National Energy Board

Office national de l'énergie

Reasons for Decision

ITC Lake Erie Connector LLC

Lake Erie Connector International Power Line Project

EH-001-2015

January 2017

Facilities

Canada

National Energy Board

Reasons for Decision

In the Matter of

ITC Lake Erie Connector LLC

Application dated 22 May 2015 for the
Lake Erie Connector International
Power Line Project

EH-001-2015
January 2017

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Glossary of Terms, Abbreviations, and Units

AC	Alternating current. An electrical power system that has voltage and current reversing every half-cycle. Systems in North America operate at 60 cycles per second.
ACE	Abandonment cost estimate
Applicant	ITC Lake Erie Connector LLC
Application	The application submitted to the Board by ITC Lake Erie on 22 May 2015 for the proposed Project.
ATP	Application to Participate
Board	National Energy Board
CEAA 2012	*Canadian Environmental Assessment Act*, *2012*, SC 2012, c 19.
Certificate	Certificate of Public Convenience and Necessity as defined in section 2 of the NEB Act. ITC Lake Erie's Application included a request for a Certificate pursuant section 58.16 of the NEB Act in respect of an international or interprovincial power line.
commencement of construction	The start of construction activities for the Project, including the clearing of vegetation, ground-breaking and other forms of right-of-way preparation that may have an impact on the environment (activities associated with normal surveying do not constitute the commencement construction.
Commenter	A person who is directly affected and /or has relevant information or expertise regarding the Project and who has been approved by the Board to provide a Letter of Comment.
Company	ITC Lake Erie Connector LLC
CSA	Canadian Standards Association
DC	Direct current. The unidirectional flow of electric charge.
EAE	National Energy Board's Enhanced Aboriginal Engagement process
ECCC	Environment and Climate Change Canada
Electricity Filing Manual	*National Energy Board Electricity Filing Manual* (May 2015).

EPP	Environmental Protection Plan
ERP	Emergency Response Plan
for approval	When a condition requires a filing with the Board "for approval", ITC Lake Erie must not commence the indicated action or activity until the Board issues its written approval of the filing.
Funding Review Committee	A committee, independent of the Board's hearing process for this Project, established to review applications for funding made under the Participant Funding Program.
GHGs	Greenhouse Gas Emissions
Governor in Council	The Cabinet of the Federal Government of Canada.
HCCC	Haudenosaunee Confederacy Chiefs Council
HDD	Horizontal directional drilling
HDI	Haudenosaunee Development Institute
Hearing Order	Order issued by the Board on 21 October 2015 setting out the process in relation to the hearing for the assessment of the Application, including: hearing time limit; how the public may participate; hearing events, steps, and deadlines; and procedures and guidance.
HVDC	High-voltage direct current. A direct current above 69,000 volts.
Hydro One	Hydro One Networks Inc.
IEC	International Electrotechnical Commission
IESO	The Independent Electricity System Operator
including	Use of this term, or any variant of it, is not intended to limit the elements to just those listed. Rather, it implies minimum requirements with the potential for augmentation, as appropriate.
Intervenor	A party (e.g., individual(s), company or group) who has applied to participate in the EH-001-2015 hearing and has been granted standing by the Board to participate as an Intervenor having rights and obligations in the proceedings as set out in the Hearing Order.
IPL	International Power Line. Facilities constructed or operated for the purpose of transmitting electricity from or to a place in Canada to or from a place outside Canada.

IR	Information Request. A written question to the Applicant or a Participant in the hearing process, most usually an Intervenor, in relation to its evidence, asked by the Board, or filed by an Intervenor or the Applicant during the written portion of the hearing pursuant to the deadlines set out by the Board, to which a response must be subsequently filed.
ITC Holdings	ITC Holdings Corp.
ITC Lake Erie	ITC Lake Erie Connector LLC
LLC	Limited Liability Company
MISO	Midcontinent Independent System Operator
MNCFN	Mississaugas of the New Credit First Nation
MNRF	Ontario Ministry of Natural Resources and Forestry
NBCC	National Building Code of Canada
NEB	National Energy Board
NEB Act	*National Energy Board Act*, RSC 1985, c N-7.
NERC	North American Electric Reliability Corporation
NPCC	Northeast Power Coordinating Council
NRCan	Natural Resources Canada
NYISO	New York Independent System Operator
OPG	Ontario Power Generation
Participant	An individual, company, or group who has applied to participate in the hearing and who has been granted standing to participate by the Board. The term participant includes the Applicant, Intervenors, and Commenters in the hearing.
PAR	Phase angle regulator
Parties	Includes the Applicant and Intervenors, but does not include Commenters.
PFP	Participant Funding Program
PJM	PJM Interconnection LLC

Post-construction	The time once construction is complete, following final clean-up through to the completion of reclamation activities. Activities that take place during post-construction include monitoring to evaluate the success of reclamation activities, compliance with commitments, and the stabilization of the disturbed lands.
Procedural Update	Directions made during the hearing process by the Board in regard to matters and procedures in the hearing process
Process Advisor	National Energy Board staff assigned to provide assistance to the public, landowners, Aboriginal groups, and Participants to help them understand the hearing process, the different roles of the hearing participants, and how to participate in a hearing in relation to an application before the National Energy Board.
Project	ITC Lake Erie's proposal to construct and operate an approximately 117 kilometre 1,000 megawatt ±320 kilovolt high-voltage direct current (HVDC) bi-directional electric transmission interconnection, plus associated facilities between Nanticoke, Haldimand County, Ontario and Erie County, Pennsylvania, US crossing Lake Erie. The length of the Canadian portion of this HVDC merchant transmission line is 48.1 kilometres (consisting of 1.3 kilometres on land and 46.8 kilometres under the lakebed).
public record	The NEB's public record of a hearing available to the public through the NEB's website. Records specific to the EH-001-2015 hearing are found at: http://www.neb-one.gc.ca/pplctnflng/mjrpp/lkrcnnctr/index-eng.html
Reasons for Decision	Sets out the Board's decision as to whether a Certificate should be issued for all or any portion of the international power line, the findings of the Board, and all the terms and conditions the Board considers necessary or desirable in the public interest to which any Certificate would be subject, pursuant to section 58.16 of the NEB Act. If the Reasons for Decision decide that a Certificate should be issued, such is subject to approval of the Governor in Council.
ROV	Remote Operated Vehicle
right-of-way	The strip of land acquired for which a company has obtained, or plans to obtain rights for the construction and operation of a pipeline or power line.
SARA	*Species at Risk Act*, SC 2002, c 29.
SF_6	Sulphur hexafluoride

SIA	System Impact Assessment
UNESCO	United Nations Educational, Scientific, and Cultural Organization
US	United States of America
VSC	Voltage Source Converter

List of Units

°C	degrees centigrade
CAD	Canadian dollars
GWh	Gigawatt hour. One billion watt hours.
ha	hectare
km	kilometre
kV	Kilovolt. One thousand volts.
m	metre
mm	millimetre
MW	Megawatt. One thousand watts.
MWh	Megawatt hour. One thousand watt hours.
USD	United States dollars

Recital

IN THE MATTER OF the *National Energy Board Act*, R.S.C. 1985, c. N-7, as amended, and the regulations made thereunder;

IN THE MATTER OF an application by ITC Lake Erie Connector LLC before the National Energy Board for a Certificate of Public Convenience and Necessity pursuant to sections 58.16 of Part III.1 of the *National Energy Board Act*, filed under File No. OF-Fac-IPL-I175-2015-01-02 on 22 May 2015; and

IN THE MATTER OF National Energy Board Hearing Order EH-001-2015, dated 21 October 2015;

HEARD by way of written submissions as determined by the National Energy Board and communicated through Procedural Update No. 2, dated 3 May 2016.

BEFORE:

L. Mercier	Presiding Member
R. R. George	Member
R. Wallace	Member

Written Final Argument

ITC Lake Erie Connector LLC

Independent Electric System Operator

Written Reply Argument

ITC Lake Erie Connector LLC

Decision of the Board

For all the reasons and findings set out within the chapters that follow within these Reasons for Decision, the Board finds that the Lake Erie Connector international power line project (Project) is in the public interest, and it is and will be required by the present and future public convenience and necessity. This decision reflects the Board's assessment of all relevant evidence filed on the EH-001-2015 public record in relation to the List of Issues (Appendix I), and all considerations that appeared to the Board to be directly related to the Project and relevant. The Board notes that its reasons and findings can be found within the sections entitled "Views of the Board" set out within the chapters.

Pursuant to section 58.16 of the *National Energy Board Act* (NEB Act), subject to Governor in Council approval, the Board has decided that a Certificate of Public Convenience and Necessity (Certificate) shall be issued for the Project, incorporating the terms and conditions set out in Appendix III, and including all commitments made by ITC Lake Erie Connector LLC (ITC Lake Erie) during the hearing process.

If the issuance of this Certificate by the Board is approved by the Governor in Council, the terms and conditions the Board has set out for the Project will be legal requirements, and the Board will monitor all conditions and regulate all lifecycle phases of the Project. "Views of the Board" sections of the chapters of these Reasons for Decision also refer to the conditions, which are noted in bold type face. The conditions govern the Project prior to and during construction, operation, and the eventual abandonment of the Project. In total, the Board would attach 42 conditions to the Certificate that cover a wide range of matters, including:

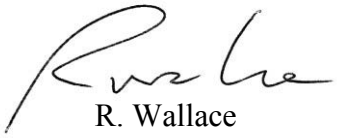
- protection of the environment;
- socio-economic matters;
- emergency preparedness and response during the lifecycle of the Project; and
- reliability and safety of the Project.

The Board encourages anyone wishing to more fully understand the context of the information and evidence provided by all those who participated in this public hearing to consult the Board's online public registry (hearing record) for the Project, which is available on the Board's website at www.neb-one.gc.ca.

The Board thanks all Participants for their contributions to the proceeding.

L. Mercier
Presiding Member

R. R. George
Member



R. Wallace
Member

Chapter 1

Introduction

1.1 The Project

On 22 May 2015, ITC Lake Erie filed an application under section 58.16 of Part III.1 of the NEB Act for a Certificate and such further relief as the Board may determine appropriate for the Project. ITC Lake Erie described the Project as an approximately 117 kilometre 1,000 megawatt (MW) ±320 kilovolt (kV) high-voltage direct current (HVDC) bi-directional electric transmission interconnection, plus associated facilities to transfer electricity between Nanticoke, Haldimand County, Ontario and Erie County, Pennsylvania, United States of America (US) crossing Lake Erie.

This Application was preceded by the filing of an election pursuant to section 58.23 of the NEB Act by ITC Lake Erie on 19 May 2015 that the provisions of the NEB Act, referred to in section 58.27, and not the laws of the province described in section 58.19 should apply to the Project.

ITC Lake Erie stated that the Project will consist of a proposed 1,000 MW HVDC transmission line, two HVDC converter stations and AC lines to connect to the existing electricity grid. The Project has an estimated capital cost of approximately $1 billion USD. The estimated cost of construction for the Canadian portion of the Project is $543,536,066 CAD[1].

The Project will be the first direct interconnection between the PJM Interconnection LLC[2] (PJM) market in the US mid-Atlantic and Midwest, and the Independent Electricity System Operator[3] (IESO) market in Ontario. Once constructed, the Project will be incorporated into the Ontario electricity grid, which is managed by the IESO and the PJM electricity grid in the US. ITC Lake Erie stated that the Project has a minimum 30-year design life, and is bi-directional in that it will have the ability to transmit power from Canada to the US and vice-versa.

The Project is being developed as a merchant transmission line project that will be financially supported by commitments from transmission customers who will purchase capacity on the

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[1] For the purposes of the National Energy Board Cost Recovery Regulations, the Board estimates the cost of construction for the Canadian portion of the international power line to be $543,536,066 CAD.

[2] PJM Interconnection LLC is a regional transmission organization that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia.

[3] The Independent Electricity System Operator in Ontario is responsible for: balancing the supply of and demand for electricity in Ontario and directing its flow across the provinces transmission lines; planning for the province's medium and long-term energy needs; overseeing the electricity wholesale market; and power conservation measures.

transmission line. ITC Lake Erie said that neither Ontario nor PJM electricity ratepayers will be required to support the cost of developing, operating, or maintaining the Project.

1.1.1 The Proposed Project Facilities

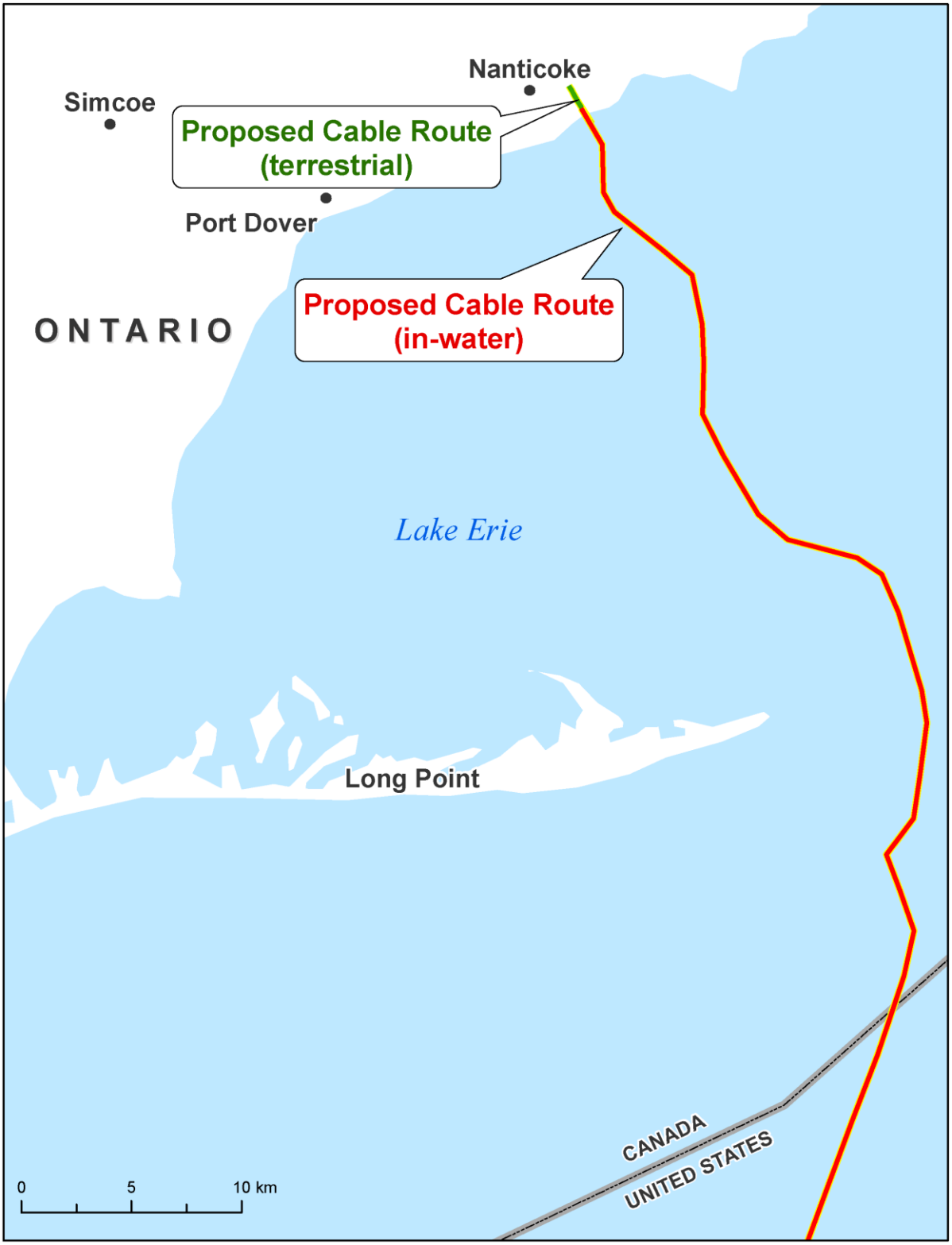
ITC Lake Erie stated that the Project consists of a proposed 1,000 MW HVDC transmission line (terrestrial and in-water cables), two HVDC converter stations with ancillary above-ground facilities (one in Canada and one in the US), and new terrestrial AC lines to connect the converter stations to the IESO, and PJM electricity grids. The length of the buried AC line in Canada is 1.3 kilometres. The Canadian HVDC converter station (Haldimand Converter Station) will be located in Ontario near a point of interconnection in Haldimand County, close to the Nanticoke transformer station switchyard. The Haldimand Converter Station will convert 500 kV AC power to ±320 kV direct current (DC) power or vice versa. The HVDC transmission line would consist of two transmission cables, one positively charged and the other negatively charged, along with a fibre optic cable for communications between the converter stations.

The HVDC transmission line would enter the waters of Lake Erie and cross from Canada to the US. The length of the Canadian portion of the HVDC transmission line is 48.1 kilometres, consisting of 1.3 kilometres on land and 46.8 kilometres under the lakebed.

If approved, ITC Lake Erie indicated that construction of the facilities would begin in the second quarter of 2018, with an anticipated in-service date in the fourth quarter of 2020.

Figure 1.1, Project Overview Map, illustrates the portion of the Project that is located in Canada and in Canadian waters.

Figure 1.1 Project Overview Map



Map produced by the NEB, October 2016. The map is a graphical representation intended for general informational purposes only.

1.1.2 US Approvals and Permits

As the Project crosses an international boundary, ITC Lake Erie stated that it is required to obtain US authorizations for the Project, including, but not limited to: a Presidential Permit issued by the US Department of Energy; a permit from the US Army Corps of Engineers under the *Clean Water Act* and the *Rivers and Harbors Appropriation Act*; and permits from the Pennsylvania Department of Environmental Protection relating to water obstruction and encroachment and stormwater discharge. ITC Lake Erie said that these authorizations would be received by the second quarter of 2017.

1.2 Relief Requested by ITC Lake Erie

In its Application, ITC Lake Erie requested that the Board issue:

- a Certificate, pursuant to section 58.16 of the NEB Act, authorizing the construction and operation of the Canadian portion of the Lake Erie Connector facilities; and
- such further and other relief as ITC Lake Erie may request, or that the Board may determine to be appropriate.

1.3 Environmental Assessment

The Board was not required to undertake an environmental assessment pursuant to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) as the Project is not a designated project pursuant to the *Regulations Designating Physical Activities* SOR/2012-147.

The Project is not a designated project because it does not:

- require the construction, operation, decommissioning, and abandonment of a new electrical transmission line with a voltage of 345 kV or more that requires a total of 75 kilometres or more of new right-of-way; or
- involve the construction, operation, decommissioning, and abandonment of a new electrical transmission line in a wildlife area or migratory bird sanctuary.

The Board determined that the Project was to be subject to an environmental assessment under the NEB Act. The Board's environmental assessment for the Project is provided in Chapter 7.

1.4 Regulatory Process

1.4.1 Hearing Participation

On 21 October 2015, the Board issued a Hearing Order and Application to Participate (ATP) for the EH-001-2015 hearing (hearing or proceeding), indicating that the ATP form would be available on the Board's website starting on 9 November 2015. Those who wished to participate in the hearing had until 27 November 2015 to apply using the Board's online ATP form.

The Board received, considered and granted standing at the level requested to 11 applicants. Six entities applied for Intervenor status. The remaining five applicants requested to participate as Commenters. Table 1.1 indicates that all applicants were accepted and granted the status requested in their applications. Appendix II of these Reasons for Decision provides further details on their participation in the hearing.

Table 1.1 Applicants to the Board's ATP Process

Status Applied For	Status Granted	Participant
Intervenor	Intervenor	Elmcrest
Intervenor	Intervenor	Haudenosaunee Confederacy Chiefs Council
Intervenor	Intervenor	Hydro One
Intervenor	Intervenor	The IESO
Intervenor	Intervenor	Natural Resources Canada
Intervenor	Intervenor	Ontario Ministry of Natural Resources and Forestry
Commenter	Commenter	Environment and Climate Change Canada
Commenter	Commenter	Haldimand County
Commenter	Commenter	Health Canada
Commenter	Commenter	Industrial Power Users of Niagara
Commenter	Commenter	Manitoba Hydro

The Board notes that its standing decisions made in the hearing do not constitute findings by the Board with respect to the facts or claims asserted in an ATP or by a Participant during the proceeding.

1.4.2 Hearing Order

On 21 October 2015, the Board issued a Hearing Order for the EH-001-2015 proceeding and subsequently issued several procedural updates. The Hearing Order established a public hearing process designed to encourage and support meaningful public and Aboriginal participation.

The Board conducted a regulatory and environmental assessment to determine if the proposed Project is in the Canadian public interest. In its assessment, the Board considered the List of Issues set out in Appendix I.

1.4.3 Participant Funding

The NEB administers a Participant Funding Program (PFP) which provides financial assistance to support the participation of individuals, Aboriginal groups, landowners, incorporated non-industry not-for-profit organizations, or other interested groups who seek to participate in the Board's hearing process. PFP is meant to facilitate the participation of the public in hearings, and is not intended to cover all the costs of participation.

A Funding Review Committee for the PFP was established, independent of the Board's hearing process, to review applications for participant funding and make recommendations on funding awards. The Funding Review Committee reviewed applications from a landowner group and an Aboriginal group, and recommended funding awards to both. These recommendations were accepted, and the applicants were advised of the available amounts and the claims process.

More information on the PFP and the funding awards allocated for the Project can be found on the NEB's website at Participant Funding Reports:
www.neb-one.gc.ca/prtcptn/hrng/pfp/llctnfnd/index-eng.html

1.4.4 Written Process

On 11 April 2016, the Board requested comments from all Parties on whether an oral hearing portion was required as part of the hearing process for the Project. The Board received comments from ITC Lake Erie, which stated that, in ITC Lake Erie's view, it would be appropriate to conduct the balance of the proceeding by way of written hearing.

On 3 May 2016, the Board decided to continue by means of a written hearing process. In its decision, the Board noted that no Intervenors filed responses or indicated any interest in participating in an oral hearing portion.

The written process included opportunities for Participants to file evidence, pose information requests (IRs), provide Letters of Comment, and submit final argument. Appendix II provides the types and sources of information and evidence filed by Participants during the proceeding. It also indicates where the information is found on the Board's hearing record for the Project located on the NEB's website.

1.4.5 Oral Traditional Evidence

The Board understands that Aboriginal peoples have an oral tradition for sharing lessons and knowledge from generation to generation and that this information cannot always be shared adequately in writing. The Board finds it valuable for its consideration of applications to gather oral traditional evidence during its proceedings from interested Aboriginal Intervenors.

The Board determined a process for gathering oral traditional evidence in the hearing and informed the Aboriginal Intervenor by letter dated 4 March 2016.

Chapter 5 provides information about Aboriginal matters, including information about oral traditional evidence.

1.5 Public Interest

The public interest is inclusive of all Canadians and refers to a balance of economic, environmental, and social interests that changes as society's values and preferences evolve over time in respect of IPLs applied for under section 58.16 of the NEB Act. The Board assesses the overall public good a project may create and its potential negative aspects, weighs its various impacts, and makes its decision.

In making its decision regarding public convenience and necessity, the Board has regard to all considerations that appear to it to be directly related to the IPL and relevant. The Board relies on the facts that are established to its satisfaction through the hearing process for the assessment of a project, and conducts its proceeding consistent with the principles of natural justice.

In its assessment of ITC Lake Erie's Application, the Board considered whether it is in the overall Canadian public interest. In its determination of whether the Project is in the Canadian public interest, the Board considered the List of Issues in Appendix I, including the potential impacts of the Project on Aboriginal and landowner interests; the potential environmental and socio-economic effects of the Project; the suitability of the design, construction and operation; the safety and security during construction and operation of the Project including emergency planning and third-party damage prevention; commercial impacts and impacts on the bulk power system; the economic feasibility; and the need for the Project.

The Board based its determination on findings of fact, and carefully assessed and weighed all of the evidence filed and arguments submitted by Participants in the proceeding, exercising its discretion in balancing the interests of a diverse public. The Board also assessed and considered all the evidence, comments, and arguments presented by those who participated in the proceeding.

1.6 Lifecycle Approach

The Board takes a lifecycle approach to regulation, holding its regulated companies accountable so that Canadians and the environment are protected throughout the lifecycle of each project. The lifecycle includes the following phases: planning and pre-application, application assessment and public hearing, construction and post-construction, operations and maintenance, and eventual abandonment.

Should the Governor in Council (GIC) approve the issuance of a Certificate, and ITC Lake Erie proceeds with the Project, the Board will use this same ongoing oversight to regulate the certificated Project facilities and components.

1.7 Conditions

Under the NEB Act, the Board has the authority to set out conditions that it considers necessary or desirable in the public interest. The purpose of such conditions is to mitigate potential risks and effects associated with a project so that the Project can be designed, constructed, operated, and abandoned in a safe manner that protects the public and the environment.

On 26 February 2016, the Board released 20 possible conditions for the Project for information purposes, to provide all Participants with information about how potential concerns could be addressed. Following the receipt of additional filings and further assessment by the Board, a revised list of 37 possible conditions was released to Parties for comment on 25 July 2016. Two additional possible conditions were released for comment on 8 August 2016. The Board considered all comments it received from ITC Lake Erie, Intervenors, and any information in Letters of Comment before finalizing and setting out the terms and conditions it would impose if the Board's decision on the Project is approved by the Governor in Council.

The Board imposes 42 conditions to be attached to the Certificate which are set out in Appendix III, Certificate Conditions. The Board considers these 42 conditions necessary or desirable in the public interest. These conditions relate to the List of Issues in Appendix I as well as other relevant and related issues brought forward within the evidence filed during the proceeding.

There are conditions discussed throughout the chapters that follow.

The Board also finds that the following conditions, found in Appendix III, are necessary or desirable:

Certificate Condition 1 – requiring compliance with all conditions;

Certificate Condition 2 – providing an expiry date of the Certificate;

Certificate Condition 3 – requiring that all commitments made in the proceeding be implemented;

Certificate Condition 4 – requiring that the Project be constructed, operated, and abandoned in accordance with the standards and other information referred to in the Application and proceedings;

Certificate Condition 5 – requiring that the IPL be constructed and operated by ITC Lake Erie;

Certificate Condition 6 – requiring leave of the Board for any changes in ownership or operator; and

Certificate Condition 16 – requiring confirmation that all necessary US federal and state permits and approvals have been received for the US portion of the ITC Lake Erie Connector Project.

The Board notes that any commitments made by ITC Lake Erie in its Application or in its related submissions during the proceeding have also become regulatory requirements. To be satisfied that ITC Lake Erie complies with all of its commitments for this Project, the Board imposes **Certificate Condition 8** (Appendix III) requiring ITC Lake Erie to file a Commitments Tracking Table for the Project.

If ITC Lake Erie decides to proceed with the Project, it will be required to comply with all the terms and conditions set out in the Certificate and any commitments it made during the proceeding.

The Board will monitor and enforce compliance with these terms and conditions throughout the lifecycle of the Project through audits, inspections, and other compliance and enforcement tools.

Documents filed by ITC Lake Erie in relation to condition compliance and related Board correspondence will be available to the public on the Board's website at www.neb-one.gc.ca

The Board's condition compliance web page enables Canadians to track company compliance with Certificate approval conditions.

Chapter 2

Economic Feasibility and Need for the Project

In making its determination on the economic feasibility of a proposed IPL and related facilities, the Board assesses the need for the IPL and the likelihood of the IPL being used at a reasonable level over its economic life. To make this determination, the Board considers the evidence filed regarding the supply of electricity that will be available to be transported on the IPL, any transmission contracts underpinning the IPL, and the availability of adequate markets to receive electricity delivered by the IPL.

In considering whether a project is and will be required by the present and future public convenience and necessity, the Board takes into consideration the potential impacts on commercial third parties. The Board also considers the company's ability to finance the construction, ongoing operation and maintenance, and abandonment of the proposed IPL.

2.1 Need for Facilities

In making its determination as to whether to issue a Certificate, the Board, under the NEB Act, shall have regard to all considerations that appear to it to be relevant. This includes undertaking an assessment of the need for this Project so that it can be balanced against any burdens it may create. The Board notes that not all burdens associated with this Project are financial or economic ones to be borne by the investors in the Project.

Views of ITC Lake Erie

ITC Lake Erie stated that the Project will be the first direct transmission connection between Ontario and PJM and it will provide significant benefits to both jurisdictions by enhancing power system reliability (discussed further in Section 3.2) and increasing market efficiency (discussed further in Section 2.3).

ITC Lake Erie stated that the Project's power flow and direction can be immediately controlled to respond to changing system and market conditions. Accordingly, the Project provides optionality for transmission customers to take advantage of daily or hourly changes in market conditions and it enhances system operators' ability to respond to emergency and unforeseen events.

ITC Lake Erie stated that the Project would deliver customer value by facilitating the trading of energy, capacity, renewable energy credits, and ancillary services which include operating reserves used to balance the power systems and provide supporting services under certain system contingencies. ITC Lake Erie stated that the cost of trading energy between Ontario and PJM would be reduced by over 50 per cent as a result of the direct interconnection provided by the Project.

ITC Lake Erie stated that it expected the open solicitation process to show market interest in the Project and confirm the value of the Project. ITC Lake Erie filed confidential information with the Board under section 16.1 of the NEB Act, providing the Board with information related to the interest expressed in the open solicitation process.

Views of the Participants

Manitoba Hydro in its Letter of Comment raised concerns regarding the System Impact Assessment (SIA), conducted by the IESO, and the effect of the Project on the reliability of the bulk power system and the facilities of Manitoba Hydro. These concerns and the IESO's response are addressed in Section 3.2.2.

> ***Views of the Board***
>
> The Board finds that the Project would improve power system reliability and trade efficiency between the IESO and PJM. The Board is of the view that ITC Lake Erie has demonstrated that the Project is responding to market need and that sufficient benefits to the power system and economic efficiency exist to demonstrate the need for the Project.

2.2 Supply

Views of ITC Lake Erie

ITC Lake Erie stated that the Project would constitute the first direct interconnection between the Ontario power system, administered by the IESO and the PJM electric power system which covers all or part of 13 US states and the District of Columbia.

ITC Lake Erie stated that Ontario currently has a surplus of electricity generation capacity and is a net exporter of electricity. In 2014, the province's net exports reached 14,200 Gigawatt hours (GWh) which represents about 9 per cent of Ontario's total generation. ITC Lake Erie stated that in the same year, PJM was a net importer of electricity during summer and winter and a net exporter of electricity in the spring and fall. Exports and imports reached 47,800 GWh and 47,400 GWh respectively. Table 2.1 summarizes the generation and trade data submitted by ITC Lake Erie for Ontario and PJM.

Table 2.1 Ontario and PJM Market Overviews

	Ontario	PJM
Peak load (2014)	22,800 MW	141,395 MW
Total generation capacity (end of 2014)	34,367 MW	183,724 MW
Capacity mix	Nuclear (38 per cent), natural gas (29 per cent), hydro (25 per cent), wind (7 per cent)	Coal (40 per cent), natural gas (31 per cent), nuclear (18 per cent), and a small amount of renewable resources
Total energy generated (2014)	153,900 GWh	808,300 GWh
Net exports (2014)	14,200 GWh (9 per cent of total in-province generation)	400 GWh (47,800 GWh of exports and 47,400 GWh of imports)
Main trading partners	Main destinations for exports: New York (45 per cent), Michigan (39 per cent), PJM (5 per cent)	Transactions with MISO[4] and NYISO[5] account for 58 per cent of PJM's imports and 79 per cent of its exports

Source: ITC Lake Erie, Application, Annex 2 – Market Assessment Report, [A70152-9]

Views of Participants

No Participants expressed concerns regarding available supply.

[4] MISO, the Midcontinent Independent System Operator, is an independent, not-for-profit regional transmission organization responsible for maintaining reliable transmission of power in 15 US states and Manitoba.

[5] NYISO, the New York Independent System Operator, is a not-for-profit regional transmission organization responsible for maintaining reliable transmission of power in the New York Control Area.

Views of the Board

The Board notes that both Ontario and PJM trade large amounts of electricity. Both markets are expected to periodically generate surplus electricity or rely on imports depending on seasonal variations in electricity generation and demand and the availability of specific generation options, among other factors. The Board finds that the varying needs and supply availability in both markets represent ample trading opportunity to support the Project.

2.3 Markets

Views of ITC Lake Erie

ITC Lake Erie stated that, as the first direct interconnection between Ontario and PJM, the Project will improve reliability and economic efficiency by allowing those markets to benefit from their respective resources and that the Project would facilitate trading of energy, ancillary services, capacity, and renewable energy credits between the two markets.

ITC Lake Erie said that opportunities for trade between the Ontario and PJM markets are presently limited because of transfer constraints and the costs of transmission through other power systems, either through Michigan or New York. Transacting power between Ontario and PJM through another power system currently adds up to $15.2/MWh in costs. The Company said that a direct interconnect would reduce those costs to approximately $7.0/MWh.

ITC Lake Erie indicated that, historically, the monthly average electricity prices have been significantly higher in PJM than in Ontario. In 2014, differentials between average hourly prices in the two markets reached approximately $30/MWh with PJM prices higher than the IESO prices during 84 per cent of the hours that year. ITC Lake Erie stated that the energy market price differences reflect the potential for transmission customers to sell electricity into the higher priced electricity market.

ITC Lake Erie stated that it expects to enter into signed transmission contracts for the full capacity of the Project. ITC Lake Erie indicated that it anticipates that there will be a secondary market for the sale of unused transmission capacity, as is the case for merchant transmission lines in other markets.

ITC Lake Erie stated that both the IESO and PJM markets may need access to additional generation resources in the future. The Company further stated that although Ontario currently has an energy surplus, the surplus will decrease as a result of the planned refurbishment and retirement of certain nuclear stations and the expiry of contracts for some of Ontario's power plants starting in 2023. In the future, the Project could be used to import lower-cost electricity from PJM to meet Ontario's capacity needs.

ITC Lake Erie indicated that the amount of renewable energy required to meet PJM's renewable portfolio standards is expected to reach nearly 100,000 GWh by 2025. ITC Lake Erie said that developers and owners of renewable projects in Ontario could generate additional value by selling renewable energy and associated renewable energy credits to states in the US where imports can be used to meet renewable portfolio standards.

ITC Lake Erie stated that capacity trading could also be a source of value for the Project; however, Ontario's market rules do not currently permit trading capacity across its tie lines, the power lines that connect Ontario to neighbouring jurisdictions. ITC Lake Erie stated that the IESO is working on proposals which could allow such trading in the future. ITC Lake Erie notes that the trading of capacity is a potential source of additional value for the Project as both the IESO and PJM markets may need access to additional generation resources in the future, but that the construction and operation of the Project does not depend on the IESO enabling such trade.

Views of Participants

No Participants expressed concerns about the existence of markets for the electricity to be transported on the Project.

The Industrial Power Users of Niagara in its Letter of Comment recommended that the Project export only electricity that is not contracted to the IESO. The Industrial Power Users of Niagara stated that exports of electricity from Ontario are not subject to the Global Adjustment[6] and that the Global Adjustment that is not collected on exports is ultimately passed on to Ontario ratepayers. Members of the Industrial Power Users of Niagara are concerned that increasing exports of contracted power will result in additional foregone collection of Global Adjustment payments and greater subsidization of exports by large Ontario ratepayers.

Reply of ITC Lake Erie

ITC Lake Erie agreed that the Global Adjustment is not charged to energy exports from Ontario. However, the Company contended that because of the IESO market design, whereby Ontario exports are not linked to any specific generation facility, and as a result the export of uncontracted power is not viable. ITC Lake Erie stated that it does not know how the Project may impact Global Adjustment costs, but said that higher Global Adjustment costs might decrease hourly Ontario energy prices which could mitigate any ratepayer impact. The Company also stated that the Ontario government decided not to charge the Global Adjustments on exports and that the Ontario Energy Board regulates what it determines to be a just and reasonable rate for the export of electricity through its setting of an export transmission tariff rate.

> ***Views of the Board***
>
> The Board is satisfied that a direct interconnection between Ontario and PJM, two large power markets that trade significant amounts of energy, creates sufficient value for customers and would promote market efficiencies by decreasing transmission costs and

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[6] ITC Lake Erie filed the document "Understanding Global Adjustment" produced by the IESO which provided the following explanation of Global Adjustment:

"The Global Adjustment was established by the Ontario government in 2005 to cover the cost of providing adequate generating capacity and conservation programs for Ontario. The Global Adjustment varies from month to month, responding to changes in the Ontario energy price compared to contract prices. Generally speaking, when the energy price is lower, the Global Adjustment is higher to cover additional costs."

capitalizing on price differentials between the two markets. Further, the Board finds that the Project will provide greater flexibility for the IESO and PJM to meet their changing energy needs over the life of the Project.

The Board considered the comments of the Industrial Power Users of Niagara and the response of ITC Lake Erie. The Board notes that the Ontario Energy Board regulates what it determines to be a just and reasonable rate for the export of electricity through its setting of an export transmission tariff rate. The Board is of the view that Ontario and its ratepayers stand to benefit from the increased supply and market efficiency as a result of the Project.

2.4 Transmission Contracts

Views of ITC Lake Erie

ITC Lake Erie stated that the target capacity of the Project is 1,000 MW. ITC Lake Erie indicated that a line of this capacity represents an appropriate balance between cost and market opportunity and minimizes potential impacts to the IESO and PJM transmission systems. ITC Lake Erie said that a lower capacity line would not result in significant cost savings to ITC Lake Erie and would limit the ability of the Project to accommodate additional future demand.

ITC Lake Erie stated that the IESO and PJM transmission systems can accommodate 1,000 MW of injections or withdrawals subject to the potential need to make some PJM system upgrades to mitigate thermal, voltage and short-circuit issues. In further filings ITC Lake Erie stated that it reduced its requested firm withdrawal rights in PJM to 500 MW to avoid more costly network upgrades. ITC Lake Erie stated that the change does not affect the 1,000 MW capacity of the Project which will still be able to accommodate up to 1,000 MW of withdrawals from PJM (500 MW on firm service and 500 MW on non-firm service).

ITC Lake Erie indicated that it initiated an open solicitation process in 2015 to identify potential subscribers of transmission capacity with whom to negotiate transmission contracts for up to 1,000 MW of transmission rights. Due to the bi-directional nature of the Project, transmission rights will be available to be purchased separately for importing to and exporting from Canada.

