



FINAL ENVIRONMENTAL ASSESSMENT
Section 6.8 Greenhouse Gas Assessment
November 2023

Acknowledgements

We wish to acknowledge that the Waasigan Transmission Line Project is located within lands that represent the traditional territories and homelands of the Robinson-Superior Treaty (1850) and Treaty #3 (1873) First Nations, and traverse the Red Sky Métis Independent Nation, Northwestern Ontario Métis Community and Northern Lake Superior Métis Community.

Hydro One also wishes to acknowledge Indigenous artist, Storm Angeconeb, for developing the covering page and wildlife designs throughout the Final Environmental Assessment. Storm is a highly recognized visual artist from Lac Seul First Nation in Treaty #3 and currently resides in Red Lake. Many of her works include animals and birds as representations of herself or those close to her. The artist's description of the covering page is presented below.

Hydro One Environmental Study Art:

What stands out in this art piece is the symbolic representation of solar rays as “Bringing Power”; we can see the environment represented through the wildlife and Ojibwe floral visuals. This artwork is an excellent representation of Hope, Life, and Opportunity, visually portrayed through the Black Bear and her two cubs. The colour theme of this artwork comes from the Waasigan Transmission Line Project brand identity.

Artist: Storm Angeconeb

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APPENDIX 6.8-A
Greenhouse Gas Calculation Methodology



6.8 Greenhouse Gas Emissions

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This section describes and summarizes an assessment of the effects of the proposed Waasigan Transmission Line Project (the Project) on greenhouse gas (GHG) emissions.

The purpose of this section is to assess how the Project will affect climate change through the emissions of GHGs. This is assessed by understanding how the GHG emissions at the provincial and federal scales change due to the presence of the Project. The assessment of the impacts of climate change on the Project (i.e., the resilience of the Project to climate change) is discussed in Appendix 3.0-C.

Before beginning the GHG emissions assessment, it is important to put the Project in a greater context. The Project consists of approximately 360 km of transmission line in northwestern Ontario. The Project's objective is to increase electricity capacity in Ontario to address future electricity delivery needs and, in particular, to support growth and maintain a reliable electricity supply to areas west of Thunder Bay and north of Dryden. Increasing electricity demands are projected in the region due to an increase in industrial activities, particularly in the mining sector.

As outlined in the annual sustainability reports, Hydro One is committed to adapting to and mitigating the impacts of climate change. Hydro One transmits and distributes electricity that is approximately 94% clean or carbon-emission free (Hydro One 2021). In 2021, Hydro One's Board of Directors approved the company's targets to reduce corporate-wide GHG emissions, committing to achieving net-zero GHG emissions by 2050, with a target of a 30% emissions reduction (of Scope 1 and 2 emissions, as defined in section 6.8.4 below) by 2030, using 2018 for the baseline levels. In support of these commitments, Hydro One established plans and mitigation targets to reduce their most significant emission sources and agreed on annual emission reduction targets.

In support of this goal, the following targets have been set by Hydro One:

- Reducing fleet carbon emissions by 40% through the conversion of feasible fleet vehicles to electric or hybrid and the modification of driving behaviours;
- Reducing SF₆ emissions by 25%; and
- Reducing emissions from Hydro One Remotes diesel fuel electricity generation by 50% by connecting Northwestern Ontario remote communities to the Hydro One electricity grid and using renewable resources to generate electricity.

The pathways and actions towards achieving these targets are still being developed by Hydro One and are not included in the GHG emissions assessment to avoid an underestimation of the potential GHG emissions associated with the Project. Where appropriate, the commitments will



be considered qualitatively to demonstrate the potential to reduce emissions associated with the Project.

The assessment follows the general approach and concepts described in Section 5.0. In addition, the quantification of the GHG emission follows Ontario Regulation (O. Reg.) 390/18 Greenhouse Gas Emissions: Quantification, Reporting, and Verification (Government of Ontario 2021), which is aligned with the quantification methods outlined in the Ontario climate change guide titled “Considering climate change in the environmental assessment process’ (Ontario Climate Change Guide; MECP 2017), as well as the Draft Technical Guide Related to the Strategic Assessment of Climate Change (SACC) (Government of Canada 2021). These guidance documents, as well as the Federal and Provincial Committee on Climate Change and Environmental Assessment (FPTCCCEA; FPTCCCEA 2003) require climate change to be addressed through the following considerations:

- How will potential changes in climate affect the Project (including supporting and/or ancillary facilities and infrastructure)?
- How will the construction of the Project affect climate change (e.g., the Project’s contribution to climate through the emission of GHGs)?

6.8.1 Input from Engagement

Comment pertaining to GHGs that were raised by Indigenous communities, government officials and agencies, and interested persons and organizations during engagement and how they are addressed in the environmental assessment (EA) are listed in Table 6.8-1. Comments, responses and follow-up actions are provided in the Engagement Summary (Section 4.0). In addition, the Draft EA Report was provided to Indigenous communities, government officials and agencies, and interested persons and organizations for review and comment on May 17, 2023. A high-level summary of the key themes from the comments on the Draft EA Report are included in Table 6.8-1. The detailed responses to these comments are included in Appendix 4.0-A.

