parkerjones acoustics

The Creamery, Aber-Arad

Dairy Partners Limited

BAT Noise Audit

28th April 2025

First Issue

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Revision History

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Executive Summary

This BAT Noise Audit has been undertaken to assess noise emissions associated with operations at the Dairy Partners (DP) Creamery site in Aber-arad and to evaluate the extent to which Best Available Techniques (BAT) are currently in place, and where further measures may be applied to reduce environmental noise impact. The audit forms part of ongoing efforts to manage environmental performance in line with the requirements of the site's environmental permit and relevant industry guidance.

The site comprises a large number of fixed plant items and also includes intermittent or mobile noise sources—which together contribute to the site's cumulative noise emissions. The complexity of the acoustic environment is further increased by the proximity of residential receptors and the distributed layout of noise sources across the site.

Previous noise audits were carried out in September 2020, July 2021, and July 2023 (with a minor update in September 2024), involving a combination of source-level measurements and boundary noise modelling. These earlier assessments relied primarily on measurements at or near the site boundary due to limited access to receptor locations.

In June 2024, a more comprehensive noise impact assessment was conducted, with long-term unattended monitoring carried out within the curtilage of three key residential properties (NSRs 1, 2, and 3). This access enabled the measurement of actual cumulative noise levels at the receptors, providing a valuable validation point for previous and ongoing predictions.

In parallel, the site's detailed 3D CadnaA noise model has been updated based on the latest assessment and has been used to disaggregate the overall site noise into the individual contributions from each plant item or operational process, allowing for a robust comparison of their relative impact.

This combined measurement and modelling approach has enabled a clearer identification of the most significant sources of noise, the evaluation of previously implemented mitigation, and the assessment of the potential benefit of additional control measures.

This assessment considers the existing mitigation measures already in place and evaluates the extent to which additional Best Available Techniques (BAT) could be implemented to further reduce noise emissions. For each plant item or process, potential BAT-aligned options have been identified where applicable, alongside indicative estimates of the noise reduction that could be achieved—both at source and at nearby receptor locations.

The analysis has particular focus on noise character (e.g. tonal or intermittent qualities), frequency content, and the relative contribution of each source to the cumulative noise impact. Where possible, commentary is also given on technical feasibility and the likely effectiveness of each option. However, it should be noted that financial and operational constraints—such as safety restrictions, process requirements, and contractor limitations—are not fully known to PJA and therefore remain the responsibility of DP to clarify. Accordingly, DP is expected to provide further information on the feasibility and cost-benefit implications of the options discussed in this audit.

A number of mitigation strategies have now been proposed by DP, covering several of the dominant sources identified. These include the partial or full enclosure of noisy plant (such as chillers, glycol pumps, and cooling tower pumps), the installation of acoustic louvres to various exhaust systems, a physical barrier around the LNG refuelling area, and acoustic louvres/silencers around the Compressor Room.

Based on the predicted reductions from these mitigation proposals, the specific noise level (L_{Aeq}) from fixed plant is expected to reduce as follows:

- NSR 1: from ≈48 dB to 43 dB
- NSR 2: from ≈48 dB to 43 dB
- NSR 3: from ≈45 dB to 44 dB

These reductions represent an improvement in the acoustic environment, particularly at NSRs 1 and 2, which are understood to be the most affected receptors (and are the primary complaints historically against the site). A 5 dB reduction is generally perceptible and would be expected to result in a noticeable decrease in loudness. While the noise would still be audible, it would be less prominent and may reduce the likelihood of complaint, even if it remains above background levels.

Some of the proposed measures are already being progressed by DP as part of a phased mitigation strategy. Others have been identified as lower priority due to either low relative impact or feasibility constraints—for example, reliance on third-party hauliers or supplier arrangements, or technical or safety limitations that may hinder certain upgrades.

In line with BAT principles, DP is expected to continue investigating the practicality of outstanding measures and to provide further feasibility assessments and cost-benefit evaluations, drawing upon their internal operational knowledge and site-specific constraints that may not be available to external consultants. This will ensure that the final suite of control measures reflects a proportionate, site-specific application of BAT, balancing noise impact with economic and operational viability.

This audit therefore sets out a clear, evidence-based path for ongoing improvement and regulatory engagement, consistent with the principles of environmental permitting and continuous improvement under BAT.

Contents

1.0 Introduction

ParkerJones Acoustics Limited (PJA) has been instructed by Dairy Partners Limited (DP) to undertake a Best Available Techniques (BAT) Noise Audit, as requested by Natural Resources Wales (NRW) in regulating the existing Environmental Permit for the facility at The Creamery, Aber-Arad, Newcastle Emlyn, SA38 9DQ ('the site').

This document, a BAT Noise Audit, has been written to evaluate the noise contributions from each individual process, plant and machinery (that generates a significant amount of noise) at the nearby residential properties, in order to determine which are the main contributors, and therefore which will require further noise mitigation to reduce the level of impact.

This version supersedes the previous update issued in September 2024 and follows on from earlier reports produced by PJA in September 2020, July 2021, November 2021, and July 2023. Also of note is the Noise Impact Assessment report issued in June 2024, which assessed the site's noise emissions in accordance with BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound', and the accompanying Method Implementation Document (MID), produced jointly by the Institute of Acoustics (IOA), Association of Noise Consultants (ANC) and Chartered Institute of Environmental Health (CIEH).

This updated audit has been prepared in response to feedback from Natural Resources Wales (NRW), specifically in relation to two documents issued on 13 February 2025: the Compliance Assessment Report – IC21b: Missing Information (ref: CAR_NRW0045972-IC21b) and the accompanying summary document titled Dairy Partners – IC21b NRW response 13.02.2025. Both outline NRW's expectations regarding the level of technical justification and supporting detail required to demonstrate compliance with Best Available Techniques (BAT) under the Environmental Permitting Regulations.

The June 2024 Noise Impact Assessment is implicitly accepted by NRW as a valid basis for assessing the site's current noise impact, with no specific criticisms raised regarding its methodology, measurement approach, or conclusions. NRW's concerns appear instead to relate to the BAT Noise Audit and Implementation Plan, which were considered incomplete due to a lack of feasibility assessments, cost-benefit analysis, and implementation timescales for potential mitigation measures.

This updated audit reflects a more extensive package of mitigation measures now being proposed by DP and assesses the likely effectiveness of those measures in reducing noise emissions from the site. It also revisits other sources and potential mitigation options—including those already in place and those not currently being taken forward. Where specific options are not being progressed, this report provides commentary on their likely acoustic benefit and the reasons they may not be deemed practicable or reasonable, although DP will provide further explanation separately in relation to operational feasibility, cost-benefit justification, and implementation timescales. The audit also reviews the current status of existing mitigation, including recently installed measures, and considers whether additional steps should be taken in accordance with BAT principles, particularly those outlined under BAT Conclusion 14 of the Food, Drink and Milk Industries BRef (EU, 2019).

This version also benefits from new measurement data obtained during noise monitoring carried out in June 2024 at the nearby residential properties. These receptor-level measurements have enabled PJA to more directly verify worst-case specific noise levels (during a 1-hour daytime and 15-minute nighttime period), quantify the cumulative impact from the site as a whole, and help refine the calibration of the 3D noise model. These measurements are referenced in the Noise Impact Assessment report issued on 18 June 2024, which the author assumes the reader has reviewed in conjunction with this BAT Audit; if not, it is recommended that they do so. While previous reports were based on a combination of source-level measurements and boundary monitoring—followed by modelling to estimate noise levels at the receptors—this more recent data allows for an additional degree of confidence in the predictions presented, and in turn, greater confidence in the analysis of which sources are contributing most to noise and complaints, and what mitigation measures are likely to represent the best practicable means of control.

Please note: while every attempt has been made to ensure this report communicates effectively to a non-specialist reader, some sections are necessarily technical in nature. A glossary of relevant acoustic terminology is provided in Appendix A.

2.0 Background Information

2.1 Site Description

The site is located at grid reference SN 31539 40206 in Aber-Arad, Newcastle Emlyn, with the main entrance to the site off the B4333 along the south boundary. The facility is on the outskirts of the town with residential receptors along the south and west boundaries, with some slightly further to the north. In the wider sense, the dairy site is adjoined by commercial premises to its northeast (builders' yard) and west (Antur Teifi Business Park). To its east is positioned a residential dwelling, with further then located to the south, separated from the creamery by the public highway (B4333).

The development is a dairy processing facility that produces cheese (and has done since 1932), operating for 24 hours a day, 365 days a year, with many items of plant running continuously throughout this. This includes heavy goods vehicles coming in and out of site around the clock, and an average batch cycle of approximately 35 hours (28 hours production, 7 hours cleaning). The site includes a range of production and service buildings, circulation and hard standing storage areas, as well as other areas used in the general management of product and waste derived from the process undertaken at the plant.

2.2 Changes since the last BAT Noise Audit

Since the last visit to measure noise levels across the wider site in July 2023, it does not appear that any significant noise mitigating works have been carried out, or that noise generating processes have changed significantly.

The exception to this is the LNG refuelling process (measured in June 2024), which has undergone changes, with a change of supplier and the reverting back to a noisier process that has previously been improved to a near silent level. PJA noted that at the time that a Heras fencing based noise barrier (approx. 1.8m tall) had been partially erected locally around the re-fuelling process (i.e. within 3m of it), and long parts of the south site boundary. A very large and wide stack of wooden pallets had also been placed along parts of the south boundary albeit this is believed to be variable in nature. This strategy overall has now changed (more information later in this report).

2.3 Noise Generating Plant/Processes

The main noise emitters (locations shown in Figure 2.1 overleaf) considered in this report are:

- ETP Tankers – tankers entering the site via the south-east entrance and collecting effluent from the tankers to take away from site and dispose of. The pumping process is the noisiest aspect, also requiring the tanker engine to idle, occurring for around 10 - 20 minutes at a time. Previously with the old ETP, around 8 to 9 tankers visited site per day.
- Milk Tankers – delivering milk to the front of the site, there can be roughly 24 to 30 tankers per day with up to 6 at any one time.
- Chiller compound, including:
    - Chillers (x 3)– running continuously but varying in noise as the load changes (depending on how much the temperature needs to be chilled, and whether all chillers are operational). Acoustic lagging jackets were added to parts of the chillers and a partial angled roof/barrier has been added on the east side of the compound in 2021 (as measured in the last visit).
    - Glycol Pumps – also within the chiller compound, running continuously at a steady load.
- Cooling Tower – two towers with a large set of acoustic attenuators on either side (added in 2019).
- Cooling Tower Pumps – in a small enclosure at the corner of the Boiler House and behind the Cooling Tower – running continuously at a steady load. The enclosure was extended in 2021.
- Borehouse Pump Room – several pumps inside a small lightweight building beside the chiller compound – running continuously. The door was previously open, it has now been closed since the first audit in 2020 and the ventilation fan in the east façade is now back in operation.
- Borehole Water Tank – next to the pump room, running continuously.
- Vat Room Exhausts (east elevation) – two high level vents on the east elevation of the main production building above rooms appearing to contain milk/cream VATs – running continuously.
- Vat Room Exhaust (south elevation) – added in early 2021, on the south elevation of the Vat Room, sitting in the external wall (not ducted)
- Production Hall Exhausts – two high level vents on the west side of the production hall near to the dock levellers – running continuously.
- Boiler House Louvres – high level ventilation louvres on the south elevation.
- Boiler House Pressure Valve Release – high level dog leg shaped exhaust flue on the north elevation – operating occasionally for a few minutes at a time.
- Whey Dispatch Pump – unloading tankers in through the main entrance 4 to 5 times a day per 30 minutes at a time.
- Pump House – set of 5 to 6 pumps on the north side of site which operate intermittently for a few minutes. External door added in 2021.
- ETP (Effluent Treatment Plant) – area which became operational in 2021, with an array of noise generating plant pumps, blowers, and flotation units. Replaces the old ETP plant to the north-east which has now ceased operating entirely.

Whilst on-site on the 4th of June 2024, PJA were asked to survey the following:

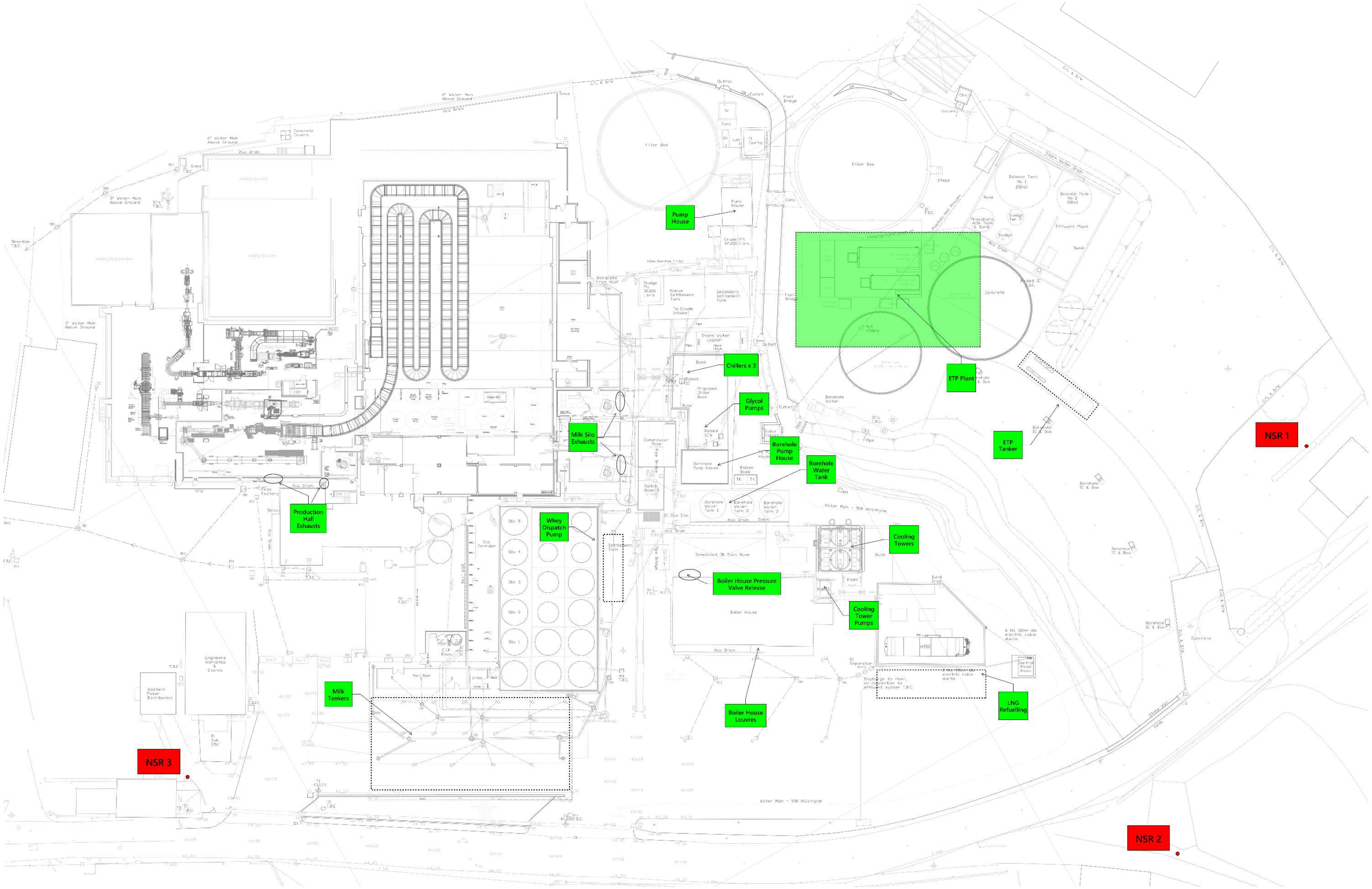
- LNG – refuelling of liquified natural gas tankers for approximately 1.5 hours per visit, twice a week.

2.4 Noise Sensitive Receptors

For the purpose of this assessment, three noise-sensitive receptors (NSRs) have been defined and are shown in Figure 2.1 overleaf. These receptors have been selected as they are considered to be the most exposed to operational noise from the Dairy Partners site, based on their proximity and orientation relative to the dominant noise sources.

The selected receptors are situated along the southern, eastern, and western boundaries of the site, where the majority of noise-generating activity takes place (e.g. tanker movements, fixed plant, and exhausts). While there are residential dwellings to the north and northwest, these are generally expected to experience significantly lower levels of noise due to screening from intervening buildings and distance from the main sources.

Figure 2.1 – Site plan showing locations of main noise generating processes/equipment (green) and nearby noise sensitive receptors (red)



3.0 Assessment

3.1 Methodology

Several BAT Noise Audits have been undertaken by ParkerJones Acoustics (PJA) at the Dairy Partners site since September 2020, with subsequent updates in July 2021, November 2021, and July 2023.

The most recent full set of site-wide noise measurements was conducted on 20th July 2023. During this visit, PJA measured noise both at source (typically 1 metre from key plant and equipment) and at the site boundary, in the direction of residential properties. At the time, the site appeared to be operating under typical day-to-day conditions.