ITC Lake Erie stated that it posted information concerning the open solicitation process for the Project to relevant publications and trade press, including the selection criteria ITC Lake Erie would use to identify potential transmission customers, and a request for the submission of expressions of interest. Additionally, ITC Lake Erie stated that over 300 market participants were notified by email of the commencement of the open solicitation process.

ITC Lake Erie stated that the transmission contracts will be effectively “take-or-pay” contracts, whereby regardless of the actual usage or the amount of energy flow over the IPL, the committed transmission customers will pay for the contracted transmission capacity.

On 22 April 2016, ITC Lake Erie filed an update on the ongoing negotiations with potential transmission customers under the confidentiality provisions of section 16.1 of the NEB Act describing the expressed interest in securing transmission contracts.

On 2 August 2016, ITC Lake Erie filed a letter with the Board indicating that it had extended the anticipated in-service date. ITC Lake Erie stated that it did not wish to place the necessary deposits to secure capacity in the manufacturing queue of the Project's cable supplier until its negotiations with potential transmission customers were further advanced.

Views of Participants

No Participants expressed concerns regarding ITC Lake Erie's open solicitation process or its ability to enter into transmission contracts.

> ***Views of the Board***
>
> The Board is of the view that the notification of potentially interested transmission customers undertaken by ITC Lake Erie was sufficient to provide commercial parties with the opportunity to secure capacity on the Project.
>
> The Board notes ITC Lake Erie's commitment that the Project will not be constructed unless sufficient transmission contracts are signed to cover the costs of the Project and provide a reasonable return to ITC Lake Erie. In the absence of more detailed evidence regarding the ongoing negotiations, the Board imposes **Certificate Condition 29** (Appendix III) requiring ITC Lake Erie to provide confirmation that it has entered into the necessary transmission contracts ahead of the commencement of construction.
>
> The Board notes that ITC Lake Erie as the owner of a merchant IPL is the only entity at financial risk for any funds devoted towards its development, construction, and operation. Economic and financial risks associated with the Project cannot be passed along to Ontario or PJM ratepayers, but must be borne by investors and transmission contract holders.
>
> The Board is of the view that the evidence filed by ITC Lake Erie demonstrates sufficient interest in the Project and, along with the imposed condition, reasonably supports the assumption that the Project's capacity would be used and useful over the longer term.

2.5 Ability to Finance

Views of ITC Lake Erie

ITC Lake Erie stated that as the Lake Erie Connector is a merchant project, the economic and financial risks of the Project will be entirely borne by ITC Lake Erie and transmission customers who subscribe for capacity on the Project. Neither Ontario nor PJM ratepayers will be burdened with any of the costs of developing, operating or maintaining the Project. ITC Lake Erie stated that the Project has an estimated capital cost of approximately $1 billion USD.

ITC Lake Erie stated that it expects to enter into signed, firm, long-term transmission contracts for the capacity of the project. ITC Lake Erie said that when a sufficient level of contracts has been executed, the Project may become financeable using a variety of borrowing instruments.

ITC Lake Erie stated that it intends to secure financing for the Project based on the Project revenues to be earned from its transmission customers.

ITC Lake Erie stated that it was encouraged by the progress of the on-going discussions with potential transmission customers. For further discussion of the open solicitation process see Section 2.4.

ITC Lake Erie said that it anticipates that it may rely upon its parent, ITC Holdings Corp. (ITC Holdings), for any residual funding needs. ITC Lake Erie stated that it has the full financial support and credit of its parent company ITC Holdings, a New York Stock Exchange listed company and which is the US's largest independent electricity transmission company. ITC Lake Erie stated that ITC Holdings has a strong balance sheet, strong credit ratings, and significant access to liquidity and capital markets.

ITC Lake Erie stated that ITC Holdings' current capital plan, through 2018, estimates a total of $4.5 billion in capital investments. ITC Lake Erie does not expect the Project to impact other capital projects of ITC Holdings' that will be carried out during the ITC Lake Erie construction period.

On 9 February 2016 ITC Holdings announced on its website that Fortis Inc. (Fortis) is acquiring ITC Holdings, subject to necessary US state and federal approvals. The Company stated that the proposed acquisition by Fortis, scheduled to close in late 2016, is not anticipated to have any adverse impact on the Project, including financing of the Project. ITC Lake Erie anticipates that ITC Holdings will remain as a stand-alone company (owned directly by Fortis) and ITC Lake Erie will remain as a subsidiary of ITC Holdings.

ITC Lake Erie said that Fortis has a long history in the Canadian utility sector and has demonstrated strong profitable growth. Fortis is listed on the Toronto Stock Exchange, and headquartered in St. John's, Newfoundland. The Fortis-ITC Holdings acquisition is being structured so that Fortis will maintain solid investment-grade credit ratings and a consistent capital structure. Following closing of the proposed transaction, Fortis will be one of the top 15 North American public utility companies ranked by enterprise value, with an estimated enterprise value of $42 billion CAD.

Views of the Participants

The IESO filed an IR to ITC Lake Erie regarding its ability to finance the Project. The IESO asked ITC Lake Erie for confirmation that:

- the Project will be fully merchant and ITC Lake Erie does not intend to recover any of the costs associated with the Project from ratepayers, such that ITC Lake Erie will bear 100 per cent of the risks in constructing the Project;
- ITC Lake Erie's decision to proceed with the Project is based solely on the value of its private market negotiations with its shippers and investors; and
- ITC Lake Erie will not be proposing to receive compensation outside of transmission charges levied on the shippers.

Response of ITC Lake Erie

ITC Lake Erie provided confirmation that it plans for the Project to be fully financed by transmission customers who voluntarily purchase transmission rights over the IPL. ITC Lake Erie stated that it does not intend to seek recovery of any of the costs associated with the IPL from Ontario ratepayers through a transmission tariff.

ITC Lake Erie confirmed that it will bear 100 per cent of the risks in constructing the Project and that ITC Lake Erie's decision to proceed with the Project is based on the value of its private market negotiations with potential shippers and investors.

Lastly, ITC Lake Erie confirmed that it has no plans to generate compensation outside of transmission charges levied on shippers.

> ***Views of the Board***
>
> The Board finds that the financing plans, as outlined in ITC Lake Erie's evidence, are sufficient to demonstrate ITC Lake Erie's ability to finance the Project.
>
> The Board is of the view that sufficient interest has been expressed to reasonably support the assumption that the Project could be financed through borrowing instruments made available to ITC Lake Erie as a result of its signed transmission contracts.
>
> The Board also notes the parental guarantee from ITC Holdings filed by ITC Lake Erie, as well as the pending acquisition of ITC Holdings by Fortis. The Board is satisfied that the parental guarantee provided by ITC Holdings demonstrates sufficient financial strength to fully fund the construction of the Project.
>
> Notwithstanding, the Board imposes **Certificate Condition 6** (Appendix III) requiring ITC Lake Erie to seek leave of the Board to sell, convey, lease, or otherwise transfer the Power Line to any person, in whole or in part.

2.6 Financial Responsibility

Financial assurances are used to demonstrate that a power line operator has sufficient financial means or financial instruments in place to cover the costs of damages, remediation, and liabilities that may arise from potential malfunctions, accidents, and failures during the operation of the Project.

Views of ITC Lake Erie

ITC Lake Erie confirmed that it would be the operator of the Project and the responsible party for addressing a possible emergency or incident during the lifecycle of the Project. ITC Lake Erie indicated that the cost to complete repairs following an incident could reach approximately $15 million USD.

ITC Lake Erie stated that it plans to reserve funds to pay for possible incidents and, depending on the exact circumstances of a possible incident, may have access to manufacturer warranties

and insurance to pay for possible incidents. ITC Lake Erie stated that it plans to have a comprehensive set of insurance, but that it was still reviewing appropriate insurance coverages for the Project.

Views of the Participants

No Participants raised any concerns with regard to ITC Lake Erie's plan to address its financial responsibility in the case of a possible incident on the Project.

> ***Views of the Board***
>
> The Board notes ITC Lake Erie's plan to have a comprehensive set of insurance coverage for the Project. The Board is satisfied that ITC Lake Erie's plan with regard to obtaining insurance coverage is reasonable to address ITC Lake Erie's financial responsibility should an incident occur on the Project.
>
> The Board notes that ITC Lake Erie has not determined its specific insurance coverage and that the most cost effective means of a company addressing its financial responsibility may change over time. Therefore, the Board imposes **Certificate Condition 41** (Appendix III) requiring ITC Lake Erie to file, each year throughout the lifecycle of the Project, the current insurance certificate(s) and updated details regarding the insurance and other financial instruments held by ITC Lake Erie that will enable ITC Lake Erie to adequately respond to a potential incident.

2.7 Abandonment Funding

When a company whose infrastructure is regulated by the NEB wants to abandon a power line, or part of one, it must submit an application to the Board which includes details on safety, environment, and discussions with all potentially affected persons or groups. The Board considers the application and, if it is approved, may impose conditions and monitor the abandonment activities. The company is responsible for funding the abandonment of the facilities as well as any ongoing conditions imposed by the Board as a result of its decision on an abandonment application.

Views of ITC Lake Erie

ITC Lake Erie stated that the Project has been designed to have an operational life of at least 30 years and that, upon the decommissioning and abandonment of the Project, the Haldimand Converter Station will be dismantled and removed, and the site will be reclaimed and restored as close to pre-disturbance condition as practical.

ITC Lake Erie estimated the abandonment cost to be in the order of $3 million USD for the deconstruction of the Haldimand Converter Station including removal of all buildings, equipment, and underground structures and foundations, as well as the restoration of the site.

ITC Lake Erie stated that it is anticipated that the AC and HVDC cables will be abandoned in place for both the terrestrial and in-water cables. Future study would be required to determine if

the value of the recovered AC and HVDC cables would warrant removal of the cables and remediation of the cable route. ITC Lake Erie stated that the abandonment of the cables was not considered in the Abandonment Cost Estimate (ACE).

ITC Lake Erie stated that as the site will be fully restored; there will be no on-going liabilities and associated costs following the abandonment of the Haldimand Converter Station nor the abandonment of the cables in place.

ITC Lake Erie stated that in its ACE it considered:

- completion of an Environmental Site Assessment to determine areas that would require remediation, and appropriate methods to remediate those areas in accordance with Ontario guidelines and site condition standards;
- removal of all buildings and equipment, and recovery of the residual value of this equipment as applicable;
- removal of all underground structures and components of the facility including foundations;
- removal of all external ancillary structures and components including access roads, fencing;
- removal of the potable water storage tank;
- pump-out and removal of the septic tank and abandonment of the septic bed in accordance with Ontario requirements;
- removal of utilities (electrical power and natural gas supply);
- recovery/recycling of materials as appropriate at licensed facilities;
- disposal of all non-recoverable/recyclable materials at licensed disposal facilities; and
- site grading and replacement of topsoil, and potentially seeding/re-vegetation of the site pending confirmation of the preferred use of the site following decommissioning.

ITC Lake Erie stated that it does not consider the abandonment costs to be a material amount in light of the total cost of constructing and operating the Project.

ITC Lake Erie stated that it plans to finance the abandonment costs through funds reserved, which will be kept separate from other operating costs, during the life-cycle of the Project. However, ITC Lake Erie indicated that it had not conducted an analysis of the costs associated with reserving funds to finance abandonment or the specific accounting methodologies it would use for the reserved funds.

Views of Participants

No Participants expressed concerns regarding abandonment funding.

Views of the Board

The Board views assurances that sufficient funds are set aside for abandonment of a project as important in determining the public interest. For a set-aside mechanism to be acceptable, it must protect abandonment funds from operational demands, and set aside funds such that the fully-funded amount, at the time of abandonment, is equal to an appropriate ACE approved by the Board.

The Board is satisfied with the ACE submitted by ITC Lake Erie and approves an ACE of $3 million USD for the Project. The Board reminds ITC Lake Erie that a decision regarding its ACE does not constitute a decision on its future abandonment plans, and that ITC Lake Erie will be required to apply to the Board to abandon the Project.

The Board notes ITC Lake Erie's commitments to fund the abandonment of the Project when required and reserve funds for the abandonment over the life of the Project. However, given the lack of specific measures to protect funds reserved for abandonment from operational demands, the Board imposes **Certificate Condition 38** (Appendix III) requiring ITC Lake Erie to file a set-aside mechanism with the Board for approval that follows the principles of the Board's MH-001-2013 Reasons for Decision (Set-Aside and Collection Mechanisms) and reflects the ACE ITC Lake Erie filed in its evidence.

The Board is of the view that the requirement for a set-aside mechanism is not onerous, and is in the public interest.

Chapter 3

Facilities and Emergency Response Matters

The Board uses a risk-informed lifecycle approach in requiring that NEB-regulated facilities and activities are safe and secure from their initial construction through to their abandonment. In consideration of the safety and security of proposed facilities, the Board assesses, at a high level, whether the facilities are appropriately designed, the range of operating conditions, and the human and natural environment where the facilities would be located. Specific considerations include a company's approach to engineering design, security, emergency preparedness, and health and safety.

When a company designs, constructs, or operates facilities, it must do so in accordance with the NEB Act and its regulations, including the *National Energy Board Electricity Regulations* and Board's General Order for Electricity Reliability Standards (MO-036-2012), its commitments made during a proceeding, and the terms and conditions the Board attaches to any Certificate. The company is responsible for ensuring that the design, specifications, programs, manuals, procedures, measures, and plans developed and implemented by the company are in accordance with the legislation, regulations, and relevant industry standards including those of Canadian standards organizations.

3.1 Overall Design

Views of ITC Lake Erie

The proposed Project is an approximately 117 kilometre, 1,000 MW, ±320 kV HVDC bi-directional electric transmission interconnection to transfer electricity between Haldimand County in Ontario and Erie County, Pennsylvania.

Table 3.1 provides a general overview of the location and scope of the Project's components.

Table 3.1 Overview of the Project's Components

Components located in Canada	Area or Length / Location
Terrestrial underground 500 kV AC Cable	1.3 kilometres / Haldimand County, ON
HVDC Converter Station	7.5 hectares / Haldimand County, ON
Terrestrial underground ±320 kV HVDC Cable	1.3 kilometres / Haldimand County, ON
In-water ±320 kV HVDC Cable	46.8 kilometres / Lake Erie, Canada
International Boundary Crossover Point	Latitude: 42.797489 Longitude: -80.010767

Source: ITC Lake Erie's Application, Project Description & Engineering [A70152-2]

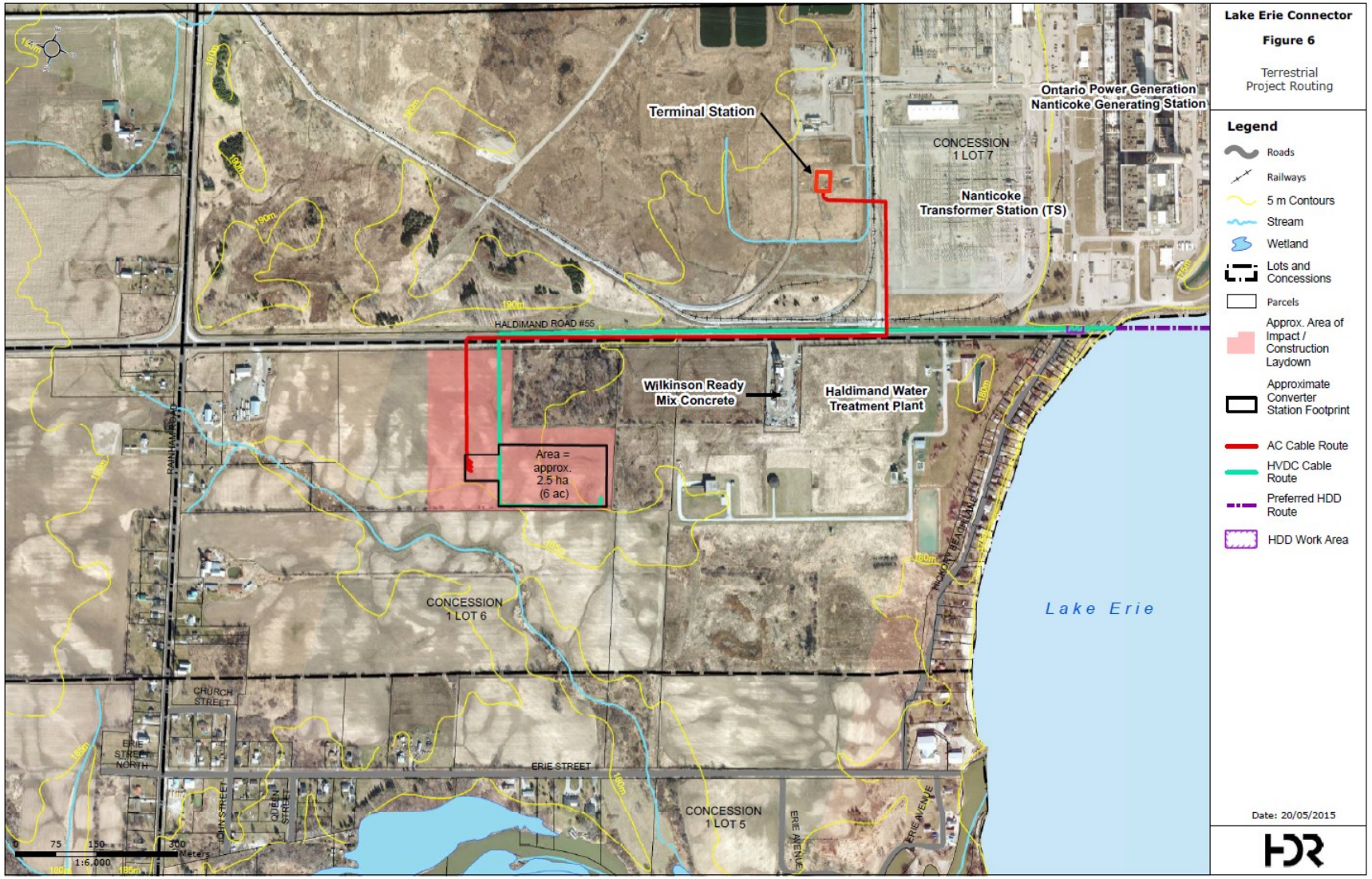
Terrestrial Routes

ITC Lake Erie stated that the Project would connect to the existing Independent Electricity System Operator (IESO) grid at Hydro One's Nanticoke transformer station switchyard (Nanticoke Transformer Station) by means of terrestrial 500 kV AC cables that terminate at the Project's Haldimand Converter Station, approximately 1.3 kilometres away.

The terrestrial ±320 kV HVDC transmission line would consist of two power cables and a fibre optic cable. ITC Lake Erie's preferred terrestrial underground HVDC transmission cable route would extend approximately 1.3 kilometres from the Haldimand Converter Station site to the landfall point at the shore of Lake Erie.

ITC Lake Erie submitted that there are no significant technical or physical constraints that restrict or affect the terrestrial AC and HVDC cable routes. ITC Lake Erie further stated that the preferred terrestrial routes were selected to minimize the distance to the existing Nanticoke Transformer Station in order to reduce the extent of the terrestrial AC cable construction and installation. The preferred terrestrial routes for the AC and HVDC cables are illustrated in Figure 3.1.

Figure 3.1 Preferred Terrestrial AC and HVDC Cable Routes



Source: ITC Lake Erie, Application, Appendix A – Figure Booklet, Figure 6 [A70512-3]

The 500 kV underground AC transmission line will consist of three solid dielectric polymer insulated cables with one conductor per phase. Two fibre optic cables would also be installed to provide redundant communication paths between the Haldimand Converter Station and the Nanticoke Transformer Station.

ITC Lake Erie stated that the majority of the terrestrial AC and HVDC cables would be installed in separate, excavated trenches, with a physical protection layer (concrete slab, polymer barrier, or similar protection). ITC Lake Erie assumed an approximate 7 metre separation distance between the AC and HVDC cables. The depth and width of each trench would be approximately 3 to 5 metres wide and 1 to 2 metres deep and the cable would be installed in lengths of roughly 762 metres. For safety purposes, marker tape would be placed approximately 0.3 to 0.6 metres above the cables in each cable trench.

In-Water HVDC Cable Route

ITC Lake Erie said that the Canadian in-water portion of the Project is located in the waters of Lake Erie and constitutes approximately 97 per cent (46.8 kilometres) of the Canadian portion of the HVDC cable route. The in-water HVDC cables would be buried in the lakebed. The lakebed is comprised of silt, clay and/or gravel with approximately 2 kilometres of the route near landfall in Nanticoke, Ontario being bedrock. The in-water HVDC cable route would minimize potential crossings with existing infrastructure (i.e., natural gas lines) and shipping channels, and would maintain sufficient separation distances from other potentially sensitive features such as known archaeological sites and/or shipwreck locations.

The in-water HVDC transmission cables would be solid dielectric polymer insulated HVDC cables with a fibre optic cable. The cables would be bundled together during installation to minimize disturbance and external electrical and magnetic fields. In most areas of the corridor, the cables would be buried in the lakebed to protect them from damage due to shipping traffic, fishing activity, or ice scour. Typical burial depths would be in the order of 2 metres.

The two in-water HVDC transmission cables and the fibre optic cable would be placed in a common trench. Each in-water HVDC cable would be approximately 152 millimetres in diameter and weigh approximately 62 kilograms per metre. An extruded lead moisture barrier with an external polyethylene jacket would be used to protect the insulation system of the in-water HVDC cables. To protect the cables and provide additional strength during installation, an armouring system consisting of one layer of galvanized wires with bedding layers would be installed over a polyethylene jacket.

Haldimand Converter Station Description

ITC Lake Erie said that the Haldimand Converter Station would have a main building used to house the HVDC converter modules and a service building to house control and protection equipment, cooling equipment and auxiliary distribution panels. The HVDC converter modules would convert the AC power to DC power or vice-versa.

ITC Lake Erie said that the design of the HVDC converter modules would reduce audible sound and protect the equipment from exposure.

ITC Lake Erie stated that the Project will utilize Voltage Source Converter (VSC) HVDC technology for the Converter Station and solid dielectric polymer insulated cable technology for the HVDC transmission system because it is the most reliable and economic solution for the Project. ITC Lake Erie said that the VSC HVDC is relatively new technology for HVDC transmission and went on to explain that it has some advantages over the classic thyristor-based HVDC, including that:

- it uses fully-controlled power switches;
- it has the ability to inject or absorb reactive power independent of the amount of active power transfer;
- it has the ability to operate at low short circuit ratios;
- it has black start capability; (i.e., the ability to restore the electric grid to operation without relying on external sources of electrical energy); and
- the Project's VSC HVDC technology provides specific reliability benefits through reactive power adjustments that can provide voltage control and maintain energy flows independent of power system conditions.

ITC Lake Erie said that other reliability benefits of the Project include that:

- the Project can provide energy supply and respond to emergency or unforeseen events when the respective power systems do not have adequate supply;
- the Project may assist Ontario in meeting its projected need for energy and capacity supply as a result of the retirement and refurbishment of nuclear units commencing in 2019;
- the Project's HVDC technology allows power flow and direction to be directly and immediately controlled by operators or automatic control devices to respond to emergencies and unforeseen events; and
- the Project will provide an alternate source of energy supply during peak demand periods within Ontario and PJM allowing power system operators to avoid emergency control actions that may otherwise be needed to maintain reliability.

ITC Lake Erie anticipates that the primary equipment installed outside the building will include circuit breakers, disconnects, surge arrestors, transformers, cooling equipment, and power line carrier filters. The facility would also have an emergency generator. Security fencing will surround the Haldimand Station area to prevent unauthorized access and ensure public safety.

ITC Lake Erie filed listings of Project components illustrating how the components related to standards developed by the following:

- Institute of Electrical and Electronics Engineers;
- International Electrotechnical Commission;
- International Council on Large Electric Systems;

- American National Standards Institute;
- National Electrical Manufacturer Association; and
- Canadian Standards Association.

The specific standards for the Converter Station are set out within Appendix IV.

Additionally, ITC Lake Erie said that the Project will comply with the requirements identified by the IESO in the System Impact Assessment (SIA) completed for the Project, international industry practice, and good engineering practice. ITC Lake Erie also set out that the Project will comply with applicable local codes and regulations such as: the National Building Code of Canada; the National Fire Code of Canada; the Ontario Electrical Safety Code; the Ontario Building Code; and the *Occupational Health and Safety Act* (Ontario).

> ***Views of the Board***
>
> The Board is satisfied that the general design of the Project is appropriate for the intended use.
>
> The Board is satisfied with the Project's black start capability as this would allow restoring the electric grid to operation without relying on external sources of electrical energy. In the Board's view, this aspect of the Project is of particular importance because it enhances the availability of resources to restore the electric system to a normal condition, in the event of a partial or total shutdown of the system. The Board notes that is a reliability requirement as outlined in NERC standards.
>
> The Board understands from the evidence filed on the public record that reactive power is a requirement in maintaining transmission system reliability, as set out in North American Electric Reliability Corporation (NERC) standards. For example, reactive power is essential in solving system voltage problems. Moreover, an adequate amount of reactive power is essential to support transmission service; the transmission system needs reactive power to support system voltages to allow for transport of real power across transmission lines. The Board, having considered the evidence filed by ITC Lake Erie in this respect, is satisfied with the Project's ability to inject or absorb reactive power, independent of the amount of active power transfer, and that therefore, the reliability of the electric transmission system is protected.
>
> The Board is satisfied that the applicable standards ITC Lake Erie has stated it will follow in relation to the Project, and which are included in Appendix IV, are appropriate. The Board is also satisfied that Project will be constructed and operated following international industry practices, applicable NERC reliability standards, and other applicable reliability standards. The Board is further satisfied that both the AC and the terrestrial and in-water HVDC portions of the Project, as well as the Haldimand Converter Station, will be designed, constructed, and operated in accordance with standards developed by institutions such as: Institute of Electrical and Electronics Engineers; International Electrotechnical Commission; International Council on Large Electric Systems; American National Standards Institute; National Electrical Manufacturer Association; and Canadian Standards Association.

The Board notes that ITC Lake Erie will have to further comply with requirements of the IESO as well as with local codes and regulations.

Given the importance the Board places on the design, safety and security of NEB–regulated facilities, the Board imposes the following:

- **Certificate Condition 7** (Appendix III) requiring ITC Lake Erie to seek approval of the Board of any proposed modifications to the ITC Lake Erie electrical system before any modification is made;
- **Certificate Condition 9** (Appendix III) requiring ITC Lake Erie to file for approval a quality assurance and compliance plan to ensure that the Project is designed, constructed and operated in compliance with Certificate Conditions, designs, specifications, and undertakings set forth in the Application, other filings and submissions;
- **Certificate Condition 27** (Appendix III) requiring ITC Lake Erie to file confirmation by an officer of the Company that all necessary approvals and permits have been obtained from specified government agencies and the IESO; and
- **Certificate Condition 42** (Appendix III) requiring ITC Lake Erie to file as-built drawings identifying the location of all facilities.

3.2 Potential Impacts on the Electric System

According to the IESO report, filed by ITC Lake Erie in support of its Application, the Project will have elements classified as both a part of the bulk power system, as outlined by the Northeast Power Coordinating Council (NPCC) authority, and a part of the bulk electric system, as outlined by NERC. The Board's *Electricity Filing Manual* defines both the bulk electric system and the bulk power system as follows: "The network of generating facilities and interconnected transmission facilities that produce and then flow electricity, respectively, around the overall power system and into non-networked distribution facilities that, in turn, radially serve end user load." The Board considers both the bulk power system and the bulk electric system to refer to the electric system as a whole.

In an application under section 58.16 of the NEB Act, the Board assesses a project's impact on reliability on the electric system generally and on neighbouring jurisdictions. Specifically, in relation to the Project's impact on reliability, which comprises adequacy and security as discussed below, the Board considers whether:

- the elements in the electric system remain within their thermal limit;
- the system voltage remains within its limits in steady state for pre- and post-contingency conditions;
- there is transient stability in the system so that it remains stable following a major disturbance;
- the short-circuit levels remain within the system's acceptable levels; and

- the incorporation of the project would have an impact on congestion.

For this Project, the Board also assessed the Project's impact on tie lines between Ontario and Manitoba and whether the Project would hinder energy transfer between the Manitoba and the Ontario electric systems.

3.2.1 Potential Impacts on the IESO-Controlled Grid

Views of ITC Lake Erie

ITC Lake Erie stated that any new electric transmission power project in Ontario must be approved by the IESO and an SIA undertaken to determine any adverse impact on the reliability of the electric system. ITC Lake Erie requested that the IESO prepare an SIA for the Project and requested that the IESO determine whether the proposed connection should be approved or disapproved by the IESO under Chapter 4, section 6 of the Market Rules for the Ontario Electricity Market. The IESO stated that an SIA was performed for import and export scenarios and also that it investigated the impact of the Project on the electric transmission system within Ontario and on the existing interconnections between Ontario and other jurisdictions.

The SIA involves a number of tests to investigate material adverse impacts on the reliability of electric system. One of those tests includes testing for thermal loading, meaning generation of excessive heat on the transmission system. The SIA found that in all tested scenarios, the Project did not cause any thermal loading violations to the transmission system.

The SIA also indicated that incorporation of the Project did not cause any voltage violation for an "all elements in-service" scenario or in a "one element out-of-service" scenario.

The transient stability simulations undertaken by the SIA indicated that the connection of the proposed Project will not have an adverse impact on the transient stability of the IESO-controlled grid following IESO-recognized contingencies.

The SIA indicated that the incorporation of the Project is not expected to increase the short circuit level significantly. Therefore, a short circuit study was not carried out for the Project.

The SIA pointed out that importing 1,000 MW into Ontario at the Nanticoke Transformer Station does not have a material adverse impact on the IESO-controlled grid. In the event of high flows eastward towards Toronto, the SIA showed there is a low probability of congestion that may curtail imports from the Project. The SIA noted that because the HVDC is a fully controlled link, existing interconnection contingencies are not expected to limit the amount of active power that can be imported over the Project pre-contingency. Additionally, the SIA indicated that the incorporation of the Project will not result in a significant impact on the existing interconnection flows pre-contingency. According to the SIA, the export scenario was not materially different from the import scenario with regard to the interconnection contingencies.

As a result of the above findings in the SIA, the IESO concluded the proposed connection of the Project is expected to have no material adverse impact on the reliability of the integrated power system.

Views of the Board

Assessing whether the proposed Project would have an adverse impact on the reliability of the bulk power system is an important consideration in the Board's examination of the Application. The Board notes that the IESO has statutory responsibility for planning, security assessment and scheduling, administration of ancillary services, real time coordination of the power system, making and enforcing reliability standards and Ontario market rules that govern the IESO-controlled grid, maintaining the reliability of the bulk power system within the province of Ontario, and developing and administering the wholesale electricity markets, subject to regulatory oversight by the Ontario Energy Board.

The Board, in its determination of the public interest, considers the Project's impact, if any, on reliability and on the transmission of electric energy among neighbouring jurisdictions. The Board notes that the term "reliability" covers all aspects related to the system's ability to satisfy the customer requirements, and is underpinned by the concepts of adequacy and security. In terms of adequacy, which is the existence of sufficient facilities within the system to satisfy the consumer load demand, the Board examines the transmission of electric energy. In terms of security, which refers to the ability of the electric system to respond to disturbances within that system (including thermal violations, as discussed below), the Board also examines the transmission facility, meaning the IPL and associated facilities. The Board, in considering these issues, has relied on the findings in the SIA.

The Board notes that the Project provides a direct HVDC connection between Ontario and PJM therefore, enhancing the number of transmission facilities in the region. The Board is of the view that the incorporation of the Project enhances adequacy, a paramount aspect of reliability.

With respect to security, the SIA indicated that the incorporation of the Project into the existing electric power system would not yield any thermal or voltage violations. The SIA sets out that the incorporation of the Project would not affect the stability of the electric system during transient conditions nor would the short circuit level increase significantly. The Board is satisfied with the SIA's assessment regarding security. The Board, having considered the evidence in the SIA, is of the view that the incorporation of the Project into the existing electric power system does not compromise security.

The SIA indicated that export and import results yielded low probability of congestion. The Board, having considered the evidence in the SIA regarding congestion, is of the view that the incorporation of the Project does not compromise the transmission of electric power among neighbouring jurisdictions.

The Board is satisfied that the SIA demonstrates that the Project would not have a significant impact on the integrated power system in Ontario and on the reliability of bulk electric system.

The Board is of the opinion that the matter of reliability of the transmission system is a paramount concern, and conditions are necessary. The Board imposes **Certificate Condition 21** (Appendix III) requiring ITC Lake Erie to file a report confirming that the

design of facilities, construction plan, and planned operations comply with its related submissions. The Board further imposes **Certificate Condition 41 subsection e)** (Appendix III) requiring ITC Lake Erie to comply with the provisions of the Board's General Order for Electricity Reliability Standards (MO-036-2012).

As part of its process, and in keeping with procedural fairness, the Board invited comments from ITC Lake Erie and the Intervenors on conditions that it was considering. The IESO submitted comments on one of the possible conditions. The IESO proposed revisions to the possible condition in relation to the operation of the alternating current transmission line and the addition of a new condition. Having considered the comments by the IESO and the response by ITC Lake Erie, which stated that it did not object to the IESO proposal, as well as the possible conditions that Parties were asked to comment on, and the public interest, the Board has determined that:

- the possible condition in relation to the operation of the alternating current transmission line which the IESO asked to have revised to better reflect its responsibilities will not be imposed by the Board. Rather, the Board imposes **Certificate Condition 17** (Appendix III) in relation to the reliability, safety and security of international power lines. The Board is of the view that **Certificate Condition 17** will address the IESO's comments; and
- the additional condition requested by the IESO in relation to ITC Lake Erie being required to undertake specified actions to adhere to its operating obligations to the IESO will not be imposed by the Board. Rather, the Board imposes **Certificate Condition 27** (Appendix III) requiring that ITC Lake Erie confirm that all necessary permits and approval have been obtained. This condition refers to a listing of organizations from which permits and approvals will be required, including the IESO, that ITC Lake Erie must provide to the Board.

Should anyone have concerns about a company's compliance with the conditions imposed upon it by the Board, they are encouraged to bring the matter to the attention of the Board.

Given the importance that the Board places on the reliability of electrical systems, the Board imposes the following:

- **Certificate Condition 36** (Appendix III) requiring ITC Lake Erie to file with the Board an Operations and Maintenance Manual for the ITC Lake Erie electrical system requiring documented audits of records and inspections, a schedule for annual reviews and updates, and a listing of contents as specified in the Condition;
- **Certificate Condition 37** (Appendix III) requiring ITC Lake Erie to file with the Board safety manuals related to the operation activities of the Project and an outline of the safety training program to be implemented for the operation of the Project;
- **Certificate Condition 39** (Appendix III) requiring ITC Lake Erie operate the HVDC link as per design and specifications consistent with the electrical

reliability standards applicable to the Project, and to inform the Board of any operational deviations, the reasons for the deviation and the mitigation strategies used or to be used; and

- **Certificate Condition 40** (Appendix III) requiring ITC Lake Erie to file confirmation by an officer of the Company that the Project was completed and constructed in compliance with all applicable Certificate Conditions.

3.2.2 Potential Impacts on Neighbouring Jurisdictions

Views of ITC Lake Erie

ITC Lake Erie said that the Project would provide significant benefits by, among other things, enhancing power system reliability within the Eastern Interconnection, and increasing market efficiency (as discussed in Section 2.3). In support of its position, ITC Lake Erie filed the IESO SIA, described in the previous Section. The SIA concluded that the Project is expected to have no material adverse impact on the reliability of the integrated power system and that it would increase the overall import and export capability of Ontario's transmission system.

Views of Participants

Manitoba Hydro

Through its Letter of Comment and further filings, Manitoba Hydro set out the following overarching concerns:

- the IESO did not consult with Manitoba Hydro;
- the Project would worsen the loop flows on the Ontario-Minnesota and the Ontario-Manitoba tie lines and as a result of the increased loop flows, wear and tear on its equipment would increase;
- the loss of the Project would result in a cascade tripping on the Ontario-Minnesota and the Ontario-Manitoba tie lines;
- there may possibly be a violation of the NERC standard TPL-001-4; and
- the location of Ontario's operating reserve could aggravate the issue of excessive loop flow.

Manitoba Hydro indicated that there could be a potential negative impact on the electrical system in Manitoba as a result of the Project. Manitoba Hydro stated that there is industry concern regarding the pre-existing excessive power loop flow issue on the transmission lines that encircle the Great Lakes. Manitoba Hydro indicated that the US Federal Energy Regulatory Commission has considered the issue in recent years and indicated that:

> *"Power flows over the path of least resistance, and, as a result, it may not flow over the path for which it is scheduled by a transmission operator. This difference between actual and scheduled flow on a path or interface is called loop flow, and*

has historically been both common and extremely volatile in the Lake Erie region. This situation has been referred to generally as the Lake Erie loop flow issue."

Manitoba Hydro said that as a result of the excessive power loop flow issue, affected utilities such as Manitoba Hydro, have invested in phase shifting transformers in order to mitigate excessive loop flow. Manitoba Hydro stated that it is concerned that the Project may contribute to the existing loop flow issue around the Great Lakes area and cause more frequent off-load phase shift tap adjustments on the phase shifting transformers located in Manitoba. Manitoba Hydro indicated that an increase in loop flow could result in impacts on the reliability of the bulk power system, increased wear and tear on Manitoba Hydro equipment, increased maintenance requirements, a greater demand on Manitoba Hydro resources, and diminished ability for Manitoba Hydro to export power and/or a potential necessity for Manitoba Hydro to purchase power for import.

Manitoba Hydro noted that the impact of the Project on loop flow would be highly dependent on the location of Ontario generators providing operating reserves and further noted that that the location of these generators in Ontario that may be used as a source of operating reserves is unknown. Manitoba Hydro stated that if the location of the generators in Ontario was north of Sudbury or near Thunder Bay, for example, a portion of the power flow schedule would flow directly towards the Project and a portion would loop around the Great Lakes. In Manitoba Hydro's view, this example would demonstrate that the Project could contribute to the problem of excessive loop flow.

Manitoba Hydro also stated its concern that a temporary loss of the proposed facilities after they come into operation, such as an unplanned power outage, may result in tripping of the Ontario-Minnesota tie line and subsequently the Ontario-Manitoba tie line or vice versa. As a result of this potential tripping, Manitoba Hydro identified NERC transmission planning standard, TPL-001-4 as one NERC standard that could be potentially violated because this standard requires that loss of the proposed facilities must not result in cascade tripping.

