AJAX WATERFRONT SHORELINE ASSESSMENT AND GAP ANALYSIS

Review of Existing Conditions and Identification of Information Gaps

Prepared for the Town of Ajax

FINAL REPORT

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Executive Summary

Toronto and Region Conservation Authority (TRCA), with the direction from the Town of Ajax, has completed a desktop and field assessment of the Lake Ontario Waterfront in Ajax. This assessment determined the extent of existing available information, supplemented the existing information with the collection of additional data and analysis, and determined any outstanding data gaps that will be required for the completion of a Municipal Class or Conservation Class Environmental Assessment ("Class EA") process.

The area is primarily public lands and includes open greenspace, the Waterfront Trail, a water treatment plant, and recreational facilities. It is highly used by the public and provides a significant natural buffer between existing development and the naturally eroding shoreline.

Several reports were reviewed and incorporated in this analysis, including the Lake Ontario Shoreline Management Plan. Recommendations from this management plan are integrated into the overall recommendations of this report, and will also be considered through future phases. Updated electrofishing data and a Stage 1 Archaeological Report were completed to supplement the existing the baseline information. The existing terrestrial data is outdated and will need to be updated during the Class EA.

An assessment was completed to determine the potential for continued erosion based on the shoreline conditions, the local wave action, and sediment transport modelling. The assessment considered the observed historic erosion rates and predicted erosion rates based on current coastal processes to divide the shoreline into "reaches", or areas with similar predicted annual erosion rates. Average historic erosion rates (from 1967 to 2015) are as high as 0.6m/year, and average short-term erosion rates (from 2015 to 2019) were noted as up to 2.0 m/year, showing an increase is the annual erosion rates from historic measurements. Thirteen monitoring stations were established based on erosion rates and proximity to essential infrastructure.

Erosion Hazard Assessments were completed at the monitoring stations identified through the analysis. Seven were inspected on foot, and six were inspected using remotely piloted aircraft technology. Each station was assigned a score out of 100, and ranged from 32 to 47. Most sites were identified as having a medium potential for future instability. Sites H, J, and M did not have visible erosion in proximity to the park path and were not evaluated. Annual inspections of these sites would document the real time erosion rates for each discrete site.

Recommendations for erosion protection along the shoreline focus on maintaining the existing natural buffer between development and the shoreline and allowing natural erosion processes to continue by relocating infrastructure. In areas where this is not possible, shoreline hardening may be considered and balanced against the negative impacts of reduced sediment inputs on nearby beaches. Existing corrugated steel pipes are recommended to be shortened and protected.

The report outlines the information that will be required to complete a Class EA for proposed significant remediation measures. Should the Town of Ajax proceed with a Class EA, TRCA can use previous experience to work with a coastal engineer to develop and evaluate conceptual designs and manage public notifications and consultation. This phase is currently estimated to cost $337,000.

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1.0 INTRODUCTION

Toronto and Region Conservation Authority (TRCA) has undertaken a detailed shoreline assessment and gap analysis to collect baseline information on the existing Lake Ontario shoreline conditions to determine data gaps and current infrastructure hazards within the Town of Ajax. The project area is 5.7 kilometers long and located along the Ajax waterfront (**Figure 1**).

This report has been prepared as a summary of the work completed in support of the project, and includes:

- description of the existing shoreline and current conditions;
- summary and analysis of existing baseline information and additional information gathered during the scope of work;
- the identification of any information gaps that will need to be addressed prior to engaging in a Municipal Class or Conservation Class Environmental Assessment ("Class EA") process;
- presentation of areas at risk of short-term and long-term erosion impacts; and
- recommendations for next steps to prepare for Environmental Assessment process.

1.1 Purpose of the Undertaking

The Ajax Waterfront Shoreline Assessment and Gap Analysis Project (hereafter referred to as "the Project") has been undertaken to investigate the rate and location of shoreline erosion along the Ajax waterfront to inform the development of remedial and preventative erosion protection. The overall objective is outlined in more detail below:

A. Collect and Summarize Baseline Information

One of TRCA's objectives is to provide a summary of any available baseline information located within the project area. This information has then been supplemented by additional field work to update, where required. In areas where more detailed data collection will be required, TRCA has identified these as part of the scope of the next phase of work.

B. Identify Priority Erosion Risk Areas

TRCA's second objective is to complete a coastal and shoreline assessment for the Ajax waterfront to identify erosion hazards and determine the risk for each. Completing a coastal shoreline assessment will provide insight into the coastal processes and the impacts from typical negative events, such as high water levels, high wind events, and more frequent storm events. This will allow TRCA and the Town of Ajax to prioritize areas for future remedial action.

C. Recommendations for Class EA Phase

After completing the above-noted objectives, TRCA will provide recommendations for additional data collection and analysis to satisfy the Class EA process. A cost estimate is also provided to assist with budgeting and planning.

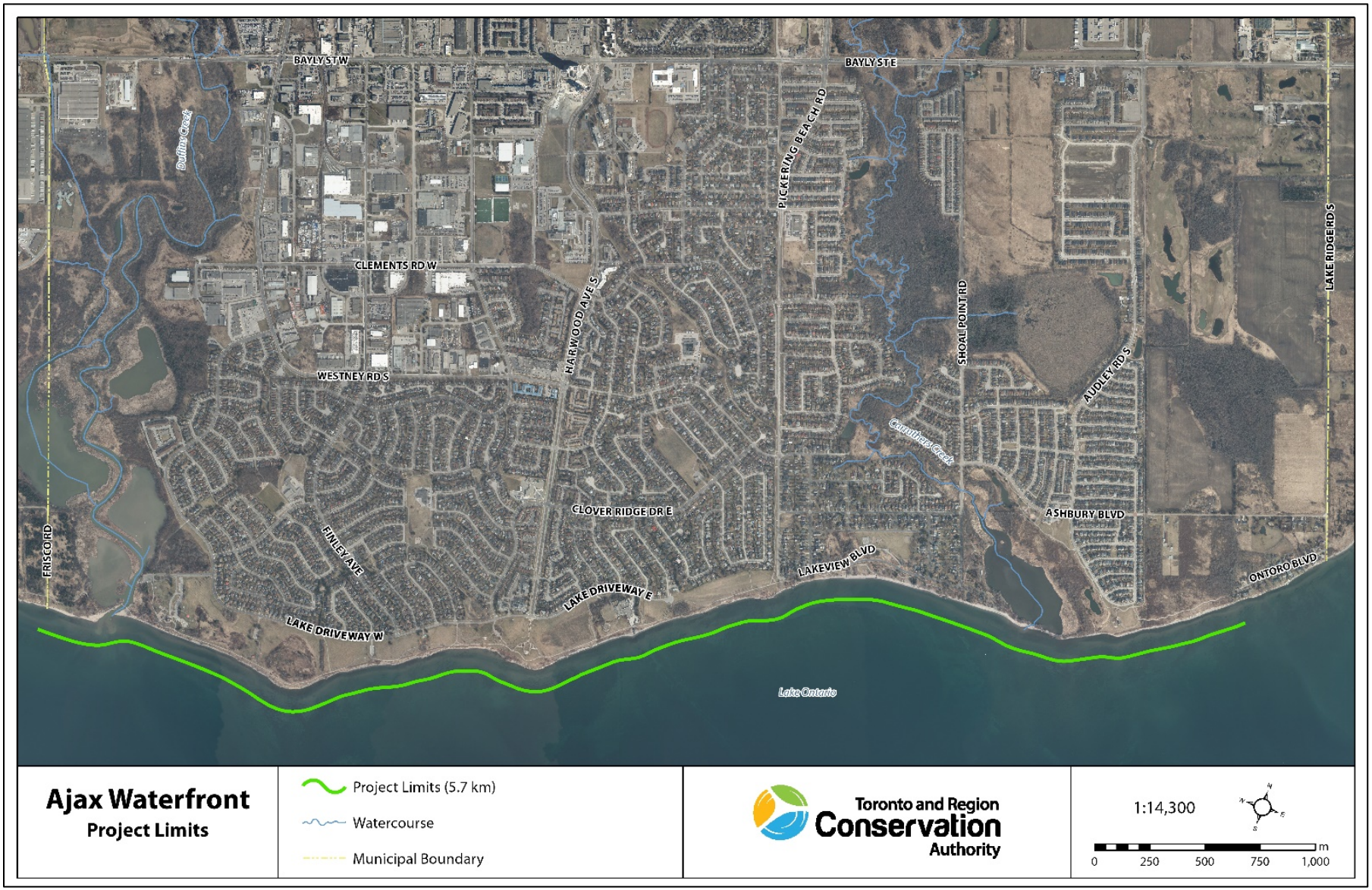

Figure 1. Ajax Waterfront Shoreline Assessment and Gap Analysis Project limits along 5.7 kilometers of shoreline from Frisco Rd to Ontoro Blvd in Ajax, ON. *Source: TRCA, 2019*

1.2 General Description of the Undertaking

Due to the high-water levels along Lake Ontario's shoreline in 2017 and 2019, and the high wind event in 2018, evidence of erosion has become more prevalent along the Ajax waterfront. This erosion poses potential hazards to public safety. The Waterfront Trail's proximity to the shoreline has become increasingly closer creating concern for the public.

By completing the shoreline assessment and gap analysis, TRCA will have identified locations of erosion hazards and rank the severity of each hazard. The shoreline assessment will provide insight on coastal processes experienced along the shoreline. By ranking the erosion hazards and identifying coastal processes, TRCA and the Town of Ajax can determine recommended mitigation measures that will restore or protect infrastructure and public greenspaces that are at higher risk. This information can also be used as part of the decision-making process for planned or future development, as applying the predicted annual erosion rate can assist in determining an appropriate setback from the existing shoreline.

1.3 Description of the Study Area

The project area spans along the Ajax waterfront from Frisco Road in the west, to Ontoro Boulevard in the east and is located on the north shore of Lake Ontario in the Town of Ajax.

Historically, the Ajax waterfront was primarily used for agricultural purposes. During the late 1960s, on the eastern boundary near Paradise Park, a residential development north of the shoreline was evident. Further development of the residential community continued towards the waterfront in the early 1970s and continued to expand westward. During this development, a buffer was maintained between the residential development and Lake Ontario. With the residential development in the early 1970s, a water supply plant was constructed south of Lake Driveway East opposite Lawrie Road.

Currently, most of this section of the Ajax waterfront is for public use, which includes trails, playgrounds, gardens and the Ajax Water Supply Plant (**Figure 2**). The trail runs along the shoreline connecting eastward into Pickering and westward into Whitby. The shoreline consists mostly of small bluffs and sand and cobble beaches.

There are three playgrounds along the Ajax waterfront that contribute to the community's greenspace: Rotary Park, Paradise Park and Lakeside Neighborhood Park. Rotary Park provides a splash park, playground and concession stand that attract the public and local community. Along with Rotary Park, Paradise Park has a recently constructed playground and pavilion that accompany a tennis court and baseball diamond. Lakeside Neighborhood Park also provides a large greenspace for the community.

Along with the three parks identified in **Figure 2**, there are two major marshes within the project area: Duffins Creek Marsh and Carruthers Marsh. These marshes provide habitat for the local fauna and aquatic species.

Figure 2. Location of project area and notable features along the Ajax waterfront. *Source: TRCA, 2021*.

Figure 3. Aerial view of the shoreline at Lion's Point, near Rotary Park. *Source: TRCA, 2021.*

Figure 4. Aerial view of the shoreline at the eastern end of Lake Driveway East. *Source: TRCA, 2021.*

Figure 5. Aerial view of Paradise Beach and Park located between the bases of Pickering Beach Road and Shoal Point Road. *Source: TRCA, 2021.*

Figure 6. Aerial view of the shoreline at Carruthers Marsh. *Source: TRCA, 2021*.

2.0 PREVIOUS PROJECTS AND STUDIES

This section outlines some of the work that has been previously completed within the project area, including some erosion and flood management projects implemented by TRCA, as well as studies and field data collected by TRCA and others.

Information from these projects and studies has been incorporated into this report and will continue to be considered during subsequent phases of work.

2.1 TRCA Erosion Protection along Ajax Shoreline

TRCA has partnered with Town of Ajax to complete multiple projects along the shoreline over the years. These projects generally included wetland creation, post and paddle fencing, outfall repairs and planting sites.

