

Mackenzie Valley Highway Project Technical Data Report—Acoustic Environment Baseline

Prepared for:

Government of the Northwest Territories

Prepared by:

K'alo-Stantec Limited

December 2022

Project No.: 144903025



K'alo-Stantec

Limitations and Sign-off

This document entitled Mackenzie Valley Highway Project Technical Data Report—Acoustic Environment Baseline was prepared by K’alo-Stantec Limited (“K’alo-Stantec”) for the account of Government of the Northwest Territories (the “Client”) to support the regulatory review process for its Developer’s Assessment Report (DAR) (the “Application”) for the Mackenzie Valley Highway Project (the “Project”). In connection therewith, this document may be reviewed and used by the Department of Infrastructure (INF) for the Government of the Northwest Territories participating in the review process in the normal course of its duties. Except as set forth in the previous sentence, any reliance on this document by any other party or use of it for any other purpose is strictly prohibited. The material in it reflects K’alo-Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between K’alo-Stantec and the Client. The information and conclusions in the document are based on the conditions existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, K’alo-Stantec did not verify information supplied to it by the Client or others, unless expressly stated otherwise in the document. Any use that another party makes of this document is the responsibility and risk of such party. Such party agrees that K’alo-Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other party as a result of decisions made or actions taken based on this document.

Prepared by _____
(signature)

Samuel Lacrampe, P.Eng.,
Atmospheric Engineer

Reviewed by _____
(signature)

Jonathan Chui, P.Eng.
Senior Noise Specialist

Approved by _____
(signature)

Erica Bonhomme, M.Sc., P.Geo.
Principal, Environmental Services



Executive Summary

The Government of the Northwest Territories (GNWT), Department of Infrastructure (INF) is proposing the Mackenzie Valley Highway Project (the “Project”) that will extend the Mackenzie Highway (Northwest Territories Highway #1) from Wrigley to Norman Wells to replace the Mackenzie Valley Winter Road (MVWR) along this portion. The Project includes construction of approximately 281 kilometres (km) of new all-season highway, and the construction and operation of temporary and permanent quarry and borrow sources. The project highway alignment will pass through the Dehcho Region and a portion of the Tulita District of the Sahtu Region within the Northwest Territories (NT).

This technical data report (TDR) presents detailed technical data and analysis of the baseline acoustic environment for the Project.

Data and information reviewed for this report included traditional knowledge (TK) and traditional use (TU) information pertaining to acoustic environment. Traditional knowledge relevant to this TDR specifically focused on caribou behavioral responses to noise. The reviewed TK and TU indicates that interviewees generally agreed that caribou are not necessarily impacted by construction equipment or vehicular traffic and become accustomed over the years; however, not all interviewees agreed with this.

Other documents reviewed included the baseline noise survey results conducted in the area from the Mackenzie Gas Project (as reported in 2004) and Enbridge Pipelines Project. Based on the average measurement results from these projects, the baseline day-night sound level (L_{dn}) for the Mackenzie Valley Highway (MVH) Project is assumed to be 38 dBA (A-weighted decibels). The measurement locations in the Mackenzie Gas Project and Enbridge Pipelines Project are representative of remote areas without any development, similar to the acoustic local study area (LSA) and regional study area (RSA) for the MVH Project baseline noise levels are assumed the same for the project footprint along the proposed highway route and near the proposed borrow sources.

