5.0 DESCRIPTION, EVALUATION AND RATIONALE FOR 'ALTERNATIVE METHODS' OF CARRYING OUT THE UNDERTAKING

'Alternative Methods' are different ways of doing the same activity. In the context of the LWC Project, 'Alternative Methods' are similar ways of designing a new natural waterfront park on created land with ecological habitat and public linkages within the LWC Project Study Area.

For the purpose of the EA, different 'Alternative Methods' were identified by modelling different fill volumes and alternative shoreline treatments in relation to the coastal processes that will ultimately dictate their configuration. The initial identification of 'Alternative Methods' considered the amount of fill required to establish a footprint upon which other LWC Project objectives could be achieved. Different combinations of hard and soft shorelines (i.e. revetment vs. beach) and the incorporation of different fill volumes produced a series of alternative footprints upon which the various LWC Project objectives could be achieved. LWC Project objectives were addressed as subsequent layers applied to the alternative footprints. The identification and evaluation of 'Alternative Methods' was carried out in a four-step process, depicted in Figure 5.1.

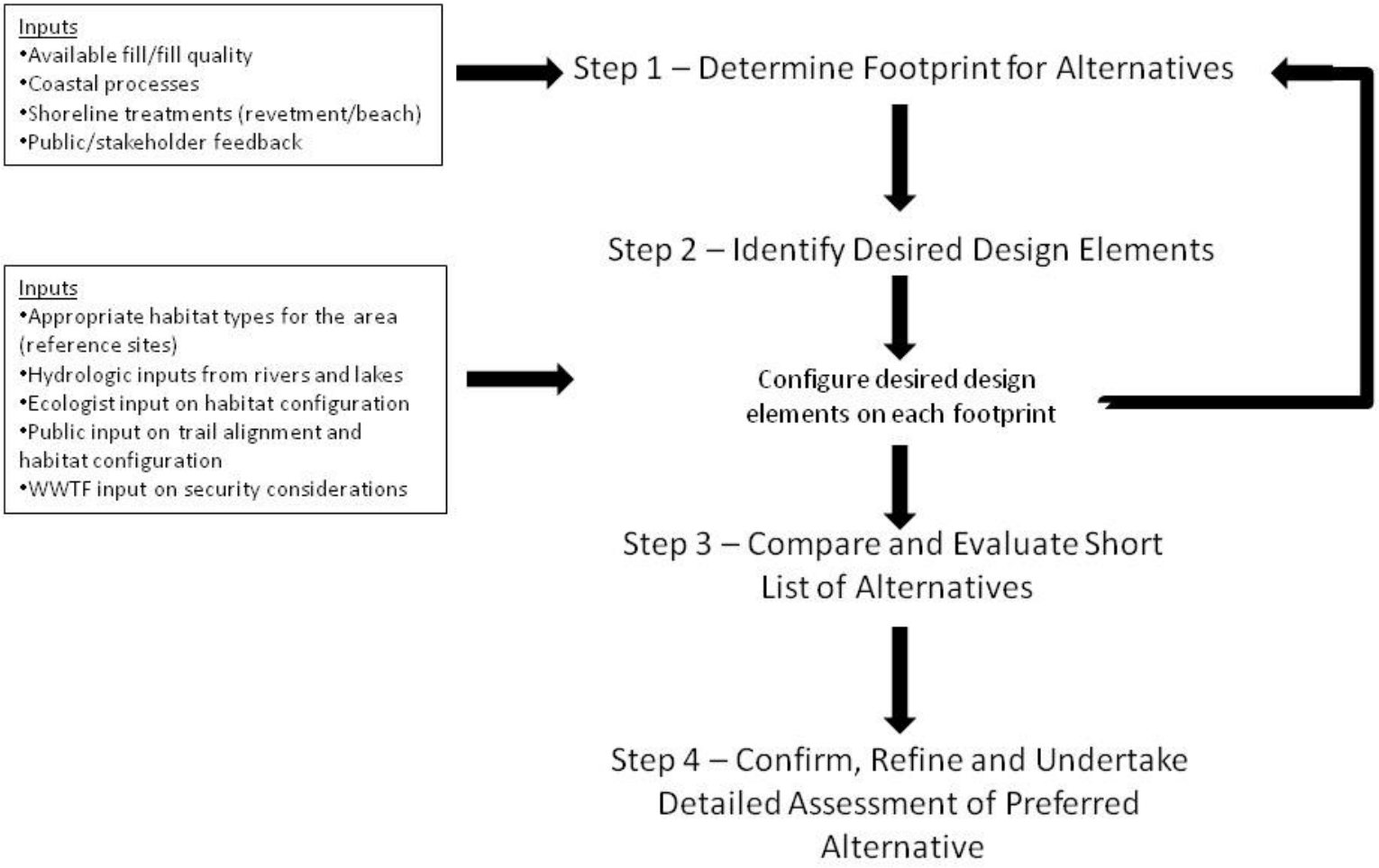
5.1 STEP 1: DETERMINE FOOTPRINT FOR ALTERNATIVES

The first step in defining the Alternative LWC Project Configurations was to develop a range of footprints[12] up to a maximum spatial extent. This range of footprints was determined through consideration of coastal processes, effects on water quality and the economical use of fill. The LWC Project footprint can be affected by and/or can affect coastal processes to the detriment of the broader LWC Regional Study Area or to the detriment of the LWC Project footprint itself. Footprints needed to be designed in a way that does not negatively affect coastal processes and must be able to withstand the same processes. Alternative LWC Project Configurations include both the footprint of the land creation area and the ecological and public access features within the footprint.

The development of Alternative LWC Project Configurations was driven by the LWC Project objectives related to the creation of habitat and public access and informed by the available volumes of fill and input from the public and technical experts. It is anticipated that between 1.5 and 2.0 million cubic metres of clean fill will be available through infrastructure works planned by the Region of Peel over the next ten years. The shape and location of the footprint was also influenced by the location of existing intake and outfall infrastructure, the need to provide access to this infrastructure, and the avoidance of any significant marine archaeological resources.

[12] "Footprint" refers to the size and shape of the fill area.

Figure 5.1 Framework to Identify and Evaluate 'Alternative Methods'



The methodology for determining the footprint for the 'Alternative Methods' involved:

1. Determining an appropriate range of fill volumes;
2. Determining the effect of coastal processes on land creation;
3. Determining appropriate range of shoreline treatments to establish a stable footprint;
4. Generating an initial set of alternative footprints; and
5. Refining alternative footprints based on public and stakeholder input.

5.1.1 Determine an Appropriate Range of Fill Volumes

Currently, the Region of Peel has long-term plans for infrastructure works throughout the Region of Peel that are anticipated to generate significant volumes of clean fill. This clean fill is typically treated as waste and hauled long-distances for disposal. The LWC Project is an opportunity to use this generated material as a resource to meet the naturalization and public access objectives and use the offset costs from the reduced haulage to help fund the planning and implementation of the LWC Project. The Region of Peel anticipates that between 1.5 and 2.0 million cubic metres of clean fill would be generated as a result of these infrastructure projects. For the initial generation of Alternative LWC Project Configurations (i.e. 'Alternative Methods'), an upset limit of 2.0 million cubic metres of clean fill was used to represent the maximum potential extent of the LWC Project footprint. Based on the projected availability of clean fill for the LWC Project, the EA Technical Team looked at the other factors that would determine a range of potential sizes and shapes for Alternative LWC Project Configurations.

5.1.2 Determine the Effect of Coastal Processes on Land Creation

An initial assessment of wave climate within the LWC Project Study Area was carried out prior to the development of the Alternative LWC Project Configurations. The purpose of the initial wave assessment was to establish net wave energy and design wave heights in the LWC Project Study Area. The analysis was completed for a node located within the LWC Project Study Area in water depth of 5 m below chart datum. The net wave energy is used for the initial assessment of beach alignment for shoreline treatments with beaches. Figure 3.12 shows the dominant wave energy distribution in the general area of the LWC Project. The energy distribution is very strongly dominated by easterly waves. There is also a weak, but well defined, secondary direction energy component directly from the south. This analysis indicated that footprints must be aligned perpendicular to the dominant wave energy (from the east) and beaches would consist of cobble (up to 200 mm diameter) to remain stable at this node location (5 m depth).

5.1.3 Determine Appropriate Range of Shoreline Treatments to Establish a Stable Footprint

The Alternative LWC Project Configurations were developed using reasonable assumptions and simplifications regarding the elevation of the site and overall site grading. The final site grading plans may modify the total fill volumes. The average fill grade over the site is assumed to be 79.0 metres above sea level (masl). This elevation is used since it is anticipated to be the minimum wave uprush elevation along the exposed part of the shoreline of the fill site.

Normal land creation procedure includes the construction of a perimeter berm using concrete rubble or core stone material. The crest elevation of the berm is 78.0 masl. This is lower than the average fill level. It is anticipated that the crest of the actual protection structure will be built up on top of the berm. The berm is assumed to be 10 m wide at the crest and side slopes are 2h:1v. The 10 m width allows for two way traffic on top of the berm during construction.

The perimeter berm can be constructed entirely around the site or in stages based on anticipated annual fill volumes. The shape of the landform should try to minimize the perimeter length and volume of the berm while maximizing the internal fill volume. Theoretically, this suggests circular or square containment cell shapes would be the most efficient to achieve this. This ideal approach must be tempered due to potential problems that can be caused by the introduction of sharp changes in shoreline alignment associated with these shapes. Potential problems can include sudden deflection of currents, collection of debris or sediment and/or creation of “dead water” areas.

Three types of shoreline treatments were considered for the Alternative LWC Project Configurations. The potential shoreline stabilization treatments include armour stone revetment concepts, headland beach concepts and island beach concepts.

5.1.4 Generate Alternative Footprints

Concepts with armour stone revetment protection were developed by creating landforms that have a minimal footprint and gently curving shores. The minimal footprint was achieved by extending the landforms into the deeper water fronting the south part of the LWC Project.

The headland beach concepts were prepared with cobble beaches facing the direction of net wave energy from the east. The beaches are between 100 m and 200 m long. Longer beach cells are not recommended at the conceptual design level. Most of the beach cells are less than 150 m long. The beaches were assumed to be constructed of cobble size material, generally in the order of 100 mm to 150 mm. Widths of the beaches were approximated and assumed using a typical

slope of 4h:1v. The slope of the beaches can vary and will be analyzed in more detail during later stages of planning. Beaches, rather than headlands, are located over the existing outfall pipes. All of the beaches show the same alignment due to the significant domination of the east quadrant wave energy. Locating beaches perpendicular to the secondary south quadrant wave vector would require substantial sheltering of the beach from the east waves. The remainder of the shoreline outside of the beach sector is protected with an armour stone revetment.

The island beach concepts follow the same design approach as the headland beaches except that the headlands are replaced with offshore islands. The islands are positioned with their long axis parallel to the beach alignment. This allows for the creation of a semi-sheltered water area behind the island. The beach alignment is expected to curve outward possibly forming a tombolo[13] that may connect to the island during low water levels.

The three initial footprint concepts (revetment, headland beach and island beach) are depicted in Figure 5.2. These alternative concepts could be expanded or contracted according to the amount of fill available for the project resulting in varying extents into Lake Ontario.

5.1.5 Refine Alternative Footprint Concepts

The three alternative footprint concepts depicted in Figure 5.2 were presented in a workshop with the CLC on October 9, 2012 and the LWC EA Technical Team on October 19, 2012 to solicit feedback on the designs and determine if other designs should be considered. Based on feedback from the CLC workshop and further input from the Technical Team, two additional island beach alternative footprints were generated that provided different functional characteristics to the original alternative footprint shapes (Figure 5.3). The first new island beach alternative footprint (Island Beach B) connects the northern most island to the mainland, establishing a sheltered embayment feature. The second new island beach alternative footprint (Island Beach C) allows for the creation of a longer, linear cobble beach extending to Etobicoke Creek that avoids a “hook” feature at the north end as identified on the original island beach footprint (Figure 5.3). Consultation with the CLC and the LWC EA Technical Team resulted in five alternative footprints that were carried forward for evaluation (Figure 5.3).

[13] Tombolo is a narrow spit of beach material that connects the main beach with the headland.

