

11. ACOUSTIC ENVIRONMENT

This section describes and summarizes an assessment of the effects of the East-West Tie Transmission Project (the Project) on the acoustic environment. Specifically, environmental effects relevant to human noise receptors are assessed. Assessment of the effects of the Project on wildlife, socio-economics and human health, as related to sensory disturbance from noise, is carried out in Sections 14, 18 and 21, respectively.

Acoustic values can be described in terms of noise or sound. Noise is defined as unwanted sound; however, the terms noise and sound are often used interchangeably.

An introduction to key concepts used in the assessment of outdoor acoustics is provided below:

- **“Noise” or “noise levels”** refers to the levels that can be heard or measured at a Point of Reception (POR).
- A noise **“receptor”** or POR is a location where an assessment, measurements, or predictions of noise levels are made.
- The **“level”** of a noise is expressed on a logarithmic scale, in units called decibels (dB). Since the scale is logarithmic, a noise that is twice the noise level as another will be three decibels (3 dB) higher. **“Sound pressure level”** is the physical quantity that is measured in the environment that describes sound waves quantitatively. It is a ratio of the absolute pressure relative to a reference (i.e., 20 micropascals [μPa]). This ratio of pressures is converted to a dB scale.
- Noise emissions and noise levels have an associated frequency. The human ear does not respond to all frequencies in the same way. Mid-range frequencies are most readily detected by the human ear, while low and high frequencies are harder to hear. Environmental noise levels used in this assessment are presented as **“A-weighted decibels”** (or dBA), which incorporates the frequency response of the human ear.
- The **“percentile noise level”**, designated L_n , is the noise level exceeded “n” percent of a specified time period and is measured in dBA. The L_{90} , for instance, is the noise level exceeded 90% of the time. It is a noise level index that commonly refers to the baseline noise level and is most often referenced in a rural setting.
- Outdoor noise is usually expressed as an **“equivalent noise level”** ($L_{\text{eq, Time (T)}}$), which is a logarithmic average (i.e., energy average) of the measured or predicted noise levels over a given period of time (T). An equivalent noise level measured or predicted over the nighttime period would be referred to as $L_{\text{eq, night}}$.
- Environmental noise levels vary throughout the day and it is therefore important to distinguish between the time of day (i.e., daytime/nighttime). For the purposes of this assessment, the day is divided into two periods for which noise is evaluated. The **“daytime”** noise levels occur for the period from 07:00 (7 am) to 19:00 (7 pm). The **“nighttime”** noise levels occur for the period from 19:00 (7 pm) to 07:00 (7 am).

The assessment follows the general approach and concepts described in Section 5. The main steps in the assessment include:

- considering input from Indigenous communities, government representatives and agencies, other communities, property owners and people or groups interested in the Project during the ongoing consultation and engagement process (Section 11.1);
- identifying information and data sources used in the assessment (Section 11.2);
- identifying and rationale for selection of criteria and indicators for the acoustic environment (Section 11.3);

EAST-WEST TIE TRANSMISSION PROJECT

AMENDED ENVIRONMENTAL ASSESSMENT REPORT

- establishing temporal boundaries (i.e., construction and operation phases) and study areas (i.e., Project footprint and local study area) for the assessment of effects on these criteria (Section 11.4);
- describing the existing environment (i.e., baseline characterization) and identifying environmentally sensitive features specific to each criterion (Section 11.5);
- identifying potential Project-environment interactions (Section 11.6);
- undertaking the net effects assessment (Section 11.7):
 - identifying potential environmental effects;
 - identifying mitigation measures;
 - predicting the net effects; and
 - characterizing the net effects (i.e., after mitigation) of the Project on environmental criteria (Section 11.8).
- assessing the significance of the net effects (Section 11.9);
- conducting a cumulative effects assessment of the net effects in combination with other past, present, or reasonably foreseeable developments (RFDs) and activities and assessing significance, if applicable. (Section 11.10);
- determining the degree of certainty in the net effects prediction and associated assessment of significance (Section 11.11); and
- identifying follow-up, inspection, and monitoring programs that will be completed during and after construction (Section 11.12).

11.1 Input from Consultation and Engagement

Consultation and engagement for the Project considered Indigenous communities, regulatory agencies, property owners, interest holders, Crown interests and the general public. Consultation activities are described in Section 2 of the amended Environmental Assessment (EA) Report. The draft and final EA Reports were each subject to a public review and comment period. Comments received on the draft EA Report, responses and change log are provided in Appendix 1-III. Comments received on the final EA Report and responses are provided in Appendix 1-IV. The following concerns related to the acoustic environment were raised during consultation and engagement and from comments received on the draft and final EA Reports:

- Ministry of Environment and Climate Change (MOECC), Ministry of Natural Resources and Forestry (MNRF), and Métis Nation of Ontario (MNO) expressed concern that many responses to comments on the draft EA Report were provided in Appendix 1-III of the final EA Report and not integrated into the body of the final EA Report. Suggested changes acknowledged in responses to comments on the draft EA Report but not incorporated into the final EA Report have been incorporated into the amended EA Report where appropriate.
- MOECC, MNRF and Indigenous communities expressed concern with the pathway screening methodology employed in the draft and final EA Reports. The EA methods have been revised and feedback has been incorporated. The terms “effect pathway” and “assessment endpoint” were removed from the amended EA Report. This revision is reflected throughout this section of the amended EA Report.
- MOECC, MNRF and Indigenous communities expressed concerns about the use of the pathway screening method excluding some potential Project effects from being carried forward to the net effects assessment. All potential Project effects are considered in the net effects assessment and a net effects assessment table was added as Table 11-10 to this section.

EAST-WEST TIE TRANSMISSION PROJECT

AMENDED ENVIRONMENTAL ASSESSMENT REPORT

- Animiigoo Zaagi'igan Anishinaabek First Nation, Métis Nation of Ontario, and the general public had concerns about the potential for noise to result from the Project. This concern is addressed in Section 11.7 as an increase in baseline sound levels during construction and is an identified potential effect from the Project.
- Red Sky Métis Independent Nation had a concern about the potential for construction to occur outside the hours of 7 am to 7 pm. The mitigation in Table 11-8 indicates that construction activities will occur during the daytime period from 07:00 to 19:00. In the event construction will occur beyond the daytime period, the Owner will re-evaluate the potential Project-related effects and if required, review mitigation requirements.

