Ashbridges Bay Erosion and Sediment Control Project

Conservation Ontario Class Environmental Assessment

Environmental Study Report

Toronto and Region Conservation Authority and the City of Toronto

December 2014

Toronto and Region Conservation for The Living City | TORONTO

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Alberta D'Souza, Toronto and Region Conservation Authority
Angus Armstrong, Toronto Port Authority
Beverly Edwards, Toronto Ornithological Club
Bill Snodgrass, City of Toronto
Bob Kortright, Toronto Field Naturalists
Cathy Eden, Toronto and Region Conservation Authority
Chris Dunn, City of Toronto
Councillor Mary-Margaret McMahon, City of Toronto
Councillor Paula Fletcher, City of Toronto
David Hatton, Toronto and Region Conservation Authority
Erica Dewell, Toronto and Region Conservation Authority
Frank Quarisa, City of Toronto
Gord MacPherson, Toronto and Region Conservation Authority
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James Yacoumidis, City of Toronto
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John Edwards, Toronto Hydroplane & Sailing Club
Karen McDonald, Toronto and Region Conservation Authority
Ken Dion, Toronto and Region Conservation Authority
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Ron Anderson, Navy League of Canada
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EXECUTIVE SUMMARY

Ashbridges Bay is a vibrant community with a host of land and water based recreational opportunities for residents and visitors - all nestled beside the City of Toronto's largest wastewater treatment plant.

Following construction of Ashbridge's Bay Park in the mid-1970s, sediment eroding from the Scarborough Bluffs that was transported westward began to be deposited in the eastern embayment of the Park, creating a large beach (Woodbine Beach). As the embayment filled in, a sandbar began to form offshore, causing the sediment moving within the water system to then bypass the park. A large portion of the sediment bypassing Ashbridges Bay Park is now being deposited at the mouth of Ashbridges Bay in the Coatsworth Cut navigation channel.

Coatsworth Cut is located at the western boundary of Ashbridge's Bay Park. The Bay and Cut have serviced several boating clubs since the 1930s and the general public via three public boat launches since 1977. Currently there are several hundred vessels seasonally moored in the area at local yacht and sailing clubs. Various non-motorized vessels (canoes, kayaks and paddleboards) also use the area for recreation and competitive training.

In 1983, Toronto and Region Conservation (TRCA) began dredging operations at the Coatsworth Cut navigation channel to maintain safe boat passage. Maintenance dredging has been conducted 20 times in the past 30 years and is currently required on an annual basis. TRCA has been interested in undertaking remedial works at Ashbridges Bay to find a long term solution for the erosion and sedimentation issues. TRCA began the first Conservation Ontario Class Environmental Assessment (EA) study to address this issue in 2002. At the same time, a number of other planning studies were underway in the area. TRCA suspended their study while the City of Toronto completed and received approval for two EAs which will change the local shoreline to allow for enhanced stormwater and wastewater treatment for the City's growing population. In 2009 TRCA partnered with Waterfront Toronto to re-examine the remedial solutions for the erosion and sediment issues in the area with an expanded project scope that proposed the relocation of existing boat clubs in Ashbridges Bay to a newly created land base on Ashbridges Bay Park. The study was suspended when projected costs exceeded the available budget.

With a refined scope in 2013, the TRCA partnered with the City of Toronto to resume the EA study once again. The Ashbridges Bay Erosion and Sediment Control Conservation Ontario Class EA is Step 1 of the Ashbridges Bay Landform Project. This EA study seeks an erosion and sediment control solution that can be integrated into the City of Toronto's approved facilities which lie within the waterlot south of the Ashbridges Bay Wastewater Treatment Plant. In Step 2 of this project a detailed design exercise, with input from stakeholders and the general public, will be undertaken for the landform. Although this EA has considered and ensured that the remedial solutions do not preclude opportunities for things such as public access, trail connections and enhancing coastal and terrestrial habitat, these will be explored in depth for the landform as a whole in Step 2.

The objective of the Ashbridges Bay Erosion and Sediment Control Class EA is to identify a preferred solution that will mitigate erosion and sediment deposition at the harbour entrance of Coatsworth Cut in order to ensure safe navigation - while considering the various approved facilities, planning initiatives and current uses in the study area. Extensive work was undertaken in previous initiations of the erosion and sediment control studies in the area which identified a number of remedial alternatives. These alternatives were revisited with the re-initiation of this study, and, through a screening process, those that met the project scope were carried forward and subsequently refined to consider and integrate into the City of Toronto's approved facilities (high rate treatment facility and treatment wetland). The alternatives refinement resulted in three remedial alternatives in addition to the ‘Do Nothing” Alternative being carried forward for evaluation as part of this EA study. The ‘Do Nothing’ alternative was considered to be status quo – i.e., maintaining on-going dredging as it is currently required to keep the navigation channel open.

All three remedial alternatives consist of shore connected breakwaters which are designed to keep sediment from entering the Coatsworth Cut channel. The difference between these alternatives is the positioning of the main breakwater in proximity to the Ashbridges Bay Wastewater Treatment Plant's seawall gates. During heavy rainfall or snowmelt, large amounts of stormwater combine with sanitary sewage in older areas of Toronto that are serviced by combined sewers. During high flow conditions, a portion of the effluent treated at the wastewater treatment plant is discharged through the seawall gates. The remedial alternatives needed to be designed to allow for the on-going use of the seawall gates. The distinguishing features (main breakwater position) of the alternatives are as follows:

- Alternative 1: The main breakwater is positioned on the western side of the Ashbridges Bay Wastewater Treatment Plant’s seawall gates.
- Alternative 2: The main breakwater is positioned on the western side of the Ashbridges Bay Wastewater Treatment Plant’s seawall gates and a smaller breakwater is positioned on the east side of the seawall gates to act as a defector.
- Alternative 3: The main breakwater is positioned on the eastern side of the Ashbridges Bay Treatment Plants’ seawall gates and a secondary breakwater is positioned on the west side to form a channel for seawall gate discharge.

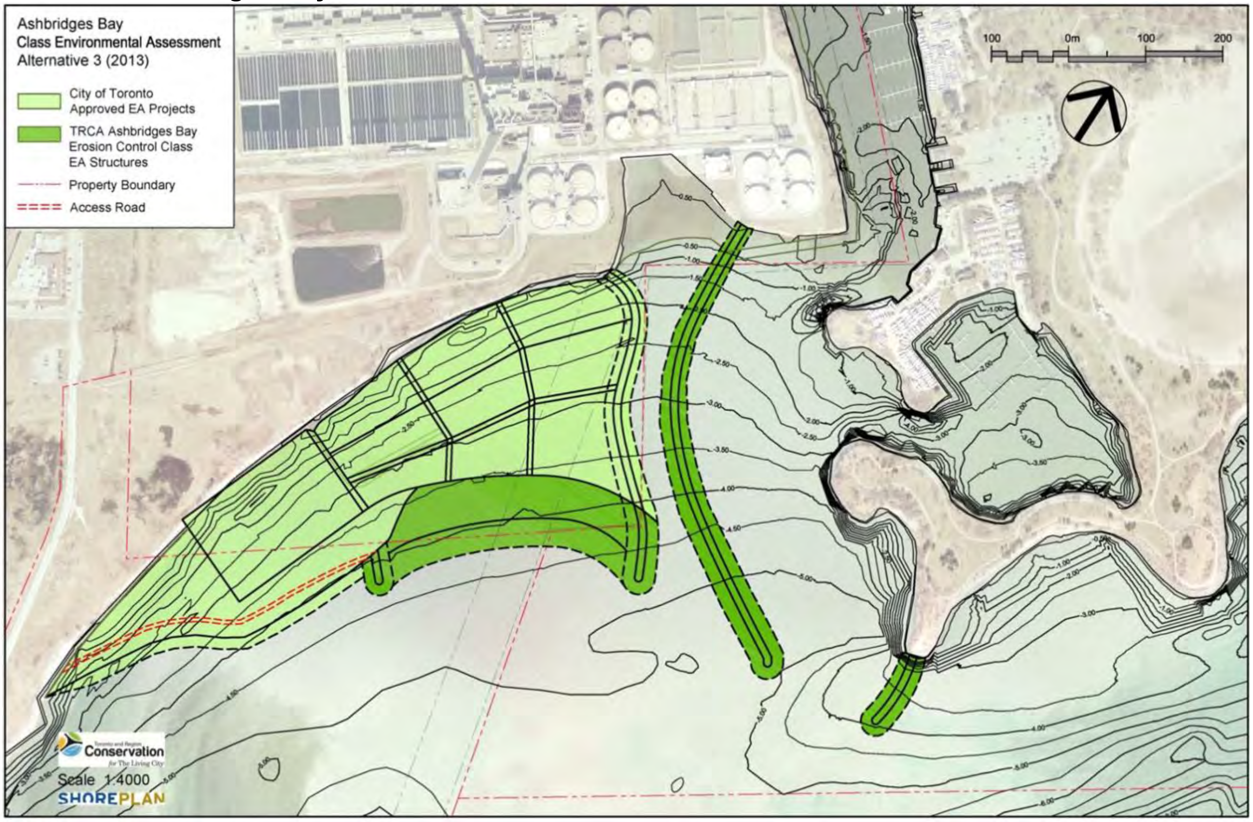
All three of the remedial alternatives feature a smaller breakwater that is shore connected to the headland at Ashbridges Bay Park. In combination with the primary breakwaters for each alternative this breakwater defines the entrance of the new navigation channel. All of the three Alternatives also feature a cobble beach that integrates the breakwaters with the other approved City of Toronto facilities.

The three remedial alternatives, along with the “Do Nothing” were evaluated against each other based on the following:

- Physical Environment;
- Natural and Biological Environment;
- Socio-economic Environment;
- Cultural Environment;
- Feasibility and Cost; and
- Technical Considerations

Alternative 3 was selected as the preferred alternative as a result of the evaluation and subsequent support from stakeholders and the public. The defining factor in the evaluation was Alternative 3’s ability to have a potential positive impact on water quality in the recreational boating areas whereas Alternatives 1 and 2 could potentially have negative impacts on Phosphorus and *E. coli* levels. This potential positive impact with Alternative 3 is achieved by the separation of the seawall gate discharge from the recreational boating areas. Alternative 3 also offers the best integration of existing and planned City of Toronto infrastructure and will provide decades of safe navigation in Coatsworth Cut without dredging.

Ashbridges Bay Erosion and Sediment Control Class EA Preferred Alternative



Upon identification of the preferred solution, a detailed environmental analysis was undertaken to determine mitigation measures. Both temporary and permanent impacts due to construction, operation and maintenance of the undertaking were considered. Information gathered in this process will help inform the detailed design process.

TRCA and the City of Toronto invited participation in the EA process from a number of provincial and federal agencies, and First Nations. A Community Liaison Committee comprised of various local stakeholder groups was also formed to facilitate on-going community involvement at the planning level of the project. Two Public Information Centres (PICs) were held to provide opportunities for the general public to be made aware of the project and to have their concerns addressed. All public information on the project, including newsletter, presentations, and workbooks were made available on TRCA and City of Toronto websites.

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1 INTRODUCTION

In 2013, the Toronto and Region Conservation Authority (TRCA) in partnership with the City of Toronto commenced a study to explore alternatives and recommend solutions to address erosion and sediment control issues at Ashbridges Bay, Toronto, Ontario. This study was undertaken to address the existing risk to navigation caused by sediment deposition at the harbour entrance of Coatsworth Cut (at Ashbridges Bay), while considering the approved projects and waterfront planning initiatives in the area. The planning and design of the preferred remedial measures were carried out in accordance with the guidelines set out in the Class Environmental Assessment (EA) for Remedial Flood and Erosion Control Projects (January 2002, as amended in June 2013).

The dredging of the Coatsworth Cut channel to maintain safe navigation commenced in the 1980's. Dredging volumes and costs increased throughout the 1990's, with dredging now required on an annual basis. In 2002, TRCA initiated a Class EA to address sediment and erosion issues. The study was suspended in 2004 while other planning initiatives in the area were completed. The study was recommenced in 2009, and included addressing public access and facilitating a potential relocation of the recreational boat clubs in Coatsworth Cut. The 2009 study was suspended when the estimated project cost exceeded the budget available at the time. A number of key studies and initiatives involving Ashbridges Bay/Coatsworth Cut have now been completed. With a refined project scope this Class EA was resumed in 2013.

The Ashbridges Bay Erosion and Sediment Control Conservation Ontario Class EA is Step 1 of the Ashbridges Bay Landform Project. This EA seeks to develop an erosion and sediment control solution that can be integrated into the City of Toronto's approved facilities which are located in the water lot south of Ashbridges Bay Wastewater Treatment Plant (ABTP) (see Section 1.2 [Purpose of Undertaking] for more information). In Step 2 of this project a detailed design exercise, with input from stakeholders and the general public, will be undertaken for the landform. Although this EA has considered and ensured that solutions did not preclude opportunities for things such as public access, trail connections and enhancing coastal and terrestrial habitat, these will be explored in depth for the landform in Step 2.

1.1 Class Environmental Assessment Process

TRCA is defined as a public body in Section 3 of Regulation 334/90 in the Environmental Assessment Act (R.S.O.) 1990, and as such, must conduct its remedial flood and erosion control projects in accordance with said Act.

Recognizing that common elements exist in addressing flood and erosion problems, a coordinated approach to environmental assessments was developed by Conservation Ontario for all Conservation Authorities (CAs), known as the Class Environmental Assessment for Remedial and Erosion Control Projects (Class EA). According to the Class EA document:

"Remedial Flood and Erosion Control Projects refer to those projects undertaken by Conservation Authorities, which are required to protect human life and property, in previously developed areas, from an impending flood or erosion problem. Such projects do not include works which facilitate or anticipate development. Major flood and erosion control undertakings which do not suit this definition, such as multipurpose projects, lie outside the limits of this Class and require an Individual Environmental Assessment" (Conservation Ontario, 2002, amended in 2013).

Twenty years of experience have demonstrated that using the Class EA approach for dealing with flood and erosion control projects is an effective way of complying with the Environmental Assessment Act requirements. Approval of the Class EA allows CAs to carry out these types of projects without applying for formal approval under the Act, on the condition that all other necessary federal and provincial approvals are obtained. A chart illustrating the key steps of the Class EA planning and design process is presented in Figure 1-1.

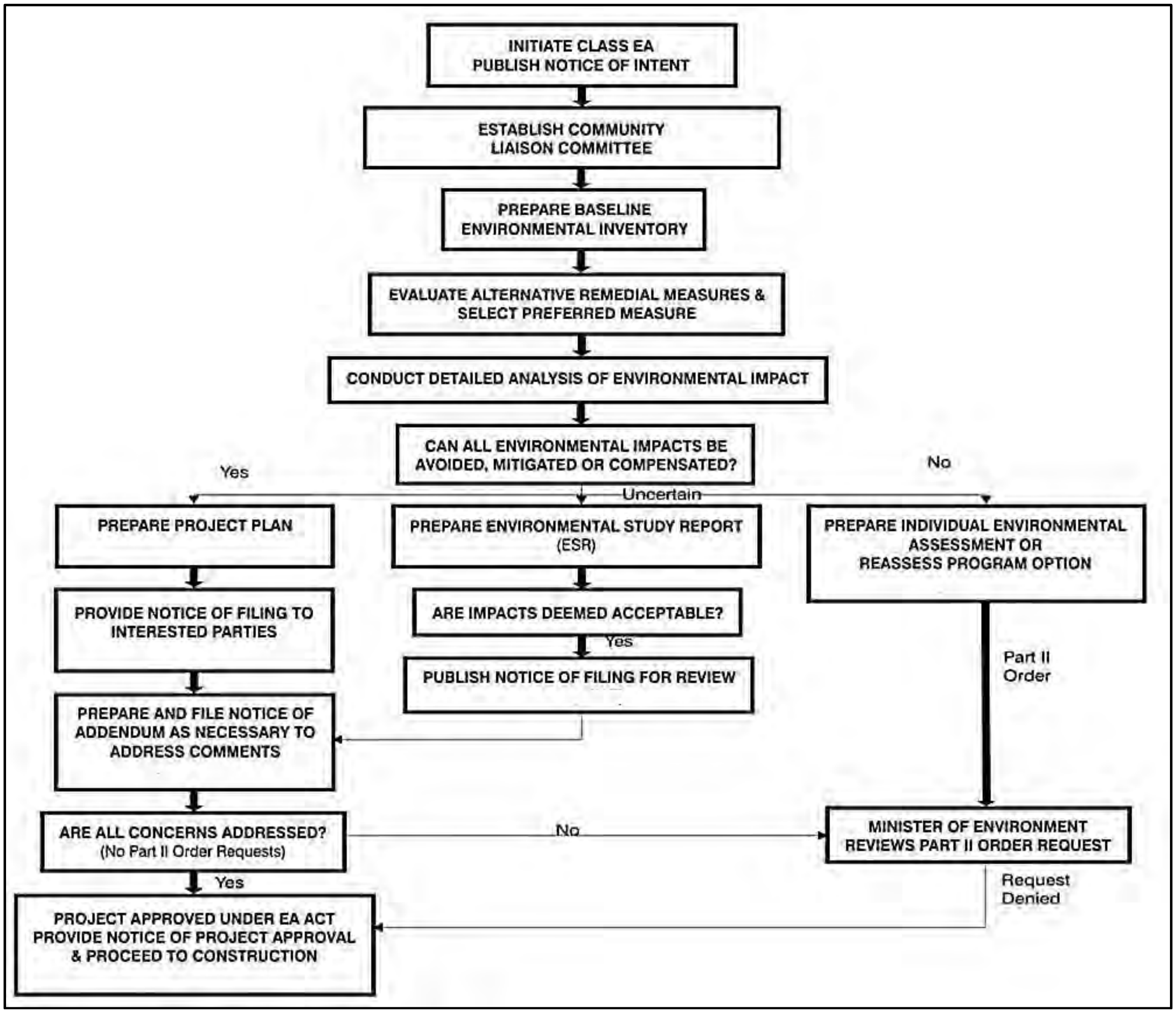

Figure 1-1. Class Environmental Assessment planning and design process.
Source: Conservation Ontario 2002, amended in 2013.

1.2 Purpose of the Undertaking

The purpose of the Ashbridges Bay Erosion and Sediment Control Class EA is to identify a preferred solution that will mitigate erosion and sediment deposition at the harbour entrance of Coatsworth Cut in order to ensure safe navigation - while considering the various approved facilities, planning initiatives and current uses in the study area.

The study uses the results of the work completed in TRCA's 2002 and 2009 EAs and considers the following:

- the approved concepts for City of Toronto facilities in the vicinity of ABTP, as identified in completed EAs (see Sections 2.2 [Previous Work and Studies] and 3.5.3.2 [Future Infrastructure] for more information);
- the creation of coastal and terrestrial habitats; and
- improvements in public and ecological connectivity to and along the waterfront as per the objectives of the Lake Ontario Park Master Plan and the Tommy Thompson Park Master Plan.

This Class EA does not consider the relocation of the boat clubs in Coatsworth Cut and Ashbridges Bay. While the clubs' needs and current uses of the local study area are a part of the project socio-economic considerations, relocation of the clubs is not within the scope of this EA.

1.3 Description of the Study Area

1.3.1 Regional Study Area

The project regional study area is a section of the northern Lake Ontario coast between Tommy Thompson Park in the west and East Point Park in the east (**Error! Reference source not found.**). This section constitutes a littoral cell, which is defined as an area where sediment is isolated from adjacent cells and its own sediment sources and sinks exist within.

1.3.2 Local Study Area

The project local study area includes the waters of Ashbridges Bay, Coatsworth Cut, the Ashbridge's Bay Yacht Club boat basin as well as the waters immediately south of Ashbridges Bay Treatment Plant. Further, the land portion of the local study area includes the north-east portion of Tommy Thompson Park, and the shorelines of Ashbridges Bay Treatment Plant (ABTP) and Ashbridge's Bay Park (Figure 1-3).

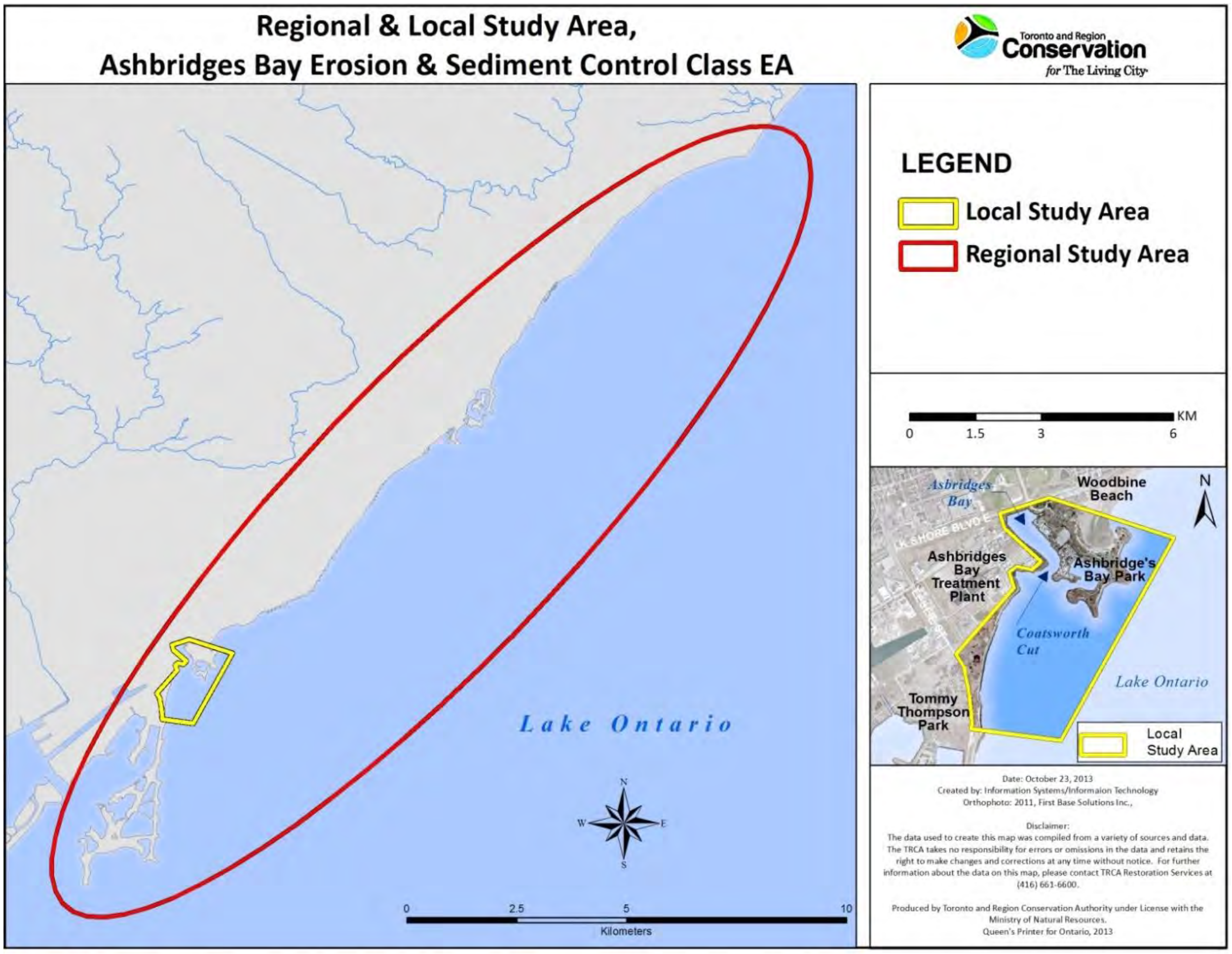

Figure 1-2. Ashbridges Bay EA regional study area.
Source: TRCA, 2013.

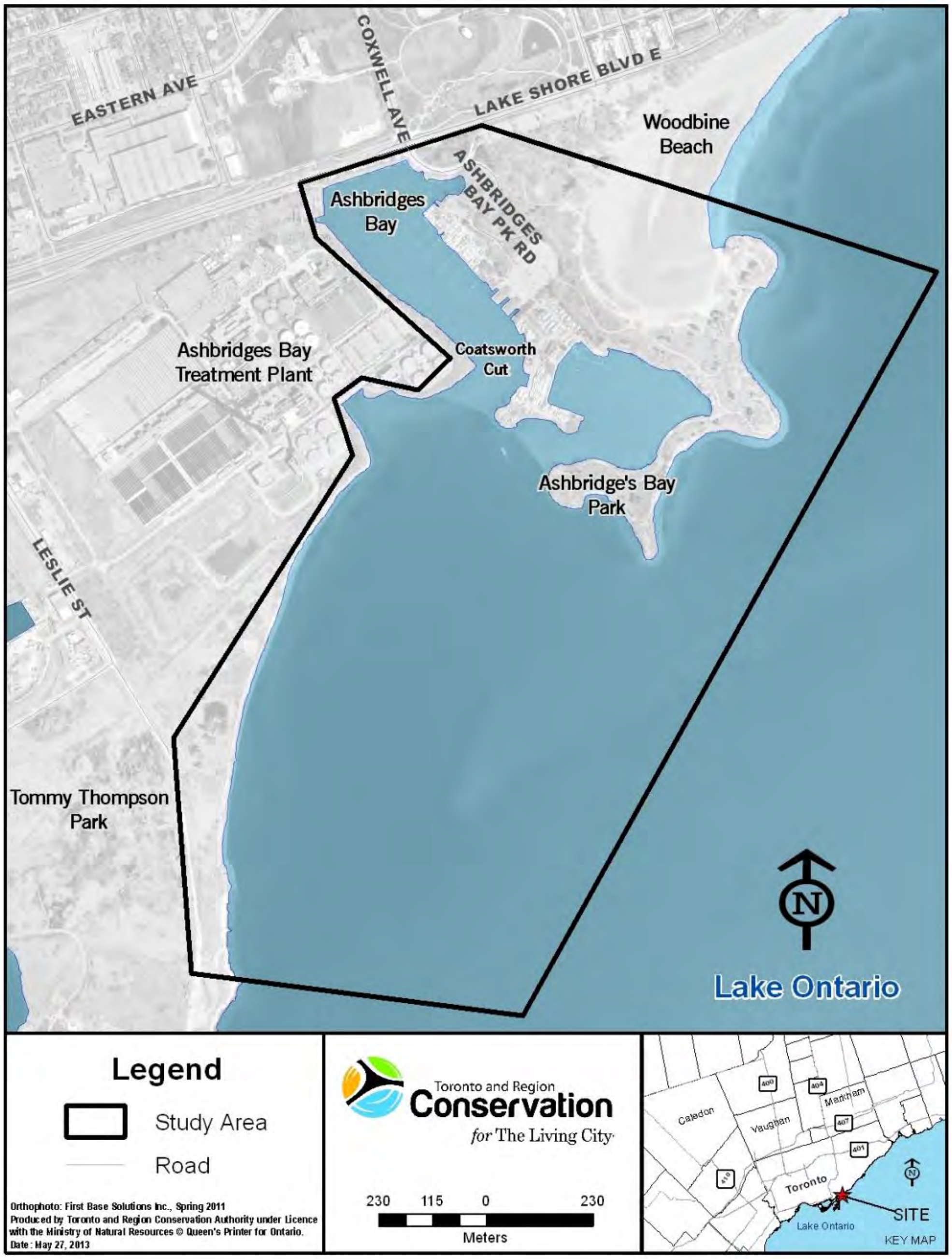

Figure 1-3. Ashbridges Bay EA local study area.
Source: TRCA, 2013.

1.4 Description of the Undertaking

Conservation Authorities recognize that flooding and erosion can result in the following ancillary problems:

- Sedimentation of watercourses and coastal wetland areas;
- Degradation of aquatic habitats, such as fish spawning grounds;
- Loss of fertile soil, and the destruction of terrestrial vegetation and associated habitat resources;
- Loss of natural shoreline protective features such as beaches, berms and dunes;
- Imbalances in natural processes which provide aquatic and terrestrial habitat;
- Personal hardship and severe social disruption; and
- Impacts to or loss of cultural heritage resources, including built heritage resources (bridges, mills and houses), cultural heritage landscapes and archaeological resources

According to Conservation Ontario (2013), there are four situations in which remedial flood and erosion control projects may be undertaken within the Class EA:

1. Riverine Flooding
2. Riverine and Valley Slope Erosion
3. Shoreline Flooding
4. Shoreline Erosion

The Ashbridges Bay Erosion and Sediment Control study falls under the shoreline erosion problem situation. The project objective is to identify a preferred solution that will mitigate erosion and sediment deposition at the harbour entrance of Coatsworth Cut in order to ensure safe navigation. Shoreline modifications to divert sediment will be explored. Alternative remedial measures suitable to address shoreline erosion and sedimentation issues include reducing wave energy and enhancing natural processes, protecting from wave energy or stabilizing the slope through drainage or grading improvements. Table 1-1 shows examples of alternative methods and designs identified under the Class EA undertakings for shoreline erosion. Conservation Ontario notes that these “should be used as a "starting point" only. A full range of alternatives should be considered, including both traditional and innovative measures, in accordance with the Class EA planning process” (Conservation Ontario, 2013).

As stated above, in accordance with the Class EA planning process, a full range of alternatives must be developed, including both traditional and innovative approaches. The type and range of alternatives developed, such as the ones listed in Table 1-1, vary by project as they are based on the nature, cause and extent of the problem, and must be tailored to the individual characteristics of the regional and local study areas.

Table 1-1. Alternative methods and designs identified under the Class EA undertakings for shoreline erosion.
Source: Conservation Ontario, 2013.

Problem Situation	Alternative Remedial Measures	Examples of Alternative Methods/Designs
Shoreline Erosion	• Reduce wave energy and enhance natural processes • Protect from wave energy • Stabilize bank or slope	• Artificial Nourishment • Headland Beach System • Offshore Breakwaters (including Offshore Low Crested Breakwaters) • Groynes • Coastal Wetlands • Shore Connected Breakwaters • Revetments • Seawalls • Jetty • Islands • Soil Bioengineering • Improve Internal Drainage • Improve Surface Drainage • Regrading of the Slope

1.5 Rationale for the Undertaking

Within the project local study area, Coatsworth Cut and Ashbridge's Bay Park house a number of boating clubs that require a safe navigational passage through Coatsworth Cut and into Ashbridges Bay. Ashbridge's Bay Park was created in the 1970's. Sediment deposition creating a navigation hazard and thus a risk to public safety became evident in the early 80's at which time maintenance dredging at the mouth of Coatsworth Cut began. Dredging has been conducted 20 times in the past 30 years and is currently required on an annual basis.

Identification of the Problem: Sediment deposition creating navigation hazard.

Assessment of Remedial Program Option: Erosion Control Program.

Is there a Risk to Public Safety: Yes - Sediment accumulation causes dangerous navigation conditions for recreational boaters.

Can Prevention Measures Resolve the Problem: No - Increasing dredging volumes and costs are unsustainable. The relocation of navigation entirely from Coatsworth Cut area was examined in 2009 and deemed to not be financially viable.

Are Remedial Works Required? Yes. There is a need to examine opportunities to reduce the dredging and risk to recreational boating.

Do Remedial Works Fit the Class EA Definition: Yes - Shoreline modifications to divert and intercept sediment (generated through coastal processes) away from navigation areas will be explored.

2 BACKGROUND

2.1 History of the Problem

2.1.1 Sedimentation

Coatsworth Cut is a navigation channel located at the western boundary of Ashbridge's Bay Park, which has serviced several boating clubs since the 1930s and the general public via three boat launches since 1977. Currently there are several hundred boats seasonally moored in the area at local yacht and sailing clubs. Various non-motorized vessels (canoes, kayaks and paddleboards) also use the area for recreation and competitive training (see Section 3.5.8 [Recreational Boating and Social Clubs] for more details).

Following construction of Ashbridge's Bay Park in the mid-1970s, sediment eroding from the Scarborough Bluffs that was transported westward began to be deposited in the eastern embayment of the Park creating a large beach (Woodbine Beach). In addition to the natural processes occurring, there were efforts in the late 1980's made to mechanically fill the embayment. The intent of this filling was to reduce the severe drop-off in the water just off the beach to help mitigate drowning risks. As the embayment was filled in, a sandbar began to form offshore, causing the sediment moving within the water system to then bypass the park. A large portion of this sediment is now deposited at the mouth of Ashbridges Bay (Coatsworth Cut). In 1983, TRCA began dredging operations at Coatsworth Cut to maintain the navigation channel. Maintenance dredging has been conducted 21 times in the past 31 years and is currently required on an annual basis.

Sediment transport into Coatsworth Cut was examined in detail for the first time in 1999. Baird and Associates estimated that 10,000 m^3 of sediment was being transported around the Ashbridges headlands on an annual basis and that results of particle tracking indicated that most of this sediment was being deposited in front of the Ashbridges Bay Wastewater Treatment Plant (ABTP), with some 2,000 m^3 making its way into the entrance of Coatsworth Cut (Baird, 2001). The same report determined that the majority of sediment supply to Coatsworth Cut is from the east, however a significant amount also results from the eastward transport of sediment along Leslie Street Spit due to the prevailing westerlies in the area. In essence, Coatsworth Cut acts as a sediment sink. Once sediment is deposited in Coatsworth Cut, wave action and longshore currents are insufficient to continue moving this material elsewhere, resulting in the need for TRCA to maintain the navigation channel by mechanical methods (i.e., dredging).

Bathymetric surveys conducted in 1998, 2009 and 2012 showed that an increase in average lakebed elevation has occurred south of the ABTP and west of the Ashbridge's Bay Park headlands, making it increasingly difficult to maintain the required navigation depths in Coatsworth Cut. Analysis conducted by Shoreplan Engineering (2013) estimates that there is a minimal sediment supply of 2,000 m^3 per year to the Coatsworth Cut and Ashbridges Bay area (see Section 3.2.13 [Sediment Transport] for more information). It is worth noting that a similar analysis described by Shoreplan (2010) estimated the minimal sediment transport rates at 5,000 m^3 per year. The difference between the earlier and current transport estimates is due to the construction of new shoreline protection works near Meadowcliffe Drive and Guildwood Parkway.

Sediment modeling undertaken by Shoreplan Engineering in 2013 to support this EA is based on a reduced supply compared to the current conditions, as it takes into account erosion control measures being undertaken in the Scarborough Bluffs area. Although the supply of sediment would never completely disappear (even with full erosion control in place in the Scarborough Bluffs), hypothetically, if the supply were to go to zero, there is so much sand within the water column of the littoral cell that it will continue to circle within the Ashbridges Bay area and make its way to the sediment sink at Coatsworth Cut, particularly in storm events. As a result, there will always be some siltation at the Coatsworth Cut entrance. This means that on-going dredging will be required in order to maintain the navigation channel. The exploration of a remedial solution in this Class EA is designed to provide a long term solution to keep sediment out of the navigation channel and reduce the need for dredging.

2.1.2 History of the Ashbridges Bay Erosion and Sediment Control Class Environmental Assessment

In 2002, TRCA initiated a Conservation Ontario Class EA to remediate navigation hazards due to sediment accumulation in Coatsworth Cut. Around the same time, a number of planning initiatives related to the City of Toronto's Wet Weather Flow Management Master Plan (Municipal Class EA Schedule C for the Coatsworth Cut Combined Sewer Outfall (CSO) and Stormwater Outfalls Control) and the ABTP outfall (Ashbridges Bay (formerly Main) Treatment Plant Individual EA) were launched which would have major implications on the shoreline configuration and water quality in the local study area. Waterfront Toronto had also initiated the development of the Lake Ontario Park Master Plan, creating a vision for Toronto's waterfront as a whole. These initiatives needed to be considered in order to integrate an erosion and sediment control solution appropriately. As a result, the EA was halted until after these initiatives were completed.

By 2009, the Ashbridges Bay (formerly Main) Treatment Plant Individual EA was completed that will see the implementation of a new outfall for the Treatment Plant. The Municipal Class EA Schedule C for the Coatsworth Cut Combined Sewer Outfall (CSO) and Stormwater Outfalls Control was completed as well. This EA considered control options to improve the receiving water quality in the Coatsworth Cut Sewershed and included a 10 hectare treatment wetland to be located south of the ABTP as the preferred end-of-pipe water quality control. The EA also identified in the future that the TRCA would be looking at erosion and sediment control options that would be incorporated into the wetland design (Figure 2-1). Finally, the Lake Ontario Park Master Plan was completed by Waterfront Toronto in 2008, and in 2009, Waterfront Toronto proceeded with the planning of Lake Ontario Park Phase 1, which included construction of a new landform at Ashbridge's Bay Park to facilitate relocation of the boat clubs currently located in Coatsworth Cut to the boat basin occupied solely by Ashbridge's Bay Yacht Club. To achieve this vision, Waterfront Toronto partnered with the City of Toronto and TRCA. With other initiatives involving the local study area (the Coatsworth Cut CSO and the ABTP EAs) completed, TRCA's Erosion and Sediment Control Class EA was re-initiated.

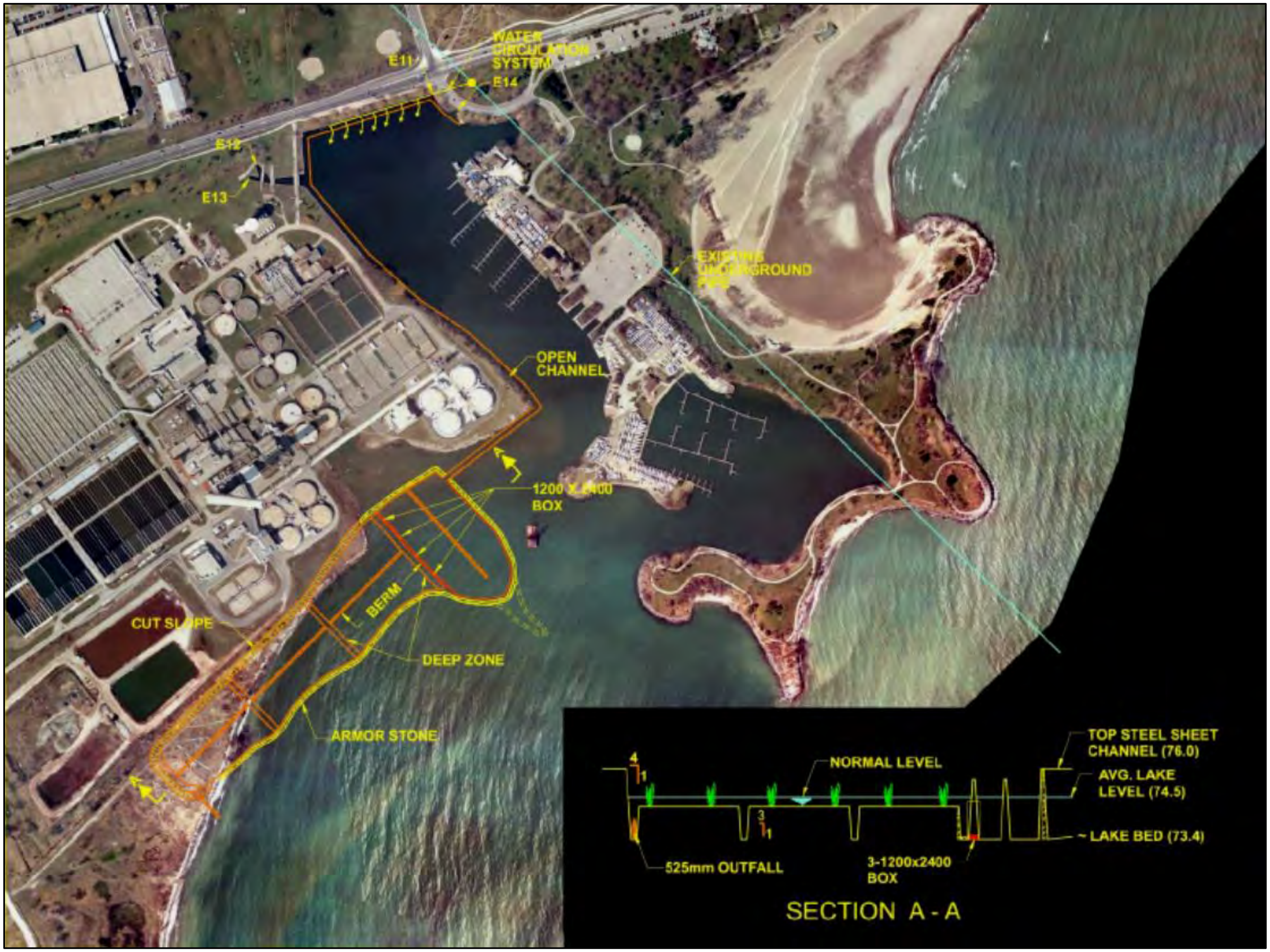

Figure 2-1. Coatsworth Cut Combined Sewer and Stormwater Outfalls Control Class EA Preferred Solution for the treatment wetland showing the potential future erosion and sediment control structure (yellow dotted line).
Source: CH2M HILL, 2007.

In the 2009 TRCA's Class EA, the 2002 EA alternative designs were re-examined and new alternatives incorporating the Lake Ontario Master Plan vision were identified with input from the project Technical and Community Advisory Committee members as well as Coatsworth Cut and Ashbridge's Bay Park boat clubs. Through the development of alternatives, it was determined that the potential costs to achieve the boat club relocation and shoreline management objectives of the project would range from $20 to $40 million. These costs were deemed to exceed the available funding and the Class EA was suspended in January 2010.

Throughout this time, in the absence of a permanent sedimentation control solution, maintenance dredging activities in Coatsworth Cut were on-going. In addition, another project involving the local study area was completed by the City of Toronto. A combined sewer overflow high-rate treatment facility (satellite treatment plant) sited in the City's waterlot south of ABTP was approved in 2012 as part of the Don River and Central Waterfront Municipal Class EA Schedule C Study carried out in support of the Wet Weather Flow Management Master Plan.

In 2012, with all future City of Toronto infrastructure involving Ashbridges Bay/Coatsworth Cut approved through their respective EAs, TRCA, in partnership with the City of Toronto, recommenced the Class EA to address outstanding erosion and sedimentation issues in the area. In addition to the approved EAs involving Ashbridges Bay/Coatsworth Cut, the current EA takes into consideration other planning initiatives such as the Tommy Thompson Park Master Plan. With a number of the recommendations of the City of Toronto's Wet Weather Flow Management Master Plan implemented or being planned for future implementation, the issues faced in TRCA's 2002 Class EA are expected to be mitigated. Further, with the relocation of the Coatsworth Cut boat clubs no longer being explored, and hence not within the scope of the current Class EA, the cost of implementation would be greatly reduced and thus not a limiting factor.

Timeline at a Glance:

- **Mid-1970's:** Ashbridge's Bay Park constructed.
- **Early 1980's:** Coatsworth Cut sedimentation creating hazardous navigation conditions becomes evident. Dredging commences.
- **1990's:** Dredging volumes and costs increase. Reports by Sandwell (1991) and Baird (1999) indicate that approximately 10,000.00 m^3 of sand per year is deposited in Coatsworth Cut.
- **2002:** TRCA initiates a Class EA to address sediment and erosion issues in Ashbridges Bay/Coatsworth Cut.
- **2004:** Class EA suspended while the City of Toronto and Waterfront Toronto projects and planning initiatives involving Ashbridges Bay/Coatsworth Cut are underway.
- **2008:** Planning initiatives involving Ashbridges Bay/Coatsworth Cut are complete: City of Toronto completes Coatsworth Cut CSO Class EA and the Ashbridges Bay (formerly Main) Treatment Plant Individual EA. Waterfront Toronto completes Lake Ontario Park Master Plan and proceeds to planning Phase I of the Lake Ontario Park.
- **2009:** City of Toronto, Waterfront Toronto and TRCA form a partnership to implement Phase I of the Lake Ontario Park. TRCA recommences Class EA to address sediment and erosion issues and facilitate public access as well as the potential relocation of the boat clubs in Coatsworth Cut.
- **2010:** Class EA suspended due to the high cost of the proposed relocation of the Coatsworth Cut boat clubs.
- **2012:** City of Toronto's Don River and Central Waterfront Class EA is completed. A satellite treatment plant (high rate treatment facility) in the waterlot south of ABTP is approved as part of

the EA. With all future City of Toronto infrastructure involving Ashbridges Bay/Coatsworth Cut approved through the projects' EAs, TRCA, in partnership with the City of Toronto, recommences the Class EA to address outstanding erosion and sedimentation issues in the area.

- **2013:** The current Erosion and Sediment Control Conservation Ontario Class EA was initiated.

2.2 Previous Work and Studies

2.2.1 Work Undertaken as Part of TRCA's 2002 and 2009 Sediment and Erosion Class EA Prior to Suspension

Prior to suspension of TRCA's 2002 and 2009 EAs (see Section 2.1 [History of Problem] for more information), a number of investigations and other work involving the local study area were performed. The results formed the basis of the current Class EA. In particular, the following were used in this Class EA study:

- Ashbridges Bay Lake Filling Additional Water Quality Modelling (Modelling Surface Water Limited, 2003)
- Ashbridges Bay Sedimentation Study in Support of Final Design Draft Report (Baird and Associates, 2001)
- Ashbridge's Bay Park/Coatsworth Cut Shoreline Stability and Sedimentation Study (Baird and Associates, 2001)
- Don River and Central Waterfront Class Environmental Assessment Project Satellite Treatment Plant Lakefill Siting Report (Shoreplan Engineering and MMM Group Limited, March 2012)
- Draft Baseline Environmental Conditions Report (TRCA, 2010)
- Interim Coastal Engineering Report (Shoreplan Engineering Limited, 2010)
- Stage 1 Archaeological Assessment (CRM Labs, 2009)

2.2.2 Planning Documents

A number of planning documents involving Ashbridges Bay/Coatsworth Cut area have been produced over the past several years. Though some plans were not implemented or are currently in the implementation stage, each was given consideration in this project due to the potential impact on the Ashbridges Bay shoreline configuration. These planning documents include:

- Tommy Thompson Park Master Plan (1995)
- Central Waterfront Secondary Plan (2003)
- Wet Weather Flow Management Master Plan (2003)
- Lake Ontario Park Master Plan (2008)

2.2.3 Other Studies and Reports

The completed EA studies within the project local study area are summarized in Table 2-1. Additional details such as the proposed approved facilities construction timelines are provided in Section 3.5.3.2 [Future Infrastructure].

Table 2-1. Completed Environmental Assessments within the project local study area.

Environmental Assessment	Agency	Approved Preferred Alternative(s) Relevant to the Local Study Area
Ashbridges Bay (formerly Main) Wastewater Treatment Plant Individual EA (1997)	City of Toronto	Outfall: larger-capacity outfall pipe extending approximately 3-4 km into Lake Ontario to replace the current 1 km long outfall pipe. The exact location and specifications are being determined in the detailed design phase (2016).
Coatsworth Cut CSO and Stormwater Outfalls Control Municipal Class EA Schedule C (2007)	City of Toronto	Treatment Wetland: to be located in the waterlot south of the Ashbridge's Bay Treatment Plant (ABTP) and is proposed to contain a forebay and an outfall. Channel: a conveyance structure to convey the flow of four different outfalls to the wetland. Water Circulation System: will promote circulation or the overturn of water in Coatsworth Cut by pumping water from offshore.
Don River and Central Waterfront Project – Municipal Class EA Schedule C (2012)	City of Toronto	Treatment of Collected Wet Weather Flows: a new wet weather treatment facility will provide high-rate treatment of wet weather flows and will be located in the waterlot south of the ABTP.

2.3 Justification of Conservation Authority Involvement

TRCA has a mandate to carry out remedial erosion control works as set out in Section 20 of the Conservation Authorities Act (R.S.O. 1990):

"*The objects of an authority are to establish and undertake, in the area which it has jurisdiction, a program designed to further the conservation, restoration, development and management of natural resources other than gas, oil, coal and minerals*" (R.S.O. 1990, C.27, s.20).

As part of this broad mandate, Conservation Authorities are considered to have prime responsibility over water management in terms of water quantity and related hazards through administrative and regulatory powers. In the 1980 Watershed Plan, TRCA developed and implemented its Erosion and Sediment Control Program (ESCP) with two major directions:

"*To minimize the aggravation or creation of erosion or sediment problems as a result of new development, and to rectify existing problems through protective works*" (TRCA, 1980).

These directions are categorized as either preventative or protective, respectively. The project falls under the protection component of the ESCP as it will be designed to protect lives and minimize property damage through the construction of suitable remedial works to mitigate risk to safe navigation due to sediment erosion and deposition in Coatsworth Cut, which serves as access to Ashbridges Bay.

3 BASELINE ENVIRONMENTAL INVENTORY

3.1 Location

Ashbridges Bay is located on the north shore of Lake Ontario in Toronto, Ontario. Within the project local study area, Coatsworth Cut serves as an access route to the lake for several recreational boating clubs and the public (via a public boat launch) as well as offers sheltered water for sailing, kayaking and other water-based recreational activities.

Regional Study Area

The project regional study area is a reach of the northern Lake Ontario coast between Tommy Thompson Park in the west and East Point Park in the east (**Error! Reference source not found.**).

Local Study Area

The project local study area consists of Ashbridges Bay, Coatsworth Cut, Ashbridge's Bay Park, the shoreline along the ABTP and the north-east portion of Tommy Thompson Park (Figure 1-3).

Site Location:	City of Toronto
Landowners:	City of Toronto, Toronto Port Authority, and TRCA
NAD 83, Zone 17	
Easting: 635962	Northing: 4835060
Latitude: 43.65611	Longitude: -79.31389

3.2 Physical Environment

3.2.1 Unique Landforms

A number of unique landforms exist within the project regional and local study areas.

The closest one - Scarborough Bluffs, an Earth Science Area of Natural and Scientific Interest (ANSI) - is located approximately 10 kilometres (km) east of the project local study area (Figure 3-5).

Within the project local study area, Ashbridges Bay constitutes the last remaining fragment of the original Ashbridges Bay wetland. Historically, Ashbridges Bay formed a part of an extensive coastal marsh, sheltered from the lake by a four km peninsula formed by the deposition of material eroded from the Scarborough Bluffs. By the middle decades of the 19th century, increasing quantities of sewage and industrial development along the shores of Lake Ontario and Lower Don River had caused serious pollution issues. In 1893, Coatsworth Cut was created to increase water circulation in an attempt to improve water quality in the Bay and to afford navigable passage for shipping.

However, pollution issues associated with growing urbanization persisted at Ashbridges Bay. Rising public health concerns and the need for new port and industrial lands resulted in the filling of the marsh, which began shortly after the Toronto Harbour Commission creation in 1912. Filling was complete in the 1920's, with modern day Ashbridges Bay remaining as the last fragment of the historic coastal wetland (Bonnell, 2011).

In the 1970's, Ashbridge's Bay Park was constructed east of Coatsworth Cut (Figure 3-2 and Figure 3-3) via lake-filling operations. The Park provides approximately 35 hectares (ha) of waterfront parkland while its eastern portion comprises the Woodbine Beach. The Park is used for recreational purposes (Section 3.4.6 [Recreational or Tourist Use of Water Body and/or Adjacent Lands]) and houses a number of recreational boating clubs and other facilities (Section 3.5.3.1 [Existing Infrastructure, Support Services & Facilities]).

Figure 3-1. Ashbridges Bay in 1949.
Source: City of Toronto, ND.

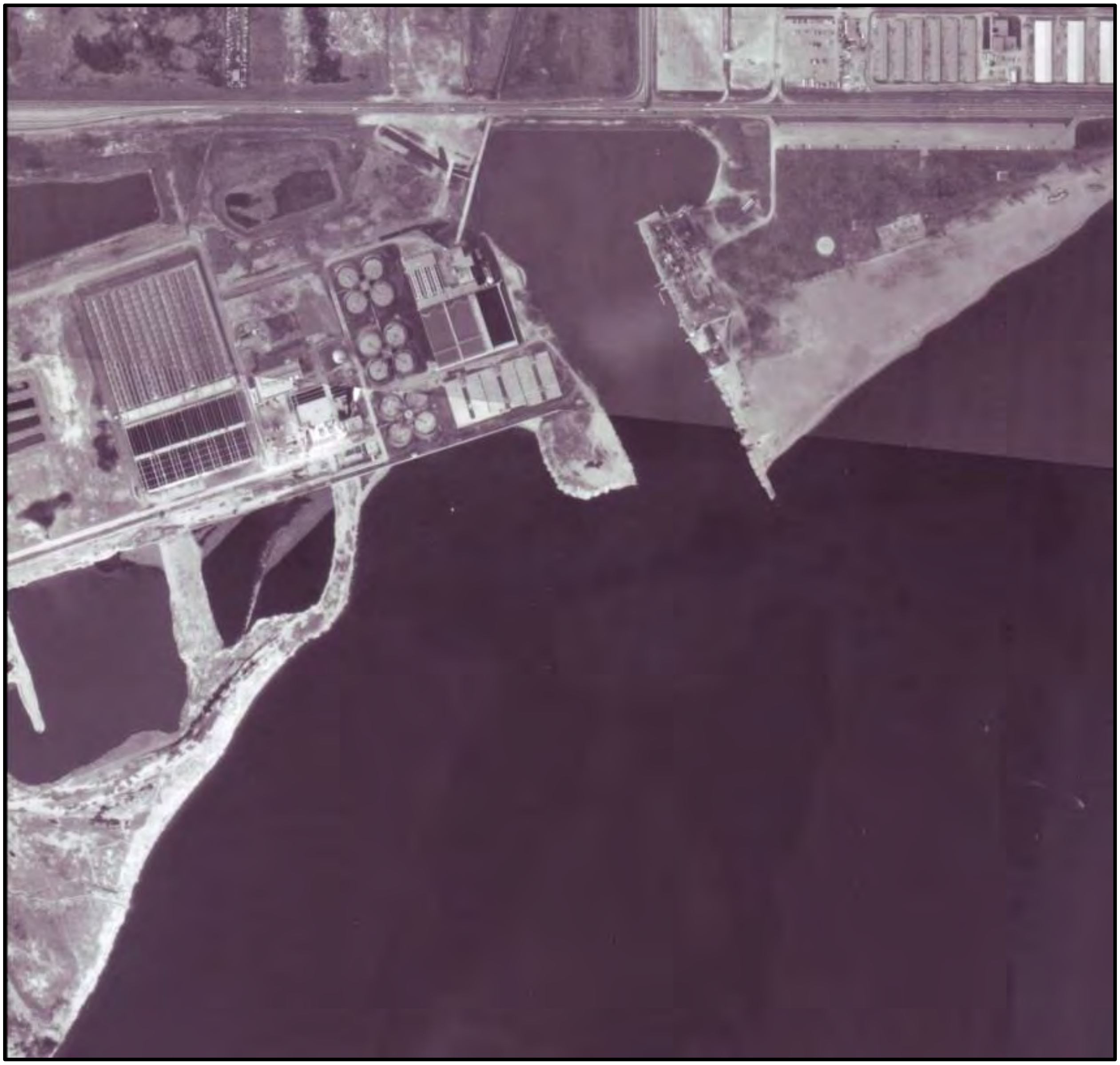

Figure 3-2. Ashbridges Bay in 1967.
Source: City of Toronto, ND.

Figure 3-3. Ashbridges Bay in 1980.
Source: City of Toronto, ND.

Figure 3-4. Ashbridges Bay in 2007.
Source: City of Toronto, ND.

3.2.2 Existing Mineral or Aggregate Resources Extraction Industries

There were no existing mineral/aggregate resource extraction industries identified within the project local or regional study areas.

3.2.3 Areas of Natural and Scientific Interest – Earth Science

Earth Science Areas of Natural and Scientific Interest (ANSIs) are geological in nature and consist of some of the most significant representative examples of the bedrock, fossil and landforms in Ontario and include examples of on-going geological processes (MNR, 2011). ANSIs are categorized as Provincially Significant, Regionally Significant or Locally Significant. In addition, there are Candidate ANSIs – areas of natural and scientific interest that have been identified and recommended for protection by the Ministry of Natural Resources (MNR) or other sources in an ecological site district report, with status approval pending.

While no Earth Science ANSIs were identified within or in close proximity to the project local study area, one – Scarborough Bluffs, Provincial Earth Science ANSI – is located approximately 10 km east of Ashbridges Bay (Figure 3-5) in the project regional study area.

3.2.4 Niagara Escarpment/Oak Ridges Moraine

The project local or regional study area is not located on or in close proximity to the Niagara Escarpment or the Oak Ridges Moraine.

3.2.5 Specialty Crop Areas

There are no specialty crop areas within the project local or regional study area.

3.2.6 Agricultural Lands or Production

There are no agricultural lands or production within the project local or regional study area.

3.2.7 Agricultural Tile or Surface Drains

No agricultural tile or surface drains exist within the project local and are unlikely to be found in the regional study area as it is highly urbanized.

3.2.8 Air Quality

While the specific air quality characteristics of the proposed project location are not known, it is reasonable to assume that the local study area air quality is determined by the air quality conditions in the City of Toronto, as there are no significant air pollution sources in the local study area. The air quality in Toronto is monitored by the Ministry of the Environment (MOE) and the air quality monitoring station closest to project local study area is the Toronto Downtown station located at Bay Street and Wellesley Street West. Pollutants measured at this station include O_3 (Ozone), $PM_{2.5}$ (Particulate Matter up to 2.5 micrometers in size) and NO_2 (Nitrogen Dioxide). The percentage distribution of hourly 2011 (most recent data published to date) Air Quality Index (AQI) readings by the AQI category is shown in Table 3-1. Air quality readings in the very good and good categories were reported nearly 96% of the time while moderate to poor categories were reported less than 5% of the time. Overall, the 2011 Toronto East station AQI readings correspond to the average 2011 provincial value of approximately 95% of the time for very good to good categories and 5% of the time for moderate to poor categories.

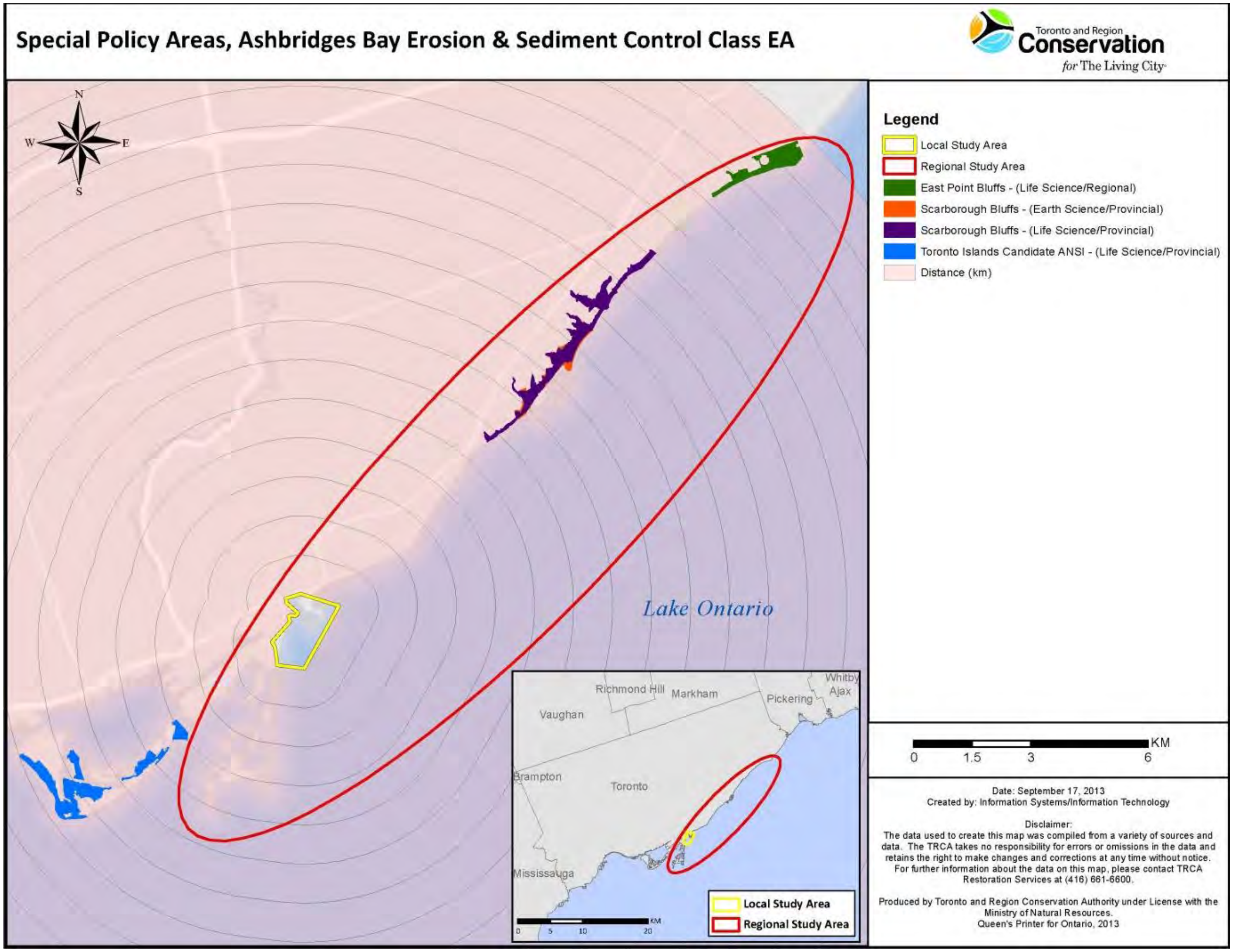

Figure 3-5. Areas of Natural and Scientific Interest within and in proximity to the project regional study area.
Source: TRCA, 2013.

Table 3-1. Toronto Downtown air quality monitoring station: Air Quality Index summary for 2011.
Source: MOE, 2013.

Percentage of Valid Hours AQI in Range				
Very Good (0 – 15)	**Good (16 – 31)**	**Moderate (32 – 49)**	**Poor (50 – 99)**	**Very Poor (100+)**
40.3	54.9	4.8	<0.1	0

Generally, air quality in Ontario has improved significantly over the past 10 years, especially for NO_2, CO Carbon Monoxide) and SO_2 (Sulfur Dioxide)– pollutants emitted by vehicles and industry, as well as fine particulate matter, which may be emitted directly or from other emissions such as SO_2 (MOE, 2013).

As the project local study area is adjacent to ABTP, it is affected by odours associated with Plant operations. ABTP personnel logged 40 complaints related to odour in 2012 (Toronto Water, 2013).

Comprehensive Odour Study of ABTP completed in 2002 confirmed that the Plant is a source of nuisance odours to the surrounding community. The study found that the largest source of odour is the aeration system and outlined a plan to reduce odours emitted from the plant so that they are not noticeable beyond the plant fence line. The comprehensive air management strategy developed by the City in 2007 is currently being implemented. The construction involves improvements to ventilation and odour control systems, treatment process, collection and dispersion system of odorous air emissions from aeration tanks and other upgrades, expected to be complete in 2019 (City of Toronto, 2014).

3.2.9 Noise Levels and Vibration

The main sources contributing to the environmental noise climate (i.e., background sound) within the project local study area include the local road and boat traffic, maintenance activities at the Ashbridge's Bay Park and the ABTP as well as other existing industrial or commercial activities.

As the project local study area is located within the City of Toronto, local municipal by-laws are in effect with respect to noise (i.e., unwanted sound) regulation. The City of Toronto By-law 476-2002 restricts the time and place of construction and other activities that produce unwanted sound if it is clearly audible at a point of reception located within a given regulated area (City of Toronto, 2002).

3.2.10 Water Levels

Water levels on Lake Ontario fluctuate on short-term, seasonal and long-term bases. Seasonal fluctuations reflect the annual hydrologic cycle which is characterized by higher net basin supplies during the spring and early part of summer, and lower supplies during the remainder of the year. Figure 3-6 is a hydrograph for Lake Ontario showing recent and long-term mean monthly water levels with respect to chart datum. Because of movement of the earth's crust, the "datum" or elevation reference system used to define water levels previous within the Great Lakes-St. Lawrence River system must be adjusted every 25 to 35 years. The current datum is known as the International Great Lakes Datum, 1985 (IGLD 1985). The date, 1985, is the central year of the period 1982- 1988 during which water information was collected for preparing the datum revision (Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data, 1992).

Figure 3-6 illustrates that water levels generally peak in the summer (June) and the lowest water levels typically occur in the winter time (December). The average annual water level fluctuation is approximately 0.5 metres (m). Although water levels below chart datum are rare, the lowest monthly mean on record is approximately 0.4 m below chart datum.

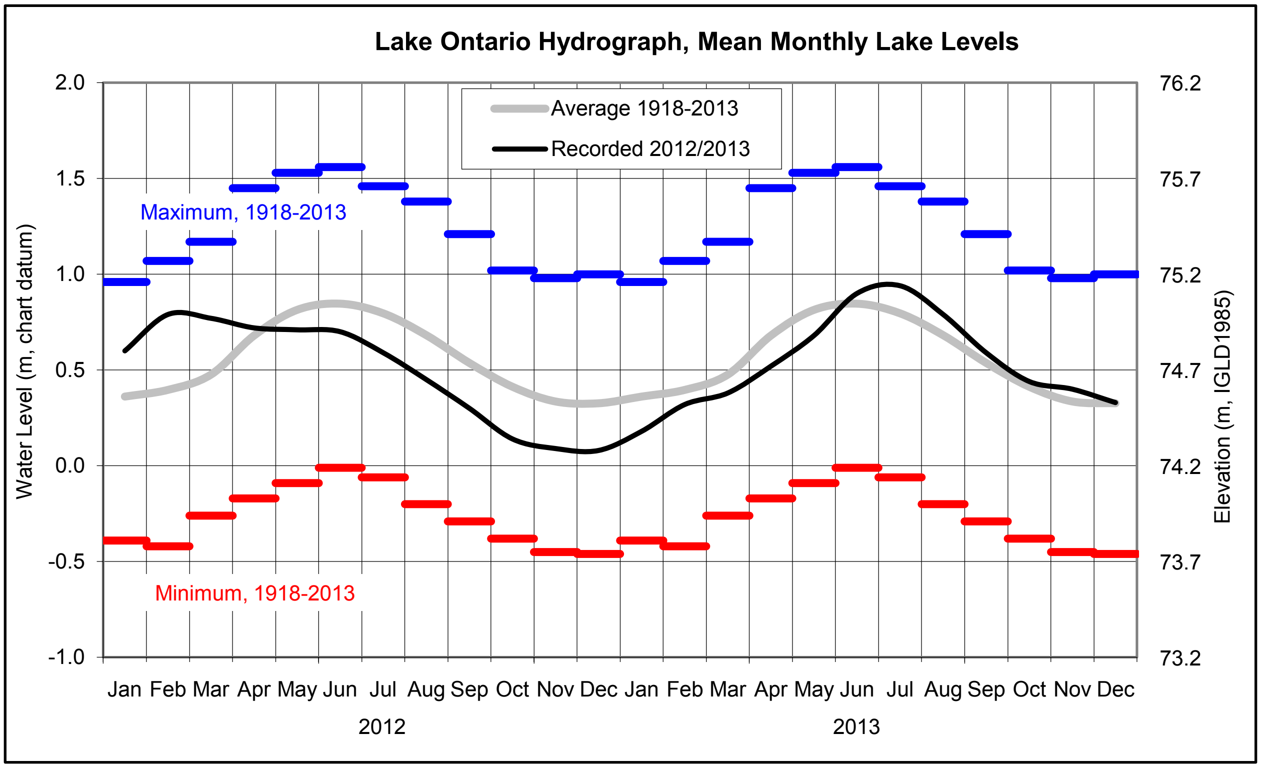

Figure 3-6. Lake Ontario Hydrograph.
Source: Shoreplan Engineering Limited, 2014.

Short-term fluctuations caused by local meteorological conditions last from less than an hour to several days. These fluctuations are most noticeable during storm events when barometric pressure differences and surface wind stresses create temporary imbalances in water levels at different locations on the lake. These storm surges, or wind-setup, are most noticeable at the ends of the Lake, particularly when the wind blows down the length of the Lake. Due to the depth of Lake Ontario, storm surges are not as severe as elsewhere on the Great Lakes (e.g., Lake Erie).

MNR (1989) investigated storm surges throughout the Great Lakes as part of their analysis of extreme water levels for design conditions. Table 3-2 shows mean monthly water levels, storm surges and instantaneous water levels at Toronto for a number of statistical return-periods. The effects of storm surges and seiches can be locally magnified within enclosed basins due to resonance effects. Seiches are oscillations in the water level that continue to occur after the initial driving forces causing the surge have ceased. Undocumented reports have been made by members of the public that indicate seiche heights have been observed to be higher in the Ashbridge's Bay Yacht Club basin than in Ashbridges Bay. None of the alternatives considered would be expected to affect seiches or surges.

Long-term water level fluctuations on the Great Lakes are the result of persistently high or low net basin supplies. There is no consistent or predictable cycle to the long-term water level fluctuations, as shown by over a century of water level records. Figure 3-7 presents Lake Ontario's mean monthly water levels from 1918 to 2013, including both long-term and seasonal fluctuations.

Table 3-2. Water Levels and Storm Surge Heights for Lake Ontario at Toronto.
Source: Shoreplan Engineering Limited, 2014.

Return Period (years)	2	5	10	25	50	100
Instantaneous Water Level (metres, IGLD85)	75.23	75.40	75.49	75.60	75.67	75.74
Highest Annual Monthly Water Level (metres, IGLD85)	75.05	75.23	75.33	75.44	75.52	75.59
Wind Set Up, Wind Surges (metres)	0.21	0.21	0.24	0.28	0.31	0.34

Based on data from MNR (1989), converted from IGLD55 to IGLD85 using the Canadian Hydrographic Service benchmark at Toronto.

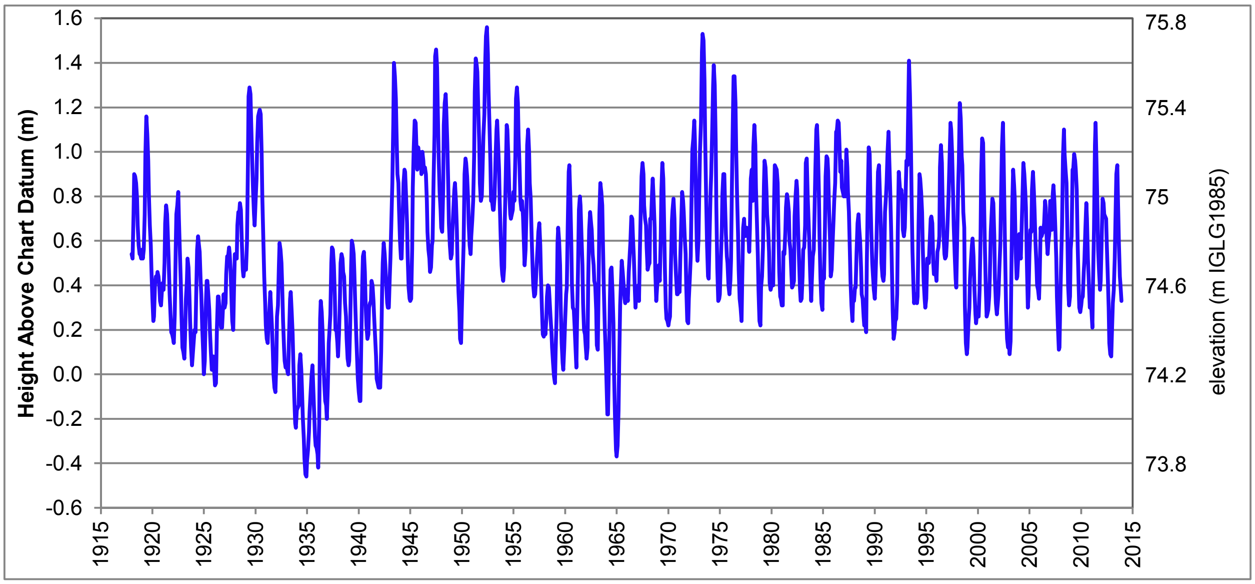

Figure 3-7. Lake Ontario Mean Water Levels, 1918 – 2013. Source: Shoreplan Engineering Limited, 2014.
Source: Shoreplan Engineering Limited, 2014.

Some climate change studies that examine the impact of global warming have suggested that the long-term water levels on the Great Lakes will be lower than they are today. Those changes, however, are expected to have a lesser impact on Lake Ontario than on the upper lakes since the Lake Ontario water levels are regulated by the International Joint Commission (IJC) through the operation of the Moses Saunders Dam on the St. Lawrence River.

The IJC, after intensive analysis and extensive consultation, concluded that a new approach to regulating the flows and levels of the St. Lawrence River and Lake Ontario - Plan 2014 - should be implemented. According to IJC, Plan 2014 will provide the best possible balance between the multiple – and sometimes conflicting – uses and interests, including domestic and sanitary use, navigation, hydropower, and coastal development, while addressing environmental harm caused by past regulation and enhancing recreational boating opportunities in most years.

The maximum level simulated under Plan 2014 is only 6 cm (a little more than 2 inches) higher than the maximum level under the previous Plan (Plan 1958DD). Plan 2014 attempts to more closely follow natural patterns of water levels and flows while continuing to moderate extreme low and high water levels. Currently (at the time of this ESR preparation), the Plan is awaiting the Order of Approval. In the meantime, the 100-year instantaneous water level determined by MNR (1989) is used, as most approval agencies require that the 100-year instantaneous water level be used for the design and assessment of shoreline protection structures.

The mean water level of 74.8 m (IGLD, 1985) was used to develop the nearshore wave climate (Section 3.2.12.2 [Nearshore Wave Climate]), the average annual sediment transport characteristics (Section 3.2.13.2 [Average Annual Sediment Transport Characterization]) and the initial sediment transport modeling (Section 3.2.13.4 [Sediment Modeling for Typical Storm]). The typical storm modeling described in Section 3.2.13.4 used changes in water levels which were based on recorded water levels, and the starting water level for those model runs was the mean water level of 0.6 m above chart datum.

3.2.11 Bathymetry

Bathymetric data was required to develop numerical grids for the wave analyses and for erosion and deposition calculations at the site. A composite bathymetric data set was derived from the following sources:

- Canadian Hydrographic Service (CHS) Field Sheets 3735, 3847, 3848, 3957, 8306, 8374, 1200094, and 1200095;
- TRCA soundings of Ashbridges Bay and Coatsworth Cut surveyed in 2005, 2009, and 2012;
- Shoreline and backshore contours digitized from 2002 orthophotos supplied by TRCA; and
- 2011 Soundings of the east side of the Tommy Thompson Park, supplied by the Toronto Port Authority (TPA).

Figure 3-8 and Figure 3-9 are contour plots of the composite bathymetric data in the vicinity of Ashbridges Bay. Figure 3-10 shows the location of 12 typical profiles derived from the composite bathymetric data. Those profiles are shown in Figure 3-11, Figure 3-12, Figure 3-13 and Figure 3-14.

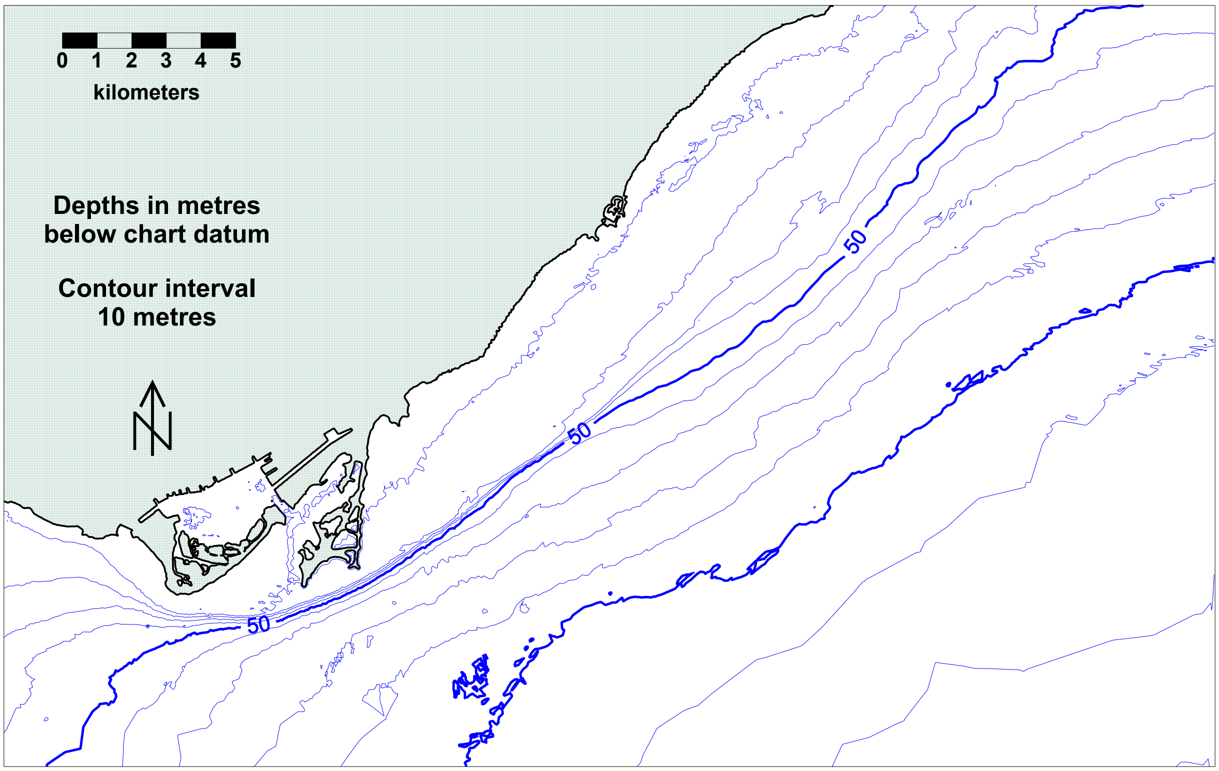

Figure 3-8. Regional Bathymetry.
Source: Shoreplan Engineering Limited, 2014.

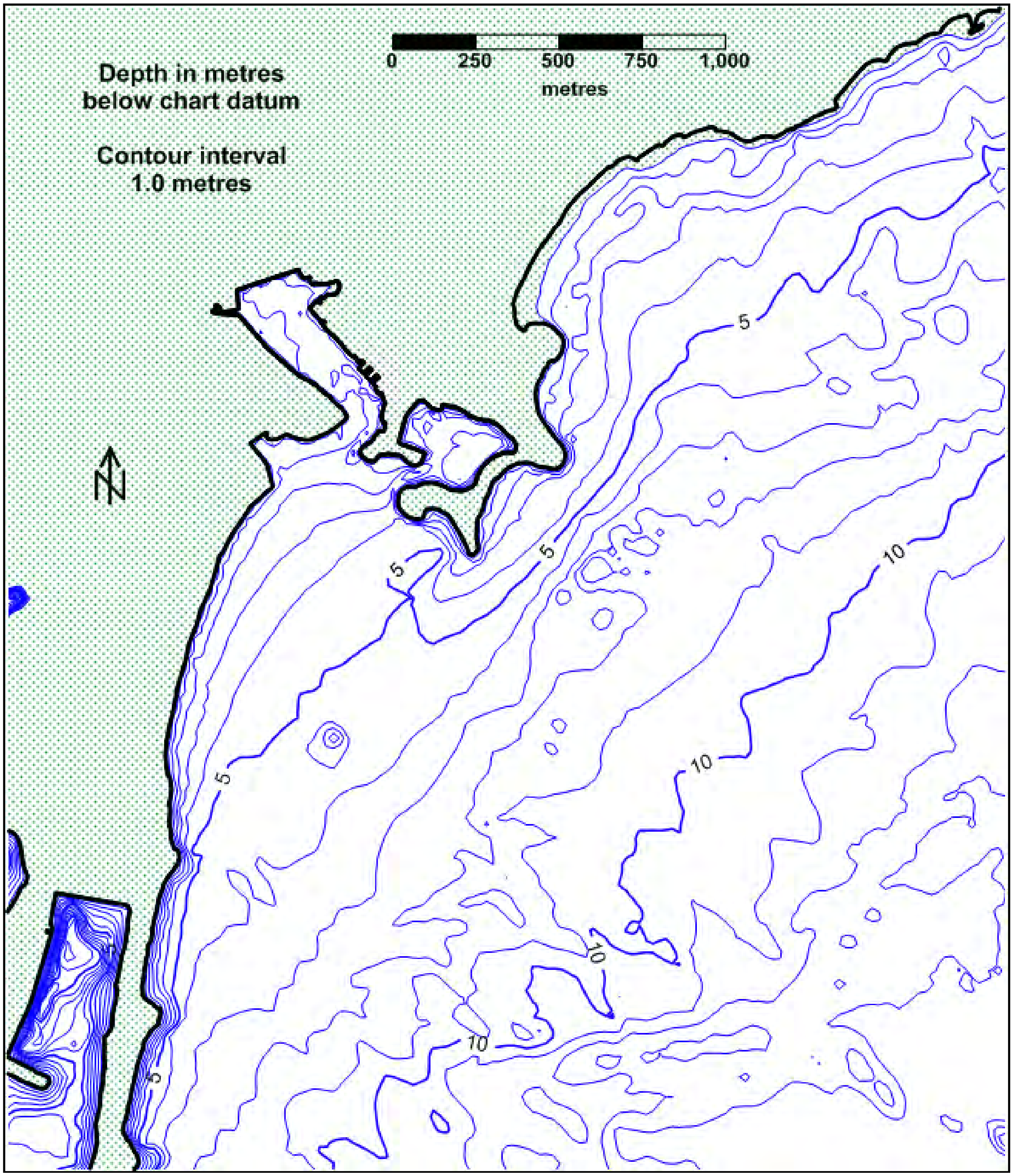

Figure 3-9. Nearshore Bathymetry.
Source: Shoreplan Engineering Limited, 2014.

