Noise Impact Assessment

Site Address: 1 Dale Street, Bilston, WV14 7JU

Client Name: Salisbury Poultry (Midlands) Ltd.

Project Reference No: NP-010935

Authorisation and Version Control			
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Amendment History	
Revision	Summary of Amendments
01	--

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Contents

List of Figures

List of Tables

1. Introduction

NOVA Acoustics Ltd has been commissioned to prepare a noise impact assessment as part of a bespoke Environmental Agency ('EA') permit application ('the Application') at Salisbury Poultry's breaded site, 1 Dale Street, Bilston, WV14 7JU ('the Site').

Currently, the site does not operate under an EA permit, however, the EA have since requested that a bespoke permit application is submitted for review. This report has been compiled to accompany the permit application.

A noise survey has been undertaken to establish the prevailing background and ambient sound levels at the closest Noise Sensitive Receptors ('NSRs'). This report details the existing background and ambient sound climate and the noise emissions associated with the proposed development. Measures required to mitigate noise impact have been recommended where necessary and assessed in accordance with the relevant performance standards, legislation, policy and guidance. The noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

1.1 Standards, Legislation, Policy & Guidance

The following performance standards, legislation, policy and guidance have been considered to ensure good acoustic design in the assessment:

- The Environmental Permitting (England and Wales) Regulations 2016 (as amended).
- The Environment Agency Guidance 'Noise and Vibration Management: Environmental Permits (Jan 2022)'.
- Environmental Agency 'Method Implementation Document ('MID') for BS4142 (2023).
- National Planning Policy Framework (2023).
- Noise Policy Statement for England (2010).
- BS4142:2014+A1:2019 – 'Methods for rating and assessing commercial and industrial sound'.

Further information on the legislation can be found in Appendix B.

1.2 Background

Salisbury Poultry (Midlands) Ltd carries out on-site secondary processing of poultry. After going through secondary processing in the main site located off Vulcan Road, a percentage of produce is transported to the breaded facility at 1 Dale Street. Noise generated by the breaded facility is the focus of this report.

The figure overleaf shows the breaded site under assessment.

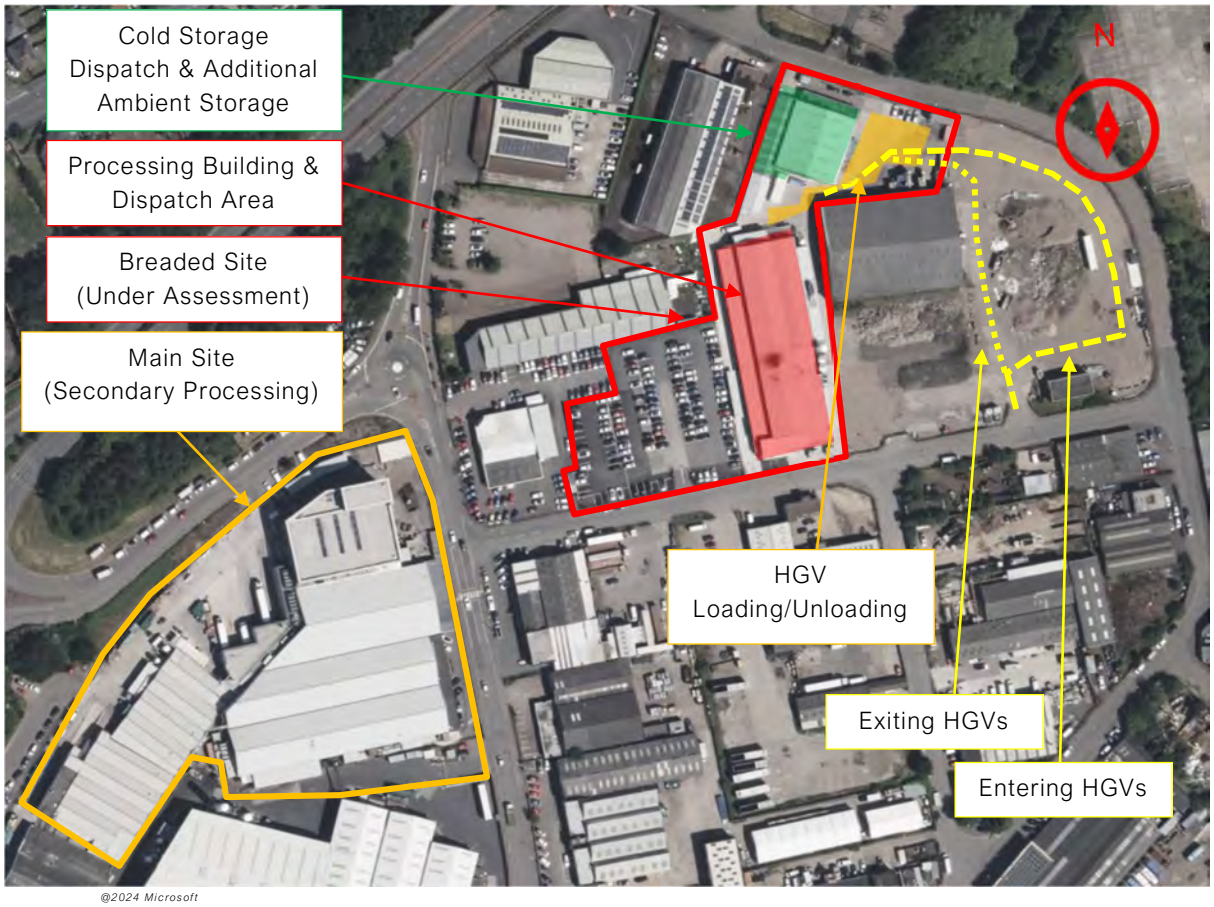


Figure 1 – Wider Site Layout

2. Environmental Noise Survey

2.1 Measurement Methodology

The following table outlines the measurement dates and particulars. All sound level meters were fitted with a proprietary environmental kit complete with a 130mm diameter windshield suitable for windspeeds up to 8m/s. Technical issues prohibited the use of a localised weather station, therefore, met office weather data of the area, specifically the closest weather station, has been consulted. A handheld anemometer was also utilised during any attended noise monitoring to measure windspeeds. Details regarding the equipment used and the meteorological conditions during the survey are available in Appendix C.

A south-westerly wind blowing towards NSR1 was present for the duration of the attended monitoring. Wind speeds did not typically exceed 5 m/s at heights of 1.5m and 3.5m at all measurement positions.

Please note that any equipment mounted at heights greater than 1.5m above local ground was done so to avoid interference from the general public. Also note that LT denotes 'long-term' static measurements that were both unmanned and attended, and ST denotes 'short-term' static measurements that were attended, exclusively.

Location	Survey Dates	Measurement Particulars
MP1 (LT)	05-09/04/24	Equipment mounted on a lamppost along a bicycle path adjacent to Marbury Drive (NSR1). The microphone was approximately 3.5m above local ground and at least 3.5m from any other large reflective surface.
MP2 (LT)	05-09/04/24	Equipment mounted on a lamppost along Marbury Drive in a location deemed to be uninfluenced by any noise emissions generated by the site. The microphone was approximately 3.5m above local ground and at least 3.5m from any other large reflective surface.
MP3 (LT)	05-09/04/24	Equipment mounted on a lamppost along a footpath adjacent to Backstone Lane (NSR4). The microphone was approximately 3.5m above local ground and at least 3.5m from any other large reflective surface.
MP4 (ST)	05/04/24	Equipment mounted lamppost at the site boundary in direct line of sight to the plant rooms and external fixed plant along the eastern elevation of the breaded processing building. The microphone was approximately 3.5m above local ground and at least 3.5m from any other large reflective surface.
MP5 (ST)	05/04/24	Equipment mounted tripod at 1.5m above local ground and at least 3.5m from any other large reflective surface.
MP6 (ST)		
MP7 (ST)		
MP8 (ST)		

Table 1 – Measurement Methodology

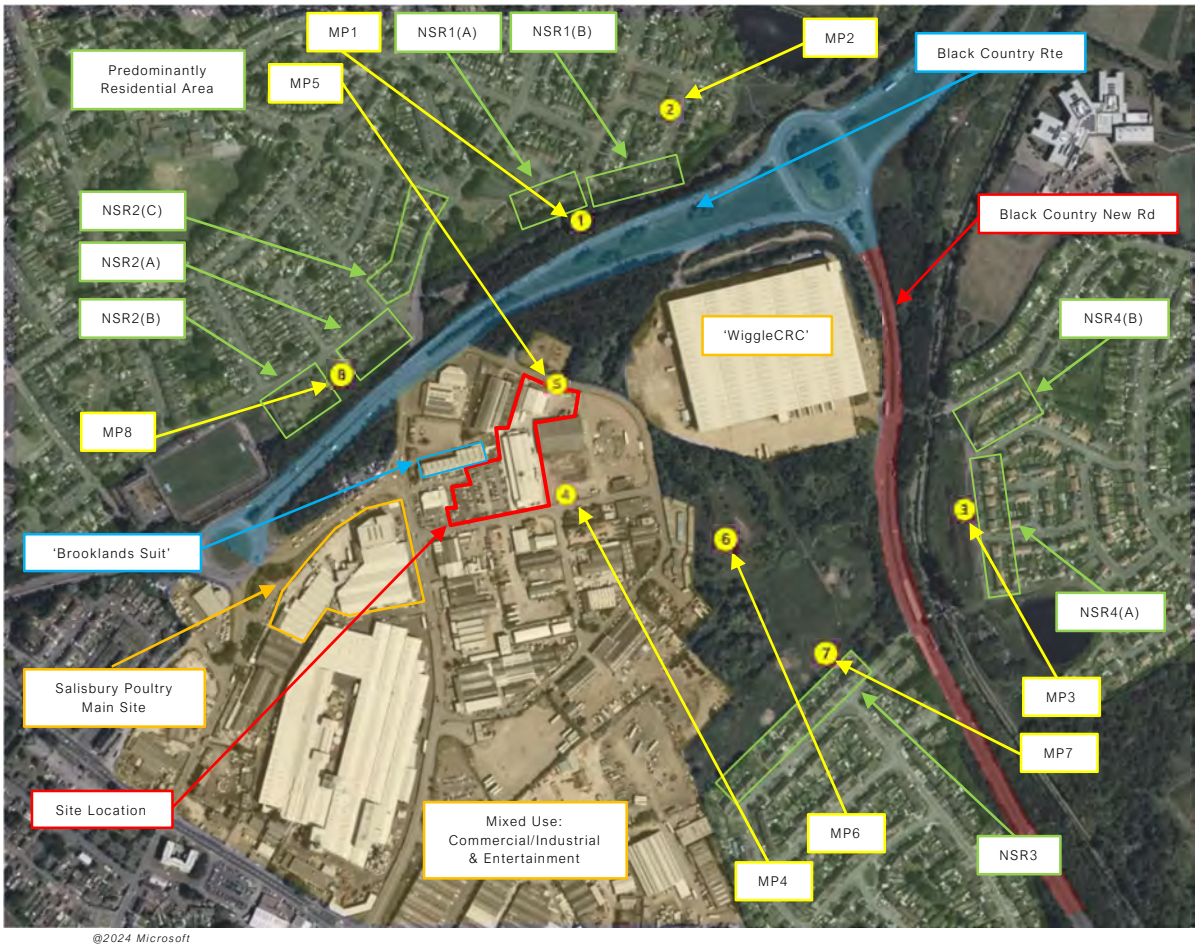


Figure 2 – Measurement Locations and Site Surroundings

2.2 Area Description and Context

The site is situated on the fringes of Bilston Industrial Estate. The area surrounding the site is mixed in nature with both commercial/industrial premises and residential dwellings. The closest NSRs are as follows:

- NSR1(A) is a row of detached 2-storey dwellings approximately 185m NNE of the site.
- NSR1(B) is a group of 2-storey dwellings approximately 220m NNE of the site.
- NSR2(A) is a group of semi-detached 2-storey dwellings approximately 160m NWW of the site.
- NSR2(B) is a group of bungalows approximately 190m NWW of the site.
- NSR3 is a row of semi-detached 2-storey dwellings approximately 380m SE of the site.
- NSR4(A & B) are group of semi-detached 2-storey dwellings approximately 450m W of the site.

Noteworthy commercial/industrial premises surrounding the site include:

- 'Brooklands Suite',
- 'D.S. Willets (Stainless)',
- 'Salisbury Poultry (Midlands) Ltd' main site on Vulcan Road,
- 'WiggleCRC',
- 'Apex Stainless Fasteners'.