In Manitoba Hydro's opinion, the effect of the Project on this loop flow issue had not been adequately demonstrated by ITC Lake Erie in its filings with the Board, and requested the Board issue a condition attached to any Certificate that the Board may issue. The requested condition would require ITC Lake Erie to demonstrate, to the satisfaction of Manitoba Hydro, the impact of the Project on the Manitoba electrical system including analysis on both the Ontario-Manitoba tie line and the Ontario-Minnesota tie line.

The IESO's Responses to Board IRs

In response to IRs from the Board in relation to Manitoba Hydro's concerns, the IESO stated that when a request for a connection assessment is received, the IESO conducts an SIA. The IESO stated that the SIA for the Project assessed the impact of the new or modified connection on the reliability of the IESO-controlled grid and on all tie lines connecting the Ontario transmission system to neighbouring transmission systems.

The SIA verified that the connection of the Project would meet all applicable requirements in the following documents:

- NERC standards (including TPL-001-4);
- NPCC criteria;
- Ontario Market Rules (enabled by the Ontario Electricity Act 1998);
- the Ontario Energy Board's Transmission System Code; and
- the IESO's Ontario Resource and Transmission Assessment Criteria.

In carrying out the SIA, the IESO stated that it considered all of the tie lines that connect Ontario with neighbouring jurisdictions, including the Ontario–Manitoba and Ontario–Minnesota tie lines. Based on its assessment, the IESO concluded that a detailed study of the impact of the Project on the Ontario–Manitoba and Ontario–Minnesota tie lines was not needed.

The IESO noted that Ontario has tie lines with Manitoba, Minnesota, New York, Michigan, and Quebec and that all of these tie lines are exposed to power loop flows, with the exception of those with Quebec, whose tie lines are either radial connections or controlled by a back to back HVDC converter. The IESO stated it does not share Manitoba Hydro's concerns about excessive power loop flows and provided the following arguments.

The IESO noted that the Project is not an AC transmission line, but rather a DC interconnection, which uses power electronics and control systems to accurately control the power flow across this interconnection. This technology allows actual flows on this interconnection to be controlled such that they are equal to the scheduled flows, substantially reducing the contribution of the Project to any power loop flows on Ontario's interconnections with neighbouring jurisdictions. Power loop flow effects are much more pronounced with AC interconnections. The IESO indicated that the Ontario-Manitoba and Ontario-Minnesota tie lines connect to the northwestern portion of Ontario's power system, while the Project would be connected to the IESO-controlled grid in southern Ontario and that:

- the Ontario-Manitoba and Ontario-Minnesota tie lines are electrically very distant from the Project;
- the transmission system connecting northern and southern Ontario consists of a few, very long transmission lines, which provide a high resistance to loop flows;
- Southern Ontario is expected to be the sink for imports scenarios and the source for exports scenarios on the Project; and
- the generators in northwestern Ontario are, typically, baseload supply resources and would likely not change their generation outputs due to the quantity of imports or exports transmitted by the Project.

The IESO stated that a distribution factor analysis, completed in response to Manitoba Hydro's comments, confirmed that dispatching generation in southern Ontario to import or export power through the Project would have a negligible contribution to power loop flows on the Manitoba or Minnesota tie lines.

The distribution factor analysis showed that less than 0.6 per cent of the 1,000 MW (6 MW) of power scheduled for import or export would appear on the Ontario-Manitoba interconnection and less than 0.3 per cent (3 MW) would appear on the Ontario-Minnesota interconnection. This conclusion assumes that southern Ontario is the sink for any imports or source for any exports on the Project and assumes no off-load tap changes on the Manitoba and Minnesota phase angle regulators (PARs). Smaller scheduled flows on the Project will result in proportionally smaller impacts upon the Ontario-Manitoba and Ontario-Minnesota interconnections.

Further, regarding the distribution factor analysis, the IESO said that in relation to tap changes that would involve the on-load tap changers on the Manitoba PARs, the PARS only act when the difference between actual flows and scheduled flows on this interconnection is 25 MW or higher. The on-load tap changers on the Minnesota PARs only move when the difference between actual and scheduled flows on this interconnection is 10 MW or higher. Therefore, the increase in the number of tap changes on those PARs due to the Project is expected to be marginal.

The IESO stated that as the NERC Reliability Coordinator for Ontario, the IESO is required to plan and operate the entire Ontario transmission system such that the impact of the loss of any single transmission or generation element is limited. The IESO clarified, in response to a Board IR, that the loss of any element including the Project will never cause tripping that cascades outside the province. The IESO stated that the loss of the Project was considered in the SIA studies and the results presented in the SIA report showed that cascade tripping of the ON-MB interconnection would not occur following the loss of the Project.

The IESO stated that it fulfills multiple NERC functional entity roles for Ontario, including Reliability Coordinator, Balancing Authority and Transmission Operator, and as such, the IESO is responsible to adhere to more than 1,000 NERC reliability standards. The IESO also stated that the NPCC regularly reviews IESO compliance with NERC standards through a variety of mechanisms, and compliance with NERC standards is the top priority of the IESO's System Operations business unit. The IESO concluded that the connection of the Project will not violate any applicable NPCC, Ontario planning standards, or NERC standards, including standard TPL-001-4, and will not have an adverse impact on the reliability of the integrated power system. The IESO stated its registration and performance validation functions ensure that the delivered Project meets the connection requirements in its SIA. The SIA for the Project was conducted for a maximum capacity of 1,000 MW and accordingly, the Notification of Conditional Approval that was issued by the IESO. The IESO stated Manitoba Hydro is not responsible for monitoring or enforcing IESO compliance with reliability standards, and does not have the information or expertise to do so.

Manitoba Hydro's Reply to the IESO's IR Response

Manitoba Hydro stated that the IESO's comments partly addressed Manitoba Hydro's main concerns. However, Manitoba Hydro acknowledged that the IESO would be in the best position to be able to control the location of generator dispatch and generator adjustment schedules on the Project to minimize possible impacts on excessive power loop flow.

Response of ITC Lake Erie

ITC Lake Erie agreed with the views expressed by the IESO.

> ***Views of the Board***
>
> Determining the effects of the proposed IPL on other provinces and transfer capabilities between transmission systems is an important consideration in the Board's examination of the Application. The Board notes that the IESO's comments partly addressed Manitoba Hydro's main concerns. The Board considered Manitoba Hydro's outstanding concerns and, in doing so, took into account the evidence filed and evaluated the arguments submitted, including the IESO's views in relation to those concerns.
>
> In relation to Manitoba Hydro's view that there was a lack of consultation by the IESO in conducting the SIA, the Board is of the view that the IESO, as the system operator for the area affected by the Project, was best placed to evaluate the impacts on the overall system, including impacts on neighbouring jurisdictions. The Board also notes that the IESO is obligated by its statutory responsibilities to consider the impact of any project in Ontario over the tie lines that connect Ontario with neighbouring jurisdictions.
>
> Noting the above with respect to the IESO's role and responsibilities the Board also finds that the SIA and the distribution factor analysis have sufficient depth and breadth of analysis to reasonably demonstrate that the Project would have a marginal impact on the Manitoba and Minnesota tie lines. Specifically, the Board notes that the IESO analysis concluded that the Project would have a marginal impact on loop flows and would not result in cascade tripping or a violation of NERC standard TP-001-4.
>
> Lastly, the Board notes that the Project provides a direct HVDC connection between Ontario and PJM, thus avoiding the need to schedule energy transactions through AC transmission lines around either side of Lake Erie, which, ITC Lake Erie's evidence demonstrated, are congested areas. The Board notes that evidence filed by ITC Lake Erie and the IESO, by way of its SIA, indicates that because the Project involves a HVDC connection, it offers a superior measure of control of the actual power flow over the tie line. Hence, the actual power flows on the Ontario and PJM interconnection would be controlled in a manner such that they are equal to the scheduled power flows. The measure of control afforded by an HVDC connection substantially reduces the contribution of the Project to any power loop flows on all of Ontario's interconnections with neighbouring jurisdictions.

3.3 Geotechnical Considerations

In its assessment of the setting of the Project as well as the Project's design and construction methods the Board has considered geotechnical issues as discussed in this section.

3.3.1 Haldimand Converter Station Foundation Design

Views of ITC Lake Erie

ITC Lake Erie filed two preliminary geotechnical investigation reports with the Board. The reports, which assessed the existing site conditions for the Haldimand Converter Station, provided the results of the field drilling program, described subsurface conditions, provided results of laboratory testing, and provided preliminary recommendation for structural foundations.

ITC Lake Erie stated that the subsurface conditions near the Haldimand Converter Station consisted of a variation of fill encountered at ground surface under-laid by silty clay, clayey silt, and silty clay till over bedrock. Bedrock was encountered at depths that varied between 4.6 and 8.9 metres. Groundwater levels were recorded at depths that varied between 0.1 metre above ground surface and 6.8 metres below ground surface.

Views of Participants

No Participants raised any concerns or comments regarding the Haldimand Converter Station.

> ***Views of the Board***
>
> While the Board notes that ITC Lake Erie has submitted two preliminary assessment reports, and has committed to applying Canadian standards to the design of the Haldimand Converter Station in accordance with the National Building Code of Canada (NBCC), the Board is of the view that structures built within the Haldimand Converter Station should be designed in accordance with the NBCC to address the integrity of the buildings and equipment placed within the Converter Station. In the absence of such detailed information in the Application, the Board imposes **Certificate Condition 12** (Appendix III) requiring ITC Lake Erie to file with the Board for approval a final geotechnical detailed design report that sets out the design parameters and methodologies recommended to design the foundation at the Haldimand Converter Station in compliance with the NBCC.

3.3.2 Horizontal Direction Drilling (HDD) Feasibility and Contingency Plan

Views of ITC Lake Erie

ITC Lake Erie stated that HDD will be used for the transition from land to the waters of Lake Erie to avoid and/or minimize disturbance to the Lake Erie shoreline and near shore areas. ITC Lake Erie advanced two subsurface investigation boreholes in the vicinity of the anticipated location of the HDD entry points and two boreholes near the exit points. Three separate HDD drill holes are planned, one for each HVDC cable and another for the fibre optic cable.

The HVDC cables and the fibre optic cable will be installed within separate high-density polyethylene pipes with an outside diameter less than 41 cm within a 26 metre wide corridor. This is required in order to maintain a 10 metre separation distance between the HDD boreholes. The subsurface conditions near the HDD entry points consisted of stiff low plastic silty clay overlying slightly weathered limestone, and the subsurface conditions near the exit points of the HDD consisted of very soft medium plastic clay and peat layers over limestone.

ITC Lake Erie stated that the final HDD drill paths will be determined during the detailed design stage of the Project, and that relevant information including entry and exit points, no-drill zone, and drill angles will be confirmed and provided to the Board when completed.

ITC Lake Erie also stated that in the event that HDD failure occurs, it would re-evaluate potential alternate installation methods including attempting HDD at a second nearby location, and assessing the feasibility for open trench installation. Open trench installation assessment would be pending the completion of appropriate investigations and consultation with relevant agencies. ITC Lake Erie also stated that it will provide a detailed description of the contingency plan, including alternate installation methods, in the event that HDD installation fails and indicated that it would provide this information in its final HDD Contingency Plan.

Views of Participants

Haldimand County in its Letter of Comment expressed concern with the impacts of the Project's HDD operations on the Nanticoke Water Treatment Plant. Its concerns are further discussed in Chapter 8.

> ***Views of the Board***
>
> The Board is of the view that ITC Lake Erie did not file sufficient information to show the drill path details and the soil stratigraphy along the HDD trajectory at the Canadian landfall area. The Board is also of the view that the cable installation through HDD must comply with Clause 4.22 and 6.2.11 of Canadian Standards Association (CSA) Z662-15, due to the absence of regulation concerning HDD installation procedure and method for power lines and in order to demonstrate the feasibility of performing the HDD procedure. The Board imposes **Certificate Condition 11** (Appendix III) requiring ITC Lake Erie to file with the Board for approval a drawing showing the HDD drill path, entry and exit points, the anticipated drill angles at the entry and exit points, the no drill zone, and the soil stratigraphy along the HDD trajectory.
>
> Given that the Board views that safety is paramount, ITC Lake Erie is required to file a confirmation by an authorized ITC Lake Erie officer that the HDD installation can be completed in a safe and reliable manner.
>
> The Board is of the view that ITC Lake Erie must demonstrate that, in the case of HDD failure, the Company has another installation option to safely and properly transition the cable from the terrestrial portion to the in-water section. The Board acknowledges ITC Lake Erie's commitment to investigate another installation approach in the case that HDD was not successful and imposes **Certificate Condition 11** (Appendix III) requiring ITC Lake Erie to

> submit a contingency plan to the Board for approval to describe the alternative installation approach.

3.3.3 In-Water HVDC Cable

Views of ITC Lake Erie

The in-water HVDC cable system will consist of two HVDC cables bundled with a fibre optic cable and will be buried below the lakebed in order to protect the cables from any damage that may occur due to anchor drops from shipping traffic and/or fishing activity, and ice scour[7].

ITC Lake Erie stated that it considered navigation channels and anchorage areas in identifying the preferred in-water HVDC cable route across Lake Erie because these areas present a greater potential for anchor drop and drag.

ITC Lake Erie stated that it selected a 500 metre wide corridor for the in-water HVDC cable route. ITC Lake Erie stated that Canadian Seabed Research Ltd. performed a marine geophysical survey on its behalf, which provided information on subsurface conditions below the lakebed. Subsequently, and based on the results of the marine geophysical survey, ITC Lake Erie indicated that it had made multiple revisions to the cable route within the 500 metre corridor with the exception of one location where ITC Lake Erie revised the cable route approximately 50 metres east from the previously identified cable corridor. The revised alignment is aimed at avoiding the geotechnical and geological hazards and constraints that were identified during the marine geophysical survey.

3.3.3.1 In-Water Trench Excavation and Backfill

Views of ITC Lake Erie

ITC Lake Erie stated that at the Canadian landfall, bedrock is either exposed or very close to the surface near shore, preventing cable burial via jet plow or water jetting. Due to geological constraints, ITC Lake Erie may need to excavate a trench by confined stemmed blasting in the bedrock for approximately 1.6 kilometres, from the exit of the HDD bore to the softer lakebed sediment. ITC Lake Erie also stated that the blasted rock will be removed by a barge-mounted excavator and will be side casted. The trench will be bedded and backfilled with a sand and gravel mixture. ITC Lake Erie further stated that the proposed backfill material would be crushed limestone in accordance with the American Society for Testing and Materials ASTM C33, size No. 57. The source of the crushed limestone used to backfill the blasted in-water trench has not yet been identified.

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[7] Ice scouring is the process whereby sea-ice ridges or icebergs contact the seabed forming long, linear gouges in the lakebed sediments.

Views of Participants

No Participants raised any concerns or comments regarding the blasted in-water trench.

> *Views of the Board*
>
> The Board is of the view that any excavation made for the Project onshore and offshore should be backfilled in accordance with standard practice to minimize settlement and reduce the impact of external disturbances such as groundwater, ice scour, and anchor drops. Material used to backfill excavation should minimize the potential damage to the HVDC cable during installation and should result in surface conditions that are equivalent to or exceed those present before excavation.
>
> Given that ITC Lake Erie has not identified a source for the proposed crushed limestone backfill material, the Board imposes **Certificate Condition 13** (Appendix III) requiring ITC Lake Erie to identify the location of the identified source of the crushed limestone material.

3.3.3.2 In-Water Cable Installation Via Jet Plow and Remote Operated Vehicle

Views of ITC Lake Erie

ITC Lake Erie stated that, where the lakebed sediment is sufficiently soft and deep, it would install the in-water HVDC cable by the use of a towed jet plow. ITC Lake Erie said that the use of a jet plow is a very common technique for burying underwater cables and uses the combination of a plow shear and high pressure water jets to fluidize a trench in the lakebed.

ITC Lake Erie later performed a geophysical survey for the purpose of identifying the nature of the sediment where the jet plow is to be used for in-water cable installation. The geophysical survey determined that for sections of the in-water HVDC cable route, between kilometre post 15 and the Canadian US border, the lakebed sediments are very soft and may not be able to support the jet plow during installation. ITC Lake Erie proposed installing the cable by post-lay burial methodology using water jetting with the assistance of a Remote Operated Vehicle (ROV) for the section of the in-water HVDC cable route where the sediments may not be able to support the jet plow.

Views of Participants

No Participants filed comments or concerns regarding the installation of the in-water cable.

> *Views of the Board*
>
> The Board is of the view that the installation methods identified by ITC Lake Erie are suitable given the description of the lakebed conditions provided by ITC Lake Erie. In Section 3.3.3.3 the Board discusses its concerns with adequate burial depth as well as contingency plans and mitigative measures.

3.3.3.3 Cable Integrity Risks & Burial Depth

Views of ITC Lake Erie

Ice scour and anchor drops, by vessels associated with shipping and fishing activities in Lake Erie, are the two primary risks that might cause damage to the cable if it is not buried at sufficient depth below the lakebed.

Ice scour is the process where an ice keel, that forms due to the formation and drifting of lake ice ridges, contacts the lakebed and results in long linear gouges in the lake floor sediments. ITC Lake Erie stated that the scouring process has long been recognized as a potential threat to sub-lake engineering activities such as pipeline or cable installations. ITC Lake Erie stated that data demonstrate that ice scours can be up to 1.7 metres deep, 100 metres wide, and several kilometres long, in water depths up to 25 metres in Lake Erie. ITC Lake Erie also stated that the extent and thickness of the ice in Lake Erie is influenced by the severity of winter including the number of storms, their severity, and duration, as well as the direction of the wind.

ITC Lake Erie stated that anchor drop risks to the cable are posed by vessels anchoring within the vicinity of the cable, either deliberately or due to an emergency that would require the vessel to drop anchor quickly. Ships in transit do not typically drop anchor under normal conditions, and planned anchoring usually takes place in a designated anchorage area.

ITC Lake Erie stated that the risk of interaction between anchors and ITC Lake Erie's buried cables is higher near a port or anchorage area. Anchorage areas are identified in zones where anchors may be readied for deployment in the event of an emergency due to navigational reasons such as the traffic density, proximity of obstructions, shallow waters, and the presence of other vessels. ITC Lake Erie stated that the route was selected to avoid anchorage areas.

ITC Lake Erie provided a cable risk assessment and cable self-burial assessment where it stated that: "Any planned anchoring should take into consideration the position of the cable marked on the chart."

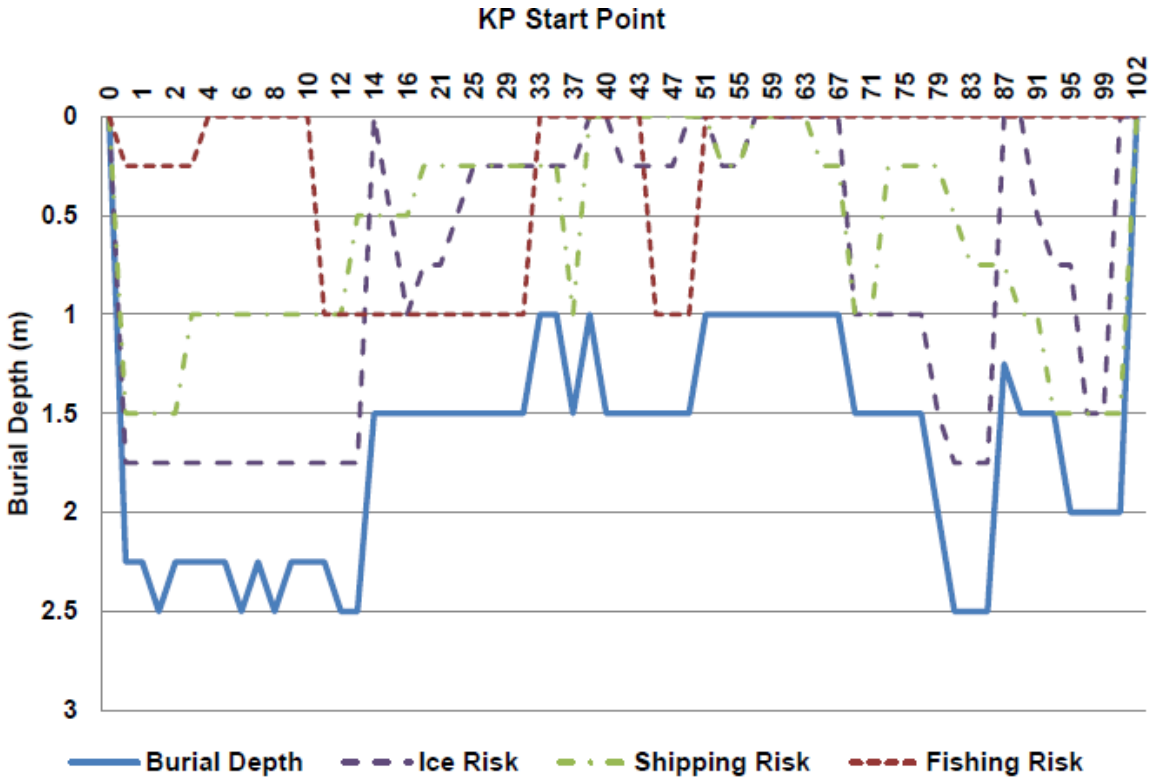
Figure 3.2 shows what ITC Lake Erie recommended as the burial depth by kilometre post along the proposed in-water HVDC cable route based on the risks posed by ice scour and anchor drop from shipping and fishing activities.

ITC Lake Erie stated that for installation purposes and in order to reduce the number of adjustments to the burial tool used during installation, it may be preferable to apply a degree of smoothing to the cable burial depth identified by ITC Lake Erie shown in Figure 3.2. Specifically, ITC Lake Erie has identified a preferred burial depth of 2.5 metres between kilometre posts 0 and 18, and a preferred burial depth of 1.5 metres between kilometre post 18 and the Canada-US border.

ITC Lake Erie stated that it will not be performing any surveys of burial depth post installation of the in-water HVDC cable. ITC Lake Erie also stated that it concluded that the lakebed is considered to be stable, as the lakebed sediments have minimal potential for mobilization through water current, and it does not anticipate sand waves or cable exposure to occur. ITC Lake Erie predicted that the cable will remain buried at the planned depth. ITC Lake Erie also

stated that the depth of the cable burial will be monitored and confirmed during cable installation.

Figure 3.2 Recommended Burial Depth along the In-Water Cable Route



Source: ITC Lake Erie, Cable Risk Assessment [A77107-3]
Note: The term "KP Start Point" on the horizontal axis refers to Kilometre Post Start Point.

Views of Participants

No Participants filed comments or concerns regarding risks to the in-water HVDC cable or the burial depth.

> ### *Views of the Board*
>
> The Board is of the view that anchor drop and drag by lake traffic navigating in Lake Erie poses a potential hazard to the proposed in-water HVDC cable when installed below the lakebed. The Board is also of the view that increased risk to the cable may occur due to deviation from the navigation channels. To reduce such risks the Board is imposing **Certificate Condition 34** (Appendix III) requiring ITC Lake Erie to file with the Board after completion of the in-water cable installation, a list of identified anchor drop risk areas and a list of the Canadian authorities that ITC Lake Erie has notified of anchor drop risks.
>
> The Board finds that communication of potential navigational risks to the boating and shipping public is important and that ITC Lake Erie recognizes the risks associated with anchor drop locations and shallow burial depth. By imposing **Certificate Condition 34**

(Appendix III), the Board requires that proper communication will take place between ITC Lake Erie and the proper Canadian authorities to address and mitigate anchoring risks.

The Board is of the view that the minimum burial depth below the lakebed, as identified by ITC Lake Erie, is sufficient to protect the cable from ice scour and anchor drops. However, if the minimum burial depth, as identified by ITC Lake Erie, cannot be achieved in the lakebed during construction the Board imposes **Certificate Condition 10** (Appendix III) requiring ITC Lake Erie to file for approval prior to commencement of construction a contingency plan detailing the measures to be taken and outlining any potential environmental effects and mitigation measures considered in response to shallower burial depth than the minimum ITC Lake Erie identified burial depth.

ITC Lake Erie has indicated that a post-construction survey will not be performed, but rather the burial depth will be monitored and confirmed during cable installation. The Board is of the view that a detailed survey of construction burial depths and any mitigation required to address all locations where the cable installation did not reach the minimum burial depth identified by ITC Lake Erie is necessary. The Board imposes **Certificate Condition 33** (Appendix III) requiring ITC Lake Erie to file an in-water cable burial survey after completion of the installation. The in-water survey shall contain drawings and maps confirming the cable burial depth that was achieved during construction along with a report that documents all locations where the cable installation did not reach the minimum burial depth as identified by ITC Lake Erie, a description of ITC Lake Erie's as-built mitigation at shallower than planned burial depths, and an impact analysis of any mitigation measures taken in response to burial depths shallower than the minimum burial depth.

The Board finds that the evidence filed by ITC Lake Erie and the information that will be filed in response to **Certificate Conditions 10 and 33** (Appendix III) are sufficient to demonstrate that minimum burial depths will be achieved and that appropriate mitigation will be in place where the minimum burial depth cannot be achieved.

3.3.3.4 In-Water Third Party Facilities Crossing Plan

Views of ITC Lake Erie

ITC Lake Erie stated that the preferred HVDC transmission cable route is expected to cross over a number of pipelines and that discussions are on-going with the owner of the pipelines to confirm preferred construction methodologies related to the pipeline crossings.

Views of Participants

No Participants raised any concerns or comments regarding the in-water third party facilities crossing plan.

Views of the Board

The Board is of the view that the safety of existing structures and of the in-water HVDC cable installation during construction and operation of the cable system is a priority.

The Board notes ITC Lake Erie's plans to obtain crossing agreements with the pipeline companies operating those lines. In addition to **Certificate Condition 15** (Appendix III) requiring the identification of all existing facilities to be crossed and confirming that agreements and crossing permits have been acquired, the Board imposes **Certificate Condition 18** (Appendix III) requiring ITC Lake Erie to file with the Board for approval the details of the crossing method including the minimum burial depth, the proximity of all third party facilities to the HVDC cable, and the construction procedure at all of the identified crossing locations.

By imposing **Certificate Condition 18** (Appendix III), the Board can determine that ITC Lake Erie has buried the cable at or below the minimal depth identified in its Application and in accordance with proper burial techniques agreed upon with the company whose pipelines ITC Lake Erie's cable is crossing.

3.4 Construction Safety Manuals

Views of ITC Lake Erie

ITC Lake Erie has indicated that a number of construction activities are planned within the Canadian portion of the Project including the construction of the terrestrial cable system, Haldimand Converter Stations, HDD installation, and the in-water HVDC cable system installation using jet plowing and post-lay burial ROV procedures. The HVDC cable will be installed underwater in the lakebed of Lake Erie. ITC Lake Erie also stated that measures will be implemented to minimize potential effects on navigation and navigation safety during the construction/installation of the HVDC cable.

Views of Participants

No Participants raised any concerns or comments regarding the construction safety manuals.

Views of the Board

The Board is of the view that the safety of employees, contractors, the public, and the environment are of paramount importance. The Board requires ITC Lake Erie to submit construction safety manuals at least 90 days prior to the commencement of construction. Construction safety manuals for the Project must include construction procedures, activities, and public related safety issues for all the construction activities that will take place for the Project on land and in-water. The Board imposes **Certificate Condition 14** (Appendix III) requiring ITC Lake Erie to file these manuals prior to the commencement of construction to address safety risks pertaining to the Project.

In addition, the Board imposes **Certificate Condition 35** (Appendix III) requiring ITC Lake Erie to perform all excavations in compliance with applicable occupational health and safety legislation, reporting any non-compliances to the Board.

3.5 Emergency Response

Views of ITC Lake Erie

ITC Lake Erie said that it would have Emergency Response Plans (ERPs) for each of the construction and operations phases of the Project. The ERP for construction will be completed during the detailed design and the construction planning stages and will be provided to the Board when completed and no later than three months prior to commencement of construction. The ERP for operations will be completed during the construction phase, and will be provided to the Board no later than three months prior to the commencement of commissioning and operations.

ITC Lake Erie confirmed its commitment to consult with the appropriate parties and agencies, during the development of its ERPs for construction and operations of the Project in accordance with applicable standards, including CSA Standard Z731-03 *Emergency Preparedness and Response* and NERC Standard EOP-001-2b – *Emergency Operations Planning*.

ITC Lake Erie stated that it will consult with appropriate persons, agencies and governments that have the relevant expertise when establishing the ERPs, including but not limited to continuing consultation with:

- Canadian Coast Guard;
- Haldimand County;
- Hydro One;
- IESO;
- Ontario Ministry of the Environment and Climate Change;
- Ontario Ministry of Energy;
- Ontario Ministry of Natural Resources and Forestry;
- Ontario Ministry of Transportation;
- PJM; and
- Transport Canada.

ITC Lake Erie stated that following receiving confirmation from appropriate agencies that they are to be consulted, it will carry out appropriate engagement to solicit input on proposed approaches for emergency response planning associated with the construction and operation of the Project. Agencies and interested parties will be provided an opportunity, as requested, to review and comment on the draft ERP documents. Comments will be considered and addressed accordingly. The final ERPs will be provided to those agencies that confirm that a copy is required to be filed with that agency.

ITC Lake Erie noted that before existing and potential hazards can be prevented and controlled, they must be identified and assessed. Its process for hazard identification and evaluation will assess the probabilities and consequences associated with hazards arising from human activities,

technological events and natural threats in accordance with CSA Standard Z731-03 *Emergency Preparedness and Response*. Risk-based analyses evaluating historical occurrence, probability of recurrence, vulnerability, maximum threat potential, severity, and amount of pre-event warning for various hazards will be examined and a representative risk assessment will be completed for the Project. Site-specific health and safety plans will be developed that define the potential hazards at each work site. ITC Lake Erie stated that the results of the above will be used to complete the initial hazard identification.

ITC Lake Erie described the role of its Safety Coordinator, and stated that its proactive safety approach will ensure that the Safety Coordinator evaluates all equipment and processes for compliance with applicable safety rules and regulations.

In the supplementary evidence it filed, ITC Lake Erie outlined the expected components and anticipated contents of the ERPs for construction and operations that it will prepare.

ITC Lake Erie identified the following standards that are relevant to the ERPs it will develop:

- CSA Standard Z731-03 Emergency Preparedness and Response;
- *Occupational Health and Safety Act* (Ontario); and
- NERC Standard EOP-001-2b – Emergency Operations Planning.

ITC Lake said that it will develop the notification procedures to be included in the ERPs based on guidance as included in CSA Standard Z731-03 and NERC Standard EOP-001-2b. The notification procedures to be developed will describe: who is responsible for notification and reporting; to whom, both internally and externally, notifications and reports are to be made; when notifications and reports are to be made; and how notifications and reports are made. Notification procedures will also consider the classification level of the emergency and/or hazard identified. ITC Lake Erie will confirm the list of entities and the notification procedure with interested agencies during the consultation process.

Views of Participants

There were no comments or evidence filed by any Participants to the hearing with respect to ITC Lake Erie's proposed ERPs.

In its Application to Participate, Haldimand County indicated that Issue 5 - Safety and security during construction and operation of the Project, including emergency response planning and third-party damage prevention connected it to the Project. Haldimand County did not elaborate on this issue other than to refer to "fire-safety". In its Letter of Comment, Haldimand County did not make any further reference to emergency response planning.

> ***Views of the Board***
>
> The Board notes that ITC Lake Erie has made commitments with respect to: consultation with appropriate agencies, governments, and interested parties; content; standards to be met; roles and responsibilities of staff and the Safety Coordinator; and notification and timing for

the filing and implementation of ERPs for the construction and operations of the Project. The Board further notes that the standards referred to are applicable to the electrical industry and to this Project. The Board is satisfied with the approach to the development of the ERPs as described by ITC Lake Erie and the commitments made. The Board notes that ITC Lake Erie has committed to consulting with Haldimand County which had raised the matter of "fire-safety" in its Application to Participate, but did not make further mention of any concerns. To capture these commitments, and other commitments made by the Company throughout the hearing process, and to require ITC Lake Erie to report on them, the Board imposes **Certificate Condition 8** (Appendix III) requiring ITC Lake Erie to file with the Board a commitments tracking table, listing all commitments made by ITC Lake Erie in its Application and in its related submissions during the EH-001-2015 proceeding in relation to the Project.

Chapter 4

Public Consultation

The Board's expectations regarding public consultation by an applicant are set out in the *Electricity Filing Manual*. Applicants are expected to undertake an appropriate level of public involvement, commensurate with the setting, nature, and magnitude of a project. The Board considers public involvement to be a fundamental component during each phase in the life cycle of a project (project design, construction, operation and maintenance, and abandonment) in order to address potential impacts of the project. This chapter addresses ITC Lake Erie's public and government consultation program. ITC Lake Erie's Aboriginal engagement and consultation are discussed in Chapter 5 Aboriginal Matters.

ITC Lake Erie acquired the development and ownership rights to the Project from Lake Erie Power Corp. in June 2014. Prior to that date consultation was conducted by Lake Erie Power Corp. with ITC Lake Erie continuing this activity after that date.

4.1 Overview of ITC Lake Erie's Public and Agency Consultation

Views of ITC Lake Erie

ITC Lake Erie stated it developed a consultation plan which addresses the requirements of the NEB Act and the *Electricity Filing Manual*. The Company stated that the overall goal and purpose of its Public and Agency Consultation Program for the Project is to ensure that early, effective, transparent, and meaningful consultation is carried out with all interested and potentially affected agencies, stakeholders, local communities, and the public. ITC Lake Erie stated that the objectives of its Program include: building relationships with stakeholders; engaging stakeholders; and fulfilling commitments made to stakeholders. ITC Lake Erie stated that these objectives will be accomplished by:

- sharing information with the public, stakeholders, and local and regional officials regarding the Project, ensuring that there is a baseline of knowledge about the Project in the general community within the potential affected area;
- engaging key government agencies in discussions regarding the Board's Election Certificate application process (more generally known as the NEB application hearing process) and other approvals/permitting processes, so as to proactively identify and address potential issues in order to successfully complete future phases of the Project in accordance with the Project schedule;
- informing the general public within the local community about the Project, and to seek constructive dialogue with interested parties. This dialogue will assist in identifying public and community issues and interests, which would be addressed through the Board's Election Certificate application process;

- providing opportunities for active engagement of interested parties including the public, stakeholders, and agencies which will address the requirements of the Board's Election Certificate application process for consultation;
- implementing a community engagement approach that extends beyond these requirements, to engage all interested parties that could be affected by or that could affect the successful outcome of the Project, to gain acceptance and understanding about the Project from local residents and the local community;
- monitoring and managing overall issues regarding the Project as a whole and to manage the expectations related to the Project;
- implementing activities and programs required to address commitments made during the Board's Election Certificate application process specific to communications and community engagement; and
- actively listening and engaging the community and relevant stakeholders to allow ITC Lake Erie to maintain community trust and credibility and to develop a positive baseline for communications and engagement in the Project during construction and operations.

4.2 Public Consultation

Views of ITC Lake Erie

ITC Lake Erie stated that prior to filing its Application, consultation included three rounds of public open houses and meetings with local residents and businesses, beginning in December 2013. The Company stated that notices for open houses and hearings were distributed to all residents and business owners within 5 kilometres of the Project site, and notices were published in local newspapers for distribution to surrounding communities. ITC Lake Erie stated that each round of consultation corresponded with major milestones in the Project: announcement of the Project; details of the assessment methodology and proposed technical studies that would support the Project; and an overview of the results of the assessment and technical studies.

ITC Lake Erie stated that it added contacts to its public mailing list based on the direction given by the Board in its Hearing Order issued on 21 October 2015 to distribute copies of the Hearing Order to potentially affected landowners along the proposed route, as well as all those persons and agencies listed in the Board's Hearing Order. ITC Lake Erie stated that in accordance with the Board's direction, it posted the Hearing Order on its website and that the Notice of Public Hearing and Application to Participate was published in three regional newspapers (Le Régional, Simcoe Reformer, and Hamilton Spectator), as well as in Aboriginal publications, as noted in Chapter 5 Aboriginal Matters, and that copies of the Application were made available for viewing at the Norfolk County Public Library in Simcoe Ontario and the Central Library in Hamilton Ontario.

The Company noted that potentially affected landowners along Haldimand County Road 55 and Hickory Beach Lane (extending into Lake Erie) were identified by way of a land title search. Although not directed by the Board, ITC Lake Erie stated that it distributed a copy of the NEB-issued Notice of Public Hearing and Application to Participate by Canada Post through

unaddressed Admail to residential and non-residential addresses within 5 kilometres of the Project site, consistent with previous notices distributed for public open houses.

ITC Lake Erie stated that it continued to meet and have discussions with non-agency organizations (utilities, public organizations, associations, etc.) after the filing of the Application with the Board, and that the purpose of these meetings and discussions was to discuss potential interactions with existing and future utilities. The Company stated that its mailing list for non-agency organizations was updated to reflect additional contacts identified through on-going engagement.

ITC Lake Erie stated that there were very few issues identified and comments made during ongoing public consultation. ITC Lake Erie indicated that the majority of discussions with non-agency organizations were related to the requirements associated with crossing utility lines (stating that discussions with utilities will continue as the Project progresses). Other topics of discussion included:

- AC cable route and terminal station locations;
- connection points and cost estimates;
- access to property; and
- property acquisition.

ITC Lake Erie stated that consultation with the public and non-agency organizations will continue as the Project progresses and that the Company will continue to respond to comments and information requests in a timely manner.

ITC Lake Erie indicated that it offered to meet with Elmcrest, a group of landowners of lakefront property in Haldimand County and an Intervenor in the hearing process. The Company stated that as of 22 April 2016, Elmcrest had not responded to the Company's offer to meet. ITC Lake Erie stated that it would respond to any comments or concerns raised by Elmcrest during the hearing process. ITC Lake Erie also stated that it would meet with Elmcrest to discuss the Project, at its request.

ITC Lake Erie stated that it is in the process of finalizing a term sheet with Dundee Energy Limited (Dundee), the operator of the underwater natural gas pipelines located along the proposed in-water cable route. ITC Lake Erie stated that no material issues or concerns have been raised by Dundee and it anticipates entering into a Facility Proximity and Crossing Agreement in the near future.

ITC Lake Erie stated it will address complaints by landowners and the public as required and in a manner consistent with the requirements of the NEB Act and the *Electricity Filing Manual.*

Views of Participants

No evidence or comments about ITC Lake Erie's public consultation program were filed.