11.2 Information Sources

Information for the acoustic environment baseline was collected from review of the following sources:

- the MOECC Model Municipal Noise Control By-Law Noise Pollution Control Guideline (NPC) Construction Equipment, Publication NPC-115 (NPC-115) (MOECC 1978);
- the MOECC Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning, Publication NPC-300 (NPC-300) (MOECC 2013);
- Alberta Energy Regulator (AER) Directive 038: Noise Control (Energy and Utilities Board [EUB] 2007);
- aerial imagery provided by NextBridge Infrastructure LP (NextBridge; acquired 2013-2014) and publicly available aerial imagery (Esri no date);
- equipment list provided by Project engineering team;
- U.S. Department of Transportation Federal Highway Administration Construction Noise Handbook. (FHWA Construction Noise Handbook) (US Department of Transportation 2006);
- CanVec geographic data sets; and
- MNRF's Land Information Ontario (LIO) geographic data sets (MNRF 2016).

The review of orthoimagery and the CanVec and MNRF's LIO (MNRF 2016) geographic data sets was carried out to identify potential existing human Point of Reception (PORs) in the acoustic environment local study area (LSA; Section 11.4.2). For the purposes of the amended EA, sufficient information was deemed to be available from the references listed above to assess the potential effects of the Project on the acoustic environment.

11.3 Criteria and Indicators

Criteria are components of the environment that are considered to have economic, social, biological, conservation, aesthetic or ethical value (Section 5.1).

The acoustic environment is important to NextBridge, interested parties, and the general public as noise (i.e., unwanted sound) may result in annoyance to people. Assessment of the effects of the Project on wildlife, socio-economics and human health, as related to sensory disturbance from noise, is carried out in Sections 14, 18 and 21, respectively.

Indicators represent attributes of the environment that can be used to characterize changes to criteria in a meaningful way. The indicators for the acoustic environment are defined as follows:

- **Change in Daytime Equivalent Noise Level ($L_{eq, day}$):** a logarithmic average of the measured or predicted noise levels over the daytime period (07:00 to 19:00). It is expressed on an “A-weighted decibel” scale, which incorporates the response of the human ear, in dBA. For the amended EA Report, this indicator is assessed qualitatively using information about the Project and the Project team’s experience assessing similar sources of noise.
- **Project operation-related One-hour Equivalent Noise Level ($L_{eq, 1-hour [day, night]}$):** a logarithmic average of the measured or predicted noise levels over any one-hour period (e.g., 00:00 to 01:00). It is expressed on an “A-weighted decibel” scale, which incorporates the response of the human ear, in dBA. For the amended EA Report, this indicator is assessed qualitatively using information about the Project and the Project team’s experience assessing similar sources of noise.

For both indicators, the number and location of PORs potentially affected by the Project is determined quantitatively by overlaying POR datasets and the acoustic environment local study area.

The criterion and indicators selected for the assessment of Project effects on the acoustic environment, measurement of potential effects for each indicator, data sources used, and the rationale for their selection are provided in Table 11-1.

Table 11-1: Acoustic Environment Criteria and Indicators

on	Indicators	Measurement of Potential Effect	Data Sources	Rationale
Noise	Change in Daytime Equivalent Noise Level ($L_{eq, day}$)	<ul style="list-style-type: none"> ■ Indicator qualitatively evaluated. The number and location of PORs potentially affected by the Project is determined quantitatively by overlaying POR datasets and the acoustic environment LSA. ■ Considered previous evaluation of similar noise sources. 	<ul style="list-style-type: none"> ■ Project description; ■ Project construction schedule; ■ Project construction equipment summary; ■ Project footprint; ■ POR datasets – LIO data; and ■ Project mitigation measures. 	<ul style="list-style-type: none"> ■ Project activities have the potential to affect existing noise levels. ■ Noise may result in annoyance to people.

EAST-WEST TIE TRANSMISSION PROJECT AMENDED ENVIRONMENTAL ASSESSMENT REPORT

Table 11-1: Acoustic Environment Criteria and Indicators

on	Indicators	Measurement of Potential Effect	Data Sources	Rationale
Noise	Project operation-related one-hour equivalent noise level ($L_{eq, 1-hour (day, night)}$)	<ul style="list-style-type: none"> ■ Indicator qualitatively evaluated. The number and location of PORs potentially affected by the Project is determined quantitatively by overlaying POR datasets and the acoustic environment LSA. ■ Considered previous evaluation of similar noise sources. 	<ul style="list-style-type: none"> ■ Project description; ■ Project footprint; ■ POR datasets – LIO; and ■ Project mitigation measures. 	<ul style="list-style-type: none"> ■ Project activities have the potential to affect existing noise levels. ■ Noise may result in annoyance to people.

$L_{eq, 1-hour (day, night)}$ = One-hour Equivalent Noise Level Daytime or Nighttime Period; LIO = Land Information Ontario; LSA = local study area; MOECC = Ministry of Environment and Climate Change; POR = Point of Reception.

11.4 Assessment Boundaries

11.4.1 Temporal Boundaries

The Project is planned to occur during two phases (Section 5.2.1):

- **construction phase:** the period from the start of construction to the start of operation (approximately two years); and
- **operation phase:** encompasses operation and maintenance activities throughout the life of the Project, which is anticipated to be indefinite.

The assessment of Project effects on the acoustic environment considers effects that occur during both the construction and operation phases. These periods are sufficient to capture the effects of the Project. Project effects on the acoustic environment are expected to be the greatest during the construction phase. Project construction will involve various construction activities occurring during the daytime period (i.e., between 7 am and 7 pm) typically for up to 10 hours per day, at times simultaneously, over a span of two years. For preliminary construction planning purposes, the preferred route right-of-way (ROW) has been divided into six sections ranging from approximately 45 to 100 kilometres (km) in length, each with its own crew of workers to complete each construction activity. It is expected that construction activities will be completed sequentially and cover approximately 200 meters (m) to 6 km in length each day, depending on the specific construction activity. During the operation phase, it is possible that the transmission line may be audible at times due to corona discharge, typically during adverse weather conditions such as rain, fog and wet snow (Foreman and Onderwater 2003).

