Harbour, the Eastern Channel, the Western Channel, the Coatsworth Cut and Ashbridges Bay in order to maintain these areas for marine navigation (Figure 13). This testifies to the movement of seabed material within the harbour (Aquatic Habitat Toronto, 2014). Historically, the Western Channel was completely dredged in 1906, when its depth was found to be too shallow following the sinking of the steam barge Resolute (Wickson, 2002). The sand bars inside Toronto's harbour have held and still hide numerous vessels from over the years. One example demonstrating the movement of the sand bars comes from the Harbour Master in his 1862 report. He wrote that the sand bar of the eastern entrance had grown and the water became shallower. The gap or entrance enlarged half a mile in width. He indicated that the beach line receded so far that a boiler from a wreck steamer that was visible out of the water was now lying 100 yards further away and in deep water (Buchanan, 1882).

A hydrographic survey of the project site was completed by PortsToronto on November 15, 2011 and details the lakebed areas adjacent to fill lands on the eastern end of the BBTCA runway (Dillon Consulting Limited, 2013). An area extending in the harbour 200 m from the end of the lakefill shows a light slope from 6 m to 10 m in depth. The seabed consists of sand and silt deposits varying in unknown thickness, likely 10 m or less of overlying natural bedrock (CH2M Hill Canada Limited, 2013). No mention of the actual seabed material is made and no further ground penetrating studies were conducted. On the western end of the airstrip the seabed is predominantly made of fine sand and silt to a depth of 6 m at 200 m from the airstrip (CH2M Hill Canada Ltd., 2013). No data concerning the depth of the sediment is available.

1.3.3 Known Shipwrecks and other Known Marine Archaeological Resources

Lake Ontario has close to 500 known shipwrecks (Northern Shipwreck Database 2002) accounting for approximatively 12% of all the 6,000 shipwrecks of the Great Lakes (Swayze, 2014), although some researchers estimate a total of 25,000 lost ships on the Great Lakes (Thomson, 2000). It is interesting to note that in Bouchette's 1815 Map of the Plan of York Harbour (adapted from the original 1793 map), the image of the Schooner Anandaga wreck can be seen on the western part of the island. This military vessel was later salvaged.

The shipwrecks illustrated on the southern part of the Island or outside the Harbour are not listed, except for the Lyman M. Davis, the closest wreck to be visited by divers located at the southern point of the Island. Since sport diving is not allowed within the extended footprint and diving within the harbour is strictly regulated, interviews done with some of Toronto's dive shops did not revealed pertinent information for wreck locations near the current BBTCA study area. To realise a more thorough listing would necessitate extensive research due to the high number of known maritime tragedies in the area and the staggering amount of historical documentation available.

Gibraltar Point, once located on the northern end of the island, was witness to numerous tragedies. Many of the known wrecks on that point were salvaged and the vessels were repaired and sailed again. Some ships were damaged beyond repair and lay there to rest for many years. One of the oldest wrecks of the Point is the Toronto, also known as the Toronto Yacht. The vessel broke her back on the rocky reef and became somewhat of a novelty, a portion of her hull remained upon the beach for number of years (Lewis, 2003; Swayze, 2014).

The Monarch also broke up at Gibraltar Point (Figure 13). Its motors were salvaged while part of the vessel broke up during the storm. Like the vessel Toronto, the remains of both hulls are most probably hidden within the lake-fill. The wreck Commodore Jarvis excavated at the Air Canada Center in 1997 proves that lake-fill presents archaeological potential and can conceal hull remains (ASI, 2003).

As for the vessels Chicoutimi, Midland Rover, Resolute and Theresa, their actual location is unknown. They are lost in the Harbour and sank near the Western Channel. It is therfore possible to encounter submerged archaeological resources within the land mass extension construction footprint at both ends of the BBTCA.

Table 4 presents a summary list of the wrecks known to exist within Toronto Harbour and Figure 14 illustrates the approximate location of several of these wrecks. The list does not include ships that have been, to our knowledge, salvaged. Wrecks listed shown in bold are shipwrecks whose locations are known, or it is reasonable to think, are in the vicinity of the construction footprint at both ends of the BBTCA. The list comes principally from David Swayze Great Lakes Shipwreck File which has compiled close to 5,000 shipwrecks from 1679 to 2001.

Table 4: List of Shipwrecks Known to be Present in Toronto Harbour

Vessel Name	Type at Loss	Official No	Build Info	Dimensions	Accdt Date	Accdt Place	Reference
ERIE BELLE	schooner, wood, 3-mast	C73913	1873, W. Pontine, Port Burwell, Ont.	136x24x10, 275gc	1924	Near the Eastern Gap, Toronto Harbour	The David Swayze Great Lakes Shipwreck File
ISLAND QUEEN	propeller, (wood), passenger & package freight	C117078	1905, D.McMurchey, Toronto	98x20 129gc 87nc	1918, Mar 12	Toronto harbour- at her wharf	The David Swayze Great Lakes Shipwreck File

Vessel Name	Type at Loss	Official No	Build Info	Dimensions	Accdt Date	Accdt Place	Reference
NORONIC	propeller, steel, passenger	C134014	1913, Western Drydock, Port Arthur, Ont. hull# 6	362x52x30, 6905gc 3935nc	1949, Sep 17	Toronto Harbour, pier #9	The David Swayze Great Lakes Shipwreck File
ONTARIO	propeller, wood, freighter	C80875	1881, R. Davis, Wolfe Isl., Ont.*	104x23x6, 150gc 93nc	1885, Aug 3	Toronto harbour, probably at her wharf	The David Swayze Great Lakes Shipwreck File
PICTON	sidewheel steamer, iron composite, passenger & package freight	C ?	1870, Gilbert, Montreal	179x27x11, 946 gc	1907, Sep 20	Toronto harbour	The David Swayze Great Lakes Shipwreck File
MONARCH -	**sidewheel steamer, wood, passenger & package freight**	**C none**	**1856, A & D Shaw, Kingston, Ont.***	**174x25x11, 400 t.**	**1856, Nov 29**	**Gibraltar Pt. off Toronto**	**The David Swayze Great Lakes Shipwreck File**
TORONTO -	**armed sail yacht, wood**	**none**	**1799, J. Dennis, Humber, Ont.**		**1812, Summer**	**Gibraltar [Hanlan's] Point,**	**The David Swayze Great Lakes Shipwreck File**
CHICOUTIMI	**sidewheel steamer., wood, passenger & package freight**	**C80756**	**1881, R. Savard, Levis [Bienville], Quebec**	**93x20x6 110gc 70nc**	**1898**	**in harbour at Toronto**	**The David Swayze Great Lakes Shipwreck File**
GORDON JERRY	propeller, wood, bulk freight "rabbit" stonehooker	C88628	1884, J Duprey, River Rascom, Ont. as a schooner (or Port Burwell, 1874)	102x25x6 124 t.	1905, Fall	on Ward Island, Toronto harbor	The David Swayze Great Lakes Shipwreck File
MIDLAND ROVER	**schooner, wood, 3-mast**	**C71120**	**1863, Quayle & Martin, Cleveland (also seen as G. Notter)**	**140x30x12, 353g/n**	**1882, Dec 4**	**Toronto Bay, western channel**	**The David Swayze Great Lakes Shipwreck File**
RESOLUTE –	**propeller, wood, "steambarge", twin screw**	**C88241**	**1883, W. Evans, Deseronto, Ont.**	**137x28x10x 372gc 262nc**	**1906, Nov 22**	**Western Channel, Toronto Harbor**	**The David Swayze Great Lakes Shipwreck File**

Vessel Name	Type at Loss	Official No	Build Info	Dimensions	Accdt Date	Accdt Place	Reference
REUBEN DOUD	schooner, wood, 3-mast	C100305	1873, Gibson, Winneconne, WI [US# 110151]	137x26x12 324g 308n	1906, Aug 24	on Ward's Is. near the harbor entrance at Toronto	The David Swayze Great Lakes Shipwreck File
THERESA	**propeller, wood**	**C90564**	**1874, Clayton, NY [US#6839]**	**86x18x5, 84 t.**	**1887, Aug**	**Lost in Toronto Harbour**	**The David Swayze Great Lakes Shipwreck File**
PROVINCIAL	Paddle Wheels		Baltimore, Maryland, U.S.A., 1839	170x 22 - 145 tons	blown up June 1877 to get rid of it.	Beached near Union Station	Ref : 1
LYMAN M. DAVIS	Schooner	The only wreck known to divers. It rest outside the harbour			1934	wreck lies in about 135 feet of water, in Humber Bay, just outside Toronto Harbour	http://www.scubatoronto.com/divesites.asp?siteID=4
INKERMAN	steamboat				1857, may	Browne's Wharf, Toronto	http://images.maritimehistoryofthegreatlakes.ca/198/data?n=1
UNKNOWN WRECK					Prior to 1833	Edge of sand bar western end of Gibraltar's point	Illustrated in the Plan of the town and Harbour of York, Upper Canada. 1833 Toronto Public Library

1: http://db.library.queensu.ca/dbtw-wpd/exec/dbtwpub.dll?AC=GET_RECORD&XC=/dbtw-wpd/exec/dbtwpub.dll&BU=http%3A%2F%2Fdb.library.queensu.ca%2Fmarmus%2Fmills%2Findex.html&TN=mills&SN=AUTO16291&SE=1484&RN=0&MR=20&TR=0&TX=1000&ES=1&CS=1&XP=&RF=Milltab&EF=Basic+Record+Form&DF=Milling&RL=0&EL=1&DL=0&NP=3&ID=&MF=mymsg.ini&MQ=&TI=0&DT=&ST=0&IR=10834&NR=0&NB=0&SV=0&SS=1&BG=bccee2&FG=008080&QS=index&OEX=ISO-8859-1&OEH=ISO-8859-1

1.3.4 Known Archaeological Sites and Surveys

Background studies have indicated that York County was intensively occupied by pre-contact Aboriginal people and early Euro-Canadian settlers. A request to the ASDB was made on August 21, 2014 to determine if there were any registered archaeological sites in close proximity to the BBTCA study area. A response was received from Robert von Bitter of the MTCS on September 2, 2014 which indicated the presence of seven registered archaeological sites within 1 km of the current study area. Of the seven registered sites, there are six Euro-Canadian historic sites and one site of undetermined type. Two of these sites, CjCl Tower (AjGu-20) and Dodds (AjGu-69) are located on the Toronto Islands, but are located to the southeast of the BBTCA study area. Table 5 provides additional information on these archaeological sites.

Table 5: Archaeological Sites within 1 km of the BBTCA Study Area

Site Borden	Site Name	Site Type	Cultural Affiliation	Researcher
AjGu-20	CJCL Tower	Dump	Euro-Canadian	Donald A. Brown (1985)
AjGu-24	Furniss Water Works Wharf	Navy Wharf	Euro-Canadian (Late)	Robert Mayer (1986)
AjGu-25	1894 Landfill	Dump	Euro-Canadian (Late)	Robert Mayer (1986)
AjGu-26	Historic Fort York	Fort	Euro-Canadian; pre-contact Aboriginal	David Spittal (2006)
AjGu-32	New Fort	Fort	Euro-Canadian	N/A
AjGu-69	Dodds	N/A	N/A	N/A
AjGu-74	Queens Wharf Station	N/A	Euro-Canadian	N/A

Information concerning specific site locations is protected by provincial policy, and is not fully subject to the Freedom of Information Act. The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. The MTCS will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

Registered archaeological site CjCl Tower (AjGu-20) is located on the Toronto Islands to the southeast of the BBTCA study property, on the peninsula narrows. According to the MTCS, CjCl Tower (AjGu-20) was identified by Donald A. Brown under the archaeological license issued to Scott Hamilton in 1985. The site was documented as a Euro-Canadian dump site circa 1860-1890 and included ceramics, glass vessels, bottles, bricks, and metal which were protruding from sand dunes. The area has reverted back to marsh and scrub vegetation as part of a park area. The second site located on the Toronto Islands is the Dodds site (AjGu-69) which was registered by Charles Garrad and is the supposed (though undetermined) location of a Mississauga campsite; however, the MTCS records do not contain any specific information on the type or cultural affiliation of this site.

The remaining five archaeological sites are dotted across the Toronto waterfront shoreline to the north of the BBTCA study area and include the Furniss Water Works Wharf (AjGu-24), a Late Euro-Canadian Navy wharf site used for unloading coal from ships and protecting water mains. No artifacts were collected, but the structural remains of lake-fill cribbing were observed. These structural remains were buried under 9 m of 19th century landfill mixed with lake sediment and were severely impacted by construction excavation in 1986. Archaeological site AjGu-25, the 1894 Landfill site, was identified by Robert Mayer in 1986 as a Euro-Canadian landfill area. The site was enclosed by Esplanade cribwork likely placed for the Grand Trunk Railway. Secondary deposits of late 19th century refuse material were buried beneath 9 m of fill. The majority of this site was destroyed by the construction excavation for the SkyDome Stadium, which is now the Rogers Centre. The Historic Fort York site (AjGu-26) is located between present-day Bathurst and Strachan Avenue on Historic Fort York Property. Three pre-contact Aboriginal artifacts were recovered (2 chert, 1 pottery) along with approximately 250,000 Euro-Canadian artifacts associated with the British military Fort. AjGu-26 is protected from development as a national historic site of Canada and is managed by the City of Toronto. MTCS records contained no further information regarding the New Fort (AjGu-32) or the Queen's Wharf Station (AjGu-74) sites.

1.3.5 Existing Conditions

The BBTCA study area is located on the western tip of the Toronto Islands, and includes the airport runways and buildings. The City of Toronto Master Plan has designated the majority of the Toronto Islands as parklands and natural areas and this includes small parts of the southern portion of the BBTCA study area. Hanlan's Point beach

and sand dune areas are limited to the section of the shoreline that extends south from the western end of the BBTCA runway. The Inner Harbour and the Western Channel surrounding the eastern and northern shorelines of the BBTCA study area are commonly used by commercial, recreational, and ferry vessels.

2. Analysis and Conclusions

2.1 Archaeological Potential Analysis

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Criteria commonly used by the Ontario MTCS (Ontario Government, 2011b:17-18) to determine areas of archaeological potential include:

- Proximity to previously identified archaeological sites;
- Distance to various types of water sources;
- Soil texture and drainage;
- Glacial geomorphology, elevated topography and the general topographic variability of the area;
- Resource areas including food or medicinal plants, scarce raw materials and early Euro-Canadian industry;
- Areas of early Euro-Canadian settlement and early transportation routes;
- Properties listed on municipal register of properties designated under the *Ontario Heritage Act* (Government of Ontario 1990b);
- Properties that local histories or informants have identified with possible archaeological sites, historical events, activities or occupants; and
- Historic landmarks or sites.

Certain features indicate that archaeological potential has been removed, such as land that has been subject to extensive and intensive deep land alterations that have severely damaged the integrity of any archaeological resources. This includes landscaping that involves grading below the topsoil level, building footprints, quarrying, sewage and infrastructure development (Ontario Government, 2011b, Section 1.3.2).

2.1.1 Known Marine Archaeological Resources and Potential

At least four vessels are known to have been lost inside of the Toronto Harbour in the vicinity of the BBTCA study area, two of which are in the direct vicinity of the Western Channel. Sedimentation located at the land mass extension construction footprint at both ends of the BBTCA runway is suitable for preserving and covering such underwater resources. As such, the potential for submerged archaeological resources can be considered high.

2.1.2 Known Archaeological Sites

Seven registered archaeological sites are situated within 1 km of the BBTCA study area, including 2 sites on the Toronto Islands, and archaeological potential is elevated in proximity to each of these known and registered sites. Consideration of the proximity of land-based archaeological sites can contribute to the assessment of marine based archaeological potential as it is possible that some archaeological sites have become submerged with the rising and falling water levels of Lake Ontario.

2.1.3 Natural Environment Features

The evaluation of archaeological potential based on the proximity of the study areas to water sources must take into account a number of factors. A basic example would be the difference between an accessible shoreline versus an inaccessible shoreline, as the potential for archaeological sites to be present is elevated in areas where there is easy

access to water. Archaeological site locations and site types are affected in varying degrees by proximity to different types of water sources and shorelines. Primary sources of water such as lakes, rivers, streams and creeks are reliable sources of drinking water and transportation and trade routes, while secondary water sources such as seasonal streams and creeks, springs, marshes and swamps are intermittent sources of potable water. Features indicating past water sources, for example glacial lake shorelines, relic river or stream channels, and shorelines of drained lakes or marshes are archaeologically significant features that indicate archaeological potential.

Lakes, large rivers, and glacial shorelines are probably the most important foci of pre-contact settlement and indicate high archaeological potential (ASI, 2006). The BBTCA study area is located entirely on the Toronto Islands in Lake Ontario, just west of the Don River Estuary. The Islands are also in close proximity to the remnant shorelines of glacial Lake Iroquois and, although the Islands would have been completely inundated by the lake until the glaciers retreated, nearshore deposits of sand and silt laid down during the Holocene would have made the island a habitable location for pre-contact and post-contact Aboriginal people.

2.1.4 Areas of Early Euro-Canadian Settlement and Industry

Areas of early Euro-Canadian settlement are indicated on the 19th century maps and from archival research conducted during the course of the study. The earliest roads in the vicinity of the study area are Yonge Street, visible on the historic mapping as early as 1818, Queen Street, and King Street. No early roads are located within the BBTCA study area as this area consisted only of two small portions of the original sandbar until the airport lands were created by lake-fill in the 1930s.

ASI (2003) notes that several temporary 19th century York military encampments, comprising a blockhouse and a storehouse, existed in the original Gibralter Point area to the south of the BBTCA study area; however, given the extensive disturbance to the original sandbar of Gibralter Point to construct the BBTCA, it is unlikely that any evidence of these settlements still exist. The 1809 lighthouse and the associated lighthouse keeper's cottage represent areas of potential for the recovery of Euro-Canadian resources; however, these areas fall outside of the BBTCA study area to the south. Of similar interest would be the locations of the many 19th century cottages that were noted to have populated the original peninsula sandbars near the BBTCA study area (ASI, 2003).

2.2 Conclusions

Background research indicates that lake-fill has proved to conceal known archaeological resources resting at the bottom of the harbour. Known wrecks are present under the extension of the Toronto Islands and potentially within the lake-fill under the BBTCA property. In fact, the remains of the **Toronto Yacht**, lost at Hanlan's Point and the unknown wreck illustrated in the plan of 1833 are possibly still present within the lake-fill (Toronto Public Library, 1833).

In terms of marine archaeology, the Archaeological Master Plan for the Central Waterfront (City of Toronto, 2003) is erroneous when it concludes that lake-fill does not have archaeological potential (City of Toronto, 2003). While land based archaeological sites will not be present on the artificially constructed land, under the water, the lake-fill and other sediment could be preserving marine archaeological resources. Sedimentation of the bottom at the areas of proposed land mass extensions is suitable for preserving and covering such underwater resources. Archaeological potential is removed in areas where the lakebed has been dredged; however, the archaeological potential is judged to be high for marine archaeological resources in all other areas as significant marine archaeological resources could be present and obscured by sediment.

3. Recommendations

The background research of the underwater portion of the BBTCA study area resulted in the identification of several ship wrecks that have been lost in Toronto Harbour and potentially in the vicinity of the study area. Based on these findings, there is high potential for the recovery of marine archaeological resources. It is possible that these resources may be impacted by the proposed land mass extension and mitigation measures are required.

Given that the preferred method of extending the runway is to construct it on lake-fill, we considered that capping the existing lakebed with lake-fill could in fact protect possible cultural remains. This unusual method has been proven efficient only through archaeological example in numerous coastal cities. In order to propose this measure as a relevant mitigation method, the compactness of the bottom sediment must be evaluated and proven to be of high density limiting compression of possible potential archaeological resources. Only following further studies of bottom sediment can we recommend this, out of the ordinary, method of mitigation

For this reason, we recommend that a survey of the projected lake-fill area and its 100 meters buffer zone be performed with a sub-bottom profiler and an underwater magnetometer. This should determine if any archaeological resources, particularly shipwrecks, are present under the existing lakebed. The depth of the study area will probably make this survey difficult and may necessitate remotely operated equipment. If the result of the survey proves that no cultural resources are present, lake filling can be executed as projected. If anomalies are present, a visual confirmation of the resources is to be executed through direct diving or by remotely operated vehicle equipped with an underwater camera. If the cultural remains are buried within the lakebed, an underwater excavation is to be completed in order to visually confirm and identify the presence of cultural remains. Only after a proper validation can we propose appropriate protective measures.

We also recommend that a qualified underwater archaeologist with scientific competence appropriate to the project be present at all time during the physical survey as specified in the general principals of the Convention on the Protection of the Underwater Cultural Heritage by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The MTCS is asked to accept this report into the Ontario Public Register of Archaeological Reports thereby concurring with the recommendations presented herein.

4. Advice on Compliance with Legislation

This report is submitted to the Ontario Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (2012) requires that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ontario Ministry of Government and Consumer Services.

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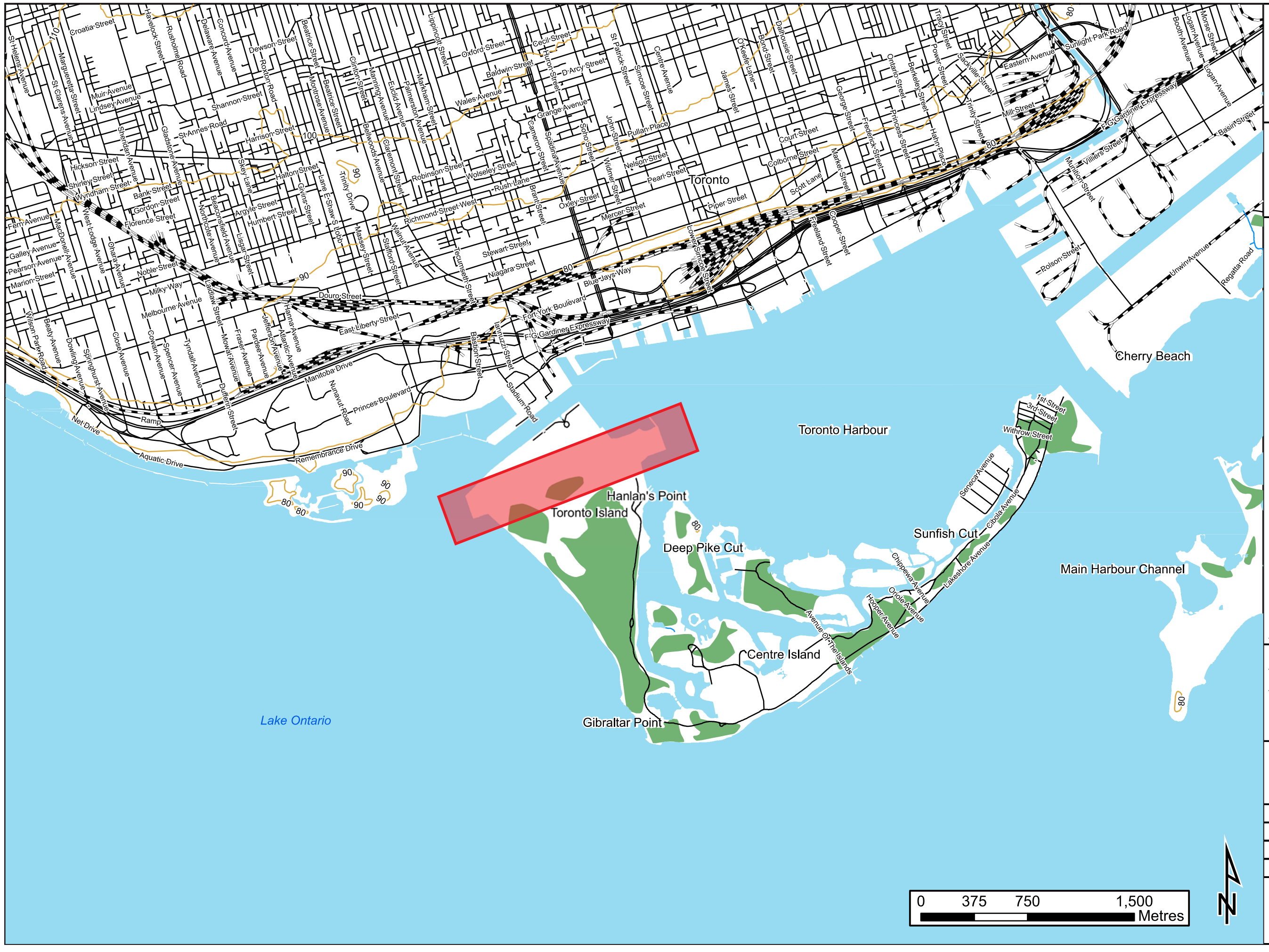
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6. Figures

All figures pertaining to the Stage 1 archaeological assessment for the areas of the land to be impacted by the proposed land mass extension at the BBTCA are provided on the following pages.



Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

- Study Area
- Wooded Area
- Water Body
- Wetland
- Aggregate Pit
- Watercourse
- Road
- Railway
- 120 Contour (5 m)

Source: OBM layers - Ministry of Natural Resources

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Figure 1:
Location of Study Area

Date: June 2015

PN: 60328546

Scale: 1:25,000

Datum: NAD 83 UTM 17N

AECOM



Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

- Study Area - Runway Extension Construction Footprint
- Proposed Runway Extension
- Existing Runway
- Roads
- Watercourse
- 190 Contour (5 m)

Source: OBM layers - Natural Resources Canada
Aerial Photo - 2013 CNES/Airbus DS, ESRI

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Figure 2:
Study Area in Detail

Date: June 2015

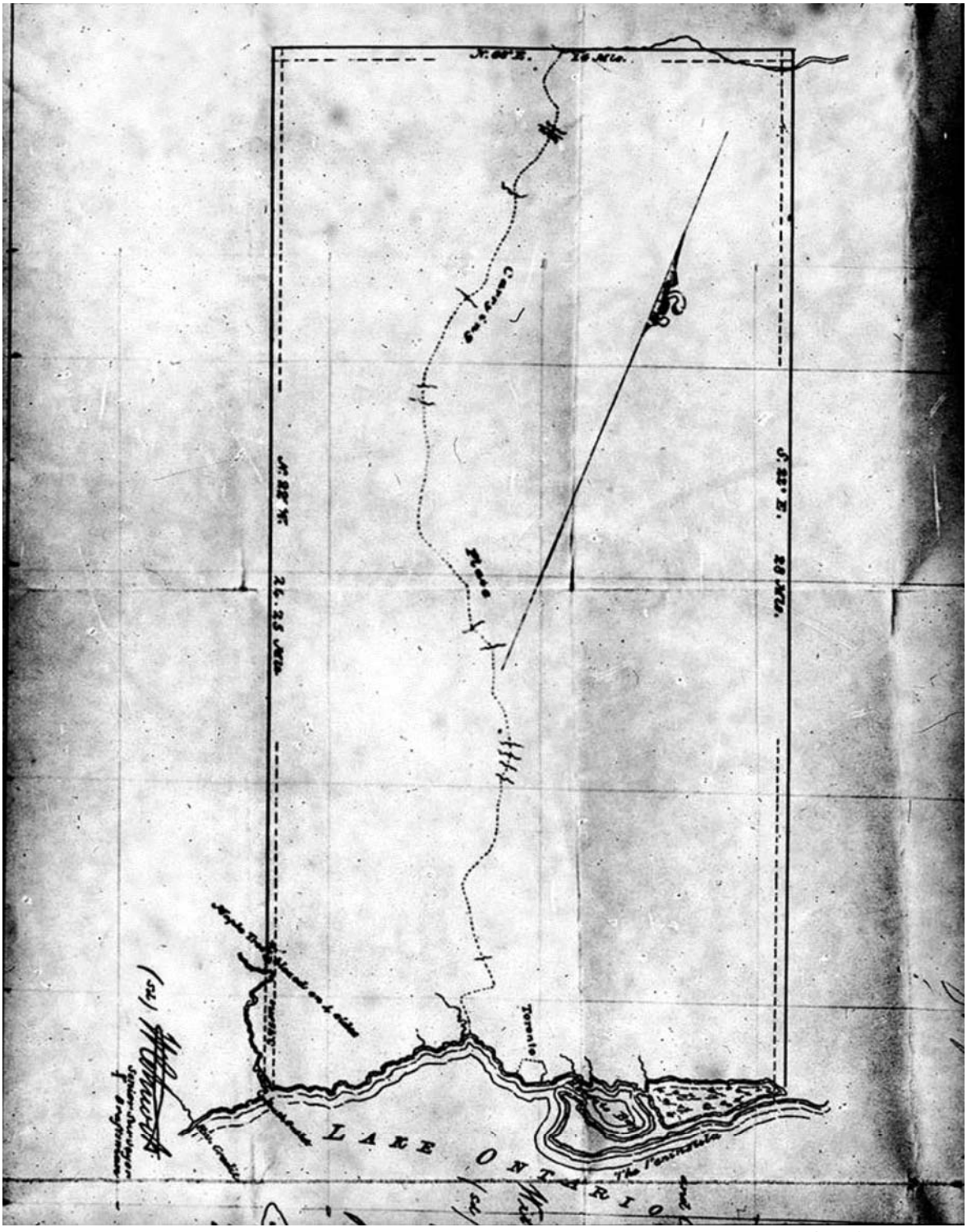
PN: 60328546

Scale: 1:5,500

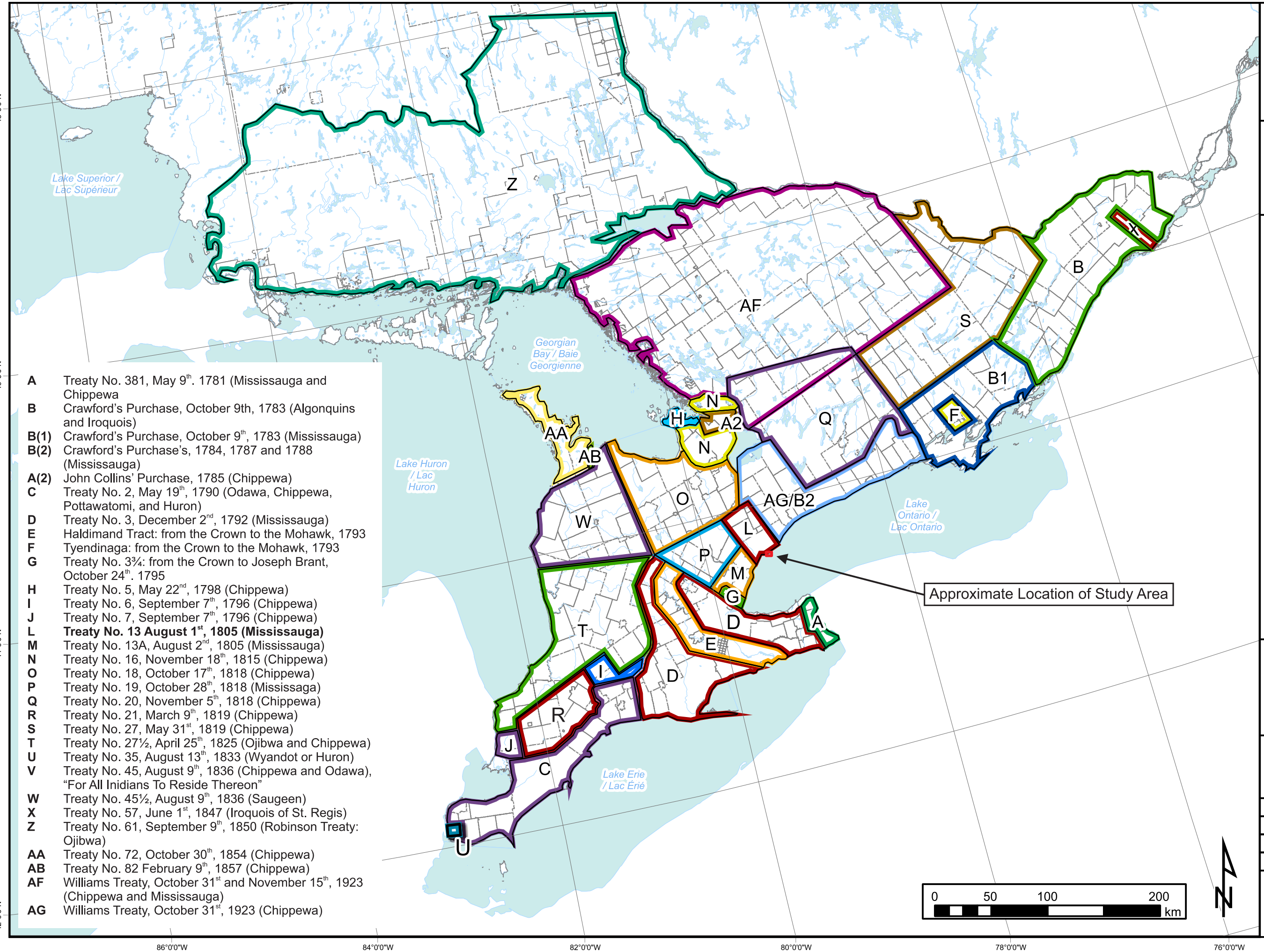
Datum: NAD 83 UTM 17N

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Figure 3: 1787 Map of the Toronto Purchase (surveyed by William Chewitt 1787-1805)



From City of Toronto Archives



A Treaty No. 381, May 9th. 1781 (Mississauga and Chippewa)
B Crawford's Purchase, October 9th, 1783 (Algonquins and Iroquois)
B(1) Crawford's Purchase, October 9th, 1783 (Mississauga)
B(2) Crawford's Purchase's, 1784, 1787 and 1788 (Mississauga)
A(2) John Collins' Purchase, 1785 (Chippewa)
C Treaty No. 2, May 19th, 1790 (Odawa, Chippewa, Pottawatomi, and Huron)
D Treaty No. 3, December 2nd, 1792 (Mississauga)
E Haldimand Tract: from the Crown to the Mohawk, 1793
F Tyendinaga: from the Crown to the Mohawk, 1793
G Treaty No. 3¾: from the Crown to Joseph Brant, October 24th. 1795
H Treaty No. 5, May 22nd, 1798 (Chippewa)
I Treaty No. 6, September 7th, 1796 (Chippewa)
J Treaty No. 7, September 7th, 1796 (Chippewa)
L **Treaty No. 13 August 1st, 1805 (Mississauga)**
M Treaty No. 13A, August 2nd, 1805 (Mississauga)
N Treaty No. 16, November 18th, 1815 (Chippewa)
O Treaty No. 18, October 17th, 1818 (Chippewa)
P Treaty No. 19, October 28th, 1818 (Mississaga)
Q Treaty No. 20, November 5th, 1818 (Chippewa)
R Treaty No. 21, March 9th, 1819 (Chippewa)
S Treaty No. 27, May 31st, 1819 (Chippewa)
T Treaty No. 27½, April 25th, 1825 (Ojibwa and Chippewa)
U Treaty No. 35, August 13th, 1833 (Wyandot or Huron)
V Treaty No. 45, August 9th, 1836 (Chippewa and Odawa), "For All Inidians To Reside Thereon"
W Treaty No. 45½, August 9th, 1836 (Saugeen)
X Treaty No. 57, June 1st, 1847 (Iroquois of St. Regis)
Z Treaty No. 61, September 9th, 1850 (Robinson Treaty: Ojibwa)
AA Treaty No. 72, October 30th, 1854 (Chippewa)
AB Treaty No. 82 February 9th, 1857 (Chippewa)
AF Williams Treaty, October 31st and November 15th, 1923 (Chippewa and Mississauga)
AG Williams Treaty, October 31st, 1923 (Chippewa)

Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend
- Study Area
- Water Body
- Watercourse
- Municipality Boundary - Upper
- Municipality Boundary - Lower
- Treaty Boundary

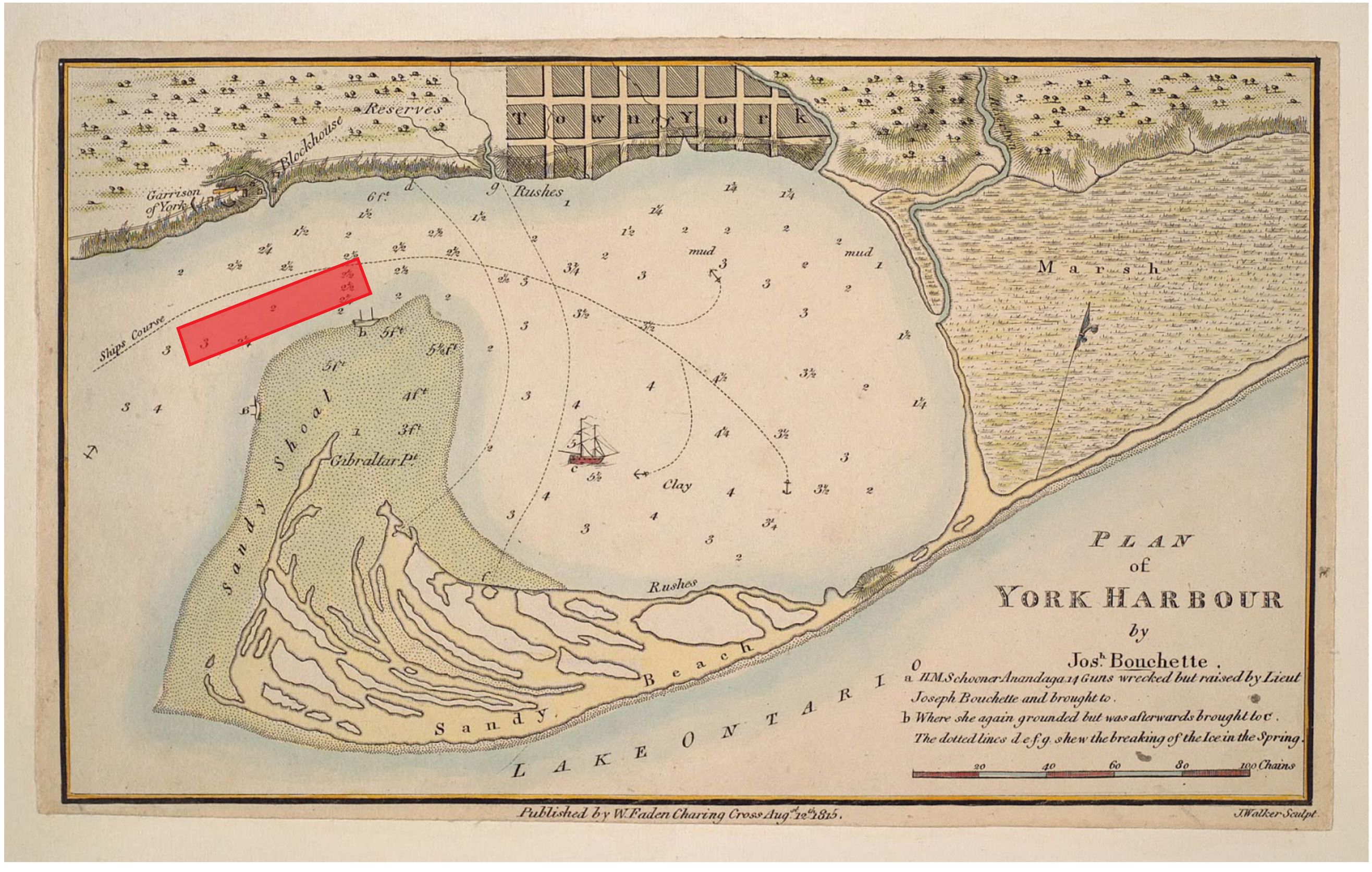
Source: OBM layers - Natural Resources Canada
Treaty Boundaries - Morris 1943

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Figure 4:
Treaties and Purchases
(Adapted from Morris 1943)

Date: June 2015
PN: 60328546
Scale: 1:3,000,000
Datum: NAD 83 CSRS Canada Atlas Lambert

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Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

Approximate Location of Study Area

Source: Historic Map - Boucehette 1815

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Figure 5:
Bouchette's 1815 Map of the Plan of York Harbour (adapted from the original 1793 map)

Date: June 2015

PN: 60328546

Scale: NTS

Datum: NA

AECOM



Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

Approximate Location of Study Area

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Figure 6:
Browne's 1851 map of the Township of York

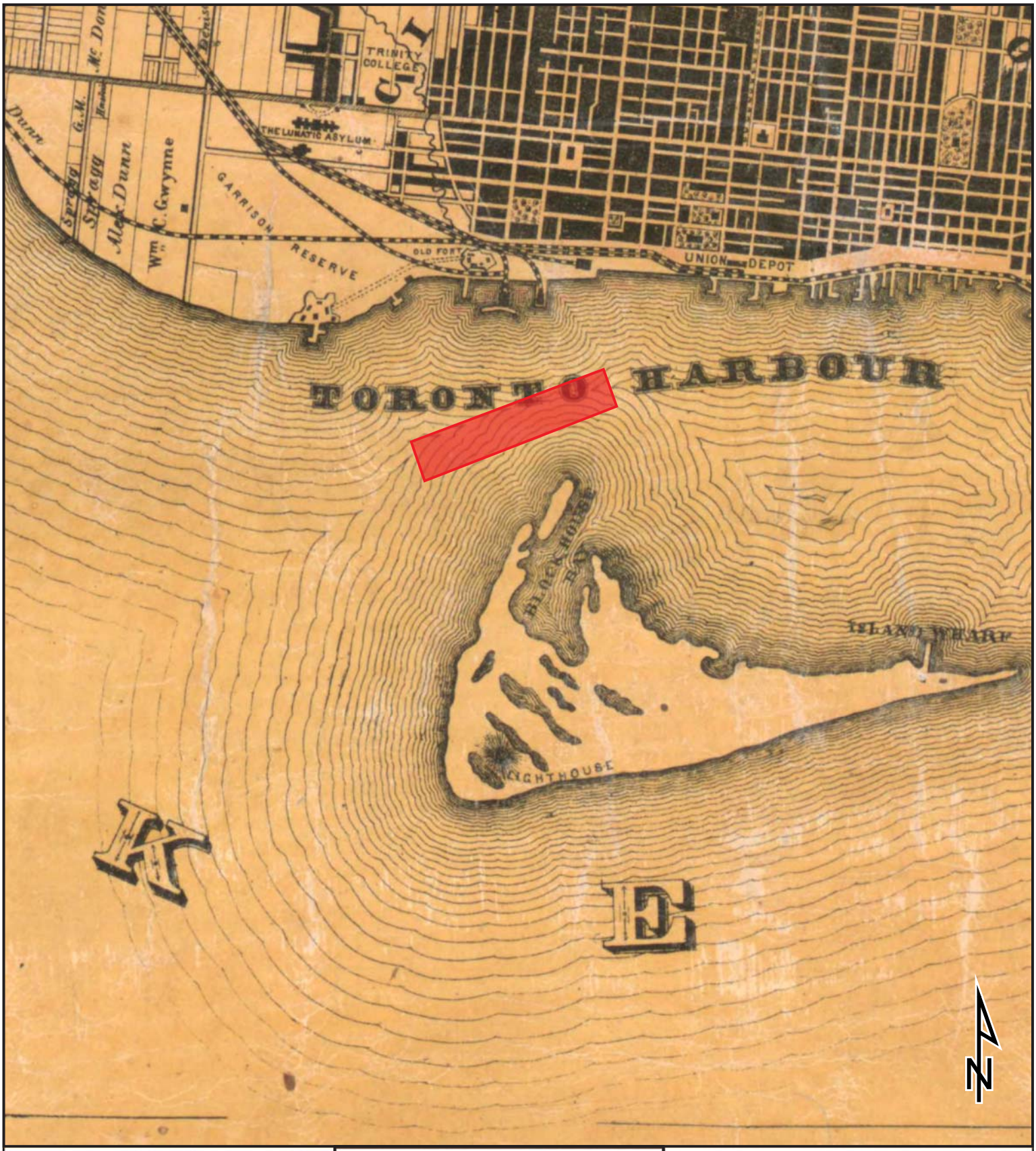
Date: June 2015

PN: 60328546

Scale: NTS

Datum: NA

AECOM



Legend

Study Area

AECOM

Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport
Runway Extension

Source: Historic Map - Tremaine 1860

Figure 7:
A Portion of Tremaine's 1860 Map of the County of York

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Date: June 2015	PN: 60328546
Scale: NTS	Datum: NA



Legend

Study Area

AECOM

Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport
Runway Extension

Source: Historic Map - Miles and Co. 1878

Figure 8:
A Portion of the 1878 Miles and Co. Illustrated Historical Atlas of York County

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Date: June 2015	PN: 60328546
Scale: NTS	Datum: NA



Legend

- Study Area
- Archaeological Potential
- 1820 Shoreline
- 1912 Shoreline

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Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport
Runway Extension

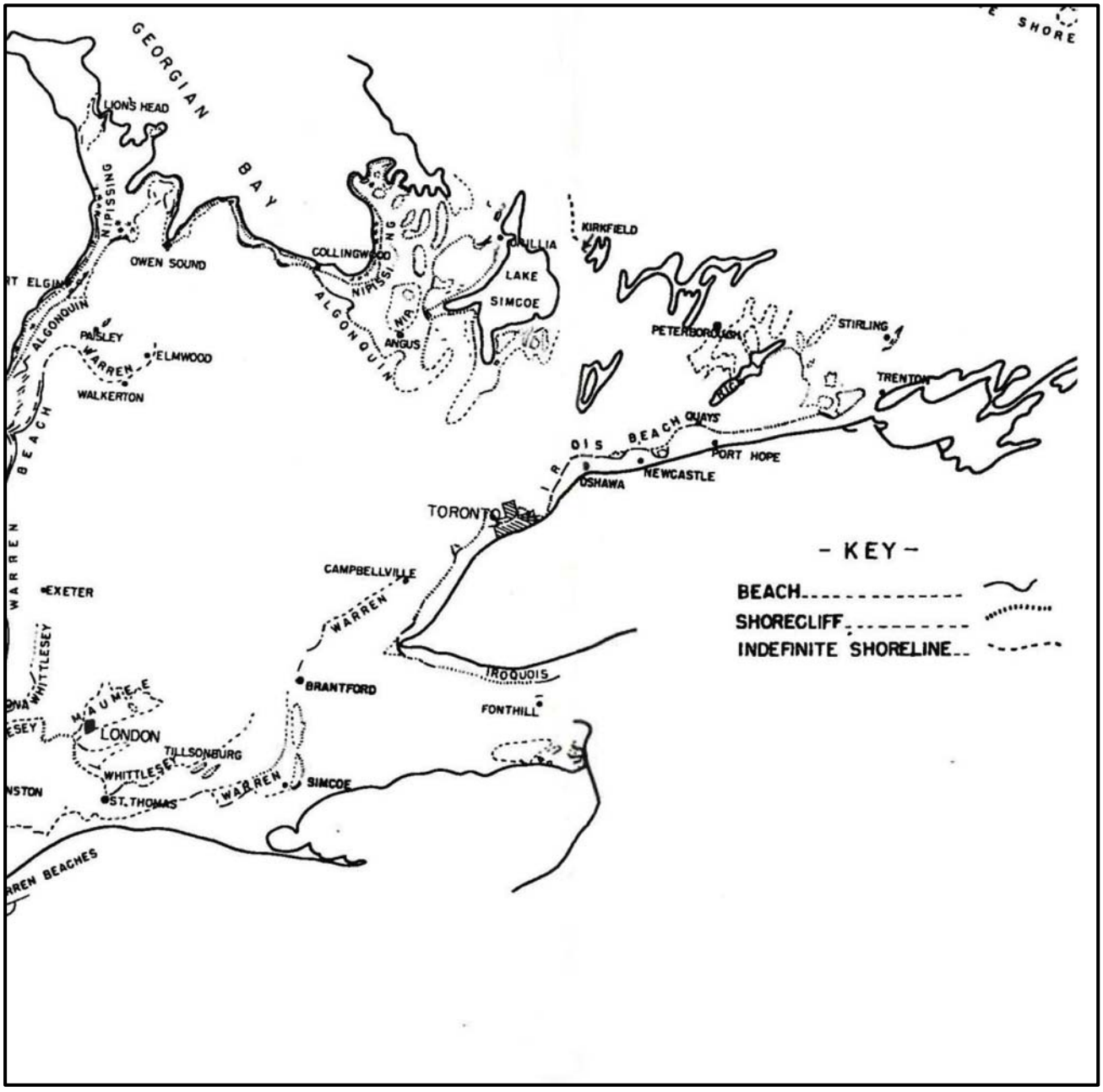
Source: Archaeological Master Plan of the Central Waterfront, City of Toronto, ASI 2003

Figure 9:
Central Waterfront Archaeological Master Plan of the Toronto Islands

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Date: June 2015	PN: 60328546
Scale: NTS	Datum: NA

Figure 10: Estimated Location of Glacial Lake Iroquois



Chapman and Putnam (1984)



Stage 1 Archaeological Assessment
Billy Bishop Toronto City Airport Runway Extension

Legend

- Study Area
- 1906 Approximate Area of Toronto Island
- Current Area of Toronto Island and Potential Location of Lake Fill
- Water Body

Source: OBM layers - Ministry of Natural Resources
Historical Area of Toronto Island - Atlas of Canada, No 35 Toronto, Department of the Interior 1906

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Figure 11:
Natural Environment versus Lake-Fill on the Toronto Island

Date: June 2015

PN: 60328546

Scale: 1:15,000

Datum: NAD 83 UTM 17N

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Figure 12: Dredged Areas in Relation to Toronto Island



(Aquatic Habitat Toronto 2014).

Figure 13: Wreck of the Monarch at Gibraltar Point



Source: Toronto Public Library

AECOM
410 – 250 York Street, Citi Plaza
London, ON, Canada N6A 6K2
www.aecom.com

519 673 0510 tel
519 673 5975 fax

Memorandum

To	Angela Homewood, PortsToronto	Page	1
CC	Leah Weller, AECOM		
Subject	BBTCA Cultural Heritage Resource Review		
From	Adria Grant, AECOM		
Date	22/09/2015	Project Number	60328546

This Cultural Heritage Resource review has been prepared to provide information on cultural heritage features to the public and City of Toronto regarding the Billy Bishop Toronto City Airport Runway and Jets Environmental Assessment. This review included:

- a search of the City of Toronto Inventory of Heritage Properties;
- consultation with Rosi Zirger, Heritage Planner, and Robert Von Bitter, Archaeological Sites Coordinator, of the Ontario Ministry of Tourism, Culture, and Sport (MTCS),
- requests to Ontario Heritage Trust (OHT) for information on properties protected by an OHT easement agreement, and
- searches of the Ontario Heritage Properties (OHP) database (2005), the Canadian Register of Historic Places, Ontario Historical Plaques database, Ontario Heritage Trust's Online Plaques Guide, the registered Cemeteries and Crematoriums Database, and the Ontario Genealogical Society's (OGS) list of unregistered cemeteries by County/District.

Figure 1 provides the study area and adjacent land and illustrates the location of the cultural heritage resources identified during this review.

The *Ontario Heritage Act* requires that municipalities keep a register of all properties that they consider to have cultural heritage value or interest. The register can contain World Heritage Sites, National Historic Sites, Provincially significant properties and any properties that the municipality decides to list as culturally significant or designate under the *Ontario Heritage Act*. Properties may be listed as having cultural heritage value or interest but not be designated under the *Ontario Heritage Act*. All properties that a municipality deems to have cultural heritage value or interested are listed in the municipal register; however, it is the municipality's decision whether or not to designate a property under the *Ontario Heritage Act* as this designation protects a property under certain by-laws.

1.1 Designated and Listed Heritage Buildings/Properties

A search of the OHP database identified one heritage property on the Toronto Islands, the Gibraltar Point Lighthouse; however, this building is located well outside of the BBTCA study area to the south

along Lakeshore Avenue. As the OHP database has not been updated since 2005, a review and search of the City of Toronto's Inventory of Heritage properties was also conducted to confirm the presence or absence of any additional listed or designated heritage properties within or adjacent to the study area. The results of these searches identified one heritage property adjacent to the BBTCA study area, the Ned Hanlon Memorial. Details on this heritage property are provided below.

Ned Hanlan Memorial (Listed)

The Ned Hanlan Memorial was listed by Toronto's City Council as a "Miscellaneous" building type with cultural heritage significance, on June 20, 1973. The Memorial is a large statue located near the ferry dock at Hanlan's point. It was constructed in 1926 and unveiled at the grounds of the Canadian National Exhibition and in 2004 the monument was moved to its current location on the Toronto Islands. No additional information was provided in the City's Inventory regarding this listed heritage monument.

Further consultation with Rosi Zirger, Heritage Planner of the MTCS confirmed that there are no Provincial Heritage Properties or Notices of Intention to Designate issued in accordance with section 34.6 of the *Ontario Heritage Act* within or abutting the study area. The OHT was contacted via email on June 3, 2015 regarding information on properties protected by an OHT easement agreement. Michael Sawchuck, Manager, Acquisitions and Conservation Services, at the Ontario Heritage Trust confirmed that there are no easement agreements on properties within or abutting the BBTCA study area.

1.2 National Historic Sites

A search of the Canadian Register of Historic Places resulted in the identification of one National Historic Site immediately to the south of the BBTCA study area. The Toronto Island Airport Terminal Building was designated as a National Historic Site of Canada in 1989. The Toronto Island Airport Terminal Building was built in 1938 and is described as a two-storey, wooden aviation terminal with a central control tower. It is located at the western end of the Toronto Islands across the Western channel from downtown Toronto. The building continues to be a part of the existing BBTCA land. The formal recognition consists of the building on its original footprint.

The Toronto Island Airport Terminal Building was designated a National Historic Site as it is a rare surviving example of air terminal construction dating from the formative years of air passenger travel. It is one of very few early terminal buildings to have survived and is likely the oldest, extant operating terminal of its time in Canada. For additional information on the cultural heritage conservation of the airport administration building and surrounding environment, please refer to the Environmental Screening Report for the Removal and Relocation of the Airport Administration building, Billy Bishop Airport by SENES Consultants Limited (2011) and PortsToronto (formerly the Toronto Port Authority), Billy Bishop Toronto City Airport Lakefill Within Marine Exclusion Zone (Keep-Out-Area) - Toronto Harbour by Dillon Consulting Limited (2013).

1.3 Additional Cultural Heritage Features

In a 2004 meeting, City Council passed by-law 952-2004 which identified the Toronto Islands as a site worthy of study for a Heritage Conservation District. The study also recommended that the

Toronto Islands be municipally recognized as a cultural heritage landscape. A review of the City of Toronto Heritage Conservation Districts Studies currently lists the Toronto Islands Heritage Conservation District as “HCD Authorized for Study” although there is currently no Heritage Conservation Study or plan in place.

In addition to built heritage, a search of the registered Cemeteries and Crematoriums Database determined that there are no registered cemeteries within or adjacent to the BBTCA study area. An additional search of the OGS list of unregistered cemeteries for York County also does not list any cemeteries within, or in close proximity to, the study area.

For detailed information regarding archaeological resources and archaeological potential adjacent to the BBTCA study area, please refer to the Stage 1 Archaeological Assessment by AECOM (2015) and the Archaeological Master Plan of the Central Waterfront, City of Toronto prepared by Archaeological Services Inc. (2003).

1.4 Historical Plaques

A search of the Ontario Historical Plaques database and OHT’s Online Plaques Guide was conducted to determine if there were additional heritage features within or adjacent to the BBTCA study area. Eleven historical plaques were identified on the Toronto Islands, three of which are located adjacent to the study area at Hanlan’s Point. Historical plaques that can be found adjacent to the study area include:

Ned Hanlan 1855-1908

One of Canada's greatest oarsmen, Edward Hanlan was born in Toronto. As a child he took up rowing when his family settled in this vicinity, now named Hanlan's Point. Although standing only 175 cm and rarely heavier than 68 kg, he became a leading international sculler. In 1873 Hanlan won the amateur rowing championship of Toronto Bay. Becoming a professional in 1876, he defeated all opponents in the Philadelphia Races of that year. He overcame all leading North American competitors and in 1880 won the world single sculls championship in England. Hanlan retained his title until 1884. A popular Toronto figure, he was elected Alderman for this area in 1898 and 1899.

Babe Ruth at Hanlan’s Point

Near this site, in Maple Leaf Park on September 5, 1914, the now legendary baseball player Babe Ruth hit his first home run as a professional. It was to be the only home run he ever hit in the minor leagues. As a 19-year-old rookie, playing for the Providence Grays in the International League, he connected with a pitch from Ellis Johnson of the Toronto Maple Leafs, sending the ball over the fence in right field and scoring three runs. Pitching for the Grays, Ruth allowed only one hit, earning the title "southside phenom" from the Toronto Daily Star. The final score was Providence Grays 9, Toronto Maple Leafs 0. Babe Ruth quickly moved up to the major leagues, and played his way to a phenomenal career. The Toronto team went on to win a total of eleven pennants before folding in 1967

Professional Baseball at Hanlan’s Point

In 1867, Toronto's professional baseball club moved to the new Hanlan's Point Stadium - part of the larger Hanlan's Point Amusement Park on this site. Baseball and lacrosse joined other

attractions here, including hotels, thrilling amusement rides, and such curiosities as a diving horse. In 1910, the baseball team, now called the Toronto Maple Leafs, replaced its wooden stadium with a concrete, 18,000-seat structure named Maple Leaf Park. The team remained there for the next 15 years, winning pennants for adoring fans in 1912, 1917, and 1918. In 1926, the club was moved to a more accessible, state-of-the-art stadium at the foot of Bathurst Street. The island stadium was eventually demolished and the site was redeveloped for the Toronto Island Airport.

1.5 Cultural Landscapes

InfoSheet #2, Policy 2.6.1 of the *Provincial Policy Statement* defines cultural heritage landscapes as:

> "…a defined geographical area of heritage significance which has been modified by human activities and is valued by a community. A landscape involves a grouping(s) of individual heritage features such as structures, spaces, archaeological sites and natural elements, which together form a significant type of heritage form, distinctive from that of its constituent elements or parts. Examples may include, but are not limited to, heritage conservation districts under the Ontario Heritage Act; and villages, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways and industrial complexes of cultural heritage value."
>
> (PPS, 2005: InfoSheet#2, 1)

The Toronto Islands represent one of Toronto's most important cultural heritage landscapes. Throughout its long history, the Islands have played a significant role in the social, economic, and cultural development of the City of Toronto. The character of this cultural landscape lies in its history of diverse uses, which is currently reflected by existing residences, an airport, commercial and industrial buildings, resorts, public parklands, beaches, military service, and water-based recreational activities.

Cultural modifications to the Toronto Islands began in 1806 with the construction of the Gibraltar Point Lighthouse. A variety of hotels were later constructed on the Islands after the 1830s, mostly in the narrows area on the eastern portion of the island. In the late 19th and early 20th centuries, cottages flourished along Hanlan's Point, in the vicinity of the BBTCA study area and for some time, the island became a resort for people with means (Careless, 1984). Eventually, plans were made to create public parklands on the island and breakwaters were constructed to protect the island from erosion. Perhaps the most significant alteration to the Islands, contributing to the current cultural heritage landscape, was the addition of fill to alter to the configuration of Toronto's new Island and water channels.

In the 1930s, a large area at Hanlan's Point was selected for the site of a new municipal airport, the BBTCA. A considerable amount of fill was added to the northwestern portion of the island in order to provide the necessary land for the development of the airport. This land is still in use as the BBTCA and is one of the most visually prominent cultural landscapes on the Toronto Islands.

In a 2004 meeting, City Council recommended that the Toronto Islands be municipally recognized as a cultural heritage landscape. Although the entirety of the Toronto Islands is considered a significant cultural heritage landscape, there are several specific cultural landscape features that are of note within and adjacent to the current study area. The specific features of the existing cultural landscape

include the BBTCA, Hanlan's Point Beach, the ferry docks and passenger facility at Hanlan's Point, and public parklands.

1.6 Summary of Key Findings of the Cultural Heritage Resources Review

During the cultural heritage resource evaluation, one listed built heritage structure/property - the Ned Hanlan Memorial - and one National Historic Site of Canada - The Toronto Island Airport Terminal Building - were identified adjacent to the BBTCA study area to the south. In addition, eleven historical plaques were identified on the Toronto Islands, three of which are also located adjacent to the current study area at Hanlan's Point. Finally, in 2004, City Council passed by-law 952-2004 which identified the Toronto Islands as a site worthy of study for a Heritage Conservation District and also recommended that the Toronto Islands be municipally recognized as a cultural heritage landscape. Although the study area under consideration for a Heritage Conservation District is as yet undefined, there are several specific cultural landscape features that are of note within and adjacent to the current study area including the BBTCA, Hanlan's Point Beach, the ferry docks and passenger facility at Hanlan's Point, and surrounding public parklands.

The proposed changes to the BBTCA involve modifications to the existing BBTCA cultural heritage landscape that are consistent with its character. There are no anticipated negative impacts to the cultural heritage landscape or other heritage resources in the vicinity.

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2014 Cemeteries and Crematoriums Database. https://www.consumerbeware.mgs.gov.on.ca/esearch/cemeterySearch.do?eformsId=0 (Last accessed on March 13, 2015).

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2011 Environmental Screening Report for the Removal and Relocation of the Airport Administration building, Billy Bishop Airport. Prepared for Toronto Port Authority.

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Appendix C-9

Socio-Economic Effects Assessment

AECOM
30 Leek Crescent, Floor 4
Richmond Hill, ON, Canada L4B 4N4
www.aecom.com
905 882 4401 tel
905 882 4399 fax

Memorandum

To	Marc Rose, AECOM	Page	1
CC	Paul Murray, AECOM		
Subject	Socio-Economic Net Effects Assessment		
From	Megan Ketchabaw, AECOM		
Date	May 24, 2017 (revised June 23, 2017)	Project Number	60447218

1. Overview of Socio-Economic Study

The Environmental Assessment (EA) focuses on the assessment and evaluation of two future scenarios at the BBTCA.

1. **Future Baseline Scenario:** ..... The runway is not extended and jets are not permitted at BBTCA; a Runway End Safety Area (RESA) is constructed approximately 43m into the lake at both ends of the runway to address Transport Canada's requirements,
2. **Proposed Future Scenario: .....** Tripartite Agreement is amended to permit commercial jet operations and the land mass is extended by 200 metres at each end of the main runway.

The description of the Future Baseline Scenario is derived from PortsToronto's 2012 revised Master Plan which details the growth that can occur within the requirements of the existing Tripartite Agreement. The Proposed Future Scenario is derived from PortsToronto's 2015 Master Planning Exercise, which includes future passenger volumes that can be accommodated should the Tripartite Agreement be amended to permit commercial jets to operate from the BBTCA.

The socio-economic effects assessment study examines the effects of the proposal (Proposed Future Scenario) on a number of social and economic community values, which have been categorized into use and non-use values. The first category, "use values", includes assets that exist because people use them, such as places, goods, and services associated with tourism and recreation opportunities. "Non-use values" are values ascribed to aspects of the environment that exist independent of people's use or enjoyment of them.

Non-use values include: options for future generations to develop and use the waterfront, and impacts on Toronto's "brand" as a waterfront city. These non-use values refer to important considerations that are believed to be highly valued by City residents (and others) irrespective of

whether they use the airport or visit the waterfront. This collection of values is assessed together in this technical memo.

The analysis conducted in support of this memo indicates that the socio-economic environment around the Local Study Area (LSA) is dynamic and multi-faceted. It is a thriving area for a variety of residential, recreational and economic uses and is important to residents and visitors alike for its use and non-use values.

There are some fundamental issues and concerns with the current operation of the Billy Bishop Toronto City Airport (BBTCA), particularly for LSA residents and recreational users. These issues are primarily characterized as interruptions in the use and enjoyment of public and private spaces coinciding with the takeoff and landing of BBTCA aircraft due to noise and odour.

These effects are expected to worsen under the Future Baseline Scenario as the number of flights and passengers is expected to increase. The addition of a RESA (approximately 43m on each end) under the Future Baseline Scenario will have some effect on use and enjoyment of the Inner Harbour by recreational boaters. With regard to land-based effects of the Future Baseline Scenario, proposed mitigation measures will minimize but not eliminate the associated increase in traffic congestion.

Implementation of the RESA will also require an amendment to the Tripartite Agreement allowing for an expansion of airport lands to accommodate the RESA requirements.

Compared to the Future Baseline Scenario, the effects associated with the Proposed Future Scenario are generally similar. The use and enjoyment of public and private spaces will continue to be affected by noise, odour, and traffic congestion, although the latter will be minimized through mitigation measures including improved transit. The biggest difference between the two scenarios is the impact of lakefill associated with the runway extension on recreational boaters and emergency response.

The table below provides a summary of the effects associated under: (1) Existing Conditions; (2) the Future Baseline Scenario; and (3) the Proposed Future Scenario.

Does the airport negatively affect …	Existing Conditions	Future Baseline Scenario (as compared to Existing Conditions)	Proposed Future Scenario (as compared to Future Baseline)
Residential Uses	**Yes** Some local area residents are negatively affected by current operations at BBTCA	**Yes** Increasing the number of passengers and aircraft movements will exacerbate the relationship between local residents and the airport	**Yes** Extending the runway, and increasing the number of passengers and aircraft movements, will further exacerbate the relationship between local residents and the airport
Recreational Uses	**Yes** Recreational boaters are negatively affected by current operations at BBTCA	**Yes** Increasing the number of passengers and aircraft movements will contribute to increased crowds and traffic,	**Yes** The introduction of jets will change the look and feel of the waterfront, and the proposed landmass

		which may deter some recreational users from visiting the area. The presence of the RESA will further restrict recreational boaters	extension will reduce the area of navigable water available for recreational boaters
Institutional Uses	**No** BBTCA operations do not affect schools and other institutional uses in the area	**No** Future BBTCA operations are not expected to affect schools and other institutional uses in the area	**No** Future BBTCA operations are not expected to affect schools and other institutional uses in the area
Economy	**No** BBTCA is more of a value to local businesses than it is a cost	**No** There will be increased business activity catering to the increased volume of passengers	**No** There will be increased business activity catering to the increased volume of passengers
Tourism	**No** BBTCA is generally seen as a positive driver for tourism in the area	**No** BBTCA is generally seen as a positive driver for tourism in the area, factoring in an increased number of passengers and aircraft movements	**No** BBTCA is generally seen as a positive driver for tourism in the area, factoring in an increased number of passengers and aircraft movements
Municipal Implications	**No** There is no impact on municipal services and property taxes	**Yes** The presence of the RESA may affect response times of the Toronto Police Marine Unit	**Yes** The presence of the runway extension may affect response times of the Toronto Police Marine Unit
Property Values	**No** There is no evidence that BBTCA operations have any negative effect on property values	**No** Future BBTCA operations are not expected to have a negative effect on property values	**No** Future BBTCA operations are not expected to have a negative effect on property values
Non-Use Values	**No** The presence of BBTCA does not change how the waterfront is perceived by non-users	**No** There is not expected to be a change in how the waterfront is perceived by non-users as a result of the future baseline operation	**Yes** The introduction of jet aircraft and runway extension is expected to change how the waterfront is perceived by non-users

1.1 Study Area

The socio-economic Study Area boundaries have been determined to include all relevant features along the waterfront and to ensure that potential impacts within key areas of the waterfront are assessed. The boundaries include:

- The Gardiner Expressway to the north;

- Port Lands to the east;
- Leslie Street Spit to the south; and
- Ontario Place to the west.

The Study Area described above and shown below in **Figure 1** represents the LSA for assessing use values. A larger, Regional Study Area (RSA), which consists of the City of Toronto, was identified for the discussion pertaining to non-use values.



Figure 1: Socio-Economic Local Study Area

1.2 Key Research Questions

The following research questions guided this assessment:

1. How does the current operation of BBTCA:
    a. Contribute to economic value to the City, employment, businesses, and its users?
    b. Affect tourism as represented by use of LSA hotels, restaurants, and/or tourism-related businesses?
    c. Affect property values, quality of life, and/or viewscapes of residents within the LSA?
    d. Affect the use and enjoyment of recreational and cultural uses/events along the waterfront and on the island?
2. How does the waterfront provide value to non-users of the City?
3. How might any of the above effects change based on the Future Baseline and Proposed Future Scenarios for the BBTCA?

These questions were developed based on the primary concerns and feedback expressed by the public, agencies and stakeholders during three public information open houses held on December 9, 2014; January 24 and 26, 2015; April 11, 2015; and numerous Agency Advisory Committee and Stakeholder Advisory Committee meetings.

To address these research questions, the methodology and data collection described in the following section were developed. The overall intent was to determine if the operations associated with the Future Baseline and Proposed Future Scenarios at BBTCA impose negative or positive changes as per the above questions.

1.3 Methodology and Data Gathering

The overall methodology for the socio-economic assessment of the operations associated with Future Baseline and Proposed Future Scenarios is driven by social values related to the range of “use” and “non-use” values most commonly referred to by participants in public meetings and correspondence. As described in the Final Study Design Report (August 2015), use values (as the term implies) relate to the following active uses of the waterfront:

- Residential Uses;
- Recreational Uses;
- Institutional Uses;
- Economy;
- Tourism;
- Municipal Implications; and
- Property Values.

In this technical memo, those use values are organized into value categories depicted in **Figure 2**. This approach allows for the use values to be grouped and discussed along common themes as they are relevant to the socio-economic environment.

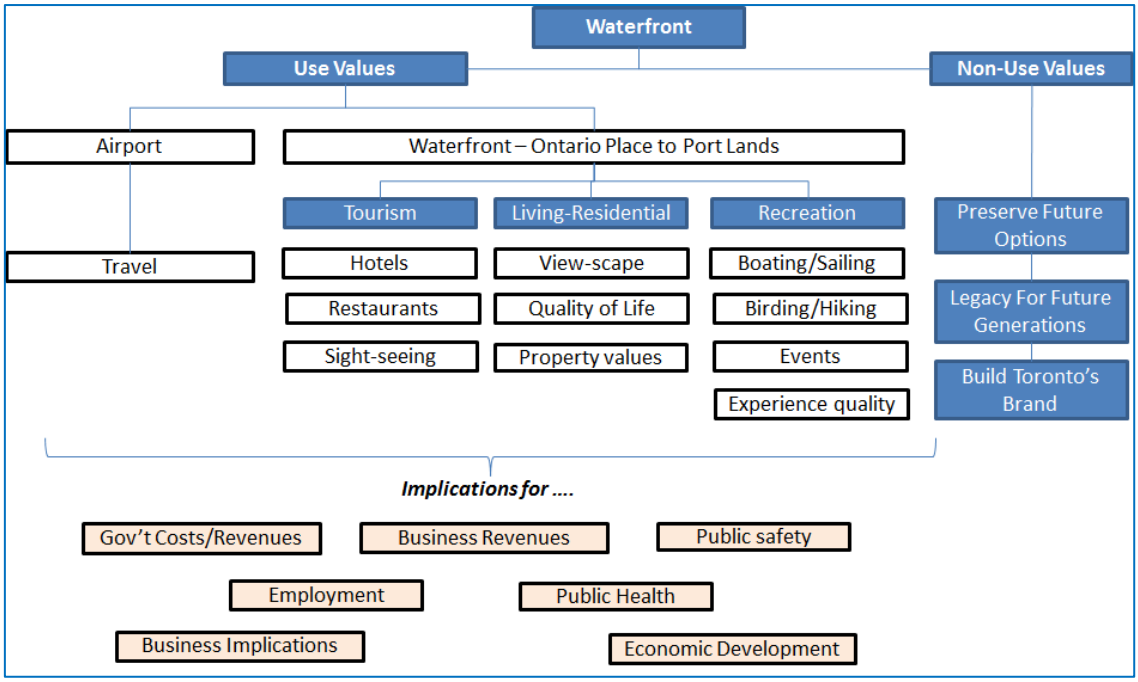


Figure 2: Socio-Economic Values Identified by Participants at Public Meetings

Tourism refers to impacts of the airport on:

- Hotels and accommodation services along the waterfront;
- Local businesses such as restaurants; and,
- Businesses that specifically cater to tourists such as sight-seeing operators.

Living-Residential is focused on the impact of the airport operations on residential use and enjoyment of their properties, such as but not limited to viewscapes, noise, and air quality. In a similar fashion, Recreation uses focus on the public's use and enjoyment of recreational, cultural, and other outdoor activities, and how quality of their experience may be affected by airport operations.

Non-Use values refer to passive values associated with the waterfront, which were identified by participants in the public meetings as being important to the wider City such as:

- Preservation of options for future City generations to develop and use the waterfront;
- Ensuring a "living legacy" for future generations; and
- Enhancing the "brand" of Toronto.

These non-use values refer to important considerations that are believed to be highly valued by City residents (and others), whether they do or do not use the airport or visit the waterfront.

The aggregation of these use and non-use values delivers value to local and regional residents and tourists that can be expressed in both monetary and non-monetary terms. However, not all values can easily be expressed in dollar benefits. Values such as "experience quality" of recreation and

"quality of life" of residential living on the waterfront are described and assessed in qualitative terms in this assessment. Other use values, such as air travel, can be measured in quantitative terms. In all cases, the overall approach to this socio-economic assessment is to identify and measure each of the use and non-use values, where possible, in quantitative and/or qualitative terms.

No attempt is made to assess if any single "use" or "non-use" value is more important or carries greater weight than others. Likewise, there is no attempt to aggregate net effects on values at this time. The task here is to identify those values that are affected (both positively and negatively) by current BBTCA operations and to measure possible socio-economic consequences from the Future Baseline and Proposed Future Scenarios.

The above framework (**Figure 2**) and research questions have guided the approach to the socio-economic assessment. A number of data gathering exercises, including surveys, interviews and desktop research were completed for this study. Secondary data collection included a review of existing reports, websites and Statistics Canada data. These sources are referenced as relevant throughout this technical memo. Primary data collection consisted of four main survey methods. These are summarized and described in **Table 1** below.

Table 1: Primary Data Collection Methods

Primary Data Collection Method	Number of LSA Respondents	Number of RSA Respondents	Number of Respondents Outside of the RSA	Total Number of Respondents	Description	Field Dates
Telephone Surveys	388	416	N/A	804	Telephone surveys with a statistically significant sample of residents within the LSA and RSA	August 31 to September 17, 2015
Intercept Surveys	45	130	89	264	One-on-one surveys with users of the LSA, including business, recreational, residential and airport users as well as commuters (none statistically significant)	August 26, 2015 to September 11, 2015
Stakeholder Interviews	18	6	1	25	One-on-one open ended interviews with a range of stakeholders including residents, businesses, associations, real estate brokers and community groups (none statistically significant)	June 11 to October 27, 2015

For more details on survey and interview methods, including questionnaires and guides refer to **Appendices A** through **C**. Tabulated responses for the telephone survey provided in the IntelliPulse Inc. Top-Line Findings Report provided in the appendices. Responses were not tabulated for the stakeholder interviews to protect the anonymity of responses as the sample size is relatively small. Instead, the results of the stakeholder interviews are reported upon qualitatively throughout this technical memo.

Across all forms of data and information collection, effort was made to ensure openness and transparency in questioning and that no leading questions were posed. Many open-ended questions enabled respondents to elaborate on their views and opinions. Questions specific to the BBTCA were introduced in the latter half of interviews and discussions.

With the exception of the telephone survey it is important to note that all the data and information collected, reviewed and synthesized in this assessment should not be interpreted as statistically representative. For the most part, the knowledge gained from the above data and information gathering activities lends itself at best to a qualitative assessment only.

1.3.1 Residential Uses

Background studies and data were reviewed to identify existing and planned future residential use and enjoyment in the LSA. A sample of LSA residents participated in phone, stakeholder and intercept surveys. LSA residents were engaged by intercept surveyors on public property outside of LSA residences or condominium buildings and in LSA parks and public spaces. Pre-arranged stakeholder interviews were also conducted with LSA residents and resident associations.

A sample of LSA residents were randomly selected and interviewed via telephone. Comments were also collected through written feedback forms during open house events. The results of the phone, intercept surveys and stakeholder interviews were then collected and in some cases tabulated to provide an indication of residents' attitudes towards the direction of effect from the current BBTCA operations and the proposed runway extension. Results from the Noise, Air Quality, Built Environment and Traffic effects assessments were also reviewed to provide a commentary on the effect that changes in these areas of the environment could have on residential use and enjoyment of property.

1.3.2 Recreational Uses

A desktop search was conducted, and background studies and data were consulted to identify existing and planned future recreational uses. The desktop search was also used to complete an inventory of LSA recreational spaces such as parks, trails, and beaches, as well as an inventory of LSA recreational clubs or organizations.

Intercept surveys were conducted with recreational users (i.e., boaters, runners, cyclists, walkers, and bird watchers) on random days to gain an understanding of the local environment, current BBTCA operations and effects of the proposed runway extension on recreational opportunities and use. The intercept surveys were administered throughout the LSA on public property, in the following locations: outside the Ontario Place site; within the Bathurst and Eireann Quays; the Music Garden; HTO Park; the area surrounding the Harbourfront Centre; the Jack Layton Ferry Terminal; within the East Bayfront Precinct; within the Distillery Historic District; within the Lower Don Lands and Port Lands including the Leslie Street Spit; and on the Toronto Islands. City of Toronto parks, public spaces, trails and beaches were utilized to engage recreational users.

Stakeholder interviews were also conducted with four boating clubs to better understand LSA recreational opportunities and use. Results from the Noise, Air Quality, Built Environment and Traffic effects assessments were also reviewed to provide a commentary on the effect that changes in these areas of the environment could have on the use and enjoyment of recreational spaces.

1.3.3 Institutional Uses

Background studies and data were reviewed to understand the existing and planned future institutional conditions in the LSA. A desktop search was also completed to develop an inventory of LSA institutions and services. Pre-arranged interviews with two educational institutions and an emergency services representative were conducted to gain an understanding of the local environment, current BBTCA operations and anticipated effects of the proposed runway extension on the function and operation of schools and emergency services. Findings from the Noise, Air Quality, Built Environment and Traffic effects assessment studies were reviewed to understand the effect that changes in these areas of the environment could have on institutional uses and operations.

1.3.4 Economy

A review of selected background studies and data was completed to understand economic implications for business across the City of Toronto and to determine existing and projected future conditions. In addition to this review intercept surveys were administered to some business users (i.e., respondents working in the LSA or users of LSA businesses) to gain an understanding of the local environment, the effect of current BBTCA operations, and anticipated effects of the proposed runway extension on business operations and opportunities.

Prearranged stakeholder interviews were also conducted with some selected LSA businesses and business associations to document and understand the influence of the waterfront, current BBTCA operations and the potential effects of the proposed runway extension on the function and operation of local businesses (includes business expansion/investment intentions and effects related to business customers). The results from the Noise, Air Quality and Built Environment effects assessments were also reviewed to provide a commentary on the effect that any changes in these areas of the environment could have on local businesses.

1.3.5 Tourism

A desktop review was completed to generate an inventory of LSA cultural venues and attractions, which along with results from the intercept surveys were used to identify existing and future conditions. Tourists from the GTA, Ontario, other provinces, and outside Canada were included in the intercept surveys to gather qualitative information on their experiences as a tourist to the LSA, as well as perceived effects of the proposed runway extension on those experiences. Stakeholder interviews were also conducted with businesses that attract tourists, and with those who rely on tourist business. Interviews and survey results were then tabulated to provide an indication of tourist attitudes towards the BBTCA and the proposed runway extension on tourist experiences and tourist visitation in connection with the waterfront area within the LSA. Results from the Noise, Air Quality, Built Environment and Traffic effects assessments were also reviewed to note the effect that changes in these areas of the environment could have on the waterfront and tourists to the LSA.

1.3.6 Municipal Implications

A background review examined current conditions for Toronto Police, Fire and EMS.

1.3.7 Property Values

A review and synthesis of background studies and data from the Toronto Real-Estate Board was completed to assess historical changes in property values within the LSA, and to help understand potential future conditions. Interviews were also conducted with a selection of LSA real estate brokers to understand past and potential future projected changes to the sale of existing and new waterfront floor area, with and without the proposed project.

1.3.8 Non-use Values

The telephone and intercept surveys as well as stakeholder interviews were utilized to determine both existing and future non-use values. The phone survey was used to capture a statistically representative sample of City of Toronto residents (both LSA and RSA) regarding their perceived non-use values of the waterfront. The phone survey was also used to obtain the attitudes and perspectives of RSA residents who have never used the waterfront to understand the area's non-use. The intercept surveys and stakeholder interviews were used to ask about how respondents value the waterfront both at present and in the future.

2. Description of the Potential Affected Environment – Current Conditions

2.1 Description of Existing "Use Value" Conditions

The following sections describe the existing conditions of the socio-economic environment and are organized by socio-economic asset as described in the Final Study Design Report (August 2015).

2.1.1 Residential Uses

The LSA is densely populated and is dominated by a combination of residential and commercial (office) uses. The residential uses include low and mid-rise non-profit and assisted housing complexes, and high-rise market-rate condominiums on the mainland side, detached family homes on the Toronto Islands, and house boats harboured in the Central Waterfront area (either docked at the mainland or at the Toronto Islands) (N. Barry Lyon Consultants, 2013).

Condominium (high-rise) residents account for the majority of residents living in the socio-economic LSA. In general, the condominium buildings found in the LSA were built within the past 20 to 30 years and a number of new condominium developments are planned in the area (City of Toronto, 2011; Waterfront Toronto, 2015b).

While there are some people who live on their boats full-time, many of the boat owners in the LSA use their boats for recreation only, as indicated by stakeholder interviewees. Many of these recreational boat users use their boats as a secondary residence for weekends and holidays during the summer months. However, one full-time house boat resident was interviewed.

There are also residents living on the Toronto Islands. Residential occupation of the islands has experienced several changes over the years and has resulted in a unique ownership and occupancy situation. In December 1993, the *Toronto Islands Residential Community Stewardship Act* was

passed, which enabled island residents to purchase 99-year land leases from a Land Trust. (*Toronto Islands Residential Community Stewardship Act*, 1993). The Toronto Islands Residential Community Trust was established under the Act to manage the land and buildings associated with the Island Community on behalf of the general public and island residents. Under this legislation, Island leases and homes can only be sold and bought through the Toronto Islands Residential Community Trust. The Trust also regulates the prices for homes and leases which by law are only sold to people on the Purchasers' List. The Purchasers' List is a 500 person waiting list for potential purchasers of Island land leases and homes. The List is reopened whenever space permits, and is added to by a lottery system (Toronto Islands Residential Community Trust Corporation, 2015).

Through intercept and phone survey data collection it is apparent that LSA respondents tend to be satisfied with living in the LSA. Of the 388 LSA residents who participated in the phone survey, approximately 93% stated that they are satisfied with living in the LSA, with the clear majority (67%) "very satisfied". Of the 45 respondents who participated in the intercept surveys that are LSA residents, 35 stated that they are "very satisfied" and 6 stated that they are "somewhat satisfied" with living in the LSA.

The LSA attracts residents because of its central location and amenities including the Toronto Islands and other recreational opportunities. When residents were asked the primary reason why they live on or near the waterfront, approximately 51% of the LSA phone survey respondents stated it is because of the natural setting, the view and the lake, while 34% of the respondents live in the area because of the convenient location and the proximity to work. The remaining respondents live in the area because of the proximity to recreational opportunities. Results from the intercept surveys indicate similar trends, with natural setting and view (32 of 264), recreational opportunities (21 of 264), and convenient location and proximity to place of work and services (20 of 264) being the most stated responses. Similar views were also reflected in stakeholder interview discussions.

While LSA residents indicated that they are generally satisfied with living in the LSA, one quarter (27%) of phone survey respondents and 12 of the 45 LSA intercept survey respondents indicated that they have considered moving from their current address in the past five years. A variety of reasons prompted LSA residents to consider moving, including 20% of the phone survey responses specifically related to some negative aspect of the BBTCA. Of this 20% intent to move the following reasons were offered:

- Airport noise (6%);
- Effects related to the runway extension and addition of jets (5%);
- Airport-attributed road traffic (5%);
- Airport (no specifics provided) (3%); and
- Airport-attributed pollution (1%).

The most frequent phone survey responses for considering moving with no direct relation to the BBTCA include:

- Too much construction or too many condominiums (20%);
- Traffic congestion (16%); and
- Not enough living space (14%).

Intercept survey respondents from the LSA had similar reasons for considering a move from their current address. Of the provided reasons, the most common responses were related to location (3 of 45), construction (2 of 45), noise (2 of 45), congestion and crowds (2 of 45), and the lack of natural environment (parks, natural/green space) (2 of 45). As noted above, reasons for considering a move from the area being attributed to the BBTCA is low relative to other activities or aspects in the LSA.

LSA residents use the outdoor spaces at their residence in a variety of ways. Of the LSA phone survey respondents, 50% indicated they use their outdoor space for relaxing (e.g. reading, tanning, enjoying the view), 30% use their outdoor space for exercise (e.g. walking, swimming), and 19% use it for picnicking, eating, or entertaining. LSA residents that were intercepted to complete a survey gave similar responses, with relaxing, picnicking or eating, and barbequing being the most frequently stated responses. These views were also reflected in stakeholder interview discussions as well.

LSA residents were asked what factors affect their use and enjoyment of their residence, either positively or negatively. From the phone survey, the most frequently stated positive factors that affected use and enjoyment of their residence were:

- Scenery/view (16%);
- Weather (12%);
- Positive general, uses of property (6%); and
- Access to parks/garden (6%).

The most frequently stated negative factors from the phone survey were:

- Airport noise, pollution (19%);
- Too noisy, people, Gardiner Expressway, party boats (19%);
- Weather, wind (16%); and
- Traffic congestion/roads (13%).

From the intercept surveys, the most frequent positive factors that affected use and enjoyment of their residence included:

- Social environment and atmosphere (6);
- Natural environment including the water and the view (4); and
- Convenience or location (4).

Negative factors that affected use and enjoyment of their residence included:

- Pollution (noise, water, environment) (16);
- Traffic (7);
- Urbanization (7); and
- Weather (7).

These responses were also similar to those collected from the stakeholder interviews. LSA residents stated that they were comfortable living in the area largely due to its location (convenience and accessibility) to work, amenities and services. They also reported a sense of community and familiarity with neighbours and the natural setting as positive attributes of living in the area. Further, long-standing residents stated that these positive attributes have offset the negative effects related to

airport noise and local traffic to keep them living at their current place of residence in the LSA at least under the current conditions.

A common theme that evolves from the combination of intercept surveys, stakeholder interviews and input during public meetings is interruption of use and enjoyment of their living spaces because of the noise and smell of BBTCA operations that result in respondents:

- Closing doors and windows;
- Sleeping poorly; and
- Experiencing poor concentration and interrupted discussions.

Conversations with four LSA real estate brokers confirm the above views based on their interactions with buyers and sellers. Some local residents are increasingly troubled by the growth of BBTCA operations, but they also add that frustrations with traffic congestion and the general noise levels of area construction tend to be far greater annoyances than that of BBTCA.

Does the current operation of BBTCA negatively affect residential quality of life?	**Yes, for some.** **Some local area residents are negatively affected by current operations at BBTCA. However, more expressed concerns about local area traffic congestion.**

2.1.2 Recreational Uses

The LSA provides a number of unique recreational activities, events, and opportunities that are not available elsewhere in the City of Toronto. Survey respondents and stakeholder interviewees indicated that the area is a draw for both LSA residents and visitors outside the LSA largely due the natural setting, lake view, and variety of activities and public spaces.

Recreational land uses and facilities in the LSA include parks, natural areas, beaches, trails and sport facilities. The network of parks and open spaces that line the Toronto Waterfront and Toronto Islands is extensive, and is expanding. It provides a variety of both active and passive recreational space for residents and visitors alike (USI, 2013). Examples of active recreational space include sports fields, skating rinks, marinas, and outdoor theatres (for concerts/plays), while examples of passive recreational space include natural or undeveloped park space, picnic sites, playgrounds, hiking trails, and areas for wildlife viewing and bird watching. Many of the recreational spaces within the LSA are connected by a system of sidewalks, trails and walkways. Some of the common recreational activities in the LSA include cycling, boating, bird watching and picnicking. The collection of parks and recreational facilities found within the LSA is outlined in **Table 2** below.

Table 2: LSA Recreation Facility Inventory

Category (Type)	Recreation Facility	Location	Description
Park	The Gore	701 Fleet St, near Fleet St & Fort York Blvd	A small treed park located on Fleet Street.
Park	June Callwood Park	636 Fleet St, near Fleet St & Gzowski	June Callwood Park is located amidst a quadrant of tall condominium buildings on a wedge-shaped corridor spanning

Category (Type)	Recreation Facility	Location	Description
		Blvd	from Fort York Boulevard to Fleet Street. The park is a key element in reconnecting the Fort to the Lake Ontario shoreline which has incrementally moved south with infilling over the decades. The park honours the work of June Callwood.
Park	Toronto Inuksuk Park	789 Lake Shore Blvd W, near Lake Shore Blvd W & Newfoundland Rd	The Toronto Inukshuk Park, formerly Battery Park, is home to the Toronto Inukshuk, a legacy project to commemorate World Youth Day in 2002 that brings an important symbol of Canada's Aboriginal people to the people of Toronto. Includes a bike trail.
Park	Coronation Park	711 Lake Shore Blvd W, near Lake Shore Blvd W & Fort York Blvd	Coronation Park can be found just east of Ontario Place along the Martin Goodman Trail. A Royal Oak commemorating the Coronation of King George VI is planted in the south west corner of the Park. This Oak is surrounded by a ring of others and a grove of maple trees all planted in honour of Canadian War Veterans. There is also a World War II memorial a few metres to the east. Includes three ball diamonds, seven bike trails, an off-leash dog area, two drinking fountains, a picnic shelter, a picnic site and a washroom facility.
Park	Stadium Road Park	10 Stadium Rd, near Stadium Rd & Little Norway Cres	A small park found next to Stadium Road located on the Toronto waterfront. Includes a drinking fountain.
Park	Little Norway Park	659 Queens Quay W, near Queens Quay W & Eireann Quay	A 2.4 hectare park at Bathurst Street and Queens Quay West with many walking paths through gardens. Its name commemorates the World War II training base, used by the Norwegian Air Force that once existed on the site. Includes a ball diamond, three drinking fountains, two playgrounds, a wading pool and a washroom facility.
Park	Toronto Music Garden	479 Queens Quay W, near Queens Quay W & Lower Spadina Ave	The Toronto Music Garden is one of the City's most enchanted locations. The park design is inspired by Bach's First Suite for Unaccompanied Cello, with each dance movement within the suite corresponding to a different section of the garden. Includes three drinking fountains.
Park	Ireland Park	5 Eireann Quay, near Eireann Quay & Queens Quay W	Found next to the Canada Malting Silos this park has a small baseball diamond.
Park	Spadina Quay Wetlands	441 Queens Quay W, near Queens Quay W & Yo Yo Ma Lane	A former lakeside parking lot has been transformed into the 2800-sq-metre Spadina Quay Wetlands, a thriving, sustainable ecosystem full of frogs, birds, fish and butterflies.
Park	HTO Park West	375 Queens Quay W, near Queens Quay W & Lower Spadina Ave	A unique space that faces the inner harbour with the Toronto Islands in the distance, it's a spot to sit and relax during a busy day downtown. The urban beach is the focal point of HTO Park West. Bright yellow umbrellas populate the white sand providing shade for those relaxing in Muskoka chairs. Includes a drinking fountain.
Park	HTO Park	339 Queens Quay W, near Queens Quay W & Rees St	Located in Toronto's Inner Harbour, this unique park includes grassy hills, a long sand beach extending along the water's edge, stationary yellow shade umbrellas and Muskoka chairs Billed as "Toronto's Urban Beach", HTO park is an inviting space that highlights contemporary landscape design. Includes a drinking fountain, beach and outdoor showers.
Park	Peter Street Basin Park	370 Queens Quay W, near Queens Quay W & Lower	A wetland park located on Queens Quay.