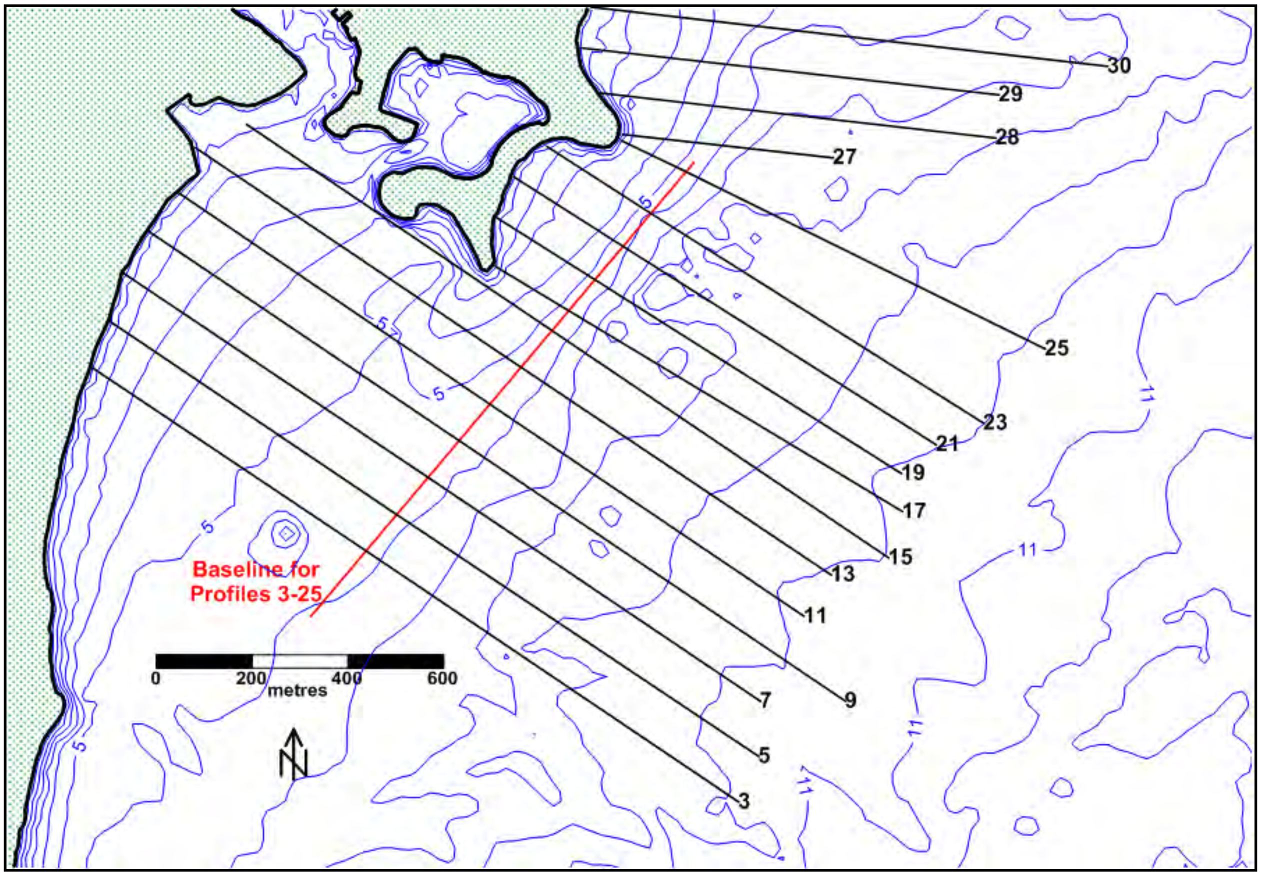

Figure 3-10. Typical Profiles – Location Plan.
Source: Shoreplan Engineering Limited, 2014.

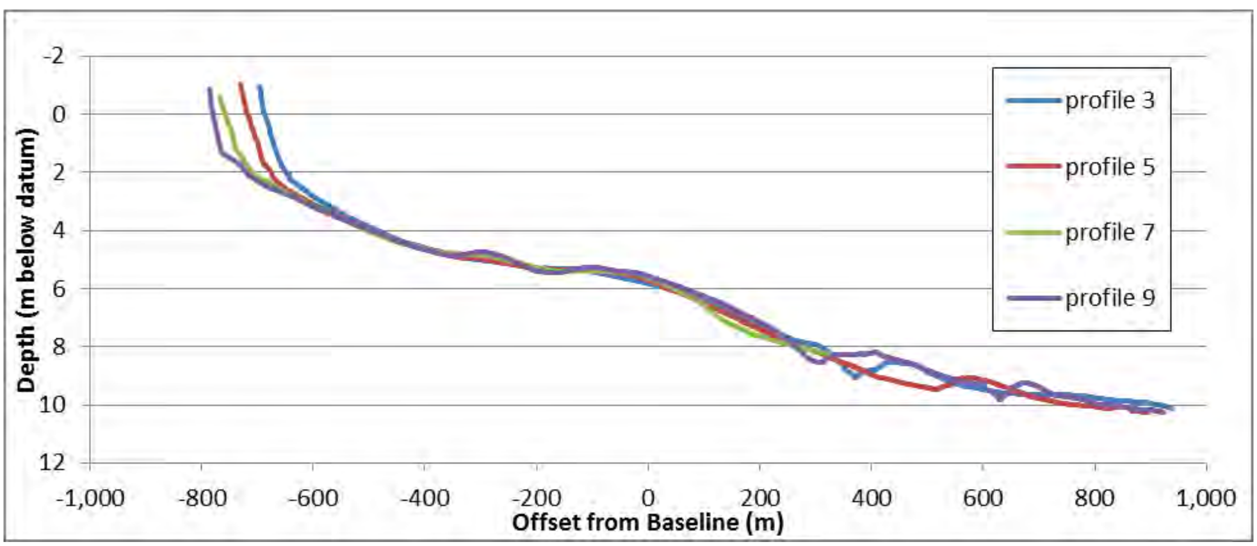

Figure 3-11. Typical Profiles 3 to 9.
Source: Shoreplan Engineering Limited, 2014.

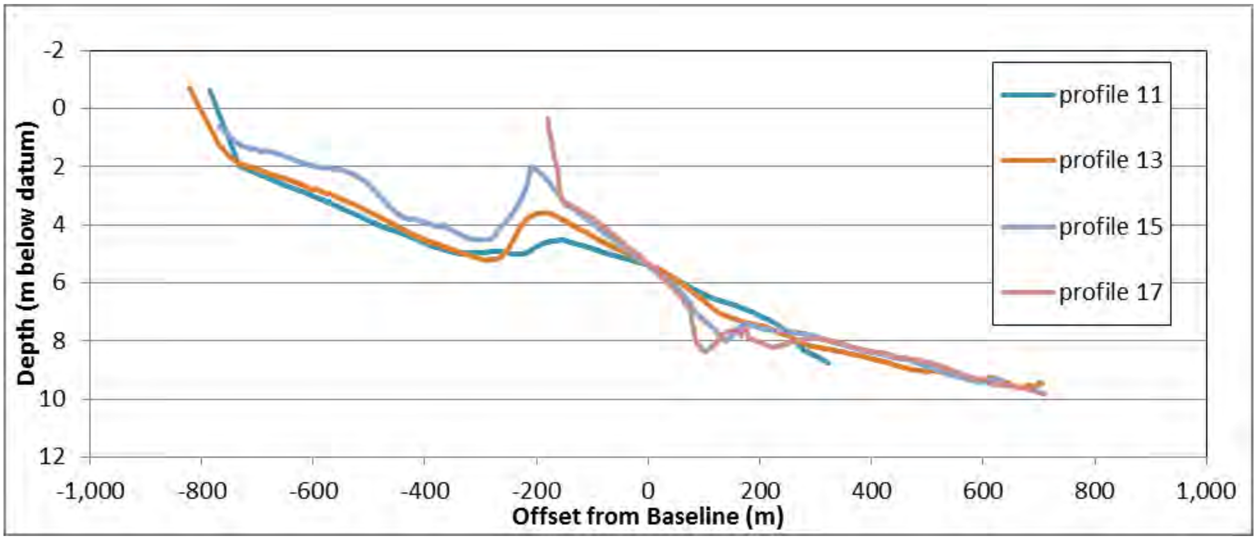

Figure 3-12. Typical Profiles 11 to 17.
Source: Shoreplan Engineering Limited, 2014.

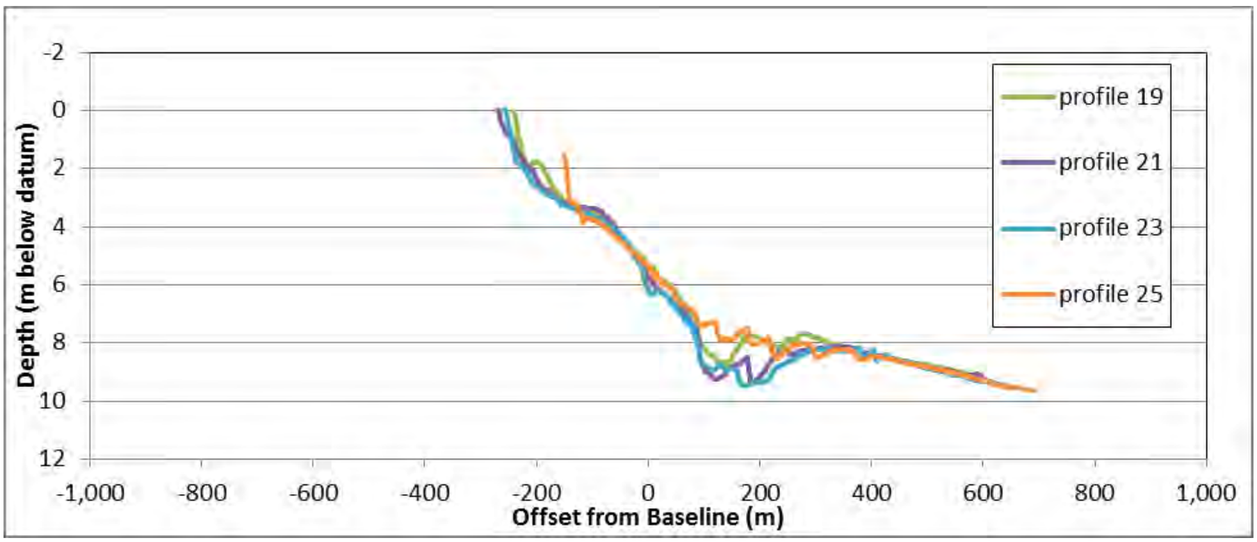

Figure 3-13.Typical Profiles 19 to 25.
Source: Shoreplan Engineering Limited, 2014.

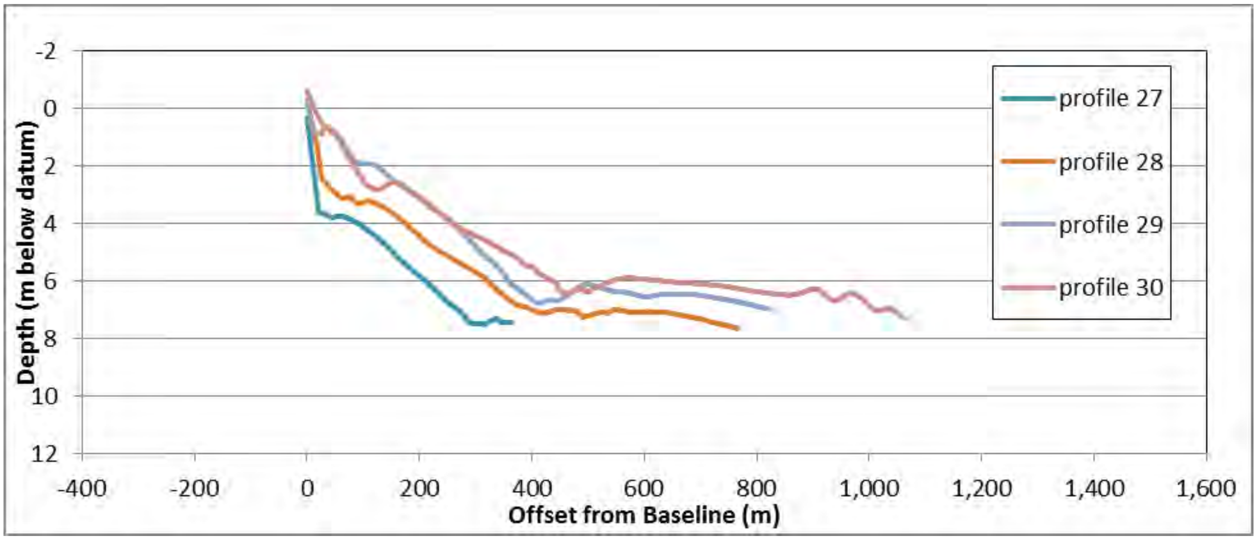

Figure 3-14. Typical Profiles 27 to 30.
Source: Shoreplan Engineering Limited, 2014.

3.2.12 Wave Climate

Wave characteristics are an important factor in the design of coastal structures. Due to the scarcity of locally measured wave conditions, a process known as hindcasting is used to develop a long-term wave database suitable for statistical analysis. Hindcasting uses recorded wind data to model the wave conditions expected to have occurred due to the recorded winds. Hindcasting allows for the production of wave climates representing expected conditions over a number of years.

3.2.12.1 Offshore Wave Climate

For this study, a deep-water wave hindcasting model that estimates wave conditions (height, period and direction) at an offshore location where water depths do not affect the wave generation process was employed. Those offshore waves were then transferred inshore using numerical models that account for the transformation of wave conditions caused by changing water depths.

During the 2009 assessment, a 36-year wave hindcast was completed by using Toronto Islands wind data to produce deep water wave conditions offshore of the site. Wind data recorded from January 1, 1973 to December 31, 2008 were used to produce hourly estimates of the deep-water significant wave height, peak wave period and mean wave direction. Wind data prior to 1973 was not used due to the relatively high occurrence of missing data. The hindcast was subsequently extended from January 1, 2009 to December 31, 2012 to produce a 40-year hindcast data set.

The deep-water wave climate offshore of Toronto has a bi-nodal distribution of the total wave power with predominant easterly and southwesterly peaks. Figure 3-15 shows the directional distribution of the highest hindcast wave heights and the total offshore wave power from the 40-year hindcast. Approximately 60% of the total power comes from the east and approximately 40% comes from the southwest; while there is a greater frequency of south westerly waves, the longer fetches to the east allow the generation of higher wave heights, which contain more wave energy. Figure 3-16 presents the wave energy distribution as a rose plot.

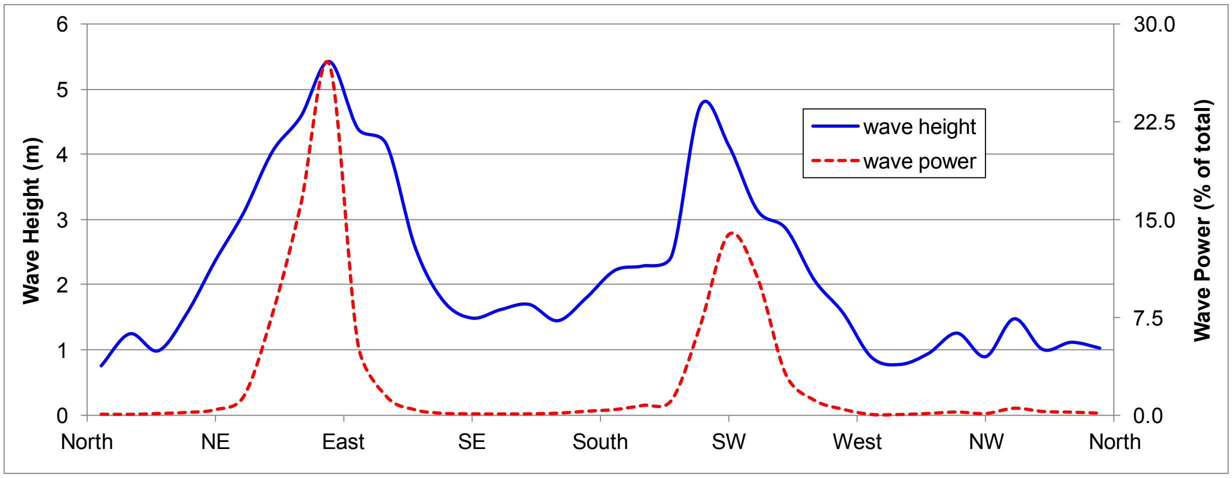

Figure 3-15. Distribution of Highest Hindcast Wave Heights and Total Wave Power.
Source: Shoreplan Engineering Limited, 2014.

Figure 3-16. Wave Energy Rose.
Source: Shoreplan Engineering Limited, 2014.

Figure 3-17 presents the "all-directions" wave height and period exceedance curves which show the percentage of time a given wave height or period is exceeded. Figure 3-18 and Figure 3-19, respectively, show the annual and monthly variation of the total offshore wave power from the 40-year hindcast.

Figure 3-20 shows the results of a peak-over-threshold extreme value analysis of easterly storm event wave heights. The 100-year return period wave condition at the 90% upper confidence interval has a significant wave height of 5.7 m with a peak spectral period of 10.3 seconds (s).

A similar analysis of southwesterly storms (Figure 3-21) yields a 100-year return period wave with a 4.6 m significant wave height and an 8.6 s spectral peak period for waves coming from that sector.

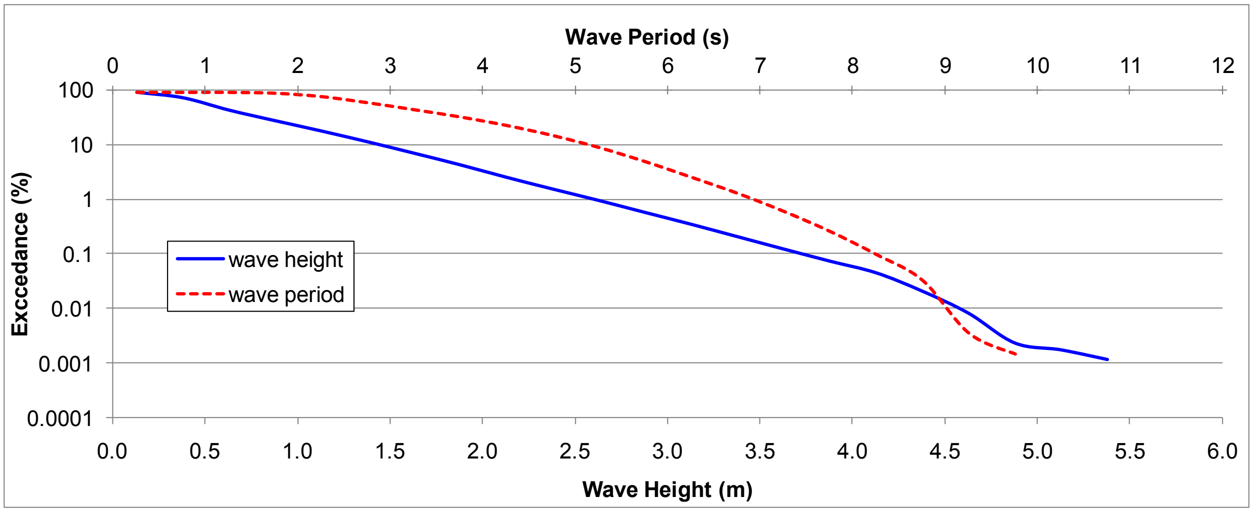

Figure 3-17. Wave Height and Period Exceedance Curves.
Source: Shoreplan Engineering Limited, 2014.

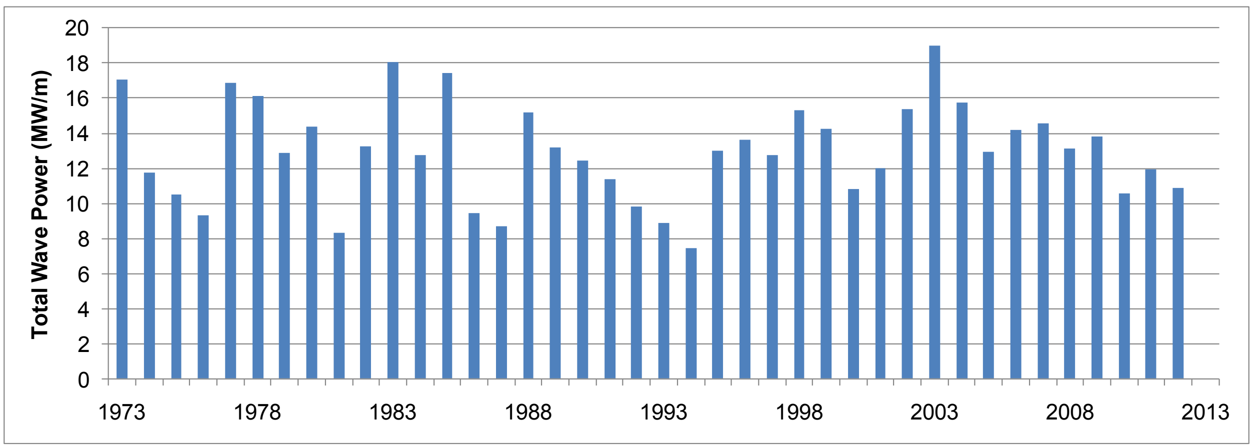

Figure 3-18. Annual Distribution of Total Wave Power.
Source: Shoreplan Engineering Limited, 2014.

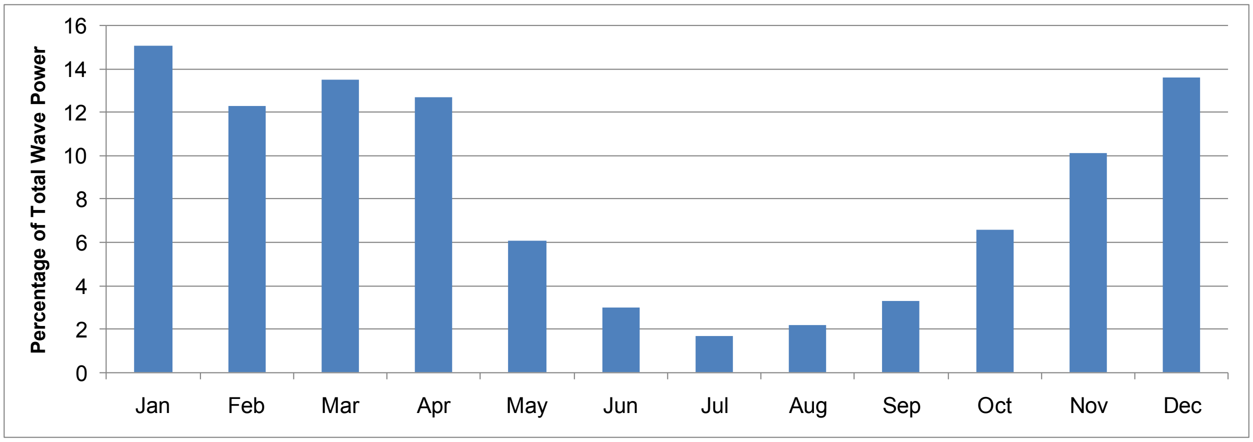

Figure 3-19. Monthly Distribution of Total Wave Power.
Source: Shoreplan Engineering Limited, 2014.

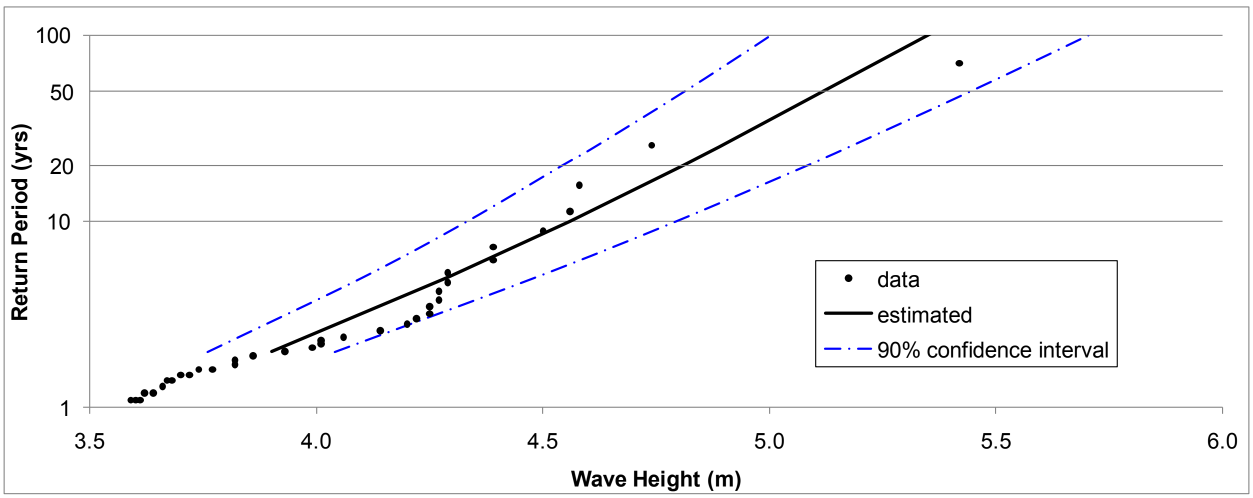

Figure 3-20. Extreme Value Analysis of Easterly Wave Heights.
Source: Shoreplan Engineering Limited, 2014.

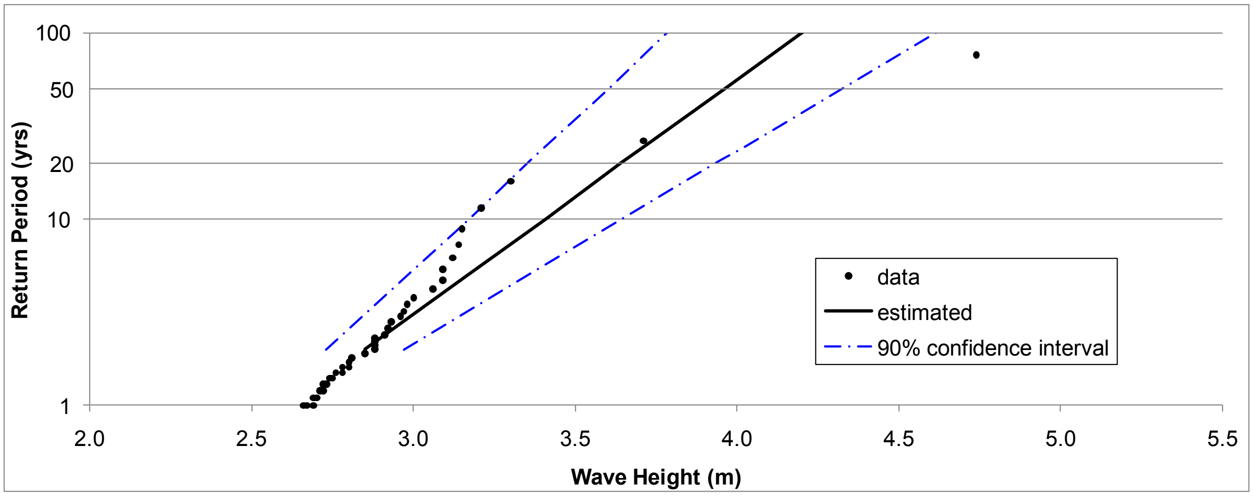

Figure 3-21. Extreme Value Analysis of Southwesterly Wave Heights.
Source: Shoreplan Engineering Limited, 2014.

3.2.12.2 Nearshore Wave Climate

Nearshore design wave heights and wave climates were determined by transferring the offshore wave conditions in to the site using the CMS-Wave numerical model developed by the U.S. Army Corps of Engineers. CMS-Wave is a two-dimensional spectral wave model with energy dissipation and diffraction terms. It simulates a steady-state spectral transformation of directional random waves co-existing with ambient currents in the coastal zone. It includes features such as wave generation, wave reflection, wave diffraction, and bottom frictional dissipation. Nearshore bathymetry in the wave model was derived from the composite bathymetry data set described in Section 3.2.11 [Bathymetry].

The design nearshore waves were determined by transferring individual offshore wave conditions. An example of the model results is illustrated in Figure 3-22 which shows a wave height contour and vector plot for the transformation of a 4.0 m, 8.0 s deep-water easterly wave under an average water level of 74.8 m IGLD85.

Generally, wave climates can be produced at any location within the model grids by transferring a large number of representative offshore wave conditions and using the results of the transformations to interpolate nearshore waves for each wave in the hindcast. Within the project study area, the nearshore wave climates were produced at seven locations shown in Figure 3-23. These climates were developed during the original coastal assessment using the 40-year wave hindcast described in Section 3.2.12.1 [Offshore Wave Climate].

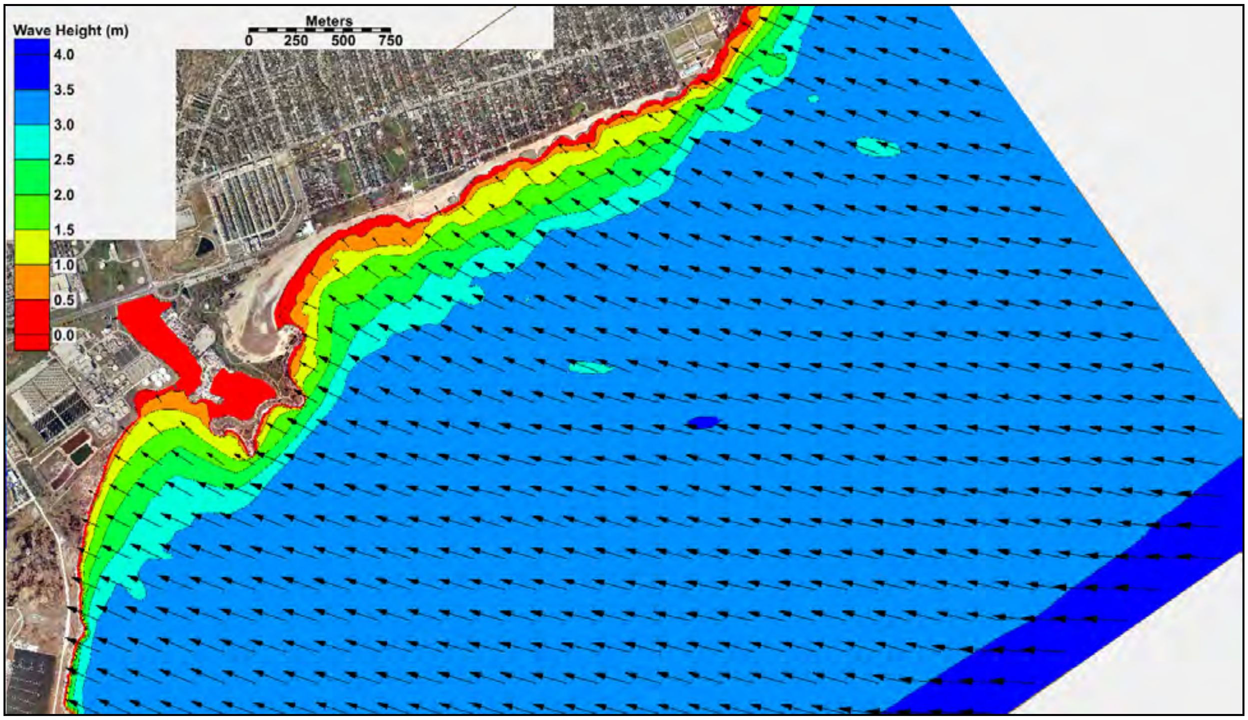

Figure 3-22. CMS-Wave Model Results for a 4.0 m, 8.0 s deep-water Easterly Wave at 74.8 m IGLD85.
Source: Shoreplan Engineering Limited, 2014.

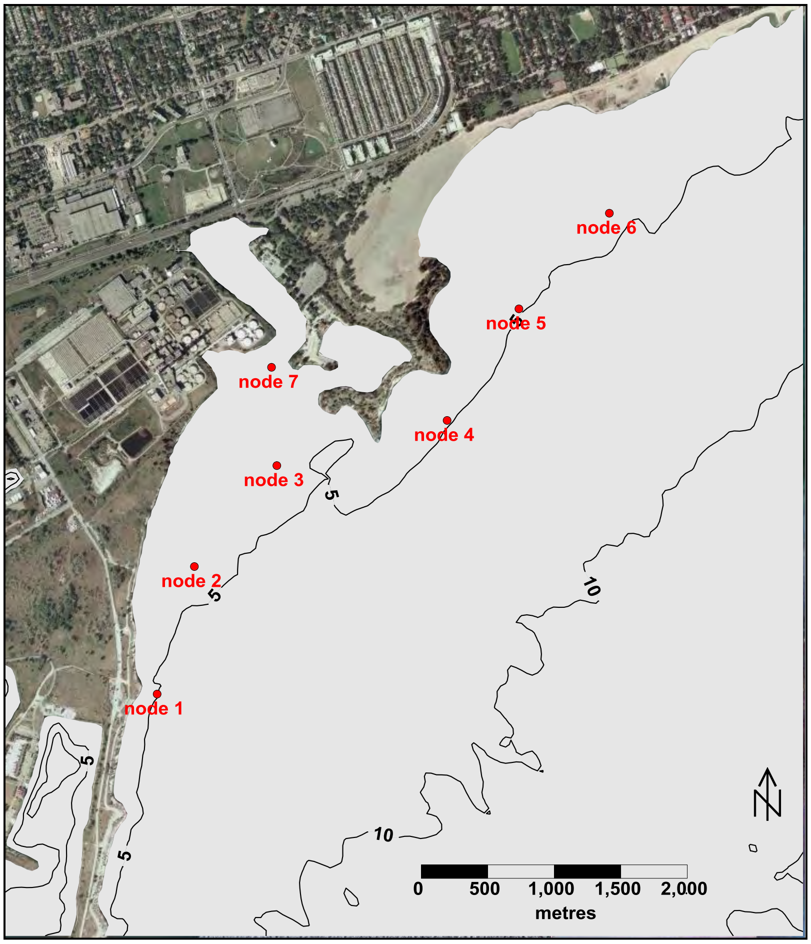

Figure 3-23. Nearshore Wave Climate Locations.
Source: Shoreplan Engineering Limited, 2014.

3.2.13 Sediment Transport

3.2.13.1 Review of Dredging Records

TRCA is responsible for maintaining/dredging the Coatsworth Cut channel as required to keep it open for navigation. The entrance is dredged to a depth of 2 m below the chart datum (IGLD1985) to ensure the minimal depth of 1.8 m is achieved.

Dredging volume data is presented in Figure 3-24. The volumes of dredged sand are shown for the years when dredging took place. The annualized dredging volumes were calculated by dividing the dredged volumes by the number of years since the previous dredging took place. A total of 107,600 m^3 of sand were removed over the 31 year period of record, giving an overall annual average dredging volume in the order of 3,500 m^3.

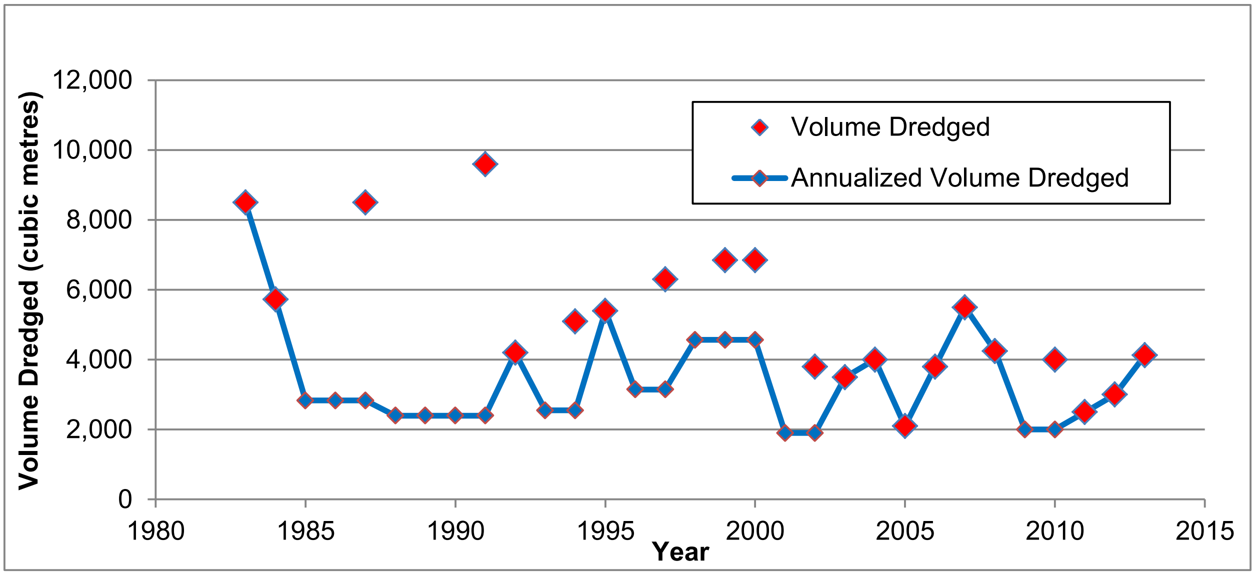

Figure 3-24. Summary of Coatsworth Cut Dredging Volumes from 1983 to 2013.
Source: Shoreplan Engineering Limited, 2014.

3.2.13.2 Average Annual Sediment Transport Characterization

A preliminary sediment transport modeling exercise was carried out in order to provide a general assessment of the key wave conditions affecting sediment transport around Ashbridges Bay. Due to the complexity of the shoreline at Ashbridges Bay, 2-dimensional (2-D) sediment transport models were required to define the nearshore flow field and sediment transport patterns. However, the computational requirements of 2-D models are such that only a limited number of wave conditions can be considered within a study of this size. In order to determine what wave conditions should be modeled in detail (i.e., using a 2-D model), a 1-dimensional (1-D) sediment transport model was used to characterize sediment transport at Ashbridges Bay.

While including detailed wave kinematics routines, the 1-D sediment transport model is applied to a single profile and therefore inherently assumes that the bathymetry is relatively uniform in the alongshore direction. Thus, though suitable for the shoreline updrift of Ashbridges Bay, it cannot be applied in close proximity to the headlands. It is, however, capable of simulating a large number of wave conditions and therefore appropriate for determining the conditions to be examined via a more detailed 2-D model.

Sediment transport updrift of Ashbridges Bay was characterized using the nearshore wave climate from node 6 (Woodbine Beach) and sediment transport along the Tommy Thompson Park was characterized using the nearshore wave climate from node 1 (see Figure 3-23 and Figure 3-24). The 40 years of hourly wave conditions were “binned” using a total of approximately 2,000 discrete wave conditions and the frequency of occurrence of each wave condition was summed. Those wave conditions were modeled using typical profiles from Woodbine Beach and from Tommy Thompson Park. The wave conditions which moved sand towards Ashbridges Bay were then ranked by the volume of sand moved and cumulative transport volumes were calculated. Figure 3-25 shows cumulative distribution curves for the sediment transport calculations at the two locations considered. The curves show the percentage of the total sediment transport directed towards the site as a function of the number of wave conditions modeled. For example, it can be seen that 80% of the total sediment transport directed towards the study area can be considered by modeling the top 36 wave conditions from node 1 and the top 53 wave conditions from node 6. The waves that transported sediment away from the site were not considered as part of this characterization as the purpose of this exercise was to identify the waves that contributed to the sedimentation problem.

The waves that caused the top 80% of sediment transport towards the site were examined in detail, where similar wave conditions were combined in a series of additional binning processes. The total wave duration from each bin was determined from the sum of the durations of the individual waves in that bin. Ultimately, the waves that produced the top 80% of the sediment transport directed towards the site were reduced to seven representative wave conditions at node 6 (Woodbine Beach) and six representative wave conditions at node 1 (Tommy Thompson Park). Figure 3-26 shows the cross-shore distribution of the average annual sediment transport rate for the east to west directed transport calculated for Woodbine Beach (node 6) using the full wave climate file (2,139 waves) and the seven representative wave conditions. The results from the modeling with the seven representative conditions were judged to be suitably close to the results produced with the full wave climate.

Table 3-3 lists the representative wave conditions for both node 1 and node 6. The equivalent deep-water wave conditions associated with the representative nearshore wave conditions are also shown in Table 3-3 as the deep-water waves are used in the 2-D sediment transport modeling.

Notably, Table 3-3 shows that the wave conditions moving sand into Ashbridges Bay and Coatsworth Cut along Tommy Thompson Park are all easterly waves, according to this type of analysis. As mentioned above, this constitutes one of the disadvantages of using profile based 1-D sediment transport models at this site. This 1-D model incorrectly predicts that southwesterly waves do not move sediment along a profile extending off Tommy Thompson Park because those would be offshore waves. Profile based sediment transport models generate their alongshore currents from waves which break obliquely on the profile and, as a result, a southwest wave will not be shown to generate an alongshore current on an easterly facing profile. Based on site conditions examination and confirmed with the 2-D sediment transport modeling, southwest waves do in fact move sand into Coatsworth Cut.

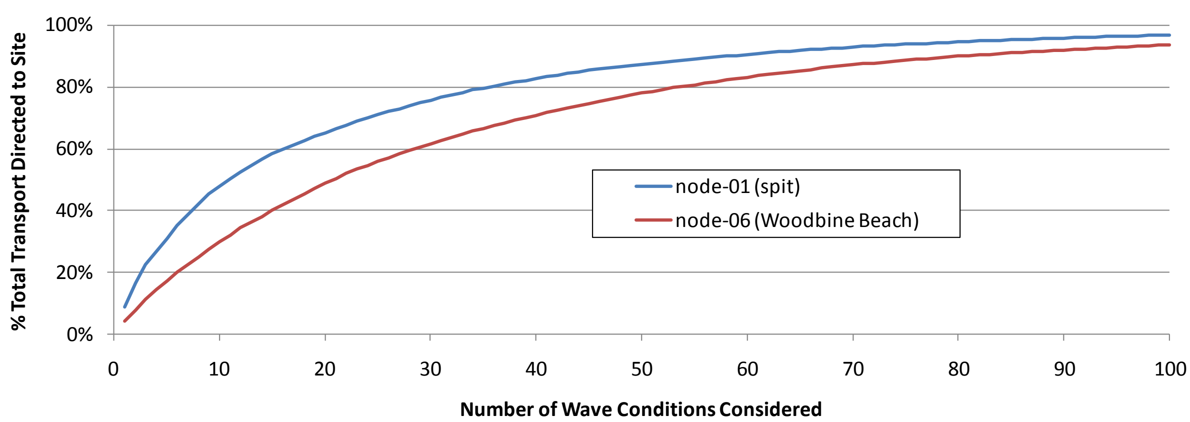

Figure 3-25. Sediment Transport Distribution Curves.
Source: Shoreplan Engineering Limited, 2014.

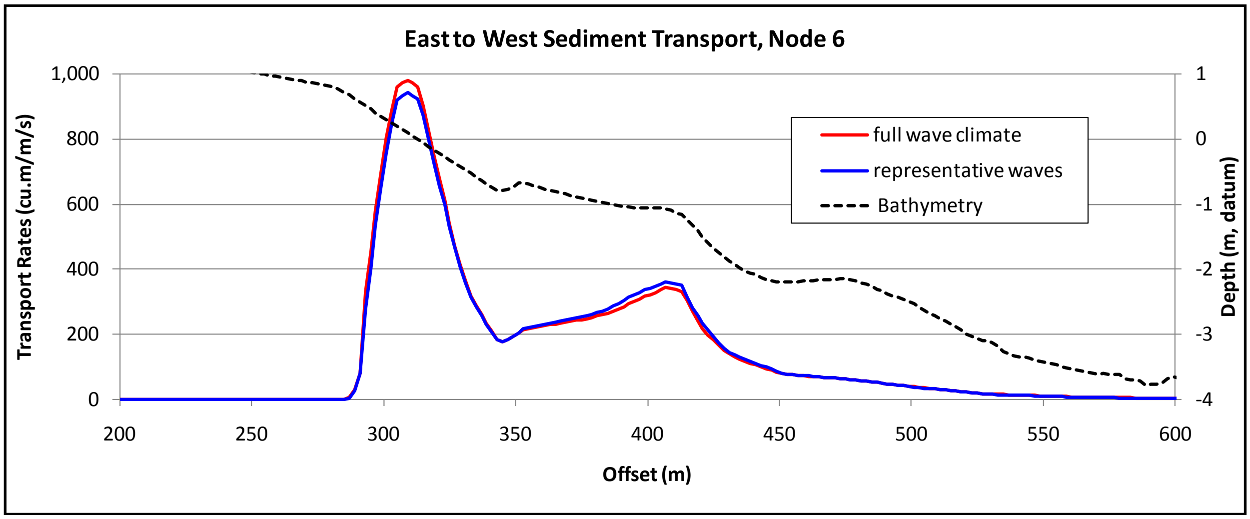

Figure 3-26. Cross-Shore Distribution of Average Annual Sediment Transport.
Source: Shoreplan Engineering Limited, 2014.

Table 3-3. Representative Wave Conditions based on 1-D Modeling.
Source: Shoreplan Engineering Limited, 2014.

Nearshore Wave Condition					Equivalent Offshore Wave		
Wave Height (m)	Wave Period (s)	Wave Direction (deg)	Duration (hours)	% of Transport	Wave Height (m)	Wave Period (s)	Wave Direction (deg)
Nearshore Node 1 (Tommy Thompson Park)							
0.75	4.5	100	450	30	1.0	4.0	90
1.05	5.2	105	239	28	1.5	5.0	90
1.34	6.0	109	103	15	2.0	5.6	90
0.45	3.5	90	418	13	1.0	4.0	50
1.65	6.6	112	56	9	2.5	6.9	70
1.95	7.1	114	25	4	3.5	6.9	70
2.26	7.8	115	7	1	3.5	7.4	90
Nearshore Node 6 (Woodbine Beach)							
2.86	8.3	111	7	27	4.0	8.0	90
2.55	7.7	108	14	25	3.5	7.4	90
2.25	7.1	107	25	21	3.0	6.9	90
1.95	6.6	105	41	16	2.5	6.5	90
3.15	9.0	113	1	6	5.0	8.7	90
1.65	6.1	103	52	6	2.0	6.1	90

3.2.13.3 Sediment Transport Descriptive Model

A descriptive model of sediment transport rates and patterns within the study area was developed by combining the results of an updated sediment budget with lakebed elevation changes determined through surveys and numerical modeling.

3.2.13.3.1 Sediment Budget

Sediment budgets are a coastal management tool used to analyse and describe the different sediment inputs (sources) and outputs (sinks) on the coasts, which is used to predict morphological change in any particular coastline over time. The net sediment transport direction along the Scarborough Bluffs is from east to west. East Point in Scarborough is generally recognized to form the eastern end of the littoral cell containing Ashbridges Bay. The headland structures at Bluffer's Park have trapped a significant volume of sand on the updrift (east) side and the structures have been considered by some to form a nearly complete barrier to sediment transport. The review of dredging activities at Bluffer's Park and Bluffer's Park aerial photographs analysis suggest that fine sand has been bypassing Bluffer's Park headlands for a number of years, and it is now likely that most medium and coarse sand is also passing. Sand is still being supplied to the eastern beaches but all of the shoreline between the R.C. Harris Water Treatment Plant (WTP) and Bluffer's Park has now been protected. While some of the littoral sediment is being supplied through erosion of the cohesive nearshore bottom, a greater volume must be bypassing Bluffer's Park.

Sediment budgets presented in Atria (1993), Sandwell (1991) and Philpott (1988) were updated to account for current shoreline conditions. The shoreline between the R.C. Harris WTP and East Point was divided into 19 shoreline reaches with similar shoreline recession rates (Geocon, 1982). Average annual recession rates for each sector were combined with bluff composition data from Geocon (1982) to provide estimates of the average annual sediment load due to bluff erosion. That sediment load was divided into fine and coarse sand fractions based on sediment size. Silts and clays with a grain size less than 0.1 mm were ignored as that material is rapidly lost offshore and does not play a major role in littoral sediment transport.

To update the sediment budget, the percentage of shoreline protected within each reach was estimated and the volume of eroded bluff material was revised to consider that protection. As well, the volume of littoral sediment introduced through downcutting of the cohesive nearshore bottom was calculated, although that volume was relatively small. The downcutting volumes from the cohesive nearshore bottom are proportional to the natural bluff recession rates, but do not account for the presence of sand deposits further out on the nearshore profiles. Atria (1991) estimated that there may have been in excess of 1.5 million m^3 of sand in the nearshore deposit between Bluffer's Park and the Eastern Beaches. How much of that sand may be feeding the Eastern Beaches is not known.

Table 3-4 shows the volumes of fine and coarse sand introduced through bluff and cohesive nearshore bottom erosion, summed over the shoreline reaches on either side of Bluffer's Park.

Table 3-5 shows the supply based alongshore sediment transport rates at the R.C. Harris Water Treatment Plant for three different bypassing scenarios at Bluffer's Park. Under the maximum bypassing scenario, all fine and coarse sand bypasses the headland structures, giving an average sediment supply rate of 8,000 m^3 per year for the project area. Under the middle bypassing scenario, all of the fine sand bypasses the headlands but only ½ of the coarse sand does. That gives an average annual sediment supply of 6,000 m^3. Under the minimum bypassing scenario, only ½ of the fine sand gets past Bluffer's

Park and all of the coarse sand is retained. That would give a sediment supply of approximately 2,000 m^3 per year.

It is worth noting that a similar analysis described by Shoreplan (2010) estimated sediment transport rates of 20,000, 15,000, and 5,000 m^3 per year for the maximum, middle, and minimum bypassing scenarios, respectively. The difference between the earlier and current transport estimates is due to the construction of new shoreline protection works near Meadowcliffe Drive and Guildwood Parkway.

For the sediment transport descriptive model presented in Section 3.2.13.3.3 [Sediment Transport Modeling – Representative Waves], it was assumed that the middle to maximum bypassing scenario would apply.

Table 3-4. Littoral Sediment Supply Rates under 2013 Protection Conditions.
Source: Shoreplan Engineering Limited, 2014.

Sand Supply Volumes (m^3/yr), 2013 Conditions					
	Bluff Erosion		Nearshore Cohesive Bottom Erosion *		Total
Shoreline Sector	fine sand	coarse sand	fine sand	coarse sand	
East Point to Bluffers Park	2,800	2,400	1,100	1,700	7,900
Bluffers Park to R.C. Harris	0	0	100	100	200
Total	**3,000**	**2,000**	**1,000**	**2,000**	**8,000**

(* does not account for possible erosion of lakebed sand deposits)

Table 3-5. Supply Based Littoral Sediment Transport Rates.
Source: Shoreplan Engineering Limited, 2014.

Supply Based Alongshore Transport Rate Scenarios					
	Bluffer's Park Bypassing		transport rate (m^3/yr)		
Scenario	fine sand	coarse sand	fine sand	coarse sand	Total
maximum	100%	100%	4,000	4,000	8,000
middle	100%	50%	4,000	2,000	6,000
minimum	50%	0%	2,000	0	2,000

3.2.13.3.2 Lakebed Morphology Measurements

Changes in the volume of the nearshore bottom sediments were reviewed using survey data collected by TRCA in 1998, 2009 and 2012.

Figure 3-27 shows the lakebed elevation changes between 1998 and 2012, for the area common to those data sets. The elevation changes were calculated by producing equally spaced rectangular grids of the lakebed using surface fitting software and then subtracting the earlier grid depths from the later grid depths. This method results in a positive difference representing deposition and a negative difference representing erosion.

The lakebed elevation changes represented in Figure 3-27 show a total deposition of approximately 208,000 m^3 and a total erosion of 109,000 m^3, producing a net deposition in the order of 99,000 m^3. Spread over the 14 year interval between surveys that gives an average annual deposition rate of approximately 7,000 m^3 per year for the comparison area.

The survey data was also examined through profile comparisons. A total of 16 cross-shore profiles were developed between Woodbine Beach and Ashbridges Bay. The profile comparison shows the presence of a bypassing shoal along the outer edge of the headland. Figure 3-28 to Figure 3-43 show the profile comparisons. In particular, profiles P13 to P7 show that the bypassing shoal has extended beyond Headland C (Figure 3-4) but has not yet connected to the Tommy Thompson Park.

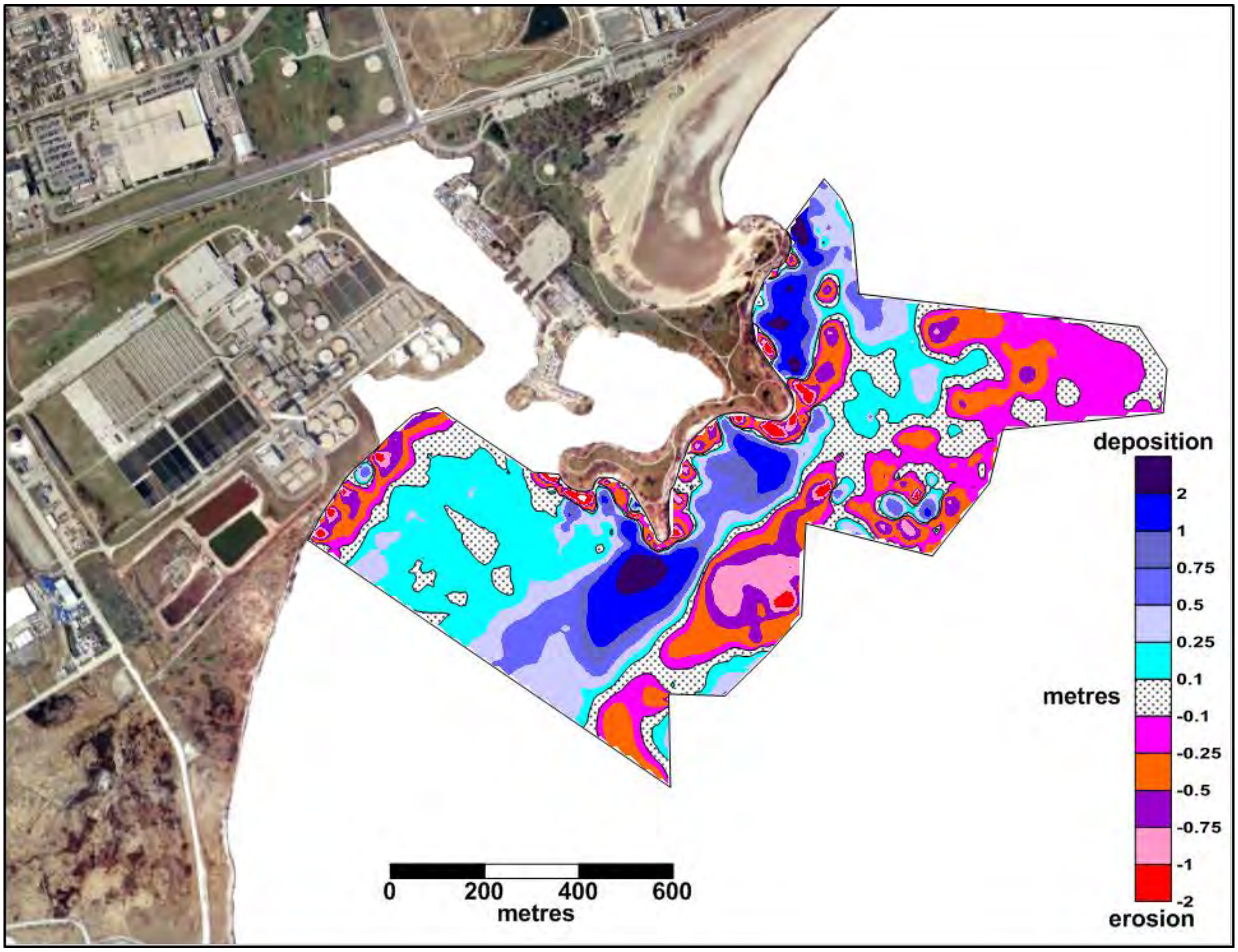

Figure 3-27. Measured Lakebed Elevation Changes, 1998 – 2012.
Source: Shoreplan Engineering Limited, 2014.

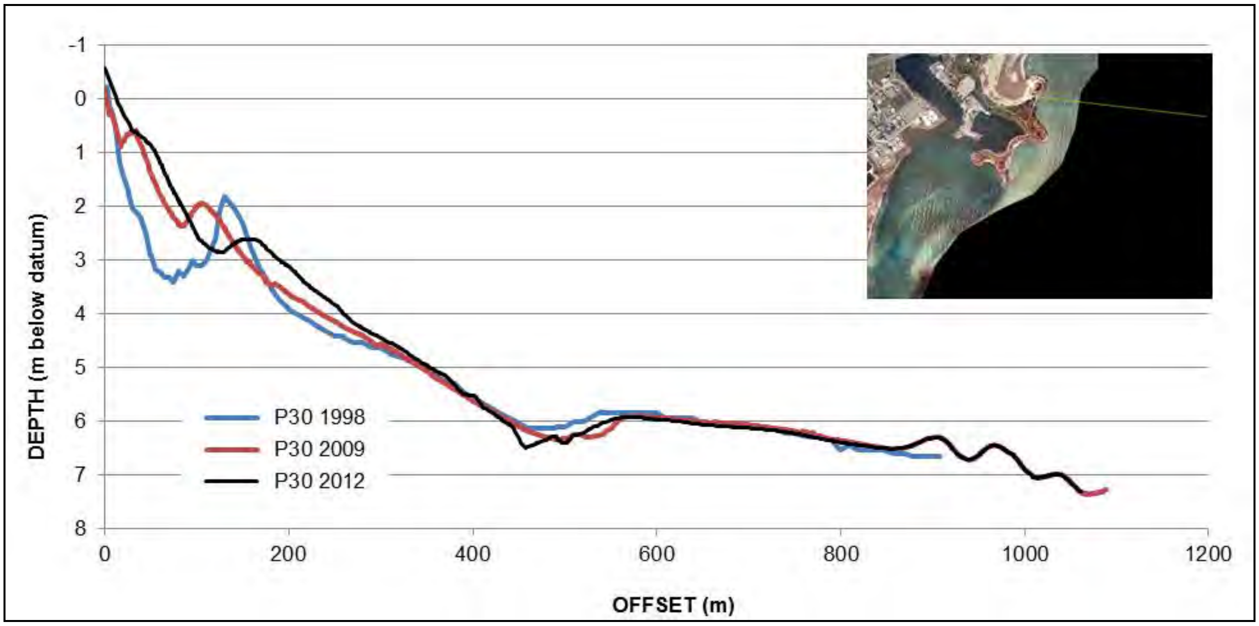

Figure 3-28. Profile Comparison P30.
Source: Shoreplan Engineering Limited, 2014.

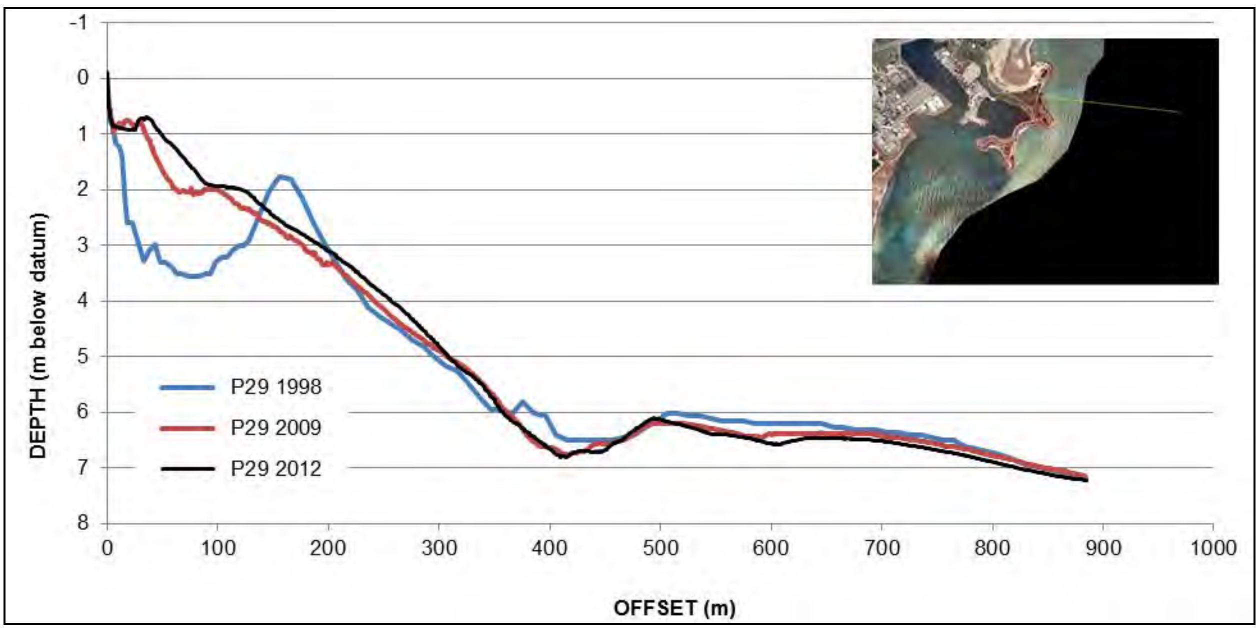

Figure 3-29. Profile Comparison P29.
Source: Shoreplan Engineering Limited, 2014.

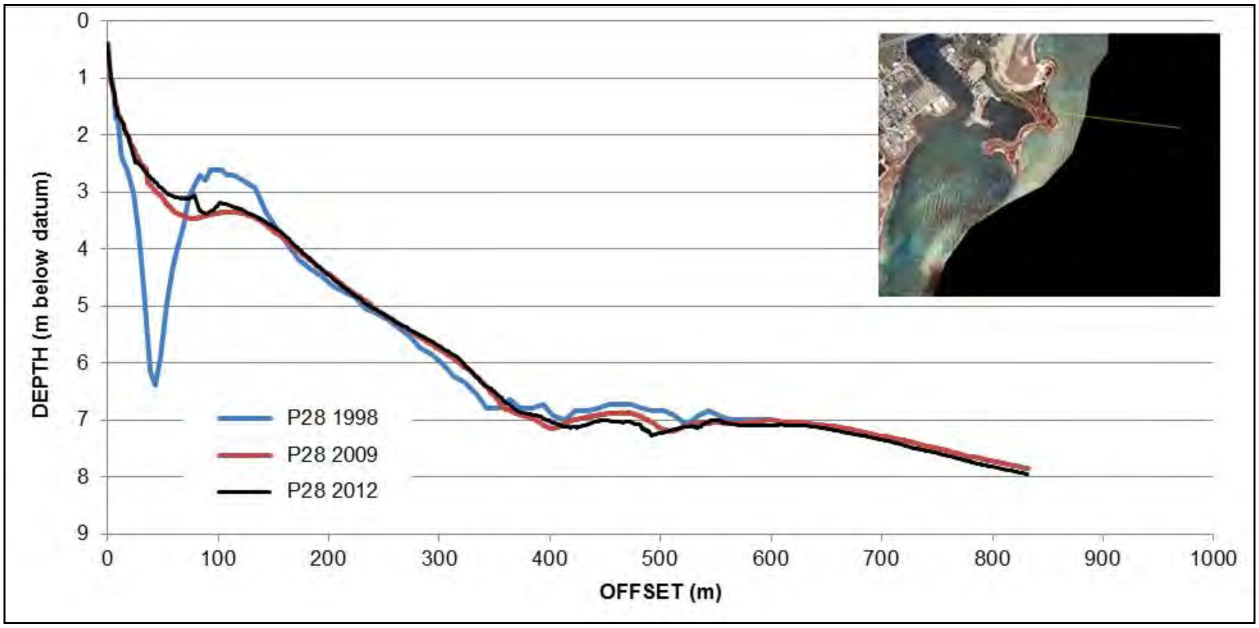

Figure 3-30. Profile Comparison P28.
Source: Shoreplan Engineering Limited, 2014.

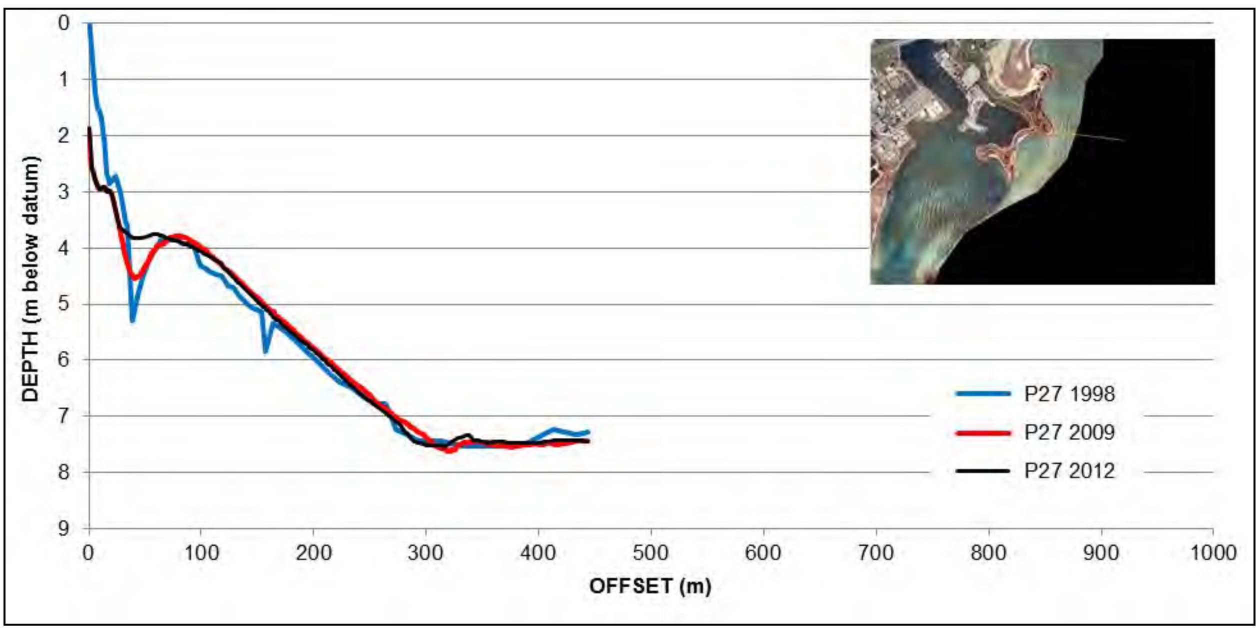

Figure 3-31. Profile Comparison P27.
Source: Shoreplan Engineering Limited, 2014.

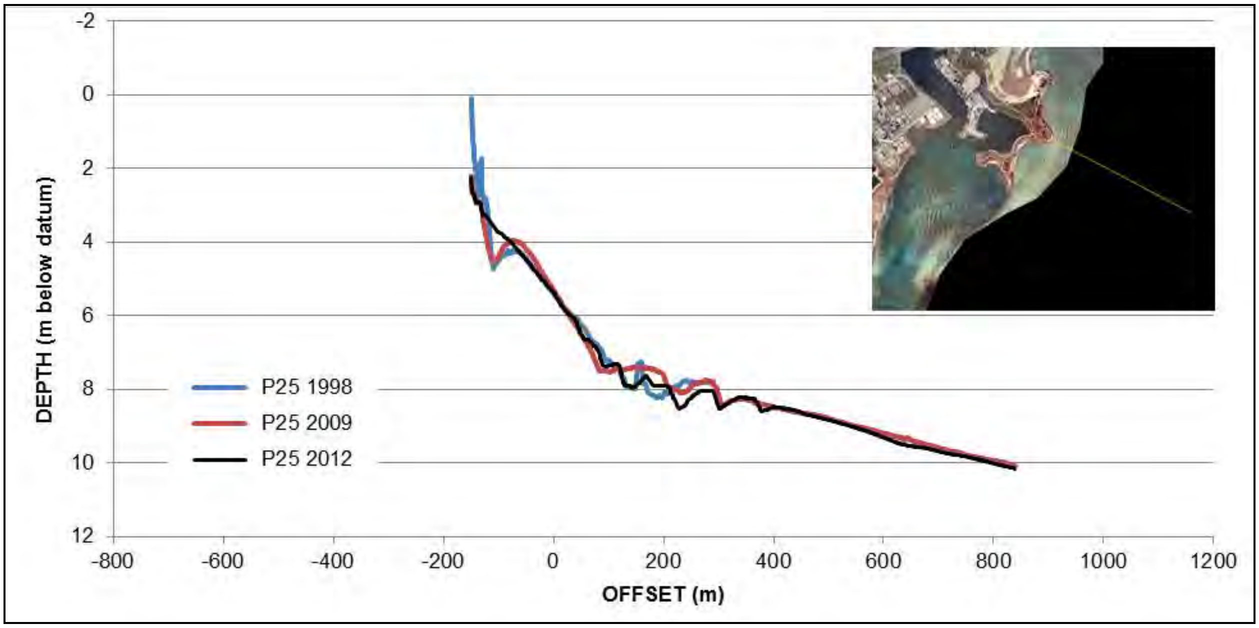

Figure 3-32. Profile Comparison P25.
Source: Shoreplan Engineering Limited, 2014.

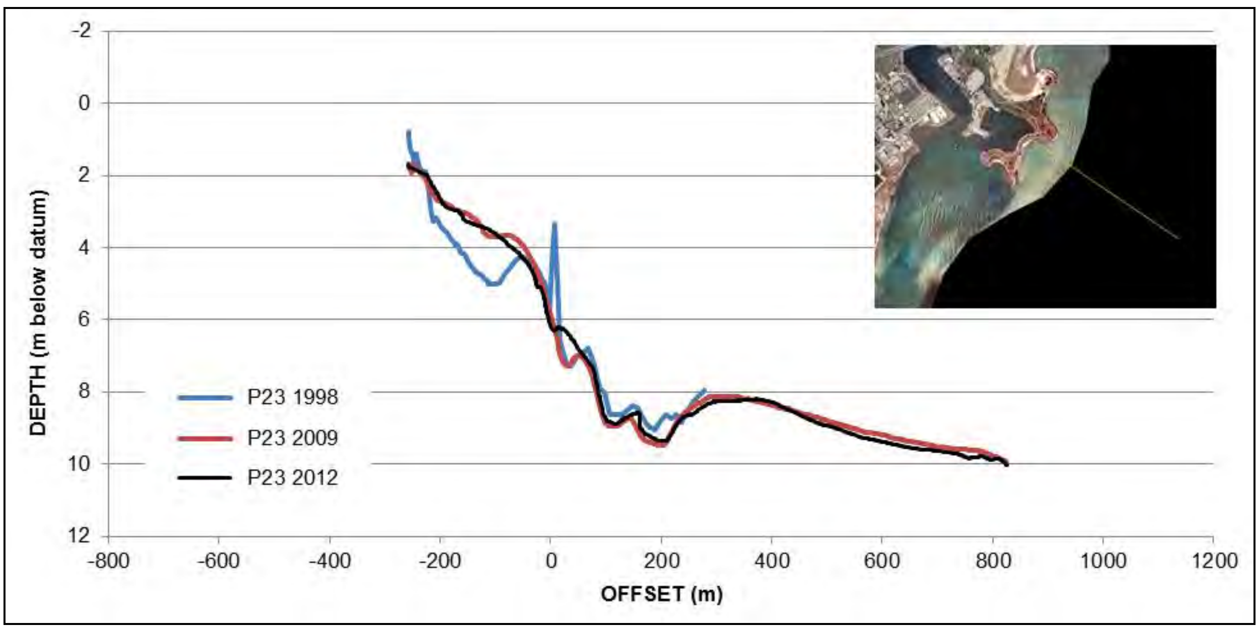

Figure 3-33. Profile Comparison P23.
Source: Shoreplan Engineering Limited, 2014.

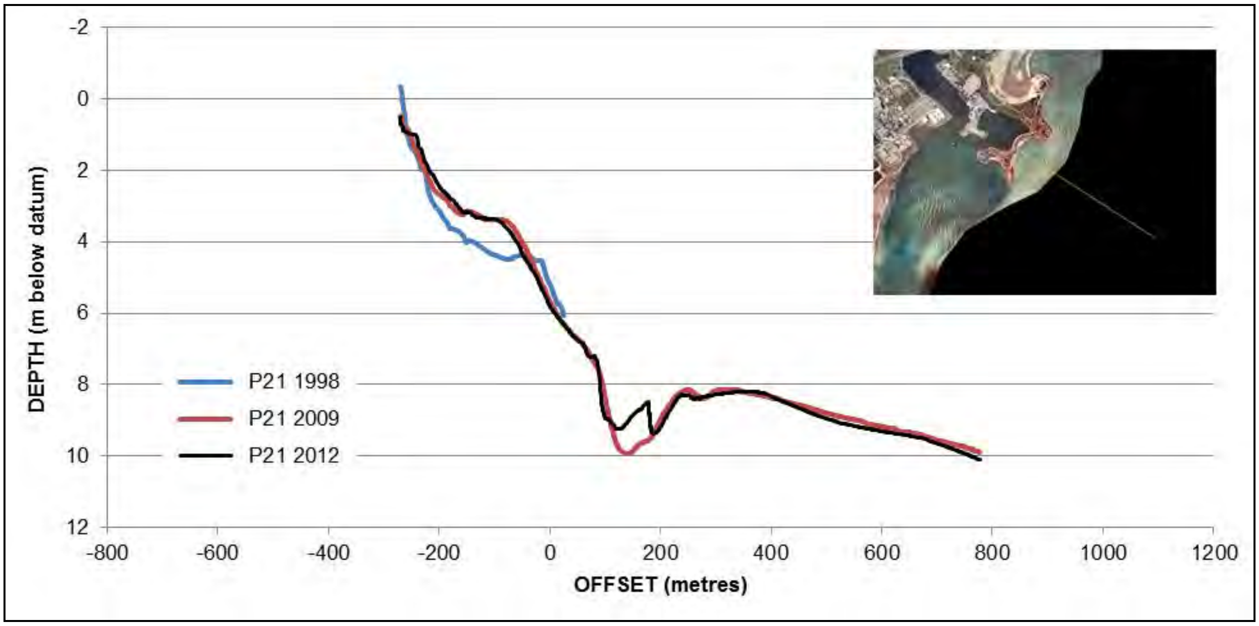

Figure 3-34. Profile Comparison P21.
Source: Shoreplan Engineering Limited, 2014.

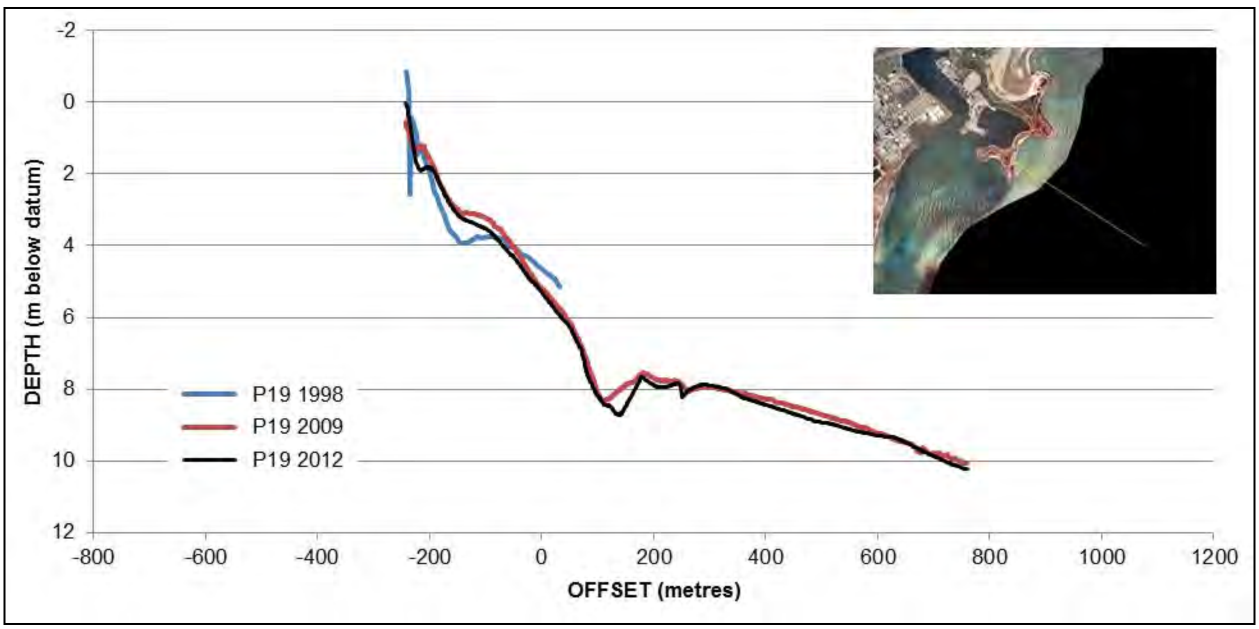

Figure 3-35. Profile Comparison P19.
Source: Shoreplan Engineering Limited, 2014.

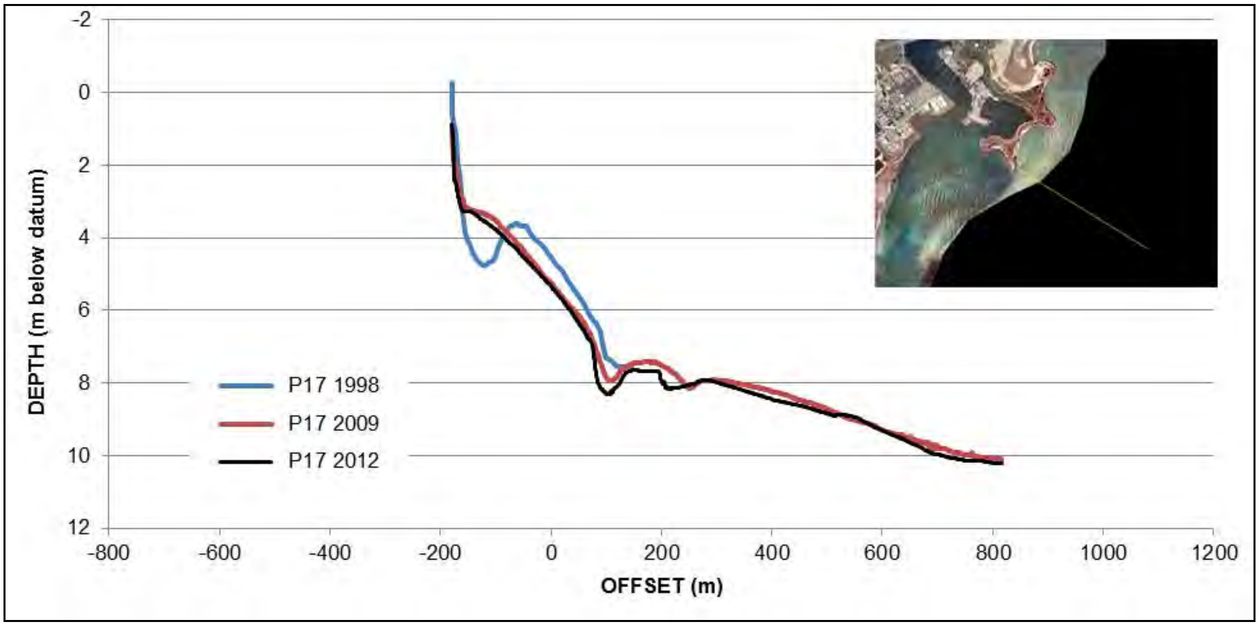

Figure 3-36. Profile Comparison P17.
Source: Shoreplan Engineering Limited, 2014.

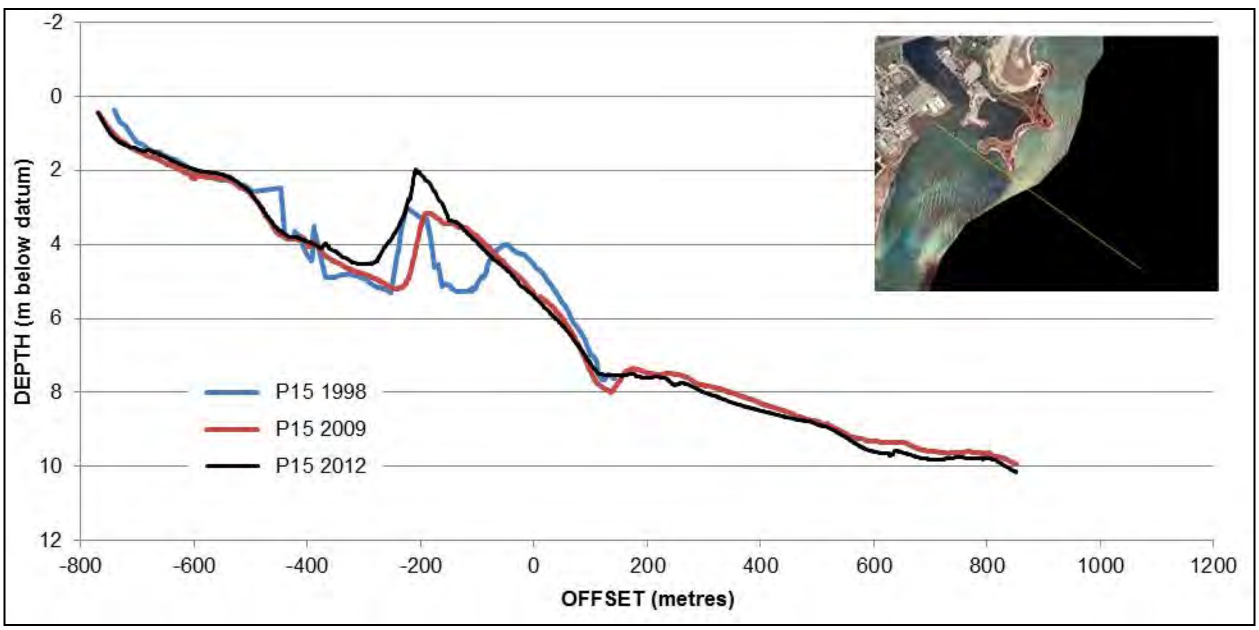

Figure 3-37. Profile Comparison P15.
Source: Shoreplan Engineering Limited, 2014.

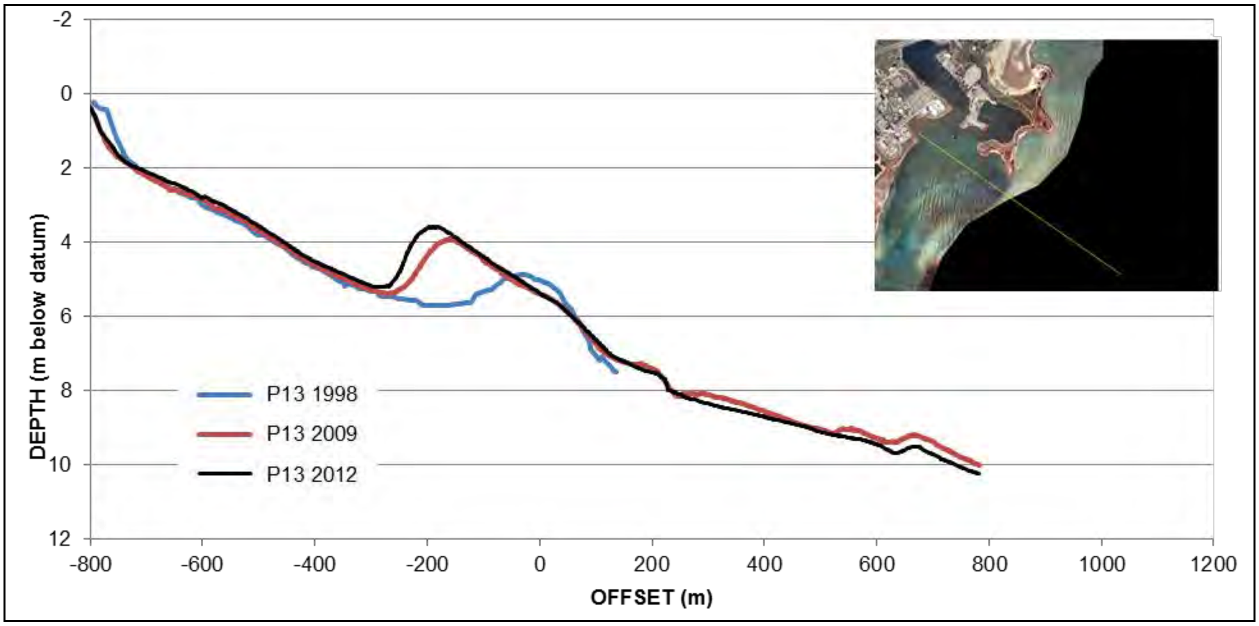

Figure 3-38. Profile Comparison P13.
Source: Shoreplan Engineering Limited, 2014.

