

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.

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. <ul style="list-style-type: none"> • Fewer contaminants have predicted concentrations higher than their Toxicity Reference Values. • Fewer tonnes of CO₂ 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 MIKE could be developed for the Water Quality Study Area, or one of the existing MIKE-3 (Dewy, 2012), ELCOM (University of

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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.

7. References

- 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.
- Aquatic Habitat Toronto, 2007:
Toronto Waterfront Aquatic Habitat Restoration Strategy.
- Aquatic Habitat Toronto, 2013:
Recreational Fisheries Plan.
- AuthentiCity, 2008:
Creative City Planning Framework prepared for the City of Toronto.
- BA Group, 2013:
BBTCA Transportation Assessment of Proposed Jet Activity Summary Report.
- Canada *Marine Act*:
Section 4.(f), Purpose [of the Act], page 4.
- CH2M HILL Canada Limited, 2013:
Porter Airlines Runway Extension Proposal Review Coastal Processes and Environments.
- City of Toronto and SENES Consultants Limited, 2003:
Waterfront Scan and Environmental Improvement Strategy Study.
- City of Toronto and Toronto and Region Conservation Authority, 2013:
Port Lands Profile.
- City of Toronto and Waterfront Toronto:
Port Lands Acceleration Initiative – Film Studio District.
- City of Toronto et. al., 2014:
Villiers Island Precinct Plan.
- City of Toronto, 2001:
City of Toronto Bike Plan – Shifting Gears.
- City of Toronto, 2003:
Making Waves – Central Waterfront Plan Part II.
- City of Toronto, 2009:
Toronto Municipal Code. Chapter 591, Noise. Retrieved from
http://www.toronto.ca/legdocs/municode/1184_591.pdf

- City of Toronto, 2010:
Official Plan.
- City of Toronto, 2013:
Parks Plan 2013 – 2017.
- City of Toronto, 2014:
April 1, 2014 City of Toronto Council Resolution.
- City of Toronto, 2015:
Bathurst Quay Neighbourhood Plan Website.
<http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=d7ea37130161a410VgnVCM10000071d60f89RCRD>
- CommunityAIR, 2013:
Reviewing Deluce's Jets Proposal: What the City Has (and Hasn't) Done.
- Dillon Consulting, 2011:
Proposed Noise Barriers and Engine Run-Up Enclosure Environmental Screening Report.
- Dillon Consulting, 2011:
Toronto Port Authority Proposed Pedestrian/Services Tunnel and Perimeter Road Project.
- Dillon Consulting, 2013:
Lakefill Within Marine Exclusion Zone (Keep-Out-Area) - Toronto Harbour for the Toronto Port Authority.
- DPRA Consulting, 2013:
Consultation on the Use of Jets at Billy Bishop Toronto City Airport (BBTCA) for the City of Toronto
- Dr. Davidson-Arnott, R., 2013:
Peer Review of Porter Airlines Runway Extension Proposal Review Coastal Processes and Environment.
- Environics Research Group, 2013:
Toronto Resident Survey: Billy Bishop Toronto City Airport.
- Frontier Economics, 2014:
Global Hub Economic Impact Study.
- Golder Associates, 2013:
Health Impact Assessment Proposed Billy Bishop Expansion.
- Golder Associates, 2015:
Foundation Investigation and Design Report.
- Government of Canada, 2014:
Basics of Environmental Assessment. Retrieved from <https://www.ceaa-acee.gc.ca/default.asp?lang=en&n=B053F859-1#gen01>
- Government of Ontario, 2015:
Preparing Environmental Assessments. Retrieved from <https://www.ontario.ca/environment-and-energy/preparing-environmental-assessments>

GTAA, 2007:

Taking Flight: The Airport Master Plan 2008-2030. Retrieved from
<http://www.torontopearson.com/en/gtaa/master-plan/#>

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.

Jacobs Consultancy Canada Inc., 2010:

Billy Bishop Toronto City Airport – Noise Management Study – Interim Report.

MMM Group, 2015:

Proposed Runway Extension Constructability Report for Billy Bishop Toronto City Airport. Prepared for
PortsToronto.

N. Barry Lyon Consultants Ltd., 2013:

Condominium Market Value Impact Analysis: Billy Bishop Airport.

PortsToronto, 2000:

Toronto Port Authority Practices and Procedures within the Limits of the Port & Harbour of Toronto.

PortsToronto, 2015:

Billy Bishop Airport's 75th Anniversary. Retrieved from <http://www.portstoronto.com/Airport/Billy-Bishop-Airport-75th-Anniversary.aspx>

PortsToronto, 2016:

Emergency Preparedness. Retrieved from: <https://www.portstoronto.com/airport/business-information/emergency-preparedness.aspx>

PortsToronto, 2017:

Airport Master Plan. Retrieved from: <https://www.portstoronto.com/airport/business-information/future-planning/airport-master-plan.aspx>

RWDI, 1997:

TCCA Aircraft Noise Study. Report No. 96-351-09.

RWDI, 2005:

Noise Impact Assessment, Ferry Passenger Transfer Facility, TCCA. Report No. W06-5022A.

RWDI, 2013:

BBTCA Final Report Air Quality Review.

Tetra Tech AMT, 2013:

Aircraft Noise Assessment of Allowing CS100 Flights at Billy Bishop Toronto City Airport

Toronto and Region RAP, 1994:

Clean Waters, Clear Choices.

Toronto Waterfront Revitalization Corporation, 2005:

East Bayfront Precinct Plan.

Toronto Waterfront Revitalization Corporation, 2005:
West Don Lands Precinct Plan.

Urban Strategies Inc., 2013:
BBTCA Review Urban Planning & Design Assessment of Potential Transportation Impacts & Mitigation Measures.

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

Waterfront Toronto, 2013:
Strategic Business Plan 2014-2023.

Waterfront Toronto, 2016:
History & Heritage. Retrieved from
<http://www.waterfronttoronto.ca/nbe/portal/waterfront/Home/waterfronthome/about-us/history-and-heritage>

Waterfront Toronto, 2017a:
2016/17 Annual Report. Retrieved from
http://www.waterfronttoronto.ca/nbe/wcm/connect/waterfront/c9e7aaec-ed75-4320-84f1-e4d06875e0d5/2016-17+Annual+Report+-+June+13%2C+2017+%28for+posting%29.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=c9e7aaec-ed75-4320-84f1-e4d06875e0d5

Waterfront Toronto, 2017b:
Parks and public spaces. Retrieved from
<http://www.waterfronttoronto.ca/nbe/portal/waterfront/Home/waterfronthome/our-vision/parks>

Waterfront Toronto, 2017c:
Who We Are. Retrieved from
<http://www.waterfronttoronto.ca/nbe/portal/waterfront/Home/waterfronthome/about-us/who-we-are>

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