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## **NOISE IMPACT STUDY - HORIZONTAL DIRECTIONAL DRILLING FOR BLUEWATER RIVER CROSSING REPLACEMENT PROJECT**

As requested, Stantec Consulting Limited (Stantec) has completed an assessment of noise due to horizontal drilling under the St. Clair River, St. Clair Township, Ontario. Stantec performed the assessment based on information provided regarding the equipment to be used during the drilling operations. This letter report summarizes our analysis and recommendations to minimize the potential noise impact during the drilling period.

### **BACKGROUND:**

St. Clair Pipelines Management Inc. (SCPLMI), on behalf of St. Clair Pipelines L.P. (SCPL), made an application and subsequently received approval for the Bluewater River Crossing Replacement Project (the Project) from the National Energy Board via a letter dated June 13, 2012. The approval has noise related conditions which are summarized below:

### **Condition 6:**

In the event of horizontal directional drilling (HDD) bore equipment being set up in Canada, at least 14 days prior to the start of the HDD activity, SCPLMI shall file with the Board a noise management plan containing information on day-time and potential night-time HDD operations. The plan shall include but not be limited to:

- a) a final summary of proposed HDD noise mitigation measures for day-time and potential night-time operations;
- b) confirmation that residents potentially affected by HDD noise will receive notice from SCPLMI at least 14 days prior to starting the HDD activities;
- c) confirmation that residents potentially affected by HDD noise will receive contact information for SCPLMI at least 14 days prior to starting the HDD activities in the event they have concerns about the HDD noise; and
- d) a description of how SCPLMI plans to address any complaints received regarding HDD noise.

### **DRILLING ACTIVITIES AND EXPECTED NOISE SOURCES:**

There are several residential receptors located around the Project and these are shown in Figure 1. The surrounding area also consists of several industrial facilities; therefore the ambient environment in the area is expected to be dominated by sound from nearby industrial facilities, and traffic on St. Clair Parkway.

HDD activities involve a drill rig and associated equipment noted below. The drilling period is expected to be approximately one month in duration. It is anticipated that drilling will only occur during daylight hours and that the "pull back" of the pipe section under the River will occur on a 24 hr basis (night time hours). The pull back

will take approximately 1 to 2 days to complete. Once the HDD and pull back are complete, noise emissions from the Project will be limited to typical construction noises associated with equipment such as tracked graders and pickup trucks. The following typical noise sources are expected at the Project:

1. Drill rig;
2. Rig hydraulic power unit;
3. Mud rig;
4. Mud rig engine and generator;
5. Tractors associated with drill and mud rigs;
6. Mud pump and cleaner;
7. Excavator; and
8. Other miscellaneous sources.

The actual locations of the sources may vary slightly within the Project site; the potential locations are shown in Figure 2. Although some variation of the locations of the sources is possible within the site, these minor changes will not significantly affect the noise propagation from the Project or the predicted impacts at the Points of Reception.

#### **CRITERIA AND METHODOLOGY:**

The Ontario Ministry of the Environment (MOE) has published a series of noise guidelines for different applications. Among these publications, NPC-205 and Municipal Noise Control Bylaw (MOE Municipal By-Law) have particular relevance to the Project. These guidelines have been adopted by many municipalities. St. Clair Township does not have any specific guidelines applicable to construction noise and therefore the MOE publications will be used.

#### ***Stationary Sources vs. Construction Noise***

The MOE publications define three different types of sources, which are transportation related sources, stationary sources and impulsive sources (e.g. blasting). Per the MOE publication NPC 205, the one-hour equivalent sound level from stationary sources should not exceed the maximum of the lowest background sound levels during any given hour or the exclusionary limit provided in the guidelines at any noise-sensitive point of reception (POR). The background sound level is considered to be the sound in the environment from sources other than those associated with the Project under assessment. Based on a review of the aerial imagery of the surrounding area of the Project, it was determined that the acoustical environment surrounding the Project is considered Class 1 acoustical environment. In a Class 1 acoustical environment the day and night-time ambient sound is generated by manmade sounds and the corresponding exclusionary limit provided by the MOE is given in Table 1 below.

**Table 1: MOE Exclusionary Sound Level Limit for Regular Operation of a Facility**

<b>Receptors</b>	<b>Regular Operation Day/Night [dBA]</b>
All Receptors	50 / 45

The noise from the regular operation of a Facility during a predictable worst case hour should not exceed the limits provided in Table 1.

Since the construction sources are operated from a confined area they could be interpreted as stationary sources. However, MOE publication NPC 205 excludes the construction activities from consideration as stationary sources. As per the MOE publication, construction includes erection, alteration, repair, dismantling, demolition, structural maintenance, painting, moving, land clearing, earth moving, grading, excavating, the laying of pipe and conduit whether above or below ground level, street and highway building, concreting, equipment installation and alteration and the structural installation of construction components and materials in any form or for any purpose, and includes any work in connection therewith; "construction" excludes activities associated with the operation at waste and snow disposal sites.

MOE’s Municipal Noise Control By-Law provides time limits for construction in designated quiet zones or zoned residential areas. This guideline suggests that in residential areas construction should be avoided from 19:00 hours to 07:00 hours of the following day; it further recommends avoiding construction during weekends and statutory holidays. However, if construction noise is at an acceptable level, then construction can occur during the night-time period/weekend.

A review of the St. Clair zoning map indicates that the area is designated as Type 3 industrial (attached).

