

7.6 Human Health

This section describes and summarizes the baseline studies undertaken for the Project and presents an assessment of the effects of the Project on human health. The assessment follows the general approach and concepts described in Section 4.0.

The assessment of the effects of the Project on human health evaluates the change in human health that could result from a change in environmental quality (i.e., specifically from changes in chemical concentrations), including the following:

- surface water quality;
- groundwater quality; and
- air quality.

Project-related air emissions consist of volatile compounds; as a result, aerial deposition does not occur and subsequently, the emissions do not bioaccumulate up the food chain. For this reason, changes in soil and food quality (including country foods) are not expected and have not been evaluated further for human health.

The assessment of the change in human health that could result from a change in environmental quality relies on the results of the Human Health Risk Assessment (HHRA) that is provided in Appendix 7.6A. The HHRA follows the risk assessment framework endorsed by provincial and federal regulatory agencies (MOE 2005, Health Canada 2012). The framework provides a structured and clear approach for evaluating potential human health risks, if any, to people associated with changes in environmental quality due to chemical releases from a project.

The assessment of the effects of the Project on human health also evaluates the change in human health (i.e., annoyance) that could result from a change in noise levels. This assessment relies on the results of the noise assessment provided in Appendix 7.6B. The noise assessment follows Health Canada (2016) guidance for evaluating health effects of noise.

7.6.1 Input from Engagement

Issues pertaining to human health that were raised by Aboriginal communities, Aboriginal groups, and stakeholders during engagement and how they are addressed in the environmental assessment (EA) are listed in Table 7.6-1. Comments, responses and follow-up actions are provided in Appendix 2.3A – Aboriginal Engagement Summary Report and Appendix 2.4A – Stakeholder Engagement Summary Report.

ENVIRONMENTAL ASSESSMENT REPORT FOR THE PHASE 1 NEW TRANSMISSION LINE TO PICKLE LAKE PROJECT SECTION 7.0: SOCIO-ECONOMIC ENVIRONMENT BASELINE CHARACTERIZATION AND EFFECTS ASSESSMENT

Table 7.6-1: Summary of Issues Raised during Engagement Related to Human Health

Issue	How Addressed in the Environmental Assessment	Aboriginal Community or Aboriginal Group/Stakeholder
Concern of potential effects of electromagnetic fields (EMF).	There is no compelling scientific evidence that electric and magnetic fields (EMFs) in living and school environments, regardless of distance from transmission lines, cause ill health. Health Canada (2010) states: "When you are inside your home, the magnetic fields from high voltage power lines and transformer boxes are often weaker than those from household electrical appliances." Based on the available weight of evidence, Health Canada "does not consider that any precautionary measures are needed regarding daily exposures to EMFs at [extremely low frequencies] based on the available weight of evidence. There is no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those located just outside the boundaries of power line corridors." Additional information about EMF is provided in Section 3.5.2.3 of the Final EA Report.	<ul style="list-style-type: none"> ■ Engagement with Cat Lake First Nation on the Terms of Reference (ToR). ■ Round Three Part One Engagement with Eagle Lake and Mishkeegogamang First Nation community members.
Right-of-way spraying in future, elders has mentioned the move and move different sickness increase, e.g., cancer (different types).	Vegetation maintenance will be mechanical and not involve spraying of herbicides.	Engagement with Cat Lake First Nation on the ToR
If the land is affected in anyway, the humans will be affected because the human eats, drinks from the land.	Effects to human health from potential changes to water, air quality, and noise are addressed in this section. No predicted change in human health from existing conditions is expected.	Engagement with Eabametoong First Nation on the ToR
My family is an important part of the human environment.	Effects to human health from potential changes to water, air quality, and noise are addressed in this section. No predicted change in human health from existing conditions is expected.	Engagement with Township of Pickle Lake on the ToR

Table 7.6-1: Summary of Issues Raised during Engagement Related to Human Health

Issue	How Addressed in the Environmental Assessment	Aboriginal Community or Aboriginal Group/Stakeholder
Positive effect on humans and their quality of life in remote Northern Ontario.	<p>The overall benefits of the Project include:</p> <ul style="list-style-type: none"> ■ improving capacity and reliability to the region and future customers; ■ enabling connection of remote Aboriginal communities to the north of Pickle Lake; ■ increase potential for economic development; ■ reducing reliance on diesel generation that will, in turn, reduce greenhouse gas emissions; ■ enhance the potential for renewable energy projects; and ■ reduce reliance on the current transmission line, which has been susceptible to a high incidence of outages. 	Engagement with Township of Pickle Lake on the ToR

Note: EA = environmental assessment; EMF = electric and magnetic fields; ToR = Terms of Reference.

7.6.2 Information Sources

Information for the human health baseline was collected from review of the following sources:

- baseline conditions for surface water for surface quality data (Section 5.1.5);
- baseline conditions for groundwater for groundwater quality data (Section 5.2.5);
- baseline conditions for air quality data (Section 5.3.5);
- baseline conditions for noise (Section 5.5.6);
- baseline conditions for traditional land and resource use for information on the communities and types of people present in the study areas and how people use the study areas (Section 8.0);
- baseline conditions for non-traditional land and resource use information for information on the communities and types of people present in the study areas and how people use the study areas (Section 7.5.5); and
- the HHRA (Appendix 7.6A) for calculated risk estimates (i.e., hazard quotients [HQs]).

The information presented in the sources listed above was reviewed in order to understand existing environmental quality, noise levels, the communities and types of people present in the study areas, how people use the study areas and existing conditions for human health. For the purposes of the EA, sufficient information was deemed to be available from the sources listed above to assess the potential effects of the Project on human health.

7.6.3 Criteria and Indicators

Criteria are components of the environment that are considered to have economic, social, biological, conservation, aesthetic, or ethical value (Section 4.1).

- **Human health:** The health of people is important to the well-being of individuals, families and communities. Different members of communities may have different characteristics (e.g., occupancy, use of land and consumption of resources) which may result in different exposures and health risks that may potentially affect human health.

Indicators represent attributes of the environment that can be used to characterize changes to criteria in a meaningful way.

- Environmental quality (i.e., surface water, groundwater and air quality): Project activities can result in changes in environmental quality (i.e., surface water, groundwater and air quality) as a result of the release of chemicals to the environment. People near the Project can potentially be exposed to these chemicals. Exposure to these chemicals can potentially result in health risks to people.
- Noise levels: Project activities can result in changes in noise levels. Noise associated with Project activities may result in health effects to people.

A summary of the criterion and indicators selected for the assessment of Project effects on human health, and the rationale for their selection, are provided in Table 7.6-2.

Table 7.6-2: Human Health Criteria and Indicators

Criteria	Indicators		Rationale
Human health	<ul style="list-style-type: none"> ■ Environmental quality (i.e., surface water, groundwater and air quality). Potential human health risks from exposure to environmental media are quantified, via a Human Health Risk Assessment (Appendix 7.6A), using hazard quotients [HQs] for non-carcinogenic chemicals and incremental lifetime cancer risks [ILCRs] for carcinogenic chemicals. ■ Noise levels. Potential human health effects (i.e., annoyance) from exposure to noise from the Project are quantified using the percent highly annoyed (%HA) level. 		<ul style="list-style-type: none"> ■ The health of people is important to the wellbeing of individuals, families and communities. ■ Different members of communities may have different characteristics (e.g., occupancy, use of land and consumption of resources) which may result in different exposures and health risks that may potentially affect human health.

7.6.4 Assessment Boundaries

7.6.4.1 Temporal Boundaries

The Project is planned to occur during two stages:

- **Construction stage:** the period from the start of construction to the start of operation (approximately 18 to 24 months); and
- **Operation and maintenance stage:** encompasses operation and maintenance activities throughout the life of the Project.

With respect to the change in human health that could result from a change in environmental quality, the assessment of Project effects on human health considers effects that occur during the construction stage only as chemical emissions are considered to be largest during this stage of the Project. This timeframe is intended to be sufficient to capture the effects of the Project.

With respect to the change in human health that could result from a change in noise levels, the assessment of the effects of the Project on human health considers effects that occur during the construction stage and operation and maintenance stage. This timeframe is intended to be sufficient to capture the effects of the Project.

7.6.4.2 Spatial Boundaries

The spatial boundaries for human health are defined to be the same spatial boundaries identified by the air quality and noise disciplines. This is because these disciplines provided the predicted Project-related changes to air quality and noise levels used in the assessment of the effects of the Project on human health. Detailed descriptions and figures of the spatial boundaries for air quality and noise are provided in Sections 5.3 and 5.5, respectively.