4.3 Consultation with Government Stakeholders

Views of ITC Lake Erie

ITC Lake Erie stated that federal, provincial, and local agencies were engaged early in the Project beginning in spring/summer 2013 prior to the filing of the Application with the Board. The Company stated that three rounds of agency consultation were conducted to provide updates on Project scope, on technical studies to support its Application, and on next steps in the hearing process. ITC Lake Erie noted that it initially contacted the following agencies and organizations:

- Ontario Ministry of Aboriginal Affairs;
- Ontario Ministry of Environment and Climate Change;
- MNRF;
- Ontario Ministry of Tourism, Culture and Sport;
- Infrastructure Ontario;
- Fisheries and Oceans Canada, including the Canadian Coast Guard;
- ECCC;
- Canadian Environmental Assessment Agency;
- Transport Canada, including the Navigable Waters Protection Division;
- IESO;
- Haldimand County; and
- Long Point Region Conservation Authority.

ITC Lake Erie stated that it held meetings, teleconferences, and/or exchanged emails with:

- Ontario Ministry of Environment and Climate Change;
- MNRF;
- Ontario Ministry of Energy;
- Haldimand County;
- IESO;
- Hydro One;
- Ontario Power Authority; and
- OPG.

ITC Lake Erie stated that few issues and comments were raised during agency consultations. ITC Lake Erie stated that the majority of discussions centred on permits and permitting requirements, and changes to contact information. The Company noted that permitting

discussions will continue as the Project progresses. ITC Lake Erie further noted that other topics of discussion included:

- land disposition process and requirements;
- potential effects on existing oil and gas production and associated pipelines;
- in-water HVDC cable route and potential effects on fisheries;
- planned and future projects in the vicinity of the Project;
- utility crossings; and
- lab results for borehole samples along the cable route.

ITC Lake Erie stated that agency consultation will continue as the Project progresses, and that the Company will respond to comments and information requests in a timely manner.

Views of Participants

No evidence or comments about ITC Lake Erie's consultation with government stakeholders were filed.

> ***Views of the Board***
>
> The Board recognizes that an applicant's involvement of the public is a fundamental component during each phase throughout the life cycle of a project as it aides in identifying and addressing potential impacts. The Board notes the efforts of ITC Lake Erie to work with community stakeholders and local, provincial, and federal agencies and governments to identify and address their concerns.
>
> The Board notes that ITC Lake Erie has committed to continue its efforts to consult and maintain effective and timely consultation activities with stakeholders, including affected landowners, as appropriate, throughout the lifecycle of the Project. The Board expects ITC Lake Erie to follow and undertake its commitments. The Board, upon consideration of the evidentiary record, finds that the design and implementation of ITC Lake Erie's public consultation program was reasonable given the scale and setting of the Project.

Chapter 5

Aboriginal Matters

The Board's hearing process is designed to obtain as much relevant evidence as possible on Aboriginal concerns about the Project, the potential impacts on Aboriginal interests, and possible mitigation measures to minimize adverse impacts on Aboriginal interests. The Board is provided with, and considers information about, concerns related to the Project, and the measures that would be required to address those concerns. In assessing the potential impacts of the Project on Aboriginal interests, including rights, the Board considers all of the evidence provided.

This chapter covers the participation of Aboriginal groups in the Board's Enhanced Aboriginal Engagement (EAE) Process; participation of Aboriginal groups in the Board's hearing process; Aboriginal consultation undertaken by ITC Lake Erie; and the potential impacts of the Project on the interests, including rights, of Aboriginal groups. This chapter includes summaries of Aboriginal concerns and interests as recorded by ITC Lake Erie in its evidence, as well as information filed with the Board by specific Aboriginal groups.

The Board notes that identifying and referring to specific passages within the public record might lead to other direct and indirect references being overlooked. Anyone wishing to fully understand the context of the information and evidence in relation to Aboriginal matters should review the entire record of the hearing. In addition, evidence provided by Aboriginal groups and evidence of Aboriginal concerns and interests recorded by ITC Lake Erie in its evidence is summarized in other chapters throughout these Reasons for Decision, particularly in Chapter 7 Environment and Socio-Economic Matters and Chapter 8 Infrastructure, Employment, and Economy. This chapter does not stand in isolation from the Reasons for Decision as a whole.

5.1 The Board's Enhanced Aboriginal Engagement (EAE) Process

5.1.1 Overview

The Board has an EAE process which it utilizes for various application reviews, including section 58.16 applications. The purpose of the EAE process is to help Aboriginal groups understand the Board's regulatory process and how to participate in it. The EAE process involves proactive contact with Aboriginal groups who may be affected by a proposed project, including those groups that have publicly claimed or asserted the right to use the land in the Project area for traditional purposes. The Board reviews the completeness of the list of potentially affected Aboriginal groups identified in an applicant's project description filed with the Board. The Board may identify other groups who may be potentially impacted by the proposed project. The Board's list of groups is sent to the Government of Canada's Major Projects Management Office (MPMO) or Natural Resources Canada (NRCan), and if applicable the list is updated. This list is called the Crown List. The Board sends a letter package which includes a summary of the project and how to obtain more information, to each potentially affected Aboriginal group on the Crown List. After issuing the letter package, Board staff

followed up with phone calls to each of the Aboriginal groups to confirm receipt, respond to questions Aboriginal groups may have, and arrange information meetings with those Aboriginal groups who make a request.

5.1.2 The EAE Process for the ITC Lake Erie Project

For this Project, the Board carried out its EAE activities between May 2015 and September 2015. On 19 May 2015, the Board sent the letter package described above to each of the Aboriginal groups identified on the Crown List as being potentially affected by the Project. In the letter package, the Board offered to provide further information about its hearing process and options for participation, as well as information about participant funding available through the Participant Funding Program (PFP) administered by the NEB through an independent Funding Review Committee. The Board letter also encouraged the Aboriginal groups to contact ITC Lake Erie to engage directly should any specific concerns be identified with the Project. The Board also undertook follow up calls with each of the Aboriginal groups to confirm that each group had received the letter. During those calls, the Board also inquired if the group wanted a community meeting.

The groups identified on the Crown List were:

1. Aamjiwnaang First Nation
2. Alderville First Nation
3. Association of Iroquois and Allied Indians
4. Beausoleil First Nation
5. Bkejwanong Territory (Walpole Island First Nation)
6. Caldwell First Nation
7. Chippewas of Georgina Island First Nation
8. Chippewas of Kettle and Stony Point First Nation
9. Chippewas of Rama First Nation
10. Chippewas of the Thames First Nation
11. Curve Lake First Nation
12. Delaware Nation at Moraviantown
13. Haudenosaunee Confederacy Chiefs Council and Haudenosaunee Development Institute
14. Hiawatha First Nation
15. Métis Nation of Ontario
16. Métis Nation of Ontario - Clear Waters Métis Community Council
17. Métis Nation of Ontario - Credit River Métis Community Council
18. Métis Nation of Ontario - Grand River Métis Community Council
19. Métis Nation of Ontario - Niagara Region Métis Community Council

20. Métis Nation of Ontario - Oshawa and Durham Métis Community Council
21. Métis Nation of Ontario - Toronto and York Region Métis Community Council
22. Mississaugas of the New Credit First Nation
23. Mississaugas of Scugog Island First Nation
24. Mohawk Council of Akwesasne
25. Mohawk Council of Kahnawake
26. Mohawk Council of Kanesatake
27. Mohawks of the Bay of Quinte
28. Munsee-Delaware Nation
29. Nation huronne-wendat
30. Oneida Nation of the Thames
31. Six Nations of the Grand River
32. Southern First Nations Secretariat
33. Wahta Mohawks

Board staff met with those Aboriginal groups who requested meetings to discuss the hearing process, the PFP administered by the NEB, and how to participate in the hearing. The Board staff met with a number of Aboriginal groups on the dates as noted below:

- 21 August 2015 meeting – Mississaugas of the New Credit First Nation; and
- 21 August 2015 meeting – Southern First Nations Secretariat (comprised of Aamjiwnaang First Nation, Caldwell First Nation, Chippewas of Kettle and Stony Point First Nation, Chippewas of the Thames First Nation, Delaware Nation at Moraviantown, Munsee-Delaware Nation, and Oneida Nation of the Thames).

5.2 Participation of Aboriginal Groups in the Board's Hearing Process

In developing the hearing process to assess ITC Lake Erie's Project, the Board considered means by which all potentially affected Aboriginal groups would be provided with reasonable opportunities to make their concerns known to the Board. During the proceeding, Aboriginal participants were provided with a number of options in which they could present their views and concerns to the Board.

5.2.1 Application to Participate Process

All interested persons or groups can apply to participate in the Board's hearing process by demonstrating that they are directly affected by the proposed project or that they have relevant information or expertise that will assist the Board in making its decisions in respect of a proposed project. When applying to participate, applicants identify which project-related issues

(from the List of Issues provided in the Hearing Order; the list for this Project is reproduced in Appendix I of these Reasons for Decision) they are interested in.

Those wishing to participate in the Board's hearing process can apply as either an Intervenor or a Commenter. An Intervenor is granted broad participation rights and obligations, typically including the right to file evidence, ask questions, and file a final argument. A Commenter is granted the right to file a Letter of Comment at any time before the deadline set in the Hearing Order or Procedural Update. Commenters are not able to ask questions about the evidence of other Parties or make a final argument. The process as described above was the one used for hearing process for the Project.

The Application to Participate (ATP) process was held from 9 November 2015 to 27 November 2015. Of the 33 Aboriginal groups identified on the Crown List, only the Haudenosaunee Confederacy Chiefs Council (HCCC) filed an application to participate.

It its ATP, the HCCC identified itself as a "federal government", and identified *Issue No.9* of the List of Issues - *Potential impacts of the Project on Aboriginal interests* as its main interest regarding the Project. The HCCC's ATP also set out additional matters, all being of a legal nature, which it stated the Board should consider. The Board granted the HCCC status in the Hearing as an Intervenor. In the Board's Ruling No. 1 on Participation in the Hearing, dated 15 December 2015, the Board stated that it had not considered the additional matters set out in the ATP. The Board advised that as an Intervenor, the HCCC could bring a Notice of Motion in the form described in section 4.4 of the Hearing Order to have the Board hear and determine whether those additional matters would form part of the hearing process. No Notice of Motion in relation to these matters was filed during the hearing process. The HCCC did not file any evidence or other submissions regarding the Project during the hearing process.

5.2.2 Oral Traditional Evidence

The Board understands that Aboriginal peoples have an oral tradition for sharing lessons and knowledge from generation to generation. In Procedural Update No. 1, dated 15 December 2015, the Board noted that Aboriginal Intervenors may, upon arrangement, present oral traditional evidence in addition to, or instead of filing written evidence. By letter to the HCCC dated 4 March 2016, the Board provided information about how to file a written Notice of Intent form to provide oral traditional evidence. During the hearing process, no request to provide oral traditional evidence was filed.

5.2.3 Letters of Comment

There were no applications filed by Aboriginal groups to participate as Commenters in the hearing process. However, the Board received letters which were placed on the public record from the Mississaugas of New Credit First Nation, Curve Lake First Nation and Mohawk Council of Akwesasne. These letters are discussed in Sections 5.4.2, 5.5.1.2, and 5.5.1.3 of this chapter.

5.3 Government of Canada Consultation Process with Aboriginal Groups

The Government of Canada, through NRCan, provided a letter that was included in the Board's letter package sent to each potentially affected Aboriginal group on the Crown List. The letter was addressed to each of the 33 identified Aboriginal groups and informed them of the federal Crown's Aboriginal consultation process for the Project, and stated that the Crown was relying on the Board's public hearing process, to the extent possible, to fulfil its duty to consult.

NRCan stated in its letter that the Crown will be tracking issues raised by Aboriginal groups during the Board's hearing process, and that matters brought forward will be assessed to determine whether additional consultation obligations may exist. In its letter NRCan stated that the Government of Canada encourages all Aboriginal groups whose established or asserted rights could be impacted by the Project to apply to the Board to participate in the public hearing process. It also encouraged potentially-impacted Aboriginal groups to engage directly with ITC Lake Erie, since the Project proponent may have the ability to make changes to the Project to address any specific concerns raised. It also stated that any unresolved concerns should be brought forward through the Board's hearing process.

The Government of Canada indicated that federal authorizations for the proposed project will only be issued once the Crown determines that its consultation obligations with respect to each of these authorizations have been discharged, and that all regulatory requirements have been met.

5.4 Consultation with Aboriginal Groups

Views of ITC Lake Erie

5.4.1 ITC Lake Erie's Aboriginal Engagement Program

ITC Lake Erie acquired the development and ownership rights to the Project from Lake Erie Power Corp. in June 2014. Prior to that date, consultation with Aboriginal groups was conducted by Lake Erie Power Corp. with ITC Lake Erie continuing consultation activities after June 2014.

ITC Lake Erie stated that its "Aboriginal engagement program" is guided by the legal requirements of section 35 of the *Constitution Act, 1982*, applicable regulatory requirements and relevant guidance sources, such as the *Electricity Filing Manual*, CEAA 2012, and related policy and guidance materials. ITC Lake Erie stated that it is committed to creating a meaningful Aboriginal engagement program. The Company stated it created an adaptive engagement program so that as information is disseminated about the Project and interests and concerns are raised, its Aboriginal engagement program will evolve to address potential effects on the exercise of existing or asserted Aboriginal or Treaty rights as appropriate.

ITC Lake Erie stated that it will continue to engage in discussions with Aboriginal groups and their respective communities throughout the Project, with varying degrees of engagement depending on the interests of potentially impacted Aboriginal groups and their respective consultation protocol requirements. ITC Lake Erie further stated that it will proactively obtain

feedback from Aboriginal groups and engage Aboriginal groups in the review of the Application to the Board.

ITC Lake Erie stated that the following principles guide its approach to Aboriginal engagement:

- Early engagement with Aboriginal groups can eliminate potential Project design issues and concerns and identify and address construction and operation issues in an open and transparent manner.
- Working with Aboriginal groups and participants in the technical study and planning stages can enhance Project development and lead to positive acceptance of the Project.
- Aboriginal groups have a diverse range of interests and protocols and time spent learning about perspectives, impacts, and interests fosters trust and respect and can lead to a Project with mutually beneficial aspects.
- ITC Lake Erie can assist Aboriginal groups with capacity building in a broad variety of ways, from information sharing in its data collection processes, to internships and to considering opportunities for strategic partnerships and contracting for the Project.
- ITC Lake Erie will follow the evolving legal and constitutional relationship between Aboriginal groups and the Crown in order to comprehend the issues confronting First Nations and Métis.

ITC Lake Erie stated that the goals and objectives of its Aboriginal engagement program are to:

- carry out early, transparent and meaningful engagement with Aboriginal groups interested in the Project;
- build trust and confidence in the Project through learning about historical relationships, interests and perspectives, and consideration of impacts and concerns relating to the Project and lands in general;
- strive to meet the needs of parties having an interest in the Project by integrating recommendations, as appropriate, from Aboriginal groups as part of the Project planning process;
- establish mutually acceptable community engagement processes and consider local initiatives that will enable ITC Lake Erie to receive comments from a broad range of sources throughout the Project preparation and implementation process;
- support the participation of Aboriginal groups potentially impacted by the Project through capacity funding for engagement activities;
- ensure the Aboriginal groups provide input into the environmental and socio-economic assessment where possible;
- meet with Aboriginal groups upon request, provide up to date information about the Project, obtain input on the proposed development and implementation of the Project and explain the regulatory approvals processes;

- consider opportunities to put in place internships, contracting, and procurement opportunities; and
- carry out on-going engagement activities and fulfill commitments with Aboriginal groups according to agreements and protocols.

5.4.2 ITC Lake Erie's Engagement of Aboriginal Groups Prior to Filing the Application

ITC Lake Erie stated that the Company's initial engagement with Aboriginal groups began in August 2013, and from that time until the filing of the Application with the Board on 22 May 2015, it engaged with 17 Aboriginal groups. ITC Lake Erie stated that it engaged with Aboriginal groups with a view to putting in place a broad and adaptive engagement program to address the requirements of the *National Energy Board Act* and the *Electricity Filing Manual.* ITC Lake Erie's initial engagement included the following groups:

1. Bkejwanong Territory (Walpole Island First Nation)
2. Caldwell First Nation
3. Chippewas of the Thames First Nation
4. Delaware Nation at Moraviantown
5. Haudenosaunee Development Institute on behalf of Haudenosaunee Confederacy Chiefs Council
6. Métis Nation of Ontario
7. Métis Nation of Ontario - Credit River Métis Community Council
8. Métis Nation of Ontario - Grand River Métis Community Council
9. Mississaugas of the New Credit First Nation
10. Mohawk Council of Akwesasne
11. Mohawk Council of Kahnawake
12. Mohawks of the Bay of Quinte
13. Munsee-Delaware Nation
14. Oneida Nation of the Thames
15. Six Nations of the Grand River
16. Southern First Nations Secretariat
17. Wahta Mohawks

ITC Lake Erie stated that prior to filing its Application on 22 May 2015, it had grouped its Aboriginal engagement program activities into three rounds of engagement.

Round No.1 of Aboriginal Engagement (August 2013 to September 2013)

ITC Lake Erie stated that initial early engagement activities were carried out in August and September 2013 with the two First Nation groups in the immediate vicinity of the Project being Mississaugas of the New Credit First Nation (MNCFN) and Six Nations of the Grand River (Six Nations). ITC Lake Erie stated that the meetings were used to introduce the Project, provide background on the Company, and initiate dialogue on the technical and environmental aspects of the Project. The Company indicated that comments and questions from Aboriginal groups pertained to general interest in the Project, including:

- need for the Project;
- Applicant's experience with transmission projects;
- Project's environmental impacts;
- HVDC versus AC;
- historical artefacts in Lake Erie;
- Project location and timing;
- lake depth, ice scour, underwater gas pipelines, and shipwrecks in Lake Erie;
- discussion about coal industry in the US and energy policy;
- Aboriginal consultation and accommodation; and
- Aboriginal employment and training.

ITC Lake Erie stated that it responded to the comments and questions, and committed to make contact with Six Nation's Grand River Employment and Training as the Project progressed, and undertake future engagement activities with Aboriginal groups.

Round No. 2 of Aboriginal Engagement (October 2013 to January 2015)

ITC Lake Erie stated that Round No.2 Aboriginal engagement activities were focused on collecting information on local communication protocols, initiating contact to provide a general introduction about the Project to a broader list of Aboriginal groups and gauging interest in the Project. ITC Lake Erie stated that introductory telephone calls were carried out to confirm contact persons and ensure correspondence would be sent in accordance with local protocols.

ITC Lake Erie stated that all 17 Aboriginal groups were sent a Project introduction letter on 29 November 2013, and on 15 July 2014 a Project update letter and a request by ITC Lake Erie for information on how to best carry out engagement. In addition, the Company stated that on 19 November 2013 it phoned all of the 17 Aboriginal groups except for MNCFN and Six Nations (both of whom it had already contacted in Round No.1 Aboriginal engagement activities) to confirm contact persons, and made follow up phone calls on 2 December 2013. ITC Lake Erie stated that it met with those groups who requested a meeting (Caldwell First Nation; Chippewas of the Thames First Nation; Haudenosaunee Development Institute

(HDI), the entity carrying out engagement activities on behalf of the HCCC; MNCFN; Munsee-Delaware Nation; and Six Nations). The Company further stated that it sent a hard copy of presentations provided at the aforementioned engagement meetings and a summary of technical studies to those groups with which it did not meet.

ITC Lake Erie stated that between August and September of 2014, it entered into archaeology monitoring agreements with MNCFN and Six Nations, and arranged for Aboriginal community members from those communities to participate as monitors in Stage 1 and Stage 2 archaeological activities. The Company further stated that in November 2014 it arranged with both Aboriginal groups for monitor participation in Stage 3 archaeological assessment activities.

ITC Lake Erie filed on the Board's public record summaries of the questions, issues, and comments from meetings held with Aboriginal groups during the Round No. 2 engagement. The Company stated that Aboriginal groups asked about or commented on:

- ITC Lake Erie's business model and assets;
- economic and financial impacts of the Project;
- Project location;
- environmental and noise impacts of the Project;
- installation and maintenance requirements for the cables;
- land acquisition;
- safety of the Project;
- employment opportunities;
- gas drilling and shipwrecks in Lake Erie;
- archaeological studies and Aboriginal monitors;
- Project impacts on traditional practices;
- directional drilling;
- cumulative effects;
- Project impacts to recreation activities during construction;
- existing Aboriginal title claims; and
- consultation and engagement protocols.

ITC Lake Erie stated that it provided responses to the questions, issues, and comments raised by Aboriginal groups, and committed to make contact with communities interested in employment opportunities, and to work with Aboriginal groups who expressed interest in assisting with the archaeology studies. The Company also committed to have a construction protocol to address potential adverse environmental impacts on fish and fish habitats in Lake Erie.

Round No. 3 of Aboriginal Engagement (February 2015 to May 2015)

ITC Lake Erie stated that on 3 February 2015 it sent all 17 Aboriginal groups a Project Description, with a request for comments. The Company noted that much of its Aboriginal Engagement Round No. 3 consisted of circulating technical studies and having technical meetings with those Aboriginal groups, being MNCFN and Six Nations, which expressed further interest in the Project. During this period ITC Lake Erie stated that it also met with the Southern First Nations Secretariat which represents seven Aboriginal groups, as previously noted, and had two more Project meetings with HDI on behalf of HCCC.

ITC Lake Erie stated that in April 2015, it finalized the terms of a memorandum of understanding with MNCFN to guide engagement and future consultation activities between the parties.

ITC Lake Erie stated that in April and May 2015, it coordinated monitors from MNCFN and Six Nations to participate in further archaeological assessment activities. ITC Lake Erie stated that during community meetings MNCFN and Six Nations asked general questions about the Project and its location; about impacts of the cable's electromagnetic fields on fish and the environment; and about the HVDC cable and its in-water installation. ITC Lake Erie stated that it provided an update to MNCFN on the Project's archaeological assessments and committed to provide the First Nation with further information once the documentation was prepared. ITC Lake Erie stated that its interest was in discussing site enhancements, climate change, and employment opportunities with MNCFN. The Company also stated that it had an interest in discussing procurement and hiring opportunities with Six Nations.

ITC Lake Erie stated that the Southern First Nations Secretariat asked about environmental effects from similar transmission lines, Treaty lands, and the Project's environmental and archaeology studies. The Company further stated that it responded to all questions and would continue meeting with interested communities.

5.4.3 ITC Lake Erie's Engagement of Aboriginal Groups After Filing the Project Application in May 2015

The Board and NRCan identified 33 Aboriginal groups potentially affected by the Project as noted in the Crown List in Section 5.1.2. On 18 November 2015, ITC Lake Erie sent the Board a letter confirming that the Company had sent to all 33 Aboriginal groups on the Crown List copies of the Notice Package by registered mail on 30 October 2015 as directed by the Board. The Notice Package consisted of the Board's letter dated 21 October 2015 confirming completeness of the Application, as well as the Hearing Order, and the Notice of Public Hearing and Application to Participate. ITC Lake Erie stated that in accordance with the Board's direction, it posted the Hearing Order on its website and that the Notice of Public Hearing and Application to Participate was published in three Aboriginal publications (Turtle Island News, Windspeaker (Birchbark), and Two Row Times), as well as in the other publications, noted in Chapter 4 Public Consultation.

ITC Lake Erie indicated that after filing the Project Application, three Aboriginal groups had identified a strong interest in the Project, being: MNCFN, Six Nations, and HDI on behalf of the

HCCC. The concerns and interests of these three Aboriginal groups, as noted by Lake Erie through its consultation record, are described below.

Mississaugas of the New Credit First Nation

In addition to the initial three rounds of Aboriginal engagement described above, ITC Lake Erie filed additional information regarding its engagement with MNCFN, the Aboriginal group located in closest proximity to the Project.

ITC Lake Erie stated that it was involved in further communications with MNCFN to coordinate the involvement of monitors from MNCFN for archaeological assessment activities for the Project during May and June 2015. The Company further stated that it engaged with MNCFN to coordinate completion of an updated Monitoring Agreement for further archaeology work. ITC Lake Erie noted that in August 2015 there was a meeting with MNCFN to review certain aspects of the Project Application and the technical report review. The Company stated that during that same month, there was another meeting with MNCFN to brainstorm on future procurement and contracting opportunities regarding the Project. The Company stated that it met again with MNCFN on 12 November 2015, in advance of an Open House planned for the same day. ITC Lake Erie stated that it provided an update on both the Project and on the Board's process regarding the Project Application, as well as an update on its technical reports.

ITC Lake Erie stated that it participated in two Open Houses in August and November 2015 with the MNCFN community. The Company stated that at both Open Houses, it responded to technical questions about the Project's development and construction processes, supply opportunities, cable routing, and the installation process.

Six Nations of the Grand River

In addition to the initial three rounds of Aboriginal engagement as previously described above, ITC Lake Erie filed additional information regarding its engagement with Six Nations. The Company stated that it finalized a "terms of reimbursement agreement" with Six Nations in March 2015. ITC Lake Erie also stated that it worked with Six Nations to coordinate the involvement of its members as monitors for archaeological assessment activities for the Project during May and June 2015.

ITC Lake Erie stated that it participated in and sponsored an Open House for the community in May 2015. The Company stated that Six Nations raised questions about cable routing and installation process to ensure that impacts on fish were minimized, as well as potential future employment and contracting opportunities. The Company stated that once community members gained an understanding of the Project, there was general interest in understanding Project timelines and how members could participate in potential procurement opportunities arising from the Project. ITC Lake Erie committed to participate in an Open House again for 2016, stating how conducive the event was for overall Project awareness and meeting and engaging with community members from Six Nations.

ITC Lake Erie stated that it again met with Six Nations in November 2015 to provide an update on the Board's hearing process regarding the Project Application, and to discuss the

Application and technical reports status. The Company stated that it provided an update on the Project's technical reports regarding fish and fish habitat assessment, blasting impact analysis, marine geophysical survey results, cumulative effects assessment, and archaeological assessment activities.

ITC Lake Erie stated that it had received a copy of a letter sent by Six Nations to the Ontario Ministry of Natural Resources and Forestry (MNRF), dated 19 November 2015. This letter set out that Six Nations had received a notice dated 20 October 2015 from the Company in relation to the Application. Six Nations set out its rights and interests in relation to certain lands and noted that the Project was to be located in the 1701 Fort Albany Treaty area of Six Nations, a Treaty which assures Six Nations economic, cultural, sustenance, and other rights and that those rights are affirmed and protected in the Constitution. The letter further advised about unresolved land rights and informed that these are the responsibility of the Crown in Right of Canada and Crown in Right of Ontario, and that Six Nations was seeking consultation from the Crown, proponents and municipalities in good faith in order to obtain its free, prior and informed consent. ITC Lake Erie stated that in the letter, Six Nations confirmed that it is concerned about any development relating to lands, water, and resources throughout its Treaty territory and any archaeology issues associated with such development. In the letter Six Nations requested a meeting with MNRF and ITC Lake Erie to discuss the Project.

ITC Lake Erie stated it responded to the Six Nations' letter on 16 December 2015. The Company confirmed that it was in the process of carrying out engagement with Six Nations and that over the course of engagement since November 2013, ITC Lake Erie had learned about Six Nations' process for engagement. The Company noted this process had provided for opportunities to introduce the Project and receive input about the technical aspects of the Project. ITC Lake Erie confirmed that that it looked forward to continuing the engagement process.

ITC Lake Erie stated that it engaged in emails and various correspondences with Six Nations between 21 December and 24 December 2015 to confirm the Company's support for local community Christmas initiatives.

Haudenosaunee Development Institute (HDI)

ITC Lake Erie stated that HDI would be the entity that will carry out engagement activities on behalf of HCCC. ITC Lake Erie also stated that it communicated numerous times with HDI prior to and after filing its Application with the Board, and included several email communications between the Company and HDI in its Application, as well as in its supplemental evidence.

ITC Lake Erie stated that HDI had provided the Company with its own engagement agreement on behalf of HCCC, and that the Company was in discussions with HDI regarding this agreement and provided HDI with a revised agreement. ITC Lake Erie stated that it has not been able to come to an agreement with HDI regarding Project engagement as HDI stated it has concerns with both ITC Lake Erie's and the Crown's definition of consultation, as well as the Board's hearing process. ITC Lake Erie noted the concerns set

out by HDI were in regard to the duty to consult, and the terms that ITC Lake Erie was seeking to negotiate with HDI.

ITC Lake Erie stated that it inquired of HDI whether HDI would consider a stand-alone agreement for an archaeology monitor that could be put in place, in order for a monitor, endorsed by HCCC and HDI, to participate in field studies. In its response, HDI stated that it would not enter into an archaeology agreement without first having finalized a justification / accommodation agreement. ITC Lake Erie informed HDI that the Project currently has the participation of monitors from Haudenosaunee and Anishnawbe communities, which it believes is broad enough to address any issues that may arise during the completion of the archaeology work. In its response, HDI indicated that HDI monitors would not be participating in archaeological work on the Project.

Views of Intervenors

Haudenosaunee Confederacy Chiefs Council

In a letter dated 23 November 2015, the Board responded to an email dated 12 November 2015 that had been sent by the HCCC to Board staff. The email set out comments about NRCan's Crown consultation process with the Haudenosaunee, as well as questions regarding the Board's jurisdiction. The Haudenosaunee did state that they had Treaty and other rights that would be impaired, infringed, and interfered with by the Project. The email did not include any specifics about rights or impacts. In its response letter, the Board pointed out that NRCan is best placed to deal with comments about Crown consultation and that as the comments about the Board's jurisdiction are of a legal nature for such to be considered, the comments must be brought before the hearing process. The Board encouraged the HCCC to apply to participate in the hearing process, before the deadline of 27 November 2015.

On 27 November 2015 the HCCC filed its Application to Participate as an Intervenor in the hearing process, and were granted Intervenor status. In its application the HCCC set out a list of questions related to section 35 of *The Constitution Act, 1982*, and fiduciary duties. In its ATP the HCCC did not identify any specific Aboriginal interests or rights nor any specific potential impacts of the Project on its interests or rights. The HCCC did not file any other submissions or evidence in the hearing process.

Views of Aboriginal Groups Identified on the Crown List and not Participating in the Hearing Process

Mississaugas of the New Credit First Nation

MNCFN was identified as part of the Board's EAE process and was included as part of ITC Lake Erie's Aboriginal engagement program prior to filing the Application, and after the Application was filed. On 8 October 2015, prior to the release of the Board's Hearing Order, MNCFN filed a letter on the Board's public registry, updating the Board on the engagement process carried out to date between MNCFN and ITC Lake Erie. MNCFN stated that

the following agreements had been put in place between the parties that guide their engagement process:

- Archaeology Monitoring Agreement as of 23 September 2014;
- Letter Agreement as of 1 December 2014; and
- Memorandum of Understanding 13 April 2015.

MNCFN further stated that it continues to engage with ITC Lake Erie on all aspects of the Project and has completed its own internal peer review of the technical reports provided in the Application submission. MNCFN stated that it is satisfied with the process to date and that ITC Lake Erie has made its technical team available to meet with MNCFN peer review technicians to discuss the technical reports.

MNCFN stated that in collaboration with ITC Lake Erie, it is beginning to now turn its attention to assessing the skilled trades opportunities and other potential supply chain initiatives. MNCFN stated that it is very interested in taking advantage of economic development opportunities within its traditional territory. MNCFN further stated that through autumn 2015 and into 2016 its monitors would continue to be involved in capacity building through the additional archaeology work required for the Project. MNCFN did not file an Application to Participate in the Hearing.

This same information, as provided by MNCFN to the Board, was referred to in ITC Lake Erie's evidence.

Mohawk Council of Akwesasne

The Mohawk Council of Akwesasne was identified as part of the Board's EAE process and was included in ITC Lake Erie's Aboriginal engagement program prior to filing the Application. On 6 November 2015, following the release of the Board's Hearing Order, the Mohawk Council of Akwesasne filed a letter on the public registry regarding the ITC Lake Erie Project, stating that the Mohawk Council of Akwesasne Aboriginal Rights and Research Office considers the ITC Lake Erie Project to be impacting the area of Six Nations and MNCFN. The Mohawk Council of Akwesasne also stated that it would leave further comment to the responsible authorities of Six Nations and MNCFN. The Mohawk Council of Akwesasne did not file an Application to Participate in the Hearing.

Curve Lake First Nation

On both 1 October 2015 and 23 February 2016, prior to and following the release of the Board's Hearing Order, respectively, Curve Lake First Nation filed almost identical letters on the public registry regarding the ITC Lake Erie Project. These letters stated that ITC Lake Erie's Project area is situated within the traditional territory of Curve Lake First Nation. The First Nation stated that it has particular concern for the remains of its ancestors, and that it would want to be contacted in the event archaeology remains were discovered at the Project. The first letter from Curve Lake First Nation was referred to in ITC Lake Erie's evidence.

The Board responded to the first letter on 9 November 2015 and copied ITC Lake Erie, explaining that any concerns regarding human remains or archaeological artefacts that might be found during construction are best brought to the attention of ITC Lake Erie, and provided the Company's contact information. The Board also explained that Aboriginal groups can bring unresolved concerns to the Board through its hearing process, provided contact information for the Board's Process Advisor for the Project, and provided information about the PFP administered by the NEB. On 9 March 2016 the Board responded similarly to Curve Lake First Nation's second letter. Curve Lake First Nation did not file an Application to Participate in the Hearing.

5.5 Potential Impacts of the Project on Aboriginal Groups

Views of ITC Lake Erie

ITC Lake Erie noted that the Project site falls within the traditional territories of MNCFN and Six Nations and within the boundaries of the beaver hunting grounds according to the 1701 Nanfan Treaty, which covers virtually all of southern Ontario. The Company also noted that the Project is not located in proximity to any First Nations or known lands used for traditional purposes.

ITC Lake Erie stated that the lands required for the Project are currently under active agricultural use or have previously been disturbed for industrial and municipal use and are not currently being used by Aboriginal groups for traditional land use activities. ITC Lake Erie stated that it provided and reviewed information regarding potential effects on fisheries related to the Project with those Aboriginal groups who expressed an interest in fisheries. The Company noted that no Aboriginal groups have identified any specific current traditional land uses within proximity to the Project, and that no significant concerns have been identified to date relating to potential effects of the Project on traditional Aboriginal land use, including current traditional uses of the resources in the waters of Lake Erie.

ITC Lake Erie stated that in accordance with local protocol and negotiated agreements, monitors from MNCFN and Six Nations participated in the data collection process for archaeology work carried out for the Project. ITC Lake Erie stated that no concerns or objections were expressed by the monitors sent on behalf of these two Aboriginal groups.

ITC Lake Erie stated that MNCFN and Six Nations have expressed their interest in the Project from an economic perspective and wish to continue working with the Company to identify potential future opportunities for employment, training and/or other mutually beneficial opportunities. ITC Lake Erie stated that it is committed to continued engagement with local Aboriginal groups to identify potential opportunities for training and employment. Further, opportunities have been identified for involvement in future field studies and potentially in regards to provision of services by Aboriginal businesses in support of the construction of the Project. ITC Lake Erie noted that the majority of the potential Aboriginal employment and training opportunities would be during the construction phase of the Project, as the Project will require minimal staff during the operations phase. ITC Lake Erie stated it has expressed interest in participating in future career fairs or similar sessions targeted for Aboriginal groups to increase awareness of the types of skilled trades that would be required during construction.

Views of Intervenors

Haudenosaunee Confederacy Chiefs Council

HCCC did not file any Intervenor evidence with the Board about potential impacts of the Project on its specific Aboriginal interests or rights.

Views of Aboriginal Groups Identified on the Crown List and not Participating in the Hearing Process

Mohawk Council of Akwesasne

As previously noted, on 6 November 2015, following the release of the Board's Hearing Order, the Mohawk Council of Akwesasne filed a letter on the public registry regarding the ITC Lake Erie Project. It also stated in that letter that the ITC Lake Erie Project does not directly impact the Akwesasne territory.

Curve Lake First Nation

As previously noted on both 1 October 2015 and 23 February 2016, prior to and following the release of the Board's Hearing Order, respectively, Curve Lake First Nation filed almost identical letters on the public registry. Curve Lake First Nation also stated in those letters that it is not currently aware of any issues regarding the ITC Lake Erie Project that would cause concern with respect to its traditional, Aboriginal, and Treaty rights. As previously noted, the first letter from Curve Lake First Nation was referred to in ITC Lake Erie's evidence.

> ***Views of the Board***
>
> ***Overview***
>
> The Board notes that this chapter does not stand in isolation from the Reasons for Decision as a whole. Anyone wishing to fully understand the context of the information and evidence in relation to Aboriginal matters should review the entire record of the hearing, as identifying and referring to specific passages within the public record may lead to other direct and indirect references being overlooked.
>
> In making its decision on this Project Application, as to whether the Project should be approved or not, and as to what conditions should be imposed if the decision is to approve, the Board considers all of the relevant evidence on the public record for the hearing process. The Board considers the evidence regarding consultation undertaken with Aboriginal groups, the comments and concerns of Aboriginal groups, the potential impacts on Aboriginal interests, and the mitigation measures the applicant proposed.
>
> The Board takes Aboriginal concerns into consideration before it makes any decision that could have an impact on the interests of Aboriginal groups. Whenever a project has the potential to impact the interests of Aboriginal groups, the Board seeks to obtain as much evidence as possible in that regard so that it may assess and consider the potential impacts in its decision.

The Board interprets its responsibilities in a manner consistent with section 35(1) of the *Constitution Act, 1982*, which recognizes and affirms the existing Aboriginal and Treaty rights of Aboriginal peoples. In order to ensure that its decisions with respect to this Application are consistent with both section 35(1) and procedural fairness requirements, the Board has assessed its hearing process on the points that follow. The Board is of the view that this process is appropriate, recognizing the nature of this Application, the importance of the constitutionally protected rights of Aboriginal peoples, and the many and varied societal interests that must be considered in its assessment.