Figure 5.2 Initial Alternative LWC Project Configurations

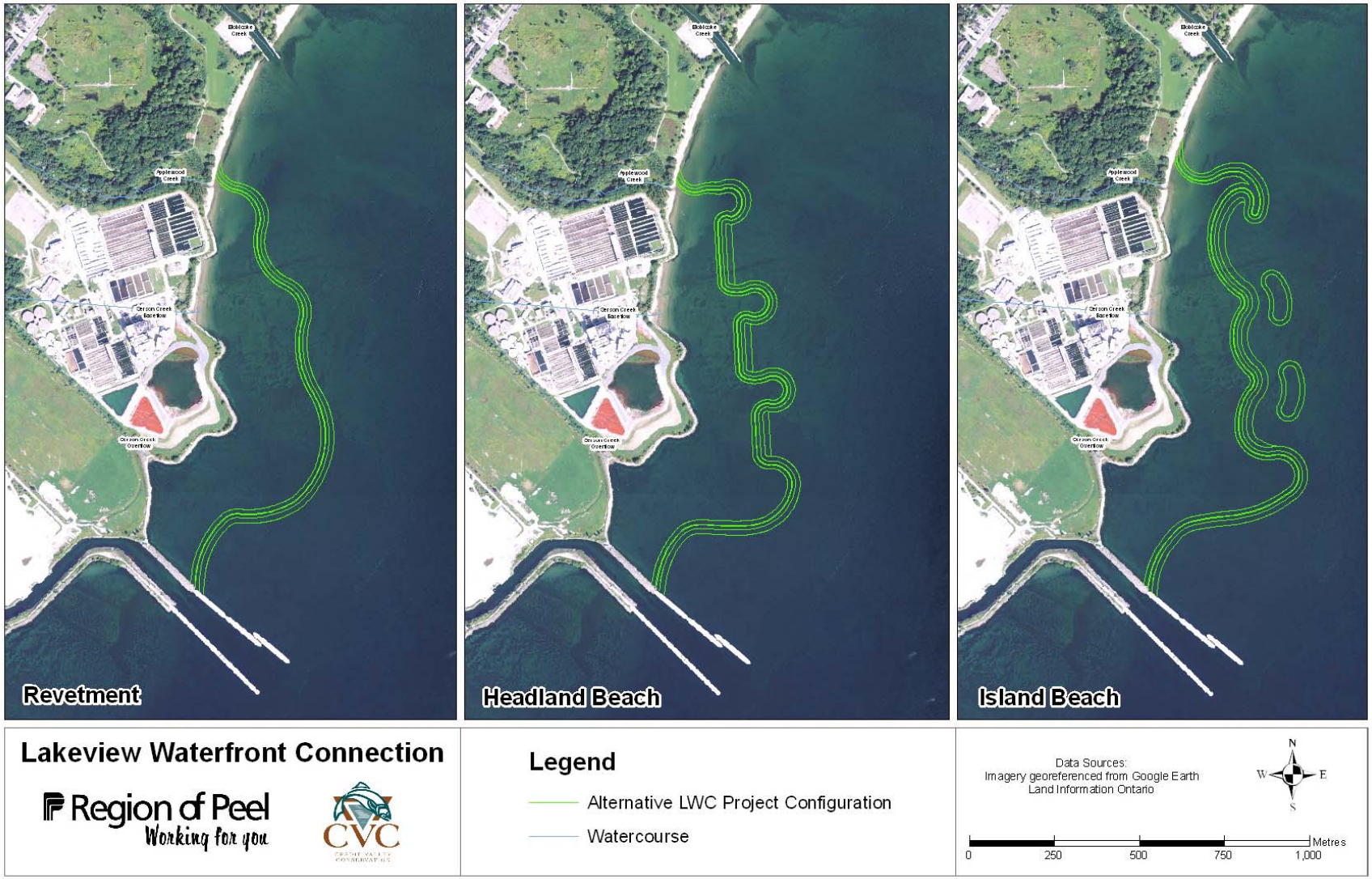
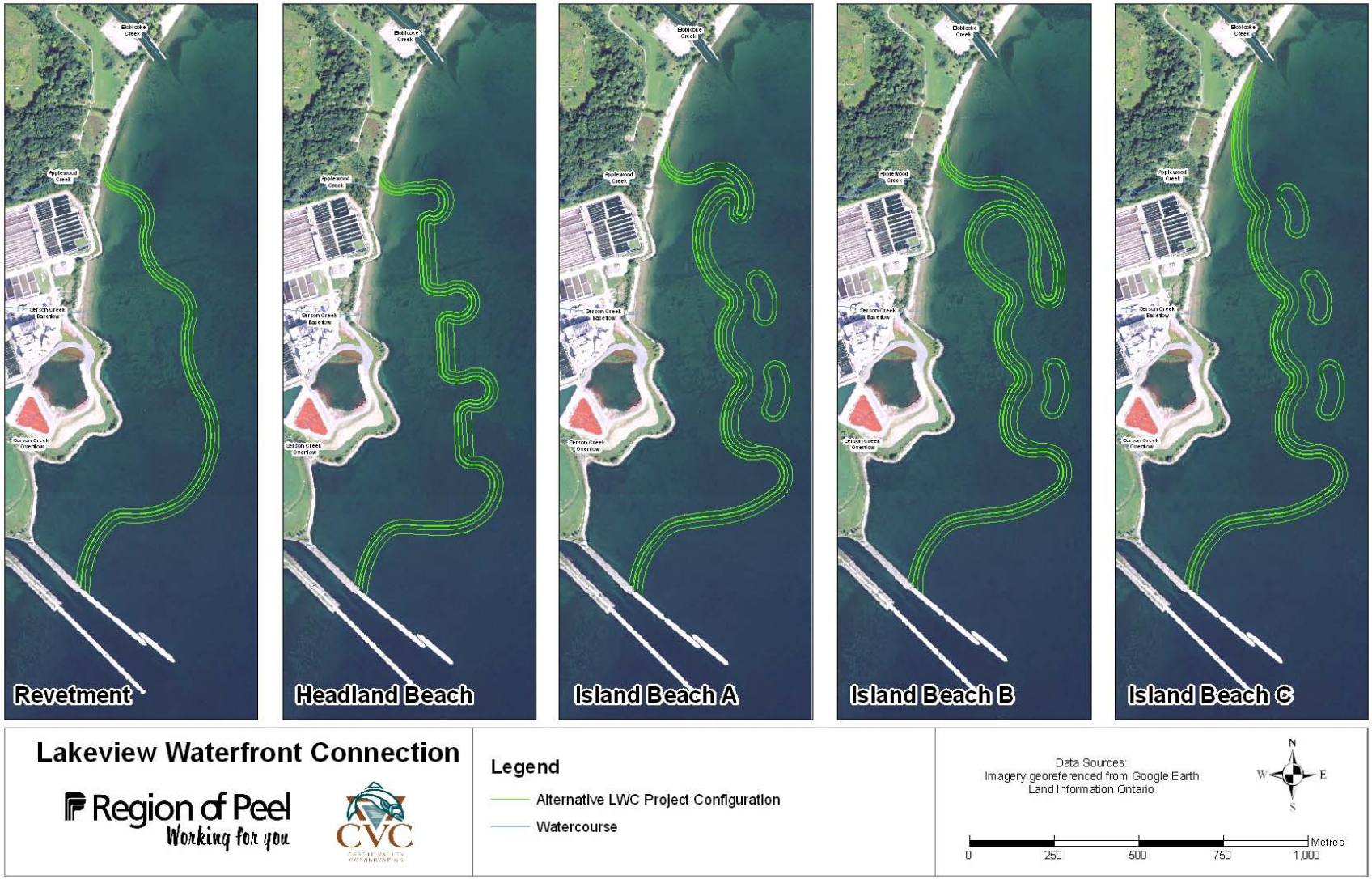


Figure 5.3 Final Alternative LWC Project Configurations



5.2 STEP 2: IDENTIFY DESIRED DESIGN ELEMENTS

The LWC Project goal is "to create a new natural park that will establish ecological habitat and public linkages on the eastern Mississauga waterfront". To achieve the LWC Project goal, a series of ecological and recreational design elements that address the LWC Project objectives were layered onto the alternative footprints.

Consultation with the public, the CLC, the EA Technical Team and the TAC identified a number of design elements that would be included on each alternative footprint to meet the LWC Project goal and objectives. Key design elements that were identified for the alternatives included:

- A multi-use recreational trail to provide access to and along the waterfront;
- Opportunities for passive recreation; and
- Naturalized ecosystem components that were appropriate for the north shore of Lake Ontario based on historical conditions in the area.

With these broad categories of desired design elements identified, it was necessary to solicit input from the LWC EA Technical Team to identify the individual building blocks that would make up each design element (see Sections 5.2.1 and 5.2.2). Once the individual building blocks were identified, the LWC EA Technical Team, in consultation with the public and stakeholders, arranged the building blocks onto each alternative footprint.

The methodology for the identification of desired design elements and their placement on the alternative footprints involved:

1. Consultation with the public and stakeholders to identify desired design elements;
2. Ensuring general compatibility between desired design elements and the Inspiration Lakeview Vision;
3. Determining the ecological building blocks that are appropriate for meeting the naturalization objective (Section 5.2.1);
4. Determining the public linkage building blocks that are appropriate for meeting the access objective (Section 5.2.1); and
5. Layering the individual building blocks onto the alternative footprints utilizing input from the public and stakeholders.

5.2.1 Appropriate Ecological Communities for the LWC Project Study Area

Due to the historical mix of industrial and residential land uses within the LWC Project Study Area, opportunities for sizeable and functional habitat patches were limited or unfeasible. The LWC Project provides an opportunity to create a considerable and functional naturalized area,

which will provide connectivity both regionally and locally for migrating terrestrial and aquatic species.

As part of the preliminary identification of habitat components for the Alternative LWC Project Configurations, specific habitat types were identified that would provide a foundation for local and regional ecological processes. These habitat types are discussed in detail below.

5.2.1.1 Coastal Terrestrial Habitat

The spatial arrangement of coastal terrestrial vegetation patterns along the north shore of Lake Ontario can vary with slope and exposure to elements in the nearshore area. Herbaceous vegetation often dominates closest to the water followed by hardy shrubs and successional tree species. Generally, the forest area could consist of oak savannah and Carolinian type trees including cottonwood. The site would be typified by vegetation species which would maximize the quality and quantity of stopover habitat to benefit migratory species in the fall fruiting period. It also offers habitat that would maximize invertebrate diversity in the spring that would also benefit both migratory and resident wildlife, and encourage the production of terrestrial and aquatic invertebrates given the proximity to water in the streams, wetlands and shoreline areas.

5.2.1.2 Stream and Wetland Habitat

Within the proposed land creation area two creeks are present: Applewood Creek and Serson Creek (see Section 3.1.1.2). Applewood Creek is currently connected ecologically with Lake Ontario up to Lakeshore Road. Flows in Serson Creek are currently bisected north of the WWTF, with base flows running through a culvert under the WWTF and discharging on a remnant sandy beach immediately south of the plant. A large, straight stormwater channel has also been cut between the WWTF and the OPG lands, diverting overbank flood flows in Serson Creek directly to the lake. Given this configuration, fish are unable to migrate from the lake to Serson Creek. Opportunities to provide connections between the lake and Serson Creek were explored as part of the LWC Project to maximize benefits of the proposed constructed wetlands. In addition, the Inspiration Lakeview visioning activities contemplated the possibility of rerouting Serson Creek through the middle of the OPG lands. Wetland patch size and orientation were considered in the development of the Serson Creek wetland to accommodate that potential future change.

As in many similar coastal marshes on the north shore of Lake Ontario, the connectivity of these streams would be highly reliant on balancing watershed and lake driven inputs. The optimal wetland habitat size should replicate historical conditions and other similar watersheds found along the north shore of Lake Ontario while considering current watershed conditions. Ensuring

stream connectivity and structure within the wetlands will also maximize the use of water, and create additional habitat diversity.

5.2.1.3 Shoreline & Nearshore Habitat

The land creation area should be designed to benefit the coastal habitats within the LWC Project Study Area, allowing for transitions from the water to the beach and terrestrial habitats. Structurally diverse shoreline treatments should be favoured. Given the depths of 5-6 m on the lakeward edge of the landform, shoreline treatments should be structured to augment fish habitat.

In general, the more complex and diverse the Alternative LWC Project Configuration, the more effective that shoreline will function for fish and wildlife uses. Further, shorelines that have shallower slopes transitioning from the terrestrial lands down to the water's edge will be deemed as providing better functioning habitat for most species of fish and wildlife.

The range of shoreline types considered included: revetments, headlands and beaches, and different configurations of islands and beaches.

Revetments consist of large interlocking quarried blocks forming a steep wall from the lake bed to the top of the landform, making the movement between the lake and the shore difficult for most wildlife. Shorelines using armourstone tend to be relatively uniform and offer limited opportunity for fish communities.

Headland beaches consist of a series of spaced constructed armourstone headlands that are connected to the landform but protrude further out into the lake. Linear beaches consisting of smaller, mobile materials such as sand, gravel and cobbles are located along the shoreline between these hardened headlands which prevent the beaches from washing away. These beach shorelines provide more diverse habitat structure, and offer opportunities for movement of resources and wildlife between the land and water than revetments. In the case of the LWC Project, given the depth of water and wave conditions, beach materials will largely consist of cobbles.

Island beaches consist of a series of constructed low-lying armourstone islands that are not connected to the landform above water under average water levels. The shorelines then consist of a long, uninterrupted beach front consisting of smaller mobile materials such as gravel and cobble. These shorelines offer the most diverse structural habitat, offering the most shoreline/water interface area, and provides unique "sheltered" habitat on the shoreside of the islands. The shoreline/water interface area is generally more productive habitat. As with the headland beaches, the island beach materials will largely consist of cobbles in the deeper watered

areas, but where proposed beaches approach the existing shorelines, the beach will grade to smaller materials due to smaller waves.

5.2.2 Refinement of Habitat Components for the LWC Project Study Area

The preliminary natural heritage components for the LWC Project Study Area were refined based on a number of principles, in order to determine sizes and features for the LWC Project Study Area.

Aquatic habitat principles considered:

- Historical natural heritage conditions;
- Current watershed conditions;
- Wetland functions;
- Maximize habitat diversity within natural limitations;
- Relevant reference sites along the northwestern Lake Ontario shoreline; and
- Consideration of all aquatic habitat enhancements to achieve "No Net Less" of fish habitat arising from disruption or removal of aquatic habitat from land creation.

Terrestrial habitat principles considered:

- Creation of habitat areas that were large enough to provide wildlife refuges and functions;
- Orientation and zonation of natural habitat areas in relation to distance from the Lake;
- Topographical variations (macro and micro); and
- Connections to adjacent natural areas.

These principles are discussed in greater detail in the following sections.

5.2.2.1 Historical Natural Heritage Conditions

Historical conditions of the LWC Project Study Area provide context for the natural heritage conditions which would have naturally existed in the absence of urbanization, and provides appropriate baseline knowledge regarding the appropriate ecological features for the area. While wetlands were once abundant across the lower Great Lakes basin, wetlands have experienced a significant decline since the late 1700's, with the loss of approximately 57% of historical wetlands west of the Bay of Quinte (Whillans 1982) and primarily within the GTA.

Within and immediately adjacent to the LWC Project Study Area, historical aerial imagery and mapping (see Chapter 3) indicates the presence of a well vegetated, 1.60 ha, low-lying coastal marsh at the mouths of Serson Creek, Applewood Creek, and Etobicoke Creek, established behind a barrier beach. Also present were 1.37 ha and 0.4 ha of estuarine habitat, associated with Applewood Creek and Etobicoke Creek, respectively. As presented in Section 3.2.1.4, by the mid-1960s, the wetland/coastal marsh connecting the three creeks had undergone significant change due to human influences and were no longer present. Even the historical aerial photos from 1946 and 1954 (see Figures 3.18 and 3.19 in Section 3.2.1.4) represent degraded coastal wetland conditions and were likely much smaller than the original wetland areas observed at the mouth of Etobicoke Creek in the 1700s as depicted in sketches provided by European colonists to the area (TRCA 2002).

There is an opportunity with the LWC Project to create "river-sourced" wetland habitat by incorporating flows from Applewood Creek and Serson Creek. Depending on the final elevation of the proposed wetlands, a portion will be influenced by lake water which will be vital to provide a functional habitat connection for the marshland ecotone.

Key Principle:

- Coastal wetland systems should be influenced by both river and lake inputs.
- The historical air photo of the LWC Project Study Area depicts a total of approximately 3.5 ha of coastal wetland in 1940s. This represents a reasonable lower limit for wetland habitat to be considered in refining Alternative LWC Project Configurations.

5.2.2.2 Wetland Function

Although water levels in Lake Ontario have been semi-regulated as a result of the St. Lawrence Seaway Project (1954), seasonal and wave related water level fluctuations can impact thermal regimes, and thus the extent and composition of coastal wetland vegetation (Keough *et al*. 1999). While these fluctuations can provide ecological benefits, they can also introduce negative impacts to the system, such as sudden coldwater upwellings, and the proliferation of invasive species (e.g., the common carp). As such, in order to buffer the negative impacts from these fluctuations, the coastal wetlands proposed for the LWC Project will be designed appropriately.

