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ACOUSTIC CONSULTANTS

NOISE ASSESSMENT

ARLA, TAW VALLEY

ISSUE 02

REPORT REFERENCE NO. J005953-9406-02

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	Name	Position
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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.

CONTENTS

1.0 SUMMARY

At the request of EHS Projects a noise impact assessment has been undertaken with respect to closest receivers to the 24 hour operating dairy processing facility at Arla Foods, Taw Valley. The assessment has been commissioned to support an Environment Agency Environmental Permit Variation to give an understanding of the current noise emissions from the site and the noise emission including modification proposals for comparison with typical target noise emission levels

Our assessment has determined that, based on the company applying all practical mitigation treatments to achieve Best Practical Means / Best Available Techniques approach, and taking account of the context of the site and its standing and acoustic perception (or lack of) within the surrounding community, then the following target criteria would appear to be the most reasonable and practical target criterion for controlling noise emissions from the site as set out in section 4.5.6 of this report:

- A sound rating level less than 5dB above representative background noise levels during the day-time, thus equating to a limit of 46 dB(A) $L_{Ar,T,r}$.

- A sound rating level less than 10dB above representative background noise levels during the night-time, thus equating to a limit of 39 dB(A) $L_{Ar,T,r}$.

Section 10.1 of the report indicates that with the modification proposals in place and with mitigation applied as recommended:

- during the daytime the sound rating levels do meet the proposed criteria of 46 dB $L_{Ar,Tr}$ from Section 4.5.6 or all locations.

- that during the night-time the sound rating levels do not meet the proposed criteria of 39 dB $L_{Ar,Tr}$ from Section 4.5.6 except at Wellspring Lane and Foxglove Court.

Notwithstanding the above, external amenity areas at the residential receivers will predominantly not be used at night. As such, if it were considered that after application of mitigation the following would be true…

- all *practical* mitigation options had been exhausted,
- subsequent to the said mitigation there was unlikely to be a tangible character to the sound emission
- there will be a significant reduction in noise levels compared to the existing scenario amounting to in the region of a minimum of 5dB at the least in all cases, therefore achieving in the region of a halving of loudness of more.

….then achieving the World Health Organisation (WHO) recommendation of 45 dBA $L_{eq\ 8\ hour}$ for "non-industrial" type noise sources at locations outside windows at night would seem a reasonable and practical target criterion when looking at the context of the site. Table 14 indicates that L_{Aeq} noise levels of 44 dB(A) even for the worst 15 minutes, thus it would be expected that the criterion would be more comfortably achieve over the full 8 hour night-time period.

Notwithstanding the above, I note that this WHO guideline is designed to be applied to **"all noise"** including industrial components and not industrial components alone as we are undertaking to do here.

However, noting that the second chart in Section 6.3 indicates that during the night-time current L_{Aeq} noise levels are in lower 50s L_{Aeq}, and that our current predictions of Arla associated noise alone indicate 50-51 dBA L_{eq}, then it might be indicated that the noise from Arla already dominates the night-time noise climate, and therefore potentially reducing this noise emission from Arla to 44 dB(A) $L_{eq\ 8\ hours}$ or less will likely mean a similar reduction from all sources. As such it seems likely that with the proposed mitigation in place then noise from all sources on site will likely approach the 45 dBA $L_{eq\ 8\ hour}$ limit from WHO for "all noise" and also represent a significant reduction to the current noise climate.

As such based on the above we would be of the opinion that with the said recommended measures in place then the overall impact from the development would be “low”.

Furthermore the Operator could reasonably argue that operational mitigation measures such as described in section 10.1 can be seen as achieving Best Practical Means / Best Available Techniques and would therefore be adequate.

1.1 Report Overview

Section 3 details the site location and the nearest noise sensitive receivers (NNSRs). The section also gives a breakdown of potentially noisy operations at site.

Section 4 outlines the assessment criteria and methodology from BS4142:2014+A1:2019 “Methods for rating and assessing industrial and commercial sound” and other standards as typically required by the Environmental Agency for use in the noise impact assessment.

Section 5 gives details of the Background and Ambient Sound Level Survey undertaken at a proxy location away from the Arla Taw Valley site.

Section 6 gives details of the site noise survey including long term measurements at locations close to the site perimeter and short term measurements to characterise noise emissions from individual plant items in more detail.

Section 7 gives details Site Modification Proposals.

Section 8 details the noise modelling of the existing site in SoundPLAN 9.1 noise mapping model of the site calibrated to measured sound level data and gives a noise impact assessment to BS4142:2014+A1:2019 guidelines.

Section 9 details the noise modelling of the existing site including modification proposals and gives a noise impact assessment to BS4142:2014+A1:2019 guidelines.

Section 10 gives details of potential mitigation options that could be described as being within Best Practical Means / Best Available Techniques. The section still indicates adverse impacts based on BS4142 assessment methodology, but goes on to discuss contextual mitigating circumstances and indicates that absolute sound levels at closest sensitive receivers with mitigation in place could be argued as being within acceptable threshold limits based on other guidance.

Section 11 details uncertainties associated with the assessment process and how they have been overcome or minimised.

2.0 INTRODUCTION

Arla Foods, Taw Valley have requested a noise assessment to support an Environment Agency Environmental Permit Variation. The noise assessment is to be undertaken to give an understanding of the current noise emissions at site and the noise emission including for modification proposals for comparison with typical target noise emission levels. The assessment has been undertaken to the requirements of BS4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'. The investigation also includes for measurement of background sound at a proxy location away from the site to allow for comparison of site noise with background sound at a location unfettered by noise from the facility.

The following sections set out the investigation and detail recommendations for mitigation where required.

3.0 SITE LAYOUT AND OPERATION

The location of the facility is shown in Figure 1 below, along with the nearest noise sensitive receivers (NNSRs).

Figure 1: Site Layout showing site layout and Nearest Noise Sensitive Receiver (NNSR) Locations (Google Earth)

Operations of the existing site are described in Section 6.0 and proposals for modification of the site are set out in Section 7.0.

4.0 CRITERIA

4.1 Introduction

Assessment is to be undertaken to BS4142:2014+A1:2019 (see below) as per industry standard and Environment Agency / Natural Resources Wales (NRW) requirements.

4.2 BS 4142:2014 + A1:2019 Methods for rating and assessing industrial and commercial sound'

The standard describes a method of determining the level of sound of a commercial nature, together with procedures for assessing the impact of such a sound outside nearby noise sensitive areas.

The standard may be thought of as a procedure for comparing the sound from commercial sources with background sound levels in the absence of the comercial sound and determining the likely impact of the sound on noise sensitive residences.

In accordance with BS 4142 the background sound level is the typical A-weighted sound pressure level at the assessment position that is exceeded for 90% of a given time interval (L_{A90}). The specific sound level is the equivalent continuous (L_{Aeq}) sound pressure level at the assessment position produced by the commercial source over a given time interval.

Certain acoustic features can increase the impact over that expected from a simple comparison between the specific sound level and the background level. Where such features are present, these are taken into account by adding corrections to the specific sound level.

This correction is applied based on whether the following features occur, or are expected to be present. The correction values can either be determined subjectively, or by various objective measurement procedures.

- The sound contains a distinguishable, discrete, continuous tone (whine, hiss, screech, hum, etc.). 0 – 6 dB penalty
- The sound contains distinct impulses (bangs, clicks, clatters, or thumps). 0 – 9 dB penalty.
- The sound is irregular enough to attract attention. 0 – 3 dB penalty.
- Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

From the addition of the above penalties where appropriate the rating level is established, this being the value that is compared with the background sound. Note that corrections for impulsivity and tonality may be added arithmetically where both are present and likely to affect perception within the same reference period. However, if any single feature is dominant to the exclusion of the others then it might be appropriate to apply a reduced or even zero correction for the minor charcteristics.

According to BS 4142 an initial estimate of the impact is given based on the rating level value as follows:

- a rating level 10 dB(A) or more above the background is an indication of significant adverse impact, depending on the context.
- a rating level 5 dB(A) above the background is an indication of an adverse impact, depending on the context.
- where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on the context.

BS4142 indicates that the noise source should be evaluated over the appropriate time interval which is as follows:

- 1h during the day (07:00 – 23:00 hours)
- 15 min during the night (23:00 – 07:00 hours)

The above initial assessment may then be modified depending on the context, to take into account;

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
    1. Façade insulation treatment
    2. Ventilation and / or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
    3. Acoustic screening

4.2.1 Where Background Sound Levels Contain Existing Industrial Noise

Section 8.1 of BS4142:2014 states that

> *"….it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds…."*

4.2.2 Where Background Sound Levels are Low

It is additionally noted that BS4142 Section 11 states that:

> *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night".*

It is noted that the previous incarnation of BS4142, i.e. BS4142:1997 – 'Method for rating industrial noise affecting mixed residential and industrial areas' also noted limitations where background noise levels are low and stated that

> *"The method is not suitable for assessing the noise measured inside buildings or when background and rating noise levels are both very low.*
>
> *NOTE. For the purposes of this standard, background noise levels below 30dB and rating levels below about 35dB are considered low."*

4.3 BS 8233:2014 Guidance on Sound Insulation and Noise reduction for Buildings

Dwelling houses, flats and rooms in residential use

British Standard 8233:2014, Guidance on Sound Insulation and noise reduction for buildings, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 1. BS 8233 Recommended Indoor Ambient Noise Levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 $L_{Aeq,16hour}$	–
Dining	Dining room/area	40 $L_{Aeq,16hour}$	–
Sleeping (daytime resting)	Bedrooms	35 $L_{Aeq,16hour}$	30 $L_{Aeq,8hour}$

It should however be stressed that the above criterion relates to steady noise excluding unusual noise events departing from the typical noise character of the area.

With regard to gardens and external areas, BS 8233:2014 (Section 7.7.3.2) gives the following advice:

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T,}$ with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

4.4 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following noise levels are applicable to dwellings.

Internal Spaces Noise Criteria

Table 2. WHO Guidelines for Community Noise Internal Noise Criteria

Specific Environment	Critical Health Effect(s)	L_{Aeq} dB	Time Base (hours) *
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16
Inside bedrooms	Sleep disturbance, night-time	30	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours and night time 23:00 – 07:00 hours.

In addition to the above continuous equivalent noise levels, WHO guidelines indicates that exceedances of 45 dB L_{Amax} for single sound events should be limited to no more than 10 – 15 times per night, when measured with a 'fast' time weighting.

External Spaces Noise Criteria

Table 3. WHO Guidelines for Community Noise External Noise Criteria

Specific Environment	Critical Health Effect(s)	L_{Aeq} dB	Time Base (hours)*
Outdoor living area	Serious annoyance, daytime and evening	55	16
	Moderate annoyance, daytime and evening	50	16
Outside Bedrooms	Sleep disturbance, window open (outdoor values) night time	45	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours, and night time 23:00 – 07:00 hours.

WHO guidelines state, 'To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq}.'

4.5 Project Specific Criteria

4.5.1 BS4142:2019 + A1+2019

Project specific noise criteria for a site can be complex to decide upon and will often depend on contextual factors.

The most common document used by UK Regulators for determining baseline noise criteria for industrial emissions is BS4142:2014 + A1:2019 as referenced in Section 4.2 .

With regard to BS4142, then in the event that a long standing facility such as Arla Taw Valley is working to Best Available Techniques in terms of noise control, and where there are no history of complaints[1], then based on our previous experience regulators tend to allow for noise emission limits such that the rating noise level from the facility $L_{A,r}$ does not exceed the existing background noise level L_{A90} by more than 10dB. This satisfies the clause in BS4142 regarding a rating sound level being below a level where a significant adverse impact would be expected, depending on the context.

4.5.2 Establishing a Representative Background Sound Level

To establish the said criterion from BS4142 in the previous section then a representative background sound level (the residual sound level being the sound level exceeded 90% of the time) needs to be established for the noise exposed receivers around the site.

With regard to the background sound measured at receivers close to the site, site observation indicates that this is entirely composed of sound contributions by from the site itself. However, BS4142 (see Section 4.2.1 above) indicates that *"….it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds…."*.

The background sound levels for the closest receivers as detailed in section does not drop below 47 dBA L_{90} as detailed in section 5.1.4. This might therefore suggest an acceptable noise rating level limit of 56 dBA $L_{A,r}$ day and night at site.

4.5.3 World Health Organisation Requirements

Notwithstanding the above, the suggested noise limit in the previous section would exceed the 55 dB(A) daytime external noise level recommend limits from the World Health Organisation and would significantly exceed the 45 dBA L_{eq} outside bedrooms recommended by the same body as per previous Section 4.4.

4.5.4 Establishing a Representative Background Sound Level - Proxy Location

In light of the discussion in previous section, then clearly using background sound levels at local receivers that are dominated by site noise to establish limits can cause significant creep to levels that are unacceptable in absolute terms.

[1] It is understood that there have been recent complaints regarding salt deliveries which occur over a single hour once per week. Site personnel have made measurements at the closest receiver being Birchy Cottage on Culm Cross. The site personnel measured 46 dB(A) L_{eq} with pump operation compared to 42.2 dB(A) L_{eq} without, indicating salt pump noise alone of circa 43.7 dB(A) Leq, with a highest level of 56.6 dB(A) L_{eq} during "banging" which occurs at the end of the delivery to free the caked salt on the tanker drum. This will be discussed later in the report.

Regulatory bodies therefore generally like to see a background noise survey at a similar location to plant but without the influence of noise from the plant and our survey to this end presented in section 5.1.4 indicates a background noise level of 42 dBA L_{90} during the day and 30 dBA L_{90} during the night.

4.5.5 Establishing a Representative Background Sound Level – Where Background Sound Levels are "Low"

As detailed above, the suggested noise limit from the previous section is very low and would be impractical to try and achieve and the noise control required to achieve it would go beyond what can be considered as "Best Available Techniques".

The reason that the derived limit in the previous section is so low is because the rural background noise level at night is very low. BS4142 Section 11 states that:

> *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night".*

It is noted that the previous incarnation of BS4142, i.e. BS4142:1997 – 'Method for rating industrial noise affecting mixed residential and industrial areas' raises these limitations where background noise levels are low and states that:

> *"The method is not suitable for assessing the noise measured inside buildings or when background and rating noise levels are both very low.*
>
> *NOTE. For the purposes of this standard, background noise levels below 30dB and rating levels below about 35dB are considered low."*

As such in our opinion, noting the comments in the current incarnation of the standard, and noting the context of the current site where background noise levels are currently more than 20dB above those at the proxy location, then it seems reasonable to retain a lower threshold of background noise level for assessment of 30 dBL_{A90} as indicated in the 1997 edition of BS4142.

4.5.6 Proposed Sound Rating Level Criteria – Arla, Taw Valley

Proposed Day-time Noise Limit (Residential)

The proposed threshold background noise limit from the section 5.1.4 would give a noise rating level limit of 46 dB $L_{Ar,Tr}$ to be less than 5dB above background and thus from BS4142 indicating a level below that associated with an indication of adverse impact, depending on the context.

Proposed Night-time Noise Limit (Residential)

The proposed threshold background noise limit from the section 5.1.4 would give a noise rating level limit of 39 dB $L_{Ar,Tr}$ to be less than 10dB above background and thus from BS4142 indicating a level below that associated with significant adverse impact, depending on the context.

This proposed night-time limit is slightly more relaxed relatively than the daytime but notes the guidelines in the 1997 version of BS4142 that indicates: *For the purposes of this standard, background noise levels below 30dB and rating levels below about 35dB are considered low."* BS4142:2014 also asks for further consideration when background levels are low but does not give a value, and as such we have reverted to the 1997 definition.

5.0 PROXY SITE AMBIENT AND BACKGROUND SOUND LEVEL MEASUREMENTS

For comparison a background sound level (L_{A90}) was determined at a proxy local receiver in the absence of noise from the facility for comparison with emitted sound levels from Arla to facilitate an initial comparative BS4142 assessment. This is the approach required by the Environment Agency when undertaking Noise Assessments.

5.1 Wellsprings Lane

5.1.1 Site Description

The site chosen was located at Wellsprings Lane, Okehampton. The site was deemed to be representative of the proximity of closest receivers to the Arla site in terms of adjacency to the A3124/A3072 roads, but a sufficient distance away from the facility to eliminate potential contribution from sound sources from the site itself. The site location is shown in Figure 2 below with the sound level meter being some 1.7km from the boundary of the Arla site

Figure 2: Location of Background Sound Level Measurement Site at Wellsprings Lane (Google Earth)

For the current assessment, there are two measurement parameters to determine at the site under BS4142:2014 as follows:

- The background sound level $L_{A90,T}$ for comparison to the sound level due to the Arla Operation.
- The residual sound level $L_r = L_{Aeq,T}$ which is the effective equivalent energy average sound level that would occur without the Arla site.

5.1.2 Survey Times and Dates

The background sound measurements were conducted between 18:00 hours on 9th December 2025 and 13:15 hours on 11th December 2025. The measurement period was selected to measure at least one full representative daytime and night-time period of background sound levels to give a good representation of the acoustic climate of the area.

5.1.3 Equipment

The background survey was conducted using the following equipment.

Table 4: Equipment List for Background Sound Survey at Clay Lane

Manufacturer	Type	Model	Serial Number	Calibration Date	Calibration Certificate Number	Calibration Lab	Date of Expiration of Calibration
NTi	Sound Level Meter	XL2-TA	A2A-08665-E0	05/11/2025	07405/3	University of Salford	05/11/2027
NTi	Pre-amplifier	MA220	14704	05/11/2025	07405/3	University of Salford	05/11/2027
NTi	Microphone	MC230A	A28401	05/11/2025	07405/3	University of Salford	05/11/2027
RION	Calibrator	NC-74	34856999	04/09/2025	CONF25/004	ANV	04/09/2026

The sound level meter used is Class 1 as per BS EN 61672-1:2003.

The sound level meter was set up approximately 1.5m above ground level.

All measurements were undertaken in effective accordance with BS 7445 “Description and measurement of environmental sound” wherever practicable.

The sound level meter was field calibrated both before and after the survey, during which time no significant deviation from the calibrated level was observed. The sound level meter was fitted with a microphone and windshield at all times.

All measurements were undertaken with a fast time weighting. Broadband statistics were measured throughout.

Sound level measurements were taken over contiguous 15-minute periods on fast response. A range of statistical sound indicators were measured, including L_{Aeq} and L_{A90}.

5.1.4 Measured Background and Ambient Sound Data

The weather station (at measurement position NNSR 1) malfunctioned during the visit. However, the weather site Weather Underground indicates that wind speeds at Royal Marines Base Chivenor was below 11mph for the majority of the critical night-time periods although wind speeds 16 to 31 mph were noted on the daytime of 9th December, 8 to 21 mph were noted during the daytime of 10th December and 10 to 17 mph on 11th December with no precipitation referenced apart from 0.02 inches between 2 and 3pm on the 9th December.

Notwithstanding the above, the said records were taken from a costal site which will tend to be windier than land locked sites from our understanding. Furthermore, PDA Ltd staff on site noted no precipitation and no evidence of wind and as such it can be deemed that measurement conditions were conducive to undertaking noise measurements.