In 2020, TRCA partnered with the Town of Ajax to repair an unstable outfall structure where the material behind the outfall had eroded and caused the headwall to become exposed. The outfall structure is located west of the Love Crescent Parking Lot. The headwall was back filled and an armourstone structure was installed to stabilize and support the outfall (**Figure 7** and **Figure 8**). TRCA has also partnered with Town of Ajax in 2021 to implement a new boardwalk to connect Rotary Park to the existing Duffins Creek bridge (**Figure 9**). The new boardwalk was designed to address the flooding and erosion issues that have been experienced along the previous gravel path.

Figure 7. Aerial view of headwall repair conducted in 2020. *Source: TRCA, 2021*.

Figure 8. Shoreline view of headwall repair and armourstone structure from 2020. *Source: TRCA, 2021.*

Figure 9. Aerial view of the re-designed pedestrian boardwalk that connects to the Duffins Creek bridge. *Source: TRCA, 2021*

2.2 Supporting Studies and Assessments

Through the baseline data collection completed, TRCA identified previously completed studies and assessments along the Ajax waterfront.

2.2.1 Biological Studies and Monitoring Programs

TRCA previously completed an Ecological Land Classification (ELC) for several areas, including Carruthers Marsh, Paradise Park and Duffins Creek. Some terrestrial data was also collected prior to 2004, however this data is outdated and will need to be updated as part of the Class EA process. This data provides information on the types of communities present within the area and assists with identifying mitigative measures to protect areas which are unique or important to the local ecology. **Figure 15** and **Figure 16** show the relevant and historic ELC data already collected. This information is further reviewed in **Section 3.3**.

TRCA has a large terrestrial and aquatic monitoring program to monitor flora and fauna. The most recent fish data collected by TRCA was located offshore near Rotary Park in 2011. However, this data is out of date and does not provide a current representation of the fish community present along the shoreline. An updated sampling program was implemented in 2021 as part of this analysis, and a summary is provided in **Section 3.3**. Terrestrial monitoring will be performed annually, and aquatic monitoring will be completed every three years by TRCA within the Carruthers Creek watershed as part of the Carruthers Creek Watershed Plan, from 2021 - 2031. Any relevant and recent data from these monitoring programs will be used to assess the potential impacts of proposed alternatives in the EA phase.

2.2.2 Engineering Studies

There was a monitoring program completed by TRCA from 2007-2009 to monitor and review the conductivity and four Beneficial Use Impairments (BUIs) to monitor the nearshore water quality of Lake Ontario. BUIs identify changes in the chemical, physical and biological nature of the lake's water quality (Auer, 2011). The four BUIs monitored were:

- *E. coli*
- total suspended solids
- soluble reactive phosphorus
- total phosphorus

In 2011, Dr. Auer reviewed the data collected from the monitoring program to propose point source and watershed contributions to the Ajax-Pickering nearshore. From the review, Duffins Creek was identified as a dominant source of *E. coli* and total suspended solids that contributed largely to beach closures and some aesthetic degradation. To the west of the project limits, the Duffins Creek Water Pollution Control Plant was identified as being the source of phosphorus along the nearshore.

2.3.3. Management Plans

The Lake Ontario Shoreline Management Plan (SMP) was prepared by Zuzek Incorporated for Central Lake Ontario Conservation Authority (CLOCA), Ganaraska Region Conservation Authority, and Lower Trent Region

Conservation Authority in November 2020. The study area includes the shoreline through all three jurisdictions, between Ajax and Quinte West. The purpose of the report was to develop a shoreline management strategy that would promote sustainable coastal development in the future through a process called Integrated Coastal Zone Management (ICZM). ICZM balances the environmental, economic, social, cultural and recreational objectives within the limits of the existing and predicted dynamic coastal ecosystem.

Ten general recommendations are included which are applied to the entire shoreline. These recommendations include:

- incorporating the effects of climate change
- protecting sources of sediment and monitoring the effects of sediment transport
- considering hard armouring as a last resort
- nourishing artificial beaches
- integrating this plan with neighbouring jurisdictions

The SMP also divides the shoreline into distinct sections which show similar existing coastal conditions, called “reaches”. Recommendations are provided for each reach of the shoreline and can be summarized as one of four overall remediation options: avoid, retreat, accommodate, or protect. Reach 1 is located partially within the municipal boundary of Ajax and therefore located within the scope of this study area. The recommendations for Reach 1 that are applicable to the Ajax shoreline include:

- Monitoring top of bank recession near Lakeside Neighbourhood Park
- Re-align multi-use path when necessary
- Add more signage about bluff risks
- Maintain natural shoreline areas as buffers against erosion and to provide future sediment supply areas
- Private and government landowners should monitor shoreline protection stability and erosion flanking potential, especially along Ontoro Boulevard

Any remediation options should consider the general recommendations and Reach 1 specific recommendations provided in the Lake Ontario SMP.

3.0 BASELINE DATA AND INFORMATION GAPS

To align with the Class EA process, the baseline data collected in support of the Project will be presented in the baseline inventory format typical of an Environmental Assessment Report. The baseline inventory provides the information needed to evaluate the alternative options developed through the Class EA process, and to evaluate the types and level of environmental impacts that may result from implementing the preferred alternative.

This baseline environmental inventory takes into consideration the directly and indirectly affected environment. This information is presented generically for this report, however more targeted impacts will be evaluated within the Class EA Report. The area indirectly affected by the Project includes remaining portions of the Ajax waterfront such as the memorial gardens, playgrounds, parking lots, and trail use. The Waterfront Trail would also be directly affected as it would be used for access to the shoreline.

Baseline environmental data was collected from the following organizations due to their specific expertise relevant to the regional and local Project area:

- Toronto and Region Conservation Authority (TRCA);
- W. F. Baird and Associates (Baird);
- Town of Ajax;
- Environment and Climate Change Canada;
- Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry;
- Fisheries and Oceans Canada (DFO); and
- Ministry of Environment, Conservation and Parks (MECP).

3.1 Existing Site Conditions

To align this report with the Class EA process, the broad definition of 'environment' as provided in the *Environmental Assessment Act* is applied to this section. The prepared environmental description is *"an inventory of elements for which a given project is likely to have an impact"* (CO, 2013). The inventory includes an evaluation of the presence and extent of physical, biological, cultural, social, economic, and technical engineering elements applicable to the Project limits.

The items presented in **Section 3.0** are summaries based on currently available information, and data gathered through the scope of work of the Project. Additional research and data collection will be required and completed as part of the Class EA process. Key gaps in information or analysis are also identified throughout this section.

Drone photos, drone videos, and photogrammetry data is available in **Appendix F**.

3.2 Physical Environment

Unique Landforms

The small bluffs and sand and cobble beaches are the most significant natural features in the area. These bluffs and beaches (**Figure 3** and **Figure 5**) are evident along the waterfront for 5.7 kilometers. **Figure 10** shows the approximate locations of bluffs and beaches along the shoreline.

Figure 10. Shoreline types along the Ajax shoreline. *Source: TRCA, 2021.*

Existing Mineral/Aggregated Resource Extraction Industries

There are no records of mineral or aggregate resource extraction industries in the Ajax area.

However, Lake Ontario was the site of the "stone hooking" industry from the 1850s to the 1910s (TRCA, 2003). By using a shallow draft schooner and several bent poles, shale was extracted from the lakebed. The shale was used for ballast and sold for construction purpose. The amount of material removed from the lakebed is unknown, but it is estimated that 1,000,000 cubic meters of shale was removed from the Toronto Harbour. It is likely that the stone material provided erosion protection to the lakebed and shoreline by absorbing and dissipating wave energy.

Earth Science – Areas of Natural and Scientific Interest (ANSI)

The Government of Ontario defines ANSIs as "areas of land and water containing unique natural landscapes or features. These features have been significantly identified as having live or earth science values related to protection, scientific study or education." Earth Science ANSIs are of important geological significance and may contain fossils, bedrock, landforms or other geological processes.

There are no Earth Science ANSIs identified within the project area.

Specialty Crop Area /Agricultural Lands or Production

There are no agricultural lands present within the project area.

Niagara Escarpment/Oak Ridges Moraine

The project area is not located in the Niagara Escarpment or the Oak Ridges Moraine, therefore there will be no impact from these works.

Environmentally Significant Areas (ESA) – Physical

ESAs are defined as areas of land that meet one or more certain physical or biological criteria. The physical criterion is that the area must contain rare or high-quality landforms. There are no ESAs that meet this physical criterion along the Ajax waterfront.

Air Quality

Air quality is measured hourly at various stations across Ontario by the Ministry of the Environment, Conservation and Parks. The station closest to the project area is known as the "Oshawa" station. This station is located approximately 16.5 kilometers from the project area and is northeast of the intersection of Conlin Road and Thorton Road N. Air quality results are used to calculate the Air Quality Health Index (AQHI), which describes the general air quality as a risk to human life on a scale of 1 to 10. The risk levels are shown in **Table 1**. The AQHI for Oshawa tends to score in the low-risk range of 1 to 3 throughout the year.

Table 1: Air Quality Health Index Risk Levels. Source*: MOECC, 2021.*

Air Quality Health Index (AQHI) Range	Risk Level
1 to 3	Low
4 to 6	Moderate
7 to 9	High
10 +	Very High

Impacts to air quality (if any) will be identified and discussed in the Class EA Report.

Agricultural Tile or Surface Drains

There are no drainage features associated with agricultural lands near the project area.

Noise Levels and Vibration

There are no notable sources of noise or vibrations along the Ajax waterfront. As the area is mainly residential and public greenspace, no industrial activities are expected. Minor sources of possible noises could include recreational watercraft, public use, or maintenance work.

Impacts to noise levels and vibration (if any) will be identified and discussed in the Class EA Report.

Water Flow Regime (Baseflow conditions and storm conditions)

Lake Ontario water levels are measured and recorded on an hourly basis in the Toronto Harbour by Fisheries and Oceans Canada (DFO). Water levels in Lake Ontario have been regulated since the 1960s, but lake levels still fluctuate based on the inputs and outputs. The graphs below in **Figure 11** show the water level fluctuations before the regulation and after.

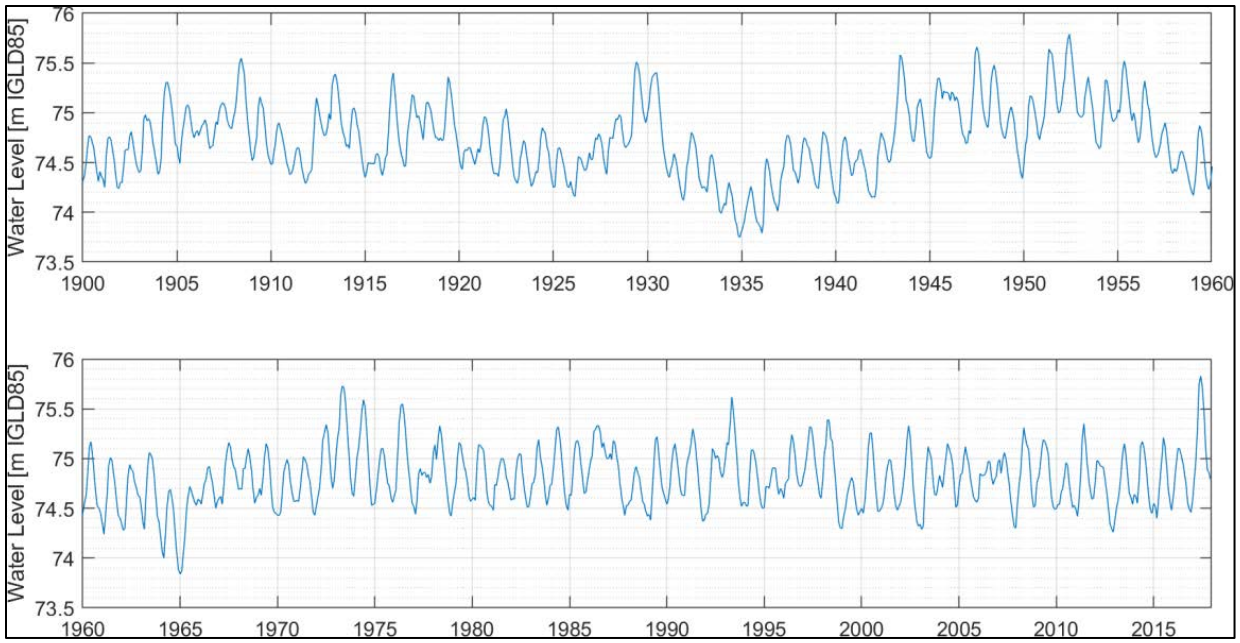

Figure 11. Water levels in Lake Ontario before regulation (top) and after regulation (bottom). *Source: Baird, 2021.*

In 2017 and 2019, Lake Ontario experienced record high lake level events causing extensive flooding and erosion along the shoreline. **Figure 12** demonstrates the high water levels Lake Ontario experienced in 2019 compared to the water levels of Lake Ontario in 2020 and 2021.

