Waterdown to Finch Project

Environmental Report

February 2019

ERM Project No. 0460600-0005-0003

EM Doc. No. ONT-WF-SPPL-UP-RR-0006

UPI Doc. No. 24255-598-3RT-10001

The business of sustainability

ERM

February 2019

Waterdown to Finch Project

Environmental Report

ERM Toronto
120 Adelaide Street West
Suite 2010
Toronto, Ontario
M5H 1T1

EXECUTIVE SUMMARY

Operating safely for many decades, Imperial Oil Limited's (Imperial) Sarnia Products Pipeline (SPPL) is important infrastructure that provides refined products used by households and businesses across the Greater Toronto and Hamilton Area. To support continued safe, reliable, and environmentally responsible transportation of the products, Imperial is planning to construct and operate a new pipeline that will replace the transportation capabilities of the existing SPPL. The Waterdown to Finch Project (the Project) is the proposed installation of approximately 63-kilometres of pipeline between the company's pump station in rural Hamilton (Waterdown Station) and its terminal storage facility in Toronto's North York area (Finch Terminal).

The Ontario Energy Board's (OEB) *Environmental Guidelines for the Location, Construction, and Operation of Hydrocarbon Pipelines and Facilities in Ontario*, 7th Edition (2016) provides guidance to proponents who plan to develop oil and gas pipelines in Ontario. The Environmental Report is a component of the Leave to Construct application to the OEB. This Environmental Report has been prepared to satisfy the OEB's Environmental Guidelines and fulfill regulatory requirements related to the proposed Project.

In planning the Project, input was received from a broad range of stakeholders, including government agencies, landowners, public, and Indigenous communities with a potential interest in the Project. Imperial initiated, and will continue to consult with applicable federal, provincial and municipal agencies, and Conservation Authorities, including those on the Ontario Pipeline Coordinating Committee. Imperial also met with and continues to meet with key agency technical staff to understand their interest in the Project and address specific regulatory and policy requirements. Imperial has engaged, and continues to consult with Indigenous communities with an interest in the Project.

Imperial's consultation program included two series of Community Information Sessions held in July and November 2018, which presented the public with opportunities to provide feedback and engage in-person with subject matter experts about the Project. To support all consultation Imperial made information readily available through a Project page on Imperial's website, as well as dedicated and actively monitored email and phone contact options.

The potential effects of the Project on existing physical, bio-physical, and socio-economic features are assessed in this report along with proposed key mitigation measures to minimize potential effects. Considering the implementation of the mitigation measures, as well as adherence to all permitting, regulatory and legislative requirements, potential adverse environmental effects will largely be avoided. Where avoidance is not feasible, it is expected that the mitigation will minimize the effects such that they will not be significant. Environmental monitoring and regular inspection during operations will be used to confirm that mitigation measures are implemented and effective.

Consideration has also been given to the potential cumulative effects of the Project in combination with other projects and/or existing infrastructure. Because the route follows existing easements and infrastructure corridors through areas previously altered by agriculture or urban/suburban development, the cumulative effects are considered to be not significant.

ACKNOWLEDGEMENTS

ERM Consultants Canada Ltd. (ERM) were retained by UPI Projects Canada (UPI) on behalf of Imperial to prepare this Environmental Report. In addition to UPI and Imperial, the physical, environmental and socio-economic studies, assessment and reporting were supported by Savanta Inc., Past Recovery Archaeological Services Inc., Unterman McPhail Associates, CanACRE Ltd., NATIONAL Public Relations, and Stantec Consulting Ltd.

CONTENTS

List of Tables

List of Figures

ACRONYMS AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

ARA	Aquatic resource area
BHR	Built heritage resource
BC MOF	British Columbia Ministry of Forestry
BC MWLAP	British Columbia Ministry of Water, Land and Air Protection
CA	Conservation Authority
CH	Conservation Halton
CHER	Cultural heritage evaluation report
CHVI	Cultural heritage value or interest
CHL	Cultural heritage landscapes
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
CRA	commercial, recreational, or Aboriginal
CUP	Cultural plantations
CUW	Cultural woodland
CVC	Credit Valley Conservation Authority
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
ELC	Ecological land classification
ER	Environmental Report
ERM	ERM Consultants Canada Ltd.
ESA	*Endangered Species Act*
FO	Forest
HBC	Heritage Bridge Committee
HCA	Hamilton Conservation Authority
HCCC/HDI	Six Nations Haudenosaunee Confederacy Chiefs Council/Haudenosaunee Development Institute
HDB	Horizontal directional boring

HDD	Horizontal directional drilling
HONI	Hydro One Networks Inc.
HWN	Huron-Wendat Nation
IO	Infrastructure Ontario
km	kilometre
KP	Kilometre post
LiDAR	Light detection and ranging
LIO	Land Information Ontario
LSA	Local study area
LTC	Leave to Construct
m	metre
mBGS	metres below ground surface
MMA	Ministry of Municipal Affairs
MECP	Ministry of Environment, Conservation and Parks
MENDM	Ministry of Energy, Northern Development and Mines
MCFN	Mississaugas of the Credit First Nation
MNRF	Ministry of Natural Resources and Forestry
MNO	Métis Nation of Ontario
MOI	Ministry of Infrastructure
MTCS	Ministry of Tourism, Culture, and Sports
MTO	Ministry of Transportation
NEC	Niagara Escarpment Commission
OEB	Ontario Energy Board
OMAFRA	Ministry of Agriculture, Food and Rural Affairs
OHA	*Ontario Heritage Act*. R.S.O. 1990 c. N.2.
OGS	Ontario Geological Survey
OPCC	Ontario Pipeline Coordinating Committee
OSAP	Ontario stream assessment protocol
OWES	Ontario wetland evaluation system

PGA	Peak ground acceleration
PSW	Provincially significant wetlands
RAP	Ontario restricted activity timing windows for the protection of fish and fish habitat
ROW	Right(s)-of-way
RSA	Regional study area
SAR	Species at risk
SARA	*Species at Risk Act*
SARO	Species at risk in Ontario
SN	Six Nations of the Grand River
SPPL	Sarnia products pipeline
SW	Swamp
SWA	Significant wildlife habitat
TC	Transport Canada
TRCA	Toronto and Region Conservation Authority
TSSA	Technical Standards and Safety Authority
TWS	Temporary work space
UPI	Universal Pegasus International
VIU	Vancouver Island University

1. INTRODUCTION

Operating safely for many decades, Imperial Oil Limited's (Imperial) Sarnia Products Pipeline (SPPL) is important infrastructure that provides refined products used by households and businesses across the Greater Toronto and Hamilton Area. To support continued safe, reliable, and environmentally responsible transportation of products, Imperial is planning to construct and operate a new pipeline that will replace the transportation capabilities of the existing SPPL.

The Waterdown to Finch Project (the Project) is the proposed installation of approximately 63-kilometres of pipeline between the company's pump station in rural Hamilton (Waterdown Station) and its terminal storage facility in Toronto's North York area (Finch Terminal). To accommodate reliable supply of products throughout this process, the Project involves the construction of the new pipeline while the existing pipeline continues to operate. Once the new pipeline is successfully installed, the existing line will be safely deactivated and the new pipeline will operate in its place.

This Environmental Report (ER) was prepared to fulfill regulatory requirements related to the proposed Project.

1.1 Purpose and Organization

The Ontario Energy Board's (OEB) *Environmental Guidelines for the Location, Construction, and Operation of Hydrocarbon Pipelines and Facilities in Ontario*, 7th Edition (2016) (Environmental Guidelines) provides guidance to proponents who plan to develop oil and gas pipelines in Ontario. The ER is a component of the Leave to Construct (LTC) application to the OEB and has been prepared to satisfy the OEB's Environmental Guidelines.

This ER comprises the following eight sections:

1. Introduction: provides an overview of the ER, including primary objectives and regulatory framework.
2. Purpose and Description of the Project: provides an overview of the Project.
3. Consultation: describes the consultation program completed to date, including objectives, identification of parties, communication methods, a summary of events, and how input received from stakeholders was responded to and incorporated into project planning.
4. Environmental and Socio-economic Existing Conditions: provides an overview of the data sources and methods used to prepare the ER and describes the existing physical, environmental, socio-economic, archaeological, and cultural heritage conditions.
5. Effects Assessment and Mitigation: provides an assessment of potential environmental effects, proposed mitigation, and describes net effects.
6. Cumulative Effects Assessment: provides an assessment of potential cumulative effects the Project may have in combination with other projects and/or existing infrastructure.
7. Environmental Management, Monitoring, and Contingency Measures: describes proposed management and monitoring commitments to address potential environmental effects.
8. Summary and Conclusions: provides a discussion on key findings and conclusion of the ER.

1.2 Objectives of this Environmental Report

In alignment with the OEB's Environmental Guidelines, the primary objective of this ER is to describe the actions taken to date to confirm the location, or route, for the pipeline and the related construction methods and activities, considering the physical, environmental, socio-economic, archaeological, and cultural heritage (hereafter called the environmental and socio-economic) conditions.

To meet these objectives, this ER:

- confirms the pipeline route and related construction methods and activities that will be subject to the LTC application;
- describes the consultation plan that was implemented for the Project to consult the public, government agencies, landowners, Indigenous communities, and other stakeholders; the results of the consultation to date; and the responses that were or will be taken as a result of the consultation;
- defines the local study areas (LSAs) and regional study areas (RSAs) for consideration of the environmental and socio-economic conditions;
- describes the existing environmental and socio-economic conditions and identify the important or sensitive features, or constraints, within the study areas;
- describes the Project's interaction with the environmental and socio-economic constraints, and identify those interactions that are anticipated to result in an adverse effect or adverse cumulative effect;
- describes the mitigation and monitoring that will be implemented to avoid or minimize the Project's adverse environmental or socio-economic effects; and
- identifies any relevant supplemental environmental and socio-economic studies that may be necessary for decision-making in support of the LTC application for the Project.

1.3 Regulatory Requirements and Approvals

1.3.1 Ontario Energy Board

The OEB is an independent, quasi-judicial tribunal that is regulated by the *Ontario Energy Board Act*, S.O.1998 c.15 Sch. B, (the Act). The primary objective of the OEB is to ensure the public interest is served and protected. Any individual or organization planning to construct certain hydrocarbon transmission facilities within Ontario must apply to the OEB for an LTC prior to construction, pursuant to section 90 (1) of the Act. The Project will require an LTC because the pipeline length is greater than 20-km, has a nominal pipe diameter of 12 inches or greater, and additional land is required. The OEB's approval for construction of pipelines is conditioned upon compliance with applicable regulatory requirements including design, operation, maintenance, safety, and integrity.

This ER is a component of the LTC application for the Project. This ER follows the OEB's Environmental Guidelines, which aim to provide direction on how to identify, document, and manage environmental and socio-economic effects. This ER is provided to the Ontario Pipeline Coordinating Committee (OPCC) for review and comment. The OPCC is an inter-ministerial committee chaired by the OEB and comprises provincial government ministries, authorities, and boards with potential interest in the construction or operation of hydrocarbon transmission facilities in Ontario. This ER is also provided to interested city, municipal, and stakeholder groups, and to Indigenous communities for review and comment.

1.3.2 Other Regulatory Agencies

In addition to the LTC, Imperial will obtain a number of additional permits or approvals from federal, provincial, or municipal agencies to construct and operate the Project. The environmental reviews, consultation, permits or approvals potentially anticipated prior to construction are listed in Table 1.3-1.

Table 1.3-1: Potential Environmental Permits or Approvals from Other Regulatory Agencies

Jurisdiction	Agency	Permit or Approval[1]
Federal	Fisheries and Oceans Canada (DFO)	Review/Authorization under the *Fisheries Act*
	Transport Canada (TC)	Screening under the *Navigation Protection Act* Section 9(1)
Provincial	Infrastructure Ontario (IO)	Approval under the *Ministry of Infrastructure Public Works Class Environmental Assessment*
	Ministry of the Environment, Conservation and Parks (MECP)	Water Taking Permit(s) under the *Ontario Water Resources Act*
	Ministry of Natural Resources and Forestry (MNRF)	Species at Risk Overall Benefit Permit under the *Endangered Species Act*, or registration/exemption
	Ministry of Tourism, Culture and Sport (MTCS)	Archaeological Clearance under the *Ontario Heritage Act*
Regional/Municipal	Credit Valley Conservation Authority (CVC)	Development Permit under *Ontario Regulation 166/06* (Development, Interference with Wetlands and Alterations to Shorelines and Watercourses)
	Conservation Halton (CH)	
	Hamilton Conservation Authority (HCA)	
	Toronto and Region Conservation Authority (TRCA)	
	Niagara Escarpment Commission (NEC)	Development Permit under *Niagara Escarpment Planning and Development Act* (Section 24)
	Various Cities/Municipalities	Review or Approval of a Heritage Impact Assessment
	Various Cities/Municipalities	Tree Removal Permit

[1] *This list is preliminary and subject to change.*

2. PURPOSE AND DESCRIPTION OF THE PROJECT

2.1 Project Purpose

Imperial's SPPL is important infrastructure that provides petroleum products used by households and businesses across the Greater Toronto and Hamilton Area. Products include a significant portion of jet fuel for Toronto Pearson International Airport, as well as gasoline and diesel fuel that keep people, goods and services moving throughout the region. To support continued safe, reliable, and environmentally responsible transportation of products, Imperial is planning to construct and operate approximately 63-kilometres of pipeline between the company's Waterdown Station and Finch Terminal to replace the transportation capabilities of the existing SPPL.

2.2 Project Description

The proposed Project involves construction of approximately 63 km of a new 12-inch diameter pipeline and associated infrastructure between Imperial's Waterdown Station and Finch Terminal (Figure 2.2-1).

The new pipeline will be constructed following the existing SPPL as closely as possible, in consideration of environmental and social constraints, and other infrastructure and land uses in the area. The existing pipeline is located within an Imperial right-of-way (ROW) for approximately 18.8 km, and within a ROW managed by HydroOne Networks Inc. (HONI) for approximately 43.7 km. New easements will be required on a limited number of private lands and Imperial will be working directly with the affected landowners to obtain these agreements. New easements will also be required within the HONI ROW, and Imperial is working with HONI and Infrastructure Ontario to secure the necessary agreements. Pipelines owned by other operators inside the ROW will continue to operate without disruption.

Infrastructure associated with the new pipeline will include new valves and launchers/receivers (infrastructure necessary to launch and receive pipeline inspection tools; Table 2.2-1). Valve mechanism and placement will be in compliance with TSSA requirements and Canadian Standards Association (CSA) Z662. A cathodic protection system consisting of rectifier and anode beds will be installed to protect the pipeline from corrosion. Alternating current mitigation will be accomplished by installing zinc ribbon with the pipeline to prevent corrosion.

Table 2.2-1: Associated Project Infrastructure

Valve Site	Descriptor	Kilometer Post (KP)[1]	Operator Type
1	Walker's Line	11.0	Motor
2	Henderson	17.2	Manual
3	Mississauga	32.4	Motor
4	Rathkeale	34.4	Manual
5	Tomken	40.4	Motor
6	Eglington	46.6	Motor
7	Benway	52.7	Motor

[1] *Location is subject to optimization.*

Once the new pipeline is operating, the existing line will be safely deactivated and the new pipeline will operate in its place.

Other projects initiated by Imperial in the vicinity of the Project, but are not part of the Project nor the scope of this ER, and are addressed through separate regulatory processes:

- Deactivation of the existing SPPL;
- The Credit River Valley Project (pipeline crossing of the Credit River); and
- Realignment of the existing SPPL to accommodate the Metrolinx Finch West LRT Project.

2.3 Project Construction Methods

The new pipeline will be constructed using the following general methods:

- Trenched; and
- Trenchless, using drilling or boring.

Trenched construction will be used for approximately 41 km of the Project. Trenched construction activities and sequence will be as follows (also see Figure 2.3-1):

1. *Survey*: The construction site is prepared in advance with survey, signage, lighting, fences, and traffic management where needed to protect public safety. Targeted pre-construction environmental surveys may also be conducted.
2. *Clearing:* Vegetation in the ROW and workspace will be cleared to permit safe construction activities. Vegetation will be managed in accordance with landowner requirements if applicable, or in the case of trees, according to municipal tree removal permit conditions.
3. *Topsoil Clearing:* Construction equipment, including bulldozers and graders, will arrive at the site. Topsoil will be separated from subsoil where appropriate and stockpiled to one side of the workspace for restoration.
4. *Trenching:* A trench will be excavated to an appropriate width and depth.
5. *Stringing, Bending, Welding, and Coating:* Segments of pipe are delivered to site, welded together, coated, and inspected.
6. *Lowering and Backfilling:* The pipe is lowered into the trench and the trench is backfilled using the excavated soil, and topsoil is replaced over the workspace and re-contoured to approximate pre-existing conditions.
7. *Hydrostatic Testing, Tie-in, and Commissioning:* The pipeline interior is cleaned using specialized equipment to remove dirt or debris. The capacity for the pipeline to withstand operational pressures is then tested using water, then dried and purged. The constructed pipeline will be connected to existing facilities at Waterdown Station, Finch Terminal and valve sites; the pipeline is commissioned and begins operations.
8. *Clean-up and Reclamation:* The ROW and temporary work space (TWS) are reclaimed or restored to natural or pre-construction contours, and the native topsoil is replaced. In natural areas, restoration includes re-seeding the disturbed areas. In developed areas, restoration involves leaving the site in a condition suitable to resume agricultural activity or urban landscaping.

Figure 2.2-1
Waterdown to Finch Project Overview

ERM

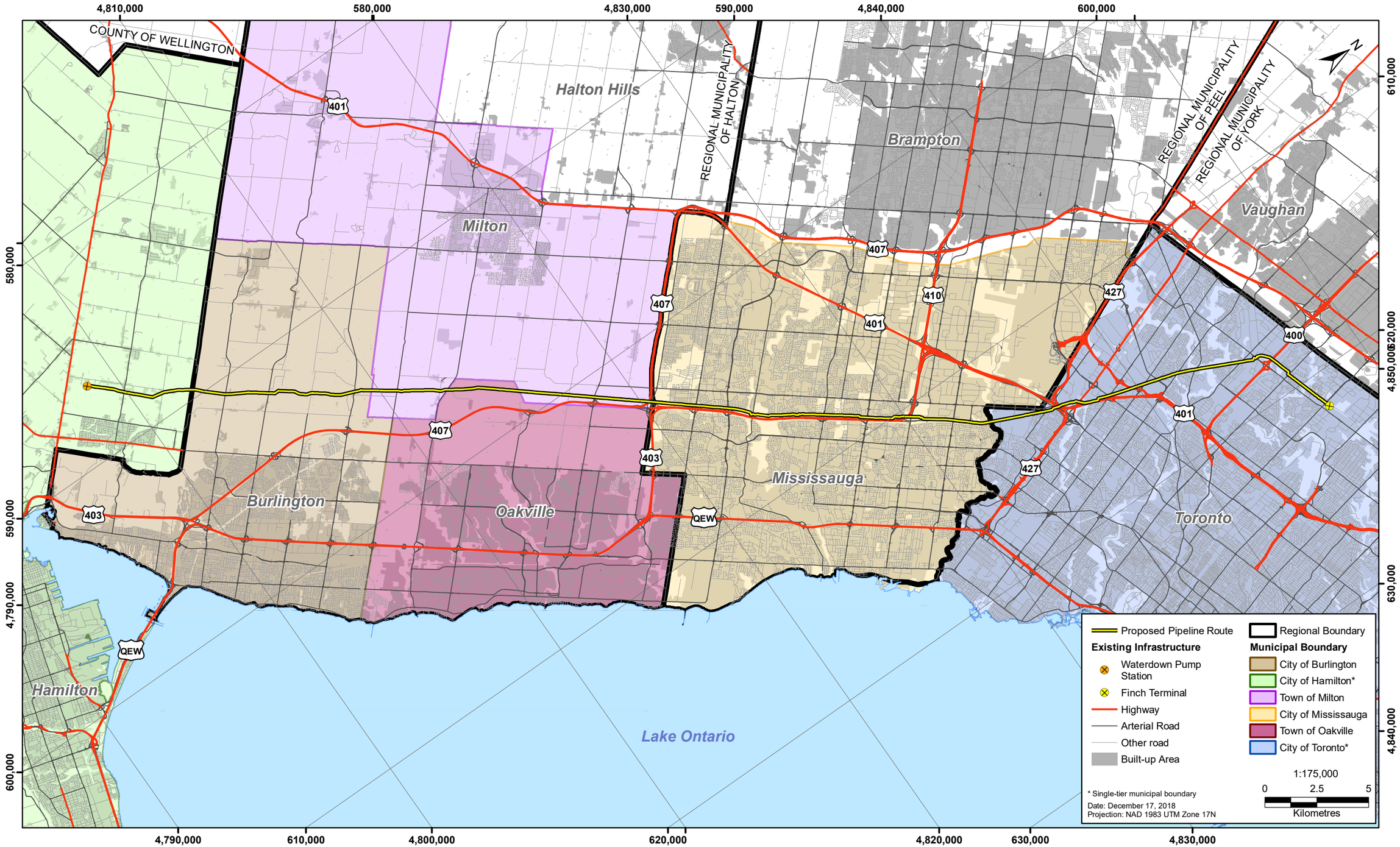
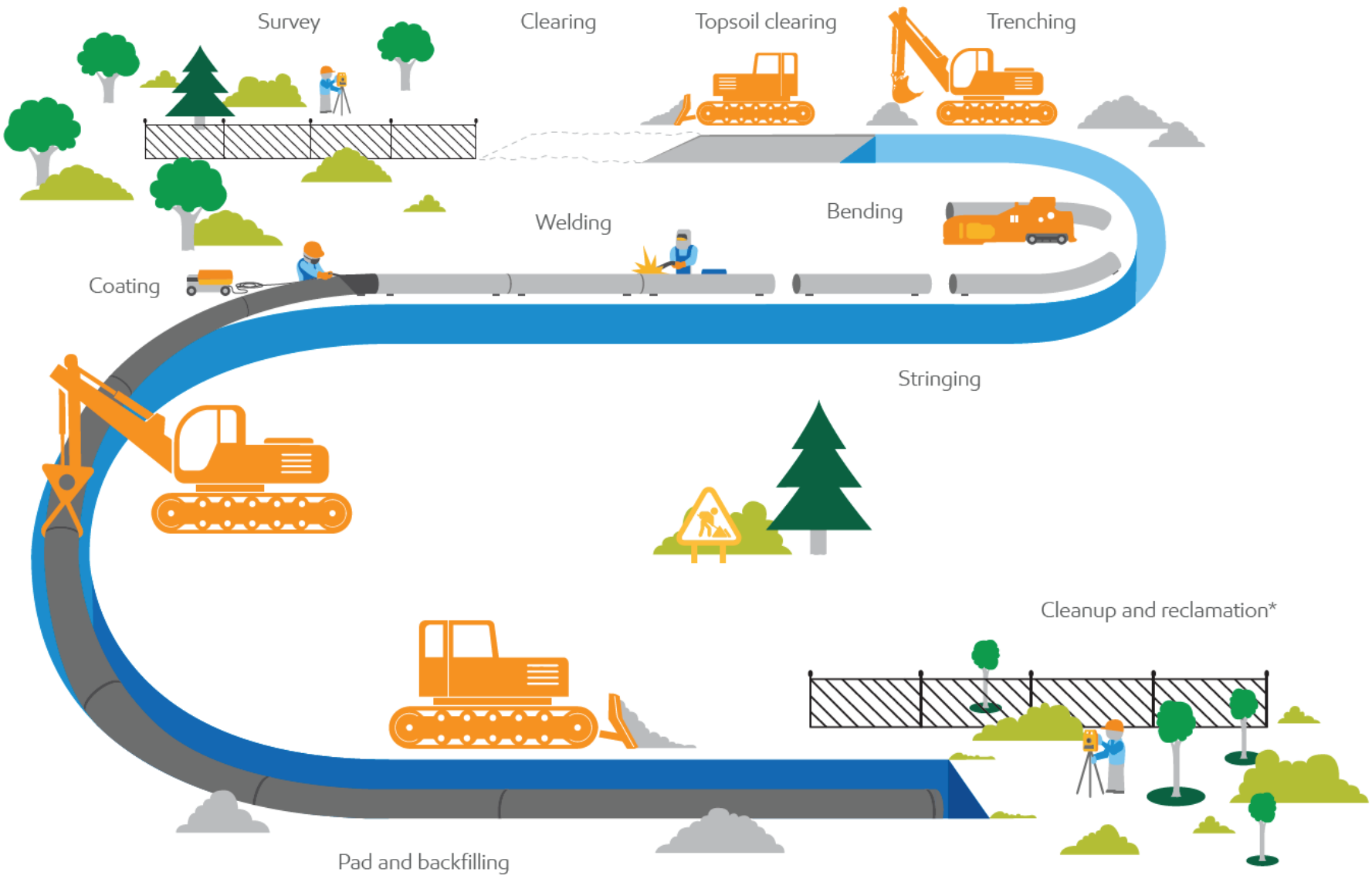


Figure 2.3-1
Typical Trench Pipeline Construction Sequence



Trenchless construction will be used for approximately 22 km of the Project to minimize disturbance to environmentally or socially sensitive features and other infrastructure and land uses.
Trenchless construction requires an entry and exit site on either side of the feature or infrastructure to be crossed, from which equipment will install the pipeline under the feature without surface disturbance (see Figure 2.3-2 and Appendix A). The two trenchless methods that will be used are:

- Bore drilling, including Horizontal Directional Bore (HDB), which involves installing pipe using specialized auger drilling equipment, typically used for short segments of trenchless construction, such as beneath single crossings of provincial and municipal roads and railroads. For this type of installation, excavations are required at the entry and exit points. These excavations are required to setup the boring machine and install the pipeline.
- Horizontal directional drill (HDD), which involves installing pipe using a drilling rig to drill a tunnel below the surface to pull the pipeline through. HDD will typically be used for longer segments of trenchless construction, such as beneath large watercourses, or multiple adjacent sensitive features.

For typical construction drawings depicting trench and trenchless methods, see Appendix A.

The various construction equipment to be used and the estimated maximum noise levels for each method are presented in Table 2.3-1.

2.4 Project Land Use

Imperial will require various uses of land to construct and operate the Project. Generally, land tenure associated with pipeline construction and operation is acquired through an easement or a lease. Easement tenures can either be permanent or temporary and will vary depending on specific Project needs.

Permanent easement is required for long term use and entry to the property, primarily during pipeline operation but may also be used during construction. Between Kilometer Post (KP) 0 (Waterdown Station) and KP 18.8, minimal new permanent easement will be required as the pipeline will largely be within Imperial's existing SPPL easement. Between KP 18.8 and KP 62.5, within the HONI corridor, new permanent easement will be required. Additionally, new easements will be required on a limited number of private lands and Imperial will be working directly with the affected landowners to obtain these agreements.

A lease is required for TWS and extra-temporary workspace (ETWS) during construction. TWS is generally adjacent to or straddles the permanent easement and is used to store material, string and weld segments of pipe, and as a workspace and travel space for construction equipment.

ETWS are required for access roads to the easement and laydown areas for material and/or equipment storage during construction. ETWS planning is currently underway and will include consultation with landowners and regulatory permitting authorities. Existing roads will primarily be used as access roads, and some upgrades to existing roads may be required (e.g., road widening). Laydown areas will be sited within existing disturbed lands to the extent possible to avoid effects on sensitive features such as watercourses, wetlands and species at risk habitat. Where avoidance is not possible, additional mitigation measures will be implemented to minimize effects to the sensitive features.

2.5 Project Schedule

Project construction is planned to occur from December 2019 to November 2020. Construction is anticipated to take eight (8) to ten (10) months and commissioning approximately one (1) month.
The construction and commissioning schedule is shown in Figure 2.5-1. Once operational, the pipeline is expected to operate for more than 50 years.

Figure 2.3-2
Typical Trenchless Pipeline Construction

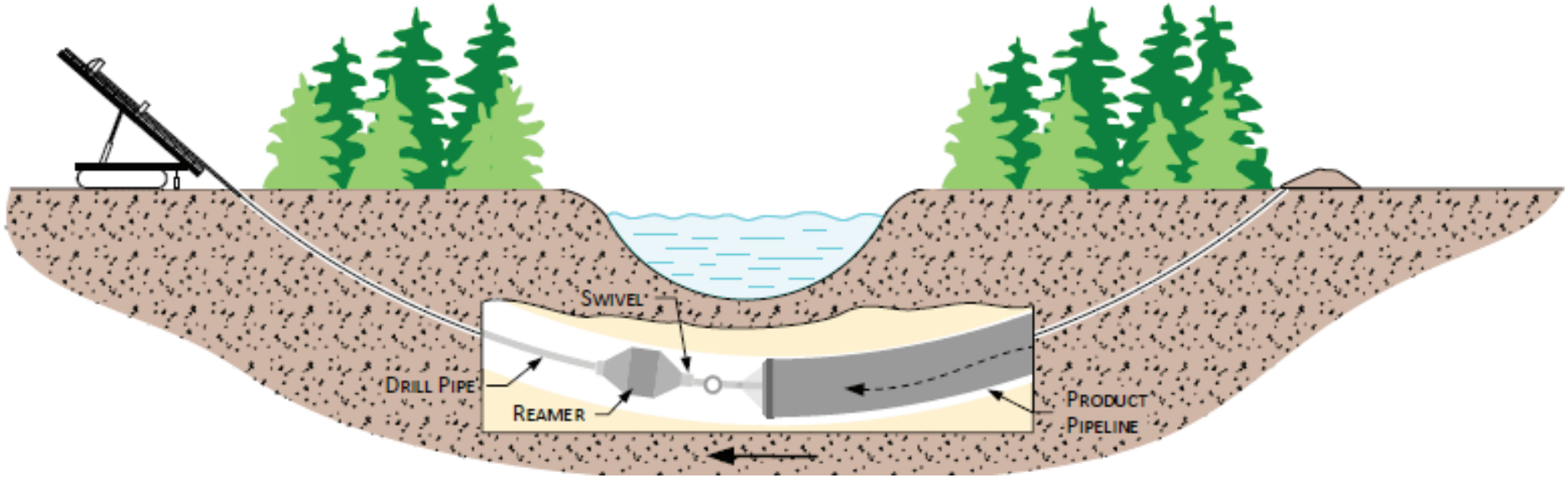


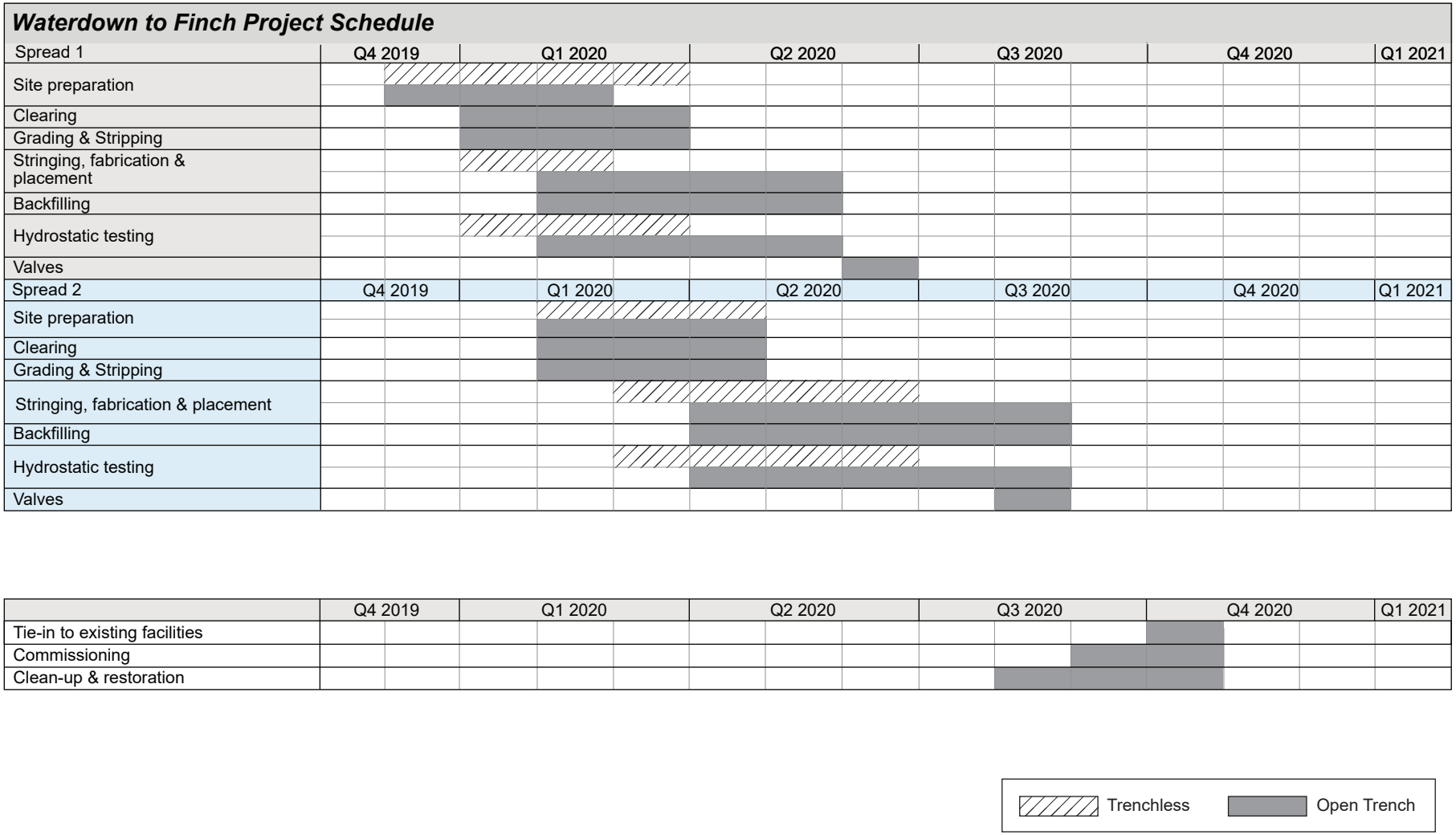
Table 2.3-1: Construction Equipment and Estimated Maximum Noise Levels

Equipment	Noise Level (dBA)	Distance (m)[1]
20T backhoe	71	10
25T backhoe	77	10
30T backhoe	80	10
Angle grinder	80	10
Auger (including screws and rails)	74	10
CAT D5	78	10
CAT D6	81	10
CAT D8	86	10
Compactor (ground)	80	16
Compressor (air)	80	16
Concrete mixer truck	85	16
Concrete pour	75	10
Concrete pump truck	82	16
Crane	85	16
Diesel generator	76	10
Directional drill	77	10
Dumpers	77	10
Excavator (hydraulic)	85	16
Generator (general purpose utility)	82	16
Grader	85	16
Seeder	79	10
Jackhammer	85	16
Mixing tank	76	10
Mounting supports for mounting drill	87	10
Paver (asphalt)	85	16
Pickup truck	55	16
Pile driver (impact)	95	16
Piling rig	90	10
Pneumatic tool	85	16
Power harrow	79	10
Pump (dewatering)	77	16
Rock drill	85	16
Scraper	85	16
Sideboom	80	10
Stone carts	79	10
Subsoilers	79	10
Tele-handler	71	10
Tractor and trailer	79	10
Vibrating roller (Ramax)	75	10
Welding rigs	80	10

Source: Environmental Statement Document 6.13.1, Noise and Vibration, The Yorkshire and Humber CCS Cross Country Pipeline, National Grid, June 2014.

[1] *Distance at which the noise level applies.*

Figure 2.5-1
Project Construction Schedule



2.6 Evaluation of Alternative Routes

The following general criteria were used in selecting the proposed pipeline route and construction methods:

- The existing Imperial easement will be followed as close as possible to minimize the disruption of current land uses.
- Existing Imperial valve surface locations will be used wherever possible to minimize the footprint of above-grade facilities.
- The new pipeline will tie into additional new SPPL installations, such as Credit River Crossing and the Finch Avenue realignment.

The route evaluation and decision were supported by desktop studies, validated existing survey information, various physical, environmental, and socio-economic field surveys, consultation with regulators and other stakeholders, and constructability reviews.

Because the Project will be sited within an existing Imperial easement from KP 0 to KP 18.8, an alternative route was considered only within the urban area from KP 18.8 to KP 62.5 (Figure 2.6-1). This alternative route underwent review, but was deemed not feasible because, in comparison to the proposed Project route, the alternative route:

- is over 14 km longer;
- crosses nearly two times as many watercourses;
- crosses three times as many wetlands;
- crosses an additional urban river park;
- crosses five more railroads;
- passes within 100 m of twice as many groundwater supply wells;
- has 450 percent more wildlife species of conservation concern records within 1 km;
- crosses two additional conservation areas;
- requires 10 more HDDs and nine more bores; and
- crosses an area deemed not feasible to construct (through York University on Keele Street).

