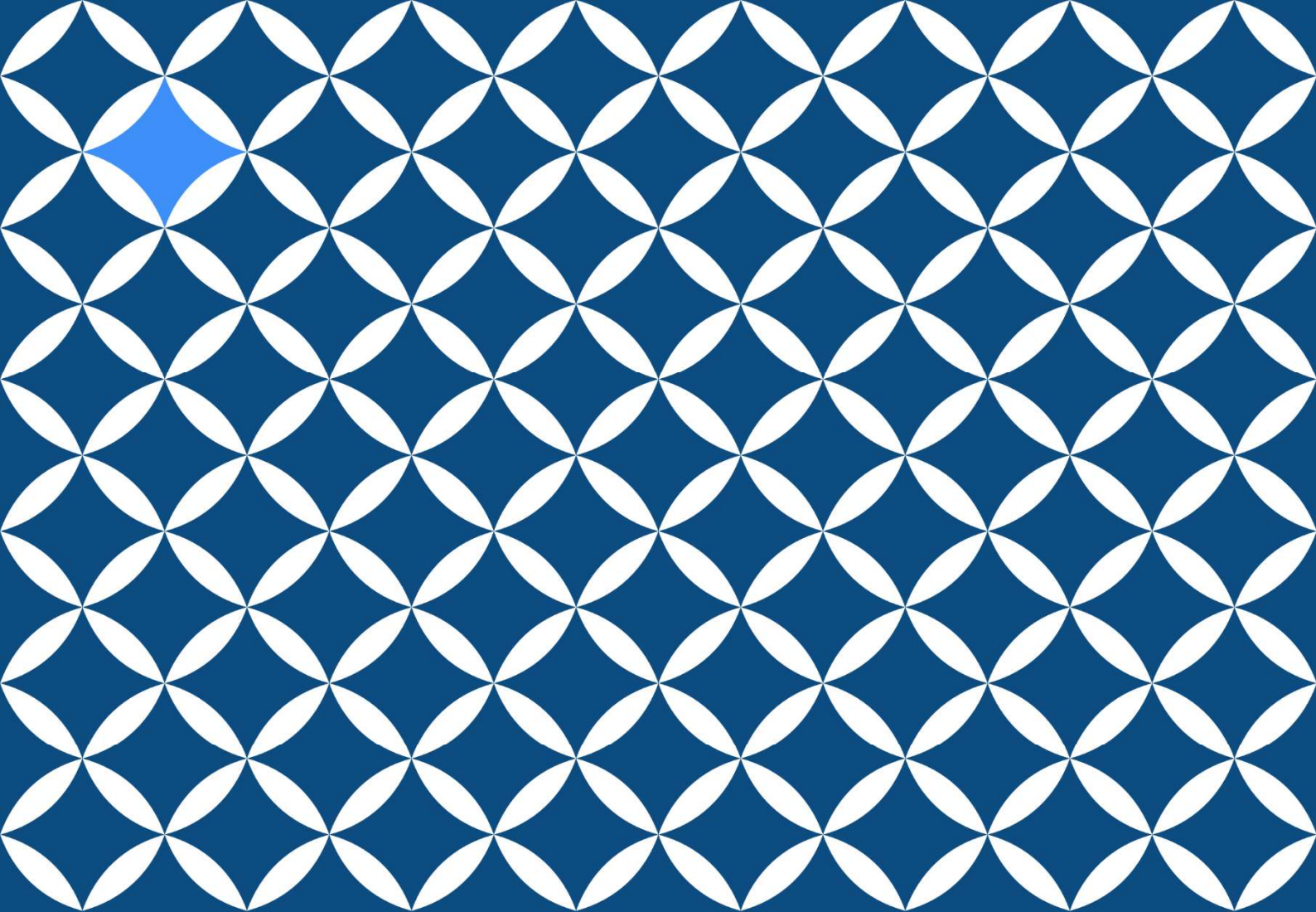




📍 Unit 11, Brunel Court, Gadbrook Park, CW9 7LP

☎ 01565 632535

✉ info@solacoustics.co.uk

🌐 www.solacoustics.co.uk

New Horizon Biofuel, Wrexham

Environmental Noise Impact Assessment

P2385-REP04-REV B-BDH

14 July 2026

PROJECT New Horizon Biofuel, Wrexham
Environmental Noise Impact Assessment

CLIENT New Horizon Plastic Co Ltd
91 Soho Hill
Birmingham
B19 1AY

**DOCUMENT
REFERENCE** P2385-REP04-REV B-BDH

SIGNED



BRIAN HORNER

CHECKED



JOE SINKER

DATE 14 / 07 / 2026

REVISIONS

Reviewer	Date	Description

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Name of Organisation Sol Acoustics Limited

Company Registration Number 4218702

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1 Executive Summary

- 1.1 Sol Acoustics Ltd ("Sol") has been appointed to provide an environmental noise impact assessment to support the discharge of Improvement Programme Requirement Condition 2 ("IPC2") of the Permit Variation (Variation number: EPR/CB3797CA/V002) for the existing New Horizon Biofuel site (the "Facility"), located at Units 9 – 11, Vauxhall Industrial Estate, Johnstown, Wrexham LL14 6HA.
- 1.2 This acoustic assessment report considers the predicted environmental noise impact arising from the operation of all currently operable plant and processes associated with the Facility at the nearest Noise Sensitive Receptors ("NSRs") during the hours of operation.
- 1.3 The pre-existing environmental noise climate at the identified NSRs has been measured by Sol, between Thursday 4th April and Monday 8th April 2024 (inclusive).
- 1.4 The environmental noise emissions predicted to arise from the operation of the Facility have been quantified, modelled, and assessed using proprietary "CadnaA" 3D noise modelling software, based upon the noise prediction methodology set out in BS ISO 9613-2:2024: '*Acoustics — Attenuation of sound during propagation outdoors, Part 2: Engineering method for the prediction of sound pressure levels outdoors*' ("ISO 9613-2").
- 1.5 An Environmental Noise Impact assessment report (P2385-REP02-REV B-BDH, dated 15th May 2024) has previously been submitted to Natural Resources Wales ("NRW") for the existing Facility to support the Permit Variation. This assessment was necessarily based upon the previous version of ISO 9613-2:1996: '*Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation*'. The change of assessment standard has resulted in a change in the predicted noise levels at the surrounding NSRs.
- 1.6 Therefore, this report provides an updated environmental noise impact assessment in accordance with the current version of ISO 9613-2, while assessing compliance with the requirements of IPC2 in accordance with the previous version of ISO 9613-2 to enable a more direct comparison.
- 1.7 ***It is the conclusion of this environmental noise impact assessment that the predicted total, aggregate environmental noise impact arising from the proposed operation of the Facility, including all pre-existing and new plant and processes cumulatively, and assuming full compliance with the additional noise mitigation requirements specified within this report, results in an "adverse" noise impact at the worst affected noise sensitive receptors during daytime periods (07:00 – 19:00 hours), following the consideration of context, as assessed in accordance with British Standard BS 4142: 2014+A1: 2019.***
- 1.8 ***An assessment has also been undertaken which compares the predicted Rating Levels for the current site to those presented in Sol's previous assessment P2385-REP02-REV B-BDH (as referenced in Improvement Programme Requirement Condition 2 of the Permit Variation), which shows very marginal exceedances of up to 1 dB at NSR E only.***
- 1.9 ***This report will need to be updated again once the PET wash plant, wood pellet line and fixed rigid line are operating.***
- 1.10 Please refer to the main report and appendices for further information.

