CLASS ENVIRONMENTAL ASSESSMENT FOR REMEDIAL FLOOD AND EROSION CONTROL PROJECTS

Ajax Shoreline Erosion Mitigation Project

Town of Ajax

ENVIRONMENTAL STUDY REPORT

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Executive Summary

Toronto and Region Conservation Authority (TRCA), with the direction from the Town of Ajax and support from W.F. Baird & Associates, has completed a Class Environmental Assessment ("Class EA") process for the Ajax Shoreline Erosion Mitigation Project.

The project is located along the Lake Ontario shoreline within the Town of Ajax, from Frisco Road to Ontoro Boulevard. Baseline data was collected beginning in 2021 to support the Class EA and its concept alternatives. Historic and updated information was used to determine the existing physical, biological, cultural, socio-economic, and technical conditions. Noteworthy features include presence of bank swallow habitat, low aquatic abundance/diversity, historic cemetery, and Provincially Significant Wetlands.

TRCA retained W. F. Baird and Associates to complete a coastal analysis, develop concepts, and to act as the technical lead in the concept evaluation. In order to break the 5.7km shoreline into more manageable pieces, Baird divided the shoreline into twelve reaches. Each reach has similar properties and existing conditions.

Six concept alternatives were developed ranging from harder, more traditional approaches (like revetments) to softer, more natural solutions (like cobble and boulder beaches). Multiple alternatives were recommended for each reach, with a preferred alternative identified. These alternatives were presented to the public, where feedback indicated a preference for softer approaches where possible, and concerns regarding the overall cost.

The alternatives were revised and narrowed down to two shoreline protection options. The Offshore Breakwater With Gaps option includes a hardened, off-shore structure intended to reduce wave intensity and decrease shoreline erosion. The Improved Cobble/Boulder Beach option expands on the original cobble/boulder beach by allowing a spectrum design approach, varying from more engineered and more robust, to less engineered and more natural. Public engagement will be an important component of detailed design development for the Improved Cobble/Boulder Beach as the concept is more variable than the other alternatives presented.

Additionally, Shoreline Erosion Monitoring was suggested to eliminate the need for shoreline erosion protection across three of the twelve reaches. Instead of erosion protection, it relies on a program to monitor erosion rates, safety concerns, and distance to critical infrastructure to support small-scale localized trail or drainage work. It can also support reaches where shoreline protection is recommended to update implementation priority as well as monitor shoreline protection effectiveness post-construction.

The revised concepts were evaluated in detail to determine the impacts associated with implementing the recommended alternative at each Reach. Offshore Breakwaters are recommended for two reaches, Improved Cobble/Boulder Beaches are recommended for four reaches, and Shoreline Erosion Monitoring is recommended for the remaining six reaches.

Reach 3 (Offshore Breakwater) and Reach 5 (Improved Cobble/Boulder Beach) are high priority sites with implementation recommended within the next 10 years. Implementation of all reaches will depend on available funding as approved by the Town of Ajax. Shoreline Erosion Monitoring should be approved as soon as funding is available to support future implementation.

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1.0 INTRODUCTION

Toronto and Region Conservation Authority (TRCA), in partnership with the town of Ajax, is planning to implement long-term erosion protection and mitigation along the Lake Ontario shoreline that falls within the Ajax waterfront. In preparation for any shoreline protection work, TRCA undertook a Gap Analysis and Environmental Assessment.

The Gap Analysis consisted of compiling and assessing existing data for the Ajax waterfront; any areas of research which needed to be updated or further explored were identified in order to fully assess erosion concerns along the shoreline and develop design recommendations. Once the Gap Analysis was complete, TRCA and the Town of Ajax began two rounds of public and stakeholder consultation to refine concept alternatives and gather feedback on the project. The consultation process included two rounds of three separate meetings: a Technical Advisory Committee meeting, Community Liaison Committee meeting, and a Public Information Centre. Indigenous groups were also explicitly consulted as part of the Environmental Assessment process. The details of those meetings and Indigenous consultation are found in this report, which represents the culmination of the Environmental Assessment process.

This Environmental Study Report has been prepared as documentation of the decision-making process exercised when selecting the preferred measure(s) for carrying out the proposed remedial work. This Environmental Study Report includes:

- The situation or problem to be addressed, including the causes and history of the problem;
- The alternative methods for the remedial work, as well as the alternatives to the remedial work;
- The preparation of a baseline inventory to provide the information needed to evaluate the alternative methods and the alternative to the works;
- An examination of a full range of alternative remedial measures and the alternatives to the remedial measures. Advantages and disadvantages of each alternative are considered in the analysis, including a “Do Nothing” option;
- A description of the environment that will be affected, whether directly or indirectly, by the remedial works, and the effects that the remedial works can be expected to have on that environment;
- Identification of methods for avoiding or mitigating negative impacts to the environment;
- An evaluation of the advantages and disadvantages to the environment for each alternative;
- A record of consultation with interested persons, aboriginal communities, government agencies, and community groups; and
- An outline of monitoring program which will commence upon completion of the work.

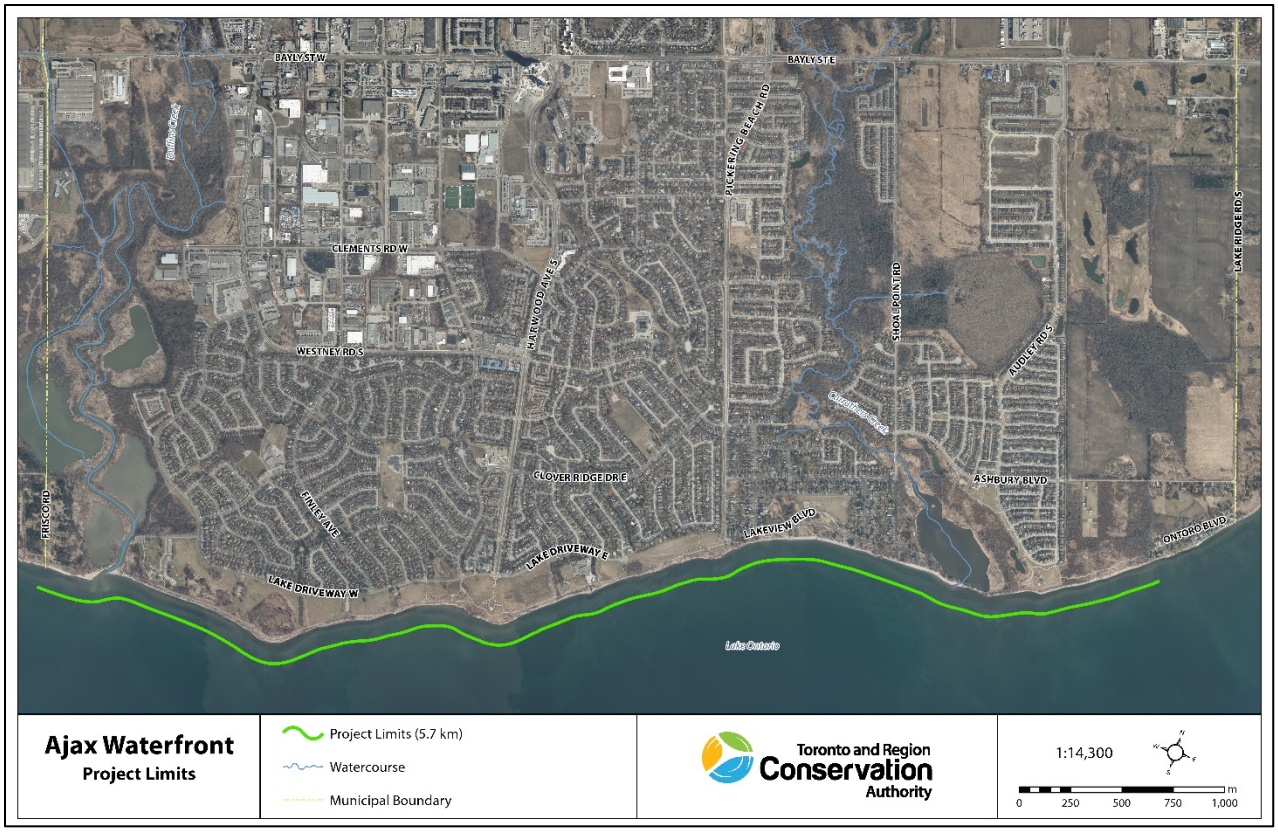

Figure 1. Ajax Waterfront Shoreline Erosion Mitigation Project limits along 5.7 kilometers of shoreline from Frisco Rd to Ontoro Blvd in Ajax, ON. *Source: TRCA, 2019*.

1.1 Relationship of the Undertaking to the Environmental Assessment Act

TRCA is defined as a public body in Section 3 of Regulation 334/90 in the *Environmental Assessment Act (R.S.O. 1990)* (EA Act) and must conduct its remedial flood and erosion control projects in accordance with said Act. While TRCA in partnership with the Town of Ajax had the option of pursuing a Municipal Class Environmental Assessment, the strong emphasis on erosion and flood processes and protection led TRCA to the decision to proceed with a Conservation Class Environmental Assessment.

Recognizing that common elements exist in addressing flood and erosion problems, a coordinated approach to environmental assessments was developed by Conservation Ontario (CO) in 1993 for use by all of the Conservation Authorities (CAs), referred to as the Class Environmental Assessment for Remedial Flood and Erosion Control Projects (Class EA) (amended 2024). This project was completed in accordance with the Class EA process and aligns with the following excerpt from 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.

> Conservation Services and Wetland Management Programs that support the Water and Land Management Policy Area primarily carry out the Conservation Authorities' land management interests. However, these activities also have direct benefits to the Conservation Authorities' role in water management. (CO, 2024)

Over thirty years of experience have demonstrated that using the Class EA approach is an effective way of complying with the EA Act's requirements. Approval of the Class EA allows CAs to carry out these types of projects without applying for formal approval under the EA Act on the condition that all other necessary federal and provincial approvals are obtained (CO, 2024). A chart illustrating the key steps of the Class EA planning and design process is shown below in **Figure 2**.

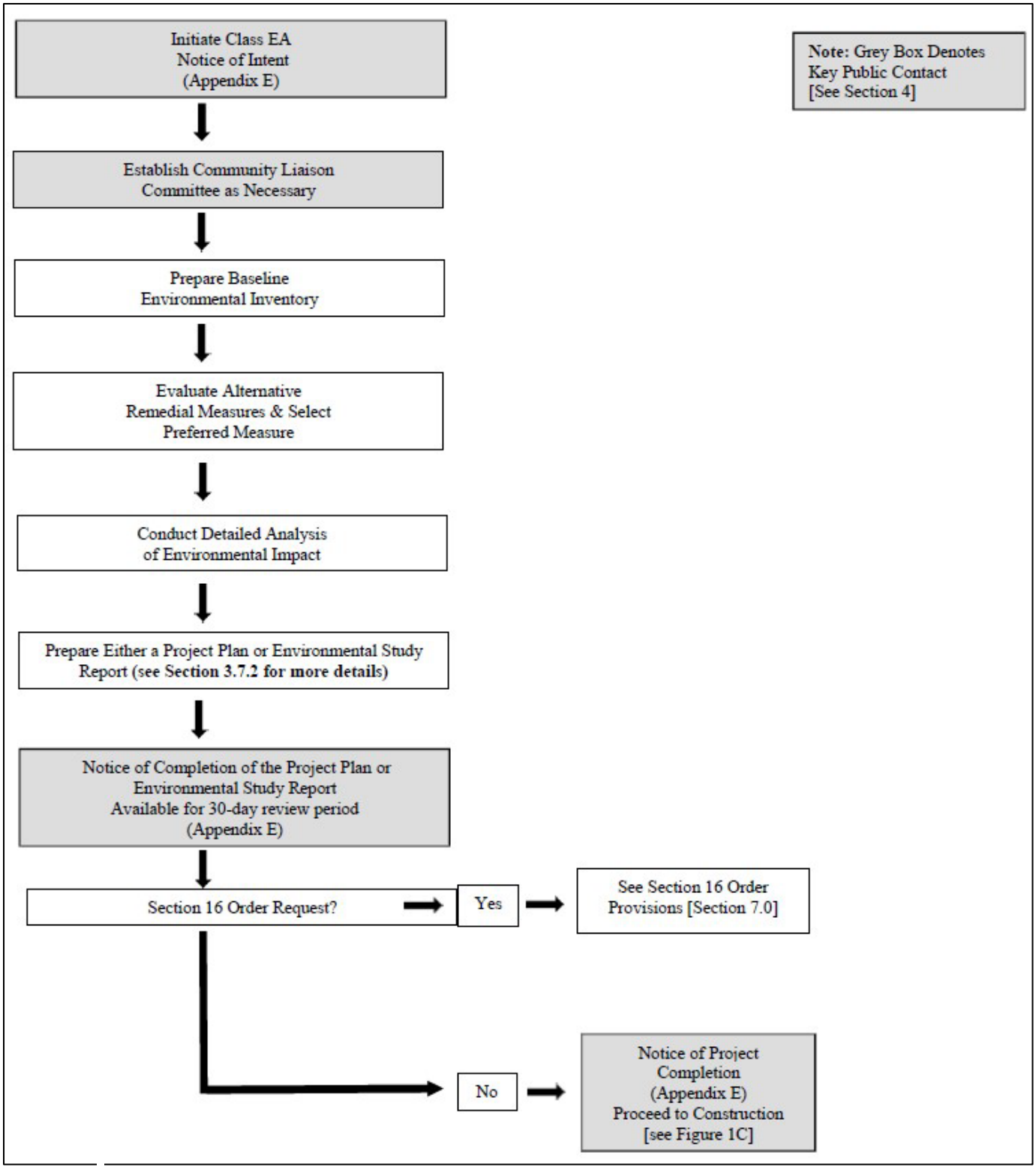

Figure 2. Class EA Planning and Design Process. *Source: CO, 2024.*

1.2 Purpose of the Undertaking

The Ajax Shoreline Erosion Mitigation Project (hereafter referred to as “the project”) has been undertaken to develop remedial and preventative erosion protection along the Ajax shoreline. The overall objective is outlined in more detail below:

A. Identify Erosion and Flood Risk Areas

Through the Gap Analysis phase of the project, the project team studied the entire shoreline to identify areas of vulnerability in the short and long-term. Historic data as well as a costal analysis of current conditions by W.F. Baird and Associates (Baird) contributed to the understanding of where shoreline protection work was most needed, and ideas of how to effectively address hazardous erosion.

B. Develop Alternatives to Address Erosion and Balance Stakeholder Objectives

The second purpose of the project was to develop erosion mitigation alternatives tailored to areas of concern along the Ajax waterfront shoreline and balance those with identified stakeholder objectives. Design directions incorporated the perspectives of experts within relevant fields, community leaders and the public in tandem with data collected through coastal analysis. Public consultation helped to guide evaluation in the following criteria:

- Physical;
- Biological;
- Cultural;
- Socioeconomic; and
- Technical/Engineering.

The project team and consultant collaborated on concept design evaluation and moved forward with the selection of final alternative recommendations for each reach to be presented and finalized in the second round of Public Consultation.

C. Informed Future Project Design

Following the publication of this report, the public and municipal partners at the Town of Ajax will have access to information gathered and refined during the EA process to plan future erosion mitigation projects along the Ajax Waterfront Park.

1.3 Description of the Study Area

The project area spans the length of the Ajax Waterfront Park shoreline 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. Major roads leading to the park include Harwood Avenue South and Pickering Beach Road, which connect to Lake Driveway West and Lakeview Blvd.

Historically, the Ajax waterfront was used primarily for agricultural purposes. During the late 1960s, on the eastern boundary near Paradise Park, a residential development was constructed within 50m of the shoreline at its closest point. Development of the residential community continued to expand westward through the 1970s; during this stage of development, the 100-300m buffer area that became Ajax

Waterfront Park was established between the residential development and Lake Ontario. A water supply plant was constructed alongside residential development in the late 1970s and still operates south of Lake Driveway East opposite Lawrie Road.

There are a number of public and environmental landmarks at Ajax Waterfront Park; public landmarks refer to playgrounds, gardens, and recreation areas like Paradise Beach and Rotary Park Pavilion, while environmental landmarks refer to significant coastal wetlands. The location of these public and environmental landmarks is shown on **Figure 3**.

Figure 3. Location of project area and notable features along the Ajax waterfront. *Source: TRCA, 2024*.

In addition to public and environmental landmarks, the Waterfront Trail, a multi-use paved trail parallel to Lake Ontario, runs through Ajax and extends into Pickering and Whitby. The natural shoreline consists mostly of bluffs (small, steep cliffs), sand beach (shoreline mainly comprised of sand) and cobble boulder beach (shoreline made of stones which vary in size from pebbles to boulders). See **Figure 4 - Figure 6** for examples of these types of shorelines. Informal access to the sand and cobble beaches occurs in several places along the shoreline and is used by the public in addition to the formal Paradise Beach area.