The intervening topography between the site and NSR1 is largely dominated by Black Country Route which is elevated to at least the first-floor height of NSR1. The elevation Black Country Route falls gradually to level with the local ground, however, only the top floor of the north-eastern most dwelling of NSR2(A) has direct line of sight with the roof of the main production building.

The line of sight between NSR3 and NSR4 is broken by either other non-associated buildings on Bilston Industrial Estate or the intervening ground which is hilly along the eastern boundary of the Industrial Estate.

2.3 Operational Procedures

NOVA Acoustics has been informed of the following:

- Internal production within the main building occurs between 05:00 to 22:30, Monday to Friday, and only up to three times a year on Saturdays (same hours).
- Dispatch operations from within the main building, the additional storage building, and adjacent external areas occur between 06:00 and 00:00, Monday to Friday, and 06:00 to 18:00 hours on Saturdays and Sundays. This includes all HGV activity.
- The ammonia plant room and associated external fixed plant operates during internal processing and goes into 'night mode' once operations cease. However, it was observed that the associated ammonia plant was active until 00:00 hours on Friday night (night 1) of the survey. As such, the noise model and subsequent BS4142 assessment has accounted for this timing.
- Other items of external fixed plant, such as air-cooled condensers were active 24/7. These condensers serve the dispatch areas where cold storage is necessary.
- NOVA Acoustics has been informed that the air compressor plant room equipment operates in conjunction with internal production within the main building, exclusively.
- An HVAC system servicing the main production building operates over the same time periods as the internal poultry processing, however, it was observed operating after 23:00 hours.

2.4 Subjective Impression of Noise Environment

During the daytime, the acoustic climate at NSR1, NSR2 and MP1 is dominated by road traffic noise emissions from Black Country Route, which facilitates a heavy traffic flow that is generally steady-state in nature. Noise emissions from the site were inaudible over the residual noise climate. Furthermore, noise emissions from Bilston industrial estate were also inaudible above the residual noise climate.

During the evening and into night-time, the acoustic climate at NSR1, NSR2 and MP1 reduced in level and any road traffic noise emissions became less frequent, providing less acoustic masking, resulting in some industrial noise emissions being audible. A continuous steady-state low frequency hum was present and clearly perceptible at NSR2 and MP8, and only masked by HGVs passing on Black Country Route. The low frequency hum was just perceptible at MP1 and NSR1. The low frequency hum was thought to be partially due to HGV chiller trailers running on diesel associated with the site under assessment, however, the vast majority of the noise emissions were emanating from the main Salisbury Poultry site on Vulcan Road.

Between 22:00 and approximately 23:20 hours on Friday evening/night, entertainment noise breakout emissions from 'Brooklands suite' were clearly perceptible at NSR2 and MP8, however, they were only

just perceptible at NSR1 and MP1. The noise breakout included rhythmic low frequency noise emissions from pre-recorded amplified kick drums and basslines.

A continuous steady-state mid-frequency tone was just perceptible at NSR2 and MP8, which was only masked by fast moving or particularly loud vehicles. This was thought to be due to an external blast chiller associated with the main Salisbury Poultry site.

At NSR1 and MP1 the forklift sirens from the loading/unloading of HGVs at the site were just audible and included a subjectively 'clearly perceptible' tone.

A surrogate background sound monitoring position (MP2) was established in a location that was uninfluenced by the specific noise emissions from the site. The acoustic environment at MP2 was deemed akin to that of NSR1 and NSR2, however, any noise emissions from the site were inaudible.

During the attended monitoring at NSR3 (MP7) and NSR4 (MP3), any noise emissions from the site were inaudible over the residual noise climate. It should be recognised that the wind was blowing in a north-easterly direction with wind speeds of up to 5 m/s recorded. The acoustic environment at NSR3 and NSR4 was dominated by road traffic noise emissions from Black Country New Road, although the overall acoustic climate was deemed to be lower at NSR3. Industrial noise emissions emanating from the direction of 'Apex Stainless Fasteners' were clearly audible at NSR3 at times, particularly during the evening and into the night. The industrial noise emissions heard at NSR3 can be described as sporadic and impulsive due to metallic impacts and scraping occurring externally.

The short-term attended monitoring position MP6 was situated on the hilltop overlooking the site. During the monitoring HGV trailers running on diesel from the site were perceptible and included a continuous low frequency humming, however, approximately every 30-minutes the diesel units would cease for approximately 5-10 minutes; making the noise emissions intermittent in nature. Forklift sirens from the site were also just perceptible at MP6 and the noise emissions were subjectively tonal. The mid to high frequency noise emissions from the ammonia plant room door breakout and rooftop outlet were just perceptible at times and seemed to fluctuate in level due to varying wind speeds.

2.5 Environmental Noise Survey Results

Background & Ambient Sound Level Analysis

The following section outlines the measured background sound levels that have been used as the baseline for the subsequent BS4142 noise assessments.

The table overleaf outlines the 'lowest typical' background sound levels measured across the long-term positions. The background sound levels have been derived from the following periods:

- MP2 & MP3: 07:00 – 23:00 hours (all daytime site operations, including Sundays for 'robustness'),
- MP2 & MP3: 23:00 – 00:00 & 05:00 – 07:00 hours (all night-time operations),
- MP2 & MP3: 00:00 – 05:00 hours (continuous fixed plant operations and dispatch internal ambient noise breakout only).

Full time histories, statistical analysis and weather conditions can be seen in Appendix C.

Description	MP2 $L_{A90,15min}$ (dB)	MP3 $L_{A90,15min}$ (dB)
Daytime (19:00 – 23:00 hours)	48	49
Night-time (23:00 – 00:00 & 05:00 – 07:00 hours)	48	46
Night-time (00:00 – 05:00 hours)	40	41

Table 2 – $L_{A90,T}$ Sound Level Results Summary

Outlined in the table below is a comparison of the $L_{A90,T}$ sound levels measured at MP3 and MP7 (NSR3) simultaneously.

Description	MP3 $L_{A90,T}$ (dB)	MP7 $L_{A90,T}$ (dB)
20:30 – 21:00 hours	50	45
00:09 – 00:24 hours	46	42

Table 3 – Comparison of Measured $L_{A90,T}$ Sound Levels

As can be seen in the table, there is a 5 dB and 4 dB deviation at MP7 (NSR3) from the $L_{A90,T}$ sound levels measured at MP3 during daytime and night-time, respectively. Consequently, corrections to account for deviations have been applied to define the background sound levels used as the baseline for the BS4142 assessment at NSR3.

Presented in the table below are the background levels used as the baseline for the BS4142 noise impact assessments at each NSR.

Description	NSR1 (dB)	NSR2 (dB)	NSR3 (dB)	NSR4 (dB)
Daytime $L_{A90,15min}$ (19:00 – 23:00 hours)	48	48	45	49
Night-time $L_{A90,15min}$ (23:00 – 00:00 & 05:00 – 07:00 hours)	48	48	42	46
Night-time $L_{A90,15min}$ (00:00 – 05:00 hours)	40	40	37	41

Table 4 – Background Sound Level Summary

Short-Term Sound Level Results Summary

The table below outlines the ambient and background sound levels measured at the surrounding NSRs during the attended monitoring. Please note that the sound levels measured during the evening period at MP1 and MP2 were deemed to be heavily influenced by adverse weather.

Description	1/1 Octave Frequency Band (Hz, $L_{eq,T}$, dB)								Overall (dBA)	$L_{AFmax,T}$ (dB)	$L_{A90,T}$ (dB)
	63	125	250	500	1k	2k	4k	8k			
MP5: 19:18 – 19:48	65	57	55	50	52	47	41	35	55	76	52
MP5: 22:12 – 22:33	66	67	57	54	54	48	42	39	58	71	55
MP6: 20:04 – 20:25	60	53	49	49	51	45	38	34	54	80[1]	50
MP7 (NSR3): 20:30 – 21:00	56	51	48	45	45	39	32	30	49	76	45
MP7 (NSR3): 00:09 – 00:24	54	48	46	45	44	38	34	30	48	47	42
MP8 (NSR2(B)): 23:40 – 00:30	64	56	50	49	51	46	40	34	54	77	50

Notes:

[1] *L_{AFmax} due to operator knocking meter.*

Table 5 – Attended Monitoring Ambient Sound Level Results Summary

3. Noise Impact Assessment

In the following section of the report, the impact of the noise emissions generated by the sites' current operations is assessed.

3.1 Adopted Criteria

It is understood that the site has been operating for a number of years without a bespoke EA permit, and that to the best of the applicants and NOVA Acoustics' knowledge, no complaints relating to the noise emissions generated by the breaded site have been received.

Where necessary, it is required that any site noise emissions causing significant impact (classed as 'significant adverse impact, dependent on context' in accordance with BS4142) are mitigated to an acceptable level given the context of the site. Noise emissions causing an 'adverse impact' must be minimised to as low as practicable also considering context; this does not necessarily mean that the site would be in breach providing the implementation of appropriate measures (may also be Best Available Techniques ('BAT')) can be "rigorously" demonstrated. Site noise emissions causing 'no impact' to 'low impact' may not require any action over the basic appropriate measures or BAT.

Considering the above, the BS4142 rating sound level at the most affected NSRs shall be controlled to avoid 'significant adverse impact', BAT shall be considered to minimise any 'adverse impact' with the aim to reduce to 'low impact' where practicable, dependent on the context of the site.

3.2 Summary of On-Site Measurements

For all onsite measurements the following measurement methodology was adhered to:

- Internal ambient measurements were taken at 1.5m above the ground in various internal locations.
- All measurements of external noise sources were taken at 1.5m above local ground, in a position found to be most influenced by the generated noise emissions if residual noise could not be corrected for. Further measurements were also taken in the direction of the closest NSR. Where possible, measurements have been taken at a position where point source propagation is to be expected. Where not possible, measurements at discrete locations around the noise source have been conducted to facilitate calculations considering ISO 3746:2010. Where the ISO 3746:2010 method could not be adhered to, manufacturers data has been consulted.
- All measurements were taken using a fast time-weighting and the sound level meter was set to log every 0.1s.
- Measurements were taken in 1/3rd octave frequency bands; however, the report details the 1/1 octave band sound levels inputted to the noise modelling software.

On-Site Spot Measurement Results Summary

The complete summary of the external spot measurements and subsequent specific sound levels can be found in Appendix E.

3.3 Specific Sound Levels & Noise Modelling Data

Noise Breakout Emissions

The table below outlines the internal ambient noise levels measured within each room. Each measurement was taken during periods of typical activity or when plant was operating at its maximum load.

Description	1/1 Octave Frequency Band (Hz, $L_{eq,T}$, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Main Production Area	76	83	84	84	82	79	73	66	87
Fryer Room	73	85	79	75	73	69	64	58	78
Prep Room	74	77	77	80	79	77	69	60	83
Dispatch Area (Main Building & Unit 1)	72	82	78	75	74	70	61	51	78
Air Compressor Plant Room ('ACPR')	72	76	79	80	79	77	73	70	84
Ammonia Plant Room	78	79	85	92	87	86	83	75	93
SMA Plant Room	68	76	69	72	71	70	67	62	76

Table 6 – Measured Internal Ambient Noise Level Summary

The noise breaking out of the spaces has been calculated within SoundPlan 9.0 software in accordance with BS12354. The following assumptions have been made within the calculations:

- During operations hours, the internal operations are continuous, and as such, no on-time corrections have been applied to the measured internal ambient noise levels.
- All buildings on-site are of steel portal frame structure with composite steel façades and roofing akin to Kingspan KS1000RW panels. The manufacturers datasheets can be found in Appendix D.
- All FD30 fire doors are solid core doors which have been modelled as 45mm MDF in INSUL 9.0 software and remain closed at all times.
- All roller shutter doors ('RSDs') are a minimum 0.7mm steel and remain closed. RSDs are only opened when personnel or FL operatives require ingress or egress; on-times corrections are presented in Table 7.

The following table outlines the assumed sound reduction values for each building fabric element.