Category (Type)	Recreation Facility	Location	Description
		Spadina Ave	
Park	Rees Street Park	238 Queens Quay W, near Queens Quay W & Lower Simcoe St	A small park with picnic tables on the Toronto waterfront.
Park	Toronto Waterfront Park	Robertson Cres, near Rees & Queens Quay	A small park with picnic tables on the Toronto waterfront.
Park	Harbour Square Park Lands	25 Queens Quay W, near Queens Quay W & Bay St	Located next to the Toronto Ferry Docks, Harbour Square Park Lands offers downtown users a spot to sit and watch the ferries travel back and forth to the island. Includes a washroom facility.
Park	Sugar Beach Park	11 Dockside Dr	Sugar Beach draws upon the industrial heritage of the area and its relationship to the neighbouring Redpath Sugar Refinery Museum to create a whimsical urban beach at the water's edge. Includes a drinking fountain and a splash pad.
Park	Water's Edge Promenade	115 Queens Quay E, near Queens Quay E & Dockside Dr	The Promenade is found at the water's edge just east of Jarvis Street to the Parliament Slip. It gives people an opportunity to experience Toronto's waterfront east of the Jarvis Slip. It consists of a wide granite mosaic promenade and a wide wooden boardwalk.
Park	Sherbourne Common	5 Lower Sherbourne St, near Lower Sherbourne St & Queens Quay E	Located just east of Lower Sherbourne Street, the 1.5 hectare park spans more than two city blocks, from Lake Ontario in the south to Lake Shore Boulevard in the north, on both sides of Queens Quay. It was transformed from an industrial area and is the first park in Canada to integrate a neighbourhood-wide stormwater treatment facility into its design. Includes two drinking fountains, a playground, a splash pad and an outdoor rink.
Park	Jennifer Kateryna Koval's'kyj Park	2 Polson St, near Polson St & Cherry St	A 0.35 acre park located at the west end of Polson Street overlooking the lake.
Park	Mccleary Park	755 Lake Shore Blvd E, near Lake Shore Blvd E & Gardiner Expy	A 2.8 hectare park on Lake Shore Boulevard East near Carlaw Avenue that features two lit ball diamonds, a cricket pitch, a drinking fountain, a picnic site and a washroom facility.
Park	Cherry Beach Clark Beach Park	1 Cherry St, near Unwin Ave & Regatta Rd	Located on the north shore of the Outer Harbour at the foot of Cherry Street. Ample parking is located on the Martin Goodman Trail and receives TTC bus service during the summer season. Includes seven bike trails, an off-leash dog area, a picnic site and a washroom facility.
Park	Cherry Beach Sports Fields	275 Unwin Ave, near Unwin Ave & Regatta Rd	A sports park including two regulation-sized elite soccer and lacrosse artificial fields. The fields can accommodate a wide range of recreational activities as well. Includes a playground and a washroom facility.
Park	Underpass Park	33 St Lawrence St, near St Lawrence St & Trolley Cres	Underpass Park, located under and around the Eastern Avenue, Richmond and Adelaide overpasses, is the most extensive park ever built under an overpass in Canada, and the first ever in Toronto. Includes a drinking fountain, an outdoor basketball court, a playground and a skateboard area.
Park	Corktown Common	Located in the south eastern portion of the West	The park was built on remediated industrial lands and acts as a major flood protection landform as well as offers recreation and enjoyment for the residents of the area. Includes a playground,

Category (Type)	Recreation Facility	Location	Description
		Don Lands neighbourhood	a splash pad, an athletic field, open lawns, a BBQ, fireplace and washroom facilities.
Park	Tommy Thompson Park (Leslie Street Spit)	1 Leslie St, near Leslie St & Unwin Ave	Located on Toronto's waterfront in the Port Lands, Tommy Thompson Park is a unique urban wilderness minutes from downtown. The park is located on a man-made peninsula, known as the Leslie Street Spit, which extends 5 kilometres (km) into Lake Ontario. The park represents some of the largest existing natural habitats on the Toronto waterfront. Wildflower meadows, cottonwood forests, coastal marshes, cobble beaches and sand dunes are just some of the habitats at Tommy Thompson Park. Wildlife, especially birds, flourish at the park which provides one of the best nature watching areas in the Greater Toronto Area. The park also provides opportunities for recreational activities such as hiking, cycling (15 trails), rollerblading and fishing.
Park	Toronto Islands – Ward's Island Park	1 Centre Island Pk, near Centre Island Pk & Lakeshore Ave	This park includes the Island Café, a soccer field, a playground and the Ward's Island Association Clubhouse. Also includes 19 bike trails, two drinking fountains, an outdoor multipurpose court, a picnic site, a playground and five washroom facilities.
Park	Toronto Islands – Algonquin Island Park	Toronto, ON	A natural park with trails running through it that houses the Algonquin Island Association.
Park	Toronto Islands – Olympic Island Park	Toronto, ON	Located on the City side of the Toronto Islands, Olympic Island is home to many of the great attractions associated with the area. The Centre Island ferry dock, Centreville Amusement Park and the Island Yacht Club are all found here. Includes three drinking fountains, three fire pits, five picnic sites a playground and two washroom facilities.
Park	Toronto Islands – Island Park	Toronto, ON	A sprawling green space with an old-fashioned amusement park, beaches, picnic areas and City views. Includes 20 bike trails, a change room facility, 14 drinking fountains, two fire pits, five picnic sites, a splash pad, seven washroom facilities, a pond and Frisbee golf.
Park	Toronto Islands – Centre Island Park	Toronto, ON	Includes seven bike trails, five drinking fountains, fire pit, picnic shelter, ten picnic sites, wading pool and eight washroom facilities.
Park	Toronto Islands – Hanlan's Point Park	Toronto, ON	The park includes a number of facilities including the popular Hanlan's Point Beach. It was named after the Hanlan family, one of the first year-round inhabitants on the Toronto Islands. Includes a ball diamond, 12 bike trails, a change room facility, seven drinking fountains, four fire pits, an outdoor tennis court, 12 picnic sites and four washroom facilities.
Park	Toronto Islands – Franklin Children's Gardens	Located within the Toronto Island Park	An interactive garden for kids and families on the Toronto Island Park. Franklin Children's Garden is inspired by Franklin the Turtle from the celebrated book series. The garden is divided into seven sections where children can enjoy gardening, storytelling, exploring wildlife and visiting seven child-accessible sculptures from the Franklin the Turtle series. The garden features Little Sprouts Garden, TD Storybook Place, Snail Trail, Hide and Seek Garden, Franklin's Pollination Station, Pine Grove and Turtle Pond.
Park	Toronto	Located within the	A hedge maze on Centre Island that consists of 1,300 planted

Category (Type)	Recreation Facility	Location	Description
	Islands – William Meany Maze	Toronto Island Park	black cedars twisting 15,000-square-foot labyrinth.
Beach	Hanlan's Point Beach	Lakeshore Ave	Located on the western shore of Toronto Island Park, this long beach includes a clothing optional area - only the second of its kind in Canada. Includes volleyball facilities.
Beach	Gibraltor Point Beach	Lakeshore Ave	A small secluded beach located on the southwestern shore of Toronto Island Park.
Beach	Centre Island Beach	Lakeshore Ave	Located on the southern shore of Toronto Island Park, this site has been used for public bathing since 1888 and is surrounded by park amenities. It is the only Island beach protected by an offshore breakwall. Includes a concessions/snack bar, bike rental, showers and change rooms.
Beach	Ward's Island Beach	Lakeshore Ave	Located on the southeastern shore of Toronto Island Park away from major park facilities and activity areas, this is one of the quietest beaches on the Island.
Beach	Cherry/Clarke Beach	Located in the Portlands at the southern end of Cherry St	Located on the north shore of the Outer Harbour at the foot of Cherry Street, this beach features ample parking, is located on the Martin Goodman Trail and receives TTC bus service during the beach season. The west side of the swimming beach is popular with kiteboarders. Includes a designated off-leash dog area and washrooms.
Trail	Waterfront Trail	Runs from the shores of Lake Ontario, Lake Erie, Lake St. Clair and the Niagara, Detroit and St. Lawrence Rivers	The Waterfront Trail stretches over 1,600 km along the Canadian shores of Lake Ontario, Lake Erie, Lake St. Clair and the Niagara, Detroit and St. Lawrence Rivers, the Waterfront Trail connects 68 communities and over 182 parks and natural features.
Trail	Lower Don River Trail	The trail generally extends from Pottery Rd in the north to Parliament St in the south, along the Don River	A paved trail that runs along the Don River.

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The LSA also includes the Waterfront Neighbourhood Centre (WNC), which is a non-profit organization formerly known as the Harbourfront Community Centre that works in partnership with residents and community-minded organizations to create a safe and supportive environment for recreational activities for people of all ages (HCC, 2015). WNC is supported by a volunteer board of community members and is partially funded by the City of Toronto for administrative staffing and building-related costs. The WNC includes a large multi-purpose building that houses a variety of program spaces, full-sized gymnasium, outdoor basketball courts and a children's playground. A wide range of programs and services is offered for children, youth, adults and seniors.

Another focal point for a wide range of recreational activities and events within the LSA is the Harbourfront Centre. Harbourfront Centre is a not-for-profit cultural organization governed by a 26 person community based volunteer Board of Directors. It is located on a 10-acre site in the Toronto Central Waterfront, and offers a diverse range of activities and events to the public attracting over 12 million visitors each year to its many facilities, venues, and events (Harbourfront Centre, 2015). Some of the Harbourfront Centre's recreational spaces include Ann Tindal Park, Canada Square, Exhibition Common, Natrel Pond/Rink, the Toronto Music Garden and the WestJet Stage.

A total of 22 clubs and organizations are located within the LSA and are used for their local amenities (both recreational and social). A majority of activity is related to boating given the location of the LSA on Toronto's waterfront. A listing of these clubs and organizations is included in **Table 3**.

Table 3: Recreational Clubs and Organizations Operating in the LSA

Clubs and Organizations		
Category	Club/Association	Description
Boating	Council of Commodores	An organization representing the interests of sailing and boating clubs in the Golden Horseshoe / Western Lake Ontario area.
	Alexandra Yacht Club	An active self-help club with 100 Senior members and about 25 Associate members who boat in both sailboats and powerboats.
	Island Yacht Club	A private boating and social club with a family oriented atmosphere. Swimming, tennis and dining facilities are available to members. The club provides both boating and social memberships.
	The National Yacht Club	The National Yacht Club has been on the water since 1894, and is an active, inclusive boating community for members located near the foot of Bathurst Street.
	Royal Canadian Yacht Club (RCYC)	A private member sailing club with a tradition that dates back to 1852. It is also a sport, fitness, social and family club. The club has two locations, one in downtown Toronto, and one on the Island.
	Hanlan Boat Club	Home to Havergal College, Upper Canada College, the University of Toronto Varsity Rowing Team (the oldest rowing program in Canada), a thriving Competitive Club Membership, and a number of community programs. The Hanlan Rowing Club has approximately 300 members and Havergal College, Upper Canada College, and University of Toronto teams have a combined 150 members.
	Toronto Boaters' Alliance (TBA)	A boating interest group representing the interests of Toronto boaters.
	Queen City Yacht Club (QCYC)	One of Toronto's oldest sailing clubs and is a not-for-profit community of sailors located on parkland on Algonquin Island in the Toronto harbour. They offer club cruises, club and inter club racing, summer camp sailing lessons and adult keelboat lessons.
	Aquatic Park Sailing Club	A member sailboat only club found halfway down that Leslie Street Spit.
	Mooredale Sailing Club	A member non-profit sailing community with the largest fleet of Albacores in Toronto.
	Toronto Multihull Cruising Club	A self-help, member run, multihull club found on Lake Ontario in Toronto's Outer Harbour.

Clubs and Organizations		
Category	Club/Association	Description
	St. James Town Sailing Club	A cooperatively-run community member sailing club in Toronto's Outer Harbour. They offer sailing lessons and opportunities for leisure sailing or racing.
	Westwood Sailing Club	A not-for-profit co-operative sailing and social club.
	Sailing Fanatics	A sailing school that also offers a fleet user membership that provides sailboats to its members.
	Bayside Rowing Club	A rowing club that offers lessons to the general public through a wide variety of recreational and competitive rowing programs. Bayside Rowing Club has approximately 300 members.
	Water Rats Sailing Club	A sailing club that provides low-cost community based sailing and paddling to over 200 members. It is a not-for-profit organization and is operated by members on a volunteer basis.
	Outer Harbour Sailing Federation	A federation that represents eight community water-sport clubs which include sailing, rowing, and sometimes wind surfing. They provide low-cost, volunteer-run, water recreation programs to a wide range of people without public funding.
	Disabled Sailing Association of Ontario (DSAO)	A non-profit charitable family of organizations that promote and enable Ontarians with disabilities to experience therapeutic, recreational and social rehabilitation through the freedom of independent sailing.
	Outer Harbour Centreboard Club	Offers affordable downtown sailing for dinghy owners. It's a volunteer run, not-for-profit Toronto community self-help club in Toronto.
	Toronto Island Canoe Club	A not for profit organization dedicated to promoting the sport of sprint canoe/kayak and to providing opportunities for youth and adults to learn about water safety, develop small boat skills and enjoy the lagoons of Toronto Island. It is located on Ward's Island.
	Ontario Place Marina	A 240 slip marina that offers a mooring facility for boats up to 90 feet in length. The marina's operating season approximately runs from May to October each year. It can accommodate daily, monthly and seasonal users.
	Marina Quay West	A 200 slip marina that is located next to the City of Toronto Music Garden and a number of condominium residences. The marina is suited to boats between 24 and 50 feet in length. The marina is open year round and is operated by the Harbourfront Centre.
	Marina Four	A 100 slip marina located within the Harbourfront Centre central site and adjacent to the Concert Stage. The marina is best suited for boats sized 24 to 30 feet in length. The marina is closed from November 1 to April 30 each year and is operated by the Harbourfront Centre.
	John Quay	A dockage location found along the southern boardwalk adjacent to the Amsterdam Brewhouse at Pier 4. It is not a protected marina and is used exclusively for larger visiting pleasure crafts and ships from approximately 40 feet to 200 feet in length.
	Outer Harbour Marina	A 650 slip marina and is Toronto's largest freshwater marina. It can accommodate boats from 20 feet to 100 feet in length and is operated by PortsToronto. The marina is located in a sheltered harbour adjacent to the Leslie Street Spit at 475 Unwin Avenue.
	Toronto Island Marina	A 350 slip marina located on the Toronto Islands (Centre Island). The

Clubs and Organizations		
Category	Club/Association	Description
	& Yacht Club	marina offers seasonal and visitor docking options and runs from May 1 to October 31 each year.
General Recreation	Ward's Island Recreation Association	A non-for-profit association that provides its members with tennis, field sports, lawn bowling and social facilities.
Windsurfing	Toronto Windsurfing Club	A not-for-profit association located in Toronto's Outer Harbour that promotes and facilitates recreational and competitive windsurfing. It is managed by volunteer members.

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The LSA is a major recreational destination for LSA and regional residents as well as visitors from outside the region. LSA residents make use of the natural setting and recreational amenities described above, and the area draws visitors from the RSA and even further afield.

LSA residents stated that they use the waterfront for a variety of recreational purposes. In the phone survey the most frequently stated uses included:

- Jogging/hiking/exercise/walking (82%);
- Cultural events (39%);
- Relaxing (36%);
- Shopping/restaurants (32%);
- Boating (18%); and
- Picnicking/visiting the island (18%).

The majority of intercept survey respondents use the LSA for recreational purposes (244 of 264 respondents). The most frequently stated recreational uses or activities were similar to the LSA phone survey respondents; i.e., jogging, hiking, exercising, or walking (190); relaxing (166); going to restaurants (156); and attending local events (71).

For most intercept survey respondents, the positive factors affecting their use and enjoyment of the LSA recreational facilities were:

- Natural environment (101);
- Variety and number activities and events (41);
- Accessibility (40); and
- The sociability or community feel of the area (19).

The negative factors affecting their use and enjoyment were:

- Weather (50);
- Crowds (28);
- Traffic and lack of parking (24); and
- Pollution (water, noise, and air pollution) (19).

The prearranged stakeholder interviews with selected target organizations added another perspective for the variety of uses or activities within the LSA. As boating is one of the most common recreational activities of the waterfront, representatives from a number of boating related clubs (i.e., sailing, rowing, and yachting) were interviewed. All of the club representatives interviewed expressed that while the Toronto Waterfront and Harbour has experienced a lot of change over the past decade or so, they are mostly satisfied with the location of their club and still continue their enjoyment of activity on the Waterfront with some exceptions.

When asked how the BBTCA and its operations affect their group or club, many expressed a growing concern for the safety of boaters in the Inner and Outer Harbours. Other concerns were related to the current navigability of the Western Channel; health concerns with diminished air quality and the foul smell of aircraft fuel; the impact of airport noise (specifically when teaching on the water); and the distraction from passing planes overhead. While many of these clubs are currently dissatisfied with the location of the BBTCA on the Toronto Waterfront and the frequency of interruptions from passing aircraft, they expressed some willingness to “tolerate” (their emphasis) the current level of operations at the BBTCA as long as the frequency (volume) of flights is capped at its current level.

Does the current operation of BBTCA negatively affect recreational users?	**Yes, for some.** **Recreational boaters are negatively affected by current operations at BBTCA.**

2.1.3 Institutional Uses

There are a wide variety of institutions and services located in the LSA. These institutions and services within the LSA include educational institutions such as schools or child care services; clinics, including those that are medical, dental and skin related; emergency services such as police, fire, and

EMS; a place of worship; and social service and welfare organizations. An inventory of the institutions and services found in the LSA is provided in **Table 4** below.

Table 4: Institutions and Services found in the LSA

Category (Type)	Institution	Location	Description
Education	City School	635 Queens Quay W	Part of the Toronto District School Board's Alt 9 family of Alternative Secondary Schools. As stated in the stakeholder interviews, enrollment for the 2015/2016 school year is 117 students. The school can accommodate up to 150 students.
	The Waterfront School	635 Queens Quay W	Part of the Toronto District School Board and includes grades from Junior Kindergarten to Grade 8. It serves the community bound by York Street on the east, Stadium Road on the west between Lakeshore Blvd and Queens Quay West. As stated in the stakeholder interviews, enrollment for the 2015/2016 school year is 212 students. The school can accommodate up to 280 students.
	Island Public/ Natural Science School	30 Centre Island Pk	Part of the Toronto District School Board. Three programs are run from the school: a day program that services the Island and Harbourfront community, a residential Science Program for 68 students in Grades 5 and 6 and a Nursery school. As stated in the stakeholder interviews, enrollment for the Island Public School for the 2015/2016 school year is 151 students. The school can accommodate up to 213 students.
	George Brown College (Waterfront Campus)	51 Dockside Dr	A public, fully accredited college of applied arts and technology with three full campuses in downtown Toronto, Ontario.
	Waterfront Montessori Children's Centre	18 Wyandot Ave	A nonprofit, co-operative style childcare centre and preschool. Their program has a blend of early childhood education, Montessori and nature-focused curricula.
	Distillery District Early Learning Centre	8 Distillery Lane	Runs early learning programs for infants, toddlers and preschoolers. It also runs a junior and senior kindergarten program.
Child Care	St. Stephen's Harbourfront Child Care Centre	650 Queens Quay W	A day care centre servicing the LSA. It provides childcare for infants and toddlers aged 2 months to 4 years.
	St. Stephen's Waterfront Childcare	635 Queens Quay W	Located in the Toronto Waterfront School, it offers places for children aged 4 to 5 years old in the Before and After School Kindergarten program.
	Water Club	208 Queens Quay	A private day care centre servicing the LSA.

Category (Type)	Institution	Location	Description
	Childcare	W	
	Waterpark Place Child Care Centre	20 Bay Street	A George Brown workplace child care centre that offers care for children aged 1 to 5 years.
	Pinnacle Jr YMCA	12 Yonge St	A non-profit, licensed YMCA childcare centre that serves children aged 0 to 4 years.
	Gibraltar Point Day Nursery	30 Centre Island Pk	This non-profit, licensed child care, serves children 2 years 6 months to 5 years. It is located in and affiliated with the Island Public/Natural Science School. The nursery has capacity for 24 full time children.
Place of Worship	St. Andrew's by the Lake Anglican Church	102 Lakeshore Ave, Ward's Island	A family church rooted in Anglican traditions of worship and community service. It serves the Toronto Island community, but many parishioners live in the City of Toronto and surrounding area.
Emergency Services	Toronto Police Marine Unit	259 Queens Quay W	The Marine unit also has 3 sub-stations located at Bluffers Park, Center Island and Humber River, which all are used for police and lifeguard functions. As stated in the stakeholder interviews, the Toronto Police Marine Unit employs 2 staff sergeants, 9 sergeants, 37 constables and 1 superintendent. Its operational jurisdiction is from the Etobicoke Creek (Peel Region) to Rouge River (Durham Region) and extending 13 nautical miles to the US/Canada border. Marine Unit serves as a first response team for the BBTCA and the Toronto Islands, and is responsible for all waterways within Toronto.
	Toronto Fire & Marine Station 334, EMS Station 36	HTO Park 339 Queens Quay W	Located on Queens Quay west of Toronto Harbourfront Centre, Fire and Marine Station 334 and EMS Station 36 sits on the edge of Toronto Harbour.
	Toronto Fire Station 335	235 Cibola Ave	Fire station servicing the Toronto Islands. It is located on Ward's Island.
Medical Clinic	Lakefront Clinics	550 Queens Quay W	A group of clinics offering family health care services, allergy testing and treatment, chiropractic treatment, physiotherapy, acupuncture, massage therapy, nutritional or diet counseling, teeth whitening, house-call care, mobile care, and workplace care.
	Harbourfront Medical	8 York St #4	A healthcare centre that offers a medical walk-in clinic, naturopathic medicine, a travel clinic, chiropractic treatment, physiotherapy treatment, registered massage therapy, orthotics and acupuncture.
	Waterfront	266 Queens Quay	A family practice and walk-in clinic.

Category (Type)	Institution	Location	Description
	Medical Centre	W	
Dental Clinic	Harbourfront Dental	10 Lower Spadina Ave #202	Dental office with a wide range of services.
	Harbour Dental Centre	12 Yonge St #8	Dental office with a wide range of services.
Skin Care Clinic	AvantDerm	45 Mill St	A full service dermatology clinic offering both medical and cosmetic services.
Social Service & Welfare Organizations	Centre francophone de Toronto	20 Lower Spadina Ave	A non-profit organization that serves as the main entry point for Francophones who live or plan to move to Toronto. The Centre helps promote the well-being of the Francophone community and offers a range of services to meet the needs of all Francophones in the Greater Toronto Area.
	Canadian Council On Rehabilitation and Work (CCRW)	1 Yonge St	An organization in place to promote and support meaningful and equitable employment of people with disabilities.
	The Mission to Seafarers Southern Ontario	Pier 51, 8 Unwin Ave	A mission that cares for victims of piracy, providing a lifeline to seafarers stranded in foreign ports, or simply providing a social community. The Mission supports the world's 1.5 million seafarers.

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Community groups or organizations representing a number of different causes also operate in the LSA. Most of these groups either advocate for a cause directly related to the BBTCA or the waterfront in general. These community groups and organizations are identified in **Table 5** below.

Table 5: Community Groups and Organizations Operating in the LSA

Community Group	Description
Greater Waterfront Coalition	A coalition of community organizations concerned with the potential runway extension and introduction of jets at Billy Bishop Toronto City Airport.
Friends of Billy Bishop	A coalition of waterfront businesses, community members and City builders. It is a volunteer-led organization working to promote the enhancement of the Toronto Island Airport.
CodeBlueTO	A coalition of individuals, organizations, and groups who have come together in the shared belief that Toronto's waterfront should be revitalized in the most beautiful, ecologically sensitive, and financially sound ways possible, using transparent processes and also engage the broader community.
West Don Lands Committee	A community-driven coalition of resident, business, environmental, heritage and other groups. It has worked since 1997 to ensure timely development of the West Don Lands in a manner that is beneficial to the local and larger community.
Community AIR	A non-profit citizen's group that seeks to have the Toronto Island Airport shut down and its lands converted to park land.
Citizens for a Healthy Toronto Waterfront	A citizen led organization working to preserve a healthy Toronto waterfront for generations to come.
Don Watershed Regeneration Council	A council established by TRCA in 1995 with a mandate to implement *Forty Steps to a New Don* and act as a link among governments, interested citizens, and members of the general public. The Council consists of representatives from TRCA, regional and local municipalities, City of Toronto community councils, watershed residents, community groups, senior government agencies, watershed businesses, and academic institutions.
Toronto Field Naturalists	A charitable, non-profit organization that aims to stimulate public interest in natural history and encourages the preservation of our natural heritage.
Friends of the Spit	Friends of the Spit is an advocacy group for the protection of the Leslie Street Spit as a public urban wilderness.

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No questions in the phone survey directly related to institutional use. However, of the LSA respondents, 7% indicated they chose to live in the LSA because of the proximity to services (includes shopping, medical facilities, schools, etc.). The intercept survey did not include any questions related to institutional uses or services.

Three of the 24 stakeholder interviews conducted were held with representatives of institutions or services located in the LSA. These interviews were conducted with a representative from the Toronto Police Marine Unit, George Brown College (Waterfront Campus) and a representative from the Toronto District School Board.

The Toronto District School Board has three educational facilities located within the LSA, i.e., the City School, the Waterfront School and the Island Public/Natural Science School, and George Brown College has one campus in the LSA. It is apparent the positive aspects of their location include:

- Access and proximity to the Waterfront;
- A unique location that offers both educational and social experiences for area students and families; and
- Proximity to historic and cultural sites and events (e.g. Fort York, Malt Silos, Medieval Times, CNE, etc.).

Negative aspects, however, include:

- Traffic congestion at peak hours which coincides with school drop off and pick up times; and
- Safety of children and parents related to access.

It was also apparent that the educational and recreational experiences and the quality of education, care and recreation provided at each of the schools are not currently compromised by current BBTCA operations.

Interviews conducted with some other organizations reiterated the same positive and negative attributes of the Waterfront while adding that the Waterfront provides an escape from the pressures and “busyness” of the rest of Toronto. A willingness to tolerate the current operations of the BBTCA was generally acknowledged; however, if operations are increased, an imbalance of uses on the Waterfront could be created.

Does the current operation of BBTCA negatively affect institutional uses?	**No.** **BBTCA operations do not affect schools and other institutional uses in the area.**

2.1.4 Economy

There are a number of businesses operating in the LSA. These business primarily include restaurants, hotels, recreation related businesses (Centreville Theme Park, tour companies, boats rentals, etc.), cultural venues, small independent shops, and the BBTCA. This section looks at the contributions and associated economic benefits related the BBTCA.

LSA Businesses

The socio-economic LSA has a wide array of businesses, varying in size, industry and clientele served. Many of the businesses within the LSA serve recreational users since the Central Waterfront area is a major tourist attraction and caters to both local residents and tourists. Examples of

waterfront recreational businesses include boat tour companies, Centre Island Amusement Park, bike rentals, and event spaces (such as the Toronto Music Gardens, WestJet Stage, etc.).

There are a number of retail stores and restaurants within the LSA serving both residential and tourist/visitor clientele. Some examples include major supermarkets, convenience stores and an array of small and large retailers of clothing, decor, and gifts. Five hotels and conference centres are present in the LSA and provide both accommodations and hospitality services to visitors of Toronto.

Waterfront Toronto has invested approximately $1.4 billion in the revitalization of Toronto's waterfront (Waterfront Toronto, 2015a). An Economic Impact Analysis conducted for Waterfront Toronto in 2013 by UrbanMetrics indicated that between 2001 and 2012, Waterfront Toronto generated approximately 7,600 direct full-time person years of employment in the City of Toronto (Waterfront Toronto, 2015a). This investment has in turn generated some $30 million in local tax revenues to the City and about $137 million to Ontario.

According to UrbanMetrics:

> "*Although Waterfront Toronto's expenditures are significant, they are relatively small compared to the recurring benefits, such as permanent jobs, property taxes, income taxes and tourism spending that will be experienced with continued development of new office, residential, retail/service commercial, cultural and entertainment uses along the City's waterfront, which would not occur without these initial investments by Waterfront Toronto."* (Waterfront Toronto, 2015a, page 26)

The linkage of BBTCA operations to the Waterfront Toronto investments is uncertain. Specifically it is not known if the investments by Waterfront Toronto and the residential/commercial developments in the area would occur if BBTCA operations did not expand. However, comments by some LSA businesses, Real Estate Brokers and others, do provide some qualitative context for this:

- BBTCA is an important part of the waterfront fabric.
- People choose to live in this area for a variety of reasons, including convenient access to BBTCA.

Out of the 264 intercept survey respondents, 165 (63%) identified themselves as a business user, with 23 indicating they work in the LSA. When asked if these respondents had any issues or concerns with the location of their business or place of work, 18 of 24 respondents answered they have none. Of the respondents who do have issues or concerns, the most prevalent response was related to traffic and parking, and accessibility. One local business owner describes 150 retail/commercial operations present in the waterfront with some 3,000 to 5,000 employees working in the LSA. When business stakeholder interviewees were asked to what extent is the waterfront important to the function of LSA businesses, all interviewees responded that the ***unique waterfront location is important for their business***. They stated a variety of reasons for this with the most common being the lakefront view, ambience of the area, proximity to the downtown core, and the investment that has been put into the area (i.e., parks and Queen's Quay revitalization).

Intercept survey respondents, similar to phone survey respondents, were asked what types of local businesses they visited in the LSA in the past. Of these respondents, 95 of 264 indicated they had

visited retail shops or the supermarket and 13 of 264 indicated they had stayed at local area hotels. When asked what factors affect their decision to patronize businesses in the LSA – either positively or negatively – respondents answered the following:

Positive Factors (# of respondents):

- Location/accessibility (90);
- Natural environment/view (35);
- Social environment (19);
- Quality of service (shops) (18); and
- Affordability (3).

Negative Factors (# of respondents):

- Traffic and parking (8);
- Weather (5);
- Quality of service (shops) (5);
- Construction (5);
- Expensive (3);
- Crowds (3); and
- Noise (airport) (1).

Intercept survey respondents showed an overwhelmingly positive response in terms of the factors that affect their decision to patronize LSA businesses, with location/accessibility and lakefront view being the most prominent factors. Interestingly, only one respondent (of 264 intercepts) indicated that noise from the BBTCA negatively impacts their decision to patronize businesses in the LSA, suggesting that based on the intercept surveys, the BBTCA does not generally impact someone's decision to patronize a LSA business. Interviewed stakeholders identified similar positive and negative aspects of the Waterfront environment to those mentioned by intercept survey respondents. The most common negative response was related to the issue of increasing traffic and congestion in the LSA.

Business stakeholder interviewees were also asked whether or not they have any concerns related to the current operations of the BBTCA. Most interviewees indicated that they have no real concern about the BBTCA and its current operations. Of the interviewees who mentioned they do have some concern, their concerns were related to increased traffic, congestion and noise from the airport. Most interviewees also indicated that the BBTCA does not negatively affect their business operations, with some suggesting that having the BBTCA on the Waterfront positively impacts their business, as being close to an airport is a major "selling feature" (specifically for hotels and venues). However, one business owner located near the BBTCA expressed concern for the lack of parking for his customers competing with BBTCA travelers.

Does the current operation of BBTCA negatively affect local businesses and their users?	**No.** **Qualitative information collected from a variety of sources indicates that the BBTCA is more of a value to local businesses than it is a cost. However, increasing traffic congestion is a concern for most.**

Airport Use

Today, the Airport serves a wide variety of activities which include scheduled passenger service, charter/business aviation, flight training, air ambulance operations and recreational flying (PortsToronto, 2014). Since 2006, when Porter Airlines started operations, annual passenger activity has increased dramatically from 23,000 passengers to about 2.4 million passengers in 2014 (see **Table 6**).

Table 6: BBTCA Annual Passenger Activity 2006-2015

	BBTCA Passenger Activity 2006-2015 (thousands)								
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Total Annual Passengers	23	264	509	771	1,131	1,548	1,909	2,300	2,400
Percent Annual Increase	-	1057%	92%	52%	47%	37%	23%	20%	4%

(Source: Years 2006-2012: HLT Advisory, 2013; Years 2013-2014: PortsToronto, Annual Reports 2013, 2014)

According to HLT Advisory (2013), the nature of passenger travel through BBTCA is roughly split equally between inbound and outbound passengers (i.e., roughly 50% of passengers are local to Toronto and area). According to HLT passengers currently are predominantly business-oriented with about 42% of inbound passengers staying one or no nights. Only 26% of inbound trips last four days or more. In conversations with local business representatives, (e.g. hotels, Waterfront Business Improvement Association (BIA), BBTCA) the notion that BBTCA is dominated by business travel was confirmed, but that the share of leisure travel is trending upwards.

Determining and documenting the economic benefits from an operation like BBTCA has been the subject of recent study. HLT Advisory (2013) prepared a report for the City of Toronto, *Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport* which examined previous economic studies prepared by InterVISTAS (2012, 2014). HLT Advisory concluded that economic impacts described by InterVISTAS were appropriate, but added that spending by non-resident BBTCA passengers produces additional economic benefits that add further value. The results from both studies are highlighted in **Table 7**.

Table 7: Economic Contribution from Operations at BBTCA

	Expenditure Sources	**Direct Employment (Jobs)**	**Annual Tax Revenue (City & Province)**
			($ Million)
InterVISTAS	BBTCA operations	1,700	22
HLT Advisory	Spending of non-resident passengers	945	23
Total		**2,645**	**45**

Table references:
InterVISTAS, 2012. Billy Bishop Toronto City Airport Economic Impact Study.
HLT Advisory, 2013. Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport.

In both cases, only direct jobs and combined direct annual tax revenue to the City and Province are considered here. All other effects (indirect and induced) would be double counting given the location of BBTCA within the GTA and the likelihood that indirect and induced jobs would remain unchanged or only marginally affected in such a large metropolitan area.

Together, HLT (2013) and InterVistas purport that BBTCA operations (as of 2012) and non-resident passenger spending would generate about 2,645 direct jobs and about $45 million in annual tax revenues to Ontario and the City of Toronto combined, of which the majority (about 90%) accrues to the province.

Both studies relied on Input-Output models, which is a commonly accepted tool and assessment framework for studies of this nature. However, it is important to note that although a reasonable approximation of the economic benefits associated with expenditures was linked to BBTCA, special care must be taken when interpreting the results.

BBTCA is an important mode of inter-region transportation and is important to the vitality of Toronto's City core, according to the Toronto Financial District BIA, the Entertainment District BIA and the Waterfront BIA. However, it is acknowledged that most travelers continue to use Pearson International Airport. **A key question raised by some is: Can BBTCA operations be held to current levels of activity without imposing economic costs?** This question serves this assessment by enabling a determination of whether viable alternatives to BBTCA exist and can be leveraged.

To assess this question, airport users were targeted in both the phone and intercept surveys with specific questions to understand their use and preference patterns for travel. From the phone survey it was found that a higher proportion of LSA respondents (64%) have used the BBTCA than RSA respondents in the remainder of the City (41%). In the RSA, usage of the BBTCA is highest in the rest of the former City of Toronto (53% of former City of Toronto respondents), followed by York/East York (44% of York/East York respondents), Etobicoke (32% of Etobicoke respondents) and Scarborough (22% of Scarborough respondents).

Of the 264 intercept survey respondents, 132 (50%) stated that they had used the BBTCA in the past for travel. During the implementation of the intercept surveys, about 30 airport users were randomly selected in the BBTCA terminal lounges on August 27, 2015.

When survey respondents were asked how often in the past year they had used the BBTCA for their travel needs, the most commonly stated response was "two to three times" (LSA 28%, RSA 34%) for phone survey respondents and "one time" (47 of 264) for intercept survey respondents. Approximately 20% of phone survey respondents within the LSA and the RSA indicated that they had used the BBTCA more than four times in the past year, compared to approximately 10% (28 of 264) of intercept survey respondents.

BBTCA airport users were also asked why they choose to fly in or out of the BBTCA, with both phone and intercept survey respondents suggesting they had done so because of the airport's convenient location. Airport users also suggested other benefits of BBTCA including:

- Superior airline service;

- More affordable flights; and
- More convenient flight schedule as reasons for choosing the BBTCA over alternative options.

Survey respondents were then asked what they would do if they could not book a flight for their desired time and day out of the BBTCA. **The majority of all survey respondents indicated that they would make alternate travel arrangements**, with most of those respondents stating that they would travel through Pearson International Airport (phone survey: LSA 59%, RSA 56%; intercept survey: 85 of 264. Of these respondents, 22% of LSA and RSA phone survey respondents and 50 intercept survey respondents suggested that they would book a different flight at another time through the BBTCA, with 10% (LSA) and 11% (RSA) of phone survey respondents and 15 intercept survey respondents indicating they would drive or take a train instead.

All phone and intercept survey respondents were also asked to indicate the number of times they had used Pearson International Airport for travel in the past year. An overwhelming majority of survey respondents indicated that they had used Pearson in the past year (phone survey: LSA 74%, RSA 71%; intercept survey: 195 of 264.

Of the respondents who have used Pearson, 33% (LSA) and 23% (RSA) of phone survey respondents and 79 of 264 intercept survey respondents stated they had used it two to three times in the past year. About 14% (LSA) and 18% (RSA) of phone survey respondents and 69 of 264 intercept survey respondents used it once, and 33% (LSA) and 23% (RSA) of phone survey respondents and 47 intercept survey respondents used Pearson more than four times.

All respondents were also asked if they would be more or less likely to use Pearson or the BBTCA now that the Union Pearson Express (UP Express) is complete. The majority of respondents (60% (LSA) and 67% (RSA) of phone survey respondents and 193 intercept survey respondents) stated that there would be no change in their choice of airport between Pearson and BBTCA now that the UP Express is in operation. Only 33% (LSA) and 27% (RSA) of phone survey respondents and 42 intercept survey respondents suggested they would be more likely to use Pearson, and 7% (LSA) and 6% (RSA) of phone survey respondents and 20 intercept survey respondents suggested they would be more likely to use the BBTCA. However, it is useful to note that at the time of this survey the UP Express had just started operating and few respondents had experience with the service.

Interviews with 24 stakeholders representing area business, recreational users, real estate brokers, and residents reveal the following qualitative insight with respect to BBTCA operations:

1. Most agree that BBTCA offers value to travelers, business, and the City in general.
2. Some representing recreational users have used and will continue to use BBTCA because of convenience and service of quality.
3. However, nearly all suggest the current level of BBTCA operations is acceptable or tolerable (in the case of recreational/residential users) if it does not grow beyond its current levels of use. In other words, most raised concerns about the ability to use and enjoy public and private spaces if the number of flights and passengers per day were to increase from current levels.

The above information leads one to conclude the following about the BBTCA's current operations:

1. The current users of BBTCA are very satisfied with their experience and they obtain great value (time savings, convenience) from it.
2. Most, but not all, BBTCA users would use alternate travel options (mostly fly from Pearson) in the event they could not book a BBTCA flight when required – some would wait until an alternative BBTCA flight was available. This means viable alternative travel options are available and would be used.
3. The economic benefits described by HLT Advisory (2013) and InterVistas (2012) derived from BBTCA would for the most part shift to alternative travel modes and facilities, mostly Pearson International Airport, if demand for BBTCA travel expands beyond levels of passenger traffic that are permitted under the Tripartite Agreement.
    a. This means that direct and indirect employment opportunities would shift from BBTCA to alternative travel, and the government tax revenues would likely be retained. For municipal revenues, largely derived from business and property taxes, it is likely no effect would occur if Pearson International Airport was used in lieu of the BBTCA.
    b. This conclusion assumes that Pearson International Airport has the capacity to accommodate overflow travels from BBTCA.

Does the current operation of BBTCA contribute economic value to the City, employment, businesses, and its users?	**Yes.** **Such benefits shift to viable alternative modes of travel if flights from BBTCA are not available.**

2.1.5 Tourism

Tourism related uses with the LSA are varied. Recent investments have created an integrated environment of walkways, parks, and trails that now link the area together and create an inviting experience for visitors. A number of cultural venues and attractions such as museums, galleries and concert venues are also found in the area which is another draw for tourists and visitors. The venues and attractions found in the LSA are identified in **Table 8** below.

Table 8: Cultural Venues and Attractions Located in the LSA

Category (Type)	Attraction	Location	Description
Amusement Park	Centreville and Far Enough Farm	Avenue of the Island	A children's amusement park located on Centre Island, part of the Toronto Islands. Far Enough Farm is found on the outskirts of the amusement park and is home to several domesticated animals. Both are operated by William Beasley Enterprises Limited on a land lease from the City of Toronto.
Museum/ Gallery	Museum of Inuit Art/Museum of Inuit Art Gallery	207 Queens Quay W	A museum devoted exclusively to Inuit art and culture.
	The Power Plant Contemporary Art Gallery	231 Queens Quay W	One of Canada's leading galleries devoted to contemporary art.
	Redpath Sugar	95 Queens Quay E	A museum located within the Red Path Sugar Refinery that

Category (Type)	Attraction	Location	Description
	Museum		teaches visitors the history of the sugar industry in Canada and about the lives and times of the Redpath family.
	The Queen's York Rangers Museum	660 Fleet Street W	A museum devoted to the history of the Queen's York Rangers. The museum is located within the Fort York Armoury.
Concert Venue/ Theatre	TD Echo Beach	909 Lake Shore Blvd W	Toronto's first fully-licensed outdoor beach concert venue located on the East Island of Ontario Place, just east of the Molson Canadian Amphitheatre.
	Molson Canadian Amphitheatre	909 Lake Shore Blvd W	A semi-enclosed outdoor concert venue in Toronto.
	Harbourfront Centre Theatre (part of Harbourfront Centre)	231 Queens Quay W	A multi-use venue ideal for music, dance, and theatre that can be transformed into various seating configurations. It has two balcony levels and three lobbies.
	The Walter Carsen Centre for The National Ballet of Canada	470 Queens Quay W	This is one of two locations of the National Ballet of Canada. It is the only Canadian ballet company to present a full range of traditional full-length classics.
	Polson Pier	11 Polson St	Polson Pier, previously known as The Docks Waterfront Entertainment Complex or The Docks, is a multi-purpose entertainment venue in Toronto, Ontario. It is located in largely industrial Port Lands area of the City along the shore of Toronto Harbour.
Historic Site	Fort York National Historic Site	250 Fort York Blvd	Fort York is a historic site of military fortifications and related buildings on the west side of downtown Toronto. It is operated by the City of Toronto with support from The Friends of Fort York and other members of the community, as a historic site museum.
Tour Operators	Toronto Harbour Tours and Charters	145 Queens Quay W	Live narrative sightseeing or private charters of Toronto's harbour and islands by boat.
	City Sightseeing Toronto	249 Queens Quay W	A tour company that offers double-decker City tours and a Toronto Harbour & Island Cruise.

Table references:
City of Toronto, 2015. Fort York Armoury. Retrieved from http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=c14df35f00f15410VgnVCM10000071d60f89RCRD&building=411DDCE37A9AF81B85257C8B007355AD
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Toronto Harbour Tours Inc., 2010. About Us. Retrieved from http://www.harbourtourstoronto.ca/about.html

The intercept survey data (based on 264 respondents) demonstrate that approximately 74 survey respondents were visitors or tourists to the LSA on the day the survey was administered. It was

determined that these respondents were tourists as they live outside of the City of Toronto and the purpose of their visit to the LSA on the day of the survey was either for a recreational activity, or to fly in or out of the airport. Tourists have been identified as living in the Greater Toronto Area (GTA) (16), outside of the GTA (21), outside of Ontario (13), or outside of Canada (24).

Sixty-three (63) of the 74 intercept survey respondents were identified as recreational users. Some of the recreational activities these tourists participated in, in the LSA include:

- Jogging/hiking/exercise/walking;
- Biking;
- Relaxing;
- Boating;
- Picnicking;
- Swimming; and
- Visiting the Toronto Islands (Centreville, Parks, and Beaches).

When these tourists were asked what factors affect their use and enjoyment of the recreational facilities in the LSA they cited the natural environment (23), accessibility/convenience (12), maintenance and safety (11) and available facilities and services (9) the most often as positive factors that affect their use and enjoyment. The weather (11), crowds (5) and prices (4) were the most commonly mentioned as negative factors that affect their use and enjoyment of recreational facilities in the LSA.

Twenty-nine (29) of 74 tourists also visited LSA businesses which include:

- Restaurants;
- Retail stores/supermarkets;
- Hotels;
- Recreational businesses; and
- Event businesses.

When intercept survey tourists were asked what factors affected their decision to patronize businesses in the LSA they cited location/accessibility/convenience (15), good service/quality (7), and the natural setting (9) as the main reasons for visiting LSA businesses. Only four respondents had negative comments about LSA businesses. These comments were related to crowding, accessibility, noise from the airport and bad weather.

Two of the 24 prearranged stakeholder interviews were conducted with organizations that derive a large portion of their business from tourists/visitors. Both of these organizations stated that their waterfront location is important and valuable to visitors. They state that the key reason for the tourists and visitors in the area relates to the beauty and uniqueness of the site. One operator in the accommodation business states that their guests prefer this waterfront location over many alternatives throughout the City because of the waterfront experience along with its proximity to the business core of the City. The other business owner sells/rents goods and services to area visitors on a daily basis.

When asked if they had any concerns related to the BBTCA operations both offered the following observations:

1. BBTCA is commonly used by their patrons and is valued for its convenience and service quality.
2. The current noise and other interruption events linked to BBTCA are not a factor for their patrons – based on a lack of comments or complaints. Rather, there have been many complaints linked to traffic and the Queens Quay revitalization construction.
3. The visible and audible flights linked to BBTCA do not appear to be detraction from the waterfront experience. One comment is: "The flights tend to be part of the theatre of the area".

Both interviewees commented on other businesses in the area and felt the above sentiments are common across a variety of LSA businesses since this topic is discussed often within the Waterfront BIA network.

Does the current operation of BBTCA negatively affect tourism?	**No.** **BBTCA is generally seen as a positive driver for tourism in the area.**

2.1.6 Municipal Implications

The area of the Toronto Waterfront within the LSA is an important area of the City regarding municipal implications. Past and present investment or improvements to the area will have implications for the City, such as planning and investments currently being made by the City through the *Bathurst Quay Neighbourhood Plan*, and by Waterfront Toronto.

Municipal Services

Toronto Police, Fire and EMS all operate and have facilities within the LSA. Activity levels along the waterfront vary due to season, weather and other factors. Stakeholder interviews have indicated that as a result of these factors, these City administered organizations are already finding certain operations within the LSA to be challenging.

As described in **Table 4** above, the Toronto Police Marine Unit offers assistance to all waterways and watercourses in the City of Toronto including Lake Ontario to the US/Canada border. The Unit provides emergency response services, enforcement, and patrols on all watercourses. The BBTCA is serviced by 14 Division and the Toronto Islands are serviced by 52 Division, with the Toronto Police Marine Unit acting as a first responder for both locations. In the interview with the Unit, it was indicated that the current marine traffic in the Inner and Outer Harbours and near the BBTCA terminal negatively impacts the service provided by the Unit due to the congestion created by the volume of boats operating in the area. Wake turbulence in the Inner Harbour also serves to impact or reduce emergency response times. The Unit works with the BBTCA and other emergency services in the area as first responders and is currently working with the BBTCA on a Downtown Emergency Management Plan.

Property Tax Revenue

As detailed in **Section 2.1.7** below, a study conducted by N. Barry Lyons Consultants (2013) found that the Waterfront condominium market showed stable upward demand and increasing pricing, in keeping with the overall Toronto condominium market. The Toronto Real Estate Board's (TREB) June – Annual Market Watch Report (2015) also indicates that property values have continued to increase within the Central Waterfront Area, and shows no difference in rate of change in property values in the areas along the Central Waterfront Area and close to the BBTCA. Stakeholder interviews with real estate brokers suggested that people still desire the unique environment that Toronto's waterfront provides regardless of the traffic, noise (from all sources), and activity from current operations of the BBTCA. Those choosing to live in the area are willing to overlook nuisances for the lake views, access to the water and amenities the area provides. This indicates that the property tax revenue received by the City of Toronto continues to steadily increase as property values in the LSA increase.

Does the current operation of BBTCA negatively affect municipal services and property taxes?	**No.** **There is no impact on municipal services and property taxes.**

2.1.7 Property Values

The LSA is home to an increasing number of residents. Since 2001, the total resident population of this area has increased by over 130% from 18,500 residents in 2001 to just over 43,000 residents in 2011 (**Table 9**). The area attracts residents for its natural setting, lakefront views, and variety of recreational and cultural activities available and close proximity to major employment districts within the City core.

Table 9: Population by Age, 2001-2011

	2001	%	2006	%	2011	%	% Change 2001-2011
Total	*18,530*	*100%*	*26,015*	*100%*	*43,295*	*100%*	*133.6%*
Children 0-14	1,785	9.6%	1,850	7.1%	2,405	5.6%	34.7%
Youth 15-24	1,755	9.5%	2,435	9.4%	4,695	10.8%	167.5%
Working Age 25-64	13,295	71.7%	19,445	74.7%	32,980	76.2%	148.1%
Seniors 65+	1,695	9.1%	2,285	8.8%	3,215	7.4%	89.7%

The predominant demographic of the area is best described as young working-age single or married couples, mostly between 20-40 years of age (**Figure 3**). Compared to the rest of the City, the downtown waterfront neighbourhoods have fewer children and seniors residing in the area. Interviews with four Real Estate Brokers in the area indicate the following common themes for the area:

1. Residential properties are for the most part high-rise condominiums (greater than 5 floors).
2. Demand for new and used condominium/apartment units has been strong and tends to outpace supply.
3. Sellers of condominium units tend to capture their full asking price:

a. Ratio of final sales to asking price has been between 98-100% over the past decade according to data from the Toronto Real Estate Board.
b. The average "days on market" (time from listing to sale) is about 30 days.

4. The number of residential units within the downtown waterfront neighbourhood has increased from 4,415 units in 2001 to just over 9,500 units in 2011 (City of Toronto, 2011. City of Toronto Neighbourhood Planning Area Profiles, waterfront Communities – The Island (77), Social Profile #3, Families and Dwellings).
5. According to UrbanMetrics (2013) "*On a square footage basis, Harbourfront resale prices are generally among the highest in the entire Toronto CMA, on average".*
6. Also according to UrbanMetrics (2013), *"the annual value of building permits in the waterfront area increased more than triple the City average from 2001 to 2011", about 690% in the waterfront area compared to 195% in the city as a whole.*

These numbers demonstrate that the LSA has become a highly desirable area to live and work. Proposed residential and non-residential developments in the LSA expected to expand as illustrated in **Figure 4**. This means the area will in the future contain a higher density of residential units.

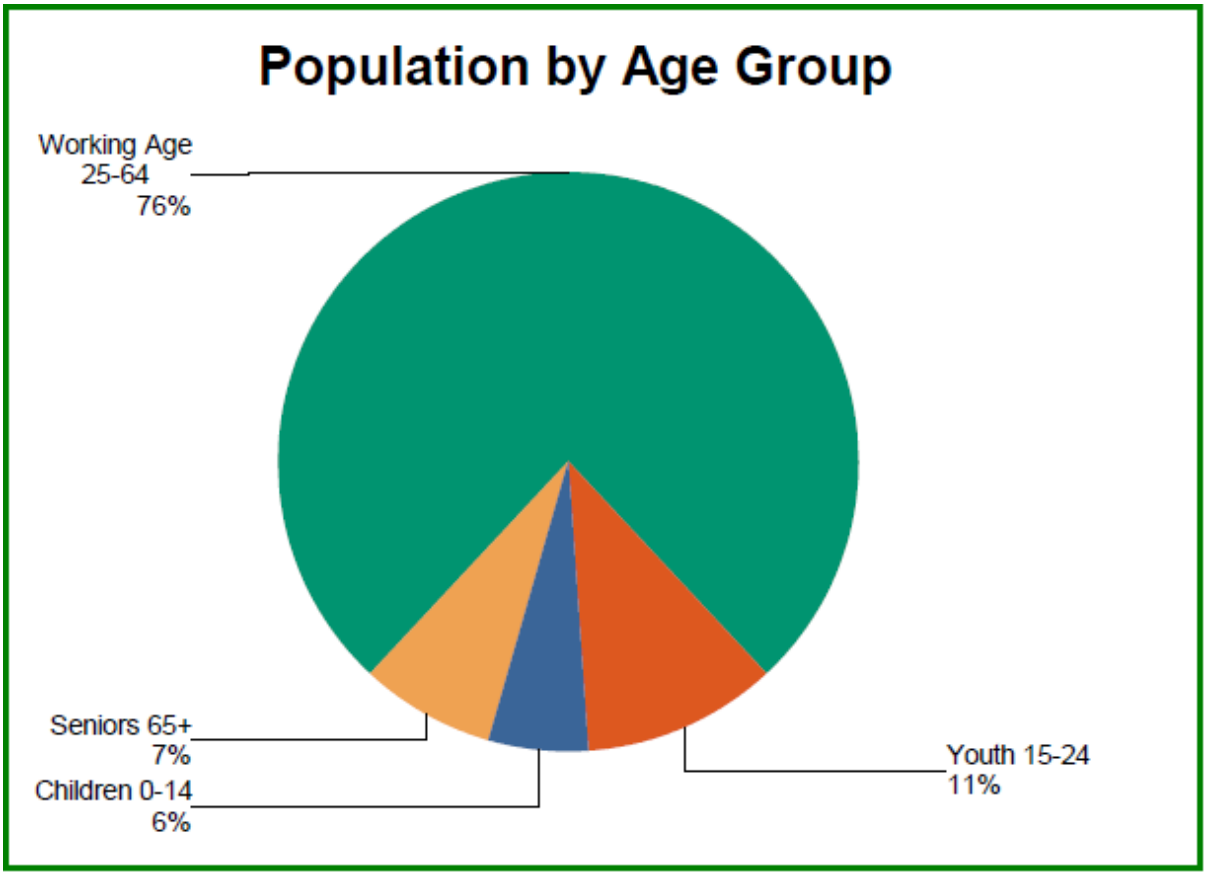


Figure 3: City of Toronto Neighbourhood Planning Area Demographics Profile for Waterfront Communities – The Island (77)

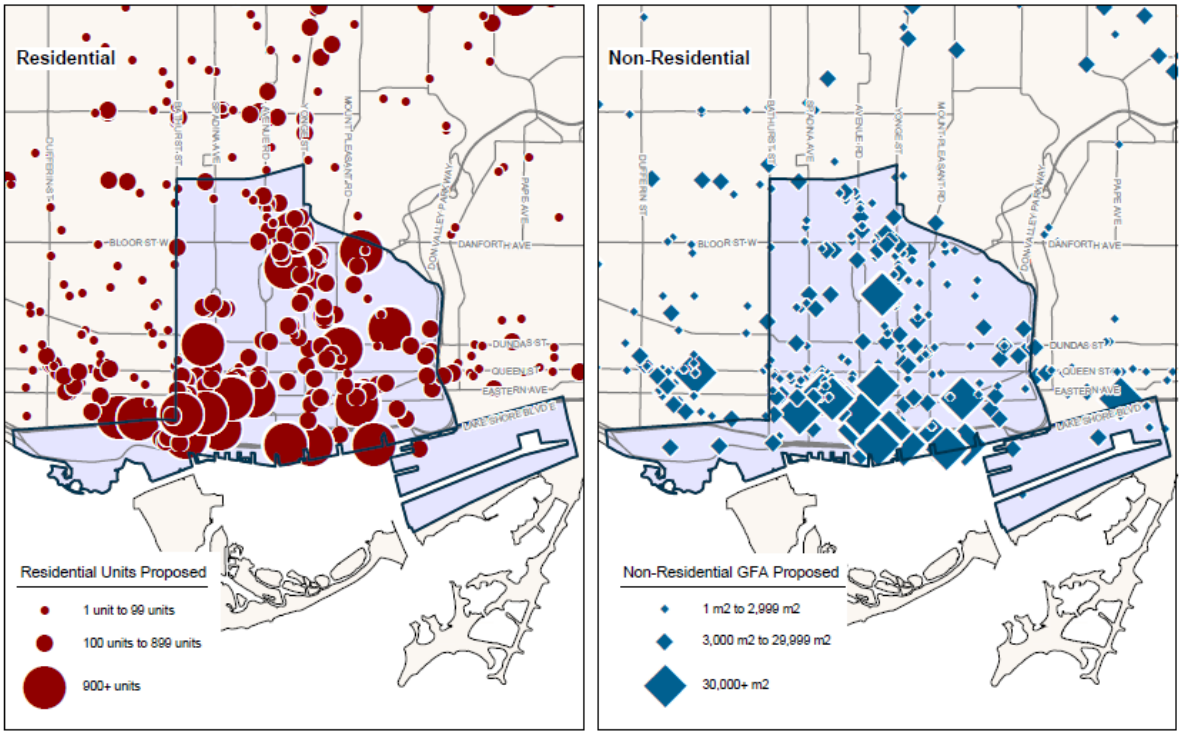


Figure 4: Proposed Residential and Non-Residential Developments in the LSA

Property Values

While the area has a number of market strengths, it also has some weaknesses that were identified in a study conducted by N. Barry Lyon Consultants (2013) for the City of Toronto. The weaknesses of the area generally limit it from reaching higher per square foot values, which may be found in other North American waterfront communities. Some of the area weaknesses include, but are not limited to (N. Barry Lyon Consultants, 2013):

- Entertainment and cultural programming, while attractive for some residents, causes a lot of tourist traffic, activity and congestion;
- For residential units facing north, the Gardiner Expressway and Lake Shore Boulevard create a constant source of noise and pollution, and a barrier to the rest of the downtown core;
- There is a lack of retail uses to meet the daily needs of residents (i.e., grocery and drug stores);
- Some buyers may have concerns about the operations of the BBTCA in terms of noise, pollution and traffic; and
- Rush hour traffic congestion is likely the largest weakness of the area. It can be difficult to get to and from the Gardiner Expressway, Queens Quay and Lake Shore Boulevard West during peak hours.

Even with its market weaknesses the area is desirable to prospective buyers. The research conducted by N. Barry Lyon Consultants (2013), indicated that over the last ten years demand from developers, investors and end users is consistent with that of the broader market.

While the BBCTA is highly visible, generates significant activity in the area, and contributes to traffic and noise, N. Barry Lyons Consultants (2013) found that there is no evidence to support that the BBCTA has had an impact on either the sale of new condominiums by developers, or in the resale market in terms of pricing. Based on the interviews Lyons conducted with area sales agents, they found that it is likely that some owners have moved from waterfront condominiums due to airport traffic, congestion on Queen's Quay or noise, but there still appears to be a steady supply of buyers willing to live with these conditions, suggesting that the benefits of living in the area outweigh the above negatives.

The N. Barry Lyons Consultants (2013) study found that the Waterfront condominium market showed stable demand and increasing pricing, in keeping with the overall Toronto condominium market. The TREB's June – Annual Market Watch Report (2015) also indicates that property values have continued to increase within the Central Waterfront Area, and shows no difference in rate of change in property values in the areas along the Central Waterfront Area and close to the BBTCA. This is shown in **Figure 5** and **6** below. Prearranged stakeholder interviews with four (4) real estate brokers suggested that people still desire the unique environment that Toronto's waterfront provides regardless of the traffic, noise (from all sources), and activity from current operations of the BBTCA. They are willing to overlook nuisances for the lake views, access to the water and amenities the area provides.

From the period 2004 to 2015, the average condominium prices in the downtown core areas (CO1 and CO8) most closely match the LSA for this assessment. Compared to the average annual condominium selling prices in Central Toronto, the LSA condominium prices have kept pace with the rest of the central area (**Figure 5**). Equally important, the percentage change in condominium prices from one year to the next tend to show that waterfront condominium prices (areas CO1 and CO8) have kept pace with those in Central Toronto and in many years have exceeded it (**Figure 6**).

The N. Barry Lyons Consultants (2013) study also found that local area condominium suites have shown value appreciation and a low number of days on the market. They found that this is even true of condominium buildings located closest to the BBTCA. These are condominiums that are arguably the ones most impacted by the BBTCA's operations, increased passenger volumes and associated noise and traffic increases. Even the new condominium market in the area (i.e., East Bayfront developments) has been received well and opened with a strong response. This is a market that is often lagging in many parts of the City. It was therefore concluded by N. Barry Lyons Consultants that the BBTCA has not had any negative impact on Toronto Waterfront condominium values.

Overall, the prearranged stakeholder interviews with real estate brokers conducted for this largely confirm the information presented in the N. Barry Lyons Consultants study. Current BBTCA operations are not negatively affecting demand in the area and property values have been continuing to increase over the past decade regardless of the impacts of area traffic congestion and noise and operations at the BBTCA.

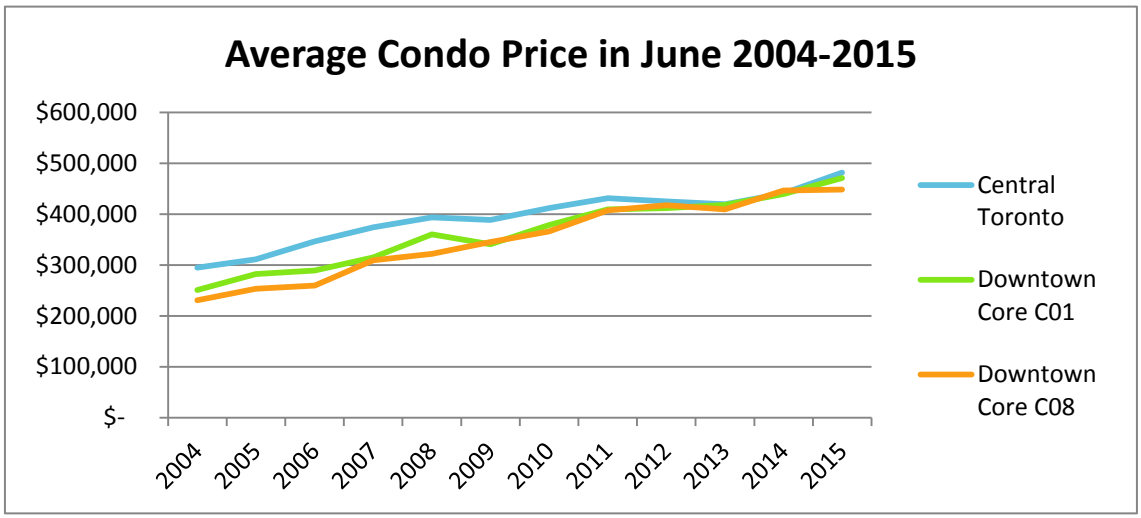


Figure 5: Average Condominium Price in June 2004-2015 (TREB, 2015)

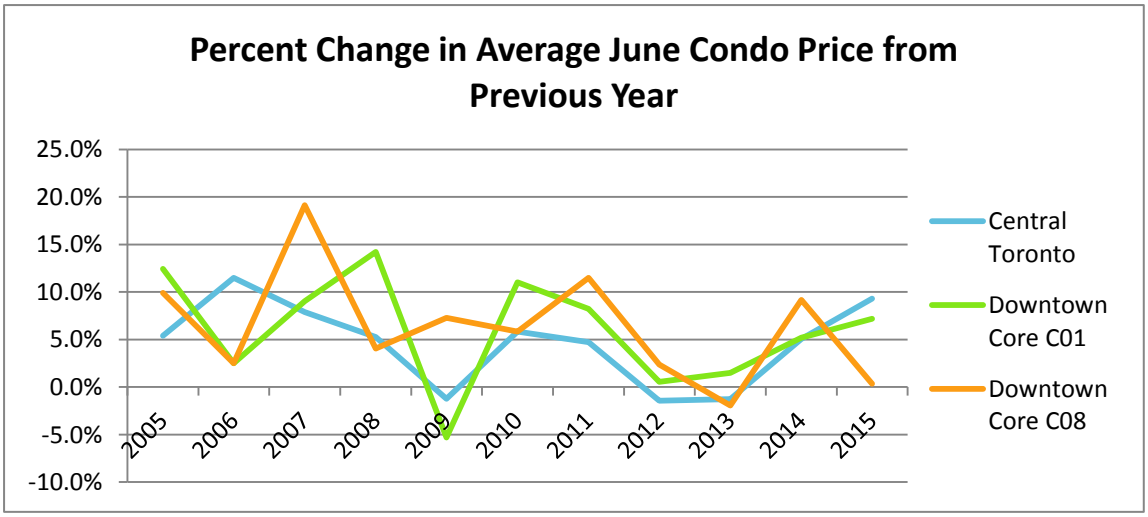


Figure 6: Percent Change in Average June Condominium Price from Previous Year (TREB, 2015)

Note (Figures 5 and 6): Downtown Core CO1 generally encompasses the central downtown core and is bound by Bloor Street to the north, Yonge Street to the east, the shore of Lake Ontario (including the Toronto Islands) to the south and Dundas Street W/Dufferin Street (including Ontario Place) to the west. Downtown Core CO2 generally encompasses the eastern downtown core and is bound by Bloor Street to the North, the Don Valley Parkway to the East, the shore of Lake Ontario to the south, and Yonge

Insight gained from conversations with four LSA real estate brokers adds some perspective to the above:

1. Although in general there is no indication of any negative effect on property values in the LSA linked to BBTCA operations, it is possible that some individual property owners might experience a financial loss if the owner feels compelled to sell their condominium unit soon after purchase.

2. The properties close to BBTCA tend to have lower selling prices compared to equal units elsewhere in the LSA because of lack of services and amenities.
3. Even for residential buildings in close proximity to BBTCA, property values are increasing at equivalent rates to other LSA areas.

In conclusion, there is no evidence that property values of residential units near the BBTCA or along the waterfront are negatively affected.

Does the current operation of BBTCA negatively affect residential property values?	**No.** **There is no evidence to suggest that BBTCA operations have any negative effect on property values along the waterfront or near the site.**

2.1.8 Non-use Values

One does not have to use the waterfront to derive satisfaction from its existence. Many people in the City may not have visited or plan to visit the waterfront, but they may nonetheless derive value from it in the form of:

- Maintaining options for future generations to develop and use the waterfront as they wish it to become;
- Preserving aspects of the natural environment for future use and enjoyment – the argument being for example that if part of the Inner Harbour is filled in the loss is irreversible; and
- Representing or contributing to the "brand" of Toronto as a major "waterfront" city with a certain "quality of life" that is attractive.

Both LSA and RSA phone and intercept survey respondents were asked to list the top three things they value most about Toronto's waterfront. From phone survey respondents, it was found that there is little consensus on what is most valued about Toronto's waterfront between LSA and RSA residents. RSA respondents have a variety of things they value, from the scenery (26%) to specific activities. LSA respondents are more likely than those in the RSA to cite the scenery (35%), the large open space (23%), the convenient location (18%), the sense of community (13%), and the peaceful nature of an area close to but away from the rest of the City (13%). RSA respondents are more likely than the LSA respondents to cite the recreational facilities (11%). Both LSA and RSA respondents indicated that they value the water or proximity to the lake and enjoy walking or biking in the area.

The phone survey also found that non-users, who are those that live in the RSA but have never visited the LSA (13.6%), value the waterfront even though they have never visited it. These non-users cited scenery and view (22%), the water and proximity to the lake (17%) and recreational activities (14%) as the top three reasons why they value the Waterfront. The results from the intercept survey generated similar responses. When asked the same question, intercept survey respondents most commonly stated the natural setting (307), recreational opportunities (153), the uniqueness of the area and the identity it creates for the City of Toronto (137).

Phone and intercept survey respondents were also asked to state how important they believe the waterfront is to the City of Toronto. Almost all City of Toronto phone survey respondents (RSA and LSA) rate Toronto's waterfront as important to the City. LSA phone survey respondents are more

likely to state “very important” (93%) as are phone survey respondents in the RSA (89% - users only), with 82% of non-users in the RSA stating this as well. Overall, the majority of intercept survey respondents also felt that the waterfront is very important to the City of Toronto, with 234 respondents stating this. Only 17 respondents felt that the area is somewhat important, and 9 respondents “didn’t know/were not sure”.

The waterfront is important to the City of Toronto because of its natural setting (location); it attracts tourists, and is a site for unique recreation and events. The LSA phone survey respondents were more likely cite tourism as the most valued attribute of the waterfront, while both LSA and RSA phone survey respondents say the waterfront is important to the City because of the natural setting and view (LSA 48%, RSA users 57%, RSA non-users 43%), and for the recreation it provides (LSA 33%, RSA users 39%, RSA non-users 30%). Intercept survey respondents cited the same characteristics of the waterfront as phone survey respondents with the most frequent responses being the natural setting (240), recreational activities (203), tourist destination (126) and the social environment it provides (114).

Does the current operation of BBTCA negatively affect non-use values?	**No.** **While BBTCA supports some of the non-use values that survey respondents identify as important (e.g., tourist destination), there are other non-use values that may be negatively affected by airport operations (e.g., natural setting).**

2.2 Summary of Existing Conditions

The socio-economic environment around the LSA is dynamic and multi-faceted. The area is home to a variety of businesses, a growing population and is very close to Toronto’s main financial and entertainment districts. The area has a variety of recreational opportunities and unique waterfront amenities as well as the airport which serves as a major hub for business and other local travelers. Despite the ongoing construction of various projects in the area, demand for amenities and traffic and congestion concerns, the area continues to experience property value increases either at rates at par with or above other areas in the City. It is a thriving area for a variety of residential, recreational and economic uses and is important to residents and visitors alike for its use and non-use values.

There are some fundamental issues and concerns with the current operation of the BBTCA, particularly for LSA residents and recreational users. These issues are primarily characterized as interruptions in the use and enjoyment of public and private spaces coinciding with the takeoff and landing of BBTCA aircraft due to noise and odour.

3. Description of Future Conditions

In order to document future socio-economic conditions, other past, present and certain or reasonably foreseeable future effects from other projects within the same geographic and temporal boundaries of this assessment were considered. The following section describes any anticipated differences between today’s existing conditions and the anticipated future conditions upon which the effects assessment is based (the year 2033).

3.1 Residential Uses

By the year 2026, the City of Toronto's population is projected to surpass 3 million, and reach almost 3.2 million people by the year 2031 (Hemson Consulting, Ltd., 2012). With a continued increasing population, there are a number of planned residential developments in the LSA. These developments are currently listed in the City of Toronto's Development Applications index as active, or are through the planning approval process but have not yet been built. Most of these planned developments are proposed to be built in west end of the LSA and will be found in the West Don Lands, Keating Channel, Villiers Island, East Bayfront, and Lower Yonge planning precincts. Many of these developments will also include some retail, office, or institutional space.

The entire Lower Don Lands neighbourhood, when built out, will have a population of between 20,480 and 21,390 residents in approximately 13,000 units. Within the Lower Don Lands, the Keating Channel Precinct population is expected to be approximately 7,520 people in 4,700 units (Michael Van Valkenburgh Associates, Inc., 2010). The area will consist of a mixed use neighbourhood with predominately mid-rise buildings, and some high-rise elements. Development of the Villiers Island Precinct Plan is currently underway, and will include live-work communities.

Despite the amount of planned developments in the LSA, phone survey respondents (15% LSA and 14% RSA) and 87 of 240 personal intercept survey respondents suggested that they would like to see the area maintained as it is now with limited residential development in the LSA moving into the future. It is important to note that most of the intercept survey respondents who answered this question were referring mostly to the Central Waterfront Area of the wider LSA.

3.2 Recreational Uses

The City of Toronto's *Parks Plan 2013-2017*, and its eventual successor, will guide parks planning in the City moving into the future. The current plan states that $278 million has been committed by all three levels of government through Waterfront Toronto to create new, or improve existing parks or public spaces in the Central Waterfront Area by 2021. It is therefore expected that parks and public spaces in the Central Waterfront Area will continue to be improved, with new parks also planned to be added in the Lower Don Lands (i.e., the Keating Channel and Villiers Island precincts) and the Port Lands neighbourhoods as these areas are developed. One of the planned parks is the 375 hectare Lake Ontario Park in the Port Lands which will extend from Cherry Beach to Ashbridges Bay, providing connections to the Eastern Beaches and Tommy Thompson Park (Waterfront Toronto, 2015c). A significant proportion of the park is planned to be dedicated to recreational boating, and the park will also include a number of outlook points that reach out over the water's edge.

The revitalization of the 63 hectare Ontario Place site was announced by the Province of Ontario in 2014, with most of the revitalized site being dedicated to new park and recreation space which will significantly add to the current LSA park and public spaces. The development is planned to include: a cultural hub, with a focus on learning, innovation and research; a canal district with restaurants and shops; a waterscaped park; a green space for events and festivals; a green pedestrian land bridge over Lake Shore Boulevard connecting to Exhibition Place; and a park and trail to be developed on the eastern edge of the site. Each of these areas is planned to be linked by a continuous waterfront trail around the site islands (MTCS, 2015). The waterscaped park is proposed to include a series of floating elements and surfaces for recreation purposes and water activities around the Ontario Place Cinesphere and pods. Construction for the new park and trail on the 7.5 acre portion of East Island is

already underway and includes a waterfront trail, gardens, a pavilion, rocky beach and fire pit area, and a boardwalk (MTCS, 2015).

Through both the phone and intercept surveys, respondents expressed their vision for the future of Toronto's waterfront over the next 25 to 50 years. Both phone and intercept survey respondents stated recreation and nature as primary future uses they would like to see in Toronto's waterfront. Over half of the phone and intercept survey respondents suggested recreation/tourism as the primary future use, with 51% (LSA) and 61% (RSA) of phone survey respondents and 167 of 264 intercept survey respondents stating this. Furthermore, 23% (LSA) and 27% (RSA) of phone survey respondents and 149 of 264 intercept survey respondents also indicated that they would like the natural environment and scenic views to be preserved.

It is also expected that recreational organizations and clubs will maintain their presence on the Toronto Waterfront, as was indicated through stakeholder interviews.

3.3 Institutional Uses

It is not expected that future institutional uses will differ much from those that are currently operating in the LSA. There are no proposed higher education institutions in the LSA at present. Based on the projected number of school-aged children at full build out, a school is proposed to be located just east of the Parliament Street Slip to service both the Keating Channel and East Bayfront neighbourhoods. Two daycare facilities are also proposed to be located in the Keating Channel neighbourhood (Michael Van Valkenburgh Associates, Inc., 2010).

The Keating Channel Precinct Plan also notes that additional emergency services will be required in the Lower Don Lands as a result of the anticipated increase in population (Michael Van Valkenburgh Associates, Inc., 2010).

3.4 Economy

Stakeholder interviews with BIAs and local area businesses highlight expected growth in business development surrounding the LSA. The Toronto Financial District has been identified as an area of significant growth as well. Business stakeholder interviewees also commented that future improvements expected in transit and redevelopment (i.e., completion of Queens Quay Revitalization, Lower Don Lands build-out) will increase accessibility to the area and will provide more amenities making the area more attractive to prospective businesses, residents and visitors/tourists. The introduction of the PATH system to the LSA provides a further connection to the Downtown core and Financial District, and is expected to make the area more desirable because of increased accessibility.

The Lower Don Lands developments are also expected to provide employment, with approximately 25% of the floor area of the Keating Channel Precinct being devoted to employment uses. This will result in approximately 168,000-197,000 square metres (sq. m) of employment area, and employment of approximately 6,000-7,020 persons (Michael Van Valkenburgh Associates, Inc., 2010). Employment areas in the Precinct will help to ensure that there will be opportunities for future residents to live and work in the same neighbourhood if desired. The Keating Channel Precinct is also planned to be the focal point of commercial activity for the entire Lower Don Lands. The employment mix is planned to include office commercial, professional office, and retail uses.

3.5 Tourism

Additional parkland and public space, including the revitalization of Ontario Place is expected to continue, and increase the draw of visitors to the LSA. The first phase of the Ontario Place revitalization involves the creation of an urban park and the William G. Davis Trail, which are currently under construction. While Centreville has no plans to improve or expand their amusement park on Centre Island at present, they have expressed that they would like to maintain their operations on the island into the foreseeable future. It is expected that the LSA will continue to be a major draw for visitors coming to the Toronto area and for residents in and nearby the GTA.

3.6 Municipal Implications

There are no immediate plans to expand fire or police services in the area, though interviews with stakeholders indicate that services would expand to meet the growing demands in the area.

3.7 Property Values

Through prearranged stakeholder interviews with four real estate brokers it is apparent to them that future property values will continue to increase in the LSA, regardless of current or future BBTCA operations. It is likely that there will be continued demand for this area because of a growing preference for waterfront living, close proximity to the downtown core and the lifestyle the area offers. Future planned investments by Waterfront Toronto to improve existing park and public space, and add new parks and public spaces to the LSA, are likely to contribute to an increased residential demand for the area going forward.

3.8 Non-use Values

The LSA and RSA phone and intercept surveys showed that respondents value Toronto's waterfront, and that they see recreation (51% of phone survey respondents; 167 of intercept survey respondents) and the natural environment (23% of phone survey respondents; 149 of intercept survey respondents) as the primary future uses of the waterfront over the next 25 to 50 years. Of the intercept survey respondents, 87 would like to see the area maintained as it is now . Phone survey respondents also indicated that they would like the area to have space for community gatherings with a family focus (20%). This is a view that is not anticipated to change moving into the future.

While non-users have never visited the LSA, they would still like to see the area be maintained for recreational purposes and the natural environment moving into the future. When non-users were asked how they would like to see Toronto's waterfront be used over the next 25-50 years, the majority of respondents cited "for recreation purposes" (i.e., boating, cycling/walking, relaxing, parks and green space) (50%), followed by "natural/wilderness preservation" (18%).

4. Net Effects of Future Airport Operations

The net effects assessment for the socio-economic environment was conducted by documenting the current conditions within the study area (as described in **Section 2**) followed by projections of future conditions (i.e., to year 2033) on the use and non-use values described in the previous section. The net effects assessment was conducted for both the Future Baseline Scenario (i.e., the growth that can occur within the existing Tripartite Agreement) and Proposed Future Scenario (i.e., including extension of the land mass and runway to accommodate commercial jet operation from the BBTCA

under an amended Tripartite Agreement). Specifically, the effects assessment for the Future Baseline Scenario compares existing conditions (as described in Section 3) to those anticipated under this scenario, whereas the effects assessment for the Proposed Future Scenario compares conditions anticipated under the two future scenarios.

The net effects assessment identifies likely effects from future airport operations on each of the socio-economic values described previously. It then identified recommended mitigation or effects management to minimize or avoid the effects from occurring, and concludes by summarizing the net (or remaining) effects after mitigation has been applied.

The results of the net effects analysis are presented in **Section 4** below. The following studies were reviewed to inform the effects assessment:

- CommunityAIR, 2013. Reviewing Deluce's Jets Proposal: What the City Has (and Hasn't) Done;
- Environics Research Group, 2013. Toronto Resident Survey: Billy Bishop Toronto City Airport;
- HLT Advisory, 2013. Economic Impact Considerations of an Expanded Billy Bishop Toronto City Airport;
- InterVISTAS Consulting, 2012. Billy Bishop Toronto City Airport (YTZ) Economic Impact Study;
- Urban Metrics Inc., 2013. Economic Impact Analysis (2001-2013). Prepared for Waterfront Toronto; and
- Urban Strategies Inc. (USI), 2013. Billy Bishop Toronto City Airport Review Preliminary Land Use Evaluation. For the City of Toronto Waterfront Secretariat.

These studies generally focused on the economic effects associated with the proposal; critiques of the studies noted an inadequate review of the social effects. To address the gaps in information, the social effects linked to the BBTCA information were identified from the following sources:

- Intercept surveys;
- City-wide phone survey;
- Stakeholder interviews; and
- Findings from the Marine Navigation, Noise, Air Quality, Built Environment, Natural Environment, and Transportation effects assessments.

For the detailed methods used to complete the phone and intercept surveys and stakeholder interviews, please refer to **Attachments A** through **C**.

4.1 Future Baseline Scenario

The following sections describe the socio-economic Net Effects Analysis for the Future Baseline Scenario (i.e., the growth that can occur within the limits of the existing Tripartite Agreement). This Scenario includes land mass extensions of approximately 43 metres (m) at both ends of the existing main runway in order to accommodate the runway end safety area (RESA). It also anticipates an increased number of passengers and aircraft movements, but no introduction of jet aircraft.

The results of the Net Effects Analysis for each socio-economic asset are described below. It should be noted that much of the results are inferred from how participants to the phone survey, intercept survey, and stakeholder interviews responded to the existing conditions of the LSA, as well as the results of the various effects assessments conducted for other aspects of the project (i.e., traffic, air, noise, etc.).

4.1.1 Residential Uses

The effects on residential uses examine the potential changes to the use and enjoyment of private property as it relates to the presence of the runway end safety area (RESA) and the expanded airport operations as described above. Such effects would be related to the disturbances caused during operation of the BBTCA as described above. This also includes changes to noise, air quality, the viewshed and traffic that could affect the use and enjoyment of private property.

Likely Effects

Operation effects will likely involve greater vehicular traffic and people along the Waterfront due to an increased number of passengers and total annual aircraft movements at the BBTCA. The increased number of passengers will exacerbate congestion and therefore affect residents' use and enjoyment of property. The increased number of aircraft movements will increase the frequency of disturbances of residential activities and also likely affect the visual landscape.

Findings from the phone surveys, intercept and stakeholder surveys indicate that increased passenger volume and aircraft movements will exacerbate an already sensitive situation. As discussed in **Section 2.1.1**, one quarter (27%) of phone survey respondents and 12 of 45 LSA intercept survey respondents indicated they have considered moving from their current address in the past five years. Of the phone survey respondents who indicated they considered moving, 20% cited the existing BBTCA operations as the reason for potentially moving. Of the phone survey LSA resident responses, the most frequently stated negative factors that affect the current use and enjoyment of their residence were airport noise and pollution (19%), and the noise from people in the area, the Gardiner Expressway, and party boats (19%). Local residents who are already frustrated with BBTCA operations will become even more dissatisfied with their place of residence in the Future Baseline Scenario. This will contribute to a decreased use and enjoyment of private property for some.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Future Baseline Scenario on residential uses, it is recommended that all the proposed mitigation measures as stipulated in air and traffic reports (including improved transit) be adhered to. The transportation effects assessment (AECOM Canada Ltd., 2016) concluded that effects to residential uses will return to existing levels with proposed mitigation measures. That is, even with the increased number of passengers in the Future Baseline Scenario, mitigation measures including improved shuttle frequency, ease of use (e.g. improved signage and infrastructure for public transit options and increased visibility of shuttle pick-up and drop-off locations), and improved taxi operations will be sufficient so that access to residences is not affected, when compared with current levels.

Furthermore, it is recommended that PortsToronto and the aircraft operators consider capping flight volumes and/or scheduling flights to minimize disturbances during early and late evenings or other socially sensitive periods such as weekends, special cultural events and holidays.

Finally, it is recommended that PortsToronto and the airport operator work with local stakeholder advisory groups and community members to further develop relationships with local residents, seek feedback on ways to improve airport operations and determine other appropriate mitigation measures.

Net Effects

Even with the proposed mitigation measures in place to address potential increases in traffic and changes in air quality and noise, it is expected that there will be net effects of the Future Baseline Scenario on residential uses. The feedback from the surveys and interviews indicate that current operations are already affecting people's use and enjoyment of property. Increasing the number of passengers and increasing the number of aircraft movements will exacerbate an already tenuous relationship between local residents and the airport.

Furthermore, one mitigation measure (transit improvements) is contingent upon a number of external factors which could include timing and funding of such improvements. It is expected that without these transit improvements in place, residential use and access will be adversely affected due to increased traffic.

Will the future baseline (permitted) operation of BBTCA negatively affect residential quality of life compared to the current operation?	**Yes, for some.** **Increasing the number of passengers and aircraft movements will exacerbate an already tenuous relationship between local residents and the airport.**

4.1.2 Recreational Uses

The effects on recreational uses examine the potential changes to the use and enjoyment of recreational spaces as it relates to the construction of the RESA and the expanded airport operations. Such effects would be related to disturbances caused during operation of the BBTCA. This also includes changes to noise, air quality and the viewshed that would affect the use and enjoyment of recreational spaces.

Likely Effects

Operational effects will likely involve greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. The increased number of aircraft movements will increase the frequency of disturbances/interruptions and might also affect the visual landscape. Findings from the phone surveys, intercept and stakeholder surveys indicate that increased passenger volume and aircraft movements will exacerbate an already sensitive situation. As discussed in **Section 2.1.2**, of the 264 intercept survey respondents, 28 respondents cited crowds, 24 respondents cited traffic and lack of parking, and 19 cited pollution (water, noise and air) as the factors that affect their current use and enjoyment of recreation facilities in the LSA. Recreational users who are already frustrated with BBTCA operations will become even more dissatisfied in the

Future Baseline Scenario as it becomes more crowded with greater passengers and aircraft movements. This will contribute to a decreased use and enjoyment of recreational amenities. It is anticipated that a number of recreational users may choose not to visit the area in the Future Baseline Scenario.

As detailed in **Section 3.2**, phone and intercept survey respondents indicated that they would like to see recreation as the primary future use of the LSA. **Section 4.2.2** below states that the majority of these respondents suggested that increases in noise, traffic, pollution, and decreases in livability and recreational activities would affect this vision of the future.

Construction of the RESA will further restrict the area available for water-based recreational purposes including boating. The presence of the RESA will affect the use of and access to water-based recreational areas. Stakeholder interviews with boating related clubs indicated that they are currently dissatisfied with the BBTCA operations and expressed concerns with regards to safety in the Inner and Outer Harbours, and the navigability of the Western Channel. There were also concerns related to air quality and airport noise.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Future Baseline Scenario on recreational uses, it is recommended that all the proposed mitigation measures as stipulated in air and traffic report (including improved transit) be adhered to. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area. Without these measures, recreational use will be negatively affected.

Furthermore, it is recommended that PortsToronto and the aircraft operators consider capping flight volumes and/or scheduling flights to minimize disturbances during early and evening events or other socially sensitive periods, particularly during organized recreational events and on weekends and holidays.

Finally, it is recommended that PortsToronto and the airport operator work with local stakeholder advisory groups and recreational groups and organizations collaboratively to further develop relationships with local recreational users, seek feedback on ways to improve airport operations and determine other appropriate mitigation measures.

Net Effects

Even with the proposed mitigation measures in place to address potential increases in traffic and changes in air quality and noise, it is expected that there will be net effects of the Future Baseline Scenario on recreational uses. The feedback from the surveys and interviews indicate that current operations are already affecting recreational use and enjoyment to varying degrees depending on the location along the waterfront. Increasing the number of passengers and the number of aircraft movements as well as the presence of the RESA will affect the balance of uses in the LSA.

Will the future baseline (permitted) operation of BBTCA negatively affect recreational users compared to the current operation?	**Yes, for some.** **Increasing the number of passengers and aircraft movements will contribute to increased crowds and traffic, which may deter some recreational users from visiting the area. The presence of the RESA will further restrict recreational boaters.**

4.1.3 Institutional Uses

The effects on institutional uses examine the potential changes to the activities and use of institutional services as it relates to the RESA and the airport operations. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA (e.g. disruption of formal and informal instruction and access to places for these activities). This also includes a consideration of changes to noise, air quality and the viewshed that would affect the use of institutional services.

Likely Effects

Operational effects will likely involve greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. In interviews with local stakeholders, it was understood that current congestion and BBTCA operations is a safety concern for pedestrians accessing local institutional facilities. Findings from the phone surveys, intercept and stakeholder surveys indicate that increased passenger volumes may exacerbate an already sensitive situation. The increased number of passengers will exacerbate congestion and may affect access and egress to local institutions particularly near the intersection of Lake Shore Boulevard and Bathurst Street. It is expected that without these transit improvements in place, institutional use will be adversely affected due to increased traffic.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Future Baseline Scenario on institutional uses, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area. Without these measures, access to institutional uses will be negatively affected.

Furthermore, it is recommended that PortsToronto and the aircraft operators consult with local institutions to ensure that safety concerns, including the safety of pedestrians coming to and from the City School at Queens Quay West and Eireann Quay, are mitigated on an ongoing basis.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will negligible net effects on institutional uses as a result of the Future Baseline Scenario.

Will the future baseline (permitted) operation of BBTCA negatively affect institutional uses compared to the current operation?	**No.** **Future BBTCA operations are not expected to affect schools and other institutional uses in the area.**

4.1.4 Economy

The effects on the economy examine the potential changes to economic activity as it relates to the presence of the RESA and the expanded airport operations. Such effects would be related to disturbances caused during operation of the BBTCA. This also includes changes to noise, air quality and the viewshed that would affect access to and overall economic activity for local area businesses.

Likely Effects

The growth in the airport operations and increased congestion will create both positive and negative effects for local area businesses and economic activity. It is anticipated that there will be increased business activity catering to the increased volume of passengers. These include transportation, accommodation, food, and beverage services. With increased flight activity and a higher number of aircraft movements, there will be increased and more convenient access for business travelers to the City's business core and tourists to the City's entertainment venues and the LSA.

As detailed in **Section 4.2.4** below, 118 of 264 intercept survey respondents do not anticipate a change in their likelihood to travel in or out of the BBTCA due to the proposed project being approved. Similarly, 19 of 42 intercept survey respondents who operated businesses in the LSA or were employed in the LSA did not anticipate a change to their business as a result of the proposed project being approved. The survey also found that 12 LSA businesses or employees anticipate their business activity to increase and only seven anticipate their business activity to decrease. Of the respondents who anticipate an increase, they cited economic growth (more customers and business opportunities) (10) as the primary reason for the anticipated increase. It is likely that these results would be similar for the Future Baseline Scenario as this scenario involves the increase of BBTCA operations.