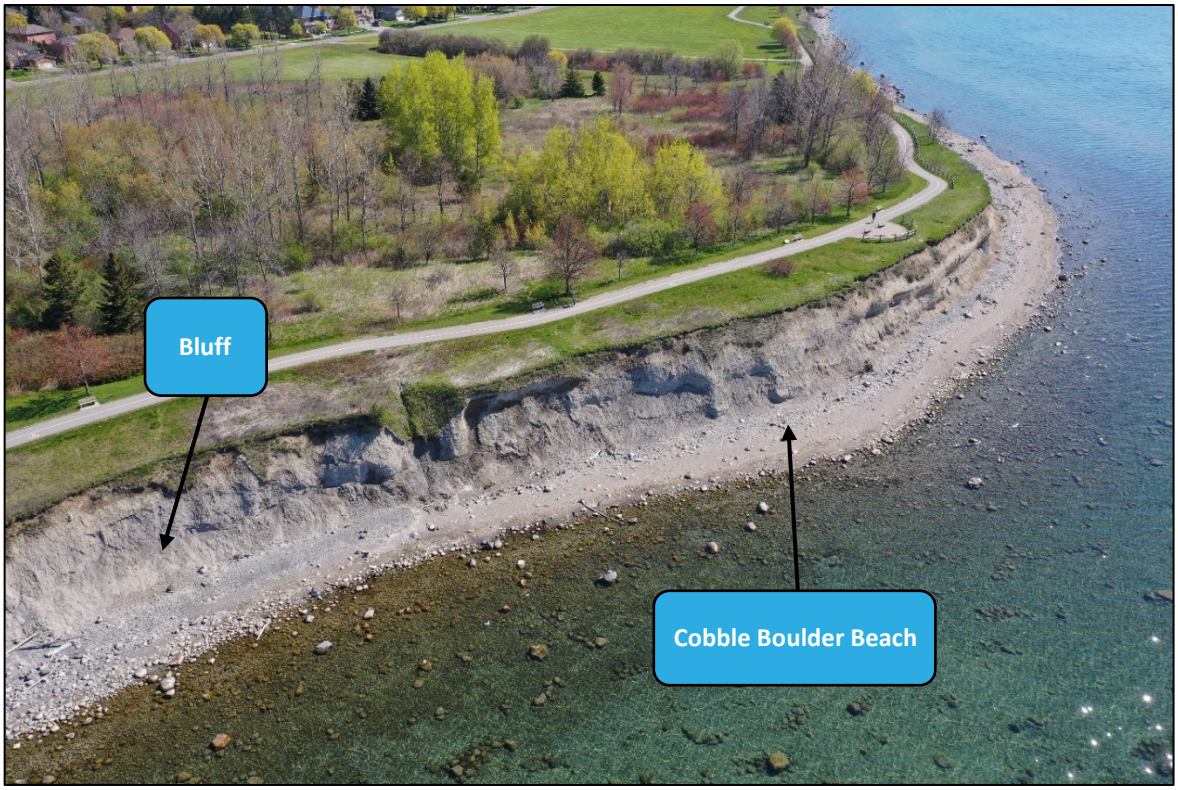

Figure 4. Aerial view of the shoreline at Lion's Point, near Rotary Park. *Source: TRCA, 2021.*

Figure 5. Aerial view of the shoreline at the eastern end of Lake Driveway East. *Source: TRCA, 2021.*

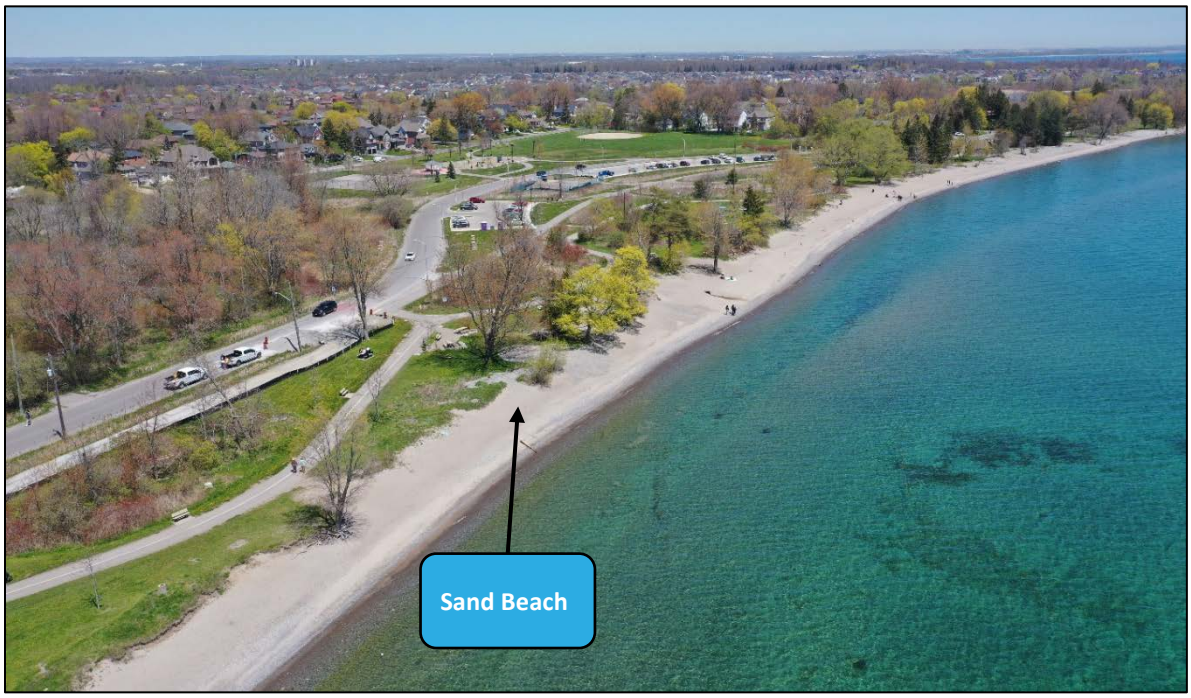

Figure 6. Aerial view of Paradise Beach and Park located between Pickering Beach Road and Shoal Point Road. *Source: TRCA, 2021.*

There are three playgrounds along the Ajax waterfront that contribute to park Public Landmarks: Rotary Park, Paradise Park, and Lakeside Neighborhood Park. Rotary Park includes a playground and concession stand that attract the public and local community. Paradise Park has recently constructed a playground and pavilion that accompany a tennis court and baseball diamond. Lakeside Neighborhood Park includes a playground in addition to providing a large greenspace for the community.

Along with the Public Landmarks identified in **Figure 3**, there are two major Environmental Landmarks within the project area: Duffins Creek Marsh and Carruthers Marsh (**Figure 7**). These marshes provide important habitat for local fauna and aquatic species. There is significant public interest in protecting these spaces which is reflected in design recommendations.

Figure 7. Aerial view of the shoreline at Carruthers March, one of the two Environmental Landmarks in the project area. *Source: TRCA, 2021.*

1.4 Project Timeline

The Environmental Assessment process was divided into distinct phases culminating in this report and project approval. Those phases are outlined in **Figure 8** and expanded upon in later sections.

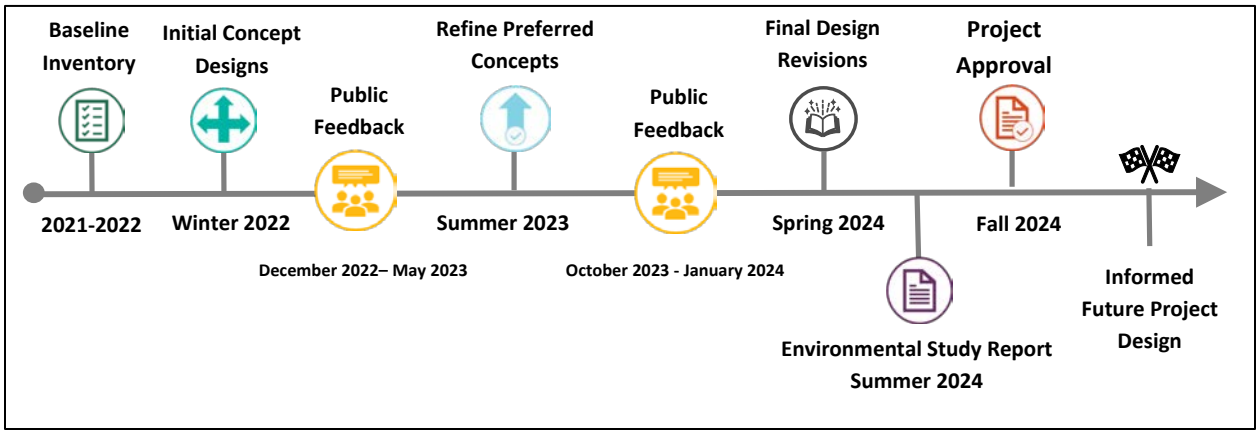

Figure 8. Environmental Assessment Milestone Timeline. *Source: TRCA, 2023.*

Milestones in the Environmental Assessment process included the **Gap Analysis Report**, which compiled all information collected during the Gap Analysis phase.

After the Environmental Assessment was formally initiated, initial alternative designs were created. Two rounds of public engagement were undertaken to gather feedback on proposed alternatives and project plans to refine alternatives before issuing this Environmental Study Report.

1.5 General Description of the Undertaking

There are four situations in which remedial flood and erosion control projects may be undertaken within the Class EA framework:

1. Riverine flooding
2. Riverine and valley slope erosion
3. Shoreline flooding
4. Shoreline erosion

Shoreline erosion is the focus of the project. 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 narrowed in places due to bluff erosion creating concern for the public and a potential long-term threat for park infrastructure. Through the Environmental Assessment process, TRCA and the Town of Ajax determined preferred mitigation measures that will restore or protect infrastructure and public greenspaces that are at greater risk while incorporating feedback from the public.

In accordance with the Class EA planning process, a full range of alternative solutions must be developed, including both traditional and innovative approaches. The type and range of alternatives

developed will vary by project as they are based on the nature, cause and extent of the problem. The options developed must be tailored to the individual characteristics of each site.

The project examined several remedial alternative solutions to achieve the objectives:

- Offshore Breakwater with Gaps;
- Nearshore Reef;
- Groynes with Beach Fill;
- Cobble / Boulder Beach;
- Conventional Revetment; and
- Do Nothing (with Monitoring).

Alternatives to the undertaking were also considered while planning the project and assessing the need for an Environmental Assessment. Within the context of this project, 'Do Nothing' (with Monitoring) is a more robust example of this type of alternative, but the project also considered localized trail realignment or drainage improvements. Alternative solutions and alternatives to the undertaking were shared with the public during all phases of engagement.

While some areas along the shoreline still require robust erosion protection, half of the shoreline segments can use the alternatives to the undertaking (monitoring, localized trail realignment when necessary, and localized drainage improvements where necessary) to eliminate the need for shoreline protection altogether.

Due to the unique and varying properties of the Ajax shoreline, a detailed Environmental Study Report was required to fully assess all impacts expected from implementing the recommended alternative. As some of the proposed alternatives are significantly 'softer' than the erosion protection more commonly installed along the Greater Toronto Area (GTA) shoreline, continued monitoring will be beneficial to further knowledge about the efficacy of this type of shoreline protection within an open-coast environment.

In determining the preferred method of remediation for the erosion risk and slope instability problem, five major factors were considered:

- Physical Conditions;
- Environmental Conditions;
- Cultural considerations;
- Socioeconomic implications; and
- Technical/engineering complexity .

In all cases, design of erosion control structures must provide protection compatible with TRCA's Design Criteria, which includes improvements to or enhancements of the existing terrestrial and aquatic habitat conditions through more natural methods where possible. Upon review, the proposed undertaking meets all TRCA planning and policy objectives and satisfies the needs and concerns of the affected property owners and public based on the input received during Community Liaison Committee (CLC), Public Information Centre (PIC) meetings and outreach activities.

The decision-making process used in the selection of the preferred remedial solution is documented in detail in **Section 4.0.**

A record of consultation activities, including copies of all CLC and PIC materials, can be found in **Appendix D.**

1.6 Rationale for the Undertaking

The rationale for the undertaking was to assess conditions along the Ajax waterfront shoreline and identify alternatives before emergency work becomes necessary. While there are many areas along the 5.7km project area where erosion does not pose a near-term hazard, this environmental assessment identified alternatives to protect the entire shoreline as funding becomes available or necessary. During the Gap Analysis and Baseline Inventory phase of the project, current conditions were compared to historical data to understand erosion rates and coastal processes along the shoreline. Projections of shoreline recession in the near and long-term created from the data gathered acted as a starting point for alternative designs and highlighted areas of Ajax Waterfront Park that are vulnerable to significant damage.

Long-term erosion protection alternatives developed as part of the Environmental Assessment will provide a framework for future erosion mitigation related planning, should the Town of Ajax choose to pursue funding for infrastructure and park protection.

2.0 BACKGROUND

This section provides information as to the causes, effects, extent, and associated hazards relating to erosion and instability within the project limits. The findings and recommendations of previous studies are presented herein as justification for TRCA's involvement.

2.1 Justification of Authority Involvement

TRCA has a mandate 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, Conservation Authorities like TRCA 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, which is designed to protect lives and minimize loss of property through the construction of suitable remedial works. Through annual capital funding from its member municipalities, TRCA is able to implement a program of major remedial works for slope stabilization throughout the watersheds of the Greater Toronto Area. Funding for any work at Ajax Waterfront Park would not come from the existing pool of capital funding, however, the Town of Ajax could potentially join member municipalities in the funding and maintenance pool. The current Class EA reflects TRCA's expertise in watershed management and Lake Ontario shoreline management and promotes potential integration with adjacent municipalities for erosion protection work.

2.2 History of the Problem

Erosion along the Ajax waterfront naturally occurs, but due to human activity that negatively impacted shoreline composition and climate change, erosion rates have rapidly increased and become problematic in some areas. The natural composition of the shoreline is a mixture of sand and cobbles, which received sediment and stone input from the bluffs. The stoney shoreline and nearshore area helped to slow down waves as they approached land, acting as natural erosion control. However, during the 19th and early 20th centuries, the industry known as 'stone hooking' removed stone from the shoreline and nearshore for use in construction. While TRCA does not have quantifiable data on the extent of stone hooking activity in the area, the effects of stone hooking are documented in the GTA and understood to have compromised long-term erosion protection. A compromised nearshore, compounded by more frequent and extreme weather events caused by climate change have led to the current conditions of the Ajax waterfront shoreline.

Erosion rates across the Lake Ontario shoreline have been exacerbated by more frequent and intense storm activity due to climate change; high lake level and wind events have led to some areas of the Ajax Waterfront Park to experience higher rates of land loss and damage due to wave action. This phenomenon is apparent in parts of the Ajax waterfront like the shoreline directly adjacent to Rotary Park Pavilion, where erosion has begun to encroach on the Waterfront Trail and other infrastructure. Land loss projections at current erosion rates were identified as part of the Gap Analysis and Coastal Report and show how some areas of the shoreline will experience dramatic near-term land loss due to coastal erosion.

TRCA has been involved in a number of restoration and infrastructure projects at Ajax Waterfront Park, including wetland creation, post and paddle fencing, outfall repairs and planting sites. Installation of erosion and flood control structures along the shoreline have included the Duffins Creek boardwalk in 2021 (**Figure 9**), and the Love Crescent Outfall in 2019 (**Figure 10**).

Figure 9. Part of the Duffins Creek Boardwalk. *Source: TRCA, 2022.*

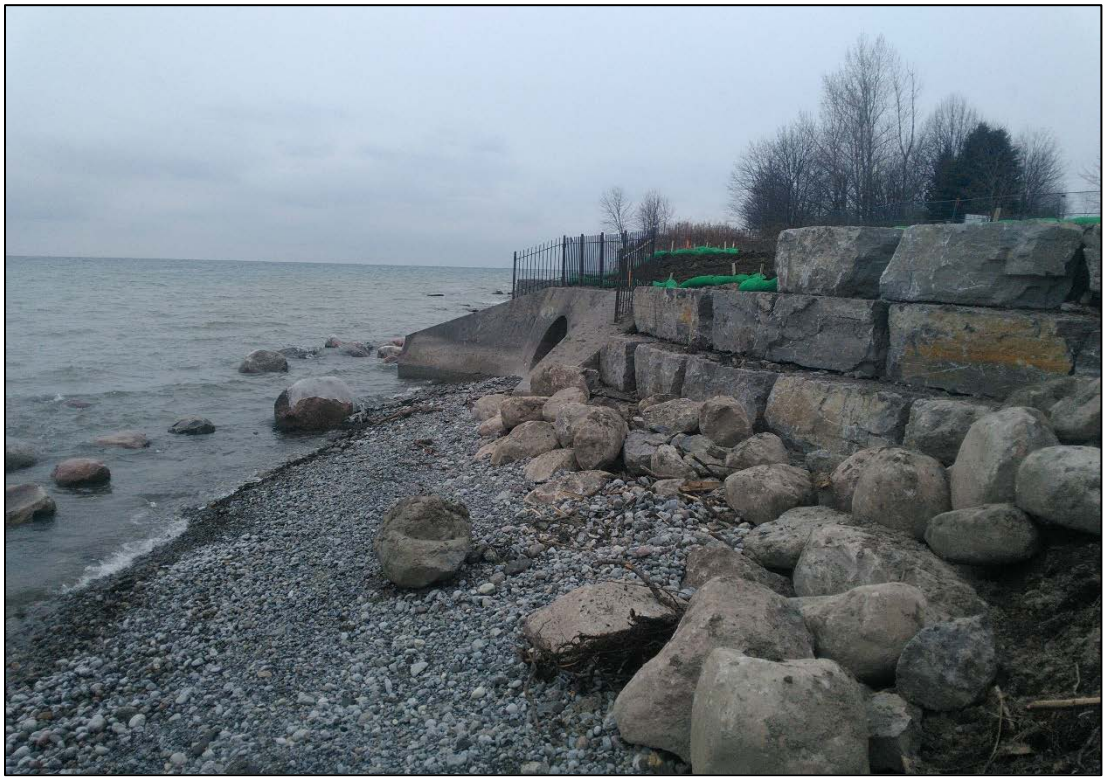

Figure 10. Love Crescent Outfall, completed by TRCA in 2019. *Source: TRCA, 2019.*

During the baseline data and gap analysis phase of the Environmental Assessment, information gathered from these projects helped to illustrate how shoreline protection has become more necessary due to the storm and high lake levels events between 2017 and 2019. Even prior to those detrimental coastal events, erosion rates of up to 0.5m/year (W.F. Baird and Associates, 2021) along some areas of the shoreline have resulted in approximately 500 meters of Waterfront Trail realignment since its formalization.

Shoreline composition would have historically included more boulders and natural wave break material both on and offshore; stone hooking involving the removal of those larger shoreline material may have contributed to a more rapid erosion rate in the following century. Climate change is also pointed to as a source of exacerbated erosion damage. TRCA and Baird note that recent storm events in 2017 and 2019, as well as the high water event in 2018 caused significant erosion damage across the Lake Ontario shoreline.

2.3 Planning Documents

In developing the range of alternatives for evaluation under the Class EA guidelines, TRCA incorporated the applicable guidelines from several municipal, provincial, and federal guidance and policy documents, as follows:

Toronto and Region Remedial Action Plan (1994)

The Toronto and Region Remedial Action Plan (RAP) was developed by all levels of government and other stakeholders. The RAP encompasses a 2,000 km^2 area within TRCA's jurisdiction in the City of Toronto. This area includes the Lake Ontario waterfront and all of the watersheds between Etobicoke Creek in the west and Rouge River in the east. While Ajax Waterfront Park does not fall within the Plan area, the primary principles of the Plan still guide decision making for this project. The Toronto RAP is managed by representatives from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Ministry of Northern Development, Mines, Resources and Forestry, the City of Toronto, and TRCA. The RAP has been working towards the following goals:

- Clean waters;
- Healthy habitats;
- Science and monitoring;
- Sustainability; and
- Education and involvement .