Table of Contents

1	INTRODUCTION.....	1
2	REGULATORY FRAMEWORK.....	3
3	NOISE DESCRIPTORS	4
4	STUDY AREA.....	5
4.1	Local Study Area.....	5
4.2	Regional Study Area	6
5	REVIEW OF EXISTING DATA	7
5.1	Traditional Knowledge and Traditional Use	7
5.2	Mackenzie Gas Project and Enbridge Pipelines Project.....	8
5.3	Mackenzie Valley Winter Road	9
5.4	Provincial Noise Guidelines	9
5.5	Health Canada	10
6	KEY RESULTS AND FINDINGS	11
7	CLOSURE.....	12
8	REFERENCES.....	13

List of Tables

Table 5.1	Baseline Sound Survey Results – Mackenzie Gas Project and Enbridge Pipelines Project	8
Table 6.1	Baseline Sound Level Summary	11

List of Figures

Figure 1.1	Project Location, Local Study Area, and Regional Study Area	2
------------	---	---

Abbreviations

ATV	all-terrain vehicle
BC OGC	British Columbian Oil and Gas Commission
DAR.....	Developer's Assessment Report
dB	decibel
dBA.....	A-weighted decibels
GNWT	Government of the Northwest Territories
HC	Health Canada
INF.....	Department of Infrastructure
km.....	kilometre
L _d	daytime sound level
L _{dn}	day-night sound level
L _{max}	maximum sound level
L _n	nighttime sound level
LSA.....	Local Study Area
m	metre
MVH	Mackenzie Valley Highway
MVRMA	<i>Mackenzie Valley Resource Management Act</i>
MVWR.....	Mackenzie Valley Winter Road
NT.....	Northwest Territories
RSA	Regional Study Area
TDR.....	Technical Data Report
the Project	Mackenzie Valley Highway Project
TK.....	traditional knowledge
ToR.....	Terms of Reference
TU.....	traditional use



Glossary

A-Weighting Sound (dBA)	A weighting of the frequencies in a sound that approximates the response of the human ear to frequencies in moderately loud sounds (sound pressure levels in the range of 45-65 dBA).
Daytime	A time period from 7:00 AM to 10:00 PM
Daytime Sound Level (L_d)	L_d - Daytime period equivalent sound level (15 hours from 7:00 AM to 10:00 PM)
Day-night Sound Level (L_{dn})	L_{dn} - An equivalent continuous sound level taken over 24 hours, with the night-time (10:00 PM to 7:00 AM) sound contributions increased by 10 decibels (dB). A 10 dB penalty added to the nighttime period to account for the increased sensitivity to noise during the night.
24-hour equivalent Sound Level ($L_{Aeq-24hr}$)	An energy-average sound level taken over a 24-hour period of time. It represents the average sound pressure encountered for the period. L_{eq} is usually A-weighted. An L_{eq} value expressed in A-weighted dB (dBA) is a good, single value descriptor of the annoyance of noise.
Decibel (dB)	A logarithmic unit of measurement that expresses the magnitude of sound pressure level relative to reference level (20 micro-Pascals). It is dimensionless unit since it expresses the ratio of two quantities with the same unit.
MVH Project Area (Project Area)	The area to be utilized by the Project and includes the proposed alignment of the MVH between Wrigley and Norman Wells and a 100 m buffer on either side. It also includes the temporary and permanent borrow sources and associated access roads.
Nighttime	A time period from 10:00 PM to 7:00 AM.
Nighttime Sound Level (L_n)	L_n - Nighttime period equivalent sound level (9 hours from 10:00 PM to 7:00 AM).

Mackenzie Valley Highway Project
Technical Data Report—Acoustic Environment Baseline

Glossary
December 2022

Noise	Unwanted sound.
Sound	Acoustic energy added to the ambient air in the form of fluctuating pressure.