Wetland function, in the case of constructed and managed wetlands, refers to the regulation of water levels in order to promote, adjust, or maintain a diversity of wetland flora and fauna. For the LWC Project, there is an opportunity to use water control structures for the coastal wetlands in order to provide variable environmental conditions, such as water level and temperature fluctuations, and the transfer of sediment. These conditions can be achieved by using coastal

wetland designs based on two geomorphic types of wetlands which are found along the north shore of Lake Ontario, as described by Keough *et al.* (1999): protected wetlands; and drowned-river mouth and flooded-delta wetlands.

- **Drowned-river mouth and flooded-delta wetlands** have direct surface-water connections that occupy flooded river valleys or cap drowned deltas that are driven by both lake and riverine water inputs. These wetlands often have a narrowed lake opening and depending on the rate of inundation, may have river banks that form a natural levee system from fluvial deposits. These levees provide the conditions for overbank pocket wetlands which often become connected to streams by bank breaching.
- **Protected wetlands** are isolated from most of the direct hydraulic processes generated by the lake. Historically, protected wetlands may have existed within the LWC Project Study Area during years of low lake levels and when littoral sediments formed a contiguous barrier beach.

Key Principles:

- Wetland areas should depict similar characteristics to other coastal wetlands found on the north shore of Lake Ontario. Two applicable wetland forms for consideration include: drowned-river mouths with natural appearing levees and pocket wetlands; and coastal wetlands that are periodically protected from direct lake effects through the establishment of barrier beaches.

5.2.2.3 Relevant Reference Sites Along the Northwestern Lake Ontario Shoreline

Using reference sites which possess similar conditions to the historical conditions of the LWC Project Study Area provides insight into habitat features for the LWC Project Study Area.

Rattray Marsh and Turtle Creek Marsh are located along the western Lake Ontario shoreline within the vicinity of Project Study Area. Rattray and Turtle Creek Marshes are a drowned river-mouth (bay-bar) coastal wetlands, approximately 13.9 & 2.4 ha in size respectively. Rattray Marsh is located behind a barrier beach system. The Rattray and Turtle Creek wetlands are classified as 78/53% marsh and 22/47% swamp respectively, while the surrounding areas composed of forest, subdivision and parkland.

Gold Point Marsh, located along the City of Oshawa shoreline, is composed of similar wetland habitat as would have historically been found in the LWC Project Study Area. Gold Point Marsh is a drowned river-mouth coastal wetland, approximately 4 ha in size, located behind a barrier beach system. The wetland is classified as 65% marsh and 35% swamp, while the surrounding area is composed of forest, thicket and meadow (CLOCA 2011).

As the above examples and Applewood Creek possess a similar drainage area and both exhibit urban headwaters, they were deemed appropriate reference sites for the design of the wetland complex at the mouth of Applewood Creek.

Key Principles:

- The watersheds, coastal wetlands and surrounding terrestrial habitats at Rattray Marsh, Turtle Creek Marsh, and Gold Point Marsh possess similar conditions to what would have been found in the Applewood Creek area in the 1940s. The examples depict a wetland habitat size of 3.5 ha to 4.0 ha that would be appropriate for each of the Serson Creek and Applewood Creek coastal wetlands. Features observed at these Marshes were used as a reference site for the LWC Project.

5.2.2.4 Ability of Aquatic Habitat Enhancements To Achieve "No Net Loss" Of Fish Habitat

Land creation activities will create a loss of aquatic habitat which will require compensation under CVC's management goal of no net loss of productive capacity of fish habitat. As such, an important consideration in the development of the natural heritage components of the Alternative LWC Project Configurations is an understanding of the potential loss of productive fish habitat, such that habitat components may be designed to be as self-compensating as possible. CVC Policy encourages all planning and permit applications to achieve an ecological gain. Where it has been demonstrated an ecological gain is not feasible, CVC will promote the principle of no-net-loss of ecological functions and hydrologic functions (CVC 2010).

A preliminary analysis of potential compensation required was undertaken and identified a number of habitat components important in offsetting the loss of productive fish habitat.

Key Principles:

- Alternative LWC Project Configurations should be designed to be as self-compensating as possible with regards to loss of productive fish habitat.
- Coastal wetlands that provide a benefit for fish production and large in-land wetlands that provide warm, highly vegetated areas for fish spawning and rearing should be included as habitat components in addition to the proposed shoreline treatments.
- Cobble beaches are preferable over revetment or other hardened shoreline treatments as they provide foraging and spawning opportunities for nearshore pelagic species.
- Maximizing shoreline or diversity is recommended to maximize habitat gains required to offset losses generated with land creation activities.

5.2.2.5 Create Habitat Areas Large Enough to Provide Wildlife Refuges and Functions

Habitat quality is based on a number of factors, including but not limited to: habitat size and cohesiveness, shape, diversity and ability to provide linkages. In general, larger, un-fragmented habitat patches with connectivity to other adjacent habitats and limited human influence are more diverse, productive and better able to act as a wildlife refuge. In the development of Alternative LWC Project Configurations, general guidelines identified in the Peel – Caledon Significant Woodlands and Significant Wildlife Habitat Study (2009), were used to benchmark minimum habitat size targets for functional forest (4 ha) and meadow (10 ha) habitats in the design of the LWC Project.

Key Principles:

- Create large contiguous blocks of habitat with minimum targets of 4 ha for forest and 10 ha for meadow habitat.
- The following items will make the natural areas more attractive to wildlife:
    - **Shape:** Blocks should be generally round or square to reduce edges and provide more sheltered interior conditions. In general, thicker blocks are better than thinner blocks.
    - **Diversity:** A variety or mosaic of habitats including forest, meadows, successional and wetlands are better to encourage different types of wildlife. Wildlife uses more than one type of habitat.
    - **Linkage:** Connect existing and future habitats to create larger matrices of natural areas.

5.2.2.6 Orientation and Zonation of Natural Habitat Areas in Relation to Distance from the Lake

The Lake Ontario shoreline is a harsh environment. The vast open fetch lengths of the lake allow for the development of strong winds and large waves. Where shorelines drop off rapidly, wave and wind energy can be particularly strong. As a result, features found along shorelines and the coastal terrestrial areas are reflective of these harsh conditions. Beaches in an environment similar to the LWC Project Study Area would be long and linear, consisting of larger cobbles that are regularly moved by the waves. The adjacent terrestrial coastal habitats adjacent to the beach usually consist of low-lying meadow grasses and hardy shrubs that are able to withstand the desiccating influence of strong winds. As you move further inland, conditions become less severe and more woody shrubs and treed vegetation begin to establish. Thus, when seen from above, a natural shoreline would appear to have linear bands running the length of the shoreline of beach, meadow, shrubs and forest. The configuration of these bands can be

influenced by underlying soils and geology, wave climate, the presence of wetlands and changes in topography.

Key Principles:

- Design the natural areas to follow patterns observed at other sites on Lake Ontario.
- Natural coastal areas adjacent to shorelines allow for:
    - Natural beach features (whether sand, gravel or cobble) to offer dynamic processes that provide higher function than static armoured shorelines;
    - Transitional access points for wildlife that are able to cross from aquatic to terrestrial habitats and allow for other food web interactions; and
    - Establishment of appropriate habitat zones in relation to proximity to the shorelines: generally speaking, as you move further from the beach areas, vegetation transitions from hardy meadow species to woody shrubs to coastal forest species.

5.2.2.7 Incorporate Topographical Variations

Natural areas are not flat. Small changes to elevation on large and small scales create a diversity of habitat needed for wildlife. Topography designed for trails through natural areas can also help deter off-trail disturbance. The Alternative LWC Project Configurations were established on the basis of a uniform topography (of ~79 m elevation or ~4 m above lake level), in the calculation of fill volumes required for each footprint. In reality, each footprint requires a much lower elevation to establish the coastal wetland areas proposed for each of the two creeks. As such, fill that is not required for placement in the wetland areas must be accommodated on the remaining adjacent terrestrial lands within the Alternative LWC Project Configurations in order to retain the balance between areas of cut (low-lying areas) and fill (upland areas). The fill volume balance will not be undertaken for each Alternative, but the need to maintain this balance in cut and fill will be considered when establishing maximum wetland sizes in the development of the Alternative LWC Project Configurations. However, the following key principles will only be considered at the refinement of the Preferred Alternative stage.

Key Principles (in refining a Preferred Alternative):

- **Elevation changes:** The ground should be designed to include a variety of heights and public viewing points. Small hills can be created to diversify habitats. They can be used to direct or deter public access to particular areas. Hills are typically drier sites and could be suitable for meadow habitat. Sheltered areas between hills are more suitable to

forests. Hills are typically drier sites and could be suitable for meadow habitat. Sheltered areas between hills are more suitable to forests.

- **The ground should not be flat (hummocky topography):** There should be smaller pockets of ground that rise and fall similar to what would be found in an area that has not been disturbed by development. Small areas with changes in height create specialized areas for plants and animals called microhabitat. Microhabitat can be more sheltered and have special conditions that develop specialized wildlife, plants and soil.
- **Bluffs:** Small hills with one very steep face are natural on shorelines and provide habitat for certain wildlife, birds and plants, such as the Bank Swallow. Bluffs can also act to impair access to restricted areas (e.g., around the WWTF).

5.2.2.8 Connect to Adjacent Natural Areas

Being able to establish linkages and connections between habitat types is critical in allowing for species to migrate and to provide resources for the various activities and life stages for wildlife. Mammals such as White-tailed deer and others use the natural areas along creeks to move south from the Oak Ridges Moraine to Lake Ontario and may make different uses for creek, wetland, meadow and forest habitat. Species such as frogs, and turtles would be able to use the treed swamp as a migratory corridor to be able to access one marsh area to another. Mink would be able to access meadows from both beach and wetland areas. Birds migrating across Lake Ontario are able to home in on natural greenspaces along the shoreline. Providing diverse habitat types, the LWC Project has the potential to provide perching and resting areas for birds, as well as foraging areas for migratory and resident birds. Some species would also be able to nest and reproduce in the various habitat types. Allowing for a diversity of complementary and accessible habitats within an area provides better opportunities for establishing migration corridors and providing the necessary resources for resident and migratory species.

Key Principles:

- The new natural areas should connect directly to existing natural areas (i.e. Applewood Creek, Serson Creek, the Lake Ontario shoreline, Arsenal Lands, Marie Curtis Park and Etobicoke Creek) to allow wildlife movement.
- The LWC Project should provide important connections between land and water ecozones: from the beach to land and from the creeks/wetlands to land.
- Forests and meadow habitats should provide complementary habitat functions for a wide range of species and activities.
- The LWC Project should provide important stopover habitat for species migrating across Lake Ontario and habitat for species migrating along the shoreline.

5.2.3 Public Access Features

Consultation with the public, the CLC, the EA technical team and the TAC identified a multi-use recreational trail (i.e. a trail that is shared by bicycles and pedestrians) as the key building block to provide access to and along the waterfront.

A multi-use recreational trail is the main component of the access objective for the LWC Project. Based on consultation with the public it was determined that the trail should connect parks in the east (e.g. Marie Curtis Park) to future green space associated with Inspiration Lakeview. The trail system could include secondary and tertiary trails feeding off the multi-use trail that permit viewing of the new naturalized areas, but would be designed in a way that would not negatively affect the function of natural areas. Public feedback indicated the following desired elements of the trail:

- Lookouts from the LWC Project study area back to the cities of Mississauga and Toronto;
- Provide access to the water's edge;
- Allow for passive recreation including birding, fishing, picnicking, etc.;
- Be designed in a way that considers public safety in relation to the shoreline and isolated parts of the trail; and
- Consider design options that would isolate pedestrians and cyclists.

Utilizing the design information provided by the ecology team and feedback from the public and stakeholders on desired viewsheds, recreation opportunities, safety and security concerns, the LWC EA Technical Team layered the individual building blocks onto the five LWC Project alternative footprints.

5.2.4 Layering Design Elements within the Project Footprints

Based on the analysis conducted in Sections 5.2.1, 5.2.2 and 5.2.3, the LWC EA Technical Team identified wetland, forest, meadow, treed swamp and beach as the key ecological building blocks required to meet the LWC Project goal and objectives. In addition to the ecological building blocks, inclusion of a multi-use recreational trail system would provide improved public access to and along the waterfront.

With the individual building blocks identified, the next step in the process of alternative generation was to arrange the building blocks in logical locations within each of the alternative footprints based on the guidance provided by the public, stakeholders and the LWC EA technical team.

There were a number of considerations that were used to place the design elements including public/stakeholder feedback and ecological constraints identified by the LWC EA technical team. These considerations included:

- Public desire for clear views towards the lake and city viewscapes from different vantage points including the future Inspiration Lakeview site;
- Public desire for views from the lake (boaters) to the site;
- Public desire for improved access to the water and passive recreation opportunities;
- WWTF desire for site security;
- Public desire to buffer views of the WWTF; and
- Ecological constraints around the placement of wetlands since they need to be connected to upland water sources (i.e. river inputs) and to the lake (lake inputs).

As an initial step, the 2 million m^3 fill volume was used as the base amount for each alternative to do an initial placement of the various building blocks. Once the building blocks were established on the 2 million m^3 footprints, they could be layered onto the smaller fill volumes to determine if the optimum and minimum size requirements for ecological building blocks (see Section 5.2.1) could fit on the smaller footprints.

5.2.4.1 Wetlands

Wetlands require water sources to ensure long term function so the placement of wetlands was constrained by the location of hydrologic inputs (i.e. streams and Lake Ontario). Thus, it was determined that wetlands should be placed first to ensure they are located in areas that provide the appropriate hydrological conditions and the other building blocks could be placed around them. Utilizing the general size guidelines of approximately 7 ha for wetlands, conceptual wetlands configurations were overlain on the project footprints using ArcGIS software (Figure 5.4).