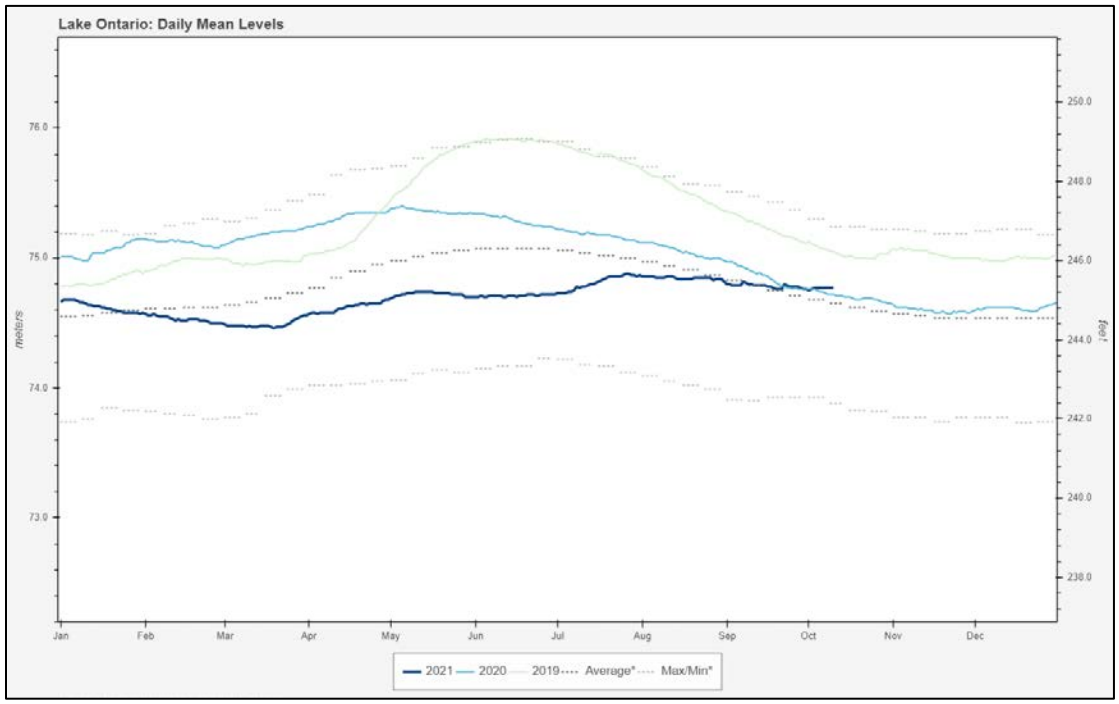

Figure 12. Daily water levels of Lake Ontario from 2019 to 2021 to demonstrate the high-water levels in 2019. *Source: International Joint Commission (IJK), 2021.*

Impacts to water levels (if any) will be identified and discussed in the Class EA Report.

Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge and Discharge Zones

Duffins Creek and Paradise Park are the two major areas that contribute to the High Volume Groundwater Recharge Areas (HVGRA) located within the project limits (**Figure 13**). A few of the outfalls along the shoreline were also identified as HVGRAs.

Impacts to surface drainage and groundwater flows (if any) will be identified and discussed in the Class EA Report.

Figure 13. Groundwater recharge areas near and within the project area. *Source: TRCA, 2021*.

Water Quality

As mentioned in **Section 2.2.2** Engineering Studies, during a monitoring program in 2007 to 2009, the conductivity and four BUIs were monitored to evaluate the nearshore water quality of Lake Ontario and determine potential contributors and pollutants. The data collected from the monitoring program was reviewed in 2011 to determine Duffins Creek was a large contributor to the *E. coli* and total suspended solids in the water along the Ajax waterfront that has caused beach closures and aesthetic degradations (Auer, 2011).

Additional updated water quality data will be collected and discussed in the Class EA Report.

Soil/Fill Quality

The Ajax waterfront consists primarily of sand, cobble, and seeded topsoil for the greenspaces. During this stage of the project, fill will not be required. However, if mitigation measures and repair work are undertaken along the Ajax waterfront, only clean fill should be used to prevent any reduction in the quality of existing soils and fill. Confirmation of the existing soil quality should be determined through visual analysis (i.e. boreholes) on a site-by-site basis when considering design options.

Existing Transportation Routes

The Waterfront Trail travels parallel to the shoreline and is highly used by pedestrians, cyclists and other public users. Authorized vehicles can access the Waterfront Trail through access points at various locations along the waterfront, such as Rotary Park, Paradise Park, parking lots and other trail entrances with bollards. Public transit routes also exist through the nearby community along Lake Driveway West but the public transit routes will not be impacted during project.

Constructed Crossings

There are pedestrian crossings along the project limit. The constructed crossing on the west end of the project area is the boardwalk from Rotary Park to Duffins Creek. There is also a small pedestrian bridge on the Waterfront Trail that is located to the west of the Ajax Water Supply Plant.

Figure 14. The boardwalk at Duffins Creek and the pedestrian crossing located west of the Ajax Water Supply Plant. *Source: Google Earth, 2021.*

3.3 Biological Environment

A detailed review of the biological conditions of the project limits was completed to understand the flora and fauna communities the Ajax waterfront supports.

Wildlife Habitat

The Project area consists mainly of manicured lawn, parks and greenspace for public use. There are a few potential wildlife habitat areas that have been identified by the natural cover data (**Figure 15**). Along with manicured greenspaces, there are wetlands, small forested areas and meadows. These small forested areas may provide breeding and nesting habitat for birds and provide shelter for terrestrial fauna. Duffins Creek, Caruthers Marsh and Paradise Park provide wetland habitat for multiple terrestrial and aquatic species. Along with these identified areas, the shoreline itself can provide wildlife habitat for multiple bird species and other local fauna.

Figure 15. Location of natural cover data that was collected in 2017. *Source: TRCA, 2021*.

ELC data has been collected for parts of the project area; however, this data is up to 15 years old and may only be used for historical purposes. **Figure 16** shows the location of the historical data.

Updates to TRCA's existing ELC, Flora, and Fauna inventories will be performed as part of the Class EA process. Breeding bird surveys may need to be completed prior to implementation, depending on the species observed and timing for future implementation.

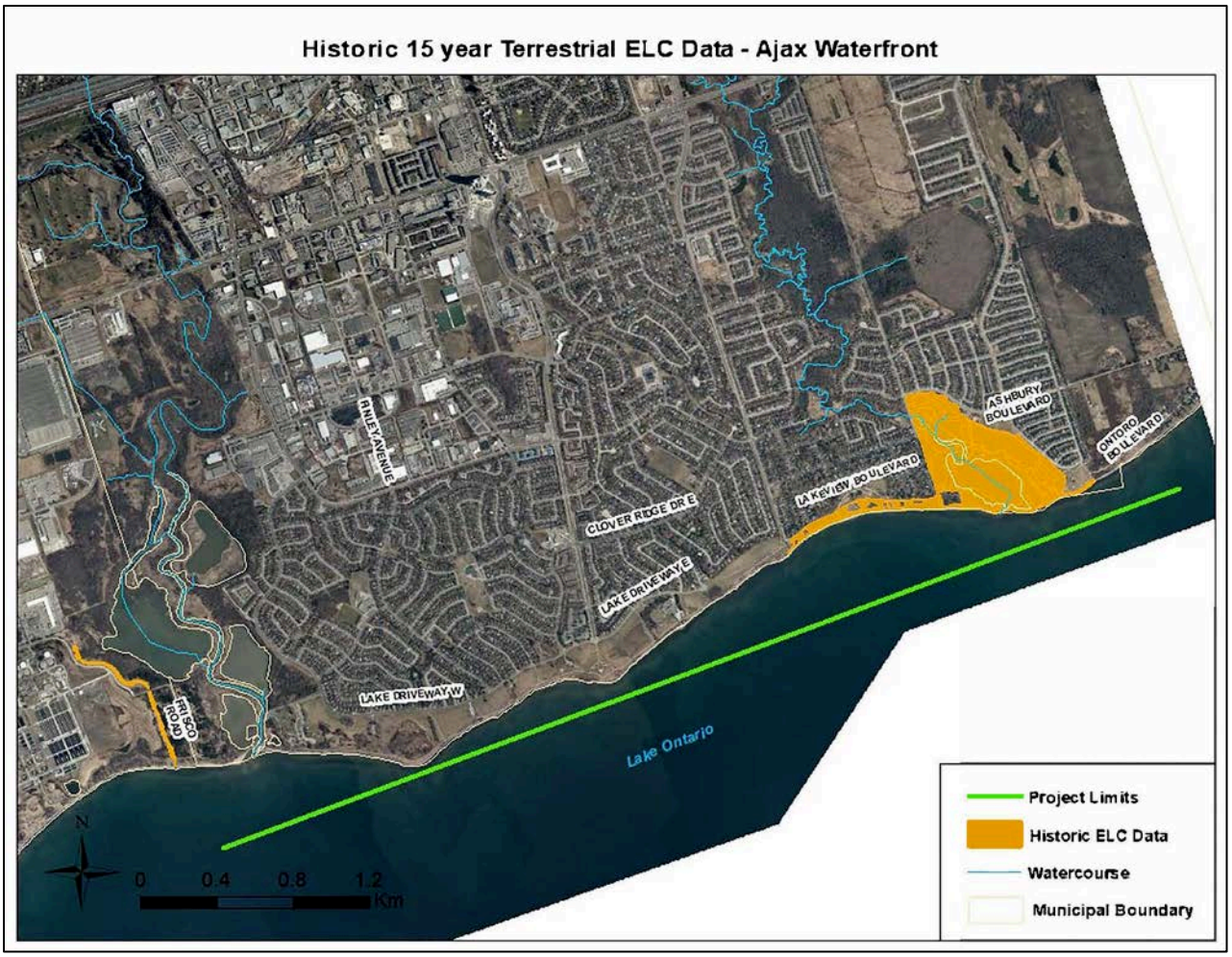

Figure 16. Historical ELC data collected over the past fifteen years along the Ajax waterfront. *Source: TRCA, 2021.*

Habitat Linkages or Corridors

Due to the residential community and open greenspace, most of the Project area does not provide habitat linkages or corridors. Duffins Creek to the west and Carruthers Creek to the East both contain highly vegetated areas adjacent to the watercourses which may provide habitat linkages to the wooded areas located north of the project area. While most shoreline protection work is not likely to significantly impact these habitat linkages, consideration should be given to potential negative impacts as part of the evaluation in the Class EA report.

Significant Vegetation Communities

The vegetation primarily consists of manicured lawn grasses and planted trees. There are a few small, forested tree stands along the waterfront. No significant vegetation communities have been previously identified, however updates to the terrestrial inventory may identify significant vegetation communities.

Environmentally Significant Areas (ESA) – Biological

ESAs are defined as areas of land that meet one or more certain physical or biological criteria. Duffins Creek and Carruthers Marsh have been identified as ESAs (**Figure 17**). These ESAs have also been identified as Provincially Significant Wetlands and are shown in **Figure 18**.

Impacts to existing ESAs (if any) will be identified and discussed in the Class EA Report.

Figure 17. ESAs along the Ajax waterfront. *Source: TRCA, 2021*.

Figure 18. Provincial Significant Wetlands that have been identified within the project limits. *Source: TRCA, 2021.*

Fish Habitat

Lake Ontario and the wetlands along the Ajax waterfront provide fish habitat and any works occurring in and around these waterbodies must be assessed for potential cause to harm fish or fish habitat. A DFO Request for Review application is to be submitted if any work is occurring in or around the lake. This is required to determine if there are any potential impacts that could harm fish or fish habitat. At this current phase, fish habitat will not be impacted. For future mitigation measures or repairs, the fish habitat could experience impacts and will need to be assessed.