Terrestrial Natural Heritage System Strategy (2006)

TRCA's Terrestrial Natural Heritage System Strategy (TNHSS) was designed to enhance biodiversity and quality of life for residents by increasing the amount of forest and wetland habitats. It uses a science-based resources to identify any lands that should be included in a terrestrial natural heritage system. TNHSS was designed for the entire TRCA jurisdiction as terrestrial systems and their interactions span watershed boundaries. TNHSS contains a number of strategic directions including proposed land use planning policies, land management, stewardship and education opportunities, and long-term monitoring.

Planning and Development Procedural Manual (2007)

TRCA's Planning and Development Procedural Manual provides a comprehensive summary of the legislative and policy framework that guides TRCA's decisions and actions with respect to planning and regulatory responsibilities, as outlined in Ontario Regulation 166/06.

The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority (2014)

The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority (LCP) is a CA policy document that guides the implementation of TRCA's legislated and delegated roles and responsibilities in the planning and development approvals process. Comparable to a combined municipal official plan and zoning bylaw, the LCP represents a compilation of existing plan and permit review policies and practices that have evolved over time. It also contains new policies related to TRCA programs, scientific research, and external planning and development initiatives.

Socioeconomic and Cultural Heritage Studies

TRCA conducted a demographic survey via Environics, details of which are included in **Section 2.4.4**. The study focused on the residential area directly adjacent to the project area.

Data collected in Environics is included in **Appendix A**.

2.4 Supporting Studies and Assessments

Through the gap analysis and coastal analysis phase of the Environmental Assessment, TRCA compiled a comprehensive baseline of historic information on the Ajax waterfront. This was achieved through examination of previous studies completed by TRCA, analysis of historic and current conditions of the Ajax waterfront shoreline by the project consultant, and coordination with the Town of Ajax to compile data gathered by federal, provincial, and municipal agencies.

2.4.1 Physical Studies

W.F. Baird and Associates (Baird) conducted a shoreline assessment of the Ajax waterfront shoreline as part of the gap analysis phase. The shoreline assessment included both coastal conditions and physical conditions of the shoreline. Coastal conditions refer to waves, currents, water levels, as well as wind intensity and direction. Physical conditions include bluff height, composition, runoff, vegetation, and surrounding shoreline qualities. Historic and current data was analyzed to develop a holistic assessment that identified vulnerable areas of the Ajax Waterfront Park shoreline, erosion rates and forecasts, and potential methods of remediation.

Other supporting studies consulted during the baseline data and gap analysis phase were:

- **Central Lake Ontario Conservation Authority Shoreline Management Plan *(Zuzek, 2020)***

  This plan, developed for surrounding Conservation Authorities, outlined principles to guide the sustainable coastal development of the Lake Ontario shoreline east of TRCA jurisdiction. Since this

Shoreline Management Plan boundary abuts Ajax Waterfront Park, it was used to inform ways to integrate design approaches consistently across the Lake Ontario Shoreline.

- **Carruthers Creek Management Plan 2021-2031** ***(TRCA, 2021)***

  The Carruthers Creek Management Plan was developed by TRCA in partnership with Durham Region to understand the current conditions of Carruthers Creek and identify measures to improve and protect watershed health. Since the mouth of Carruthers Creek falls within the project area, it was important to incorporate the objectives of the Management Plan in alternative designs.

- **Monitoring, Modeling and Management of Nearshore Water Quality In the Ajax-Pickering Region of Lake Ontario** ***(Auer, 2011)***

  TRCA, York, and Durham municipalities conducted a review of the water quality monitoring program along the Ajax-Pickering nearshore region of Lake Ontario and its efficacy in identifying sources which negatively impact water quality. Impacts to water quality were part of the criteria used in alternative designs; integrating data from the study helped to inform the design process.

Copies of these documents are included in **Appendix A.**

2.4.2 Biological Studies

TRCA previously completed an Ecological Land Classification (ELC) for several areas, including Carruthers Marsh, Paradise Park and Duffins Creek. Terrestrial data was compiled as part of the gap analysis phase and was included in the Gap Analysis Report. This data provides information on the types of communities like forest, wetland, beach/bluff, meadow, and successional present within the area and assists with identifying mitigative measures to protect areas which are unique or important to the local ecology. **Figure 18** shows the extent of ELC data already collected. This information is further reviewed in **Section 3.0.**

TRCA has a large terrestrial and aquatic monitoring program to monitor flora and fauna. An updated sampling program was implemented in 2021 as part of the Gap Analysis Report. 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. Monitoring done as part of the Carruthers Creek Watershed Plan includes only the creek area and not the entire project area. However, this plan does include Carruthers Marsh, the mouth of which falls into the project area. Data collected as part of the Plan can be used to support detailed design development, but with the understanding that the scope is limited, and dedicated terrestrial and aquatic monitoring will need to be done for the entire project area. The most updated information available has been used to assess alternatives and will be updated to continue the support design development for the proposed alternatives.

2.4.3 Cultural Studies

In 2021, TRCA completed a Stage 1 Archeological Assessment of the Ajax waterfront. Results of the Stage 1 Archeological Assessment show that areas of interest adjacent to the shoreline include the

Simcoe Point Cemetery. The Simcoe Point Cemetery, also known as the Greenlaw-Peak cemetery, is a pioneer graveyard established by the Peak family upon their arrival in the area as early as 1798. At least 19 people are buried at the site, which was originally a family farm but also a resort property until roughly 1950, when the Simcoe House Resort burnt down. Today, the site is commemorated by the commemorative plaque near the mouth of Duffins Creek, but not within the project area proper. Measures to ensure any erosion mitigation work will not disturb sensitive archeological sites will be taken as part of any future project implementation. A complete description and mapped location of Simcoe Point Cemetery are included in **Appendix A.**

2.4.4 Socioeconomic Studies

Environics Analytics performed a demographic analysis of the residential neighbourhoods adjacent to the Ajax waterfront study area encompassing 8,110 homes and a population of 24,676. This study looked at demographics such as population, households, housing, income, education, employment, and diversity.

The study determined that the average household income was approximately $150,000 annually, with almost 30% university educated. Approximately 35% of the population is not in the workforce (either not old enough to work or retired). 40% of people use a personal vehicle to get to work, and less than 10% use public transit. Less than 30% of people belong to a visible minority group, with only 1.1% indigenous representation. Over 90% of households speak English at home. The demographic is nearly entirely a combination of “First-Class and Upper Middle-Class.” (TRCA, 2024.)

2.4.5 Engineering Studies

There was a monitoring program completed by TRCA from 2007-2009 to monitor the nearshore water quality of Lake Ontario.

The Monitoring, Modeling and Management of Nearshore Water Quality report (Auer, 2011) reviewed the data collected from a water quality monitoring program to determine point source and watershed pollution contributions to the Ajax-Pickering nearshore. From this 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 a source of phosphorus along the nearshore. These point sources impacting water quality were included in the evaluation of alternatives in **Section 4.0**. A copy of the report is included in **Appendix A.**

2.4.6 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; and
- Integrating this plan with neighbouring jurisdictions.

The SMP also divides the shoreline into 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; and
- Private and government landowners should monitor shoreline protection stability and erosion flanking potential, especially along Ontoro Boulevard.

Any remediation options considered the general recommendations and Reach 1 specific recommendations provided in the Lake Ontario SMP in **Appendix A**.

2.5 Reach Delineation

In order to accurately and effectively prescribe alternatives, Baird divided the 5.7km shoreline area into 12 distinct areas called “reaches”. Reaches were determined during the coastal and gap analysis phase, and used criteria outlined in **Figure 11.**

Reaches vary in length from as little as 100 meters to over 1 kilometer depending on shoreline conditions. Once reaches were established, alternatives were developed to address concerns specific to each reach. Priority levels were assigned to each reach based on proximity to permanent infrastructure, erosion rates, and potential public hazards. **Figure 12** shows the location of each shoreline reach and its approximate length.

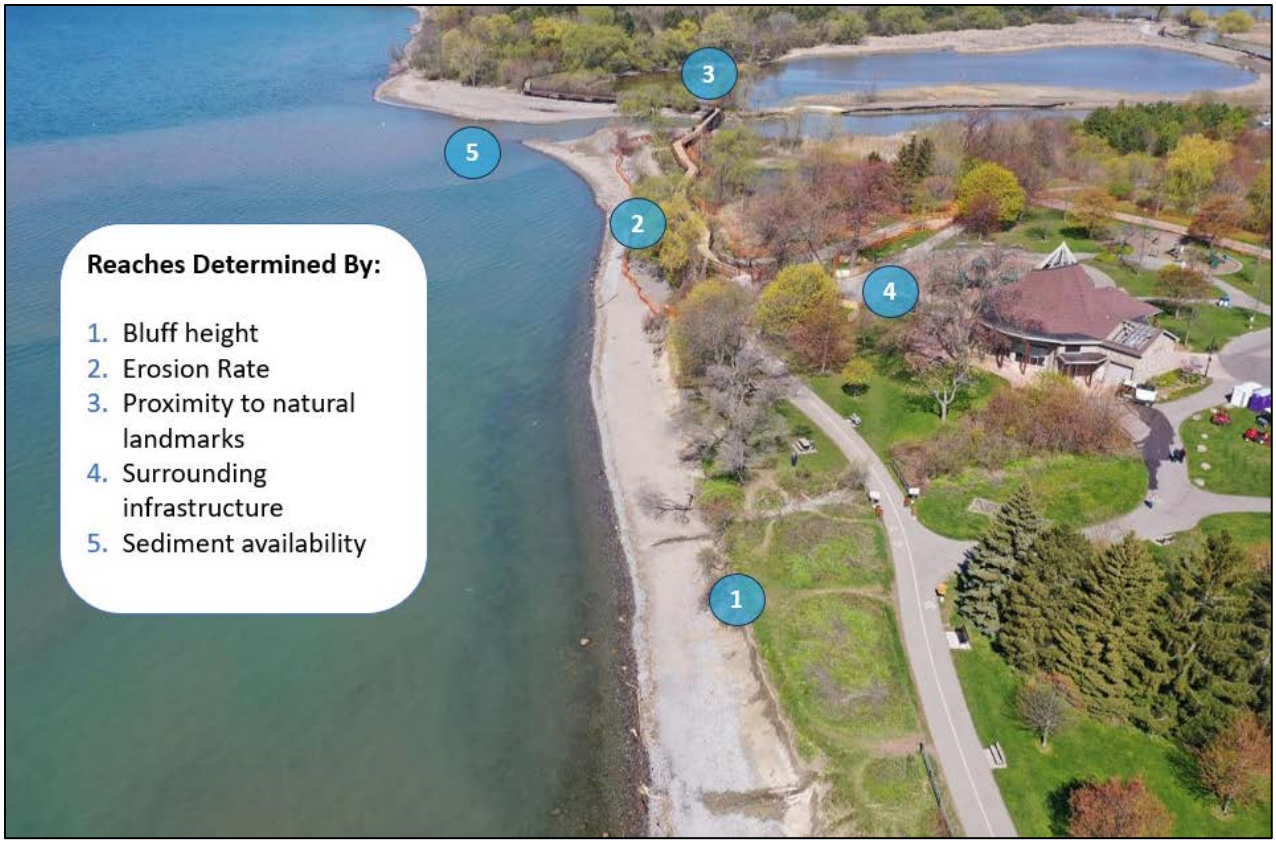

Figure 11. Reach Criteria. *Source: TRCA, 2023.*

Figure 12. Ajax Waterfront Park shoreline reaches. *Source: Baird, 2023.*

3.0 BASELINE ENVIRONMENTAL INVENTORY

After initiation of the Class EA, a baseline inventory is prepared. 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.

The inventory involves the examination and documentation of:

- the erosion problem;
- existing site conditions, including physical, biological, cultural and socioeconomic characteristics;
- engineering/technical aspects to be considered;
- previous protective measures that have been implemented within the project limits.
- whether the site falls within a vulnerable area as identified in the local assessment report prepared under the *Clean Water Act*, 2006

The baseline environmental inventory accounts for direct and indirect impacts on and adjacent to the project area. Direct impacts refer to elements of project work like required tree or vegetation removals, aquatic habitat improvements, or trail protection. Indirect impacts encompass effects of work outside the project scope like increased traffic during implementation, increased social or community opportunities from shoreline stabilization, and protected habitat linkage corridors.

For this project, 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;
- Town of Ajax;
- Environment and Climate Change Canada;
- Ministry of Northern Development, Mines, Natural Resources and Forestry (MNRF);
- Fisheries and Oceans Canada (DFO); and
- Ministry of Environment, Conservation and Parks (MECP).

3.1 Existing Site Conditions

In accordance 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:

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 a 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. (CO 2024)

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.
Documents outlining existing conditions are included in **Appendix B**.

3.1.1 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 are evident along the waterfront for 5.7 kilometers. **Figure 13** shows the approximate locations of bluffs and beaches along the shoreline. "Protected", in the context of **Figure 13** refers to areas of the Ajax waterfront shoreline where erosion mitigation and protection structures are already in place.

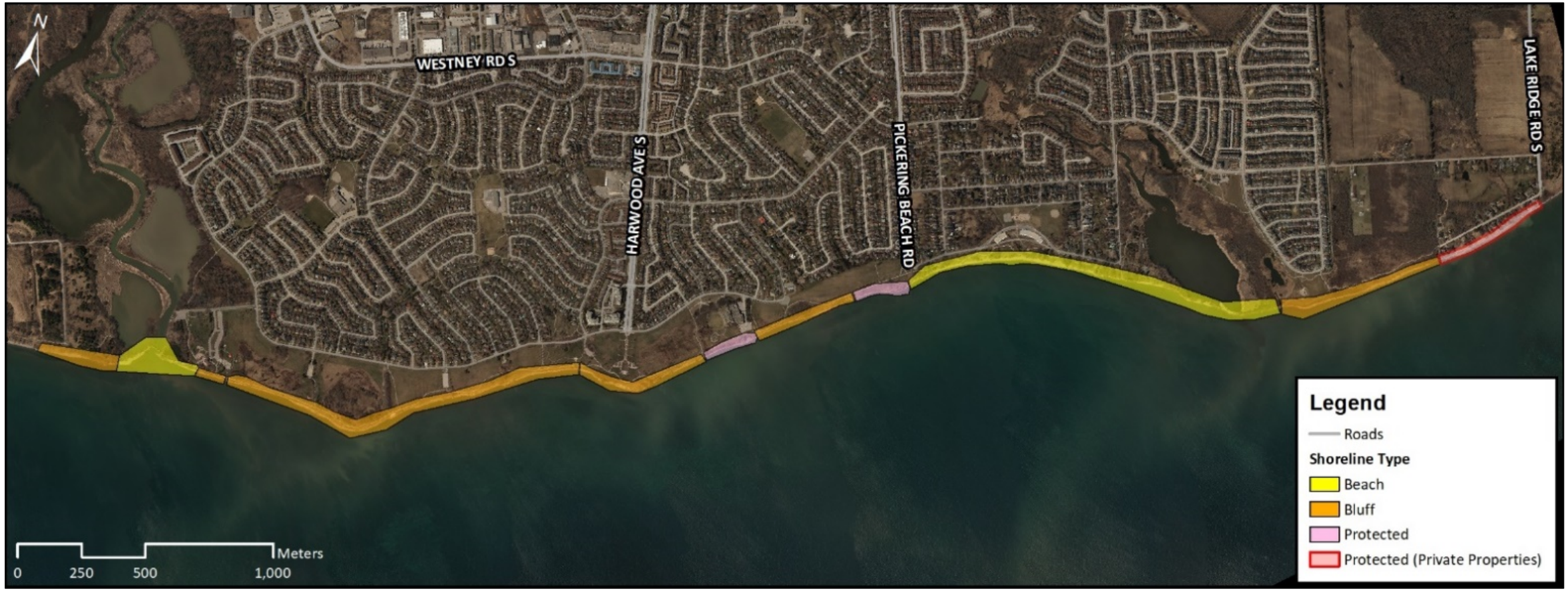

Figure 13. Shoreline types along the Ajax shoreline. *Source: TRCA, 2021.*

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, stone was extracted from the lakebed which was used for ballast and also sold for construction purposes. The amount of material removed from the lakebed is unknown, but it is estimated that 1,000,000 cubic meters of material was removed from Toronto Harbour, west of the project area. It is likely that the stone material provided erosion protection to the lakebed and shoreline by absorbing and dissipating wave energy. TRCA and other stakeholders have concluded that it is reasonable to assume that the Ajax waterfront shoreline was also an area where stone hooking occurred. Removal of large stone material from the nearshore would have affected the shoreline and bluff composition and led to long-term shoreline instability and washout. One of the recommended options would largely restore the area to pre-industrialization conditions that were resilient to coastal processes. Details on how this option would restore pre-industrial conditions and where it was recommended are included in **Section 4.0**.

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

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 life 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. There are two Life Science ANSIs within the project area, detailed in **Section 3.1.2**.

Specialty Crop Area /Agricultural Lands or Production

There are no agricultural lands present within the project area. The closest agricultural lands are located east of the project area, between Hoile Avenue and Range Road.

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 proposed work.

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. Duffins Creek and Carruthers Marsh are both *biological* ESAs within the project area. Problematic erosion was not observed in these areas and no work was recommended; work recommended close to Duffins Creek mouth or Carruthers Marsh will take precautions to prevent any detrimental impacts on the adjacent ESA. These precautions are developed during the detailed design phase of project work, and may include additional erosion and sediment control features to protect sensitive habitat, adhering to

migration and spawning windows to limit impact on wildlife, and a limited work area to prevent unnecessary disturbance.

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 northeast of 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. Air quality is not anticipated to be impacted by shoreline protection work.

Table 1: Air Quality Health Index Risk Levels. Source*: MECP, 2024.*

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

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. Long-term noise level disturbances are not anticipated as part of shoreline protection work. During any implementation process, construction activity during regular working hours would be present for the duration of work.

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 14** shows the water level fluctuations before the regulation and after.

