Introduction & Background to Application:

The National Permitting Service (NPS) Installations Team at Bristol asked the Acoustics and Air Quality Modelling and Assessment Unit (AQMAU) to audit a noise impact assessment (NIA)[1] submitted by Arup behalf of Powerfuel Portland (the applicant). The NIA relates to bespoke environmental permit application EPR/AP3304SZ/A001 for the proposed Portland Energy Recovery Facility, located in Portland Port, Castletown, Portland, DT5 1PP.

The NIA has been provided by the applicant to address requests included in a Schedule 5 notice issued by the Environment Agency on 08 September 2023.

AQMAU previously audited a NIA[2] in September 2021, with our advice documented in an audit report[3] which was provided to the Environment Agency's National Permitting Service's Bristol Installations team. AQMAU's original audit concluded that the applicant's conclusions could be used for permit determination, although we did identify marginally lower background sound levels and noted that the NIA had not included His Majesty's Prison (HMP) The Verne in the BS 4142 impact assessment, despite presenting background sound levels and rating levels at this receptor.

This technical note documents the methodology and outcome of AQMAU's audit, to determine if the submitted NIA addresses the Schedule 5 requests appropriately.

Schedule 5 requests

The Schedule 5 notice issued on 08 September 2023 states the following:

The Bibby Stockholm ("the barge") is now moored within 500 metres of the proposed installation. The barge is considered to be an additional sensitive receptor and as such it needs to be taken into consideration.

Noise

1. Submit an updated noise assessment report to account for the barge. This must be undertaken by an experienced and suitably qualified person in accordance with BS 4142.

   This will involve updating the noise modelling, background sound survey and BS 4142 assessment. New background sound data should be obtained which is representative of the barge. The installation is proposed to operate 24/7, so this should be representative of a day and night period, ideally to cover a weekend.

   In support of this noise assessment you will need to provide raw background sound level measurements in an Excel spreadsheet format and accompanying computer modelling files or calculation spreadsheets to BS 4142.

2. If the noise assessment report shows that noise could have a significant adverse impact at the barge, submit a noise management plan which includes proposals for the further attenuation and/or management of noise.

[1] Powerfuel Portland Portland Energy Recovery Facility BS4142 Noise Impact Assessment. Arup Ltd. Document Ref: AAc/267701/R04. Issue 3, Dated 17 October 2023.
[2] Powerfuel Portland. Portland Energy Recovery Facility. BS4142 Noise Impact Assessment. Arup Ltd. Document Ref: AAc/267701/R03a. Issue 2, Dated 21 May 2021.
[3] AQMAU report reference, AQMAU_C2184_RP01. Dated 14th September 2021.

Updated NIA methodology

The applicant has provided a revised NIA to address the Schedule 5 requests, undertaking the following:

- Measured baseline sound survey data at the Bibby Stockholm receptor.
- Measured additional baseline sound survey data at other receptors which were assessed previously, to account for potential changes to the underlying sound climate since 2021.
- Measured operational sound levels for operational generators present at the Bibby Stockholm barge receptor and undertaking noise modelling to demonstrate whether the generators could have affected the baseline sound survey at other receptors (excluding the Bibby Stockholm barge itself).
- Updated their BS 4142 impact assessment at nearest noise sensitive receptors based on the new background sound data.
- Proposed mitigation measures for the stack and turbine hall to reduce the predicted BS 4142 impacts, and revised noise modelling to account for the proposed measures.

AQMAU notes that as per the previous submission, a noise management plan has not been submitted with the application.

Updated baseline sound survey – methodology

The consultant carried out unattended baseline sound monitoring from Wednesday 13th to Thursday 21st September 2023 at three locations: Leet Close, 3 Verne Common Road (Verne House), and at the port adjacent to the Bibby Stockholm accommodation vessel.

Electricity is currently supplied to the Bibby Stockholm accommodation vessel by three generators, two of which operate continuously during day and night-time periods. The consultant notes that the measurement location chosen for the Bibby Stockholm accommodation vessel was located *"…at the furthest end of the vessel away from the shore. This measurement location was chosen as it would experience the lowest levels of generator noise while still being representative of the vessel accommodation."* AQMAU agrees that this location would have been subject to the lowest levels of operational noise from the generators. The consultant notes that the generators are planned to serve the barge for an 18-month contracted stay. In the event that the barge remains at the port for a greater duration, the barge would be powered by shore power generated from the ERF. The consultant has therefore used the background sound levels measured at the location furthest away from the generators to represent the scenario where the barge is powered by a shore-based electricity supply.