On 4th June 2024, PJA returned to site to carry out a targeted survey of the LNG refuelling process, following a change in supplier that had resulted in a substantial increase in noise emissions. The previous provider had offered a near-silent filling process, but the current setup now generates much more prominent noise levels. No additional measurements of other plant were requested during the June 2024 site visit, and the site-wide measurement scope of July 2023 has therefore not been repeated.

However, as part of the June 2024 work, PJA were able to install unattended noise monitoring equipment at three residential receptor properties—NSRs 1, 2, and 3, as shown in Figure 2.1. Monitoring took place over a continuous period from the morning of Tuesday 4th June to Monday 10th June 2024. This represents a significant development over previous surveys, which had relied on boundary measurements due to lack of access to residential land. The data collected directly within the curtilage of the affected dwellings allows for a more accurate assessment of cumulative noise impact from the site and offers a useful validation point for the predictions made by the noise model.

Despite this improvement, it is not generally possible to determine the contributions of individual noise sources from receptor-level monitoring alone. In a few cases, dominant plant could be clearly identified and measured in isolation at the receptors. However, for most sources—especially those that are quieter or located further from the receptors—background noise and overlapping emissions prevent clear separation. As such, detailed 3D noise modelling has again been relied upon to estimate individual contributions. This modelling is based on source-level data measured in the field (typically at 1 metre in multiple directions), with all relevant plant and buildings represented in CadnaA.

Some items of plant operate intermittently, for example only once every few days, and were not active during the June 2024 monitoring period. In these cases, source data from previous surveys—when the plant in question was operational—has been used. These historic measurements remain valid for use in the model, assuming that no significant changes to equipment layout or operational behaviour have occurred in the meantime.

The assessment also considers tonal content where applicable, using narrow-band frequency analysis in accordance with Annex D of BS 4142:2014+A1:2019, to determine whether penalties for tonality should be applied in line with the rating methodology.

3.2 Operational Measurements/Observations

Table 3.1 overleaf presents the estimated specific noise contributions from each significant plant item or process at the three defined noise-sensitive receptors (NSRs 1 to 3). These estimates are derived from a combination of source-level noise measurements, detailed 3D noise modelling, and on-site observations.

Source measurements were taken at 1 metre in multiple directions from each plant item and incorporated into a comprehensive CadnaA noise model. The model includes detailed representations of all major buildings, structures, screening elements, and relevant topography. Noise levels were predicted at receptor locations corresponding to the June 2024 survey positions within the curtilage of nearby residential properties.

The aim of this analysis is to disaggregate the overall site noise into specific contributions from each source. This provides a clear basis for identifying dominant emitters, evaluating existing mitigation, and determining where further control efforts should be focused. Photographs and model screenshots are included in Appendix B.2.

NRW previously queried the derivation of sound power levels in earlier audits, where estimates were based solely on close-range measurements due to a lack of receptor access. That limitation has since been addressed by the June 2024 noise impact assessment, which involved long-duration unattended monitoring at three residential properties. The results provided a reliable benchmark for validating the noise model. Predicted levels for fixed plant fell within 1–3 dB of measured values at all receptors, demonstrating good agreement and supporting the reliability of the source data.

It is important to note that deriving formal sound power levels using ISO 3744 or ISO 9614 methods is not practical for this site. Many sources operate intermittently, cannot be isolated, or are physically difficult to access. Conducting such tests would likely require a full site shutdown across several days, which is not feasible for an operational facility of this scale.

Instead, a proportionate approach has been taken—using directional 1 m measurements and integrating them into a 3D noise model that accounts for propagation effects, building screening, and terrain. This process has now been substantiated by real-world receptor measurements, adding confidence to the noise source breakdowns.

Given the objective of a BAT Noise Audit—to determine which sources are most significant and where mitigation should be focused—this level of accuracy is entirely appropriate. The modelled results are sufficiently robust to support practical decision-making, and the small differences between predicted and measured levels do not materially affect the conclusions.

Table 3.1 – Noise contributions and subjective observations from each source at nearby residential receptors

Source	Noise Contribution dB $L_{Aeq,T}$			Subjective Notes / Dominant Noise Generating Component	Regularity
	NSR 1	NSR 2	NSR 3		
ETP Tankers	67	66	35	Very loud and dominant at receptors close to the ETP site entrance. Fairly tonal noise. However, 7 – 10 dB quieter than the survey in Sept 2020, but pump noise may be different on each lorry. Low frequency hum from idling, clearly audible though not as noticeable when pumping. Noisiest component(s): Vacuum Pump	15 - 30 minutes typically once every other day.
Chillers	43	43	23	Tonal qualities audible at NSR 1 Noisiest component(s): Screw compressor tonal quality dependent upon speed of the internal fan.	Continuous - 24 hours a day. Tonal quality varies depending upon the load.
Cooling Tower Pumps	37	39	20	Slight tonal element though not particularly noticeable outside of the recently constructed enclosure. Noisiest component(s): Rotary component in pump.	Continuous - 24 hours a day
Milk Tankers (pumping and idling)	36	46	65	Pumps relatively quiet, the main noise is the tanker engines idling whilst pumping. Noisiest component(s): Engine	30 minutes for up to 30 times a day – can accommodate 4 – 6 tankers at the same time

Source	Noise Contribution dB $L_{Aeq,T}$			Subjective Notes / Dominant Noise Generating Component	Regularity
	NSR 1	NSR 2	NSR 3		
Vat Room Exhausts (east elevation)	44	42	21	Low-frequency/broadband hum with no tonal qualities – clearly heard but not as distinguishable as other noise sources at a similar level because of the lack of tonal characteristic. <u>Noisiest component(s)</u>: Extract fan within the ventilation system. Possible flow-generated noise.	Continuous - 24 hours a day
Vat Room Exhaust (south elevation)	27	25	34	Low-frequency/broadband hum, blade passing frequency noticeable at source objectively but subjectively not particularly tonal, and not perceived as tonal at the receptors. <u>Noisiest component(s)</u>: Extract fan	Continuous - 24 hours a day
ETP (Effluent Treatment Plant)	36	35	15	High pitched tonal element can be heard at around 8 kHz at the site boundary with NSR 2 on occasion. Intermittent noise every minute or so from a 'knife gate valve' also faintly audible. <u>Noisiest component(s):</u> Pumps, knife gate valve, fluid rushing through pipes	Continuous - 24 hours a day
Borehole Pump Room	30	23	7	Constant low-mid frequency broadband noise – improved since the door has been shut. <u>Noisiest component(s)</u>: Several pumps.	Continuous - 24 hours a day

Source	Noise Contribution dB $L_{Aeq,T}$			Subjective Notes / Dominant Noise Generating Component	Regularity
	NSR 1	NSR 2	NSR 3		
Boiler House Pressure Valve Release	55	45	49	Clearly noticeable but relatively broadband noise without particularly annoying characteristics. Noisiest component(s): Flow regenerated noise from pressured steam through small pipework.	Rarely occurs.
LNG (pressure fill)	50	48	35	Very noticeable low-mid frequency noise. Noisiest component(s): Pumps at the rear of the tanker.	1.5 hours – twice a week
LNG (alarm)*	60	58	45	Tonal alarm, very audible at the receptor across the road with the door open but muffled with the door closed. Noisiest component(s): Tonal alarm	1.5 hours – twice a week – intermittent every 3 minutes for 2 seconds
Cooling Towers	33	36	13	Slight mid-high frequency broadband noise but relatively quiet compared to other sources due to the addition of silencers. Noisiest component(s): Airflow noise	Continuous - 24 hours a day

Source	Noise Contribution dB $L_{Aeq,T}$			Subjective Notes / Dominant Noise Generating Component	Regularity
	NSR 1	NSR 2	NSR 3		
Glycol Pumps (Chiller Base)	38	33	23	Clear harmonic tones when measuring close to source but not particularly noticeable outside of the chiller compound. Noisiest component(s): Rotary component inside pump, tonal quality seen close to internal fans assumed RPM + 1st harmonic.	Continuous - 24 hours a day
Whey Dispatch Pump	39	36	30	High frequency tonal quality – but not that perceptible at the receptors. Noisiest component(s): Rotary component inside pump, tonal quality seen close to internal fans assumed RPM.	30 minutes for up to 4 or 5 times a day
Boiler House Louvres	16	37	30	Low-frequency hum, not particularly noticeable. Noisiest component(s): Ventilation system inside – airflow type noise.	Continuous - 24 hours a day
Pump House	22	19	3	Constantly running but very intermittent, pumps run for a minute or so then turn off completely for another minute. Not noticeable at receptors. Noisiest component(s): Pumps on the left hand side of the door.	Continuous/intermittent - 24 hours a day

Source	Noise Contribution dB $L_{Aeq,T}$			Subjective Notes / Dominant Noise Generating Component	Regularity
	NSR 1	NSR 2	NSR 3		
Production Hall Exhausts	13	14	44	Low-frequency hum, not particularly noticeable or disturbing. Noisiest component(s): Extract fan	Continuous - 24 hours a day
Borehole Water Tank	30	18	18	Broadband noise but not distinguishable from other sources when more than 5 – 10m away. Noisiest component(s): Water flow.	Continuous - 24 hours a day
*Values shown are $L_{Aeq,2sec}$ values, given that alarm operates very briefly for 1 -2 seconds roughly every 3 minutes.					

3.3 Predicted Receptor Levels (Current)

3.3.1 Fixed Plant / Continuously Operating Plant

The analysis begins by evaluating the individual specific noise contributions from fixed plant items that typically operate on a near-continuous basis and may run at any time across a 24-hour period. These include: Chillers, Cooling Tower Pumps, Vat Room Exhausts (east and south elevations), the Effluent Treatment Plant (ETP), Borehole Pump Room, Cooling Tower, Glycol Pumps (Chiller Base), Boiler House Louvres, Pump House, Production Hall Exhausts, and the Borehole Water Tank.

Based on the predicted individual specific noise levels presented in Table 3.1—and by summating these contributions—the CadnaA model predicts cumulative specific noise levels ($L_{Aeq,1hour}$ daytime or $L_{Aeq,15min}$ nighttime) from fixed plant of approximately 48 dB at NSR 1, 48 dB at NSR 2, and 45 dB at NSR 3.

These predictions align reasonably well with the results of the June 2024 Noise Impact Assessment, which recorded specific noise levels from fixed plant in the range of 49–50 dB at NSR 1, 43–46 dB at NSR 2, and 45–47 dB at NSR 3. Some variation between the modelled and measured results is anticipated, given the complexity of the site and the inherent variability in source noise levels, operating conditions, and environmental factors.

Such differences are entirely normal and can arise from a number of factors: changes in the operational state of plant and equipment between measurement periods; fluctuating environmental conditions (such as wind speed and direction or air temperature) during on-site monitoring; and the fact that source noise measurements have been collected across multiple site visits over a period of years, potentially capturing slightly different configurations or levels of activity. While these elements may result in slight deviations between predicted and measured levels, the variance remains within a reasonable margin for this type of assessment.

Importantly, in the context of a BAT Noise Audit—where the aim is to identify dominant noise sources and guide the targeting of mitigation measures—this level of consistency is considered more than adequate. The purpose is not to predict absolute receptor noise levels with pinpoint precision, but to establish the relative contributions of individual sources. Even allowing for a few decibels' difference, the analysis provides a solid foundation for identifying which sources are most significant and where further control may be most effectively applied.

3.3.2 Vehicles and Intermittently Operating Plant

The next category of sources comprises intermittent vehicle operations, specifically: Milk Tankers, ETP (Effluent Treatment Plant) Tankers, and LNG Refuelling Tankers. While these are not continuous noise sources, they contribute significantly to short-term elevated noise levels during the daytime.

The most consistent contributor among the intermittent sources is the milk tanker operation. Tankers arrive and depart throughout the day—up to 30 times daily—with the facility able to accommodate four to six tankers simultaneously. Each operation typically lasts around 30 minutes and has a notable impact on NSR 3 (adjacent to the site entrance), where specific noise levels can reach approximately 65 dB. During these periods, vehicles remain idling while pumping takes place. Although electric pumps are used to empty the tankers, the engines must continue running to maintain a constant air supply for the operation of the valve systems.

In contrast, the ETP tankers are far more intermittent. Typically, a single vehicle operates on site for between 15 and 30 minutes once every other day. Despite the infrequency, these operations can result in high specific noise levels at NSR 1, with levels up to 67 dB recorded during pumping activities. On the other hand, The number of ETP tankers visiting the site has decreases substantially as a result of the new ETP being commissioned (from as many as 8 – 9 a day, to typically 1 every other day, or at most, every day).

The LNG refuelling process also occurs intermittently—usually around twice per week—with refuelling lasting approximately 1.5 hours. Specific noise levels at NSR 1 are typically around 50 dB during the refuelling process, although the associated alarm emits short bursts of noise (approximately 2 seconds in duration) at around 60 dB every 3 minutes, which increases the potential for disturbance despite the relatively moderate average level.

Other intermittently operating sources include the Whey Dispatch Pump and the Boiler House Pressure Valve Release.

Emissions from the Whey Dispatch Pump are relatively low in comparison to other sources on site. The pump typically operates during the daytime and usually at the same time that milk tankers are present. As such, its noise is often masked by the sound of idling and pumping milk tankers at the front of the site, meaning its contribution to the overall sound environment is minimal.

The Boiler House Pressure Valve Release, by contrast, is a potentially louder event. However, it is a planned health and safety operation that occurs only once per year. Given its rarity and brief duration, it is not considered to be a particularly critical source of noise from a BAT perspective.

3.4 BAT Audit and Possible Mitigation

Table 3.2 overleaf presents a review of the noise mitigation measures currently in place across the site and considers whether Best Available Techniques (BAT) are already being applied, or whether further improvements could be made. Where improvements may be possible, the table outlines a range of additional mitigation options—some of which may be considered High Priority, and others of Low Priority.

This review has been informed by site-specific observations, source-level noise measurements, and receptor-level monitoring data. It also takes into account the guidance set out in the Food, Drink and Milk BREF (BAT Reference) Note, as revised in December 2019, which provides a sector-specific framework for assessing noise control measures.

High Priority

Plant or processes marked as High Priority are those where additional noise control is considered necessary and likely to yield meaningful benefit at the receptors. These tend to be either:

- Among the dominant noise sources currently contributing to elevated receptor noise levels, or
- Characterised by tonal, impulsive, or intermittent emissions that are more likely to attract attention and generate complaints, or

In the first instance, these are the sources for which additional mitigation efforts should be explored. However, the list of mitigation options presented should not be taken as a definitive set of actions that must be implemented immediately; rather, they represent a suite of technically viable options for consideration and discussion between DP and NRW.

Low Priority

Plant or processes assigned a Low Priority designation fall into one of the following categories:

- Technically feasible, but lower impact – where additional mitigation could be implemented, but the source is not considered a major contributor to receptor noise levels, or where its acoustic character is unlikely to be especially intrusive (e.g. steady broadband noise with no distinctive features).

- Operationally or economically unfeasible – where mitigation could achieve a significant benefit, but is constrained by practical limitations such as:
    - Health and safety restrictions,
    - Dependence on external suppliers or infrastructure;
    - Significant operational disruption, or
    - Disproportionate cost relative to the likely acoustic benefit.

In such cases, further input will be required from Dairy Partners to expand on the practical feasibility and cost-benefit justification for not progressing with these measures. PJA has provided commentary on likely acoustic benefit, but cannot make determinations about implementation timeframes, operational viability, or financial constraints.

Notes on Predicted Reductions

Where appropriate, Table 3.2 includes indicative estimates of the potential reduction in sound levels that could be achieved at source through the implementation of further mitigation. These values are not based on any specific product or detailed design at this stage, but instead reflect the range of reductions that PJA would generally anticipate based on experience with similar sites and installations. As such, they should be treated as approximate and illustrative rather than definitive predictions.

It should also be noted that where several possible mitigation options are listed for the same source, these should not be assumed to be additive. That is, five options each offering reductions of 10, 5, 3, 2, and 1 dB respectively would not result in a 21 dB reduction overall. In practice, the effectiveness of mitigation tends to diminish as more options are applied, particularly where they overlap in purpose or target similar aspects of the noise source.

Some additional commentary is also provided regarding the expected effect at receptor locations, where applicable. However, it is important to understand that even significant reductions at source (e.g., 20–25 dB from a full enclosure) may only lead to modest overall reductions at the receptors (e.g., 1–3 dB). This is due to the cumulative and distributed nature of the site's noise emissions—there is no single, dominant fixed plant item that accounts for the majority of the noise impact. Instead, multiple items contribute similar levels, meaning that reducing just one in isolation will not substantially lower the overall level unless other contributors are also addressed.

The figures in Table 3.2 therefore assume each source is mitigated in isolation, without changes to other nearby or similarly contributing items. In reality, if multiple sources were mitigated simultaneously, the cumulative benefit at receptor locations could be more substantial, potentially reducing overall specific noise levels by several decibels.