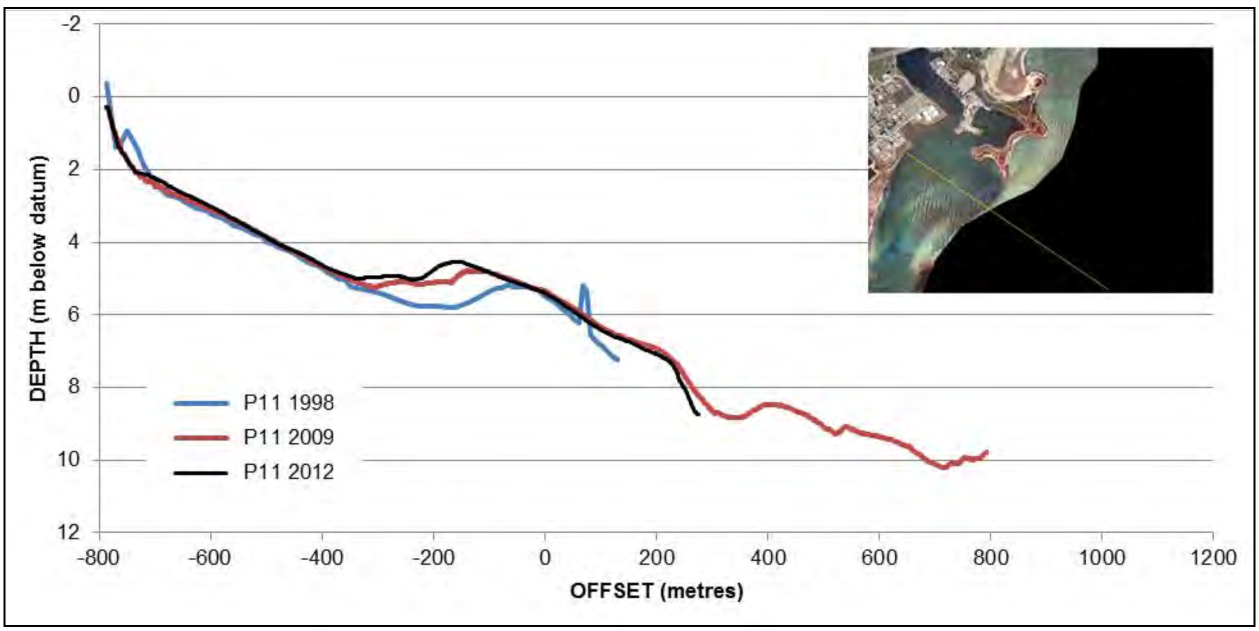

Figure 3-39. Profile Comparison P11.
Source: Shoreplan Engineering Limited, 2014.

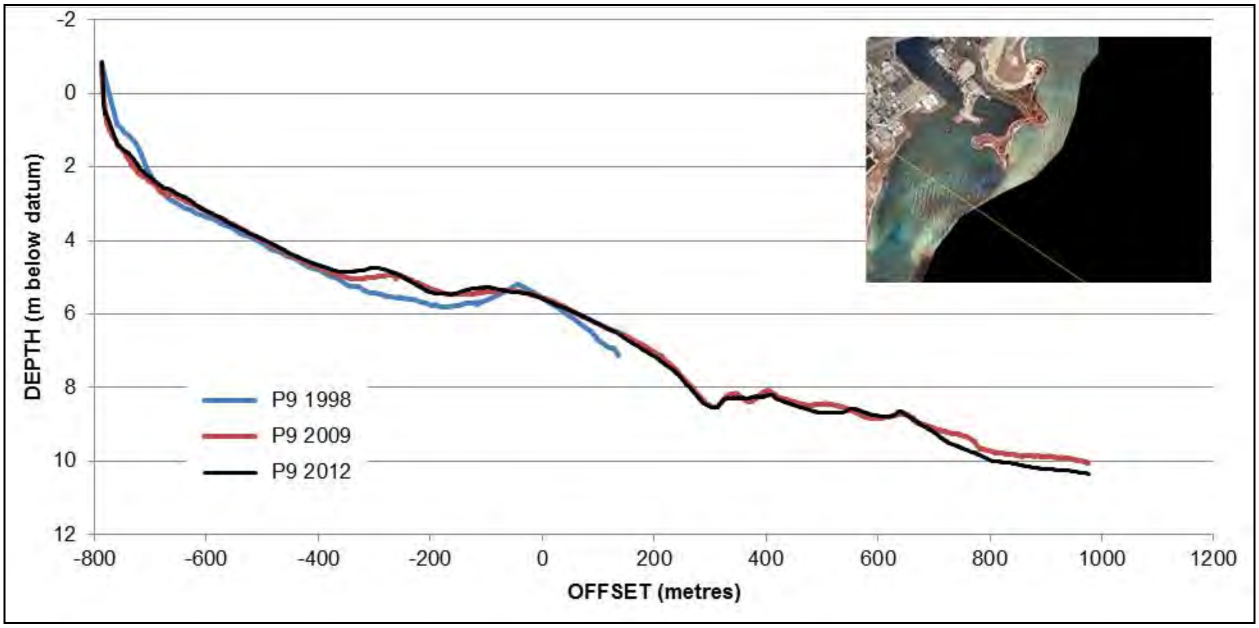

Figure 3-40. Profile Comparison P9.
Source: Shoreplan Engineering Limited, 2014.

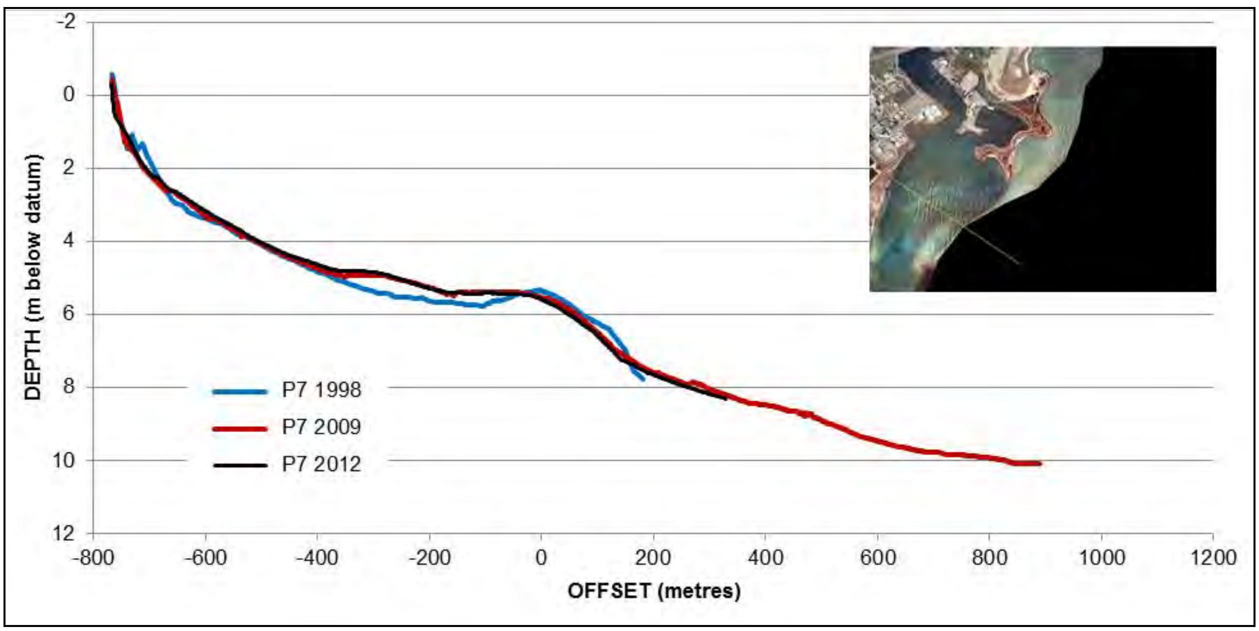

Figure 3-41. Profile Comparison P7.
Source: Shoreplan Engineering Limited, 2014.

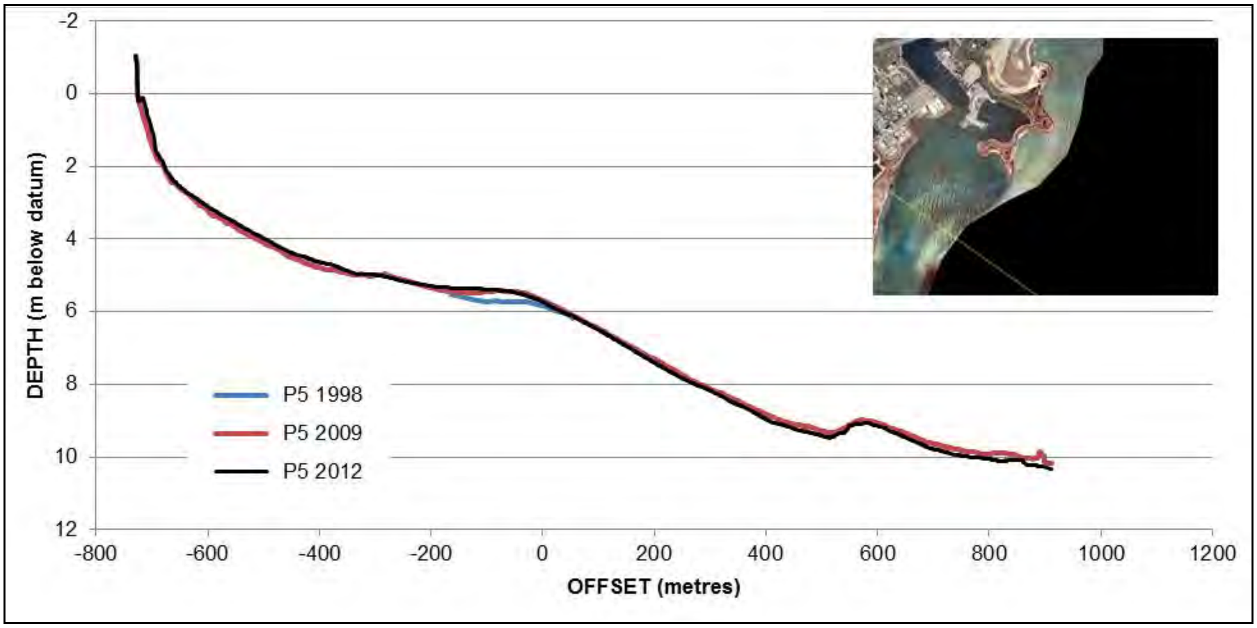

Figure 3-42. Profile Comparison P5.
Source: Shoreplan Engineering Limited, 2014.

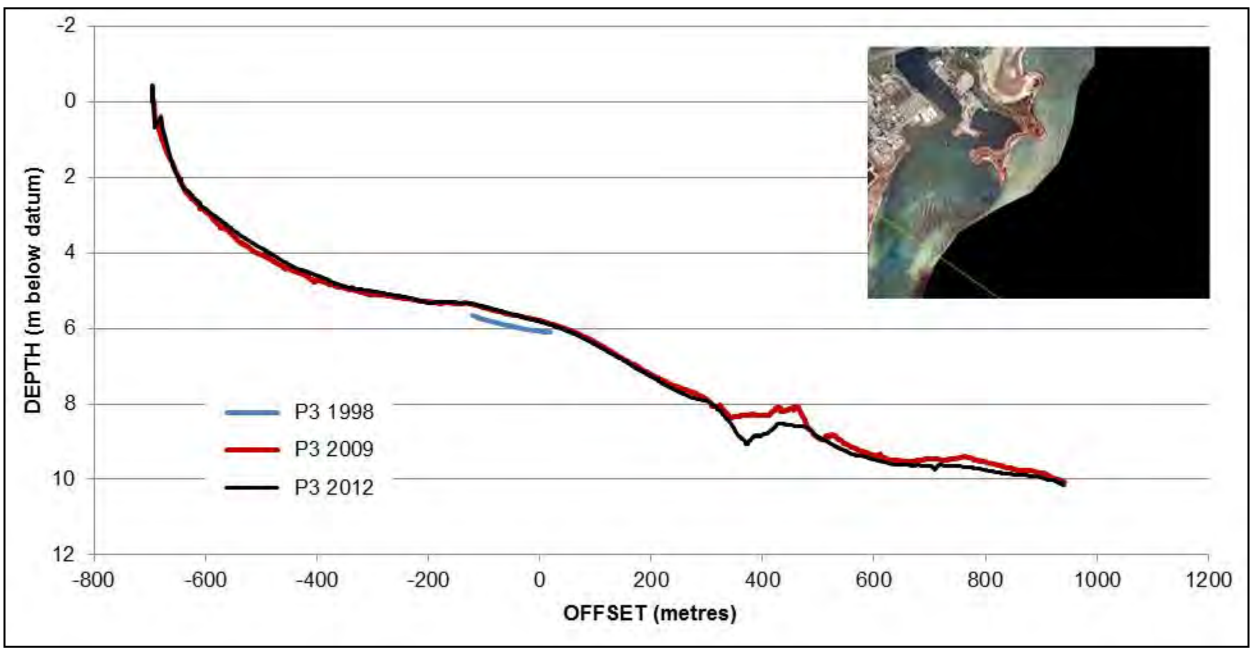

Figure 3-43. Profile Comparison P3.
Source: Shoreplan Engineering Limited, 2014.

3.2.13.3.3 Sediment Transport Modeling – Representative Waves

Two-dimensional sediment transport modeling was carried out using the Coastal Modeling System (CMS) software developed by the U.S. Army Corps of Engineers. CMS is a set of complementary numerical models that operate within the Surface Modeling System (SMS). Individual models applied within SMS use complementary input/out file formats to facilitate data sharing.

CMS-Wave is a two-dimensional spectral wave model with energy dissipation and diffraction terms. It simulates a steady-state spectral transformation of directional random waves co-existing with ambient currents in the coastal zone. It includes features such as wave generation, wave reflection, and bottom frictional dissipation. CMS-Wave outputs wave conditions, including wave generated radiation stresses, for use in the coastal circulation and sediment transport models.

CMS-Flow is a two-dimensional depth averaged hydrodynamic circulation model designed for local applications. It is a finite-volume numerical engine which includes the capabilities to compute hydrodynamics (water levels and current flow values under any combination of tide, wind, surge, waves and river flow), sediment transport as bedload, suspended load, and total load, and morphology change.

The CMS modeling was carried out using the representative wave conditions described in Section 3.2.13.2 [Average Annual Sediment Transport Characterization] and a median sand diameter of 0.15 millimetres (mm). That is representative of the median size determined from grain size analyses of sediments collected by TRCA in 1997, 1998, 2010 and 2012. The TRCA sediment size data is presented in Appendix A.

Figure 3-44 and Figure 3-45 show typical CMS modeling results. Figure 3-44 shows sediment transport contours associated with a 4.0 m, 8.0 s wave coming from the east. Figure 3-45 is a more detailed view of the Ashbridges Bay headland showing the wind and wave generated currents that drive the sediment transport. The headland causes an offshore deflection of the relatively uniform alongshore currents that develop on both Woodbine Beach and Tommy Thompson Park. A gyre that forms adjacent to Headland A contributes to the offshore deflection of the alongshore current.

A large gyre also forms in Ashbridges Bay, directly in front of the ABTP. That gyre causes the recirculation of some of the sediments that reach the area from both along Tommy Thompson Park and from bypassing the Ashbridges Bay headlands.

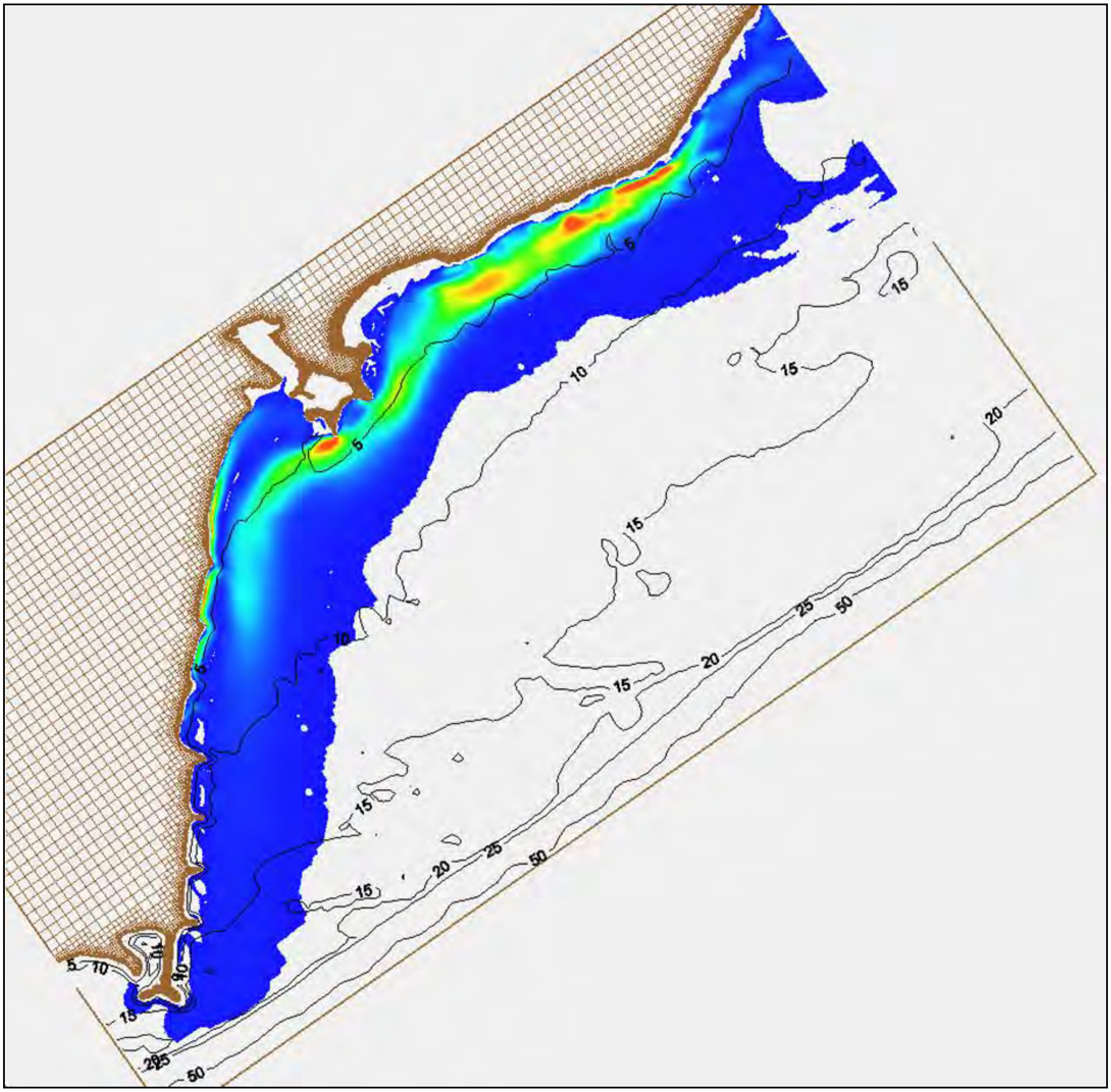

Figure 3-44. Sediment Transport Rates for 4.0 m, 8.0 s East Wave.
Source: Shoreplan Engineering Limited, 2014.

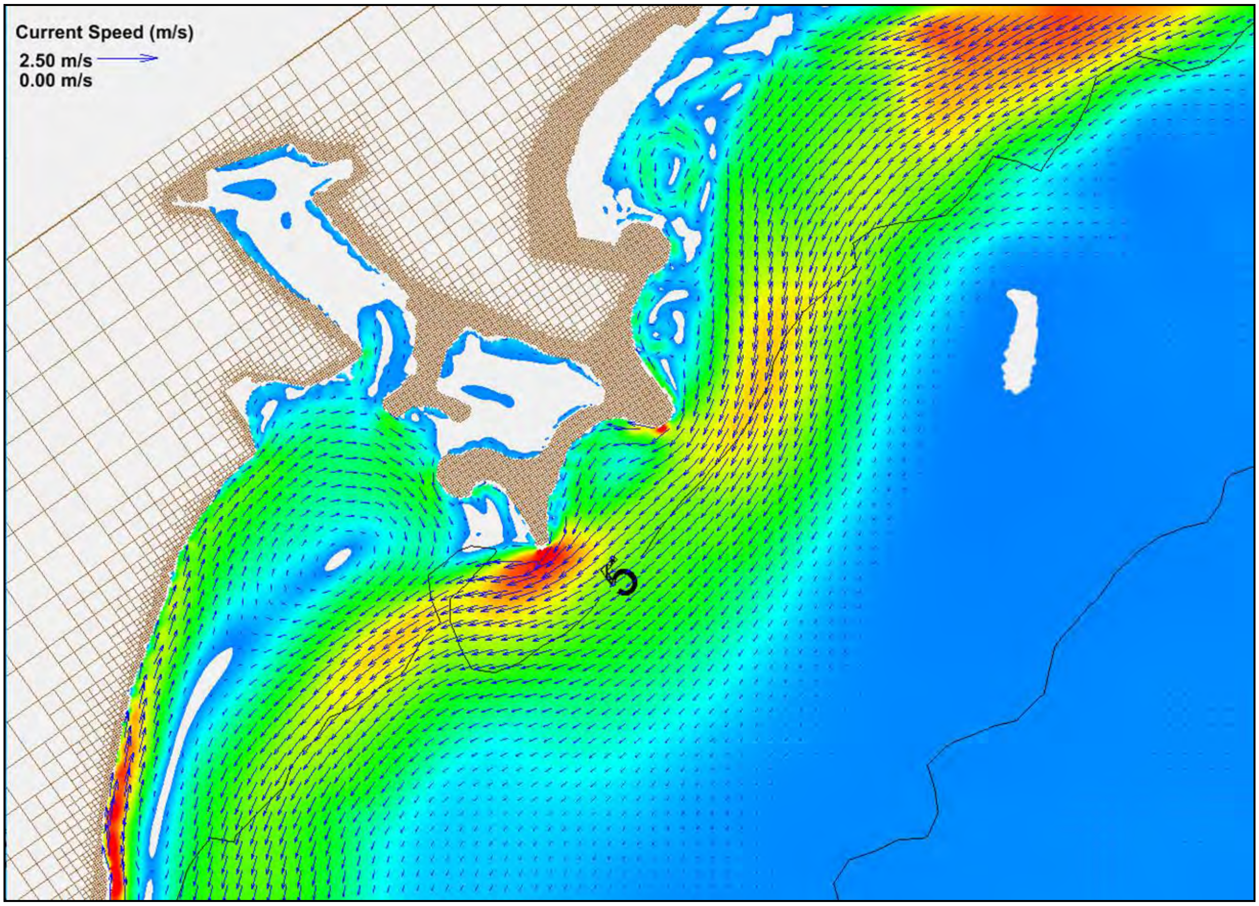

Figure 3-45. Typical Wave-Generated Current Patterns.
Source: Shoreplan Engineering Limited, 2014.

3.2.13.3.4 Descriptive Model

The sediment budget data, the results of the survey comparisons and the results of the numerical modeling were used to develop a descriptive model of sediment transport within the project study area. The key elements of the descriptive model are presented schematically in Figure 3-46. It shows that more than 10,000 m^3 of sand per year is supplied from updrift, with most of it bypassing Headland A (Figure 3-46). Woodbine Beach is mostly full and is no longer trapping a significant portion of the available sediment. Some sand is deposited on the bypassing bar that has formed in front of Headlands B and C (Figure 3-46) and it will continue to deposit as that shoal extends in a southwesterly direction.

The updrift sediment supply rate is considered to be an un-quantified value greater than 10,000 m^3 per year due to the uncertainty associated with supply from the nearshore sand deposits. The sediment budget estimates show that up to 8,000 m^3 per year can be supplied through erosion of the updrift unprotected bluffs and cohesive profiles near the shore. However, potential supply from the sand deposits sitting further offshore has not been quantified.

There is some loss of sand offshore to deep water but that is expected to be less than 5% of the supply volume. There is gross transport along both the Tommy Thompson Park and the Ashbridge’s Bay Park headlands as sand moves back and forth under the influence of easterly and southwesterly waves.

However, the net transport along the Park is thought to be low as there is no significant source of new material to the nearshore sediment pathways. Some of the suspended sediment moved by the currents that are forced southward by Tommy Thompson Park will be transported past the tip of the Park and lost from the littoral cell. It has been estimated that less than 10% of the sand originating from updrift will be lost in this manner, and it will be primarily the small diameter particles.

There is a noticeable amount of sand moved in a circular pattern in front of the ABTP, with some being deposited in Coatsworth Cut. On average, approximately 3,500 m^3 of sand is removed from the system every year through dredging. Though previous studies predicted that the dredging rates would increase as the bypassing bar extends past Headland C, recent dredging records do not support this prediction. However, notwithstanding the dredging records, it is not unreasonable to expect the Coatsworth Cut sedimentation rates to increase as the bypassing bar grows. The plots for profiles 11 and 13 (Figure 3-38 and Figure 3-39) show that the bypassing bar continues to extend southwest, indicating that there is a possibility of Coatsworth Cut infilling rates increasing.

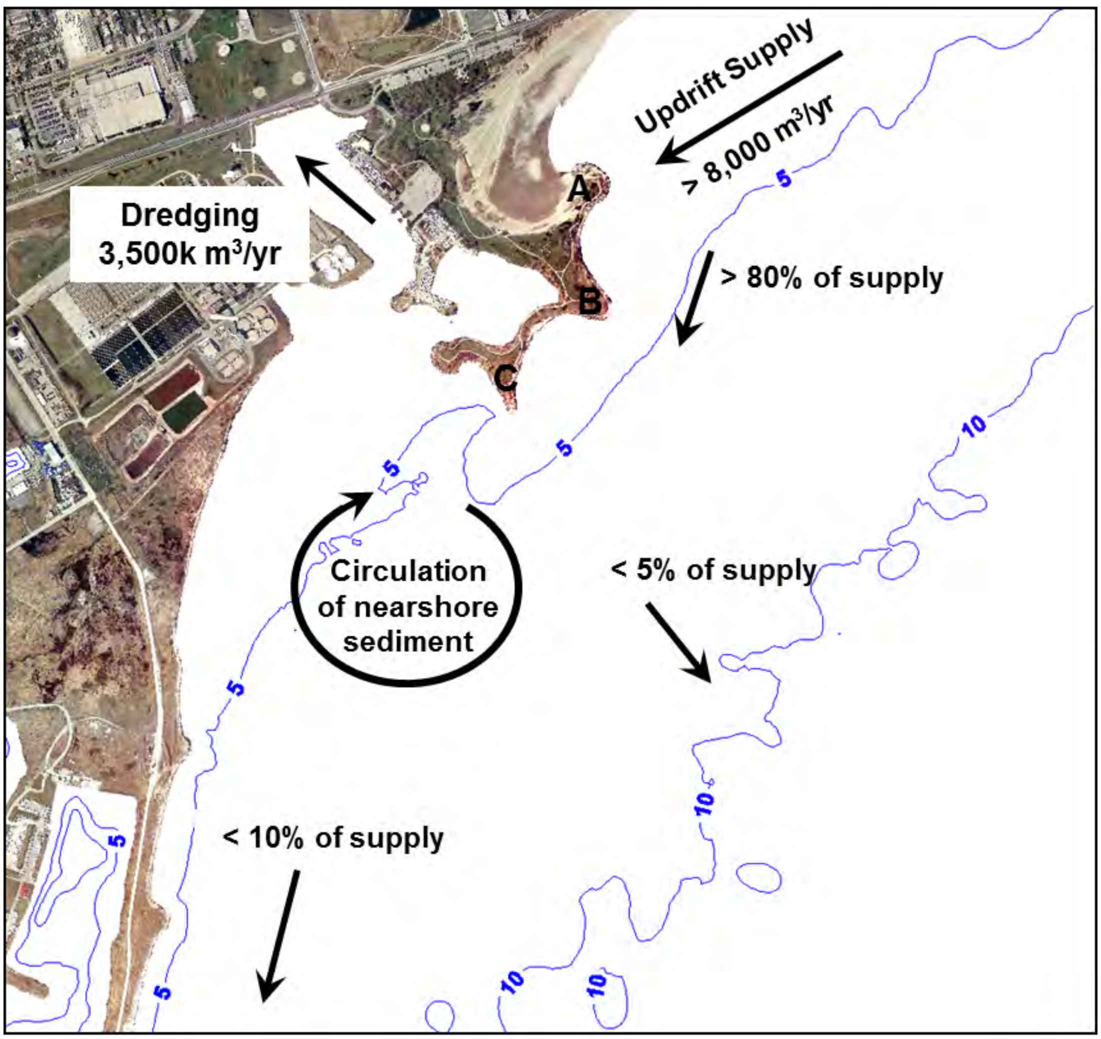

Figure 3-46. Descriptive Model of Nearshore Sediment Transport.
Source: Shoreplan Engineering Limited, 2014.

3.2.13.4 Sediment Modeling for Typical Storm

As the sediment transport modeling carried out during development of the sediment transport descriptive model (see Section 3.2.13.3 [Sediment Transport Modeling – Representative Waves]) considered only single wave conditions, additional sediment transport modeling was carried out that considered more representative baseline conditions. The additional sediment transport modeling was carried out for a "typical storm" which had varying wind, wave and water level conditions over the course of its 30-hour duration. The storm conditions and numerical modeling are described below.

3.2.13.4.1 Typical Storm Conditions

A detailed examination of the 40-year hindcast wave data was carried out to identify major storm events. The deep-water wave data were examined for storms defined by minimum wave heights throughout the storm, minimum wave height at the peak of the storm and minimum storm durations. A winter storm which occurred in December 1987 and was characterized by significant easterly and southwesterly wave conditions was selected as a typical event for a storm front moving past the site. The storm had a 30 hour duration and wave heights of 1.0 m or higher.

Figure 3-47 shows the hindcast wave heights and direction as well as the recorded wind speeds, wind directions and water level changes. The storm was modeled as having started at the average water level used for the previous modeling (see Section 3.2.10 [Water Levels]) so the recorded changes in water levels were modeled rather than the actual water levels measured during December 1987. While the actual storm starts at time 0 hours, as shown in Figure 3-47, the modeling was started earlier with five hours of constant input conditions during the ramp period. The ramp period is the length of time during which the model forcing is gently increased or ramped from zero in order to avoid shocking the model at the beginning of the simulation.

Modified storm files were also created as part of the sensitivity testing carried out at the start of the sediment transport modeling. The modified storms were similar to the typical storms but had differing durations of easterly and southwesterly waves.

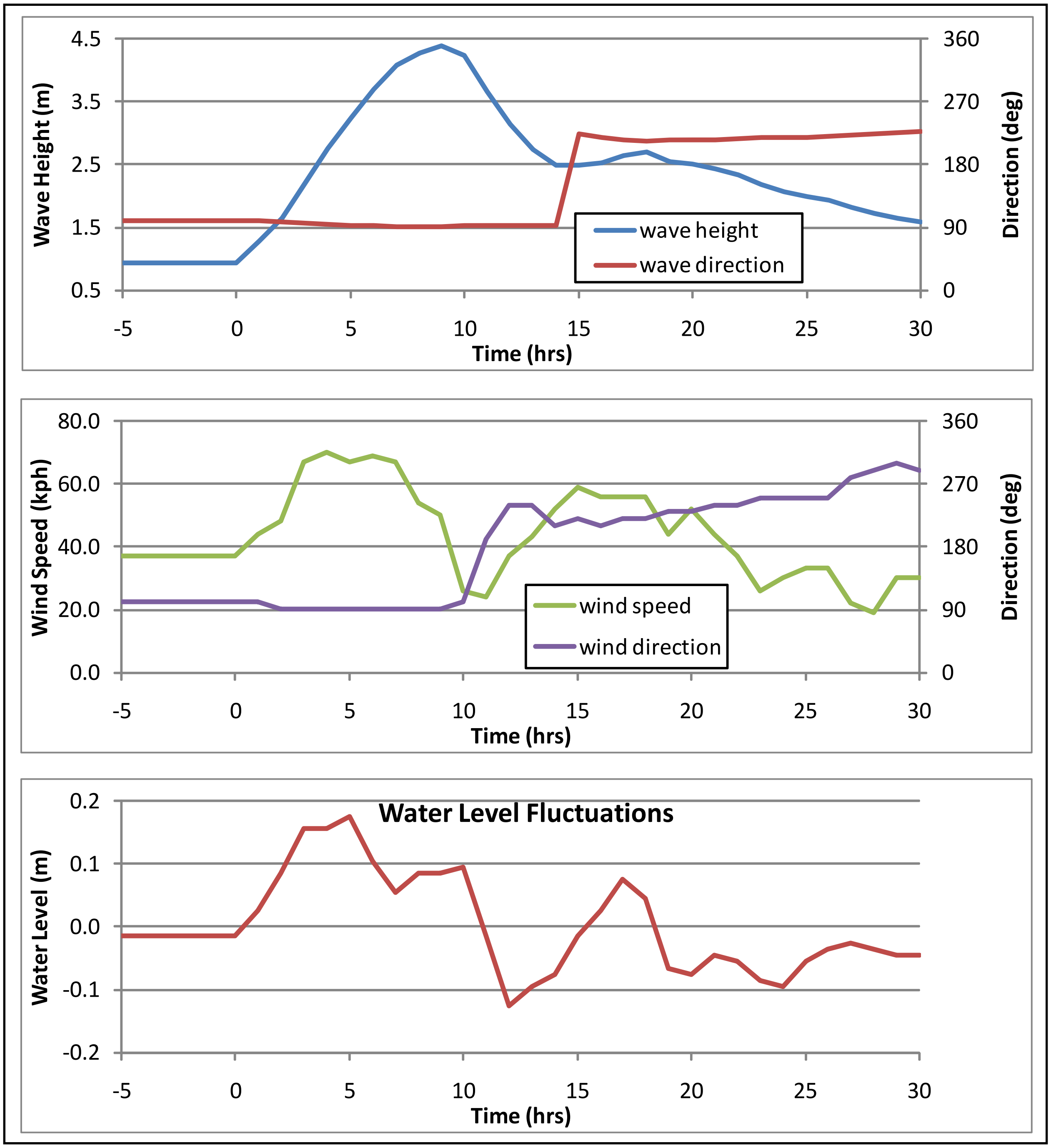

Figure 3-47. Reference Storm for 2-D Sediment Transport Modeling.
Source: Shoreplan Engineering Limited, 2014.

3.2.13.4.2 CMS Modeling – Typical Storm

2-D sediment transport modeling was carried out with the CMS software described in Section 3.2.13.3.3 [Sediment Transport Modeling – Representative Waves]. Figure 3-48 shows the sedimentation patterns predicted for a typical storm under existing conditions. There are areas of deposition and erosion throughout the model domain with the more severe erosion occurring around the headlands. The deposition patterns are consistent with what was found based on the survey comparison (see Section 3.2.13.3.2 [Lakebed Morphology Measurements]), with deposition occurring offshore of Headland B, on the bypassing shoal extending off of Headland C, and in the entrance to Coatsworth Cut.

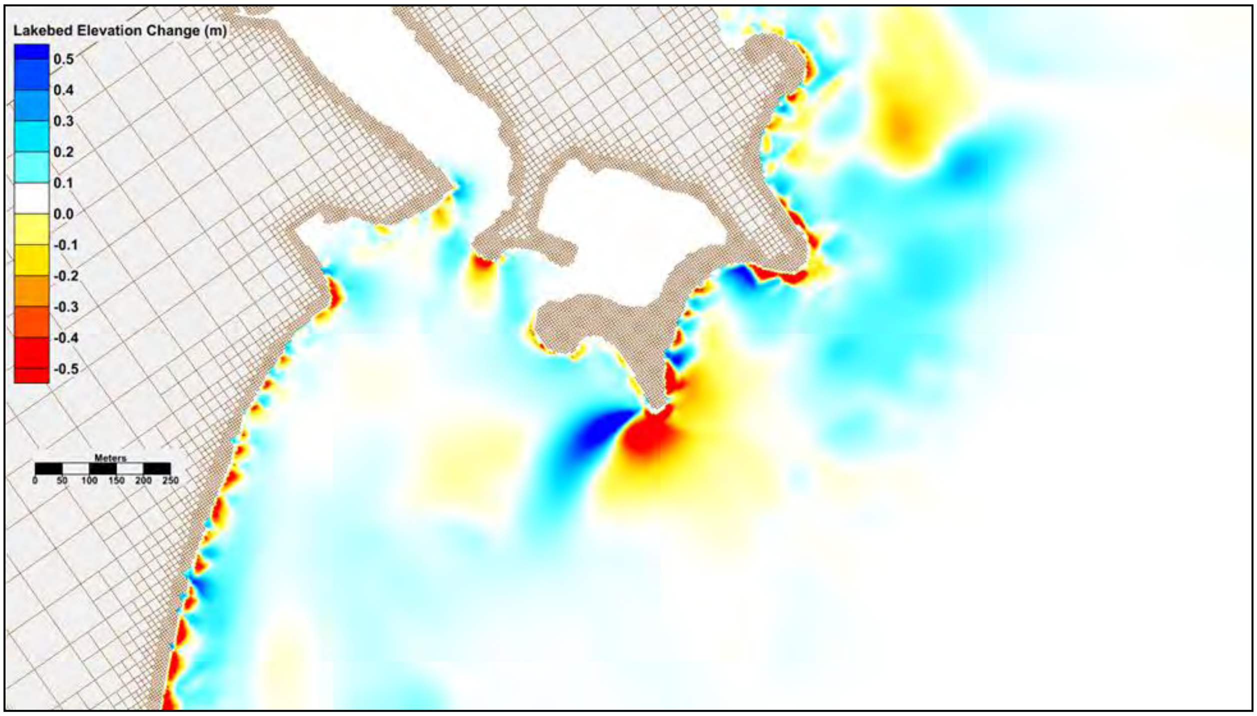

Figure 3-48. Sedimentation Patterns, Typical Storm, Existing Conditions.
Source: Shoreplan Engineering Limited, 2014.

3.2.14 Shoreline Stability

TRCA's Erosion Management Program undertakes shoreline inspections along the Lake Ontario waterfront to provide ongoing identification and remediation of erosion hazards. Remediation is carried out on a priority basis and subject to available funding.

A number of shoreline deficiencies were identified in Ashbridge's Bay Park in 2013. The documented deficiencies are illustrated in Figure 3-49. As shown in Figure 3-27 (Measured Lakebed Elevation Changes, 1998 – 2012), erosion has been occurring around the headlands for a number of years. Figure 3-48 (Sedimentation Patterns, Typical Storm, Existing Conditions) also shows that the most severe erosion in the local study area predicted during a typical storm event occurs along the shoreline of the Park around the western headlands.

While the Park shoreline deficiencies are considered low risk to property and life (TRCA, 2013a), long term shoreline erosion may result in impacts to public use (e.g., damage to existing trails) and boat club facilities (e.g., erosion in areas used for winter storage of boats). The on-going erosion of the Ashbridge's

Bay Park headlands is also expected to be contributing to sediment loads in the local study area. However, this contribution is very minimal as the majority of the sediment supply originates from bluff and cohesive nearshore bottom erosion occurring in the eastern end of the littoral cell (Scarborough Bluffs area). See Section 3.2.13 [Sediment Transport] for additional information.

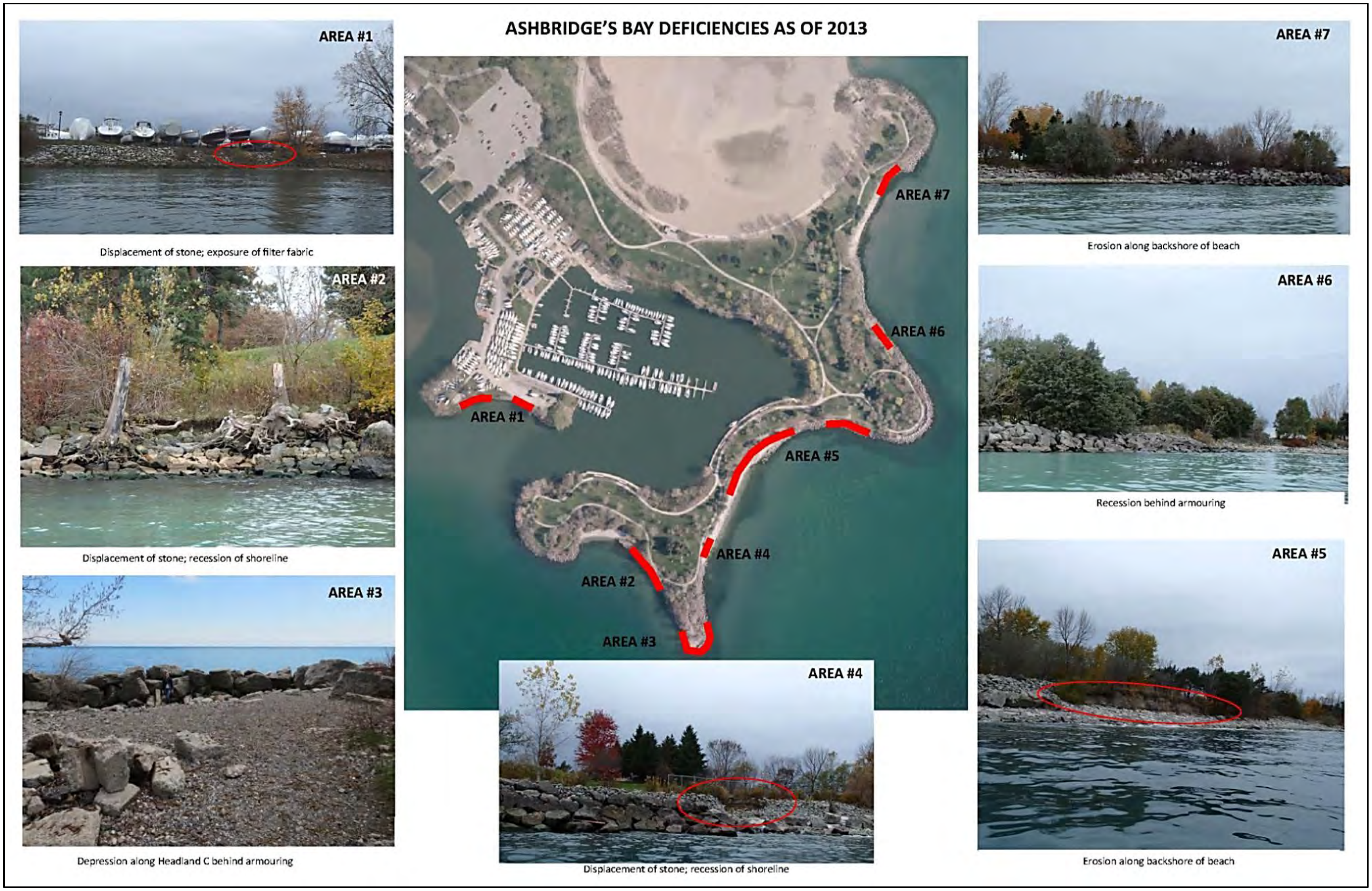

Figure 3-49. Ashbridge's Bay Park shoreline deficiencies as documented in 2013.
Source: TRCA, 2013a.

3.2.15 Existing Surface Drainage and Groundwater Seepage

The land portions of the project local study area are drained into Lake Ontario. In addition, four outfalls are located in the north end of Ashbridges Bay that convey stormwater flows from the Coatsworth Cut sewershed and discharge into the lake (see Figure 3-70).

The surficial geology of the study area is comprised of lakefill over highly variable deposits of organics and beach and nearshore sands which grade into the silt and clays of the former Lake Iroquois. The lakefill was placed mainly in the first half of the 20^{th} century. No groundwater seepage has been observed in this area, although it is expected that groundwater is close to surface within lakefill. Groundwater is not expected to pose challenges to construction, but any project construction activities will consider the highly heterogeneous nature of the surficial soils.

3.2.16 Groundwater Recharge/Discharge Zones

As mentioned in Section 3.2.15 [Existing Surface Drainage and Groundwater Seepage], no groundwater seepage has been observed in the project local study area nor is groundwater discharge to the lake of concern given the assimilative capacity of the body of water. However, it is expected that groundwater is close to the surface of the existing lakefill.

Groundwater recharge in the local study area is expected to be limited due to the relatively small size of the area terrestrial component as well as its lakefill-based composition.

3.2.17 Water Quality

3.2.17.1 Background

Water quality in the project regional study area (area banded by a red oval in Figure 3-50) is defined mainly by the water quality within the Lake Ontario Coastal Zone (Figure 3-51), which is defined as waters shallower than 30 m. Within the Coastal Zone, discharges from land based sources such as tributaries and treatment plants mix with off-shore waters, resulting in water quality which mimics ambient 'main'-lake conditions but is significantly influenced by the land based discharges. Within the local study area (area bounded by yellow line in Figure 3-50), water quality is determined by the Lake Ontario Coastal Zone water quality and is heavily influenced by source specific discharges.

In order to characterize water quality conditions pertaining to the project, the focus of this section is on the Ashbridges Bay - Coatsworth Cut area as well as surrounding environs (project local study area is thus included).

Lake Ontario Coastal Zone water quality conditions applicable to the project are described in Section 3.2.17.2 [Ambient Water Quality in the Ashbridges Bay area of the Lake Ontario Coastal Zone] and the source specific discharges are described in Section 3.2.17.3 [Source Specific Water Quality].

Beyond the Lake Ontario Coastal Zone (see red - yellow interface in Figure 3-51), the lake depth increases rapidly down to depths of approximately 150 m in the Niagara Basin, which is the most western basin of Lake Ontario. Monitoring information summarized in this section includes stations (Figure 3-52) in waters shallower than 30 m as well as waters deeper that the Toronto Scarp (the underwater ridge located near the Tommy Thompson Park and the Toronto Islands).

Water quality in the Lake Ontario Coastal Zone adjacent to the project local study area is influenced by discharges from the Humber River and Lake Ontario tributaries located further west, Highland Creek and tributaries located further east, outflows from the Inner Harbor (through the Eastern Gap) and three wastewater treatment plants closest to the area - the Humber Treatment Plant, ABTP and the Highland Treatment Plant.

Sources of land-based discharges significantly influencing water quality in the local study area include the ABTP outfall (discharges treated water), ABTP seawall gates (discharge secondary bypass flows) as well as the four outfalls located in the north end of Ashbridges Bay (Figure 3-70). ABTP secondary bypass events occur during severe storms when the system becomes overloaded and secondary treated flows are discharged via the seawall gates. Sediment accumulation may also impact water quality via nearshore turbidity. Yet another factor is proximity to eroded materials from Tommy Thompson Park (Metro Toronto, 1989 cited in MMM, 2012). As a result, water in the Ashbridges Bay area has fairly high concentrations of nutrients, metals and bacteria.

The City of Toronto has completed a number of Class EA studies that will improve water quality in the Lake Ontario Coastal Zone and specifically the Ashbridges Bay area both directly and indirectly when implemented.

Firstly, the Coatsworth Cut CSO and Stormwater Outfalls Control Class EA (completed in 2007) identified the implementation of source controls, conveyance controls and end-of-pipe control stormwater management projects in the Coatsworth Cut sewershed. Recommended sewer infrastructure projects including upsizing storm sewers, raising existing weir elevations within the combined sewer system, and installing a new CSO storage/treatment tank have been completed. These recent projects will reduce the number of annual CSO events and help achieve F-5-5 guidelines (i.e., meet the provincial guidelines for combined sewer overflows) at the four outfalls discharging to Coatsworth Cut – Ashbridges Bay. A future project to be implemented from the Coatsworth Cut Class EA is a treatment wetland immediately south of the ABTP.

Secondly, the Don River and Central Waterfront Project Class EA Environmental (completed in 2012) recommended a new wet weather treatment facility to provide high-rate treatment of collected wet weather flows (from the lower Don River, Taylor Massey Creek, and the Inner Harbour) to be located south of the ABTP. The preliminary design of the tunnel collection and conveyance system for the Don River and Central Waterfront Project began in 2014.

Thirdly, a new outfall pipe for the ABTP (currently being designed) will relocate the outfall further from the Ashbridges Bay- Coatsworth Cut area.

The list of approved facilities in the vicinity of Ashbridges Bay is also provided in Section 3.5.3.2 [Future Infrastructure] of this ESR.

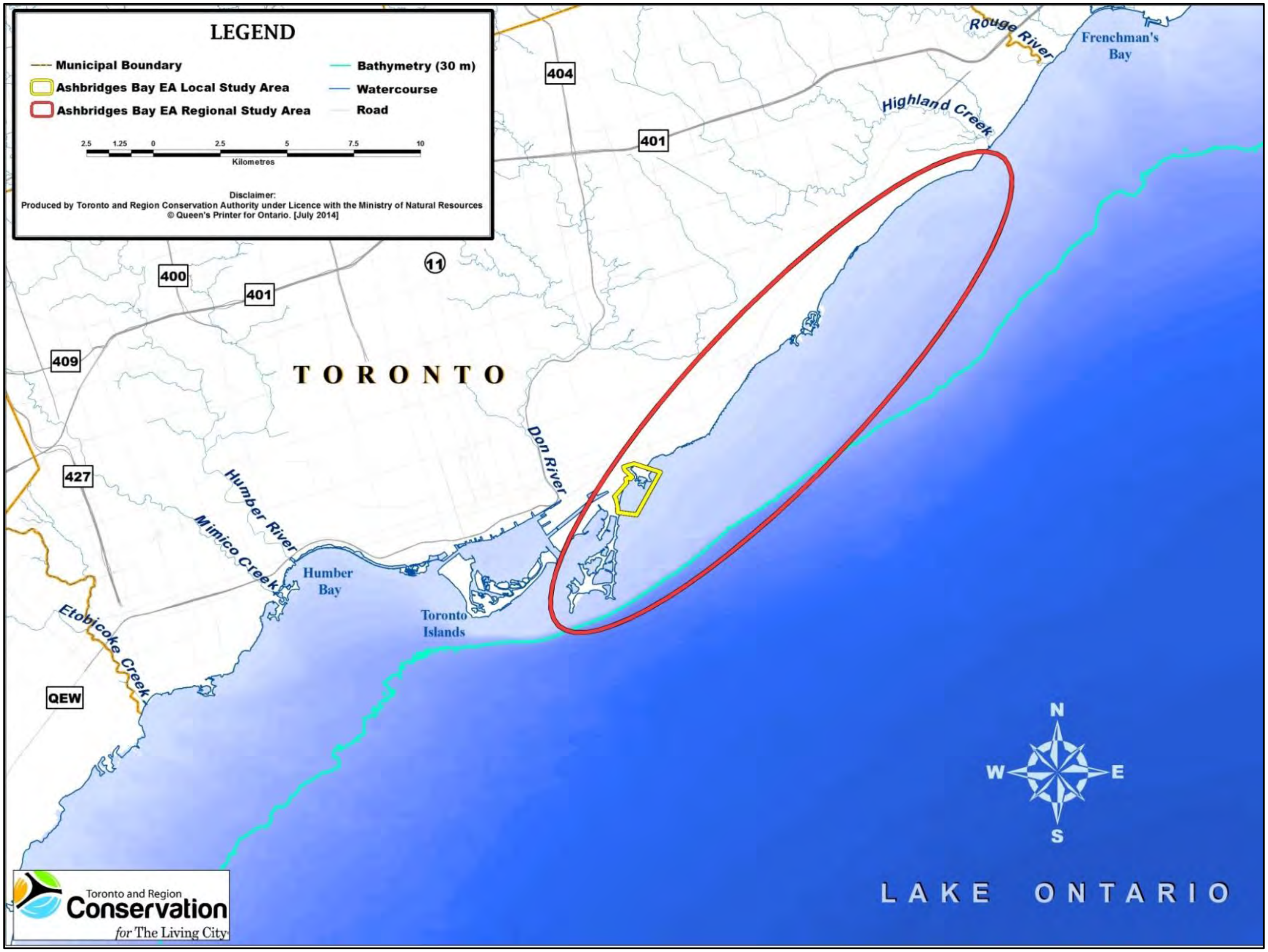

Figure 3-50. Lake Ontario Coastal Zone along the Toronto Waterfront.
Source: TRCA, 2014.

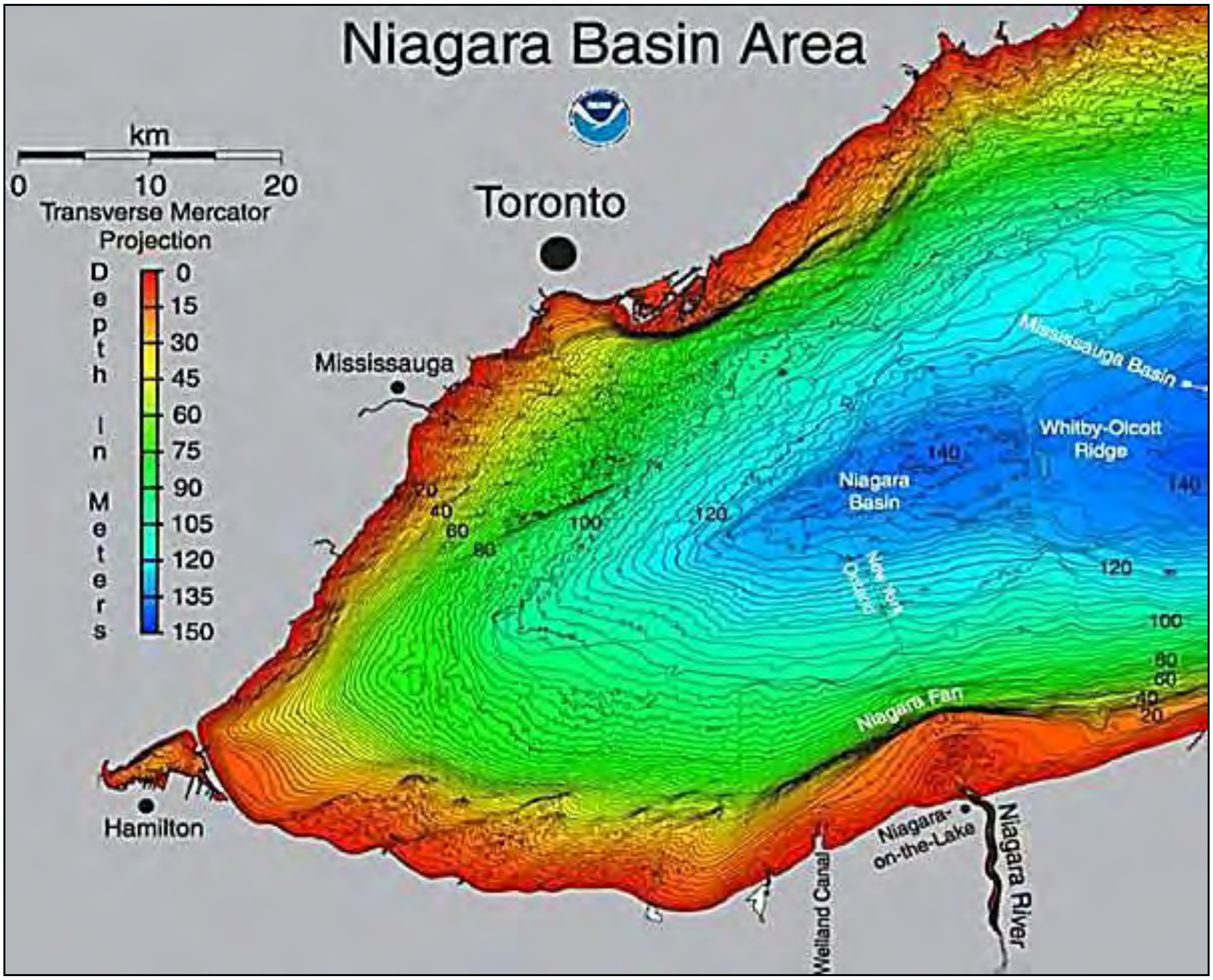

Figure 3-51. Depth contours of Lake Ontario (the Coastal Zone - the 30 m contour - is the edge of the red and yellow bands around Lake Ontario).
Source: National Oceanic and Atmospheric Administration, 2014.

3.2.17.2 Ambient Water Quality in the Ashbridges Bay area of the Lake Ontario Coastal Zone

This section summarizes ambient water quality conditions in the Lake Ontario Coastal Zone in the vicinity of Ashbridges Bay, drawing on data compiled by CH2M HILL et al (2014) and Environment Canada. Water quality information is provided for Total Phosphorus (TP), pH, Ammonia, *E. coli* and Dissolved Oxygen (DO) based on data collected from the water quality monitoring stations shown in Figure 3-52 and listed in Table 3-6.

As shown in Figure 3-52, in addition to the monitoring stations located within the Coastal Zone (particularly in the vicinity of the intakes for the R.C. Harris and F.J. Horgan Filtration Plants), a number of stations are located beyond the 30 m lake depth contour, reflecting the historical focus of long-term Federal Government programs on monitoring offshore water quality.

Table 3-6. Data Sources for Ashbridges Bay area of the Lake Ontario Coastal Zone.
Source: CH2M HILL et al, 2014.

Agency	Program	Station	Collection Period	Sampling Frequency	Parameters Measured
Lake Water Quality					
MOE	Toronto East Study	4060 and 4061	8/Apr/2008 to 10/July/2008	Monthly	*E. coli*, TP, pH
MOE	Drinking Water Surveillance Program (DWSP)	R. C. Harris, Toronto Island and F. J. Horgan Water Treatment Plants	1998-2007	1 to 4 times per year	TP, pH
Environment Canada	Great Lakes Surveillance Program (GLSP)	9 and 11	25/Mar/1980 to 5/Apr/2011	2 to 3 times per year (spring/summer/fall)	Ammonia, TP, pH, DO
City of Toronto	Water Treatment Plant Raw Water Sampling	R. C. Harris, Toronto Island and F. J. Horgan Water Treatment Plants	2/Jan/2007 to 19/Dec/2011	Daily	Ammonia, *E. coli*, pH
Physical Lake Characteristics					
Environment Canada	Great Lakes Surveillance Program (GLSP)	9 & 11	1998, 1999, 2001, 2003, 2005, 2006, 2008 and 2010	1 to 3 times per year (spring/summer/fall)	Thermographs
MOE	2008 Field Program	3223	8/Apr/2008 to 10/July/2008	30 mins	Currents, Thermographs
City of Toronto	2011/2012 ADCP Deployment	COT1, COT2A, COT3, COT4A, COT5	30/Aug/2011 to 25/Apr/2012	30 mins	Currents, Bottom Temperatures

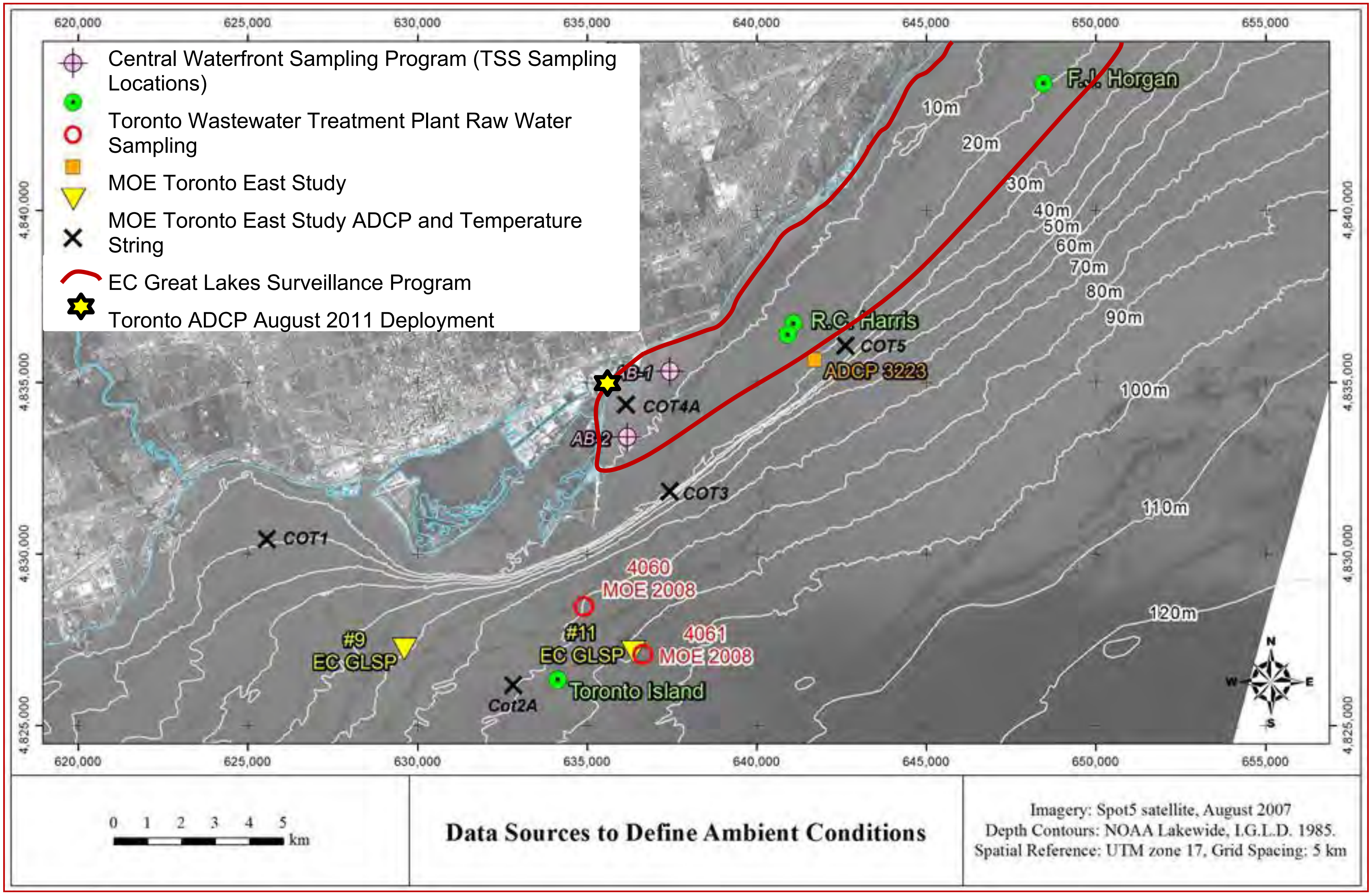

Figure 3-52. Map of Ashbridges Bay Coastal Zone and area monitoring stations.
Source: CH2M HILL et al, 2014.

3.2.17.2.1 Total Phosphorus

Total Phosphorus levels in the Ashbridges Bay area of the Lake Ontario Coastal Zone are in the order of 0.006 to 0.008 mg/L - below the Provincial Water Quality Objective (PWQO) of 0.02 mg/L - and reflect oligotrophic conditions. Oligotrophic conditions are characterized by low nutrient levels and resulting low algal productivity, ample supply of Dissolved Oxygen and generally clear waters.

The TP data are presented in Figure 3-53. The Environment Canada GLSP data were excluded for the period 1980 to 1995 to reflect the influence of decreasing lake loadings and the zebra mussel invasion. The same data are summarized in Table 3-7 as the seasonal 75^{th} percentile TP concentrations, as the 75^{th} percentile is used to define the ambient conditions for the mixing zone analysis.

Overall, TP levels in the Ashbridges Bay area of the Lake Ontario Coastal Zone correspond to the lake-wide TP concentrations, which have declined between the 1970's and present time. In the 1970s, lake-wide TP concentrations were in the range of 0.024 to 0.025 mg/L and plateaued in the 0.03 mg/L range (Figure 3-54). Relative to the PWQO of 0.02 mg/L, this level of water quality is classified as eutrophic, or associated with high levels of nutrients and thus increased algal productivity. Implementation of TP removal from detergents and wastewater treatment plants reduced the typical effluent discharge concentrations from the range of 10 mg/L to 1 mg/L over two decades, resulting in the PWQO being achieved by 1980, including in nearshore waters. TP continued to decline through the mesotrophic range (0.01 to 0.02 mg/L) in the 1980's. In the 1990's, the spread of non-native zebra mussels was credited with causing a further decline in algal and TP levels in nearshore waters and being associated with the corresponding decline in off-shore TP concentrations (Figure 3-54). As a result, offshore waters have reached oligotrophic, or nutrient-low, levels (less than 0.01 mg/L) in the past two decades.

Despite the general decline in lake-wide (both off- and nearshore waters) TP concentrations, TP levels in highly urbanized areas such as the Toronto Harbor remain higher than TP levels along the shorelines of a more rural character. As illustrated in Figure 3-53, TP concentrations in the Toronto Harbor were in the 0.015 – 0.025 mg/L (or 15 – 25 µg/L) range while TP levels in less urbanized areas such as those east of the Greater Toronto Area were generally below 0.01 mg/L (or 10 µg/L), as measured in the lake-wide surveys conducted in 2008. This is attributed to impacts associated with urban stormwater runoff, combined sewer overflows as well as treated wastewater discharge.

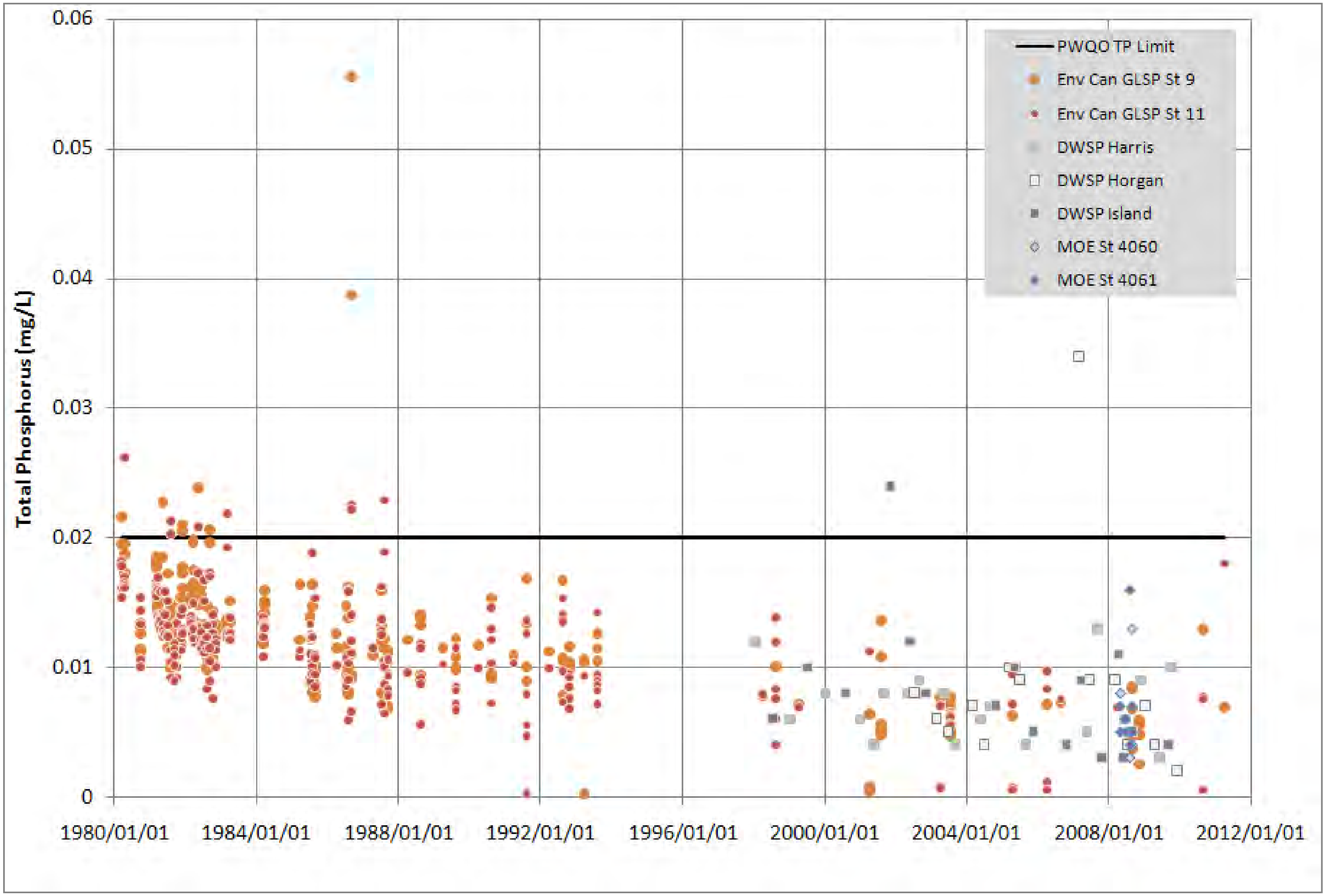

Figure 3-53. Time series of Total Phosphorus levels in Ashbridges Bay area of Lake Ontario.
Source: CH2M HILL et al, 2014.

Table 3-7. Summary of seasonal 75th percentile Total Phosphorus concentrations (mg/L) in Ashbridges Bay area of Lake Ontario.
Source: CH2M HILL et al, 2014.

Agency	Station	Number of Data Points	75th Percentile of all data	Winter (Dec – Feb)	Spring (Mar – May)	Summer (Jun – Aug)	Fall (Sep – Nov)
MOE DWSP (1998 to 2009)	R. C. Harris	4	0.009	-	-	0.005	0.010
	F. J. Horgan	5	0.007	0.006	0.008	0.004	-
	Toronto Island	4	0.007	-	0.009	0.005	-
MOE Field Program (2008)	4060	8	0.007	-	0.007	0.006	-
	4061	8	0.007	-	0.007	0.007	-
Environment Canada GLSP (1995 to 2011)	9	35	0.007	-	0.007	0.008	0.006
	11	33	0.008	-	0.008	0.008	-
Weighted Average			0.007	0.006	0.008	0.007	0.007
Mean			0.007	0.006	0.008	0.006	0.008
Standard Deviation			0.001	-	0.001	0.002	0.003

Notes:
Total Phosphorus PWQO is 0.02 mg/L

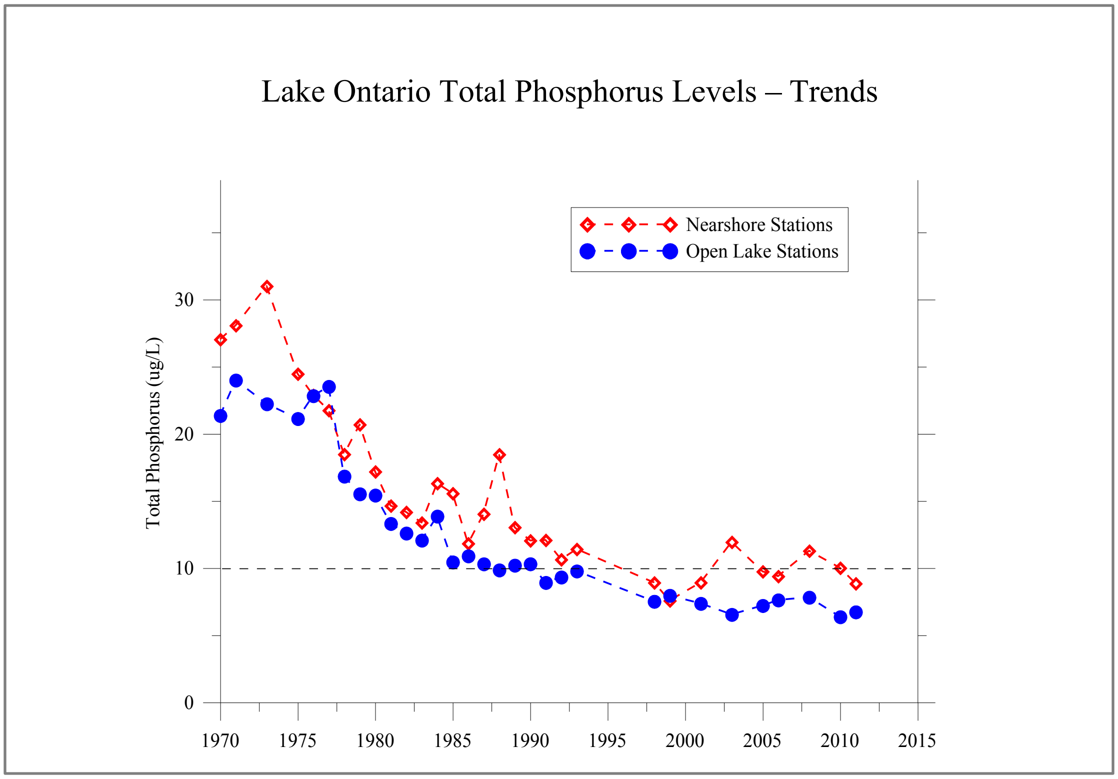

Figure 3-54. Total Phosphorus Concentrations for the period of 1970 to present.
Source: Dove, 2014.

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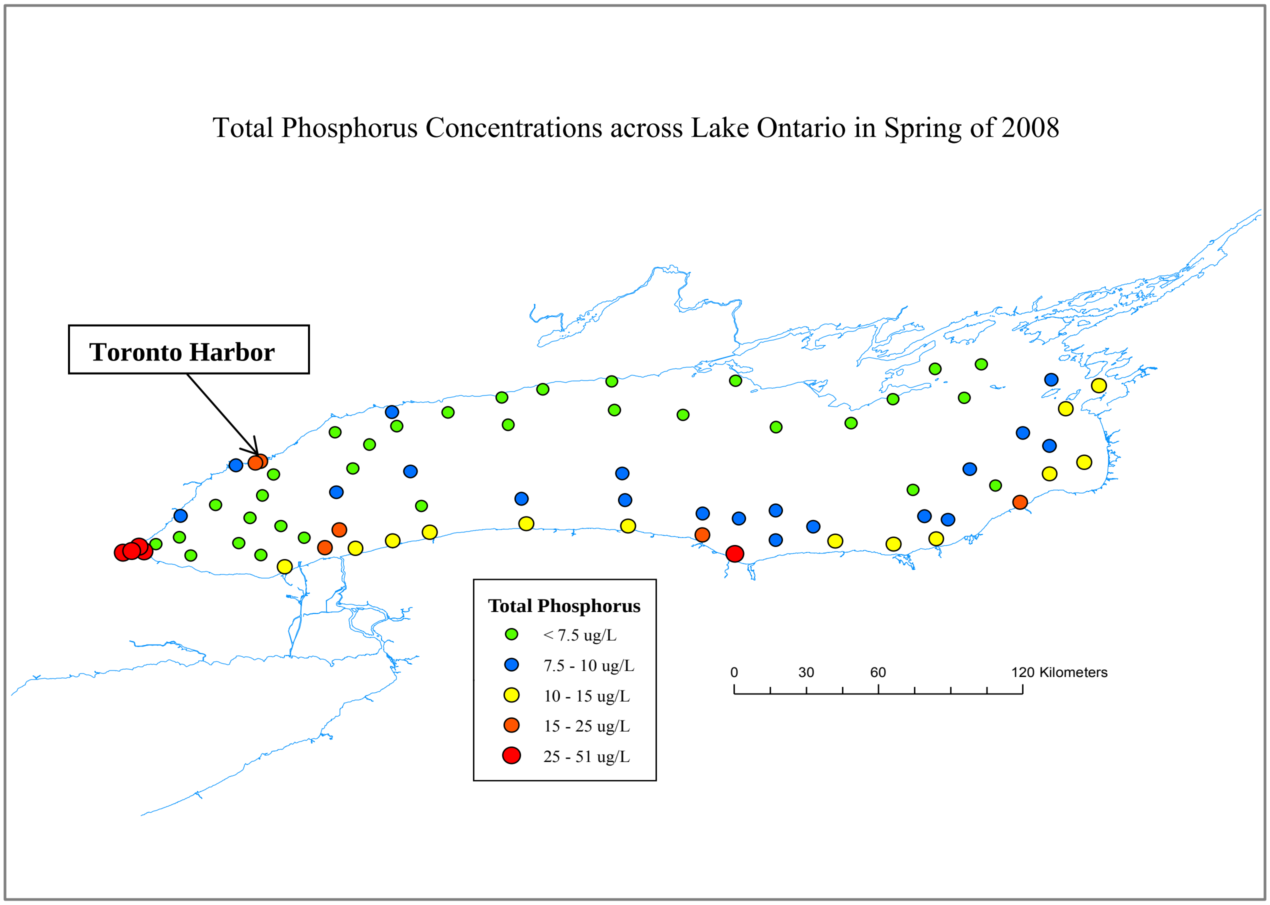

Figure 3-55. Distribution of Total Phosphorus concentrations across Lake Ontario in Spring of 2008.
Source: Dove, 2014.

3.2.17.2.2 pH and Ammonia

The un-ionized ammonia (UIA) concentrations in the Ashbridges Bay area of Lake Ontario Coastal Zone indicative of ammonia toxicity to aquatic life were found to be well below the PWQO of 0.02 mg/L, indicating excellent water quality with respect to this constituent.

UIA concentrations were calculated using pH, temperature and Total Ammonia-Nitrogen (TAN) measurements. The time series of pH values are shown in Figure 3-56: it was found that the seasonal 75th percentile pH levels ranged from 8 to 8.4. UIA values were found to be in the order of 0.3 to 0.4 ug/L - well below the PWQO of 0.02 mg/L, indicating excellent water quality with respect to unionized ammonia.

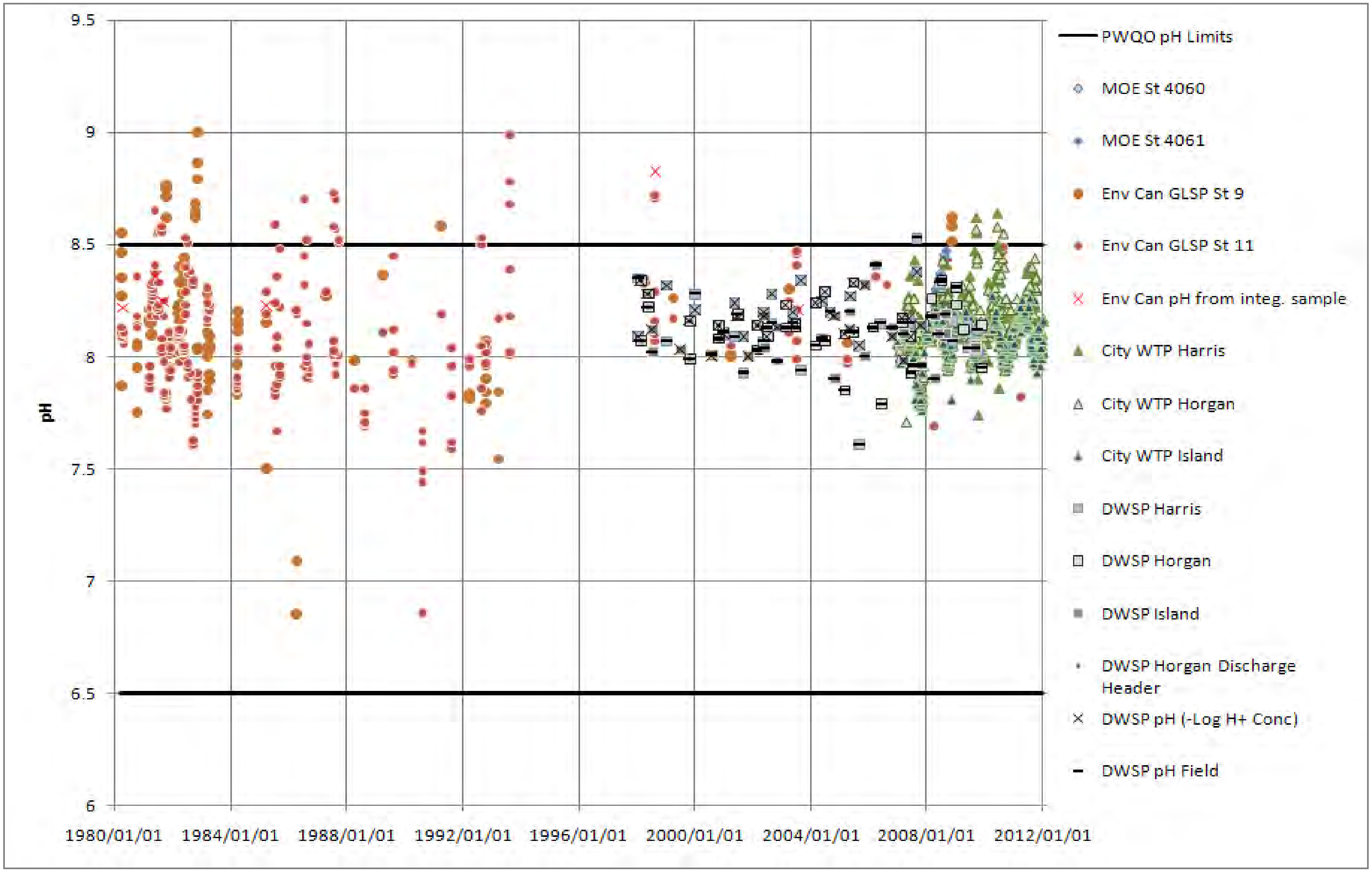

Figure 3-56. pH Measurements in Ashbridges Bay area of Lake Ontario Coastal Zone.
Source: CH2M HILL et al, 2014.

3.2.17.2.3 E. coli

Escherichia coli (*E. coli*) levels in the Lake Ontario Coastal Zone adjacent to Ashbridges Bay measured between 2007 and 2012 were detection limit (less than 1 Colony Forming Unit (CFU)/100 mL) and below the PWQO of 100 CFU/100 mL (Table 3-8, Figure 3-57), indicating excellent source and recreational water quality, respectively.

Figure 3-57 shows the measured time series data for *E. coli* in the Ashbridges Bay area of Lake Ontario and the maximum recorded *E. coli* concentrations are summarized in Table 3-8. As stated above, most of the *E. coli* values shown in Figure 3-57 were detection limit (less than 1 CFU/100 mL). The maximum recorded values were selected as a way of delineating the upper limit of observed data: the geometric mean of the maximum values recorded at each station was 10 CFU/100 mL. The observed *E. coli* levels meet the PWQO of 100 CFU/100 mL applicable to beach water quality at designated beaches. In addition, the observed data indicate excellent source water quality at the water treatment plant intakes (Dewey, 2011).