Table 6.8-1: Summary of Comment Themes Raised During Engagement Related to GHGs

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
Concerns regarding the effects and impacts from climate change, whether the EA is considering overall project GHG emissions from all Project stages, and whether alternatives have been considered to reduce	A GHG assessment has been conducted for the Project and summarized in Section 6.8-Greenhouse Gas. Emissions from the operations phase are not estimated as the emissions from this phase are considered small compared to the emissions during construction (particularly from land	Migisi Sahgaigan Gwayakocchigewin Limited Partnership



Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
<p>the use of GHGs during construction and operation.</p>	<p>clearing). Emissions during operations would only be associated with maintenance vehicles and use of SF6 as an insulator. This section identifies the major emission sources, summarizes the net emissions and how the Project's emissions could impact the provincial and federal GHG emissions totals. A list of mitigation measures to reduce emissions from the construction phase of the Project is summarized in the section.</p> <p>A Climate Analysis has been conducted for the Project and summarized in Appendix 3.0-C-Climate Analysis. It includes an assessment of the Project's resilience to climate change and extreme weather events impacts. The resilience assessment is based on key climate variables and the Project's in-design mitigation measures to reduce the climate impacts.</p>	
<p>Request for a GHG Reduction Strategy for the Project that incorporates the mitigation measures outlined in Section 6.8.</p>	<p>An Environmental Protection Plan (EPP) will be developed prior to construction which will include GHG reduction measures outlined in the EA, including turning off vehicles and equipment when not in use, as practicable, maintaining equipment to maximize fuel efficiency, using multi-passenger vehicles will be used to transport personnel, where practicable, and using electric or hybrid vehicles for operation and maintenance activities, where possible.</p> <p>A commitment to include a GHG Reduction Plan in the EPP has been added in Section 10 (Monitoring and Commitments) of the EA.</p>	<p>Gwayakocchigewin Limited Partnership</p>

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
Request for initiatives to be developed with impacted Indigenous Nations to offset some impacts of land-clearing. These initiatives could be community-led and incorporate both IK and science. Examples could include tree planting in communities.	As outlined in Section 10, Hydro One has committed to undertaking a biodiversity initiative to offset habitat loss or long-term change resulting from the Project. This could aid in mitigating impacts from land clearing for the Project. The scope of this initiative is expected to be determined post-EA completion and will include engagement with Indigenous communities. Reference to the biodiversity initiative was added to Section 6.8.8.1.2.	Gwayakocchigewin Limited Partnership
Reference should be made to Ontario's climate change guide for EAs.	References were added to Section 6.8 and Appendix 6.8-A.	Ministry of Environment, Conservation and Parks (MECP), Climate Change Policy Branch
Questions and clarifications regarding emission calculations inputs and results.	The detailed methodology for the GHG emissions is provided in Appendix 6.8-A (Greenhouse Gas Calculation Methodology). Footnotes were added to various tables to clarify the meaning of the values.	MECP, Climate Change Policy Branch

GHG – Greenhouse gases, SF6- Sulphur hexafluoride

6.8.2 Information Sources

Information for the GHGs baseline (i.e., GHGs in the absence of the Project) was collected from the Environment and Climate Change Canada (ECCC) National Inventory Report (NIR) 1990-2020: Greenhouse Gas Sources and Sinks in Canada (ECCC 2022a). The NIR is prepared and submitted annually to the United Nations Framework Convention on Climate Change (UNFCCC) to satisfy Canada's requirements under the convention to update, publish, and make available the national inventory of anthropogenic emissions by sources and removals by sinks. The UNFCCC provides reporting guidelines for the preparation of GHG inventory reports (UNFCCC 2014). The NIR 1990-2020 presents the total Canada-wide (federal) GHG emissions from 2020. It is the most recent annual dataset available and includes annual GHG emissions by province and territory.

O. Reg. 390/18 governs the documentation and reporting of GHG emissions in Ontario (Government of Ontario 2021). The Guideline for Greenhouse Gas Emissions: Quantification,



Reporting and Verification (Government of Ontario 2018a; the O. Reg. 390/18 Guideline) provides the emission quantification methods that are required to be used under this reporting regulation.

For the purposes of the EA, sufficient information was deemed to be available from these references to assess the potential effects of the Project on GHGs.

6.8.3 Criteria and Indicators

Criteria are components of the environment that are considered to have economic, social, biological, conservation, aesthetic, or ethical value, as described in Section 5.2. **Indicators** are an aspect or characteristic of a criterion that, if changed as a result of the Project, may demonstrate a physical, biological or socio-economic effect.

The criteria and indicators for GHGs were initially outlined in the Draft Terms of Reference (ToR). Feedback from Indigenous communities, government officials and agencies, and interested persons and organizations received during engagement was incorporated into the preliminary criteria and indicators approved in the Amended ToR.

No concerns have been raised during the EA process regarding the preliminary criteria and indicators proposed in the Amended ToR. These criteria and indicators selected for the assessment of Project effects on GHGs, and the rationale for their selection, are provided in Table 6.8-2.

Table 6.8-2: Greenhouse Gases Criteria and Indicators

Criteria	Rationale	Indicators	Measurement of Potential Effects
GHGs	<ul style="list-style-type: none"> Commitment to avoid or minimize emissions of GHGs, which contribute to climate change. Hydro One Networks Inc. (Hydro One) corporate commitment to achieve net-zero GHG emissions by 2050, with a target to achieve a 30% GHG emissions reduction by 2030. 	<ul style="list-style-type: none"> Change to GHG emissions of: <ul style="list-style-type: none"> carbon dioxide (CO₂). nitrous oxide (N₂O); and methane (CH₄). 	<ul style="list-style-type: none"> Quantitative assessment of predicted construction emissions of CO₂, N₂O and CH₄ expressed in units of equivalent CO₂ (CO₂e).