1 Introduction

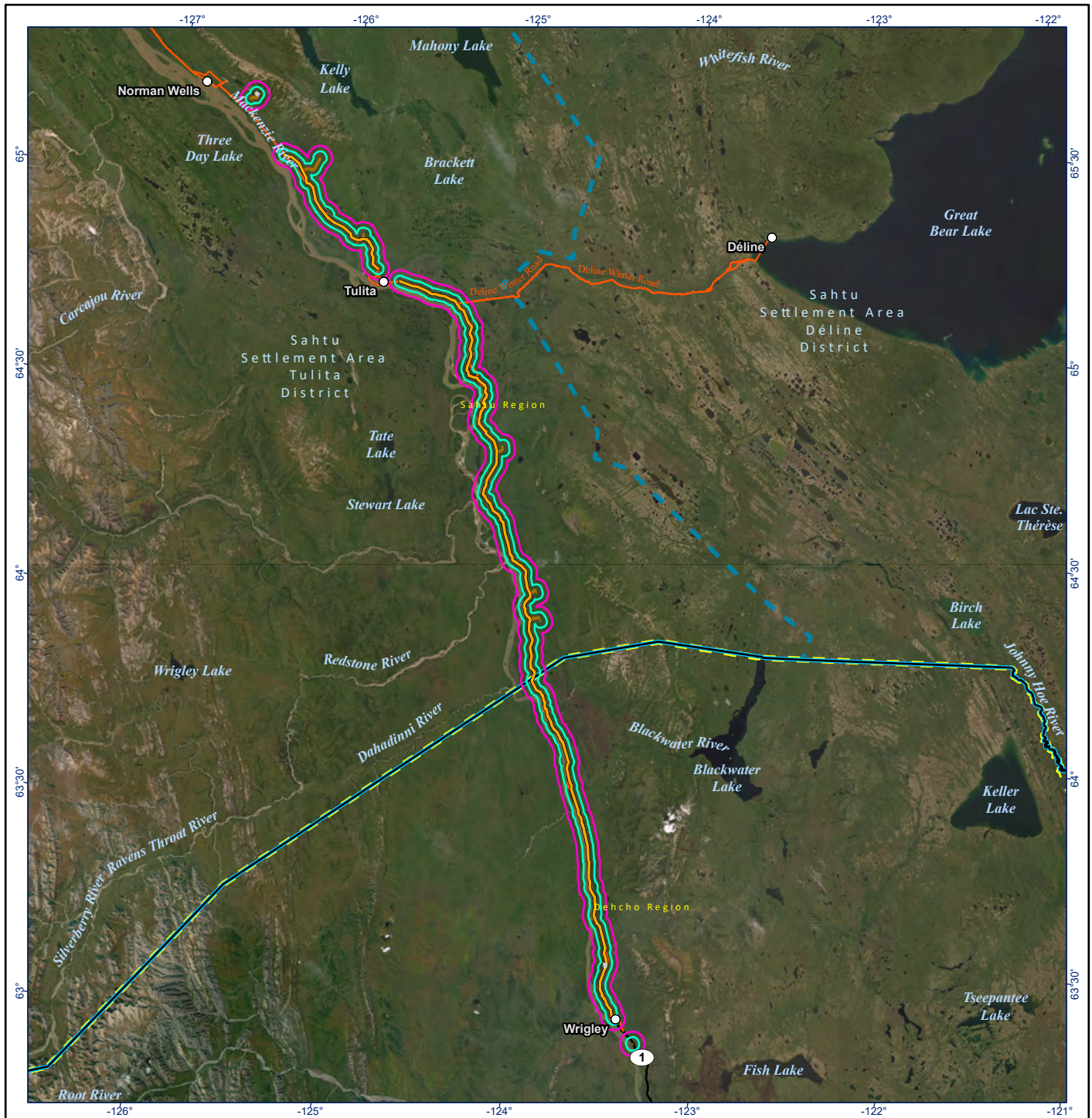
The Government of the Northwest Territories (GNWT), Department of Infrastructure (INF) is proposing the Mackenzie Valley Highway Project (the “Project”) that will extend the Mackenzie Highway (Northwest Territories Highway #1) from Wrigley to Norman Wells to replace the Mackenzie Valley Winter Road (MVWR) along this portion. The Project includes construction of approximately 281 kilometres (km) of new all-season highway, and the construction and operation of temporary and permanent quarry and borrow sources. The project highway alignment will pass through the Dehcho Region and a portion of the Tulita District of the Sahtu Region within the Northwest Territories (NT; Figure 1.1).