Figure 3 below shows contiguous 15-minute period time histories of the sound data for the measurement position at Wellsprings Lane:

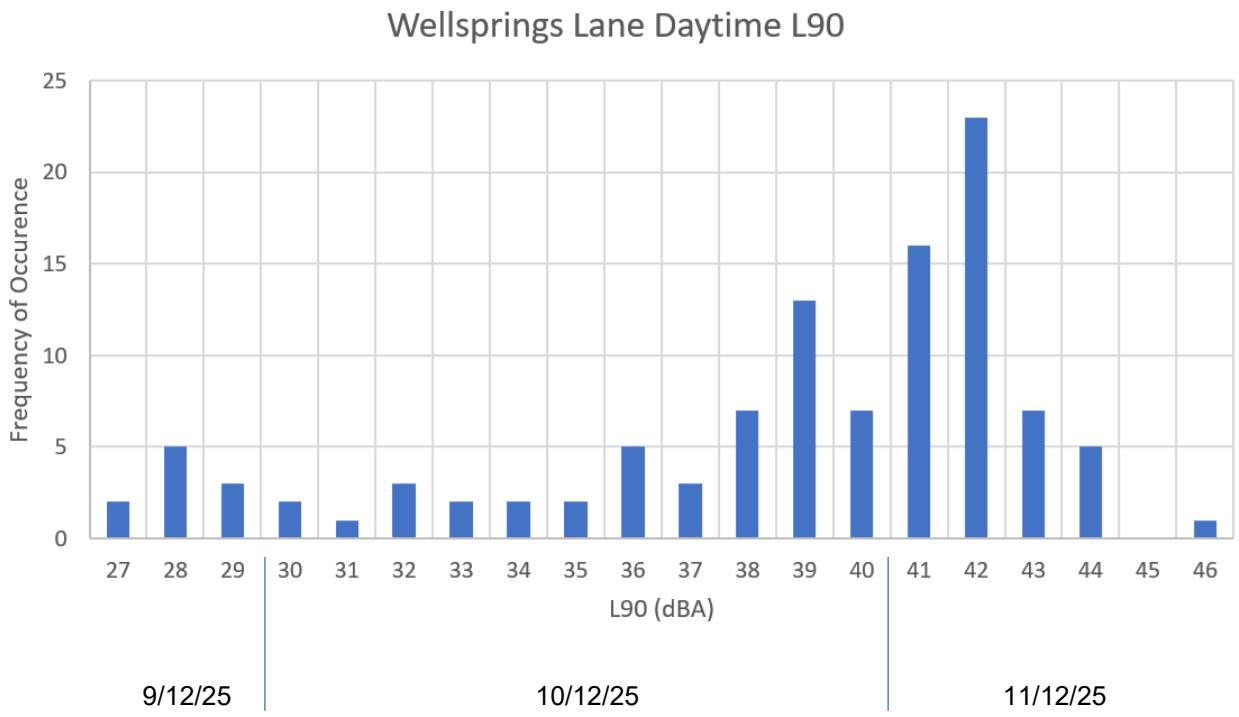


Figure 3 - Contiguous 15-minute period time histories of the sound data for the measurement position at Wellsprings Lane

Figures 4 and 5 below shows histograms of daytime and night-time L_{A90} background sound levels measured at the Wellsprings Lane location.

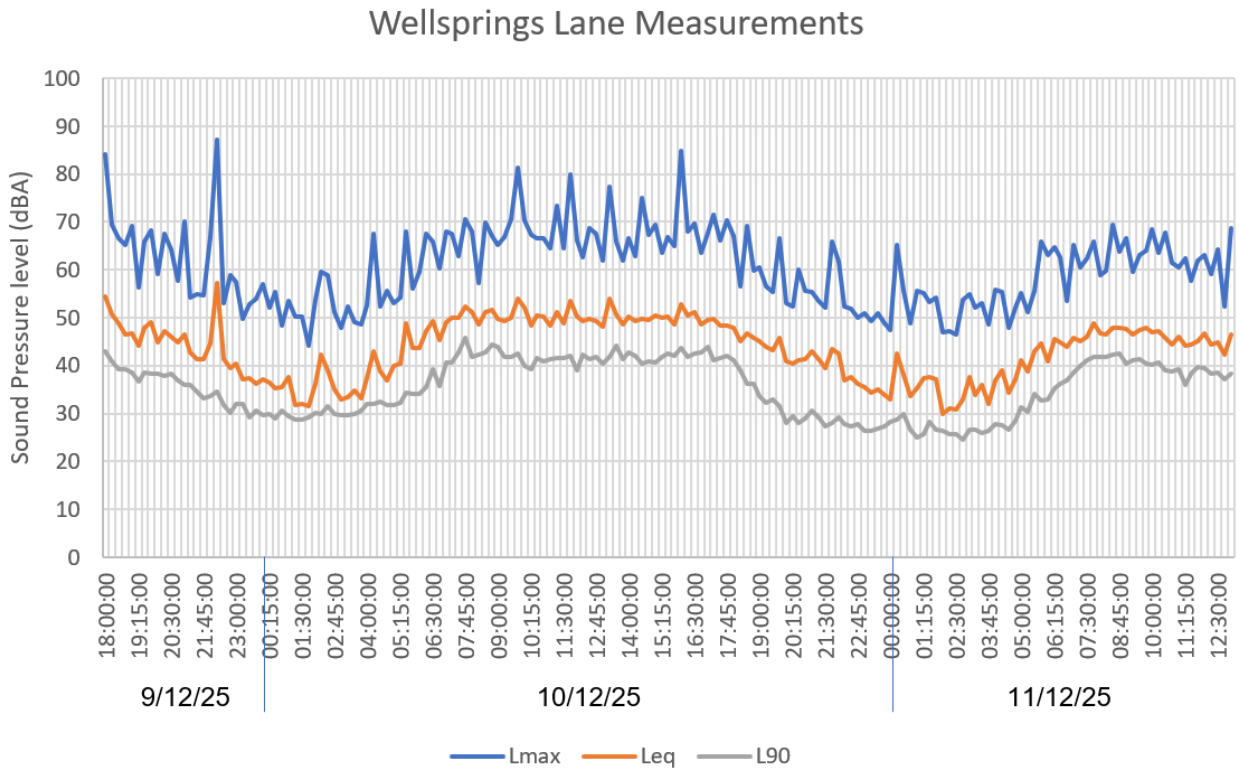


Figure 4: Histogram of daytime (0700 to 2300 hours) Background Sound Level ($L_{A90,\ 15\ min}$) [dB] at Wellsprings Lane from period 9th December to 11th December 2025

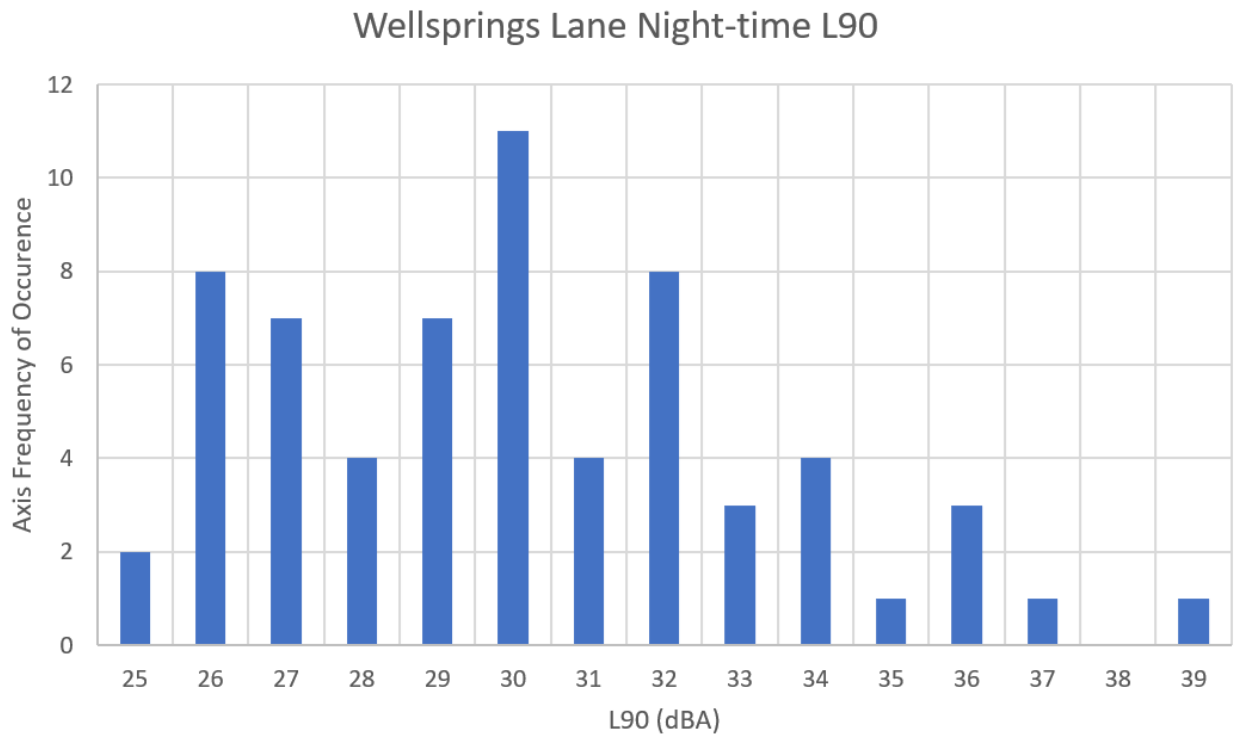


Figure 5: Histogram of night-time (2300-0700 hours) Background Sound Level ($L_{A90,\ 15\ min}$) [dB] at Wellsprings Lane from period 9th December to 11th December 2025

5.1.5 Background Sound Level (BS4142:2014)

Daytime

Figure 4 indicates a modal value of $L_{A90,\ 15\ min}$ of 42 dB for daytime

The range is from 27 to 46 dB $L_{A90,\ 15\ min}$.

We would consider the modal daytime background sound level to be most representative at 42 dB L_{A90}

Night-time

Figure 5 indicates a modal value of $L_{A90,\ 15\ min}$ of 25 dB for night-time

The range is from 25 to 39 dB $L_{A90,\ 15\ min}$.

We would consider the modal night-time background sound level to be most representative at 30 dB L_{A90}

6.0 SITE SOUND LEVEL MEASUREMENTS (EXISTING PLANT)

6.1 Site Operational Overview

6.1.1 Main Site

Figure 6 below gives an outline annotated description of the main site logistics operations.

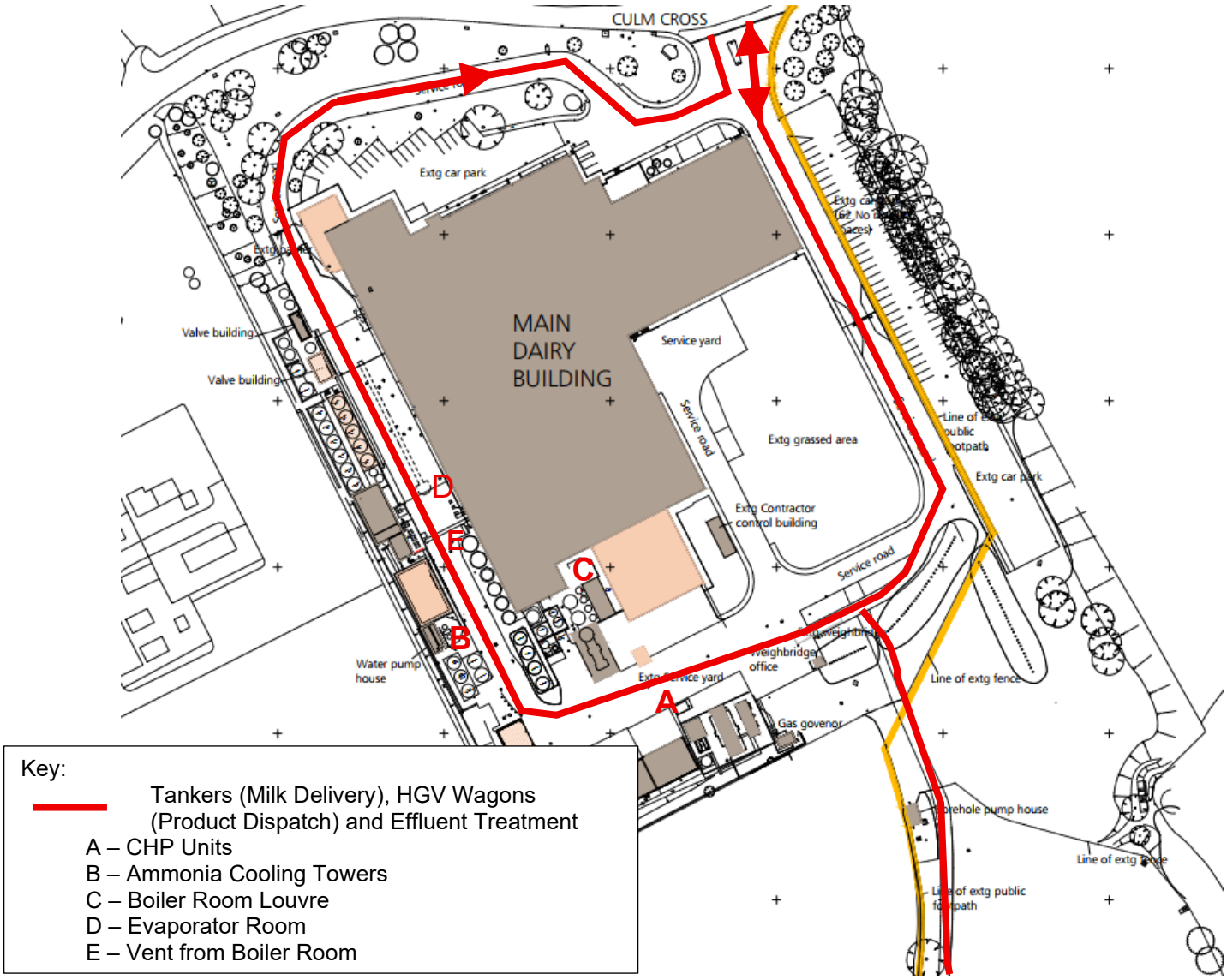


Figure 6: Main Site Logistic Operations and Noise Sources

Subjectively on site, the majority of the noise emanates from a large condenser evaporator shown at E which dominates the noise climate to the western boundary of the site.

We have not included assessment of the existing Effluent Treatment Plant as this is to be replaced by the newly proposed plant (see Section 7.3 below).

6.2 Site Visit and Sound Survey Details

Measurements of sound were undertaken on site to characterise the sound sources associated with the bulk loading activities in the loading bay.

A sound survey was carried out between the hours of 16:15 on Tuesday 9th December, and 11:45 on Thursday 11th December, to assess the external operations. All measurements were undertaken by Mr Joe Meadows and Mr Jamie Wilson, both of PDA Ltd.

The site sound level survey was conducted using the following sound level meter:

Table 5: Equipment List for Site Sound Survey

Manufacturer	Type	Model	Serial Number	Calibration Date	Calibration Certificate Number	Calibration Lab	Date of Expiration of Calibration
NTi	Sound Level Meter	XL2-TA	A2A-25356-E1	15/05/2024	UK-24-050	NTi Audio	15/05/2026
NTi	Pre-amplifier	MA220	13935	15/05/2024	UK-24-050	NTi Audio	15/05/2026
NTi	Microphone	MC230A	A26543	15/05/2024	UK-24-050	NTi Audio	15/05/2026
Rion	Calibrator	NC75	34245619	07/05/2025	07204/1	University of Salford	07/05/2026

The sound levels meters used are Class 1 as per BS EN 61672-1:2003.

6.3 Fixed Measurement Locations

Fixed position measurements were taken at 1 locations as indicated in Figure 8 below. The fixed positions were used to give an indication of the sound climate close to the boundary of the site at closest receivers, and of the general noise climate whilst on site. The measurement results were also planned to be used to help calibrate the detailed sound output model as detailed in later sections.

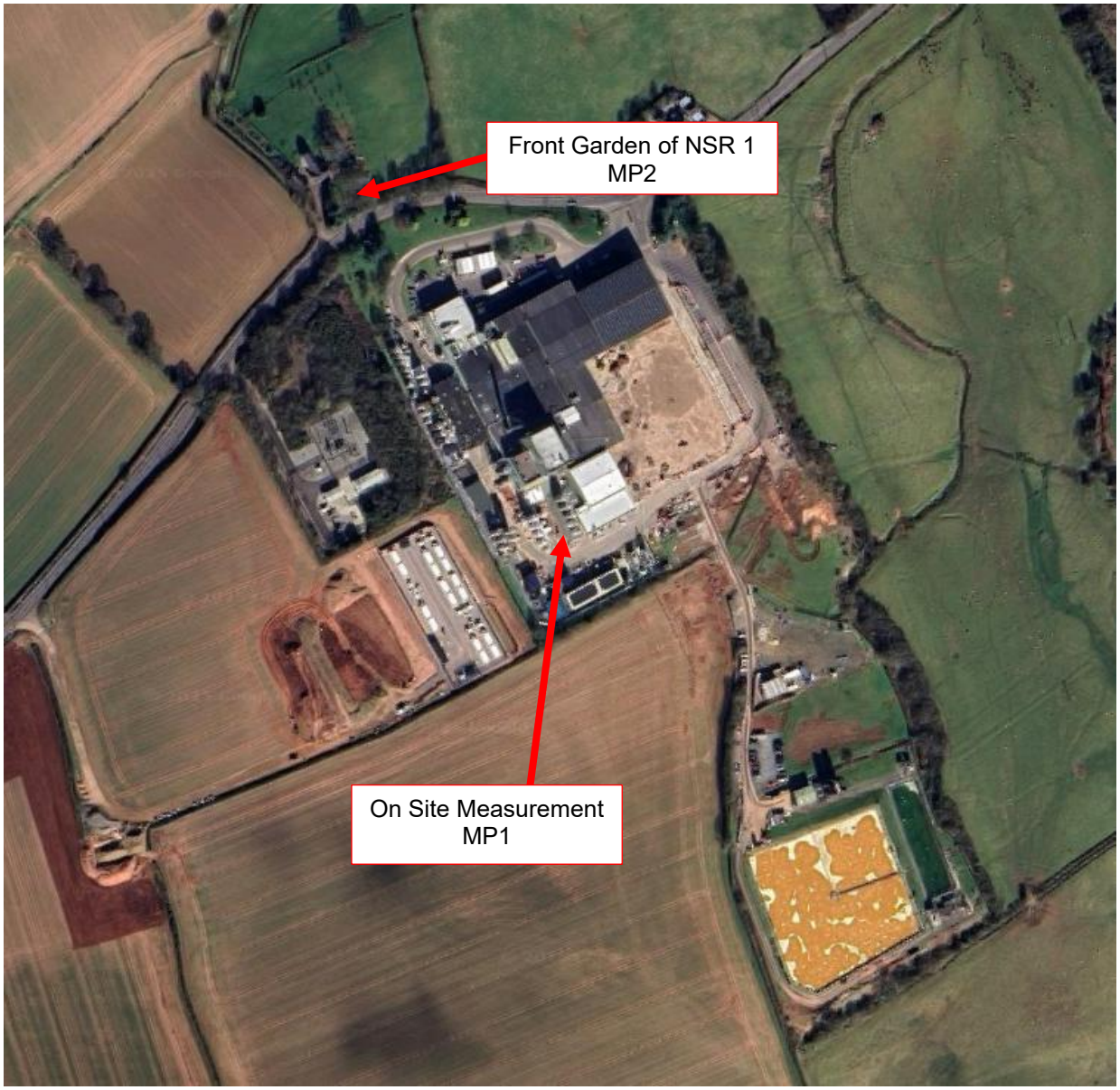


Figure 7 Main Site Layout showing Fixed Site Measurement Positions (Google Earth)

A weather station was also located at MP2.

Figures 8 and 9 below show contiguous 15-minute period time histories of the sound data of the two fixed position sound level meters that was recorded throughout the day.