It was determined that the proposed pipeline route is the only reasonable option, particularly within the urban landscape, because it benefits from following the existing utility corridors.

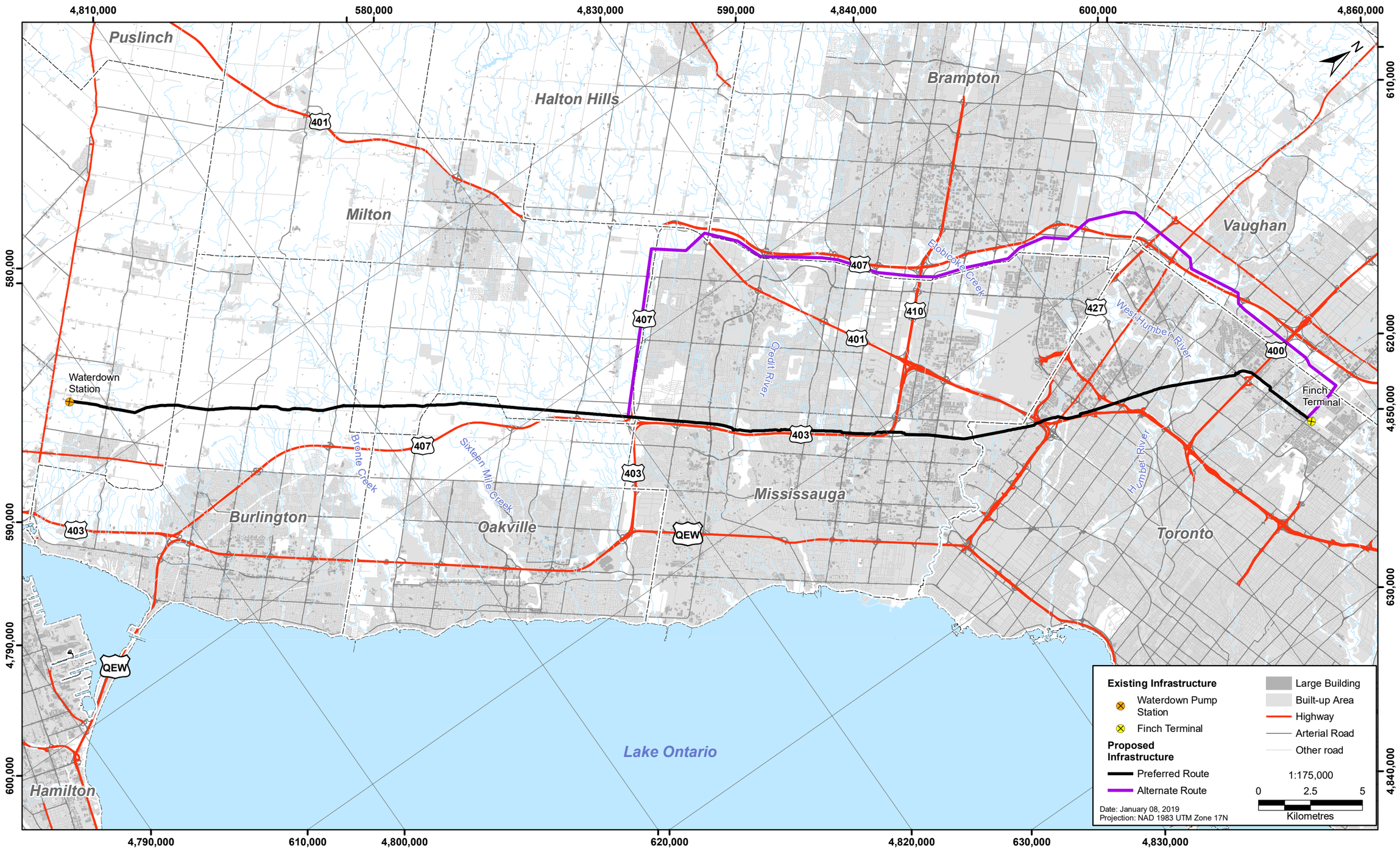
2.7 Pipeline Route Description

The proposed pipeline route, which is assessed as the Project in this ER, is described in Table 2.7-1.

Small adjustments to the route have been and will continue to be made based on the results of continued environmental and socio-economic studies, consultation, and design. For example, the following key inputs from Project consultation (see Section 3) were considered in pipeline routing and construction methods:

- Consultation with the MNRF identified the need to schedule construction outside of sensitive timing windows for species at risk (SAR), limit disturbance within regulated habitat and, in some cases, use trenchless construction.
- The identification of Provincially Significant Wetlands (PSW) changed the planned construction method from trenched to trenchless in areas with these features.

Figure 2.6-1
Alternative Pipeline Route



- Engagement with HONI identified the need to re-route the pipeline centreline within their utility ROW to protect power transmission infrastructure.
- Consultation with stakeholders identified the need for route deviation from urban residential properties and areas of congested utility infrastructure.

Table 2.7-1: Pipeline Route Description

KP Start	KP End	Description
0	4	The proposed pipeline route begins at the company's Waterdown Station. This section of the pipeline is located primarily in an agricultural setting and is within Imperial's existing pipeline easement.
4	11	This segment crosses the Hidden Lake Golf Club Course. The pipeline will be installed under the golf course using HDD.
11	18	The route continues in an agricultural setting within existing Imperial pipeline easement. The section includes one railroad crossing that will be bored, and an HDD crossing of Bronte Creek.
18	29	The pipeline transitions from the Imperial ROW into HONI's ROW at approximately KP 18.8. Sixteen Mile Creek, East Sixteen Mile Creek and Highway 407 will be crossed with by HDD. At approximately KP 28, the land use switches from rural to urban landscape as it enters the City of Mississauga.
29	36	This segment marks the beginning of the urban portion of the route, and includes two HDD crossings at transit stations. Imperial is currently proposing the pipeline crossing of the Credit River, subject to separate applications.
36	43	The pipeline route continues in an urban setting. This segment has multiple HDD and bored crossings.
43	50	This route segment crosses Etobicoke Creek, Green Grass One Golf Course and Centennial Park. The pipeline will be constructed by HDD under a significant portion of these areas. Other HDD crossings within this segment include Highway 401, Mimico Creek and Dixon Road.
50	57	The pipeline alignment continues in an urban setting that encompasses the Humber River and its respective recreational area. The pipeline will be installed under this area primarily by HDD. Highway 409 will also be crossed using the HDD construction method.
57	62.5	The final segment of the pipeline route ends at Imperial's Finch Terminal in North York. This segment includes several HDD and bored crossings, including Black Creek. Imperial is currently working on realigning the Finch Avenue crossing to accommodate part of the Metrolinx light rail construction along Finch Avenue.

2.8 Project Operations and Maintenance

When the Project is installed and commissioned, operation of the new pipeline will involve 24/7 monitoring from Imperial's dedicated control centre, augmented by routine aerial and ground visual inspections of the pipeline ROW. Inspection tools will also be periodically used to assess the internal and external integrity of the pipe.

This ER primarily addresses the potential effects and mitigation to be applied during pipeline construction, when environmental and socio-economic effects may occur due to construction activities and equipment. All necessary permits and approvals will be in place prior to the commencement of any on-the-ground operation or maintenance activities for the Project, and Imperial will maintain compliance with applicable regulations for these activities. In addition, industry best practices for environmental protection will be implemented.

3. CONSULTATION

Imperial recognizes the importance of consultation, which is an integral part of Project planning and supports the public interest consideration of the OEB's regulatory process.

Consultation is the process of identifying interested and potentially affected parties and informing them about the Project, soliciting information about values, local environmental and socio-economic circumstances, and receiving input for implementation in planning and design. Imperial is committed to meaningful consultation. In addition to informing stakeholders, Imperial employs a two-way communication approach to sharing information, receiving and responding to comments, to ultimately make informed decisions.

Consultation for the Project is guided by the requirements of the *OEB's Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario, 2016, 7th Edition.*

3.1 Identification of Interested Parties

Imperial identified a broad range of interested parties – stakeholders, government agencies, landowners and Indigenous communities with a potential interest in the Project – and consultation was initiated early in project planning. As planning progressed, additional stakeholders were identified and consulted.

Imperial has followed the guidance of the Ontario Ministry of Energy, Northern Development and Mines (MENDM) (formerly Ontario Ministry of Energy), Indigenous Energy Policy Branch, to prepare and submit a separate Indigenous Consultation Report and Record of Consultation with the LTC application, to be filed in early 2019.

3.1.1 Government

Imperial met with the OEB early during project planning. The focus of the preliminary discussions was to describe the Project in greater detail, review the preliminary permitting and construction schedule, solicit anticipated issues and feedback, identify expectations, and confirm next steps. In addition, Imperial sought feedback and guidance from the other government entities that require engagement on the Project.

Based on Imperial's initial stakeholder mapping and following the advice of the OEB staff, Imperial developed a notification and outreach process that included federal, provincial and municipal agencies, and Conservation Authorities, including those on the OPCC. Imperial provided written notification to the identified agencies of the Project's commencement on May 22, 2018 and at key milestones such as the July 2018 and November 2018 Community Information Sessions. Imperial also met and will continue to meet with key agency technical staff to understand their interest in the Project and address their regulatory and policy requirements.

Provincial Government

Imperial has consulted with and will continue to consult with provincial Ministries. At commencement of the Project, Imperial sent notification letters to both Ministerial and Ministry agencies, including:

- Ontario Energy Board;
- Infrastructure Ontario;
- Ministry of Agriculture, Food and Rural Affairs;
- Ministry of Economic Development, Job Creation and Trade;
- Ministry of Environment, Conservation and Parks;

- Ministry of Energy, Northern Development and Mines – Indigenous Energy Policy;
- Ministry of Infrastructure;
- Ministry of Municipal Affairs and Housing;
- Ministry of Natural Resources and Forestry;
- Ministry of Tourism, Culture and Sport;
- Ministry of Transportation;
- Technical Standards and Safety Authority;
- Conservation Halton;
- Credit Valley Conservation Authority;
- Hamilton Conservation Authority;
- Toronto and Region Conservation Authority; and
- Niagara Escarpment Commission.

Imperial provided notification letters for the Project to local Members of Provincial Parliament along the Project's corridor following the June 2018 election. This was to support sharing information with and responding to constituents with Project information, website, and email or phone contacts.

Municipal and Regional Governments

To support consultation, Imperial proactively notified, briefed and communicated with municipal and regional staff. Municipalities provided advice on outreach activities for the July 2018 and November 2018 Community Information Sessions. Government representatives and some elected officials attended the information sessions. In addition to construction permitting, the following municipalities provided key comments on the Project:

- City of Burlington;
- City of Hamilton;
- City of Mississauga;
- City of Toronto;
- Region of Halton;
- Region of Peel;
- Town of Milton; and
- Town of Oakville.

Federal Government

Notification about the Project was provided to the following federal agencies based on potential federal regulatory interest:

- Fisheries and Oceans Canada;
- Transport Canada; and
- Environment and Climate Change Canada.

Fisheries and Oceans Canada (DFO) is responsible for administering the *Fisheries Act*, which provides regulatory guidance and approvals on any project that has the potential to cause "serious harm to fish," as defined in the *Fisheries Act*.

Transport Canada is responsible for administering the *Navigation Protection Act*. Transport Canada provides guidance related to navigable waterways that have the potential to be affected by the Project and related approvals and requirements.

Environment and Climate Change Canada (ECCC) is responsible for administering several different legislations, including but not limited to the *Canadian Environmental Protection Act, Migratory Birds Convention Act* and *Species at Risk Act*. ECCC provides regulatory guidance on projects that have the potential to affect an area of federal interest or responsibility, with emphasis on projects that have the potential to affect air, water and soil quality, and flora and fauna.

Imperial also sent written notification letters to federal Members of Parliament along the Project's corridor at the commencement of the Project.

3.1.2 Stakeholders

Stakeholders include members of the public, organizations or individuals that were identified by Imperial as having a potential interest in the Project, or entities who self-identified as having an interest in the Project. Stakeholders who were consulted for the Project include the following:

- members of the public, or local residents;
- landowners and adjacent landowners;
- HONI;
- local business associations;
- community organizations (i.e., neighborhood associations, agriculture and environmental groups);
- industry organizations and associations; and
- key customers.

Key stakeholders received notices about the Project along with direct invitations to attend the Community Information Sessions. Members of the public were informed of Community Information Sessions through local advertising. Stakeholders were also able to access information, ask questions and provide feedback to Imperial, at any time, through the dedicated website page (www.imperialoil.ca/waterdowntofinch), which includes a Project-specific email and phone number.

3.1.3 Indigenous Communities

The MENDM – Indigenous Energy Policy provided the Crown's direction on the duty to consult. On September 11, 2018 MENDM provided a letter delegating the procedural aspects of the Crown's duty to consult to Imperial, and included a list of Indigenous communities that should be consulted about the Project, as follows:

- Mississaugas of the Credit First Nation;
- Six Nations of the Grand River; and
- Huron-Wendat Nation.

The MENDM's delegation letter noted that Imperial is required to consult with both the Six Nations Elected Council and the Haudenosaunee Confederacy Chiefs Council (HCCC), and all correspondence with the HCCC should copy the Haudenosaunee Development Institute (HDI).

Imperial provided notification about the Project and met with the above noted Indigenous communities, in advance of the delegation letter. Consultation with these communities is ongoing.

In addition, while the Métis Nation of Ontario (MNO) was not listed in the delegation letter, Imperial identified the MNO as an Indigenous community to be informed of the Project for engagement and provided notification. Imperial has offered to meet with the MNO to discuss the Project on multiple occasions, but a meeting has not yet occurred.

3.2 Methods

Imperial uses various consultation methods, each tailored specifically to meet the context, expectations and needs of stakeholders, government agencies and Indigenous communities. Imperial's consultation is ongoing and iterative, with a one-time consultation related to a specific discrete issue, or a series of consultations related to a particular issue. After initial notification, ongoing consultation is the most common. This method allows Imperial to understand the perspectives of stakeholders and to consider their input for the planning, construction and operation of the Project. Table 3.2-1 provides an overview of consultation methods.

Table 3.2-1: Summary of Consultation Methods

Tool	Audience
Notification letters including brochures and offer of in-person meetings	■ Regulatory agencies, including members of the Ontario Pipeline Coordinating Committee, Conservation Authorities ■ Indigenous communities ■ Landowners/adjacent landowners ■ Municipal governments impacted (elected and staff) ■ Provincial government bodies impacted (elected and staff) ■ Federal government (elected and staff)
One-on-one meetings	■ All of the above who requested meetings
Project website	■ All – Project materials available on website: www.imperialoil.ca/waterdowntofinch
Project phone/email	■ All – Project materials direct to email and phone line for more information
Project contact cards	■ Contact cards with website, email and phone line made available at information sessions and to all members of the public if they met a member of a field team or surveyor working on behalf of the Project
Community Information Sessions (in-person)	■ Information sessions were held in six communities along the ROW in July 2018 and November 2018
Open house (in-person)	■ Proponent's Open House at the Mississaugas of the Credit First Nation community.
Information session outreach (advertising)	■ Advertising in local papers to advise of the Project's Community Information Sessions, Project's website and contact details
Community Information Session outreach (direct)	■ Postcards directly mailed to impacted landowners/adjacent landowners ■ Outreach to regional/municipal governments and elected officials, regulatory agencies, Members of Provincial Parliament, identified stakeholder groups, other identified community stakeholders and individuals who requested ongoing information updates
Information sessions (online)	■ Information session invitations posted to the website for July 2018 and November 2018 sessions ■ Information session materials (poster boards and videos) posted to the website

Imperial's proactive communication included two series of Community Information Sessions in July 2018 and November 2018, which presented the public with opportunities to provide feedback to and engage in-person with subject matter experts on the Project. Important elements of Imperial's consultative approach included making information readily available on the Project's website and being available by email or phone to answer questions.

3.2.1 Project Notices

Imperial provided notification to introduce the Project and to provide information about the environmental and socio-economic study process, the consultation process, and the initial Community Information Sessions in July 2018. The Notices were sent by mail and electronically to the Project's stakeholders, agencies, municipalities, landowners and Indigenous communities (Table 3.2-2). The Project notification was also advertised in local print media in each of the local municipalities and published on the Project's website.

3.2.2 Project Website

A dedicated website page (www.imperialoil.ca/waterdowntofinch) was established in May 2018, and is maintained for interested parties to obtain information about the Project, view and download maps, view an online information session, and view notices of the Community Information Sessions. A dedicated phone number (416-586-1915) and email address (questions@imperialon.ca) are available to receive questions, comments and feedback. Comments can be submitted at any time and the Project's team will respond to the feedback, comment or concern. Individuals making the request or submission receive an acknowledgement of their inquiry within 24 hours and the team reviews each item, determines the optimal technical or subject matter expertise needed, and provides a response. While timelines will vary based on the complexity of the request, the team emphasized timely and accurate responses. All comments and queries are tracked centrally to maintain consistency and completion.

3.2.3 Community Information Sessions

The OEB recommended two series of Community Information Sessions, such as open houses within the communities along the proposed route, which included the following:

- July 2018 series: Introduce Project, answer questions, gather concerns and solicit input.
- November 2018 series: Provide additional information, demonstrate incorporation and accommodation of previous concerns and solicit further input.

The Community Information Sessions were intended to capture input and feedback from the public, help improve public understanding, identify and address issues, and give the public an opportunity to participate in the Project's planning process. The information sessions helped ensure that community members, businesses and organizations received accurate and timely information about the purpose of the Project, the associated timelines, and engagement throughout the duration of the Project.

Imperial held two series of Community Information Sessions to present information and provide opportunities for input. The first Community Information Session was held in July 2018 to introduce the Project and the second was held in November 2018 to provide new Project information, feedback on how consultation has affected the planning and design of the Project as well as solicit additional input from the participants. The Community Information Sessions included all municipalities along the proposed route. The majority of Community Information Sessions consisted of a late-afternoon and an evening session to accommodate attendance during work or personal hours. During the July 2018 series, Burlington and Oakville only included one session each. In total, 22 sessions have been held to date in the municipalities along the ROW.

Table 3.2-2: Summary of Project Notices

Notice	Content	Methods
Early Project Notification May 22, 2018	Provided early formal notification of the Project to stakeholders, agencies, municipalities, landowners, and Indigenous communities.	■ Mail out of letter ■ Email of letter ■ Project website
Notice of Community Information Session – Oakville July 16, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, explaining the planning process and seeking feedback on the Project.	■ Mail out of notice ■ Email of notice ■ Ad in *Oakville Beaver* – July 5 ■ Ad in *Oakville Beaver* – July 12 ■ Project website ■ Info Session held at River Oaks Community Centre, Oakville
Notice of Community Information Session – Mississauga July 17, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, explaining the planning process and seeking feedback on the Project.	■ Mail out of notice ■ Email of notice ■ Ad in *Mississauga News* – July 5 ■ Ad in *Mississauga News* – July 12 ■ Project website ■ Info Session held at Living Arts Centre, Mississauga
Notice of Community Information Session – Toronto July 18, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, explaining the planning process and seeking feedback on the Project.	■ Mail out of notice ■ Email of notice ■ Ad in *Etobicoke Guardian* and *North York Mirror* – July 5 ■ Ad in *Etobicoke Guardian* and *North York Mirror* – July 12 ■ Project website ■ Info Session held at Royal Canadian Legion Branch 286, Toronto
Notice of Community Information Session – Burlington July 24, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, explaining the planning process and seeking feedback on the Project.	■ Mail out of notice ■ Email of notice ■ Ad in *Burlington Post* – July 12 ■ Ad in *Burlington Post* – July 19 ■ Project website ■ Info Session held at Haber Community Centre, Burlington
Notice of Community Information Session – Milton July 25, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, explaining the planning process and seeking feedback on the Project.	■ Mail out of notice ■ Email of notice ■ Ad in *Milton Canadian Champion* – July 12 ■ Ad in *Milton Canadian Champion* – July 19 ■ Project website ■ Info Session held at Milton Town Hall, Milton

Notice	Content	Methods
Notice of Community Information Session – Hamilton July 26, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, explaining the planning process and seeking feedback on the Project.	■ Mail out of notice ■ Email of notice ■ Ad in *Hamilton Spectator* – July 12 ■ Ad in *Hamilton Spectator* – July 19 ■ Ad in *Flamborough Review* – July 12 ■ Ad in *Flamborough Review* – July 19 ■ Project website ■ Info Session held at St. Thomas the Apostle Church Hall, Waterdown
Notice of Community Information Session – Burlington November 6, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, Leave to Construct process, construction methods and timelines, and how Imperial has incorporated community feedback.	■ Mail out of notice ■ Email of notice ■ Ad in *Burlington Post* – October 25 ■ Ad in *Burlington Post* – November 1 ■ Project website ■ Info Session held at Brant Hills Community Centre, Burlington
Notice of Community Information Session – Milton November 7, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, Leave to Construct process, construction methods and timelines, and how Imperial has incorporated community feedback.	■ Mail out of notice ■ Email of notice ■ Ad in *Milton Canadian Champion* – October 25 ■ Ad in *Milton Canadian Champion* – November 1 ■ Project website ■ Info Session held at Milton Hall, Milton
Notice of Community Information Session – Hamilton November 8, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, Leave to Construct process, construction methods and timelines, and how Imperial has incorporated community feedback.	■ Mail out of notice ■ Email of notice ■ Ad in *Hamilton Spectator* – October 25 ■ Ad in *Hamilton Spectator* – November 1 ■ Ad in *Flamborough Review* - October 25 ■ Ad in *Flamborough Review* – November 1 ■ Project website ■ Info Session held at Brant Hills Community Centre, Burlington

Notice	Content	Methods
Notice of Community Information Session – Toronto November 13, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, Leave to Construct process, construction methods and timelines, and how Imperial has incorporated community feedback.	■ Mail out of notice ■ Email of notice ■ Ad in *North York Mirror* – October 25 ■ Ad in *North York Mirror* – November 8 ■ Ad in *Etobicoke Guardian* – December 6[1] ■ Project website ■ Info Session held at Royal Canadian Legion Branch 286, Toronto
Notice of Community Information Session – Oakville November 14, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, Leave to Construct process, construction methods and timelines, and how Imperial has incorporated community feedback.	■ Mail out of notice ■ Email of notice ■ Ad in *Oakville Beaver* – October 25 ■ Ad in *Oakville Beaver* – November 8 ■ Project website ■ Info Session held at Oakville Soccer Club, Oakville
Notice of Community Information Session – Mississauga November 15, 2018	Provided notice of Community Information Session for the purpose of sharing details about the Project, Leave to Construct process, construction methods and timelines, and how Imperial has incorporated community feedback.	■ Mail out of notice ■ Email of notice ■ Ad in *Mississauga News* – October 25 ■ Ad in *Mississauga News* – November 8 ■ Project website ■ Info Session held at Mississauga Living Arts Centre, Mississauga

[1] *Due to an error with the publisher, the advertisement in the Etobicoke Guardian did not appear in advance of the Community Information Session. Imperial ran an advertisement in the Etobicoke Guardian on December 6, 2018 to raise awareness and drive participation on the Project website, which was updated to include all information materials that were available at the November Community Information Session, including information poster boards, the Project brochure, links to information videos that were displayed at the session and other content.*

Attendees were encouraged to register with their contact information at the sessions and indicate interest in receiving updates about the Project. Further, attendees were provided an opportunity to rate and offer comments about the session using an optional feedback form. Based on the completed survey responses, the sessions received positive feedback.

The Project team logged questions or comments raised during the Community Information Session, which are summarized in the Key Comments Table (Appendix B). Based on feedback from participants at the July 2018 sessions, the team enhanced the November 2018 sessions to facilitate a greater exchange of information about the Project. The enhancements included:

- Land owner queries: Digital maps were made available to facilitate information exchange in addition to one-on-one communication with land owners.
- Detailed maps for the Project: Imperial provided detailed preliminary pipeline route maps and made these available during the Community Information Session and on the website.
- More ways to learn and engage:
  - Poster board information included priority topics, such as a “What We’ve Heard” list and how Imperial has responded.
  - An example of a section of pipe was presented.
  - Videos were shown to help inform the public of the proposed construction methods, safe pipeline deactivation techniques, and Imperial’s safety and emergency response program.

3.2.4 Government Agencies

Imperial proactively consulted and provided early notification to government agencies about the Project. After the initial notice of commencement, Imperial conducted outreach with the identified government agencies, including the OPCC members, to set up in-person or teleconference meetings with agency representatives and technical staff. Meetings with technical staff allowed for focused consultation to receive feedback on regulatory or technical expectations and needs. In general, discussion topics included:

- a description of the Project;
- the regulatory process being followed;
- the Project’s schedule and timelines for the regulatory process;
- information on Imperial’s consultation methods, including consultation with Indigenous communities; and
- the planning process to evaluate the pipeline route, design, safety and proposed mitigation measures.

At the meetings, where appropriate, Imperial sought input on matters of pipeline routing, design, construction, the environmental and socio-economic studies and the Project’s consultation process.

Appendix B, Table B-1, provides a summary of key comments received from government agencies and how Imperial considered and addressed these comments. These consultations are ongoing, and details, including the record of agency meetings that took place and associated meeting minutes, will be included in the Key Comments Table (Appendix B) and the Record of Consultation as part of the LTC application.

3.2.5 Meetings with Municipalities

Imperial provided early notification and established an ongoing dialogue with municipalities and elected municipal officials in the Project’s LSA. In-person meetings were held with the City of Burlington, City of Hamilton, City of Mississauga, City of Toronto, Region of Halton, Region of Peel, Town of Milton; and

Town of Oakville. After the notice of commencement, Imperial conducted outreach with municipalities to introduce the Project and to establish lines of communication for further technical, permitting or community related discussions. The following municipal staff were contacted:

- Chief Administrative Officer/City Manager;
- Clerk;
- Mayor;
- councillors along the pipeline right-of-way; and
- staff.

Imperial informed the municipal representatives of the Community Information Sessions, considered the advice of the municipal staff, and asked that any inquiries about the Project be directed to the Project's team through the dedicated phone number and email address.

Appendix B, Table B-2, provides a summary of key comments received from municipalities and how Imperial considered these comments.

The record of municipal government meetings that took place will be included in the Record of Consultation in the LTC application.

3.2.6 Landowners and Occupants

Imperial has reviewed directly affected land parcel registers and instruments and has provided direct notifications and/or held one-on-one meetings with regulatory landowners and private landowners.

Appendix B, Table B-3, provides a summary of key comments received from landowners and how Imperial considered these comments.

Land matters and ROW will be discussed in greater detail in the LTC application.

3.2.7 Indigenous Communities

Imperial recognizes the importance of collaborating with local Indigenous groups when conducting activities. Imperial has engaged Indigenous communities and their representatives and maintains an ongoing dialogue about the Project with Indigenous leaders, community members and their designated representatives. Imperial will consult based on the following guiding commitments (Imperial 2018):

- respecting traditional practices, decision-making processes, cultural activities and language;
- respecting the legal rights of Indigenous peoples and the Crown's duty to consult;
- ensuring timely discussions when activities have the potential to impact communities;
- treating all parties fairly; and
- responding to comments and concerns in a timely manner.

Imperial has prepared a detailed Indigenous Consultation Report and Record of Consultation which will be included in the LTC application and appendices. Below is a summary of these reports.

Imperial's consultative approach is open, proactive and flexible, based on the preferences unique to each identified community. The communities have influenced the consultation methods and activities. Consultation methods have included in-person and teleconference meetings with designated representatives and community members.

Through an open and transparent consultation process, Imperial has:

- notified Indigenous communities early and often throughout the regulatory process;
- provided Project information, including project description, timelines, and maps;
- consulted with Indigenous communities identified by the Crown who may be affected or have an interest in the Project;
- engaged with additional communities, including those not part of rights-based consultation but who may have an interest in the Project;
- explained regulatory and approval processes that applies to the Project;
- involved communities in archaeological assessment planning and shared archaeology assessment findings and draft reports;
- enabled the participation of Indigenous Field Monitors for archaeological and environmental field studies and environmental monitoring of other Project activities;
- followed up with communities to check that they had received Project information and were aware of opportunities;
- reviewed comments and concerns raised;
- responded to comments and/or concerns in a timely manner;
- where appropriate, accommodated requests for additional review time and minor schedule amendments to address comments and concerns;
- assumed reasonable costs associated with procedural consultation; and
- maintained a Record of Consultation describing activities carried out as part of the delegated procedural aspects of consultation.

Imperial has provided capacity funding to support field monitors from Indigenous communities to participate in field surveys, including archaeology, wildlife and habitat, wetlands and waterbodies, vegetation, and fish habitat surveys. All the consulted communities participated in the archaeological field surveys, and the Mississaugas of the Credit First Nation and HDI have participated in environmental field surveys.

A Stage 1 Archaeological Assessment report (Miller, Pollock, and Cleland 2018) was prepared for the Project and was submitted to the interested Indigenous communities in September 2018 for review and comment.

Imperial recognizes that consultation is an integral part of the LTC application and consultation will be ongoing throughout the life of the Project.

Appendix B, Table B-4, provides a summary of key comments received from Indigenous communities and how Imperial addressed these comments or took action to accommodate the requests.

3.3 Input Received and Response

The summary of key comment inputs received and Imperial's response to comments during preparation of the ER, including how refinements to the Project have been made based on input, is described in detail in Appendix B.

4. EXISTING ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS

4.1 Study Methods

The Project's planning process first involved selection of the pipeline route (see Section 2.6). The route was assessed by an integrated team of subject matter experts that considered the physical, environmental and socio-economic constraints of the Project, the environmental and socio-economic existing conditions along the route, and the potential interaction of the Project with the important or sensitive features within that setting.

This assessment of the existing environmental and socio-economic conditions then focused on the proposed pipeline route identified in Section 2.7. The assessment was completed for physical (Section 4.5), biophysical (Section 4.6), and socio-economic (Section 4.7) features of the existing environment. The assessment of existing conditions was completed in the following steps:

- Identification of interactions between the Project and the existing environment;
- Identification of study areas;
- Review of existing data sources;
- Targeted field surveys; and
- Documentation of survey results.

4.1.1 Study Areas

The Local Study Area (LSA) and Regional Study Area (RSA) were defined considering the existing physical, environmental and socio-economic conditions based on the review of available information, as a result of engagement with Project's stakeholders, and later refined based on the results of field reconnaissance in the fall of 2017. The route was further refined, and the Project's "footprint" was designed. The footprint is the area that will be disturbed during construction, which will include the permanent easement and temporary work spaces.

To consider the physical, environmental and socio-economic constraints that were identified during the routing study, the study area for potential effects includes the LSAs and RSAs, which are variable depending on the feature and its relevance to the potential effects of the new pipeline construction and operation. LSAs and RSAs specific to each physical, environmental and socio-economic feature and the rationale for the size of the study areas are presented in Tables 4.1-1 and 4.1-2, respectively.

Table 4.1-1: Local Study Areas Defined by Feature

Feature	Local Study Area (metres on either side of centreline[1])	Local Study Area Rationale
Physiography and Geology	250	Direct effects on physiography and geology resources are predicted to be limited to the footprint, but additional area was studied to allow for adjustments to the footprint during planning and assessment.
Soil	250	Direct effects on soil resources are predicted to be limited to the footprint, but additional area was studied to allow for adjustments to the footprint during planning and assessment.
Groundwater	200	Direct effects on groundwater resources are anticipated to be indistinguishable from other sources beyond 200 m of the centreline.

Feature	Local Study Area (metres on either side of centreline[1])	Local Study Area Rationale
Surface Water	250 upstream; 500 downstream of watercourse crossings	Fish and fish habitat are considered the most sensitive receptor of potential local changes in surface water quantity and quality resulting from the Project. Therefore, this LSA is consistent with Fish and Fish Habitat.
Air and Noise	250	Direct effects on air quality (i.e., dust) and noise are anticipated to be indistinguishable from other sources beyond 250 m of the centreline.
Vegetation and Wetlands	62.5	Direct effects on vegetation communities and wetlands are anticipated to be limited to the construction footprint and indistinguishable from other sources 62.5 m from the centreline given the nature of the local environment.
Wildlife and Wildlife Habitat	62.5	Direct effects on wildlife and wildlife habitat are anticipated to be limited to the construction footprint. Indirect effects are anticipated to be indistinguishable from other sources 62.5 m from the centreline given the nature of the local environment.
Fish and Fish Habitat	250 upstream; 500 downstream of watercourse crossings	Direct effects on fish and fish habitat are anticipated to be indistinguishable from other sources beyond 250 m upstream and 500 m downstream of watercourse crossings.
Socio-Economic	250	Direct socio-economic effects are anticipated to be indistinguishable from other sources beyond 250 m of the centreline.
Archaeology (Stage 1)	50	Direct impacts to archaeological resources are predicted to be limited to the footprint, but additional area was studied to allow for adjustments to the footprint during planning and assessment.
Cultural Heritage	62.5	Direct impacts to cultural heritage resources are predicted to be limited to the footprint, but additional area was studied to allow for adjustments to the footprint during planning and assessment.

[1] *The centreline is the middle of the existing or proposed permanent easement.*

Table 4.1-2: Regional Study Areas Defined by Feature

Feature	Regional Study Area	Regional Study Area Rationale
Physiography and Geology	n/a	No effects expected beyond local.
Soil	n/a	No effects expected beyond local.
Groundwater	n/a	No effects expected beyond local.
Surface Water	n/a	No effects expected beyond local.
Air and Noise	750 m on either side of the centreline[1]	Indirect and/or cumulative effects on air quality (i.e., dust) or noise are not anticipated beyond 750 m.

Feature	Regional Study Area	Regional Study Area Rationale
Vegetation and Wetlands	Ecological Land Classification (ELC) Units or Woodland/Wetland Complexes	Effects from the Project, such as removal of vegetation or introduction of invasive species are anticipated to impact only those ELC communities or woodland/wetland complexes adjacent to the LSA.
Wildlife and Wildlife Habitat	Significant Wildlife Habitat Units	Effects are anticipated to impact only those significant wildlife habitat units adjacent to the LSA.
Fish and Fish Habitat	Watersheds intersected by the Project	Fish are mobile within unrestricted watercourses, therefore the watershed is considered for indirect effects.
Socio-Economic	Municipal Boundary	Effects are anticipated to be indistinguishable from baseline sources beyond municipal boundaries.
Archaeology (Stage 1)	n/a	No effects expected beyond local.
Cultural Heritage	n/a	No effects expected beyond local.

[1] The centreline is the middle of the existing or proposed permanent easement.

4.1.2 Existing Data Sources

The planning and assessment process included search and review of publicly available and restricted government data, and the acquisition of Light Detection and Ranging (LiDAR) data and aerial imagery of the study areas. The following key data sources were reviewed (data sources are described in the respective sections):

- Canadian and Ontario species at risk information (i.e., Species at Risk Public Registry (Government of Canada 2017), DFO species at risk distribution data (DFO 2015a, 2015b, 2015c, 2015d, 2015e, 2018) and the province of Ontario species at risk listings (Government of Ontario 2017; NHIC 2018));
- Database of Vascular Plants of Canada (2010);
- Land Information Ontario (LIO) Database, including Aquatic Resource Area (ARA) watercourse data (MNRF 2018); MNRF Make-a-Map: Natural Heritage Areas Application (MNRF 2018);
- MECP Water Well and Permit to Take Water Records;
- Ministry of Environment, Conservation and Parks Source Protection Information Atlas of Ontario (October 2018);
- Ministry of Tourism, Culture and Sport Archaeological Report Database;
- MNRF Natural Heritage Information Centre Rare Species Records (MNRF 2018);
- Niagara Escarpment Plan (2017);
- Official Plans for the Cities of Hamilton, Burlington, Milton, Mississauga, and Toronto;
- Ontario Breeding Bird Atlas Website (Bird Studies Canada 2009);
- Ontario Freshwater Fishes Life History Database (Eskins 2017);
- Ontario Reptile and Amphibian Atlas Website (Ontario Nature 2018);

- Ontario's Greater Golden Horseshoe Growth Plan;
- Provincial Policy Statement (2014);
- Publicly available data from Conservation Halton (2002, 2009a, 2009b, 2009c, 2010, 2013a, 2013b, 2013c), CVC (2002), and TRCA (2011, 2016);
- Published geological mapping and reports from the Ontario Geological Survey (OGS); Geological Survey of Canada; Oil, Gas and Salt Resource Library (OGSR); and the MNRF;
- Soil mapping from the Ontario Ministry of Agriculture, Food and Rural Affairs, as well as Agriculture and Agri-Food Canada;
- Statistics Canada census data; and
- The Greenbelt Plan (2017).

Requests were sent to MNRF, MECP, DFO, HCA, CH, CVC, and TRCA to identify any potential information or spatial data gaps identified in the background literature review.

These existing and acquired data sources were used to advance the Project's planning and to target the field surveys on important and sensitive environmental and socio-economic features.