The Project is subject to an environmental assessment and the requirements of Part 5 of the *Mackenzie Valley Resource Management Act* (MVRMA). As part of the environmental assessment process, the Developer’s Assessment Report (DAR) assesses how development of the proposed Project could affect the acoustic environment.

This technical data report (TDR) presents the existing conditions (baseline) for the acoustic environment to support development of the DAR as required by the Terms of Reference (ToR; MVEIRB, 2015).

The required elements specified in the ToR with respect to baseline conditions include describing the existing acoustic environment “along the proposed highway route”, including noise sources, types and boundaries, and any relevant standards, guidelines, or objectives. This report describes the existing acoustic environment within the acoustic local and regional study areas.

Relevant territorial, provincial, and federal noise guidelines are discussed in this TDR with the focus on their purpose and use in determining baseline sound levels.



- Proposed Mackenzie Valley Highway Alignment - Issued for EA 2022
- Granular Borrow / Rock Quarry Site and Access
- Quarry
- Local Study Area
- Regional Study Area
- Community
- All-Season Road
- Winter Road
- District Boundary
- Region Boundary
- Settlement Area Boundary

0 10 20
Kilometres
(At original document size of 8.5x11)
1:600,000



Kalo-Stantec



Project Location

Wrigley to Norman Wells, NWT

Client/Project

Prepared by AT on 2023-03-07

TR by AJ on 2023-03-07

144903025-0029 REV.B

Government of Northwest Territories
Mackenzie Valley Highway Project

Figure No.

1.1

Title

**Project Location, Local Study Area,
and Regional Study Area**

Notes

1. Coordinate System: NAD 1983 Northwest Territories Lambert
2. Data Sources: Centre for Geomatics Government of NWT, Government of Canada, Stantec
3. Background: World Topographic Map: Esri, FAO, NOAA, USGS, NRCan
World Imagery: Earthstar Geographics
World Hillshade: Esri, USGS

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

2 Regulatory Framework

The GNWT has developed guidelines that, along with legislation, regulations and policies, help manage the environment in the NT. However, there is no dedicated regulation or guideline that regulates the acoustic environment.

In the absence of territorial noise regulations, noise guidelines from Alberta and British Columbia are included to provide additional information for the estimation of baseline sound levels for the Project.

In addition to provincial noise guidelines, federal noise guidance such as the Health Canada (HC) Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (HC, 2017) can be referenced for noise assessment of large infrastructure projects. The HC document provides generic guidance on predicting health risks related to sound predicted in federal environmental assessments of proposed major resource and infrastructure projects. The guidance includes recommendations for estimating baseline sound levels.

3 Noise Descriptors

The noise descriptors commonly used in federal and provincial guideline documents are the daytime (L_d), nighttime (L_n), day-night (L_{dn}) and maximum (L_{max}) sound levels. L_d and L_n are the continuous equivalent (energy-averaged) sound levels calculated over the daytime (07:00 AM – 10:00 PM) and nighttime (10:00 PM – 07:00 AM) periods, respectively. L_{dn} is the day-night average sound level over a 24-hour period with 10 decibels (dB) penalty added to nighttime sound level because of increased sensitivity to nighttime noise.

Health Canada guidance widely uses L_d , L_n and L_{dn} parameters for estimation of baseline noise levels and assessment of the effects of project-related noise from construction activities and project operation. This baseline TDR uses the same parameters to describe the Project's baseline acoustic environment.

4 Study Area

The Project is located in the Mackenzie Valley region of the NT between the current terminus of the existing all-weather highway in Wrigley (Northwest Territories Highway #1) and Prohibition Creek (approximately 28 km south of Norman Wells). The Project highway alignment parallels the Mackenzie River to its east and passes through the community of Tulita. The Project is located in sparsely populated areas except those parts of the highway alignment near the communities of Wrigley, Tulita and Norman Wells. The existing acoustic environment is dominated mostly by the sounds of natural environment such as wind, rainfall, running water and wildlife. Noise contributions from human activity are present near the settlements of Wrigley, Tulita and Norman Wells and along the footprint of the existing Mackenzie Valley Winter Road. These human activities are transient in nature and include local traffic, operation of off-road vehicles and snow-machines, helicopter, and aircraft flyovers.

