



Niagara Region

Niagara Escarpment Crossing
Comprehensive Environmental
Assessment
Proposed Terms of Reference

Appendix L
Surface Water Work Plan

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1 Introduction

This document outlines the proposed work plan that will be carried out during the Niagara Escarpment Crossing Environmental Assessment (EA) to generate a more detailed description and understanding of the environment from a surface water perspective. Further, this document describes how that information will be used to assess the effects of the alternatives and proposed project on the environment through evaluation criteria and indicators. This work plan forms **Appendix L** to the proposed Niagara Escarpment Crossing Comprehensive EA Terms of Reference (ToR) and should be read in conjunction with it.

The ToR presently provides a preliminary description of the environment to gain a general understanding of the potential effects that should be examined in the Niagara Escarpment Crossing EA based on the range of alternatives to the project currently anticipated. This description reflects all components included within the Ontario *Environmental Assessment Act* (EA Act) definition of the environment: natural, social, built, economic, and cultural.

Several investigative studies are proposed as part of the Niagara Escarpment Crossing EA to expand on this preliminary description, including, but not limited to the following:

- Air Quality
- Agricultural
- Archaeology
- Built Heritage and Cultural Heritage Landscapes
- Contaminated Property
- Groundwater
- Land Use
- Natural Heritage
- Noise and Vibration
- Surface Water
- Visual Impact

The details associated with the surface water investigation (includes drainage and stormwater management) are provided in this document while details of the other investigative studies are provided as separate work plans. In addition to the investigative studies, the proposed ToR includes three other work plans: Traffic, Operations and Safety, Transportation Planning and Engineering, and Financial all of which are included as separate appendices.

2 Establishment of Surface Water Conditions

2.1 Confirmation of the Preliminary Study Area

The preliminary study area provided in the ToR will be utilized as a starting point for establishing existing and future environmental conditions (**Figure 2-1**). This preliminary study area will be finalized during preparation of the Niagara Escarpment Crossing EA when more detailed information has been obtained, the alternatives to the project have been confirmed, and the potential environmental effects are better understood.