GHG = greenhouse gas; CO₂ = carbon dioxide; N₂O = nitrous oxide; CH₄ = methane; Hydro One = Hydro One Networks Inc.; CO₂e = units of equivalent carbon dioxide.

GHG emissions include the following compounds: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulphur hexafluoride (SF₆), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). Consideration of these GHG emissions is required as part of the Ontario Provincial GHGRP under O. Reg. 390/18 Greenhouse Gas Emissions: Quantification, Reporting, and



Verification regulation (Government of Ontario 2021) and Canada's GHGRP under the *Canadian Environmental Protection Act 1999*. As outlined in the Amended ToR, the assessment of Project effects on GHG emissions considers effects that occur during the construction stage, as GHG emissions are considered to be largest during this stage of the Project. During construction the Project is predicted to emit CO₂, CH₄ and N₂O from the combustion of fossil fuels during operation of mobile equipment (vehicles, construction equipment and helicopters), stationary combustion (propane to heat temporary buildings during construction), purchased electricity consumption for powering the temporary buildings, and effects of land clearing (i.e., loss of carbon sink).

GHG emission sources during the operational phase of the Project would include fuel combustion for maintenance vehicles and equipment, ongoing loss of a carbon sink, and fugitive emissions through the electricity transmission and distribution. These fugitive emissions that come from transmission and distribution include line losses (i.e., loss of energy through the transmission of electricity), and SF₆ and PFC emissions from transmission and distribution equipment. Hydro One is actively assessing corporate emissions associated with both transmission line losses and from SF₆, and PFCs outside of this Environmental Assessment. In collaboration with third parties, such as electricity generators, equipment suppliers and regulators, Hydro One is developing operational practices and standards to minimize emissions where mitigation measures are within the control of Hydro One. These initiatives are to mitigate not only fugitive emissions, but all emissions associated with Hydro One operations. The operations emissions will be managed under the corporate climate change mitigation program and reported in annual sustainability reports, as Hydro One works to meet its GHG emissions targets.

As outlined in the ToR and Amended ToR, only emissions during the construction phase are considered in the assessment, as the year with the largest emissions throughout the life of the Project is anticipated to be during construction given the potential sources present in each phase and the corporate climate change mitigation programs and GHG emission targets influencing the GHG emissions over operations. These single year emissions during construction are very likely higher than those during operations primarily due to the emissions associated with clearing the land for the Project (i.e., the initial loss of a carbon from the sink). The one-time loss from the removal of vegetation occurs during the construction and is not present during operations and, as a measure of conservatism, the land clearing was assumed to take place all in one year. Additionally, sources of fuel combustion associated with the vehicles and equipment during construction will be greater (e.g., at least an order of magnitude) than the number of vehicles and equipment to maintain the transmission line during operation. As such, the construction stage of the Project is carried forward as the bounding parameter for this assessment (i.e., construction is used to represent the annual Project emissions as it very likely has the highest emissions). The indicators for the GHGs criteria are defined as follows:



- **Predicted CO₂ emissions:** the quantity of CO₂ expressed in CO₂e reflects federal and provincial commitments to GHG emissions and climate change. Emissions of CO₂ are expressed on an annual basis in tonnes of CO₂e per year (t CO₂e/yr) or kilotonnes of CO₂e per year (kt CO₂e/yr). CO₂ has a Global Warming Potential (GWP) of one (1) under UNFCCC reporting guidelines (UNFCCC 2014).
- **Predicted CH₄ emissions:** the quantity of CH₄ expressed in CO₂e reflects federal and provincial commitments to GHG emissions and climate change. Emissions of CH₄ are expressed on an annual basis in t CO₂e/yr or kt CO₂e/yr. CH₄ has a GWP of 28 under UNFCCC reporting guidelines (UNFCCC 2014, IPCC 2014).
- **Predicted N₂O emissions:** the quantity of N₂O expressed in CO₂e reflects federal and provincial commitments to GHG emissions and climate change. Emissions of N₂O are expressed on an annual basis in t CO₂e/yr or kt CO₂e/yr. N₂O has a GWP of 265 under UNFCCC reporting guidelines (UNFCCC 2014, IPCC 2014).

6.8.4 Greenhouse Gas Emissions Scope

For the purposes of accounting and reporting, as defined by *The GHG Protocol: A Corporate Accounting and Reporting Standard* (WRI and WBCSD 2013), GHG emissions are typically classified as Scope 1, Scope 2, or Scope 3. These three scopes are generally defined as follows:

- **Scope 1: Direct GHG emissions:** Emissions occurring from sources that are owned or controlled by a proponent (e.g., generators, boilers, vehicles, process, land clearing/burning, loss of a carbon sink, and fugitive emissions).
- **Scope 2: Indirect GHG emissions:** Emissions from the generation of purchased electricity, heating, and cooling consumed by the proponent.
- **Scope 3: Other indirect GHG emissions:** Emissions that are a consequence of a proponent's activities but occur from sources not financially or operationally controlled by that proponent (e.g., emissions from waste, the extraction and production of purchased materials, and business travel; ISO 2006).

The estimate of GHG emissions focused on the emissions directly linked to the Project. These emissions are classified as Scope 1, direct GHG emissions and Scope 2, indirect emissions. Consistent with the federal GHG reporting program for individual projects, Scope 3 emissions have not been estimated (ECCC 2020a). GHG emission sources considered for the Project are summarized in Table 6.8-3.