A more detailed assessment of these cumulative effects is presented later in Section 3.5, where the noise reductions expected from the specific package of mitigation measures currently being proposed by Dairy Partners are calculated. In that section, the modelling has been refined using design details and product specifications supplied by DP, allowing for more accurate estimates of the overall reduction in site noise at each receptor.

Table 3.2 – Assessment of current noise control measurements and potential future BAT mitigation

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
ETP Tankers	• Vacuum pump • Tanker engine idling	• The number of ETP tankers visiting the site has decreases substantially as a result of the new ETP being commissioned.	No	• Erect a portable screen/barrier at the side of the tanker. The barrier can be lifted into place around the vacuum pump and hydraulic cooler. Alternatively a more permanent structure could be constructed to form a bay for the tanker to reverse in to. The barrier should break the line of sight from the side of HGV to the residential properties. Even a basic temporary screen (Heras fencing with acoustic blankets) can deliver 5–10 dB reduction in individual noise contributions if placed well (breaking line of sight). *(BRef Alignment: Section 2.3.8.2 (Noise abatement) and BAT 14 (e), which encourages the use of obstacles between emitter and receiver, including walls and barriers)* • Position tanker vehicles so that the side where the vacuum pump and hydraulic cooler are facing north-westwards, with the tanker itself acting as a noise barrier, out of sight from residents to the south-east. Estimated 5 dB reduction in individual noise contributions. A no-cost mitigation that's sensible where space allows. *(BRef Alignment: Partially aligns with 2.3.8.1 (Appropriate location of equipment and buildings), which discusses screening by existing structures or reorientation.)* • Install silencers on to vacuum pumps if possible, or replace with quieter alternatives. But may only be possible if DP owns the tankers, likely more difficult when a contractor is used. Estimated 5 – 15 dB reduction in individual noise contributions depending on whether a basic silencer is installed, or a new low noise pump is installed. *(BRef Alignment: Strongly supported by BAT 14 (c) and (d), which mention low-noise pumps and noise reducers).* • Move ETP operations to daytime hours. During the last survey, they appeared consistently between around 06:00 and 06:30. *(BRef Alignment: This aligns with BAT 14 (b)(iv), which encourages the avoidance of noisy activities at night, if possible.)*	Low Priority The ETP tankers are considered a low priority for further mitigation due to their infrequent use and recent reductions in activity. However, DP should still assess the feasibility of rescheduling operations to daytime hours, repositioning vehicles and/or installing temporary barriers, and (if practicable) screening or silencing the vacuum pumps.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Chillers	• Chiller screw compressors Tonal noise is created by the rotary components running at high speed (cooled water rotary screwed chiller), and ringing of metal-on-metal contact from lack of anti-vibration fixings.	• A third chiller was installed to reduce the load on the existing two, which appears to have improved the situation. • Installed in an open top enclosure with acoustic absorption installed to the walls. A small section of angled roof has been added. • Acoustic insulation/lagging has now been installed on all of the screw compressors and oil separators.	No	• Construct an enclosure including roof to replace the existing chiller compound. A reduction in the individual noise contributions of approximately 10–15 dB(A) is likely if ventilation gaps remain in parts of the structure (see Section 3.5.1 for further analysis). If the compound were fully enclosed—with appropriate acoustic louvres or a ducted ventilation system incorporating silencers—a reduction of around 20–25 dB(A) in individual noise contributions could be achievable. However, this would depend on the specific ventilation solution adopted. Acoustic louvre performance can vary significantly, and fan-assisted systems may generate their own noise and/or require plant to run at increased capacity if airflow is restricted. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), which recommends using physical obstacles such as enclosures, barriers, and walls to block the direct propagation of noise.)* • Replace the chillers with an alternative, lower-noise technology. Current chillers are understood to be water-cooled rotary screw models, which produce tonal, high-frequency noise—often perceived as siren-like due to shifting tonal peaks. Replacing these with quieter chiller types (e.g., scroll or reciprocating models with lower rotational speeds) could yield an estimated 5–10 dB(A) reduction in individual source levels, depending on the specification of the replacement units. *(BRef Alignment: BAT 14(a), which encourages the use of low-noise equipment; and 2.3.8.2 – prioritising source-level noise reduction through selection of quieter machinery types.)* • Fit anti-vibration fixings and rubber isolation washers. Replacing metal bolts and fittings with alternatives that include vibration-damping components may help reduce high-frequency ringing tones. A small source-level reduction of up to 2 dB(A). *(BRef Alignment: BAT 14(c), recommending vibration control techniques to reduce structure-borne noise; also referenced in Section 2.3.8.2.)* • Improve maintenance and lubrication practices. Routine maintenance—particularly around fastenings—may reduce metal-on-metal vibration and other tonal features. A minor reduction in individual noise contributions of up to 2 dB(A) may be achievable through these actions. *(BRef Alignment: BAT 14(f), which recommends implementation of maintenance protocols to reduce noise; Section 2.3.8.2 also encourages proactive upkeep of mechanical components to limit noise emissions.)*	High Priority A roof or full enclosure is the most logical next step for achieving a further substantial reduction in noise emissions from the chillers. As outlined in Section 3.5.1, it is understood that this mitigation is already being taken forward to some extent, with the option of further improvements depending on the level of reduction achieved following initial installation.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Cooling Tower Pumps	• Rotary component (speed/vane passing frequency) Tonal noise is created by the rotary components, and ringing of metal-on-metal contact from lack of anti-vibration fixings.	• Partial enclosure installed around the pumps – the size of the enclosure has increased recently which has benefited residents to the south. • Contained at the corner of the Boiler House which provides some screening to residents to the west.	No	• Fully seal the existing enclosure Close all significant air gaps around the current enclosure, including under the cooling tower where noise escapes to the east. If properly sealed and acoustically treated, a reduction in individual noise contributions of approximately 10–15 dB(A) is expected (see Section 3.5.3 for further analysis). *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), which recommends the use of enclosures and barriers to block direct noise propagation.)* • Apply acoustic lagging or jackets to the pump casings Many of the pumps already have some lagging, but additional treatment could yield a further reduction of around 2–3 dB(A) in individual noise contributions. *(BRef Alignment: Section 2.3.8.1 – Equipment design; BAT 14(a), which encourages the use of low-noise equipment and noise-damping materials at source.)* • Install anti-vibration mountings and rubber washers Replacing standard fixings with vibration-isolating alternatives could provide a minor reduction of up to 2 dB(A). This may help control high-frequency metallic ringing, though the benefit would be modest on its own. *(BRef Alignment: Section 2.3.8.1 – Equipment design; BAT 14(b), which supports vibration control through resilient mounting.)* • Enhance equipment maintenance regime Regular cleaning, lubrication, and servicing could yield a small reduction (up to 2 dB(A)) by limiting wear-related noise and vibration. This is a low-cost, low-effort measure to maintain acoustic performance. *(BRef Alignment: Section 2.3.8.3 – Good maintenance; BAT 14(h), promoting maintenance to preserve acoustic performance.)* • Add silencers to pump outlets Depending on the pump type and outlet configuration, installing silencers could lead to a reduction of 5–10 dB(A) in individual noise contributions. Feasibility may vary depending on access and compatibility. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages silencers and sound-dampening components on air/fluid handling systems.)*	High Priority A roof or full enclosure is the most logical next step for achieving a further substantial reduction in noise emissions from the chillers. As outlined in Section 3.5.3, it is understood that this mitigation is already being proposed.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Milk Tankers (pumping and idling)	• Engine idling • Pumps	• Low noise emission pumps are installed (engine noise is dominant). • Operations limited to daytime only.	No	• Install an electric motor system to allow pump operation with the engine off Currently, milk tankers are required to keep their engines idling during offloading to maintain air pressure to valve systems and run the onboard pump. Retrofitting an electric motor to power the pump independently would allow the tanker engine to be switched off during operation. As the idling engine is the dominant source of noise—often masking the pump itself—this change could eliminate the majority of noise associated with milk tanker offloading. A reduction in individual noise contributions of up to 25 dB(A) is anticipated, although this is somewhat uncertain due to the difficulty in isolating and measuring pump noise independently of the engine. *(BRef Alignment: Section 2.3.8.1 – Source-level controls; BAT 14(c), which promotes the adoption of quieter technologies and reduction of noise at source.)* • Install an acoustic barrier to provide partial shielding to the milk tanker area A barrier could be installed in a suitable location to provide some acoustic screening between the milk tanker operations and the nearest receptors. The design and position would need to be determined with consideration for vehicle movements and site logistics. The likely benefit is difficult to quantify at this stage, but a reduction in individual noise contributions in the region of 2–4 dB(A) may be achievable depending on placement and effectiveness. (BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), which promotes the use of physical obstacles such as barriers to interrupt the propagation path between source and receptor.)	Low Priority Replacing the current system with an electric pump that would allow the HGV engine to be switched off could reduce individual noise contributions by up to 25 dB(A), as it would eliminate the dominant engine noise. However, feasibility appears limited—DP do not own the tankers, and implementation would depend on coordination with external hauliers. While the potential benefit is high, it is not currently seen as a realistic option. DP will need to provide further information on feasibility, cost benefit analysis, and supplier engagement.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Vat Room Exhausts (east elevation) Vat Room Exhaust (south elevation)	• Fan	• None to PJA's knowledge.	No	• Redesign ventilation to incorporate internal ducting with silencers The current configuration involves fans mounted directly within the wall, discharging externally without internal ducting. This prevents the use of in-duct silencers in the existing layout. However, the system could be redesigned to include a short run of ducting internally, allowing silencers to be installed between the fan and discharge point. This could achieve reductions in individual noise contributions of approximately 10–25 dB(A), depending on silencer performance and flow dynamics. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages silencers and sound-dampening components on air/fluid handling systems.)* • Install external ducting with integrated in-duct silencers An alternative solution would be to duct the existing louvre openings externally—e.g. via vertical flues or horizontal ductwork—which could provide directional attenuation by redirecting emissions upwards or away from receptors. This would also create the necessary space to incorporate an in-duct silencer within the external ducting run. Estimated reductions in individual noise emissions could be in the range of 10–25 dB(A), depending on the geometry, silencer type, and length of duct. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages silencers and sound-dampening components on air/fluid handling systems.)* • Replace existing external louvres with acoustic louvres The existing fixed louvres could be replaced with acoustic-rated alternatives. Depending on product selection and installation, this could yield a 5 dB(A) reduction in individual noise contributions. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages silencers and sound-dampening components on air/fluid handling systems.)* *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), which encourages the use of physical barriers and noise control features integrated into exhaust systems.)*	High Priority Replacing the existing louvres with acoustic louvres is the most practical and realistic next step, and DP are currently reviewing this option (see Section 3.5.4). A more substantial reduction could be achieved by redesigning the system to incorporate ducted outlets with in-duct silencers—either internally or externally—which would allow for insertion of silencers while also improving the directivity of noise emissions. However, this would require a more significant redesign and DP will need to consider the technical and operational feasibility of such changes.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
ETP	• Pump • Knife valve • Water rushing through the pipes	• Acoustic lagging installed around the blower pipe. • Acoustic louvres installed to the blower house. • Pump recently fixed to remove high frequency tonal element.	No	• Construct a partial enclosure or screen between the buffer and aeration tanks Could provide limited shielding of pump and water movement noise. Estimated reduction of up to 5 dB(A) at source, though likely to result in no more than 1 dB(A) at the boundary/receptor. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), which recommends the use of screening structures and barriers to reduce direct propagation of noise.)* • Install a small screen around the knife valve Aimed at mitigating the faint intermittent tonal noise from valve operation. May reduce noise by up to 5 dB(A) at source, though only a 1 dB(A) improvement at the boundary/receptor is expected. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), relating to localised shielding of specific noise-emitting components.)* • Fit anti-vibration fixings or washers to reduce high-frequency ringing Replacing rigid bolts/screws with vibration-isolating fittings may reduce tonal elements by 1–2 dB(A) at source, with negligible change at the boundary. *(BRef Alignment: BAT 14(c), which supports the use of vibration control components; Section 2.3.8.2 also references fixing upgrades for tonal mitigation.)* • Continue regular maintenance and lubrication of pipework and fittings Good maintenance may help limit tonal or vibration-related emissions. Reduction is expected to be <1 dB(A) at source, with no perceptible change at the boundary. *(BRef Alignment: BAT 14(b), encouraging good maintenance practice to limit noise emissions.)*	Low Priority Only minor further reductions at source are possible, with negligible effect at the boundary at this stage.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Borehole Pump Room	• Several pumps	• Installed within a ventilated room rather than located outside	Yes	• No further at this stage, the room previously had the door left open, this has now been closed and the ventilation fan switched back on.	Low Priority
Boiler House Pressure Valve Release	• Valve	• Exhausts at the rear of the building without line of sight to most residents.	No	• Install an exhaust silencer on the flue An exhaust silencer could be installed on the flue, which typically achieves a 15-25 dB reduction at source. However, since the valve release occurs infrequently, the overall reduction in boundary noise levels would be negligible. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages the use of silencers in air/fluid handling systems.)*	Low Priority Since the pressure valve release occurs only once a year for health and safety purposes, it is not considered a critical noise source at this time. While a silencer could be installed, it is unlikely to provide significant benefit given the infrequency of the event and the intermittent nature of the noise. Therefore, it would be more appropriate to prioritize other noise sources.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
LNG (pressure fill)	• Valves on the rear of the tanker	• Temporary noise fencing around the tanker.	No	• Find an alternative supplier where the mechanism of refueling is virtually silent Likely to achieve around a 30 dB reduction at source. However, this would depend on the specific supplier chosen and the refueling system design. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages the use of quieter equipment.)* • Install a permanent noise barrier around the area The barrier should replace the temporary fencing, ensuring it is imperforate with no air gaps between panels. The barrier should be at least 2.5 meters high. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), which recommends the use of enclosures, barriers, and walls to block direct propagation of noise.)*	High Priority The optimal solution would be to revert to a previous supplier whose delivery system was silent. However, DP has indicated that this service is no longer available in the UK, and further clarification is needed regarding the constraints around this option. As an alternative, DP is proposing a partially sided barrier solution, which is discussed further in Section 3.5.5.
LNG (alarm)*	• Tonal alarm	• None	No	• Install and keep the door on the alarm closed, with the operator nearby The alarm is loud enough to be heard without needing the door open. Likely to achieve around a 25 dB reduction at source. There is no significant effect on overall noise levels at the boundary as this noise source is intermittent. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which recommends reducing noise at source through design and operational measures.)*	
Cooling Towers	• Fans/airflow	• New cooling towers recently installed with acoustic silencers on intakes	Yes	None.	Low Priority