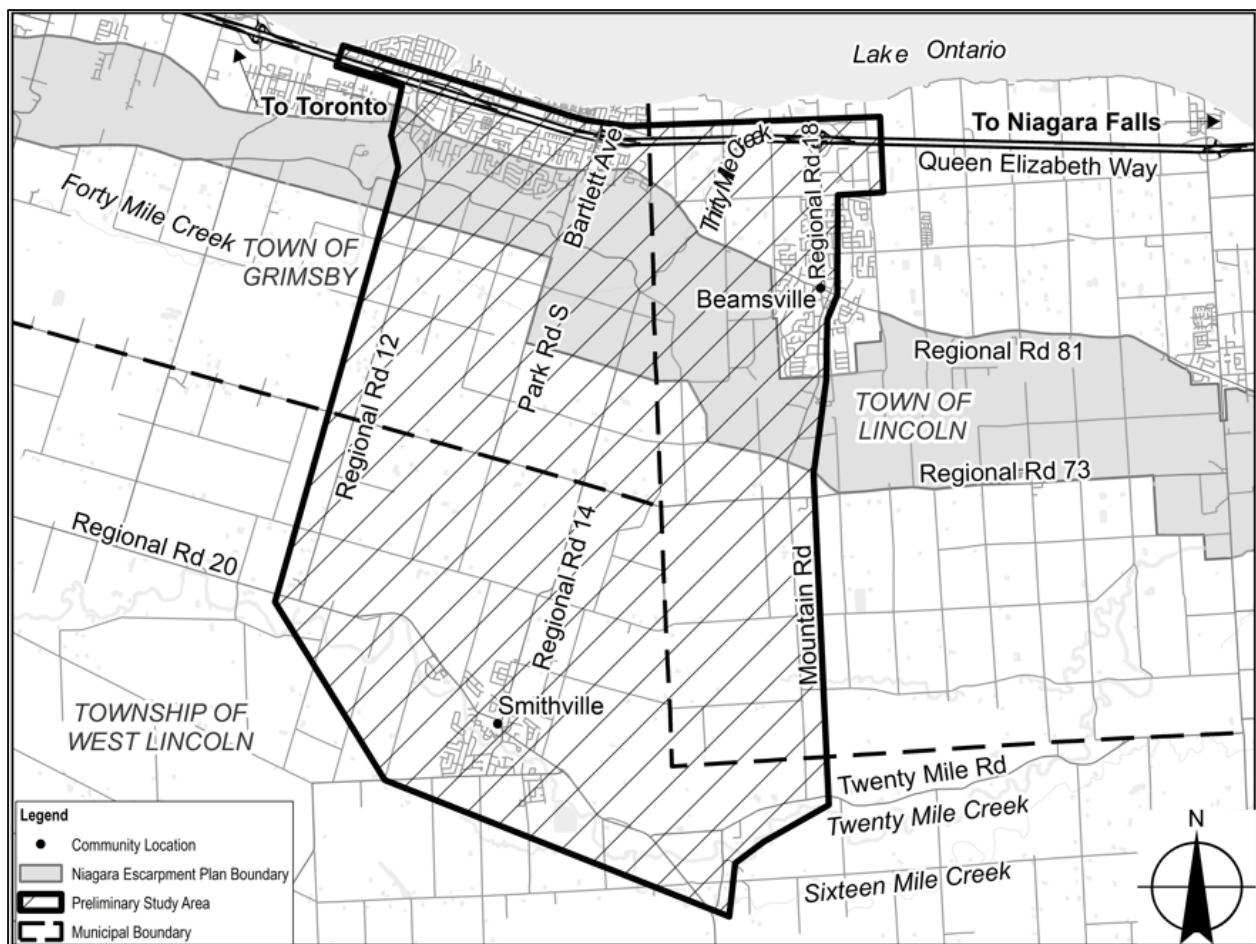


Figure 2-1: Preliminary Study Area

2.2 Review of Available Existing Information Sources

Available existing sources of information will be collected and reviewed to determine existing and future environmental conditions, including any data gaps that need to be addressed through subsequent work (e.g., field investigations, modelling, etc.).

Presently, the list of existing information sources that will be collected and reviewed as part of the proposed Surface Water Work Plan includes, but may not be limited to, the following:

- Niagara Escarpment Crossing Study 1997
- Niagara Crossing Transportation Study, 2016
- Smithville Master Community Plan Integrated Municipal Class Environmental Assessment Master Plan Report, Township of West Lincoln, 2023
- Niagara Escarpment Plan, 2017
- Available watershed and sub-watershed study reports
- Niagara Region Stormwater Management Guidelines, 2022
- Niagara Peninsula Conservation Authority, Stormwater Management Guidelines, 2010
- Niagara Peninsula Source Protection Plan
- Source Protection Information Atlas
- MTO's 2008 Highway Drainage Design Standards
- Erosion and Sediment Control Guide for Urban Construction, 2019
- MECP Stormwater Management Planning and Design Guidelines, 2003
- Evaluation, Classification and Management of Headwater Drainage Features Guidelines (Revised July 2013), TRCA
- Low Impact Development Stormwater Management Planning and Design Guide, 2010
- Design Guidelines and standards of local municipalities
- Aerial photographs and base maps

In addition, documentation prepared during the Niagara Escarpment Crossing EA from the other proposed work plans (e.g., Groundwater, Natural Heritage, etc.) will also be considered, as appropriate, along with the preceding existing information sources.

2.3 Proposed Field Investigations

Field investigations are proposed to supplement and enhance available existing sources of information so that additional data is generated to assess each alternative (i.e., identifying potential environmental effects, developing appropriate impact management measures for addressing potential adverse environmental effects, and describing net effects). The need for field investigations will be based on the level of detail associated with the existing information sources collected and reviewed, accessibility of the final study area, and comments received from review agencies, Indigenous communities, and the public.