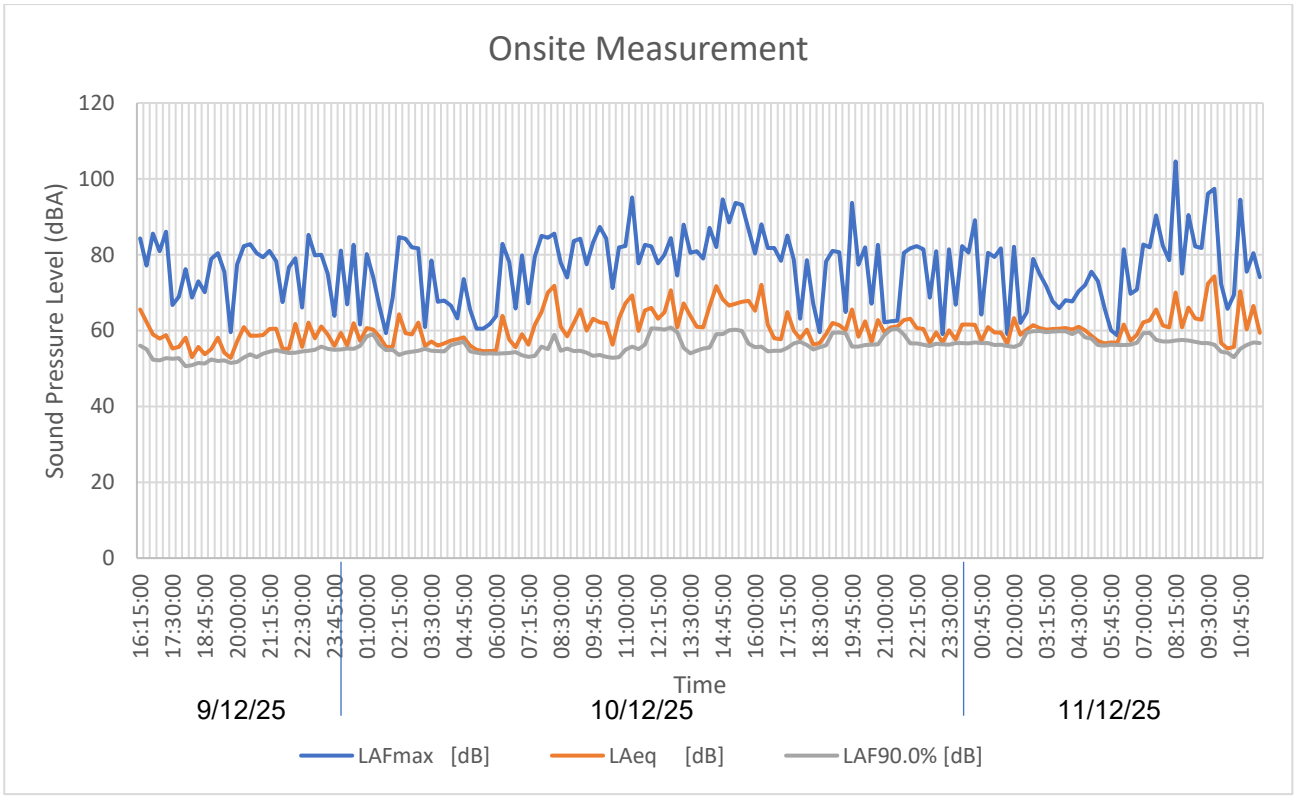


Figure 8 15-minute sound data in fixed measurement position 1 (MP1) (dBA)

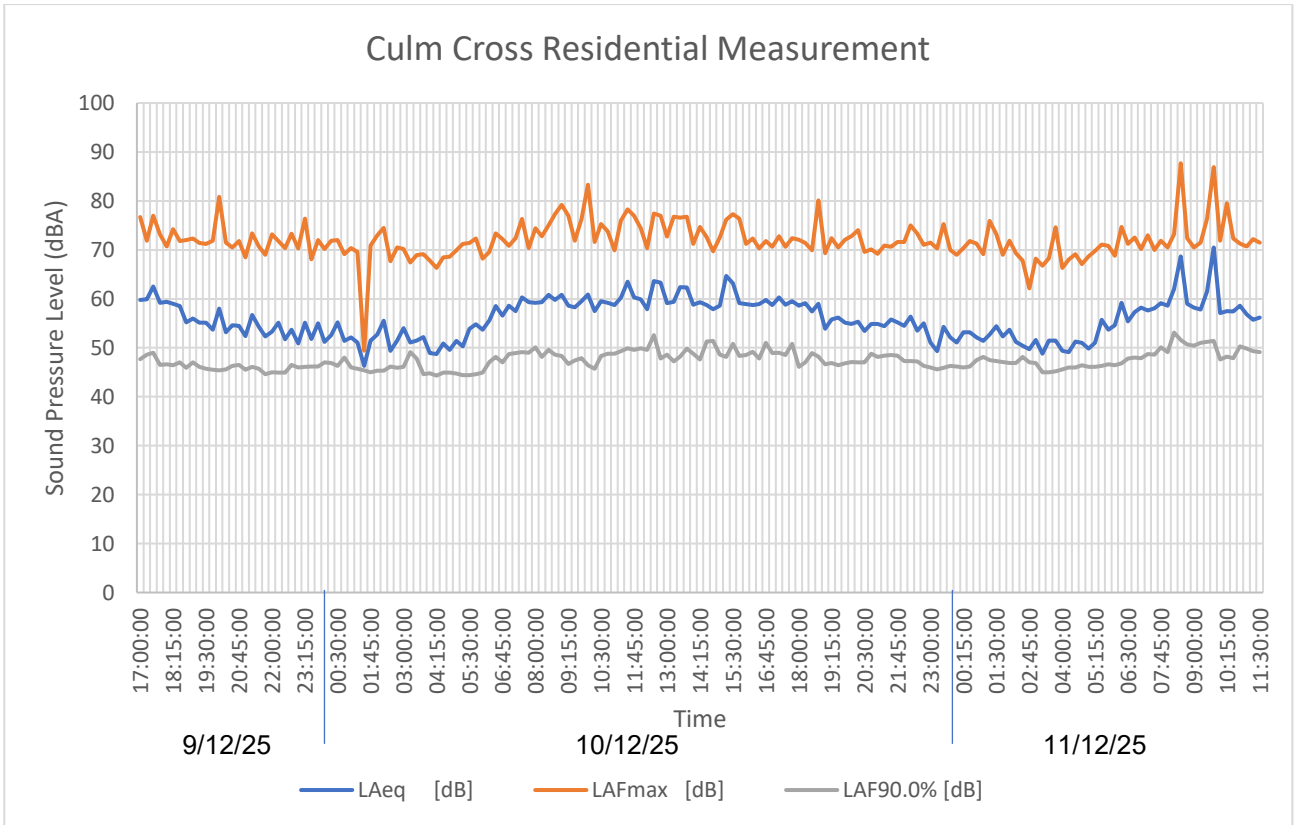


Figure 9 15-minute sound data in fixed measurement position 2 (MP2) (dB(A))

6.4 Sound Sources and Spot Measurement Positions

Some of the most dominant sound sources are detailed in the above. However, a detailed survey of sound sources at site was undertaken to gauge contributions from all sources.

Appendix B gives descriptions of the sound sources being recorded at the measurement positions and the overall sound levels measured.

The location of sound measurements around the site from Appendix B is shown in Appendix C for the Main Site.

Appendix D gives the one third octave band measured sound data for the positions referenced in Appendices B and C.

The table below gives an overview of the calculated sound power levels based on the data in the appendices as detailed above.

Table 6 Derived Sound Power Levels for Existing Site Plant

Measurement Reference #	Description of Noise Source	Sound Power Level (dBA)
1	Cream Tank	82.5
2	Milk Intake Pump	84.1
3	Additional Milk Intake Pump	78.1
4	Milk Intake Pump	84.2
5	Boiler open door	76.7
6	Vent from boiler room	93.1
7	Evaporator room	91.2
8	Hot Water Silo	82.8
9	Ammonia Cooling Tower	68.9
10	Gas Plant	67.3
11	Boiler Room Louvre	96.5
12	Silo Washing	71.8
13	CHP Generator 1	79.6
14	CHP Generator 2	82.3
15	Forklift Forward	81.5
16	Forklift Reversing	82.6
17	Ammonia Cooling Towers	111.4
18	Scan of Separator	81.2

7.0 SITE MODIFICATION PROPOSALS

The site modification proposals are the subject of the Environmental Permit Variation.

The proposals are set out in the figure below:

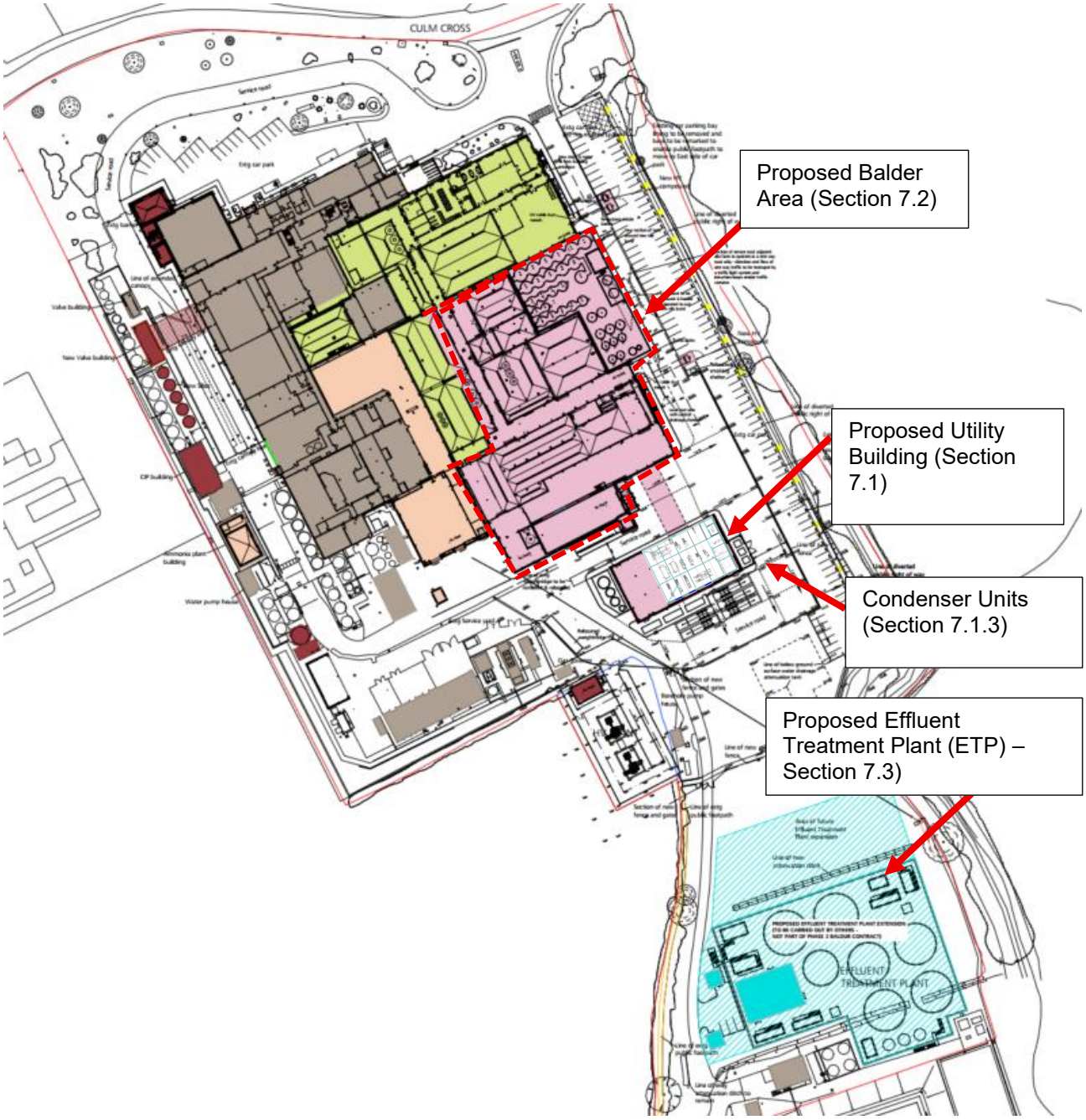


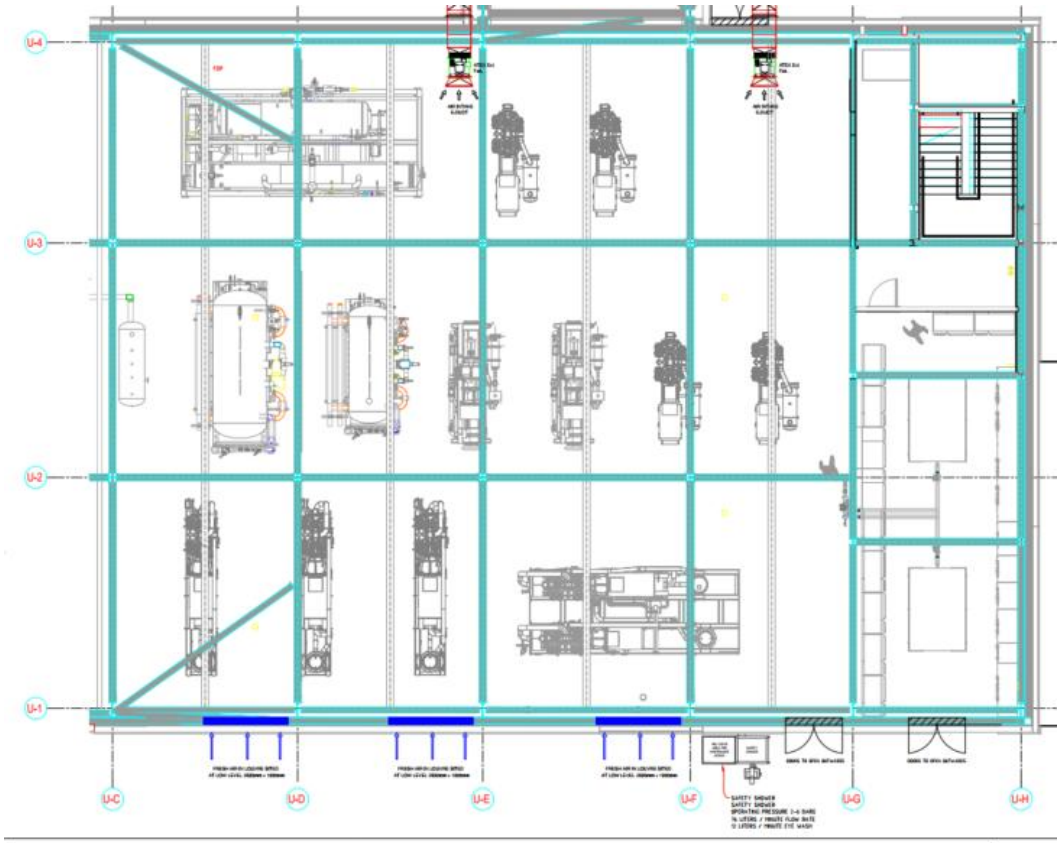
Figure 10 Site Modification Proposals

7.1 Proposed New Utility Building

It is understood that the final selections for plant have not yet been determined. However, Arla Taw Valley have provided us with the Tender design information which includes typical plant items including noise specifications to be used within and external to the building.

7.1.1 Compressor Noise

The proposed new building is to have a number of ammonia compressors as set out below



Machine Model	Operational (Duty/Standby)	Total Sound power dB	Total Mean S.Pressure dB
HPC108SV Comp 1	Duty	dB(L) 105.5 dB(A) 102.7	dB(L) 87.6 dB(A) 84.8
HPC108SV Comp 2	Standby		
SAB233LV comp 3	Duty	dB(L) 110.3 dB(A) 106.8	dB(L) 88.3 dB(A) 84.8
SAB233LV comp 4(Swing)	Duty / Standby	dB(L) 110.3 dB(A) 106.8	dB(L) 88.3 dB(A) 84.8
SMC116LV Comp 6(Swing)	Duty / Standby	dB(L) 107.4 dB(A) 107.6	dB(L) 87.9 dB(A) 85.1
SMC116LV Comp 7(Swing)	Duty / Standby		
HPC116SV Compressor 1	Duty	dB(L) 107.4 dB(A) 107.6	dB(L) 87.9 dB(A) 85.1
HPC116SV Compressor 2	Duty	dB(L) 107.4 dB(A) 107.6	dB(L) 87.9 dB(A) 85.1
HPX716SV Compressor 3	Duty	dB(L) 109.1 dB(A) 105.9	dB(L) 89.4 dB(A) 86.2
HPX716SV Compressor 4	Duty	dB(L) 109.1 dB(A) 105.9	dB(L) 89.4 dB(A) 86.2
HPX716SV Compressor 5	Duty	dB(L) 109.1 dB(A) 105.9	dB(L) 89.4 dB(A) 86.2

Summary

since all machines are operating **at the same time**, we combine their sound power levels using **logarithmic addition** (not simple averaging).

I've treated the **dB(L)** and **dB(A)** values separately, as they represent different weightings.

Overall summary Power level dB	Overall Summary pressure level dB
Total dB(L): = 118.2 dB(L) **Total dB(A): = 116.1 dB(A)**	**Total dB(L): 89.9 dB(L)** **Total dB(A): 86.0 dB(A)**

Factors are calculated at 1m free field distance

Figure 11: Utility Building Compressor Room Layout

The units shown in Figure 11 are at ground floor level with an overlying concrete floor.

Allowing for a typical reverberation time of circa a 2.5 seconds, the volume of the ground floor of just over 4000 m^3 and typical compressor noise spectra from previous projects then this gives and overall sound pressure level internally, based on the noise levels in Figure 11, of 98 dB(A) $L_{EP,d}$.

Based on the above then the sound intensity (sound power per metre squared) emitted from the cladding and louvres would be calculated as follows:

Table 7: Estimated Noise Break-out (SWL m^{-1}) for Compressor Room

Description	Overall Level (dBA)	Sound Pressure Level (dB) / Sound Reduction Index (dB) Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Internal Noise Level Compressor Room	98	90	100	103	98	91	82	77	71
Direct to Reverberant Field Reduction		-6	-6	-6	-6	-6	-6	-6	-6
Transmission Loss Cladding [1]		-14	-17	-31	-40	-48	-46	-56	-56
Sound Power Level per Metre Squared (SWL m-1)	**50**	**66**	**62**	**48**	**37**	**33**	**45**	**31**	**32**
Sound Power Level per Side Wall for 34m by 5.5m (SWL)	**71**	**87**	**83**	**69**	**57**	**54**	**66**	**52**	**53**

Notes:

1. Assuming cladding of Kingspan KS1000 AWP(60) or metal PIR sandwich or similar with 100mm deep galvanized studs and internal layer of 15mm plasterboard or equivalent. This type of cladding system will likely be required to meet planning requirements at the site which is understood to need to meet background noise levels at the boundary.

Table 8: Estimated Noise Break-out (SWL m^{-1}) and SWL per Louvre for Compressor Room Louvres

Description	Overall Level (dBA)	Sound Pressure Level (dB) / Sound Reduction Index (dB) Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Internal Noise Level Compressor Room	98	90	100	103	98	91	82	77	71
Direct to Reverberant Field Reduction		-6	-6	-6	-6	-6	-6	-6	-6
Transmission Loss Louvres [1]		-7	-8	-13	-23	-37	-33	-29	-29
Sound Power Level per Metre Squared (SWL m^{-1})	**65**	**73**	**71**	**66**	**54**	**44**	**58**	**58**	**59**
Sound Power Level per Louvre for 1000mm by 2500mm unit (SWL)	**69**	**77**	**75**	**70**	**58**	**48**	**62**	**62**	**63**

Notes:

1. Assuming cladding of Kingspan KS1000 AWP(60) or metal PIR sandwich or similar with 100mm deep galvanized studs and internal layer of 15mm plasterboard or equivalent. This type of louvre system will likely be required to meet planning requirements at the site which is understood to need to meet background noise levels at the boundary.

The above systems have been modelled as set out in Sections 9.0 below using normalized sound spectra from similar systems measured and / or assessed by PDA Ltd previously.

7.1.2 Ventilation Units

Figure 11 above shows extract fan units. We understand that the attenuators on these systems will be designed to meet the noise limits set out in the planning noise report by Entran Environment and Transportation Report "Arla Taw Valley – Fixed Plant Noise Limits" dated 21-03-25 as attached to this report. It is understood that the limits as follows will be achieved at the boundary of the site:

Receptors	Time Period	Rating Level, $L_{Ar,Tr}$ dB	Specific Level, $L_{Aeq,T}$ dB
R1, R2	Daytime 07:00 - 23:00	38	33
	Night-time 23:00 – 07:00	37	32
R3 – R6	Daytime 07:00 - 23:00	37	32
	Night-time 23:00 – 07:00	33	28

Figure 12: Planning Noise Limits for Fixed Plant as set out in the Planning noise report by Entran Environment and Transportation Report "Arla Taw Valley – Fixed Plant Noise Limits" dated 21-03-25

By achieving the above levels at the boundary of the site the levels at the nearest receiver at circa 30m from the Balder plant area then the noise levels at the receiver some 90m or more will be 10dB lower i.e. a rating level of 23 dB $L_{Ar,Tr}$ dB. This is more than 10dB below the criteria from section 4.5.6 and therefore will not make any material contribution to overall noise levels.

