# ENVIRONMENTAL ASSESSMENT FOR THE MARATHON PGM-Cu PROJECT AT MARATHON, ONTARIO 

STILLWATER CANADA INC. MARATHON PGM-Cu PROJECT

SUPPORTING INFORMATION DOCUMENT No. 13 BASELINE TECHNICAL REPORT NOISE - MARATHON PGMCu PROJECT

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Stillwater Canada Inc.<br>Baseline Technical Report - Noise<br>Marathon PGM-Cu Environmental Assessment<br>Marathon, Ontario

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## Executive Summary

True Grit Consulting Ltd. (TGCL) was retained by Stillwater Canada Inc. (SCI) to assess existing acoustic conditions at locations relevant to a proposed copper/platinum group metals mine to be constructed north of Marathon, Ontario. This baseline noise information will be used to assess potential noise impact under the Federal and Provincial Environmental Assessment (EA) process, within the context of potential exposure of local biota and communities to noise generated by project-related activities.

The Marathon PGM-Cu Project (the Project) is located approximately 10 km north of the Town of Marathon, Ontario. It lies partially within the municipal boundaries of the Town of Marathon, as well as partially within the unorganized Townships of Pic, O'Neil and McCoy. The proposed Project site is in an area characterized by dense vegetation, moderate to steep hilly terrain with a series of streams, ponds and small lakes. The Project area is bounded to the east by the Pic River and Lake Superior to the West.

The Project will consist of open pit mining and ore processing operations. One primary pit and four smaller satellite pits will be mined in sequence, with a combined ore quantity of approximately $288 \times 10^{6}$ metric tonnes (MT). The ore will be processed (crushed, ground and concentrated) at on-site facilities. The final concentrate containing copper and platinum group metals (gold, platinum, and palladium; PGM) will be transported off-site via road and/or rail to a smelter and refinery for further metal extraction.

The baseline noise study considers background/ambient sound sources contributing to the existing acoustic environment prior to Project development activity. The study focuses on three areas: the project site; along the relevant Highway 17 (Hwy 17) transportation corridor; and, within the Town of Marathon along relevant transportation routes to the rail load out facility, which has not been sited but for which two development options have been proposed. The study characterizes baseline noise conditions at representative noise sensitive receptors (NSR), some of which may be subject to eventual regulatory scrutiny under current Ontario Ministry of Environment (MOE) noise guidelines.

The nearest known NSR is a residence and commercial development (May's Gifts) on the north side of Hwy 17, located approximately 3.4 km southwest of the closest proposed open pit and processing building. Other nearby NSR include two cottages on the north and south ends of Hare Lake and three hotels adjacent to Hwy 17. In the Town of Marathon, Peninsula Road, the main arterial road required for final concentrate transportation, is bordered by institutional, commercial, enterprise, light industrial, heavy industrial, rural and residential zones. NSR along the relevant transportation corridors include churches, hotels, residences, a hospital, and a library.

Within the Project site, where background noise consists predominantly of sounds from the existing natural environment, baseline noise was characterized on the basis of August 2009 site sound level measurements. For this study area, appropriate baseline noise descriptors are considered to be the lowest one hour equivalent continuous A-weighted sound pressure levels ( $\mathrm{L}_{\text {eq(1) }}$ ) measured during the MOE-defined daytime and night time periods.

For the nearest NSR and for NSR along the relevant Hwy 17 and Town of Marathon transportation corridors, where background noise consists predominantly of roadway traffic sounds, baseline traffic noise was characterized by traffic noise modelling (TNM) using relevant traffic data available from the Ontario Ministry of Transportation (MTO) and the Town of Marathon Municipal Office. For these study areas, three TNM outputs are considered to be appropriate baseline traffic noise descriptors:

- lowest $\mathrm{L}_{\text {eq(1) }}$;
- daytime 16 hour equivalent continuous A-weighted sound pressure level ( $\mathrm{L}_{\text {eq(16) }}$ ); and/or

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- night time eight hour equivalent continuous A-weighted sound pressure level ( $\mathrm{L}_{\text {eq(8) }}$ ).

The results are considered to reasonably represent baseline noise conditions within the following time frames:

- for the Project site, 2011 and previous years;
- for the nearest NSR, 2009 to present, since MTO 2009 data was used;
- for the Hwy 17 transportation corridor, 2008 to present, since MTO 2008 was used; and
- for the Town of Marathon, 2011, since 2011 data was used.

The baseline noise conditions are presented in this report in tabular and noise grid map format. A summary of key baseline noise descriptors is shown below:

| Location | $\begin{array}{c}\text { Baseline Noise } \\ \text { Characterization } \\ \text { Method }\end{array}$ | $\begin{array}{c}\text { Baseline Noise } \\ \text { Descriptor }\end{array}$ | $\begin{array}{c}\text { Baseline Noise } \\ \text { Descriptor } \\ \text { (dBA) }\end{array}$ |
| :---: | :---: | :---: | :---: |
| General Project Site | Measurement | Daytime Lowest $\mathrm{L}_{\text {eq }}(1)$ | 40 to 40.3 |
|  |  | Night time Lowest $\mathrm{L}_{\text {eq(1) }}$ |  |$]$

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| AADT | Annual average daily traffic |
| :---: | :---: |
| A-weighting | weighting characteristic that approximates the relative sensitivity of human hearing to diferent frequencies (pitch) of sound |
| am | Ante meridian, times from midnight to just before noon |
| C | Degrees Celsius |
| CAR | Canadian Aviation Regulations |
| CEAA | Canadian Environmental Assessment Act (Canada) |
| CEA Agency | Canadian Environmental Assessment Agency |
| cm | Centimetre |
| Cu | Copper |
| CYSP | Marathon Municipal Airport code |
| dB | Decibel, dimensionless unit of measure for sound pressure level |
| dBA | A-weighted decibel(s): the sound presssure level modified by application of A-weighting |
| DEM | Digital Elevation Model |
| e.g. | For example |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| EMRD | Extraction metallurgy research division |
| ENL | Engineering Northwest Limited |
| FHWA | US Federal Highway Administration |
| Hwy | Highway |
| HO | Harmonization order |
| i.e. | That is |
| ISO | International Standards Organization |
| JRP | Joint Review Panel |
| km | Kilometre(s) |
| km/hr | Kilometre(s) per hour |
| kV | Kilovolt |
| L | Sound pressure level |
| $\mathrm{L}_{\text {eq }}$ | Equivalent continuous A-weighted sound pressure level |
| $\mathrm{L}_{\text {eq(1) }}$ | One hour $\mathrm{L}_{\text {eq }}$ |
| $\mathrm{L}_{\text {eq(8) }}$ | Eight hour $\mathrm{L}_{\text {eq }}$ |
| $\mathrm{L}_{\text {eq(16) }}$ | Sixteen hour $\mathrm{L}_{\text {eq }}$ |
| LU | Land Use |
| m | Metre(s) |
| mm | Millimetre(s) |

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| MOE | Ontario Ministry of Environment |
| :---: | :---: |
| MPGM | Marathon PGM Corporation |
| MPI | Marathon Pulp Inc. |
| MRSA | Mine Rock Storage Area |
| MTO | Ontario Ministry of Transportation |
| NAD | North American Datum |
| NSR | Noise sensitive receptor(s) |
| NoC | Notice of Commencement |
| pm | Post meridian, times from noon to just before midnight |
| NPC | Noise Pollution Control, reference to a former MOE section |
| OEA Act | Ontario Environmental Assessment Act |
| OG | Operational Guideline |
| ON | Ontario |
| O. Reg | Ontario Regulation |
| ORNAMENT | Ontario Road Noise Analysis Method for Environment and Transportation |
| PGE | Platinum Group Element |
| PGM | Platinum Group Metal |
| PSMF | Process Solids Management Facility |
| QA/QC | Quality Assurance Quality Control |
| QC | Quality Control |
| RMS | Root Mean Square |
| S | Second(s) |
| SCI | Stillwater Canada Incorporated |
| SFL | Sustainable Forestry License |
| SWC | Stillwater Mining Company |
| TGCL | True Grit Consulting Limited |
| TNM | Traffic noise model(ling)(s) |
| ToR | Terms of Reference |
| uS | Micro Siemen(s) |
| US | United States of America |
| USGS | United States Geological Survey |
| UTM | Universal Transverse Mercator |
| VA | Voluntary agreement |
| WHO | World Health Organization |
| \% | percent |

### 1.0 Introduction

Stillwater Canada Inc. (SCI) proposes to develop a platinum group metals (PGMs), copper (Cu) and possibly iron (Fe) open-pit mine and milling operation near Marathon, Ontario. A Notice of Commencement (NoC) of an environmental assessment (EA) in relation to the proposed Marathon PGMCu Project (the "Project") was filed by the Canadian Environmental Assessment Agency (CEA Agency) under Section 5 of the Canadian Environmental Assessment Act on April 29, 2010 (updated July 19, 2010).

The EA was referred to an independent Review Panel by the Minister of the Environment on October 7, 2010. On March 23, 2011 SCI entered into a Voluntary Agreement (VA) with the Province of Ontario to have the Project subject to the Ontario Environmental Assessment Act (OEA Act). This agreement was the instrument that permitted provincial government to issue a Harmonization Order (HO) under Section 18(2) of the Canada-Ontario Agreement on Environmental Assessment Cooperation to Establish a Joint Review Panel for the Project between the Minister of the Environment, Canada and the Minister of the Environment, Ontario.

The HO was issued on March 25, 2011. The Terms of Reference (ToR) for the Project Environmental Impact Statement (EIS) and the agreement establishing the Joint Review Panel (JRP) were issued on August 8, 2011.

The following provides an overview of the proposed development including its location, surrounding land uses, the exploration history of the site and the primary features of the mining and milling facilities. The information provided below, in the Environmental Impact Statement Report and supporting technical studies is based on the conceptual mine design for the Project. The conceptual design provides planning level information for the environmental assessment process. Detailed design will commence following EA approval in concordance with the concepts presented herein.

### 1.1 Project Location

The Project is located approximately 10 km north of the Town of Marathon, Ontario (Figure 1). The town, with a population of 3,353 (2011 Census), is situated adjacent to the Trans-Canada Highway 17 (Hwy 17) on the northeast shore of Lake Superior, about 300 km east and 400 km northwest (by highway) of Thunder Bay and Sault Ste. Marie, respectively.

The centre of the Project footprint sits at approximately $48^{\circ} 47^{\prime} \mathrm{N}$ latitude and $86^{\circ} 19^{\prime} \mathrm{W}$ longitude. The Project site is in an area characterized by relatively dense vegetation, comprised largely of a birch and, to a lesser extent, spruce-dominated mixed wood forest. The terrain is moderate to steep, with frequent bedrock outcrops and prominent east to west oriented valleys. The climate of this area is typical of northern areas within the Canadian Shield, with long winters and short, warm summers.

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Figure 1: Location of the Proposed Marathon PGM-Cu Project Site near Marathon, Ontario

### 1.2 Surrounding Land Uses

The Project site lies partially within the municipal boundaries of the Town of Marathon, as well as partially within the unorganized townships of Pic, O'Neil and McCoy. The primary zoning designation within the Project Site is 'rural'.

In the immediate vicinity of the Project there are several authorized aggregate sites, including SCl's licensed aggregate site located to the northeast of Hwy 17 along the existing site access road (Camp 19 Road).

The Marathon Municipal Airport (CYSP), which operates as a Registered Airport (Aerodrome class) under the Canadian Aviation Regulations (CARs; Subsection 302), is adjacent to, and south of the Project site. The airport occupies a land area of approximately 219 hectares and is accessed from Hwy 17.

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Several First Nations and Métis peoples claim the Project site as falling within their traditional land use boundaries. Based on Aboriginal accounts, prior to the construction of the forestry road, the land and water uses associated with (or close to) the site would have typically been limited to the Pic River corridor, the Bamoos Lake-Hare Lake-Lake Superior corridor and the Lake Superior shoreline and nearshore area, rather than the interior of the Project site. Traditional land and water uses (or rights conferred by Treaty) that can be ascribed to the site could include:

- Hunting;
- Trapping;
- Fishing; and,
- Plant harvesting for food, cultural and medicinal uses.

Primary industries supporting the Town of Marathon, as well as the region, have historically been forestry, pulp and paper, mining and tourism. The Project site is located within the Big Pic Forest Management Area. The Big Pic Forest includes Crown land east and north of Lake Superior and is generally north, south and west of the community of Manitouwadge and includes the communities of Marathon, Caramat and Hillsport.

Until July 2010 the forest was managed under the authority of a Sustainable Forest License (SFL), which was held by Marathon Pulp Inc. This SFL was revoked, with the forest reverting to the Crown as a Crown Forest. Until recently, Marathon Pulp Inc. (MPI) operated a kraft pulp mill in Marathon on the shore of Peninsula Harbour. The mill announced its indefinite shut down (effective at the end of February 2009) on February 11, 2009, and as a result there has been a significant downturn in the local economy. A second mill operated in Terrace Bay was temporarily closed in December 2011.