Fish monitoring occurs in various locations throughout the Ajax waterfront by the Aquatic Monitoring and Management (AMM) division at TRCA. AMM staff collect fish data in the spring, summer and fall by completing seine net sampling and electrofishing sampling. Three season electrofishing sampling was performed for the Ajax shoreline in 2021, and only one White Sucker was caught. This is representative of the open coast shoreline type, and indicates there is a lack of natural habitat features here to encourage refuge or spawning. This portion of the shoreline is likely used primarily as a movement corridor. For additional information AMM's sampling, please refer to **Appendix B**.

Species of Concern – Flora and Fauna

Species at Risk polygons are shown in light red in **Figure 19**. Species at Risk are present along the western limits of the project. This includes Eastern Wood-Peewee, Eastern Meadowlark, Bobolink, and Least Bittern. Impacts to these species should be considered during the planning phase for any work in this area, and mitigative measures should be identified.

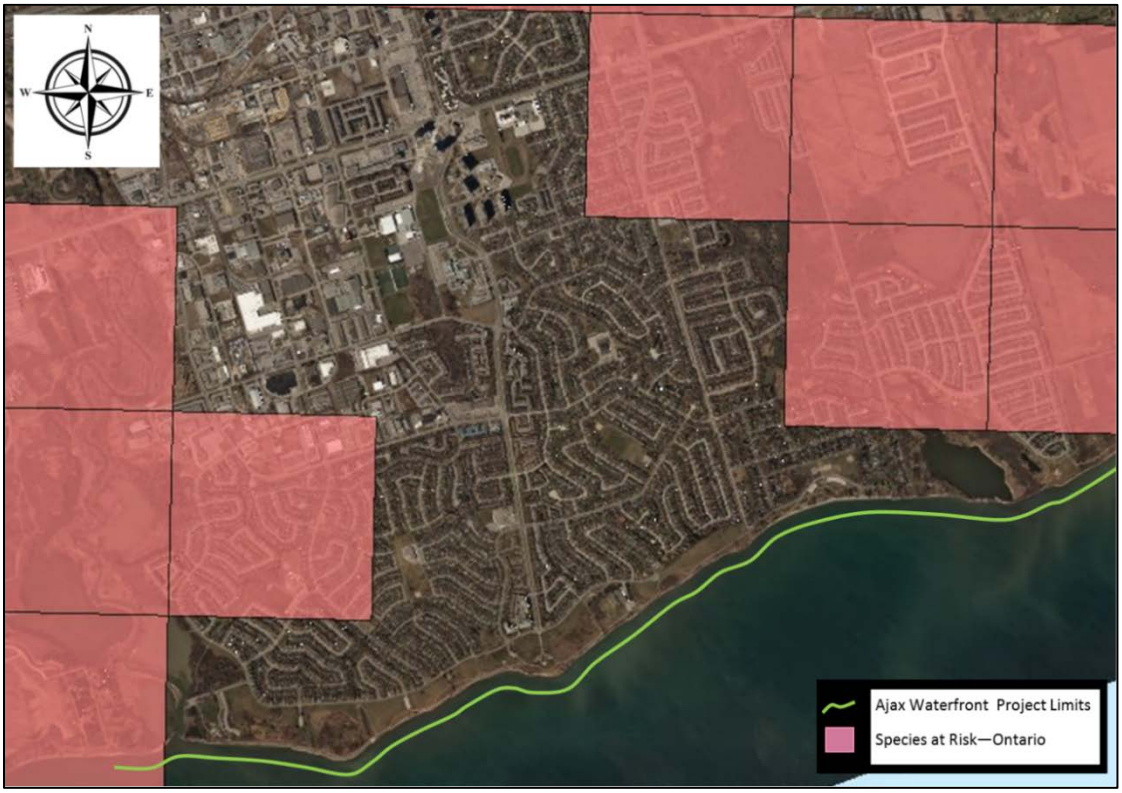

Figure 19. Species at Risk locations where species have been identified near the project area. *Source: TRCA, 2021.*

Wildlife/Bird Migration Patterns

TRCA has currently not received or collected data on migration patterns for wildlife or bird species along the Ajax waterfront.

Impacts to wildlife migration patterns will be identified on a site-by-site basis and discussed in the Class EA Report.

Exotic/Alien and Invasive Species

There are currently no exotic species identified along the Ajax waterfront. However, several invasive species near the project area have been identified in the past. Some of these invasive species are: Common Carp (*Cyprinus carpio*), Emerald ash borer (*Agrilus planipennis*), European gypsy moth (*Lymantria dispar dispar*) and European Common Reed (*Phragmites*). Other potential invasive species that could be present will be further identified by completing a flora field assessment to determine invasive populations within the project area.

Measures to ensure invasive species are not transported off-site or new species introduced will be incorporated during the Class EA process. Any trees or shrubs planted will be native species.

Wildlife Populations

Various wildlife populations are present along the shoreline and within the surrounding area. Some wildlife which has been previously documented near the area and could be present are coyotes, deer, raccoons, turtles, and geese. For further understanding of the wildlife populations that use the Ajax waterfront, field assessments for fauna need to be completed.

Wetlands

There are three wetlands located within the project area. From west to east, there is: Duffins Marsh, Paradise Park Wetlands and Carruthers Marsh. These wetlands are identified in **Figure 15** where the natural cover of the Ajax waterfront is outlined. These wetlands provide a diverse ecosystem for multiple terrestrial and aquatic species. Wetlands also contribute to promoting the water quality by filtering the water and allowing sediment to deposit before entering Lake Ontario. The Lake Ontario SMP notes that preserving barrier beaches will help protect wetlands from wave action.

Microclimate

The microclimate of the shoreline of Lake Ontario is heavily influenced by winds, nearshore waves, solar heating and thermal characteristics. These factors affect shoreline conditions and aquatic habitat. If these components are altered, it could have lasting effects on the shoreline profile, built environment, or local habitat. Lake currents and nearshore waves are largely a product of wind conditions. The Ajax waterfront is generally influenced by wind and wave conditions from the southeast and southwest.

Solar heating can also influence the ecology of Lake Ontario as lake waters stratify with temperature. The amount and intensity of solar heating and thermal stratification can affect the aquatic habitat conditions. Increase in water levels and temperatures can largely impact the microclimate.

An assessment on whether climate change would likely impact the conditions within the study area was provided with Baird's coastal analysis. Minimal impacts due to climate change are expected with respect to shoreline erosion within the project area.

Unique Habitats

There are two Provincially Significant Wetlands (**Figure 18**) that provide unique habitats to multiple species that are not common in other parts of the project area. Any impacts to these habitats will be assessed during the Class EA Report.

Areas of Natural Scientific Interest - Life Science (ANSI-LS)

Two ANSI-LS have been identified within the project area and are shown on **Figure 20**. Duffins Creek Coastal Marsh is located on the western limit and has been identified as a candidate provincially significant ANSI-LS. Shoal Point Wetlands is located on the eastern limit and has been identified as a confirmed regionally significant ANSI-LS.

Provincially significant ANSIs are those that show the best representation of the natural features and landscapes of Ontario. Regionally significant ANSIs are those that are considered “next best” and are not afforded protection under the Planning Act, but are protected if they are located in a particular region under that region’s management plan (Ontario, 2020).

Candidate ANSIs are those that meet the requirements of a provincial, regional, or local ANSI but has not been formally confirmed.

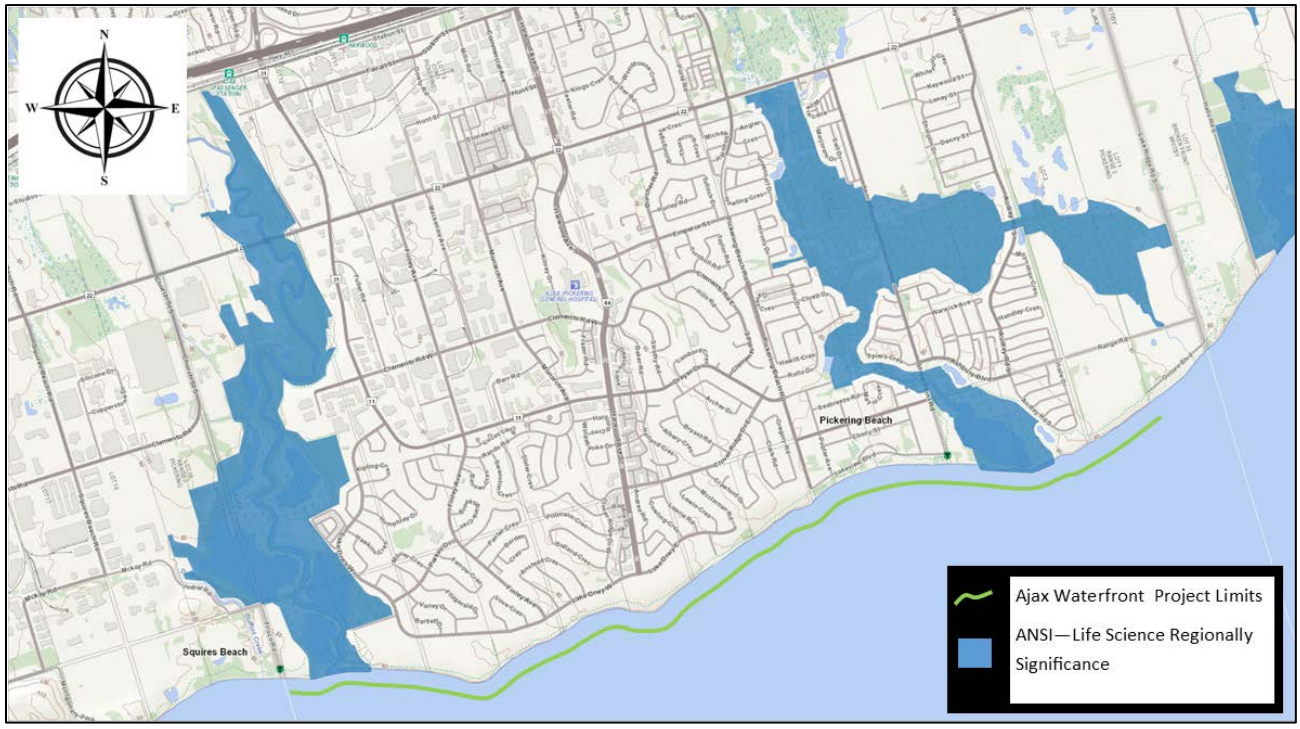

Figure 20. Life Science ANSI identified at Carruthers Marsh and Duffins Creek. *Source: Ontario GeoHub, 2021*.

3.4 Cultural Environment

Information in this section was summarized from the Stage 1 Archaeological Assessment Report prepared for the Ajax Shoreline. For additional information on any of the items discussed below, please refer to **Appendix A**.

Traditional Land Uses

TRCA’s jurisdiction encompasses the overlapping Traditional territories and Treaty areas of the Anishinaabe, Haudenosaunee, Huron-Wendat, and Métis nations. The future Class EA will be undertaken with participation from appropriate first nations identified by TRCA, the Town of Ajax, the Province of Ontario, and through soliciting engagement efforts.

Indigenous Reserve or Community

There are no known Indigenous reserves or communities within the project limits.

Outstanding Native Land Claim or Treaty Rights

The treaties most relevant to the Greater Toronto Area (GTA) include the Treaties of 1701, the Toronto Purchase (1805), the Head of the Lake Treaty (1806), the Ajetance Treaty (1818), and the Williams Treaties (1923). Of these, the Williams Treaties are directly applicable to the project area.

The Williams Treaties negotiated the surrender of a large tract of land in central and southern Ontario, which involved the Rama, Beausoleil, Georgina Island, Scugog Island, Alderville, Hiawatha, and Curve Lake First Nations and the Crown in 1923. These treaties were to account for the absence of documentation tied to the Gunshot Treaty of 1788, the northern boundary of which was to be established as far back as one could hear a gun shot from Lake Ontario. Part of the lands included in the Williams Treaties encompasses the southern part of the Rouge River Valley and in territory claimed by The Mississaugas of the Credit. Given that the Mississaugas were not a signatory of the Williams Treaty and did not surrender their interest in the lands, they claim unextinguished aboriginal title to the Rouge River Valley tract (TRCA, 2021).