However, the increased congestion and potential traffic (should transit needs not be fully met) include increased disturbances and interruptions at cultural and entertainment events. Should mitigation measures regarding traffic management not be adhered to, there may be a decrease in business activity due to increased congestion and lack of available parking to accommodate both increased BBTCA passenger volume and local customers. Some LSA business operators have expressed concern through intercept survey responses and stakeholder interviews that parking spaces are already limited in the area and BBTCA passengers and employees are already consuming much of the limited spaces. Without adequate mitigation (including transit) these issues will be exacerbated.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Future Baseline Scenario on the local economy, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area. Without these measures, local businesses and economic activity will be negatively affected.

Furthermore, it is recommended that PortsToronto and the aircraft operator consult with local businesses and business organizations on an ongoing basis to understand if new concerns around

traffic or congestion arise and if there is potential for further mitigation measures. Such measures could include the provision of additional on-site parking and the establishment of off-site parking (and an associated monitoring and permitting system) for BBTCA passengers to ensure that local roads and parking continue to serve local businesses and their customers.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will be positive effects on local area businesses and economic activity, and limited negative net effects as a result of the Future Baseline Scenario.

Will the future baseline (permitted) operation of BBTCA negatively affect local businesses and their users compared to the current operation?	**No.** **There will be increased business activity catering to the increased volume of passengers. Such benefits shift to viable alternative modes of travel if flights from BBTCA are not available.**

4.1.5 Tourism

The effects on tourism examine the potential changes to tourist behaviour as it relates to the presence of the RESA and the airport operations. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA (e.g. ability of tourists to enjoy activities and attractions). This also includes a consideration of changes to noise, air quality and the viewshed that would affect the use and enjoyment of tourist attractions.

Likely Effects

Operation effects will likely involve greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. The increased number of aircraft movements will also increase the frequency of disturbances and also affect the visual landscape. Findings from the phone surveys, intercept and stakeholder surveys indicate that increased passenger volume and aircraft movements may affect tourists' propensity to visit the area. As discussed in **Section 2.1.5**, of the 74 respondents of the intercept survey that were identified as tourists, only five cited crowds as a factor that would affect their use and enjoyment of the recreational facilities in the LSA. Twenty-five (25) tourist/recreational users who participated in the intercept survey indicated that they did not anticipate a change to their use and enjoyment of the area as a result of the proposed project, and three respondents indicated they anticipate an increase (**Section 4.2.5**). This result would likely be similar for the Future Baseline Scenario. During stakeholder interviews, two organizations that catered to tourists/visitors indicated that the BBTCA was not a factor that negatively affected patrons; however the traffic and construction in the area were.

It is likely that some tourists may still be drawn to the area, and with increased flight service the downtown core may be more easily accessed by visitors. However, there are a number of tourists who may choose not to visit the LSA due to increased congestion and a more urban and busier feel.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Future Baseline Scenario on tourism, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area. Without these measures, tourism will be negatively affected.

Furthermore, it is recommended that PortsToronto and the aircraft operators consult with local tourist operators and organizations on an ongoing basis to understand if new concerns around traffic or congestion arise and if there is need for further mitigation measures.

Net Effects

With the implementation of the recommended mitigation measures, it is anticipated that there will be negligible net effects on tourism as a result of the Future Baseline Scenario.

Will the future baseline (permitted) operation of BBTCA negatively affect tourism compared to the current operation?	**No.** **BBTCA is generally seen as a positive driver for tourism in the area, factoring in an increased number of passengers and aircraft movements.**

4.1.6 Municipal Implications

The effects on municipal implications examine the potential changes to the municipal tax base and other municipal services as it relates to the presence of the RESA and the airport operations. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA. This also includes a consideration of changes to noise, air quality and the viewshed that would affect use of and demand for municipal services.

Likely Effects

There are no anticipated effects of the Future Baseline Scenario on the property tax revenue.

Operation effects will likely involve greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. Interviews with local first responders indicated that there are concerns with an increased number of passengers in the area and the ability of first responders to address safety concerns should they arise. Increased land based congestion may affect general pedestrian safety and slow response times. Furthermore, the increased number of passengers may affect emergency services through an increased demand for services. Similarly, the presence of the RESA may create further congestion in the water and increase wake turbulence, which will affect the service provided by the Toronto Police Marine Unit.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Future Baseline Scenario on municipal services, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area.

Furthermore, it is recommended that PortsToronto and the aircraft operators consult with first responders and other municipal services on an ongoing basis to understand if new concerns around safety and congestion arise and if there is need for further mitigation measures.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will be negligible net effects on land-based emergency services as a result of the Future Baseline Scenario. However, the presence of the RESA may affect response times of the Toronto Police Marine Unit.

Will the future baseline (permitted) operation of BBTCA negatively affect municipal services and property taxes compared to the current operation?	**Yes, for some municipal services. The presence of the RESA may affect response times of the Toronto Police Marine Unit.**

4.1.7 Property Values

The effects on property values reflect potential changes associated with future airport operations. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA (e.g. use and enjoyment of property). This also includes a consideration of changes to noise, air quality and the viewshed that would affect property values.

Likely Effects

Operation effects will likely involve greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. The increased number of aircraft movements will increase the frequency of disturbances and also affect the visual landscape. It is likely that people's use and enjoyment of property will decrease with increased congestion and growth in airport operations. Some residents may choose to move from the area. As previously discussed, one quarter (27%) of phone survey respondents and 12 of 45 LSA intercept survey respondents indicated they have considered moving from their current address in the past five years.

The decreased livability of the areas may in turn, affect the likelihood that some residents will move from the area. Residents who are already frustrated with BBTCA operations will become even more so in the Future Baseline Scenario as it becomes more crowded with more passengers and aircraft movements.

However, historical records and interviews with local stakeholders and real estate representatives indicate that despite historic growth in airport activity, property values have continued to increase over time, oftentimes at rates faster than other areas within the City. Therefore, while some residents may become dissatisfied with living in the area and may choose to move, new residents are expected to replace those residents.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Future Baseline Scenario on property values, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also

recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area.

Furthermore, it is recommended that PortsToronto and the aircraft operators consult with residential associations and local real estate agents on an ongoing basis to understand if new concerns around property values arise and if there is need for further mitigation measures.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will be negligible net effects on property values as a result of the Future Baseline Scenario.

Will the future baseline (permitted) operation of BBTCA negatively affect residential property values compared to the current operation?	**No.** **Future BBTCA operations are not expected to have a negative effect on property values along the waterfront or near the site.**

4.1.8 Non-use Values

The effects on non-use values associated examine the potential changes brought about by the presence of the RESA and the airport operations. Such effects would be related to the alignment of public values (respondents from the LSA and RSA) associated with the operation of the BBTCA. These values prioritize recreational purposes and natural/wilderness preservation/scenery (the latter with respect to the Toronto Islands), and to a lesser extent, community/family places of gathering, less development in the LSA (particularly condominium), and business purposes.

Likely Effects

The growth in the airport operations and increased congestion will change the look and feel of the LSA. Interviews with Toronto residents who do not normally visit the waterfront as well as those who do use the LSA stated that they value the area for its mixed uses and natural setting. Many stated that the LSA is unique because of its close proximity to the downtown core and its natural landscape and recreational opportunities.

New developments are planned for the area, which will experience significant growth even without changes in the airport operations. In the Future Baseline Scenario, this balance of uses is expected to change as the area will have a more congested, urban, and busier feel. However, it is expected that further intensification will be gradual and users and non-users will adjust.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Future Baseline Scenario on non-use values, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will be negligible net effects on non-use values as a result of the Future Baseline Scenario.

Will the future baseline (permitted) operation of BBTCA negatively affect non-use values compared to the current operation?	**No.** **There is not expected to be a change in how the waterfront is perceived by non-users as a result of the future baseline operation.**

The table below outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers.

Table 10: Future Baseline Scenario Net Effects Analysis

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Residential Uses	▶ Changes to the use and enjoyment of private property as it relates to airport operations (e.g., having to keep windows closed during periods of high BBTCA activity). ▶ Changes to noise levels. ▶ Changes to air quality. ▶ Changes to the viewshed. ▶ Changes to frequency of interruptions of use and enjoyment of living spaces.	▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to residential uses will generally remain similar to existing conditions even with the addition of residential uses in the Lower Don Lands and Keating Channel precincts once build out is complete.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion will affect residents' use and enjoyment of property. ▶ Increased number of aircraft movements will increase the frequency of disturbances of residential activities and also affect the visual landscape.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage City and Metrolinx to implement transit improvements. ▶ Consider capping flight volumes during certain prescribed times of the day.	▶ Some residents will experience an increase in the number and frequency of interruptions and disturbances from increased flight volumes.
Recreational Uses	▶ Changes to the use and enjoyment of recreational spaces as it relates to airport operations (e.g., ability to listen to concerts at the Music Garden). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed. ▶ Changes to the frequency and number of interruptions of recreational activities.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to recreational uses will generally increase with the addition of the 63 ha revitalization of Ontario Place and 375 ha Lake Ontario Park.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased number of aircraft movements will increase the frequency of disturbances of recreational activities and also affect the visual landscape.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶ Consider capping flight volumes during certain prescribed times of the day.	▶ Recreational users will experience an increase in the number and frequency of noise and sight interruptions from increased operational flight volumes.
Institutional Uses	▶ Changes to the uses of institutional spaces as it relates to airport operations (e.g., at the City School). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to institutional uses will generally remain similar to existing conditions even with the addition of institutions and services associated with build out of the Lower Don Lands.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion will likely affect access and egress to local institutions.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.
Economy	▶ Increases or decreases in business activity associated with changes in airport operations.	▶ None.	▶ None.	▶ Increased business activity catering to the increased volume of passengers including transportation, accommodation, food, and beverage services. ▶ Increased access for business travelers to the City's business core as well as increased and more convenient access for tourists to the City's entertainment venues and LSA. ▶ Loss in LSA business activity because	▶ Provide additional on-site parking and/or establish off-site parking for BBTCA passengers away from LSA businesses. ▶ Establish a monitoring and permitting system to enforce the above off-site parking and traffic accommodation for BBTCA passengers.	▶ Increased business activity catering to the increased volume of passengers. ▶ Negligible negative net effects during operations are anticipated.

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
				of constrained access and limited parking for business clientele.		
Tourism	▶ Changes in tourist-behaviour linked to changes to BBTCA operations. ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to tourism will generally remain similar to existing conditions.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased passenger volume and aircraft movements may affect tourists' propensity to visit the area due to an increase in the frequency of disturbances. ▶ Conversely, the downtown core may be more easily accessed by visitors due to increased flight service.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.
Municipal Implications	▶ Changes to the municipal tax base. ▶ Changes to response time for municipal services.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Future baseline conditions pertaining to municipal services will generally remain similar to existing conditions.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased land based congestion may affect general pedestrian safety and slow response times. ▶ Increased number of passengers may affect emergency services through an increased demand for services. ▶ Presence of the RESA may create further congestion in the water, which may affect the service provided by the Toronto Police Marine Unit.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Presence of the RESA may affect response times of the Toronto Police Marine Unit.
Property Values	▶ Changes to property values within the waterfront for both existing and planned waterfront communities.	▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ Property values in the City of Toronto will continue to increase at a rate greater than the rest of the country.	▶ Greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. ▶ Residents who are already frustrated with BBTCA operations will become even more dissatisfied and may move from the area. ▶ However, new residents are expected to replace any residents who move.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.
Non-use Values	▶ Change to non-use values as it relates to airport operations.	▶ Infill into Lake Ontario for construction of the RESA is required (direct and indirect). ▶ Maintain the current runway configuration with 53 % increase in peak hour passengers groundside; 35 % increase of total annual airport passengers; and 23 % increase of annual aircraft movements.	▶ None.	▶ Greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. ▶ The growth in airport operations and increased congestion will change the look and feel of the LSA.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.

4.2 Proposed Future Scenario

The following sections describe the socio-economic Net Effects Analysis for the Proposed Future Scenario (i.e., extending the land mass and runway to accommodate commercial jet operation from the BBTCA under an amended Tripartite Agreement). This scenario includes a 200 m land mass extension at both ends of the main runway to allow the commercial aircraft operation of the CS100 and other qualifying jets under this scenario. It also allows for an increased number of passengers both with BBTCA as a point of origin or destination as well as through the BBTCA, when compared to the Future Baseline Scenario (5.5 million versus 3.8 million total passengers moving through the airport respectively).

The results of the Net Effects Analysis for each socio-economic asset are described below.

4.2.1 Residential Uses

The effects on residential uses examine the potential changes to the use and enjoyment of private property as it relates to the presence of the 200 m land mass extension on each end of the main runway and the airport operations as well as increased passenger activity. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA (e.g. residents having to keep windows closed during periods of high BBTCA operational activity). This also includes changes to noise, air quality, traffic, and the viewshed that could affect the use and enjoyment of private property.

Likely Effects

With the introduction of more efficient aircraft and a potential noise barrier (also affecting potential odour impacts), overall air quality is expected to improve with the proposed project. However, the findings from RWDI (2016a) do indicate that some site neighbours in the Little Norway area will experience infrequent and small increases in odour and some emissions. Noise levels are also expected to improve with the proposed project due to more efficient aircraft and proposed sound barriers (RWDI, 2016b).

Compared to the Future Baseline Scenario, the number of permitted passengers will increase with the proposed runway extension and the aircraft will be larger, with increased passenger capacity. Notwithstanding the findings of the air, traffic and noise reports, the increased number of people will exacerbate congestion and therefore affect residents' use and enjoyment of property. Findings from the phone surveys, intercept and stakeholder surveys (detailed below) indicate that larger aircraft and increased passenger volume (even without increases in traffic, air or noise levels) will exacerbate an already sensitive situation. The runway extension will create a visual disturbance. Local residents who are already frustrated with BBTCA operations will become even more dissatisfied with their place of residence and contribute to a decreased use and enjoyment of private property. It is anticipated that a number of residents may even choose to move from the area should the project proceed.

Two-thirds (66%) of the phone survey LSA residents and just over half of the (24) intercept survey LSA residents anticipate that their satisfaction with living in the area will decrease should the proposal to introduce jets and lengthen the BBTCA main runway proceed. When these respondents were asked why this might be the case, 73% of phone survey respondents cited noise and nuisance as the primary reason for their anticipated decrease in satisfaction with living in the area. From the

telephone survey, others responses included increased traffic (54%), decreased air quality (38%), disturbance to recreational uses (18%) and visual disturbance (12%). Similarly, the majority of intercept survey LSA residents stated an increase in pollution (noise and air) (18) as the primary reason for an anticipated decrease in their satisfaction with living in the LSA. Similar results were received when participants were asked about the expected decrease in enjoyment of their residence in the LSA.

Phone and intercept survey LSA residents were then asked whether or not they might be more or less likely to move from their current residence, if the proposed project were to proceed. Responses to this question were divided, with 42% of phone survey respondents and 19 intercept survey respondents saying there would be no change, and 41% of phone survey respondents and 15 intercept survey respondents saying they would be more likely to move.

Of the phone and intercept survey respondents who indicated they would be more likely to move, 63% of phone survey respondents suggested noise and nuisance as the primary factor that would prompt them to move, while eight intercept survey respondents suggested increased urbanization and commercialization as the primary factors. Other reasons included increased traffic (42%), decreased air quality (31%), and too many people in the area (18%).

Noise, air, and traffic concerns were continually cited by local residents as potentially affecting their use of property and satisfaction with living in the area. While findings from the technical disciplines indicate that these effects, when mitigated, are anticipated to be minimal or non-existent, other effects such as increased congestion, the extension of the runway, and the introduction of jets, will likely affect residents' use and enjoyment of property and the visual landscape.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Proposed Future Scenario on residential uses, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area. Without these measures, residential use will be negatively affected.

Furthermore, it is recommended that PortsToronto and the aircraft operators consider capping flight volumes and/or scheduling flights to minimize disturbances during early and late evenings or other socially sensitive periods.

Finally, it is recommended that PortsToronto and the airport operator work with local stakeholder advisory groups and community members to further develop relationships with local residents, seek feedback on ways to improve airport operations and determine other appropriate mitigation measures.

Net Effects

Even with the proposed mitigation measures in place to address potential increases in traffic, it is expected that there will be net effects of the proposed project on residential uses. Increasing the number of passengers and the extension of the runway will further exacerbate the relationship between local residents and the airport. Furthermore, the extension of the runway will change the

look of the waterfront, which is expected to affect people's use and enjoyment of their residential areas.

Will the proposed future operation of BBTCA negatively affect residential quality of life compared to the future baseline operation?	**Yes.** **Extending the runway, and increasing the number of passengers and aircraft movements, will further exacerbate the relationship between local residents and the airport.**

4.2.2 Recreational Uses

The effects on recreational uses examine the potential changes to the use and enjoyment of recreational spaces as it relates to the presence of the 200 m land mass extension on each end of the main runway, increased airport operations and the introduction of the CS100 or other qualifying jets. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA (e.g. ability to listen to concerts at the Music Garden; on-water instructional courses related to boating activities). This also includes a consideration of changes to noise, air quality, traffic, and the viewshed that would affect the use and enjoyment of recreational spaces.

Likely Effects

The number of permitted passengers will increase with the proposed runway extension and the aircraft will be larger, with increased passenger capacity. Notwithstanding the findings of the traffic report, the increased number of people will exacerbate congestion and therefore affect recreational users. Findings from the phone surveys, intercept and stakeholder surveys (detailed below) indicate that larger aircraft and increased passenger volume (even without increases in traffic, air or noise levels) will exacerbate an already sensitive situation, even when compared to the Future Baseline Scenario. The runway extension will create a visual disturbance and encroach on the area available for water-based recreation. Recreational users who are already frustrated with BBTCA operations will become even more dissatisfied. It is anticipated that a number of recreational users may choose to visit other areas should the project proceed.

When intercept survey recreational users were asked whether or not they anticipate a change in their use and enjoyment of the LSA, approximately half (117) of the respondents indicated that their use and enjoyment would decrease. Of the respondents who anticipate their use and enjoyment of the area to decrease, they cited pollution (noise, air, and environment) (107) as the primary source. These views were largely echoed in the responses from recreational stakeholder interviewees, with none of the interviewees supporting the proposed project. All interviewees expressed concern that an increase in noise, traffic congestion and unusable water space (related to the runway extension) and a reduction in view would negatively affect recreational use of the LSA (including the Inner and Outer Harbours and the Western Channel). They also concluded that all of these factors would contribute to a decrease in the quality of the 'waterfront experience' that many recreation users currently enjoy.

Similarly, phone and intercept survey respondents indicated that they would like to see recreation as the primary future use of the LSA, as detailed in **Section 3.2** above. These respondents also suggested that the proposed project would affect their envisioned use of the LSA. A total of 74% (LSA) and 58% (RSA) and 150 intercept survey respondents stated this. Anticipated increases in

noise, traffic, pollution, and decreases in livability and recreational activities were cited by respondents as the reasons for their assumption.

Noise, air quality, and traffic concerns were continually cited by recreational users as potentially affecting their use of recreational facilities in the area. While findings from the technical disciplines indicate that these effects, when mitigated, are anticipated to be minimal or non-existent, other effects such as increased congestion, the extension of the runway, and the introduction of jets will likely affect recreational users' enjoyment of the LSA.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Proposed Future Scenario on recreational uses, it is recommended that all the proposed mitigation measures as stipulated in air and traffic reports (including improved transit) be adhered to.

Furthermore, it is recommended that PortsToronto and the aircraft operators consider capping flight volumes and/or scheduling flights to minimize disturbances during early and late evenings or other socially sensitive periods.

Finally, it is recommended that PortsToronto and the airport operator work with local stakeholder advisory groups and community members to further develop relationships with local residents, seek feedback on ways to improve airport operations and determine other appropriate mitigation measures.

Net Effects

Even with the proposed mitigation measures in place to address potential increases in traffic, it is expected that there will be net effects of the proposed project on recreational uses. Use and enjoyment of recreational areas in the LSA will be affected by the introduction of jets, which will change the look and feel of the LSA, and the proposed landmass extension will reduce the area of navigable water available for recreational boaters.

Will the proposed future operation of BBTCA negatively affect recreational users compared to the future baseline operation?	**Yes.** **The introduction of jets will change the look and feel of the LSA, and the proposed landmass extension will reduce the area of navigable water available for recreational boaters.**

4.2.3 Institutional Uses

The effects on institutional uses examine the potential changes to the activities and use of institutional services as it relates to the presence of the 200 m land mass extension on each end of the main runway, increased airport operations and the introduction of the CS100 or other qualifying jets. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA (e.g. disruption of formal and informal instruction and access to places for these activities). This also includes a consideration of changes to noise, air quality, traffic, and the viewshed that would affect the use of institutional services.

Likely Effects

The number of permitted passengers will increase with the proposed runway extension and the aircraft will be larger, with increased passenger capacity. Notwithstanding the findings of the traffic report, the increased number of people will exacerbate congestion and therefore may affect institutional users. Findings from stakeholder surveys indicate that larger aircraft and increased passenger volume (even without increases in traffic, air or noise levels) may affect access, egress and safety. However, an interview conducted with an LSA Education Institution indicated that the proposed project is not anticipated to have any direct effects on LSA educational facilities.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Proposed Future Scenario on institutional uses, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area. Without these measures, access to institutional uses will be negatively affected.

Furthermore, it is recommended that PortsToronto and the aircraft operators consult with local institutions to ensure that safety concerns are mitigated on an ongoing basis.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will be negligible net effects on institutional uses as a result of the proposed project.

Will the proposed future operation of BBTCA negatively affect institutional uses compared to the future baseline operation?	**No.** **Future BBTCA operations are not expected to affect schools and other institutional uses in the area.**

4.2.4 Economy

The effects on economy examine the potential changes as it relates to the presence of the 200 m land mass extension on each end of the main runway, increased airport operations and the introduction of the CS100 or other qualifying jets. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA (e.g. disruption of formal and informal instruction and access to places for these activities). This also includes a consideration of changes to noise, air quality, traffic, and the viewshed that would affect access to and egress from local businesses.

Likely Effects

The growth in the airport operations and increased congestion will create both positive and negative effects for local area businesses and economic activity. It is anticipated that there will be increased business activity catering to the increased volume of passengers. These include transportation, accommodation, food, and beverage services. With increased flight activity and a higher number of aircraft movements, there will be increased access for business travelers to the City's business core

as well as increased and more convenient access for tourists to the City's entertainment venues and LSA. Furthermore, new destinations and places of origin may be added to the flight schedules at the BBTCA thereby potentially increasing the connectivity of the downtown area by the airport.

The above economic benefit results do not take into account that economic benefits linked to air travel might shift to alternative travel options, particularly Pearson International Airport, if BBCTA operations were in any way constrained and passenger volumes did not grow beyond today's current volume. While the results presented by InterVISTAS and HLT Advisory imply that future benefits linked to BBTCA passenger volume growth would be lost if the current level of BBTCA operations was capped, this is not anticipated to be the case. Instead, since there are alternative travel options, most if not all economic benefits (i.e., jobs) would likely shift to operations at Pearson International Airport as they would assume most of this passenger traffic. In this case, economic benefits transfer to Pearson International Airport so long as it has the capacity to absorb the increase in passenger volume.

The increased congestion and potential traffic (should transit needs not be fully met) include increased disturbances and interruptions at cultural and entertainment events. Should mitigation measures regarding traffic management not be adhered to, there may be a decrease in business activity due to increased congestion and lack of available parking to accommodate both increased BBTCA passenger volume and local customers. Some LSA business operators have expressed concern that parking spaces are already limited in the area and BBTCA passengers and employees are already consuming much of the limited spaces. Without adequate mitigation (including transit) these issues will be exacerbated.

As a result of the proposed project, it was found that 118 intercept survey respondents do not anticipate a change in their likelihood to travel in or out of the BBTCA, while 91 anticipate an increase, 24 anticipate a decrease, and another 24 are not sure. Respondents who stated they anticipate no change or an increase in their use of the BBTCA cited options for flights and destinations (78), and a general preference for the BBTCA (37) as the reasons for their anticipated future use. Respondents who anticipate their use to stay the same or decrease cited their preference for Pearson International Airport (48) as the main reason.

From the intercept survey it was found that many LSA businesses or LSA employees or business owners anticipate that their business activity will not change (19) as a result of the proposed project being approved. The survey also found that 12 LSA businesses or employees anticipate their business activity to increase and only seven anticipate their business activity to decrease. Of the respondents who anticipate an increase, they cited economic growth (more customers and business opportunities) (10) as the primary reason for the anticipated increase. Similar sentiments were expressed during the stakeholder interviews.

Some LSA business operators have expressed concern through intercept survey responses and stakeholder interviews that increased operations at the BBTCA could lead to increased LSA traffic, congestion and noise as well as limited parking availability which has the potential to hinder some LSA businesses.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Proposed Future Scenario on the local economy, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area. Without these measures, local businesses and economic activity will be negatively affected.

Furthermore, it is recommended that PortsToronto and the aircraft operator consult with local businesses and business organizations on an ongoing basis to understand if new concerns around traffic or congestion arise and if there is potential for further mitigation measures. Such measures could include the provision of additional on-site parking and establishment of off-site parking (and an associated monitoring and permitting system) for BBTCA passengers to ensure that local roads and parking continue to serve local businesses and their customers.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will be positive effects on local area businesses and economic activity, and negligible negative net effects as a result of the Proposed Future Scenario.

Will the proposed future operation of BBTCA negatively affect local businesses and their users compared to the future baseline operation?	**No.** **There will be increased business activity catering to the increased volume of passengers. Such benefits shift to viable alternative modes of travel if flights from BBTCA are not available.**

4.2.5 Tourism

The effects on tourism examine the potential changes to tourist-behaviour as it relates to the presence of the 200 m land mass extension on each end of the main runway, increased airport operations and the introduction of the CS100 or other qualifying jets. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA (e.g. ability of tourists to enjoy recreational activities and tourist attractions). This also includes a consideration of changes to noise, air quality, traffic, and the viewshed that would affect the use and enjoyment of tourist attractions.

Likely Effects

The number of permitted passengers will increase with the proposed runway extension and the aircraft will be larger, with increased passenger capacity. Notwithstanding the findings of the air, traffic and noise reports, the increased number of people will exacerbate congestion and therefore may affect tourism and tourist activities. Findings from the intercept and stakeholder surveys indicate that larger aircraft and increased passenger volume (even without increases in traffic, air or noise levels) may affect tourists' propensity to visit the area, and their use and enjoyment of the LSA. There is also the potential for the increased congestion and introduction of jets to change the look and feel of the area as well as the recreational opportunities (e.g., boating) which are a large part of the tourist draw.

The intercept survey identified that 59 of the 74 tourists surveyed identified themselves as recreational users while 29 of the 74 tourists identified as business users (note that respondents could identify as more than one type).

Twenty-seven (27) of the 59 recreational users anticipate a decrease in their use and enjoyment of the LSA as a result of the proposed project. Twenty-five (25) indicated they anticipate no change, four were not sure and only three indicated they anticipate an increase. Respondents who stated they anticipate a decrease in their use and enjoyment cited an increase in pollution (19) as the main reason. Other reasons stated include increased urbanization and crowding (5), increased traffic and decreased options for parking (7) and negative impacts to the natural environment and view (8). Of the 3 respondents who suggested they anticipate an increase in their use and enjoyment of the LSA as a result of the proposed project, they cited an increase in available recreational activities as the main reason.

Any negative impact from increased congestion will likely be offset by the number of additional tourists travelling to Toronto from existing and new destinations, who will spend money on tourism-related businesses, attractions and accommodations in the LSA.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Proposed Future Scenario on tourism, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area. Without these measures, tourism will be negatively affected.

Furthermore, it is recommended that PortsToronto and the aircraft operators consult with local tourist operators and organizations on an ongoing basis to understand if new concerns around traffic or congestion arise and if there is need for further mitigation measures.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will be negligible net effects on tourism as a result of the proposed project.

Will the proposed future operation of BBTCA negatively affect tourism compared to the future baseline operation?	**No.** **BBTCA is generally seen as a positive driver for tourism in the area, factoring in an increased number of passengers and aircraft movements.**

4.2.6 Municipal Implications

The effects on municipal implications examine changes as they relate to the construction of the 200 m land mass extension on each end of the main runway, increased airport operations and the introduction of the CS100 or other qualifying jets. Such effects would be related to the frequency of disturbance caused during operation of the BBTCA (e.g., ability of tourists to enjoy recreational activities and tourist attractions) and any changes in municipal taxes. This also includes a consideration of changes to noise, air quality, traffic, and the viewshed that would affect the demand for and access to municipal services.

Likely Effects

It is assumed that there will be no changes to the property tax revenue as a result of the proposed project.

Operation effects will likely involve greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. Interviews with local first responders indicated that there are concerns with an increased number of passengers in the area and the ability of first responders to address safety concerns should they arise. Increased land based congestion may affect general pedestrian safety and slow response times. Furthermore, the increased number of passengers may affect emergency services through an increased demand for services. Similarly, the expansion of the MEZ associated with the runway extension will result in increased boating congestion and wake turbulence in the Inner and Outer Harbours and the potential for an increase in boating incidents and further increasing emergency response times.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Proposed Future Scenario on municipal services, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area.

Furthermore, it is recommended that PortsToronto and the aircraft operators consult with first responders and other municipal services on an ongoing basis to understand if new concerns around safety and congestion arise and if there is need for further mitigation measures.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will be negligible net effects on land-based emergency services as a result of the Proposed Future Scenario. However, the presence of the runway extension may affect response times of the Toronto Police Marine Unit.

Will the proposed future operation of BBTCA negatively affect municipal services and property taxes compared to the future baseline operation?	**Yes.** **The presence of the runway extension may affect response times of the Toronto Police Marine Unit.**

4.2.7 Property Values

The effects on property values examine changes as they relate to the construction of the 200 m land mass extension on each end of the main runway, increased airport operations and the introduction of the CS100 or other qualifying jets. Such effects consider changes to noise, air quality, traffic, and the viewshed that would affect property values.

Likely Effects

The following discussion describes the likely effects to property values as it relates to the proposed project. As with the Future Baseline Scenario, it is expected that with increased congestion, population, and flight movements, residents' satisfaction with living in the area may decrease. Some residents may choose to move from the area. However, based on historical patterns in property values, it is expected that new residents who are more tolerant of local nuisance conditions will move into the area to replace these dissatisfied residents.

LSA residents interviewed via the phone survey who indicated they would be more likely to move from their current residence as a result of the proposed project suggested a number of reasons for this – with the most common being noise and nuisance (63%). Of these respondents, 8% indicated they would be more likely to move because they anticipate that their property value would decrease as a result of the proposed project.

Based on stakeholder interviews, LSA real estate brokers do not expect any significant effects on LSA residential properties or people's desire to live in the LSA, should the proposed project proceed. However, stakeholder interviewees did note that if noise from the proposed BBTCA operations increases and air quality decreases significantly, there is a possibility that sales and property values in the immediate vicinity of the BBTCA could be affected. Based on the findings from the noise and air quality reports, this outcome is unlikely.

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Proposed Future Scenario on property values, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area.

Furthermore, it is recommended that PortsToronto and the aircraft operators consult with residential associations and local real estate agents on an ongoing basis to understand if new concerns around property values arise and if there is need for further mitigation measures.

Net Effects

With implementation of the recommended mitigation measures, it is anticipated that there will be negligible net effects on property values as a result of the proposed project.

Will the proposed future operation of BBTCA negatively affect residential property values compared to the future baseline operation?	**No.** **Future BBTCA operations are not expected to have a negative effect on property values along the waterfront or near the site.**

4.2.8 Non-use Values

The effects on non-use uses values examine the potential changes brought about by the presence of the 200 m land mass extension on each end of the main runway, increased airport operations and the introduction of the CS100 or other qualifying jets. Such effects would be related to the alignment of public values (respondents from the LSA and RSA) associated with the operation of the BBTCA. These values prioritize recreational purposes and natural/wilderness preservation/scenery, and to a lesser extent, community/family places of gathering, less development in the LSA (particularly condominium), and business purposes.

Likely Effects

When compared to the Future Baseline Scenario, the further growth in the airport operations and increased congestion will change the look and feel of the LSA. Furthermore, the introduction of jet aircraft and the runway extension will contribute to a more urban and busier feel in the area. Interviews with Toronto residents who do not normally visit the waterfront as well as those who do use the LSA stated that they value the area for its mixed uses, and natural setting. Many stated that the LSA is unique because of its close proximity to the downtown core and its natural landscape and recreational opportunities.

New developments are planned for the area and it will experience significant growth, even without changes in the airport operations. When compared to the Future Baseline Scenario, this balance of uses is expected to be changed as the area will have a more congested, urban, and busier feel attributed to the increased number of passengers, the larger jet aircraft and the runway extension.

While the LSA has drastically changed and developed in recent years, the introduction of jet aircraft is likely to change how people value the LSA. Should the proposed project proceed, some non-users expressed that they would be less likely to visit (34%). Of these respondents, the most commonly stated responses included noise and nuisance (37%), visual impact (19%) and increased traffic (17%) as deterrents related to the proposed project.

Phone survey non-users mentioned ways they would like to see Toronto's waterfront be used over the next 25-50 years. Half of the non-users feel that if the project were to proceed, their vision for the Waterfront over the next 25-50 years would be affected. They most commonly cited the effect of increased noise on enjoyment of the area, activities and events (35%) as the primary reason. Other cited reasons include a general negative effect on the Waterfront Area (13%), decrease in livability and property values (13%), and increased pollution and fumes (11%).

Recommended Mitigation or Effects Management

In order to mitigate the effects of the Proposed Future Scenario on non-use values, it is recommended that all the proposed mitigation measures outlined in the traffic report be implemented. It is also recommended that the City of Toronto and other partners press forward with plans to introduce more transit to the area.

Net Effects

Even with implementation of the recommended mitigation measures, it is anticipated that the introduction of jet aircraft, ongoing congestion and runway extension will change people's perception of the LSA.

Will the future baseline (permitted) operation of BBTCA negatively affect non-use values compared to the current operation?	**Yes.** **The introduction of jet aircraft and runway extension is expected to change how the waterfront is perceived by non-users.**

The table below outlines measures of effect used to determine whether there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-powered aircraft and a runway extension.

Table 11: Proposed Future Scenario Net Effects Analysis

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Scenario Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Residential Uses	▶ Changes to the use and enjoyment of private property as it relates to airport operations (e.g., having to keep windows closed during periods of high BBTCA activity). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements.	▶ Proposed future conditions pertaining to residential uses will generally remain similar to existing conditions even with the addition of residential uses in the Lower Don Lands and Keating Channel precincts once build out is complete.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion, extension of the runway, the introduction of jets, and the increased frequency of air traffic will affect residents' use and enjoyment of property. ▶ The extended runway will create a visual disturbance. ▶ Local residents who are already frustrated with BBTCA operations will become even more dissatisfied with their place of residence and contribute to a decreased use and enjoyment of private property.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶ Consider capping flight volumes during certain prescribed times of the day.	▶ Residents will experience an increase in the number and frequency of interruptions and disturbances from increased flight volumes. ▶ Use and enjoyment of residential areas will be affected by the introduction of jets, which will change the look and feel of the LSA.
Recreational Uses	▶ Changes to the use and enjoyment of recreational spaces as it relates to airport operations (e.g., ability to listen to concerts at the Music Garden). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements.	▶ Proposed future conditions pertaining to recreational uses will generally increase with the addition of the 63 ha revitalization of Ontario Place and 375 ha Lake Ontario Park.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion, extension of the runway, the introduction of jets, and the increased frequency of air traffic will affect recreational users' enjoyment of the area. ▶ The runway extension will create a visual disturbance and encroach on the area available for water-based recreation, resulting in increased congestion for boaters within the Inner Harbour and Western Channel. ▶ Recreational users who are already frustrated with BBTCA operations will become even more dissatisfied and may choose to visit other areas.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶ Consider capping flight volumes during certain prescribed times of the day.	▶ Recreational users will experience an increase in the number and frequency of interruptions and disturbances from increased flight volumes. ▶ Use and enjoyment of recreational areas will be affected by the introduction of jets, which will change the look and feel of the LSA, and will reduce the area of navigable water for recreational boaters.
Institutional Uses	▶ Changes to the uses of institutional spaces as it relates to airport operations (e.g., at the City School). ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed.	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements.	▶ Proposed future conditions pertaining to the institutional uses will generally remain similar to existing conditions even with the addition of institutions and services associated with build out of the Keating Channel and Lower Don Lands precincts.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased congestion will likely affect access and egress to local institutions.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.
Economy	▶ Increases or decreases in	▶ None.	▶ None.	▶ Increased business activity catering to	▶ Provide additional on-site parking and/or	▶ Positive effects on local area businesses

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Scenario Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
	business activity associated with changes in airport operations.			the increased volume of passengers including transportation, accommodation, food, and beverage services. ▶ Increased access for business travelers to the City's business core as well as increased and more convenient access for tourists to the City's entertainments venues and LSA. ▶ Loss in LSA business activity because of constrained access and limited parking for business clientele.	establish off-site parking for BBTCA passengers away from the LSA businesses. ▶ Establish a monitoring and permitting system to enforce the above off-site parking and traffic accommodation for BBTCA passengers. ▶	and economic activity as a result of increased volume of passengers. ▶ Negligible negative net effects during operations are anticipated.
Tourism	▶ Changes in tourist-behaviour linked to changes to the BBTCA operations. ▶ Changes to noise. ▶ Changes to air quality. ▶ Changes to the viewshed. ▶	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements.	▶ Proposed future conditions pertaining to tourist-behaviour will generally remain similar to existing conditions.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Increased passenger volume and aircraft movements may affect tourists' propensity to visit the area due to an increase in the frequency of disturbances. ▶ Conversely, additional tourists travelling to Toronto from existing and new destinations, who will spend money on tourism-related businesses, attractions and accommodations in the LSA.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements.	▶ Negligible net effects during operations are anticipated.
Municipal Implications	▶ Changes to the municipal tax base. ▶ Changes to response time for municipal services. ▶	▶ Runway extension (approximately 200 m on each end). ▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements. ▶	▶ Future baseline conditions pertaining to municipal services will generally remain similar to existing conditions.	▶ Greater vehicular traffic and people along the Waterfront due to an increased number of passengers to the BBTCA. ▶ Increased land based congestion may affect general pedestrian safety and slow response times. ▶ Increased number of passengers may affect emergency services through an increased demand for services. ▶ Presence of the runway extension will create further congestion in the water and increase wake turbulence, which will affect the service provided by the Toronto Police Marine Unit.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶	▶ Presence of the runway extension will affect response times of the Toronto Police Marine Unit.
Property Values	▶ Changes to property values within the waterfront for both existing and planned waterfront communities.	▶ Introduction of the CS100 and other qualifying jets. ▶ 84 % increase in peak hour passengers groundside; 105 % increase of total annual airport passengers; and 21 % increase of annual aircraft movements. ▶	▶ Property values in the City of Toronto will continue to increase at a rate greater than the rest of the country.	▶ Greater vehicular traffic and people along the waterfront due to an increased number of passengers to the BBTCA. ▶ Residents who are already frustrated with BBTCA operations will become even more dissatisfied and may move from the area. ▶ However, new residents are expected to replace any residents who move.	▶ Implement measures to improve traffic conditions, including improved shuttle frequency and taxi operations. ▶ Encourage the City and Metrolinx to implement transit improvements. ▶	▶ Negligible net effects during operations are anticipated.

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Appendix A

Telephone Survey

- **IntelliPulse Inc. Top-line Findings Report**

Environmental Assessment for the Billy Bishop Toronto City Airport Runway Extension

September, 2015
Top-line Findings Report

Prepared for:





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INTELLIPULSE INC. | P.416.253.6382 | F.416.259.4758 | WWW.intellipulse.com | mbuhlman@intellipulse.com | 25 Eastbourne Crescent | Toronto, ON | M8V 1W7

1. PROJECT OVERVIEW

INTRODUCTION

IntelliPulse Inc. is pleased to provide the top-line frequency tables to AECOM for the Billy Bishop Toronto City Airport runway extension. This section of the report provides an overview to the questionnaire design and the survey methodology. The following sections provide the tables or charts with the survey responses for respondents who live within the Local Study Area (LSA) and the Regional Study Area (RSA).

The questionnaire was designed for telephone administration and was segmented such that the LSA and RSA respondents were asked common questions but also questions that pertained only to their circumstances. The survey was translated into French and bilingual interviewers were used to conduct these interviews. The following report sections indicate which responses apply to a particular study area. The Technical Appendix contains the questionnaire.

The survey was administered from August 31 to September 17, 2015 and took an average of 12.8 minutes. The telephone survey was administered by The Logit Group Inc. under the direct supervision of IntelliPulse Inc. and AECOM. AECOM participated in monitoring the survey's implementation.

LOCAL STUDY AREA SAMPLE DESIGN

The Local Study Area is defined by the boundaries in the accompanying map:

- The Gardiner Expressway to the north,
- Leslie Street to the east,
- Toronto Island and the Leslie Street Spit to the south, and
- Strachan Avenue including Ontario Place to the west.



INTELLIPULSE INC. | P.416.253.6382 | F.416.259.4758 | WWW.intellipulse.com | mbuhlman@intellipulse.com | 25 Eastbourne Crescent | Toronto, ON | M8V 1W7

The LSA sample was drawn from two sources:

1. The Logit Group obtained the detailed postal codes and pulled the landline telephone numbers accordingly. There are 410 Postal Codes that are part of the Mapped area. The Logit Group obtained 4,948 landline telephone records.

2. In addition, The Logit Group purchased 10,000 cell phone numbers (416/647) and employed the following method.

Specific protocols were followed for the cellphone sample. An Interactive Voice Response (IVR) message was sent to all the cellphone numbers. The text was as follows:

Hello, we are calling from IntelliPulse Research, a national survey research firm, conducting surveys about the Toronto Waterfront Area.

1. Do you live south of the Gardiner Expressway between Leslie Street and Strachan Ave?
   If Yes, press 1 Continue 1
   If No, press 2 Thanks and Terminate 2

2. Would you be willing to have us call you back in a couple of days to answer some questions about the Toronto Waterfront area?
   If Yes, press 1 1
   Thank you and you will hear from us in a couple of days
   Record as Sample Type 3, Code 3

   If No, press 2 Thanks and Terminate 2
   Thank you for your time.

Respondents who replied "yes" were called back several times if they did not answer their cellphone. A voice message was also left with a toll-free 1-800 number to encourage their participation in the survey.

When contacted, respondents were asked for their landline number. The Logit Group deleted the number from the landline sample.

The outcome of the IVR calls was as follows:

Total Records	**10000**
Answering Machine	3534
Busy	465
Fax	3
Operator Intercept; call could not be completed as dialled	3347
No Ring	44
Live Answer	**2607**
Did not reply	2504
Live in Area	*31*
Do not live in Area	*72*
Want Call	10
Do not want call	13

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The aim was to complete 400 interviews within the LSA. A total of 388 were completed among residents who were 18 years of age or older. The confidence interval for a sample of this size is ±5.1%, 19 out of 20 times.

REGIONAL STUDY AREA SAMPLE DESIGN

The Regional Study Area is defined as the remainder of the City of Toronto. The sample of landline telephone numbers was drawn proportional to the populations of Etobicoke, York, Toronto, East York, Scarborough, and the remainder of Toronto excluding the LSA.

A total of 416 interviews were completed among residents who were 18 years of age or older. The confidence interval for a sample of this size is ±5.0%, 19 out of 20 times.

The Technical Appendix contains the telephone sample outcome.

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2. LIVING ON THE WATERFRONT

The following questions were asked among LSA respondents.

The majority of the LSA respondents live in the Toronto Waterfront Area because of its unique setting and the view of the waterfront.

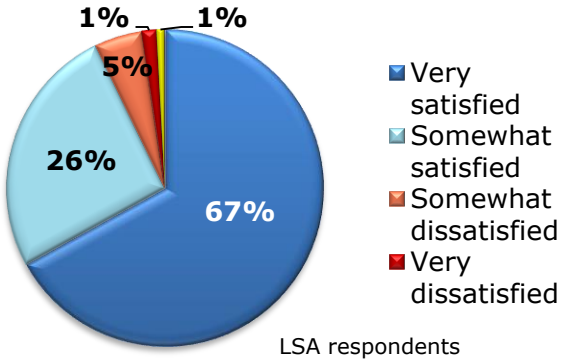
1. Why do you live on the waterfront?

	Percent	Count
Natural setting/view/lake (quiet)	51	(196)
Convenient location/proximity to work	34	(131)
Proximity to recreational opportunities	17	(66)
Family home/legacy	9	(34)
Proximity to services (includes shopping, medical, schools etc.)	7	(28)
Community/culture/history of the area	6	(23)
Type of residence/availability	6	(23)
Like/good area - general	5	(20)
Affordability	4	(16)
Moved from waterfront	2	(9)
Safety/cleanliness	2	(8)
Other	4	(14)
Don't know/refused	1	(2)
Total LSA	100	(388)

Note: Percent sums to more than 100%since more than one response was accepted. Count is the number of respondents who gave that answer. Total is the total number of respondents.

93% of the LSA respondents are satisfied with living in Toronto's Waterfront Area, with the clear majority (67%) "very satisfied".

2. How satisfied are you with living in your current area?

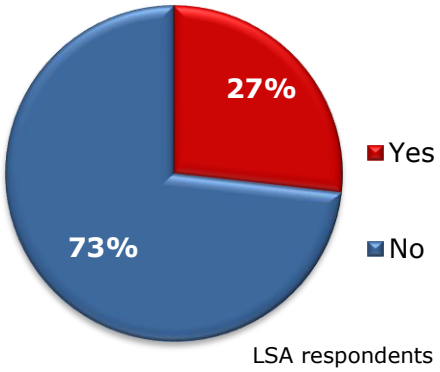


LSA respondents

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One-quarter of the LSA respondents have considered moving from their current address in the past five years.

3. In the past 5 years, have you considered moving from this address?



LSA respondents

As can be seen below, a variety of reasons prompted local residents to consider moving; 20% of the responses specifically relate to some aspect of the BBTCA.

4. Why have you considered moving?

	Percent	Count
Too much construction/ condos	20	(21)
Traffic congestion	16	(17)
Not enough living space	14	(15)
Want a better, different community	11	(11)
Noise	10	(10)
Cost is rising	8	(8)
To move into a house	6	(6)
Airport Noise	6	(6)
To be closer to family	5	(5)
Effects of the expansion of jets	5	(5)
Airport Traffic	5	(5)
Too many local events, tourists	5	(5)
Overpopulated area	4	(4)
Poor transit system	4	(4)
Lack of stores	3	(3)
Airport - no specifics	3	(3)
Pollution	2	(2)
Airport pollution	1	(1)
Other	9	(9)
Total LSA	100	(104)

Base: Have considered moving. More than one response accepted. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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The predominant use of residents' outdoor space at their residence is for relaxation.

5. In what ways do you use the outdoor spaces (including your balcony, if applicable) at your place of residence?

	Percent	Count
Relaxing (e.g., reading, tanning, enjoying the view)	50	(194)
Exercise (e.g., walk, swim)	30	(116)
Picnic/eating/entertaining	19	(72)
I do not use the outdoor spaces at my residence	15	(57)
Gardening	13	(52)
BBQ	11	(44)
Recreational activities	2	(7)
Building facilities (e.g., community room, lounge)	2	(7)
Shopping	2	(6)
No outdoor space	1	(4)
Smoking/drinking	1	(4)
Work	1	(2)
Other	3	(12)
Not address question/Don't know	2	(8)
Total LSA	100	(388)

Note: Percentages sum to more than 100% since more than one response was accepted. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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A variety of positive and negative factors were cited that affect local area residents' use and enjoyment of their outdoor space. Included in the negative factors, specifically cited in 19% of the responses, is the airport.

6. What factors affect your use and enjoyment of the outdoor spaces at your residence – either positively or negatively?

	Percent	Count
Positive:		
Scenery/view	16	(64)
Weather, breeze, affects activities	12	(45)
Positive general, uses of property	6	(25)
Access to parks/garden	6	(25)
Proximity to recreational facilities/amenities/restaurants	5	(21)
Biking/walking trails	5	(19)
Harbor front/waterfront access	4	(16)
Variety of events/festivals/activities	3	(12)
Peace/quiet/relaxation	3	(11)
Friendly people, environment	1	(4)
Good accessibility - general, public transit	2	(8)
Well maintained / clean	1	(3)
Recent renovations/to waterfront	1	(3)
Ferry / island	<.5	(1)
Safe area	<.5	(1)
Negative		
Airport noise, pollution	19	(75)
Too noisy, people, Gardiner, party boats	19	(72)
Weather, wind, affects activities	16	(61)
Traffic congestion/roads	13	(49)
Construction/development of new condos	9	(34)
Overcrowded/too many people/tourists	6	(23)
Pollution/air quality	5	(20)
Events/festivals cause traffic, crowding, access	3	(10)
Bike trails, cyclists	2	(8)
Ferry service	2	(7)
Poor accessibility, including the Gardiner	2	(7)
Police services	1	(5)
A lot of people/tourists	1	(5)
Public transportation, access, noise	1	(5)
Bugs	1	(4)
Negative - general	1	(4)
Loss of green space/parks	1	(3)
Yacht club / boats	1	(2)
Poor cleanliness	1	(2)
Accessibility - general	1	(2)
Lack of stores/restaurants	<.5	(1)
Poor scenery, aesthetics	<.5	(1)
Other	5	(21)
Nothing/none	2	(8)
Don't use outside space / recreational facilities	2	(6)
Don't know/refused	5	(20)
Total LSA	100	(388)

Note: Percentages sum to more than 100% since more than one response was accepted. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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Respondents were read the following:

For the purposes of this survey, we are referring to the portion of Toronto's Waterfront that is south of the Gardiner Expressway between Leslie Street and Strachan Avenue, including Ontario Place, the Leslie Street Spit and the Toronto Islands. We understand that the Toronto Waterfront Area is much larger than this but we are specifically asking about this smaller section of the Waterfront Area.

The waterfront area is used by local residents for a variety of purposes. Notably 82% of the respondents undertake the physical activity of walking, jogging or other exercise.

7. In what ways do you use the outdoor areas in the Waterfront Area for recreational purposes?

	Percent	Count
Jogging/hiking/exercise/walking	82	(319)
Cultural Events	39	(152)
Relaxing	36	(139)
Shopping/restaurants	32	(124)
Boating	19	(75)
Picnicking/Island	18	(70)
Swimming	15	(59)
Dog walking	10	(38)
Bird Watching	8	(30)
Other	10	(38)
Do not use the outdoor areas for recreational purposes	4	(17)
Don't know/refused	<.5	(1)
Total LSA	100	(388)

Note: Percent sums to more than 100% since more than one response was accepted. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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Roughly similar percentages of local respondents report a positive and negative factor that influences their use and enjoyment of recreational facilities. Notably, only 13% volunteer specifically the BBTCA airport as a negative influence.

8. What factors affect your use and enjoyment of the recreational facilities in the area – either positively or negatively

	Percent	Count
Positive:		
Weather, breeze, affects activities	9	(36)
Biking/walking trails	9	(36)
Proximity to recreational facilities/amenities/restaurants	9	(33)
Harbor front/waterfront access	7	(28)
Variety of events/festivals/activities	7	(26)
Good accessibility	4	(17)
Positive general, uses of property	4	(14)
Recent renovations/to waterfront	4	(13)
Scenery/view	3	(13)
Good access to public transportation	3	(12)
Access to parks/garden	3	(11)
Friendly people, environment	3	(10)
Well maintained / clean	2	(7)
Ferry / island	2	(6)
Yacht club / boats	1	(4)
Peace/quiet/relaxation	1	(3)
A lot of people/tourists	1	(3)
Safe area	1	(3)
Airport	1	(3)
Negative		
Traffic congestion/roads	16	(61)
Overcrowded/too many people/tourists	13	(50)
Airport noise, pollution	13	(49)
Weather, wind, affects activities	10	(37)
Too noisy, people, Gardiner, party boats	7	(26)
Construction/development of new condos	6	(25)
Bike trails, cyclists	3	(10)
Pollution/air quality	2	(8)
Lack of stores/restaurants	2	(8)
Loss of green space/parks	2	(6)
Poor accessibility, including the Gardiner	1	(4)
Events/festivals cause traffic, crowding, access	1	(4)
Public transportation, access, noise	1	(4)
Police services	1	(2)
Negative - general	1	(2)
Poor scenery, aesthetics	1	(2)
Ferry service	<.5	(1)
Safety - general	<.5	(1)
Other	7	(28)
Nothing/none	3	(11)
Don't use outside space / recreational facilities	4	(14)
Don't know/refused	6	(24)
Total LSA	*100*	(388)

Note: Percent sums to more than 1005 since more than one response was accepted. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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3. VISIT THE TORONTO WATERFRONT AREA

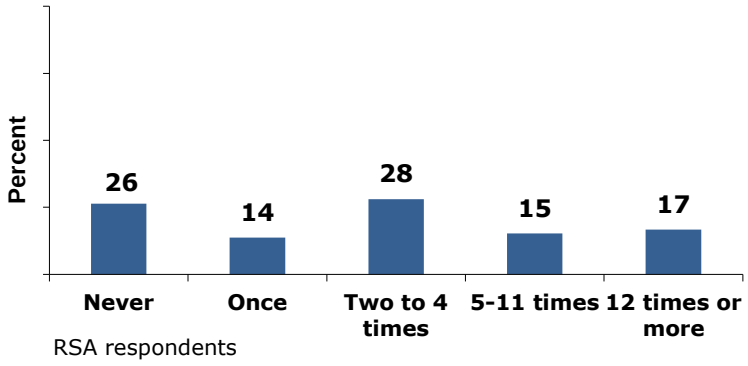
The following questions were asked among RSA respondents.

Respondents were read the following:

We would like to ask you some questions about the Toronto Waterfront Area. For the purposes of this survey, we are referring to the portion of Toronto's Waterfront that is south of the Gardiner Expressway between Leslie Street and Strachan Avenue, including Ontario Place, the Leslie Street Spit and the Toronto Islands. We understand that the Toronto Waterfront Area is much larger than this but we are specifically asking about this smaller section of the Waterfront Area.

Three-quarters of the respondents in the rest of Toronto claim to have visited the Toronto Waterfront Area in the past year.

9. How often would you say you have visited this area in the past year?



RSA respondents

"Recreation" is the primary reason for visiting the Toronto Waterfront.

10. For what reasons have you visited the Toronto Waterfront Area in the past year?

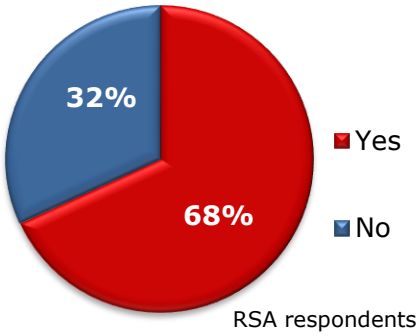
	Percent	Count
Recreation (e.g., boating)	79	(242)
Go to local attractions (islands, etc.)	14	(44)
Shopping/restaurants	9	(28)
Cultural activities/events	8	(26)
Walking	8	(23)
Use of Billy Bishop Airport	7	(21)
Work	7	(21)
Visiting friends and family	5	(16)
Activities not in LSA (e.g., CNE, Ontario Place)	2	(7)
Other	<.5	(1)
Don't know/refused	1	(3)
Total	100	(305)

Base: Visited Waterfront Area in the past year. Responses sum to more than 100% since more than one response was accepted. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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Two-thirds of the respondents in the rest of Toronto have plans to visit the area in the upcoming year, again reciting recreation as the main reason.

11. Do you have any plans to visit the Toronto Waterfront area in the upcoming year?



RSA respondents

12. For what reasons?

	Percent	Count
Recreation / boating	83	(234)
Go to local attractions (islands, etc.)	17	(47)
Cultural activities/events	8	(22)
Shopping/restaurants	7	(20)
Walking around	7	(19)
Use of Billy Bishop Airport	6	(18)
Work	5	(14)
Visiting friends and family	5	(13)
Other	1	(3)
Activities not in LSA	<.5%	(1)
Not answer question / don't know	1	(3)
Total RSA	100	(282)

Base: Plan to visit Area in upcoming year. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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4. VALUE OF THE TORONTO WATERFRONT AREA

The following questions were asked of all respondents.

There is little consensus on what is most valued about the Toronto Waterfront. Toronto residents have a variety of things they value, from the scenery to specific activities. Local area respondents are more likely than those in the remainder of the City to cite the scenery, the large open space, the convenient location, the sense of community, and the peaceful nature of an area close to but away from the rest of the city[1]. Respondents in the rest of the City are more likely than the LSA respondents to cite the recreational facilities.

13. What are the top three things that you value most about the Toronto Waterfront Area?

	LSA		RSA	
	Percent	**Count**	**Percent**	**Count**
Scenery/view	35	(136)	26	(107)
Like the water/proximity to lake	28	(108)	29	(118)
Large open/green spaces/ conservation/ parks	23	(91)	16	(66)
Walking/biking by the lake	19	(74)	20	(84)
Convenience/location	18	(71)	4	(16)
Events/concerts/entertainment	14	(55)	11	(46)
Sense of community/atmosphere/people	13	(49)	6	(24)
Peaceful/safe/away from the city	13	(49)	8	(34)
Accessibility	12	(45)	10	(42)
Cleanliness/maintenance	10	(40)	9	(36)
Harbour Front Centre - restaurants/shopping	10	(40)	7	(31)
Variety activities, facilities	10	(37)	10	(43)
The islands/ferry	9	(36)	12	(50)
Recreational facilities/boating/sailing	7	(29)	11	(46)
Fresh air/cooler	7	(28)	3	(11)
Good public transport	6	(25)	2	(10)
Close to the airport	4	(14)	4	(15)
Too much condo/development at the waterfront (negative)	1	(3)	3	(12)
Other	5	(21)	7	(27)
None/nothing	1	(3)	1	(5)
Don't know/refused	1	(3)	9	(38)
Total	*100*	(388)	*100*	(414)

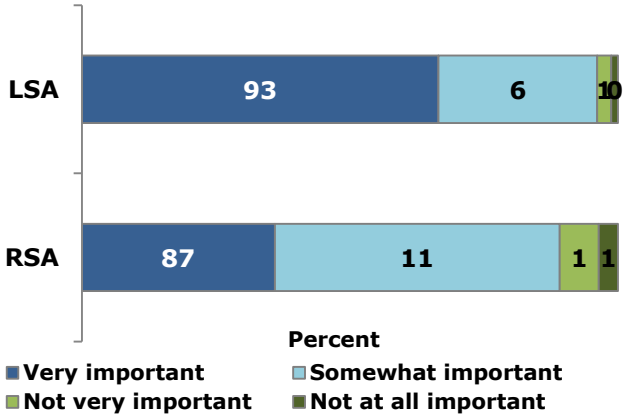
Note: Red font indicates a statistically significant difference between LSA and RSA. Count is the number of respondents who gave that answer. Total is the total number of respondents.

[1] Answers were compared by the geographic location of respondents (LSA, the rest of the City of Toronto, Scarborough, York and East York combined, and Etobicoke). However, due to the variety of responses to the open-ended / list questions, the sample sizes only allowed a comparison between LSA and RSA.

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Almost all Toronto residents rate the Toronto Waterfront Area as important to the City. Examining differences by city area, LSA respondents are more likely to state "very important" (93%) as are respondents in the rest of Toronto (91%), followed by Etobicoke (86%), York / East York (84%), and Scarborough (84%).

14. Overall how important is the Waterfront Area to the City of Toronto...?



As noted below, the Waterfront Area is valued because of its setting, it brings in tourists, and the attractions it offers for recreation and events. Regionally, LSA respondents are more likely than those in the rest of Toronto to cite tourism.

15. Please explain why you say the Waterfront Area is [RESPONSE TO Q14].

	LSA		RSA	
	Percent	Count	Percent	Count
As a natural setting/view	48	(187)	54	(220)
As a tourist destination	39	(152)	32	(131)
For recreation purposes	33	(129)	36	(149)
As a space to gather as a community	21	(83)	16	(65)
Unique/defines the city	19	(72)	22	(92)
For cultural events/activities	16	(62)	16	(65)
For residential development	6	(24)	7	(29)
Very pleasant/relaxing place to get away	6	(23)	7	(27)
For commercial purposes	5	(18)	4	(16)
As a transportation centre (i.e. airport)	3	(13)	2	(9)
For industry	3	(11)	3	(14)
Environmental / air effects	2	(7)	3	(12)
Quality of life	2	(6)	2	(9)
Mainly for the people that live in that area	2	(7)	1	(5)
Don't know	1	(3)	1	(4)
Improvements needed	1	(3)	1	(5)
Other	8	(30)	9	(35)
Don't care	<.5	(1)	1	(4)
Other things are more important			1	(6)
Total	100	(388)	100	(410)

Note: Red font indicates a statistically significant difference between LSA and RSA. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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A similar theme as in other questions emerges on how residents view future uses of the Toronto Waterfront – recreation, nature being the top two. Notably RSA respondents are more likely than LSA respondents to prefer that the Waterfront Area be used for recreational purposes.

16. Over the next 25 to 50 years, how would you like to see the Toronto Waterfront Area be used?

	LSA		RSA	
	Percent	**Count**	**Percent**	**Count**
For recreational purposes (e.g., boating, parks, green space)	51	(198)	61	(253)
Natural/Wilderness preservation/scenery	23	(91)	27	(110)
As a place to gather as a community / family	20	(79)	19	(79)
Limit/no more condo development	15	(57)	14	(56)
Residential development	12	(48)	8	(33)
For tourism	11	(43)	14	(59)
None, Nothing in particular, don't know	9	(36)	9	(37)
Physical changes e.g., parking, Gardiner, transit	9	(35)	7	(27)
No airport expansions/jets	8	(30)	2	(7)
Continue development/revitalization of Waterfront area	7	(27)	6	(25)
Other	6	(24)	6	(25)
More commercial purposes (e.g, restaurants,)shopping	6	(24)	7	(31)
As a business centre	5	(19)	4	(16)
As a transportation hub (airport)	4	(14)	2	(10)
For industrial purposes	2	(8)	1	(5)
No change/should stay the same	10	(40)	10	(42)
Not address question	3	(11)	5	(20)
Total	100	(388)	100	(414)

Note: Red font indicates a statistically significant difference between LSA and RSA. Count is the number of respondents who gave that answer. Total is the total number of respondents.

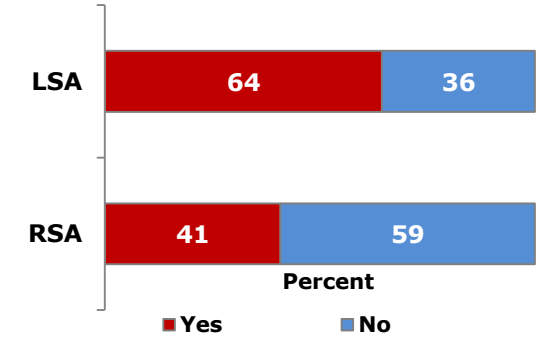
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5. USAGE OF THE BILLY BISHOP AIRPORT

The following questions were asked of all respondents.

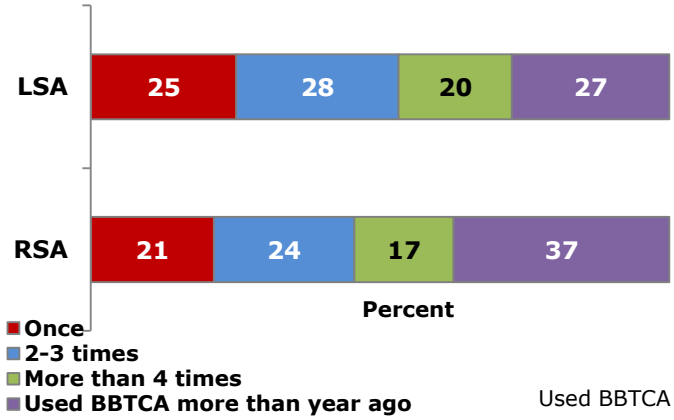
A higher proportion of LSA respondents have used the BBTCA than respondents in the remainder of the City. Outside the LSA, usage is highest in the rest of Toronto (53%), followed by York/East York (44%), Etobicoke (32%) and Scarborough (22%).

17. Have you ever used the Billy Bishop Airport for air travel in and out of Toronto?



Upwards to half of the City respondents who used the BBTCA used it up to three times in the past year. Usage is highest in the LSA (20%, more than four times) and rest of Toronto (20%) and lower in Scarborough (15%), York / East York (14%) and Etobicoke (11%).

18. How often have you used the Billy Bishop Airport for air travel in the past year?



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Most BBTCA users chose to fly from this airport because of its convenient location. LSA respondents are more likely than RSA respondents to cite the convenient location of the airport, and RSA respondents are more likely to cite flight affordability and faster service.

19. What are the reasons you chose to fly in or out of Billy Bishop Airport as opposed to another airport in the area?

	LSA		RSA	
	Percent	**Count**	**Percent**	**Count**
Convenient location	81	(202)	73	(124)
More affordable flights	15	(38)	25	(43)
More convenient flight schedule	19	(47)	15	(25)
Shorter lines/faster to travel through than Pearson	12	(29)	22	(38)
Superior airline service	10	(24)	10	(17)
Other	11	(27)	8	(14)
Smaller airport	2	(5)	1	(2)
Easier to use/security/design	5	(13)	7	(12)
Don't know/refused	2	(5)	2	(4)
Total	100	(250)	100	(169)

Base: Have used BBTCA. Count is the number of respondents who gave that answer. Red font indicates a statistically significant difference between LSA and RSA. Count is the number of respondents who gave that answer. Total is the total number of respondents.

Over half of Toronto respondents who use BBTCA would use Pearson International Airport if they could not get the desired flight out of BBTCA. Regionally, respondents in the remainder of Toronto are more likely than the average to wait for an available BBTCA flight (26%), and Scarborough respondents to make alternate travel plans (25%; note of caution due to the small number of respondents).

20. If you could not get a flight at the desired time and day out of Billy Bishop, would you:

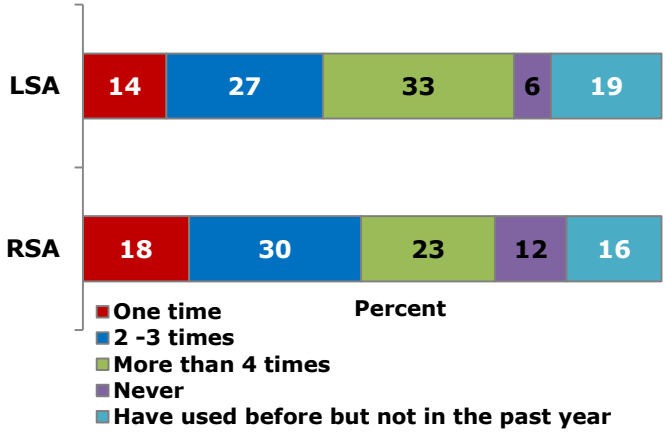
	LSA	RSA
	%	**%**
Make travel arrangements through Pearson International Airport	59	56
Wait until a flight is available at Billy Bishop	22	22
Make alternate travel plans such as drive or rail	10	11
Not travel at all	1	
Other	8	11
Total	*250*	*169*

Base: Have used BBTCA.

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The clear majority of Toronto residents have used Pearson International Airport in the past year. Regionally, LSA respondents have the highest usage (33% more than four times), followed by the rest of Toronto (29%), York/East York (22%), Etobicoke (19%) and Scarborough (15%).

21. How many times have you used Pearson International Airport in the past year?



Union Pearson Express is not likely to have an impact on usage of Pearson International Airport or BBTCA for two-thirds of the respondents. The rest of Toronto respondents are most likely to not change their airport choice (76%), followed by Etobicoke (62%), LSA (60%), York / East York (58%) and Scarborough (58%).

22. With the addition of the new Union Pearson Express linking Union Station to Pearson International Airport, will you be…

	LSA	RSA
	%	%
Not change your choice of Airports between Billy Bishop and Pearson	60	67
More likely to fly through Pearson International Airport	33	27
More likely to fly through Billy Bishop Airport	7	6
Total	*388*	*414*

6. BILLY BISHOP AIRPORT PROPOSAL SUBMISSION

The following was read to all respondents.

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

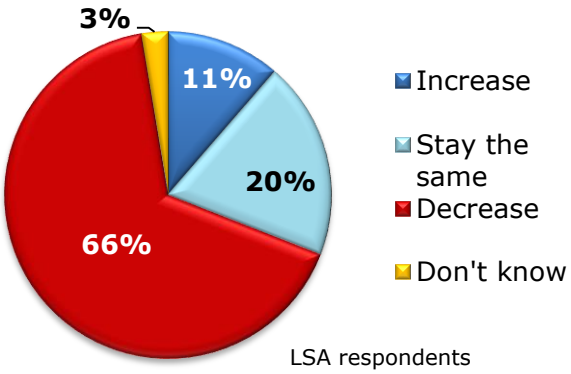
The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

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The following questions were asked of the LSA respondents.

Two-thirds of the Local Waterfront respondents anticipate that their satisfaction with living in the area will decrease should the proposal to introduce jets and lengthen the BBTCA runway proceed.

23. Should the proposed project proceed, do you foresee your satisfaction with living in your area to ...



LSA respondents

Noise is volunteers as the primary reason for their anticipated decrease in satisfaction with living in the area.

24. Why do you say your satisfaction with living in your area will [RESPONSE TO Q23]?

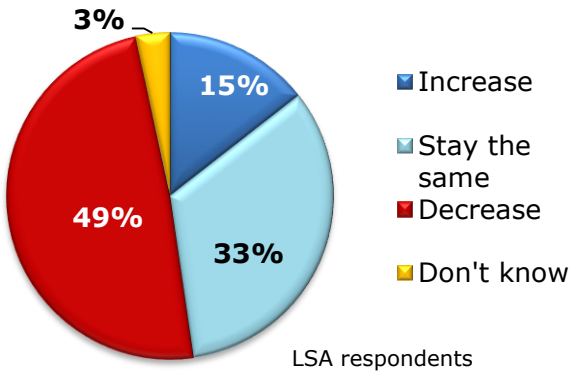
Why	Should the proposed project proceed, do you foresee your satisfaction with living in your area to ..			
	Increase		Decrease	
	Percent	Count	Percent	Count
More convenient access to travel	66	(29)	1	(3)
Other response	20	(9)	8	(21)
Increased travel options/ destinations	20	(9)	1	(2)
More jobs and economic activity	14	(6)		
Noise and nuisance	9	(4)	73	(189)
More people in the area	9	(4)	16	(41)
Increased traffic	5	(2)	54	(139)
Air quality	2	(1)	38	(99)
Recreational uses			18	(47)
Visual disturbance			12	(31)
Impact on environment/wildlife			10	(26)
Dangerous/safety concerns			8	(20)
Too close to residence for jets			7	(19)
Not address question/Don't know	2	(1)	<.5	(1)
Total LSA	100	(44)	100	(258)

Base: LSA respondents who say "increase" or "decrease" satisfaction. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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Almost half of the Local respondents anticipate that their use and enjoyment of the Waterfront will decline should the proposal proceed.

25. Do you anticipate your use and enjoyment of the Toronto Waterfront Area to …:



LSA respondents

Noise is again the top reason for an anticipated decrease in the use and enjoyment of the Waterfront.

26. Why do you say your use and enjoyment of the Toronto Waterfront Area will [RESPONSE TO Q25]?

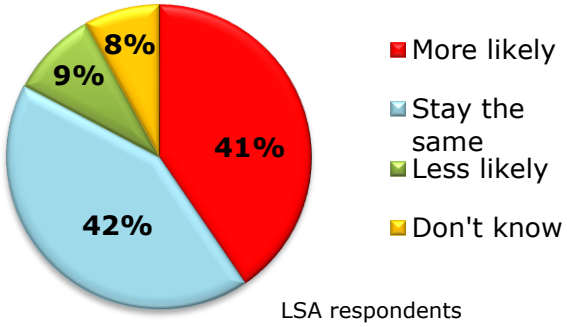
	Do you anticipate your use and enjoyment of the Toronto Waterfront Area to..			
	Increase		Decrease	
	Percent	Count	Percent	Count
More people, activities in the area	30	(17)	16	(31)
More usable area, access, attractive	25	(14)		
Other response	20	(11)	4	(7)
More convenient access to travel	18	(10)	1	(1)
More jobs and economic activity	11	(6)		
Noise and nuisance	9	(5)	76	(145)
Recreational use	7	(4)	11	(20)
Increased traffic	5	(3)	54	(102)
Visual effects	5	(3)	14	(26)
Impact on wildlife/environment	2	(1)	4	(8)
Air quality			38	(72)
Smaller harbour/less green space			9	(18)
Dangerous/not safe			8	(15)
Too close to residential area			6	(11)
Not address question/don't know	2	(1)	2	(3)
Total LSA	100	(56)	100	(190)

Base: LSA respondents who say "increase" or "decrease" satisfaction. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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Local respondents are split on whether they are more likely to anticipate moving or not their residents should the proposal procced.

27. Should the proposed project proceed, do you anticipate you will be more or less likely to move from your current residence?



LSA respondents

Noise is the primary consideration that would prompt Local residents to move.

28. Why do you say you will be [RESPONSE TO Q27] to move?

	Should the proposed project proceed, do you anticipate you will be more or less likely to move from your current residence?			
	More likely		Less Likely	
	Percent	Count	Percent	Count
Noise and nuisance	63	(99)	8	(3)
Increased traffic	42	(66)	6	(2)
Air quality	31	(49)		
More people in the area	18	(28)	3	(1)
Visual disturbance	16	(25)		
To close to residents, too many planes	10	(15)		
Decreased property value	8	(13)		
Decreased satisfaction/diminished experience	8	(12)		
Other response	6	(10)	11	(4)
Dangerous/safety concerns	5	(8)		
Health risk/stress level	5	(8)		
Impact on environment/wildlife	3	(5)	0	(0)
Like living here/don't want to move	3	(4)	44	(16)
More jobs and economic activity	1	(2)	6	(2)
More convenient access to travel	1	(1)	33	(12)
Increased property value	1	(1)		
Not address question/don't know	1	(1)		
Total	100	(157)	100	(36)

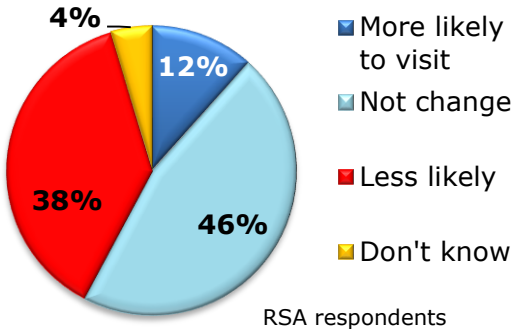
Base: LSA respondents who say "more" or "les" likely. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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The following questions were asked of the RSA respondents.

Roughly half of the respondents in the rest of Toronto are unlikely to change their visitation behaviour to the Waterfront Area if the proposed project proceeds. One-third, however, anticipates that they are less likely to visit the area.

29. Should the proposed project proceed, do you anticipate that you would be …?



RSA respondents

While travel convenience is the primary reason for an anticipated increase in visits, noise is the main reason RSA respondents state they are less likely to visit the Toronto Waterfront.

30. Why do you say you are [RESPONSE TO Q29] to visit?

	Should the proposed project proceed, do you anticipate that you would be..			
	More likely to visit the Waterfront area because of the expansion		Less likely to visit the Waterfront area because of the expansion	
	Percent	Count	Percent	Count
More convenient access to travel	65	(31)	1	(1)
Other response	19	(9)	6	(9)
More jobs and economic activity/ commercial	8	(4)	3	(4)
Usable area, attractiveness	8	(4)	1	(1)
Visual impact	4	(2)	22	(35)
More people in the area	2	(1)	15	(24)
Noise and nuisance			68	(106)
Air quality			23	(36)
Increased traffic			38	(59)
Dangerous/not safe			3	(5)
Smaller harbor/reduced green space			6	(9)
Don't want jets			8	(13)
Impact on wildlife/environment			1	(2)
Recreational use			4	(7)
No address question/don't know	2	(1)	1	(1)
Total	100	(48)	100	(156)

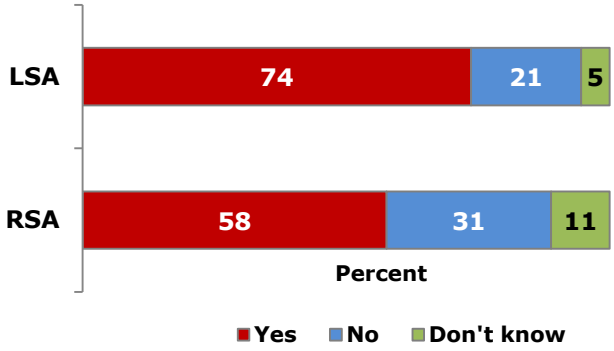
Base: RSA respondents who say "more" or "less" likely. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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The following were asked of all respondents.

The clear majority of all Toronto residents anticipate that the proposed project will have an impact on their vision for the future of the Toronto Waterfront Area. LSA respondents are clearly more likely to believe that the proposed project will affect future Waterfront uses (74%) compared to York / East York (62%), the remainder of Toronto (59%), Etobicoke (57%) and Scarborough (53%).

31. Earlier on, you mentioned some ways in which you'd like to see the Toronto Waterfront Area be used in the next 50 years. Do you think the proposed project will affect those uses?



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A variety of factors are volunteered as having an impact on the uses for the Toronto Waterfront over the next 50 years. The only significant difference in responses between the LSA and RSA respondents is that Local respondents are more likely to state that the proposed project will have an adverse impact on the "livability" of the Waterfront Area.

32. How would the proposed project affect those uses?

	LSA		RSA	
	Percent	**Count**	**Percent**	**Count**
Noise - impact on enjoyment, activities, concerts	36	(103)	36	(87)
Increased traffic/parking	23	(66)	19	(45)
Decrease livability/property values/it will push people away	20	(57)	10	(25)
Pollution/fumes	20	(56)	15	(35)
Decrease in recreation activity / boating	16	(47)	12	(29)
Negative effect on waterfront	11	(31)	9	(21)
More crowded/people	7	(21)	7	(17)
Negative impact / less enjoyable - general	6	(17)	5	(12)
It will attract more people/tourists/ more attractions/entertainment will be available	5	(14)	6	(14)
Visual disturbance/unattractive view	5	(13)	5	(13)
Negative impact on wildlife/natural environment	4	(11)	7	(17)
Increase economic development, jobs	3	(10)	3	(6)
It will improve the area/make it more accessible/convenient	3	(9)	1	(3)
Less public space	3	(9)	4	(10)
The area will become more commercial	3	(8)	7	(17)
Increase air traffic	3	(8)	7	(17)
Accidents, safety	2	(7)	3	(7)
Increase construction	1	(2)	1	(3)
Other	3	(9)	5	(11)
Don't know/refused	5	(14)	6	(15)
Total	*100*	(286)	*100*	(239)

Base: "Yes" proposed project will affect Waterfront uses. Percentages sum to more than 100% since more than one response was accepted. Red font indicates statistically significant difference. Count is the number of respondents who gave that answer. Total is the total number of respondents.

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As a final summation question, 43% of the LSA and 60% of the RSA respondents did not have any further questions or concerns. Local respondents are more likely than respondents in the rest of the city to say they are not in favour of the proposed project rather than cite a concern or question, and are more likely to volunteer noise, infrastructure capacity, not listening to local residents, and health effects.

33. Do you have any overall questions or concerns about the proposed project that you would like us to record?

	LSA		RSA	
	Percent	**Count**	**Percent**	**Count**
No questions or concerns	43	(168)	60	(249)
Not in favor of proposed project/jets	23	(88)	12	(48)
Increased noise level	9	(33)	5	(22)
Infrastructure re increased traffic, passengers	8	(30)	3	(14)
Consider only developer interests/should listen to people	6	(24)	2	(10)
Health effects - air quality, pollution	5	(21)	1	(5)
Need more information/study/effects	5	(19)	3	(12)
Environmental impact/ marine, birds	4	(15)	3	(11)
Safety concerns/planes crashing	4	(15)	1	(6)
Impact on the waterfront	3	(12)	2	(10)
Impact on city/living area	3	(10)	2	(9)
Taking up public space, land water	2	(8)	2	(10)
Support of expansion/airport	2	(8)	4	(16)
Decrease in property value/economic development	1	(5)	1	(4)
What is the time-frame, current stage	1	(5)	1	(4)
What is the purpose of the project/why is it being done	1	(5)	<.5	(2)
Want airport closed down	1	(3)	1	(3)
Other	2	(8)	4	(16)
Don't know	1	(5)	1	(3)
Total	100	(388)	100	(414)

Note: Percentages sum to more than 100% since more than one response was accepted. Red font indicates statistically significant difference. Count is the number of respondents who gave that answer. Total is the total number of respondents.

7. RESPONDENT PROFILE QUESTIONS

The following were asked of all respondents.

Very few respondents or a family member worked in the air transportation industry.

34. Do you, or does anyone in your household work for the air transportation industry?

	LSA	RSA
	%	%
Yes	3	2
No	97	98
Refused	1	
Total	*388*	*414*

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Respondent age in both study areas skewed to the older age categories.

S1 In what age category do you belong?

	LSA	RSA
	%	%
18 - 24	2	3
25 - 34	5	7
35 - 44	14	13
45 - 54	23	23
55 - 64	21	23
65 or older	35	32
Total	*388*	*414*

The majority of respondents were women.

S2 Gender

	LSA	RSA
	%	%
Male	39	43
Female	61	57
Total	*388*	*414*

The following is the distribution of the sample by geographic location of the respondents as capture by the sampling program.

	Percent	Frequency
RSA - Scarborough	11	91
RSA - Toronto	24	189
RSA - Etobicoke	11	84
RSA - York	3	27
RSA - East York	3	23
LSA	48	388
Total	*100*	*802*

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TECHNICAL APPENDIX

SAMPLE OUTCOME

Label	TOTAL	RSA landline	LSA landline	LSA cell (from IVR)
Stratum		SAMPL=1	SAMPL=2	SAMPL=3
Total	34677	29707	4960	10
(No result code)	19862	19862	0	0
02 (INT00) No answer	208	187	21	0
03 (INT00) Busy	4	3	1	0
04 (INT00) Answering machine / voicemail	504	398	106	0
05 (INT01) Callback - ENGLISH	231	183	47	1
06 (INT00) Fax	24	17	7	0
07 (INT00) Not in service	43	34	9	0
08 (INT01) Business	54	27	26	1
09 (INT01) Language barrier (no English, no French)	446	376	70	0
10 (INT01) Not available during field window	301	201	100	0
11 (INT01) Refusal	3181	2421	759	1
14 (INT01) Refusal - put us on your DO NOT CALL list	182	99	83	0
15 Refusal (Mid-survey)	102	61	40	1
16 Call back later to finish the survey	25	5	18	2
20 (INT01) There is nobody 18 years of age or older	17	13	4	0
23 (INT23) DQ A/B - Cannot speak to someone who is 18+ and a resident of the City	13	11	2	0
24 (INT24) DQ QD - (LANDLINE) Not at their home telephone number	5	5	0	0
50 (INT01) New Phone number	2	0	2	0
51 (INT01) Callback - FRENCH (not for today)	11	7	4	0
90 (INT99) COMPLETE	**800**	**413**	**386**	**1**
P1 DIALER - No answer	1413	963	450	0
P2 DIALER - Busy	155	77	78	0
P3 DIALER - Operator intercept	3642	2196	1446	0
P4 DIALER - Line answered	1361	706	653	2
P5 DIALER - Answering machine	1967	1371	595	1
P6 DIALER - Fax/modem	102	56	46	0
P8 DIALER - Default value	2	0	2	0
P9 Unknown Result Code	13	8	5	0
W0 Session Timeout	7	7	0	0

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QUESTIONNAIRE

Sample Cell Phone IVR Script:

Hello, we are calling from IntelliPulse Research, a national survey research firm, conducting surveys about the Toronto Waterfront Area.

3. Do you live south of the Gardiner Expressway between Leslie Street and Strachan Ave?
   If Yes, press 1 *Continue* 1
   If No, press 2 Thanks and Terminate 2

   Record incidence

4. Would you be willing to have us call you back in a couple of days to answer some questions about the Toronto Waterfront area?
   If Yes, press 1 1
   Thank you and you will hear from us in a couple of days
   Record as Sample Type 3, Code 3

   If No, press 2 Thanks and Terminate 2
   Thank you for your time.

   Record incidence

Survey Questionnaire

A) Pre-determined Sample Type:
   RSA landline telephone from sample 1
   LSA landline telephone from sample 2
   LSA cell from IVR 3

SAMPLE 1 AND 2 LANDLINE:

Hello, I'm _____of IntelliPulse Research, a national survey research firm. We are conducting surveys on behalf of PortsToronto to understand how people use Toronto's waterfront area.

We are not selling anything, and your responses will only be reported in aggregate with those of other respondents. This survey should take approximately 10-15 minutes of your time.

SKIP TO SCREEN B

SAMPLE 3 CELL:

Hello, I'm _____of IntelliPulse Research, a national survey research firm. We called you a couple of days ago and at that time you agreed we could call you back for a survey regarding the Toronto Waterfront area.

IF NOW IS NOT A GOOD TIME, ASK FOR A CALL BACK DATE AND TIME _____

So that we don't call you back on a land telephone line, can you please give me that number and we will take it out of our sample?
   Record number and delete from SAMPLE TYPE 2 if interview is completed. 1
   (___)___-____
   No landline telephone number..... 2

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We are conducting surveys on behalf of PortsToronto to understand how people use Toronto's waterfront area.
We are not selling anything, and your responses will only be reported in aggregate with those of other respondents. This survey should take approximately 10-15 minutes of your time.

SKIP TO SCREEN B

ASK ALL

B) Are you 18 years of age or older and a resident of this household?
Yes 1
No (SKIP TO C)..... 2

WATCH FOR GENDER QUOTAS 50/50

C) IF NO ASK: May I please speak to someone in the household who is?
Yes REPEAT INTRODUCTION 1
No, not available, ASK; When would be a good time to call back? RECORD.....2

Date:_____Time:_____

SAMPLE 1 AND 2 LANDLINE:
D) Have I reached you at your home telephone number that is (READ TELEPHONE NUMBER)?
Yes (continue) 1
No (Thanks and terminate).....2

IF NECESSARY: This survey is registered with the Marketing Research and Intelligence Association who can confirm that it is a legitimate market research survey. Their number is 1-800-xxxxx and the identification number of the study is _____.

MAIN QUESTIONNAIRE

S1
In what age category do you belong?
18 – 24..... 1
25 – 34..... 2
35 – 44..... 3
45 – 54..... 4
55 – 64..... 5
65 or older..... 6

S2
INTERVIEWER RECORD GENDER
Male 1
Female 2

FOR RSA RESIDENTS SKIP TO INTRODUCTION BEFORE Q9
FOR LSA RESIDENTS CONTINUE

1. Why do you live on the waterfront? *(do not read aloud but code as appropriate, check all that apply*)

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Convenient location/proximity to work 1
Proximity to recreational opportunities.....2
Natural setting/viewscape.....3
Family home/legacy.....4
Affordability 5
Proximity to services (includes shopping, medical, schools etc.) .6
Other _____ .....7 *Record answer and supply in Excel or Word to AECOM)*

2. How satisfied are you with living in your current area?
   Very satisfied 1
   Somewhat satisfied.....2
   Somewhat dissatisfied 3
   Very dissatisfied.....4
   Don't know/not sure 5

3. In the past 5 years, have you considered moving from this address?
   Yes (Proceed to 4).....1
   No (Skip to 5) 2

4. Why have you considered moving?
   1. _____

5. In what ways do you use the outdoor spaces (including your balcony, if applicable) at your place of residence? (*Do not read aloud, but check all that apply)*
   BBQ.....1
   Gardening 2
   Relaxing 3
   Picnic/eating.....4
   Exercise 5
   Other _____ .....6 *Record answer and supply to AECOM*
   I do not use the outdoor spaces at my residence (DO NOT READ)….7

6. What factors affect your use and enjoyment of the outdoor spaces at your residence – either positively or negatively? *(Probe for issues related to <u>outdoor use</u>. … Probe for each answer.* Is that a positive or a negative? *(and record* <u>Pos</u> ***or*** <u>Neg</u> *for each response)*
   Minimum 1 response
   1. _____
   2. _____
   3. _____

   For the purposes of this survey, we are referring to the portion of Toronto's Waterfront that is south of the Gardiner Expressway between Leslie Street and Strachan Avenue, including Ontario Place, the Leslie Street Spit and the Toronto Islands. We understand that the Toronto Waterfront Area is much larger than this but we are specifically asking about this smaller section of the Waterfront Area

7. In what ways do you use the outdoor areas in the Waterfront Area for recreational purposes?
   Bird Watching.....1

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Boating.....2
Cultural Events.....3
Dog walking 4
Jogging/hiking/exercise.....5
Picnicking.....6
Relaxing 8
Shopping.....9
Swimming 10
Other _____.....11 *Record answer and supply in Excel or Word to AECOM*
Do not use the outdoor areas for recreational purposes(DO NOT READ)…. 12

8. What factors affect your use and enjoyment of the recreational facilities in the area – either positively or negatively? *Probe for each answer.* Is that a positive or a negative? *and record* Pos ***or*** Neg *for each response)*
   1. _____
   2. _____
   3. _____

FOR LSA SKIP TO Q13
FOR RSA RESIDENTS CONTINUE

We would like to ask you some questions about the Toronto Waterfront Area.
For the purposes of this survey, we are referring to the portion of Toronto's Waterfront that is south of the Gardiner Expressway between Leslie Street and Strachan Avenue, including Ontario Place, the Leslie Street Spit and the Toronto Islands. We understand that the Toronto Waterfront Area is much larger than this but we are specifically asking about this smaller section of the Waterfront Area

9. How often would you say you have visited this area in the past year?
   Never *Skip to Q11*.....1
   Once.....2
   Two to 4 times.....3
   5-11 times 4
   12 times or more.....5

10. (*If answered code 2-5 in Q9*) For what reasons have you visited the Toronto Waterfront Area in the past year? *(do not read aloud but check all that apply)*
    Use of Billy Bishop Airport.....1
    Work 2
    Recreation 3
    Shopping 4
    Other _____ .....5 *Record answer and supply in Excel or Word to AECOM*

11. Do you have any plans to visit the Toronto Waterfront area in the upcoming year?
    Yes.....1
    No *Skip to Q13*.....2

12. (*If yes to Q11)* For what reasons? *(do not read aloud but check all that apply)*
    Use of Billy Bishop Airport.....1
    Work 2
    Recreation 3
    Shopping 4

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Other _____ .....5 *Record answer and supply in Excel or Word to AECOM*

FOR ALL RESIDENTS

13. What are the top three things that you value most about the Toronto Waterfront Area? MINIMUM 1 RESPONSE. PROBE IF NECESSARY
    1. _____
    2. _____
    3. _____

14. Overall how important is the Waterfront Area to the City of Toronto….*read responses*..?
    Very important.....1
    Somewhat important.....2
    Not very important.....3
    Not at all important.....4

15. Please explain why you say the Waterfront Area is [RESPONSE TO Q14]. (*do not read aloud but check all that apply)*

    Display responses If 1 or 2 to Q14…
    For recreation purposes 1
    As a natural setting 2
    As a tourist destination.....3
    For commercial purposes.....4
    For residential development.....5
    As a transportation centre (i.e. airport)....6
    For industry.....7
    For cultural events.....8
    As a space to gather as a community 9

    Display responses If 3 or 4 to Q14…
    Don't care 10
    Other things are more important 11
    Don't know 12

    Display for all responses to Q14
    Other _____ .....13 *Record answer and supply to AECOM*

16. Over the next 25 to 50 years, how would you like to see the Toronto Waterfront Area be used? *(do not read aloud but check all that apply)*
    Residential development 1
    As a business centre.....2
    Natural/Wilderness preservation.....3
    For recreational purposes.....4
    As a transportation hub (airport) 5
    For tourism.....6
    For industrial purposes 7
    As a place to gather as a community 8
    None, Nothing in particular, don't know.....9
    Other _____.....10 *Record answer and supply in Excel or Word to AECOM*

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17. Have you ever used the Billy Bishop Airport for air travel in and out of Toronto?
    Yes.....1
    No (Skip to Q21) 2

18. *(if Yes to Q17)* How often have you used the Billy Bishop Airport for air travel in the past year?

