Washington State Department of Transportation

Memorandum

November 8, 2017

TO: Rick Huey

FROM: Jim Laughlin
(206) 440-4643

SUBJECT: Mukilteo Multimodal Phase 2 30-inch Steel Pile Vibratory Installation – Zone of Influence Technical Memorandum.

Underwater Noise Levels

This memo summarizes the measurements made while attempting to detect the outer boundary of the Zone of Influence (ZOI) for the installation of one 30-inch steel pile using a vibratory hammer at the Mukilteo Multimodal Phase 2 project. Data was collected in real-time using the Underwater Sound Level Meter (USLM) at different ranges from the source during the month of November, 2017 (Figure 1).

One 30-inch diameter steel pile was monitored on November 7th as it was being installed using a vibratory hammer. No frequency weighting (*e.g.*, A-weighting or C-weighting) was applied to the underwater acoustic measurements presented in this report. Underwater sound levels quoted in this report are in decibels relative to the standard underwater acoustic reference pressure of 1 µPa. No noise attenuation devices were used during these vibratory measurements. Root Mean Square (RMS) noise levels corresponding to the broadband sound levels are reported in terms of the 5-second average continuous sound level and have been computed from the Fourier transform of pressure waveforms in 5-second time intervals.

Measurements

- Daytime ambient levels measured during the winter months were 124 dB_{RMS} for broadband measurements.
- Underwater noise measurements for the steel pile installation were collected at ranges of 7,894 meters (4.9 miles), 7,632 meters (4.7 miles), and 7,362 meters (4.6 miles) from the 30-inch pile. Table 1 summarizes the results of the measurements. No other vessels were in the immediate area during these measurements.

Figure 1: Locations of the noise monitoring sites near Mukilteo.

Table 1: Summary Table of Underwater Monitoring Broadband Results for Steel Pile Installation at Mukilteo Multimodal Phase 2 Project.

Pile Type	Distance To Pile (miles)	Average RMS Value (dB)	Background Sound Levels (dB)	Vibratory Driver Detectable? (Y/N)
30-inch Steel	4.9	120	124	N
	4.7	134	124	Y
	4.6	132	124	Y

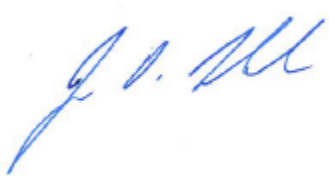
Summary

The results of Table 1 shows for the installation of the 30-inch steel pile the average broadband RMS value measured there was no detectable sound levels over the background level at 4.9 miles from the source. Average RMS values were higher than background sound levels at 4.7 and 4.6 miles from the source and the vibratory hammer was audible at these distances.

Therefore, we recommend that the ZOI be reduced to 4.9 miles for installation of 30-inch piles.

If you have any questions please call me at (206) 440-4549.

Sincerely,



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