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Glycol Pumps (Chiller Base)	• Rotary component (speed/vane passing frequency) Tonal noise is created by the rotary components, and ringing of metal-on-metal contact from lack of anti-vibration fixings.	• Installed in an open top enclosure with acoustic absorption installed to the walls. Roof recently installed over the top. • Acoustic insulation/lagging has been installed on to sections of the 3 pumps.	No	• Improve the chiller compound enclosure As the glycol pumps are within the chiller compound, proposed enclosure upgrades (e.g. adding a roof and sealing ventilation gaps) would benefit these pumps too. Reductions of 10–15 dB(A) are expected if gaps remain, with up to 20–25 dB(A) possible if fully enclosed using acoustic louvres or a ducted system with silencers. *(BRef Alignment: Section 2.3.8.2; BAT 14(e) – physical obstacles such as enclosures and walls.)* • Construct a dedicated enclosure A smaller enclosure directly around the pumps could yield a 10–15 dB(A) reduction. However, this may be unnecessary if full compound upgrades proceed. *(BRef Alignment: Section 2.3.8.2; BAT 14(e).)* • Install anti-vibration fixings Replacing rigid fasteners with rubber-damped ones could reduce the pumps' tonal ringing (noted at 3, 6, and 9 kHz), with up to 2 dB(A) reduction possible. *(BRef Alignment: BAT 14(c) – vibration control at source.)* • Improve maintenance and lubrication Regular maintenance and lubrication of fittings may slightly reduce high-frequency squeal, achieving up to 2 dB(A) reduction. *(BRef Alignment: BAT 14(d) – proactive maintenance.)* • Add silencers to outlets If feasible, adding silencers to the pump outlets could reduce airborne noise by 5–10 dB(A). Implementation depends on available space and performance limits. *(BRef Alignment: Section 2.3.8.1; BAT 14(b) – silencers at emission point.)*	High Priority Improvements to the chiller compound enclosure—such as adding a roof and reducing ventilation gaps—represent the most logical next step for reducing noise emissions from the glycol pumps. As discussed in Sections 3.5.1 and 3.5.2, these works are currently being planned as part of a wider enclosure strategy. Further enhancement may be considered depending on the performance achieved following initial implementation.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Whey Dispatch Pump	• Rotary component (speed/vane passing frequency creates a whine)	• Acoustic insulation/lagging is installed on some of the components.	No	• Add acoustic lagging/jackets to all noise-generating parts Parts that are currently without lagging are noticeably noisier than those with it. Adding lagging or jackets could reduce noise at source by around 4–8 dB, but it will likely result in negligible reductions in overall noise levels at the boundary. *(BRef Alignment: Section 2.3.8.1 – Equipment Design; BAT 14(a), encouraging the use of noise-damping materials at source.)* • Construct a one-sided enclosure or barrier around the pump Constructing a barrier on the east side of the pump, between it and the tanker, could result in a 10–15 dB reduction at source. However, the overall impact on boundary or receptor levels would be less than 1 dB. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), recommending the use of barriers or enclosures to block noise propagation.)* • Install anti-vibration fixings Replacing bolts/screws with rubber fittings/washers can reduce the high-frequency metallic ringing from the pump, but it is expected to have a negligible impact on boundary levels. *(BRef Alignment: Section 2.3.8.1 – Equipment Design; BAT 14(a), suggesting the use of anti-vibration measures to mitigate noise.)* • Improved maintenance of equipment Regular cleaning and lubrication of the pump and surrounding parts will help reduce operational noise. However, this measure is likely to result in a negligible reduction at the boundary. *(BRef Alignment: Section 2.3.8.1 – Equipment Design; BAT 14(a), which encourages good maintenance practices to limit excessive noise.)*	Low Priority The Whey Dispatch pump is not a critical noise source compared to others on-site. Its noise is typically masked by the more prominent noise generated by the milk tankers during the day. Given the minimal impact on boundary levels, the cost outlay for implementing additional noise reduction measures is not deemed justifiable at this stage.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Boiler House Louvres	• General broadband noise from inside	• None to PJA's knowledge	No	• Replacing the existing louvres with acoustic louvres: Likely to achieve a 5 dB reduction at source. The reduction in overall noise levels at the receptors/boundary is expected to be negligible, with a reduction of less than 1 dB at NSR 2. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages the use of silencers and sound-dampening components on air/fluid handling systems.)* • Using a ducted ventilation system with an in-duct silencer: Likely to achieve a 15 dB reduction at source. However, the reduction in overall noise levels at the receptors/boundary is expected to be negligible, with an approximate 1 dB reduction at NSR 2. *(BRef Alignment: Section 2.3.8.1 – Equipment design; BAT 14(c), which encourages the use of silencers and sound-dampening components on air/fluid handling systems.)*	Low Priority The noise from this source is not a priority at this stage, as more significant noise sources need attention first. While the proposed measures may reduce noise at source, the overall reduction at receptors would be minimal.
Pump House	• Several pumps	• None to PJA's knowledge	No	• Installing a better ventilation system to reduce the open façade area through which noise escapes: Likely to achieve a 15 dB reduction at source. The reduction in overall noise levels at the receptors/boundary is expected to be negligible. • *BRef Alignment: Section 2.3.8.1 – Equipment design; BAT 14(a), which encourages the use of low-noise equipment and noise-damping materials at source.)*	Low Priority The noise from this source is not a priority at this stage, as more significant noise sources need attention first. While the proposed measures may reduce noise at source, the overall reduction at receptors would be minimal.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Production Hall Exhausts	• Fans/airflow	• None to PJA's knowledge.	No	• Redesign ventilation to incorporate internal ducting with silencers The current configuration involves fans mounted directly within the wall, discharging externally without internal ducting. This prevents the use of in-duct silencers in the existing layout. However, the system could be redesigned to include a short run of ducting internally, allowing silencers to be installed between the fan and discharge point. This could achieve reductions in individual noise contributions of approximately 10–25 dB(A), depending on silencer performance and flow dynamics. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages silencers and sound-dampening components on air/fluid handling systems.)* • Install external ducting with integrated in-duct silencers An alternative solution would be to duct the existing louvre openings externally—e.g. via vertical flues or horizontal ductwork—which could provide directional attenuation by redirecting emissions upwards or away from receptors. This would also create the necessary space to incorporate an in-duct silencer within the external ducting run. Estimated reductions in individual noise emissions could be in the range of 10–25 dB(A), depending on the geometry, silencer type, and length of duct. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages silencers and sound-dampening components on air/fluid handling systems.)* • Replace existing external louvres with acoustic louvres The existing fixed louvres could be replaced with acoustic-rated alternatives. Depending on product selection and installation, this could yield a 5 dB(A) reduction in individual noise contributions. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(c), which encourages silencers and sound-dampening components on air/fluid handling systems.)* *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), which encourages the use of physical barriers and noise control features integrated into exhaust systems.)*	Low Priority The noise from the production hall exhausts could be reduced at source by fitting acoustic louvres. However, these sources are not audible at NSR 1 or NSR 2, who are understood to be the primary complainants against the site. The noise primarily affects NSR 3, where PJA is not aware of any substantial complaints.

Source	Noise generating parts (in order of dominance)	Current Noise Control Measures	Already employing BAT?	Potential BAT Measures	Possible Next Step for Improvement?
Borehole Water Tank	• Pump and water flow noise	• None to PJA's knowledge (though the tank is relatively well screened from residents)	No	• Construct an enclosure around the pump: Likely to achieve a 10–15 dB reduction at source. The reduction in overall noise levels at the receptors/boundary is expected to be negligible. *(BRef Alignment: Section 2.3.8.2 – Noise Abatement; BAT 14(e), which recommends the use of enclosures and barriers to block direct noise propagation.)*	Low Priority The noise from this source is not a priority at this stage, as more significant noise sources need attention first. While the proposed measures may reduce noise at source, the overall reduction at receptors would be minimal.

3.5 DP's Mitigation Proposals

3.5.1 Chillers

Dairy Partners (DP) are proposing to install a roof over the chiller compound as part of a broader enclosure strategy. At this stage, PJA understands—based on discussions with DP, though not yet supported by technical drawings—that the enclosure will remain partially open for ventilation purposes. Specifically, gaps are anticipated along the south-western side of the enclosure, facing towards the borehole water tank, and along the north-western elevation, between the chiller compound and the production hall, where the ground level rises and there is currently only a palisade fence. The current vertical barrier encloses the north-eastern, eastern, and part of the south-western perimeter.

PJA has attempted to simulate this arrangement in the CadnaA noise model, although it is important to note that the modelling of partially enclosed structures presents limitations due to the assumptions and algorithms of ISO 9613, which underpins the CadnaA software. ISO 9613 is designed to simulate standardised propagation scenarios and is well-suited to open or fully enclosed spaces, but it is less accurate when representing hybrid arrangements such as a roofed enclosure with unsealed wall sections or irregular openings for ventilation. In particular, the software cannot easily model diffraction and shielding effects through partial roofs and incomplete walls, nor can it fully account for complex acoustic paths introduced by semi-open structures.

To accommodate this, PJA has applied a conservative but representative configuration in the model, based on anticipated geometry and absorption characteristics. The modelling predicts a reduction of approximately 10 dB at the nearest receptors, based on the assumption that the structure remains only partially enclosed. While the limitations of the model mean this figure should be treated with caution, it aligns with typical reductions observed in practice for similar cantilever or partial enclosure systems, which often achieve 10–15 dB attenuation depending on the extent of coverage and layout. In this context, the 10 dB estimate is considered a reasonable and somewhat conservative expectation.

The enclosure is to be constructed using Kingspan KS1000RW composite insulated panels, with a quoted weighted sound reduction index (Rw) of 25 dB. The frequency-dependent performance of these panels is also published: sound reduction indices of 20 dB at 63 Hz, 18 dB at 125 Hz, 20 dB at 250 Hz, 24 dB at 500 Hz, 20 dB at 1000 Hz, 29 dB at 2000 Hz, 39 dB at 4000 Hz, and 47 dB at 8000 Hz. This profile demonstrates relatively modest attenuation at low frequencies but strong performance in the mid-to-high frequency range.

This is relevant to the acoustic profile of the chiller compound, as the plant located within this area (e.g. chillers and glycol pumps) typically exhibits strong tonal components in the mid-frequency range, and the overall broadband noise energy is concentrated around mid to upper octave bands. Therefore, even if some leakage occurs at lower frequencies due to ventilation gaps, the enclosure is expected to be effective in controlling the most dominant and perceptually intrusive parts of the spectrum. This characteristic strengthens the case for the enclosure's acoustic benefit, particularly with regard to human perception and potential annoyance.

DP has indicated a willingness to reassess the effectiveness of the mitigation once the roof has been installed. There remains an option to further improve the enclosure by sealing any remaining ventilation gaps—such as by installing acoustic louvres or replacing open sections with ducted systems incorporating in-line silencers. Should this additional work be undertaken, it could convert the compound into a fully sealed acoustic enclosure, more akin to a plant room. In such a case, source-level reductions in the region of 20 – 25 dB(A) could be achieved, subject to proper ventilation design and sealing of all acoustic weak points.

This phased approach—starting with the roof and leaving the option open for further enclosure—represents a pragmatic and scalable strategy. It enables the initial mitigation performance to be assessed in practice and avoids over-committing to potentially unnecessary or overly costly solutions until there is evidence of need. From a BAT perspective, it reflects a willingness to implement reasonably practicable measures and to monitor effectiveness in line with the principles of continuous improvement.

Overall, based on the current proposals, a reduction in the individual noise contributions from the chiller compound of at least 10 dB(A) is anticipated.

3.5.2 Glycol Pumps

The glycol pumps are also located within the chiller compound and will therefore benefit from the proposed enclosure works. A similar overall reduction of approximately 10 dB(A) is expected for the glycol pumps as a result of the new roof and partial walling.

Tonality analysis of the glycol pumps has identified distinct tonal components—particularly prominent peaks at around 3 kHz, 6 kHz, and 9 kHz—which contribute to their perceptibility at the receptor locations. Given the mid-to-high frequency nature of these emissions, and the fact that enclosure structures typically provide greater attenuation at higher frequencies, it is reasonable to expect that reductions in the order of 15–25 dB may be achieved at these tonal frequencies, even if the overall A-weighted reduction remains closer to 10 dB(A).

Overall, based on the current proposals, a reduction in the individual noise contributions from the glycol pumps of at least 10 dB(A) is anticipated.

3.5.3 Cooling Tower Pumps

The cooling tower pumps are currently housed beneath a partial enclosure structure located on the eastern side of the site. As it stands, the enclosure comprises a solid wall to the east and a cantilevered roof that extends westward, covering approximately 80% of the span between the pump compound and the adjacent boiler house. However, the current arrangement has notable acoustic weaknesses, including an unsealed section at the western end of the roof and a lack of walling on the northern side, where the pumps are partially exposed in the direction of the cooling tower.

DP are proposing to improve this enclosure by sealing the open roof section and installing additional wall panels along the northern elevation. These upgrades will use Kingspan KS1000RW insulated panels, 40 mm in thickness, with a weighted sound reduction index (Rw) of 25 dB, consistent with the materials proposed for the chiller and glycol compounds.

PJA has modelled the likely effect of these improvements, based on the assumption that the enclosure will be fully sealed using the Kingspan system. Based on this, a reduction in the individual noise contributions of approximately

10–15 dB(A) is expected. This estimate is consistent with experience from similar industrial enclosures and reflects a combination of improved physical containment and reduced direct line-of-sight transmission from the pumps to nearby receptors.

As with the chillers and glycol pumps, this enclosure is expected to provide greater attenuation at mid-to-high frequencies than at low frequencies. This is particularly relevant for the cooling tower pumps, which exhibit tonal components at around 3 kHz. As such, these mid-frequency tonal elements—often more perceptible and annoying to the human ear—are expected to be attenuated effectively by the proposed enclosure. While the Kingspan panel system offers reasonable broadband performance, its relative effectiveness at higher frequencies reinforces the suitability of this mitigation approach in addressing both the overall level and the character of the noise.

DP have confirmed that this mitigation is currently in the planning stage, with implementation to follow subject to final design confirmation and contractor availability. The proposal is considered consistent with BAT principles in providing a practical and scalable enclosure solution to further limit noise breakout from this part of the site.

Overall, based on the current proposals, a reduction in the individual noise contributions from the cooling tower pumps of at least 10 dB(A) is anticipated.

3.5.4 VAT Room Exhausts

Dairy Partners (DP) are planning to install acoustic louvres to three Vat Room exhausts: two located on the east elevation and one on the south elevation. These fans are currently mounted directly in the wall, discharging air to the exterior with no existing ductwork or in-duct silencing. As a result, noise is emitted freely from each exhaust, contributing to the site's overall acoustic output, particularly during peak daytime activity.

The proposed acoustic louvres are Construction Specialties A-150S models. These are 150 mm deep, single-bank horizontal blade units filled with mineral wool and have been tested in accordance with EN ISO 10140-2 and EN ISO 717-1. They offer a weighted sound reduction index of 10 dB Rw, with octave-band sound reductions of 7.7 dB at 63 Hz, 2.5 dB at 125 Hz, 2.7 dB at 250 Hz, 4.8 dB at 500 Hz, 10.3 dB at 1 kHz, 12.6 dB at 2 kHz, 10.8 dB at 4 kHz, and 8.9 dB at 8 kHz.

While the louvre provides reasonable attenuation in the mid to high frequency range, its performance at low and lower-mid frequencies is relatively modest. This is worth noting, as the noise from the Vat Room exhausts appears to have a bias toward low to mid frequencies, where tonal components and broadband energy are most pronounced. As such, while the proposed louvre will offer some benefit—particularly in higher frequency bands—the overall reduction may be limited by its weaker performance in the dominant frequency regions of this particular noise source. Nevertheless, it is expected to yield a measurable improvement and represents a practical and proportionate first step in reducing direct airborne noise from the exhausts.

Accordingly, a conservative estimate of 5 dB(A) reduction in the individual noise contribution from each of the three exhausts is considered reasonable. The units are expected to be installed during the next stage of the site's mitigation programme and represent a relatively simple and cost-effective BAT-aligned measure to reduce direct airborne noise emissions from this part of the facility.

This option does not preclude the future installation of additional silencing measures—such as externally ducted flues incorporating in-line silencers—which could offer improved attenuation, particularly at lower frequencies. However, this would require more significant structural alterations and design considerations, and would need to be investigated further by DP. Importantly, the effectiveness of the proposed louvres can be reviewed once installed, allowing DP to reassess whether further measures are warranted in light of the actual noise reduction achieved.

Overall, based on the current proposals, a reduction in the individual noise contributions from the three VAT Room Exhausts of at least 5 dB(A) is anticipated.

3.5.5 LNG

Dairy Partners (DP) are proposing the installation of a 2.8-meter high barrier around the LNG refuelling area, with the barrier extending along the southern and eastern sides of the site. The LNG tanker reverses in from the west, and this barrier is intended to reduce the direct propagation of noise from the refuelling process, particularly during peak activity when the tanker engine is running and the refuelling pumps are in operation.

The barrier will act as a physical obstruction, blocking the direct path of noise from the refuelling area towards sensitive receptors to the south (NSR 2) and east (NSR 1).

The expected reduction at the receptors is likely to be in the region of around 5 - 10 dB when compared against a scenario with no barrier. The barrier will not entirely eliminate noise but should reduce the direct line of sight between the noise source and the sensitive receptors. This reduction is considered modest but still beneficial in the context of overall noise management.

In terms of construction, the barrier will use Echo Barrier H9™ panels. These panels are designed to be installed with overlapping sections, which helps to eliminate air gaps and improve the overall effectiveness of the barrier in blocking noise (the panels are 3.65 meters wide, and the panels are positioned every 2 meters to overlap). The bottom 0.8 meters of the barrier will be made of concrete blocks for added stability, while the top 2 meters will consist of the acoustic panels.

The approximate octave band reductions for these panels are as follows: 5 dB at 63 Hz, 8 dB at 125 Hz, 8 dB at 250 Hz, 9 dB at 500 Hz, 22 dB at 1,000 Hz, 34 dB at 2,000 Hz, and 43 dB at 4,000 Hz. These panels offer an overall sound reduction index of around 18 dB R_w.

Overall, based on the current proposals, a reduction in the individual noise contributions from the LNG refueling of at least 5 dB(A) is anticipated at NSRs 1 and 2.

3.5.6 Compressor Room

Dairy Partners (DP) are proposing to replace the existing louvres in the compressor room with new acoustic louvres, in line with the measures proposed for the Vat Room exhausts. In addition, an in-duct silencer will be applied to the ducting of one of the compressors to further mitigate noise emissions.

It should be noted that the compressor room has not previously been identified as a significant noise source. The room is located next to the chiller and glycol compound, with the louvres positioned above the glycol pumps. Given the constant presence of noise from the glycol pumps and chillers, it has been challenging to isolate and measure noise specifically from the compressor room. Consequently, no reliable or isolated measurements of the compressor room's noise emissions have been obtained.

Due to the dominance of noise from the glycol pumps and chillers, it is clear that emissions from the compressor room are significantly less in comparison. As a result, PJA has been unable to produce a noise estimate for the specific contributions of the compressor room.