The Government of Canada and the Board's Hearing Process

The Board understands that Crown consultation is of great importance to Aboriginal groups. The Board notes that the Government of Canada, indicated in letters from Natural Resources Canada (NRCan), issued on 19 May 2015 and filed on the public registry, to the 33 identified potentially affected Aboriginal groups that it relies on the Board's hearing process to the extent possible to fulfill its duty to consult Aboriginal groups for the proposed Project. The Board is of the view that this reliance is appropriate given the Board's robust and inclusive process, its technical expertise, and broad remedial powers with respect to Project-related matters. The Board notes that a number of judicial decisions, including *Taku River Tlingit First Nation v. British Columbia (Project Assessment Director)* 2004 3 SCR 550, 2004 SCC 74 (CanL II), have acknowledged the Crown's ability to rely on opportunities for Aboriginal consultation that are available within existing processes for regulatory or environmental review. This is a means by which the Crown may be satisfied that Aboriginal concerns have been heard and considered, and where appropriate, accommodated.

Applicants and the Board's Hearing Process

The Board's process was designed to obtain as much relevant evidence as possible on Aboriginal concerns about the Project, potential impacts on Aboriginal interests, including rights, and possible mitigation measures to minimize adverse impacts on Aboriginal interests. In addition to providing technical information addressing Project-related impacts on, among other things, fisheries, wildlife, vegetation, and heritage resources, ITC Lake Erie was required to make all reasonable efforts to consult with potentially affected Aboriginal groups and to provide information about those consultations to the Board. ITC Lake Erie was expected to report to the Board on all Aboriginal concerns that were expressed to it, even if it was unable or unwilling to address those concerns. This allowed any concerns of an Aboriginal group who chose not to participate in the subsequent hearing process, to still have those concerns brought to the attention of the Board through ITC Lake Erie's evidence.

Before filing a project application, applicants are expected to follow the provisions of the *Electricity Filing Manual* and identify, engage and consult with potentially affected Aboriginal groups. The *Electricity Filing Manual* also requires that an application include detailed information on any comments and concerns raised by potentially affected Aboriginal groups or those that are otherwise identified by the applicant. The Board expects applicants to provide information about the project and initiate early discussions with potentially impacted Aboriginal groups in the planning of the project and report on these activities to the Board. This allows for early exchange of information and for interests to be

considered at the onset of the project and through the design phase. The extent of the project-specific consultation activities that needs to be implemented is determined, to a large extent, by the nature, scope, and setting of a project.

The Board expects an applicant to design and implement its consultation activities with regard to the nature and magnitude of a project's impacts. Where there is a greater risk of more serious impacts on Aboriginal interests (which would, in part, depend on the nature of that interest), the Board has greater expectations in terms of the applicant's consultation with the potentially impacted Aboriginal group. In contrast, where there is a remote possibility of an impact on Aboriginal interests, or the impacts are minor in nature, the applicant's consultation will generally not be expected to be as extensive.

Aboriginal Groups and the Board's Hearing Process

The Board, through provision of its Enhanced Aboriginal Engagement (EAE) process, encourages Aboriginal groups to engage with the applicant so that their interests and concerns are identified early, considered by the applicant, and potentially resolved before the application is filed, as the applicant is often in the best position to respond to such concerns. In addition to the mandated one-on-one consultation that is to occur between an applicant and potentially impacted Aboriginal groups, it should also be understood that the Board's hearing process itself, including these Reasons for Decision, is part of the overall consultative process. The Board's hearing process assesses the consultation undertaken by ITC Lake Erie and its predecessor, Lake Erie Power Corp., and provides Aboriginal groups an additional avenue in which to explain their concerns about the Project and have those concerns carefully considered by the Board if they chose to participate. The Board encourages Aboriginal groups who are directly impacted by a proposed project, or have information and expertise that could help the Board gain a greater understanding of the project under consideration, to apply to participate in the hearing process.

For the Board's hearing process for this Project, Aboriginal groups were provided a number of options to present their interests and concerns directly to the Board. While the Board required ITC Lake Erie to identify Aboriginal groups potentially affected by the Project and implement a consultation program, the Board also took steps to facilitate the direct participation of Aboriginal groups in the hearing. The Board's EAE process commenced in May 2015, with the Board sending letters to each of the 33 potentially impacted Aboriginal group, informing them of the Project as well as the Board's role in respect of the Project. The letters provided information regarding the PFP administered by the NEB through an independent Funding Review Committee, and offered to provide further information on the hearing process. Board staff followed up on these letters, responded to questions regarding the Board's process and conducted information meetings with those groups who requested them, being MNCFN, and the Southern First Nations Secretariat which represents seven Aboriginal groups.

The Board conducted an ATP process from 9 November 2015 to 27 November 2015, which required interested persons or groups to request to be participants in the Board's hearing process. The applicants had to demonstrate that they would be directly affected by the

Project or that they have relevant information or expertise that will assist the Board in making its decision in respect of the Project.

The HCCC was the only Aboriginal group who filed an ATP, and HCCC was granted Intervenor status. Such status permitted the HCCC to file evidence, ask written questions of the Applicant and other Parties; respond to any questions from the Board, the Applicant, or other Parties; and file final argument. The Board notes that HCCC provided an email on 12 November 2015 to the Board prior to submitting its ATP which commented on the Crown's consultation process and included questions on the Board's jurisdiction. The Board replied on 23 November 2015, and noted that NRCan is best placed to deal with comments about Crown consultation and that as the comments about the Board's jurisdiction are of a legal nature for such to be considered, the comments must be brought before the hearing process.

The Board notes that no Aboriginal groups provided an ATP in the hearing for status as a Commenter.

A Funding Review Committee, independent of the Board's hearing process for this Project, was established to review applications for funding made under the PFP. This Committee reviewed the two applications that were received, including one from an Aboriginal group; it recommended funding awards to those who had applied, and advised those applicants of the funding awards and the claims process.

The Board understands that Aboriginal peoples have an oral tradition for sharing lessons and knowledge from generation to generation, and encourages Aboriginal groups who are Intervenors to provide such evidence in its hearing process. The Board provided a letter setting out information to the HCCC as to how it could request to provide such oral traditional evidence. The Board notes no request to provide oral traditional evidence was filed.

The HCCC, after being named an Intervenor, did nothing further in the hearing process. HCCC provided no oral traditional evidence, and did not file evidence, final argument, nor did it bring forward to the hearing process, the comments it had made in its November 2015 email. The only concerns directly related to the HCCC on the public registry for the Board to consider were those provided by ITC Lake Erie in its consultation evidence.

Consultation throughout the Project Lifecycle

The Board has set out broad expectations for all Board-regulated companies that consultation will continue throughout the life of a project and the Board routinely imposes binding obligations on the applicant to ensure that such consultation is occurring in an appropriate manner throughout the lifecycle. As the lifecycle regulator, the Board also has a number of processes and tools at its disposal to execute its oversight of a project, including ensuring compliance with any conditions imposed by the Board.

If a Certificate is issued for this Project, the Board notes that ITC Lake Erie has committed to ongoing consultation with Aboriginal groups throughout the life of the Project. The Board

also notes that consultation will occur as the conditions imposed by the Board are met and additional permits from other regulators are obtained.

ITC Lake Erie's Consultation with Aboriginal Groups

In assessing the consultation undertaken by ITC Lake Erie with Aboriginal groups, the Board evaluated the design and implementation of ITC Lake Erie's consultation activities. The Board considered the Company's activities to engage Aboriginal groups and to learn about their concerns and interests. It also considered how Aboriginal groups responded to opportunities for consultation and how ITC Lake Erie sought to understand, consider and address the concerns of potentially affected groups. The Board considered how this input influenced the Project's proposed design and operation. The only evidence filed directly by Aboriginal groups that the Board is able to consider as relevant are the ATP filed by HCCC, the letter filed by MNCFN, and the letter filed by Curve Lake First Nation, the contents of both letters having been confirmed within the consultation evidence of ITC Lake Erie. The Board considered all of that evidence in making its decision.

The Board is satisfied with the design and implementation of ITC Lake Erie's consultation activities to date given the scope and nature of the Project. ITC Lake Erie's predecessor, Lake Erie Power Corp., followed by ITC Lake Erie, began consulting with Aboriginal groups that it identified as being potentially impacted by the Project in the late summer of 2013, and in autumn 2015 commenced consultation activities with the additional groups identified on the Crown List of May 2015. The Board finds that the criteria used by ITC Lake Erie to identify potentially affected Aboriginal groups were appropriate.

The Board also finds that all 33 potentially affected Aboriginal groups were provided with sufficient information about the Project. The Board notes ITC Lake Erie provided Project information to Aboriginal groups, which included information about the Project design; construction; operations; and environmental, social and economic effects, including potential economic development opportunities including training, contracting and employment. The Board also notes MNCFN is the Aboriginal group located in closest proximity to the Project, and that it provided correspondence stating that three agreements have been put in place between MNCFN and ITC Lake Erie, and that MNCFN was satisfied with the engagement process.

The Board notes that ITC Lake Erie continued to facilitate opportunities with potentially affected Aboriginal communities to contribute to Project planning and committed to work with interested communities to address any Project-specific concerns raised and to identify further opportunities for consultation throughout construction and operation of the Project. The Board also notes that ITC Lake Erie stated that it is committed to continued engagement with local Aboriginal groups to identify potential opportunities for training and employment.

Having carefully considered all of the relevant and related evidence, the Board finds that Aboriginal groups were given sufficient information about the Project. The Board also finds that ITC Lake Erie made reasonable efforts to provide Aboriginal groups who expressed an interest in the Project with opportunities to participate in Project planning and to share traditional knowledge and identify site-specific and general concerns about the Project.

The Board finds that ITC Lake Erie was responsive to the concerns raised by Aboriginal groups and that it has committed to continue to work with Aboriginal groups, to address Project-related concerns, and establish appropriate mitigation measures. The Board reminds ITC Lake Erie that **Certificate Condition 3** (Appendix III) requires the Company to implement all commitments made in the proceeding including the commitment it has made to work with Aboriginal groups throughout the life cycle of the Project.

The Board finds that ITC Lake Erie has designed and implemented an appropriate and effective consultation program that meets the requirements and expectations of the Board, including those set out in the *Electricity Filing Manual*. The Board finds that, with ITC Lake Erie's commitments and the Board's conditions, ITC Lake Erie can effectively continue to consult with Aboriginal groups to learn more about their interests and concerns, and address issues raised by Aboriginal groups throughout the lifecycle of the Project. In fact the Board notes ITC Lake Erie's comments about its participation in an Open House with Six Nations and how conducive that was to overall Project awareness, and being able to meet and engage with community members from Six Nations.

Project-related Impacts

In assessing potential impacts on Aboriginal interests, the Board considered all of the relevant and related evidence provided. The Board notes there was no evidence filed by Aboriginal parties to the hearing process, as to potential impacts of the Project on their interests. There was information filed by Curve Lake First Nation, which was not a party to the hearing process, which commented on Project-related impacts. This letter was confirmed by ITC Lake Erie's consultation evidence. The only evidence the Board is able to consider regarding the concerns of any potential impacts on the interests of the Intervenor HCCC, given the absence of any evidence, final argument, or other information filed on the public record by HCCC, is the consultation evidence filed by ITC Lake Erie. The Board assessed how ITC Lake Erie identified and evaluated the potential impacts of the Project on the interests of Aboriginal groups, the concerns raised by Aboriginal groups, and the measures ITC Lake Erie has proposed to minimize or eliminate the Project's potential impacts on the interests of Aboriginal groups.

The Board considered the evidence provided by ITC Lake Erie, and the letters filed by Curve Lake First Nation, about the nature and extent of the activities, uses, and practices that are carried out by Aboriginal groups in the Project area. The Board acknowledges that the evidence shows that there were no outstanding concerns about Project-related impacts. The HCCC, as the only Aboriginal Intervenor in the hearing process, did not file any evidence about the potential impacts of the Project on its interests or rights.

The Board notes that ITC Lake Erie offered to MNCFN, Six Nations, and HDI opportunities to participate as monitors in stages 1 through 3 of the archaeological assessment. The Board further notes that ITC Lake Erie negotiated agreements with MNCFN and Six Nations to participate in the data collection process for archaeology work, and that these two Aboriginal groups did participate in the monitoring activities for the archaeology work.

The Board notes Curve Lake First Nation's concerns about ancestral remains will be addressed through the Board imposing **Certificate Condition 24** (Appendix III). This condition requires ITC Lake Erie to file confirmation that it has obtained a compliance letter from the relevant provincial authorities confirming that all applicable provincial requirements regarding archaeological and heritage resources have been met for both the terrestrial and in-water portions of the Project, at least 30 days prior to the commencement of construction. Further discussion regarding this matter of heritage resources is provided in Chapter 7 Environment and Socio-Economic Matters.

As outlined in this Chapter, as well as Chapter 7 Environment and Socio-Economic Matters and Chapter 8 Infrastructure, Employment and Economy of these Reasons for Decision, ITC Lake Erie has described its specific and broad mitigation measures that would be implemented to address potential effects on biophysical elements, including fish and fish habitat, wildlife, vegetation, and water quality and quantity, as well as measures to address potential effects on traditional use and socio-economic components. The Board notes that these mitigation measures include ITC Lake Erie's commitment to Aboriginal groups to have a construction protocol to address potential adverse environmental impacts on fish and fish habitats in Lake Erie. The Board is of the view that proper and effective implementation of mitigation measures to minimize potential effects to fish and fish habitat is dependent on the judgment of a qualified aquatic specialist. Therefore, to confirm the Company has a qualified aquatic specialist assigned to the Project, the Board imposes **Certificate Condition 26** (Appendix III) requiring ITC Lake Erie to have personnel with appropriate training and qualifications on site to conduct monitoring of water quality during blasting and HDD and provide input on when other mitigation measures for preventing harm to fish are required. Further discussion regarding this matter of aquatic species and habitat is provided in Chapter 7 Environment and Socio-Economic Matters.

The Board notes that the lands required for the Project are currently under active agricultural use or have previously been disturbed for industrial and municipal use and are not currently being used by Aboriginal groups for traditional land use activities.

Based on the specific and broad mitigation measures proposed by ITC Lake Erie, and other factors as noted in these Reasons for Decision as a whole, the Board finds that ITC Lake Erie's proposed mitigation will minimize the potential environmental effects and impacts on the potential use of lands and resources for traditional purposes.

Concluding Comments

The review and final design of a proposed project is, in the Board's view, an iterative process. Should the Project proceed, ITC Lake Erie would be required to continue its consultation with potentially affected Aboriginal groups, and to finalize the development of its plans and measures to reduce and mitigate the potential effects and to protect the environment and the resources that are of importance to and utilized by Aboriginal groups.

The Board is satisfied that with ITC Lake Erie's commitments, its proposed mitigation measures, and with all of the Board's conditions, that the effects on the interests of potentially affected Aboriginal groups can be effectively minimized.

> Having considered the consultation undertaken by the Applicant with Aboriginal groups, the impacts on Aboriginal interests, the proposed mitigation measures, including all the conditions, to minimize adverse impacts on Aboriginal interests and the commitment made by ITC Lake Erie to ongoing consultation with Aboriginal groups, and all relevant and related evidence on the public record, the Board is satisfied that its decision with respect to the Project is consistent with section 35 of the *Constitution Act*, *1982*.

Chapter 6

Land Matters

The *Electricity Filing Manual* sets out the Board's expectations for lands information to support an application for a Certificate under section 58.16 of the NEB Act. Applicants are expected to provide a description and rationale for the proposed route of an IPL, the location of associated facilities, and the permanent and temporary lands required for a project. Applicants are also expected to provide a description of the land rights to be acquired and the land acquisition process, including the status of land acquisition activities. This information permits the Board to assess the appropriateness of the proposed route, land requirements, and the applicant's land acquisition program.

6.1 Project Footprint and Routing

Views of ITC Lake Erie

6.1.1 Haldimand Converter Station

ITC Lake Erie stated that the Nanticoke Transformer Station switchyard was the only feasible point of interconnection on the north shore of Lake Erie that provided an opportunity for a reasonable route and connection across Lake Erie as there are no other 500 kV switchyards along the Lake Erie shore. The Company also stated that it considered two potential converter station locations, one on Riverside Drive and the other on Haldimand Road. ITC Lake Erie stated that the Haldimand Road location was chosen as the preferred alternative due to engineering design and feasibility, economic feasibility and costs, and potential environmental and socio-economic impacts.

ITC Lake Erie further stated that locating the converter station on Haldimand Road is preferred as it aligns with the industrial land-uses encouraged within the Lake Erie Industrial Park, minimizes the distance to the existing Nanticoke Transformer Station switchyard (the point of interconnect to the IESO grid), avoids impact to wetlands and other natural features, minimizes natural resource and community impacts, and maximizes the visual screening/buffering capacity of the site through the use of existing features, topography, and separation distances.

6.1.2 Terrestrial AC and HVDC Cable Routes

ITC Lake Erie stated that the preferred terrestrial AC and HVDC cable routes were selected to minimize environmental and community impacts and, in particular, to align with municipal land-uses encouraged in the Lake Erie Industrial park, avoid impact to natural features located along either Nanticoke Creek and/or the Lake Erie shoreline, minimize potential effects to the local community, including the Hamlet of Nanticoke and Hickory Beach cottages, and minimize potential effects on local utility infrastructure.

ITC Lake Erie stated that the AC cables will connect the Haldimand Converter Station with the Nanticoke Transformer Station switchyard. The Company stated that its preferred route for the AC cables will extend underground east from the proposed Haldimand Converter Station, across Haldimand Road 55, south along the east right-of-way of Haldimand Road 55, east across OPG lands, ending at the Terminal Station where the AC cable will transition from underground to above ground (see Figure 7.2 in Chapter 7 Environment and Socio-Economic Matters). The total terrestrial AC cable route would be approximately 1.3 kilometres. The Company noted that the AC transmission line will then run above ground from the Terminal Station to the Nanticoke Transformer Station switchyard point of interconnection. ITC Lake Erie stated that the final location of the Terminal Station and the point of connection with the Nanticoke Transformer Station switchyard will be confirmed through discussions with OPG and Hydro One.

ITC Lake Erie stated that the preferred underground HVDC cable route will extend approximately 1.3 kilometres from the proposed Haldimand Converter Station site, along the east right-of-way of Haldimand Road 55, to the shoreline of Lake Erie (the Canadian landfall point). The cable will enter under the shoreline into the waters of Lake Erie, and then be buried in the lakebed and cross Lake Erie to the landfall point in Pennsylvania (see Figure 7.1 in Chapter 7 Environment and Socio-Economic Matters).

ITC Lake Erie stated that the location of the HDD temporary construction work and the HVDC cable installation will be in close proximity to two parcels of private land on the Lake Erie shore immediately west of Haldimand Road 55, and will result in temporary closure of a portion of Haldimand Road 55 and/or the eastern entrance to Hickory Beach Lane. ITC Lake Erie stated that geotechnical investigations are being carried out to determine the final HDD drilling path and exit point, and that when these are confirmed (anticipated in Q3 2017), a more defined route and bedrock trenching area for blasting can be determined within the indicated trenching area. The Company further stated that based on the results of recent geotechnical investigations, the anticipated bedrock trenching area for blasting is expected to be approximately 2 metres wide. Additional information on HDD and geotechnical considerations are provided in Chapter 3 Facilities and Emergency Response Matters.

ITC Lake Erie stated that the majority of both the terrestrial AC and HVDC transmission lines will be installed within a plowed agricultural field, the current right-of-way of Haldimand Road 55 (including areas currently occupied by the road bed and roadside ditch), and on disturbed areas alongside an access road on OPG lands near the Nanticoke Transformer Station switchyard. The Company further stated that the temporary construction work areas for cable installation will be located within the existing Haldimand Road 55 right-of-way.

6.1.3 In-water HVDC Cable Route

ITC Lake Erie stated that the preferred HVDC cable landfall location and preferred in-water cable route were selected to:

- minimize distance to the existing Nanticoke Transformer Station switchyard;
- avoid potential effects to wetlands, natural features, shoreline, and the nearby community;

- avoid impacts to aquatic habitat in Lake Erie (such as potential fishery and spawning areas); and
- avoid and minimize impacts on the shoreline, shipping traffic, fishing activity, and potential damage to the HVDC cable from ice scour and anchor drag during cable installation and operation.

The Company also stated that the preferred HVDC cable landfall location was selected to avoid potential archaeological and cultural heritage resources, such as shipwrecks located on the lakebed, and minimize pipeline crossings by the HVDC cable.

ITC Lake Erie stated that the preferred in-water cable route will extend 46.8 kilometres across Lake Erie from the Canadian landfall location to the US/Canada border. The Company noted that the HVDC transmission cables will transition from the landfall location into Lake Erie via HDD installation and that the in-water transmission cables will be sited to maximize operational reliability and minimize cost and potential environmental impact from construction, operation, and maintenance.

ITC Lake Erie indicated that its in-water HVDC cable route will be within a 100 metre corridor. The Company noted that over the majority of the route, the routing boundary is offset 50 metres to each side of the proposed route, and at the Canadian landfall, the routing boundary covers the range of potential HDD end points. ITC Lake Erie stated that pipelines are crossed by the Canadian portion of the Proposed Route, ranging in size from approximately 5 to 15 centimetres in diameter. The Company stated that three pipelines are charted and the approximate locations of these pipelines were known prior to the geophysical survey. ITC Lake Erie also stated there is a suspected water intake pipe that will be crossed by the Canadian portion of the Proposed Route (see Chapter 8, Infrastructure and Economy).

Views of Participants

No evidence or comments about ITC Lake Erie's Project footprint or routing were filed by Participants.

6.2 Land Requirements, Rights, and Acquisition

Views of ITC Lake Erie

6.2.1 Haldimand Converter Station

ITC Lake Erie stated that the Haldimand Converter Station and associated facilities will be located on a 15.5 hectare parcel of private property in Haldimand County. ITC Lake Erie stated that the Haldimand Converter Station site will be used for staging and laydown activities during the construction of the Haldimand Converter Station and the installation of the HVDC and AC cables. The Company noted that an access roadway will be completed to facilitate equipment deliveries, construction worker movement and worker parking.

ITC Lake Erie stated that it started its acquisition of permanent private land tenure for the construction and operation of the proposed Haldimand Converter Station and a portion of the AC and HVDC cable routes in July 2014. The Company stated that these lands are currently under an option to purchase and will be acquired by exercising the option.

6.2.2 Terrestrial AC and HVDC Cable Routes

ITC Lake Erie stated that the majority of the terrestrial AC and HVDC transmission lines will be installed within the eastern side of the current Haldimand Road 55 right-of-way. The company stated that a trench approximately 1 metre wide will be required for the AC and HVDC cables. ITC Lake Erie stated that the AC and HVDC cable segments will be jointed together in joint pits, which will be approximately 2 metres wide, 10 metres long, and 2 metres deep. ITC Lake Erie stated that the temporary construction area required in the Haldimand Road right-of-way will be approximately 15 metres wide for the length of the route where both the AC and HVDC cables occupy the right-of-way, as well as for the separate AC and HVDC routes. The Company noted that this right-of-way will accommodate the AC and HVDC cable joint working areas, as well as the working area for a jack and bore receiving pit for the AC cable installation under the railway spur lines on the OPG lands. ITC Lake Erie further noted that construction lay-down areas on the Haldimand Converter Station site will also be used, as necessary, to support the cable installation process.

ITC Lake Erie stated that it is seeking an agreement from Haldimand County to occupy lands required for the terrestrial HVDC and AC cable alignment within the existing Haldimand Road 55 right-of-way, including temporary workspace. ITC Lake Erie further stated that Haldimand County has been supportive of positioning the cable alignment along the east side of the road right-of-way, and that this agreement is expected to be executed prior to the release of the Board's decision.

ITC Lake Erie stated that a portion of the AC cable will be installed underground across OPG lands, ending at the Terminal Station. The company stated that a permanent easement of approximately 15 metres in width will be sought for the length of the AC cable on OPG lands, and a permanent easement of approximately 36 metres by 26 metres will be sought for the Terminal Station. ITC Lake Erie stated that it is pursuing a permanent easement on these lands, as well as lands for temporary workspace. The Company submitted that Hydro One will install and own the transmission infrastructure from the terminal station to the Nanticoke Transformer Station switchyard point of interconnection. ITC Lake Erie stated that it is coordinating with Genesee & Wyoming Railroad Services, Inc., the owner of the rail tracks located on OPG's property, to obtain a rail crossing agreement.

ITC Lake Erie noted that to accommodate HDD installation of the in-water HVDC cable, a temporary construction work area of approximately 30 metres wide by 46 metres long will be required within the Haldimand Road 55 right-of-way, at the entrance of Hickory Beach Lane, in close proximity to two parcels of private land. ITC Lake Erie stated that on 10 August 2015 it acquired one of the two parcels of land immediately to the west of the terminus of the HDD installation of the HVDC cable under the Lake Erie shoreline. The Company stated that it is considering options to purchase the other parcel of land.

6.2.3 In-water HVDC Cable Route

ITC Lake Erie stated that the land located along the Lake Erie shoreline, which appears to be largely submerged, is not currently in use and the current registered owner deceased. The Company stated it is attempting to locate and contact the heirs of the deceased owner to discuss the necessary easements. ITC Lake Erie stated that if it is unable to contact the heirs and obtain the necessary easement, the Company intends to utilize the powers available to it under sections 87 to 107 of the NEB Act to acquire rights to the land. ITC Lake Erie stated it will also work with MNRF to determine if the submerged shoreline lands have reverted to Crown ownership, in which case the property will be covered by the rights obtained from MNRF.

ITC Lake Erie stated that it is seeking permanent easement for lands occupied by the in-water HVDC cable, based on the as-built cable alignment, in accordance with the MNRF land disposition process. The Company submitted that interim occupational authority will be sought to allow for installation of the HVDC cable. ITC Lake Erie stated that preliminary discussions between the Company and MNRF have begun with respect to the three-year land use permit and the required easements. ITC Lake Erie stated that if the Project is approved, it will submit an application to MNRF for the land use permit. In the event that a major repair of the HVDC cable is required due to damage or a break in the cables, the ITC Lake Erie plans to request that the easement agreement include a clause that will allow for occupancy of an additional width of up to 120 metres for the position of the underwater joint required for the cable repair.

ITC Lake Erie stated that while lands required for the in-water cable route are administered by MNRF there is one existing leaseholder, Dundee, which owns and operates underwater natural gas pipelines within the leasehold along the in-water HVDC cable route. The Company stated that it has engaged with Dundee regarding the in-water HVDC cable installation and is negotiating a crossing agreement.

6.2.4 General

ITC Lake Erie stated it has proceeded to develop and enter into land acquisition agreements including options to purchase and for the necessary easements, as described above. The Company noted that the form of these agreements is generally in the form required by subsection 86(2) of the NEB Act, including:

- provisions for compensation for the acquisition of the lands, or in the case of easements, recurring payments over the period of the agreement;
- terms of renewal for easement agreements; compensation for damages as appropriate;
- indemnification clauses; and
- restrictions on use of the lands.

The Company further noted that additional terms and conditions for the occupancy and/or easement agreements, as requested by OPG, Haldimand County and the MNRF respectively, may be included.

ITC Lake Erie stated that should the Project be approved it will, as necessary, file the plan, profile, book of reference for the power line, and that it is the intent of ITC Lake Erie to acquire the land rights from all parties as identified above prior to NEB approval. The Company noted that a subsection 87(1) of the NEB Act notice will describe the procedure for approval of the detailed route of the Project. In the event that land rights are not acquired in advance of any Board approval being given, ITC Lake Erie stated it will serve notices pursuant to the requirements of subsection 34(1) of the NEB Act, as appropriate, on those landowners from which land rights have not been acquired.

Views of the Parties

Haldimand County

Haldimand County stated in its ATP that its preference would be for ITC Lake Erie to site the cable wholly within the Haldimand Road 55 road allowance. The County submitted that doing so would be the simplest solution as no easement would be required to be registered. The County stated that it may also support having the easement extending beyond the road allowance on to the easterly boundary of the lands owned by Haldimand County. The County stated that the road use matters will require the execution of a land use agreement.

> ***Views of the Board***
>
> The Board is of the view that ITC Lake Erie's anticipated requirements for permanent and temporary land rights, and ITC Lake Erie's process for the acquisition of these land rights is reasonable. The Board is also of the view that the terrestrial and in-water routes proposed by ITC Lake Erie are acceptable. The Board notes that ITC Lake Erie will reduce adverse Project impacts by utilizing the existing right-of-way to the extent possible.
>
> In the event that a Certificate is issued for the Project, ITC Lake Erie will be required to prepare a plan, profile and book of reference that depicts the proposed detailed route. As noted in Section 3.3.3.4, the Board imposes **Certificate Condition 15** (Appendix III) requiring that all infrastructure facilities to be crossed by the Project are identified and that all agreements and crossing permits are in place**.**

Chapter 7

Environment and Socio-Economic Matters

Under the NEB Act, the Board considers environmental protection as a component of the public interest. When making its decision, the Board is responsible for assessing the environmental and socio-economic effects of the Project throughout the life of the Project. This chapter represents the Board's environmental assessment. While this Project is not a designated CEAA project under the *Regulations Designating Physical Activities, 2012*, the Board's environmental and socio-economic assessment does include an evaluation of the significance of environmental and socio-economic effects.

7.1 The NEB's Environmental Assessment Methodology

In assessing the environmental and socio-economic effects of the Project, the Board used an issue-based approach as set out in the *Electricity Filing Manual*.

This assessment begins with: (a) a description of the Project (Section 7.2), (b) a description of the setting and the environmental and socio-economic elements within that setting (Section 7.3), and (c) a summary of those environmental and socio-economic concerns raised by participants (Section 7.4). Based on these, the Board identified Project–environment interactions expected to occur (Section 7.5; Table 7.2). If there were no expected Project–environment interactions or interactions were expected to be positive or neutral then no further examination was deemed necessary.

The Board assesses the potential adverse environmental and socio-economic effects, as well as the adequacy of ITC Lake Erie's proposed environmental protection strategies and mitigation measures (Section 7.5). Section 7.5.3 discusses the extent to which standard mitigation is relied on to minimize potential adverse effects. In Section 7.5.4, the Board provides detailed analysis for issues that are of public concern or of environmental consequence, and that may require additional mitigation. For each issue considered in detail, Views of the Board are provided and the Board assesses whether further mitigation is required by way of conditions on any Project approval. Where there are any residual effects remaining after proposed mitigation, cumulative effects are considered in Section 7.6. The Board's conclusion on the significance of environmental effects of the Project is given in Section 7.7.

7.2 Project Location and Details

The Canadian portion of the Project is located both on land (terrestrial route) and within the waters of Lake Erie (in-water route).

The terrestrial route begins at the proposed Haldimand Converter Station site near the hamlet of Nanticoke in Haldimand County, Ontario (see Figures 7.1 through 7.4). The converter station would consist of a main building (converter hall) housing HVDC converter modules and a

service building to house control and protection equipment, cooling equipment, and auxiliary distribution panels. The facility would also have an emergency generator. Security fencing would surround the Haldimand Converter Station area. The terrestrial HVDC cables would be installed underground, extending east from the Converter Station, across Haldimand Road 55, and then south along the east right-of-way of Haldimand Road 55 for approximately 1.3 kilometres to the Lake Erie landfall point. The AC cables would parallel the HVDC cables up to a point of entry onto OPG lands, within the Nanticoke Terminal Station switchyard.

The in-water route traverses the lakebed of Lake Erie, extending approximately 46.8 kilometres across Lake Erie to the Canada/United States border within Lake Erie. The shoreline beach bluff and nearshore lakebed are unsuitable for jet plow installation. Consequently an approximately 609 metre portion of the in-water route would be installed via HDD, to a water depth of approximately 5 metres. From the offshore (south) end of the HDD section, approximately 1.6 kilometres of the HVDC cable would be installed via open trench. The open trench would be created by low-intensity blasting in the bedrock in water depths from 5–10 metres. Approximately 44.6 kilometres (95 per cent) of the Canadian portion of the HVDC cable would be buried in fine-grained lake sediments using either a jet plow deployed from a self-propelled barge or through water jetting via post-lay burial by a Remote-Operated Vehicles (ROV).

Chapter 1.1 of the Board's Reasons for Decision provides a general description of the Project. The following table provides further details on Project components and activities relevant to the environmental assessment.

Table 7.1 Project Components and Activities

Project Components and Activities
• Haldimand Converter Station (7.5 hectares) • Terrestrial underground 500 kV AC Cable and ±320 kV HVDC Cable (1.3 kilometres) • In-water ±320 kV HVDC Cable (46.8 kilometres)
Construction Phase Activities
Construction of Haldimand Converter Station – 6-12 months • Clearing, grading, site preparation – 7.5 hectare site • Construction of converter station – 110 metre by 35 metre converter hall that is 18 metres tall; service building (all components designed and constructed in accordance with appropriate standards and guidelines including those of the IEC and CSA) • Clean up and reclamation/landscaping *Installation of 1.3 kilometres of Terrestrial 500 kV AC and ±320 kV HVDC Cables – 5-6 months* • Clearing and right-of-way preparation • Trenching • Cable laying and backfilling • Clean up and reclamation

Project Components and Activities

- Approximately 1 metre wide trenches for AC and HVDC cables
- Approximately 15 metre wide permanent easement for terrestrial AC and HVDC cables

HDD Installation of ±320 kV HVDC Cables for 609 metres under shoreline and nearshore of Lake Erie – 3-14 months

- Boring
- Blasting
- Approximately 30 metre by 46 metre temporary work area for HDD equipment on land

Installation of ±320 kV HVDC Cables for 1.6 kilometres via blasting of nearshore trench in Lake Erie – 3-14 months

- Blasting 2 metre wide trench in the nearshore bedrock of Lake Erie from HDD exit point to approximately kilometre post 3.5, progressing at a rate of approximately 12-15 metres per day

Installation of approximately 45 kilometres of in-water ±320 kV HVDC Cables – 6 months

- Installation via jet plow and post-lay burial of cable by water jetting using ROVs at a rate of approximately 1.5 to 2 kilometres per day
- Approximately 2 metre wide trenches for in-water HVDC cables
- Approximately 30 metre wide permanent easement for in-water HVDC cables

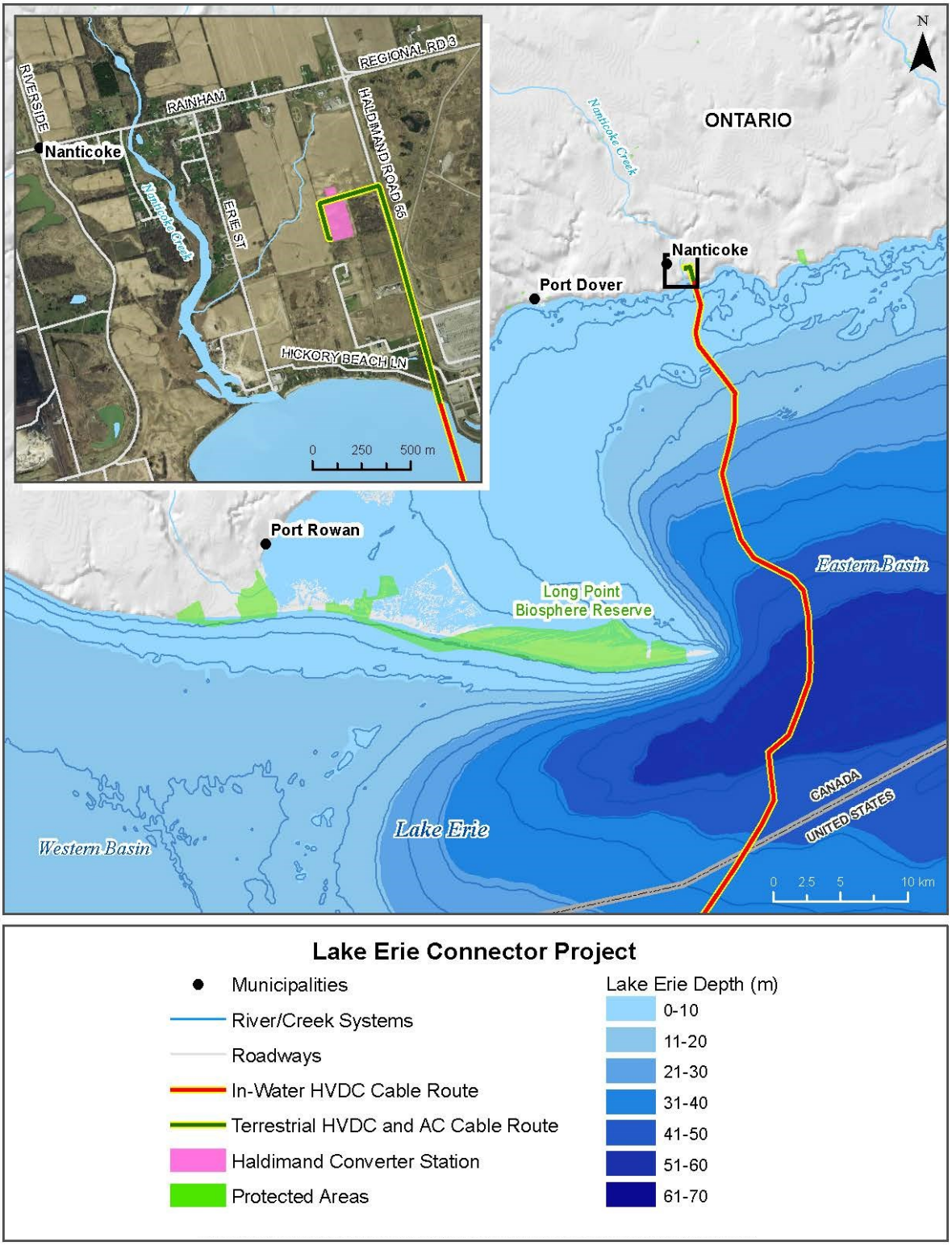
Operation Phase Activities– Service life of the Project: minimum 30 years

- Routine maintenance – periodic, scheduled shut-downs of the Haldimand Converter Station for equipment inspections, testing and replacement; regular vegetation management at converter station site; periodic, scheduled start-up of the emergency generator
- Damage repair – in-water HVDC cables would be lifted from the lakebed to the surface for repair; terrestrial cables would be exposed for repair

Abandonment Phase – At the end of the service life of the Project

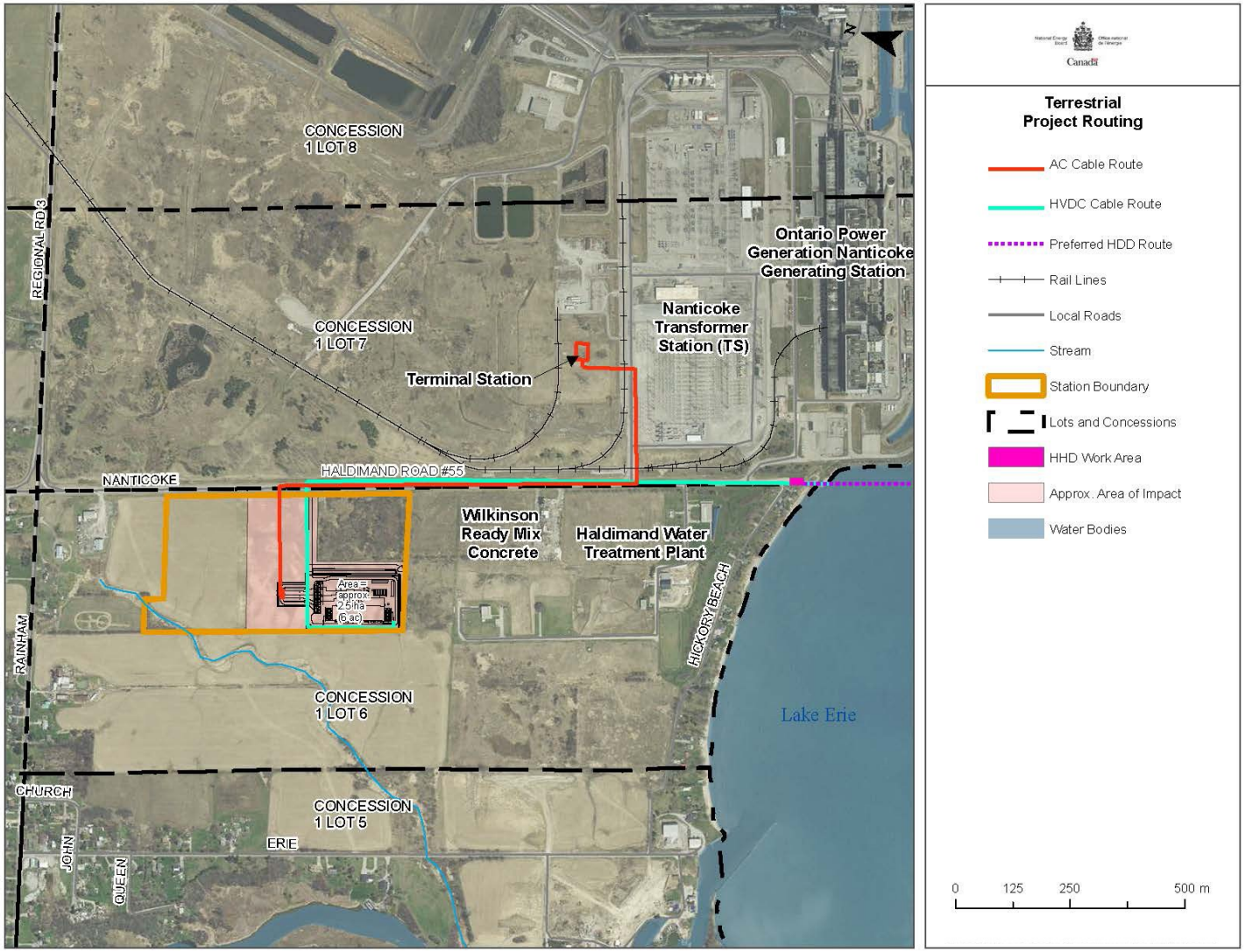
Pursuant to the NEB Act, an application would be required to abandon the facilities, at which time the environmental effects would be assessed by the NEB.