2 Introduction

2.1 Sol Acoustics Ltd ("Sol") has been appointed to provide an environmental noise impact assessment to support a discharge of Improvement Program Requirement Condition 2 ("IPC2") of the Permit Variation (Variation number: EPR/CB3797CA/V002) for the existing New Horizon Biofuel site (the "Facility") that is located at Units 9 – 11, Vauxhall Industrial Estate, Johnstown, Wrexham LL14 6HA.

2.2 The purpose of this acoustic assessment is as follows:

- ◆ Identify the nearest pre-existing noise sensitive receptors ("NSRs") that are most likely to be affected by environmental noise arising from plant and/or process noise that is associated with the Facility.
- ◆ Determine the prevailing, pre-existing baseline background noise climate at the worst affected NSR, through direct, environmental noise measurement.
- ◆ Identify all significant noise sources associated with the Facility.
- ◆ Calculate the resultant environmental noise level contribution and impact at the nearest NSRs to the Facility, taking factors such as distance to receptors, acoustic screening, and other environmental features into consideration.
- ◆ Carry out an environmental noise assessment of the Facility in accordance with the assessment methodology that is prescribed in relevant Standards (e.g. British Standard 4142: 2014+A1: 2019) and other acoustic guidance, in order to determine the likely significance of the noise impact generated.

2.3 This acoustic report is structured as follows:

- ◆ Section 3 provides a basic description of the Facility and key surrounding NSRs.
- ◆ Section 4 provides summary details of the benchmark environmental noise survey undertaken in order to determine the pre-existing environmental noise climate at the identified NSRs.
- ◆ Section 5 provides the results of the benchmark environmental noise survey.
- ◆ Section 6 provides a summary of the pertinent acoustic Standards which have been used to assess the magnitude of the noise impact likely to be generated.
- ◆ Section 7 provides a summary of the proprietary 3D acoustic models constructed and acoustic calculations undertaken.
- ◆ Section 8 provides a BS4142: 2014+A1: 2019 acoustic assessment, provides an assessment in accordance with the requirements of IPC2 and provides a noise management plan in outline terms.
- ◆ Section 9 provides a conclusion statement.
- ◆ *Appendix A provides a glossary of acoustic terminology.*
- ◆ *Appendix B provides details of the noise surveys undertaken and a summary of the data obtained from these.*

- ◆ *Appendix C provides a detailed site plan showing the approximate location of significant site plant and environmental noise sources.*
- ◆ *Appendix D provides details of the 3D computer noise model as constructed for this project.*
- ◆ *Appendix E provides an outline description of all key noise sources and provides indicative plant noise levels which must not be exceeded.*
- ◆ *Appendix F gives details and qualifications of contributing Sol Acoustics' staff.*

3 Description of Site

3.1 General Overview and Noise Sensitive Receptors (NSRs)

3.1.1 The Facility is located at the New Horizon Biofuel site that is located at Units 9 – 11, Vauxhall Industrial Estate, Johnstown, Wrexham LL14 6HA; it is located on the eastern edge of the industrial estate. Immediately to the south, west and north are other industrial units, and to the east is a railway line, woodland, and agricultural fields. The nearest noise sensitive premises are as follows:

- A. Two-storey housing off New Hall Road, located c.420 metres to the east of the Facility.
- B. New Hall Independent Hospital located c.360 metres to the southeast of the Facility.
- C. Two-storey housing off Ruabon Road, located c.220 metres to the west of the Facility.
- D. Two-storey housing on Moreton Avenue, located c.190 metres to the northwest of the Facility.
- E. Two-storey housing on Heol Kenyon, located c.270 metres to the north of the Facility.

3.1.2 Figure 1 indicates the location of the Facility in relation to the identified NSRs, and also the corresponding location of the noise monitoring position used in order to inform this acoustic assessment.



Figure 1: Aerial photo overlaid with noise sensitive receptors and monitoring locations in relation to the Facility (Google 2026)

3.2 Characteristics of the Facility

- 3.2.1 The existing Facility currently accepts and processes waste plastic. Additionally, the site operates a biomass plant and wood pelleting facilities.
- 3.2.2 New Horizon was granted a Permit Variation (Variation number: EPR/CB3797CA/V002) on 14th August 2024 which permits the following plant to operate on site:
- ◆ A new wood processing line in Units 9 and 11. This comprises of new internally sited wood baling plant within the existing building as located on unit 9. A new external walking floor, biomass boilers and dust extract fan and filter and external shredding and mobile plant shall operate at Unit 11. This line shall operate 07:00 hours to 19:00 hours. Figure 3 provides a plan and elevation view of the new internally sited bailer.
 - ◆ A mixed rigid line installed in Unit 11 which has been installed in a purpose built building and was intended to operate 07:00 hours to 19:00 hours. However, this line is not operational. This assessment therefore does not consider the noise impact from this line.
 - ◆ A new fully internally sited polyethylene terephthalate ("PET") plastic wash and recycling line to be installed within an existing building in Unit 10. The anticipated use of the new PET plastic recycling line shall be covered under a separate Permit Application. This assessment therefore assumes that the PET plastic recycling line is not operational.
 - ◆ New wood pellet line internally sited within an existing building in Unit 11. This plant has not yet been installed and therefore this is not considered in this assessment.
 - ◆ A new plastic pallet line internally sited within a purpose built building, operating 07:00 hours to 19:00 hours. This plant is operational and considered within this assessment.

