



January 15, 2016

File: 0890-15A

Urban Systems Ltd.
1090 Homer Street
Vancouver, BC
V6B 2W9

Attention: Tim Stevens

Dear Tim:

**Re: Highway 1 - Admirals McKenzie Interchange Project
Baseline Noise Monitoring and Assessment**

The objectives of the baseline noise monitoring and assessment undertaken by BKL Consultants Ltd. were to measure, document and report the existing (ambient) noise exposures at residences and educational facilities that will be close to the proposed Admirals McKenzie Interchange Project (the Project). This report summarizes the baseline monitoring results and baseline noise predictions at the residences and educational facilities close to the Project. A future report will predict the post-construction noise after the design details are known.

Baseline Noise Monitoring at Residences

On September 21-22, 2015, BKL performed baseline noise monitoring at four residential locations (R1 to R4) within the study area of the Project as shown in Table 1 below. The monitoring period was 24 hours for all sites except for R3 where noise was only measured for 30 minutes as we were not able to contact the residents for permission to set up unattended monitoring equipment.

Measurements were conducted using two Brüel & Kjær 2250, one Larson Davis 820 and one 01dB DUO sound level meters. All meters meet the Type 1 specifications in ANSI S1.4:1983. The sound level meters were field calibrated before and after each measurement using a Brüel & Kjær Type 4230 Calibrator. Weather conditions during the measurement period were clear with no significant wind.

Table 1: Baseline Measurement Locations

Location	Address	Description	Height Relative to Ground [m]
R1	1181 Portage Road	In garden at front of property	1.5
R2	1085 Burnside Road	In backyard on cliff edge overlooking highway	1.5
R3	3151 Esson Road	Beside residence on Portage Road	1.5
R4	3241 Admirals Road	In backyard on roof of shed	2.5

The noise monitor at Location R1 was placed inside a flower bed on the north side of the property at 1181 Portage Road. The microphone was placed at a height of 1.5 m and was approximately 26 m from the Highway 1 centreline.

The noise monitor at Location R2 was placed on a cliff overlooking Highway 1 on the south side of the property located at 1080 Burnside Road West. The microphone was placed at a height of 1.5 m above the ground and was 36 m from the Highway 1 centreline. The height of the microphone with respect to the surface of the highway was approximately 13 m.

The noise monitor at Location R3 was placed on the northeast corner of 3151 Esson Road. This microphone was placed at a height of 1.5 m above the ground and was set back 65 m from the Highway 1 centreline.

The noise monitor at Location R4 was placed in the backyard of 3241 Admirals Road. The microphone was placed on top of a shed at the south corner of the lot at a height of 2.5 m. This meter was set back approximately 44 m from the Highway 1 centreline.

Baseline Noise Monitoring at Schools

Short-term noise monitoring was also performed indoors at three schools (S1 to S3) as shown in Table 2 below. At each school, one to two classrooms that were exposed to the highest level of road traffic noise were chosen for monitoring. Measurement periods were approximately 30 minutes.

Table 2: Short-Term Measurement Locations

Location	School	Rooms
S1	Ecole Marigold School	13
S2	Spectrum Community School	317 and 324
S3	St. Joseph's Elementary School	103 and Portable

Residential Baseline Monitoring Results

The 2014 Ministry of Transportation and Infrastructure's (MOTI) *Policy for Assessing and Mitigating Noise Impacts from New and Upgraded Numbered Highways* (the Policy) contains thresholds to rate whether traffic noise associated with a project presents a Moderate or Severe noise impact.

Table 3 below shows the 24-hour day-night average (L_{dn}) level for each location, the relevant noise impact thresholds, and the allowable increase in total noise exposure due to the Project.

