REPORT ON

TALTSON HYDROELECTRIC EXPANSION PROJECT NOISE DISCUSSION

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1 INTRODUCTION

This qualitative discussion of potential noise from the Taltson Hydroelectric Expansion Project (the Project) focuses on the spatial extent of noise from various construction related activities to provide supporting information for the assessment of wildlife components. This document does not evaluate residual effects or consequence of the noise.

2 METHODS

2.1 SPATIAL AND TEMPORAL STUDY AREA BOUNDARIES

This assessment of noise was conducted to determine the extent of noise propagation from Project related activities. Noise is generally considered a local effect, since it attenuates with distance. The area potentially affected by changes in noise level is determined by this document.

The temporal consideration of this discussion is the period of transmission line construction. While the full construction period for the Project is several years, in most cases, activity at any specific location along the right of way (ROW) would not be expected to last for more than a few weeks during any particular phase of construction. The winter road will only operate for a few months during each winter, dependant on seasonal freeze/thaw. Staging areas, including the main camp in Area 1, would be sources for noise which would likely last for most of the construction period.

2.2 APPROACH

Noise generated by construction of the Project would vary between different activities, as well as on a daily and hourly basis for each specific activity. To determine the potential extent of noise from Project construction, a “worst-case” approach was used. The worst case for construction was determined by:

- Assuming a number of items of noise generating equipment typically used for transmission line construction;
- Using published data to determine the amount of noise generated by the various types of equipment; and
- Reviewing the typical duration of use of noise generating equipment used for specific activities.

Once a worst case scenario was established for an activity, potential changes in noise levels and noise contributions due to the Project construction were determined by calculating noise levels generated by the worst case scenarios at specific points of reception.

Activities or equipment that have sound emissions were determined based on assumptions made about typical transmission line construction practices. Sound emissions for the various sources were based on noise measurements from similar equipment, in-house manufacturer data, or standard sound emission formulae.

Calculations were conducted using formulae consistent with CAN/CSA-ISO1996-1:05 Acoustics – Description, measurement and assessment of environmental noise (CAN/CSA 2005) and ISO9613-2: Attenuation of sound during propagation outdoors (ISO 1996). Both standards provide methods for estimating Leq noise levels over selected time periods.

2.3 SCENARIOS

Based on the nature of the project, the various activities assessed include: transmission line construction, canal construction, and construction and use of the winter road.

For the transmission line, the construction activities that are expected to potentially generate the broadest extent of noise are:

- Clearing and preparation: this scenario represents noise perceived from both ROW and staging areas. The focus is on the particular annoyance from chainsaws and logging machinery;
- Staging areas (activity within);
- Helicopter use for tower construction or other aerial surveys; and
- Small scale blasting activity for tower construction.

For the canal construction at Twin Gorges and Nonacho Lake, activities that are expected to generate the broadest extent of noise are the large scale blasting of rock, material removal/crushing, and drilling (blast preparation). This is similar to a quarrying type of operation.

Construction of the winter road will employ activities similar to the clearing and preparation stage of the transmission line. Use of the winter road during construction will generate noise from the heavy trucks using the road.

3 TRANSMISSION LINE CONSTRUCTION

3.1 EMISSIONS

The typical sound emissions for a variety of construction equipment that may be used for the transmission line construction activities are provided in Table 1. The character and source references for each emission considered are also provided.

Table 1 Construction Sound Emissions

Source Name	Sound Power (dBA)	Type	Reference
Small scale blasting	110[(a)]	Impulsive, tonal	FHWA 2006
Back-up alarm	115[(a)]	Impulsive, tonal	TCPL 2005
Tree feller	111	Continuous	Caterpillar Pers. Comm.
Skidder	105	Continuous	Caterpillar Pers. Comm.
Hand held chainsaw	110	Continuous	NSW EPA 2007
Wheeled loader	110	Continuous	DEFRA 2004
Track dozer	116	Continuous	CadnaSET 2003
Excavator/hoe	110	Continuous	CadnaSET 2003
Compressor	94	Continuous	Caterpillar Pers. Comm.
Generator	110	Continuous	CadnaSET 2003
Rough terrain crane	111	Continuous	TCPL 2005
Helicopter - lift type, approach and takeoff	139	Continuous	FAA 1985
Helicopter - lift type at hover or flyover	131	Continuous	FAA 1985

(a) 5 dBA penalty included in sound power based on the type of source.