Transboundary Water Management Issues

The project area is located completely within the municipal boundaries of the Town of Ajax. The eastern limit of the project area is managed by CLOCA, and therefore collaboration with the Lake Ontario SMP previously prepared by CLOCA is essential to ensure successful integration of both TRCA's and CLOCA's recommendations.

Riparian Uses

The local parks and greenspaces allow riparian areas to be utilized by the local community and public.

Impacts to riparian uses will be identified and discussed in the Class EA Report.

Recreational or Tourist Uses of a Waterbody and/or Adjacent Lands

The area along the Ajax waterfront is frequently used recreationally as the Waterfront Trail runs along the shoreline. This trail attracts multiple recreational activities such as cycling, walking, running, rollerblading and skateboarding. Multiple parks, seating areas, greenspace, boardwalks and memorial gardens are utilized by the public and local residents.

Temporary disruption to the recreational or tourist use is expected for most erosion risk mitigation recommendations, and the impacts will be assessed in the Class EA report.

Aesthetic or Scenic Landscapes or Views

The Waterfront Trail offers multiple scenic views of Lake Ontario from the shoreline. Naturally formed headlands offer opportunities for lookout points.

Impacts to shoreline aesthetics will be identified and discussed in the Class EA Report.

Archaeological Resources, Built Heritage Resources and Cultural Heritage Landscapes

A Stage 1 archeology assessment has been conducted to determine if there is any archeological potential within the project limits. This assessment relies on a desktop analysis and provides recommendations for areas requiring field testing prior to excavation. By reviewing the historical land use, geographic and cultural features

and aerial photography, the Stage 1 assessment indicated there is medium to high potential for buried archeological resources.

Due to the potential of buried resources, a Stage 2 archaeological assessment is required for most of the project area to determine if any archaeological resources are found and determine if the resources have sufficient cultural heritage. *(Ministry of Ontario, 2021).* The Stage 2 archeological assessment is to be completed prior to implementation of any recommended works, and should be coordinated once the limits of work areas and access routes are determined. Further detail of areas where a Stage 2 assessment has been recommended can be referenced in maps 13-17 in **Appendix A**.

Historic Canals

There are no historical canals within the Ajax waterfront.

Federal Property

There is no federal property located within the project area.

Heritage River System

There are no heritage river systems present near the project area.

3.5 Socioeconomic Environment

The information provided in this section is a preliminary assessment. Additional research and data will be compiled and impacts on the socioeconomic environment will be explored in more detail in the Class EA Report.

Surrounding Neighbourhood or Community

The surrounding neighbourhood is a residential community that is immediately adjacent to the Ajax waterfront. There are three major residential communities: Duffin's Bay, Clover Ridge and Pickering Beach.

Surrounding Land Uses and Growth Pressure

The land surrounding the shoreline consists of greenspace and parklands that include the Waterfront Trail, parks, recreational spaces, boardwalk and seating areas. Due to the proximity to the shoreline and the nearby residential area, there is no potential for urban development between the existing development and the shoreline. However, with future population growth and the desire for suburban areas, the growth pressures in this area are expected to increase.

Pedestrian Traffic Routes

The Waterfront Trail is largely used by pedestrians, cyclists and the general public. There are also informal trails along the Ajax waterfront that lead to the shoreline. These informal trails are near areas that are at risk from erosion. The boardwalk near Duffins Marsh was recently installed to allow pedestrian access along the Waterfront Trail.

Property Values or Ownership

The Ajax waterfront and surrounding greenspace are mostly owned by TRCA and managed by the Town of Ajax. There are a few small land parcels that are owned by the Town of Ajax.

Figure 21. Ownership of property along the Ajax waterfront. *Source: TRCA, 2021.*

Property Accessibility

There are multiple parking lots with access to the shoreline which include wheelchair accessible parking spots. The Waterfront Trail is paved to accommodate a large variety of users.

Impacts to existing accessibility will be identified in the Class EA Report.

3.6 Engineering and Technical Environment

Rate of Erosion in Ecosystem

TRCA assessed and identified the erosion rates along the shoreline by delineating the crest and water line through GIS data and historical aerial photos. Light Detection and Ranging (LiDAR) data was used for 2015 and 2019 to delineate the shoreline crest and the orthoimage associated was used to delineate the water line. Historical aerial photos of high quality were selected, georeferenced and mosaicked to delineate the shoreline in different years.

Transects were created every meter across the shoreline. Given the history of the different time periods (post-hurricane Hazel with the 1967 set, and Lake Ontario high water levels in 2017 and 2019), the delineation of the shoreline was separated into two groups: the long-term change rate between 1967 and 2015, and the short-term change rate between 2015 and 2019 as seen in **Figure 22**.

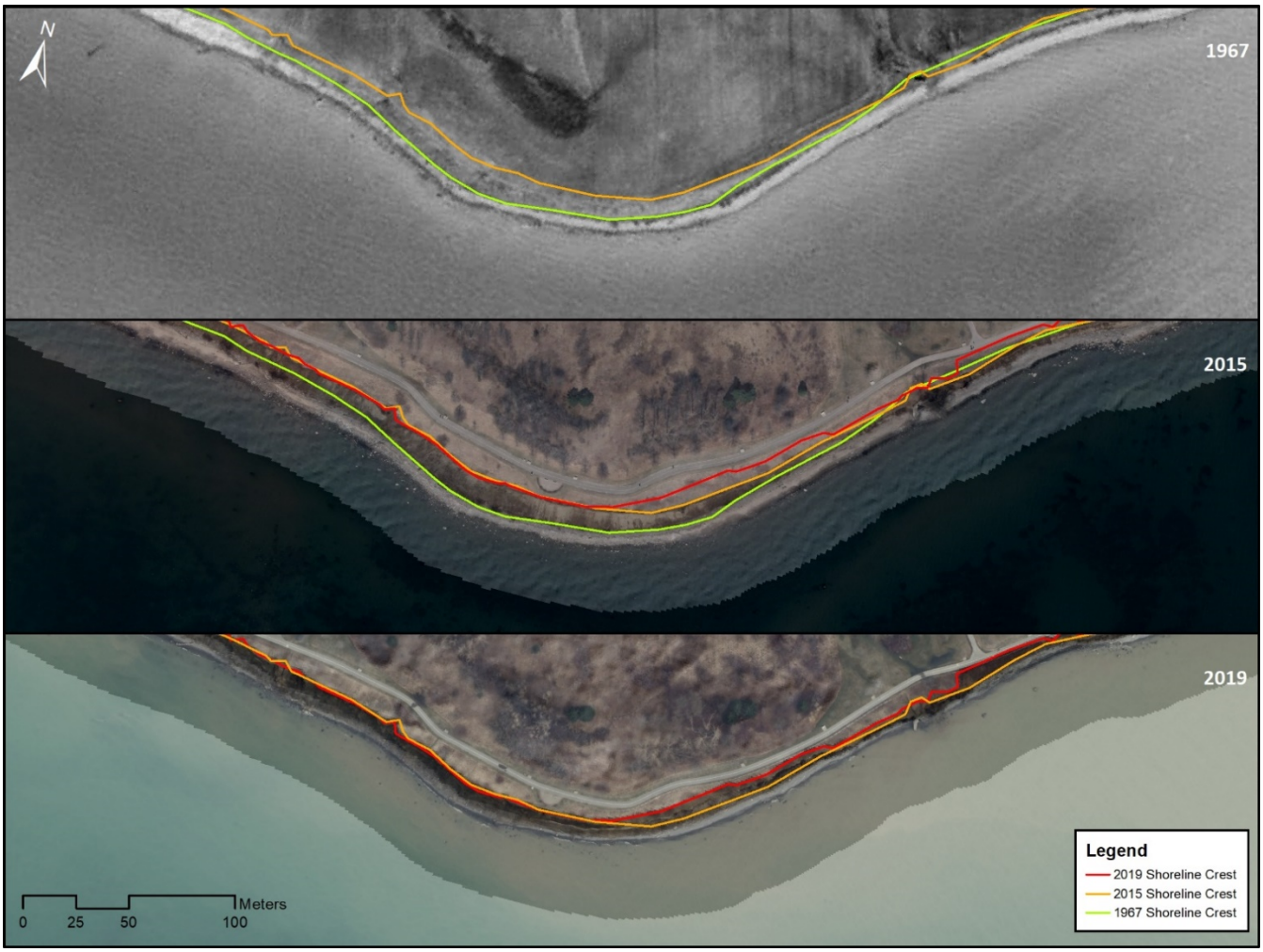

Figure 22. Shoreline crest delineation comparison between 1967-2015 and 2015-2019. The top image shows the long-term change, the bottom image shows the short-term change, and the middle image shows the shoreline location for all three years. *Source: TRCA, 2021.*

Additional analysis was completed by Baird which incorporated the wave conditions, sediment transport modeling, and visual assessment of the shoreline conditions to predict future erosion rates as well as assess current and past erosion.

Based on these analyses, the long-term erosion along the shoreline averaged between 0.1m and 0.6m per year (TRCA, 2021. Baird, 2021.). The short-term erosion rates, which are highly variable and more localized, range from 0.2m to 2.0m per year. Generally, in areas where there are naturally occurring headlands, more boulder material is located on the nearshore lakebed, assisting in decreasing the long-term erosion.

Additional information on the coastal assessment and how these erosion rates were used to determine the location of erosion hazard monitoring locations can be found in **Section 4.0**.

Sediment Deposition Zones in Ecosystem

Sediment deposition rates were explored in both the Lake Ontario SMP (*Zuzek*, 2020) and the Baird coastal assessment (*Baird*, 2021). Both assessments noted that sediment accumulation in these areas is primarily local,

with the bluffs providing the largest source of sediment input to the local beaches. Preservation of these sediment inputs is essential to naturally replenish the existing beaches.

Flood Risk in Ecosystem

There is a flood risk to some portion of the shoreline, particularly in the lower elevation areas along the dynamic beach section. Most of the shoreline is comprised of small bluffs, which assist in mitigating flood risks but are a concern for erosion, as explored below.

Slope Stability

A detailed assessment of slope stability was not performed in this study as it would require physical examination of the soil profile and would require borehole analysis to fully complete. However, visual assessment indicates that the slope of the bluffs is near vertical which promotes slope instability.

Existing Structures

There are multiple stormwater outfalls and sanitary infrastructure present along the Ajax waterfront. Some of this infrastructure has become exposed due to the erosion along the shoreline, as shown in **Figure 23**. The Ajax Water Supply Plant has one of the larger stormwater outfalls (**Figure 24**) that is located along the Ajax waterfront.

Through the use of GIS data provided by the Town of Ajax, TRCA assessed the exposure and consequence of failure for underground infrastructure, trails, sidewalks, lighting, municipal buildings, tress and other existing structures along the Ajax waterfront to determine erosion risks. The proximity to these items (the Waterfront Trail, existing light fixtures, existing benches, and existing buried infrastructure) was considered in identifying locations for erosion hazard monitoring.

Hazardous Lands/Sites

There are no hazardous lands within the project limits.

Figure 23. Infrastructure exposed along the Ajax waterfront. *Source: TRCA, 2021*.

Figure 24. Stormwater outfall located near the Ajax Water Supply Plant. *Source: TRCA, 2021.*

4.0 EROSION RISK MONITORING AND PRIORITY AREAS

4.1 Coastal Assessment

As part of our mandate to prevent, eliminate or reduce the risk to life and property from flooding and erosion, TRCA monitors the condition of shoreline erosion in its jurisdiction (where funding has been provided) through the Erosion Risk Monitoring Program (ERMP). Accelerated and continuing erosion is identified, monitored and recorded for public health and safety hazards. If erosion hazards are deemed severe enough, TRCA may decide to undertake repairs of the structure or rehabilitation of the area. Based on regular monitoring through the ERMP, TRCA plans and implements major maintenance and remedial flood and erosion control work on a priority basis to the limit of available funding each year. The City of Toronto, Region of Peel and York Region are all currently monitored by TRCA's ERMP on an annual basis, however this program is not yet established within the Town of Ajax.

An initial assessment was completed by TRCA and Baird to identify the highest priority areas based on past, current, and predicted erosion and flooding along the Ajax shoreline. The shoreline was outlined for a variety of years between 1967 and 2020, depending on the clarity of the historic photos available.

