

Note

**HaskoningDHV UK Ltd.
Water & Maritime**

To: Natural Resources Wales
From: Royal HaskoningDHV
Date: 14 December 2023
Copy:
Our reference: PC5357-RHD-XX-XX-ME-X-0001
Classification: Project related
Checked by

Subject: Criterion Quay Sampling MLA - Note on noise generation

Overview

Natural Resources Wales (NRW) have requested further information on the noise levels that would be produced during the drilling activities (boreholes and vibrocores) required as part of the geotechnical investigation survey.

Specific details for the equipment to be used are not yet available to inform this assessment, so work carried out on other drilling activities in the marine environment are summarised here to provide information on the potential noise levels.

Sensitive species

The geotechnical investigation survey will be undertaken within Milford Haven Waterway. This area is designated within the Pembrokeshire Marine/Sir Benfro Forol Special Area of Conservation (SAC). The following designated species are considered potentially sensitive to underwater noise:

- Grey seal
- Sea lamprey
- River lamprey
- Allis shad
- Twaite shad

Underwater noise

During drilling activities, the noise levels created are such that the technique is often presented as a technique in itself to mitigate underwater noise impacts. Relatively little acoustic energy is transferred to the ground from drilling, with material simply being removed to create a space or socket for the piles, and thus this type of operation produces little transfer of acoustic energy. It is generally accepted that the noise generated from drilling is equivalent to or less than that created by vessel engines. As an example, small sea-going vessels typically produce broadband noise at source SPLs of between 170 and 180 dB re 1 μ Pa @ 1 m (Richardson et al., 1995), whereas a supertanker generates SPLs in the region of 198 dB re 1 μ Pa @ 1 m (Hildebrand, 2004).

Measurements of underwater noise generated by rotary drilling to instal 1219 mm diameter steel tubular piles were taken by Subacoustech from a survey in the River Mersey in 2019 (Subacoustech, 2019); the measured noise level was between 125 and 130 dB re 1 μ Pa SPL_{RMS}. Although recordings at 100m from the rig (the closest distance to which the boat was safely able to approach the rig) were clearly audible using specialist listening equipment, the noise levels were of the order of background noise levels and

these measured noise levels were influenced (and thus slightly increased) by the ambient noise caused by strong currents. The boring noise levels in the absence of higher ambient underwater noise therefore must be lower than 130 dB, measured at 100m.

Gardline conducted noise monitoring during geotechnical borehole and vibro-coring operations at Her Majesty's Naval Base Devonport in September 2021 (Gardline, 2022a, 2022b). Two static mooring arrays were deployed, one at mid-water and one approximately 1m above the seafloor. During vibrocore activities the peak SEL was calculated to be 180 dB re $1\mu\text{Pa}^2\text{s}$ at 1m. The peak received exposure levels were calculated for all interval periods between coring activities and resulted in a peak mean SEL of 133 dB re $1\mu\text{Pa}^2\text{s}$ and an overall maximum of 163 dB re $1\mu\text{Pa}^2\text{s}$. During borehole drilling activities a mean SEL of 133.0dB re. $1\mu\text{Pa}^2\text{s}$ was recorded which was equivalent to background underwater noise.

The report poses that various forms of anthropogenic noise, such as vessel traffic, may have had a greater impact than vibrocore and may have contributed to the recordings from the survey. However, without up-to-date local vessel track data for the period, Gardline concluded that it was not possible to compare the potential impact of the vibrocore to the ongoing vessel traffic transiting through the site.

The predicted SPL noise levels from drilling (Subacoustech, 2019) are below the numerical threshold presented in Popper *et al.* (2014) for TTS in fish, which requires a receptor to be exposed to a noise of 158 dB SPL_{RMS} for at least 12 hours, for the most acoustically sensitive fish species.

Gardline (2022) plotted distances against the model to estimate the overall distance per marine mammal species group beyond which they would not be impacted by the noise. Phocid carnivores may experience a Temporary Threshold Shift (TTS) within 5m of drilling activities and would not be exposed to a Permanent Threshold Shift. This is considered a worst-case scenario as frequency weighting was not applied to the model, and therefore results were not fully comparable to the thresholds detailed in Southall *et al.* (2019).

Based on these measured noise levels, it is anticipated that noise generated from borehole and vibrocore drilling during the GI survey would be within the baseline underwater noise levels typically found on the Milford Haven Waterway caused by vessel activity. Consequently, it is concluded that there would be no impact to migratory fish species (sea and river lamprey, and twaite and allis shad) or grey seals with regard to TTS generated from drilling activities.

Above water noise

A borehole and vibrocore rig will generally require an engine or generator on board the jack-up barge to power the equipment. As such, there will be above water noise generated during the survey, however this will be equivalent to the baseline noise levels within a busy port with numerous vessels and vehicles moving around and within the area. A datasheet for the likely equipment to be used is provided alongside this note. Monitoring undertaken on a previous survey with a noise receiver 100m from source did not exceed 70bd(A).

Significant effects on designated species are not, therefore, considered likely.

References

Gardline (2022) HMNB Devonport Capital Dredge Site Investigation: Noise Monitoring Results Report. Gardline Report Ref 11748.E0

Popper et al (2014) Sound Exposure Guidelines for Fishes and Sea Turtles. A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI

Hildebrand J (2004). Impacts of anthropometric sound on cetaceans. International Whaling Commission. IWC/SC/56/E13 report, Sorrento, Italy. Available at <http://cetus.ucsd.edu/projects/pub/SC-56-E13Hilde.pdf>

Richardson W J, Greene C R, Malme C I, Thompson D H (1995). Marine mammals and noise. Academic Press Inc., San Diego, 1995.

Southall et al (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. *Aquatic Mammals* **45**(2)

Subacoustech (2019) 12 Quays Birkenhead, Underwater Noise during Rotary Drilling. 27th November 2019. Subacoustech Environmental Report No. P265R0204