The consultant has measured operational sound levels 5m from the generators and undertaken noise modelling to predict the sound energy propagation of around the barge and other receptors. The consultant has then derived marginally higher background sound levels (2 dB higher) to represent conditions where the generators are operational and influencing the background sound climate at the barge. AQMAU agrees that this approach is appropriate, as the generators will be influencing current background sound levels at the barge. However, AQMAU notes that the consultant's modelling has included one sound source only to represent the generators, and the barge structure has not been accounted for in the model. AQMAU has tested sensitivity to an additional generator and the barge structure in the model and finds that the operational sound levels from the generators could

be approximately 3 dB higher than the consultant has presented. This reduces the risk of adverse impacts occurring at the barge with the ERF operational.

The consultant has summarised the measured background sound data in terms of graphs and histograms shown in Appendix C and provided raw data for analysis. The consultant notes that weather conditions were unsuitable between 19th and 21st September 2023, so data measured within this period has not been included in the analysis.

Updated baseline sound survey data - AQMAU review

AQMAU has analysed the consultant's data and finds that while the histograms suggest higher background sound levels as being representative, the data has not been separated into weekday and weekend periods. The lower range of values derived by the consultant is consistent with the more sensitive periods during the weekend, so AQMAU agrees with the background sound levels used in the assessment for all receptors including the Bibby Stockholm barge for the two scenarios considered at this receptor (power from generators and power from shore).

Results from Leet Close have been used to represent residences at East Weare Road, Leet Close and Beel Close. AQMAU notes that the background sound levels presented at this location were lower than those measured in 2021, by 4 dB during daytime hours (0700 – 2300) and by 5 dB during night-time hours (2300 – 0700), which increases the risk of adverse impacts compared to the previous NIA. AQMAU has also used this data to represent HMP The Verne.

Operational sound levels of generators at Bibby Stockholm Barge

The consultant has measured operational sound levels 5m from the generators and undertaken noise modelling to predict the sound energy propagation around the barge and to demonstrate whether the generators could have affected the baseline sound survey at other receptors (excluding the Bibby Stockholm barge itself).

The consultant's modelling is shown in Figure 6 of the NIA. The consultant concludes: *"The modelling shows that the levels of generator noise are more than 10dB below the lowest measured baseline level and therefore do not contribute significantly at the noise sensitive locations other than the Bibby Stockholm."*

As previously noted, the consultant's noise model included one generator only, and AQMAU has tested sensitivity to the inclusion of an additional generator. AQMAU finds that the operational sound levels from the generators could be 3 dB higher at receptors other than the Bibby Stockholm barge than the consultant has presented. However, the predicted generator sound levels are still more than 10 dB below the lowest measured background sound level at the other receptors, therefore operational generators are not considered to have impacted the updated background sound measurements at surrounding receptors.

Updated BS 4142 impact assessment – without mitigation

The consultant has updated their BS 4142 impact assessment at the nearest noise sensitive receptors based on the new background sound level data. AQMAU notes that the consultant's predictions of specific sound levels and derivation of rating levels (which include an acoustic feature correction of +3dB) has not changed since the submission in 2021 for the receptors previously assessed.

The previous NIA indicated low impacts during daytime and night-time periods at all noise sensitive receptors. AQMAU predicted marginally higher rating levels (by 1-2dB) than the consultant at the noise sensitive receptors. This corresponded to below adverse impacts at HMP The Verne during daytime and night-time, reduced to low impacts when context was considered, and low impacts during daytime and night-time for all other receptors.

In our previous audit, AQMAU tested sensitivity to the following:

- Use of our own terrain (LIDAR DTM 1m resolution).
- Absorption coefficient of buildings of 0.1 (0.5dB reflection loss).
- An order of reflection of 3.
- Increasing sound power level of the flue stack to 100dB LWA (was 95dB L_{WA} in consultant's model).