7.1.3 Condenser Units

The condenser units as shown in Figure 8 are set externally at the eastern end of the Condenser building and are screened to the west as shown in the isometric drawing below:

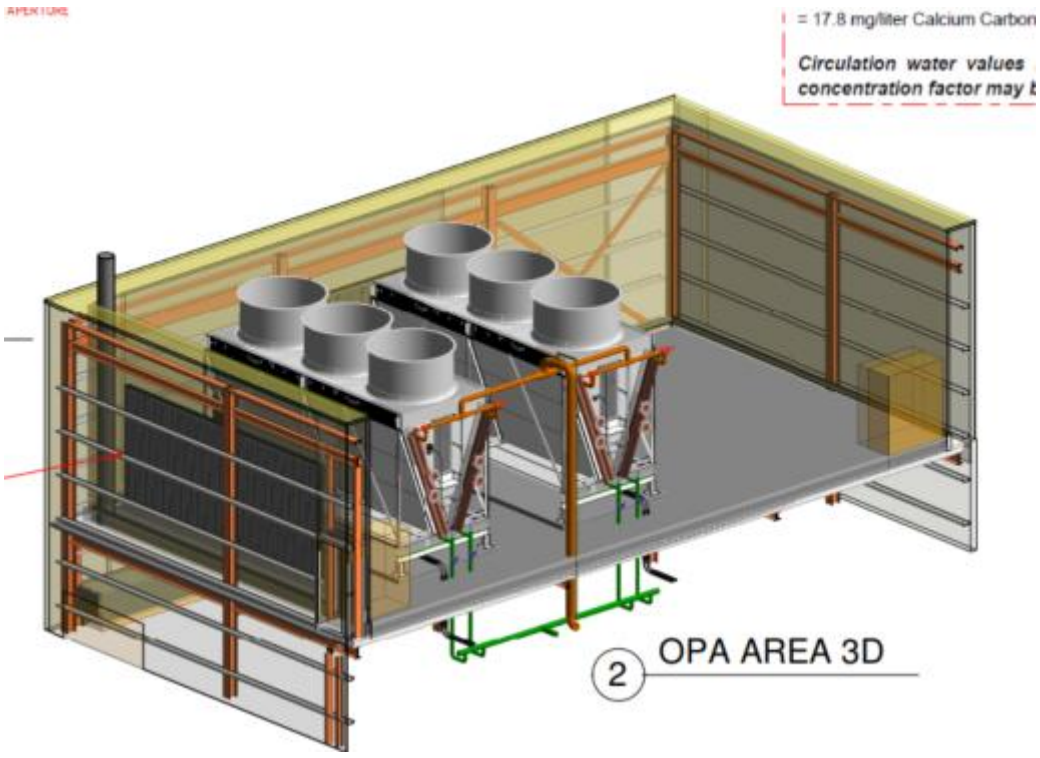


Figure 13: Utility Building Compressor Room Layout

The sound power of the unit is given as follows:

Table 9: Sound Power per Condenser (Including 3 fans per Condenser)

Description	Overall Level (dBA)	Sound Pressure Level (dB) / Sound Reduction Index (dB) Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Sound Power per Condenser	92.8	77	75	70	58	48	62	62	63
Typical Barrier Attenuation (Full Line of Sight)		10	10	10	10	10	10	10	10
Attenuated Sound Power per Condenser [1]	**82.8**	**91**	**91.2**	**87.6**	**86.2**	**83.3**	**78**	**71.2**	**61.7**

Notes:

1. Assuming perimeter enclosure cladding to be solid minimum 10 kg/m^2 or louvre to meet similar sound insulation.

It is noted that the condenser unit is 215m away from the nearest receiver on Culm Cross. This gives a calculated sound level at this receiver of 82.8 dB(A) SWL-20*log(215m)-8 for hemispherical propagation which is 28.2 dB(A) L_{eq}. This is more than 10dB below the night-time noise criterion of 39 dB(A) $L_{Ar,Tr}$ set out in Section 4.5.6 and as such will not be materially significant in the calculation. Furthermore it is understood that the lower criteria as set out in Section 7.1.2 above the are to be achieved at the boundary of the site by the tenderers and as such the contribution will be required to be even lower. As such this element has not been included in the noise model.

7.2 Balder Area

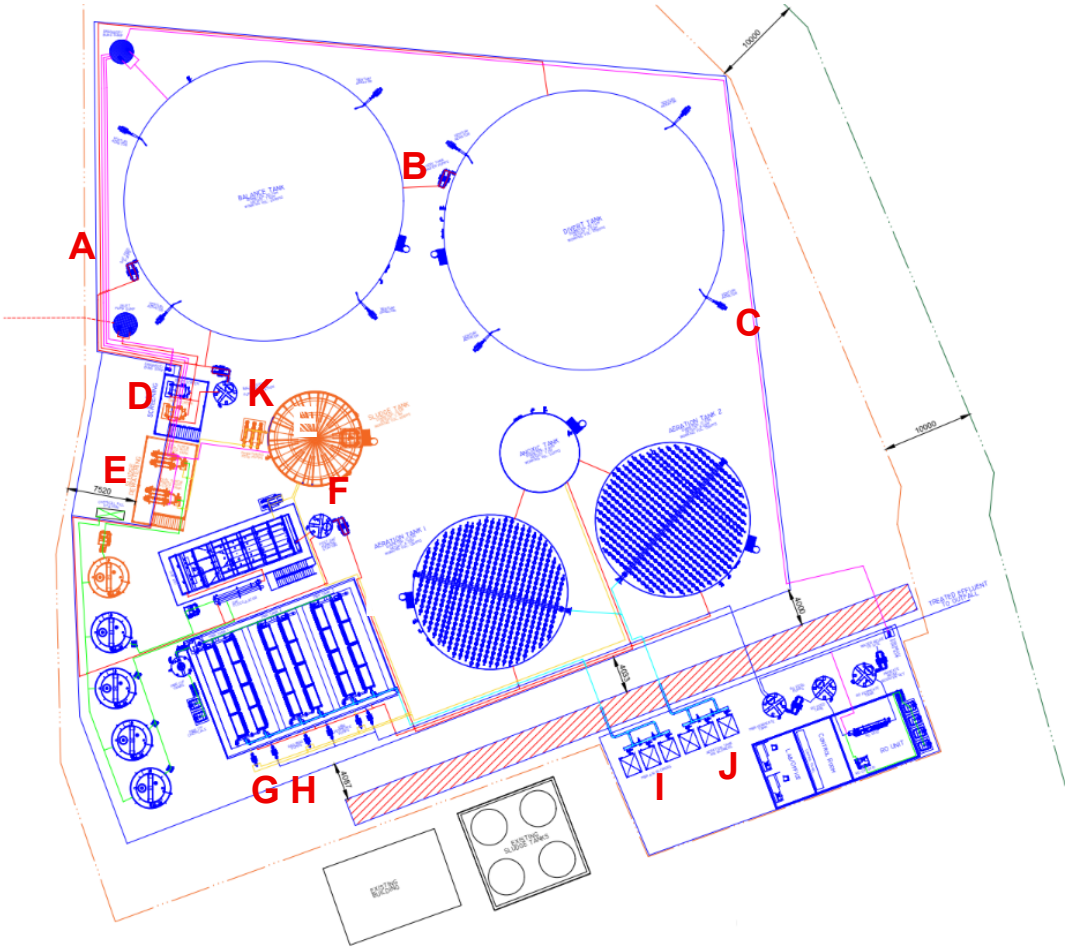
Within the Balder Area the design has not yet been progressed to a sufficient stage to progress a complete noise impact assessment.

However, I understand that the proposal is for plant to be designed to meet the noise limits set out in the Entran Environment and Transportation Report “Arla Taw Valley – Fixed Plant Noise Limits” dated 21-03-25 as shown in Figure 10 above.

By achieving the levels required in the said planning report at the site boundary of the site the levels at the nearest receiver at circa 30m from the Balder plant area then the noise levels at the receiver some 90m or more away from the plant area will be 10dB lower i.e. a rating level of 23 dB $L_{Ar,Tr}$ dB. This is more than 10dB below the criteria from section 4.5.6 and therefore will not make any material contribution to overall noise levels.

7.3 Proposed Effluent Treatment Plant

The figure below shows the proposed Effluent Treatment Plant Layout:



Key:
A – DAF Feed Pumps *Grundfos SL1.110.200.110.4.52M.Q.N.51D.A 11kW <81 dB(A) SWL*
B – Divert Tank Transfer Pumps *Grundfos SL1.110.200.110.4.52M.Q.N.51D.A 11kW <81 dB(A) SWL*
C – Venturi Aerator (8) 3 *Landia 18.5kW AirJet 74 dB(A) SWL*
D – Drum Screen *SGR Exernally Fed Drum Screen <88 dB(A) SWL*
E – Screw Press *Glanua 66.5 dB(A) SWL (Excluded as low noise level)*
F – DAF Sludge Pumps *Mono C16AC10RMA 4kW 96 dB(A) SWL*
G – RAS/WAS Pumps
H – MBR Permeate Pumps
I – MBR Air Blowers *Aerzen Rotary Lobe Compressor 82.5 dB(A) SWL (with Acoustic Hood)*[2]
J – Aeration Tank Air Blowers *Aerzen Positive Displacement Blower 92.5 dB(A) SWL (with Acoustic Hood)*[3]
K – Dewatering Feed Pumps *Mono C16AC10RMA 4kW 96 dB(A) SWL*
NB SWL measurements derived from measurements at 1m for pumps and assumed that this increases to 1.5m to source centre for compressors etc.

Figure 14: Effluent Treatment Site Layout

The above systems have been modelled as set out in Sections 9.0 below using normalized sound spectra from similar systems measured and / or assessed by PDA Ltd previously.

[2] 104.5 dB(A) SWL (No Acoustic Hood) but the acoustic hood will be needed.
[3] 116.5 dB(A) SWL (No Acoustic Hood) but the acoustic hood will be needed.

8.0 SOUND EMISSION MODELLING – EXISTING SITE

A 3-dimensional sound model has been created using SoundPLAN sound modelling software. The software uses the method of ISO 9613 '*Acoustics – attenuation of sound during propagation outdoors – general method of calculation'* and takes into account geometric spreading, ground effects, air attenuation, barrier attenuation and reflections.

The measured sound levels detailed in the previous sections and associated appendices were used to calibrate the model in the SoundPLAN sound mapping software. With regard to the model we note the following:

- ground relief LIDAR maps have been obtained from the Environment Agency National LIDAR Programme.
- 1/3 octave band frequency spectra from 25 Hz to 20 kHz were included in the model for each source.
- a ground attenuation factor of 0 was used for hard-standing areas, and a ground attenuation factor of 1 was used for soft ground.

8.1 Fixed Plant Items – Sound Emission Modelling

To include for sound emission from fixed plant noise sources the SoundPLAN model developed using information from measurements as detailed in section 6.4 above.

The location of sound measurements around the site is shown in Appendix C for the Main Site.

Appendix B gives descriptions of the sound sources being recorded at the measurement positions and the overall sound levels measured. Furthermore the derived Sound Power Levels developed using the SoundPLAN model for calibration and used in the SoundPLAN model are given in Table 6 above.

Appendix D gives the one third octave band measured sound data for the positions referenced in Appendices B and C. These one third octave band spectra were used for the sound sources in the SoundPLAN model.

8.2 Vehicular Sound Sources

For vehicular sound sources i.e. moving sound sources and vehicle mounted sound sources, PDA Ltd have a wealth of sound data from similar sites and sound sources have been modelled as below.

8.2.1 Main Vehicle Route

The main fixed plant sound sources at site are described in Section 6.4 above.

In addition there are various deliveries and dispatch operations occurring at the site with the traverse routes annotated in Figure 2 above.

Sound power calculations for truck traverses around the site calculated as follows:

$$SWL\ m^{-1} = SWL+10*\log(1/v)+10*\log(n)-10*\log(3600) \quad [1]$$

Where:

SWL is the maximum pass-by Sound Power Level for the vehicles normalized between acceleration and steady movements.

v is velocity in ms^{-1} (taken as 4.47 m s^{-1} = 10mph)

(1/v) is the time taken to travel 1m, so the time associated with the single vehicle point source sound power in each meter.

n is number of vehicles per hour.

We have been provided with the following information regarding delivery and dispatch operations:

HGVs (Milk Reception Area)
Up to 50 per day.

HGVs (cheese dispatches)
5 per day.
00:00, 04:00, 07:00, 10:30, 17:00

HGVs (goods in packaging, pallets, starters)
10-15 per week.

HGVs (Effluent Treatment Plant - ETP)
4 per week.

The above equates to 58-59 HGVs per day or an average of 2.5 per hour.

Considering that the reference period given in BS 4142:2014 for the daytime and night-time is 1 hour and 15 minutes respectively, we have considered a worst case scenario for HGV movements in either case, in which at least one HGV of each type arrives within a given window. We have also assumed that HGVs destined for the Milk Reception Area would be likely to arrive at a greater frequency than a pure even distribution over 24 hours. The considered scenario is as described below:

Daytime: 4 HGVs over an hour with the traverse of 1 per hour inclusive of the ETP.

Nighttime: 2 HGVs over a 15 minute period with the traverse of 1 per hour inclusive of the ETP.

We have referred to reference measurements taken of a comparable HGV by PDA Ltd, and have determined the SWL to be 102dB based on a large amount of measurements taken in this type of facility. Considering the HGV routes over the traverse route shown in Figure 6 then based on the equation above, the HGVs arriving at the parking bay have been determined to have a SWL per metre of 64.7 dB(A) L_{eq} during the day, and 66 dB (A) L_{eq} during the night. The HGVs arriving at the ETP have been determined to have a SWL per metre of 59.9 dB(A) L_{eq} during the day, and 66dB(A) L_{eq} during the night. This allows for reversing manoeuvres of 10 seconds per HGV.

With regard to reversing alarms then we assume that no reversing alarms will be used or that non-intrusive broad band / white noise alarms would be used which do not tend to increase the overall sound level or intrusiveness. Based on the vehicle routes and lengths then, on this basis, manouvering would not be expected to add any materially significant noise contribution to truck movements.

It is understood that there is no allowance for truck mounted refrigerated units to operate on the site.

8.3 SoundPLAN Model

The SoundPLAN calibration model is based on typical operation with no HGV movements. This includes the noise sources of plant measured on site, with MP1 being the reference level. It is shown in the figure below:

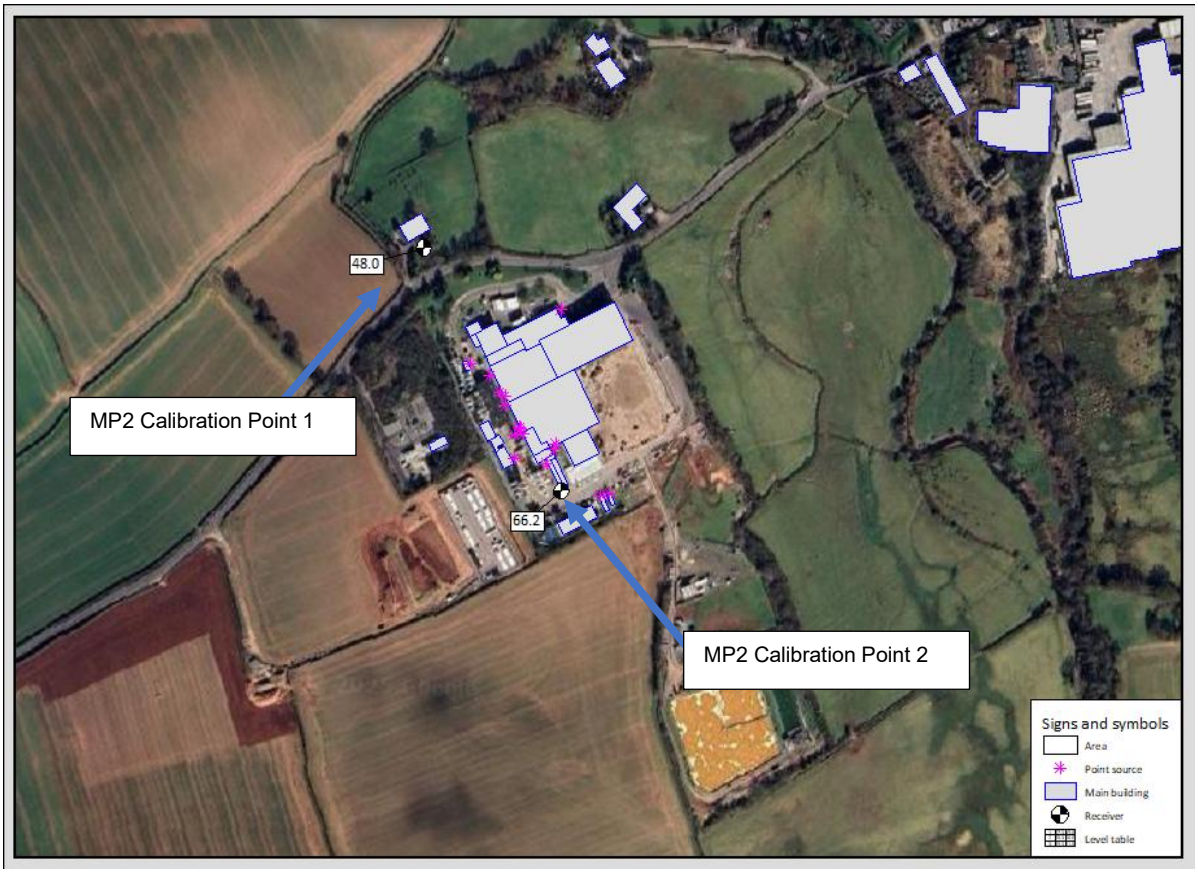


Figure 15: SoundPLAN Model of Existing Site

8.4 SoundPLAN Model Results (No HGV Movements)

The calculated NNSR receiver sound levels are shown in Table 4 below. Note the calibration point result for MP1 and MP2 which can be compared to the sound level time history in Figures 8 and 9.

Table 10. SoundPLAN Results – Sound Pressure Levels (L_{Aeq})

NNSR Receiver	Floor level	Predicted Sound Pressure Level dB(A) L_{eq}
NSSR 1 (Culm Cross)	GF	48.5
	1.FI	48.6
NSSR 2 (Culm Cross)	GF	28.8
	1.FI	28.8
Calibration Point 1	-	48
Calibration Point 2	-	66.6

It can be seen that the external site calibration point and NSSR 1 level of 48 to 48.6 dB(A) is within the residual night-time L_{90} range of 45-50 dB(A) from Figure 9. The background noise level at night between transient events (such as traffic etc.) and therefore would be expected to be dominated by continuous noise from the plant itself and as such this indicates that the noise modelling is consistent with measured noise levels.

As such on this basis the SoundPLAN model we have developed using sound power levels of plant from close proximity site measurements can be considered as producing reasonable results.

8.5 SoundPLAN Model Results (Including HGV Movements)

The calculated NNSR receiver sound levels are shown in the table below.