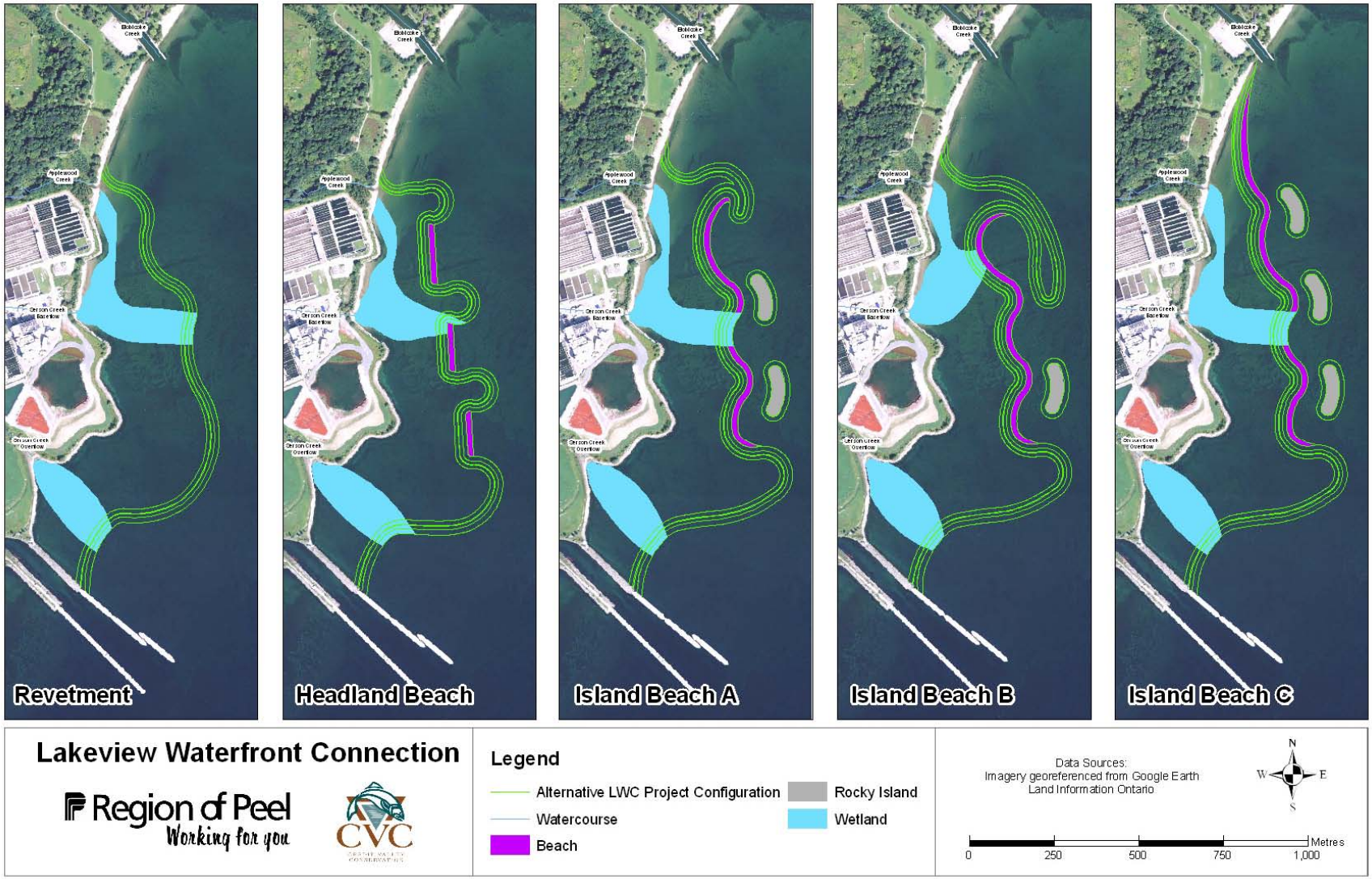
Wetlands were located according to the physical constraints for wetland function (i.e. existing hydraulic inputs from upstream aquatic systems and connection to Lake Ontario). The three upstream aquatic systems that provide wetland inputs include Applewood Creek, Serson Creek storm drain and Serson Creek overflow channel.

The result was two wetland patches on each alternative footprint; one wetland patch in the south connecting the Serson overflow channel and Lake Ontario; and a larger wetland patch in the north connecting both the Serson baseflow channel and Applewood Creek to Lake Ontario. The connection between the Serson baseflow channel and Applewood Creek was considered

necessary since future flows from the Serson baseflow channel could be diverted through the Serson overflow channel. This would eliminate the Serson baseflow channel as an input to the northern wetland making the connection of Applewood Creek necessary to maintain a permanent upstream hydrologic input.

Since each alternative footprint has variable shoreline configurations, the wetlands took on slightly different shapes for the different alternatives but the general layout and location is similar for each. The primary difference between alternatives is the location of the outlet to Lake Ontario depending on the location of protected shoreline. With the wetlands placed according to their physical constraints, other building blocks could then be placed around them to meet the ecological and recreation objectives of the LWC Project.

Figure 5.4 Wetland Layers Added to the Alternative LWC Project Configurations

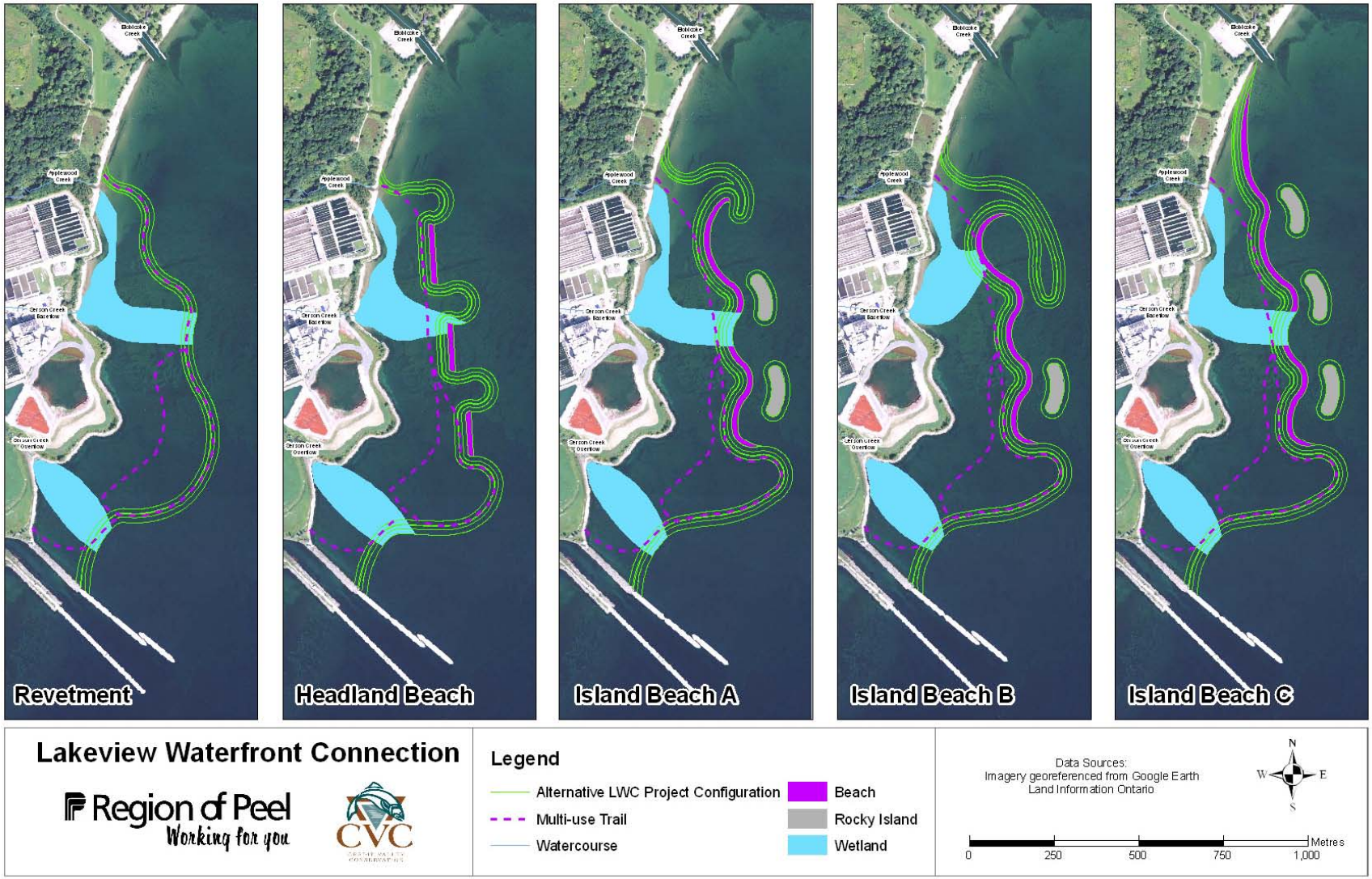


5.2.4.2 Recreational Trail

Based on feedback from the public, the multi-use recreational trail was placed close to the water's edge to permit access to Lake Ontario and provide the desired views of the lake and the City of Toronto to the east. It was also important to place the trail along the water's edge to enable close access for future maintenance of the shoreline works. The trail has a connection to Marie Curtis Park and connects back to the existing landbase in the south adjacent to the OPG pier that will provide a potential waterfront connection between the existing waterfront trail and the future Inspiration Lakeview development. There is also potential for secondary and/or seasonal trails within each footprint.

The trail was primarily located outside of wetland habitat to minimize specialized construction considerations such as the need for boardwalks; however, the trail crosses wetland areas for each alternative. The trail will be designed to cross wetlands at the narrowest point to minimize disruption. The conceptual locations for the trail on each footprint are shown on Figure 5.5.

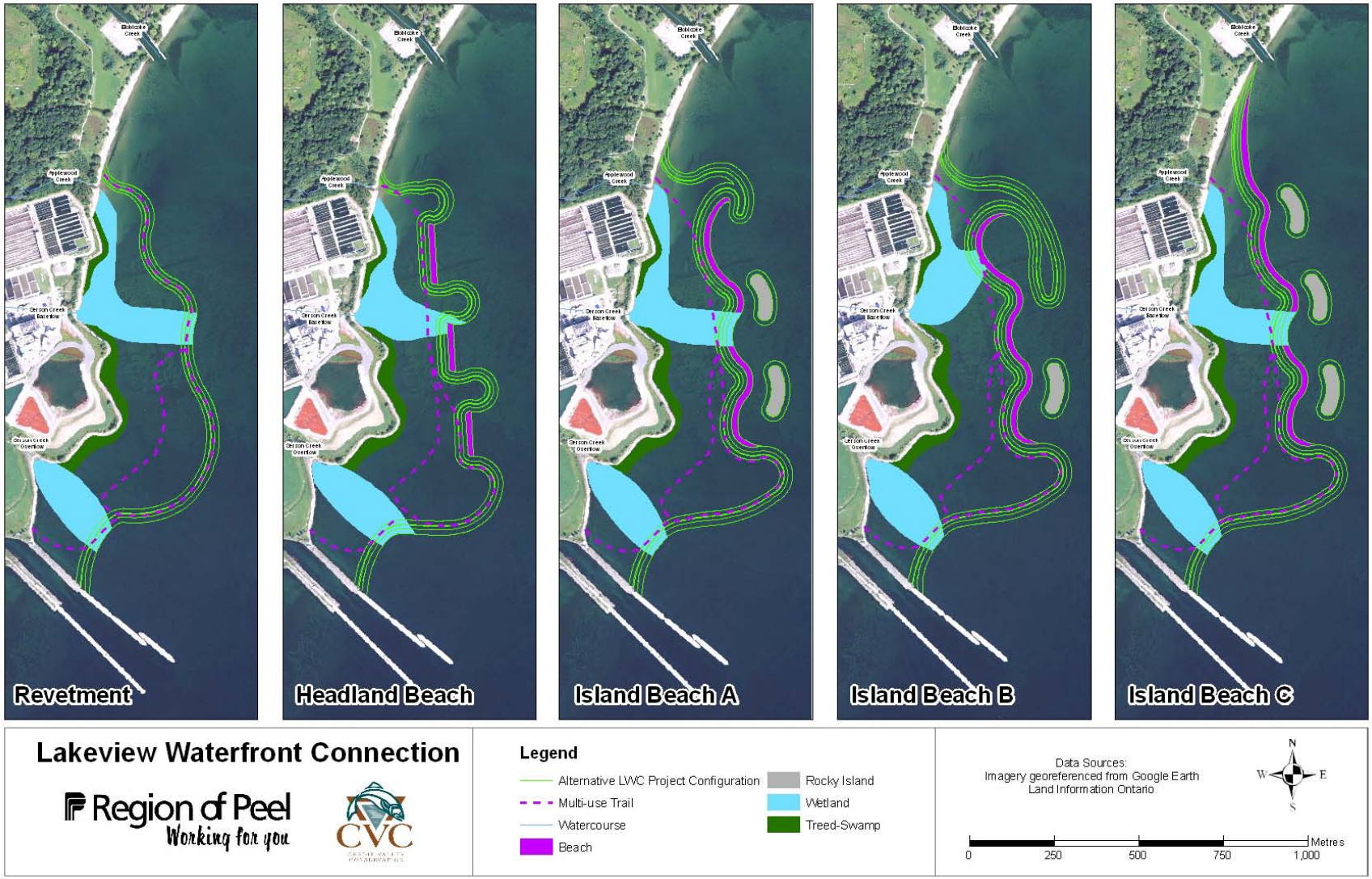
Figure 5.5 Trail Layers Added to the Alternative LWC Project Configurations



5.2.4.3 Treed Swamp

The public identified a desire to screen views of the WWTF from the waterfront and the WWTF identified a need for site security. Placement of a treed swamp in front of the WWTF was considered a good way to meet both desires. This would discourage public access to the WWTF from the new waterfront since wet habitats discourage foot access. Inherent in the design of a wet forest is a lower ground elevation which will also provide a slope transition to the WWTF that will serve as an additional barrier to public access. The trees included in the wet forest habitat would provide a visual barrier of the WWTF from the waterfront that would meet the public's desire for a visual screen. Thus, a treed swamp was placed in front of the WWTF providing a hydrologic connection between the two wetland areas and creating an access barrier. This location for the treed swamp is common to all five alternatives with slight variation in the total size due to variations in wetland shape as shown on Figure 5.6 below.