The local and regional study areas presented in this TDR are the areas where data were compiled/collected to allow for an understanding of the environment in support of the project-specific effects assessment and the cumulative effect assessment.

The local and regional study areas (LSA and RSA respectively) presented in this TDR partially overlap with the local and regional study areas of Mackenzie Gas Project (IORVL, 2004). As part of Mackenzie Gas Project environmental impact studies (IORVL, 2004) and Enbridge Pipelines Project (Enbridge, 2018), baseline sound surveys were conducted near Norman Wells and at other remote locations with acoustic environments similar to the LSA and RSA. The baseline sound survey results obtained at these remote locations are considered representative of the acoustic LSA and RSA because of the similar acoustic environment. In addition, noise effects near the existing MVWR during the four months of operation is referenced from the Mackenzie Valley Highway Extension Pehdzeh Ki Ndeh – Dehcho Region Project Description Report (Dessau, 2012).

4.1 Local Study Area

The LSA for the characterization of existing conditions is a 1.5 km buffer around the centerline of the highway alignment and quarry/borrow access roads and 1.5 km buffer around the footprint of the proposed quarry/borrow sources. Potential quarry/borrow sources in Sahtu Region and in the Dehcho Region are shown in Figure 1.1. Project-related noise effects are expected to occur within the LSA; outside the LSA, noise effects are expected to be negligible due to natural atmospheric attenuation and ground absorption. Project residual noise effects are not expected to extend beyond the LSA. Figure 1.1 shows the spatial boundaries of the acoustic environment LSA.

4.2 Regional Study Area

The RSA for the characterization of existing conditions was set as a 3 km (double of LSA) buffer around centerline of the highway alignment and 3 km buffer around the footprint of the proposed quarry/borrow sources. Potential quarry/borrow sources in Sahtu Region and in the Dehcho Region are shown in Figure 1.1. The RSA is to account for other existing and future physical activities that may have effects that act cumulatively with the project effects and to provide context for project specific effects and cumulative effects. Physical activities located beyond the 3 km buffer are not expected to interact with project residual acoustic effects due to natural atmospheric attenuation and ground absorption. Figure 1.1 shows the spatial boundaries of the acoustic environment RSA.

5 Review of Existing Data

This section of TDR presents a summary of baseline sound level information obtained from past projects and Health Canada guidance. It also presents a summary of traditional knowledge and traditional use related to the acoustic environment.

5.1 Traditional Knowledge and Traditional Use

The Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region (Dehcho First Nations, 2011) report was reviewed for traditional knowledge (TK) and traditional use (TU) related to the acoustic environment. This report presents TK related to caribou behavior, specifically caribou responses to noise. The TK and TU information provided in the report is based on interviewee responses to noise and light disturbance related questions. The interview questionnaire asked the following noise and light disturbance related questions:

1. Have you observed noise or light disturbance from aircraft, skidoos, all-terrain vehicles (ATVs), or industry affecting woodland caribou in your area?
2. If so, how is it affecting the caribou?
3. Do you notice areas where it is more of a problem?
4. Do you have suggestions for how to address this?

The findings described below do not give a strong indication of the existing anthropogenic noise in the LSA; however, they provide information on the possible impact of the noise related to project activities on wildlife.

The report (Dehcho First Nations, 2011) summarizes that: “Interviewees generally agreed that woodland caribou, like most animals, will not necessarily be impacted by machines or industrial noise such as graders or pumping stations, or a skidoo driven at a reasonable pace”.