The Hemlo Mining Camp is located 30 km to the southeast. There are currently two mines in production at the Camp (David Bell Mine, Williams Mine), which are estimated to be in operations until 2025

### 1.3 Exploration History of the Site

Exploration for copper and nickel deposits on the Project site started in the 1920s and continued until the 1940s with the discovery of titaniferous magnetite and disseminated chalcopyrite occurrences. During the past four decades, the site has undergone several phases of exploration and economic evaluation, including geophysical surveys, prospecting, trenching, diamond drill programs, geological studies, resource estimates, metallurgical studies, mining studies, and economic analyses. These studies have successively enhanced the knowledge base of the deposit.

In 1963, Anaconda acquired the Marathon property and carried out systematic exploration work including diamond drilling of $36,531 \mathrm{~m}$ in 173 drill holes. This culminated in the discovery of a large copper-PGM deposit. Anaconda discontinued further work on the project in the early 1980s due to low metal prices at the time.

In 1985, Fleck purchased a $100 \%$ interest in the Marathon PGM-Cu Project with the objective of improving the project economics by focusing on the platinum group element (PGE) values of the deposit. The Fleck drilling totaled $3,615 \mathrm{~m}$ in 37 diamond drill holes. In 1986, H.A. Symons carried out a feasibility study for Fleck based on a 9,000 tonnes per day conventional flotation plant with marketing of copper concentrate and Kilborn Limited carried out a prefeasibility review for Fleck that included preliminary results from the Lakefield pilot plant tests (Kilborn Limited, 1987). The feasibility study indicated a low internal rate of return which was confirmed by Teck Corporation who concluded the project was uneconomic due to low metal prices at the time. On June 10, 1998, Fleck changed its name to PolyMet Mining Corp.

In 2000, Geomaque acquired certain rights to the Marathon PGM-Cu Project through an option agreement with Polymet. Geomaque and its consultants carried out a study of the economic potential of the Marathon PGM-Cu Project. The study included a review of the geology and drill hole database, interpretation of the mineralized zones, statistics and geostatistics, computerized block model, resource estimation, open pit design and optimization, metallurgy, process design, environmental aspects, capital and operating cost.

Marathon PGM Corp. acquired the Marathon PGM-Cu deposit from Polymet in December 2003. Marathon PGM Corp. funded programs of advanced exploration and diamond drilling on a continuous basis between June 2004 and 2009. Approximately 320 holes and $65,000 \mathrm{~m}$ were drilled from 2007 to 2009 to define and expand the resource and for condemnation holes outside of the pit area. A feasibility study was published in 2008 and updated in January 2010.

Stillwater Mining Company (SWC) and Marathon PGM entered into an agreement on September 7, 2010 pursuant to which SWC would acquire all of the outstanding shares of Marathon PGM. The acquisition agreement received ministerial approval under the Investment Canada Act on November 24, 2010 and the agreement closed on November 30, 2010. On December 31, 2010 Stillwater Mining Company formed a Canadian corporation, Stillwater Canada Inc. In March 2012, MC MINING LTD (MC) purchased 25\% interest in Stillwater Canada Inc. who is the proponent of the Marathon PGM-Cu Project.

### 1.4 Project Overview

The Project is based on the development of an open pit mining and milling operation. The conceptual general layout of the components of the mine site, the transmission line corridor and access road is provided in Figure 3 below. One primary pit and a satellite pit complex to the south (currently envisaged to be comprised of four satellite pits) are proposed to be mined. Ore will be processed (crushed, ground, concentrated) at an on-site processing facility. Final concentrates containing copper and platinum group metals will be transported off-site via road and/or rail to a smelter and refinery for subsequent metal extraction and separation. The total mineral reserve (proven and probable) is estimated to be approximately 91.5 million tonnes. It is possible that an iron concentrate may also be produced, depending upon the results of further metallurgical testing and market conditions at that time.

During the operations phase of the Project, ore will be fed to the mill at an average rate of approximately 22,000 tonnes per day. The operating life of the mine is estimated to be approximately 11.5 years. The construction workforce will average approximately 400 people and will be required for between 18 and 24 months. During operations the work force will comprise an estimated 365 workers. The mine workforce will reside in local and surrounding communities, as well as in an Accommodations Complex that will be constructed in the Town of Marathon.

Approximately 288 million tonnes of mine rock ${ }^{1}$ will be excavated. It is estimated that between eighty five to ninety percent of this material is non-acid generating (NAG) and will be permanently stored in a purposefully built Mine Rock Storage Area (MRSA) located east of the primary pit. The NAG or so-called Type 1 mine rock will also be used in the construction of access roads, dams and other site infrastructure as needed. Drainage from the MRSA will be collected, stored, treated and discharged as necessary to the Pic River. During mine operations, about 20 million tonnes of mine rock could have the potential to generate acid if left exposed for extended periods of time. This mine rock is referred to as Type 2 mine rock or potentially acid generating (PAG). The Type 2 mine rock will be managed on surface during mine operations in temporary stock piles with drainage directed into the open pits. This material will be relocated to the bottom of the primary and satellite pits and covered with water to prevent potential acid generation and covered with Type 1 materials.

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Process solids ${ }^{2}$ will be managed in the Process Solids Management Facility (PSMF), as well as in the satellite pit complex. The PSMF will be designed to hold approximately 61 million $\mathrm{m}^{3}$ of material, and its creation will require the construction of dams. Two streams of process solids will be generated. An estimated 85 to $90 \%$ of the total amount of process solids produced will be non-acid generating, or socalled Type 1 process solids. The remaining ten to fifteen percent of the process solids could be potentially acid generating and referred to as Type 2 process solids. The Type 2 process solids will be stored below the water table in the PSMF or below water in the pits to mitigate potential acid generation and covered with Type 1materials. Water collected within the PSMF, as well as water collected around the mine site other than from the MRSA will be managed in the PSMF for eventual reclamation in the milling process. Excess water not needed in the mill will be discharged, following treatment as is necessary, to Hare Lake.

Access to the Project site is currently provided by the Camp 19 Road, opposite Peninsula Road at Hwy 17. The existing road runs east towards the Pic River before turning north along the river to the Project site (approximately 8 km ). The existing road will be upgraded and utilized from its junction with Hwy 17 for approximately 2.0 km . At this point a new road running north will be constructed to the future plant site. The primary rationale for developing the new road is to move traffic away from the Pic River. The new section of road will link two sections of forest access roads located on the site.

Power to the Project site will be provided via a new 115 kV transmission line that will be constructed from a junction point on the Terrace Bay-Manitouwadge transmission line (M2W Line) located to the northwest of the primary pit. The new transmission line will run approximately 4.1 km to a substation at the mill site. The width of the transmission corridor will be approximately 30 m .

Disturbed areas of the Project footprint will be reclaimed in a progressive manner during all Project phases. Natural drainage patterns will be restored as much as possible. The ultimate goal of mine decommissioning will be to reclaim land within the Project footprint to permit future use by resident biota and as determined through consultation with the public, Aboriginal peoples and government. A certified Closure Plan for the Project will be prepared as required by Ontario Regulation (O.Reg.) 240/00 as amended by O.Reg.194/06 "Mine Development and Closure under Part VII of the Mining Act" and "Mine Rehabilitation Code of Ontario".

Maps showing the existing features and topography of the site, as well as the proposed conceptual development of the site are provided in Figure 2 and 3 below.

[^1]

Figure 2: Existing Conditions at the Marathon PGM-Cu Project Site


Figure 3: Marathon PGM-Cu Project Conceptual General Site Layout

### 2.0 Methodology

The study area is necessarily broad in scope to accommodate planned Project activities and includes locations in three focus areas: within the Project property boundary; along TransCanada Highway 17 (Hwy 17) and within the Town of Marathon (Figure 4). Ore extraction and processing will commence within the property boundary. The final ore concentrate will be transported via Hwy 17 and may be transported through the Town of Marathon to one of two proposed rail load out facility sites for shipping for further processing (Figure 5). One proposed Town of Marathon concentrate transport route follows Peninsula Road and Marina Drive and the second follows Peninsula Road, Stevens Avenue and Winton Street.

Since Project noise impacts will be assessed at noise sensitive receptors (NSR), the baseline study identifies and considers NSR within the three focus areas as summarized below.

- Project Site: The nearest known NSR is a residence and commercial development (May's Gifts) located on the north side of Hwy 17 approximately 3.4 km southwest of the closest proposed open pit and processing building. Other nearby NSR are two cottages on the north and south ends of Hare Lake.
- Hwy 17 transportation corridor: NSR include, in addition to May's Gifts, three hotels: the Travelodge Hotel, the Peninsula Inn and the Wayfare Inn.
- Town of Marathon transportation corridors: Peninsula Road is the main arterial road, which is bordered by institutional, commercial, enterprise, light industrial, heavy industrial, rural and residential zones (Figure 5). Peninsula Road would be used for either proposed concentrate transport route and is currently the significant urban background noise source. NSR include churches, hotels, residences, hospital, and a library (Figures 5 and 6).

Noise assessment methods offer numerous options to describe acoustic environments. Appropriate assessment methods and noise descriptors were selected for each focus area depending on the nature of predominant ambient noise sources with consideration for guidelines, as currently available, likely to be used to assess Project noise impact.

Two assessment methods were used. Within the Project footprint, baseline noise was determined by measuring sound levels in August 2009. Along Hwy 17 and the proposed Town of Marathon transportation routes, baseline noise was determined through traffic noise modelling (TNM) using current relevant traffic data.

The study term baseline is a time descriptor referring to conditions prior to Project development activities; the term background is a source descriptor referring to ambient sound sources not related to Project activities. Technical terminology is consistent with usage as defined in the various reference documents identified in the next section.

### 2.1 References

The study was completed in accordance with the following reference publications:

- MOE publication NPC 102: Sound and Vibration Measurement Equipment Specifications (NPC 102).
- MOE publication NPC 103: Noise Measurement Procedures (NPC 103).
- MOE publication LU 131: Noise Assessment Criteria in Land Use Planning (LU 131).
- MOE publication NPC 205: Sound Level Limits for Stationary Sources in Class 1 \& 2 Areas (NPC 205).
- MOE publication NPC 206: Sound Level due to Road Traffic (NPC 206).
- MOE publication NPC 232: Sound Level Limits for Stationary Sources in Class 3 Areas (NPC 232).
- MOE publication NPC 233: Information to be Submitted for Approval of Stationary Sources of Sound (NPC 233).
- MOE publication: Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT).


### 2.2 Selection of Baseline Noise Descriptors

Since noise impacts are generally assessed according to the principle of predictable worst case impact relative to established noise limits, baseline noise descriptors relevant to the appropriate limits as they may eventually apply to the Project were selected as described in the following sections.

### 2.2.1 Project Site

The Project is predominantly located in a rural area with an acoustical environment generally dominated by natural sounds with little to no road traffic. In accordance with NPC 232, the Project site is identified as a Class 3 area. NPC 232 states that no restrictions apply to any stationary source resulting in a one hour equivalent continuous sound level ( $\mathrm{L}_{\text {eq(1) }}$ ) at a point of reception within 30 m of a dwelling or a camping area lower than the following daytime and night time exclusionary limits:


However, background sound levels as assessed by measurement according to NPC 233 may be important to assess Project noise impact. NPC 233 states that background sound levels are to be obtained either by prediction or through monitoring over a minimum period of 48 hours, exclusive of highly intrusive short duration noise caused by a source such as an aircraft fly-over.

At five locations throughout the Project site, 48 hour measurements were used to determine $\mathrm{L}_{\text {eq(1) }}$ during the daytime hours of 7:00 am to 7:00 pm and night time hours of 7:00 pm to 7:00 am. The lowest daytime and night time $\mathrm{L}_{\mathrm{eq}(1)}$ in the monitoring periods were selected as the baseline noise descriptors.

### 2.2.2 Nearest NSR

The Project site southern boundary area along Hwy 17 contains an acoustic environment dominated by road traffic particularly between the hours of 7:00 am and 11:00 pm. NPC 205 and 206 were used to determine regulatory criteria that may eventually apply to the Project site. In accordance with NPC 205, the Hwy 17 corridor is identified as a Class 2 area. NPC 205 states that no restrictions apply to any stationary source resulting in a one hour $\mathrm{L}_{\text {eq }}$ at a Class 2 sensitive point of reception lower than the following daytime and night time exclusionary limits:

| Time of Day | $L_{\text {eq(1) }}$ <br> $(d B A)$ |
| :---: | :---: |
| $7: 00 \mathrm{am}-7: 00 \mathrm{pm}$ | 50 |
| $7: 00 \mathrm{pm}-7: 00 \mathrm{am}$ | 45 |

For the purpose of Project noise impact assessment, regulatory criteria may eventually be based on background traffic sound levels, if the background sound levels are higher than the NPC 205 exclusionary limits. Baseline $L_{e q(1)}$ due to road traffic were determined according to NPC 206. Since noise levels associated with traffic volumes can be variable and location-specific, NPC 206 states that baseline traffic noise may be measured or calculated on the basis of traffic flows on contributing roads, providing that the road traffic shall reflect the principal of predictable worst case impact. Since Project operation will be continuous, the predictable worst case noise impact of the Project is expected to occur during the hour with the lowest traffic volume and accordingly the lowest $\mathrm{L}_{\mathrm{eq}(1)}$.