Another indicator of *E. coli* levels is provided by data collected to monitor beach water quality. The two beaches nearest to the Ashbridges Bay area which have monitoring information are the Woodbine Beach (partially in the local study area – see Figure 1-3) and the Kew-Balmy Beach (in the regional study area, immediately east of the Woodbine Beach). Ashbridges Bay and Coatsworth Cut are not used for swimming, but rather secondary contact uses such as sailing and boating. A summary of recent beach water quality monitoring at the Woodbine and Kew-Balmy beaches is provided in Table 3-9. The information is presented as the amount of time per swimming season (number of days, per cent of time) the beaches are posted. From 2007 to 2012, both the Kew-Balmy Beach and the Woodbine Beach met the requirements of the Blue Flag program, which requires that the beach be posted not more than 20 per cent of the swimming season.

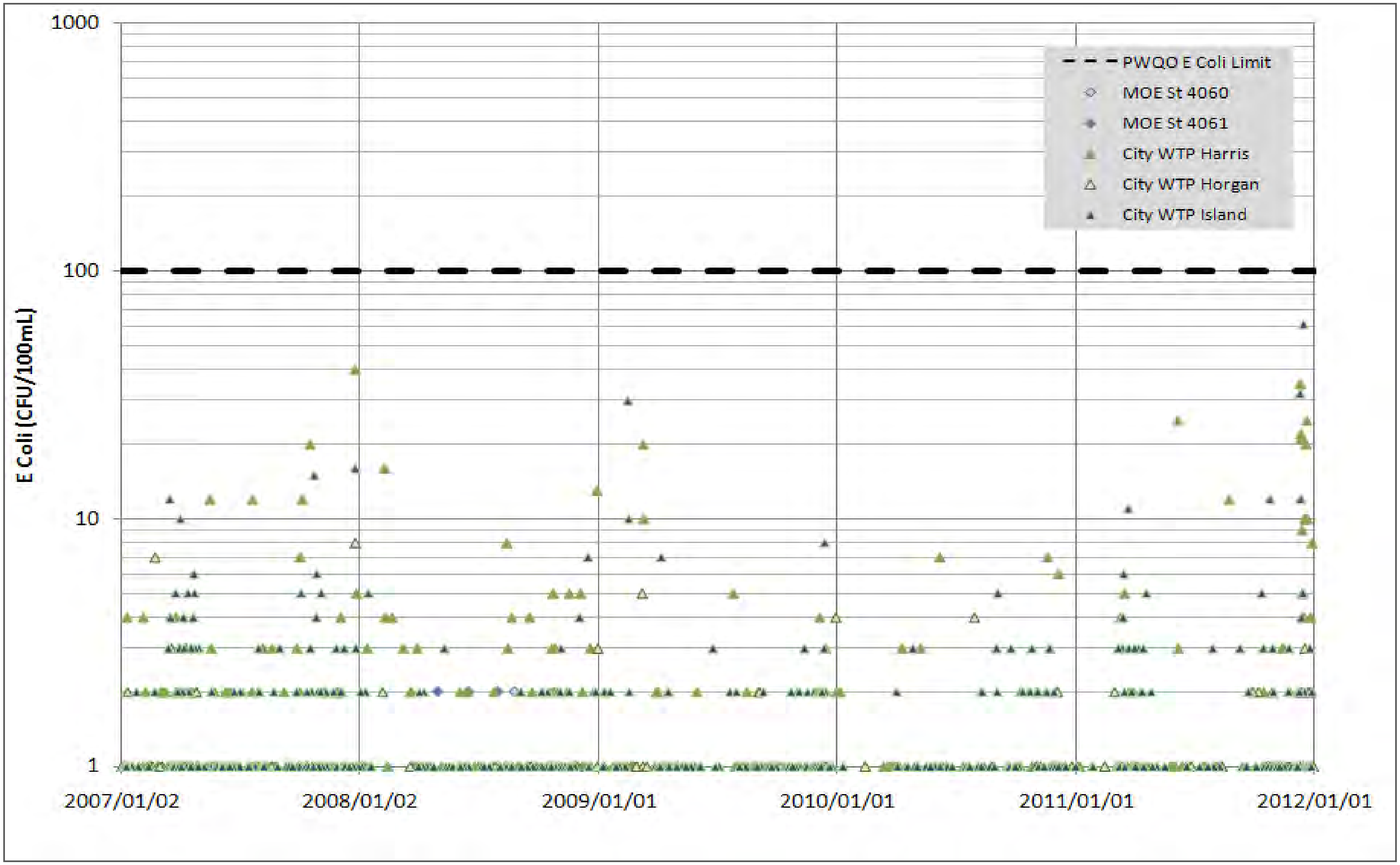

Figure 3-57. E. coli levels (CFU/100 mL) measured in the Ashbridges Bay area of the Lake Ontario Coastal Zone from 2007 to 2012.
Source: CH2M HILL et al, 2014.

Table 3-8. Summary of maximum recorded *E. coli* levels (CFU/100 mL) ambient conditions in the Ashbridges Bay area of the Lake Ontario Coastal Zone.
Source: CH2M HILL et al, 2014.

Agency	Station	Number of Data Points	All Data	Winter (Dec – Feb)	Spring (Mar – May)	Summer (Jun – Aug)	Fall (Sep – Nov)
WTP Raw Water Sampling (2007 to 2011)	R. C. Harris	1799	40	40	50	25	20
	F. J. Horgan	1804	8	8	5	4	2
	Toronto Island	1618	61	61	12	5	15
MOE Field Program (Spring/Summer 2008)	4060	5	2	-	2	2	-
	4061	4	2	-	2	2	-
Geometric Mean			10	27	7	5	8
Mean			8	40	5	4	15
Standard Deviation			27	27	20	10	9

Notes:
Recreational water PWQO for *E. coli* is 100 CFU/100 mL (geometric mean of at least 5 samples).
Station locations are shown in Figure 3-52.
Maximum values were used to define *E. coli* ambient conditions as the 75th percentile values were small (less than 5 CFU/100 mL) due to the majority of the samples having had a value of zero.

Table 3-9. Summary of beach closures at the Woodbine Beach and Kew-Balmy Beach, Toronto from 2005 to 2012.
Source: Patel, 2014.

Beach	2005		2006		2007		2008		2009		2010		2011		2012	
	Days	Per cent of time	Days	Per cent of time	Days	Per cent of time	Days	Per cent of time	Days	Per cent of time	Days	Per cent of time	Days	Per cent of time	Days	Per cent of time
Kew-Balmy	20	21	19	21	14	16	12	13	12	17	13	14	14	15	10	11
Woodbine	14	14	9	10	5	6	4	4	7	10	9	10	0	0	7	7

3.2.17.2.4 Dissolved Oxygen

Dissolved Oxygen (DO) levels observed in the Lake Ontario Coastal Zone adjacent to Ashbridges Bay area are indicative of excellent water quality with respect to DO.

DO measurements recorded are summarized in Table 3-10, which shows that the dissolved oxygen concentrations were approximately the maximum concentration that dissolved oxygen can attain at the respective spring-time and summer-time temperatures. Values observed indicate that the waters of the lake Coastal Zone adjacent to Ashbridges Bay have excellent water quality: the DO concentration values were well above the PWQO target range of 5 - 8 mg/L for cold water biota (e.g., coldwater fish species such as Rainbow Trout and Chinook Salmon) and 4 - 7 mg/L for warm water biota (e.g., warmwater fish species such as Largemouth Bass and Pumpkinseed) for Ontario's surface waters when the water temperature is between 0 and 20°C.

Table 3-10. Seasonal 25th percentile Dissolved Oxygen (mg/L) concentrations in Ashbridges Bay area of Lake Ontario Coastal Zone.
Source: CH2M HILL et al, 2014.

Agency	Station	Number of Data Points	All Data	Winter (Dec – Feb)	Spring (Mar – May)	Summer (Jun – Aug)	Fall (Sep – Nov)
Environment Canada GLSP (2003 to 2010)	9	4	-	-	-	10.9	-
	11	6	-	-	13.7	10.2	-
Weighted Average			-	-	13.7	10.6	-
Mean			-	-	13.7	10.6	-
Standard Deviation			-	-	-	0.5	-
Notes: Station locations are shown in Figure 3-52. Dissolved Oxygen was averaged over depths of 0 to 20 m.							

3.2.17.2.5 Water Clarity, Total Suspended Solids and Secchi Disk Depth

In the 1970's and 1980's, Lake Ontario water clarity was routinely measured in offshore waters as a part of the Great Lakes surveillance program undertaken by Environment Canada using Secchi disk depth as an indicator. Water clarity was historically dominated by algal composition, water colour and turbidity (suspended solids). In the recent decade, measurements related to water clarity have been sparse.

There is limited data available for Total Suspended Solids (TSS) concentrations in the Ashbridges Bay area of the Lake Ontario Coastal Zone. TSS concentrations were measured in the City of Toronto's Central Waterfront Sampling Program, where values in the order of 2 mg/L were measured in the surface waters at stations AB-1 and AB-2 (Figure 3-52) in the Fall of 2010 (CH2M HILL et al*,* 2014). While no directly applicable PWQO value is available, values observed were well below the TSS level of 10 mg/L which is considered to be the upper limit for TSS level in source water used by the City of Toronto filtration plants.

3.2.17.2.6 Biomonitoring

Biomonitoring data collected in the local study area showed that the levels of contaminants analyzed (PAHs, metals, organochlorine pesticides (OC pesticides) and PCBs) generally corresponded to the concentrations found in other highly urbanized areas of the Toronto waterfront such as the Inner Harbor slips.

To assess water quality in Ashbridges Bay, TRCA has an ongoing monitoring program where it uses freshwater mussels *Elliptio complanata* as bioindicators. Bioindicators are organisms whose change (e.g., change in mussel tissue concentrations of various substances) points to altered environmental conditions, thus providing a time-integrated estimate of past environmental conditions.

TRCA used *Elliptio complanata* to determine the presence of bioavailable contaminants within the water column of the Bay. Contaminant concentrations from the two locations (Ashbridge's Bay Yacht Club Marina and Ashbridges Bay) in the project local study area were compared to concentrations found in the Control sample (mussels taken from an uncontaminated water body). Parameters analyzed included PAHs, metals, organochlorine pesticides (OC pesticides) and PCBs. PAHs and metals analysis results from 2008, 2009, 2010 and 2012 (2011 data set was incomplete and thus not included in this review) are included in Appendix D.

Overall, the results from Ashbridges Bay sampling locations were consistent with the results observed in other urbanized areas along the waterfront such as the Inner Harbor slips (TRCA, 2012). Both OC Pesticides and PCBs analysis parameters were below the detection limit. The majority of the PAHs analysis parameters concentrations did not exceed the Control sample values. Where they did, PAHs concentration exceedances were fairly small in magnitude and did not occur on an annual basis. Presence of PAHs within the local water column may be attributed to urban runoff and the area uses, especially recreational boating which is associated with petroleum fuel consumption, as it is petroleum hydrocarbon products and a variety of combustion processes and products such as vehicle exhaust that are considered to be major sources of PAHs (CCME, 2010). A number of metals such as Copper and Zinc showed exceedances when compared to the Control sample. These may be attributed to the naturally-occurring differences in background metal concentrations as well as the area uses and local discharges.

3.2.17.3 Source Specific Water Quality

This section summarizes forecasted concentrations of water quality constituents in specific discharge sources that influence water quality in the local study area.

These local land based discharges include the following:

- ABTP treated effluent discharged via the plant outfall;
- Discharge from the four combined sewer (CS) and storm sewer (SS) outfalls located in the north end of Ashbridges Bay;
- ABTP bypass flow discharged via the plant seawall gates when plant flows exceed the hydraulic capacity of the plant (severe wet weather events); and
- Flows from the Toronto Inner Harbor.

The City of Toronto Lake Ontario MIKE-3 water quality model was used to provide a spatial description of existing water quality conditions in the Ashbridges Bay – Coatsworth Cut area as there is a paucity of detailed local nearshore water quality monitoring information. The City's water quality model is a mass-balance model which uses constituent loadings and water flow rates from land based sources and currents within the Lake in order to estimate Lake ambient conditions.

Water quality was examined for the following four constituents: Total Phosphorus, Total Suspended Solids, *E. coli* and Copper, where TP and *E. coli* were used as the main constituents in the evaluation of the remedial alternatives, with TP serving as an indicator of eutrophication and *E. coli* as an indicator of recreational water quality.

The detailed documentation of the forecasting methodology as well as characterization of the land based discharges listed above is provided in Dewey (2014a) (included in Appendix I). Section 4.3.3.1 [Physical Environment] describes the results of the remedial alternatives evaluation with respect to potential impacts on water quality.

3.2.17.3.1 ABTP Outfall

The ABTP outfall discharges treated wastewater approximately 1 km offshore, with the final effluent meeting or surpassing the requirements of the ABTP Environmental Compliance Approval. The average concentrations of constituents examined for the purposes of this EA – Total Phosphorus, water quality of the ABTP outfall, used in this study, are provided in Table 3-11.

Table 3-11. Average pollutant concentrations in the ABTP outfall.
Source: Dewey, 2014a.

Parameter	Concentration	
	Mean	**Peak**
Total Phosphorus	1 mg/L	1.29 mg/L
Total Suspended Solids	9.4 mg/L	100 mg/L
Copper	0.05 mg/L	0.15 mg/L
E. coli	5.5 CFU/100 mL	235 CFU/100 mL

3.2.17.3.2 Combined and Stormwater Sewer Outfalls

There are four combined and stormwater sewer outfalls located in the north end of Ashbridges Bay that serve as significant determinant of water quality in the Bay. Average pollutant concentrations in the discharge from these sewers, determined in the City of Toronto Wet Weather Flow Management Master Plan studies, are shown in Table 3-12.

Table 3-12. Average pollutant concentrations during Ashbridges Bay combined and storm sewer outfalls discharge events.
Source: Dewey, 2014a.

Parameter	Concentration
Total Phosphorus	0.36 mg/L
Total Suspended Solids	92 mg/L
Copper	0.025 mg/L
E. coli	430,000 CFU/100 mL

3.2.17.3.3 ABTP Secondary Bypass Events

ABTP secondary bypass events constitute another contributor to the water quality in Ashbridges Bay, especially at the shoreline of the Bay since the treated effluent is discharged approximately 1000 m offshore via the plant outfall pipe (CH2M HILL et al, 2014; Toronto Water, 2013).

Bypass events take place during heavy rainfall or snowmelt when high flows cause the treatment plant system to overload and result in discharge of secondary treated waters into Lake Ontario via the plant seawall gates. In 2012, there were nine secondary treatment bypass occurrences where portions of the flow received primary treatment before being disinfected and discharged into Lake Ontario. These occurrences were attributed to high wet weather flows that exceeded the plant's secondary treatment capacity (Toronto Water, 2013). A summary of the 2012 bypass events, including the volume of flow discharged is presented in Table 3-13. Seawall gates discharge constituent concentrations are listed in Table 3-14. As part of the water quality modelling undertaken for this EA (Dewey, 2014a), simulated parameter concentrations based on a disinfection failure during bypassing were used to characterize the *E. coli* quality of the seawall gate discharge. This is therefore conservative, as discharge from the seawall gates does normally undergo chlorination which provides disinfection treatment.

Table 3-13. 2012 Bypass events summary, Ashbridges Bay Treatment Plant.
Source: Toronto Water, 2013.

No.	Date	Duration (hr)	Volume (m^3)
1	3-May	4.62	152,722
2	1-Jun	12.5	603,616
3	15-Jul	3.45	135,852
4	25-Jul	6.02	146,533
5	31-Jul	3.67	137,774
6	10-Aug	3.65	121,507
7	27-Aug	2.48	51,614
8	4-Sep	4.15	138,620
9	8-Sep	6.33	286,522
Total annual bypass volume (m^3)			1,774,760

Table 3-14. Seawall gates discharge constituent concentrations.
Source: Dewey, 2014a.

Parameter	Concentration
Total Phosphorus	2.5 mg/L
Total Suspended Solids	600 mg/L
Copper	0.025 mg/L
E. coli	1,000,000 CFU/100 mL

3.2.17.3.4 Flows from the Inner Harbour

Studies undertaken in support of the Credit Valley, Toronto and Region and Central Lake Ontario Source Protection Region Study (Dewey, 2011) and the Don River and Central Waterfront EA (Dewey, 2012) have demonstrated that water quality in Lake Ontario's Coastal Zone adjacent to Ashbridges Bay is also influenced by outflows from the Inner Harbor through the Eastern Gap.

River flow rates and pollutant concentrations (see Dewey, 2012), calculated for the Don River from the Don River and Central Waterfront EA studies and used together with hydrodynamic mixing patterns between the Lake Ontario Coastal Zone and Inner harbor, were used to define outflow concentrations through the Eastern Gap to the environs of the local study area.

3.2.17.4 Existing Water Quality in the Study Area

Section 3.2.17.2 [Ambient Water Quality in the Ashbridges Bay area of Lake Ontario Coastal Zone] summarizes ambient water quality information available for the Ashbridges Bay - Coatsworth Cut study area and the adjacent waters of Lake Ontario. There is a paucity of water quality information available within the EA local study area, particularly data capturing the spatial variability within Ashbridges Bay and the ABYC marina caused by discharges from the Ashbridges Bay outfalls and the ABTP outfall and seawall gates discharge points. Accordingly, a modelling tool was used to estimate spatial variations in existing water quality within the local study area, which are described below.

Specifically, the City of Toronto Lake Ontario MIKE-3 hydrodynamic and water quality model is used to provide a spatial description of existing water quality conditions in the project local study area. The City's water quality model is a mass-balance model which uses constituent loadings and water flow rates from land based sources and currents within the Lake to estimate ambient conditions.

The Wet Weather Flow Management Master Plan (WWFMMP) (2003) study evaluated ten constituents to relate the effects of urbanization and specifically storm water runoff on receiving waters including water courses and the coastal zone of Lake Ontario. The constituents were grouped into broad categories of nutrients (TP, Total Nitrogen and Nitrate), turbidity related (Total Suspended Solids), recreational water quality (*E. coli*), heavy metals (Total Copper, Total Zinc and Total Lead) and representative organic compounds (Dieldrin, Benzo(G,H,I)perlene). The subsequent Environmental Assessment Study for Coatsworth Cut (CH2M HILL 2007) focused on a smaller sub-set of constituents – TP, TSS, *E. coli*, and Copper - for evaluating changes in water quality due to the treatment wetland. The same four constituents were evaluated in this study.

3.2.17.4.1 Modelling Methodology for Evaluation of Water Quality in the Study Area

The objective of the modeling exercise carried out for the Ashbridges Bay – Coatsworth Cut area was to predict water quality characteristics in Ashbridges Bay and surrounding waters for both existing conditions and changes caused by the construction of the sediment and erosion control structures proposed by TRCA as part of the Ashbridges Bay Erosion and Sediment Control Class EA project. The proposed design alternatives involve different erosion control structures configurations in the near shore waters which affect how lake currents and resultant water quality are altered within the Study Area, and are described in Section 4.2 [Alternatives Description].

The City of Toronto's Lake Ontario MIKE-3 hydrodynamic and water quality model has been previously used by the City to evaluate the effects of the proposed Ashbridges Bay Treatment Plant (ABTP) Outfall, the Don River and Central Waterfront EA Project study, and the WWFMMP study.

The MIKE-3 hydrodynamic model uses a 2-dimensional wind field developed by the US National Oceanic Atmospheric Administration as the predictive tool for developing wind stresses which are the major forcing function causing current speed and direction within Lake Ontario.

The computation scheme for the lake model is to model the entire lake at a resolution of 2430 m, and then to use smaller, nested grids whose resolutions are 810, 270 and 90 meters, respectively, to focus on the study area (see Dewey, 2014a (Appendix I) for further information). For this project, it was necessary to use a 30 m nested grid within the 90 m domain, as the widths of the proposed sediment control structures are smaller than 90 m and closer to 30 m.

The model used in Dewey (2014a), is a smaller version of the ABTP Outfall study model (Dewey, 2014b). The ABTP model has been extensively calibrated and verified with Acoustic Doppler Current Profile (ADCP) data at several locations within the 270m and 810 m domains (Dewey, 2014a).

Lake-wide concentrations were used as initial conditions. Because the hydrological residence time of Lake Ontario is of the order of eight years, these initial conditions correspond to the concentrations of the evaluated constituents in the Lake Ontario Coastal Zone for the length of the five month simulation period. The following concentrations (Dewey, 2014a) are used for Lake Ontario conditions:

- TP – 0.007 mg/L
- *E. coli* – 0 CFU/100 mL
- TSS – 0 mg/L
- TCu (Total Copper) – 0 mg/L

For calibrating the water quality model, *E. coli* was assigned a first order decay coefficient of $1.1E^{-5}$ day^{-1} (a decay rate derived from the 2003 WWFMMP study) while the other constituents - TP, TSS, and Total Copper - were modeled as conservative substances (i.e., with a decay coefficient of 0).

The modeling principles, calibration of the City's lakefront water quality model, as well as detailed results for constituents considered in this study - TP, TSS, *E. coli* and TCu - are provided in Dewey (2014a) (Appendix I).

3.2.17.4.2 Estimated Spatial Variations for Existing Water Quality Conditions in the Study Area

This section graphically summarizes spatial water quality variations within the environs of the Ashbridges Bay – Coatsworth Cut area which are due to discharges from the ABTP outfall, outfalls located in the north end of Ashbridges Bay and the ABTP seawall gates, as well as ambient lake water quality in the greater Lake Ontario Coastal Zone.

A spatial representation of how TP, TSS, *E. coli* and TCu levels in the Ashbridges Bay – Coatsworth Cut area are influenced by these discharges is provided in Figures Figure 3-58 to Figure 3-61. The simulated concentrations are shown as average concentrations for a six month period (April 1 to October 31) using 1991 meteorological conditions.

As shown in Figure 3-58 to Figure 3-61, the existing water quality in the Ashbridges Bay area is affected by the storm sewer discharges located in the north end of the Bay for all four constituents. In addition, the waters adjacent to ABTP are affected by discharges from the plant seawall gates for TCu and TSS. Ashbridges Bay and the near-shore area adjacent to the seawall gates together with a broader area to the west of the sea-wall gates are affected by TP discharges.

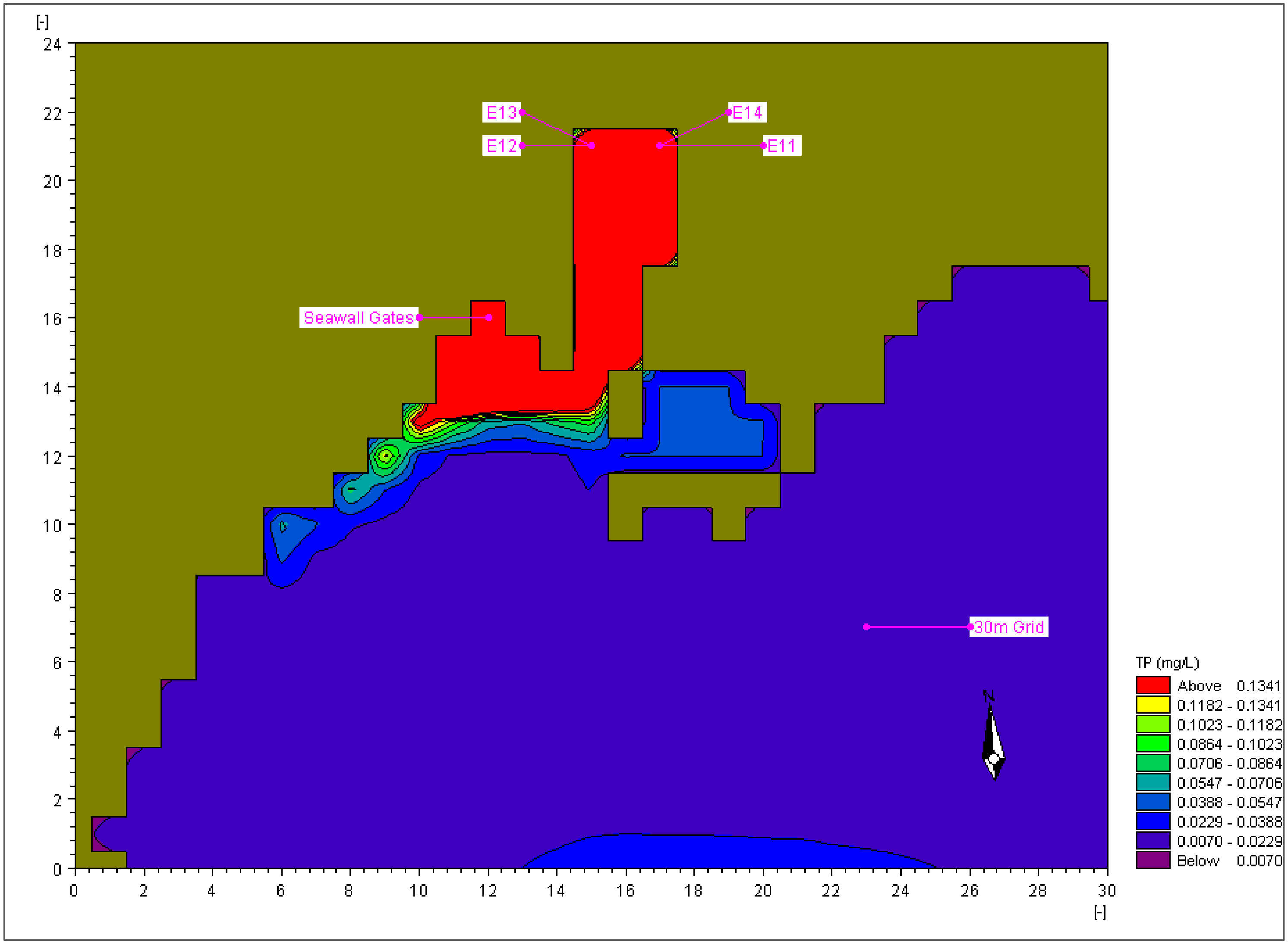

Figure 3-58. Spatial variations in Total Phosphorus levels within the local study area – existing conditions.
Source: Dewey, 2014a.

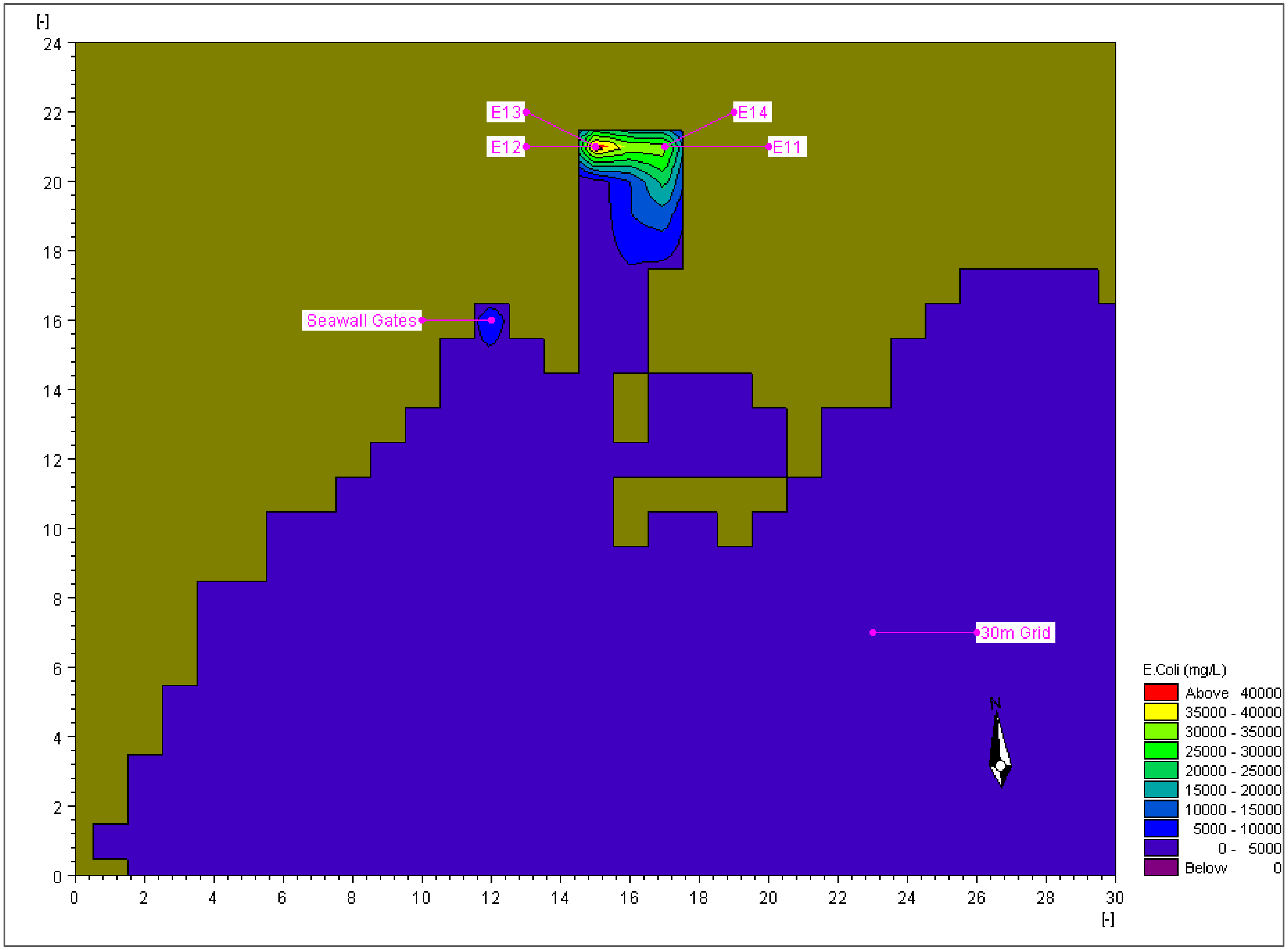

Figure 3-59. Spatial variations in *E. coli* levels within the local study area – existing conditions.
Source: Dewey, 2014a.

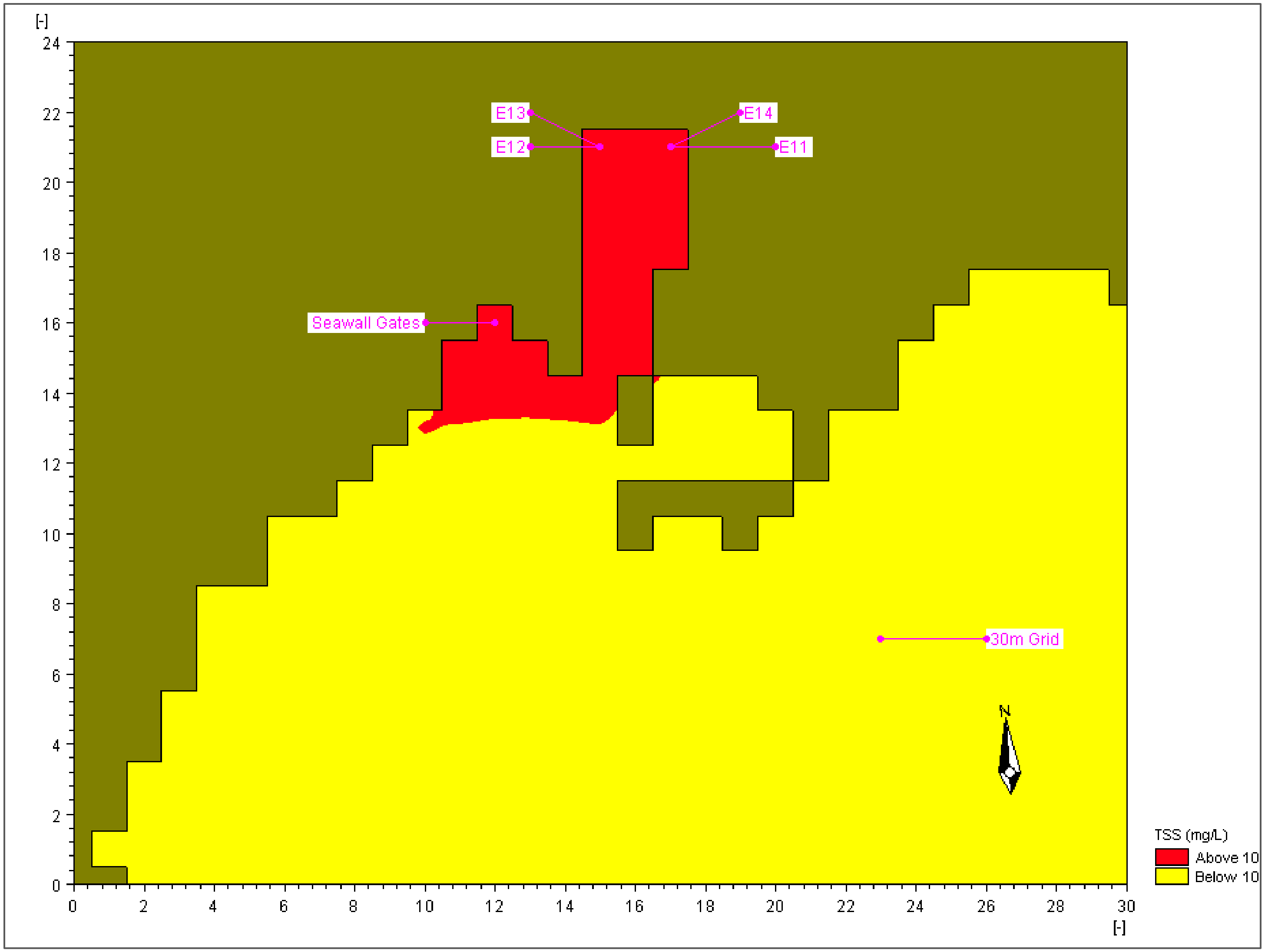

Figure 3-60. Spatial variations in Total Suspended Solids levels within the local study area – existing conditions.
Source: Dewey, 2014a.

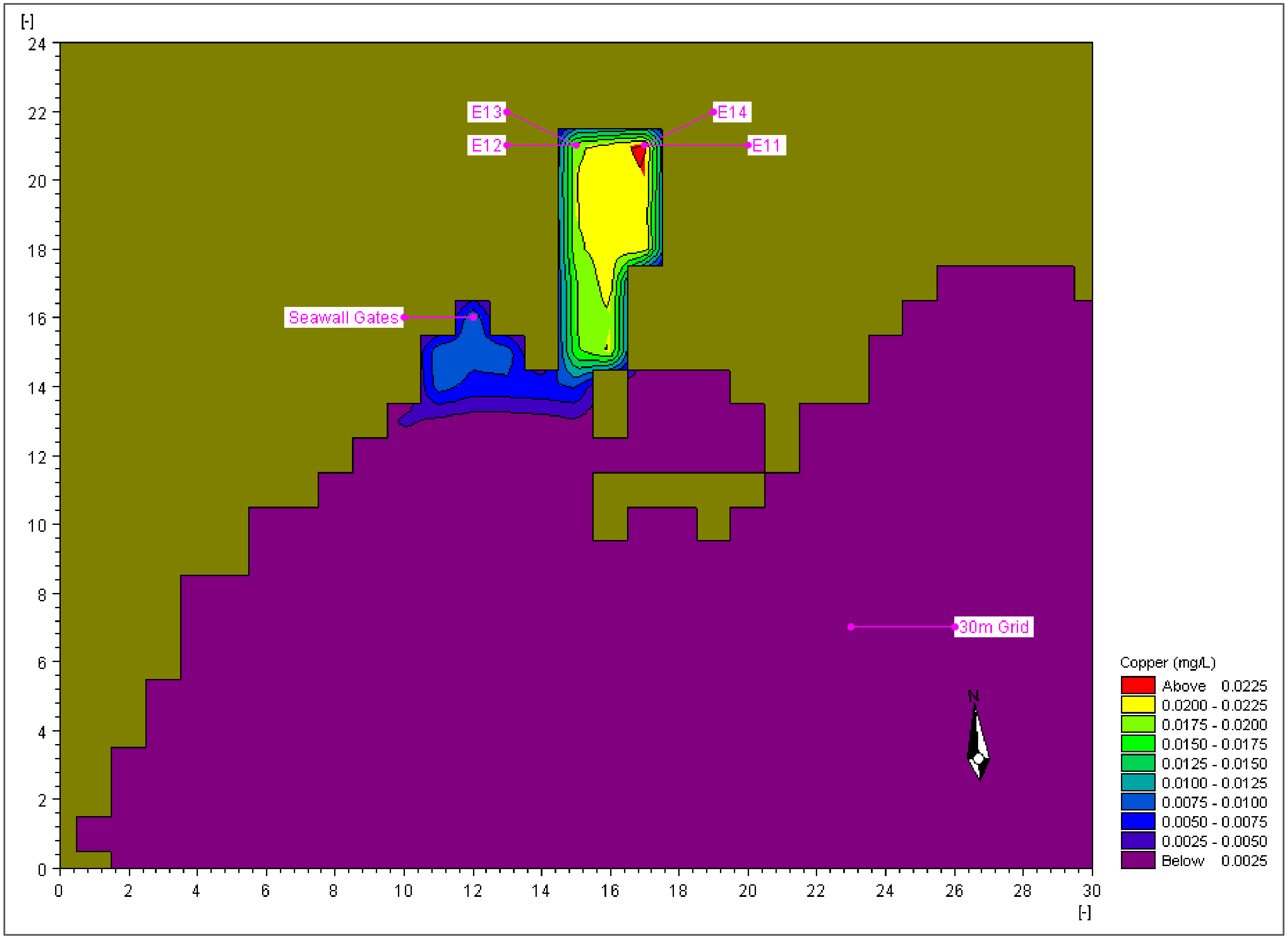

Figure 3-61. Spatial variations in Copper levels within the local study area – existing conditions.
Source: Dewey, 2014a.

3.2.18 Soil/Fill Quality

The entire project local study area landforms were determined to be fill-based, with the in-filling having taken place mainly in the 20th century (1970's and earlier). The lakefill is primarily composed of construction rubble, riprap and armourstone.

Fill quality tests within the project local study area were not undertaken. As the infilling took place prior to current guidelines, the intention of any undertaking in the project local study area would be to minimize the lakefill disturbance. If excavation is required per the preferred alternative detailed design, soil/fill quality testing will be undertaken.

Natural deposits of sand and silty clay occur in surrounding waters. Surficial sediment chemistry analysis is conducted for Coatsworth Cut, where it is associated with dredging, as well as the Boat Basin for the purposes of the ongoing TRCA environmental monitoring program. Further information is found in Section 3.2.19 [Sediment Chemistry].

3.2.19 Sediment Chemistry

In addition to background levels of various organic and inorganic substances, a wide variety of organic compounds and metals enter the aquatic ecosystem from industrial, agricultural and urban sources. The contaminants are adsorbed onto suspended particles and eventually settle to the sediments. In high enough concentrations, they may exert toxic effects on aquatic life and indirectly affect human health as well. Sediment analysis results were compared to the Provincial Sediment Quality Guidelines Lowest Effect Level (LEL) and Severe Effect Level (SEL) concentrations (Appendix C). According to the Sediment Quality Guidelines, LEL indicates a level of contamination that is tolerated by the majority of sediment-dwelling organisms and sediments meeting the LEL are considered clean to marginally polluted. SEL indicates a level of contamination that is detrimental to the majority of the sediment-dwelling organisms and sediment meeting SEL are considered heavily contaminated (Fletcher et al, 2008).

Sediment chemistry in the project local study area has been monitored via analysis of surficial sediment in the Boat Basin as well as the Coatsworth Cut entrance. The analytes measured include metals (e.g., Arsenic), nutrients (e.g., Phosphorus), PAHs and synthetic organic chemicals such as OC pesticides and PCBs. Sediment texture was defined as well.

3.2.19.1 Surficial Sediment Monitoring at Ashbridge's Bay Yacht Club Boat Basin

This section presents an overview of the surficial sediment chemistry monitoring results from 2008 to 2012. During this period, TRCA collected Boat Basin sediment samples in 2008, 2010, 2011 and 2012. In addition to sediment texture identification, parameters measured included metals, PAHs, nutrients and OC pesticides. Metals, nutrients, PAHs and texture analysis results are included in Appendix D. PCBs and OC pesticides analysis parameters were below the laboratory detection limit and did not exceed LEL or SEL.

Metals analysis results indicated that, while no metals exceeded SEL concentration, four – Chromium, Total, Copper, Lead and Nickel – exceeded LEL in all years of monitoring from 2008 to 2012, and Cadmium, Iron and Mercury exceed LEL in 2011, 2011-2012 and 2012, respectively. LEL exceedances by a number of metal analysis parameters may be attributed to the high degree of area urbanization.

Nutrients analysis results showed that Phosphorus, Total Kjeldahl Nitrogen and Total Organic Carbon exceeded LEL in 2008, 2010, 2011 and 2012. At the same time, no SEL exceedances were found. Given the presence of four outfalls periodically discharging storm and combined sewer flows in the project local study area, these findings are not unexpected.

PAHs analysis results showed that a number of parameters exceeded LEL. In particular, Pyrene exceeded LEL in all four years of monitoring from 2008 to 2012. Chrysene, Dibenzo(a,h)anthracene, Fluoranthene and Phenanthrene exceeded LEL in 2010. No parameters exceeded SEL. Similarly to the biomonitoring study results (Section 3.2.17.2.6 [Biomonitoring]), it is not surprising to find Boat Basin sediment exceed a number of PAH analysis parameters given the area uses such as recreational boating as well as the urban runoff the area receives.

Finally, surficial sediment texture analysis results indicated that the sediment within the Boat Basin consisted mainly of sand and silt.

Generally, metals and other contaminants bound to sediment particles are not harmful to organisms in low enough concentrations. Yet, at high enough levels, these substances pose a certain degree of risk to aquatic life. However, a recent review of sediment and benthic conditions in the Toronto area found that local benthic community has demonstrated improvements over time, sediments were not acutely toxic to a number of test organisms, concentrations of various metals and organic contaminants such as PCBs in sediment were consistent with what might be expected in a large urban area and that chronic sediment toxicity tests indicated that sediment physical make-up rather than contaminants were responsible for the observed responses in the test organisms (Golder Associates, 2012).

3.2.19.2 Coatsworth Cut Surficial Sediment

Coatsworth Cut has been regularly dredged to maintain navigation in the area (see Section 3.2.13.1 [Review of Dredging Records] for more information on dredging frequency and volumes of material removed). Prior to dredging, sediment within the Cut is subjected to contaminant testing in order to dispose of the material appropriately. Parameters analyzed typically include various metals, inorganics, hydrocarbons and Volatile Organic Compounds (VOCs). Sediment analysis results are evaluated as per the intended usage criteria (e.g., Confined Fill Guidelines, MOE) and the removed material is used or disposed accordingly.

3.2.20 Existing Transportation Routes

Located in a highly urbanized environment, the project local study area is surrounded by an extensive road network, from local roads with less than 2,500 vehicles per day to arterial roads and two expressways (the Gardiner Expressway and the Don Valley Parkway). Public transit and multi-use pathways are present as well.

Lake Shore Boulevard East is a four lane arterial road that runs immediately north of Coatsworth Cut. The closest main north-south connection to Lake Shore Boulevard East is Coxwell Avenue. To the west, Lake Shore Boulevard East connects with the Gardiner Expressway and the Don Valley Parkway, which provide rapid inter-regional access to the project local study area. The Gardiner Expressway is an eight lane divided highway providing access to the downtown core and western side of the City. The Don Valley Parkway constitutes an express route through the central portion of the City and to northern regions. To the east, Lake Shore Boulevard becomes Woodbine Avenue which directs traffic northbound, connecting with Kingston Road. Kingston Road is a four lane artery which runs parallel to the project regional study area.

The area is well serviced by public transit provided by the Toronto Transit Commission (TTC). East-west transportation is facilitated via the Streetcar routes 501 and 502 running along Queen Street East and can be accessed several blocks north of the project local study area. North-south public transit is available via Leslie Street (Route 83), Coxwell Avenue (Route 22) and Woodbine Avenue (Route 92).

As part of the Streetcar fleet renewal process, TTC is currently constructing a new maintenance and storage facility ("Leslie Barns") southeast of Leslie Street and Lakeshore Boulevard East. In addition to the facility, the project will provide the connection tracks to the existing TTC streetcar network and include a number of utility upgrades and streetscape enhancements (TTC, 2013).

Cycling and pedestrian transportation is provided by a multi-use pathway portion of the Martin Goodman Trail-Waterfront Trail located partially within and adjacent to the project local study area. Immediately north of Coatsworth Cut, a major multi-use pathway runs along Lakeshore Boulevard East, and a small network of minor multi-use pathways is located within the Ashbridge's Bay Park. Ashbridge's Bay Park also serves as one of the main Waterfront Trail access points with available parking (Waterfront Regeneration Trust, 2013).

3.2.21 Microclimate

Microclimate is defined as the climatic condition of a small area resulting from the modification of the generic climatic conditions (Conservation Ontario, 2013). In turn, climatic conditions are determined by variables such as temperature, humidity, atmospheric pressure, wind and precipitation.

No detailed investigations of the project local study area microclimate conditions such as shading, windscreening and snow accumulation have been undertaken to date. Should the potential for negative impacts arise, necessary impact assessment studies will be carried out.

3.2.22 Climate Change

Climate change is a variation in the long-term weather patterns of temperature and precipitation (typically decades or longer). These patterns can result in a climate that is warmer or colder, wetter or drier. Normally, climate change happens slowly over thousands of years, but because of increased industrialization and associated human activities, the Earth's climate is rapidly warming (MNR, 2012). Human activities inducing these changes are the ones that affect the composition of the atmosphere by adding to the greenhouse gases, particularly carbon dioxide (Environment Canada, 2010). Among the other greenhouse gases caused by human or anthropogenic activity are ozone, methane, nitrous oxide, and chlorofluorocarbons (CFCs). Finally, water vapour, a natural greenhouse gas and the most abundant one, will also increase with global warming, as warmer temperatures would cause more evaporation and increase the atmosphere's ability to hold moisture.

While climate change is considered to be a significant potential long-term stressor with the potential to impair Lake Ontario physical integrity, the predictions of its effects have a high degree of uncertainty. It is recognized that additional work is required to more fully understand the processes involved and the linkages they provide between physical habitats and biological communities, in addition to the impacts on the built environment. The following is a summary of the main Great Lakes climate change stressors and their potential effects according to the report prepared for the U.S. Global Change Research Program.

Climate change stressors on Lake Ontario and its nearshore coastal systems include: 1) changing water level regimes; 2) changing storm patterns and precipitation; and 3) altered thermal regimes (Mackey, 2012).

It is predicted that Great Lakes water levels will generally remain within the natural historical range of water levels with annual means slightly below long term mean water levels. While Lake Ontario water levels are controlled, increased precipitation, storm severity and frequency during winter and spring months, and more drought-like conditions in the summer and early fall have implications for short-term, seasonal, and inter-annual water level variability and the phenology of organisms that rely on those seasonal and inter-annual water levels (Mackey, 2012).

Major winter and spring precipitation events are expected to increase nutrient and sediment loadings into the Great Lakes. Increased storm magnitude and frequency coupled with warmer surface water temperatures will likely reduce ice cover, increase wave power, and reduce winter ice shore protection which will increase the risk for coastal flooding and result in accelerated beach, shore, and bluff erosion (Mackey, 2012).

As the Great Lakes region is anticipated to see substantial increases in annual and seasonal air temperatures and extreme heat events, lake surface water temperatures will be affected by reducing the extent and duration of Great Lakes winter ice cover. In addition, over time, it is anticipated that thermal stratification will occur earlier in the spring, and later in the fall (Mackey, 2012).

3.3 Biological Environment

3.3.1 Life Science Areas of Natural and Scientific Interest

Life Science ANSIs are representative segments of Ontario's biodiversity and natural landscapes including specific types of forests, valleys, prairies and wetlands, their native plants and animals and their supportive elements. They contain relatively undisturbed vegetation and landforms and their associated species and communities (MNR, 2011). Similarly to the Earth Science ANSIs, Life Science ANSIs are designated as Provincially Significant, Regionally Significant or Locally Significant. There are also Candidate Life Science ANSIs: areas of natural and scientific interest that have been identified and recommended for protection by MNR or other sources, with status approval pending.

While no Life Science ANSIs are located within or in close proximity to the project local study area, a number of Life Science ANSIs are situated within the project regional study area (Figure 3-62). In particular, the Toronto Islands, a Regionally Significant ANSI, is located approximately 5 to 6 km west of the project local study area. The provincially significant Scarborough Bluffs Life Science ANSI occupying 163 ha is located approximately 10 km east of Ashbridges Bay. Finally, East Point Bluffs, a 15 ha Regionally Significant Life Science ANSI, is also found approximately 20 km east of Ashbridges Bay within the project regional study area.

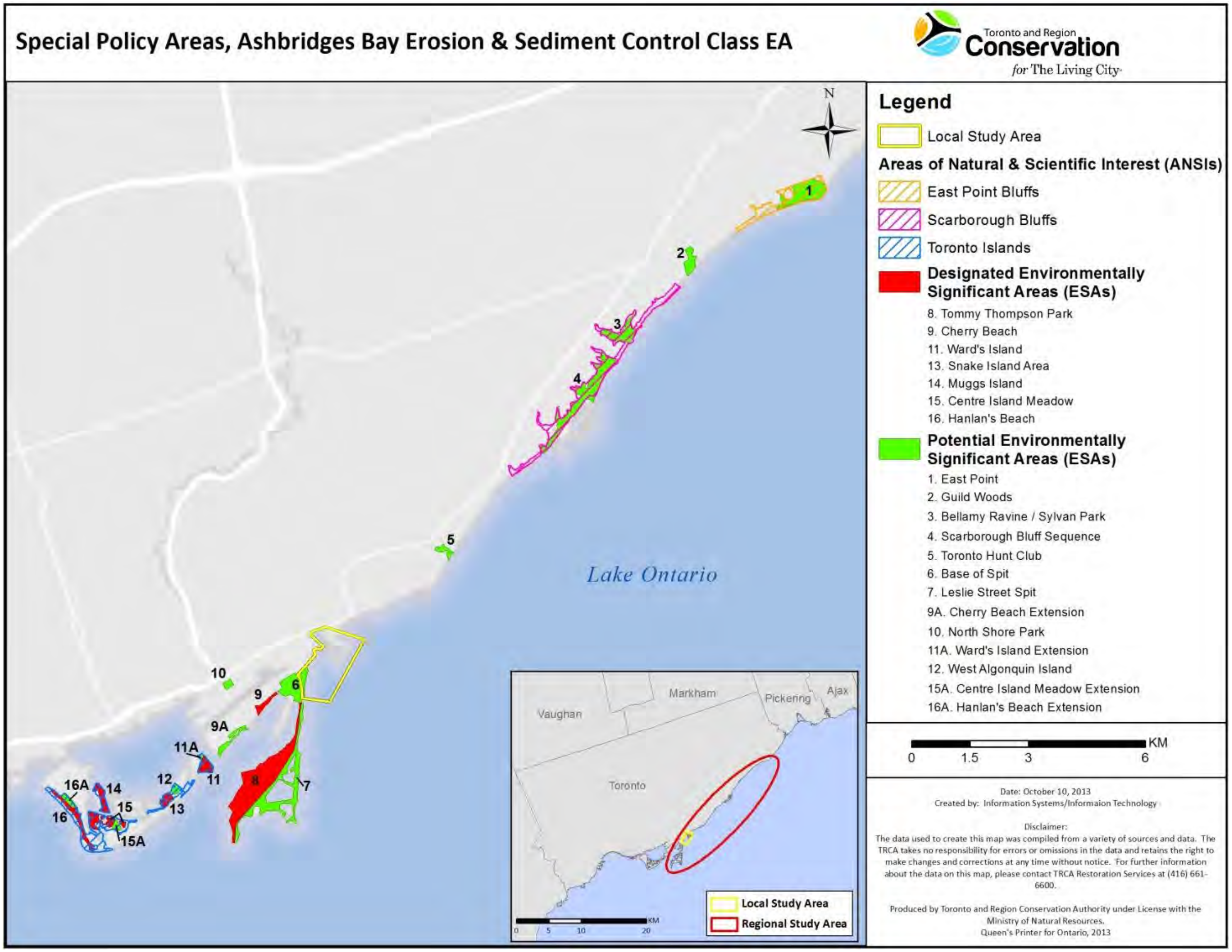

Figure 3-62. Special Policy Areas along the Toronto waterfront within the project regional study area.
Source: TRCA, 2013.

3.3.2 Environmentally Significant Areas

Environmentally Significant Areas (ESAs) are natural areas within the City of Toronto's natural heritage system which are particularly significant or sensitive and which require additional protection to preserve their qualities and significance (North-South Environmental Inc., 2012). ESAs are afforded protection under the City of Toronto Official Plan policy 3.4.13 (City of Toronto, 2007) which states that activities taking place on lands under ESA designation will be limited to those compatible with the preservation of the natural features and ecological functions attributed to those areas.

While there are no designated ESAs within the project local study area, the project regional study area contains seven (Figure 3-62). Of these, two are located west of and in a close proximity to the project local study area: Tommy Thompson Park ESA and Cherry Beach ESA. The rest are found on Toronto Islands (City of Toronto, 2007).

In addition to the seven designated ESAs, 12 potential ESAs are situated within the regional study area. Of these, Base of Spit potential ESA partially overlaps with the project local study area, and Cherry Beach Extension, Tommy Thompson Park and North Shore Park potential ESAs are located almost immediately to the west of the local study area (Figure 3-62).

Potential ESAs are areas that meet some or all of the ESA designation criteria but are not currently recognized as ESAs in the City of Toronto Official Plan (2010). At the time of approval of the City of Toronto Official Plan 2010, the City agreed to identify ESAs using information that was available at the time and committed to identify additional ESAs across the City, using criteria in the Official Plan, and to designate these areas and include them in the maps accompanying Official Plan. Recently, an amendment to designate 68 new ESAs and amend the boundaries of 14 existing ESAs has been proposed. Each area proposed for designation or boundary revision has been studied in detail to verify that it meets Official Plan criteria and to determine appropriate boundaries. According to the report prepared for the City by North-South Environmental Inc. in 2012, Base of Spit is an area that meets a number of ESA designation criteria. Therefore, it has been identified as a potential ESA in this study.

Base of Spit is located at the base of Tommy Thompson Park and consists of thicket, meadow, woodland and wetland on fill. There are 28 vegetation communities that have been identified within this area, including seven significant vegetation communities. In addition, 19 significant flora species and two significant fauna species have been recorded in this area. With respect to species significance within the TRCA jurisdiction, Base of Spit contains 46 flora species of conservation concern (North-South Environmental Inc., 2012).

3.3.3 Wildlife Habitat

Generally, the amount and quality of wildlife habitat is linked to the amount and quality of natural cover within a given area. As the areas directly adjacent Ashbridges Bay and Coatsworth Cut – namely, Ashbridge's Bay Park and the ABTP shoreline – generally lack continuous natural cover, they are considered to provide limited wildlife habitat. In addition, the Park is heavily used by local residents and visitors for passive recreation. Small pockets of woody vegetation located throughout the Park may be used by migrating songbirds for brief periods.

Investigations associated with the Coatsworth Cut CSO and Stormwater Outfalls Control Class EA (2007) found the shoreline immediately south of ABTP to have the potential of providing habitat suitable for migratory song and savannah birds as it would provide shelter and offer food sources. Shoreline substrate in the same area was stated to provide suitable habitat for turtles and hibernacula for snakes. As well, the semi-natural littoral zone within Ashbridges Bay/Coatsworth Cut - between the ABYC Boat

Basin and Lakeshore Boulevard - was found to provide shelter and cover for wildlife as well as serve as an interface for waterfowl to come up on shore, while the hardened breakwall sections of the shoreline did not offer the same conditions (CH2M HILL Ltd., 2007).

At the same time, other areas within the project regional study area afford considerable wildlife habitat, in terms of both size and quality. Specifically, Tommy Thompson Park, located west of Ashbridges Bay, features a variety of terrestrial habitats including forest, successional, meadow, wetland and beach/bluff habitats (TRCA, 2013). The Park is well known by birders and naturalists for the diversity of wildlife it supports. It has been recognized as providing globally important habitat for the conservation of bird populations and holds an Important Bird Area status (BirdLife International, 2012).

3.3.4 Habitat Linkages and Corridors

Historically, the Toronto waterfront featured a variety of linked habitats which offered wildlife opportunities for continuous migration. However, over the past 200 years urbanization has resulted in a substantial decrease in the amount and quality of wildlife habitat and habitat continuity (TRCA, 2013b). The local study area does not serve as a corridor or linkage of significance due to the fragmentation of greenspace within it.

To the west of Ashbridges Bay, habitat linkages exist between Tommy Thompson Park, Cherry Beach and Cherry Beach Extension (Figure 3-62). Toronto Islands are easily accessible to birds. This rather large block of habitat has a poor connection to the habitat located to the east of the Bay, due to a relatively small amount of cover found along the shoreline of the ABTP and the manicured state of Ashbridge’s Bay Park. East of the project site, Ashbridge’s Bay Park has limited connection to habitats located further east along the Scarborough Bluffs. There is a small amount of natural cover providing continuity along the shoreline, afforded by the Eastern Beaches. However, Eastern Beaches are used extensively by the public for recreation, which may discourage wildlife movement. Another disjoint in waterfront habitat to the east of Ashbridges Bay is caused by the R.C. Harris Water Treatment Plant and its manicured property.

3.3.5 Wildlife and Bird Migration Patterns

The project local study area is located within an important bird migratory zone which encompasses both the Atlantic and Mississippi flyways. During migration, songbirds rely on vegetated shorelines when in need of rest, food, or shelter from adverse weather conditions. In other words, vegetated shorelines serve as an important staging area for migrating songbirds when they are most vulnerable. In addition to songbirds, waterfowl, shorebirds and birds of prey are also common migrants and may utilize Ashbridges Bay and surrounding area habitat during migration. Specifically, migrating birds are found in the vegetation cover to the east and west of Coatsworth Cut at Tommy Thompson Park as well as, possibly and to a more limited extent, Ashbridge’s Bay Park.

As described in Section 3.3.4 [Habitat Linkages and Corridors], wildlife migration along the waterfront in proximity to Ashbridges Bay is limited due to the east-west disconnection of greenspace which occurs at Coatsworth Cut. The ABTP and Lakeshore Boulevard create a break between the habitat found southwest of the plant (Tommy Thompson Park) and to the east of Ashbridge’s Bay Park. Bird migration, however, is not similarly affected as birds are significantly more mobile than most other fauna species.

While Ashbridge’s Bay Park provides habitat for transient wildlife and, possibly, a small resident population, a greater wildlife population is found in Tommy Thompson Park which is located immediately to the southwest of the Park. Resident Tommy Thompson Park wildlife include eastern red fox (*Vulpes vulpes*), eastern cottontail (*Sylvilagus floridanus*), grey squirrel (*Sciurus carolinensis*), striped skunk

(*Mephitis mephitis*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), little brown bat (*Myotis lucifugus*), meadow vole (*Microtus pennsylvanicus*), white-footed mouse (*Peromyscus leucopus*), muskrat (*Ondatra zibethicus*), beaver (*Castor Canadensis*) and likely Virginia opossum (*Didelphis virginiana*) which have been noted in residential areas surrounding the project site.

3.3.6 Vegetation

Currently, vegetation data formally recorded by TRCA exists for the natural area within the project local study area. This area is located southwest of ABTP and represents the northernmost extent of Tommy Thompson Park. Ashbridge's Bay Park, green space occupying the east side of the project local study area, is considered to have a manicured condition, and, as a result, vegetation community and individual flora species data are not collected. Should the proposed project works affect this area, field surveys will be conducted to compile site vegetation inventory in order to assess and mitigate potential impacts.

3.3.6.1 Terrestrial and Riparian Vegetation

The vegetation communities identified within the project local study area natural area were delineated using the Ecological Land Classification (ELC) System of the Ontario Ministry of Natural Resources (Lee et al, 1998). As well, vegetation communities were ranked in order to facilitate understanding of human activity effects on the vegetation community scale, interpret the state of the natural system and facilitate the development of natural heritage management strategies (TRCA, 2007). The L ranking system consists of five ranks - L1 to L5 - assigned on the basis of several scoring criteria such as "local occurrence" and "geophysical requirements". Each rank reflects a level of conservation concern for a given vegetation community within TRCA jurisdiction. L Ranks and levels of conservation concern they represent are summarized in Table 3-15.

Table 3-15. Vegetation communities' L ranks and corresponding levels of conservation concern.
Source: TRCA, 2007.

L Rank	Level of Conservation Concern in TRCA Region
L1	Of regional concern in TRCA jurisdiction due to rarity, stringent habitat needs, and/or threat to habitat.
L2	Of regional concern; typically occurs in high-quality natural areas and under highly specific site conditions; probably at risk in the Toronto area.
L3	Of regional concern; restricted in occurrence and/or requires specific site conditions; generally occurs on natural rather than cultural areas.
L4	Generally secure in rural matrix; of conservation concern in the urban matrix.
L5	Generally secure; may be of conservation concern in a few specific situations. Contributes to natural cover.
L+	Community defined by alien species (e.g., Scots pine plantation, buckthorn thicket). Contributes to natural cover at least to some extent.

As indicated above, vegetation communities' inventory is typically compiled for natural areas within the TRCA jurisdiction. In the local study area, a natural area is found immediately south-west of ABTP (Figure 3-63). The information below applies to this area.

The project local study area natural habitat contains 14 vegetation communities (Table 3-16, Figure 3-63) comprised of terrestrial plant species, riparian species, or both. Of these, generally secure communities and communities defined by alien species (L5 and L+, respectively) occupy 83% of the total coverage area. Willow Shrub Beach (L2 community) makes up 11.6% of the area, extending along the shore of the Bay to the west of ABTP, The remaining 5.4% is occupied by L4 communities.

Table 3-18 lists flora species recorded within the project local study area. Two L3, four L4 and one L5 species were recorded. Table 3-17 provides a summary of flora species levels of conservation concern in TRCA region they represent. Figure 3-64 shows the locations of individual flora species observations.

Immediately south of ABTP, the inventory collected during the Coatsworth Cut CSO and Stormwater Outfalls Control Class EA study (Coatsworth Cut Class EA) by CH2M HILL Ltd. (2007) contained the following flora species: Canada Goldenrod with species of Alfalfa, Russian-olive (*Elaeagnus angustifolia*), White Sweet Clover, Chicory, Queen Ann's Lace, Riverbank Grape (*Vitis riparia*), Heath Aster, Common Reed (*Phragmites australis*), Common Dandelion (*Taraxacum officinale*), New-England Aster (*Aster novae-angliae*), Common Plantain (*Plantago major*), Common Ragweed, and Butter-and-eggs. There were also small mesic pockets containing Purple Loosestrife (*Lythrum salicaria*), Devil's Beggar's Tick (*Bidens frondosa*), Flat-top Bushy Goldenrod (*Euthamia graminifolia*), Narrowleaved Cattail, Tall Goldenrod (*Solidago altissima* var. *altissima*), and Rushes. Cottonwood and Sandbar Willow (*Salix exigua*) trees, Red-osier Dogwood (*Cornus stolonifera*), and Staghorn Sumac shrubs.

Within the Ashbridge's Bay/Coatsworth Cut semi-natural littoral zone between the ABYC Boat Basin and Lakeshore Boulevard, Coatsworth Cut Class EA study identified Weeping Willows (*Salix x pendulina*) and Silver Maples, White Sweet Clover, Common Ragweed (*Ambrosia artemisiifolia*), Canada Goldenrod, Heath Aster, Alfalfa (*Medicago sativa*), Pumpell's Brome (*Bromus inermis*), Butter-and-eggs (*Linaria vulgaris*), and Queen Ann's Lace (*Daucus carota*). The hardened breakwall zone (remainder of the shoreline in Ashbridge's Bay/Coatsworth Cut) was found to contain Weeping Willows, Pumpell's Brome, Butter-and-eggs, Canada Goldenrods, Chicory (*Chicorium intybus*), Common Milkweed (*Asclepias syriaca*), Yarrow (*Achillea millefolium*) and Dog Strangling Vine (*Vincetoxicum nigrum*) (CH2M HILL Ltd., 2007).

Table 3-16. Local study area vegetation communities within the natural area, Ashbridges Bay Erosion and Sediment Control EA.
Source: TRCA, 2013.

ELC Name	L Rank	Area (m^2)	% of the Total Coverage Area
Willow Shrub Beach	L2	12907.98	11.59
Red-top Mineral Meadow Marsh	L4	7.75	0.01
Willow Mineral Thicket Swamp	L4	5970.27	5.36
Native Deciduous Sapling Regeneration Thicket	L5	30117.75	27.04
Native Deciduous Successional Woodland	L5	8094.30	7.27
Native Forb Meadow	L5	33689.69	30.24
Common Reed Mineral Meadow Marsh	L+	998.43	0.90
Common Reed Mineral Shallow Marsh	L+	1290.71	1.16
Common Reed Mineral Shallow Marsh	L+	1488.74	1.34
Exotic Deciduous Thicket	L+	784.58	0.70
Exotic Successional Woodland	L+	3449.34	3.10
Exotic Successional Woodland	L+	3310.53	2.97
Narrow-leaved Cattail Mineral Shallow Marsh	L+	7404.52	6.65
Reed Canary Grass Mineral Meadow Marsh	L+	1875.11	1.68

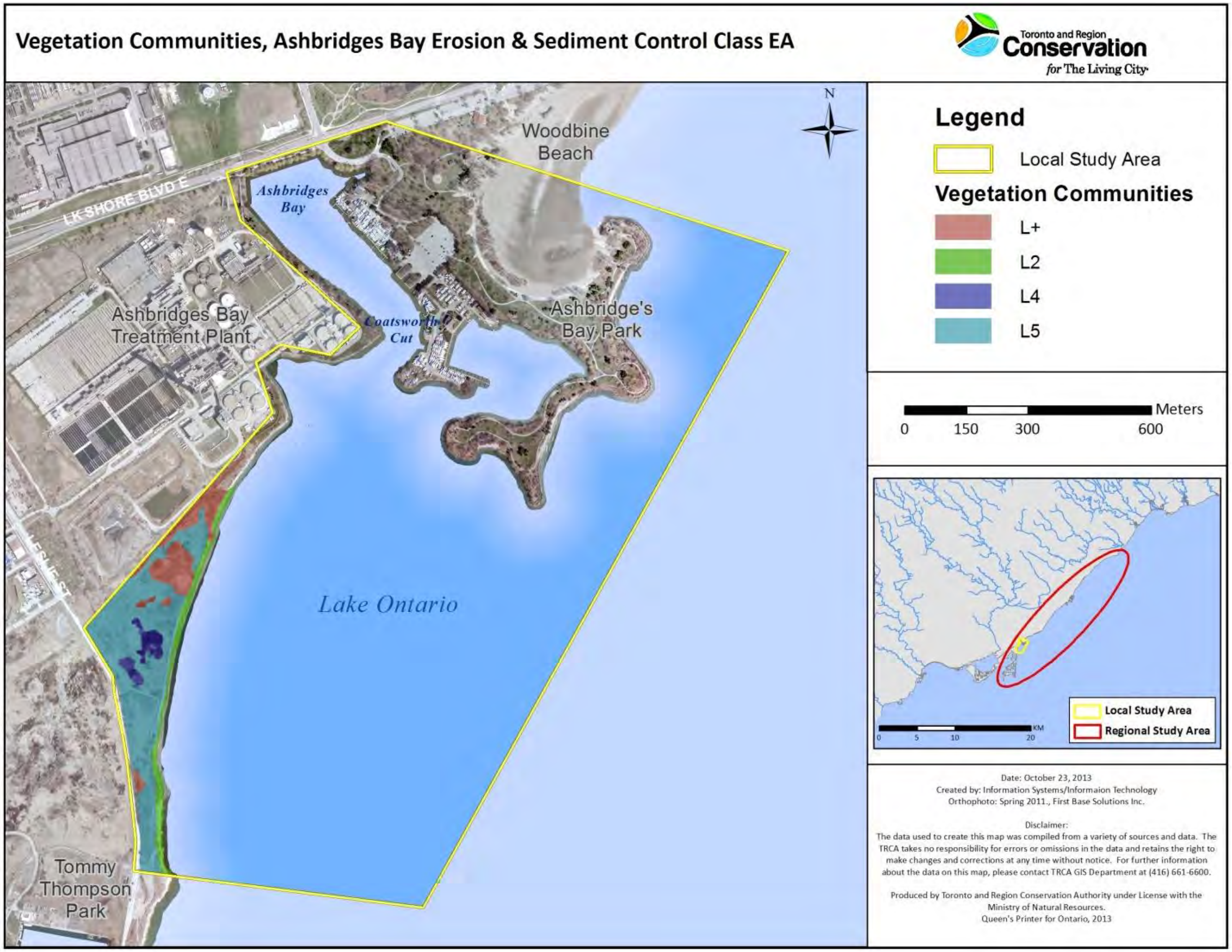

Figure 3-63. Vegetation communities within the natural area of the project local study area.
Source: TRCA, 2013.

Table 3-17. Flora species L ranks and levels of conservation concern they represent.
Source: TRCA, 2007.

L Rank	Level of Conservation Concern in TRCA Region
L1	Unable to withstand disturbance; many criteria are limiting factors; generally occur in high-quality natural areas in natural matrix; almost certainly are rare in the TRCA jurisdiction; of concern regionally.
L2	Unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.
L3	Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.
L4	Able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix.
L5	Able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix. May be of very localized concern in highly degraded areas.
L+	Exotic. Not native to TRCA jurisdiction. Includes hybrids between a native species and an exotic.
L+?	Origin uncertain or disputed; i.e., may or may not be native.
LH	Hybrid between two native species. Usually not scored unless highly stable and behaves like a species.
LX	Extirpated from our region with remote chance of rediscovery. Presumably highly sensitive.

Table 3-18. TRCA Terrestrial vegetation species records within the project local study area.
Source: TRCA, 2013.

Common Name	Scientific Name	L Rank
River bulrush	*Scirpus fluviatilis*	L3
Slender gerardia	*Agalinis tenuifolia*	L3
Bebb's willow	*Salix bebbiana*	L4
Cut-leaved avens	*Geum laciniatum*	L4
Pussy willow	*Salix discolor*	L4
Three-square	*Scirpus pungens*	L4
Silverweed	*Potentilla anserina ssp. Anserine*	L5

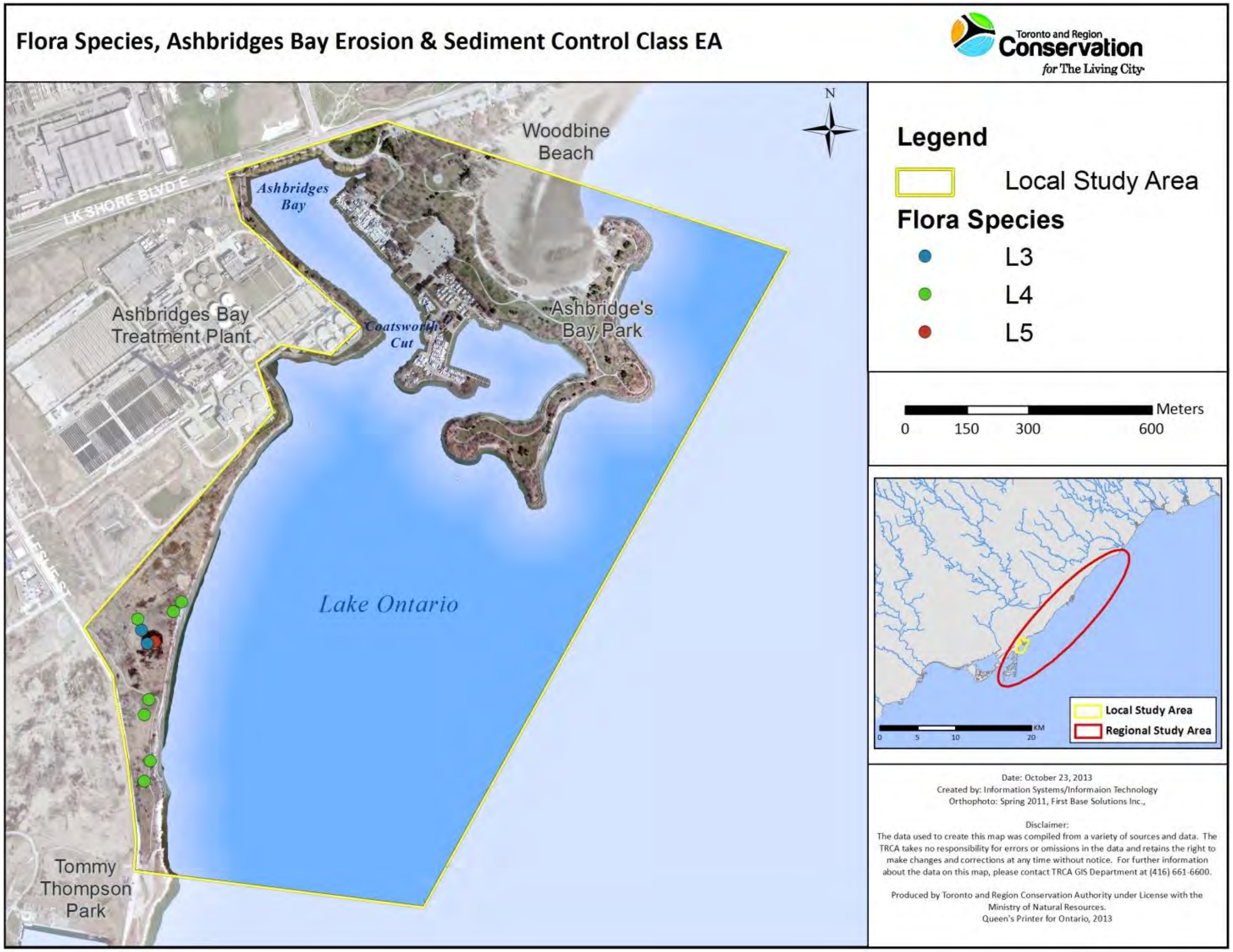

Figure 3-64. Terrestrial vegetation species records within the project local study area.
Source: TRCA, 2013.

3.3.6.2 Aquatic Vegetation

Aquatic vegetation species inventory collected for the ABYC Boat Basin as well as the Ashbridges Bay/Coatsworth Cut by TRCA in 2009 showed presence of the following five species: Canadian waterweed (*Elodea canadensis*), Slender pondweed (*Potamogeton pusillus*), Richardson's pondweed (*Potamogeton richardsonii*), Curly pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*). Of these, Eurasian watermilfoil is a non-native species while the rest are native. The distribution of aquatic vegetation is limited to sheltered environments found within the Boat Basin and Coatsworth Cut. It has been noted that the aquatic vegetation growth in those areas can reach nuisance proportions during summer months, which may be attributed to elevated nutrient levels.

3.3.7 Wildlife Population

Fauna records summary presented in this section includes data collected as part of TRCA's Terrestrial Natural Heritage System Strategy as well as incidental observations. As is the case for vegetation data, fauna species data have been collected for natural areas which excluded Ashbridge's Bay Park.

TRCA's L ranking system is applied to fauna species (such as birds, mammals and amphibians discussed here) in a similar way it is used to rank vegetation communities and flora species. TRCA L ranking system for fauna species is currently applied to species that breed within TRCA's jurisdiction, including summer visitors and year-round residents. The fauna ranking criteria are in line with the goal of identifying species and species associations which indicate ecosystem quality or are sensitive to ecosystem deterioration as well as ensuring continued presence of indigenous species (TRCA, 2007). The five L ranks reflect the level of conservation concern in TRCA region and range from L1 (species of least or no concern) to L5 (species of high conservation concern).

Bird species recorded within the natural area of the project local study area are listed in Table 3-19 and the locations are shown in Figure 3-65. Bird species recorded include Eastern kingbird, Orchard oriole and American woodcock. Of these, only Eastern kingbird is a confirmed breeder within the area and Orchard oriole and American woodcock are possible breeders.

Table 3-19. Bird species recorded within the natural area of the project local study area.
Source: TRCA, 2013.

Common Name	Scientific Name	Breeding Status	L Rank
American woodcock	*Scolopax minor*	Possible	L3
Eastern kingbird	*Tyrannus tyrannus*	Confirmed	L4
Orchard oriole	*Icterus spurius*	Possible	L5

Other fauna species recorded include brown snake (*Storeria dekayi*) and garter snake (*Thamnophis sirtalis sirtalis*), both of which are ranked L4.

Bird observations from the Ashbridges Bay area obtained via the Toronto Ornithological Club from eBird, an online open source bird observations database, are provided in Appendix E.

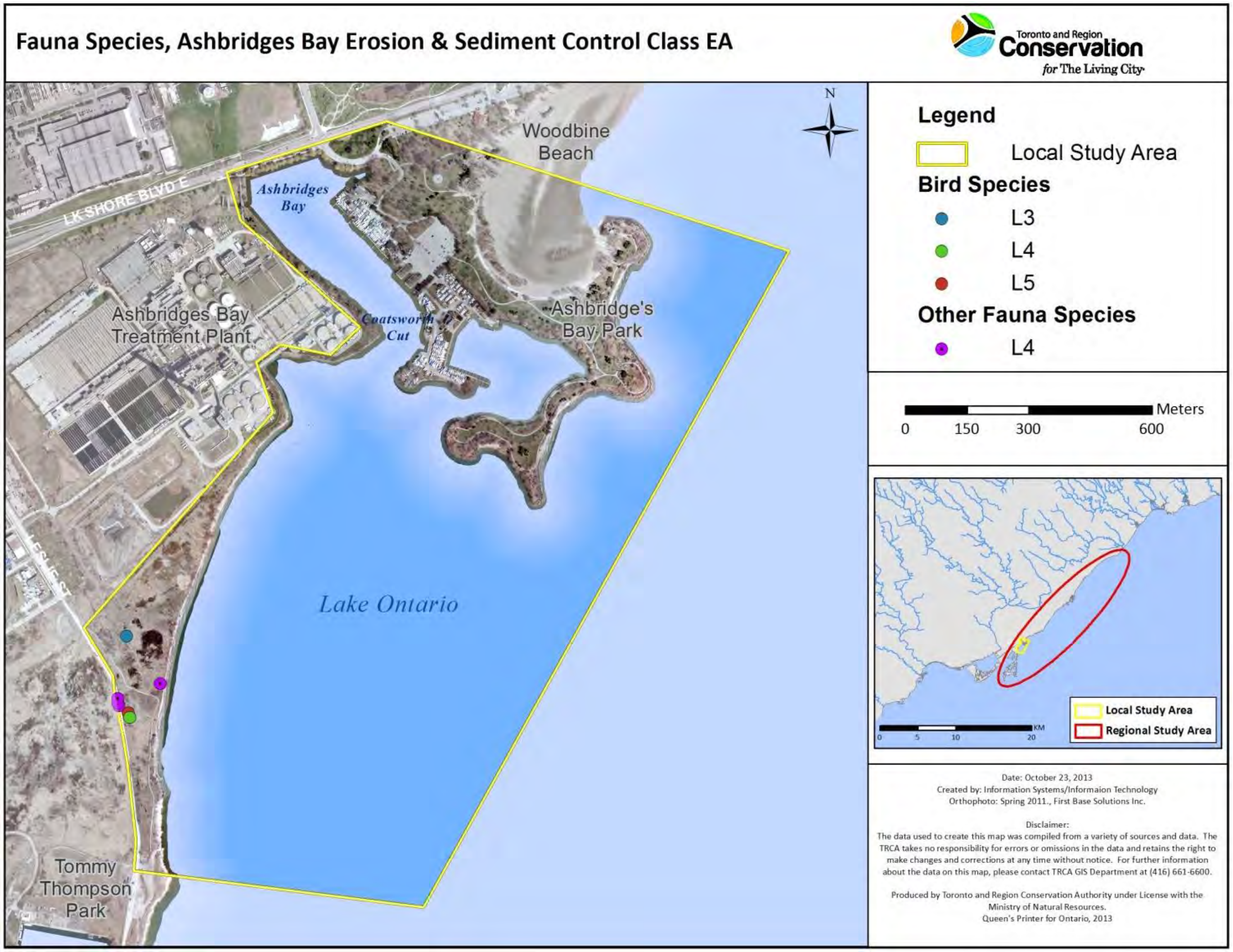

Figure 3-65. Fauna species records within the natural area of the project local study area.
Source: TRCA, 2013.

3.3.8 Fish and Fish Habitat

This section describes the major components of Ashbridges Bay aquatic habitat and fish community including the historical records summary, habitat types and characteristics, as well as species assemblages, trophic levels and thermal guilds.

The local study areas aquatic habitat is the product of the nearshore geology, meteorological conditions and anthropogenic influences.

The nearshore geology of the Toronto area is discussed in detail in the Toronto Waterfront Aquatic Habitat Restoration Strategy (TRCA, 2007). Meteorological conditions including wind, nearshore wave climate, regional climatic conditions, solar heating and thermal characteristics have a considerable influence on the nearshore environment and aquatic habitats. Water levels, too, play an important role in the development and maintenance of shoreline ecosystems. Fluctuating water levels influence wave action, currents, turbidity, pH, temperature and nutrients.

Water levels, wind and wave climate and the littoral transport are described in Sections 3.2.10 [Water Levels], 3.2.12 [Wave Climate] and 3.2.13 [Sediment Transport]. Lake thermal stratification also plays an important role in the ecology of Ashbridges Bay. Lake Ontario undergoes stratification in March, when the nearshore and surface areas begin to warm. By August, the nearshore area temperature reaches 17˚C to a depth of 5 to 10 m. Turnover begins between November and December with coldest water temperatures occurring in February. Nearshore areas are particularly affected by upwelling events caused by wind driven inshore movement of cold subsurface water that lasts over a period of a few days to weeks. Coldwater upwellings may reduce productivity, limit the growth and survival of aquatic organisms, and disperse offshore the warmer water associated with river discharges and point sources. As a result, warmwater fish species are particularly affected.

Historically, Ashbridges Bay spanned a large marshland complex, originating as a delta formation at the mouth of the Don River. Occupying the area between present-day Woodbine Avenue and Toronto Islands, the marsh had an estimated cover of 550 ha. It was separated from Lake Ontario by a peninsula formed by eroding sand moving westward from the Scarborough Bluffs. Before filling of the Bay began in the early 20th century, the fish community was linked to the Don River watershed. Historic records indicate that the fish were exploited in abundance by First Nation and Old World Settlers throughout the 19th century. Verbal accounts of the autumnal migration of Atlantic Salmon (*Salmo salar)* to the Don River describe a large concentration of fish arriving in the area during spawning. Also noted were large numbers of spawning Yellow Perch (*Perca flavescens)*, White Sucker (*Catostomus commersonii)* and Redhorse (*Moxostoma* spp.) which occupied the shallow marsh in spring. In addition, records mention widespread occurrence of Lake Sturgeon (*Acipenser fulvescens)*, Northern Pike (*Esox lucius)* and Channel Catfish (*Ictalurus punctatus)*. Finally, coldwater species such as Lake Trout, Burbot and Lake Whitefish were captured to the south of the sand bar separating the marsh from the lake (Whillans, 1998).