Nonetheless, the proposed mitigation measures, including the acoustic louvres and in-duct silencer, are a step in the right direction. While PJA does not expect these measures to have a significant impact on the overall noise levels at the boundary, considering the compressor room's relative quietness compared to other noise sources, there is no harm in implementing these measures. They are considered to align with BAT principles and contribute to an overall improvement in noise management at the site.

3.5.7 Summary of Expected Reductions in Noise Emissions at the Receptors

Based on the predicted individual noise contributions from each noise source, as determined from the values in Table 3.1, and subtracting the estimated reductions for each mitigation measure highlighted in the previous subsections, the total noise contribution from fixed plant has been recalculated for each of the three noise-sensitive receptors (NSRs). The resulting noise levels are as follows:

- NSR 1: From 48 dB to 43 dB
- NSR 2: From 48 dB to 43 dB
- NSR 3: From 45 dB to 44 dB

While the specific noise levels are within a few decibels of those measured on site, these reductions indicate an improvement in the noise environment, particularly at NSRs 1 and 2, the most affected receptors.

A reduction of 5 dB is generally noticeable to most people. It would be perceived as a moderate decrease in loudness, making the noise less prominent, but still audible above background levels. While this reduction will be perceptible, the noise will not be fully masked by the surrounding environment. Therefore, although the noise from the site will still be above background levels, the proposed mitigation measures are expected to reduce its prominence and improve the overall noise environment, particularly at the receptors most impacted by the site's noise.

Appendix A – Acoustic Terminology and Concepts

A.1 – Glossary

Table A.1 – Glossary of acoustic terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio of the root-mean-square pressure of the sound and a reference pressure (2x10-5 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4000Hz (4kHz). This is roughly equal to the range of frequencies on a piano. Frequency is often divided into ('first') octave bands for analysis, with the range above considered within 7 octave bands with centre frequencies at 63 Hz, 125 Hz, 250 Hz, 1 kHz, 2 kHz and 4 kHz. 'Third' octave bands split this further into smaller frequency bands. This is typically only referenced in assessment of tonality of a noise source by identifying peaks (tones) in the frequency spectrum, i.e. when applying a rating penalty for tonality within a BS 4142:2014 assessment.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period. This parameter is typically considered as a good representation of the 'average' overall noise level. It is referred to technically as the A-weighted equivalent continuous sound level and is a dB(A) as defined above.
$L_{A90,T}$	The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level'.
$L_{A10,T}$	The A-weighted noise level that is exceeded for 10% of the measurement period T. This parameter is often considered as the 'average maximum level';
$L_{AFmax,T}$	The maximum A-weighted noise level during the measurement period T.

A.2 – Subjective Changes in Noise Level

Table A.2 – Subjective loudness from an increase or decrease in sound pressure level

Change in sound pressure level	Relative change in sound power energy (multiplier)		Change in apparent subjective loudness (for mid-frequency range)
	Decrease	Increase	
3 dB	1/2	2	'Just perceptible'
5 dB	1/3	3	'Clearly noticeable'
10 dB	1/10	10	'Half or twice as loud'
20 dB	1/100	100	'Much quieter, or louder'

Appendix B – Measurement/Modelling Details

B.1 – Noise Modelling

The noise predictions within this report have been undertaken using the proprietary software CadnaA® by DataKustik, a 3-D noise mapping package which implements a wide range of national and international standards, guidelines and calculation algorithms, including those set out in ISO 9613-2:1996.

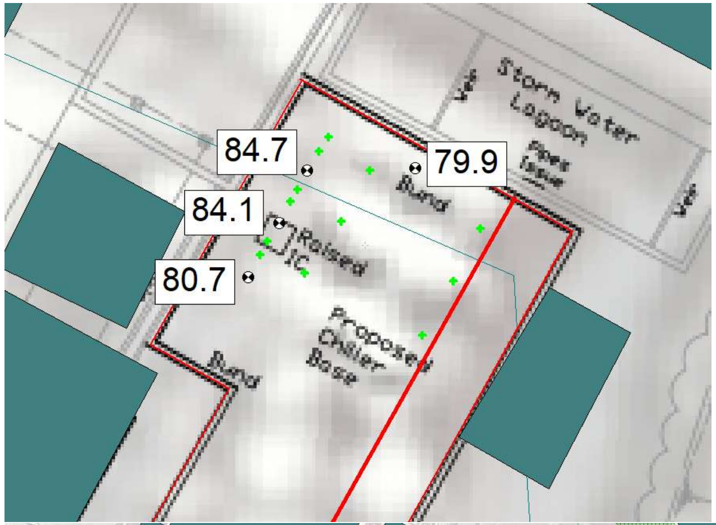
The noise model has been used to help predict noise contributions from each process/plant based upon measurements taken close to source. This is necessary as most noise sources are not loud enough to be dominant over the background noise at the nearby residents. The noise model has assumed:

- downwind propagation, i.e. a wind direction that assists the propagation of sound from source to receptor;
- a ground absorption factor of 0 on any roads, car parks, buildings, and any tarmacked/concreted areas;
- a ground absorption factor of 1 on grassy areas;
- a maximum reflection factor of three where buildings and barriers are assumed to have a 'smooth' reflective façade, as a worst-case;
- atmospheric sound absorption based upon a temperature of 10°C and a humidity level of 70%, as per Table 2 of ISO 9613-2:1996.
- Source heights representing the heights of the noise generating components observed on site.

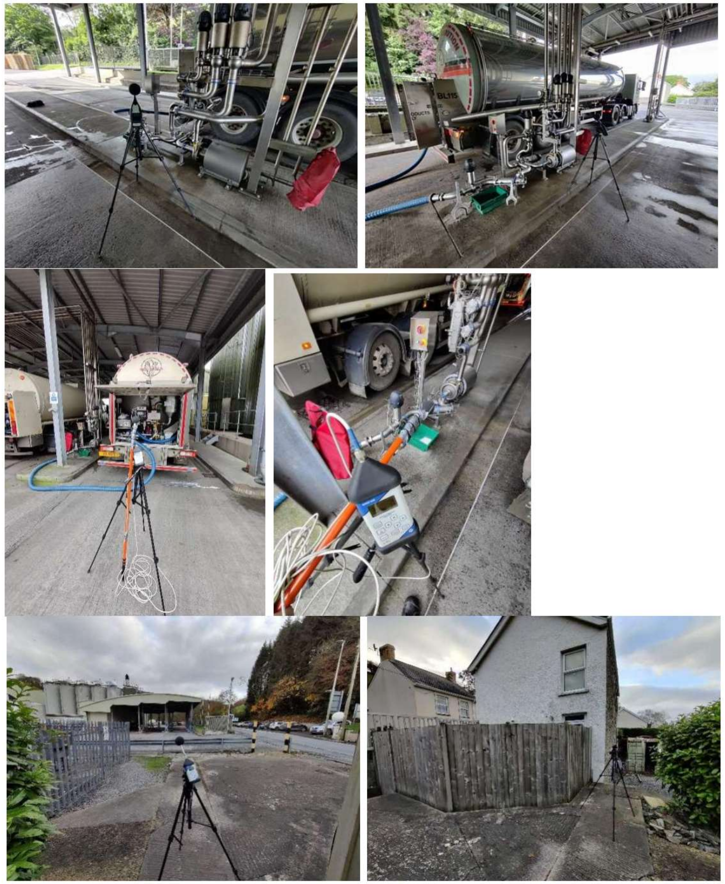
B.2 – Operational Noise Results

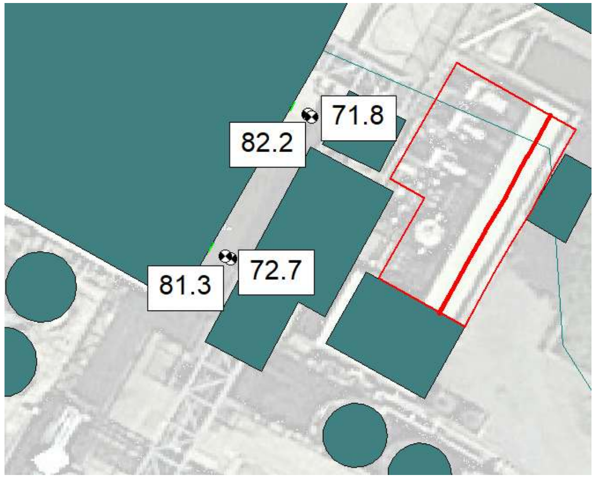
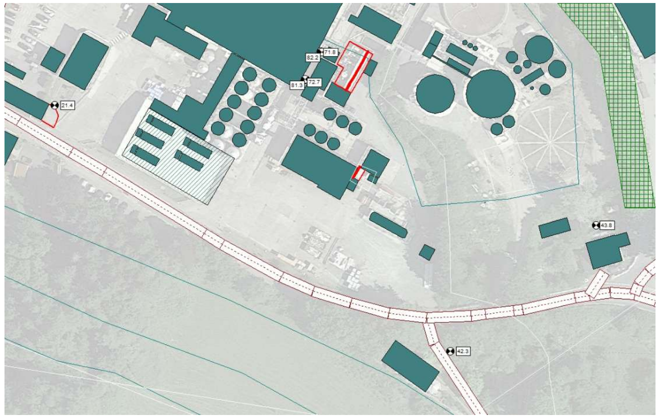
Shown on the subsequent pages. The results are those taken from the most recent measurements conducted on the 20th of July 2023 and 4th of July 2024, unless otherwise stated. Measurements presented from November 2021, July 2021, or September 2020 are done so because either a) the noise source did not operate during the latest survey, b) the noise source is sufficiently quiet and/or reliable measurements could not be taken due to the presence of other noise sources, or c) the noise source was not accessible due to works.

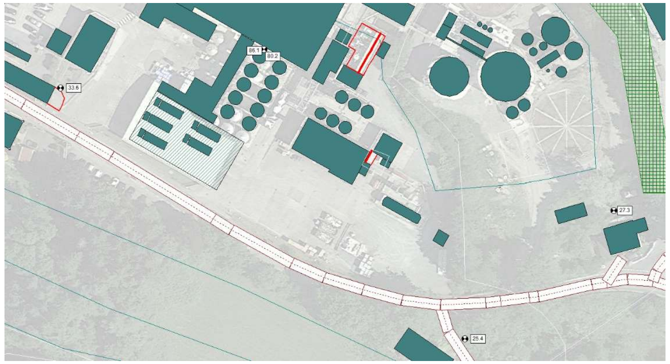
Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
ETP Tankers	**Source** 84 dB @ 1m from Vacuum Pump and Hydraulic Cooler **NSR 1** 67 dB (dominant) **NSR 2** 66 dB (dominant) **NSR 3** 35 dB Levels likely to fluctuate from tanker to tanker		Not required as noise source was clearly dominant during the measurements.

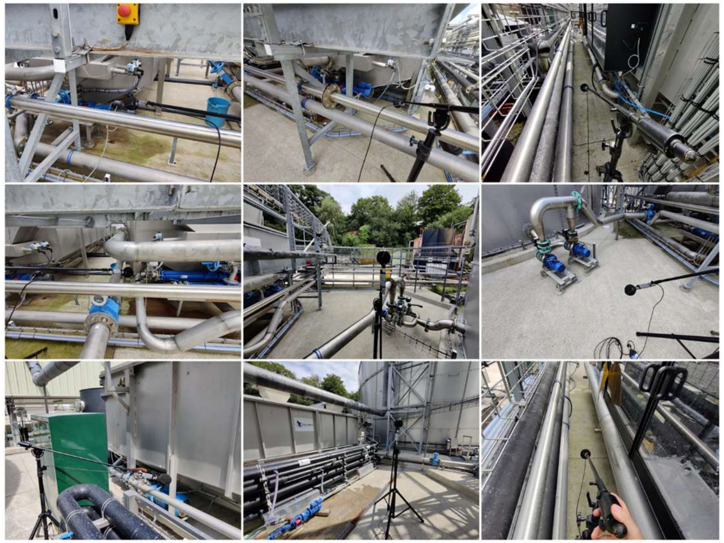
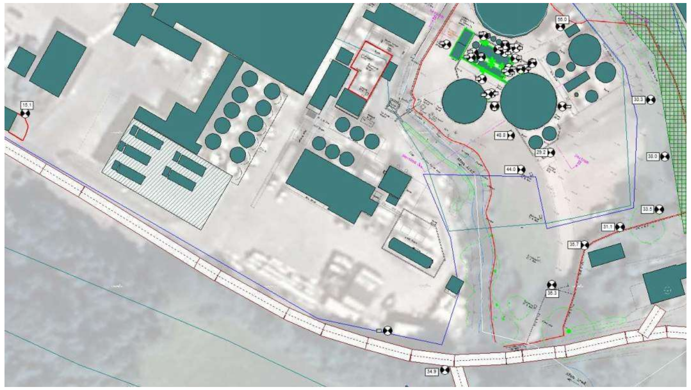
Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Chillers	**Source** 75 - 85 dB average inside compound depending on load. 85 dB between chiller 1 and 2 oil separators 84 dB between chiller 2 and 3 oil separators 80 dB south of chiller 3 oil separators 80 dB by side of screw compressor of chiller 1 **NSR 1** 43 dB (perceptible) **NSR 2** 43 dB (perceptible) **NSR 3** 23 dB (barely perceptible)		 

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Cooling Tower Pumps	**Source** 66 dB @ 0.5m in front of enclosure door 81 dB inside the enclosure. 87 dB with the microphone placed directly in centre of pump area. **NSR 1** 37 dB (just perceptible) **NSR 2** ≈39 dB (just perceptible) **NSR 3** 20 dB (not perceptible)		 

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Milk Tankers (pumping and idling)	<u>**Source**</u> 85 dB @ 1m from front cab 74 dB @ 1m from pump (though mostly idling noise from the lorry) <u>**NSR 1**</u> 36 dB (barely perceptible) <u>**NSR 2**</u> 46 dB (perceptible at most times, particularly during quiet periods of road traffic) <u>**NSR 3**</u> 65 dB (dominant) (with 5 lorries) 55 dB (with 1 lorry)		 

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Vat Room Exhausts (east elevation)	**<u>Source</u>** 78 dB at 1m below exhaust, 1m away from elevation 82 dB at 1m (and on axis) in front of the exhaust (measured in Nov 21) 72 dB at 1.5m above ground. **<u>NSR 1</u>** 44 dB (audible broadband noise) **<u>NSR 2</u>** 42 dB (audible broadband noise – as per above) **<u>NSR 3</u>** 21 dB (inaudible)		 

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Vat Room Exhaust (south elevation)	<u>**Source**</u> 80 dB at 1.5m height below. 86 dB at 1m in front and on axis <u>**NSR 1**</u> 27 dB (not distinguishable from other noise sources) <u>**NSR 2**</u> 25 dB (not perceptible) <u>**NSR 3**</u> 34 dB (just perceptible)		 

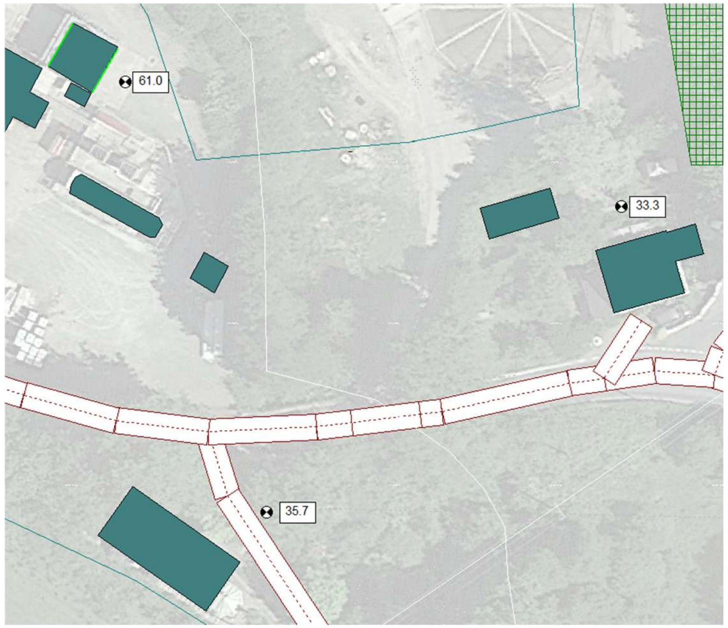
Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
ETP (Effluent Treatment Plant)	**<u>Source</u>** 60 to 85 dB at 1m depending on location. **<u>NSR 1</u>** 36 dB (perceptible but not clearly distinguishable from other more dominant noise sources) **<u>NSR 2</u>** 35 dB (perceptible but not clearly distinguishable) **<u>NSR 3</u>** 15 dB (not perceptible)		 