    One time..... 1
    2-3 times..... 2
    More than 4 times..... 3
    I have used the Billy Bishop Airport in the past but not within the past year 4

19. What are the reasons you chose to fly in or out of Billy Bishop Airport as opposed to another airport in the area? *(do not read aloud but check all that apply)*
    Convenient location.....1
    More affordable flights.....2
    More convenient flight schedule.....3
    Shorter lines/faster to travel through than Pearson 4
    Superior airline service.....5
    Other _____ .....6 *Record answer and supply in Excel or Word to AECOM*

20. If you could not get a flight at the desired time and day out of Billy Bishop, would you: *(Read list)*
    Wait until a flight is available at Billy Bishop 1
    Make travel arrangements through Pearson International Airport .2
    Make alternate travel plans such as drive or rail……3
    Not travel at all 4
    Other _____ .....5 *Record answer and supply in Excel or Word to AECOM*

21. How many times have you used Pearson International Airport in the past year?

Have used before but not in the past year	1
One time	2
2 -3 times	3
More than 4 times	4
Never	5

22. With the addition of the new Union Pearson Express linking Union Station to Pearson International Airport, will you be…*Read list* …
    More likely to fly through Billy Bishop Airport..... ….1
    More likely to fly through Pearson International Airport ..... ….2
    Not change your choice of Airports between Billy Bishop and Pearson ... ….3

READ SLOWLY

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

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The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

FOR RSA RESIDENTS SKIP TO Q29
FOR LSA RESIDENTS CONTINUE

23. Should the proposed project proceed, do you foresee your satisfaction with living in your area to … *Read list* …:
    Increase 1
    Stay the same/no change *Skip to Q25* 2
    Decrease.....3
    Don't know/not sure *Skip to Q25* 4

24. *(If 1 or 3 to Q23)* Why do you say your satisfaction with living in your area will [RESPONSE TO Q23]? (*don't read aloud but code all that apply)*
    More convenient access to travel 1
    More jobs and economic activity 2
    Noise and nuisance 3
    Visual disturbance 4
    More people in the area.....5
    Air quality.....6
    Increased traffic 7
    Other *response*_____.8 *Record answer and supply to AECOM*

25. Do you anticipate your use and enjoyment of the Toronto Waterfront Area to… *Read list* …:
    Increase 1
    Stay the same/no change *Skip to Q27* 2
    Decrease.....3
    Don't know/not sure *Skip to Q27* 4

26. *(If 1 or 3 to Q25)* Why do you say your use and enjoyment of the Toronto Waterfront Area will [RESPONSE TO Q25]? (*don't read aloud but code all that apply)*
    More convenient access to travel.....1
    More jobs and economic activity 2
    Noise and nuisance.....4
    Visual disturbance 5
    More people in the area 6
    Air quality.....7
    Increased traffic.....8
    Other *response* _____.....9 *Record answer and supply to AECOM*

27. Should the proposed project proceed, do you anticipate you will be more or less likely to move from your current residence?
    More likely.....1
    Stay the same/no change *Skip to Q29* 2
    Less Likely 3
    Don't know/not sure *Skip to Q29* 4

28. *(if 1 or 3 to Q27)* Why do you say you will be [RESPONSE TO Q27] to move? *(don't read aloud but code all that apply)*
    More convenient access to travel.....1
    More jobs and economic activity 2
    Increased property value.....3

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Noise and nuisance.....5
Visual disturbance.....6
More people in the area.....7
Air quality.....8
Increased traffic.....9
Decreased property value.....10
Other *response*_____.....11 *Record answer and supply to AECOM*

FOR LSA RESIDENTS SKIP TO Q31

FOR RSA RESIDENTS CONTINUE TO Q29

29. Should the proposed project proceed, do you anticipate that you would be …?
    More likely to visit the Waterfront area because of the expansion.....1
    Not change your likelihood to visit the Waterfront area because of the expansion *Skip to Q31*.....2
    Less likely to visit the Waterfront area because of the expansion.....3
    Don't know/not sure *Skip to Q31*.....4

30. (If 1 or 3 to Q29) Why do you say you are [RESPONSE TO Q29] to visit? (*don't read aloud but code all that apply)*

    More convenient access to travel.....1
    More jobs and economic activity.....2
    Noise and nuisance.....4
    Visual disturbance.....5
    More people in the area.....6
    Air quality.....7
    Increased traffic.....8
    Other *response*_____...9 *Record answer and supply to AECOM*

FOR ALL RESIDENTS

31. Earlier on, you mentioned some ways in which you'd like to see the Toronto Waterfront Area be used in the next 50 years. Do you think the proposed project will affect those uses?
    Yes.....1
    No *Skip to Q33*.....2
    Not sure/don't know *Skip to Q33*.....3

32. *(If YES to Q31)* How would the proposed project affect those uses?
    1._____

33. Do you have any overall questions or concerns about the proposed project that you would like us to record?(*probe for a specific question or concern)*
    1. _____
    No questions or concerns.....1
    Don't know.....2

For the purposes of understanding trends in responses, we'd like to ask you one last question.

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34. Do you, or does anyone in your household work for the air transportation industry?
    Yes.....1
    No.....2
    Refuse answer.....3

Thank you for your time and participation [end survey]

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Appendix B

Intercept Survey

- Intercept Survey – English
- Intercept Survey – French
- Intercept Survey Visual

Billy Bishop Intercept Survey

Introduction

[Read out] Hi, my name is _____ and I work for AECOM, a global engineering and environmental consultancy firm, and we are conducting surveys on behalf of PortsToronto to understand how people use the waterfront area. We understand that the waterfront area is very large but for this survey, when we say the waterfront area, we are referring to this area *(show map)*.

Do you have 15 minutes to spare to complete this survey? All responses will be kept confidential and you will not be identified in any of the research findings.

Interviewer only: **Write in location and time of interview:** _____

Background Questions

1. **What is the main purpose of your trip here today:** *(don't read aloud but code according to these answers)*

- ☐ Recreational Activity (what activity)
- ☐ Conducting business (provide specifics)
- ☐ Traveling to-from home
- ☐ Airport (flying in/out)
- ☐ Other

2. **How often do you visit this location or the waterfront area in general** *(pick the best answer that applies)***?**

- ☐ Every day
- ☐ 1 to 3 times per week
- ☐ 2 to 3 times a month
- ☐ Monthly
- ☐ Every 6 months
- ☐ Once a year
- ☐ Less than once per year
- ☐ First time today

If mentioned….. *(if not leave blank)*

- ☐ More often in summer
- ☐ More often in spring
- ☐ More often in Winter
- ☐ More often in Fall

3. Where is your home located?

Within Toronto _____

Within Local Study Area (show map) _____

Within GTA (write in where) _____

Outside GTA (write in where) _____

Outside Ontario (write in where) _____

Outside Canada (write in where) _____

4. How many people are in your party today?

☐ *Adults* ☐ *Teens* ☐ *Children*

Group A – Recreational User

Use and Enjoyment of Toronto Waterfront Recreational Areas

A1. *(Ask this question only if it is not known that the respondent is here today for a recreational activity. If already identified as a recreational user in Q1, then skip directly to A2)*. **Have you ever used the areas or facilities in the Toronto Waterfront Area for recreational purposes before?** *(If no, provide examples to clarify answer).*

☐ *Yes*

☐ *No* (SKIP TO B1)

A2. In addition to your trip here today, what are the other recreational uses or activities that you tend to participate in, in the waterfront area? *(Don't read aloud but code according to these answers and check all that apply. NOTE – code reason for current trip so all uses are included).*

☐ Dog Walking

☐ Jogging/Hiking/Exercise/Walking Trails

☐ Boating

☐ Swimming

☐ Biking

☐ Relaxing

☐ Bird Watching

☐ Picnicking

☐ Other _____

A3. **What factors affect your use and enjoyment of the recreational facilities in the area – either positively or negatively?** *(do not prompt, probe respondent for clarification e.g., if they say "noise" specify what kind of noise – traffic, planes etc. – note if these are positive or negative).*

_____

_____

_____

_____

_____

_____

Group B – Business User (including shopping)

B1. *(Ask this question only if it is not known that the respondent is here today for a business or retail purpose. If already identified as a business user in Q1, then skip directly to B2).* **Have you ever come to the waterfront area for business or work reasons or to go shopping/dining or attend events before?**

- ☐ *Yes*
- ☐ *No* (SKIP TO C1)

B2. **Do you work in the waterfront area?**

- ☐ *Yes* (SKIP TO B3)
- ☐ *No* (SKIP TO B4)

B3. **Do you have any issues or concerns with the location of your business or place of work?** *(don't read aloud but probe for responses).*

- ☐ Traffic
- ☐ Noise
- ☐ Crime
- ☐ Accessibility
- ☐ None
- ☐ Other _____

B4. **What are the types of local businesses that you have visited in the waterfront area in the past?**

- ☐ Restaurants
- ☐ Retail/supermarket
- ☐ Hotel
- ☐ None (skip to C1)
- ☐ Recreational
- ☐ Events (e.g., concerts)
- ☐ Other _____

B5. **What factors affect your decision to patronize businesses in the waterfront area – either positively or negatively?** *(do not prompt, probe respondent for clarification e.g., if they say "location" specify in terms of ease of accessibility, close to other businesses – note if these are positive or negative).*

_____

_____

_____

_____

_____

_____

_____

Group C – Local Resident

C1. **(don't ask again, just code if they are a resident of the waterfront area)**

- ☐ *Yes*
- ☐ *No* (SKIP TO D1)

C2. **Why do you live on the waterfront?** *(do not read aloud but code as appropriate, select all that apply)*

- ☐ Convenient Location/ Proximity to Work
- ☐ Affordability
- ☐ Proximity to Recreational Opportunities
- ☐ Proximity to Services (includes shopping, medical, schools etc.)
- ☐ Natural setting / Viewscape / Proximity to Water
- ☐ Other _____
- ☐ Family Home / Legacy
- ☐ *Don't know/not sure*
- ☐ Cityscape / Urban Location

C3. **How satisfied are you with living in your current area?**

- ☐ Very satisfied
- ☐ Very dissatisfied
- ☐ Somewhat satisfied
- ☐ Don't know/not sure
- ☐ Somewhat dissatisfied

C4. **In the past 5 years, have you considered moving from this address?**

- ☐ *Yes* (SKIP TO C5)
- ☐ *No* (SKIP TO C6)

C5. **Can you please explain why?**

_____

_____

_____

C6. **In what ways do you use the outdoor spaces at your place of residence, including your balcony?** *(Do not read aloud, but check all that apply)*

- ☐ BBQ
- ☐ Gardening
- ☐ Relaxing
- ☐ None
- ☐ Picnic/eating
- ☐ Exercise
- ☐ Other _____

C7. **What factors affect your use and enjoyment of your residence – either positively or negatively?** *(Probe for issues related to outdoor use. Leave open ended. Answers to be coded later.)*

_____

_____

_____

_____

_____

_____

_____

Group D – Airport User

D1. *(Ask only if you don't already know the person is here today because they are traveling to/from the airport. If already identified as an airport user, skip to D2).* **Have you ever used the Billy Bishop Airport for Air Travel?**

- ☐ *Yes*
- ☐ *No*

D2. **How often, in the past year (including today) have you used the Billy Bishop Airport for your travel needs?**

- ☐ One time
- ☐ 2 to 3 times
- ☐ More than 4 times
- ☐ None (not within the past year)

D3. **What are the reasons you chose to fly in or out of Billy Bishop Airport as opposed to another airport in the area?** *(do not read aloud but check all that apply)*

- ☐ Convenient location
- ☐ More convenient flight schedule
- ☐ More affordable flights
- ☐ Don't know/not sure
- ☐ Superior airline service
- ☐ Shorter lines/faster to travel through compared to Pearson
- ☐ Other _____

D4. **If you could not book a flight at the desired time and day out of Billy Bishop, would you:** *(Read list – check all that apply)*

- ☐ Book a different flight at another time through Billy Bishop
- ☐ Make travel arrangements through Pearson International Airport
- ☐ Make alternate travel plans such as drive or rail
- ☐ Not travel at all
- ☐ Other _____

General Questions (Ask all respondents)

5. **How many times have you used Pearson International Airport in past year?**

- ☐ One time
- ☐ 2 to 3 times
- ☐ More than 4 times
- ☐ Never

6. **Now that the Union Pearson Express[1] is complete, linking Union Station to Pearson International Airport, will you be:**

- ☐ More likely to fly through Billy Bishop Airport
- ☐ More likely to fly through Pearson
- ☐ No change in choice of Airports between Billy Bishop and Pearson

1. *If asked, the Union Pearson Express provides express, high-quality rail service between Union Station in downtown Toronto and Terminal 1 at Pearson. Travel time is 25 minutes, schedule time is every 15 minutes. Cost is $27.50 for adult one way.*

7. What are the top three things that you value most about the Toronto Waterfront Area?

a) _____

b) _____

c) _____

8. Overall how important is the Waterfront Area to the City of Toronto….?

- ☐ Very important
- ☐ Somewhat important
- ☐ Don't know/not sure
- ☐ Not very important
- ☐ Not at all important

9. What is it about the Waterfront Area that makes it important to the City of Toronto? *(do not read aloud but check all that apply)*

- ☐ For Recreation Purposes
- ☐ As a Natural Setting
- ☐ As a Tourist Destination
- ☐ For Commercial Purposes
- ☐ For Cultural Events
- ☐ Don't Know/Not Sure
- ☐ For Residential Development
- ☐ As a Transportation Centre (i.e., airport)
- ☐ For Industry
- ☐ As a Place for Community Gatherings
- ☐ Not Important
- ☐ Other _____

10. Over the next 25 to 50 years, how would you like to see the Toronto Waterfront Area be used? That is, what is your vision for the Toronto Waterfront Area? *(do not read aloud but check all that apply)*

- ☐ Residential development
- ☐ As a business centre
- ☐ Natural/Wilderness Preservation
- ☐ For Recreational Purposes
- ☐ For Tourism
- ☐ As a Transportation Hub (airport)
- ☐ As a Mass Transit Transportation Hub
- ☐ For Industrial Purposes
- ☐ None, Nothing in Particular, Don't Know
- ☐ Other _____

Project Description – Read Aloud and Refer to Diagram/Map

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

Group A – Recreational Users Only

A4. **As a recreational user of the area, do you anticipate your use and enjoyment of the Toronto Waterfront Area to:**

- ☐ Increase
- ☐ Decrease
- ☐ Stay the Same / No Change
- ☐ Don't Know / Not Sure

A5. **Can you explain why** *(in regard to QA4 – ask for comments to clarify response)***?**

_____

_____

_____

_____

Group B – Business Users Only

Ask Local Businesses/Employees Only

B6. **As a local business or as someone who is employed in the local area, do you anticipate your business activity to:**

- ☐ Increase
- ☐ Decrease
- ☐ Stay the Same / No Change
- ☐ Don't Know / Not Sure

B7. **Can you explain why** *(in regard to QB6 - ask for comments to clarify response)***?**

_____

_____

_____

_____

Ask Local Business Patrons Only

B8. **As someone who visits this area for retail or other business purposes, do you anticipate your satisfaction visiting businesses in this area to:**

- ☐ Increase
- ☐ Decrease
- ☐ Stay the Same / No Change
- ☐ Don't Know / Not Sure

B9. **Can you explain why** *(in regard to QB8 - ask for comments to clarify response)***?**

_____

_____

_____

_____

Group C – Local Study Area Residents Only

C8. **As a local area resident, do you foresee your satisfaction with living in your area to:**

- ☐ Increase
- ☐ Decrease
- ☐ Stay the Same / No Change
- ☐ Don't Know / Not Sure

C9. **Can you explain why** *(in regard to QC8 - ask for comments to clarify response)***?**

_____

_____

_____

_____

C10. **Do you anticipate your use and enjoyment of your residence to:**

- ☐ Increase
- ☐ Decrease
- ☐ Stay the Same / No Change
- ☐ Don't Know / Not Sure

C11. **Can you explain why** *(in regard to QC10 - ask for comments to clarify response)***?**

_____

_____

_____

_____

C12. Do you anticipate you will be more or less likely to move from your current residence?

- ☐ Increase
- ☐ Decrease
- ☐ Stay the Same / No Change
- ☐ Don't Know / Not Sure

C13. Can you explain why *(in regard to QC12 - ask for comments to clarify response)***?**

Closing Questions (All Respondents)

11. As a result of the proposed project, do you anticipate a change in your likelihood to travel in and out of Billy Bishop Airport?

- ☐ No change in use of Billy Bishop Airport
- ☐ More likely to travel through Billy Bishop Airport
- ☐ Less likely to travel through Billy Bishop Airport
- ☐ Don't Know / Not Sure

12. Can you explain why *(in regard to Q11 - ask for comments to clarify response)***?**

13. Earlier on, you mentioned some ways in which you'd like to see the Toronto Waterfront Area be used in the next 50 years. Do you think the proposed project will affect those uses?

- ☐ *Yes*
- ☐ *No*
- ☐ Not Sure / Don't Know

14. *(If YES to Q1)* **How would the proposed project affect those uses?**

_____

_____

_____

_____

15. **Do you have any overall comments about the proposed or this survey that you would like us to record?**

_____

_____

_____

_____

16. **For the purposes of understanding trends in responses, we'd like to ask if you, or anyone in your household works for the air transportation industry.**

- ☐ *Yes*
- ☐ *No*
- ☐ Refuse Answer

Thank you for your time and participating in this survey. *(Hand respondent business card with contact information)*

Sondage a l'Aéroport Billy Bishop

Introduction

Bonjour, je travaille pour AECOM, une firme de génie-conseil de portée mondiale, et nous réalisons une enquête pour le compte de PortsToronto afin de mieux comprendre comment les gens utilisent le secteur riverain du lac Ontario à Toronto. Aux fins de cette enquête, le secteur d'étude qui nous intéresse est ceci *(montrez la carte)*.

Auriez-vous 15 minutes pour répondre à notre sondage? Toutes les réponses demeurent confidentielles et vous ne serez pas identifiés dans les résultats de la recherche.

Heure et lieu de l'entrevue:_____

Questions de Contexte

1. **Quel est le but principal de votre déplacement ici aujourd'hui:** *(choisir la meilleure réponse)*

- ☐ Groupe A: activité récréative (quelle activité?_____)
- ☐ Groupe B: Raisons d'affaires (fournir des détails_____)
- ☐ Départ de, ou rentrer chez vous
- ☐ Aéroport (_____revenir ou _____départ)
- ☐ Autre (fournir des détails_____)

2. **Combien de fois visitez-vous cet endroit, ou le secteur riverain du lac** *(choisir la meilleure réponse)***?**

- ☐ Chaque jour
- ☐ Chaque mois
- ☐ Moins qu'une fois par an
- ☐ 1 à 3 fois par semaine
- ☐ 1 fois par 6 mois
- ☐ C'est ma première fois aujourd'hui
- ☐ 2 à 3 fois par mois
- ☐ Une fois par an

si plus qu'une fois …..

- ☐ Plus souvent en été
- ☐ Plus souvent en hiver
- ☐ Plus souvent en printemps
- ☐ Plus souvent en automne

3. Où demeurez-vous (résidence principale)?

- ☐ À Toronto
- ☐ À l'intérieur du secteur d'étude
- ☐ Dans la région de Toronto <<greater Toronto area>> (où?_____)
- ☐ Hors la région de Toronto (où?_____)
- ☐ À l'extérieur de l'Ontario (où?_____)
- ☐ À l'extérieur du Canada (où?_____)

4. Combien de personnes vous accompagnent aujourd'hui?

☐ *Adultes* ☐ *Adolescents* ☐ *Enfants*

Groupe A – activités récréatives

Utlisation aux fins récréatives du secteur riverain de Toronto

A1. Avez-vous déjà utilisé les aires ou les installations sur le secteur riverain de Toronto à des fins récréatives?

- ☐ *Oui*
- ☐ *Non* (passez à la question B1)

A2. En plus de votre voyage ici aujourd'hui, quelles sont les autres activités récréatives auxquelles vous participeriez au secteur riverain? *(cochez tous les éléments applicables)*

- ☐ La promenade de chien
- ☐ /le jogging/ la course/ l'exercice
- ☐ la navigation de plaisance
- ☐ la natation
- ☐ Le vélo
- ☐ Pour détendre
- ☐ L'observation des oiseaux
- ☐ Le pique-nique
- ☐ Autre _____

A3. **Quels facteurs influencent votre utilisation ou votre jouissance des installations de loisirs autour d'ici - soit de façon positive ou négative?**

_____

_____

_____

_____

_____

_____

Groupe B – personnes qui travaillent à ou magasinent dans les entreprises locales

B1. **Avez-vous déjà venu au secteur riverain pour les raisons d'affaires ou de travail, ou pour faire du magasinage, pour sortir au restaurant, ou pour participer aux événements?**

☐ *Oui*

☐ *Non* (passez à la question C1)

B2. **Travaillez-vous dans le secteur riverain?**

☐ Oui

☐ Non (passez à la question B4)

B3. **Avez-vous des préoccupations ou des inquiétudes par rapport à l'emplacement de votre entreprise ou lieu de travail?**

☐ Circulation

☐ Bruit

☐ Crime

☐ Accessibilité

☐ Aucun

☐ Autre _____

B4. **Quels types d'entreprises locales avez-vous déjà fréquentées au secteur riverain?**

☐ Restaurants

☐ Vente au détail / supermarché

☐ Hôtel

☐ Aucun (passez à la question C1)

☐ Loisirs

☐ Concerts, spectacles ou événements

☐ Autre _____

B5. **Quels facteurs influencent votre décision de fréquenter les entreprises au secteur riverain – soit de façon positive ou négative?**

Groupe C – Résident local

C1. **Pourquoi habitez-vous au secteur riverain? (cochez toutes les raisons)**

- ☐ Emplacement pratique / proximité au lieu de travail
- ☐ Abordable
- ☐ Proximité aux loisirs
- ☐ Proximité des services (y compris les achats, médicaux, écoles, etc.)
- ☐ Emplacement naturel / pittoresque / proximité à l'eau
- ☐ Autre _____
- ☐ J'ai hérité cette maison
- ☐ Je ne sais pas
- ☐ Paysage urbain / Localisation urbaine

C3. **Êtes-vous satisfait de votre quartier?**

- ☐ Très satisfait
- ☐ Très insatisfait
- ☐ Un peu satisfait
- ☐ Je ne sais pas/Je ne suis pas sûr
- ☐ Un peu insatisfait

C4. **Dans les 5 dernières années, avez-vous déjà pensé à quitter ce quartier?**

- ☐ *Oui*
- ☐ *Non* (passez à la question C6)

C5. **Pourquoi?**

C6. Comment utilisez-vous les espaces extérieurs de votre lieu de résidence, y compris votre balcon ou la terrasse sur le toit?

- ☐ Barbecue
- ☐ Jardinage
- ☐ Détendre
- ☐ Aucun
- ☐ Manger ou pique-nique
- ☐ Exercice
- ☐ Autre _____

C7. Quels facteurs influencent l'utilisation et la jouissance de votre résidence, et en particulier, les espaces extérieurs - soit de façon positive ou négative?

_____

_____

_____

_____

_____

_____

Groupe D – Voyageur de l'Aéroport Billy Bishop

D1. Avez-vous déjà pris un vol à partir de l'Aéroport Billy Bishop?

- ☐ *Oui*
- ☐ *No*

D2. Combien de fois, dans la dernière année (y compris aujourd'hui) avez-vous utilisé l'Aéroport Billy Bishop?

- ☐ Une fois
- ☐ 2 à 3 fois
- ☐ Plus que 4 fois
- ☐ Aucune fois (pendant la dernière année)

D3. Quelles sont vos raisons d'avoir choisi de voyager à partir de l'aéroport Billy Bishop plutôt qu'un autre aéroport dans la région? *(cochez tous les éléments applicables)*

- ☐ Emplacement pratique
- ☐ Horaire de vol plus pratique
- ☐ Vols à prix plus abordable
- ☐ Je ne sais pas
- ☐ Excellent service de clientèle
- ☐ Trajets plus courts / passage plus rapide par rapport à Pearson
- ☐ Autre _____

D4. **Si vous ne pouviez pas réserver un vol à une heure et un jour préféré de Billy Bishop, que feriez-vous?** *(marquer tous les éléments applicables)*

- ☐ Réserver un autre vol à un autre moment par Billy Bishop
- ☐ Voyager par l'aéroport international Pearson
- ☐ Conduire en voiture ou prendre le train ou l'autobus
- ☐ Ne pas voyager
- ☐ Autre _____

Questions générales

5. Combien de fois avez-vous utilisé l'aéroport international de Pearson durant la dernière année?

- ☐ Une fois
- ☐ 2 à 3 fois
- ☐ Plus que 4 fois
- ☐ Aucune fois (pendant la dernière année)

6. Maintenant que l'Union Pearson Express est en service, reliant la gare Union et l'aéroport international Pearson, seriez-vous:

- ☐ Plus susceptibles de voyager à partir de l' Aéroport Billy Bishop
- ☐ Pas plus ou moins susceptible de changer votre comportement de voyage
- ☐ Plus susceptibles de voyager par l'aéroport international Pearson

Quelles sont les trois choses que vous appréciez le plus du secteur riverain de Toronto?

a) _____

b) _____

c) _____

7. De manière générale, comment jugez-vous l'importance du secteur riverain pour la Ville de Toronto?

- ☐ Très important
- ☐ Un peu important
- ☐ Je ne sais pas
- ☐ Peu important
- ☐ Pas important du tout

8. Qu'est-ce qui rend le secteur riverain important pour la ville de Toronto?

- ☐ La récréation
- ☐ La nature
- ☐ Destination touristique
- ☐ Les activités commerciales
- ☐ Les événements culturels
- ☐ Je ne sais pas
- ☐ Le développement résidentiel
- ☐ Un Centre de transport (c.-à-d., aéroport)
- ☐ L'industrie
- ☐ Lieu de rassemblement communautaire
- ☐ Pas important
- ☐ Autre _____

9. Au cours des 25 à 50 prochaines années, comment le secteur riverain de Toronto devrait-il être utilisé? Autrement, quelle est votre vision pour le secteur riverain de Toronto? *(marquer tous les éléments applicables)*

- ☐ Développement résidentiel
- ☐ Centre d'affaires
- ☐ Nature/ préservation de la nature
- ☐ Récréation
- ☐ Tourisme
- ☐ Un centre de transport (c.-à-d., aéroport)
- ☐ Un centre de transport en commun
- ☐ Industrie
- ☐ Je ne sais pas
- ☐ Autre _____

Description du projet

En 2013, Porter Airlines a soumis un projet à la Ville de Toronto demandant l'introduction des avions à réaction à l'aéroport Billy Bishop.
Le projet pourrait engendrer une augmentation jusqu'à 30% du volume de passagers et une augmentation de 20% de vols réguliers quotidiens.
Le projet propose également le prolongement de la piste d'atterrissage de 200 mètres de part et d'autre de la piste actuelle afin de desservir de petits avions à réaction.

Groupe A – Activités récréatives

A4. En tant qu'utilisateur récréatif du secteur, prévoyez-vous que votre utilisation et votre jouissance du secteur riverain**:**

- ☐ Seront améliorées
- ☐ Seront empirées
- ☐ Demeuront les mêmes
- ☐ Je ne sais pas

A5. Pourquoi?

_____

_____

_____

_____

Group B – Gens d'affaires

B6. Comme entreprise locale ou quelqu'un qui travaille dans le secteur, prévoyez-vous que vos activités commerciales**:**

- ☐ Seront améliorées
- ☐ Seront empirées
- ☐ demeuront les mêmes
- ☐ Je ne sais pas

B7. Pourquoi?

_____

_____

_____

_____

Seulement les clients d'entreprises locales:

B8. Comme quelqu'un qui visite ce secteur aux fins de magasinage ou d'autres fins commerciales, prévoyez-vous que votre satisfaction avec vos visites aux entreprises dans le secteur riverain:

- ☐ sera améliorée
- ☐ sera empirée
- ☐ Demeura la même
- ☐ Je ne sais pas

B9. Pourquoi?

_____

_____

_____

_____

Groupe C – Résidents locaux

C8. Comme un résident local, prévoyez-vous que votre satisfaction avec la vie dans votre quartier:

- ☐ Sera améliorée
- ☐ Sera empirée
- ☐ Demeura la même
- ☐ Je ne sais pas

C9. Pourquoi?

_____

_____

_____

_____

C10. Prévoyez-vous que l'utilisation et la jouissance de votre résidence:

- ☐ Seront améliorées
- ☐ Seront empirées
- ☐ Demeuront les mêmes
- ☐ Je ne sais pas

C11. Pourquoi?

_____

_____

_____

C12. Prévoyez-vous que vous serez plus ou moins susceptibles de déménager de votre résidence actuelle ?

- ☐ Plus susceptibles
- ☐ Moins susceptibles
- ☐ Demeure le même
- ☐ Je ne sais pas

C13. Pourquoi?

Questions finales

10. Le projet proposé aura-t-il une incidence sur la fréquence de vos dépalcements à partir de l'aéroport Billy Bishop?

- ☐ Pas de changement dans l'utilisation de l'aéroport Billy Bishop
- ☐ Plus susceptibles de voyager à partir de l'aéroport Billy Bishop
- ☐ Moins susceptibles de voyager à partir de l'aéroport Billy Bishop
- ☐ Je ne sais pas

11. Pourquoi?

12. Plus tôt, vous avez mentionné quelques façons dont vous aimeriez que le secteur riverain de Toronto soit utilisé dans les 50 prochaines années. Le projet proposé aura-t-il un impact sur ces usages?

- ☐ *Oui*
- ☐ *Non*
- ☐ Je ne sais pas

13. Si oui, comment le projet proposé affectera-t-il ces utilisations?

_____

_____

_____

_____

14. Avez-vous d'autres commentaires ou des questions sur le projet ou cette enquête?

_____

_____

_____

_____

15. Est-ce que vous, ou quelqu'un dans votre ménage travaille pour l'industrie du transport aérien.

☐ *Oui*

☐ *Non*

☐ pas de réponse

Merci d'avoir participé à cette enquête. Bonne journée.



Central Waterfront Surveys

Legend

- Central Waterfront Survey Area
- Billy Bishop Toronto City Airport

0 0.5 1 2

Kilometres

1:50,000

AECOM

Date Saved: 27/05/2015 11:25:19 AM

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RUNWAY DESIGN

Master Planning Exercise | Billy Bishop Toronto City Airport

WSP

PORTS TORONTO

Appendix C

Interview Guides

BBTCA Key Stakeholder Interview Guide

Emergency Services

INTERVIEW SCRIPT

Hi, my name is _____ and I work for AECOM and we are currently holding discussions with people involved in clubs or groups in the Toronto Islands/waterfront areas on behalf of Ports Toronto. We would like to gain an understanding of the importance of the waterfront and its surrounding environment to your organization. This interview should take around 20-30 minutes to complete, your answers are completely confidential and you will not be identified in any reports except for in aggregate form.

Interviewer, please record:

Name of respondent:

Group/Organization:

General Questions

1. Can you tell me a bit about your unit, the services provided to the waterfront area and your role in it?

Questions Related to Waterfront Location

2. What are the things about the local environment that you feel are positive attributes and help your unit to function or operate?
3. What are the things about the local environment that you feel are negative attributes or that may have caused problems for your unit either now or in the past?

Questions Related to BBTCA

4. Do you have any concerns related to the Billy Bishop Toronto City Airport and its current operation?
5. Does the Billy Bishop Toronto City Airport and its operations affect your unit? If so, how?
6. Have you had to respond to emergencies or other issues at the Airport? If so how and with what frequency?

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

7. What effect do you think the expansion will have on your unit?
8. What things would help your unit to continue to operate as they do throughout potential construction and operations at the airport?

Close of Interview

9. Do you have any other questions or views you would like us to know about that can be reflected in assessment?
10. May I list your unit in the final report on the list of stakeholders that participated in these interviews? Your specific comments will not be attributed to you.

Thank participant and offer contact information should they have any follow up questions or concerns.

END INTERVIEW

BBTCA Key Stakeholder Interview Guide

Individual Resident

INTERVIEW SCRIPT

Hi, my name is _____ and I work for AECOM and we are currently holding discussions with people involved in clubs or groups in the Toronto Islands/waterfront areas on behalf of Ports Toronto. We would like to gain an understanding of the importance of the waterfront and its surrounding environment to you as a local resident. This interview should take around 20-30 minutes to complete, your answers are completely confidential and you will not be identified in any reports except for in aggregate form.

Interviewer, please record:

Name of respondent:

Group/Organization:

General Questions

1. How important is the location of your residence to you?
2. Are you currently satisfied with the location of your residence in the Waterfront Area?

Questions Related to Waterfront Location

3. What are the things about the local environment that you feel are positive attributes to you as a local resident?
4. What are the things about the local environment that you feel are negative attributes or that may have caused problems for you as a local resident?

Questions Related to BBTCA

5. Do you have any concerns related to the Billy Bishop Toronto City Airport and its current operations?
6. Does the Billy Bishop Toronto City Airport and its operations affect your place of residence and your use and enjoyment of your property?
7. Have you ever used or do you use the Airport for travel in and out of Toronto?
8. Are there any positive effects of the Airport for you as a local resident?

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

9. What effect do you think the expansion will have on you as a local resident and your use and enjoyment of your property?
10. What things would help your organization to continue to operate as they do throughout potential construction and operations at the airport?

Close of Interview

11. Do you have any other questions or views you would like us to know about that can be reflected in assessment?

Thank participant and offer contact information should they have any follow up questions or concerns.

END INTERVIEW

BBTCA Key Stakeholder Interview Guide

BIA

INTERVIEW SCRIPT

Hi, my name is _____ and I work for AECOM and we are currently holding discussions with people involved in the Toronto Islands/waterfront areas on behalf of Ports Toronto in regards to the environmental assessment for the expansion of the Billy Bishop Airport. We would like to gain an understanding of the importance of the waterfront and its surrounding environment to your organization. This interview should take around 20-30 minutes to complete, your answers are completely confidential and you will not be identified in any reports except for in aggregate form.

Interviewer, please record:

Name of respondent:

Group/Organization:

General Questions

1. Can you tell me a bit about your association and your role in it?
2. To what extent is location in the waterfront area important to the function of the businesses in your organization?
3. Are you businesses generally satisfied with their location in the Central Waterfront Area?
4. Can you estimate the number of businesses in the Central Waterfront Area, or share the number of businesses that are part of your organization?
5. Overall, what types of businesses does your organization represent?
6. Do you know how many FTE employees are affiliated with those businesses?
7. Would you say that businesses in this area are long term establishments or is there a fair amount of new business growth or turn over?

Questions Related to Waterfront Location

8. What are the things about the local environment that you feel are positive attributes and help these business to function and operate?
9. What are the things about the local environment that you feel are negative attributes or that may have caused problems for businesses either now or in the past?
10. Is the “waterfront experience” important to clientele or patrons? If so, in what ways?

Questions Related to BBTCA

11. Do you have any concerns related to the Billy Bishop Toronto City Airport and its current operation?

12. Does the Billy Bishop Toronto City Airport and its operations affect business operations? If so, how and it what cases?
13. Does the Billy Bishop Toronto City Airport have any effect in terms of increase or decrease to the volume of your business activity in the area?

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

14. What effect do you think the expansion will have on local businesses?
15. What things would help businesses to continue to operate as usual do throughout potential construction and operations at the airport?

Close of Interview

16. Do you have any other questions or views you would like us to know about that can be reflected in assessment?
17. May I list your association in the final report on the list of stakeholders that participated in these interviews? Your specific comments will not be attributed to you.

Thank participant and offer contact information should they have any follow up questions or concerns.

END INTERVIEW

BBTCA Key Stakeholder Interview Guide

Event/Cultural Venue

INTERVIEW SCRIPT

Hi, my name is _____ and I work for AECOM and we are currently holding discussions with people involved in clubs or groups in the Toronto Islands/waterfront areas on behalf of Ports Toronto. We would like to gain an understanding of the importance of the waterfront and its surrounding environment to your organization. This interview should take around 20-30 minutes to complete, your answers are completely confidential and you will not be identified in any reports except for in aggregate form.

Interviewer, please record:

Name of respondent:

Group/Organization:

General Questions

1. Can you tell me a bit about your organization and your role in it?
2. To what extent is your physical location important to the function of your venue?
3. Are you currently satisfied with the location of your venue in the waterfront area?

Questions Related to Waterfront Location

4. What are the things about the local environment that you feel are positive attributes and help your venue to function or operate?
5. What are the things about the local environment that you feel are negative attributes or that may have caused problems for your venue either now or in the past?
6. Is the "waterfront experience" important to your patrons or visitors? If so, how?

Questions Related to BBTCA

7. Do you have any concerns related to the Billy Bishop Toronto City Airport and its current operation?
8. Does the Billy Bishop Toronto City Airport and its operations affect your venue? If so, how?

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

9. What effect do you think the expansion will have on your venue and visitation?
10. What things would help your organization to continue to operate as they do throughout potential construction and operations at the airport?

Close of Interview

11. Do you have any other questions or views you would like us to know about that can be reflected in assessment?
12. May I list your organization in the final report on the list of stakeholders that participated in these interviews? Your specific comments will not be attributed to you.

Thank participant and offer contact information should they have any follow up questions or concerns.

END INTERVIEW

BBTCA Key Stakeholder Interview Guide

Resident Association

INTERVIEW SCRIPT

Hi, my name is _____ and I work for AECOM and we are currently holding discussions with people involved in clubs or groups in the Toronto Islands/waterfront areas on behalf of Ports Toronto. We would like to gain an understanding of the importance of the waterfront and its surrounding environment to the residents affiliated with your association. This interview should take around 20-30 minutes to complete, your answers are completely confidential and you will not be identified in any reports except for in aggregate form.

Interviewer, please record:

Name of respondent:

Group/Organization:

General Questions

1. Can you tell me a bit about your association and the residents it represents?
2. How important is the waterfront location to the residents in your association?
3. Are residents generally satisfied with the waterfront location?

Questions Related to Waterfront Location

4. What are the things about the local environment that you feel are positive attributes for the residents in this area?
5. What are the things about the local environment that you feel are negative attributes or that may have caused problems for the residents in this area?
6. Is the "waterfront experience" important to residents? If so, in what ways?

Questions Related to BBTCA

7. Do you have any concerns related to the Billy Bishop Toronto City Airport and its current operation?
8. Does the Billy Bishop Toronto City Airport and its operations affect the quality of the living experience for residents in this area or how they use and enjoy their property? If so, how?
9. Do the residents use the Billy Bishop Airport, or does the Airport have any positive effects on the daily living for these residents or your building operations?

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

10. What effect do you think the expansion will have on the residents in this area, and their use and enjoyment of their property?
11. What things would help residents to continue to live and enjoy their residence as they do throughout potential construction and operations at the airport?

Close of Interview

12. Do you have any other questions or views you would like us to know about that can be reflected in assessment?
13. May I list your association in the final report on the list of stakeholders that participated in these interviews? Your specific comments will not be attributed to you.

Thank participant and offer contact information should they have any follow up questions or concerns.

END INTERVIEW

BBTCA Key Stakeholder Interview Guide

Environment/Community Group

INTERVIEW SCRIPT

Hi, my name is _____ and I work for AECOM and we are currently holding discussions with people involved in clubs or groups in the Toronto Islands/waterfront areas on behalf of Ports Toronto. We would like to gain an understanding of the importance of the waterfront and its surrounding environment to your organization. This interview should take around 20-30 minutes to complete, your answers are completely confidential and you will not be identified in any reports except for in aggregate form.

Interviewer, please record:

Name of respondent:

Group/Organization:

General Questions

1. Can you tell me a bit about your organization and your role in it?
2. To what extent is the Central Waterfront Area important to the function of your group/organisation?
3. Are you currently satisfied with the Central Waterfront Area and its surroundings?

Questions Related to Waterfront Location

4. What are the things about the local environment that you feel are positive attributes for your organization?
5. What are the things about the local environment that you feel are negative attributes for your organization?
6. Is the "Waterfront experience" important to your organization? If so, how?

Questions Related to BBTCA

7. Do you have any concerns related to the Billy Bishop Toronto City Airport and its current operation?
8. Does the Billy Bishop Toronto City Airport and its operations affect your group or organization? If so, how?

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

9. What effect do you think the expansion will have on your organization?
10. What things would help your organization to continue to operate as they do throughout potential construction and operations at the airport?

Close of Interview

11. Do you have any other questions or views you would like us to know about that can be reflected in assessment?
12. May I list your organization in the final report on the list of stakeholders that participated in these interviews? Your specific comments will not be attributed to you.

Thank participant and offer contact information should they have any follow up questions or concerns.

END INTERVIEW

BBTCA Key Stakeholder Interview Guide

Education

INTERVIEW SCRIPT

Hi, my name is _____ and I work for AECOM and we are currently holding discussions with groups in the Toronto Islands/waterfront areas on behalf of Ports Toronto in regards to the Environmental Assessment for the expansion of the Billiy Bishop Airport. We would like to gain an understanding of the importance of the waterfront and its surrounding environment in the activities and operations at the City School, the Waterfront School and the Island Public School. This interview should take around 20-30 minutes to complete, your answers are completely confidential and you will not be identified in any reports except for in aggregate form.

Interviewer, please record:

Name of respondent:

Group/Organization:

General Questions

1. Can you tell me a bit about the City School and the Waterfront School, the Island public school, as well as your role at the TDSB?

Questions Related to Waterfront Location

2. What are the things about the local environment that you feel are positive attributes that lend to the learning and educational opportunities at the City School/Waterfront School as well as the Island Public School?
3. What are the things about the local environment that you feel are negative attributes or that may have caused problems for the learning and educational opportunities at the City School/Waterfront School as well as the Island Public School?

Questions Related to BBTCA

4. Does the Billy Bishop Toronto City Airport and its operations affect the any of these schools?
5. Do you have any concerns related to the Billy Bishop Toronto City Airport and its current operation?

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

6. What effect do you think the expansion might have on the operations and functions at any of the school locations?
7. What things would help the TDSB and the schools to continue to operate as they do throughout potential construction and operations at the airport?

Close of Interview

8. Do you have any other questions or views you would like us to know about that can be reflected in assessment?
9. May I list the Toronto District School Board in the final report on the list of stakeholders that participated in these interviews? Your specific comments will not be attributed to you.

Thank participant and offer contact information should they have any follow up questions or concerns.

END INTERVIEW

BBTCA Key Stakeholder Interview Guide

Boating

INTERVIEW SCRIPT

Hi, my name is _____ and I work for AECOM and we are currently holding discussions with people involved in clubs or groups in the Toronto Islands/waterfront areas on behalf of Ports Toronto in regards to the Environmental Assessment for the expansion of the Billy Bishop Airport. We would like to gain an understanding of the importance of the waterfront and its surrounding environment to your organization. This interview should take around 20-30 minutes to complete, your answers are completely confidential and you will not be identified in any reports except for in aggregate form.

Interviewer, please record:

Name of respondent:

Group/Organization:

General Questions

1. Can you tell me a bit about your organization and your role in it?
2. To what extent is the Toronto Harbour important to the function of your group/organisation?
3. Are you currently satisfied with the Toronto Harbour as a as it relates to your organization?

Questions Related to Waterfront Location

4. What are the things about the Toronto Harbour and its local environment that you feel are positive attributes and help your group to operate?
5. What are the things about the Toronto Harbour and its local environment that you feel are negative attributes or that may have caused problems for your group either now or in the past?

Questions Related to BBTCA

6. Does the Billy Bishop Toronto City Airport and its operations affect your group or organization? If so, how?
7. Do you have any concerns related to the Billy Bishop Toronto City Airport and its current operation?

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

8. What effect do you think the expansion will have on your organization or boating operations?
9. What things would help your organization to continue to operate as they do throughout potential construction and operations at the airport?

Close of Interview

10. Do you have any other questions or views you would like us to know about that can be reflected in assessment?
11. May I list your organization in the final report on the list of stakeholders that participated in these interviews? Your specific comments will not be attributed to you.

Thank participant and offer contact information should they have any follow up questions or concerns.

END INTERVIEW

BBTCA Key Stakeholder Interview Guide

Hotel

INTERVIEW SCRIPT

Hi, my name is _____ and I work for AECOM and we are currently holding discussions with people involved in the Toronto Islands/waterfront areas on behalf of Ports Toronto in regards to the environmental assessment for the expansion of the Billy Bishop Airport. We would like to gain an understanding of the importance of the waterfront and its surrounding environment to your organization. This interview should take around 30-45 minutes to complete, your answers are completely confidential and you will not be identified in any reports except for in aggregate form.

Interviewer, please record:

Name of respondent:

Group/Organization:

General Questions

1. Can you tell me a bit about your hotel, its operations and your role in it?
2. To what extent is your location in the waterfront area important to the function of your hotel operations?
3. Are you currently satisfied with the location of your hotel in the Central Waterfront Area?

Questions Related to Waterfront Location

4. What are the things about the local environment that you feel are positive attributes and help your hotel to function and operate?
5. What are the things about the local environment that you feel are negative attributes or that may have caused problems for your hotel either now or in the past?
6. Is the "waterfront experience" important to your clientele? If so, in what ways?

Questions Related to BBTCA

7. Do you have any concerns related to the Billy Bishop Toronto City Airport and its current operation?
8. Does the Billy Bishop Toronto City Airport and its operations affect your hotel operations? If so, how?
9. Does the Billy Bishop Toronto City Airport have any effect in terms of increase or decrease to the volume of your business activity? If so, how?

10. Have you noticed if your patrons come to the area via the Billy Bishop airport or Toronto Pearson? Can you comment on the frequency of travel through either of these airports, and have your patrons commented on their experiences at either of these airports?

In 2013, Porter Airlines submitted a proposal to the City of Toronto requesting to introduce jet aircraft at the Billy Bishop Airport.

The proposal might mean an increase of up to 30% in passenger volume and a 20% increase in daily scheduled flights.

The proposal also requests a 200 metre land mass extension at both ends of the runway to allow for the use of some small jets.

11. What effect do you think the expansion will have on your business?
12. What things would help your business to continue to operate as usual do throughout potential construction and operations at the airport?

Close of Interview

13. Do you have any other questions or views you would like us to know about that can be reflected in assessment?
14. May I list your business in the final report on the list of stakeholders that participated in these interviews? Your specific comments will not be attributed to you.

Thank participant and offer contact information should they have any follow up questions or concerns.

END INTERVIEW

Interview Questions for Real Estate Brokers

Name:

Address:

Date of Interview:

Name of Interviewer:

1. What are the positive attributes that attract people to reside in this area?

2. What are negative attributes that dissuade people from choosing to live in the area?

3. What are the reasons why people choose to move away from the area?

4. What is the typical demographic profile of buyers and sellers in this area?

5. How have residential property values in the waterfront area changed in the past decade?
    a. What are the key drivers for this change?
    b. Can you direct me to data that demonstrates this change in value?

6. How have current operations at BBTCA affected demand for residential properties on or near the waterfront until now?
    a. Has this change translated into property value changes in any way?
    b. If so, please explain.

7. Do you anticipate any changes in demand for residential properties if the proposal for jets and runway extension go through as planned?
    a. If so please explain.

8. Do you have any other questions or views you would like us to know about that can be reflected in the assessment?

9. May I list your Real Estate Brokerage/Agency in the list of stakeholders that participated in these interviews? Your specific comments will not be attributed to you.

AECOM

Appendix C-10

Natural Environment Effects Assessment

AECOM
105 Commerce Valley Drive West, Floor 7 905 886 7022 tel
Markham, ON, Canada L3T 7W3 905 886 9494 fax
www.aecom.com

Memorandum

To	Marc Rose, AECOM	Page	1
CC	Julia Cushing, AECOM		
Subject	BBTCA EA: Natural Environment Cumulative Net Effects Assessment		
From	Jessica MacKay Ward, James Kamstra, Olga Hropach, Johanna Perz, Joe de Laronde, Ashley Minion and Gary Epp		
Date	November 13, 2015	Project Number	60328546

1 Description of the Potentially Affected Environment – Current Conditions

1.1 Natural Environment

1.1.1 Aquatic Environment Study Area

The original Study Area for the Aquatic Environment included the following boundaries:

- Inner Harbour to the north;
- Tommy Thompson Park (TTP) to the east;
- Toronto Island to the south; and
- Hanlan's Point Beach to the west.

Additional areas of concern identified through public consultation include:

- Footprints of the proposed extension of the land mass and adjacent aquatic habitat;
- Outer harbour;
- Western Channel; and;
- Lake Ontario in the vicinity of Ontario Place.

In response to comments received from the public, work related to the aquatic environment will focus on areas in the vicinity of the land mass extension as this is the area where potential effects from construction are anticipated.

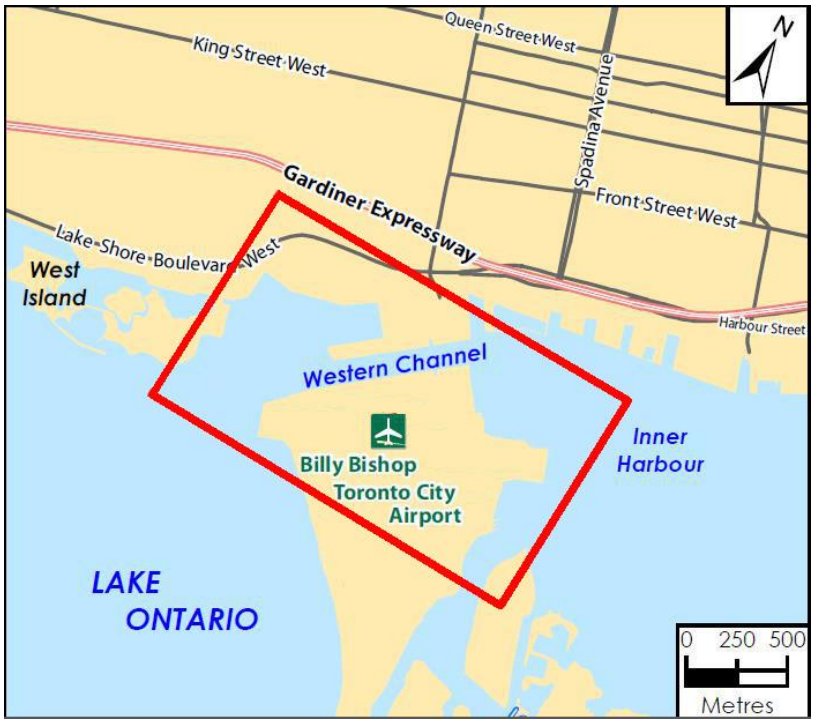


Figure 1-1: Aquatic Environment Study Area

1.1.2 Terrestrial Environment Study Area

1.1.2.1 Background Information Review

The original terrestrial environment Study Area for the background information review included the following boundaries:

- Inner Harbour to the north;
- Tommy Thompson Park (TTP) to the east;
- Toronto Island to the south; and
- Hanlan's Point Beach to the west.

Additional areas of concern which were identified through public consultation include:

- Toronto Islands;
- Jet flight paths and missed approach decision points; and
- The Bird Hazard Zone (BHZ) as identified in the Billy Bishop Toronto City Airport (BBTCA) Wildlife Management Plan.

After considering comments received to date, the boundaries of the Study Area for the Terrestrial Environment study have been expanded based on the BBTCA BHZ, aircraft flight paths, glide slopes and missed approach points. The Study Area for the Terrestrial Environment study will include the BBTCA BHZ, with the expectation that this area will encompass the projected jet flight paths at altitudes where bird strikes are most likely to occur. Areas of concern for the terrestrial environment identified above have been included in the revised Study Area.

The revised terrestrial environment Study Area for the background information review includes the original Study Area plus:

- The primary BHZ, defined by Transport Canada includes the following:
  - In the vicinity of the BBTCA, the northern and southern boundaries of the primary BHZ include the areas within 2 km of and adjacent to the runway (including the extension of the land mass);
  - The eastern and western boundaries of the primary BHZ extend 9 km from each end of the main runway (including the extension of the land mass). At these limits, the northern and southern boundaries of the primary BHZ extend 4 km from the centreline of the runway in each direction (8 km in total); and
  - This results in a primary BHZ that resembles a bowtie.
- The secondary BHZ, defined by Transport Canada, includes the following:
  - A 4 km buffer applied to the primary BHZ.

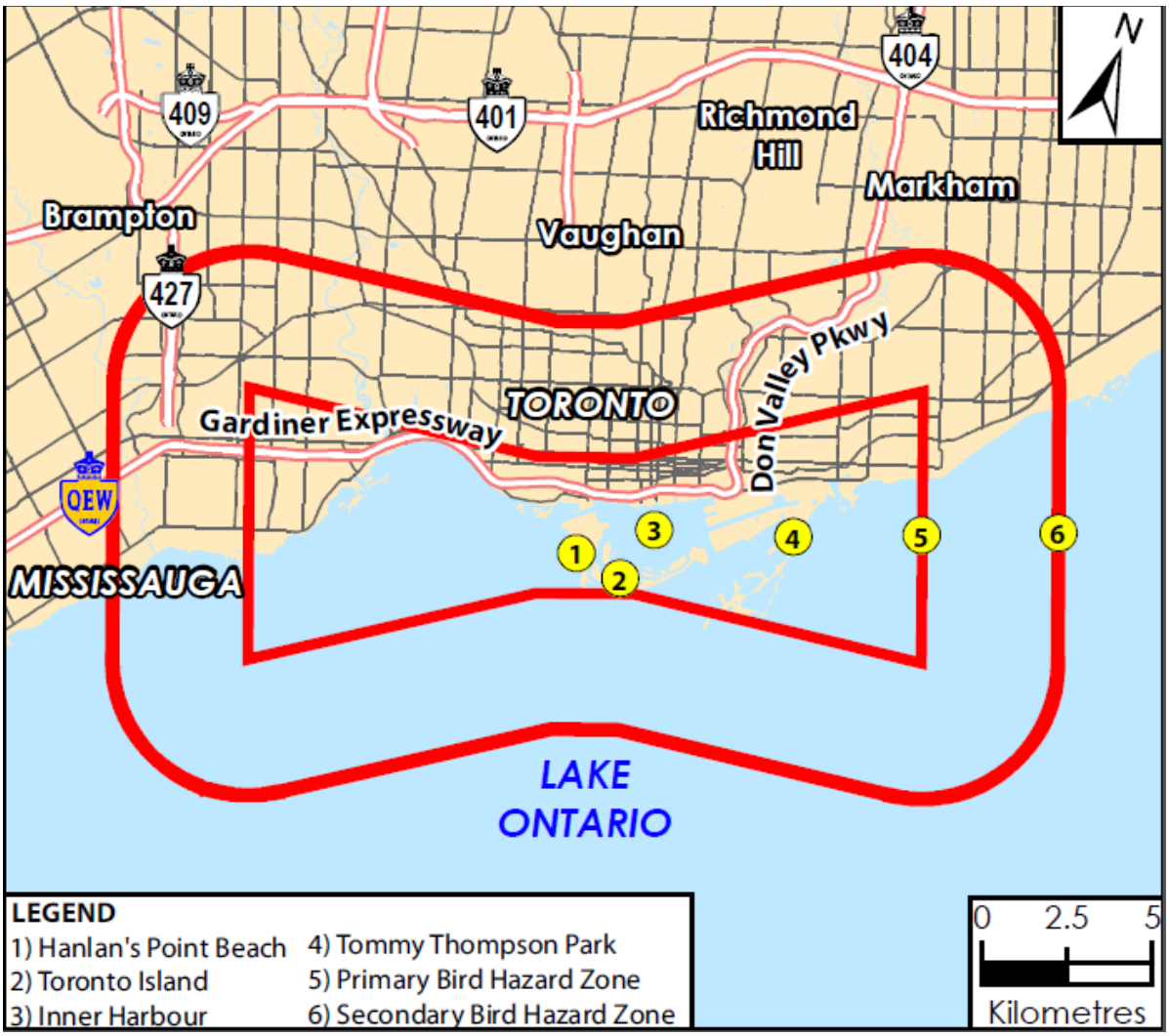


Figure 1-2: Terrestrial Study Area for the Background Information Review

1.1.2.2 Field Investigations

The Study Area for field investigations has been revised to be localized to the runway extensions. This includes all of the vegetated areas within 120 m of the proposed runway extensions. The Study Area for the seasonal avian field surveys includes approximately 500 m from both runway extensions, wherein seasonal and spatial distribution of bird species was assessed.

1.2 Methods

1.2.1 Aquatic Environment

1.2.1.1 Background Information Review

Background information obtained from various sources (listed below) was used to develop a comprehensive understanding of the fish community potentially affected by the proposed runway extensions. Additional information on the existing fish habitat conditions in the vicinity of the proposed runway extensions was collected through two field visits to determine substrate composition and aquatic vegetation presence.

Background Information Sources

Existing background information on aquatic habitat and species was collected from the following sources and analysed to establish existing conditions and to identify data gaps:

- Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments (CH2M HILL Canada Limited, 2013);
- Toronto Port Authority Proposed Pedestrian/Services Tunnel and Perimeter Road Project (Dillon, 2011);
- Conservation Ontario 2014 Aquatic Species at Risk (SAR) distribution mapping; and
- Available fisheries data and monitoring reports from:
  - Toronto and Region Conservation Authority (TRCA);
  - Ministry of Natural Resources and Forestry (MNRF);
  - Department of Fisheries and Oceans (DFO); and,
  - Aquatic Habitat Toronto (AHT)

Agency Correspondence

Table 1-1 below summarizes communications with agencies regarding aquatic systems within the Study Area.

Table 1-1: Summary of Agency Consultation

Agency	Date and Data and/or Information Requested	Date and Data and/or Information Obtained
Fisheries and Oceans Canada (DFO)	▪ September 12, 2014: AECOM requested aquatic species records for the study area, including SAR records.	▪ September 12, 2014: DFO confirmed record of American eel in the Toronto Harbourfront on July 13, 2012. There are no other records for aquatic SAR in the study area.

Table 1-1: Summary of Agency Consultation

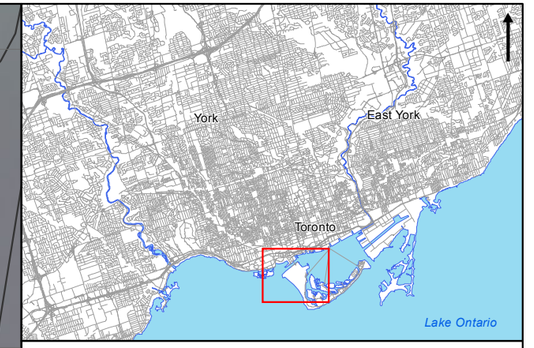
Agency	Date and Data and/or Information Requested	Date and Data and/or Information Obtained
Ministry of Natural Resources and Forestry (MNRF)	▪ September 23, 2014: AECOM requested aquatic species records for the study area, including SAR records.	▪ February 26, 2015: AECOM received fish collection records from the MNRF Aurora District.
Aquatic Habitat Toronto (AHT)	▪ January 7, 2015: AECOM requested inner harbour fisheries data and monitoring reports, fish and mussel records, aquatic SAR records, areas of habitat use, reports and studies on recreational fisheries near the Toronto Islands and water quality data.	▪ April 2, 2015: AHT provided the following information: • Sites queried between 2009 and 2014 • Toronto Harbour Billy Bishop Inner Exclusion Zone: Species caught include: Alewife, Emerald shiner, Gizzard shad • Outer Exclusion Zone: Species caught include: Alewife, Creek chub, Threespine stickleback • Inner Harbour Species caught: Alewife, Emerald shiner, Threespine stickleback, Golden shiner, Largemouth bass, Yellow perch, Common carp, Northern pike, Gizzard shad, Round goby, Brook silverside, Chinook salmon, Rainbow smelt, Longnose gar, Black crappie, White sucker, Pumpkinseed, Brook stickleback, Rock bass, Common shiner, Spottail shiner, American eel, Freshwater drum, Brown bullhead, Bluntnose minnow.
Toronto and Region Conservation Authority (TRCA)	▪ September 16, 2014: AECOM requested fish data for within the aquatic environment study area. ▪ March 19, 2015: AECOM requested fish and mussel records, inner harbour fisheries data and monitoring reports, reports and studies on recreational fisheries near the Toronto Islands, and water quality data	▪ September 17, 2014: TRCA provided fisheries survey data to AECOM. ▪ April 4, 2014: TRCA provided fish data within the harbour and Toronto Islands ▪ September 02, 2015: TRCA provided AECOM updated Hydro-acoustic data for study area around areas proposed for infill. ▪ October 13, 2015: TRCA provided results to AECOM of HEAT model for the proposed infilling.

1.2.1.2 Aquatic Field Investigations

Additional information on the existing aquatic habitat conditions within the footprint of the proposed runway extensions was collected through field investigations as set forth in the BBTCA work plan. Aquatic habitat conditions within the proposed footprint for the runway extensions were documented through a two-day field investigation completed by AECOM aquatic biologists and TRCA staff with the use of a Go-Pro Hero 3+ underwater camera outfitted with an underwater light producing 126 lumens. A grid, consisting of 29 sample locations on the east side of the runway and 34 sample locations on the west side of the runway was used to locate sampling sites and they were surveyed using divers employing underwater photography. Each location was assigned a unique identification number. A photo was taken and aquatic macrophytes, substrate, and cover were identified at each sample location and recorded. These locations were limited to within the Marine Exclusion Zones (MEZ) on either end of the existing runway as shown on **Figure 3-1**.

The purpose of this investigation was to document existing fish habitat conditions including substrate, submerged and emergent aquatic vegetation, and other cover types (e.g. submerged woody debris). This information will be used to form the basis of the impact assessment. Existing conditions will be compared with the habitat requirements of the resident fish community, which will in turn, assist in determining required habitat offsetting in conjunction with the TRCA, AHT and DFO.





Legend

- Roads
- Marine Exclusion Zone
- Existing Airport
- Proposed 08-26 Runway Extension
- Runway Extension (200m Construction Footprint)

N

0 100 200 400 600
Meters

BBTCA EA: Natural Environment Cumulative Net Effects Assessment

Extent of Aquatic Field Investigations

October 2015	1:10,000	Datum: NAD '83 UTM 17N Source: BING, ONB
P#: 60328546	V#: 001	

AECOM

Figure 1-3

This drawing has been prepared for the use of AECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM's express written consent.

Map location: \\CA9AA1FP001\Data\Projects\60328546\900-CAD-GIS\03_Incoming\2015-10-26_FigureUpdates_60328546\60328546 - Billy Bishop\Design\Figure 1-3 - Extent of Aquatic Field Investigations.mxd
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The TRCA will use these habitat data to run the *Habitat Evaluation Assessment Tool* or model (HEAT). The HEAT, based on the DFO's *Habitat Alteration Assessment Tool*, assigns values to various habitat features relative to their depth and location in lacustrine environments. The model and associated output values were originally created and vetted based on science research conducted by DFO. Effectively, the HEAT output will attempt to describe what habitat is negatively affected (harmfully disrupted or lost) by the infill, how much value that habitat has (relative to fish life processes) and approximately how much habitat would be required to off-set (or compensate) for these impacts. DFO, until 2012 and the change in DFO process (Fish and Fish Habitat Program to Fishery Protection Program), used the HAAT to assess all infills or land mass extensions in the Great Lakes.

1.2.2 Terrestrial Environment

1.2.2.1 Background Information Review

A background information review was conducted using background information sources and correspondence with relevant agencies. The information collected from background resources and agencies was used to develop a comprehensive understanding of the terrestrial environment and wildlife potentially affected by the proposed runway extensions.

Special consideration was given to identifying any Species of Conservation Concern (SOCC) and Species at Risk (SAR). According to the Significant Wildlife Habitat Technical Guide (MNRF, 2000), SOCC includes those species that are listed on the SAR in Ontario (SARO) list as Special Concern and/or provincially significant with a provincial ranking of S1 (extremely rare), S2 (very rare) or S3 (rare to uncommon) by Natural Heritage Information Centre (NHIC). SOCCSAR include species that are listed on the SARO list as Extirpated, Endangered or Threatened and receive species and habitat protection under the *Endangered Species Act 2007* (ESA). SOCC do not receive legal protection under the ESA, but are protected under other Acts, such as the *Migratory Birds Convention Act, 1994* and *Ontario Fish and Wildlife Conservation Act, 1997*, and planning documents. Additionally, habitat for these species is considered Significant Wildlife Habitat under the Provincial Policy Statement (PPS, 2014) and associated Natural Heritage Reference Manual (2010).

Background Information Sources

Existing background information on terrestrial habitat and species, including waterfowl and other birds, was collected for the terrestrial environment Study Area as defined in **Section 1.1.2.1** from the following secondary sources and analysed to establish existing conditions and identify data gaps:

- **Guidance and Reference Documents:**
  - *Natural Heritage Reference Manual Second Edition* (MNRF, 2010);
  - *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015);
  - *City of Toronto Official Plan* (City of Toronto, 2010);
  - *Provincial Policy Statement* 2014 (MMAH, 2014); and
  - *Airport Wildlife Management Plan – 2012 Billy Bishop Toronto City Airport* (CYTZ) (Falcon Environmental Services Inc., 2013).
- **Previous Technical Studies:**
  - *Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments* (CH2M HILL Canada Limited, 2013);

  - *Toronto Port Authority Proposed Pedestrian/Services Tunnel and Perimeter Road Project* (Dillon, 2011);
  - *Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment* (Dr. Davidson-Arnott, R. 2013); and
  - *Migratory Birds in the City of Toronto: A Literature Review and Data Assessment* (Dougan & Associates Ecological Consulting and Design with North – South Environmental Inc., 2009).

- **Interactive Mapping Sites:**
  - MNRF Make-A-Map: Natural Heritage Areas (MNRF, 2014a);
  - MNRF NHIC Rare Species Records (MNRF, 2014b);
  - City of Toronto Interactive Map – Environmentally Significant Areas (City of Toronto, n.d.-a);
  - City of Toronto Interactive Map – Toronto Maps Version 2 (City of Toronto, n.d.-b); and
  - Important Bird Areas Canada (IBA Canada, 2015).

- **Wildlife Atlases:**
  - Butterfly Atlas of Ontario Online (Jones *et al.*, 2015);
  - Atlas of the Breeding Birds of Ontario Website (BSC. *et al.*, 2006);
  - Ontario Reptile and Amphibian Atlas (Ontario Nature, 2014); and
  - Atlas of the Mammals of Ontario (Dobbyn, 1994).

- **Ministry of Natural Resources and Forestry (MNRF; 2014c)** mapping from Land Information Ontario (LIO) for**:**
  - Provincial Parks;
  - Conservation Reserves;
  - Provincially Significant Wetlands (PSWs);
  - Unevaluated Wetlands;
  - Wooded Areas; and
  - Areas of Natural and Scientific Interest (ANSIs).

Agency Correspondence

Written requests (submitted via email) for wildlife records, specifically bird data, and any additional relevant natural environment information for the Study Area as described in **Section 1.1.2.1** were made to agencies. Requests were made for available information pertaining to significant features or functions (such as Provincially Significant Wetlands, Areas of Natural and Scientific Interest and wildlife habitats), terrestrial species records (such as plants, birds, and other wildlife, rare species and SAR) and related GIS layers. **Table 1-2** lists the agencies contacted, information source, and data or information obtained.

Table 1-2: Summary of Agency Consultation

Agency	Date and Data and/or Information Requested	Date and Data and/or Information Obtained
Ministry of Natural Resources and Forestry (MNRF)	▪ September 23, 2014: AECOM requested significant features or functions information relevant to the Study Area, including SAR records. ▪ May 4, 2015: AECOM requested additional data to accommodate revised Study Area.	▪ October 3, 2014: MNRF confirmed presence of the Toronto Islands ANSI and absence of SAR records within the Study Area. ▪ June 9, 2015: MNRF confirmed presence of SAR records within the revised Study Area.
Toronto Region and Conservation Authority (TRCA)	▪ September 30, 2014: AECOM requested significant features or functions information relevant to the Study Area, including wildlife habitats, bird records, SAR records and management plans. ▪ May 4, 2015: AECOM requested additional significant features or functions information to accommodate the revised Study Area. ▪ September 30, 2015: AECOM inquired if wildlife diversity and abundances are expected to significantly change in the next 20 years at TTP due to restoration projects and management techniques.	▪ September 26, 2014: TRCA provided waterbird nest data at Tommy Thompson Park (TTP). ▪ January 8, 2015: TRCA provided wetland data, fauna data and breeding bird records for the TTP and Toronto Islands, and Draft City of Toronto Canada Goose Management Strategy (TRCA, 2014 a). ▪ June 15, 2015: TRCA provided GIS data for ESAs, ANSIs, Wetlands, Flora and Fauna (including rare species) within the revised Study Area. ▪ October 22, 2015: TRCA provided estimated projections for bird populations at TTP and commented on current management techniques.
Environment Canada (EC) – Canadian Wildlife Services (CWS)	▪ September 30, 2014: AECOM requested records from Annual Mid-Winter Waterfowl Surveys, reports and/or studies on Cormorants and waterfowl and their behaviours, established protocols and management plans.	▪ January 6, 2015: EC-CWS provided a list of contacts in different departments and organizations from where the requested information could be obtained, including Bird Banding Office and York University. ▪ February 4, 2015: EC-CWS provided records from Mid-Winter Surveys (2014 to 2015), Migrant Waterfowl Surveys (2009 to 2011), and relevant GIS layers.
EC – CWS – Bird Banding Office	▪ January 7, 2015: AECOM requested bird banding data for the Study Area. ▪ May 4, 2015: AECOM requested additional bird banding data to accommodate the revised Study Area.	▪ January 8, 2015: Bird Banding Office provided bird banding data from years 2008 to 2013 for the Study Area.
Bird Studies Canada (BSC) Nature Counts	▪ January 19, 2014: AECOM requested bird records within the Study Area. ▪ May 4, 2015: AECOM requested additional bird records to accommodate the revised Study Area.	▪ January 21, 2015: BSC Nature Counts provided approval to download records from the Canadian Migration Monitoring Network (CMMN) Daily Estimated Totals from the Tommy Thompson Bird Research Station (TTBRS). ▪ May 4, 2015: BSC Nature Counts provided approval to download records from the following sources: • eBird Database; • EC-CWS Ontario Shoreline Survey; • Ontario Breeding Bird Atlas (OBBA) 2001 to 2005; • Cornell Lab of Ornithology (CLO)'s Great Backyard Bird Count (GBBC); and • Project FeederWatch, including Ontario Bird Feeder Survey. ▪ May 5, 2015: BSC Nature Counts provided approval to download bird and amphibian data from Marsh Monitoring Program.
Toronto Ornithological Club	▪ September 30, 2014: AECOM requested records and reports from Annual Christmas Bird Counts, Hawk Watch, Greater Toronto Raptor Watch and Spring Warbler Surveys. ▪ January 6, 2014: AECOM followed up regarding previous request. ▪ April 1, 2015: AECOM followed up regarding previous request. ▪ May 4, 2015: AECOM followed up regarding previous request.	▪ No data received.

Table 1-2: Summary of Agency Consultation

Agency	Date and Data and/or Information Requested	Date and Data and/or Information Obtained
Toronto Field Naturalists	▪ March 4, 2015: AECOM requested information about birds, plants and vegetation communities, rare species and SAR, and significant features and functions within the Study Area. ▪ May 4, 2015: AECOM requested additional information to accommodate the revised Study Area.	▪ March 9, 2015: Toronto Field Naturalists provided the following publications: *Toronto Islands: Plant Communities and noteworthy species* (Steve Varga, 1987); • *On the flora of the Toronto Islands Part I* (Catling and McKay, 1974); • *The vascular plants of the Leslie St. Headland* (Catling et al., 1977); and • *Waterfowl populations in the vicinity of the Leslie Street Headland* (Freedman and McKay, 1997). ▪ May 4, 2015: Toronto Field Naturalists provided the following publications for the revised Study Area: • *Humber Forks at Thistle Town* (O'Donnell, 2000); • *Toronto Field Naturalists' Ravine Survey Study Number Eight West Don River Valley 1974 to 1978* (Banville and Cardini, 1978); • *Toronto Field Naturalists' Ravine Survey Study Number Seven Taylor Creek Woodbine Bridge Ravines 1976* (Cardini and Juhola, 1997); • *Toronto Field Naturalists' Ravine Survey Study Number Three Chapman Creek Ravine, Etobicoke* (Clive and Goodwin, 1975); • *Toronto Ravine Survey Program Toronto Field Naturalists Study Number One Chatsworth Ravine* (Cranmer-Byng *et al.,*1973); • *Burke Ravine 1974 – 1976* (Cranmer-Byng *et al.*, 1988); • *Toronto Field Naturalists' Ravine Survey Study Number Two Brookbanks Ravine* (Cruickshank and Parker, 1974); and • *Toronto Field Naturalists' ravine Survey Study Number Four Wigmore Park Ravine* (Kelly and Greenbaum, 1976).
Fatal Light Awareness Program (FLAP)	▪ May 4, 2015: AECOM requested bird fatality records within the revised Study Area. ▪ June 16, 2015: AECOM followed up with FLAP regarding requested bird fatality records.	▪ July 7, 2015: FLAP provided total number of bird fatalities from 2010 to 2015 within the revised Study Area.
Friends of the Spit	▪ May 5, 2015: AECOM requested information and records pertaining to birds, plants and other wildlife on the Leslie Street Spit.	▪ No data received.
Harbourfront Canoe and Kayak Centre	▪ June 16, 2015: AECOM called the Harbourfront Canoe and Kayak Centre and inquired if they keep any bird records.	▪ June 16, 2015: The Harbourfront Canoe and Kayak Centre responded that they do not keep any records of bird species.
Kawartha Turtle Trauma Centre	▪ May 5, 2015: AECOM requested reptile, including turtle records within the revised Study Area.	▪ No data received.
Transport Canada	▪ September 30, 2014: AECOM Requested bird strike data and relevant reports for the BBTCA, as well as any reports or studies completed on the potential impacts of airports and different aircrafts (propeller vs. jet) on birds. ▪ March 27, 2015: AECOM requested reports and/or studies on potential impacts of airports and different aircrafts (propeller vs. jet) on birds. ▪ May 5, 2015: AECOM requested any available wildlife management plants for airports in North America.	▪ March 27, 2015: Transport Canada provided bird strike data for the BBTCA from 2004 to 2015.
Falcon Environmental Services Inc.	▪ February 4, 2015: AECOM requested bird strike data and wildlife management plan for the BBTCA.	▪ February 7, 2015: Falcon Environmental Services Inc. provided Bird Strike Data from years 2007 to 2014, Wildlife Data from 2014 for the BBTCA, and the *Airport Wildlife Management Plan – 2012 Billy Bishop Toronto City Airport (CYTZ)* (Falcon Environmental Services Inc., 2013).

Table 1-2: Summary of Agency Consultation

Agency	Date and Data and/or Information Requested	Date and Data and/or Information Obtained
City of Toronto	▪ May 8, 2015: AECOM requested GIS shapefiles for the City's Natural Heritage System, Environmentally Significant Areas, and the boundaries of the Ravine and Natural Features Protection Bylaw.	▪ No data received.
York University	▪ January 7, 2015: AECOM requested scientific articles on Cormorants and their behaviours at the TTP.	▪ January 10, 2015: York University provided requested scientific articles, including: • *Double-crested cormorant foraging ecology at a large colony in southern Ontario: Analyses of chick diet, feeding rates and foraging directions* (Andrews *et al*. 2012); • *Double-crested cormorants and urban wilderness: conflicts and management* (Taylor *et al.* 2011); • *Predators, prey and the dynamics of change at the Leslie Street Spit* (Foster and Fraser, 2013); and • *Double-crested Cormorant Management at Tommy Thompson Park: a Conspecific Attraction Experiment and Egg-oiling Modeling Scenarios* (Feldmann, 2011). • *Effects of egg oiling on ground nesting double-crested cormorants at a colony in Lake Ontario: an examination of nest-attendance behaviour* (Taylor and Fraser, 2012). • *A report on work related to Double-crested Cormorant research on Peninsulas B and C, Tommy Thompson Park, April – September 2014* (Fraser and Rosenberger, *unpublished*).
Toronto Pearson International Airport	▪ September 23, 2015: AECOM requested a wildlife management plan through the online system.	▪ No data received.

1.2.2.2 Terrestrial Field Investigations

Based on the *Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment* (Dr. Davidson-Arnott, R. 2013), further studies are required to identify and determine the magnitude of potential effects on the terrestrial environment from the proposed runway extensions. Therefore, additional field investigations including terrestrial habitats and vegetation surveys, as well as seasonal avian surveys, were completed by AECOM between 2014 and 2015 in the vicinity of the proposed runway extensions. Information collected from these surveys was used to supplement and fill data gaps identified through the background information review.

Terrestrial Habitats and Vegetation Surveys

A site visit was conducted by qualified AECOM ecologists on October 3, 2014 to collect additional information on the existing terrestrial habitat conditions and vegetation communities in the immediate vicinity of the proposed runway extensions. Vegetation communities that are potentially affected within 120 m of each runway extension were assessed and delineated according to the Ecological Land Classification (ELC) system for Southern Ontario (Lee *et al*., 1998). ELC is the provincially accepted standard for describing, identifying, classifying and delineating vegetation communities into ELC units based on the stand structure and plant species composition. Vegetation communities were classified to Vegetation Type where possible, which is the smallest scale of classification based on the ELC protocol. A detailed vascular plant inventory was completed in conjunction with the ELC surveys for each identified vegetation community. Special consideration was given to identifying SOCC and SAR plants, as well as plants that are locally rare in Toronto or regionally rare in the Ecoregion District 7E-4 according to Varga (2000). Incidental wildlife observations with a focus on bird species in the vicinity of BBTCA were also recorded. Terrestrial habitat and vegetation surveys were completed along portions of Hanlan's Point Beach and Toronto Island Parks that are within 120 m of each of the proposed runway extensions.

Seasonal Avian Field Surveys

Seasonal avian surveys were conducted by qualified AECOM avian biologists between fall 2014 and summer 2015. These avian field surveys were designed to assess the seasonal and spatial coverage, abundance, richness and behaviour of bird species present within 500 m of the runway extensions. **Table 1-3** provides a summary of the timing windows and survey frequencies for each seasonal avian survey that was completed.

Table 1-3: Avian Field Survey Summary

Seasonal Survey	Survey Timing Window	Number of Visits
Fall Migration	October to November	4
Overwintering	December to February	2
Spring Migration	March to May	2
Breeding Bird Survey and Summer Cormorant Behaviour	May to July	3
Summer Cormorant Behavior	August	1
Total:		**12**

During each site visit, avian biologists conducted surveys at four point-count stations. Two stations were established at both the east and west end of the existing runway. The location of the point-count stations remained the same across most dates surveyed, with the exception of October 27, 2014, during which two different vantage points were selected from the mainland with clear views of each

runway end. On other dates (mainly in the winter), only one point count station at each end of the existing runway was surveyed as it was deemed sufficient to record all bird species present. Avian surveys were conducted in a variety of weather conditions and avian biologists observed and recorded all bird species present in the vicinity of the existing runways for approximately 15 to 20 minutes at each point count station. The following information was recorded during each survey to the extent possible:

- Station name (i.e., east or west end of the existing runway);
- UTM coordinates;
- Date, start and end times;
- Observer name;
- Weather conditions including temperature (°C), precipitation (i.e., snow, rain, none), wind (according to the Beaufort scale), and % cloud cover;
- Bird species and numbers observed;
- Spatial distribution and general location of birds in relation to the runways and BBTCA grounds;
- Distance and direction from observer;
- Behaviour of individuals observed (e.g., foraging, flying, wading);
- Maximum flight height and direction; and
- Details of any encountered SAR observations.

During the summer cormorant behaviour surveys, avian biologists focused on recording information pertaining to Double-crested Cormorants (*Phalacrocorax auritus*) observed in the vicinity of the existing runways from the established point count stations. The following information pertaining to Double-crested Cormorants was recorded during these surveys:

- Number of individuals per flock;
- Number and frequency of flocks;
- Flight height and direction of flocks;
- Distance of flocks from observer;
- Spatial distribution and general location of birds in relation to the runways and BBTCA grounds; and
- Behaviour of individuals observed (e.g., foraging, flying, wading).

As summer cormorant behaviour surveys and breeding bird surveys were conducted simultaneously during the three visits completed between May and July, 2015, all birds observed during these surveys were documented. One additional survey was completed in August 2015 to further assess cormorant behaviour during the later summer season. Therefore, a total of four visits were completed for summer Double-crested Cormorant behaviour surveys.

1.3 Aquatic Environment Results

The following sections summarize the information collected from background information sources and data received from agencies as they pertain to fish and fish habitat in the aquatic environment Study Area.

1.3.1 Results of Background Information Review

The Billy Bishop Toronto City Airport (BBTCA) is located within Lake Ontario. The airport is situated on the Toronto Islands located approximately 350 m from the Toronto shoreline south-west of downtown Toronto.

The TRCA has jurisdiction over 72 km of the Lake Ontario waterfront spanning from the City of Toronto/City of Mississauga border in the west to the Town of Ajax/Town of Whitby border in the east. Across this shoreline, from west to east, nine watersheds drain into Lake Ontario. These nine watersheds are: Etobicoke Creek, Mimico Creek, Humber River, Don River, Highland Creek, Rouge River, Duffins Creek, Petticoat Creek and Carruthers Creek (TRCA, 2015).

Lake Ontario is the last receiving body in the Great Lakes chain before the St. Lawrence River and Atlantic Ocean. With no barriers between the ocean and Lake Ontario, fish are able travel back and forth from the ocean to the freshwater lake. Different parts of the lake offer various aquatic habitats ranging from deep refuges to shallow littoral areas around various islands to rocky shoals and sandy-weedy bays.

Overfishing in the 1800s coupled with pollution and development in the 1900s took a toll on Lake Ontario's fish. Before dams on the St. Lawrence River restricted passage, species like the American Eel (*Anguilla rostrate*), Atlantic Salmon (*Salmo salar*) and the Lake Sturgeon (*Acipenser fulvescens*) used to migrate between the lake and the ocean in enormous numbers (Lake Ontario Waterkeepers, 2015).

1.3.1.1 Fish Community

Pre-existing fish community data were compiled from the MNRF and the TRCA. The fish community surveys are from various dates ranging from 1973 to 2004. Many surveys may be considered historical; however, the majority of the species are expected to continue to be present in the waters of Lake Ontario. The complete fish community tables are provided in **Appendix A**.

The overall fish habitat at both runway extensions was given a quality rating of Low, Moderate or Good based on how conducive the habitat was to fulfilling one or more of the fish community requirements (i.e., spawning, rearing, feeding or migration corridors). Success is based on the amount of cover and refugia available, food sources and productivity and general likelihood of the native species to carry out their life processes.

1.3.2 Results of Aquatic Field Investigations

1.3.2.1 Fish Habitat

East Runway Extension

At the east end of the runway, the grid was surveyed using divers employing underwater photography and 29 sampling locations were recorded. Each location was assigned a unique identification number. A photo was taken and aquatic macrophytes were identified at each sampling location.

Overall the aquatic vegetation at the east end consisted of a variety of species including: Eurasian water-milfoil (*Myriophyllum spicatum*) which is an invasive aquatic plant native to Europe, Asia, and northern Africa; fanwort (*Cabomba caroliniana*), another aquatic invasive plant native to the southeastern United States and parts of South America; Canada waterweed (*Elodea Canadensis*), and coontail (*Ceratophyllum demersum*). At nine of the 29 sampling locations no aquatic vegetation was observed. The most common species of aquatic plant observed at the east runway was Canada waterweed.

While the dominant substrate over the majority of sites was sand, silt was dominant in only one or two areas in the centre of the sampling locations.

The quality of fish habitat in the east extension is thought to be of *Moderate* quality. A variety of cover was present, albeit invasive species, to provide refuge for many fish species within the lake. The majority of fish species shown on the fish records table are "*generalists*" (i.e., species able to utilize a wide range of habitats; may or may not have specific life history requirements) and would be able to carry out a variety of life processes within the habitat at the east runway extension location.

The high frequency of sandy substrates provides excellent habitat for species like the Eastern Sand Darter (*Ammocrypta pellucida*). Due to the availability and diversity of cover and potential food sources, the sum total of habitat features results in an increased diversity in the habitats available to a wide range of fish species. Therefore, the overall rating reflects how the habitat may best suit the greater good of fish species recorded within the area.

West Runway Extension

At the west end of the runway, the grid was surveyed using divers employing underwater photography and 34 sampling locations were recorded. Each location was assigned a unique identification number. A photo was taken and aquatic macrophytes were identified at each sampling location.

Aquatic vegetation was limited at the west runway with only small pockets observed at the sampling locations. Substrate consisted of mainly sand; however, organic debris was observed on top of the sand in some locations. Zebra Mussel (*Dreissena polymorpha*) shells were identified at one sample location in the west extension.

The quality of fish habitat in the west extension would be valuable to specific species of fish that require a sandy substrate or generalist species which can utilize a variety of habitats. Otherwise, the habitat at the west extension would be considered *Low* to *Moderate* to the fish species that require aquatic macrophytes to carry out life processes. While residence habitat may be limited, the west runway extension area may be considered indirect habitat for many species; indirect habitats include migration routes to more suitable habitat.

According to fish records collected by the TRCA and the MNRF, a large variety of species have been identified within Lake Ontario along these reaches, as expected. The majority of the species are of moderate sensitivity and can adapt to varying habitats. Therefore, the habitat proposed to be infilled has value as fish habitat though it is common and not of rarity or extreme sensitivity when comparing other locations in Lake Ontario. See **Appendix A** for the complete fish species table.

1.3.2.2 Aquatic Species at Risk

No aquatic SAR were observed during the field investigations. As indicated in an email dated October 3, from MNRF biologist Brittany Ferguson, Aurora District, the MNRF have no SAR concerns with the runway expansion.

Email correspondence from DFO SAR biologist, Dave Balint dated September 12, 2014 confirms a record of American Eel within the Toronto Harbour. American Eel are listed as an Endangered SAR listed under the provincial ESA and is under consideration for listing under the federal Species at Risk Act (SARA). No year for this fish record was given; however, according to Aquatic Habitat Toronto

data, a record of American Eel captured on July 13, 2012 in the Toronto Harbour Spadina Quay is of note. DFO-SAR confirmed that no other SAR fish or mussel species were identified in adjacent areas to the study area.

American Eel are bottom dwellers (COSEWIC, 2006). They hide in burrows, tubes, snags, masses of plants and other types of shelters (COSEWIC, 2006). Within the proposed runway extension areas, there are very few aquatic plants available and the substrate is mainly sand. There is very little to no cover and refugia available for this species. With that in mind, as the habitat at the west end is best generalized as 'open habitat', these conditions would not be ideal for this species as residence habitat. Therefore, the proposed works occurring at the east and west ends of the current runway are not expected to have a negative net effect on the American Eel species.

1.4 Terrestrial Environment Results

The following sections summarize the information collected from background information sources and data received from agencies as they pertain to natural heritage features and wildlife in the terrestrial environment Study Area. Scientific names of species discussed within the following sections can be found within the associated tables and appendices.

1.4.1 Results of the Background Information Review

1.4.1.1 Designated Natural Areas

According to the *MNRF Make-a-Map: Natural Heritage Areas Application* (MNRF 2014a), several designated areas are located within or in the vicinity of the Study Area. These include two Provincially Significant Wetlands (PSWs), one Locally Significant Wetland (LSW), five Life Science ANSIs, one Earth Science ANSIs, and 16 Environmentally Significant Areas (ESAs). There are two globally Important Bird Areas (IBAs) located within the Study Area, including the Tommy Thompson Park / Leslie Street Spit and West End of Lake Ontario IBAs, which are located more than 3 km and approximately 12 km from the BBTCA grounds, respectively (IBA Canada, 2015). Additionally, portions of the Study Area are also located within the City of Toronto Natural Heritage System, Ravine and Natural Features Protection Bylaw and TRCA Regulated Areas limits. A description of each of these designated areas is provided below. The locations of these designated natural areas are shown on **Figure 1-4**.

1.4.1.1.1 Provincially and Locally Significant Wetlands (PSWs and LSWs)

There are two PSWs and one LSW located within the Study Area. These are mapped on **Figure 1-4** and are described in detail below.