By the middle decades of the 19th century, increasing quantities of sewage and industrial development along the shores of Ashbridges Bay and Lower Don River had caused serious pollution issues. Following a number of failed attempts to improve the pollution problems within the Bay, growing public health concerns and the need for new port and industrial lands, the filling of the area began shortly after the Toronto Harbour Commission creation in 1912. Filling was complete in the 1920's (Bonnell, 2011).

As described above, anthropogenic influences (coastal marsh alterations that took place in the 1900's to1920's, followed by the construction of Ashbridge's Bay Park and ABTP) as well as the meteorological conditions and on-going coastal processes all played a role in forming present-day Ashbridges Bay aquatic habitat. Currently, the nearshore aquatic habitat of the Bay consists of open coast and sheltered embayments, as defined in the Toronto Waterfront Aquatic Habitat Restoration Strategy (TRCA, 2007).

Open coast habitat, characterized by extensive wind and wave action, colder water and common occurrence of hypolimnetic upwellings, is found along the ABTP shoreline as well as the Ashbridge's Bay Park headlands. These areas constitute forage and spawning habitat for a number of cool- and cold-water fish species. Generally, however, fish production in open coast habitats is limited due to wave action, lack of structural habitat and rapidly fluctuating temperatures (TRCA, 2007).

Sheltered embayment habitat is present within Coatsworth Cut and the Boat Basin. In contrast to the open coast environment, sheltered embayment habitat is characterized by a lack of intense wave action, a substantial amount of riparian and aquatic vegetation, shallow water depths and warm to cool water temperatures (TRCA, 2007). Sheltered embayments contribute to fish production by providing essential spawning and nursery habitat for a variety of species. The lack of intense wave action encourages growth of submergent aquatic vegetation which creates structural habitat. In addition, headland presence may mitigate the effects of coldwater upwelling events and increase water retention capacity of embayments. As a result, summer water temperatures in sheltered embayments typically reach a range favourable to a number of warmwater fish species.

Nearshore fisheries monitoring within Ashbridges Bay is carried out by TRCA on an annual basis. Four locations (two open coast – West Side and Headland – and two embayment locations – Coatsworth Cut and Boat Basin – approximately 400 m long each, shown in Figure 3-66) are typically sampled via electrofishing twice per year, once in the summer and once in the fall, weather permitting.

While fisheries monitoring in the Bay has been conducted since 1989, this report examines the most recent data, collected from 2008 to 2013. During this period, West Side, Coatsworth Cut and Boat Basin have been sampled annually, and Headland was sampled in 2008 and 2009.

From 2008 to 2013, a total of 26 fish species were captured during the surveys. Of those, the majority of species detected belong to cool and warm thermal guilds (Table 3-20). The only coldwater species captured were the non-native salmonids - Brown Trout, Chinook Salmon and Rainbow Trout - which are non-resident and may utilize Ashbridges Bay habitat for foraging as well as when migrating along the waterfront. Of the 25 species detected, 18 were native and 8 were non-native.

On a habitat type-specific basis, the two open coast sites (West Side and Headland, Figure 3-66) had an average of 6 and 7 species detected while sheltered embayment sites (Coatsworth Cut and Boat Basin, Figure 3-66) had 9.3 and 11.3 (Table 3-21), respectively. As mentioned above, lower species richness values at the open coast sites may be attributed to wave action, fluctuating water temperatures and lack of structural habitat such as that provided by aquatic vegetation.

Further, only four warmwater species have been detected at open coast sites, compared to 11 captured at embayment sites (Table 3-23).

As shown in Figure 3-67, embayment sites – Coatsworth Cut and Boat Basin – had higher biomass per unit of effort values compared to biomass values of open coast sites. Generalist species were shown to be most abundant by biomass at both open coast and embayment locations, followed by specialists and piscivores at open coast sites and piscivores and specialists at embayment sites. Notably, a large portion of yearly catch by biomass was comprised of the degradation-tolerant non-native Common Carp (Table 3-22), which is a generalist species by trophic level.

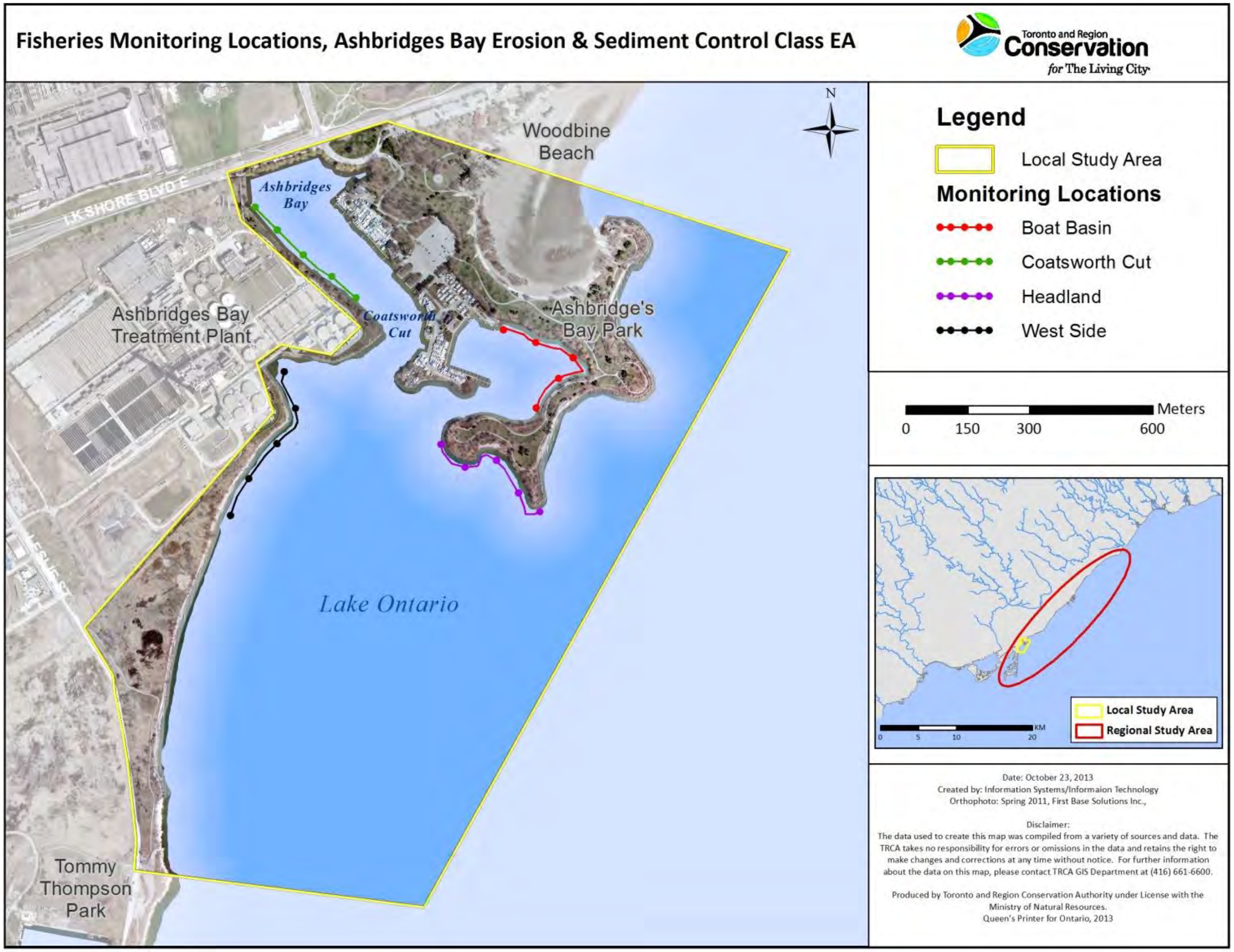

Figure 3-66. Ashbridges Bay fisheries monitoring locations.
Source: TRCA, 2013.

Table 3-20. Species captured in Ashbridges Bay from 2008 to 2013.

Origin	Thermal Guild	Species	Common Name	Trophic Group
Native	Cool	*Notropis atherinoides*	Emerald Shiner	Generalist
		Rhinichthys cataractae	Longnose Dace	Specialist
		Lepisosteus osseus	Longnose Gar	Piscivore
		Esox lucius	Northern Pike	Piscivore
		Notropis hudsonius	Spottail Shiner	Specialist
		Gasterosteus aculeatus	Threespine Stickleback	Specialist
		Catastomus commersoni	White Sucker	Specialist
		Perca flavescens	Yellow Perch	Specialist
	Warm	*Lepomis macrochirus*	Bluegill	Specialist
		Amia calva	Bowfin	Piscivore
		Ameiurus nebulosus	Brown Bullhead	Generalist
		Aplodinotus grunniens	Freshwater Drum	Specialist
		Dorosoma cepedianum	Gizzard Shad	Specialist
		Micropterus salmoides	Largemouth Bass	Piscivore
		Lepomis gibbosus	Pumpkinseed	Specialist
		Amploplites rupestris	Rock Bass	Specialist
		Micropterus dolomieu	Smallmouth Bass	Piscivore
		Morone chrysops	White Bass	Specialist
Non-native	Cold	*Salmo trutta*	Brown Trout	Piscivore
		Oncorhynchus tshawytscha	Chinook Salmon	Piscivore
		Oncorhynchus mykiss	Rainbow Trout	Piscivore
	Cool	*Alosa pseudoharengus*	Alewife	Specialist
		Osmerus mordax	Rainbow Smelt	Specialist
		Neogobius melanostomus	Round Goby	Specialist
	Warm	*Cyprinus carpio*	Common Carp	Generalist
		Carassius auratus	Goldfish	Generalist

Table 3-21. Average number of species captured in Ashbridges Bay fisheries monitoring locations from 2008 to 2013.

Location	Average No. Species Captured per Year
1 - West Side	6
2 - Coatsworth Cut	9.3
3 - Boat Basin	11.3
4 - Headland	7

Table 3-22. Annual per cent composition by biomass per 1,000 seconds of electrofishing effort of Common Carp at Ashbridges Bay from 2008 to 2013.

Location	2008	2009	2010	2011	2012
1 - West Side	50	39	0	0	96
2 - Coatsworth Cut	85	82	78	54	82
3 - Boat Basin	0	24	19	9	0
4 - Headland	61	88	N/A	N/A	N/A

Table 3-23. Cold-, cool- and warmwater species captured at embayment and open coast sites, Ashbridges Bay, from 2008 to 2013.

Thermal Guild	Common Name	Embayment	Open Coast
Cold	Brown Trout	x	x
	Chinook Salmon	x	x
	Rainbow Trout	x	
Cool	Alewife	x	x
	Emerald Shiner	x	x
	Longnose Dace		x
	Longnose Gar	x	
	Northern Pike	x	x
	Rainbow Smelt		x
	Round Goby	x	x
	Spottail Shiner	x	x
	Threespine Stickleback	x	
	White Sucker	x	x
	Yellow Perch	x	x
Warm	Bluegill	x	
	Bowfin	x	
	Brown Bullhead	x	
	Common Carp	x	x
	Freshwater Drum	x	x
	Gizzard Shad	x	
	Goldfish	x	
	Largemouth Bass	x	
	Pumpkinseed	x	
	Rock Bass	x	x
	Smallmouth Bass		x
	White Bass	x	
Total Number of Species Detected		23	15

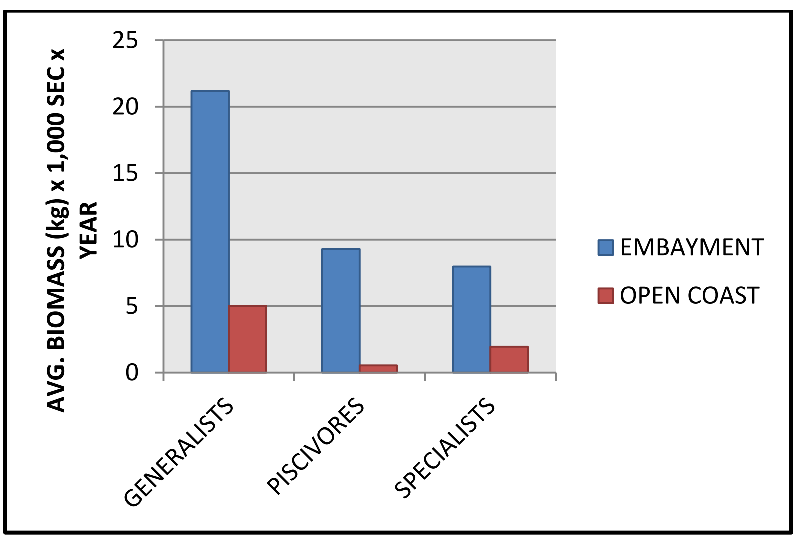

Figure 3-67. Average biomass (kg) per 1,000 seconds of electrofishing effort per year of generalist, piscivore and specialist species captured at Ashbridges Bay from 2008 to 2013.

3.3.9 Species of Concern

This section focuses on flora and fauna species of concern found within the project local study area. Four levels of species ecological significance recognition and protection are used: 1) TRCA L ranking system to describe a given species' status within TRCA's jurisdiction; 2) species' status as assigned by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC); 3) species' status under the provincial *Endangered Species Act;* and 4) federal *Species at Risk Act* (SARA). TRCA L ranking system assigns ranks and scores to vegetation communities and flora and fauna species in order to facilitate the following:

- With respect to vegetation communities, to understand the human activity effects on the vegetation community scale, interpret the state of the natural system and facilitate the development of natural heritage management strategies (TRCA, 2007); and
- With respect to plant and animal species, to identify species which indicate ecosystem quality or are sensitive to ecosystem deterioration as well as ensure continued presence of indigenous species (TRCA, 2007).

The five L ranks reflect the level of conservation concern within the TRCA region and range from L1 (species of high conservation concern) to L5 (species of least or no concern). L+ rank signifies that a given species is non-native or, when applied to vegetation communities, a given community is defined by non-native species.

COSEWIC is the nation-wide authority for assessing the conservation status of wildlife species that may be at risk of extinction in Canada. COSEWIC's assessment informs SARA and is considered to be the first step in wildlife protection (COSEWIC, 2013). Enforced by the Ontario Ministry of Natural Resources, the *Endangered Species Act* aims to identify, protect and facilitate recovery of Ontario species at risk. Likewise, the goal of federal SARA is to prevent endangered or threatened wildlife from becoming extinct or lost from the wild as well as to help facilitate the recovery of these species. SARA ensures the scientific assessment and listing of species, protects critical habitat, and enables compensation, permits and enforcement (it is enforced by Environment Canada) (Government of Canada, 2012).

There are two flora species of conservation concern within the TRCA jurisdiction that have been recorded in the project local study area: River bulrush and Slender gerardia, both ranked L3 (Table 3-17). L3 ranked species are fairly restricted in occurrence within the TRCA region and generally occur in natural rather than cultural areas. In addition to L3 species, there are four L4 ranked species in the project local study area: Bebb's willow, Cut-leaved avens, Pussy willow and Three-square Silverweed. Despite being secure in rural matrix, L4 species are considered of conservation concern within the TRCA jurisdiction due to a typically high degree of urbanization within the region. There are no records of plant species at risk identified by the provincial *Endangered Species Act* or federal SARA.

There is one L3 ranked fauna species (American woodcock) and three L4 ranked species (Eastern kingbird, Garter snake and Brown snake) recorded within the project local study area.

A single record of a fish species of concern exists for Ashbridges Bay. In 1993, an American Eel was captured in the Ashbridge's Bay Yacht Club marina. American Eel is classified as "Endangered" provincially and as "Threatened" by COSEWIC. This species is not considered to be at risk under SARA.

3.3.10 Non-native Species

"Exotic", "alien" or "non-native" refers to species that do not naturally occur in an ecosystem. "Invasive" species are plants or animals that aggressively establish themselves in an ecosystem at the expense of its native species and natural functions.

There is a number of non-native species found within the project local study area. They include purple loosestrife (*Lythrum salicaria*), garlic mustard (*Alliaria petiolata*), common reed (*Phragmites australis*), dog strangler vine (*Vincetoxicum rossicum*) and Norway maple (*Acer platanoides*). Invasive species such as garlic mustard tend to dominate sites indefinitely, readily outcompeting native species in all types of habitat and are a control priority (TRCA, 2009).

The non-native fish species captured in Ashbridges Bay include Brown Trout, Chinook Salmon, Rainbow Trout, Alewife, rainbow Smelt, Round Goby, Common Carp and Goldfish (Table 3-20).

3.3.11 Wetlands

Although Ashbridges Bay was historically a coastal wetland, there are no existing wetlands located in the project local study area today due to extensive lake-filling activities that took place in the early 1900's. As shown in Figure 3-68, though some wetland habitat is present in the project regional study area, no significant wetlands are found within the boundaries of the littoral cell examined.

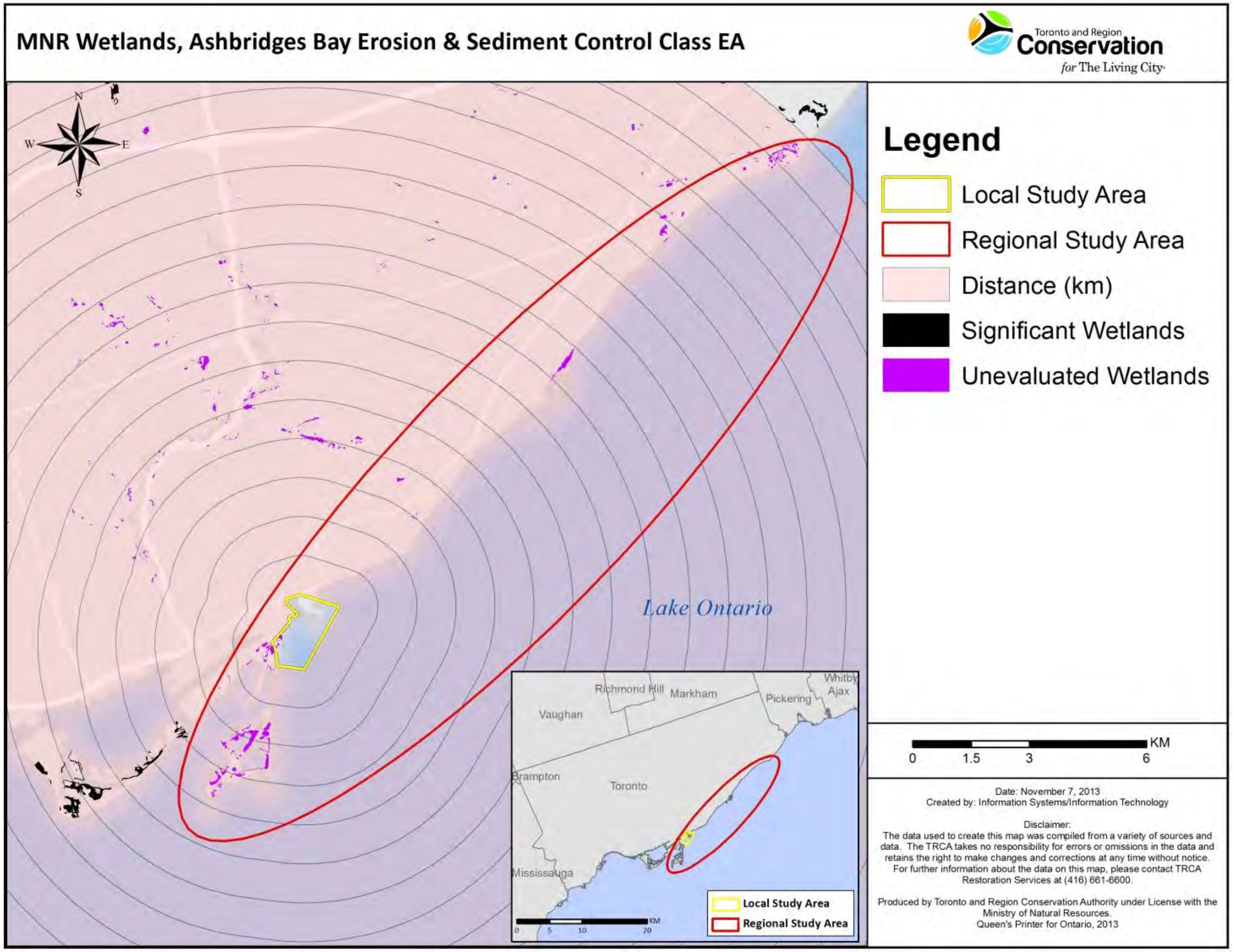

Figure 3-68. Wetland Habitat in and around the project regional and local study areas.
Source: TRCA, 2013.

3.3.12 Unique Habitats

There are no habitats in the project local study area that would be deemed unique. However, a number of areas bearing a Life Science ANSI designation within the project regional study area can be considered unique. These areas are listed in Section 3.3.1 [Life Science Areas of Natural and Scientific Interest].

3.4 Cultural Environment

3.4.1 Traditional Land Uses

Land use and settlement in and around the local and regional study areas were mainly influenced by Lake Ontario. The local study area was more specifically influenced by the Don River as well as the topography of the area that determined road placement and settlement patterns. Historically, the project study area was situated within marshland, which has provided sustenance for humans for over 12,000 years. Archaeological evidence highlights how watershed resources, including marshlands, were traditionally used and impacted in the past by both First Nations and EuroCanadian populations, revealing environmental reasons for settlement. These human-environment relationships include proximity to water (for human consumption, food procurement, transportation and during the historic period, milling), soil characteristics (for agriculture), slope conditions (for settlement), local biotic communities (for food, shelter, and clothing) and landscapes (that may have spiritual significance).

Within the project local study area is Ashbridges Bay. Ashbridges Bay was named for the Ashbridge family, Empire Loyalists originally from Pennsylvania who were granted crown land by Governor Simcoe in 1799 and began farming shortly thereafter. Both sons fought in the War of 1812 and participated in the Rebellion of 1837. The sons lived along the waterfront until their deaths, the last being in 1861. After that, industrialization took place and as a result, lake filling destroyed most of the marshes on the site. The land was later purchased by TRCA in 1972 and in 1977 Ashbridge's Bay Park was created.

3.4.2 Aboriginal Reserve or Community

While there are no reserve lands near or adjacent to the project local or regional study area, the project is located within lands for which there are Aboriginal interests and treaty rights, including traditional uses. In particular, the project is located within the treaty area of the Williams Treaty First Nations. In consultation with Aboriginal Affairs and Northern Development Canada (AANDC) and the Ontario Ministry of Aboriginal Affairs (MAA), the following communities are known to have an interest in the study area: Williams Treaty First Nations, Mississaugas of the New Credit First Nation, the Huronne-Wendat, Six Nations of the Grand River Territory, Kawartha Nishnawbe First Nation, and the Metis Nation of Ontario.

3.4.3 Outstanding Native Land Claim

The United Indian Council (ASSCTN) is currently in active litigation regarding the 1923 Williams Treaty, in which the current local and regional study area is located. This claim alleges that the 1923 Williams Treaty was invalid as there was inadequate compensation for land taken and there was a failure to provide reserves. The United Indian Council includes Alderville First Nation, Beausoleil First Nation, Chippewas of Georgina Island First Nation, Chippewas of Rama First Nation, Curve Lake First Nation, Hiawatha First Nation, Mississauga's of Scugog Island First Nation, Mississaugas of the New Credit First Nation, and Moose Deer Point First Nation. Each of the above communities is being consulted with as part of this Environmental Assessment (EA).

3.4.4 Trans-boundary Water Management Issues

There are no known trans-boundary water management issues concerning the project local or regional study area.

3.4.5 Riparian Uses

The riparian uses of the local and regional study areas include water sports (e.g., kayaking), boating, access to swimming, bird watching, angling and passive recreation. A number of boat clubs and marinas are located along the shoreline within Coatsworth Cut and Ashbridges Bay which provide for water-based and other activities (see Section 3.5.8 [Recreational Boating and Social Clubs] for more information). Located approximately 10 km east of Ashbridges Bay, Bluffer's Park has a marina as well. In addition, beaches and trails along the shoreline within the project regional study area offer a variety of recreational opportunities.

3.4.6 Recreational or Tourist Use of Water Body and/or Adjacent Lands

Recreational uses of Ashbridges Bay include boating and sports, as described in Section 3.5.8 [Recreational Boating and Social Clubs]. The adjacent lands used for recreation include Tommy Thompson Park, Ashbridge's Bay Park and Eastern Beaches (including the Woodbine Beach located immediately east of Ashbridge's Bay Park) which stretch eastward along the shore of Lake Ontario. Tommy Thompson Park, described as a "unique urban wilderness" site, provides opportunities for nature observing, hiking, cycling, rollerblading and fishing (TRCA, 2013). Ashbridge's Bay Park uses include walking, cycling, dog walking, jogging, bird watching, photography, rollerblading, angling and a number of others, as revealed by the Ashbridge's Bay Park user survey conducted by TRCA in Summer 2013 (Appendix F). Toronto Eastern Beaches hosts annual music festivals and fairs, also featuring sports facilities and providing opportunities for sailing, canoeing, windsurfing, rollerblading, cycling, swimming and kite flying (City of Toronto, 2013). Woodbine Beach, in particular, also houses outdoor beach volleyball courts and is home to a large number of tournaments throughout the summer season.

3.4.7 Recreational or Tourist Use of Existing Shoreline Access Locations

Public access to Ashbridges Bay shoreline is provided on the east side of the Bay via the Ashbridge's Bay Park trails and the public boat launch (Figure 3-72). Further east outside of the project local study area, access is facilitated along the pathways connecting residential streets to a series of public beaches. To the west, public may access the shoreline via the Tommy Thompson Park entrance during the park's hours of operation.

3.4.8 Aesthetic or Scenic Landscapes or Views

The shoreline of Lake Ontario offers scenic views all along its length within the project regional and local study areas. With respect to the project local study area, presence of parklands and beaches enhances the natural aesthetics of Ashbridges Bay while its flat surface allows for a panoramic view of the lake, City skyline, boat clubs, and watercraft (i.e., sailboats, canoes and kayaks).

3.4.9 Archaeological Resources, Built Heritage Resources and Cultural Heritage Landscapes

A Stage 1 Archaeological Assessment was undertaken by CRM Lab in 2009 to document the history and archaeological potential of the project study area, and is included in its entirety in Appendix H. The study area was situated within open lake conditions, and within 19th and 20th century infill of open lake conditions. According to the Stage 1 Archaeological Assessment report, in depth documentary and cartographic research identified no significant cultural occupations within the project study area, nor is any known shipwrecks or archaeological sites located within the project study area. CRM Lab did indicate that there remains some potential for deeply buried archaeological remnants in the area. While the remnants of the original stone jetties used to stabilize Coatsworth Cut (1893-1894) may remain deeply buried within the area, there are no plans anticipated that would disturb those structures as part of this study (CRM Lab, 2009). If any such remains are encountered during construction, TRCA is required to notify the Ministry of Culture immediately. As a result, CRM Lab (2009) recommends that the project study area has no potential to contain Aboriginal and EuroCanadian archaeological sites, and that the area be cleared of archaeological concerns.

3.4.10 Historic Canals

There are no historic canals registered within the project local or regional study area.

3.4.11 Federal Property

Within the project local study area, the ABTP property (land base and some areas of the waterlot) is under a long term lease by the City of Toronto from the Toronto Port Authority (Figure 3-71).

3.4.12 Heritage River Systems

There are no heritage river systems registered within the project local or regional study area.

3.5 Socio-Economic Environment

3.5.1 Surrounding Neighbourhood/Community

The project local study area is located within Ward 32 Beaches-East York and is adjacent to Ward 30 Toronto-Danforth.

Both Ward 30 and Ward 32 are made up of primarily residential properties mixed with commercial properties along major roads such as Queen Street East. Ward 32 experienced a 2.7% population growth from 2006 to 2011 while Ward 30 experienced a 0.9% growth during the same period (City of Toronto, 2012a; City of Toronto, 2012b).

The surrounding neighbourhoods are known as The Beaches (#63), Woodbine Corridor (#65), Greenwood-Coxwell (#65) and South Riverdale (#70).

3.5.2 Surrounding Land Uses or Growth Pressure

Land uses within the project local study area are limited to open space and employment/industrial. Land uses within the adjacent area also include commercial residential, residential, and utility and transportation (Figure 3-69).

To capture various uses of Ashbridge's Bay Park which comprises the northeastern portion of the project local study area, TRCA conducted a number of informal voluntary surveys of park users. The surveys were conducted over the course of several days in the summer of 2009 and 2013. Survey methodology and complete results are included in Appendix F. According to the survey results, the park uses included the following recreational activities: walking, cycling, dog walking, jogging, rollerblading, swimming, playing volleyball, practicing yoga, fishing, photography, nature appreciation and picnicking. As well, the park is used as an access point to Eastern Beaches located east of the project local study area. The majority of users surveyed indicated that they used the park during the morning and afternoon hours, typically several times a week, mostly in summertime.

The project local study area water body uses are described in Section 3.5.8 [Recreational Boating and Social Clubs].

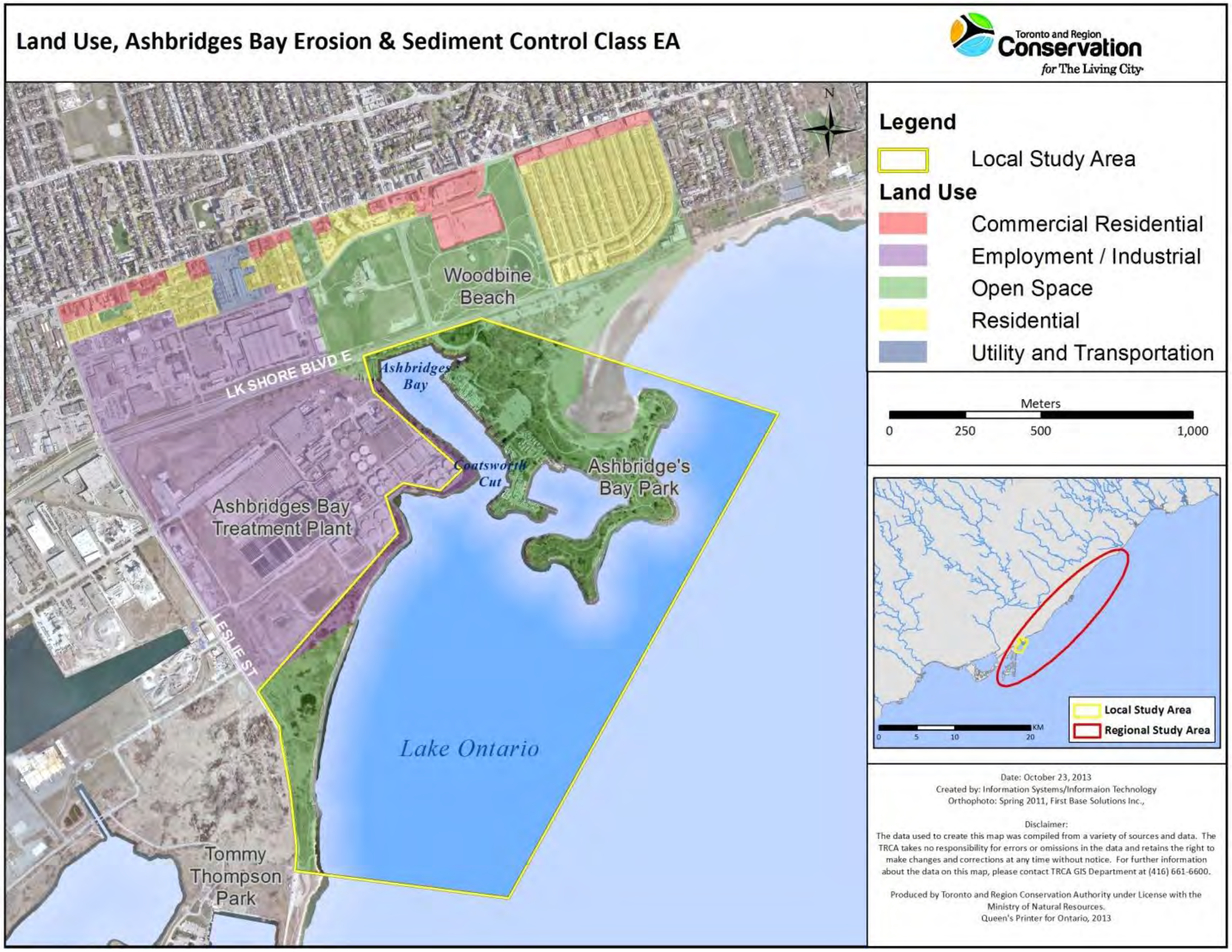

Figure 3-69. Land use within and adjacent to the project local study area.
Source: TRCA, 2013.

3.5.3 Infrastructure, Support Services & Facilities

3.5.3.1 Existing Infrastructure, Support Services & Facilities

Existing infrastructure, support services and facilities within the project local study area include the Toronto Water infrastructure, a public boat launch, recreational clubs' facilities as well as the City of Toronto-operated facilities located in Ashbridge's Bay Park. The Toronto Water infrastructure includes the ABTP (including the plant outfall and the seawall gates) and four outfalls located in the north end of the Coatsworth Cut (Figure 3-70). While the plant outfall extends approximately 1000 m into Lake Ontario and discharges at that point, the seawall gates are located on the south side of the plant and discharge directly into the Lake within the project local study area. Seawall gates discharges are associated with by-pass events (see Section 3.2.17 [Water Quality]) as well as other plant operations. The four outfalls discharge both storm sewer flows and, during wet weather periods, combined sewer flows from upstream catchments. Though the ABTP is located immediately northwest of the project local study area, the approved plant facilities sited within the Bay (see Section 3.5.3.2 [Future Infrastructure] for details) and the seawall gates operation are considerations in this project. The public boat launch is located on the east side of Coatsworth Cut and so are the majority of the recreational boating and social clubs' facilities. Ashbridge's Bay Park contains City-operated public restrooms.

3.5.3.2 Future Infrastructure

A number of Environmental Assessment studies have been approved in recent years that recommend the construction of several facilities within the project local study area. These facilities, shown in Figure 3-70, include the following:

1) Coatsworth Cut CSO & Stormwater Outfalls Control Municipal Class EA Schedule C Environmental Study Report (ESR) (2007):

- *Stormwater treatment wetland complex* (forebay, treatment cells, outfall and water circulation system) as well as the *conveyance channel* for collecting the discharge from the four (4) outfalls located in the northern end of Coatsworth Cut
    - *Expected construction: 2018 – 2021*

2) Don River and Central Waterfront Project Municipal Class EA Schedule C ESR (2012):

- A new *wet weather treatment facility* to provide high-rate treatment of wet weather flows
    - *Expected construction: 10+ years*

3) Ashbridges Bay Treatment Plant - Individual EA (1997)

- A larger-capacity *outfall pipe* extending into Lake Ontario to replace the current outfall pipe
    - *Design in progress*

- A new Ultraviolet Disinfection System for secondary effluent

- A new effluent pumping station (on the existing ABTP property)

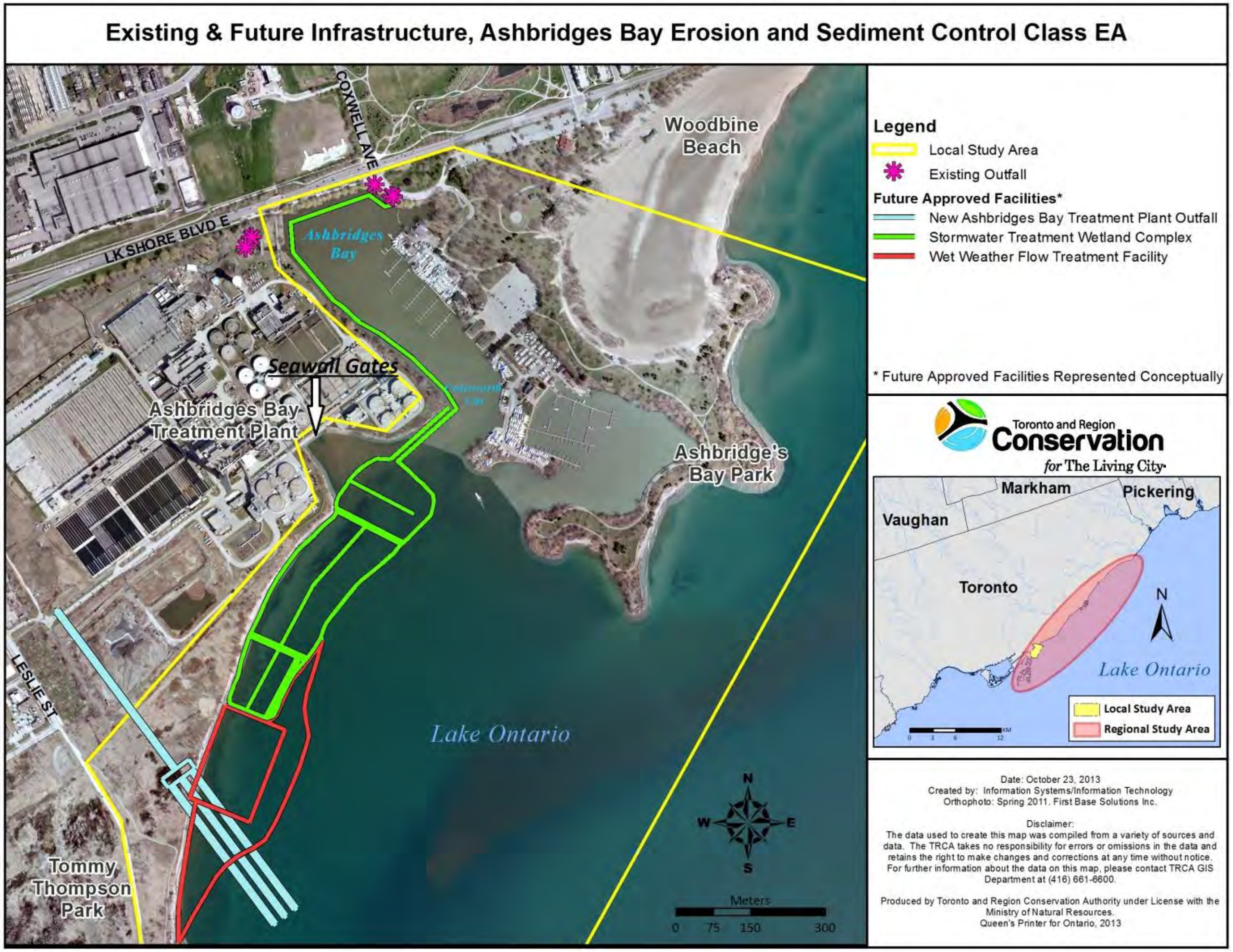

Figure 3-70. Project local study area existing and future infrastructure.
Source: TRCA, 2013.

3.5.4 Pedestrian Traffic Routes

Pedestrian traffic in the project local study area is associated with Lakeshore Boulevard East, Leslie Street, the Martin Goodman Trail/Waterfront Trail located within and adjacent to the project local study area, and a small network of multi-use pathways within the Ashbridge's Bay Park.

3.5.5 Property Ownership

The project local study area property owners include City of Toronto, Province of Ontario, Toronto Port Authority and TRCA (Figure 3-71).

3.5.6 Existing Tourism Operations

While the Ashbridge's Bay Park, Woodbine Beach, Tommy Thompson Park and the recreational boating and social clubs located in Ashbridges Bay/Coatsworth Cut may serve as visitor destinations, there are no known tourism operations in the project local study area.

3.5.7 Property Accessibility

ABTP is accessible via Leslie Street, south of Lakeshore Boulevard East. Leslie Street also provides access to Tommy Thompson Park, with the park entrance located at Unwin Avenue and Leslie Street. Ashbridge's Bay Park and the boat clubs occupying the east side of Coatsworth Cut are accessible via Ashbridge's Bay Park Road south of Lakeshore Boulevard East and Coxwell Avenue.

3.5.8 Recreational Boating and Social Clubs

Recreational boating constitutes the main use of Ashbridges Bay and Coatsworth Cut. Generally, types of watercraft found using the area include the following:

Non-motorized watercraft: canoes, kayaks, paddle boards, surfski; non-motorized sailboats; large sailboats; and motor boats.

There are four recreational boating/sailing clubs utilizing the shoreline and waters of Coatsworth Cut and Ashbridges Bay. The clubs include the Balmy Beach Canoe Club (BBCC) Toronto, the Navy League of Canada, the Toronto Hydroplane and Sailing Club (THSC) and the Ashbridge's Bay Yacht Club (Figure 3-72). In addition to boating clubs, a social club – the Toronto Beaches Lions Club (TBLC) – is also located on the east side of Ashbridges Bay within Coatsworth Cut.

The BBCC is a non-profit flatwater sprint racing club which offers canoe/kayak programs for all ages and abilities. In addition, BBCC offers a summer day camp program for children aged 8 to12, a dragon boat program for community and school groups, surfski opportunities and the PaddleALL program for para-athletes and those with special needs. The Club is a founding section of the Balmy Beach Club which was formed in 1903 (BBCC, No Date).

The Navy League of Canada is a non-profit charitable organization for youth aged 9 to 19. The organization sponsors Navy League Cadets aged 9 to12 and Sea Cadets aged 12 to19. The programs are run by volunteers and the organization is in partnership with the Department of National Defence for the Sea Cadets program (Peace, 2013).

THSC was founded in 1951 and originally focused on building and using hydroplanes. Today, it is primarily a sailing club, offering both cruising and racing (THSC, No Date), services such as mooring and winter storage as well as a variety of social events for club members. The club is run entirely by volunteers.

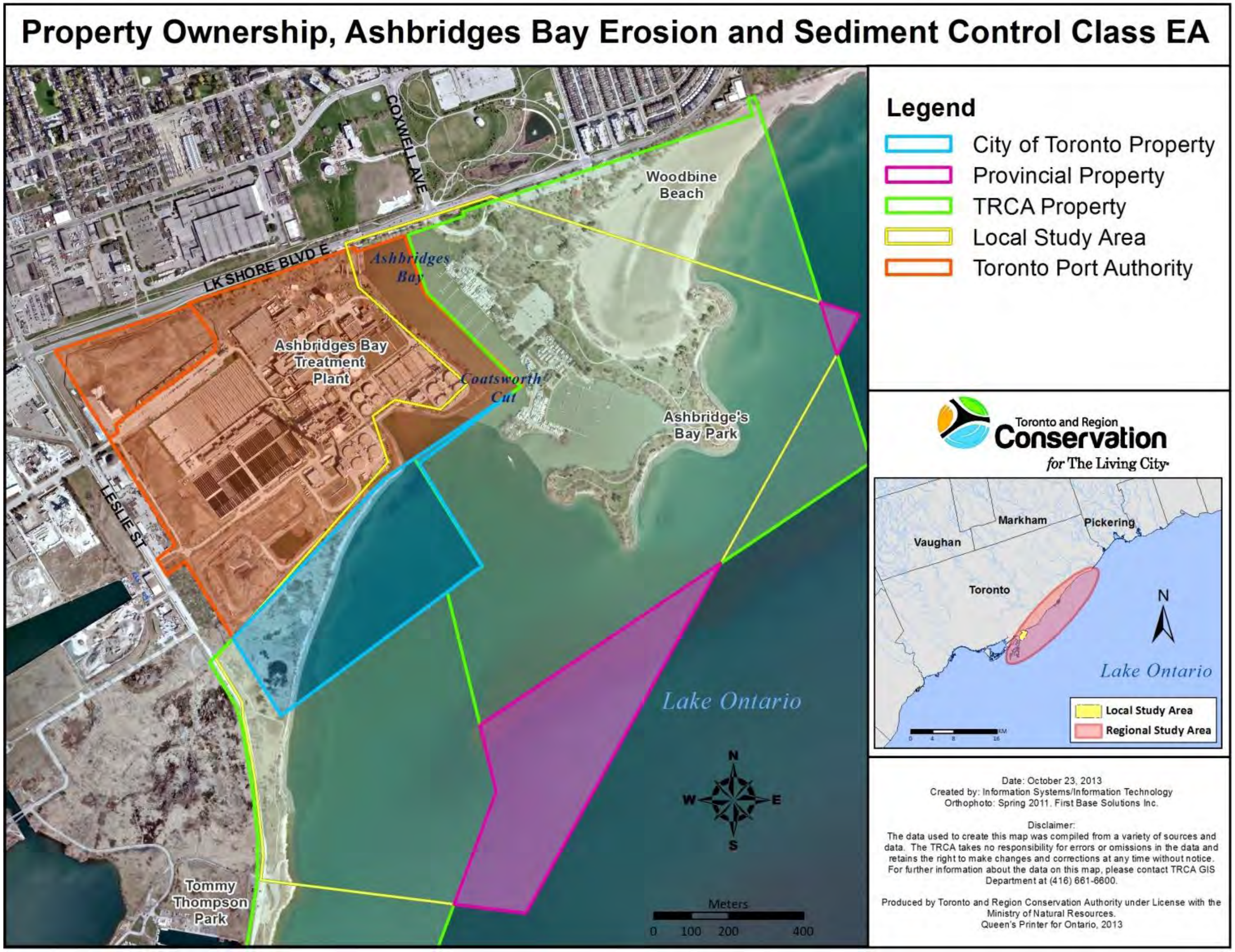

Figure 3-71. Project local study area property ownership.
Source: TRCA, 2013.

The Ashbridge's Bay Yacht Club, formed in 1932, offers various boating activities such as racing, cruising and sailing skills development (Ashbridge's Bay Yacht Club, No Date), and features a number of facilities, including a gas dock and a 270-boat capacity marina. The club offers subsidized sailing school enrollment to youth, in cooperation with Community Centre 55, the local non-profit organization. It also hosts Lake Yacht Racing Association Race Regattas and Ontario blind and handicap sailing association races.

The TBLC is part of the Lions Clubs International, whose objective is serving the community – "neighbour helping neighbour" (TBLC, 2002). Over the course of its operation, TBLC implemented a number of initiatives and sponsored several projects aimed at benefiting local community and other GTA residents. Today, TBLC organizes and sponsors annual events such as the Easter Parade, Canada Day Celebration in Kew Gardens, Christmas in the Park and the Terry Fox Run.

In Summer 2013, TRCA conducted a voluntary survey of the recreational boating clubs described above in order to examine the socio-economic aspect of their operations in a more detailed manner. Survey questionnaire can be found in Appendix G. As per the survey conditions, the results are presented collectively.

The BBCC Toronto, the Navy League, THSC and Ashbridge's Bay Yacht Club had approximately 2,000 members at the time the survey was conducted. Over 90% of members are Toronto residents living within 20 km of Ashbridges Bay. In addition to members, the clubs reported receiving nearly 4,300 visitors in 2012 to 2013.

Collectively, the clubs employ seven staff on a full-time basis and 45 staff seasonally. All clubs are non-profit organizations and partially or fully rely on volunteers to operate. At the time of survey completion, the clubs had 581 volunteers with various time commitments.

While being non-profit organizations, the clubs do receive revenue, collected mainly through membership fees. The majority of the revenue goes towards maintenance and other revenue expenditures, with approximately 75 to 99% estimated to be spent within the City of Toronto.

Figure 3-72. Project local study area recreational boating and social club locations and facilities.
Source: TRCA, 2013.

4 ALTERNATIVES DEVELOPMENT AND EVALUATION

This section describes the development of remedial alternatives considered in this EA, alternatives evaluation process and results, and the proposed preferred alternative implementation.

4.1 Alternatives Development

The development of remedial alternatives was based on the work completed in the previously initiated 2002 and 2009 EAs (see Section 2.1 [History of the Problem]). Alternatives developed in 2002 and 2009 were re-examined and refined based on the current EA scope.

As stated in Section 1.2 [Purpose of the Undertaking], the current EA scope includes consideration of the following:

- Current land-based area uses (e.g., recreational activities at Woodbine Beach) and on-going operations (e.g., ABTP seawall gates operation);
- The approved concepts for the City of Toronto facilities in the vicinity of ABTP: ABTP outfall, satellite treatment plant and treatment wetland;
- Creation of aquatic and terrestrial habitats; and
- Local study area planning initiatives such as the Lake Ontario Park Master Plan and the Tommy Thompson Park Master Plan.

Notably, this Class EA does not consider the relocation of the boat clubs currently in Coatsworth Cut and Ashbridges Bay. While the clubs' needs and current uses of the local study area are a part of the project socio-economic considerations, relocation of the clubs is not within the scope of this EA.

Table 4-1 summarizes the review of 2002 and 2009 alternatives (Figure 4-1 to Figure 4-14) and identifies the alternatives that met the scope of the current EA and thus were carried forward for further consideration.

As indicated in Table 4-1, alternatives 1, 1-A, 2, 2-A and the 'Do Nothing/Status Quo' Alternative met the requirements of the current EA and thus were carried forward as part of the study. These alternatives were subsequently refined to take into consideration the previously approved City of Toronto facilities.

The refinement process resulted in the creation of three design alternatives for the current study – Alternative 1, 2 and 3, and the 'Do Nothing/Status Quo' Alternative. The descriptions of these alternatives are provided in Section 4.2 [Alternatives Description].

Table 4-1. Review of 2002 and 2009 alternatives based on the current EA scope.

Alternative (Figure)	Retained for Consideration Yes/No	Comments
1 - 2002 EA (Figure 4-1)	Yes	The Alternative constitutes an effective solution to the erosion and sedimentation issues. At the same time, the Alternative does not affect the current land-based uses in the area, on-going operation of the ABTP seawall gates, and the implementation of the City of Toronto future approved facilities (the new ABTP outfall, satellite treatment plant and treatment wetland). As well, the Alternative does not involve relocation of the boat clubs currently in Coatsworth Cut and Ashbridges Bay and provides design flexibility to integrate City of Toronto approved facilities to be situated in the waterlot in front of the ABTP (i.e., treatment wetland and satellite treatment plant).
1-A - 2002 EA (Figure 4-2)	Yes	Same as Alternative 1.
2 - 2002 EA (Figure 4-3)	Yes	Same as Alternative 1.
2-A - 2002 EA (Figure 4-4)	Yes	Same as Alternative 1.
2-B - 2009 EA (Figure 4-5)	No	The Alternative constitutes an effective solution to the erosion and sedimentation issues. However, the Alternative involves relocation of the boat clubs currently in Coatsworth Cut and Ashbridges Bay.
2-C - 2009 EA (Figure 4-6)	No	Same as Alternative 2-B.
2-D - 2009 EA (Figure 4-7)	No	Same as Alternative 2-B.
3 - 2009 EA (Figure 4-8)	No	The Alternative constitutes an effective solution to the erosion and sedimentation issues. However, it requires relocation of the local study area boat clubs and modification of the Ashbridge's Bay Park landform.
3-A - 2009 EA (Figure 4-9)	No	Same as Alternative 3.
4 - 2009 EA (Figure 4-10)	No	The Alternative constitutes an effective solution to the erosion and sedimentation issues. However, it requires modification of the Ashbridge's Bay Park landform and disruption to land-based uses of the area.
5 - 2009 EA (Figure 4-11)	No	The Alternative constitutes an effective solution to the erosion and sedimentation issues. However, it requires relocation of the local study area boat clubs and modification of the Ashbridge's Bay Park landform.
5-A - 2009 EA (Figure 4-12)	No	Same as Alternative 5.
5-B - 2009 EA (Figure 4-13)	No	Same as Alternative 5.
5-C - 2009 EA (Figure 4-14)	No	Same as Alternative 5.
6 - 2009 EA	No	This Alternative consists of dredging Woodbine Beach

Alternative (Figure)	Retained for Consideration Yes/No	Comments
		in order to increase the volume of sand being captured on the east side of Ashbridge's Bay Park landform, resulting in a diversion of a significant volume of sediment from Coatsworth Cut. This Alternative would disrupt the recreational activities at Woodbine Beach, thus resulting in a negative impact to the current area uses.
Do Nothing/Status Quo	Yes	The 'Do Nothing' Alternative is considered to be 'Status Quo' (regular dredging in Coatsworth Cut) for this assessment as this activity is required to maintain navigability for boaters. As per the Class EA process, consideration of this alternative is mandatory: it allows identification of the risks associated with the current condition and forms the basis of comparison against other alternatives to determine whether the proposed solutions provide better outcomes.

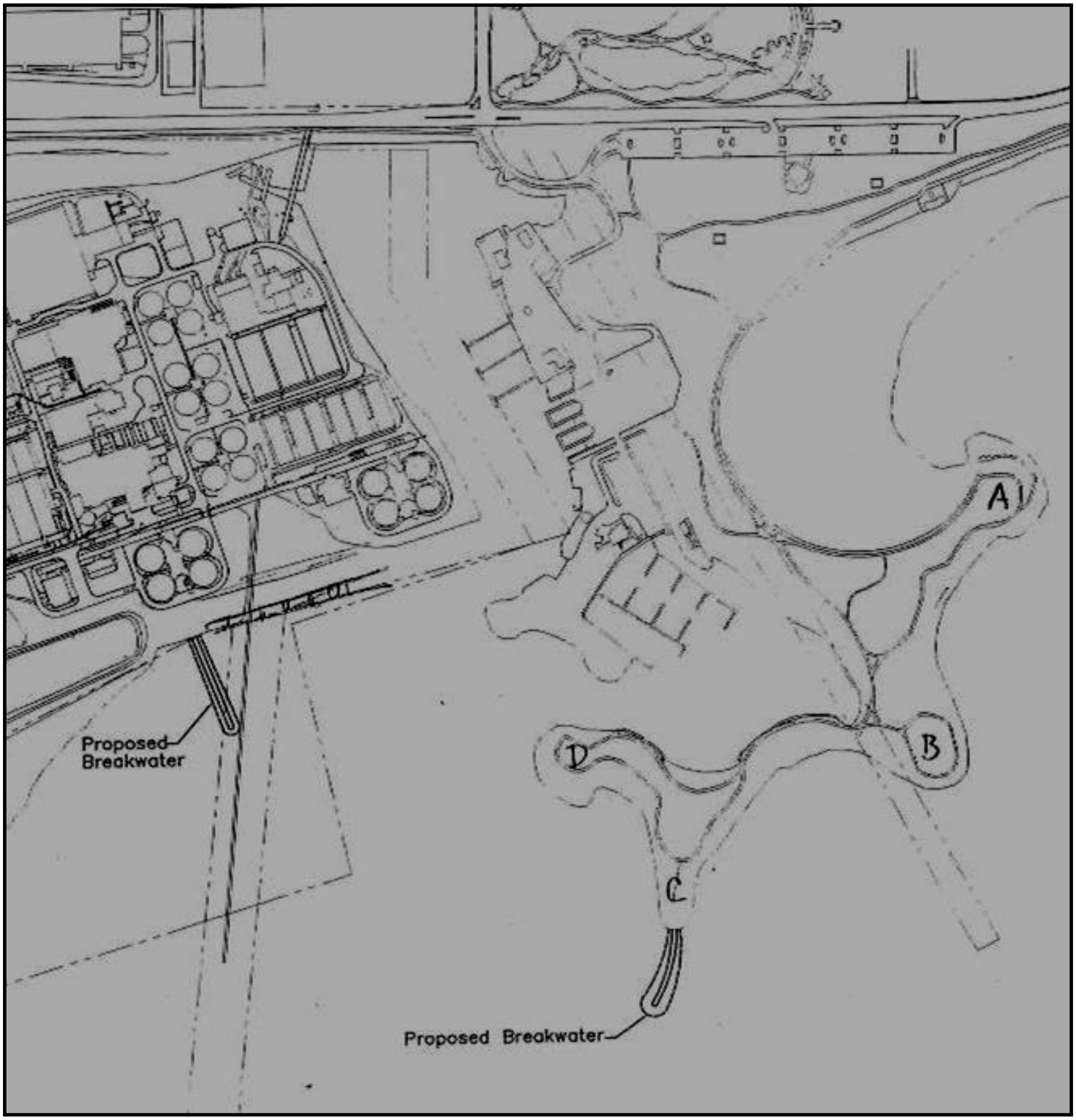

Figure 4-1. Alternative 1 (2002 EA).

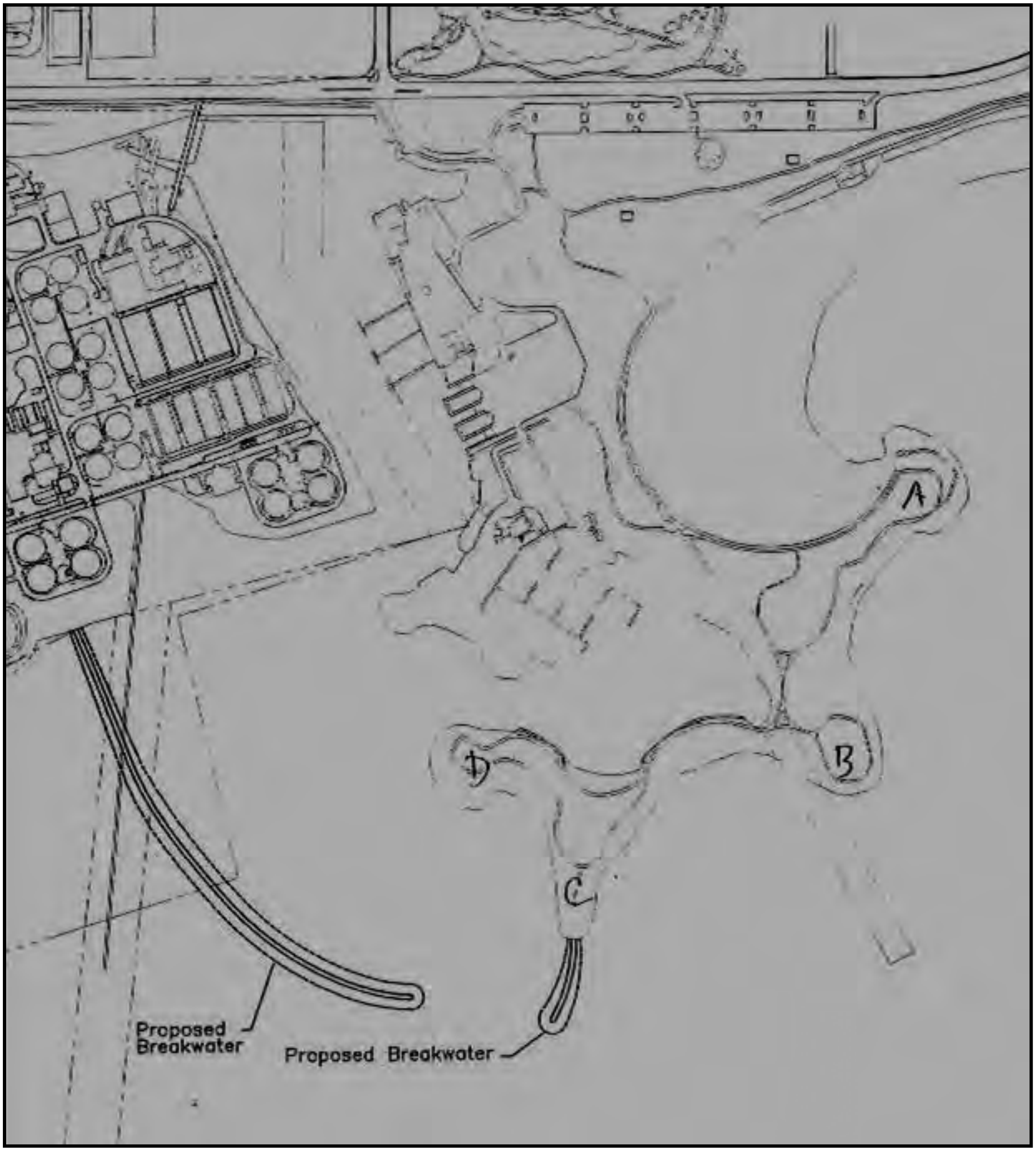

Figure 4-2. Alternative 1-A (2002 EA).

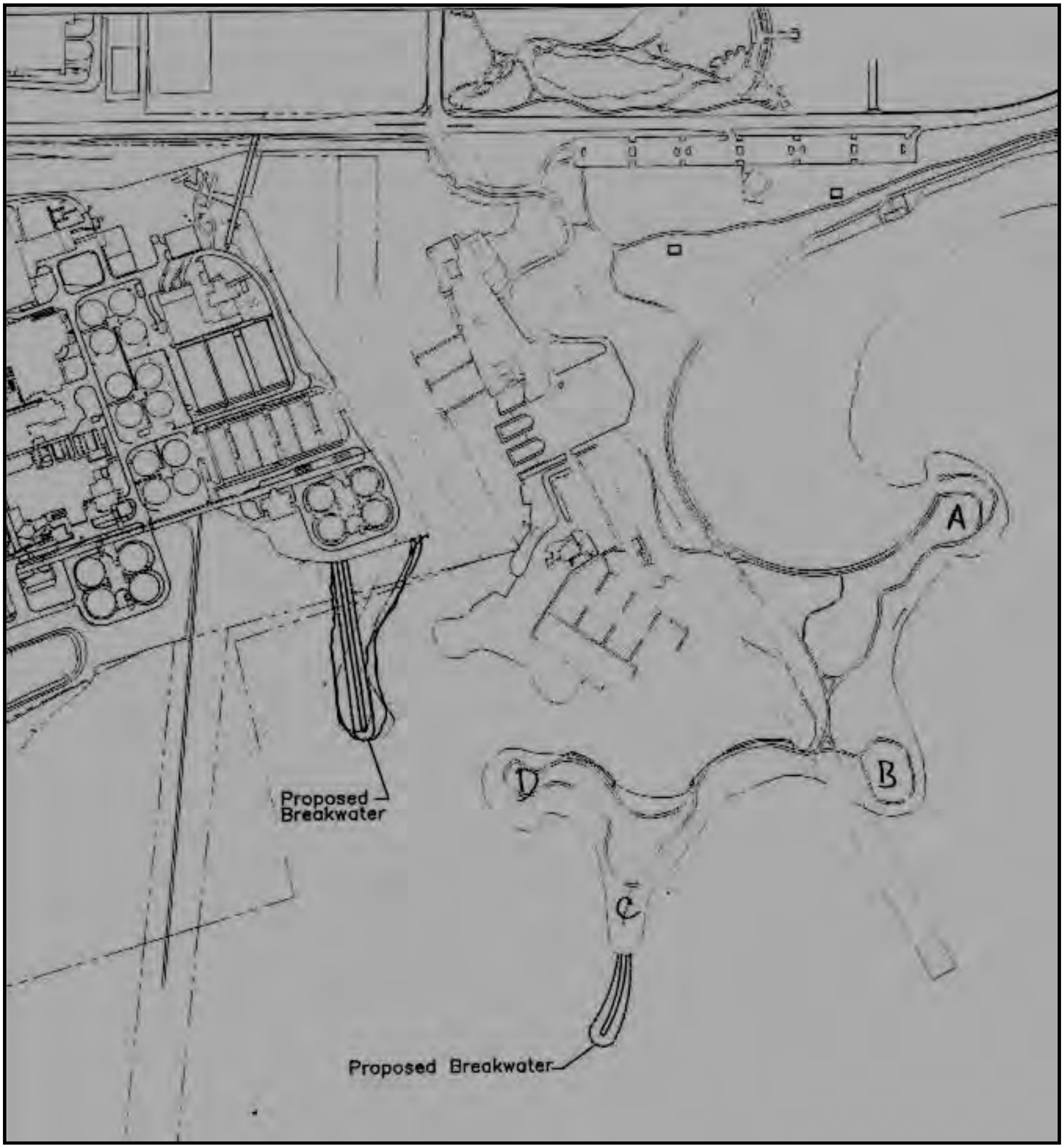

Figure 4-3. Alternative 2 (2002 EA).

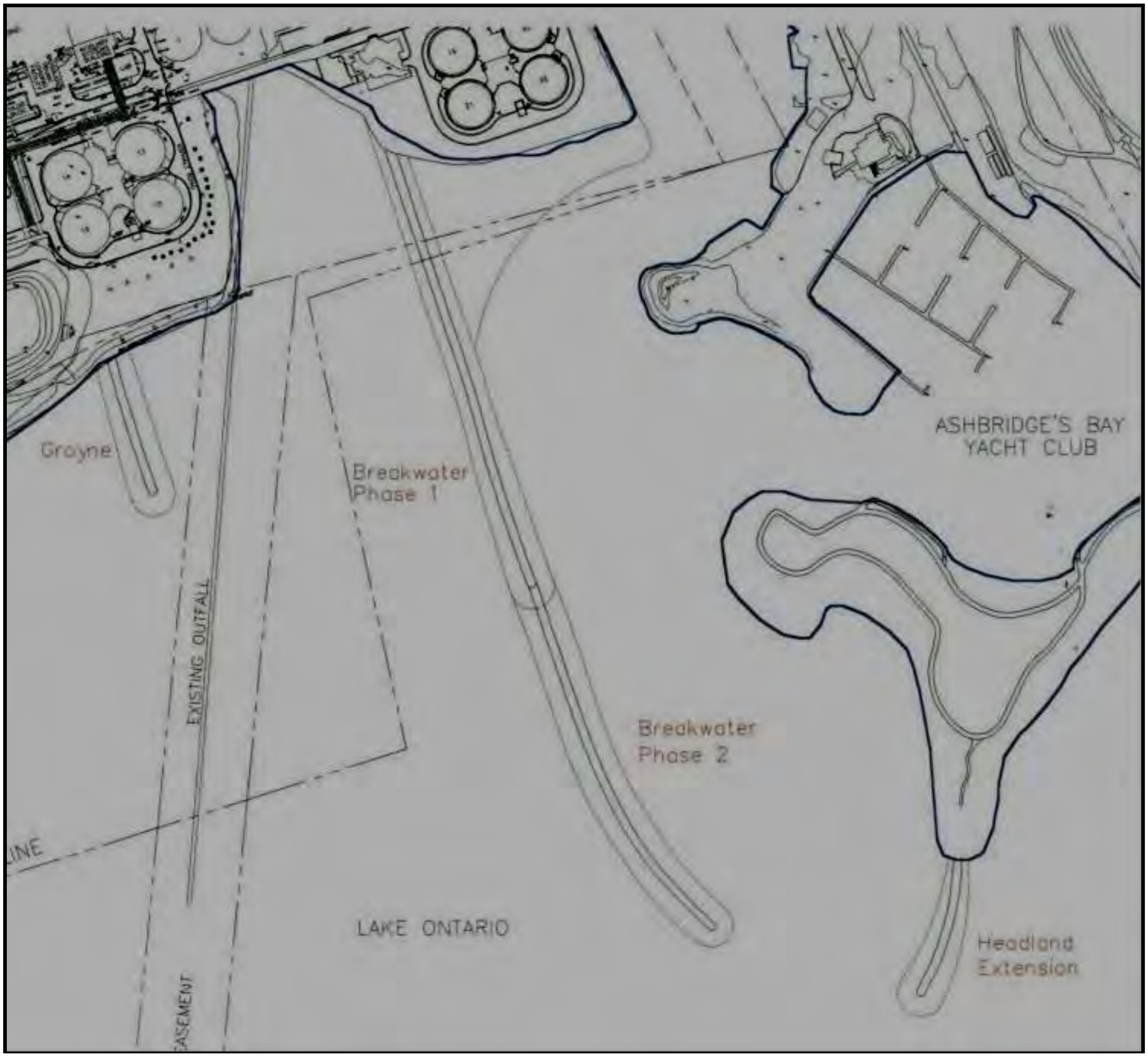

Figure 4-4. Alternative 2-A (2002 EA).

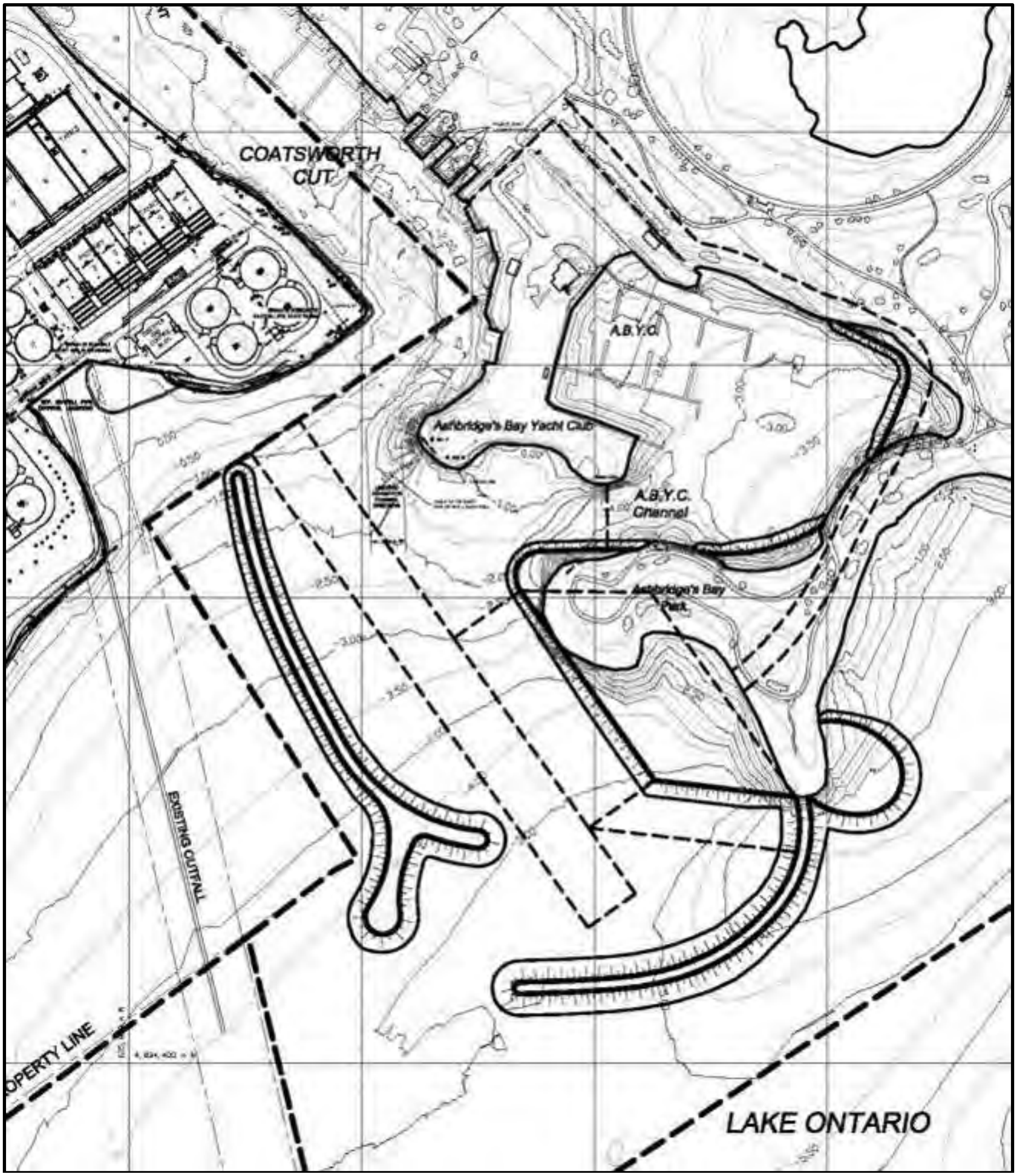

Figure 4-5. Alternative 2-B (2002 EA).

Figure 4-6. Alternative 2-C (2002 EA).

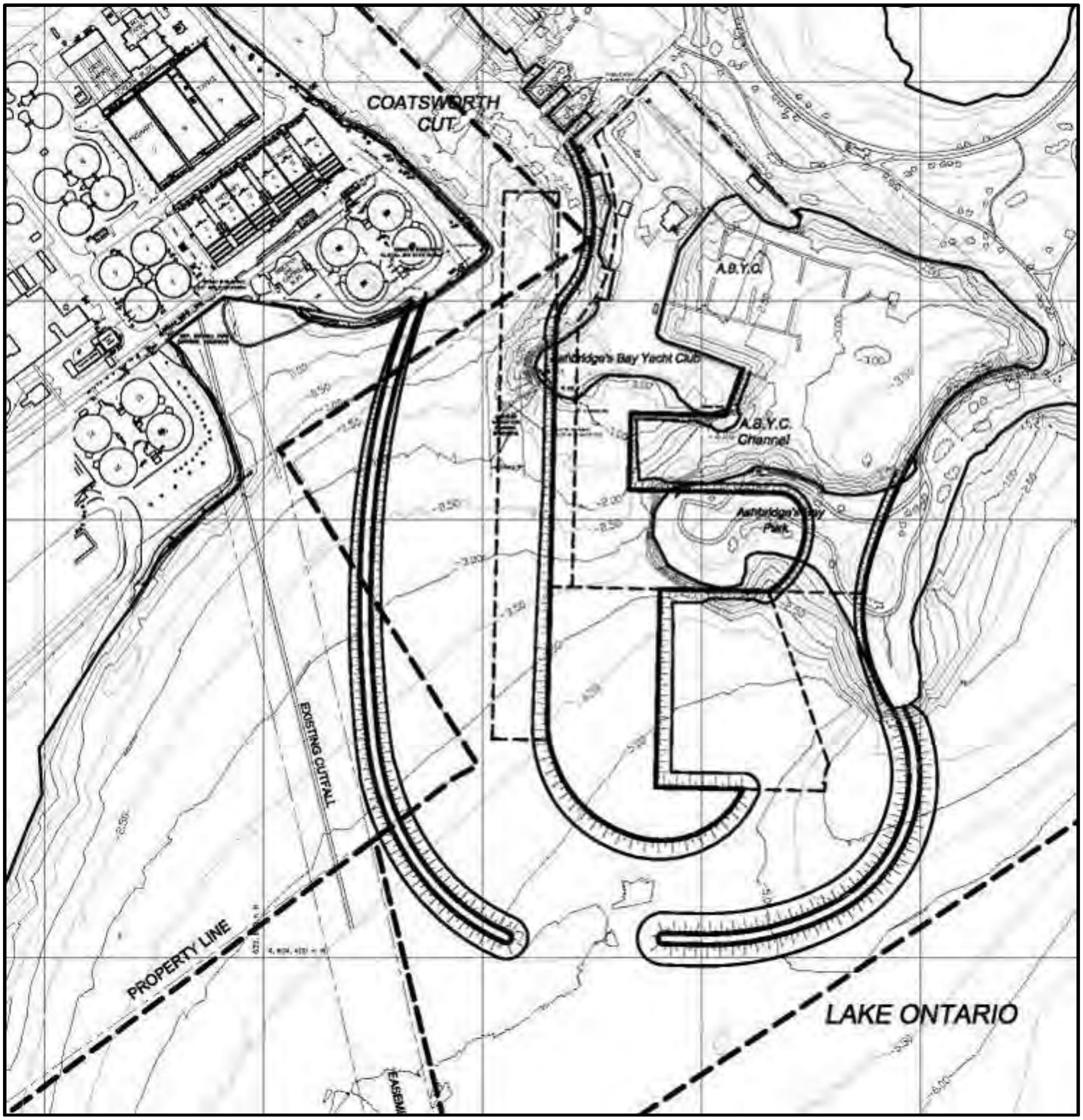

Figure 4-7. Alternative 2-D (2002 EA).

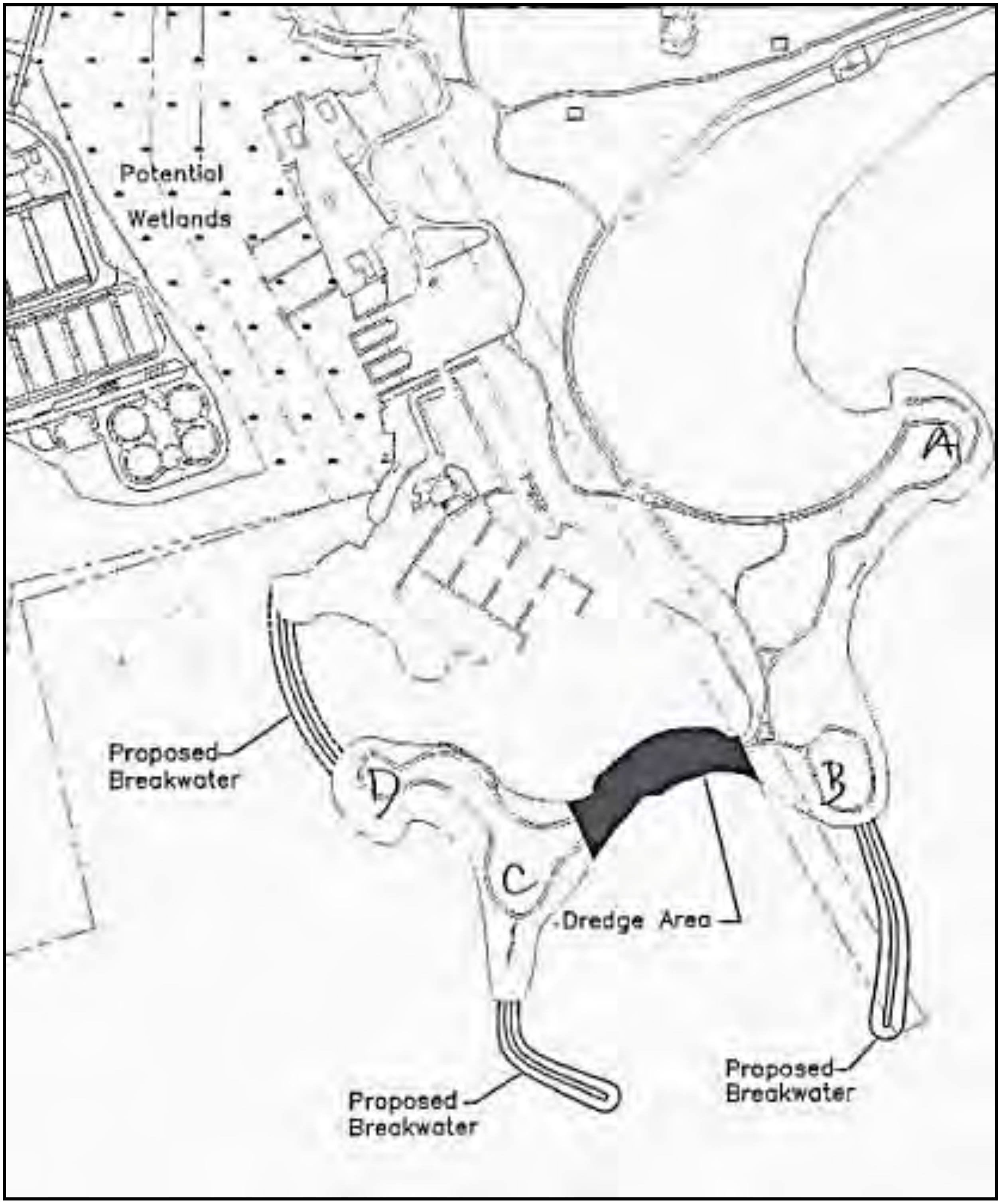

Figure 4-8. Alternative 3 (2009 EA).

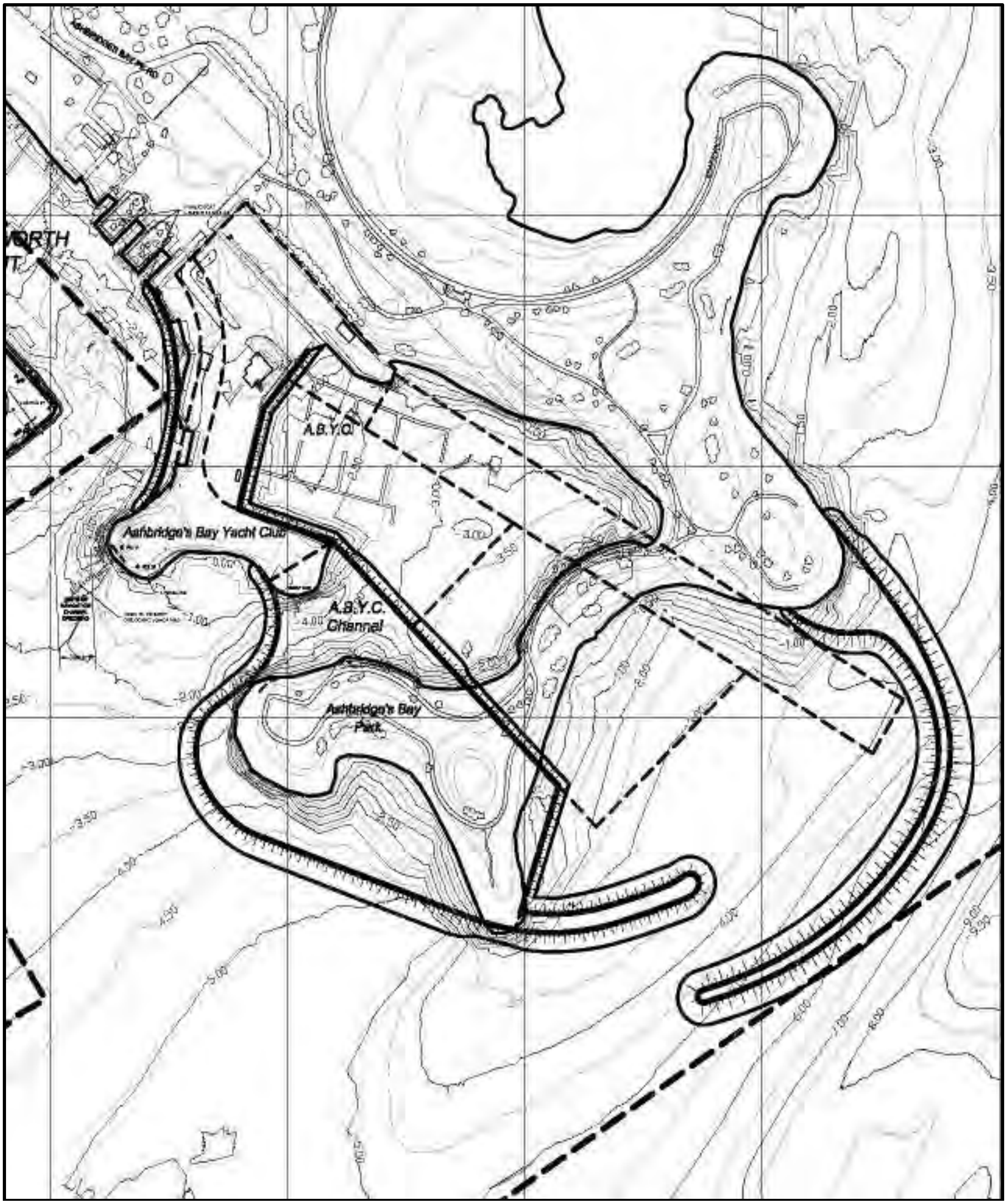

Figure 4-9. Alternative 3-A (2009 EA).