Table 6.8-3: Greenhouse Gas Emission Sources for the Project

Emission Scope	GHG Emission Source
Scope 1	<ul style="list-style-type: none"> ● Diesel and gasoline combustion from construction equipment; ● Jet fuel from helicopters during construction; and ● Land clearing (loss of carbon sink) and burning. ● SF₆ and/or PFC use during operation¹ ● Purchased natural gas or propane for buildings
Scope 2	<ul style="list-style-type: none"> ● Purchased electricity for buildings ● Line Losses during operation¹
Scope 3	<ul style="list-style-type: none"> ● Not included in the assessment

1) Line losses as well as SF₆ and PFC emissions during operations were considered qualitatively.

6.8.5 Assessment Boundaries

6.8.5.1 Temporal Boundaries

The Project is planned to occur during three stages:

- **Construction stage:** the period from the start of construction to the start of operation (approximately 43 months: 22 months for Phase 1 and 21 months for Phase 2).
- **Operation and maintenance stage:** the period from the start of operation and maintenance activities through to the end of the Project life.
- **Retirement stage:** the period from the end of the Project life and start of retirement activities through to the end of final reclamation of the Project. This Project will be operated for an indeterminate period and retirement, or decommissioning, is not anticipated. The timing of retirement, or decommissioning, is not known at this time as it is anticipated that upgrades to reinforce or rebuild portions of the Project may occur over its lifetime to maintain its longevity.

As described in Section 5.3.2, the Project will be operated for an indefinite period and the timing of retirement, or decommissioning, is not known at this time as it is anticipated that upgrades to reinforce or rebuild portions of the Project may occur over its lifetime to maintain its longevity. Further, potential effects and mitigation measures to be identified during the EA for the construction of the Project will likely equally apply to the potential removal of the Project at a future point in time, should it ever be required.

The assessment of Project effects on GHG emissions considers effects that occur during the construction stage, as GHG emissions are considered to be largest during this stage of the Project (as discussed in Section 6.8). Therefore, the construction stage acts as a bounding parameter for the GHG assessment and potential effects and mitigation measures for



operations and maintenance and retirement are not identified separately in this EA. The construction period is sufficient to capture the effects of the Project.

6.8.5.2 *Spatial Boundaries*

Spatial boundaries are not defined for this assessment because GHG emissions are both regional and global by nature. Boundaries for GHG emissions correlate with the administrative inventory boundaries that currently apply to GHG emissions under the federal GHG policy, regulations, and legislation (ECCC 2020b, c).

6.8.6 **Description of the Existing Environment**

This section provides a summary of the existing environment relevant to GHGs as determined through desktop review. As there are no spatial boundaries, due to the global nature of GHG emissions, the baseline characterization will be the same across all corridor options considered.

6.8.6.1 *Methods*

A desktop review was completed to identify baseline conditions. While GHG emissions are monitored at a federal scale by the ECCC, they can also be quantified using published emission factors. For the purposes of this assessment, federal and provincial reported GHG emissions data were used to characterize existing GHG emissions at the federal and provincial levels using the ECCC National Inventory Report 1990-2022: Greenhouse Gas Sources and Sinks in Canada (ECCC 2022a).

6.8.6.2 *Results*

The primary sources of GHG emissions in Canada and Ontario are from anthropogenic sources that include the transportation sector (e.g., vehicles on 400 series highways in Ontario) and large industrial activities (e.g., manufacturing facilities) (ECCC 2022a). Estimates of GHG emissions are expressed as million metric tonnes (Mt) of CO₂e, which are calculated based on the GWP for each gas relative to the GWP of CO₂.

The latest available national and provincial GHG data were used to describe current GHG emissions. The latest available GHG emissions data are for the year 2020, which were published in the 2022 National Inventory Report (ECCC 2022a). In 2020, approximately 672 Mt of CO₂e emissions were reported nationally, with Ontario accountable for 22.3% of these emissions. The national and provincial emissions reported for 2020 (ECCC 2022a) are summarized in Table 6.8-4.

Table 6.8-4: Baseline Greenhouse Gas Emissions

Source ^(a)	GHG Emissions (Mt CO ₂ e)
Canada-wide 2020 GHG emissions	672
Ontario-wide 2020 GHG emissions	150

a) ECCC 2022a. GHG = greenhouse gas; Mt CO₂e = million metric tons of carbon dioxide equivalent.

6.8.7 Potential Project-Environment Interactions

Potential Project-environment interactions were identified through a review of the Project Description (Section 3.0) and existing environmental conditions. The linkages between Project components and activities and potential effects to GHG emission are identified in Table 6.8-5.



Table 6.8-5: Project-Environment Interactions for Greenhouse Gas Emissions

Criteria	Indicator	Project Stage Construction	Project Stage Operation and Maintenance	Project Stage Retirement	Description of Potential Project-Environment Interaction	Description of GHG Emissions Considered for the Assessment
GHG emissions	<ul style="list-style-type: none"> • Predicted CO₂ emissions; • Predicted CH₄ emissions; and • Predicted N₂O emissions. 	✓	✓	✓	<ul style="list-style-type: none"> • GHG emissions from construction activities. • GHG emissions from maintenance activities during operations and maintenance stage. • GHG emissions from decommissioning activities during retirement stage (should a decision be made in the future to decommission the Project). 	<p>The assessment estimates GHG emissions only from the construction stage as the GHG emissions are considered to be largest during this stage of the Project (see Section 6.8) and therefore are considered to be the bounding parameter. The usage of vehicles and equipment during the operations and maintenance and retirement stages would be lower than the construction stage and are not anticipated to be material (less than 0.01% of the current Provincial totals). Corporate emissions from lines losses and SF₆ and PFCs during the operation of transmission lines are being considered through Hydro One's climate change program. Additionally, the site would have the same mitigation measures in place during the operations and maintenance stage, which would further reduce the GHG emissions.</p>

✓ = A potential Project-environment interaction could result in an environmental or socio-economic effect.