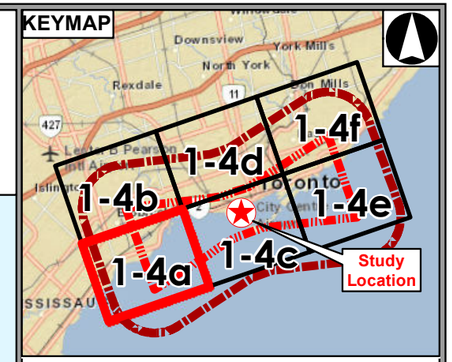
The Provincially Significant Toronto Islands Coastal Wetland Complex is located approximately 370 m from the BBTCA. This PSW was formed on an active sand beach bar system and consists of an intricate system of 34 small wetlands situated throughout the Toronto Islands (North-South Environmental Inc. and Dougan & Associates, 2009). These wetlands largely consist of swamps and marshes that provide foraging and nesting areas for colonial bird species, waterfowl and hundreds of migrating songbird species, including rare species, that stopover at Tommy Thompson Park, the Toronto Islands and other locations along the lakeshore (North-South Environmental Inc. and Dougan & Associates, 2009). These wetlands are known to support a high diversity of bird species, as well as plants and other wildlife. Common species such as Northern Cardinal, Yellow Warbler and

Drawn By: S.P.O.

QUEENSWAY E
QEW
EVANS AVE
PARK LAWN RD
Mimico Creek
BROWNS LINE
KIPLING AVE
ISLINGTON AVE
ROYAL YORK RD
Etobicoke Creek
REGIONAL MUNICIPALITY OF PEEL
DIXIE RD
Applewood Creek
Serson Creek
LAKESHORE RD E
CITY OF TORONTO
Lake Ontario

N
W
E
S

KEYMAP



Legend

- Billy Bishop Airport
- Primary Bird Hazard Zone Area
- Secondary Bird Hazard Zone Area
- Municipal Boundary
- Watercourse
- Waterbody
- Wooded Area
- Railway

Road Classification

- Freeway
- Ramp
- Arterial
- Collector
- Local Road

Wetlands

- Unevaluated Wetland

0 0.5 1 2
Kilometres

BBTCA EA: Natural Environment Cumulative Net Effects Assessment

Designated Natural Areas within Terrestrial and Ornithological Study

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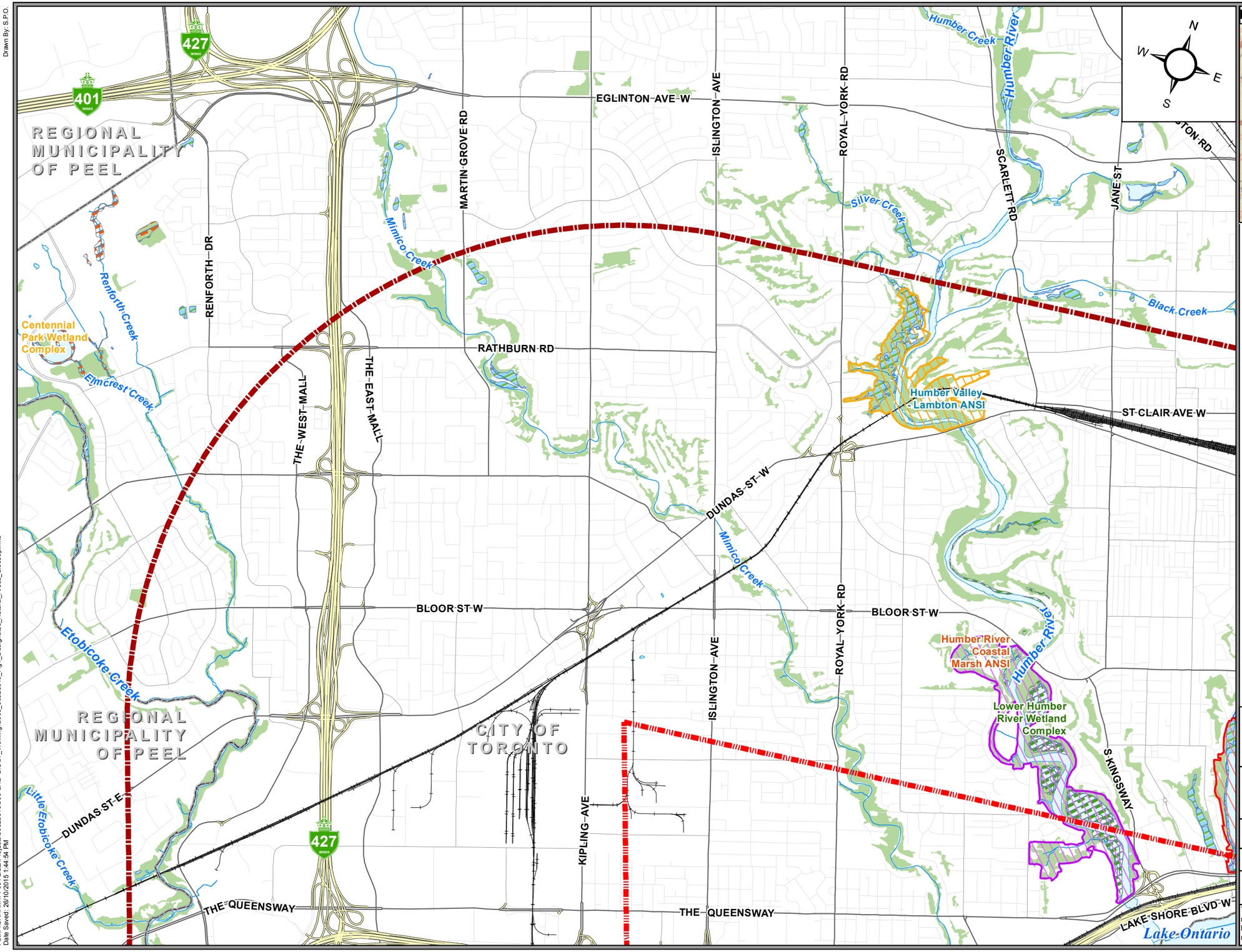
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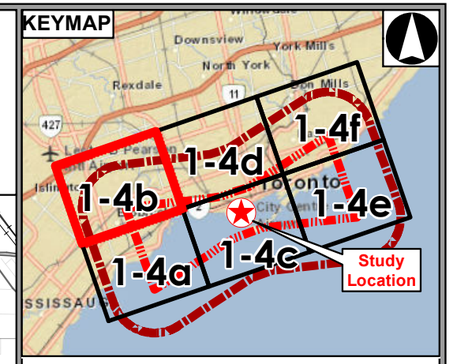
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Drawn By: S.P.O.





Legend

- Billy Bishop Airport
- Primary Bird Hazard Zone Area
- Secondary Bird Hazard Zone Area
- Municipal Boundary
- Watercourse
- Waterbody
- Wooded Area
- Railway

Road Classification

- Freeway
- Ramp
- Arterial
- Collector
- Local Road

Areas of Natural and Scientific Intrest

- Provincial ANSI - Life Science
- Provincial Candidate ANSI - Life Science
- Regional Candidate ANSI - Life Science

Wetlands

- Provincially Significant Wetland
- Locally Significant Wetland
- Unevaluated Wetland

0 0.5 1 2
Kilometres

BBTCA EA: Natural Environment Cumulative Net Effects Assessment

Designated Natural Areas within Terrestrial and Ornithological Study

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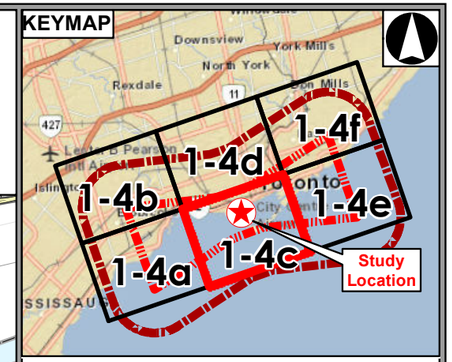
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Drawn By: S.P.O.

KING ST W
GARDINER EXPY
BATHURST ST
SPADINA AVE
UNIVERSITY AVE
BAY ST
YONGE ST
JARVIS ST
QUEEN ST E
FRONT ST E
PARLIAMENT ST
ADELAIDE
LAKE SHORE BLVD W
LAKE SHORE BLVD E
CITY OF TORONTO
Toronto Islands ANSI
Toronto Islands Coastal Wetland Complex
Toronto Islands Coastal Wetland Complex
Lake Ontario

N
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E
S

KEYMAP



Legend

- Billy Bishop Airport
- Primary Bird Hazard Zone Area
- Secondary Bird Hazard Zone Area
- Municipal Boundary
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- Railway

Road Classification

- Freeway
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- Arterial
- Collector
- Local Road

Areas of Natural and Scientific Intrest

- Provincial Candidate ANSI - Life Science

Wetlands

- Provincially Significant Wetland
- Unevaluated Wetland

0 0.5 1 2
Kilometres

BBTCA EA: Natural Environment Cumulative Net Effects Assessment

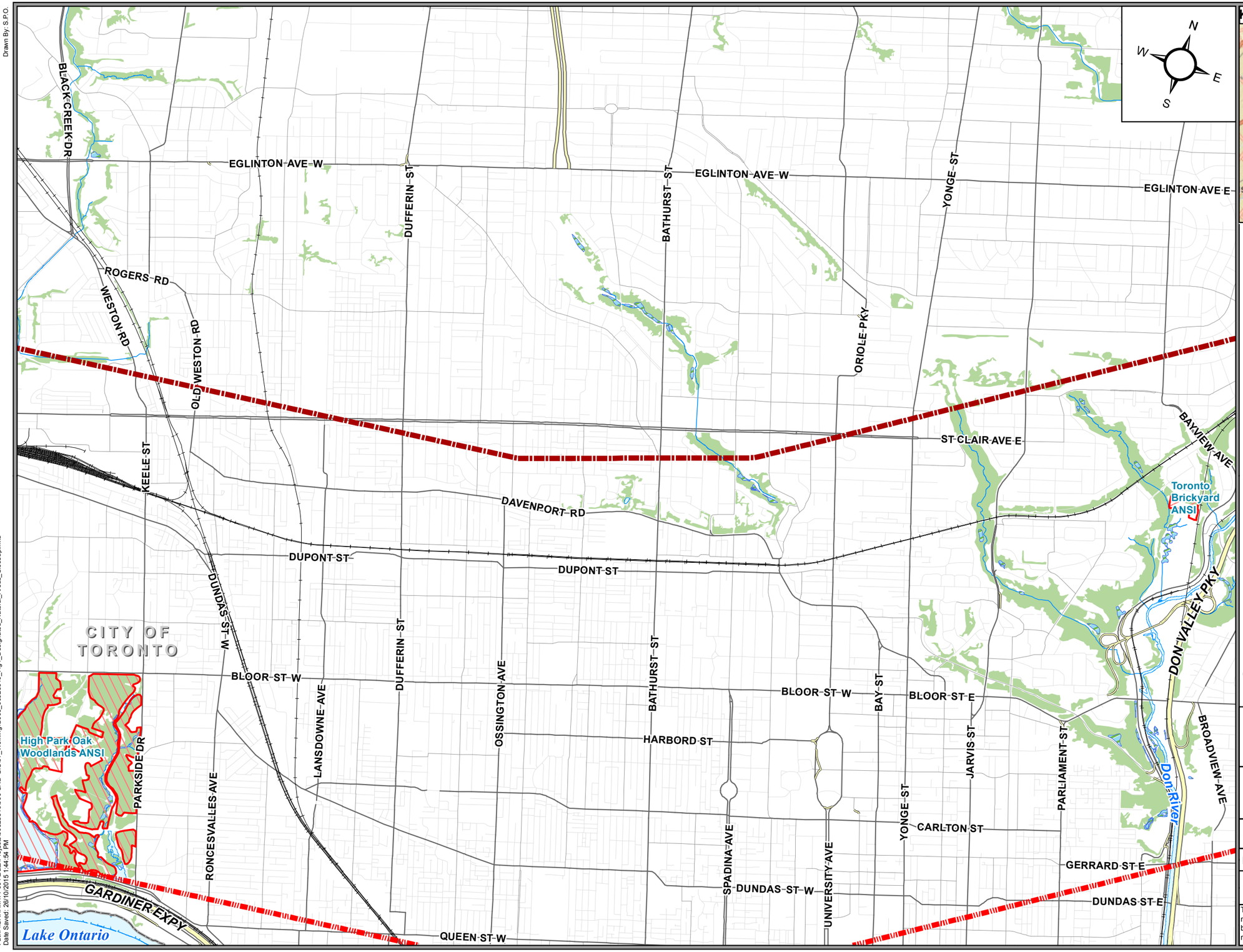
Designated Natural Areas within Terrestrial and Ornithological Study

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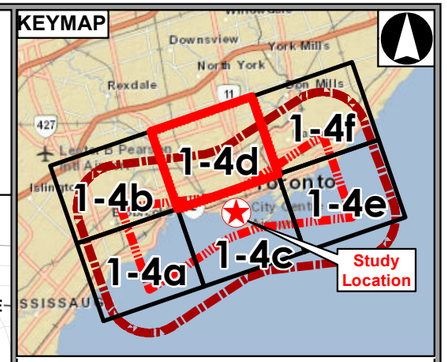
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Drawn By: S.P.O.



KEYMAP



Legend

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- Secondary Bird Hazard Zone Area
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- Wooded Area
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Road Classification

- Freeway
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- Local Road

Areas of Natural and Scientific Intrest

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- Provincial ANSI - Life Science
- Regional Candidate ANSI - Life Science

Wetlands

- Unevaluated Wetland

0 0.5 1 2

Kilometres

BBTCA EA: Natural Environment Cumulative Net Effects Assessment

Designated Natural Areas within Terrestrial and Ornithological Study

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CARLAW AVE

EASTERN AVE

LAKE SHORE BLVD E

CITY OF TORONTO

Lake Ontario

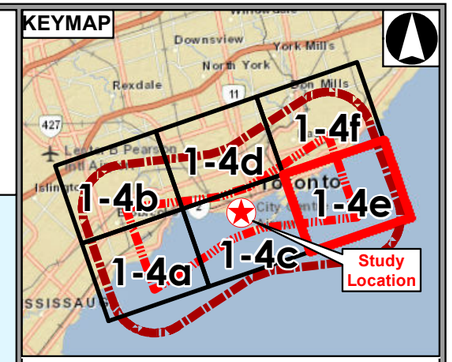
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KEYMAP



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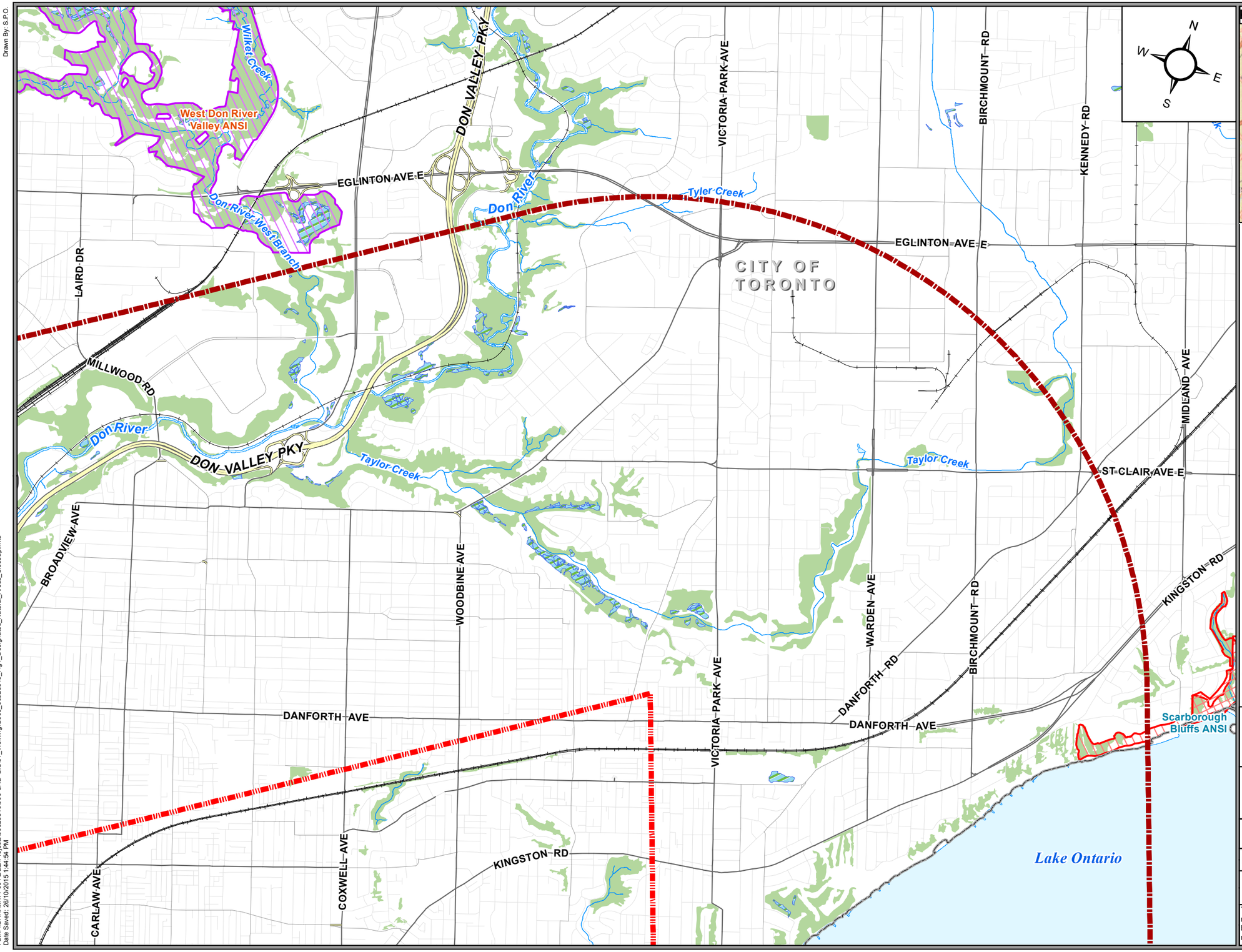
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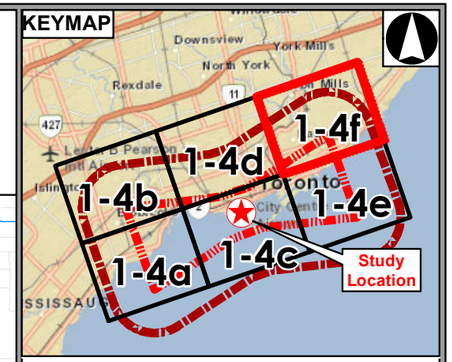
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Black-capped Chickadee and less common species such as Blue-gray Gnatcatcher and Least Flycatcher are often found in the treed swamps of the PSW (North-South Environmental Inc. and Dougan & Associates, 2009). Nesting platforms installed in the submerged aquatic marsh on Centre Island support colonies of Common Terns that forage within the wetland complex. Great Blue Herons, Great Egrets, Black-crowned Night-Heron, Osprey, Common Tern and Caspian Terns forage within the aquatic marshes that provide critical habitat for fish. The PSW supports many provincially and locally significant plant and wildlife species and their habitats, some of which include Black Tern, Peregrine Falcon, Red-headed Woodpecker, Blanding's Turtle, Northern Map Turtle and Low Nut-rush (North-South Environmental Inc. and Dougan & Associates, 2009). Blanding's Turtle is listed as Threatened on the SARO list and protected under the *ESA*, while Peregrine Falcon, Red-headed Woodpecker and Northern Map Turtle are designated as Special Concern on the SARO list.

The Provincially Significant Lower Humber River Wetland Complex is located approximately 6 km west of the BBTCA. It consists of 15 wetlands, comprised of 84% swamps and 16% marsh (North-South Environmental Inc. and Dougan & Associates, 2009). The open wetlands support habitat for waterfowl species, including Mallard, Canada Goose, Gadwall and Green-winged Teal (North-South Environmental Inc. and Dougan & Associates, 2009). The presence of large dead trees in this PSW also provides habitat for bird species that nest in tree cavities such as Red-headed Woodpecker, for which there were two active nests confirmed in 2003, as well as Hooded Merganser, Eastern Screech-owl, American Kestrel, Wood Duck and Hairy Woodpecker (North-South Environmental Inc. and Dougan & Associates, 2009). Furthermore, this PSW acts as an important stopover area for migrating songbirds and is more than 7 km away from the West End of Lake Ontario Important Bird Area (North-South Environmental Inc. and Dougan & Associates, 2009). Reptile species that inhabit this PSW include Blanding's Turtle, Northern Map Turtle and an abundance of Midland Painted Turtles (North-South Environmental Inc. and Dougan & Associates, 2009). Amphibians breeding in this area also include American Toad, Northern Leopard Frogs and Spotted Salamanders.

The Centennial Park Wetland Complex is locally significant and consists of 4.7 ha of Red Ash Mineral Deciduous Swamp (SWD2-2) with an additional 2.4 ha of vegetated aquatic communities such as Narrow-leaved Cattail Mineral Shallow Marsh (MAS2-1) and Reed Canary Grass and Forb Mineral Meadows (MAM2-2 and MAM2-10) that surround several ponds (TRCA, 2007). The TRCA considers Red Ash Mineral Deciduous Swamp (SWD2-2) and Forb Mineral Meadow Marsh (MAM2-10) to be of regional concern in urban landscaping, and these are assigned a local rank of L4 by the TRCA (TRCA, 2007). Some of the bird species recorded in this wetland complex include Virginia Rail, Green Heron, Swamp Sparrow and Willow Flycatcher (TRCA, 2007).

There are many unevaluated wetlands within the Study Area, including on the Leslie Street Spit; however, there are no unevaluated wetland features mapped within 120 m of the proposed runway extensions.

1.4.1.1.2 Areas of Natural and Scientific Interest (ANSI)

Several ANSIs are located within the Study Area. These are mapped on **Figure 1-4** and are discussed in detail as follows.

The Provincially Significant Toronto Islands Coastal Wetland Complex is also part of the Toronto Islands Life Science ANSI designated as a Provincially Significant Candidate ANSI by the MNRF (North-South Environmental Inc. and Dougan & Associates, 2009), which is located south of the BBTCA. Muggs Island and the wildlife sanctuary, which includes Forestry Island, Snake Island, East Ward Island, Hanlan's Beach and West Algonquin, constitute portions of this ANSI. The Toronto

Islands contain six relatively undisturbed vegetation communities, including wet meadows, lagoon edges, beach strands, dunes, Cottonwood woodlands and sand prairies, all of which are considered to be rare in the Greater Toronto Area (GTA) Region (Varga, 1987). The Toronto Islands support a high diversity of 338 plant species; of which 40 are regionally rare, 15 are endemic to the Islands and three are provincially rare (Varga, 1987). The wet meadows contain most of the rare plant species and are predominately found at Gibraltar Point and Ward's Island. The lagoon edges contain moist sands that support plant species that are also common in the wet meadows. The beach strands, located on the southeastern part of Ward's Island and west of the BBTCA grounds, contain large patches of a provincially rare plant called Bushy Cinquefoil (*Potentilla paradoxa*) (Varga, 1987). The Toronto Islands also have a large dune system that supports many plant species that have specialized to grow in harsh conditions such drought, direct sunlight, strong winds and shifting sands and are found nowhere else in the region (Varga, 1987). The Cottonwood woodlands are known to support large concentrations of Saw-whet Owls during their fall migration. Marram grass (*Ammophila breviligulata*), a species only found along shoreline sand dunes, dominates the open dunes north of Gilbraltar Point (Catling and McKay, 1974). The sand prairies are remnant tall-grass prairie communities (Varga, 1987).

High Park is the largest municipal park in Toronto and covers an area of 161 ha in total, of which 73 ha is designated as a Provincially Significant Life Science ANSI (Kidd *et al*, 2000). It is located more than 4 km away from the BBTCA. The High Park Oak Woodlands Provincially Significant ANSI received its designation in 1989 and is primarily recognized for supporting remnant prairie and black oak savannah vegetation communities and associated rare plant species (City of Toronto, 2002). The black oak savannah is especially significant as it represents the vegetation cover that was once commonly found in southern Ontario and contains many rare prairie plant species. This ANSI also contains remnants of dry deciduous forests, mesic deciduous upland forests and dry mesic mixed upland forests (Kidd *et al.,* 2000). Generally, High Park acts as an important stopover for migratory songbirds during spring and fall migration. Over 280 bird species have been recorded in High Park, including songbirds, waterbirds and raptor species (City of Toronto, 2002). At least 59 species of butterflies have been recorded in High Park, including Monarchs which are a Special Concern species (City of Toronto, 2002). Several mammal species also live in the park, most of which are common and adapted to the city landscape such as Racoons, Striped Skunk, Muskrats, Beavers, Eastern Cottontails, Opossums, Deer Mice, Meadow Voles, shrews and moles. Big Brown Bat and Little Brown Bat are also common in High Park (City of Toronto, 2002). Little Brown Bat is designated as an Endangered Species under the ESA. High Park is generally not considered to be a major wildlife movement corridor but it is located in close proximity to the Humber River Valley which better facilitates wildlife movement (Ages Consultants Limited, 2013).

Toronto Brickyard is designated as a provincially significant Earth Science ANSI and contains 2 ha of wide ranging Ordovician and post glacial landform features (AECOM, 2010; Kelly, *et al.* 1987). It is located more than 6 km from the BBTCA.

Scarborough Bluffs is a provincially significant Life and Earth Science ANSI and a small portion of it is located within the eastern boundary of the Study Area, at least 13 km from the BBTCA. This ANSI is recognized for the bluff formation and associated vegetation and wildlife (Dillon Consulting Ltd., 2015).

Additionally, there are other provincial and regional candidate Life Science ANSIs located within the Study Area, including the Humber Valley Lambton provincial candidate and the Humber River Coastal Marsh regionally candidate ANSIs, which are located more than 8 km and 5 km, respectively, from the BBTCA.

1.4.1.1.3 Natural Heritage System – City of Toronto

Map 9 of the City of Toronto Official Plan (2010) identifies that portions of the Natural Heritage System are located within the Study Area. As described in Section 3.4 of the City's Official Plan, the following features compose the Natural Heritage System: significant landforms and physical features, watercourses and hydrological features, valley slopes, riparian zones, terrestrial natural habitat types, significant aquatic features, species of concern and significant biological features that are subject to the Provincial Policy Statement (MMAH, 2014).

1.4.1.1.4 Ravine and Natural Feature Protection Bylaw – City of Toronto

The Ravine and Natural Feature Protection Bylaw is enforced by the City of Toronto and protects natural features that are vulnerable to degradation due to removal of trees, changes in grade or lack of management (City of Toronto, n.d.-c). Ravine and natural features are important features in the City of Toronto and provide many ecological benefits and functions, including acting as wildlife corridors, preventing soil erosion, reducing storm flows and improving water quality of lakes and streams (City of Toronto, n.d.-c). Forested areas along the Humber and Don Rivers, and on the Toronto Islands and Leslie Street Spit are designated as ravine and natural features that receive protection under this Bylaw (City of Toronto, n.d.-b); however, there are no such designated areas located in the immediate vicinity of the proposed runway extensions at the BBTCA (City of Toronto, n.d.-b).

1.4.1.1.5 Environmentally Significant Areas (ESAs)

Environmentally Significant Areas (ESAs), designated by the City of Toronto, form portions of the City's Natural Heritage System and include natural heritage areas that are particularly significant (locally and/or regionally), which require additional protection to conserve their important ecological qualities and functions. According to the City of Toronto Interactive Map – Environmentally Significant Areas (City of Toronto, n.d.-a), there are 16 existing ESAs identified within the Study Area, which are summarized in **Table 1-4**.

1.4.1.1.6 Important Bird Area (IBA)

Tommy Thompson Park is located on a human-made peninsula, known as the Leslie Street Spit, which extends approximately 5 km southwest into Lake Ontario (Wilson and Cheskey, 2001; TRCA, n.d.-a). Leslie Street Spit, including Tommy Thompson Park, is designated by BirdLife International as a globally significant IBA due to the globally significant numbers of nesting colonial waterbirds, nationally significant numbers of waterfowl during migration and over winter, and large concentrations of migrating songbirds (TRCA, n.d.-a; Wilson and Cheskey, 2001). This IBA covers approximately 10 km^2 in area (Wilson and Cheskey, 2001). Dense thickets of cottonwoods and willows support nesting colonies of Black-crowned Night Heron (IBA Canada, 2015). There are approximately 55,000 pairs of Ring-billed Gull, and 1,200 pairs of Black-crowned Night Heron nesting on the Spit which are considered nationally significant numbers (IBA Canada, 2015). Common Terns and Double-crested Cormorants (approximately 3,000 pairs; Wilson and Cheskey, 2001), which colonized the site in 1990, are also present in large numbers (IBA Canada, 2015). Large concentrations of migrating songbirds annually stopover at the Leslie Street Spit to feed and rest while traveling between nesting and overwintering grounds (IBA Canada, 2015; Dougan & Associates and North-South Environmental Inc., 2009).

Table 1-4: Summary of Existing ESAs in the Study Area

ESA Name	Characteristics, Rare Species and Communities, and Significant Ecological Function[1]	Area (ha)[1]	Significant Stopover for Migrant Songbirds (Yes/No)[2]	Location
Rosedale Valley	This ESA is dominated by deciduous forests. There are eight significant flora species, two significant vegetation communities, and one significant fauna species. This area supports amphibian breeding habitat.	13.2	No	Don River Tributary
Moore Park Ravine	This ESA consists of mature deciduous forests and seepage areas that support swamp communities. There are 12 significant flora species and one significant vegetation community.	18.8	No	Don River Valley
Park Drive Ravine/Don Valley (West Side)	This ESA consists of several vegetation communities, including mature forested communities, successional thickets and savannahs. There are ten significant flora species, three significant vegetation communities and two significant fauna species.	35.5	No	Don River Valley
Vale of Avoca	This ESA is dominated by deciduous forests. There are four significant flora species and one significant fauna species.	16.3	No	Don River Valley
Iroquois Shoreline	This ESA consist of undisturbed remnants of the former Lake Iroquois shoreline in Toronto and contains bluff slopes. There are five significant flora species.	2.4	No	Don Watershed
Humber Valley	This ESA consists of cattail marshes, graminoid meadows and bottomland forests in the valley bottom, and deciduous forests on the slopes. Portions of the Provincially Significant Lower Humber River Wetland Complex are part of this ESA. There are 53 significant flora species, six significant vegetation communities and 15 significant fauna species. This ESA supports areas of waterfowl aggregations, important amphibian breeding habitat and acts as an important land linkage between the lake and the river corridor that facilitates wildlife movement.	43.5	Yes – 2% of the total migrant songbirds in Toronto are recorded from Humber Valley.	Humber River Valley
Tommy Thompson Park	This ESA is situated on a man-made peninsula and consists of cottonwood forests, sandy shorelines and wetlands in varying stages of early to mid-succession. There are 32 significant flora species, 12 significant vegetation communities and 14 significant fauna species. There is a significant amphibian breeding habitat for American Toad and Northern Leopard Frog, a global IBA, a nationally-significant nesting area for Black Crowned Night-herons, Ring-billed Gulls and regionally significant nesting area for Common Terns. It may also contain habitat for snake hibernacula.	191.3	Yes – 21% of the total migrant songbirds are recorded from Tommy Thompson Park. This is the second most significant migratory bird location.	Leslie Street Spit
Centre Island Meadow/ Wildlife Sanctuary	This ESA consists of several vegetation communities, including sand dunes, sand barrens, beach, thicket swamps, meadow marshes and aquatic marshes that are mixed with cultural communities. There are 43 significant flora species, seven significant vegetation communities and four significant fauna species.	23.9	Yes – 28% of total migrant songbirds are recorded from Toronto Islands. This is the most significant migratory bird location.	Toronto Islands
Hanlan's Beach	This ESA consist of open dunes, thicketed dunes, beach and thicket swamp communities. There are 43 significant flora species and 12 significant vegetation communities.	27.1		
Muggs Island	This ESA consists of open cottonwood forest, thickets, dry open sand barrens and small swamp depressions. There are 26 significant flora species and four significant vegetation communities.	11.2		
Snake Island Area	This ESA consists of open cottonwood woodlands, sand barrens and beaches. There are 36 significant flora species, five significant vegetation communities and one significant fauna species.	7.0		
Ward's Island	This ESA consists of dune ridge communities, meadows, beaches and woodlands. There are 47 significant flora species, ten significant vegetation communities and one significant fauna species. This ESA also supports breeding habitat for Northern Leopard Frog.	11.5		
Cherry Beach	This ESA is located along the shoreline west of the Leslie Street Spit and includes native and non-native vegetation communities in varying stages of succession. This ESA is considered to be a notable stopover area for migrant songbirds. There are 11 significant flora species and four significant vegetation communities.	8.4	Yes – 1% of total migrant songbirds are recorded from Cherry Beach.	Waterfront

Table 1-4: Summary of Existing ESAs in the Study Area

ESA Name	Characteristics, Rare Species and Communities, and Significant Ecological Function[1]	Area (ha)[1]	Significant Stopover for Migrant Songbirds (Yes/No)[2]	Location
Glen Stewart Ravine	This ESA consist of mature deciduous forests on the slope of the ravine and swamp communities that are fed by springs and seeps, which contribute to water quality and biodiversity. There are nine significant flora species, one significant vegetation community and one significant fauna species.	7.3	Yes – 1% of total migrant songbirds are recorded from Glen Stewart Ravine.	Waterfront
High Park	This ESA consists of black oak savannah and prairies, mature forests, ponds, aquatic and shallow marshes. There are 105 significant flora species, six significant vegetation communities and ten significant flora species.	83.3	Yes – 20% of total migrant songbirds are recorded from High Park. This is the third most significant migratory bird location.	Waterfront
Williamson Park	This ESA consist of deciduous upland, lowland forest and bottomland forests. There is a substantial seepage supports wetland communities. There are two significant flora species and one significant fauna species.	3.0	No	Waterfront

Notes: 1. Descriptions of ESA characteristics, rare species and communities, significant ecological function and calculated areas were taken from Appendix 2 of the Environmentally Significant Areas in the City of Toronto (North-South Environmental Inc. et al., 2012).

2. Percentages of Total Migrant Bird Records taken from Table 1 of the Migratory Birds in the City of Toronto – A Literature Review and Data Assessment Final Report (Dougan & Associates and North-South Environmental Inc., 2009). Stopover for Migrant Songbirds were considered Significant at those locations that comprised of 1% or greater of the total migrant bird records reported.

The West End of Lake Ontario IBA just falls within the western most boundary (i.e. Secondary Bird Hazard Zone) of the Study Area and is approximately 12 km from the BBTCA. This IBA is recognized for the large congregations of waterfowl in late winter and early spring. Large flocks consisting of thousands of Greater Scaup, White-winged Scoter, Long-tailed Duck and other diving ducks have been recorded along the west end shoreline of Lake Ontario (IBA Canada, 2015). Other diving ducks that congregate in large numbers includes Common Goldeneye, King Eider, Red-breasted Merganser and Surf Scoter (IBA Canada, 2015). The invasion and colonization of Zebra and Quagga Mussels (Dreissena spp.) along the perimeter of the Lake have largely contributed to the large congregations by providing feeding areas (IBA Canada, 2015).

1.4.1.2 Wildlife

The following sections describe the different types of wildlife that occur within the terrestrial Study Area and summarize all of the available information and data collected from the background information review and agency correspondence with respect to resident and migratory birds, mammals, reptile and amphibians, and butterflies. Each of these sections describe the species generally found within the terrestrial Study Area as well as the species that occur in more localized areas which may be potentially affected by the future baseline and proposed future scenarios. Specifically, these localized areas include the BBTCA grounds, Toronto Islands and Tommy Thompson Park/Leslie Street Spit. Special consideration is also given to identifying any SOCC and SAR.

1.4.1.2.1 Resident/Migratory Birds

Bird species records were requested from Bird Studies Canada Nature Counts for the terrestrial Study Area. Records from the following sources and monitoring programs were analyzed for species diversity and for any bird SOCC and SAR:

- CMMN Daily Estimated Totals;
- eBirds Database;
- Great Backyard Bird Count;
- Marsh Monitoring Birds;
- OBBA 2001 and 2005, including highest breeding evidence, rare and colonial species, and SAR;
- EC-CWS Ontario Shoreline Survey; and
- Ontario Bird Feeder Survey (Project FeederWatch).

Based on these records, a total of 353 bird species have been recorded in the terrestrial Study Area between 1838 and 2014. A comprehensive list of these bird species is provided in **Appendix B**. The majority of these species are common with abundant populations. A total of 35 bird SOCC, some of which are considered to be rare breeders in Ontario have also been recorded; however, these are mostly migrants passing through and not breeding in the GTA. A total of 17 bird SAR have been recorded, including eight Threatened species, eight Endangered species and one Extirpated species. Some of these bird SAR and SOCC are historical records (more than 50 years old) while others are more recent. These species are further discussed in **Section 1.4.2.2**.

BBTCA Grounds

The most commonly observed birds in the immediate vicinity of the BBTCA runways are those that loaf and feed in the open water of the Western Channel and Inner Harbour including Mallard, Canada Goose, Ring-billed Gull, and Double-crested Cormorants (CH2M HILL, 2013; Dillion Consulting Ltd., 2011). Wildlife data received from Falcon Environmental Services Inc. (2014) on February 7, 2015 were used to determine the bird species that occur on the BBTCA grounds. A total of 39 bird species encountered were identified by Wildlife Control Officers on the BBTCA grounds in 2014 (**Table 1-5**). Ring-billed Gulls and/or other gulls and terns, as well as Double-Crested Cormorants were the most frequently encountered. Other relatively abundant species encountered include Canada Goose and Mallard. European Starling and Barn Swallows were also relatively numerous on the BBTCA grounds.

Three species designated as Threatened under the *ESA* were recorded on BBTCA grounds in 2014. Observations recorded by Falcon Environmental Services Inc. include a significant number of Barn Swallow (799 or 1% of the total number of birds identified to species in 2014), Bank Swallows (63 or < 1% of the total number of birds identified to species in 2014), and on one occasion two of Chimney Swifts. A total of four SOCC were also observed on BBTCA grounds, this included several records of Caspian Tern, Great Egret, Long-tailed Duck and Peregrine Falcon. Most birds were likely drawn to habitats provided by Lake Ontario, immediately adjacent to the BBTCA grounds, while others may have been attracted to the flying insects, perching structures, worms and standing water that sometimes occur on the flat and open airfield. The BBTCA grounds consist of paved runways and manicured grass that supports few breeding or migratory birds; however, nearby surrounding habitats do provide nesting, foraging, and stopover habitats such as the surrounding water, other parts of the Toronto Islands and TTP/Leslie Street Spit (CH2M HILL, 2013; Dillion Consulting Ltd., 2011).

Table 1-5: Bird Species Abundances Observed on BBTCA Grounds by Falcon Environmental Services Inc. in 2014

Common Name	Scientific Name	Status		Total Number of Individuals Encountered
		S-Rank[1]	ESA Status[2]	
American Black Duck	*Anas rubripes*	S4B	-	333
American Crow	*Corvus brachyrhynchos*	S5B	-	89
American Kestrel	*Falco sparverius*	S4B	-	64
American Robin	*Turdus migratorius*	S5B	-	29
Bank Swallow	*Riparia riparia*	S4B	THR	63
Barn Swallow	*Hirundo rustica*	S4B	THR	799
Belted Kingfisher	*Megaceryle alcyon*	S4B	-	1
Blue Jay	*Cyanocitta cristata*	S5B	-	50
Canada Goose	*Branta canadensis*	S5B	-	13,713
Caspian Tern	*Hydroprogne caspia*	S3B	NAR	32
Chimney Swift	*Chaetura pelagica*	S4B	THR	2
Common Merganser	*Mergus merganser*	S5B	-	23
Common Tern	*Sterna hirundo*	S4B	NAR	141
Cooper's Hawk	*Accipiter cooperii*	S4B	NAR	2
Double-crested Cormorant	*Phalacrocorax auritus*	S5B	NAR	48,821
Eastern Phoebe	*Sayornis phoebe*	S5B	-	2
European Starling	*Sturnus vulgaris*	SNA	-	1,709
Great blue Heron	*Ardea herodias*	S4B	-	6
Great Egret	*Ardea alba*	S2B	-	6
Harlequin Duck	*Histrionicus histrionicus*	SNA	-	5
Herring Gull	*Larus argentatus*	S5B	-	128
Hooded Merganser	*Lophodytes cucullatus*	S5B	-	7
Killdeer	*Charadrius vociferus*	S5B	-	78

Table 1-5: Bird Species Abundances Observed on BBTCA Grounds by Falcon Environmental Services Inc. in 2014

Common Name	Scientific Name	Status		Total Number of Individuals Encountered
		S-Rank[1]	ESA Status[2]	
Long-tailed Duck	*Clangula hyemalis*	S3B	-	12
Mallard Duck	*Anas platyrhynchos*	S5B	-	3,271
Mourning Dove	*Zenaida macroura*	S5B	-	9
Mute Swan	*Cygnus olor*	SNA	-	374
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B	-	2
Peregrine Falcon	*Falco peregrinus*	S3B	SC	6
Red-breasted Merganser	*Mergus serrator*	S4B	-	2
Red-tailed Hawk	*Buteo jamaicensis*	S5B	NAR	59
Red-winged Blackbird	*Agelaius phoeniceus*	S4B	-	28
Ring-billed Gull	*Larus delawarensis*	S5B	-	25,152
Savannah Sparrow	*Passerculus sandwichensis*	S4B	-	291
Snowy Owl	*Bubo scandiacus*	SNA	NAR	5
Spotted Sandpiper	*Actitis macularius*	S5B	-	1
Tree Swallow	*Tachycineta bicolor*	S4B	-	5
Turkey Vulture	*Cathartes aura*	S5B	-	2
Wild Turkey	*Meleagris gallopavo*	S5B	-	8

[1] ***S-rank:*** *The natural heritage provincial ranking system (provincial S-rank) is used by the MNRF Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities.* The following status definitions were taken from NatureServe Explorer's (2015) National and Subnational Conservation Status Definitions available at http://explorer.natureserve.org/nsranks.htm:

SX Presumed Extirpated—Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SH Possibly Extirpated (Historical)—Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for.

S1 Critically Imperiled—Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.

S2 Imperiled—Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.

S3 Vulnerable—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 Secure—Common, widespread, and abundant in the nation or state/province.

SNR Unranked—Province conservation status not yet assessed.

SU Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNA Not Applicable —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

S#S# Range Rank —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Breeding Status Qualifiers

B – Breeding Conservation status refers to the breeding population of the species in the province.

N – Nonbreeding Conservation status refers to the non-breeding population of the species in the province.

M – Migrant Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.

Note: *A breeding status is only used for species that have distinct breeding and/or non-breeding populations in the province. A breeding-status S-rank can be coupled with its complementary non-breeding-status S-rank if the species also winters in the province, and/or a migrant-status S-rank if the species occurs regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. The two (or rarely, three) status ranks are separated by a comma (e.g., "S2B,S3N" or "SHN,S4B,S1M").*

Other Qualifiers

? -Inexact or Uncertain — Denotes inexact or uncertain numeric rank. (The ? qualifies the character immediately preceding it in the S-rank.)

[2]ESA Status: *The Endangered Species Act 2007 (ESA) protects species listed as Threatened and Endangered on the Species at Risk in Ontario (SARO) List on provincial and private land. The Minister lists species on the SARO list based on recommendations from the Committee on the Status of Species at Risk in Ontario (COSSARO), which evaluates the conservation status of species occurring in Ontario. The following are the categories of at risk:*

END *(Endangered)*	*A species facing imminent extinction or extirpation in Ontario.*
THR *(Threatened)*	*Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a large portion of its Ontario range if the limiting factors are not reversed.*
SC *(Special Concern)*	*A species that may become threatened or endangered due to a combination of biological characteristics and identified threats.*
NAR *(Not at Risk)*	*A species that has been evaluated and found to be not at risk.*

Bird species recorded by AECOM avian biologists between 2014 and 2015 in the vicinity of the proposed runway extensions and on the BBTCA grounds are further discussed in **Section 1.4.2.2**.

Toronto Islands

The Toronto Islands and associated shorelines provide important bird habitats, particularly to resident and migratory waterfowl. Data from the 2014 and 2015 Mid-Winter Surveys and the 2010 Migrant Waterfowl Surveys collected by EC-CWS were provided to AECOM on February 4, 2015. These data (EC-CWS, 2015) were analysed to determine the diversity and relative abundance of waterfowl species present in the vicinity of the Toronto Islands. The results of migrant waterfowl (2010) and midwinter surveys (2014 and 2015) for the Toronto Islands area, including TTP/Leslie Street Spit, conducted by the EC-CWS are summarized in **Table 1-6**. During these surveys, a total of 15 species of waterfowl were recorded. None of the species observed are listed under the *ESA.* Furthermore, the majority of the species that were observed during these waterfowl surveys are ranked as S4 or S5 and thereby considered common and secure in Ontario. The one provincially rare species, Long-tailed Duck (S3), recorded during these surveys was present in substantially higher numbers than observed for other waterfowl; this result was consistent across survey types. Other species that occurred in consistently high numbers in the Toronto Islands area include Mallard, unidentified Scaup species and Canada Goose.

Table 1-6: Waterfowl Abundance from Migrant Waterfowl (2010) and Midwinter Surveys Completed (2014-2015) by EC-CWS in the Vicinity of the Toronto Islands and TTP/Leslie Street Spit

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Abundance				Total
				2010 Spring Migration Survey	*2010 Fall Migration Survey*	*2014 Midwinter Survey*	*2015 Midwinter Survey*	
American Black Duck	*Anas rubripes*	S4	-	0	51	50	0	101
American Wigeon	*Anas americana*	S4	-	0	5	0	0	5
Bufflehead	*Bucephala albeola*	S4	-	337	19	0	0	356
Canada Goose	*Branta canadensis*	S5	-	112	848	30	140	1130
Common Goldeneye	*Bucephala clangula*	S5	-	151	42	10	0	203
Common Merganser	*Mergus merganser*	S5	-	0	1	6	0	7
Gadwall	*Anas strepera*	S4	-	4	0	0	0	4
Long-tailed Duck	*Clangula hyemalis*	S3	-	1691	9533	280	284	11788

Table 1-6: Waterfowl Abundance from Migrant Waterfowl (2010) and Midwinter Surveys Completed (2014-2015) by EC-CWS in the Vicinity of the Toronto Islands and TTP/Leslie Street Spit

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Abundance				Total
				2010 Spring Migration Survey	*2010 Fall Migration Survey*	*2014 Midwinter Survey*	*2015 Midwinter Survey*	
Mallard	*Anas platyrhynchos*	S5	-	135	1330	27	25	1517
Mute Swan	*Cygnus olor*	SNA	-	76	312	13	10	411
Northern Pintail	*Anas acuta*	S5	-	0	2	0	0	2
Red-breasted Merganser	*Mergus serrator*	S4	-	0	56	12	1	69
Ring-necked Duck	*Aythya collaris*	S5	-	5	0	0	0	5
Tundra Swan	*Cygnus columbianus*	S4	-	5	0	0	0	5
White-winged Scoter	*Melanitta fusca*	S4	-	2	0	1	0	3
Unidentified Divers	-	-	-	247	33	0	0	280
Unidentified Large Dabblers	-	-	-	56	421	0	0	477
Unidentified Mergansers	-	-	-	68	56	0	0	124
Unidentified Swans	*Cygnus sp.*	-	-	3	38	0	0	41
Unidentified Scaup	*Aythya sp.*	-	-	60	1145	70	0	1275
Unidentified Scoter	*Melanitta sp.*	-	-	0	2	0	0	2
Total				**2952**	**13894**	**499**	**460**	**17805**

Notes 1 and 2 – See Notes at the Bottom of Table 1-5.

Tommy Thompson Park/ Leslie Street Spit

Tommy Thompson Park (TTP) and the Leslie Street Spit provide a large area of habitat for wildlife in the otherwise highly developed Lake Ontario shoreline of Toronto and, for this reason they attract a variety of bird species (TRCA, 2010).

A nationally and globally significant number of colonial waterbirds have nested at TTP since the construction of the Leslie Street Spit in 1971 (IBA, 2015). Bird nesting at TTP has been monitored since the construction of the Leslie Street Spit. The waterbird nest data provided by TRCA on September 26, 2014 were used to determine the diversity and relative abundances of waterbirds at TTP. Results from this dataset are presented on **Figure 1-5** and **Figure 1-6**. Based on the waterbird nest data provided by TRCA, seven colonial waterbirds have been confirmed nesting within TTP. TTP contains one of the largest global breeding colony of Ring-billed Gulls. This species occurred with the highest frequency during TRCA waterbird nest surveys (**Figure 1-5**). The second most abundant colonially-nesting waterbird at TTP is Double-crested Cormorant, which has been increasing since it first appeared in 1990 (TRCA, 1992; **Figure 1-5**). Other colonial waterbirds nesting, in smaller numbers, at TTP includes Black-crowned Night Heron, Common Tern, Caspian Tern, Herring Gull and Great Egret (**Figure 1-6**). The large number of Black-crowned Night Heron nesting at TTP comprises a significant proportion of the national population; however, this species has been gradually declining since 2000 (**Figure 1-6**).

"The Breeding Birds of Tommy Thompson Park" is a project that was initiated by TRCA in 2005 to monitor other nesting birds for the site (Derbyshire, 2006). The methods of these surveys consist of variable circular plot (VCP) counts, nest searching and casual observation (Derbyshire, 2006; TRCA, 2010). TRCA provided AECOM with data from 2013 and 2014 breeding bird surveys. The results of these surveys are summarized in **Table 1-7**. A total of 23 species were observed in TTP Breeding Bird Survey Zones E and F, which cover the southern extent of TTP. None of the species observed are listed under the *ESA* and all of the species are common with apparently secure or secure populations in Ontario.

Similar to the Toronto Islands, open water within and surrounding TTP/Leslie Street Spit provides important habitat for migrating and wintering populations of waterfowl. The most common species are Long-tailed Duck, Greater Scaup, Common Mergansers, Red-breasted Mergansers and Bufflehead (Freedman and McKay, 1977), Other waterfowl that have been recorded in the vicinity of TTP include Horned Grebe, Canada Goose, Gadwall, American Coot, Pied-billed Grebe, Common Teal, Redhead, Canvasback, Ruddy Duck, Common Loon, Brant, Northern Pintail, Green-winged Teal, Blue-winged Teal, American Wigeon, Northern Shoveler, Hooded Merganser, Black Scoter, Surf Scoter and White-winged Scoter (Freedman and McKay,1977; TRCA, 2006).

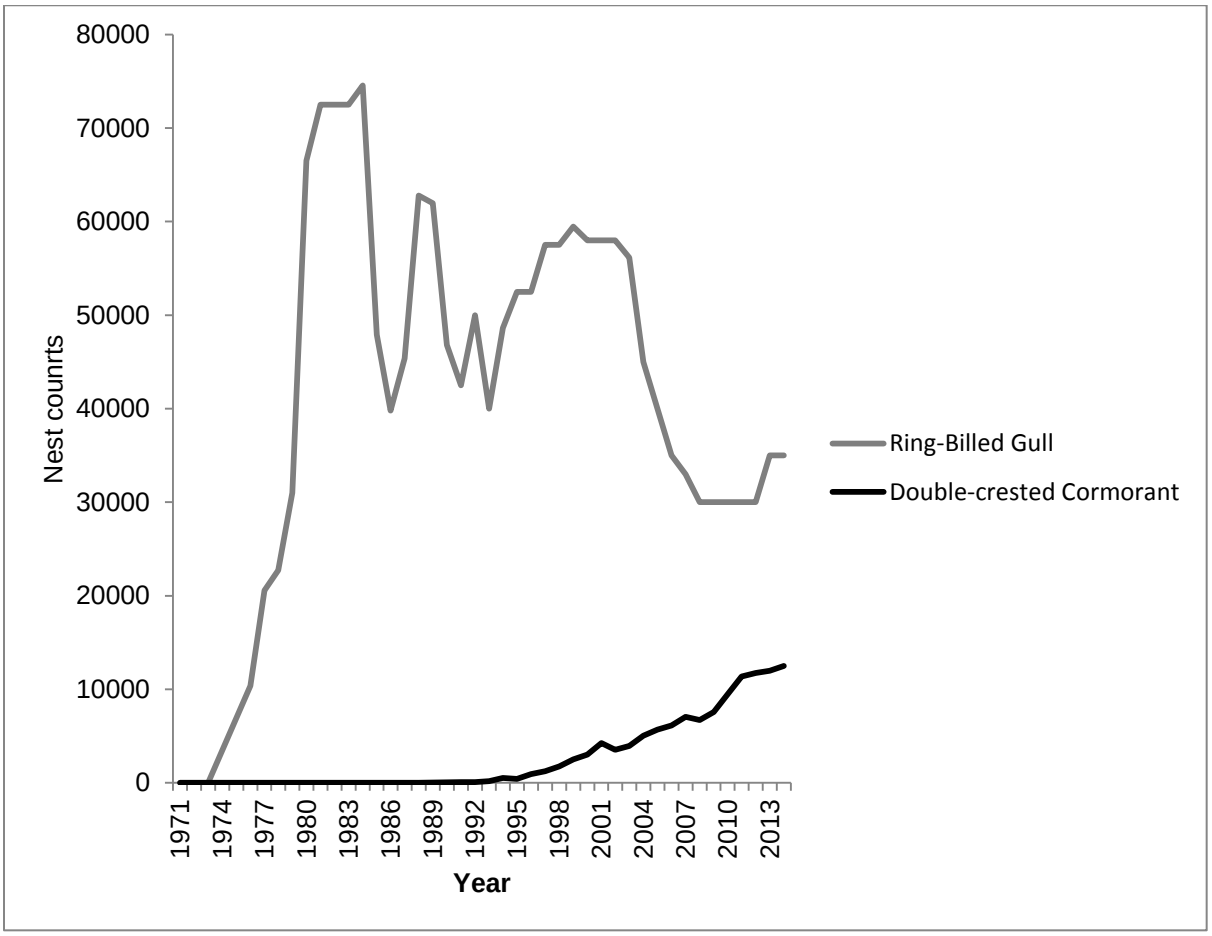


Figure 1-5: Nest Counts of the Most Abundant Colonially-nesting Waterbirds at Tommy Thompson Park, 1971-2014

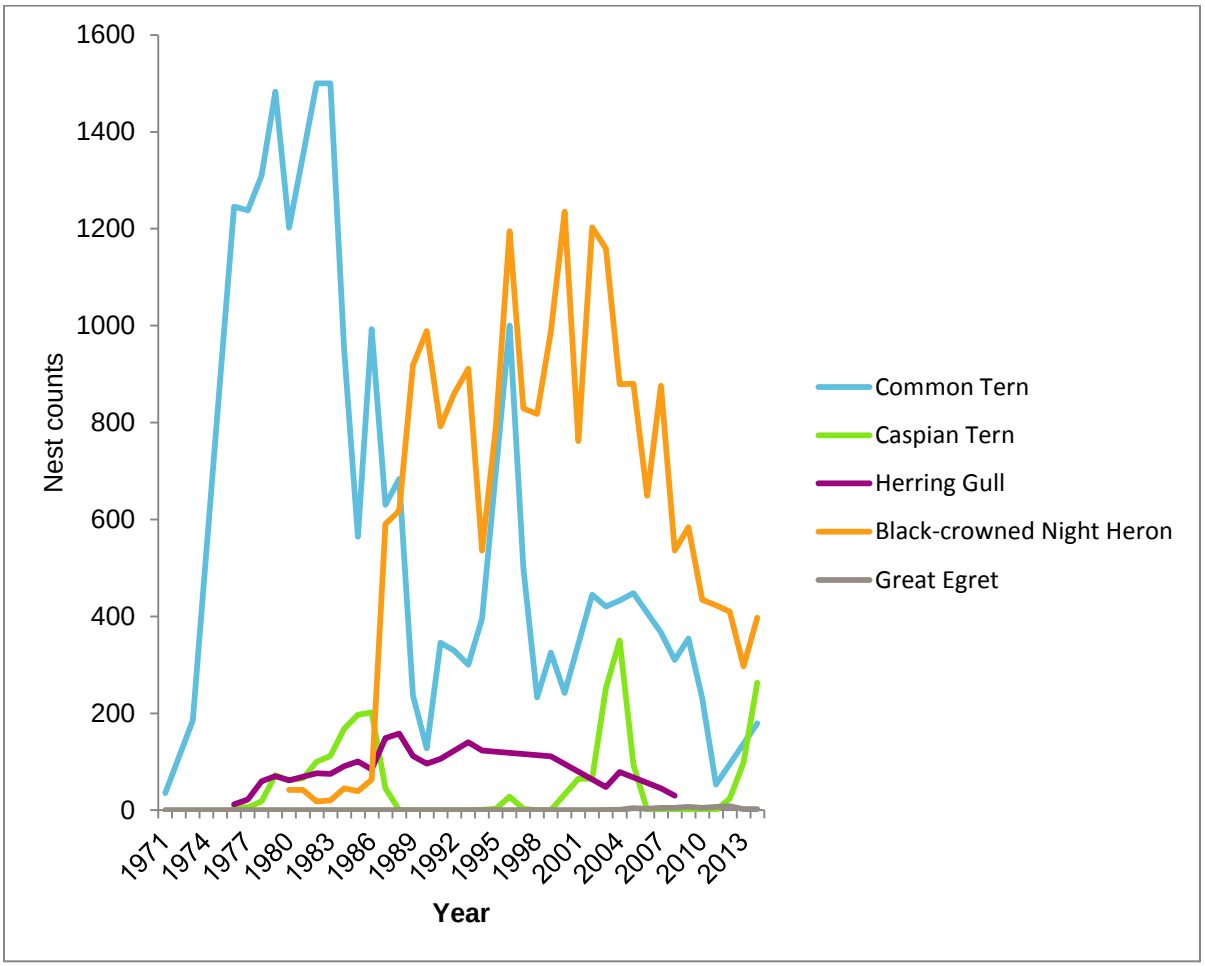


Figure 1-6: Nest Counts of Colonially-nesting Waterbirds Present in Lower Abundance at Tommy Thompson Park, 1971-2014

Table 1-7: Species Abundance Observed during Breeding Bird Survey in Zones E and F, Tommy Thompson Park, 2013-2014

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Abundance	
				2013	2014
American Goldfinch	*Cardeulis tristis*	S5	-	8	7
American Robin	*Turdus migratorius*	S5	-	28	35
Baltimore Oriole	*Icterus galbula*	S4	-	6	17
Black-billed Cuckoo	*Coccyzus erythropthalmus*	S5	-	0	1
Black-capped Chickadee	*Poecile atricapillus*	S5	-	2	0
Blue-gray Gnatcatcher	*Polioptila caerulea*	S4	-	1	2
Brown Thrasher	*Toxostoma rufum*	S4	-	0	1
Cedar Waxwing	*Bombycilla cedrorum*	S5	-	9	12
Common Grackle	*Quiscalus quiscula*	S5	-	1	0
Eastern Kingbird	*Tyrannus tyrannus*	S4	-	9	6
European Starling	*Sturnus vulgaris*	SNA	-	4	3
Gadwall	*Anas strepera*	S4	-	1	1
Gray Catbird	*Dumetella carolinensis*	S4	-	11	12
Killdeer	*Charadrius vociferus*	S5	-	0	3
Mallard	*Anas platyrhynchos*	S5	-	3	3

Table 1-7: Species Abundance Observed during Breeding Bird Survey in Zones E and F, Tommy Thompson Park, 2013-2014

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Abundance	
				2013	2014
Orchard Oriole	*Icterus spurius*	S4	-	2	1
Red-winged Blackbird	*Agelaius phoeniceus*	S4	-	76	106
Song Sparrow	*Melospiza melodia*	S5	-	2	6
Spotted Sandpiper	*Actitis macularius*	S5	-	4	2
Tree Swallow	*Tachycineta bicolor*	S4	-	7	8
Warbling Vireo	*Vireo gilvus*	S5	-	5	11
Willow Flycatcher	*Empidonax traillii*	S5	-	7	8
Yellow Warbler	*Setophaga petechia*	S5	-	47	59
Total	-	-	-	**233**	**305**

Notes 1 and 2 – See Notes at the Bottom of Table 1-5.

1.4.1.2.2 Mammals

The City of Toronto contains a high diversity of urban wildlife that has adapted to survive in a highly developed and densely populated area. Forested ravines, city parks and open spaces that make up the City of Toronto's Natural Heritage System provide important habitats for mammals (City of Toronto, 2012a). The forested ravines, such as those along the Humber and Don Rivers, act as wildlife corridors and allow for the movement of mammals between different areas to seek food, shelter and mates (City of Toronto, 2012a). The Lake Ontario shorelines, including the Toronto Islands and Leslie Street Spit also provide important habitats (City of Toronto, 2012a). According to the Atlas of the Mammals of Ontario (Dobbyn, 1994) and fauna records provided by TRCA on June 15, 2015, there are 32 mammal species recorded within the Study Area; these are summarized in **Table 1-8**. The majority of these mammals are common and widespread throughout Ontario; however, the Little Brown Bat and Northern Long-eared Bat are designated as Endangered and are protected under the *ESA*.

Table 1-8: Mammals within the Study Area

Taxon	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]
Bat	Little Brown Bat	*Myotis lucifugus*	S4	END
	Hoary Bat	*Lasiurus cinereus*	S4	-
	Silver-haired Bat	*Lasionycteris noctivagans*	S4	-
	Eastern Red Bat	*Lasiurus borealis*	S4	-
	Northern Long-eared Bat	*Myotis septentrionalis*	S3	END
	Big Brown Bat	*Eptesicus fuscus*	S5	-
Carnivore	Common Raccoon	*Procyon lotor*	S5	-
	Striped Skunk	*Mephitis mephitis*	S5	-
	Eastern Coyote	*Canis latrans*	S5	-
	Red Fox	*Vulpes vulpes*	S5	-
Hare	European Hare	*Lepus europaeus*	SNA	-
Mole	Hairy-tailed Mole	*Parascalops breweri*	S4	-
	Star-nosed Mole	*Condylura cristata*	S5	-
Opossum	Virginia Opossum	*Didelphis virginiana*	S4	-
Rabbit	Eastern Cottontail	*Sylvilagus floridanus*	S5	-
Rodent	Beaver	*Castor canadensis*	S5	-
	Deer Mouse	*Peromyscus maniculatus*	S5	-
	Eastern Gray Squirrel	*Sciurus carolinensis*	S5	-
	Eastern Chipmunk	*Tamias striatus*	S5	-
	Groundhog	*Marmota monax*	S5	-
	House Mouse	*Mus musculus*	SNA	-

Table 1-8: Mammals within the Study Area

Taxon	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]
	Porcupine	*Erethizon dorsatum*	S5	-
	Meadow Vole	*Microtus pennsylvanicus*	S5	-
	Norway Rat	*Rattus norvegicus*	SNA	-
	Meadow Jumping Mouse	*Zapus hudsonius*	S5	-
	Muskrat	*Ondatra zibethicus*	S5	-
	Red Squirrel	*Tamiasciurus hudsonicus*	S5	-
	White-footed Mouse	*Peromyscus leucopus*	S5	-
Shrew	Northern Short-tailed Shrew	*Blarina brevicauda*	S5	-
	Common Shrew	*Sorex cinereus*	S5	-
Ungulate	White-tailed Deer	*Odocoileus virginianus*	S5	-
Weasel	American Mink	*Mustela vison*	S4	-

Notes 1 and 2 – See Notes at the Bottom of Table 1-5.

BBTCA Grounds

Given the proximity of the BBTCA to the Toronto Islands, migration of mammals from the islands to the BBTCA grounds is possible. Several mammal species have been observed within the property boundaries of the BBTCA (Falcon Environmental Services Inc., 2013). These include American Mink, Eastern Coyote, Common Racoon and to a lesser extent White-tailed Deer and Red Fox (Falcon Environmental Services Inc., 2013). Rodents and other small mammals are also likely present within the BBTCA property but are more difficult to detect. Eastern Grey Squirrel, Beaver and Muskrats can also be observed within the Toronto Islands Park, which borders the BBTCA property (Falcon Environmental Services Inc., 2013 and 2014). All of these species are present and common in the Study Area.

Toronto Islands

The Toronto Islands support several mammal species identified within the Study Area. Much like elsewhere within the City of Toronto, the Toronto Islands support a relatively large population of racoons. Furthermore, the population of racoons is increasing due to an abundance of food and lack of predators on the islands (Kidd, Date n.d.). Red foxes are well established on the islands that they have colonized likely by travelling across the ice from the mainland in the winter. Red foxes prey on Eastern Cottontails, which helps manage their populations on the islands (Kidd, n.d.). Other mammal species that occur on Toronto Island, include Muskrats, Striped Skunks, Coyotes and occasionally White-tailed Deer (Kidd, n.d.). All of these species are present and common in the Study Area.

Tommy Thompson Park/ Leslie Street Spit

TTP contains a few mammal species that have colonized the peninsula including Eastern Coyote, Beaver, American Mink, Muskrats, Racoons, Eastern Cottontail, Groundhogs, Deer Mouse, White-footed Mouse and Meadow Vole (TRCA, n.d.-b). The forested areas and open areas above the water at TTP also provide suitable roosting and foraging habitat for several bat species such as Eastern Red Bat, Silver-haired Bat, Big Brown Bat and Little Brown Bat. Of these bat species, Little Brown Bat is listed as an Endangered SAR (TRCA, n.d.-b). Other uncommonly encountered mammal species at TTP include Norway Rat, Virginia Opossum and Eastern Gray Squirrel (TRCA, n.d.-b). With the exception of Little Brown Bat, all mammal species that are known to occur at the TTP are common in the Study Area.

1.4.1.2.3 Reptiles and Amphibians

Wetland communities associated with the Humber and Don River valley systems as well as lakeside wetlands at the Leslie Street Spit and Toronto Islands provide important amphibian habitats. The City of Toronto supports 25 native reptile and amphibian species (City of Toronto, 2012b); these are summarized in **Table 1-9**. Records from the Ontario Reptile and Amphibian Atlas (Ontario Nature, 2014) and fauna records provided by TRCA on June 15, 2015 are also incorporated into **Table 1-9**. All of the amphibian species are common and tolerant to urban disturbances. Of these reptile species, four are designated as Special Concern, and one Threatened Species. The remaining reptile species are all common and widespread in Ontario.

Table 1-9: Amphibians within the Study Area

Taxon	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]
Amphibian	American Bullfrog	*Lithobates catesbeianus*	S4	-
	American Toad	*Anaxyrus americanus*	S5	-
	Central Newt	*Notophthalmus viridescens louisianensis*	S4?	-
	Eastern Red-backed Salamander	*Plethodon cinereus*	S5	-
	Gray Treefrog	*Hyla versicolor*	S5	-
	Green Frog	*Lithobates clamitans*	S5	-
	Mudpuppy	*Necturus maculosus*	S4	-
	Northern Leopard Frog	*Lithobates pipiens*	S5	-
	Pickerel Frog	*Lithobates palustris*	S4	-
	Red-spotted Newt	*Notophthalmus viridescens viridescens*	S5	-
	Spotted Salamander	*Ambystoma maculatum*	S4	-
	Spring Peeper	*Pseudacris crucifer*	S5	-
	Western Chorus Frog (Carolinian Population)	*Pseudacris triseriata*	S4	-
	Wood Frog	*Lithobates sylvaticus*	S5	-
Snake	DeKay's Brownsnake	*Storeria dekayi*	S5	-
	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	S5	-
	Milksnake	*Lampropeltis triangulum*	S3	SC
	Northern Watersnake	*Nerodia sipedon sipedon*	S5	-
	Red-bellied Snake	*Storeria occipitomaculata*	S5	-
	Smooth Greensnake	*Opheodrys vernalis*	S4	-
Turtle	Blanding's Turtle	*Emydoidea blandingii*	S3	THR
	Eastern Musk Turtle	*Sternotherus odoratus*	S3	SC
	Midland Painted Turtle	*Chrysemys picta marginata*	S4	-
	Northern Map Turtle	*Graptemys geographica*	S3	SC
	Snapping Turtle	*Chelydra serpentina*	S3	SC

Notes 1 and 2 – See Notes at the Bottom of Table 1-5.

BTTCA Grounds

There are no records of amphibians or reptiles on the BBTCA grounds; however, this does not preclude their presence as most of the herpetofauna species are small and therefore can easily go undetected by Wildlife Control Officers.

Toronto Islands

The Toronto Islands support a moderate diversity of amphibian and reptile species. **Table 1-10** summarizes the amphibian and reptile species recorded by the TRCA in the Toronto Islands between 1990 and 2013.

Table 1-10: TRCA Records of Amphibians and Reptiles in Toronto Islands

Taxon	Common Name	Species Name	S-Rank[1]	ESA Status[2]	Year(s) Recorded
Amphibian	American Toad	*Anaxyrus americanus*	S4	-	2012
	Northern Leopard Frog	*Lithobates pipiens*	S5	-	2003 2007 2008 2010 2012
Reptile	Blanding's Turtle	*Emydoidea blandingii*	S3	THR	2009 2010 2012
	Northern Map Turtle	*Graptemys geographica*	S3	SC	1998
	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	S5	-	1990
	Midland Painted Turtle	*Chrysemys picta marginata*	S4	-	2003 2009 2010 2012 2013

Notes 1 and 2 – See Notes at the Bottom of Table 1-5.

Tommy Thompson Park/ Leslie Street Spit

The open grasslands, rocky areas and woodlands found at TTP provide suitable snake habitats for the following species: Eastern Gartersnake, Dekay's Brownsnake, Milksnake and Northern Red-bellied Snake (TRCA, n.d.-c). Turtle species documented basking on logs or rocks at TTP include Midland Painted Turtle, Red-eared Slider, Common Snapping Turtle, Blanding's Turtle and Northern Map Turtle (TRCA, n.d.-c). Of these species, Eastern Milksnake, Common Snapping Turtle and Northern Map Turtle are designated as Special Concern and Blanding's Turtle is designated as Endangered. There have been increased observations of Blanding's Turtles at TTP likely due to the presence of marshy areas with shallow water and continued habitat improvements by TRCA (TRCA, n.d.-b).

1.4.1.2.4 Butterflies

The City of Toronto is situated within a transitional area between the Carolinian Zone and the Great Lakes – St. Lawrence or Mixed Forest Zone and therefore contains a diverse mix of plant species that are characteristic to each of these zones which provide habitat for butterfly species (City of Toronto, 2011). This plant diversity provides a variety of habitats for numerous butterfly species that thrive within the City's ravines, parklands and waterfront (City of Toronto, 2011). According to the Ontario Butterfly Atlas Online (Jones *et al.*, 2015), there are 83 butterfly species that have been recorded within the larger Study Area between 1901 and 2014 (**Table 1-11**). Of these, the Monarch (*Danaus plexippus*) is the only species that is designated as a Special Concern species. A provincially significant butterfly species, the Tawny Emperor, has also been repeatedly recorded in the Toronto Islands between 2010 and 2014. The geographic distribution of this species is mainly restricted to further southwest such as Point Pelee and Pelee Island where it can be most commonly found (Environment Canada, 2014). The remaining butterfly species are common with relatively healthy populations.

Table 1-11: Butterfly Species Recorded within the Study Area (between 1901 and 2014)

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]
Acadian Hairstreak	*Satyrium acadica*	S4	-
American Copper	*Lycaena phlaeas*	S5	-

Table 1-11: Butterfly Species Recorded within the Study Area (between 1901 and 2014)

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]
American Lady	*Vanessa virginiensis*	S5	-
American Lady	*Vanessa virginiensis*	S5	-
American Snout	*Libytheana carinenta*	SNA	-
Appalachian Brown	*Lethe appalachia*	S4	-
Baltimore Checkerspot	*Euphydryas phaeton*	S4	-
Banded Hairstreak	*Satyrium calanus*	S4	-
Black Swallowtail	*Papilio polyxenes*	S5	-
Broad-winged Skipper	*Poanes viator*	S4	-
Bronze Copper	*Lycaena hyllus*	S5	-
Cabbage White	*Pieris rapae*	SNA	-
Canadian Tiger Swallowtail	*Papilio canadensis*	S5	-
Checkered White	*Pontia protodice*	SNA	-
Cherry Gall Azure	*Celastrina serotina*	S4?	-
Clouded Sulphur	*Colias philodice*	S5	-
Cloudless Sulphur	*Phoebis sennae*	SNA	-
Common Buckeye	*Junonia coenia*	SNA	-
Common Checkered Skipper	*Pyrgus communis*	SNA	-
Common Ringlet	*Coenonympha tullia*	S5	-
Common Sootywing	*Pholisora catullus*	S4	-
Common Wood-Nymph	*Cercyonis pegala*	S5	-
Compton Tortoiseshell	*Nymphalis l-album*	S5	-
Coral Hairstreak	*Satyrium titus*	S5	-
Crossline Skipper	*Polites origenes*	S4	-
Delaware Skipper	*Anatrytone logan*	S4	-
Dun Skipper	*Euphyes vestris*	S5	-
Eastern Comma	*Polygonia comma*	S5	-
Eastern Tailed Blue	*Cupido (Everes) comyntas*	S5	-
Eastern Tiger Swallowtail	*Papilio glaucus*	S5	-
Edwards' Hairstreak	*Satyrium edwardsii*	S4	-
European Skipper	*Thymelicus lineola*	SNA	-
European Skipper	*Thymelicus lineola*	SNA	-
Eyed Brown	*Lethe eurydice*	S5	-
Fiery Skipper	*Hylephila phyleus*	SNA	-
Giant Swallowtail	*Papilio cresphontes*	S4	-
Gray Comma	*Polygonia progne*	S5	-
Gray Hairstreak	*Strymon melinus*	S4	-
Great Spangled Fritillary	*Speyeria cybele*	S5	-
Green Comma	*Polygonia faunus*	S4	-
Harvester	*Feniseca tarquinius*	S4	-
Hickory Hairstreak	*Satyrium caryaevorus*	S4	-
Hobomok Skipper	*Poanes hobomok*	S5	-
Horace's Duskywing	*Erynnis horatius*	SNA	-
Juvenal's Duskywing	*Erynnis juvenalis*	S5	-
Least Skipper	*Ancyloxypha numitor*	S5	-
Little Glassywing	*Pompeius verna*	S4	-
Little Wood-Satyr	*Megisto cymela*	S5	-
Little Yellow	*Pyrisitia lisa*	SNA	-
Long Dash Skipper	*Polites mystic*	S5	-
Long-tailed Skipper	*Urbanus proteus*	SNA	-
Long-tailed Skipper	*Urbanus proteus*	SNA	-
Meadow Fritillary	*Boloria bellona*	S5	-
Milbert's Tortoiseshell	*Aglais milberti*	S5	-
Monarch	*Danaus plexippus*	S2N,S4B	SC
Mourning Cloak	*Nymphalis antiopa*	S5	-
Mustard White	*Pieris oleracea*	S4	-

Table 1-11: Butterfly Species Recorded within the Study Area (between 1901 and 2014)

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]
Northern Azure	*Celastrina lucia*	SNA	-
Northern Broken-Dash	*Wallengrenia egeremet*	S5	-
Northern Cloudywing	*Thorybes pylades*	S5	-
Northern Crescent	*Phyciodes cocyta*	S5	-
Northern Pearly-eye	*Lethe anthedon*	-	-
Ocola Skipper	*Panoquina ocola*	SNA	-
Orange Sulphur	*Colias eurytheme*	S5	-
Orange-barred Sulphur	*Phoebis philea*	SNA	-
Painted Lady	*Vanessa cardui*	S5	-
Painted Lady	*Vanessa cardui*	S5	-
Pearl Crescent	*Phyciodes tharos*	S4	-
Peck's Skipper	*Polites peckius*	S5	-
Pipevine Swallowtail	*Battus philenor*	SNA	-
Purplish Copper	*Lycaena helloides*	S3	-
Question Mark	*Polygonia interrogationis*	S5	-
Red Admiral	*Vanessa atalanta*	S5	-
Red Admiral	*Vanessa atalanta*	S5	-
Red-spotted Purple	*Limenitis arthemis astyanax*	S5	-
Sachem	*Atalopedes campestris*	SNA	-
Silver-spotted Skipper	*Epargyreus clarus*	S4	-
Silvery Blue	*Glaucopsyche lygdamus*	S5	-
Silvery Checkerspot	*Chlosyne nycteis*	S5	-
Spicebush Swallowtail	*Papilio troilus*	S4	-
Striped Hairstreak	*Satyrium liparops*	S5	-
Summer Azure	*Celastrina neglecta*	S5	-
Tawny Emperor	*Asterocampa clyton*	S2S3	-
Tawny-edged Skipper	*Polites themistocles*	S5	-
Variegated Fritillary	*Euptoieta claudia*	SNA	-
Viceroy	*Limenitis archippus*	S5	-
White-M Hairstreak	*Parrhasius m-album*	SNA	-
Wild Indigo Duskywing	*Erynnis baptisiae*	S4	-

Notes 1 and 2 – See Notes at the Bottom of Table 1-5.

BBTCA Grounds

There are no records of butterflies on the BBTCA grounds; however, this does not preclude their presence as butterflies are not usually recorded by Wildlife Control Officers.

Toronto Islands

The Toronto Islands consists of six different plant communities, including wet meadows, lagoon edges, beach strands, dunes Cottonwood woodlands and sand prairies. These vegetation communities support approximately 338 plant species as documented by Steve Varga in 1986 that have specifically adapted to grow in these types of communities (Varga, 1987). Some of these plant species are regionally or provincially rare (Varga, 1987). The varied habitats, flora diversity and the position of the Toronto Islands along the Ontario lakeshore together provide important stopover and resting areas for numerous migrating butterflies that forage for nectar found in grasses and wildflowers. **Table 1-12** below provides a summary of the 53 butterfly species that have been recorded in Toronto Islands between 1961 and 2014 (Jones *et al.*, 2015). Similarly to the broader Study Area, the Monarch, a Special Concern species, and the Tawny Emperor, a provincially rare species, have been recorded on the Islands.

Table 1-12: Butterfly Species Recorded within Toronto Islands between 1961 and 2014

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]
Acadian Hairstreak	*Satyrium acadica*	S4	-
American Lady	*Vanessa virginiensis*	S5	-
American Snout	*Libytheana carinenta*	SNA	-
Appalachian Brown	*Lethe appalachia*	S4	-
Black Swallowtail	*Papilio polyxenes*	S5	-
Bronze Copper	*Lycaena hyllus*	S5	-
Cabbage White	*Pieris rapae*	SNA	-
Clouded Sulphur	*Colias philodice*	S5	-
Common Buckeye	*Junonia coenia*	SNA	-
Common Ringlet	*Coenonympha tullia*	S5	-
Common Sootywing	*Pholisora catullus*	S4	-
Common Wood-Nymph	*Cercyonis pegala*	S5	-
Crossline Skipper	*Polites origenes*	S4	-
Delaware Skipper	*Anatrytone logan*	S4	-
Dun Skipper	*Euphyes vestris*	S5	-
Eastern Comma	*Polygonia comma*	S5	-
Eastern Taileded Blue	*Cupido comyntas*	S5	-
Eastern Tiger Swallowtail	*Papilio glaucus*	S5	-
European Skipper	*Thymelicus lineola*	SNA	-
Eyed Brown	*Lethe eurydice*	S5	-
Fiery Skipper	*Hylephila phyleus*	SNA	-
Giant Swallowtail	*Papilio cresphontes*	S4	-
Gray Hairstreak	*Strymon melinus*	S4	-
Great Spangled Fritillary	*Speyeria cybele*	S5	-
Harvester	*Feniseca tarquinius*	S4	-
Hobomok Skipper	*Poanes hobomok*	S5	-
Least Skipper	*Ancyloxypha numitor*	S5	-
Little Glassywing	*Pompeius verna*	S4	-
Little Wood-Satyr	*Megisto cymela*	S5	-
Little Yellow	*Pyrisitia lisa*	SNA	-
Milbert's Tortoiseshell	*Aglais milberti*	S5	-
Monarch	*Danaus plexippus*	S2N,S4B	Special Concern
Mourning Cloak	*Nymphalis antiopa*	S5	-
Northern Azure	*Celastrina lucia*	SNA	-
Northern Broken-Dash	*Wallengrenia egeremet*	S5	-
Northern Crescent	*Phyciodes cocyta*	S5	-
Orange Sulphur	*Colias eurytheme*	S5	-
Painted Lady	*Vanessa cardui*	S5	-
Pearl Crescent	*Phyciodes tharos*	S4	-
Pipevine Swallowtail	*Battus philenor*	SNA	-
Question Mark	*Polygonia interrogationis*	S5	-
Red Admiral	*Vanessa atalanta*	S5	-
Red-spotted Purple	*Limenitis arthemis astyanax*	S5	-
Silver-spotted Skipper	*Epargyreus clarus*	S4	-
Silvery Blue	*Glaucopsyche lygdamus*	S5	-
Spicebush Swallowtail	*Papilio troilus*	S4	-
Striped Hairstreak	*Satyrium liparops*	S5	-
Summer Azure	*Celastrina neglecta*	S5	-
Tawny Emperor	*Asterocampa clyton*	S2S3	-
Tawny-edged Skipper	*Polites themistocles*	S5	-
Variegated Fritillary	*Euptoieta claudia*	SNA	-
Viceroy	*Limenitis archippus*	S5	-
Wild Indigo Duskywing	*Erynnis baptisiae*	S4	-

Notes 1 and 2 – See Notes at the Bottom of Table 1-5.

The Toronto Islands are especially important for Monarchs that fly over Toronto because they function as a Migratory Butterfly Stopover Area. During their spring migration, Monarchs migrate northward from their overwintering grounds in central Mexico to their breeding habitats in eastern North America in March and early April (COSEWIC, 2010), generally arriving in Toronto by late May (COSEWIC, 2010 and City of Toronto, 2011). During their fall migration, Monarchs start to migrate in large numbers westwards along the Lake Ontario Shoreline through Toronto in August and September (COSEWIC, 2010 and City of Toronto, 2011). During the fall migrations, Monarchs have been known to form overnight roosts on trees along the lakeshore, most notably on Hanlan's Point and elsewhere in the Toronto Islands. In some years, Monarchs can number in the thousands. In 2014, a total of 744 individual Monarchs were recorded to the Ontario Butterfly Atlas from Centre Island to Hanlan's Point (Jones *et al*., 2015). Details of these records are provided in **Table 1-13**.

Table 1-13: Monarchs Recorded at Hanlan's Point in 2014

Date	Location	Number of Monarchs Recorded
August 7, 2014	Toronto, Centre Island to Hanlan's Point	52
September 17, 2014	Toronto, Centre Island to Hanlan's Point	292
September 22, 2014	Toronto, Centre Island to Hanlan's Point	400
	Total:	**744**

Tommy Thompson Park/Leslie Street Spit

TTP and the Leslie Street Spit also contain a variety of habitats for foraging and resting butterflies including dry and wet meadows, forests and thickets (TRCA, n.d.-d). TTP supports many of the same species that occur in the broader Study Area and the Toronto Islands such as Clouded Sulphur, Common Wood Nymph, Question Mark, American Painted Lady and Dun Skipper; and less common species such as Giant Swallowtail and Fiery Skipper (TRCA, n.d.-d). TTP also functions as a staging area for Monarchs where large congregations of these butterflies can be seen foraging and resting during their fall migration (TRCA, n.d.-d).

1.4.1.3 Wildlife Movement Corridors

As discussed above, forested ravines, city parks and open spaces that make up the City's Natural Heritage System provide important land linkages that facilitate wildlife movement across the urbanized landscape (MNRF, 2000). Generally, wildlife movement corridors are important to ensure genetic diversity in populations, to allow seasonal migration of animals and to allow animals to move from one habitat to another (e.g., from foraging to breeding habitat) in order to complete important life processes (MNRF, 2000). The most significant wildlife movement corridors that fall within the Study Area are the forested river valleys and ravines associated with the Don and Humber Rivers. These support the movement of migrant birds, mammals, amphibians, reptiles, and insects (City of Toronto, 2011, 2012a and 2012b; Dougan & Associates and North-South Environmental Inc., 2009). According to the *City of Toronto Migratory Birds Study* (Dougan & Associates and North-South Environmental Inc., 2009), migrant birds tend to use riparian corridors that are connected to lakeshores such as the Don River Valley which provides shelter and food for migrant waterbirds such as Black-crowned Night-Herons, Spotted Sandpipers and Belted Kingfishers among other bird species. Utility corridor such as hydro and railway right-of-ways can also act as wildlife movement corridors and provide habitat to some extent.

1.4.2 Results of Terrestrial Field Investigations

1.4.2.1 Terrestrial Habitats and Vegetation Survey

Generally, natural vegetation cover within the BBTCA property is minimal. The majority of the BBTCA property is comprised of runways that have been paved and manicured lawns that are actively managed. Natural vegetation is mostly limited to along the shoreline of the runways, where it has been overgrown by weeds, herbaceous and shrub species. Vegetation communities identified within 120 m of each end of the runway are shown on **Figure 1-7a** and **1-7b** and described in detail for each runway extension as follows.

East End of Existing Runway

The existing runway surface is tarmac and the immediately surrounding grass is regularly mowed. The stone rip-rap along the shoreline on the north and south sides of the runway is overgrown with adventive vegetation that is dominated by weedy and herbaceous species. There are no distinct vegetation communities noted on the north side but some of the herbaceous species growing in the rip-rap include Butter and Eggs, Wild Carrot, plantains, Viper's bugloss and Water Horehound. A few Red-osier Dogwoods and willows are also present. These species are considered to be low quality secondary growth species that are adapted to disturbed areas, and are probably controlled by occasional cutting or herbicide application.

The rip-rap on the south side of the runway is more densely vegetated than the north. This area is too small (<0.05 ha) to be classified into an ELC vegetation community but it is dominated by shrub species, including Red-osier Dogwood, Sandbar Willow, Carolina Poplar, American Elm, Eastern Cottonwood and Hybrid Crack Willow. Common herbaceous species cover between 25 and 60% of the rip-rap and include White Sweet Clover, Canada Goldenrod, Heath Aster, Butter and Eggs, Wild Carrot and Thicket Creeper. There are a few clusters of Purple Loosestrife, which is an invasive wetland species. Grass species consist of fescues, Quack Grass, Kentucky Blue Grass and Canada Bluegrass. Two locally and regionally rare plant species (Varga 2000), were recorded in this community: Hedge-nettle and Variegated Horsetail.

Several vegetation communities are also present within the Toronto Island Parks that are located outside but adjacent to the BBTCA property and near the east end of the existing runway. A cultural hedgerow (CUH) runs from Lakeshore Avenue and immediately adjacent to the fenceline bordering the south BBTCA property line and towards the shoreline in the east. This hedgerow is dominated by Austrian Pines, Cottonwoods and Crack Willows that have been planted. The ground cover mainly consists of Canada Goldenrods, Thicket Creeper and grasses. Hedge-nettle and Variegated Horsetail, both locally and regionally rare species, were also recorded here (Varga, 2000). South of the cultural hedgerow, there is a manicured lawn with several planted Crack Willows.

There are two vegetation communities located west of Lakeshore Avenue and south of the BBTCA property. These vegetation communities were likely managed as manicured lawns in the past for the park but were allowed to regenerate. Most of the trees in these communities are assumed to be planted. Immediately south of the BBTCA property, there is a young cultural thicket (CUT1). The canopy layer covers between 10 and 25% of this community and is dominated by Crack Willows with lesser amounts of White Spruce and Sugar Maple. The sub-canopy is co-dominated by Eastern White Cedar, White Mulberry and White Spruce and covers between 10 and 25% of the community. The shrub layer is dominated by Red-osier Dogwood with fewer Manitoba Maple, Spindle Tree and Black Walnut and covers between 25 and 60% of this community. The ground cover consists of grasses, Canada Goldenrod, Canada Thistle and Wild Carrot.

200m

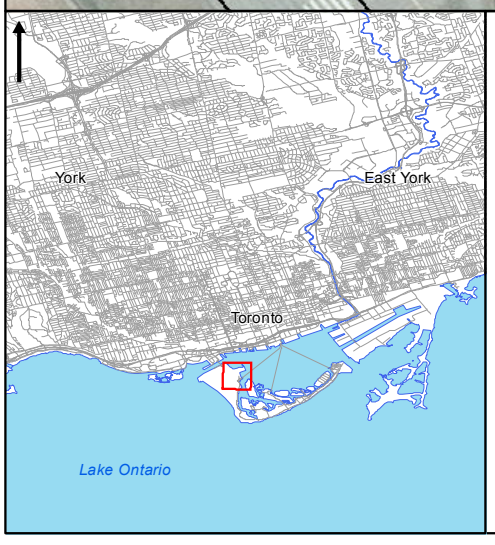
CUH

CUW

CUT 1-1

CUT 1-1

Lakeshore Ave



Legend

- Roads
- Marine Exclusion Zone
- Proposed 08-26 Runway Extension
- Existing Airport
- Runway Extension (200m Construction Footprint)

ELC Community

- CUH - Cultural Hedgerow
- CUT1 - Mineral Cultural Thicket
- CUW1 - Mineral Cultural Woodland

N

BBTCA EA: Natural Environment Cumulative Net Effects Assessment

East Runway Terrestrial Field Survey
October 2014

October 2015	1:3,000	Datum: NAD '83 UTM 17N Source: BING, ONB
P#: 60328546	V#: 003	**Figure 1-7a**

AECOM

0 50 100 200
Meters

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Map location: P:\60328546\900-CAD-GIS\103_Incoming\2015-10-26_FigureUpdates_60328546\60328545 - Billy Bishop\Design\Figure 2a-b - Terrestrial Field Survey.mxd
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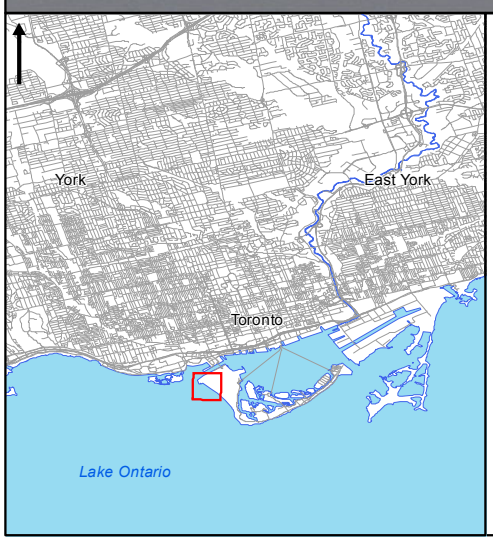
200m

CUT 1-1

SDO1-1

CUM1-1

BBO



Legend

- Roads
- Marine Exclusion Zone
- Proposed 08-26 Runway Extension
- Existing Airport
- Runway Extension (200m Construction Footprint)

ELC Community

- BBO1 - Mineral Open Beach/Bar
- CUM1-1 - Dry-Moist Old Field Meadow
- CUT1 - Mineral Cultural Thicket
- SDO1-1 - Little Bluestem – Switchgrass-Beachgrass Open Dune

N

BBTCA EA: Natural Environment Cumulative Net Effects Assessment

West Runway Terrestrial Field Survey
October 2014

October 2015	1:3,000	Datum: NAD '83 UTM 17N Source: BING, ONB
P#: 60328546	V#: 003	**Figure 1-7b**

AECOM

0 50 100 200
Meters

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Map location: P:\60328546\900-CAD-GIS\03_Incoming\2015-10-26_FigureUpdates_60328546\60328546 - Billy Bishop\Design\Figure 2a-b - Terrestrial Field Survey.mxd
Date Saved: 26/10/2015 5:25:42 PM

A young cultural woodland (CUW1) is located south of this thicket. The canopy covers between 25 and 60% of the woodland and is dominated by Hybrid Crack Willow with some Wych Elm. The sub-canopy is dominated by Wych Elm with some Eastern White Cedar, White Mulberry and Small Leaf Linden. The ground cover consists of Canada Goldenrod, Bitter Nightshade and Garlic Mustard.