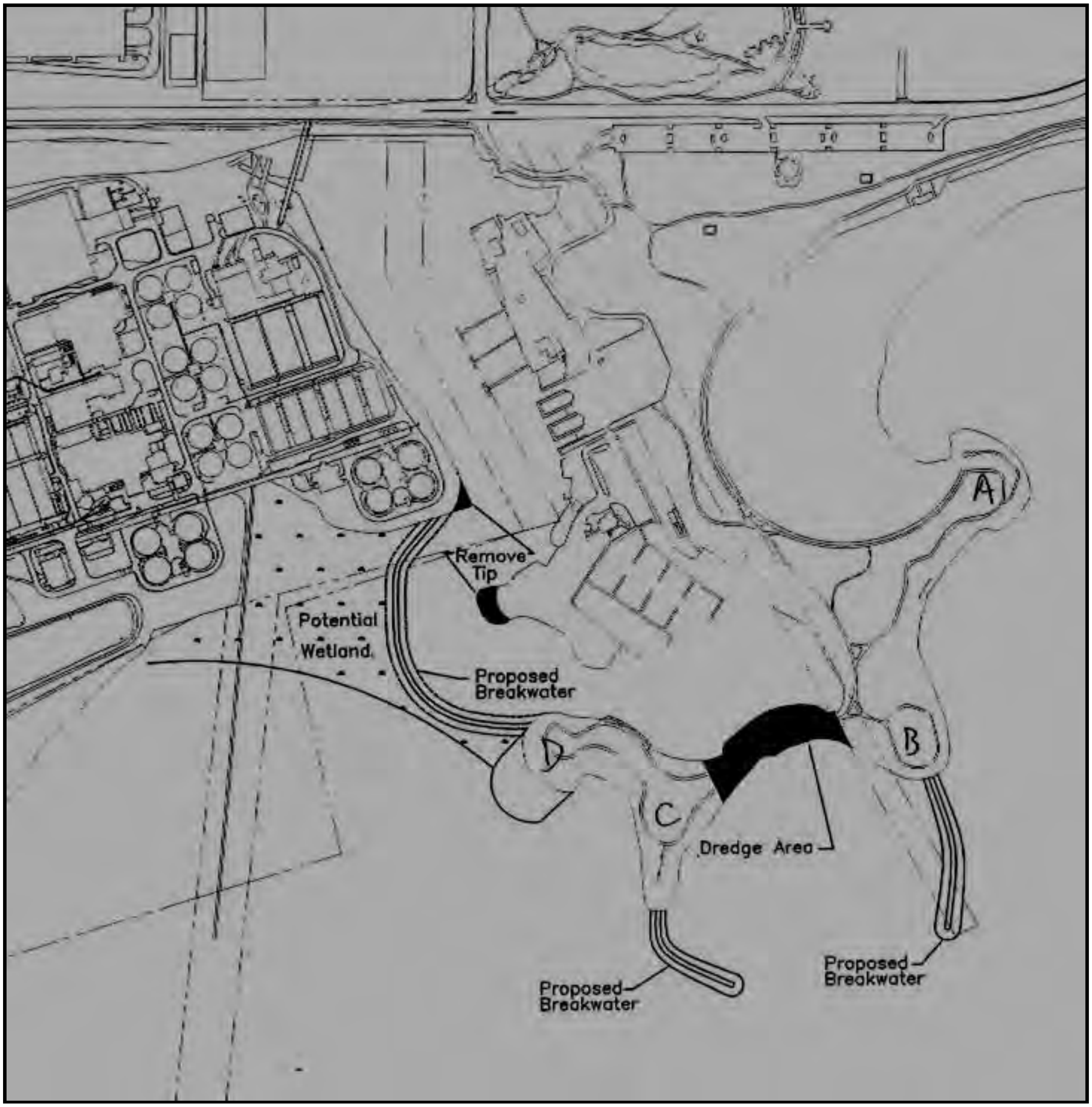

Figure 4-10. Alternative 4 (2009 EA).

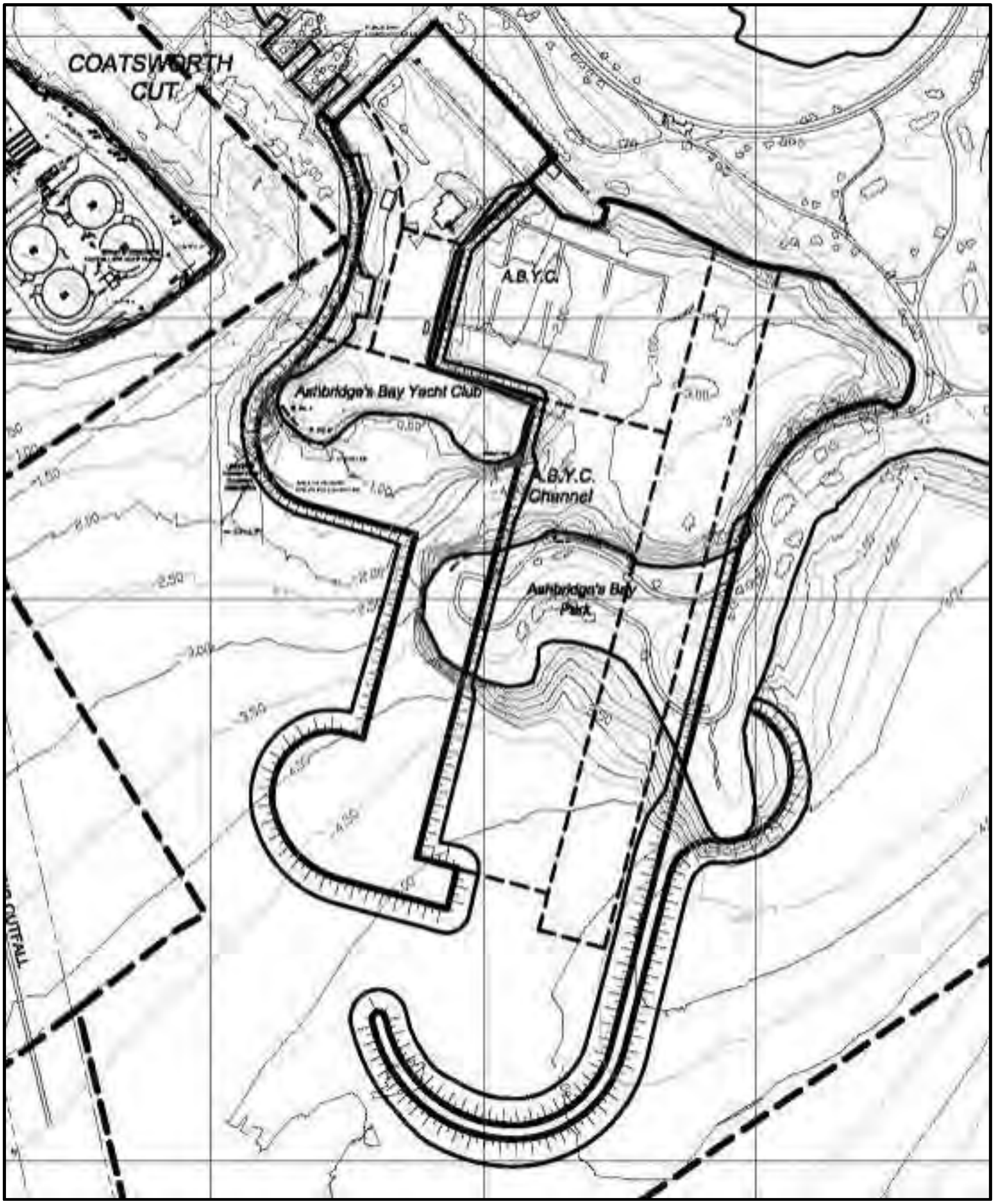

Figure 4-11. Alternative 5 (2009 EA).

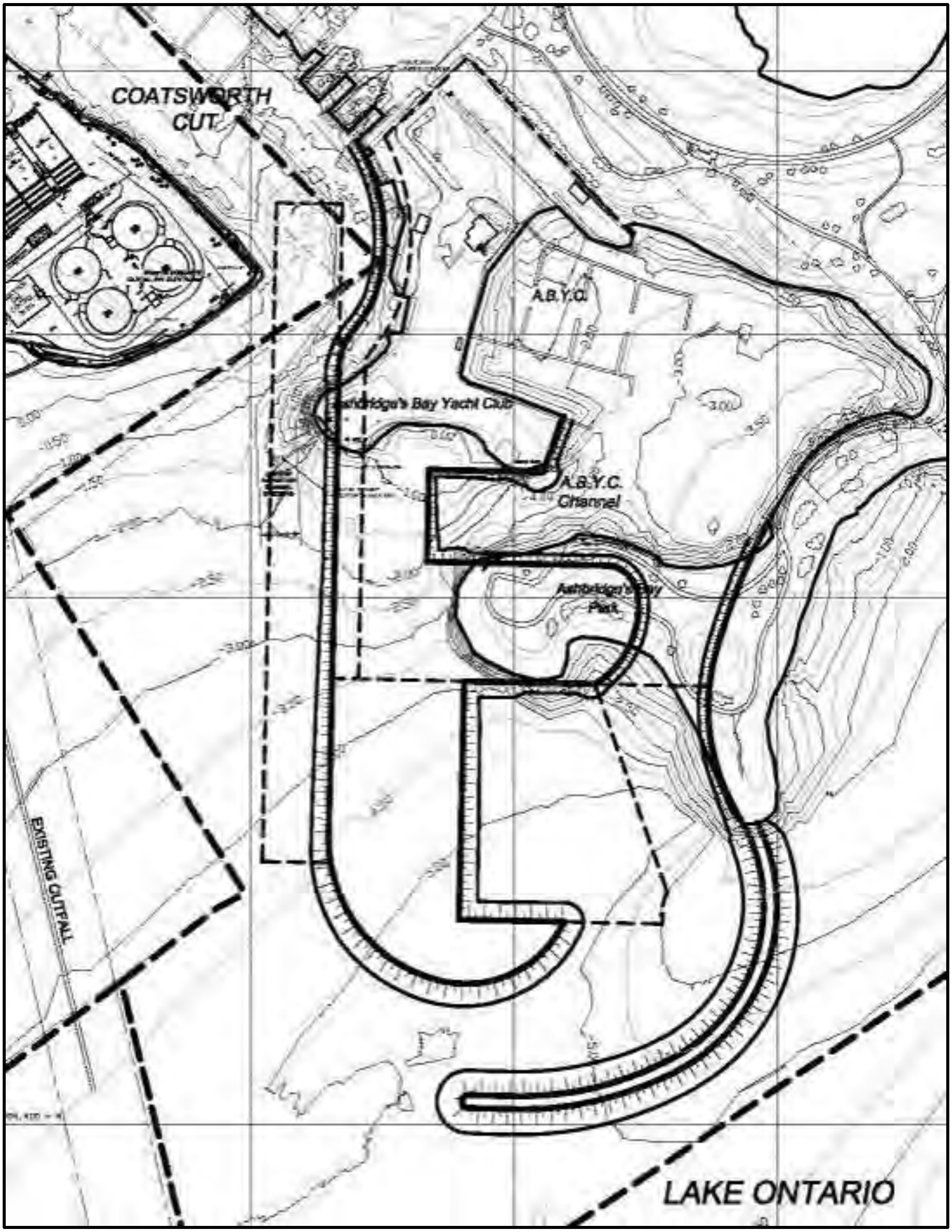

Figure 4-12. Alternative 5-A (2009 EA).

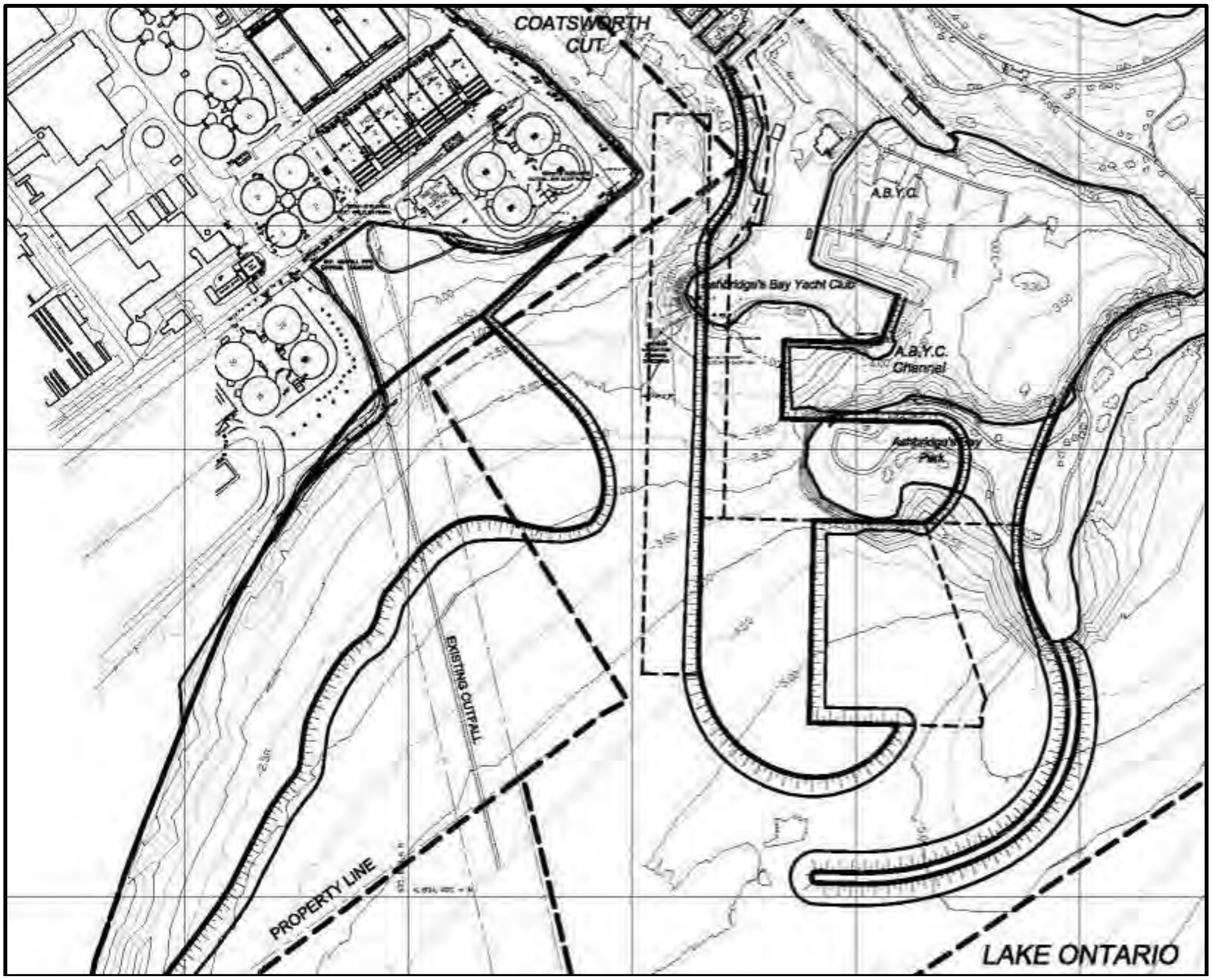

Figure 4-13. Alternative 5-B (2009 EA).

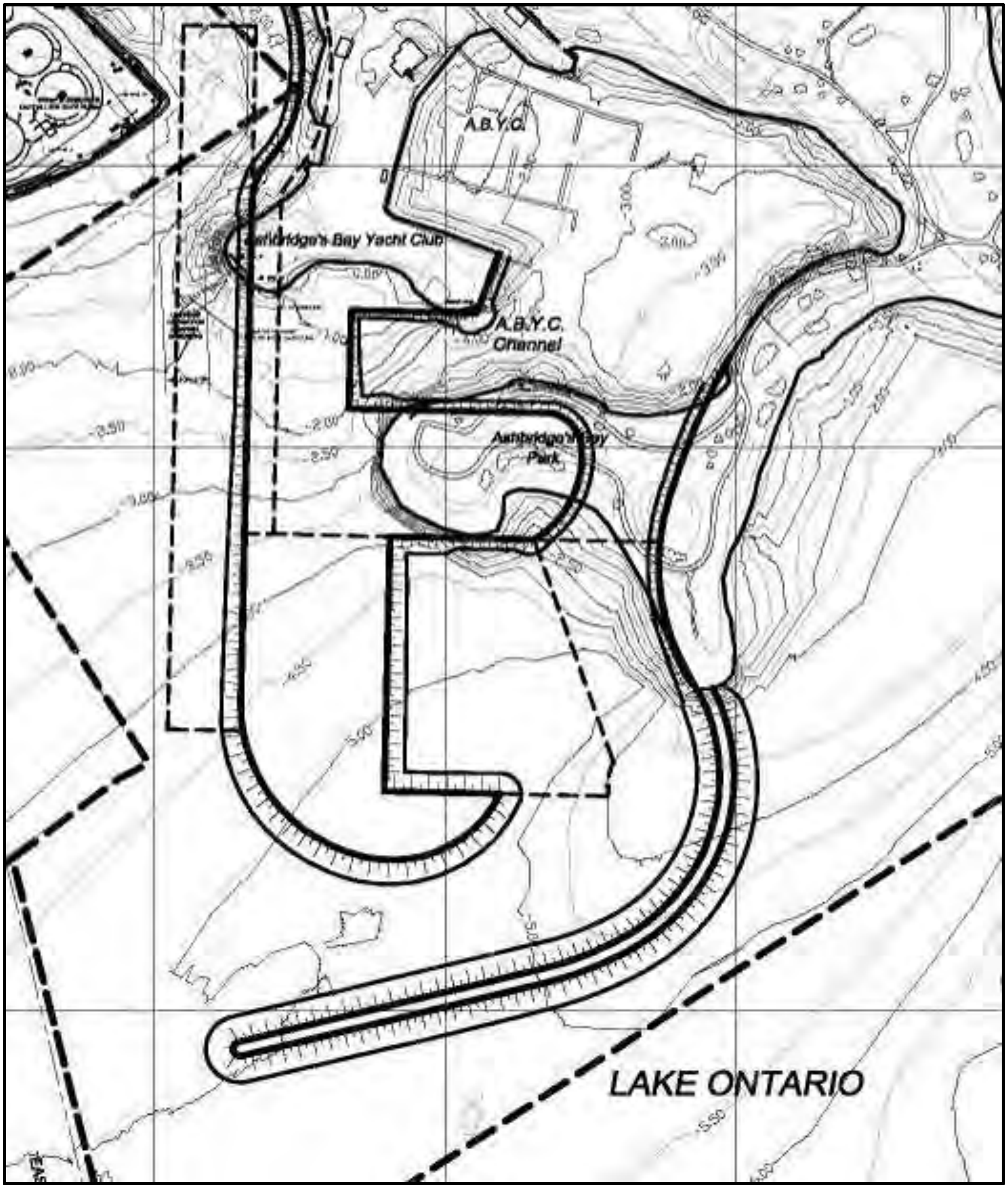

Figure 4-14. Alternative 5-C (2009 EA).

4.2 Alternatives Description

This section provides the descriptions of the four alternatives evaluated in this EA. Alternatives 1, 2 and 3 represent different shore-connected breakwater and new shoreline/cobble beach configurations, and the fourth Alternative is the ‘Do Nothing/Status Quo’ option which represents on-going maintenance dredging in Coatsworth Cut.

4.2.1.1 Alternative 1

Alternative 1 consists of two breakwater extensions referred to as the east and west breakwaters (Figure 4-15). The east breakwater is approximately 100 m long and extends from Headland C of Ashbridge’s Bay Park. The west breakwater is approximately 625 m long and extends from the west side of the ABTP seawall gates.

The entrance created between the east and west breakwaters is approximately 120 m wide. It is located at the -4 m depth contour within the lake. The size of the breakwater-enclosed area is approximately 160,000 m^2.

The shoreline of the landform that is created as a result of this Alternative integrated with the approved City of Toronto facilities (satellite treatment plant and treatment wetland) is approximately 850 m long with one half (400 m) being cobble beach. The remainder of the shoreline is proposed to be an armour stone revetment, as per the preliminary concepts for the satellite treatment plant (MMM, 2012). Construction access to the erosion and sediment control structures is proposed to be on the landbase for the satellite treatment plant.

Public access along the crest of the cobble beach can be considered and will be explored in the detailed design stage.

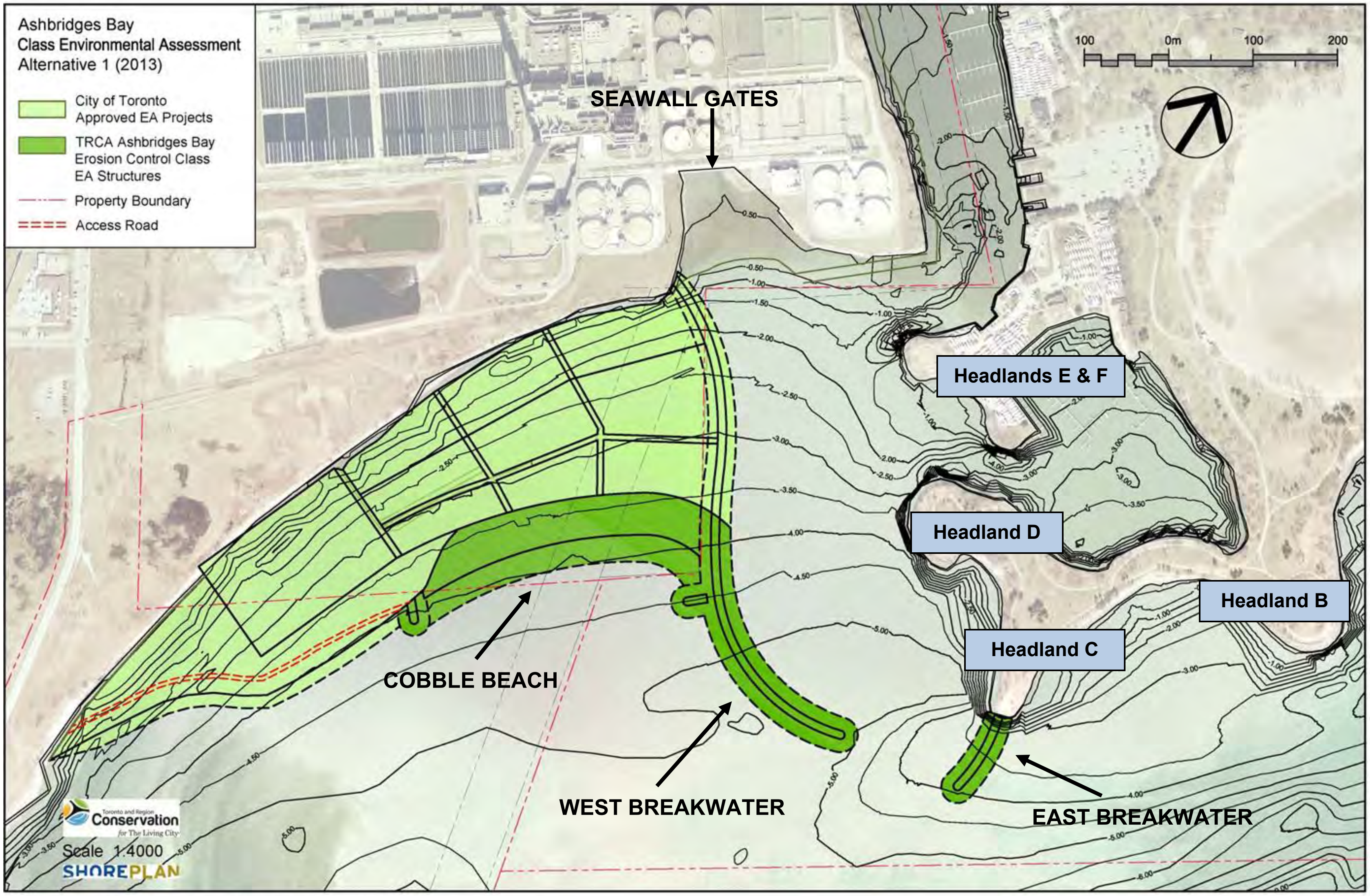

Figure 4-15. Alternative 1.
Modified from Shoreplan Engineering Limited, 2014.

4.2.1.2 Alternative 2

Similarly to Alternative 1, Alternative 2 consists of two breakwater extensions referred to as east and west breakwaters (Figure 4-16). The east breakwater is approximately 100 m long and extends from Headland C of Ashbridge's Bay Park. The west breakwater is approximately 625 m long and extends from the west side of the ABTP seawall gates.

In addition to the east and west breakwaters, a central breakwater that is approximately 200 m long extends from the east side of the ABTP seawall gates. The purpose of this breakwater is to deflect occasional discharge from the seawall gates away from the Coatsworth Cut mouth and the ABYC marina entrance. The distance between this breakwater and Ashbridge's Bay Park Headlands E and F is approximately 100 m. The size of the breakwater-enclosed area is similar to that of Alternative 1, and the size of its entrance is approximately 120 m.

Similarly to Alternative 1, the shoreline of the landform that is created as a result of integrating the satellite treatment plant landbase, treatment wetland and Alternative 2 is approximately 850 meters long with one half (400 m) being cobble beach. The remainder of the shoreline is proposed to be an armour stone revetment, as per the preliminary concepts for the satellite treatment plant (MMM, 2012). Construction access to the erosion and sediment control structures is proposed to be on the satellite treatment plant land.

Public access along the crest of the beach can be considered and will be explored in the detailed design stage.

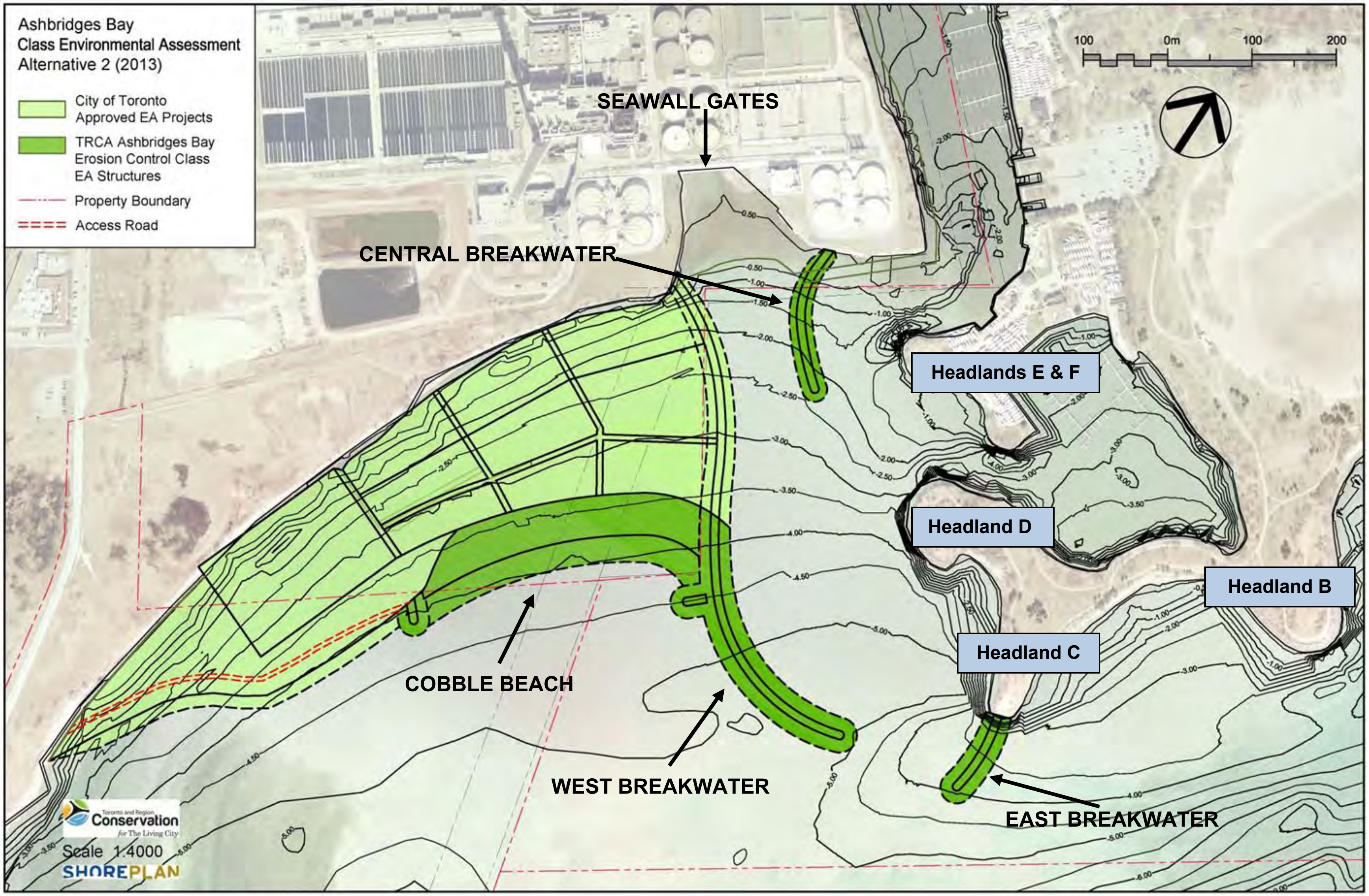

Figure 4-16. Alternative 2.
Modified from Shoreplan Engineering Limited, 2014.

4.2.1.3 Alternative 3

Alternative 3 consists of the east breakwater and primary and secondary west breakwaters (Figure 4-17). Similarly to Alternatives 1 and 2, the east breakwater is approximately 100 m long and extends from the base of Ashbridge's Bay Park Headland C.

The primary west breakwater extending from the east side of the ABTP seawall gates is approximately 650 m long. The secondary west breakwater is positioned west of the seawall gates and is approximately 450 m long. The spacing between the west breakwaters is approximately 40 m and matches the approximate width of the seawall gates, allowing free open channel flow. The size of the breakwater-enclosed area is approximately 116,000 m^2. The width of the breakwater-enclosed area opening is approximately 120 m.

The shoreline of the entire landform enclosed between the original shoreline south of ABTP and the secondary west breakwater is approximately 820 m long (slightly shorter than the shoreline created for Alternative 1 and 2) with one half (400 m) being cobble beach. Again, the remainder of the shoreline is proposed to be an armour stone revetment, as per the preliminary concepts for the satellite treatment plant (MMM, 2012). Construction access to the erosion and sediment control structures is proposed to be on the satellite treatment plant land.

Public access along the crest of the beach can be considered and will be explored in the detailed design stage.

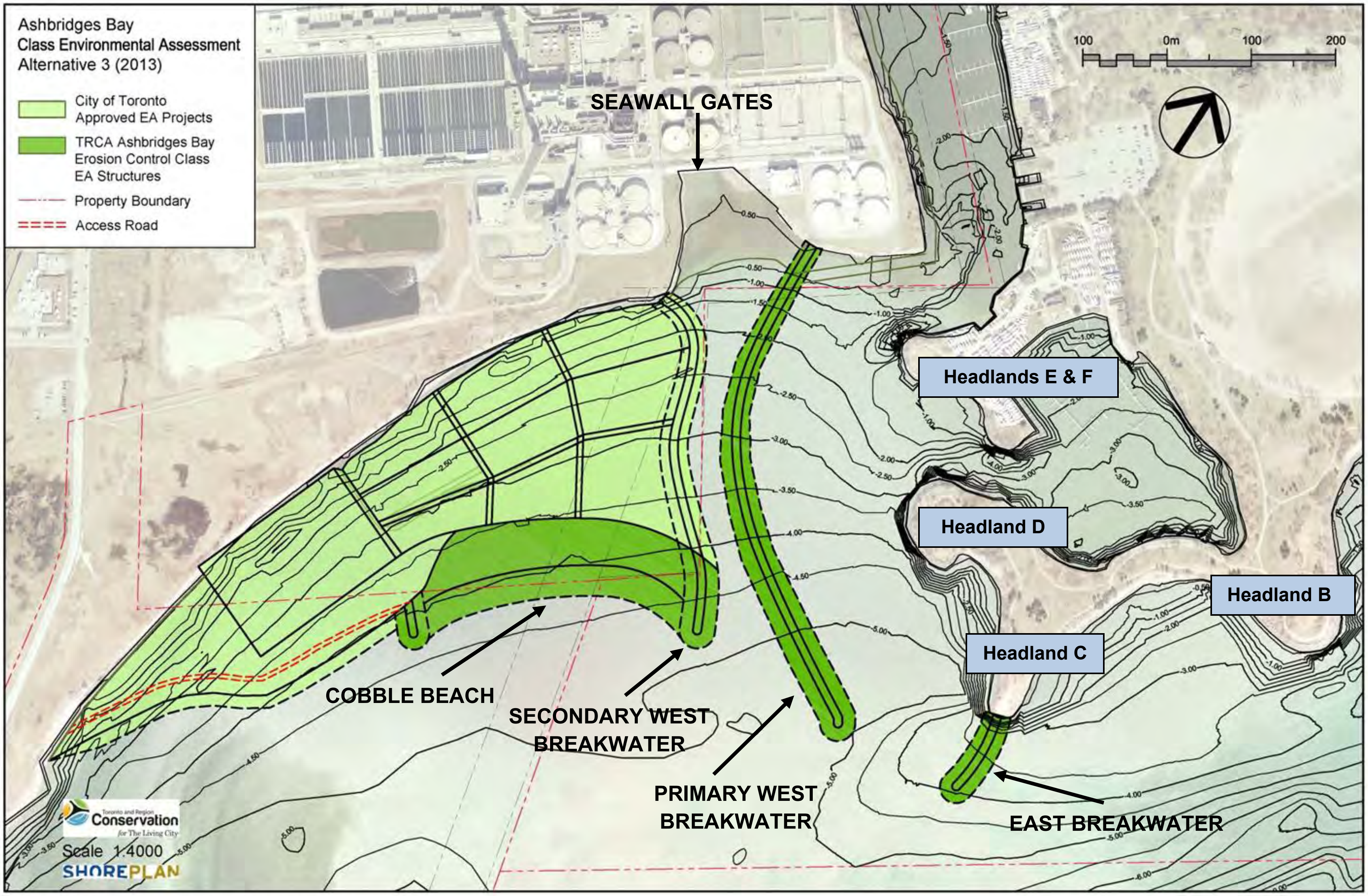

Figure 4-17. Alternative 3.
Modified from Shoreplan Engineering Limited, 2014.

4.2.1.4 Do Nothing/Status Quo Alternative

The ‘Do Nothing/Status Quo’ Alternative is considered to be status quo as on-going dredging of Coatsworth Cut is required to maintain navigation and safety. The channel currently dredged is approximately 25 m wide and maintained at 1.8 m (5.9 ft) below datum, which is considered to be the minimum required to maintain the Federal Navigation Standards. As stated previously (Table 4-1), consideration of this Alternative is mandatory as per the Class EA process.

4.3 Alternatives Evaluation

The baseline environmental inventory information was used to evaluate the potential impact of alternatives on the surrounding environment. Positive and negative impacts on physical, biological, cultural and socio-economic environment as well as feasibility, cost and technical considerations were examined. Evaluation criteria, ranking scheme and results are outlined below.

4.3.1 Evaluation Criteria

To ensure that the proposed solution best meets project objectives, TRCA, City of Toronto, Shoreplan Engineering Limited, members of the public and other project stakeholders held several discussions to determine alternatives evaluation criteria in relation to the physical, biological, cultural, social, economic, and technical and engineering elements. Criteria reviewed in 2002 and 2009 were used as a starting point.

A list of criteria discussed is presented in Table 4-2. A number of the criteria were addressed immediately using the work completed in previous EAs and other local area studies. This allowed for some criteria to not require further analysis. The rest were retained and addressed in alternatives evaluation (see Section 4.3.3 [Alternatives Evaluation]).Table 4-2 identifies whether further evaluation was undertaken for each criterion and if it was not, rationale is included in the Evaluation Status’ column.

Table 4-2. Alternatives Evaluation Criteria.

Criterion	Consideration	Evaluation Status
Physical Environment		
Sediment Movement	Does the Alternative impact sediment movement in the littoral cell?	Further evaluation to be undertaken
Soil and Groundwater	Does the Alternative impact soil/groundwater quality, or is it potentially impacted by contaminated soils/groundwater?	No further evaluation: No groundwater dependent features in close proximity to the local study area were identified, nor is groundwater discharge to the lake of concern given the assimilative capacity of the body of water (see Sections 3.2.16 and 3.2.18).
Unique Landform s	Does the Alternative impact any unique habitats or landforms in the area?	Further evaluation to be undertaken
Water Quality	Does the Alternative impact water quality?	Further evaluation to be undertaken
Water Circulation	Does the Alternative impact water circulation?	Further evaluation to be undertaken
Biological Environment		
Aquatic Habitat	Does the Alternative affect aquatic habitat?	Further evaluation to be undertaken
Terrestrial Habitat	Does the Alternative affect sensitive terrestrial habitat or communities?	Further evaluation to be undertaken
Migratory and Breeding Birds	Does the Alternative result in impacts to habitat for migratory or breeding bird communities?	Further evaluation to be undertaken
Species of Interest	Does the Alternative result in impacts to species of interest/concern?	Further evaluation to be undertaken
Fisheries	Does the Alternative impact fish community assemblages?	Further evaluation to be undertaken
Socio-Economic Environment		
Parks – Public Use and Infrastructure	Does the Alternative impact public use and infrastructure in the area?	Further evaluation to be undertaken
Parks Planning – Ashbridge's Bay Park, Tommy Thompson Park and the Lake Ontario Park Master Plan	Does the Alternative impact the goals and objectives of existing planning initiatives in the area?	Further evaluation to be undertaken
Boat Club Facility and Operations	Does the Alternative impact boat club facilities, programs and operations?	Further evaluation to be undertaken
Recreational Water Use Impacts	Does the Alternative provide for sheltered/flat water conditions required by canoes/kayaks?	Further evaluation to be undertaken
Accessibility and Scenic Views Impact	Does the Alternative impact public access and/or existing scenic views?	Further evaluation to be undertaken

Criterion	Consideration	Evaluation Status
Cultural Heritage		
Cultural Heritage Impacts	Does the Alternative potentially impact unknown cultural heritage resources in the area?	No further evaluation: Stage 1 Archaeological Assessment determined that the local study area has a low potential to contain archaeological resources and built heritage resources. Stage 2 Assessment was not recommended. See Section 3.4.9 for more information.
First Nations or Métis Interests	Does the Alternative impact any identified First Nations or Métis constitutional or treaty rights in the area?	No further evaluation: A number of Aboriginal Communities were contacted throughout the EA process and asked to identify potential impacts (see Section 6.6). No potential impacts for any of the alternatives were identified.
Technical Considerations		
Public Safety	Does the Alternative impact public safety during construction and/or day-to-day use following construction?	Further evaluation to be undertaken
Navigation Standards	Does the Alternative impact the movement and interaction between anticipated types of watercraft; the Coast Guard Auxiliary Station; or Federal navigation safety guidelines?	Further evaluation to be undertaken
Shoreline Stability	Does the Alternative impact wave energy within the area and subsequently shoreline erosion?	Further evaluation to be undertaken
Dredging	Does the Alternative reduce annual long term dredging requirements?	Further evaluation to be undertaken
Climate Change	Is the Alternative able to adjust / function / adapt in the event of changing lake levels due to Climate Change?	No further evaluation: Climate change impacts on the Lake Ontario water levels are expected to be minimal as the Lake water levels are controlled (Mackey, 2012) (more information on Lake Ontario water levels regulation can be found in Section 3.2.10).
Feasibility and Cost		
Capital and Maintenance Costs	Compare alternatives, relative to one another, for cost to construct and maintain.	Further evaluation to be undertaken
Construction Phasing Impacts (Land and Water)	Does construction phasing of the Alternative result in significant impacts to existing users (staging, access, disruption of use, etc.)?	Further evaluation to be undertaken
Impacts on Other Projects	Does the Alternative produce impacts to projects not currently identified under Technical Considerations Criteria?	Further evaluation to be undertaken

Criterion	Consideration	Evaluation Status
Land/Water Lot Requirements	Does the Alternative require lands or water lots under ownership or lease by agencies/stakeholders other than TRCA or City of Toronto?	No further evaluation: Most of the local study area land is owned by TRCA or the City of Toronto. A portion of the water lot in front of ABTP is owned by the Toronto Port Authority and is under a long term lease by the City of Toronto. The implementation of this project falls within the permitted uses under the lease conditions (T. Bowering, personal communication, 12/09/2013).

4.3.2 Ranking Scheme

Alternatives were compared to each other with respect to the character of impact based on a given evaluation criterion and ranked as “Preferred”, “Intermediate Preferred” or “Not Preferred”.

For each criterion, the “Preferred” rank was assigned to an alternative that had a positive, neutral or least negative impact, as compared to other alternatives. The “Not Preferred” rank was assigned to an alternative that had the most negative or least positive impact, and the “Intermediate Preferred” rank was assigned to an alternative that produced a moderately negative or positive impact, as compared to other alternatives evaluated. If all or some alternatives resulted in the same impact, the rank reflected the character of that impact (e.g., the “Preferred” rank was assigned to all alternatives if all resulted in neutral impact on a given environmental component). In cases where no or little difference in impacts between the alternatives occurred, more than one alternative was assigned the same rank.

4.3.3 Evaluation Results

This section presents the results of alternatives evaluation based on the criteria established (criteria listed in Table 4-2). In each Section from 4.3.3.1 to 4.3.3.5, a summary table of evaluation results is provided, followed by a more detailed explanation of alternatives ranking.

It must be noted that, although the Ashbridges Bay Erosion and Sediment Control Class EA is ensuring the integration of other approved facilities in the area, only the potential impacts of the erosion and sediment control structures are being assessed in this evaluation. The impacts of the other approved facilities in the local study area - satellite treatment plant and treatment wetland - have been assessed in their respective EA studies: Don River and Central Waterfront Project Municipal Class EA and Coatsworth Cut CSO and Stormwater Outfalls Control Municipal Class EA.

4.3.3.1 Physical Environment

The results of alternatives evaluation with respect to impacts on physical environment are presented in Table 4-3 and the details follow below.

Table 4-3. Alternatives evaluation results with respect to physical environment impacts.

Criteria	Alternative	Rank		
		Preferred	Intermediate Preferred	Not Preferred
Sediment Movement: Does the Alternative impact sediment transport processes?	Do Nothing/Status Quo	●		
	Alternative 1	●		
	Alternative 2	●		
	Alternative 3	●		
Unique Landforms: Does alternative impact any unique habitats or landforms in the area?	Do Nothing/Status Quo			●
	Alternative 1	●		
	Alternative 2	●		
	Alternative 3	●		
Water Quality: Does the alternative impact water quality?	Do Nothing/Status Quo		●	
	Alternative 1			●
	Alternative 2			●
	Alternative 3	●		
Water Circulation: Does the alternative impact water circulation?	Do Nothing/Status Quo	●		
	Alternative 1	●		
	Alternative 2	●		
	Alternative 3	●		

Sediment Movement

All alternatives were ranked as “Preferred” with respect to potential impact on sediment movement.

Potential sediment transport impacts were assessed for each alternative using the Coastal Modeling System (CMS) numerical model, which is the same model used for the existing conditions analysis presented in Section 3.2.13.3 [Sediment Transport Descriptive Model]. The results of sediment transport modeling carried out for the alternatives evaluation indicated that no adverse impact on the sediment transport within the littoral cell considered would occur for any of the alternatives (Shoreplan Engineering Limited, 2014). See Appendix I for the detailed report.

In the local study area, the ‘Do Nothing/Status Quo’ Alternative would result in continued sediment deposition in Coatsworth Cut, along the shoreline south of ABTP and adjacent to Ashbridge’s Bay Park headlands (see Figure 4-18 and Figure 4-19). Alternatives 1, 2 and 3 would result in reduced sediment deposition within the areas enclosed by breakwaters – Coatsworth Cut and the area immediately west of Ashbridge’s Bay Park Headlands C and D – and continued deposition in deeper water outside of the breakwater-enclosed areas (Figure 4-20 to Figure 4-25). Overall, no changes in the existing sediment transport pattern that would affect adjacent littoral cells are anticipated for any of the alternatives (Shoreplan Engineering Limited, 2014). The full report on sediment/coastal modeling carried out is provided in Appendix I.

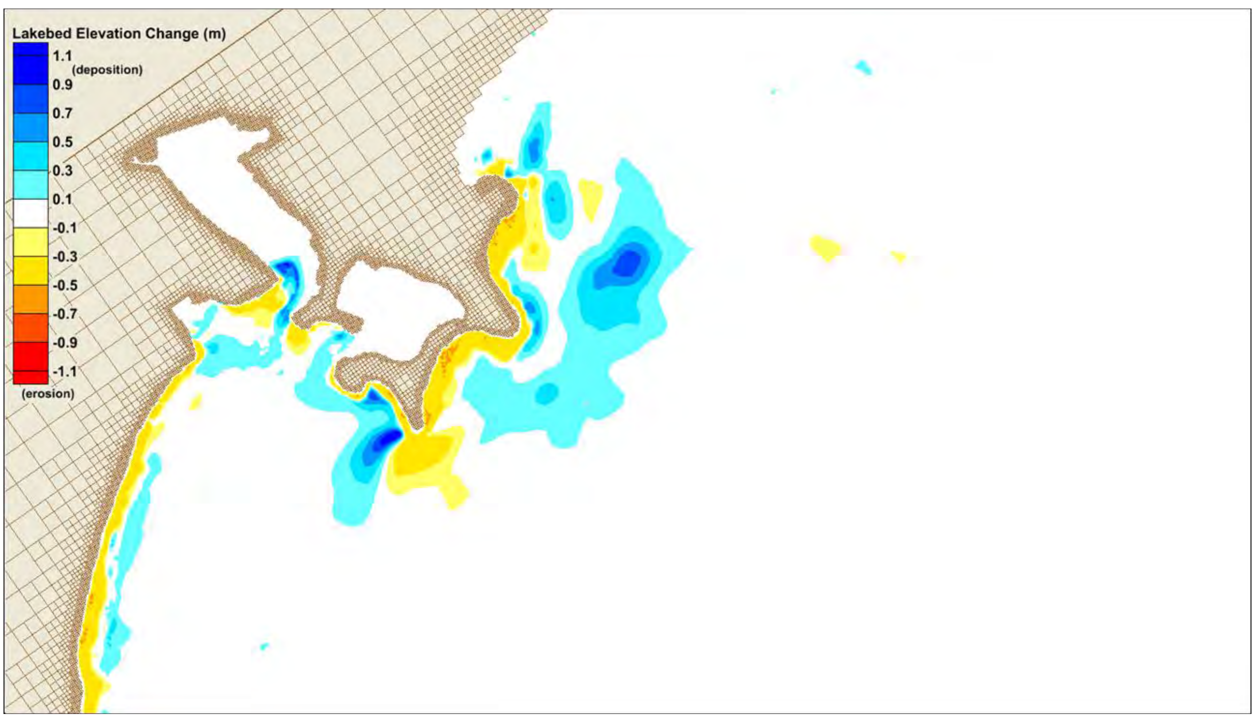

Figure 4-18. CMS Results, 2009- 2012 Input, Existing Conditions.
Source: Shoreplan Engineering Limited, 2014.

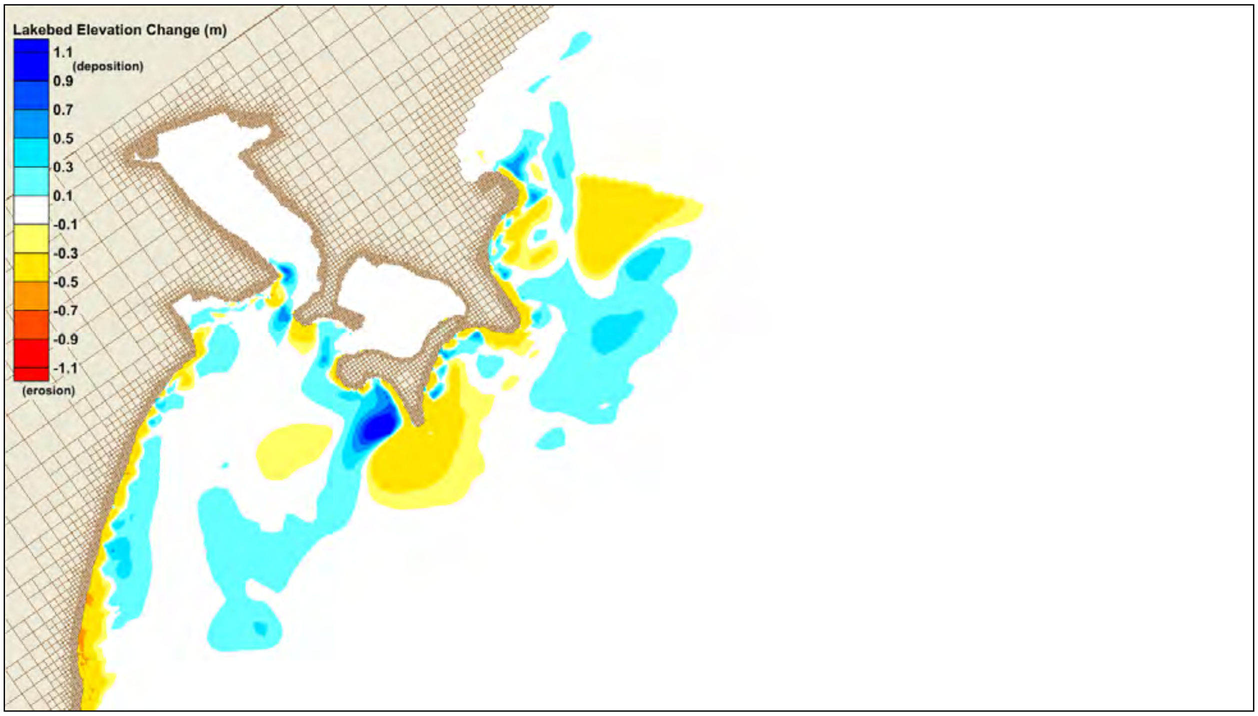

Figure 4-19. CMS Results, Representative Storm, Existing Conditions.
Source: Shoreplan Engineering Limited, 2014.

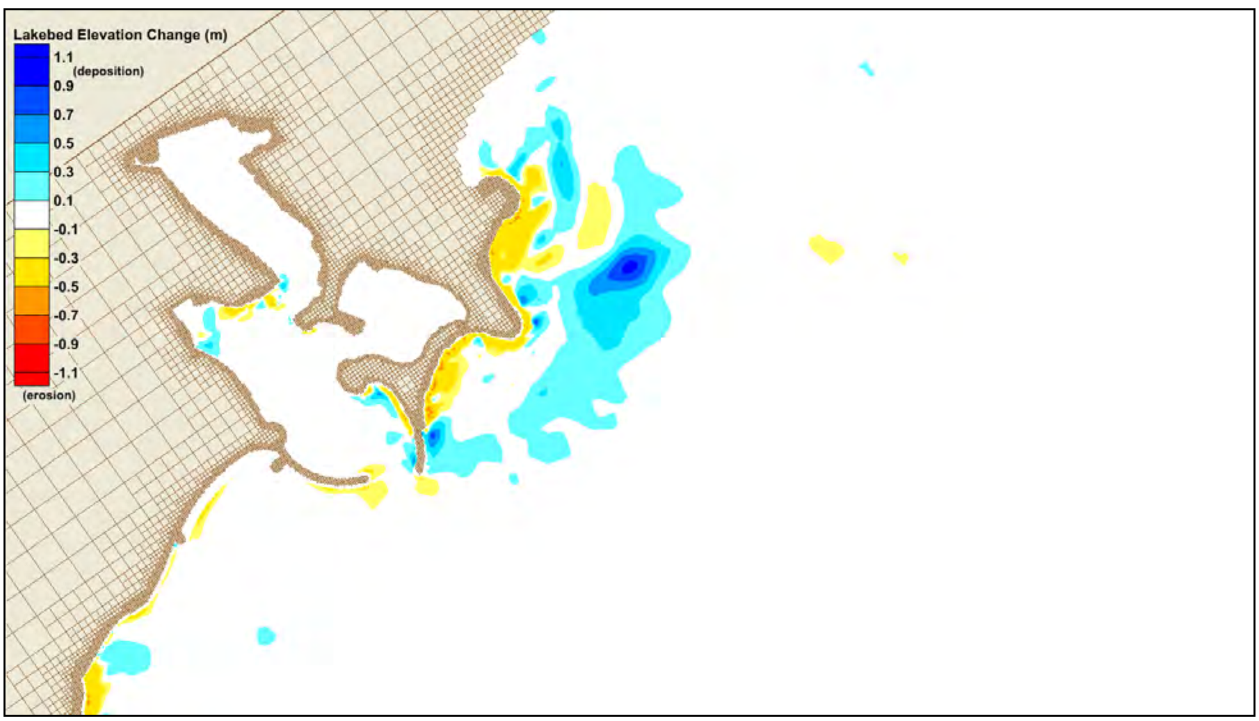

Figure 4-20. CMS Results, 2009 – 2012 Input, Alternative 1.
Source: Shoreplan Engineering Limited, 2014.

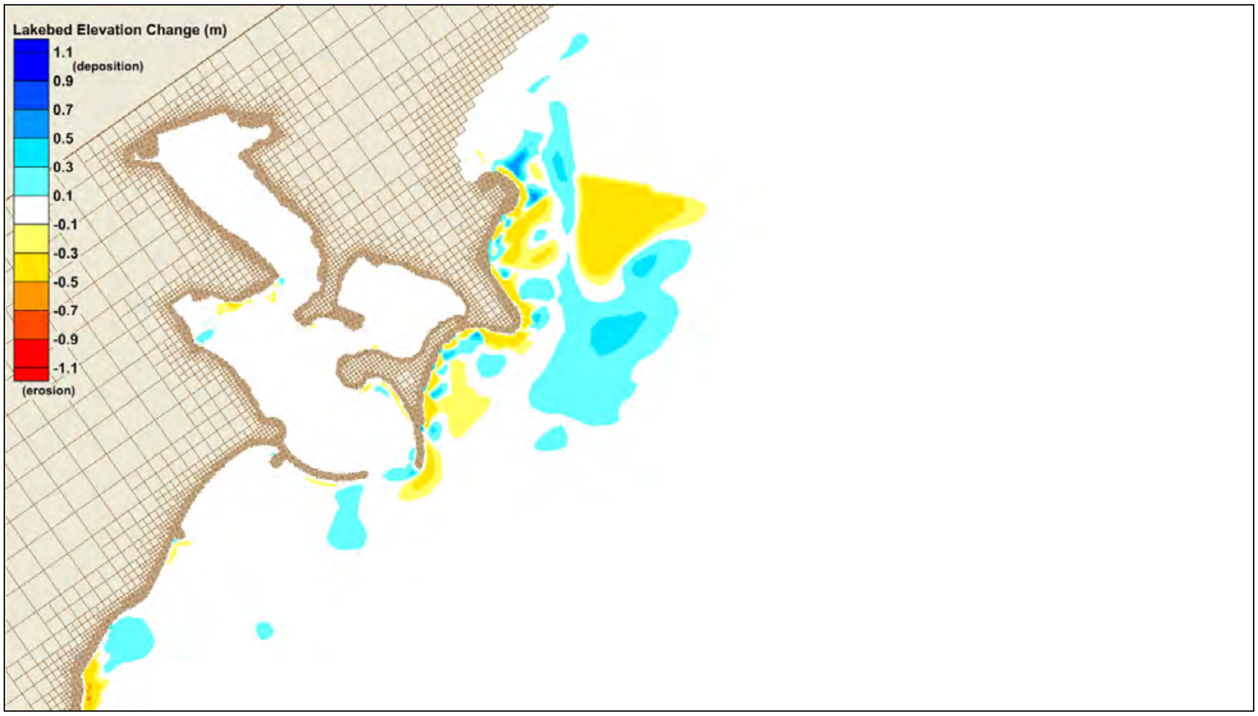

Figure 4-21. CMS Results, Representative Storm, Alternative 1.
Source: Shoreplan Engineering Limited, 2014.

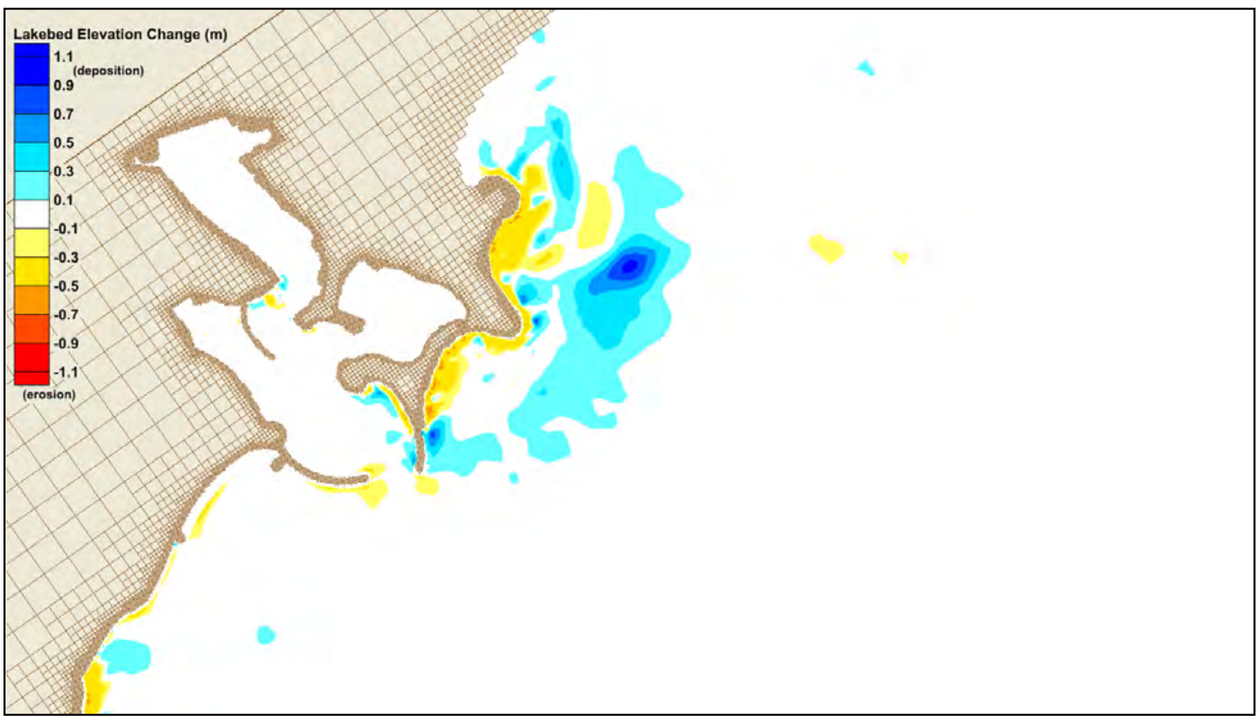

Figure 4-22. CMS Results, 2009 – 2012 Input, Alternative 2.
Source: Shoreplan Engineering Limited, 2014.

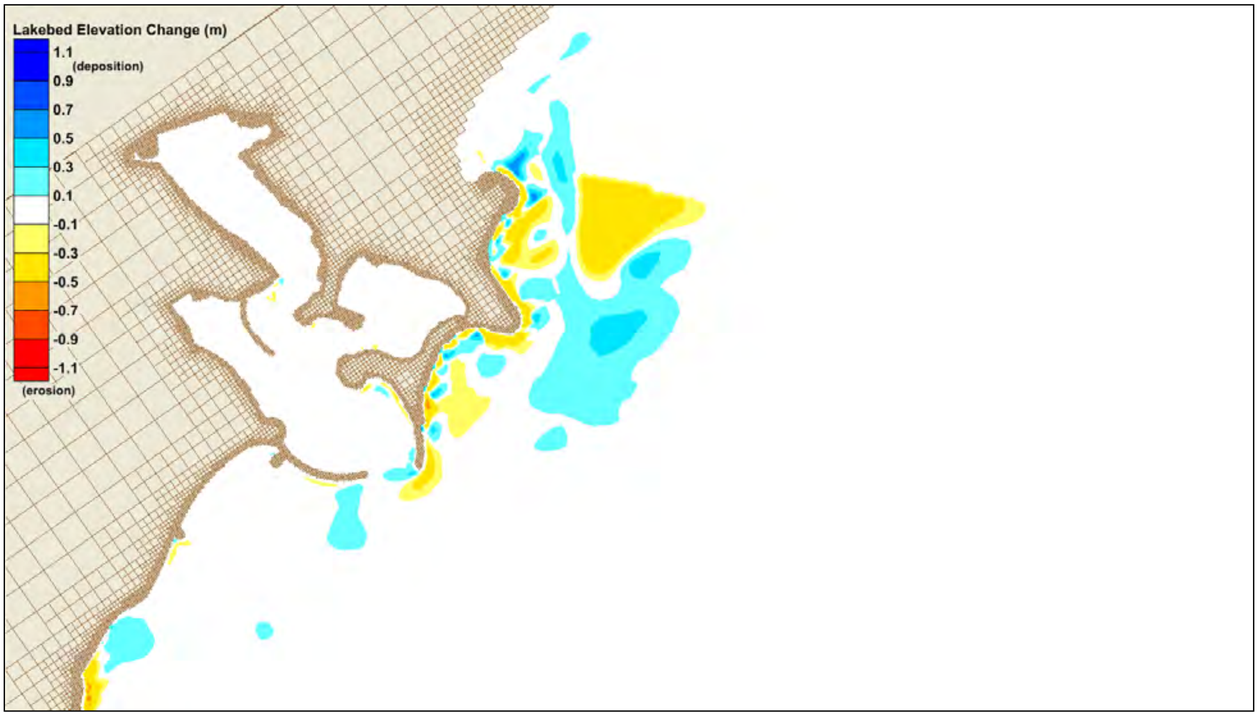

Figure 4-23. CMS Results, Representative Storm, Alternative 2.
Source: Shoreplan Engineering Limited, 2014.

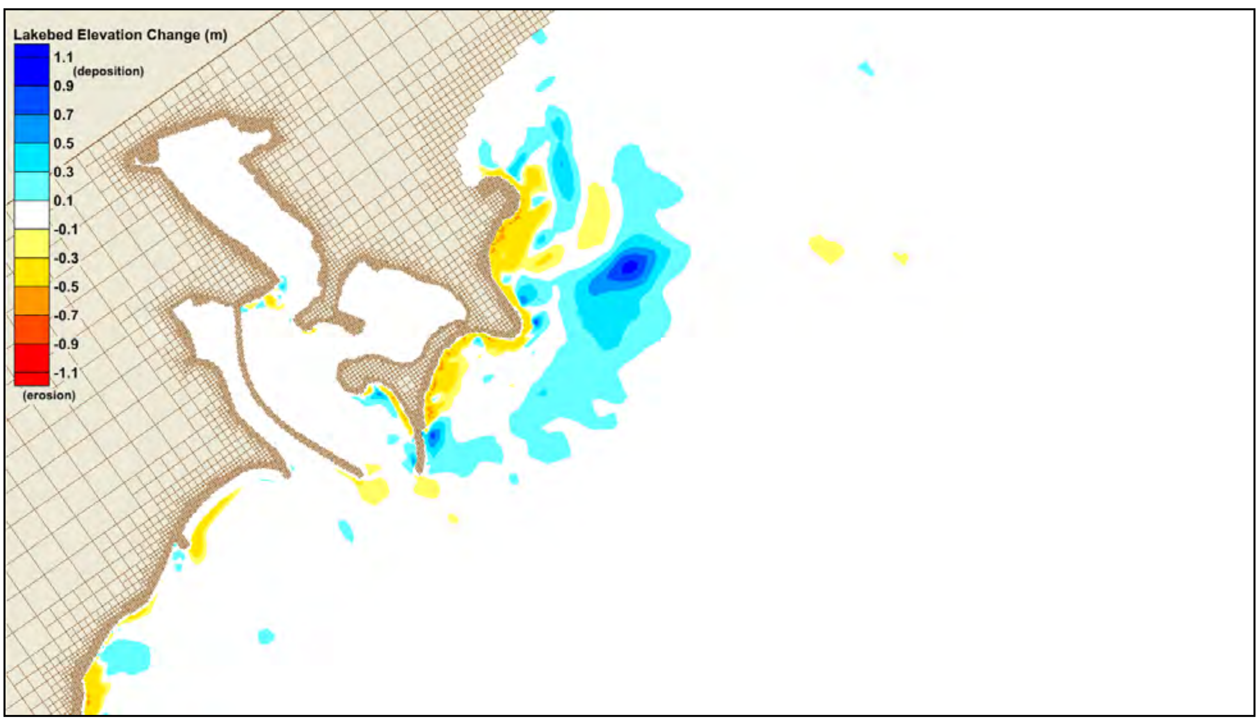

Figure 4-24. CMS Results, 2009 – 2012 Input, Alternative 3.
Source: Shoreplan Engineering Limited, 2014.

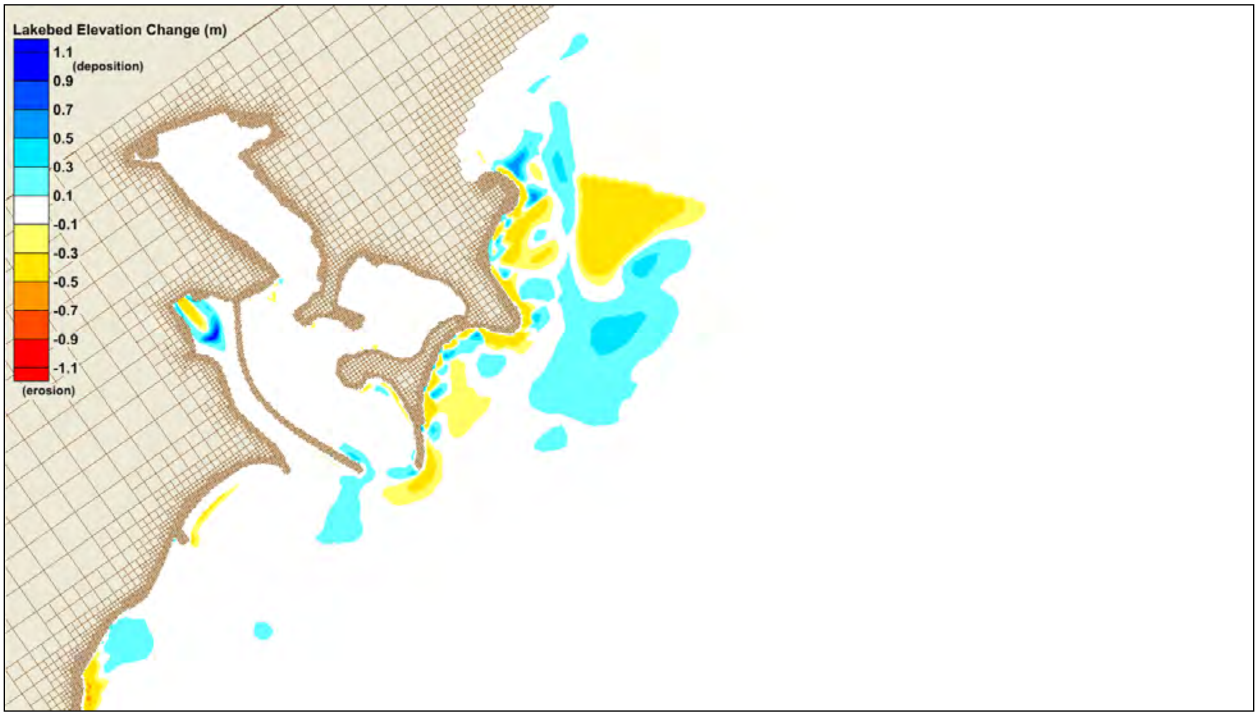

Figure 4-25. CMS Results: Representative Storm, Alternative 3.
Source: Shoreplan Engineering Limited, 2014.

Unique Landforms

Ashbridge's Bay Park is considered to be a unique landform in the local study area. With respect to impacts on Ashbridge's Bay Park landform, the 'Do Nothing/Status Quo' Alternative was ranked as "Not Preferred" and Alternatives 1, 2 and 3 were ranked as "Preferred". The "Do Nothing/Status Quo" Alternative received the "Not Preferred" rank since it would result in continued erosion of Ashbridge's Bay Park headlands, particularly Headland C, as shown in Figure 4-18 and Figure 4-19. In addition, the 'Do Nothing/Status Quo' Alternative does not provide an opportunity to remediate existing shoreline deficiencies at the Park, particularly Headland C (see Section 3.2.14 [Shoreline Stability]). Alternatives 1, 2 and 3 received the "Preferred" rank as they would result in reduction of Headland C erosion and preclude further erosion of the lake bottom areas along Headlands E and F (Figure 4-20 to Figure 4-25) as these headlands would be located within the breakwater-enclosed area.

Water Quality

With respect to the potential impacts on water quality, Alternative 3 was ranked as "Preferred", Alternatives 1 and 2 received the "Not Preferred" rank and the 'Do Nothing/Status Quo' Alternative was ranked as "Intermediate Preferred".

The alternatives assessment pertaining to water quality impacts focused on two constituents – TP concentration and *E. coli* levels, which were used as indicators of aquatic health and recreational water quality, respectively. Though the modeling was carried out for four constituents - TP, Total Suspended Solids, Copper and *E. coli,* as shown in Dewey (2014a) (see Appendix I), the evaluation of alternatives in this study focused on TP and *E. coli* as these were determined to be the most relevant constituents, based on the local area uses.

As discussed in Section 3.5.8 [Recreational Boating and Social Clubs], the main uses of the local study area include various forms of recreational boating such as kayaking and canoeing, associated with the boating clubs located in Ashbridges Bay and Coatsworth Cut. In addition to the boating activities, boating clubs offer mooring facilities (ABYC in particular).

TP served as an indicator of aquatic health as TP levels are linked to aquatic plant growth and therefore aquatic habitat conditions as well as boating facilities conditions and maintenance. High levels of phosphorus, which is a fertilizer, boost aquatic plant growth. Excess plant growth may reach nuisance proportions, potentially causing navigation and facilities maintenance issues. As algae and plants die and decompose, dissolved oxygen is consumed, potentially subjecting aquatic life to negative effects of low dissolved oxygen.

E. coli served as an indicator of recreational water quality as its levels are indicative of fecal pollution and may have implications on human health, subject to the degree of exposure to contaminated waters as well as *E. coli* levels. 100 *E. coli* per 100 mL of water is the PWQO value for swimming, or primary contact, which involves full body immersion where it's likely that some water will be swallowed (Health Canada, 2012). With Ashbridges Bay used primarily for recreational boating, local study area uses are expected to involve secondary contact with water, where only the limbs are regularly wetted – such as when kayaking or canoeing (Health Canada, 2012). As per Health Canada (2012) guidelines, the secondary contact recreational water quality guideline value is 500 *E. coli* per 100 mL, derived via multiplying the existing primary contact PWQO of 100 *E. coli* per 100 mL by a factor of 5.

TP and *E. coli* levels were enumerated at key locations within the project local study area: Ashbridges Bay, ABYC Marina Entrance, ABYC Marina and the Gap (the opening created by the east and west breakwaters), as shown in Figure 4-26. The predicted TP and *E. coli* levels for each of the alternatives are shown in Figure 4-27 and Figure 4-28, respectively.

The assessment identified that the 'Do Nothing/Status Quo' Alternative would result in no change in water quality conditions, with the TP and *E. coli* level thus corresponding to the existing conditions. Compared to the predicted design alternatives (Alternatives 1, 2 and 3) water quality conditions, the existing conditions (or 'Do Nothing/Status Quo' Alternative) TP levels are lowest in the Gap, ABYC Marina and Marina Entrance, and second lowest in Ashbridges Bay (Figure 4-27). *E. coli* levels are lowest in the Gap, second lowest at marina entrance, second highest in the marina itself and highest in Ashbridges Bay (Figure 4-28).

Alternatives 1 and 2 have the potential to worsen the existing water quality in Ashbridges Bay and adjacent areas (ABYC marina) as they may cause elevated TP and *E. coli* levels in areas frequently used for water based recreation.

Alternative 1 was predicted to have the largest potential negative impact on water quality in the ABYC marina and marina entrance. Based on the modeling results, Alternative 1 would result in highest increase in both TP and *E. coli* levels, as compared to other alternatives and existing conditions (or the 'Do Nothing/Status Quo' Alternative) (Figure 4-27 and Figure 4-28). The increase in forecast TP and *E. coli* concentrations was attributed to the combination of the ABTP seawall gates and the Ashbridges Bay outfalls discharge.

Alternative 2 was predicted to result in the second-highest increases in TP and *E. coli* levels, as compared to other alternatives (Figure 4-27 and Figure 4-28).

The predicted increases in constituent concentrations associated with Alternative 3 were the smallest, relative to the predicted increased concentrations for Alternatives 1 and 2 (Figure 4-27 and Figure 4-28). In fact, Alternative 3 was forecast to improve *E. coli* levels in the ABYC marina and marina entrance, relative to existing conditions (Figure 4-28). At the Gap, Alternative 3 would result in maintaining the TP levels below the TP PWQO. At the ABYC marina entrance, Alternative 3 was forecast to result in TP concentrations which are essentially the same as existing conditions (Figure 4-28). Notably, Alternative 3 was predicted to achieve the *E. coli* Provincial Water Quality Objective (PWQO) of 100 *E. coli* per 100 mL of water for primary contact recreational water quality at ABYC marina and its entrance. As mentioned above, primary contact is defined as activities in which the whole body or the face and trunk are frequently immersed and where it is likely that some water will be swallowed (e.g., swimming) (Health Canada, 2012). The *E. coli* levels for existing conditions and for all three design alternatives meet the Health Canada secondary contact recreational water quality guideline value of 500 *E. coli* per 100 mL in ABYC marina, ABYC marina entrance as well as the Gap. As previously stated, secondary contact involves activities such as sailing and rowing, where only the limbs are regularly wetted (Health Canada, 2012). In contrast to the Gap, ABYC marina and marina entrance, secondary contact *E. coli* guideline value in Ashbridges Bay is not met under either existing conditions or with the implementation of any of the alternatives. At this location, no impacts (negative or positive) on *E. coli* levels as a result of the implementation of any of the alternatives were forecast.

As the forecasts for the three remedial alternatives use the same pollutant loadings to the Ashbridges Bay area as for existing conditions, the modeling results are caused solely by the difference in breakwater configurations (see Section 4.2 [Alternatives Description]) for alternatives site plans). Introduction of a breakwater east of the seawall gates in Alternatives 2 and 3 would result in deflection of pollutant discharges from the ABTP seawall gates away from the ABYC marina and its entrance, therefore resulting in lower forecast TP and *E. coli* concentrations in these locations. Alternative 3 was associated with the best water quality as it has the longest breakwater east of the seawall gates which confines the seawall gates discharge and diverts it from the recreational areas in Ashbridges Bay.

Based on the water quality modeling results summarized above, the ‘Do Nothing/Status Quo’ Alternative was ranked as “Intermediate Preferred”, Alternative 3 was ranked as “Preferred”, and Alternatives 1 and 2 received the “Not Preferred” rank.

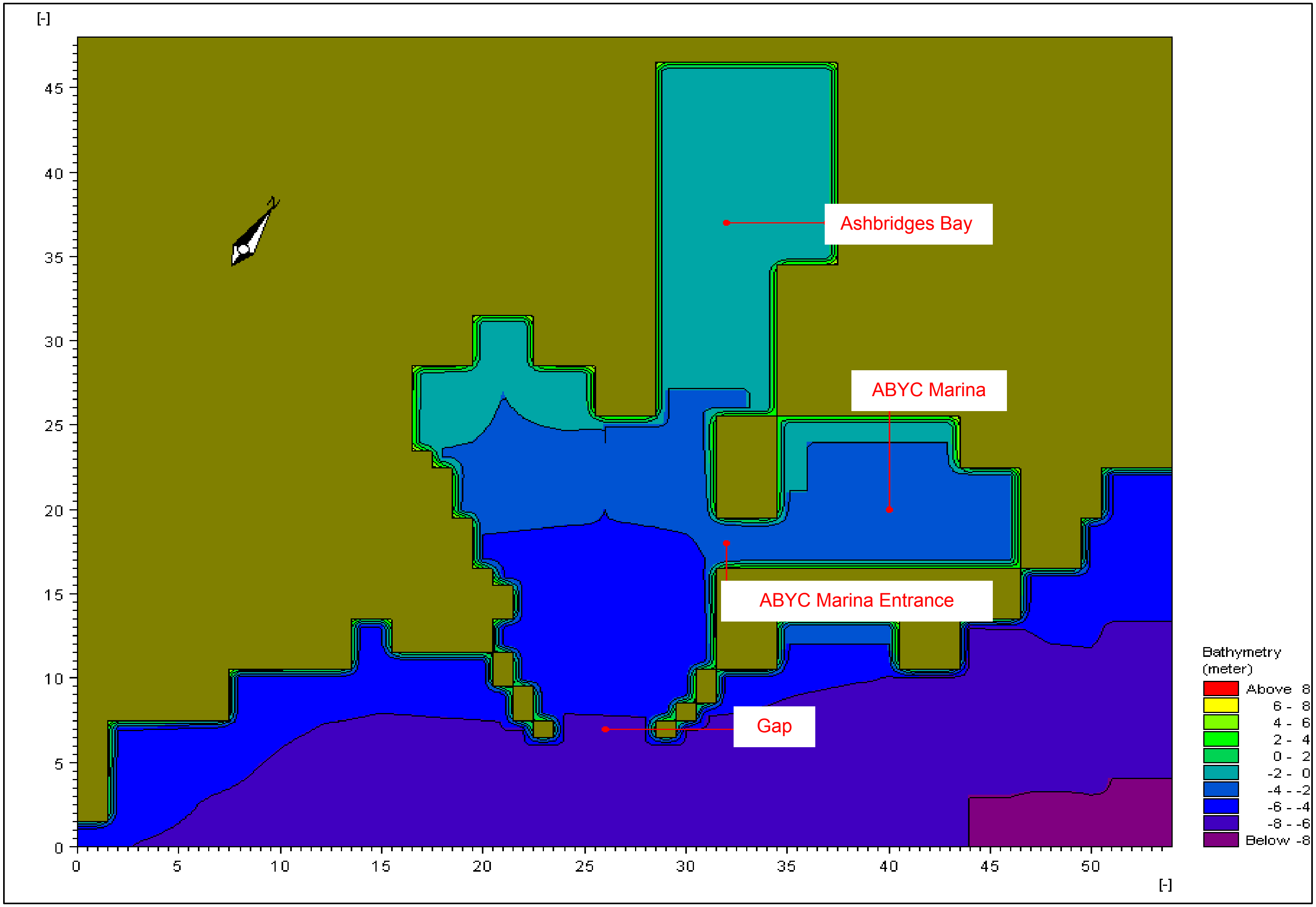

Figure 4-26. Locations used to assess water quality impacts within the project local study area.
Source: Dewey, 2014a.

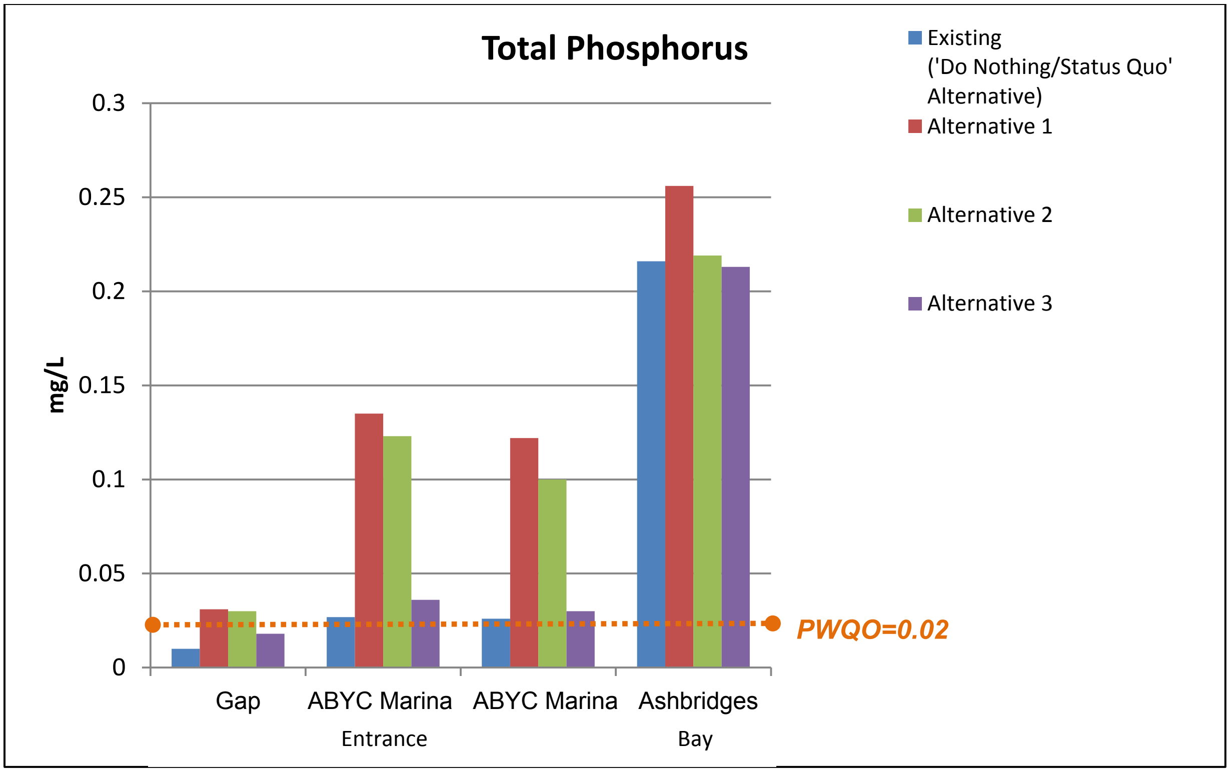

Figure 4-27. Predicted Total Phosphorus levels for each of the remedial alternatives and the existing conditions, or the 'Do Nothing/Status Quo' Alternative. PWQO = Provincial Water Quality Objective.