Description	1/1 Octave Frequency Band (Hz, R, dB)								Rw (dB)
	63	125	250	500	1k	2k	4k	8k	
KS1000RW Panel (Manufacturer Datasheet)	20	18	20	24	20	29	39	47	25
Voided KS1000RW Roof of Main Production Building (INSUL 9.0)	12	19	34	45	42	35	70	70[1]	39
45mm Solid Core Fire Door (INSUL 9.0)	21	25	29	26	26	39	48	48[1]	29
0.7mm Profile Steel RSD (INSUL 9.0)	9	11	15	20	25	30	35	35[1]	24
Open RSDs to Dispatch (10-min per 1-hour / 2-min per 15-min)	0	0	0	0	0	0	0	0	0

Notes:

[1] *Assumed.*

Table 7 – Assumed Sound Reduction Values of Building Fabric Elements

Presented in the table below are the calculated level differences (*D'*) for plant room noise breakout elements. These have been used as the baseline for the element sound insulation within SoundPlan 9.0, which have then been further augmented using ambient spot measurements.

Description	1/1 Octave Frequency Band (Hz, D', dB)							
	63	125	250	500	1k	2k	4k	8k
Ammonia Plant Room Louvred Door	-7	3 [1]	-7	-14	-10	-13	-12	-15
ACPR Louvred Door	-6	-6	-9	-10	-11	-12	-13	-15
SMA Plant Room Louvre (4 No. Louvres in Total)	0	-7	-5	-6	-5	-9	-14	-16

Notes:

[1] *This anomaly has been ignored and the ACPR louvered door level differences have been utilised given all louvred doors are identical across the site.*

Table 8 – Calculated Level Difference of Plant Room Noise Breakout Elements

Sound Power Levels of External Noise Sources

Presented in the table below are the calculated sound power levels of all external sources (corrected for residual noise where applicable), and the on-time corrections over the relevant BS4142 reference time periods. Where a source's on-time would be ≥75% of the refence time period, no on-time correction has been applied to present a 'robust' assessment. Full calculations can be found in Appendix F and all on-time corrections have been applied within the noise modelling software.

Description	1/1 Octave Frequency Band (Hz, Lw, dB)								L_{WA} (dB)	Day On-Time (1-hour)	Night On-Time (15-min)
	63	125	250	500	1k	2k	4k	8k			
Ammonia Plant Room Rooftop Outlet	86	93	97	97	95	90	84	78	99	100%	100%
HGV Chiller Trailers on Diesel	113	100	93	94	90	83	79	74	96	45-min	100%
ACPR Fan Right	83	82	83	81	76	73	69	62	83	100%	100%
ACPR Fan Left	75	82	83	80	77	74	70	63	83	100%	100%
FL (un)Loading HGV	103	97	90	89	87	91	85	76	95	20-min	100%
1 No. Bitzer Condenser Unit (Dispatch North)	88	92	85	84	83	78	75	72	87	100%	100%
1 No. Bitzer Condenser Unit (Dispatch South)	86	89	83	83	82	78	72	66	86	100%	100%
Rooftop HVAC Outlet (Extract)	85	100	87	85	81	77	74	60	88	100%	100%
Boiler Plant Room Door at 1m ($L_{W/m2}$)	68	67	61	65	62	59	53	46	67	100%	100%

Table 9 – Sound Power Levels of External Noise Sources

Sound Power Levels of Mobile Plant

Please note that the sound power levels presented in the following table are the input values only; the speed and the number of events has been applied within the noise modelling software. Full calculations can be found in Appendix F.

Description	1/1 Octave Frequency Band (Hz, Lw dB)								L_{WA} (dB)	Day On-Time (1-hour)	Night On-Time (15-min)
	63	125	250	500	1k	2k	4k	8k			
HGV Pass-by (highest 1-sec)	92	95	96	96	94	90	84	76	98	4 No. Move	2 No. Move

Table 10 – Sound Power Levels of HGV Pass-by

Measured External Ambient Noise Levels

To further augment the noise model, additional measurements were taken at various locations around the site. The table below outlines a summary of the measured external ambient noise levels.

Description	1/1 Octave Frequency Band (Hz, $L_{eq,T}$ dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
ACPR Fans at 3.5m	65	70	68	65	63	61	55	49	68
4 No. Bitzer Condenser Units at 10m	68	70	68	64	63	57	50	45	67
Ambient in Front of Oil Silos at 17m (10-minutes)	65	64	61	60	58	54	49	42	63
MP4: 20:00 – 21:00	65	61	58	57	55	51	46	39	60
MP4: 23:00 – 23:15	66	62	58	56	57	50	45	39	60

Table 11 – Measured External Ambient Noise Levels

Noise Modelling

The following assumptions have been made within the SoundPlan 9.0 noise modelling software:

- To accurately model the land surrounding the Site, the topographical data has been taken from the EA's 'National LIDAR Programme' on the DEFRA Data Services Platform.
- For the purpose of the assessment, the ground between the source and receivers is considered to be a mixture of acoustically 'hard' and 'soft' surfaces that have been modelled according to the ground type.
- Octave band noise data was used to facilitate noise modelling in accordance with ISO 9613-2. ISO 9613-2 assumes a 'downwind' model to the NSRs.
- The sound map grid height has been set to 3.5m, however, the noise levels used in the assessment has been taken from the most exposed point of each façade during the night-time, and the centre of gardens during the daytime, depending on which was greater.
- The site and all other buildings and any intervening objects have been modelled according to measurements taken on-site, with Google Maps and those provided by the LIDAR data.
- Three situations have been assessed:
    - Daytime (07:00 to 23:00 hours): all sources active.
    - Night-time (23:00 – 00:00 & 05:00 – 07:00 hours): all night-time operations.
    - Night-time (00:00 – 05:00 hours): fixed plant & internal ambient dispatch breakout exclusively.
- The noise emissions breaking out of the buildings are calculated within the noise modelling software in accordance with BS12354 assuming the following:
    - The internal ambient noise levels presented in Table 6,
    - The sound reduction values for each building fabric element presented in Table 7 & 8,

- The C_d correction for diffusivity has been applied depending on the internal acoustic conditions.

- All building fabric elements are assumed to behave as area noise sources which is calculated within the SoundPlan software considering the formula: $L_W = L_{P1m} + 10*Log(S)$, where S is the surface area of the building element and L_{P1m} is the external noise level calculated in accordance with BS12354.
- Processing within the main building occurs between 05:00 – 22:30 hours.
- Dispatch operations and associated HGV activity occurs between 06:00 – 00:00 hours.
- To form a 'robust' assessment, all fixed plant may operate 24/7.
- The ambient sound levels presented in Tables 5 and 11 have been used to inform the noise model.
- All fixed sources other than building fabric elements have been modelled as point source emitters. Where more than one dominating noise generating element was present in a noise source, the median point source height was chosen. Where only a single noise generating element was present, or a single element was dominant, the point source height was that of the only or dominant element.
- All mobile sources have been modelled as slow-moving point source emitters (line source $L_{W/m2}$) and on-times have been calculated based on vehicle speed (4.4 m/s) and the number of events per reference time period.

The sound maps showing the specific sound level emissions from the site can be seen in the following figures.

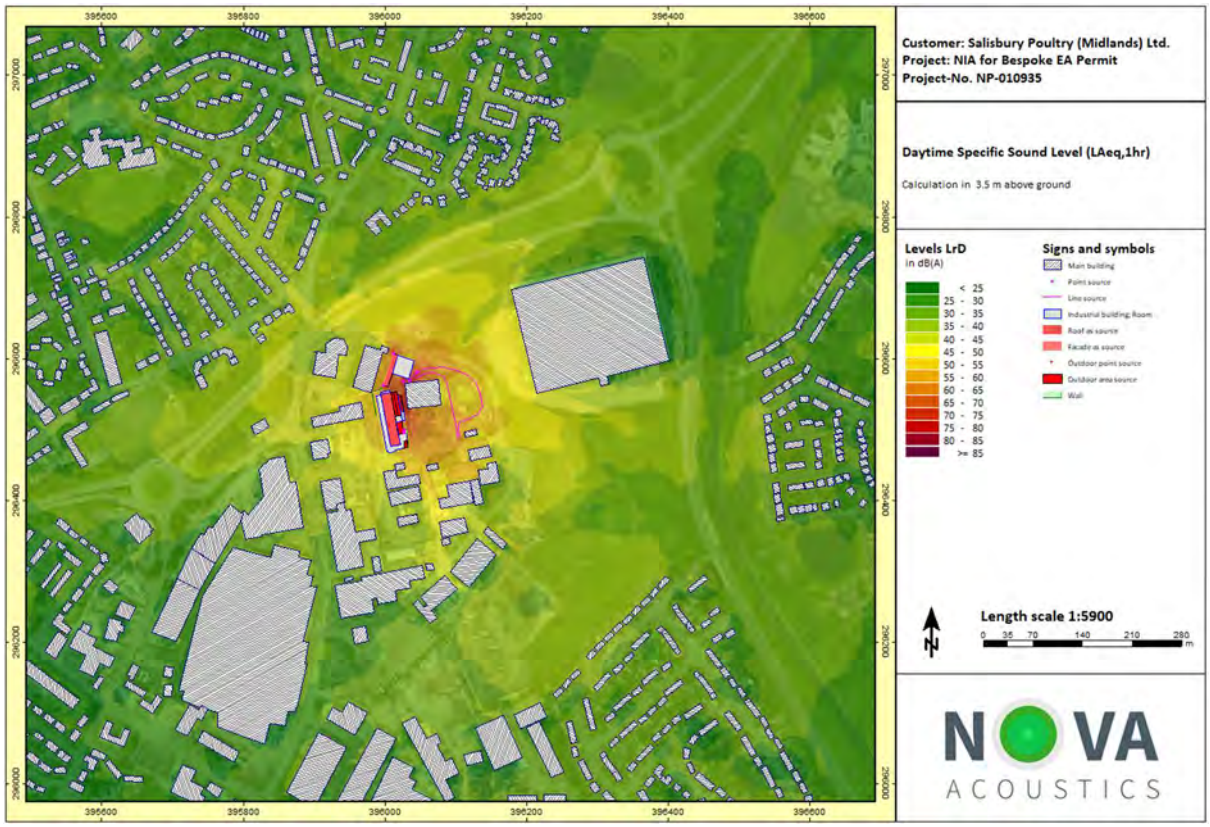


Figure 3 – Specific Sound Level Map (Existing Daytime Operations (07:00 – 23:00 hours))

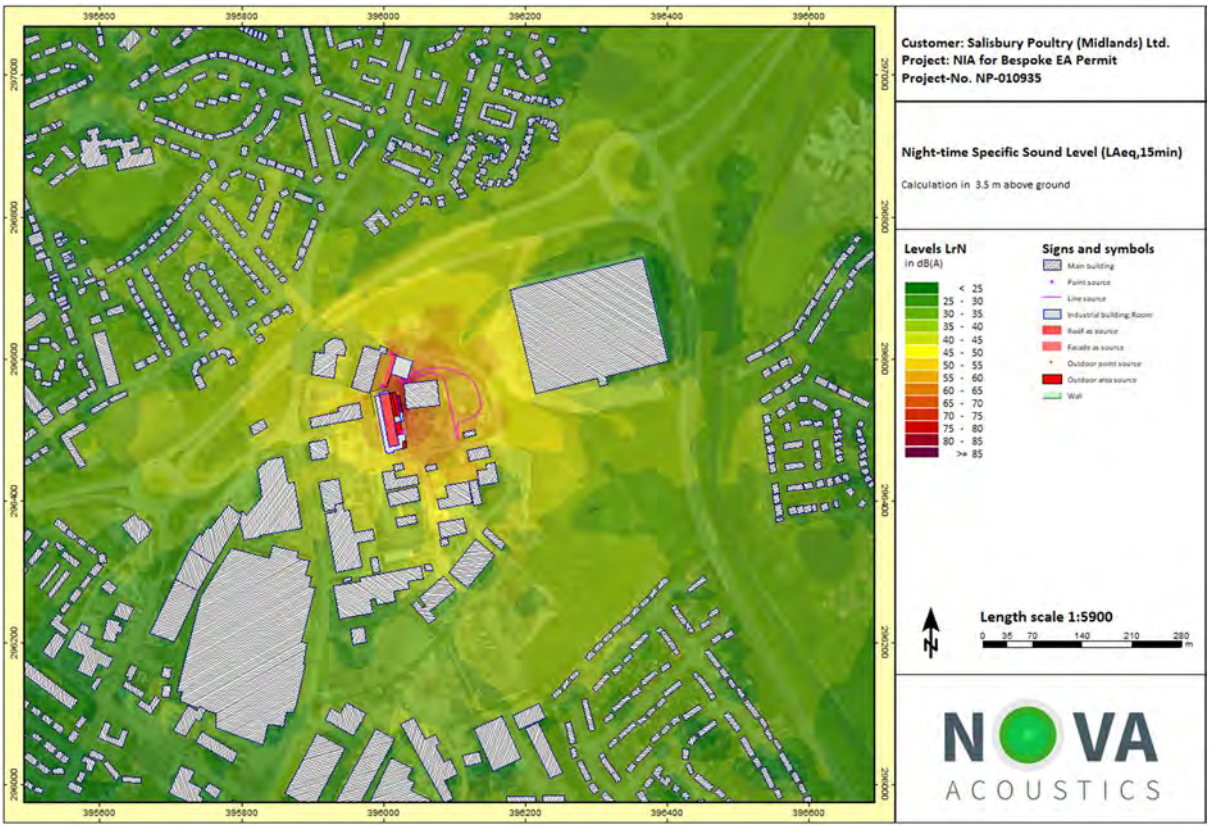


Figure 4 – Specific Sound Level Map (Night-time Operations (23:0 – 00:00 & 05:00 – 07:00 hours))