Figure 7.1 Map of Project Cable Route and Haldimand Converter Station



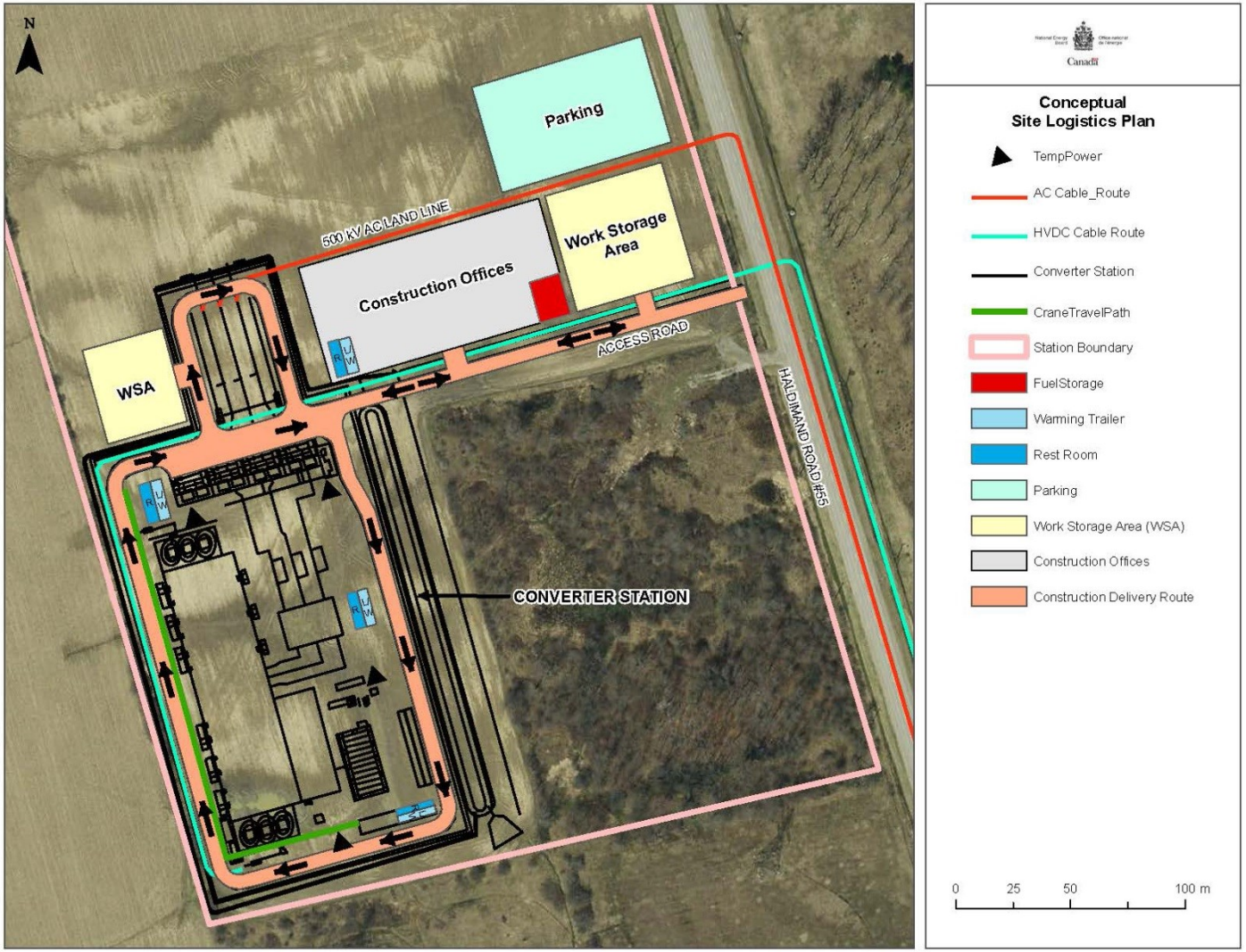
Map produced by the NEB, August, 2016. The map is a graphical representation intended for general informational purposes only.

Figure 7.2 Map of Project Terrestrial Route



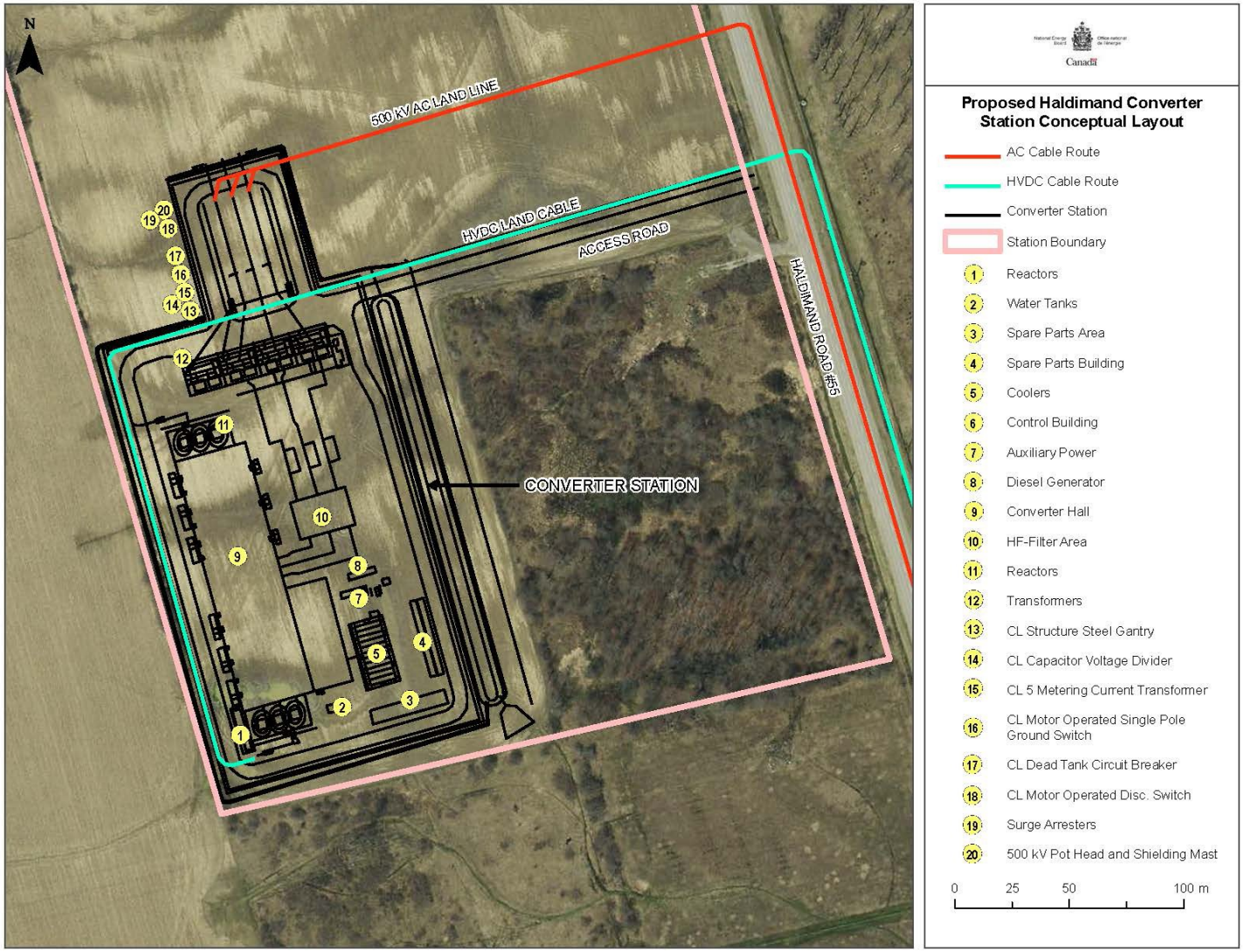
Map produced by the NEB, September 2016. The map is a graphical representation intended for general informational purposes only.

Figure 7.3 Site Logistics Plan for Construction of Haldimand Converter Station



Map produced by the NEB, September 2016. The map is a graphical representation intended for general informational purposes only.

Figure 7.4 Conceptual Layout of Haldimand Converter Station



Map produced by the NEB, September 2016. The map is a graphical representation intended for general informational purposes only.

7.3 Environmental Setting

ITC Lake Erie set out the information in this section in its evidence filed on the public record.

7.3.1 Land and Human Occupancy and Resource Use

7.3.1.1 Terrestrial

The current landscape is a mix of rural, agricultural, residential, commercial, and light and heavy industrial land uses. The terrestrial portion is within the Industrial Influence Area of the Lake Erie Industrial Park and zoned to include both light and heavy industry. Major occupants of the Lake Erie Industrial Park include OPG's Nanticoke Generating Station (which recently ceased operation) to the east, the U.S. Steel Canada Lake Erie Works to the west, the Esso Imperial Oil refinery to the north-east, and the Haldimand County Water Treatment Plant to the south.

The Haldimand Converter Station would be located on private land and is currently tilled. The site is currently designated and zoned Agricultural but falls under the *Site Specific Policies* of the Haldimand County Official Plan which permits industrial and/or specific commercial purposes. The terrestrial cable route is physically located between agricultural and industrial (OPG Nanticoke Generating Station) land uses.

According to the 2011 census, Haldimand County had a population of approximately 44,875 people. Within a 1 kilometre radius of the Haldimand Converter Station site, which includes most of the Hamlet of Nanticoke, there are approximately 175 to 250 residents, and approximately 90 residential properties, a few of which are working farms. Many of the residential properties are located on Hickory Beach Lane along the shore of Lake Erie (see Figure 7.2). This 1 kilometre radius also includes four recreational areas. There are some small commercial properties along Haldimand Road 55 to the north and south of the Haldimand Converter Station.

7.3.1.2 In-water

The entire length of in-water HVDC cable route within the Canadian waters is provincial Crown land administered by MNRF.

There are both commercial and recreational fisheries in Lake Erie. The Town of Port Dover (approximately 12 kilometres west of the in-water HVDC cable route) has a large marina, the Port Dover Harbour Marina, and is home to large commercial fishing operations. The Hoover Marina, located in Nanticoke Creek (approximately 1 kilometre west of the in-water HVDC cable route), is used primarily for recreational fishing and boating.

Lake Erie is a part of the commercial shipping routes through the Great Lakes. Designated shipping lanes are located in the Canadian nearshore to the Nanticoke Generating Facility and the U.S. Steel Canada terminal. The central Lake Erie shipping lanes are part of the main Great Lakes shipping route.

There are gas pipelines present on the lakebed. The Project cable route would cross pipelines ranging from 5 to 15 centimetres in diameter. Two of which are natural gas pipelines that are active.

A water intake structure is located on the lakebed and may be crossed by the Project cable route

7.3.2 Physical Environment and Soils

7.3.2.1 Terrestrial

There is no potential for mudflows, landslides, or subsidence in the terrestrial study area. Groundwater flows southward toward Lake Erie and west toward Nanticoke Creek. No watercourse crossings are required. The Lake Erie shoreline consists of exposed bedrock which extends 2 kilometres into Lake Erie.

Soils within the Haldimand Converter Station site range from silty clay to clayey silt, and are not highly susceptible to wind or water erosion, soil compaction, or loss of structure.

7.3.2.2 In-water

The in-water portion of the cable route is located in the eastern basin of Lake Erie, from shoreline to water depths up to 64 metres.

The eastern basin of Lake Erie is a depositional environment with the potential for thicker fine-grained sediments. Surficial geology ranges from bedrock in the nearshore and shoreline to post-glacial sediments up to 4 metres deep at approximately 8.5 kilometres from landfall.

The sediments in the Great Lakes generally represent a primary sink for contaminants, and can act as a source through re-suspension and subsequent redistribution. Sediments in various parts of Lake Erie are contaminated with varying levels of cadmium, mercury, and other trace metals. Concentrations of both mercury and polychlorinated biphenyls are higher in deeper water where fine sediments are more common (coarser sediments are more prevalent in shallower shoreline areas).

The Long Point Escarpment, a unique geologic feature, has a relief of 15 to 20 metres and extends longitudinally east–west for approximately 50 kilometres along the lakebed. The proposed in-water HVDC cable route is more than 700 metres away from the Escarpment area. The escarpment reportedly has a variable cover of silt and clay.

There is no evidence of mass movements such as slumping or sliding within Lake Erie. There is low potential for seismic events.

The eastern basin rarely freezes over but is often covered in drift ice. Relatively large ice features whose keels can scour the lake bottom in water depths up to 25 metres, can create sediment deformations to approximately 2-metre depths. A number of ice scour related features have been identified within the in-water route corridor.

Predictions for the potential change in water levels in Lake Erie as a result of climate change are variable, and suggest a possible 1 to 2 metres decline in water levels over the next 70 years, along with dramatic seasonal fluctuations in water levels.

7.3.3 Vegetation

7.3.3.1 Terrestrial

The Haldimand Converter Station site would be located on agricultural land that is actively tilled.

A wooded area of 5.5 hectares is located adjacent to the proposed Haldimand Converter Station site. The wooded area has wetlands in low-lying areas. No clearing of the wooded area would take place for construction of the Project.

Plant species at risk with the potential to occur in the Project area include butternut (*Juglans cinerea*; listed as Endangered on Schedule 1 of the *Species At Risk Act*), common hoptree (*Ptelea trifoliata*; Schedule 1 Threatened), and eastern flowering dogwood (*Cormus florida*; Schedule 1 Endangered). However, none of these species, nor any vascular plant species regulated under the Ontario *Endangered Species Act* or the federal *Species At Risk Act*, were observed during the field investigation.

No significant vegetation communities have been identified along the cable routes.

7.3.3.2 In-water

Aquatic vegetation along the Lake Erie shoreline is scarce in proximity to the Project because of frequent high-energy wave action and the presence of exposed shale bedrock. Bedrock substrates generally preclude the growth of submerged aquatic vegetation.

7.3.4 Wetlands

Wetlands including deciduous swamp, thicket swamp, meadow marsh, and shallow marsh are located within the woodlot adjacent to the southeast corner of the Haldimand Converter Station site, but are not expected to be cleared or altered physically by the Project.

7.3.5 Water Quality and Quantity

7.3.5.1 Terrestrial

Nanticoke Creek is located approximately 750 metres west of the Haldimand Converter Station site and is a warm-water fishery with an associated Provincially Significant Wetland complex. A tributary swale of Nanticoke Creek is located northwest of the Haldimand Converter Station footprint, and would not be disturbed during construction.

The majority of the proposed Haldimand Converter Station site drains south toward Lake Erie, with some drainage westward to Nanticoke Creek.

7.3.5.2 In-water

Lake Erie receives about 90 per cent of its inflow from the three upper Great Lakes (Lake Superior, Lake Michigan, and Lake Huron) via connecting waterways from southern Lake Huron. Overflow from Lake Erie's eastern basin drains via the Niagara River into Lake Ontario.

Over the past century, the Great Lakes have undergone dramatic changes in water quality, chemistry, flora, and fauna. Discharges of liquid and solid waste from industrial, agricultural, and domestic sources have introduced toxic substances, including heavy metals, into Lake Erie. Approximately 50 per cent of all lead entering Lake Erie comes from atmospheric deposition.

The Great Lakes Water Quality Agreement (1978), signed by Canada and the US, began an extensive binational effort to reduce sources of pollution to Lake Erie, including bans on sale of phosphate detergents, improvements in organic waste collection and treatment systems, and reduction in industry discharges.

7.3.6 Wildlife and Wildlife Habitat

7.3.6.1 Terrestrial

The proposed Haldimand Converter Station would be located on tilled agricultural land, and surrounded by agricultural land, roadside ditches, and a small woodlot. The terrestrial cable route would be located in roadside ditches along Haldimand Road 55.

Many migratory bird species have the potential to occur in the area and some may nest in appropriate habitat. A total of 55 wildlife species were documented within the site of the proposed Haldimand Converter Station during field investigations.

Selkirk Provincial Park is located 11 kilometres east of the Project and Turkey Point Provincial Park is located 13 kilometres to the west. Long Point National Wildlife Area, one of the largest bird and waterfowl migration and staging areas in North America, is located within a designated UNESCO Biosphere Reserve approximately 40 kilometres to the west of the Project's HVDC cable landfall location on the shoreline of Lake Erie.

7.3.7 Aquatic Species and Habitat

7.3.7.1 In-water

Lake Erie is the only water body that occurs within the Project footprint. The fishes of Lake Erie are a mixture of cold- and warm-water species. Both recreational and commercial fishing occur in Lake Erie.

There are 37 fish species that may occur in Lake Erie, including Silver Chub, a species of minnow that has suffered population decline in Lake Erie (the Great Lakes–Upper St. Lawrence population of Silver Chub is listed as Special Concern on the *Species At Risk Act* Schedule 1). The Project work proposed would occur outside of the current distribution of Silver Chub.

Fish communities in Lake Erie have been drastically altered over the past 150 years by a series of stresses imposed by human activity, such as intensive and selective commercial fishing, watershed and shore erosion, nutrient loading, introduction of invasive species, stream destruction and marsh drainage.

The fisheries of Lake Erie are managed cooperatively by agencies of Michigan, New York, Ohio, Pennsylvania, and Ontario through the Lake Erie Committee, established under the Great Lakes Fishery Commission.

Review of the side-scan sonar conducted during the detailed route assessment revealed what are interpreted to be beds of quagga mussels, an invasive species, near the Long Point Escarpment.

7.3.8 Atmospheric and Acoustic Environment

There are existing receptors for potential air and acoustic emissions to the north (residences and businesses along Rainham Road), west (residences along Erie Street), and south (businesses and industry along Haldimand Road 55 and residences along Hickory Beach Lane) of the Project.

Noise in Lake Erie within the Project area is generated by natural sources, such as wind and wave activity, and by boat, shipping, and barge traffic.

7.3.9 Heritage Resources

7.3.9.1 Terrestrial

There were no previously registered archaeological sites within the area for the proposed Haldimand Converter Station. However, a review of the historical and archeological contexts of the study area suggests there is potential for Aboriginal and Euro-Canadian archaeological resources within the proposed property and four previously registered archaeological sites are located within 1 kilometre of the proposed Haldimand Converter Station.

A Stage 2 archaeological assessment was conducted on the proposed Haldimand Converter Station site, with one site (P2) meeting the threshold requirements for a Stage 3 archaeological assessment. The Stage 3 archaeological assessment determined that site P2 is considered to have significant cultural heritage value and/or interest, but that due to the location of the site within the Haldimand Converter Station site, avoidance and protection of the site is not a viable option. A Stage 4 excavation mitigation of developmental impacts was planned to be complete and filed with the Ontario Ministry of Tourism, Culture and Sport and the National Energy Board by 30 September 2016, but has been delayed by weather and is now expected to be filed in mid-November 2016.

7.3.9.2 In-water

Archaeological assessments on the in-water HVDC cable route were conducted. A Stage 1 assessment demonstrated that the study area possessed potential for the recovery of Aboriginal and Euro-Canadian archaeological resources, and that according to the Ontario Archaeological Sites Database, no previously registered archaeological sites are located within 1 kilometre of the in-water HVDC cable route. No known shipwrecks are within 500 metres of the in-water HVDC cable route. A Stage 2 Lake Erie Archaeological Assessment of the in-water HVDC cable route was carried out and found that a Stage 3 assessment was not required.

7.3.10 Traditional Land and Resource Use

The Project site falls within the traditional territories of the Mississaugas of the New Credit First Nation (MNCFN) and the Six Nations of the Grand River, located approximately 21 and 30 kilometres from the Project respectively.

While the location of the Project falls outside the boundaries of the Haldimand Tract, being lands that are subject to several on-going land claims disputes initiated by the Six Nations of the Grand River, the Project falls within the boundaries of the 1701 beaver hunting grounds according to the 1701 Nanfan Treaty, which covers virtually all of southern Ontario.

Aboriginal groups engaged have not identified any specific current traditional land uses in proximity to the Project.

7.3.11 Navigation and Navigation Safety

Lake Erie is a navigable waterbody used extensively for recreational and commercial fishing, boating and shipping. The Port Dover Marina and Hoover Marina are located approximately 12 kilometres and 1 kilometre west of the in-water HVDC cable route, respectively.

Designated shipping lanes are located in the Canadian nearshore to the Nanticoke Generating Facility and the U.S. Steel Canada terminal. The central Lake Erie shipping lanes are part of the main Great Lakes shipping route. The depth of the shipping channel at the HVDC in-water cable route crossing is approximately 10 to 11 metres.

7.4 Environmental Issues of Concern

The Board received Letters of Comment from two Participants that raised particular concerns related to environmental issues.

Views of the Parties

Environment and Climate Change Canada (ECCC)

ECCC filed a Letter of Comment on the Project, providing advice and recommendations related to its mandated responsibilities. ECCC's comments relate to migratory birds, species at risk, water quality, air quality and greenhouse gases (GHGs). ECCC suggests that if species at risk are

encountered, the local MNRF District Office should be contacted. ITC Lake Erie has committed to this in its draft EPP (Wildlife Encounter and Species of Concern Discovery Contingency Plan). Mitigation for migratory birds and GHGs are discussed further in Tables 7.6 and 7.7 respectively.

Health Canada

Health Canada also filed a Letter of Comment on the Project, providing advice and recommendations related to its mandated responsibilities. In its Letter of Comment, Health Canada expressed concerns related to mitigation for water quality, noise and air quality impacts on human health. ITC Lake Erie responded to Health Canada's concerns in its response to IR No. 4. Overall, ITC Lake Erie's response acknowledged Health Canada's concerns and explained how the issues would be addressed to meet regulatory requirements and industry standards.

Sections 7.5 to 7.7 constitute the Board's environmental assessment and include the Views of the Board.

7.5 The Board's Environmental Effects Analysis

Based on the description of the Project (Section 7.2), the setting and the environmental and socio-economic elements within that setting (Section 7.3), and the environmental and socio-economic concerns raised by participants (Section 7.4), the Board identified Project-environment interactions expected to occur (Section 7.5, Table 7.2 below). If there were no expected Project–environment interactions, or interactions were expected to be positive or neutral, then no further examination was deemed necessary.

7.5.1 Interactions and Potential Adverse Environmental Effects

The table below identifies the expected interactions between the Project and the environment, and the potential adverse environmental effects resulting from those interactions.

Table 7.2 Project - Environment Interactions

	Environmental Element	Description of Interaction (or Why No Interaction is Expected)	Potential Adverse Environmental Effect	Mitigation Discussed in:
Bio-Physical	Physical Environment	• Clearing, grading, construction of Haldimand Converter Station; clearing, trenching and backfilling of terrestrial HVDC cable • Installation of HVDC cable in Lake Erie lakebed via jet plow and water jetting by ROV • Installation of HVDC cable under shoreline and near shore via HDD	• Altered drainage patterns at proposed Haldimand Converter Station site • Disturbance of lakebed sediments and terrain • Alteration of geology and stratigraphy along cable route	• Standard Mitigation (Section 7.5.3)
	Soil and Soil Productivity	• Clearing, grading, construction of Haldimand Converter Station; clearing trenching and backfilling of terrestrial HVDC cable • Installation of HVDC cable in Lake Erie lakebed via jet plow and water jetting • Installation of HVDC cable under shoreline and near shore via HDD	• Loss of soil and/or decrease in soil quality as a result of: o soil compaction, admixing, erosion during construction and trenching o potential for inadvertent returns of drilling fluids during HDD o localized increase in soil temperature from underground AC and HVDC cables o disturbance of lakebed sediments	• Standard Mitigation (Section 7.5.3)

	Environmental Element	Description of Interaction (or Why No Interaction is Expected)	Potential Adverse Environmental Effect	Mitigation Discussed in:
	Vegetation	• Clearing during construction of Haldimand Converter Station and trenching of terrestrial HVDC cable • Installation of HVDC cable in Lake Erie lakebed via jet plow and water jetting • Installation of HVDC cable under shoreline and near shore via HDD • Decommissioning of Haldimand Converter Station	• Disturbance of aquatic vegetation • Removal of terrestrial vegetation • Introduction and/or spread of weeds (terrestrial)	• Standard Mitigation (Section 7.5.3) • Table 7.5
	Water Quality and Quantity	• Clearing, construction of Haldimand Converter Station; clearing, trenching of terrestrial HVDC cable • Installation of HVDC cable in Lake Erie lakebed via jet plow and water jetting • Installation of HVDC cable under shoreline and near shore via HDD and blasting a nearshore trench	• Potential reduction in terrestrial water quality as a result of sedimentation and runoff from construction activities • Temporary reduction in water quality of Lake Erie as a result of: o inadvertent returns of drilling fluid from HDD o resuspension of contaminated lakebed sediments	• Standard Mitigation (Section 7.5.3)
	Aquatic Species and Habitat	• Installation of HVDC cable in Lake Erie lakebed via jet plow and water jetting by an ROV • Installation of HVDC cable under Lake Erie shoreline and near shore via HDD and open trench	• Change in fish abundance and loss of fish habitat from: o inadvertent returns of drilling fluid from HDD o change in fish and fish habitat from blasting of HDD exit hole and nearshore trenching	• Standard Mitigation (Section 7.5.3) • Table 7.4

	Environmental Element	Description of Interaction (or Why No Interaction is Expected)	Potential Adverse Environmental Effect	Mitigation Discussed in:
		• Operation of HVDC cable • Electromagnetic field generated by in-water HVDC cables during operations • Maintenance and/or repair of HVDC cable	○ resuspension of contaminated lakebed sediments during installation of HVDC cable by jet plow and/or water jetting • Change in fish movement as a result of electromagnetic field created by HVDC cable • Change in aquatic species abundance (e.g., fish and invertebrates) from changes in water temperature around the HVDC cable • Change in fish and fish habitat during operations from repair of HVDC cable (cable would be lifted from the lakebed for repair) and removal of HVDC cable at decommissioning	
	Wetlands	• No wetlands occur within the Project footprint or cable route	• Change in wetland water quality and hydrological functions is possible if runoff/sediment reach wetlands in the wooded area east of the Haldimand Converter Station site	• Standard Mitigation (Section 7.5.3)

	Environmental Element	Description of Interaction (or Why No Interaction is Expected)	Potential Adverse Environmental Effect	Mitigation Discussed in:
	Terrestrial Wildlife and Wildlife Habitat	• Clearing, construction of Haldimand Converter Station; clearing, trenching of terrestrial HVDC cable • Installation of HVDC cable in Lake Erie lakebed via jet plow and water jetting • Installation of HVDC cable under shoreline and near shore via HDD • Electromagnetic field generated by buried terrestrial AC and HVDC cables during operations • Decommissioning of Haldimand Converter Station	• Reduction in wildlife habitat availability • Increased wildlife mortality risk • Reduced wildlife movement • Reduced wildlife abundance	• Standard Mitigation (Section 7.5.3) • Table 7.6
	Species at Risk or Species of Special Status and related habitat (Terrestrial and Aquatic)	• Clearing, construction of Haldimand Converter Station; clearing, trenching of terrestrial HVDC cable • Installation of HVDC cable in Lake Erie lakebed via jet plow and water jetting • Installation of HVDC cable under shoreline and near shore via HDD • Electromagnetic field generated by buried terrestrial and in-water cables during operations • Maintenance and/or repair of HVDC cable • Decommissioning of Haldimand Converter Station	• See vegetation, fish and fish habitat, and wildlife and wildlife habitat rows in this table	• Standard Mitigation (Section 7.5.3) • Table 7.6

	Environmental Element	Description of Interaction (or Why No Interaction is Expected)	Potential Adverse Environmental Effect	Mitigation Discussed in:
	Atmospheric Environment	• Construction (operation of construction equipment) • Operation of Haldimand Converter Station • Decommissioning (operation of equipment for removal of converter station)	• Increase in sulphur hexafluoride (SF_6) emissions and other greenhouse gas emissions • Increase in airborne pollutants	• Standard Mitigation (Section 7.5.3) • Table 7.7
	Acoustic Environment	• Construction (clearing, grading, trenching, backfilling, construction of converter station, HDD installation of HVDC cables), nearshore blasting • Operation of Haldimand Converter Station • Decommissioning (operation of equipment for removal of converter station)	• Increase in baseline sound level leading to sensory disturbance to wildlife • Increase in noise during construction, associated with approximately three-month timeframe for HDD installation of the HVDC cable under the Lake Erie shoreline. Two properties at the eastern end of Hickory Beach Lane would experience the most noise associated with HDD	• Standard Mitigation (Section 7.5.3)
	Electromagnetism and Corona Discharge	• Operations of both terrestrial AC and HVDC cables and in-water HVDC cables	• Change in electromagnetism and corona discharge	• Standard Mitigation (Section 7.5.3)

	Environmental Element	Description of Interaction (or Why No Interaction is Expected)	Potential Adverse Environmental Effect	Mitigation Discussed in:
Socio-Economic	Human Occupancy/ Resource Use (including Fisheries)	• Construction (clearing, grading, trenching, backfilling, construction of Haldimand Converter Station) • Operation of Haldimand Converter Station • Decommissioning (removal of converter station)	• Temporary sensory disturbance of nearby residents • Temporary interruption to commercial and recreational activities on Lake Erie	• Standard Mitigation (Section 7.5.3)
	Heritage Resources	• Construction (clearing, grading, trenching, backfilling of terrestrial and in-water routes and construction of Haldimand Converter Station) • AC and HVDC cable maintenance	• Disturbance to or loss of previously recorded or unidentified archaeological resources or sites.	• Standard Mitigation (Section 7.5.3)
	Current Traditional Land and Resource Use	• Aboriginal groups engaged by ITC Lake Erie have not identified any specific current traditional land uses in proximity to the Project.		• Standard Mitigation (Section 7.5.3)
	Navigation and Navigation Safety	• Installation of HVDC cable on Lake Erie lakebed • HVDC cable maintenance	• Disruption of recreational and commercial fishing, and boating • Interference with commercial shipping activities	• Standard Mitigation (Section 7.5.3)

	Environmental Element	Description of Interaction (or Why No Interaction is Expected)	Potential Adverse Environmental Effect	Mitigation Discussed in:
	Social and Cultural Well-being	• Construction (clearing, grading, trenching, backfilling, construction of converter station) • Operation of Haldimand Converter Station • Decommissioning (removal of converter station)	• Disruption of social well-being due to increased temporary and short-term dust, visual, traffic, and noise impacts, as well as commercial and recreational activities impacts	• Standard Mitigation (Section 7.5.3)
	Human Health/Aesthetics	• Construction (clearing, grading, trenching, backfilling, construction of converter station) • Operation of Haldimand Converter Station • Decommissioning (removal of converter station)	• Alteration of visual aesthetics with construction of Converter Station • Low level static magnetic fields associated with operation of HVDC cables	• Standard Mitigation (Section 7.5.3)
Other	Accidents/ Malfunctions	• Fires, spills, overheating at converter station	• Possible effects on wildlife and wildlife habitat, human health, vegetation, species at risk, soils • Release of SF_6	• Standard Mitigation (Section 7.5.3) • Chapter 3
	Effects of the Environment on the Project	• Seismic activity, ice scour and/or wave action could disturb cable within lakebed	• Possible accident or malfunction from exposure of or damage to cable as a result of ice scour • Worker injury or damage to cables as a result of adverse weather	• Standard Mitigation (Section 7.5.3)

7.5.2 Mitigation of Potential Adverse Environmental Effects

In its Application, draft EPP and supplemental reports, ITC Lake Erie has identified routine design, standard mitigation and best practices to mitigate most of the potential adverse environmental effects identified in Table 7.2 above.

Where there are outstanding issues regarding environmental elements, or the Company's proposed mitigation may not be sufficient and additional mitigation may be necessary, then a detailed analysis is presented in Section 7.5.4.

7.5.3 Standard Mitigation

The Board recognizes that many adverse environmental effects are lessened through applying standard mitigation. Standard mitigation refers to a specification or practice that has been developed by industry, or prescribed by a government authority, that has been previously employed successfully and is now considered sufficiently common or routine that it is integrated into the Company's operational policies, procedures, and systems, and meets the expectations of the Board.

ITC Lake Erie proposes standard mitigation to avoid or minimize potential adverse environmental effects on the physical environment, soil and soil productivity, water quality and quantity, vegetation, wildlife and wildlife habitat, aquatic species and habitat, species at risk, species of special concern, atmospheric and acoustic environments, electromagnetism and corona discharge, navigation and navigation safety, heritage resources, and human receptors. Project-specific mitigation is proposed in the EPP for impacts to valued components such as aquatic species and habitat, acoustic environment, heritage resources, and navigation and navigation safety.

Among the mitigation strategies to avoid or minimize effects of the Project on the environment, ITC Lake Erie is relying in part on:

- its design of the Project according to standards and best practices;
- route and site selection to avoid environmentally sensitive features such as wetlands;
- scheduling activities to avoid sensitive periods in accordance with the recommendations of MNRF and the Lake Erie Management Unit;
- development of detailed, practical, effective mitigation and contingency measures to address site-specific issues;
- monitoring and inspection during construction to ensure that planned mitigation is implemented and effective; and
- conducting maintenance and operation of the HVDC cable and converter station to ensure integrity of the transmission system, public safety, and environmental protection.

ITC Lake Erie would implement the management and contingency plans included in the EPP. The EPP includes mitigation for managing elements such as waste, traffic, navigation and navigation safety, stormwater, erosion and sedimentation. Contingency plans for spills, inadvertent returns during HDD, wildlife encounters, adverse weather, archaeological and heritage resource discovery are included in the EPP.

The Board is of the view that sufficient standard mitigation measures have been identified to mitigate most of the potential adverse environmental effects identified. The Board also notes that many aspects of ITC Lake Erie's proposal for the Project address environmental risks, for example as related to noise and air quality. To ensure that all standard and site-specific mitigation measures are appropriate and would be implemented according to their intent, the Board has imposed the following conditions:

7.5.3.1 Environmental Protection Plan

The Board imposes **Certificate Condition 20** (Appendix III) requiring ITC Lake Erie to file an updated, Project-specific EPP to communicate all environmental protection procedures and mitigation measures to employees, contractors and regulators. The commitments should be clear and unambiguous to minimize errors of interpretation. In cases where there may be multiple ways of achieving the desired outcome, the EPP should state the goal, mitigation options, and clear decision-making criteria for choosing which option to apply under what circumstances. Where a mitigation measure is mandatory it should be clearly stated as such. Updated Environmental Alignment Sheets are also to be included with the EPP.

The Board expects an EPP to include step-wise plans and processes for contractors and other construction personnel that can be easily understood, followed, and implemented. The Board notes that ITC Lake Erie's draft EPP falls short on this requirement and is not adequate. For example, some mitigation commitments made in the Application and subsequent filings are left out of the EPP or are described as *potential* mitigation in the EPP.

The EPP should be comprehensive and cover general and site-specific mitigation related to all environmental elements.

Construction would not commence until ITC Lake Erie has received approval of its EPP from the Board.