The need for an increased level of detail and collection of field data is expected as the Niagara Escarpment Crossing EA progresses. While the assessment of alternative(s) to the project can be completed based on existing source data, the assessment of alternative methods of carrying out the project will be based on more site specific information generated through subsequent work (e.g., field investigations, modelling, etc.).

The following geomorphic field investigations are currently proposed as part of the Surface Water Work Plan:

- Channel morphology and bankfull channel sections.
- Characterization of bed and bank materials, vegetation, and riparian cover.
- Erosion identification on channel and channel bank which will help to determine appropriate erosion protection measures.
- Rapid geomorphic assessment and reach identification.
- Photographic inventory of the site.

Documentation

The results of reviewing available existing information sources and the proposed field investigations will be documented in a Surface Water Baseline Conditions Report.

3 Assessment of the Alternatives

3.1 Alternatives To the Project

Following confirmation of the preliminary list of alternatives to the project, they will be assessed and comparatively evaluated leading to a recommended alternative(s) to the project. The recommended alternative(s) will be presented to review agencies, Indigenous Communities, and the public for a defined period to receive comments, following which a preferred alternative(s) will be identified. The assessment of the alternatives to the project (through the application of evaluation criteria) will be based on available existing information sources contained in the Baseline Conditions Reports.

3.1.1 Preliminary Criteria and Indicators

The preliminary evaluation criteria and indicators that will be used for assessing the alternatives to the project from a surface water perspective include, but may not be limited to, those set out in **Table 3-1**. The preliminary evaluation criteria and indicators will be finalized based on comments received during the Niagara Escarpment Crossing EA and documented in the EA Report.

Table 3-1: Preliminary Criteria and Indicators for Assessing the Alternatives To the Project

Category	Criterion	Indicator
Natural Environment	➤ Effect on surface water drainage patterns and features	➤ Changes to surface water drainage patterns and features
Natural Environment	➤ Effect on surface water quantity and quality	➤ Changes to surface water quantity and quality

3.2 Alternative Methods of Carrying Out the Project

Following the identification of the preferred alternative(s) to the project, alternative methods of carrying out the project will be generated, possibly screened, assessed, and comparatively evaluated leading to a recommended method(s). The recommended method(s) will be presented to review agencies, Indigenous communities, and the public

for a defined period to receive comments, following which a preferred method(s) will be identified.

The generation and possible screening of the alternative methods will be based on available existing information sources contained in the Baseline Conditions Reports. The assessment of the alternative methods of carrying out the project (through the application of evaluation criteria) will be based more on the information provided through subsequent work (e.g., field investigations, modelling, etc.) contained in the Baseline Conditions Reports, as appropriate.

3.2.1 Preliminary Criteria and Indicators

The preliminary evaluation criteria and indicators that will be used for assessing the alternative methods of carrying out the project from a surface water perspective include, but may not be limited to, those set out in **Table 3-2**. The preliminary evaluation criteria and indicators will be finalized based on comments received during the Niagara Escarpment Crossing EA and documented in the EA Report.

Table 3-2: Preliminary Criteria and Indicators for Assessing the Alternative Methods of Carrying Out the Project

Category	Criterion	Indicator
Natural Environment	➤ Effect on watershed/subwatershed drainage patterns and features	➤ Change to watershed/subwatershed drainage patterns ➤ Encroachment, severance, displacement, long-term alteration / disruption, as applicable, to the following: <ul style="list-style-type: none"> ▪ Watercourse crossings (permanent, intermittent, and ephemeral) ▪ Flood plain ▪ Riparian areas ▪ Headwater areas
Natural Environment	➤ Effect on surface water	➤ Temporary and/or long-term change in surface water

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Category	Criterion	Indicator
		quantity due to increased impervious surfaces
Natural Environment	➤ Effect on surface water	➤ Temporary and/or long-term change in surface water quality through direct and indirect discharges of contaminated and sediment-laden runoff
Natural Environment	➤ Effect on stream geomorphology	➤ Temporary and/or long term change in geomorphic form/function/stability in affected channels

4 Impact Assessment of the Proposed Project

Once selected, the preferred method(s) of carrying out the project (i.e., proposed project) will be further developed at a preliminary design level of detail so that the potential environmental effects can be identified with more certainty, more site specific impact management measures (i.e., avoidance, mitigation, and compensation measures) can be developed for application, net environmental effects can be identified with more certainty, appropriate monitoring requirements can be clearly defined, and specific approval/permitting requirements for constructing the proposed project can be identified.