7.6.5 Description of the Existing Environment

The existing environment for human health as it relates to environmental quality was described using an assessment of the potential human health risks (i.e., HHRA) associated with exposure to existing (i.e., baseline or background) chemical concentrations measured in the environment. A detailed description of the existing environment for human health for air quality is provided in the HHRA (Appendix 7.6A).

The existing environment for human health as it relates to noise levels was not specifically evaluated as no standards or federal/provincial guidance for assessing acceptable levels of noise under baseline or background conditions exist. Health Canada supports the use of percent highly annoyed (%HA) levels for assessing potential human health effects (i.e., annoyance) from noise; however, the %HA criterion of 6.5% is applicable to the change between baseline and project noise levels. Therefore, with respect to noise levels in the existing environment, an assessment of human health was not evaluated. Note that a general evaluation of existing conditions with respect to noise and the environment is presented by the noise discipline in Section 5.5.6 and summarized in Section 7.6.5.2 below.

7.6.5.1 Baseline Data Collection Methods

Baseline data have been collected for indicators (i.e., surface water, groundwater and air quality, and noise levels) based on their known potential to contribute to changes in human health, and the possibility that the Project may affect these environmental components known to contribute to a change in human health:

- **Surface water and groundwater quality:** Sections 5.1.5 and 5.2.5 present the baseline surface water quality and groundwater quality data in the surface water and groundwater local study areas (LSAs), respectively.
- **Air quality:** Section 5.3.5 presents the baseline conditions for air quality in the air quality LSAs.
- **Noise levels:** Section 5.5.6 presents a detailed description of the baseline conditions for noise in the noise LSAs. A summary is provided in Section 7.6.5.2 below.

With respect to environmental quality, existing conditions for human health as it relates to air quality were specifically evaluated as changes to air quality was determined to be the major source of exposure from the Project (Appendix 7.6A). Air quality in the human health LSAs were evaluated based on existing chemical concentrations in air and calculated risk estimates (i.e., HQs presented in the HHRA [Appendix 7.6A]). The HQ is the ratio of the chemical exposure likely to be incurred by people under existing conditions (i.e., background air concentrations) and the amount of chemical exposure that is considered to be safe (i.e., toxicity reference value [TRVs]). Hazard quotients of less than one are associated with negligible human health risks. Hazard quotients of greater than one indicate the potential for human health risks.

7.6.5.2 Baseline Conditions

A detailed description of existing conditions for surface water quality is provided in Section 5.1.5 and summarized in this section. Surface water quality in the human health LSAs was compared to relevant guidelines including:

- Provincial Water Quality Objectives (PWQOs) (OMOEE 1999);
- Canadian Water Quality Guidelines (CWQGs) (CCME 1999); and
- Ontario Drinking Water Standards (ODWS) (MOE 2002).

Surface water quality in the human health LSAs generally meets relevant guideline values (PWQOs and others), with the exception of iron, cadmium and phosphorus, which exceeded the PWQOs (Section 5.1). Average concentrations of iron exceeded the Health Canada Guideline for Canadian Drinking Water Quality (GCDWQ) and the ODWS; however, the guideline/standard is based on aesthetics (taste and staining of laundry) and Health Canada notes that iron toxicity due to drinking water sources has not been documented (Health Canada 2014, Province of Ontario 2006). Average concentrations of cadmium met the GCDWQ and the ODWS. Phosphorus is generally not a human health concern but rather concerns with this parameter are typically related to aesthetics (i.e., nuisance algal blooms).

A detailed description of existing conditions for groundwater quality is provided in Section 5.2.5. Information on groundwater quality is limited to whether the water is fresh or mineralized. There is no information available on existing conditions in terms of chemical concentrations.

A detailed description of existing conditions for air quality is provided in Section 5.3.5 and summarized in this section. Overall, monitoring data indicate that background air quality surrounding the Project is below the relevant provincial and federal ambient air quality guidelines, criteria and standards. The same baseline air quality concentrations were used for all three corridors.

A detailed description of existing conditions for noise levels is provided in Section 5.5.6 and summarized in this section. The daytime and nighttime existing (Baseline Characterization) noise levels for identified sensitive human receptors (i.e., points of reception [PORs] near the connection facilities and along the corridor) would be similar to those presented in Table 7.6-3.

Table 7.6-3: Summary of Baseline Characterization Noise Levels

Descriptor	Existing Daytime (07:00-19:00) Noise Level ($L_{eq,day}$)	Existing Nighttime (19:00-07:00) Noise Level ($L_{eq,night}$)
Potential PORs near transformer station	45	40
Potential PORs near connection facilities options and along the corridors	45	35

Note:

POR = point of reception.

A detailed description of existing conditions for human health as it relates to air quality is provided in the HHRA (Appendix 7.6A), and is summarized below:

- Potential human health risks from chemicals of potential concern (COPCs) in air with available background concentrations were considered to be negligible (i.e., HQs were less than one; HQ = 0.17 for oxides of nitrogen (NO_x) [as nitrogen dioxide {NO₂}] for the 1-hour averaging period, HQ = 0.35 for particulate matter less than 10 micron (µm) in diameter (PM₁₀) for the 24-hour averaging period).
- For diesel particulate matter (DPM) for the annual averaging period, potential human health risks could not be determined because background air concentrations were not available.
- Because the same baseline air quality concentrations were used for all three corridors, the calculated HQs apply to all three corridors.

A detailed description of existing conditions for human health as it relates to noise levels is not provided for the reasons discussed previously (Section 7.6.5).

7.6.6 Potential Project-Environment Interactions

Potential Project-environment interactions were identified through a review of the Project Description and existing environmental conditions. The linkages between Project components and activities and potential effects to human health are identified in Table 7.6-4.

Table 7.6-4: Project-Environment Interactions for Human Health

Criteria	Indicator	Project Phase		Description of Potential Project-Environment Interaction
		Construction (includes access road and ROW preparation, installation, and reclamation activities)	Operation (includes operation and maintenance activities)	
Human Health	Groundwater quality	✓	–	Changes to groundwater quality from transportation of personnel, materials and equipment, hazardous materials, solid and liquid handling
	Groundwater quality	✓	–	Changes to groundwater quality from excavations for foundations and dewatering excavations
	Groundwater quality	✓	✓	Changes to groundwater quality may be caused by disturbing shallow soils with potentially pre-existing contamination near Pickle Lake TS
	Groundwater quality	✓	✓	Changes to groundwater quality from the use of explosives and blasting to create level areas for transmission structures, access roads and for foundation excavations
	Groundwater quality	✓	✓	Changes to groundwater quality associated with operation of construction camp water supply wells
	Surface water quality	✓	–	Changes to surface water quality from short-term wastewater discharges
	Surface water quality	✓	✓	Changes to surface water quality from the transport and delivery of airborne particulate matter to nearby waterbodies
	Surface water quality	✓	–	Changes to surface water quality from the wash-off of trash and leachate at waste handling and storage facilities to nearby waterbodies
	Surface water quality	✓	✓	Changes to surface water quality from the wash-off of spills and leaks to nearby waterbodies

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NEW TRANSMISSION LINE TO PICKLE LAKE PROJECT
SECTION 7.0: SOCIO-ECONOMIC ENVIRONMENT BASELINE
CHARACTERIZATION AND EFFECTS ASSESSMENT**

Table 7.6-4: Project-Environment Interactions for Human Health

Criteria	Indicator	Project Phase		Description of Potential Project-Environment Interaction
		Construction (includes access road and ROW preparation, installation, and reclamation activities)	Operation (includes operation and maintenance activities)	
Human Health	Surface water quality	✓	—	Changes to surface water quality from the wash-off of explosives spills and residues from blasting activities to nearby waterbodies
	Surface water quality	✓	—	Changes to surface water quality from the wash-off of organic debris from mechanical vegetation maintenance activities to adjacent waterbodies
	Surface water quality	—	—	Changes to surface water quality from the wash-off of organic debris from work sites to nearby waterbodies, and/or increased rates of erosion in disturbed and exposed areas with sediment transport and delivery to adjacent waterbodies
	Surface water quality	✓	—	Changes to surface water quality during short-term water diversions at waterbody crossings
	Surface water quality	✓	✓	Changes to surface water quality due to changes in reach and cross-section hydraulics at waterbody crossings
	Air Quality	✓	—	Changes to ambient concentrations due to criteria air contaminant (CAC) and fugitive dust emissions
	Noise Levels	✓	✓	Changes to noise emissions could increase existing noise levels at PORs

Notes:

CAC = criteria air contaminant; PORs = points of reception; TS = Transmission Structures; ✓ = A potential Project-environment interaction could result in potential effects to human health; _ = No plausible interaction was identified.