11.4.2 Study Areas

Study areas for the assessment are provided in Table 11-2.

EAST-WEST TIE TRANSMISSION PROJECT AMENDED ENVIRONMENTAL ASSESSMENT REPORT

Table 11-2: Acoustic Environment Study Areas

Study Area	Area (ha)	Description	Rationale
Project footprint	3,490	The Project footprint is the preferred route ROW, laydown yards, storage yards, construction camps, construction easements and new access roads.	Designed to capture the potential direct effects of the footprint of the Project.
Acoustic Environment Local Study Area	141,766	Extends approximately 1.5 km from the preferred route ROW boundary and approximately 500 m from the boundary of construction camps, laydown yards, storage yards, temporary construction easements, and new and improvement/widening access roads	<ul style="list-style-type: none"> ■ The approximately 1.5 km setback to define the acoustic environment LSA is based on professional judgement and guidance provided by AER Directive 038: Noise Control Directive (Directive 038) (EUB 2007) for noise assessments in Alberta, as no similar guidelines have been established in Ontario. ■ Since noise attenuates with distance, potential noise effects from the Project are expected to be the highest in the acoustic environment LSA, and any measurable noise effects due to the Project are predicted to be generally limited to the acoustic environment LSA. ■ In the area beyond the acoustic environment LSA, noise emissions from Project activities are expected to further attenuate, resulting in a negligible contribution; therefore, a separate acoustic environment regional study area (RSA) was not specifically assessed.

AER = Alberta Energy Directive; EUB = Energy Utilities Board; ha = hectares; km = kilometre; LSA = local study area; m = metre; ROW = right-of-way; RSA = regional study area.

11.5 Description of the Existing Environment

This section provides a summary of the existing acoustic environment as determined through desktop study.

11.5.1 Baseline Data Collection Methods

A desktop study was completed to identify baseline conditions in the acoustic environment LSA. Baseline conditions of the acoustic environment were determined to characterize the existing acoustic environment and identify potential PORs where human activity is expected to occur in the vicinity of the Project. A search for publicly available studies confirmed that limited information regarding existing baseline noise levels in the acoustic environment LSA is available. Upon review of the information sources identified in Section 11.2, a desktop level analysis of the orthoimagery and spatial data from the MNRF's LIO database (MNRF 2016) was considered to be most representative of the acoustic environment. This information was used to determine baseline conditions in the acoustic environment LSA, specifically the presence of potential PORs and expected existing baseline noise levels.

11.5.2 Baseline Conditions

The potential PORs in the acoustic environment LSA were identified in general accordance with the MOECC NPC-300 noise guideline (MOECC 2013). The NPC-300 guideline defines PORs as sensitive land uses with human activity, including dwellings, campsites or campgrounds, sensitive institutional uses (e.g., educational, nursery, hospital, healthcare, community centre, place of worship or detention centre), or sensitive commercial uses (e.g., hotel or motel). The MNRF LIO spatial data set (MNRF 2016) identifies existing structures, and these structures have been conservatively considered as "potential" PORs, but it is anticipated that most of these structures will not qualify as PORs as defined by the MOECC as they may not be considered noise sensitive

EAST-WEST TIE TRANSMISSION PROJECT

AMENDED ENVIRONMENTAL ASSESSMENT REPORT

spaces. Therefore, it is possible the MNRF LIO spatial data set (MNRF 2016) list of existing structures are PORs representative of the existing noise sensitive land uses and if required, may need to be verified through ground-truthing. The quantity of potential PORs, within given distances to the Project footprint in the acoustic environment LSA, is summarized in Table 11-3.

Table 11-3: Summary of Structure Distance to the Boundary of the Project Footprint^(a)

Distances	Number of Potential Structures
In Project footprint ^(b)	-
0 to 50 m	25
50 to 100 m	53
100 to 250 m	222
250 to 500 m	535
500 to 1000 m	1,452
1000 to 1500 m	2,028
Total	4,334

a) The Project footprint is as defined in Table 11-2.

b) Structures in the Project footprint will be purchased and no longer assessed.

m = metre; - = data not available.

The expected existing baseline noise levels in the acoustic environment LSA were described using the MOECC NPC-300 noise guideline. NPC-300 describes the expected acoustic environment at PORs based on a classification system. In accordance with this classification system, the MOECC prescribes noise limits for stationary noise sources based on periods of day (i.e., daytime, evening and/or nighttime) and relative location at the POR (i.e., plane of window and outdoor location). The plane of window is typically assessed as a second storey bedroom window, at a height of 4.5 m above grade. An outdoor location is assessed at a location within 30 m of a dwelling at a height of 1.5 m above grade. The classification system and respective noise limits for the different periods of day, at the plane of window and outdoor location of a POR, are summarized in Table 11-4 and Table 11-5, respectively.

Table 11-4: Point of Reception Classification, Description and Exclusionary Noise Level Limit at the Plane of Window

Class	Description	Exclusionary Noise Limit (dBA) ^(a)		
		Day (07:00 to 19:00)	Evening (19:00 to 23:00)	Night (23:00 to 07:00)
1	Major population centre. Background sound level dominated by activities of people, usually road traffic.	50	50	45
2	Area with acoustical environment representative of both Class 1 and 3.	50	50	45
3	Rural area. Background sound level dominated by natural sounds having little or no road traffic.	45	40	40
4	New development areas where land use authority has formally confirmed Class 4 designation. Intended for new noise sensitive land uses near established stationary sources.	60	60	55

a) These exclusionary limits represent the minimum limit against which a stationary source is to be assessed. For sound from a stationary source, the sound level limit at a Point of Reception is the higher of the applicable exclusionary limit or background sound level.

dBA = A-weighted decibels.