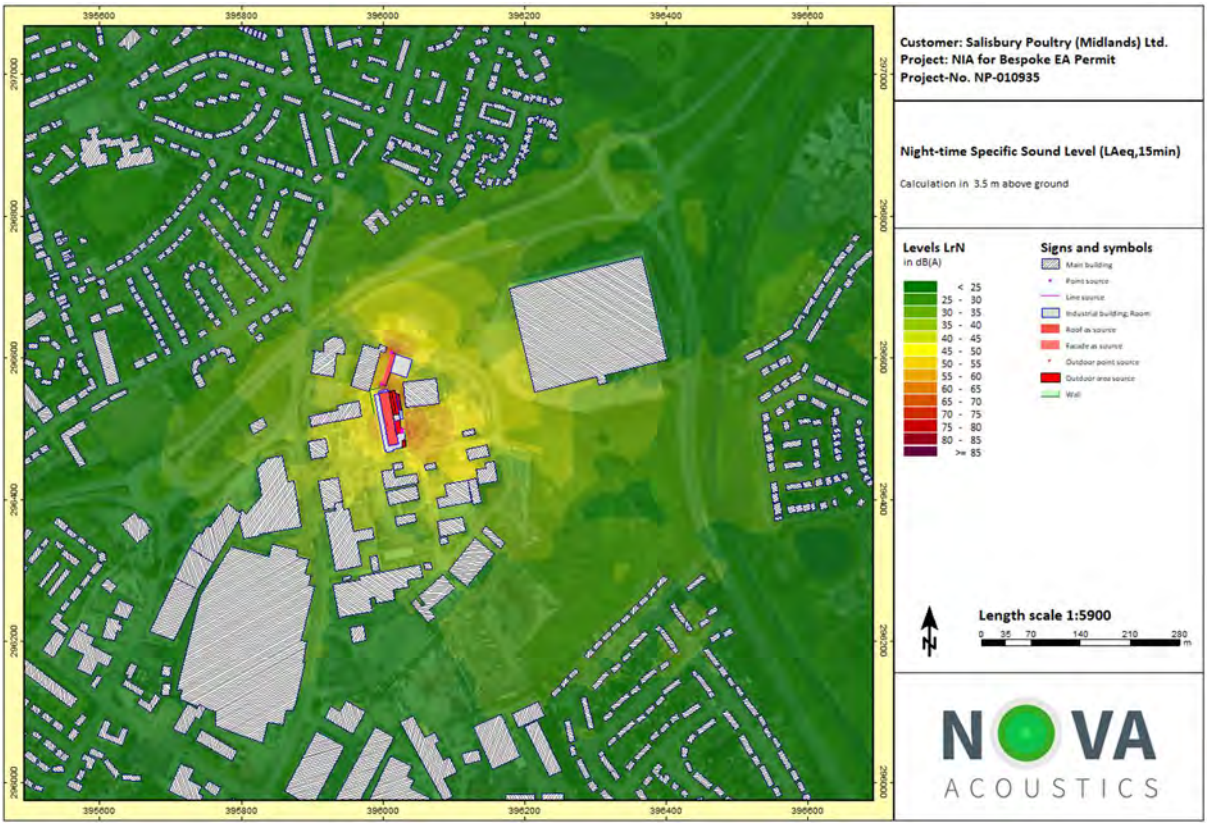


Figure 5 – Specific Sound Level Map (Night-time Operations (00:00 – 05:00 hours))

3.4 BS4142 Noise Impact Assessment of Existing Operations

The BS4142 noise impact assessments are conducted at the most affected NSRs in the following tables.

Description	NSR							
	1(A4)	1(B3)	2(A1)	2(B1)	2(C1)	3(E)	4(A1)	4(B1)
BS4142 Noise Impact Assessment – Daytime (19:00 – 23:00 hours)								
Specific Sound Level (L_{Aeq})	35	36	41	38	39	37	35	34
Acoustic Feature Correction	+6[1]	+6[1]	+2[2]	+2[2]	+2[2]	0	0	0
Rating Sound Level ($L_{Ar,T}$)	41	42	43	40	41	37	35	34
Background Sound Level $L_{A90,15min}$	48	48	48	48	48	45	49	49
Exceedance of L_{A90}	-7	-6	-5	-8	-7	-8	-14	-15
BS4142 Noise Impact Assessment – Night-time (23:00 – 00:00 & 05:00 – 07:00 hours)								
Specific Sound Level (L_{Aeq})	35	36	41	39	39	35	35	34
Acoustic Feature Correction	+6[1]	+6[1]	+2[2]	+2[2]	+2[2]	0	0	0
Rating Sound Level ($L_{Ar,T}$)	41	42	43	41	41	35	35	34
Background Sound Level $L_{A90,15min}$	48	48	48	48	48	42	48	48
Exceedance of L_{A90}	-7	-6	-5	-7	-7	-7	-13	-14
BS4142 Noise Impact Assessment – Night-time (00:00 – 05:00 hours)								
Specific Sound Level (L_{Aeq})	26	27	30	29	27	27	27	27
Acoustic Feature Correction	0	0	0	0	0	0	0	0
Rating Sound Level ($L_{Ar,T}$)	26	27	30	29	27	27	27	27
Background Sound Level $L_{A90,15min}$	40	40	40	40	40	37	41	41
Exceedance of L_{A90}	-14	-13	-10	-11	-13	-10	-14	-14

Notes:

[1] *In accordance with the subjective method of acoustic feature corrections in accordance with BS4142, a + 2 dB penalty has been applied to account for the low frequency humming from the HGV chiller trailers running on diesel. A further +4 dB penalty has been applied for the 'clearly perceptible' tonality in the noise emissions generated by the forklift sirens.*

[2] *Similarly to above, a +2 dB penalty has been applied for the low frequency humming from the HGV chiller trailers running on diesel.*

Table 12 – BS4142 Noise Impact Assessment of Existing Operations

Discussion

Table 12 shows that the rating sound level at all NSRs at all time periods is at least 5 dB below the respective prevailing background sound level. This is an indication of 'low impact, dependent on context' in accordance with BS4142, which supports the subjective impression obtained during the environmental sound survey and on-site monitoring.

At NSR2, NSR3 and NSR4 the level of impact would be classed as below 'No Observed Effect Level' ('NOEL') in accordance with the NPSE and NPPF. However, due to the forklift sirens (and associated tonality) being audible at NSR1 occasionally, the level of impact is thought be between 'No Observed Adverse Effect Level' ('NOAEL') and 'Lowest Observed Adverse Effect Level' ('LOAEL'). The definition of NOAEL is that *"noise can be heard, but does not cause any change in behaviour, attitude or other physiological response"*. In addition, noise at NOAEL *"can slightly affect the acoustic character of the area but not such that there is a change in the quality of life".*

4. Limitations and Uncertainty

The impact assessment has been prepared in accordance with source data measured during the site visit. The measurement distances were measured accurately using a laser meter, and the worst-case highest sound levels measured where directivity was at its greatest have been used.

The measurements were undertaken at distances where noise emissions from operations were dominant (where planar source behaviour was present), and also where they were propagating in point source manner. The latter allowed for the accurate calculation of sound power levels in accordance with BS5228:2009.

All measurements were taken with a 130mm diameter windshield fitted that is effective up to 8m/s according to manufacturer's data.

The calculations using SoundPlan 9.0 conform to ISO 9613 that has an uncertainty reported as ±3.0 dB. ISO9613 assumes a downwind model output that will tend overestimate actual noise propagation from source to receptor locations; the calculated levels are therefore based on worst-case scenarios. The vast majority of noise emissions are steady-state and continuous in nature suggesting that uncertainty would be lower compared to situations where the noise sources are erratic or variable.

The 'uncertainty budget' has been derived using the methodology outlined in 'Uncertainties in Noise Measurement' procedure by Kerry and Craven (Craven, N.J., Kerry, G. 2007. '*Uncertainties in Noise Measurement'. University of Salford).* This document requires an uncertainty budget to be calculated based on the following approach:

- Define the half value (for example, 3 for ±3.0 dB) of each source of uncertainty,
- Apply a correction for the standard uncertainty for a rectangular distribution (x / √3) for each source of uncertainty,
- Add together the values found in 2 for all uncertainties,
- Take the square root to find the combined uncertainty,
- Multiply by 2 to calculate the expanded uncertainty to 95% confidence.

The following table outlines the total expanded uncertainty:

Measurement Uncertainty			
Description	**Accuracy**	**Variance**	**Comments**
Instrumentation Accuracy	±0.1 dB	0.1/√3 = **0.1 dB**	Minimised by use of calibrated traceable instrument.
Use of Wind Shield	±0.2 dB	0.2/√3 = **0.1 dB**	Prevents local wind effects, all meters collecting data used wind shields.
Measurement Distance from Source	±0.5m (worst-case 50cm error of 5m)	20*Log (4.5/5) = -0.9 20*Log (5.5/5) = +0.8 Difference = 1.7 dB 1.7/√3 = **1.0 dB**	
Background Sound Level	±1.5 dB	1.5/√3 = **0.9 dB**	Background sound level uncertainty may exist.
Measurement Uncertainty	Total Variance = **2.1 dB**	Total Uncertainty: √2.1 = **1.4 dB**	
Modelling Uncertainty			
Description	**Accuracy**	**Variance**	**Comments**
Measurement of Sources to Receptors	±3m (closest receptor 160m)	20*Log(157/160) = -0.2 20*Log)(163/160) = +0.2 Difference = 0.4 dB 0.4/√3 = **0.2 dB**	Minimised by use of model based on accuracy of maps.
Air Absorption	Temp range considered to be -5◦C to +20◦C	Results for 9◦C = 0.003639 dB/m Results for -5◦C = 0.006381 dB/m Results for 20◦C = 0.004978 dB/m Variance = 0.002704 dB/m Over 163m this is 0.4 dB 0.4/√3 = **0.2 dB**	Assumed 101.3 kPa, variable temp (worst absorption temp for air), 70% relative humidity, no precipitation.
Modelling Uncertainty	±3.0 dB	3/√3 = **1.7 dB**	Stated model uncertainty due to Para. 9 of ISO 9613, Table 5.
Modelling Uncertainty	Total Variance = **2.1 dB**	Total Uncertainty: √2.1 = **1.4 dB**	
Combined Uncertainty	Total Variance = **4.2 dB**	Total Uncertainty = √4.2 = 2.0 dB Expanded to 95% confidence = 2.0 * 2 = **4.0 dB**	

Table 13 – Expanded Uncertainty of Measurement and Modelling

The table above shows an expanded uncertainty of up to 4 dB. Given the worst-case conditions the noise modelling software accounts for, it is likely that the results presented in this report are an overestimate of the actual level of impact.

5. Conclusion and Action Plan

The site has been assessed against the requirements of BS4142 and the EA's policies and guidance, and a mitigation scheme has been provided to reduce the noise impact from the site.

The cumulative site noise emissions are predicted to cause 'low impact' in accordance with BS4142 at surrounding NSRs.

At NSR2, NSR3 and NSR4 the level of impact would be classed as below 'No Observed Effect Level' ('NOEL') in accordance with the NPSE and NPPF. However, due to the forklift sirens (and associated tonality) being audible at NSR1 occasionally, the level of impact is thought be between 'No Observed Adverse Effect Level' ('NOAEL') and 'Lowest Observed Adverse Effect Level' ('LOAEL'). The definition of NOAEL is that *"noise can be heard, but does not cause any change in behaviour, attitude or other physiological response"*. In addition, noise at NOAEL *"can slightly affect the acoustic character of the area but not such that there is a change in the quality of life"*.