Baseline traffic noise at the nearest NSR (May's Gifts) is characterized by the lowest $L_{\text {eq(1) }}$ predicted by TNM during either the daytime hours of 7:00 am to 7:00 pm or the night time hours of 7:00 pm to 7:00 am. The TNM results also include $L_{\text {eq(1) }}$ for other locations along the Hwy 17 transportation route.

### 2.2.3 Highway 17 and Town of Marathon Transportation Corridors

Background noise at sensitive receptors along Hwy 17 and the proposed transportation routes within the town of Marathon is dominated by roadway traffic noise. It is expected that the Project may result in increased traffic volume, which may result in an associated noise impact. In accordance with ORNAMENT, road traffic noise impact assessment may be made by consideration of the 16 hour equivalent continuous sound level $\left(\mathrm{L}_{\mathrm{eq}(16)}\right)$ during the daytime hours of 7:00 am to 11:00 pm and the eight hour equivalent continuous sound level ( $\mathrm{L}_{\text {eq(8) }}$ ) during the night time hours of 11:00 pm to 7:00 am, as determined at sensitive areas by TNM.

MOE publication LU 131, used for land use planning, contains road traffic daytime and night time criteria for sensitive outdoor living environments and road traffic daytime and night time criteria for sensitive indoor living environments. The LU 131 criteria summarized below may be relevant to Project traffic noise impact assessment within the Town of Marathon.

| Time of Day | Outdoor <br> Sound Level <br> (dBA) | Indoor Sound <br> Level <br> (dBA) |
| :---: | :---: | :---: |
| $7: 00 \mathrm{am}-11: 00 \mathrm{pm}$ | 55 | 45 |
| 11:00 $\mathrm{pm}-7: 00 \mathrm{am}$ | 50 | 40 |

Only outdoor background noise is considered in this study since, if noise levels assessed at an outdoor receiver are acceptable/unacceptable, assessment at an indoor receiver would be unnecessary. For the transportation corridors, night time $\mathrm{L}_{\mathrm{eq}(8)}$ is selected as the baseline traffic noise descriptor.

### 2.3 Baseline Noise Measurements

Baseline noise conditions at the project site were determined by measuring ambient sound levels in August 2009.

Instrumentation meeting NPC 102 specifications was used for all sound measurements. Integrating Quest NoisePro DL and Quest Q-300 Logging Dosimeters were used to measure existing baseline sound levels over 48 hour periods. The instruments were set to measure A-weighted sound pressure level on slow response and determine/log $L_{\text {eq(1) }}$ for every hour of the measurement period. One Bruel and Kjaer Hand Held Analyzer Type 2250 sound level meter was used to characterize the typical unweighted frequency spectrum of representative baseline sound levels.

Five measurement locations were chosen to represent background noise across the Project site. For each measurement, the microphone was positioned at a height of 1.2 m above grade. The references for noise measurement were NPC 103 and NPC 233. The locations and times of measurements are provided below in Table 1 and the locations are shown on Figure 4.

| $\qquad$ |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Measurement | Location | Date | Start <br> Time | Duration (hrs) |
| N1 | East Property Boundary Along the Pic River | August 5, 2009 | 4:00 pm | 43* |
| N2 | Southwest Property Boundary | August 5, 2009 | 10:00 am | 38.5* |
| N3 | West Property Boundary, North End of Hare Lake | August 31, 2009 | 7:00 pm | 48 |
| N4 | South Property Boundary | August 31, 2009 | 5:00 pm | 48 |
| N5 | North Property Boundary | August 31, 2009 | 8:00 pm | 48 |
| Note: * Measurement terminated due to precipitation. |  |  |  |  |

Daily wind statistics for the hours of 7:00 am to 4:00 pm, available from Environment Canada Marathon Airport Weather Station, were examined for the measurement dates.

### 2.4 Baseline Noise Modelling

SoundPLAN, an ISO 9613-2 standard noise modelling software program, was used with a current (version 2.5) traffic noise model (TNM) component developed by the US Federal Highway Administration (FHWA) to produce grid noise maps describing baseline traffic noise conditions at the Project site, along Hwy 17 and within the Town of Marathon. Two noise models were designed to provide the following results:

- At the nearest NSR (May's Gifts), the baseline traffic noise lowest daytime and night time $\mathrm{L}_{\mathrm{eq}(1)}$.
- Along Hwy 17 and within the Town of Marathon, the baseline traffic noise day time $\mathrm{L}_{\text {eq(16) }}$ and night time $\mathrm{L}_{\mathrm{eq}(8)}$.

The SoundPLAN FHWA TNM is a sophisticated modelling program that allows for site-specific inputs including traffic data, terrain, forest attenuation and traffic control systems. The TNM has no minimum restriction on hourly traffic volume, as do older ORNAMENT-based models. The TNM inputs and assumptions are summarized in the following sections.

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### 2.4.1 Nearest NSR

The TNM was created to determine baseline traffic sound levels at the nearest NSR and at other locations along the Hwy 17 segment 10 km west and 4 km east of the Hwy17/Peninsula Road intersection. The following data inputs were used for traffic volume, vehicle speed and vehicle distribution.

Relevant hourly MTO traffic data were available for April, September and October of 2009. The model input lowest hourly traffic volume (as required to determine lowest $\mathrm{L}_{\text {eq(1) }}$ ) was selected from MTO Weekly Volume Summaries (Appendix A) for the Hwy 17 segment west of Heron Bay Road during the weeks of April 14 to April 20, 2009 and September 30 to October 6, 2009. The west of Heron Bay Road data set is considered more representative of traffic south of the Project site than another available hourly MTO traffic data set (for Hwy 17 west of Coldwell Road, 18.8 km west of the Hwy 17/Peninsula Road intersection), which is outside the baseline study area. Based on 24 hour traffic counts for these two weeks, the following lowest daytime and night time traffic volume hours were selected: Sunday, October 4, 2009 between 7:00 am and 8:00 am, when 49 vehicles travelled on Hwy 17 west of Heron Bay Road; and Monday, April 20, 2009, between 2:00 am and 3:00 am, when seven vehicles travelled on Hwy 17 west of Heron Bay Road.

The posted $90 \mathrm{~km} / \mathrm{hr}$ speed limit was conservatively used for the average speed of vehicles travelling along Hwy 17 since actual speed data was not available.

Vehicle type distributions were derived from an existing Engineering Northwest Limited (ENL) traffic study and applied to the lowest traffic volume data. The ENL June 16, 2010 traffic count at the intersection of Hwy 17 and Peninsula Road (Appendix A) reported less than 24 hours of data collected on a single summer day, but included vehicle distributions. Vehicle types travelling to and from the Hwy 17 segment, west of Peninsula Road, were accumulated and averaged based on the total amount of vehicles (Appendix A). The vehicles consisted of 65\% passenger vehicles, 6\% single unit trucks (short trucks), $25 \%$ transport trucks (long trucks), 1\% buses and 3\% motorcycles. Since motorcycles are generally not used during the winter months, the percentage of motorcycles was conservatively added to the percentage of passenger vehicles to give a total of $68 \%$.

### 2.4.2 Highway 17 Transportation Corridor

The TNM created to determine Hwy 17 transportation corridor baseline sound levels encompassed Hwy 17 between Heron Bay Road ( 6.7 km east of Peninsula Road) and Coldwell Road (18.8 km west of Peninsula Road). The following inputs were used for traffic volume, vehicle speed, daytime/night time distribution and vehicle type distribution.

The most recent available annual average daily traffic (AADT) data obtained from the MTO document entitled Provincial Highways Traffic Volumes 2008 (AADT only) were used to determine traffic volume. In order to approximate the distribution of traffic between the daytime and night time periods, MTO Weekly Volume Summaries for the Hwy 17 segment west of Heron Bay Road for the weeks of April 14 to April 20, 2009 and September 30 to October 6, 2009 were used. Based on a combined average of the weekly volumes, $88 \%$ of the traffic occurs between the daytime hours of 7:00 am to 11:00 pm and 12\% of the traffic occurs between night time hours of 11:00 pm to 7:00 am.

The posted $90 \mathrm{~km} / \mathrm{hr}$ speed limit was conservatively used for the average speed of vehicles travelling along Hwy 17 since actual speed data was not available.

Vehicle type distributions were derived from the ENL study as follows: 68\% passenger vehicles, 6\% single unit trucks (short trucks), 25\% transport trucks (long trucks), and 1\% buses.

### 2.4.3 Town of Marathon Transportation Corridors

The TNM created to provide Town of Marathon baseline sound levels included the two proposed roadway concentrate transport routes: one route follows Peninsula Road and Marina Drive and the second follows Peninsula Road, Stevens Avenue and Winton Street.

The following inputs were used for traffic volume, vehicle speed, daytime/night time distribution and vehicle type distribution.

The most recent available AADT data obtained from the Town of Marathon Traffic Count Survey 2011 (Appendix A) were reviewed and traffic volume data inputs were selected for appropriate sites as summarized below:

| Site | Annual <br> Average Daily <br> Traffic (AADT) | Speed <br> $(\mathrm{km} / \mathrm{hr})$ | Relevant <br> Roadway | Range |
| :---: | :---: | :---: | :---: | :---: |
| Site 15 | 3,017 | 80 | Peninsula Road | Hwy 17 to Industrial Park Road |
| Site 15 | 3,017 | 60 | Peninsula Road | Industrial Park Road to Penn Lake Road |
| Site 15 | 3,017 | 50 | Peninsula Road | Penn Lake Road to Hemlo Drive |
| Site 12 | 10,000 | 40 | Peninsula Road | Hemlo Drive to Sund Crescent |
| Site 17 | 8,850 | 40 | Peninsula Road | Sund Crescent to Steven's Avenue |
| Site 26 | 700 | 50 | Steven's <br> Avenue | Steven's Avenue to Winton Street |

Vehicle speeds were either speeds reported in the municipal traffic study or current posted speed limits. Vehicle speeds ranged from $80 \mathrm{~km} / \mathrm{hr}$ transitioning from the highway down to $40 \mathrm{~km} / \mathrm{hr}$ in the urban hub.

Since no distribution of hourly traffic was contained in the municipal study, it was assumed that traffic within the town has a daytime/night time distribution similar to Hwy 17, with $88 \%$ of the traffic occurring during the daytime and $12 \%$ during the night time. This assumption is reasonable with respect to the ORNAMENT traffic distributions for regional roads of $90 \%$ daytime and $10 \%$ night time.

Vehicle type distributions were derived from the June 16, 2010 ENL traffic study. Vehicles types travelling to and from Peninsula Road were accumulated and averaged based on the total amount of vehicles (Appendix A). The vehicles consisted of: 89\% passenger vehicles; 5\% single unit trucks (short trucks); 3\% transport trucks (long trucks); 1\% buses; and 2\% motorcycles. Since motorcycles are generally not used during the winter months, the percentage of motorcycles was conservatively added to the percentage of passenger vehicles (91\%).

### 2.4.4 Other Model Inputs/Assumptions

For terrain, a digital elevation model was created by Viasat Imagery using satellite imaging technology. Elevation contours used for the design were in 2 m intervals but, for the purposes of the baseline noise study, the contours were increased to 5 m intervals to generate reasonable calculation periods. A 10 m high forest was implemented in the noise modelling in areas that currently occupy mature forest.

The FHWA TNM user guidelines recommend default ambient meteorological conditions (temperature of 20 C and humidity $50 \%$ ) and state that modifying the default conditions has minimal effect upon the

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calculation. Accordingly, no adjustments were made to the temperature/humidity defaults. No adjustments were made for wind, since the road noise source(s) are in close proximity to the receptors.

The Project property boundaries are considered to be the effective mining claim limits, as shown on Figure 4.

The Project operation is assumed to be continuous, so that any eventual worst case noise impact is expected to occur during the night time hours when the background noise is lowest. Therefore, grid noise maps showing only night time predicted baseline sound levels are reported.

The TNM does not consider noise from ambient sources other than traffic, i.e. in rural areas sounds of the natural environment, in urban areas sounds of other mobile/stationary sources and in all areas noise caused by other vehicles such as rail or aircraft.

Since the most recent available traffic data was used, the TNM results are considered to reasonably represent baseline traffic noise within the following time frames:

- for the nearest NSR, 2009 to present (MTO 2009 traffic data was used);
- for the Hwy 17 transportation corridor, 2008 to present (MTO 2008 traffic data was used); and
- for the Town of Marathon, 2011 (2011 traffic data was used).

Temporal extensions of the baseline TNM results depend on the similarity between the baseline and future/historic traffic volume and other input data.