EAST-WEST TIE TRANSMISSION PROJECT

AMENDED ENVIRONMENTAL ASSESSMENT REPORT

Table 11-5: Point of Reception Classification, Description and Exclusionary Noise Level Limit at the Outdoor Point of Reception Location

Class	Description	Exclusionary Noise Limit (dBA) ^(a)		
		Day (07:00 to 19:00)	Evening (19:00 to 23:00)	Night (23:00 to 07:00) ^(b)
1	Major population centre. Background sound level dominated by activities of people, usually road traffic.	50	50	n/a
2	Area with acoustical environment representative of both Class 1 and 3.	50	45	n/a
3	Rural area. Background sound level dominated by natural sounds having little or no road traffic.	45	40	n/a
4	New development areas where land use authority has formally confirmed Class 4 designation. Intended for new noise sensitive land uses near established stationary sources.	55	55	n/a

a) These exclusionary limits represent the minimum limit against which a stationary source is to be assessed. For sound from a stationary source, the sound level limit at a Point of Reception is the higher of the applicable exclusionary limit or background sound level.

b) As described in NPC-300, in general, the outdoor points of reception will be protected during the nighttime as a consequence of complying with the plane of window sound level limits.

dBA = weighted decibels; n/a = indicates that Exclusionary Noise Limits are not applicable.

A large number of the structures (i.e., potential PORs) identified in the acoustic environment LSA could potentially be affected by Project activities based on the above analysis. Upon review of orthoimagery and the MOECC NPC-300 classification system presented in Table 11-4, the acoustic environment LSA can be classified as being in a Class 3 area. Baseline sound levels in the acoustic environment LSA are expected to be dominated by some anthropogenic activities and sounds of nature. The MOECC NPC-300 prescribed noise level limits have been adopted to define the expected existing noise levels in the acoustic environment LSA. Therefore, in accordance with NPC-300, baseline noise levels at the PORs are expected to be approximately 45 dBA during the daytime period ($L_{eq, day}$) and 40 dBA during the evening/nighttime periods ($L_{eq, night}$).

11.6 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 the acoustic environment are identified in Table 11-6.

EAST-WEST TIE TRANSMISSION PROJECT AMENDED ENVIRONMENTAL ASSESSMENT REPORT

Table 11-6: Project-Environment Interactions for the Acoustic Environment

Criteria	Indicator	Project Phase		Description of Potential Project-Environment Interaction (Potential Effect)
		Construction (includes access road and ROW preparation, installation, and reclamation activities)	Operation (includes operation and maintenance activities)	
Noise	Project construction-related change in Daytime Equivalent Noise Level ($L_{eq, day}$)	✓	-	Noise emissions from construction activities could increase existing noise levels at PORs.
	Project operation-related one-hour equivalent noise level ($L_{eq, 1-hour day, night}$)	-	✓	Noise emissions from operation and maintenance activities could increase the existing noise levels at PORs.

$L_{eq, day}$ = Daytime Equivalent Noise Level; PORs = point of reception; ROW = right-of-way; ✓ = A potential Project-environment interaction could result in an environmental or socio-economic effect; - = No plausible interaction was identified.

11.7 Potential Effects, Mitigation and Net Effects

This section presents the potential effects, appropriate mitigation measures, and predicted net Project effects for the acoustic environment.

11.7.1 Measurement of Potential Effects

Potential effects were considered to be likely if the noise levels resulted in a change from existing conditions that would be just perceptible to humans. A change in level of 3 dB is just perceptible by the normal human ear (Bies and Hansen 2009). Therefore, a potential effect was considered to be likely and carried forward to the net effects characterization and assessment of significance, if the noise levels resulted in an increase equal to 3 dB or more for the respective noise indicator. Changes in noise levels that would be just perceptible to humans (i.e., less than 3 dB) were assigned a no net effect and not carried forward into the net effects characterization and assessment of significance.

11.7.1.1 Project Construction-Related Change in Daytime Equivalent Noise Level

The Project Construction-Related Change in Daytime Equivalent Noise Level is evaluated qualitatively. The qualitative assessment was carried out using the Project description, Project construction schedule, Project construction equipment summary, Project footprint, POR datasets, Project mitigation measures and past evaluation of similar noise sources. The number and location of PORs potentially affected by the Project is determined quantitatively by overlaying POR datasets and the acoustic environment LSA.

11.7.1.2 Project Operation-Related One-Hour Equivalent Noise Level

The Project Operation-Related One-hour Equivalent Noise Level is evaluated qualitatively. The qualitative assessment was carried out using the Project description, Project footprint, POR datasets, Project mitigation measures and past evaluation of similar noise sources. The number and location of PORs potentially affected by the Project is determined quantitatively by overlaying POR datasets and the acoustic environment LSA.

11.7.2 Project Construction-Related Change in Daytime Equivalent Noise Level

11.7.2.1 *Noise Emissions from Construction Activities Could Increase Existing Noise Levels at PORs*

11.7.2.1.1 Potential Effects

Noise emissions from construction activities could increase baseline sound levels at existing PORs. The Project construction phase will involve various construction activities occurring during the daytime period (07:00 to 19:00), up to 10 hours per day, at times simultaneously, over a span of approximately two years for the entire length of the preferred route. For preliminary construction planning purposes, the preferred route has been divided into six sections ranging from approximately 45 to 100 km in length, each with its own crew of workers to complete each construction activity. It is expected that construction activities will be completed sequentially and cover approximately 200 m to 6 km each day, depending on the specific construction activity.

Refer to Section 4.3.1 for an overview of construction activities. Construction activities will be sequentially staggered and, therefore, are not expected to take place concurrently at the same locations. Upon review of the preliminary construction plan for the Project provided by the engineering team, it was conservatively assumed that as a worst case, flagging and clearing, access road construction, staking, geotechnical investigations and installation of foundations could occur at the same time within an approximately 5 km stretch along the preferred route, with each activity occurring within separate, approximately 1 km segment. Corresponding equipment for these activities was used in combination with estimated sound pressure levels (dBA) at 15 m away from the working equipment to estimate overall noise emissions as a result of Project construction. A representative construction scenario, including the construction equipment respective sound pressure levels were established using the Project design details, Golder's database of similar noise sources, manufacturer's specifications, and publicly available data from the FHWA Construction Noise Handbook (US Department of Transportation 2006). This representative construction scenario assisted in qualitatively evaluating construction activity noise effects. The actual noise level due to construction equipment will depend on its proximity to a POR. This representative construction scenario is summarized in Table 11-7.