4.1.3 Field Surveys

The overarching goals of the field surveys were to:

- Confirm the accuracy of the existing and acquired data; and
- Conduct targeted surveys to supplement existing data.

Field surveys of the identified important and sensitive environmental and socio-economic features within the LSAs and RSAs were conducted in spring, summer, and fall 2018. These targeted field surveys were generally conducted within the LSA. In some cases, health and safety concerns or access to private land restricted access to portions of the study area.

The following targeted field surveys were completed:

- Jefferson salamander reproductive habitat and egg mass outside of Regulated Habitat (Jefferson Salamander Recovery Team 2013);
- Reptile emergence with a focus on species at risk (MNRF Blanding's Turtle Nest and Nesting Survey Guidelines – version 1 2016); (MNRF Survey Protocols for Blanding's Turtle (*Emydoidea blandingii*) in Ontario 2016);
- Breeding bird and wetland bird callback (Ontario Breeding Bird Atlas 2001-2005);
- Spring/summer/fall vegetation inventory with a focus on species at risk (Ecological Land Classification for Southern Ontario 1998);
- Butternut health assessment (assessment of butternut tree health for the purposes of the *Endangered Species Act*, 2007);
- Ecological Land Classification mapping (Ecological Land Classification for Southern Ontario 1998);
- Bat habitat assessment and acoustic monitoring with a focus on species at risk;
- Monarch butterfly and monarch butterfly habitat (protocol as received from MNRF on April 9, 2018);

- Assessment of fish-bearing status of watercourses (guidance from the Fish-stream Identification Guidebook (BC Environment et al. 1998) and others (Powers and Orsborn 1985; BC Environment 1995; Washington Department of Fish and Wildlife 1999; Parker 2000; BC MOF 2001));
- Fish habitat assessment at fish-bearing watercourses (an abbreviated version of the Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures (BC Fisheries 2001; BC MOE 2008), with reference to the Ontario Stream Assessment Protocol (OSAP) (Stanfield 2017) and other habitat assessment guidelines (MTO 2009; Zale et al. 2012; VIU 2013));
- Cultural heritage existing conditions (Standards and Guidelines for Conservation of Provincial Heritage Properties 2010);
- Stage 1 and Stage 2 Archaeology Assessment (Standards and Guidelines for Consulting Archaeologists 2011); and
- Incidental wildlife, species at risk and species at risk habitat observations.

The data collected to date is summarized in this section, and is spatially represented in several maps, including the Ecological Land Classification mapping (Appendix C) and the Environmental Features Map (Appendix D).

Additional environmental and socio-economic field surveys may be undertaken in 2019 to support various permit applications or construction planning processes. These surveys will include:

- arborist tree inventory and genetic analysis on butternut in targeted study areas;
- a second round of the Jefferson salamander habitat and egg mass survey;
- additional Stage 2 (and potentially Stage 3/4) archaeological assessment;
- additional fish habitat assessment; and
- surficial soils assessment, including soybean nematode cyst in targeted agricultural areas.

Additional field surveys, including geotechnical investigations, groundwater monitoring including water well monitoring, design and constructability reviews, and civil and land surveys were conducted in 2017 and 2018. The surveys will continue into 2019 to support planning, design and permitting of the Project, and are relevant to the LTC application and other applications but are not relevant to or included in this ER.

4.2 Physical Features

4.2.1 Physiography and Geology

The Project crosses the St. Lawrence Lowlands Physiographic Region, which is a plain-like area that was affected by Pleistocene glaciation and is covered by surficial deposits and features associated with glaciers (Bostock 2014). The surficial geology in the LSA consists primarily of coarse-textured glaciolacustrine deposits and silty to clayey till (OGS 2000). Overburden thickness is less than 3 m near KP 7.0 and between KP 36.0 and KP 37.0 (Gao et al. 2006).

Major bedrock units in the LSA include Silurian- to Ordovician-aged sandstone, shale, siltstone, dolostone, and limestone (OGS 2011). Individual rock units include the Lockport Formation, Amabel Formation, Clinton Group and Cataract Group, Queenston Formation, and a collection of units including the Georgian Bay Formation, Blue Mountain Formation, Billings Formation, Collingwood Member, and Eastview Member (see Table 4.2-1). The Niagara Escarpment is a prominent geological and topographic feature which extends westward from Queenston on the Niagara River, then to the west and north through Hamilton and Milton (Ontario Department of Mines and Northern Affairs 1971). The Niagara Escarpment results from where the hard and resistant Lockport or Amabel Dolomite dips gently to the

southwest and is underlain by softer shales, sandstones, and dolomites of the Clinton and Cataract Groups and shales of the Queenston and Georgian Bay Formations.

Table 4.2-1: Rock Units in the LSA

Unit Name	Age	Approximate Distance Crossed (m)	Major Rock Type	Minor Rock Type
Lockport Formation	Lower Silurian	100	Limestone, dolostone, shale	Chert, bituminous dolostone
Amabel Formation	Lower Silurian	8,200	Dolostone	Crinoidal grainstones, bituminous dolostone
Clinton Group; Cataract Group	Lower Silurian	1,950	Sandstone, shale, dolostone, limestone	
Queenston Formation	Upper Ordovician	22,700	Red Shale	Red siltstone, minor green shale and siltstone, with variable calcareous siltstone to sandstone and limestone interbeds
Georgian Bay Formation, Blue Mountain Formation, Billings Formation, Collingwood Member, and Eastview Member	Upper Ordovician	29,950	Shale, limestone, dolostone, fossiliferous siltstone	

Source: Armstrong and Dodge 2007; OGS 2011

Several non-fuel mineral resources occur in the RSA. The nearest oil well is located 2.3 km northwest of KP 27.5 (OGSR 2018). Most of the resources are derived from the sedimentary and carbonate bedrock, including limestone, cement, lime, salt, gypsum, shale for brick manufacturing, and sandstone.
One mineral resource occurrence (unconsolidated marl at Lake Medad) is located about 200 m southeast of KP 5.6. No other mines or mining claims were identified within 0.5 km of the Project. The Project will be located within the existing ROW and utility corridors; therefore, the Project would not affect expansion of nearby mining facilities.

Paleontological resources, including fossiliferous bedrock, are potentially present in the LSA. However, since most overburden in the area exceeds 3 m, these resources are unlikely to be affected by the Project (Armstrong and Dodge 2007).

The 2010 National Building Code of Canada seismic hazard maps provide various peak ground acceleration (PGA) return periods in Canada. Values are determined for a 2 percent in 50-year period (a 2,500-year return period) probability of exceedance. In the LSA, the predicted PGA for a 2 percent in 50-year period is 0.16g (Natural Resources Canada 2016). This PGA corresponds to strong perceived shaking, but light potential damage (Wald et al. 2006). The overall seismic hazard for this area is low to medium (National Building Code of Canada 2015). Two inactive faults were identified near KP 7.7 and KP 9.4 on some maps (OGS 1991; OGSR 2018). The faults are Precambrian border faults and, in many cases, have uncertain or no known effect on the overlying Paleozoic strata (Armstrong and Dodge 2007).

Landslide susceptibility in the LSA ranges from 2 to 6 (low to high) and depends primarily on slope, surficial geology, vegetation, and position relative to other geologic features (Bobrowsky and Dominguez 2012). Most of the LSA is relatively flat and on graded topography of the existing ROW; therefore, the risk for landslides is low.

Based on a review of mapping from the MNDM, the Project will cross approximately 10 km of potential karst areas. Potential karst is present from KP 0.0 to KP 9.8; within that area, karst is known to occur near KP 4.4 to 4.7 and KP 5.7 to KP 5.8 (Brunton and Dodge 2008).

4.2.2 Soil

The Project generally crosses fine textured (loam to clay loam) glacial till and alluvial deposits. Each soil map unit crossed by the Project, as well as key soil properties, is identified in Appendix E. From KP 0.0 to 27.7, the most common soil series are Oneida, Chinguacousy, and Jeddo. Beginning at KP 27.7, the Project crosses soils mapped as “Built Up Area,” which includes the previously disturbed utility corridor. In general, these built-up areas are formed from similar parent materials and have similar characteristics as the rest of the LSA. Oneida are moderately well drained soils, Chinguacousy are imperfectly drained, and Jeddo are poorly drained, all of which are formed from fine textured glacial till and ice-ground Ordovician rock formations.

The Canada Land Inventory (CLI) assessment and classification system shows the potential of an area for agricultural production. It assigns the classes and subclasses according to the Soil Capability Classification of Agriculture, which is based on characteristics of the soil as determined by soil surveys. Mineral soils are grouped into 7 classes and 13 subclasses according to the potential of each soil to produce field crops. Organic soils are not a part of the classification. These CLI maps can be used at the regional level for making decisions on land improvement and farm consolidation, for developing land-use plans, and for preparing equitable land assessments. From KP 0.0 to 27.7 (Built Up Areas are not included in the CLI assessment), about 50% of the soils are in Class 1 (no limitations), about 40% are in Class 2 to 3 (moderate limitations), and about 10% are in Class 4 to 6 (severe limitations to unsuitable). The CLI class and subclass for each soil map unit crossed by the Project is included in Appendix E.

4.2.3 Groundwater

The *Ontario Clean Water Act* (2006) requires development of collaborative, locally driven and science-based watershed plans to keep water clean in wells, rivers, streams and lakes. Source Protection Areas (SPA) are watershed-based jurisdictions that primarily align with Conservation Authority boundaries. The Project crosses four (4) areas: Toronto SPA, Credit Valley SPA, Halton Region SPA and Hamilton Region SPA. In these SPA’s, local committees developed plans to protect the water sources that supply municipal drinking water systems.

Referred to as a “source protection plan,” it is a list of policies and programs to protect current and future sources of municipal drinking water from contamination and overuse. Implementing source protection plans is a responsibility shared by the Ontario government, municipalities and various other bodies, including Conservation Authorities, federal government agencies, and health boards.

Components of the source protection plans include identification and mapping of vulnerabilities of the water source and potential threats to the water sources including water quantity and quality. The source protection plan components in proximity to the Project include wellhead protection areas, vulnerable aquifers, recharge areas and event-based areas. These are defined and described below.

A wellhead protection area (WHPA) is the land area around a well where contaminants from land activities can reach and pollute the well water supply (Source Protection Information Atlas, Oct 2018). Subdivided concentrically to show risk, scores range between 2 (lowest) and 10 (highest). In general, a

score of 8 or 10 indicates there is a policy for certain activities to prohibit or manage them. These risk scores are based on the following conditions:

- WHPA A: Area closest to the well, within a 100-m radius. Land-based activities here pose the highest risk to well water. The vulnerability score is always 10.
- WHPA B: Contaminants from land-based activities in this area would take less than 2 years to travel to the well. Scores range between 6 and 10.
- WHPA C or C1: Contaminants would take less than 5 (C) or 10 (C1) years to travel to the well. Dense non-aqueous phase liquids (DNAPLs) continue to pose a threat here. The vulnerability scores range between 4 and 8.
- WHPA D: Contaminants would take up to 25 years to travel to the well. The vulnerability scores range between 2 and 6.
- WHPA E (Groundwater under Direct Influence; GUDI): This is the area around a well where water quality could be impacted by surface water.
- WHPA F (GUDI): This is an additional area of the watershed, beyond the boundaries of WHPA E, where surface water can contaminate ground water with pollutants that are already a problem for the well. To be a WHPA F, three conditions apply: a WHPA E exists, the well in question is being contaminated by surface water, and the source of the contamination is most likely not located in the other WHPAs.

In the RSA, groundwater levels within the bedrock are a subdued reflection of the surface topography with regional groundwater flow toward Lake Ontario. Similar patterns for water levels and flow are found within the overlying overburden.

The Project does not encroach any of the municipal water supply wells or the established wellhead protection areas. The closest such area is approximately 7 km to the northwest of the Project footprint, close to the southwest end at Waterdown Station. This part of the ROW is where depth to the water table is greater than the depth of the planned excavations and associated dewatering. As such, the Project is unlikely to affect any established wellhead protection areas.

Over half of the footprint crosses areas mapped as highly vulnerable aquifers (HVA). According to a definition provided by the Source Protection Information Atlas of Ontario (October 2018), such HVA's can easily be contaminated because the overlying soil layers are thin or permeable, or both.

The Source Protection Information Atlas of Ontario (October 2018) indicates that the LSA does not cross many significant recharge areas (areas where precipitation recharges the groundwater source or aquifer); this is due to the footprint being underlain by areas of low-permeability glaciolacustrine-derived silty to clayey tills. The mapped areas of significant recharge coincide with erosional valleys. In valleys, such as Bronte Creek and Sixteen Mile Creek, the low-permeability soils have been eroded away and Paleozoic bedrock is exposed, allowing a more efficient recharge.

The LSA crosses several areas designated as event-based areas (EBAs) in the Source Protection Information Atlas of Ontario (October 2018). Such EBAs are defined as areas within a watershed where a release could pollute the drinking water supply because of the presence of sanitary sewers, sewage treatment plants or pipelines that are close to rivers, streams or other water bodies.

A review of the MECP water well record (WWR) database (Appendix H) identified 290 MECP water well records within 200 m of the Project's footprint (additional wells may be present if the WWR is incomplete). This distance represents the LSA (Section 4.1) within which the wells may be affected by proposed Project activities. Of those 290 wells, 203 are monitoring wells, test holes or of unknown use and are excluded from this discussion. The remaining 87 wells are grouped by a depth of completion and, then,

by a depth to water table (or the reported static water level) to extend the LSA into the subsurface. These groupings are created and presented here for discussion purposes only and do not represent any particular aquifers. The well groups are:

- wells with completed depths >20 m below ground surface (mBGS); and
- wells with completed depths ≤20 mBGS.

Wells with Completed Depths >20 mBGS:

Fifty (50) wells are completed to depths ranging from 20.4 mBGS to 102.0 mBGS. Of those wells, 46 are completed within shale or limestone bedrock and 4 are within sand/gravel. Depth to static water level in most of these wells range from 4.0 mBGS to 22.9 mBGS.

Wells with Completed Depths ≤20 mBGS:

Thirty-six (36) wells are completed to depths ranging from 9.1 mBGS to 19.5 mBGS. The remaining one (1) water well record notes a depth of 0.0 mBGS and provides no information on well installation and lithologies. This record is excluded from this discussion. Twenty-seven (27) of those wells are complete within shale or limestone bedrock, 5 within sand/gravel, and 4 within silt/clay. The formations intersected in 3 wells are not specified on the available record. Those 36 wells are further divided into two sub-groups, depending on depth to static water level:

1. Static water level >4 mBGS: Twenty-eight (28) wells have static water levels at depths greater than 4 mBGS. The wells (closest to the Project's excavations) are located approximately 21.8 m away from trenchless section excavations and 0.6 m away from open trench excavations.
2. Static water level <4 mBGS: Eight (8) wells have static water levels at depths less than 4 mBGS. Some of those wells are as close as 14.8 m to planned excavations to depths of to 4 mBGS for trenchless construction, and approximately 27.0 m to planned open trench excavations depths of 2 mBGS).

4.2.4 Surface Water

The route transects twelve major watersheds, which all drain into Lake Ontario (Figure 4.2-1). No watercourse[1] is crossed within two of the watersheds. Within the remaining ten watersheds, the route crosses 88[2] watercourses and 49 wetlands. Appendix F contains a list of waterbodies crossed by the route.

Starting at the Waterdown Pump Station, the Project footprint is located in the Borer's Creek Subwatershed in the Rock Chapel Creek Watershed. The route is located in a largely agricultural landscape in the headwaters of Borer's Creek, which eventually drains to Cootes Paradise Marsh, a large wetland at the west end of Lake Ontario (Hamilton Watershed Stewardship Program 2018). Following along the route eastward, the Project crosses the Grindstone Creek, Bronte Creek, Sixteen Mile Creek, and Joshua Creek watersheds, within a largely rural landscape (Conservation Halton Website 2018). The Project is at the headwaters of the Burlington Urban Streams Watershed but does not cross any streams or wetlands within this watershed. At the Highway 407 crossing, the Project crosses into the Credit River Watershed and an urban setting. This watershed is in one of the most densely populated parts of Canada with over 750,000 people living in the watershed (Credit Valley Conservation Foundation

[1] Watercourse' as used in this document refers to the Provincial Policy Statement (PPS) definition of "*river, stream and small inland lake systems*", that is, "*all watercourses, rivers, streams, and small inland lakes or waterbodies that have a measurable or predictable response to a single runoff event*" (Government of Ontario 2014), however, does not include wetlands as defined in Section 4.5.1 unless they contain open water.

[2] Some watercourses and wetlands are crossed multiple times; there are a total of 105 pipeline crossings through watercourses, and 54 pipeline crossings through wetlands, associated with the Project.

Website 2018). The Project continues eastward through the Cooksville Creek, Etobicoke Creek, and Mimico Creek watersheds, which are also urbanized. Approximately 60% of Mimico Creek is artificially channelized (Toronto and Region Conservation Authority Website 2018). The Project runs eastward through the Humber River Watershed, which is a large and densely populated watershed with 856,000 people (Toronto and Region Conservation Authority Website 2018). The Project terminates in the Don River Watershed but does not cross any watercourses or wetlands in this watershed.

4.2.5 Air and Noise

The Project occurs within rural, suburban and urban land use areas, with sources of air quality pollutants including vehicle traffic, industry, agriculture, and residences that result in emissions of particulate matter (e.g., aerosols, smoke, fumes, dust, fly ash and pollen), nitrogen dioxide, sulphur dioxide, ozone and volatile organic compound concentrations (MECC 2017).

Overall, air quality has improved in Ontario in the last decade, with substantial reductions in air pollutant concentrations as a result of the phase-out of coal-fired generating stations, reductions in industrial emissions, and vehicle emissions (MECC 2017). In 2016, there were no exceedances of the annual or 24-h Canadian Ambient Air Quality Standards (CAAQS) for fine particulate matter ($PM_{2.5}$) in Ontario (MECC 2017). Several exceedances of the ozone CAAQS were recorded; these exceedances were attributed partially to transboundary flows (MECC 2017).

Vehicle traffic is the predominant source of background noise in urban areas. In a recent study completed in the City of Toronto, daytime background noise levels in the City ranged from 51.6 to 79.5 dBa, and nighttime levels ranged from 42.6 to 74.4 dBa (City of Toronto 2017). Typical noise sources from pipeline construction and maximum anticipated volumes are presented in the Project Description (Table 2.3-1).

4.3 Biophysical Features

4.3.1 Vegetation and Wetlands

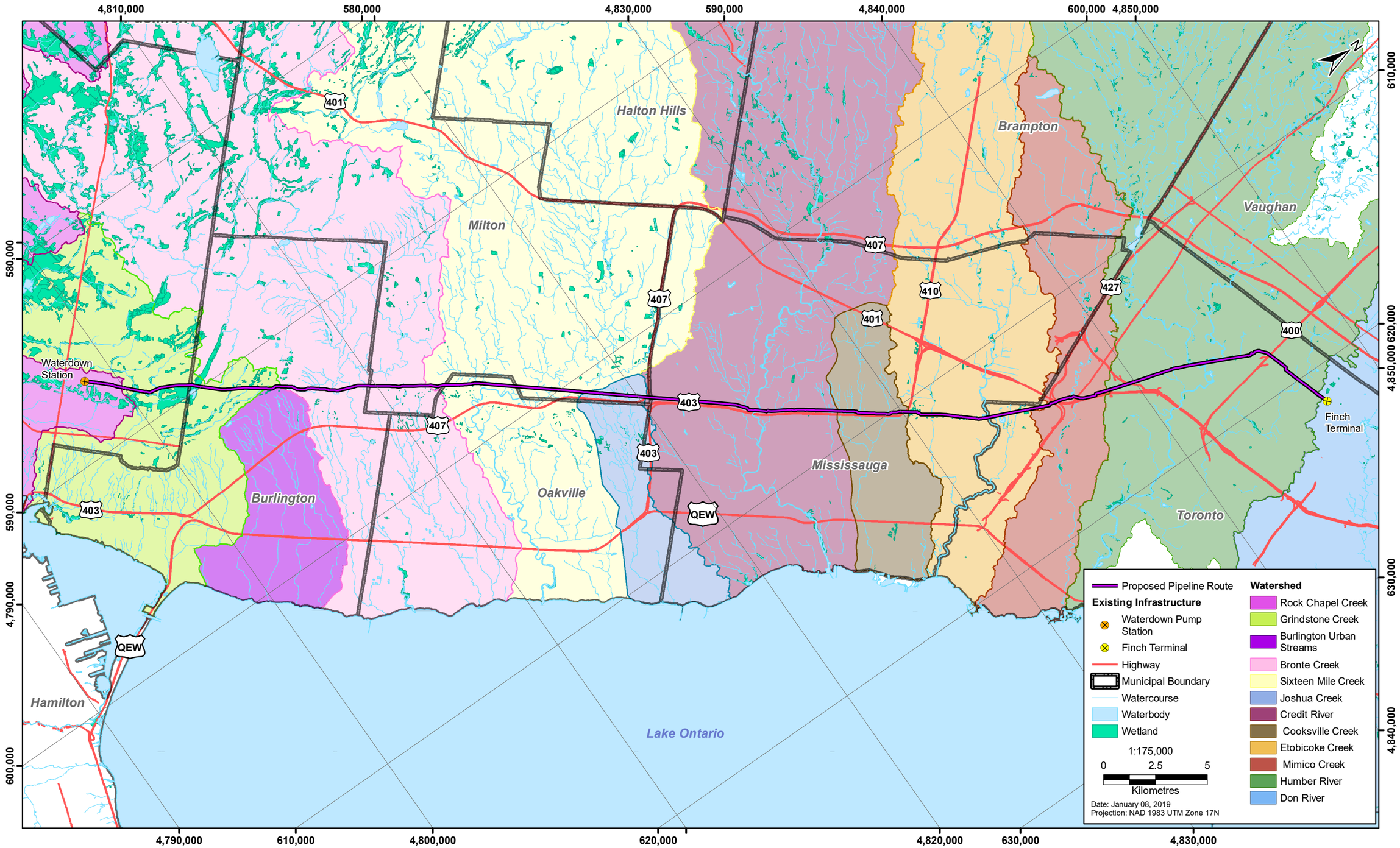
4.3.1.1 Vegetation

The predominant community types in the LSA are influenced by anthropogenic activities. These included cultural woodlands, thickets and meadows, agricultural communities, golf courses, mowed lawns, parklands, and residential areas. Natural vegetation communities were limited to approximately 10% of the LSA, with woodlands representing approximately 5%, and wetland communities the other 5%. Of the vegetation communities identified, one is considered to be provincially rare; Cliff and Talus Slopes (CLT1) was identified in the LSA at KP 9.8 along the Niagara Escarpment.

Vegetation communities in the LSA were identified using aerial imagery and verified during field surveys in 2018. Vegetation community types were confirmed, sampled and revised, if necessary, using the sampling protocol of the ELC for Southern Ontario (Lee at al. 1998). ELC was completed to the finest level of resolution (Vegetation Type) where feasible. ELC mapping of the LSA is provided in Appendix C. General descriptions of the identified vegetation communities are also provided in Appendix C.

Figure 4.2-1
Watersheds Along the Project Route

ERM



A total of 564 species of vegetation[3] were identified during three seasonal botanical surveys in the LSA in 2018. Of these species, the majority (99%) are provincially ranked S5 (common and secure), S4 (apparently common and secure), SU (status uncertain) or SNA (species not native to Ontario)[4], or are hybrids. Butternut (*Juglans cinerea*), which is listed as a Species at Risk in Ontario (SARO), was identified and is discussed further in section 4.5.4. In addition, four species identified as being of provincial concern (i.e., S1 to S3) were identified:

- Honey locust (*Gleditsia triacanthos*): Observed in two locations in the LSA, these individuals were determined to be escaped horticultural varieties and are not considered further (KP 13.1 and 27.2).
- Trumpet creeper (*Campsis radicans*): Observed at one location in the LSA, these individuals were determined to be escaped horticultural varieties and are not considered further (KP 13.0).
- Tall boneset (*Eupatorium altissimum*): Observed at one location in the LSA. The only native/naturally occurring population in the province is found on Pelee Island, and therefore this occurrence is considered to be introduced (KP 56.2).
- Virginia bluebells (*Mertensia virginica*): Observed in one location in the LSA within the Sixteen Mile Creek floodplain (KP 19.6).

Two species were identified with a Coefficient of Conservatism[5] greater than 9. One of these species is Virginia bluebells (listed above), and the second is yellow pimpernel (*Taenidia integerrima*), which was observed along the edge of a deciduous forest community in the LSA at KP 33.0.

4.3.1.2 Wetlands

Review of existing Land Information Ontario mapping identified five PSW complexes in the LSA and crossed by the footprint. These wetland complexes in the LSA, their locations along the Project footprint, and their identified ELC vegetation communities are presented in Table 4.3-1. A complete list of wetland crossings associated with the Project footprint is presented in Appendix F.

In addition to the known PSW, a number of unevaluated wetlands were identified in the LSA based on the results of the ELC. These were grouped into the complexes[6] presented in Table 4.3-2.

Following the Ontario Wetland Evaluation System for Southern Ontario, complex wetlands may be grouped into a PSW if they are within 750 m of a significant wetland community and are hydrologically connected to that community, among other factors. Table 4.3-2 also identifies groupings of unevaluated wetlands in the LSA that are potentially associated with existing PSWs.

Appendix F contains a complete list of wetland crossings, including associated wetland complexes, watercourses, and ELC vegetation communities.

[3] Species names generally follow nomenclature from the Database of Vascular Plants of Canada (Brouillet et al. 2010+).

[4] The provincial status of all plant species and vegetation communities is based on NHIC (2016).

[5] Identification of potentially sensitive native plant species is based on their assigned coefficient of conservatism (CC) value, as determined by Oldham et al. (1995). This CC value, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to a specific natural habitat. Species with a CC value of 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters.

6 Note that these are not formal complexes established during a wetland evaluation, rather, these complexes were established where their proximity and connectivity seemed relevant.

Table 4.3-1: Provincially Significant Wetlands in the LSA

Provincially Significant Wetland Complex	Location along Project Footprint	Ecological Land Classification within LSA
Lake Medad Valley Wetland Complex	KP 2.42 to KP 2.57	Reed canary-grass mineral meadow marsh (MAM2-2) Forb mineral meadow marsh (MAM2-10) Green ash mineral deciduous swamp (SWD2-2)
	KP 3.70	MAM2-2
	KP 5.33 to KP 5.66	Meadow Marsh (MAM) Organic deciduous swamp (SWD7) Mixedwood Swamp (SWM)
Grindstone Creek Headwaters Wetland Complex	KP 7.23 to KP 7.60	MAM2-2 Willow mineral deciduous swamp (SWD4-1)
	KP 7.95 to KP 8.2	MAM2-2 Swamp maple mineral deciduous swamp (SWD3-3)
North Oakville-Milton West Wetland Complex	KP 16.6 to KP 17.2	Forb mineral meadow marsh (MAM2) Thicket Swamp (SWT)
North Oakville-Milton East Wetland Complex	KP 25.25	Cattail organic shallow marsh (MAS3-1) SWD4-1
Centennial Park Wetland Complex	KP 44.6 to KP 46.00	Canada blue-joint graminoid mineral meadow marsh (MAM2-1) Submerged shallow aquatic (SAS)

Table 4.3-2: Unevaluated Wetland Complexes in the LSA

Unevaluated Wetland Complex	Location along Project Footprint	Ecological Land Classification in the LSA
Added to Logies Creek Parkside Drive Wetland Complex[1]	KP 0.60 TO KP 7.86	MAM2/CUM1-1
		SWM1-1
Added to Grindstone Creek Headwaters Wetland Complex[1]	KP 5.16 TO KP 5.17	MAM2
WE4	KP 6.36 TO KP 6.57	SWD2-2
		SWD3-3
Added to Grindstone Creek Headwaters Wetland Complex[1]	KP 8.35	MAS3-8
WE6	KP 8.66 TO KP 8.70	MAS2-1/MAM2-2
		SAF1-3
WE7	KP 10.50 TO KP 10.60	MAM2
WE8	KP 11.45 TO KP 11.63	MAM2-10
		SWT2-9
		MAM2-2
WE9	KP 12.20	MAM2-6

Unevaluated Wetland Complex	Location along Project Footprint	Ecological Land Classification in the LSA
WE10	KP 12.45 TO KP 12.52	SWT2-9
WE11	KP 12.96 TO KP 13.00	MAM2-10
WE12	KP 17.63 TO KP 17.67	MAM2-10/MAM2-2
WE13	KP 19.55	MAM2
WE14	KP 21.05 TO KP 22.03	CUM1-1/MAM2-10
WE15	KP 26.84 TO KP 27.30	MAM2-2
		MAS2-1
		MAS2-1/MAM2-2
WE16	KP 27.94 TO KP 28.12	MAM2-2
WE17	KP 28.37 TO KP 29.20	MAM2-2
		SWD3-3
		MAS2-1
WE18	KP 29.79 TO KP 29.82	MAS2-1
WE19	KP 32.05 TO KP 32.27	MAM2-2
		MAM2
WE20	KP 32.59 TO KP 32.78	MAM2/CUM1-1
WE21	KP 33.05 TO KP 33.10	SWD4-3
WE22	KP 33.33 TO KP 33.38	MAM2-2
WE23	KP 33.65 TO KP 33.7	MAS2-1
WE24	KP 34.60 TO KP 35.80	MAM2-2
		MAS2-1
WE25	KP 36.20 TO KP 36.30	MAS2-1
WE26	KP 36.53 TO KP 36.72	MAM2
		MAM2-2
		MAS2
WE27	KP 37.18 TO KP 37.25	MAS2-1
WE28	KP 39.91 TO KP 39.94	MAM2-10
WE29	KP 40.10 TO KP 40.15	MAM2
WE30	KP 40.20 TO KP 40.70	MAS2-1/MAM2-2
		MAS2-1
WE31	KP 41.20 TO KP 41.70	MAS2-1/MAM2
		MAS2-1
WE32	KP 42.30 TO KP 42.95	MAS2-1
Added to Centennial Park Wetland Complex[1]	KP 45.05 TO KP 45.10	MAM2-2
WE34	KP 46.60 TO KP 46.70	MAS2-1a

Unevaluated Wetland Complex	Location along Project Footprint	Ecological Land Classification in the LSA
WE35	KP 48.20 TO KP 48.91	MAM
WE36	KP 49.52 TO KP 49.65	MAM2
WE37	KP 50.50	MAS2
WE38	KP 52.70 TO KP 52.82	MAS2
WE39	KP 54.45 TO KP 55.65	MAM2-2
		SWD4-1
WE40	KP 57.75	MAS2-1
WE2	KP 59.98 TO KP 58.00	MAS2-1/MAM2-2
WE3	KP 60.30	MAM2

[1] Unevaluated wetland potentially associated with an existing PSW

4.3.1.3 Woodlands

Delineation of woodland communities was completed based on the results of the ELC, with forest (FO), swamp (SW), cultural woodland (CUW) and cultural plantations (CUP) considered. Each woodland community was numbered, with woodland patches separated by less than 20 m considered to be features of the same woodland in accordance with the recommendations in the Natural Heritage Reference Manual (MNR 2010). These woodland communities were compared against the relevant municipal Official Plan to confirm those features that have been previously identified as significant woodlands, significant natural areas, key features, or components of the natural heritage system. Woodlands considered to be significant are identified in Table 4.3-3.

Table 4.3-3: Significant Woodlands in the LSA

Municipality	Woodland Identifier	Location
City of Hamilton	WO1	KP 0to KP 0.9
	WO3	KP 2.4 to KP 2.6
	WO4	KP 4.4 to KP 5.2
City of Burlington	WO4	KP 5.2 to KP 5.8
	WO5/WO6	KP 6.3 to KP 67
	WO8/WO9	KP 7.3 to KP 7.5
	WO10	KP 8 to KP 8.5
	WO11	KP 9.4 to KP 10.6
	WO12	KP 11.3 to KP 11.5
	WO15/WO16	KP 11.8 to KP 13.2
Town of Milton	WO18	KP 17 to KP 17.3
City of Oakville	WO19	KP 17.6 to KP 17.7
	WO20/WO21	KP 18.8 to KP 19.9
Town of Milton	WO22/23	KP 22 to KP 22.8

Municipality	Woodland Identifier	Location
City of Mississauga	WO25 to WO28	KP 32 to KP 32.3
	WO29 to WO33	KP 32.5 to KP 33.1
	WO35	KP 41.1
	WO36	KP 43.2 to KP 43.3
City of Toronto	WO37 to WO40	KP 53.8 to KP55.4

Woodland communities in the LSA that were not already considered significant under municipal policy, were assessed for significance in accordance with the evaluation criteria contained in the Natural Heritage Reference Manual. Of these seven woodland communities, four (WO2, WO13, WO14 and WO17) were determined to be less than 0.5 ha in size and therefore too small to be considered significant features. In addition, at less than 40 m wide, WO34 did not meet the requirements for minimum patch width to require further assessment. The remaining two woodlands are discussed further below:

- WO7 is approximately 2.4 ha and comprises open cultural woodland and cultural plantation near Mt. Nemo Tributary 2b at KP 7.3. According to the Halton Region Official Plan, woodlands above the Niagara Escarpment need to be a minimum of 10 ha to be considered a significant feature, so WO7 is not considered a significant woodland.
- WO24 is a 0.55 ha deciduous forest/swamp community north of Highway 403 in Mississauga at KP 28.7. This woodland community is not identified as providing linkage functions, is not within 50 m of a watercourse or other significant natural feature, and was not identified as containing significant species, so WO24 is not considered a significant woodland.

4.3.2 Wildlife and Wildlife Habitat

The existing setting for wildlife and wildlife habitat was assessed by identifying significant wildlife habitat (SWH) in the RSA and conducting targeted surveys for breeding birds, bats, reptiles and species at risk in the LSA.

Targeted surveys for other wildlife species were not completed but incidental observations were recorded. Incidental observations included 6 species of amphibians, one species of reptile, six species of mammals, nine species of odonates and 12 species of butterflies. Of these species, all are generally considered common within the province except for monarch (*Danaus plexippus*), listed as being a Species Concern on the SARO list, and painted skimmer (*Libellula semifasciata*), listed as an S2 (imperiled) species. These species are discussed below in relation to the significant wildlife habitat in the RSA.

4.3.2.1 Significant Wildlife Habitat

SWH is one of the more complex natural heritage features to identify and evaluate. There are several provincial documents that discuss identifying and evaluating SWH, including the NHRM (MNR 2010), the Significant Wildlife Habitat Technical Guide (MNR 2000), and the SWH Eco-Region Criterion Schedule (MNRF 2015). The Subject Lands are located in Eco-Region 7E and were therefore assessed using the 7E Criterion Schedule (MNRF 2015).

There are four general types of SWH:

- Seasonal concentration areas;
- Rare or specialized habitats;
- Habitat for species of conservation concern; and

- Animal movement corridors.

Locations of candidate SWH are initially determined through review of ELC mapping of the LSA. Areas where candidate SWH were identified were then either assessed through detailed wildlife studies in accordance with the protocols identified in the 7E Criterion Schedule to confirm presence, or have been carried forward to the assessment of impacts as candidate SWH.

Seasonal Concentration Areas

Seasonal concentration areas are those sites where large numbers of a species gather together at one time of the year, or where several species congregate. Seasonal concentration areas include deer yards; wintering sites for snakes, bats, raptors and turtles; waterfowl stopover and staging areas; bird nesting colonies; shorebird staging areas; and migratory stopover areas for passerines or butterflies. Areas that support Special Concern species or provincially vulnerable to imperiled species (S1-S3), or if a large proportion of the population may be lost if the habitat is destroyed, are examples of seasonal concentration areas which should be designated as significant.

- Waterfowl stopover and staging areas were considered in relation to the larger wetland complexes along the study area; however, open water areas that were considered capable of supporting significant numbers of migratory waterfowl were not identified. A review of desktop information for the area also did not identify any known significant waterfowl stopover and staging areas. Open water communities, such as the large farm pond near KP 12, likely provide some stopover functions for migratory waterfowl but the small size indicates that the feature would not be considered significant.
- Raptor wintering is considered to occur along the pipeline route, with usage levels varying depending on snow conditions and small mammal population irruptions in any given year. The majority of large grassland areas are in active agricultural production (i.e., hayfields), or maintained for anthropogenic use (e.g., golf courses, parklands) and would not provide suitable habitat conditions. Wintering raptors are likely common along the existing ROW and utility corridor where it crosses through woodlands, as the interface between the woodland communities and the open habitats likely provide preferred foraging opportunities. However, the relatively narrow width and long linear nature of this feature do not support an overall identification as SWH.
- All woodland communities are considered as candidate significant bat maternity colonies. Based on bat acoustic monitoring (see Section 4.5.2.3), woodlands WO1, WO10, WO11, and WO29 are confirmed bat SWH given the large numbers of silver-haired bats and/or big brown bats recorded throughout the monitoring period.
- Habitats for over-wintering turtles are generally restricted to the major river systems, potentially including Bronte Creek, Sixteen Mile Creek, Credit River, and Humber River. Man-made ponds present in the LSA may also provide over-wintering habitats but are not considered to be candidate significant wildlife habitat in accordance with the Ecoregion Criteria Schedules.
- Suitable habitat conditions for reptile hibernacula were observed in locations close to the Niagara Escarpment, particularly between KP 4.5 and KP 5.5, and at KP 9.8. Fieldwork completed in the spring in these locations did not identify any evidence of significant reptile use, with only occasional eastern gartersnake *(Thamnophis sirtalis sirtalis*) and Dekay's brownsnake *(Storeria dekayi*) observed. However, it is considered likely that significant numbers of snakes over-winter within these areas, and therefore these locations are considered to represent candidate significant reptile hibernacula.
- Winter congregation areas for deer are to be determined by MNRF. Woodlands greater than 100 ha are assumed to be significant winter congregation areas for deer. As a result, woodlands WO4 and WO11 are considered to be significant deer wintering areas.