Table 11. SoundPLAN Results – Sound Pressure Levels (L_{Aeq})

NNSR Receiver	Floor level	Predicted Sound Pressure Level dB(A) L_{eq}	
		Daytime	Nighttime
NSSR 1 (Culm Cross)	GF	49.3	49.8
	1.Fl	49.7	50.5
NSSR 2 (Culm Cross)	GF	43.8	46.8
	1.Fl	44.5	47.5

9.0 SOUNDPLAN MODELLING (INCLUDING VARIATION WORKS)

9.1 SoundPLAN Model Results (Including HGV Movements)

The SoundPLAN model including for the proposed site is shown in the figure below:

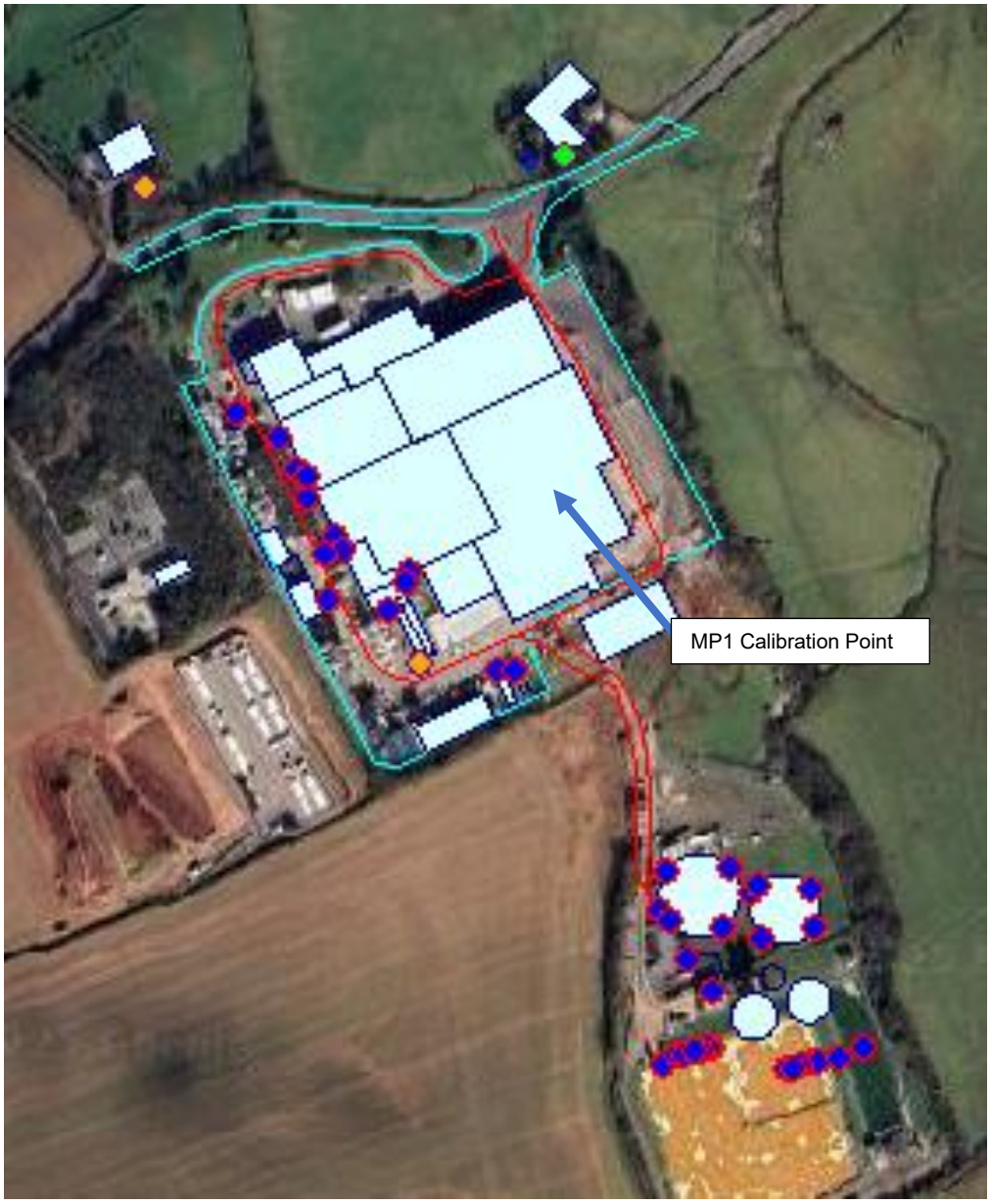


Figure 16: SoundPLAN Model of Proposed Site

The calculated NNSR receiver sound levels are shown in Table 12 below.

Table 12. SoundPLAN Results – Sound Pressure Levels (L_{Aeq})

NNSR Receiver	Floor level	Predicted Sound Pressure Level dB(A) L_{eq}	
		Daytime	Nighttime
NSSR 1 (Culm Cross)	GF	49.3	49.9
	1.Fl	49.6	50.4
NSSR 2 (Culm Cross)	GF	44.1	47.1
	1.Fl	45	48
Wellspring Lane	GF	24.4	24.8
	1.Fl	25.3	25.7
Foxglove Court	GF	26.8	27.6
	1.Fl	28	29

The receivers at Wellsprings Lane and Foxglove Court are shown in the figure below:

Figure 17: Noise Sensitive Receivers

9.2 BS4142 Assessment

With regard to the measurements in Table 13 then noting the number of sources involved then no particular character is likely to dominate and as such I would recommend a 3dB character correction from BS4142 as follows:

- *Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.*

Allowing for the above would give the following sound rating levels based on BS4142:

Table 13. SoundPLAN Results – Sound Rating Levels ($L_{Ar,Tr}$)

NNSR Receiver	Floor level	Predicted Sound Rating Level dB(A) $L_{Ar,Tr}$	
		Daytime	Nighttime
NSSR 1 (Culm Cross)	GF	52.3	52.9
	1.Fl	52.6	53.4
NSSR 2 (Culm Cross)	GF	47.1	50.1
	1.Fl	48	51
Wellspring Lane	GF	27.4	27.8
	1.Fl	28.3	28.7
Foxglove Court	GF	29.8	30.6
	1.Fl	31	32

9.3 Salt Deliveries

It is understood that there have been recent complaints regarding salt deliveries which occur over a single hour once per week. Site personnel have made measurements at the closest receiver being Birchy Cottage (NSSR1) on Culm Cross. The site personnel measured 46 dB(A) L_{eq} at this location with pump operation compared to 42.2 dB(A) L_{eq} without, indicating salt pump noise alone of circa 43.7 dB(A) L_{eq}, with a highest level of 56.6 dB(A) L_{eq} during "banging" which occurs at the end of the delivery to free the caked salt on the tanker drum.

The noise from this type of event is likely to be quite tonal based on measurements I have taken of a salt pump in the past, and a character correction of 4dB might seem reasonable to add to give a rating level of circa 46.2 dB(A) $L_{Ar,Tr}$ based on this from the salt pump alone.

With regard to the above due to the period and transient of these events then we would be of the opinion that this is unlikely to be defined as an objective adverse impact, although they will very likely be audible.

Notwithstanding the above it might be considered that the the occupants of Birch Cross be notified of when these deliveries occur, although based on experience sometimes these can be difficult to pin down.

Alternatively and possibly additonally then temporary barriers installed around the salt pump when in operation would reduce the above rating level by circa 5dB at least this reducing the rating level to below 41.2 dB(A) $L_{Ar,Tr}$ during operation, which is well within the daytime criteria set out in this report. Furthermore again this is only expected to occur for 1 hour a week and only during the daytime and therefore again the impact would expct to be mitigated by this infrequency also.

10.0 MITIGATION RECOMMENDATIONS

10.1 Recommendations

Table 14 indicates that during the daytime the sound rating levels do not meet the proposed criteria of 46 dB $L_{Ar,Tr}$ from Section 4.5.6 or all locations except at Wellspring Lane and Foxglove Court..

Furthermore, Table 14 indicates that during the night-time the sound rating levels do not meet the proposed criteria of 39 dB $L_{Ar,Tr}$ from Section 4.5.6 except at Wellspring Lane and Foxglove Court.

The noise sources contributing to the overall sound levels at each receiver location have been ranked in order of contribution in Appendix E and F. It is noted that the night-time levels are higher which is driven by the assessment being over the worst case 15 minutes rather than the worst case hour.

Based on Appendix E and F the highest noise contributors for each receiver will need to be targeted to reduce overall emissions. In terms of reductions that can be practically achieved at the dominant noise sources then the following would be recommended:

1. Ammonia Cooling Tower. This is the major noise contributor at the receiver "Culm Cross 1" which is understood to be Birchy Cottage. However, when at site it was understood that whilst this cooling tower is currently externally mounted, we understand that the proposal is to sit it within a louvred building which was adjacent to it on site and being worked on. Based on the configuration of this building then even with a standard non-acoustic louvre I would expect 5dB reduction to the noise emission of the condenser unit.

2. Furthermore I would note that, if practicable, the positioning of a solid barrier of minimum 10kg/m^2 surface density with no gaps (including at base) to give line of sight shielding from to receivers at Birchy Cottage, Culm Cross would be recommended as shown in Figure 18 below. This would give a 5dB reduction to the dominant noise sources as shown in Appendix G and H including the already attenuated condenser unit.

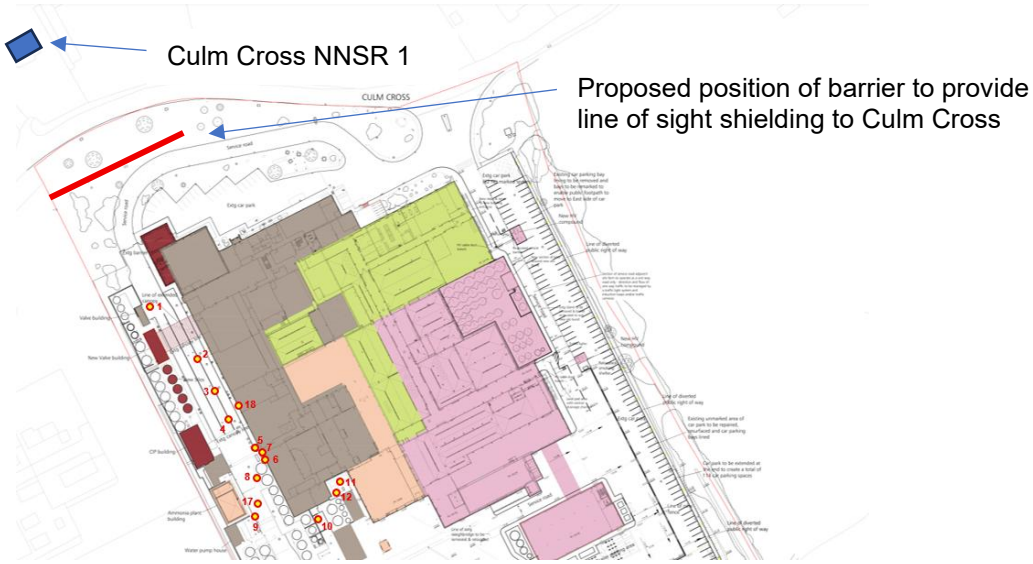


Figure 18: Proposed Barrier Location (if practicable)

Based on the above reductions then, from the calculations Appendix G and H, with bolded figures having been mitigated, the following noise levels are predicted:

Table 14. SoundPLAN Results – Sound Pressure Levels (L_{Aeq})

NNSR Receiver	Floor level	Predicted Sound Pressure Level dB(A) L_{eq}	
		Daytime	Nighttime
NSSR 1 (Culm Cross)	GF	41.6	42.6
	1.Fl	42.4	43.7
NSSR 2 (Culm Cross)	GF	39.5	42.2
	1.Fl	41.3	43.1
Wellspring Lane	GF	24.4	24.8
	1.Fl	25.3	25.7
Foxglove Court	GF	26.8	27.6
	1.Fl	28	29

10.2 BS4142 Assessment

With regard to the measurements in Table 14 then noting the number of sources involved then no particular character is likely to dominate and as such I would recommend a 3dB character correction from BS4142 as follows:

- *Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.*

Allowing for the above would give the following sound rating levels based on BS4142:

Table 15. SoundPLAN Results – Sound Rating Levels ($L_{Ar,Tr}$)

NNSR Receiver	Floor level	Predicted Sound Rating Level dB(A) $L_{Ar,Tr}$	
		Daytime	Nighttime
NSSR 1 (Culm Cross)	GF	44.6	45.6
	1.Fl	45.4	46.7
NSSR 2 (Culm Cross)	GF	42.5	45.2
	1.Fl	44.3	46.1
Wellspring Lane	GF	27.4	27.8
	1.Fl	28.3	28.7
Foxglove Court	GF	29.8	30.6
	1.Fl	31	32

10.3 Salt Deliveries

With the above barrier in place then this would be predicted to reduce the predicted rating level of 46.2 dB(A) $L_{Ar,Tr}$ by circa 5dB at least this reducing the rating level to below 41.2 dB(A) $L_{Ar,Tr}$ during operation,

which is well within the daytime criteria set out in this report. Furthermore again this is only expected to occur for 1 hour a week thus adding further mitigating circumstances in that regard.

10.4 Discussion

Table 15 indicates that during the daytime the sound rating levels meet the proposed criteria of 46 dB $L_{Ar,Tr}$ from Section 4.5.6 at all locations.

However, Table 15 indicates that during the night-time the sound rating levels still do not meet the proposed criteria of 39 dB $L_{Ar,Tr}$ from Section 4.5.6 except at Wellspring Lane and Foxglove Court.

Notwithstanding the above, external amenity areas at the residential receivers will predominantly not be used at night. As such, if the following were considered to be true after application of mitigation…

- all *practical* mitigation options had been exhausted,
- subsequent to the said mitigation there was unlikely to be a tangible character to the sound emission
- there will be a significant reduction in noise levels compared to the existing scenario amounting to in the region of a minimum of 5dB at the least in all cases, therefore achieving in the region of a halving of loudness of more.

….then achieving the World Health Organisation (WHO) recommendation of 45 dBA $L_{eq\ 8\ hour}$ for "all" noise sources at locations outside windows at night would seem a reasonable and practical target criterion when looking at the context of the site. Table 14 indicates that L_{Aeq} noise levels of 44 dB(A) even for the worst 15 minutes, thus it would be expected that the criterion would be more comfortably achieve over the full 8 hour night-time period.

Notwithstanding the above, I note that this WHO guideline is designed to be applied to **"all noise"** including industrial components and not industrial components alone as we are undertaking to do here.

However, noting that the second chart in Section 6.3 indicates that during the night-time current L_{Aeq} noise levels are in lower 50s L_{Aeq}, and that our current predictions of Arla associated noise alone indicate 50-51 dBA L_{eq}, then it might be indicated that the noise from Arla already dominates the night-time noise climate, and therefore potentially reducing this noise emission from Arla to 44 dB(A) $L_{eq\ 8\ hours}$ or less will likely mean a similar noise level and reduction for the entire noise climate. As such it seems likely that with the proposed mitigation in place then noise from all sources on site will likely approach the 45 dBA $L_{eq\ 8\ hour}$ limit from WHO for "all noise" at the worst affected receivers and therefore also represent a significant reduction to the current noise climate.

As such based on the above we would be of the opinion that with the said recommended measures in place then the overall impact from the development would be "low".

10.5 Best Available Techniques

The Environment Agency Guidance last updated 31 January 2022 regarding noise and vibration management for environmental permits indicates that operators must prevent significant pollution and also comply with the requirements to use 'appropriate measures' (Waste Framework Directive 2018/851) or 'best available techniques' (BAT) to prevent or minimise noise pollution.

The 'best available techniques' referenced above is similar to the 'Best Practicable Means' (BPM) referred to in the Environmental Protection Act 1990. In simple terms, this requires the noise-maker to operate as quietly as possible, without suffering unreasonable financial and operational restraints.

Based on the above definition the Operator could reasonably argue that operational mitigation measures such as described in section 10.1 can be seen as achieving Best Practical Means / Best Available Techniques and would therefore be adequate.

11.0 UNCERTAINTY

BS4142 indicates that an assessment of noise impact should consider uncertainty within the assessment. This uncertainty can arise from: uncertainty in measurements; uncertainty in sound emission and sound power level; and uncertainty in calculation method.

11.1 Uncertainty in Measurements

It is noted that the instrumentation used for the assessment conforms to Class 1 accuracy in accordance with IEC 61672. In addition, the instrumentation has been calibrated to national standards and was field calibrated at the time of the measurements.

We would therefore consider that the effect of uncertainty on the measurement of sound would be minimal.

11.2 Uncertainty in Sound Power Levels

We would note that we have derived sound power levels of plant from on site measurements and calibration assessment for each in sound mapping software. Therefore, we would consider that the effect of uncertainty on the sound power levels will be low.

11.3 Uncertainty in Calculation Method

It should be noted that the calculation method undertaken to predict the specific sound level at the noise sensitive receivers has been undertaken in accordance with ISO 9613-2 ‘Acoustics – attenuation of sound during propagation outdoors – general method of calculation’ which is a validated method of calculation and assumes a worst-case down-wind propagation.

We would therefore consider that any uncertainty in the prediction and calculation method is unlikely to affect the outcome of the assessment.

APPENDIX A – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of sound, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB $L_{Aeq.}$ Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous sound level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average sound level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq}. It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB $L_{An.}$ It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) $L_{max,}$ dB $L_{Amax,}$ etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall sound level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the sound level in each band can be expressed in any form e.g. L_{eq}, L_{90}, L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.

Sound reduction index (R):

This is a measure in decibels (dB) of the sound insulation of a particular construction. It is a laboratory measured parameter independent of area, and of receiving room conditions. The sound reduction index is the value produced from laboratory tests on a construction. When tested in a laboratory, results of R are obtained over a range frequencies in 1/3rd and/or full octave bands. These may then be weighted in accordance with BS EN ISO 717: 1997: Part 1 to give the overall Weighted Sound Reduction Index R_w. Where sound reduction with respect to road traffic noise is required the frequency weighting may be adapted using the C_{tr} spectrum adaptation term. In this case the single figure value is given in terms of $R_w + C_{tr}$.

Standardised level difference (D_{nT}): this is the level difference adjusted to assume a standard reverberation time of 0.5 seconds in the receiving room so that partitions can be compared independent of the furnishing and surface finishes of the rooms. The measure is generally used in residential testing as 0.5 seconds is taken as the approximate reverberation time of a furnished living room or bedroom. The D_{nT} is usually quoted for 1/3 rd octave bands between 100 Hz and 3150 Hz.

Weighted standardised level difference ($D_{nT,w}$): the $D_{nT,w}$ is a single figure expression used to describe the sound insulation of a partition. The weighting system used to obtain the single figure $D_{nT,w}$ from the 1/3rd octave D_{nT} values is given in BS EN ISO 717: Part 1. The $D_{nT,w}$ is used for expressing sound insulation measured "in the field", and is part of the term used in Approved Document E 2003, guidance to the Building Regulations for the assessment of performance of separating elements between residences.

Spectrum adaptation terms (C, C_{tr}): These terms are single figure values which are added to a single figure R_w or D_w term to adapt the frequency weighting for different source sound spectra. Adding the C_{tr} term to a weighted parameter approximates to the human perceived sound insulation of an element when subjected to road traffic noise. The C_{tr} term may be used to determine a single figure approximation of sound insulation against road traffic noise. The C_{tr} term is part of the term used in Approved Document E: 2003 of the Building Regulations for the assessment of performance of separating elements between residences.

Flanking: Flanking is the term used to describe how sound gets from one room to another by routes other than via the wall or floor directly separating them. Such flanking paths around a party wall would be the internal leaf of the external wall or the roof void, plus any air gaps at junctions. The sound insulation of flanking paths is very important. If the insulation is poor it can result in a poor built performance in terms of sound insulation, even if the party walls or floors themselves are adequate. When a measurement of sound insulation is made in a building as opposed to an acoustic laboratory, it will include flanking sound transmission. Standards for sound insulation in residential properties now require testing of $D_{nT,w}$ + C_{tr} values which include sound transmission via flanking paths.