Table 3 - Residential Monitoring Results and Noise Impact Thresholds

Measurement Location	L_{dn} [dBA]	Post-Project Noise Threshold Total L_{dn} [dBA]		Allowable Increase in Total L_{dn} [dBA]	
		Moderate Impact	Severe Impact	Moderate Impact	Severe Impact
R1	74.0	65.0	75.0	0.0	1.0
R2	71.0	65.0	74.5	0.0	3.5
R3	63.0*	65.0	68.7	2.0	5.7
R4	67.0	65.0	71.3	0.0	4.3

* Calculated based on 30-minute measurement and nearby 24 hour measurement

According to the Policy, the noise exposure at R1, R2, and R4 already exceed the Moderate Impact threshold. This means that any increase in traffic noise at this location would present at least a Moderate Impact.

School Baseline Monitoring Results

The results of the short-term measurements performed at the three schools are shown in Table 4. The Policy states that mitigation measures should be investigated when the noisiest hour of the day ($L_{eq(max\ hr)}$) is 40 dBA or greater indoors. The estimated $L_{eq(max\ hr)}$ calculated based on the short-term measurement results and hourly noise level variation at the nearest baseline measurements, is also shown in Table 4.

Table 4 - School Measurement Results and Noise Impact Threshold

School	Room	Measured L_{eq} [dBA]	Estimated $L_{eq(max\ hr)}$ [dBA]	Noise Impact Threshold [dBA]	Allowable Increase in $L_{eq(max\ hr)}$ [dBA]
S1	13	44	46	40	0
S2	317	34	36	40	4
	324	34	36	40	4
S3	Portable	51	54	40	0
	103	38	41	40	0

According to the Policy, Ecole Marigold and St. Joseph's Elementary schools already exceed the 40 dBA threshold in the most-affected classrooms.

Baseline Noise Modelling Assessment

A 3-D noise model was constructed to predict the noise levels at the Project residential and school receivers. Ground contours, existing alignment, legal layout, orthophotos and traffic data were provided by Urban Systems and McElhanney. Road traffic noise sources were calibrated based on traffic data and baseline noise measurements.

The noise levels at 53 out of 160 modelled receivers are predicted to already exceed the Moderate Impact threshold. No receivers are predicted to already exceed the Severe Impact threshold. Figures 1 and 2 show the predicted baseline noise contours for the modelled project area.