### 3.0 Results

### 3.1 Project Site

Baseline sound levels were measured at the following five project site locations in August 2009. Complete results are provided in Table 2 (attached). The project site daytime lowest $L_{\text {eq(1) }}$ ranged from 40.0 dBA to 42.0 dBA and the night time lowest $\mathrm{L}_{\text {eq(1) }}$ ranged from 40.0 dBA to 41.9 dBA .

Key Table 2 baseline noise descriptors are shown below:

| Summary of Table 2 Results |  |  |  |
| :---: | :---: | :---: | :---: |
| Sample <br> Location | Description | Lowest Daytime <br> Hourly Leq (dBA) | Lowest Night time <br> Hourly Leq (dBA) |
| N1 | East property boundary, <br> along the Pic River | 40.0 | 40.0 |
| N2 | Southwest property boundary | 40.0 | 40.0 |
| N3 | North end of Hare Lake, <br> near western property boundary | 42.0 | 41.9 |
| N4 | South property boundary | 40.3 | 40.0 |
| N5 | North property boundary | 40.0 | 40.0 |

Sample locations are shown on Figure 4. Measurements N1 and N2 were interrupted by precipitation resulting in monitoring periods of 43 and 38.5 hours. Generally, the weather conditions for N1 and N2 were cloudy. Measurements N3, N4 and N5 had monitoring periods of 48 hours. The weather conditions during N3 to N5 were clear and sunny. Wind speed and Leq(1) for each measurement location are plotted versus time of day in Graphs 1 through 5 (Appendix B).

The unweighted frequency response for location N3 is shown in Figure 7.

## $3.2 \quad$ Nearest NSR

The TNM baseline traffic noise results, based on the 2009 daytime and night time lowest hourly MTO traffic volumes, are presented in tabular and grid noise map formats. Daytime and night time lowest hourly $\mathrm{L}_{\mathrm{eq}(1)}$ at the nearest NSR (May's Gifts), are summarized in Table 3. The May's Gifts lowest background traffic $\mathrm{L}_{\text {eq(1) }}$ are 53.4 dBA during the daytime and 44.9 dBA during the night time. Table 3 also includes the traffic noise lowest $\mathrm{L}_{\mathrm{eq}(1)}$ predicted at each of the five monitoring locations. Figure 8 is a grid noise map showing the lowest traffic noise night time $L_{\text {eq(1) }}$ for the Hwy 17 segment 8 km west of the Hwy 17/Peninsula Road intersection.

### 3.3 Highway 17 Transportation Corridor

The TNM baseline traffic noise results, based on MTO 2008 AADT data, are presented in tabular and grid noise map formats. Daytime $L_{\text {eq(16) }}$ and night time $L_{\text {eq(8) }}$ at NSR along Hwy 17 between Peninsula and

Coldwell Roads are summarized in Table 4. The NSR include North Hare Lake cottage, South Hare Lake cottage, Peninsula Inn, Travelodge Hotel, Wayfare Inn and May's Gifts. The TNM traffic noise background daytime $\mathrm{L}_{\text {eq(16) }}$ ranged from 4.0 dBA at North Hare Lake Cottage to 57.2 dBA at Travelodge Hotel; the night time $\mathrm{L}_{\mathrm{eq}(8)}$ ranged from 0.0 dBA at North Hare Lake Cottage to 51.6 dBA at Travelodge Hotel.

Results for three Hwy 17 NSR are shown below.

- Travelodge Hotel:
o Daytime $\mathrm{L}_{\text {eq(16) }}$ of 57.2 dBA ; and
o Night time $\mathrm{L}_{\text {eq(8) }}$ of 51.6 dBA .
- Wayfare Inn:
o Daytime $\mathrm{L}_{\text {eq(16) }}$ of 55.8 dBA ; and
o Night time $\mathrm{L}_{\text {eq(8) }}$ of 50.2 dBA .
- May's Gifts:
o Daytime $\mathrm{L}_{\text {eq(16) }}$ of 55.5 dBA ; and
- Night time $\mathrm{L}_{\text {eq(8) }}$ of 49.8 dBA .

Figure 9 is a noise grid map showing night time $\mathrm{L}_{\text {eq(8) }}$ for the following transportation corridors: along Hwy17, 8 km west and 2 km east of the Hwy 17/Peninsula Road intersection and along Peninsula Road, 3 km south of the Hwy 17/Peninsula Road intersection.

### 3.4 Town of Marathon Transportation Corridors

The TNM baseline traffic noise results, based on Town of Marathon 2011 AADT data, are presented in tabular and grid noise map formats. Daytime $\mathrm{L}_{\mathrm{eq}(16)}$ and night time $\mathrm{L}_{\mathrm{eq}(8)}$ at 19 NSR along the proposed concentrate transportation routes through the Town of Marathon are summarized in Table 5. The NSR included churches, hotels, residences, a hospital, and a library (Figure 6). The TNM baseline traffic noise results identify at the NSR daytime $\mathrm{L}_{\text {eq(16) }}$ of 39.8 to 61.5 dBA and night time $\mathrm{L}_{\text {eq(8) }}$ of 34.2 dBA to 55.9 dBA .

Figure 10 is a grid noise map showing night time $\mathrm{L}_{\text {eq(8) }}$ for the Town of Marathon.

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### 4.0 Discussion

### 4.1 General Comments

The objective of the study is to characterize existing baseline noise conditions throughout the Project site and other related areas. The baseline noise information can be used to evaluate the potential acute and cumulative effects on sensitive receptors of noise emissions associated with the Project. The baseline noise conditions may also become relevant, governing MOE noise limits, when a sensitive receptor is present (such as May's Gifts or the Hare Lake cottages) and application is made for MOE approval of noise emissions.

### 4.2 Project Site

Measurement-based assessment is preferred within the property boundary since baseline ambient noise is dominated by sounds of the existing natural environment, which are difficult to predict for reasons including lack of relevant statistical/sound power data and unexpected/intermittent sources such as animals and induced foliage movement that can contribute significantly to the overall sound level. The measurements were made prior to any significant physical disruption of the environment, such as will occur during initial site clearing in the Project preparation phase, and are considered to reasonably represent baseline acoustic conditions in 2011 and prior years.

Three of the baseline sound level measurements, N3 to N5, meet the NPC 103 sampling time requirement and weather restriction, which states that noise measurements must not be conducted during precipitation. Measurements N1 and N2, which were terminated due to precipitation events, do not meet the NPC 103 sampling time requirement of 48 hours, but are discussed herein since the actual measurement periods of 43 and 38.5 hours comprised substantial proportions of the required sampling times and the collected data provides important hourly baseline ambient noise information.

Baseline sound levels over the entire Project site are considered to be represented by the daytime and night time $L_{\text {eq(1) }}$ for measurement locations N1 to N5. The measured baseline daytime and night time $L_{\text {eq(1) }}$ ranged from 40.0 to 46.4 dBA . The highest daytime sound levels were typically measured between 2:00 pm and 5:00 pm and the lowest typically between 7:00 am and 10:00 am. The highest night time sound levels were typically measured between 6:00 am and 7:00 am and the lowest typically measured between 2:00 am and 6:00 am. The highest measured daytime $L_{\text {eq(1) }}$ corresponded with the periods of highest wind speed. Although the hourly Leq and wind speed data are not exactly location- and timesynchronized, since wind statistics are measured at a different location with a higher elevation and stored as a snapshot data record every hour while the sound levels are based on continuous measurements over the entire hour, the time-synchronization is sufficient to demonstrate the general relationship between higher wind speeds and higher measured sound levels.

Measurement locations N1, N2, N4 and N5 results characterize baseline ambient sound levels generally representative of the Project site. The lowest measured baseline daytime $L_{\text {eq(1) }}$ for these locations ranged from 40.0 to 40.3 dBA and the baseline night time $\mathrm{L}_{\text {eq(1) }}$ were consistently 40.0 dBA .

Measurement location N1 is at the east Project property boundary along the Pic River. The maximum measured N1 daytime $L_{\text {eq(1) }}$ corresponded with the highest reported daytime wind speed for each respective time period (Graph 1): the highest measured N1 daytime $L_{\text {eq(1) }}$ was 42.3 dBA between 2:00 pm and 3:00 pm. The highest measured night time $L_{\text {eq(1) }}$ was 40.3 dBA between 7:00 pm and 8:00 pm. The lowest measured N1 daytime $L_{\text {eq(1) }}$ was 40.0 dBA between 10:00 am and 11:00 am. The lowest measured N1 night time $\mathrm{L}_{\mathrm{eq}(1)}$ of 40.0 dBA was typical of the N 1 night time measurements.

Measurement location N2 is in the southwest Project area, north of May's Gifts. The maximum daytime $\mathrm{L}_{\mathrm{eq}(1)}$ corresponded with the highest reported daytime wind speed for each respective time period (Graph 2): the highest measured daytime $L_{\text {eq(1) }}$ was 44.0 dBA between 2:00 pm 3:00 pm. The highest measured night time $L_{\text {eq(1) }}$ was 40.2 dBA between 2:00 am and 3:00 am. The lowest $L_{\text {eq(1) }}$ during the daytime was 40.0 dBA between 7:00 am and 10:00 am. The lowest measured N 2 night time $\mathrm{L}_{\mathrm{eq}(1)}$ of 40.0 dBA was typical of the N2 night time measurements.

Measurement location N4 is in the southern Project area near the Project access road and near one of the southwest property boundaries. The maximum daytime hourly Leq corresponded with the highest reported daytime wind speed for each respective time period (Graph 4): the highest daytime $L_{\text {eq(1) }}$ was 46.4 dBA between 4:00 pm and 5:00 pm. The highest night time $\mathrm{L}_{\text {eq(1) }}$ was 40.2 dBA between 7:00 pm and 8:00 pm. The lowest daytime $L_{\text {eq(1) }}$ was 40.3 dBA between 7:00 am and 8:00 am and the lowest night time $\mathrm{L}_{\text {eq(1) }}$ was 40.0 dBA between 5:00 am and 6:00 am.

Measurement location N5 is in the northern Project area in a large ravine which continues in a northerly direction off the property. The maximum daytime $L_{\text {eq(1) }}$ corresponded with the highest reported daytime wind speed for each respective time period (Graph 5): the highest daytime $L_{\text {eq(1) }}$ was 45.6 dBA between 4:00 pm and 5:00 pm. The highest night time $L_{e q(1)}$ was 41.4 dBA between 10:00 pm and 11:00 pm. The lowest daytime $\mathrm{L}_{\text {eq(1) }}$ was 40.0 dBA between 7:00 am and 8:00 am. The lowest measured N 5 night time $\mathrm{L}_{\mathrm{eq}(1)}$ of 40.0 dBA was typical of the N5 night time measurements.

Measurement location N3 is at the north end of Hare Lake, near the western Project property boundary. The maximum daytime $L_{\text {eq(1) }}$ corresponded with the highest reported wind speed for each respective time period (Graph 3), although the variation in N3 sound levels was generally less than for the other four measurement locations. The highest daytime $L_{\text {eq(1) }}$ was 44.5 dBA between 3:00 pm and $4: 00 \mathrm{pm}$ and the highest night time $L_{\text {eq(1) }}$ was 43.7 dBA between 5:00 am and 6:00 am . The lowest daytime $L_{\text {eq(1) }}$ was 42.0 dBA between 10:00 am and 11:00 am and the lowest night time $\mathrm{L}_{\text {eq(1) }}$ was 41.9 dBA between 7:00 pm and 8:00 pm. The N3 measured baseline sound levels were consistently higher for all daytime and night time hours than sound levels measured at the other four locations. Factors possibly contributing to higher measured sound levels at N3 include the following: the presence of an overhead transmission line; the wildlife/foliage associated with this area; and the presence near N3 of a large open lake area that may be susceptible to relatively higher wind speeds.

The N3 results represent background sound levels at the western portion of the Project site north of Hare Lake. The N3 results are also considered to represent background sound levels at the north and south Hare Lake cottages. N3 is located close to, but without any direct noise impact from, the cottage (N3 is 0.7 km east of the north cottage and 1.6 km northeast of the south cottage) and is subject to similar environmental conditions, since both N3 and the subject cottages are located beside large open lake areas.

The N3 lowest measured baseline daytime and night time $L_{e q(1)}$ may therefore become significant with respect to eventual Project noise emission permitting. The N3 lowest measured daytime $\mathrm{L}_{\mathrm{eq}(1)}$ of 42.0 dBA is lower than the MOE Class 3 exclusionary daytime limit of 45.0 dBA , but the lowest measured night time $\mathrm{L}_{\mathrm{eq}(1)}$ of 41.9 dBA is higher than the Class 3 night time limit of 40.0 dBA . Since the measured baseline night time $\mathrm{L}_{\text {eq(1) }}$ is higher than the night time exclusionary limit of 40 dBA , it may govern the eventual regulatory limit at the NSR located in the western portion of the project site.