— = No plausible interaction was identified.

GHG = greenhouse gases; CO₂ = carbon dioxide; CH₄ = methane; N₂O = nitrous oxide

6.8.8 Potential Effects, Mitigation Measures, and Net Effects

This section presents the potential effects, appropriate mitigation measures, and predicted net Project effects for greenhouse gas emissions. A summary of the potential effects, mitigation measures and net effects are presented in Table 6.8-12.

6.8.8.1 Greenhouse Gas Emissions from Construction Activities

6.8.8.1.1 Potential Effects

The primary sources of GHG emissions during the construction stage of the Project are the effects of land clearing (including the loss of carbon sink and the burning of cleared wood), as well as fossil fuel combustion from construction activities, including off-road and on-road equipment, and electricity consumption.

Effects of Land Clearing: It was conservatively assumed that 100% of the vegetation being removed for the Project will be burned, as a bounding condition. The land clearing emissions represent the loss of the carbon sink associated with the forest growth. The highest land clearing emissions occur when there is a loss of the existing carbon sink with negligible regrowth of vegetation. Hydro One is working with the local forest companies to provide merchantable timber. Merchantable timber received from the forest companies would not be burned, and therefore, there would be no associated emissions with this timber. Currently, there is no available information on the percentage of timber that would be merchantable. In absence of this information, it is assumed that 100% of the vegetation removed will be burned. Hence, the amount of GHG estimates for land clearing are conservative in nature and have been overestimated. In addition, the construction scheduling may not result in biomass burning over the entire area and may result in some burning in the future.

A summary of the data used for the land clearing and biomass burning calculations is provided in Table 6.8-6.



Table 6.8-6: Data Used for Land Clearing Emission Calculations (Scope 1)

Emission Source	Data Used in Emission Rate Calculations	References
Land clearing ^(a, b, c)	<ul style="list-style-type: none"> • Area of vegetation to be cleared • Types and amount of vegetation to be removed (assumed boreal coniferous for forested land), including: <ul style="list-style-type: none"> • Mean above-ground biomass growth; • Above-ground biomass ratios; • Carbon fraction; and • Annual flux for CH₄. 	Intergovernmental Panel on Climate Change (IPCC) 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories and Draft Technical Guide Related to the SACC (Government of Canada 2021)

- a) The land clearing emission estimates account for the removal of a carbon sink and thus the loss of annual removal of carbon from the atmosphere. This also occurs through the duration of the operation stage.
- b) Currently, calculations assume that the vegetation will not be allowed to regrow, but is understood that temporary disturbances will be reclaimed and that compatible vegetation will be allowed within the right-of-way (ROW). This revegetation would provide carbon sinks in the region during the operational stage of the Project.
- c) The GHG emissions do not consider the amount of merchantable timber and instead assume all wood will be burned. Hydro One has commitment to provide merchantable timber to local forest companies. As there is lack of information on the amount of merchantable timber, it is conservatively assumed that 100% of it would be burned.

SACC = Strategic Assessment of Climate Change; IPCC = Intergovernmental Panel on Climate Change; CH₄ = methane; GHG = greenhouse gas.

Fuel Consumption: It was assumed that, as a worst case, construction camp power generation, flagging and clearing, access road construction, staking, foundation installation, tower assembly and stringing activities for the Project could occur at the same time. GHG emissions totals from these activities were calculated based on the fuel consumption data for diesel, gasoline, propane, and Jet A fuel in combination with published emission factors from the National Inventory Report 1990-2020 (ECCC 2022b) as described in Table 6.8-7.

Table 6.8-7: Data Used for Fuel Consumption Emission Calculations (Scope 1)

Emission Source	Fuel Consumption Data Used in Emission Rate Calculations	Emission Factor Used in Emission Rate Calculations
Fuel consumption (mobile equipment, vehicular exhausts, helicopters, and stationary combustion)	<ul style="list-style-type: none"> Fuel consumption data for diesel, gasoline, propane, and Jet A fuel. 	<ul style="list-style-type: none"> Gasoline emission factors from Table A6.1-14 (Tier 2, LDGVs) of NIR 1990-2020: GHG Sources and Sinks in Canada, Canada’s Submission to the UNFCCC, Part 2 (ECCC 2022b). Diesel emission factors from Table A6.1-5 of NIR 1990-2020: GHG Sources and Sinks in Canada, Canada’s Submission to the UNFCCC, Part 2 (ECCC 2022b). Jet A fuel emission factors from Table A6.1-5 (Kerosene, Construction) of NIR 1990-2020: GHG Sources and Sinks in Canada, Canada’s Submission to the UNFCCC, Part 2 (ECCC 2022b). Propane emission factors from Table A6.1-4 NIR 1990-2020: GHG Sources and Sinks in Canada, Canada’s Submission to the UNFCCC, Part 2 (ECCC 2022b) NIR 1990-2020: GHG Sources and Sinks in Canada, Canada’s Submission to the UNFCCC, Part 2 (ECCC 2022b).