Figure 5.6 Treed Swamp Layers Added to the Alternative LWC Project Configurations



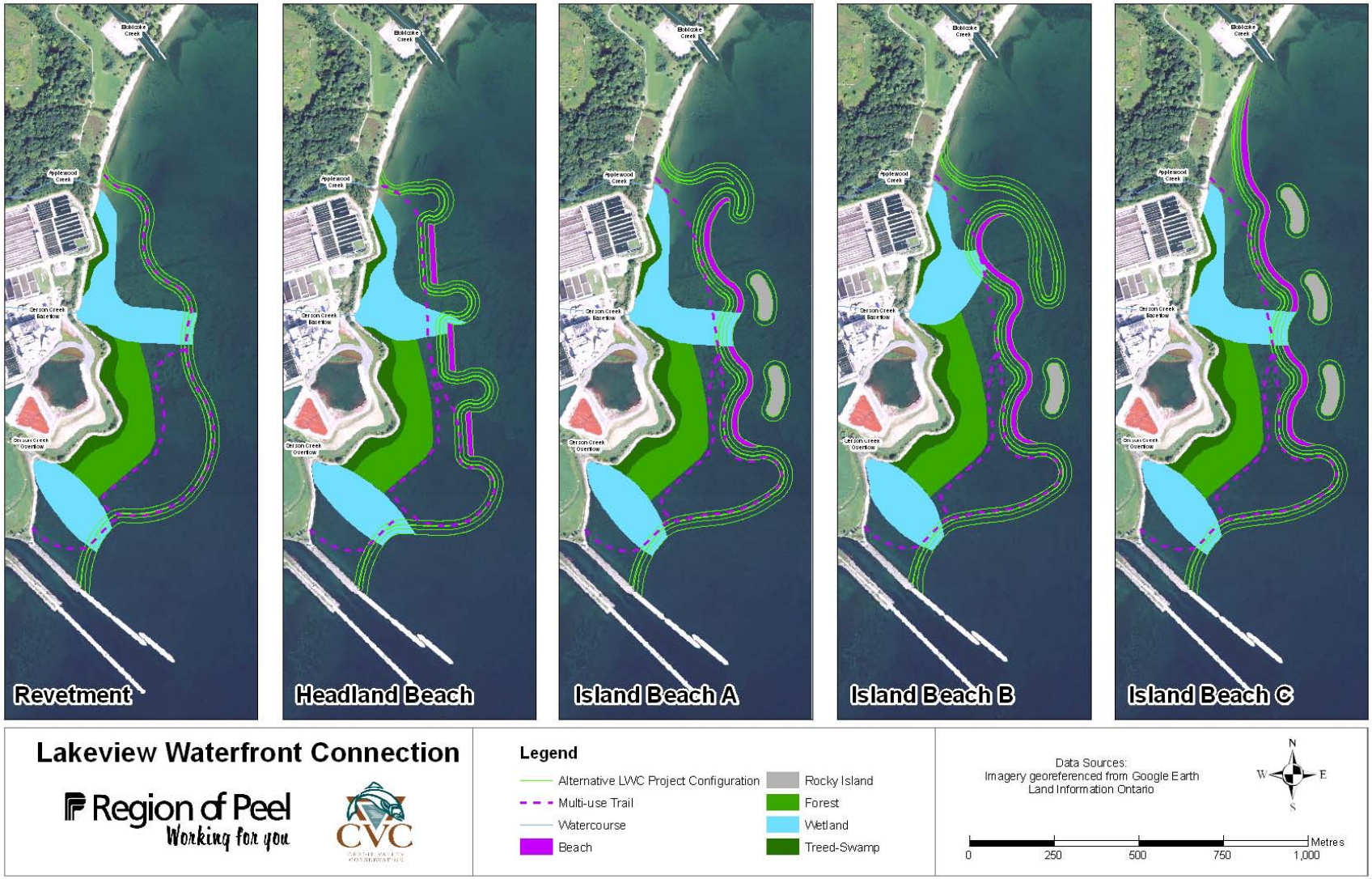
5.2.4.4 Forest

The LWC EA ecology team identified a target minimum requirement of 4 ha of forest to effectively function as wildlife refuge. From an ecological perspective, there were no specific requirements for the location of the forest building block, but the ecologists noted that a larger intact block was preferred over smaller blocks broken up by trails and distributed around the site. The ecologists also identified that coastal forest habitat frequently occurs setback from the harsh shoreline conditions along north shore of Lake Ontario with a band of meadow providing a physical separation and transition between the forest and shoreline conditions.

The public expressed concern that tall trees could block views of the lake from the future Inspiration Lakeview site and requested that forest blocks should be located away from the southern portion of the LWC Project Study Area. The public also requested that forest blocks be concentrated in the northern half of the LWC Project Study Area to avoid blocking views of the lake from the recreational trail. Keeping the forest north of the trail would also discourage undesirable activities and improve visibility to promote safety.

Based on the input from the ecology team and the public, a minimum 4 ha of forest habitat was placed south of the wet forest, between the two wetland features. This location provides additional screening of the WWTF and avoids blocking views towards Lake Ontario from the future Inspiration Lakeview site. This location for the forest is common to all five alternatives with slight variation in the total size due to variations in wetland shape as shown on Figure 5.7.

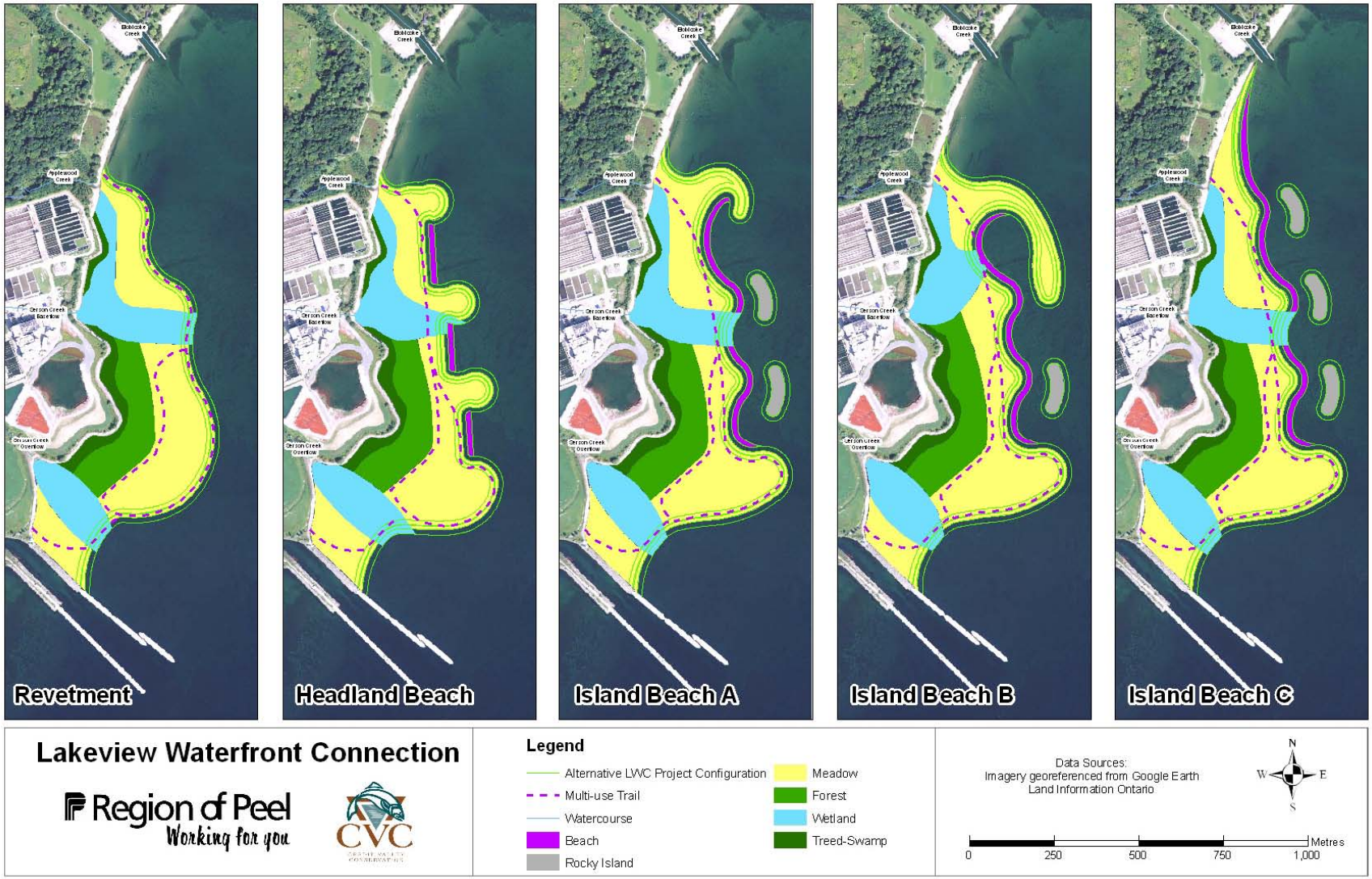
Figure 5.7 Forest Layers Added to the Alternative LWC Project Configurations



5.2.4.5 Meadow

The LWC Project EA ecologists identified minimum requirement of 10 ha of meadow habitat to effectively function as wildlife and bird habitat. Meadow habitats are also frequently found immediately adjacent to the shoreline given their robustness of surviving the more exposed harsh conditions along Lake Ontario shoreline. Locating the meadow habitat along the shoreline of each alternative also allows for the trail to provide good views of Lake Ontario and keeps the trail out of forested areas that could be associated with undesirable uses and safety concerns. This location of meadow habitat along the shoreline is common to all alternatives with variation in the total size due to variations in shoreline and wetland shape as shown on Figure 5.8.

Figure 5.8 Meadow Layers Added to the Alternative LWC Project Configurations



5.3 STEP 3 – COMPARE AND EVALUATE SHORT LIST OF ALTERNATIVES

The purpose of Step 3 was to evaluate the five alternatives to identify one preferred alternative to be carried forward for more detailed technical analysis as part of Step 4. This evaluation of alternatives was accomplished by establishing an order of preference between the five alternatives developed in Steps 1 and 2 (Figure 5.8). The evaluation method used criteria and indicators to structure information and facilitate the comparison of alternatives against each other by LWC Project objectives. The evaluation criteria and indicators were developed to reflect LWC Project objectives through consultation with a wide range of regulators, stakeholders and members of the public.

The comparison of alternatives required the explicit consideration of trade-offs thereby keeping the more desirable attributes over those less desirable. The alternative identified as preferred at the end of Step 3 has the greatest potential to meet all of the objectives of the LWC Project. The detailed assessment of the preferred alternative is presented in Step 4.

5.3.1 Evaluation Methodology

The comparative evaluation of alternatives involved three tasks as detailed below:

1. Development of comparative evaluation criteria and indicators;
2. Assessment of effects; and
3. Comparative evaluation to identify the alternative(s) with the highest potential to meet project objectives.

5.3.1.1 Criteria and Indicators

The evaluation criteria and indicators used for the comparative evaluation were developed by the LWC EA Technical Team and reviewed by a number of stakeholders including:

a) TRCA, CVC and Region of Peel;
b) City of Mississauga and City of Toronto staff;
c) The public;
d) Interest groups;
e) Aboriginal groups; and
f) Federal and provincial regulatory agencies.

5.3.1.2 Effects Assessment

In general, the data for the effects assessment were collected as part of baseline studies (see Chapter 3). Baseline data were used with the descriptions of the alternatives and the critical assumptions to determine how each alternative would potentially affect the environment. For many of the indicators the data were collected by measuring areas or linear distances using GIS. Table 5.1 details how the effects assessment was carried out for each criterion included in the evaluation. The indicators for each criterion are presented in Table 5.1.

For some of the criteria and indicators, the effects assessment concluded that there were no differences between any of the alternatives. These criteria and/or indicators were screened from the evaluation as they do not assist in decision-making. Table 5.1 details which criteria and/or indicators were screened from the evaluation.

The LWC Project, as articulated by the LWC Project objectives, is about taking a degraded area of the Mississauga waterfront and improving aquatic and terrestrial habitat and public access in coordination with other planning initiatives. The evaluation of 'Alternative Methods' was structured to assess the ability of each alternative to meet these LWC Project objectives. It is recognized that there will be minor negative effects associated with construction; however; the Preferred Alternative would result in overall net benefits to the environment and community. The purpose of the effects assessment is to measure those benefits between alternatives.

Benefits are measured in the evaluation and as part of the trade-offs. It was assumed that the nuisance effects associated with construction were common to all alternatives, easily mitigated using standard construction practices (Appendix C) and thus, did not help to distinguish between alternatives. Therefore, effects from construction were not included in the evaluation.

Once the effects assessment was completed, the alternatives were rated for each indicator as most preferred, moderately preferred and least preferred. In general this was done by looking at the differences between the alternatives vis-à-vis the confidence level of the assessment methods. If the differences were very small the alternatives were rated the same; only major differences are reflected in the ratings.

The full and complete results of the effects assessment and ratings are reported in Appendix D (complete evaluation matrix minus criteria that are screened and deferred to the assessment of the preferred alternative).

5.3.1.3 Comparative Evaluation

The comparative evaluation combined the information presented by indicator to reflect a preference by criterion and then combined the information presented by criterion to reflect a preference for each objective. Finally, the preferences by objective were combined to present the preferred alternative, in effect rolling up the detailed information into a decision. At each point any trade-offs between alternatives are identified and discussed in the following sections with the intent of providing the reader with a traceable decision-making process. The criteria and indicators used for the evaluation are presented by objective in Tables 5.1, 5.3, 5.5 and 5.7 and Appendix D.

5.3.2 Results of the Comparative Evaluation by Objective

Sections 5.3.2.1 through 5.3.2.5 detail the comparative evaluation of alternatives by objective to identify trade-offs and create a reasoned argument as to which alternative(s) are most preferred for each objective. Each section states what the objective is intended to measure followed by a discussion of trade-offs between indicators within criteria, a discussion of trade-offs between criteria and the determination of the rating of alternatives for the objective. Please note that the discussion of effects assumes that mitigation measures have been applied to address any potential effects and that construction effects and mitigation measures are common to all alternatives.

5.3.2.1 Naturalization

The criteria and indicators for the naturalization objective measure the ability of each alternative to establish a diverse range of terrestrial and aquatic ecosystem habitat. The evaluation of the naturalization objective is based on three criterion:

1. change in shoreline character;
2. ability to create functional habitat blocks; and
3. ability of the alternative to be self-compensating with respect to fish habitat.

Table 5.1 provides the comparative evaluation for the naturalization objective. A more detailed evaluation table is provided in Appendix D.