For the Project components and activities affecting groundwater and surface water quality, there were no net effects predicted based on effective implementation of impact management measures or net effects were determined to be not significant (Sections 5.2 and 5.1, respectively). Therefore, net effects to human health from changes in groundwater and surface water quality as a result of the Project components and activities are not expected and further assessment of groundwater and surface water quality is not warranted as it relates to a change in human health. Potential Project-environment interactions were identified for human health for air quality and noise levels; therefore, these are carried forward for further assessment.

7.6.7 Potential Effects, Impact Management Measures, and Net Effects

This section presents the potential effects, appropriate impact management measures, and predicted net Project effects for human health. Unless otherwise noted, the discussion of potential effects, impact management measures and net effects apply to all corridors. A summary of the potential effects, impact management measures and net effects are presented in Table 7.6-5. Potential effects with no predicted net effect after implementation of impact management measures identified in Table 7.6-5 are not carried forward to the net effects assessment.

7.6.7.1 Changes to Ambient Concentrations due to Criteria Air Contaminant (CAC) and Fugitive Dust Emissions

Potential Effects

The assessment of the potential change in human health that could result from a change in air quality from CAC and fugitive dust emissions to air from construction activities is based on predicted chemical concentrations in air and calculated risk estimates (i.e., HQs) presented in the HHRA (Appendix 7.6A).

As described in Appendix 7.6A, the HHRA follows the risk assessment framework endorsed by provincial and federal regulatory agencies (MOE 2005, Health Canada 2012). The framework provides a structured and clear approach for evaluating potential human health risks, if any, to people associated with changes in environmental quality due to chemical releases from a project. For there to be a potential health risk, the following three conditions must be met (Figure 7.6-1).

- a receptor (i.e., people) must be present;
- there must be a way by which the receptor can come into contact with the chemical (i.e., an exposure pathway); and
- a chemical must be present at a concentration that could be harmful (i.e., a chemical of potential concern).

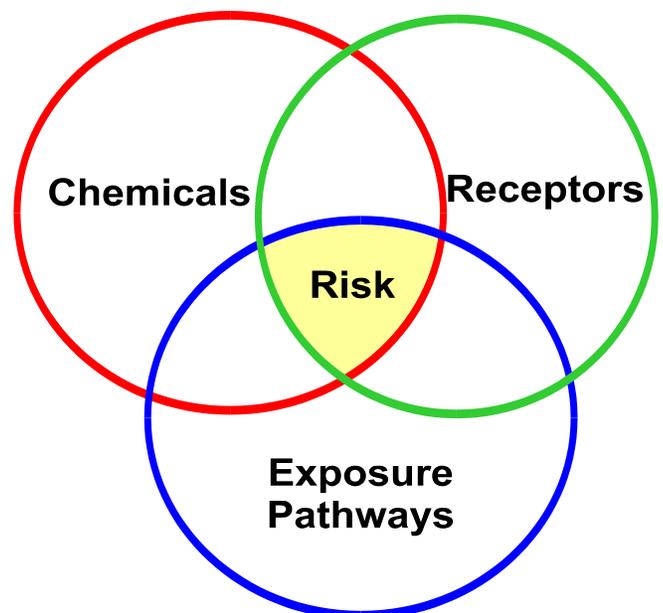


Figure 7.6-1: Three Conditions for Potential Health Risk

If any of these three conditions are not present, there would be no potential for health risks. For example, if a receptor and a COPC are present but there is no way for the receptor to come into contact with the COPC (i.e., an exposure pathway is not present), there would be no potential health risk.

For the Project, the potential change in human health that could result from a change in air quality from CACs and fugitive dust emissions to air during construction was assessed for potential receptors in the air quality LSAs that could be directly exposed to CACs and fugitive dust in air via inhalation. Human health receptors may include people living in (e.g., residents), working in or visiting (e.g., recreational users) the area that may be exposed to COPCs in the air quality LSAs. These receptors include people of all ages, including those at sensitive life stages

such as infants, children and the elderly. A resident was selected as the main human health receptor for evaluation given that people may reside in the air quality LSAs. Workers were not identified as human health receptors for the assessment because the potential change in health of workers is protected through compliance with appropriate workplace practices following requirements defined in the Ontario *Occupational Health and Safety Act* and other applicable regulatory instruments.

Taking into consideration impact management measures and using a number of conservative assumptions, air concentrations over a representative approximately 5 kilometre (km) stretch of Project construction were predicted at approximately 100 metres (m) intervals from the 40-m-wide transmission line alignment ROW to the outer boundary of the LSAs (to a distance of approximately 1.5 km on either side of the ROW) using a screening dispersion model (as detailed by the air quality discipline in Section 5.3). Air concentrations were predicted based on a 1-hour averaging period, 24-hour averaging period and annual averaging period. The predictions generated apply to all three corridors. The predicted air concentrations were used as input to the HHRA to evaluate potential health risks associated with short-term or acute (1-hour and 24-hour) and long-term or chronic (annual) exposures by people.

Potential health risks were evaluated through comparison of predicted air concentrations against 1) air quality thresholds available from regulatory agencies, and 2) through the calculation of risk estimates (i.e., HQs). Comparison to air quality thresholds was considered to represent a conservative evaluation of the potential for the predicted concentrations to result in negative effects; consequently, chemicals with predicted concentrations less than air quality thresholds were considered to pose a negligible risk to human health. Chemicals with predicted concentrations greater than air quality thresholds were identified as COPCs and were evaluated further through the calculation of HQs.

HQs of less than one are associated with negligible human health risks; conversely, HQs greater than one indicate the potential for human health risks. Typically in an assessment of potential human health risks, consideration is given to both non-carcinogenic and carcinogenic effects; however, emissions to air from the Project are predicted to occur only during the construction stage of the Project. The construction stage is expected to take approximately two years. People at a particular location would, therefore, be predicted to be exposed to chemicals emitted from the Project for a maximum of approximately two years. However, construction activities affecting air quality will be sequentially staggered. This duration is a small fraction of a person's expected lifespan and exposure to emissions for this brief period of time is unlikely to appreciably affect the risk of developing cancer over a lifetime; therefore, only the potential for non-carcinogenic health effects were assessed and incremental lifetime cancer risks (ILCRs) were not calculated.

The following summary of potential human health risks from CAC and fugitive dust emissions from construction activities is based on the results of the HHRA:

- Potential human health risks from short-term or acute (i.e., 1-hour) exposure to NO_x (as NO₂) were identified at distances of approximately 100 and 200 m from the 40-m-wide transmission line alignment ROW based on predicted concentrations from Project construction activities and from predicted concentrations from Project construction activities in combination with background air concentrations (calculated HQs of 1.7 and 1.9, respectively at 100 m and calculated HQs of 1.1 and 1.3, respectively at 200 m).

- The exceedances of the target HQ of 1 at 100 and 200 m were examined further with respect to potential human health receptors within this distance of the 40-m-wide transmission line alignment ROW for each of the three corridors. For all three corridors, the Central Patricia residential area overlaps with the Project footprint. The closest potential human health receptor in the Central Patricia residential area is a church rectory located at 175 m from the 40-m-wide transmission line alignment ROW. For the Corridor Alternative Around Mishkeegogamang and Corridor Alternative Through Mishkeegogamang, the Silver Dollar residential area is within 152 m of the Project footprint. The Mishkeegogamang First Nation Reserve is located approximately 100 m from the 40-m-wide transmission line alignment ROW. This indicates the potential for risks to people in these residential areas from acute or short-term exposure to NO_x (as NO₂).
- Potential human health risks from other chemicals over the averaging times (1-hour, 24-hour and annual) were considered to be negligible.