In its draft EPP, ITC Lake Erie identified Transport Canada as the assessor for matters of navigation and navigation safety regarding the Project. However, as a result of changes to section 58.3 of the NEB Act, the responsibility to assess power lines subject to the NEB Act that pass in, on, over, under, through, or across navigable waters such as Lake Erie was transferred from the Minister of Transport to the Board. The Board is now solely responsible for assessing project effects on navigation and navigation safety on Board-regulated projects. Transport Canada's role in this context is to support the Board. As such, the Board expects ITC Lake Erie to update its Navigation and Navigation Safety Plan within the EPP accordingly.

7.5.3.2 Waste Management

To address the inadequacies that the Board noted in ITC Lake Erie's draft Waste Management Plan filed during the hearing process the Board imposes **Certificate Condition 23** (Appendix III) requiring ITC Lake Erie to file a Waste Management Plan for both the terrestrial and in-water portions of the route, that would be implemented, monitored, and reported to the Board and other appropriate regulatory authorities.

7.5.3.3 Heritage and Archeological Resources

The Board imposes **Certificate Condition 24** (Appendix III) requiring ITC Lake Erie to file confirmation that it has obtained a compliance letter from the relevant provincial authorities confirming that all applicable provincial requirements regarding archaeological and heritage resources have been met for both the terrestrial and in-water portions of the Project, at least 30 days prior to the commencement of construction. ITC Lake Erie must file a statement on how it intends to meet any conditions and respond to any comments or recommendations contained in the compliance letter. ITC Lake Erie must also file a description of how it has incorporated any additional mitigation measures into its EPP as a result of any conditions, comments, or recommendations contained in the compliance letter.

7.5.3.4 Environmental Compliance Manager Qualifications

To ensure that the Environmental Compliance Manager, who would be responsible for overseeing implementation of the final EPP, has the appropriate training, skills, and expertise to perform that role, the Board imposes **Certificate Condition 25** (Appendix III), which requires ITC Lake Erie to file with the Board a record of the Environmental Compliance Manager's qualifications and experience prior to the commencement of construction on the Project.

7.5.3.5 Construction Progress Reports

In order to track construction activity and environmental, socio-economic, safety, and security issues during construction, the Board imposes **Certificate Condition 30** (Appendix III) requiring ITC Lake Erie to file monthly construction reports. These reports shall include information on the activities carried out during the construction and report any environmental, socio-economic, safety, and security issues and issues of non-compliance; and the measures undertaken for the resolution of each issue and non-compliance.

7.5.3.6 Post-Construction Environmental Monitoring Reports for Terrestrial Route

To be satisfied that post-construction environmental monitoring is thorough and effective and that reports are developed and submitted, the Board imposes **Certificate Condition 32** (Appendix III) requiring ITC Lake Erie to submit post-construction environmental monitoring reports after the first, second, and third years following the commencement of operation.

7.5.4 Detailed Analysis of Key Environmental Issues

Where there are outstanding issues regarding environmental elements, or the Company's proposed mitigation may not be sufficient and additional mitigation may be necessary, the Board has conducted a detailed analysis. Based on the Project–environment interactions outlined in Table 7.2 and the standard mitigation measures discussed in Section 7.5.3 above, the Board has identified four issues as requiring detailed analysis. These issues are explored in detail in the following subsections. Table 7.3 specifies the definitions for criteria used in evaluating the significance of residual effects.

Table 7.3 Criteria, Ratings, and Definitions Used by the Board in Evaluating the Likelihood of Significant Effects

Criteria	Rating	Definition
All criteria	Uncertain	When no other criteria rating descriptor is applicable due to either lack of information or inability to predict.
Temporal Extent	Short-term	An effect, either resulting from a single project interaction or from infrequent multiple ones, whose total duration is usually relatively short-term and limited to or less than the duration of construction, or one that usually recovers immediately after construction. An effect usually lasting in the order of weeks or months.
	Medium-term	An effect, either resulting from a single or infrequent project interaction or from multiple Project interactions each of short duration and whose total duration may not be long-term but for which the resulting effect may last in the order of months or years.
	Long-term	An effect, either resulting from a single project interaction of long lasting effect; or from multiple Project interactions each of short duration but whose total results in a long lasting effect; or from continuous interaction throughout the life of the project. An effect usually lasting in the order of years or decades.
Reversibility	Reversible	An effect expected to, at a minimum, return to baseline conditions within the life cycle of the Project.

Criteria	Rating	Definition
	Permanent	An effect that would persist beyond the life cycle of the Project, or last in the order of decades or generations. Some social or cultural effects that persist beyond a single generation may become permanent.
Geographic Extent	Project Footprint	Effect would be limited to the area directly disturbed by the Project development, including the width of the right-of-way and any temporary workspace.
	Local Study Area	Effect would generally be limited to the area in relation to the Project where direct interaction with the biophysical and human environment could occur as a result of construction or reclamation activities. This area varies relative to the receptor being considered (e.g., a 1.3-kilometre wide corridor around the in-water HVDC cable route for aquatic species and habitat).
	Regional Study Area (RSA)	Effect would be recognized in the area beyond the Local Study Area that might be affected on the landscape level. This area also varies relative to the receptor being considered (e.g., a 5-kilometre radius around the proposed converter station for wildlife and wildlife habitat).
Magnitude	Low	Effect is negligible, if any; restricted to a few individuals/species or only slightly affects the resource or parties involved; and would impact quality of life for some, but individuals commonly adapt or become habituated, and the effect is widely accepted by society.
	Moderate	Effect would impact many individuals/species or noticeably affect the resource or parties involved; is detectable but below environmental, regulatory or social standards or tolerance; and would impact quality of life but the effect is normally accepted by society.
	High	Effect would affect numerous individuals or affect the resource or parties involved in a substantial manner; is beyond environmental, regulatory or social standards or tolerance; and would impact quality of life, result in lasting stress and is generally not accepted by society.

Criteria	Rating	Definition
Evaluation of Significance	Likely to be significant	Effects that are either: (1) of high magnitude; or (2) long-term, permanent, and of regional geographic extent.
	Not likely to be significant	Any adverse effect that does not meet the above criteria for "significant".

Table 7.4 Key Environmental Issue 1: Aquatic Species and Habitat

Background/Issues	**Background** Approximately 46.8 kilometres of HVDC cable would be installed in the bed of Lake Erie via Horizontal Directional Drill (HDD), trenching and low-intensity blasting, jet plow and water jetting (refer to Section 7.2 for details). There are 37 fish species that may occur in the Project area. Habitat available within the Project footprint includes minimal spring spawning at the wave-exposed shoreline area of Hickory Beach, which is limited to incidental use by small-bodied forage species (e.g., alewife, rainbow smelt, emerald shiner). The shoreline of Hickory Beach is also potential nursery habitat for the newly hatched young of spring spawning species. The majority of the Project footprint within Lake Erie is located over fine-grained substrates, and provides general habitat for fish and invertebrates. ITC Lake Erie noted the lack of specialized spawning habitat along the route. The following potential effects could arise from the Project: • risk of inadvertent release of HDD drilling fluids, causing localized, temporary increase in water turbidity; • risk of blasting effects on fish, and localized changes in lakebed substrates as a result of nearshore blasting; and • temporary, localized disturbance of fine-grained lakebed sediments and localized changes to lakebed sediments and the benthic community, as well as temporary, localized effects on water quality as a result of jet plow and ROV water jetting installation.
Proposed Mitigation	ITC Lake Erie has committed to following Department of Fisheries and Oceans "Measures to Avoid Causing Harm to Fish and Fish Habitat", including blasting methodology. The Project schedule has not yet been finalized, and thus it is not clear

	what time of year HDD and blasting activities would take place. However, ITC Lake Erie would conduct HDD installation and blasting in accordance with any in-water work windows identified during consultation with MNRF and Lake Erie Management Unit. The HDD installation of the HVDC cables beneath the shoreline would avoid disturbing shoreline and shallow (0–5 metres) water fish habitat, including habitat that is potentially suitable for Silver Chub and other spring spawners. Nearshore preparatory excavation of the HDD receiving pit and pre-cutting of the cable trench would occur at and offshore of the end of the trenchless HDD segment, thereby avoiding the shallow areas of Hickory Beach. ITC Lake Erie does not currently have a contingency plan in case of HDD failure. However, if the HDD should fail, ITC Lake Erie would submit a contingency plan to the Board at least three months prior to commencement of the contingency method. ITC Lake Erie will file an Inadvertent Return Contingency Plan with the Board (part of the final EPP), which will include Material Safety Data Sheets (MSDS) for drilling fluid to be used for HDD. Nearshore blasting regimes would be designed to minimize shock waves in accordance with Department of Fisheries and Oceans guidelines. The use of bubble curtains to deter fish that may be in the area prior to each blast would be considered, and acoustic fish repulsion would be conducted to startle fish out of a 12.5 metre setback distance from blast sites prior to each blasting event.
Proposed Monitoring	ITC Lake Erie would have a qualified aquatic specialist (biologist) conduct water quality monitoring during installation of the HVDC cable via HDD and during nearshore blasting.
Views of the Board	The Board is of the view that direct mortality could result from the trenching/blasting and jet plow/water jetting. Given the mitigation to be implemented, direct mortality, if any, associated with these activities would likely be limited to a few individuals; therefore, the magnitude of residual effects is anticipated to be low and the Project is not expected to result in effects to aquatic Species At Risk. Any aquatic resources impacted by the Project would likely resemble pre-construction conditions in the short to medium term. Fish habitat alteration could result from trenching/blasting and jet plow/water jetting. The use of HDD at the shoreline would result in minimal impacts to fish habitat (the small area of the exit/receiving pit, and small area of excavated sump pit). Any fish habitat impacted by the Project is low-quality fish habitat, and the alteration of such habitat would be of low magnitude, temporary (i.e., medium/short-term) in nature, and reversible.

	Decreased water quality is likely to result from increased suspended sediment resulting from construction of the three Project activities outlined above, and that such increased sediment could result in temporary, short-term, reversible impacts to fish and fish habitat. Once construction activities cease, water quality would return to background levels within the short term (i.e., hours). Given the mitigation and the Board's conditions, Project effects on water quality would be low in magnitude. ITC Lake Erie committed to various mitigation measures to minimize potential effects to fish and fish habitat. Proper and effective implementation of these mitigation measures is dependent on the judgment of a qualified aquatic specialist. Therefore, to confirm the Company has a qualified aquatic specialist assigned to the Project, the Board imposes **Certificate Condition 26** (Appendix III) requiring ITC Lake Erie to have personnel with appropriate training and qualifications on site to conduct monitoring of water quality during blasting and HDD and provide input on when other mitigation measures for preventing harm to fish are required. While ITC Lake Erie has committed to adhere to in-water work windows, the Board's understands that these windows have yet to be finalized with MNRF. As such the Board imposes **Certificate Condition 19** (Appendix III) requiring ITC Lake Erie to file with the Board information related to Project works and the in-water work windows.
Evaluation of Significance of Residual Effects	Temporal Extent: Short to medium term Reversibility: Reversible Geographical Extent: Local Study Area Magnitude: Low Adverse Effect Not likely to be significant

Table 7.5 Key Environmental Issue 2: Weed Management Plan

Background/Issues	The control and treatment of weeds and invasive plants is an important consideration on any Project where ground disturbance is taking place and soils will be left exposed and unvegetated for a period of time. In its IRs, the Board asked ITC Lake Erie to file a Weed Management Plan as part of its draft EPP. ITC Lake Erie included a Landscaping and Planting Plan in its draft EPP which stated that ITC Lake Erie would develop and implement a weed control program during construction, and would implement a weed and vegetation management control program as part of regular landscape maintenance operations on the Haldimand Converter Station site.

Proposed Mitigation	ITC Lake Erie's Landscaping and Planting Plan consists of a brief high-level summary outlining ITC Lake Erie's intentions for landscaping the Haldimand Converter Station site, but does not provide any detailed descriptions of the methods to be used for weed control or the criteria for deciding on the effectiveness of weed control measures.
Proposed Monitoring	Separate from its Landscaping and Planting Plan, ITC Lake Erie proposes in its Restoration and Reclamation plan (also part of the draft EPP) to conduct post-construction monitoring. This would include inspecting for reclamation success on the Haldimand Converter Station site for lands that were replanted after construction, and to monitor for noxious weeds on areas of the Haldimand Converter Station site that are not permanently occupied or used. The Restoration/Reclamation Plan also states that weed control would be performed in accordance with the Landscaping and Planting Plan. For the terrestrial portion of the cable route, ITC Lake Erie would restore vegetation to pre-construction conditions in consultation with Haldimand County. ITC Lake Erie states that after it has returned the right-of-way to pre-construction conditions, Haldimand County would be responsible for ongoing vegetation management along Haldimand Road 55.
Views of the Board	In its draft EPP, ITC Lake Erie included both a draft Landscaping and Planting Plan and a draft Restoration and Reclamation Plan. The Board is concerned with the potential for overlap and gaps between these two plans and the resulting potential for confusion. For example, weed monitoring is proposed as part of the Restoration and Reclamation Plan but weed management is to be included in the Landscaping and Planting Plan. In addition, while ITC Lake Erie mentioned weed control in these plans, neither document explains how weed control would be managed over the life of the project and the Board does not find the Landscaping and Planting Plan to meet requirements for a meaningful plan whose implementation can be properly verified. Without the inclusion of clear, measureable goals and objectives, criteria for measuring success, and adaptive management measures, it is difficult to determine whether weeds would be adequately monitored and controlled during the post-construction period and over the long term. The Board notes that effective long-term weed control may often be achieved in part by implementing a good planting program, and to this end the Board commends ITC Lake Erie's proposal for a Landscaping and Planting Plan. However, given current deficiencies in the Plan which include lack of details regarding weed control and monitoring measures, the Board imposes **Certificate Condition 22** (Appendix III) requiring ITC Lake Erie to file with the Board for approval information related to how it

	would manage weeds during both the construction and the operations phases of the Project. The Board expects the Weed Management Plan to be filed with the final EPP, and to include more detail about the weed management program, including definition of clear, measureable goals and objectives, a mechanism for tracking weed problems, criteria for evaluating whether mitigation goals are met, and adaptive management measures. The Plan should also clearly outline activities to be undertaken a) during construction, b) during the three-year post-construction monitoring period, and c) during operations, and clarify where weed control activities will be undertaken at each stage (i.e., on the Haldimand Converter Station site, on the terrestrial right-of-way, etc.). The Board also notes that it may take more than a couple of years for planted vegetation to become well established or for certain weed species and infestations to be brought under control. The Board therefore expects ITC Lake Erie to include as part of its filing for **Certificate Condition 22** a detailed plan for the ongoing periodic monitoring of weeds and vegetation on Project lands throughout the operation of the Project. In addition, the Board expects, as part of **Certificate Condition 32** (Appendix III), that ITC Lake Erie will provide progress reports that include updates on the effectiveness of its proposed mitigation, such as the establishment of plantings and any weed control issues in order to verify that the Weed Management Plan is implemented and corrective action is taken when necessary.
Evaluation of Significance of Residual Effects	Temporal Extent: Medium term Reversibility: Reversible Geographical Extent: Local Study Area Magnitude: Low Adverse Effect Not likely to be significant

Table 7.6 Key Environmental Issue 3: Migratory Birds

Background/Issues and Views of the Participants	There is potential for the Project to disturb birds protected by the *Migratory Birds Convention Act*, 1994, SC 1994, c 22. (*Migratory Birds Convention Act*) or other birds protected under provincial legislation. The Haldimand Converter Station site and terrestrial cable route provide minimal nesting habitat of low quality for bird species. However, in its Application, ITC Lake Erie stated its view that there is no migratory bird habitat within the actively tilled field where the Haldimand

	Converter Station would be located, and that roadside ditches are regularly mowed (thus precluding nesting). *Views of Environment and Climate Change Canada (ECCC)* In its Letter of Comment, ECCC stated its expectation that ITC Lake Erie develop and implement a management plan that effectively avoids or minimizes the risk of negative effects on migratory birds. ECCC referred to its guidance for determining the presence of nests, which states that incidental take of migratory birds (accidental killing of birds or destruction of their nests) can be avoided by conducting non-intrusive pre-construction surveys and by monitoring for active nests and applying protective setbacks from active nests. The Board asked several IRs to clarify ITC Lake Erie's responsibilities and commitments to ensuring that nesting birds would not be harmed during clearing and construction activities.
Proposed Mitigation	Following receipt of ECCC's letter and the Board's IRs, ITC Lake Erie committed to following ECCC's guidance related to determining the presence of nests, and if clearing and construction commences during the nesting period for migratory birds, ITC Lake Erie would have a qualified avian biologist conduct bird nest surveys prior to commencing construction.
Proposed Monitoring	ITC Lake Erie's draft EPP stated that visual monitoring would be undertaken as part of daily inspections during construction (draft EPP, Wildlife Encounter and Species of Concern Discovery Contingency Plan), though it does not specify who would conduct this monitoring nor what qualifications they would have. The draft EPP also states that the Environmental Compliance Manager would be responsible for assessing the discovery of wildlife species with the on-call biologist and enacting the Wildlife Encounter Species of Concern Discovery Contingency Plan (which is applicable to migratory birds).
Views of the Board	The Board is of the view that there is potential for the Project to disturb birds protected by the *Migratory Birds Convention Act* or provincial legislation. The Board notes that ITC Lake Erie committed to contract a qualified biologist to conduct pre-construction nesting surveys, in accordance with the ECCC guidance, within seven days of the commencement of clearing or construction, on the Haldimand Converter station site and surrounding area and along the terrestrial cable routes including actively tilled fields and mowed ditches. The Board finds that having a qualified avian biologist conduct pre-clearing/pre-construction nest surveys would minimize the risk of incidental take.

	As such, the Board imposes **Certificate Condition 31** (Appendix III) requiring ITC Lake Erie to have a qualified avian biologist conduct surveys and to file the results with the Board.
Evaluation of Significance of Residual Effects	<table><tr><th>Temporal Extent</th><th>Reversibility</th><th>Geographical Extent</th><th>Magnitude</th></tr><tr><td>Short term</td><td>Reversible</td><td>Local Study Area</td><td>Low</td></tr><tr><td colspan="4">Adverse Effect</td></tr><tr><td colspan="4">Not likely to be significant</td></tr></table>

Table 7.7 Key Environmental Issue 4: Greenhouse Gases (GHGs)

Background/Issues and Views of the Participants	In its Application, ITC Lake Erie did not provide an assessment of construction-related GHG emissions, only noting that vehicle emissions would result from the Project during the two- to three-year construction period for the Haldimand Converter Station and the terrestrial AC and HVDC cables. However, with respect to potential GHG emissions from Project operations, ITC Lake Erie stated that there are no sources of air emissions from the AC or HVDC cables during operation. ITC Lake Erie assessed the potential for emissions related to accidental release of SF_6, which would be used as an insulating and/or arc quenching medium in the 500 kV AC circuit breaker located in the station switchyard. Although not anticipated by the equipment supplier, emissions of SF_6 and other associated contaminants (i.e., impurities in pure SF_6 and by-products of SF_6 decomposition in high-voltage equipment) could potentially be emitted as a result of equipment leakage. ITC Lake Erie stated that site-wide emissions of SF_6 are considered negligible. ITC Lake Erie also stated that during operation of the Project there would be temporary emissions from the emergency diesel generator, as a result of periodic testing and if/when the emergency generator is used in the event of a power outage that would affect the ability of the Haldimand Converter Station to operate. ITC Lake Erie provided quantitative estimates of these emissions in its Application. *Views of Environment and Climate Change Canada (ECCC)* ECCC's Letter of Comment inquired about an air quality effects assessment, and requested that ITC Lake Erie quantify the direct GHG emissions from all phases of the Project. ECCC stated that SF_6 has a substantial impact as a GHG with a global warming potential 22,800 times more powerful than carbon dioxide (CO_2).

	ECCC requested that ITC Lake Erie develop best management practices to minimize potential effects of an SF_6 release in case of an emergency. In response to ECCC's letter, ITC Lake Erie stated that construction activities are not expected to result in significant direct GHG emissions, and do not warrant detailed estimation. Regarding GHG emissions attributed to project operation, ITC Lake Erie explained that the Project offers a potential additional source of value for transmission customers and itself through the sale of renewable generation attributes, known as renewable energy credits. ITC Lake Erie argued that the Project, through such renewable energy trade, could assist Ontario and PJM in meeting their respective GHG reduction targets, considering Ontario's clean generation supply mix.
Proposed Mitigation	ITC Lake Erie proposes to design facilities in accordance with applicable standards. ITC Lake Erie has stated that SF_6 emissions from high-voltage electric equipment are highly regulated and manufacturers must provide maximum possible guarantees against leakage. Best management practices are applied; the equipment is sealed and will be subject to routine maintenance and inspection.
Views of the Board	The Board notes ECCC's request for a quantitative assessment of direct emissions from the Project, including construction. The Board also recognizes that the operation of a transmission line is unlikely in itself to generate substantial GHG emissions and notes that ITC Lake Erie has provided quantitative estimates of GHG emissions from the emergency diesel generator for the Haldimand Converter Station and possible emissions of SF_6 in an emergency situation, both of which are low in magnitude. The Board also notes that the market drivers for the Project include the transition of the electricity sectors in both the US and in Ontario towards renewable sources and the grids which support them. The Board is of the view that the reductions in GHG emissions from the clean generation supply mix have the potential to outweigh the minimal GHG emissions associated with Project operations. For reasons of transparency and accountability, the Board has decided that it would be appropriate for ITC Lake Erie to provide a quantitative estimate of GHG emissions from the construction phase of the Project. As such, the Board imposes **Certificate Condition 28** (Appendix III) requiring ITC Lake Erie to estimate GHGs related to Project construction and file its assessment with the Board. The Board notes GHGs that do not arise directly from construction and operation of the Project may be assessed separately by other agencies or relevant government departments.

Evaluation of Significance of Residual Effects	Temporal Extent	Reversibility	Geographic Extent	Magnitude
	Medium term	Permanent	Regional Study Area to Global	Low
	Adverse Effect			
	Not Likely to be Significant			

7.6 Cumulative Effects Assessment

The Board's assessment of cumulative effects considers the impact of adverse residual effects associated with the Project in combination with residual effects from other projects and activities that have been or will be carried out, within the appropriate temporal and spatial boundaries and ecological context.

Potential residual effects of the Project include effects on:

- physical elements – physical environment, soil and soil productivity, water and water quality, air emissions, GHG emissions, and acoustic environment;
- biological elements – vegetation, aquatic species and habitat, wildlife and wildlife habitat, and species at risk; and
- socio-economic elements – human health, employment and economy, and acoustic environment.

Existing and proposed projects and activities that have potential for spatial and temporal interaction of effects, and therefore potential cumulative effects, include: agriculture, industrial activities, electricity transmission, oil and gas, recreation and tourism, renewable energy, and infrastructure.

The terrestrial landscape is highly altered by industrial, agricultural, and domestic activities. Over the past century, these activities have introduced toxic substances, heavy metals, and organic contaminants into the waters of Lake Erie. These high levels of contamination have had severe effects on the structure and function of the lake ecosystem and its inhabitant species.

The Board recognizes that due to the high proportion of existing development, including agriculture, industrial activities and infrastructure, some environmental elements are already experiencing significant adverse cumulative effects. These environmental elements include aquatic species and habitat, vegetation, wetlands, terrestrial wildlife species and habitat, water and water quality, acoustic environment, and atmospheric environment. The Board is of the view that these elements are likely to continue to experience ongoing cumulative effects.

The Board has considered the potential for cumulative environmental effects as a result of the Project and determined that most would be limited to the duration of construction, fairly localized, minor in nature, and would be mitigated, as discussed above in Section 7.5, by ITC Lake Erie's Project design, environmental protection and mitigation measures and the Board's related conditions. The Board also recognizes that some adverse residual effects could interact with effects from other projects and activities in the long term, such as Project contributions to GHG emissions in the atmospheric environment. However, the Board is of the view that these would likely be low in magnitude and their contribution to cumulative effects, while permanent, would be minor.

The Board is of the view that the Project area will continue to experience ongoing cumulative effects on environmental elements, and that these effects are mainly the result of agricultural and industrial activity. Moreover, the evidence suggests that any potential cumulative effects associated with the Project are generally overshadowed by and included within the greater context of current and historical development that are determinants of cumulative effects in the Project area.

7.7 Environmental Assessment Conclusion

The Board is of the view that overall, with the implementation of ITC Lake Erie's environmental protection procedures and mitigation and the Board's conditions, the Project is not likely to cause significant adverse environmental effects.

Chapter 8

Infrastructure, Employment, and Economy

The Board's expectations for an applicant regarding direct socio-economic impacts caused by the existence of a project are set out in the *Electricity Filing Manual*. Applicants are expected to identify and consider the impacts a project may have on infrastructure, services, employment, and economy. Applicants are also expected to provide mitigation of negative impacts and the consideration of positive benefits of the project.

Potential socio-economic effects that are caused by changes to the environment are included in Chapter 7, Environment and Socio-Economic Matters. Direct socio-economic effects caused by the existence of the Project itself are discussed below.

8.1 Infrastructure and Services

Views of ITC Lake Erie

8.1.1 Terrestrial Route

ITC Lake Erie stated that the proposed Haldimand Converter Station site and preferred terrestrial AC and HVDC cable routes are within the Industrial Influence Area associated with the Lake Erie Industrial Park, one of the largest industrial parks in Ontario. The Company further stated that the Industrial Influence Area designation includes lands within 3 kilometres of the Industrial Park and ensures that conflicting land uses will not be developed in proximity to heavy industry in the Industrial Park. ITC Lake Erie noted that the Industrial Park is zoned to include both light and heavy industry. ITC Lake Erie stated that major occupants in or near the Industrial Park include U.S. Steel Canada Lake Erie Works; the OPG's Nanticoke Generating Station site (which ceased operation in 2013); and an Imperial Oil refinery. The Company noted that the Industrial Park is serviced by road, rail, and water access, with access to Great Lakes shipping available through the U.S. Steel Canada Docks.

ITC Lake Erie stated that the Haldimand County Water Treatment Plant is located south of the Haldimand Converter Station site on Haldimand Road 55, and that no water service or sewer lines cross the proposed Converter Station site.

ITC Lake Erie noted that the water conduit from the forebay of the Nanticoke Generating Station to the Haldimand County Water Treatment Plant crosses Haldimand Road 55 and the route for the terrestrial HVDC cable. ITC Lake Erie stated that both the terrestrial AC and HVDC cable routes will cross underground beneath a 230 kV transmission line that runs west towards the U.S. Steel Canada Lake Erie Works, and two existing 500 kV transmission lines. The Company noted that installation of the AC and HVDC cables underground minimizes interference with this existing infrastructure. The Company further noted that there are existing utilities in the east side of the Haldimand Road 55 right-of-way being, Bell infrastructure, and a raw water line to the

Esso Refinery. The Project cables will run next to and cross under these infrastructure and utilities. ITC Lake Erie stated that it will coordinate with the appropriate utilities during installation of the AC and HVDC cables, and that the AC and HVDC cables can be installed in the east side of the Haldimand Road 55 right-of-way with only minimal/temporary interference.

The Company noted that there is potential for consumption of municipal services from Haldimand County during construction. ITC Lake Erie stated that waste collection services provided by the County would likely be used. The Company stated that the primary source of power to the site will be self-contained. The Company also stated that no temporary accommodations would be required on the Haldimand Converter Station site for labour, as it is anticipated that staff would commute to the site from communities within the surrounding area.

ITC Lake Erie stated that an ERP for Project construction will be completed during detailed design and the construction planning stages. The Company stated it will provide the ERP for construction to the Board no later than three months prior to the commencement of construction. ITC Lake Erie stated that the ERP to the implemented during operations will be completed during the construction phase and will be provided to the Board no later than three months prior to the start of commissioning and operations. The Company submitted a draft EPP for the Project, which includes a traffic management plan to minimize potential effects associated with temporary lane closures. ITC Lake Erie stated it will comply with local municipal by-laws regarding working and construction hours and that it will implement a construction management plan, including protocols to minimize engine idling and maintain vehicles. The Company also submitted that it will coordinate with the appropriate utilities during installation of the AC and HVDC cables.

8.1.2 In-water HVDC Cable Route

ITC Lake Erie stated that there are a number of natural gas lines on the lakebed within the Canadian waters, and that these pipelines carry gas from offshore wells to onshore collection and processing facilities. The Company stated that the in-water cable route will cross pipelines, owned by Dundee Energy Limited, ranging from approximately 5 to 15 centimetres in diameter; two of which are active natural gas pipelines. ITC Lake Erie stated that the in-water route has been designed to minimize pipeline crossings and any associated potential effects to the natural gas extraction activities.

ITC Lake Erie stated that there are other infrastructure-related features in the vicinity of the HVDC cable route including dredge disposal sites located east and west of the cable route, and a water intake pipe which potentially extends out from the shoreline at the Canadian landfall point. The Company submitted that the HDD installation in the landfall area will be considerably below the surface of the lakebed, and that the construction and operation of the Project would not interact with this infrastructure. ITC Lake Erie stated that consultations with OPG and Haldimand County have confirmed that their water supply is drawn from an intake in the forebay of the Nanticoke Generating Station and would not be affected by the Project.

Views of the Parties

Haldimand County

Haldimand County in its Letter of Comment stated that the subject lands intended for the Converter Station are zoned 'Agriculture', that the Haldimand County Official Plan policy permits the location of power lines and related substations in all land use designations, and therefore the proposal conforms to the Official Plan policy. The County stated that it has not yet been determined whether servicing will be required for the proposed Converter Station, and that if required, only municipal water may be available in the area. Haldimand County submitted that for sanitary needs, a private septic system will need to be installed.

Haldimand County stated that the construction of the Converter Station will be subject to site plan control, and that a site plan agreement will be signed and registered on title to make sure that the proposed development proceeds as per approved site plan.

Haldimand County stated that while a traffic impact study will not be required, a traffic control plan will be required during construction to ensure all lines are locatable and road crossings are identified in drawings and onsite. Haldimand County also stated that road entrance permits are required for any entrances and a road excavation permit will be required for all work within the road right-of-way.

Haldimand County stated that the Nanticoke Water Treatment Plant has two intakes located approximately 465 metres apart in Lake Erie and one intake located at the Industrial Pumping Station. The County submitted that the in-lake intake cribs for the Nanticoke Water Treatment Plant are located approximately 500 metres and 520 metres offshore at a depth of 6.3 metres. Haldimand County stated that the proposed HVDC cable route is approximately 100 metres west of the westerly most intake, and that it is not expected that the alignment or existence of the HVDC cable would constitute a hazard. However, Haldimand County expressed concern about impacts of the Project's HDD operation on the in-lake intakes, Industrial Pumping Station, and the raw water line; and about impacts of the AC and HVDC cables that will cross the corridor for the transmission watermain. The County also stated that it has reserved the west half of Haldimand Road 55 for the future expansion of the Nanticoke Water Treatment Plant, and noted that the ITC Lake Erie Project may impact this planned expansion.

Haldimand County stated that the Project involves the installation of the AC and HVDC cables within the easterly half of the Haldimand Road 55 right-of-way, which will impact the County's long-term plan for Haldimand Road 55. The County noted the Project's impact on the utilities in the road's right-of-way, which include a raw water line, underground Bell infrastructure, and a buried Union Gas Transmission line. However, Haldimand County stated that its preference would be for ITC Lake Erie to site the cable wholly within the Haldimand Road 55 road allowance (see Chapter 6, Land Matters).

Haldimand County recommended that further study of the existing buried infrastructure along the route of the terrestrial cables be completed and submitted to Haldimand County, and that ITC Lake Erie negotiate a crossing agreement with the County regarding the Project and planned county infrastructure.

8.2 Employment and Economy

Views of ITC Lake Erie

ITC Lake Erie stated that the total population of Haldimand County as of 2011 was approximately 44,875, with the largest sectors of the workforce employed in trades/transport/equipment operators, sales and service, and business/finance/administration.

ITC Lake Erie stated that the local economy of the County is based on rural and agricultural activity as well as lifestyle, tourism, recreation, and heritage resources. The Company noted that the County has been promoting basic services to support industrial growth, including the availability of a skilled industrial workforce, promotion of the Lake Erie Industrial Park, proximity to major transportation routes and an existing industrial base and infrastructure.

ITC Lake Erie stated it will seek to utilize local labour and business, and Aboriginal residents and businesses as appropriate. The Company stated that it continues to engage in discussions with local community members and Aboriginal groups to determine the availability of goods and services required to support construction of the Project. ITC Lake Erie stated that these services range from site security and provision of amenities, to heavy equipment and operators, as well as skilled electrical trades.

ITC Lake Erie stated that during construction, approximately 185 person-years of employment will be required for the Haldimand Converter Station, of which approximately 80 percent of this labour could be sourced within Ontario. The Company noted that approximately 4,000 additional man-hours of labour will be required for installation of the terrestrial AC and HVDC cables. ITC Lake Erie stated that it is not expected that there would be any displacement of workers or business during the construction and operation of the Project.

ITC Lake Erie stated that all stages of the Project will deliver economic impacts to Ontario. ITC Lake Erie stated that construction impacts of the Project in Ontario, including direct, indirect, and induced impacts, amount to a total 331 jobs, $21.4 million in employment income, $38.2 million in gross domestic product (GDP), and $8.8 million in government tax revenues. The Company further stated that direct impacts of the Project in Ontario amount to 194 jobs, $12.9 million in employment income, and $18.8 million in GDP. ITC Lake Erie stated that construction impacts of the Project in Haldimand County, including direct, indirect, and induced impacts, amount to a total of 200 jobs, $13.03 million in employment income, $18.94 million in GDP, and $38.4 million in business revenue. The Company stated that direct impacts of the Project in Haldimand County amount to 170 jobs, $11.3 million in employment income, $15.4 million in GDP, and $32.5 million in business output. The Company submitted that indirect impacts are relatively small because of the small industrial base in the area, which means that it is unlikely that there will be significant impact on local businesses.

ITC Lake Erie stated that operational impacts of the Project in Ontario, including direct, indirect, and induced impacts, amount to a total 11 jobs, $0.9 million in employment income, and $1.9 million in GDP. The Company stated that direct impacts of the Project in Ontario amount to six jobs, $0.6 million in employment income, and $1.3 million in GDP. ITC Lake Erie stated that operational impacts in Haldimand County, including direct, and induced impacts, amount to a

total of 5 jobs, $0.5 million in employment income, $1 million of GDP, and $1.7 million of business output. The Company stated that direct impacts of the Project in Haldimand County amount to 4 jobs, $0.4 million in employment income, $0.9 million of GDP, and $1.5 million of business output (accounting for about 85 per cent of the impacts). ITC Lake Erie stated that during operations, municipal property taxes will be remitted to Haldimand County. The Company further stated that indirect impacts for Haldimand County are negligible given the overall small expenditures on supply goods and services that are expected to take place locally.

ITC Lake Erie stated that two Aboriginal groups, Mississaugas of the New Credit First Nation and the Six Nations of the Grand River, have expressed their interest in the Project from an economic perspective and wish to continue working with the Company to identify potential future opportunities for employment, training and/or other mutually beneficial opportunities. ITC Lake Erie stated that monitors from two Aboriginal groups participated in the data collection process for archaeological work carried out for the Project. ITC Lake Erie submitted that it has identified opportunities for involvement in future field studies, and potentially in regards to provision of services by Aboriginal businesses in support of the construction of the Project (such as engagement of local businesses in landscaping of the Project site). The Company stated that it is committed to continued engagement with local Aboriginal groups regarding training and employment. ITC Lake Erie stated it has expressed interest in participating in future career fairs or similar sessions to increase awareness of the types of skilled trades that would be required during construction. ITC Lake Erie noted that the majority of the potential Aboriginal employment and training opportunities would be during the construction phase of the Project, as the Project will require minimal staff during operations.

> ***Views of the Board***
>
> The Board is satisfied that ITC Lake Erie has identified and considered the relevant impacts on infrastructure and services, and has proposed suitable mitigation to address the Project's potential effects. The Board also considered the evidence that ITC Lake Erie provided regarding the potential benefits to the Aboriginal, local, regional, and provincial economies associated with the Project.
>
> The Board notes that ITC Lake Erie committed to file plans to address the Project's socio-economic impacts, including an Emergency Response Plan and a construction management plan, and that the Company has filed a draft traffic management plan as part of its Environmental Protection Plan. The Board notes Haldimand County's recommendation that ITC Lake Erie negotiate a crossing agreement with the County regarding the Project and planned county infrastructure. The Board also notes that ITC Lake Erie submitted that it will coordinate with the appropriate utilities during installation of the AC and HVDC cables.
>
> As noted in Section 3.3.3.5.2, the Board imposes **Certificate Condition 15** (Appendix III) requiring that all infrastructure facilities to be crossed by the Project are identified and that all agreements and crossing permits are in place at least 90 days prior to commencement of construction. The Board further imposes **Certificate Condition 27** (Appendix III) requiring an officer of ITC Lake Erie to file with the Board confirmation that all necessary approvals and permits have been obtained for the Project.

The Board notes Haldimand County concerns regarding HDD and as previously discussed in Section 3.3.2 the Board imposes **Certificate Condition 11** (Appendix III) in relation to the Project's HDD operations which will, in the Board's view, address the concerns of Haldimand County.

The Board notes ITC Lake Erie's commitments to Aboriginal groups regarding potential opportunities for training and employment, as well as provisions of services by Aboriginal businesses in support of the construction of the Project.

The Board finds that the Project's impacts on infrastructure and services will be reasonably addressed. The Board also finds that the Project would provide benefits to Aboriginal, local, regional, and provincial economy and that any adverse socio-economic impacts of the Project will be adequately addressed.

Appendix I – List of Issues

ITC Lake Erie Connector Project

List of Issues

The Board identified, but did not limit itself to, the following issues for consideration in the hearing with respect to the construction and operation of the proposed Lake Erie Connector International Power Line Project (Project):

1. The need for the Project.
2. The economic feasibility of the Project.
3. The potential commercial impacts of the Project.
4. The suitability of the design, construction and operation of the Project.
5. Safety and security during construction and operation of the Project, including emergency response planning and third-party damage prevention.
6. Potential impact on the bulk power system, including neighbouring jurisdictions.
7. The potential environmental and socio-economic effects of the Project, including any cumulative environmental effects that are likely to result from the Project, including those required to be considered by the NEB's Electricity Filing Manual.
8. The appropriateness of the general route and land requirements for the Project.
9. Potential impacts of the Project on Aboriginal interests.
10. Potential impacts of the Project on landowners and the use of lands and waters.
11. The terms and conditions to be included in any recommendation or approval the Board may issue.