External Building Fabric

- 3.2.3 The external walls to the existing building at Unit 9 (which houses the existing plastic processing plant and the proposed new wood bailing plant) are constructed from masonry up to c.2 metres height. The upper walls and roof comprises of a single lightweight insulated cladding panel. There are four roller shutter doors located to the west façade.
- 3.2.4 The external walls and roof of the existing building at Unit 11 are constructed from a single lightweight insulated cladding panel. There are six roller shutter doors located to the east façade.
- 3.2.5 The newly constructed rigid plastic line building is constructed from a single lightweight insulated cladding panel with a roller shutter door located to the north façade.
- 3.2.6 The newly constructed plastic crates building is constructed from a single lightweight insulated cladding panel with an open entrance to the east façade.

Facility Operating Times

- 3.2.7 The Facility is permitted to operate Monday to Friday 07:00 to 19:00 hours.

Site Deliveries and Collections

- 3.2.8 Site deliveries and collections occur during the daytime only. There could be up to a total 20 HGV movements to/from the Facility per day.

Mobile Plant

3.2.9 The following mobile plant operates at the Facility:

- ◆ Unit 9, Wood Bailing Building
 - ◇ Forklift truck – internal

- ◆ Unit 11, wood shredding
 - ◇ Wood hog (shredder) - external
 - ◇ Forklift truck - external
 - ◇ Bobcat excavator - external

- ◆ Unit 11, plastic pallet line
 - ◇ Forklift truck – internal

- ◆ Unit 11, Plastic shredding
 - ◇ Molson SK130 LC excavator - external
 - ◇ Untha LR1400 shredder - external
 - ◇ Orkel Hi-X compactor and bailer - external

Noise Level Emissions

- 3.2.10 Sol attended the existing Facility during Thursday 4th April 2024, 8th May 2024, 3rd October 2024, 3rd July 2025 and 17th February 2026 in order to undertake sound pressure level measurements of the existing and proposed plant at the Facility during typical (worst case, full, on load) operation.
- 3.2.11 All noise measurements were carried out using Type 1 Precision Grade noise monitoring equipment.
- 3.2.12 The complete noise measuring systems were field calibrated immediately prior to and following the noise survey periods.
- 3.2.13 The sound pressure level measurements comprised of full broadband A-weighted, $L_{Aeq,T}$ and third-octave unweighted, $L_{eq,T}$ sound pressure level measurements. All sound pressure level measurements were conducted over 10-second sample periods, as using an omnidirectional microphone, typically at a measurement distance of one metre from the target noise source in each case. In all cases, two measurements were conducted at each position in order to demonstrate repeatability of the results.

- 3.2.14 Sound pressure level measurements were conducted using an omnidirectional microphone and in broad accordance with International Standard ISO 3744:2010: '*Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*' ("ISO3744").
- 3.2.15 Noise data for HGVs have been taken from the published noise level database of construction site equipment and activities as issued by the Department for Environment, Food and Rural Affairs ("Defra") and as presented in BS 5228-1:2009+A1:2014: '*Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*'.
- 3.2.16 The new wood shredder and the plastic pallet line are currently located on site and were able to be run in order to undertake noise level measurements of the plant. In each case the plant was processing material, and these measurements are deemed to be representative of typical operation.
- 3.2.17 The wood walking floor and biomass boilers were not deemed to be acoustically significant and were not measured.