Although potential health risks from acute or short-term exposure to NO_x (as NO₂) were identified for all three corridors in the HHRA, there is a low likelihood of any human receptor being exposed when the following points are considered:

- Exposures and health risks to people were determined based on predicted maximum concentrations of NO_x in air. The maximum concentrations may occur anywhere along a representative 5 km segment of Project construction and are not necessarily representative of concentrations at a specific location (e.g., a residence or commercial/industrial building in the residential areas of Central Patricia and Silver Dollar and the Mishkeegogamang First Nation Reserve).
- A person must be present at the exact location and time that the predicted maximum concentration is occurring for there to be a potential for a health effect.
- As indicated in Section 5.3.6, once the preferred corridor is selected, potential sensitive human receptors within the Project footprint will be confirmed and avoided through detailed design, if required. Potential receptors located outside of the Project footprint, but within 100 m of the Project footprint will be verified with respect to their presence and use. Any confirmed receptors determined to be of use outside of, but within 100 m of the Project footprint will be avoided as a receptor as part of the Project detailed design.

Impact Management Measures

The impact management measures described for air quality (Section 5.3) are applicable. In brief, where reasonable and practical, vehicles and equipment will be turned off when not in use and will be regularly serviced, maintained and inspected for leaks. Slash piles will be burned in compliance with O. Reg. 207/96. In addition, other dust control practices (e.g., wetting with water) will be implemented. Dust-generating activities will be reduced, as practical, during periods of high wind. Multi-passenger vehicles will be used to transport personnel, where practical.

Net Effects

After implementation of the impact management measures described for air quality (Section 5.3), there is a net effect of changes to ambient concentrations on human health and this potential effect is carried forward to the net effects characterization.

7.6.7.2 Changes to Noise Emissions During Construction Stage Activities Could Increase Existing Noise Levels at PORs

Potential Effects

The assessment of the potential change in human health that could result from a change in noise emissions from construction stage activities is based on predicted noise levels and calculated change in %HA levels presented in the noise assessment (Appendix 7.6B). As described in Appendix 7.6B, the noise assessment uses the %HA level put forward by Health Canada (2016) to assess potential for human health effects (i.e., annoyance) from noise.

Using a number of conservative assumptions, noise levels were predicted for construction stage activities by the noise discipline (Section 5.5). For construction activities, four modelling scenarios were considered:

- construction of the transmission line;
- construction of the transformer station and connection facility;
- construction of a construction camp; and
- construction of an access road.

Noise levels were predicted at 50 m increments from the transmission line alignment ROW, transformer station/connection facility, construction camp, and access road. The %HA levels were then calculated from the noise levels and provided to the human health discipline. The change in %HA levels were compared to the Health Canada criterion of 6.5% to assess potential human health effects (i.e., annoyance) risks from noise associated with construction activities.

The following summary with respect to noise levels potentially generated by the Project from construction activities and human health effects (i.e., annoyance) is based on the results of the noise assessment (Appendix 7.6B):

- For construction activities related to the transmission line alignment ROW and access roads, the change in %HA was greater than the Health Canada criterion of 6.5% at distances of up to 300 m from these Project components. However, although exceedances were noted, construction noise is expected to be temporary in nature, occur only during specific activities and be localized to the area under construction along the transmission line alignment ROW or access roads. In addition, the %HA criterion is applicable to long-term project noise (i.e., more than one year) and construction activities at any specific location related to the transmission line alignment ROW and access roads are expected to take less than one year. Overall, health effects (i.e., annoyance) from exposure to construction noise are not expected to human receptors along the transmission line alignment ROW or access roads.
- For construction activities related to the temporary construction camps, the change in %HA was greater than the Health Canada criterion of 6.5% at a distance of up to 300 m from this Project component. However, it is assumed that worker health will be protected through compliance with appropriate workplace practices following requirements defined in the Ontario *Occupational Health and Safety Act* and other applicable regulatory instruments. Therefore, noise from construction activities related to the temporary construction camps have not been considered for further evaluation with respect to human health.

- For construction activities related to the transformer station/connection facility, the change in %HA was greater than the Health Canada criterion of 6.5% at a distance of up to 350 m from this Project component. A portion of the residential area in Central Patricia is located within the proposed transformer station footprint, as well as outside of the transformer station footprint for both the Preliminary Proposed Corridor, Corridor Alternative Through Mishkeegogamang and Corridor Alternative Around Mishkeegogamang. The closest human receptor location to the transformer station footprint for all three corridors was a church rectory located approximately 175 m from the transformer station footprint. The change in %HA at this location is greater than Health Canada criterion of 6.5%. Given that the locations of the transformer station and connection facility are stationary and construction activities are not transient when compared to the construction of the transmission line alignment ROW and access roads, there is potential for human health effects (i.e., annoyance) to human receptors in proximity during construction of the transformer station and connection facility. As noted in Appendix 7.6B, health effects related to noise are in terms of annoyance and by extension have a potential to negatively affect human health. With that said, although a potential for health effects (i.e., annoyance) has been predicted to human receptors near the transformer station, it is important to note the following points for context:
 - The noise assessment relies on predicted noise levels and calculated %HA levels provided by the noise discipline. A number of conservative assumptions were used in the noise modelling such that predicted levels have likely been overestimated. For a summary of the conservative assumptions used in the noise modelling, refer to Section 5.5.
 - There is no potential for a change in noise levels during the nighttime period as Project construction will typically occur during one 10-hour shift per day, generally within the daytime period (i.e., 07:00 to 19:00).
 - The impact management measures identified in Section 5.5 (and summarized below) will be implemented at a minimum during construction stage activities.
 - An engagement program will be in place to notify residences of upcoming work.
 - The Health Canada %HA criterion is applicable at the community level; however, in this assessment, %HA has been conservatively used to assess the potential for health effects (i.e., annoyance) at an individual human receptor location (i.e., church rectory).
 - As noted in Section 5.5, once the preferred corridor is selected, potential sensitive human receptor locations within the Project footprint will be confirmed and avoided through detailed design, if required. Potential sensitive human receptor locations outside of the Project footprint, but within 100 m of the Project footprint will be verified with respect to their presence and use. Any confirmed receptor locations determined to be of use outside of, but within 100 m of the Project footprint will be avoided through detailed design.

Impact Management Measures

The impact management measures described for noise (Section 5.5) are applicable. In brief, numerous impact management measures will be implemented to minimize the potential impact of noise emissions over the course of the Project. Primarily, Wataynikaneyap and its contractors will comply with local municipal noise by-laws and the MOECC Model Municipal Noise Control Bylaw (i.e., NPC-115). In addition, construction activities will typically occur during one 10-hour shift per day, generally within the daytime period (i.e., 07:00 to 18:00). Night-time work is not anticipated. In the event construction will occur beyond the daytime period, Wataynikaneyap and its contractors will review impact management measure requirements. During operations and maintenance activities, Wataynikaneyap and its contractors will comply with local municipal noise by-laws and the MOECC Model Municipal Noise Control Bylaw (i.e., NPC-115). Noise abatement equipment on machinery will be properly maintained and in good working order.

Net Effects

After implementation of the impact management measures identified for noise (Section 5.5) and summarized above, there is a net effect of changes to noise emissions levels during construction stage activities on human health and this potential effect is carried forward to the net effects characterization.

7.6.7.3 Changes to Noise Emissions During Operation and Maintenance Stage Activities Could Increase Existing Noise Levels at PORs

Potential Effects

The assessment of the potential change in human health that could result from a change in noise emissions from operation and maintenance stage activities is based on predicted noise levels and calculated change in %HA levels presented in the noise assessment (Appendix 7.6B). As described in Appendix 7.6B, the noise assessment uses the %HA level put forward by Health Canada (2016) to assess the potential for health effects (i.e., annoyance) from noise.

For operation and maintenance stage activities, three scenarios were considered:

- operation and maintenance of the ROW, fencing, transmission line, conductors, tower foundations and permanent access roads;
- operation and maintenance of the transformer station and connection facility; and
- electricity transmission.

The greatest effects to noise during the operation and maintenance stage are expected to occur during the operation of the transformer station and connection facility as they will operate continuously over the life of the Project. Therefore, noise levels associated with operation and maintenance of the transformer station and connection facility were predicted by the noise discipline. Noise levels were predicted at PORs identified within close proximity to the transformer station and connection facility. The %HA levels were then calculated from the noise levels and provided to the human health discipline. The change in %HA levels were compared to the Health Canada criterion of 6.5% to assess potential for human health effects (i.e., annoyance) from noise associated with operation and maintenance stage activities. For operation and maintenance stage activities, the change in %HA was less than the Health Canada criterion of 6.5% for all receptors in the vicinity of the transformer station and connection facilities.