Table 5.1 Comparative Evaluation Table – Naturalization

Objective	Criteria	Indicator(s)	Alternatives				
			Revetment	Headland	Island Beach A	Island Beach B	Island Beach C
Naturalization	Change in shoreline character	Change in diversity of shoreline types	• uniform revetment shoreline with no diversity • no new beach is created • loss of 363 m of existing beach • overall loss of shoreline diversity	• 449 m of beach created • a similar length of beach lost • remaining shoreline is revetments • no change in shoreline diversity	• 847 m of beach created • 402 m of lee island shoreline created • 1656 m of revetment created • 28% increase in the amount of beach versus hardened shoreline • 2% increase in beach overall • increased diversity created by lee island shoreline.	• 935 m of beach created • 518 m of lee island shoreline created • 1724 m of revetment created • 29% increase in the amount of beach versus hardened shoreline • 3% increase in beach overall • increased diversity created by lee island shoreline.	• 1307 m of beach created • 515 m of lee island shoreline created • 1413 m of revetment is created • 40% increase in the amount of beach versus hardened shoreline • 5% increase in beach overall • increased diversity created by lee island shoreline.
		Irregularity of shoreline to provide nearshore forage fish habitat	• 1.3 times more irregular than a straight linear shoreline	• 1.7 times more irregular than a straight linear shoreline	• 2.3 times more irregular than a straight linear shoreline	• 2.4 times more irregular than a straight linear shoreline	• 2.1 times more irregular than a straight linear shoreline
		Ease of access to water for wildlife	• poor access for wildlife due to revetments	• easier access provided for wildlife at beaches	• easier access provided for wildlife at beaches	• easier access provided for wildlife at beaches	• easier access provided for wildlife at beaches

Table 5.1 Comparative Evaluation Table – Naturalization (Cont'd)

Objective	Criteria	Indicator(s)	Alternatives				
			Revetment	**Headland**	**Island Beach A**	**Island Beach B**	**Island Beach C**
Naturalization	**SUMMARY**		**LEAST PREFERRED**	**MODERATELY PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**
	Ability to create functional habitat blocks	Ability to meet minimum habitat area guidelines: 4 ha of forest; 7-8 ha of wetland; and 10 ha of meadow.	• Forest:6.7 ha • Wetland:8.0 ha • Meadow:16.0 ha	• Forest:6.4 ha • Wetland:7.7 ha • Meadow:17.0 ha	• Forest:6.7 ha • Wetland:7.8 ha • Meadow:18.2 ha	• Forest:7.2 ha • Wetland:7.7 ha • Meadow:18.5 ha	• Forest:6.7 ha • Wetland:7.8 ha • Meadow:18.2 ha
		Qualitative assessment of habitat created	• does not provide isolated wildlife refuge areas • does not provide sheltered and diverse shoreline habitats	• does not provide isolated wildlife refuge areas • provides moderately sheltered and diverse shoreline habitats	• provides some isolated wildlife refuge areas on the islands • provides moderately sheltered and diverse shoreline habitats	• provides some isolated wildlife refuge areas on the islands • provides well sheltered and diverse shoreline habitats	• provides the most isolated wildlife refuge areas on islands • provides moderately sheltered and diverse shoreline habitats

Table 5.1 Comparative Evaluation Table – Naturalization (Cont'd)

Objective	Criteria	Indicator(s)	Alternatives				
			Revetment	**Headland**	**Island Beach A**	**Island Beach B**	**Island Beach C**
Naturalization	**SUMMARY**		**LEAST PREFERRED**	**MODERATELY PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**
	Ability of alternative to be self-compensating with respect to fish habitat	Area of aquatic habitat lost or changed (ha)	• 30.7 ha	• 32.0 ha	• 34.2 ha	• 34.8 ha	• 34.7 ha
		HAAT model estimates of area requiring compensation lost (ha)	• Requires 7.2 ha of habitat compensation	• Requires 6.1 ha of habitat compensation	• Requires 6.7 ha of habitat compensation	• Requires 4.7 ha of habitat compensation	• Requires 6.7 ha of habitat compensation
		Area of aquatic Habitat Lost compared to HAAT Model estimate of area requiring compensation.	• 4.3 ha of fill / 1ha of compensation	• 5.2 ha of fill / 1 ha of compensation	• 5.1 ha of fill / 1 ha of compensation	• 7.4 ha of fill / 1 ha of compensation.	• 5.1 ha of fill / 1 ha of compensation
	SUMMARY		**LEAST PREFERRED**	**MODERATELY PREFERRED**	**MODERATELY PREFERRED**	**MOST PREFERRED**	**MODERATELY PREFERRED**

Change in Shoreline Character

For the criteria "change in shoreline character" there were three indicators used to evaluate each Alternative LWC Project Configuration:

1. Change in diversity of shoreline types;
2. Irregularity of shoreline to provide nearshore forage fish habitat; and
3. Ease of access to water for wildlife.

Change in diversity of shoreline types measures the amount of beach created or lost, the amount of revetment created or lost and the amount of change in both beach and revetment compared to the existing shoreline. There is a desire for greater shoreline diversity and Alternative LWC Project Configurations that result in greater shoreline diversity are preferred. Beaches are preferred to revetments along the shoreline due to their function as both terrestrial and aquatic habitat and their function in providing access to wildlife between terrestrial and aquatic habitat.

Irregularity of shoreline to provide nearshore forage fish habitat is a ratio that describes the irregularity of a shoreline compared to the straight length of shoreline. The more irregular a shoreline the more nearshore forage fish habitat is available. The higher the number the more preferred the alternative.

Some wildlife requires easy and safe access to the water for different aspects of their lifecycle. Different shoreline treatments create or discourage easy access. The indicators "ease of access to water for wildlife" measures each alternative's ability to provide access between terrestrial and aquatic environments based on the presence or absence of beaches.

The Revetment alternative provides a uniform revetment shoreline with no diversity. No beach is created and there is a loss of 363 m of existing beach. The Revetment alternative results in an overall loss of shoreline diversity, the least irregular shoreline and no easy access between the terrestrial and aquatic environment for wildlife since there are no beaches.

The Headland Beach alternative provides 449 m of new beach with a similar length of existing beach is lost. The remaining shoreline is revetments. The Headland Beach alternative provides no change in shoreline diversity, a more irregular shoreline than the Revetment alternative and provides easier access (compared to Revetment) between the terrestrial and aquatic environment for wildlife since cobble beaches are proposed for this alternative.

The Island Beach A alternative provides 847 m of beach, 402 m of lee island shoreline and 1656 m of revetment. There is a 28% increase in the amount of beach versus hardened shoreline and a 2% increase in beach overall. Increased diversity is also created by the addition of the lee island shoreline. The Island Beach A alternative provides a more irregular shoreline than both the Revetment and Headland Beach alternative and provides easier access (compared to Revetment) between the terrestrial and aquatic environment for wildlife since cobble beaches are proposed for this alternative.

The Island Beach B alternative provides 935 m of beach, 518 m of lee island shoreline and 1724 m of revetment. There is a 29% increase in the amount of beach versus hardened shoreline and a 3% increase in beach overall. Increased diversity is also created by the addition of the lee island shoreline. The Island Beach B alternative provides a more irregular shoreline than both the Revetment and Headland Beach alternatives and a similar amount of irregularity as Island Beach A. Island Beach B provides easier access (compared to Revetment) between the terrestrial and aquatic environment for wildlife since cobble beaches are proposed for this alternative.

The Island Beach C alternative provides 1307 m of beach, 515 m of lee island shoreline and 1413 m of revetment. There is a 40% increase in the amount of beach versus hardened shoreline and a 5% increase in beach overall. Increased diversity is also created by the addition of the lee island shoreline. The Island Beach C alternative provides a more irregular shoreline than both the Revetment and Headland Beach alternatives and a similar amount of irregularity as Island Beach A and Island Beach B. Island Beach C provides easier access (compared to Revetment) between the terrestrial and aquatic environment for wildlife since cobble beaches are proposed for this alternative.

While the Island Beach C alternative results in highest amount of overall beach created, much of this newly created beach is a result of covering the existing sand beach at Marie Curtis Park. When compared to the existing conditions, Island Beach A, Island Beach B and Island Beach C result in a slight increase in overall beach compared to the existing shoreline so all three are considered most preferred. The Headland Beach alternative results in no net gain or loss in beach compared to the existing shoreline so it considered moderately preferred while the Revetment Alternative results in a net loss of beach compared to existing conditions and is considered least preferred.

Based on the results for each indicator described above, Island Beach A, Island Beach B and Island Beach C Alternative LWC Project Configurations were ranked “most preferred” for the criteria “change in shoreline character”. Headland Beach was ranked “moderately preferred” and Revetment was ranked “least preferred”.

Ability to Create Functional Habitat Blocks

For the criteria "ability to create functional habitat blocks" there were two indicators used to evaluate each Alternative LWC Project Configuration:

1. Ability to meet minimum habitat area guidelines (7-8 ha of wetland; 4 ha of forest; and 10 ha of meadow); and
2. Qualitative assessment of habitat created.

Minimum habitat sizes have been provided as a guideline to ensure appropriate levels of ecological function within the LWC Project Study Area. Meeting these minimum habitat area guidelines will provide adequate functional habitat for each broad ecological building block.

Ecological function is related to the relative quality of the new habitat created. Habitat patch size, shape, potential for human disturbance through trails and infrastructure dictate future ecological function. Alternative LWC Project Configurations deemed to have higher quality habitat will be scored higher.

For the indicator "ability to meet minimum habitat area guidelines" each of the Alternative LWC Project Configurations meets the minimum habitat size guidelines identified by the ecology team. However, differences between the alternatives are identified through a qualitative assessment of quality of the habitat created based on their ability to provide isolated wildlife refuge areas and sheltered, diverse shoreline habitats.

The Revetment and Headland Beach alternatives do not provide isolated wildlife refuge areas (i.e. islands), however the Headland Beach alternative does provide moderately sheltered and diverse shoreline habitats where the Revetment alternative does not.

All three Island Beach alternatives provide some degree of wildlife refuge and sheltered and diverse shoreline habitat. There are trade-offs between each of the Island Beach alternatives based on the number of islands created (wildlife refuge) and the amount of sheltered and diverse shoreline habitat. While Island Beach B provides the most sheltered and diverse shoreline habitat, it only has one island to provide wildlife refuge. Island Beach C had three islands providing the most wildlife refuge, but has less sheltered and diverse shoreline habitat than both Island Beach A and Island Beach B alternatives.

Since each of the Island Beach alternatives provide a mix of wildlife refuge and sheltered and diverse shoreline habitat, they were each scored as "most preferred". Although the Headland Beach alternative does not provide wildlife refuge, it was scored "moderately preferred" since it does provide sheltered and diverse shoreline habitat. Revetment was scored "least preferred" since it does not provide sheltered and diverse shoreline habitat nor wildlife refuge.

Ability of Alternative to be Self-Compensating with Respect to Fish Habitat

For the criteria "ability of alternative to be self-compensating with respect to fish habitat" there were three indicators used to evaluate each Alternative LWC Project Configuration:

1. Area of aquatic habitat lost or changed;
2. HAAT model estimates of area requiring compensation lost; and
3. Area of aquatic habitat lost compared to HAAT model estimate of area requiring compensation.

Land creation activities will result in a loss of aquatic habitat and the area of loss is a key consideration in the ability of the LWC Project to self-compensate for this loss. The conservation authorities would like to adhere to the principle of self-compensation in that any habitat lost should be replaced preferably with higher quality habitat in the event that habitat area created is not equal to area lost. The indicator "area of aquatic habitat lost or changed" measures the area of aquatic habitat lost based on the footprint of each Alternative LWC Project Configurations.

Different shoreline types and their resulting footprints have intrinsic differences in ecological features and functions and thus, their ability to be self-compensating from a fish habitat perspective. The indicator "HAAT model estimates of area requiring compensation lost" will determine which alternatives are better able to be self-compensate by minimizing the net loss of habitat.

The "area of aquatic habitat lost compared to HAAT model estimate of area requiring compensation" indicator measures the amount of fill that would occur for each alternative before 1 ha of habitat compensation is required. Thus, the two indicators listed above are standardized where the greater the fill area, the higher intrinsic habitat quality provided.

The Revetment alternative requires the smallest area of land creation (30.7 ha) but it will require the highest level of offsite habitat compensation due to the lack of functional fish habitat created by the revetment structures. The HAAT analysis indicates that 7.2 ha of like habitat will be required to compensate for the land creation activity, thus, 4.3 ha of land creation can occur before 1 ha of habitat compensation is required.

The Headland Beach alternative requires 32.0 ha of land creation but will require less offsite habitat compensation compared to the Revetment alternative due to more functional fish habitat created by the shoreline configuration and cobble beaches. The HAAT analysis indicates that 6.1 ha of like habitat will be required to compensate for the land creation activity, thus, 5.2 ha of land creation can occur before 1 ha of habitat compensation is required.

The Island Beach A alternative requires 34.2 ha of land creation but will require less offsite habitat compensation compared to the Revetment alternative due to more functional fish habitat created by the shoreline configuration and cobble beaches. The HAAT analysis indicates that 6.7 ha of like habitat will be required to compensate for the land creation activity. Although slightly more habitat compensation is required than for the Headland Beach alternative, slightly more land creation can occur before 1 ha of habitat compensation is required (5.1 ha).

The Island Beach B alternative requires 34.8 ha of land creation but will require less offsite habitat compensation compared to all alternatives due to more functional fish habitat created by the sheltered embayment feature and cobble beaches. The HAAT analysis indicates that only 2.3 ha of like habitat will be required to compensate for the land creation activity, thus, 15.1 ha of land creation can occur before 1 ha of habitat compensation is required.

The Island Beach C alternative requires 34.7 ha of land creation and will require similar offsite habitat compensation as the Headland Beach and Island Beach A alternatives. The HAAT analysis indicates that 3.4 ha of like habitat will be required to compensate for the land creation activity, thus, 10.2 ha of land creation can occur before 1 ha of habitat compensation is required.

The Island Beach B alternative has the greatest area of land creation, but due to the types of habitat created, it is best able to compensate for that loss. Island Beach B requires the least amount of offsite compensation of all alternatives and was ranked as most preferred for the criteria “ability of alternative to be self-compensating with respect to fish habitat”. A combination of the area of land creation and the types of aquatic habitat created results in similar amounts of offsite compensation required for the Headland Beach, Island Beach A and Island Beach C alternatives, thus, these three alternatives were ranked as moderately preferred. The Revetment alternative requires the most offsite compensation and was ranked least preferred.

Summary of Evaluation by Objective - Naturalization

In summary, the Revetment alternative scores lowest for each criterion under the naturalization objective. The three Island Beach alternatives score highest under the naturalization objective with Island Beach B scoring slightly higher with respect to the ability of the alternative to self-compensate for fish habitat. The Headland Beach alternative scores higher than the Revetment for all criteria but lower than or equal to the three Island Beach alternatives for all criterion.

Therefore, for the naturalization objective, Island Beach A, Island Beach B and Island Beach C are ranked “most preferred”; Headland Beach is ranked “moderately preferred” and Revetment is ranked “least preferred”. Table 5.2 presents a summary of the criteria ratings for the naturalization objective.

Table 5.2 Summary of Criteria Ratings for the Naturalization Objective

Objective	Criteria	Alternatives				
		Revetment	**Headland Beach**	**Island Beach A**	**Island Beach B**	**Island Beach C**
Naturalization	Change in shoreline character	Least preferred	Moderately preferred	Most preferred	Most preferred	Most preferred
	Ability to create functional habitat blocks	Least preferred	Moderately preferred	Most preferred	Most preferred	Most preferred
	Ability of alternative to be self-compensating with respect to fish habitat	Least preferred	Moderately preferred	Moderately preferred	Most preferred	Moderately preferred
SUMMARY		**LEAST PREFERRED**	**MODERATELY PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**

5.3.2.2 Access

The criteria and indicators for the access objective measure the ability of each alternative to provide safe and accessible public linkages to and along the waterfront, including the relocation of the Waterfront Trail close to the water's edge, while allowing for compatible recreational, educational and cultural heritage opportunities. The evaluation of the access objective is based on four criteria:

1. potential for lookout areas;
2. potential for public access to the water's edge;
3. potential for effect from construction on traditional uses of lands by First Nations and Métis; and
4. potential for changes to use of waterfront for recreation.