LDGV = Light-duty gasoline vehicles; NIR – National Inventory Report; GHG = greenhouse gas; UNFCCC = United Nations Framework Convention on Climate Change.

Electricity Consumption: The electricity consumption data for the entire construction period along with the Ontario grid electricity emission factor was used to estimate Scope 2 emissions. A summary of the data used for electricity consumption calculations is provided Table 6.8-8.

Table 6.8-8: Data Used for Electricity Consumption Emission Calculations (Scope 2)

Emission Source	Electricity Consumption Data Used in Emission Rate Calculations	Emission Factor Used in Emission Rate Calculations
Electricity consumption	Electricity consumption data	Grid intensity factor from NIR 1990-2020: GHG Sources and Sinks in Canada, Canada's Submission to the UNFCCC, Table A13-7, Part 3 for the year 2020 for Ontario (ECCC 2022c)

NIR = National Inventory Report; GHG = greenhouse gas; UNFCCC = United Nations Convention on Climate Change.

Total Construction Emissions: The estimated total GHG emissions for the construction stage of the Project are summarized in Table 6.8-9, while the estimated annual GHG emissions for the highest year are summarized in Table 6.8-10. The methodology used to calculate the GHG emissions has been included in Appendix 6.8-A. Construction stage GHG emissions are attributed to the operation of mobile equipment and stationary combustion (i.e., fuel consumption), land clearing, and electricity consumption.

Table 6.8-9: Summary of Estimated Greenhouse Gas Emissions during Construction

Source	Construction Stage GHG Emissions (tonnes) CO ₂	Construction Stage GHG Emissions (tonnes) CH ₄	Construction Stage GHG Emissions (tonnes) N ₂ O	Construction Stage Total (tonnes) CO ₂ e	Percent Contribution (%)
Fuel Consumption (Scope 1)	32,804	0.95	0.79	32,921	5%
Land clearing (Scope 1)	607,291	77	—	609,448	95%
Electricity Consumption (Scope 2)	— ^(a)	—	—	45	0.01%
Total	640,095	78	1	642,414	100%

Some of the numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

CO₂ = carbon dioxide; CH₄ = methane; N₂O = nitrous oxide; CO₂e = carbon dioxide equivalent.

a) The emission factor for electricity consumption is directly for CO₂ equivalent and therefore are no values for CO₂, CH₄, and N₂O emissions as they are not calculated separately.



Table 6.8-10: Summary of Annual Greenhouse Gas Emissions (Highest Year)

Source	Highest Year GHG Emissions (tonnes/year) CO ₂	Highest Year GHG Emissions (tonnes/year) CH ₄	Highest Year GHG Emissions (tonnes/year) N ₂ O	Highest Year GHG Emissions (tonnes/year) CO ₂ e	Percent Contribution (%)
Fuel Consumption (Scope 1)	9,155	0.26	0.22	9,187	1.5%
Land clearing (Scope 1)	584,671	21.50	—	585,273	98.5%
Electricity Consumption (Scope 2)	—	—	—	6	0.001%
Total	593,825	22	0.22	594,466	100%

Some of the numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

CO₂ = carbon dioxide; CH₄ = methane; N₂O = nitrous oxide; CO₂e = carbon dioxide equivalent.

a) The emission factor for electricity consumption is directly for CO₂ equivalent and therefore are no values for CO₂, CH₄, and N₂O emissions as they are not calculated separately.

A comparison of the estimated GHG emissions from the Project to Ontario and Canadian emission totals was completed using the year assumed to have the highest emissions. The results are provided in Table 6.8-11. The estimated maximum annual GHG emissions from the Project represent 0.4% of the provincial total and 0.1% of the Canada-wide total.

A comparison to the global GHG emissions total was not completed as GHG emissions from the Project, using the construction stage as a bounding stage, represent a negligible fraction of global GHG emissions.

Table 6.8-11: Comparison of Estimated Greenhouse Gas Emissions from the Project to Ontario and Canada

Source	Construction Stage GHG Emissions (CO ₂ e tonnes/year)
Project annual GHG emissions(a)	594,466
Comparison to Ontario total	0.40%
Comparison to Canada-wide total	0.088%
Ontario-wide 2020 GHG emissions	150,000,000
Canada-wide 2020 GHG emissions	672,000,000

a) Project emissions are represented using the construction stage as a bounding parameter.

CO₂e tonnes/year = carbon dioxide equivalent tonnes; GHG = greenhouse gas.



6.8.8.1.2 Mitigation Measures

Hydro One will work with Indigenous communities, landowners and Sustainable Forest Licence holders to find other uses for the merchantable timber rather than burning the timber. This will reduce the GHG emissions from biomass burning for the Project. Further, temporary disturbances will be reclaimed, and compatible vegetation will be allowed to regrow within the ROW. Both mitigation measures will reduce the reduction of the carbon sink. As outlined in Section 10, Hydro One has committed to undertaking a biodiversity initiative to offset habitat loss or long-term change resulting from the Project. This could also aid in mitigating impacts from land clearing for the Project. The scope of this initiative is expected to be determined post-EA completion and will include engagement with Indigenous communities and local stakeholders.