Rare or Specialized Habitats

Rare habitats are those with vegetation communities that are considered rare in the province. Subnational Ranks (SRanks) are rarity rankings applied to species at the state level in the United States, or at the provincial level in Canada, and are part of a system developed under the auspices of the Nature Conservancy (Arlington, VA). Generally, community types with SRanks of S1 to S3 (extremely rare to rare-uncommon in Ontario), as defined by the NHIC (2016), could qualify. These habitats are assumed to be at risk and likely also support additional wildlife species that are considered significant. No such habitats were identified in the LSA.

In addition to S1 to S3 communities, other communities are considered, including alvars, cliff and talus slopes, sand barrens, savannahs, and old growth forest. Within the LSA, cliff and talus slopes are present along the Niagara Escarpment at KP 9+800 but only at the periphery of the LSA. None of the other vegetation communities listed were identified during baseline surveys.

Specialized habitats are microhabitats that are critical to some wildlife species. The NHRM (MNR 2010) defines specialized habitats as areas that provide for species with highly specific habitat requirements, areas with exceptionally high species diversity or community diversity, and areas that provide habitat that greatly enhances species' survival. Specialized habitats identified in the LSA are described below:

- Waterfowl nesting habitat occurs throughout the LSA but no evidence of significant concentrations of nesting waterfowl were observed during baseline breeding bird surveys.
- A Cooper's hawk (*Accipiter cooperii*) nest was confirmed during baseline surveys; however, the feature was associated with a small woodland patch that was isolated from the core woodland. Therefore, this feature is not considered to be significant wildlife habitat for raptor nesting. No other stick nests were identified along the pipeline route during field surveys.
- All of the identified wetland communities (see Section 4.5.1.1) are considered to be candidate significant amphibian breeding habitat. In addition, several vernal pools were identified within woodlands WO4, WO5, WO10 and WO15, and these communities are also considered candidate significant amphibian breeding habitat as a result.
- Woodlands WO4 and WO11 meet the habitat requirements for woodland area-sensitive breeding birds. Though only a portion of the habitat features were surveyed, two of the indicator species (scarlet tanager and pileated woodpecker) of this habitat type were observed in these woodlands. Thus, they are considered candidate significant wildlife habitats.

Habitat for Species of Conservation Concern

Species of conservation concern include those that are provincially rare (S1 to S3), provincially historic records (SH) and Special Concern species. Several specialized wildlife habitats are also included in this SWH category, i.e., terrestrial crayfish habitat and significant breeding bird habitats for marsh, open country and early successional bird species.

Habitats of species of conservation concern do not include habitats of endangered or threatened species as identified by the *Endangered Species Act* (ESA) (2007). Endangered and threatened species are discussed in Section 4.5.4. The following habitats for species of conservation concern were identified in the LSA:

- Terrestrial crayfish chimneys were identified at three locations in the LSA (KP 17.0 to 17.2, KP 40.0, KP 54.6).

- Special Concern Woodland Breeding Birds (eastern wood-pewee, *Contopus virens*, and wood thrush, *Hylocichla mustelina*). These species were detected either individually, or in conjunction with each other, in woodlands WO1, WO4, WO9, WO11, WO15, WO18, WO20, WO21, WO22 and WO23.
- All patches of milkweed were mapped in the LSA, with patches searched for evidence of monarch butterfly breeding. Confirmed breeding of monarch (monarch caterpillar or eggs observed on milkweed plants) was recorded at these locations: KP 0.4 to 0.6, 2.0 to 2.5, 6.6, 7.3 to 7.5, 7.7 to 7.9, 9.8 to 10.9, 11.5 to 11.7, 11.9, 12.4 to 12.5, 18.7 to 18.9, 19.1 to 19.5, 19.8 to 20.6, 22.3 to 22.9, 24.8 to 25.3, 26.8 to 27.3, 42.3 to 42.4, 43.6 to 43.9, 45.1 to 45.3, 46.6 to 46.9, 47.8 to 47.9, 49.4 to 49.7, 53.2, 54.6 to 54.9, 55.3 to 55.4, 56.2 to 56.4, 58.5 to 58.6.
- Painted skimmers are commonly observed in shallow ponds and marshes in forested areas, and this species was observed along the hydro corridor between woodlands WO22 and WO23.
- A population of Virginia bluebells was identified within the Sixteen Mile Creek floodplain (KP 19.6).

Animal Movement Corridors

Animal movement corridors are areas that are traditionally used by wildlife to move from one habitat to another. This is usually in response to different seasonal habitat requirements, such as amphibian movement corridors between breeding and summer/over-wintering habitats.

Deer commonly move along riparian communities, hedgerows, or other connecting natural features. Several deer movement corridors are present to and from woodlands WO4 and WO11, given the large and linear nature of these features. But, given the number of dispersal corridors from these features, significant animal movement corridors for deer were not identified in the LSA.

Amphibian movement corridors between wetlands and nearby woodlands were considered. As with deer, amphibian movements between features would primarily occur along any connecting natural features/riparian areas where present. Though a detailed assessment confirming significant amphibian movement corridors was not completed, mitigation measures will be implemented to protect amphibians where movement corridors are crossed by the Project's construction.

4.3.2.2 Breeding Birds

Breeding bird surveys were conducted following protocol set forth by the Ontario Breeding Bird Atlas (Cadman et al. 2007) and the Ontario Forest Bird Monitoring Program (Cadman et al. 1998). Surveys were conducted between dawn and five hours after dawn with suitable wind conditions, and no thick fog or precipitation (Cadman et al. 2007). Forty-one point count stations were identified in the LSA based on aerial photo interpretation, and confirmed during the spring site reconnaissance conducted between May 7 and May 17, 2018. Stations were within or immediately adjacent to the various habitat types present in the LSA. Point counts were combined with area searches while moving to and from stations to help determine the presence, variety and abundance of bird species. Each point count station was surveyed for 10 minutes for birds within 100 m and outside 100 m. All species recorded on a point count were mapped to provide specific spatial information and were observed for signs of breeding behaviour. Surveys were conducted at least 10 days apart. In grasslands considered to be suitable for either bobolink or eastern meadowlark, surveys were completed in accordance with MNRF (2012) Guidelines for bobolink and eastern meadowlark.

These breeding bird surveys identified 81 species of birds during the breeding season. Of this total, 16 species are confirmed breeders, 41 are probable and 19 are possible breeders in the LSA. The remaining 5 bird species are considered non-breeders, flyovers or migrants. All species observed during the breeding bird surveys are listed in Appendix G. All of the probable, possible or confirmed breeding species are provincially ranked S5 (common and secure), S4 (apparently common and secure)

or SNA (species not native to Ontario). Four of the bird species recorded are listed as Threatened or Endangered on the Species at Risk in Ontario (SARO) list (Ontario Regulation 230/08) and are discussed further in Section 4.5.4. Two of the bird species are listed as being of Special Concern on the SARO list, and are discussed in respect of Significant Wildlife Habitat for Species of Conservation Concern in Section 4.5.2.1.

4.3.2.3 Bats

Acoustic bat monitoring in the LSA was completed in June 2018 at 13 monitoring stations placed in woodlands that have the potential to be directly impacted by tree clearing for the Project. Survey equipment and deployment period and methodology generally follow the MNRF protocols for SAR bats (MNRF 2017). The monitoring stations were selected based on aerial interpretation, ELC vegetation community types, and ground-truthing for suitable bat micro-habitat, such as clusters of trees that are >10 cm in diameter at breast height (DBH) and have peeling bark, leaf clusters, and cavities. Surveys to detect bat species were completed using Wildlife Acoustics Song Meter SM3BAT/SM4BAT recording devices over a minimum duration of 10 consecutive evenings.

Ultrasonic recordings were filtered to eliminate recordings with high levels of noise or with no bat calls, and then further analyzed using SonoBat's auto-classification tool. Any calls with a positive identification were reviewed by a wildlife ecologist with training in bat species identification by sonogram.
High frequency calls that were not identifiable to species were also manually reviewed to identify those with characteristics of species at risk bats (i.e., calls with frequencies greater than 40 kHz).

Of the calls recorded, the most common species recorded was the big brown bat (*Eptesicus fuscus*), representing more than 61% of the identifiable recordings. Other common species detected included the hoary bat (*Lasiurus cinereus*; 19%*)* and the silver-haired bat (*Lasionycteris noctivagans*; 10%). All other species represented around 10% of the total recorded calls. Occurrences of species at risk bats are discussed in Section 4.3.4.

4.3.3 Fish and Fish Habitat

Initial characterization of watercourses crossed by the Project was determined by conducting a desktop literature review (see Section 4.2). Municipal drainage spatial layers (i.e., mapping of culverts and ditches) from the various municipalities were not available, and some MNRF offices have not yet provided requested information regarding presence of species at risk and locations of *Endangered Species Act* protected habitat. Data from the literature review were used to collate documented fish species, potential presence of species at risk, thermal regime[7], and other features and sensitivities of note. Review of topographic mapping and aerial imagery was used to identify potential barriers to fish passage.

Field surveys followed an abbreviated version of the habitat assessment protocols described in Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures (BC Fisheries 2001), the Ontario Stream Assessment Protocol (OSAP) (Stanfield 2017), and other habitat assessment guidelines (Zale et al. 2012; VIU 2013) to document biophysical features and habitat values of the watercourses crossed by the Project. A qualitative assessment was conducted of habitat values for spawning, rearing, and over-wintering[8], and of connectivity during field surveys in summer and fall of 2018.

[7] Watercourses are classified by thermal regime, determined by the dominant proportion of temperature readings between June 1 and August 31: warm water (>25°C), cool water (19°C-25°C) and cold water (<19°C) (Metcalfe et al. 2013). These thermal classifications reflect the species assemblages likely to be present and inform restricted activity timing windows for in-stream works. Thermal regime depends upon factors such as groundwater inputs and shade, so may vary by site within any given watercourse.
[8] Given the high fish species biodiversity present in the RSA, generic requirements for these life stages were used, with a focus on the requirements of high value species such as species at risk (where potentially present).

Where there was the potential for the pipeline crossing to be located in a non-fish-bearing reach of a fish-bearing stream, because of a downstream barrier to fish passage or connectivity constraints[9] identified by review of available topographic mapping and aerial imagery, additional field surveys were conducted, in some cases outside of the LSA. Where a barrier to fish passage was identified, the reach(es) upstream of the barrier were assessed to determine if winter/dry season refugia were present. If no such refugia were present, the reaches upstream of the identified barrier were categorized as non-fish-bearing. Twelve streams were confirmed to be non-fish-bearing at the crossing location, and the remainder had sufficient downstream connectivity that fish presence cannot be precluded.

Watercourses at crossing sites were differentiated between streams and non-classified drainages. A stream was defined as a watercourse with a continuous channel bed of a minimum of 100 m in length, or a continuous channel bed known to contain fish, or which flows directly into a water body known to contain fish. Non-classified drainages include discontinuous Class C and D headwater drainage features (TRCA and CVC 2014) and swales (Stanfield 2017), where connectivity is insufficient to allow for fish presence. An additional classification of 'culverted' was added to capture watercourses that were extensively culverted[10] (i.e., for greater than 500 m) near or at a proposed Project crossing location.

Data received after the completion of the 2018 field program resulted in the identification of a number of additional watercourse crossings. This information included improved resolution aerial imagery (EagleView 2018), survey data for the Project (Stantec 2018), data provided by CH (November 2018) and CVC (December 2018). For the purpose of this ER, these watercourse crossing sites are conservatively classified based on aerial imagery. A field survey is planned for spring 2019 to assess these additional watercourse crossing sites.

Of the 105 crossing sites, 68 have been classified as streams, 33 sites have been identified as non-classified drainages, and four crossing sites have been classified as culverted underneath the crossing location. Streams were further classified into four groups to indicate sensitivity to disturbance by the Project. The sensitivity classification was a qualitative exercise based on professional judgment and considered riparian values (i.e., width and vegetation type), connectivity (i.e., flow and presence of downstream barriers), channel width, observed fish habitat values for different life stages (e.g., over-wintering, rearing, spawning), potential presence of fish and of species at risk, and assessments of stream sensitivity from the literature. The classifications are as follows:

- Class 1: Major fish-bearing stream, generally mainstem of watershed, large riparian zone, aquatic species at risk frequently present, good or excellent habitat values.
- Class 2: Permanent fish-bearing stream with substantial riparian zone and good connectivity, aquatic species at risk potentially present, fair to good habitat values.
- Class 3: Intermittent fish-bearing stream, variable (both width and vegetation type) riparian zone, potential connectivity concerns, poor to fair habitat values.
- Class 4: Non-classified drainage or non-fish-bearing stream.

Appendix F lists the classification and fish-bearing status of watercourses intersected by the Project. Appendix D shows the location and setting of these watercourses.

Diversity of fish species in the fish-bearing streams is generally reflective of habitat quality. Some of the Class 1 streams (e.g., the Humber River) have over 50 documented species of fish, whereas smaller streams (e.g., Cooksville Creek) have fewer than five documented species. Appendix F describes the fish

[9] Connectivity refers to the potential for connectivity at high flows, through a continuous channel with no permanent barriers to fish passage.

[10] Municipal drainage spatial data was not available; identification of culverts was based on review of OHN watercourse mapping, aerial imagery, and field surveys.

species documented in the watercourses crossed by the Project and individual species' habitat preferences. Reduced activity timing windows, relevant to the timing of construction, were also identified for each crossing location, based on thermal regime and fish distribution information provided in Appendix F. Fish species at risk are discussed in Section 4.5.4.

4.3.4 Species at Risk

The *Species at Risk Act* (SARA) (2002) protects Extirpated, Endangered and Threatened Schedule 1 species from being killed, harmed, harassed, captured, or taken, and their designated critical habitat from being destroyed.

In Ontario, ESA (2007) protects species[11] listed by the Committee on the Status of Species at Risk in Ontario (COSSARO) from being killed, injured, disturbed, captured, or harvested, and their habitat from being damaged or destroyed. "Habitat" under the ESA includes the following definitions:

- "General" habitat (based on the general definition in clause 2(1)(b) of ESA): "an area on which a species depends directly or indirectly to carry on its life processes including life processes such as reproduction, rearing, hibernation, migration or feeding"; and
- "Regulated" habitat (as defined in clause 2(1)(a) of ESA): the area prescribed for a specific species in a habitat regulation (MNRF 2016).

The terrestrial and aquatic species listed as Threatened or Endangered, either provincially on the SARO list or federally under Schedule 1 of SARA that could potentially occur in the LSA are described below. Because of the potential impact to species at risk[12] from inadvertent or intentional human interference, the specific locations of these species are not discussed herein but will be addressed directly with MNRF.

4.3.4.1 Vegetation

Butternut is the lone vegetation SAR identified in the LSA. Twenty six butternut trees (*Juglans cinerea*; provincially listed as Endangered) were identified in woodland communities in the LSA.

To date, of the 26 Butternut trees identified, eight were considered to be retainable or archivable trees, while the remaining 18 were determined to be in poor condition by a MNRF certified Butternut Health Assessor such that retention is not warranted.

It is likely that additional butternut trees will be identified by an arborist inventory to be completed in 2019. The results of this assessment will be provided to MNRF for review and confirmation.

4.3.4.2 Wildlife

Bobolink (*Dolichonyx oryzivorus*; provincially listed as Threatened) / eastern meadowlark (*Sturnella magna*; provincially listed as Threatened) are associated with large grassland communities and are therefore commonly found in agricultural hayfields. Numerous individuals were recorded within several hayfields in the LSA. In addition, two individuals were recorded during field surveys within cultural meadow communities that are not maintained for agriculture.

Bank swallow (*Riparia riparia*; provincially listed as Threatened) / barn swallow (*Hirundo rustica*; provincially listed as Threatened) were observed during breeding bird surveys, predominantly foraging over the landscape. Limited numbers of suitable nesting structures (barns) are present within the LSA.

[11] Those species listed as Endangered, Threatened or Extirpated

[12] Within this document, "species at risk" refers to both provincially and federally listed species, and "protected habitat" refers to both critical habitat, and to General or Regulated habitat.

However, no such structures are proposed for removal, and targeted investigations into the structures were not completed.

MNRF has identified Regulated habitat for Jefferson salamander (*Ambystoma jeffersonianum*; provincially listed as Endangered) and Class 1 and 2 General habitat for Blanding's turtle (*Emydoidea blandingii*; provincially listed as Threatened) in the LSA. Neither of these species were observed in the LSA during 2018 wildlife surveys. Project construction within these protected habitats will be in compliance with the ESA. Consideration will also be given to the potential for these species to be found outside of the protected habitats.

Vernal pools outside of protected habitat were considered in respect of potential for provision of characteristics capable of supporting Jefferson salamander. These pools were identified during an April site investigations, and assessed for salamander habitat suitability based on MNRF guidance. All vernal pools were revisited through the end of June to determine whether the hydroperiod is of sufficient length to support salamander breeding. Vernal pools identified during the surveys were determined not to provide optimal habitat conditions for Jefferson salamander, and all identified pools were dry by late June. As a result, the hydroperiod of these features is considered to be too narrow to support amphibian breeding. As a result, no breeding habitat for Jefferson salamander was identified outside of the regulated areas.

Suitable habitat features for Blanding's turtle outside of the MNRF identified General habitat were not encountered in the LSA during wildlife surveys. It is recognized that this species will often range far from nesting and over-wintering areas, and therefore may be found incidentally in the LSA.

During acoustic bat surveys, species at risk bats were identified in several woodland communities including WO1, WO4, WO10, WO11, WO15, and WO2. Suitable maternity colony features were identified within each of these communities during field surveys.

4.3.4.3 Fish

Three species of aquatic fish species at risk have been identified as potentially present in the LSA. Redside dace (*Clinostomus elongates*; provincially and federally listed as Endangered), American eel (*Anguilla rostrate*; provincially listed as Endangered), and silver shiner (*Notropis photogenis*; provincially listed as Threatened*)* have been documented in several watercourses crossed by the Project footprint. Potential presence of these three species was considered at crossing sites based on habitat suitability, and on connectivity to watercourses with documented presence of a given species. Suitable habitat for spawning, rearing and/or over-wintering is present at a number of crossings where these species are potentially present.

A federal recovery strategy has not yet been prepared for redside dace, and as such it has no designated critical habitat (Government of Canada 2017). MNRF has not yet provided information on the presence or absence of General or Regulated habitat for this species in the LSA. Suitable spawning, rearing and over-wintering habitat was identified at a number of crossing locations.

American eel does not spawn in Ontario. Suitable rearing and over-wintering habitats were identified at several watercourse crossing locations. MNRF has identified General habitat for this species in the LSA.

General habitat for silver shiner was also identified by MNRF in the LSA. Suitable spawning, rearing and over-wintering habitat for this species was identified at a number of crossing locations.

4.4 Socio-economic Features

This section provides a description of existing land uses and socio-economic conditions along the Project's route. The land use LSA is defined as a 250 meter buffer around the centreline and workspace area. The socio-economic LSA is defined as a 250 meter buffer around the centreline while the

socio-economic RSA includes the communities of Hamilton, Burlington, Milton, Oakville, Mississauga and Toronto (Table 4.4-1). In Toronto, the Project passes through four federal electoral districts, including Etobicoke Centre, Etobicoke North, Humber River – Black Creek, and York Centre, and information is provided at that level where available.

Table 4.4-1: Communities along the Project Footprint

Community	KP Begins	KP Ends
Hamilton	0	5.2
Burlington	5.2	13.9
Milton	13.9	17.6
Oakville	17.6	21.1
Milton	21.1	27.6
Mississauga	27.6	44.1
Toronto	44.1	62.5

Source: ERM Internal Analysis

4.4.1 Land Use Planning

Several land use planning policies that are used to manage land use in the region are relevant to the Project. These include the Provincial Policy Statement, the Greenbelt Plan and the Niagara Escarpment Plan.

The Provincial Policy Statement for Ontario, most recently issued in 2014, provides direction on all matters of land use planning and development in the province. The Statement states that all infrastructure “shall be provided in a coordinated, efficient and cost-effective manner that considers impacts from climate change while accommodating projected needs” and is planned to meet current and future needs while being financially viable over its life cycle. Development of new infrastructure requires consideration of existing infrastructure as well as opportunities for re-adaptive use. Infrastructure is required to be “strategically located to support the effective and efficient delivery of emergency management services” (MAH 2014).

The Greenbelt Plan (2017) for Ontario, together with Ontario's Greater Golden Horseshoe Growth Plan (Growth Plan), builds on the Provincial Policy Statement to establish and support land use planning and development in the Greenbelt. Among other capacities, “the Growth Plan provides the policy framework to guide infrastructure planning and investments to support and accommodate forecasted growth in a manner that is integrated with land use planning and environmental protection.” Planning, design and construction of infrastructure needs to minimize negative impacts on landscape, key heritage or hydrologic features, and specialty crops. The plan also indicates that when infrastructure crosses prime agricultural areas, an agricultural impact assessment should be undertaken. The Project footprint crosses the Greenbelt Plan Area from the Waterdown Pump Station and sporadically along highways 403 and 407, up to their intersection in Mississauga, with lands identified as protected countryside, natural heritage system, and Niagara Escarpment Plan Area (MMA 2017).

The Niagara Escarpment Plan (2017) is a large-scale environmental land use plan that directs activities in the Niagara Escarpment and its vicinity to ensure new developments are compatible with the natural environment. Infrastructure developments are to be designed with the least possible impact to encourage green infrastructure and low impact developments. The location and design of new infrastructure are to minimize the negative impact on the Escarpment environment including impact on parks, green spaces, The Bruce Trail and Escarpment Natural Areas. Infrastructure should also avoid prime agriculture areas where possible. Only linear infrastructure is to be developed in prime agricultural areas and is subject to

an agricultural impact assessment or equivalent analysis. Portions of the Project footprint (from the Waterdown Pump Station to Highway 20) are within the Niagara Escarpment Plan area and are also located on agricultural lands.

4.4.2 Existing Land Use

From west to east the Project crosses through the communities of Hamilton (Waterdown Station) Burlington, Oakville, Milton, Mississauga, and Toronto (Finch Terminal). Official community plans and land use planning policies in those communities may be relevant to the Project and provide information on land use designation in the Project footprint. Land use designation as described under each community plan include:

- Rural land use designations: agricultural lands, specialty crops, rural settlement areas and other rural open spaces. Agricultural lands are primary long-term designations that provide a secure land base for agricultural activities. Land designations include agricultural uses, agricultural-related commercial and industrial uses, and on farm-secondary uses. Agricultural lands start at the Waterdown Station and continue to the intersection of highways 407 and 403 in Mississauga. Specialty crops areas (also identified by the Greenbelt Plan) identify lands of unique growing potential. Rural settlement areas are intended to be residential and centres that serve the immediate community and the surrounding rural area.
- Business/employment areas: lands that support economic functions in communities (business centres) as well as those that support those businesses, such as parks, workplace daycares and restaurants, small scale retail stores, and services to meet the daily needs of businesses and employees.
- Environmentally Sensitive Areas (ESA): areas that have special environmental attributes (diverse landscape, plant and/or wildlife populations or rare ecosystems) that are protected from development.
- Mixed uses: combine a broad array of residential uses, offices, retail and services, institutions, entertainment, recreation and cultural activities, and parks and open spaces.
- Neighbourhoods: include residential and apartment uses, as well as lower scale buildings, parks, schools, local institutions, small-scale stores and shops.
- Niagara Escarpment Plan area: land use designations include the Escarpment Natural Area, Escarpment Protection Area, and Escarpment Rural Area (Table 4.4-2). Escarpment Natural Area identifies lands that are in a relatively natural and undisturbed state (valley lands, wetlands and woodlands) and may contain important heritage resources, wildlife habitat or essential ecosystem. Escarpment Protection Area designates lands of visual prominence or environmental significance, as well as natural features that have been significantly modified by land use, agriculture or residential activities. Escarpment Rural Area includes portions of escarpment and lands in its vicinity, providing a buffer to more ecologically sensitive areas.
- Parkway Belt/utility corridor: a multi-purpose corridor for the transmission of energy and communication, and transportation that can also serve as urban separator, and provide space for parklands, sport fields, pedestrian and cycling trails, and transit facilities. Parkway Belt extends from 17.6 KP to 46.1 KP.
- Public and private open spaces/natural areas: include parks, open spaces, golf courses, and other recreational and cultural areas.

Table 4.4-2: Greenbelt and Niagara Escarpment Plan Areas

Plan Type	Total Distance Intersected	Intersecting KP
Greenbelt Plan (Protected Countryside)	9.0 km	0.0 - 3.8; 13.2 - 14.0; 15.7 - 17.4; 18.5 - 20.2; 21.9 - 22.9.
Escarpment Natural Area	1.8 km	4.8 - 5.8; 7.3 - 7.4; 8.1 - 8.1; 9.7 - 9.8; 10.0 - 10.0; 10.5 - 10.6; 12.1 - 12.2; 12.9 - 13.2.
Escarpment Protection Area	3.0 km	4.5 - 4.7; 5.8 - 6.0; 8.9 - 9.7; 9.8 - 10.0; 10.0 - 10.5; 10.6 - 11.4; 11.5 - 11.9.
Escarpment Rural Area	4.6 km	3.8 - 4.5; 4.7 - 4.8; 6.0 - 7.3; 7.4 - 8.1; 8.1 - 8.9; 11.4 - 11.5; 11.9 - 12.1; 12.2 - 12.9.

Specific official community plans relevant to land use planning in the LSA include:

- Rural Hamilton Official Plan, which applies to rural lands in the City of Hamilton: According to the plan's land use designations, the Project footprint crosses through rural settlement, agriculture, and rural and open space areas including Joe Sam's Leisure Park. The plans also identify that the Project footprint crosses the Niagara Escarpment Plan Area, including the Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area (City of Hamilton 2018).
- Official Plan for the City of Burlington: In the City of Burlington, the Project footprint crosses the Niagara Escarpment Plan Area as well as agricultural rural areas. The Niagara Escarpment Plan Area includes ESA, Escarpment Natural Area, and Escarpment Protection Areas, as well as Escarpment Rural Area. Recreational areas include the Hidden Lake Golf Club (City of Burlington 2018).
- Livable Oakville Plan for lands north of Highway 407: The Project footprint crosses lands designated as Parkway Belt and Greenbelt lands described in Part E of the Plan (Special Policy Areas) and are subject to the Greenbelt Plan. Recreational areas include Angel's View at Oakville Executive Golf Club (Oakville 2018).
- Town of Milton Official Plan: As identified in the Plan, the Project footprint is located in the southernmost part of the Town of Milton, in agricultural areas, crossing the Parkway Belt West Plan Area, ESA and Greenlands A Area, as well as deferred and appealed areas (Milton 2018).
- Mississauga Official Plan: The Project footprint in Mississauga is in an urban area consisting of neighbourhoods (residential areas), land designated as business employment, mixed use and downtown, and along the Parkway Belt West, crossing public and private open spaces and utilities. Green spaces, Erin Mills Athletic Fields, Culham Trail, Hewick Meadows and Tomken Arena are on or in proximity to the Project footprint, as well as designated parking areas and multiple road crossings (Mississauga 2018).
- Toronto's Official Plan: Along the Project footprint, land use designations west of Highway 401 include employment areas, natural areas and parks (Centennial Park) and golf courses (Centennial Park Golf Centre). After crossing Renforth Drive, the Project footprint runs in the utility corridor in proximity to residential neighbourhoods, mixed use and employment areas. At about KP 54.3, extending to KP 56.6, the Project footprint crosses natural areas, including Summerlea Park, West Humber Parkland, Humber River Recreational Trail, Saint Lucie Park, and Habitant Park. The Project footprint then continues in the utility corridor and crosses parks and other green spaces, including Remberto Navia Sports Fields, Driftwood Park and a nearby community garden (at KP 60.9). The Project footprint crosses multiple roads, parking and commercial/business areas (Toronto 2018).

Additional official plans include:

- Official Plan for the Regional Municipality of Halton: This outlines a long-term vision for Halton's physical form and community character, as well as policy positions to be required in the Official Plans and Zoning By-laws of Burlington, Oakville, Milton and Halton Hills. The Region provides direction on matters such as management of land and natural resources, housing development, provision of services, community growth and economic development. Local municipalities direct development in accordance with local desires while adhering to the overall planning vision for Halton and policies of the plan (Halton 2018).
- Region of Peel Official Plan: This applies to the combined areas of the cities of Brampton and Mississauga, and the town of Caledona, and outlines strategies to guide growth and development in the Region. The plan serves as the primary long-range land use policy document for the Region of Peel. Provincial plans (such as the Niagara Escarpment Plan, Greenbelt Plan and Parkway Belt West Plan) that apply to portions of the Peel Region take precedence over the Regional Plan. (Peel Region 2018)

Land use designations relative to the Project footprint and land use LSA are shown in Figure 4.4-1.

Agricultural Land

Agricultural land in the land use LSA comprises of prime agricultural land (23.46 km) and candidate area (1.09 km), and extends from the Waterdown Pump Station (in Hamilton) to the highway 407/403 intersection for approximately 27.5 km, although some land is also farmed past the highway 407/403 intersection.

Agricultural land crop type includes corn, soybeans, and winter wheat. Harvested crops are summarized in Table 4.4-3. Corn, soybeans and wheat are in crop rotation of wheat-corn-soybean-corn with wheat able to grow in several consecutive years, and therefore leading to substantial variability in what is harvested year to year.

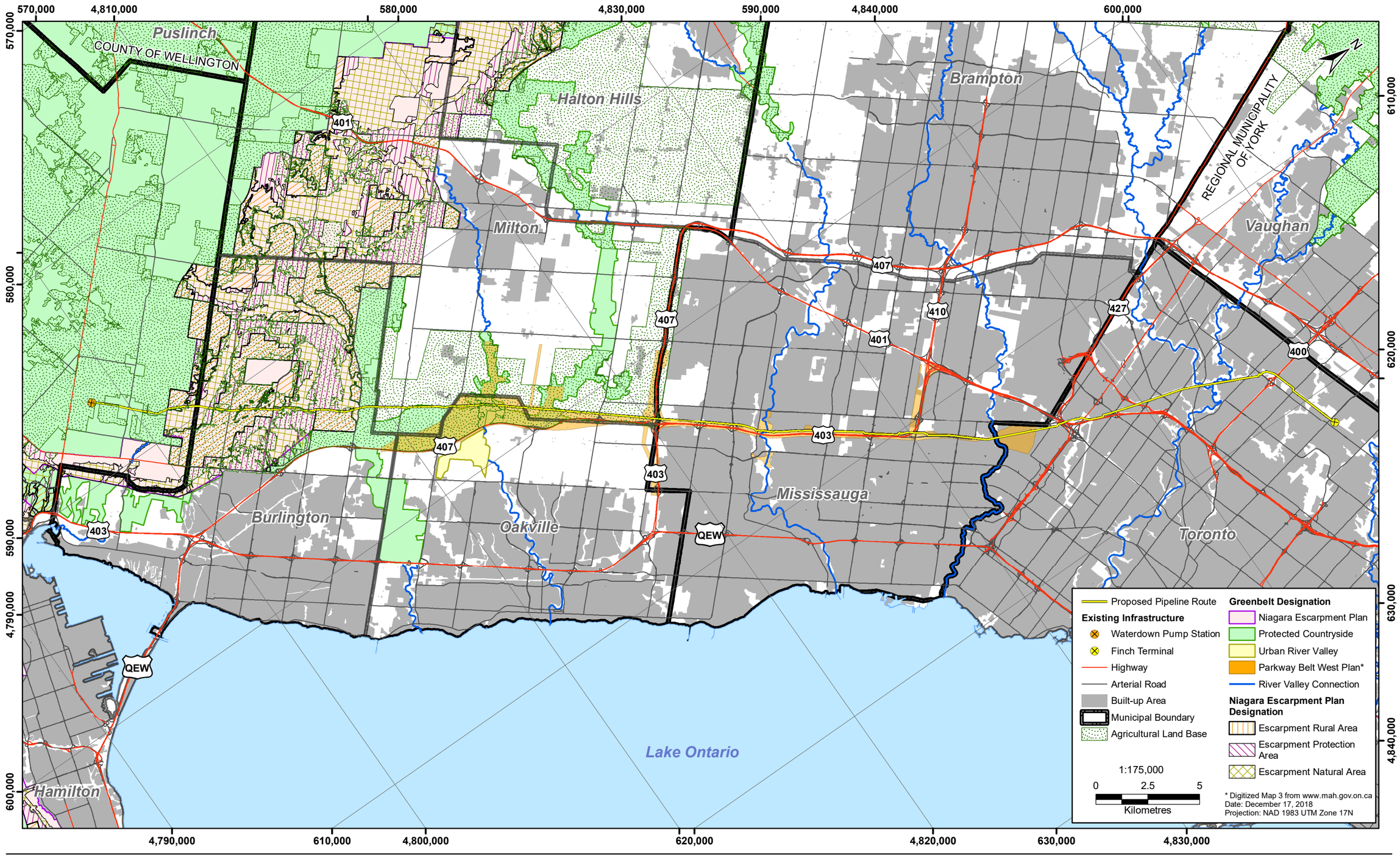
Table 4.4-3: Identified Agricultural Uses in the Land Use LSA, 2017

Crop Type	Total Distance Intersected	Intersecting KP
Corn	1.43 km	1.34 - 1.67; 11.91 - 12.03; 12.19 - 12.38; 12.57 - 12.62; 15.96 - 15.97; 16.07 - 16.18; 16.28 - 16.39; 18.14 - 18.24; 18.30 - 18.32; 18.35 - 18.56; 21.57 - 21.59; 23.89 - 23.90; 23.99 - 24.13.
Soybeans	8.85 km	0.00 - 0.08; 0.23 - 0.26; 0.27 - 0.30; 0.35 - 0.43; 0.44 - 0.64; 0.92 - 1.09; 1.10 - 1.13; 1.18 - 1.26; 1.27 - 1.30; 1.31 - 1.34; 2.79 - 3.08; 3.10 - 3.17; 3.21 - 3.23; 7.51 - 7.51; 7.55 - 7.69; 8.94 - 9.23; 9.38 - 9.42; 9.45 - 9.48; 11.09 - 11.10; 11.14 - 11.21; 11.53 - 11.56; 11.66 - 11.91; 12.03 - 12.19; 12.68 - 12.75; 13.98 - 14.38; 14.80 - 15.19; 15.63 - 15.96; 15.97 - 16.07; 16.18 - 16.28; 16.39 - 16.45; 16.50 - 16.61; 16.68 - 16.77; 16.86 - 16.98; 17.01 - 17.07; 17.67 - 17.70; 18.24 - 18.30; 18.32 - 18.35; 18.63 - 18.87; 18.89 - 18.97; 21.14 - 21.16; 21.22 - 21.57; 21.59 - 22.01; 22.74 - 22.76; 22.78 - 22.81; 22.81 - 23.47; 23.51 - 23.89; 23.90 - 23.99; 24.13 - 24.57; 24.76 - 26.19; 26.25 - 26.80; 40.54 - 40.55.
Winter Wheat	1.02 km	3.40 - 3.46; 11.13 - 11.14; 11.21 - 11.25; 13.20 - 13.23; 13.57 - 13.97; 17.52 - 17.63; 17.71 - 17.81; 21.02 - 21.07; 21.10 - 21.14; 21.16 - 21.22; 22.01 - 22.10; 22.72 - 22.74; 22.76 - 22.78; 22.81 - 22.81.

Source: Government of Canada (2018)

Figure 4.4-1
Waterdown Finch Project, Land Use Designation

ERM



Other Land

Remaining land from the Waterdown Pump Station to the Finch Terminal comprises of broadleaf forest, exposed land and barren, grassland, mixwood, pasture and forages, and shrubland. Everything else (mostly past highway 407/403 intersection in Mississauga) is classified as urban and developed area (Table 4.4-4).