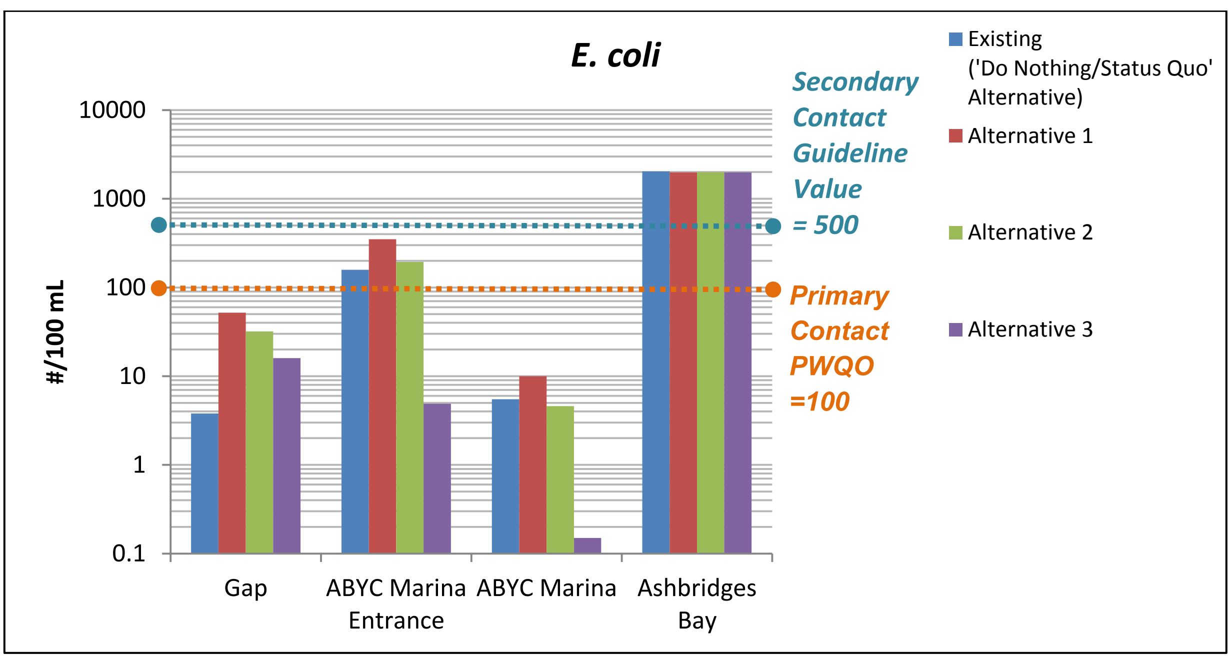

Figure 4-28. Predicted *E. coli* levels for each of the remedial alternatives and the existing conditions, or the 'Do Nothing/Status Quo' Alternative. PWQO = Provincial Water Quality Objective.

Water Circulation

All Alternatives were ranked as “Preferred” with respect to potential impacts on water circulation. Though water circulation was not modeled explicitly, the design wave conditions developed for the study site (Figure 4-29) served as an indicator of exchange between the lake waters and Ashbridges Bay/breakwater-enclosed areas. The ‘Do Nothing/Status Quo’ Alternative would have no impact on water circulation as no change in current wave conditions would occur. Wave conditions (height contours and vectors) of Alternatives 1, 2 and 3 showed that the easterly waves would continue to penetrate into the breakwater-enclosed area through the opening between the east and primary west breakwaters, similarly to the existing conditions or the ‘Do Nothing/Status Quo’ Alternative. Since no significant change in wave conditions is predicted for any of the alternatives, no adverse impact on water circulation is expected.

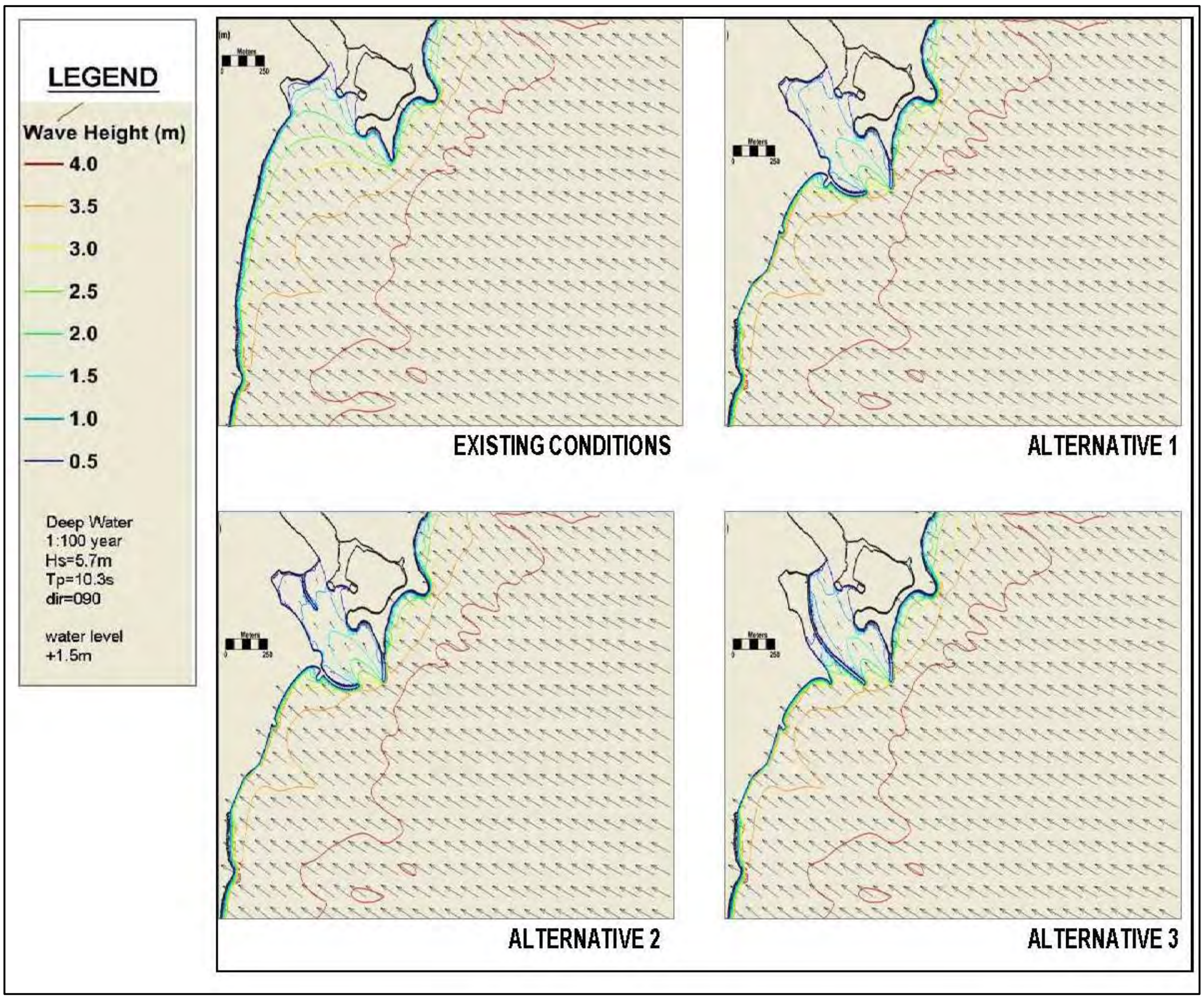

Figure 4-29. Design wave conditions for existing conditions and Alternatives 1, 2 and 3.
Source: Shoreplan Engineering Limited, 2014.

4.3.3.2 Biological Environment

The results of alternatives evaluation with respect to potential impacts on biological environment are presented in Table 4-4 and the details follow below.

Table 4-4. Alternatives evaluation results with respect to biological environment impacts.

Criteria	Alternative	Rank		
		Preferred	Intermediate Preferred	Not Preferred
Aquatic Habitat: Does the Alternative result in impacts to aquatic habitat?	Do Nothing/Status Quo	●		
	Alternative 1			●
	Alternative 2			●
	Alternative 3			●
Fisheries: Does the Alternative result in impacts to fish community assemblages?	Do Nothing/Status Quo	●		
	Alternative 1			●
	Alternative 2			●
	Alternative 3			●
Species of Interest: Does the Alternative impact species of interest/concern?	Do Nothing/Status Quo	●		
	Alternative 1			●
	Alternative 2			●
	Alternative 3			●
Terrestrial Habitat: Does the Alternative result in impacts to sensitive terrestrial habitat or communities?	Do Nothing/Status Quo			●
	Alternative 1		●	
	Alternative 2		●	
	Alternative 3	●		
Migratory and Breeding Birds: Does the Alternative result in impacts to habitat for migratory or breeding bird communities?	Do Nothing/Status Quo			●
	Alternative 1		●	
	Alternative 2		●	
	Alternative 3	●		

Aquatic Habitat

The ‘Do Nothing/Status Quo’ Alternative has been ranked as “Preferred” and Alternatives 1, 2 and 3 received the “Not Preferred” rank with respect to potential impact on the local aquatic habitat.

The ‘Do Nothing/Status Quo’ Alternative has been ranked as “Preferred” as the negative impact of dredging (e.g., localized increases in turbidity) is small and no loss of aquatic habitat occurs. Alternatives 1, 2 and 3 were ranked as “Not Preferred” as they would result in aquatic habitat loss due to lake-filling required to construct the sediment control structures and associated shoreline.

Fisheries

The ‘Do Nothing/Status Quo’ Alternative has been ranked as “Preferred” and Alternatives 1, 2 and 3 received the “Not Preferred” rank with respect to potential impact on fisheries.

The ‘Do Nothing/Status Quo’ Alternative was ranked as “Preferred” as the negative impact of dredging on the local fish community (e.g., avoidance of dredging site by fish due to increases in turbidity) would be small as compared to the potential negative impact associated with Alternatives 1, 2 or 3. While dredging results in fish displacement that is short term and fairly minor, lake-filling activities and timeframe to construct the sediment control structures and associated shoreline would result in a greater displacement of fish over longer period of time. Therefore, Alternatives 1, 2 and 3 were ranked as “Not Preferred”.

Species of Interest/Concern

The ‘Do Nothing/Status Quo’ Alternative was ranked as “Preferred”, and Alternatives 1, 2 and 3 were ranked as “Not Preferred” with respect to potential impact on species of interest/concern.

A number of L3 and L4-ranked species of concern have been recorded in the local study area, as discussed in Section 3.3.9 [Species of Concern]. Terrestrial habitat disturbance associated with Alternatives 1, 2 or 3 would result from construction access and initial staging area implementation and is expected to be fully mitigated via appropriate mitigation measures implemented before and during construction (e.g., conscientious site design to minimize vegetation removal) as well as the post-construction habitat restoration. No long-term adverse effects on the local terrestrial species of concern are anticipated for any of the alternatives.

One fish species of concern – American Eel, designated as “Endangered” under the Ontario *Species at Risk Act* – has been recorded in the local study area. An Eel was captured in the Ashbridge’s Bay Yacht Club marina in 1993 (see Section 3.3.9 [Species of Concern]). Though the Ashbridges Bay record is considered to be an isolated report, this species has been captured elsewhere along the Toronto waterfront and may utilize Ashbridges Bay occasionally. As Alternatives 1, 2 and 3 would involve loss of fish habitat, they received the “Not Preferred” rank. The ‘Do Nothing/Status Quo’ Alternative would not result in any changes to the existing fish and fish habitat conditions and was thus ranked as “Preferred”.

Terrestrial Habitat

With respect to potential impacts to the local terrestrial habitat, the ‘Do Nothing/Status Quo’ Alternative was ranked as “Not Preferred”, Alternatives 1 and 2 as “Intermediate Preferred”, and Alternative 3 as “Preferred”.

The evaluation of alternatives in terms of their potential impact on the area terrestrial habitat was based on long-term impacts. For Alternatives 1, 2 and 3, short-term impacts associated with construction activities were not considered as it was assumed that post-construction site restoration would ensure no long-term adverse effects or changes to terrestrial habitat affected. Under this assumption, no long-term impacts on the *existing* local study area terrestrial habitat would occur for any alternatives. However, the alternatives differed in terms of the habitat improvement potential they offered which was reflected by their ranking.

The ‘Do Nothing/Status Quo’ Alternative provides no opportunity for terrestrial habitat creation and was thus ranked as “Not Preferred”. The proposed breakwaters and new shoreline of Alternatives 1 or 2 would provide minor foraging habitat semi-aquatic mammals as well as loafing habitat for shore and water birds. Alternative 3 would provide the same habitat as Alternatives 1 or 2, and potential to create Common Tern breeding habitat on the isolated breakwater. As a result, Alternative 3 was ranked as “Preferred” and Alternatives 1 and 2 as “Intermediate Preferred”.

Migratory and Breeding Birds

With respect to potential impacts on migratory and breeding birds utilizing the local study area habitat, the ‘Do Nothing/Status Quo’ Alternative was ranked as “Not Preferred”, Alternatives 1 and 2 as “Intermediate Preferred”, and Alternative 3 as “Preferred”.

The evaluation of alternatives in terms of their potential impact on the migratory and breeding birds utilizing the local study area was based on long-term impacts. For Alternatives 1, 2 and 3, short-term impacts would be associated with construction activities and were not considered as it was assumed that mitigation measures implemented during the construction period and the post-construction site restoration would ensure no long-term adverse effects. Under this assumption, no negative impacts were deemed to be likely for any of the alternatives and the alternatives ranking reflected their potential for migratory and breeding bird habitat improvement.

The ‘Do Nothing/Status Quo’ Alternative does not provide any opportunities for improving migratory and breeding bird habitat and was thus ranked as “Not Preferred”. Alternatives 1, 2 or 3 would provide additional land base which may serve as migratory bird stopover and provide loafing habitat for shore and water birds. Alternative 3 would also have the potential to create suitable nesting habitat for Common Terns. In particular, Common Tern nesting habitat could be created on the isolated breakwater of Alternative 3. As a result, Alternative 3 was ranked as “Preferred” and Alternatives 1 and 2 as “Intermediate Preferred”.

4.3.3.3 Socio-Economic Environment

The results of alternatives evaluation with respect to potential impacts on socio-economic environment are presented in Table 4-5 and the details follow below.

Table 4-5. Alternatives evaluation results with respect to socio-economic environment impacts.

Criteria	Alternative	Alternative Ranking		
		Preferred	Intermediate Preferred	Not Preferred
Parks – Public Use and Parks Infrastructure: Does the Alternative impact public use and park infrastructure in the area – public boat launch, Ashbridge’s Bay Park?	Do Nothing/Status Quo			●
	Alternative 1		●	
	Alternative 2		●	
	Alternative 3		●	
Parks Planning – Ashbridge’s Bay Park, Tommy Thompson Park and the Lake Ontario Park Master Plan: Does the Alternative impact the goals and objectives of existing planning initiatives in the area?	Do Nothing/Status Quo			●
	Alternative 1	●		
	Alternative 2	●		
	Alternative 3	●		
Accessibility and Scenic Views: Does the Alternative impact public access and/or existing scenic views?	Do Nothing/Status Quo			●
	Alternative 1	●		
	Alternative 2	●		
	Alternative 3		●	
Boat Club Facilities and Operations: Does the Alternative impact existing boat clubs and their facilities, programs and operations?	Do Nothing/Status Quo			●
	Alternative 1		●	
	Alternative 2		●	
	Alternative 3		●	
Non-motorized Recreational Water Use: Does the Alternative provide for sheltered water conditions required by canoes/kayaks?	Do Nothing/Status Quo			●
	Alternative 1	●		
	Alternative 2	●		
	Alternative 3		●	

Parks – Public Use and Parks Infrastructure

The ‘Do Nothing/Status Quo’ Alternative was ranked as “Not Preferred” and Alternatives 1, 2 and 3 were ranked as “Intermediate Preferred” with respect to impacts on public use of the local parks (Ashbridge’s Bay Park and TTP) and park infrastructure.

While the ‘Do Nothing/Status Quo’ Alternative would not affect public use of and park infrastructure at Ashbridge’s Bay Park or TTP, it would not resolve the navigation issues experienced by the Ashbridge’s Bay Park public boat launch users (the boat launch is a major component of public use in the local study area). Under this Alternative, recreational boaters using the boat launch are negatively affected as the current dredging efforts are insufficient to provide a full season of safe navigation in Coatsworth Cut. Decreased water depth due to sedimentation in the Coatsworth Cut channel can be unpredictable and especially dangerous to the boaters who are not familiar with the area. As a result, the 'Do Nothing/Status Quo' Alternative was ranked as "Not Preferred".

Alternatives 1, 2 and 3 constitute equally effective long-term solutions to the current sedimentation and navigation issues in Coatsworth Cut, thus benefiting Ashbridge's Bay Park visitors engaging in water based recreation and using the public boat launch. As well, these Alternatives offer the potential to expand public access within Ashbridge's Bay Park, where additional public access may be provided along the east breakwater which would be connected to Ashbridge's Bay Park Headland C. Therefore, these Alternatives were ranked as "Intermediate Preferred".

Parks Planning – Ashbridge's Bay Park, Tommy Thompson Park and the Lake Ontario Park Master Plan

The 'Do Nothing/Status Quo' Alternative was ranked as "Not Preferred" with respect to the potential impacts to the local parks planning initiatives and strategies, and Alternatives 1, 2 and 3 were ranked as "Preferred".

Alternatives 1, 2 and 3 support the shoreline enhancement goals of the TTP Master Plan and provide the potential to integrate TTP shoreline work and the proposed sediment control solution. An opportunity to create public access along the shoreline associated with the proposed sediment control structures would support the Lake Ontario Park Master Plan objectives and permit a connection from Tommy Thompson Park to Ashbridge's Bay Park, if such was to be considered by Waterfront Toronto. Therefore, Aternatives 1, 2 and 3 received the "Preferred" rank.

The 'Do Nothing/Status Quo' Alternative would not affect the goals and objectives of existing planning initiatives in the area, but it also does not support TTP shoreline and habitat enhancement objectives and Lake Ontario Park Master Plan public use opportunities increase. As a result, the 'Do Nothing/Status Quo' Alternative was ranked as "Not Preferred" compared to Alternatives 1, 2 and 3.

Accessibility and Scenic Views

With respect to impacts on accessibility and scenic views, the 'Do Nothing/Status Quo' Alternative was ranked as "Not Preferred", while Alternative 3 was ranked as "Intermediate Preferred" and Alternatives 1 and 2 were ranked as "Preferred".

Though low profile structures, Alternatives 1 and 2 would provide a visual buffer of the ABTP facilities and operations, particularly those carried out close to the existing shoreline. In addition, the structures have the potential to expand public access along the shoreline south of the plant, which is currently inaccessible to the general public. Alternative 3 is structurally similar to Alternatives 1 and 2 and would provide the same visual buffer of the ABTP operations and the same potential to expand shoreline accessibility to the public. However, the ABTP seawall gates channel created by primary and secondary west breakwaters of Alternative 3 may become aesthetically undesirable during by-pass events at the plant (see Section 3.2.17 [Water Quality]). Therefore, Alternative 3 was ranked as "Intermediate Preferred" and Alternatives 1 and 2 were ranked as "Preferred" in terms of their potential impact on aesthetic and accessibility. The 'Do Nothing/Status Quo' Alternative was ranked as "Not Preferred" as it does not provide for shoreline accessibility expansion and the views of ABTP operations from Ashbridge's Bay Park remain un-buffered.

Boat Club Facilities and Operations

Alternatives 1, 2 and 3 were ranked as “Intermediate Preferred” with respect to impacts on boat club operations, and the ‘Do Nothing/Status Quo’ Alternative was ranked as ‘Not Preferred”.

Under the ‘Do Nothing/Status Quo’ Alternative, Ashbridge’s Bay boat clubs would continue to be affected as the navigation issues caused by Coatsworth Cut sedimentation would remain. For instance, access to ABYC’s fuel dock and the sailing school launch located south of the fueling dock becomes problematic as sediment fills in the Coatsworth Cut channel. Overall, operation of the local boat clubs is dependent on safe navigation in and out of Ashbridges Bay where club facilities are located. While the ‘Do Nothing/Status Quo’ Alternative would not affect boaters travel time between the boat club facilities in the Bay and open waters of the lake, navigation issues would persist. Therefore, the ‘Do Nothing/Status Quo’ Alternative was ranked as “Not Preferred”.

Under Alternatives 1, 2 and 3, positive impacts would be experienced by the local boat clubs as the navigation issues in Coatsworth Cut would be resolved. However, travel time to open waters of Lake Ontario used by some ABYC sailing school programs would increase as the waterlot immediately south of ABTP would no longer be available. As a result, the affected sailing school programs may need to be modified. Due to negative impact on existing sailing school programs in Ashbridges Bay, Alternatives 1, 2 and 3 were ranked as “Intermediate Preferred”.

Impacts to boat club facilities during construction of the alternatives are reviewed in Section 4.3.3.4 [Feasibility and Cost].

Non-motorized Recreational Water Use

Alternatives 1 and 2 were ranked as “Preferred”, Alternative 3 was ranked as “Intermediate Preferred” and the ‘Do Nothing/Status Quo’ Alternative received the “Not Preferred” rank with respect to potential impacts on non-motorized recreational water uses in Ashbridges Bay.

The ‘Do Nothing/Status Quo’ Alternative would result in continuing sedimentation and resulting navigation issues in Coatsworth Cut, with the non-motorized vessels (e.g., canoes and kayaks) being forced to use the same narrow navigation channel as larger motorized vessels. Therefore, safety concerns may arise, particularly when the number of vessels sharing the same navigation channel is high. The size of sheltered water area in the Bay would remain unchanged under this alternative.

Alternatives 1, 2 and 3 would result in resolution of the sedimentation and navigation issues in Coatsworth Cut. With the navigation issues resolved, the potential for safety concerns arising from the shared use of the narrow navigation channel by motorized and non-motorized craft would also be substantially reduced. While none of these alternatives would provide flat water conditions similar to those in the northern-most end of Ashbridges Bay, the breakwater-enclosed area is anticipated to be generally calmer than the open waters of the lake. Alternatives 1 and 2 would provide the largest breakwater-enclosed area - approximately 160,000 m^2, and Alternative 3 would provide approximately 116,000 m^2 of space within the breakwater-enclosed area. As a result, Alternatives 1 and 2 were ranked as “Preferred” and Alternative 3 was ranked as “Intermediate Preferred”.

Impacts to non-motorized recreation water use during construction of the alternatives are reviewed in Section 4.3.3.4 [Feasibility and Cost].

4.3.3.4 Feasibility and Cost

The results of alternatives evaluation with respect to technical feasibility and cost are shown in Table 4-6 and details follow below.

Table 4-6. Alternatives evaluation results – technical feasibility and cost.

Criteria	Alternative	Rank		
		Preferred	Intermediate Preferred	Not Preferred
Capital and Maintenance Costs: Compare alternatives, relative to one another, for cost to construct and maintain.	Do Nothing/Status Quo	●		
	Alternative 1		●	
	Alternative 2		●	
	Alternative 3			●
Construction/Implementation Impacts (Land and Water): Does construction/implementation of alternative result in significant impacts to existing users (staging, access, disruption of use, etc.)?	Do Nothing/Status Quo	●		
	Alternative 1			●
	Alternative 2			●
	Alternative 3			●
Impacts on Other Projects: Does alternative produce impacts to projects not currently identified under Technical Considerations Criteria?	Do Nothing/Status Quo			●
	Alternative 1			●
	Alternative 2			●
	Alternative 3	●		

Capital and Maintenance Costs

The 'Do Nothing/Status Quo' Alternative was ranked as "Preferred"; Alternative 1 and 2 were ranked as "Intermediate Preferred" and Alternative 3 was ranked "Not Preferred" with respect to capital and maintenance costs. Cost estimates used for the evaluation of Alternative 1-3 are preliminary estimates. The same factors were considered for all remedial alternatives to allow for the evaluation to be comparative. A more in depth cost analysis was carried out for the preferred alternative (see Section 4.4.3 [Preliminary Cost Estimates]). It should be noted that in all cases costs are dependent on material costs and sources which are market-driven and variable. The large range in the preliminary costs is intended to represent variables associated with material cost and supply (free material vs. purchased).

Under the 'Do Nothing/Status Quo' Alternative, current conditions would persist. At present time, annual cost of maintenance dredging is upwards of $250,000 and does not meet the navigation needs for the full recreational boating season. Notably, this cost includes dredged material disposal at the nearby TTP containment facilities and/or use in other TRCA projects. The current efforts for dredging are considered an absolute minimum for keeping the navigation channel open. In order to maintain safe navigation year-round for all users (power boats, sail boats, canoes, kayaks, etc.), it is anticipated that more than double the amount of sediment would need to be removed. This cost would need to be expended annually indefinitely in order to keep the navigation channel open, and may increase should TTP facilities become unavailable for dredged material disposal, necessitating off-site disposal. Despite the fact that the 'Do Nothing/Status Quo' Alternative would not meet the objective of a long term solution to the problem, it was ranked as "Preferred' purely from a short term cost perspective. The cost estimates associated with Alternatives 1-3 equal approximately 26 to 56 years of dredging (based on a range of $6.6 to $14.1 million).

The preliminary cost estimate for Alternative 1 is $6.6 - $12.2 million. There would be minimal to no annual maintenance required for Alternative 1 and it is expected that this solution would provide more than 20 years of safe navigation without maintenance dredging in Coatsworth Cut. 20 years of maintenance dredging has been very conservatively estimated to be $5 million. This is the lowest cost Alternative after the 'Do Nothing/Status Quo' Alternative as it requires the smallest volume of material for the breakwaters.

The preliminary cost estimates for Alternative 2 is $6.9 - $12.5 million. Similarly to Alternative 1, there would be minimal to no annual maintenance required for Alternative 2 and it is expected that this solution would provide more than 20 years of safe navigation without maintenance dredging. 20 years of maintenance dredging has been very conservatively estimated to be $5 million. The cost estimate of this Alternative slightly exceeds the cost estimate of Alternative 1. The difference is attributed to the cost of the small deflector breakwater east of the seawall gates. As the cost estimate difference between Alternative 1 and 2 is less than 5 per cent, both received the same rank for this criterion.

The preliminary cost estimates for Alternative 3 is $8.7 - $14.1 million. There would be minimal to no annual maintenance required for Alternative 3 and it is expected that this solution would provide more than 20 years of safe navigation without maintenance dredging. 20 years of maintenance dredging has been very conservatively estimated to be $5 million. Alternative 3 is the highest cost Alternative as the design includes an additional breakwater located east of the ABTP seawall gates.

Construction/Implementation Impacts (Land and Water)

The ‘Do Nothing/Status Quo’ Alternative was ranked as “Preferred” in terms of its implementation impacts such as disturbance to recreational boaters and Ashbridge’s Bay Park trail users, and Alternatives 1, 2 and 3 were ranked as “Not Preferred”.

The ‘Do Nothing/Status Quo’ Alternative would not result in negative impacts on the current area uses (e.g., recreational boating) and users (e.g., park visitors) other than the impacts produced by maintenance dredging in Coatsworth Cut at present time (i.e., existing conditions). Therefore, this alternative received the “Preferred” rank.

The potential negative impacts caused by Alternatives 1, 2 or 3 construction would include a possible increase in truck traffic in the local study area, disruptions to Ashbridge’s Bay Park and TTP access and trail use by the public, local terrestrial and aquatic habitat disturbance and fish habitat loss. In addition to this the construction will impact navigation in the area for motorized and non-motorized vessels by reducing the size of existing open water areas. However, it is not expected to restrict travel in and out of Ashbridges Bay or the Ashbridges Bay Yacht Club basin. Other impacts to local boat clubs would include construction noise and changes in views and vistas. As a result, these alternatives received the “Not Preferred” rank.

Impacts on Other Projects

With respect to impacts on projects not included in the technical considerations of the evaluation, the ‘Do Nothing/Status Quo’ Alternative and Alternatives 1 and 2 were ranked as “Not Preferred” while Alternative 3 received the “Preferred” rank.

Other projects and factors not listed in the technical considerations of the evaluation include the following:

- Potential impacts to the on-going ABTP operations (unimpeded seawall gates operation)
- Preservation of the current area uses (particularly, recreational boating), and
- Accommodation of the future approved facilities to be situated in the water lot south of ABTP (treatment wetland and satellite treatment facility).

Of crucial importance is the ability of each alternative to provide the optimal integration of itself with the current area uses, ABTP operations and future approved facilities.

The ‘Do Nothing/Status Quo’ Alternative accommodates the future approved facilities and does not interfere with the ongoing ABTP operations. However, it allows sediment deposition in Coatsworth Cut to continue, thus compromising Ashbridges Bay recreational boating activities (as ongoing maintenance dredging is insufficient to provide safe navigation year-round). Therefore, this Alternative was ranked as "Not Preferred".

Alternatives 1 and 2 prevent sediment deposition in Coatsworth Cut and provide for safe maintenance-free navigation, preserving the current area uses. They also accommodate the satellite treatment facility and the treatment wetland and do not interfere with ongoing ABTP operations. However, they are configured such that the ABTP seawall gates would discharge directly into the breakwater-enclosed area, having a negative impact on water quality in areas frequently used for water based recreation (see Section 4.3.3.1 [Physical Environment]). As a result, these alternatives were ranked as "Intermediate Preferred".

Alternative 3 provides the best opportunity to integrate sediment control structures with the current area uses and ongoing ABTP operations, and has sufficient design flexibility to accommodate future facilities. It was ranked as "Preferred" due to its potential for improved water quality conditions in areas frequently used for water based recreation, as it's designed to convey the ABTP seawall gates discharge in a separate channel (created by the primary and secondary west breakwaters), diverting the discharge away from the breakwater-enclosed area (see Section 4.3.3.1 [Physical Environment] for details).

4.3.3.5 Technical Considerations

The evaluation of alternatives with respect to technical considerations is summarized in Table 4-7 and the details follow below.

Table 4-7. Evaluation of Alternatives – technical considerations.

Criteria	Alternative	Rank		
		Preferred	Intermediate Preferred	Not Preferred
Public Safety: Does alternative impact public safety during construction and/or day-to-day use following construction?	Do Nothing/Status Quo			●
	Alternative 1		●	
	Alternative 2		●	
	Alternative 3	●		
Navigation Standards:: Does alternative impact the movement and interaction between different types of watercraft; the Coast Guard Auxiliary Station; or Federal navigation safety guidelines?	Do Nothing/Status Quo			●
	Alternative 1	●		
	Alternative 2	●		
	Alternative 3	●		
Shoreline Stability: Does alternative impact shoreline stability in the local study area?	Do Nothing/Status Quo			●
	Alternative 1	●		
	Alternative 2	●		
	Alternative 3	●		
Dredging: Does alternative reduce annual long term dredging requirements?	Do Nothing/Status Quo	*Not Applicable*		
	Alternative 1	●		
	Alternative 2	●		
	Alternative 3	●		

Public Safety

The 'Do Nothing/Status Quo' Alternative was ranked as "Not Preferred" in terms of technical considerations, Alternatives 1 and 2 were ranked as "Intermediate Preferred", and Alternative 3 was ranked as "Preferred".

The ‘Do Nothing/Status Quo’ Alternative would have no impact on the safety of TTP or Ashbridge’s Bay Park visitors not participating in water-based recreation. However, this Alternative would also result in continuation of regular dredging in Coatsworth Cut, which would potentially have a more negative impact on recreational boater safety than the limited time disruptions associated with sediment control structures construction (i.e., Alternatives 1, 2 or 3). As the sedimentation and navigation issues would not be resolved under this Alternative, it was given the “Not Preferred” rank.

Alternatives 1, 2 and 3 would result in temporary access restrictions to some areas and trails in Ashbridge’s Bay Park and the north end of Tommy Thompson Park which would be used as construction access and staging areas. To construct the east breakwater at Ashbridge’s Bay Park Headland C, efforts would be made to complete the construction in late Fall and Winter (when user numbers in this area, both on and off water, are lower) in order to reduce the risk of exposing park visitors to potential safety hazards associated with construction. Once construction is complete, Alternatives 1 and 2, where a single west breakwater is located west of the ABTP seawall gates, would allow close access to the gates by non-motorized watercraft thus creating a potentially hazardous situation during by-pass events at the plant. Alternative 3, on the other hand, would confine the seawall gates discharge between the primary and secondary breakwaters thus isolating it from the breakwater-enclosed area used by the boating public. As a result, public safety concerns under this Alternative would be lower than under other alternatives considered. Therefore, Alternatives 1 and 2 were ranked as “Intermediate Preferred”, and Alternative 3 was ranked as “Preferred”.

Navigation Standards

Alternatives 1, 2 and 3 were ranked as “Preferred” in terms of their impact on the ability to meet and maintain navigation standards in Ashbridges Bay/Coatsworth Cut, and the ‘Do Nothing/Status Quo’ Alternative was ranked as “Not Preferred”.

Under the ‘Do Nothing/Status Quo’ Alternative, current conditions that pose issues for meeting the Federal navigation standards during the entire boating season would remain unchanged. Under Alternatives 1, 2 or 3, sediment deposition in Coatsworth Cut would be substantially reduced. Without sediment deposition, hazard- and maintenance-free navigation could be provided in Coatsworth Cut and Federal navigation standards could be met all season. The design of Alternatives 1, 2 and 3 exceeds the Federal navigation standards within the breakwater-enclosed areas. Therefore, Alternatives 1, 2 and 3 were ranked as “Preferred” and the ‘Do Nothing/Status Quo’ Alternative was ranked as “Not Preferred”.

Shoreline Stability

Alternatives 1, 2 and 3 were ranked as “Preferred” in terms of their impact on shoreline stability in the local study area, and the ‘Do Nothing/Status Quo’ Alternative was ranked as “Not Preferred”.

Under the ‘Do Nothing/Status Quo’ Alternative, no change in existing wave conditions is expected, and erosion of Ashbridge’s Bay Park headlands, particularly those exposed to open waters of the lake, would continue (see Figure 4-18 and Figure 4-19). Under Alternatives 1, 2 or 3, erosion of park headlands fully or partially located within the breakwater-enclosed area (Headlands C, D, E and F) would be significantly reduced, as shown in Figures 4-6 to 4-11. In addition, east breakwater construction would require remediation of shoreline stability and erosion issues at Headland C. Therefore, Alternatives 1, 2 and 3 were ranked as “Preferred” with respect to potential impacts on shoreline stability, and the ‘Do Nothing/Status Quo’ Alternative was ranked as “Not Preferred”.

Dredging

Alternatives 1, 2 and 3 were ranked as “Preferred” in terms of their impact on reducing annual dredging requirements in Coatsworth Cut, and the ‘Do Nothing/Status Quo’ Alternative was omitted from evaluation under this criterion as it assumes Coatsworth Cut dredging to continue.

Under the ‘Do Nothing/Status Quo’ Alternative, sediment would continue to accumulate in Coatsworth Cut, as shown in Figure 4-18 and Figure 4-19 (see also Appendix I for a detailed report of coastal modeling results obtained for the study).

Under Alternative 1, 2 or 3, annual dredging would no longer need to be carried out in order to maintain navigable conditions in Coatsworth Cut. These alternatives are equally effective in minimizing sediment accumulation in the breakwater-enclosed areas and, once implemented, would ensure more than 20 years of dredge-free safe navigation (see Appendix I for the coastal modeling report). This is illustrated in Figures 4-6 to 4-11, which show very little sediment accumulation in breakwater-enclosed areas for all Alternatives (1, 2 and 3) under either of the two sets of input conditions: a representative major storm event, and conditions which occurred between two bathymetric surveys. Therefore, Alternatives 1, 2 and 3 received the “Preferred” rank in terms of their impact on dredging requirements.

4.3.4 Evaluation Summary

Alternative 3 was identified as the preliminary Preferred Alternative based on the alternatives evaluation results.

A comparative summary of the alternatives evaluation results based on evaluation categories is shown in Table 4-8, and the evaluation summary based on individual evaluation criteria where each alternative was ranked as “Preferred” is shown in Table 4-9. Table 4-10 shows the overall resulting rank of each alternative as well as the total number of times each alternative was ranked as “Preferred”, “Intermediate Preferred” and “Not Preferred”.

Table 4-8 shows that all alternatives considered were ranked highest in two of the four evaluation criteria categories. This demonstrates that, at a summary level, there was not an overwhelming stratification of the Alternatives. Table 4-9 shows the rationale behind the summary level evaluation by listing all criteria where each alternative received the “Preferred” rank.

Importantly, Alternative 3 was ranked as “Preferred” with respect to the potential impacts on the water quality in the Ashbridges Bay/Coatsworth Cut area. While Alternatives 1 and 2 were found to have the potential to worsen the existing water quality in Ashbridges Bay and Coatsworth Cut (they may cause elevated Total Phosphorus (TP) and *E. coli* levels in areas frequently used for water based recreation), and the ‘Do Nothing/Status Quo’ Alternative would result in no change in water quality conditions (both TP and *E. coli* concentrations would remain at the existing conditions level), Alternative 3 was demonstrated to have the potential for an improvement in *E. coli* levels in the ABYC marina and marina entrance – areas regularly used by recreational boaters. At the ABYC marina entrance location, Alternative 3 was predicted to result in achieving the *E. coli* Provincial Water Quality Objective (PWQO). It would also result in maintaining the TP levels below the TP PWQO at the Gap location while Alternatives 1 and 2 result in TP concentrations increase in this area. Alternative 3 was associated with the best water quality as it has the longest breakwater east of the seawall gates, resulting in diversion of the seawall gates discharge from the rest of the Bay.

The results of alternatives evaluation with respect to the potential impacts to water quality was the main factor that led to stratification of the Alternatives in the evaluation. As a result, Alternative 3 was identified as the preliminary Preferred Alternative for agency and public consideration. Although the evaluation criteria were not weighted and each was considered independently, water quality impacts were noted to be interconnected to the physical, biological and socio-economics criterions.

Table 4-8. Evaluation summary based on evaluation criteria categories.

Criteria Category	'Do Nothing/ Status Quo' Alternative	Alternative 1	Alternative 2	Alternative 3
Physical Environment				Preferred
Biological Environment	Preferred			
Socio-Economic Environment		Preferred	Preferred	
Cost and Feasibility	Preferred			
Technical Considerations		Preferred	Preferred	Preferred

Table 4-9. "Preferred" rank assignment by individual criteria.

Criteria	'Do Nothing/ Status Quo' Alternative	Alternative 1	Alternative 2	Alternative 3
Physical Environment				
Sediment Movement	●	●	●	●
Unique Landforms		●	●	●
Water Quality				●
Water Circulation	●	●	●	●
Biological Environment				
Aquatic Habitat	●			
Fisheries	●			
Species of Interest	●			
Terrestrial Habitat				●
Migratory and Breeding Birds				●
Socio-Economic Environment				
Parks – Public Use and Parks Infrastructure	*None of the alternatives scored as "Preferred" in this criterion*			
Parks Planning		●	●	●
Accessibility and Scenic Views		●	●	
Boat Club Facilities and Operations	*None of the alternatives scored as "Preferred" in this criterion*			
Non-motorized Recreational Water Use		●	●	
Feasibility and Cost				
Capital and Maintenance Costs	●			
Construction/Implementation Impacts (Land and Water)	●			
Impacts on Other Projects				●
Technical Considerations				
Public Safety				●
Navigation Standards		●	●	●
Shoreline Stability		●	●	●
Dredging		●	●	●
TOTAL	**7**	**9**	**9**	**12**

Table 4-10. Evaluation summary based on alternatives ranking by individual criteria.

Alternative	Not Preferred	Intermediate Preferred	Preferred	Overall Resulting Rank
Do Nothing/Status Quo	12	1	7	Least Preferred
Alternative 1	6	6	9	Intermediate Preferred
Alternative 2	6	6	9	Intermediate Preferred
Alternative 3	5	4	12	Preferred

4.4 Preferred Alternative Description

As stated in Section 4.3.4 [Evaluation Summary], the evaluation results led to the preliminary identification of Alternative 3 as the recommended concept for agency and public consideration. Based on the comments received throughout the consultation process, including the evaluation input received from the public, Alternative 3 was identified as the Preferred Alternative.

Stakeholders and the general public consistently supported Alternative 3 due to its potential to improve water quality in the recreational boating areas (see Section 4.3.3.1 [Physical Environment] for more information on the Alternatives evaluation with respect to potential impacts on water quality). In addition to providing long-term safe navigation, Alternative 3 design also affords the best accommodation of the existing and future approved City of Toronto infrastructure in the area. In particular, it allows for the on-going operation of the seawall gates as it is not known when or if these structures are to be fully decommissioned.

In summary, Alternative 3 provides the following:

- Least impacts to water quality in the recreational areas with a potential positive impact on *E.coli* levels in areas frequently used for recreational boating;
- Best integration of current ABTP operations and flexibility in accommodating future approved City of Toronto infrastructure; and
- Decades of safe navigation without on-going maintenance dredging.

4.4.1 General Description

The plan view drawing of the Preferred Alternative - Alternative 3 - is presented in Figure 4-30. The components of the project associated with this EA are shown in green, and the components associated with the approved City of Toronto projects are indicated in blue.

General descriptions of the Preferred Alternative structural components – breakwaters, temporary culvert (in place during construction only) and shoreline (cobble beach) – are provided below.

Breakwaters

The Preferred Alternative is composed of three breakwaters. The east breakwater is 100 m long and extends into the lake from Headland C of Ashbridge's Bay Park. The primary west breakwater is 650 m long and is connected to the shore on the east side of the ABTP seawall gates. The secondary west breakwater is 400 m long and positioned approximately 40 m to the west of the primary west breakwater. The spacing between the primary and secondary west breakwaters matches the approximate width of the seawall gates to allow free open channel flow of discharge.

Typical breakwater cross-sections are presented in Figure 4-31. The locations of the sections are indicated on the plan view in Figure 4-30.

Breakwater crest elevation is approximately 77.5 m and crest width is approximately 10 metres. The crest elevation is between 2 and 2.5 m above the typical summer high water level and 1.8 m above the design high water level. The outer crest edge will be subject to wave overtopping, with waves expected to spill over the back crest of the east breakwater. A low crest reduces the visual impact of the structures for Ashbridge's Bay Park/TTP visitors.

The crest width of 10 m, which is greater than a typical minimum width used more commonly, was selected to reduce the amount of wave spill and provide safe maintenance access. The protection works are not designed to provide or encourage public access onto the structures. Given the length of the structures and the expectancy of wave overtopping, public access onto the structures would be discouraged. The refinements of the design elements in the detailed design phase will focus on reduction of the crest elevation and the width of the breakwater.

Breakwater Section 1 in Figure 4-31 illustrates the design for the protection of headland tips .The tips of the headlands are located between 4 and 5 meters below datum and the headlands are subject to design wave conditions similar to those used for breakwater design. The design wave conditions near the tips of the headlands are estimated to be in the order of 3.0 to 3.5 metres. Headland tip protection is expected to consist of a double layer of armour stone on both sides and crest. The toe design and embedment will allow for potential scour within sand bottom on all sides.

Section 2 in Figure 4-31 illustrates the design of the east breakwater length. It is similar to Section 1 on the exposed side of the breakwater but reduced in mass and toe depth on the back side. Sections 3, 5 and 10 also show reductions in the mass of the primary protection layers and the toe embedment on one side due to sheltering caused by orientation, other structures or beach material placed adjacent to the headland.

The northern part of the primary west breakwater beyond section 3 is proposed to be protected on the east side with rip rap material only, since wave activity is reduced to less than one metre in height under design storm conditions. The rip rap size will be reduced as the wave height reduces along the length of the breakwater. Typical sections 6 and 7 apply in this region. No formal protection is proposed along the west side of the breakwater on the channel side. Waves cannot reach this area and water flow is the only potential force to dislodge material from the structure or scour the toe. This can be accommodated with the core material, particularly if concrete rubble is used or by specifying large core material along the outer west edge of the breakwater.

Temporary Culvert

In order to construct the primary west breakwater, temporary culvert would need to be installed off the secondary west breakwater. This structure would allow for water to flow between the two breakwaters while facilitating construction access to the site of the primary west breakwater (see Section 4.4.2.2 [Proposed Construction Phasing] for more information on construction phasing).

The culvert must provide a flow capacity equal to the maximum discharge rate through the overflow gates of approximately 26.6 m^3/sec. This is likely to consist of four individual corrugated steel pipe (CSP) culverts of about 2.0 m in diameter and invert elevation between 74.0 m and 75.0 m. The crossing width will be minimized and likely include only a single travel lane over the culverts area. Each CSP culvert is expected to be in the order of 25 m long. The culverts would likely be installed partially submerged and the use of clear stone bedding would be required. The exposed side of the berm around the culverts would be temporarily protected with concrete rubble.

The culverts will be removed once the construction of primary west breakwater is complete.

Cobble Beach

The cobble beach forms part of the shoreline of the landform created as a result of integrating the Preferred Alternative and the future approved City of Toronto facilities. Full shoreline length is approximately 850 m long with one half (approximately 400 m) being cobble beach. The remainder of the shoreline is associated with the City of Toronto satellite treatment plant and, as indicated in the preliminary concepts for this facility, is proposed to be an armour stone revetment.

The cobble beach will be exposed to large waves in the order of 3 m. The construction of a cobble beach is commonly achieved with initial placement of small concrete rubble and brick and this material is allowed to form the beach alignment and slope. The cobble material is placed over this rubble material once the beach reaches a dynamic stability. This reduces the quantity of the beach material required and reduces construction costs.

Though construction materials of various sizes may be used, practical material size range is in the order of 100 to 200 mm. The smaller the material, the flatter the below and above water slopes that will be stable. Material of the size noted above is expected to stabilize at a slope of approximately 2 horizontal (h) to 3 horizontal: 1 vertical (v) above water and 4h to 5h:1v below water. The face of the beach will be undergoing constant changes and beach scarp will be present reflecting the effects of most recent storms.

The crest of the beach is formed by the wave run up on the face of the beach and is expected to potentially reach as high as 3.5 to 4.0 m above the design high water level. However, most of the time the beach crest elevation would be controlled by the more typical water levels and the crest would be between 78.5 and 79.0 m.

Public access along the cobble beach crest can be considered and will be explored in the detailed design stage (pending EA approval).

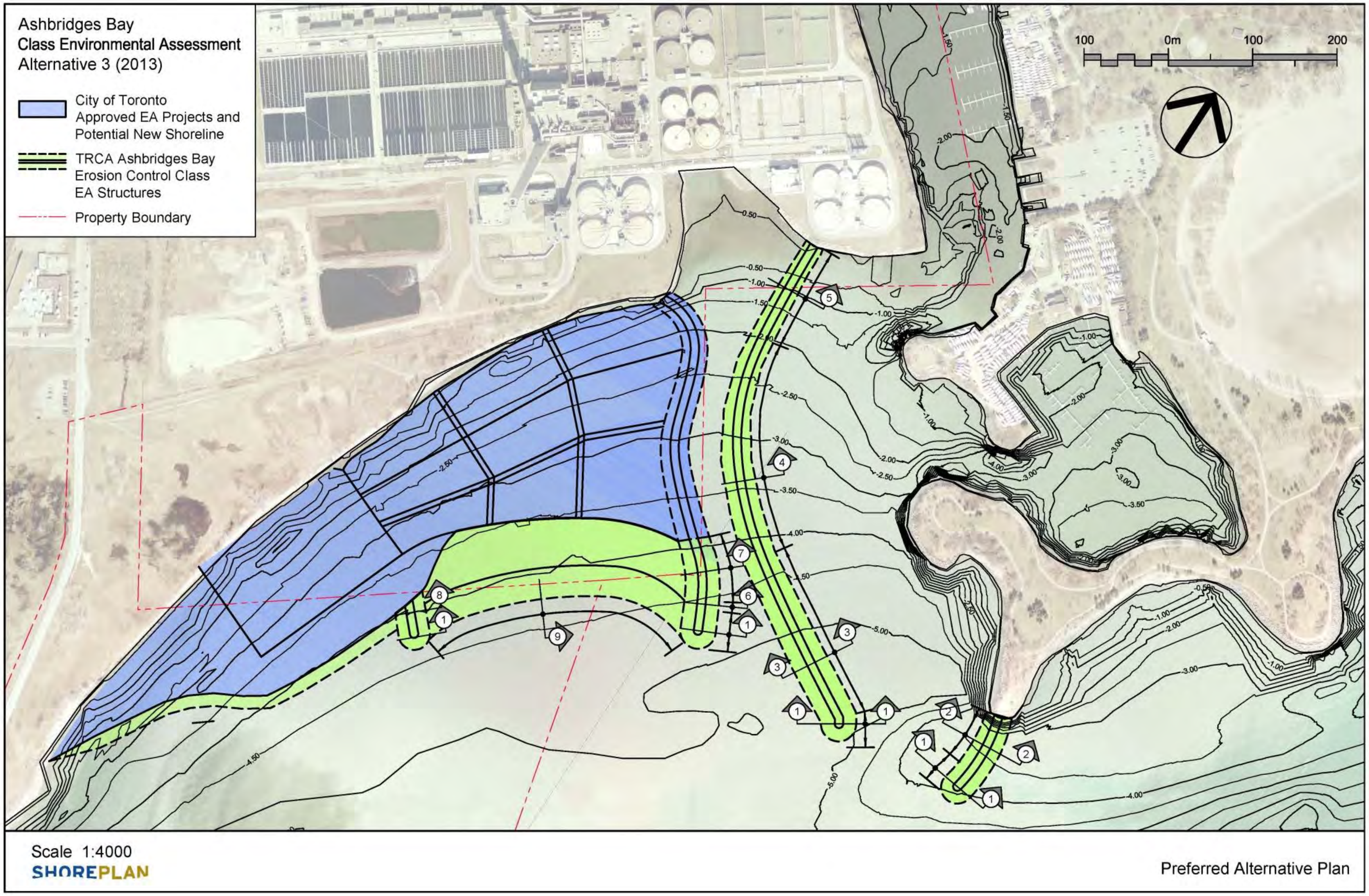

Figure 4-30. Preferred Alternative (Alternative 3) – plan view.
Source: Shoreplan Engineering Limited, 2014.

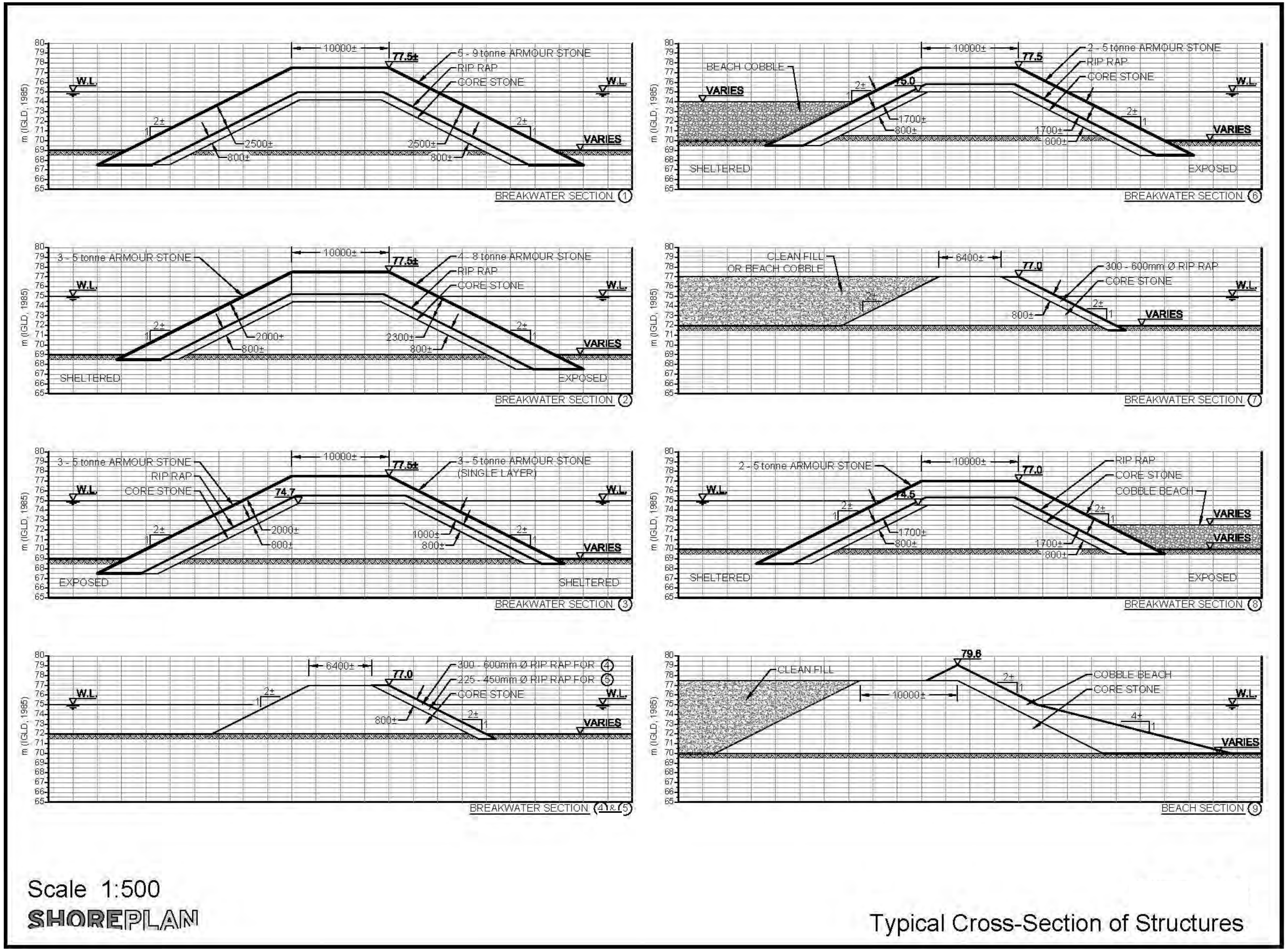

Figure 4-31. Typical cross-sections of sediment control structures.

Source: Shoreplan Engineering Limited, 2014.

4.4.2 Proposed Implementation

The two west breakwaters (primary and secondary) will be implemented in conjunction with the construction of the land base for the previously approved City of Toronto infrastructure (satellite treatment facility and treatment wetland) to be located in the water lot south of ABTP. The east breakwater will be constructed from Headland C of Ashbridge's Bay Park.

The proposed construction access is described in Section 4.4.2.1 [Proposed Construction Access] and a general construction phasing plan is described in Section 4.4.2.2 [Proposed Construction Phasing]. A detailed construction phasing plan integrating the components of this EA with the previously approved City of Toronto facilities will be prepared in the detailed design project phase.

4.4.2.1 Proposed Construction Access

Two access routes are proposed to construct the Preferred Alternative. Leslie Street is proposed as an access route for construction of the west breakwaters and cobble beach. The landbase for the City of Toronto's previously approved high rate treatment facility will be phased for construction (in detailed design of the landform) to allow for access to the project site from the current shoreline. To construct the east breakwater, access along Ashbridge's Bay Park Road and Ashbridge's Bay Park trail is proposed (Figure 4-32).

The west breakwaters construction would utilize Leslie Street (Figure 4-32) and the landbase for the City of Toronto's previously approved high rate treatment plant as an access point. Exact shoreline access routing and vehicle control point location are dependent on the ABTP operations and security requirements as well as TTP operating hours and projects and will be finalized during detailed design in consultation with appropriate City of Toronto and TRCA staff. All efforts will be made to avoid negative impacts on TTP visitors, ABTP operations and other area uses. The initial staging area is proposed to be located on the shoreline adjacent to the western-most portion of the new landform in order to facilitate eastbound construction (see Section 4.4.2.2 [Proposed Construction Phasing]). Once the land base for the satellite treatment facility is in place, it is expected for the breakwater construction access and staging area to be moved onto this new land base.

The proposed east breakwater construction access is proposed to utilize Ashbridge's Bay Park Road and existing park asphalt trail. The implementation of this breakwater would be undertaken in the Fall/Winter season to minimize potential impacts to park users. In order to meet the target construction timeframe (Fall/Winter), all construction materials are expected to be purchased as opposed to being received from free sources.

A portion of the existing park trail would be closed to the public during construction and a material stocking area would be established adjacent to the breakwater construction site. None or minimal damage to the trail surface and shoulders is expected based on previous experience (recent remedial shoreline work in the park utilized existing trail without negative impact to the surface of the trail or adjacent areas). However, should impact to the existing trails occur during construction, repairs will be done to ensure the trail is left in the condition it was in prior to construction. All efforts will be made to coordinate any other maintenance or infrastructure initiatives in being undertaken in the Park with the breakwater construction for cost efficiencies and to reduce public use impact.

Potential trail/road repair/re-surfacing costs associated with construction access routes and staging areas would be included in the final project budget. Natural area disturbances would be mitigated via post-construction site restoration, also to be included in the project budget (pending EA approval and required permits).

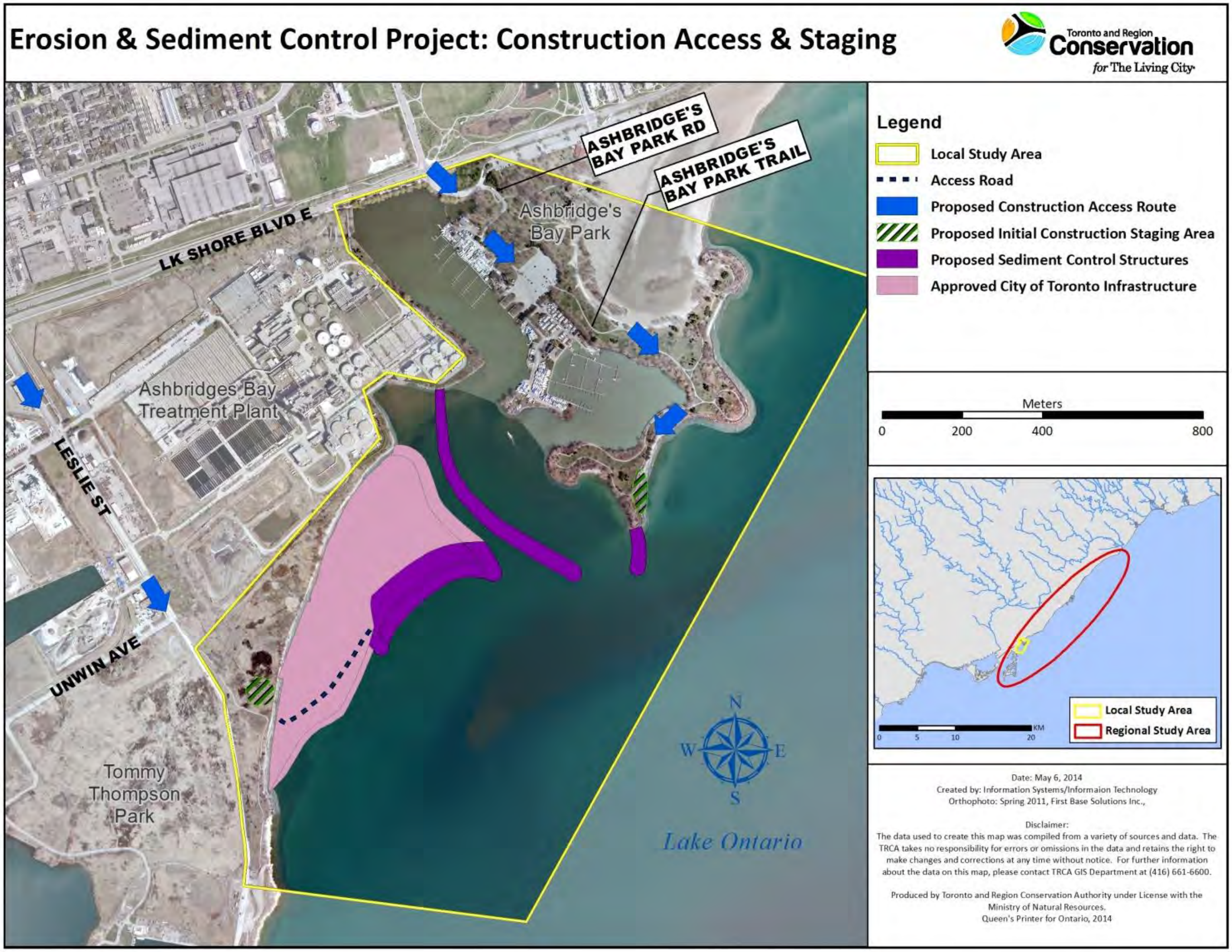

Figure 4-32. Proposed construction access routes and staging areas.
Source: TRCA, 2014.

4.4.2.2 Proposed Construction Phasing

The Preferred Alternative construction is proposed to be integrated with the construction of the land base for satellite treatment plant and treatment wetland, approved under their respective EAs. An integrated land base construction approach would minimize the potential negative impacts on surrounding environment and public use in the area, in addition to reducing implementation timeframe and overall costs.

A construction phasing plan for the study's proposed erosion and sediment control structures is schematically illustrated in Figure 4-33. A comprehensive construction phasing plan for the entire landform which will integrate the City of Toronto previously approved facilities would be prepared in the detailed design project phase for the entire landform. Landform construction is proposed to proceed from west to east, and the City of Toronto's high rate treatment plant land base is expected to be constructed first. This land base would allow for the creation of an access road and staging area to facilitate construction of the west breakwaters and cobble beach associated with the preferred alternative for this EA. In order to construct the primary west breakwater, a temporary culvert would need to be constructed off the secondary west breakwater (see Section 4.4.1 [General Description] for more information on culvert specifications). This structure would allow for water to flow between the two breakwaters while facilitating construction access to the site of the primary west breakwater, and will be removed when construction is completed. The east breakwater would be constructed from Headland C of Ashbridge's Bay Park. To minimize negative impacts on park users, east breakwater construction would be undertaken in late Fall and Winter, when there is less public activity in the area.

It must be noted that each construction phase does not necessarily represent an annual construction period. Rather, the phasing is based on logical sequences of construction. The actual annual phasing will depend on a number of parameters including availability of funding and availability of concrete rubble, if such material is used, and the availability of clean earth fill. The availability of concrete rubble and clean earth fill is dependent on the construction activity in the City of Toronto and locations of other potential disposal sites.

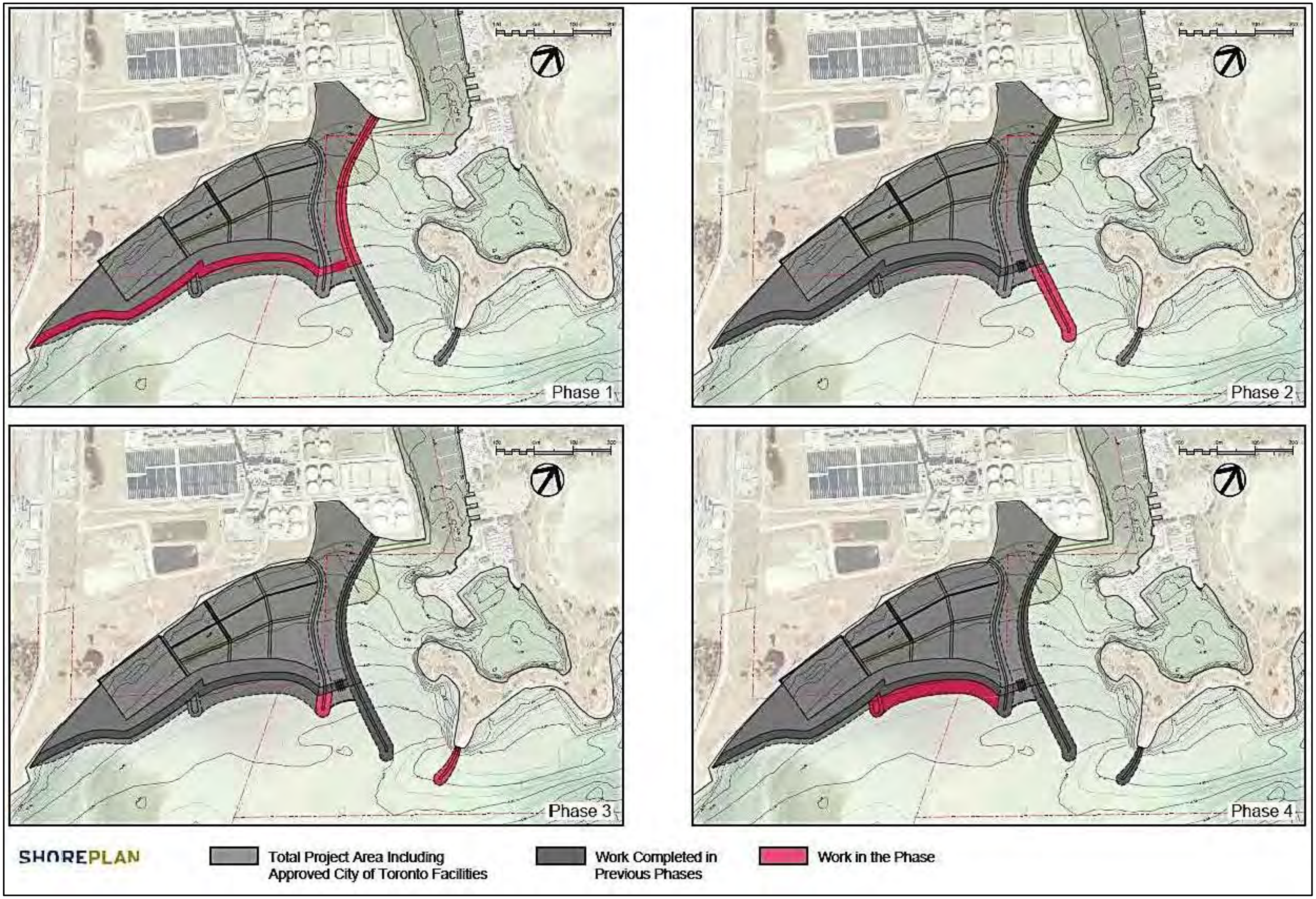

Figure 4-33. Proposed construction phasing.
Source: Shoreplan Engineering Limited, 2014.

4.4.3 Preliminary Cost Estimates

4.4.3.1 Preferred Alternative Cost Estimate

Cost estimates for the Preferred Alternative (Alternative 3) were refined and two scenarios are provided in Tables 4-12 and 4-13. The costs are provided for each major component of the Preferred Alternative with the unit costs for materials required outlined in Table 4-11.

The major components of the Preferred Alternative include the east and west breakwater, east and west beach groyne, and central cobble beach. The east and central breakwaters are structures required to mitigate erosion and sediment deposition at the harbor entrance of Coatsworth Cut in order to ensure safe navigation. The cobble beach and associated groyne components of the design support the integration of the previously approved City of Toronto projects (treatment wetland as well as the high rate treatment facility, as described in Section 3.5.3.2 [Future Infrastructure].

The cost estimates presented in Table 4-12 were prepared under the assumption that all core material is purchased at $30.00/tonne. This includes the material for the construction of the access berm along the south side of the City of Toronto projects. At the same time, it is common practice in waterfront construction to use concrete rubble as core material for the construction of access berms. This material may be available free of charge. The costs associated with this approach are presented in Table 4-13. The costs do not include the small cost of the rubble placement and operation of the fill site as those costs depend on the phasing of the operations and cannot be determined accurately at this point.

It must be noted that costs provided in Table 4-12 and Table 4-13 are preliminary and will be refined in the detailed design stage of the project. See Section 8 [Coordination with Other Projects] for further information.

Table 4-11. Summary of construction material unit costs.
Source: Shoreplan Engineering Limited, 2014.

Material	Unit Cost
Armour Stone	$100/tonne
Rip rap	$50/tonne
Core Material	$30/tonne
Beach Cobble	$30/tonne

Table 4-12. Preliminary Cost Estimate for Preferred Alternative - Purchased Core.
Source: Shoreplan Engineering Limited, 2014.

Structure		**East Breakwater**	**Central Breakwater**	**East Beach Groyne**	**West Beach Groyne**	**Central Cobble Beach**	**TOTAL**
	Unit						
Total Cost	$	$2,536k	$9,225k	$1,875k	$1,034k	$5,016k	$19,686k
Net Quantity							
Armour Stone	tonne	19,048	36,751	8,027	7,164	0	71,000
Rip Rap	tonne	5,378	30,972	4,382	2,429	0	43,000
Core	tonne	12,088	133,379	28,438	6,471	123,506	304,000
Beach Cobble	tonne	0	0	0	0	26,221	26,000
Net Cost							
Armour Stone	$	$1,905k	$3,675k	$803k	$716k	$0	$7,099k
Rip Rap	$	$269k	$1,549k	$219k	$124k	$0	$2,161k
Core	$	$363k	$4,001k	$853k	$194k	$3,705k	$9,116k
Beach Cobble	$	$0	$0	$0	$0	$1,311k	$1,311k
Total Length	m	101	626	109	43	328	1,207
Cost/m	$/m	$25.1k	$14.7k	$17.2k	$24.3k	$15.3k	$16.3k

***Note**: all costs are expressed in thousands of dollars and rounded off to the nearest $1,000.*

Table 4-13. Preliminary Cost Estimate for Preferred Alternative – Free Core Material.
Source: Shoreplan Engineering Limited, 2014.

Structure		**East Breakwater**	**Central Breakwater**	**East Beach Groyne**	**West Beach Groyne**	**Central Cobble Beach**	**TOTAL**
	Unit						
Total Cost	$	$2,174k	$5,224k	$1,022k	$840k	$1,311k	$10,571k
Net Quantity							
Armour Stone	tonne	19,048	36,751	8,027	7,164	0	71,000
Rip Rap	tonne	5,378	30,972	4,382	2,429	0	43,000
Core	tonne	12,088	133,379	28,438	6,471	123,506	304,000
Beach Cobble	tonne	0	0	0	0	26,221	26,000
Net Cost							
Armour Stone	$	$1,905k	$3,675k	$803k	$716k	$0	$7,099k
Rip Rap	$	$269k	$1,549k	$219k	$124k	$0	$2,161k
Core	$	$0	$0	$0	$0	$0	$0
Beach Cobble	$	$0	$0	$0	$0	$1,311k	$1,311k
Total Length	m	101	626	109	43	328	1,207
Cost/m	$/m	$25.1k	$14.7k	$17.2k	$24.3k	$15.3k	$8.8k

***Note:** all cost are expressed in thousands of dollars and rounded off to the nearest $1,000.*

4.4.3.2 Potential for Additional Revenue

In addition to the purchased materials needed for the construction of the Preferred Alternative, the design of remedial solution will require clean fill material that can be accepted on site at a charge to the provider. This would allow for the potential to receive revenue to help offset the project implementation costs. An estimate of $1,026,200 is presumed to be the potential revenue based on an estimate of 74,500 m^3 of fill material required for the construction of the preferred alternative.

It should be noted that the implementation of the entire Ashbridges Bay Landform (component of this EA along with other approved City of Toronto facilities) is currently estimated to potentially generate anywhere from $3 to 7 million. This site is anticipated to allow for the accommodation of City of Toronto fill material which will result in further savings (reduction in disposal and transportation costs) to the City, with the logistics of the fill operation to be confirmed in the detailed design project phase.

It should be noted that revenue potential is impacted by the economy and is therefore considered to have a high level of unpredictability when forecasting into the future.

4.4.4 Constructed Works Monitoring and Maintenance

During the Preferred Alternative construction, the monitoring program may include recording of the survey of waterline position, bathymetry, photographic records of the constructed works (including aerial and oblique photographs), ongoing monitoring of turbidity at the active fill face, and a review of constructed works by a qualified engineer. A comprehensive construction phase monitoring program would be developed during detailed design, once accurate construction timing is established.

Post-construction monitoring may include updates of the nearshore and navigation areas bathymetry, waterline position survey, photographic records of the constructed works (both aerial and oblique photographs) and a review of constructed works by a qualified engineer. Additional bathymetry surveys of the predicted deposition areas (west of the breakwater structures and south of the headlands at Ashbridge's Bay Park) may be undertaken on an annual basis. The collected data would allow monitoring changes in the new and surrounding shoreline and bathymetry.

Once the proposed works are in place, maintenance requirements include operational and structural. Structural maintenance requirements would be focused on the rehabilitation and repair of the structures themselves. Operational maintenance requirements would be focused on dredging as required to maintain navigability in the breakwater-enclosed area and its entrance. Both types of maintenance would require a complimentary monitoring program, as the key to a good maintenance plan for the structures is a comprehensive inspection and monitoring plan that identifies the required maintenance work.

Structural

The structures associated with the Preferred Alternative, specifically for the first two years following construction, should be given bi-annual visual inspections by a professional engineer experienced in the assessment of marine structures. One inspection should take place in the fall when the water levels are approaching their annual low. A second inspection should take place in the spring to examine structures for any damage associated with late fall, winter and early spring storms. Assuming that no significant repair work is required within the first two-year period, visual inspections by a TRCA engineer or a technician experienced in the assessment of civil infrastructure can be subsequently carried out annually. Those inspections should take place in the spring. Any significant problem areas should be referred to a professional engineer experienced in the assessment of marine structures for a more detailed review.

Once the structures have a good stability record for at least five years, they may be inspected less frequently. A routine inspection interval of three to five years is expected to be sufficient. A specific inspection time interval can be determined by the inspecting engineer. Irrespective of the routine inspection interval, a visual inspection should be carried out following major storm events. For the purposes of this discussion, a major event may be defined as a storm that causes noticeable damage along other portions of the Lake Ontario shoreline within the TRCA jurisdiction.

A detailed underwater review of the structure should be undertaken by professional divers prior to expiration of the construction warranty period (typically 1 year after construction). A routine detailed inspection is recommended to be carried out every five years (Shoreplan Engineering Limited, 2014). That level of inspection includes an underwater review. It is recommended that a second underwater review be undertaken five years after the initial review recommended above, and the frequency of future reviews be established based on the results of the first two inspections. As the structures age, inspection frequency can be adjusted as required.

For newly constructed structures it is common practice to recommend that 0.5 to 1.0% of the construction budget be accrued annually to establish a maintenance fund for that structure (Shoreplan Engineering Limited, 2014). That fund is typically spent on an as-needed basis rather than at a constant annual rate. If the structure is properly built out of suitable material, there should be no need for routine maintenance work on the Preferred Alternative for a number of years. It is common for new structures to not require routine maintenance for a period of 15 to 20 years, or more. However, although the probability is low, there is always a risk that design conditions could be exceeded in any given year (e.g., after a severe storm), and the structure could be damaged.

Operational

Operational maintenance, or dredging near the new opening of the Preferred Alternative within the breakwater-enclosed area or in Coatsworth Cut, is not expected to be required for decades. The area to the west of west breakwaters and the nearshore area south of Ashbridge's Bay Park would be the main depositional area for sediment (see Figure 4-24 and Figure 4-25). Although subject to any changes in coastal conditions, it is anticipated that it would be at least several decades to more than a century before the nearshore areas build up significantly (to 1 meter or more). Aside from the uniform deposition of sediment with the new breakwater structures in place, coastal modeling results show that a shoal would form at the outer end of the east breakwater (see Figure 4-24 and Figure 4-25). As this shoal is outside of the navigation channel, it is not anticipated to require maintenance dredging. However, it may be included in the bathymetry surveys of depositional areas (see above) to ensure that this formation does not become a navigation hazard.

5 DETAILED ENVIRONMENTAL SCREENING OF THE PREFERRED ALTERNATIVE

To complete the detailed environmental analysis of the preferred alternative, the information collected for the baseline environmental inventory as well as alternatives evaluation was examined in greater detail to confirm potential impacts, refine mitigation and/or compensation measures, and identify any unforeseen impacts.

Screening criteria used were consistent with the criteria provided in the Conservation Ontario Class Environmental Assessment (2011) guidelines. The criteria represented impacts to physical, biological, cultural and socio-economic environments and included engineering/technical considerations.

The environmental components where potential positive, negative or neutral effects are likely were identified. The detailed consideration included potential effect ranking as Negative High (-H), Negative Medium (-M), Negative Low (-L), Neutral or None (N), Positive Low (+L), Positive Medium (+M) or Positive High (+H) based on the magnitude, geographic extent, duration, frequency, permanence of reversibility, and ecological context of the effect in question. Proposed mitigation and/or compensation measures and any residual effects were documented as well.

The results of the detailed environmental analysis of the preferred alternative are presented in Table 5-1. The criteria determined as not applicable and environmental components where no impacts are likely were omitted from further discussion.

In summary, no potential effects were identified for the project regional study area as the proposed sediment control structures are sited in the waterlot south of ABTP and Ashbridge's Bay Park Headland C, and construction access and staging areas are anticipated to be confined to the northern-most area of Tommy Thompson Park, parts of Ashbridge's Bay Park and, possibly, ABTP shoreline. As a result, the vast majority of the Preferred Alternative potential environmental effects are more likely to occur in the project local study area and the lands immediately surrounding it. The potential effects and proposed mitigation measures are discussed in Sections 5.1 - 5.5.

Table 5-1. Summary of the Preferred Alternative detailed environmental screening.