EAST-WEST TIE TRANSMISSION PROJECT AMENDED ENVIRONMENTAL ASSESSMENT REPORT

Table 11-7: Estimated Noise Emissions from Representative Construction Scenario

Construction Equipment	Total Quantity	Estimated Sound Pressure Level at 15 m ^(a) (dBA)	Construction Activities Simultaneously Operating Across Representative 5 km Length of Preferred Corridor				
			Flagging and Clearing	Access	Staking	Geotechnical Investigation	Foundations
Grader	4	85	Not used	Used	Not used	Not used	Not used
Dump	8	84	Not used	Used	Not used	Not used	Not used
Dozer	7	85	Used	Used	Not used	Not used	Not used
Excavator	10	85	Used	Used	Not used	Used	Used
Feller	5	85	Used	Used	Not used	Not used	Not used
Skidder	5	85	Used	Used	Not used	Not used	Not used
Processor	2	85	Used	Used	Not used	Not used	Not used
Mulcher	8	85	Used	Used	Not used	Not used	Not used
Flatbed	10	84	Not used	Used	Not used	Not used	Used
Drill rig	1	85	Not used	Not used	Not used	Used	Not used
Small drill rig	5	85	Not used	Not used	Not used	Not used	Used
Large drill rig	1	85	Not used	Not used	Not used	Not used	Used
Crane	4	85	Not used	Not used	Not used	Not used	Used
Pier driller	1	85	Not used	Not used	Not used	Not used	Used
Backhoe	2	80	Not used	Not used	Not used	Not used	Used
Forklift	20	80	Not used	Not used	Not used	Not used	Used
Helicopter	5	105	Not used	Not used	Not used	Not used	Used

a) Golder Associates Ltd.'s (Golder's) database of similar noise sources, manufacturer's specifications, and publicly available data.

dBA = A-weighted decibels; km = kilometre; m = metre.

Potential effects on the acoustic environment during construction are anticipated to be greater than during operation. These effects are expected to vary based on type of construction activity and proximity to PORs, but for typical transmission line construction noise effects are expected to be greatest during installation of foundations and cable splicing. It is anticipated that approximately six to ten tower foundations will be installed per segment per day. It is expected that any one location would be exposed to elevated noise levels relative to baseline for the installation of foundations for three to four days as construction progresses.

Cable splicing may use an implosion method that requires the use of explosives, which generate an impulsive noise event. This results in a compression force to splice two lengths of conductor together. It is estimated that six conductor splices may occur approximately every 6 km along the preferred route. Once cable splicing is completed at a location, there will be no additional impulsive noise events associated with cable splicing. Due to the sound characteristic expected with cable splicing (i.e., impulsive), nearby affected communities will be notified about the splicing schedule (Pasini 2006). In jurisdictions where noise levels are expected to be elevated for a limited time, notification will be provided (e.g., by mail). Based on the infrequent nature of this activity and its short duration, the net effects associated with splicing are anticipated to be negligible.

Based on the description of the construction activities above, existing noise levels can be expected to increase, on occasion, near potential PORs. The change in the acoustic environment due to construction activities is expected to result in a change that may be perceived as being nearly twice as loud when compared to existing levels (i.e., increase of approximately 10 dB) during the daytime period. Construction noise will be temporary in nature and localized within the acoustic environment LSA. Given the staged construction plan, PORs will not be continuously exposed to construction activities that result in an increase in baseline sound levels during the entire construction phase. Due to the staged nature of construction activities, increased noise levels are expected to vary as the proximity of PORs differs along the preferred route ROW. The range in increased noise levels associated with construction activities will depend primarily on the number and type of noise sources and their proximity to

EAST-WEST TIE TRANSMISSION PROJECT

AMENDED ENVIRONMENTAL ASSESSMENT REPORT

the PORs (i.e., the Project noise levels in the environment decrease as the distance between the POR and construction activities increases).

11.7.2.1.2 Mitigation

During the construction phase, NextBridge 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 practicable, vehicles and equipment will be turned off when not in use. In addition, construction activities will typically occur during one 10-hour shift per day, with normal working hours of 07:00 to 19:00. In the event that construction will occur beyond the daytime period, NextBridge and its contractors will re-evaluate the potential Project-related effects and if required, review mitigation requirements. Noise concerns will be addressed as they arise through a noise complaint process. These mitigation measures are expected to minimize the potential effects associated with noise emissions. Mitigation measures are summarized in Table 11-8. The effectiveness of mitigation will be evaluated during construction, and measures will be modified or enhanced as necessary through adaptive management.

11.7.2.1.3 Net Effects

Noise emissions during construction may result in a net effect because it is expected that, after the implementation of mitigation measures, changes in noise levels at potential PORs may be greater than 3 dB above existing background noise levels during the daytime period. There is a net effect predicted after implementation of the mitigation described above (Section 11.7.2.1.2) and in Table 11-8. This net effect (Increase in existing noise levels at potential PORs that results in a change that is greater than 3 dB) is carried forward to the net effects characterization (Section 11.8).

11.7.3 Project Operation-related One-hour Equivalent Noise Level

11.7.3.1 *Noise Emissions from Operation and Maintenance Stage Activities Could Increase the Existing Baselines Levels at Existing PORs*

11.7.3.1.1 Potential Effects

Noise emissions from operation activities could increase the existing baseline levels at existing PORs. Refer to Section 4.3.2 for an overview of operation activities. Operation activities with potential effects on the acoustic environment include the following:

- maintenance and inspection of electrical transmission lines;
- maintenance of the Project ROW and permanent access roads; and
- operation of the electrical transmission line.