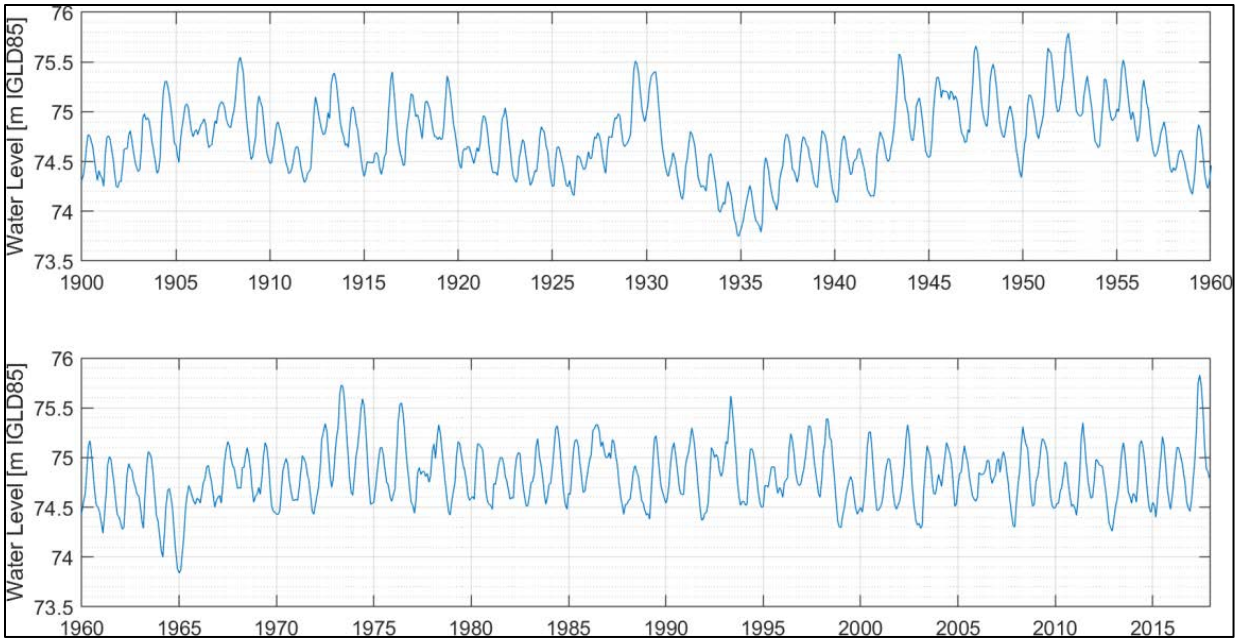

Figure 14. Water levels in Lake Ontario before regulation (top) and after regulation (bottom). *Source: Baird, 2021.*

In 2017 and 2019, Lake Ontario experienced record high lake level events causing extensive flooding and erosion along the shoreline. **Figure 15** demonstrates the high water levels Lake Ontario experienced in 2019 compared to the water levels of Lake Ontario in 2020 and 2021.

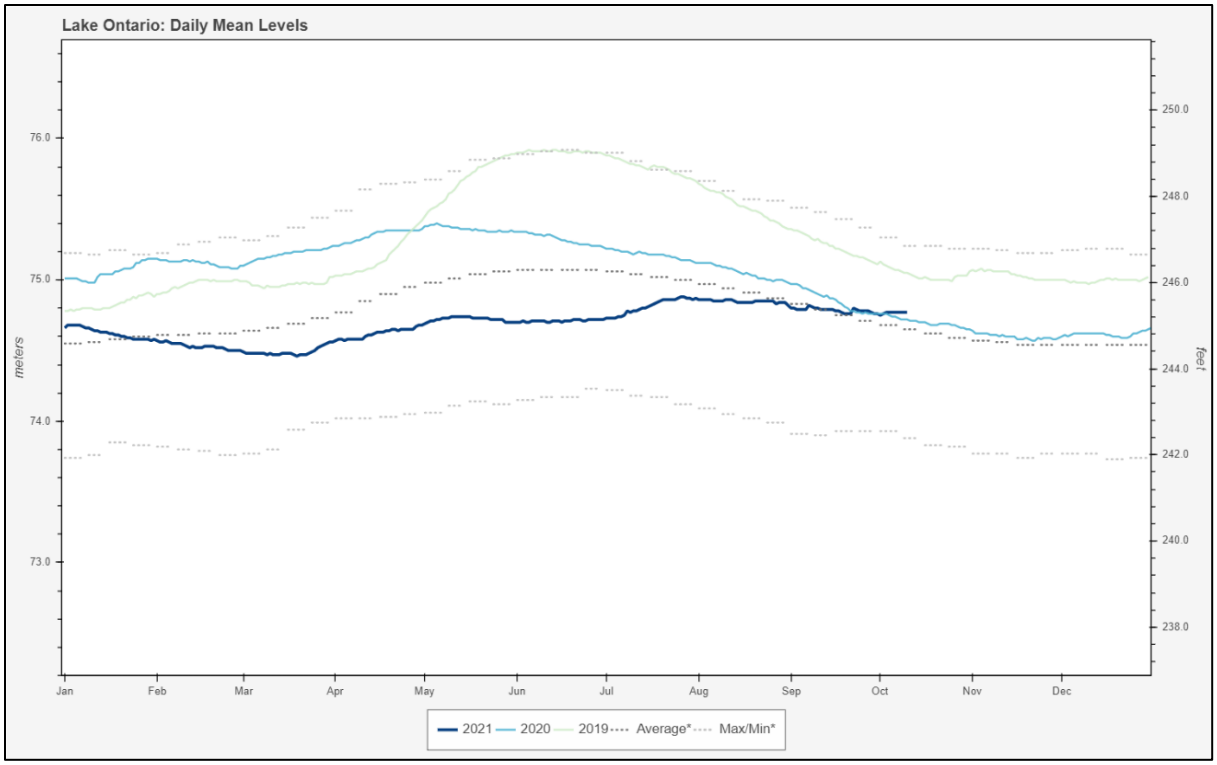

Figure 15. Daily water levels of Lake Ontario from 2019 to 2021 to demonstrate the high water levels in 2019. *Source: International Joint Commission (IJK), 2021.*

Some of the recommended alternatives along the Ajax waterfront will bolster shoreline resilience from wave action caused by fluctuating water levels exacerbated by severe storm events due to climate change. Areas like Paradise Beach, which experience flooding partially due to high water levels, will not be addressed through the proposed solutions as there was no observed erosion. However, there is the potential to include localized drainage features to be installed as part of future park maintenance work implemented by the Town of Ajax.

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 16**). Two outfalls along the shoreline were also identified as HVGRAs.

Groundwater seepage along bluff faces was mentioned during the public consultation process as a concern for community members; while bluff seepage and runoff was considered through the design process, analysis showed that erosion along the shoreline was caused predominantly by coastal processes like wave action and runoff impacts were minimal. Further, these seepage and runoff impacts would be alleviated by preventing toe erosion from coastal processes and allowing the slope to stabilize. Localized drainage improvements have been proposed as part of all recommended alternatives to be more fully explored during detailed design phases.

Figure 16. Groundwater recharge areas near and within the project area. *Source: TRCA, 2021*.

Littoral Drift/Other Coastal Processes

According to findings from the project consultant, "littoral deposit comprising coarse textured lacustrine sand and gravel, with some silt and clay" around Carruthers Creek. There are also "modern alluvial deposits" around both Duffins Creek and Carruthers Creek. (Baird, 2021)

Another coastal process analyzed in Baird's 2021 report was wave runup and overtopping, which was identified as a "process of significant concern where there are structures close to the shore, or some sort of threat to public amenities such as pathways or parks" (Baird, 2021). Wave action was determined to be a primary cause of bluff erosion along the Ajax Waterfront Park shoreline, exacerbated by high water levels and storm events.

Any shoreline protection work implemented following this EA will include measures to ensure natural littoral drift and other coastal processes are not negatively impacted, particularly around Duffins Creek and Carruthers Creek.

Water Quality

As mentioned in **Sections 2.4.1 and 2.4.5**, during a monitoring program in 2007 to 2009, the conductivity and four other water use criteria 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 and determined that 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). Algal blooms were mentioned as a concern by the

public during the first Public Information Centre (PIC), but none of the recommended alternatives along the shoreline are anticipated to affect water quality long-term. In order to prevent excessive sediment from entering the Lake during work, it is standard practice for TRCA to employ sediment control measures in the immediate work area. One potential strategy for erosion and sediment control is to install clean fill on dry, low-wave days; this prevents sediment runoff and disturbance to the nearshore. The detailed design phase of work will determine the best ESC measures to employ on site.

Soil/Fill Quality

The Ajax waterfront shoreline area consists primarily of sand, cobble, and seeded topsoil in adjacent greenspaces. Based on the proposed recommendations, only clean aggregate fill is anticipated to 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. Soil quality analysis via visual inspection (boreholes) were not pursued since accessible bluff faces allowed for broader observation along the project area to support alternative designs. Further, alternative designs were based primarily on erosion along the shoreline caused by coastal processes, so boreholes were not advanced as part of the scope of work. If slope regrading is required as part of the detailed designs rather than natural stabilization processes, boreholes can be advanced at the engineer's discretion to support designs.

Contaminated Soils/Sediment/Seeps

Contaminated soils/sediment/seeps have not been identified at the site.

Existing Transportation Routes

The Waterfront Trail travels parallel to the shoreline and is highly used by pedestrians, cyclists and park visitors. 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 by any recommended alternatives.

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. It is important to note that these crossings are strictly for recreational purposes—no vehicle or rail crossings are present within the project area.

Figure 17. The boardwalk at Duffins Creek and the pedestrian crossing located west of the Ajax Water Supply Plant. *Source: Google Earth, 2021.*

Geomorphology

Following the Coastal Analysis and Gap Analysis conducted by W.F. Baird and Associates, it was found that the project area was "stonepoor silt to silty sand textured till on Paleozoic terrain" (Baird, 2021). Alternatives were developed with the understanding of historic and current bluff and shoreline composition; while the current shoreline is comprised primarily of silt and sand with a few stones, historically the shoreline and bluffs would have included more boulders and cobbles. According to Baird's Environmental Assessment: "The study area is located in the Iroquois Plain…The Iroquois Plain generally comprises historic sand and boulder shorelines around undulating glacial till plains…smoothed by historic wave action" (Baird, 2023). A full account of geomorphological findings is included in Baird's Coastal Analysis and Environmental Assessment in **Appendix A.**

3.1.2 Biological Environment

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 around the wetlands on either side of the project area, and in the meadow and forested areas along the Ajax waterfront shoreline (**Figure 18**). Along with manicured greenspaces, there are wetlands, small forested areas and meadows. The 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 18. Location of Ecological Land Classification data that was collected in 2017. *Source: TRCA, 2021*.

In 2022 TRCA conducted updated ELC, flora and fauna surveys to reflect current conditions and found that in addition to the 5 identified habitat types in **Figure 18**, plantation habitat was also present in areas where the Town of Ajax had introduced vegetation or trees. A full exploration of vegetation communities is included in the Ajax Waterfront Terrestrial Biological Inventory in **Appendix B.**

Updates to TRCA's existing ELC, Flora, and Fauna inventories identified likely wildlife habitat in the project area based on species presence and vegetation type—any impacts to wildlife habitat, particularly those used by Species at Risk (SAR), will require additional surveys prior to implementation of recommended alternatives.

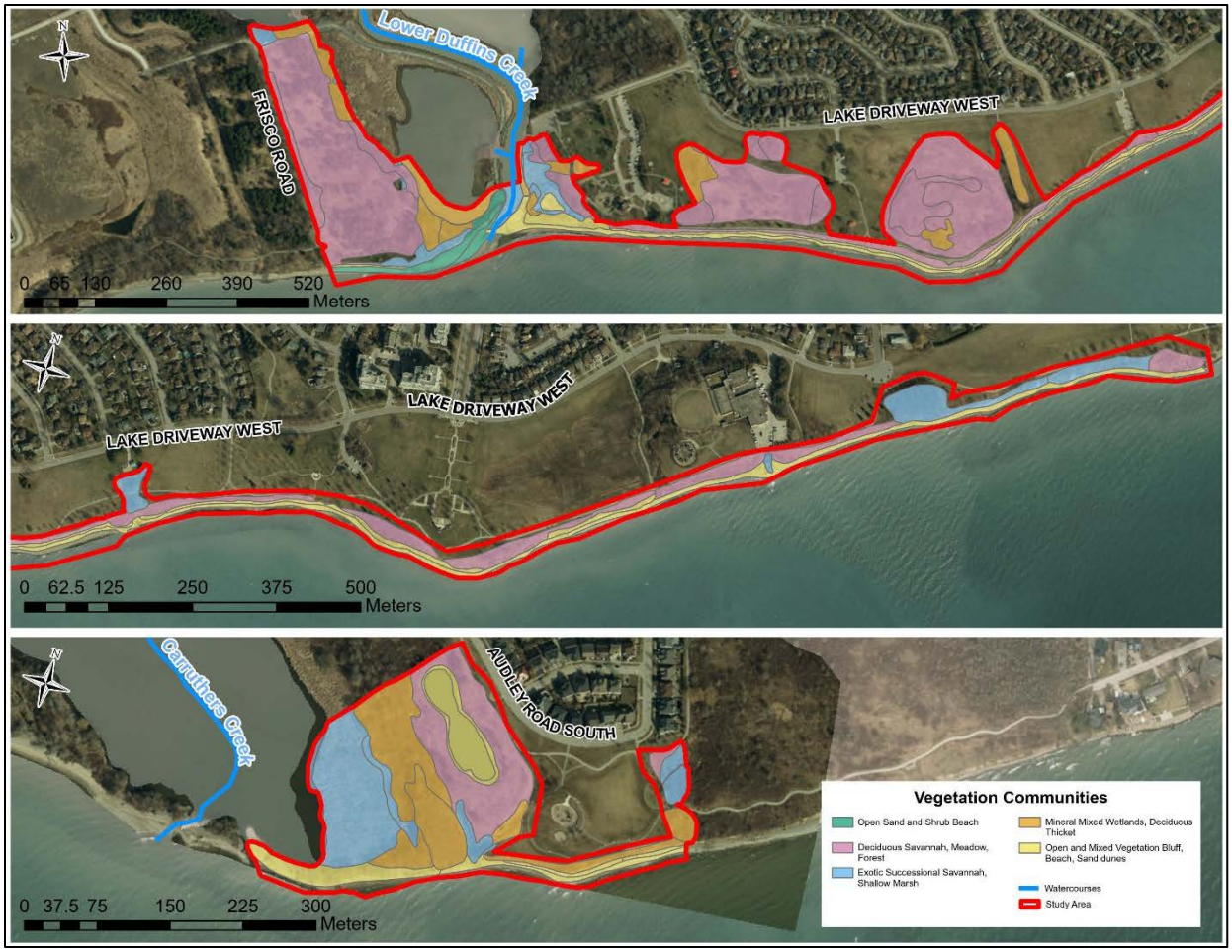

Figure 19. Ecological Land Classification Data. *Source: TRCA, 2024.*

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 recommended alternatives are not likely to significantly impact these habitat linkages, there could be disruptions during implementation that involves fencing or disturbance from construction activity. However, detailed design planning will aim to mitigate any disturbance during construction.

Significant Vegetation Communities

Most significant vegetation communities fall within the Duffins Creek and Carruthers Marsh areas of the Ajax waterfront which are not anticipated to be impacted by recommended alternatives. However, TRCA identified that the dynamic coastal communities most characteristic of the Ajax waterfront would be the most impacted by work on the shoreline as these communities fall along the Ajax waterfront shoreline. These communities are largely maintained by natural disturbance processes like erosion and include three different coastal beach communities. Efforts to mitigate negative impacts to these communities

will be explored during the detailed design phase. More information on Significant Vegetation Communities can be found in the Ajax Waterfront Terrestrial Biological Inventory in **Appendix B**.

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 20**). These ESAs have also been identified as Provincially Significant Wetlands and are shown in **Figure 21**.

Avoiding any impacts to Duffins Creek and Carruthers Marsh as part of project work was factored into alternative development and the recommended alternatives will have no negative impacts on ESAs.

Figure 20. ESAs along the Ajax waterfront. *Source: TRCA, 2021*.

Figure 21. Provincial Significant Wetlands that have been identified within the project limits. *Source: TRCA, 2021.*

Fish Habitat

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. The Ajax shoreline predominantly consists of an open coast aquatic environment.

Three season (spring, summer, and fall) electrofishing sampling was performed for the Ajax shoreline in 2021, and only one White Sucker was caught. This is representative of typical open coast shorelines and indicates there is a lack of natural habitat features here to encourage fish refuge or spawning. Alternative solutions are anticipated to improve this section of open coast shoreline and provide more spawning opportunities. While Duffin's Creek Marsh and Carruthers Marsh provide habitat for a variety of fish species, these areas are only recommended for a monitoring alternative which would not alter or disturb fish habitat. For additional information on AMM's sampling, refer to **Appendix B**.

Lake Ontario and the wetlands along the Ajax waterfront have the potential to provide fish habitat and any works occurring in and around these waterbodies must be assessed for potential harm to 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. Impacts to fish habitat and mitigative measures to protect fish habitat will be determined and

assessed during the detailed design phase, and approval from DFO is required before implementation of any of the recommended shoreline protection alternatives.

Species of Concern – Flora and Fauna

Species at Risk polygons are shown in light red in **Figure 22**. During 2022 flora and fauna inventory work, TRCA identified 63 flora species of regional and urban concern, 15 fauna species of concern, and 22 bird species concern. Impacts to these species should be considered during the detailed design phase and mitigative measures should be identified. Although not reflected in **Figure 19**, multiple Bank Swallow (*riparia riparia*) nesting sites have been identified along the Ajax Shoreline within the project area. Bank Swallows are identified as provincially Threatened; their habitat has protected status under Species at Risk legislation. Bank Swallows have been documented via iNaturalist and EBird mapping, as well as visual documentation taken by staff while on site. Any work that occurs in areas where Bank Swallows are nesting will undergo the necessary mitigation measures and permitting in order to complete work without negatively impacting any colony present.