APPENDIX B – TABLE OF SPOT MEASUREMENTS

Measurement Reference #	Description of Measurement	Noise Level dB L_{Aeq}
1	1m from Cream Tank	74.5
2	1m from Milk Intake Pump	73.1
3	1m from Additional Milk Intake Pump	73.1
4	1m from Milk Intake Pump	73.2
5	1m from Boiler open door	71.7
6	1m from Vent from boiler room	82.1
7	1m from Evaporator Room	80.2
8	1m from Hot Water Silo	77.8
9	1m from Ammonia Cooling Tower	60.9
10	1m from Gas Plant	59.3
11	1m from Boiler Room Louvre	85.5
12	1m from Silo Washing	66.8
13	3m from CHP Generator 1	62.1
14	4m from CHP Generator 2	62.3
15	Approx 3m from Forklift Forward	73.5
16	Approx 3m from Forklift Reversing	74.6
17	4.5m from Ammonia Cooling Towers	93.4
18	Scan of Separator	81.2

APPENDIX C – FIGURE OF SPOT MEASUREMENT LOCATIONS

APPENDIX D – SPOT MEASUREMENT 3RD OCTAVE DATA

#	3rd Octave Frequency Band Hz (dBA)																			
	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
1	68	61.6	59	62.6	59.4	58.5	61.5	57.4	57.9	67.3	57.1	58.7	57.8	55.9	59.9	57.5	71.9	59.3	54.6	55.9	52.7
2	66.3	61.7	59	60.3	60.1	61.9	63.1	60.6	63.4	62.1	63.1	62.4	60	60	66.7	62.8	60.2	59.8	57.7	60.1	58.8
3	66.8	60.5	61.7	64.3	61.9	62.4	67	63.2	62.6	66.3	65.6	63.6	64.4	63.6	62.8	62	61	58.6	57.7	57.1	57.3
4	70.2	67.3	63	63.1	61.1	63.7	64	61.9	63.4	60.5	67.4	63.5	61.6	65.3	63.4	62.2	61.2	60.3	58.8	57.8	59.8
5	77	74.9	69.6	72.4	68	68.1	63.3	61.1	61.5	62.2	61.8	61.4	62.4	62	61.5	60.7	60.2	58.9	57.5	57.3	54.9
6	75.1	70.3	66.2	63.7	66.2	67.7	71.5	74.7	75.3	75	70.8	70.2	69.3	71.2	71	71.4	70.7	70.7	69.3	72.7	67.8
7	75.6	72.1	67.8	64.8	66.5	67.7	70.5	69.9	70.6	72.9	68.3	69.4	67.8	69.3	69.5	69.4	69.2	69.4	67.7	69.2	67.3
8	64.2	61.3	57.6	62.1	69.9	67.7	70.2	63.8	59.6	60.5	60.8	61.4	63.6	65.1	62.4	62.6	62.6	66.9	69.4	67.9	68.3
9	61.8	58.4	55.9	56.6	59	60.3	57.9	53.9	52.3	54.9	52.2	52.5	51	53.5	47	45.7	45.2	47	46.1	50	41.7
10	64.5	65.2	57.6	55	53.8	55.3	53.1	50.3	50.6	48.9	50.2	52.6	51	48.2	48.1	47	44.6	43.2	42.8	47	45.2
11	83.3	77.7	75.3	77.6	78.6	82.5	89.8	78.1	75.5	76.3	72.5	75.3	75.5	74.7	79.7	75.4	66.9	60.9	57	56.2	54.8
12	62.8	61.3	55.9	52	55.5	65.5	62.3	57.6	56.4	55.7	53.1	55.8	54.8	52.9	54.1	52.6	53.7	53.9	53.8	54.8	54.3
13	74.4	73.5	68.2	66.1	65.6	66.4	63	56.7	53.8	51.3	52.5	51	49.1	47.8	47.5	46.9	45.7	45.4	44.8	42.7	40.7
14	66.8	71.9	68.3	65.7	64.1	64.8	61.2	57	55.3	53.2	53.5	53.3	52.3	51.6	51	50.3	48.4	47.2	45.5	42.6	39.6
15	70.9	71.7	69.5	65.9	64	65.1	62	58.1	56.2	60.1	61.5	64.4	60	59.1	61.1	63.3	63.1	63.6	63.5	62.5	61.1
16	70.5	72.2	68.6	65.6	64.4	65.4	61.4	58.3	58.9	59.4	59.9	58.8	56.5	57.7	58.6	58.9	60.2	71.7	61.4	57.7	56.8
17	66.1	66.9	58.8	60	63.5	68.4	63.4	59.8	61.4	64	64.3	62.6	63.3	65.8	67.1	72.5	74.3	74.3	76.8	82.5	88
18	75.2	86.8	73.8	72.7	82.1	80.3	78.7	73.1	72.7	73.5	71.7	75.4	71.7	71.7	72	68.6	66.2	65	65.3	67.5	57.3

APPENDIX E – RANKED SOUNDPLAN MODEL NOISE SOURCES (DAYTIME)

Wellspring Lane	GF	1F	Culm Cross 1			Culm Cross 2			Foxglove Court		
Total	24.4	25.3	Total	49.3	49.6	Total	44.1	45	Total	26.8	
Dewatering Feed Pump	18.1	18.5	17 - Ammonia Cooling Tower	47.9	47.7	Existing HGV to Car Park x6/x3	42.7	43.6	11 - Boiler Room Louvre	19	20.1
Post DAF Pumping Station	16.9	17.1	Existing HGV to Car Park x6/x3	39.7	41.3	Existing HGV to ETS 1x/1x	37.7	38.7	Aeration Tank Airblower with Acoustic	18	19.6
6 - Vent from Boiler Room	12.7	14.4	6 - Vent from Boiler Room	35.1	36.8	11 - Boiler Room Louvre	24.9	25	Existing HGV to Car Park x6/x3	17.9	19.5
Aeration Tank Airblower with Acoustic	12.5	14.2	Existing HGV to ETS 1x/1x	34.9	36.5	17 - Ammonia Cooling Tower	24.2	23.7	Aeration Tank Airblower with Acoustic Hood	17	18.2
17 - Ammonia Cooling Tower	12.3	14	1 - Cream Tank	33.5	34.8	6 - Vent from Boiler Room	21.4	22	Aeration Tank Airblower with Acoustic Hood	17	18.2
11 - Boiler Room Louvre	12.1	12.8	7 - Evaporator Room	33.1	33.7	Venturi Aerator	19.1	19.5	Permeate Reuse Booster Set Pumps	15.2	16.2
Aeration Tank Airblower with Acoustic Hood	11.5	12.7	4 - Milk Intake	32	32.7	7 - Evaporator Room	18.4	19.4	Existing HGV to ETS 1x/1x	14.2	15.4
Aeration Tank Airblower with Acoustic Hood	11.4	12.7	8 - Hot Water Silo	27.3	29.2	Divert Tank Transfer Pumps	18.3	18.5	RO Feed Pumps	13.3	13.8
7 - Evaporator Room	11.2	12.6	Dewatering Feed Pump	24.4	27.6	Venturi Aerator	18.1	18.2	Venturi Aerator	10.1	10.5
Existing HGV to Car Park x6/x3	10.9	12.6	18 - Seperator	24	25.5	Venturi Aerator	17.6	17.8	Venturi Aerator	9.9	10.4
Existing HGV to ETS 1x/1x	8.6	9.9	11 - Boiler Room Louvre	21.2	22.6	Aeration Tank Airblower with Acoustic	13.3	13.8	Venturi Aerator	9.5	10.1
RO Feed Pumps	6.5	7.1	3 - Additional Milk Intake Pump	20.1	21.2	Aeration Tank Airblower with Acoustic Hood	13	13.6	14 - CHP Generator 2	8.1	9.8
Venturi Aerator	3.7	4	5 - Boiler Open Door	19.7	21	Aeration Tank Airblower with Acoustic Hood	12.7	13.1	MBR Air Blower with Acoustic Hood	6.9	9.4
Venturi Aerator	3.6	3.9	Aeration Tank Airblower with Acoustic	18.3	21	13 - CHP generator 1	9.6	10.7	MBR Air Blower with Acoustic Hood	6.9	8.1
MBR Permeate Pumps	3.1	3.3	Aeration Tank Airblower with Acoustic Hood	17.7	20.7	Post DAF Pumping Station	9	9.7	MBR Air Blower with Acoustic Hood	6.8	8.1
MBR Permeate Pumps	3.1	3.3	2 - Milk Intake Pump	15.9	16.9	14 - CHP Generator 2	8.6	9.4	MBR Permeate Pumps	6.6	8
MBR Air Blower with Acoustic Hood	1.8	3	Aeration Tank Airblower with Acoustic Hood	15.3	16.5	18 - Seperator	8.6	9	MBR Permeate Pumps	6.5	6.9
RAS/WAS Pumps	1.7	2.8	MBR Permeate Pumps	12.6	16	Dewatering Feed Pump	8	8.4	MBR Permeate Pumps	6.5	6.8
MBR Air Blower with Acoustic Hood	1.6	2.8	MBR Permeate Pumps	12.5	16	4 - Milk Intake	7.8	8.1	RAS/WAS Pumps	6.4	6.8
MBR Air Blower with Acoustic Hood	1.6	2	14 - CHP Generator 2	12	13.4	Permeate Reuse Booster Set Pumps	6.7	7.8	RAS/WAS Pumps	6.3	6.7
RAS/WAS Pumps	1.6	1.9	13 - CHP generator 1	10.7	12.1	1 - Cream Tank	6.6	7.1	RAS/WAS Pumps	6.3	6.6
RAS/WAS Pumps	1.6	1.9	Venturi Aerator	9.1	11.8	8 - Hot Water Silo	6.1	7.1	Post DAF Pumping Station	6.1	6.6
MBR Permeate Pumps	1.5	1.8	Venturi Aerator	8.9	11.7	5 - Boiler Open Door	5.6	7	13 - CHP generator 1	4.6	4.6
DAF Feed Pump	-0.6	0.6	DAF Feed Pump	7.8	10.9	MBR Air Blower with Acoustic Hood	5.4	6.8	17 - Ammonia Cooling Tower	0.1	3.7
1 - Cream Tank	-1.5	-0.3	Divert Tank Transfer Pumps	7.6	10.7	MBR Air Blower with Acoustic Hood	5.3	6.7	Dewatering Feed Pump	-0.4	0.7
5 - Boiler Open Door	-1.7	-0.4	Venturi Aerator	7.5	10.3	RO Feed Pumps	4.3	6.2	6 - Vent from Boiler Room	-2.7	-1.5
8 - Hot Water Silo	-3.2	-1.6	Post DAF Pumping Station	6.7	7.7	3 - Additional Milk Intake Pump	2.8	3.1	7 - Evaporator Room	-4.4	-3.3
3 - Additional Milk Intake Pump	-4.7	-3.1	RO Feed Pumps	4.8	7	MBR Air Blower with Acoustic Hood	1.7	2.4	18 - Seperator	-4.8	-3.8
18 - Seperator	-4.8	-4.1	Venturi Aerator	4.6	6.5	Venturi Aerator	0.5	1.8	26 - Louvre 1	-5.1	-3.9
Permeate Reuse Booster Set Pumps	-5.4	-4.2	MBR Air Blower with Acoustic Hood	4	5.1	RAS/WAS Pumps	-2.1	-0.2	26 - Louvre 2	-5.1	-3.9
14 - CHP Generator 2	-5.7	-4.5	MBR Air Blower with Acoustic Hood	3.6	4.6	RAS/WAS Pumps	-3.4	-1.7	26 - Louvre 3	-5.2	-4
Venturi Aerator	-5.7	-5.6	MBR Air Blower with Acoustic Hood	3.4	4.3	RAS/WAS Pumps	-3.4	-1.8	12 - Silo Washing	-6.1	-4
13 - CHP generator 1	-6.4	-6.4	Permeate Reuse Booster Set Pumps	2.2	2.9	MBR Permeate Pumps	-3.5	-2	1 - Cream Tank	-7.5	-4.6
4 - Milk Intake	-8.5	-7.6	RAS/WAS Pumps	-1.8	-0.8	DAF Feed Pump	-4.2	-2.7	Venturi Aerator	-7.7	-6.3
Venturi Aerator	-9.2	-8.1	MBR Permeate Pumps	-1.9	-0.8	2 - Milk Intake Pump	-4.4	-3.7	4 - Milk Intake	-9.7	-6.8
26 - Louvre 3	-9.9	-8.6	RAS/WAS Pumps	-3.1	-2	MBR Permeate Pumps	-4.9	-3.7	Divert Tank Transfer Pumps	-11.3	-8
26 - Louvre 1	-10	-8.6	RAS/WAS Pumps	-3.1	-2.1	MBR Permeate Pumps	-4.9	-4.3	Venturi Aerator	-11.5	-8.6
26 - Louvre 2	-10	-8.6	Venturi Aerator	-7	-6.7	12 - Silo Washing	-6	-5.7	Venturi Aerator	-12.3	-9.4
10 - Gas Plant	-10.1	-8.7	Venturi Aerator	-7.4	-6.8	Venturi Aerator	-7.4	-7.4	Venturi Aerator	-14.8	-11
2 - Milk Intake Pump	-12.9	-11.6	12 - Silo Washing	-7.5	-7.4	Venturi Aerator	-7.7	-7.7	Venturi Aerator	-15.2	-11.2
Venturi Aerator	-16.1	-16	Venturi Aerator	-7.6	-7.5	Venturi Aerator	-8	-7.9	5 - Boiler Open Door	-16.1	-13.4
Divert Tank Transfer Pumps	-19.2	-19.1	Venturi Aerator	-8	-7.9	Venturi Aerator	-8.3	-8.1	DAF Feed Pump	-17.9	-15.5
Venturi Aerator	-21.5	-20.8	10 - Gas Plant	-10.4	-9.4	10 - Gas Plant	-10.7	-8.3	3 - Additional Milk Intake Pump	-19	-18.2
Venturi Aerator	-21.7	-21.5	26 - Louvre 3	-15.2	-14.9	26 - Louvre 2	-10.9	-8.9	8 - Hot Water Silo	-19	-18.2
12 - Silo Washing	-21.8	-21.7	26 - Louvre 2	-15.3	-15	26 - Louvre 1	-11	-9.7	Compressor Wall	-19.2	-19.1
Venturi Aerator	-21.8	-21.8	26 - Louvre 1	-15.4	-15.1	26 - Louvre 3	-11.5	-10.9	2 - Milk Intake Pump	-21.2	-20.3
Compressor Wall	-23.3	-23.1	Compressor Wall	-21.7	-21.5	Compressor Wall	-12.2	-11.4	10 - Gas Plant	-23.6	-22.8
Compressor Wall	-34.3	-34	Compressor Wall	-30.1	-30.2	Compressor Wall	-26.6	-25.3	Compressor Wall	-30.4	-30.4

APPENDIX F – RANKED SOUNDPLAN MODEL NOISE SOURCES (NIGHT-TIME)

Wellspring Lane	GF	1F	Culm Cross 1			Culm Cross 2			Foxglove Court		
Total	24.8	25.7	Total	49.9	50.4	Total	47.1	48	Total	27.6	29
1 - Cream Tank	18.1	18.5	17 - Ammonia Cooling Tower	47.9	47.7	Existing HGV to Car Park x6/x3	44	44.9	Existing HGV to ETS 1x/1x	20.3	22.3
26 - Louvre 3	16.9	17.1	Existing HGV to Car Park x6/x3	41	42.6	Existing HGV to ETS 1x/1x	43.8	44.8	Existing HGV to Car Park x6/x3	19.2	21.4
3 - Additional Milk Intake Pump	14.7	16	Existing HGV to ETS 1x/1x	41	42.6	11 - Boiler Room Louvre	24.9	25	11 - Boiler Room Louvre	19	19.6
MBR Permeate Pumps	12.7	14.4	6 - Vent from Boiler Room	35.1	36.8	17 - Ammonia Cooling Tower	24.2	23.7	Aeration Tank Airblower with Acoustic	18	19.5
MBR Air Blower with Acoustic Hood	12.5	14.2	1 - Cream Tank	33.5	34.8	6 - Vent from Boiler Room	21.4	22	Aeration Tank Airblower with Acoustic Hood	17	18.2
Aeration Tank Airblower with Acoustic Hood	12.3	14	7 - Evaporator Room	33.1	33.7	Venturi Aerator	19.1	19.5	Aeration Tank Airblower with Acoustic Hood	17	18.2
8 - Hot Water Silo	12.2	13.9	4 - Milk Intake	32	32.7	7 - Evaporator Room	18.4	19.4	Permeate Reuse Booster Set Pumps	15.2	15.4
6 - Vent from Boiler Room	12.1	12.8	8 - Hot Water Silo	27.3	29.2	Divert Tank Transfer Pumps	18.3	18.5	RO Feed Pumps	13.3	13.8
MBR Air Blower with Acoustic Hood	11.5	12.7	Dewatering Feed Pump	24.4	27.6	Venturi Aerator	18.1	18.2	Venturi Aerator	10.1	10.5
RAS/WAS Pumps	11.4	12.7	18 - Seperator	24	25.5	Venturi Aerator	17.6	17.8	Venturi Aerator	9.9	10.4
MBR Air Blower with Acoustic Hood	11.2	12.6	11 - Boiler Room Louvre	21.2	22.6	Aeration Tank Airblower with Acoustic	13.3	13.8	Venturi Aerator	9.5	10.1
2 - Milk Intake Pump	6.5	7.1	3 - Additional Milk Intake Pump	20.1	21.2	Aeration Tank Airblower with Acoustic Hood	13	13.6	14 - CHP Generator 2	8.1	9.8
Venturi Aerator	3.7	4	5 - Boiler Open Door	19.7	21	Aeration Tank Airblower with Acoustic Hood	12.7	13.1	MBR Air Blower with Acoustic Hood	6.9	9.4
Venturi Aerator	3.6	3.9	Aeration Tank Airblower with Acoustic	18.3	21	13 - CHP generator 1	9.6	10.7	MBR Air Blower with Acoustic Hood	6.9	8.1
Venturi Aerator	3.1	3.3	Aeration Tank Airblower with Acoustic Hood	17.7	20.7	Post DAF Pumping Station	9	9.7	MBR Air Blower with Acoustic Hood	6.8	8.1
13 - CHP generator 1	3.1	3.3	2 - Milk Intake Pump	15.9	16.9	14 - CHP Generator 2	8.6	9.4	MBR Permeate Pumps	6.6	8
18 - Seperator	1.8	3	Aeration Tank Airblower with Acoustic Hood	15.3	16.5	18 - Seperator	8.6	9	MBR Permeate Pumps	6.5	6.9
26 - Louvre 1	1.7	2.8	MBR Permeate Pumps	12.6	16	Dewatering Feed Pump	8	8.4	MBR Permeate Pumps	6.5	6.8
Permeate Reuse Booster Set Pumps	1.6	2.8	MBR Permeate Pumps	12.5	16	4 - Milk Intake	7.8	8.1	RAS/WAS Pumps	6.4	6.8
14 - CHP Generator 2	1.6	2	14 - CHP Generator 2	12	13.4	Permeate Reuse Booster Set Pumps	6.7	7.8	RAS/WAS Pumps	6.3	6.7
26 - Louvre 2	1.6	1.9	13 - CHP generator 1	10.7	12.1	1 - Cream Tank	6.6	7.1	RAS/WAS Pumps	6.3	6.6
10 - Gas Plant	1.6	1.9	Venturi Aerator	9.1	11.8	8 - Hot Water Silo	6.1	7.1	Post DAF Pumping Station	6.1	6.6
4 - Milk Intake	1.5	1.8	Venturi Aerator	8.9	11.7	5 - Boiler Open Door	5.6	7	13 - CHP generator 1	4.6	4.6
DAF Feed Pump	-0.6	0.6	DAF Feed Pump	7.8	10.9	MBR Air Blower with Acoustic Hood	5.4	6.8	17 - Ammonia Cooling Tower	0.1	3.7
Dewatering Feed Pump	-1.5	-0.3	Divert Tank Transfer Pumps	7.6	10.7	MBR Air Blower with Acoustic Hood	5.3	6.7	Dewatering Feed Pump	-0.4	0.7
MBR Permeate Pumps	-1.7	-0.4	Venturi Aerator	7.5	10.3	RO Feed Pumps	4.3	6.2	6 - Vent from Boiler Room	-2.7	-1.5
RAS/WAS Pumps	-3.2	-1.6	Post DAF Pumping Station	6.7	7.7	3 - Additional Milk Intake Pump	2.8	3.1	7 - Evaporator Room	-4.4	-3.3
Venturi Aerator	-4.7	-3.1	RO Feed Pumps	4.8	7	MBR Air Blower with Acoustic Hood	1.7	2.4	18 - Seperator	-4.8	-3.8
Aeration Tank Airblower with Acoustic Hood	-4.8	-4.1	Venturi Aerator	4.6	6.5	Venturi Aerator	0.5	1.8	26 - Louvre 1	-5.1	-3.9
Venturi Aerator	-5.4	-4.2	MBR Air Blower with Acoustic Hood	4	5.1	RAS/WAS Pumps	-2.1	-0.2	26 - Louvre 2	-5.1	-3.9
11 - Boiler Room Louvre	-5.7	-4.5	MBR Air Blower with Acoustic Hood	3.6	4.6	RAS/WAS Pumps	-3.4	-1.7	26 - Louvre 3	-5.2	-4
Venturi Aerator	-5.7	-5.6	MBR Air Blower with Acoustic Hood	3.4	4.3	RAS/WAS Pumps	-3.4	-1.8	12 - Silo Washing	-6.1	-4
17 - Ammonia Cooling Tower	-6.4	-6.4	Permeate Reuse Booster Set Pumps	2.2	2.9	MBR Permeate Pumps	-3.5	-2	1 - Cream Tank	-7.5	-4.6
Venturi Aerator	-8.5	-7.6	RAS/WAS Pumps	-1.8	-0.8	DAF Feed Pump	-4.2	-2.7	Venturi Aerator	-7.7	-6.3
12 - Silo Washing	-9.2	-8.1	MBR Permeate Pumps	-1.9	-0.8	2 - Milk Intake Pump	-4.4	-3.7	4 - Milk Intake	-9.7	-6.8
RO Feed Pumps	-9.9	-8.6	RAS/WAS Pumps	-3.1	-2	MBR Permeate Pumps	-4.9	-3.7	Divert Tank Transfer Pumps	-11.3	-8
Existing HGV to Car Park x6/x3	-10	-8.6	RAS/WAS Pumps	-3.1	-2.1	MBR Permeate Pumps	-4.9	-4.3	Venturi Aerator	-11.5	-8.6
Existing HGV to ETS 1x/1x	-10	-8.6	Venturi Aerator	-7	-6.7	12 - Silo Washing	-6	-5.7	Venturi Aerator	-12.3	-9.4
Post DAF Pumping Station	-10.1	-8.7	Venturi Aerator	-7.4	-6.8	Venturi Aerator	-7.4	-7.4	Venturi Aerator	-14.8	-11
7 - Evaporator Room	-12.9	-11.6	12 - Silo Washing	-7.5	-7.4	Venturi Aerator	-7.7	-7.7	Venturi Aerator	-15.2	-11.2
Compressor Wall	-16.1	-16	Venturi Aerator	-7.6	-7.5	Venturi Aerator	-8	-7.9	5 - Boiler Open Door	-16.1	-13.4
5 - Boiler Open Door	-19.2	-19.1	Venturi Aerator	-8	-7.9	Venturi Aerator	-8.3	-8.1	DAF Feed Pump	-17.9	-15.5
Divert Tank Transfer Pumps	-21.5	-20.8	10 - Gas Plant	-10.4	-9.4	10 - Gas Plant	-10.7	-8.3	3 - Additional Milk Intake Pump	-19	-18.2
Venturi Aerator	-21.7	-21.5	26 - Louvre 3	-15.2	-14.9	26 - Louvre 2	-10.9	-8.9	8 - Hot Water Silo	-19	-18.2
Aeration Tank Airblower with Acoustic	-21.8	-21.7	26 - Louvre 2	-15.3	-15	26 - Louvre 1	-11	-9.7	Compressor Wall	-19.2	-19.1
Compressor Wall	-21.8	-21.8	26 - Louvre 1	-15.4	-15.1	26 - Louvre 3	-11.5	-10.9	2 - Milk Intake Pump	-21.2	-20.3
MBR Permeate Pumps	-23.3	-23.1	Compressor Wall	-21.7	-21.5	Compressor Wall	-12.2	-11.4	10 - Gas Plant	-23.6	-22.8
RAS/WAS Pumps	-34.3	-34	Compressor Wall	-30.1	-30.2	Compressor Wall	-26.6	-25.3	Compressor Wall	-30.4	-30.4