Table 5.3 provides the comparative evaluation for the access objective.

Two additional criteria were evaluated for the access objective:

1. potential for displacement of built heritage resources due to construction; and
2. potential effects from construction on marine- and land-based archaeological resources.

After evaluating these four criteria for the five LWC Project alternatives, it was determined that there was no difference for any of the alternatives so these criteria were removed from the evaluation table. A detailed evaluation table, including criteria deemed to be equal for each alternative, is provided in Appendix D.

Table 5.3 Comparative Evaluation Table – Access

Objective	Criteria	Indicator(s)	Alternatives				
			Revetment	**Headland**	**Island Beach A**	**Island Beach B**	**Island Beach C**
Access	Potential for lookout areas	Number of opportunities for lookout areas	• continuous lookout opportunities along shoreline • all lookout opportunities are uniform and are perched above water on revetment • excellent opportunities to create raised viewing platform • all views to Lake Ontario unobstructed	• varied lookout opportunities along shoreline • some lookouts perched on revetment some at water's edge • opportunity to create raised viewing platform • views to Lake Ontario from beaches obstructed by headlands	• varied lookout opportunities along shoreline • some lookouts perched on revetment some at water's edge • opportunity to create raised viewing platform • additional lookout opportunities created by hooked peninsula • some views to Lake Ontario from beaches partially obstructed by peninsula	• varied lookout opportunities along shoreline • some lookouts perched on revetment some at water's edge • opportunity to create raised viewing platform • additional lookout opportunities created by hooked peninsula • many views to Lake Ontario from beaches partially obstructed by peninsula	• varied lookout opportunities along shoreline • some lookouts perched on revetment some at water's edge • opportunity to create raised viewing platform • additional lookout opportunities created by hooked peninsula • all views to Lake Ontario unobstructed
	SUMMARY		**MODERATELY PREFERRED**	**LEAST PREFERRED**	**MOST PREFERRED**	**MODERATELY PREFERRED**	**MOST PREFERRED**
	Potential for public access to water's edge	Percent change in accessible water's edge	• 10% loss of accessible water's edge	• 14% gain of accessible water's edge	• 20% gain of accessible water's edge	• 22% gain of accessible water's edge	• 25% gain of accessible water's edge

Table 5.3 Comparative Evaluation Table – Access (Cont'd)

Objective	Criteria	Indicator(s)	Alternatives				
			Revetment	**Headland**	**Island Beach A**	**Island Beach B**	**Island Beach C**
Access	Potential for public access to water's edge	Potential to create tiered trail system providing seasonal access	• Limited potential	• Excellent potential	• Excellent potential	• Excellent potential	• Moderate potential
		Potential to create multi-use trail connection across area of land creation	• Excellent potential	• Excellent potential	• Excellent potential	• Excellent potential	• Excellent potential
	SUMMARY		**LEAST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**
	Potential for effect from construction on traditional uses of lands by First Nations and Métis	Extent of traditional uses of lands within LWC Project Study Area	• provides access to enhanced river and wetlands • does not provide access to the shoreline	• provides access to enhanced river and wetlands • provides access to the shoreline	• provides access to enhanced river and wetlands • provides access to the shoreline	• provides access to enhanced river and wetlands • provides access to the shoreline	• provides access to enhanced river and wetlands • provides access to the shoreline
	SUMMARY		**LEAST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**

Table 5.3 Comparative Evaluation Table – Access (Cont'd)

Objective	Criteria	Indicator(s)	Alternatives				
			Revetment	**Headland**	**Island Beach A**	**Island Beach B**	**Island Beach C**
Access	Potential for changes to use of waterfront for recreation	Potential for changes to existing recreational activities on the sand beach at Marie Curtis Park west	• alteration of 162 m of existing sand beach	• alteration of 154 m of existing sand beach	• alteration of 244 m of existing sand beach	• alteration of 241 m of existing sand beach	• alteration of 505 m of existing sand beach
		Potential for changes to use for windsurfers and/or kiteboarders	• creates new hazards that did not exist previously • minimal encroachment into MCP West beach	• creates new hazards that did not exist previously • minimal encroachment into MCP West beach	• creates new hazards that did not exist previously • moderate encroachment into MCP West beach	• creates new hazards that did not exist previously • moderate encroachment into MCP West beach	• creates new hazards that did not exist previously • extensive encroachment into MCP West beach
	SUMMARY		**MOST PREFERRED**	**MOST PREFERRED**	**MODERATELY PREFERRED**	**MODERATELY PREFERRED**	**LEAST PREFERRED**

Potential for Lookout Areas

For the criteria "potential for lookout areas" there was one indicator used to evaluate each Alternative LWC Project Configuration: "number of opportunities for lookout areas". Lookout areas (providing views along the shoreline) are an important feature in enhancing public enjoyment of the waterfront. The size and character of the shoreline created will create differences in opportunities for lookouts.

The Revetment alternative provides continuous lookout opportunities along the shoreline. All lookout opportunities are uniform and are perched above water on revetment. Excellent opportunities exist to create raised viewing platforms with unobstructed views to lake. The Revetment alternative does not provide any viewing opportunities from lake level since the entire shoreline is perched on revetment structures and does not provide beach lookouts.

The Headland Beach alternative provides varied lookout opportunities along the shoreline. Some lookouts are perched on revetment and others are at the water's edge. There are opportunities to create raised viewing platforms; however views to lake from beaches are obstructed by headlands.

The Island Beach A alternative provides varied lookout opportunities along the shoreline. Some lookouts perched are on revetment and others are at the water's edge. There are opportunities to create raised viewing platforms and additional lookout opportunities are available on the hooked peninsula; however some views to lake from beaches are partially obstructed by the peninsula.

The Island Beach B alternative provides varied lookout opportunities along the shoreline. Some lookouts are perched on revetment and others are at the water's edge. There are opportunities to create raised viewing platforms and additional lookout opportunities are created by the hooked peninsula; however many views to lake from beaches obstructed by the peninsula.

The Island Beach C alternative provides varied lookout opportunities along shoreline. Some lookouts are perched on revetment and others are at the water's edge. There is an opportunity to create raised viewing platforms and all views to lake are unobstructed.

Based on their provision of varied lookout opportunities (beach and revetment) and predominantly unobstructed views of the lake, Island Beach A and Island Beach C were selected as "most preferred" for the criteria "potential for lookout areas". The Revetment alternative provides unobstructed views of the lake but is less desirable due to a lack of beach lookouts. The Island Beach B alternative provides beach lookouts but some of the lake views from beaches are obstructed by the sheltered embayment feature. Revetment and Island Beach B were ranked as

"moderately preferred" for these reasons. Headland Beach was ranked least preferred as many of the views to the lake are obstructed by the headland features.

Potential for Public Access to Water's Edge

For the criteria "potential for public access to the water's edge" there were three indicators used to evaluate each Alternative LWC Project Configuration:

1. Percent change in accessible water's edge;
2. Potential to create tiered trail system providing seasonal access; and
3. Potential to create multi-use trail connection across area of land creation.

Ease of regular access to the water's edge will enhance public enjoyment of the waterfront, and facilitate a variety of uses. The indicator "percent change in accessible water's edge" measures the change from the existing shoreline to the proposed shoreline in terms of how much access to the water is available to the public.

A key component of east-west public linkages along the waterfront is the Waterfront Trail, which is forced to bypass much of the actual waterfront within the LWC Project Study Area. All Alternative LWC Project Configurations will provide opportunities to change the path of the Waterfront Trail to better connect with trails and parks to the east and west of the LWC Project Study Area and to provide connections back to Lakeshore Road and the adjacent communities. The indicator "potential to create tiered trail system providing seasonal access" is a qualitative measure of the opportunity provided by each Alternative LWC Project Configuration to provide a tiered trail system. The indicator "potential to create multi-use trail connection across area of land creation" determines if a waterfront trail connection across the Project footprint is possible for each alternative.

The Revetment alternative results in a 10% loss in accessible water's edge since some of the currently accessible water's edge at Marie Curtis Park would be covered and replaced with revetment structures. Due to the uniform nature of the revetment structures there is limited potential to create a tiered trail system. Similar to all alternatives, there is excellent potential to create a multi-use trail connection across the site.

The Headland Beach alternative results in a 14% gain in accessible water's edge due to the creation of new beaches. There is excellent potential to create a tiered trail system and a multi-use trail connection across the site.

The Island Beach A alternative results in a 20% gain in accessible water's edge due to the creation of new beaches. There is excellent potential to create a tiered trail system and a multi-use trail connection across the site.

The Island Beach B alternative results in a 22% gain in accessible water's edge due to the creation of new beaches. There is excellent potential to create a tiered trail system and a multi-use trail connection across the site.

The Island Beach C alternative results in a 25% gain in accessible water's edge due to the creation of new beaches. There is moderate potential to create a tiered trail system and excellent potential to create a multi-use trail connection across the site.

Headland Beach, Island Beach A, Island Beach B and Island Beach C were ranked as "most preferred" since they each result in a considerable increase in accessible water's edge compared to existing conditions. Although Island Beach C was only considered to create moderate potential for a tiered trail system, which was offset by its greater provision of accessible water's edge. Revetment was ranked as "least preferred" because it results in a loss of accessible water's edge and limited potential to create a tiered trail system.

Potential for Effect from Construction on Traditional Uses of Lands by First Nations and Métis

The new natural waterfront park must respect and wherever possible enhance traditional uses of lands by First Nations and Métis. For the criteria "potential for effects from construction on traditional uses of lands by First Nations and Métis" there was one indicator used to evaluate each Alternative LWC Project Configuration: "extent of traditional uses of lands within LWC Project Study Area". Based on consultation with Aboriginal communities, there are no traditional uses practiced in the LWC Project Study Area; however, the Mississaugas of the New Credit First Nation indicated a need to access the water. All Alternative LWC Project Configurations provide access to the new stream configurations and wetlands. The Revetment alternative does not provide access to the lake as there are no beaches while the other four alternatives include beaches. For this reason, Revetment has been ranked "least preferred" for this criteria and Headland Beach, Island Beach A, Island Beach B and Island Beach C have been ranked "most preferred".

Potential for changes to use of waterfront for recreation

For the criteria "potential for changes to use of waterfront for recreation" there were two indicators used to evaluate each Alternative LWC Project Configuration:

1. Potential for changes to existing recreational activities on the sand beach at Marie Curtis Park west; and
2. Potential for changes to use for windsurfers and/or kiteboarders.

Creating new parkland in front of the existing sand beach at Marie Curtis Park west could change the character of the area and affect the way current recreational users experience the site. The indicator "potential for changes to existing recreational activities on the sand beach at Marie Curtis Park west" quantitatively measures how each Alternative LWC Project Configuration will change existing recreational uses (i.e. walking, sitting on the beach, etc.) at Marie Curtis Park beach. The existing beach behind each Alternative LWC Project Configuration will remain intact, but may transition to a vegetated community over time with the absence of wave disturbance. The indicator "potential for changes to use for windsurfers and/or kiteboarders" provided a qualitative evaluation of effects specific to these beach users. Each Alternative LWC Project Configuration results in the creation of a new landform that will create a new potential hazard to windsurfers and kiteboarders.

The Revetment alternative results in 162 m of the existing sand beach at Marie Curtis Park affected by the new landform.

The Headland Beach alternative results in 154 m of the existing sand beach at Marie Curtis Park affected by the new landform.

The Island Beach A alternative results in 244 m of the existing sand beach at Marie Curtis Park affected by the new landform.

The Island Beach B alternative results in 241 m of the existing sand beach at Marie Curtis Park affected by the new landform.

The Island Beach C alternative results in 505 m of the existing sand beach at Marie Curtis Park affected by the new landform.

The Revetment and Headland Beach alternatives were ranked as "most preferred" as they result in the least length of impact on Marie Curtis Park beach. Island Beach A and Island Beach B were ranked "moderately preferred" as they result in more of the Marie Curtis Park beach altered as part of the land creation, but still leave over half of the existing beach unaffected. Island Beach C was ranked "least preferred" since it affects the entire length of Marie Curtis Park's western beach.

Summary of Evaluation by Objective - Access

In summary, the Revetment alternative scores "least preferred" for two indicators, "moderately preferred" for one indicator and "most preferred" for one indicator. The Island Beach A scored "most preferred" for three criteria and moderately preferred for one criteria. Island Beach B, Island Beach C and Headland Beach each score higher than the Revetment but lower than Island Beach A. Therefore, for the access objective, Island Beach A is ranked "most preferred"; Headland Beach, Island Beach B and Island Beach C are ranked "moderately preferred" and Revetment is ranked "least preferred". Table 5.4 presents a summary of the criteria ratings for the access objective.

Table 5.4 Summary of Criteria Ratings for the Access Objective

Objective	Criteria	Alternatives				
		Revetment	**Headland Beach**	**Island Beach A**	**Island Beach B**	**Island Beach C**
Access	Potential for lookout areas	Moderately preferred	Least preferred	Most preferred	Moderately preferred	Most preferred
	Potential for public access to water's edge	Least preferred	Most preferred	Most preferred	Most preferred	Most preferred
	Potential for effect from construction on traditional uses of lands by First Nations and Métis	Least preferred	Most preferred	Most preferred	Most preferred	Most preferred
	Potential for changes to use of waterfront for recreation	Most preferred	Most preferred	Moderately preferred	Moderately preferred	Least preferred
SUMMARY		**LEAST PREFERRED**	**MODERATELY PREFERRED**	**MOST PREFERRED**	**MODERATELY PREFERRED**	**MODERATELY PREFERRED**

5.3.2.3 Compatibility

The criteria and indicators for the compatibility objective measure the ability of each alternative to be compatible with existing infrastructure. The evaluation of the compatibility objective is based on two criteria:

1. potential for effects to existing WWTF outfall access points; and
2. ability to maintain/enhance site security at the WWTF.

After evaluating these two criterion against the five Alternative LWC Project Configurations, it was determined that there was no difference for any of the alternatives so these criterion were removed from the evaluation table. All five alternatives result in two manhole access points along the WWTF outfall pipe being covered by fill. This can be mitigated by extending the

manhole access points to the surface of the new landform. By establishing a treed swamp and forest adjacent to the existing shoreline, each alternative is able to maintain/enhance site security by discouraging public access adjacent to the WWTF. There is no measureable difference between alternatives for the compatibility objective so it is concluded that all alternatives are equally preferred for this objective. A detailed evaluation table, including criteria deemed to be equal for each alternative, is provided in Appendix D.