Vehicles and equipment will be turned off when not in use, as practicable, and equipment will be well maintained to maximize fuel efficiency. Slash piles will be burned in compliance with O. Reg. 207/96 (Government of Ontario 2018). Multi-passenger vehicles will be used to transport personnel, where practicable. Electric or hybrid vehicles will be used for operation and maintenance activities where possible. As outlined in Section 10, a GHG Reduction Plan incorporating these mitigation measures will be included in the Environmental Protection Plan that will be developed prior to construction.

Hydro One with their contractor(s) will prepare and implement a Dust Control/Air Quality Plan prior to construction.

These mitigation measures (Table 6.8-12) align the Project with the corporate commitment to achieve net-zero GHG emissions by 2050 and to reduce corporate emissions by 30% (compared to 2018 values) by 2030.

6.8.8.1.3 Net Effect

The Project is predicted to have a low effect on emission levels of CO₂, N₂O, and CH₄ based on the comparison between the estimated annual emissions from the Project to both the federal and provincial GHG emissions.

Although mitigation will help to reduce GHG emissions, they will not be eliminated; thus, the remaining emission of GHGs from construction activities was classified as a net effect and was carried forward to net effects characterization.



Table 6.8-12: Potential Effects, Mitigation Measures, and Predicted Net Effects

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
<p>Project activities during the construction stage, including:</p> <ul style="list-style-type: none"> • Combustion of fossil fuels in mobile vehicles and equipment that would be used for land clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turn-around areas, and temporary construction camps); • Combustion of fossil fuels for heating temporary buildings during construction; • Combustion of fossil fuels for operation of helicopters for construction purposes; • Combustion of fossil fuels in mobile vehicles and equipment used for decommissioning and reclamation of decommissioned access roads, temporary laydown areas, turn-around areas, staging areas, and temporary construction camps; • Combustion of fossil fuels in mobile vehicles for transportation 	<ul style="list-style-type: none"> • GHG emissions from construction activities 	<ul style="list-style-type: none"> • Hydro One will work with Sustainable Forest Licence holders to manage merchantable timber for the Project. • Temporary disturbances will be reclaimed, and compatible vegetation will be allowed to regrow within the ROW. • Where reasonable and practicable, vehicles and equipment will be turned off when not in use, unless weather and/or safety conditions dictate the need for them to remain turned on and in a safe operating condition. • Hydro One with their contractor(s) will keep equipment well maintained to maximize fuel efficiency. • Slash pile burning will be subject to permits and approvals by appropriate regulatory agencies. Slash piles will be burned in compliance with O. Reg. 207/96 (Government of Ontario 2018). • Multi-passenger vehicles will be used to transport personnel, where practicable. • Electric or hybrid vehicles will be used for operation and 	<p>Net changes in GHG emissions during construction activities</p>



Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
of personnel, materials, and equipment; <ul style="list-style-type: none"> ● Loss of carbon sinks and one-time loss of carbon from land clearing and ● Purchase and consumption of electricity for construction camps. 		maintenance activities where possible. <ul style="list-style-type: none"> ● Hydro One with their contractor(s) will prepare and implement a Dust Control/Air Quality Plan prior to construction. 	

GHG = greenhouse gases; ROW = right-of-way; O. Reg. = Ontario Regulation; Hydro One = Hydro One Network Inc.



6.8.9 Net Effects Characterization

6.8.9.1 Net Effects Characterization Approach

Net effects are described using the significance factors identified in Table 5.6-2. Effects levels are defined for the magnitude of effects characteristics for greenhouse gas emissions in Table 6.8-13.

Table 6.8-13: Magnitude Effect Levels for Greenhouse Gas Emissions

Indicator / Net Effect	Negligible	Low	Moderate	High
GHG emissions during construction activities	<0.1% of the provincial emission levels, or by <0.01% of the federal emission level	>0.1% but <1% of the provincial emission levels, or by <0.1% of the federal emission levels	>1% compared to provincial totals, or by >0.1% compared to national totals.	>5% compared to provincial totals, or by >1% compared to national totals

GHG = greenhouse gases.

6.8.9.2 Net Effects Characterization

A summary of the characterization of net effects of the Project on GHG emissions is provided in Table 6.8-14. Net effects are described after the implementation of effective mitigation measures, and summarized according to direction, magnitude, geographic extent, duration/reversibility, frequency, and probability of the effect occurring following the methods described in Section 5.0.



Table 6.8-14: Characterization of Predicted Net Effects for Greenhouse Gas Emissions

Criteria	Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration/ Irreversibility	Frequency	Likelihood of Occurrence	Significance
GHGs	<ul style="list-style-type: none"> • Predicted CO₂ emissions; • Predicted CH₄ emissions; and • Predicted N₂O emissions. 	GHG emissions during construction activities	Direct	Negative	Low	Beyond regional	Permanent	Continual	Certain	Not Significant

CO₂ = carbon dioxide; N₂O = Nitrous oxide; CH₄ = Methane; GHG = Greenhouse Gas



6.8.9.3 *Net Change in Greenhouse Gas Emissions from Construction*

The net effects associated with construction are anticipated to be minimal due to the short timeframe during which they will be produced. Nonetheless, GHG emissions associated with Project construction activities will additively increase overall provincial and federal GHG emissions, and contribute permanently to global cumulative GHG emissions.

In terms of magnitude, the effects are assessed as 0.40% of the Ontario total and 0.088% of the Canada-wide total. Given the definitions of magnitude presented in Table 6.8-13, this assessment of >0.1% but <1% of the provincial emission levels, and <0.1% of the federal emission levels, rates the net effect as low magnitude.