In addition to the desktop shoreline assessment, Baird also completed several other analyses to further refine their assessment, including:

- Visual assessment of the shoreline conditions
- Determine nearshore wave conditions and their impact to the shoreline through wave runup and overtopping
- Consider the effects of climate change on future erosion rates
- Review longshore sediment transport modelling

The shoreline was divided into 5 Reaches of similar wave conditions and erosion rates, as shown in **Figure 25**. Each reach was assigned an average annual erosion rate based on long-term impacts. In addition to this, TRCA performed an assessment on the short-term impacts based on more recent comparisons between 2015 and 2019 using LiDAR data to accurately measure the top of the shoreline even when aerial photos were less clear. The short-term erosion rates were determined on a site-by-site basis rather than a reach basis as their impacts are more localized than the long-term erosion rates. These are summarized in **Table 2** below.

Table 2. Annual erosion rates along the Ajax shoreline. *Source: Baird, 2021 and TRCA, 2021.*

Reach	Long-Term Erosion Rates (Baird)	Short-term Erosion Rate Range (TRCA)
A	0.34 m/year	0.0 – 2.00 m/year
B	0.41-0.50 m/year	
C	0.13 m/year	
E	0.12 m/year	

Figure 25. Limits of shoreline reaches. *Source: Baird, 2021.*

The short-term erosion rates are higher and more variable than the long-term erosion rates and can be used to show the areas most likely to experience more aggressive erosion, called “hot spots”. Baird also provided examples of the projected top of bank location for 2040 and 2070 using their assessment. These locations are shown in **Figure 26**. Note that these projections are limited as they do not consider the stable slope position, which would require physical data collection (i.e. boreholes) to fully identify. These protections assume no shoreline protection is implemented and would be considered a “do nothing” option.

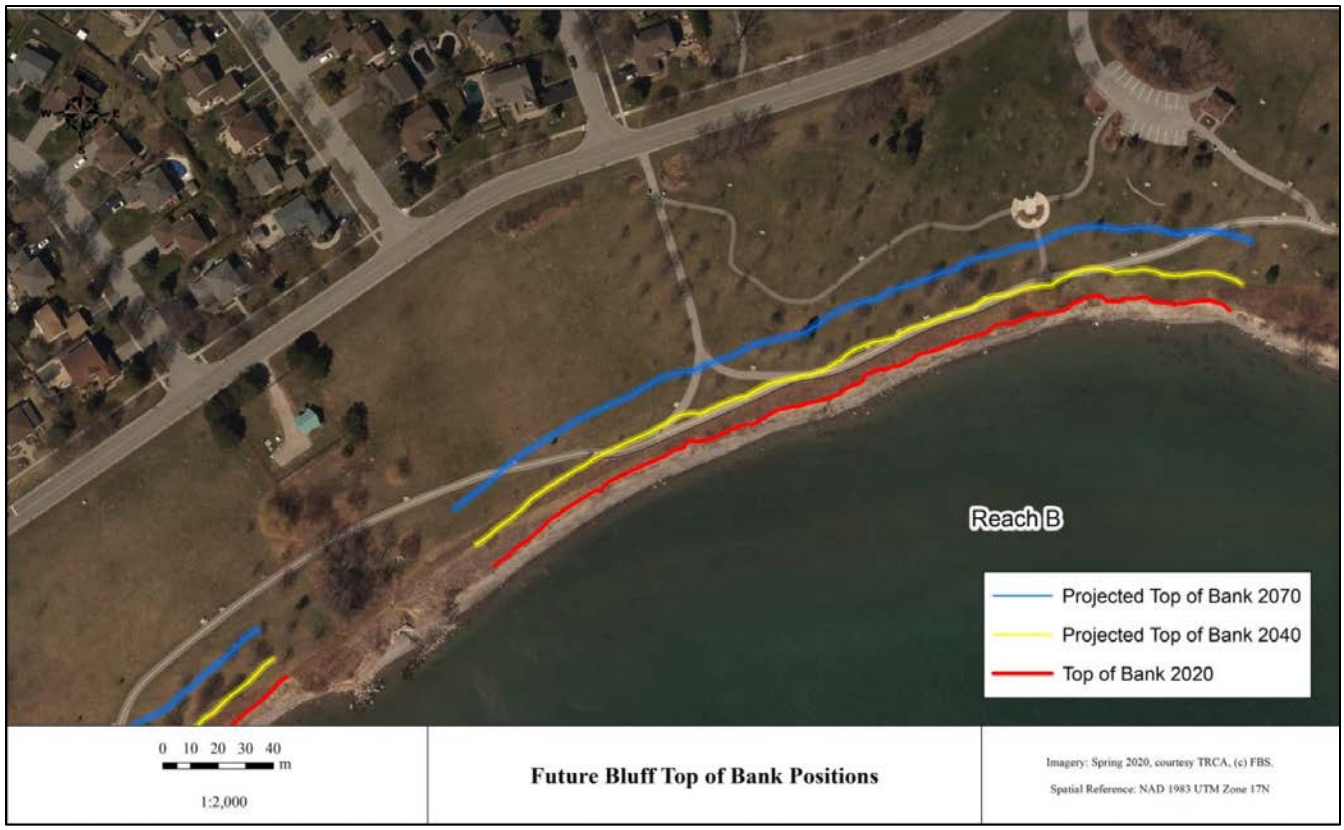

Figure 26. Top of bank projections for Reach B. *Source: Baird, 2021.*

Through this assessment, a total of 13 sites were identified as being at risk and flagged for erosion hazard monitoring. Seven of these sites were identified for boots on the ground inspection, and the remaining six use Remotely Piloted Aircraft System (RPAS) photogrammetric models to perform the inspection. The location of these sites is shown on **Figure 27**. Benefits of the RPAS technique include covering a larger area in a shorter amount of time, so this technique is especially useful for sites that are large enough to require multiple monitoring stations to accurately reflect the erosion rates.

Figure 27. Sites identified for potential erosion risk monitoring through a ERM internal remote assessment process. Source*: TRCA, 2021*.

To allow for a fully comprehensive study of the shoreline, TRCA collected photogrammetry data using RPAS technology. This baseline assessment provides details on the conditions of the shoreline and allows for remote measuring of the rate of erosion throughout all parts of the shoreline. This information was used in the development of the priority areas identified above and can be updated in the future to document the shoreline recession accurately and remotely both in high-risk and low-risk areas.

4.2 Erosion Hazard Monitoring Records

TRCA conducts Erosion Hazard Monitoring inspections and prepares reports based on erosion hazards observed by staff during annual monitoring, or those flagged for inspection through members of the public or partnering municipalities or agencies. This monitoring is performed for each municipality in TRCA's jurisdiction based on the funding provided for the program.

Erosion Hazard Monitoring stations were determined using the results of the shoreline analysis described in **Section 4.1**. The annual erosion rates for both short-term and long-term erosion and the location of essential structures was used to determine sites that would be strong candidates for additional monitoring. These sites were ground-truthed to confirm whether a clear bluff crest could be identified within the site. Sites were then formally established as Erosion Hazard Monitoring sites by TRCA's Erosion Risk Management monitoring program. Of the thirteen sites initially identified through desktop review, ten were formally added to TRCA's in-house Stream Erosion and Infrastructure Database.

Monitoring stations were established at each site by using a fixed location (i.e. edge of asphalt path, light post) or a galvanized steel pin. The closest distance from the edge of the shoreline to the reference point was measured and recorded. Staff also documented the slope angle, performed a visual assessment of the soil stratigraphy, and reviewed the site for signs of erosion such as gullying, scouring, or toe erosion. Photos of the site were taken on the ground and in the air using a micro drone. Inspections were completed on October 27, 28, and November 3, 2021.

Sites H, J and M were identified as not requiring Erosion Hazard Monitoring records due to site conditions not triggering the minimum thresholds required for erosion hazard sites. This can happen when the infrastructure risk is too far away to accurately measure, or the slope angle is too shallow such that the top of slope is ill-defined.

Each record is given a priority score, which is determined by considering several parameters that may impact the stability of the slope, including:

- Slope angle, bank height, and stratigraphy
- Percent cover of vegetation on the slope
- Signs of recent mass movement and potential for future instability
- Evidence of cutting action, seepage, and gullying
- Proximity to structures and whether structure is essential or moveable

These parameters are assessed visually and can be completed on site or through RPAS point cloud data and 3D models. Each category has a score automatically generated based on the reported conditions, and these scores are added to produce a total number out of 100.

A site with a score of 70 or greater typically reflects a high priority site where remedial action is expected to be required within five years from identification. A site with a score between 60 and 69 reflects a medium priority site where there is no immediate risk to public safety or essential infrastructure. A site with a score of 59 or less is considered a low priority site where the risk to public safety or essential infrastructure appears to be long-term. The priority ranking scores for the Ajax shoreline range from 32 to 47, indicating that all sites identified have a long-term risk to the infrastructure, even though they may be experiencing active erosion in the short-term.

A summary of each Erosion Hazard Monitoring site is shown in **Table 3**.

Table 3. Summary of Erosion Hazard scoring and proximity for each Erosion Hazard Monitoring site. *Source: TRCA, 2021.*

Site ID (Report)	Site ID (SEID)	Priority Ranking Score	Closest Distance to Asphalt Path	Notes
A (RPAS)	EMS988	35	18.8 m	• Undercut backshore, rilling • Orange fence installed at active scour
B	EMS982	47	3.8 m	• Small gully with actively flowing water • Active discharge from small clay pipe • Undercutting
C	EMS981	35	4.7 m	• Signs of recent movement on the slope • Signs of active seepage
D*	EMS979, EMS980	36	5.1, 6.5 m	• Signs of active seepage; rilling • Slumping on bluff face • Bluff crest is undermined
E (RPAS)	EMS983	34	2.85 m	• Fallen trees show recent movement • Crest of bluff is undercut
F (RPAS)	EMS984	34	2.4 m	• Signs of recent movement along toe • Crest of bluff is undermined
G (RPAS)	EMS985	40	3.25 m	• Signs of rilling and active seepage
H	(No Erosion Hazard)	N/A	N/A	• No Erosion Hazard identified at this site; informal shoreline protection present • Minor outflanking around outfall wingwall • Bluff erosion noted east and west of project area however there is no proximity to the park path; continual monitoring using RPAS may be used to assess ongoing erosion for these areas
I (RPAS)	EMS986	39	4.0 m	• Undercut bluff • Rilling and active seepage
J	(No Erosion Hazard)	N/A	N/A	• Rip rap drainage swale present • No Erosion Hazard identified at this site; gradual slope
K	EMS978	35	4.1 m	• Active erosion extended beyond limits of desktop analysis • Slope crest is undermined • Active flowing water (pipes) and seepage present • 3 exposed culvert outlets
L	EMS977	32	6.9 m	• Slope crest is undermined • Minor rills present • Signs of recent slumping • Informal shoreline protection
M (RPAS)	(No Erosion Hazard)	N/A	N/A	• No Erosion Hazard identified

* Site D was divided into two Erosion Hazard Monitoring sites due to the large size. Adding another station allows better representation of deficiencies on plan views.

Figures 28 through 32 show examples of some of the types of data represented in each Erosion Hazard Monitoring record.