Table 4.4-4: Other Land Uses along the Project Footprint, 2017

Land Type	Total Distance Intersected
Broadleaf	5.97 km
Exposed Land and Barren	1.73 km
Grassland	0.08 km
Mixwood	0.41 km
Pasture and Forages	13.05 km
Shrubland	0.21 km
Urban and developed	28.95 km

Source: Government of Canada (2018)

4.4.3 Residents and Businesses

Approximately 30.0 km of the Project is in urban and developed areas, including residential properties and businesses, starting roughly at the highway 407/403 intersection and continuing to the Finch Terminal (KP 27.5 to 62.5), although residential properties are also intersected between KP 0 to 27.5. Although the Project footprint is located in a utility corridor, in suburban and urban areas it is in proximity to neighborhoods with apartment buildings and single-family houses. The Project footprint is also close to a number of employment and service areas, intersecting parking lots and storage areas.

4.4.4 Institutional Services and Facilities

Several institutional services and facilities are in the LSA, including 11 schools, one hospital, and 24 religious institutions (Table 4.4-5). There are also two fire stations (KP 50.4 and 61.7) and a police station (KP 58.7) within the LSA. One hospital is within 500 m of the Project footprint (KP 31.4).

Table 4.4-5: Institutional Services and Facilities in the Socio-economic LSA

Features (within 250 m)	Number	Names of Facilities	Approximate KP
Schools and Learning Centres	11	Philip Pocock Catholic Secondary School	41.1
		Mother Cabrini Catholic School	46.6
		Timothy Christian School	54.1
		Emery Adult Learning Centre & Collegiate Institute	57.0
		Norfinch Adult Education Centre	58.3
		Monsignor Fraser College (Norfinch Campus)	58.7
		St. Pio of Pietrelcina Elementary School/Childcare	58.7
		St Charles Garnier Catholic School	59.2
		Seneca College (Yorkgate Campus)	59.5

Features (within 250 m)	Number	Names of Facilities	Approximate KP
Schools and Learning Centres *(cont'd)*		Driftwood Public School	59.9
		James Cardinal McGuigan Catholic High School	61.5
Religious Institutions	24	St. Thomas The Apostle Church	1.73
		Free Methodists Church	38.3
		Mississauga Southern Chinese Baptist Church	42.2
		Kingdom Hall of Jehovah's Witnesses (Dixie Rd)	42.3
		New Life Christian Assembly of Toronto (573 Albion Rd)	42.3
		St. Peter's Syriac Orthodox Church of Canada	42.4
		Apostle's Continuation Church	51.4
		Nanaksar Gurdwara	52.1
		International Muslims Organization (65 Rexdale Blvd)	52.5
		Rexdale Gospel Hall	53.1
		Ti Agia Maria & St Demiana Church	53.4
		Grace Fellowship Church	53.7
		Faizan-e-Madina (595 Albion Rd)	54.3
		The Cathedral Church of St. Mary	54.3
		Korean Saints Church	54.6
		New Life Assembly	54.6
		Weston Road Pentecostal Church	56.2
		The Prayer Palace	57.2
		Good Shepherd Chaldean Cathedral	57.5
		Mahadhammika Buddhist Vihara (Burma Buddhist Association of Ontario)	57.8
		Toronto Chinese Christian Reformed Church	61.1
		Friendship Community Church	61.9
		Snowball Church	61.9

4.4.5 Culture, Tourism, and Recreational Facilities

The Project crosses and is close to several municipal and city parks, golf courses and recreational areas (Table 4.4-6). The Project footprint crosses the regions of four Conservation Authorities (Hamilton Region CA, Halton Region CA, Credit Valley Region CA, and Toronto and Region CA). Etobicoke and North York Hydro Green Space, as well as city-wide open spaces, are located within the Project footprint.

4.4.6 Linear Infrastructure

The Project footprint is close to or intersects five major highways and 27 major roads, for approximately 130 total road crossings. The most significant highway crossing is at the intersection of Highway 401 and Highway 427. The Project intersects five rail line corridors for a total of 14 railway tracks.

Table 4.4-6: Recreational Areas in the Socio-economic LSA

Features (intersected by Project or within 250 m)	Number	Names of Facilities	Approximate KP
Parks and Recreational Areas	23	Joe Sam's Leisure Park	1.9-2.5
		Crawford Walk	30.7
		Erin Mills Athletics Fields	31.4-31.7
		Hewick Meadows	33.0
		Ellis Leuschner Challenge Park	33.2-33.6
		Tomken Arena	41.2
		Wood Creek Park	43.9
		Centennial Park	44.1-46.7
		Centennial Mini-Indy	44.9
		Centennial Park Pan Am BMX Centre	45.3
		Soccer City	48.3
		Royal Woodbine Golf Club	49.7-49.9
		Stoffel Drive Allotment Garden	53.1
		Rexlington Park	53.5
		The Elms Park	53.9
		Turpin Avenue Park	54.1-56.7
		West Humber Parkland	54.8
		Summerlea Park	56.3
		St Lucie Park	56.8
		Habitant Park and Arean	56.9
		Lindy Lou Park	58.6-59.3
		Remberto Navia Sports Fields	60.0-60.5
		Driftwood Park	60.3
		Black Creek Parkland	61.0-61.6
		Four Winds Allotment Garden	61.3-61.5
Golf Course Crossings	3	Hidden Lake Golf Club	5.8-6.8
		Angel's View at Oakville Executive Golf Course	20.2-21.1
		Centennial Park Golf Centre	44.1-45.0

Along the Project footprint there are active underground oil and gas pipelines (Enbridge, Sun Canadian, Trans Northern Pipeline), as well as a deactivated 10-inch Imperial-owned oil and gas pipeline running between KP 0 and 48. At about 29.4 KP, Sun Canadian Pipeline's underground oil and gas pipeline begins to run along the Project footprint, and at about 40.4 KP, the TNPI oil and gas pipeline begins.

There are also electrical transmission lines that run along or intersect the Project. In total, the Project footprint crosses 124 power lines, 22 central water lines, 175 utility lines and 79 foreign pipelines. A summary of infrastructure crossings is provided in Table 4.4-7.

Table 4.4-7: Summary of Linear Infrastructure Crossings

	Location of Crossings by KP Range							
Crossing Type	**0 - 10**	**10 - 20**	**20 - 30**	**30 - 40**	**40 - 50**	**50 - 60**	**60 - 70**	**Grand Total**
Foreign Pipeline	8	3	10	18	23	17	0	79
Powerline	10	10	15	20	23	44	2	124
Railroad	1	1	0	1	0	2	0	5
Road	5	7	22	31	32	29	4	130
Utility	11	11	14	35	34	62	8	175
Water CL	4	8	3	4	1	2	0	22

4.4.7 Economy and Employment

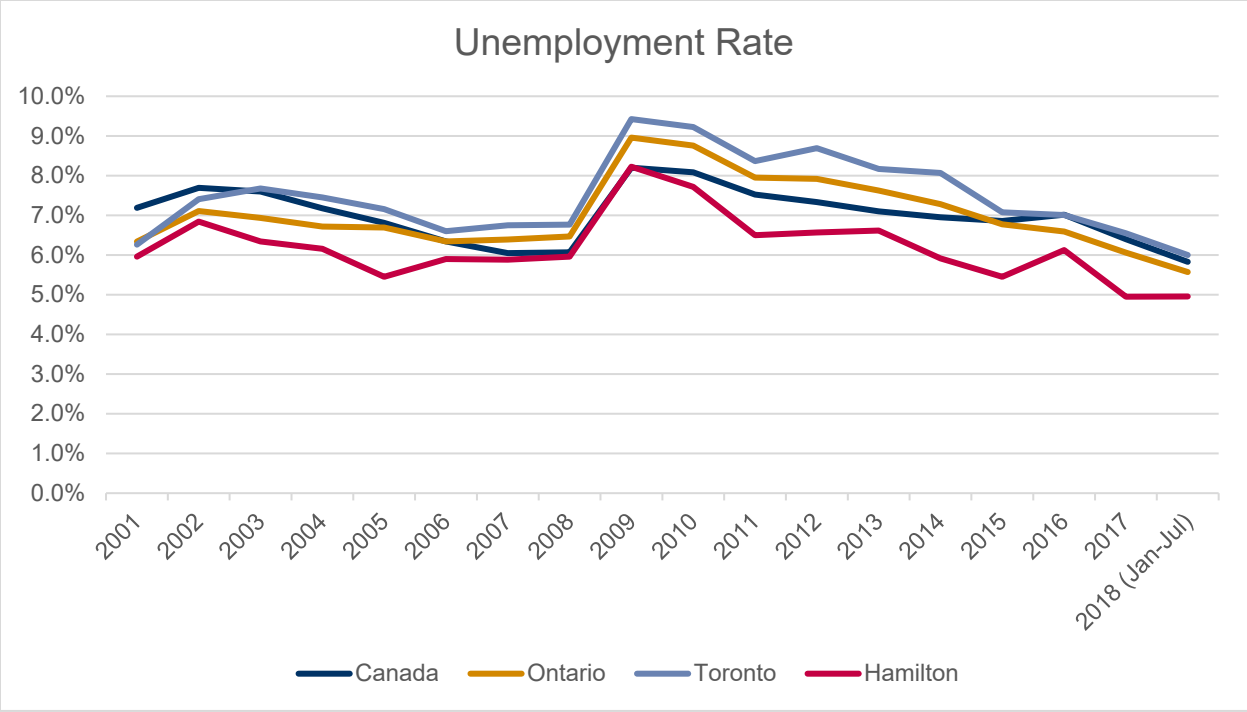
Employment and income data are provided for the socio-economic RSA that includes the communities of Hamilton, Burlington, Oakville, Milton, Mississauga, and Toronto (including the four federal electoral districts). The communities of Burlington and Milton have lower unemployment rates (5.6%) compared to the provincial (7.4%) and national (7.7%) averages, suggesting that the jobs markets in those communities favour the job seeker. The cities of Mississauga and Toronto have higher unemployment rates of 8.3% and 8.2%, respectively, compared to the provincial and national averages, suggesting the job market favours the employer (Table 4.4-8).

Table 4.4-8: Labour Force Characteristics, 2016

Characteristic	Hamilton	Burlington	Oakville	Milton	Mississauga	Toronto	Ontario	Canada
In the labour force	278,640	101,650	105,750	59,815	394,640	1,483,680	7,141,675	18,672,475
Participation rate	63.2%	68.0%	68.2%	74.2%	66.4%	64.7%	64.7%	65.2%
Employment rate	58.7%	64.2%	63.5%	70.1%	60.8%	59.3%	59.9%	60.2%
Unemployment rate	7.0%	5.6%	6.9%	5.6%	8.3%	8.2%	7.4%	7.7%

Source: Statistics Canada (2017)

Historically, the unemployment rate in the RSA has fluctuated, with a peak of above 10.0% in July 2009 for the City of Toronto and a gradual decline thereafter (Figure 4.4-2). The City of Hamilton has consistently had the lowest unemployment rates, with the lowest unemployment of 4.0% in November 2017.



Source: Statistics Canada 2018

Figure 4.4-2: Annual Unemployment Rate in the Socio-economic RSA

Toronto had 226,190 people aged 15 years and over in the labour force in 2016, with an average participation rate of 61.2%. Of the four federal electoral districts in Toronto through which the Project runs, Etobicoke North and Humber River – Black Creek had the highest unemployment rates of 10.6% and 11.0%, respectively. Unemployment rates in Etobicoke Centre and York Centre were 7.2% and 7.7%, respectively.

Healthcare and social services, retail trade, manufacturing, and professional and scientific services represent the largest industries by employment in the LSA, accounting for approximately 40% of all employment (Table 4.4-9). The Humber River – Black Creek electoral district had the largest proportion, or one in five workers, employed in manufacturing, followed by Etobicoke North, with one in six in that sector. Also, compared to data for the City of Toronto, Humber River – Black Creek had a larger proportion employed in construction (8.7%), with a lower share in Etobicoke Centre (7.7%), York Centre (7.6%), and Etobicoke North (7.0%).

Employment income ranges from 71.5% of all income in Hamilton to 83.2% in Milton, with the largest share, 13.3%, of government transfer payments occurring in Hamilton (Table 4.4-10). The City of Milton had the highest median employment income of $44,594, compared to lesser incomes in Hamilton, Mississauga, and Toronto, and Ontario and Canada as a whole (Table 4.4-10). Further, in the four electoral districts in Toronto, the lowest median household income was in Humber River – Black Creek at $53,500; household income was $61,000 in both Etobicoke North and York Centre, and $82,400 in Etobicoke Centre. Government transfer payments represented the largest share of income in Etobicoke North and Humber River – Black Creek at 19.2% and 22.3%, respectively.

Table 4.4-9: Employment, by Industry, in the Socio-economic RSA, 2016

Industry	Hamilton	Burlington	Oakville	Milton	Mississauga	Toronto	Ontario	Canada
All industry categories	271,985	100,200	103,580	58,775	382,205	1,437,540	6,970,625	18,268,125
Agriculture; forestry; fishing and hunting	1.1%	0.4%	0.3%	0.8%	0.2%	0.1%	1.5%	2.4%
Mining; quarrying; and oil and gas extraction	0.1%	0.2%	0.3%	0.2%	0.1%	0.1%	0.5%	1.5%
Utilities	0.5%	0.7%	0.6%	0.6%	0.5%	0.4%	0.7%	0.7%
Construction	7.4%	5.5%	4.7%	6.0%	5.9%	5.3%	6.8%	7.5%
Manufacturing	12.2%	9.9%	7.7%	10.0%	10.6%	7.3%	9.8%	8.7%
Wholesale trade	4.1%	6.1%	5.6%	6.7%	6.0%	3.5%	3.9%	3.6%
Retail trade	11.8%	12.2%	10.9%	11.8%	11.9%	9.8%	11.2%	11.6%
Transportation and warehousing	4.2%	3.8%	3.6%	6.3%	7.0%	4.0%	4.7%	4.8%
Information and cultural industries	2.0%	2.8%	3.1%	2.6%	2.7%	4.3%	2.5%	2.3%
Finance and insurance	4.0%	6.6%	10.3%	7.9%	7.7%	8.3%	5.5%	4.3%
Real estate and rental and leasing	1.8%	2.2%	3.0%	1.8%	2.3%	2.8%	2.1%	1.8%
Professional; scientific and technical services	5.8%	9.3%	13.1%	9.3%	10.1%	12.2%	8.1%	7.3%
Management of companies and enterprises	0.1%	0.4%	0.5%	0.3%	0.3%	0.3%	0.2%	0.2%
Administrative and support; waste management and remediation services	5.2%	4.2%	3.7%	4.0%	5.5%	5.5%	4.9%	4.4%
Educational services	8.9%	8.6%	7.9%	8.0%	6.3%	7.7%	7.6%	7.4%
Health care and social assistance	13.3%	10.5%	9.0%	8.4%	8.4%	10.0%	10.8%	11.7%
Arts; entertainment and recreation	1.8%	1.9%	2.1%	1.6%	1.4%	2.4%	2.1%	2.1%
Accommodation and food services	6.7%	6.3%	5.9%	5.0%	6.1%	7.4%	6.9%	7.0%
Other services (except public administration)	4.3%	3.7%	3.5%	3.5%	3.9%	4.7%	4.3%	4.5%
Public administration	4.6%	4.7%	4.1%	5.2%	3.2%	3.7%	6.0%	6.2%

Source: Statistics Canada (2017)

Table 4.4-10: Median Individual and Household Income in the Socio-economic RSA, 2015

	Hamilton	Burlington	Oakville	Milton	Mississauga	Toronto	Ontario	Canada
Median employment income in 2015 among recipients ($)	$33,209	$40,896	$42,427	$44,594	$34,727	$33,602	$33,946	$33,684
Composition of Income:								
Employment income	71.5%	74.4%	77.0%	83.2%	78.0%	74.4%	72.9%	72.0%
Government transfers	13.3%	8.2%	5.2%	7.4%	9.8%	9.4%	11.1%	11.7%
Median total income of households in 2015 ($)	$69,024	$93,588	$113,666	$104,730	$83,018	$65,829	$74,287	$70,336

Source: Statistics Canada (2017)

4.4.8 Archaeological Resources

Archaeological assessments carried out in Ontario follow four stages, though not all stages will be necessary for all projects:

- Stage 1: determines whether a parcel of land contains the potential for significant archaeological resources through a review of geographic, land use, and historical information. An optional property inspection may be used to supplement the background research and is required in order to exclude areas of low potential from requiring a Stage 2 assessment.
- Stage 2: identifies any archaeological sites that are present within the lands that are part of the development project through physical testing of areas determined to exhibit archaeological potential.
- Stage 3: assesses the degree of cultural heritage value or interest (CHVI) of identified archaeological sites through more extensive testing and makes recommendations regarding appropriate strategies for mitigating development impacts, if warranted.
- Stage 4: recommended mitigation strategies are carried out, whether through the implementation of avoidance and protection measures to conserve the archaeological site or, if protection is not a viable option, through the completion of archaeological excavation to document the site and remove the artifacts.

Criteria for determining CHVI of provincial significance are in the *Ontario Heritage Act* (OHA; Ontario Regulation 10/06), with further guidance provided by the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011). Archaeological sites that have been identified as exhibiting CHVI are afforded protection through the OHA, where under Sections 48 and 69 of the Act, it is an offence for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further CHVI, and the report has been filed in the *Ontario Public Register of Archaeological Reports* (referred to in Section 65.1 of the OHA).

If an archaeological site is determined to possess CHVI of provincial significance requiring mitigation of development impacts, development of the area (typically consisting of the known limits of the site as well as a protective buffer) would only be allowed if appropriate steps have been taken so that the site remains unaltered and is avoided during development. If avoidance and protection are not feasible, complete excavation and recording of the site, or the portions of the site that cannot be avoided, would be required. Once completed, the archaeological concerns under the land use planning and development process may be considered addressed and development may proceed.

A desktop evaluation was conducted as part of the Stage 1 Archaeological Assessment for the Project, using the *Archaeological Report Database* and *Archaeological Sites Database* maintained by MTCS. The evaluation provides spatial representation and attribute information for archaeological sites and previous assessment areas in Ontario. The database mainly lists archaeological sites discovered by professional archaeologists conducting archaeological assessments required by legislated processes under land use development planning (mostly since the late 1980s). Areas that have been previously assessed and are not recommended for further work are generally considered cleared of archaeological concern.

To support the Stage 1 Assessment, a field visit took place from November 15 to November 18, 2017 and consisted of spot checks at targeted locations in the LSA. Areas of specific interest during the visit were water crossings, areas of known archaeological sites, deep and extensive land disturbances, and areas of possible pipeline rerouting. Areas with conclusive evidence of previous deep and extensive land disturbance (e.g., quarrying, or major landscaping involving grading below topsoil, building footprints, sewage and infrastructure development) can be considered to have had archaeological potential removed

in the affected area. This information has been incorporated into the Draft Stage 1 Archaeological Assessment Report (Miller et al. in progress). Based on the results of the Stage 1 Assessment, a Stage 2 Archaeological Assessment is currently being undertaken for the Project.

Based on the Stage 1 Archaeology Assessment, the LSA was generally determined to exhibit characteristics that indicate potential for the presence of archaeological resources associated with pre-Contact Indigenous settlement and/or land uses. Specifically, parts of the LSA are:

- located within 300 m of primary and secondary water sources, both of which are potential sources of potable water, wild game and other food resources;
- located within 300 m of known archaeological sites attributed to Indigenous settlement and/or land uses; and
- located along the Niagara Escarpment, an area of elevated topography and a distinctive land formation.

The LSA also exhibits characteristics that indicate potential for the presence of archaeological resources associated with post-Contact Indigenous and Euro-Canadian settlement and/or land uses. Specifically:

- the factors noted above would have made the LSA suitable for continued occupation by Indigenous groups through the post-Contact period;
- parts of the LSA are located within 300 m of known archaeological sites attributed to Euro-Canadian settlement and/or land uses;
- the LSA crosses multiple historic transportation routes with associated potential buffers of 100 m;
- the LSA is located within 300 m of multiple early Euro-Canadian settlements, as indicated by nineteenth-century mapping and surviving buildings; and
- the LSA is located immediately adjacent to and runs through designated heritage properties and landscapes, specifically the Pinchin Farm Property and the Credit River Corridor Cultural Landscape.

Given the number of features of archaeological potential identified in or adjacent to the LSA, the evaluation of potential began from the assumption that all portions of the LSA contained archaeological potential. Previous archaeological assessments within the LSA have cleared small areas of further archaeological concern and these do not require any further archaeological assessments unless archaeological resources are unexpectedly encountered during construction. The property inspection combined with background research then allowed for the identification of some areas of deep and extensive disturbance.

Between KP 0 and 28.4, the LSA is mainly composed of agricultural fields and forest and crosses several watercourses and wetlands. The TWS also passes through residential and commercial properties, a park and two golf courses within this section. From KP 28.4 to KP 39.9 the LSA is within the HONI corridor between residential subdivisions to the west and Highway 403 to the east. This land crosses rivers and creeks, and is mainly a mix of manicured grass, untouched grasslands and parks. A small section of the current pipeline between KP 30 and KP 32 travels east, across Highway 403 and through the back yards of multiple private residences. Within this KP range, the Stage 1 Assessment included both the existing pipeline and the alignment of the new pipeline away from the private residences. From KP 40 to the pipeline's terminus at KP 62.5, the utility corridor becomes increasingly urbanized. In this section, the LSA crosses creeks and rivers, multiple parks and green spaces, a golf course, the Humber River Valley forest, parking lots, current construction zones, and residential and commercial properties.

Based on the desktop and property inspections conducted, issues of archaeological concern, including archaeological sites, river crossings and potential cemeteries, have been documented in the Draft Stage

1 Archaeological Assessment Report (Miller et al. In progress). Of particular concern to the Project is the Parsons Site (AkGv-8) located at approximately KP 61, as it has remained largely intact, except for sporadic excavations from the 1950s to 1980s and two Stage 4 mitigation excavations along a limited corridor for a water main and for a multi-use pathway. The Lake Medad Site (AiGx-3, approximately KP 5.5) with a high CHVI, the Dark Site (AjGv-26, approximately KP 36.6), the First Site (AjGv-25, approximately KP 38.8) with unknown CHVI, and the Emery Site (AkGv-12, approximately KP 56.8) are located in the immediate area of the existing pipeline and their extents have not been well established.

All water sources (creeks, rivers, lakes and wetlands) hold high potential for the identification of archaeological sites within 300 m and therefore pose a moderate potential for finding archaeological resources. The Black Creek and Credit River possess a higher-level archaeological potential because they are in areas where numerous other Indigenous archaeological sites have been identified.

4.4.9 Cultural Heritage Resources and Landscapes

The process for screening of potential impacts to built heritage and cultural heritage landscapes (CHL) in Ontario is carried out as a separate and distinct study. In some cases, this study requires a separate assessment process, including a Cultural Heritage Evaluation Report (CHER), prepared by a qualified consultant, which is reviewed by the *Culture Services Unit* within MTCS. The results of the study are presented here based on an *Existing Conditions Report on Cultural Heritage Landscapes and Built Heritage Resources* prepared for the Project (Unterman McPhail Associates In progress).

The study found that the footprint follows established easements for a pipeline corridor (1952) and a HONI transmission corridor (1930s). Much of the established pipeline easement traverses an open, rural, agricultural landscape from Waterdown to the City of Mississauga. From Mississauga to the City of Toronto and the Finch Terminal, the footprint is within the HONI transmission corridor. The footprint crosses an urban environment characterized primarily by industrial/commercial and infrastructure development of the mid- to late-20th Century.

The field survey identified CHL and built heritage resources located within the LSA. CHL can be separated into three types, namely, designed landscapes, evolved landscapes and associative landscapes. These types of CHL were identified by the UNESCO World Heritage Committee in 1992 and have been adopted by Parks Canada and the Ontario MTCS for evaluation. In the identification of the principal CHL of heritage value or interest within the LSA, the following considerations were applied during the field survey:

- Farm complexes were to include two or more buildings, one of which must be a farmhouse or barn, and may include a tree-lined drive, tree windbreaks, fences, gardens and small orchards;
- Roadscapes were to generally be no more than a two-lane width, with absence of shoulders or narrow gravel shoulders and grassy ditches, and may be distinguished by tree lines, bridges, culverts and other associated features;
- Waterscapes were to contribute to the overall character of the CHL in relation to their influence on historic development and settlement patterns and ideally associated built heritage resources;
- Railscapes were to be active or inactive or railway rights of way typically shown on 19th and early- to mid-20th Century historical maps; and
- Agricultural landscapes generally were to comprise a farming pattern that reflected a recognizable field pattern within an area, or on an individual lot, and could have associated agricultural outbuildings, structures, and natural and vegetative elements such as hedgerows and tree rows.

Since the Project follows established infrastructure, the presence of individual built heritage resources or resources associated with CHL, such as farm complexes and population centres, in the LSA was limited. No historic settlements, population centres or cemeteries are located in the LSA.

Within the LSA, twenty-seven (27) cultural heritage resources, principally CHL, were identified within the study area. Since agricultural land is found within much of the western half of the study area, its presence is considered to be a constant feature. As well, the pipeline ROW (1952) and the HONI transmission corridor (1930s) are considered to be continuous throughout the LSA. Therefore, these landscapes are not considered individual sites.

The principal cultural heritage resources identified LSA are associated with transportation (i.e., rural roadscapes). The roadways mainly follow township concession and sidelines surveyed in the 19th Century, and are noted on historical mapping and conform to the definition of a roadscape (see above) used for the survey identification process. Rail lines that have their origins in the 19th Century and early 20th century and shown on historical mapping were also identified as CHL.

The Project footprint crosses several rivers and some smaller tributaries along its length. The Grindstone Creek, Twelve Mile Creek, Sixteen Mile Creek, Bronte Creek, Etobicoke Creek and Black Creek are of historical interest with regard to the theme of township settlement and are generally illustrated on nineteenth century mapping. However, built heritage resources that are formally recognized within their respective municipalities as CHL, or are forty years of age and older and are associated with the waterscapes, were identified within the study area. Therefore, these waterscapes are not considered as separate CHL.

4.5 Contaminated Sites

A Phase 1 Environmental Site Assessment (ESA) and a review of Environmental Risk Information Service (ERIS) regulatory database reports identified three sites of known hydrocarbon product contamination to soil and groundwater resources, as listed below. There is also the potential for other sites to be intersected along the route, particularly in the urban setting, that have undocumented hydrocarbon or other contaminant impacts.

- Waterdown Pump Station (KP 00+000) – Imperial's Waterdown Station contains a known site where hydrocarbons are present in local soil and groundwater. A remedial system has been in place since 2013.
- McCulloch Avenue (KP 51 +300) - a known site of hydrocarbon soil contamination, but of unknown source, is proximal to Imperial's existing 12 inch pipeline near McCulloch Avenue in Toronto. Based on ERM's review, the affected soils were not removed, and remain in place.
- Finch Receiver Valve (KP 63+000) - the Finch Receiver Valve is situated at Imperial's Finch terminal storage facility, where available ERIS database report identified previous reportable spills. Based on available data, no known active remedial activities have been conducted. Therefore, soils and groundwater may be currently impacted in the Project footprint.

5. EFFECTS ASSESSMENT

The OEB's Environmental Guidelines require an assessment of the potential environmental effects that a project can have on the existing physical, environmental and socio-economic conditions, and the identification of mitigation measures to avoid or minimize potential effects.

The OEB's Guidelines also require a cumulative effects assessment to assess the potential effects of the Project in combination with other projects and/or existing infrastructure, which is presented in Section 6.0.

5.1 Assessment Methods

This Project effects assessment was completed following the OEB Environmental Guideline (2016). The assessment was completed for physical (Section 5.2), biophysical (Section 5.3), and socio-economic (Section 5.4) features of the existing environment. The effects assessment is completed in the following steps:

- Identification of potential adverse effects of the Project on each environment and socio-economic feature;
- Identification of the typical and specific mitigation measures to be implemented to avoid or minimize the potential adverse effects; and
- Assessment of net adverse effects (i.e., the adverse effects after mitigation has been considered).

The relevance of the identified net adverse effects on the features are considered in terms of significance and likelihood. Significance is described in terms of magnitude, geographic extent, duration, frequency, and reversibility of the effect on a physical, environmental or socio-economic feature, which are assessed by addressing the following questions:

- *How much will the feature be affected?*
- *What area will be affected?*
- *How long will the effect last?*
- *How often will the effect occur?*
- *Can the effect be reversed?*

The level of public concern and the ecological context of the net effect is also considered. The likelihood of the net effect considers its probability to occur. Following the precautionary principle, if an effect is uncertain it is therefore considered likely to occur.

The assessment of net effects is focused on the construction phase of the Project, scheduled from December 2019 to November 2020 (see Section 2.1 for a detailed schedule) but considers site restoration activities for up to three years following construction, and pipeline operation and maintenance. The pipeline will be operated and maintained for more than 50 years. Refer to Section 5.4.9 (Contamination) for the net effects assessment related to a potential spill during the operation phase of the Project.

5.2 Physical Features

5.2.1 Physiography and Geology

The potential adverse effects on physiography and geology are predicted to be:

- Alteration of topography;
- Removal of bedrock;

- Precluding of mineral resource mining expansion;
- Impacts to karst features (e.g., sedimentation of groundwater); and
- Disturbance of paleontological resources.

The effects of Project construction of the on topography and geology are anticipated to be the disturbance within the footprint resulting from grading and trenching during construction. These effects will be minimized by returning the disturbed areas to preconstruction conditions to the maximum extent practicable. Landslide risk is low in the LSA due to gentle slopes. Trench and slope breakers will be used as needed at the Niagara Escarpment and on valley slopes such as near Mullet Creek and the Credit River.

If consolidated rock is encountered during construction, Imperial's preferred procedure will be to cut and excavate the bedrock using standard construction equipment. Cutting of bedrock will only be required in areas if relatively hard bedrock (i.e., crystalline bedrock) is encountered and the bedrock cannot be removed by conventional excavation methods. Following rock cutting, and where necessary, excess rock will be removed from the site and disposed of locally, subject to landowner approval and applicable permit conditions. In areas where rock predominates and little suitable backfill material is available, rock will be pulverized and placed in the trench as pad material around the pipe.

Construction of the pipeline will not preclude the expansion of existing mining operations, as expansion is currently precluded by roads, waterbodies, and property boundaries. Additionally, the pipeline will be located within an existing easement and utility corridor. No impacts to mineral resources are anticipated.

If karst features are identified in the LSA, erosion and sediment controls will be installed along the edge of the construction footprint upslope of the karst features with a direct connection to the phreatic zone of the karst to prevent the introduction of sediment into the subterranean karst environment. Construction related water discharges in karst areas will be directed to well-vegetated upland areas with no karst features present or to approved discharge structures. Water will not be discharged directly into sinkholes, and discharged water will be directed away from known karst features with a direct connection to the phreatic zone of the karst.

Paleontological resources can be affected by construction activity through ground disturbance (grading, excavation, HDD), resulting in direct disturbance and/or loss of the resource.

Maintained pipelines constructed using modern materials welding techniques have performed well in seismically active areas. Only large, abrupt ground displacements have significantly affected pipeline facilities. Due to the limited potential for large, seismically induced ground movements in the LSA, there is little risk of earthquake-related impacts on the pipeline (O'Rourke and Palmer 1996).

A summary of potential environmental effects, the key mitigation measures to be implemented, and the assessed net effect on physiography and geology are presented in Table 5.2-1.

Net effects of the Project on physiography and geography are predicted to be effectively mitigated and reversed through standard practice pipeline construction and restoration practices. Surface disturbance of many of the slopes and embankments in the Project footprint will be avoided by using trenchless construction. In areas of trenched construction and at entry and exit locations of trenchless construction, restoration of the Project footprint to preconstruction conditions to the maximum extent practicable will begin immediately after construction. Revegetation and the resulting stabilization of soils in the footprint is expected within three years, which is expected to effectively reverse the net effects of the Project on physiography and geology. Therefore, net adverse effects of the Project on physiology and geology are not expected to occur.

Table 5.2-1: Potential Effects, Key Mitigation Measures, and Net Effects on Physiography and Geology

Potential Effect	Key Mitigation Measures	Net Effect
Alteration of topography	■ Return ground contours to preconstruction conditions to the maximum extent practicable. ■ Install trench and slope breakers as needed on slopes that are susceptible to landslide.	None
Removal of bedrock	■ Fracture and excavate the bedrock using standard construction equipment and saws. ■ Properly dispose of excess rock material.	None
Precluding of mineral resource mining expansion	■ All existing mining operations are currently precluded by roads, waterbodies, property boundaries, and/or existing rights-of-way.	None
Sedimentation of groundwater via karst features	■ Install erosion and sediment controls to divert water away from known karst features. ■ Limit water discharges to well-vegetated upland areas with no karst features present.	None
Disturbance of paleontological resources	■ Stop work and notify agencies or organizations if significant fossils are found during construction.	None

5.2.2 Soil

The potential adverse effects on soil are predicted to be:

- Mixing of topsoil and subsoil;
- Drain tile damage;
- Soil compaction;
- Soil erosion;
- Introduction of rocks into topsoil;
- Poor re-vegetation; and
- Proliferation of soybean cyst nematode (SCN).

Trenched construction of the Project will have effects on soils in the footprint. During trenched construction and at entry and exit locations of trenchless construction, topsoil and subsoil will be disturbed as a result of topsoil stripping, grading, trench excavation, and by heavy equipment movement. The potential mixing of topsoil or surface soil with the subsoil from these activities could result in a loss of soil productivity. To prevent mixing of the soil horizons or incorporation of additional rock into the topsoil, topsoil segregation will be performed anywhere topsoil is present within the pipeline workspace, including non-saturated wetlands, cultivated or rotated croplands, managed pastures, hayfields, and residential areas. Topsoil will be segregated, as appropriate, from the subsoil and stored in windrows along the edge of the workspace. Topsoil will be replaced in the reverse sequence during backfilling and final grading. Implementation of proper topsoil segregation will help promote post-construction re-vegetation success, thereby minimizing loss of crop productivity and the potential for long-term problems with erosion.

Drain tiles are subsurface structures used in some agricultural areas to improve the productivity of the land by increasing drainage of the soils. Drain tile damage could occur by operation of heavy construction equipment, causing rutting in wet soils, and during excavation of the pipeline trench, as most drain tiles

are installed at a depth shallower than the planned trench depth. Imperial will consult with landowners prior to construction to identify and/or repair any drain tiles or irrigation systems that would be affected by the Project.

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Construction equipment traveling over wet soils could disrupt the soil structure, reduce pore space, increase runoff potential, and cause rutting. The degree of compaction depends on moisture content and soil texture. Fine-textured soils with poor internal drainage that are moist or saturated during construction are the most susceptible to compaction and rutting. Compaction impacts will be mitigated through the use of deep tillage operations during restoration activities using a paraplow or similar implement. In areas where topsoil segregation occurs, plowing with a paraplow or other deep tillage implement to alleviate subsoil compaction will be conducted before replacement of the topsoil.

Droughty soils which have a coarse surface texture and are “somewhat excessively” or “excessively” drained could prove difficult to re-vegetate. Drier soils have less water to aid in the germination and eventual establishment of new vegetation. Coarser textured soils also have a lower water-holding capacity following precipitation, which could result in moisture deficiencies in the root zone and creation of unfavorable conditions for many plants. In addition, the presence of certain soil conditions along the pipeline route that may reduce moisture-holding capacity (e.g., previously compacted soils) could result in poor re-vegetation of the footprint, including a potential increase in invasive plant species. Following final grading and cleanup, Imperial will condition the construction footprint for planting, including the preparation of a seedbed and application of soil amendments at rates agreed to by the landowner or land managing agency, or as specified in writing by an appropriate Conservation Authority. Seeding and mulching in cultivated areas will conform to the adjacent off-right-of-way area unless otherwise requested in writing by the landowner or in accordance with written recommendations for seed mixes, rates, and dates obtained from Conservation Authorities, MNRF, and municipalities.

Erosion is a continuous natural process that can be accelerated by human disturbance. Factors that influence erosion include soil texture, structure, length and percent of slope, vegetative cover, and rainfall or wind intensity. Soils most susceptible to erosion by water are characterized by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Clearing, grading, and equipment movement could accelerate the erosion process and, without adequate protection, result in discharge of sediment to waterbodies and wetlands. Soil loss due to erosion could also reduce soil fertility and impair re-vegetation. Temporary erosion controls will be installed prior to initial ground disturbance and maintained throughout construction. Imperial will complete final cleanup as soon as practical after construction, weather and soil conditions permitting. In no case will restoration of an area be delayed beyond the next available seeding season. Except in active agricultural areas, temporary erosion control devices will be maintained until the footprint is re-vegetated successfully. Following successful re-vegetation of construction areas, temporary erosion control devices will be removed.