The following 'Action Plan' is outlined to ensure the design considerations and specifications from this report are duly implemented:

1. The Noise Management Plan ('NMP') outlined in Section 6 should be implemented and continuously reviewed.

The findings of this report will require written approval from the Local Authority and Environment Agency prior to the approval of the application.

6. Noise Management Plan ('NMP')

This noise management plan outlines the methods by which the site operator will systematically assess and minimise the potential impacts of noise generated by the site. The noise management plan is a working document with the specific aim to ensure that:

- Noise impact is considered as part of routine inspections.
- Noise is primarily controlled at source by good operational practices and 'Best Available Techniques ('BAT'), including physical and management control measures.
- All appropriate measures are taken to prevent or, where that is not reasonably practical, to reduce noise emissions from the site.

The noise management plan addresses the impact of noise and the control measures employed to mitigate the risk. These are supported through monitoring procedures to identify elevated levels and review complaints should they arise. The complaints management procedure is also addressed, which includes the management responsibilities.

6.1 Hours of Operation

- Internal production within the main building occurs between 05:00 to 22:30, Monday to Friday, and only up to three times a year on Saturdays (same hours).
- Dispatch operations from within the main building, the additional storage building, and adjacent external areas occur between 06:00 to 00:00, Monday to Friday, and 06:00 to 18:00 hours on Saturdays and Sundays; this includes all HGV activity.
- The ammonia plant room and associated external fixed plant operates around internal processing and goes into 'night mode' once operations cease. However, the associated ammonia plant may be active until 00:00 hours.
- Other items of external fixed plant, such as, air cooled condensers are active 24/7.
- The air compressor plant room equipment operates in conjunction with internal production within the main building, exclusively.

6.2 Equipment Maintenance

All failed/broken plant and equipment will be replaced with equivalents that produce equal or lower levels of noise. This will be verified with manufacturers technical datasheets or on-site noise measurements.

All plant and machinery will be regularly and properly maintained in accordance with the preventative maintenance schedule of which the appropriate staff will be trained in.

6.3 Operator Monitoring Plan

Monitoring of noise emissions from the site will be undertaken both subjectively and objectively.

Continuous Subjective Noise Monitoring

- All operational staff will, as part of their induction, be made aware of their roles and responsibility. It is the responsibility of all staff to be aware of noise on site and to report any potential noise issues to the sites Operations Manager at the earliest opportunity.

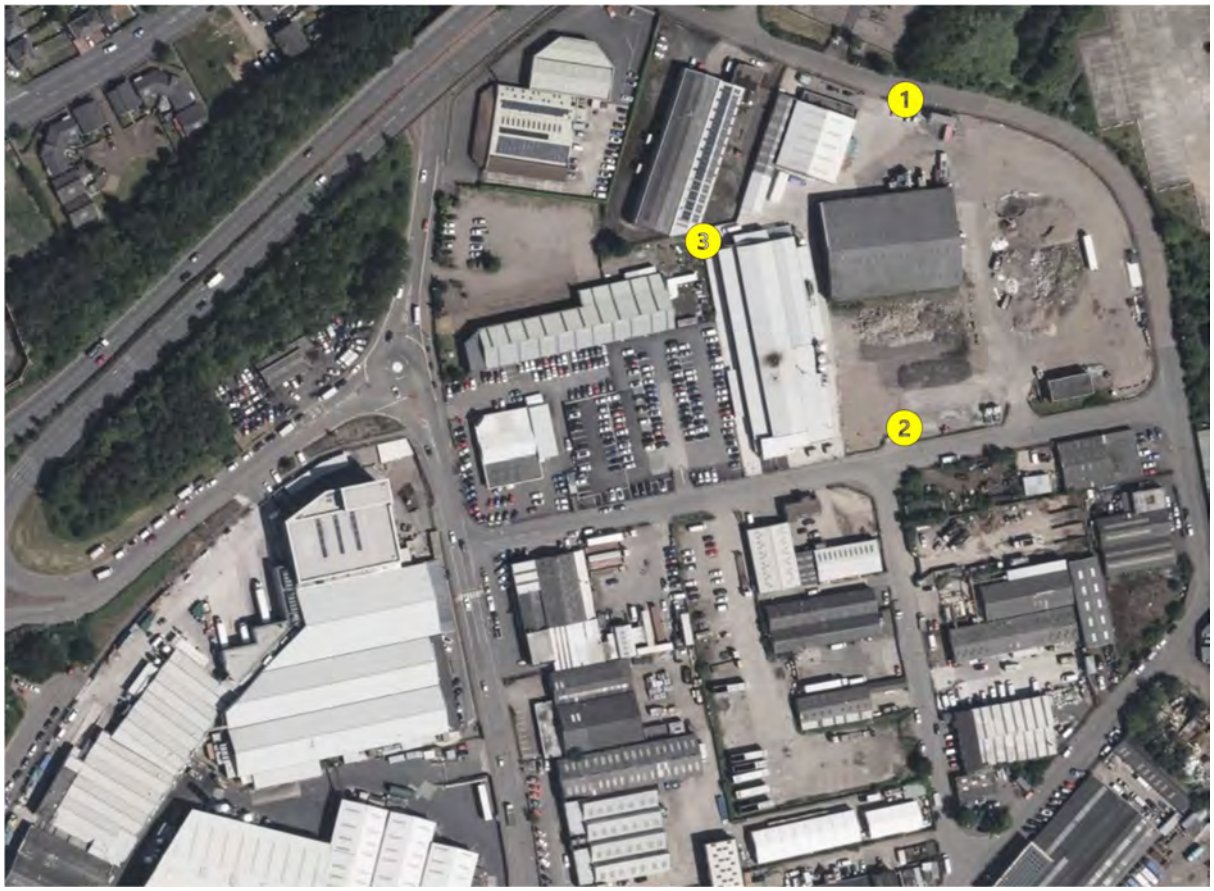
- All staff will have refresher training on noise issues, prevention and management at six-monthly intervals.
- If members of staff report any instances of elevated noise, this should be investigated immediately. In the event that increased noise levels are verified, the source of the noise should be taken out of commission and must be fixed/corrected prior to the equipment being put back into commission.
- A visual inspection of all equipment should be made before use to ensure that there are no obvious faults or malfunctions that could lead to elevated noise levels. It will be ensured that all noise mitigation measures (silencers, etc.) are installed as per manufacturer's guidance.

Objective Noise Monitoring

- A class 2 sound level meter should be purchased to measure sound levels on site. This will take place during typical operations when the site is in use and associated plant vehicles are operating as normal.

Monthly Measurements

Noise levels will be measured at monthly intervals at the site perimeter in the location shown below.



- $L_{Aeq,1hour}$ (A-weighted noise levels averaged over a 1-hour assessment period) and L_{AFmax} noise levels will be recorded. Measurements taken on site will be compared with previous measurements. If $L_{Aeq,1hour}$ noise levels increase by more than 3 dB from the previous month then the cause of the increase shall be investigated.

- When the source of the elevated noise levels is discovered, remedial work shall be undertaken to reduce noise emissions to 'normal' levels. If complex remedial work is required, the offending equipment will be taken out of commission until repair work is completed. This will be logged in an IMS (Issue Management System).

6.4 Noise Control Measures Summary

- Reversing alarms will be self-adjusting white noise models.
- Engines will be switched off when not in use. Vehicles will not be left idling.
- Vehicle horns to be used as a Health and Safety measure only.
- Deliveries will be spread evenly throughout the day where practicable.

6.5 Management Control Measures

- Users of on-site plant and equipment complete a daily defect log at the beginning of the working day if they observe that their vehicle is not working to its optimum. An on-site mechanic actions the defect log on the same working day and machines are not used until this action has been completed.
- Tool-box talks are provided by site management on a regular basis to site operatives. These talks include all aspects of the management plans for this site.
- Plant maintenance schedules using the manufacturer's recommendations where vehicles are serviced after 500 hours of operation.
- Pre-use checks are completed prior to using plant and equipment daily.
- Defects are reported and actions are taken to rectify the problem or remove the offending item from service until such time as the issue is resolved.
- All plant and equipment are visually inspected by the operator at the end of the working day.
- Throughout the day operators are vigilant in checking vulnerable areas like exhausts and engine bays.
- Specialist contractors are used to perform maintenance outside the scope and expertise of the site management and operatives.
- All documentation relating to plant and equipment maintenance is retained in the site office for inspection.

6.6 Noise Complaint Investigation

It is understood that an Issue Management System ('IMS') is currently implemented and completed by the site manager, and includes a site diary, plus forms and records of complaints. Further to this, a complaints procedure is also implemented; this procedure allows for all complaints, feedback and requests made by third parties regarding the site's operational activities, health and safety performance or quality of service/product. The IMS shall continue to be implemented.

A phone number for the head office can be obtained online in order to allow for any member of the public to lodge a complaint without entering the operational site. The operations manager will be specifically assigned to deal with complaints.

All complaints received from third parties including statutory authorities, statutory consultees, members of the general public and representatives of the company will be forwarded to the operations manager to

action as below within 2 hours (where feasible). The complaint will be logged in the incident database within 72 hours.

The operations manager will ensure that:

- The complaint is investigated to identify the cause, if necessary, this may involve direct communication with the complainant.
- The noise source will be measured using a class 2 sound level meter and compared with monthly objective monitoring records.
- In the event of elevated noise being detected, the presence of 'abnormal' onsite activity is assessed and if necessary, action is taken immediately to prevent a reoccurrence of the same problem. These actions must be documented.
- The complainant will be contacted and given information on the investigations conducted and actions taken as appropriate.
- All complaints are reported to regional directors and discussed at site meetings.
- Details of other complaints are sent to the other company personnel as appropriate.

If the investigation indicates that the complaint has not been justified this will be clearly recorded on the incident report. All complaints will be logged.

6.7 Reporting Measures

In the event of elevated levels of noise being identified, the event will be reported into the IMS by a member of operational staff. Upon notification of an environmental incident, the site manager will complete an incident reporting form. The completed form is then distributed throughout the company for review at operational, management and health and safety meetings.

All performance failures will be categorised for input into the IMS as follows:

- Minor event: quick fix possible, locally resolved.
- Medium event: brief disruption to service, management intervention required.
- Major event: significant disruption to service.

Each non-conformance category must have a given deadline for rectification. The deadline for each category is:

- Minor Event: within 24 hours
- Medium Event: within 6 hours
- Major Event: within 1 hour

The IMS will record any actions taken to rectify the issue, ensure that any necessary actions or review are recorded onto the IMS and ensure that the person reporting the incident is notified. The site manager will investigate the performance failure within a reasonable time frame (ideally 2 hours). Once the issue has been resolved, the corrective action will be entered onto the system and the issue will be closed.

Appendix A – Acoustic Terminology

A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure given by the following formula in decibels (dBA). $L_{pA} = 10 \log_{10} (pA/p_0)^2$. Where: pA is the A-weighted sound pressure in pascals (Pa) and $p0$ is the reference sound pressure (20 µPa)
Background Sound	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time
Facade level	Sound pressure level 1 m in front of the facade
Free-field level	Sound pressure level away from reflecting surfaces
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants
Noise Criteria	Numerical indices used to define design goals in a given space
Noise Rating (NR)	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves
Octave Band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit
Percentile Level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting “F”, which is exceeded for N% of a specified time interval
Rating Level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped
Sound Pressure, p	root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound
Sound Pressure Level, L_p	Quantity of sound pressure, in decibels (dB), given by the formula: $L_p = 10\log_{10}(p/p_0)^{2.}$ Where: p is the root-mean-square sound pressure in pascals (Pa) and $p0$ is the reference sound pressure (20 µPa)
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies

Appendix B – Standards, Legislation, Policy, and Guidance

This report is to be primarily based on the following standards, legislation, policy and guidance.

B.1 – National Planning Policy Framework (2023)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2023. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 180e, it states:

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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

Paragraph 191 states:

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 the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) *Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
b) *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
c) *Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

B.2 – Noise Policy Statement for England (2010)

Paragraph 191 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision 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.

To achieve this vision the Statement identifies the following three 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;
- Where possible, contribute to the improvement of health and quality of life.

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that "significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development".

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

NOEL – No Observed Effect Level

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. This can be related to the third aim above, which seeks: "where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."