AQMAU has retained the same sensitivity checks in this updated audit. The Bibby Stockholm barge structure has been included in our model, and we have tested sensitivity to receptors at ground, first and second floors as they exist on the barge.

As the consultant's revised BS 4142 impact assessment is based on updated background sound levels and the inclusion of the Bibby Stockholm barge, the consultant's predicted BS 4142 impacts have changed. The consultant's NIA now shows the following impacts:

- Beel Close, Leet Close, East Weare Road, Ayton Drive: low impacts day & night.
- Bibby Stockholm barge: below adverse impact day & night (with generators or shore power).
- Top of Verne Common Road: below adverse impacts day and night.

As per the previous NIA, the consultant has not presented a BS 4142 impact assessment for receptors at HMP The Verne. It is not clear why this receptor has been omitted from the impact assessment, as background sound levels and rating sound levels are presented in Table 1 and Table 4 of the NIA respectively which can facilitate a BS 4142 impact assessment. Based on the NIA, this would correspond to the following:

- HMP The Verne: adverse impact day and night.

As previously noted, AQMAU's sensitivity check modelling has resulted in marginally higher specific sound levels and rating levels than the consultant, and without mitigation, AQMAU cannot rule out the following impacts:

- Beel Close, Leet Close, East Weare Road, Ayton Drive: below adverse impacts day & night.
- Bibby Stockholm barge: below adverse impacts day & night (with generators or shore power).
- Top of Verne Common Road: adverse impacts day and night.
- HMP The Verne: adverse impacts day and night.

In line with the aims of the Noise Policy Statement for England[4], The Environment Agency's guidance[5] and the standard permit condition for noise, this level of impact would only be acceptable if the site is working to Best Available Techniques.

[4] Noise policy statement for England - GOV.UK (www.gov.uk)
[5] Noise and vibration management: environmental permits - GOV.UK (www.gov.uk)

Updated BS 4142 impact assessment – with proposed mitigation

The consultant has proposed the following additional mitigation measures to reduce their predicted below adverse BS 4142 impacts:

- Stack: 5dB attenuation at source, achieved by *"…locating in-line attenuators after the induced draft (ID) fans and just prior to the stack, with a suitably designed splitter configuration to attenuate across broadband frequencies but also designed to mitigate the blade passage frequency."*
- Boiler room western façade: cladding panel with sound insulation of R_w 30 dB.
- Turbine Hall northern façade: cladding panel with sound insulation of R_w 30 dB.
- Turbine Hall louvre: 600mm acoustic louvre with sound insulation of R_w 24 dB.

The consultant has revised their noise modelling to incorporate these measures and concludes that with the mitigation in place, the BS 4142 impacts would be low at all receptors during day and night periods.

AQMAU considers that with the proposed mitigation measures in place, the BS 4142 impacts are likely to be as follows:

- Beel Close, Leet Close, East Weare Road, Ayton Drive: low impacts day & night.
- Bibby Stockholm barge: low impacts day & night (with generators or shore power).
- Top of Verne Common Road: below adverse impacts day and night.
- HMP The Verne: below adverse impacts day and night.

Assessment of compliance with Schedule 5 notice

The applicant has submitted an updated noise impact assessment (NIA) report to account for the Bibby Stockholm barge. The revised NIA does not show significant adverse impacts at the barge, so it has not been necessary to provide a separate noise management plan.

AQMAU therefore considers that the applicant has complied with the Schedule 5 notice.

AQMAU recommendations:

AQMAU notes that while the Schedule 5 notice required a noise management plan in the event of significant adverse impacts being predicted at the Bibby Stockholm barge, given the potential for adverse impacts and the significant public interest in the application, a noise management plan could also be requested from the applicant to demonstrate that noise impacts will be controlled on an ongoing basis. The mitigation measures proposed in Section 5.1 and Table 6 of the NIA could be incorporated into any noise management plan.

The mitigation measures should be incorporated into the final design by the applicant in any case. The formal method for requesting this should be identified by the Determining Officer but could include a pre-commencement condition or improvement condition if a noise management plan is not considered necessary.

Although AQMAU has identified higher BS 4142 impacts than the consultant, the worst-case impacts are likely to be below adverse, meaning that the proposed permit should not be refused on the grounds of noise emissions.

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