At N3, the measured unweighted frequency response showed that background noise was dominated by low frequency sounds. Ninety-four percent of the sound levels occurred at frequencies less than or equal to 125 Hz . Sixty seven percent of the sound levels had frequency at 16 Hz (Figure 7). The N3 measured intensities are considered low; however, since annoyance perceived by individuals is subjective, the natural background noise may produce annoyance in some individuals.

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Although measurement methods were used to characterize Project site baseline noise, TNM results are also available for locations N1 to N5 within the Project boundaries and support the selection of a measurement based method to characterize baseline noise at these locations. The TNM baseline traffic noise results for N1 to N5 of 17.7 dBA or less for both the day and night periods suggest that traffic noise does not contribute significantly to background noise at locations within the Project boundaries. TNM would not be an appropriate method to characterize baseline noise conditions at these locations.

### 4.3 Nearest NSR

TNM is the preferred method to determine acoustic conditions along highway transportation corridors since roadway traffic is the predominant source of background noise. Along the southwest portion of the Project property, background noise is dominated by vehicular traffic on Hwy 17 and aircraft traffic at the CYSP. Aircraft noise was not considered in the study, since the NPC 233 background sound level definition states that highly intrusive short duration noise caused by a source such as an aircraft fly-over is excluded from noise assessments.

The Table 3 TNM results for Hwy 17 are considered to reasonably represent 2011 baseline acoustic conditions, since the model was based on the most recent available relevant 2009 MTO traffic data.

Baseline noise at the nearest NSR to the Project site, May's Gifts, is considered to be represented by the TNM results of lowest daytime $\mathrm{L}_{\text {eq(1) }}$ of 53.4 dBA and night time $\mathrm{L}_{\text {eq(1) }}$ of 44.9 dBA .

Both daytime and night time baseline noise may be relevant to Project noise impact assessment. Since the May's Gifts lowest daytime $\mathrm{L}_{\text {eq(1) }}$ of 53.4 dBA is 3.4 dBA higher than the current MOE Class 2 acoustic environment daytime $\mathrm{L}_{\text {eq(1) }}$ limit of 50 dBA , it may be considered during the assessment of Project daytime noise impacts. The May's Gifts lowest night time $\mathrm{L}_{\text {eq(1) }}$ of 44.9 dBA is 0.1 dBA lower than the current MOE Class 2 night time $\mathrm{L}_{\text {eq(1) }}$ limit of 45 dBA and may therefore not be more relevant to Project night time noise impact assessment than the night time exclusionary limit.

### 4.4 Highway 17 Transportation Corridor

TNM assessment is the preferred method to characterize acoustic conditions along highway transportation corridors since roadway traffic is the predominant source of ambient noise, as discussed above in Section 4.3.

The Table 4 TNM results are considered to reasonably represent 2011 baseline traffic noise conditions along the Hwy 17 transportation corridor, since the model was based on the most recent available relevant 2008 MTO traffic data. At representative Hwy 17 NSR, the baseline traffic noise daytime $L_{\text {eq(16) }}$ ranged from 53.2 to 57.2 dBA and night time $\mathrm{L}_{\text {eq(8) }}$ ranged from 47.6 to 51.6 dBA . The highest NSR daytime $\mathrm{L}_{\text {eq(16) }}$ and night time $\mathrm{L}_{\text {eq(8) }}$ were determined for the Travelodge Hotel, which is not unusual/unexpected since this NSR is located at the intersection of Hwy 17 and Peninsula Road.

The baseline traffic noise conditions may be relevant to Project traffic noise impact assessment, since the baseline sound levels exceed applicable land use planning sound level criteria. For three representative NSR (Travelodge Hotel, Wayfare Inn and May's Gifts) the baseline sound levels exceed the LU 131 daytime $\mathrm{L}_{\text {eq(16) }}$ criterion of 55 dBA ; for two of these (Travelodge Inn and Wayfare Inn) the baseline sound levels exceed the night time $\mathrm{L}_{\text {eq(8) }}$ criterion of 50 dBA .

### 4.5 Town of Marathon Transportation Corridors

Within the Town of Marathon, urban hum, consisting mostly of road traffic sound, is considered to dominate baseline background noise.

The Table 5 TNM results are considered to reasonably represent 2011 baseline traffic noise in the Town of Marathon, since the model was based on 2011 traffic data obtained from the Town of Marathon Municipal Office. At representative NSR along the main arterial roads, including along the two proposed ore concentrate transport routes, the baseline daytime $\mathrm{L}_{\text {eq(16) }}$ were 39.8 to 61.5 dBA and the night time $\mathrm{L}_{\mathrm{eq}(8)}$ were 34.4 to 55.9 dBA .

The baseline noise conditions may be relevant to Project noise impact assessment, since background traffic noise along the proposed Town of Marathon transportation routes appears to result in baseline sound levels higher than the LU131 daytime $\mathrm{L}_{\mathrm{eq}(16)}$ criterion of 55 dBA and the night time $\mathrm{L}_{\mathrm{eq}(8)}$ criterion of 50 dBA . The TNM results include baseline daytime $\mathrm{L}_{\mathrm{eq}(16)}$ higher than 55 dBA at the following five NSR:

- condominiums on the north corner of the Peninsula Road/Hemlo Drive intersection;
- the hospital;
- the residence on the north corner of the Peninsula Road/Industrial Park intersection (Residence A);
- the residence on the north corner of the Peninsula Road/Ontario Street intersection (Residence B); and
- the residence on the south corner of the Peninsula Road/Ontario Street intersection (Residence C).

The TNM results include baseline night time $L_{e q(8)}$ higher than 50 dBA at three of these NSR: Residences $A, B$ and $C$. Residence $C$ receives the largest daytime $L_{\text {eq(16) }}$ of 61.5 dBA and the largest night time $L_{\text {eq(8) }}$ of 55.9 dBA , which is not unusual or unexpected since it is the NSR closest to main arterial roads along the proposed transportation routes.

### 4.6 Limitations

The SoundPlanTNM module was developed by the US FHWA and is presumed to accurately predict traffic noise based on traffic volume data. The two baseline TNM were not validated using measurements. Since Project noise impact will be assessed in a similar manner, i.e. by prediction of sound levels, and since ORNAMENT does not require validation, validation is not considered necessary.

TNM is used to estimate sound levels due to traffic sources at varying distances from a defined roadway. Since background noise from sources other than traffic may be present and may be significant at some points of reception (i.e. intermittent and/or isolated sources such as aircraft, railway, maintenance equipment, auditory warning signals and industrial exhaust fans), TNM may estimate sound levels for such points of reception that are lower than the actual ambient sound levels received.

### 5.0 Conclusions

Based on the baseline noise study work plan as executed, the following conclusions are presented.
The study results reasonably represent baseline acoustic conditions in the study focus areas within the following time frames:

- for the Project site, 2011 and previous years;
- for the nearest NSR (May's Gifts), 2009 to present;
- for the Hwy 17 transportation corridor, 2008 to present; and
- for the Town of Marathon, 2011.

Key baseline noise descriptors are summarized below:

| Location | Baseline Noise Characterization Method | Baseline Noise Descriptor | Baseline Noise Descriptor (dBA) |
| :---: | :---: | :---: | :---: |
| General Project Site | $\begin{gathered} \text { Measurement } \\ \text { (N1, N2, N4, N5) } \end{gathered}$ | Daytime Lowest $\mathrm{L}_{\text {eq(1) }}$ | 40 to 40.3 |
|  |  | Night time Lowest $\mathrm{L}_{\text {eq(1) }}$ | 40.0 |
| Western Project Site North of Hare Lake (represents NSR) | Measurement <br> (N3) | Daytime Lowest $\mathrm{L}_{\text {eq(1) }}$ | 42.0 |
|  |  | Night time Lowest $\mathrm{L}_{\text {eq(1) }}$ | 41.9 |
| Nearest NSR <br> May's Gifts | Traffic Noise Modelling | Daytime Lowest $\mathrm{L}_{\text {eq(1) }}$ | 53.4 |
|  |  | Night time Lowest $\mathrm{L}_{\text {eq(1) }}$ | 44.9 |
| Hwy 17 Corridor Representative NSR | Traffic Noise Modelling | Daytime $\mathrm{L}_{\text {eq(16) }}$ | 53.2 to 57.2 |
|  |  | Night time $\mathrm{L}_{\text {eq(8) }}$ | 47.6 to 51.6 |
| Town of Marathon Representative NSR | Traffic Noise Modelling | Daytime $\mathrm{L}_{\text {eq(16) }}$ | 39.8 to 61.5 |
|  |  | Night time $\mathrm{L}_{\text {eq( }}$ (8) | 34.4 to 55.9 |
| dBA: sound pressure level in A-weighted decibels <br> NSR: noise sensitive receptor(s) <br> $\mathrm{L}_{\text {eq(1) }}$ : One hour equivalent continuous A-weighted sound pressure level <br> $\mathrm{L}_{\text {eq(16) }}$ : Sixteen hour equivalent continuous A-weighted sound pressure level <br> $\mathrm{L}_{\text {eq( }(8)}$ : Eight hour equivalent continuous A -weighted sound pressure level |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

### 6.0 Closure

Respectfully submitted by:
True Grit Consulting Ltd.


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MS/IC/EZ:pn

| Table 2: Measured Background 48 Hour Sound Levels Stillwater Canada Inc., Marathon, ON |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Locations | $\begin{gathered} \text { Daytime } 1 \text { Hour } \mathrm{L}_{\mathrm{eq}} \\ \operatorname{Max}(\mathrm{dBA}) \end{gathered}$ | Daytime 1 Hour $L_{\text {eq }}$ Min (dBA) | Daytime 48 Hour $\mathrm{L}_{\mathrm{eq}}(\mathrm{dBA})$ | Night Time 1 Hour $\mathrm{L}_{\text {eq }}$ Max (dBA) | Night Time 1 Hour $\mathrm{L}_{\mathrm{eq}} \operatorname{Min}(\mathrm{dBA})$ | Night Time 48 <br> Hour $\mathrm{L}_{\mathrm{eq}}$ (dBA) |
| ${ }^{1} \mathrm{~N} 1$ | 42.3 | 40.0 | 40.7 | 40.3 | 40.0 | 40.1 |
| ${ }^{2} \mathrm{~N} 2$ | 44.0 | 40.0 | 40.6 | 40.2 | 40.0 | 40.0 |
| N3 | 44.5 | 42.0 | 43.3 | 43.7 | 41.9 | 42.8 |
| N4 | 46.4 | 40.3 | 43.7 | 41.4 | 40.0 | 40.6 |
| N5 | 45.6 | 40.0 | 41.7 | 41.4 | 40.0 | 40.2 |
| Notes: | 1. The 48 hour measurement at location N 1 , was interrupted by precipitation resulting in 43 hours. <br> 2. The 48 hour measurement at location N 2 , was interrupted by precipitation resulting in 38.5 hours. |  |  |  |  |  |


| Table 3: Baseline Traffic Noise Model Results <br> Highway 17 Lowest Hourly Sound Levels <br> Stillwater Canada Inc., Marathon, ON |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Locations | Storey | Height (m) | Lowest Daytime <br> Hourly Background <br> $\mathbf{L}_{\text {eq(1) }}(\mathrm{dBA})$ | Lowest Night Time <br> Hourly Background <br> $\mathrm{L}_{\text {eq(1) }}(\mathrm{dBA})$ |
| N1 | 1 | 1.5 | 0.0 | 0.0 |
| N2 | 1 | 1.5 | 15.1 | 6.6 |
| N3 | 1 | 1.5 | 0.0 | 0.0 |
| N4 | 1 | 1.5 | 17.7 | 9.3 |
| N5 | 1 | 1.5 | 0.0 | 0.0 |
| May's Gifts | 1 | 1.5 | 53.4 | 44.9 |


| Table 4: Baseline Traffic Noise Model Results Highway 17 Traffic Sound Levels Stillwater Canada Inc., Marathon, ON |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Locations | Storey | Height (m) | ```Day Time Background \(\mathrm{L}_{\text {eq(16) }}\) (dBA)``` | Night Time Background $\mathrm{L}_{\text {eq(8) }}$ (dBA) |
| North Hare Lake Cottage | 1 | 1.5 | 4.0 | 0.0 |
| South Hare Lake Cottage | 1 | 1.5 | 8.5 | 2.9 |
| Peninsula Inn | 1 | 1.5 | 53.2 | 47.6 |
| Peninsula Inn | 2 | 4.5 | 54.7 | 49.1 |
| lod | 1 | 1.5 | 54.7 | 49.1 |
| lodge | 2 | 4.5 | 57.2 | 51.6 |
| Wayfare Inn | 1 | 1.5 | 54.4 | 48.8 |
| Waytare Inn | 2 | 4.5 | 55.8 | 50.2 |
| May's Gifts | 1 | 1.5 | 55.5 | 49.8 |