Some sources have been noted to be impulsive or tonal in nature. The sound emissions reported for these sources include a penalty of 5 dBA due to the tendency of these sources to be particularly annoying (Can:ISO 1996-1 2006).

Noise attenuation factors considered in the calculations include absorption of sound by the atmosphere, ground conditions (soft vs hard surfaces) and distance. The duration of construction activity was assumed to be 10 hours per day, with no activity during the night (day = 07:00 – 23:00; night = 23:00 – 07:00).

3.2 NOISE PREDICTIONS

Table 2 lists the results of the noise calculations for each scenario based on varying distances from the ROW or limit of activity. The calculation points were placed perpendicular to the centre of activity for the scenario. The two ground based scenarios assumed that equipment noise sources were working continuously within a 500 by 250 metre area.

Table 2 Construction Scenario Noise Predictions by Distance from Activity

Distance from source to nearest receiver (metres)	Predicted Noise Level L_d (dBA) [a]				
	Clearing and Preparation (Staging or ROW)	Staging Areas	Helicopter Work (hovering at 200m)	Helicopter Work (fly-by at 200m)	Blasting
250	51	49	59	50	75
500	46	46	55	47	71
1000	41	42	47	41	64
2000	34	35	39	34	55
3000	30	30	33	29	49
4000	26	25	28	25	45
5000	22	22	25	21	41
10000	6	6	9	6	25

[a] L_d (daytime) noise levels, average hourly noise level.

Based on the results presented, noise from construction work along the ROW or at staging areas can be expected to be lower than the average existing noise level of 35 dBA at approximately 2 km from most construction activity. Helicopter activity involving hovering will propagate farther, reaching a noise level of 35 dBA at about 2.5 km. Construction type blasting for tower bases (if required) will attenuate to 35 dBA at about 7 km however, this is a short-term or instantaneous event so disturbances at this distance would not be sustained. This does not mean that Project sound will not be heard, as the character of construction noise will differ from natural sounds.

4 CANAL CONSTRUCTION

The initial stages of construction for the canals at Twin Gorges and Nonacho Lake will employ clearing and preparation activity similar to the transmission line construction. Noise from these activities in relation to the canal construction is expected to be similar to the level already predicted in the previous section. The analysis of noise from canal construction is focused on quarrying type activity (material movement) and blasting.

4.1 EMISSIONS

The scenario used to represent the expected noise from heavy equipment constructing the canal used a combination of rock drills, a portable crusher, a loader, and a dump truck all working within a 100 m by 200 m area. One large, or quarry scale blast, per day is also assumed. Typical sound emissions for this scenario are provided in Table 1. The character and source references for each emission considered are also provided.

Table 3 Construction Sound Emissions

Source Name	Sound Power (dBA)	Type	Reference
Large scale blasting	137[a]	Impulsive, tonal	TCPL 2005
Crusher	111	Continuous	Field Measurement
Wheeled loader	110	Continuous	DEFRA 2004
Dump Truck	113	Continuous	FHWA 2006
Rough terrain rock drill	111	Continuous	TCPL 2005

[a] 12 dBA penalty included in sound power based on the type of source.

The blasting noise sources have been noted to be highly impulsive in nature. The sound emission reported for this source includes a penalty of 12 dBA due to the tendency of blasting to be particularly annoying (Can:ISO 1996-1 2006).