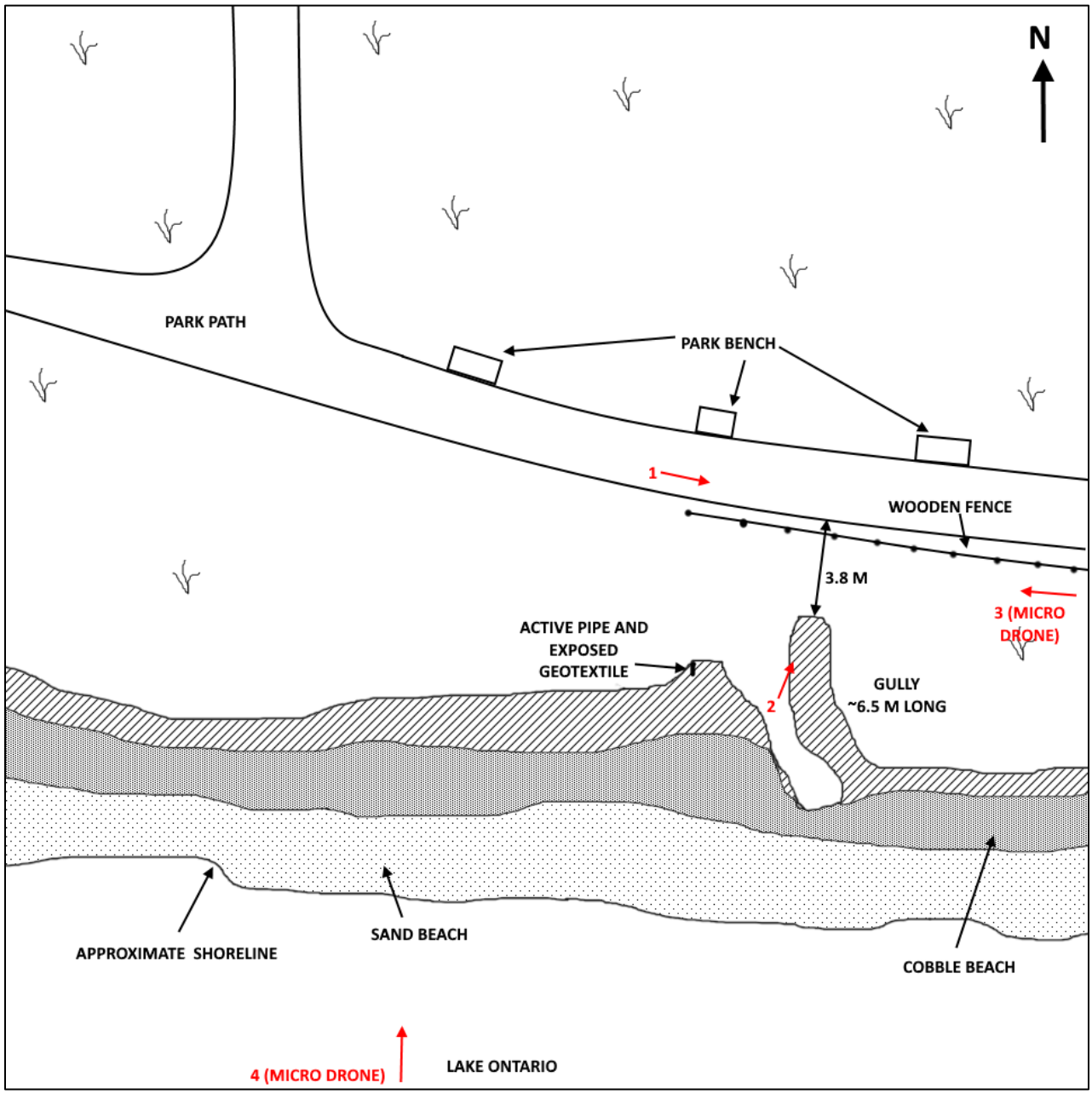

Figure 28. Plan drawing of Site B (EMS982) showing location of deficiencies, proximity to the park path, and the location of photos (in red). *Source: TRCA, 2021.*

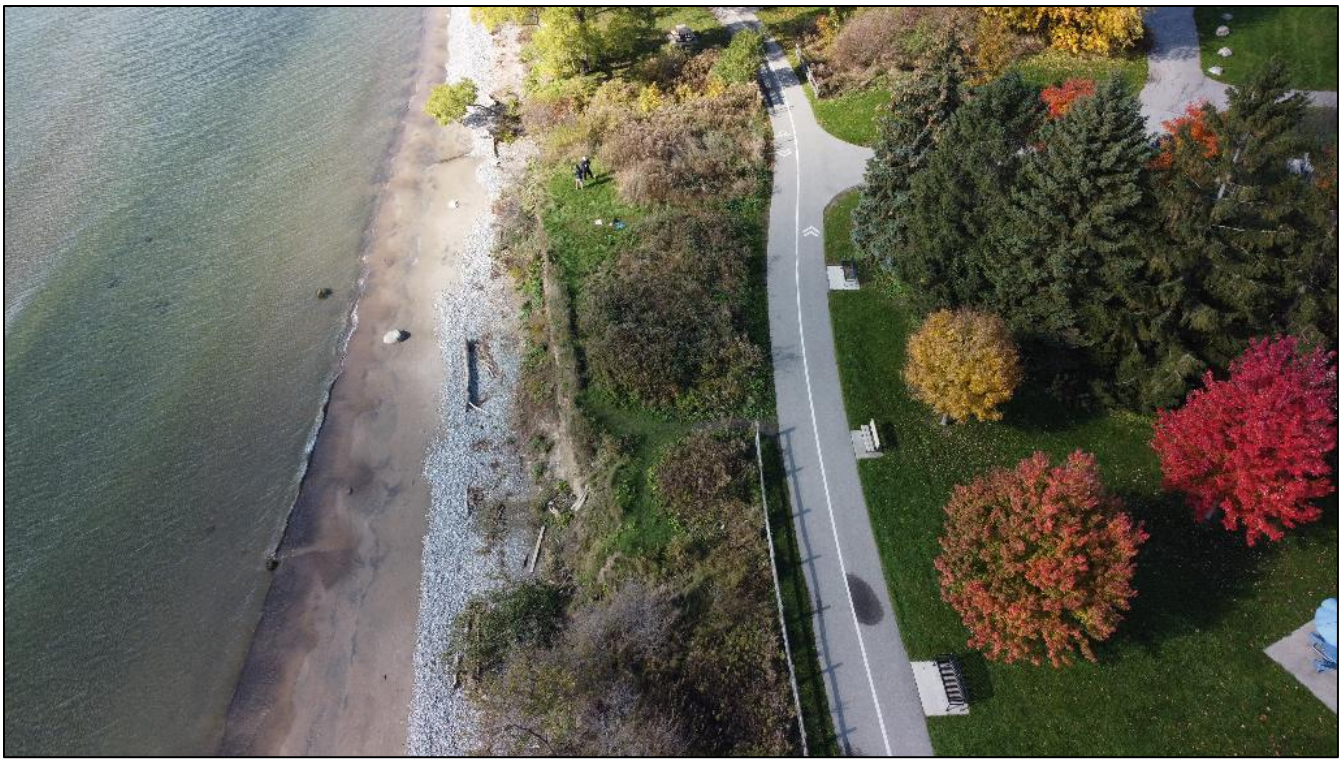

Figure 29. Microdrone imagery of Site B (EMS982) showing proximity of park path to existing shoreline. *Source: TRCA, 2021.*

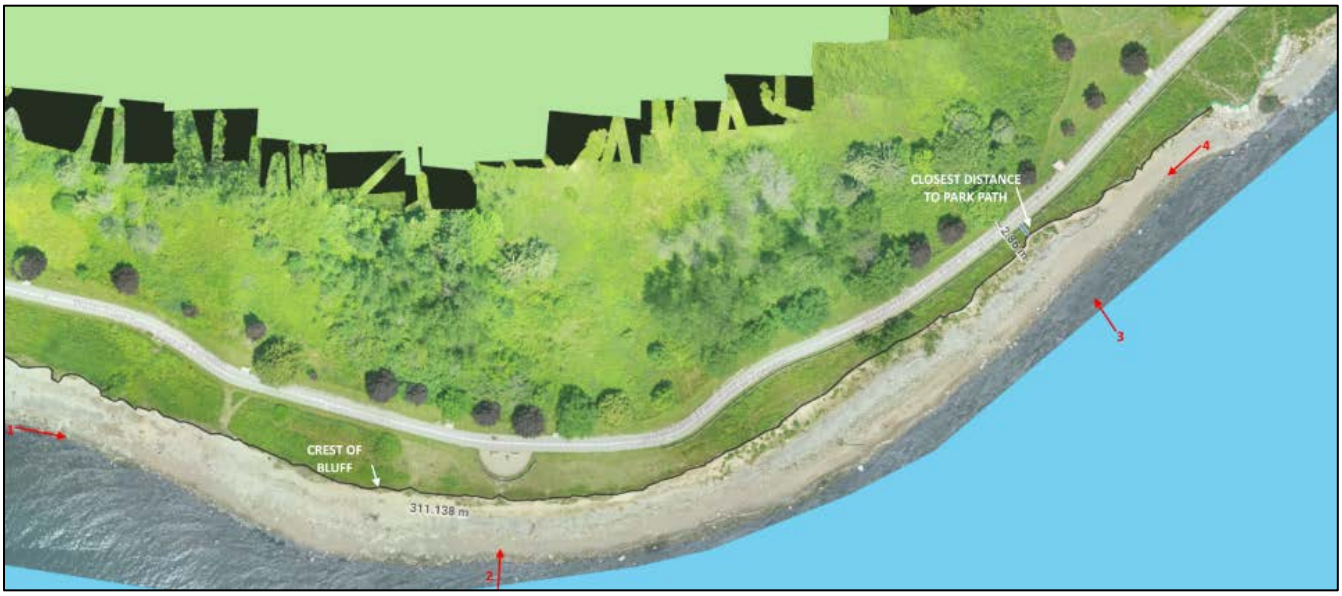

Figure 30. 3D model of RPAS photogrammetry data used to create a plan view of the deficiencies and photo locations for Site E (EMS983). *Source: TRCA, 2021.*

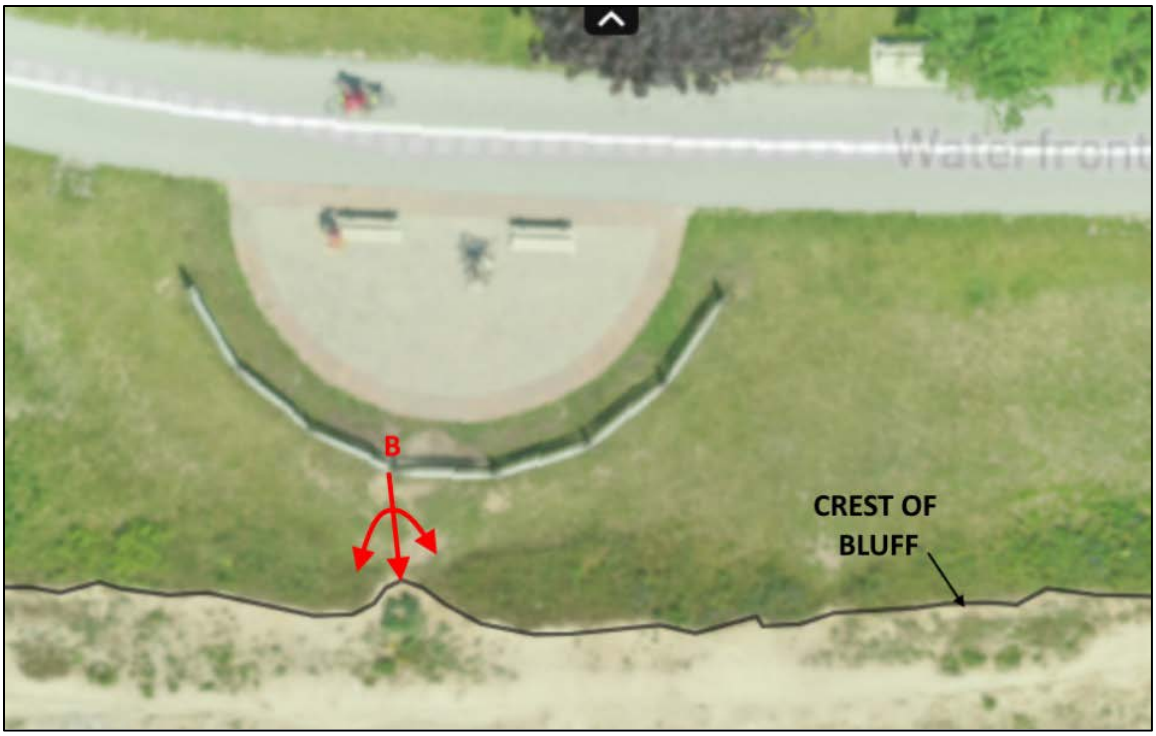

Figure 31. Example of monitoring station establishment for the RPAS Sites using point cloud data and imagery overlaid on a generated 3D model. For Site E (EMS983), monitoring station B was set up at the edge of the fence line and measured to the bluff crest. *Source: TRCA, 2021.*

Figure 32. Photo of monitoring station B for Site E (EMS983) using RPAS technology. *Source: TRCA, 2021.*

TRCA has been monitoring active Erosion Hazard sites along the Lake Ontario shoreline in other municipalities; approximately 70% of these active sites are inspected annually. Annual inspections would be performed in the same way as the initial inspection, and updated measurements would be recorded and compared with the previous year. When a site is first established, both a monitoring record and a station record are established to track and record the annual changes at each monitoring station. An example of a station record is shown in **Table 4**.