In concert with preparing the preliminary design level of detail, it may be necessary to undertake additional work (e.g., field investigations, modelling, etc.) at the impact assessment stage of the Niagara Escarpment Crossing EA. The additional work proposed as part of the Surface Water Work Plan could include the following subject to the preparation of an EA:

- Inspection of potential watercourse crossing locations as well as any existing watercourse crossings, as appropriate, to review drainage conditions.
- Inspection of potential erosion sites.
- Confirmation of the drainage divide lines and overland flow routes.
- Photographic inventory covering specific points of interest.
- Preparation of a Drainage and Stormwater Management (SWM) Strategy based on applicable guidelines to focus on post-development (proposed conditions) stormwater management as follows to assess potential impacts and develop appropriate impact management measures for surface water:
 - Existing Conditions:
 - Identify existing drainage patterns and flow routes following Niagara Peninsula Conservation Authority (NPCA) and Niagara Region's SWM Guidelines.
 - Identify watercourse crossings associated with the proposed project, analyze their hydrology at the crossing location, and assess existing condition hydraulics.
 - Coordinate with NPCA, if a Headwater Drainage Feature (HDF) assessment is required as part of the impact assessment of the proposed project. Headwaters are non-permanently flowing drainage features that may not have defined bed or banks. They usually are first-order and zero-order intermittent and ephemeral channels and swales. If required, then conduct HDF assessment according to

TRCA's Evaluation, Classification and Management of Headwater
Drainage Features Guidelines, 2013.

- Evaluate the potential impact of climate change on existing watercourse crossing structures and channels according to Niagara Region SWM Guidelines.

➤ Fluvial Geomorphology:

- Identify and assess through a fluvial geomorphological assessment all erosion hazard impacts associated with a watercourse's migration, downcutting and meander belt.

➤ Proposed Conditions:

- Prepare proposed conditions drainage plan based on the proposed project and determine hydrological impact to the receiving watercourses.
- Determine impact to the hydrological functions of any wetland or watercourse due to the proposed project.
- Consult with local municipalities and NPCA regarding specific requirements for each area of work.
- Demonstrate quality, quantity, and erosion control in the SWM Strategy to meet the requirements of MECP, NPCA and Niagara Region SWM Guidelines. Include low impact development (LID) measures and source control approach as a part of the SWM Strategy.
- Conduct hydraulic analysis of any watercourse crossing and determine crossing size to comply with the applicable design standards.
- Evaluate the impact to floodplain due to any proposed watercourse crossing structures and satisfy NPCA's flood plain requirements as necessary.
- Ensure that the habitat connectivity, fish passage and wildlife movement are incorporated in the watercourse crossing design, as required.
- Consult local municipalities for their requirements, if there would be a storm outlet to local municipal infrastructure and if there is any existing drainage issue within the study limit.
- Identify and assess all potential erosion hazard impacts associated with valley slopes of the Niagara Escarpment.
- Incorporate the impact of climate change in the design in co-ordination with the NPCA.

Documentation

The results of the impact assessment including any additional work will be documented in a Surface Water Impact Assessment Report.

5 Documentation

The results of implementing this work plan will be documented in two reports during the Niagara Escarpment Crossing EA:

- **Surface Water Baseline Conditions Report** – will document the results of collecting and reviewing available existing sources of information and the proposed field investigations.
- **Surface Water Impact Assessment Report** – will document the results of the impact assessment of the proposed project including any additional work such as preparing a SWM Strategy.

Upon completion, each report will be made available during the Niagara Escarpment Crossing EA to review agencies, Indigenous Communities, and the public for their information via the project website and upon request and will become either a reference or supporting document to the submitted EA Report. The EA Report will be based on and reflect the information contained in the two reports.