Introducing rocks to the surface soil horizon could reduce soil moisture-holding capacity, resulting in a reduction of soil productivity. Additionally, some agricultural equipment could be damaged by contact with large rocks. Rocks at the surface and in the surface soil horizon could be encountered during grading, trenching, and backfilling. In addition, construction through soils with shallow bedrock could result in the incorporation of bedrock fragments into surface soils. The introduction of subsoil rocks into agricultural topsoil will be minimized by segregating topsoil from subsoil and replacing topsoil during cleanup and restoration. Where bedrock is encountered during construction, the trench will be cut with a specialized saw attachment. Imperial will minimize the mixing of excavated bedrock with backfill and will replace rock in the trench to a level that is not higher than the original bedrock profile. Where necessary, excess rock will be removed from the site, or alternatively, disposed of locally subject to landowner approval and applicable permit conditions.

The proliferation of the soybean cyst nematode (SCN), a soil-borne parasite, has significantly impacted soybean yields in Ontario for several years. SCN spread can occur between agricultural fields through the inadvertent transfer of soil or plant material on construction equipment, hand-tools, vehicles, and personnel. To mitigate potential for proliferation of SCN caused by pipeline construction activities, all equipment will arrive onto any agricultural (crop) fields along the Project in clean condition. As well, crop fields along the Project will be tested for the presence of SCN prior to the commencement of construction, and testing results will be recorded. If SCN presence is detected on equipment, vehicles, hand-tools, or work-boots, they will be thoroughly cleaned of all soil and plant material with appropriate methods prior to leaving the SCN impacted field to commence work along any other portion of the Project.

A summary of potential environmental effects, the key mitigation measures to be implemented, and the assessed net effect on soil are presented in Table 5.2-2.

Table 5.2-2: Potential Effect, Key Mitigation Measures, and Net Effects on Soil

Potential Effect	Key Mitigation Measures	Net Effect
Mixing of topsoil and subsoil affecting productivity	■ Topsoil, where present, will be stripped and will be segregated from subsoil during trenching. A 1-m separation will be maintained or a barrier installed between topsoil and subsoil storage piles. ■ Work involving topsoil handling will be suspended during high winds and heavy rain.	None
Drain tile damage affecting drainage	■ Consult with landowners on location prior to construction ■ Prompt repair of damaged tiles prior to backfilling trench.	None
Soil compaction affecting drainage	■ Construction will be limited during saturated conditions. ■ Decompaction will be conducted on replaced soils over agricultural lands.	None
Soil erosion affecting quality and quantity	■ Operations involving topsoil handling will be suspended during high winds and heavy rain. ■ Erosion control devices will be installed and maintained. ■ Stabilize topsoil with seed and mulch post- construction in non-agricultural areas.	None
Introduction of rocks into topsoil affecting productivity	■ Conduct topsoil segregation and remove and dispose of excess rock off the ROW.	None
Proliferation of soybean cyst nematode (SCN)	■ Clean equipment, vehicles, hand-tools, and work-boots prior to leaving SCN impacted fields.	None

Net effects of the Project on existing soil conditions are predicted to be effectively mitigated and reversed through standard practice pipeline construction and restoration practices. Surface disturbance of many of the slopes and embankments in the Project footprint that are susceptible to erosion will be avoided by using trenchless construction. In areas of trenched construction and at entry and exit locations of trenchless construction, restoration of the Project footprint to preconstruction conditions to the maximum extent practicable will begin immediately after construction. Revegetation and the resulting stabilization of soils in the footprint is expected within three years, which is expected to effectively reverse the net effects of the Project on soils. Therefore, net adverse effects of the Project on soils are not expected to occur.

5.2.3 Groundwater

The potential adverse effects on groundwater are predicted to be:

- Reduction in groundwater quantity; and
- Reductions in groundwater quality.

Most of the households within the Greater Toronto and Hamilton Area are connected to municipal water supply systems with water supply from Lake Ontario and will not be affected by dewatering along the footprint. Rural agricultural areas are often supplied by domestic ground water supply wells that may be affected by construction activities.

Of the 87 wells in the LSA, eight (8) water supply wells are completed to a depth of less than 20 m and have a depth to water of less than 4 mBGS (Section 4.2.5). These wells, which are as close as 14.8 m to planned excavations to depths of to 4 mBGS for trenchless construction, and approximately 27.0 m to planned open trench excavations depths of 2 mBGS, could potentially be affected by dewatering of excavations during Project construction. An assessment of water quantity and quality prior to and during construction is proposed pending landowner permission and accessibility of the wells.

Section 4.4.4 presents an estimated drawdown of the water table (up to 4 mBGS near the pipeline trench, and extending approximately 200 m radially; at this distance, drawdown is predicted to be minimal). Based on these parameters, it is unlikely that the wells completed to depths of more than 20 m would be significantly affected by dewatering. Such wells tap groundwater-bearing formations that are most likely separated from the shallowest groundwater by formations of low permeability that impede vertical groundwater movement. Even if vertical flow of groundwater occurred (e.g., in areas of groundwater recharge), drawdown caused by dewatering would be a small fraction of the water column above the pump in such wells, and the drawdown is expected to be for a short period of time (approximately two weeks).

To confirm this, Imperial is proposing to monitor depth to water and water quality pre-construction and post-construction, pending landowner permission and accessibility of the wells. Where well supply is affected, Imperial will work with the owner to ensure the provision of potable water. A Water Taking Permit will be obtained from the Ministry of Environment, Conservation and Parks (MECP) for dewatering activities associated with construction. Areas mapped as ‘vulnerable aquifers’ and ‘recharge areas’ overlap the Project’s footprint and may be impacted by accidental fuel spills from machinery used for construction and transportation. Protocols for equipment maintenance, operation, and spill prevention and response will be in place during construction. Impacts may also result from the intersection of contaminated areas within the corridor. A Phase 1 assessment has identified potential areas of contamination, and a Contaminated Material Management and Handling Plan will be implemented for these areas. If an unknown area of contamination were to be intersected during construction, the management and handling plan would be implemented.

Trenchless construction methods (HDD and bore) are not expected to negatively affect the quantity or quality of surrounding groundwater. Drilling mud used during these construction activities will be prepared using bentonite clay and fresh water obtained from municipal sources. The used drilling mud will be stored in tanks on site and disposed of at an approved facility.

In the event of a ‘frac-out’ event, where drilling mud is lost through fractures and breaks in the surrounding geologic material and migrates to the surface, the Inadvertent Returns During HDD Plan and the Spill Prevention and Response Plan will be implemented (Section 7). The potential effects of accidental hydrocarbon spills are assessed in Section 5.4.9.

Water required for hydrostatic testing will be sourced from and disposed back into the municipal water network, and therefore no related effects on groundwater quantity are anticipated.

A summary of potential environmental effects, the key mitigation measures to be implemented, and the assessed net effect on groundwater are presented in Table 5.2-3.

Table 5.2-3: Potential Effect, Key Mitigation Measures, and Net Effects on Groundwater

Potential Effect	Key Mitigation Measures	Net Effect
Reduction in groundwater quantity	■ Where practical, minimize dewatering for areas where water wells are within 200 m of the dewatering and groundwater level is less than 4 mBGS. ■ Water supply wells will be supplemented with alternate potable water sources, if affected by construction dewatering. ■ A community feedback system will be established for local residents to report changes to groundwater supply wells.	Potential reduction of groundwater supply to wells in the LSA where groundwater level is less than 4 mBGS
Reduction in groundwater quality	■ Monitor drilling to confirm efficient operation with minimal drill mud losses. ■ Proper drill mud and drilling waste management to maintain containment, monitoring and disposal to approved facility offsite. ■ In the event of drilling mud release, implement response measures outlined in the Spills Prevention and Response Plan.	None

The potential net effect of the Project on groundwater will be limited to wells that are within 200 m of the trenched construction and at entry and exit locations of trenchless construction and have a groundwater source less than 4 mBGS. This potential effect can occur during the trenching and dewatering, and groundwater quantity is expected to recover within two (2) weeks of backfilling, effectively reversing the Project's net effect on groundwater. Net adverse effects of the Project on groundwater are likely but are considered to be not significant.

5.2.4 Surface Water

The potential adverse effects on surface water are predicted to be:

- Reduction in surface water quantity; and
- Reduction in surface water quality.

Pipeline construction can affect both surface water quantity and quality. Water withdrawals during both pipeline construction (e.g., trench dewatering, hydrovac and trenchless watercourse crossings) and commissioning (hydrostatic testing) and associated disposal can affect both surface water quantity and quality.

Localized effects on surface water flow can occur during pipeline construction as a result of water collection in an open trench. Water diversion structures and measures will be put in place to prevent surface water runoff from entering the work space (subject to excavation activities) from areas outside the construction area. Thus, surface water entering the workspace would be precipitation only. These localized effects are not anticipated to result in measurable net effects or affect overall surface water balance. A Water Taking Permit will be obtained from MECP for site dewatering during construction that includes consideration of the groundwater inflow as well as surface water impoundment as a result of precipitation.

Crossings of streams and wetlands are not expected to result in effects to surface water quantity as water will be transferred from the upstream side of the crossing to the downstream side. Construction in these areas will be conducted during dry or frozen ground conditions to the greatest extent possible. Therefore, temporary interception of the stream flow during pipeline construction are anticipated to have a negligible impact on flow conditions in downstream watercourses.

Water required for construction, such as for drilling mud and hydrostatic testing, will be sourced from and disposed back into the municipal water network, and therefore, no related effects on surface water quantity are anticipated.

Sediment and contaminant inputs to watercourses and wetlands can occur during site preparation, and pipeline construction and can affect surface water quality. This will be mitigated through the implementation of an Erosion and Sediment Control Plan, which will include industry best management practices. The potential for sediment and contaminant inputs to fish-bearing watercourses are assessed as part of Fish and Fish Habitat (see Section 5.3.3) but many of the same mitigation measures will be applied equally to non-fish bearing watercourses and wetlands. The potential effects of accidental hydrocarbon spills are assessed in Section 7.3.

Potential effects during operation of the pipeline are changes in surface water quality, related to the risk of a hydrocarbon spill, and are discussed in Section 5.4.9.

A summary of potential environmental effects, key mitigation measures to be implemented, and the assessed net effect are presented in Table 5.2-4.

Table 5.2-4: Potential Effect, Key Mitigation Measures, and Net Effects on Surface Water Resources

Potential Effect	Key Mitigation Measures	Net Effect
Reduction in surface water quantity	■ No surface waterbodies are to be used as water source.	None
Reduction in surface water quality	■ Set TWS and ETWS a minimum of 15 m from the top of bank of watercourses and wetlands where feasible. Clearing of riparian vegetation will be kept to a minimum. ■ No herbicides will be used within 30 m of the top of bank of any watercourse or wetland. ■ Develop and implement an Erosion and Sediment Control Plan that minimizes risk of sedimentation to a waterbody. ■ Stabilize banks and riparian areas to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site. ■ Develop and implement a water monitoring program as part of the Environmental Protection Plan to confirm discharge criteria are being met, if applicable.	Minor increase in sediment concentration of surface water during construction.

The net effects of the Project on surface water can occur during temporary diversion of surface water runoff and trench dewatering, and during isolation of watercourses for open cut crossing construction. Although mitigation will be in place to prevent the surface water runoff from entering watercourses, some sedimentation of watercourses can occur during trenched construction of the pipeline, particularly during the diversion of water at isolated crossings, and during the construction and use of the equipment crossings. Net adverse effects of the Project on surface water are likely but are considered to be not significant.

5.2.5 Air

The potential adverse effects on air quality are predicted to be:

- Decrease in air quality.

Pipeline construction can affect air quality through the generation of dust from equipment traffic and emissions from construction equipment.

A summary of potential effects, key mitigation measures to be implemented, and the assessed net effects on air are presented in Table 5.2-5.

Table 5.2-5: Potential Effect, Key Mitigation Measures, and Net Effects on Air

Potential Effect	Key Mitigation Measures	Net Effect
Decrease in air quality	■ During dry and windy conditions, water will be used on the ROW and on access roads to reduce airborne dust. ■ During dry and windy conditions water and tackifier will be used on piles of loose, fine material. ■ Piles of loose, fine materials or locations of disturbed soils will be wetted during dry and windy conditions. ■ Loads will be covered in instances where loose, fine materials are being transported. ■ Excessive vehicle and equipment idling will be discouraged. ■ Speed limits will be implemented and enforced along the ROW and access roads. ■ To reduce the volume of traffic along the ROW, multi-passenger vehicles such as buses and vans will be used to transport workers to and from active construction sites. ■ A Traffic Management Plan will be developed. The Plan will address construction related traffic routing, access locations, access restrictions, speed limits and idling. ■ A representative will be appointed to deal with complaints of air quality from the public. The representative's contact information will be made available to residents within the vicinity of the Project prior to the start of construction.	Dust and emissions from equipment and Project-related traffic during construction can decrease local air quality.

Air quality for local sensitive receptors can decrease slightly and periodically due to the generation of dust, particularly during dry conditions, and from the emissions from construction equipment. The net adverse effects of the Project on air quality are likely but are considered to be not significant.

5.2.6 Noise and Vibration

The Project can cause increased noise and vibration from construction-related equipment, which could result in disturbances to land users or residents in the LSA.

A summary of potential environmental effects, key mitigation, and noise and vibration net effects is presented in Table 5.2-6.

Noise and vibration are expected to increase during trenched construction and at entry and exit locations of trenchless construction, which can disturb land users or residents in the LSA. The net adverse effects of the increased noise and vibration are likely but are considered to be not significant.

5.3 Biophysical Features

5.3.1 Vegetation and Wetlands

The potential adverse effects on vegetation and wetlands are predicted to be:

- Direct removal of trees and vegetation required to support pipe installation;
- Disturbance within rooting zones of trees along the edge of the work areas;
- Introduction of invasive species; and
- Change in wetland form/function.

Table 5.2-6: Potential Effect, Key Mitigation Measures, and Net Noise and Vibration Effects

Potential Effect	Key Mitigation Measures	Net Effect
Increase in noise and vibration	■ In general, work will be restricted to the hours of 7am to 7pm in locations that are close to residential areas, or in accordance with local by-laws or by-law exemptions. ■ Where continuous (24 hours per day) loud noise and vibration from HDD or bore is to occur within the vicinity of residential areas, noise mitigation measures such as placing equipment at certain locations on the ROW, using the soil piles as noise deflectors, operating equipment at lower rpm's when possible, use noise reduction exhaust systems and air intake systems if feasible and temporary noise barriers if applicable. ■ To reduce the volume of traffic along the ROW, multi-passenger vehicles such as buses and vans will be used to transport workers to and from active construction sites. ■ Machinery and equipment will be well maintained and will be fitted with appropriate mufflers that are in good working order. ■ A representative will be appointed to liaise with and address potential concerns or complaints of excessive noise and vibration from the public. The representative's contact information will be made available to residents within the vicinity of the Project prior to the start of construction.	Increase in local noise and vibration during construction

Construction of the pipeline has the potential to result in direct and indirect effects on vegetation and wetland communities. The majority (93%) of the pipeline construction footprint will occur within maintained landscapes (golf courses, residential, maintained lawns, etc.), agricultural lands, or culturally influenced vegetation communities (woodlands, thickets, meadows), which includes areas that are subject to periodic maintenance to prevent succession of vegetation along the existing pipeline ROW and utility corridor. The remainder of the footprint is in natural vegetation communities, of which approximately 5% are wetland communities, including wooded swamps, and 2% are upland forest communities. See also Section 5.3.3 (Fish and Fish Habitat) for mitigation measures related to riparian vegetation.

Removal of all vegetation will be required for open-cut installation of the pipeline for the majority of the route. Where feasible, HDD or HDB has been proposed in several locations along the route to avoid direct impacts on sensitive vegetation communities, including all provincially significant wetlands. It is possible that micro-siting (small field adjustments) of the footprint will allow for preservation of trees/natural vegetation in areas. Given the above mitigation measures, extensive tree removal is not anticipated to be required to support construction, with removals limited to those areas where succession of vegetation into the existing corridor has occurred over time and where workspace is required adjacent to the existing corridor (where treed).

Efforts will be made to preserve trees within woodland communities to the extent possible, but direct removals, and potential root impairment when working near forest edges, may occur to support pipeline construction. Where feasible, pruning will be completed under the supervision of a certified arborist to reduce tree removals. Any stockpiling of excavated or other materials, or storage of equipment, will be away from natural vegetation communities to the greatest extent possible to prevent impairment of root zones.

Activities such as the movement and storage of large equipment and stockpiling of material may also result in compaction of soils, which may impair vegetation re-growth. The extent of soil compaction will be assessed as a component of restoration works, with remediation measures, such as soil discing, to occur as needed.

The footprint will also cross several wetland communities. As noted previously, HDD and bore construction methods have been proposed for all provincially significant wetland communities. However, several unevaluated wetland communities have been identified along the pipeline route. Most of these communities were small, isolated meadow marsh communities that are considered to be relatively resilient to disturbance, and it is expected that these communities would re-establish within one to three years following completion of construction (Environment Canada 1996). To promote the re-establishment of the wetland vegetation, these areas will be allowed to regenerate from the existing seed bank to the greatest extent possible. Some tree removal within deciduous swamp and thicket swamp communities may also be required, which would have an impact on wetland form and function. Planting of replacement shrubs/saplings will be considered where feasible. To minimize disturbance of the surrounding wetland communities, work within wetlands will be timed to occur in the winter to the greatest extent possible. Matting and use of tracked equipment will be used to further minimize disturbance, where possible. All works within wetlands will be completed in accordance with permits obtained from the relevant Conservation Authority.

Indirect impacts on vegetation communities and wetlands may also occur through introduction of invasive species along the route. To minimize the spread of invasive species, measures will be undertaken to ensure equipment and machinery are clean upon delivery to the site and are regularly cleaned throughout construction.

To preserve the seed bank within the topsoil, the topsoil will be stored separately from the subsoil and replaced following construction. This will assist in the regeneration of native vegetation. Where re-seeding is required, seed mixes will be suitable for the local climatic conditions and be composed of native species selected in consultation with the appropriate Conservation Authority.

A summary of potential environmental effects, key mitigation, and net effects on vegetation and wetlands is presented in Table 5.3-1.

Table 5.3-1: Potential Effect, Key Mitigation Measures, and Net Effects on Vegetation and Wetlands

Potential Effect	Key Mitigation Measures	Net Effect
Direct removal of vegetation required to support pipe installation	■ Trenchless methods are proposed for all provincially significant wetland communities. ■ Alignment has been restricted to the existing cleared ROW to the greatest extent possible. ■ A detailed tree inventory will occur to satisfy municipal requirements with respect to tree removals. ■ Work space limits in proximity to areas of natural vegetation will be clearly marked to minimize encroachment. ■ Any pruning of trees will be completed under the supervision of a certified arborist where possible. ■ A Reclamation Plan will be prepared to address re-vegetation after construction.	Minor changes in natural vegetation community composition along the footprint.
Disturbance within rooting zones of trees along the edge of the work areas	■ Work space limits close to areas of natural vegetation will be clearly marked to minimize encroachment to the greatest extent possible. ■ Soil and other materials will be stored away from remnant natural vegetation communities. ■ Tracking of machinery and other equipment through identified rooting zones will be minimized to the greatest extent possible. ■ Ripping and discing, or similar methods, to be used to restore areas of compacted soils.	Some trees along the edge of the footprint may be impacted by construction activities but impacts are not expected to have an overall impact on form or function of surrounding vegetation communities.

Potential Effect	Key Mitigation Measures	Net Effect
Introduction of invasive species	■ Equipment will be delivered to the site in a clean condition. ■ Appropriate cleaning stations/procedures will be used to mitigate the transfer of invasive species. ■ A Reclamation Plan will be prepared to address weed control during construction and restoration.	Minor ingress of invasive species in the footprint until restoration is complete.
Change in wetland form/function	■ HDD will be utilized for all provincially significant wetlands ■ All work within wetlands will be completed under the requirements of relevant Conservation Authority permits and will follow other construction best-management practices. ■ Restoration works will maintain flow pathways within and to/from wetland communities. ■ Wetlands will be allowed to regenerate from the existing seed bank wherever possible to promote the re-establishment of the local vegetation community.	Minor alterations to local wetland form and function until restoration is complete.

Many areas of sensitive vegetation and wetlands in the Project footprint will be avoided by using trenchless construction. The areas of the Project footprint cleared of vegetation will be restored to best match existing conditions. Generally, agricultural crops will be restored within one growing season of construction and the restoration of other anthropogenic vegetation (particularly landscaped areas and cultural vegetation communities) or natural vegetation and wetlands will occur within three years of construction, which is expected to effectively reverse the net effects of the Project on vegetation and wetlands. However, re-establishment of mature trees can take significantly longer. The net adverse effects of the Project on vegetation and wetlands are likely but are considered to be not significant.

5.3.2 Wildlife and Wildlife Habitat

Potential adverse effects on wildlife and wildlife habitat are predicted to be:

- Removal or alteration of wildlife habitat;
- Disturbance of wildlife surrounding active construction works;
- Increased risk of wildlife mortality;
- Removal or alteration of Bat Maternity Colony Habitat/Special Concern Woodland Breeding Bird Habitat/Woodland Area-Sensitive Breeding Bird Habitat;
- Disturbance of reptile hibernacula;
- Removal or alteration of amphibian breeding habitat/terrestrial crayfish habitat; and
- Removal or alteration of monarch habitat.

The primary impact on wildlife is anticipated to be the temporary loss or alteration of habitat during the construction period. It is expected that construction will occur within a single calendar year, and therefore the disruption is expected to impact a single breeding season for all species. Further, where suitable habitat is present, construction activity will be completed to the greatest extent possible outside of the wildlife restricted activity periods presented in Appendix I. If construction activity cannot be completed outside of the restricted activity periods, management plans will be implemented to avoid or minimize effects on wildlife. Because most of the habitat in the Project footprint is anthropogenically influenced communities (particularly agricultural lands, landscaped areas, and cultural vegetation communities) restoration works that are planned following construction are expected to return the majority of these areas to existing conditions.

Noise associated with construction works can result in wildlife avoidance of construction areas, potentially resulting in behavioural changes and disruption of movement corridors. Work within a given a location is expected to be completed within a relatively brief time period – from a few days to a few months, depending on the activity – and significant disruptions to local wildlife is not anticipated.

Disruption of native vegetation within areas considered to have potential to provide suitable nesting sites for migratory birds will be timed to occur outside of the migratory bird period, typically late March through late August, where possible. Where it is not possible for removal of vegetation to occur outside of this period, work areas will be surveyed by an ornithologist for nesting birds for a maximum of 48 hours in advance of the planned removal of the vegetation. Should bird nesting of a species protected under either the *Migratory Birds Convention Act* or the *Fish and Wildlife Conservation Act* be confirmed, a setback will be determined by the ornithologist to prevent disturbance of the nesting attempt. Work within the setback will be allowed to proceed once it is confirmed by the ornithologist that the nesting attempt is completed.

Construction works will also have the potential to result in increase the risk of wildlife mortality. To mitigate the potential for mortality, movement of vehicles on the route (outside of municipal roadways) will be restricted to a speed of 30 km/hr. In addition, the construction workforce will be made aware of the potential for wildlife occurring within the Project's location and the measures to be taken to avoid wildlife wherever possible. An Environmental Protection Plan (EPP) will be prepared, and will identify protocols for management of wildlife encounters, which will include at minimum:

- Measures to maintain site cleanliness to prevent attraction of wildlife to the work areas;
- Recommended procedures to be followed at the start of each work day during the active period (i.e., inspection of vehicles, equipment and work areas, prior to commencement of work);
- Procedures to be followed should a wildlife encounter occur, including specific protocols for encounters with injured/dead wildlife, or species at risk, including notification to appropriate regulatory agencies when required; and
- Identification information to be provided (photographs, habitat descriptions, active periods, etc.) relating to species at risk with the potential to be found within the work area.

In addition to the general mitigation measures identified above, several significant wildlife habitat types have been identified, which are discussed separately below:

- Bat Maternity Colony Habitat: Woodland communities WO1, WO10, WO11, and WO29 were identified as significant bat maternity colony habitat. Tree removal is not currently expected within woodlands WO10 and WO11, while some minor tree removal will be required at woodlands WO1 and WO29. It is not expected that tree removal would have a material impact on the extent of maternity colony habitat available in the local area given the size of the woodlands present in these locations. Should tree removal within these woodlands be required, trees would be removed outside of the bat active period to prevent any impact on roosting bats, should they be present.
- Reptile Hibernacula: Candidate reptile hibernacula were identified along the Niagara Escarpment at KP 4.5 through KP 5.5, and at KP 9.8. Work within these areas will likely occur outside of the reptile active period given other timing restrictions in the area. Suitable hibernacula features were not identified within the footprint, but rather from the woodland communities surrounding the ROW. As a result, direct impact to hibernacula features is not expected. However, it is possible that construction activities may incidentally result in disturbance of hibernacula, or previously unidentified hibernacula may be encountered during construction. The protocols for encounters with wildlife will provide procedures to be followed should reptile hibernacula be encountered or disturbed during construction works. This would be expected to include the collection and transfer of the impacted reptiles to an animal care facility by qualified personnel until such time as they can be released.

- Deer Winter Congregation Areas: Deer winter congregation areas were identified in woodlands WO4 and WO11. Woodland removal is not expected from either of these features. The construction workforce will be made aware of the potential for increased concentrations of deer at these locations if working in winter.
- Cliff and talus slopes: Identified at KP 9.8, this habitat type is outside of the footprint and neither direct nor indirect effects on this habitat feature are anticipated.
- Cooper's hawk nest: Though not a significant feature, tree removal is currently planned around the Cooper's hawk nest identified at KP4.6. The nest support tree will be protected, if possible. If not possible, the tree will be removed outside of the breeding window in consultation with MNRF.
- Amphibian breeding habitats/movement corridors: Mitigation measures identified with respect to wetlands will be effective at mitigating potential impacts to these amphibian breeding habitats to the greatest extent possible. Where work within areas of standing or open water wetland vegetation will occur, wildlife salvage will be undertaken by qualified professionals as a component of dewatering, and be completed in consultation with MNRF.
- Area-sensitive breeding bird habitat: No impact to these features are anticipated as no tree removal is proposed, and it is currently anticipated that work in these areas will occur outside of the breeding bird period.
- Terrestrial crayfish habitat: Some potential for removing portions of terrestrial crayfish habitat may occur with construction through these areas. Restoration works following construction will restore impacted areas to conditions suitable for terrestrial crayfish such that re-colonization of these habitats can occur.
- Special Concern Woodland Breeding Birds (eastern wood-pewee and wood thrush): These species were detected either individually, or in conjunction with each other, in woodlands WO1, WO4, WO9, WO11, WO15, WO18, WO20, WO21, WO22 and WO23. Tree removal will not be required for the majority of these features, with only minor removals anticipated along the edges of woodlands WO1 and WO20 potentially required. These minor removals would not be expected to impact use of these features by either species.
- Monarch butterfly: Construction will result in the removal of milkweed within several confirmed breeding patches within the footprint. Where possible, removal of vegetation in these areas will be timed to occur outside of the monarch use period (typically June through August). Restoration efforts will include the use of milkweed as a component of the seeding mix where possible (i.e., where in agreement with the landowner).
- Painted skimmer: Observed along the hydro corridor between woodlands WO22 and WO23, no impact to painted skimmer is expected as this area is proposed to be constructed through HDD.

A summary of potential environmental effects, key mitigation measures to be implemented, and net effects on wildlife and wildlife habitat are presented in Table 5.3-2.

Many areas of sensitive wildlife and wildlife habitat in the Project footprint will be avoided by using trenchless construction. In areas of trenched construction and construction-related travel, some wildlife species can be disturbed by the clearing of vegetation and other construction activities. Generally, the areas of the Project footprint cleared of vegetation that provides wildlife habitat will be restored within three years of construction, which is expected to effectively reverse the net effects of the Project on the habitat However, the re-establishment of woodland habitat can take significantly longer. The net adverse effects of the Project on wildlife and habitat are likely but are considered to be not significant.

Table 5.3-2: Potential Effect, Key Mitigation Measures, and Net Effects on Wildlife and Wildlife Habitat

Potential Effect	Key Mitigation Measures	Net Effect
Removal of wildlife habitat	■ Measures to minimize disturbance of vegetation communities will be effective at minimizing loss of wildlife habitat. ■ Restoration and/or compensation of wildlife habitat will be completed post-construction in consultation with the Conservation Authorities and MNRF.	Temporary loss of wildlife habitat in the footprint.
Disturbance of wildlife surrounding active construction works	■ Works to be timed outside of key sensitive periods (i.e., Restricted Activity Periods) to the greatest extent possible. ■ Imperial will implement wildlife exclusion fencing where appropriate. ■ Training of construction workforce on wildlife protection requirements	Temporary disturbance of wildlife in the local study area as construction progresses.
Wildlife mortality	■ Works within bird habitat to be completed outside of the migratory bird timing window where possible. Where not possible, work areas to be surveyed by an ornithologist a maximum of 48 hours prior to the removal of vegetation. ■ Speed limits along the construction footprint will be restricted to 30 km/hr. ■ Construction workforce to be made aware of the potential for wildlife along the route, and that they are to be given the right of way. ■ EPP to outline procedures to be followed for all encounters with wildlife.	None
Removal of Bat Maternity Colony Habitat/Special Concern Woodland Breeding Bird Habitat	■ Tree removal to occur outside of the bat active period and breeding bird period.	Negligible alteration to extent of available habitat.
Disturbance of Reptile Hibernacula	■ Protocol to be prepared as part of the EPP to document methods to be used if a previously unidentified hibernacula is encountered.	None
Removal of amphibian breeding habitat/terrestrial crayfish habitat	■ Mitigation measures with respect to impacts to wetlands will be effective at minimizing extent of impact on these communities. ■ Where work within areas of standing or open water wetland vegetation will occur, wildlife salvage will be undertaken by qualified personnel as a component of dewatering.	Potential for change in mortality risk to amphibians/terrestrial crayfish; no loss of habitat expected following effective implementation of restoration works.
Removal of Monarch butterfly habitat	■ Vegetation removal timed to occur outside of the Monarch use period (typically June through August), where possible. ■ Restoration efforts to use Milkweed as a component of the seeding mix where possible.	None

5.3.3 Fish and Fish Habitat

Potential adverse effects to fish and fish habitat are predicted to be:

- Reduced habitat quality related to sedimentation of water;
- Reduced habitat quality related to spills of hydrocarbons or other contaminants in water;
- Direct injury or mortality of fish, eggs or alevin due to crushing by materials or machinery;
- Direct injury or mortality of fish, eggs or alevin due to dewatering;
- Loss of riparian vegetation, resulting in decreased bank stability, changes in food supply and nutrient concentrations, and loss of shade (i.e., changes in water temperature);
- Physical changes to stream banks and beds;
- Loss of aquatic vegetation and in-water organic structures;

These potential effects can occur during construction in or near to fish-bearing watercourses, including activities within riparian zones. Generally, the Project will avoid or minimize potential effects to fish and fish habitat by constructing the crossings of watercourses using trenchless methods and/or by constructing outside of the Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat, otherwise known as the restricted activity period (RAP). Refer to Section 5.3.1 for additional mitigation measures related to vegetation and wetlands.

The lease for the construction of the majority of trenchless crossings will be located outside of riparian zones and does not involve in-water activities. For these sites, potential effects are related to management of storm water runoff, drilling mud and the risk of release (frac-out), which could result in water quality effects and physical alteration of channel substrates or banks.

Appropriate planning and design of drill/bore paths will reduce the likelihood of a frac-out event. Collecting and disposing of drilling fluid off-site will avoid contaminants entering the stream from this vector. Appropriate timing of work, use of non-toxic drilling fluid, and a rapid and effective monitoring and response plan will minimize the effects associated with a frac-out.

The lease for construction at a limited number of trenchless crossings will be located within the riparian zone (e.g. due to existing infrastructure or topographic limitations). Clearing of vegetation, excavation and grading of the platforms, and the use of industrial equipment within the riparian zone may result in the following effects: changes in contaminant concentrations, changes in sediment concentrations, and changes in food supply, nutrient concentrations and shade (i.e., changes in water temperature).

Minimizing workspace area and clearly delineating its boundaries will minimize effects associated with riparian clearing. Erosion and sediment control, and spill prevention and response measures will mitigate potential effects to water quality. Site restoration will encourage establishment of replacement riparian vegetation. Full riparian function is typically achieved within three to five years of restoration for grasses and shrubs, but may take decades for mature forest.

Trenched crossings will involve clearing and excavation in the riparian area, excavation in both the riparian area and in-water, and physical changes to the stream bed (i.e., removal of aquatic vegetation and organic structures, and changes to bank stability). Additionally, if the watercourse is wet during construction, the site will need to be isolated from flow, which involves placement of structures in water and diversion of water. These activities may result in the following effects: changes in contaminant concentrations, changes in sediment concentrations, changes in food supply, nutrient concentrations and shade (i.e., changes in water temperature), changes to habitat structure and cover, and direct mortality or injury of fish.

TWS will be minimized where possible, and in-water work will proceed as rapidly as possible. It is anticipated that at most sites in-water work will be completed within a week. Working “in the dry”, either when the site is naturally dry or through site isolation, fish salvage, and dewatering, will minimize the risk of injury or mortality to fish, avoid sedimentation of downstream reaches, and allow for more effective site restoration, as will proper practices for construction and removal of dams, dewatering, and use of fish screens. Timing windows will be followed where possible, particularly for sites containing spawning habitat or species at risk. Work will also be timed so that the watercourse is naturally dry or frozen, where possible. As a result, it is anticipated that a limited number of sites will require salvage and dewatering. Sites will be restored to their former condition once pipeline installation is complete; it is assumed that aquatic vegetation will re-establish within three years of restoration.

Vehicles and equipment crossings of the watercourses will require clearing of riparian vegetation and use of industrial equipment in the riparian zone. The potential effects and mitigation described above for trenched crossings apply to vehicle and equipment crossings, with the exception of those related to site isolation and diversion of water. Crossing of fish-bearing streams will be via existing bridges or temporary clear span bridges unless the streams are dry or frozen. Care will be taken to situate crossings to minimize their impact on banks and riparian vegetation. Temporary crossings are anticipated to remain in use for up to two weeks.

There is a low risk of the pipeline becoming exposed in the future due to scour, potentially resulting in the physical alteration of channel substrates or banks, but the appropriate crossing design will reduce or avoid this effect.

Site restoration may also result in effects to fish habitat, as the result of site preparation, use of fertilizers and riparian planting. These effects can be avoided by restricting the use of fertilizers and utilizing erosion and sediment control and spill prevention and response measures.

Potential effects related to the risk of a spill during construction and operation of the pipeline are discussed in Section 5.4.9.

A summary of potential environmental effects, key mitigation measures to be implemented, and the assessed net effects on fish and fish habitat are presented in Table 5.3-3.

Disturbance of many fish-bearing waterbodies will be avoided by using trenchless construction. In areas of trenched construction and construction-related travel, some fish-bearing waterbodies can be disturbed by the clearing of riparian vegetation and in-stream construction activities. Generally, the in-stream construction activities including the restoration of the bed and bank will be completed within a few days, but construction vehicle crossings may be in place for several weeks. The net effects on fish and habitat from the sedimentation of watercourses are anticipated to be limited to the LSA and can continue through restoration of the Project footprint. Generally, restoration is expected within three years of construction, which is expected to effectively reverse the net effects of the Project on the riparian and aquatic habitat. However, re-establishment of riparian function in areas of mature forests can take significantly longer. In no case are the net effects anticipated to negatively affect fish populations in project watersheds. As a result, net effects of the Project on fish and fish habitat are considered to be not significant[13].