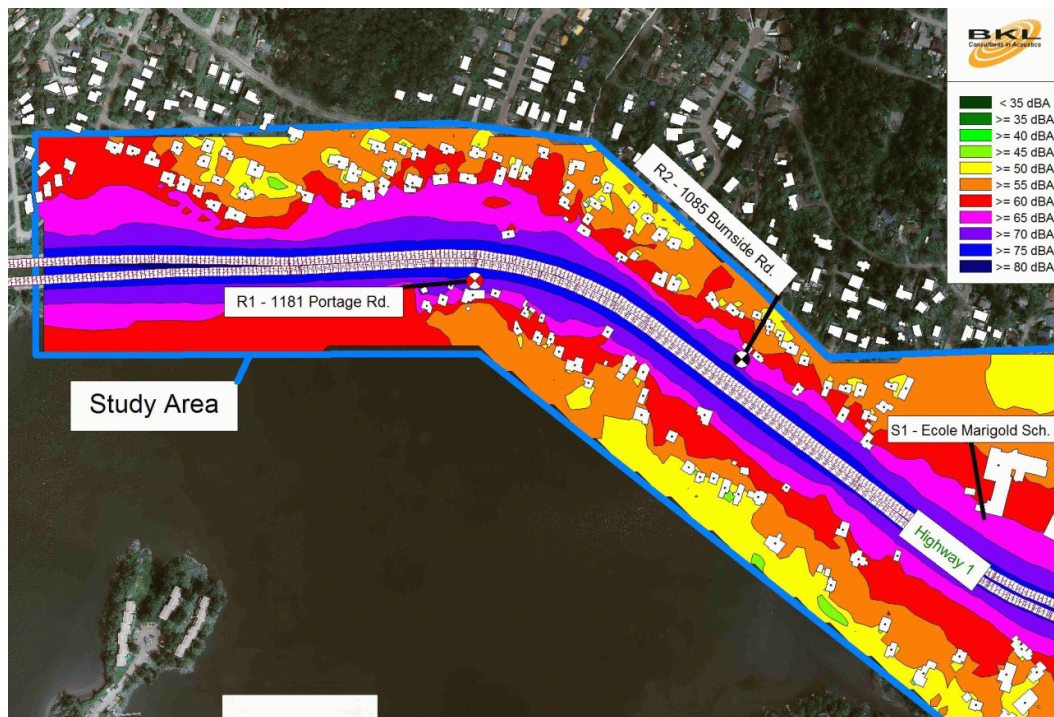


Figure 1: Predicted Baseline Day-Night Noise Levels (Ldn) at 4 Meters Receiver Height (West)

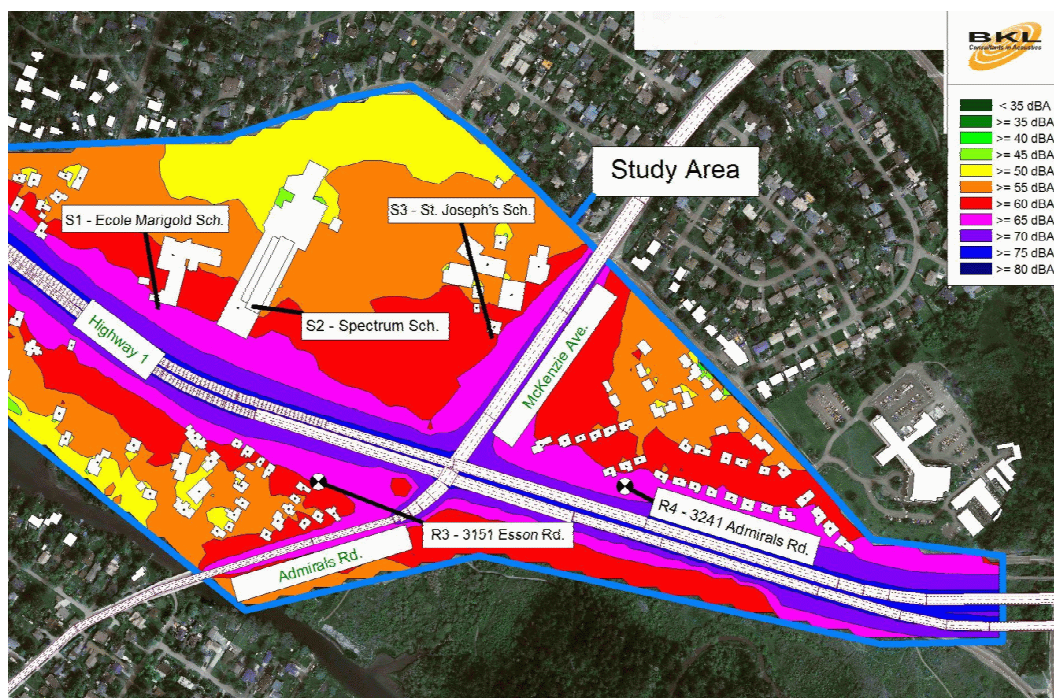


Figure 2: Predicted Baseline Day-Night Noise Levels (Ldn) at 4 Meters Receiver Height (East)

Conclusions

Baseline noise monitoring was performed at four residences and three schools. The results indicate that three residential sites already exceed the Moderate Impact threshold and two schools already exceed the 40 dBA $L_{eq,max-hr}$ threshold due to traffic on Highway 1 and McKenzie Avenue.

Existing noise levels at the first two rows of receivers were predicted in our noise model. The noise levels at 53 out of 160 modelled receivers are predicted to already exceed the Moderate Impact threshold. However, no predicted baseline noise levels are above the Severe Impact threshold.

This completes our reporting of the baseline monitoring and assessment. Please feel free to contact us if you have any questions.

Sincerely,

BKL Consultants Ltd.

per:



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