**Acceptable Noise**

Humans do not respond to a change in loudness in accordance with the loss of acoustical energy; typically a 3 dB change is imperceptible to the average human, yet it represents a doubling (or halving) of acoustical energy (Hoover and Keith 1981) from a source. The human perception of a change in loudness is presented in Table 3-3 (U.S. EPA, 1974). These values should not be considered criteria, but instead can be used to assess the significance of a change or difference beyond a criterion.

**Table 2: Human Perception of Changes in Loudness**

<b>Change in Sound Level</b>	<b>Human Perception of Relative Loudness</b>
1 to 3	Insignificant due to imperceptibility
4 to 5	Just-noticeable
6 to 9	Marginally significant
10 or more	Significant, perceived as a doubling (or halving) of sound exposure

Considering a mixture of residential and industrial land use in the vicinity of the Project, which potentially have higher ambient sound levels due to other industrial activities; and considering the construction will last for short duration of time; a criterion of up to 9 dB above the MOE's exclusionary limit is suggested for this Project.

**Table 3: Sound Level Limit for Drilling Operations**

Receptors	Regular Operation Day/Night [dBA]
All Receptors	59 / 54

**DISCUSSION AND RECOMMENDATIONS:**

The following sources were considered in the analysis:

**Table 4: Source Sound Power Levels in Octave Band Format (dB, re 10<sup>-12</sup> W)**

Equipment/Source	Octave Band Centre Frequency (Hz), Sound Power Levels (dB)									
	32	63	125	250	500	1000	2000	4000	8000	dBA
Drilling Rig	99	95	103	103	99	99	96	93	86	104
Rig HPU	100	99	107	108	109	110	109	106	99	115
Mud Pump/Generator Engines	97	96	104	105	106	107	106	103	96	112
Engine Exhausts	100	99	117	105	103	102	101	98	97	109
Mud Pump	95	102	103	98	96	92	88	85	73	98
Mud Cleaner	38	38	87	86	90	95	93	96	97	102
Shaker	59	59	71	80	107	98	102	94	98	108
Excavator	104	109	110	106	106	106	103	98	89	110
Light Plants	94	98	96	92	86	87	85	81	74	92

Assuming the sources operate continually, the following table provides the predicted sound levels at the Points of Reception (see Figures 1-4):

**Table 5: Predicted Sound Levels at Modelled Points of Reception**

	Sound Pressure Level due to Drill Rig Only [dBA]	Sound Pressure Level due to All sources [dBA]
POR001	70	73
POR002	69	71
POR003	61	64
POR004	62	65
POR005	58	61

POR006	63	66
POR007	58	62
POR008	60	64

1. The above table indicates that the predictable worst case operation (i.e. all sources working simultaneously and continually) exceeds the daytime allowable limit by up to 14 dB and night-time limit by up to 19 dB.
2. The drilling operation alone exceeds the daytime limit by 11 dB and night time limit by up to 16 db.

**NOISE CONTROL AND RECOMMENDATIONS:**

1. A stationary barrier is not recommended for the Project due to the limited noise attenuation that would be attained at the majority of receptors. Movable noise enclosures are recommended, to be able to place noise attenuation measures as close to the sources of noise as possible (see Figures 5 and 6). An enclosure material such as the Portable Acoustic Panel System by Environmental Noise Control Inc, or equivalent, is recommended (product sheet attached). Enclosures should be used for :
  - a. Drilling Rig
  - b. Rig Hydraulic Power Unit (with Diesel Engine)
  - c. Triple Cell Shaker Scalper
  - d. Mud Rig Diesel Engine (CAT 3406)
  - e. Mud Rig Generator and engine (CAT 3208)
  - f. Drill Pipe Rig
2. Administrative controls should also be used to minimize noise impacts.
  - It is recommended to enforce a no idling policy for equipment within the Project.
  - Where possible the equipment should be operated at a lower throttle setting.
  - All equipment used by contractors should be well maintained and fitted with engine mufflers.
  - In case of a valid complaint during construction, SCPLMI should respond expeditiously and take appropriate action to ensure that the issue is managed responsibly.
3. Stantec recommends that construction trailers (e.g. site office, contractor trailers etc.) be placed between the project and the nearest receptor such that they break the line of site between the Project equipment units and receptors.
4. With a combination of enclosures and trailers the sound level is expected to be reduced in the range of 60-63 dBA. Considering the technical challenges in mitigating the noise, it is recommended:
  - a. to complete the project in as short a duration as possible;
  - b. to engage with the Township and nearby residents and periodically update them on the Project's progress;
  - c. to consider noise monitoring at the nearest points of reception as actual noise may be less than the predicted worst case impact; and,
  - d. where activities that cause noise need to be carried out outside of daylight hours (ie. pull back), adjacent landowners should be offered alternative arrangements for the night.

**CLOSURE:**

The acoustic analysis presented in this report is based on information obtained from SCPLMI and their representatives. The assessment represents the conditions at the subject property at the time of the assessment. The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Conclusions and recommendations presented in this report should not be construed as legal advice. Stantec Consulting Limited attests that to the best of our knowledge, the information presented in this report is accurate.

Respectfully,

**STANTEC CONSULTING LTD.**

***Original Signed***

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**Attachments:**

Figure 1: Area map showing construction location and points of reception  
Figure 2: Construction site map showing noise sources  
Zoning map – St. Clair  
Figure 3: Equivalent sound level contours with only drill rig operating  
Figure 4: Equivalent sound level contours with all sources operating  
Figure 5: Equivalent sound level contours with only drill rig operating – drill rig barriers  
Figure 6 : Equivalent sound level contours with all sources operating – drill and mud rig barriers  
Acoustic Panel System product sheet