Some of the interviewees indicated that: “in the past, animals including caribou and moose were more likely to be frightened by industrial or vehicular noises but have become accustomed over the years”. Not all interviewees agreed that caribou become accustomed to anthropogenic noise. There were some interviewees who feel that industrial and vehicular noise would be negative for the caribou and cause them to flee.

Boreal Caribou TK Collection Study (McDonald et al., 2010) for the Sahtu Settlement Area was also reviewed for TK and TU information related to the acoustic environment. The study acknowledges that noise from general construction activities and from construction traffic is a major disturbance factor for the boreal woodland caribou. According to the study: “*caribou prefer old growth areas and have a tendency to stay away from winter roads because of noise pollution*”. That study recommends that any development should not occur during the calving season or near caribou habitat.

Project activities (construction and operation) have potential to impact other important harvested species, such as moose. The reviewed TK and TU information for the Dehcho Region (Dehcho First Nations, 2011) and the Sahtu Settlement Area (McDonald et al., 2010) is focused on the impacts of human-induced changes to caribou habitat as an important harvested species. That TK and TU information does not provide any specific data on the impacts of increased anthropogenic sound levels to the habitats of other harvested species, such as moose. There is currently a gap in information related to harvested species other than caribou.

5.2 Mackenzie Gas Project and Enbridge Pipelines Project

Baseline sound surveys were conducted for two projects located near the Project area. The LSA and RSA presented in this TDR partially overlap with the LSA and RSA of the Mackenzie Gas Project (IORVL, 2004), and the Enbridge Pipelines Project (Enbridge, 2018) is located approximately 200 km south of the acoustic environment LSA. Baseline sound surveys were conducted near Norman Wells, Niglintgak, and Inuvik Area for the Mackenzie Gas Project, and near Fort Simpsons for the Enbridge Pipelines Project. The baseline sound survey results obtained at these locations are considered representative of the acoustic LSA and RSA for the Mackenzie Valley Highway (MVH) Project because of the similar acoustic environment for remote areas without any development. Further, the Norman Wells survey location is within the acoustic RSA. Baseline sound survey results based on the Mackenzie Gas Project and Enbridge Pipelines Project are provided in Table 5.1. The summer L_{dn} are higher than the winter L_{dn} for the Niglintgak and Inuvik Area Facility locations. The range of values in the results indicate variability due to season and locations. The estimated average baseline sound level is 34 A-weighted decibels (dBA) and 31 dBA, based on the logarithmic average of measured L_d and L_n for all locations. The equivalent L_{dn} of 38 dBA is based on the L_d of 34 dBA and L_n of 31 dBA.

Table 5.1 Baseline Sound Survey Results – Mackenzie Gas Project and Enbridge Pipelines Project

Reference Project	Sound Survey Location and Time	Daytime L_d (dBA)	Nighttime L_n (dBA)	Day-Night L_{dn} (dBA)
Mackenzie Gas Project	Winter Sound Levels at Niglintgak. Nov 30 – Dec 1, 2002	37	33	40
	Summer Sound Levels at Niglintgak. July 6 – 7, 2003	38	36	43
	Winter Sound Levels at the Inuvik Area Facility. Dec 3 – 4, 2002	21	19	26
	Summer Sound Levels at the Inuvik Area Facility. July 5 – 6, 2003	33	25	34
	Summer Sound Levels at Norman Wells. July 10 – 11, 2003	32	32	38
Enbridge Pipelines Project	Spring Sound Levels at Fort Simpsons. April 2 – 4, 2018	27	22	29
Average baseline sound level		34	31	38

5.3 Mackenzie Valley Winter Road

Baseline sound level information for MVWR was reviewed in project description documents for the Dehcho Region (Dessau, 2012) and Sahtu Region (5658 NWT Ltd. and GNWT, 2011).