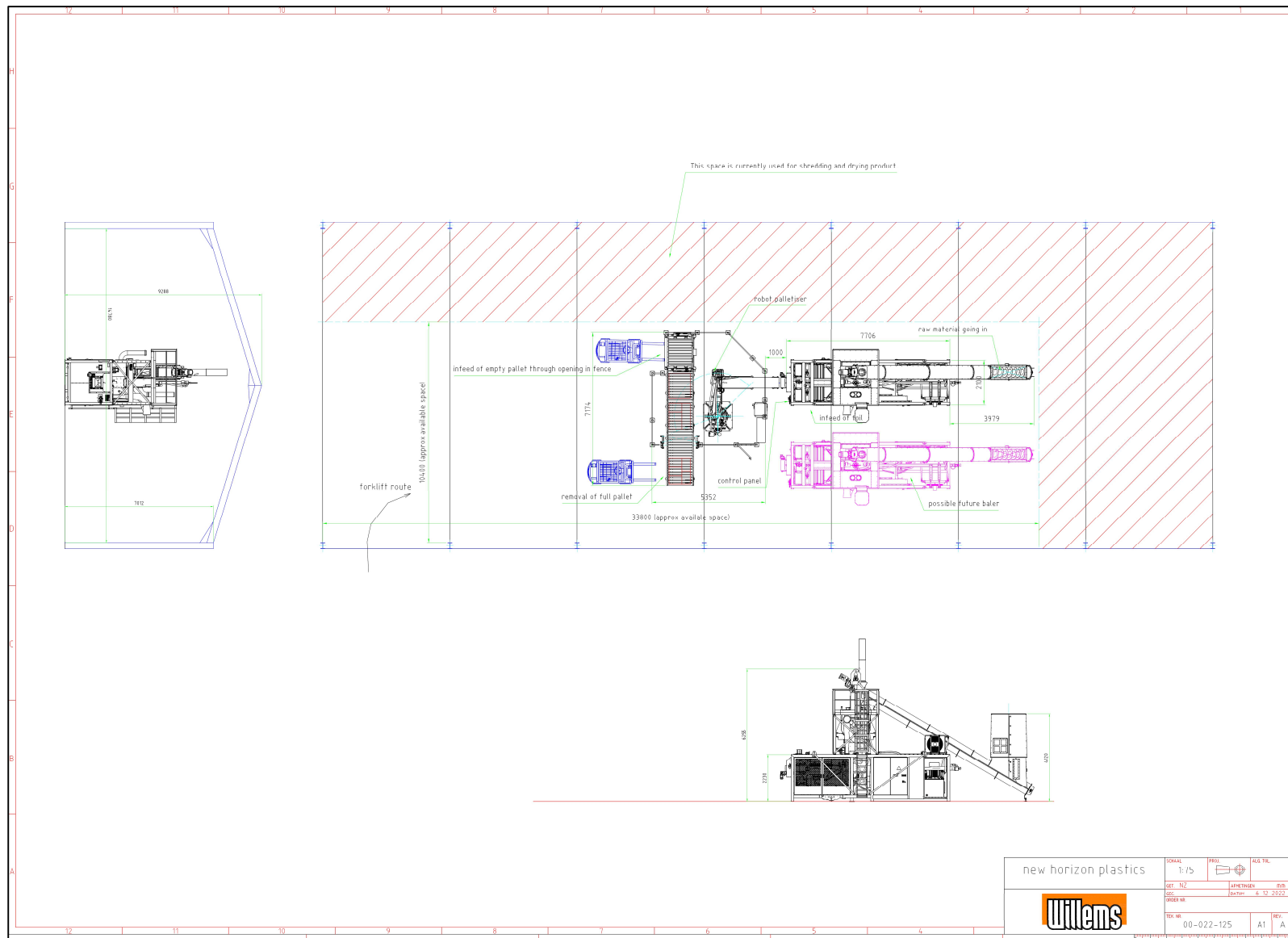


Figure 3: Plan and elevation of the new wood bailer plant

4 Details of Investigation

4.1 Pre-Existing Environmental Noise Climate

- 4.1.1 In order to inform this environmental noise benchmarking assessment, a continuous environmental noise survey has been conducted by Sol between c.13:15 hours during Thursday 4th April and c.10:15 hours during Monday 8th April 2024. The purpose of the survey was to determine the prevailing pre existing
- 4.1.2 Background Sound Levels at the nearest noise sensitive premises to the Facility, as during typical weekday and weekend, daytime and night time periods for environmental noise benchmarking and subsequent acoustic impact assessment purposes.
- 4.1.3 The environmental noise survey consisted of three environmental noise measurement positions, as follows:
- ◆ **Noise Monitoring Position 1:** Tripod-mounted microphone at c.1.5 metres above local ground level and c.5 metres distance from the housing off New Hall Road. The microphone was mounted in "free field" acoustic conditions. Key noise sources included road traffic noise from the A483, noise from trees and intermittent noise from the nearby railway line.
 - ◆ **Noise Monitoring Position 2:** Mast-mounted microphone at c.2 metres above local ground level and c.30 metres distance to the east of the housing on Ruabon Road. The microphone was mounted in "free-field" acoustic conditions. Key noise sources included road traffic noise from the local road network and noise from trees.
 - ◆ **Noise Monitoring Position 3:** Tripod-mounted microphone at c.1.5 metres above local ground level and c.10 metres distance to the south of the housing on Moreton Avenue. The microphone was mounted in "free-field" acoustic conditions. Key noise sources included road traffic noise from the local road network, noise from trees and intermittent noise from the nearby industry.
- 4.1.4 The location of the noise monitoring positions in relation to key existing environmental noise sources is shown in Figure 1. The full measurement results are as presented in Appendix B.
- 4.1.5 The noise survey was conducted using Type 1 Precision Grade noise monitoring equipment. The complete sound measuring systems were field calibrated immediately prior to and following the noise survey period. (Full details of all the instrumentation used are retained on file by Sol, including traceable calibration records; these are available for review if needed).
- 4.1.6 Meteorological data was recorded at Noise Monitoring Position 1 for the duration of the noise survey, as using a Professional Grade Vaisala "WXT530" weather station. Brief periods of significant rainfall, exceeding 1mmh⁻¹, occurred on the night of 5th, 6th and 7th April 2024. Noise data as recorded during these periods have been omitted from the assessment; the average wind speed throughout the survey remained below 5ms⁻¹. Notwithstanding the weather conditions recorded, the microphone system was entirely weatherproofed and fitted with all-weather environmental windshield, with bird spike also.

5 Environmental Noise Survey Results

5.1 Pre-Existing Environmental Noise Climate

- 5.1.1 *Appendix B provides fully detailed time history information for the environmental noise levels as recorded for the duration of the environmental noise survey.*
- 5.1.2 The Facility was operational as during the environmental noise survey. However, it previously did not operate on Saturdays and Sundays. Therefore, the Background Sound Levels as recorded during Sunday 7th April 2024 have been used to determine the typical Background Sound Levels at all measurement positions as this data does not include any noise from the Facility (i.e. a true Background Sound Level in BS 4142: 2014+A1: 2019 terms).
- 5.1.3 Table 1 overleaf provides a basic summary of the typical overall, A-weighted noise levels measured at the various noise measurement positions, in $L_{Aeq,T}$ and $L_{A90,15min}$ terms. The specific, measured noise levels pertinent to the required BS 4142: 2014+A1: 2019 environmental noise assessment are highlighted in ***bold, italic*** text:

Measurement Position	Date	Daytime (07:00 – 19:00 Hours)		Evening (19:00 – 23:00 Hours)		Night time (23:00 – 07:00 Hours)	
		dB $L_{Aeq, T}$	dB $L_{A90, 15min}$ (Typical)	dB $L_{Aeq, T}$	dB $L_{A90, 15min}$ (Typical)	dB $L_{Aeq, T}$	dB $L_{A90, 15min}$ (Typical)
1	Thursday 4 April 2024	54*	49	52	46	49	42
	Friday 5 April 2024	55	52	53	47	48	43
	Saturday 6 April 2024	57	54	50	48	49	42
	Sunday 7 April 2024	56	50	55	44	48	40
	Monday 8 April 2024	54*	50	-	-	-	-
2	Thursday 4 April 2024	63*	47	60	41	62	38
	Friday 5 April 2024	64	46	60	41	53	35
	Saturday 6 April 2024	62	44	58	40	54	36
	Sunday 7 April 2024	63	45	59	36	66	30
	Monday 8 April 2024	62*	46	-	-	-	-
3	Thursday 4 April 2024	51*	42	49	40	48	38
	Friday 5 April 2024	53	47	48	41	48	34
	Saturday 6 April 2024	53	44	45	40	48	37
	Sunday 7 April 2024	53	44	47	36	49	30
	Monday 8 April 2024	55*	47	-	-	-	-
* Measurement not conducted for the full assessment period							