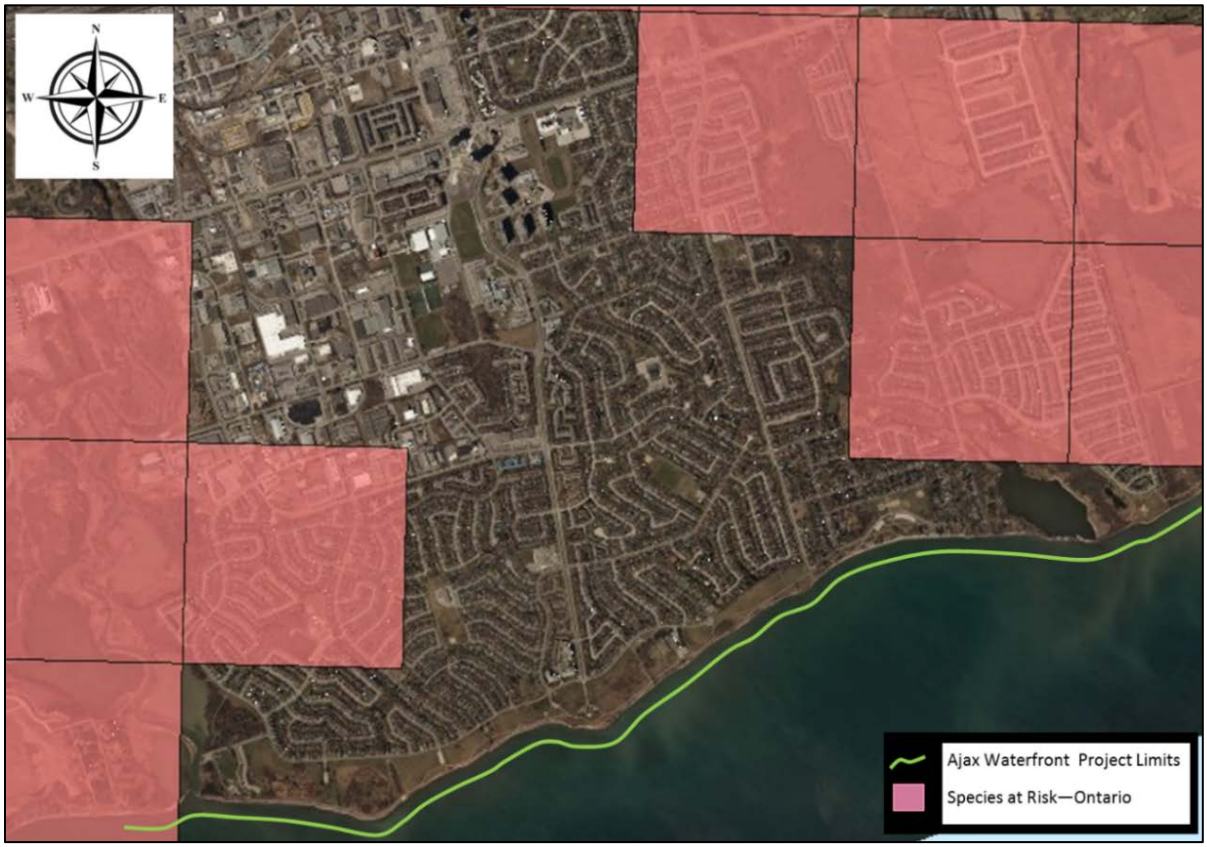

Figure 22. Species at Risk locations where species have been identified near the project area. *Source: TRCA, 2021.*

Wildlife/Bird Migration Patterns

TRCA has currently not received or collected data on migration patterns for wildlife or bird species along the Ajax waterfront. Nesting sites have been noted along the waterfront, and consideration to bird migration windows will be given prior to implementation of any recommended alternatives.

Impacts to wildlife migration patterns have been evaluated on a reach-by-reach basis and will be further discussed through necessary permitting applications as part of detailed designs.

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 LDD moth (*Lymantria dispar dispar*), Purple Loosestrife (*Lythrum salicaria*) 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 detailed design phase. Any trees or shrubs planted as part of site restoration will be native species.

Wildlife Populations

The bulk of wildlife populations present in and around Ajax Waterfront Park were found within and directly adjacent to Duffins Creek marsh and Carruthers Marsh. However, the small forested areas, meadows and dynamic coastal beaches do provide habitat for wildlife who do not rely on marsh habitat. Citizen science platforms like iNaturalist listed a variety of species present throughout the project area which was formally inventoried by TRCA in June of 2022. TRCA biologists inventoried a total of 54 vertebrate species in the project area, including 37 species of concern. For further understanding of the wildlife populations found within the project area, see the Flora and Fauna Terrestrial Biological Inventory in **Appendix B.**

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 18** 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 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. An 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, and these impacts have been accounted for in the recommended alternatives

Unique Habitats

There are two Provincially Significant Wetlands (PSW) (**Figure 21**) that provide unique habitats to multiple species that are not common in other parts of the project area. The wetlands fall into Reach 2 and Reach 11, both of which would benefit from long-term monitoring. A monitoring program will ensure that changes in coastal processes that may jeopardize the integrity of the PSW could be monitored or potentially addressed. Any implementation of shoreline work adjacent to PSWs, like Reach 3 or Reach 12, will take stringent measures to limit any negative impacts or disturbances to those areas. A PSW is determined through the Ontario Wetland Evaluation System, which can designate a wetland as significant according to a scoring system. Wetlands scoring above a 600 across all scoring categories or above 200 in Biological criteria are designated PSWs.

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

Two ANSI-LS have been identified within the project area and are shown on **Figure 23**. Duffins Creek Coastal Marsh is located on the western limit and has been identified as a candidate provincially significant ANSI-LS. Carruthers Marsh at the eastern limit of the project area has also 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.

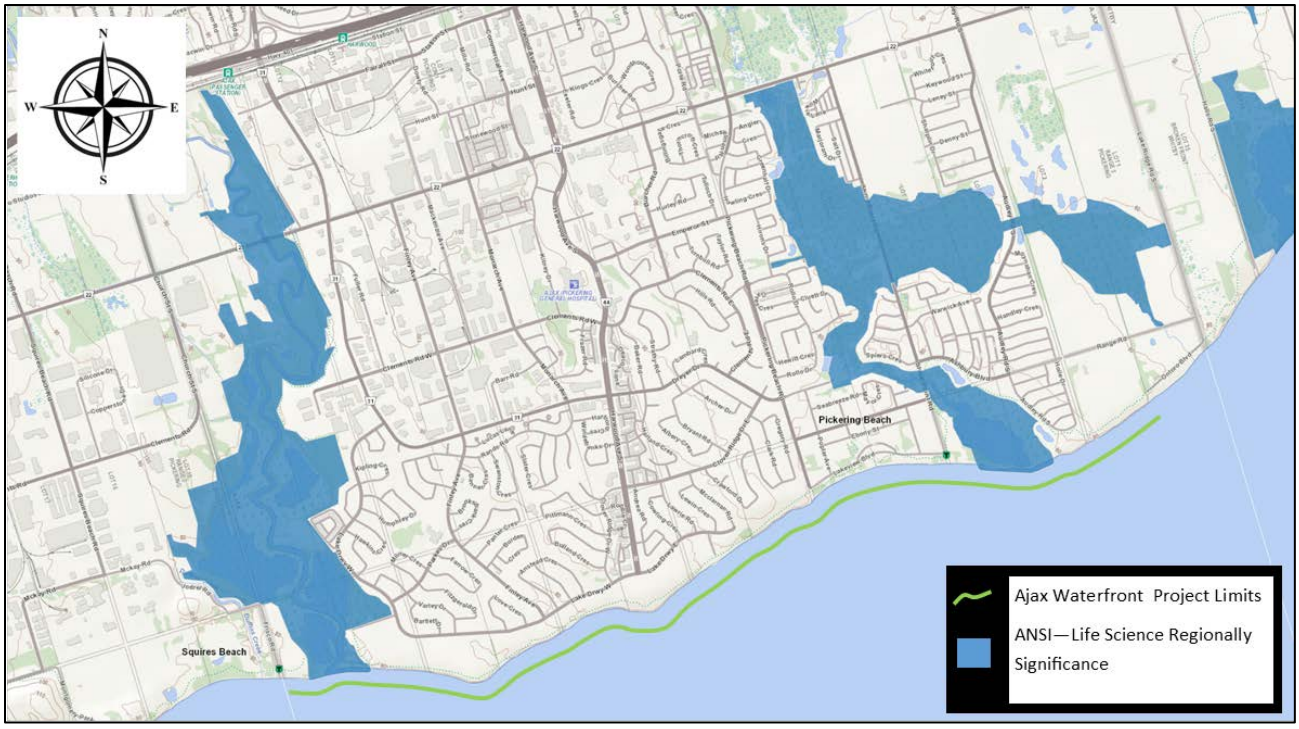

Figure 23. Life Science ANSI Identified at Carruthers Marsh and Duffins Creek. *Source: Ontario GeoHub, 2021*.

3.1.3 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. We acknowledge that the Class EA reported here was undertaken within Traditional Territories and Treaty Lands, in particular those of the Mississaugas of the Credit First Nation, as well as the Huron-Wendat, the Anishinaabeg of the Williams Treaty First Nations, and the Haudenosaunee.

Indigenous Reserve or Community

There are no known Indigenous reserves or communities currently within the project limits; therefore, there will be no impact due to these works.

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 to 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 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

Ajax Waterfront Park provides the public with access to riparian areas and Lake Ontario through formal and informal trails. Riparian areas along the Ajax waterfront consist mainly of partially vegetated bluffs and cobble boulder beach shoreline; while wildlife communities utilize the riparian area for various uses, the majority of the space is frequented by parkgoers for recreation. Public consultation feedback echoed the importance of riparian access for parkgoers incorporated into any shoreline protection work.

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 allows for 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 recreational or tourist use of parts of the shoreline is expected for most erosion risk mitigation recommendations during implementation but will benefit shoreline and park access long-term through shoreline stabilization.

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 like Veteran's Point Gardens.

The aesthetic qualities of the shoreline were considered in design evaluations and noted by the public to be a priority in any erosion mitigation work. Final design recommendations incorporate more natural looking alternatives within proposed protection strategies.

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 *(Ontario, 2021).* Work area limits, including any excavation limits or access routes, will be determined during the detailed design phase at which point the Stage 2 assessment will be completed. Further detail of areas where a Stage 2 assessment has been recommended can be referenced in maps 13-17 of the Stage 1 Archaeology Report in **Appendix A**.

Cultural Heritage Evaluation Report (CHER)

Completion of the Ministry of Citizenship and Multiculturalism (MCM) Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes checklist identified one property within the study area (Rotary Park) listed on the Town of Ajax Inventory of Non-Designated Heritage Properties. The property was included on the Town's Inventory due to its associative value relating to its use by Indigenous communities, early settlers, and the federal government as part of the Defence Industries Limited munitions plant during the Second World War. The associative values relating to this property are outlined in a historical plaque located on site. Following discussion with heritage planning staff at the Town of Ajax, it was determined that there are no built heritage features on the property associated with the identified commemorative themes and the cultural heritage value or interest of the property is related to its archaeological potential. It was therefore determined that any potential impacts to the property could be evaluated through the completion of an Archaeological Assessment.

As such, a Cultural Heritage Evaluation Report (CHER) was not recommended for the property as it was not expected to yield any further information, conclusions or recommendations.

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.

3.1.4 Socioeconomic Environment

Surrounding Neighbourhood or Community

There are three major residential communities which abut the project area: Duffins Bay, Clover Ridge and Pickering Beach. A demographic study on these communities provided by Environics was completed in 2023 and is detailed in 2.4.4 Socioeconomic Studies.

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.

Existing Infrastructure, Support Services, Facilities

Within Ajax Waterfront Park are a number of public amenities including:

- Rotary Park Pavilion
- Public washroom facilities
- Playgrounds
- The Waterfront Trail
- Stormwater outfalls
- Parking lots

Additionally, municipal infrastructure such as the Ajax Water Filtration plant is located east of Harwood Avenue South. Infrastructure within the park has been discussed in **Section 2.0**.

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 installed in 2020-2021 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. Residential properties along the project area consist mainly of single-family detached homes ranging in value from $0.8-1.7 million.

Figure 24. Ownership of property along the Ajax waterfront. TRCA owned refers to property that is owned by TRCA and managed by the Town of Ajax; TRCA owned and managed refers to property that is both owned and managed by TRCA. *Source: TRCA, 2024.*

Existing Tourism Operation

Ajax Waterfront Park attracts visitors from the wider Durham area, but does not operate formal tourism operations. Any recommended alternatives to protect the shoreline and upland infrastructure would ensure visitors can continue to safely enjoy the shoreline and surrounding amenities.

Property Accessibility

There are multiple parking lots with park access which include wheelchair accessible parking spots. The Waterfront Trail is paved to accommodate a large variety of users. None of the recommended alternatives will have long-term negative impacts on accessibility of the Waterfront Trail. However, short-term impacts will occur during implementation of any shoreline protection. Installing shoreline protection will provide long-term protection to the Waterfront Trail and improve accessibility.

3.1.5 Engineering/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 Geographic Information Systems (GIS) data and historical aerial photos. In 2015 and 2019, Light Detection and Ranging (LiDAR) data was used to delineate the shoreline crest and the orthoimage associated was used to delineate the water line. Historical aerial photos of high quality were selected and georeferenced to delineate the shoreline in different years.

Transects were created for every metre across the shoreline. To reflect notable historic events like post-hurricane Hazel water levels in 1967, and Lake Ontario high water levels in 2017 and 2019, the shoreline delineation 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 25**. The top image shows the long-term change, the bottom image shows the short-term change, and the middle image shows the shoreline recession across the three featured years.

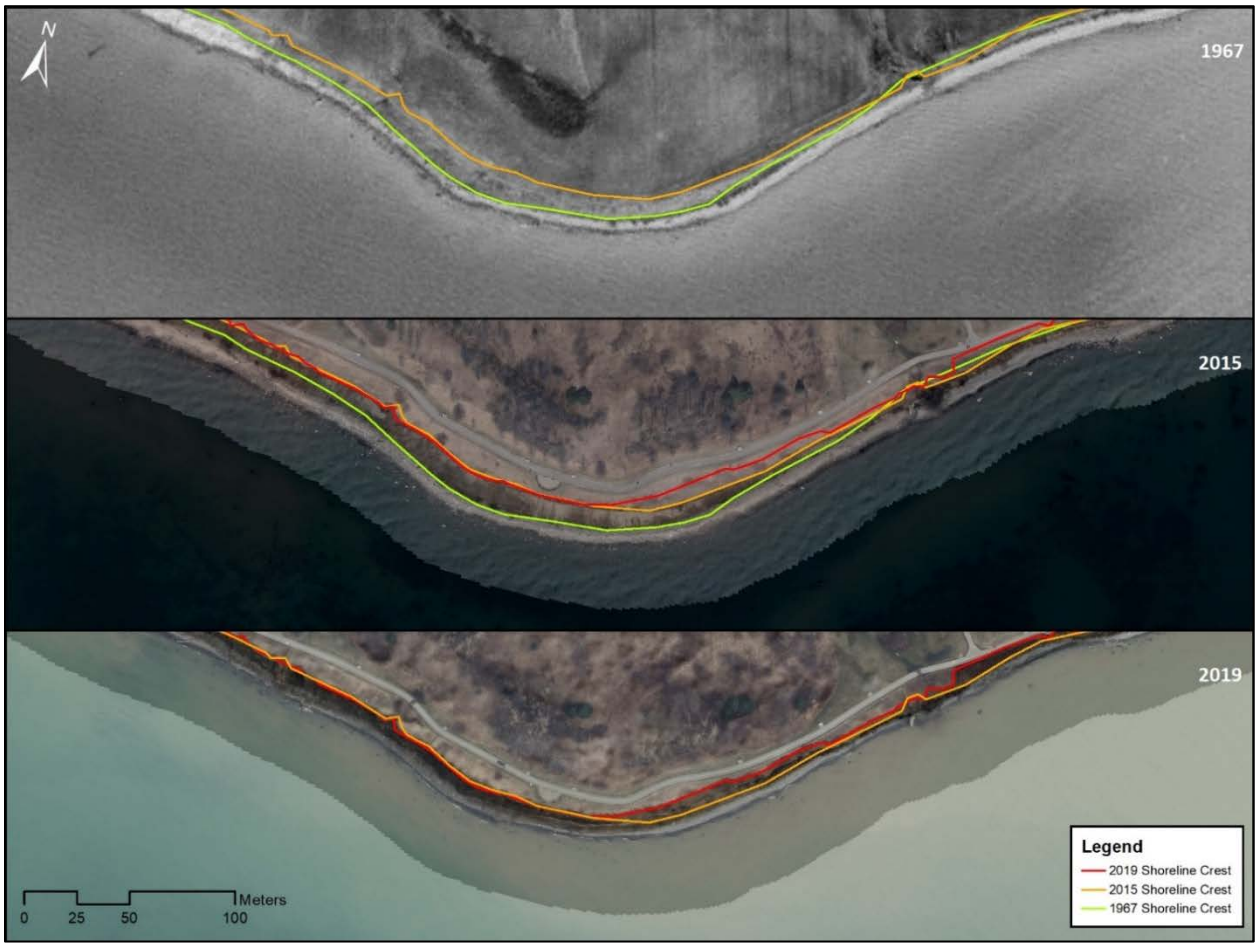

Figure 25. Shoreline crest delineation comparison between 1967-2015 and 2015-2019. *Source: TRCA, 2021.*

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 determined erosion rates can be found in Baird's coastal analysis found in **Appendix A.**

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 portions of the shoreline, particularly in the lower elevation areas like Paradise Beach. Most of the shoreline is comprised of small bluffs, which assist in mitigating flood risks but are a concern for erosion as determined through Baird's Environmental Assessment, found in **Appendix A**.

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. A geotechnical assessment indicated the ability for slopes to self-stabilize over time provided the shoreline protection is installed far enough in front of the existing bluff to collect any falling soils. This exact distance will be determined during detailed designs.

Existing Structures

There are approximately 5 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 26**. The Ajax Water Supply Plant has one of the larger stormwater outfalls (**Figure 27**) located along the Ajax waterfront.

Using GIS data provided by the Town of Ajax, TRCA assessed the exposure and consequence of failure for underground infrastructure, trails, sidewalks, lighting, municipal buildings, trees and other existing structures along the Ajax waterfront to determine erosion risks. The proximity to these items was considered in identifying locations for erosion hazard monitoring and helped inform the priority of shoreline protection implementation.

Hazardous Lands/Sites

Hazardous lands/sites are defined as: “Property or lands that could be unsafe for development due to naturally occurring processes” (CO, 2024). There are no hazardous lands within the project limits outside of the erosion hazards which are thoroughly examined and mitigated by the solutions recommended in this report.

Figure 26. Infrastructure exposed along the Ajax waterfront. *Source: TRCA, 2021*.