This is further expanded using the updated "Noise Exposure Hierarchy Table" which includes an additional level of impact referred to as the 'No Observed Adverse Effect Level' ('NOAEL'). It is stated that at this level: *"noise can be heard, but does not cause any change in behaviour, attitude or other physiological response"*. In addition, noise at this level *"can slightly affect the acoustic character of the area but not such that there is a change in the quality of life".*

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 – BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'

Overview

BS4142:2014 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS4142:2014 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

Rating Penalty

Section 9 of BS4142:2014 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS4142:2014 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

a) subjective method;
b) objective method for tonality;
c) reference method."

Due to the nature of the development the subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS4142:2014, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed. Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142:2014 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

a) Tonality

A rating penalty of +2 dB is applicable for a tone which is "just perceptible", +4 dB where a tone is "clearly perceptible", and +6 dB where a tone is "highly perceptible".

b) Impulsivity

A rating penalty of +3 dB is applicable for impulsivity which is "just perceptible", +6 dB where it is "clearly perceptible", and +9 dB where it is "highly perceptible".

c) Other Sound Characteristics

BS4142:2014 states that where "the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distance against the residual acoustic environment, a penalty of +3 dB can be applied."

d) Intermittency

BS4142:2014 states that when the "specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time ... if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied."

Background Sound Level

The background sound level is the underlying level of sound over a period, T, and is indicative of the relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

To ensure the background sound level values used within the assessment are reliable and suitably represent both the particular circumstance and periods of interest, efforts have been made to quantify a 'typical' background sound level for a given period. The purpose has not been to simply select the lowest measured value. Diurnal patterns have also been considered as they can have a major influence on background sound levels, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes.

Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.

Assessment of Impact

BS4142:2014 states: "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

- "Typically, the greater this difference, the greater the magnitude of the impact."
- "A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."
- "A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."
- "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 negligible impact, depending on the context."

Interpreting the guidance given in BS4142:2014, with consideration of the guidance given in the NPSE and NPPG Noise, an estimation of the impact of the rating sound is summarised in the following text:

- A rating sound level that is +10 dB above the background sound level is likely to be an indication of a Significant Observed Adverse Effect Level;

- A rating sound level that is +5 dB above the background sound level is likely to be an indication of a Lowest Observed Adverse Effect Level;
- The lower the rating sound 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 sound level does not exceed the background sound level, this is an indication of the specific sound source having a negligible impact and would therefore classified as No Observed Adverse Effect Level.

During the daytime, the assessment is carried out over a reference time period of 1-hour. The periods associated with day or night, for the purposes of the Standard, are 07.00 to 23.00 and 23.00 to 07.00, respectively.

B.4 – Environmental Permitting (England and Wales) Regulations 2016 (as amended)

The regulations require that operators of permitted installations conduct their activities to prevent, or where that is not possible, to reduce to a minimum, pollution arising from their operations. For the processing of food stuffs, noise is a potential significant pollutant. The legislation requires that all pollutants (including noise and vibration) meet the standards required and demonstrate Best Available Techniques (BAT).

Assessment of the impacts of noise from a proposed installation requires an assessment to predict the significance of the potential impacts.

Additional guidance and reference to national standards for the monitoring and evaluation of noise are accepted as appropriate metrics for assessing the significance of impacts. The relevant guidance is detailed below.

Horizontal Guidance for Noise Part 2 – Noise Assessment and Control (H3)

Agency Guidance note H3 provides advice on assessing the potential impact of noise from permitted installations. The guidance notes that:

> *"Regulation of noise under IPPC will bring together several legislative regimes with different scope but similar purpose and, in the case of A1 installations, will require a co-ordinated approach between the Regulator and both the Planning functions and the Environmental Health or Environmental Protection Teams of local authorities. At an early stage, lead planning and environmental health/protection officers should be identified to ensure an effective liaison and consultation process."*

It is therefore appropriate to reference guidance used by planning authorities in determining planning applications and, where possible, align compliance requirements to avoid confusion or conflict between similarly required regulatory outcomes.

H3 endorses the use of the following specific guidance and standards for the assessment of noise from permitted installations:

- National Planning Policy Framework 2021 (NPPF)
- Planning Practice Guidance (ProPG)

- British Standard 4142:2014+A1:2019 – 'Methods for rating industrial noise affecting mixed residential and industrial areas'
- British Standard 5228:2009+A1:2014 – 'Noise and vibration control on construction and open sites'
- British Standard 7445:2003 – 'Description and measurement of environmental noise'
- World Health Organisation Guidelines for Community Noise: 1999.

It is expected that controls on noise emissions put in place under the environmental permit requirements should be consistent with those required under other regulatory regimes. It is therefore also appropriate to also consider planning policy when setting appropriate noise controls.

It is normal for permitted installations to demonstrate compliance by preparing a Noise Management Plan (NMP). The NMP addresses physical, operational and management controls exercised by the operator of the installation to comply with 'Best Available Techniques' ('BAT').

Appendix C – Environmental Survey

C.1 – Time History Noise Data

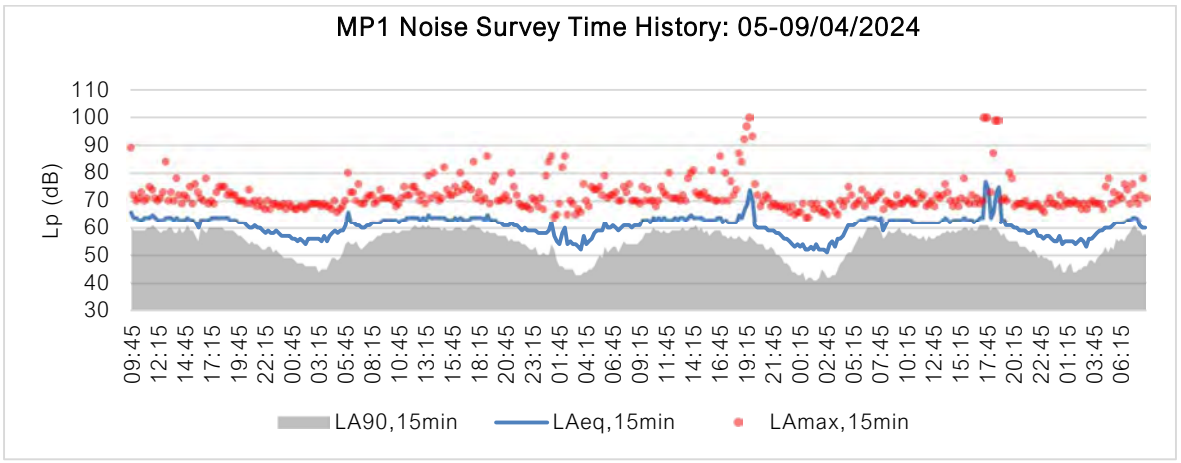


Figure 6 – MP1 Noise Survey Time History (Full Period)

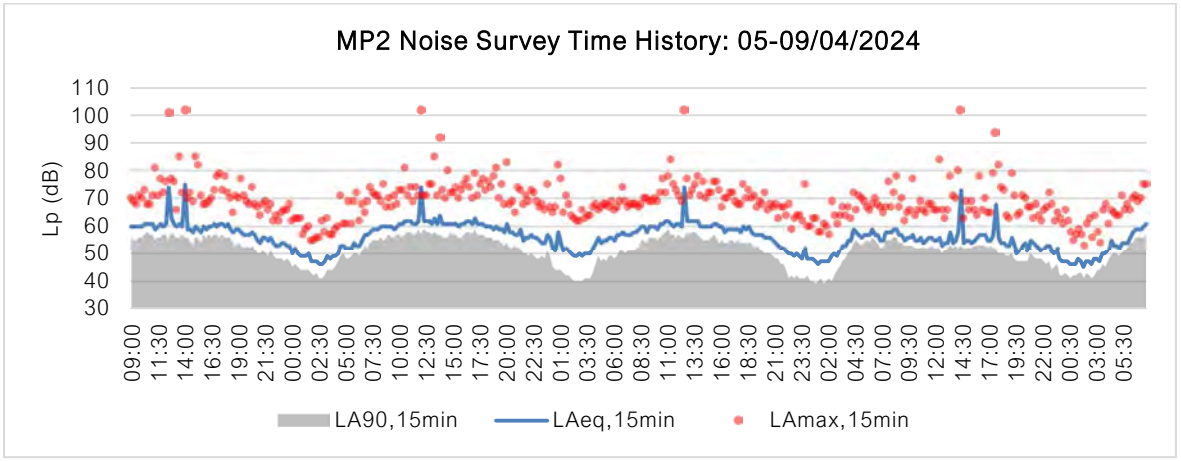


Figure 7 – MP2 Noise Survey Time History (Full Period)

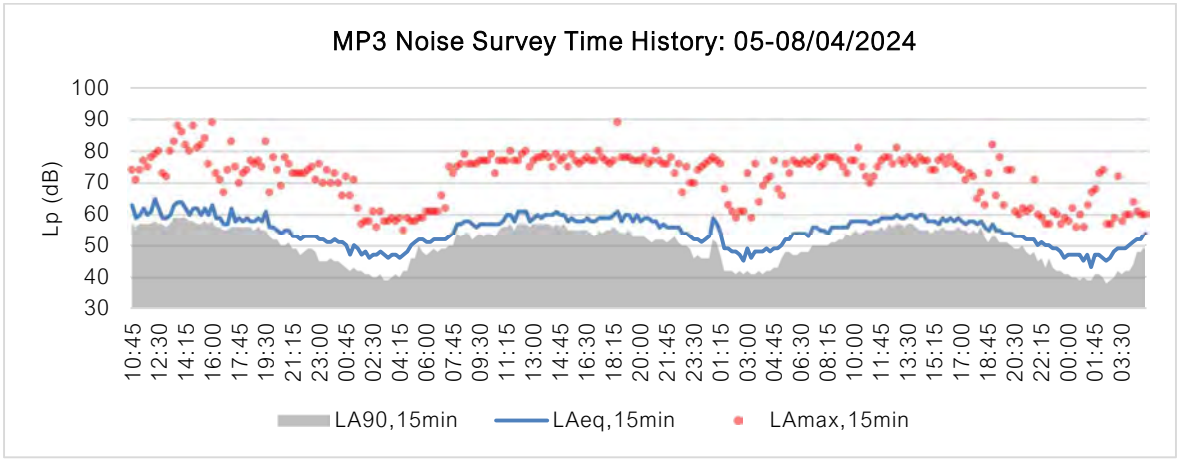


Figure 8 – MP3 Noise Survey Time History (Full Period)