Table 1: Summary of typical, measured broadband environmental noise levels

6 Environmental Noise Performance Specification Requirements

6.1 Guidance on Noise and vibration Management: Environmental Permits

6.1.1 Published by the Environment Agency ("EA"), Scottish Environment Protection Agency ("SEPA"), Natural Resources Wales ("NRW") and Northern Ireland Environment Agency (collectively referred to as the "Environment Agencies") during 23rd July 2021, and subsequently updated 31st January 2022, this guidance sets out the minimum requirements for environmental noise and vibration impact assessments, as required to support a Permit Application. It replaces the Environment Agency's previous Horizontal Guidance for Noise (H3), Parts 1 and 2. The key requirements of the guidance, which are applicable to this assessment, are as presented below:

- ◆ The environmental noise impact assessment must be undertaken in accordance with British Standard BS4142: 2014+A1: 2019: '*Method for rating and assessing industrial and commercial sound*'. A summary of this Standard is provided in Section 6.2.
- ◆ The acoustic character of the sound generated must be considered. This must consider whether the sound is tonal, impulsive, or intermittent in operation. For industrial noise sources where the sound is neither impulsive nor tonal, but is readily distinguishable against the residual acoustic environment, the "Environment Agencies" will expect a minimum acoustic character correction of +3dB unless otherwise justified.
- ◆ The BS 4142: 2014+A1: 2019 defined Background Sound Levels and Residual Sound Levels as used to inform the assessment must not include noise from the Facility. Where it is pre-existing, the Facility must not be operational during the environmental noise level measurements.
- ◆ Noise arising from the normal operation of the Facility must not result in a BS 4142: 2014+A1: 2019 defined 'significant adverse impact' (following consideration of the context) at the surrounding NSRs. The "Environment Agencies" will not issue a Permit where the site is, or predicted to be, operating at (or above) this level.
- ◆ As stated above, the guidance recognises that the context of the situation can affect the outcome of the BS 4142: 2014+A1: 2019 assessment but states that there are practical limits. The guidance stipulates that it is unlikely to be acceptable to adjust the magnitude of the impact beyond the next BS 4142: 2014+A1: 2019 assessment magnitude band (e.g., suggesting that a Rating Level of around 10dB above the Background Sound level – defined by the Standard as a "significantly adverse" impact, depending on the context - is actually a "low impact" purely on the grounds of context etc.).

6.1.2 Notwithstanding the above, the assessment must demonstrate that Best Available Techniques (BAT) has been applied to prevent or minimise noise emissions.

6.2 Environmental Permit Requirements

6.2.1 The Environmental Permit Variation for the Facility was granted on 14th August 2024 (Variation number: EPR/CB3797CA/V002). Section 3.3 relates to noise and states the following:

'... 3.3 Noise and vibration

3.3.1 Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of Natural Resources Wales, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved noise and vibration management plan to prevent or where that is not practicable to minimise the noise and vibration ...'

6.2.2 In addition to the above, Improvement Program Requirement Condition 2 (IPC2) also relates to noise, and this states the following:

Reference	Requirement	Date
IPC2	Following successful commissioning and establishment of routine steady operation, the Operator shall undertake a BS 4142:2014+A1:2019 noise impact assessment following guidance set out in Noise and Vibration Management: Environmental Permits and Method implementation document (MID) for BS 4142, to demonstrate that impacts do not exceed those specified in the Environmental Noise Impact Assessment (P2385-REP02-REV B-BDH). Upon completion of the work, a written report shall be submitted to Natural Resources Wales for approval.	6 months after permit issue or otherwise agreed in writing with Natural Resources Wales

Table 2: Requirements of Improvement Condition 2

6.3 BS4142: 2014+A1: 2019 *'Method for rating and assessing industrial and commercial sound'*

- 6.3.1 BS 4142: 2014+A1: 2019: *'Method for rating and assessing industrial and commercial sound'* is intended to be used to assess noise of an industrial nature, which includes sound from fixed installations comprising of mechanical and/or electrical plant and equipment. The methods prescribed in this British Standard use outdoor sound levels in order to assess the likely effects of sound on people who might be inside or outside a dwelling or premises that is used for residential purposes upon which sound is incident.
- 6.3.2 The procedure contained in BS 4142: 2014+A1: 2019 for assessing environmental noise impact is to compare the measured or predicted noise level from the source in question - the *"Specific Sound Level"* immediately outside the noise sensitive premises - with the corresponding *"Background Sound Level"*. Where the noise contains attention attracting characteristics such as tonal, impulsive and/or intermittent elements, it may be appropriate to apply a correction to the Specific Sound Level in order to obtain the *"Rating Level."*
- 6.3.3 BS 4142: 2014+A1: 2019 states that the significance of sound arising from 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 also the context in which the sound occurs:
- a) Typically, the greater this difference, the greater the magnitude of the impact;
 - b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context;
 - d) 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.
- 6.3.4 For the daytime, the assessment is conducted over a one-hour period, and over a 15-minute period at night. The daytime and nighttime periods are defined as occurring between 07:00 hours to 23:00 hours, and 23:00 hours to 07:00 hours, respectively.
- 6.3.5 For BS 4142:2014+A1:2019 assessment purposes, it is necessary to determine the typical Background Sound Level as occurring during each assessment period. Section 8.1 of BS 4142:2014+A1:2019 states the following:

'... In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods ...'