Appendix II – Participation in the Hearing

The National Energy Board (Board) encourages anyone wishing to more fully understand the context of the evidence provided by Participants during the course of the hearing, including written submissions, to consult the Board's online public registry (hearing record) for the Project, which is accessible from the Board's website at www.neb-one.gc.ca.

Written Submissions by Intervenors

Table A, below, provides the types and sources of information and evidence submitted by Intervenors during the proceeding. It also indicates where the information can be found on the Board's hearing record for the Project.

Table A – Written Submissions by Intervenors

Intervenor	Application to Participate	Information Requests to ITC Lake Erie	Response to NEB Information Requests	Evidence	Final Argument or Comments on Conditions
Elmcrest	A74221-1				
Haudenosaunee Confederacy Chiefs Council	A74311-1				
Hydro One	A74211-1				
Independent Electricity System Operator (IESO)	A74287-1	A75506	A76299 A77099		A79048-1
Natural Resources Canada (NRCan)	A74054-1				
Ontario Ministry of Natural Resources and Forestry	A74290-1				

Oral Traditional Evidence

In its letter of 4 March 2016 (A75809) to the Haudenosaunee Confederacy Chiefs Council, the Board provided information about how to file a written Notice of Intent form to provide oral traditional evidence. No Notice of Intent to provide oral traditional evidence was filed during the hearing process.

Letters of Comment

Table B lists those Commenters who filed a Letter of Comment with the Board during the proceeding. It also indicates where their Letters of Comment can be found on the Board's hearing record for the Project.

Table B – Letters of Comment

Commenter	Application to Participate	Letter of Comment	Response to NEB Information Requests
Environment and Climate Change Canada	A74265-1	A75901	
Haldimand County	A74243-1	A75763	
Health Canada	A74225-1	A75886	
Industrial Power Users of Niagara	A74295-1	A75906-1	
Manitoba Hydro	A74289-1	A75784-1	A76295-1 A77090-1

Appendix III – Certificate Conditions

Conditions to be attached to the Certificate

The terms used in this Appendix have been defined in the Glossary at the beginning of these Reasons for Decision:

General/Overarching Conditions

1. Condition Compliance

ITC Lake Erie shall comply with all of the conditions contained in this Certificate unless the Board otherwise directs.

2. Certificate Expiration Clause

Unless the Board otherwise directs prior to [three years from the date of the grant of the Certificate], this Certificate shall expire on [same date as noted before in this condition] unless construction in respect of the Project has commenced by that date.

3. Implementation of all Commitments

ITC Lake Erie shall implement or cause to be implemented all of the policies, practices, mitigative measures, recommendations, and procedures for the protection of the environment and promotion of safety referred to in its Application, or as otherwise agreed to in its related submissions.

4. General

ITC Lake Erie shall cause the approved Project to be constructed, operated, and abandoned in accordance with the specifications, standards, and other information referred to in its Application or as otherwise agreed to in its related submissions.

5. Ownership and Operator

The international power line and its associated facilities to be constructed and operated pursuant to this Certificate (the Power Line) shall be owned and operated by ITC Lake Erie LLC.

6. Change of Ownership or Operator

ITC Lake Erie shall not sell, convey, lease, or otherwise transfer the Power Line to any person, in whole or in part, without leave of the Board.

7. Notification of Protection Modifications

ITC Lake Erie shall seek approval from the Board of any proposed modification to the ITC Lake Erie electrical system before any modification is made.

8. Commitments Tracking Table

ITC Lake Erie shall:

a) file with the Board and post on its website, **at least thirty (30) days prior to the commencement of construction**, a commitments tracking table listing all commitments made by ITC Lake Erie in its Application, and otherwise agreed to during questioning or in its related submissions, including references to:

   i. the documentation in which the commitment appears (for example, the Application, responses to information requests, hearing transcripts, permit requirements, condition filings, or other documentation);

   ii. the accountable lead for implementing each commitment; and

   iii. the estimated timelines associated with the fulfillment of each commitment;

b) file with the Board, at the following times, an updated commitments tracking table:

   i. within ninety (90) days after the certificate date; and

   ii. at least thirty (30) days prior to commencement of construction;

c) update the status of the commitments and file those updates with the Board, **on a monthly basis starting ninety (90) days after the certificate date until the commencement of operations, and quarterly during operations until all commitments are satisfied (except those that involve filings for the Project's operational life)**;

d) post on its website the same information required by b) and c), within the same indicated timeframes; and

e) maintain at each of its construction offices:

   i. the relevant environmental portion of the commitments tracking table listing all of ITC Lake Erie's regulatory commitments, including those from the Application and subsequent filings, and conditions from received permits, authorizations, and approvals;

   ii. copies of any permits, authorizations, and approvals for the Project issued by federal, provincial, or other permitting authorities that include environmental conditions or site-specific mitigation or monitoring measures; and

   iii. copies of any subsequent variances to any permits, authorizations, and approvals in e) ii.

Prior to Construction

9. Compliance Program

ITC Lake Erie shall file with the Board for approval, **at least ninety (90) days prior to the commencement of construction**, a Quality Assurance and Compliance Program. The Program shall describe the methods by which ITC Lake Erie shall ensure the Project described in the Application is designed, constructed and operated in conformity with the conditions of the certificate, designs, specifications, and undertakings set forth in its Application or as otherwise adduced in its evidence before the Board. The Program shall include, but not be limited to:

a) a process or procedure to identify conditions of approval, company designs, specifications, and undertakings set forth in the Application or otherwise adduced in ITC Lake Erie's evidence;

b) processes or procedures to monitor, measure, document, and report on compliance with conditions of approval, company designs, specifications, and undertakings set forth in the Application or otherwise adduced in ITC Lake Erie's evidence;

c) the position title and contact information of the person(s) responsible for each aspect of the Program;

d) the qualifications, contact information, description of the job role and the position title of the person(s) who is authorized to stop work should the work be in non-conformity with conditions of approval, company designs, specifications, and undertakings set forth in the Application or otherwise adduced in ITC Lake Erie's evidence;

e) a process or procedure to identify and implement any corrective action as a result of any non-conformances that may be necessary before recommencing work;

f) a process or procedure to evaluate the effectiveness of the corrective actions taken as a result of any non-conformances; and

g) methods by which adherence to the Program shall be monitored, measured, documented, and reported to ITC Lake Erie's management.

10. In-Water Cable Burial Contingency Plan

ITC Lake Erie shall file with the Board for approval, **at least ninety (90) days prior to the commencement of construction**, a contingency plan detailing the measures to be taken and a justification as to why a different burial depth is sufficient in the event that the minimum burial depth as identified by ITC Lake Erie, to be 2.5 metres between kilometre post 0 and kilometre post 18, and to be 1.5 metres between kilometre post 18 and the Canadian border, cannot be achieved in the lakebed. The contingency plan shall include an impact analysis, including any potential environmental effects, of any mitigation measures considered in response to burial depths shallower than the minimum burial depth.

11. Horizontal Directional Drilling (HDD) and Contingency Plan

ITC Lake Erie shall file with the Board for approval, **at least ninety (90) days prior to the commencement of construction**:

a) a drawing showing the HDD drill path, entry and exit points, the anticipated drill angles at the entry and exit points, the no drill zone, and the soil stratigraphy along the HDD trajectory based on the available borehole information;

b) a contingency plan to provide an alternative method of installation along the Canadian shore-line in the event that the HDD procedure is not successful; and

c) confirmation by an authorized officer of ITC Lake Erie based on the available information, that the HDD installation can be completed in a manner consistent with safety and reliability.

12. Haldimand Converter Station Foundation Design

ITC Lake Erie shall file with the Board for approval, **at least ninety (90) days prior to the commencement of construction**, a final geotechnical detailed design report that sets out the design parameters and methodologies recommended to design the foundations of the structures at the Haldimand Converter Station in accordance with the National Building Code of Canada.

13. Blasted In-Water Excavation and Backfill Material

ITC Lake Erie shall file with the Board, **at least one hundred twenty (120) days prior to the commencement of construction**, the location of the identified source for the proposed crushed limestone borrow material to be used for the backfilling of the blasted in-water trench.

14. Construction Safety Manuals

ITC Lake Erie shall file with the Board, **at least ninety (90) days prior to the commencement of construction**:

a) safety manuals related to the construction of the Project. The manuals must address construction procedures, activities, and public safety issues for the following:

   i. terrestrial and in-water cable installation, including details on the post-lay burial procedure;

   ii. Haldimand Converter Station construction;

   iii. blasting activities; and

   iv. navigation limitations to lake traffic during construction;

b) an outline of the safety training program to be implemented for the operation of the Project.

15. Agreements and Crossing Permits

ITC Lake Erie shall file with the Board, **at least ninety (90) days prior to the commencement of construction**, the identity of all infrastructure facilities to be crossed by the power line, and confirmation that all the agreements or crossing permits for those facilities have been acquired.

16. United States (US) Approvals

ITC Lake Erie shall file with the Board, **at least sixty (60) days prior to the commencement of construction,** confirmation by an authorized officer of the company that all necessary US federal and state permits and regulatory approvals regarding electrical standards and installation practices have been received for the US portion of the ITC Lake Erie Connector Project.

17. Reliability, Safety, and Security of International Power Lines

ITC Lake Erie shall:

a) comply with the provisions of Board Order MO-036-2012 electric reliability; and

b) file with the Board a list of reliability standards applicable to the Project, **at least sixty (60) days prior to commencement of construction**.

18. In-Water Third Party Facilities Crossing Plan

ITC Lake Erie shall file with the Board for approval, **at least ninety (90) days prior to the commencement of construction**, a plan setting out details as to how the Project will cross third party in-water facilities, including:

a) minimum burial depth;

b) proximity of the cable to all existing third party facilities;

c) construction procedure; and

d) confirmation that the information filed is in accordance with the agreements or crossing permits.

19. Adherence to In-Water Restricted Activity Timing Windows

ITC Lake Erie shall file with the Board for approval, **at least sixty (60) days prior to the commencement of construction of the in-water trench**:

a) the relevant in-water restricted activity timing windows for the proposed Project;

b) the finalized timing of the in-water trench construction;

c) in the event that in-water trench construction will not adhere to the in-water restricted activity timing windows, the rationale for why, and mitigation measures to be applied; and

d) a summary of ITC Lake Erie's consultation with regulatory agencies (e.g., Ontario Ministry of Natural Resources and Forestry) in relation to the matters set out in a) to c). This summary must include any issues or concerns raised and how ITC Lake Erie has addressed or responded to those issues or concerns.

20. Environmental Protection Plan (EPP)

ITC Lake Erie shall file with the Board for approval, **at least sixty (60) days prior to the commencement of construction,** a final and updated project specific EPP, which it has committed to implement. The EPP shall describe all environmental protection procedures, and mitigation and monitoring commitments, as set out in ITC Lake Erie's Application or as otherwise agreed to in its related submissions. The EPP shall use clear and unambiguous language that confirms ITC Lake Erie's intention to implement all of its commitments. Construction will not commence until ITC Lake Erie has received approval of its EPP from the Board.

21. Design and Interconnection Compliance

ITC Lake Erie shall file with the Board for approval, **at least sixty (60) days prior to the commencement of construction**, a report confirming that the design of facilities, construction plan, and planned operations comply with the following:

a) ITC Lake Erie's 500 kV equipment has been designed for a continuous voltage rating of at least 550 kV;

b) ITC Lake Erie's protective relaying system will be set to ensure that transmission equipment remains in-service for the voltage range between 94% of the minimum continuous value and 105% of the maximum continuous value;

c) ITC Lake Erie's connection equipment has been designed to be fully operational within -40 degrees C to +40 degrees C ambient air temperature; and

d) ITC Lake Erie has made provision in the design of protections and controls of the Project to allow for future installation of Special Protection Scheme equipment that complies with the Northeast Power Coordinating Council reliability requirements.

22. Weed Management Plan

ITC Lake Erie shall file with the Board for approval, **at least forty-five (45) days prior to the commencement of construction**, a project specific Weed Management Plan that includes:

a) ITC Lake Erie's goals, including mitigation goals, and measurable objectives regarding the Weed Management Plan;

b) the methods and procedures available to achieve the mitigation goals and clear decision criteria for their selection;

c) a mechanism for tracking weed problems and weed control activities;

d) criteria to evaluate if the mitigation goals have been met;

e) adaptive management practices that will be used to revise the mitigation methods and procedures if evaluation criteria determine that mitigation goals are not met;

f) a summary of ITC Lake Erie's consultation concerning the matters set out in a) to e) with appropriate regulatory authorities, including any issues or concerns raised and how ITC Lake Erie has addressed or responded to those issues or concerns;

g) the type and frequency of monitoring activities and parameters to be monitored and the applicable criteria that it would be used to measure against;

h) a proposed schedule for reporting to the Board on the progress and success of the Plan; and

i) confirmation that the approved Weed Management Plan will be attached to the final EPP.

23. Waste Management Plan

ITC Lake Erie shall file with the Board for approval, **at least forty-five (45) days prior to the commencement of construction**, an updated Waste Management Plan which identifies measures to manage waste from construction and operations for the in-water portion of the route. The Plan shall include:

a) ITC Lake Erie's goals, including mitigation goals, and measurable objectives regarding the Waste Management Plan for the in-water portion of the route;

b) the methods and procedures available to achieve the mitigation goals and clear decision criteria for their selection;

c) criteria to evaluate if the mitigation goals have been met;

d) adaptive management practices that will be used to revise the mitigation methods and procedures if evaluation criteria determine that mitigation goals are not met;

e) details on handling, storage, use, and disposal of waste;

f) a summary of ITC Lake Erie's consultation concerning the matters set out in a) to e) with appropriate regulatory authorities, including any issues or concerns raised and how ITC Lake Erie has addressed or responded to those issues and concerns;

g) the type and frequency of monitoring activities and parameters to be monitored and the applicable criteria that it would be used to measure against;

h) a proposed schedule for reporting to the Board on the progress and success of the Plan; and

i) confirmation that the approved Waste Management Plan will be attached to the final EPP.

24. Heritage and Archaeological Resources

ITC Lake Erie must file with the Board, **at least 30 days prior to the commencement of construction:**

a) for both the terrestrial and in-water portions of the Project, confirmation, signed by an officer of the company, that it has obtained all of the required archeological and heritage resource permits and clearances from the relevant provincial authorities;

b) a description of how ITC Lake Erie will meet any conditions and respond to any comments and recommendations contained in the permits and clearances referred to in a); and

c) a description of how ITC Lake Erie has incorporated any additional mitigation measures into its EPP as a result of any conditions, comments, or recommendations referred to in b).

25. Environmental Compliance Manager Qualifications

ITC Lake Erie shall file with the Board, **at least twenty one (21) days prior to commencement of construction**, confirmation that a qualified environmental compliance manager shall be on site during construction to carry out appropriate inspections and monitor compliance with the final EPP. ITC Lake Erie shall include the qualifications, environmental education and experience, roles and responsibilities, decision-making authority, and reporting structure of each environmental compliance manager assigned to the Project that will be on site to monitor the effectiveness of erosion and sedimentation control measures, multi-functional barriers for wildlife exclusion, and any other applicable environmental mitigation measures that would be put in place during construction, as well as implementing any contingency plans as necessary, and performing any other duties outlined in the final EPP.

26. Qualified Aquatic Specialist

ITC Lake Erie shall file with the Board, **at least fourteen (14) days prior to the commencement of construction**, confirmation that a qualified aquatic specialist shall be on site during construction. ITC Lake Erie shall include the qualifications and experience, roles and responsibilities, decision-making authority, and reporting structure of each aquatic specialist assigned to the Project that will be on site during blasting activities and HDD.

27. Other Approvals and Permits

ITC Lake Erie shall file with the Board, **at least fourteen (14) days prior to commencement of construction**, confirmation by an officer of ITC Lake Erie that all necessary approvals and permits have been obtained for the Project from the organizations listed in Section 4.4.2 of the Application – "Other Approvals and Permits". ITC Lake Erie shall also include in the filing any commitments made or requirements attached to any permits or approvals so issued.

28. Quantitative Estimation of Direct, Project-related Greenhouse Gas (GHG) Emissions from Construction

ITC Lake Erie must file with the Board, **at least ninety (90) days prior to the commencement of construction**;

a) a quantitative estimation and assessment of greenhouse gas emissions expected to directly result from each activity, including clearing, during construction of the Project, including, but not limited to, emissions generated by vessels, vehicles, and equipment; and

b) a description of the calculation methodology used in the estimation and assessment, the assumptions and inputs used, and any variables that may affect the results.

29. Transmission Contracts

ITC Lake Erie shall file with the Board, **at least sixty (60) days prior to the commencement of construction**, confirmation that ITC Lake Erie has executed the necessary long-term transmission contracts for the Project.

During and Post-Construction

30. Construction Progress Reports

ITC Lake Erie shall file with the Board, **at the end of each month during construction**, construction progress reports. The reports shall include information on the activities carried out during the reporting period, as well as any environmental, safety and security issues and non-compliances that arose and the measures undertaken for the resolution of each issue and non-compliance. The first report shall include a schedule for anticipated submission of each monthly report until construction is complete.

31. Pre-Disturbance Bird Surveys

In the event of construction or clearing activities within restricted activity periods for migratory birds, ITC Lake Erie shall:

a) retain a qualified avian biologist to carry out pre-construction surveys in accordance with Environment and Climate Change Canada's guidance to identify any migratory and other breeding birds and active nests in and around the Project site; and

b) file with the Board, within fourteen (14) days post-commencement of construction or clearing:

   i. the results of the surveys;

   ii. a description of the mitigation, including monitoring, developed in consultation with government authorities, to protect any identified migratory and other breeding birds and their nests; and

   iii. a letter of confirmation that ITC Lake Erie has consulted with the appropriate provincial and federal regulatory authorities in relation to matters set out in a), b) i., and b) ii.

32. Post-Construction Environmental Monitoring for Terrestrial Route

ITC Lake Erie shall file with the Board, **on or before 31 January of each of the first, second, and third growing seasons following completion of construction** of the Project, a post-construction environmental monitoring report for the terrestrial portion of the Project that:

a) identifies any environmental issues that arose during construction or in the course of the previous year;

b) describes the methodology used for monitoring, the criteria established for evaluating success and the results found;

c) describes measures ITC Lake Erie has taken to correct the issues;

d) describes current status of the issues in a) and whether the issues are resolved or unresolved;

e) assesses the effectiveness of the mitigation (planned and corrective) measures applied against the criteria for success identified in b); and

f) provides a schedule for and description of further proposed measures that ITC Lake Erie will take to address any issues identified and unresolved in a) and d). All filed post-construction environmental monitoring reports must address issues related to soils and weed management, as well as any other environmental issues that arose during or after construction (for example, any issues related to species at risk or species of special concern, and to wildlife and wildlife management).

33. In-Water Cable Burial Survey

ITC Lake Erie shall file with the Board, **within sixty (60) days after the completion of the in-water cable installation:**

a) drawings and maps confirming the burial depth of the cable along the in-water cable route;

b) a report that documents and communicates any locations where the cable installation did not reach the minimum burial depth as identified by ITC Lake Erie;

c) a description of how ITC Lake Erie mitigated the risks associated with shallower than planned burial depths, where encountered; and

d) an impact analysis of any mitigation measures taken in response to burial depths shallower than the minimum burial depth, including the locations identified, mitigation measures taken, and the impact of the applied mitigation.

34. Anchor Drops and Cable Integrity

ITC Lake Erie shall file with the Board, **within sixty (60) days after the completion of the in-water cable installation:**

a) a list of any anchor drop risk areas identified along the Canadian portion of the cable route;

b) a list of the appropriate Canadian authorities that have been notified of such risks; and

c) a letter of confirmation that ITC Lake Erie has communicated to those authorities the locations of the identified anchor drop risks and of the areas where cable burial is less than the minimum burial depth as identified by ITC Lake Erie.

35. Excavation Safety

ITC Lake Erie shall perform all excavations along the cable route in accordance with applicable occupational health and safety legislation. ITC Lake Erie shall file with the Board, **within sixty (60) days of the completion of construction**, a report detailing any construction activities that did not comply with the applicable occupational health and safety legislation.

Prior to Operation

36. Operations and Maintenance Manual

ITC Lake Erie shall file with the Board**, at least sixty (60) days prior to the commencement of operations**, an Operations and Maintenance Manual for the ITC Lake Erie electrical system. The Manual shall require ITC Lake Erie to conduct documented audits of its records and inspections of the ITC Lake Erie electrical system and right-of-way to confirm ITC Lake Erie's conformity to the requirements of the Manual. The Manual shall also include a schedule or procedure for its yearly review and update, as appropriate, to remain current with regulatory requirements and accepted industry practice. The Manual, and the programs and procedures on ITC Lake Erie's records as required by the Manual, shall be made available to the Board for periodic review. The Manual should include, but not be limited to:

a) type of maintenance followed by ITC Lake Erie;

b) maintenance schedules according to the selected maintenance practice;

c) operational procedures for steady state and transient conditions;

d) maintenance and monitoring requirements and plans for the power line (terrestrial and in-water cable) and the Haldimand Converter Station;

e) a public awareness program for the life of the Project that:

   i. promotes public awareness of ongoing hazards associated with the Project; and

   ii. provides contact numbers for the public to report issues and concerns;

f) vegetation control plans and procedures for the power line's right-of-way and the Haldimand Converter Station footprint;

g) training requirements for personnel implementing the Manual; and

h) the maintenance and operations records that will be produced during operations, including during the performance of maintenance tasks and routine inspections.

37. Operations Safety Manuals

ITC Lake Erie shall file with the Board, **at least ninety (90) days prior to the commencement of operations**:

a) safety manuals related to the operation activities of the Project. The manuals must address routine operation procedures, activities, and public safety issues that might be encountered during the operation of the:

   i. terrestrial and in-water cables; and

   ii. Haldimand Converter Station; and

b) an outline of the safety training program to be implemented for the operation of the Project.

38. Abandonment Funding

ITC Lake Erie shall file with the Board for approval, **at least ninety (90) days prior to the date the Project is placed in service**, a mechanism to set aside funds for the future abandonment of the Project that is consistent with the principles for set-aside mechanisms set out in the Board's MH-001-2013 Reasons for Decision dated 29 May 2014, and specifically chapters 2.9, 3.4, 5.2.2, and 5.2.4, and appendices VII, XI, and XII. The set-aside mechanism shall reflect the abandonment cost estimate ITC Lake Erie filed in its evidence.

During Operations

39. Operation of High-Voltage Direct Current (HVDC) Transmission Line and Converter Station (HVDC Link)

a) ITC Lake Erie shall operate the HVDC Link as per design and specifications consistent with the electrical reliability standards applicable to the Project; and

b) ITC Lake Erie shall inform the Board of any operational deviation from design and specifications, **within forty-eight (48) hours of such operational deviation occurring**, and shall file with the Board, **within sixty (60) days after the operational deviation has occurred**, a written report that shall include:

   i. the reasons why the deviation occurred;

   ii. analysis of potential negative implications of the deviation to the HVDC Link; and

   iii. mitigation strategies for the implications identified in paragraph b) ii. and when the mitigation was or will be implemented.

40. Compliance Reporting

ITC Lake Erie shall file with the Board, **within thirty (30) days of the date that the approved Project is placed in service**, a confirmation, by an officer of ITC Lake Erie, that the approved Project was completed and constructed in compliance with all applicable conditions in this Certificate. If compliance with any of these conditions cannot be confirmed, the officer of ITC Lake Erie shall file with the Board details as to why compliance cannot be confirmed. The filing required by this condition shall include a statement confirming that the signatory to the filing is an officer of ITC Lake Erie.

41. Annual Filing Requirements

ITC Lake Erie shall file with the Board**, prior to 31 January, on an annual basis**, the following information:

a) confirmation that ITC Lake Erie is still the owner and operator of the Project and the current contact information for ITC Lake Erie including:

   i. corporate headquarters, street and mailing address;

   ii. phone number;

   iii. fax number;

   iv. email address;

   v. the name and job title of an officer of ITC Lake Erie for the Board to serve documents on as required; and

   vi. the name and job title of a secondary contact at ITC Lake Erie;

b) current insurance certificate(s) and updated details regarding the insurance and other financial instruments such as promissory note, line of credit, letter of credit or parental guarantees held by ITC Lake Erie to address its financial resource requirement that will enable ITC Lake Erie to respond to and cover any potential costs associated with a potential Project incident of at least $15 million;

c) demonstration of readily accessible financial requirements for funds of at least $1.5 million using acceptable financial instruments such as cash on hand, secured line of credit or letter of credit;

d) reporting of the accrued finances for the set-aside of abandonment funds;

e) a filing that complies with the provisions of Board Order MO-036-2012 electric reliability;

f) import and export flow data organized by month for the previous calendar year;

g) an updated commitments tracking table as per Certificate Condition 8;

h) the amount of contracted supply in megawatts by type of generation source (where possible); and

i) confirmation that no changes were made to ITC Lake Erie's compliance program, safety manual, or operations and maintenance manual. If any changes have been made ITC Lake Erie is to provide a rationale and description of the change(s) if not already provided to the Board.

42. As-built Drawings

ITC Lake Erie shall file with the Board **no later than sixty (60) days after the commencement of operations** as-built drawings identifying the location of all facilities including, but not limited to, the converter station, cables, and in-water protection mats.

Appendix IV – Applicable Standards for Electrical Components of the Project

Applicable Standards for Cables

Applicable Standards for Cables	
Standard Name	**Description**
IEC 60183	Guide to the selection of High Voltage Cables
IEC 60228	Conductors of insulated cables
IEC 60229	Tests on cable over sheaths which have a special protective function and are applied by extrusion
IEC 60287	Calculation of the current rating
IEC 60811	Common test methods for insulating and sheathing materials of electric cables
CIGRE Technical Brochure No. 496 (2012)	Recommendations for testing DC extruded cable systems for power transmission at a rate voltage up to 500 kV
CIGRE Electra No. 171 (1997)	Recommendations for mechanical tests on submarine cables

Applicable Standards for Major Components of HVDC Converter Station

AC Substation Equipment Connected to AC Busbar		
AC Disconnector Grounding Switch	IEC 62271-1	High-voltage switchgear and control gear - Part 1: Common specifications
	IEC 62271-102 Edition 1.2	High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches
	IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions - Part 1: Definitions, information and general principles
	IEC 60815-2	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for AC systems
	IEC 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
AC Grounding Switch	IEC 62271-1 Edition	High-voltage switchgear and control gear - Part 1: Common specifications
	IEC 62271-102 Edition 1.2	High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches
	IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V

	IEC 60815-I	Selection and dimensioning of high-voltage insulators for polluted conditions - Part 1: Definitions, information and general principles
	IEC 60815-2	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for AC systems
	IEC 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
Insertion Resistor	IEC 60099-4 Edition 2.2	Surge Arresters.-Part 4: Metal oxide surge arresters without gaps for AC systems
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
AC Surge Arresters	IEC 60099-4 Edition 2.2	Surge Arresters.-Part 4: Metal oxide surge arresters without gaps for AC systems
	Cigre Guide	Application guide for metal oxide arresters without gaps for HVDC Converter Stations
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
AC Insulators	IEC 60273	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions - Part 1: Definitions, information and general principles
	IEC 60815-2	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for AC systems

	IEC 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	IEC 61109	Insulators for overhead lines - Composite suspension and tension insulators for AC systems with a nominal voltage greater than 1,000 V - Definitions, test methods and acceptance criteria
	IEC	Dimensions of ball and socket couplings of string insulator units
	IEC 60372	Locking devices for ball and socket couplings of string insulator units. Dimensions and tests
	IEC 60305	Insulators for overhead lines with a nominal voltage above 1000 V - Ceramic or glass insulator units for AC systems - Characteristics of insulator units of the cap and pin type
	IEC 60383-1	Insulators for overhead lines with nominal voltage above 1,000 V; Part 1: Ceramic or glass insulator units for AC systems; definitions, test methods and acceptance criteria
	IEC 60383-2	Insulators for overhead lines with a nominal voltage above 1000 V; Part 2: insulator strings and insulator sets for AC systems; definitions, test methods and acceptance criteria
	IEC 61952	Insulators for overhead lines — Composite line post insulators for AC systems with a nominal voltage greater than 1,000 V — Definitions, test methods and acceptance criteria
	IEC 61462	Composite hollow insulators- Pressurized and unpressurized insulators for use in electrical equipment with rated voltage greater than 1,000 V -Definitions, test methods, acceptance criteria and design recommendations
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
	IEC 60168 Edition 4.2	Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1,000 V

	IEC	Radio interference test on high-voltage insulators
AC Voltage Divider	IEC	Coupling capacitors and capacitor dividers - Part 1: Common clauses
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
AC Circuit Breakers	ANSI / IEEE C37.06	Standard for AC high-voltage circuit breakers rated on a symmetrical current basis
	ANSI / IEEE C37.09	Test procedure for AC high-voltage circuit breakers rated on a symmetrical current basis
AC Current Transformer	IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions - Part 1: Definitions, information and general principles
	IEC 60815-2	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for AC systems
	IEC 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	NEMA-	Method of RIV tests on high voltage insulators
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
	IEC 61869-1	Instrument transformers- General requirements
	IEC 61869-2	Instrument transformers- Additional requirements for current transformers

AC Capacitive Voltage Transformer	IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions - Part 1: Definitions, information and general principles
	IEC 60815-2	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for AC systems
	IEC 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	NEMA-107	Method of RIV Tests on High Voltage Insulators
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
AC Capacitive Voltage Transformer	IEC 61869-1	Instrument transformers- General requirements
	IEC 61869-5	Instrument transformers- Additional requirements for capacitive voltage transformers
AC Voltage Divider	IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions - Part 1: Definitions, information and general principles
	IEC 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	NEMA-	Method of RIV Tests on High Voltage Insulators
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements

	IEC	Coupling capacitors and capacitor dividers — Part 1: Common clauses
	IEC 61462	Composite hollow insulators - Pressurized and unpressurized insulators for use in electrical equipment with rated voltage greater than 1,000 V - Definitions, test methods, acceptance criteria and design recommendations
AC Shunt Reactors	IEC 60076-1	Power Transformers — Part 1: General
	IEC 60076-6	Power Transformers — Part 6: Reactors
	IEC 60060-1	High-voltage test techniques — Part 1: General definitions and test requirements
AC Coupling Capacitors	IEC 60358-1	Coupling capacitors and capacitor dividers — Part 1: Common clauses
	IEC 60060-1	High-voltage test techniques — Part 1: General definitions and test requirements
AC Equipment Between Converter Transformer and Converter Modules		
Converter Transformers	IEC 60076-1	Power Transformers — Part 1: General
	IEC 60076-2	Power Transformers — Part 2: Temperature Rise
	IEC 60076-3	Power Transformers — Part 3: Insulation levels, dielectric tests and external clearances in air
	IEC 60076-4	Power Transformers — Part 4: Guide to the impulse and switching impulse testing — Power transformers and reactors
	IEC 60076-5	Power Transformers — Part 5: Ability to withstand short circuit

	IEC 60076-7	Power transformers. Part 7: Loading guide for oil immersed power transformers
	IEC 60076-10	Power Transformers — Part 10: Determination of sound level
	IEC 60137	Insulated bushings for alternating voltages above 1000 V
	IEC 60296	Fluids for electro technical applications — Unused mineral insulating oils for transformers and switchgear
	IEC 60214-1	Tap-changers - Part 1: Performance requirements and test methods
	IEC 60214-2	Tap-changers - Part 2: Application guide
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
Converter Hall Grounding Switch	IEC 62271-1 Edition 1.1	High-voltage switchgear and control gear - Part 1: Common specifications
	IEC 62271-102 Edition 1.2	High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
AC Surge Arresters	IEC 60099-4 Edition 2.2	Surge Arresters.-Part 4: Metal oxide surge arresters without gaps for AC systems
	Cigre Guide WG 33/14-05	Application guide for metal oxide arresters without gaps for HVDC Converter Stations
AC Surge Arresters	IEC/TS 60071-5	Insulation Coordination - Part 5: Procedures for High Voltage DC Converter Stations

	IEC 60060-1	High-voltage test techniques - Part I: General definitions and test requirements
AC Insulators	IEC 60273	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions - Part 1: Definitions, information and general principles
	IEC 60815-2	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for AC systems
	IEC 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	IEC 61109	Insulators for overhead lines - Composite suspension and tension insulators for AC systems with a nominal voltage greater than 1,000 V - Definitions, test methods and acceptance criteria
	IEC 60120	Dimensions of ball and socket couplings of string insulator units
	IEC 60372	Locking devices for ball and socket couplings of string insulator units. Dimensions and tests
	IEC 60305	Insulators for overhead lines with a nominal voltage above 1000 V - Ceramic or glass insulator units for AC systems - Characteristics of insulator units of the cap and pin type
	IEC 60383-1	Insulators for overhead lines with nominal voltage above 1,000 V; Part 1: Ceramic or glass insulator units for AC systems; definitions, test methods and acceptance criteria
	IEC 60383-2	Insulators for overhead lines with a nominal voltage above 1,000 V; Part 2: Insulator strings and insulator sets for AC systems; definitions, test methods and acceptance criteria
	IEC 61462	Composite hollow insulators- Pressurized and unpressurized insulators for use in electrical equipment with rated voltage greater than 1,000 V - Definitions, test methods, acceptance criteria and design recommendations

	IEC 61952	Insulators for overhead lines — Composite line post insulators for AC systems with a nominal voltage greater than 1,000 V — Definitions, test methods and acceptance criteria
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
	IEC 60168 Edition 4.2	Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1,000 V
	IEC 60437	Radio interference test on high-voltage insulators
AC Voltage Divider	IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions – Part 1: Definitions, information and general principles
	IEC 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	NEMA-107	Method of RIV tests on high voltage insulators
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
	IEC 60358-1	Coupling capacitors and capacitor dividers - Part 1: Common clauses
Zero Flux CTs	IEC 60068-2-27	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
	IEC 60044-8	Instrument transformers
	IEC 61000	Electromagnetic compatibility
	IEC 60255	Electrical Relays
AC Wall	IEC 60137	Insulated bushings for alternating voltage above 1,000 V

Bushings	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
DC Equipment		
Converter	IEC 60747-9	Semiconductor devices. Discrete devices. Insulated-gate bipolar transistors (IGBTs)
	IEC 62501	Voltage sourced converter (VSC) valves for high-voltage direct current (HVDC) power transmission
	EN 50178	Electronic equipment for use in power installations
	IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 62501	VSC valves electrical testing
	IEC 61071	Power electronic capacitors
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
Converter Hall Grounding Switch	IEC 62271-1 Edition 1.1 (1)	High-voltage switchgear and controlgear - Part 1: Common specifications
	IEC 62271-102 Edition 1.2 (1)	High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
DC Disconnector Grounding switch	IEC 62271-1 Edition 1.1 (1)	High-voltage switchgear and controlgear - Part 1: Common specifications
	IEC 62271-102 Edition 1.2 (1)	High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches

	IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions – Part 1: Definitions, information and general principles
	IEC 60815-2 (I)	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for AC systems
	IEC 60815-3 (I)	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
DC Bushings	IEC 62199	Bushings for DC application
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
Converter Reactor	IEC 60076-1	Power Transformers — Part 1: General
	IEC 60076-6	Power Transformers — Part 6: Reactors
	IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions - Part 1: Definitions, information and general principles
	IEC 60815-2 (1)	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for AC systems
	IEC 60815-3 (1)	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements

DC Surge Arresters	IEC 60099-4 Edition 2.2 (1)	Surge Arresters.-Part 4: Metal oxide surge arresters without gaps for AC systems
	Cigre Guide WG 33/14-05	Application guide for metal oxide arresters without gaps for HVDC Converter Stations
	IEC/TS 60071-5	Insulation Coordination - Part 5: Procedures for High Voltage DC Converter Stations
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
	IEC 60273	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1,000 V
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions – Part 1: Definitions, information and general principles
	IEC 60815-2 (1)	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for AC systems
	IEC 60815-3 (1)	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	IEC 60383-1 (1)	Insulators for overhead lines with nominal voltage above 1,000 V; Part 1: Ceramic or glass insulator units for AC systems; definitions, test methods and acceptance criteria
	IEC 60383-2 (1)	Insulators for overhead lines with a nominal voltage above 1,000 V; Part 2: Insulator strings and insulator sets for AC systems; definitions, test methods and acceptance criteria
	IEC 61325	Insulators for overhead lines with a nominal voltage above 1,000 V - Ceramic or glass insulator units for DC systems - Definitions, test methods and acceptance criteria

	IEC 61462 (1)	Composite hollow insulators- Pressurized and unpressurized insulators for use in electrical equipment with rated voltage greater than 1000V - Definitions, test methods, acceptance criteria and design recommendations
	IEC 61109 (1)	Insulators for overhead lines - Composite suspension and tension insulators for AC systems with a nominal voltage greater than 1,000 V - Definitions, test methods and acceptance criteria
	IEC 61952 (1)	Insulators for overhead lines — Composite line post insulators for AC systems with a nominal voltage greater than 1,000 V — Definitions, test methods and acceptance criteria
	IEC 60060-1	High-voltage test techniques - Part 1: General definitions and test requirements
	IEC 60168 Edition 4.2	Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1,000 V
	IEC 60437	Radio interference test on high-voltage insulators
Zero Flux CTs	IEC 60068-2-27	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
	IEC 60044-8	Instrument transformers
	IEC 61000	Electromagnetic compatibility
	IEC 60255	Electrical relays
DC Voltage Divider	IEC 60358-1	Coupling capacitors and capacitor dividers - Part 1: Common clauses
	IEC 61462 (1)	Composite hollow insulators - Pressurized and unpressurized insulators for use in electrical equipment with rated voltage greater than 1,000 V - Definitions, test methods, acceptance criteria and design recommendations
	IEC 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions - Part 1: Definitions, information and general principles

	IEC 60815-3 (1)	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for AC systems
	IEC 60060-1	Voltage test techniques - Part 1: General definitions and test requirements
	IEC 60060-2	High-voltage test techniques - Part 2: Measuring systems
	IEC 60270	High-voltage test techniques - Partial discharge measurements
(1) AC standards applied to DC equipment: In the absence of an applicable DC standard, the relevant sections of the AC standard will be used, where applicable.		

Source: ITC Lake Erie, Response to Information Request No. 1, [A71614-2]