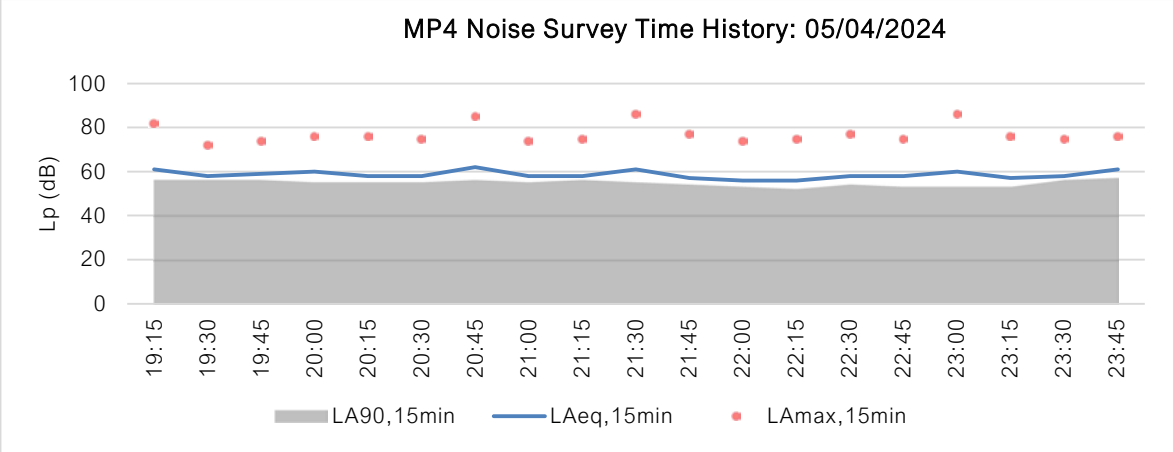
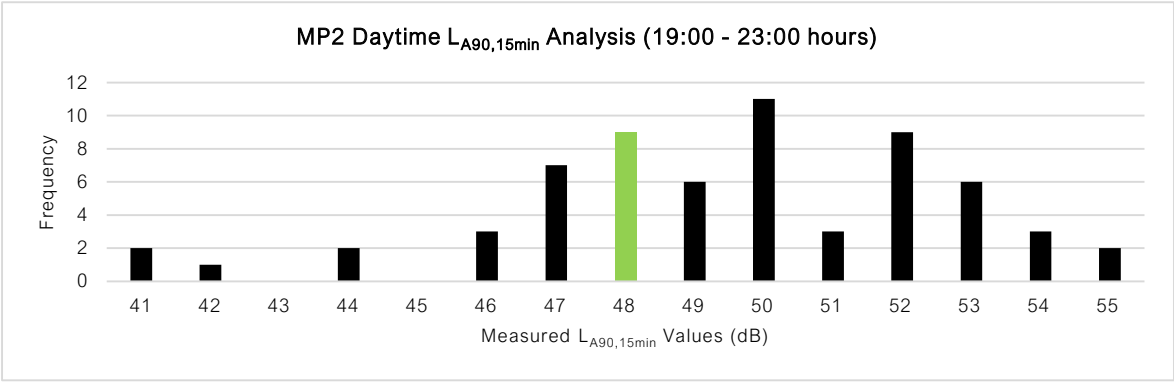
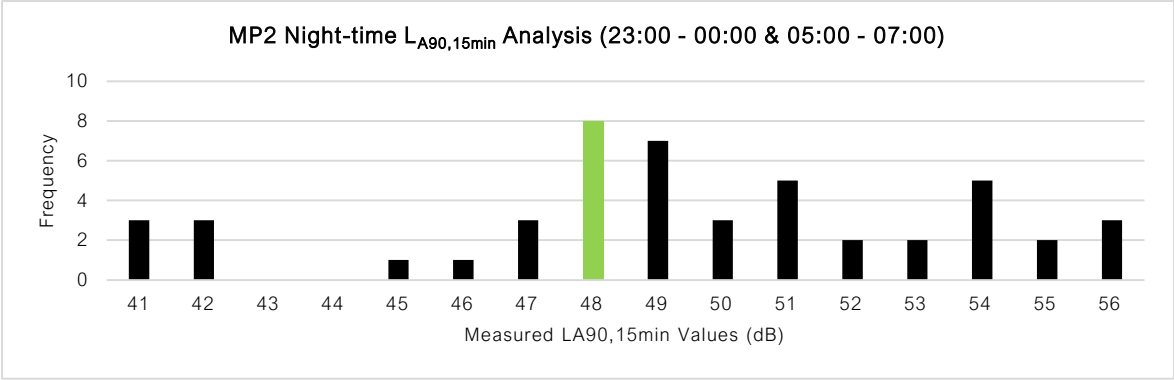


Figure 9 – MP4 Noise Survey Time History (Full Period)





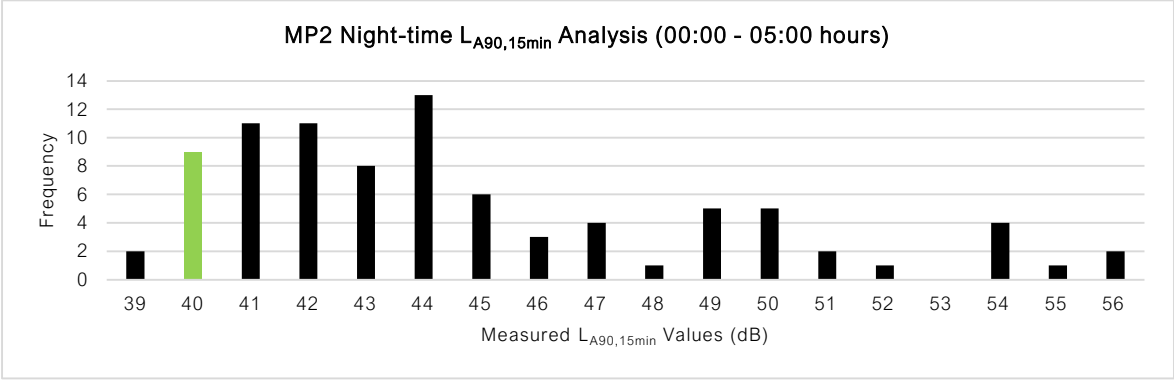


Figure 10 – MP2 Background Sound Level Analysis

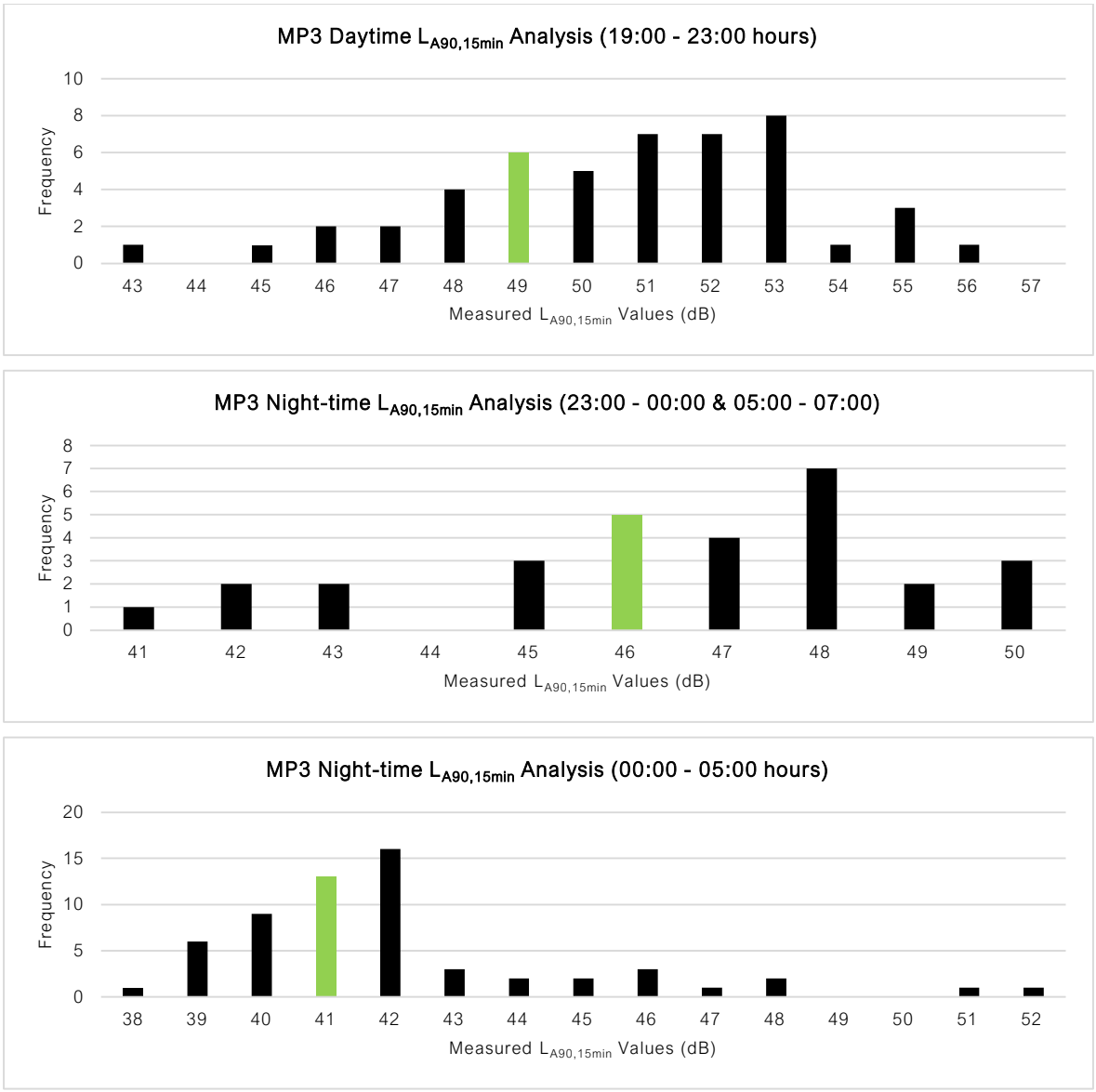


Figure 11 – MP3 Background Sound Level Analysis

C.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
Svantek SV307 Class 1 Sound Level Meter	84953	114.1 (pre) / 114.1 (post)
Svantek SV36 Class 1 Calibrator	106876	
Svantek SV307 Class 1 Sound Level Meter	101030	114.0 (pre) / 114.1 (post)
Svantek SV36 Class 1 Calibrator	106876	
CESVA SC250 Class 1 Sound Level Meter	T252917	93.9 (pre) / 93.9 (post)
CESVA CB011 Class 1 Calibrator	T253524	
CESVA SC420 Class 1 Sound Level Meter	T246471	93.8 (pre) / 94.1 (post)
CESVA CB011 Class 1 Calibrator	T253524	

Table 14 – Surveying Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.3 dB. All sound level meters are calibrated every 24 months, and all calibrators are calibrated every 12 months by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

C.3 – Meteorological Conditions

Technical issues prohibited the use of a localised weather station, therefore, met office weather data of the area, specifically the closest weather station, has been consulted; however, all measurements have been compared with met office weather data of the area, specifically the closest weather station, and the data from the weather station is outlined in the table below.

When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather Conditions – Darlaston (Approx. 2.2km NEE of Site)				
Time Period	Air Temp (°C)	Rainfall (mm/h)	Prevailing Wind Direction	Wind Speed (m/s)
05/04/24: 00:00 – 23:59	11.0 – 17.2	0.0	SW	0.0 – 3.3
06/04/24: 00:00 – 23:59	9.2 – 18.0	0.0	SW	0.0 – 4.6
07/04/24: 00:00 – 23:59	8.2 – 14.7	0.0	SE	0.0 – 3.3
08/04/24: 00:00 – 23:59	8.4 – 14.6	0.0	NW	0.0 – 2.9
09/04/24: 00:00 – 10:00	5.1 – 8.4	0.0	S	0.0 – 2.5

Table 15 – Weather Conditions

Appendix D – Manufacturers' Datasheets

QuadCore™ RW Trapezoidal Roof Panel

Insulation Core
KS1000 RW insulated roof panels are manufactured with an HCFC, CFC and HFC free QuadCore insulation core.

Fire
Reaction to Fire
Classified B-s1,d0 according to the European Reaction to Fire classification system (Euroclasses) BS EN 13501–1:2007+A1:2009 when tested on the internal liner. Please contact Technical Services for information relating to the external face

B_{ROOF} (t4) to BS EN 13501-5:2016

Insurer Approvals
LPS 1181 Part 1: Issue 1, series of fire growth tests for LPCB approval and is certified to LPS 1181 Grade EXT-B

FM 4471 Class 1 panel roofs*

FM 4880 Class 1 fire rating of building panels or interior finish materials, unlimited height

FM 4882 Class 1 interior wall panels in smoke sensitive occupancies (pharmaceutical manufacturing & storage areas, and food preparation & storage areas or similar occupancies)

*1.5m maximum span only. Please contact Technical Services for more information.

FM APPROVED

LPCB

LPS 1181 : Issue 1.2
Cert. No: 260f & 186f

Environmental
Kingspan Insulated Panels produced in the UK are certified to BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) 'Very Good'. Kingspan Insulated Panels directly contribute to BREEAM/LEED credits.

Air Leakage
An air leakage rate of $3m^3/hr/m^2$ at 50Pa or less can be achieved when using Kingspan insulated roof and wall panels.

Acoustic
Sound Reduction Index (SRI)

Hz*	63	125	250	500	1K	2K	4K	8K
SRI (dB)	20	18	20	24	20	29	39	47

* Frequency

The KS1000 RW insulated roof panel has a single figure weighted sound reduction Rw = 25dB.