Table 5: Baseline Traffic Noise Model Results
Town of Marathon Traffic Sound Levels Stillwater Canada Inc., Marathon, ON

| Receptor | Location | Storey | Height (m) | Day Time Background $\mathrm{L}_{\text {eq(16) }}$ (dBA) | Night Time Background $L_{\text {eq(8) }}$ (dBA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Anglican Church | Steven's Avenue | 1 | 1.5 | 52.1 | 46.4 |
| Bayview Apartments | Steven's Avenue | 1 | 1.5 | 48.0 | 42.4 |
|  |  | 2 | 4.5 | 48.1 | 42.5 |
|  |  | 3 | 6.0 | 48.4 | 42.8 |
| Senior's Centre | Steven's Avenue | 1 | 1.5 | 46.5 | 40.8 |
|  |  | 2 | 4.5 | 48.6 | 43.0 |
| Catholic Church | Steven's Avenue | 1 | 1.5 | 51.8 | 46.1 |
| Condominium | North corner of Peninsula Road and Hemlo Drive | 1 | 1.5 | 55.3 | 49.6 |
|  |  | 2 | 4.5 | 54.8 | 49.1 |
|  |  | 3 | 6.0 | 54.7 | 49.1 |
| Harbour Inn | Peninsula Road | 1 | 1.5 | 54.5 | 48.9 |
| Hospital | Peninsula Road | 1 | 1.5 | 55.2 | 49.5 |
|  |  | 2 | 4.5 | 52.7 | 47.1 |
| Library | Peninsula Road | 1 | 1.5 | 52.3 | 46.6 |
|  |  | 2 | 4.5 | 51.7 | 46.0 |
| Pic Motel | Peninsula Road | 1 | 1.5 | 49.8 | 44.1 |
| Kingdom Hall Church | Peninsula Road | 1 | 1.5 | 50.3 | 44.7 |
| Zero-100 Motor Inn | Peninsula Road | 1 | 1.5 | 54.9 | 49.3 |
| Residence [A] | North corner of Peninsula Road and Industrial Park Road | 1 | 1.5 | 56.1 | 50.4 |
| Residence [B] | North corner of Peninsula Road and Ontario Street (Across from Hospital) | 1 | 1.5 | 57.9 | 52.3 |
| Residence [C] | South corner of Peninsula Road and Ontario Street (Across from Hospital) | 1 | 1.5 | 61.5 | 55.9 |
| Residence | Northeast corner of Ontario Street and Alberta Street | 1 | 1.5 | 44.3 | 38.6 |
| Residence | North End of Steedman Drive | 1 | 1.5 | 40.5 | 34.9 |
| Residence | Southwest corner of Sund Cresent and Peninsula Road | 1 | 1.5 | 50.0 | 44.4 |
| Residence | East corner of Stevens Avenue and Drake Street | 1 | 1.5 | 52.0 | 46.4 |
| Residence | West side of Whitman Court | 1 | 1.5 | 39.8 | 34.2 |
|  |  | 2 | 4.5 | 40.1 | 34.4 |

Figures

$\begin{array}{ll}\text { LEGEND } \\ \text { - N2 } & \\ \text { Noise Measurement Location }\end{array}$

```
SCALE
    600 [1200
```

Stillwater Canada Inc.
Background Noise Assessment Marathon, Ontario


Legend



Stillwater Canada Inc. Background Noise Report Marathon, Ontario

Town of Marathon Zoning Plan


$\begin{array}{lll}\mathrm{L} & \mathrm{m} \\ 0 & 200 & 400\end{array}$

## TRUE GRIT

Residential Zone
Proposed Rail Loadout Transportation Routes

O Representative
Residential Receptor

Stillwater Canada Inc.
Background Noise Report
Marathon, Ontario
Town of Marathon Noise Sensitive Receptor Plan

Figure 7: Baseline Un-Weighted Frequency Response for Location N3 North of Hare Lake Stillwater Canada Inc., Marathon, ON

August 31 -September 1, 2009




Stillwater Canada Inc
Grid Noise Map
Baseline Highway 17 Night Time Traffic Noise $\mathrm{L}_{\text {eq( } 8 \text { ) }}$
Marathon, ON

Night Time grid noise map at a height
of 1.5 m of background Hwy 17 traffic at
sensitive receptors. Results are based on AADT provided by the Ministry of Transportion (2008).

Modelled with SoundPLAN

## Sound Pressure

Levels in dBA
Symbols and Signs



TRUE * ${ }^{\text {Wh }}$ GRIT
CONSULTING LTD


Appendix A
Traffic Data



Vehicle Distribution for Hwy 17 Based on ENL Traffic Count on June 16, 2010

| Time | Vehicle Type | Hwy 17 |  |  |  |  | sum | Percentage |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Hwy 17 Eastbound Left Him | Hwy 17 Eastbound Through | Hwy 17 Eastbound Right | Hwy 17 Westbound Through | Peninsula Road Northbound Left |  |  |
| 6:00 | Passenger | 0 | 2 | 4 | 2 | 3 | 11 | 0.78 |
|  | Long Trucks | 0 | 4 | 0 | $\square 1$ | 0 | 5 | 0.36 |
| 6:15 | Passenger | 0 | 1 | 1 | ${ }^{1}$ | 4 | 7 | 0.50 |
|  | Long Trucks | 0 | 1 | 0 | 3 | 1 | 5 | 0.36 |
| 6:30 | Passenger | 0 | 2 | 5 | 0 | 6 | 13 | 0.93 |
|  | Long Trucks | 0 | 2 | 2 | 0 | 0 | 4 | 0.29 |
| 6:45 | Passenger | 0 | 1 | 2 | 5 | 7 | 15 | 1.07 |
|  | Long Trucks | 0 | 2 | 0 | 1 | 0 | 3 | 0.21 |
| 7:00 | Passenger | 0 | 2 | 5 | 1 | 4 | 12 | 0.86 |
|  | Short Truck | 0 | 1 | 0 | 0 | 0 | 1 | 0.07 |
|  | Motorcycles | 0 | 3 | 0 | 0 | 0 | 3 | 0.21 |
| 7:15 | Passenger | 0 | 5 | 3 | 0 | 5 | 13 | 0.93 |
|  | Short Truck | 0 | 0 | 0 | 0 | 1 | 1 | 0.07 |
|  | Motorcycles | 0 | 0 | 0 | 0 | 2 | 2 | 0.14 |
| 7:30 | Passenger | 0 | 4 | 0 | 2 | 8 | 14 | 1.00 |
|  | Short Truck | 0 | 1 | 0 | 0 | 1 | 2 | 0.14 |
|  | Long Trucks | 0 | 0 | 0 | 2 | 0 | 2 | 0.14 |
| 7:45 | Passenger | 0 | 4 | 2 | 6 | 5 | 17 | 1.21 |
|  | Short Truck | 0 | 1 | 0 | 1 | 1 | 3 | 0.21 |
|  | Long Truck | 0 | 2 | 1 | 1 | 0 | 4 | 0.29 |
| 12:00 | Passenger | 0 | 5 | 11 | 8 | 13 | 37 | 2.64 |
|  | Short Truck | 0 | 0 | 1 | 1 | 0 | 2 | 0.14 |
|  | Long Trucks | 0 | 7 | 0 | 9 | 0 | 16 | 1.14 |
| 12:15 | Passenger | 0 | 11 | 3 | 7 | 13 | 34 | 2.42 |
|  | Short Truck | 0 | 1 | 0 | 0 | 0 | 1 | 0.07 |
|  | Long Trucks | 0 | 3 | 0 | 3 | 0 | 6 | 0.43 |
| 12:30 | Passenger | 0 | 12 | 6 | 5 | 7 | 30 | 2.14 |
|  | Short Truck | 0 | 2 | 1 | 2 | 0 | 5 | 0.36 |
|  | Long Trucks | 0 | 3 | 1 | 9 | 0 | 13 | 0.93 |
|  | Buses | 0 | 0 | 1 | 0 | 0 | 1 | 0.07 |
|  | Motorcycles | 0 | 8 | 0 | 0 | 0 | 8 | 0.57 |
| 12:45 | Passenger | 0 | 6 | 4 | 4 | 7 | 21 | 1.50 |
|  | Short Truck | 0 | 0 | 0 | 0 | 2 | 2 | 0.14 |
|  | Long Trucks | 0 | 2 | 0 | 9 | 1 | 12 | 0.86 |
|  | Motorcycles | 0 | 2 | 1 | 0 | 0 | 3 | 0.21 |
| 1:00 | Passenger | 0 | 5 | 4 | 9 | 5 | 23 | 1.64 |
|  | Short Truck | 0 | 1 | 0 | 1 | 0 | 2 | 0.14 |
|  | Long Trucks | 0 | 6 | 0 | 13 | 1 | 20 | 1.43 |
| 1:15 | Passenger | 0 | 4 | 1 | 4 | 8 | 17 | 1.21 |
|  | Long Trucks | 0 | 4 | 0 | 7 | 1 | 12 | 0.86 |
|  | Buses | 0 | 1 | 0 | 0 | 0 | 1 | 0.07 |
|  | Motorcycles | 0 | 2 | 0 | 0 | 0 | 2 | 0.14 |
| 1:30 | Passenger | 0 | 5 | ${ }^{6}$ | 4 | 5 | 20 | 1.43 |
|  | Short Truck | 0 | 1 | 0 | 0 | 3 | 4 | 0.29 |
|  | Long Trucks | 0 | 3 | 0 | 2 | 1 | 6 | 0.43 |
|  | Buses | 0 | 0 | 1 | 0 | 0 | 1 | 0.07 |
| 1:45 | Passenger | 0 | 5 | 8 | 15 | 6 | 34 | 2.42 |
|  | Short Truck | 0 | 0 | 0 | 0 | 1 | 1 | 0.07 |
|  | Long Trucks | 0 | 2 | 0 | 17 | 0 | 19 | 1.35 |
| 2:00 | Passenger | 0 | 3 | 2 | 2 | 8 | 15 | 1.07 |
|  | Short Truck | 0 | 1 | 0 | 0 | 0 | 1 | 0.07 |
|  | Long Trucks | 0 | 5 | 9 | 5 | 0 | 19 | 1.35 |
|  | Motorcycles | 0 | 0 | 0 | 0 | 2 | 2 | 0.14 |
| 2:15 | Passenger | 0 | 1 | 3 | 13 | 5 | 22 | 1.57 |
|  | Short Truck | 0 | 0 | 2 | 1 |  | 5 | 0.36 |
|  | Long Trucks | 0 | 6 | 0 | 7 | 0 | 13 | 0.93 |
|  | Motorcycles | 0 | 0 | 0 | 1 | 0 | 1 | 0.07 |
| 2:30 | Passenger | 0 | 8 | 6 | 10 | 4 | 28 | 2.00 |
|  | Short Truck | 0 | 2 | 2 | 0 | 1 | 5 | 0.36 |
|  | Long Trucks | 0 | 4 | 0 | ${ }^{6}$ | 0 | 10 | 0.71 |
|  | Buses | 0 | 0 | 1 | 0 | 0 | 1 | 0.07 |
|  | Motorcycles | 0 | 0 | 0 | 1 | 0 | 1 | 0.07 |
| 2:45 ${ }^{\text {P }}$ | Passenger | 0 | 10 | 8 | 9 | 8 | 35 | 2.49 |
|  | Short Truck | 1 | 0 | 1 | 3 | 0 | 5 | 0.36 |
|  | Long Trucks | 0 | 5 | 0 | 3 | 0 | 8 | 0.57 |
|  | Buses | 0 | 0 | 1 | 0 | 0 | 1 | 0.07 |
| 3:00 | Passenger | 0 | 7 | 3 | 12 | 9 | 31 | 2.21 |
|  | Short Truck | 0 | 2 | 2 | 4 | 0 | 8 | 0.57 |
|  | Long Trucks | 0 | 0 | 0 | 9 | 0 | 9 | 0.64 |
|  | Buses | 0 | 0 | 0 | ${ }_{0}$ | 1 | 1 | 0.07 |
|  | Motorcycles | 0 | 0 | ${ }^{0}$ | ${ }_{1}^{14}$ | 1 | 2 | 0.14 |
| 3:15\| ${ }_{\text {P }}$ S | Passenger |  |  |  |  | 12 | 41 | 2.92 |
|  | Short Truck | 0 | 0 | 0 | 0 | 1 | 1 | 0.07 |
|  | Long Trucks | 0 | 12 | 0 | ${ }_{6}$ | 0 | 18 | 1.28 |
|  | Motorcycles | 0 | 0 | 2 | 0 | 0 | 2 | 0.14 |
| 3:30 ${ }_{\text {P }}^{\text {P }}$ S | Passenger | 0 | ${ }_{6}$ | 7 | 10 | 4 | 27 | 1.92 |
|  | Short Truck | 0 | 2 | 0 | 1 | 1 | 4 | 0.29 |
|  | Long Trucks | 0 | 2 | 0 | 10 | 0 | 12 | 0.86 |
|  | Motorcycles | 0 | 3 | 0 | 1 | 0 | 4 | 0.29 |
| 3:45 ${ }^{\text {P }}$ | Passenger | 0 | 7 | 13 | 5 | 4 | 29 | 2.07 |
|  | Short Truck | 0 | 1 | 0 | 1 | 1 | 3 | 0.21 |
|  | Long Trucks | 0 | 4 | 0 | 5 | 0 | 9 | 0.64 |
|  | Motorcycles | 0 | 1 | 0 | 0 | 1 | 2 | 0.14 |
| 4:00 P | Passenger | 0 | 8 | 12 | 8 | 10 | 38 | 2.71 |
|  | Short Truck | 0 | 2 | 1 | 1 | 0 | 4 | 0.29 |
|  | Long Trucks | 0 | 3 | 0 | 5 | 0 | 8 | 0.57 |
|  | Motorcycles | 0 | 0 | 0 | 0 | 1 | 1 | 0.07 |
| 4:15\| ${ }^{\text {P }}$ S | Passenger | 0 | 5 | 10 | 4 | 10 | 29 | 2.07 |
|  | Short Truck | 0 | 1 | 1 | 1 | 2 | 5 | 0.36 |
|  | Long Trucks | 0 | 2 | 1 | 4 | 0 | 7 | 0.50 |
|  | Motorcycles | 0 | 1 | 0 | 0 | 0 | 1 | 0.07 |
| 4:30 ${ }^{\text {P }}$ S | Passenger | 0 | 6 | 9 | 5 | 8 | 28 | 2.00 |
|  | Short Truck | 0 | 1 | 0 | 1 | 1 | 3 | 0.21 |
|  | Long Trucks | 0 | 5 | 0 | 6 | 1 | 12 | 0.86 |
|  | Motorcycles | 0 | 0 | 1 | 1 | 0 | 2 | 0.14 |
| 4:45 ${ }^{\text {a }}$ ( ${ }_{\text {P }}^{\text {S }}$ | Passenger | 0 | 6 | 7 | 11 | 13 | 37 | 2.64 |
|  | Short Truck | 0 | 0 | 0 | 2 | 0 | 2 | 0.14 |
|  | Long Trucks | 0 | 4 | 0 | 4 | 0 | 8 | 0.57 |
|  | Buses | 0 | 1 | 0 | 0 | 0 | 1 | 0.07 |