Figure 27. Stormwater outfall located near the Ajax Water Supply Plant. *Source: TRCA, 2021.*

4.0 EVALUATION OF PRELMINARY ALTERNATIVE OPTIONS

Information obtained in the baseline inventory was used in the development and evaluation of preliminary alternative options. Evaluation criteria considered the advantages and disadvantages of each alternative within the context of each reach where the alternative was recommended, and how it aligned with the objectives and current use of the greater Ajax waterfront.

4.1 Description of Preliminary Alternative Options

The preliminary alternative options were produced by Baird and included alternatives that fall into three main categories.

The first is the 'do-nothing' and monitoring program category, which allows current erosion processes to continue under a monitoring program which could allow the Town of Ajax to reconsider shoreline protection if necessary.

The second category includes alternatives that reduce but do not intend to stop the rate of erosion. These alternatives are typically offshore and do not stop waves from reaching the toe of the bluff, but dissipate wave intensity so erosion processes are muted.

The third category contains alternatives that 'harden' the shoreline; this includes alternatives that directly alter the bluff toe and immediately halt further erosion at the toe following implementation. These alternatives were only considered in areas in which erosion posed the most imminent threat to

surrounding permanent park infrastructure, or where rapid erosion could result in significant loss of parkland.

It should be noted that some alternatives will take a blended approach to shoreline stabilization and will be assigned to more than one category. For example, some options combine elements of Category 2 and Category 3, so it has been assigned to both categories rather than just one.

In every category, a certain amount of natural bluff recession will still occur in order for the slope to naturally stabilize (as seen in **Figure 28**). Further, while all built solutions are considered “long-term”, they are not considered ‘permanent’ stabilization as they still have a finite lifespan which could last a century or more with minor maintenance as necessary. See **Figure 28** for a graphic that illustrates the three categories of solutions.

Some typical design drawings can be found in the Environmental Assessment and Conceptual Design Development report in **Appendix A.** These are intended to be examples only, and the actual heights, widths, stone sizing, etc. are all subject to change while detailed, site-specific designs are developed.

Example photos of what the structures may look like can be found in **Figure 30**.

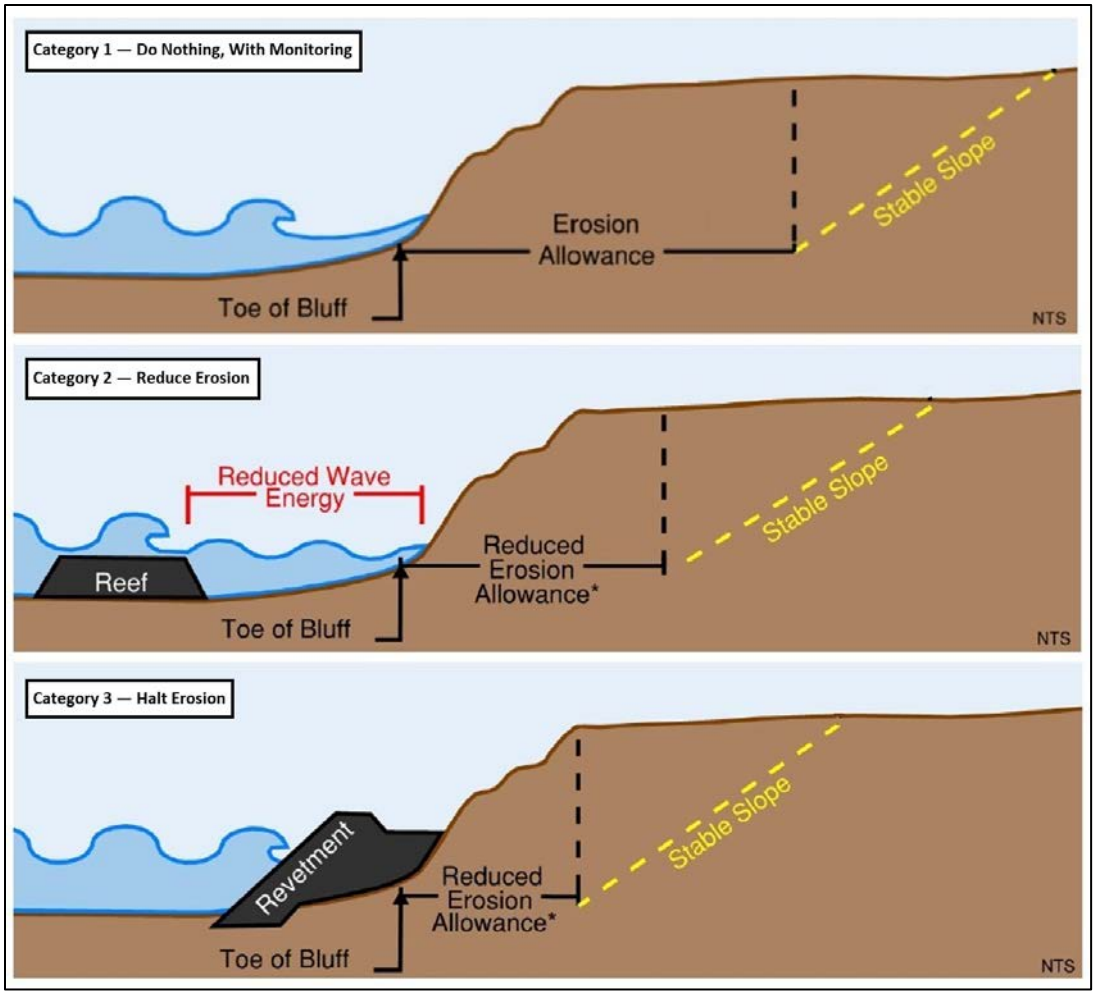

Figure 28. Three categories of designs for alternative development. The total amount of erosion and land loss decreases with Category 2 and 3 approaches. *Source: Baird, 2023*.

The following is a list of preliminary proposed alternatives with its associated approach category:

Alternative 1 – Offshore Breakwater with Gaps; *Category 2*

Alternative 2 – Nearshore Reefs; *Category 2*

Alternative 3 – Groynes with Beach Fill; *Category 2/3*

Alternative 4 – Cobble/Boulder Beach; *Category 2/3*

Alternative 5 – Conventional Revetment at Bluff; *Category 3*

Alternative 6 – 'Do Nothing' with Monitoring; *Category 1*

The evaluation of each preliminary alternative option includes an examination of the types and extents of impacts, both positive and negative. It is important to note that each of these alternatives are intended to include some amount of monitoring to ensure effectiveness. Some small-scale trail realignment and localized drainage improvements are also expected to be required across all proposed alternatives, including the 'Do Nothing', to ensure continued safety.

4.1.1 Alternative 1 – Offshore Breakwater with Gaps

Offshore breakwaters with gaps are structures made of large stone positioned parallel to the shoreline with gaps to allow water to continue to flow through the area, maintaining adequate sediment transport and access to and from the Lake. Within the context of the Ajax Waterfront Park, the majority of the structure would be underwater, with the top visible above the high water mark.

Table 2. Advantages and Disadvantages of Preliminary Offshore Breakwater with Gaps. *Source: TRCA, 2023.*

Advantages	Disadvantages
• The shoreline is not physically altered since structures are constructed in the lake. • They offer robust protection from wave action by providing a barrier even during high water levels. Diminished wave action will still reach the shore, allowing for ongoing sediment transport to adjacent beach areas. • The nearshore space between the structure and the shoreline is protected from wave energy and provides potential fish habitat. • Breakwaters can be constructed with some variation in gaps to tailor to priorities at the site.	• The structures are visible above the water, and so while they do not alter the shoreline, they do visually change the character of the lakefront. • Due to the positioning of these structures, a substantial amount of in-water work will be necessary, adding potential cost and complication to shoreline protection work. • Because the structure is offshore, it requires larger stones to withstand waves and currents in relatively deep water. This can complicate procurement and be costly in order to be effective against wave action. • Should failure of these structures occur, it can be difficult to repair as they are located offshore in deeper waters.

4.1.2 Alternative 2 – Nearshore Reefs

A Nearshore Reef slows down waves as they approach the shoreline and provides space for fish and other aquatic life to use as habitat. They are constructed to mimic natural stone reefs, so their crest elevation is below the water nearly all the time. It is important to understand the distinction between the "shoreline" and "nearshore". The shoreline can be understood as where the lake ends, and dry land begins. The nearshore, however, is the shallow area beginning at the shoreline extending out into the lake.

Table 3. Advantages and Disadvantages of Preliminary Nearshore Reef. *Source: TRCA, 2023.*

Advantages	Disadvantages
• They do not alter the shoreline physically in order to provide protection. • These structures can be tailored to a site to allow for varying degrees of protection based on what is necessary. • Stone sizes used in nearshore reefs are usually smaller so the cost of the structure can be less than that of larger emergent structures like the offshore breakwater. • They have been shown to be effective at mimicking a natural reef and providing fish habitat. • The structure tends to fail more gradually, offering opportunity for minor repairs and maintenance	• They must be built wide enough (measured from the shore side to the lakeward side of the reef) to ensure energy from waves are dissipated as they pass over the reef. This can be costly, limit where they can be implemented and how effective they are. • While in general smaller stone can be used to construct a nearshore reef, larger material may be needed on their lakeward side to ensure that wave energy does not wash away stone closer to shore. • They are less effective during high water events when erosion protection can be more necessary. • They require significant in-water work which can involve a complicated permitting and implementation process.

4.1.3 Alternative 3 – Groynes with Beach Fill

Groynes with beach fill involve the use of two structures working together to provide erosion protection. Groyne structures are made of armourstone and built perpendicular to the shoreline. They help to prevent longshore transport (movement of sediment through wave action parallel to the shoreline) and washout. Having groynes perpendicular to the shoreline creates a barrier to this sediment transport and helps keep it in place. They are sometimes paired with beach fill, which involves filling the spaces between the groynes with material such as sand, gravel, rip rap or cobble stones to provide dynamic beach protection.

Table 4. Advantages and Disadvantages of Preliminary Groynes with Beach Fill. *Source: TRCA, 2023.*

Advantages	Disadvantages
• They provide robust erosion protection while still providing a beach area for recreation. • The structure tends to fail more gradually, offering opportunity for minor repairs and maintenance • While they change the physical shoreline, they could help retain wider beaches for people or wildlife above the high water level.	• In order to support a sand or fine gravel beach, groynes would have to extend far enough out into the lake to prevent sediment movement, which could be more cost-prohibitive to implement. • Groynes change the aesthetic quality of the shoreline and disrupt the walkable beach. • They are less effective during high water events when erosion protection can be more necessary.

4.1.4 Alternative 4 – Cobble/Boulder Beach

The cobble/boulder beach alternative uses natural cobble/boulder material of varying size to supplement existing beaches along the shoreline. Cobble is typically understood to be natural round stone ranging in diameter from about 5cm (baseball-sized) to 25cm (volleyball-sized). Boulders are similar to cobble but are larger than 25cm diameter. Adding larger cobbles and boulders to the shoreline and expanding the width of the submerged beach into the lake helps to lessen wave energy and can slow erosion at the toe of the bluffs.

Table 5. Advantages and Disadvantages of Preliminary Cobble/Boulder Beach. *Source: TRCA, 2023.*

Advantages	Disadvantages
• Since some of the natural shoreline is already comprised of cobbles and boulders, this alternative matches the aesthetic quality of the area while providing protection. • Cobble/boulder beaches can be scaled to suit conditions as necessary. • The structure tends to fail more gradually, offering opportunity for minor repairs and maintenance.	• Natural cobbles and boulders can be difficult and expensive to procure at high volumes. • While boulders and cobbles will provide some erosion protection, it can be less effective than other more hardened alternatives.

4.1.5 Alternative 5 – Conventional Revetment

A revetment is an engineered structure made of large blocks of stone (often limestone or granite) called armourstone that is built along the shoreline. A conventional revetment at Ajax Waterfront Park would be constructed at the base of a bluff face with multiple layers of stacked stone and would halt further regression of the shoreline.

Table 6. Advantages and Disadvantages of Preliminary Conventional Revetment. *Source: TRCA, 2023.*

Advantages	Disadvantages
• It is a robust stone structure with a track record of performing well in erosion protection. • It provides the strongest erosion protection of all the proposed alternatives. • There is limited in-water work involved in construction, limiting lakebed disturbance. • Material to construct this type of structure is readily available from many quarries. • Failure would gradually take place as stones shift.	• It will drastically change the physical and aesthetic quality, including reducing the ability to walk along the shoreline. • Beaches would only exist in front of the structure and at low water levels if they were to exist at all. The beach over time would begin to shrink as erosion would begin to remove material from the toe of the structure. This would eventually lead to no beach being present at all. • A conventional revetment does not provide aquatic habitat.

4.1.6 Alternative 6 – 'Do Nothing'

The "Do Nothing" option is a mandatory alternative that must be considered during the Class EA process in order to justify the need to undertake remedial works within the project limits. Should the "Do Nothing" option or other CA programs, such as land acquisition, be deemed a more acceptable solution, then there shall be no further consideration for remedial action and the Class EA process terminates.

The "Do Nothing" approach to shoreline management should be utilized in conjunction with a shoreline monitoring regiment. It implies that there is no immediate risk to shoreline features that need protection so immediate action is not necessary.

Table 7. Advantages and Disadvantages of Preliminary 'Do Nothing'. *Source: TRCA, 2023.*

Advantages	Disadvantages
• The low cost associated with this option makes it a cost-effective method to monitor for erosion risks. The results of monitoring can be used to determine when work becomes necessary. • The natural shoreline aesthetic and character is retained. • The nourishment of the nearby shoreline as erosion continues is maintained.	• With continued erosion the shoreline will continue to retreat, in turn leading to the loss of recreational areas in the long-term.

This approach may evolve if in time a more suitable approach to shoreline management becomes apparent or if budgetary restraints are no longer an issue. Alternatives were identified based on the risk that erosion posed to the reach. Long-term stable slope calculations were performed and plotted as can be seen below. The "Do Nothing" approach was identified for reaches where erosion was not a risk even if left to continue long-term.

The "Do Nothing" alternative proposes that no shoreline erosion protection is implemented, but localized trail realignment and/or drainage improvements may be implemented by the Town based on need and funding availability.

Figure 29 shows the expected top of slope for Reaches 1-4 based on historic and predicted changes to shoreline erosion rates. The top of slope for the remaining reaches can be found in Environmental Assessment and Conceptual Design Development report in Environmental Assessment and Conceptual Design Development report in **Appendix A.**

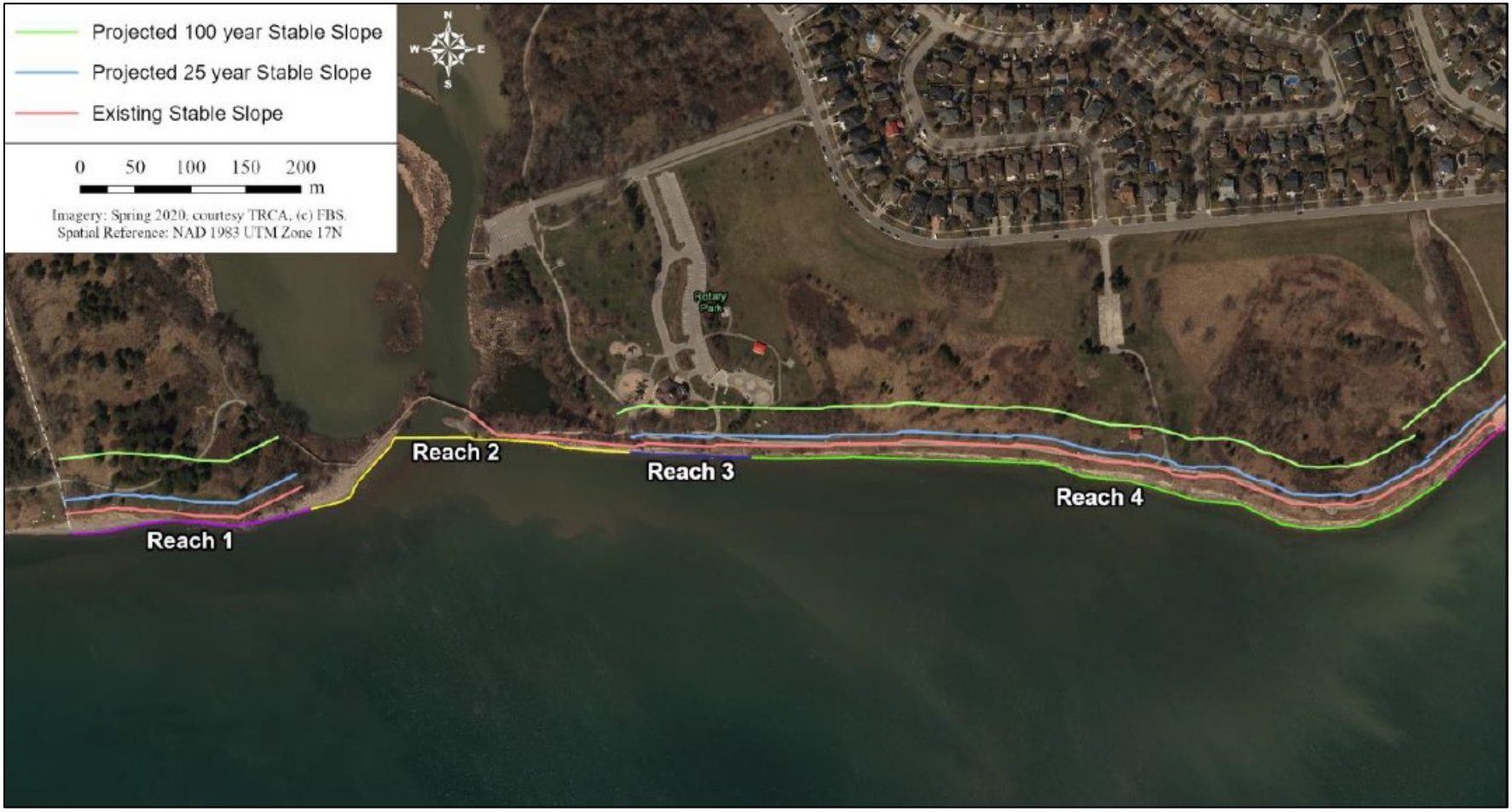

Figure 29. Long-term stable slope projections for Reaches 1-4. *Source: Baird, 2023*