[13] A significant negative effect to fish and fish habitat is defined as “serious harm” per the *Fisheries Act: “the death of fish or permanent alteration to or destruction of fish habitat of a spatial scale, duration, or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, nursery, rearing, food supply areas, migration corridors, or any other area in order to carry out one or more of their life processes.”* (DFO 2013)

Table 5.3-3: Potential Effect, Key Mitigation Measures, and Net Effects on Fish and Fish Habitat

Potential Effect	Key Mitigation Measures	Net Effect
Reduced habitat quality related to sedimentation of water	■ Conduct in-stream work during periods of low flow to further reduce the risk to fish and their habitat, or to allow work in water to be isolated from flows. ■ Minimize the duration of in-stream work. ■ To the greatest extent possible, schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation. ■ Minimize the work footprint to limit the area of impact. Only conduct activities where entirely necessary. Clearly define the footprint (i.e., using flagging) prior to works. Limit foot traffic in riparian areas and below the top of bank to only that which is necessary, in order to prevent trampling flora and fauna. ■ Set drill pads and staging, laydown and stockpiling areas a minimum 15 m from the top of bank of all watercourses, wherever possible. ■ Confirm that water leaving the work area achieves applicable water quality guidelines. ■ Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the Project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include: ○ Installation of effective erosion and sediment control measures before starting work to minimize sediment entering the water body. ○ Storage of erosion and sediment control (e.g., straw bales) and water management materials (e.g., pumps, hose) on-site so they are available for use if needed. ○ Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system. Protect/armour pump discharge area(s) to prevent erosion and the release of suspended sediments downstream, and remove this material when the works have been completed. ○ Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high-water mark of nearby waterbodies to prevent re-entry. ○ Regular inspection and maintenance of erosion and sediment control measures and structures during construction. ○ Removal of non-biodegradable erosion and sediment control materials once site is stabilized. ■ Undertake all in-stream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse to the greatest extent possible. This may be done by timing (i.e., site is dry or frozen), or with physical barriers, diversion of flow around the worksite, and dewatering of the worksite.	Heavy rain events and/or removal of isolation dams may result in small-scale sedimentation of watercourses

Potential Effect	Key Mitigation Measures	Net Effect
	■ Remove accumulated sediment and excess spoil from the isolated area before removing dams. Gradually remove the upstream dam first to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle. ■ Immediately stabilize banks and riparian areas disturbed by the Project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.	
Reduced habitat quality related to spills of hydrocarbons or other contaminants in water	■ Minimize the duration of in-stream work. ■ Set drill pads and staging, laydown and stockpiling areas a minimum 15 m back from the top of bank of all watercourses, wherever possible. ■ Keep sites tidy during construction and leave sites in a good condition at the end of the Project. Remove all construction materials and wastes from site upon completion of the Project. ■ No herbicides will be used within 30 m of the top of bank of any watercourse. ■ Develop a Spill Prevention and Response Plan that is to be implemented during construction and immediately in the event of a sediment release or spill of a deleterious substance, and keep an emergency spill kit on-site. Provide all on-site staff with training in the use of hazardous materials and spill response. ■ Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water (e.g., at a distance of greater than 30 m from top of bank). ■ Maintain all equipment in proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline and other petroleum products. ■ Clean equipment and convert to a biodegradable hydraulic fluid before operating below the top of bank of any fish-bearing watercourse. ■ Specify building material used in a watercourse (to construct, for example, coffer dams, temporary bridges) has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish. ■ No fertilizers will be used within 30 m of the top of bank of any watercourse.	None
Water quality effects directly related to drilling (both sedimentation and other contaminants)	■ Design the drill/bore path to an appropriate depth below the watercourse to minimize the risk of frac-out, and to prevent the line from becoming exposed due to natural scouring of the stream bed. ■ Collect all drilling fluid and treat it in an approved containment system and/or dispose of it appropriately off-site. Do not deposit drilling fluid into the riparian or aquatic environment. ■ Consistently monitor pressure of drilling fluid to determine if a frac-out has occurred. ■ Implement a water quality monitoring program during HDD and HDB. This program will measure turbidity downstream of works over regular intervals (e.g., hourly) to determine if frac-out has occurred. ■ Keep all material and equipment needed to contain and clean up drilling mud releases on-site and readily accessible in the event of a frac-out.	Sedimentation of water due to frac-out is unlikely, but may occur

Potential Effect	Key Mitigation Measures	Net Effect
	■ Implement the Inadvertent Returns during HDD Plan that includes measures to stop work, contain the drilling fluid/mud and prevent its further migration into the watercourse, and notify all applicable authorities, including DFO. Prioritize clean-up activities relative to the risk of potential harm and dispose of the drilling mud in a manner that prevents re-entry into the watercourse. Clean-up measures should not result in greater damage to the banks and watercourse than from leaving the drilling mud in place.	
Direct injury or mortality of fish, eggs or alevin due to crushing by materials or machinery	■ Follow site-specific crossing methods in the Watercourse Crossing Table (Appendix F). Drill sites are to be accessed from either side using existing crossings (i.e., roads) for all Class 1 streams. ■ Use temporary crossing structures for all fish-bearing streams containing water. ■ Operate machinery from above the top of bank whenever possible. Minimize disturbance to the banks of watercourses. ■ Undertake all in-stream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse to the greatest extent possible. This may be done by timing (i.e., site is dry or frozen), or with physical barriers, diversion of flow around the worksite, and dewatering of the worksite.	None
Direct injury or mortality of fish, eggs or alevin due to dewatering	■ Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows, or result in the stranding or death of fish watercourse to the greatest extent possible. ■ Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Design and installation of screens should be in line with DFO guidance (DFO 1995, 2016). ■ Retain a qualified environmental professional to document that appropriate protocols are applied and applicable permits for relocating fish are obtained, and to capture any fish (or amphibians) trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters, before dewatering. Fish/amphibians may need to be relocated again, should flooding occur on the site. Any capture and relocation of an endangered or threatened aquatic species at risk will require approval from DFO.	None
Loss of riparian vegetation, resulting in decreased bank stability, changes in food supply and nutrient concentrations, and loss of shade (i.e., changes in water temperature)	■ Follow site-specific crossing methods in the Watercourse Crossing Table (Appendix F). Drill sites are to be accessed from either side using existing crossings (i.e., roads) for all Class 1 streams. ■ Design and construct approaches to the watercourse crossings, such that they are perpendicular to the watercourse, to minimize loss of or disturbance to riparian vegetation. ■ Immediately stabilize banks and riparian areas disturbed by the Project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.	Minor alterations to local riparian form and function until riparian vegetation is re-established.

Potential Effect	Key Mitigation Measures	Net Effect
Physical changes to stream banks and beds	■ Follow site-specific crossing methods in the Watercourse Crossing Table (Appendix F). Drill sites are to be accessed from either side using existing crossings (i.e., roads) for all Class 1 streams. ■ Locate crossings at straight sections of the watercourse, perpendicular to the banks, whenever possible. Avoid crossing watercourses or building structures on meander bends, braided watercourses, alluvial fans, active floodplains or any other area that is inherently unstable and may result in the erosion and scouring of the watercourse bed. ■ Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds Where the stream is dry or frozen, and fording has been identified as a crossing option, use watercourse bank and bed protection methods such as matting or snowfill. Limit machinery fording of the watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure. Use temporary crossing structures for all fish-bearing streams containing water. ■ Design and plan in-stream works such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided, and impacts to species at risk, their residences or protected habitat are avoided. Do not ford, place crossing materials or operate machinery on the bed of a waterbody where protected habitat or residences of freshwater species at risk occur. ■ Operate machinery from above the top of bank whenever possible. Minimize disturbance to the banks of watercourses. ■ Restore bed and banks to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored. ■ If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, use appropriately-sized, clean rock. ■ Immediately stabilize banks and riparian areas disturbed by the Project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.	Minor alterations to in-water habitat form and function until restoration is complete.
Loss of aquatic vegetation and in-water organic structures	■ Follow site-specific crossing methods in the Watercourse Crossing Table (Appendix F). Drill sites are to be accessed from either side using existing crossings (i.e., roads) for all Class 1 streams. ■ Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the top of bank. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.	Minor alterations to in-water habitat form and function until aquatic vegetation is re-established

5.3.4 Species at Risk

Potential adverse effects on vegetation species at risk are predicted to be:

- Removal of butternut trees; and
- Disturbance to rooting zones of butternut trees.

Damage to root zones may affect butternuts trees located close to the work zones. Mitigation measures identified in Section 5.3.1 (Vegetation and Wetlands) are expected to be effective at minimizing root damage on butternut, but it is expected that some individual trees will need to be removed for Project construction. Removal of these trees will occur in compliance with the requirements of ESA. It is expected that compensation trees will be planted at a ratio to be determined in consultation with MNRF.

Potential adverse effects on wildlife SAR are predicted to be:

- Incidental take of species at risk wildlife;
- Removal of bobolink/eastern meadowlark habitat;
- Removal of habitat trees for SAR bats;
- Construction within Jefferson salamander Regulated habitat; and
- Construction within Blanding's turtle General habitat.

Construction works will also have the potential to result in increased incidental take of wildlife species at risk. Consultation is ongoing with MNRF to ensure that all project-related activities are completed in compliance with the ESA.

Construction may require some minor tree removal from features considered to provide species-at-risk bat habitat. As the Project is within an existing easement and utility corridor, extensive tree removal is not anticipated to be required, and removals would be expected to have negligible impacts on the quality and extent of habitat throughout the study area. Any tree removals will occur outside of the bat active period (typically April through October).

Bobolink and eastern meadowlark were recorded in several areas along the pipeline route. The majority of these communities were agricultural hayfields, with the exception of two cultural meadow communities. It is expected that work within these habitats will result in minor temporary removals of habitat. Works will be timed to occur outside of the bobolink and eastern meadowlark breeding season (i.e., May 1 through July 31) to avoid incidental mortality of either species. As the majority of the communities are within active agricultural lands, it is expected that they will be re-seeded with a seed mix of the farmer's choosing in the following growing season. As there will be no vertical structures within the habitats following completion of construction, it is not expected that the disturbed portions of the grasslands will impact bobolink and eastern meadowlark use or carrying capacity of the habitats. Given the above, minor temporary loss of habitat is expected.

Jefferson salamander Regulated habitat has been identified in the LSA. Trenchless construction methods have been proposed in several locations along this route to minimize the potential for impact to Jefferson salamander. Where works are required, they will occur typically within previously disturbed locations of cultural meadow/thicket, agricultural lands, or residential communities. These habitats are unlikely to support significant components of the Jefferson salamander life cycle and are more likely to be used for movement. Works in these areas will be timed to avoid Jefferson salamander active periods (typically March through October), and will be restored as soon as possible following construction.

Blanding's turtle General habitat has also been identified in the LSA. Trenchless construction will be used through a portion of this community to avoid direct impact on regulated Blanding's turtle habitat. Trenched construction will occur typically within previously disturbed locations of cultural meadows/thicket/plantation, agricultural land/nurseries, developed land, or residential lands. Though no turtle nesting was identified

during the 2018 field season, it is possible that Blanding's turtle may nest within these areas. To avoid potential impact to Blanding's turtle nests, work within these areas will occur outside of the active period (typically April through October), and will be restored as soon as possible following construction.

Potential environmental effects on aquatic SAR are identical to those described in Section 5.3.3 (Fish and Fish Habitat).

As described in Section 4.5.4, three species of aquatic species at risk were identified as potentially present in watercourses crossed by the Project: American eel (provincially listed as Endangered), silver shiner (provincially listed as Threatened), and redside dace (provincially and federally listed as Endangered). Trenchless pipeline installation methods will be used for Class 1 and 2 watercourse crossings with a high potential for the presence of aquatic species at risk.

Potential effects to aquatic species at risk, the associated mitigation, and the resulting net effect are described in the discussion of Section 5.3.3 (Fish and Fish Habitat).

A summary of potential environmental effects, key mitigation measures, and assessed net effects for the vegetation and wildlife SAR are presented in Table 5.3-5. Refer to Table 5.3-3 for a similar summary for fish including SAR.

Table 5.3-5: Potential Effect, Key Mitigation Measures, and Net Effects on Species at Risk

Potential Effect	Key Mitigation Measures	Net Effect
■ **Vegetation**		
Removal of butternut trees	■ Micro-siting to avoid removal where possible. ■ Where not possible, provide compensation trees at a ratio to be determined with MNRF. ■ Identify and isolate any butternut in proximity to the work area to prevent accidental encroachment/removal of the feature.	Removals/transplant are considered permanent effects. However, overall benefit to the species will be provided through planting of compensation trees in greater numbers than those that are removed.
Disturbance to rooting zones of butternut trees	■ Micro-siting to avoid impacts where possible. ■ Installation of isolation measures to prevent accidental encroachment into the protection zone for the tree. ■ Monitor individual butternuts following construction in consultation with MNRF to document evidence of health decline attributable to the Project is identified. ■ Provide compensation for any trees found to be impacted by the development.	Negligible, discrete effect that will occur one time following implementation of effective mitigation. Should effects be identified, these would be noted in the medium term.
■ **Wildlife**		
Incidental take of species at risk wildlife	■ Within areas confirmed as Jefferson salamander habitat, all above-ground works will occur outside the restricted activity period. For bird/bat species at risk, management plans will be developed through consultation with MNRF. Construction staff to be provided with orientation/training and fact sheets showing photos and general information on species-at-risk wildlife in the area. A protocol will be made available indicating who should be contacted should presence of species at risk be confirmed/detected.	None

Potential Effect	Key Mitigation Measures	Net Effect
Removal of bobolink/eastern meadowlark habitat	■ Any construction works with the potential to impact the identified habitats of bobolink/eastern meadowlark will be timed to occur outside of their breeding period, typically May through July. ■ Agricultural fields to be re-seeded in conjunction with the tenant farmer in advance of the following growing season. Non-agricultural fields to be re-seeded with a native grassland mix in conjunction with the relevant landowner.	One-time temporary loss of habitat. Habitat restoration expected to be completed in the medium term (up to three years post construction). Overall, temporary loss of the grassland would be expected to have a negligible impact on bobolink/eastern meadowlark use of the habitat as no vertical structures will be installed in association with the construction.
Removal of habitat trees for species-at-risk bats	■ Any construction works with the potential to require removal of habitat trees for species-at-risk bats will be completed outside of the bat active period (typically April through October). ■ Prior to removal, the trees will be assessed for provision of bat habitat features (i.e., snags, loose bark, cavities, etc.). Should such features be present, efforts will be made to microsite around the habitat tree to avoid removal where possible. ■ Wherever possible, and in compliance with relevant safety regulations, trees should be replanted.	Habitat removal would be considered permanent. Given the minor amount of tree removal anticipated to be required, and in consideration of the large extent of forest present from the overall communities that will be impacted, the removal of trees to facilitate construction of the pipeline is expected to have a negligible effect on habitat for SAR bats.
Construction within Jefferson salamander Regulated habitat	■ Construction will be required within regulated habitat for Jefferson salamanders. Natural vegetation communities within the identified Regulated habitat will predominantly be subject to HDD and bore construction methods to avoid surface disturbance. Open trench construction will predominantly occur within currently disturbed lands, including residential and agricultural communities. ■ Some tree removal may be required from a small woodland community that is partially within the regulated habitat area. As this feature is not directly connected with the larger woodland communities that comprise the habitat it is considered unlikely that Jefferson salamander will use the feature during their terrestrial phase. ■ No removal of vernal pool breeding habitat or upland woodland habitats is expected to be required. ■ Should any works be required during the active period, such as restoration, work site isolation measures, such as silt fencing, should be employed to prevent accidental entry of Jefferson salamanders into the work area. ■ Consultation with the MNRF is ongoing to confirm mitigation planning within Regulated habitat.	One-time temporary effect that will occur in the short term. No effect on key Jefferson salamander habitat features is anticipated. Some disturbance within the regulated habitat will occur; however, this will be temporary and predominantly be limited to previously disturbed areas.

Potential Effect	Key Mitigation Measures	Net Effect
Construction within Blanding's turtle General habitat	■ Construction will be required within General habitat for Blanding's turtles. Natural vegetation communities within the identified regulated habitat will predominantly be subject to HDD and bore construction methods to avoid surface disturbance. Open trench construction will predominantly occur within currently disturbed lands, including residential and agricultural communities. ■ Some vegetation removal may be required from a small woodland community and a cultural meadow community within the General habitat area. Based on site assessments, these features are not expected to support critical functions of the Blanding's turtle life cycle. ■ As works will not directly impact wintering habitats, works will be constructed during the over-wintering period. ■ Should any works be required during the active period, such as restoration, work site isolation measures, such as silt fencing, should be employed to prevent accidental entry of Blanding's turtle into the work area. ■ Consultation with the MNRF is ongoing to confirm mitigation planning within General habitat.	One-time temporary effect that will occur in the short term. No effect on key Blanding's turtle habitat features is anticipated. Some disturbance within the General habitat will occur, however this will be temporary and predominantly limited to previously disturbed areas.

Summary

Many areas of SAR habitat in the Project footprint will be avoided by using trenchless construction. In areas of trenched construction and construction-related travel, some SAR species and habitat can be disturbed by the clearing of vegetation and other construction activities. In these areas, specific mitigation measures will be implemented to reduce or avoid potential effects. Generally, the areas of the Project footprint cleared of vegetation that provides SAR habitat will be restored within three years of construction, which is expected to effectively reverse the net effects of the Project on the habitat. The re-establishment of mature trees can take significantly longer, however an overall benefit is expected for Butternut through the planting of compensation trees. The net adverse effects of the Project on SAR are likely but are considered to be not significant.

5.4 Socio-economic Features

5.4.1 Agriculture

The potential adverse effects of the Project on agriculture are predicted to be:

- Restricted access to land and use of agricultural land; and
- Disturbance to farming and livestock operations.

Trenched construction will be the primary construction method on agricultural land, which can temporarily restrict current agricultural land use along the footprint.

Restricted access to, and use of, agricultural land and agricultural activities can result in reduced agricultural output and revenue for affected landowners. The Project footprint will cross 23.46 km of prime agricultural land, including approximately 12 km of farmed land, of which wheat, soybeans, and corn are most prevalent. The footprint also crosses 13.05 km of pastures and forages that can serve as areas for grazing animals or sources of grass or hay for horses and cattle. During construction, those areas will not be available for grazing or for harvesting hay. Because construction will take place primarily in winter months, many of the potential effects on agricultural land use and disturbance to farming operations will be avoided.

Mitigation measures to avoid or minimize impacts on agriculture are summarized in Table 5.4-1, including the description of the resulting net effects.

Table 5.4-1: Potential Effect, Key Mitigation Measures, and Net Effects on Agriculture

Potential Effect	Key Mitigation Measures	Net Effect
Restricted access to land and use of land	■ Construction activities and access to properties will be communicated in advance of any planned work such that landowners are aware of activities and potential disturbances. ■ Breaks in soil windrows will be maintained during planting and harvest season, where appropriate, to permit landowner access to adjacent fields. ■ Access to properties should be maintained at all times, and if reduced or restricted it should be communicated in advance with affected landowners. ■ All work will be contained to the agreed ROW and construction workspaces.	Access to land and use of the land will be temporarily restricted.
Disturbance to farming and livestock operations	■ Imperial will prepare ROW plans and easement agreements that will help to determine compensation for decrease in farming output/revenue. ■ Lands in the ROW will maintain current ownership (private or MOI) with the ability of Imperial to access ROW for surveying and maintenance.	None

The net effects of the Project on access to and use of land will be limited to the construction footprint and only during construction. Generally, agricultural crops will be restored within one growing season. Compensation to affected landowners for decreases in farming output/revenue during this time are expected to fully mitigate this effect. Net adverse effects of the Project on existing agriculture are likely but are considered to be not significant.

5.4.2 Residents and Businesses

The potential adverse effects on land uses, residents and businesses are predicted to be:

- Temporary increases in dust and air emissions, noise and vibration;
- Increased traffic;
- Restricted access to properties (residential, businesses);
- Damage to properties (e.g., gardens, lawns, parking lots, parks); and
- Impairment of the use and enjoyment of property, undesirable aesthetic effects, and real or perceived safety concerns.

The construction of the Project can result in temporary increases in noise, dust and air emissions associated with operation of machinery and disturbance of soil, as well as emissions of combustion engine exhaust gases. Noise and ground vibrations from construction equipment (see Section 5.2.7) can potentially affect business operations and people in nearby residences.

The transportation of equipment, materials and workers to the construction site will increase traffic on roads, particularly near the Project footprint. This can affect private and public transportation, school bus routes, and operation of emergency vehicles. Also, changes in local traffic patterns (e.g., road or lane closures) could be expected if delivery of construction supplies or equipment is necessary, or if construction activity close to a roadway obstructs access to residential properties and businesses.

The Project will use trenchless construction to avoid disturbance to roads and highways and avoid road closures and related impacts on traffic and transportation. Trenchless construction will be also used in certain areas to avoid conflict with land uses (e.g., golf courses) and damage to properties. However, areas of trenched construction will create disturbances to land use and properties during construction. Construction activities can affect the enjoyment of outdoor spaces (e.g., gardens, backyards) due to noise, dust, and air emissions, and create undesirable aesthetic effects. Real and perceived safety concerns can arise among residents because of hazards associated with active construction activities (e.g., moving equipment, open excavations, increased traffic) and the presence of operating pipelines. As the pipeline will be buried underground, these effects are expected to be temporary and reversible once the construction and restoration activities are completed.

The potential effects, key mitigation measures to avoid or minimize potential impacts on residents and businesses, and the description of the net effects are summarized in Table 5.4-2.

Table 5.4-2: Potential Effect, Key Mitigation Measures, and Net Effects on Residents and Businesses

Potential Effect	Key Mitigation Measures	Net Effect
Increases in noise, dust and air emissions, and vibrations	■ See Table 5.2-5, Section 5.2-5 for mitigations related to dust and air emissions. ■ See Table 5.2-6, Section 5.2-6 for mitigations related to noise and vibration.	See Tables 5.2-5 and 5.2-6.
Increased traffic	■ To reduce the volume of traffic along the ROW, multi-passenger vehicles such as buses and vans will be used to transport workers to and from active construction sites. ■ Construction teams will use pre-existing ROW, such as utility corridors, where possible, for access. ■ A Traffic Management Plan will be developed to address construction-related traffic routing, access locations, access restrictions, speeds and idling. ■ Road closures will be managed to minimize the closure time and avoid peak traffic hours. ■ A Communication Plan will be in place to inform affected residents and businesses of any planned work, potential disturbances, service disruptions and any safety precautions that residents and businesses will need to follow. In addition, transportation of equipment and materials, as well as road closures, will be communicated by the construction contractor to the relevant municipality in advance of planned activities. ■ Signage will be used to inform of construction activities, road closures, alternative travel routes or the transportation of construction equipment and materials.	Project construction will result in increased traffic locally.

Potential Effect	Key Mitigation Measures	Net Effect
Restricted access to properties (residential, businesses)	■ A Communication Plan will be in place to inform affected residents and businesses of any planned work, potential disturbances, service disruptions and any safety precautions that residents and businesses will need to follow. Specifically, construction activities and any disturbances related to the access to properties will be communicated in advance of planned work such that residents, businesses and landowners are aware of activities and potential disturbances. ■ Access to properties should be maintained at all times, and if reduced or restricted it should be communicated in advance with affected residents and businesses. ■ All work should be contained to the ROW.	Temporarily restricted access to local properties is possible.
Damage to properties (e.g., gardens, lawns, parking lots)	■ Precautionary measures (e.g., protective matting or fencing, trenchless where appropriate, timing) will be taken to mitigate damage to properties. ■ A complaint mechanism will be in place through the land agent to facilitate communication of issues and concerns, including damage repair and compensation, by affected parties.	Damage to properties in the Project's footprint during construction will occur.
Impairment of the use and enjoyment of property, undesirable aesthetic effects, and real or perceived safety concerns	■ Imperial will engage with residents, businesses, and landowners about construction activities and timing, and coordinated access to properties. ■ A Health and Safety Plan will be developed with the highest health and safety regulations and procedures, to maintain the safety of workers and the public. ■ A Communication Plan will be in place to inform residents and businesses of any planned work, potential disturbances, service disruptions and any safety precautions that residents and businesses will need to follow. ■ Safety fences will be installed where the public could be at risk of harm. ■ Signage will be in place to inform of ongoing activities and associated risks. ■ A public complaint mechanism will be in place through the project website (including a phone number and email) to facilitate communication of issues and concerns, including damage repair and compensation, by affected parties.	Construction activities will lead to temporary reduced enjoyment of outdoor spaces within the LSA.

The net effect of the Project on residents and businesses is expected to be limited to the LSA and only during construction in a particular area. The net effect from dust and air emissions, noise and vibration will be limited to the LSA and only during construction, as described in Sections 5.2.5 and 5.2.6. Plans will be shared with residents and users to minimize significant disruption to activities. Generally, agricultural crops will be restored within one growing season of construction and the restoration of other anthropogenic vegetation (particularly landscaped areas and cultural vegetation communities) to best match existing conditions will occur within three years of construction. Net adverse effects of the Project on residents and businesses are likely but are considered to be not significant.

5.4.3 Institutional Services and Facilities

The potential adverse effects on institutional services and facilities are predicted to be:

- Temporary increases in dust and air emissions, noise and vibrations;
- Restricted access to institutional services and facilities; and
- Emergency service disruptions.

In the LSA, there are 11 educational and 24 religious institutions. Project-related activities can create a number of disturbances, such as noise, vibrations, and increased traffic for staff and visitors of facilities close to the Project's site, similar to the potential effects to residences and business described in Section 5.3.2. Construction activities can also temporarily restrict access to these institutional services and facilities.

In the unlikely event the Project requires the use of emergency services such as medical and firefighting, there could be an unexpected increase in the utilization of those services.

The potential effects, key mitigation measures to avoid or minimize effects, and the description of the net effects are summarized on institutional services and facilities are summarized in Table 5.4-3.

Table 5.4-3: Potential Effect, Key Mitigation Measures, and Net Effects on Institutional Services and Facilities

Potential Effect	Key Mitigation Measures	Net Effect
Increase in noise, dust and air emissions, and vibrations	■ See Table 5.2-5, Section 5.2-5 for mitigations related to dust and air emissions. ■ See Table 5.2-6, Section 5.2-6 for mitigations related to noise and vibration.	See Tables 5.2-5 and 5.2-6.
Restricted access to institutional services and facilities and service disruptions	■ Construction activities will be communicated in advance of any planned work such that schools and religious facilities are aware of activities and potential disturbances. ■ Access to all institutional services and facilities will be maintained at all times. ■ Proper fencing and other protective measures will be in place to restrict access to the construction site. ■ A Traffic Management Plan will be developed to address construction-related traffic routing, access locations, an access restrictions related to access to institutional services and facilities.	None

The net effect of the Project on institutional services from dust and air emissions, noise and vibration will be limited to the LSA and only during construction, as described in Sections 5.2.5 and 5.2.6. Plans will be shared with community representatives and institutions to minimize significant disruption to services and facilities.

Net effects of the Project on institutional services are likely but are considered to be not significant.

5.4.4 Culture, Tourism, and Recreational Facilities

The potential adverse effects on culture, tourism, and recreational facilities are predicted to be:

- Restricted access to recreational areas and outdoor spaces (e.g., parks, golf courses);
- Temporary increases in noise, dust and air emissions; and
- Impairment of the use and enjoyment of property, undesirable aesthetic effects, real or perceived safety concerns and other general disturbances.

The Project footprint is close to and crosses several municipal and city parks, golf courses and recreational areas. Trenchless installation methods will be used to avoid sensitive recreational areas such as the Hidden Lake Golf Club, the Centennial Park Golf Course, and several other parks and recreational areas such as the Humber River recreational areas (including West Humber Parkland) and part of Centennial Park.

Trenched construction will be used in some municipal and city parks and outdoor recreational areas where impacts can be mitigated through measures such as construction in winter when the facility or area is closed or experiences low use. There will be temporary increases in noise, dust and air emissions, undesirable aesthetic effects, and real or perceived safety concerns that can reduce the enjoyment of those spaces.

The potential effects, key mitigation measures to avoid or minimize effects, and the description of the net effects are summarized in Table 5.4-4.

Table 5.4-4: Potential Effect, Key Mitigation Measures, and Net Effects on Culture, Tourism, and Recreational Facilities

Potential Effect	Key Mitigation Measures	Net Effect
Restricted access to recreational areas and outdoor spaces (parks, golf courses)	■ A Communication Plan will be in place to inform affected residents and businesses of any planned work, potential disturbances, service disruptions and any safety precautions that residents and businesses will need to follow. Specifically, construction activities and restricted access to parks and other outdoor spaces will be communicated to the relevant municipality or user groups by the construction contractor in advance of planned work such that users are aware of activities and potential disturbances. ■ Will construct in winter or the low season, to the greatest extent possible. ■ A public complaint mechanism will be in place through the project website (including a phone number and email) to facilitate communication of issues and concerns, including damage repair and compensation, by affected parties.	Temporarily restricted access to local recreational properties is possible.
Temporary increases in noise, dust and air emissions	■ See Table 5.2-5, Section 5.2-5 for migrations related to dust and air emissions. ■ See Table 5.2-6, Section 5.2-6 for mitigations related to noise.	See Table 5.2-5 and 5.2-6.
Impairment of the use and enjoyment of property, undesirable aesthetic effects, real or perceived safety concerns	■ A Communication Plan will be in place to inform the public of any planned work, potential disturbances, service disruptions and any safety precautions that recreational users will need to follow. ■ Safety fences will be installed where public could be at risk of harm. ■ Signage will be in place to inform of ongoing activities and associated risks.	Construction activities can lead to temporarily reduced enjoyment of outdoor spaces and safety concerns.

The net effect of the Project on culture, tourism and recreational facilities will be limited to the LSA and only during construction and until site restoration. The use of trenchless construction in designated areas, the timing of construction during times of low activity, and communications with community representatives and the public will reduce the disruption to users of the facilities during construction. Generally, the restoration of anthropogenic vegetation (particularly landscaped areas and cultural vegetation communities) or natural vegetation and wetlands will occur within three years of construction. However, re-establishment of mature trees can take significantly longer. Net effects of the Project on the use of recreational facilities are likely but are considered to be not significant.

5.4.5 Linear Infrastructure

Potential adverse effects on linear infrastructure are predicted to be:

- Service disruptions; and
- Damage to infrastructure.

Foreign pipelines, water and sewer lines, communication lines, and power lines are in proximity to, run parallel to or intersect the Project. The Project also crosses a number of roads, highways and railroads. Construction equipment can damage underground infrastructure if contact is made during clearing or trenching, or strikes above-ground electrical infrastructure (e.g., electricity towers or wires), causing service disruptions. Trenchless installation methods will be used to avoid damage to roads and railroads. However, changes in local traffic patterns (e.g., road or lane closures) are expected during the delivery of construction supplies or equipment, or if construction activity is close to a roadway, as described in Section 5.3.2.

Imperial will work with applicable infrastructure owners, operators and municipalities, and will operate under strict health and safety regulations such that potential impacts to existing infrastructure are minimized or avoided.

The potential effects, key mitigation measures to be implemented, and the net effects on linear infrastructure are summarized in Table 5.4-5.

Table 5.4-5: Potential Effect, Key Mitigation Measures, and Net Effects on Linear Infrastructure

Potential Effect	Key Mitigation Measures	Net Effect
Service disruptions and damage to infrastructure	■ All provincial and federal health and safety regulations and precautionary work practices will be determined, communicated and enforced prior to and during construction activities. ■ Imperial will use the Ontario OneCall system to reduce the likelihood of damage to buried utilities and all crossing and/or encroachment agreements will be followed. ■ Work plan will be shared, and required approvals and permits will be obtained from relevant service providers prior to any construction activities. ■ There will be no grading in proximity to pipelines, and additional protection will be placed on the ground to avoid damage to underground linear infrastructure if necessary (e.g., according to). ■ Where route crosses a foreign pipeline, the Project's pipeline will be placed with appropriate clearance to the foreign pipeline, avoiding damage or service disruption to the foreign pipeline. ■ Impacts to paved roadways will be avoided by using trenchless construction methods. If traffic management is necessary, it will be in accordance with a Traffic Management Plan and requirements of local municipalities. ■ The Project will maintain all minimum setback distances from HONI or municipal electrical infrastructure as determined by crossing or encroachment permits or agreements. Construction equipment will be located on the side of the trench without power towers and lines, where practical such that proper distance and minimize the likelihood of accidents.	Temporary restrictions to traffic are expected on some roads. No other service disruptions are expected.

The net effect of the Project on existing linear infrastructure, will be limited to the LSA and only during construction. The use of trenchless construction under roads and railroads, communications with owners and operators, and adherence to best practices and regulations will avoid disruption or damage to infrastructure. Net effects of the Project on existing linear infrastructure are unlikely and are considered to be not significant.

5.4.6 Economy and Employment

The construction of the Project is not expected to result in adverse effects on local economy and employment.

5.4.7 Archaeological Resources

The potential adverse effects to archaeological resources are predicted to be:

- Disturbance of known archaeological resources; and
- Impairment, damage or loss of previously unknown archaeological resources.

Currently known archaeological sites in the LSA were identified during the Stage 1 Archaeological Assessment. These sites are based on the data in the Archaeological Report Database maintained by MTCS, which provides spatial representation and attribute information for archaeological sites and previous assessment areas including CHVI. Avoidance and protection are generally the preferred management recommendation for archaeological sites determined to have CHVI. Where avoidance is not possible due to other constraints, Imperial will use a trenchless installation method to mitigate impact on the resource (e.g., Parson's Site). If avoidance or trenchless installation is not feasible, then additional archaeological studies including Stage 3 and potentially Stage 4 Archaeological Assessments will be required prior to disturbance.

A Stage 2 Archaeological Assessment is currently in progress within the Project's footprint to identify unknown archaeological sites that may be impacted during construction activities. In addition, an Archaeological Resources Contingency Plan will be implemented during construction to identify any archaeological materials that were not located during the Stage 2 Assessment. Following identification, disturbance to previously unknown archaeological sites will be mitigated using the same techniques as described above for currently known archaeological sites.

The potential effects, key mitigation measures to avoid or minimize effects on archaeological resources are summarized in Table 5.4-6.

Table 5.4-6: Potential Effect, Key Mitigation Measures, and Net Effects on Archaeological Resources

Potential Effect	Key Mitigation Measures	Net Effect
Disturbance of known archaeological sites	■ Imperial will avoid known sites to the greatest extent possible through routing evaluation and maintenance of appropriate buffers. ■ Where appropriate, trenchless installation methods will be used to mitigation impacts to known archaeological sites and with approval from MTCS. ■ Where the above mitigation measures are not achievable, Imperial will undertake Stage 3, and potentially Stage 4, archaeological assessments prior to construction.	None

Potential Effect	Key Mitigation Measures	Net Effect
Impairment, damage or loss of unknown archaeological sites	■ Prior to construction, the Project will complete a Stage 2 archaeological assessment in areas that retain archaeological potential. Construction activities will not proceed until the area is cleared of archaeological concern and acceptance has been received from MTCS. ■ During construction, Imperial will implement a "Chance Find" Archaeology Resource Contingency Plan to effectively manage discoveries of previously undocumented archaeological resources, including human remains.	None

The Stage 2 Archaeological Assessment and associated mitigation measures, including Stage 3 and potentially Stage 4 Archaeological Assessments, are expected to result in avoiding adverse effects to archaeological sites. Net effects of the Project on archaeological resources are not predicted.

5.4.8 Cultural Heritage Resources and Landscapes

Potential adverse effects to cultural heritage resources are predicted to be:

- Impairment, damage or loss of built heritage resources; and
- Impairment, damage or loss of cultural heritage landscapes.

Built heritage resources and cultural heritage landscapes have been identified in the LSA. These resources and landscapes have the potential to be affected by the Project's development through impairment, damage, or direct loss due to pipeline construction activities or indirectly related to air quality, dust, noise and vibration. Avoidance of identified resources is the preferred management recommendation for cultural heritage resources. Where avoidance is not feasible, alternative installation methods may be considered (i.e., trenchless). As cultural heritage resources were identified in the LSA, a Heritage Impact Assessment (HIA) will be submitted to the local municipality for review and approval. Mitigation measures identified in the HIA, as well as conditions found in the review from MTCS, will be implemented prior to construction.

The potential effects, key mitigation measures to avoid or minimize the effects, and the net effect on cultural heritage resources and landscapes are summarized in Table 5.4-7.

Table 5.4-7: Potential Effect, Key Mitigation Measures, and Net Effects on Cultural Heritage Resources and Landscapes

Potential Effect	Key Mitigation Measures	Net Effect
Impairment, damage or loss of built heritage resources	■ Imperial will avoid known cultural heritage resources and landscapes through routing considerations. Where avoidance is not feasible, trenchless installation methods will be implemented. ■ Imperial will prepare a HIA and submit to the relevant authorities for approval. ■ Mitigation measures presented in the HIA, along with conditions in the municipal review, will be implemented prior to construction.	None
Impairment, damage or loss of cultural heritage landscapes	■ Imperial will avoid identified, municipally significant cultural heritage landscape impacts through routing considerations. The Project will prepare a HIA and submit to the relevant authorities for approval.	None

The HIA and associated mitigation measures, including further documentation if avoidance is not feasible, are expected to result in avoiding adverse effects to cultural heritage resources and landscapes. Net effects of the Project on cultural heritage resources and landscapes are not predicted.

5.5 Contamination

Potential adverse effects of contaminated/impacted material are:

- Reduced groundwater and soil quality by intersecting existing contamination;
- Reduced surface water, groundwater and soil quality by introducing new contamination due to accidental spills.

Pipeline construction through the known sites of contamination within the footprint (i.e., KP 0+000, 0+300 and 63+000) may have the potential to further affect water and soil quality. There is also the potential for other unknown sites of contamination to be encountered during construction, which can also further affect water and soil quality.

To mitigate environmental effects, a Contaminated Materials Management and Handling Plan will be developed to describe the handling, testing, storage, treatment and disposal of contaminated soil and water (i.e. groundwater and surface water).