- 6.3.6 The typical Background Sound Level has been determined based upon statistical analysis of the full, measured dataset (in histogram form, and considering the modes and median of the data sets).
- 6.3.7 Table 3 specifies the *typical* Background Sound Levels at each of the identified NSRs:

Noise Sensitive Receptors	Representative Noise Measurement Position	Typical Background Sound Level at Each Assessed NSR, dB $L_{A90,15min}$		
		Daytime (07:00 – 19:00 hours)	Evening (19:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
A. Housing off New Hall Road (c.420 metres to the east)	1	50	44	40
B. New Hall Independent Hospital (c.360 metres to the southeast)	1	50	44	40
C. Housing off Ruabon Road (c.220 metres to the west)	2	45	36	30
D. Housing on Moreton Avenue (c.190 metres to the northwest)	3	44	36	30
E. Housing on Heol Kenyon (c.270 metres to the north)	3	44	36	30

Table 3: *Typical Background Sound Level at each assessed NSR*

7 Environmental Noise Model

7.1 Methodology and Basis of 3D Environmental Noise Models

7.1.1 In order to predict the likely noise levels impinging on the surrounding noise sensitive receptors, proprietary 3D computer noise models were created using the DataKustik "CadnaA" noise mapping software. The following assumptions have been made when generating the noise model:

- ◆ The noise model was set up to apply the noise prediction methodology as set out in BS ISO 9613-2:2024: '*Acoustics — Attenuation of sound during propagation outdoors, Part 2: Engineering method for the prediction of sound pressure levels outdoors*'. It shall be noted that Sol's previous assessment: P2385-REP02-REV B-BDH, dated 15th May 2024, was necessarily set up to apply the noise prediction methodology as set out in ISO 9613-2:1996: '*Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation*'. This will lead to variation between the predicted results.
- ◆ The model was set to include third order reflected noise from solid structures.
- ◆ Ground absorption, as defined in ISO 9613-2, has been taken into consideration. The base ground absorption for the model has been set to G=1.0 (soft ground). The ground absorption for large tarmacked areas has been set to G=0.0 (hard ground).
- ◆ The existing land topography of the site and surrounding area up to and including the nearest NSR has been taken into consideration in the assessment. Third party topographical information has been obtained from open source data as available from emapsite.
- ◆ The noise impact expected at the surrounding residential receptors has been modelled at a height of 1.5 metres (ground floor level) and 4 metres above local ground level (first floor level).
- ◆ The noise model assumes that on average up to four HGVs could arrive at and depart from the Facility during a typical 1-hour daytime assessment period. No HGVs are expected to arrive at, nor depart from the Facility during any night-time period.
- ◆ All externally sited plant noise sources have been modelled as point, line, or area sources, as appropriate, as based on physical size of the plant.
- ◆ For modelling purposes, the effective sound power level of each identified noise source has been determined broadly in accordance with the principles presented in International Standard ISO 3744: 2010: '*Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods*', taking into due consideration the physical dimensions of each noise source. The effective measurement surface area of the noise source at the measurement position, which has been used to derive the sound power level, is stated in Appendix E.

- ◆ Noise breakout from internal plant has been modelled by determining the level of noise radiated from the external building fabric of the building, all as based upon the assessment methodology provided within British Standard BS 12354-4:2017 '*Building acoustics Estimation of acoustic performance of buildings from the performance of elements Part 4: Transmission of indoor sound to the outside*'. The sound power level per unit area for each external building element has been determined based on the as measured reverberant sound pressure level within each building. The sound power level per unit area for each external building element has then been determined by applying a "diffusivity term," as defined in BS 12354-4:2017 and subtracting the sound insulation performance of each building face.
- ◆ Table 4 provides an acoustic specification for the key elements of the external façade to all existing buildings:

Building Element	Construction	Sound Reduction Index (SRI, dB) @ Octave Band Centre Frequency (Hz)							dB R_w
		63	125	250	500	1k	2k	4k	
Roof and Cladding	0.7mm thick DC60 profiled galvanised metal deck	19	20	18	22	18	26	26	22

Table 4: Modelled acoustic performance of external building fabric

- 7.1.2 Figure 4 provides a three-dimensional visualisation of the noise model used to inform the noise impact assessment.
- 7.1.3 *Appendix D provides further information in respect of the 3D computer environmental noise model.*
- 7.1.4 *Appendix E provides an inventory of plant and process source noise level data; these form the basis of the 3D noise model underpinning the report. These should not be exceeded.*



Figure 4: 3D view of the noise model of the Facility (Google 2026)

8 Environmental Noise Impact Assessment

8.1 Residential Housing (BS4142 Assessment)

8.2 The BS4142:2014+A1:2019 defined Rating Level has been determined from the predicted Specific Sound Level, as determined from the 3D noise model of the Facility, and by applying a correction for the acoustic character of the sound. In all cases, and in accordance with BS 4142:2014+A1:2019, a correction of +3dB has been applied to the calculated Specific Sound Level, as arising at the noise sensitive receptors from the Facility, in order to allow for any residual "readily distinctive" acoustic features, in order to determine the BS 4142:2014+A1:2019 defined Rating Level for acoustic assessment purposes.

8.1.1 This environmental noise impact assessment has considered three separate scenarios, as follows:

- 1 Existing site only
- 2 New activities which are part of the proposed Permit Variation
- 3 Existing and proposed Permit Variation activities together

8.3 In order to simplify the assessment, existing site operations which are no longer proposed to be used on site as part of the Permit Variation have not been included. An example of this is the Terex TDS V20 Shredder that previously operated at Unit 9. Noise from the shredder was previously deemed to be significant and this has now been replaced by a new (and quieter) Untha LR1400 shredder which is located to the south of the site in Unit 11 (note that the shredder was purposely replaced to reduce the noise level impact). It is of course the case that predicted noise levels from the existing site will be lower than the actual previous noise emissions from the site but will ensure the combined noise emissions from the new and existing noise sources reflects the proposed site operations.

8.4 Table 5, Table 6 and Table 7 presents the predicted overall A-weighted, BS 4142:2014+A1:2019 defined Rating Level at the identified NSRs for 1: existing, 2: new Permit Variation activities and 3: combined activities as during the hours of operation (Monday – Friday 07:00 – 19:00 hours, excluding Bank Holidays) respectively.