Biological
Kingspan panels are normally immune to attack from mould, fungi, mildew and vermin. No urea formaldehyde is used in the construction, and the panels are not considered deleterious

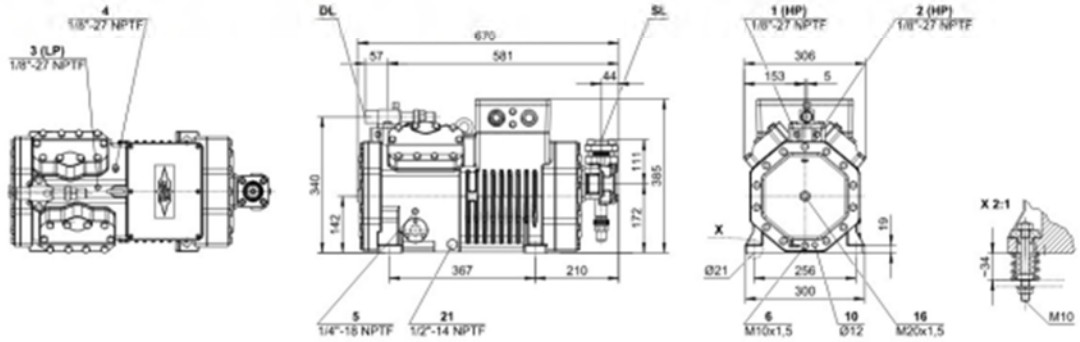
Materials
Substrate
- Kingspan XL Forté, Kingspan Spectrum, Kingspan AQUA*safe*, Kingspan AQUA*safe55* and Kingspan CLEAN*safe*: Metallic protected steel to BS EN 10346:2015.thickness 0.5mm.
  CLEAN*safe* 15: Metallic protected steel to BS EN10346:2015.thickness 0.4mm
- Stainless Steel: Austenitic Grade 316 stainless steel to BS EN 10088: Part 2: 2014, thickness 0.4mm.
- Aluminium: Please contact Kingspan envirocare Technical Services.

Coatings - External Weather Sheet
- Kingspan XL Forté: Consists of a multi-layer organic coating, embossed with a traditional leather-grain finish.
- Kingspan Spectrum: Consists of a coated semi-gloss finish with slight granular effect.

Coatings - Internal Liner Sheet
- Kingspan CLEAN*safe* 15: The coating has been developed for use as the internal lining of insulated panels. Standard colour is "bright white" with an easily cleaned surface.
- Kingspan AQUA*safe*: The coating has been developed for use as the internal lining of insulated panels to suit high humidity internal environments.
- Kingspan AQUA*safe 55*: The coating has been developed for use as the internal lining of insulated panels to swimming pool internal environments.
- Kingspan CLEAN*safe 120*: The coating has been developed for use as the internal lining of insulated panels where a high level of cleanliness and hygiene is required, and the panels are to be cleaned down on a regular basis.
- Stainless Steel: The stainless steel liner has been developed for use as the internal lining of insulated panels in buildings with a very aggressive/corrosive internal environment.

Technical Data: (4PCS-15.2Y)

Dimensions and Connections



Technical Data

Technical Data	
Displacement (1450 RPM 50Hz)	48,50 m3/h
Displacement (1750 RPM 60Hz)	58,53 m3/h
No. of cylinder x bore x stroke	4 x 65 mm x 42 mm
Weight	142 kg
Max. pressure (LP/HP)	19 / 28 bar
Connection suction line	42 mm - 1 5/8"
Connection discharge line	28 mm - 1 1/8"
Oil type R134a/R407C/R404A/R507A/R407A/R407F	tc<55°C: BSE32 / tc>55°C: BSE55 (Option)
Oil type R22 (R12/R502)	B5.2 (Standard)
Oil type R290/R1270	SHC226E (Standard)
Motor data	
Motor voltage (more on request)	380-420V PW-3-50Hz
Max operating current	31.0 A
Winding ratio	50/50
Starting current (Rotor locked)	81.0 A Y / 132.0 A YY
Max. Power input	16,3 kW
Extent of delivery (Standard)	
Motor protection	SE-B1
Enclosure class	IP65
Vibration dampers	Standard
Oil charge	2,60 dm³
Available Options	
Discharge gas temperature sensor	Option
Start unloading	Option
Capacity control	100-50% (Option)
Additional fan	Option
Oil service valve	Option
Crankcase heater	0..140 W PTC (Option)
Oil level monitoring	OLC-K1 (Option, not for R290/R1270)
Sound measurement	
Sound power level (+5°C / 50°C)	75,5 dB(A) @ 50Hz
Sound power level (-10°C / 45°C)	76,5 dB(A) @ 50Hz
Sound power level (-35°C / 40°C)	(81,0) dB(A) @ 50Hz
Sound pressure level @ 1m (+5°C / 50°C)	67,5 dB(A) @ 50Hz
Sound pressure level @ 1m (-10°C / 45°C)	68,5 dB(A) @ 50Hz
Sound pressure level @ 1m (-35°C / 40°C)	(73,0) dB(A) @ 50Hz

Appendix E – On-Site Spot Measurement Results Summary

The following table outlines the results summary of the measurements taken of external noise sources.

Description	Distance (m)	1/1 Octave Frequency Band (Hz, L_{eq}, dB)								Overall (dBA)
		63	125	250	500	1k	2k	4k	8k	
HVAC Outlet (Ambient)	3	69	82	70	68	65	60	57	46	71
HVAC Outlet (Reidual)	5	70	68	62	60	59	54	49	44	63
Diesel FL Loading HGV with Cleaned Pallets/Trays	10	75	69	62	61	59	63	57	48	67
Highest 1-sec of HGV Pass-by	3	74	77	78	78	76	72	66	58	80
Ambient of Air Compressor Room Right Fan	1.3	73	72	73	71	66	63	59	52	72
Ambient of Air Compressor Room Left Fan	1.3	65	72	73	70	67	64	60	53	72
Ambient of Air Compressor Room Door Breakout	1	66	70	70	70	68	65	60	55	73
Ambient of Ammonia Plant Room Door Breakout	1	71	82	78	78	77	73	71	60	81
4 No. Green Allianz Condensers	3.5	72	74	76	72	72	67	60	55	76
4 No. Green Allianz Condensers	10	68	70	68	64	63	57	50	45	67
Ambient of Boiler Room Door Breakout	1	68	67	61	65	62	59	53	46	67
Ambient of SMA Plant Room Louvre Breakout	1	68	69	64	66	66	61	53	46	69
1 No. Allianz Condenser for Dispatch Unit 1	2.5	76	79	73	73	72	68	62	56	76
Ammonia Plant Room Outlet	2	69	76	80	80	78	73	67	61	82
1 No. Allianz Condenser North of Dispatch Unit 1 (Ambient)	11	68	69	61	60	60	56	51	48	64
Above Residual ^^	11	67	59	53	51	53	54	52	49	60
HGV Chiller Trailer on Diesel	13	83	70	63	64	60	53	49	44	66

Table 16 – On-Site Spot Measurement Results Summary

Appendix F – Calculations

Item / Description	dB(A)	63	125	250	500	1k	2k	4k	8k
Internal Ambient of Amonnia Plant Room	93	78	79	85	92	87	86	83	75
Ambient of Amonnia Plant Room Door Breakout	81	71	82	78	78	77	73	71	60
Level Difference (D') of Louvred Door		-7	3	-7	-14	-10	-13	-12	-15
Internal Ambient of Air Compressor Room	84	72	76	79	80	79	77	73	70
Ambient of Air Comprossor Room Door Breakout	73	66	70	70	70	68	65	60	55
Level Difference (D') of Louvred Door		-6	-6	-9	-10	-11	-12	-13	-15
Internal Ambient of SMA Plant Room	76	68	76	69	72	71	70	67	62
Ambient of SMA Plant Room Louvre Breakout	69	68	69	64	66	66	61	53	46
Level Difference (D') of Louvre		0	-7	-5	-6	-5	-9	-14	-16

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB) 63	125	250	500	1k	2k	4k	8k	Lp Dist (m)	Q Factor
Model / Unit	Ammonia Plant Room Rooftop Outlet	Octave-Band Lp	Lp at 2m, Q factor (Q=1)	82	89	76	80	80	78	73	67	61	2	1
No. of	1													
Data Type	Emperical Data		Total Lw	99	86	93	97	97	95	90	84	78		
Source Mitigation Description	No													
Time Corrected Lw of Fixed Plant	On-Time (min) 60	Time Period Day	Correction (dB) 0	99	86	93	97	97	95	90	84	78		

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB) 63	125	250	500	1k	2k	4k	8k	Lp Dist (m)	Q Factor
Model / Unit	HGV Chiller Trailer on Deisel (Front)	Octave-Band Lp	Lp at 13m, Q factor (Q=2)	66	83	70	63	64	60	53	49	44	13	2
No. of	1													
Data Type	Emperical Data		Total Lw	96	113	100	93	94	90	83	79	74		
Source Mitigation Description	No													
Time Corrected Lw of Fixed Plant	On-Time (min) 45	Time Period Day	Correction (dB) -1	95	112	99	92	93	89	82	78	73		

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB) 63	125	250	500	1k	2k	4k	8k	Lp Dist (m)	Q Factor
Model / Unit	ACPR Fan Left	Octave-Band Lp	Lp at 1.3m, Q factor (Q=2)	72	65	72	73	70	67	64	60	53	1.3	2
No. of	1													
Data Type	Emperical Data		Total Lw	83	75	82	83	80	77	74	70	63		
Source Mitigation Description	No													
Time Corrected Lw of Fixed Plant	On-Time (min) 60	Time Period Day	Correction (dB) 0	83	75	82	83	80	77	74	70	63		

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB) 63	125	250	500	1k	2k	4k	8k	Lp Dist (m)	Q Factor
Model / Unit	ACPR Fan Right	Octave-Band Lp	Lp at 1.3m, Q factor (Q=2)	72	73	72	73	71	66	63	59	52	1.3	2
No. of	1													
Data Type	Emperical Data		Total Lw	83	83	82	83	81	76	73	69	62		
Source Mitigation Description	No													
Time Corrected Lw of Fixed Plant	On-Time (min) 60	Time Period Day	Correction (dB) 0	83	83	82	83	81	76	73	69	62		

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB) 63	125	250	500	1k	2k	4k	8k	Lp Dist (m)	Q Factor
Model / Unit	HGV Pass-by (Highest 1-sec)	Octave-Band Lp	Lp at 3m, Q factor (Q=2)	80	74	77	78	78	76	72	66	58	3	2
No. of	1													
Data Type	Emperical Data		Total Lw	98	92	95	96	96	94	90	84	76		

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB) 63	125	250	500	1k	2k	4k	8k	Lp Dist (m)	Q Factor
Model / Unit	FL (Un)Loading HGV	Octave-Band Lp	Lp at 10m, Q factor (Q=2)	67	75	69	62	61	59	53	57	48	10	2
No. of	1													
Data Type	Emperical Data		Total Lw	95	103	97	90	89	87	91	85	76		
Source Mitigation Description	No													
Time Corrected Lw of Fixed Plant	On-Time (min) 20	Time Period Day	Correction (dB) -5	90	98	92	85	84	82	86	80	71		

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB)								Lp Dist (m)	Q Factor
					63	125	250	500	1k	2k	4k	8k		
Model / Unit	1 No. Bitzer 4PCS-15.2Y-40P Condenser Unit (North Dispatch)	Octave-Band Lp	Lp at 12m, Q factor (Q=8)	63	64	68	61	60	59	54	51	46	12	8
No. of	1													
Data Type	Emperical Data		Total Lw	87	88	92	85	84	83	78	75	72		
Source Mitigation Description	No													
Time Corrected Lw of Fixed Plant	On-Time (min) 60	Time Period Day	Correction (dB) 0	87	88	92	85	84	83	78	75	72		

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB)								Lp Dist (m)	Q Factor
					63	125	250	500	1k	2k	4k	8k		
Model / Unit	1 No. Bitzer 4PCS-15.2Y-40P Condenser Unit (South Dispatch)	Octave-Band Lp	Lp at 2.5m, Q factor (Q=8)	76	76	79	73	73	72	68	62	56	2.5	8
No. of	1													
Data Type	Emperical Data		Total Lw	86	86	89	83	83	82	78	72	66		
Source Mitigation Description	No													
Time Corrected Lw of Fixed Plant	On-Time (min) 60	Time Period Day	Correction (dB) 0	86	86	89	83	83	82	78	72	66		

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB)								Lp Dist (m)	Q Factor
					63	125	250	500	1k	2k	4k	8k		
Model / Unit	Rooftop HVAC Outlet	Octave-Band Lp	Lp at 3m, Q factor (Q=2)	70	67	82	69	67	63	59	56	42	3	2
No. of	1													
Data Type	Emperical Data		Total Lw	88	85	100	87	85	81	77	74	60		
Source Mitigation Description	No													
Time Corrected Lw of Fixed Plant	On-Time (min) 60	Time Period Day	Correction (dB) 0	88	85	100	87	85	81	77	74	60		

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