Noise attenuation factors considered in the calculations include absorption of sound by the atmosphere, ground conditions (soft vs hard surfaces) and distance. The duration of construction activity for Nonacho Lake was assumed to be 10 hours per day, with no activity during the night (day = 07:00 – 23:00; night =

23:00 – 07:00). For the Twin Gorges canal, construction activity is expected to continue on a 24-hour, 7-day a week basis.

4.2 NOISE PREDICTIONS

Table 2 lists the results of the noise calculations for this scenario based on varying distances from the ROW or limit of activity. The calculation points were placed perpendicular to the centre of activity for the scenario. The two ground based scenarios assumed that equipment noise sources were working continuously within a 500 m by 250 m area.

Table 4 Construction Scenario Noise Predictions by Distance from Activity

Distance from source to nearest receiver (metres)	Predicted Noise Level L_d (dBA) [(a)]	
	Canal Construction	Large Scale Blasting
250	65	75
500	58	71
1000	50	63
2000	42	55
3000	36	49
4000	32	45
5000	29	40
10000	19	25

(a) Ld (daytime) noise levels, average hourly noise level for any hour (day or night).

Based on results presented, noise from continuous construction work for the canals is expected to be lower than the average existing noise level of 35 dBA (day or night) at approximately 3 km from most construction activity. For blasting, the values represent the maximum only for the hour in which the blast occurs. Blasting will attenuate to 35 dBA at about 7 km however, this is a short term or instantaneous event so disturbances to this distance would not be sustained. This does not mean that Project generated sound will not be heard, as the character of construction noise will differ from natural sounds.

5 WINTER ROADS

During the three year construction period, there are two winters that the Winter Road is planned to be used. A total of 80 truck loads are required to move material in the northern section of the Project, and up to 150 truckloads are planned for the southern portion. The Tibbit to Contwoyto winter road currently uses convoys of three trucks to move materials. The same assumption is used for the southern winter road, with up to two convoys per day.

For the purpose of calculating the noise from the winter road, the worst case scenario becomes a maximum of 6 highway type transport trucks in an hour. The sound power output of a typical highway truck is 99 dBA (FHWA 2006). Based on the same calculation methods used for the construction activity (ISO 9613-2), this indicates the hourly noise level from the passage of 6 highway trucks would reach the upper end of ambient noise level (35 dBA) within approximately 500 m of the roadway. Noise levels would diminish to 25 dBA at approximately 1500 m.

6 WORKER CAMPS

On site worker camps are considered noise sensitive receivers by Health Canada; however, the analysis of these locations requires examination of indoor noise levels as the primary issue for camps is sleep disturbance rather than nuisance noise. The camps will be placed at approximately 1 km from major staging areas. For the camp near Twin Gorges, planned construction activities are scheduled to run 24 hours per day, seven days per week; therefore, an assessment of potential sleep disturbance must consider both the daytime and night time sleep periods.

Indoor noise levels at the camps will depend on the building structures/materials used. At a minimum, building construction is expected to consist of insulated industrial trailers with double glazed windows. These types of industrial trailers generally have some sound transference from the exterior to the interior, rated at a Sound Transmission Class of 27 (STC 27) (Owens Corning 1986). Data for the STC 27 rating for industrial structures was used to calculate indoor noise levels from continuous sources a Twin Gorges camp location 1 km from activity.

The loudest expected activity at 1000 m from the activity is the canal construction/materials movement and drilling at 50 dBA outdoor. Translated to an indoor noise level, this results in an indoor noise prediction of 23 dBA, well within the recommended noise level for sleep of 35 dBA.

Blasting is a discreet noise event that can cause a sudden disturbance to sleep. Disturbance from blasting can be minimized by scheduling blasts to between shifts, or during shift changes when the fewest number of workers would be asleep.

7 REFERENCES

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8 CLOSURE

We trust the above meets your present requirements. If you have any questions or require additional details, please contact the undersigned.

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