| Time | Vehicle Type | Hwy 17 |  |  |  |  | SUM | Percentage |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Hwy 17 Eastbound Left | Hwy 17 Eastbound Through | Hwy 17 Eastbound Right | Hwy 17 Westbound Through | Peninsula Road Northbound Left |  |  |
| 5:00 | Passenger | 0 | 5 | 7 | 10 | 11 | 33 | 2.35 |
|  | Short Truck | 0 | 1 | 1 | 1 | 0 | 3 | 0.21 |
|  | Long Trucks | 0 | 0 | 0 | 6 | 0 | 6 | 0.43 |
|  | Motorcycles | 0 | 0 | 0 | 2 | 0 | 2 | 0.14 |
| 5:15 | Passenger | 0 | 4 | 4 | 9 | 7 | 24 | 1.71 |
|  | Short Truck | 0 | 0 | $\square$ | 0 | 2 | 3 | 0.21 |
|  | Long Trucks | 0 | 1 | $\square 1$ | 4 | 0 | 6 | 0.43 |
| 5:30 | Passenger | 0 | 3 | 7 | 3 | 5 | 18 | 1.28 |
|  | Long Trucks | 0 | 3 | 0 | 7 | 0 | 10 | 0.71 |
|  | Motorcycles | 0 | 0 | 1 | 0 | 0 | 1 | 0.07 |
| 5:45 | Passenger | 0 | 5 | 8 | 5 | 6 | 24 | 1.71 |
|  | Short Truck | 0 | 0 | 0 | 0 | 1 | 1 | 0.07 |
|  | Long Trucks | 0 | 2 | 0 | 7 | 0 | 9 | 0.64 |
|  | Motorcycles | 0 | 1 | 0 | 0 | 0 | 1 | 0.07 |
| 6:00 | Passenger | 0 | 1 | 3 | 6 | 8 | 18 | 1.28 |
|  | Short Truck | 0 | 1 | 0 | 1 | 0 | 2 | 0.14 |
|  | Long Trucks | 0 | 7 | 0 | 8 | 0 | 15 | 1.07 |
| 6:15 | Passenger | 0 | 4 | 2 | 6 | 12 | 24 | 1.71 |
|  | Long Trucks | 0 | 0 | 0 | 0 | 8 | 8 | 0.57 |
| 6:30 | Passenger | 0 | 6 | 5 | 1 | 2 | 14 | 1.00 |
|  | Short Truck | 0 | 0 | 0 | 1 | 3 | 4 | 0.29 |
|  | Long Trucks | 0 | 4 | 0 | 2 | 0 | 6 | 0.43 |
|  | Buses | 0 | 0 | 0 | 1 | 1 | 2 | 0.14 |
|  | Motorcycles | 0 | 0 | 0 | 2 | 0 | 2 | 0.14 |
| 6:45 | Passenger | 0 | 4 | 6 | 3 | 4 | 17 | 1.21 |
|  | Short Truck | 0 | 0 | 0 | 1 | 0 | 1 | 0.07 |
|  | Long Trucks | 0 | 3 | 0 | 0 | 0 | 3 | 0.21 |
| 7:00 | Passenger | 0 | 2 | 10 | 4 | 9 | 25 | 1.78 |
|  | Short Truck | 0 | 0 | 0 | 1 | 0 | 1 | 0.07 |
|  | Long Trucks | 0 | 1 | 0 | 9 | 0 | 10 | 0.71 |
|  | Motorcycles | 0 | 0 | 0 | 0 | 1 | 1 | 0.07 |
| 7:15 | Passenger | 0 | 1 | 4 | 2 | 4 | 11 | 0.78 |
|  | Long Trucks | 0 | 1 | 0 | 7 | 0 | 8 | 0.57 |
|  | Buses | 0 | 0 | 0 | 1 | 0 | 1 | 0.07 |
| 7:30 | Passenger | 0 | 3 | 7 | 1 | 3 | 14 | 1.00 |
|  | Long Trucks | 0 | 3 | 0 | 5 | 0 | 8 | 0.57 |
| 7:45 | Passenger | 0 | 2 | 3 | 1 | 6 | 12 | 0.86 |
|  | Long Trucks | 0 | 2 | 0 | 2 | 0 | 4 | 0.29 |
| Notes: Traffic data is referenced from a traffic count completed at the intersection of Hwy 17/Peninsula Road on June 16, 2010 by ENL |  |  |  |  |  | total | 1403 | 100.00 |

## FINAL TRAFFIC DISTRIBUTION

| Vehicle | Percentage (\%) | 65 |
| :--- | :---: | ---: |
| Passenger | 6 |  |
| Short Trucks |  | Mike: <br> Since motorcycles do not <br> operate in the winter, and <br> we are using the ADT, <br> tong Trucks |
| they will be added to the |  |  |
| Buses | 1 | Passenger Vehicles. |
| Motorcycles | 100 |  |
|  |  |  |


| Ministry of | Highway <br> Standards <br> Branch | Traffic <br> Office |
| :--- | :--- | :--- |
| Transportation 2008  <br> Provincial Traffic Volumes (AADT Only) <br> Highways King's Highways / Secondary Highways / Tertiary Roads |  |  |

Ministry Contact:
Traffic Office (905)-704-2960
Abstract:
This annual publication contains the annual average daily traffic (AADT) volume information for each of the sections of highway under MTO jurisdiction for the year 2008 only.

[^2]
*Non Assumed - indicates that the roadway is not under provincial


INTRODUCTION
This publication contains information pertaining to annual average
daily traffic volumes on roads under Provincial jurisdiction as of
December 31,2008 .

## TRAFFIC VOLUME INFORMATION

A detailed listing outlining the 2007 annual average daily traffic volumes on Provincial Highways (King's, Secondary, Tertiary Roads and the 7000 series highways) is provided.
The highway network is divided into approximately 1600 sections for reporting purposes. Although local conditions cause variations in the volume within the sections, the volumes shown are considered to adequately represent the section.
On highways that overlap another highway, for instance Highway 35 and Highway 115, the volume information is referenced to the lower number highway. When an overlap occurs between a freeway and non-freeway, reference is made to the freeway route number. The freeways are Highway 400 to Highway 427 and the QEW.



| Site | Surveyed | Street | TRAFFIC VOLUME | AADT | EXISTING | CLASS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | By | Name |  | VOLUME | SPEED | NO. |
| Site 9 | W.MacKenzie | Hemlo Drive | 980 | 3,267 | 50km | 3 |
| Site 10 | J. Tocheri | Hemlo Drive | 1,150 | 3,833 | 50 km | 3 |
| Site 11 | L. Amadeo | Hemlo Drive | 2,193 | 7,310 | 50km | 3 |
| Site 12 | B. Harris | Peninsula | 3,000 | 10,000 | 40km | 3 |
| Site 15 | N.Willet | Peninsula Road (all veh) | 905 | 3,017 | 60km | 3 |
| Site 17 | B.Honan | Peninsula Rd. | 2,655 | 8,850 | 40km | 3 |
| Site 17 | H.Honan | Sund Crescent | 1,060 | 3,533 | 50 km | 3 |
| Site 1 | C. Just | Van Horne | 211 | 703 | 50km | 4 |
| Site 1 |  | Hemlo | 567 | 1,890 | 50km | 4 |
| Site 2 | B.Harris | Steedman | 132 | 440 | 50 km | 4 |
| Site 2 |  | Hemlo | 486 | 1,620 | 50km | 4 |
| Site 3 |  | Steedman | 499 | 1,663 | 50km | 4 |
| Site 4 |  | Lloyd Irwin | 218 | 727 | 50km | 4 |
| Site 4 |  | Michano | 231 | 770 | 50km | 4 |
| Site 5 | R. Hogue | Steedman | 747 | 2,490 | 50km | 4 |
| Site 5 |  | Lloyd Irwin | 175 | 583 | 50km | 4 |
| Site 6 |  | Graham Crescent | 69 | 230 | 50 km | 4 |
| Site 7 | J. Maloney | Penn Lake Rd. | 492 | 1,640 | 50km | 4 |
| Site 8 | G. Levesque | Chisholm Trail | 350 | 1,167 | 50km | 4 |
| Site 9 |  | Jackson Crescent | 178 | 593 | 50km | 4 |
| Site 10 |  | Lynx Lane | 545 | 1,817 | 50km | 4 |
| Site 13 | Nettie Lombar | Johnson | 292 | 973 | 50km | 4 |
| Site 14 | S. Bouchie | Penn Lake Rd E | 313 | 1,043 | 50km | 4 |
| Site 16 | E. MacKenzie | Ontario St. | 310 | 1,033 | 50km | 4 |
| Site 18 |  | Sund | 840 | 2,800 | 50km | 4 |
| Site 19 | S. Harris | Stevens | 474 | 1,580 | 50km | 4 |
| Site 19 |  | Howe | 234 | 780 | 50km | 4 |
| Site 21 | E. Bertin | Howe | 245 | 817 | 50km | 4 |
| Site 22 | E. Cooper | Peninsula Rd. | 1,470 | 4,900 | 40km | 4 |
| Site 22 | T. Cooper | Stevens | 1,400 | 4,667 | 50km | 4 |
| Site 25 | C.MacKenzie | Drake | 160 | 533 | 50km | 4 |
| Site 1 |  | Lr. Laverendyre | 57 | 190 | 50km | 5 |
| Site 1 |  | Poplar | 98 | 327 | 50km | 5 |
| Site 1 |  | Nicolet | 78 | 260 | 50km | 5 |
| Site 1 |  | Laurier | 38 | 127 | 50km | 5 |
| Site 2 |  | Nugget | 90 | 300 | 50km | 5 |
| Site 3 | M. Sullivan | Nugget | 92 | 307 | 50 km | 5 |
| Site 3 |  | Nicolet | 77 | 257 | 50km | 5 |
| Site 4 | A. Morrison | McFarland | 48 | 160 | 50km | 5 |
| Site 4 |  | Griggs | 21 | 70 | 50km | 5 |
| Site 5 |  | McFarland | 74 | 247 | 50km | 5 |
| Site 6 | B. Richards | Radisson | 115 | 383 | 50km | 5 |
| Site 6 |  | Michano | 206 | 687 | 50km | 5 |
| Site 7 |  | Wilwood Trail | 83 | 277 | 50km | 5 |
| Site 8 | R. Chisholm | Godfrey | 129 | 430 | 50km | 5 |
| Site 8 |  | Pinewood | 55 | 183 | 50km | 5 |
| Site 9 |  | Bastedo | 180 | 600 | 50km | 5 |
| Site 13 | Nettie Lombar | MacKenzie | 93 | 310 | 50km | 5 |
| Site 13 | Nettie Lombar | Evergreen | 47 | 157 | 50km | 5 |
| Site 14 | A. Bouchie | Penn Lake Rd W | 6 | 20 | 50km | 5 |
| Site 15 | J.Willet | Industratial Park Rd | 85 | 283 | 60km | 5 |
| Site 16 | M.Harrison | Manitoba Street | 55 | 183 | 50km | 5 |
| Site 18 | W.Bertin | Aspendale E | 90 | 300 | 50km | 5 |
| Site 18 | L.Bertin | Aspendale W | 100 | 333 | 50km | 5 |
| Site 18 |  | Steedman | 93 | 310 | 50km | 5 |
| Site 19 |  | Bissell | 44 | 147 | 50km | 5 |
| Site 19 |  | Stewart | 71 | 237 | 50km | 5 |
| Site 20 | J.Carman | Brown | 64 | 213 | 50km | 5 |
| Site 20 | N.Rounding | Jones | 27 | 90 | 50km | 5 |
| Site 21 | C.Joseph | Yawkey | 142 | 473 | 50km | 5 |
| Site 24 | J. Marchand | Croy Court | 43 | 143 | 50km | 5 |
| Site 24 |  | McCullough | 102 | 340 | 50km | 5 |
| Site 24 |  | Abrams | 145 | 483 | 50km | 5 |
| Site 24 |  | McLeod | 33 | 110 | 50km | 5 |
| Site 25 |  | Ross | 38 | 127 | 50km | 5 |
| Site 25 |  | King | 27 | 90 | 50km | 5 |
| Site 26 | A. Gregor | Stevens | 210 | 700 | 50km | 5 |
| Site 26 | M. Cummings | Whitman | 13 | 43 | 50km | 5 |
| Site 26 |  | Woodson | 60 | 200 | 50km | 5 |