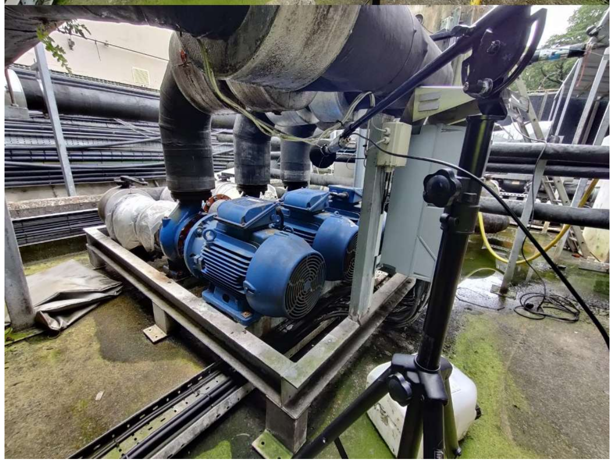
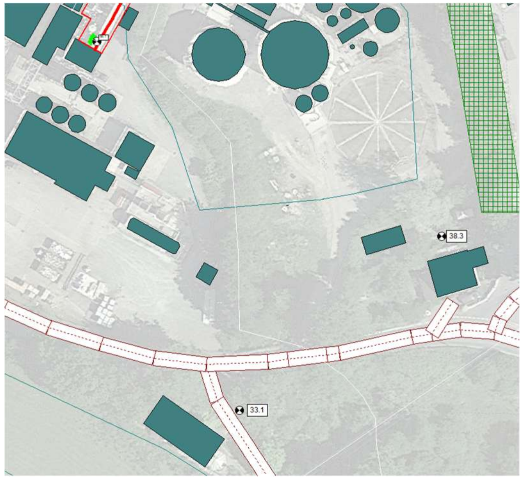
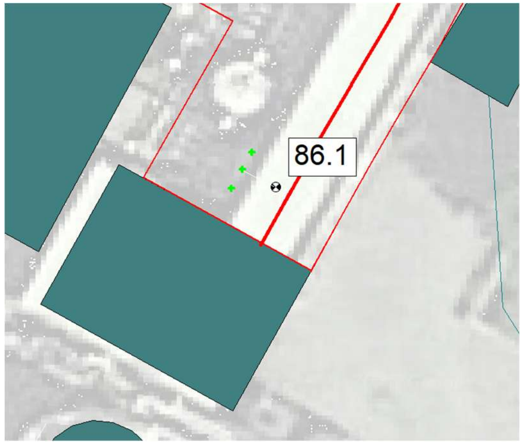
Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Borehole Pump Room	**Source** 66 dB 1m outside of the door. 70 dB 0.5m outside of fan on front elevation. **NSR 1** 30 dB (barely perceptible) **NSR 2** 23 dB (not perceptible) **NSR 3** 7 dB (inaudible)	 	 

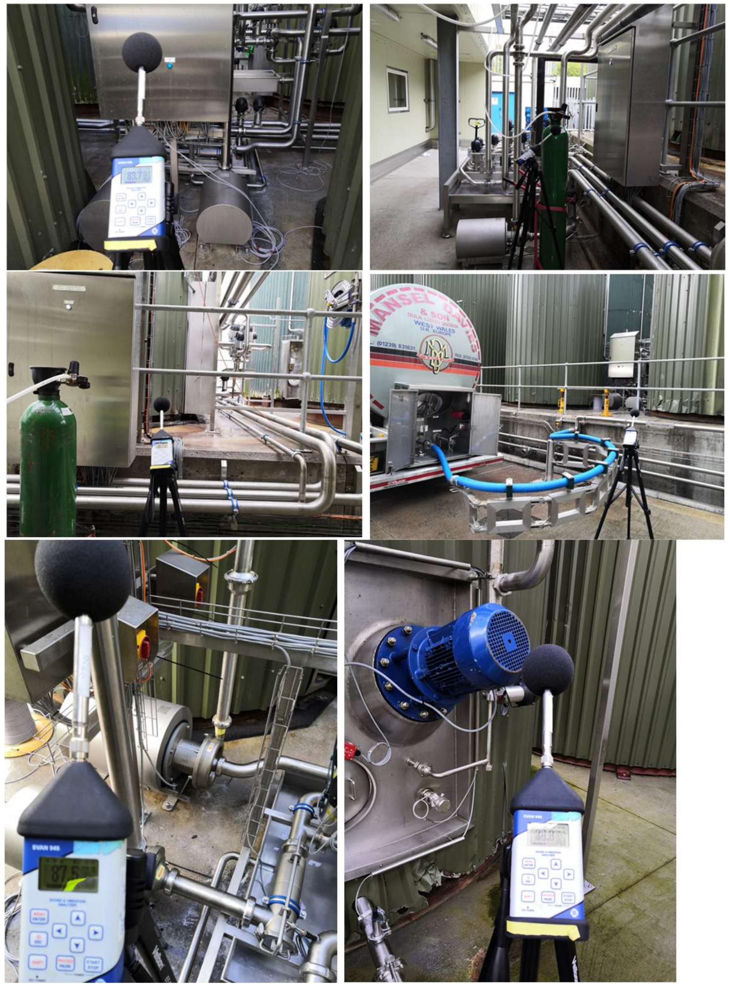
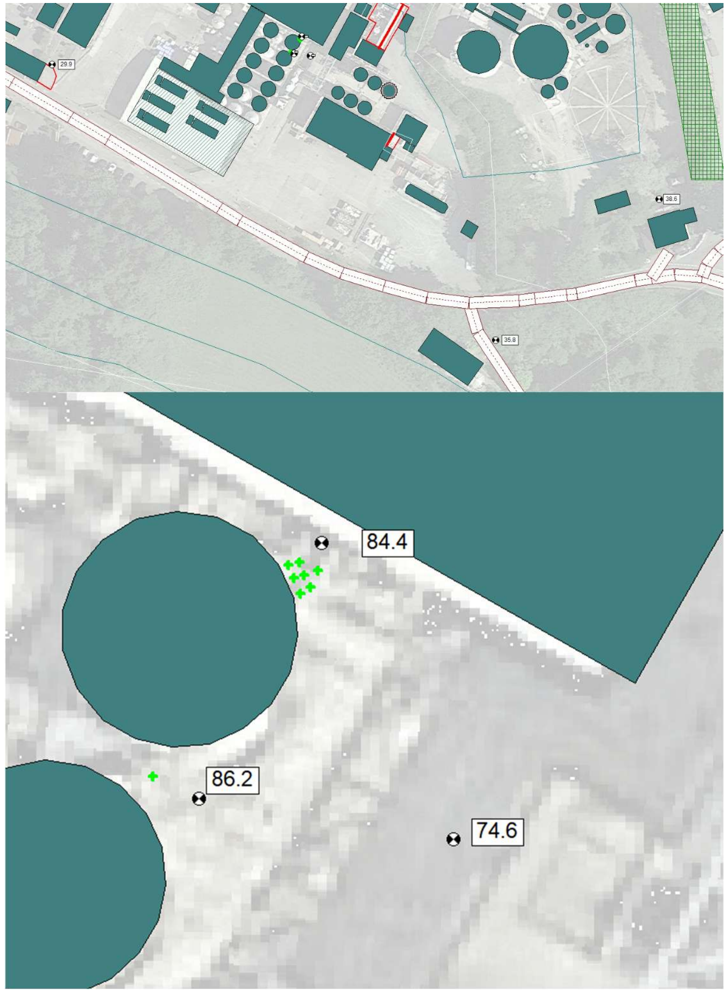
Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Boiler House Pressure Valve Release	**Source** <82 dB at ground level beneath the exhaust **NSR 1** 55 dB **NSR 2** 45 dB **NSR 3** 49 dB	 	

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
LNG (pressure fill)	**Source** ≈83 dB @ 1m **NSR 1** 50 dB (clearly audible) **NSR 2** 48 dB (clearly audible) **NSR 3** ≤35 dB (not audible over milk tanker noise)	 	Measurements taken at all three NSRs in June 2024 as detailed in the Noise Impact Assessment report dated the 18th of June

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
LNG (alarm)	**Source** 93 dB @ 1m from alarm Alarm sounds for a couple of seconds every 3 minutes **NSR 1** ≈60 dB $L_{Aeq,2sec}$ (clearly audible) **NSR 2** ≈58 dB $L_{Aeq,2sec}$ (clearly audible) **NSR 3** ≤45 dB $L_{Aeq,2sec}$ (not audible over milk tanker noise)		Measurements taken at all three NSRs in June 2024 as detailed in the Noise Impact Assessment report dated the 18^{th} of June

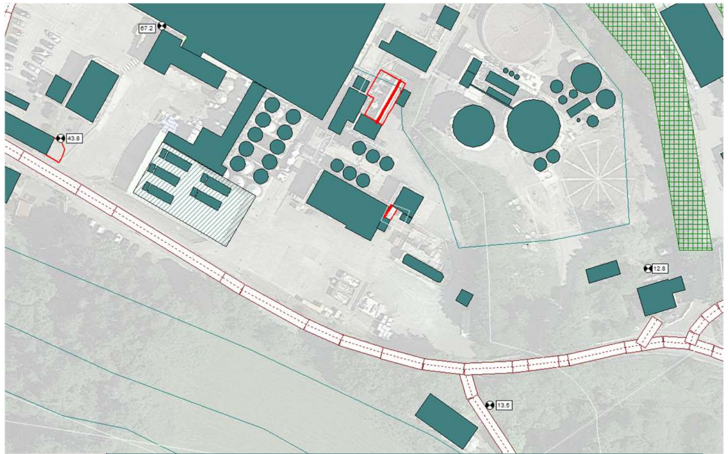
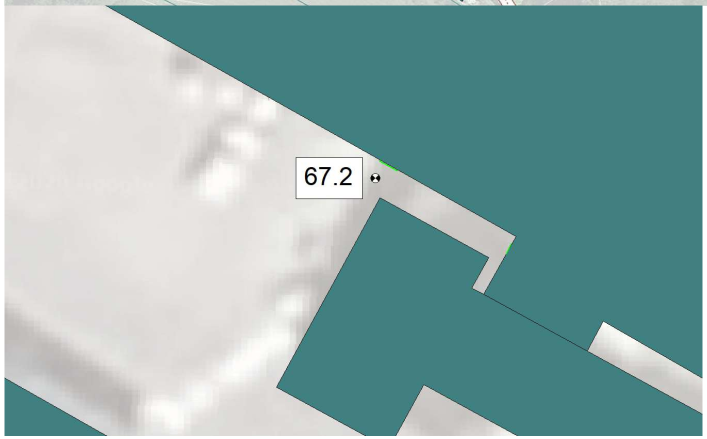
Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Cooling Towers	**Source** ≈61 dB @ 3m away / 3m above ground (previously measured 58 dB at 1.5m above ground. Not clear whether the increase is attributable to the Cooling Tower, assumed it is as a worst case) **NSR 1** 33 dB (perceptible – broadband noise) **NSR 2** 36 dB (perceptible – broadband noise) **NSR 3** 13 dB (not audible)	 	

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Glycol Pumps (Chiller Base)	**Source** 86 dB @ 1m in front of 3 pumps 92 dB with mic within 20cm of top of the pumps **NSR 1** 38 dB (just perceptible – slight tonal quality) **NSR 2** 33 dB (barely perceptible) **NSR 3** 23 dB (inaudible)	 	 

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Whey Dispatch Pump	**Source** 86 dB at 1m from noisiest dispatch pump **NSR 1** 39 dB (just perceptible) **NSR 2** 36 dB (just perceptible) **NSR 3** 30 dB (just perceptible)		

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Boiler House Louvres	<u>**Source**</u> ≈66 dB at ≈0.3m beneath the bottom of the louvres (higher than previously measured but measured much closer to the louvres) <u>**NSR 1**</u> 16 dB (not perceptible) <u>**NSR 2**</u> 37 dB (just perceptible broadband noise thought not typically distinguishable from residual noise) <u>**NSR 3**</u> 30 dB (just perceptible)	 	

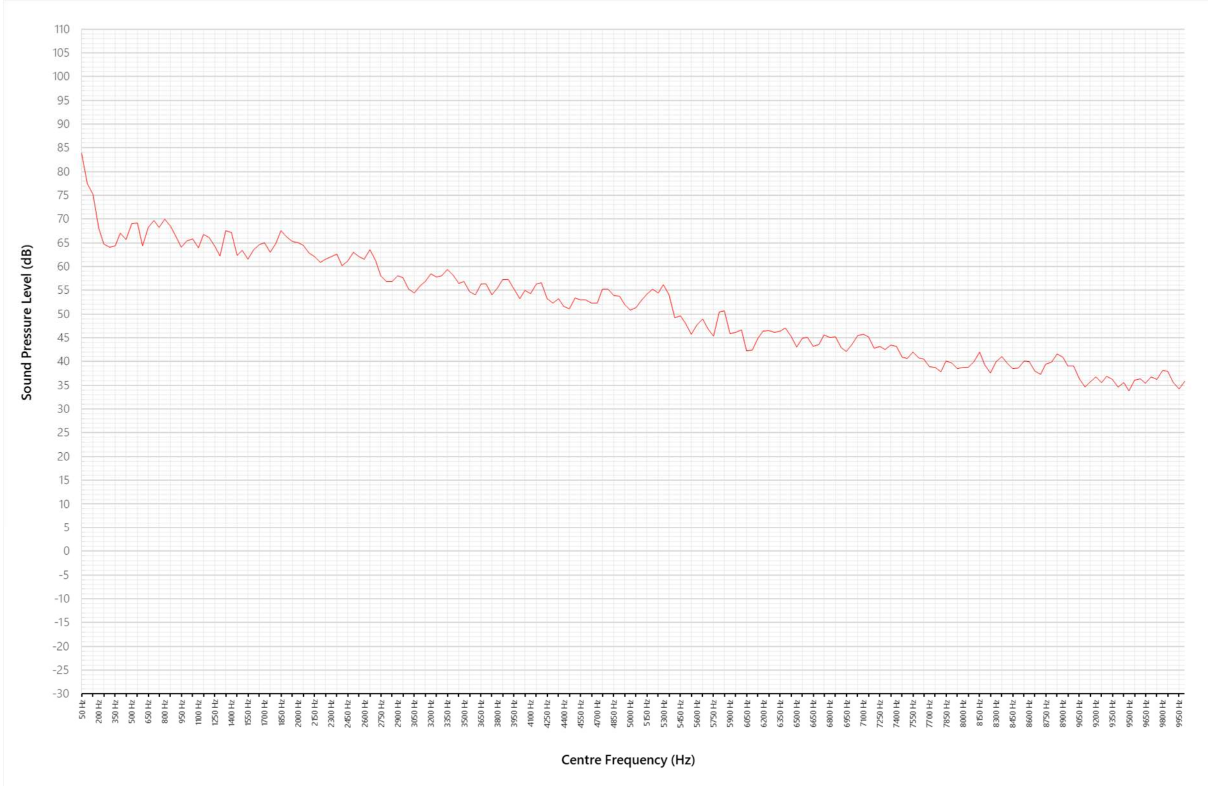
Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Pump House	**Source** 60 dB 1m outside door. 86 dB inside. **NSR 1** 22 dB (not perceptible) **NSR 2** 19 dB (not perceptible) **NSR 3** 3 dB (inaudible)	  	 

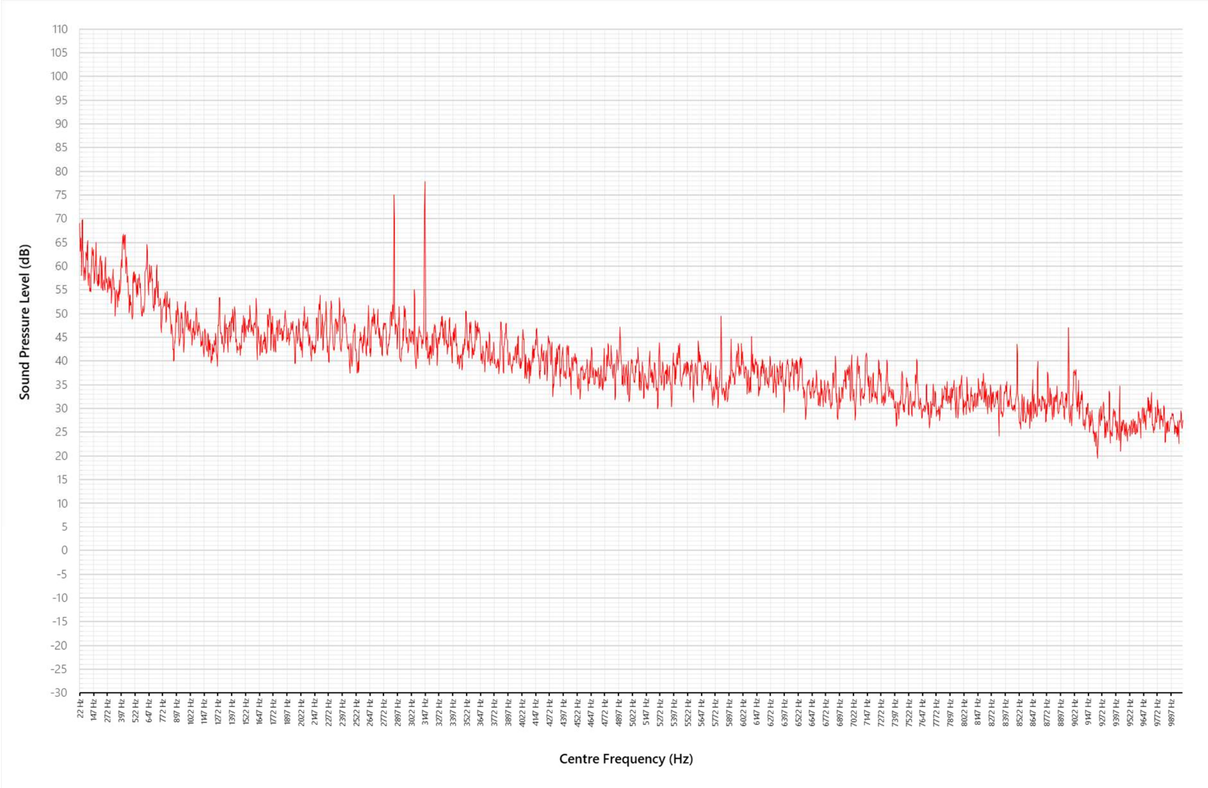
Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Production Hall Exhausts	<u>**Source**</u> <67 dB at ground level in sight of two exhausts <u>**NSR 1**</u> 13 dB (inaudible) <u>**NSR 2**</u> 14 dB (inaudible) <u>**NSR 3**</u> 44 dB (audible)	 	 

