RAMBOLL ENVIRON

ENVIRONMENT & HEALTH

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MEMORANDUM

To: Tadas Kiselius, VNF
CC: Irina Makarow, BergerABAM

Project No: 29-33275E

From: Kristen Wallace

Project Name: Vancouver Energy DEIS Review

Subject: Calculations to Consider Construction Noise for DEIS

This memo documents the methods and results of additional construction noise calculations conducted using the FTA general method guidelines identified in the FTA Transit Noise and Vibration Impact Assessment manual (FTA 2006). These calculations demonstrate that proper application of the FTA guidelines leads to a conclusion that construction would not result in significant noise impacts.

BACKGROUND

The DEIS identified potential "moderate to major" noise impacts from both typical construction activities, pile driving, and jet grouting activities due to noise that would be received at the JWC and the Tidewater office building. The DEIS cited FTA general guidelines methodology as the basis of the construction noise assessment. The DEIS did not, however, properly apply the FTA methodology, which led to erroneous results and conclusions. Ramboll Environ, therefore, revisited the construction noise calculations following the FTA general assessment methodology as described below.

FTA GENERAL ASSESSMENT

The FTA general assessment methodology specifies the following:

- Construction noise levels are to be calculated as hourly L_{eq}s, not L_{dn}s.
- Predictions are to be based on only the two noisiest pieces of equipment expected to be used in each construction phase.
- Full power operation for a time period of one hour is assumed (because most construction equipment operates continuously for periods of one hour or more at some point).
- Free-field conditions are assumed and ground effects are ignored.
- Emission level at 50 feet is taken from Table 12-1 in the FTA manual.
- All pieces of equipment are assumed to operate at the center of the project work area (or the roadway centerline in the case of a guideway or highway construction project).
- Suggested guidelines for potential noise impacts using the general assessment method are that an hourly L_{eq} of 90 dBA at residential uses and 100 dBA at industrial/commercial or lower would not be expected to result in adverse community reaction. Calculated sound levels at or below these levels would, therefore, not be expected to result in significant noise impacts from construction.

EX 0101-TSS

Application of FTA General Assessment Calculations to Typical Construction Activities

Ramboll Environ applied the steps identified above to typical construction activities expected with the proposed project, with the revisions noted below.

- Table 3.9-5 of the DEIS identifies the two loudest pieces of equipment during each phase of typical construction. The DEIS used a 1971 EPA document on construction noise (EPA 1971), to identify the loudest potential equipment per phase. [1] Table 3.9-5 identifies the Erection phase as the loudest phase, with the two loudest pieces of equipment being a derrick crane and a jack hammer.
- Table 3.9-5 of the DEIS used the maximum sound levels identified in the FHWA's 2006 *Roadway Construction Noise Model* (RCNM) instead of the levels identified by FTA's general assessment guidelines. The levels identified by FTA are from EPA's 1971 document referenced above. It is appropriate to use the FHWA levels since construction equipment sound levels have been reduced since 1971, and the 2006 FHWA levels are likely to more accurately reflect current construction equipment sound levels. The levels used for these calculations include the derrick crane (with a maximum sound level of 89 dBA at 50 feet) and the jack hammer (with a maximum sound level of 81 dBA at 50 feet).
- Sound levels of full power operation for a time period of one hour were estimated by assuming that the maximum sound level could occur over the full hour and would represent the worst-case hourly L_{eq}. The reference hourly L_{eq} for the Erection phase, including both the derrick crane and jack hammer is 89.6 dBA at 50 feet.
- Free-field conditions were assumed and ground effects ignored. For this estimate, we used a simple distance calculation that assumes that sound from the construction equipment dissipates over distance by 6 dBA for every doubling of distance from the source.
- The FTA general assessment guidance states that all pieces of equipment should be assumed to operate at the center of the project, or centerline, in the case of a guideway. Instead, Ramboll Environ used the more conservative (i.e., nearer) distances identified in the DEIS of 100 feet to the Tidewater Office Building, 400 feet to the JWC, and 3,000 feet to the Fruit Valley residential area.

Using the above assumptions and techniques, the calculated worst-case, typical construction sound levels at the Fruit Valley residences, the JWC dormitories, and the Tidewater Office Building are 54, 72, and 84 dBA, respectively. The calculated levels of 54 and 72 dBA at locations representing residential locations are much lower than the 90 dBA suggested in the 2006 FTA manual to avoid adverse community reaction. Similarly, the calculated level of 84 dBA at the Tidewater Office Building (a commercial receiver) is much lower than the 100 dBA suggested in the 2006 FTA manual to avoid adverse community reaction.

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[1] U.S. Environmental Protection Agency, "Noise from Construction Equipment and Operations, Building Equipment and Home Appliances," NTID300.1, December 31, 1971.

Because the calculated hourly L_{eq} levels are much lower than the construction noise impact levels suggested in the FTA manual, no significant noise impacts would be expected during typical construction activities.

Application of FTA General Assessment Calculations to Impact Pile Driving and Jet-Grouting Activities

Applying the same general assessment methodologies and impact criteria discussed above to potential pile driving and jet grouting activities results in the following:

- The two loudest pieces of equipment during impact pile driving would be the pile driving (with a maximum sound level of 101.3 dBA at 50 feet) and crane (with a maximum sound level of 80.6 dBA at 50 feet). Using the very conservative assumption that the maximum level occurs during the entire hour, the total hourly L_{eq} from impact pile driving activities is estimated to be 101.3 dBA at 50 feet).
- The total hourly L_{eq} from jet grouting (with a maximum level of 85 dBA at 50 feet) and a concrete batch plant (with a maximum level of 83 dBA at 50 feet) is 87.1 dBA, which is much lower than impact pile driving.
- Because it is the loudest of the two activities, we focused this assessment using the impact pile driving hourly L_{eq} of 101.3 dBA at 50 feet.
- Free-field conditions were assumed and ground effects ignored. For this estimate, we used a simple distance calculation that assumes that sound from the construction equipment dissipates over distance by 6 dBA for every doubling of distance from the source.
- The pile driving equipment was conservatively assumed to operate at the nearest point of pile driving to each receptor location. The distances considered were 3,000 feet to Fruit Valley residences, 450 feet to the JWC dormitories, and 700 feet to the Tidewater Office Building.

Using the above assumptions and techniques, the worst-case, conservative calculated pile driving hourly L_{eq} levels at the Fruit Valley residences, the JWC dormitories, and the Tidewater Office Building are 66, 82, and 78 dBA, respectively. The calculated levels of 66 and 82 dBA at the Fruit Valley and JWC locations representing residential locations are much lower than the 90 dBA suggested in the 2006 FTA manual to avoid adverse community reaction. Similarly, the calculated level of 78 dBA at the Tidewater Office Building (a commercial receiver) is much lower than the 100 dBA suggested in the 2006 FTA manual to avoid adverse community reaction.

Because the calculated hourly L_{eq} levels are much lower than the construction noise impact criteria suggested in the FTA manual, no adverse community reaction would be expected, any noise impacts would be minor, and no significant noise impacts would be expected during either pile driving or jet grouting activities.