APPENDIX G – RANKED SOUNDPLAN MODEL NOISE SOURCES (DAYTIME) (MITIGATED)

Wellspring Lane	GF	1F	Culm Cross 1			Culm Cross 2			Foxglove Court		
Total	24.4	25.3	**Total**	**41.6**	**42.4**	**Total**	**39.5**	**40.3**	Total	26.8	28
Dewatering Feed Pump	18.1	18.5	**17 - Ammonia Cooling Tower**	**37.9**	**37.7**	**Existing HGV to Car Park x6/x3**	**37.7**	**38.6**	11 - Boiler Room Louvre	19	20.1
Post DAF Pumping Station	16.9	17.1	**Existing HGV to Car Park x6/x3**	**34.7**	**36.3**	**Existing HGV to ETS 1x/1x**	**32.7**	**33.7**	Aeration Tank Airblower with Acoustic	18	19.6
6 - Vent from Boiler Room	12.7	14.4	**6 - Vent from Boiler Room**	**30.1**	**31.8**	11 - Boiler Room Louvre	24.9	25	Existing HGV to Car Park x6/x3	17.9	19.5
Aeration Tank Airblower with Acoustic	12.5	14.2	**Existing HGV to ETS 1x/1x**	**29.9**	**31.5**	17 - Ammonia Cooling Tower	24.2	23.7	Aeration Tank Airblower with Acoustic Hood	17	18.2
17 - Ammonia Cooling Tower	12.3	14	**1 - Cream Tank**	**28.5**	**29.8**	6 - Vent from Boiler Room	21.4	22	Aeration Tank Airblower with Acoustic Hood	17	18.2
11 - Boiler Room Louvre	12.1	12.8	**7 - Evaporator Room**	**28.1**	**28.7**	Venturi Aerator	19.1	19.5	Permeate Reuse Booster Set Pumps	15.2	16.2
Aeration Tank Airblower with Acoustic Hood	11.5	12.7	**4 - Milk Intake**	**27**	**27.7**	7 - Evaporator Room	18.4	19.4	Existing HGV to ETS 1x/1x	14.2	15.4
Aeration Tank Airblower with Acoustic Hood	11.4	12.7	**8 - Hot Water Silo**	**22.3**	**24.2**	Divert Tank Transfer Pumps	18.3	18.5	RO Feed Pumps	13.3	13.8
7 - Evaporator Room	11.2	12.6	Dewatering Feed Pump	24.4	27.6	Venturi Aerator	18.1	18.2	Venturi Aerator	10.1	10.5
Existing HGV to Car Park x6/x3	10.9	12.6	18 - Seperator	24	25.5	Venturi Aerator	17.6	17.8	Venturi Aerator	9.9	10.4
Existing HGV to ETS 1x/1x	8.6	9.9	11 - Boiler Room Louvre	21.2	22.6	Aeration Tank Airblower with Acoustic	13.3	13.8	Venturi Aerator	9.5	10.1
RO Feed Pumps	6.5	7.1	3 - Additional Milk Intake Pump	20.1	21.2	Aeration Tank Airblower with Acoustic Hood	13	13.6	14 - CHP Generator 2	8.1	9.8
Venturi Aerator	3.7	4	5 - Boiler Open Door	19.7	21	Aeration Tank Airblower with Acoustic Hood	12.7	13.1	MBR Air Blower with Acoustic Hood	6.9	9.4
Venturi Aerator	3.6	3.9	Aeration Tank Airblower with Acoustic	18.3	21	13 - CHP generator 1	9.6	10.7	MBR Air Blower with Acoustic Hood	6.9	8.1
MBR Permeate Pumps	3.1	3.3	Aeration Tank Airblower with Acoustic Hood	17.7	20.7	Post DAF Pumping Station	9	9.7	MBR Air Blower with Acoustic Hood	6.8	8.1
MBR Permeate Pumps	3.1	3.3	2 - Milk Intake Pump	15.9	16.9	14 - CHP Generator 2	8.6	9.4	MBR Permeate Pumps	6.6	8
MBR Air Blower with Acoustic Hood	1.8	3	Aeration Tank Airblower with Acoustic Hood	15.3	16.5	18 - Seperator	8.6	9	MBR Permeate Pumps	6.5	6.9
RAS/WAS Pumps	1.7	2.8	MBR Permeate Pumps	12.6	16	Dewatering Feed Pump	8	8.4	MBR Permeate Pumps	6.5	6.8
MBR Air Blower with Acoustic Hood	1.6	2.8	MBR Permeate Pumps	12.5	16	4 - Milk Intake	7.8	8.1	RAS/WAS Pumps	6.4	6.8
MBR Air Blower with Acoustic Hood	1.6	2	14 - CHP Generator 2	12	13.4	Permeate Reuse Booster Set Pumps	6.7	7.8	RAS/WAS Pumps	6.3	6.7
RAS/WAS Pumps	1.6	1.9	13 - CHP generator 1	10.7	12.1	1 - Cream Tank	6.6	7.1	RAS/WAS Pumps	6.3	6.6
RAS/WAS Pumps	1.6	1.9	Venturi Aerator	9.1	11.8	8 - Hot Water Silo	6.1	7.1	Post DAF Pumping Station	6.1	6.6
MBR Permeate Pumps	1.5	1.8	Venturi Aerator	8.9	11.7	5 - Boiler Open Door	5.6	7	13 - CHP generator 1	4.6	4.6
DAF Feed Pump	-0.6	0.6	DAF Feed Pump	7.8	10.9	MBR Air Blower with Acoustic Hood	5.4	6.8	17 - Ammonia Cooling Tower	0.1	3.7
1 - Cream Tank	-1.5	-0.3	Divert Tank Transfer Pumps	7.6	10.7	MBR Air Blower with Acoustic Hood	5.3	6.7	Dewatering Feed Pump	-0.4	0.7
5 - Boiler Open Door	-1.7	-0.4	Venturi Aerator	7.5	10.3	RO Feed Pumps	4.3	6.2	6 - Vent from Boiler Room	-2.7	-1.5
8 - Hot Water Silo	-3.2	-1.6	Post DAF Pumping Station	6.7	7.7	3 - Additional Milk Intake Pump	2.8	3.1	7 - Evaporator Room	-4.4	-3.3
3 - Additional Milk Intake Pump	-4.7	-3.1	RO Feed Pumps	4.8	7	MBR Air Blower with Acoustic Hood	1.7	2.4	18 - Seperator	-4.8	-3.8
18 - Separator	-4.8	-4.1	Venturi Aerator	4.6	6.5	Venturi Aerator	0.5	1.8	26 - Louvre 1	-5.1	-3.9
Permeate Reuse Booster Set Pumps	-5.4	-4.2	MBR Air Blower with Acoustic Hood	4	5.1	RAS/WAS Pumps	-2.1	-0.2	26 - Louvre 2	-5.1	-3.9
14 - CHP Generator 2	-5.7	-4.5	MBR Air Blower with Acoustic Hood	3.6	4.6	RAS/WAS Pumps	-3.4	-1.7	26 - Louvre 3	-5.2	-4
Venturi Aerator	-5.7	-5.6	MBR Air Blower with Acoustic Hood	3.4	4.3	RAS/WAS Pumps	-3.4	-1.8	12 - Silo Washing	-6.1	-4
13 - CHP generator 1	-6.4	-6.4	Permeate Reuse Booster Set Pumps	2.2	2.9	MBR Permeate Pumps	-3.5	-2	1 - Cream Tank	-7.5	-4.6
4 - Milk Intake	-8.5	-7.6	RAS/WAS Pumps	-1.8	-0.8	DAF Feed Pump	-4.2	-2.7	Venturi Aerator	-7.7	-6.3
Venturi Aerator	-9.2	-8.1	MBR Permeate Pumps	-1.9	-0.8	2 - Milk Intake Pump	-4.4	-3.7	4 - Milk Intake	-9.7	-6.8
26 - Louvre 3	-9.9	-8.6	RAS/WAS Pumps	-3.1	-2	MBR Permeate Pumps	-4.9	-3.7	Divert Tank Transfer Pumps	-11.3	-8
26 - Louvre 1	-10	-8.6	RAS/WAS Pumps	-3.1	-2.1	MBR Permeate Pumps	-4.9	-4.3	Venturi Aerator	-11.5	-8.6
26 - Louvre 2	-10	-8.6	Venturi Aerator	-7	-6.7	12 - Silo Washing	-6	-5.7	Venturi Aerator	-12.3	-9.4
10 - Gas Plant	-10.1	-8.7	Venturi Aerator	-7.4	-6.8	Venturi Aerator	-7.4	-7.4	Venturi Aerator	-14.8	-11
2 - Milk Intake Pump	-12.9	-11.6	12 - Silo Washing	-7.5	-7.4	Venturi Aerator	-7.7	-7.7	Venturi Aerator	-15.2	-11.2
Venturi Aerator	-16.1	-16	Venturi Aerator	-7.6	-7.5	Venturi Aerator	-8	-7.9	5 - Boiler Open Door	-16.1	-13.4
Divert Tank Transfer Pumps	-19.2	-19.1	Venturi Aerator	-8	-7.9	Venturi Aerator	-8.3	-8.1	DAF Feed Pump	-17.9	-15.5
Venturi Aerator	-21.5	-20.8	10 - Gas Plant	-10.4	-9.4	10 - Gas Plant	-10.7	-8.3	3 - Additional Milk Intake Pump	-19	-18.2
Venturi Aerator	-21.7	-21.5	26 - Louvre 3	-15.2	-14.9	26 - Louvre 2	-10.9	-8.9	8 - Hot Water Silo	-19	-18.2
12 - Silo Washing	-21.8	-21.7	26 - Louvre 2	-15.3	-15	26 - Louvre 1	-11	-9.7	Compressor Wall	-19.2	-19.1
Venturi Aerator	-21.8	-21.8	26 - Louvre 1	-15.4	-15.1	26 - Louvre 3	-11.5	-10.9	2 - Milk Intake Pump	-21.2	-20.3
Compressor Wall	-23.3	-23.1	Compressor Wall	-21.7	-21.5	Compressor Wall	-12.2	-11.4	10 - Gas Plant	-23.6	-22.8
Compressor Wall	-34.3	-34	Compressor Wall	-30.1	-30.2	Compressor Wall	-26.6	-25.3	Compressor Wall	-30.4	-30.4

APPENDIX H – RANKED SOUNDPLAN MODEL NOISE SOURCES (NIGHT-TIME) (MITIGATED)

Wellspring Lane	GF	1F	Culm Cross 1			Culm Cross 2			Foxglove Court		
Total	**24.8**	**25.7**	**Total**	**42.6**	**43.7**	**Total**	**42.2**	**43.1**	**Total**	**27.6**	**29.0**
1 - Cream Tank	18.1	18.5	**17 - Ammonia Cooling Tower**	**37.9**	**37.7**	**Existing HGV to Car Park x6/x3**	**39**	**39.9**	Existing HGV to ETS 1x/1x	20.3	22.3
26 - Louvre 3	16.9	17.1	**Existing HGV to Car Park x6/x3**	**36**	**37.6**	**Existing HGV to ETS 1x/1x**	**38.8**	**39.8**	Existing HGV to Car Park x6/x3	19.2	21.4
3 - Additional Milk Intake Pump	14.7	16	**Existing HGV to ETS 1x/1x**	**36**	**37.6**	11 - Boiler Room Louvre	24.9	25	11 - Boiler Room Louvre	19	19.6
MBR Permeate Pumps	12.7	14.4	**6 - Vent from Boiler Room**	**30.1**	**31.8**	17 - Ammonia Cooling Tower	24.2	23.7	Aeration Tank Airblower with Acoustic	18	19.5
MBR Air Blower with Acoustic Hood	12.5	14.2	**1 - Cream Tank**	**28.5**	**29.8**	6 - Vent from Boiler Room	21.4	22	Aeration Tank Airblower with Acoustic Hood	17	18.2
Aeration Tank Airblower with Acoustic Hood	12.3	14	**7 - Evaporator Room**	**28.1**	**28.7**	Venturi Aerator	19.1	19.5	Aeration Tank Airblower with Acoustic Hood	17	18.2
8 - Hot Water Silo	12.2	13.9	**4 - Milk Intake**	**27**	**27.7**	7 - Evaporator Room	18.4	19.4	Permeate Reuse Booster Set Pumps	15.2	15.4
6 - Vent from Boiler Room	12.1	12.8	**8 - Hot Water Silo**	**22.3**	**24.2**	Divert Tank Transfer Pumps	18.3	18.5	RO Feed Pumps	13.3	13.8
MBR Air Blower with Acoustic Hood	11.5	12.7	Dewatering Feed Pump	24.4	27.6	Venturi Aerator	18.1	18.2	Venturi Aerator	10.1	10.5
RAS/WAS Pumps	11.4	12.7	18 - Seperator	24	25.5	Venturi Aerator	17.6	17.8	Venturi Aerator	9.9	10.4
MBR Air Blower with Acoustic Hood	11.2	12.6	11 - Boiler Room Louvre	21.2	22.6	Aeration Tank Airblower with Acoustic	13.3	13.8	Venturi Aerator	9.5	10.1
2 - Milk Intake Pump	6.5	7.1	3 - Additional Milk Intake Pump	20.1	21.2	Aeration Tank Airblower with Acoustic Hood	13	13.6	14 - CHP Generator 2	8.1	9.8
Venturi Aerator	3.7	4	5 - Boiler Open Door	19.7	21	Aeration Tank Airblower with Acoustic Hood	12.7	13.1	MBR Air Blower with Acoustic Hood	6.9	9.4
Venturi Aerator	3.6	3.9	Aeration Tank Airblower with Acoustic	18.3	21	13 - CHP generator 1	9.6	10.7	MBR Air Blower with Acoustic Hood	6.9	8.1
Venturi Aerator	3.1	3.3	Aeration Tank Airblower with Acoustic Hood	17.7	20.7	Post DAF Pumping Station	9	9.7	MBR Air Blower with Acoustic Hood	6.8	8.1
13 - CHP generator 1	3.1	3.3	2 - Milk Intake Pump	15.9	16.9	14 - CHP Generator 2	8.6	9.4	MBR Permeate Pumps	6.6	8
18 - Seperator	1.8	3	Aeration Tank Airblower with Acoustic Hood	15.3	16.5	18 - Seperator	8.6	9	MBR Permeate Pumps	6.5	6.9
26 - Louvre 1	1.7	2.8	MBR Permeate Pumps	12.6	16	Dewatering Feed Pump	8	8.4	MBR Permeate Pumps	6.5	6.8
Permeate Reuse Booster Set Pumps	1.6	2.8	MBR Permeate Pumps	12.5	16	4 - Milk Intake	7.8	8.1	RAS/WAS Pumps	6.4	6.8
14 - CHP Generator 2	1.6	2	14 - CHP Generator 2	12	13.4	Permeate Reuse Booster Set Pumps	6.7	7.8	RAS/WAS Pumps	6.3	6.7
26 - Louvre 2	1.6	1.9	13 - CHP generator 1	10.7	12.1	1 - Cream Tank	6.6	7.1	RAS/WAS Pumps	6.3	6.6
10 - Gas Plant	1.6	1.9	Venturi Aerator	9.1	11.8	8 - Hot Water Silo	6.1	7.1	Post DAF Pumping Station	6.1	6.6
4 - Milk Intake	1.5	1.8	Venturi Aerator	8.9	11.7	5 - Boiler Open Door	5.6	7	13 - CHP generator 1	4.6	4.6
DAF Feed Pump	-0.6	0.6	DAF Feed Pump	7.8	10.9	MBR Air Blower with Acoustic Hood	5.4	6.8	17 - Ammonia Cooling Tower	0.1	3.7
Dewatering Feed Pump	-1.5	-0.3	Divert Tank Transfer Pumps	7.6	10.7	MBR Air Blower with Acoustic Hood	5.3	6.7	Dewatering Feed Pump	-0.4	0.7
MBR Permeate Pumps	-1.7	-0.4	Venturi Aerator	7.5	10.3	RO Feed Pumps	4.3	6.2	6 - Vent from Boiler Room	-2.7	-1.5
RAS/WAS Pumps	-3.2	-1.6	Post DAF Pumping Station	6.7	7.7	3 - Additional Milk Intake Pump	2.8	3.1	7 - Evaporator Room	-4.4	-3.3
Venturi Aerator	-4.7	-3.1	RO Feed Pumps	4.8	7	MBR Air Blower with Acoustic Hood	1.7	2.4	18 - Seperator	-4.8	-3.8
Aeration Tank Airblower with Acoustic Hood	-4.8	-4.1	Venturi Aerator	4.6	6.5	Venturi Aerator	0.5	1.8	26 - Louvre 1	-5.1	-3.9
Venturi Aerator	-5.4	-4.2	MBR Air Blower with Acoustic Hood	4	5.1	RAS/WAS Pumps	-2.1	-0.2	26 - Louvre 2	-5.1	-3.9
11 - Boiler Room Louvre	-5.7	-4.5	MBR Air Blower with Acoustic Hood	3.6	4.6	RAS/WAS Pumps	-3.4	-1.7	26 - Louvre 3	-5.2	-4
Venturi Aerator	-5.7	-5.6	MBR Air Blower with Acoustic Hood	3.4	4.3	RAS/WAS Pumps	-3.4	-1.8	12 - Silo Washing	-6.1	-4
17 - Ammonia Cooling Tower	-6.4	-6.4	Permeate Reuse Booster Set Pumps	2.2	2.9	MBR Permeate Pumps	-3.5	-2	1 - Cream Tank	-7.5	-4.6
Venturi Aerator	-8.5	-7.6	RAS/WAS Pumps	-1.8	-0.8	DAF Feed Pump	-4.2	-2.7	Venturi Aerator	-7.7	-6.3
12 - Silo Washing	-9.2	-8.1	MBR Permeate Pumps	-1.9	-0.8	2 - Milk Intake Pump	-4.4	-3.7	4 - Milk Intake	-9.7	-6.8
RO Feed Pumps	-9.9	-8.6	RAS/WAS Pumps	-3.1	-2	MBR Permeate Pumps	-4.9	-3.7	Divert Tank Transfer Pumps	-11.3	-8
Existing HGV to Car Park x6/x3	-10	-8.6	RAS/WAS Pumps	-3.1	-2.1	MBR Permeate Pumps	-4.9	-4.3	Venturi Aerator	-11.5	-8.6
Existing HGV to ETS 1x/1x	-10	-8.6	Venturi Aerator	-7	-6.7	12 - Silo Washing	-6	-5.7	Venturi Aerator	-12.3	-9.4
Post DAF Pumping Station	-10.1	-8.7	Venturi Aerator	-7.4	-6.8	Venturi Aerator	-7.4	-7.4	Venturi Aerator	-14.8	-11
7 - Evaporator Room	-12.9	-11.6	12 - Silo Washing	-7.5	-7.4	Venturi Aerator	-7.7	-7.7	Venturi Aerator	-15.2	-11.2
Compressor Wall	-16.1	-16	Venturi Aerator	-7.6	-7.5	Venturi Aerator	-8	-7.9	5 - Boiler Open Door	-16.1	-13.4
5 - Boiler Open Door	-19.2	-19.1	Venturi Aerator	-8	-7.9	Venturi Aerator	-8.3	-8.1	DAF Feed Pump	-17.9	-15.5
Divert Tank Transfer Pumps	-21.5	-20.8	10 - Gas Plant	-10.4	-9.4	10 - Gas Plant	-10.7	-8.3	3 - Additional Milk Intake Pump	-19	-18.2
Venturi Aerator	-21.7	-21.5	26 - Louvre 3	-15.2	-14.9	26 - Louvre 2	-10.9	-8.9	8 - Hot Water Silo	-19	-18.2
Aeration Tank Airblower with Acoustic	-21.8	-21.7	26 - Louvre 2	-15.3	-15	26 - Louvre 1	-11	-9.7	Compressor Wall	-19.2	-19.1
Compressor Wall	-21.8	-21.8	26 - Louvre 1	-15.4	-15.1	26 - Louvre 3	-11.5	-10.9	2 - Milk Intake Pump	-21.2	-20.3
MBR Permeate Pumps	-23.3	-23.1	Compressor Wall	-21.7	-21.5	Compressor Wall	-12.2	-11.4	10 - Gas Plant	-23.6	-22.8
RAS/WAS Pumps	-34.3	-34	Compressor Wall	-30.1	-30.2	Compressor Wall	-26.6	-25.3	Compressor Wall	-30.4	-30.4