No.	Screening Criteria	Rating of Potential Effects								Comments
		-H	-M	-L	NIL	+L	+M	+H	NA	
Physical Environment										
1	Unique Landforms					●				No effects on unique landforms are anticipated in the regional study area as the proposed sediment control structures are located in Ashbridges Bay. In the local study area, Ashbridge's Bay Park landform was identified as a unique landform. A positive effect on the shoreline stability of Ashbridge's Bay Park Headland C is anticipated as a result of implementing the east breakwater of the Preferred Alternative. See Section 5.1.1 for more information.
2	Existing Mineral/Aggregate Resources Extraction Industries								●	No extraction industry operations have been identified in either local or regional study areas.
3	Earth Science – Areas of Natural and Scientific Interest (ANSI)				●					No effects on Earth Science ANSIs are anticipated in the regional study area as the proposed sediment control structures are located in Ashbridges Bay. There are no Earth Science ANSIs in the local study area.
4	Specialty Crop Areas								●	No specialty crop areas were identified in either local or regional study areas.
5	Agricultural Lands or Production								●	No agricultural lands or production were identified in local and regional study areas.
6	Niagara Escarpment								●	Both local and regional study areas are found outside of the Niagara Escarpment.
7	Oak Ridges Moraine								●	Both local and regional study areas are found outside of the Oak Ridges Moraine.
8	Environmentally Sensitive/Significant Areas (physical)				●					No potential effects on Environmentally Sensitive/Significant Areas (physical) are anticipated in the regional study area as the proposed sediment control structures are located in Ashbridges Bay. No Environmentally Sensitive/Significant Areas (physical) are found in the project local study area.
9	Air Quality			●						The air quality in the project regional and local study areas is determined by air quality in the Greater Toronto Area, where the sources are primarily regional and international. Temporary negative effects associated with construction activities are possible in the project local study area and lands immediately surrounding it. Mitigation measures will be in place to minimize the impact. See Section 5.1.2 for more information.
10	Agricultural Tile or Surface Drains				●					No agricultural drains are found in the project local study area. Drains located in the regional study area are not expected to be impacted.
11	Noise Levels and Vibration			●						Noise and vibration levels in the project regional study are not expected to be impacted. Noise and vibration levels in the local study area and lands immediately surrounding it may be affected during the proposed undertaking construction. Mitigation measures will be in place to minimize the impact. See Section 5.1.3 for more information.
12	High/Storm Water Flow Regime				●					The project activities are not expected to affect Lake Ontario water levels regime as it is regulated.
13	Low/Base Water Flow Regime				●					The project activities are not expected to affect Lake Ontario water levels regime as it is regulated.
14	Existing Surface Drainage and Groundwater Seepage			●						No potential effects on groundwater seepage areas are anticipated in the project regional study area. No groundwater seepage areas are found in the local study area. While minor negative effects on the existing surface drainage paths may occur in the project local study area as a result of construction activities, no effects are anticipated in the project regional study area. A number of mitigation measures such as conscientious site design to minimize disturbance to existing surface drainage paths and post-construction site restoration are anticipated to minimize the impacts and ensure that no long-term adverse effects occur. See Section 5.1.4 for more information.
15	Groundwater Recharge/Discharge Zones				●					No effects on groundwater discharge or recharge are anticipated in the project regional study area. No significant recharge or discharge zones are found in the local study area which is fill-based.
16	Falls within a vulnerable area as defined by the *Clean Water Act*				●					The project regional study area contains the Harris Water Treatment Plant intake which is defined as a vulnerable area by the *Clean Water Act*. The water quality modeling carried out for the project predicted no impacts on this vulnerable area (Section 3.2.17). The project local study area does not fall within or contain a vulnerable area.
17	Littoral Drift				●					The preferred alternative's effect on sediment transport in the littoral cell considered is anticipated to be neutral. While the proposed sediment control structures are expected to prevent sediment deposition in Coatsworth Cut, sediment deposition in areas outside of those enclosed by breakwaters would continue and no disruptions in the overall sediment transport pattern are anticipated. See Section 5.1.5 for more information.
18	Wave climate				●					The regional study area wave climate is not expected to be affected, as the preferred alternative has no impact on the geophysical components of wave climate. In the local study area, the predicted changes in wave climate associated with the proposed sediment control structures are minimal and can overall be considered neutral. See Section 5.1.6 for more information.
19	Water Quality				●					No effects on water quality are anticipated in the regional study area. Within the local study area, negative impacts on water quality may include increases in turbidity during sediment removal and/or lake-filling associated with construction. At the same time, the preferred alternative is predicted to have the potential for a positive impact on average *E. coli* levels in areas frequently used for

No.	Screening Criteria	Rating of Potential Effects								Comments
		-H	-M	-L	NIL	+L	+M	+H	NA	
										water based recreation. Overall, construction-related negative effects on water quality have been deemed acceptable as the preferred alternative offers the potential for improved water quality in the long term. See Section 5.1.7 for more information.
20	Soil/Fill Quality				●					No effects on soil/fill quality are anticipated in the project regional study area as the project activities are localized to Ashbridges Bay. Appropriate guidelines such as MOE Fill Quality Guide and Good Management Practices and Provincial residential/parkland soil quality guidelines will be followed to ensure that the proposed works do not result in negative impacts. See Section 5.1.8 for more information.
21	Contaminated Soils/Sediments/Seeps				●					No effects on contaminated soils, sediments or seeps are expected in the project regional study area as the proposed works' construction is localized to Ashbridges Bay. In the local study area, no known contaminated soils, sediments or seeps occur. MOE Fill Quality Guide and Good Management Practices as well as the Provincial residential/parkland soil quality guidelines will be followed to ensure no negative impacts occur. See Section 5.1.9 for more information.
22	Existing Transportation Routes			●						No effects on existing transportation routes, including pedestrian traffic routes, are anticipated in the project regional study area. In the local study area and lands immediately surrounding it, a potential increase in truck traffic and temporary multi-use/pedestrian trail closures may occur during the proposed undertaking construction phase. Mitigation measures such as provision of alternative routes are anticipated to minimize the impacts. In the long term, pedestrian route network could be expanded as a result of implementing public access along the shoreline associated with the proposed sediment control structures and the previously approved City of Toronto infrastructure. Pedestrian network expansion opportunities would be explored in landform detailed design. See Section 5.1.10 for more information.
23	Constructed Crossings (e.g., bridges, culverts)				●					No impacts on constructed crossings are expected in the project regional study area. Project local study area has no constructed crossings.
Biological Environment										
24	Wildlife/Bird Habitat		●							No effects on the wildlife/bird habitat are expected in the project regional study area. In the local study area, wildlife/bird habitat is expected be affected during proposed works construction. Habitat disturbances such as vegetation removal during site preparation and construction-related increase in noise are anticipated to be reduced through conscientious site design, conformance to the breeding and migratory bird timing windows and post-construction site restoration. See Section 5.2.1 for details.
25	Habitat Linkages or Corridors				●					Proposed remedial works are localized to the shoreline and waterlot south of Ashbridges Bay Treatment Plant as well as parts of Ashbridge's Bay Park and are expected to have no impacts on the habitat linkages existing to the west and to the east of Ashbridges Bay within the regional study area and beyond. Ashbridges Bay itself constitutes a gap in the waterfront natural cover and does not play a significant role in conveying wildlife movement along the waterfront.
26	Significant Vegetation Communities			●						No effects on significant vegetation communities found in the project regional study area are expected as the project activities are localized to the shoreline and waterlot south of Ashbridges Bay Treatment Plant and parts of Ashbridge's Bay Park. Potential negative impacts associated with construction activities are expected in the project local study area. Impacts include vegetation removal to access the shoreline and are anticipated to be mitigated via conscientious site design minimizing vegetation loss and post-construction site restoration to encourage vegetation reestablishment. See Section 5.2.2 for details.
27	Environmentally Sensitive/Significant Areas (biological)				●					No effects on the Environmentally Sensitive/Significant Areas (ESAs) located in the regional study area are anticipated as the proposed works are localized to Ashbridges Bay. No ESAs are found within the local study area.
28	Fish and Fish Habitat	●								Fish and fish habitat within the project regional study area are not expected to be affected. In the project local study area and immediately surrounding waters, fish are anticipated to be displaced as a result of increases in noise and vibration as well as localized increases in turbidity associated with construction. Best environmental management practices will be followed to minimize the impacts. Fish habitat loss as a result of lake-filling is expected to be off-set via on-site and off-site compensation. Fish habitat loss will be quantified in the project detailed design stage and a comprehensive compensation plan will be developed in consultation with the Department of Fisheries and Oceans and Ministry of Natural Resources. See Section 5.2.3 for further information.
29	Species of Concern			●						In the regional study area, no effects on species of concern are anticipated. In the local study area, construction-related impacts on the terrestrial flora and fauna species ranked L3 and L4 are likely. Mitigation measures to minimize area disturbance during construction and avoid impacts to plants and wildlife are anticipated to reduce the negative effects. Post-construction site restoration would ensure that no long-term adverse effects occur. Potential negative effects on the single fish species of concern recorded in the local study area (American Eel, 1993) are not anticipated to be significant and will be considered in development of fish and fish habitat impact mitigation measures and compensation plan. See Section 5.2.4 for more information.
30	Exotic/Alien and Invasive Species			●						The potential impacts associated with exotic/alien and invasive species are expected to be low, as the proposed works would involve small amount of topsoil to be used and are not likely to introduce exotic invasive plant species. While soil disturbance may lead to an increase in exotic plant species, the post-construction site

No.	Screening Criteria	Rating of Potential Effects								Comments
		-H	-M	-L	NIL	+L	+M	+H	NA	
										restoration would involve site appropriate native species to minimize the establishment of non-native and/or invasive species. See Section 5.2.5 for more information.
31	Wildlife/Bird Migration Patterns				●					As the project activities are localized to the waterlot and shoreline south of Ashbridges Bay Treatment Plant as well as parts of Ashbridge's Bay Park, bird migration patterns are not expected to be affected. Wildlife migration is not anticipated to be affected as the local study area does not play a significant role in conveying wildlife movement due to its poor natural cover and the high degree of urbanization, as discussed in Sections 3.3.4 and 3.3.5. The role of Ashbridges Bay and surrounding lands as a migratory bird stopover area is discussed under Criterion No. 25 Wildlife/Bird Habitat, Section 5.2.1.
32	Wildlife/Bird Population			●						Impacts on wildlife and bird population in the project local study area as well as adjacent lands are likely as a result of displacement during construction. Mitigation measures minimizing negative effects on existing habitat as well as post-construction site restoration and Common Tern nesting habitat creation are anticipated to off-set the impacts. See Section 5.2.5 for more information.
33	Wetlands				●					No effects on wetlands located within the project regional study area are expected as the proposed works are localized to Ashbridges Bay. No wetlands have been identified in the project local study area.
34	Microclimate				●					While highly localized changes in the local study area water temperature may occur as a result of sediment control structures construction, the overall impacts on the local study area microclimate are expected to be neutral.
35	Life Science ANSIs				●					No effects on the Life Science ANSIs location in the regional study area are expected. No Life Science ANSIs are found in the local study area.
36	Unique Habitats				●					No effects on the unique habitats found in the project regional study area are expected. Project local study area contains no unique habitats.
Cultural Environment										
37	Traditional Land Uses				●					No impacts on the Traditional Land Uses are expected as no concerns have been raised by the Aboriginal Communities during consultation (see Section 6.6 for more information).
38	Aboriginal Community or Reserve				●					No concerns have been raised during consultation with the Aboriginal Communities (see Section 6.6 for more information).
39	Outstanding Native Land Claim as identified by the Aboriginal Community				●					Both regional and local study areas are within the Williams Treaty Specific Claim (1923) area. No concerns have been raised over the course of correspondence with the United Indian Council communities. Proposed project activities would not impact or be impacted by the ongoing Specific Claim process.
40	Transboundary Water Management Issues								●	No Transboundary Water Management issues concerning either local or regional study areas have been identified.
41	Riparian Uses								●	No effects on the riparian uses are expected within the project regional study area. Potential effects on the local riparian uses such as shoreline access, pedestrian routes/trails, local boat club facilities and recreational boating activities are discussed under Criteria 42, 22, 52 and 58, respectively.
42	Recreational or Tourist Uses of Existing Shoreline Access					●				No effects on the recreational or tourist uses of existing shoreline access are anticipated within the regional study area. In the local study area, construction-related shoreline access restrictions are expected in parts of Ashbridges Bay Park as well as TTP. With mitigation measures in place and the overall improvements in navigation conditions once construction is completed, the effects are anticipated to be positive. See Section 5.3.1 for details.
43	Aesthetic or Scenic Landscapes or Views			●						No impacts on aesthetics and scenic views are anticipated in the regional study area. In the local study area, temporary negative effects associated with construction activities are likely. While the lake views are not expected to be affected as the proposed sediment control structures have a low profile, minor negative impacts associated with the by-pass events discharge are likely. Section 5.3.2 provides further information.
44	Archaeological Resources				●					No impacts on archaeological resources are anticipated in the regional study area as the construction-related disturbances would be localized to Ashbridges Bay, parts of Ashbridge's Bay Park and ABTP shoreline. No impacts are expected in the local study area as the area is lakefill-based and the project Stage 1 Archaelogical Assessment deemed that the local study area has no potential to contain Aboriginal and EuroCanadian archaeological sites, as discussed in Section 3.4.9.
45	Built Heritage resources				●					No impacts are anticipated in the regional study area. No impacts are expected in the local study area as the area is lakefill-based and the project Stage 1 Archaelogical Assessment deemed that the local study area has no potential to contain Aboriginal and EuroCanadian archaeological sites, as discussed in Section 3.4.9.
46	Cultural Heritage Landscapes				●					No impacts are anticipated in the project regional study area. No impacts are expected in the local study area as the area has no potential to contain Aboriginal and EuroCanadian archaeological sites, as discussed in Section 3.4.9.
47	Historic Canals				●					No impacts are anticipated as neither local nor regional study areas contain historic canals.
48	Federal Property				●					No impacts on the federal property are expected in project regional study area.

No.	Screening Criteria	Rating of Potential Effects								Comments
		-H	-M	-L	NIL	+L	+M	+H	NA	
										Local study area contains no federal property.
49	Heritage River System				●					No heritage river systems are present in either local or regional study areas.
Socio-Economic Environment										
50	Surrounding Neighbourhood or Community					●				Within the regional study area, proposed works construction may affect residents closest to the local study area as a result of an increase in noise levels, trail closures and a potential increase in truck traffic. These temporary impacts are anticipated to be minimized via appropriate measures such as the noise by-law enforcement, alternative routes provision for pedestrians and traffic management plans. In the long term, expansion of shoreline access, remediation of navigation hazards and the potential for positive impacts on water quality achieved through the implementation of proposed sediment control works are anticipated to have a positive effect on local community. See Section 5.4.1 for more information.
51	Surrounding Land Uses or Growth Pressure				●					Lands within and adjacent to the local study area are used as industrial/employment and open space (Section 3.5.2). Project activities are not expected to impact either use.
52	Existing Infrastructure, Support Services, Facilities				●					In the regional study area, no impacts on existing infrastructure and facilities are anticipated. In the local study area, the preferred alternative provides the best integration of the existing operations and future approved facilities (see Section 4.3.3.5). Construction access and staging areas are proposed to be located away from any facilities located in Ashbridge's Bay Park, including the recreational boating clubs' facilities (Section 4.4.2.1).
53	Pedestrian Traffic Routes								●	Potential impacts on pedestrian traffic routes are discussed under Criterion No. 22 Existing Transportation Routes.
54	Property Values or Ownership				●					No effects on property values or ownership are expected in either regional or local study areas.
55	Existing Tourism Operations				●					No impacts on existing tourism operations are expected in the project regional study area. Project local study area has no known tourism operations.
56	Property/Farm Accessibility				●					No impacts on property accessibility are anticipated in the project regional and local study areas.
57	Navigation							●		No impacts on navigation are anticipated in the project regional study area. In the local study area, the proposed sediment control structures are expected to have a highly positive impact on navigation in Coatsworth Cut as they would prevent sediment deposition thus eliminating navigation hazards and the need for maintenance dredging. See Section 5.4.2 for more information.
58	Recreational Boating Activities					●				Recreational boating activities in the regional study area are not expected to be affected. In the local study area, both short-term and long-term impacts are anticipated. Short-term negative impacts may include access restrictions necessary for breakwater construction. Appropriate signage and timely communications with the local boat clubs are anticipated to mitigate the impacts. In the long term, the proposed sediment control structures result in an increase in travel time from Coatsworth Cut to open waters of Lake Ontario. Waters south of ABTP would become unavailable for use by a number of the local sailing programs as this is where the proposed sediment control breakwaters other previously approved City of Toronto facilities are situated. At the same time, hazard-free navigation as well as the potential for improvement in water quality would result in the overall positive effect on recreational boating activities in Ashbridges Bay. See Section 5.4.3 for details.
Engineering/Technical Considerations										
59	Rate of Erosion in Ecosystem				●					No impacts on the rate of erosion in the local ecosystem are expected as a result of the proposed works. While the proposed structures, including the cobble beach, have been conceptually designed to allow for scour and some changes in the nearshore, the primary purpose of the works is to *prevent sediment deposition* in Coatsworth Cut, thus providing for safe navigation.
60	Sediment Deposition Zones in Ecosystem				●					See Criterion No. 17 Littoral Transport.
61	Flood Risk in Ecosystem								●	Not applicable as Lake Ontario water levels are regulated.
62	Slope Stability				●					Slope stability in the regional study area is not expected to be affected as the proposed construction activities are localized to the local study area. In the local study area, slope of shoreline within the proposed construction and/or construction staging areas may become unstable during construction. The potential negative effects are anticipated to be minimized via the mitigation measures to be taken. See Section 5.5.1 for more information.
63	Existing Structures				●					No impact on existing structures in the regional or local study areas is expected.
64	Hazardous Lands								●	No impact on hazardous lands within the regional study area is expected as the project activities are localized to the local study area. Local study area does not contain hazardous lands.
65	Hazardous Sites								●	No impact on hazardous sites within the regional study area is expected as the project activities are localized to the local study area. No hazardous sites were identified in the local study area.

(-H) = highly negative; (-M) = moderately negative; (-L) = minor negative; (NIL) = neutral or none; (+L) = minor positive; (+M) = moderately positive; (+H) = highly positive; (NA) = not applicable.

5.1 Physical Environment

5.1.1 Unique Landforms

No effects on unique landforms are anticipated in the regional study area as the proposed sediment control structures are located in Ashbridges Bay.

In the local study area, Ashbridge’s Bay Park landform was identified as a unique landform. A positive effect on the shoreline stability of Ashbridge’s Bay Park Headland C is anticipated as a result of implementing the east breakwater of the Preferred Alternative. The east breakwater is proposed to be connected to Headland C, requiring that the existing shoreline stability and erosion issues at Headland C be remediated to allow for the east breakwater construction and operation, as intended.

5.1.2 Air Quality

Generally, air quality in the project local and regional study areas is determined by air quality in the Greater Toronto Area where the sources are primarily regional and international. The potential effect on the air quality in the local study area and surrounding land is associated with construction equipment operation, filling activities and a possible increase in truck traffic. It is expected to be minimized via the following mitigation measures:

- Regular equipment inspections;
- Enforcement of the City of Toronto Idling Control By-law; and
- Dust suppression in dry and windy weather conditions, as appropriate.

No long-term adverse effects on air quality are anticipated.

5.1.3 Noise Levels and Vibration

There are no impacts on noise levels and vibration expected in the regional study area. The potential negative effects on noise levels and vibration are anticipated to be minimal and contained to areas within close proximity to the construction site within the local study area. The impact is attributed to the construction equipment operation and a possible increase in truck traffic during peak traffic hours. Closest sensitive receptors (i.e., those in residential areas) are located approximately 0.75 km north-east of the proposed construction activities zone and are not expected to be affected. Mitigation measures may include:

- Carrying out construction Monday to Friday during normal working hours;
- Enforcement of the City of Toronto Noise By-law; and
- Regular equipment inspections and operation (e.g., restrict swinging of truck tailgates to dislodge material during filling operations) to ensure noise levels are kept to a minimum.

Potential negative effect on noise and vibration levels within the local study area and surrounding lands is expected to last for the duration of the project construction phase only. No long-term impacts would occur.

5.1.4 Existing Surface Drainage and Groundwater Seepage

There are no impacts on existing surface drainage and groundwater seepage expected in the regional study area. The potential negative effects on existing surface drainage are expected to be minor and within the construction access and staging areas in the local study area. Where existing drainage paths cannot be maintained, mitigation may include the following:

- Minimizing vegetation removal and soil exposure during site preparation; and

- Sediment and erosion control measures (e.g., installing and maintaining a sediment fence along the construction access and/or staging area boundaries) as per the TRCA's Erosion and Sediment Control Guidelines for Construction.

Post-implementation restoration of disturbed areas to pre-construction condition is expected to fully mitigate the impact. No permanent adverse effects are anticipated.

5.1.5 Littoral Drift

The potential effect of the proposed sediment control structures on littoral transport in the regional study area is expected to be neutral. In the local study area, while the proposed breakwaters are anticipated to prevent sediment deposition in Coatsworth Cut, sediment deposition would continue in deep areas immediately outside of those enclosed by proposed breakwaters and no disruptions in the overall sediment transport patterns are anticipated (see Section 4.3.3.1 [Physical Environment]).

5.1.6 Wave Climate

Proposed sediment control structures are anticipated to have no impacts on wave climate in the regional study area as well as most of the local study area, based on the coastal modeling results for the Preferred Alternative (Section 4.4.1 [General Description]). Within the area enclosed between the primary west breakwater and Ashbridge's Bay Park landform, minor changes in wave conditions are anticipated. A potential for slightly calmer wave conditions in this area exists that may benefit recreational boaters. In addition, the side slopes of the breakwater structures will be designed to reduce wave reflection. The overall effect on wave climate is considered to be neutral.

5.1.7 Water Quality

In the regional study area, no effects on the water quality are anticipated, as per the water quality modeling results discussed in Section 3.2.17 [Water Quality]. In the local study area, there is a potential for localized negative impacts over the course of the proposed works construction. Construction-related effects are temporary and no residual impacts are expected. Once the sediment control structures are in place, the potential for improved water quality conditions exists.

Construction phase impacts may include oil and/or fuel spills as well as increases in turbidity as a result of sediment run-off and lake-filling activities. Impact prevention and mitigation measures may include the following:

- Sediment and erosion control measures, as per TRCA's Erosion and Sediment Control Guidelines for Construction;
- Minimal vegetation removal where possible;
- Regular construction equipment inspections and spill prevention and control measures (e.g., spill response procedures, spill kits);
- Ensure that all materials to be used as lakefill meet appropriate standards, as per the MOE Fill Quality Guide;
- Follow the best management practices outlined in TRCA's Lakefill Quality Control Program;
- Fill during defined calm periods;
- Follow the applicable DFO Measures to Avoid Causing Harm to Fish and Fish Habitat (e.g., worksite isolation to contain suspended sediment);
- Develop and implement turbidity monitoring program as well as contingency procedures in the event of silt release or significant increase in turbidity; and
- Develop and implement a comprehensive water quality monitoring program to ensure no adverse impacts on local water-based recreational activities.

Post-construction site restoration is anticipated to ensure that no residual impacts occur. Further, the preferred alternative has the potential to improve water quality conditions in the local study area. As described in Section 4.3.3.1 [Physical Environment], the preferred alternative is predicted to result in lower *E. coli* levels in areas most frequently used for water-based recreation.

The potential for a positive long-term effect on the local water quality has been deemed to outweigh negative construction-related impacts, thus resulting in an overall positive effect on water quality.

5.1.8 Soil/Fill Quality

No effects on soil/fill quality in the regional study area are anticipated. Likewise, soil/fill quality in the local study area is not expected to be affected. MOE Fill Quality Guide and Good Management Practices and TRCA's Lakefill Quality Control Program will be followed to ensure the quality of incoming lake-fill material needed for the construction of the remedial works meets appropriate standards. Off-site soil removal is not anticipated, but, if required, the Provincial Residential/parkland Soil Quality Guidelines will be followed and an appropriate disposal method will be selected.

Potential effects on soil resulting from equipment oil or fuel spill will be minimized via the following mitigation measures:

- Regular equipment inspections to ensure no fuel spills compromising soil/fill quality occur; and
- On-site fuel/oil spill kits and appropriate spill response procedures.

Overall, no residual impacts are expected.

5.1.9 Contaminated Soils/Sediments/Seeps

No known contaminated soils, sediments or seeps are found in the local study area. In the project regional study area, no potential effects on contaminated soils, sediments or seeps are expected to occur.

On-shore earthwork associated with construction access and staging area preparation (e.g., grading) is expected to be minor, and surficial sediment removal for breakwater construction is anticipated to be limited as well. MOE Fill Quality Guide and Good Management Practices, MOE Guidelines for Dredging and Dredged Material Disposal as well as TRCA's Lakefill Quality Control Program will be followed in order to prevent potential negative impacts on the receiving environment or local soils and sediments.

5.1.10 Existing Transportation Routes

Minor negative impacts on the existing transportation routes may occur within the project local study area and lands immediately surrounding it as a result of construction activities. Impacts may include possible increase in truck traffic during peak traffic hours, temporary trail closures in TTP and Ashbridge's Bay Park, and more dust and mud on public roadways than present under ordinary conditions. Proposed mitigation measures may include, but are not limited to, the following:

- Traffic management plan to minimize impacts on vehicular, pedestrian and bicycle traffic as well as public parking at Ashbridge's Bay Park;
- Scheduling construction of the east breakwater to late Fall and Winter and purchasing all required construction materials to avoid delays that could be experienced as a result of relying on the free material sources. This strategy is expected to shorten the construction period and minimize the impact of trail closures on pedestrian traffic in Ashbridge's Bay Park;
- Timely notices of upcoming works and/or route closures as well as appropriate signage redirecting vehicular, pedestrian and/or bicycle traffic;

- Public roadways are to be kept free of excessive dust and/or mud by street sweeping and/or rumble strips or tire washing facilities for vehicles exiting construction areas; and
- Resurfacing or other repairs in areas within or immediately adjacent to construction access and staging areas will be performed, as required.

No residual impacts are anticipated following the completion of the proposed undertaking construction. In addition, the proposed undertaking provides an opportunity to expand the local trail/multi-use path network, since public access can be provided along the shoreline associated with the sediment control structures and the previously approved City of Toronto facilities.

5.2 Biological Environment

5.2.1 Wildlife/Bird Habitat

No effects on the wildlife and bird habitat within the project regional study area are anticipated. In the local study area, an overall neutral effect is expected.

During construction, the potential impacts of proposed works on wildlife and bird habitat within the local study area may result from vegetation removal, grading and other activities associated with construction site preparation (e.g., access road construction and establishment of staging area). Wildlife displacement as a result of an increase in noise and vibration from construction equipment is also likely to occur. Waterfowl, water bird and shore bird habitat impacts may include displacement of birds utilizing shoreline and waters in the vicinity of construction areas. Impact mitigation measures include, but are not limited to, the following:

- Configure access and staging areas to ensure minimal vegetation removal and grading, where possible;
- Conform to migratory and breeding bird timing windows for site preparation: vegetation will not be cleared between May 1 and July 31;
- Survey all areas to be cleared prior to removing vegetation to ensure compliance with the Migratory Birds Convention Act; and
- Restore disturbed areas to pre-construction conditions using only native flora species and implementing species-specific habitat enhancements. For example, incorporate basking and nesting areas, shelter and hibernacula in order to mitigate reptile habitat disturbance.

Once construction is completed, habitat restoration is expected to mitigate terrestrial wildlife/bird habitat impacts and no long term adverse effects are anticipated. Ashbridges Bay, Coatsworth Cut and the area enclosed by breakwaters are expected to continue providing overwintering habitat for waterfowl and water birds. Breakwater structures are anticipated to serve as loafing habitat for water and shore birds and as minor foraging habitat for semi-aquatic mammals such as mink. Finally, an opportunity to create Common Tern nesting habitat on central and west breakwaters exists and will be explored in detailed design.

5.2.2 Significant Vegetation Communities

The proposed remedial works are not expected to have any effects on the significant vegetation communities in the regional study area.

In the local study area, the potential effects of construction activities on the significant vegetation communities are expected to be slightly negative. As discussed in Section 3.3.6.1 [Terrestrial and Riparian Vegetation], an L2-ranked Willow Shrub Beach vegetation community exists along the shoreline south of ABTP. Vegetation removal required to establish shoreline access will likely involve removing a small portion of this community. To mitigate the potential negative impact, shoreline access and construction staging areas will be designed to minimize disturbance to this community. Once construction is complete, site restoration would ensure no long-term adverse effects.

5.2.3 Fish and Fish Habitat

Fish and fish habitat in the regional study area are not expected to be impacted. The proposed undertaking is expected to cause a number of impacts on the local fish and fish habitat. During construction, increases in noise and vibration levels as well as localized increases in turbidity due to lake-filling and/or sediment run-off will be mitigated using best environmental management practices. Fish habitat loss as a result of lake-filling is expected to be off-set via on-site and off-site compensation.

The environmental management practices that will be employed during construction are outlined in TRCA's Erosion and Sediment Control Guidelines for Construction and TRCA's Lakefill Quality Control Program. Other guidelines to be used include DFO's Measures to Avoid Causing Harm to Fish and Fish Habitat. Potential impacts to fish and fish habitat will also be considered in developing water quality impact prevention and mitigation measures such as the turbidity monitoring program.

To off-set fish habitat loss associated with lake-filling, shoreline improvement techniques will be integrated into the Preferred Alternative detailed design. Submerged shoals and off-shore reefs may be incorporated in areas exposed to more intense wave action and large woody debris may be used in more sheltered areas. In addition to providing vertical relief to the lake bottom and diversifying existing substrate, the structures would provide refuge and foraging habitat for a variety of fish species utilizing the area.

To ensure full compensation, several opportunities for fish habitat creation and restoration along the Toronto waterfront have been identified. TTP Cell 2 coastal wetland creation and North Shore Park shoreline (Outer Harbour) rehabilitation are the two projects identified as potential offsetting opportunities.

In the detailed design stage the proposed works would be incorporated with the previously approved City of Toronto facilities, thus allowing examination of the cumulative impacts of all projects on the local fisheries and fish habitat. Fish habitat loss will be quantified in the detailed design stage for the Ashbridges Bay landform as a whole and a comprehensive compensation plan will be developed in consultation with the Department of Fisheries and Oceans, Ministry of Natural Resources and City of Toronto.

5.2.4 Species of Concern

In the project regional study area, no impacts on species of concern are anticipated. Potential negative effects on the species of concern present in the local study area are primarily attributed to construction activities.

Species of concern recorded in the local study area include American Eel, a fish species classified as "Endangered" provincially, and a number of L3 and L4 ranked flora and fauna species, as discussed in Section 3.3.9 [Species of Concern].

American Eel was caught in Ashbridge's Bay Yacht Club marina in 1993 and has not been detected since, making the 1993 record an isolated occurrence. While American Eel uses a variety of habitats, riparian areas as well as tributary waters are considered of particular importance (MNR 2013). Proposed sediment control structures do not present a migration barrier and are sited in the open coast environment where current fish habitat generally lacks structure and cover provided by submerged vegetation and fish abundance is typically lower than in more sheltered areas such as the ABYC marina (Section 3.3.8 [Fish and Fish Habitat]). Fish and fish habitat impacts mitigation and compensation measures discussed in Section 5.2.3 are anticipated to minimize the potential negative impacts on American Eel.

Plant species of conservation concern include River bulrush, Slender gerardia, Bebb's willow, Cut-leaved avens, Pussy willow and Three-square Silverweed (see Section 3.3.9 [Species of Concern]). Mitigation of impacts would include avoiding plant removal or transplanting plants away from the construction zone to the closest suitable area, where possible.

Bird species of concern include American woodcock and Eastern kingbird. Garter snake and Brown snake are the two reptile species of concern recorded in the local study area. Mitigation of impacts to fauna species is discussed in Section 5.2.1 [Wildlife/Bird Habitat].

5.2.5 Exotic/Alien and Invasive Species

No impacts associated with exotic/alien and invasive species are anticipated in the project regional study area.

Local study area impacts are anticipated to be slightly negative, as the proposed works would involve soil disturbance and require a relatively small amount of topsoil to be used in the cobble beach construction. These impacts are anticipated to be mitigated via utilizing topsoil from sites that are known to be free of invasive/non-native species and, in the post-construction site restoration, incorporating site-appropriate native species to prevent invasive/non-native species establishment.

5.2.6 Wildlife/Bird Population

In the regional study area no impacts to wildlife and bird populations are expected. Wildlife/bird displacement from construction areas and immediately surrounding lands is expected to occur during the proposed works construction phase. As a result, wildlife/bird population in the local study area and, possibly, adjacent areas may be affected. The displacement is due to habitat disturbance associated with shoreline access and construction staging areas establishment as well as an increase in noise and vibration levels. In order to mitigate the impacts, habitat disturbance will be minimized utilizing the measures discussed in Section 5.2.1 [Wildlife/Bird Habitat]. The preferred alternative has the potential to accommodate Common Tern nesting habitat, which will be explored in detailed design as an additional measure of mitigating bird population impact.

In addition to the general habitat impact mitigation, measures specific to reptiles may be implemented to reduce potential negative effects on snakes. If construction involving disturbance to existing terrestrial habitat overlaps with snake hibernation period, mitigation measures may involve constructing a hibernaculum outside of the construction zone to relocate any hibernating animals discovered within the construction zone. If construction takes place when animals are active, site inspections by qualified personnel may be performed to capture and relocate any snakes found within the construction zone to undisturbed areas prior to construction activities starting. Other mitigation measures may include erecting a reptile-proof fence around the construction zone(s) in areas where high numbers of reptiles are likely to occur.

Overall, mitigation measures discussed above as well as the post-construction site restoration and habitat creation would ensure that no long-term adverse effects on wildlife/bird population occur.

5.3 Cultural Environment

5.3.1 Recreational or Tourist Uses of Existing Shoreline Access

In the project regional study area, no effects on existing Lake Ontario shoreline access are expected. In the local study area, potential impacts include restricted land access to TTP shoreline in the vicinity of construction access and staging areas during the west breakwaters construction as well as to some portions of Ashbridge's Bay Park during east breakwater construction. In addition to issuing timely notices of works and providing appropriate signage, the potential impact mitigation measures include provision of alternative access routes, where possible.

Furthermore, eastern breakwater construction is proposed to be scheduled during the off-season (late Fall-Winter) in order to minimize disturbance to Ashbridge's Bay Park visitors. Public boat launch located on the east side of Coatsworth Cut or any of the private shoreline access routes used by the local recreational boating and social clubs are not expected to be affected.

Once construction is completed, public access could be available along the shoreline associated with the breakwaters and the previously approved City of Toronto facilities, thus expanding the existing land-based shoreline access. Due to the elimination of existing navigation issues, water-based shoreline access is anticipated to be improved. With the mitigation measures of construction-related impacts in place, the effect of proposed works on existing shoreline access is anticipated to be positive.

5.3.2 Aesthetic or Scenic Landscapes or Views

No impacts on existing scenic landscapes and views are anticipated in the regional study area.

In the local study area, negative impacts associated with the construction activities such as construction equipment presence/operation, vegetation removal and shoreline access restrictions are likely. The aesthetic value associated with vegetation loss would be re-established following post-construction restoration.

In the long term, no scenic lake views obstructions are anticipated from anywhere along the local study area shoreline as the proposed sediment control structures have a low profile. However, minor negative impact on the local study area aesthetics is expected during the ABTP seawall gate bypass events, when there could be undesirable odor or materials discharged in the channel created by the primary and secondary west breakwaters. This impact has been deemed acceptable due to the potential benefits on water quality provided by the Preferred Alternative (see Section 4.3.3.1 [Physical Environment] for more information).

5.4 Socio-Economic Environment

5.4.1 Surrounding Neighbourhood or Community

Neighbourhoods and communities in the regional study are not expected to be impacted. The surrounding community in the local study area may be affected via a potential increase in noise and vibration levels, a potential increase in truck traffic in areas immediately surrounding the construction site during peak traffic hours, shoreline access restrictions and trail closures, impacts on the local area aesthetics, and potential impacts on water quality, navigation and recreational boating activities. These impacts are attributed to construction activities associated with the proposed works. Details and mitigation measures are discussed in the following report sections: 5.1.3 [Noise Levels and Vibration], 5.1.7 [Water Quality], 5.1.10 [Existing Transportation Routes]5.3.1 [Recreational or Tourist Uses of Existing Shoreline Access], 5.3.2 [Aesthetic or Scenic Landscapes or Views], 5.4.2 [Navigation], and 5.4.3 [Recreational Boating Activities].

Once the construction is complete and disturbed areas are restored, an overall positive effect on the local community is anticipated. The long-term positive effect is primarily due to the elimination of navigation hazards in Coatsworth Cut channel, the potential to provide of public access along the shoreline (currently no public access along the shoreline south of ABTP exists), and potential positive impact on water quality in Ashbridges Bay.

5.4.2 Navigation

Proposed sediment control structures are expected to prevent sediment deposition in the Coatsworth Cut channel, thus eliminating navigation hazards and the need for maintenance dredging. As described in Section 4.3.3.5 [Technical Considerations], once implemented, the proposed sediment control solution would ensure over 20 years of maintenance-free (i.e., dredge-free) navigation. In addition, installation of permanent navigation markers along/on the east and primary west breakwaters will be considered in detailed design or as prescribed by applicable regulations.

5.4.3 Recreational Boating Activities

There are no impacts expected to recreational boating activities in the regional study area. In the local study area minor negative effects on the recreational boating activities during the proposed sediment control structures construction are expected due to access restrictions that will need to be put in place in the waterlot south of ABTP during construction. As the proposed sediment control structures construction progresses in conjunction with other previously approved City of Toronto facilities, the amount of open water immediately south of ABTP will decrease and access to open waters of Lake Ontario from Coatsworth Cut will take more time.

Once implemented, the proposed sediment control solution is expected to affect recreational boating activities in several ways. In particular, travel time to the open water of Lake Ontario from Coatsworth Cut would increase. The implementation of the previously approved City of Toronto infrastructure in the waterlot south of ABTP will also make this area (which has traditionally been used by sailing school programs) no longer available for use by the local boat clubs. Although it is not specifically the remedial works associated with this EA that would result in the loss of this area, the erosion and sediment control structures will be integrated with the previously approved City of Toronto facilities that will transform the waterlot. At the same time, navigation hazards and disruptions associated with maintenance dredging in the Coastworth Cut navigation channel will be eliminated and a positive impact on water quality is likely to result from the implementation of the sediment control structures. Highly positive impact on navigation together with the potential for a positive impact on water quality have been deemed to outweigh potential negative effects associated with an increase in travel time to open water. Overall, a positive impact on the recreational boating activities in the local study area is anticipated.

5.5 Engineering/Technical Considerations

5.5.1 Slope Stability

Slope stability in the regional study area is not expected to be affected as the proposed construction activities are limited to the local study area.

In the local study area, slope of the shoreline within the proposed construction and/or construction staging areas (see Figure 4-32) may become unstable during construction. For example, a large storm event at the time of shoreline work may compromise the stability of the shoreline slope. To mitigate this risk, shoreline work has been recommended to be conducted during the defined calm periods. With the mitigation measures in place, no long-term adverse effects on shoreline slope stability are anticipated.

6 PUBLIC CONSULTATION

This section of the Environmental Study Report provides a summary of the consultation undertaken as part of the Ashbridges Bay Erosion and Sediment Control Class Environmental Assessment. For the detailed account of key comments received during the EA, including impacts these comments made on decisions moving forward, please see Appendix J.

Recognizing the need for accountability to the public and stakeholders, TRCA and City of Toronto worked together to identify potential project stakeholders in the study area. The stakeholder list was used to inform: distribution of the Notice of Intent, membership on both the Steering Committee and the Community Liaison Committee (CLC), and distribution of notices for Public Information Centers (PICs). TRCA contracted the services of a professional facilitator (Swerhun Facilitation and Decision Support) to assist with both the CLC meetings and PICs.

6.1 Public Outreach

In order to reach out to as many interested persons, groups and organizations as possible, City of Toronto and TRCA made project information available on their respective websites: http://www.toronto.ca and www.trca.on.ca/ashbridgesbayproject_ea. The information provided included project overview, study area map, notice of project commencement, PIC notices, PIC panels and PIC comment forms. The websites were updated at key project stages to inform the public of the study status.

6.2 Public and Agency Notification

As per the Class EA requirements, public notices were issued for the project commencement and to advertise the PICs. Details of the Notice of Intent publication follow in Section 6.2.2 [Notice of Intent]. Details of the PIC notices are provided in Section 6.4 [Public Information Centres].

Notice of Filing Document for Review will be sent to all stakeholders that received the project Notice of Intent once the ESR is filed and placed on public record for a 30 day review period. This notice will also be published in the local press. As necessary to address comments and/or changes to the ESR, a Notice of Filing for Addendum will be issued in the same manner as the Notice of Filing. The final notices to be issued to all those who expressed an interest in the study are the Notice of Project Approval and the Notice of Completion (Conservation Ontario, 2002, amended in 2013).

6.2.1 Project Initiation

In April 2012, Toronto City Council approved a motion to direct Toronto Water to enter into a joint initiative with TRCA to undertake an EA Study at Ashbridges Bay and further that TRCA be requested to lead the EA in collaboration with Toronto Water; Parks, Forestry and Recreation Division; and Waterfront Toronto, subject to available funding from the City of Toronto. In response to this, TRCA, in partnership with the City of Toronto, has commenced their Conservation Ontario Class EA to address the outstanding erosion and sediment issues at Ashbridges Bay in order to develop a solution to resolve the on-going navigation hazards created by sediment deposition in Coatsworth Cut, while taking into consideration the various approved EAs and proposed facilities in the area and the objectives of other planning initiatives in the local study area.

6.2.2 Notice of Intent

In accordance with the Class EA process, the first point of public contact occurred when the project Notice of Intent (Appendix J) was published in the Beach Mirror newspaper on May 2, 2013. The Notice was also sent to the following:

Organizations with a potential interest in the project:

- Ashbridge's Bay Yacht Club
- Balmy Beach Canoe Club
- Council of Commodores
- Friends of the Spit
- Greater Beach Neighbourhood
- Greening Ward 32
- Navy League of Canada
- Portlands Action Committee
- South Riverdale Health Centre
- Toronto Beaches Lions Club
- Toronto Field Naturalists
- Toronto Hydroplane & Sailing Club
- Toronto Ornithological Club

Aboriginal and Métis communities:

- Beausoleil First Nation
- Chippewas of Georgina Island First Nation
- Chippewas of Rama-Mnjikaning First Nation
- Conseil de la Nation Huronne-Wendat
- Coordinator of the Williams Treaty First Nations
- Curve Lake First Nation
- Haudenosaunee Confederacy Chiefs Council via Haudenosaunee Development Institute
- Hiawatha First Nation
- Kawartha Nishnawbe First Nation
- Metis Nation of Ontario
- Mississaugas of Alderville First Nation
- Mississaugas of the New Credit First Nation
- Mississaugas of Scugog Island First Nation
- Moose Deer Point First Nation
- Six Nations of the Grand River

Review Agencies:

- Aboriginal Affairs and Northern Development Canada
- Canadian Environmental Assessment Agency
- City of Toronto, various departments with interest in the project
- Conservation Ontario
- Department of Fisheries and Oceans
- Environment Canada
- Ministries of Citizenship and Immigration, Tourism and Culture
- Ministry of Culture
- Ministry of Education
- Ministry of Energy and Infrastructure
- Ministry of Environment
- Ministry of Health and Long-Term Care
- Ministry of Health Promotion

- Ministry of Infrastructure
- Ministry of Municipal Affairs & Housing
- Ministry of Natural Resources
- Ministry of Transportation
- Transport Canada
- Toronto and Region Conservation Authority, staff with interest in the project
- Toronto Port Authority

Politicians:

City of Toronto

- Mary-Margaret McMahon, Councillor, Ward 32 (Beaches-East York)
- Paula Fletcher, Councillor, Ward 30 (Toronto Danforth)

Province of Ontario

- Michael Prue, MPP, Beaches-East York
- Peter Tabuns, MPP, Toronto Danforth

Government of Canada

- Matthew Kellway, MP, Beaches-East York
- Craig Scott, MP, Toronto Danforth

6.3 Community Liaison Committee

According to the Class EA process, a Community Liaison Committee (CLC) was formed subsequently to publishing the project Notice of Intent. The primary CLC function is to assist TRCA and City of Toronto in reaching out to and maintaining contact with the local community residents, organizations and other groups and individuals with an interest in this undertaking.

There were three CLC meetings held over the course of the project. Summaries of CLC meetings are provided in Sections 6.3.2 to 6.3.4.

The following organizations were invited to participate on the CLC:

- Ashbridge's Bay Yacht Club
- Balmy Beach Canoe Club
- Council of Commodores
- Friends of the Spit
- Greater Beach Neighbourhood
- Greening Ward 32
- Navy League of Canada
- Portlands Action Committee
- South Riverdale Health Centre
- Toronto Beaches Lions Club
- Toronto Field Naturalists
- Toronto Hydroplane & Sailing Club
- Toronto Ornithological Club

The following organizations agreed to assign representatives to participate in the CLC:

- Ashbridge's Bay Yacht Club
- Balmy Beach Canoe Club
- Friends of the Spit
- Greening Ward 32 (attended one meeting only and then withdrew member)
- Navy League of Canada
- Toronto Beaches Lions Club
- Toronto Field Naturalists
- Toronto Hydroplane & Sailing Club
- Toronto Ornithological Club

In addition to the members of organizations listed above, a representative from the ABTP Neighbourhood Liaison Committee participated as an observer in CLC meetings #2 and #3.

Finally, study information and invitations to attend CLC meetings were sent to City Councillors, MPs and MPPs for each of the following wards and ridings:

- Councillor, Ward 32 (Beaches-East York)
- Councillor, Ward 30 (Toronto Danforth)
- MPP, Beaches-East York
- MPP, Toronto Danforth
- MP, Beaches-East York
- MP, Toronto Danforth

6.3.1 Role of the Community Liaison Committee

As stated in the Conservation Ontario's Class Environmental Assessment for Remedial Flood and Erosion Control Projects (2002, amended 2013),

"In an effort to facilitate more on-going public involvement at the project level, the Conservation Authority shall, based on its contact group mailing list and expressions of interest from interested persons, Aboriginal Communities or agencies, establish a Community Liaison Committee to assist the Conservation Authority by obtaining additional public input concerning the planning and design process of an individual flood and/or erosion control project, and to review information and provide input to the Conservation Authority throughout the process. The Conservation Authority shall strive to ensure that the membership of the Community Liaison Committee is representative of all views respecting a proposed remedial flood and erosion control project."

As the name implies, the function of the project CLC in the Class EA process is to assist the Conservation Authority and the City of Toronto in reaching out to and maintain contact with interested persons. In addition, CLC provides direct input to the study process. At the end of the study, the committee will have been exposed to the entire process, understood how decisions were made and had their questions answered.

A Terms of Reference for the Ashbridges Bay Erosion and Sediment Control Class EA CLC was created (Appendix J) which contained the study background information and identified the following as key CLC member roles:

- Identify public/stakeholder issues and positions related to the impact and design of the project

- Offer potential advice or solutions to resolve these issues
- Assist TRCA and the City in reaching out to and maintaining communication with community residents, local groups, associations, and organizations that share an interest in Ashbridges Bay and the project, including helping to share information with their represented organization
- Attend and assist at the Public Information Centre meetings organized by TRCA and the City of Toronto to assist in providing information to the public along with receiving their feedback.

6.3.2 Community Liaison Committee Meeting #1

The first meeting of the CLC was held on May 15, 2013 at the Beaches Lions Club, 10 Ashbridges Bay Park Road, Toronto from 6:30 to 8:30pm. The meeting was attended by 13 members of the CLC and several TRCA, City of Toronto, Shoreplan Engineering and Swerhun Facilitation staff.

The purpose of this meeting was to present the background of the Ashbridges Bay Erosion and Sediment Control Class EA project and provide an opportunity for the CLC members to give feedback on the preliminary alternatives evaluation criteria.

Summary of input received from attendees is as follows:

- Members suggested additions and amendments to the draft evaluation criteria for the sediment control alternatives, including: specifying impacts to birds in the natural environment criteria; integrating the consideration of not only negative impacts but also those that are potentially positive impacts for all evaluation criteria; and correcting the technical considerations to include meeting federal navigation regulations.
- Members suggested that a true cost benefit analysis of providing viable navigable waters in the area should be undertaken to detail the socio-economic considerations for this project.
- Members wanted to understand why this third attempt at resolving the sedimentation issue would succeed when the previous two attempts had failed. Toronto Region Conservation Authority (TRCA) cited that the completion and more comprehensive understanding of related, nearby projects and planning initiatives along with the refinement of the project scope to not include the relocation of the boat clubs (which was cost prohibitive in 2009) will both be factors in ensuring this issue is addressed. Essentially this EA project is looking at going ‘back to basics’ to focus on erosion and sediment control in the area. The City of Toronto (Toronto Water) is also focused on implementing two approved projects that involve lakefilling and shoreline reconfiguration in this area (a treatment facility and treatment wetland) and the completion of the Class EA to deal with erosion and sediment control issues is the remaining study needed to ensure an integrated detailed design approach can be undertaken for the area.
- Updated maps of the study area that show all the current clubs in Ashbridges Bay/Coatsworth Cut and recent changes/additions such as docks were requested by members.
- The northern section of Coatsworth Cut is experiencing an increase in sandbars and members sought clarity on whether this issue would be considered in this Class EA process.
- With erosion from Scarborough Bluffs a continuing issue and concern in terms of contribution to sediment build up, members wanted to understand how plans to prevent such erosion were linked to this Class EA.

Detailed documentation of this meeting, all comments received and follow up undertaken are documented in Appendix J.

Meeting minutes, including summary of comments, were circulated to the CLC members following this meeting to ensure that comments were accurately recorded and appropriately addressed. CLC members were also given an opportunity to submit written comments directly to the project team to help facilitate open dialogue between staff and the CLC members.

CLC Meeting #1 attendees included:

CLC Members:

- Susan Stuart, Balmy Beach Canoe Club
- Sarah Box, Friends of the Spit
- Scott Feltman, Greening Ward 32
- Carol McCague, Toronto Beaches Lions Club
- Sandy Gauthier, Toronto Beaches Lions Club
- Nolly Haverhoek, Toronto Beaches Lions Club
- Bob Kortright, Toronto Field Naturalists
- John Edwards, Toronto Hydroplane & Sailing Club
- Beverly Edwards, Toronto Ornithological Club
- Angus Armstrong, Toronto Port Authority
- Robert Hedley, Ashbridge’s Bay Yacht Club
- Ron Anderson, Navy League of Canada
- Rachel Lewis, Navy League of Canada

TRCA:

- Lisa Turnbull
- Nancy Gaffney
- Laura Stephenson
- Erica Dewell

City of Toronto - Toronto Water:

- Ted Bowering

Shoreplan Engineering:

- Milo Sturm

Swerhun | Facilitation & Decision Support:

- Suzannah Kinsella
- Vanessa AvRuskin

6.3.3 Community Liaison Committee Meeting #2

The second meeting of the CLC took place on September 5, 2013 at the Beaches Lions Club, 10 Ashbridges Bay Park Road, Toronto from 6:30 to 8:30pm. The meeting was attended by seven CLC members, an observer from the ABTP Neighbourhood Liaison Committee and several TRCA, City of Toronto, Shoreplan Engineering and Swerhun Facilitation staff.

The purpose of this meeting was to present an update on the work done by the project team since the first CLC meeting, including feedback from PIC #1, the updated alternatives, updated evaluation criteria and the initial coastal modeling results.

Summary of input received from attendees is as follows:

- Generally, attendees appreciated the opportunity to review and discuss the data and modeling results to date and gave favorable reviews of the presentation given.
- Some participants were strongly opposed to including a terminus on the breakwater in any of the design alternatives which was perceived as facilitating a bridge across Ashbridges Bay. Participants expressed that this is not desired, and should not be included in any of the alternatives.

Detailed documentation of this meeting, all comments received and follow up undertaken are documented in Appendix J.

Similar to the first CLC meeting, meeting minutes, including summarized comments, were circulated to the CLC members following the meeting to ensure that comments were accurately recorded and appropriately addressed. CLC members were also given an opportunity to submit written comments directly to the project team.

CLC Meeting #2 Attendees included:

CLC Members:

- Susan Stuart, Balmy Beach Canoe Club
- Sarah Box, Friends of the Spit
- Nolly Haverhoek, Toronto Beaches Lions Club
- John Edwards, Toronto Hydroplane & Sailing Club
- Beverly Edwards, Toronto Ornithological Club
- Robert Hedley, Ashbridge's Bay Yacht Club
- Rachel Lewis, Navy League of Canada

Observers:

- Michael Rosenberg, ABTP Neighbourhood Liaison Committee

TRCA:

- Lisa Turnbull
- Nancy Gaffney
- Laura Stephenson

City of Toronto - Toronto Water:

- Philip Cheung

Shoreplan Engineering:

- Milo Sturm

Swerhun | Facilitation & Decision Support:

- Suzannah Kinsella
- Bianca Wylie

6.3.4 Community Liaison Committee Meeting #3

The third meeting of the CLC was held on November 29, 2013 at the Ashbridge's Bay Yacht Club, 30 Ashbridges Bay Park Road, Toronto from 6:30 to 8:30pm. The meeting was attended by eight CLC members, an observer from the ABTP Neighbourhood Liaison Committee, and several TRCA, City of Toronto, Shoreplan Engineering and Swerhun Facilitation staff.

The purpose of this meeting was to present an update on the work done by the project team since the second CLC meeting, including an overview of the water quality modeling results, and review the baseline environmental inventory report and the preliminary alternatives evaluation results.

The key input received from the CLC members included the following:

- The project rationale should be explicit that navigation is to be made safer for all types of watercraft that use the Bay (small, non-motorized sail boats, large sailboats, canoes/kayaks/paddle boards and motor boats) and that each of these types of watercraft have different needs in terms of safe navigation.
- It is important to consider how the decommissioning of the seawall gate and storm sewer outfalls would affect the evaluation of alternatives. The change in water quality resulting from decommission would present a very different scenario which would significantly change the evaluation of the alternatives. Under this future scenario, Alternative 1 would become preferred rather than Alternative 3.
- To aid people in quickly assessing which alternative is preferred and how it differs from the other two, create a list that shows which criteria Alternative 3 came out ahead of Alternatives 1 and 2, and which criteria Alternatives 1 and 2 came ahead of Alternative 3.

Detailed documentation of this meeting, all comments received and follow up undertaken are documented in Appendix J.

Similarly to the first and second CLC meetings, meeting minutes, including summarized comments, were circulated to CLC members following the meeting to ensure that comments were accurately recorded and appropriately addressed. CLC members were also given an opportunity to submit written comments directly to the project team.

CLC Meeting #3 attendees included:

CLC Members:

- Ron Anderson, Navy League of Canada
- Don Bland, Toronto Hydroplane & Sailing Club
- Beverly Edwards, Toronto Ornithological Club
- John Edwards, Toronto Hydroplane & Sailing Club
- Robert Hedley, Ashbridge's Bay Yacht Club
- Bob Kortright, Toronto Field Naturalists
- Rachel Lewis, Navy League of Canada
- Susan Stuart, Balmy Beach Canoe Club

Observers:

- Michael Rosenberg, ABTP Neighbourhood Liaison Committee

TRCA:

- Lisa Turnbull
- Laura Stephenson
- Maria Zintchenko

City of Toronto - Toronto Water:

- Philip Cheung
- Bill Snodgrass

Shoreplan Engineering:

- Milo Sturm

Swerhun | Facilitation & Decision Support:

- Suzannah Kinsella
- Alex Health

6.3.5 Review of the Draft Environmental Study Report

The draft ESR report was electronically circulated to the project CLC members on September 18, 2014 (see Appendix J for the electronic notification). CLC members were given 3 weeks to review the document and submit comments (deadline was October 9, 2014). Staff followed up via phone and email to ensure that the document was received by each member.

No comments on the draft ESR were received. A number of members expressed via phone and one via e-mail (see Appendix J) that they felt that their comments were already addressed through the EA consultation process.

6.4 Public Information Centres

In compliance with the Class EA process, two Public Information Centres (PICs) were held to facilitate public participation in the project. These public meetings provided opportunities for the community to be made aware of the project and provide feedback as the study progressed. Both PICs were advertised in the Beach Mirror newspaper two weeks prior to the meeting and notices were sent to project stakeholders (CLC members, politicians and others who expressed an interest in the project) electronically.

Comment forms (workbooks) were distributed by the project team at each PIC to encourage public participation in the project and solicit public feedback on the information presented. Written comments ensured that suggestions and concerns were investigated and addressed, facilitating open dialogue between the project team and the public.

6.4.1 Public Information Centre #1

The first of two PICs was held on June 17, 2013 at the Toronto Fire Academy, 895 Eastern Avenue, Toronto from 6:30 to 8:30 pm. Notice for the meeting (Appendix J) was published in the Beaches Mirror on June 6, 2013. The meeting had an open house format and allowed attendees to review the information presented via display panels and discuss the project in detail with the available project team members (TRCA, City of Toronto and Shoreplan Engineering staff). The event was attended by six members of the public, one member of the City Council, two Steering Committee members, four Community Liaison

Committee members as well as several TRCA, City of Toronto, Shoreplan Engineering and Swerhun Facilitation staff.

The purpose of this PIC was to allow attendees to gain an understanding of the project and the potential solutions to the sediment deposition problem, and provide input on the solutions considered as well as the evaluation criteria to be used to assess the alternatives.

The display panels presented project objectives and background information, existing conditions, descriptions and images of the preliminary alternatives and the draft alternatives evaluation criteria.

Comment forms (workbooks) were distributed to attendees to inform and encourage input. The workbook was subsequently posted on the project website to allow members of the public not in attendance to provide comments. TRCA received one completed workbook.

The key input received from attendees verbally and in writing included the following:

- Comments and questions regarding the alternatives:
  - 1A and 2A will negatively impact dingy and small sailing craft training west of ABYC harbor as these alternatives will restrict or eliminate space used for training by ABYC
  - Alternative 2A and watercraft traffic: Want sufficient space where two breakwaters are close together. Otherwise, may create boat traffic bottleneck there, particularly in the summer season.
  - Alternative 2A vs. 1A: 2A provides for more length, but less space for various club members to navigate around each other. 1A provides for space and is thus safer for users.
  - Perhaps consideration could be given to reconfiguring points of park headlands to allow for more space
  - Which side of the sea gates will the alternative be sited?
  - What impact would the alternative have on a connection with Tommy Thompson Park?
  - Hopes were expressed that the alternative could enable improved water circulation in the cut, a benefit for both sailors and canoeists
- There was interest in how the EA process might improve the situation for canoeists in Coatsworth Cut: for example, dredging a larger area for the canoe club and potentially using Toronto Water's treatment wetland as a place to shelter canoes.
- There was concern expressed that in most Environmental Assessments the method of evaluating/scoring does not allow for comparison between each alternative. There needs to be a range of scoring that is significant enough to account for the range in impacts. Simple words like 'major' and 'minor' impacts should not be used to describe the evaluation criteria and results. The evaluation needs to be quantifiable.

The documentation of this meeting, including the summary of feedback received and follow up undertaken, is provided in Appendix J.

6.4.2 Public Information Centre #2

The second of the two PICs was held on February 6, 2014 at the Fire Academy, 895 Eastern Avenue, Toronto from 6:30 to 8:30 pm. PIC #2 notice (Appendix J) was published in Beach Mirror newspaper prior to the meeting. Similar to the first PIC, the meeting had an open house format and allowed attendees to review the information presented on display panels and discuss the project with the available project team members. The meeting was attended by eight members of the public, one member of City Council, one Steering Committee member and four Community Liaison Committee members.

The display panels contained the project overview, description of remedial alternatives, summary of the coastal and water quality modelling results, the preliminary alternatives evaluation results, and the description of the preliminary preferred alternative.

Attendees were provided a comment form and encouraged to submit feedback. The comment form was subsequently posted on the project website to allow for members of the general public not in attendance to provide comments.

The key input received from attendees included the following:

- The majority of PIC attendees agreed with evaluation and the preliminary preferred alternative. One of the key elements of this support is the potential for the preliminary preferred alternative to provide positive water quality impacts in the recreational boating areas.
- Members of boat clubs located within Coatsworth Cut and Ashbridges Bay continued to request that TRCA and the City of Toronto consider dredging beyond the navigation channel to address other problem areas in Ashbridges Bay and provide safe navigation for all Bay users (motorized and non-motorized).
- Concerns were raised following the PIC on the potential impacts to the Ashbridge's Bay Yacht Club's Sailing Program due to the loss of areas that have traditionally been used for the program (in front of the Ashbridges Bay Wastewater Treatment Plant) and an increase in travel time to the open waters of Lake Ontario that would be experienced if sediment control breakwaters are implemented.
- Boat club stakeholders requested that the project team continue to work collaboratively to ensure that the final engineering design of the breakwaters and other approved City of Toronto facilities maximizes the size of the area what will become the new basin (space between the proposed primary west breakwater and the existing land base of Ashbridge's Bay Park).

The documentation of this meeting, including the summary of feedback received and the meeting attendee list is provided in Appendix J. Documentation of all comments received and follow up undertaken is also included in Appendix J.

6.5 Agency Consultation

In addition to the correspondence that was sent for the initiation of the study (see Section 6.2 [Public and Agency Notification]), a presentation was given to the Aquatic Habitat Toronto (AHT) on December 5, 2013. AHT represents a consensus based partnership between agencies with a vested interest in the improvement of aquatic habitat on the Toronto Waterfront. Partners include Fisheries and Oceans Canada, Ministry of Natural Resources, Toronto and Region Conservation Authority and Waterfront Toronto with key participants from Environment Canada and the City of Toronto. Aquatic Habitat Toronto is responsible for the implementation of the Toronto Waterfront Aquatic Habitat Restoration Strategy (TRCA, 2007).

The purpose of the presentation was to review the remedial alternatives proposed and the overall EA progress to date, for informational purposes. Further agency consultation will be undertaken during the preferred alternative detailed design (pending EA approval), when aquatic and terrestrial habitat impacts will be examined in more detail and an appropriate offsetting/compensation and monitoring plan will be developed.

6.6 Aboriginal Consultation Activities

Prior to the delivery of any notifications, Aboriginal Affairs and Northern Development Canada (AANDC) and the Ministry of Aboriginal Affairs (MAA) were contacted for advice and information on the Aboriginal communities that should be contacted during the Aboriginal Consultation process. Additional Aboriginal community contact lists were also considered, including the lists held by the City of Toronto and TRCA. Communities that were contacted had established or asserted rights and interests in the study area, and are listed below.

- Beausoleil First Nation
- Chippewas of Georgina Island First Nation
- Chippewas of Rama-Mnjikaning First Nation
- Conseil de la Nation Huronne-Wendat
- Coordinator of the Williams Treaty First Nations
- Curve Lake First Nation
- Haudenosaunee Confederacy Chiefs Council via Haudenosaunee Development Institute
- Hiawatha First Nation
- Kawartha Nishnawbe First Nation
- Metis Nation of Ontario
- Mississaugas of Alderville First Nation
- Mississaugas of the New Credit First Nation
- Mississaugas of Scugog Island First Nation
- Moose Deer Point First Nation
- Six Nations of the Grand River

A notification letter was sent on March 28, 2013 to the identified First Nations and Métis communities to inform them of the initiation of the Ashbridges Bay Erosion and Sediment Control Project Environmental Assessment. Any interested communities were invited to contact Margie Kenedy, Archaeologist at TRCA. Enclosed with the notification letter were: a study area map, the project brief, the Stage 1 Archaeological Assessment for the Study Area, the Ministry of Tourism, Culture and Sport letter of entry into the Ontario Public Register of Reports, and the EA milestone schedule.

Few responses were received, and TRCA conducted follow up phone calls and emails on June 5, 2013 to ensure each community received the notification package, and to answer any questions that could help evaluate interest in the project. A number or communities were reached who indicated their communities had no current concerns with the project, and requested regular updates. Responses are described in Appendix J.

A second notification was sent on February 6, 2014 in order to update Aboriginal communities on the progress of the EA. This update contained information on the status of the study, and included descriptions of the alternatives being considered to solve the erosion and sediment control problem. This update also contained a draft evaluation of the alternatives, and requested that communities provide TRCA with any feedback on the material. This notification asked communities to provide information on any impacts that the proposed alternatives may have on their Constitutional and/or Treaty rights or interests in the area. Follow up phone calls were made on March 3, 2014 to ensure each community received the update, and to answer any questions.

Although direct feedback on the alternatives was not given by the communities contacted, there were a number of questions about the project answered through e-mail correspondence. For a detailed account of information circulated to Aboriginal communities along with copies of follow up correspondence, see Appendix J.

A third notification was sent on September 22, 2014 in order to provide communities with an opportunity to review the Draft Environmental Study Report prior to filing with the Ministry of the Environment and Climate Change. In addition to providing a link to the draft report, the executive summary for the draft report was also included. Only the Haudenosaunee Confederacy Chiefs Council c/o Haudenosaunee Development Institute provided any comments.

The final correspondence that will be issued to the Aboriginal communities will be the Notice of Filing, which will advertise that the Environmental Study Report has been filed and placed on the public record for a 30-day review period.

6.7 Steering Committee

A Steering Committee comprised of City of Toronto, TRCA and Waterfront Toronto staff was created to help guide the EA to ensure that the study information was disseminated appropriately and that there was input from a range of departments in key partner organizations.

Steering Committee members included representation from the following:

City of Toronto

- Waterfront Secretariat
- Toronto Water
- Parks, Forestry and Recreation

TRCA

- Restoration Services
- Watershed Management

Waterfront Toronto

6.8 Additional Meetings

Two meetings with the members of the public were held in addition to the three CLC meetings and two PICs. The first was given to the ABTP Neighbourhood Liaison Committee on June 17, 2013 to inform this group that the EA was commencing and invite members to participate in PICs. The second was given to the ABYC members on February 10, 2014 to present the preliminary preferred alternative and encourage input through submission of comments via the PIC #2 comment sheet.

Comments received during and following these meetings are included in Appendix J.

7 ENVIRONMENTAL MONITORING PROGRAM

Environmental monitoring is essential to characterize and monitor the quality of the surrounding environment, identify potential negative effects and refine mitigation measures, ensure compliance with environmental regulations, and prevent long-term adverse impacts on the environment.

This section provides an overview of the key environmental monitoring efforts that will be undertaken for the Preferred Alternative. A comprehensive monitoring program will be developed in the detailed design phase for the Ashbridges Bay Landform (the Preferred Alternative combined with the previously approved City of Toronto facilities). This program will be designed to monitor impacts to the environment during the various stages of the landform construction and following construction completion. This will allow for an inclusive assessment of cumulative impacts. The key elements of the comprehensive monitoring program will include, but are not limited to, the following, described below:

- Constructed Works monitoring,
- Ongoing environmental monitoring initiatives, and
- Environmental compliance monitoring.

Constructed Works monitoring

The objective of Constructed Works monitoring is to assess the structural integrity of the structures as they are built, and their effectiveness with respect to controlling the local erosion and sediment deposition processes. The monitoring of the sediment control structures is outlined in Section 4.4.4 [Constructed Works Monitoring and Maintenance], providing the general scope of the monitoring program for the proposed structures, new and surrounding shoreline and bathymetry associated with the implementation of the Preferred Alternative.

Construction-phase and post-construction monitoring may include recording of the survey of waterline position, bathymetry, photographic record of the constructed works, and a review of constructed works by a qualified engineer. Construction-phase monitoring may also include ongoing monitoring of turbidity at the active fill face (part of compliance monitoring described below). Additional bathymetry surveys may be undertaken on an annual basis or as deemed appropriate. Post-construction monitoring will also take into account structural maintenance requirements (see Section 0 [Preferred Alternative Description] for the full description of the Preferred Alternative). Notably, the collected data would allow monitoring changes in the new and surrounding shoreline and bathymetry.

During detailed design, the constructed works monitoring program will be refined and expanded to consider the integration of the other approved City of Toronto facilities that make up the Ashbridges Bay Landform in conjunction with the Preferred Alternative.

Ongoing environmental monitoring initiatives

Environmental monitoring initiatives already underway in the local study area (for example, surficial sediment sampling, bio-monitoring and water quality monitoring in the Lake Ontario Coastal Zone, as described in Sections 3.2.19 [Sediment Chemistry] and 3.2.17 [Water Quality]) will be assessed and could potentially be expanded if deemed appropriate.

In particular, expansion of the existing monitoring efforts currently being undertaken in the Lake Ontario Coastal Zone for *E.Coli* and Phosphorous levels (see Section 3.2.17 [Water Quality]) will be explored during the detailed design of the Ashbridges Bay Landform project in order to monitor impacts to water quality at the project site during the various stages of the landform construction as well as following construction completion.

In addition, TRCA's environmental monitoring data that is collected on an ongoing basis for Ashbridges Bay and surrounding areas will be used to assist in defining the project on- and off-site fish habitat loss compensation requirements. Fish habitat compensation determinations will be done in consultation with the Department of Fisheries and Oceans and take into account the estimates generated for the previously approved City of Toronto facilities (MMM, 2012). Fisheries monitoring data collected by TRCA may also be used to refine construction timelines with respect to fisheries timing windows and to inform proposed structures detailed design. During the detailed design process, the data may be used to help select specific shoreline improvement techniques to be integrated into the Ashbridges Bay Landform which will contribute to the required off-set for fish habitat loss. Preliminary assessments indicate that on-site fish habitat compensation will form a small part of the overall compensation required for the landform and that the majority will be implemented off-site (see Section 5.2.3 [Fish and Fish Habitat]).

Lastly, the scope of the ongoing environmental monitoring initiatives may be expanded to fulfil the requirements of the project environmental compliance monitoring, as described below.

Environmental compliance monitoring

To comply with applicable environmental regulations and permit/approval conditions, turbidity monitoring and fisheries monitoring will be undertaken as per the requirements of regulatory agencies such as the Department of Fisheries and Oceans and Ministry of Natural Resources. If, during detailed design and/or permits and approvals acquisition, additional parameters or environmental components are identified by regulatory agencies as requiring specialized monitoring, these elements will also be included in the comprehensive monitoring program associated with the project.

The turbidity monitoring program to be carried out over the course of construction will ensure that suspended sediment and turbidity resulting from construction meet the Total Particulate Matter Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME 1999, updated 2002). A comprehensive fish community monitoring program will be implemented to track the response of the local fish community to the proposed works and new habitat components. As well, specific monitoring efforts may be directed at determining the performance and function of the various components of the fish habitat compensation plan.

Monitoring data collection methods and protocols, contingency plans, and reporting procedures will be based upon monitoring programs developed for similar sediment and erosion control and/or waterfront construction projects such as the Meadowcliffe Drive Erosion Control Project (TRCA, 2010) and the Lakeview Waterfront Connection Project (SENES Consultants, 2014) and refined in consultation with the appropriate regulatory agencies.

8 COORDINATION WITH OTHER PROJECTS

All efforts have been made to ensure that the Ashbridges Bay Erosion and Sediment Control Class EA considered other project and planning initiatives in the area to ensure coordination and potential cost efficiencies.

Waterfront Toronto was engaged through the EA Steering Committee to ensure that the preferred alternative was compatible with their future plans to implement the Lake Ontario Park (LOP) Master Plan. Although a number of 'quick start' projects associated with the LOP are being currently being pursued, projects in the Ashbridges Bay area (referred to as 'The Bay' in the Plan) have not been identified to date. Waterfront Toronto will continue to be engaged in the detailed design process for the Ashbridges Bay Landform.

As a co-proponent in this Class EA process, the City of Toronto has ensured that the preferred alternative is integrated with ABTP and other WWWFMMP infrastructure planned in the local study area. See Section 3.5.3.2 [Future Infrastructure] for more information on the previously approved City of Toronto facilities.

Upon the completion of the Class EA process and pending subsequent approval of this ESR, the next step will be detailed design of the Ashbridges Bay Landform. Detailed design of the landform will include the integration of the following three elements:

1. Treatment Wetland approved as part of the Coatsworth Cut CSO and Stormwater Outfalls Control Municipal Class EA Schedule C (2007);
2. High Rate Treatment Facility approved as part of the Don River and Central Waterfront Project – Municipal Class EA Schedule C (2012); and
3. Preferred Alternative identified as part of this EA.

The detailed design process will identify a final design for the integrated landform and a more detailed implementation plan (preliminary construction phasing approach is described in Section 4.4.2.2 [Proposed Construction Phasing]). The detailed design phase will include:

- Examining public access options and further exploring the potential for establishing a connection between Tommy Thompson Park and Ashbridge's Bay Park;
- Recommending the landscape elements of the landform such as vegetation and potential amenities;
- Recommending a method of shoreline protection for the City's CSO and stormwater treatment facilities;
- Confirming on-site and off-site fish habitat compensation required for the landform as per the federal *Fisheries Act*;
- Securing the *Fisheries Act*, *Navigable Waters Protection Act* and any other necessary permits; and
- Refinement of the landform implementation budget along with construction phasing, access and staging areas with emphasis on identifying further financial and timeline efficiencies.

The public and other stakeholders will continue to be consulted during the detailed design process. The following consultation mechanisms will be used in the detailed design:

- Continued engagement and meetings of the CLC established for this Class EA study with an opportunity to expand membership, should additional stakeholders be identified;
- Public Information Centre for the general public;
- Individual meetings with stakeholders and groups in the local area and upon request; and
- Meetings with regulatory agencies and other review agencies.

9 NOTICE OF COMPLETION AND 30-DAY REVIEW PERIOD

When the Environmental Study Report is filed with the Ministry of the Environment, a Notice of Completion will be published in the Beaches Mirror. This notice will also be sent to all parties contacted in the first notification process and others who indicated an interest in the study. Copies of the report will be provided to the City of Toronto Clerk's Office, City Hall Toronto Public Library, Metro Hall and the TRCA Head Office for the public review during the 30 day review period. A copy of the Environmental Study Report will also be available online at www.trca.on.ca/ashbridgesbayproject_ea.

If a concern is raised during the 30-day review period that cannot be addressed through discussions with the TRCA and the City of Toronto, a person/party may request the Ontario Minister of the Environment to order the project to comply with Part II of the *Environmental Assessment Act*. If a Part II Order request is received, the proponent and the concerned party can work together to help resolve issues. If no resolution is achieved, the Minister of the Environment will make a decision as to whether the Part II Order request should be granted and an Individual Environmental Assessment completed.

As stated in Conservation Ontario (2002, amended in 2013), the request to issue a Part II Order must be made in writing to the Minister of the Environment or delegate and be received by the ministry within the 30 day review period following issuance of the Notice of Filing. The request should be sent to the following address:

Minister
Ministry of the Environment and Climate Change
77 Wellesley St W - Floor 11
Toronto ON M7A 2T5
Fax: 416-314-8452

At the same time, the requester shall forward a copy of the request to the Environmental Approvals Branch:

Director, Environmental Approvals Branch
Ministry of the Environment and Climate Change
2 St. Clair Ave W - Floor 12A
Toronto ON M4V 1L5
EAASIBgen@ontario.ca

and the Toronto and Region Conservation Authority:

Lisa Turnbull
Sr. Project Manager, Project Management Office
Toronto and Region Conservation Authority
5 Shoreham Drive, Downsview, ON, M3N 1S4
416-661-6600 ext. 5645
Fax: 416-667-6277
TTY: 416-338-0889

If no Part II Order requests are received during the 30-day review period, the proponent may proceed with the project. In the interest of good project management, a Notice of Study Completion shall be sent to all parties who expressed an interest in the project and to Conservation Ontario.

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GLOSSARY OF TERMS

Alternative Methods/Designs: Alternative methods of carrying out an undertaking.

Alternative Remedial Measures: Alternative ways of approaching a problem situation once it is determined that an undertaking under the Class EA is appropriate. Each type of remedial measure has a number of method/design alternatives that can be considered.

Alternative Solutions: Alternative ways of solving a documented deficiency, including the alternative of doing nothing. An assessment of alternative solutions must precede determination of alternative remedial measures and alternative methods/designs.

Aquatic Vegetation: Plants growing in the water.

Archaeological Potential: The possibility of a previously unidentified archaeological resource existing in an area is evaluated by determining the area's archaeological potential. Geographical and historical factors associated with human settlement are indicators of archaeological potential. In areas of significant archaeological potential, an archaeological assessment should be conducted to check for the existence of an archaeological resource.

Archaeological Resource: The remains of any building, structure, activity, place or cultural feature, which because of the passage of time is on or below the surface of the land or water. Significant archaeological resources are those which have been identified and evaluated and determined to be significant to the understanding of the history of a people or place.

Armour Stone: Quarried rock material that is used in the construction of shoreline or streambank protection devices. When used as shore protection it dissipates wave energy and reduces erosion.

Artificial Nourishment: The provision of additional beach material to areas where there is a deficiency in the sediment supply.

Backwater: Water moved or held back.

Bathymetry: The study of underwater depth of lake or ocean floors.

Beach: The zone of unconsolidated material that extends landward from the average annual low water level to either the place where there is marked change in material or physiographic form, the line of permanent vegetation, or the high water mark.

Berm: An embankment built around a low lying area.

Bioengineering: see "Soil Bioengineering".

Biophysical: The combination of biological and physical characteristics.

Bottom frictional dissipation: Dissipation of wave energy via bottom friction.

Breakwater: A structure protecting a shore area, harbour, anchorage, or basin from wave action.

Built Heritage Resource: One or more buildings, structures, monuments, installations, or remains associated with architectural cultural, social, political, economic or military history.

Class Environmental Assessment Document: A report documenting the EA process for a class of undertakings which is formally submitted for approval under the Environmental Assessment Act.

Once the Class EA document is approved, specific projects covered by the Class EA can be implemented by proponents without having to obtain separate approval. This is provided that the approved planning and design process is followed, and there is compliance with the Notice of Approval.

Class Environmental Assessment (EA) Process: A planning and design process used for a group of undertakings which have a generally predictable range of effects, and have relatively minor environmental significance.

Cohesive Shoreline: Many of the shorelines in the Great Lakes are cohesive shores (clay, silt, glacial till) and not sandy shorelines. At first glance they may appear to be like sandy shorelines, but the sand is usually a thin veneer and is not of significant enough thickness to provide protection. The processes along cohesive shorelines are different and it is very important to note when carrying out sediment transport studies.

Combined Sewer Outfall: discharge point of a combined sewer (sewer carrying both sanitary stormwater flows).

Conservation: The wise use and management of natural resources to maintain, restore, enhance and protect the quantity and quality of the resources for sustained benefit.

Cultural Heritage Landscape: A geographic area of heritage significance, which has been modified by human activities. Such an area is valued by a community and is of significance to the understanding of the history of a people or place.

Design Storm: A storm of a magnitude which will generate specified flows given certain conditions. This is used as a design standard for protective measures.

Dune: A nearly horizontal part of the beach, formed by the deposition of material by wind action.

Earth Science ANSI (Area of Natural or Scientific Interest): Areas designated by the Ontario Ministry of Natural Resources as containing natural features that have values related to protection, natural heritage appreciation, scientific study or education.

Ecological Land Classification: A cartographical delineation of distinct ecological areas, identified by their geology, topography, soils, vegetation, climate conditions, living species, habitats, water resources, as well as anthropic factors. Ontario's ELC is a tool for the identification, description, naming, mapping and monitoring of ecosystems.

Ecosystem: A dynamic totality comprised of interacting living and non-living components which encompasses the interacting components of sunlight, air, water, soil, plants, and animals (including humans), within the system.

Ecosystem Planning: An approach to planning that considers the interactions between all physical and biological factors.

Effluent: Outflowing of liquid.

Environment: As defined in the Environmental Assessment Act subsection 1.(1), “environment” means:

a) air, land or water,
b) plant and animal life, including human life,
c) the social, economic and cultural conditions that influence the life of humans or

community,
d) any building, structure, machine or other device or thing made by humans,
e) any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities, or
f) any part or combination of the foregoing, and the interrelationships between any two or more of them, in or of Ontario.

Environmentally Sensitive Area/Environmentally Significant Area: An area which contains significant natural features, ecosystems and/or ecological functions which warrant identification, Conservation and protection in the long term interest of the environment and the public at large.

Erosion: A term used in this document collectively referring to a) The wearing away of the land surface by running water, wind, ice or other geological agents; b) Detachment and movement of soil or rock fragments by water, wind, ice or gravity; c) Instability of a slope.

Fauna: A collective term for animal species present in an ecosystem.

Fill: Any material deposited by any agent so as to fill or partly fill a channel, valley, or other depression.

Fill Regulation: The regulation of the placing of fill by the Authority through the requirement of a proponent to obtain permission as set out under subsection 28 (1) of the Conservation Authorities Act.

Flora: The collective term for the plant species present in an ecosystem.

Gabion: A rectangular or cylindrical wire mesh cage filled with rock and used in protecting against erosion.

Gradient: Change of elevation, velocity, pressure or other characteristics per unit length; slope.

Groundwater: Subsurface water in zone of saturation.

Groyne: A shore protection structure built (usually perpendicular to the shoreline) to trap littoral drift or retard erosion. The resulting beach provides shore protection.

Groyne Field (groyne system): A series of groynes acting together to protect a section of shore.

Habitat: The place or site where an animal or plant community naturally or normally lives. The environment in which the life needs of a plant or animal organism, population, or community are supplied.

Hazardous Lands: Property or lands that could be unsafe for development due to naturally occurring processes. Along shorelines of large inland lakes, this menas the lands including that covered by water, between a defined offshore distance or depth and the furthest limit of the flooding, erosion, or dynamic beach hazard. Along river and stream systems, this mans the land, including that covered by water, to the farthest landward limit of the flooding or erosion hazard limits.

Hazardous sites: Property or lands that could be unsafe for development and site lateration due to naturally occurring hazards. These may include unstable soils (sensitive marine clays (leda), organic soils) or unstable bedrock (karst topography).

Headland: A hard structure constructed perpendicular to the shoreline, for the purpose of buildi ng or protecting a beach by trapping littoral drift.

Hydrograph: a graph showing the rate of flow (discharge) versus time past a specific point in a river, or other channel or conduit carrying flow.

Important Bird Area: An Area recognized as being globally important habitat for the conservation of bird populations.

International Great Lakes Datum 1985 (IGLD1985): The most recently revised elevation reference system used to define water levels within the Great Lakes-St. Lawrence River system.

Individual Environmental Assessment: Refers to an environmental assessment for a specific undertaking to which Part II of the Environmental Assessment Act applies and which is neither exempt nor covered by Class EA approval.

Jurisdiction: The extent of territory over which authority may be legally exercised.

L Ranking System: system of ranking and scoring species and vegetation communities to provide guidelines for natural heritage protection and management at both small and large scales developed by the Toronto and Region Conservation Authority and applied to species and vegetation communities within TRCA jurisdiction.

Lakebed Morphology: Form/shape of lake bottom.

Landform: A discernible natural landscape, such as a floodplain, stream terrace, plateau, or valley.

Life Science ANSI (Area of Natural and Scientific): Areas designated by the Ontario Ministry of Natural Resources as containing natural features that have values related to protection, natural heritage appreciation, scientific study or education.

Littoral Cell: A self-contained coastal sediment system that has no movement of sediment across its boundaries. The longshore limits are defined by natural or artificial barriers where net sediment movement changes direction or becomes zero.

Littoral Drift: The movement of sediment along a shoreline by prevailing currents and oblique waves.

Microclimate: The climatic condition of a small area resulting from the modification of the general climatic conditions.

MNR: Ontario Ministry of Natural Resources.

MOE: Ontario Ministry of the Environment.

Outfall: Point where water flows from a conduit or drain.

Part II Order: The legal mechanism whereby the status of an undertaking can be elevated from an undertaking within a Class EA to an Individual Environmental Assessment.

Pile: A long, heavy timber or section of concrete or metal to be driven into the ground or lakebed to provide support or protection.

Proponent: For the Class EA document, are the Conservation Authorities of Ontario. For a specific undertaking planned in accordance with the approved Class EA, it is the individual Conservation Authority.

Public: Includes interest groups, associations, and individuals.

Regulations: Statutory controls, enacted through legislation, for the purpose of controlling land and water use.

Regulatory Flood Standard: The approved standard(s) used to define shore land flood limits for regulatory purposes. Currently the regulatory flood standard for Southern Ontario (zone 1) is that flood produced by the Hurricane Hazel storm or the 100 year flood, whichever is greater; for northern Ontario (zone 3) it is that flood produced by the Timmins storm or the 100 year flood, whichever is greater; for Eastern Ontario (zone 2) it is the100 year flood.

Regulatory Shore Lands: Land, including that covered by water, between the international boundary and the furthest landward limit of the regulatory flood standard, the regulatory erosion standard or the dynamic beach.

Remedial Projects: Non-structural/structural works which are intended to reduce risk of damages to human life and property caused by flooding, erosion and/or other water related hazards.

Revetment: A sloped facing of stone, concrete etc. built to protect an embankment or shore structure against erosion and failure by wave action or currents.

Rip-rap: A protective layer of quarrystone, usually of mixed size, graded within wide size limit, placed to prevent erosion, scour, or sloughing of an embankment or bluff.

Risk: The chance that is associated with any action where harm or loss can be encountered. The risk associated with building in the floodplain can be assigned a percentage value based upon the degree of flood susceptibility of the proposed development.

Runoff: The conveyance of surface water caused by precipitation and/or snowmelt.

Seawall Gates: point of discharge of Ashbridges Bay Treatment Plant by-pass flows.

Seawalls: Hard, impermeable structures, built parallel to the shore, designed to withstand extreme wave action.

Sediment: Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site or origin by air, water, gravity or ice and has come to rest on the earth's surface either above or below sea level.

Sediment Budget Model: Coastal management tool used to analyse and describe the different sediment inputs (sources) and outputs (sinks) on the coasts, which is used to predict morphological change in any particular coastline over time.

Sediment Sink: A point at which sediment settles out in the coastal system.

Sediment Transport Modeling: Simulation of rates of suspended-sediment transport in glacial meltwaters, by statistical or physical methods.

Seiche: A temporary disturbance or oscillation in the water level of a lake, esp. one caused by changes in atmospheric pressure.

Sheet Pile: A steel pile with a slender, flat, cross section to be driven into the ground or lakebed and linked or interlocked with like members to form a vertical wall or bulkhead.

Shore: The area of interface between land and water extending from the lakeward limit of the littoral zone landward to the first major change in terrain.

Shore Reach/Shoreline Reach: Portions of the shoreline containing similar physiographic or biological characteristics and shore dynamics such as erosion rates, similar flood elevations, etc., and include shore alignment, offshore bathometry, fetch characteristics, sediment transport rates, flood susceptibility, land use suitability, and environmental similarity.

Shorewall: A structure separating land and water areas, primarily designed to prevent erosion and other damage due to wave action.

Slope: The degree of deviation of a surface from horizontal, measured in a numerical ratio, percent or degrees.

Slope Failure: Common types of slope failures include transitional slides, rotational slides (circular, shallow, noncircular), successive slips, retrogressive slides, (transitional, rotational) and flows (mud, earth, sheet)

Stable Slope: The angle a slope would achieve when toe erosion is absent.

Storm Event: A rainfall event where the amount of rain that falls is measured as opposed to the volume of runoff. One storm referred to is the 1:100 Year Storm: the storm that produces an amount of rainfall that based on historical data occurs on the average once in 100 years.

Surface Runoff: That component of precipitation that results in overland flow and becomes a temporary part of streamflow.

Storm Surge: A rise above the normal water level on the shoreline due to the action of wind stress on the water surface.

Terrestrial Natural Heritage System Strategy: An approach developed by the Toronto and Region Conservation Authority that provides extensive data, scientific models, mapping and guidance for TRCA staff, TRCA's partner municipalities and community groups for achieving natural heritage protection objectives.

Topography: The relative positions and elevations of the natural or built features of an area that describe the configuration of its surface.

Undertaking: An undertaking is an enterprise or activity or a proposal, plan or program in respect of an enterprise or activity which a proponent initiates.

Urban Runoff: Storm water generated from urban or urbanizing areas.

Watershed: The area drained by a river or lake system. A drainage area, drainage basin or catchment area.

Wave Climate: The general condition of sea/lake state at a particular location, the principal elements of which are the wave height, period and direction.

Wave Diffraction: The change in direction and change in velocity that a wave experiences when it leaves one medium and goes into another.

Wave Reflection: A change in direction that a wave experiences when it bounces off of a barrier between two kinds of media.

Watershed Jurisdiction: The area over which a single Conservation Authority has jurisdiction.

Watershed Planning: Planning developed by a Conservation Authority to set goals, objectives and strategy for the conservation and development of water and land resources within a watershed or watershed jurisdiction. Weathering: Mechanical and chemical processes that fragment and decompose rock materials.

Weir: Device for measuring or regulating the flow of water.

Wetland: Land that is seasonally or permanently covered by shallow water, as well as land where the water table is close to or at the surface. In either case, the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic or water-tolerant plants. The four major types of wetlands are swamps, marshes, bogs and fens. Land being used for agricultural purposes, that is periodically 'soaked' or 'wet', is not considered to be a wetland in this definition. Such lands, whether or not they were wetlands at one time, are considered to have been converted to other uses.

Wildlife: A term used in this document to refer to all forms of animal life including insects, amphibians, reptiles, birds, and mammals.