Noise emissions associated with activities during the operation phase are expected to be minimal. Noise sources and noise levels from maintenance of the preferred route ROW, permanent access roads and inspection activities during operation will be variable, expected to be limited to a short duration, and will occur periodically over the life of the Project. Expected noise sources include equipment for mechanical vegetation maintenance, access road maintenance and transmission line maintenance. Pickup trucks, all-terrain vehicles and helicopters will be used for maintenance inspections. The maintenance inspections may indicate that repairs require the use of heavier equipment such as backhoes or cranes. The sound pressure levels for heavier equipment are provided in Table 11-7 and were considered when assessing the potential noise levels during operation. The mitigation measures presented in Table 11-8 apply to these activities.

EAST-WEST TIE TRANSMISSION PROJECT

AMENDED ENVIRONMENTAL ASSESSMENT REPORT

In addition to noise from maintenance equipment, the operation of the electrical transmission line may be audible at times due to corona discharge. This is typically most audible during adverse weather conditions such as rain, fog and wet snow (Foreman and Onderwater 2003). Designing the electrical transmission line to minimize power losses through the conductor is expected to minimize noise associated with corona discharge.

11.7.3.1.2 Mitigation

During the operation phase, NextBridge and its contractors will comply with local municipal noise by-laws and the *Model Municipal Noise Control Bylaw* (i.e., NPC-115) and MOECC *Noise Guide NPC 300*. Noise abatement equipment on machinery will be properly maintained and in good working order. Where practicable, vehicles and equipment will be turned off when not in use. In addition, construction activities will typically occur during one 10-hour shift per day, with normal working hours of 07:00 to 19:00. In the event that construction will occur beyond the daytime period, NextBridge and its contractors will re-evaluate the potential Project-related effects and if required, review mitigation requirements. Noise concerns will be addressed as they arise through a noise complaint process. These mitigation measures are expected to minimize the potential effects associated with noise emissions. Mitigation measures are summarized in Table 11-8. The effectiveness of mitigation will be evaluated during construction, and measures will be modified or enhanced as necessary through adaptive management.

11.7.3.1.3 Net Effects

By implementing the mitigation described above (Section 11.7.3.1.2) and in Table 11-8, the change in noise levels at PORs associated with maintenance and inspection activities is anticipated to result in a change less than 3 dB in noise levels. Therefore, this effect was determined to have no net effect and was not carried forward to the net effects characterization.

11.7.4 Summary of Potential Effects, Mitigation and Net Effects

A summary of the potential effects assessment is provided in Table 11-8, which is based on the previous assessment discussion and the implementation of mitigation measures identified above and further supplemented in the table below.

**EAST-WEST TIE TRANSMISSION PROJECT
AMENDED ENVIRONMENTAL ASSESSMENT REPORT**

Table 11-8: Summary of Potential Effects, Mitigation and Predicted Net Effects for the Acoustic Environment

Criteria	Indicator	Project Component or Activity	Potential Effect	Mitigation	Inspection and Monitoring Details	Net Effect
Noise	Project construction-related change in daytime equivalent noise level ($L_{eq, day}$)	<p>Project activities during the construction phase, including:</p> <ul style="list-style-type: none"> ■ site access development, site preparation and soil salvage (e.g., surveying and flagging, clearing and grubbing, and topsoil stripping and grading); ■ construction of infrastructure (e.g., access roads and temporary workspaces); ■ use of construction camp generators; ■ staking of structure and guy anchor locations; ■ geotechnical investigations; ■ foundation installation; ■ assembly and erection of transmission structures; ■ conductor installation, including cable splicing; ■ decommissioning of temporary access roads and temporary workspaces; and ■ clean-up and reclamation. 	Noise emissions from construction activities could increase existing noise levels at potential PORs.	<p>Construction Phase:</p> <ul style="list-style-type: none"> ■ Comply with local municipal noise by-laws and the MOECC <i>Model Municipal Noise Control Bylaw NPC-115</i> (MOECC 1978). ■ The Owner will apply best efforts to work with the MNR to plan construction around the peak park season, generally from June to September, where the Project footprint is located within a provincial park. ■ The Owner will provide advance notice of construction activities to recreational users through formal notification in local newspapers and at recreational areas, parks and campsites locations (e.g., park entrances). ■ Construction activities will typically occur during one 10-hour shift per day, with normal working hours of 07:00 to 19:00. In the event construction will occur beyond the daytime period, NextBridge will re-evaluate the potential Project-related effects and if required, review mitigation requirements. ■ Where occupied residences are confirmed within 100 m of construction, schedule activities within 5 km radius in a manner that reduces the number of construction activities occurring at the same time. ■ No blasting near operating campgrounds, Ontario Trail Network trails or canoe routes on weekends and holidays beginning May Long weekend and ending Labour Day weekend, inclusive. ■ No blasting near provincial parks on weekends and holidays beginning May Long weekend and ending Labour Day weekend, inclusive. ■ Noise abatement, emission and pollution control equipment on machinery should be in place, properly maintained and in good working order. ■ Notify landowners along the route of the planned construction schedule before the start of construction to fulfill agreements and prevent or reduce impacts to their operations or activities. ■ Notify Indigenous communities of the overall construction schedule before the start of construction. ■ Notify applicable federal and provincial regulatory agencies and local municipal officials, and other affected parties prior to blasting and implosion operations as required by approval conditions. ■ Turn off vehicles and equipment when not in use and minimize idling, unless weather and/or safety conditions dictate the need for them to remain turned on and in a safe operating condition. 	<p>Construction Phase:</p> <ul style="list-style-type: none"> ■ The Owner will appoint qualified Environmental Inspector(s) to guide implementation, monitor and report on the effectiveness of the construction procedures and mitigation measures for minimizing potential impacts. ■ Address noise concerns as they arise through a noise complaint process. ■ In the event that construction will occur beyond the daytime period, NextBridge and its contractors will re-evaluate the potential Project-related effects and if required, review mitigation requirements. 	<p>Net effect – Increase in existing noise levels at potential PORs that results in a change that is greater than 3 dB.</p>

**EAST-WEST TIE TRANSMISSION PROJECT
AMENDED ENVIRONMENTAL ASSESSMENT REPORT**

Table 11-8: Summary of Potential Effects, Mitigation and Predicted Net Effects for the Acoustic Environment