A copy of the detailed inspection records, site photos, and photogrammetry data can be found in **Appendices E and F**.

Table 4. Example of annual Erosion Hazard Monitoring Station records for a Lake Ontario Erosion Hazard Monitoring site. *Source: TRCA, 2021.*

DATE	EROSION STATION				SLOPE ANGLE (DEG)	COMMENTS	INSPECTED BY		QC BY
	A		B						
	DIST(m)	RATE(m/yr)	DIST(m)	RATE(m/yr)					
2017-05-03	0.8		5.25			A scour (4.2 m in length) is located south of parkette. A second scour (2.1 m in length) is located along southern portion of parkette; putting park bench at risk (closest distance is 0.8 m). A third	AJ	DL	AJ
2018-06-08	0.7	0.1	3.9	1.35		Major movement has occurred along the scour located adjacent to the northern portion of the parkette, causing an 8 ft section of the wood fence to collapse. The scour located adjacent to	DL	RC	AJ
2019-07-30	0.7	0	3.9	0		No movement was observed since the previous inspection. A scour that measures 4 m in length is located north of 1.35 m diameter outfall and surficial erosion was observed along tableland	DM	AM	AJ
2020-08-25	0.2	0.5	3.5	0.4		Minor movement was observed since the previous inspection. A scour that measures 4 m in length is located north of 1.35 m diameter outfall and surficial erosion was observed along tableland	SDe	AW	
2021-05-11	0.2	0	3.5	0		No movement was observed since the previous inspection. A scour that measures 4 m in length is located north of 1.35 m diameter outfall and surficial erosion was observed along tableland	SH	FX	

4.1 Recommendations

Based on the visual computational assessments completed, a set of recommendations was provided by Baird and supplemented with Erosion Hazard Monitoring Records prepared by TRCA. The recommendations are divided based on the conditions of the shoreline, and whether there is essential infrastructure located in proximity to the erosion hazard.

For beach areas (i.e. Reach D), no formal erosion control or monitoring is recommended. Should erosion control structures be added along other reaches, consideration should be given to the impacts on the local sediment transport to ensure the sediment supply is not restricted. Should erosion control structures eventually be required in this area in the long-term, a series of offshore breakwaters or small groynes should be used in addition to beach fill.

For bluff areas (i.e. Reaches A, B, C, and E), it is recommended to refrain from hardening the shoreline except where no other options exist. The natural buffer between the existing shoreline and the limit of development provides short-term and long-term protection, and natural erosion processes should be allowed to continue wherever possible. This may include relocating the park path where possible. Should hardening be required to preserve greenspace, or in areas where infrastructure cannot be relocated, the recommendation is to consider offshore breakwaters or toe protection with a minimized footprint to maintain the sediment transport features of the naturally eroding bluffs.

For the existing corrugated steel pipes located throughout the shoreline, it is recommended that the pipes be shortened and additional protection is added to prevent continued localized erosion.

For sites A-G, I, K, and L, it is recommended that the Town of Ajax participate in an annual monitoring program, which can help provide information on changes in local erosion rates and can assist in determining an appropriate schedule for implementation of future works. Annual data collection will also allow for further refinement of the calculated annual erosion rates and provide feedback on whether these rates are accelerating compared to historic or predicted values.

5.0 CLASS EA PROCESS

As part of the Shoreline Assessment and Gap Analysis, TRCA has identified items that were beyond this scope of work but will be required to satisfy a Class EA. These gaps identified during the baseline data collection and analysis phases are presented in **Sections 3.0 and 4.0** above.

This section outlines some of the communication, outreach, and design initiatives that would be undertaken by TRCA in support of a complete a Municipal Class or Conservation Class Environmental Assessment process. The EA process shall be determined by the Town of Ajax with support from TRCA. A Conservation Class EA would allow TRCA to be the main proponent, with a focus on reach-based shoreline erosion protection. The Municipal Class EA would be jointly submitted between TRCA and the Town of Ajax, and would focus more on site-specefic infrastructure protection.

5.1 TRCA's Involvement in Class EA Process

TRCA has a primary goal to carry out remedial erosion control works as set out in **Chapter 27, 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 goal, CAs 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 will fall under the protection component of the ESCP, which is designed to protect lives and minimize loss of property through the construction of suitable remedial works.

Should a Municipal Class Environmental Assessment process be selected, TRCA will work with the Town of Ajax as a co-proponent to facilitate the Class EA.

5.2 Evaluation of Alternatives

TRCA would retain a coastal engineer to develop conceptual design alternatives during the EA phase. The information obtained in the baseline inventory (supplemented with the identified data gaps) will be used in the evaluation of the preliminary alternative options, giving specific consideration of the advantages and disadvantages of each method. TRCA would work with the coastal engineer to develop conceptual designs for site appropriate remedial alternatives. Each conceptual design would be examined and evaluated based on the types and extents of anticipated impacts, both positive and negative.

Once the preferred conceptual design is selected, a more detailed study will be completed which will predict the net impact should the preferred option be implemented. Should a net impact be negative, it will be

discussed in detail and include information on the cause and degree of effect. Information on how mitigative measures could be applied through the design process will also be determined at this stage.

The options and their impacts would be presented through community outreach initiatives and documented in the Class EA Report.

5.3 Public Notifications and Consultation

In accordance with the Class EA process, TRCA would be responsible for facilitating and documenting information sharing initiatives with the public and other stakeholders. This includes establishing a Community Liaison Committee (CLC) to assist in reaching out and maintaining contact with community residents, groups, associations and organizations. Public consultation will be used to allow input on the design alternatives, particularly as it pertains to the physical, biological, cultural, and socioeconomic environments.

TRCA would also be responsible for filing the EA Report for a 30 day review period and circulated digitally to the CLC. Following the 30 day review period of the report and the successful resolution of any concerns received during the review period, TRCA would finalize the detailed design of the preferred solution. A Notice of Project Approval and a Notice of Project Completion would be sent to all parties who expressed an interest in the Project, in addition to the other agencies identified within the Class EA process (e.g. Conservation Ontario, MECP, etc.)

Consultation with indigenous communities shall be initiated prior to delivery of any notifications. A summary of the communications shall be documented and provided in the Class EA Report.

5.4 Cost Estimate

A detailed cost estimate was prepared using the information gaps identified through this report and comparisons with previous Class EA projects TRCA has coordinated. Included in the estimate is the collection of supplemental baseline information as identified in this report, procuring and managing a coastal engineering contract for conceptual design and evaluation, preparation and management of a Class EA and associated reporting, and general project management activities.

Table 5. Summary of Cost Estimates for Class EA Phase. *Source: TRCA, 2021.*

Item	Estimated Cost
1. Baseline Data Collection	$27,000.00
2. Project Planning and Contract Management	$33,000.00
3. Class Environmental Assessment	$110,000.00
4. Coastal Engineering Contract	$137,000.00
Subtotal	$307,000.00
Contingency	$30,700.00
Total	$337,700.00
HST	$43,901.00
Less municipal HST rebate	($37,957.48)
Proposed Budget	$343,643.52

This estimate is for information purposes only and is subject to change due to inflation, changes in scope or existing conditions, among others.

6.0 SUMMARY

TRCA undertook a detailed shoreline assessment and gap analysis to collect and summarize existing and new baseline information, identify and assess priority erosion risk areas, and to provide recommendations for future assessments or remediation at priority sites.

After completing a desktop review of all available information related to the project area, summaries of the existing information were added to this report. Highlights from the previous studies included TRCA's monitoring programs for ELC, flora, and fauna; engineering reports describing the water quality data; and the Lake Ontario SMP which provided overarching recommendations and guidelines on how to approach shoreline remediation within adjacent conservation authorities.

This baseline data was then compared to the baseline data that would be required for an Environmental Assessment report. Data was considered under the Class EA required categories of physical, biological, cultural, socioeconomic, and engineering/technical environments and presented in the report, with data gaps identified within each section.

Data gaps included updating ELC and terrestrial data, performing Stage 2 Archaeological assessments once disturbance limits are known, and identifying discrete impacts to each of the categories when discrete project activities are established.

A coastal analysis was completed both by Baird and TRCA to establish current and predicted annual erosion rates. Baird analyzed the coastal conditions, identified the long-term erosion rates, and divided the shoreline into reaches based on similar annual erosion rates. TRCA determined the short-term erosion rates and identified priority sites based on both long-term and short-term erosion and proximity to existing structures. These sites were assessed and recorded in TRCA's Stream Erosion and Infrastructure Database.

Based on the information collected over the course of this study, recommendations were provided based on the individual reaches and priority sites. It is preferred to minimize hardened shoreline erosion control along all reaches, and to relocate structures where possible. Sites A-G, I, K and L are recommended for continued monitoring to document the changes in shoreline condition.

A Municipal Class or Conservation Class EA will be required in order to fully assess the impacts for areas where long-term mitigation is preferred (i.e. in areas where the path cannot be easily realigned, or where the preservation of greenspace is a high priority). Conceptual designs for remediation measures will be assessed and evaluated based on the categories noted above to select the most appropriate option.

7.0 REFERENCES

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8.0 APPENDICES

Digital copies of **Appendices A, B, C, D, E & F** are available through the following document link:

https://torontoregion-my.sharepoint.com/:f:/g/personal/whitney_brennan_trca_ca/Ep1yMGKeAuxAiGMuIlT9weIBAIRX-WdST_Lnc7wEd_kDBw?e=RckffH

If you require access, please contact:

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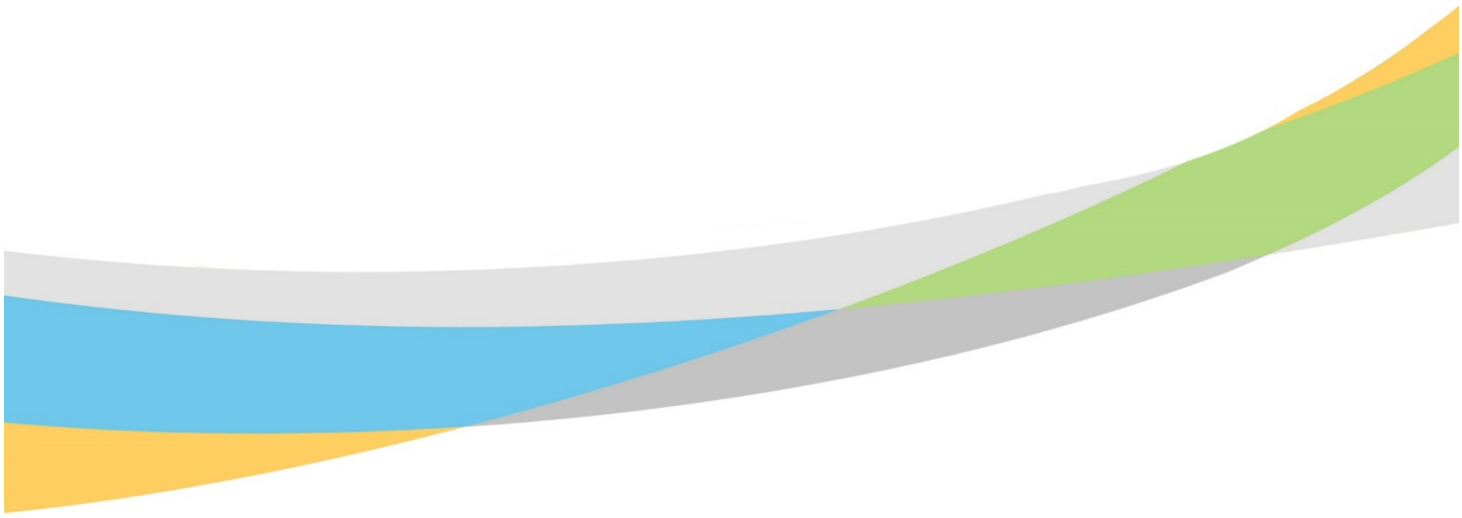

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