The MVH highway alignment largely follows the route of the existing MVWR, which is used only during winter for a 4-month period (Dessau, 2012). In winter months, the traffic noise from MVWR is not continuous due to low traffic volume: the annual average number of vehicles travelling on the MVWR is 50 to 99 vehicles according to GNWT Department of Transportation data for 2006 (Dessau, 2012). Based on approximate traffic volume, the project description for Dehcho Region estimates that $LA_{eq-24hr}$ levels within narrow strip around the MVWR (approximately 25 metres [m] from road centerline) are 50 dBA (Dessau, 2012).

The project description for the Sahtu Settlement Area (5658 NWT Ltd. and GNWT, 2011) states that the highway construction noise is expected to have limited, localized, and temporary impacts in the vicinity of the MVWR. Heavy equipment and truck movements and blasting are the known major sources of the noise associated with highway construction. The project description for Sahtu Settlement Area estimates that the noise levels associated with dump trucks and haul trucks are typically within 78 dBA to 82 dBA range at 15-meter distance from the trucks. The project description for Sahtu Settlement Area does not estimate the noise levels associated with the highway traffic volumes.

5.4 Provincial Noise Guidelines

Comparable noise guidelines from other provinces include the Alberta Energy Regulator Directive 038: Noise Control (AER, 2007), Alberta Utilities Rule 012: Noise Control (AUC, 2021) and British Columbia Oil and Gas Commission (BC OGC) Noise Control Best Practices Guideline (BC OGC, 2021).

In absence of ambient sound level measurements, these provincial guidelines recommend that the average rural ambient sound level can be assumed equal to approximately L_d of 45 dBA and L_n of 35 dBA. The daytime adjustment recognizes that daytime ambient sound levels are commonly 10 dB higher than nighttime levels. The equivalent L_{dn} value would be 45 dBA, based on the L_d of 45 dBA and L_n of 35 dBA. All three provincial guidelines indicate that the recommended ambient sound level for rural area may not apply in a pristine area. Pristine area is defined as a natural area that might have a dwelling but no industrial presence, including energy, agricultural, forestry, manufacturing, recreational or other industries that affect the noise environment.

5.5 Health Canada

Health Canada guidance recommends that the standard approach for baseline sound determinations is direct measurement (HC, 2017). However, the guidance also provides alternative approaches to estimate baseline levels in different community types. For quiet rural communities, HC noise guidance suggests the estimated baseline sound level L_{dn} to be 45 dBA or less. Quiet rural communities are described as community with dwelling units more than 500 m from heavily travelled roads and/or rail lines and not subject to frequent aircraft flyovers. The guidance also includes one conservative (i.e., most protective) approach which is to consider a reasonable worst-case scenario and assume L_{dn} baselines of 35 dBA for rural areas.

6 Key Results and Findings

The measured and estimated daytime and nighttime baseline sound level for period without MVWR operation are summarized in Table 6.1 for comparison.

Table 6.1 Baseline Sound Level Summary

Source	Daytime L_d (dBA)	Nighttime L_n (dBA)	Day-Night L_{dn} (dBA)
Mackenzie Gas Project and Enbridge Pipelines Project average baseline sound levels	34	31	38
Alberta and British Columbia noise guidelines	45	35	45
Health Canada noise guidance – quiet rural communities	45	35	45
Health Canada noise guidance – most protective approach	35	25	35

Most areas within the LSA and RSA are considered remote without any development. Anthropogenic sounds from human activities are present at certain segments of the LSA and RSA (near the settlements of Wrigley and Tulita and Norman Wells, and along the MVWR). The acoustic environment within most of the acoustic LSA and RSA of the MVH Project is expected to be dominated by natural sounds.

The measurement locations in the Mackenzie Gas Project and Enbridge Pipelines Project, described in Section 5.2, are representative of remote areas without any development, similar to the Project acoustic environment LSA and RSA. The baseline sound level L_{dn} for the MVH Project is assumed to be 38 dBA, based on the average measurement results from the Mackenzie Gas Project and Enbridge Pipelines Project. The MVH Project baseline noise levels are assumed to be the same along the proposed highway route as they are near the proposed quarry/borrow sources.