Criteria	Indicator	Project Component or Activity	Potential Effect	Mitigation	Inspection and Monitoring Details	Net Effect
Noise	Project operation-related one-hour equivalent noise level (L _{eq} , 1-hour (day, night))	Project activities during the operation phase, including: <ul style="list-style-type: none"> ■ maintenance of access roads, transmission line, and preferred ROW; ■ inspection of conductors; and ■ operation of the conductors. 	Noise emissions from operation and maintenance activities could increase existing noise levels at potential PORs.	<p>Operation Phase:</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, <i>Environmental Noise Guideline Publication NPC-300</i> (MOECC 2013) and the <i>MOECC Model Municipal Noise Control Bylaw NPC-115</i> (MOECC 1978). ■ Maintenance activities will typically occur during the daytime period from 07:00 to 19:00. In the event maintenance will occur beyond the daytime period, NextBridge will re-evaluate the potential Project related effects and if required, review mitigation requirements. ■ Noise abatement, emission and pollution control equipment on machinery should be in place, properly maintained and in good working order. ■ Turn off vehicles and equipment when not in use and minimize idling, unless weather and/or safety conditions dictate the need for them to remain turned on and in a safe operating condition. 	<p>Operation Phase:</p> <ul style="list-style-type: none"> ■ NextBridge will oversee implementation of the environmental management measures described in the Operation Environmental Management Plan (OEMP) during operation and maintenance. ■ Address noise concerns as they arise through a noise complaint process. ■ In the event that construction will occur beyond the daytime period, NextBridge and its contractors will re-evaluate the potential Project-related effects and if required, review mitigation requirements. 	No Net Effect

dB = decibels; L_{eq} = Equivalent Noise Level; MOECC = Ontario Ministry of the Environment and Climate Change; NPC = Noise Pollution Control Guideline; OEMP = Operation Environmental Management Plan; OTN = Ontario Trail Networks; POR = Point of Reception; ROW = right-of-way.

11.8 Net Effects Characterization

11.8.1 Approach

The effects assessment approach followed the general process described in Section 5.5 (methods section). Net effects are described using the factors of significance identified in Section 5.5.4 (Table 5-5). Changes to noise, specifically, the change relative to existing noise levels at the most affected PORs within the acoustic environment LSA, are measured against the magnitude levels identified in Table 11-9. For the purposes of this assessment, the daytime period is from 07:00 to 19:00 and nighttime period is from 19:00 to 07:00.

Table 11-9: Magnitude Effect Levels for the Acoustic Environment

Indicator / Net Effect	Magnitude Level Definition			
	Negligible	Low	Moderate	High
Increase in existing noise levels at potential PORs.	Project-related change in daytime equivalent noise level is less than (<) 3 dB.	Project-related change in daytime equivalent noise level is greater than or equal to (\geq) 3 dB and less than or equal to (\leq) 5 dB.	Project-related change in daytime equivalent noise level is greater than (>) 5 dB and less than (<) 10 dB.	Project-related change in daytime equivalent noise level is \geq 10 dB.

Note: Daytime period is from 07:00 to 19:00.

dB = decibel; dBA = A-weighted decibels; >= greater than; \geq = greater than or equal to; <= less than; \leq = less than or equal to; MOECC = Ontario Ministry of the Environment and Climate Change.

A change in level of 3 dB is just perceptible by the normal human ear in the environment (Bies and Hansen, 2009). Changes in noise levels for the period L_{Aeq} (A-weighted energy equivalent sound level) that would be hardly perceptible (i.e., less than 3 dB) were assigned a negligible magnitude. In Table 11-9, a noticeable change in the period L_{Aeq} (i.e., greater than or equal to 3 dB, but less than or equal to 5 dB change) were classified as having a low magnitude. Clearly noticeable changes for the period L_{Aeq} and perceived as twice as loud (i.e., greater than 5 dB, but less than 10 dB) were considered of moderate magnitude. Disturbing changes in the noise levels for the period L_{Aeq} and perceived as more than twice as loud (i.e., greater than or equal to 10 dB) were classified as having a high magnitude.

11.8.2 Net Effects Characterization

Net effects are described after the implementation of effective mitigation, and summarized according to direction, magnitude, geographic extent, duration/irreversibility, frequency/timing, and likelihood of the effect occurring following the methods described in Section 5.5. Effective implementation of mitigation summarized in Table 11-8, Section 11.7, the Construction Environmental Protection Plan (CEPP; refer to Appendix 4-II), and Operations Environmental Management Plan (OEMP; refer to Appendix 4-III) is expected to reduce the magnitude and duration of net effects on the acoustic environment.

11.8.2.1 Project Construction-Related Change in Daytime Equivalent Noise Level

11.8.2.1.1 Increase in Existing Noise Levels at Potential PORs

The noise emissions from construction activities have a direct and negative direction net effect since they could increase existing noise levels at potential PORs. The net effect of noise emissions from construction activities associated with the Project on daytime equivalent noise levels is considered to be negligible, low or moderate in magnitude (i.e., change less than or equal to 10 dB) during daytime periods with the effective implementation of the mitigation measures described in Table 11-8 and in the CEPP (refer to Appendix 4-II). With all construction

EAST-WEST TIE TRANSMISSION PROJECT

AMENDED ENVIRONMENTAL ASSESSMENT REPORT

equipment and activities not occurring simultaneously at the same location and are expected to be sequentially staggered, two potential scenarios were assessed; 1) the magnitude of the effect is assessed as negligible and low with the likelihood of occurrence to be probable 2) the magnitude of the effect is assessed as moderate with the likelihood of occurrence to be possible. For both scenarios, the net effect is also characterised as short-term and reversible as the net effects only occur during construction, and once construction is completed in an area, the noise sources will be removed, and the acoustic environment will return to baseline conditions. For both scenarios, the net effect is assessed to be frequent (i.e., intermittently) as not all equipment and activities will be occurring simultaneously at the same location and are expected to be sequentially staggered. There is no potential for a change in perceived noise levels during the nighttime period given that construction is anticipated to occur during one 10-hour shift per day, generally within the daytime period (i.e., 07:00 to 19:00). NextBridge will re-evaluate the potential Project related effects and if required, review mitigation requirements if construction will occur beyond the daytime period.