Impact Management Measures

The impact management measures described for noise (Section 5.5) are applicable. In brief, numerous impact management measures will be implemented to minimize the potential impact of noise emissions over the course of the Project. Primarily, Wataynikaneyap and its contractors will comply with local municipal noise by-laws and the MOECC Model Municipal Noise Control Bylaw (i.e., NPC-115). In addition, construction activities will typically occur during one 10-hour shift per day, generally within the daytime period (i.e., 07:00 to 18:00). Night-time work is not anticipated. In the event construction will occur beyond the daytime period, Wataynikaneyap and its contractors will review impact management measure requirements. During operations and maintenance activities, Wataynikaneyap and its contractors will comply with local municipal noise by-laws and the MOECC Model Municipal Noise Control Bylaw (i.e., NPC-115). Noise abatement equipment on machinery will be properly maintained and in good working order. Where reasonable and practical, 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.

Net Effects

With implementation of the impact management measures provided by noise (Section 5.5) and summarized above, there is no net effect of changes to noise emissions during operation and maintenance stage activities on human health; therefore, this potential effect is not carried forward to the net effects assessment.

Table 7.6-5: Potential Effects, Impact Management Measures, and Predicted Net Effects for Human Health

Project Component or Activity	Potential Effect	Impact Management Measures	Net Effect
Project activities during the construction stage: <ul style="list-style-type: none"> ■ transportation of personnel, materials and equipment; and; ■ hazardous materials, solid and liquid waste handling. 	Changes to groundwater quality from transportation of personnel, materials and equipment, hazardous materials, solid and liquid handling may affect human health.	<ul style="list-style-type: none"> ■ Wataynikaneyap will with their contractor(s) prepare and implement a Spill Prevention and Emergency Response Plan (Section 9.3.1.13) that describes spill prevention and response procedures, clearly indicates responsibilities for communication and reporting, and provides contact names and details for individuals to be contacted in case of emergency. ■ Wataynikaneyap will with their contractor(s) prepare and implement Waste Management Plans (Sections 9.3.1.9, 9.3.1.10 and 9.3.1.11) that describe the appropriate management of solid, liquid and hazardous waste, including: <ul style="list-style-type: none"> ■ construction related garbage, debris, and surplus materials; ■ hazardous materials such as used oil, filter and grease cartridges, lubrication containers; and ■ domestic garbage and camp waste (i.e., food and grey water). 	No net effect
Project activities during the construction stage: <ul style="list-style-type: none"> ■ Foundation installation including dewatering activities. 	Changes to groundwater quality from excavations for foundations and dewatering excavations may affect human health.	<ul style="list-style-type: none"> ■ Impact management measures are likely not required as changes to water quality are anticipated to recover to preconstruction water quality during construction or into operation. ■ If water withdrawal or dewatering is required to install foundations and anchors or for any minor batch plant operations, obtain a permit to take water from MOECC if more than 50,000 L/d is to be withdrawn. 	No net effect
Project activities during the construction stage: <ul style="list-style-type: none"> ■ Construction of access roads and trails, fencing, transformer station, connection facility, and transmission line alignment ROW. 	Changes to groundwater quality may be caused by disturbing shallow soils with potentially pre-existing contamination near Pickle Lake TS. Such movement of potentially contaminated soils may lead to contamination of groundwater and may affect human health.	A Phase I Environmental Site Assessment (ESA) was completed at the proposed Pickle Lake TS location that is suspected of having contamination issues. Based on the results of the Phase I ESA, a Phase II ESA was completed. Implementation of appropriate remediation, if required, will be done as a part of this Project.	No net effect
Project activities during the construction stage: <ul style="list-style-type: none"> ■ Use of explosives and blasting to create level areas for transmission structures, roads, and for foundation excavations. 	Changes to groundwater quality from the use of explosives and blasting to create level areas for transmission structures, access roads and for foundation excavations may affect human health.	<ul style="list-style-type: none"> ■ Use of explosives for foundation excavations and access roads will be limited to the extent possible. ■ A Blast Management Plan will be prepared and implemented. An overview of this Plan is provided in Section 9.3.1.15. 	No net effect
Project activities during the construction stage: <ul style="list-style-type: none"> ■ Pumping of wells for supply of water to temporary construction camps. 	Changes to groundwater quality associated with operation of construction camp water supply wells may affect human health.	<ul style="list-style-type: none"> ■ Well water will be tested before being used at temporary construction camps. ■ If groundwater contamination is identified during construction then an investigation will be completed and the water will be managed and disposed of as per appropriate regulations and the ESMP (Section 9.0). 	No net effect
Project activities during the construction stage: <ul style="list-style-type: none"> ■ Discharges of wastewater from construction, vehicle and equipment wash, and domestic activities. 	Changes to surface water quality (suspended solids and chemical constituents) during construction from short-term discharges may affect human health.	<ul style="list-style-type: none"> ■ Construction water will be discharged in compliance with O. Reg. 387/04 as amended by O. Reg. 64/16 and/or O. Reg. 63/16 where applicable, and good industry practice. ■ Wash water will be collected in closed-loop recycle systems, or contained and hauled to existing municipal Waste Water Treatment Plants (WWTPs). ■ Grey water will be discharged to leaching beds constructed at the temporary construction camps. All required permits and authorizations will be acquired for construction and operation of the leaching beds. Leaching beds will be designed and constructed according to R.R.O 1990, Reg. 358: Sewage Systems design requirements. ■ Grey water from temporary construction camps will be disposed of in compliance with the Ontario Building Code. ■ Temporary construction camps are anticipated to be located in communities with existing wastewater collection and disposal systems. ■ Domestic effluent will be removed from temporary construction camps by approved disposal trucks and disposed of at municipal waste water treatment plants with authorization and capacity to accept this waste. ■ Install, monitor, and manage appropriate erosion and sedimentation control measures to minimize or avoid sediment mobilization to drainages, or waterbodies. Adequate and appropriate erosion and sedimentation control materials shall be on-site and available prior to commencement of construction. 	No net effect

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Table 7.6-5: Potential Effects, Impact Management Measures, and Predicted Net Effects for Human Health

Project Component or Activity	Potential Effect	Impact Management Measures	Net Effect
<p>Project activities during the construction stage:</p> <ul style="list-style-type: none"> ■ 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, turn-around areas, temporary laydown areas and temporary construction camps); ■ surface water management and erosion control; ■ borrow pits for aggregates; ■ concrete mixing on-site or in batch plants; ■ operation of vehicles, construction equipment and diesel generators; and ■ transportation of personnel, materials and equipment. 	<p>Changes to surface water quality (suspended solids and chemical constituents) during construction from the transport and delivery of airborne particulate matter to nearby waterbodies may affect human health.</p>	<p>Construction stage:</p> <ul style="list-style-type: none"> ■ For vehicles and equipment owned/rented by Wataynikaneyap only properly functioning vehicles and equipment will be operated. ■ Vehicles and equipment will be regularly serviced, maintained and inspected for leaks. ■ Where reasonable and practical, 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. ■ Multi-passenger vehicles will be used to transport personnel, where practical. ■ Soil and aggregate materials will be transported wetted or under cover. ■ Vehicle speeds at work sites and on access roads will be limited. ■ Dust control practices (e.g., wetting with water) will be employed at concrete batch plants, work sites and on access roads near residential areas. ■ Progressive reclamation of disturbed areas will be practised. Natural recovery is the preferred method over seeding of reclamation on level terrain where erosion is not expected. If seeding is required, seed erosion prone areas with a native cover crop and certified seed mix approved by the applicable regulatory agency, as soon as feasible after construction. Seeding will follow as close as possible to final cleanup and topsoil material replacement pending seasonal or weather conditions. Soil stockpiles will be vegetated, where appropriate (e.g., if soils are prone to wind erosion). ■ Topsoil handling will be suspended during high wind conditions, where practical and as required. ■ Stripped soil will be stored outside waterbody buffers. Stripped soils will not be placed in surface drainage channel or wetland. 	<p>No net effect</p>
<p>Project activities during the operation and maintenance stage:</p> <ul style="list-style-type: none"> ■ Transportation of personnel, materials, and equipment. 	<p>Changes to surface water quality (suspended solids and chemical constituents) during construction from the transport and delivery of airborne particulate matter to nearby waterbodies may affect human health.</p>	<p>Operation and maintenance stage:</p> <ul style="list-style-type: none"> ■ Only properly functioning vehicles and equipment will be operated. ■ Vehicles and equipment will be regularly serviced, maintained and inspected for leaks. ■ Where reasonable and practical, 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. ■ Multi-passenger vehicles will be used to transport personnel, where practical. ■ Soil and aggregate materials will be transported wetted or under cover. ■ Vehicle speeds at work sites and on access roads will be limited. 	<p>No net effect</p>
<p>Project activities during the construction stage:</p> <ul style="list-style-type: none"> ■ Hazardous materials, solid and liquid waste handling. 	<p>Changes to surface water quality (suspended solids and chemical constituents) during construction from the wash-off of trash and leachate at waste handling and storage facilities to nearby waterbodies may affect human health.</p>	<ul style="list-style-type: none"> ■ A Spill Prevention and Emergency Response Plan will be prepared and implemented. An overview of this plan is provided in Section 9.3.1.12. ■ Waste Management Plans will be prepared and implemented to manage liquid and solid waste. An overview of these draft plans is provided in Sections 9.3.1.9, 9.3.1.10 and 9.3.1.11. ■ Portable, secure, solid waste receptacles will be provided on work sites, temporary laydown areas and temporary construction camps and periodically emptied. ■ Solid waste handling and storage facilities at temporary construction camps will be sited outside a minimum 30 m buffer around waterbodies. ■ Solid waste handling and storage facilities at temporary construction camps will be provided with drainage controls. ■ Solid waste will be managed and disposed of in compliance with O. Reg. 347 as amended by O. Reg. 86/16 under the <i>Environmental Protection Act</i>. ■ Personnel will be trained in proper solid waste handling and management procedures. ■ Waste management plans (Sections 9.3.1.9, 9.3.1.10, and 9.3.1.11) will be in place that describes the appropriate management of waste, including: <ul style="list-style-type: none"> ■ construction-related garbage, debris, and surplus materials; ■ hazardous materials such as used oil, filter and grease cartridges, lubrication containers; and ■ domestic garbage and camp waste (i.e., food and grey water). 	<p>No net effect</p>