The HC noise guidance and provincial noise guidelines recommend the L_{dn} of 45 dBA for rural communities. However, measurement results from the Mackenzie Gas Project indicate lower baseline sound levels. HC guidance recommends measured baseline data in areas with similar acoustical environments. The Mackenzie Gas Project and Enbridge Pipelines Project measurement results are considered to be more representative than the most protective baseline sound level value of 35 dBA L_{dn} .

During the four months of MVWR operation, it was estimated that L_{24hr} levels within narrow strip around MVWR (approximately 25 m from road centerline) are 50 dBA (Dessau, 2012).

During construction phase, the noise from construction activities within the LSA will affect ambient sound levels. During the operation stage, the ambient sound levels will be affected by increased traffic volume.

7 Closure

This TDR was prepared for the sole benefit of GNWT to describe existing conditions related to acoustic environment within the Project LSA and RSA. If you have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted,

K'alo-Stantec Limited

8 References

- 5658 NWT Ltd. and GNWT (5658 NWT Ltd. and Government of the Northwest Territories). 2011. Project Description Report for Construction of the Mackenzie Valley Highway Tulita District, Sahtu Settlement Area. Available at: https://reviewboard.ca/upload/project_document/EA1213-02_Project_Description_Report_for_the_Tulita_district_of_the_Sahtu_Settlement_Area.PDF.
- AER (Alberta Energy Regulator). 2007. Directive 038: Noise Control. Available at: <https://static.aer.ca/prd/documents/directives/Directive038.pdf>. Accessed October 2020.
- AUC (Alberta Utilities Commission). 2021. Rule 012: Noise Control. Available at: <https://www.auc.ab.ca/Shared%20Documents/Rules/Rule012.pdf>. Accessed February 2022.
- BC OGC (British Columbia Oil and Gas Commission). 2021. British Columbia Noise Control Best Practices Guideline. Available at: <https://www.bcogc.ca/files/operations-documentation/Oil-and-Gas-Operations-Manual/Supporting-Documents/BC-Noise-Control-Best-Practices-Guideline-July-12-v.2.2-2021.pdf>. Accessed February 2022.
- Dehcho First Nations. 2011. Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region. Report prepared for the Canadian Wildlife Services (CWS).
- Dessau. 2012. Mackenzie Valley Highway Extension Pehdzeh Ki Ndeh – Dehcho Region. Project Description Report. Available at: https://reviewboard.ca/upload/project_document/EA1213-02_Project_Description_Report_Pehdzeh_Ki_Ndeh_-_Dehcho_Region.PDF.
- Enbridge (Enbridge Pipelines (NW) Inc.). 2018. Environmental Noise Impact Assessment For The Line 21 Segment Replacement Project. Available at: https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/140186/3212119/3422672/3543222/A91217-2_Attachment_1_-_Environmental_Noise_Impact_Assessment_-_A6D2H2.pdf?nodeid=3539161&vernum=-2
- HC (Health Canada). 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise. Published: 2017-04-25. Available at: <https://www.ceaa.gc.ca/050/documents/p80054/119378E.pdf>. Accessed February 2022.
- IORVL (Imperial Oil Resources Ventures Limited). 2004. Mackenzie Gas Project (MGP) Environmental Impact Statement (EIS) Volume 3: Biophysical Baseline Part A Environmental Setting, Air Quality and Noise. Report submitted to National Energy Board and the Joint Review Panel.
- MVEIRB (Mackenzie Valley Environmental Impact Review Board). 2015. Terms of Reference EA1213-02 Mackenzie Valley Highway Extension Project Wrigley to Norman Wells Government of Northwest Territories. February 13, 2015. PR#66.



McDonald, R. and, Hrynkiw, A. and Guthrie, G. (editors). 2010. Boreal Caribou Traditional Knowledge Collection Study for the Sahtu Settlement Area. Prepared by the Sahtu Renewable Resources Board for the Canadian Wildlife Service, Environment Canada.