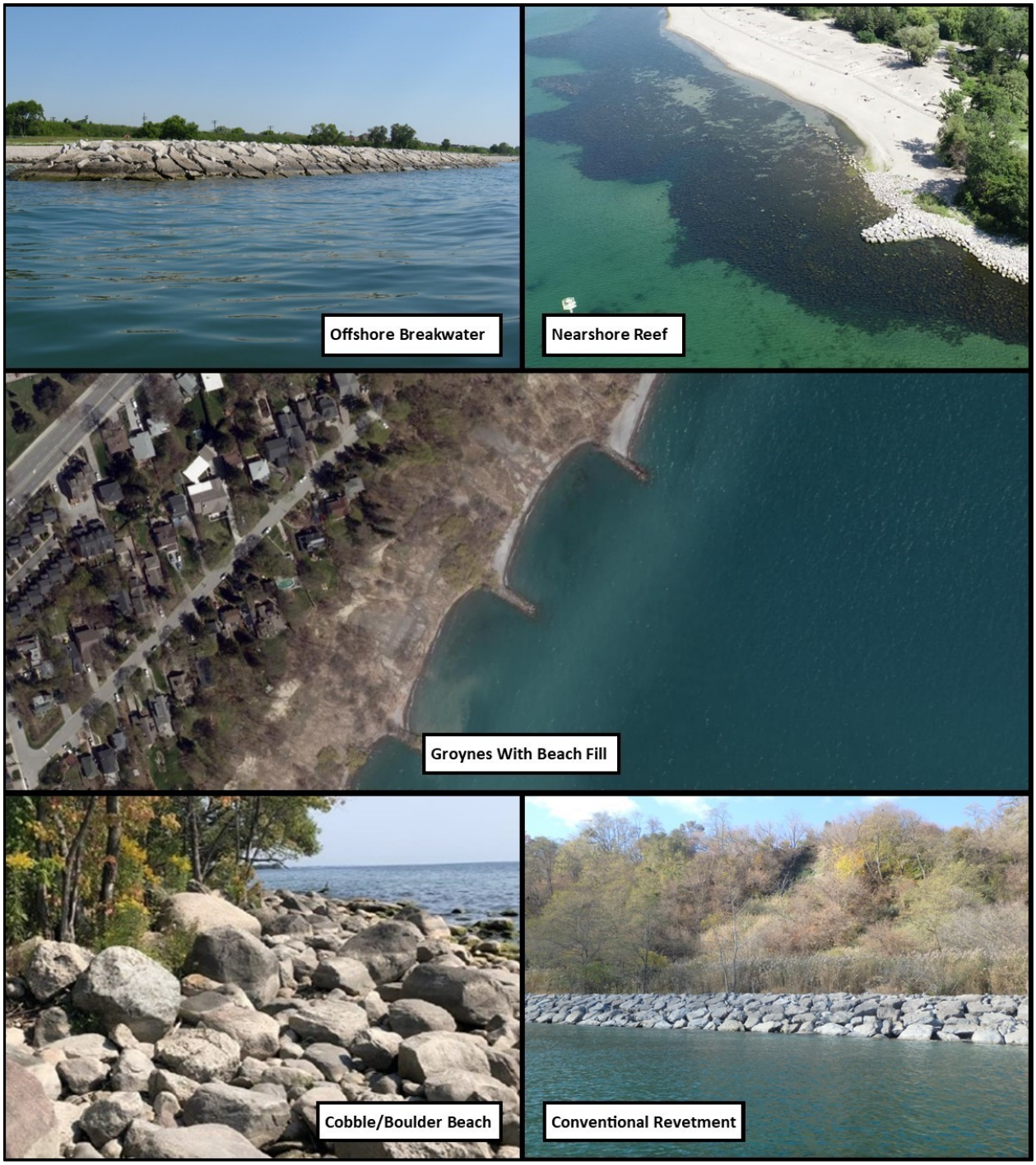

Figure 30. Examples of proposed preliminary alternatives from on-site and off-site examples. *Source: TRCA, various years.*

4.2 Description of Alternatives to the Undertaking

Alternatives to the undertaking are approaches that do not involve erosion protection or monitoring. This could mean implementing solutions such as moving essential infrastructure (e.g the Rotary Park Pavilion) to an area not threatened by erosion. Many times, these solutions are not realistic or not possible to implement. Alternatives to the undertaking, particularly in high priority areas, would lead to continued loss of land and eventually require moving major infrastructure within Ajax Waterfront Park and eventually (100+ years) moving parts of Lake Driveway. If erosion were allowed to continue along the shoreline, alternatives to the undertaking could include:

- Relocation of areas of The Waterfront Trail, eventually the entire trail
- Removing exposed and damaged infrastructure like outfalls
- Relocation of parking lots
- Relocation of memorial gardens
- Relocation of Rotary Park Pavilion, playgrounds
- Relocation of Lake Driveway
- Private residence relocation or repair

In cases where relocation is not possible, loss of that infrastructure or amenity would be anticipated. These alternatives to the undertaking were evaluated as part of the "Do Nothing" alternative above.

4.3 Evaluation of Preliminary Alternative Options

As part of the environmental assessment process, each of the identified alternatives is rated against a consistent set of evaluation criteria set out by CO's Class EA for Remedial Flood and Erosion Control Projects and is outlined in **Table 8**.

Table 8. Evaluation ranking criteria for preliminary alternatives. *Source: TRCA, 2024.*

Rank		Relation to the associated criteria
Increasing Positive Rank ↑	6	Most positive, or least negative impact; easiest to implement; lowest cost
	5	Moderate positive impact; moderate implementation; moderate cost
	4	Minor positive impact; lesser ease of implementation; high cost
	3	Neutral or no impact; no implementation; no associated costs
	2	Overall negative impact / effect
	1	Most negative impact / effect

The evaluation criteria typically consider technical, economic, environmental, and social factors or objectives. The evaluation consists of a qualitative ranking that considers the impact or effect of each alternative. As the shoreline was divided into 12 reaches, this preliminary evaluation was completed for each individual reach. **Table 9** shows the preliminary evaluation matrix for Reach 1; evaluation matrices for the remaining reaches are included in **Appendix C.**

Table 9. Preliminary alternative evaluation matrix for Reach 1 using objectives with nested criteria and indicators. *Source: TRCA, 2023.*

Objective	Criteria	Comment	Alternative 1 Offshore Breakwater with Gaps	Alternative 2 Nearshore Reefs	Alternative 3 Groynes with Beach Fill	Alternative 4 Cobble/Boulder Beach	Alternative 5 Conventional Revetment	Alternative 6 'Do Nothing'	Comments
Physical and Natural Environment	Flooding	Impact on surface drainage, flooding; meet legislated criteria for flooding and water	**1**	**1**	**1**	**1**	**1**	**1**	N/A
	Erosion	Impacts on soils, geology, rate of erosion	**4**	**3**	**5**	**3**	**6**	**1**	Promotes beach retention, imperative to public
	Aquatic Habitat	Impact on connectivity, spawning potential, barrier mitigation, habitat quantity	**4**	**6**	**2**	**5**	**1**	**3**	N/A
Social and Cultural Environment	Aesthetic Value	Impact on the aesthetic value of existing and proposed development	**2**	**4**	**2**	**5**	**1**	**6**	Maintains access to beach, imperative to public
	Benefit to Community	Access to trails, enjoyment of waterfront. Adaptability to enhance the public realm and act as a park amenity/feature	**4**	**5**	**2**	**5**	**1**	**4**	Maintains access to beach, imperative to public
	Archaeological Features	Impacts on existing archaeological features	**3**	**3**	**2**	**4**	**1**	**6**	N/A
Technical Criteria	Regulatory Agency Acceptance	Satisfy TRCA, MNRF and DFO criteria	**6**	**6**	**6**	**6**	**6**	**6**	N/A
	Impact on existing subsurface infrastructure	Protection or potential exposure of infrastructure (sanitary sewer, maintenance hole)	**5**	**4**	**5**	**4**	**6**	**1**	N/A
	Maintenance Requirements	Requirement for regular maintenance or vegetation maintenance	**3**	**5**	**4**	**3**	**4**	**1**	N/A
Constructability	Complexity of treatment	Requirement for the specialized services to design or install unique or proprietary specifications that must be completed by a certified contractor/consultant	**1**	**2**	**1**	**3**	**1**	**1**	N/A
Financial Criteria	Capital Cost	Rough Order of Magnitude (ROM) capital costs for the Detailed Design, permitting and installing proposed concept	**2**	**2**	**1**	**3**	**1**	**6**	Proposal that cobble/boulders can be added as they become available to the Town
	Maintenance Costs	Rough Order of Magnitude (ROM) costs to maintain the proposed structure	**3**	**2**	**4**	**4**	**3**	**5**	Monitoring program potential
Public Safety	Potential risks to the public	Impact to public safety (i.e., along trail, and slope) and requirement for safety features (e.g. safety fences)	**3**	**4**	**3**	**3**	**2**	**4**	N/A
Combined Rank			**41**	**47**	**38**	**49**	**34**	**45**	
Highest Ranked Preliminary Alternative			**Cobble/Boulder Beach**						

4.4 Selection of the Preferred Alternative Option

Reach-specific preliminary alternatives were recommended based on the results of the preliminary evaluation. The recommended alternatives are described in **Table 10** and shown on **Figure 31**. This table represents preliminary recommendations by reach which was later refined following consultation. Updated recommendations following consultation can be found in **Section 4.5**.

Table 10. List of Preliminary Recommended Alternatives. *Source: TRCA, 2022.*

Reach	*Reach Name*	*Characteristics*	*Priority*	*Alternative*
1	West of Duffins Creek	Documented rapid erosion in this area with low bluffs and limited infrastructure.	Low	Cobble Boulder Beach
2	Duffins Creek Mouth	No documented erosion. Reach characteristics include the creek mouth and barrier beach that the waterfront trail boardwalk runs across.	N/A	Do Nothing
3	Rotary Park Pavilion	Experiencing significant erosion that has resulted in a serious risk to the Rotary Park Pavilion and associated surrounding infrastructure. Erosion to the shoreline bluffs is rapid.	High	Offshore Breakwater
4	Lake Driveway West	Moderate erosion, higher bluffs. Opportunity to move the waterfront trail further inland.	Medium	Revetment
5	West of Lion's Point	Erosion documented here at a rapid rate to the narrow greenspace between the bluff shoreline and Lake Driveway West.	High	Revetment
6	Veteran's Point Gardens	This reach contains a naturally occurring boulder shoreline around the headland.	Medium	Cobble Boulder Beach
7/8	Filtration Plant Road & Lake Driveway East	Reach 7 and 8 already have high bluff shorelines and some existing erosion control structures, however the addition of a cobble beach here would be beneficial.	Medium	Cobble Boulder Beach
9	West of Paradise Beach	This reach has a low shoreline that in some places has a treed shoreline buffer.	Medium	Offshore Breakwater
10	Paradise Beach	No documented erosion; some flooding at high water levels. Includes Paradise Beach	Low	Do Nothing
11	Carruthers Marsh	No documented erosion occurring within this reach. This reach includes the mouth to the Carruthers Marsh.	N/A	Do Nothing
12	East of Carruthers Marsh	This reach includes a sand beach and bluff shoreline bordered by woodland and riparian marsh area with extensive green space in the backshore.	Low	Revetment

Figure 3131. Preliminary recommended alternatives for all reaches. Reach numbers are located below each alternative type. *Source: Baird, 2023.*

4.5 Updated Recommendations

After the first round of public engagement, the preliminary recommendations were updated to reflect the comments received from all public outreach initiatives. While comments varied between stakeholders and individuals, there were consistent themes of reducing the amount of shoreline hardening and using more natural solutions. The updated recommendations provided below were presented during the second round of engagement; only three alternatives are now being considered, and the revetment alternative has been removed. The impacts of each alternative are further examined in the detailed evaluation in47.

Alternative 1 – Offshore Breakwater with Gaps

The Offshore Breakwater with Gaps option remains unchanged from the description in **50**.

Alternative 2 – Improved Cobble/Boulder Beach

The Improved Cobble/Boulder Beach expands upon the original Cobble/Boulder Beach outlined in**53**. It has been updated to include a broader range of options suited to the individual site conditions. This could include using a less engineered, less robust beach in areas that require less protection or have a higher tolerance for erosion. It will also include using a more engineered beach, possible with larger anchoring stone, in areas that have more aggressive erosion and require more protection. Due to the variability of these designs, additional public engagement will occur during the detailed design phase to update on the level of protection required and to share details of the proposed designs.

Alternative 3 – Shoreline Erosion Monitoring

The Shoreline Erosion Monitoring alternative was developed as a formalized extension of the 'Do Nothing' alternative described in **55**. It includes a comprehensive monitoring program that will monitor ongoing erosion rates and compare them against predicted rates, allowing time to adjust priorities and plan for shoreline protection work as it becomes necessary. It will include a combination of remote data collection (e.g. drone photos) and on-the-ground assessments to document the condition and flag any erosion concerns.

Shoreline Erosion Monitoring is recommended across the entire shoreline, including areas where the offshore breakwater or cobble/boulder beach is recommended. Monitoring can assist with adjusting the priority for implementing shoreline protection and can also document the effectiveness of the structures once they have been constructed. Shoreline Erosion Monitoring is also recommended in areas where there is currently no erosion in order to document changes in shoreline condition. Localized small-scale trail realignment or drainage improvements may be required as part of the Shoreline Erosion Monitoring option.

4.6 Final Recommended Alternatives

Following both rounds of public consultation as part of the EA process, final recommendations were chosen based on public feedback and detailed evaluation. Feedback from the public emphasized moving away from erosion control solutions involving shoreline hardening such as conventional revetments and towards monitoring and nature-based solutions. At the time of this report, no implementation dates have been planned for any of the work, and all future work will be prioritized by the Town of Ajax and subject to available funding.

Each of the alternatives listed below can be paired with small-scale localized trail realignments and localized drainage improvements as required. Planting may also be a component of the restoration for any alternatives, although the extent and location of planting will be determined through detailed designs. Planting will be most beneficial once the toe erosion has decreased, and the slope begins to stabilize.

The final recommended alternatives are presented in **Table 11** and **Figure 32**.

Table 11. List of Final Recommended Alternatives. *Source: TRCA, 2023*.

Reach	*Reach Name*	*Priority*	*Comments*	*Recommended Alternative*
1	West of Duffins Creek	Low	Due to the popularity of the sand beach in this area, its proximity to Duffins Creek, and the lack of critical infrastructure within the reach, any work to change the shoreline was not deemed necessary in the near term.	Shoreline Erosion Monitoring
2	Duffins Creek Mouth	Low	The final recommendation for Reach 2 is Shoreline Erosion Monitoring as there is no documented erosion taking place at the mouth of Duffins Creek. Reach characteristics include the creek mouth and barrier beach that the waterfront trail boardwalk runs across.	Shoreline Erosion Monitoring
3	Rotary Park Pavilion	High	The public agreed that erosion damage at the site was extensive, and due to the proximity of the shoreline to Rotary Park Pavilion, parking lots and The Waterfront Trail, more robust shoreline protection could be accepted in the area despite aesthetic alteration.	Offshore Breakwaters with Gaps
4	Lake Driveway West	Medium	The public expressed that the preliminary alternative recommendation, a conventional revetment, was not desired from an aesthetic, access, and environmental lens. Feedback received indicated that the public was amenable to a less robust alternative that allowed for some continued erosion for a solution that incorporated nature based shoreline protection and ensured the beach would remain walkable.	Cobble Boulder Beach
5	West of Lion's Point	High	The public expressed that the preliminary alternative recommendation, a conventional revetment, was not desired from an aesthetic, access, and environmental lens. Feedback received indicated that the public was amenable to a less robust alternative that allowed for some continued erosion for a solution that incorporated nature-based shoreline protection and ensured the beach would remain walkable.	Cobble Boulder Beach
6	Veteran's Point Gardens	Medium	Since the reach already has a naturally occurring established cobble boulder beach, Shoreline Erosion Monitoring to assess site conditions and erosion rates to consider future beach enrichment was recommended.	Shoreline Erosion Monitoring
7	Filtration Plant Road	Medium	Reach 7 already has high bluff shorelines and some existing erosion control structures, however the addition of a cobble beach here would be beneficial.	Cobble Boulder Beach
8	Lake Driveway East	Medium	Reach 8 also has high bluff shorelines. The addition of a cobble beach here would be beneficial to continue to protect the Waterfront Trail.	Cobble Boulder Beach
9	West of Paradise Beach	Medium	The final recommended alternative for Reach 9 is the offshore breakwater alternative, consistent with the preliminary round of evaluation.	Offshore Breakwater with Gaps
10	Paradise Beach	Low	There is no documented erosion occurring within this Reach. During public consultation it was highlighted as an area the public feels should be monitored for any potential drainage improvements as flooding is a concern.	Shoreline Erosion Monitoring
11	Carruthers Marsh	Low	There is no documented erosion occurring within this Reach, and impacting the marsh was a concern of the public.	Shoreline Erosion Monitoring
12	East of Carruthers Marsh	Low	This reach includes a sand beach and bluff shoreline bordered by woodland and riparian marsh area with extensive green space in the backshore, so no work is necessary in the near-term. Shoreline Erosion Monitoring will assess if the playground or surrounding infrastructure was potentially at risk.	Shoreline Erosion Monitoring

Figure 3232. Map of final recommended alternatives for Ajax shoreline. Reach numbers are included below alternative type. *Source: Baird, 2024.*

5.0 ENVIRONMENTAL SCREENING

5.1 Detailed Environmental Analysis of the Preferred Alternative Options

To complete the detailed environmental analysis of the preferred alternative options, information gathered during the baseline inventory and Gap Analysis phase was examined in greater detail to confirm potential impacts of alternatives on the shoreline, refine methods of mitigation, and identify any previously unforeseen effects of work on a reach-by-reach basis. Evaluation criteria considered temporary impacts during construction of the recommended alternative, as well as permanent impacts due to function and maintenance of the preferred alternative.

The ranking system scores the expected impacts from each criterion according to the ranges in **Table 12**.