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Table 7.6-5: Potential Effects, Impact Management Measures, and Predicted Net Effects for Human Health

Project Component or Activity	Potential Effect	Impact Management Measures	Net Effect
<p>Project activities during the construction stage:</p> <ul style="list-style-type: none"> ■ hazardous materials, solid and liquid waste handling; ■ re-fueling, service and maintenance of vehicles and construction equipment; ■ operation of vehicles, construction equipment and diesel generators; and ■ transportation of personnel, materials, and equipment. <p>Project activities during the operation and maintenance stage:</p> <ul style="list-style-type: none"> ■ Transportation of personnel, materials, and equipment. 	<p>Changes to surface water quality (chemical constituents) during construction and operation from the wash-off of spills and leaks to nearby waterbodies may affect human health.</p>	<p>Construction stage:</p> <ul style="list-style-type: none"> ■ The transportation, storage, and handling of fuels will be in compliance with the <i>Technical Standards and Safety Act 2000</i> (Government of Ontario 2010) and Canada's <i>Transportation of Dangerous Goods Act</i> (Government of Canada 1992). ■ A Spill Prevention and Emergency Response Plan will be prepared and implemented. An overview of this plan is provided in Section 9.3.1.12. ■ Waste Management Plans will be implemented to manage liquid and solid waste. An overview of these draft plans is provided in Sections 9.3.1.9, 9.3.1.10 and 9.3.1.11. ■ Fuel and hazardous materials will be transported in approved containers in licensed vehicles. ■ Fuel and hazardous materials will be stored and handled in designated areas with appropriate secondary containment. ■ Re-fueling, service and maintenance of vehicles and equipment will generally be carried out in designated areas at temporary construction camps and temporary laydown areas a minimum of 30 m from waterbodies. Designated areas will be designed and constructed to collect and contain minor leaks and spill. Appropriate practices will be employed to prevent minor leaks and spills. If re-fueling within 30 m of a waterbody cannot be avoided, a spill prevention plan will be implemented. Only properly functioning vehicles and equipment will be operated. ■ Vehicles and equipment will be regularly serviced, maintained and inspected for leaks. ■ Machinery and equipment are to arrive on site in a clean condition and will be inspected and maintained routinely to avoid fluid leaks. ■ Spill response kits will be provided in fuel and hazardous materials storage and handling facilities at temporary construction camps and temporary laydown areas, in on-site work areas and/or in vehicles and equipment, and personnel will be trained in spill response practices and procedures. Spills and leaks will be contained and cleaned up as soon as possible following incidents. <p>Operation and maintenance stage:</p> <ul style="list-style-type: none"> ■ Hazardous materials will be transported in approved containers in licensed vehicles. ■ Vehicles and equipment will be regularly serviced, maintained and inspected for leaks. ■ Only properly functioning vehicles and equipment will be operated. ■ Spill response kits will be provided in vehicles and equipment. 	<p>No net effect</p>
<p>Project activities during the construction stage:</p> <ul style="list-style-type: none"> ■ Use of explosives and blasting to create level areas for transmission structures, roads and for foundation excavations. 	<p>Changes to surface water quality (chemical constituents) during construction from the wash-off of explosives spills and residues from blasting activities to nearby waterbodies may affect human health.</p>	<ul style="list-style-type: none"> ■ Wataynikaneyap with their contractor(s) will prepare and implement a Blasting Management Plan (Section 9.3.1.15) that describes specific measures that would be implemented if blasting is required. ■ Wataynikaneyap with their contractor(s) will use explosives if excavation to remove materials for foundation systems and roads is not feasible. 	<p>No net effect</p>
<p>Project activities during the operation and maintenance stage:</p> <ul style="list-style-type: none"> ■ Mechanical vegetation maintenance along ROW at an appropriate height to protect the facility and improve public and worker safety. 	<p>Changes to surface water quality (suspended solids and chemical constituents) during operation from the wash-off of organic debris from mechanical vegetation maintenance activities to adjacent waterbodies may affect human health.</p>	<ul style="list-style-type: none"> ■ Vegetation will be managed according to clearance-to-ground levels to allow for increased vegetation height. ■ Removed vegetation will be immediately transported outside a waterbody buffer zone (30 m), and above its high water mark. 	<p>No net effect</p>

Table 7.6-5: Potential Effects, Impact Management Measures, and Predicted Net Effects for Human Health