11.8.3 Summary of Net Effects Characterization

A summary of the characterization of net effects of the Project on the acoustic environment is provided in Table 11-10.

**EAST-WEST TIE TRANSMISSION PROJECT
AMENDED ENVIRONMENTAL ASSESSMENT REPORT**

Table 11-10: Characterization of Predicted Net Effects for the Acoustic Environment

Criteria	Indicators	Net Effect	Direct/ Indirect	Factors of Significance					
				Direction	Magnitude	Geographic Extent	Duration/ Irreversibility	Frequency	Likelihood of Occurrence
Noise	Project construction-related change in daytime equivalent noise level ($L_{eq, day}$)	Increase in existing noise levels at potential PORs that results in a change that is greater than 3 dB.	Direct	Negative	Negligible to Low	Local - LSA	Short-term reversible	Frequent	Probable
			Direct	Negative	Moderate	Local - LSA	Short-term reversible	Frequent	Possible

dB = decibels; $L_{eq, day}$ = Daytime Equivalent Noise Level; LSA = local study area; POR = point of reception.

11.9 Assessing Significance

The assessment of significance of net effects from the Project on acoustic environment followed the general process described in Section 5.6 and is informed by the interaction between the factors of significance, 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 final EA report.

The factors considered in the assessment of significance of net effects on the acoustic environment are outlined in Table 11-11. Net effects to the acoustic environment 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 the net effects would likely result in changes to the daytime equivalent noise level that would be considered disturbing. Net effects would be considered not significant if the effects are determined to be negligible, low or moderate in magnitude, short-term, local within the acoustic environment LSA and likely to occur and the net effect would likely result in changes to the daytime equivalent noise level that would not be considered disturbing.

Implementation of proven mitigation in Table 11-8, discussed in Section 11.7, and in the CEPP (refer to Appendix 4-II) is expected to avoid or reduce the duration, magnitude, and extent of net effects on the acoustic environment. The expected net effects on the acoustic environment are negligible (change less than or equal to 3 dB), low or moderate in magnitude, direct, short-term and local (confined to the Project footprint or extending into the acoustic environment LSA).

The expected net effects on the on the acoustic environment are not anticipated to result in a disturbing changes in the daytime equivalent noise level (i.e., changes greater than 10 dB) during construction activities. These effects are short-term, reversible and restricted to the acoustic environment local study area. Therefore, the predicted net effects on the acoustic environment noise are not significant.

EAST-WEST TIE TRANSMISSION PROJECT AMENDED ENVIRONMENTAL ASSESSMENT REPORT

Table 11-11: Factors Considered in the Assessment of Significance of Net Effects on the Acoustic Environment

Criteria	Indicators	Significance	Magnitude	Duration	Extent	Frequency	Likelihood	Context / Sustainability
Noise	Project construction-related change in daytime equivalent noise level ($L_{eq, day}$)	Significant	High	<ul style="list-style-type: none"> ■ Medium-term ■ Long-term ■ Permanent 	Any extent	Any frequency	Possible, probable or certain	Effects to the criterion would likely result in changes to the daytime equivalent noise level that would be considered disturbing.
		Not significant	<ul style="list-style-type: none"> ■ Negligible ■ Low ■ Moderate 	Short-term	Local - LSA	Any frequency	Any likelihood	Effects to the criterion would likely result in changes to the daytime equivalent noise level that would not be considered disturbing.

$L_{eq, day}$ = Daytime Equivalent Noise Level; LSA = local study area.

11.10 Cumulative Effects Assessment

For construction activities, two net effect scenarios were assessed:

- 1) the magnitude of the effect is assessed as negligible and low with the likelihood of occurrence to be probable;
and
- 2) the magnitude of the effect is assessed as moderate with the likelihood of occurrence to be possible.

Net effects assessed as 'unlikely' and 'possible' or 'negligible' and 'low' are not considered to likely contribute to cumulative effects and are not carried forward to the cumulative effects assessment (Section 5.7). Considered with the limited geographic extent of potential effects, short duration, intermittent frequency, this net effect (increase in existing noise levels at potential PORs that results in a change that is greater than 3 dB) is not expected to have potential to act cumulatively. Therefore, a cumulative effects assessment was not completed for this effect.

11.11 Prediction Confidence in the Assessment

The confidence in the effects assessment for the acoustic environment is moderate, considering that the mitigation described in the CEPP (refer to Appendix 4-II) and the OEMP (refer to Appendix 4-III) 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, planned implementation of known effective mitigation and monitoring measures, and available adaptive management measures to address unforeseen circumstances should they arise.

11.12 Follow-Up, Inspection, and Monitoring Programs

The objectives of follow-up, inspection, and monitoring programs include:

- Evaluating the effectiveness of mitigation and reclamation, and modifying or enhancing measures as necessary through adaptive management;
- identifying unanticipated potentially adverse effects, including possible accidents and malfunctions; and
- contributing to continual improvement.

Monitoring and post-construction monitoring activities are described in Section 23 and the CEPP (refer to Appendix 4-II). A summary of the monitoring activities relevant to the protection of the acoustic environment are described below:

- NextBridge will employ the services of qualified Environmental Inspector(s) to guide implementation, monitor and report on the effectiveness of the construction procedures and mitigation measures for minimizing potential impacts.
- Address noise concerns as they arise through a noise complaint process.
- In the event that construction will occur beyond the daytime period, NextBridge and its contractors will re-evaluate the potential Project-related effects and if required, review mitigation requirements.
- NextBridge will oversee implementation of the environmental management measures described in the OEMP during operation and maintenance.

11.13 Information Passed on to Other Components

Results of the acoustic environment assessment were reviewed and incorporated into the following components of the Environmental Assessment:

- Wildlife and Wildlife Habitat (Section 14);
- Indigenous Current Use of Lands and Resources for Traditional Purposes (Section 17);
- Socio-economics (Section 18); and
- Human Health (Section 21).