Therefore, effects of GHG emissions associated with the Project are direct, negative, low magnitude, beyond regional in geographic extent, permanent in duration and continuous in terms of frequency during construction. Due to the nature of the Project activities, the likelihood of occurrence of GHG emissions is certain, even after taking into account the implementation of mitigation measures described in Section 6.8.8.

6.8.10 **Assessment of Significance**

The assessment of significance of net effects of the Project is informed by the interaction between the significance factors, with magnitude, duration and geographic extent being the most important factors.

As set out in Section 5.6.5, a predicted net effect to the GHG criterion would be considered significant if it is assessed as:

- High magnitude beyond a regional geographic extent;
- Occurring for any duration; and
- Representing a management concern.

Significant effects would result in meaningful changes to the provincial and federal inventories (>5% of provincial totals and >2% of federal totals).

For this Project, the predicted net effect on GHG emissions is not anticipated to result in changes that are not in accordance with provincial and federal guidelines. Implementation of proven mitigation measures is expected to reduce the magnitude of net effects on GHG emissions, but not eliminate them fully. The magnitude of the predicted net effect on GHG emissions is low (<1% of the provincial emission levels), and beyond regional. The net effect is anticipated to be a permanent contribution to global cumulative GHG emissions, but is not anticipated to result in a management concern. Overall, the predicted net effects on GHG emissions are assessed as not significant.



6.8.11 Cumulative Effects Assessment

As described in Section 5.7, net effects carried forward in the cumulative effects assessment analysis include net effects with a magnitude greater than negligible and with a likelihood of occurrence of 'probable' or 'certain'. The Project would emit GHGs as a result of the various processes and activities including electricity consumption, land use change, and stationary combustion. These GHGs are expected to combine cumulatively with other reasonably foreseeable developments planned at the provincial and federal level that could emit GHGs. Given the global nature of GHGs, individual RFDs are not identified for this component.

6.8.11.1 Cumulative Effects Characterization

As discussed in the previous section, a cumulative effect related to the emission of GHGs is expected. The summary of cumulative effects on GHG emissions is presented in Table 6.8-15.



Table 6.8-15: Characterization of Cumulative Effects for Greenhouse Gas Emissions

Indicators	Cumulative Net Effect	Direction	Magnitude	Geographic Extent	Duration/ Irreversibility	Frequency	Likelihood of Occurrence	Significance
Predicted CO ₂ emissions; predicted CH ₄ emissions; and predicted N ₂ O emissions.	GHG emissions during construction activities	Negative or Positive	Low	Beyond regional	Permanent	Continual	Certain	Not Significant



6.8.11.2 Assessment of Significance

Due to the permanent nature of GHGs, the Project contributes to global GHG levels both as an individual project and when considered cumulatively with other projects. As described in Section 6.8.8, the implementation of proven mitigation measures during construction at the Project level is expected to reduce the magnitude of the Project's net effects on GHGs.

The emission totals from 2020 used in this assessment are anticipated to remain similar or decrease slightly by the time of construction of the Project due to provincial and federal targets to reduce GHG emissions. As such, these totals are considered to be representative of the totals that will be present during construction.

Given the above, the magnitude of the predicted cumulative effect on GHG emissions is low (<1% of the provincial emission levels). Similar to the net effect from the Project, the cumulative effect is anticipated to be a permanent contribution to global cumulative GHG emissions, but is not anticipated to result in a management concern. Overall, the predicted cumulative effects on GHG emissions are assessed as not significant.

6.8.12 Prediction Confidence in the Assessment

The confidence in the effects assessment for GHGs is moderate to high.

Uncertainty in the assessment has been reduced by making conservative assumptions, planning implementation of known effective mitigation measures and monitoring measures, and available adaptive management measures to address unforeseen circumstances should they arise.

When considering GHG emissions from the Project, uncertainty was addressed through conservative assumptions regarding the amount of land that will potentially be burned, as well as the operation of mobile equipment during the construction stage.

As well, the mitigation measures described in Section 5.4.6 are based on accepted and proven best management practices that are well-understood and have been applied to transmission line projects throughout North America. Best management practices for land clearing include reducing the amount of land cleared to the extent possible. Best management practices for mobile equipment include the regular maintenance of the equipment and practices to reduce the idling of mobile equipment. These measures will potentially reduce the emissions further below the conservative estimate, increasing confidence in the assessment.



6.8.13 Monitoring

The need for monitoring to verify the prediction of the effects assessment and the effectiveness of the mitigation measures to evaluate whether the Project has been constructed, implemented, and operated in accordance with the commitments made in the EA Report was considered for GHGs. Based on the results of the assessment, it was determined that no monitoring programs will be required for GHGs. As described in Section 6.8, Hydro One has made a number of commitments to reduce GHG emissions and corporate-wide GHG emissions, including this Project, will be explored and revised further in Hydro One’s corporate climate change program.

6.8.14 Information Passed on to Other Components

The results of the GHG assessment were not incorporated into other components of the EA.

6.8.15 Criteria Summary

Table 6.8-16 presents a summary of the assessment results for GHGs by criteria.

Table 6.8-16: Greenhouse Gas Emission Assessment Summary

Criteria	Assessment Summary
Greenhouse Gases	<ul style="list-style-type: none"> ● Net effects are assessed to be not significant. ● Cumulative net effects are assessed to be not significant.





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