A Spill Prevention and Response Plan will be developed and implemented for the Project to guide the prevention of spills and response to spills during construction. The interception and clean-up of spills will be according to provisions in the *Environmental Protection Act*, R.S.O. 1990 (EPA). The Contaminated Materials Management and Handling Plan will be developed and implemented according the requirements of the MECP.

During operations, the intent of this Project is to maintain safe and reliable operation by reducing the potential for a spill. This is accomplished with on-going monitoring and maintenance of the system as part of commissioning and operations of the pipeline. Once in operation, the pipeline will be included in Imperial's current operational plans and procedures for the SPPL. This includes Imperial's Emergency Response Plan that will be implemented in response to the unlikely event of a pipeline leak during operation.

Mitigation measures to avoid or minimize effects from contaminated areas and spills, and the net effects are summarized in Table 5.4-8.

Table 5.4-8: Potential Effect, Key Mitigation Measure, and Net Effects of Contamination

Potential Effect	Key Mitigation Measures	Net Effect
Reduced groundwater and soil quality by intersecting existing areas	■ A Contaminated Materials Management and Handling Plan will be prepared and implemented if contamination is encountered during construction.	None
Reduced surface water, groundwater and soil quality due to accidental spills	■ A Spill Prevention and Response Plan will be developed and implemented for the Project to guide the prevention of spills and response to spills during Project construction. ■ Imperial's Emergency Response Plan will be implemented to guide the in response to the unlikely event of a pipeline leak/failure during Project operation.	The affected area can vary, dependent on the magnitude of a spill, and management can take days or years.

A net effect of the Project on known and unknown existing contaminated areas is not predicted. In the unlikely event of a spill, the net effects to surface water, groundwater and soil quality can vary. Contaminated surface water, groundwater or soil that poses a significant risk to human health or the

environment as a result of a spill from the Project will be remediated. Generally, clean-up of a spill is completed within days, however remediation of contaminated material follows a risk-based approach that can take significantly longer.

5.6 Summary

With implementation of the Project design and mitigation measures, as well as adherence to all permitting, regulatory, or legislative requirements, it is expected that the potential adverse effects of the Project will largely be avoided. Where and when avoidance is not feasible, the mitigation measures are expected to minimize the potential effects.

Adverse net effects were predicted for the following features:

- Physical Features:
  - Groundwater
  - Surface water
  - Air
  - Noise and Vibration;
- Biophysical Features:
  - Vegetation and Wetlands
  - Wildlife and Wildlife Habitat
  - Fish and Fish Habitat
  - Species at Risk;
- Socio-economic Features:
  - Agriculture
  - Residents and Businesses
  - Institutional Services
  - Culture, Tourism and Recreational Facilities
  - Linear Infrastructure; and
- Contamination.

However, the adverse net effects to these features are considered to be not significant.

6. CUMULATIVE EFFECTS ASSESSMENT

6.1 Assessment Methods

A cumulative effects assessment considers a project's net adverse environmental and socio-economic effects in consideration of anticipated simultaneous effects from other, unrelated projects and activities. While a project's net effects might not be significant when considered individually, it is possible that an interaction with or in addition to an unrelated effect could result in a cumulative environmental or socio-economic effect. This potential is reflected in the OEB Environmental Guideline (2016), which requires that cumulative effects should be identified and discussed in the ER as an integral part of the environmental assessment.

Cumulative effects can occur if the Project effects interact with the effects of other projects and activities both in space (e.g., disturbance of wildlife habitat by several projects) and time (e.g., concurrent construction activities). Given the results of the Project effects assessment presented in Section 5, the following physical, environmental and socio-economic features were identified as likely to have adverse net effects that can act cumulatively with other unrelated projects or activities:

- Groundwater;
- Surface water;
- Air;
- Noise and Vibration;
- Vegetation and Wetlands;
- Wildlife and Wildlife Habitat;
- Fish and Fish Habitat;
- Species at Risk; and
- Socio-economic Features

The spatial boundaries for the cumulative effects assessment of each feature are presented in Table 6.1-1.

Table 6.1-1: Cumulative Effects Study Areas by Feature

Feature	Cumulative Effects Study Area (metres on either side of centerline)	Regional Study Area Rationale
Groundwater	200	Project effects to groundwater supply can act cumulatively with other unrelated projects.
Surface Water	250 upstream; 500 downstream of watercourse crossings	Project effects to surface water quality can act cumulatively with other unrelated projects.
Air and Noise	750	Indirect or cumulative effects on air quality (i.e., dust) or noise are not anticipated beyond 750 m.
Vegetation and Wetlands	ELC Units or Woodland/Wetland Complexes	Project effects such as removal of vegetation or introduction of invasive species can act cumulatively with other unrelated projects; however, these effects are anticipated to only impact those ELC communities or woodland/wetland complexes within the LSA.

Feature	Cumulative Effects Study Area (metres on either side of centerline)	Regional Study Area Rationale
Wildlife and Wildlife Habitat	Significant Wildlife Habitat Units	Project effects such as alteration of habitats or noise disturbance can act cumulatively with other unrelated construction projects; however, these effects are anticipated to only impact those significant wildlife habitat units within the LSA.
Fish and Fish Habitat	Watersheds intersected by the Project	This is an appropriate scale to assess both project and cumulative effects on fish populations in the project area. Fish are mobile, and hence projects within the watershed should be considered for cumulative effects.
Socio-Economic	Municipal Boundary	Project effects can act cumulatively with other unrelated construction projects but these cumulative effects are anticipated to be indistinguishable from baseline sources beyond Municipal Boundaries.

6.2 Project Interactions with Current Conditions and Activities

The effects assessment (Section 5) considers the effects of the Project within the context of existing environmental and socio-economic conditions (Section 4). Therefore, Project interactions with current conditions and activities are inherently part of the effects assessment. Because the Project route follows an existing easement and utility corridor, and the cumulative effects study area is largely altered by agriculture or urban/suburban development and existing infrastructure, the Project is expected to contribute only marginally to cumulative effects on the existing environmental and socio-economic conditions.

Most anticipated Project net effects are limited to the Project footprint. However, wildlife and fish can move to and from the Project footprint so a broader consideration of interactions with current conditions and activities is appropriate. Project effects such as alteration of wildlife habitats or disturbance of wildlife can act cumulatively with other activities. The Project, by design, is expected to avoid or minimize potential effects to sensitive wildlife and wildlife habitat by following the existing SPPL as much as possible, by the extensive use of trenchless construction to avoid significant habitat and/or by scheduling construction outside of sensitive periods. Effects to the vegetation that provides habitat to wildlife in the Project footprint are expected to be temporary, and in most cases to take only one to three years to reach comparable maturity to the vegetation impacted by Project construction.

The watersheds crossed by the Project have been altered through agriculture or through urban/suburban development, and most watercourses show existing impairment of both water quality and riparian vegetation. In this context, the resilience of the aquatic environment to additional impacts can be lower than that of natural areas. However, any net effects of the Project on water quality are anticipated to be negligible in both scale and duration, and are not anticipated to negatively impact fish populations within the associated watersheds, even cumulatively with existing effects to water quality. Similarly, net effects to habitat are not anticipated to negatively affect fish populations within the Project's watercourses. Effects to riparian and aquatic vegetation in the Project footprint are expected to be temporary, and in most cases to take only one to three years to reach comparable maturity to the vegetation impacted by Project construction.

The existing infrastructure and the activities related to the infrastructure are anticipated to interact with the Project, but because the activities will be within the maintained footprint and the current utility corridor, potential cumulative effects to environmental features in the area are not likely. The Project's contribution to cumulative socio-economic effects to local residents and land users as a result of cumulative air emissions and noise, and increases in local traffic are likely but are predicted to be not significant.

6.3 Project Interactions with Current and Foreseeable Projects

Current and foreseeable future projects that might have effects that can act cumulatively with the Project's likely net effects were identified within approximately 750 m of the Project from the following public sources and through stakeholder consultation:

- Ontario Energy Board Website;
- Infrastructure Ontario Website;
- BuildON Website;
- Canadian Environmental Assessment Registry Website; and
- National Energy Board Website.

This cumulative effects assessment considers the effects of potential interactions of the Project with the foreseeable future projects listed in Table 6.2-1. For many of these projects, construction timing is unknown. A conservative assumption was made that any of the identified foreseeable future projects could interact with the Project's construction.

Table 6.2-1: Cumulative Effects Project Inclusion List

Name	Description	Status	Estimated Projected Completion	Estimated Distance from Project Centreline (m) [1]	Estimated KP Reference
CN's Milton Logistics Hub	New mainline rail to double track on the existing line and add over 20 km of new rail yard track.	Federal EIA in progress	Unknown	150	15+200 to 16+600
Halton Biosolids Processing Plant upgrades	Tenders will be sent out in 2018, and the region expects construction to begin in spring 2018.	Unknown	Unknown	550	18+600
Hurontario Light Rail Transit (LRT)	New light rail transit	Planning	Dec 2022	0	38+050
GO Transit Regional Express Rail	Highway 401/409 Rail Tunnel	Under construction	2021	600	51+800
Finch West Light Rail Transit (LRT)	New light rail transit	Planning	Dec 2022	0	57+500
GO Transit Regional Express Rail	Expand service and electrify core segments of the rail network, including the Union-Pearson (UP) Express.	Planning	Mar 2025	0	51+750

[1] When the estimated distance is zero, it indicates that the Project's centerline crosses the foreseeable future project listed in the table.

Sources: BuildON; Canadian Environmental Assessment Registry Website; The Free Independent Press (2017).

Other projects initiated by Imperial in the vicinity of the Project, but are not part of the Project are:

- Deactivation of the existing SPPL pipeline;
- The Credit River Valley Project (pipeline crossing of the Credit River);
- The Highway 409 Crossing; and
- Realignment of the existing SPPL to accommodate the Metrolinx Finch West LRT Project.

These other projects can interact with the Project effects at specific sites where surface activities will occur. Because these interactions are expected to be within the current utility corridor, and because these projects are subject to separate environmental and regulatory review and approval, potential cumulative effects to sensitive environmental features in the area are considered not likely. The cumulative socio-economic effects to local residents and land users as a result of cumulative air emissions and noise, and increases in local traffic are likely but are predicted to be not significant.

Imperial will continue to monitor the status of other projects and activities to understand and address the potential for cumulative effects and will consult with potentially affected stakeholders regarding planned or possible mitigation.

If possible, Project construction timing and sequence will be planned to avoid simultaneous construction activities by several parties in the same location. If multiple construction activities will interact despite best planning efforts, Imperial will still strive to adhere to all municipal air and noise emission limits and applicable municipal bylaws. Where cumulative emission limits cannot be achieved, the Project will seek a by-law exemption(s) from the municipalities and adhere to the limits set in the exemption(s).

CN Milton Logistics Hub

CN is planning to build a Logistics Hub near Milton, immediately northeast of the Project near Tremaine Road. The Project will be installed by boring under Tremaine Road and the CN railway, which will avoid impeding traffic along both the road and the railway. The proposed Hub is currently undergoing Federal Environmental Impact Assessment, and the timing of approval and construction are currently unknown. The Hub is proposed to be built on what is currently agricultural land. Cumulative dust, noise and vibration from the Project and the Hub construction activities can cumulatively affect farming operations.

Construction of the Project will require clearing of some vegetation, resulting in disruption of habitat for Eastern Meadowlark, a species at risk; however, the location of the Project is approximately 700 m from the nearest point of the Hub, so cumulative effects on the disruption of habitat are not anticipated. Additionally, as construction of the Project through eastern meadowlark habitat will occur outside of the breeding and fledging period, there will be no cumulative noise or vibration effects on the species.

Halton Biosolids Processing Plant Upgrades

The Region of Halton is planning to upgrade the Halton Biosolids Processing Plant near Regional Road 25 and the upgrades may interact with the proposed construction timing. The Project will be installed by boring under Regional Road 25 and the access road to the Plant, which will avoid any traffic disruptions. No other potential cumulative effects related to the Plant upgrades are anticipated.

Hurontario LRT

The Project intersects the planned Hurontario LRT line at the intersection of Hurontario Street and Highway 403. The LRT line is currently in the procurement phase and preparatory construction work to move infrastructure to accommodate the LRT line construction is ongoing. The LRT line construction is anticipated to be completed at the end of 2022, and it could interact with the Project's construction timing. The Project will be installed using HDD under Hurontario Street and will, therefore, avoiding any surface

disturbance at the intersection. However, cumulative dust and noise and vibration from the Project and the LRT line construction may affect local residents and land users if the construction schedules overlap in this area. See Section 6.1.3 for conclusions and mitigation measures.

The Project is located approximately 600 m west of an existing railway tunnel under Highway 401/409. A new railway tunnel will be constructed under Highway 401/409 next to the existing tunnel to accommodate additional rail tracks between 2018 and 2021 as part of the GO Transit Regional Express Rail initiative. The Project will be installed under Highway 409 and the adjacent railway, and therefore, there will be no surface disturbance interaction. However, cumulative dust and noise and vibration from the Project and the Highway 401/409 tunnel construction may affect local residents and land users, if the construction schedules overlap in this area. No sub-surface interaction with the tunnel is anticipated.

Finch West LRT

The Project's ROW transects the planned Finch LRT line at Finch Avenue. Construction of the Finch LRT line is ongoing and is expected to complete in 2023. Imperial is in the process of realigning the current pipeline to accommodate the Finch West LRT Project, and this realignment is addressed under a separate regulatory process. The Project will tie into the recently realigned pipeline on either side of Finch Avenue.

Barrie GO Rail Corridor Improvements

The Barrie GO Rail Corridor does not transect the Project but is immediately east of the Finch Terminal. Improvements to the Corridor are planned and it is possible that the construction at the Finch Terminal and the Corridor improvements will occur at the same time. Therefore, cumulative dust and noise and vibration from the Project and the Corridor improvements may affect local residents and land users, if the construction schedules overlap in this area.

6.4 Summary

This cumulative effects assessment considers potential interaction of the Project with the current conditions and activities in the area, including Imperial's existing pipeline operations and the operations of other infrastructure, the planned deactivation of the existing Imperial pipeline, and other foreseeable projects.

Because the Project route follows existing easements through areas largely altered by agriculture or urban/suburban development, the Project is expected to contribute only marginally to cumulative adverse effects on the existing environmental conditions.

Cumulative socio-economic effects to local farming operations, residents and businesses, and land users can occur if the Project's construction activities interact with one or more of the projects identified in Table 6.2-1. These potential adverse effects are expected to be short term and local, and only for the duration of construction in each area. The adverse cumulative effects to these residents, businesses and land users are considered not significant.

7. ENVIRONMENTAL PROTECTION, MANAGEMENT, AND CONTINGENCY PLANS

The majority of the environmental effects of pipeline construction identified in this assessment are considered temporary and local and are expected to be mitigated through planning and the implementation of best management practices to:

- Avoid or minimize potential adverse environmental effects;
- Monitor the implementation of mitigation measures; and
- Implement appropriate response to unexpected events.

An Environmental Protection Plan (EPP) and several management and contingency plans will be developed prior to construction. These plans will build on the key mitigation measures for the Project identified in this ER. The plans will also outline the environmental inspection that will be carried out to confirm effective implementation of mitigation measures and/or contingency plans. Overall implementation of the environmental management and contingency plans is directed by the Project's EPP.

The management plans that will be developed include:

- Erosion and Sediment Control Plan (ESCP);
- Water Management Plan;
- Reclamation Plan;
- Spill Prevention and Response Plan (which includes prevention (or management) and response (or contingency) measures);
- Traffic Management Plan;
- Health and Safety Plan;
- Communication Plan;
- Waste Management Plan; and
- Contaminated Materials Management and Handling Plan.

Contingency Plans outline responses to unexpected/unplanned events that may occur during construction and have the potential to affect the environmental or socio-economic features. These include:

- Inadvertent Returns during HDD Plan;
- Contaminated Material Management and Handling Plan; and
- Chance Find' Contingency Plan for Archaeological Resources.

The following sections outline the purpose of each of these plans.

Environmental Protection Plan

The purpose of the EPP is to outline the management of the environmental programs during construction in a systematic and documented manner. It includes the applicable requirements and compliance procedures, organizational structure, specific roles and responsibilities, procedures for training personnel, inspection and reporting, and other processes and procedures to maintain environmental compliance. The EPP provides the standards and processes to manage and monitor potential environmental effects.

The EPP guides environmental management during construction of the Project and is progressively developed as the Project moves through the OEB approval process, permitting and construction phases.

The first stage of the EPP begins with preparation of Environmental Management Plans (EMPs) as part of the EA/permitting process that are commitment-based and broad in their level of detail. As the Project's planning progresses, so does the level of detail of the EMPs, to include permit approval terms and conditions, and other applicable regulatory requirements. The EPP and EMPs form the basis for what will be implemented during construction.

Erosion and Sediment Control Plan

The purpose of the Project's Erosion and Sediment Control Plan (ESCP) is to:

- Establish the planning, implementation and monitoring practices that will be applied to manage erosion and sediment loss during construction;
- Identify specific construction activities that have the potential to generate sediment; and
- Outline monitoring and reporting protocols to track ESCP performance.

Temporary erosion and sediment control measures will be implemented for the Project. Examples of potential measures to be implemented are illustrated in the typical drawings provided in Appendix A.

Water Management Plan

The Water Management Plan will support implementation of conservation measures to reduce water use during construction and identify water taking requirements and water discharge methods and locations. The Plan will outline mitigation measures for working around water wells, shallow groundwater and unconfirmed aquifers, and protection measures in the area of dewatering discharge locations. The Plan will also address the management of water for drilling and hydrostatic testing.

Reclamation Plan

The Reclamation Plan will address the planning, management, and monitoring activities related to the restoration and rehabilitation of the Project's ROW during and after construction. The goal of the Reclamation Plan is to return affected areas to their pre-construction function where feasible, and within 1-3 years following construction. This may include:

- Landscaping farmland and private properties in residential areas with the goal to return the landscape to equivalent pre-construction conditions. Where this cannot be completed, compensation for the landowner will be negotiated.
- Certain planting and building restrictions apply to residential properties containing a permanent ROW; however, in consultation with residents, restoration will be designed to accommodate the easement and owner's use.
- Disturbance to sensitive habitats and ecosystems (e.g., watercourses, riparian areas, wetlands, woodlands), will be avoided where possible using trenchless construction methods. Where an area cannot be avoided, mitigation measures will be implemented to avoid or minimize effects on sensitive ecosystems. Conservation authorities, municipalities, and the MNRF will be consulted for vegetation removal compensation (e.g., native seed mixes, tree planting). Refer to Appendix A for a Watercourse Restoration typical drawing.

Spill Prevention and Response Plan

The purpose of the construction Spill Prevention and Response is to provide the Project with guidance in the development of prevention, contingency planning, and reporting practices for the timely and effective prevention and response to potential inadvertent, construction-related releases to land and surface water.

Performance objectives for the management of potential substance release will be included in the plan that considers the Project's risks and compliance obligations, including:

- Preventing the inadvertent release of materials that may have a deleterious effect on the terrestrial and aquatic environments;
- Responding with appropriate measures in a timely manner to an inadvertent release; and
- Providing timely notifications to key project personnel and regulatory agencies.

In accordance with Ontario Regulation 224/07, Imperial will update and implement its existing SPPL spill prevention and response procedures for operation of the Project.

Traffic Management Plan

A plan to avoid or minimize impacts to the local transportation network (including impacts to agricultural equipment) from construction vehicle and equipment access to the Project will be prepared and implemented. Ongoing consultation with municipal and regional governments and related commitments will be incorporated into the Plan.

Health and Safety Plan

A Health and Safety Plan will be developed for construction to confirm that the Project meets the highest health and safety regulations and procedures, maintaining the safety of workers and the public.

Communication Plan

A Communication Plan will be in place during construction to inform affected residents and businesses of any planned work, potential disturbances, service disruptions and any safety precautions that residents and businesses will need to follow.

Waste Management Plan

The Waste Management Plan will outline strategies the Project will implement to process various construction waste streams, and will focus on waste minimization and the efficient use of resources. It will include provision for both non-hazardous (e.g., wood, plastic, metal) and potentially hazardous waste (e.g., certain lubricating oils, drilling wastes) and protocol for diverting and manifesting waste to the authorized management facility given the waste type.

Inadvertent Returns during HDD Plan

During trenchless pipeline installation, drilling operations will be continuously monitored by experienced personnel. Non-hazardous drilling fluid (typically bentonite and water) is used during the advancement of the drill string to clean and aid in stabilizing the bore hole, and carry drill cuttings to the bore entry or exit. The viscosity and pressure of the drilling fluid is adjusted throughout the procedure to manage the HDD process. Jetting pressures will be suitable to local conditions to avoid a drilling fluid release (i.e., inadvertent return) during drilling. However, an Inadvertent Returns during HDD Plan will be prepared for implementation in the event of an inadvertent release of drilling fluid during trenchless installation.

Contaminated Material Management and Handling Plan

A Phase 1 ESA has identified a limited number of potentially contaminated sites in the vicinity of the pipeline route through a review of ERIS regulatory database reports (refer to Section 4.7). In these areas, the Contaminated Material Management and Handling Plan will be implemented.

The potential also exists for contaminated material to be encountered unexpectedly during construction. If evidence of potential contamination is found (e.g., buried tanks, drums, oil residue or gaseous odour) during construction activity, the Contaminated Material Management and Handling will be implemented.

"Chance Find" Archaeological Resources Contingency Plan

The "Chance Find "Archaeological Resources Contingency Plan will be implemented if unknown archaeological resources are discovered during construction. The plan will be implemented with regulators and Indigenous communities to protect archaeological and cultural heritage resources discovered and, where necessary, appropriate documentation, salvage and commemoration.

8. SUMMARY AND CONCLUSIONS

This ER was prepared for Imperial's Waterdown to Finch Project to meet the requirements of the Ontario Energy Board's (OEB) *Environmental Guidelines for the Location, Construction, and Operation of Hydrocarbon Pipelines and Facilities in Ontario.* In keeping with this, the primary objective of this ER was to describe the actions taken to date to confirm the pipeline route and the related construction methods and activities planned to avoid or minimize the environmental and socio-economic effects of the Project. This ER considers the existing physical, environmental, socio-economic, archaeological, and cultural heritage features, and includes both an effects assessment and a cumulative effects assessment.

Imperial consulted with, and continues to consult with, a broad range of stakeholders, including government agencies and landowners, as well as Indigenous communities, with a potential interest in the Project to reach the current pipeline route and design, and to develop mitigation measures.

With implementation of the Project design and mitigation measures, as well as adherence to all permitting, regulatory, or legislative requirements, the potential adverse effects of the Project, and related cumulative effects, will largely be avoided. Where avoidance is not feasible, the mitigation measures will minimize the effects such that they are expected to be not significant. An environmental inspection or monitoring program will confirm that proposed mitigation measures are implemented and effective.

9. REFERENCES

1990 *Ontario Heritage Act* (OHA), R.S.O. 1990 c. O.18

Armstrong, D.K. and Dodge, J.E.P. 2007. *Paleozoic Geology of Southern Ontario; Ontario Geological Survey*, Miscellaneous Release-Data 219. Available online at https://maps.niagararegion.ca/metadata/md/DocumentUpload/2007-08-08%2014-44-38.pdf. Accessed October 2018.

Barrie Corridor Expansion Project Website. Available online at: http://www.metrolinx.com/en/regionalplanning/rer/barriecorridorexpansion.aspx

BC Fisheries. 2001. Reconnaissance (1:20,000) fish and fish habitat inventory: standards and procedures Version 2.0. Prepared by BC Fisheries Information Services Branch for Resources Inventory Committee (RIC), Victoria, BC.

BC Environment, Forest Service, and British Columbia, editors. 1998. Fish-stream identification guidebook -- 2d ed2d ed. BC Environment ; Forest Service, Victoria, BC.

Bird Studies Canada. 2009. *Atlas of the Breeding Birds of Ontario*. Available online at: http://www.birdsontario.org/atlas. Accessed October 2018.

Bobrowsky, P.T. and M.J. Dominguez. 2012. Landslide susceptibility map of Canada. *Geological Survey of Canada, Open File 7228*. Available online at https://doi.org/10.4095/291902. Accessed October 2018.

Bostock, H.S. 2014. Physiographic Regions of Canada, Geological Survey of Canada, "A" Series Map 1254A, (ed. 2), 2014, 3 sheets, https://doi.org/10.4095/293408.

Brunton, F.R. and Dodge, J.E.P. 2008. Karst of southern Ontario and Manitoulin Island; Ontario Geological Survey, Groundwater Resources Study 5. ISBN 978-1-4249-8376-6 (ZIP FILE); ISBN 978-1-4249-8375-9 (DVD).

BuildON Website. Accessed October 1, 2018 at https://www.ontario.ca/page/building-ontario

Canadian Environmental Assessment Registry Website. Accessed October 2, 2018 at https://www.ceaa-acee.gc.ca

Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 228.

City of Burlington. 2018. Official Plan. https://www.burlington.ca/en/services-for-you/Official-Plan.asp

City of Hamilton. 2018. Official Plan & Zoning By-law. https://www.hamilton.ca/city-planning/official-plan-zoning-by-law

City of Toronto. 2017. *Environmental Noise Study in the City of Toronto*.

Conservation Halton. 2002. Bronte Creek Watershed Study. Conservation Halton, Burlington, ON.

Conservation Halton. 2009a. 08 Urban Creeks and Supplemental Monitoring. Conservation Halton, Burlington, ON.

Conservation Halton. 2009b. 07 Bronte Creek and Supplemental Monitoring. Conservation Halton, Burlington, ON.

Conservation Halton. 2009c. 06 Grindstone Creek and Supplemental Monitoring. Conservation Halton, Burlington, ON.

Conservation Halton. 2010. 09 Sixteen Mile Creek, Grindstone Creek and Supplemental Monitoring. Conservation Halton, Burlington, ON.

Conservation Halton. 2013a. Long Term Environmental Monitoring Program 2011 Grindstone Creek, Sixteen Mile Creek and Supplemental Monitoring. Page 176 pp. Conservation Halton, Burlington, ON.

Conservation Halton. 2013b. Long Term Environmental Monitoring Program 2012 Bronte Creek, Urban Creeks and Supplemental Monitoring. Page 173 pp. Conservation Halton, Burlington, ON.

Conservation Halton. 2013c. Long Term Environmental Monitoring Program 2010 Bronte Creek, Urban Creeks and Supplemental Monitoring. Page 149 pp. Conservation Halton, Burlington, ON.

Conservation Halton Website. Accessed October 18, 2018 at https://www.conservationhalton.ca/conservation-halton-watersheds

Credit Valley Conservation Foundation Website. Accessed October 18, 2018 at https://www.cvcfoundation.ca/about-cvcf/the-credit-river-watershed/

CVC, and MNR. 2002. Credit River Fisheries Management Plan. Credit Valley Conservation (CVC) and Ministry of Natural Resources (MNR), Ontario, Canada.

DFO. 1995. Freshwater Intake End-of-Pipe Fish Screen Guidelines. Department of Fisheries and Oceans, Ottawa, ON.

DFO. 2016. Measures to Avoid Causing Harm to Fish and Fish Habitat. http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html.

Environment Canada. 1996. Planting the Seed: A Guide to Establishing Aquatic Plants. 24 pp.

Finch LRT Line Project Website. Available online at: http://www.metrolinx.com/en/greaterregion/Projects/finchwest-lrt.aspx

Gao, C., Shirota, J., Kelly, R. I., Brunton, F.R., van Haaften, S. 2006. Bedrock topography and overburden thickness mapping, southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 207. ISBN 1-4249-2550-9.

Government of Canada. 2017. October 31. Species at Risk Public Registry. Online database. https://www.registrelep-sararegistry.gc.ca/sar/index/default_e.cfm.

Government of Canada. 2018. Annual Crop Inventory 2017. https://open.canada.ca/data/en/dataset/ba2645d5-4458-414d-b196-6303ac06c1c9

Halton. 2018. Halton's Regional Official Plan. Accessed December 5, 2018 at http://www.halton.ca/planning_sustainability/plans_strategies_studies/haltons_regional_official_plan/.

Hamilton Watershed Stewarship Program. 2018. *Borer's Creek Subwatershed Factsheet*.

Hurontario LRT Project Website. Available online at: http://www.metrolinx.com/en/greaterregion/Projects/hurontario-lrt.aspx

Imperial Oil Limited. 2018. Indigenous Relations. Available online at https://www.imperialoil.ca/en-ca/community/indigenous-engagement. Accessed November 2018.

Infrastructure Ontario Website. Accessed October 2, 2018 at http://www.infrastructureontario.ca

MECC (Ministry of the Environment and Climate Change). 2017. *Air Quality in Ontario – 2016 Report*.

Miller, J., A. Pollock, and S. Cleland. In Progress. Stage 1 Archaeological Assessment for the Proposed Waterdown to Finch Project, Various Lots and Concessions, Geographic Townships of East Flamborough, Nelson, Trafalgar, Toronto, Etobicoke & York, Now City of Hamilton, City of

Burlington, Town of Milton, Town of Oakville, City of Mississauga & City of Toronto, Ontario. Prepared for ERM Consultants Canada Ltd. and Universal Pegasus International by Past Recovery Archaeological Services, Maberly, ON.

Milton. 2018. Official Plan. https://www.milton.ca/en/build/officialplan.asp

Ministry of Environment, Conservation and Parks (MECP). 2018. *Source Protection Information Atlas of Ontario*. Available at https://www.gisapplication.lrc.gov.on.ca/SourceWaterProtection/Index.html?viewer=SourceWaterProtection.SWPViewer&locale=en-US. Accessed October 2018.

Ministry of Natural Resources and Forestry (MNRF). 2018. *Land Information Ontario (LIO) Metadata Tool*. Available at: https://www.ontario.ca/page/land-information-ontario. Accessed October 2018

Ministry of Natural Resources and Forestry (MNRF). 2018. *Map-a-Map: Natural Heritage Areas Online Tool*. Available at https://www.gisapplication.lrc.gov.on.ca/matm/Index.html?viewer=Make_A_Topographic_Map.MATM&locale=en-US. Accessed November 2018.

Ministry of Tourism, Culture and Sport (MCTS). 2011. *Standards and Guidelines for Consultant Archaeologists.* Ministry of Tourism, Culture and Sport, Toronto.

Mississauga. 2018. Mississauga Official Plan. http://www.mississauga.ca/portal/residents/mississaugaofficialplan

MMA (Ministry of Municipal Affairs and Housing). 2014. Provincial Policy Statement. http://www.mah.gov.on.ca/Page10679.aspx#Infrastructure+and+Public+Service+Facilities

MMA (Ministry of Municipal Affairs and Housing). 2017. Greenbelt Plan. http://www.mah.gov.on.ca/Page13783.aspx#1

National Building Code of Canada, 2015. Seismic Hazard Map. Available online at http://www.earthquakescanada.nrcan.gc.ca/hazard-alea/simphaz-en.php#ON. Accessed October 2018.

National Energy Board Website. Accessed October 2, 2018 at https://www.neb-one.gc.ca/pplctnflng/mjrpp/index-eng.html

Natural Resources Canada, 2016, Determine 2010 National Building Code of Canada seismic hazard values, modified 2016-02-10. Available online at http://www.earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/index_2010-en.php. Accessed October 2018.

Niagara Escarpment Commission. 2017. Niagara Escarpment Plan. https://www.escarpment.org/LandPlanning/PlanReview

O'Rourke, T. D. and M.C. Palmer. 1996. Earthquake performance of gas transmission pipelines. *Earthquake Spectra*. Vol. 12, No. 3, p.493-527.

Oakville. 2018. Livable Oakville Plan. https://www.oakville.ca/townhall/livable-oakville-official-plan.html

OEB (Ontario Energy Board). 2016. *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario*. 7th Edition, 2016.

Oil, Gas, and Salt Resources Library[OGSR], 2018, PxTools records for GoogleEarth. Available online at www.ogsrlibrary.com/production. Accessed October 2018.

OMAFRA (Ontario Ministry of Agriculture, Food and Rural Affairs). 2018. Area, Yield, Production and Farm Value of Specified Field Crops, Ontario, 2012 - 2017 (Imperial and Metric Units). http://www.omafra.gov.on.ca/english/stats/crops/estimate_new.htm

Ontario Department of Mines and Northern Affairs. 1971. The Niagara Escarpment, Industrial Mineral Report No. 35.

Ontario Energy Board Website. Accessed October 2, 2018 at https://www.oeb.ca/

Ontario Geological Survey. 1991. Bedrock Geology of Ontario, southern sheet; Ontario Geological Survey, Map 2544, scale 1:1,000,000. Available online at http://www.geologyontario.mndmf.gov.on.ca/mndmfiles/pub/data/imaging/M2544/M2544.pdf. Accessed October 2018.

Ontario Geological Survey. 2000. Quaternary geology, seamless coverage of the Province of Ontario; Ontario Geological Survey, Data Set 14---Revised.

Ontario Geological Survey. 2011. 1:250,000 scale bedrock geology of Ontario, Ontario Geological Survey, Miscellaneous Release-Data 126 – Revision 1. Available online at https://www.ontario.ca/data/1250-000-scale-bedrock-geology-ontario. Accessed October 2018.

Ontario Ministry of Agriculture, Food, and Rural Affairs. 2018. *Classifying Prime and Marginal Agricultural Soils and Landscapes: Guidelines for Application of the Canada Land Inventory in Ontario.* Available online at http://www.omafra.gov.on.ca/english/landuse/classify.htm. Accessed October 2018.

Ontario Ministry of Natural Resources. March 2010. *Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005*. Second Edition. Toronto: Queen's Printer for Ontario. 248 pp.

Peel Region. 2018. Peel Region Official Plan. Accessed December 5, 2018 at https://www.peelregion.ca/planning/officialplan/download.htm

Stanfield, L. 2017. Ontario Stream Assessment Protocol (OSAP), Version 10. Government of Ontario.

Statistics Canada. 2017. Census Profile, 2016 Census. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E

Statistics Canada. 2018. Table 14-10-0294-01 Labour force characteristics by census metropolitan area, three-month moving average, seasonally adjusted and unadjusted, last 5 months. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410029401

The Free Independent Press. 2017. Upgrades to Halton processing plant will reduce smell from Georgetown Wastewater Treatment Plant. Published November 20, 2017 by Kathryn Boyle. Available online at: https://www.theifp.ca/news-story/7933756-upgrades-to-halton-processing-plant-will-reduce-smell-from-georgetown-wastewater-treatment-plant/

The Yorkshire and Humber CCS Cross Country Pipeline, National Grid. June 2014. Environmental Statement Document 6.13.1, Noise and Vibration.

Toronto. 2018. Official Plan. https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/official-plan/

Toronto and Region Conservation Authority Website. Accessed October 18, 2018 at https://trca.ca/conservation/watershed-management/etobicoke-mimico-creek/watershed-features/

TRCA. 2011. Regional Watershed Monitoring Program Fish Community Summary 2001-2009. Page 49 pages + appendices. Toronto and Region Conservation Authority (TRCA), Toronto, ON.

TRCA. 2016. Open Information and Data, Toronto Region Conservation Authority (TRCA)'s Open Data Licence v 1.0. https://trca.ca/about/open/#data.

TRCA and CVC. 2014. Evaluation, Classification and Management of Headwater Drainage Features Guideline. Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC).

Unterman McPhail Associates. In progress. *Existing Conditions Report Cultural Heritage Landscape & Built Heritage Resources – Waterdown to Finch Project.* Prepared for ERM Consultants Canada Ltd. and Universal Pegasus International by Unterman McPhail Associated in association with Archaeological Services Inc. Toronto, ON.

VIU. 2013. Habitat Assessment Methods. Page 78. Natural Resources Extension Program (NREP), Vancouver Island University (VIU), Nanaimo, BC.

Wald, D.J., Worden, B.C., Quitoriano, V., Pankow, K.L. 2006. ShakeMap Manual. Available online at http://pubs.usgs.gov/tm/2005/12A01/. Accessed November 2014.

Zale, A. V., D. L. Parrish, T. M. Sutton, and American Fisheries Society, editors. 2012. Fisheries techniques3rd ed. American Fisheries Society, Bethesda, Md.

ERM has over 160 offices across the following countries and territories worldwide

Argentina
Australia
Belgium
Brazil
Canada
Chile
China
Colombia
France
Germany
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kenya
Malaysia
Mexico
Mozambique
Myanmar
The Netherlands
New Zealand
Norway
Panama
Peru
Poland
Portugal
Puerto Rico
Romania
Russia
Singapore
South Africa
South Korea
Spain
Sweden
Switzerland
Taiwan
Thailand
UAE
UK
US
Vietnam

ERM Toronto
120 Adelaide Street West
Suite 2010
Toronto, Ontario
Canada V5H 1T1

T: (416) 646-3608
F: (416) 642-1269

www.erm.com

The business of sustainability

ERM