West End of Existing Runway

There is generally very little rip-rap and vegetation along the edge of the existing runway as it is mostly constructed of steel sheet pile walls with a flat concrete deck. There is a small cultural thicket (CUT1) near the southwest corner of the runway which is dominated by small shrubs of Sandbar Willows, Black Locust and Red-osier Dogwood with lesser amounts of Eastern Cottonwood, and American Elm. The ground cover consists of Reed-canary Grass, New England Aster, Canada Goldenrod, Wild Carrot, Flat-topped Goldenrod and White Sweet Clover. A locally and regionally rare plant according to Varga (2000), Nodding Wild Rye, was recorded in this community.

Approximately 400 m southwest of the runway, there is a cultural meadow (CUM1-1) located on a berm composed of fill and gravel that has been overgrown with herbaceous vegetation. Dominant herbaceous species include Tall Wormwood, White Sweet Clover, Flat-topped Goldenrod, Nodding Wild Rye, Canada Goldenrod, Canada Bluegrass and White Tumbleweed. A few Sandbar Willows and Carolina Poplars are scattered throughout the meadow. Nodding Wild Rye and Tall Wormwood are both ranked as locally and regionally rare plants (Varga, 2000). One locally and regionally uncommon species, Common Evening-primrose was also recorded in this meadow (Varga, 2000).

A sand dune community, Little Bluestem – Switchgrass – Beachgrass Open Dune (SDO1-1), exists immediately south of the runway and runs adjacent to the southwestern boundary of the BBTCA property along Hanlan's Point Beach. SDO1-1 is a rare sand dune community in Ontario with a provincial ranking of S2 (MNR, 2000). There is very sparse canopy cover (less than 10%) of Cottonwood and Black Locust. The sub-canopy is also sparse, is dominated by Sandbar Willow with lesser amounts of Siberian Elm and Trembling Aspen, and covers less than 10% of the community. The ground cover is dominated by Short-liguled Beach Grass and Tall Wormwood with fewer goldenrod species and White Sweet Clover. Short-liguled Beach Grass is a provincially significant species with a provincial ranking of S3 (vulnerable). Several clusters of this species are located within 120 m of the existing runway (refer to **Figure 1-7** for locations). Additionally, several species that are locally and regionally rare were recorded in this community and include Variegated Horsetail, Tall Wormwood, American Sea-Rocket, Hedge Nettle, Slender-leaved Agalinis, Baltic Rush, Nodding Wild Rye, Slender Wheat Grass and Switch Grass (Varga, 2000). Sand Dropseed is locally uncommon but regionally rare. Other locally uncommon species recorded here include Common Evening-primrose, Silverweed and Blue-joint Grass.

The immediate shoreline of Lake Ontario consists of Open Beach (BBO1) which is an active zone subject to wave action and ice scour. Consequently, this community has minimal vegetation cover. Occasional American Sea-rocket or Tall Wormwood are present but vegetation cover is generally about 1% or less.

A total of 103 vascular plant species were recorded for both ends of the existing runway. Of these, 51 are native species and 49 are non-native species, indicating a high degree of disturbance. A complete list of recorded vascular plants is provided in **Appendix C**. **Table 1-14** below summarizes the provincially significant, rare and uncommon plants identified near the east and west ends of the existing runway.

Table 1-14: Rare and Uncommon Plant Species

Common Name	Scientific Name	S – Rank[1]	Provincially Significant	Locally Rare (Toronto)[2]	Locally Uncommon (Toronto)[2]	Regionally Rare (Ecoregion 7E-4)[2]	Regionally Uncommon (Ecoregion 7E-4)[2]
Variegated Horsetail	*Equisetum variegatum ssp. variegatum*	S5		√		√	
Tall Wormwood	*Artemisia campestris ssp. caudata*	S4S5		√		√	
American Sea-rocket	*Cakile edentula*	S4		√		√	
Hooded Skullcap	*Scutellaria galericulata*	S5			√		√
Hedge-nettle	*Stachys palustris*	SE5		√		√	
Common Evening-primrose	*Oenothera biennis*	S5			√		√
Silverweed	*Potentilla anserina ssp. anserina*	S5			√		
Slender-leaved Agalinis	*Agalinis tenuifolia var. tenuifolia*	SU		√		√	
Baltic Rush	*Juncus balticus*	S5		√		√	
Short-liguled Beach Grass	*Ammophila breviligulata*	S3	√	√		√	
Blue-joint Grass	*Calamagrostis canadensis*	S5			√		
Nodding Wild Rye	*Elymus canadensis*	S4S5		√		√	
Slender Wheat Grass	*Elymus trachycaulus ssp. trachycaulus*	S5?		√		√	
Switch Grass	*Panicum virgatum*	S4		√		√	
Sand Dropseed	*Sporobolus cryptandrus*	S4			√	√	

[1] ***S-rank:*** *The natural heritage provincial ranking system (provincial S-rank) is used by the MNRF Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities.* The following status definitions were taken from NatureServe Explorer's (2015) National and Subnational Conservation Status Definitions available at http://explorer.natureserve.org/nsranks.htm:

SX - Presumed Extirpated—Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SH- Possibly Extirpated (Historical)—Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for.
S1 - Critically Imperiled—Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.
S2-Imperiled—Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.
S3 - Vulnerable—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 - Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 - Secure—Common, widespread, and abundant in the nation or state/province.
SNR - Unranked—Province conservation status not yet assessed.
SU - Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA - Not Applicable —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S# - Range Rank —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Other Qualifiers
? -Inexact or Uncertain—Denotes inexact or uncertain numeric rank. (The ? qualifies the character immediately preceding it in the S-rank.)

[2] **Source:** *Varga, S., editor. August 2000. Distribution and status of the vascular plants of the Greater Toronto Area. Ontario Ministry of Natural Resources, Aurora District. 103 pp.*

1.4.2.2 Avian Surveys

As mentioned in **Section 1.2.2**, surveys generally consisted of two point count stations at each end of the existing runway on the BBTCA grounds (see **Figure 1-8**), with the exception of the survey conducted October 27, 2014 where two different vantage points with clear views of each end of the existing runway were selected from the mainland. Surveys were conducted in varying weather conditions to the extent possible in order to document bird species richness, abundance and behaviour under different weather conditions. The survey dates, times and weather conditions from these surveys are presented in **Appendix D**.

A total of 38 bird species were recorded on or in close proximity to the BBTCA grounds across all of avian surveys conducted between 2014 and 2015; these species are summarized in **Table 1-15**. The most abundant species recorded consistently across all surveys included Double-crested Cormorant, Long-tailed Duck, Ring-billed Gull and Canada Goose.

Table 1-15: Avian Species Recorded during Avian Surveys at the BBTCA 2014-2015

Family	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]
Accipitridae	Red-tailed Hawk	*Buteo jamaicensis*	S5	NAR
Alaudidae	Horned Lark	*Eremophila alpestris*	S5B	-
Anatidae	Bufflehead	*Bucephala albeola*	S4	-
	Canada Goose	*Branta canadensis*	S5	-
	Canvasback	*Aythya valisineria*	S1B,S4N	-
	Common Merganser	*Mergus merganser*	S5B,S5N	-
	Gadwall	*Anas strepera*	S4	-
	Greater Scaup	*Aythya marila*	S4	-
	Long-tailed Duck	*Clangula hyemalis*	S3B	-
	Mallard	*Anas platyrhynchos*	S5	-
	Mute Swan	*Cygnus olor*	SNA	-
	Red-breasted Merganser	*Mergus serrator*	S4B,S5N	-
	Redhead	*Aythya americana*	S2B,S4N	-
	Greater Scaup	*Aythya marila*	-	-
	Trumpeter Swan	*Cygnus buccinator*	S4	NAR
	White-winged Scoter	*Melanitta fusca*	S4B,S4N	-
	Great Egret	*Ardea alba*	S2B	-
Charadriidae	Killdeer	*Charadrius vociferus*	S5B,S5N	-
Corvidae	American Crow	*Corvus brachyrhynchos*	S5B	-
	Blue Jay	*Cyanocitta cristata*	S5	-
Emberizidae	Savannah Sparrow	*Passerculus sandwichensis*	S4B	-
	Song Sparrow	*Melospiza melodia*	S5B	-
Falconidae	American Kestrel	*Falco sparverius*	S4	-
	Peregrine Falcon	*Falco peregrinus*	S3B	SC
Hirundinidae	Bank Swallow	*Riparia riparia*	S4B	THR
	Barn Swallow	*Hirundo rustica*	S4B	THR
	Cliff Swallow	*Petrochelidon pyrrhonota*	S4B	-
	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B	-
Icteridae	Red-winged Blackbird	*Agelaius phoeniceus*	S4	-

Table 1-15: Avian Species Recorded during Avian Surveys at the BBTCA 2014-2015

Family	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]
Laridae	Caspian Tern	*Hydroprogne caspia*	S3B	NAR
	Common Tern	*Sterna hirundo*	S4B	NAR
	Herring Gull	*Larus argentatus*	S5B,S5N	-
	Ring-billed Gull	*Larus delawarensis*	S5B,S4N	-
Phalacrocoracidae	Double-crested Cormorant	*Phalacrocorax auritus*	S5B	NAR
Picidae	Red-bellied Woodpecker	*Melanerpes carolinus*	S4	-
Scolopacidae	Semipalmated Sandpiper	*Calidris pusilla*	S3B,S4N	-
	Spotted Sandpiper	*Actitis macularius*	S5	-
Sturnidae	European Starling	*Sturnus vulgaris*	SNA	-

Notes 1 and 2 – See Notes at the Bottom of Table 1-5.

All of the waterbirds (e.g. waterfowl, gulls, herons, shorebirds, etc.) recorded within 500 m of the existing runway during these surveys are summarized in **Appendix D**. These were the most prominent group of birds utilizing the open waters in the vicinity of the BBTCA. Records of waterbirds were grouped into bird survey zones based on relative distances and direction from each end of the existing runway in order to better understand the spatial distribution of waterbirds. **Figure 1-8** provides a visual representation of the bird survey zones. Other non-waterbird species recorded during the surveys are discussed below.

The following sections further discuss the results of each seasonal avian survey completed at each end of the proposed runway extension.

1.4.2.2.1 Fall Migration Surveys

Fall migration surveys were conducted on October 3 and 27, and November 13 and 25, 2014. Within 500 m of the east end of the proposed runway extension, the most abundant waterbird species recorded were Ring-billed Gull, Red-breasted Merganser, Canada Goose, Double-crested Cormorant and Long-tailed Duck. Ring-billed Gulls, either in small flocks or individually, were generally recorded flying at an altitude of between 4 to 20 m within 500 m of the east end of the runway. Several individuals were observed perching on the pier along with Double-crested Cormorants and Herring Gulls on October 3, 2014. Other individuals of Ring-billed Gull were more generally loafing in the open water in the vicinity of the runway or along the mainland shoreline. Groups or scattered individuals of Red-breasted Merganser, Double-crested Cormorant, Long-tailed Duck, Bufflehead, Mallard and Canada Goose were observed swimming, foraging and/or diving in the open water within 500 m of the east end of the proposed runway extension. Gaggles of Canada Goose, consisting of approximately 50 individuals, and a few Mute Swans were also observed wading in the water east of Mugg's Island, more than 500 m south of the runway. Other non-waterbird species included an American Kestrel flying around the Old Terminal Building on the BBTCA grounds.

Within 500 m of the west end of the proposed runway extension, the most abundant waterbird species recorded were Red-breasted Merganser, Canada Goose, Ring-billed Gull and Long-tailed Duck. Red-breasted Mergansers, scattered in large groups of 40 and 100 individuals, were noted to be swimming out in the water within 500 m from the proposed runway extension. Small flocks of one to five Ring-billed Gulls were flying within 400 m of the proposed runway extension and larger flocks were loafing in the water. Small groups or scattered individuals of Canada Goose and / or Long-tailed Duck were observed wading, swimming, feeding and /or diving in the water within 500 m of the

proposed runway extension. Other non-waterbird species observed included Peregrine Falcon, Blue Jay and Red-bellied Woodpecker. On October 3, 2014, one Peregrine Falcon flew approximately 5 m above and across the water within 200 m of the proposed runway extension, flushing out approximately 150 Blue Jays of which some flew into shrubs behind the proposed runway extension on the BBTCA grounds and the others flew further down along Hanlan's Point Beach. Peregrine Falcon is listed as a species of Special Concern. A Red-bellied Woodpecker was recorded flying in a northward direction across the proposed runway extension.

1.4.2.2.2 Overwintering Surveys

Overwintering surveys were conducted on December 22, 2014 and March 5, 2015. Within 500 m of the east end of the proposed runway extension, the most abundant waterbird species recorded were Greater Scaup, Long-tailed Duck, Canada Goose and Ring-billed Gull. The winter was colder than normal. The Toronto Harbour was frozen during the survey conducted on March 5, 2015 and was likely frozen throughout most of February. Most of the birds observed during the overwintering surveys were swimming or wading within 500 m of the runway and very little flight activity was recorded. On December 22, 2014, variable sized groups of Greater Scaup, Red-breasted Mergansers, Long-tailed Ducks, Canada Goose and Mallards were recorded wading in the open water, either isolated in small groups, consisting of one to five individuals, or scattered in large groups of at least 20 individuals. However, there were no waterbirds recorded on March 5, 2015 east of the BBTCA grounds, with the exception of 50 Ring-billed Gulls perched on a boat near the mainland more than 500 m away from the east end of the proposed runway extension.

Open water was present and was largely unfrozen west of the BBTCA at the time of the overwintering surveys. Within 500 m of the west end of the proposed runway extension, the most abundant waterbird species were Long-tailed Duck, Greater Scaup, Red-breasted Merganser and Ring-billed Gulls. These species were all recorded to be wading in the open water. Occasionally, single birds would fly low over the water.

Generally, fewer bird species were recorded west of the BBTCA grounds compared to the east side during the overwintering surveys. This may be because there is more open water and less cover available from harsh winter conditions west of the BBTCA grounds. It seemed the open water in between Mugg's Island and Toronto Islands Park, east of the BBTCA grounds, serves as a refuge from strong winds for various concentrations of waterbirds, such as Trumpeter Swan, Mute Swan, Mallard, Canada Goose, Bufflehead, Ring-billed Gull and Greater Scaup. Similarly, concentrations of Long-tailed Duck, Red-breasted Merganser, Redhead and Scaup species were also recorded wading in the Western Channel.

1.4.2.2.3 Spring Migration Surveys

Spring migration surveys were conducted on March 27 and April 29, 2015. Within 500 m of the east end of the proposed runway extension, the most abundant waterbird species were Redhead, Long-tailed Duck and Greater Scaup. Large concentrations (>100 individuals) of Redhead and Greater Scaup species and smaller concentrations of Red-breasted Merganser, Canvasback, Mallard, Canada Goose, Long-tailed Duck, Mute Swan and Double-crested Cormorants were swimming in the open water within 500 m of the east end of the proposed runway extension. A few Double-crested Cormorants (approximately 15 individuals) were also perched on the pier, although larger numbers are known to rest on the pier later in the spring and summer according to the BBTCA Wildlife Control Officer (pers. comm., April 29, 2015). Occasional individuals or small flocks, consisting of two to five individuals, of Double-crested Cormorants, Mallards, Long-tailed Duck, Canada Goose, Herring Gull,

Red-breasted Merganser and other non-waterbird species such as Horned Lark and Red-winged Blackbirds were flying within 400 m of the east end of the proposed runway extension in mostly either a northerly or southerly direction. Flight heights varied by species and ranged between 5 and 15 m above the water. One Killdeer was recorded on a grassy patch along the runway.

Within 500 m of the west end of the proposed runway extension, the most abundant waterbird species were Long-tailed Ducks, Ring-billed Gulls and Double-crested Cormorants. Several small flocks of approximately 20 individuals of Long-tailed Ducks were wading near the Western Channel and off of Ontario Place. Some individuals of Long-tailed Ducks would occasionally take off and fly low (approximately 2 m) over the water. Approximately 60 Long-tailed Ducks were wading within 500 m southwest of the west end of the proposed runway extension; this flock was part of a larger concentration (approximately 300 individuals) of Long-tailed Ducks wading in the open water more than 500 m southwest. Occasional individuals or small flocks (consisting of two to six individuals) of Herring Gull, Mute Swan, Ring-billed Gull and other non-waterbird species such as American Crow and Red-winged Blackbirds, were observed flying within 500 m of the west end of the proposed runway extension. One flock of Double-crested Cormorants, consisting of 100 individuals, flew approximately 50 m over the BBTCA grounds in a southwestern direction. A Red-tailed Hawk was also recorded flying approximately 30 m over the BBTCA grounds in a southeastern direction.

According to the BBTCA Wildlife Control Officer (pers. comm., April 29, 2015), the week before the survey was conducted on April 29, 2015, shallow pools of water formed on grassy areas on both the north and south sides of the proposed runway extension extending west to east on the BBTCA grounds as a result of one rainy day. A few hundred Mallards, Canada Geese and gulls were observed congregating at these shallow pools. However, this was temporary as the pools dried up relatively quickly.

1.4.2.2.4 Breeding Season Surveys

Breeding season surveys were conducted on May 29, June 19 and July 14, 2015. Within 500 m of the east end of the proposed runway extension, the most abundant waterbird species were Canada Goose, Double-crested Cormorant and Ring-billed Gull. Groups of Canada Geese, consisting of five to 30 individuals, were recorded swimming and wading within 200 m of the east end of the proposed runway extension. Double-crested Cormorants were observed wading in the open water and resting on the pier, as well as flying in small flocks consisting of one to five individuals low (approximately 2 to 3 m) over the water. Variable sized flocks of Canada Geese, Double-crested Cormorants, Common Terns, Ring-billed Gulls, Herring Gulls were observed flying within 300 m of the east end of the proposed runway extension at heights ranging between 2 to 30 m. One Great Egret flew 75 m over the BBTCA grounds in a southeast direction. Other non-waterbird species included multiple small flocks of Barn Swallows (two to 20 individuals) flying and foraging for insects over the proposed runway extension, grassy areas and airport buildings on the BBTCA grounds. Barn Swallow is a SAR, listed as Threatened, in Ontario.

Within 500 m of the west end of the runway, the most abundant waterbird species were Double-crested Cormorant, and Ring-billed Gull. Numerous flocks of Double-crested Cormorants were observed flying 200 to 300 m away from the west end of the runway, with some flocks flying low over the water and others higher (i.e., approximately 50 to 100 m above the water). Few scattered individuals were observed on the water within 500 m from the west end of the proposed runway extension. More details about Double-crested Cormorant flight patterns and behaviour recorded during the breeding season surveys are discussed in **Section 1.4.2.2.5**. Occasionally, individuals or

small flocks (consisting of two to 20 individuals) of Ring-billed Gull, Common Tern, Spotted Sandpiper and Gadwall were observed flying within 200 m of the west end of the runway, at heights ranging between 1 and 100 m above the water. Three Caspian Terns were observed flying 10 m above the water within 50 m of the west runway in a southeastern direction. Generally, there was little activity on the water, with the exception of a few Canada Geese and one Mute Swan swimming along the shoreline of Hanlan's Point Beach and within 100 m of the west end of the runway. A few individuals of Spotted Sandpiper and Semipalmated Sandpipers were observed sitting on the concrete shore wall. Several Killdeer, including adult pairs with young were feeding on the grass on the BBTCA grounds. Other non-waterbird species included Savannah Sparrow and Song Sparrow singing approximately 100 m southeast of the runway along Hanlan's Point Beach as well as several Cliff Swallows, Bank Swallows and European Starlings.

Swallows were observed foraging over the BBTCA grounds almost continuously through much of the May, June, and July surveys. These consisted mostly of Barn and Cliff Swallows with occasional Bank or Northern Rough-winged Swallows among them. Since Barn Swallow and Bank Swallow are designated as a Threatened Species, these are of particular concern.

Both Barn and Cliff Swallows were observed flying low (approximately within 1 to 5 m) over the proposed runway extensions and especially over the grassy areas. They were apparently foraging for small flying insects (likely midges) that were coming off the mowed grass. Flight patterns of Barn Swallows were recorded as agile and erratic, flying back and forth in circular patterns, and flight height ranged between 5 to 100 m. Frequently 5 to 15 Barn Swallows (and sometimes more) could be seen circling around at any one time but then they would disappear for several minutes only to return a short while later. Barn Swallows were more frequent in the eastern and southern part of the BBTCA grounds while Cliff Swallows were more prevalent in the west and north, although the two were often together. There were approximately 8, 45 and 62 foraging Barn Swallows on May 29, June 19 and July 14, respectively. Four Bank Swallows were observed on July 14, 2015.

Off the west end of the proposed runway extension, Cliff Swallows could be seen flying across the waters from the west (i.e., the direction of Ontario Place), then coming to circle around the BBTCA grounds to forage. Up to 30 birds at a time could be seen. It appears that the Cliff Swallows were coming from a nesting colony, presumably somewhere to the west, to forage over Toronto Island. The swallows did not only fly around the airfield but would also continue further southeastward on Toronto Island.

1.4.2.2.5 Summer Cormorant Behaviour Surveys

Flight patterns and behaviours of Double-crested Cormorants in the vicinity of the runways were recorded during the surveys conducted on May 29, June 19, July 14, and August 6, 2015 which is the period when the birds are breeding in the nearby nesting colony at Tommy Thompson Park. Cormorants do not overwinter on Lake Ontario and return from migration in April. The colony is located approximately 4.3 km east of the east end of the existing runway at BBTCA and in the last few years has supported well over 10,000 breeding pairs (TRCA, pers. comm., 2015). As a result, the colony at TTP is the source for the majority of cormorants that are observed in the airport vicinity.

The number of Double-crested Cormorants recorded on each surveyed day is summarized in **Table 1-16**. These numbers represent flocks that were flying as well as individuals or concentrations resting on the pier or swimming in the water within 500 m of both ends of the proposed runway extension.

Table 1-16: Double-crested Cormorants Observed within 500 m of Both Ends of the Existing Runway

Survey Date	Number of Double-crested Cormorants Recorded
May 29, 2015	87
June 19, 2015	1568
July 14, 2015	87*
August 6, 2015	1201
Grand Total	**2943**

*Note: * on July 14, 2015, hundreds of Double-crested Cormorants were observed prior to the start of the survey and were not counted but noted.*

During the June, July and August visits, large flocks of Double-crested Cormorants were observed flying offshore and parallel to the Toronto Islands shoreline. Many of the birds came to within 500 m southwest from the west end of the proposed runway extension. The flocks were flying in either an easterly or westerly direction. It is suspected that these flocks were flying between the nesting colony on TTP and foraging areas located further west in Lake Ontario. Flocks were also flying along the south side of Toronto Island. On June 19, 2015 there were nearly continuous groups of cormorants observed flying in both directions (as seen from the ferry crossing) at 6:45 am; however, these flocks substantially diminished in during the avian survey that commenced at 8:00 am. Nevertheless for a 5 minute period from 8:05 to 8:10 am, ten flocks were observed moving west and seven moving east. The flocks averaged 40 birds each which means that approximately 680 birds moved through in 5 minutes. The numbers of birds moving at 6:45 am on the same day were greater (but were not counted because these were seen in the distance from the ferry and not during the actual survey). On July 14, 2015 a similar pattern was observed with cormorant flocks flying almost continuously at the same area to the southwest of runway at 7:30 am but only small numbers of cormorants were moving through the same area by 8:45 am. At that stage of the breeding cycle, the young would be very large and in the process fledging, demanding a great deal of food from the parents. On August 6, 2015, approximately 790 cormorants in various flocks were seen flying from west to east (*i.e.,* in the direction of the colony on TTP) in a 3 minute period from 7:29 to 7:31 am, at the same location. By 8:00 am on the same day, 150 cormorants were flying westward in a 10 minute period and by 8:30 am there was little movement of cormorants. Some flocks were observed flying low over the water (i.e., approximately 2 to 5 m high), while others flew as high as 50 m above water. BBTCA Wildlife Control Officer (pers. comm., August 6, 2015) reported that at 6:00 am on August 6 approximately 1000 Double-crested Cormorants were resting on the water about 400 m to the southwest of the west end of the existing runway. It is suspected that many of the large number of moving birds were likely immatures that had recently fledged.

While the majority of cormorants were observed to the southwest, occasionally a flock would fly over the channel between the airport and the mainland or sometimes single birds or small groups would fly across the end of the existing runway or over the BBTCA grounds.

Cormorants also were occasionally seen resting on the pier on the north side of the east end of the existing runway. The end of the pier is approximately 150 m north of the end of the existing runway. For example 10 cormorants were seen on the pier on June 19; 23 on July 14; and 60 on August 6, 2015. BBTCA Wildlife Control Officers were observed scaring off the birds with noisemaking devices on two of those occasions. Cormorants are regularly scared off that pier for aircraft safety (BBTCA Wildlife Control Officer, pers. comm., April 29, 2015).

Aside from Double-crested Cormorants, within 500 m of the east end of the runway extension various small concentrations of Mute Swan, Canvasback, Canada Goose and Canvasback were swimming within 500 m of the east end of the existing runway. In addition to the 60 Double-crested Cormorants, two Herring gulls and eight Ring-billed Gulls were resting on the pier together. A few Ring-billed Gulls and Semipalmated Sandpipers were flying between 5 to 10 m above the water within 200 m of the east end of the existing runway.

Within 500 m of the west end of the runway extension, the other abundant waterbird species, with the exception of Double-crested Cormorant, was Ring-billed Gull. Approximately 30 Ring-billed Gulls were resting on the water within 400 m of the west of the existing runway, with one bird observed flying 10 m above the runway. A few Killdeers and three Canada Geese were also observed walking on the BBTCA grounds. One Mute Swan was swimming along the shoreline of Hanlan's Point Beach and several Spotted Sandpipers and Killdeers were also observed foraging on the beach.

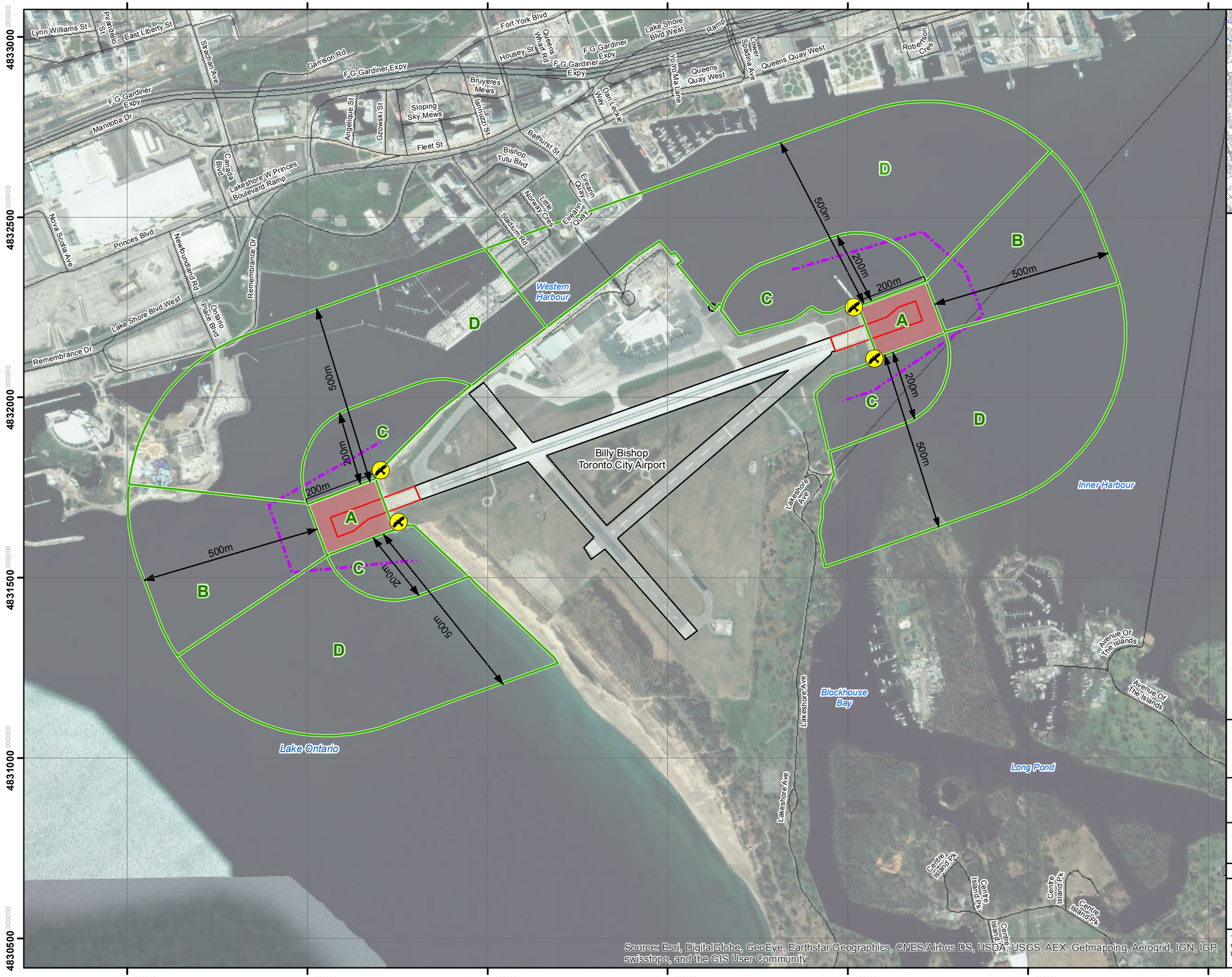
A total of 28 Barn Swallows and 25 Cliff Swallows were recorded on the BBTCA grounds. Barn Swallows were observed foraging on the BBTCA grounds, flying between 5 and 25 m above the ground. Some Cliff Swallows and to a lesser extent Barn Swallows were foraging on the western portion of the BBTCA grounds. The abandoned former wooden terminal building situated on the southeast part of the airport, was checked for the presence of nests on August 6. Although it was just after the nesting season, five Barn Swallow nests, one Cliff Swallow nest, three American Robin nests and one House Sparrow were present. These were in good shape and most or all were likely occupied in 2015.

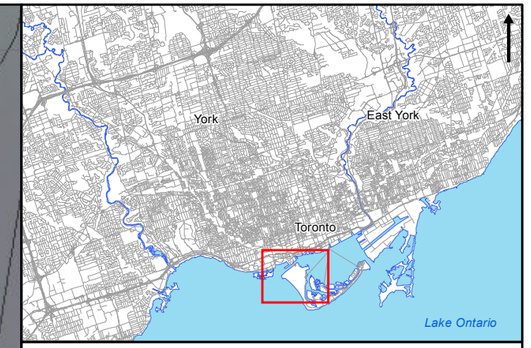
1.4.3 Species of Conservation Concern (SOCC) and Species at Risk (SAR)

A wide variety of sources, such as various wildlife atlases, were used to search for current and historical records of SOCC and SAR within the Study Area through the information background review and agency correspondence process (refer to **Section 1.2.2.1** for complete list of sources used). Requests for SOCC and SAR occurrence records within the Study Area were submitted to numerous agencies and organizations, including but not limited to the MNRF, TRCA, EC-CWS and BSC. Specifically, correspondence with the MNRF Aurora District Office was initiated on September 23, 2014 and May 4, 2015, respectively, regarding any records of SAR and other relevant natural heritage information. Responses from the MNRF were received on October 3, 2014 and June 9, 2015, respectively, indicating the presence of SAR records within the Study Area. **Table 1-2** in **Section 1.2.2.1** provides a detailed record of all of the agencies that were contacted and the information or data that was received.

Additionally, the *Make-a-map: Natural Heritage Areas Application* (MNRF, 2014b) was used to search for NHIC rare species records within the Study Area. The majority of the rare species records obtained from NHIC are considered to be historical (i.e., those greater than 50 years old) and therefore it's unlikely that the species still occurs in the Study Area given the amount of urban development in recent years.

Table 1-17 below provides a complete list of all of the SOCC and SAR that were identified through the background information review as either currently or historically known to occur within the terrestrial Study Area. This table of records was compiled from all of the information collected from secondary sources and the data obtained from all of the contacted agencies. Species recorded by Falcon Environmental Services Inc. in 2014 and/or AECOM staff during the field investigation





Legend

- Bird Survey Location
- Roads
- Marine Exclusion Zone
- Bird Survey Zones*
- Proposed 08-26 Runway Extension
- Existing Airport
- Runway Extension (200m Construction Footprint)

N

***Bird Survey Zones**

A – Within the 200 m Construction Footprint of the Proposed Runway Extension

B – Within 500 m of the Proposed Runway Extension End

C – Within 200 m from the side of the Existing Runway and Proposed Runway Extension.

D – Within 500 m from the side of the Existing Runway and Proposed Runway Extension.

0 100 200 400 600
Meters

BBTCA EA: Natural Environment Cumulative Net Effects Assessment

2014 to 2015 Bird Survey Zones

October 2015	1:10,000	Datum: NAD '83 UTM 17N Source: BING, ONB
P#: 60328546	V#: 001	

AECOM

Figure 1-8

This drawing has been prepared for the use of AECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM's express written consent.

Map location: \\CAHAM1FP001\Projects\60328546\900-CAD-GIS\03_Incoming\2015-10-26_FigureUpdates_60328546\60328546 - Billy Bishop\60328546 - Billy Bishop\Design\Figure 1-8 - 2014 to 2015 Bird Survey Zones.mxd
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Table 1-17: Species at Risk and Species of Conservation Concern Identified through the Background Information Review and Field Investigations within the Terrestrial Environment Study Area

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Record Source(s)	Local Status	NHIC Last Observed Year (MNRF, 2014b)	BBTCA	
							Recorded by Falcon Environmental Services Inc. in 2014	*Recorded by AECOM in 2014-2015*
Species at Risk (31 species)								
Birds (19 species)								
American White Pelican	*Pelecanus erythrorhynchos*	S2B	THR	• Ebirds Database • CMMN Daily Estimated Totals	Rare Migrant	Not available	No	No
Bank Swallow	*Riparia riparia*	S4B	THR	• MNRF Aurora District SAR Records (2015) • 2014 to 2015 Avian Surveys • Wildlife Data from Falcon Environmental Services Inc (2014). • Ebirds Database • CMMN Daily Estimated Totals	Breeding	Not available	Yes	Yes
Barn Swallow	*Hirundo rustica*	S4B	THR	• TRCA Fauna Records (2015) • NHIC Rare Species Records (MNRF, 2014b) • 2014 to 2015 Avian Surveys • Wildlife Data from Falcon Environmental Services Inc (2014).	Breeding	2001	Yes	Yes
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	• TRCA Fauna Records (2015) • Ebirds Database • CMMN Daily Estimated Totals	Breeding	Not available	No	No
Cerulean Warbler	*Setophaga cerulea*	S3B	THR	• Ebirds Database	Rare Migrant	Not available	No	No
Chimney Swift	*Chaetura pelagica*	S4B	THR	• MNRF Aurora District SAR Records (2015) • TRCA Fauna Records (2015) • Wildlife Data from Falcon Environmental Services Inc (2014). • Ebirds Database • CMMN Daily Estimated Totals	Breeding	Not available	Yes	No
Eastern Meadowlark	*Sturnella magna*	S4B	THR	• MNRF Aurora District SAR Records (2015) • TRCA Fauna Records (2015) • NHIC Rare Species Records (MNRF, 2014b) • Ebirds Database • CMMN Daily Estimated Totals	Breeding	2010	No	No
Eastern Whip-poor-will	*Caprimulgus vociferus*	S4B	THR	• MNRF Aurora District SAR Records (2015) • Ebirds Database • CMMN Daily Estimated Totals	Former Breeding, Migrant	Not available	No	No
Least Bittern	*Ixobrychus exilis*	S4B	THR	• NHIC Rare Species Records (MNRF, 2014b) • Ebirds Database	Former Breeding	1899	No	No
Acadian Flycatcher	*Empidonax virescens*	S2S3B	END	• Ebirds Database • CMMN Daily Estimated Totals	Rare Migrant	Not available	No	No
Golden Eagle	*Aquila chrysaetos*	S2B	END	• MNRF Aurora District SAR Records (2015) • Ebirds Database • CMMN Daily Estimated Totals	Migrant	Not available	No	No

Table 1-17: Species at Risk and Species of Conservation Concern Identified through the Background Information Review and Field Investigations within the Terrestrial Environment Study Area

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Record Source(s)	Local Status	NHIC Last Observed Year (MNRF, 2014b)	BBTCA	
							Recorded by Falcon Environmental Services Inc. in 2014	*Recorded by AECOM in 2014-2015*
Henslow's Sparrow	*Ammodramus henslowii*	SHB	END	• NHIC Rare Species Records (MNRF, 2014b)	Former Breeding	1932	No	No
King Rail	*Rallus elegans*	S2B	END	• Ebirds Database	Former Breeding	Not available	No	No
Kirtland's Warbler	*Setophaga kirtlandii*	S1B	END	• MNRF Aurora District SAR Records (2015) • Ebirds Database	Vagrant	Not available	No	No
Piping Plover	*Charadrius melodus*	S1B	END	• MNRF Aurora District SAR Records (2015) • NHIC Rare Species Records (MNRF, 2014b) • Ebirds Database	Former Breeding	1934	No	No
Prothonotary Warbler	*Protonotaria citrea*	S1B	END	• Ebirds Database • CMMN Daily Estimated Totals	Vagrant	Not available	No	No
Red Knot	*Calidris canutus rufa*	S1N	END	• Ebirds Database • CMMN Daily Estimated Totals	Rare Migrant	Not available	No	No
Yellow-breasted Chat	*Icteria virens*	S2B	END	• Ebirds Database • CMMN Daily Estimated Totals	Rare Migrant	Not available	No	No
Passenger Pigeon	*Ectopistes migratorius*	SX	Extinct	• Ebirds Database	Former Breeding	Not available	No	No
Insects (2 species)								
Mottled Duskywing	*Erynnis martialis*	S2	END	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1911	No	No
Rusty-patched Bumble Bee	*Bombus affinis*	S1	END	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1999	No	No
Mammals (2 species)								
Little Brown Bat	*Myotis lucifugus*	S4	END	• Mammals of Toronto (City of Toronto, 2012) • Atlas of the Mammals of Ontario (Dobbyn, 1994)	Not applicable	Not available	No	Unknown
Northern Long-eared Bat	*Myotis septentrionalis*	S3	END	• Mammals of Toronto (City of Toronto, 2012) • Atlas of the Mammals of Ontario (Dobbyn, 1994)	Not applicable	Not available	No	Unknown
Plants (5 species)								
Butternut	*Juglans cinerea*	S3?	END	• MNRF Aurora District SAR Records (2015) • TRCA Flora Records (2015) • NHIC Rare Species Records (MNRF, 2014b)	Not applicable	2006	No	No
Dense Blazing-star	*Liatris spicata*	S2	THR	• MNRF Aurora District SAR Records (2015) • TRCA Flora Records (2015)	Not applicable	Not available	No	No
Eastern Prickly Pear Cactus	*Opuntia humifusa*	S1	END	• MNRF Aurora District SAR Records (2015)	Not applicable	Not available	No	No
Red Mulberry	*Morus rubra*	S2	END	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1941	No	No
White Wood Aster	*Eurybia divaricata*	S2	THR	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1927	No	No

Table 1-17: Species at Risk and Species of Conservation Concern Identified through the Background Information Review and Field Investigations within the Terrestrial Environment Study Area

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Record Source(s)	Local Status	NHIC Last Observed Year (MNRF, 2014b)	BBTCA	
							Recorded by Falcon Environmental Services Inc. in 2014	*Recorded by AECOM in 2014-2015*
Reptiles and Amphibians (3 species)								
Blanding's Turtle	*Emydoidea blandingii*	S3	THR	• Reptiles and Amphibians of Toronto (City of Toronto, 2012) • Ontario Reptile and Amphibian Atlas (Ontario Nature, 2014) • NHIC Rare Species Records (MNRF, 2014b) • MNRF Aurora District SAR Records (2015) • TRCA Fauna Records (2015)	Not applicable	2009	No	No
Queensnake	*Regina septemvittata*	S2	END	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1858	No	No
Spiny Softshell	*Apalone spinifera*	S3	THR	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1982	No	No
Species of Conservation Concern (90 species)								
Birds (45 species)								
American Golden Plover	*Pluvialis dominica*	S2B	-	• CMMN Daily Estimated Totals • eBirds Database	Migrant	Not available	No	No
Bald Eagle	*Haliaeetus leucocephalus*	S4B	SC	• MNRF Aurora District SAR Records (2015) • CMMN Daily Estimated Totals • eBirds Database • Great Backyard Bird Count	Migrant	Not available	No	No
Black Tern	*Chlidonias niger*	S3B	SC	• MNRF Aurora District SAR Records (2015) • CMMN Daily Estimated Totals • eBirds Database	Former Breeding, Migrant	Not available	No	No
Black-billed Magpie	*Pica hudsonia*	S3?	-	• eBirds Database	Vagrant	Not available	No	No
Black-crowned Night Heron	*Nycticorax nycticorax*	S3B	-	• NHIC Rare Species Records (MNRF, 2014b) • CMMN Daily Estimated Totals • eBirds Database • Great Backyard Bird Count • Marsh Monitoring Birds • OBBA 2001 – 2005 Records	Breeding	1991	No	No
Canada Warbler	*Cardellina pusilla*	S4B	SC	• CMMN Daily Estimated Totals • eBirds Database	Migrant	Not available	No	No
Canvasback	*Aythya valisineria*	S1B	-	• NHIC Rare Species Records (MNRF, 2014b) • 2014 to 2015 Avian Surveys • CMMN Daily Estimated Totals • eBirds Database • OBBA 2001 and 2005 records	Migrant	2000	No	Yes

Table 1-17: Species at Risk and Species of Conservation Concern Identified through the Background Information Review and Field Investigations within the Terrestrial Environment Study Area

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Record Source(s)	Local Status	NHIC Last Observed Year (MNRF, 2014b)	BBTCA	
							Recorded by Falcon Environmental Services Inc. in 2014	*Recorded by AECOM in 2014-2015*
Caspian Tern	*Hydroprogne caspia*	S3B	-	• NHIC Rare Species Records (MNRF, 2014b) • 2014 to 2015 Avian Surveys • Wildlife Data from Falcon Environmental Services Inc (2014). • CMMN Daily Estimated Totals • eBirds Database • OBBA 2001 – 2005 records	Breeding	1985	Yes	Yes
Common Eider	*Somateria mollissima*	S2B	-	• eBirds Database	Vagrant	Not available	No	No
Common Nighthawk	*Chordeiles minor*	S4B	SC	• TRCA Fauna Records (2015) • CMMN Daily Estimated Totals • eBirds Database • OBBA 2001 and 2005 records	Former Breeding	Not available	No	No
Eastern Wood-Pewee	*Contopus virens*	S4B	SC	• CMMN Daily Estimated Totals • eBirds Database • OBBA 2001 – 2005 records	Breeding	Not available	No	No
Forster's Tern	*Sterna forsteri*	S2B		• CMMN Daily Estimated Totals • eBirds Database	Migrant,	Not available	No	No
Golden-winged Warbler	*Vermivora chrysoptera*	S4B	SC	• CMMN Daily Estimated Totals • eBirds Database	Former Breeding	Not available	No	No
Great Black-backed Gull	*Larus marinus*	S2B	-	• NHIC Rare Species Records (MNRF, 2014b) • CMMN Daily Estimated Totals • eBirds Database • Great Backyard Bird Count • OBBA 2001 and 2005 records	Breeding, Wintering	1989	No	No
Great Egret	*Ardea alba*	S2B	-	• 2014 to 2015 Avian Surveys • Wildlife Data from Falcon Environmental Services Inc (2014). • CMMN Daily Estimated Totals • eBirds Database	Breeding	-	Yes	Yes
Horned Grebe	*Podiceps auritus*	S1B	SC	• MNRF Aurora District SAR Records (2015) • CMMN Daily Estimated Totals • eBirds Database • Great Backyard Bird Count	Migrant	Not available	No	No
Hudsonian Godwit	*Limosa haemastica*	S3B,S4N	-	• eBirds Database	Migrant	Not available	No	No
Lapland Longspur	*Calcarius lapponicus*	S3B	-	• eBirds Database	Migrant	Not available	No	No
Little Gull	*Larus minutus*	S1B	-	• eBirds Database	Migrant	Not available	No	No

Table 1-17: Species at Risk and Species of Conservation Concern Identified through the Background Information Review and Field Investigations within the Terrestrial Environment Study Area

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Record Source(s)	Local Status	NHIC Last Observed Year (MNRF, 2014b)	BBTCA	
							Recorded by Falcon Environmental Services Inc. in 2014	*Recorded by AECOM in 2014-2015*
Long-tailed Duck	*Clangula hyemalis*	S3B	-	• 2014 to 2015 Avian Surveys • Wildlife Data from Falcon Environmental Services Inc (2014). • CMMN Daily Estimated Totals • eBirds Database • Great Backyard Bird Count	Migrant, Wintering	-	Yes	Yes
Louisiana Waterthrush	*Parkesia motacilla*	S3B	SC	• eBirds Database	Migrant	Not available	No	No
Marbled Godwit	*Limosa fedoa*	S3B	-	• eBirds Database	Vagrant	Not available	No	No
Olive-sided Flycatcher	*Contopus cooperi*	S4B	SC	• CMMN Daily Estimated Totals • eBirds Database	Migrant	Not available	No	No
Pacific Loon	*Gavia pacifica*	S3B	-	• eBirds Database	Vagrant	Not available	No	No
Parasitic Jaeger	*Stercorarius parasiticus*	S2B	-	• eBirds Database	Migrant	Not available	No	No
Peregrine Falcon	*Falco peregrinus*	S3B	SC	• NHIC Rare Species Records (MNRF, 2014b) • 2014 to 2015 Avian Surveys • Wildlife Data from Falcon Environmental Services Inc (2014). • CMMN Daily Estimated Totals • eBirds Database • Great Backyard Bird Count • OBBA 2001 – 2005 records	Breeding	2008	Yes	Yes
Prairie Warbler	*Setophaga discolor*	S3B	NAR	• eBirds Database	Rare Migrant	Not available	No	No
Redhead	*Aythya americana*	S2B	-	• 2014 to 2015 Avian Surveys • CMMN Daily Estimated Totals • eBirds Database • Great Backyard Bird Count • OBBA 2001 – 2005 records	Migrant, Wintering	-	No	Yes
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S4B	SC	• MNRF Aurora District SAR Records (2015) • CMMN Daily Estimated Totals • eBirds Database • Great Backyard Bird Count • OBBA 2001 – 2005 records	Breeding	Not available	No	No
Red-necked Grebe	*Podiceps grisegena*	S3B	NAR	• CMMN Daily Estimated Totals • eBirds Database • OBBA 2001 – 2005 records	Migrant	Not available	No	No
Red-necked phalarope	*Phalaropus lobatus*	S3S4B	-	• Ontario Shoreline Survey	Migrant	Not available	No	No
Red-throated Loon	*Gavia stellate*	S3B	-	• CMMN Daily Estimated Totals • eBirds Database	Migrant	Not available	No	No
Ross's Goose	*Chen rossii*	S1B	-	• eBirds Database	Vagrant	Not available	No	No

Table 1-17: Species at Risk and Species of Conservation Concern Identified through the Background Information Review and Field Investigations within the Terrestrial Environment Study Area

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Record Source(s)	Local Status	NHIC Last Observed Year (MNRF, 2014b)	BBTCA	
							Recorded by Falcon Environmental Services Inc. in 2014	*Recorded by AECOM in 2014-2015*
Rough-legged Hawk	*Buteo lagopus*	S1B	NAR	• CMMN Daily Estimated Totals • eBirds Database • Great Backyard Bird Count	Migrant, Wintering	Not available	No	No
Semipalamated Sandpiper	*Calidris pusilla*	S3B	-	• 2014 to 2015 Avian Surveys • CMMN Daily Estimated Totals • eBirds Database • Ontario Shoreline Surveys	Migrant	-	No	Yes
Short-billed Dowitcher	*Limnodromus griseus*	S3B,S4N	-	• CMMN Daily Estimated Totals • eBirds Database	Migrant	Not available	No	No
Short-eared Owl	*Asio flammeus*	S2N,S4B	SC	• CMMN Daily Estimated Totals • eBirds Database	Migrant, Wintering	Not available	No	No
Western Kingbird	*Tyrannus verticalis*	S1B	-	• eBirds Database	Vagrant	Not available	No	No
Whimbrel	*Numenius phaeopus*	S3B,S4N	-	• CMMN Daily Estimated Totals • eBirds Database • Ontario Shoreline Survey	Migrant	Not available	No	No
White-eyed Vireo	*Vireo griseus*	S2B	-	• CMMN Daily Estimated Totals • eBirds Database	Migrant	Not available	No	No
Wilson's Phalarope	*Phalaropus tricolor*	S3B	-	• eBirds Database • Ontario Shoreline Survey	Migrant	Not available	No	No
Wilson's Warbler	*Cardellina pusilla*	S4B	SC	• CMMN Daily Estimated Totals • eBirds Database • OBBA 2001 – 2005 records	Migrant	Not available	No	No
Wood Thrush	*Hylocichla mustelina*	S4B	SC	• TRCA Fauna Records (2015)	Breeding	Not available	No	No
Yellow Rail	*Coturnicops noveboracensis*	S4B	SC	• eBirds Database	Migrant	Not available	No	No
Insects (9 species)								
Clamp-tipped Emerald	*Somatochlora tenebrosa*	S2S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1941	No	No
Giant Lacewing	*Polystoechotes punctatus*	SH	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1934	No	No
Gorgone Crescentspot	*Chlosyne gorgone*	S2	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1891	No	No
Green-striped Darner	*Aeshna verticalis*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1940	No	No
Lilypad Clubtail	*Arigomphus furcifer*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1932	No	No
Monarch	*Danaus plexippus*	S4B	SC	• Ontario Butterfly Atlas Online (Jones et al., 2015)	Not applicable	Not available	No	No
Painted Skimmer	*Libellula semifasciata*	S2	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1936	No	No

Table 1-17: Species at Risk and Species of Conservation Concern Identified through the Background Information Review and Field Investigations within the Terrestrial Environment Study Area

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Record Source(s)	Local Status	NHIC Last Observed Year (MNRF, 2014b)	BBTCA	
							Recorded by Falcon Environmental Services Inc. in 2014	*Recorded by AECOM in 2014-2015*
Swamp Darner	*Epiaeschna heros*	S2S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1939	No	No
Tawny Emperor	*Asterocampa clyton*	S2S3	-	• Ontario Butterfly Atlas Online (Jones et al., 2015)	Not applicable	Not available	No	No
Unicorn Clubtail	*Arigomphus villosipes*	S2S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	191-	No	No
Plants (31 species)								
American Gromwell	*Lithospermum latifolium*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1904	No	No
Biennial Gaura	*Oenothera gaura*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1893	No	No
Black Cohosh	*Actaea racemosa*	S2	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1974	No	No
Bowman's-root	*Gillenia trifoliate*	SX	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1902	No	No
Broad Beech Fern	*Phegopteris hexagonoptera*	S3	SC	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1890	No	No
Cleland's Evening Primrose	*Oenothera clelandii*	S1	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1985	No	No
Downy Gentian	*Gentiana puberulenta*	SX	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1903	No	No
Eastern Burning Bush	*Euonymus atropurpureus*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1954	No	No
Erect Knotweed	*Polygonum erectum*	SH	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1904	No	No
Fern-leaved Yellow False Foxglove	*Aureolaria pedicularia*	S2?	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1959	No	No
Geyer's Yellow Monkeyflower	*Erythranthe geyeri*	S1	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1897	No	No
Low Nutrush	*Scleria verticillata*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1972	No	No
Old-field Toadflax	*Nuttallanthus Canadensis*	S1	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	Not Available	No	No
Prairie Milkweed	*Asclepias sullivantii*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1927	No	No
Ram's-head Lady's-slipper	*Cypripedium arietinum*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1925-PRE	No	No
Saltmarsh Sand-spurrey	*Spergularia salina*	S1	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1978	No	No
Schreber's Aster	*Eurybia schreberi*	S2S3		• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	Not available	No	No
Sharp-fruited Rush	*Juncus acuminatus*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1926	No	No
Shining-branch Hawthorn	*Crataegus magniflora*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1906	No	No
Short-liguled Beach Grass	*Ammophila breviligulata*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	-	No	Yes
Shrubby St. John's-wort	*Hypericum prolificum*	S2	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1976	No	No

Table 1-17: Species at Risk and Species of Conservation Concern Identified through the Background Information Review and Field Investigations within the Terrestrial Environment Study Area

Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Record Source(s)	Local Status	NHIC Last Observed Year (MNRF, 2014b)	BBTCA	
							Recorded by Falcon Environmental Services Inc. in 2014	*Recorded by AECOM in 2014-2015*
Smith's Bulrush	*Schoenoplectiella smithii*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1896	No	No
Southern Slender Ladies'-tresses	*Spiranthes lacera var. gracilis*	S1	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1897	No	No
Stiff Gentian	*Gentianella quinquefolia*	S2	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1877	No	No
Stiff Yellow Flax	*Linum medium var. medium*	S3?	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1892	No	No
Sundial Lupine	*Lupinus perennis*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1962	No	No
Tall Nutrush	*Scleria triglomerata*	S1	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1911	No	No
White-haired Panicgrass	*Dichanthelium praecocius*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1911	No	No
Woodland Flax	*Linum virginianum*	S2	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1890	No	No
Woodland Pinedrops	*Pterospora andromedea*	S2	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1891	No	No
Yellow Stargrass	*Hypoxis hirsuta*	S3	-	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1933	No	No
Reptiles and Amphibians (5 species)								
Eastern Musk Turtle	*Sternotherus odoratus*	S3	SC	• Reptiles and Amphibians of Toronto (City of Toronto, 2012) • Ontario Reptile and Amphibian Atlas (Ontario Nature, 2014) • NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1858	No	No
Eastern Ribbonsnake	*Thamnophis sauritus*	S3	SC	• NHIC Rare Species Records (MNRF, 2014b)	Not applicable	1913	No	No
Milksnake	*Lampropeltis triangulum*	S3	SC	• Reptiles and Amphibians of Toronto (City of Toronto, 2012) • Ontario Reptile and Amphibian Atlas (Ontario Nature, 2014) • MNRF Aurora District SAR Records (2015)	Not applicable	Not available	No	No
Northern Map Turtle	*Graptemys geographica*	S3	SC	• Reptiles and Amphibians of Toronto (City of Toronto, 2012) • Ontario Reptile and Amphibian Atlas (Ontario Nature, 2014) • NHIC Rare Species Records (MNRF, 2014b) • MNRF Aurora District SAR Records (2015)	Not applicable	1988	No	No
Snapping Turtle	*Chelydra serpentina*	S3	SC	• Reptiles and Amphibians of Toronto (City of Toronto, 2012) • Ontario Reptile and Amphibian Atlas (Ontario Nature, 2014) • NHIC Rare Species Records (MNRF, 2014b) • MNRF Aurora District SAR Records (2015)	Not applicable	1995	No	No

Notes 1 and 2 – See Notes at the Bottom of Table 1-5.

conducted on the BBTCA grounds in 2014 and 2015 are identified. The local status is given for each bird species as the table includes regular breeders, former breeders, migrants and wintering species. It also includes some bird species where individuals were recorded outside of the normal range (termed “vagrants”) and are really not part of the local fauna.

A total of 90 SOCC and 31 SAR were identified through a combination of the background information review and field investigations. This included 13 Threatened, 17 Endangered species and one Extirpated species. SAR including Barn Swallow and Bank Swallow and SOCC including Caspian Tern, Long-tailed Duck, Redhead, Great Egret, Peregrine Falcon and Semipalmated Sandpiper were recorded by AECOM during the avian surveys conducted in 20144 and 2015.

Locally and Regionally rare plants were identified during the terrestrial survey conducted by AECOM on October 3, 2015. There are identified in **Table 1-14** in **Section 1.4.2.1**.

1.4.4 Significant Wildlife Habitat

The *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* document (MNRF, 2015) was used to identify the presence of significant wildlife habitats on and in the immediate proximity of the BBTCA grounds based on the terrestrial and avian surveys completed between 2014 and 2015. As described in **Section 1.4.2.1**, the BBTCA grounds mainly consist of paved runways and manicured grass lawns with minimal natural vegetation that does not support high functioning habitat for wildlife, including migratory birds. For this reason, no significant wildlife habitats were identified on the BBTCA grounds.

However, significant wildlife habitats identified within 120 m of the runway extensions based on the results of the field investigations include the following:

- Waterfowl Stopover and Staging Area (Aquatic);
- Migratory Butterfly Stopover Area;
- Rare Vegetation Community; and
- Habitat for SOCC.

The water surrounding the BBTCA airport and the proposed runway extensions functions all year round as a waterfowl stopover and staging area (aquatic) for large concentrations of a diversity of waterfowl species as evidenced by the results of the avian surveys described in **Section 1.4.2.2**. A few bird SOCC were also observed in these waters and therefore this area also serves as habitat for SOCC. Hanlan’s Point Beach and the Toronto Islands also function as a migratory butterfly stopover area for a variety of butterflies, including Monarchs, as described in **Section 1.4.1.2.4.** As well, the Little Bluestem – Switchgrass – Beachgrass Open Dune (SDO1-1) identified immediately south and within 120 m of the west runway on Hanlan’s Point Beach is a rare sand dune community in Ontario with a provincial ranking of S2 (MNRF, 2000). It also provides habitat for Short-liguled Beach Grass, which is a SOCC with a provincial ranking of S3, and other locally and regionally rare plant species. **Section 1.4.2.1** provides a detailed description of the species composition and structure of this rare community.

2 Description of Future Conditions

The following sections describe differences anticipated between today’s existing conditions and the future existing conditions upon which the effects assessment is based, the year 2033.

2.1 Aquatic Environment

The future conditions for the aquatic environment likely won't differ from existing conditions as there are not anticipated to be any significant changes in the aquatic study area in terms of habitat restoration or additional construction activities within the Marine Exclusion Zone. The factors that influence the aquatic habitat today are likely to be the factors that influence the aquatic habitat upon completion of the project implementation.

The existing site conditions of today exemplify an aquatic habitat of no specialization and as such, fish communities dominated by generalists would typically be found; however, certain species depend on the sand environment (e.g. Eastern Sand Darter) of which sand is the dominant substrate. The aquatic macrophytes present at the west end provide cover, refuge, and protection for smaller fish. A description of future conditions may be made as a prediction only. Future conditions may depend on a variety of factors including but not limited to, future development, invasive species, and weather patterns.

2.2 Terrestrial Environment

The existing terrestrial environment at the BBTCA is not expected to substantially differ in 2033 from current conditions. Maintenance of BBTCA grounds through regular mowing is anticipated to continue; however, vegetation growing along the shorelines and boundaries of the BBTCA grounds may undergo natural succession (e.g., as trees mature).

The future conditions in the terrestrial environment Study Area generally cannot be easily predicted with certainty due to the number of confounding variables. Whether terrestrial habitat and species diversity or abundances increase, decrease or remain the same in the future will depend on the following factors:

- Possible habitat creation, restoration and enhancement projects in the Lower Don Lands (i.e., the Don Mouth Naturalization Project), and at Tommy Thompson Park (TTP)/Leslie Street Spit (TRCA, 2014b; TRCA, 2005; TTP, 2011);
- Possible management of Double-crested Cormorants at TTP/Leslie Street Spit (TRCA, 2008);
- The addition of 68 new ESAs and extensions of 14 existing ESA boundaries in the City of Toronto (City of Toronto, 2014);
- Direct and indirect effects of climate change;
- Land-use changes and/or development within the Study Area; and
- Human use of the Toronto Islands and TTP/Leslie Street Spit.

Based on correspondence with TRCA (pers. comm., October 19, 2015), the future conditions of wildlife and habitat at TTP/Leslie Street Spit may be predicted based on past and planned management and restoration activities by TRCA including the following:

- Double-crested Cormorant numbers will likely stabilize near their current population of approximately 12,000 pairs;
- Black-crowned Night Heron, gulls and Caspian Tern numbers will likely be similar to current population sizes;
- Common Tern population will likely increase in response to the creation of a new nesting island;

- Marsh bird populations are expected to increase and diversify as shoreline and coastal wetland creation areas mature;
- Resident land bird and songbird populations are expected to increase as the habitat at TTP/Leslie Street Spit matures through natural succession; and
- Also as a result of habitat maturation through natural succession, raptor nesting may occur including possible Bald Eagle and/or Great-horned Owl.

Canada Goose populations are currently being managed in the City of Toronto, including the Toronto Islands (TRCA, 2014a). The population of this species is, therefore, not anticipated to increase in the future in the vicinity of the BBTCA. Furthermore, the TRCA also currently manages Double-Crested Cormorant populations at TTP. The TRCA's goal is to conserve and manage natural resources and environmentally significant areas at TTP, which includes a continued existence of a healthy, thriving Double-crested Cormorant colony that at the same time does not reduce the ecological integrity and biodiversity of the park (TRCA, 2014c). Management techniques include deterrents, inactive nest removals, ground nest enhancements and site restoration, and does not include lethal culling (TRCA, n.d.-a). Therefore, the population of Double-crested Cormorants is also not anticipated to increase in the future from existing conditions.

Land use changes within the BBTCA Study Area may result in an increase or decrease of suitable terrestrial habitat including bird habitat depending on whether or not greenspace is created or removed. For example, the conversion of a paved parking lot to an urban park and waterfront trail as part of the revitalization of Ontario Place (Ontario Ministry of Tourism, Culture and Sport, 2015), may increase habitat availability for species, such as Canada Goose, within the terrestrial environment Study Area. Furthermore, the creation of approximately 30 ha of habitat, as part of the approved Don Mouth Naturalization and Port Lands Flood Protection Project, is expected to enhance the connectivity of natural features, as well as support a diversity of both breeding and migratory birds (TRCA, 2014b).

3 Cumulative Net Effects of Proposed Future Airport Operations

The net effects assessment for the natural environment was conducted by, first, documenting the current conditions within the study area (as described in **Section 1**). After current conditions were established, the future conditions (i.e., in the year 2033) were projected as described above. The cumulative net effects assessment was conducted for both the Future Baseline Scenario (i.e., the growth that can occur within the existing Tripartite Agreement) and Proposed Future Scenario (i.e., including extension of the land mass and runway to accommodate commercial jet operation from the BBTCA under an amended Tripartite Agreement).

3.1 Methods

The following sections describe the methods used to conduct the effects assessment for the aquatic and terrestrial environment.

3.1.1 Aquatic Environment

The measures of effect for the aquatic environment include:

- **Aquatic Habitat or Functions:** Temporary and/or long-term loss of aquatic habitat within the footprint of the proposed runway extension of the land mass including areas known to

support key life cycle stages (e.g. spawning areas) or areas known to support sensitive aquatic species

- **Aquatic Species:** Temporary and/or long-term effects on aquatic species including fish, Endangered Species and SAR such as the American eel.

3.1.1.1 Aquatic Habitat or Functions

Background information was reviewed and analyzed to identify aquatic habitats and function potentially affected by the Future Baseline Scenario and Proposed Future Scenario. Existing aquatic habitat conditions within the proposed footprint for the runway extensions were documented through field investigations. The TRCA used the habitat data collected to run the HEAT model. Results from the HEAT Model were used to assess potential effects from the Future Baseline Scenario and Proposed Future Scenarios. This information was used to assess potential effects of an infill/land mass extension on habitat features and their functions.

3.1.1.2 Aquatic Species

Background information was reviewed and analyzed to identify fish species potentially affected by the Future Baseline Scenario and Proposed Future Scenario. Existing species were evaluated according to their habitat requirements (i.e. specialists or generalists) and whether those species are likely resident, seasonally resident or migrant species as well as if any were SAR.

3.1.2 Terrestrial Environment

The measures of effect for the terrestrial environment include:

- **Significant Features or Functions:** Temporary and/or long-term loss of significant natural heritage features or functions such as PSWs, ANSIs, or SWH.
- **Terrestrial Habitats or Functions:** Temporary and/or long-term loss of sensitive terrestrial habitat or functions, including wetlands, woodlands and dune environments, or features known to support sensitive species.
- **Terrestrial Species:** Temporary and/or long-term effects on sensitive terrestrial species including plants, birds, monarch butterflies and other wildlife, rare species and Species at Risk.

3.1.2.1.1 Significant Features or Functions

Background information was reviewed and analyzed to identify significant natural heritage features potentially affected by the Future Baseline Scenario and Proposed Future Scenario. Terrestrial habitat field observations were collected in the immediate vicinity of the BBTCA and from the shoreline of the Toronto Islands, including vegetation community mapping using the ELC system for Southern Ontario and Significant Wildlife Habitat Assessment in accordance with the Ministry of Natural Resources and Forestry's (MNRF's) *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015). Significant natural features were identified within 120 m of the proposed runway extensions under the Future Baseline Scenario and Proposed Future Scenario, respectively and assessed whether these features and their functions would be affected based on proximity to construction and operation activities.

3.1.2.1.2 Terrestrial Habitats

Background information was reviewed and analyzed to identify terrestrial habitats potentially affected by the Future Baseline Scenario and Proposed Future Scenario. Terrestrial habitat field observations were collected in the immediate vicinity of the BBTCA and from the shoreline of the Toronto Islands, including vegetation community mapping using the ELC system for Southern Ontario and Significant Wildlife Habitat Assessment in accordance with the MNRF's *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015). Terrestrial habitats were identified within 120 m of the proposed runway extensions under the Future Baseline Scenario and Proposed Future Scenario, respectively and assessed whether these features and their functions would be affected based on proximity to construction and operation activities.

3.1.2.1.3 Terrestrial Species

The following methods were used to assess the potential effects on terrestrial species including bird populations associated with bird strikes:

- Background terrestrial species data were reviewed and analyzed to provide a comprehensive list of species, including birds, potentially affected by the Future Baseline Scenario and Proposed Future Scenario.
- Terrestrial species field observations were collected in the immediate vicinity of the BBTCA and from the shoreline of the Toronto Islands.
- Bird surveys (overwinter, spring and fall migration, breeding season and Double-crested Cormorant behaviour surveys) were conducted to develop an understanding of bird habitat use within the immediate vicinity of the BBTCA.
- Historical bird strike data for the BBTCA were obtained from Falcon Environmental Services, Inc. and Transport Canada, and were used to project the anticipated number of bird strikes under the Future Baseline Scenario and Proposed Future Scenario. These projections were assessed to determine potential effects on birds identified through the background review and compared to other human-related sources of bird mortality in the Study Area.
- Background information on bird species in the Study Area was compared to published information regarding the relative risk of bird strikes for different groups of birds. This included reviewing species life history information using the Birds of North America database (Cornell Lab of Ornithology, 2015a) and scientific journal articles for species characteristics and behaviours that could potentially be hazardous to airport operations.
- The projected flight paths and flight heights in the vicinity of TTP/Leslie Street Spit under the Future Baseline Scenario and Proposed Future Scenario were compared to typical flight heights and behaviours of bird species identified through the background review.
- A literature review of off-site wildlife management at North American airports was completed to identify potential mitigation or management techniques that could be implemented at BBTCA and the associated potential effects on TTP, if any. Available Airport Wildlife Management Plans (AWMPs) or similar (e.g., Wildlife Hazard Management Plans) were reviewed and summarized to assess the potential effects on bird populations associated with wildlife management actions that may be taken to prevent bird strikes (i.e., bases on human safety concerns).

3.2 Cumulative Net Effects Analysis

The following sections describe the Cumulative Net Effects Analysis for the Future Baseline Scenario and Proposed Future Scenario.

3.2.1 Future Baseline Scenario

The following sections describe the aquatic and terrestrial natural environment Cumulative Net Effects Analysis for the Future Baseline Scenario (i.e., the growth that can occur within the existing Tripartite Agreement). This scenario includes approximately 43 m land mass extensions at both ends of the existing runway in order to accommodate Runway End Safety Areas, as well as an increase in the number of total annual aircraft movements to 140,700 per year. The mix of commercial aircraft is anticipated to remain unchanged from current conditions under this scenario.

3.2.1.1 Aquatic Environment

The results of the Cumulative Net Effects Analysis for each aquatic natural environment asset are described below.

3.2.1.1.1 Aquatic Habitats or Functions

Aquatic habitat at the east end of the existing runway includes a variety of aquatic plant species, although most are invasive (e.g. Eurasian Water-milfoil and Fanwort). Habitat quality was identified as *Moderate* and consisted of various cover types that provided refugia for many generalist fish species. Excellent habitat for Eastern sand darter was also identified. At the west end of the existing runway, aquatic vegetation was limited to small pockets and Zebra mussels were found at one location. Habitat quality at the west end of the existing runway was identified as being *Low to Moderate* with indirect provision of migration routes to more suitable habitats. Generally, the fish habitat that would be affected by the proposed infilling is common for that area and likely more resilient to disturbances than more sensitive habitats. However, even common habitat types provide value as fish habitat and any infill will result in the immediate destruction of those habitats.

The potential effects, mitigation measures and net effects on these aquatic habitats and their functions associated with the Future Baseline Scenario are described in **Table 3-1** below.

3.2.1.1.2 Aquatic Species

Aquatic species may be permanently displaced due to the minimal infill of 2,500m^2 for the RESA if constructed. Additionally, minor changes to currents as a result of the proposed runway extension are anticipated and will be limited to the immediate area of the proposed extension on the western end of the runway due principally to the impact of local sediment transport processes. Minor changes to the waves entering into the Western Channel around the western runway will occur due to the reduction in size of the wave energy window for the southwesterly waves by the land mass extension (CH2M Hill, 2013); as a result a minor change to wave height would not expect to increase siltation in the Western Gap. There is the potential for local sediment and new sedimentation processes to become a factor in preventing the immediate fish populations to successfully carry out their life processes. As the current conditions favour generalist species, future potential changes are not expected to have profound long term net effects to the overall recruitment for any species.

The potential effects, mitigation measures and net effects on these aquatic species and their functions associated with the Future Baseline Scenario are described in **Table 3-1**.

Table 3-1: Effects Assessment for the Future Baseline Scenario – Aquatic Environment

Asset	Measure of Effect	Key Design Considerations & Assumptions	Future Baseline Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Aquatic Habitat or Functions	▶ Temporary and/or long-term loss of aquatic habitat within the footprint of the RESA, including areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species.	▶ Infill into Lake Ontario for construction of the RESA is required consisting of: Loss of a minimum of 2,500 m^2 (e.g., 50 m x 50 m) of aquatic habitat (direct and indirect).	▶ Future baseline conditions pertaining to the aquatic environment will generally remain similar to or the same as the existing conditions. ▶ Infill to occur at both the east and west ends of the runway to accommodate the RESA, resulting in a loss of approximately 50 m of habitat extending from the existing runway (relatively minor).	▶ Loss of approximately 2,500 m^2 of habitat considering both RESA extensions. Vegetation removal at both ends of the runway could cause changes in nutrient inputs to the water which in turn may alter food supply and nutrient concentrations for the fishery. The removal of aquatic vegetation will decrease the amount of cover available which will in turn, allow certain species to be susceptible to predation and limit the amount of diverse and stable environments. ▶ The RESA will partially constrict the water flow at the east and west ends of the runway. Changes in lake morphology may take place as water and flow adapt to the new structure below the water. The change in flow will have an effect on substrate composition which may in turn change the food supply, habitat cover, and nutrient concentrations.	▶ Continue consultation with Toronto and Region Conservation Authority (TRCA) regarding offsetting harm to fish and fish habitat. Offsetting measures are intended to counterbalance unavoidable serious harm to fish and/or fish habitat, and shall be developed to support and enhance the sustainability and ongoing productivity of fish within the disturbance area. ▶ No mitigation available to prevent vegetation removal effects and disturbance of substrate. ▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during all phases of the project.	▶ There will be a net loss of approximately 2,500 m^2 considering the RESA; however, effects are considered minor due to the relatively small size of the infill. ▶ The decreased stability of the substrate may result in an excess of fragmented organic and inorganic material which is transported by water, wind, ice, and gravity. These sediments, which contain nitrifying elements can capture or absorb contaminants and either settle or collect in the lake, reducing the availability and quality of habitat.
Aquatic Species	▶ Temporary and/or long-term effects on aquatic species, including fish, Endangered Species and Species at Risk (SAR) such as the American Eel.	▶ Infill into Lake Ontario for construction of the RESA is required consisting of: Loss of approximately 2,500 m^2 of aquatic habitat (direct and indirect).	▶ Future baseline conditions pertaining to the aquatic environment will generally remain similar to or the same as the existing conditions. ▶ Infill to occur at both the east and west ends of the runway to accommodate the RESA, resulting in a loss of approximately 50 m of habitat extending from the existing runway (relatively small).	▶ Temporary sedimentation of the surrounding environment which may cause disruption to critical life processes. ▶ Permanent loss of aquatic habitat (minimal infill) within the footprint of the RESA, however: areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species are not expected to be negatively affected. ▶ Displacement of fish after loss of immediate habitat which may result in increased predation due to reduced refuge areas.	▶ None.	▶ All potential impacts will be low to moderate in severity considering the relatively small size of the infill. Impacts are not expected to result in serious harm to the resident fish populations in the immediate vicinity. ▶ Possible increased predation of certain species; however, no long term loss of year class is expected.

3.2.1.2 Terrestrial Environment

The results of the Net Effects Analysis for each terrestrial natural environment asset are described below for the Future Baseline Scenario.

3.2.1.2.1 Significant Features or Functions

Significant Features and Functions include designated natural areas, such PSWs, ANSIs and ESAs as well as SWHs. The Toronto Islands Life Science ANSI designated as a Provincially Significant Candidate is located along Hanlan's Point Beach and extends to the BBTCA property line near the western end of the runway. There are no other designated natural areas within 120 m of the proposed 43 m land mass extensions. However, the following SWHs were identified within 120 m of the proposed 43 m land mass extensions:

- Waterfowl Stopover and Staging Area (Aquatic) within Lake Ontario;
- Migratory Butterfly Stopover Area on Hanlan's Point Beach;
- Rare Vegetation Community (Little Bluestem – Switchgrass – Beachgrass Open Dune) on Hanlan's Point Beach; and
- Habitat for a Species of Conservation Concern (SOCC), Short-liguled Beach Grass, on Hanlan's Point Beach.

The potential effects, mitigation measures and net effects on these significant natural features and their functions associated with the Future Baseline Scenario are described in **Table 3-7**.

3.2.1.2.2 Terrestrial Habitats or Functions

Significant Wildlife Habitats identified within 120 m of the proposed 43 m land mass extensions are described above. Terrestrial habitats also include wetlands, woodlands, dune environments and habitats known to support sensitive terrestrial species. There are no wetlands or woodlands within 120 m of the proposed 43 m land mass extensions.

Natural vegetation cover is minimal within the BBTCA grounds and is mostly limited to weedy herbaceous and shrub species along the shorelines. As a result, the BBTCA grounds generally do not support significant suitable habitat for terrestrial wildlife; however, some insectivorous bird species were observed foraging within the mowed grassy areas on the BBTCA grounds during breeding season surveys, including Barn Swallow, Bank Swallow, Northern Roughed-winged Swallow and Cliff Swallow. Barn Swallow and Bank Swallow are listed as Threatened under the *ESA*. Bird species including Mallard, Canada Goose and gulls may be attracted to forage or rest in temporary areas of pooled water on the BBTCA grounds in the spring, which have been observed by BBTCA Wildlife Control Officers. In addition, there is a small cultural thicket community located adjacent to the western end of the existing runway which provides habitat for a locally and regionally rare plant, Nodding Wild Rye, and the rip-rap area located southwest of the east end of the runway supports habitat for two regionally rare plant species, Hedge-nettle and Variegated Horsetail.

Outside the BBTCA grounds, a provincially significant Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community is present along Hanlan's Point Beach and extends to the BBTCA property line near the western end of the runway. This sand dune community provides habitat for a provincially rare plant species, Short-liguled Beach Grass, as well as a number of regionally and locally rare plant species (as described in **Section 1.4.2.1**). In addition, the open water within Lake

Ontario, including water within the immediate vicinity of the proposed land mass extensions provides overwintering habitat for waterfowl including large numbers of Canada Goose, Long-tailed Duck, Greater Scaup and Red-breasted Merganser.

The potential effects, mitigation measures and net effects on these terrestrial habitats and their functions associated with the Future Baseline Scenario are described in **Table 3-7** below.

3.2.1.2.3 Terrestrial Species

3.2.1.2.3.1 Terrestrial Species Potentially Affected

The BBTCA grounds and surrounding area within 120 m of the proposed 43 m land mass extensions are not known to support populations of rare or sensitive mammals, amphibians or reptiles. One provincially rare plant, Short-liguled Beach Grass, and three regionally rare plants, Hedge-nettle, Variegated Horsetail and Nodding Wild Rye, were observed on the BBTCA grounds. Refer to **Section 3.2.1.2.1** and **Section 3.2.1.2.2** for the potential effects, mitigation measures and net effects on these species.

Monarch butterflies are known to use the Toronto Islands as a Migratory Butterfly Stopover Area, including Hanlan's Point Beach. In addition, a number of regionally and locally rare plant species were observed within the sand dune community on Hanlan's Point Beach (as described in **Section 1.4.2.1**). Refer to **Section 3.2.1.2.1** and **Section 3.2.1.2.2** for the potential effects, mitigation measures and net effects on these species.

Bird species observed on the BBTCA airport grounds, in the vicinity (i.e., within 500 m) of the proposed 43 m land mass extensions, as well as on the Toronto Islands, TTP/Leslie Street Spit and the Study Area are described in detail in **Section 1.4.2.2**. In particular, the following bird SAR and SOCC have been recorded on the BBTCA airport grounds and vicinity during bird surveys and through monitoring completed by BBTCA Wildlife Control Officers:\

- Barn Swallow;
- Bank Swallow;
- Chimney Swift;
- Caspian Tern
- Long-tailed Duck;
- Redhead;
- Great Egret;
- Peregrine Falcon; and
- Semipalmated Sandpiper.

The nearby TTP/Leslie Street Spit harbours large populations of colonially-nesting waterbirds including Double-crested Cormorant and the largest global breeding colony of Ring-billed Gull. Other colonial waterbirds nesting, in relatively fewer but still relatively large numbers, at TTP/Leslie Street Spit, includes Herring Gull and the following four (4) bird SOCC:

- Black-crowned Night Heron
- Common Tern;
- Caspian Tern; and
- Great Egret.

3.2.1.2.3.2 Risk to Bird Populations Associated with Bird Strikes

Historical bird strike data for the BBTCA were obtained from Falcon Environmental Services, Inc. and Transport Canada, and were used to project the anticipated number of bird strikes under the Future Baseline Scenario. These projections were assessed to determine potential effects on birds identified through the background review and compared with other human-related sources of bird mortality in the Study Area.

On March 17, 2015 Transport Canada provided historical bird strike data for the BBTCA recorded for the past 20 years, between 1995 and 2014; while Falcon Environmental Services Inc. provided AECOM with bird strike data for the BBTCA recorded from 2007 through 2014. Data from Transport Canada prior to 2006 were excluded from analyses to facilitate comparisons between the two datasets, since Falcon Environmental Services Inc. began collecting data in 2007 and before 2006 airports were not required to report wildlife strikes to Transport Canada as is now mandated by *Civil Aviation Regulation* (CAR) 302.303 (Searing, 2010). Therefore, bird strike data from Transport Canada prior to 2006 was considered to be incomplete strike records and less reliable. For these reasons, the data from Transport Canada before 2006 were excluded from analyses.

Bird strike data provided from Transport Canada were reported using the standard three numeric range classifications (instead of the actual number) which are: single bird, between two and 10 birds and more than 10 to 100 birds (Atkins Ltd. & FERA, n.d.). In some cases, the total number of birds struck for a single event was unknown, presumably because there was either no bird remains found or the remains were indistinguishable. In order to determine the number of bird fatalities per year, the following approach was taken: the median number of struck birds within each category was considered. For example, it was assumed that 6 birds were affected for a record under the category of 2 -10 bird strikes. Given that the majority (77%) of wildlife strikes involved only one bird, records that were categorized as “unknown” were assumed to involve one bird strike. Based on these assumptions, estimated numbers of bird strikes for each year were calculated and provided in **Table 3-2**. On average, there are approximately 45 bird strikes annually from Transport Canada data between the years of 2006 and 2014.

Table 3-2: BBTCA Bird Strike data from 2006-2014, provided by Transport Canada

Year	Number of Total Annual Aircraft Movements	Number of Strike Records under each Bird Struck Category				Estimate of Total Number of Birds Struck
		Unknown	1	2-10	11-100	
2006	77,581	1	2	1	0	9
2007	90,199	1	16	1	0	23
2008	93,253	0	21	1	0	27
2009	106,316	0	31	1	0	37
2010	113,685	0	31	5	0	61
2011	111,280	0	25	2	0	37
2012	114,576	0	35	1	0	41
2013	114,428	25	36	8	0	109
2014	116,125	4	32	4	0	60
Total	-	42	294	282	56	674
Annual Mean		-	-	-	-	34

Unlike the bird strike data provided by Transport Canada, the data from Falcon Environmental Services Inc. from 2007 and 2014 reflect the actual number of birds struck and are summarized in **Table 3-3**. On average, there were approximately 41 birds struck annually. Since the Transport Canada data show an approximate (as opposed to actual) number of bird strikes, both sets of bird strike data (i.e., from Transport Canada and Falcon Environmental Services Inc.) were analyzed separately and compared below. Note that the average number of bird strikes from the two sources (41 vs 45) is quite similar.

Table 3-3: BBTCA Bird Strike data from 2007-2014, provided by Falcon Environmental Services Inc.

Year	Number of Total Annual Aircraft Movements	Total Number of Bird Strikes
2007	90,199	22
2008	93,253	26
2009	106,316	36

Table 3-3: BBTCA Bird Strike data from 2007-2014, provided by Falcon Environmental Services Inc.

Year	Number of Total Annual Aircraft Movements	Total Number of Bird Strikes
2010	113,685	63
2011	111,280	42
2012	114,576	45
2013	114,428	58
2014	116,125	39
Total	-	273
Annual Mean	-	41

The number of total annual aircraft movements (i.e., takeoff or landing) is expected to increase from 116,125 to approximately 140,700 per year under the Future Baseline Scenario. Historical total annual aircraft movements between 2006 and 2014 were provided by WSP and are presented in **Tables 3-2** and **3-3,** respectively. The historical total annual aircraft movements were then compared with the number of bird strikes from Transport Canada and Falcon Environmental Services Inc. data, respectively, between the years of 2006 and 2014 as depicted on **Figure 3-1**. The number of total annual aircraft movements was also compared with the number of bird strikes from Falcon Environmental Services Inc., as this data set includes the actual number of bird strikes compared to the estimated numbers from Transport Canada, in order to identify whether a correlation between these exists. The results from these are shown on **Figures 3-2** and **3-3** and discussed below.

Based on the Transport Canada and Falcon Environmental Services Inc. bird strike data, there appears to be a general increase in the number of bird strikes as the number of total annual aircraft movements increases (**Figure 3-1**). This is further supported by a positive correlation as shown on **Figure 3-2**. Falcon Environmental Services Inc. data suggest a relatively strong relationship (R^2 = 0.623) between the number of total annual aircraft movements and the number of birds struck. However, this relationship alone does not explain all of the variation observed in the dataset. Some of the variation can be attributed to weather conditions and stochastic events.

In order to project the number of bird strikes under the Future Baseline Scenario an approach used by Transport Canada was taken in which bird strike statistics are standardized as the number of bird strikes per 10,000 movements (TC, 2004). The average number of bird strikes per 10,000 aircraft movements was calculated based on Falcon Environmental Services Inc. 2007 to 2014 bird strike data. On average, 3.83 birds are struck per 10,000 aircraft movements. Therefore, the number of bird strikes expected for 140,700 movements under the Future Baseline Scenario is 54. This corresponds to an approximate 30% increase from the annual mean number of bird strikes of 41 calculated from the Falcon Environmental Services Inc. data. This increase in bird strikes as a result of the Future Baseline Scenario is not anticipated to significantly affect bird populations in the terrestrial environment Study Area compared with other more prominent anthropogenic sources in the area.

A review conducted by Calvert, *et al*. (2013) found that 95% of human-related avian mortality in Canada was cumulatively attributed to cat predation and collisions with windows, road vehicles and transmission lines. Little information on the magnitude of avian mortality from aircraft strikes was found. When compared with other human related causes of bird mortality, bird strikes with aircrafts are not considered to be a major source of bird mortality in Canada. Within the terrestrial environment Study Area, an average of 1,768 birds collide with buildings every year as reported by FLAP (pers. comm., July 7, 2015).

The potential effects, mitigation measures and net effects on terrestrial habitats and their functions associated with the Future Baseline Scenario are described in **Table 3-7** below.

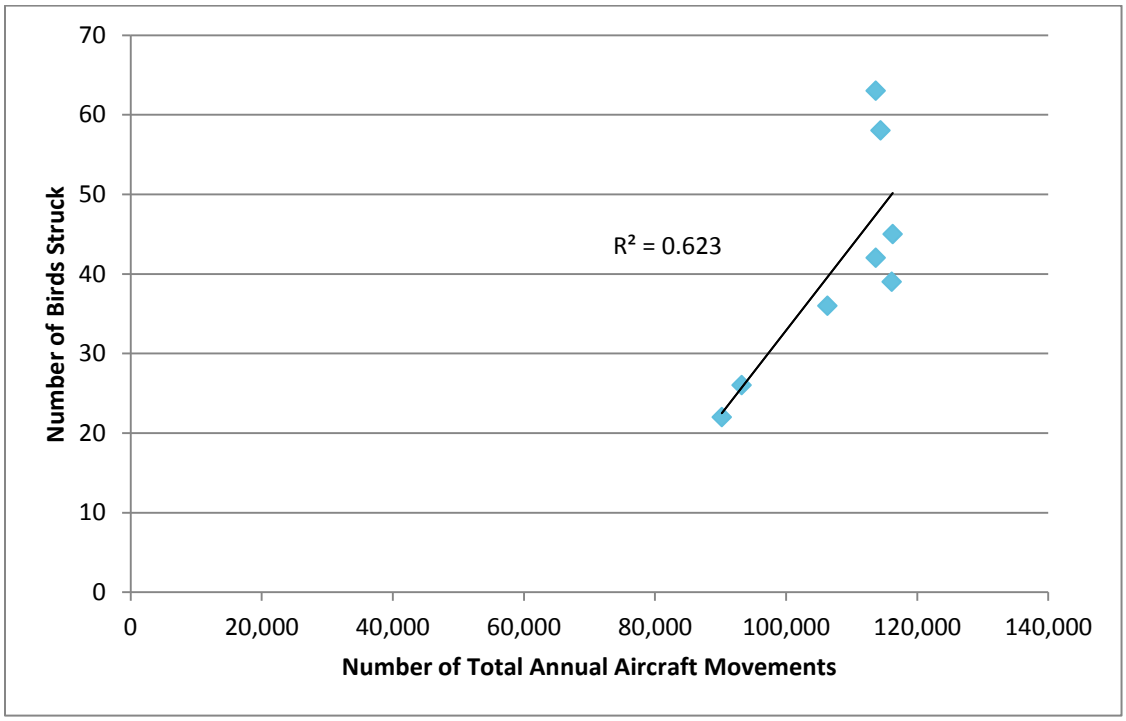


Figure 3-1: Correlation between Number of Total Annual Aircraft Movements and Number of Birds Struck from Falcon Environmental Services Inc. from 2007 and 2014

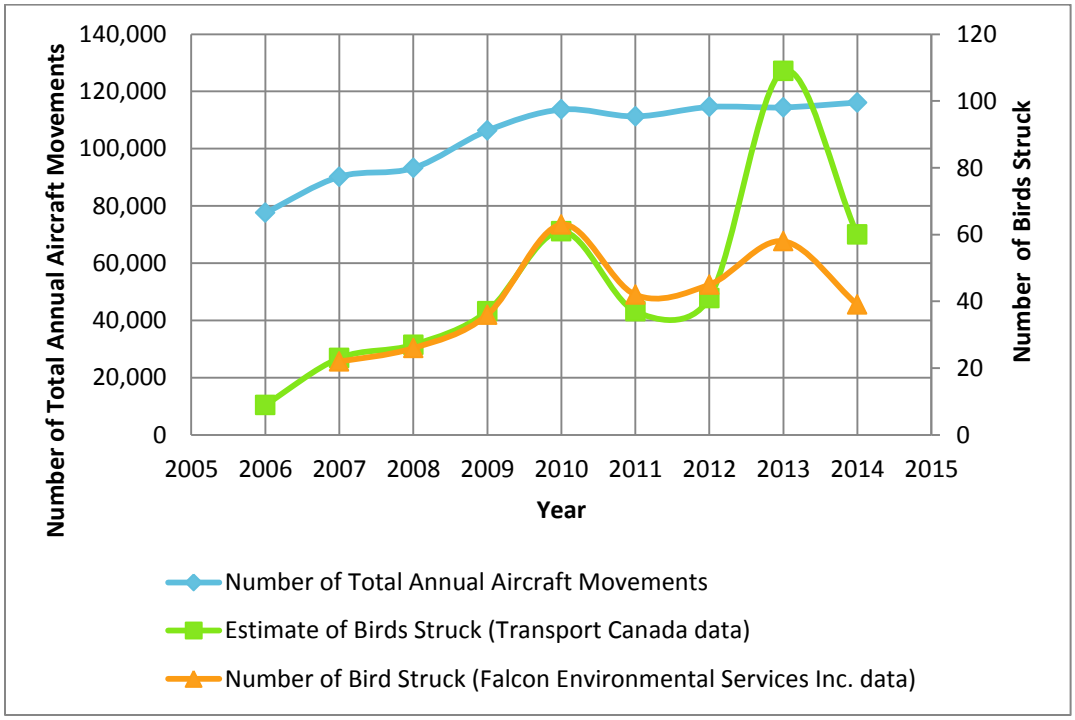


Figure 3-2: Number of Total Annual Aircraft Movements and number of birds struck from Transport Canada and Falcon Environmental Services Inc. from 2006 to 2014.