Project Component or Activity	Potential Effect	Impact Management Measures	Net Effect
<p>Project activities during the construction stage:</p> <ul style="list-style-type: none"> ■ 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, turn-around area, temporary laydown areas and temporary construction camps) earthworks associated with construction and reclamation; ■ surface water management and erosion control; and ■ reclamation of decommissioned access roads, temporary laydown areas, staging areas, and temporary construction camps. 	<p>Changes to surface water quality (land surface erosion-sedimentation processes, suspended solids) during construction from the wash-off of organic debris from work sites to nearby waterbodies, and/or increased rates of erosion in disturbed and exposed areas with sediment transport and delivery to adjacent waterbodies may affect human health.</p>	<ul style="list-style-type: none"> ■ During construction, existing access roads or trails will be used where possible to limit the disturbance caused by new construction of access roads or trails. ■ Storage, temporary laydown areas and temporary construction camps will be constructed on existing disturbed areas and/or at reasonably flat areas with stable soil sites, where possible. ■ New access roads or trails will be designed and constructed in accordance with the MNR's Environmental Guidelines for Access Roads and Water Crossings (1990). ■ Waterbody crossings will be constructed in compliance O. Reg. 180/06 as amended by O. Reg. 63/13 and O. Reg. 454/96, as applicable. ■ Buffer zones of 30 m will be maintained around waterbodies, and clearing of riparian vegetation will be limited to the extent practical and to the requirement of the access road and alignment clearing width only. Clearing at waterbody crossings along the 40-m-wide transmission line alignment ROW will generally be limited to a 6-m-wide ROW for equipment access to waterbody crossing structures (e.g., temporary bridges). ■ Cleared vegetation will be immediately transported outside a waterbody buffer zone, and above its high water mark to minimize disturbance to the bed and banks. ■ Wataynikaneyap with their contractor(s) will work with both Aboriginal communities and forest management units to manage merchantable timber cleared by the Project. ■ Slash and debris will be chipped and spread over the ROW, or will be burned accordance with provincial Forest Fires Prevention Act and in compliance with O. Reg. 207/96. ■ Install, monitor, and manage appropriate erosion and sedimentation control measures to minimize or avoid sediment mobilization to drainages, or waterbodies. Adequate and appropriate erosion and sedimentation control materials shall be on-site and available prior to commencement of construction. Temporary erosion control measures to be: <ul style="list-style-type: none"> ■ properly installed; ■ installed before or immediately after initial disturbance; and ■ inspected and properly maintained (e.g., repaired, replaced or supplemented with functional materials) throughout construction until permanent erosion control is established or reclamation is complete. ■ Seeding will follow as close as possible to final cleanup and topsoil material replacement pending seasonal or weather conditions. ■ Disturbed areas will be stabilized (e.g., cover exposed areas with erosion control blankets or tarps to keep the soil in place and prevent erosion). Such areas will be covered with mulch to prevent erosion. ■ Progressive reclamation of disturbed areas will be practised. Natural recovery is the preferred method over seeding of reclamation on level terrain where erosion is not expected. If seeding is required, seed erosion prone areas with a native cover crop and certified seed mix approved by the applicable regulatory agency, as soon as feasible after construction. Seeding will follow as close as possible to final cleanup and topsoil material replacement pending seasonal or weather conditions. ■ Aggregate will be sourced from local First Nation owned quarries or gravel pits; however if local pits are not available then borrow pits may be required at a few locations along the transmission corridor and/or purchased from local suppliers. If required, all borrow pits will be identified, established and decommissioned in accordance with applicable regulatory requirements. 	<p>No net effect</p>
<p>Project activities during the construction stage:</p> <ul style="list-style-type: none"> ■ Upgrade of existing waterbody crossings, and construction of new waterbody crossings. 	<p>Changes to surface water quality (suspended solids and chemical constituents) during short-term water diversions at waterbody crossings during construction may affect human health.</p>	<ul style="list-style-type: none"> ■ Waterbody crossings will be constructed in compliance with MNR regulatory permits and approvals, as applicable. ■ Waterbody crossings will be designed and constructed in compliance with O. Reg. 180/06, as amended by O. Reg. 63/13 and O. Reg. 454/96, as applicable. ■ Waterbody crossings will be constructed in accordance with MNR's Environmental Guidelines for Access Roads and Water Crossings (1990). ■ Temporary waterbody crossings will be reclaimed at the end of construction. The reclamation will involve removal of temporary waterbody crossing structures (if constructed), restoration and stabilization of waterbody banks, and other disturbed areas when the crossing is no longer required. 	<p>No net effect</p>

Table 7.6-5: Potential Effects, Impact Management Measures, and Predicted Net Effects for Human Health

Project Component or Activity	Potential Effect	Impact Management Measures	Net Effect
<p>Project activities during the construction stage:</p> <ul style="list-style-type: none"> Upgrade of existing waterbody crossings, and construction of new waterbody crossings. 	<p>Changes to surface water quality (suspended solids) during construction and operation due to changes in reach and cross-section hydraulics at waterbody crossings may affect human health</p>	<ul style="list-style-type: none"> Waterbody crossings will be constructed in compliance with MNRF regulatory permits and approvals, as applicable. Waterbody crossings will be designed and constructed in accordance with the MNRF's Environmental Guidelines for Access Roads and Water Crossings (1990). 	<p>No net effect</p>
<p>Project activities during the construction stage:</p> <ul style="list-style-type: none"> 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, turn-around areas, temporary laydown areas and temporary construction camps); operation of vehicles, construction equipment, and diesel generators; reclamation of decommissioned access roads, temporary laydown areas, staging areas, and temporary construction camps; and concrete mixing on-site or in batch plants. 	<p>CAC and fugitive dust emissions from construction activities can result in changes in ambient concentrations that may affect human health.</p>	<ul style="list-style-type: none"> Where reasonable and practical, 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. Vehicles and equipment will be regularly serviced and maintained and inspected for leaks. Slash pile burning will be subject to agreements with Aboriginal communities, landowners, and to permits and approvals by appropriate regulatory agencies. Slash piles will be burned in compliance with O. Reg. 207/96. Dust control practices (e.g., wetting with water) will be implemented at concrete batch plants and on access roads near residential areas or other areas, as required. Minimize dust-generating activities, as practical and where required, during periods of high wind to limit dust emissions and spread. Multi-passenger vehicles will be used to transport personnel, where practical. Wataynikaneyap will with their contractor(s) prepare and implement a Dust/Air Quality Management Plan (Section 9.3.1.1.) prior to construction. 	<p>Net changes to ambient concentrations due to CAC and fugitive dust emissions</p>
<p>Project activities during the construction stage:</p> <ul style="list-style-type: none"> 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, turn-around areas, temporary laydown areas, and temporary construction camps); operation of vehicles, construction equipment, and diesel generators; reclamation of decommissioned access roads, temporary laydown areas, turnaround area, staging areas, and temporary construction camps; and concrete mixing on-site or in batch plants. 	<p>Noise emissions from construction activities could increase existing noise levels at potential PORs and affect human health</p>	<ul style="list-style-type: none"> Comply with local municipal noise by-laws and the MOECC Model Municipal Noise Control Bylaw (i.e., NPC-115). Construction activities will typically occur during one 10-hour shift per day, generally within the daytime period (i.e., 07:00 to 19:00). Night-time work is not anticipated. In the event construction will occur beyond the daytime period, Wataynikaneyap or their contractor will review impact management measure requirements. Wataynikaneyap with their contractor(s) will check that noise abatement equipment on machinery is properly maintained and in good working order. Design access roads to minimize reversing, which is expected to minimize use of backup beepers where possible. Notify Aboriginal communities and municipalities along the corridor of the planned construction schedule before the start of construction. Where reasonable and practical, 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. Address noise concerns as they arise through an issue resolution mechanism whereby persons can contact Wataynikaneyap if there are perceived noise issues. Operate vehicles and equipment such that impulsive noise are minimized, where possible. 	<p>Net changes to noise emissions during construction stage activities could increase existing noise levels at PORs</p>
<p>Project activities during the operation and maintenance stage:</p> <ul style="list-style-type: none"> operation and maintenance of transmission line, 40-m-wide transmission line alignment ROW and permanent access roads; and operation and maintenance of transformer station and connection facility. 	<p>Noise emissions from operation and maintenance stage activities could increase existing noise levels at potential PORs and affect human health.</p>	<ul style="list-style-type: none"> The electrical transmission line will be designed to minimize noise associated with corona discharge. Comply with local municipal noise by-laws and the MOECC Model Municipal Noise Control Bylaw (i.e., NPC-115). Noise abatement equipment on machinery is properly maintained and in good working order. Where reasonable and practical, 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. Address noise concerns as they arise through an issue resolution mechanism whereby person can contact Wataynikaneyap if there are perceived noise issues. Transformer station and connection facility will operate in accordance with an Environmental Compliance Approval. A Noise Management Plan will be prepared and implemented. An overview of this plan is provided in Section 9.3.1.3. 	<p>No net effect</p>

Notes:
CAC = criteria air contaminant; MNRF = Ministry of Natural Resources and Forestry; MOECC = Ministry of the Environment and Climate Change; PORs = points of reception; ROW = right-of-way



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7.6.8 Net Effects Characterization

7.6.8.1 Net Effect Characterization Approach

The net effects assessment approach followed the general process described in Section 4.0 (methods section).

Net effects on human health from changes in air quality and noise levels during construction activities are described using the effects characteristics identified in Section 4.0. Effect levels are defined for the magnitude effects characteristic for human health in Table 7.6-6.

Table 7.6-6: Magnitude Effect Levels for Human Health

Human Health Indicator	Effect Levels Definition			
	Negligible	Low	Moderate	High
Human health	Project-related environmental exposures do not result in a change in human health	Project-related environmental exposures are unlikely to substantially result in a change in human health	Project-related environmental exposures may result in a long-term, substantive change in human health	Project-related environmental exposures are likely to result in a long-term, substantive change in human health

7.6.8.2 Net Effects Characterization

A summary of the characterization of net effects of the Project on human health is provided in Table 7.6-7 **Error! Reference source not found.** Net effects are described after the implementation of effective impact management measures, and summarized according to direction, magnitude, geographic extent, duration/reversibility, frequency, and probability of the effect occurring following the methods described in Section 4.0. Effective implementation of impact management measures summarized in Table 7.6-5, Sections 7.6.7.1 and 7.6.7.2, and the Environmental and Social Management Plan (Appendix 9.0) is expected to reduce the magnitude and duration of net effects on air quality and noise emissions and by extension net effects on human health.