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environmental & transportation

Arla, Taw Valley

Fixed Plant Noise Limits

Arla, Taw Valley

Fixed Plant Noise Limits

Revision	Date	Notes	Author	Checked	Approved
Ver. 1-0	01-03-24	E3689	SB	ND	ND
Ver. 1-1	01-05-24	Final	SB	-	ND
Ver. 1-2	21-03-25	Updated NPPF Reference	SB	-	ND

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1 INTRODUCTION

1.1 Entran Ltd has been commissioned to identify noise limits for plant relating to Phase 2 of the proposed extension to the Arla Foods facility in Taw Valley.

1.2 The exact specification of the proposed plant items has not yet been finalised and therefore this report has been prepared to identify the requirements for the proposed plant items.

1.3 Following discussion with the Environmental Health Officer at West Devon Borough Council it was agreed that the previously accepted background sound levels (as identified within the previous planning application ref 2969/20/FUL) would be adopted for further assessment at the Arla facility.

1.4 Limits have been identified in accordance with the most relevant national standards and guidelines and will be used to inform the progression of the detailed design.

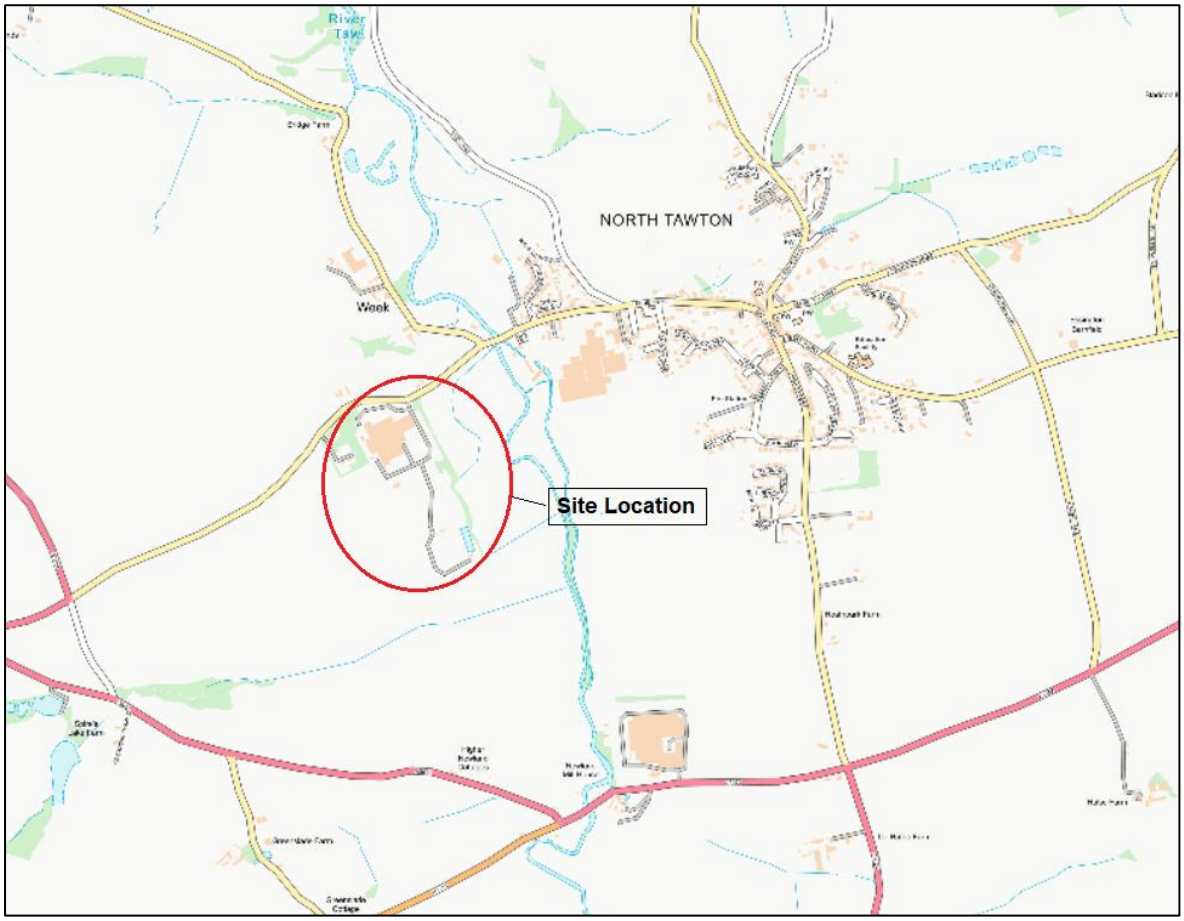
1.5 This report is necessarily technical in nature and contains terminology relating to acoustics and noise. Therefore, a glossary together with a brief introduction to the subject of noise has been provided in Appendix A.

2 SITE DESCRIPTION

2.1 The site is located East of North Tawton on Culm Cross, a minor road which runs past the north of the site. The surrounding area is largely open grassland with some residential dwellings. The existing facility comprises an established operational creamery that predominantly produces milk and cheese. The main building is situated to the north of the site with silos to the west and parking to the east.

2.2 The proposed development location and boundary are presented in Figure 1 below.

Figure 1 – Indicative Site Location Plan



3 ASSESSMENT METHODOLOGY

National Planning Policy Framework (NPPF) (Dec 2024)

3.1 The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England. It attempts to summarise in a single document all previous national planning policy advice. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

3.2 Under Section 15; Conserving and enhancing the natural environment, the following is stated in paragraph 187:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …

preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…"

3.3 The NPPF goes on to state in paragraph 198 that:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason"

Noise Policy Statement for England NPSE (March 2010)

3.4 The Government is committed to sustainable development and the Department for Environment Food and Rural Affairs (Defra) plays an important role in this by working to secure a healthy environment in which current and future generations can prosper. One

aspect of meeting these objectives is the need to manage noise for which Defra has the overall responsibility in England.

3.5 In March 2010, the Noise Policy Statement for England (NPSE) set out the long-term vision of Government noise policy as to:

'Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.'

3.6 The long-term vision is supported by the following aims:

'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life: and,*
- *Where possible, contribute to the improvement of health and quality of life.'*

3.7 The explanatory note to the policy statement emphasises that sustainable development is a core principle underpinning all government policy. In this respect, there is a need to integrate consideration of the economic and social benefit of the activity under examination with proper consideration of the adverse environmental effects.

3.8 To achieve these objectives the NPSE sets out three noise conditions to be determined by the assessor:

NOEL - No Observed Effect Level

3.9 This is the level below which no effect can be detected. In simple terms, below this level there is no detectable effect on health and quality of life due to the noise.

LOAEL - Lowest Observed Adverse Effect Level

3.10 This is the level above which adverse effects on health and quality of life can be detected.

SOAEL - Significant Observed Adverse Effect Level

3.11 This is the level above which significant adverse effects on health and quality of life occur.

3.12 The NPSE considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable.

3.13 Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the NPSE requires that:

'All reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development…. This does not mean that such adverse effects cannot occur.'

3.14 No objective values are offered within the NPSE, as the document does indicate that each site should be considered on its own merits. Consequently, consideration of the observed effects is made through an assessment methodology as detailed below.

The Institute of Environmental Management & Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)

3.15 The Institute of Environmental Management and Assessment (IEMA) have published the '*Guidelines for Environmental Noise Impact Assessment*'. The guidelines are applicable to noise impact assessment for any scale of development proposal, including core principles to achieve effectively integration with the EIA, and provide advice on the issues that need to be considered in a noise impact assessment and whether the appropriate conclusions are being reached. The factors include:

- The appropriateness of the noise parameters used for the situation;
- The reference time period used in making the assessment;
- The level, character and frequency content of the noise sources under investigation; and,
- How the predicted noise levels relate to relevant Standards and guidelines.

3.16 The guidelines also recommend that the assessor should determine the degree of impact based on evidence derived from the assessment.

The Professional Practice Guidance on Planning and Noise (2017)

3.17 The '*Professional Practice Guidance on Planning and Noise'* (ProPG) was produced by a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) to provide acoustical practitioners with guidance on the management of noise within the planning system in England.

3.18 The reparation of the ProPG acknowledges and reflects the Government's overarching NPSE, the NPPF and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance. It provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:

- advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of good acoustic design in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- promote appropriate noise exposure standards; and,
- assist the delivery of sustainable development.

British Standard BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

3.19 British Standard BS 4142: 2014 *Methods for Rating and Assessing Industrial and Commercial Sound* is intended to be used for the assessment of whether sound of industrial and/or commercial nature is likely to give rise to complaints from people residing in nearby dwellings. The Standard, which was updated in 2014, states that such sound can include:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and,

- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

3.20 The procedure contained in BS 4142 for assessing the likelihood of complaints is to compare the measured or predicted sound level from the source in question, the *'specific sound level'*, at the assessment position with the background sound level. Where sound contains acoustic features, such as tonality, impulsivity or other noticeable characteristics then a correction is added to the specific sound to obtain the '*rating level*' that reflects the contextual setting of the Site.

3.21 To assess the likelihood of complaints, the measured background sound level is subtracted from the rating level. BS 4142 states:

'Typically, the greater this difference, the greater the magnitude of the impact;

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*

- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,*

- *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.*

3.22 BS 4142 also states that *"where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation."*

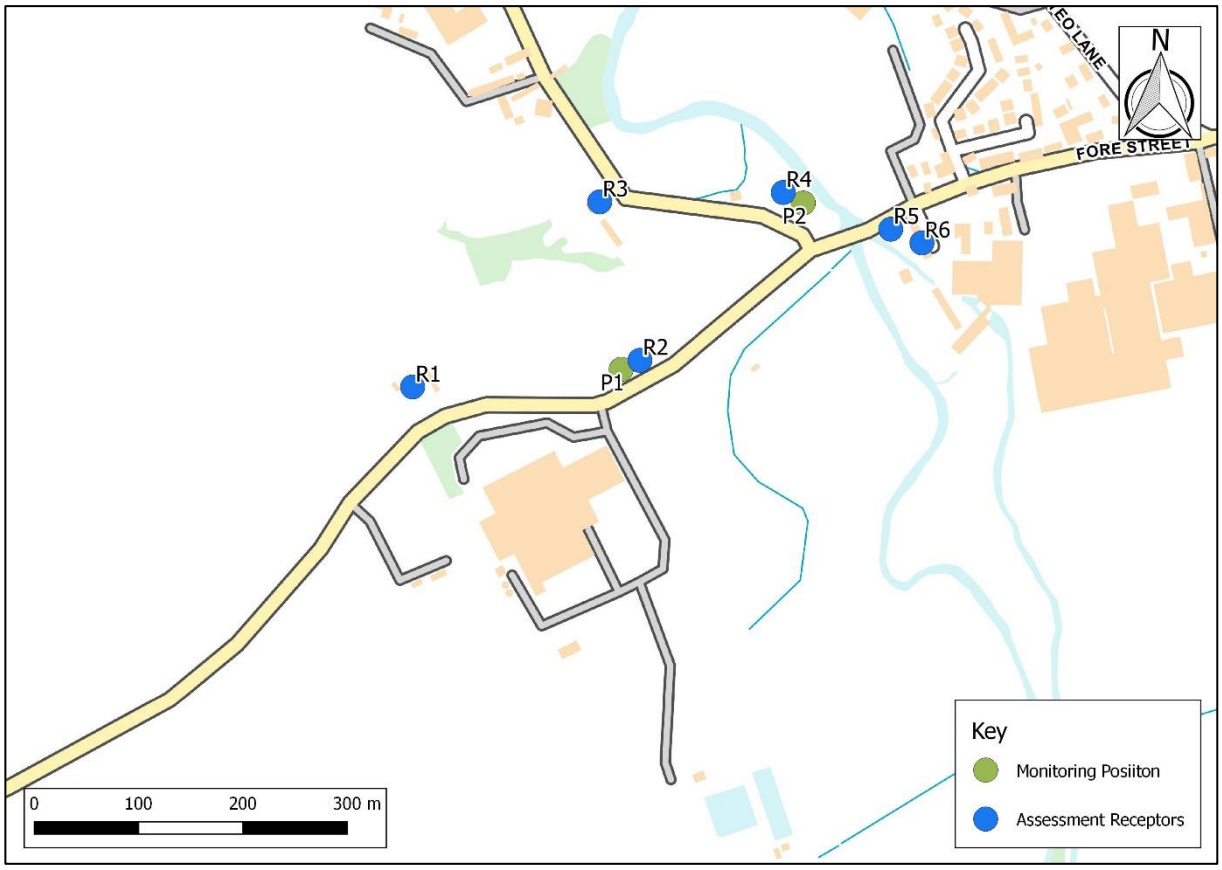
4 ENVIRONMENTAL NOISE MEASUREMENTS

4.1 There have been several applications associated with the Arla facility in recent years, with associated noise monitoring undertaken in 2017 and 2020. Source monitoring was undertaken within the garden areas of the nearest residential dwellings (Birchy Cottage, Tawcroft) to ascertain specific source data for the items of plant under consideration within the respective application. Source measurements are not appropriate for the identification of background sound levels.

4.2 Existing background sound levels in the vicinity of the proposed development were identified by an environmental survey conducted in 2020. The identified background sound levels were adopted within the associated planning application (2969/20/FUL).

4.3 The data was obtained at nearby residential dwellings of Tawcroft and Pine Lodge. The survey positions are denoted within this report as P1 and P2, respectively. The monitoring positions and nearby sensitive receptors are presented in Figure 2.

Figure 2 – Monitoring Locations and Assessment Receptors



4.4 The adopted background sound levels are presented in Table 2. The measurement data at P1 has been applied to receptors R1 and R2. Data obtained at P2 has been applied to receptors R3 – R6.

Table 2: Background Sound Levels

Position	Time Period	Background Sound Level, $L_{A90,T}$, dB re. $2x10^{-5}$ Pa.
P1 (R1, R2)	Daytime 07:00 - 23:00	38
	Night-time 23:00 – 07:00	37
P2 (R3 – R6)	Daytime 07:00 - 23:00	37
	Night-time 23:00 – 07:00	33

5 DERIVATION OF COMMERCIAL SOUND LIMITS

Fixed Plant Items and Commercial Activity

5.1 The proposed plant items will be specified to ensure compliance with the identified sound limits. The EHO has requested that the proposed items are specified such that the specific sound levels associated with proposed plant items target a value of -5dB below the adopted background sound levels.

5.2 The proposed plant items have not yet been specified and detailed data is not yet available. Limits have therefore been identified to inform the choice/design during the detailed design stage.

5.3 The proposed items will be specified and sufficiently mitigated, as required, such that suitable conditions are maintained at the nearby residential dwellings. In accordance with BS 4142, plant associated with the proposed development will be specified such that the calculated combined rating level attributed to the proposed sources does not exceed the identified background sound levels at the nearest residential dwellings during all periods of operation.

5.4 BS 4142 provides assessment periods of:

- Daytime, 07:00 – 23:00
- Night-time, 23:00 – 07:00

5.5 In accordance with the EHO stipulations, the design will target specific levels at -5dB below the adopted background sound levels. The resultant limits are identified in Table 3.

Table 3: Identified Limits for Proposed Plant Items

Receptors	Time Period	Rating Level, $L_{Ar,Tr}$ dB	Specific Level, $L_{Aeq,T}$ dB
R1, R2	Daytime 07:00 - 23:00	38	33
	Night-time 23:00 – 07:00	37	32
R3 – R6	Daytime 07:00 - 23:00	37	32
	Night-time 23:00 – 07:00	33	28

5.6 Daytime sound levels will be assessed over a 1-hour period, with night-time operation assessed during 15-minute periods.

6 MITIGATION

6.1 The proposed plant items will be specified such that sound levels remain below the limits specified in Table 3.

6.2 Mitigation options will be specified during the detailed design stage, as appropriate. Impacts from fixed plant would be negligible following specification and assessment of proposed commercial activity.

7 CONCLUSIONS

7.1 Limits for potential noise impacts have been identified for Phase 2 of the proposed extension development at the Arla Foods facility in Taw Valley.

7.2 Following liaison with the EHO at West Devon, background sound levels were adopted from those agreed for the previous application (2969/20/FUL).

7.3 The proposed plant items will be specified such that rating levels fall below the adopted background sound levels at the nearby residential receptors. Specific levels will target a value of -5dB below the adopted background sound levels. Where required, plant will be suitably mitigated to ensure sound levels remain below the identified sound limits.

APPENDIX A – INTRODUCTION TO NOISE

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB.

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs. For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest.

In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}. This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 5 minutes during the night. The noise levels are commonly symbolised as $_{A90(1hour)}$ and $L_{A90(5mins)}$. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

Table A1: Glossary of Terms

Term	Definition
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,F}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the ‘average minimum’ noise level and is often used to describe the background noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Residual Noise Level	The ambient noise remaining at a given position in a given situation when specified sources are suppressed to a degree such that they do not contribute to the ambient noise level ($L_{Aeq,T}$)
Specific Noise Level	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ($L_{Aeq,T}$)
Rating Noise Level	The specific noise level plus any adjustment for the characteristic features of the noise ($L_{Ar,Tr}$).