Noise Source	Measured/ Predicted Noise Levels (L_{Aeq}) / Subjective Observations	Site Photographs	Noise Model Screenshots
Borehole Water Tank	<u>**Source**</u> 76 dB @ 1m <u>**NSR 1**</u> 30 dB (not perceptible) <u>**NSR 2**</u> 18 dB (not perceptible) <u>**NSR 3**</u> 18 dB (not perceptible)	  (Photo from Sept 2020 measurements shown)	 

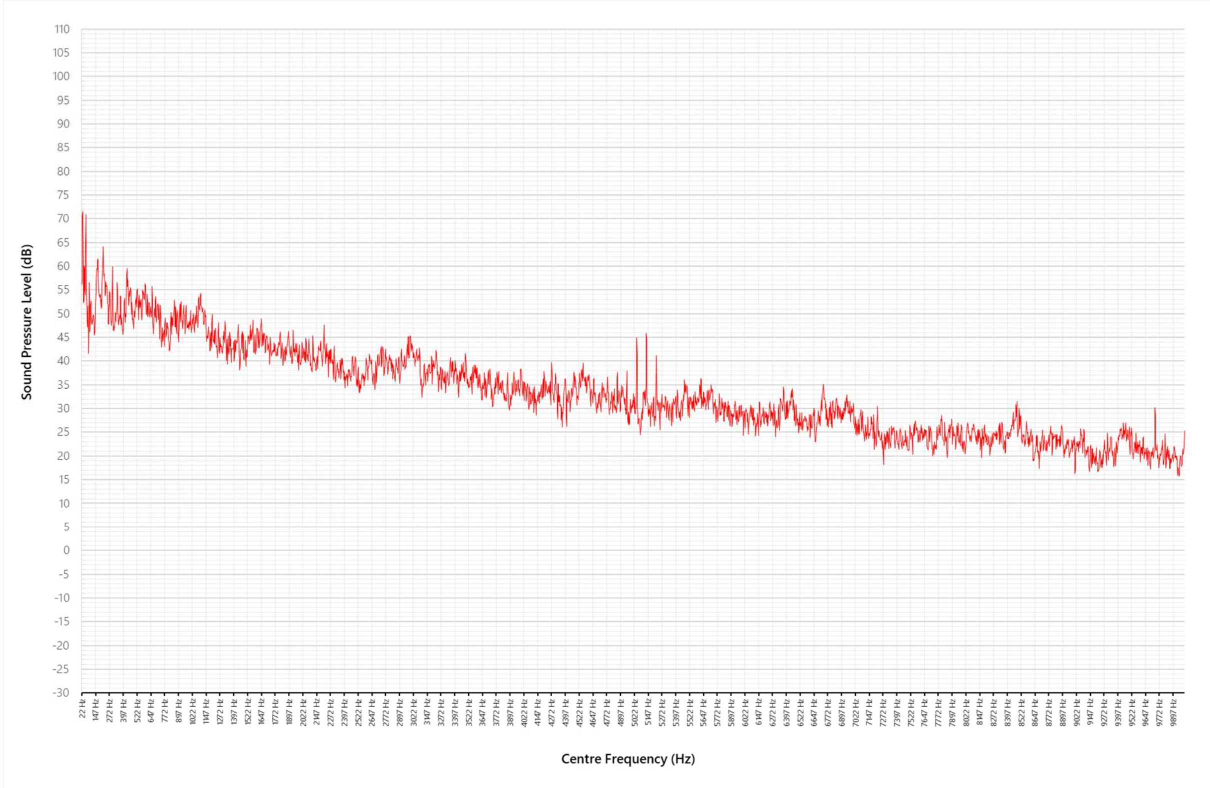
B.3 – Tonal Data

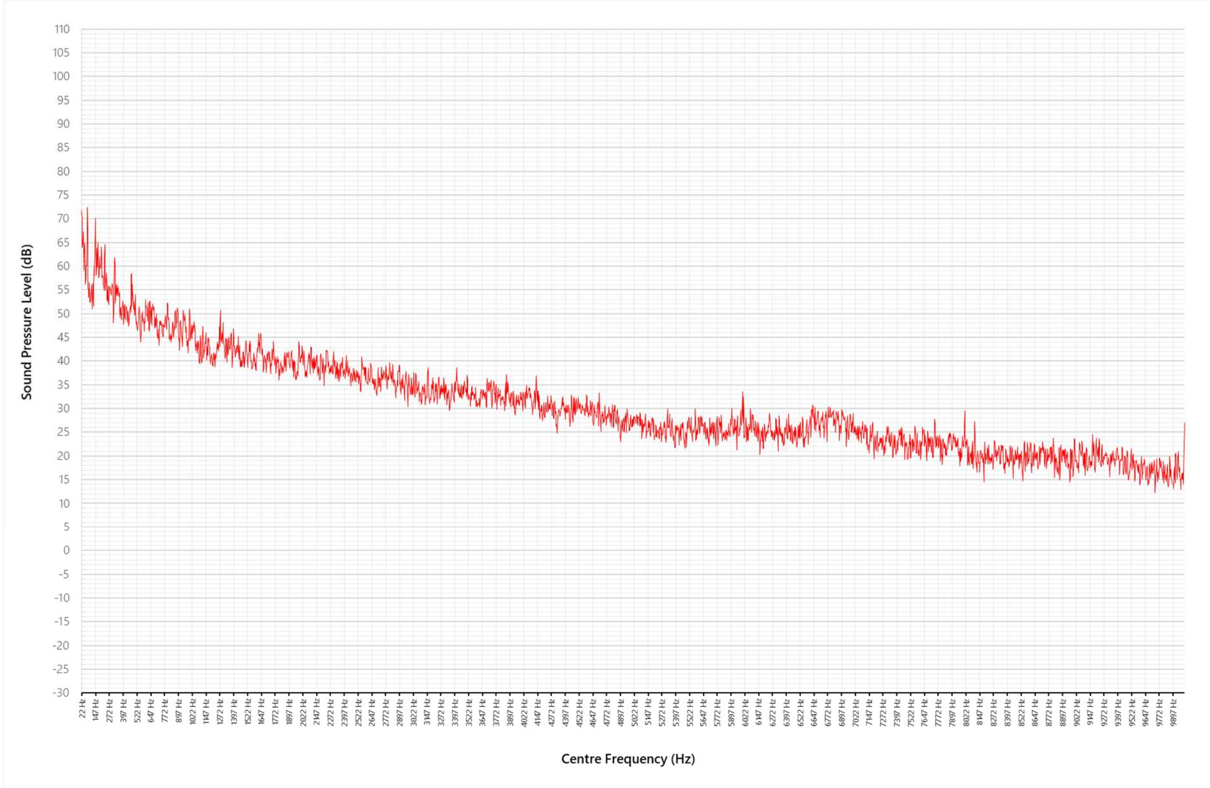
B.3.1 – FFT Graphs/Tone Identification

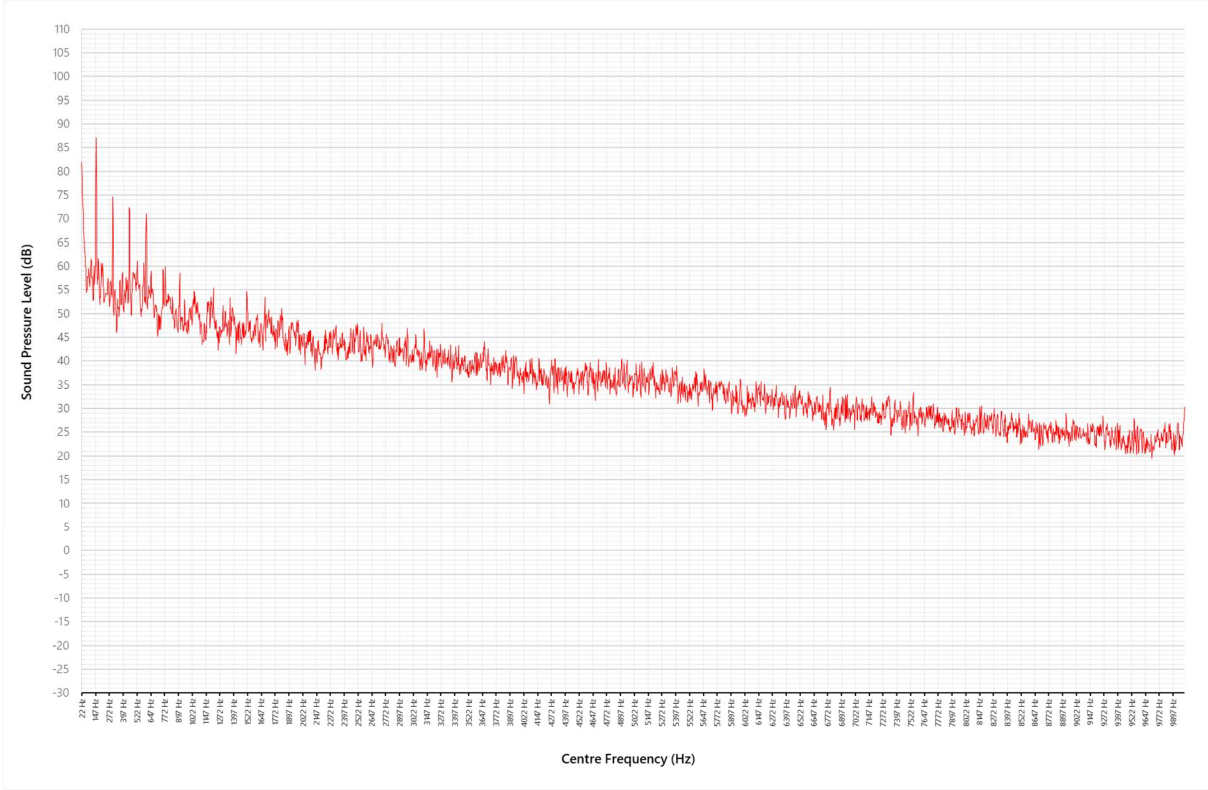
Noise Source	Measured L_{Aeq} / Measurement Position	FFT Graph
ETP Tankers	84 dB L_{Aeq} 1m from Vacuum Pump and Hydraulic Cooler 	
Comments	Low frequency bias associated with engine noise, but no particular tonal qualities.	

Noise Source	Measured L_{Aeq} / Measurement Position	FFT Graph
Cooling Tower Pumps	81 dB L_{Aeq} Inside the enclosure as shown below. 	
Comments	Tonal qualities observed in the graph at 2866 Hz and 3144 Hz. Also a small spike at 428 Hz. However, not particularly noticeable when standing at the site boundary.	

<table>
<tr><th>Noise Source</th><th>Measured L_{Aeq} / Measurement Position</th><th>FFT Graph</th></tr>
<tr><td>Milk Tankers (Pumping and Idling)</td><td>74 dB L_{Aeq}

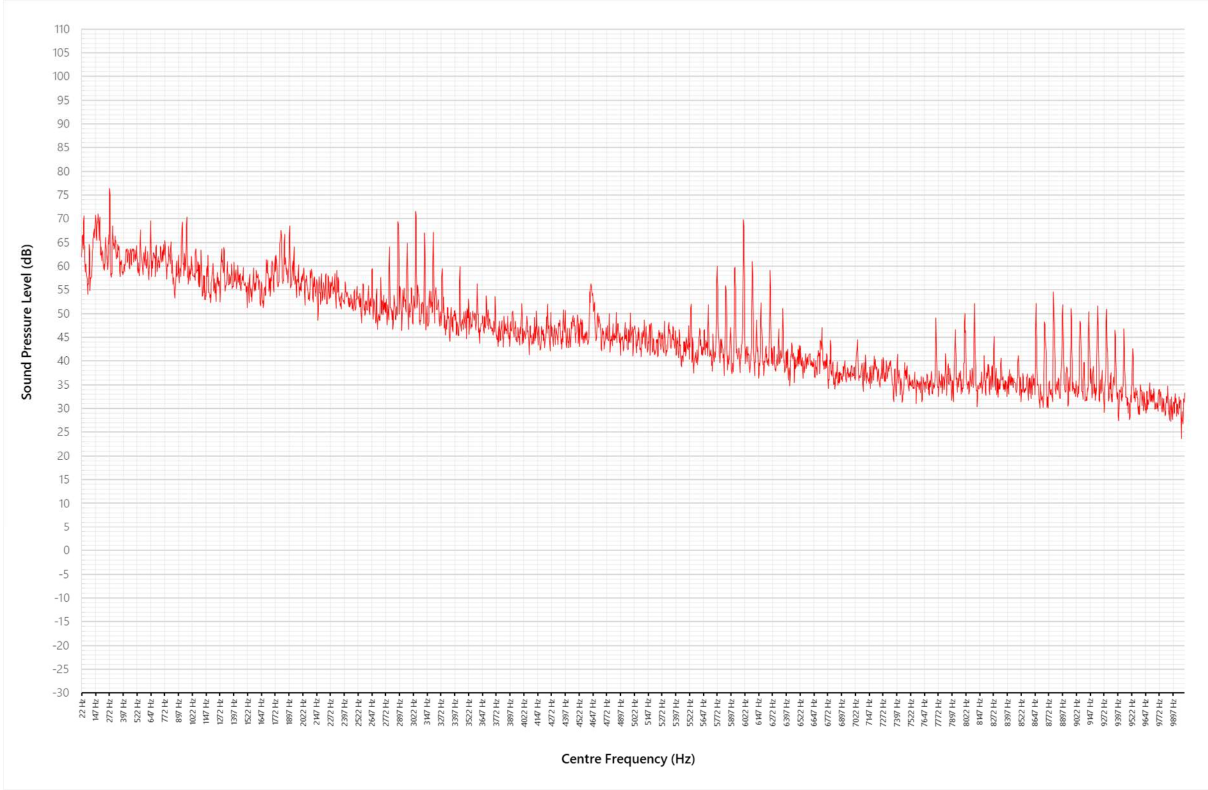
1m from the tanker pump.
</td><td></td></tr>
<tr><td>Comments</td><td colspan="2">No particular tonal qualities observed. Noise mostly from the tankers idling (which is understood to be necessary for the pump to work).</td></tr>
</table>

Noise Source	Measured L_{Aeq} / Measurement Position	FFT Graph
Vat Room Exhausts (east elevation)	78 dB L_{Aeq} 1m under/1m away from southernmost exhaust)	
Comments	No particular tonal qualities observed in the graph or subjectively. Some low frequency emphasis which is likely to be from turbulent flow generated noise, or from the blade passing frequency (assuming a large fan with a low RPM). No mid-to-high frequency tones, very much broadband in nature.	

Noise Source	Measured L_{Aeq} / Measurement Position	FFT Graph
Vat Room Exhaust (new) (south elevation)	80 dB L_{Aeq} 2m underneath the fan. 	
Comments	Perceived as a broadband noise though the fundamental tone and harmonics at low-to-mid frequency are observed in the graph, which is likely to be from the blade passing frequency. These subjectively however are not perceived as tonal.	