Table 12. Scoring system used for detailed evaluation and evaluation summary. *Source: TRCA, 2023*

Symbol	Numerical Value	Description
-H	**-3**	Substantial negative impacts
-M	**-2**	Moderate negative impacts
-L	**-1**	Minimal negative impacts
NIL	**0**	No net impacts
+L	**+1**	Minimal positive impacts
+M	**+2**	Moderate positive impacts
+H	**+3**	Substantial positive impacts
NA	**X**	Not Applicable (criterion doesn't exist in project area)

Criteria were divided into five impact groups to guide reviewers to their professional areas of expertise, as well as allow for an easier public review of the detailed evaluation of all twelve reaches. The impact groups are:

- Physical – physical environment; includes sediment and water transport, key physical elements, etc.
- Biological – plant and animal life; includes Species at Risk, preservation or creation of habitat, etc.
- Cultural – current and historic usage; includes indigenous use/transportation routes and park function/aesthetics, etc.
- Socioeconomic – current use of shoreline and surrounding area; includes property types and values, surrounding infrastructure, etc.
- Engineering/Technical – ability to withstand erosion and flooding; includes shoreline conditions, slope stability, and geotechnical considerations, etc.

Table 13 provides an example of the completed evaluation criteria and ranking system for Reach 1.

Table 13. Detailed Environmental Analysis of the Preferred Alternative for Reach 1. *Source: TRCA, 2023.*

Screening Criteria	Rating of Potential Effects for Reach 1 – Shoreline Erosion Monitoring								
	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Physical									
Unique Landforms				0					Informal recreational beach
Existing Mineral/Aggregate Resources Extraction Industries								X	
Earth Science – Areas of Natural and Scientific Interest								X	
Specialty Crop Areas/Agricultural Lands or Production								X	
Niagara Escarpment/Oak Ridges Moraine								X	
Environmentally Sensitive/Significant Areas (physical)				0					Adjacent to Duffins Creek mouth
Air Quality				0					
GHG Emissions and Carbon Sinks				0					
Resiliency to Climate Change				0					
Agricultural Tile or Surface Drains								X	
Noise Levels and Vibration				0					
Water Flow Regime				0					Flows from beach will continue
Existing Surface Drainage/Groundwater				0					Flows from beach will continue
Seepage/ Groundwater Recharge/Discharge Zones				0					No impact
Littoral Drift/ Other Coastal Processes					1				Leaving natural shoreline will continue sediment supply into Lake Ontario
Water Quality				0					No impact
Soil/Fill Quality				0					Soil impact will remain unchanged
Contaminated Soils/Sediment/Seeps (Sediment Quality)								X	No known contamination areas present
Existing Transportation Routes				0					No impacts
Constructed Crossings (e.g. bridges, culverts)				0					Leads to Duffins Creek boardwalk
Geomorphology				0					Little if any adjacent impacts
Biological									
Wildlife Habitat					1				Continue to provide existing habitat
Habitat Linkages or Corridors					1				Maintains existing linkages

Screening Criteria	Rating of Potential Effects for Reach 1 – Shoreline Erosion Monitoring								
	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Significant Vegetation Communities								X	Does not include marsh vegetation community
Environmentally Sensitive/ Significant Areas (biological)					1				Adjacent to ESA, monitoring will allow natural processes to continue
Fish Habitat				0					Mixed-substrate beach
Species of Concern								X	No species of concern recorded within reach
Exotic/Alien and Invasive Species				0					Not anticipated to affect alien/invasives
Wildlife/Bird Migration Patterns				0					No impact on bird migration patterns
Wildlife Population					1				Maintains existing sand beach and low bluff habitat to accommodate existing wildlife population
Wetlands						2			Monitoring will allow the wetlands to continue functioning with no temporary or long-term impacts
Microclimate				0					No anticipated effect
Unique Habitats					1				Maintains sandy beach shoreline
Life Science - Areas of Natural and Scientific Interest (LS ANSI)				0					Adjacent to Life Science – Area of Natural and Scientific Interest; no impacts anticipated
Cultural									
Traditional Land Uses				0					Traditionally used for agriculture; now recreational; no changes anticipated
Indigenous Reserve or Community						2			Known burial site located north of this Reach; monitoring will ensure no negative impacts to this site
Outstanding Native Land Claim or Treaty Rights								X	
Transboundary Water Management Issues								X	
Riparian Uses					1				Maintains existing riparian usage
Recreational/Tourist Uses of Water Body and/or Adjacent Land						2			Area used by community to launch kayaks/boats for entry to DCCM, Lake Ontario, Fishing, Birdwatching, use of Waterfront Trail recreating. Monitoring to facilitate continued use of area for these purposes
Aesthetic or Scenic Landscapes or Views					1				Maintains existing sand beach aesthetic
Culturally Significant Resources								X	

Screening Criteria	Rating of Potential Effects for Reach 1 – Shoreline Erosion Monitoring								
	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Historic Canals								X	
Federal Property								X	
Heritage River System								X	
Socioeconomic									
Surrounding Neighbourhood or Community					1				
Surrounding Land Uses or Growth Pressure				0					
Existing Infrastructure, Support Services, Facilities				0					
Pedestrian Traffic Routes			-1						
Property Values or Ownership			-1						
Existing Tourism Operations				0					
Property Accessibility				0					
Engineering/Technical									
Rate of Erosion in Ecosystem		-2							Erosion to continue, however no permanent infrastructure is at risk
Sediment Deposition Zones in Ecosystem				0					No change anticipated
Flood Risk in Ecosystem				0					Beach would be slightly raised, otherwise no impact
Slope Stability			-1						Protection of toe plays large role in stabilization
Existing Structures			-1						Trail would need localized realignment over lifespan to accommodate eroding bluff
Hazardous Lands/Hazardous Sites			-1						Reduction in potential for collapse

5.2 Summary of Detailed Environmental Evaluation

The detailed evaluation for each reach has been summarized below, including the most pertinent considerations in the comments for each Reach. Scores from each category of the evaluation criteria were averaged between -3 and +3 to provide a single score, and the most important considerations for each reach were included in the comments section of the summary. Please see **Appendix C** for the full detailed evaluation table for each Reach.

Table 14. Detailed Evaluation Summary for All Reaches. *Source: TRCA, 2024.*

Reach	Recommended Alternative	Screening Criteria					Comments/Notes (high level)
		Physical	Biological	Cultural	Socio-economic	Engineering /Technical	
1	Shoreline Erosion Monitoring	0	+1	+1	0	-1	• Allows for continued sediment input to the lake • Maintains public access to the beach • Adjacent to ESA and Life Science ANSI
2	Do Nothing	0	+1	0	+1	0	• High public investment to retain recreational use • Life Science ANSI designated area
3	Offshore Breakwater	0	+1	+1	+2	+2	• Reduces erosion risk to Rotary Park Pavilion/Waterfront Trail • Improves nearshore habitat • Likely to increase beach width through sediment retention
4	Cobble Boulder Beach	0	-1	0	+1	+2	• Potential negative impact to bank swallows over time • Maintains walkability of the beach for public access
5	Cobble Boulder Beach	0	0	+1	+2	+2	• Potential negative impact to bank swallows over time • Better Waterfront Trail protection where moving it is limited • Maintains beach walkability
6	Shoreline Erosion Monitoring	0	0	+1	+2	0	• Maintains shoreline walkability and protects Waterfront Trail
7	Cobble Boulder Beach	0	0	0	+1	+1	• Waterfront Trail better protected and shoreline appearance maintained
8	Cobble Boulder Beach	0	0	0	+1	+2	• Reduction in potential for bluff collapse
9	Offshore Breakwater	0	0	0	+1	+1	• Could provide calmer nearshore habitat for use by fish • Reduces erosion rates, retains accessible shoreline area
10	Do Nothing	0	0	0	+1	0	• Significant public investment in maintaining sand beach and not altering Paradise Beach area; popular destination for community and visitors
11	Do Nothing	0	+1	+1	+1	0	• Carruthers Marsh is a designated ESA and PSW • Carruthers marsh is a Life Science ANSI
12	Shoreline Erosion Monitoring	0	+1	+1	0	0	• Monitoring ensures tall bluffs remain promoting habitat for bank swallow

6.0 PUBLIC AND INDIGENOUS ENGAGEMENT SUMMARY

This section of the Environmental Study Report provides a summary of comments received during the public consultation phase of the project, a discussion of how these comments informed final design recommendations, and an outline of the monitoring program once the project is complete.

Documents related to the public outreach component of this project, including all published notices, meeting materials and minutes, and comment forms, are included in **Appendix D**.

6.1 Public Notifications and Consultation

In accordance with the Class EA process, the first point of public contact occurred with the publication of a Notice of Intent in the local newspaper, the Ajax Pickering News Advertiser. A project webpage was launched in conjunction with the Notice of Intent to share a digital copy of the notice, provide the public with more information, and act as a place to post project updates and milestones. Consultation included multiple meetings with committees such as the Technical Advisory Committee (TAC) and Community Liaison Committee (CLC). Two meetings were also held with the public through Public Information Centres (PIC). Meetings were tailored to the experience and understanding level of the audience regarding shoreline erosion protection in the study area. While the TAC and CLC were comprised of members invited to participate as technical experts or representatives of the community by TRCA and the Town of Ajax directly, the Public Information Centre was advertised to the wider community and anyone could attend and provide feedback.

Signs were posted throughout Ajax Waterfront Park from May 12 to June 9, 2023, to inform the public of the project/study and the upcoming PIC. Signage included a link to a Virtual Public Open House which expanded upon project website information, including methods to provide feedback via an online portal or at the in-person PIC held on May 24th at Duffins Bay Public School. A Public Notice was also circulated in the Ajax Pickering News Advertiser to inform the public of the PIC and Virtual Public Open House.

Invitations for the TAC and CLC were sent directly to relevant groups via email to invite them to participate in the committee meetings held virtually.

All public circulations requested that individuals contact the Senior Project Manager, Natasha Gibson, if they wished to participate further in the EA process or to be kept informed about the project's status. Contacts were added to an email update list per individual request.

A summary of the individuals and community groups that expressed interest in the project after distribution of the NOI, as well more information about the TAC and CLC and PIC meetings, is included in **Appendix D**.

6.2 Community Liaison Committee (CLC)

The project aligns with the following from the Class EA document:

> The Class EA states that a Community Liaison Committee (CLC) shall be established on a project-by-project basis for each remedial flood and erosion control work undertaken in accordance with the Class EA. The formality of a CLC's structure and composition should be proportional to the amount of public interest in an undertaking. (A CLC for a non-controversial PP, for example, should be less structured than for a more substantial undertaking generating more public concern).
>
> With this in mind, the following are presented as guidelines only. The Conservation Authority will establish specific Terms of Reference for the CLC's on a project-by-project basis.
>
> Key functions include:
> • to assist the Conservation Authority in obtaining public input
> • to identify issues of concern regarding a remedial project
> • to review information and provide comments to the Conservation Authority to be utilized during the planning and design process
> • to disseminate information *(CO, 2024.)*

6.2.1 CLC Meeting #1: January 26, 2023

CLC Meeting #1 was held virtually on January 26th. Prior to the meeting, research was done to identify and contact community groups with interests/goals relevant to work at Ajax Waterfront Park.

Representatives from TRCA, Baird, the Town of Ajax, Ajax Town Council and Durham Region Cycle Coalition attended CLC Meeting #1. They received information from the Senior Project Manager regarding the project background, objectives, and scope of work. The CLC presentation also included a detailed description of preliminary recommended alternatives and how the project footprint was delineated to properly assess areas of concern and concept applicability.

Questions from CLC participants were taken throughout the presentation, and representatives from TRCA, the Town of Ajax and Baird responded depending on subject matter. Questions from the community were limited and no major concerns were raised, with most questions coming from members of Council.

6.2.2 CLC Meeting #2: November 14, 2023

The second CLC Meeting was held virtually on Tuesday, November 14th. All attendees of the first CLC meeting were extended an invitation, as well as those who were previously invited but could not attend. Final attendance at the second CLC meeting included representatives from TRCA, Baird, the Town of Ajax, Durham Region Cycle Coalition, and Durham Region.

The meeting's aim was to circulate revised recommended alternatives following the detailed evaluation of designs and public feedback from the first Public Information Centre. The meeting also reviewed concerns raised during the PIC and project next steps.

6.3 Public Information Centre (PIC)

The project draws from the following excerpt from CO's Class EA document when creating the PIC:

> The extent of the public notification is up to the discretion of the Conservation Authority. The decision to consult further with the public would be based on the nature and extent of the project. The Class EA is a proponent driven process, and therefore, it is up to the proponent to determine the level of consultation required for a project, keeping in mind that the Class EA sets out the minimum requirements that must be followed by the proponent.
>
> In addition to publishing notices in the local press, other methods of notifying the public that a Conservation Authority may consider include radio/TV announcements, notices posted in community facilities, notices posted at the site of the project and on the Conservation Authority and/or other website(s), and notices posted on social media platforms.
>
> Each Conservation Authority must determine for itself, on a project-by-project basis, whether it is appropriate and how to expand public notification opportunities. It is recommended that consideration be given to special timing requirements (e.g., frequency of meetings) identified by groups/associations wanting to participate in the process. (CO, 2024.)

The Public Information Centre is intended to further engage the public where CLC participation is lower than anticipated. Two PICs were held to allow community members an opportunity to engage directly with the project team to ask questions and learn more about proposed alternatives and other project elements. A virtual engagement and information platform via the project website or Virtual Public Community Room (VPCR) was provided in conjunction with the PIC to ensure maximum accessibility of engagement. Comments could be given in person or online during the open comment period.

6.3.1 PIC Meeting #1 May 25, 2023

The first PIC meeting was held at Duffins Bay Public School on May 25th from 6-8pm. The format of the PIC was a formal presentation given by the Senior Project Manager, followed by a question and answer session with a panel comprised of the core project team.

Approximately 20 members of the community, including the Deputy Mayor and local Councilor attended the first PIC presentation and participated in the following question and answer period. The primary concerns voiced by the public regarding the preliminary recommended alternatives were:

- A strong aversion to hardening the shoreline
- The cost of formal shoreline protection work
- The importance of nature-based solutions along the shoreline consistent with existing conditions

The public expressed that the revetment option was widely disliked and encouraged the project team to reconsider alternatives to replace it where it was initially recommended. A full list of comments and questions

is included in **Appendix D**. Feedback from the first PIC was incorporated into concept design evaluation and final design recommendations, which were presented at the second PIC.

6.3.2 PIC Meeting #2 January 16, 2024

The second PIC meeting was held the evening of January 16th, 2024 at Rotary Park Pavilion. Rather than formally present refined alternatives and project elements, the second PIC took a drop-in format with multimedia information panels, videos, and handouts available along with core project team members available to engage with the public. Approximately 25 people attended the second PIC and were able to ask team members questions or voice their concerns directly; anyone unable to attend in person could submit questions or concerns via the project website, where panel information and presentation videos were available for review. All attendees were encouraged to follow up through the website or via email if they had any further inquiries. A record of all questions and comments submitted during the second PIC is included in **Appendix D**.

Feedback received during the second PIC helped to confirm the final recommendations submitted in this report.

6.4 Notice of Completion and Notice of Project Completion

As per the requirements of the Class EA document, the Environmental Study Report shall be filed and made available at Ajax Public Library, Main Branch (55 Harwood Avenue South, Ajax) for the duration of the thirty (30) day review period. The Environmental Study Report shall be circulated digitally to the formal CLC list and hard copies will be provided upon request.

Following the 30 day review period of this Class EA report and the successful resolution of any concerns received during the review period, TRCA and the Town of Ajax will plan to initiate the detailed design phase of the final recommended solutions, including obtaining the necessary approvals. The timeline for the detailed design phase and future implementation phase for each Reach will be determined by a variety of factors, including funding availability and approval by the Town of Ajax.

A Notice of Project Completion and a Notice of Project Construction Completion shall be sent to all parties who expressed an interest in the project, in addition to Conservation Ontario and the MOECC.

6.5 Indigenous Community Consultation

TRCA circulated project information and extended an invitation to local First Nation and Metis community representatives to participate in the public consultation process and inform them of the EA process and design development. First Nations and Metis community representatives did not express concerns about the project; a copy of this report will be circulated to provide further opportunity for feedback directly.

7.0 SUMMARY

Based on the results of the second PIC, the proposed updated recommended alternatives were generally accepted by the public and notable stakeholders.

7.1 Implementation Priority

As part of the evaluation of alternatives, each reach was assigned a priority for implementation based on the anticipated risks to infrastructure at the time of this report. These priorities are subject to change based on changing conditions and climate, however the list is intended as a starting point for future planning purposes.

The reaches are divided into low, medium, and high priority. Shoreline Erosion Monitoring is recommended to be implemented before the priority listed on **Table 15**.

Table 15. List of priority reaches for Ajax shoreline. *Source: Baird, 2024.*

High Priority	Medium Priority	Low Priority
0 – 10 Years	10 – 40 Years	40+ Years
Reach 3 Reach 5	Reach 4 Reach 6 Reach 7 Reach 8 Reach 9	Reach 1 Reach 2 Reach 10 Reach 11 Reach 12

Although the implementation priority listed above is recommended from a technical perspective, actual implementation will depend on competing funding priorities within the Town of Ajax, and changing site conditions between when this report was written and when the work will be implemented. It is the intention that higher priority sites are constructed first, however that does not preclude the work being completed in any order based on funding and other opportunities evaluated by the Town of Ajax.

7.2 Post-Construction Monitoring and Restoration

As the work is currently proposed to be constructed utilizing TRCA staff, regular monitoring by trained TRCA professionals will be conducted from the Erosion Risk Management (ERM) group, as well as Construction Services to ensure that all best management practices (BMPs) are used to avoid or minimize disturbance to the environment. Should the work be constructed using a third-party contractor, TRCA or the Town of Ajax will request that environmental BMPs are added to the design package and followed on site by the contractor.

Once construction of the works is deemed complete, it is recommended that regular inspections be completed by staff through TRCA's long-standing Erosion Hazard Monitoring Program to ensure the works are performing as expected. These inspections would flag any maintenance that may be required so it can be scheduled and carried out in a timely manner. The erosion control and slope stabilization structure would be included in TRCA's Stream and Infrastructure Database (SEID) where construction specifications, photos, and structure conditions are documented. Visual inspections would be completed following major storm events for a 1-year period. Site inspections would be conducted annually until a 3-year period has passed, after which timed

inspections would be adjusted to an appropriate frequency depending on structure's condition. Copies of these inspection reports can be provided to parties of interest upon formal request to TRCA's ERM group.

If a significant deviation from expected performance is noted during a visual inspection, additional surveys should be undertaken immediately. If a survey detects a significant deviation from expected performance, then maintenance will be planned and implemented on a priority basis to the limit of available funding each year.

8.0 REFERENCES

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9.0 APPENDICES

For digital copies of **Appendices A, B, C, & D**, please contact:

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