5.3.2.4 Coordination

The criteria and indicators for the coordination objective measure the ability of each alternative to coordinate with and inform other local planning and development initiatives. The evaluation of the coordination objective is based on three criteria:

1. consistency with the Visioning for Inspiration Lakeview;
2. consistency with the Lake Ontario Integrated Shoreline Strategy (LOISS); and
3. consistency with the Beautiful Lake: A Binational Biodiversity Strategy for Lake Ontario (i.e. the Lake Ontario Biodiversity Strategy).

Table 5.5 provides the comparative evaluation for the coordination objective.

Two additional criteria were evaluated for the coordination objective:

1. consistency with the City of Mississauga Waterfront Parks Strategy; and
2. consistency with Marie Curtis Park Revitalization Plan.

After evaluating these two criteria for the five LWC Project alternatives, it was determined that there was no difference for any of the alternatives so these criterion were removed from the evaluation table. A detailed evaluation table, including criteria deemed to be equal for each alternative, is provided in Appendix D.

Table 5.5 Comparative Evaluation Table – Coordination

Objective	Criteria	Indicator(s)	Alternatives				
			Revetment	**Headland**	**Island Beach A**	**Island Beach B**	**Island Beach C**
Coordination	Consistency of alternative with Visioning for Inspiration Lakeview	Ability to integrate alternative with potential plans for OPG's Lakeview site	• Good potential to integrate	• Excellent potential to integrate	• Excellent potential to integrate	• Excellent potential to integrate	• Excellent potential to integrate
	SUMMARY		**MODERATELY PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**
	Consistency of alternative with priorities identified by LOISS	Consistency of alternative with priorities identified by LOISS	• offers the least opportunity to improve the diversity and quantity of terrestrial and aquatic habitat of the shoreline	• offers moderate opportunity to improve the diversity and quantity of terrestrial and aquatic habitat of the shoreline	• offers moderate opportunity to improve the diversity and quantity of terrestrial and aquatic habitat of the shoreline	• offers moderate opportunity to improve the diversity and quantity of terrestrial and aquatic habitat of the shoreline	• offers moderate opportunity to improve the diversity and quantity of terrestrial and aquatic habitat of the shoreline
	SUMMARY		**LEAST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**
	Consistency of alternative with priorities identified by the Lake Ontario Biodiversity Strategy	Consistency of alternative with priorities identified by the Lake Ontario Biodiversity Strategy	• contributes to four of the Conservation Targets	• contributes to five of the Conservation Targets	• contributes to six of the Conservation Targets	• contributes to six of the Conservation Targets	• contributes to six of the Conservation Targets
	SUMMARY		**LEAST PREFERRED**	**MODERATELY PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**

Consistency with the Visioning for Inspiration Lakeview

For the criteria "consistency with the Visioning for Inspiration Lakeview" there were two indicators used to evaluate each Alternative LWC Project Configuration:

1. Consistency of alternative with Visioning for Inspiration Lakeview; and
2. Ability to integrate alternative with potential plans for OPG's Lakeview site.

The shoreline and Serson Creek within the LWC Project Study Area was identified as a "Green" area within the Inspiration Lakeview Vision Plan. This portion of shoreline was discussed as an area to establish a new continuous waterfront south of the WWTF. Alternatives are ranked based on their consistency with this vision, to ensure that the LWC Project remains consistent with the larger development plans at OPG's Lakeview site.

As a key area for establishing public linkages identified in the Inspiration Lakeview vision, the ability of alternatives to integrate with potential plans for OPG's Lakeview site is important in the larger Inspiration Lakeview planning process. A key message in the Inspiration Lakeview vision is to create opportunities to bring people to the water.

For the criteria "consistency of alternative with Visioning for Inspiration Lakeview", the Revetment alternative was ranked "moderately preferred" since it does not present an opportunity for people to directly access the water due to revetment structures along the entire length of the shoreline. All other alternatives provide direct access to the water and have all been ranked "most preferred".

Consistency with LOISS

For the criteria "consistency with LOISS", alternatives were ranked based on the indicator "consistency of alternative with priorities identified by LOISS". A key element of LOISS is to improve the diversity and quantity of terrestrial and aquatic habitat of the shoreline. The revetment alternative offers the least opportunity for achieving desired improvements to aquatic habitat of the shoreline due a lack of diversity associated with revetment structures. For this reason, the Revetment alternative is ranked "least preferred" for this criterion. All other alternatives are ranked "most preferred" as they offer better opportunities for achieving improvements to aquatic habitat.

Consistency of Alternative with Priorities Identified by the Lake Ontario Biodiversity Strategy

For the criteria "consistency of alternative with priorities identified by the Lake Ontario Biodiversity Strategy", alternatives were ranked based on based on their consistency with the recommendations and targets identified in the Lake Ontario Biodiversity Strategy, to ensure that the LWC Project does not conflict with these elements and helps to meet the objectives of the

Strategy. The three island beach alternatives contribute to six of the conservation target identified in the Strategy. The Headland Beach alternative contributes to five of the targets and the Revetment alternative contributes to four. For this reason, the three island beach alternatives are ranked "most preferred", Headland Beach is ranked "moderately preferred" and Revetment is ranked "least preferred".

Summary of Evaluation by Objective - Coordination

In summary, the Island Beach A Island Beach B and Island Beach C alternatives provide the greatest coordination with other local planning and development initiatives. The three island beach alternatives have been scored as "most preferred" since each of these alternatives ranked "most preferred" for all criteria under the Coordination Objective.

The Headland Beach alternative was only moderately preferred with respect the Lake Ontario Biodiversity Strategy due to the amount of hardened shoreline and the fact that it achieves the fewer Lake Ontario Biodiversity Strategy Conservation Targets when compared to the island beach alternatives. Due to slightly lower scoring than the island beach alternatives on this criterion, Headland Beach was evaluated overall as "moderately preferred" for the Coordination Objective.

The Revetment alternative scored lowest for compatibility with both LOISS and the Lake Ontario Biodiversity Strategy due to the amount of hardened shoreline and the fact that it achieves the fewest Lake Ontario Biodiversity Strategy Conservation Targets when compared to the other alternatives. The Revetment alternative scored "least preferred" overall for the Coordination Objective due to lower scores for these two criteria.

Table 5.6 presents a summary of the criteria ratings for the coordination objective.

Table 5.6 Summary of Criteria Ratings for the Coordination Objective

Objective	Criteria	Alternatives				
		Revetment	Headland Beach	Island Beach A	Island Beach B	Island Beach C
Coordination	Consistency with the Visioning for Inspiration Lakeview	Moderately preferred	Most preferred	Most preferred	Most preferred	Most preferred
	Consistency with LOISS	Least preferred	Most preferred	Most preferred	Most preferred	Most preferred
	Consistency with Lake Ontario Biodiversity Strategy	Least preferred	Moderately preferred	Most preferred	Most preferred	Most preferred
SUMMARY		**LEAST PREFERRED**	**MODERATELY PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**

5.3.2.5 Fiscal Viability

The criteria and indicators for the fiscal viability objective measure the relative cost differences between the alternatives. Two criteria were used to compare fiscal viability of the alternative:

1. estimated capital cost; and
2. annualized maintenance costs for the naturalized area.

Table 5.7 provides the comparative evaluation for the fiscal viability objective. A detailed evaluation table, including criteria deemed to be equal for each alternative, is provided in Appendix D.

Table 5.7 Comparative Evaluation Table – Fiscal Viability

Objective	Criteria	Indicator(s)	Alternatives				
			Revetment	**Headland**	**Island Beach A**	**Island Beach B**	**Island Beach C**
Fiscal Viability	Estimated Capital Cost	Volume of purchased material	• 552,000 tonnes	• 765,000 tonnes	• 852,000 tonnes	• 935,000 tonnes	• 794,000 tonnes
		Land Cost : Area of waterlot required	• 40.6 ha of waterlot required	• 46.7 ha of waterlot required	• 55.8 ha of waterlot required	• 55.4 ha of waterlot required	• 56.9 ha of waterlot required
	SUMMARY		**MOST PREFERRED**	**MODERATELY PREFERRED**	**LEAST PREFERRED**	**LEAST PREFERRED**	**MODERATELY PREFERRED**
	Annual maintenance costs for naturalized area	Debris management costs	• low potential for debris accumulation due to shoreline configuration	• higher potential for debris accumulation along beaches	• higher potential for debris accumulation within the embayment	• higher potential for debris accumulation within the northern "hook" feature	• higher potential for debris accumulation along beaches
	SUMMARY		**MOST PREFERRED**	**LEAST PREFERRED**	**LEAST PREFERRED**	**LEAST PREFERRED**	**LEAST PREFERRED**

Estimated Capital Cost

For the criteria "estimated capital cost" there was two indicators used to evaluate each Alternative LWC Project Configuration:

1. Volume of purchased material; and
2. Land Cost: Area of waterlot required.

The estimated capital costs for each alternative are measured by the volume of material required for shoreline protection (i.e. revetments and beaches) and the area of waterlots that would need to be purchased. Material required for shoreline protection would not be part of the fill material that would come from Region of Peel or other donor projects so it is referred to as "purchased material".

The Revetment alternative requires the least amount of purchased material and the least area of required waterlot.

Headland Beach and Island Beach C require comparable amounts of purchased material – more than revetment but less than Island Beach A and Island Beach B. Island Beach C requires the most waterlot area (similar waterlot area is required for all island beach alternatives).

Island Beach A and Island Beach B require the most purchased material and are in the upper end of required waterlots.

Based on the trade-offs identified for "estimated capital cost" indicators, Revetment is ranked "most preferred", Headland Beach and Island Beach C are ranked "moderately preferred" and Island Beach A and Island Beach B are ranked "least preferred".

Annual maintenance costs for naturalized area

Differences between alternatives related to maintenance were captured through a qualitative evaluation of each alternative's potential to accumulate debris based on the shoreline configuration. Headland Beach, Island Beach A, Island Beach B and Island Beach C were all considered to have higher maintenance costs than Revetment due to their potential to accumulate debris. Debris accumulation and associated maintenance is considered to be most likely in relation to headland, beach, hook and embayment shoreline features found in each of these alternatives.

Since debris accumulation is considered less likely for the Revetment alternative, it has been ranked "most preferred" with all other alternatives ranked "least preferred".

Summary of Evaluation by Objective – Fiscal Viability

Table 5.8 presents a summary of the criteria ratings for the fiscal viability objective.

Table 5.8 Summary of Criteria Ratings for the Fiscal Viability Objective

Objective	Criteria	Revetment	Headland Beach	Island Beach A	Island Beach B	Island Beach C
Fiscal Viability	Estimated Capital Cost	Most preferred	Moderately preferred	Least preferred	Least preferred	Moderately preferred
	Annual maintenance cost for naturalized area	Most preferred	Least preferred	Least preferred	Least preferred	Least preferred
SUMMARY		**MOST PREFERRED**	**MODERATELY PREFERRED**	**LEAST PREFERRED**	**LEAST PREFERRED**	**MODERATELY PREFERRED**

5.3.2.6 Summary of the Comparative Evaluation of Alternatives

Table 5.9 summarizes the comparative evaluation of alternatives by objective and is a summary of Tables 5.1 through 5.8.

Table 5.9 Summary of Comparative Evaluation by Objective

Objective	Revetment	Headland Beach	Island Beach A	Island Beach B	Island Beach C
Naturalization	LEAST PREFERRED	MODERATELY PREFERRED	MOST PREFERRED	MOST PREFERRED	MOST PREFERRED
Access	LEAST PREFERRED	MODERATELY PREFERRED	MOST PREFERRED	MODERATELY PREFERRED	MODERATELY PREFERRED
Coordination	LEAST PREFERRED	MODERATELY PREFERRED	MOST PREFERRED	MOST PREFERRED	MOST PREFERRED
Fiscal Viability	MOST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	LEAST PREFERRED	MODERATELY PREFERRED
SUMMARY	**LEAST PREFERRED**	**MODERATELY PREFERRED**	**MODERATELY PREFERRED**	**MODERATELY PREFERRED**	**MOST PREFERRED**

As shown in Table 5.9, Island Beach C is the most preferred alternative. Island Beach C and Headland Beach are the only two alternatives that were not ranked "least preferred" for any objectives. Island Beach C was ranked "moderately preferred" for the access and fiscal viability objectives. Island Beach C was ranked lower than Island Beach A for access since it has a greater potential encroachment on the existing sand beach at Marie Curtis Park. Refinements can be made to Island C to minimize this encroachment which would render Island C similar to Island A and Island B for the access objective. Island Beach C was ranked lower than Revetment for fiscal viability due to higher shore protection costs and waterlot acquisition.

Although there are higher expected costs with Island Beach C compared to Revetment, these are offset by higher rankings for naturalization, access and coordination objectives.

Overall, Headland Beach, Island Beach A and Island Beach B were ranked as moderately preferred. Island Beach A and Island Beach B were "most preferred" for more objectives than Headland Beach. The main differentiating factor between Island Beach A and B vs. Island Beach C was their scoring of "least preferred" under the fiscal viability objective. Although Headland Beach is not "least preferred" for any objective, it scores lower than Island Beach C under naturalization and coordination making it a less preferred alternative.

The Revetment alternative scored "least preferred" for naturalization, access and coordination objectives. Although Revetment is the lowest cost alternative, its inability to meet the other objectives make it "least preferred".

5.4 STEP 4 – CONFIRM, REFINE AND UNDERTAKE DETAILED ASSESSMENT OF PREFERRED ALTERNATIVE

Based on the evaluation described in Section 5.3, Island Beach C was selected as the LWC Preferred Alternative. A PIC was held on April 3, 2013 to present the selection of the LWC Preferred Alternative to the public. The primary purpose of this PIC was to confirm the selection of Island Beach C and determine if the public wanted to see any further refinements to Island Beach C prior to initiating the detailed effects assessment.

At the PIC, some members of the public indicated that they would prefer to maintain more of the existing sand beach at Marie Curtis Park. They indicated a desire to have the footprint for the Preferred Alternative scaled back along the beach so it does not extend to the mouth of Etobicoke Creek.

Utilizing this feedback from the public, the LWC Technical Team reviewed potential design options that would transition to the exiting beach at a point closer the WWTF. The solution was to include a small groyne structure at approximately the midpoint between Applewood Creek and Etobicoke Creek that would anchor the Preferred Alternative without extending east to Etobicoke Creek. This refinement to the Preferred Alternative is presented in detail in Chapter 6 and the detailed assessment of the Preferred Alternative is presented in Chapter 7.