Vehicle Distribution for Peninsula Road Based on ENL Traffic Count on June 16, 2010

| Time | Vehicle Type | Peninsula Road |  |  |  |  |  | sum | Percentage |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Hwy 17 Eastbound Right | Hwy 17 Westbound Left | Peninsula Road Northbound Left | Peninsula Road Northbound Through | Peninsula Road Northbound Right | Access Road Southbound Through |  |  |
| 6:00 | Passenger | 3 | 1 | 3 | $\bigcirc$ | 23 | 0 | 30 | 1.80 |
| 6:15 | Passenger | , | , | 4 | $\square$ | $\square{ }^{14}$ | 0 | 20 | 1.20 |
|  | Long Trucks | 0 | 0 | 1 | $\bigcirc$ | $\square$ | 0 | , | 0.06 |
| 6:30 | Passenger | 5 | 2 | 6 | 0 | 12 | 0 | 25 | 1.50 |
|  | Long Trucks | $\stackrel{2}{2}$ | 0 | 0 | $\bigcirc$ | 0 | 0 | 2 | 0.12 |
| 6:45 | Passenger | 2 | 3 | , | 0 | 7 | 0 | 19 | 1.14 |
| 7:00 | Passenger | 5 | 4 | 4 | 0 | 9 | 0 | 22 | 1.32 |
|  | Long Trucks | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.06 |
| 7:15 ${ }^{\text {a }}$ [ ${ }^{\text {P }}$ | Passenger | ${ }^{3}$ | 3 | 5 | 1 | $\square 5^{5}$ | 0 | 17 | 1.02 |
|  | Short Truck | 0 | 0 | 1 | 0 | $\square$ | 0 | $\stackrel{2}{2}$ | 12 |
|  | Motorcycles | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0.12 |
| 7:30 | Passenger | 0 | 2 | 8 | 0 | 7 | 0 | 17 | 1.02 |
|  | Short Truck | 0 | 0 | 1 | 0 | $\square 1$ | 0 | $\stackrel{2}{2}$ | 0.12 |
|  | Long Trucks | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 0.12 |
| 7:45 | Passenger | 2 | 5 | 5 | 1 | 7 | 1 | 21 | 1.26 |
|  | Short Truck | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0.12 |
|  | Long Trucks | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0.12 |
|  | Buses | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0.06 |
| 12:00\| ${ }^{\text {P }}$ | Passenger | 11 | 4 | 13 | 1 | 15 | 1 | 45 | 2.70 |
|  | Short Truck | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.06 |
|  | Long Trucks | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.06 |
|  | Buses | 0 | 0 | , | 0 | 1 | 0 | 1 | 0.06 |
| 12:15 | Passenger | 3 | 20 | 13 | , | , | 0 | 44 | 2.64 |
|  | Long Trucks | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0.12 |
| 12:30 ${ }^{\text {P }}$ | Passenger | 6 | 7 | 7 | 0 | 13 | 0 | 33 | 1.98 |
|  | Short Truck | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.06 |
|  | Long Trucks | 1 | 0 | $\bigcirc$ | $\bigcirc$ | ${ }^{2}$ | 0 | 3 | 0.18 |
|  | Buses | 1 | 0 | 0 | $\bigcirc$ | 1 | 0 | 2 | 0.12 |
|  | Motorcycles | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.06 |
| 12:45 | Passenger | 4 | 15 | , | , | 12 | 0 | 38 | 2.28 |
|  | Short Truck | 0 | 1 | 2 | 0 | 1 | 0 | 4 | 0.24 |
|  | Long Trucks | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0.06 |
|  | Motorcycles | 1 | 3 | 0 | 0 | $\bigcirc$ | 0 | 4 | 0.24 |
| 1:00 | Passenger | 4 | 8 | 5 | , | 13 | 0 | 31 | 1.86 |
|  | Short Truck | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.06 |
|  | Long Trucks | 0 | 3 | 1 | 0 | 0 | 0 | 4 | 0.24 |
|  | Motorcycles | 0 | - ${ }^{0}$ | 0 | 0 | 2 | 0 | 2 | 0.12 |
| 1:15 | Passenger | 1 | 15 | 8 | 0 | 15 | 1 | 40 | 2.40 |
|  | Short Truck | 0 | 2 | 0 | 0 | 3 | 0 | 5 | 0.30 |
|  | Long Trucks | 0 | 0 | 1 | , | 0 | 0 | 1 | 0.06 |
|  | Motorcycles | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0.06 |
| $1: 30 \|$P <br> 5 | Passenger | 6 | 18 | 5 | $\bigcirc$ | 8 | 0 | 37 | 2.22 |
|  | Short Truck | 0 | $\stackrel{0}{0}$ | ${ }^{3}$ | $\bigcirc$ | $\square$ | 0 | ${ }^{3}$ | 0.18 |
|  | Long Trucks | 0 | - 1 | 1 | $\bigcirc$ | $\square$ | 0 | 2 | 0.12 |
|  | Buses | ${ }_{8}^{1}$ | 0 | ${ }_{6}$ | $\square$ | 0 | 0 | 1 | ${ }^{0.06}$ |
| 1:45 | (later $\begin{aligned} & \text { Passenger } \\ & \text { Short Truck }\end{aligned}$ | 8 | [ $\begin{array}{r}15 \\ 0\end{array}$ | 1 | 0 | $\square \stackrel{8}{0}_{0}$ | - | 1 | 2.22 0.06 |
|  | Long Trucks | 0 | 1 | 0 | 0 | 0 | , | 1 | 0.06 |
|  | Motorcycles | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0.12 |
| 2:00\| | Passenger | 2 | 10 | 8 | O | 7 | 0 | 27 | 1.62 |
|  | Short Truck | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0.06 |
|  | Long Trucks | 9 | $\bigcirc$ | 0 | , | 0 | 0 | 9 | 0.54 |
|  | Motorcycles | 0 | $\bigcirc$ | 2 | 0 | $\stackrel{2}{2}$ | 0 | 4 | 0.24 |
| $2: 15 \|$P <br> S <br> N | Passenger | 3 | 18 |  |  | 12 | 1 | 40 | 2.40 |
|  | Short Truck | 2 | 0 | 2 | 0 | 2 | 0 | 6 | 0.36 |
|  | Motorcycles | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0.06 |
| 2:30 ${ }^{\text {P }}$ | Passenger | ${ }_{6}^{6}$ | ${ }_{2}^{12}$ | 4 1 | ${ }_{1}^{1}$ | 9 | 0 | 32 | 1.92 0.30 |
|  | Short Truck Buses | ${ }_{2}^{2}$ | ${ }_{2}^{2}$ | 1 | 0 | 0 | 0 | 5 | 0.30 0.12 |
| 2:45 ${ }_{\text {a }}^{\text {P }}$ | Passenger | 8 | 7 | 8 | 0 | 10 | 0 | 33 | 1.98 |
|  | Short Truck | 1 | 5 | 0 | 0 | 0 | 0 | 6 | 0.36 |
|  | Long Trucks | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0.06 |
|  | Buses | 1 | 1 | 0 | 0 | 1 | 0 | 3 | 0.18 |
|  | Motorcycles | 0 | ${ }^{0}$ | 0 | 0 | 2 | 0 | 2 | 0.12 |
| 3:00 $\|$P <br> 5 <br> L <br> B <br> M | Passenger | 3 | 23 | 9 | 0 | 8 | 0 | 43 | 2.58 |
|  | Short Truck | ${ }^{2}$ | $\stackrel{2}{2}^{2}$ | 0 | 0 | ${ }_{1}$ | 0 | 5 | 0.30 |
|  | Long Trucks Buses | 0 | $\left[\begin{array}{l}0 \\ 1\end{array}\right.$ | 0 1 | 0 | 2 1 | 0 | ${ }_{2}^{2}$ | 0.12 0.18 |
|  | Motorcycles | 0 | 0 | 1 | 0 | $\square 1$ | 0 | 2 | 0.12 |
| 3:15 ${ }^{\text {P }}$ | Passenger | 12 | 17 | 12 | 1 | 9 | 0 | 51 | 3.06 |
|  | Short Truck | 0 | ${ }_{2}^{2}$ | 1 | 0 | 1 | 0 | 4 | 0.24 |
|  | Motorcycles | ${ }_{2}^{2}$ | 3 | 0 | 1 | 1 | 1 | 8 | 0.48 |
|  | Pressenger | 7 0 | [ $\begin{array}{r}21 \\ 1\end{array}$ | 4 1 | 0 | 10 1 | 0 | 42 3 | 2.52 0.18 |
|  | Buses | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0.12 0.12 |
| 3:45 ${ }^{\text {P }}$ S | Passenger | 13 | 11 | 4 | , | 7 | 1 | 37 | 2.22 |
|  | Short Truck | 0 | 1 | 1 | 0 | 0 | 0 | ${ }^{2}$ | 0.12 |
|  | Long Trucks | 0 | 0 | 0 1 | 0 | 1 | 0 | 1 | 0.06 |
|  | Motorcycles Passenger | r 12 |  |  |  |  | 0 2 | 1 <br> 53 | 0.06 3.18 |
| 4:00 ${ }^{\text {P }}$ | Passenger | 12 1 | 19 0 | 10 0 | 2 | 8 2 | ${ }_{0}^{2}$ | 53 3 | 3.18 0.18 |
|  | Motorcycles | 0 | 1 | 1 | 0 | 0 | 0 | ${ }^{2}$ | 0.12 |
| 4:15 ${ }^{\text {P }}$ | Passenger | 10 | 21 | 10 | ${ }_{0}$ | 12 | 0 | 53 | 3.18 |
|  | Short Truck | ${ }^{1}$ | ${ }^{2}$ | 2 | 1 | 0 | 1 | 7 | 0.42 |
|  | Long Trucks | 1 | ${ }^{0}$ | ${ }_{0}^{0}$ |  | ${ }^{0}$ | 0 | 1 | 0.06 |
| 4:30 ${ }^{\text {P }}$ | Passenger | 9 | 40 2 | 8 1 | 0 | 13 2 | 2 0 | $\begin{array}{r}72 \\ 5 \\ \hline\end{array}$ | 4.31 0.30 |
|  | Long Trucks | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0.06 |
|  | Motorcycles | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.06 |
| 4:45 | Passenger | 7 | 50 | 13 | 0 | 10 | 0 | 80 | 4.79 |
|  | Short Truck | 0 | 1 | 0 | $\bigcirc$ | 0 | 0 | 1 | 0.06 |


final traffic distribution
Vehicle Percentage (\%)
Passenger Ve
Short Trucks
Short Trucks
Long Trucks
Long Trucks
Buses
Motorcycles

Appendix B
Baseline Sound Level Measurements

Graph 1: Background Sound Level Measurement at Location N1 Hourly Leq \& Wind Speed Time History

August 5-7, 2009


Graph 2: Background Sound Level Measurement at Location N2
Hourly Leq \& Wind Speed Time History
August 5-7, 2009



## Graph 4: Background Sound Level Measurement at Location N4 Hourly Leq \& Wind Speed Time History

 August 31 - September 2, 2009

Graph 5: Background Sound Level Measurement at Location N5 Hourly Leq \& Wind Speed Time History August 31 - September 2, 2009



[^0]:    ${ }^{1}$ Mine rock is rock that has been excavated from active mining areas but does not have sufficient ore grades to process for mineral extraction.

[^1]:    ${ }^{2}$ Process solids are solids generated during the ore milling process following extraction of the ore (minerals) from the host material.

[^2]:    Annual Average Daily Traffic volume (AADT)