3.2.1.2.3.3 Relative Risk of Bird Groups to Bird Strikes

Background information on bird species in the Study Area was compared with published information regarding the relative risk of bird strikes for different groups of birds. This included reviewing species life history information using the Birds of North America database (Cornell Lab of Ornithology, 2015a) and scientific journal articles for species characteristics and behaviours that could potentially be hazardous to airport operations.

Dolbeer *et al.* (2000) identified hazardous species and ranked 21 species (birds and mammals) groups based on the number of strikes reported to the National Wildlife Strike Database between 1991 and 1998 in the U.S. Gulls, blackbirds-starling, sparrows, geese, hawks, ducks, Rock Dove, herons and swallows are within the top ranked bird species groups. Generally, waterfowl, gulls, raptors, pigeons and doves are the most hazardous species across North America (TC, 2004).

Table 3-4 provides a summary of the most frequently struck bird groups at the BBTCA as identified from 2007 through 2014 by Falcon Environmental Services Inc. These data suggest that the most frequently struck bird group at the BBTCA was gulls and terns, other small birds (predominately sparrows) and swallows. Other groups included ducks, followed by raptors, geese, cormorants and blackbirds. Other bird groups involved in wildlife strikes from 2007-2014 include shorebirds and Mourning and Rock Dove.

Table 3-4: 2007-2014 Strike Records per Bird Group at BBTCA, Provided by Falcon Environmental Services, Inc.

Bird Groups	Number of Strike Records	Percent (%) of Strike Records
Unknown	96	36.4
Gulls and Terns	48	18.2
Other Small Birds	41	15.5
Swallows and Allies	39	14.8
Ducks and Allies	10	3.8
Raptors	9	3.4
Geese	6	2.3
Cormorants	5	1.9
Starlings	4	1.5
Blackbirds	3	1.1
Shorebirds	2	0.8
Mourning and Rock Dove	1	0.4
Total	264	100

The above data are generally consistent with the Transport Canada bird strike data from 1994-2014 (**Table 3-5**). Besides unidentified species, the most frequently struck bird groups at the BBTCA over the past 20 years were gulls including Ring-billed Gull, sparrows, swallows including Barn Swallow and geese including Canada Goose. Other affected bird groups were ducks including Mallard, raptors, European Starlings, Double-crested Cormorant, Shorebirds, blackbirds, pigeons and wrens. The findings of Dolbeer, *et al*. (2012) suggest that the most frequently struck bird groups in the US are gulls (16%), doves and pigeons (15%), raptors (13%) and waterfowl (7%). Based on the historical strike records at BBTCA in the past 20 years, gulls, sparrows and swallows were the most frequently struck bird group, while geese, ducks, raptors and pigeons were less frequently struck than suggested by Dolbeer *et al.*(2012).

Table 3-5: 1995 to 2014 Strike Records per Bird Group at BBTCA, Provided by Transport Canada

Bird Group	Total Number of Strike Records	Percent (%) of Strike Records
Unknown	147	38.3
Gulls	100	26.0
Sparrows	39	10.2
Swallows	34	8.9
Geese	19	4.9
Ducks	13	3.4
Raptors	10	2.6
Starlings	8	2.1
Cormorants	6	1.6
Shorebirds	4	1.0
Blackbirds	2	0.5
Pigeons	1	0.3
Wrens	1	0.3
Total	384	100.0

A review of the size, flight altitude and behaviours of the most frequently struck bird groups (i.e., those bird groups with at least one percent contributing to total strike records in the past 20 years) identified through Transport Canada data that may contribute to their vulnerability to collisions with aircrafts at BBCTA is provided in **Table 3-6,** with the exception of the “unknown” bird group**.** The bird groups identified in **Table 3-6** are at relatively high risk of collisions with aircrafts in part due to their size, high degree of sociality and flying strategy/behavior. The majority of the identified species and/or bird groups are diurnal with peaks of activity occurring in the morning and in the early evening (TC, 2002). Most bird strikes occur in the early morning and decrease throughout the day (TC, 2002). There are also peaks throughout the year where the number of reported bird strikes in Canada increase; these include during the spring migration (April to June), summer (July to August), and fall migration (September and October; TC, 2002; TC, 2004). During the summer, specifically in July, a lot of the bird strikes recorded in Canada are likely due to the presence of young immature birds that have recently fledged and also bird dispersal from their breeding grounds (TC, 2002).

Table 3-6: Summary of Bird Species Susceptible to Bird Strikes Due to Bird Size, Flight and/or Behaviour

Bird Group [1]	Most Commonly Struck Species within each Bird Group [2]	Size	Flight Altitude	Behaviours Susceptible to Bird Strikes
Gulls and Terns	Ring-billed Gull	0.83-1.4 lbs. (TC, 2004)	• Flapping flight of gulls occur under 300 ft. (TC, 2004), approximately 100 m. • Gulls may use soaring or gliding flights, which occurs at altitudes of over 1,300 ft. (TC, 2004), approximately 400 m. • Terns typically forage over water at heights of <100 m (Nisbet, et al. 2002; Cuthbert and Wires, 1999). • Migratory flight of Common Terns is between 1,000 and 3,000 m (Alerstam, 1985). • Observed flight height approximately >100 m during avian surveys conducted by AECOM at BBTCA.	• Forms large nesting colonies. • Gulls are opportunistic foragers but Ring-billed Gulls are particularly adapted to human-modified landscapes, benefiting from agricultural activity and garbage dumps that supplement the diet of this species (Pollet, *et al.* 2012). • Terns forage by plunge-diving. • Some individuals will travel greater distances to find sufficient food (Moore, 1993). • Some species form migratory flocks, varying in size from a few individuals to a few hundred (Southern, 1980; Nisbet, et al. 2002). • Some species have aerial displays (in response to presence of terrestrial predators; Pollet, *et al*. 2012).
Sparrows	Species not identified	28g – 53g (Cornell lab of ornithology, 2015b; 2015c)	• Savannah Sparrows can fly low within 1m AGL, and higher between 5-15 m AGL when flying to feeding grounds (Wheelwright and Rising, 2008). • Song Sparrow flight low, direct and short (*Arcese* et al., 2002).	• Savannah Sparrow display slow “flutter flight” (Wheelwright and Rising, 2008). • Song sparrow similar fight display to Savannah Sparrow (*Arcese* et al., 2002).
Swallows	Barn Swallow	19 g (Sibley, 2014)	• Forage by flying 10-15 m above the ground ; may be < 1 m above ground (Brown and Brown, 1999; Waugh, 1978) • Observed flight height of approximately <25m during avian surveys by AECOM at BBTCA.	• Some species, e.g., Barn Swallow, may construct nests in manmade structure (Brown and Brown 1999). • May forage in flocks and nest in colonies. • Swallows are aerial insectivores; forages for flying insects on the wing over open areas (Brown and Brown, 1999; Mead, 1979; Turner, 1980). • Swallows are medium- to long-distance diurnal migrants that form large mixed-species flocks (Brown and Brown, 1999; Garrison, 1999).
Geese	Canada Goose	4, 500 g (9.8 lbs.; Sibley 2014)	• Migratory flight at altitude of 300-1,000 m (Bellrose, 1980; Wege and Reveling, 1984) • Observed flight height of approximately 10 m during avian surveys by AECOM at BBTCA.	Populations in North America are increasing (Conover, 1998). • Feeds primarily on grasses and sedges (Mowbray, *et al.* 2002). • Highly social; usually maintain family groups throughout the year (Mowbray, *et al.* 2002) • Northern populations will migrate during the day and night through the Great Lakes region to wintering grounds in mid-latitude and southern areas of the U.S. (Mowbray, et al. 2002).

Table 3-6: Summary of Bird Species Susceptible to Bird Strikes Due to Bird Size, Flight and/or Behaviour

Bird Group [1]	Most Commonly Struck Species within each Bird Group [2]	Size	Flight Altitude	Behaviours Susceptible to Bird Strikes
Ducks	Mallard	1,100 g (2.4 lbs., Sibley, 2014);	• Daily movements of diving ducks between feeding and roosting sites were at altitudes below 100 m (Dirksen, *et al*. 1998). • Migratory flights may occur at a higher altitude (Dirksen, *et al.* 1998) • Observed flight height of approximately 6m during avian surveys by AECOM at BBTCA.	• Many species in North America with increasing population trends. • A large proportion of the daily budget is allocated to resting (Drilling, *et al.* 2002; Robertson and Savard, 2002). • Many species breed at high latitudes, e.g., Long-tailed Duck, and migrate to winter on the Great Lakes (Richardson and Johnson, 1981; Johnson and Richardson, 1982). • Some species are nocturnal migrants (Robertson and Savard, 2002). • Ducks are particularly social during migration and on the wintering grounds (Mudge and Allen, 1980; Drilling, *et al.*. 2002).
Raptors	No specific raptor species had more than two individuals struck.	0.24-11.8 lbs., depending on species	• Hunt at varying heights above ground (1-500 m) (White, et al. 2002; Smallwood and Bird, 2002). • Hunting success may increases with greater difference between falcons and its prey (200 m) (Jenkins, 2000). • Migratory flights of other raptors typically occur at high altitudes (>750 m; Kerlinger, 1989; Kerlinger, *et al*. 1985). • Observed flight height of Red-tailed Hawk approximately 30 m during avian surveys by AECOM at BBTCA.	• Many raptors search for prey in open habitats from a perch (Smallwood and Bird, 2002; Preston and Beane, 2009; White, *et al.* 2002). • Raptor may forage widely (15-43 km; White and Nelson, 1991; Enderson and Craig, 1997) for prey that includes small mammals and birds that may be abundant at airports (TC, 2004). • Many hawks, eagles and vultures will soar or glide, exploiting thermals, while searching for prey or during migrating (Preston and Beane, 2009; Buehler, 2000). • Falcons often pursue prey by diving at a high-speed from a high altitude (White, *et al.* 2002; Smallwood and Bird, 2002). • Raptors tend to congregate along migratory routes including the shores of the Great Lakes (White, *et al.* 2002).
Starlings	European Starling	82 g (Sibley, 2014)	• Mean daily maximum altitude is 124 m (range of daily maximum altitude is 52-173 m; Shamoun-Baranes *et al*., 2006). • Migratory flight at an altitude between 1,000 m or 3,000-4,000 ft. (Gruys-Casimir, 1965).	• Flourish in disturbed habitat and nests in artificial cavities (Cabe, 1993). • Feed on insects, grains, seeds and fruit (TC, 2004) and will forage on short vegetation including mown or grazed fields (Cabe, 1993). • Forage and roost communally and may travel considerable distance between sites used for its respective activity (Cabe, 1993). • Present in the Great Lakes region year round, receiving migrants from northern breeding areas; migrates in flocks and during the day (Cabe, 1993).

Table 3-6: Summary of Bird Species Susceptible to Bird Strikes Due to Bird Size, Flight and/or Behaviour

Bird Group [1]	Most Commonly Struck Species within each Bird Group [2]	Size	Flight Altitude	Behaviours Susceptible to Bird Strikes
Cormorants	Double-crested Cormorant	1,700 g (3.7 lbs.; Sibley, 2014)	• A small proportion of the daily budget is spent flying (8-19%; King, et al. 1995; Fowle, 1997). • Fly closer to the surface over water and higher over land (Dorr, *et al*. 2014). • Migratory flight up to 1,000 m (Dorr, *et al*. 2014). • Observed flight height approximately >50 m during avian surveys conducted by AECOM at BBTCA.	Gregarious; forms flocks for breeding, roosting and foraging. • Notable increases in northeastern North American population (Dorr, *et al.* 2014). • Feeds almost exclusively on fish by diving but will fly more than 10 km to locate sufficient prey (Andrews, et al. 2012). • A significant proportion of the daily budget is spent loafing (Dorr, *et al*. 2014). • Migrates during the day and usually in small flocks <50-100; large flocks of up to 1,000 individuals have been reported (Dorr, *et al.* 2014).
Shorebirds	Killdeer	75-128g (Cornell lab of ornithology, 2015d).	• Flight is rapid and strong (Jackson and Jackson, 2000)	• Active during day and night (Jackson and Jackson, 2000). • Runs rapidly on the ground in short distances, stops, bobs head and runs again (Jackson and Jackson, 2000). • Nest on the ground in vegetation but also on graveled road shoulders and parking lots (Jackson and Jackson, 2000).

Notes: 1. Bird Groups discussed represent at least 1% of strike records in the past 20 years from Transport Canada data.

2. Most commonly struck species within each Species Group in the past 20 years as identified from Transport Canada data. Most commonly struck species (where identified and reported to species level) were considered to mean at least 2 struck individuals of that species in the past 20 years.

Most daily movements of birds occur between approximately 10 and 100 m above ground level (AGL) (TC, 2004). Most birds fly at altitudes below 152 m AGL. A large proportion of northeastern North American birds are also migratory and flight of this behavior typically occurs at higher altitudes than daily movements, increasing the susceptibility of collisions with aircrafts for certain species (TC, 2004). Many of the migratory birds are also nocturnal, including Canada Geese and Swans (TC, 2002). The BBTCA operates between 6:45 am and 11:00 pm; therefore, strikes with nocturnally active or migrating birds are not anticipated. Most diurnal long-distance migrant birds such as raptors, swallows, swifts and herons fly below 1,153 m (Mateos-Rodriguez and Liechti, 2011).

Furthermore, according to the *State of Canada's Birds* (NABCI, 2012), birds that are considered hazardous to airport operations including waterfowl, colonial waterbirds and raptors, have increased in recent decades, benefiting from additional food sources (e.g., agriculture), wetland restoration, and/or a reduction in DDT, PCBs and other pollutants. On the other hand, other groups of birds at risk of collisions with aircrafts and present within or in the vicinity of the BBTCA and TTP have declined in North America over the past 40 years including aerial insectivores and shorebirds (NABCI, 2012).

The potential effects, mitigation measures and net effects on these terrestrial habitats and their functions associated with the Future Baseline Scenario are described in **Table 3-7**.

3.2.1.2.3.4 Analysis of Flight Paths and Heights near TTP/Leslie Street Spit

The projected flight paths and flight heights in the vicinity of BBTCA and TTP/Leslie Street Spit under the Future Baseline Scenario were compared with typical flight heights and behaviours of bird species identified through the background review in **Table 3-6**.

Flight trajectories were not received from the 2015 Master Planning Exercise at the time of submission of this technical memo, *BBTCA EA: Natural Environment Cumulative Net Effects Assessment*; therefore, whether or not aircrafts fly above TTP/Leslie Street Spit is uncertain.

Statistics on reported bird strike data from the US and Canada between the years of 1991 and 1999 show that most bird strikes occur during the takeoff and landing phases of flight (TC, 2004). In Canada, approximately 37% of bird strikes occur during the takeoff phase and 41% during the landing phase (TC, 2004; TC, 2002). This is because the majority of birds fly below 152 m AGL, which is within the same altitude ranges of the takeoff and landings phases. Approximately 40% of Canadian bird strikes occur when the aircraft is still on the ground during the takeoff and landings roll (TC, 2004).

Review of the Obstacle Limitation Surface (OLS) received from WSP through the Master Planning Exercise, suggests that the lengths of the landing phases are approximately within 3 km of the runway threshold, respectively. The heights at the outer surface of the OLS are 146 m at the east end and 191 m at the west end with a gradual decline in heights towards the runway threshold at each end. The OLS also provides the most conservative flight heights, meaning that these heights are the lowest that an aircraft could reach but usually aircrafts fly at higher heights. According to the flight heights of species groups in **Table 3-5** in **Section 3.2.1.2.3.3**, species most commonly found near BBTCA such as gulls, terns and ducks fly at altitude of 100 m or less during their daily movements. Barn Swallows were observed foraging between 1 and 25 m above the mowed portions of the airfield on the BBTCA grounds. Flight heights of Double-crested Cormorants recorded during the avian survey at BBTCA ranged between 0 to 50 m. The OLS for the Future Baseline Scenario is not anticipated to change from current conditions and therefore the bird strike risk is not anticipated to significantly change either as a result of flight heights.

Assuming that flight paths of aircraft intersect the airspace above TTP/Leslie Street Spit, approximate altitudes were determined using the BBTCA Instrument Procedure Obstacle Identification Surface Reference Grid provided by WSP. Flight heights associated with the grid squares that overlay TTP/Leslie Street were not provided; therefore, available flight heights nearest to the TTP/Leslie Street Spit were used instead. The closest calculated heights were over the Portlands, and were on average approximately 183 m AGL. As mentioned above, Double-crested Cormorants, Gulls, Terns and ducks, which are common species at TTP/Leslie Street Spit, fly below approximately 100 m during daily movements. Black-crowned Night-heron, which is a SOCC that forms colonies at TTP, is mostly active at night or at dusk (Hothem *et al.*, 2010) and although flight heights of this species could not be found through background review, from previous field experience, this species has been observed to fly relatively low during daily movements. Great Egrets are also more active at night, form loose groups, build nests on trees and are usually found at low altitudes (Sibley, 2014; Kushland and Hancock, 2005). Therefore, strike risk with these species over TTP is generally low given that the aircrafts are flying at higher altitudes, although the risk is increased during spring and fall migration when most migratory birds are also flying higher at the same altitudes as aircrafts. However, given that the heights from the Obstacle Identification Surface Reference Grid are not expected to change from current conditions, the bird strike risk is not anticipated to significantly change as result of flight heights.

The potential effects, mitigation measures and net effects on these terrestrial habitats and their functions associated with the Future Baseline Scenario are described in **Table 3-7** below.

3.2.1.2.3.5 Literature Review of Off-site Wildlife Management Techniques

Although the majority of bird strikes occur below 152 m during the take-off and landings phases, there is an increasing trend in the number of bird strikes that occur at higher altitudes away from the airport grounds (TC, 2002; Dolbeer, 2011). High-altitude strikes usually involve large soaring birds (e.g., raptors) or flocks of migratory birds that can cause damage to aircrafts and negative flight effects since aircrafts are travelling at higher speeds during climbs and en-route (TC, 2002). Waterfowl, gulls and raptors have been identified as bird groups with the greatest number of damaging strikes (Dolbeer, *et al.* 2012). Similarly, Dolbeer (2011) suggests that the percentage of all damaging strikes above 152 m AGL has increased significantly in the US between 1990 and 2009.

Given that continued use of the Q400 series turboprop aircrafts is proposed under the Future Baseline Scenario, that flight heights are not expected to change from current conditions, and propeller aircrafts are generally less susceptible to strike damage (Dolbeer, 2013), the potential effect on local bird populations is mostly attributed to the projected increase in bird strike risk of 30% associated with increased number of total annual aircraft movements. This in combination with an increasing trend of reported high-altitude strikes advocates the need for on-ground management techniques to be implemented that could mitigate the risk of bird strikes outside of the BBTCA grounds above 152 m. Dolbeer (2011; Dolbeer and Franklin, 2013) suggests the use of radar systems to detect and monitor hazardous bird movements within the arrival and departure airspace. In addition, he also suggests the incorporation of current and historical local population, migration and bird strike data of hazard bird species when developing management plans, which are currently incorporated in the BBTCA Wildlife Management Plan to some extent (Falcon Environmental Services Inc., 2013). Weather surveillance radar (WSR) could be filtered to detect birds in real-time within the vicinity of the airport and estimate the spatial distribution of hazard birds, as well as estimate timing, trajectories, flock size, altitudes and travel speeds (Dolbeer, 2011; Belant *et al*., 2013; Dolbeer and Franklin, 2013). This information can be used to alert Wildlife Control Officers, and contribute to air traffic control (Dolbeer, 2011; Belant *et al*., 2013; Dolbeer and Franklin, 2013).

The potential effects, mitigation measures and net effects on these terrestrial habitats and their functions associated with the Future Baseline Scenario are described in **Table 3-7**.

Table 3-7: Effects Assessment for the Future Baseline Scenario – Terrestrial Environment

Asset	Measure of Effect	Key Design Considerations & Assumptions	Future Baseline Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Significant Features or Functions	▶ Temporary and/or long-term loss of significant natural heritage features or functions, such as: ○ Provincially Significant Wetlands, ○ Areas of Natural and Scientific Interest (ANSIs), or ○ Significant Wildlife Habitats.	▶ Extension of land mass for the RESA (approximately 43 m on each end). ▶ It is assumed that construction activities for the 43 m land mass extensions will occur only within the BBTCA grounds and Lake Ontario, and will not extend onto Hanlan's Point Beach.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ It is assumed that the provincially significant sand dune community will not transform into another vegetation community through natural succession. ▶ It is assumed that the provincially significant candidate Toronto Islands Life Science ANSI will be confirmed as provincially significant.	▶ Damage to or loss of the provincially significant candidate Toronto Islands Life Science ANSI, provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community, habitat for a SOCC (Short-liguled Beach Grass), and Migratory Butterfly Stopover Area on Hanlan's Point Beach is not anticipated. ▶ Potential change in the spatial configuration of the provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community as a result of changes in sediment movement processes due to the RESA at the west end of the runway. ▶ Waterfowl Stopover and Staging (Aquatic) Area will be slightly displaced within the area of the RESA. However, this open water habitat type is abundant in the vicinity of the BBTCA.	▶ It is recommended that off-setting for removal of aquatic habitat (to be implemented off-site in order to reduce potential risk to waterfowl associated with bird strikes) consider improvements to the quality of waterfowl habitat (e.g., through increased food/prey abundance, wetland creation or rehabilitation, or shoreline improvements).	▶ No net loss of significant features is anticipated. ▶ With RESA and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas; however, no net effect is anticipated.
Terrestrial Habitats or Functions	▶ Temporary and/or long-term loss of sensitive terrestrial habitat or functions, including wetlands, woodlands and dune environments, or features known to support sensitive species.	▶ Extension of land mass for the RESA (approximately 43 m). ▶ Increase in the number of total annual aircraft movements from 114,428 to 140,700 per year. ▶ Continued use of Q400 Series turboprop aircrafts.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ It is assumed that the provincially significant sand dune community will not transform into another vegetation community through natural succession. ▶ Land use changes within the Terrestrial Study Area may result in an increase or decrease of suitable terrestrial habitat including bird habitat.	▶ Increase in number of total annual aircraft movements may result in an increased risk (estimated to be 30 %) to birds within the BBTCA grounds, including bird SAR (Barn Swallow and Bank Swallow) which may forage in mowed grassy areas. ▶ Increase in number of total annual aircraft movements may result in an increased risk (30 %) to birds within the BBTCA grounds, including birds attracted to temporary areas of pooled water in the spring. ▶ Potential change in spatial configuration of the provincially rare Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community as a result of changes in sediment movement processes due to the RESA at the west end of the existing runway. ▶ Waterfowl Stopover and Staging (Aquatic) Area and overwintering habitat for waterfowl will be displaced within the area of the land mass extensions. However, this open water habitat type is abundant in the vicinity of the BBTCA. ▶ Potential loss of habitat for locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail, within the BBTCA grounds.	▶ Translocate locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail to suitable habitat outside of BBTCA property, if possible elsewhere on the Toronto Islands. ▶ Update the BBTCA Wildlife Management Plan to include measures to reduce risk to Barn Swallow and Bank Swallow (e.g., through passive or active management techniques to prevent foraging within grassy areas on the BBTCA grounds). Train wildlife control officers to recognize Barn Swallow and Bank Swallow, as well as characteristics of their foraging habitat. ▶ Improve drainage on the BBTCA grounds in order to prevent pooling of rainwater or snowmelt, which may attract birds. ▶ It is recommended that off-setting for removal of aquatic habitat (to be implemented off-site in order to reduce potential risk to waterfowl associated with bird strikes) consider improvements to the quality of waterfowl habitat (e.g., through increased food/prey abundance, wetland creation or rehabilitation, or shoreline improvements).	▶ No net loss of terrestrial habitats is anticipated following the implementation of mitigation measures, provided that construction activities do not extend onto Hanlan's Point Beach. ▶ With the RESA and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas as well as waterfowl overwintering habitat; however, no net effect is anticipated. ▶ Minimal net effect on birds within the BBTCA grounds is anticipated as a result of increased number of bird strikes because the increase will not significantly affect local bird populations.
Terrestrial Species	▶ Temporary and/or long-term effects on sensitive terrestrial species including plants, birds, monarch butterflies and other wildlife, rare species and Species	▶ Extension of land mass for the RESA (approximately 43 m). ▶ Increase in the number of total aircraft movements from 114,428 to 140,700 per year.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ Bird populations may change at	▶ Increased number of total annual aircraft movements may result in an increased risk (30 %) to birds, including SAR and SOCC, near the BBTCA grounds.	▶ Incorporate current and historical population, migration and bird strike data of hazard birds into the BBTCA Wildlife Management Plan to predict and anticipate potential threats as they relate to hazard	▶ Minimal net effect on birds near the BBTCA grounds is anticipated as a result of increased number of bird strikes because the increase will not significantly affect local bird populations.

Table 3-7: Effects Assessment for the Future Baseline Scenario – Terrestrial Environment

Asset	Measure of Effect	Key Design Considerations & Assumptions	Future Baseline Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
	at Risk.	▶ The OLS and flight heights will remain the same or similar to current conditions. ▶ Continued use of Q400 Series turboprop aircrafts.	TTP/Leslie Street Spit as a result of TRCA management activities including potential increases in Common Tern, marsh birds, resident land birds and songbirds, and nesting raptors. ▶ Bird populations may also change due to natural population growth and decline, but are expected to remain similar to existing conditions. ▶ There is minimal natural vegetation within the BBTCA grounds. The cultural thicket at the west end of the existing runway and the vegetation within the rip-rap along the shoreline at the east end of the runway are both disturbed and contain many weedy species that generally do not provide high quality habitats.		birds near the BBTCA as well as develop and implement use of a radar-detecting system to detect and monitor hazard birds near the BBTCA grounds to minimize bird strikes.	

3.2.2 Proposed Future Scenario

The following sections describe the aquatic and terrestrial natural environment Net Effects Analysis for the Proposed Future Scenario (i.e., including extension of the land mass and runway to accommodate commercial jet operation from the BBTCA under an amended Tripartite Agreement). This scenario includes 200 m land mass extensions at both ends of the runway in order to accommodate an increase in runway length from 1,216 m to 1,658 m, as well as an increase in the number of total annual aircraft movements from 114,428 to 138,170 per year. The type of commercial aircraft would include CS100 and other qualifying jets under this scenario.

3.2.2.1 Aquatic Environment

The results of the Net Effects Analysis for each aquatic natural environment asset are described below.

3.2.2.1.1 Aquatic Habitats or Functions

Aquatic habitats potentially affected under the Proposed Future Scenario are the same as those potentially affected under the Future Baseline Scenario as described in **Section 3.2.1.1.1.**

The potential effects, mitigation measures and net effects on these aquatic habitats and their functions associated with the Proposed Future Scenario are described in **Table 3-8** below.

3.2.2.1.2 Aquatic Species

Aquatic habitats potentially affected under the Proposed Future Scenario are the same as those potentially affected under the Future Baseline Scenario as described in **Section 3.2.1.1.2.**

The potential effects, mitigation measures and net effects on these aquatic species and their functions associated with the Proposed Future Scenario are described in **Table 3-8**.

Table 3-8. Effects Assessment for the Proposed Future Scenario – Aquatic Environment

Asset	Measure of Effect	Key Design Considerations & Assumptions	Proposed Future Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Aquatic Habitat or Functions	▶ Temporary and/or long-term loss of aquatic habitat within the footprint of the proposed runway extension, including areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species.	▶ Infill into Lake Ontario for construction of runway extension is required consisting of: Loss of approximately 20,000 m^2 of aquatic habitat (direct and indirect) with an extension of 200 m from both the east and west runways.	▶ Future baseline conditions pertaining to the aquatic environment will generally remain similar to or the same as the existing conditions. ▶ Infill to occur at both the east and west ends of the existing runway, resulting in a loss of approximately 200 m of habitat extending from the runway.	▶ Loss of approximately 20,000 m^2 of fish habitat considering the runway extension. ▶ Vegetation removal at both ends of the runway could cause changes in nutrient inputs to the water which in turn may alter food supply and nutrient concentrations for the fishery. The removal of aquatic vegetation will decrease the amount of cover available which will in turn, allow certain species to be susceptible to predation and limit the amount of diverse and stable environments. ▶ The runway extension will partially constrict the water flow at the east and west ends of the runway. Changes in lake morphology may take place as water and flow adapt to the new structure below the water. The change in flow will have an effect on substrate composition which may in turn change the food supply, habitat cover, and nutrient concentrations.	▶ Continue consultation with TRCA regarding offsetting harm to fish and fish habitat. Offsetting measures are intended to counterbalance unavoidable serious harm to fish and/or fish habitat, and shall be developed to support and enhance the sustainability and ongoing productivity of fish within the disturbance area. ▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during all phases of the project.	▶ There will be a permanent net loss of approximately 20,000 m^2 considering the runway extension. ▶ The decreased stability of the substrate may result in an excess of fragmented organic and inorganic material which is transported by water, wind, ice, and gravity. These sediments, which contain nitrifying elements can capture or absorb contaminants and either settle or collect in the lake, reducing the availability and quality of habitat.
Aquatic Species	▶ Temporary and/or long-term effects on aquatic species, including fish, Endangered Species and SAR such as the American Eel.	▶ Infill into Lake Ontario for construction of runway extension is required consisting of: Loss of approximately 20,000 m^2 of aquatic habitat (direct and indirect) with an extension of 200 m from both the east and west runways.	▶ Fish species diversity and abundance may increase, decrease or remain the same depending on habitat creation and offsetting projects nearby.	▶ Possible displacement of fish after loss of immediate habitat which may result in increased predation. ▶ Permanent loss of aquatic habitat within the footprint of the proposed runway extension, however: areas known to support key life cycle stages (e.g., spawning areas), or areas known to support sensitive aquatic species are not expected to be negatively affected. ▶ Temporary sedimentation of surrounding aquatic habitats which may cause disruption to critical life processes.	▶ Prepare and implement an erosion and sediment control plan to minimize the risk of sedimentation during all phases of the project.	▶ Possible increased predation of certain species.

3.2.2.2 Terrestrial Environment

The results of the Net Effects Analysis for each terrestrial natural environment asset are described below.

3.2.2.2.1 Significant Features or Functions

Significant features potentially affected under the Proposed Future Scenario are the same as those potentially affected under the Proposed Future Scenario and include the following:

- The provincially significant candidate Toronto Islands Life Science ANSI on Hanlan's Point Beach;
- Waterfowl Stopover and Staging Area (Aquatic) within Lake Ontario;
- Migratory Butterfly Stopover Area on Hanlan's Point Beach;
- Rare Vegetation Community (Little Bluestem – Switchgrass – Beachgrass Open Dune) on Hanlan's Point Beach; and
- Habitat for a SOCC, Short-liguled Beach Grass, on Hanlan's Point Beach.

The potential effects, mitigation measures and net effects on these significant natural features and their functions associated with the Proposed Future Scenario are described in **Table 3-10** below.

3.2.2.2.2 Terrestrial Habitats or Functions

Terrestrial habitats potentially affected under the Proposed Future Scenario are the same as those potentially affected under the Future Baseline Scenario and include the following:

- Foraging habitat for insectivorous birds, including two bird Species at Risk (Barn Swallow and Bank Swallow), within the mowed grassy areas on the BBTCA grounds;
- Foraging and/or resting habitat for bird species including Mallard, Canada Goose and gulls within temporary areas of pooled water on the BBTCA grounds;
- Cultural thicket community located adjacent to the western end of the runway which provides habitat for a locally and regionally rare plant, Nodding Wild Rye;
- Rip-rap area located southwest of the east end of the runway supports habitat for two regionally rare plant species, Hedge-nettle and Variegated Horsetail;
- Provincially significant Little Bluestem – Switchgrass – Beachgrass Open Dune vegetation community present along Hanlan's Point Beach; and
- Overwintering habitat for waterfowl within Lake Ontario.

The potential effects, mitigation measures and net effects on these terrestrial habitats and their functions associated with the Proposed Future Scenario are described in **Table 3-10** below.

3.2.2.2.3 Terrestrial Species

3.2.2.2.3.1 Terrestrial Species Potentially Affected

Terrestrial species potentially affected under the Proposed Future Scenario are the same as those potentially affected under the Future Baseline Scenario. Refer to **Section 3.2.1.2.3.1** for the list of species discussed in the Net Effects Analysis.

3.2.2.2.3.2 Risk to Bird Populations associated with Bird Strikes

The number of total annual aircraft movements under the Proposed Future Scenario are projected to increase from 114,428 per year in 2014 to 138,170 per year; this is less than the projected increase in the Future Baseline Scenario to 140,700 per year. The mean annual number of bird strikes under the Proposed Future Scenario is expected to be, at most, equivalent to the mean annual number of bird strikes in the Future Baseline Scenario. Therefore the risk to bird populations associated with bird strikes is no more under the Proposed Future Scenario than the Future Baseline Scenario.

3.2.2.2.3.3 Relative Risk of Bird Groups to Bird Strikes

The same bird species and guilds susceptible to bird strikes under the Proposed Future Scenario are the same as those under the Future Baseline Scenario and are discussed in **Section 3.2.1.2.3.3**.

3.2.2.2.3.4 Analysis of Flight Paths and Heights near TTP/Leslie Street Spit

Flight height and paths near the TTP/Leslie Street Spit are expected to remain the same in both the Future Baseline and Proposed Future Scenario and are discussed in **Section 3.2.1.2.3.4.**

3.2.2.2.3.5 Literature Review of Effect of Bird Strikes on Aircraft Type

A comparison of non-engine bird strike data in the US, Canada and UK between 1990 and 2007 for CS-25 propeller vs. jet transport aircrafts revealed that the proportion of non-engine bird strikes worldwide is similar for both aircraft types, 0.31% and 0.27% respectively (Atkins Ltd. and FERA, n.d.). In Canada, a total of 730 bird strikes were reported to Transport Canada between 1991 and 1999 for the DeHavilland Dash-8 (i.e., Dash 8), which is most similar to the Q400 aircraft series currently used at the BBTCA, compared with 355 bird strikes reported for the Airbus A320 aircraft (TC, 2004), which most closely resembles the CS100 series proposed under the Proposed Future Scenario.

Although the Dash 8 appears to be the most frequently struck aircraft type, other contributing factors include: the number of bird strikes per aircraft type, number of aircrafts utilized by the airport, the number of aircraft movements and the wildlife management programs implemented by the airport (TC, 2004). The Dash-8 is the most frequently struck aircraft type because it is more commonly and frequently used for repeated short distance trips at smaller airports that may lack wildlife management plans and not necessary as result of the aircraft technology itself (TP, 2004). On the other hand, jet aircrafts are generally faster and quieter than propeller aircrafts (Dolbeer, 2013; Bradley *et al.*, 2009). Quieter jet aircrafts with turbofan engines compared with noisier piston-powered aircrafts and older turbine-powered aircrafts can be more difficult for birds to detect and avoid (Dolbeer, 2011; 2013; Bradley *et al.*, 2009). However, the use of CS100 series will also reduce the number of aircraft movements required, which could reduce bird strike risk compared with the continued use of turbo prop aircrafts at a higher frequency of aircraft movements under the Future Baseline Scenario.

In a comparison of the number of non-engine/propeller accidental strikes between CS-25 propeller and jet transport aircrafts, Atkins Ltd. and FERA (n.d.) showed a very low rate of accidents and no measurable difference in safety. However, these calculations did not include damaging strikes to engines. Dolbeer (2013) suggests that jet aircrafts are more prone to strike damage than propeller aircrafts (TC, 2004). A growing concern is multiple-engine damage caused by engine ingestion of bird flocks since modern two-engine turbine-powered aircrafts have become more commonly used replacing the three- or four- engine aircrafts (Dolbeer, 2013; Thorpe, 2003). Although a collision with a jet engine with a single small bird is unlikely to cause any damage, collisions with larger or multiple

birds causing engine ingestion can cause more serious damage compared with propeller engines that rebounds struck birds away from the engine (TC, 2004). However, fatal aircraft accidents as a result of bird strikes are rare and can be random events (Thorpe, 2003; Atkins Ltd. and FERA, n.d.). In Canada, engine ingestion occurred in two percent of all reported bird strikes nationwide and a total of one percent of all reported cases has actually resulted in serious engine problems (TC, 2004).

3.2.2.2.3.6 Literature Review of Off-site Wildlife Management Techniques

In an attempt to reduce human safety concerns associated with aircraft collisions with wildlife, Canadian and American airports have developed programs, Airport Wildlife Management Plans (AWMPs) and Wildlife Hazard Management Plans (WHMPs) respectively, that integrate both passive (indirect) and active (direct dispersal or removal) techniques to reduce the local population of wildlife within and in the vicinity of the airport (TC, 2002). A literature review of off-ground wildlife management at North American airports was completed to identify common practice mitigation or management techniques that have been historically or are currently used by airports and whether these have the potential to be implemented at BBTCA. In addition to the BBTCA, available AWMPs or WHMPs for the following airports were compared: Ottawa Macdonald-Cartier International Airport, Seattle-Tacoma International Airport, Salt Lake City International Airport, and John F. Kennedy International Airport (JFK). These documents were reviewed and summarized (**Table 3-9**) to assess the potential effects on bird populations associated with wildlife management actions.

Passive wildlife management involves the removal or modification of sources of food, water and shelter that attract species identified as management priorities during a risk assessment process (TC, 2002). Active management involves the direct dispersal (i.e., deterrents, hazing, etc.) or removal (i.e., live captures and relocations, killing, etc.) of hazardous wildlife using non-lethal and lethal techniques respectively. An increasing trend in high-altitude strikes outside of airports, which may be more hazardous to aircrafts, has led to more common use of off-ground management of areas surrounding airports in recent years, especially in the US (Belant *et al.*, 2013; Dolbeer, 2011;TC, 2002).

Based on the literature review, the most commonly used off-ground airport management technique includes contacting and working collaboratively with adjacent land owners/users, planning authorities, regulatory agencies and stakeholders in order to minimize risk associated with hazardous land-use in the vicinity of the airport grounds. Education and outreach are also used and include increasing awareness of airport wildlife issues and requesting the involvement of landowners and stakeholders to minimize bird use on their property.

Active dispersal and removal of hazardous wildlife on surrounding lands have been used by US Airports, including JFK airport, Salt Lake City International Airport, and LaGaurdia Airport. For example, after the 2009 emergency landing of US Airways Flight 1549 out of LaGaurdia Airport as result of collision with a flock of Canada Goose, public awareness regarding the hazards to aircraft with regards to this species was raised As a result, the Port Authority of New York and New Jersey (PANYNJ) in collaboration with the City of New York initiated a Canada Goose Hazard Management Program in 2009 (PANYNJ, 2012). A number of wetlands in the vicinity of Salt Lake City International Airport were identified as attractants for gulls, a hazardous bird species for the Airport. The wetlands were managed by private hunting clubs and in 1999, the airport worked with USDA Wildlife Services and a local hunting club to remove a large gull colony on an island on the property of a local hunting club through nest removal, egg oiling, and through the introduction of feral pigs that consumed eggs (SLCDA, n.d.). Although a WHMP for LaGuardia Airport could not be found online, a case study from Dolbeer and Franklin (2013) showed that as a result of a damaging strike to a passenger aircraft with a flock of Canada Geese at >152 AGL, a population management program was initiated off-airport ground at Riker's Island in 2014 and involved euthanizing 90% of the local Canada Goose population on the Island.

Such extreme measures of lethal active techniques (i.e., extirpating a bird colony from a local area) were not found to have been adopted at any Canadian Airports through this literature review. These measures appear to be more prevalent in US cases, although a bias of WHMPs of US airports being more publically available online than AWMPs from Canadian Airports exists in this literature review. Lethal active techniques on- or off-airport grounds are always used as a last resort after all other actions have been considered or implemented (Dolbeer and Franklin, 2013). Active dispersal and removal of hazardous wildlife outside airport grounds are not currently implemented by the BBTCA or the Ottawa MacDonald-Cartier International Airport (**Table 3-9**) nor are these techniques recommended to be implemented by BBTCA in the future given that conservation of local biodiversity in the GTA is highly valued by the public, planning authorities and regulatory agencies.

Table 3-9: Off-ground Wildlife Management Techniques used by North American Airports according to Airport Wildlife Management Plans (AWMPs) or Wildlife Hazard Management Plans (WHMPs)

Off-ground Management	Airport				
	Billy Bishop Toronto City Airport[1]	*Ottawa Macdonald-Cartier International Airport*[2]	*Seattle-Tacoma International Airport*[3]	*Salt Lake City International Airport Certification Manual*[4]	*John F. Kennedy International Airport*[5]
Passive bird hazard management within the vicinity of the airport grounds (e.g., wildlife proof waste disposal containers)		O		X	X
Active dispersal of hazardous birds on adjacent land					X
Active removal of hazardous wildlife on immediately adjacent land				X	
Contacting and working with adjacent land owners/users to minimize and/or remove wildlife attractants (e.g., requesting ploughing of fields immediately after harvest, etc.) or deter or remove wildlife	O	O	X	X	X
Public education (e.g., posting signs on feeding wildlife, presentations and pamphlets to raise awareness of hazards and risks to aircraft operations)	O	O	X		
Working with local planning authorities, regulatory agencies (e.g., conservation authority and stakeholders (e.g., NGOs) to mitigate wildlife hazards associated with adjacent land-use decisions and landscape changes	O	X	X		X
Adjacent land-use activities may be subject to Airport Zoning Regulations (AZRs) (e.g., method of waste disposal)	X	X			

Notes: *X – Represents off-ground Management techniques that have been historically or are currently being utilized.*
O – Represents options for off-ground Management techniques that are not currently utilized.
Sources:

1. *Falcon Environmental Services, Inc., 2012. Airport Wildlife Management Plan – 2012 Billy Bishop Toronto City Airport (CYTZ). Prepared for Billy Bishop Toronto City Airport (CYTZ), December 2013.*
2. *Beacon Environmental, 2006. Airport Wildlife Management Plan for Ottawa MacDonald-Cartier International Airport. Prepared for Ottawa International Airport Authority.*
3. *Port of Seattle-Tacoma International Airport, 2004: Wildlife Hazard Management Plan. Seattle-Tacoma International Airport. Appendix 1 of the SEA Airport Certification Manual. Seattle, Washington*
4. *Salt Lake City Department of Airports (SLCDA), No date (n.d.): Wildlife Hazard Management Plan. Appendix B of Salt Lake City International Airport Certification Manual.*
5. *Port Authority of New York and New Jersey (PANYNJ), 2012: The Bird Hazard Reduction Program: John F. Kennedy International Airport. Prepared For John F. Kennedy International Airport.*

In Canada, airports must complete a risk assessment associated with wildlife hazards at or near the airport and develop and implement AWMPs that mitigate identified wildlife hazards at Canadian Airports to meet the requirements of the *Canadian Avian Regulations 2006* (*CARs)* (Hesse *et al.*, 2009). Airports make recommendations regarding management of off-airport wildlife hazards where they have been identified on adjacent lands but they have no authority to restrict or manage the use of adjacent private property (TC, 2002). Habitat management on lands adjacent to airports is commonly used as off-ground management in minimizing wildlife hazards outside of airports. This is an effective, long term passive management technique that involves airport management working together with government and planning authorities, regulatory agencies, landowners and the public to influence land-use changes on adjacent lands by raising awareness of wildlife hazards, making recommendations and ensuring appropriate and informed land-use decisions are made (Hesse *et al.*, 2009; Bradley *et al.*, 2009). A survey of 38 airports in Western Canada (British Columbia, Alberta and Saskatchewan) showed that approximately 25% of airports that responded used off-ground management techniques such as influencing landfill practices, water management and agricultural practices with 8 km of their airports (*Hesse* et al., 2009). Active lethal control methods outside of airport grounds are not used by any of the 35 airports that have responded (*Hesse* et al., 2009).

In Canada, the Airport Zoning Regulations (AZR) under *the Aeronautics Act,* which prohibit certain land use activities in the surroundings off-airport lands identified as hazardous to aircraft operations, may be enacted by Transport Canada. These are currently implemented by the BBTCA and Ottawa-McDonald International Airport. The current Toronto Island Airport Zoning Regulations (SOR/85-515) for the BBTCA restricts the height of buildings, structures or objects, and trees to below the OLS within the AZR limits. The SOR/85-515 also prohibits any lands within the AZR to be used as waste disposal sites that might attract birds; however, there are no other Bird Hazard provisions that would restrict other types of land uses or activities attracting birds within bird hazard zones. In comparison with the Pickering Airport Zoning Regulations (SOR/2004-212) which does restrict land uses and activities that attract birds (e.g., wildlife refuges) within the limits of the bird hazard zone of the Pickering Airport Site. In the unlikely event that the SOR/85-515 will need to be amended to include Bird Hazard provisions in response to avian safety concerns, Section 5.4 (4) of the *Aeronautics Act* states that zoning regulations do not apply to existing land uses identified as hazardous to airports that were established prior to the enactment of the zoning regulation. Therefore, the TRCA would not be required to change their operation or land use at the TTP/Leslie Street Spit to meet the requirements of the new zoning regulation in the event that it will be amended. However, in order to ensure that concerns regarding bird populations at TTP/Leslie Street Spit are appropriately addressed, it's recommended that the future AWMP for BBTCA is developed in consultation with TRCA.

The potential effects, mitigation measures and net effects on these terrestrial habitats and their functions associated with the Future Baseline Scenario are described in **Table 3-10** below.

Table 3-10: Effects Assessment for the Proposed Future Scenario – Terrestrial Environment

Asset	Measure of Effect	Key Design Considerations & Assumptions	Proposed Future Considerations & Assumptions	Potential Effects	Mitigation Measures	Net Effects
Significant Features or Functions	▶ Temporary and/or long-term loss of significant natural heritage features or functions, such as: o Provincially Significant Wetlands, o ANSIs, or o Significant Wildlife Habitats.	▶ Runway extension (approximately 200 m on each end) to accommodate an increase in runway length.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ It is assumed that the provincially significant sand dune community will not transform into another vegetation community through natural succession. ▶ It is assumed that the provincially significant candidate Toronto Islands Life Science ANSI will be confirmed as provincially significant.	▶ Potential effects identified for the Future Baseline Scenario are the same for the Proposed Future Scenario. Refer to Table 4-23 for potential effects.	▶ Mitigation measures recommended for the Future Baseline Scenario are the same for Proposed Future Scenario. Refer to Table 4-23 for potential effects.	▶ No net loss of significant features is anticipated, provided that construction activities do not extend onto Hanlan's Point Beach. ▶ With the runway extension and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas; however, no net effect is anticipated.
Terrestrial Habitats or Functions	▶ Temporary and/or long-term loss of sensitive terrestrial habitat or functions, including wetlands, woodlands and dune environments, or features known to support sensitive species.	▶ Runway extension (approximately 200 m on each end) to accommodate an increase in runway length. ▶ Increase in number of total annual aircraft movements from 114,428 to 138,170 per year. ▶ It is assumed that construction activities for the runway extension will occur only within the BBTCA grounds and Lake Ontario, and will not extend onto Hanlan's Point Beach.	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ It is assumed that the provincially significant sand dune community will not transform into another vegetation community through natural succession. ▶ Land use changes within the Terrestrial Study Area may result in an increase or decrease of suitable terrestrial habitat including bird habitat.	▶ Increase in number of total annual aircraft movements may result in an increased risk (24 %) to birds within the BBTCA grounds, including bird SAR (Barn Swallow and Bank Swallow) which may forage in mowed grassy areas. ▶ Increase in number of total annual aircraft movements may result in an increased risk (24 %) to birds within the BBTCA grounds, including birds attracted to temporary areas of pooled water in the spring. ▶ Other potential effects identified for the Future Baseline Scenario are the same for the Proposed Future Scenario. Refer to Table 4-23 for potential effects.	▶ Mitigation measures recommended for Future Baseline Scenario are the same for Proposed Future Scenario. Refer to Table 4-23 for potential effects.	▶ With the runway extension and improvement of waterfowl habitat off-site, there will be a shift in waterfowl stopover and staging areas as well as waterfowl overwintering habitat; however, no net effect is anticipated.
Terrestrial Species	▶ Temporary and/or long-term effects on sensitive terrestrial species including plants, birds, monarch butterflies and other wildlife, rare species and SAR.	▶ Runway extension (approximately 200 m on each end) to accommodate an increase in runway length. ▶ Increase in number of total annual aircraft movements from 114,428 to 138,170 per year. ▶ The OLS and flight heights will remain the same or similar to current conditions. ▶	▶ Future baseline conditions pertaining to the terrestrial environment will generally remain similar to or the same as the existing conditions. ▶ Bird populations may change at TTP/Leslie Street Spit as a result of TRCA management activities including potential increases in Common Tern, marsh birds, resident land birds and songbirds, and nesting raptors. ▶ Bird populations may also change due to natural population growth and decline but are expected to remain similar to existing conditions. ▶ There is minimal natural vegetation within the BBTCA grounds. The cultural thicket at the west end of the existing runway and the vegetation within the rip-rap along the shoreline at the east end of the runway are both disturbed and contain many weedy species that generally do not provide high quality habitats.	▶ Potential loss of locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail, within the BBTCA grounds. ▶ Increased number of total annual aircraft movements may result in an increased risk (24 %) to birds, including SAR and SOCC, near the BBTCA grounds. ▶ In the unlikely event that damaging strikes with aircrafts cause aviation safety concerns, off-ground wildlife management could be considered by BBTCA to mitigate or minimize wildlife hazardous risk which may affect bird populations at TTP.	▶ Translocate locally and regionally rare plant species, Nodding Wild Rye, Hedge-nettle and Variegated Horsetail to suitable habitat outside of BBTCA property, if possible elsewhere on the Toronto Islands. ▶ No additional mitigation measures are required for removal of the cultural thicket at the west end of the existing runway and vegetation within the rip-rap along the shoreline near the east-end of the existing runway. ▶ Incorporate current and historical population, migration and bird strike data of hazard birds into the BBTCA Wildlife Management Plan to predict and anticipate potential threats as they relate to hazard birds near the BBTCA as well as develop and implement use of a radar-detecting system to detect and monitor hazard birds near the BBTCA grounds to minimize bird strikes. ▶ Develop the future Wildlife Management Plan for BBTCA in consultation with TRCA, in order to ensure that concerns regarding bird populations at TTP/Leslie Street Spit are appropriately addressed in the event that off-ground wildlife management activities at TTP/Leslie Street Spit are considered in order to mitigate risks of bird strikes to aviation safety.	▶ Short-term, frequent and highly localized nuisance effects on terrestrial species will be minimized by BMPs. ▶ No net effect is anticipated from the removal of disturbed cultural thicket and weedy vegetation given the general lack of natural vegetation on the BBTCA grounds, which consist primarily of mowed grassy fields and weedy herbaceous species. ▶ Minimal net effect on birds near the BBTCA grounds is anticipated as result of increased number of bird strikes because this increase will not significantly affect local bird populations. ▶ No net effect on bird populations at TTP in the unlikely event that off-ground management is considered, provided that the Wildlife Management Plan for BBTCA is developed in consultation with TRCA.

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Appendix A

Fish Collection Records for Aquatic Environment Study Area

Appendix A. Fish Species Collected at Billy Bishop Airport, Toronto Islands

COMMON NAME	SCIENTIFIC NAME	G RANK	N RANK	S RANK	COSEWIC	COSSARO	Spawning Season	BILLY BISHOP AIRPORT, TORONTO ISLANDS														
								158	118	248	298	359	17	356	358	178	304	137	39	13	36	3
Alewife	*Alosa pseudoharengus*	G5	N5	SNA			Spring			31			20	31	13	90	50	28	461	6	109	101
American Eel	*Anguilla rostrata*	G4	N4	S1?	Special Concern	Endangered	August & December															1
Black Crappie	*Pomoxis nigromaculatus*	G5	N4N5	S4	-	-	Spring		12								1	3				
Bluegill	*Lepomis macrochirus*	G5	N5	S5	-	-	Spring & Summer		1				1					3			1	2
Bluntnose Minnow	*Pimephales notatus*	G5	N5	S5	-	-	June - August		84			1			1							3
Bowfin	*Amia calva*	G5	N4	S4	-	-	Spring							1							1	
Brook Stickleback	*Culaea inconstans*	G5	N5	S5	-	-	Summer									1						
Brown Bullhead	*Ameiurus nebulosus*	G5	N5	S5	-	-	Late spring, early summer						3	4	1	8	1	5			12	3
Brown Trout	*Salma trutta*	G5	NNA	SNA	-	-	Late fall														1	1
Chinook Salmon	*Oncorhynchus tshawytscha*	G5	N4	SNA	-	-	Fall	1														
Common Carp	*Cyprinus Carpio*	G5	NNA	SNA	-	-	Late spring		1				1				2	1	2		9	11
Common Shiner	*Luxilus cornutus*	G5	N5	S5	-	-	Spring															2
Emerald Shiner	*Notropis atherinoides*	G5	N5	S5	-	-	Spring & Summer	1		7					1		2					
Freshwater Drum	*Aplodinotus grunniens*	G5	N5	S5	-	-	Summer														1	
Golden Shiner	*Notemigonus crysoleucas*	G5	N5	S5	-	-	May - August											1				1
Johnny Darter	*Etheostoma nigrum*	G5	N5	S5	-	-	Spring		1							1						3
Largemouth Bass	*Micropterus salmoides*	G5	N5	S5			Spring & Summer		13					3		1	5	8			3	10
Longnose Dace	*Rhinichthys cataractae*	G5	N5	S5	-	-	Spring & Summer												1			
Mottled Sculpin	*Cottus bairdii*	G5	N5	S5	-	-	Spring	1										1				
Northern Pike	*Esox lucius*	G5	N5	S5	-	-	Spring			1	1				2	11	10	5			40	62
Pumpkinseed	*Lepomis gibbesus*	G5	N5	S5	-	-	Spring & Summer		57				20	33		1	124	18		8	35	84
Rainbow Smelt	*Osmerus mordax*	G5	N5	S5	-	-	Spring	2								1	21		26		11	3
Rock Bass	*Ambloplites rupestris*	G5	N5	S5	-	-	Spring	1	1				5				1	11		5	10	33
Spottail Shiner	*Notropis hudsonius*	G5	N5	S5	-	-	Spring & Summer	3					2				21		36		28	23
Tessellated Darter	*Etheostoma olmstedi*	G5	N4	S4	-	-	Spring												4			
Threespine Stickleback	*Gasterosteus aculeatus*	G5	N5	S4	-	-	Summer	13		4			1	2			22					
White Bass	*Morone chrysops*	G5	N4N5	S4	-	-	Spring														2	
White Perch	*Morone americana*	G5	N5	SNA	-	-	Spring															4
White Sucker	*Catostomus commersonii*	G5	N5	S5	-	-	Spring	13					14			10	9	167	20	7	91	238
Yellow Perch	*Perca flavescens*	G5	N5	S5	-	-	Spring							1			1			1	10	18

COSEWIC Status: Species d

Extinct (X): A wildlife species that no longer exists.

Extirpated (XT): A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.

Endangered (E): A wildlife species facing imminent extirpation or extinction.

Threatened (T): A wildlife species likely to become endangered if limiting factors are not reversed.

Special Concern (SC): A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats

Not at Risk (NAR): A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

Data Deficient (DD): A wildlife species for which there is inadequate information to make a direct, or indirect, assessment of its risk of extinction.

GRank (Global Rank): Global

GX: Presumed Extinct; not located despite intensive searches and virtually no likelihood of rediscovery.

GH: Possibly Extinct; missing; known from only historical occurrences but still some hope of rediscovery.

G1 **:** Critically Imperiled; at very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

G2: Imperiled; at high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 **:** Vulnerable; at moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4: Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 **:** Secure; common, widespread, and abundant.

G#G# **:** Range Rank; a numeric range rank is used to indicate the range of uncertainty in the status of a species.

GU: Unrankable; currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

GNR **:** Unranked; global rank not yet assessed.

GNA: Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (i.e., hybrid).

? **:** Inexact Numeric Rank; denotes inexact numeric rank (e.g., G2?).

NRank (National Rank): Natio ***NX:*** Presumed Extirpated; species is believed to be extirpated from the nation. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

NH **:** Possibly Extirpated; species occurred historically in the nation, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years

N1: Critically Imperiled; critically imperiled in the nation because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

N2: Imperiled; imperiled in the nation because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation.

N3: Vulnerable; vulnerable in the nation due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

N4: Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.

N5 **:** Secure; common, widespread and abundant in the nation.

NNR: Unranked; national conservation status not yet assessed.

NU: Unrankable; currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

NNA **:** Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (i.e., exotic or hybrid).

N#N# **:** Range Rank; a numeric rank is used to indicate the range of uncertainty about the status of the species.

?: Inexact or Uncertain; denotes inexact or uncertain numeric rank.

SRank (Subnational Rank): S ***SX:*** Presumed Extirpated; species is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SH: Possibly Extirpated; species occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years.

S1 **:** Critically Imperiled; critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

S2: Imperiled; imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation.

S3: Vulnerable; vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4: Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 **:** Secure; common, widespread and abundant in the province.

SNR: Unranked; provincial conservation status not yet assessed.

SU **:** Unrankable; currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNA: Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (i.e., exotic or hybrid).

S#S#: Range Rank; a numeric rank is used to indicate the range of uncertainty about the status of the species.

?: Inexact or Uncertain; denotes inexact or uncertain numeric rank.

Appendix B

Master Bird List for Terrestrial Environment Study Area

Appendix B:
Master Bird List for the Terresrtial Study Area

				Source:	Canadian Migration Monitoring Network (CMMN) Daily Estimated Totals	eBirds Database	Cornell lab of Ornithology (CLO)'s Great Backyard Bird Count	Marsh Monitoring Birds	Ontario Breeding Bird Atlas (OBBA) 2001 to 2005 Highest Breeding Evidence	OBBA 2001 to 2005 rare species and colonial data	OBBA 2001 to 2005 Species at Risk	EC-CWS Ontario Shoreline Survey	Ontario Bird Feeder Survey (Project FeederWatch)
Family	**Common Name**	**Scientific Name**	**S-Rank[1]**	**ESA Status[2]**									
Accipitridae	Bald Eagle	*Haliaeetus leucocephalus*	S2N,S4B	SC	√	√	√						
Accipitridae	Broad-winged Hawk	*Buteo platypterus*	S5B		√	√							
Accipitridae	Cooper's Hawk	*Accipiter cooperii*	S4	NAR	√	√	√		√	√			√
Accipitridae	Golden Eagle	*Aquila chrysaetos*	S2B	END	√	√							
Accipitridae	Northern Goshawk	*Accipiter gentilis*	S4	NAR	√	√	√						√
Accipitridae	Northern Harrier	*Circus cyaneus*	S4B	NAR	√	√	√		√				
Accipitridae	Osprey	*Pandion haliaetus*	S5B		√	√							
Accipitridae	Red-shouldered Hawk	*Buteo lineatus*	S4B	NAR	√	√							
Accipitridae	Red-tailed Hawk	*Buteo jamaicensis*	S5	NAR	√	√	√		√				√
Accipitridae	Rough-legged Hawk	*Buteo lagopus*	S1B,S4N	NAR	√	√	√						
Accipitridae	Sharp-shinned Hawk	*Accipiter striatus*	S5	NAR	√	√	√		√	√			√
Accipitridae	Swainson's Hawk	*Buteo swainsoni*	SNA			√							
Alaudidae	Horned Lark	*Eremophila alpestris*	S5B		√	√	√		√				
Alcedinidae	Belted Kingfisher	*Megaceryle alcyon*	S4B		√	√			√				
Alcidae	Ancient Murrelet	*Synthliboramphus antiquus*	SNA			√							
Anatidae	American Black Duck	*Anas rubripes*	S4		√	√	√		√				
Anatidae	American Wigeon	*Anas americana*	S4		√	√	√		√	√			
Anatidae	Barrow's Goldeneye	*Bucephala islandica*	SNA			√							
Anatidae	Black Scoter	*Melanitta nigra*	S4B,S4N		√	√							
Anatidae	Blue-winged Teal	*Anas discors*	S4		√	√			√				
Anatidae	Brant	*Branta bernicla*	S4N		√	√							
Anatidae	Bufflehead	*Bucephala albeola*	S4		√	√	√						
Anatidae	Cackling Goose	*Branta hutchinsii*	S4N		√	√							
Anatidae	Canada Goose	*Branta canadensis*	S5		√	√	√		√				
Anatidae	Canvasback	*Aythya valisineria*	S1B,S4N		√	√			√	√			
Anatidae	Common Eider	*Somateria mollissima*	S2B			√							
Anatidae	Common Goldeneye	*Bucephala clangula*	S5		√	√	√						
Anatidae	Common Merganser	*Mergus merganser*	S5B,S5N		√	√	√						
Anatidae	Eurasian Wigeon	*Anas penelope*	SNA			√							
Anatidae	Gadwall	*Anas strepera*	S4		√	√	√		√				
Anatidae	Greater Scaup	*Aythya marila*	S4		√	√	√						
Anatidae	Greater White-fronted Goose	*Anser albifrons*	SNA			√							
Anatidae	Green-winged Teal	*Anas crecca*	S4		√	√			√	√			
Anatidae	Harlequin Duck	*Histrionicus histrionicus*	SNA		√	√	√						
Anatidae	Hooded Merganser	*Lophodytes cucullatus*	S5B,S5N		√	√	√		√	√			
Anatidae	King Eider	*Somateria spectabilis*	SHB		√	√	√						
Anatidae	Lesser Scaup	*Aythya affinis*	S4		√	√	√						
Anatidae	Long-tailed Duck	*Clangula hyemalis*	S3B		√	√	√						
Anatidae	Mallard	*Anas platyrhynchos*	S5		√	√	√		√				√
Anatidae	Mallard	*Anas platyrhynchos*	S5			√							
Anatidae	Mute Swan	*Cygnus olor*	SNA		√	√	√		√				
Anatidae	Northern Pintail	*Anas acuta*	S5		√	√	√						
Anatidae	Northern Shoveler	*Anas clypeata*	S4		√	√	√		√	√			
Anatidae	Red-breasted Merganser	*Mergus serrator*	S4B,S5N		√	√	√						
Anatidae	Redhead	*Aythya americana*	S2B,S4N		√	√	√		√	√			
Anatidae	Ring-necked Duck	*Aythya collaris*	S5		√	√	√						
Anatidae	Ross's Goose	*Chen rossii*	S1B			√							
Anatidae	Ruddy Duck	*Oxyura jamaicensis*	S4B,S4N		√	√	√						
Anatidae	Snow Goose	*Chen caerulescens*	S5B			√	√						
Anatidae	Surf Scoter	*Melanitta perspicillata*	S4B,S4N		√	√	√						

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Family	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Source: Canadian Migration Monitoring Network (CMMN) Daily Estimated Totals	eBirds Database	Cornell lab of Ornithology (CLO)'s Great Backyard Bird Count	Marsh Monitoring Birds	Ontario Breeding Bird Atlas (OBBA) 2001 to 2005 Highest Breeding Evidence	OBBA 2001 to 2005 rare species and colonial data	OBBA 2001 to 2005 Species at Risk	EC-CWS Ontario Shoreline Survey	Ontario Bird Feeder Survey (Project FeederWatch)
Anatidae	Trumpeter Swan	*Cygnus buccinator*	S4	NAR	√	√	√						
Anatidae	Tufted Duck	*Aythya fuligula*	SNA			√							
Anatidae	Tundra Swan	*Cygnus columbianus*	S4		√	√	√						
Anatidae	White-winged Scoter	*Melanitta fusca*	S4B,S4N		√	√	√						
Anatidae	Wood Duck	*Aix sponsa*	S5		√	√	√		√				
Apodidae	Chimney Swift	*Chaetura pelagica*	S4B,S4N	THR	√	√			√				
Ardeidae	American Bittern	*Botaurus lentiginosus*	S4B		√	√							
Ardeidae	Black-crowned Night-Heron	*Nycticorax nycticorax*	S3B,S3N		√	√	√	√	√	√			
Ardeidae	Great Blue Heron	*Ardea herodias*	S4		√	√	√		√	√			
Ardeidae	Great Egret	*Ardea alba*	S2B		√	√			√	√			
Ardeidae	Green Heron	*Butorides virescens*	S4B		√	√			√	√			
Ardeidae	Least Bittern	*Ixobrychus exilis*	S4B	THR		√							
Ardeidae	Little Blue Heron	*Egretta caerulea*	SNA			√							
Ardeidae	Snowy Egret	*Egretta thula*	SNA			√							
Ardeidae	Tricolored Heron	*Egretta tricolor*	SNA			√							
Ardeidae	Yellow-crowned Night-Heron	*Nyctanassa violacea*	SNA		√	√							
Bombycillidae	Bohemian Waxwing	*Bombycilla garrulus*	SNA		√	√							
Bombycillidae	Cedar Waxwing	*Bombycilla cedrorum*	S5B		√	√			√				√
Caprimulgidae	Common Nighthawk	*Chordeiles minor*	S4B	SC	√	√			√				
Caprimulgidae	Eastern Whip-poor-will	*Caprimulgus vociferus*	S4B	THR	√	√						√	
Cardinalidae	Blue Grosbeak	*Passerina caerulea*	SNA			√							
Cardinalidae	Indigo Bunting	*Passerina cyanea*	S4B		√	√			√				
Cardinalidae	Lazuli Bunting	*Passerina amoena*	SNA			√							
Cardinalidae	Northern Cardinal	*Cardinalis cardinalis*	S5		√	√	√		√				√
Cardinalidae	Painted Bunting	*Passerina ciris*	SNA			√							
Cardinalidae	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B		√	√			√				√
Cardinalidae	Dickcissel	*Spiza americana*	SNA		√								
Cathartidae	Black Vulture	*Coragyps atratus*	SNA			√							
Cathartidae	Turkey Vulture	*Cathartes aura*	S5B		√	√			√	√			
Certhiidae	Brown Creeper	*Certhia americana*	S5B		√	√	√		√				√
Charadriidae	American Golden-Plover	*Pluvialis dominica*	S2B,S4N		√	√							
Charadriidae	Killdeer	*Charadrius vociferus*	S5B,S5N		√	√		√	√			√	
Charadriidae	Black-bellied Plover	*Pluvialis squatarola*	S4N		√	√						√	
Charadriidae	Piping Plover	*Charadrius melodus*	S1B	END		√							
Charadriidae	Semipalmated Plover	*Charadrius semipalmatus*	S4B,S4N		√	√						√	
Columbidae	Rock Pigeon	*Columba livia*	SNA		√	√	√		√				√
Columbidae	Passenger Pigeon	*Ectopistes migratorius*	SX	EXT		√							
Columbidae	Mourning Dove	*Zenaida macroura*	S5		√	√	√	√	√				√
Corvidae	American Crow	*Corvus brachyrhynchos*	S5B		√	√	√		√				√
Corvidae	Black-billed Magpie	*Pica hudsonia*	S3?			√							
Corvidae	Blue Jay	*Cyanocitta cristata*	S5		√	√	√		√				√
Corvidae	Common Raven	*Corvus corax*	S5		√	√	√						√
Corvidae	Eurasian Jackdaw	*Corvus monedula*	SNA			√							
Cuculidae	Black-billed Cuckoo	*Coccyzus erythropthalmus*	S5B		√	√			√				
Cuculidae	Yellow-billed Cuckoo	*Coccyzus americanus*	S4B		√	√			√				
Emberizidae	American Tree Sparrow	*Spizella arborea*	S4B		√	√	√						√
Emberizidae	Chipping Sparrow	*Spizella passerina*	S5B		√	√			√				√
Emberizidae	Clay-colored Sparrow	*Spizella pallida*	S4B		√	√			√	√			
Emberizidae	Song Sparrow	*Melospiza melodia*	S5B		√	√	√	√	√				√
Emberizidae	Dark-eyed Junco	*Junco hyemalis*	S5B		√	√	√						√

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Master Bird List for the Terresrtial Study Area

Family	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Source: Canadian Migration Monitoring Network (CMMN) Daily Estimated Totals	eBirds Database	Cornell lab of Ornithology (CLO)'s Great Backyard Bird Count	Marsh Monitoring Birds	Ontario Breeding Bird Atlas (OBBA) 2001 to 2005 Highest Breeding Evidence	OBBA 2001 to 2005 rare species and colonial data	OBBA 2001 to 2005 Species at Risk	EC-CWS Ontario Shoreline Survey	Ontario Bird Feeder Survey (Project FeederWatch)
Emberizidae	Eastern Towhee	*Pipilo erythrophthalmus*	S4B		√	√			√				√
Emberizidae	Field Sparrow	*Spizella pusilla*	S4B		√	√	√		√				√
Emberizidae	Fox Sparrow	*Passerella iliaca*	S4B		√	√	√						√
Emberizidae	Golden-crowned Sparrow	*Zonotrichia atricapilla*	SNA			√							
Emberizidae	Grasshopper Sparrow	*Ammodramus savannarum*	S4B		√	√							
Emberizidae	Harris's Sparrow	*Zonotrichia querula*	SNA			√							√
Emberizidae	Lapland Longspur	*Calcarius lapponicus*	S3B		√	√							
Emberizidae	Lark Sparrow	*Chondestes grammacus*	SHB			√							
Emberizidae	Le Conte's Sparrow	*Ammodramus leconteii*	S4B			√							
Emberizidae	Lincoln's Sparrow	*Melospiza lincolnii*	S5B		√	√							
Emberizidae	Nelson's Sparrow	*Ammodramus nelsoni*	S4B	NAR		√							
Emberizidae	Savannah Sparrow	*Passerculus sandwichensis*	S4B		√	√			√				
Emberizidae	Snow Bunting	*Plectrophenax nivalis*	SNA		√	√	√						√
Emberizidae	Spotted Towhee	*Pipilo maculatus*	SNA			√							
Emberizidae	Swamp Sparrow	*Melospiza georgiana*	S5B		√	√	√		√				√
Emberizidae	Vesper Sparrow	*Pooecetes gramineus*	S4B		√	√							
Emberizidae	White-crowned Sparrow	*Zonotrichia leucophrys*	S4B		√	√	√						√
Emberizidae	White-throated Sparrow	*Zonotrichia albicollis*	S5B		√	√	√		√				√
Falconidae	American Kestrel	*Falco sparverius*	S4		√	√	√		√				√
Falconidae	Gyrfalcon	*Falco rusticolus*	SNA	NAR		√							
Falconidae	Merlin	*Falco columbarius*	S5B	NAR	√	√	√						
Falconidae	Peregrine Falcon	*Falco peregrinus*	S3B	SC	√	√	√		√	√	√		
Fringillidae	Common Redpoll	*Carduelis flammea*	S4B		√	√	√						√
Fringillidae	Evening Grosbeak	*Coccothraustes vespertinus*	S4B		√	√	√						√
Fringillidae	Hoary Redpoll	*Carduelis hornemanni*	SNA			√	√						
Fringillidae	House Finch	*Carpodacus mexicanus*	SNA		√	√	√		√				√
Fringillidae	Lesser Goldfinch	*Carduelis psaltria*	SNA			√							
Fringillidae	American Goldfinch	*Carduelis tristis*	S5B		√	√	√	√	√				√
Fringillidae	Pine Grosbeak	*Pinicola enucleator*	S4B			√	√						√
Fringillidae	Pine Siskin	*Carduelis pinus*	S4B		√	√	√		√	√			√
Fringillidae	Purple Finch	*Carpodacus purpureus*	S4B		√	√	√						√
Fringillidae	Red Crossbill	*Loxia curvirostra*	S4B			√	√						√
Fringillidae	White-winged Crossbill	*Loxia leucoptera*	S5B		√	√							
Fringillidae	European Goldfinch	*Carduelis carduelis*	-	-	√								√
Gaviidae	Common Loon	*Gavia immer*	S5B,S5N	NAR	√	√							
Gaviidae	Pacific Loon	*Gavia pacifica*	S3B			√							
Gaviidae	Red-throated Loon	*Gavia stellata*	S1N,S3B		√	√							
Gruidae	Sandhill Crane	*Grus canadensis*	S5B		√	√							
Haematopodidae	American Oystercatcher	*Haematopus palliatus*	SNA			√							
Hirundinidae	Barn Swallow	*Hirundo rustica*	S4B	THR	√	√			√				
Hirundinidae	Cave Swallow	*Petrochelidon fulva*	SNA			√							
Hirundinidae	Cliff Swallow	*Petrochelidon pyrrhonota*	S4B		√	√			√	√			
Hirundinidae	Bank Swallow	*Riparia riparia*	S4B		√	√		√	√	√			
Hirundinidae	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B		√	√			√				
Hirundinidae	Purple Martin	*Progne subis*	S4B		√	√			√				
Hirundinidae	Tree Swallow	*Tachycineta bicolor*	S4B		√	√		√	√				
Icteridae	Red-winged Blackbird	*Agelaius phoeniceus*	S4		√	√	√	√	√				√
Icteridae	Baltimore Oriole	*Icterus galbula*	S4B		√	√		√	√				
Icteridae	Bobolink	*Dolichonyx oryzivorus*	S4B	THR	√	√			√				
Icteridae	Brown-headed Cowbird	*Molothrus ater*	S4B		√	√			√				√

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Icteridae	Bullock's Oriole	*Icterus bullockii*	SNA				√							
Icteridae	Eastern Meadowlark	*Sturnella magna*	S4B	THR		√	√			√				√
Icteridae	Common Grackle	*Quiscalus quiscula*	S5B			√	√	√	√	√				√
Icteridae	Orchard Oriole	*Icterus spurius*	S4B			√	√			√				
Icteridae	Rusty Blackbird	*Euphagus carolinus*	S4B	NAR		√	√							√
Icteridae	Brewer's Blackbird	*Euphagus cyanocephalus*	S4B											√
Laniidae	Northern Shrike	*Lanius excubitor*	SNA			√	√	√						√
Laridae	Arctic Tern	*Sterna paradisaea*	S4B				√							
Laridae	Herring Gull	*Larus argentatus*	S5B,S5N			√	√	√	√	√	√			
Laridae	Black Tern	*Chlidonias niger*	S3B	SC		√	√							
Laridae	Ring-billed Gull	*Larus delawarensis*	S5B,S4N			√	√	√	√	√	√			√
Laridae	Black-legged Kittiwake	*Rissa tridactyla*	SNA				√							
Laridae	Bonaparte's Gull	*Larus philadelphia*	S4B,S4N			√	√							
Laridae	California Gull	*Larus californicus*	SNA				√							
Laridae	Caspian Tern	*Hydroprogne caspia*	S3B	NAR		√	√			√	√			
Laridae	Forster's Tern	*Sterna forsteri*	S2B	DD		√	√							
Laridae	Franklin's Gull	*Larus pipixcan*	SNA				√							
Laridae	Glaucous Gull	*Larus hyperboreus*	S4N			√	√	√						
Laridae	Great Black-backed Gull	*Larus marinus*	S2B			√	√	√		√	√			
Laridae	Heermann's Gull	*Larus heermanni*	SNA				√							
Laridae	Iceland Gull	*Larus glaucoides*	S4N			√	√	√						
Laridae	Ivory Gull	*Pagophila eburnea*	SNA				√							
Laridae	Laughing Gull	*Larus atricilla*	SNA				√							
Laridae	Lesser Black-backed Gull	*Larus fuscus*	SNA			√	√							
Laridae	Little Gull	*Larus minutus*	S1B				√							
Laridae	Mew Gull	*Larus canus*	SNA				√							
Laridae	Common Tern	*Sterna hirundo*	S4B	NAR		√	√		√	√	√			
Laridae	Sabine's Gull	*Xema sabini*	SNA				√							
Laridae	Slaty-backed Gull	*Larus schistisagus*	SNA				√							
Laridae	Thayer's Gull	*Larus thayeri*	SNA			√	√	√						
Mimidae	Brown Thrasher	*Toxostoma rufum*	S4B			√	√			√				√
Mimidae	Gray Catbird	*Dumetella carolinensis*	S4B			√	√			√				√
Mimidae	Northern Mockingbird	*Mimus polyglottos*	S4			√	√	√		√	√			√
Motacillidae	American Pipit	*Anthus rubescens*	S4			√	√							
Paridae	Black-capped Chickadee	*Poecile atricapillus*	S5			√	√	√		√				√
Paridae	Boreal Chickadee	*Poecile hudsonica*	S5				√	√						√
Paridae	Tufted Titmouse	*Baeolophus bicolor*	S4				√	√						
Parulidae	American Redstart	*Setophaga ruticilla*	S5B			√	√			√				
Parulidae	Bay-breasted Warbler	*Setophaga castanea*	S5B			√	√							
Parulidae	Black-and-white Warbler	*Mniotilta varia*	S5B			√	√							
Parulidae	Blackburnian Warbler	*Setophaga fusca*	S5B			√	√							
Parulidae	Blackpoll Warbler	*Setophaga striata*	S4B			√	√							
Parulidae	Black-throated Blue Warbler	*Setophaga caerulescens*	S5B			√	√							
Parulidae	Black-throated Gray Warbler	*Setophaga nigrescens*	SNA				√							
Parulidae	Black-throated Green Warbler	*Setophaga virens*	S5B			√	√							
Parulidae	Blue-winged Warbler	*Vermivora cyanoptera*	S4B			√	√							
Parulidae	Canada Warbler	*Cardellina canadensis*	S4B	SC		√	√							
Parulidae	Cape May Warbler	*Setophaga tigrina*	S5B			√	√							
Parulidae	Cerulean Warbler	*Setophaga cerulea*	S3B	THR			√							
Parulidae	Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B			√	√			√				

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Parulidae	Common Yellowthroat	*Geothlypis trichas*	S5B		√	√			√				
Parulidae	Connecticut Warbler	*Oporornis agilis*	S4B		√	√							
Parulidae	Golden-winged Warbler	*Vermivora chrysoptera*	S4B	SC	√	√							
Parulidae	Hermit Warbler	*Setophaga occidentalis*	SNA			√							
Parulidae	Hooded Warbler	*Setophaga citrina*	S4B	NAR	√	√							
Parulidae	Kentucky Warbler	*Geothlypis formosa*	SNA			√					√		
Parulidae	Kirtland's Warbler	*Setophaga kirtlandii*	S1B	END		√							
Parulidae	Louisiana Waterthrush	*Parkesia motacilla*	S3B	SC		√							
Parulidae	Magnolia Warbler	*Setophaga magnolia*	S5B		√	√			√	√			
Parulidae	Mourning Warbler	*Geothlypis philadelphia*	S4B		√	√			√				
Parulidae	Nashville Warbler	*Oreothlypis ruficapilla*	S5B		√	√			√				
Parulidae	Northern Parula	*Setophaga americana*	S4B		√	√							
Parulidae	Northern Waterthrush	*Parkesia noveboracensis*	S5B		√	√			√				
Parulidae	Orange-crowned Warbler	*Oreothlypis celata*	S4B		√	√							
Parulidae	Ovenbird	*Seiurus aurocapilla*	S4B		√	√			√				
Parulidae	Western Palm Warbler	*Dendroica palmarum palmarum*	S5B		√	√							
Parulidae	Pine Warbler	*Setophaga pinus*	S5B		√	√			√				
Parulidae	Prairie Warbler	*Setophaga discolor*	S3B	NAR		√							
Parulidae	Prothonotary Warbler	*Protonotaria citrea*	S1B	END	√	√							
Parulidae	Swainson's Warbler	*Limnothlypis swainsonii*	SNA			√							
Parulidae	Tennessee Warbler	*Oreothlypis peregrina*	S5B		√	√							
Parulidae	Wilson's Warbler	*Cardellina pusilla*	S4B	SC	√	√			√	√			
Parulidae	Worm-eating Warbler	*Helmitheros vermivorum*	SNA		√	√							
Parulidae	Yellow Warbler	*Setophaga petechia*	S5B		√	√			√				
Parulidae	Yellow-breasted Chat	*Icteria virens*	S2B	END	√	√							
Parulidae	Yellow-rumped Warbler	*Setophaga coronata*	S5B		√	√							√
Parulidae	Yellow-throated Warbler	*Setophaga dominica*	SNA		√	√							
Passeridae	House Sparrow	*Passer domesticus*	SNA		√	√	√		√				√
Pelecanidae	American White Pelican	*Pelecanus erythrorhynchos*	S2B	THR	√	√							
Phalacrocoracidae	Double-crested Cormorant	*Phalacrocorax auritus*	S5B	NAR	√	√	√	√	√	√			
Phasianidae	Ring-necked Pheasant	*Phasianus colchicus*	SNA			√			√				√
Phasianidae	Wild Turkey	*Meleagris gallopavo*	S5			√	√						
Phasianidae	Ruffed Grouse	*Bonasa umbellus*	S4										√
Picidae	Black-backed Woodpecker	*Picoides arcticus*	S4			√	√						
Picidae	Downy Woodpecker	*Picoides pubescens*	S5		√	√	√		√				√
Picidae	Hairy Woodpecker	*Picoides villosus*	S5		√	√	√		√				√
Picidae	Northern Flicker	*Colaptes auratus*	S4B		√	√	√		√				√
Picidae	Pileated Woodpecker	*Dryocopus pileatus*	S5		√	√	√		√				
Picidae	Red-bellied Woodpecker	*Melanerpes carolinus*	S4		√	√	√		√	√			√
Picidae	Red-headed Woodpecker	*Melanerpes erythrocephalus*	S4B	SC	√	√	√		√	√			
Picidae	Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B		√	√			√				√
Picidae	Lewis's Woodpecker	*Melanerpes lewis*	SNA		√								
Podicipedidae	Eared Grebe	*Podiceps nigricollis*	SNA			√							
Podicipedidae	Horned Grebe	*Podiceps auritus*	S1B,S4N	SC	√	√	√						
Podicipedidae	Pied-billed Grebe	*Podilymbus podiceps*	S4B,S4N		√	√			√	√			
Podicipedidae	Red-necked Grebe	*Podiceps grisegena*	S3B,S4N	NAR	√	√			√	√			
Podicipedidae	Western Grebe	*Aechmophorus occidentalis*	SNA		√	√							
Procellariidae	Black-capped Petrel	*Pterodroma hasitata*	SNA			√							
Procellariidae	Great Shearwater	*Puffinus gravis*	SNA			√							
Rallidae	King Rail	*Rallus elegans*	S2B	END		√							

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Family	**Common Name**	**Scientific Name**	**S-Rank[1]**	**ESA Status[2]**									
Rallidae	American Coot	*Fulica americana*	S4B	NAR	√	√	√						
Rallidae	Common Gallinule	*Gallinula chloropus*	S4B			√							
Rallidae	Virginia Rail	*Rallus limicola*	S5B		√	√		√	√				
Rallidae	Purple Gallinule	*Porphyrio martinica*	SNA			√							
Rallidae	Sora	*Porzana carolina*	S4B			√			√				
Rallidae	Yellow Rail	*Coturnicops noveboracensis*	S4B	SC		√							
Recurvirostridae	American Avocet	*Recurvirostra americana*	SNA		√	√							
Recurvirostridae	Black-necked Stilt	*Himantopus mexicanus*	SNA			√							
Regulidae	Golden-crowned Kinglet	*Regulus satrapa*	S5B		√	√	√						
Regulidae	Ruby-crowned Kinglet	*Regulus calendula*	S4B		√	√							√
Scolopacidae	American Woodcock	*Scolopax minor*	S4B		√	√			√				
Scolopacidae	Baird's Sandpiper	*Calidris bairdii*	SNA		√	√						√	
Scolopacidae	Buff-breasted Sandpiper	*Tryngites subruficollis*	SNA	DD		√							
Scolopacidae	Dunlin	*Calidris alpina*	S4B,S5N		√	√						√	
Scolopacidae	Greater Yellowlegs	*Tringa melanoleuca*	S4B,S4N		√	√						√	
Scolopacidae	Hudsonian Godwit	*Limosa haemastica*	S3B,S4N			√							
Scolopacidae	Least Sandpiper	*Calidris minutilla*	S4B,S5N		√	√						√	
Scolopacidae	Lesser Yellowlegs	*Tringa flavipes*	S4B,S4N		√	√						√	
Scolopacidae	Long-billed Dowitcher	*Limnodromus scolopaceus*	SNA			√							
Scolopacidae	Marbled Godwit	*Limosa fedoa*	S3B			√							
Scolopacidae	Pectoral Sandpiper	*Calidris melanotos*	SHB,S5N		√	√						√	
Scolopacidae	Purple Sandpiper	*Calidris maritima*	SNA			√							
Scolopacidae	Red Knot	*Calidris canutus rufa*	S1N	END	√	√							
Scolopacidae	Red Phalarope	*Phalaropus fulicarius*	SNA		√	√							
Scolopacidae	Ruddy Turnstone	*Arenaria interpres*	SNA		√	√						√	
Scolopacidae	Ruff	*Philomachus pugnax*	SNA			√							
Scolopacidae	Sanderling	*Calidris alba*	S5N		√	√						√	
Scolopacidae	Semipalmated Sandpiper	*Calidris pusilla*	S3B,S4N		√	√						√	
Scolopacidae	Short-billed Dowitcher	*Limnodromus griseus*	S3B,S4N		√	√							
Scolopacidae	Solitary Sandpiper	*Tringa solitaria*	S4B		√	√						√	
Scolopacidae	Spotted Sandpiper	*Actitis macularius*	S5		√	√			√			√	
Scolopacidae	Stilt Sandpiper	*Calidris himantopus*	S4B,S4N		√	√							
Scolopacidae	Western Sandpiper	*Calidris mauri*	SNA			√							
Scolopacidae	Whimbrel	*Numenius phaeopus*	S3B,S4N		√	√						√	
Scolopacidae	White-rumped Sandpiper	*Calidris fuscicollis*	S5N		√	√						√	
Scolopacidae	Willet	*Tringa semipalmata*	SNA			√						√	
Scolopacidae	Wilson's Phalarope	*Phalaropus tricolor*	S3B			√						√	
Scolopacidae	Wilson's Snipe	*Gallinago delicata*	S5B		√	√							
Scolopacidae	Upland Sandpiper	*Bartramia longicauda*	S4B		√							√	
Scolopacidae	Common Snipe	*Gallinago gallinago*	-	-								√	
Scolopacidae	Red-necked phalarope	*Phalaropus lobatus*	S3S4B									√	
Sittidae	Red-breasted Nuthatch	*Sitta canadensis*	S5		√	√	√		√				√
Sittidae	White-breasted Nuthatch	*Sitta carolinensis*	S5		√	√	√		√				√
Stercorariidae	Parasitic Jaeger	*Stercorarius parasiticus*	S2B			√							
Stercorariidae	Pomarine Jaeger	*Stercorarius pomarinus*	SNA			√							
Strigidae	Barred Owl	*Strix varia*	S5		√	√							
Strigidae	Boreal Owl	*Aegolius funereus*	S4	NAR	√	√							
Strigidae	Eastern Screech-Owl	*Megascops asio*	S4	NAR		√	√		√				
Strigidae	Great Gray Owl	*Strix nebulosa*	S4	NAR		√							
Strigidae	Great Horned Owl	*Bubo virginianus*	S4		√	√	√		√				√

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Family	**Common Name**	**Scientific Name**	**S-Rank[1]**	**ESA Status[2]**									
Strigidae	Long-eared Owl	*Asio otus*	S4		√	√	√						
Strigidae	Northern Hawk Owl	*Surnia ulula*	S4	NAR		√							
Strigidae	Northern Saw-whet Owl	*Aegolius acadicus*	S4		√	√	√		√	√			
Strigidae	Short-eared Owl	*Asio flammeus*	S2N,S4B	SC	√	√							
Strigidae	Snowy Owl	*Bubo scandiacus*	SNA	NAR	√	√	√						
Sturnidae	European Starling	*Sturnus vulgaris*	SNA		√	√	√	√	√				√
Sulidae	Northern Gannet	*Morus bassanus*	SNA			√							
Sylviidae	Blue-gray Gnatcatcher	*Polioptila caerulea*	S4B		√	√			√				
Thraupidae	Scarlet Tanager	*Piranga olivacea*	S4B		√	√			√				
Thraupidae	Summer Tanager	*Piranga rubra*	SNA		√	√							
Thraupidae	Western Tanager	*Piranga ludoviciana*	SNA			√							
Threskiornithidae	Glossy Ibis	*Plegadis falcinellus*	SNA			√							
Threskiornithidae	White-faced Ibis	*Plegadis chihi*	SNA			√							
Trochilidae	Ruby-throated Hummingbird	*Archilochus colubris*	S5B		√	√			√				
Troglodytidae	Carolina Wren	*Thryothorus ludovicianus*	S4			√	√		√	√			√
Troglodytidae	House Wren	*Troglodytes aedon*	S5B		√	√			√				
Troglodytidae	Marsh Wren	*Cistothorus palustris*	S4B		√	√			√				
Troglodytidae	Rock Wren	*Salpinctes obsoletus*	SNA			√							
Troglodytidae	Sedge Wren	*Cistothorus platensis*	S4B	NAR		√							
Troglodytidae	Winter Wren	*Troglodytes troglodytes*	S5B			√	√						
Troglodytidae	Eurasian Wren	*Troglodytes troglodytes*	S5B		√		√		√				√
Turdidae	Eastern Bluebird	*Sialia sialis*	S5B	NAR	√	√							
Turdidae	Fieldfare	*Turdus pilaris*	SNA			√							
Turdidae	Gray-cheeked Thrush	*Catharus minimus*	S4B		√	√							
Turdidae	Hermit Thrush	*Catharus guttatus*	S5B		√	√	√						√
Turdidae	Swainson's Thrush	*Catharus ustulatus*	S4B		√	√							√
Turdidae	Townsend's Solitaire	*Myadestes townsendi*	SNA		√	√							
Turdidae	American Robin	*Turdus migratorius*	S5B		√	√	√	√	√				√
Turdidae	Varied Thrush	*Ixoreus naevius*	SNA			√							√
Turdidae	Veery	*Catharus fuscescens*	S4B		√	√			√				√
Turdidae	Wood Thrush	*Hylocichla mustelina*	S4B		√	√			√				
Tyrannidae	Acadian Flycatcher	*Empidonax virescens*	S2S3B	END	√	√							
Tyrannidae	Alder Flycatcher	*Empidonax alnorum*	S5B		√	√							
Tyrannidae	Ash-throated Flycatcher	*Myiarchus cinerascens*	SNA			√							
Tyrannidae	Eastern Kingbird	*Tyrannus tyrannus*	S4B		√	√			√				
Tyrannidae	Eastern Phoebe	*Sayornis phoebe*	S5B		√	√			√				√
Tyrannidae	Eastern Wood-Pewee	*Contopus virens*	S4B	SC	√	√			√				
Tyrannidae	Gray Flycatcher	*Empidonax wrightii*	SNA			√							
Tyrannidae	Great Crested Flycatcher	*Myiarchus crinitus*	S4B		√	√			√				
Tyrannidae	Least Flycatcher	*Empidonax minimus*	S4B		√	√			√				
Tyrannidae	Olive-sided Flycatcher	*Contopus cooperi*	S4B	SC	√	√							
Tyrannidae	Say's Phoebe	*Sayornis saya*	SNA			√							
Tyrannidae	Variegated Flycatcher	*Empidonomus varius*	SNA			√							
Tyrannidae	Vermilion Flycatcher	*Pyrocephalus rubinus*	SNA			√							
Tyrannidae	Western Kingbird	*Tyrannus verticalis*	S1B			√							
Tyrannidae	Willow Flycatcher	*Empidonax traillii*	S5B		√	√			√				
Tyrannidae	Yellow-bellied Flycatcher	*Empidonax flaviventris*	S5B		√	√							
Vireonidae	Blue-headed Vireo	*Vireo solitarius*	S5B		√	√							
Vireonidae	Philadelphia Vireo	*Vireo philadelphicus*	S5B		√	√							
Vireonidae	Red-eyed Vireo	*Vireo olivaceus*	S5B		√	√			√				

Appendix B:
Master Bird List for the Terresrtial Study Area

Family	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Source: Canadian Migration Monitoring Network (CMMN) Daily Estimated Totals	Source: eBirds Database	Source: Cornell lab of Ornithology (CLO)'s Great Backyard Bird Count	Source: Marsh Monitoring Birds	Source: Ontario Breeding Bird Atlas (OBBA) 2001 to 2005 Highest Breeding Evidence	Source: OBBA 2001 to 2005 rare species and colonial data	Source: OBBA 2001 to 2005 Species at Risk	Source: EC-CWS Ontario Shoreline Survey	Source: Ontario Bird Feeder Survey (Project FeederWatch)
Vireonidae	Warbling Vireo	*Vireo gilvus*	S5B		√	√			√				
Vireonidae	White-eyed Vireo	*Vireo griseus*	S2B		√	√							
Vireonidae	Yellow-throated Vireo	*Vireo flavifrons*	S4B		√	√			√	√			

Notes:

1. The Natural Heritage Information Centre (NHIC) Provincial Ranking System (S-rank)

The following status definitions were taken from NatureServe Explorer's (2015) National and Subnational Conservation Status Definitions available at http://explorer.natureserve.org/nsranks.htm:

SX - Presumed Extirpated—Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SH- Possibly Extirpated (Historical)—Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for.