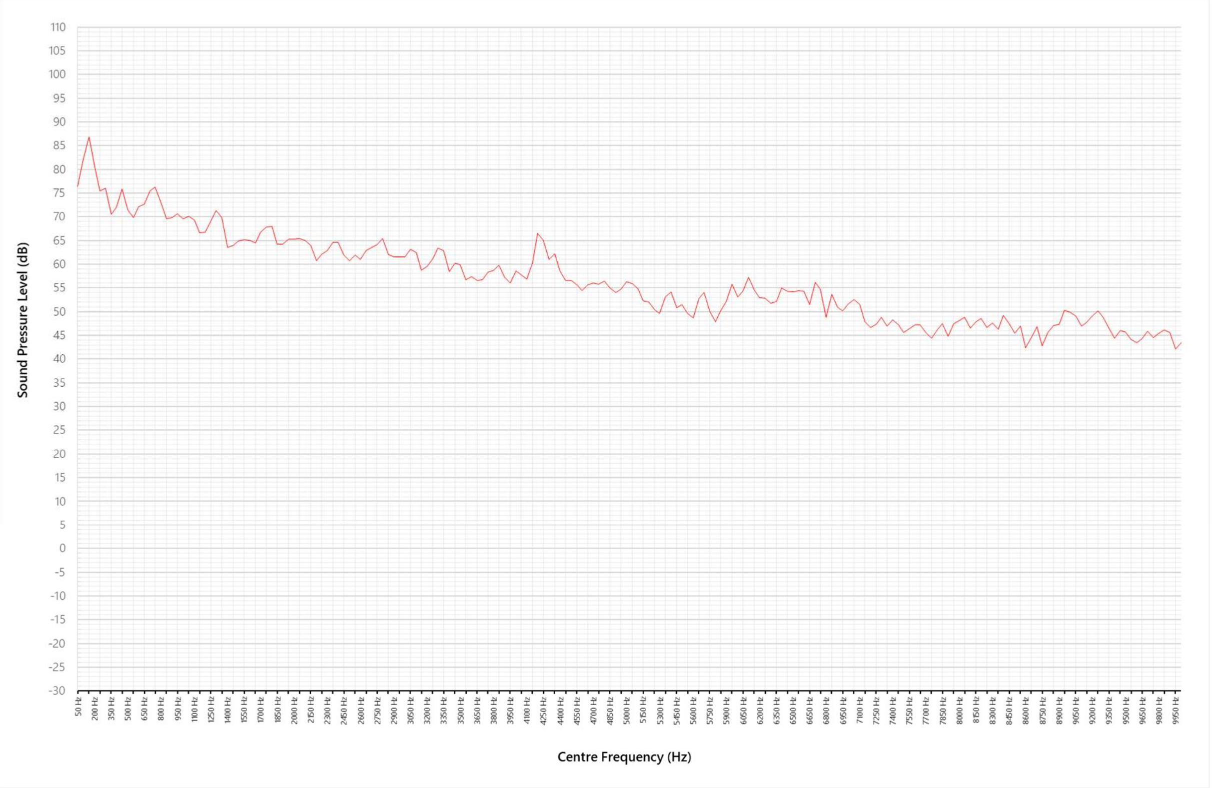
<table>
<tr><th>Noise Source</th><th>Measured L_{Aeq} / Measurement Position</th><th>FFT Graph</th></tr>
<tr><td>where Pumps (chiller compound)</td><td>86 dB L_{Aeq}

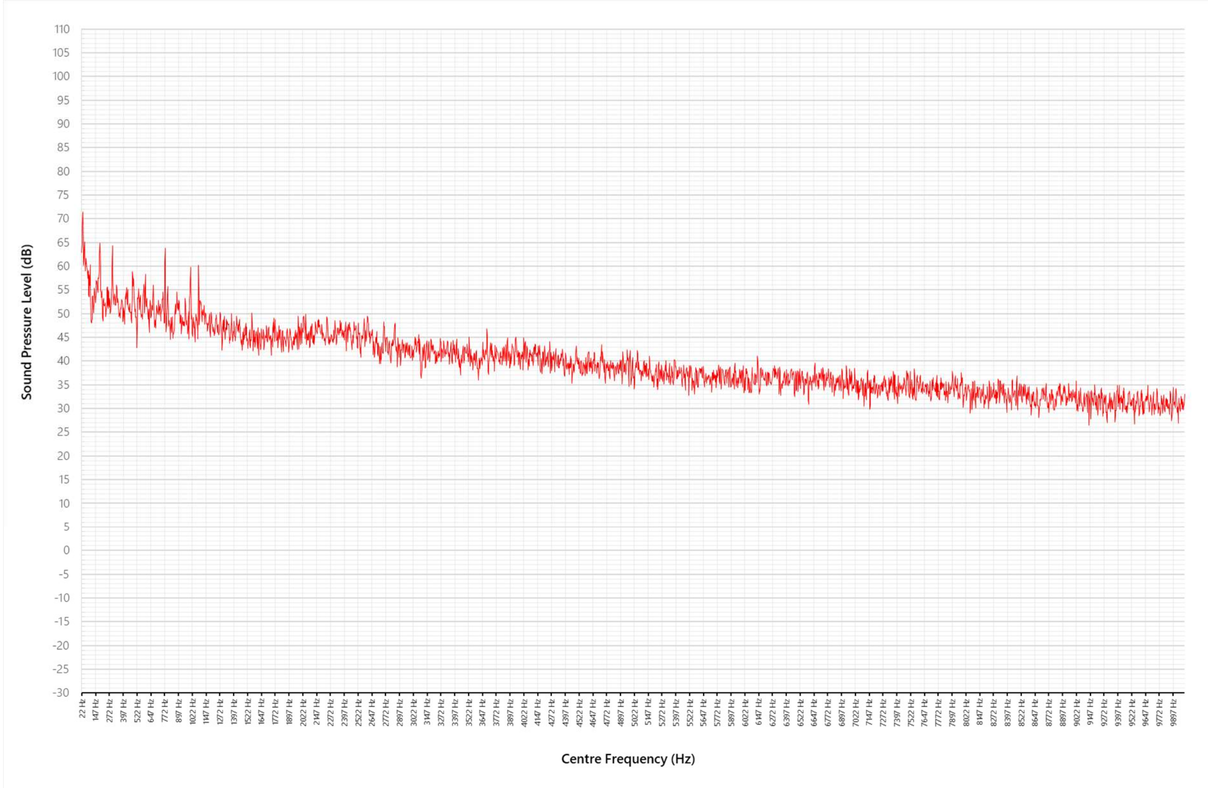
1m in front of 3 pumps.

</td><td>
</td></tr>
<tr><td>Comments</td><td colspan="2">Graph suggests three areas with evenly spaced tones, at around 3 kHz, 6 kHz, and 9 kHz. Suggesting there may be a fundamental tone at 3 kHz. Subjectively, the noise is mostly broadband with a harmonic type ringing, not perceptible at any one particular frequency.

High frequency tonal noise may be attributable to a lack of resilient anti-vibration fixings and the ‘ringing’ of loose screws/metal on metal contact.

Some tonal quality may also be heard from the chillers within the compound.</td></tr>
</table>

Noise Source	Measured L_{Aeq} / Measurement Position	FFT Graph
Pump House	86 dB L_{Aeq} Inside the pump room 	
Comments	Graph suggested a relatively broadband noise with some possible tonal element at around 4 kHz. Not noticeable at the receptors.	

Noise Source	Measured L_{Aeq} / Measurement Position	FFT Graph
Borehole Water Tank	76 dB L_{Aeq} 1m from the water tank (Photo not taken during the survey)	
Comments	Broadband noise – noise characteristic is of flowing water rather than a mechanical noise.	

B.3.2 – 1/3 Octave Bands

Item	Description	L_{Aeq} (dB)	dB in 1/3 Octave Frequency Bands (Hz)																						
			50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000
ETP Tankers	1m from Vacuum Pump	84	66	71	68	67	70	80	71	73	69	70	67	73	75	76	72	73	75	73	72	72	69	66	63
Chillers	1m from the side of Chiller 1	80	71	64	61	64	57	64	60	61	66	66	79	66	73	69	69	71	66	60	56	53	51	61	48
	Between oil separators of Chillers 1 and 2	85	65	66	62	62	59	68	63	60	68	84	75	73	81	73	73	72	71	65	61	62	59	62	53
	Between oil separators of Chillers 2 and 3	84	62	65	62	65	61	69	63	63	69	73	76	73	79	80	74	67	67	64	64	66	62	60	51
	1m from side of Chiller 3 oil separator	80	66	64	63	63	62	70	65	66	74	68	74	69	74	74	66	69	67	61	62	57	56	60	51
Cooling Tower Pumps	1m outside of enclosure door	65	65	63	63	59	61	60	59	62	61	61	58	56	52	52	51	51	51	54	56	49	47	46	40
	1m inside of enclosure door	79	69	63	67	65	71	69	72	73	72	71	71	71	69	66	66	67	67	68	70	65	65	63	60
Vat Room Exhausts (east elevation)	1m in front of left exhaust	82	83	80	79	75	73	76	71	70	75	71	72	71	72	72	71	72	73	72	69	68	65	63	61
	1m in front of right exhaust	82	71	74	71	71	72	82	78	75	79	72	72	72	72	73	72	70	69	69	67	65	62	60	58
Borehole Pump Room	0.5m outside fan	66	69	65	58	61	56	60	62	57	58	55	55	57	57	57	59	57	54	52	49	50	45	42	40
	1m outside door	70	73	70	64	68	64	65	61	60	62	59	58	60	60	60	61	60	58	57	54	54	50	47	45
Boiler House Pressure Valve Release	Below flue	82	64	65	65	62	63	64	66	69	68	71	71	72	76	74	71	72	71	71	71	69	67	64	60

Item	Description	L_{Aeq} (dB)	dB in 1/3 Octave Frequency Bands (Hz)																						
			50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000
LNG (alarm)*	1m - Alarm door open	95	79	68	73	70	64	74	68	75	69	78	68	64	79	67	79	85	92	86	86	82	69	57	54
Cooling Towers	3m - Not dominant noise source, broadband noise from cooling towers	61	67	63	67	69	65	60	62	57	55	53	50	50	50	51	48	46	46	44	46	41	38	37	35
Glycol Pumps (Chiller Base)	1m in front	86	68	65	64	67	68	72	72	76	84	76	75	76	78	78	76	74	71	71	72	66	63	65	65
	20cm above pumps	92	74	67	67	70	76	77	76	78	86	79	76	85	85	82	81	82	77	78	82	72	72	74	72
Whey Dispatch Pump	1m from dispatch pump	86	68	66	62	63	62	67	70	69	68	77	70	68	83	73	74	73	75	76	74	73	73	72	69
Boiler House Louvres	0.3m beneath the bottom of the louvres	66	62	75	83	73	62	60	58	54	55	54	53	55	55	58	54	53	52	53	52	49	46	41	38
Pump House	Inside room	90	64	62	61	69	70	85	75	74	80	83	84	80	80	80	81	78	76	79	76	72	69	68	65
	1m outside closed door	60	53	51	54	51	53	62	57	53	64	51	48	48	47	46	47	45	44	43	41	41	39	37	35
Production Hall Exhausts	Below exhaust	67	71	68	68	66	62	65	61	64	62	61	60	59	57	57	57	57	56	53	52	52	50	48	46
LNG (pressure fill)	1m from pump	83	66	61	65	58	60	75	63	61	60	73	64	60	81	70	73	73	65	59	66	62	58	52	49
Borehole Water Tank	1m in front	76	75	74	65	64	60	66	68	68	70	69	67	66	65	67	65	64	63	63	63	62	61	59	58

Appendix C – Relevant Guidelines

C.1 - Horizontal Guidance Note for Noise Assessment and Control

The purpose of the *Horizontal Guidance Note for Noise Assessment and Control* is to provide supplementary information, relevant to all sectors, to assist in preventing and minimising emissions of noise as described in the Sector Guidance Notes (or the General Sector Guidance Note).

The guidance is in two parts:

Part 1 – Regulation and Permitting – outlines the main considerations relating to the setting of Permit conditions and subsequent regulation of noise. Part 1 is aimed primarily at the information needs of regulators.

Part 2 – Noise Assessment and Control – describes the principles of noise measurement and prediction and the control of noise by design, by operational and management techniques and abatement technologies. Outline methods of noise control are provided such as:

- use of inherently quieter processes;
- selection of inherently quiet plant or "low-noise options";
- site layout to maximise natural screening, screening by buildings and separation distances;
- the orientation of directional noise sources away from sensitive receptors; and
- noise barriers or bunding.

C.2 - BS 4142:2014

BS 4142:2014 *'Methods for rating and assessing industrial and commercial sound'* is intended to be used to assess the potential adverse impact of sound of an industrial and/or commercial nature, at nearby noise-sensitive receptor (NSR) locations within the context of the existing sound environment. The method is based upon assessing the predicted noise emissions from plant against the existing background sound levels at NSRs. The predicted emissions are termed as a 'rating level', which is the specific sound level from plant, plus 'penalties' which account for whether the noise has distinguishing characteristics such as tonality, intermittency, impulsivity, or is generally distinguishable from the ambient noise environment. Such features may attract attention and be considered annoying, hence sounds with these qualities should be penalised over sounds at the same specific noise level which is less intrusive.

The significance of the impact of an industrial or commercial sound source depends on both the margin by which the rating level $L_{Ar,Tr}$ exceeds the background sound level $L_{A90,T}$ and the context in which the sound occurs. It is therefore essential to place the sound in context. But in general, *"the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."* However, if the rating level does exceed the background sound level, "a difference of around + 5 dB is likely to be an indication of an adverse impact, depending on the context", and "a difference of around +10 dB or more is likely to be an indication of a significant adverse impact depending on the context."

C.3 – BAT Guidance on Noise (Food, Drink and Milk Industries BRef, EU 2019)

Overview

This appendix summarises the key guidance relating to noise management from the Best Available Techniques (BAT) Reference Document for the Food, Drink and Milk Industries (EU, 2019). Two key sections are considered:

- Chapter 2.3.8 – Techniques to Consider in the Determination of BAT (under General Techniques), which discusses noise in the context of environmental performance across all food and drink facilities.
- Chapter 17.1.8 – BAT 14 (under the BAT Conclusions), which sets out specific BAT techniques for noise control, as applicable to the industry.

These sections form the core basis of NRW's expectation that the operator (DP) demonstrates the application of BAT principles in controlling noise emissions from the site.

Chapter 2.3.8 – Techniques to Reduce Noise and Vibration

This section provides general guidance for operators on how to approach noise control as part of environmental best practice. The key principles include:

- Baseline understanding: The identification of major noise sources and the assessment of their significance is fundamental. This should include distinguishing between permanent, continuous, or intermittent noise sources.
- Site layout and spatial planning: Consideration should be given to the placement of noise sources relative to sensitive receptors. Using buildings, terrain, or other obstacles to screen noise can be beneficial.
- Maintenance and inspection: Regular servicing of plant and equipment helps to prevent deterioration and excessive noise. Equipment that is poorly maintained or operating abnormally is a common cause of elevated site noise.
- Quiet design and replacement: Where possible, inherently quieter equipment should be selected. This includes low-noise fans, pumps, and compressors.
- Acoustic enclosures and barriers: For fixed sources of noise, such as refrigeration units, compressors, or pumps, partial or full enclosures can provide significant attenuation. Barriers may also be used externally to shield receptors.
- Operational controls: Measures such as restricting noisy activities to daytime hours, shutting doors/windows during operation, or rotating the use of equipment to spread noise impact can all reduce nuisance.
- Noise monitoring: Regular measurement of noise levels, including at site boundaries and at receptor locations (where access allows), is recommended to track compliance and evaluate the effectiveness of mitigation.

These techniques are not prescriptive but are intended to guide operators in identifying and implementing the most appropriate and feasible controls based on site-specific conditions.

BAT 14 – Techniques for Reducing Noise Emissions (Chapter 17.1.8)

BAT 14 outlines a set of techniques that should be considered in order to prevent or minimise noise emissions, with the specific combination depending on the nature of the plant, operational limitations, and spatial constraints.

1. Appropriate Location of Equipment and Buildings

Noise levels can be reduced by placing noisy equipment further from sensitive areas or using existing buildings to shield receptors. In some cases, relocating doorways, vents, or process areas may offer additional attenuation—although this is often impractical for established sites.

2. Operational Measures

Commonly applicable low-cost measures include:

- Improved inspection and maintenance regimes;
- Keeping doors and windows closed in noisy areas;
- Scheduling noisy tasks during daytime;
- Ensuring only trained staff operate equipment;
- Using noise control procedures during maintenance.

3. Low-Noise Equipment

This refers to the use of quieter alternatives for standard plant items such as pumps, fans, and compressors. While suitable for new installations, retrofitting low-noise equipment on an existing site can present challenges.

4. Noise Control Equipment

This includes:

- Noise reducers or silencers;
- Acoustic insulation;
- Full or partial plant enclosures;
- Soundproofing of internal spaces and buildings.

Space and access constraints can limit the feasibility of these techniques, but they often provide substantial benefit where applied correctly.

5. Noise Abatement Structures

Introducing obstacles such as fences, bunds, or buildings between the noise source and the receptor can reduce propagation. These measures tend to be more suitable for existing plants, where the original site design did not incorporate noise control at source.

Use in This Audit

The assessment provided in this report considers the feasibility and potential benefit of each of the above techniques in relation to the individual sources of noise at the site. Where measures are not being taken forward, commentary is provided on the likely acoustic performance and general reasoning—though further explanation may be given separately by the operator in regard to cost or practicality.

The structure of this audit reflects the principles outlined in Chapter 2.3.8 and BAT 14, ensuring that all relevant mitigation routes have been evaluated in line with current best practice for the sector.

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