8.5 *Appendix D provides full details of CadnaA noise maps, with expected daytime Specific Sound Levels indicated.*

Noise Sensitive Receptor (NSR)	Floor Level	Predicted Specific Level, dB $L_{Aeq,T}$	Acoustic Character Correction, dB	Predicted Rating Level, dB $L_{Ar,T}$	Typical Background Sound Level, dB L_{A90}	Rating Level sub. Background $\pm$ dB
A. Housing off New Hall Road (c.420 metres to the east)	Ground	33	+3	36	50	-14
	First	35	+3	38	50	-12
B. New Hall Independent Hospital (c.360 metres to the southeast)	Ground	34	+3	37	50	-13
	First	36	+3	39	50	-11
C. Housing off Ruabon Road (c.220 metres to the west)	Ground	41	+3	44	45	-1
	First	44	+3	47	45	+2
D. Housing on Moreton Avenue (c.190 metres to the northwest)	Ground	35	+3	38	44	-6
	First	41	+3	44	44	+0
E. Housing on Heol Kenyon (c.270 metres to the north)	Ground	44	+3	47	44	+3
	First	46	+3	49	44	+5
Key Green: low impact (less than or equal to 0dB) Amber: sub-adverse impact to adverse impact (i.e. +1dB to +5dB) Red: adverse to significant adverse impact (+6dB or higher)						

Table 5: BS4142 preliminary assessment (1: existing site only)

Noise Sensitive Receptor (NSR)	Floor Level	Predicted Specific Level, dB $L_{Aeq,T}$	Acoustic Character Correction, dB	Predicted Rating Level, dB $L_{Ar,T}$	Typical Background Sound Level, dB L_{A90}	Rating Level sub. Background $\pm$ dB
A. Housing off New Hall Road (c.420 metres to the east)	Ground	43	+3	46	50	-4
	First	44	+3	47	50	-3
B. New Hall Independent Hospital (c.360 metres to the southeast)	Ground	45	+3	48	50	-2
	First	47	+3	50	50	+0
C. Housing off Ruabon Road (c.220 metres to the west)	Ground	47	+3	50	45	+5
	First	49	+3	52	45	+7
D. Housing on Moreton Avenue (c.190 metres to the northwest)	Ground	42	+3	45	44	+1
	First	46	+3	49	44	+5
E. Housing on Heol Kenyon (c.270 metres to the north)	Ground	48	+3	51	44	+7
	First	50	+3	53	44	+9
Key Green: low impact (less than or equal to 0dB) Amber: sub-adverse impact to adverse impact (i.e. +1dB to +5dB) Red: adverse to significant adverse impact (+6dB or higher)						

Table 6: BS4142 preliminary assessment (2: new Permit Variation activities)

Noise Sensitive Receptor (NSR)	Floor Level	Predicted Specific Level, dB $L_{Aeq,T}$	Acoustic Character Correction, dB	Predicted Rating Level, dB $L_{Ar,T}$	Typical Background Sound Level, dB L_{A90}	Rating Level sub. Background $\pm$ dB
A. Housing off New Hall Road (c.420 metres to the east)	Ground	43	+3	46	50	-4
	First	45	+3	48	50	-2
B. New Hall Independent Hospital (c.360 metres to the southeast)	Ground	46	+3	49	50	-1
	First	47	+3	50	50	+0
C. Housing off Ruabon Road (c.220 metres to the west)	Ground	48	+3	51	45	+6
	First	50	+3	53	45	+8
D. Housing on Moreton Avenue (c.190 metres to the northwest)	Ground	43	+3	46	44	+2
	First	47	+3	50	44	+6
E. Housing on Heol Kenyon (c.270 metres to the north)	Ground	49	+3	52	44	+8
	First	51	+3	54	44	+10
Key Green: low impact (less than or equal to 0dB) Amber: sub-adverse impact to adverse impact (i.e. +1dB to +5dB) Red: adverse to significant adverse impact (+6dB or higher)						

Table 7: BS4142 preliminary assessment (3: combined activities)

- 8.6 At ground floor level, Table 5 shows that Rating Level from the Facility (all combined activities) exceeds the typical Background Sound Level by up to +8dB at the worst affected receptor. This is above the threshold for an indication of an '*... adverse impact, depending on the context ...*' in BS 4142:2014+A1:2019 terms.
- 8.7 At first floor level, Table 5 shows that Rating Level from the Facility (all combined activities) exceeds the typical Background Sound Level by up to +10dB at the worst affected receptor. This is an indication of a '*... significant adverse impact, depending on the context ...*' in BS 4142:2014+A1:2019 terms.
- 8.8 As stated above, the predicted magnitude of the impact is subject to the consideration of context. In this case, the Facility is located within an existing industrial estate and is currently operational which generate noise. The worst affected NSR (housing on Heol Kenyon – NSR E) boarder the Vauxhall Industrial Estate and are not located near any significant sources of other environmental noise such as road traffic. As such, it is entirely reasonable and expected that noise of an industrial nature is expected to be the dominant noise source impact on these properties.
- 8.9 The housing on Ruabon Road (NSR C) are located adjacent to the B5605 which is a busy road connecting Johnstown and Ruabon. The results of the environmental noise survey suggest that the ambient noise levels along this road range between 62dB to 64dB $L_{Aeq,T}$ during the hours of operation. Noise from the industrial estate is only expected to be audible during lulls in road traffic.

- 8.1.1 The Department of the Environment guidance: *'Method implementation document (MID) for BS 4142'* states that both weekday/weekend operation and the hours of operation are factors that can make receptors less sensitive to noise. The site only operates during the weekdays and during core working hours of 07:00 hours to 19:00 hours but not during the acoustically critical evening and nighttime periods and weekend periods.
- 8.1.2 Finally, as stated in Section 5.1, the typical Background Sound Levels have necessarily been determined as based upon noise level measurements as undertaken on a Sunday period in order to ensure that the Background Sound Levels did not include noise from the Facility as required by BS 4142:2014+A1:2019. In doing so, noise contributions from other third-party industrial sites in the Vauxhall Industrial Estate (which should genuinely form part of the Background Sound Levels) would also be expected to be lower potentially resulting in a more onerous assessment.
- 8.10 Taking the above into consideration, Sol considers that the environmental noise level emissions from the Facility are likely to result in an "adverse" impact at the worst affected NSR during the hours of operation.

8.1 Compliance With IPC2 of the Permit Variation

- 8.1.1 Table 8 provides a comparison of the predicted Rating Levels as presented in Sol's previous report P2385-REP02-REV B-BDH, as referenced in IPC2, and the predicted Rating Levels from the proposed full site activities covered under the Permitted Variation.
- 8.1.2 In order to provide a meaningful comparison, the predicted Rating Levels for the current site operations have been calculated using ISO 9613-2:1996: *'Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation'*. This will lead to variation between the predicted results. This version of the standard was valid at the time the previous assessment P2385-REP02-REV B-BDH, as referenced in IPC2. As such, the predicted noise levels from the current site do not match those as presented in Table 5. Furthermore, all calculations are undertaken at ground floor level in line with the previous assessment.
- 8.11 In all cases, and in accordance with BS4142, a correction of +3dB has been applied to the calculated Specific Sound Level, as arising at the noise sensitive receptors from the Facility, in order to allow for any residual "readily distinctive" acoustic features, in order to determine the BS 4142:2014+A1:2019 defined Rating Level for acoustic assessment purposes.