S1 - Critically Imperiled—Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.

S2-Imperiled—Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.

S3 - Vulnerable—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 - Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 - Secure—Common, widespread, and abundant in the nation or state/province.

SNR - Unranked—Province conservation status not yet assessed.

SU - Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNA - Not Applicable —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

S#S# - Range Rank —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Breeding Status Qualifiers

B - Breeding—Conservation status refers to the breeding population of the species in theprovince.

N - Nonbreeding—Conservation status refers to the non-breeding population of the species in the province.

M - Migrant—Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.

Note: A breeding status is only used for species that have distinct breeding and/or non-breeding populations in the province. A breeding-status S-rank can be coupled with its complementary non-breeding-status S-rank if the species also winters in the province, and/or a migrant-status S-rank if the species occurs regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. The two (or rarely, three) status ranks are separated by a comma (e.g., "S2B,S3N" or "SHN,S4B,S1M").

Other Qualifiers

? -Inexact or Uncertain—Denotes inexact or uncertain numeric rank. (The ? qualifies the character immediately preceding it in the S-rank.)

2. Endangered Species Act 2007 (ESA) Status

END (Endangered) – A species facing imminent extinction or extirpation in Ontario.

THR (Threatened) – Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a large portion of its Ontario range if the limiting factors are not reversed.

SC (Special Concern) – A species that may become threatened or endangered due to a combination of biological characteristics and identified threats.

NAR (Not at Risk) – A species that has been evaluated and found to be not at risk.

Appendix C

Master Bird List for BBTCA Runway Extensions

Appendix C: Master Plant List for BBTCA Runway Extensions

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS TORO	LOCAL STATUS Site District 7E-4	Vegetation Communities						
												West End of Runway			East end of Runway			
												SDO1-1	CUT1	CUM1-1 on sand berm	CUH in Toronto Island Park	CUT1 in Toronto Island Park	CUW1 in Toronto Island Park	Vegetation along rip-rap south of Runway
	SOURCE		OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	VARGA 2000	VARGA 2000							
PTERIDOPHYTES		**FERNS & ALLIES**																
Equisetaceae		**Horsetail Family**																
Equisetum	*arvense*	Field Horsetail	0	0		S5			G5	X	X		X	X				X
Equisetum	*variegatum ssp. variegatum*	Variegated Horsetail	5	-3		S5			G5T	R6	R9	X			X			X
GYMNOSPERMS		**CONIFERS**																
Cupressaceae		**Cedar Family**																
Thuja	*occidentalis*	Eastern White Cedar	4	-3		S5			G5	X	X					P	X	
Pinaceae		**Pine Family**																
Picea	*abies*	Norway Spruce		5	-1	SE3			G?	X	X				P	P		
Picea	*glauca*	White Spruce	6	3		S5			G5	X+	X+					P		
Pinus	*nigra*	Austrian Pine		-5	-1	SE2			G?						P	P		
DICOTYLEDONS		**DICOTS**																
Aceraceae		**Maple Family**																
Acer	*negundo*	Manitoba Maple	0	-2		S5			G5	X	X					P		
Acer	*saccharinum*	Silver Maple	5	-3		S5			G5	X	X	X				P		
Amaranthaceae		**Amaranth Family**																
Amaranthus	*albus*	White Tumbleweed		3	-1	SE5			G5	X	X			X				X
Apiaceae		**Carrot Family**																
Daucus	*carota*	Wild Carrot		5	-2	SE5			G?	X	X		X			X		X
Asclepiadaceae		**Milkweed Family**																
Asclepias	*syriaca*	Common Milkweed	0	5		S5			G5	X	X	X		X				X
Asteraceae		**Composite or Aster Family**																
Achillea	*millefolium var. millefolium*	Common Yarrow		3	-1	SE?			G5T?	X	X	X						X
Arctium	*minus*	Common Burdock		5	-2	SE5			G?T?	X	X	X						
Artemisia	*campestris ssp. caudata*	Tall Wormwood	8	0		S4S5			G5T4	R4	R5	X		X				
Aster	*ericoides*	White Heath Aster	4	4		S5			G5T?	X	X	X						X
Symphyotrichum	*lanceolatum*	Tall White Aster	3	-3		S5			G5T?	X	X	X	X					
Symphyotrichum	*novae-angliae*	New England Aster	2	-3		S5			G5	X	X	X	X					
Bidens	*frondosa*	Devil's Beggar-ticks	3	-3		S5			G5	X	X	X	X					X
Cichorium	*intybus*	Chicory		5	-1	SE5			G?	X	X	X						X
Cirsium	*arvense*	Canada Thistle		3	-1	SE5			G?	X								X
Erigeron	*annus*	Eastern Daisy Fleabane	0	1		S5			G5	X	X	X						
Euthamia	*graminifolia*	Flat-topped Bushy Goldenrod	2	-2		S5			G5	X	X	X	X	X				
Lactuca	*serriola*	Prickly Lettuce		0	-1	SE5			G?	X	X							X
Solidago	*altissima*	Tall Goldenrod	1	3		S5				X	X	X						
Solidago	*canadensis*	Canada Goldenrod	1	3		S5			G5	X	X	X	X	X	X	X	X	X
Sonchus	*arvensis ssp. arvensis*	Field Sow-thistle				SE5			G?T?	X	X	X						
Tragopogon	*pratensis ssp. pratensis*	Common Goat's-beard		5	-1	SE5			G?T?	X	X	X						
Xanthium	*spinosum*	Spiny Cocklebur		3	-1	SE2?			G?	X	X	X	X					
Balsaminaceae		**Touch-me-not Family**																
Impatiens	*capensis*	Spotted Touch-me-not	4	-3		S5			G5	X	X		X					X
Betulaceae		**Birch Family**																
Alnus	*glutinosa*	European Black Alder		-2	-2	SE4			G?	X	X	X						
Betula	*pendula*	European Weeping Birch		-4	-3	SE4			G?	X	X	X						
Boraginaceae		**Borage Family**																
Echium	*plantagineum*	Purple Viper's Bugloss				SE1			G?									X
Brassicaceae		**Mustard Family**																
Alliaria	*petiolata*	Garlic Mustard		0	-3	SE5			G5	X	X						X	
Cakile	*edentula*	American Sea-rocket	9	3		S4			G5T	R6	R7	X						
Caprifoliaceae		**Honeysuckle Family**																
Lonicera	*tatarica*	Tartarian Honeysuckle		3	-3	SE5			G?	X	X				X			
Viburnum	*lantana*	Bending Wayfaring-tree		5	-1	SE2			G?	X	X				X			
Viburnum	*opulus*	Guelder Rose		0	-1	SE4			G5	X	X						X	
Caryophyllaceae		**Pink Family**																
Saponaria	*officinalis*	Bouncing-bet		3	-3	SE5			G?	X	X	X						
Silene	*latifolia*	Bladder Campion				SE5			G?	X	X							X
Celastraceae		**Staff-tree Family**																
Euonymus	*europaea*	Spindle Tree		5	-1	SE2			G?	X	X				X	X		

Appendix C: Master Plant List for BBTCA Runway Extensions

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS TORO	LOCAL STATUS Site District 7E-4	Vegetation Communities						
												West End of Runway			East end of Runway			
												SDO1-1	CUT1	CUM1-1 on sand berm	CUH in Toronto Island Park	CUT1 in Toronto Island Park	CUW1 in Toronto Island Park	Vegetation along rip-rap south of Runway
	SOURCE		OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	VARGA 2000	VARGA 2000							
Chenopodiacea		**Goosefoot Family**																
Chenopodium	*album var. album*	Lamb's Quarters		1	-1	SE5			G5T5	X	X			X				X
Convolvulaceae		**Morning-glory Family**																
Calystegia	*sepium ssp. angulatum*	Hedge Bindweed				SU			G4G5T?			X	X					X
Cornaceae		**Dogwood Family**																
Cornus	*sericea*	Red-osier Dogwood	2	-3		S5			G5	X	X	X	X		P	X		X
Crassulaceae		**Stonecrop Family**																
Sedum	*acre*	Mossy Stonecrop		5	-3	SE5			G?	X	X	X						X
Cucurbitaceae		**Gourd Family**																
Cucurbita	*species*	Squash Species										X						
Euphorbiaceae		**Spurge Family**																
Euphorbia	*maculata*	Spotted Spurge												X				
Fabaceae		**Pea Family**																
Medicago	*lupulina*	Black Medick		1	-1	SE5			G?	X	X	X						
Melilotus	*alba*	White Sweet-clover		3	-3	SE5			G?	X	X	X	X	X				X
Robinia	*pseudo-acacia*	Black Locust		4	-3	SE5			G5	X	X	X	X					
Trifolium	*pratense*	Red Clover		2	-2	SE5			G?	X	X	X		X				X
Vicia	*cracca*	Tufted Vetch		5	-1	SE5			G?	X	X	X	X					X
Fagaceae		**Beech Family**																
Quercus	*macrocarpa*	Bur Oak	5	1		S5			G5	X	X					P		
Juglandaceae		**Walnut Family**																
Juglans	*nigra*	Black Walnut	5	3		S4			G5	X	X					X		
Lamiaceae		**Mint Family**																
Lycopus	*americanus*	Cut-leaved Water-horehound	4	-5		S5			G5	X	X							X
Lycopus	*europaeus*	European Water-horehound		-5	-2	SE5			G?	X	X	X						
Mentha	*arvensis*	American Wild Mint	3	-3		S5				X	X							X
Scutellaria	*galericulata*	Hooded Skullcap	6	-5		S5			G5	U	U							X
Stachys	*palustris*	Hedge-nettle		-5	-1	SE5			G5	R3	R10	X			X			X
Lythraceae		**Loosestrife Family**																
Lythrum	*salicaria*	Purple Loosestrife		-5	-3	SE5			G5	X	X		X					X
Moraceae		**Mulberry Family**																
Morus	*alba*	White Mulberry		0	-3	SE5			G?	X	X				P	P	P	
Oleaceae		**Olive Family**																
Fraxinus	*americana*	White Ash	4	3		S5			G5	X	X	X						
Onagraceae		**Evening-primrose Family**																
Oenothera	*biennis*	Common Evening-primrose	0	3		S5			G5	U	U	X		X				X
Plantaginaceae		**Plantain Family**																
Plantago	*major*	Common Plantain		-1	-1	SE5			G5	X	X			X				
Polygonaceae		**Smartweed Family**																
Polygonum	*persicaria*	Lady's-thumb		-3	-1	SE5			G?	X	X	X	X	X				
Rumex	*crispus*	Curly-leaf Dock		-1	-2	SE5			G?	X	X	X						
Ranunculaceae		**Buttercup Family**																
Ranunculus	*repens*	Creeping Buttercup		-1	-1	SE5			G?	X	X							X
Rhamnaceae		**Buckthorn Family**																
Rhamnus	*cathartica*	Common Buckthorn		3	-3	SE5			G?	X	X				X	X		
Frangula	*alnus*	Glossy Buckthorn		-1	-3	SE5			G?	X	X				X			
Rosaceae		**Rose Family**																
Fragaria	*virginiana*	Virginia Strawberry	2	1		SU			G5T?	X	X	X						
Malus	*pumila*	Common Crabapple		5	-1	SE5			G5	X	X				P			
Potentilla	*anserina ssp. anserina*	Silverweed	5	-4		S5				U	X	X						X
Potentilla	*argentea*	Silvery Cinquefoil		3	-2	SE5			G?	X	X							X
Potentilla	*recta*	Rough-fruited Cinquefoil		5	-2	SE5			G?	X	X							X
Prunus	*americana*	American Plum	6	5		S4			G5	X	X				X			
Salicaceae		**Willow Family**																
Populus	*deltoides ssp. deltoides*	Eastern Cottonwood	4	-1		SU			G5T?	X	X	X	X		P			X
Populus	*tremuloides*	Trembling Aspen	2	0		S5			G5	X	X	X						
Populus X	*canadensis*	Carolina Poplar				SE1			HYB	X	X							X
Salix	*bebbiana*	Long-beaked Willow	4	-4		S5			G5	X	X	X						

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BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS TORO	LOCAL STATUS Site District 7E-4	Vegetation Communities						
												West End of Runway			East end of Runway			
												SDO1-1	CUT1	CUM1-1 on sand berm	CUH in Toronto Island Park	CUT1 in Toronto Island Park	CUW1 in Toronto Island Park	Vegetation along rip-rap south of Runway
	SOURCE		OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	VARGA 2000	VARGA 2000							
Salix	*eriocephala*	Missouri Willow	4	-3		S5			G5	X	X	X						
Salix	*exigua*	Sandbar Willow	3	-5		S5			G5	X	X	X	X	X				X
Salix X	*rubens*	Hybrid Crack Willow		-4	-3	SE4			HYB	X	X	X			P	P	X	X
Scrophulariaceae		**Figwort Family**																
Agalinis	*tenuifolia var. tenuifolia*	Slender-leaved Agalinis	7	-3		SU			G5T?	R5	R5	X						
Linaria	*vulgaris*	Butter-and-eggs		5	-1	SE5			G?	X	X							X
Verbascum	*thapsus*	Common Mullein		5	-2	SE5			G?	X	X	X						
Solanum	*dulcamara*	Bitter Nightshade		0	-2	SE5			G?	X	X	X	X				X	X
Tiliaceae		**Linden Family**																
Tilia	*cordata*	Small Leaf Linden				SE1			G?							X	X	
Ulmaceae		**Elm Family**																
Ulmus	*americana*	White Elm	3	-2		S5			G5?	X	X		X					X
Ulmus	*glabra*	Wych Elm				SE1			G?							X	X	
Ulmus	*pumila*	Siberian Elm		5	-1	SE3			G?	X		X						
Vitaceae		**Grape Family**																
Parthenocissus	*inserta*	Inserted Virginia-creeper	3	3		S5			G5	X	X				X			X
Vitis	*riparia*	Riverbank Grape	0	-2		S5			G5	X	X		X			X		X
MONOCOTYLEDONS		**MONOCOTS**																
Juncaceae		**Rush Family**																
Juncus	*balticus*	Baltic Rush	5	-5		S5			G5	R5	R7	X						
Orchidaceae		**Orchid Family**																
Epipactis	*helleborine*	Common Helleborine		5	-2	SE5			G?	X	X						X	
Poaceae		**Grass Family**																
Ammophila	*breviligulata*	Short-liguled Beach Grass	10	5		S3			G5	R1	R1	X						
Calamagrostis	*canadensis*	Blue-joint Grass	4	-5		S5			G5	U	X	X						
Echinochloa	*crus-galli*	Barnyard Grass				SE5			G5	X	X					X		
Elymus	*canadensis*	Nodding Wild Rye	8	1		S4S5			G5	R6	R7	X	X	X				
Elymus	*repens*	Quack Grass		3	-3	SE5			G?	X	X							X
Elymus	*trachycaulus ssp. trachycaulus*	Slender Wheat Grass	7	0		S5?			G5T5	R2	R5	X						
Festuca	*species*	Fescue species																X
Lolium	*perenne*	English Rye Grass		3	-1	SE4			G?	X	X					X		
Panicum	*capillare*	Witch Grass	0	0		S5			G5	X	X					X		
Panicum	*virgatum*	Switch Grass	6	-1		S4			G5	R2	R2	X						
Phalaris	*arundinacea*	Reed Canary Grass	0	-4		S5			G5	X	X		X					
Phleum	*pratense*	Timothy		3	-1	SE5			G?	X	X				X			
Phragmites	*australis*	Common Reed	0	-4		S5			G5	X	X	X						
Poa	*compressa*	Canada Blue Grass	0	2		S5			G?	X	X			X				X
Poa	*pratensis ssp. pratensis*	Kentucky Bluegrass	0	1		S5			G5T	X	X			X				
Setaria	*pumila*	Yellow Foxtail		0	-1	SE5			G?	X	X					X		
Sporobolus	*cryptandrus*	Sand Dropseed	2	4		S4				U	R10	X						

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BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS TORO	LOCAL STATUS Site District 7E-4	Vegetation Communities						
												West End of Runway			East end of Runway			
												SDO1-1	CUT1	CUM1-1 on sand berm	CUH in Toronto Island Park	CUT1 in Toronto Island Park	CUW1 in Toronto Island Park	Vegetation along rip-rap south of Runway
	SOURCE		OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	VARGA 2000	VARGA 2000							
FLORISTIC SUMMARY & ASSESSMENT																		
Species Diversity																		
Total Species:		**99**																
Native Species:		**50**	50.51%															
Exotic Species		**49**	49.49%															
Total Taxa in Region (List Region, Source)		10000																
% Regional Taxa Recorded		0.99%																
Regionally Significant Species		11																
S1-S3 Native Species		2																
S4 Native Species		5																
S5 Native Species		38																
Co-efficient of Conservatism and Floral Quality Index																		
Co-efficient of Conservatism (CC) (average)		**3.42**																
CC 0 to 3	*lowest sensitivity*	25	50.00%															
CC 4 to 6	*moderate sensitivity*	19	38.00%															
CC 7 to 8	*high sensitivity*	4	8.00%															
CC 9 to 10	*highest sensitivity*	2	4.00%															
Floral Quality Index (FQI)		**24.18**																
Presence of Weedy & Invasive Species																		
mean weediness		**-1.76**																
weediness = -1	*low potential invasiveness*	25	51.02%															
weediness = -2	*moderate potential invasiveness*	11	22.45%															
weediness = -3	*high potential invasiveness*	13	26.53%															
Presence of Wetland Species																		
average wetness value		**0.53**																
upland		18	18.18%															
facultative upland		25	25.25%															
facultative		24	24.24%															
facultative wetland		23	23.23%															
obligate wetland		9	9.09%															

EXPLANATION OF TERMINOLOGY *(See the following pages for addition detailed information on terms.)*

Botanical and Common Name: From Newmaster et. al, 1998. Species requiring confirmation noted (cf).

Co-efficient of Conservatism: This value, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to a specific habitat integrity.

Wetness Index: This value, ranging from -5 (obligate wetland) to 5 (upland) provides the probability of a species occurring in wetland or upland habitats.

Weediness Index: This value, ranging from -1 (low) to -3 (high) quantifies the potential invasiveness of non-native plants. In combination with the percentage of non-native plants, it can be used as an indicator of disturbance.

Provincial Status: Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These ranks are not legal designations. S4 and S5 species are generally uncommon to common in the province. Species ranked S1-S3 are considered to be rare in Ontario.

Local Status:

X: native species present (collection-based) and all exotic species

R: native species locally rare (number of stations): Durham (<10 stations), GTA (<40 stations), Site District 6E7 (<20 stations)

U: native species locally uncommon Durham (11-20 stations), GTA (41-80 stations), Site District 6E7 (21-40 stations)

Note: study area in Site District 6E13

Record Type

X: Species recorded naturally growing in the vegetation community
P: Species recorded as planted in the vegetation community

DETAILED EXPLANATION OF TERMS

Floral Quality Index and Coefficient of Conservatism Values

Vegetation species and community sensitivity was assessed through the application of coefficient of conservatism values (CC), assigned to each native species in southern Ontario (Oldham, et. al, 1995). The value of CC, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to specific habitat integrity. The occurrence of species with a CC of 9 or 10 can be good indicators of undisturbed conditions such as mature forests, fens or bogs.

General habitat values associated with the CC values are:

0-3: species found in a wide variety of communities, including disturbed sites

4-6: species associated with a specific community, but tolerate moderate disturbance

7-8: species associated with a community in an advanced successional stage, tolerant of minor disturbances

9-10: species with a high degree of fidelity to a narrow range of synecological parameters

The floristic quality of an area is reflected in the mean value of CC. For example, an old field or grazed woodlot would tend have a low mean CC; these habitats are dominated by opportunistic species that occur in a wide range of site conditions and are tolerant of disturbance. A bog, prairie or intact forest would have a higher value, reflecting the specific habitat requirements of many of the species and a generally undisturbed condition. The following provides an example of interpretation of CC values:

mean CC value / % spp CC >8 / Condition of the Landscape

5 / 27 / intact

3.5 / 19 / slightly degraded

1.3 / 2 / severely degraded

The FQI accounts for the species diversity of the area by equating the number of native species with the mean CC value. The FQI is generally used for comparing natural areas. The CC value and FQI of the study area were calculated for the entire study area.

Weediness Index

The sensitivity of natural areas can be assessed through application of the Weediness Index. The Weediness Index quantifies the potential invasiveness of non-native plants, and, in combination with the percentage of non-native plants can be used as an indicator of disturbance. Values (ranging from 1- to -3) have been assigned to most non-native species based on the potential impact each species can have in natural areas:

-1: little or no impact on natural areas (most non-native plants are in this category)

-2: occasional impacts on natural areas, generally infrequent or localized

-3: major potential impacts on natural areas

Wetness Index

All plants in southern Ontario have been assigned a wetland category, based on the designations developed for use by the United States Fish & Wildlife Service. Plants are designated into the following categories:

OBL (Obligate Wetland): occurs almost always in wetlands under natural conditions (estimated >99% probability)

FACW (Facultative Wetland): usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability)

FAC (Facultative): equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability)

FACU (Facultative Upland): occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33% probability)

UPL (Upland): occurs almost never in wetlands under natural conditions (estimated <1% probability)

Further refinement of the Facultative categories are denoted by a "+" or "-" to express exaggerated tendencies for those species. The "+" denotes a greater estimated probability occurring in wetlands than species in the general indicator category, but a lesser probability than species occurring in the next higher category. The "-" denotes a lesser estimated probability of occurring in wetlands than species in the general indicator category, but a greater probability than species occurring in the next lower general category.

Each wetland category has been assigned a numerical value to facilitate the quantification of the wetness index. The wetland categories and their corresponding values are as follows:

OBL : -5	FAC+: -1	FACU: 3
FACW+: -4	FAC: 0	FACU-: 4
FACW: -3	FAC-: 1	UPL: 5
FACW-: -2	FACU+: 2	

Provincial Status

Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These rankings are based on the total number of extant Ontario populations and the degree to which they are potentially or actively threatened with destruction. The ranks are:

S1: Critically Imperiled—Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province

S2: Imperiled—Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province

S3: Vulnerable—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation

S4: Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5: Secure—Common, widespread, and abundant in the nation or state/province

SH: Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences

SNR Unranked—Nation or state/province conservation status not yet assessed

SX: Presumed Extirpated—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered

SNA Not Applicable —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

SU: Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends

Rank ranges, e.g. S2S3, indicate that the rank is either S2 or S3, but that current information is insufficient to differentiate.

S#S# Range Rank —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g.,

SU is used rather than S1S4).

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Nomenclature based on:

Newmaster, S.G., A. Lehela, P.W.C Uhlig, S. McMurray and M.J. Oldham. 1998. Ontario plant list. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, ON, Forest Research Information Paper No. 123. 550 pp. + appendices.

Co-efficient of Conservatism, Wetness & Weediness

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Natural Heritage Information Centre (NHIC). 2000. Provincial status of plants, wildlife and vegetation communities database. http://www.mnr.gov.on.ca/MNR/nhic/nhic.html. OMNR, Peterborough.

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Varga, S., editor. August 2000. Distribution and status of the vascular plants of the Greater Toronto Area. Ontario Ministry of Natural Resources, Aurora District. 103 pp.

Appendix D

BBTCA Seasonal Avian Surveys Weather Conditions and Waterbird Results

Table D-1: Dates, Times and Weather Conditions of Seasonal Avian Field Surveys at BBTCA

Survey Type	Dates	Survey Start and End Times	Weather Conditions
Fall Migration	October 3, 2014	7:55 am to 9:36 am	Temp(°C): 16 Wind (Dir): East Wind(B.S[1]): 3 Cloud Cover(%): 30 Precipitation: None
	October 27, 2014	8:30 am to 10:00 am	Temp(°C): 7 Wind (Dir):Southeast Wind(B.S[1]):2 Cloud Cover(%): 0 Precipitation: None
	November 13, 2014	11:36 am to 12:45 pm	Temp(°C): 1 Wind (Dir):South-Southwest Wind(B.S[1]): 5 Cloud Cover(%): 100 Precipitation: Snow
	November 25, 2014	10:06 am to 11:15 am	Temp(°C): 2 Wind (Dir):South Wind(B.S[1]): 6 Cloud Cover(%): 100 Precipitation: None
Overwintering	December 22, 2014	8:40 am to 12:00 pm	Temp(°C): 1 Wind (Dir):Southeast Wind(B.S[1]): 3 Cloud Cover(%): 100 Precipitation: None
	March 5, 2015	11:02 am to 12:00 pm	Temp(°C): -14 Wind (Dir):Northwest Wind(B.S[1]): 4-5 Cloud Cover(%): not recorded Precipitation: None
Spring Migration	March 27, 2015	10:20 am to 11:39 am	Temp(°C): -3 Wind (Dir): not recorded Wind(B.S[1]): 4 Cloud Cover(%): 75 Precipitation: none
	April 29, 2015	8:45 am to 11:39 am	Temp(°C): 13 Wind (Dir):Southwest Wind(B.S[1]): Cloud Cover(%): 0 Precipitation: None
Breeding Bird	May 29, 2015	8:45 am to 10:25 am	Temp(°C): 17 Wind (Dir):East Wind(B.S[1]): 3-4 Cloud Cover(%): 0 Precipitation: None
	June 19, 2015	7:40 am to 9:35 am	Temp(°C): 18 Wind (Dir):West Wind(B.S[1]): 2 Cloud Cover(%): 95 Precipitation: None
	July 14, 2015	7:45 am to 9:25 am	Temp(°C): 22 Wind (Dir):Southeast Wind(B.S[1]): 1 Cloud Cover(%): 100 Precipitation: None

Table D-1: Dates, Times and Weather Conditions of Seasonal Avian Field Surveys at BBTCA

Survey Type	Dates	Survey Start and End Times	Weather Conditions
Late Summer (Cormorant Behaviour)	August 6, 2015	8:10 am to 10:00 am	Temp(°C): 17 Wind (Dir):West Wind(B.S[1]): 1-2 Cloud Cover(%): 5 Precipitation: None

Notes: 1. Beaufort Speed (B.S.) Codes

0 0-2 km/h, calm
1 3-5 km/h, light air movement
2 6-11 km/h, slight breeze, can feel on face
3 12-19km/h, gentle breeze, leaves move on twigs
4 20-30 km/h, moderate breeze, small branches move
5 31-38 km/h, fresh breeze, moderate branches move
6 39-49 km/h, strong breeze, large branches move

Table D-2a: Summary of Waterbirds Recorded at the East End of the Runway

Bird Survey Zone A: Within Proposed 200 m Runway Extension

Common Name	3-Oct-14	27-Oct-14	13-Nov-14	25-Nov-14	22-Dec-14	5-Mar-15	27-Mar-15	29-Apr-15	29-May-15	19-Jun-15	14-Jul-15	6-Aug-15	Total:
Canada Goose					4				5	16	30		55
Common Merganser								18	1				19
Double-Crested Cormorant							1	8	8	1	20		38
Greater Scaup					5								5
Herring Gull							2			1	3		6
Killdeer							1		7	1			9
Long-tailed Duck				15			5						20
Mallard	5			3			1				6	2	17
Red-breasted Merganser				3			2						5
Ring-billed Gull				2					25		10		37
Total:	5	0	0	23	9	0	12	26	46	19	69	2	211

Bird Survey Zone B: Within 500 m of proposed 200 m Runway Extension

Common Name	3-Oct-14	27-Oct-14	13-Nov-14	25-Nov-14	22-Dec-14	5-Mar-15	27-Mar-15	29-Apr-15	29-May-15	19-Jun-15	14-Jul-15	6-Aug-15	Total:
Double-Crested Cormorant								5		13			18
Long-tailed Duck		10			25			30					65
Ring-billed Gull		20											20
Total:	0	30	0	0	25	0	0	35	0	13	0	0	103

Frozen

Bird Survey Zone C: Within 200 m from the side of the Existing Runway and Proposed Runway Extension

Common Name	3-Oct-14	27-Oct-14	13-Nov-14	25-Nov-14	22-Dec-14	5-Mar-15	27-Mar-15	29-Apr-15	29-May-15	19-Jun-15	14-Jul-15	6-Aug-15	Total:
Bufflehead			17	30									47
Canada Goose	5							2	6	18	30		61
Canvasback								2				7	9
Common Tern									1		2		3
Double-Crested Cormorant	65		2					15	8	9	52	60	211
Greater Scaup					10								10
Herring Gull	10						2				2	2	16
Long-tailed Duck			3	13			3	15					34
Mallard			2	3	2			2				3	12
Mute Swan					2		2	1					5
Red-breasted Merganser			75	2	10		11						98
Ring-billed Gull	6	10	6	5					7	3		8	45
Semipalmated Sandpiper												5	5
Total:	86	10	105	53	24	0	18	37	22	30	86	85	556

Bird Survey Zone D: Within 500 m from the side of the Existing Runway and Proposed Runway Extension

Common Name	3-Oct-14	27-Oct-14	13-Nov-14	25-Nov-14	22-Dec-14	5-Mar-15	27-Mar-15	29-Apr-15	29-May-15	19-Jun-15	14-Jul-15	6-Aug-15	Total:
Bufflehead					20			20					40
Canada Goose	40				103		2	6	2	12		1	166
Caspian Tern									1				1
Common Merganser					8								8
Double-Crested Cormorant	15							15			10	15	55
Great Egret											1		1
Greater Scaup					110		150	2					262
Herring Gull													0
Long-tailed Duck		6	2		90		4	125					227
Mallard	20				25			24			35	3	107
Mute Swan	6		5	8	2			4			2	3	30
Red-breasted Merganser				50	39		5	2					96
Redhead							325						325
Ring-billed Gull		2	100		10	50					5		167
Trumpeter Swan					4								4
Total:	41996	41947	42063	42026	42402	50	486	198	3	12	53	22	1485

Table D-2b: Summary of Waterbirds Recorded at the West End of the Runway

Bird Survey Zone A: Within Proposed 200 m Runway Extension

Common Name	3-Oct-14	27-Oct-14	13-Nov-14	25-Nov-14	22-Dec-14	5-Mar-15	27-Mar-15	29-Apr-15	29-May-15	19-Jun-15	14-Jul-15	6-Aug-15	Total:
Canada Goose										3		3	6
Caspian Tern									2				2
Common Tern									1	1			2
Double-crested Cormorant									1	10		1	12
Herring Gull							1						1
Killdeer									2		1	1	4
Long-tailed Duck		7	14	2	1		1						25
Mallard								2					2
Mute Swan								3					3
Ring-billed Gull		8	1	18			3		41	3		1	75
Total:	0	15	15	20	1	0	5	5	47	17	1	6	132

Bird Survey Zone B: Within 500 m of proposed 200 m Runway Extension

Common Name	3-Oct-14	27-Oct-14	13-Nov-14	25-Nov-14	22-Dec-14	5-Mar-15	27-Mar-15	29-Apr-15	29-May-15	19-Jun-15	14-Jul-15	6-Aug-15	Total:
Double-crested Cormorant	2	1								430	1		434
Herring Gull							3						3
Long-tailed Duck		7			55	2	5						69
Ring-billed Gull	5	8										30	43
Total:	7	16	0	0	55	2	8	0	0	430	1	30	549

Bird Survey Zone C: Within 200 m from the side of the Existing Runway and Proposed Runway Extension

Common Name	3-Oct-14	27-Oct-14	13-Nov-14	25-Nov-14	22-Dec-14	5-Mar-15	27-Mar-15	29-Apr-15	29-May-15	19-Jun-15	14-Jul-15	6-Aug-15	Total:
Canada Goose									10				10
Caspian Tern									1				
Common Tern											5		5
Double-crested Cormorant	5								45		4	3	57
Gadwall									2				2
Long-tailed Duck			4		10			5					19
Mute Swan		1									1		2
Red-breasted Merganser		100											100
Ring-billed Gull				2			5		11	3	11		32
Semipalmated Sandpiper										6			6
Spotted Sandpiper									1	2	1	3	7
Total:	5	101	4	2	10	0	5	5	70	11	22	6	240

Bird Survey Zone D: Within 500 m from the side of the Existing Runway and Proposed Runway Extension

Common Name	3-Oct-14	27-Oct-14	13-Nov-14	25-Nov-14	22-Dec-14	5-Mar-15	27-Mar-15	29-Apr-15	29-May-15	19-Jun-15	14-Jul-15	6-Aug-15	Total:
Canada Goose	23	40											63
Caspian Tern								2					2
Double-crested Cormorant								100	25	1105		1122	2352
Greater Scaup						112							112
Herring Gull								10					10
Long-tailed Duck			14		220	123	1	340					698
Mallard								2					
Mute Swan	1										1	1	3
Red-breasted Merganser		40			45	6		10					101
Redhead						1							
Ring-billed Gull	5	25			15			30					75
White-winged Scoter						2							2
Total:	29	105	14	0	280	242	1	494	25	1105	1	1123	3416

AECOM

Appendix C-11

Transportation Effects Assessment

AECOM
105 Commerce Valley Drive West, Floor 7 905 886 7022 tel
Markham, ON, Canada L3T 7W3 905 886 9494 fax
www.aecom.com

Memorandum

To	Marc Rose	Page	1 of 19
CC	Megan Ketchabaw		
Subject	Transportation Net Effects Assessment, BBTCA Environmental Assessment		
From	Pranav Dave, P.Eng., Mark Reitmeier, EIT		
Date	March 11, 2016	Project Number	60447218

1. Description of the Potential Affected Environment – Current Conditions

1.1 Study Area

The Local Study Area used to study transportation effects has been determined based on previously-completed traffic impact assessments and consultation with the City of Toronto and other stakeholders. The Local Study Area, depicted in **Figure 1** is bounded by:

- Lake Shore Boulevard to the north;
- Dan Leckie Way to the east;
- The Western Channel to the south; and
- Stadium Road to the west.

Based on feedback received through consultation and public meetings on January 24 and April 11, 2015, it was determined that the Local Study Area should be enhanced by including a larger geographical context. This Regional Study Area will be used to determine the broader effects of the proposal on pedestrian, cycling, transit, active transportation, ferry and heavy rail linkages outside the Local Study Area. The Regional Study Area includes:

- The Central Waterfront;
- Downtown Toronto; and
- The Greater Toronto Area.

Figure 1: Local Study Area



1.2 Description of Existing Conditions

The existing transportation facilities in the Local Study Area provide access to the BBTCA and other land uses including residential areas to the west and recreational and institutional (including the City School) areas in the central and eastern portions of the Local Study Area.

Road Network

Lake Shore Blvd is a two-way, six-lane arterial roadway with a posted speed limit of 60 km/h which forms the northern boundary of the Local Study Area, and is a major east-west thoroughfare across downtown Toronto. Signalized intersections with Lake Shore Blvd in the Local Study Area include Stadium Road (50 km/h), Bathurst St/Eireann Quay (40 km/h) and Dan Leckie Way (50 km/h). These two-way, two-lane collector roads provide north-south connections to Queens Quay, and Eireann Quay provides access to the BBTCA terminal to the south. The following intersections were analyzed in this assessment:

- Lake Shore Blvd / Stadium Rd
- Lake Shore Blvd / Bathurst St
- Lake Shore Blvd / Dan Leckie Way
- Queens Quay / Stadium Rd (unsignalized)

- Queens Quay / Eireann Quay
- Queens Quay / Dan Leckie Way

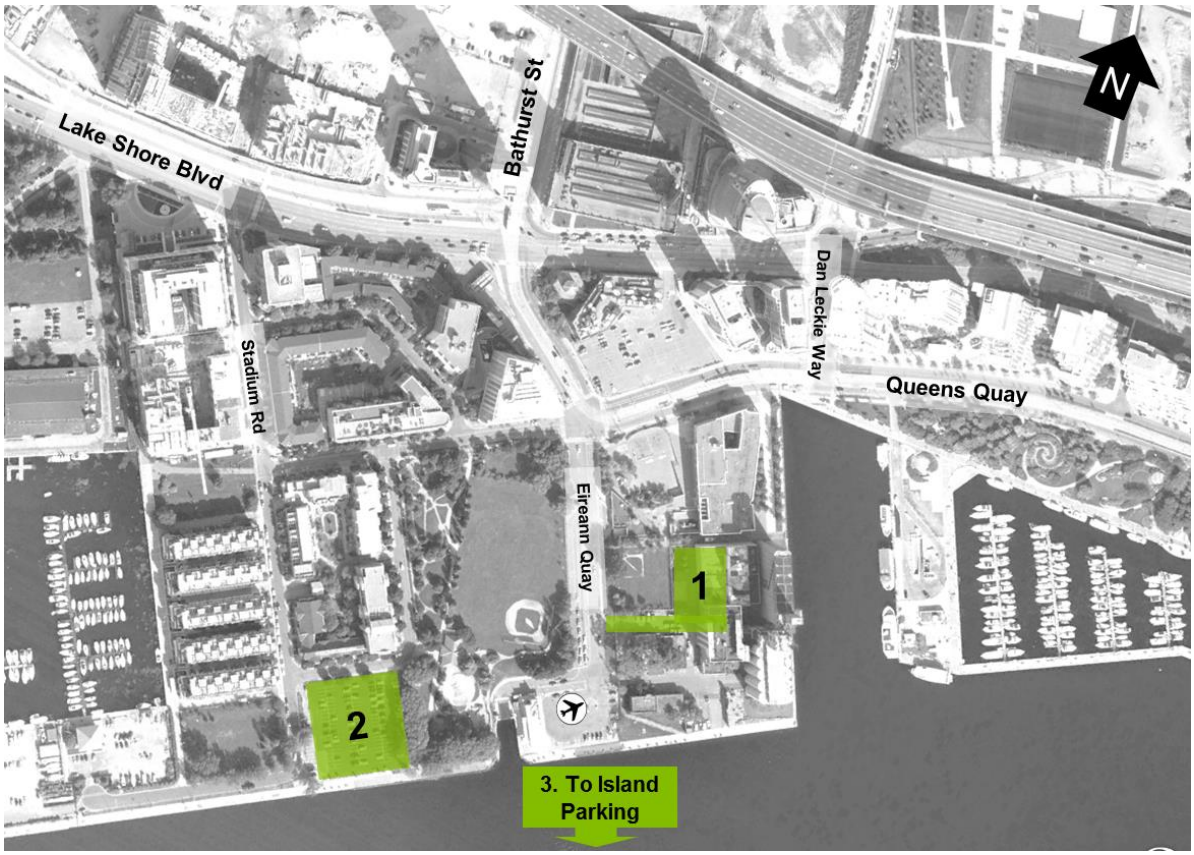
Parking

Parking within the Local Study Area is provided exclusively by Stolport Corporation. Stolport Corporation currently provides short term and long term parking at three separate locations as follows in **Table A**[1] and **Figure 2**.

Table A: Airport Parking Inventory

Parking Location	Number of Parking Spaces	Approximate Walking Distance to Terminal	Weekday Daytime Flat Rate
1. Canada Malting Site	34	~ 150 m (+ tunnel / ferry)	$35
2. Stadium Road Lot	200	~ 200 m (+ tunnel / ferry)	$20
3. Island On-Site Lots	384	~ 100 m	$35 (+ $11 ferry trip)

Figure 2: Parking Locations in the Local Study Area



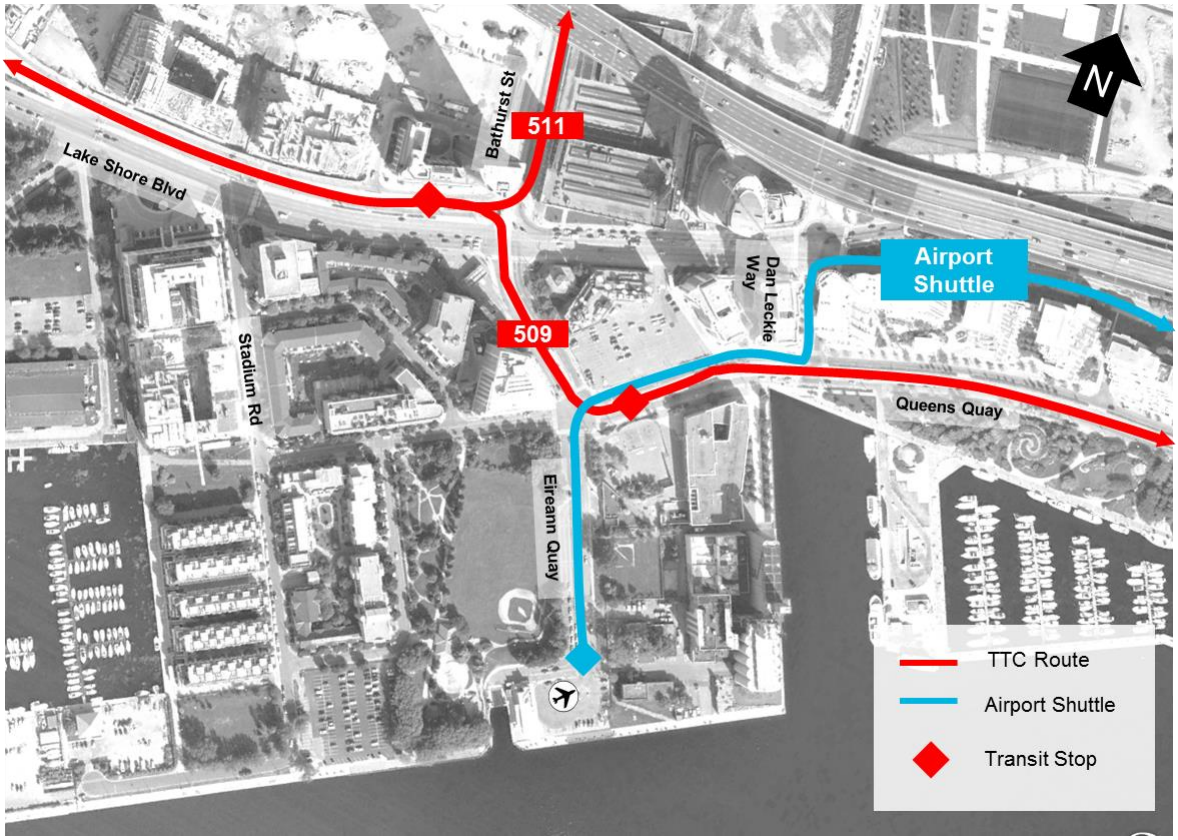
[1] *Parking data retrieved from Stolport Corporation website. Accessed at http://www.bbtcaparking.com/#!lot-locations/c1nj9, December 8, 2015.*

For each of the three lots, parking rates are available in 30 minute increments, or as weekday or weekend daytime or evening flat rates. Weekly rates are available at the Island On-Site Lot only.

Public Transit

Public transit access directly to the Local Study Area is provided by two Toronto Transit Commission (TTC) surface routes and the Complimentary Airport Shuttle. Regional transit connections are also accessible outside the Local Study Area to connect to the broader transit network, including GO Transit access to the broader GTHA from Union Station and the TTC subway network. Public transit routes servicing the Local Study Area are shown in **Figure 3** and are described below.

Figure 3: Public Transit Routes in the Local Study Area[2]



The 509 Harbourfront streetcar route runs from the Exhibition Loop in the west along Fleet Street and Queens Quay and terminates at Union Station. The route runs seven days a week at headways ranging from 5 to 10 minutes. To access the BBTCA, the 509 Harbourfront stops at the Bathurst Street / Queens Quay intersection, thus leaving a walk of approximately 200 m along Eireann Quay for passengers wishing to access the ferry terminal. In 2014, TTC reported all-day ridership (boardings) on the 509 Harbourfront streetcar of approximately 11,600[3].

[2] *The Airport Shuttle does not operate on a fixed route. The route shown in Figure 3 is an example of a route the Airport Shuttle may take between Union Station and the BBTCA ferry terminal.*

[3] *Toronto Transit Commission, Ridership statistics for surface routes, as of April 2014. Accessed at https://www.ttc.ca/PDF/Transit_Planning/Ridership_and_service_stats_2014.pdf, December 8, 2015.*

The 511 Bathurst streetcar route runs from Bathurst subway station in the north along Bathurst Street and turns west at Fleet Street to terminate at the Exhibition Loop. The route runs seven days a week at headways ranging from 4 to 8 minutes. The 511 Bathurst streetcar stops at the Bathurst Street / Lake Shore Boulevard intersection and airport passengers must walk approximately 350 m to access the ferry terminal. In 2014, TTC reported all-day ridership (boardings) on the 511 Bathurst streetcar of approximately 17,400[4].

The Airport operates a complimentary Airport Shuttle service between Union Station and the BBTCA ferry terminal. The service is free for all passengers and employees, not just those who are travelling to or from the airport. The Airport Shuttle stops at the southwest corner of Front and York Streets across from Union Station and at the Airport Shuttle pick-up currently situated on the Canada Malting site. Service begins at 5:00 AM and runs approximately every 15 minutes until 12:00 AM on weekdays. Enhanced frequencies are provided during morning peak and afternoon peak periods. According to PortsToronto, the trip to or from BBTCA lasts approximately 15 minutes. The typical shuttle bus seated capacity is 22 riders. **Table B** presents peak hour ridership on the Airport Shuttle, collected in October 2012 as part of the Strategic Transportation Study[5].

Table B: Airport Shuttle Peak Hour Ridership

Direction	AM Peak	PM Peak
To BBTCA	79	139
To Union Station	84	146

Source: City of Toronto, Strategic Transportation Study: Billy Bishop Toronto City Airport & Eireann Quay, "Airport Shuttle Bus Users Summary"

Regional transit access to and from the BBTCA is provided via connections to GO Transit and the TTC subway network at Union Station. Union Station is accessible from the BBTCA by the 509 Harbourfront streetcar or Airport Shuttle.

Active Transportation

The main active transportation facility in the Local Study Area is the Martin Goodman Trail, which forms part of the multi-use Waterfront Trail that runs along the shore of Lake Ontario. Within the Local Study Area, the trail transitions to an on-street bicycle lane along Queens Quay. Aside from standard sidewalks, no other specific active transportation infrastructure is provided in the Local Study Area.

Mode Split

Mode split data were retrieved from the Dillon Consulting *BBTCA Traffic Projections Associated with Growth Scenarios and Potential Modal Split, Deadheading and Vehicle Occupancy Targets*[6] memorandum. Passenger movements to and from the airport were observed and recorded during AM

[4] *Toronto Transit Commission, Ridership statistics for surface routes, as of April 2014. Accessed at https://www.ttc.ca/PDF/Transit_Planning/Ridership_and_service_stats_2014.pdf, December 8, 2015.*

[5] *City of Toronto, Strategic Transportation Study: Billy Bishop Toronto City Airport & Eireann Quay, Shuttle Bus Users Summary. Accessed at: http://www1.toronto.ca/city_of_toronto/city_planning/transportation_planning/files/pdf/Airport-Shuttle-Bus-Users-Summary.pdf*

[6] *Dillon Consulting,* Traffic Projections Associated with Growth Scenarios and Potential Modal Split, Deadheading and Vehicle Occupancy Targets, January 8, 2016.

and PM peak hour periods in April 2015 to determine the percentage of passengers arriving and leaving the airport on a given mode. The existing AM and PM peak hour mode splits for trips to and from BBTCA are shown below in **Table C**.

Table C: Existing Peak Hour Mode Split

Travel Mode	AM Peak Hour		PM Peak Hour	
	Departures	Arrivals	Departures	Arrivals
Take a Taxi	41%	54%	47%	44%
Airport Shuttle Bus	26%	30%	25%	26%
Transit / Walk / Cycle / Other	9%	6%	15%	15%
Picked up / Dropped off	14%	7%	8%	8%
Drive Themselves and Park	10%	3%	5%	7%
Total	**100%**	**100%**	**100%**	**100%**

Traffic Volumes

Traffic volumes in the Local Study Area have been collected by Dillon Consulting as part of various ongoing initiatives, including the BBTCA Strategic Transportation Study and work undertaken in parallel with the City of Toronto's Bathurst Quay Neighbourhood Plan (BQNP). Intersection surveys were conducted in May 2012 and in April 2015. While most disciplines' assessments within this EA utilized 2012 base year data, the traffic and transportation assessments have used the newer 2015 base year traffic data as a more accurate representation of existing conditions, reflecting the following numerous changes to the transportation network that have been implemented in the vicinity of the airport between May 2012 and April 2015:

- Turn restrictions were enacted by the City of Toronto at the following locations:
  - No right turn on red, Eireann Quay northbound at Queens Quay, any time
  - No left turn, Eireann Quay northbound at Queens Quay, any time
  - No right turn, Lake Shore Boulevard eastbound at Stadium Road, 7-9 AM
  - No left turn, Stadium Road northbound at Lake Shore Boulevard, 4-6 PM
- The northbound approach on Eireann Quay at Queens Quay was modified, removing the left turn lane and adding a short right turn lane
- The circulation and storage of taxis at the airport was substantially changed:
  - In May 2012, taxis queued within the "finger lot" on the west side of Eireann Quay; this queue frequently overflowed onto Eireann Quay with additional taxis queuing along the northbound curb.
  - Since that time, a taxi corral and loading platform has been constructed on the east side of Eireann Quay immediately northeast of the pick-up and drop-off loop, and taxis no longer queue in the Finger Lot or along Eireann Quay
- Other minor changes were made to the pick-up and drop-off circle in front of the mainland ferry terminal.

Basing the assessment on a 2015 base year ensures that the evaluation reflects the effects of the proposed undertaking only, rather than the effects of other measures that have already been in place for three years.

In addition to the revised transportation network, additional data was collected by Dillon Consulting for PortsToronto in May 2015 to determine the modal split of passengers traveling to and from the airport, as well as auto and taxi occupancy levels and taxi deadheading rates. These values have been used in the EA to inform the discussion related to mitigation.

Finally, a 2015 baseline year has also been used for consistency with the City's BQNP planning, which is being undertaken in parallel and relies on some of the same baseline traffic data and modeling.

While the evaluation is based on a 2015 baseline year, there is one exception where the traffic data reflect older baseline conditions. At the time of the 2015 traffic counts, traffic volumes on Queens Quay were substantially affected due to construction east of the Local Study Area; the eastbound lanes were fully closed east of Dan Leckie Way, and capacity was constrained in the westbound lanes. The baseline traffic conditions reflect Queens Quay fully re-opening to traffic and assume that traffic volumes on Queens Quay have returned to approximate pre-construction levels (accounting for some variation due to the post-2012 turn prohibitions and airport traffic level changes). This will result in a conservative assessment; fall 2015 surveys indicated that traffic volumes on Queens Quay did not return to pre-2012 levels once the street reopened to traffic.

Because this study focuses its attention on total airport traffic and not background traffic in the Local Study Area, volume on the section of Eireann Quay south of Queens Quay was compared as this volume represents airport trips only and is not affected by changes to turning restrictions and lane configurations in the broader Local Study Area. A comparison of 2012 and 2015 weekday peak hour traffic volumes on this section was made and the results are shown below in **Table D**.

Table D: Eireann Quay Traffic Volumes Comparison - 2012 and 2015

Traffic Volume on Eireann Quay	AM Peak Hour			PM Peak Hour		
	2012	2015	Annual growth rate	2012	2015	Annual growth rate
South of Queen's Quay - NB	220	240	2.9%	325	325	0.0%
South of Queen's Quay - SB	245	250	0.7%	255	275	2.5%
South of Queen's Quay – Two Way Total	**465**	**490**	**1.8%**	**580**	**600**	**1.1%**

The above comparison shows that volumes have only marginally increased in both the AM and PM peak hours at a rate of 1% to 2% per annum. Considering the marginal changes in peak hour airport traffic volumes over the three-year period, and in view of the factors outlined in the discussion above, the 2015 traffic counts and network will be used as the base year data from which the rest of the transportation net effects assessment will be conducted.

Full turning movement counts for 2012 and 2015 can be seen in **Appendix A**.

Traffic Operations

As part of Dillon Consulting's ongoing Strategic Transportation Study, a micro-simulation model was developed using VISSIM software to analyze the traffic operations in 2015 existing conditions. This model was developed and run for both the weekday morning and afternoon peak hours, and was calibrated to match observed existing conditions. The model incorporates cars, trucks, transit vehicles and pedestrians and accounts for surges in traffic volumes to and from the BBTCA as a result of the periodic arrival rate of the ferry service.

As part of this Environmental Assessment, AECOM developed Traffic operations metrics that were discussed with Dillon Consulting at the outset of micro-simulation model analysis. Dillon Consulting then extracted requested output results from the model at key locations in the Local Study Area. Each metric is described as follows:

- **Overall Intersection Delay** – the volume-weighted average delay per vehicle caused by the intersection traffic control and queuing. Level-of-service (LOS) can be determined from intersection delay and uses a ranking from A to F as shown in **Table E** below:

Table E: Level of Service Definitions

Level of Service (LOS)	Average Control Delay (seconds/veh)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

- **Average and Maximum Queue Lengths** – the average or maximum length of the queue formed on an intersection approach as a result of intersection traffic control in the analysis period.
- **Travel Time** – the total travel time experienced by a vehicle from one point in the network to another.
- **Traffic Spill-over** – approximated by the total number of vehicles not allowed into the network because of congestion. It can be expected that these vehicles would divert and spill-over into other areas of the broader network and/or extend the weekday peak traffic conditions.

Table F and **Table G** present the overall intersection delay and LOS and queueing results of the simulation analysis for AM and PM peak hours[7]. **Table H** describes the travel times for non-airport trips (through trips) and airport trips in the Local Study Area. The numbered travel time sections are graphically depicted in **Figure 4** and **Figure 5**.

Table F: Existing Traffic Operations Summary

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (s)	LOS	Delay (s)	LOS
Lake Shore Blvd / Stadium Rd	16.3	B	13.7	B
Lake Shore Blvd / Bathurst St	39.1	D	36.4	D
Lake Shore Blvd / Dan Leckie Way	16.8	B	27.9	C
Queens Quay / Stadium Rd	8.1	A	8.3	A
Queens Quay / Eireann Quay	23.9	C	61.4	E
Queens Quay / Dan Leckie Way	21.0	C	55.4	E

Table G: Existing Queue Lengths at Critical Locations

Intersection	Movement	Available Storage (m)*	Queue Length (m)			
			AM Peak Hour		PM Peak Hour	
			Avg.	Max.	Avg.	Max.
Lake Shore Blvd / Bathurst St	Northbound All	100	20	110	90	140
	Southbound All	220	50	165	55	165
Queens Quay / Eireann Quay	Northbound Through	110	5	40	25	90
	Southbound All	100	15	125	10	95
	Westbound All	150	5	60	100	165
Queens Quay / Dan Leckie Way	Westbound All	180	10	100	90	160
	Eastbound All	150	15	120	10	100

*Note: Red values indicate queues that exceed available storage lengths. Available storage is calculated from the approach stop bar to the upstream signalized intersection.

[7] *Data received from Dillon Consulting by email, October 10, 2015.*

Table H: Existing Travel Times for Non- Airport and Airport Trips

Travel Path			Travel Time (minutes)	
			AM Peak Hour	PM Peak Hour
Non- Airport Trips				
Westbound (WB)	1	Lake Shore Blvd WB from Dan Leckie Way to Stadium Road	2.3	2.3
	2	From Queens Quay to Bathurst St via Bathurst St / Queens Quay	2.9	6.7
	3	From Queens Quay to Lake Shore Blvd Westbound via Stadium Rd	3.6	6.0
	4	From Queens Quay to Lake Shore Blvd Westbound via Bathurst St	4.2	8.8
Eastbound (EB)	1	Lake Shore Blvd EB from Stadium Road to Dan Leckie Way	1.9	1.9
	2	From Bathurst St to Queens Quay Blvd via Bathurst St / Queens Quay	2.6	2.5
	3	From Lake Shore Blvd Eastbound to Queens Quay via Stadium Rd	3.0	3.5
	4	From Lake Shore Blvd Eastbound to Queens Quay via Bathurst St	3.8	2.6
Airport Trips				
To Airport	5	From Lake Shore Blvd Eastbound to Terminal via Bathurst St	2.9	1.9
	6	From Bathurst St to Terminal	1.7	1.8
	7	From Lake Shore Blvd Westbound to Terminal via Bathurst St	3.3	7.5
	8	From Dan Leckie Way to Terminal via Queens Quay	1.9	6.6
	9	From Queens Quay to Terminal	1.6	3.8
From Airport	5	From Terminal to Lake Shore Blvd Westbound via Bathurst St	3.6	7.6
	6	From Terminal to Bathurst St	1.8	3.7
	7	From Terminal to Lake Shore Blvd Eastbound via Bathurst St	1.9	4.2
	8	From Terminal to Dan Leckie Way via Queens Quay	2.5	2.7
	9	From Terminal to Queens Quay	1.4	1.8

Figure 4: Through Trip Travel Paths

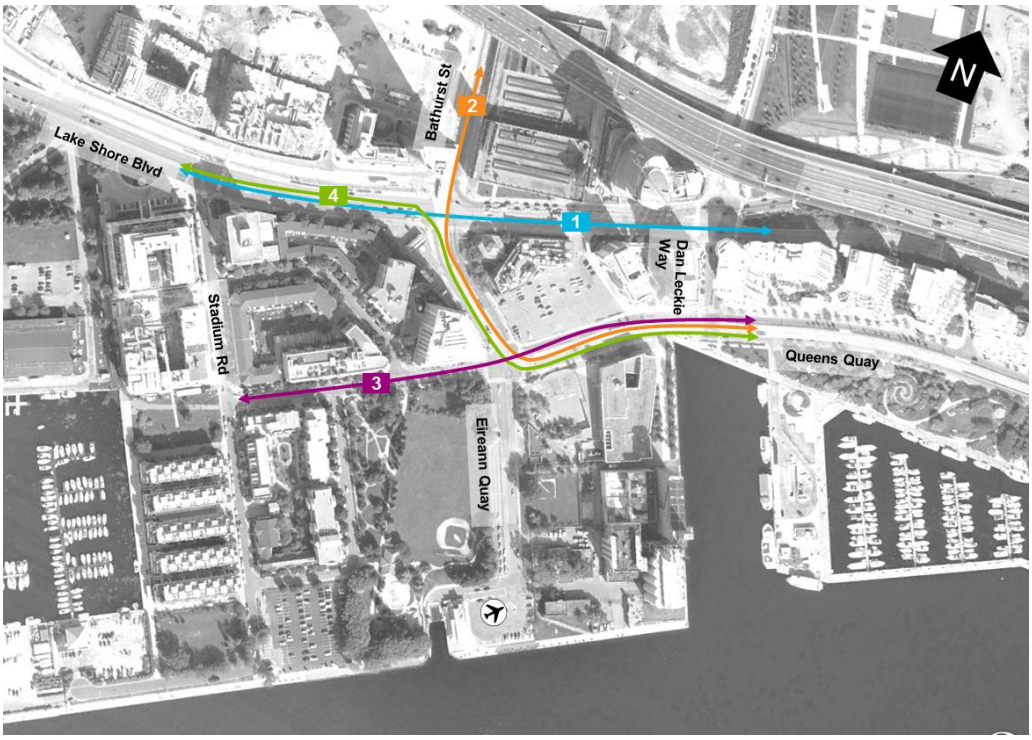
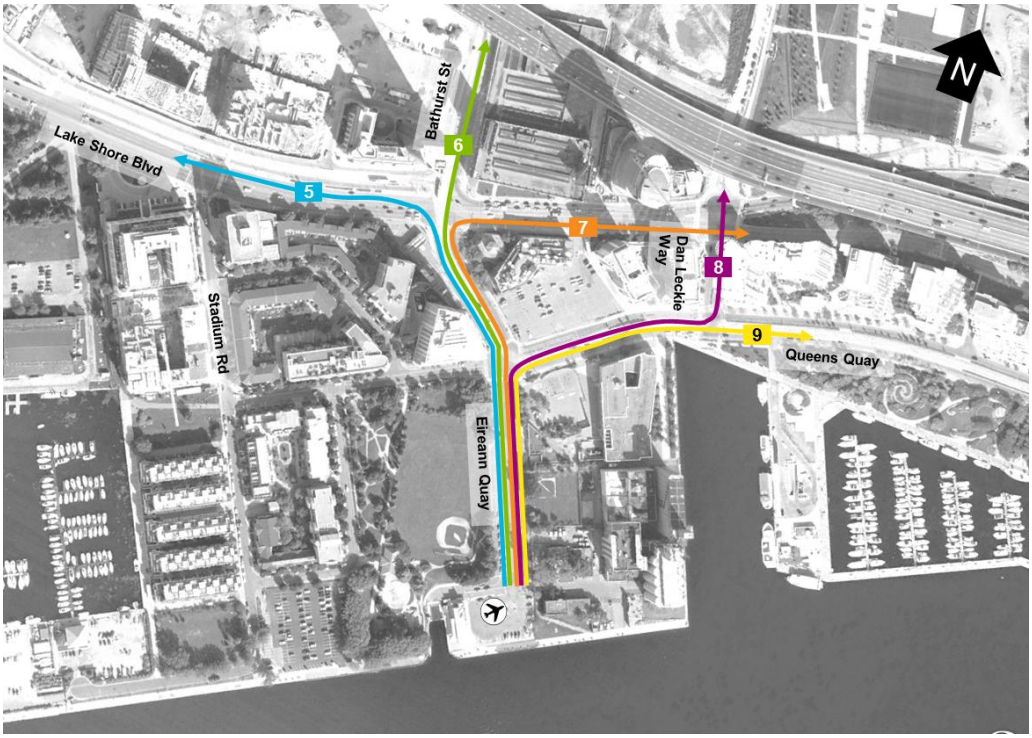


Figure 5: Airport Trip Travel Paths



General trends observed in the existing conditions traffic analysis are summarized below:

- In general, the Local Study Area operates under busy traffic conditions in both AM and PM peak hours. Many intersections in the network experience high delays, especially in the PM peak hour where the Queens Quay / Eireann Quay and Queens Quay / Dan Leckie Way intersections operate at LOS E.
- Poor operation at the intersection of Lake Shore Blvd / Bathurst St. causes significant queuing on the northbound approach, which often extends south to Queens Quay. Consequently, the intersection of Queens Quay / Bathurst Street experiences operational issues during the peak hours because of poor capacity at Bathurst Street / Lake Shore Blvd.
- Travel times are generally longer in the PM peak hour than in the AM peak hour. This is especially significant for trips to and from the airport.

1.3 Description of Future Conditions

Traffic volumes in the Local Study Area are expected to increase as a result of increased passenger activity levels to and from the airport. The passenger levels for the Future Baseline and Proposed Future Scenarios are presented below in **Table I**. The Future Baseline Scenario refers to the increase in the number of flights arriving and departing, as already approved in the current Tripartite Agreement for the airport. The Proposed Future Scenario includes the arrivals and departures of jet aircraft with higher passenger capacities.

Table I: Future Conditions Passenger Activity Levels

	Future Baseline Scenario	Proposed Future Scenario
Flights / hour	24	24
Includes jets?	No	Yes
Passengers / hour (total)	1,447	1,741
Connecting passengers	362	435
Mainland passengers	1,085	1,306
Arriving passengers	543	653
Departing passengers	542	653

The changes in flights per hour result in an approximate 21% increase in two-way traffic on Eireann Quay south of Queens Quay between the Future Baseline and Proposed Future scenarios.

In the Net Effects analyses presented below, the transportation infrastructure in the Local Study Area is assumed to be unchanged from existing conditions. While design alternatives are currently being considered to provide better access to the BBTCA in the future, no improvements to the existing transportation facilities or construction of new transportation facilities have been considered herein. Recommendations for improvements to the existing transportation network may be considered in the future as a result of mitigation measures conceived and tested to reduce the net effects of changed passenger activity levels to and from the airport.

2. Net Effects of Future Proposed Airport Operations

2.1 Methodology

Dillon Consulting's ongoing Strategic Transportation Study includes the development of micro-simulation models in VISSIM software to analyze the traffic operations for both the Future Baseline and Proposed Future Scenarios. The transportation metrics used in this study were requested by AECOM from Dillon Consulting in order to inform the net effects assessment. As demonstrated in the attached Net Effects Assessment Table, these metrics inform the changes to measures of effect for each community asset. **Table J** lists the Measures of Effect (MOE) and the corresponding transportation model output data provided from the Dillon Consulting Strategic Transportation Study.

Table J: Measures of Effect and Corresponding Transportation Metrics

MOE	Model Output
Changes to air quality	Intersection delay, queue lengths
Changes to access to residences, businesses and recreational facilities and activities	Intersection delay, travel time, traffic spillover
Changes to modal split	Mode splits, changes required for mitigation
Changes to access to the airport	Intersection delay, travel time, traffic spillover

In addition to the Dillon model outputs, AECOM described other effects on a qualitative basis based on increases in passenger activity levels; these include public safety, access to parking, changes to transit operations and active transportation modes. These metrics are then applied with the intent of qualitatively assessing the impacts of the Proposed Future Scenario compared to the Future Baseline Scenario.

As no changes to the transportation network or transportation policies have been considered in this assessment, it is assumed that existing mode shares will remain constant in the future scenarios. Therefore, the future conditions modelling represents the worst-case, do nothing traffic scenario based on projected passenger levels for the Future Baseline and Proposed Future Scenarios. Furthermore, no specific corridor background traffic growth or adjustments were applied to the future scenarios[8] in this assessment as development of residential uses in the vicinity of the Local Study Area has already been realized and other build out, such as potential development on the Canada Malting lands (outlined in the Bathurst Quay Neighbourhood Plan), has been explicitly accounted for in the development of future traffic volumes. This approach is consistent with that used in the BQNP assessment where no background growth rate was considered other than the site-specific development traffic.

[8] *As per email correspondence from Brent Hooton (Dillon Consulting) to Leah Weller and Pranav Dave (AECOM) of September 30, 2015.*

2.2 Net Effects Analysis

2.2.1 Future Baseline and Proposed Future Scenarios

The increase in passenger activity levels to and from the airport in the Proposed Future Scenario significantly affects transportation operations in the Local Study Area. The following **Table K**, **Table L** and **Table M** present the effects on vehicular traffic operations by comparing metrics between the Future Baseline and Proposed Future Scenarios[9].

Table K: Level of Service Comparison at All Intersections

Intersection	Delay (LOS)			
	AM Peak Hour		PM Peak Hour	
	Future Baseline	Proposed Future	Future Baseline	Proposed Future
Lake Shore Blvd / Stadium Rd	31.9 (C)	40.5 (D)	13.3 (B)	13.2 (B)
Lake Shore Blvd / Bathurst St	74.2 (E)	85.3 (F)	63.3 (E)	68.4 (E)
Lake Shore Blvd / Dan Leckie Way	24.6 (C)	54.4 (D)	83.9 (F)	101.0 (F)
Queens Quay / Stadium Rd	8.1 (A)	8.4 (A)	8.8 (A)	8.3 (A)
Queens Quay / Eireann Quay	74.5 (E)	82.0 (F)	117.0 (F)	114.2 (F)
Queens Quay / Dan Leckie Way	54.7 (D)	73.9 (E)	125.0 (F)	129.8 (F)

Table L: Average Queue Length Comparison at Critical Locations

Intersection	Movement	Available Storage (m)*	Queue Length (m)							
			AM Peak Hour				PM Peak Hour			
			Future Baseline		Proposed Future		Future Baseline		Proposed Future	
			Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.
Lake Shore Blvd / Bathurst St	Northbound All	100	30	130	25	110	85	140	80	140
	Southbound All	220	175	200	180	200	145	200	160	200
Queens Quay / Eireann Quay	Northbound Through	110	30	85	20	85	60	90	55	90
	Southbound All	100	70	165	75	165	55	160	60	160
	Westbound All	150	85	165	100	165	120	165	120	165
Queens Quay / Dan Leckie Way	Westbound All	180	35	160	100	160	135	155	135	155
	Eastbound All	150	10	100	10	95	10	75	10	75

*Note: Red values indicate queues that exceed available storage lengths. Available storage is calculated from the approach stop bar to the upstream signalized intersection.

[9] *Data received from Dillon Consulting by email, September 28, 2015.*

Table M: Travel Time Comparison for Through Trips and Airport Trips

Travel Path		Travel Time (minutes)			
		AM Peak Hour		PM Peak Hour	
		Future Baseline	Proposed Future	Future Baseline	Proposed Future
Non-Airport Trips					
WB	1. Lake Shore Blvd WB from Dan Leckie Way to Stadium Road	2.1	2.3	2.4	2.5
	2. From Queens Quay to Bathurst St via Bathurst St / Queens Quay	8.5	8.9	11.9	11.5
	3. From Queens Quay to Lake Shore Blvd WB via Stadium Rd	7.3	7.7	9.6	9.7
	4. From Queens Quay to Lake Shore Blvd WB via Bathurst St	7.6	7.5	12.2	11.8
EB	1. Lake Shore Blvd EB from Stadium Road to Dan Leckie Way	4.6	5.7	1.9	2.0
	2. From Bathurst St to Queens Quay via Bathurst St / Queens Quay	6.4	6.7	4.8	5.1
	3. From Lake Shore Blvd EB to Queens Quay via Stadium Rd	5.7	7.4	3.8	3.8
	4. From Lake Shore Blvd EB to Queens Quay via Bathurst St	8.6	10.5	4.6	4.5
Airport Trips					
To Airport	5. From Lake Shore Blvd EB to Terminal via Bathurst St	7.8	9.7	5.1	4.9
	6. From Bathurst St to Terminal	6.5	7.7	5.8	6.5
	7. From Lake Shore Blvd WB to Terminal via Bathurst St	7.0	11.4	14.8	17.2
	8. From Dan Leckie Way to Terminal via Queens Quay	6.4	9.1	16.3	16.9
	9. From Queens Quay to Terminal	4.8	5.7	8.0	9.1
From Airport	5. From Terminal to Lake Shore Blvd WB via Bathurst St	4.8	3.9	9.1	8.4
	6. From Terminal to Bathurst St	2.8	2.2	5.5	5.3
	7. From Terminal to Lake Shore Blvd EB via Bathurst St	3.2	2.6	5.9	5.5
	8. From Terminal to Dan Leckie Way via Queens Quay	4.4	3.6	5.3	5.4
	9. From Terminal to Queens Quay	2.9	2.2	3.9	3.8

The above transportation model results present the following conclusions:

- In the AM peak hour, intersection level of service is reduced to LOS F between the Future Baseline and Proposed Future Scenarios, especially at the major intersections of Lake Shore Blvd / Bathurst St and Queens Quay / Eireann Quay, while in the PM peak hour, these intersections already operate at LOS F in the Future Baseline Scenario.
- Average queue lengths increase marginally from the Future Baseline to the Proposed Future Scenario on most critical intersection approaches. Specifically, in the AM peak hour the westbound approaches at both the Queens Quay / Eireann Quay and Queens Quay / Dan Leckie Way intersections experience significantly greater average queueing in the Proposed Future Scenario as compared to the Future Baseline Scenario.
- Travel times for non-airport vehicle trips across the Local Study Area do not significantly vary between the Future Baseline and Proposed Future Scenarios. Vehicle trips to the airport experience greater travel times in the Proposed Future Scenario compared to the Future Baseline Scenario, with an average increase of 45 seconds and 20 seconds in the AM and PM peak hours, respectively. Travel times away from the airport do not significantly vary between the two scenarios.

In addition to the effects described using the quantitative traffic operations metrics above, the following inferences can be made on the effects to other aspects of the transportation network:

- Considering a constant parking mode share from existing conditions of 10% and the future passenger activity levels for the Future Baseline and Proposed Future Scenarios presented in **Table I**, the total number of vehicles requiring parking can be estimated at 109 and 131 in the Future Baseline and Proposed Future Scenario AM peak hours, respectively, as shown below in **Table N.** This can be accommodated by existing parking at the three locations described in **Section 1.2**.

Table N: Future Parking Requirements

	Future Baseline Scenario	Proposed Future Scenario
Mainland passengers (A)	1,085	1,306
Parking mode share (B)	10%	10%
Vehicles requiring parking (A x B)	109	131

- If active transportation mode shares stay constant at approximately 8% and 15% in AM and PM peak hours, transit ridership and cycling and pedestrian volumes will increase by up to 20% between the Future Baseline and Proposed Future Scenarios. If unmitigated by additional transit service or improved cycling and pedestrian infrastructure, this increase can cause overcrowding, poor service, and potential safety hazards.

The below table outlines measures of effect used to determine where there will be a negative, positive or no effect resulting from the Future Baseline Scenario, which maintains the current runway configuration with additional passengers.

Table O: Future Baseline Scenario – Transportation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Future Baseline Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Public Safety	▶ Estimated increased risk of collisions.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ No major improvements to roadway geometry, cross-sections or pedestrian facilities were considered to be in place.	▶ If modal split and vehicle occupancy levels remain at existing levels, future baseline traffic volumes would be increased by up to 100 % over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not assumed to change.	▶ Higher traffic and pedestrian volumes will increase the number of interactions between road users, thereby increasing exposure and potential for collisions.	▶ Increase non-auto modal split by providing transit improvements and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. The increased risk of collisions will therefore be negligible.
Residential Uses Community Services Tourism - Local Economy	▶ Changes to access to residences, businesses and recreational facilities and activities.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Increased traffic levels may cause congestion and increase travel times in the Transportation LSA.	▶ Future baseline traffic volumes will be increased over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ The increase in traffic volumes will cause traffic congestion and an average travel time increase of approximately 3 minutes for non-airport trips. ▶ Traffic spillover may occur as vehicles avoid the Transportation LSA and detour into adjacent communities.	▶ Increase non-auto modal split by providing transit improvements and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. Travel times are expected to return to existing levels and traffic spillover is expected to be negligible.
Transportation	▶ Changes to modal split.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Changes to modal split may be required in order to mitigate the effects of increased traffic volumes in the Transportation LSA.	▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ In order to mitigate effects on other community assets, non-auto modal split will be increased by providing transit improvement and increasing shuttle frequency and ease of use.	▶ No mitigation required. Changes to modal split result from the mitigation measures proposed for other measures of effect (MOE).	▶ Increases in non-auto mode share, potentially requiring improvements to transit service, pedestrian and cycling infrastructure.
Convenience	▶ Changes to access to the airport.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Increased traffic levels may cause congestion and increase travel times to and from the airport.	▶ Future baseline traffic volumes will be increased over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ The increase in traffic volumes will cause traffic congestion and an average travel time increase of approximately 3 minutes for trips to and from the airport.	▶ Increase non-auto modal split by providing transit improvement and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. Travel times are expected to return to existing levels.

The below table outlines measures of effect used to determine where there will be a negative, positive or no effect resulting from the Proposed Future Scenario, which sees the Tripartite Agreement amended to allow jet-operated aircraft and a runway extension.

Table P: Proposed Future Scenario – Transportation

Asset	Measure of Effect	Key Design Considerations and Assumptions	Proposed Future Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Public Safety	▶ Estimated increased risk of collisions.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ No major improvements to roadway geometry, cross-sections or pedestrian facilities were considered to be in place.	▶ If modal split and vehicle occupancy levels remain at existing levels, future baseline traffic volumes would be increased by up to 150 % on Eireann Quay over existing conditions due to increases in the number of flights arriving and departing in the peak hours and the presence of higher capacity jet aircraft. ▶ Mode shares for users arriving and departing the airport are not assumed to change.	▶ With the addition of jets, vehicle and pedestrian volumes will further increase, therefore increasing exposure and potential for collisions.	▶ Increase non-auto modal split by providing transit improvements and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. The increased risk of collisions will therefore be negligible.
Residential Uses Community Services Tourism - Local Economy	▶ Changes to access to residences, businesses and recreational facilities and activities.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Increased traffic levels may cause congestion and increase travel times in the Transportation LSA.	▶ Proposed future traffic volumes will be increased over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ With the addition of jets, vehicle volumes are expected to increase, causing traffic congestion and an average increase in travel time of approximately 3 minutes for non-airport trips over existing conditions. ▶ Traffic spillover may occur as vehicles avoid the Transportation LSA and detour into adjacent communities.	▶ Increase non-auto modal split by providing transit improvement and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. Travel times are expected to return to existing levels, and traffic spillover is expected to be negligible.
Transportation	▶ Changes to modal split.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Changes to modal split may be required in order to mitigate the effects of increased traffic volumes in the Transportation LSA.	▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ In order to mitigate effects on other community assets, non-auto modal split will be increased by providing transit improvement and increasing shuttle frequency and ease of use.	▶ No mitigation required. Changes to modal split result from the mitigation measures proposed for other MOEs.	▶ Increases in non-auto mode share, potentially requiring improvements to transit service, pedestrian and cycling infrastructure. ▶
Convenience	▶ Changes to access to the airport.	▶ The number of flights arriving and departing during peak hours dictates the volumes of vehicles and pedestrians arriving at and departing from the mainland terminal. ▶ Increased traffic levels may cause congestion and increase travel times to and from the airport.	▶ Proposed future traffic volumes will be increased over existing conditions due to increases in the number of flights arriving and departing in the peak hours. ▶ Mode shares for users arriving and departing the airport are not expected to change.	▶ With the addition of jets, vehicle volumes are expected to increase, causing traffic congestion and an average increase in travel time for trips to and from the airport of 4 minutes.	▶ Increase non-auto modal split by providing transit improvement and increasing shuttle frequency and ease of use. ▶ Improve taxi operations by reducing deadheading and implementing rideshare programs.	▶ With mitigation measures in place, traffic volumes on Eireann Quay will return to existing levels. Travel times are expected to return to existing levels.

3. Mitigation and Recommendations

As per Dillon Consulting's *BBTCA Traffic Projections Associated with Growth Scenarios and Potential Modal Split, Deadheading and Vehicle Occupancy Targets*[10], the objective of mitigation is to reduce traffic volumes on Eireann Quay in the Future Baseline and Proposed Future Scenarios such that they return to approximately existing levels associated with current operating conditions at the airport and remain within the approximate planning capacity of the road (currently estimated to be 750 vehicles per hour). This theoretical capacity is limited by constraining factors like queueing and delays at the Bathurst St / Lake Shore Blvd intersection. In order to offset the increases in vehicular traffic associated with increased passenger levels in the future scenarios, airport traffic volumes must be reduced by the following levels:

- Future Baseline Scenario – 36% reduction in airport traffic
- Proposed Future Scenario – 47% reduction in airport traffic

To reduce traffic volumes by the above amounts and to achieve existing vehicular traffic volumes on Eireann Quay, a combination of the following mitigation measures can be implemented by PortsToronto:

- **Increase Non-Auto Modal Split**
  - Improve wayfinding in the airport terminal to increase awareness of the 509 Harbourfront streetcar, and install automated displays showing real-time departure and travel information.
  - Improve the streetcar stop at Queens Quay / Eireann Quay and provide a weather-protected pedestrian connection from the stop to the airport terminal.
  - Establish an airport shuttle pick-up and drop-off location in a prominent location in front of the terminal building, and relocate the stop at Union Station to increase its visibility and provide better connections to GO and TTC services.
  - Prioritize access to the airport terminal for the shuttle over taxis and private vehicles
  - Increase shuttle frequency and introduce additional shuttle routes to serve local stops and a broader catchment area.

- **Improve Taxi Operations**
  - Through use of remote signage and other communication, eliminate "double deadheading" where taxis arrive empty and leave without picking up passengers. Inbound and outbound deadheading can also be reduced by encouraging taxis that have dropped off passengers to enter the taxi corral.
  - Implement ridesharing programs using smartphone applications and other technologies to encourage and simplify the process of passengers sharing taxis when leaving the airport.
  - Encourage passengers to use ridesharing by providing them with priority access to waiting taxis.
  - These measures should be developed collaboratively with the taxi industry.

[10] *Dillon Consulting,* Traffic Projections Associated with Growth Scenarios and Potential Modal Split, Deadheading and Vehicle Occupancy Targets, January 8, 2016.

Table P demonstrates a possible combination of the above-noted measures to reduce airport traffic levels. As shown in the table, deadheading is assumed to be reduced by 0.35 and 0.55 trips per passenger trip in the AM and PM peak hours, respectively. Similarly, taxi occupancy is assumed to be increased by 20% in both peak hours. The remainder of the traffic volume reduction is provided by increases in non-auto mode share.

Table Q: Mitigation Measures Required to Reduce Airport Traffic Levels

Airport traffic reduced through measure:	AM Peak Hour			PM Peak Hour		
	Existing	Future Baseline	Proposed Future	Existing	Future Baseline	Proposed Future
Taxi deadheading (deadhead trips per passenger trip)	0.8	0.45	0.45	1.0	0.45	0.45
Taxi passenger occupancy (average # of passengers per fare)	1.25	1.50	1.50	1.25	1.50	1.50
Average taxi occupancy (excluding driver, including deadheading)	0.781	1.034	1.034	0.625	1.034	1.034
Non-auto modal split (shuttle, TTC, walking/cycling)	36%	40%	51%	41%	41%	49%
# of taxi trips shifted to shuttle/transit	-	52	198	-	0	113
% of taxi trips shifted to shuttle/transit	-	10%	32%	-	0%	19%
Shuttle trips if taxi passengers shift to shuttle	304	355	502	277	277	390
TTC/other trips if taxi passengers shift to TTC/other	81	133	280	163	163	276

The following is the list of improvements identified through other initiatives (e.g. Bathurst Quay Neighbourhood Plan- BQNP) that can improve the overall traffic operations in the Local Study Area:

- Improve the westbound left turn lane at the Lake Shore Blvd / Dan Leckie Way intersection and restrict left turns at Lake Shore Blvd / Bathurst St.
- Further assess the feasibility of providing additional northbound left storage capacity at the Lake Shore Blvd / Bathurst St intersection.
- Improve traffic signal co-ordination between the Queens Quay / Bathurst St intersection and adjacent intersections to minimize queueing as a part of Bathurst Street and Queens Quay intersection reconfigurations to accommodate realigned streetcar tracks.
- Improve signage and wayfinding on Eireann Quay relating to the pick-up and drop-off areas, and manage and upgrade the use of the Canada Malting site for taxis and parking.
- Improve the streetcar stop and waiting facilities at the Queens Quay and Eireann Quay intersection.
- Provide a weather-protected pedestrian connection from the mainland terminal to Queens Quay and the streetcar stop, potentially as part of Bathurst Quay redevelopment initiative.

It is suggested that flight activity and the associated passenger activity levels are not increased in full until mitigation measures have been implemented to the point at which the reviewing authority accepts that the transportation network can support the associated increase in volumes.

Appendix A
Existing and Future Traffic Volumes

Figure 6: 2012 Peak Hour Traffic Volumes[11]

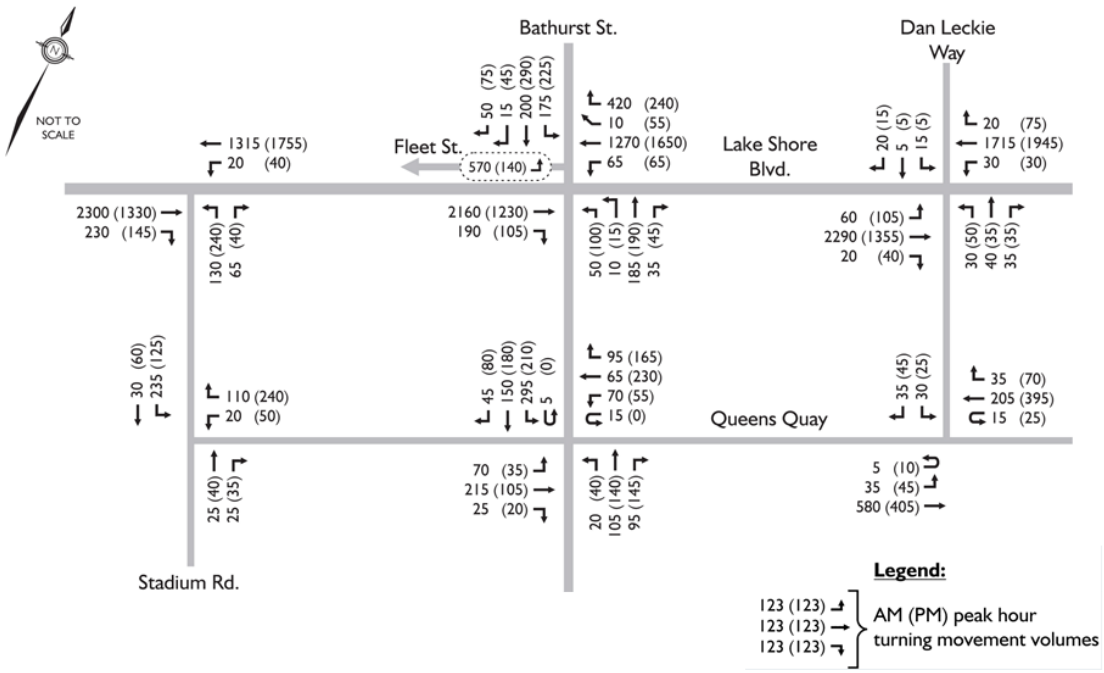
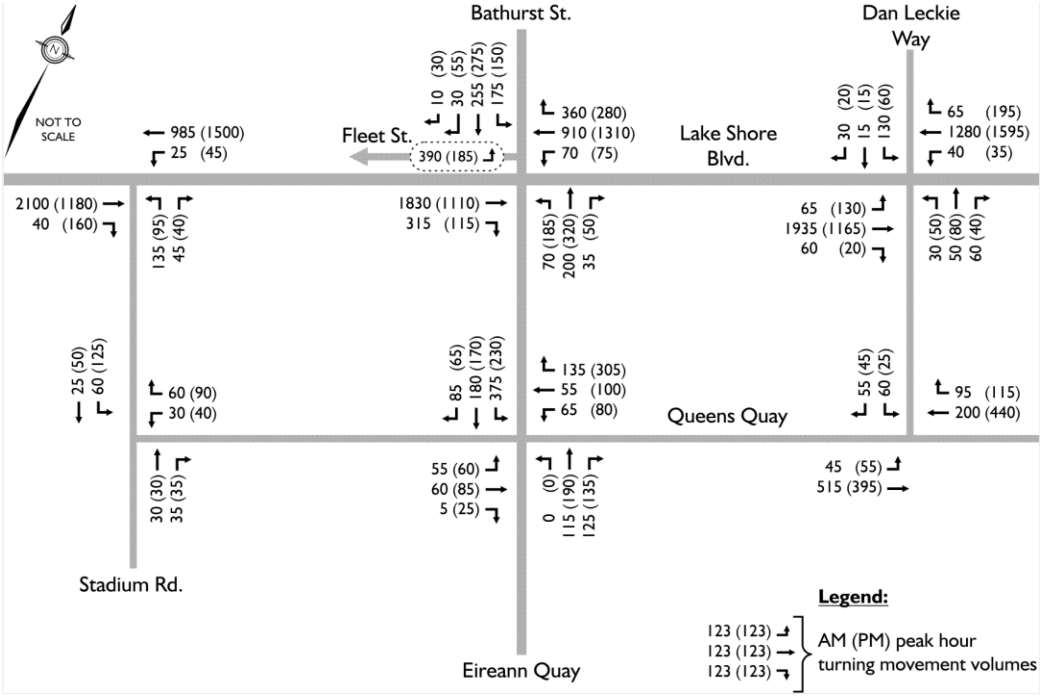


Figure 7: 2015 Peak Hour Traffic Volumes[12]



[11] *Dillon Consulting, BBTCA Strategic Transportation Review, Existing Conditions Review, "May 2012 Traffic Volumes".*
[12] *Dillon Consulting, BBTCA Results of 2015 Traffic and Passenger Surveys, August 2015.*