7.6.8.2.1 Net Changes to Ambient Concentrations due to Criteria Air Contaminant (CAC) and Fugitive Dust Emissions

With implementation of the impact management measures outlined in Table 7.6-5, construction activities associated with the Project have the potential to change ambient concentrations due to CAC and fugitive dust emissions. The net effect of changes to ambient concentrations due to CAC and fugitive dust emissions on human health is negative in direction and negligible in magnitude as exposures do not result in a change in human health. Furthermore, the effect is local in geographic extent because it is confined to the LSA, occurring at a maximum distance of 200 m from the ROW centreline. The effect is short-term and reversible because it occurs only during the construction stage when changes in air quality may occur and is reversible soon after the operation stage begins when changes in air quality are not expected. The effect is considered to be infrequent because the Project will may result in changes to ambient concentrations and thus human health throughout construction stage activities; however, it is not expected to affect any one receptor throughout the full construction stage. The effect is considered unlikely for the following reasons:

- Exposures and health risks to people were determined based on predicted maximum concentrations of NO_x in air. The maximum concentrations may occur anywhere along a representative 5 km segment of Project construction and are not necessarily representative of concentrations at a specific location (e.g., a residence or commercial/industrial building in the residential areas of Central Patricia and Silver Dollar and the Mishkeegamang First Nation Reserve);
- A person must be present at the exact location and time that the predicted maximum concentration is occurring for there to be a potential for a health effect; and
- Once the preferred corridor is selected, potential sensitive human receptors within the Project footprint will be confirmed and avoided through detailed design, if required. Potential receptors located outside of the Project footprint, but within 100 m of the Project footprint will be verified with respect to their presence and use. Any confirmed receptors determined to be of use outside of, but within 100 m of the Project footprint will be avoided as a receptor as part of the Project detailed design.

7.6.8.2.2 Net Changes to Noise Emissions During Construction Stage Activities Could Increase Existing Noise Levels at PORs

With implementation of the impact management measures outlined in Table 7.6-5, construction activities associated with the Project have the potential to change noise emissions increasing existing noise levels at PORs. The net effect of changes to noise emissions on human health is negative. This is based on the results of the noise assessment which identified a change in noise associated with Project construction at several receptors along the Project footprint that is predicted to be above the Health Canada criterion of 6.5%, specifically at receptors in proximity to the transformer station. The effect is considered to be low in magnitude because the Project-related changes in noise emissions are unlikely to substantially result in a change in human health. The effect is local in geographic extent because it is confined to the LSA, occurring at a maximum distance of 350 m from the ROW centreline. The effect is short-term and reversible because it occurs only during the construction stage when changes in noise emissions may occur and is reversible soon after the operation stage begins when changes in noise emissions are not expected. The effect is considered to be infrequent as it is expected that the Project will produce noise throughout the construction stage; however, it is not expected to affect any one receptor throughout the full construction stage. The effect is considered probable.

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Table 7.6-7: Characterization of Predicted Net Effects for Human Health

Criteria	Indicators	Net Effect	Direct/ Indirect	Significance Factors						Significance
				Direction	Magnitude	Geographic Extent	Duration/ Irreversibility	Frequency	Likelihood of Occurrence	
Human health	Air Quality	Net changes to ambient concentrations due to Criteria Air Contaminants and fugitive dust emissions	Indirect	Negative	Negligible	Local	Short-term/Reversible	Infrequent	Unlikely	Not significant
	Noise Levels	Net changes to noise emissions during construction stage activities could increase existing noise levels at PORs	Indirect	Negative	Low	Local	Short-term/Reversible	Infrequent	Probable	



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7.6.8.3 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. Consideration is also given to concerns of interested agencies, groups and individuals raised during consultation and engagement and through review comments on the EA reports. Implementation of proven impact management measures is expected to avoid or reduce the duration and magnitude of net effects on air quality and noise, and therefore by extension net effects on human health. The magnitude of the predicted net effect on human health is negligible (based on air quality) and low (based on noise levels), local and short-term.

Net effects to a criterion would be considered to be significant if the majority of the net effects are assessed as high magnitude, long-term or permanent duration, at any geographic extent and represent a management concern. The predicted net effects on human health are not anticipated to result in a change to the criteria that will alter the sustainability of the criterion beyond a manageable level; therefore, the predicted net effects on human health are assessed as not significant.

7.6.9 Cumulative Effects Assessment

The magnitude of the net effect on human health from changes to ambient concentrations due to CAC and fugitive dust emissions was predicted to be negligible; therefore, a cumulative effects assessment with future Projects was not completed as per Section 4.6.

The magnitude of the net effect on human health from changes to noise emissions during construction stage activities was predicted to be low. However, based on the list of cumulative developments described in Section 4.6, it is not expected that these projects will coincide with temporal and spatial boundaries of the Project noise assessment and therefore, the human health assessment. As a result, no further human health effects from noise are anticipated; therefore, no cumulative effects assessment of noise on human health was undertaken.

7.6.10 Prediction Confidence in the Assessment

The confidence in the effects assessment for human health is high, considering that the impact management measures described in the Environmental and Social Management Plan (ESMP) (Section 9.0) is based on accepted and proven best management practices that are well-understood and have been applied to transmission line projects throughout North America. Uncertainty in the assessment has been further reduced by making conservative assumptions as detailed in the HHRA (Appendix 7.6A) and noise assessment (Appendix 7.6B), and summarized below:

- Human health TRVs that are used to characterize potential risks to people are generally considered to be conservative. As such, use of the TRVs may overestimate toxicity and potential health risks.
- The TRV used to characterize potential risks to human health from short-term or acute exposure to NO₂ is the most stringent of the available TRVs for this COPC, and lower than the available TRVs from the Canadian Council of Ministers of the Environment (CCME) and Ontario Ministry of the Environment and Climate Change, the relevant federal and provincial jurisdictions for the Project.

- Exposures and health risks to people were determined based on predicted maximum concentrations of chemicals in air. Statistics on the predictions, which would provide a reasonable maximum estimate of exposures taking into account the variability in concentrations across a site, would result in lower exposures and health risks to people.
- The assessment relied on predicted air concentrations provided by the air quality discipline. A number of conservative assumptions were used in the air quality modelling such that predicted concentrations have likely been overestimated. For a summary of the conservative assumptions used in the air quality modelling, refer to Section 5.3.
- The Health Canada %HA criterion is applicable at the community level; however, in this assessment it has been used to conservatively assess potential risks at individual human receptor locations.
- The assessment relied on calculated %HA levels provided by the noise discipline. A number of conservative assumptions were used in the noise modelling such that %HA levels have likely been overestimated. For a summary of the conservative assumptions used in the noise modelling, refer to Section 5.5.
- Uncertainty in the assessment has been further reduced by planning adaptive management measures to address unforeseen circumstances should they arise.

Given the conservative approach of the assessment described above, the results of the assessment are unlikely to underestimate the effects of the Project on human health.

7.6.11 Follow-Up, Inspection, and Monitoring Programs

This section identifies any recommended effects monitoring to verify the prediction of the effects assessment and to verify the effectiveness of the impact management measures and compliance monitoring to evaluate whether the Project has been constructed, implemented, and operated in accordance with the commitments made in the Final EA Report. No monitoring programs are proposed or required for human health.

7.6.12 Information Passed on to Other Components

Results of the human health assessment were passed on to the following components of the EA:

- Socio-economics (Section 7.3);
- Non-Aboriginal Land and Resource Use (Section 7.4); and
- Aboriginal and Treaty Rights and Interests (Section 8.0).

7.6.13 Criteria Summary

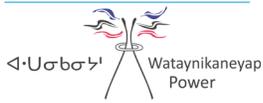
Table 7.6-8 presents a summary of the assessment results for human health by criteria and corridor alternative.

Table 7.6-8: Human Health Assessment Summary

Criteria	Preliminary Proposed Corridor	Corridor Alternative Around Mishkeegogamang	Corridor Alternative Through Mishkeegogamang
Human Health	<ul style="list-style-type: none"> ■ Net effects are assessed to be not significant. ■ The Project is not predicted to contribute to cumulative effects. 	<ul style="list-style-type: none"> ■ Net effects are assessed to be not significant. ■ The Project is not predicted to contribute to cumulative effects. 	<ul style="list-style-type: none"> ■ Net effects are assessed to be not significant. ■ The Project is not predicted to contribute to cumulative effects.

7.6.14 References

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