Noise Sensitive Receptor (NSR)	Predicted Rating Level, dB $L_{A,T}$		Exceedance, dB Pass/Fail
	P2385-REP02-REV B-BDH	Current Site Operation	
A. Housing off New Hall Road (c.420 metres to the east)	45	43	-2
B. New Hall Independent Hospital (c.360 metres to the southeast)	45	45	+0
C. Housing off Ruabon Road (c.220 metres to the west)	46	46	+0
D. Housing on Moreton Avenue (c.190 metres to the northwest)	47	44	-3
E. Housing on Heol Kenyon (c.270 metres to the north)	43	44	+1

Table 8: Comparison of the predicted Rating Level for the Rating Levels from the proposed full site activities covered under the Permitted Variation with the requirements of IPC2

8.12 Table 8 indicates that the predicted Rating Level from the current site operations do not exceed those predicted in P2385-REP02-REV B-BDH at NSRs A, B, C and D. A marginal 1dB exceedance is predicted at NSR E.

8.1 Preliminary Noise Management Plan (NMP)

8.13 Appendix E provides a preliminary Noise Management Plan; an itemised list of noise source mitigation measures which form the basis of the calculations and acoustic modelling. The finalised, actual noise mitigation strategy to be implemented must be reviewed, further developed, refined, and approved by Sol. The provisional, outline noise mitigation measures that are assumed to be in place (and are specifically required by this acoustic assessment report) are as summarised below.

8.14 *Please note that the noise impact from any plant which is not specifically included and listed within Appendix E of this report must be duly assessed. (Sol is to be advised by the Client if this list is not fully exhaustive and inclusive please). The actual/anticipated noise level emissions as expected from the plant must be confirmed and reviewed once available. This assessment must be reviewed and updated by Sol once this information becomes available;*

General (Unit 9 and 11)

- (a) **General:** All HGVs, loading shovels and forklift trucks etc. under the direct control of the Operator must only use non-intrusive broadband noise type vehicle reversing alarms and/or reversing cameras. There must be no use of pulsed and/or tonal reversing alarms (e.g. reversing beepers).
- (b) **Deliveries:** Deliveries to and from the Facility must only take place between 07:00 to 19:00 hours during Monday to Friday (excluding bank holidays) only.
- (c) **Acoustic screen:** A 2.4 metre high imperforate acoustic screen is required to the east of Unit 11. The acoustic screen must be solid, imperforate (with absolutely no gaps), sealed to the base and to provide a surface mass per unit area of at least 12.5 kg/m². The location of the required acoustic fence as used to inform this assessment is shown in Figure 5. Any future amendments to the actual location, layout or construction of the acoustic fence must be approved by Sol prior to any procurement and/or implementation.

Plastic Processing Line (Unit 9)

- (d) **Operating times:** This line is permitted to operate between 07:00 to 19:00 hours during Monday to Friday (excluding bank holidays) only.
- (e) **Internal reverberant sound pressure levels:** Table 9 sets out the maximum permissible reverberant sound pressure levels within the plastic processing building (Unit 9), which must not be exceeded:

Location	Period	Maximum Permissible Reverberant Sound Pressure Level (dB $L_{eq,T}$) @ Octave Band Centre Frequency (Hz)								dB $L_{Aeq,T}$
		63	125	250	500	1k	2k	4k	8k	
Pelleting Line Process Building	07:00 – 19:00	85	88	94	90	87	86	87	84	94
	Any other time	nil	nil	nil	nil	nil	nil	nil	nil	nil

Table 9: Maximum permissible reverberant sound pressure levels within the plastic processing building

- (f) **Terex TDS V20 shredder:** The external Terex TDS V20 shredder shall no longer be used. It has been replaced with an Untha LR1400 shredder and has been moved to the south of the site.
- (g) **Roller shutter doors:** Roller shutters and personnel doors must always be kept closed when not in use for immediate, momentary vehicle/personnel ingress/egress.

Wood Processing Facility (Units 9 and 11)

- (h) **Operating times:** This plant is permitted to operate between 07:00 to 19:00 hours during Monday to Friday (excluding bank holidays) only.

- (i) **Internal reverberant sound pressure levels:** Table 10 sets out the maximum permissible reverberant sound pressure levels within the wood bailing building (Unit 9), which must not be exceeded:

Location	Period	Maximum Permissible Reverberant Sound Pressure Level (dB $L_{eq,T}$) @ Octave Band Centre Frequency (Hz)								dB $L_{Aeq,T}$
		63	125	250	500	1k	2k	4k	8k	
Pelleting Line Process Building	07:00 – 19:00	78	83	88	86	83	80	75	64	88
	Any other time	nil	nil	nil	nil	nil	nil	nil	nil	nil

Table 10: Maximum permissible reverberant sound pressure levels within the wood bailing building

- (j) **Wood hog:** Only to be used for shredding pre-shredded wood. Must not be used for processing larger wood products such as wood pallets.

Biomass Boiler (Unit 11)

- (k) **Biomass building intake grille:** An attenuator is required in order to achieve a sound pressure level of 85dB $L_{Aeq,T}$ at one metre distance from the external building grille. The attenuator shall be installed between the intake fan grille and the biomass building external grille. The required location for the attenuator is shown in Figure 6.

Fixed Rigid Line (Unit 11)

- (l) The tyre recycling line is currently not operational.

Wood Pellet Line (Unit 11)

- (m) The wood pellet line is currently not operational.

PET Facility (Unit 10)

- (n) The PET Facility is currently not operational.





Figure 6: Attenuator required to the inlet of the Biomass to achieve a maximum permissible sound pressure level of 85dB $L_{Aeq,T}$

8.1 Uncertainty

8.1.1 Section 10 of BS4142: 2014 states the following with regards to uncertainty:

'... Consider the level of uncertainty in the data and associated calculations. Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty. Report the level and potential effects of uncertainty...'

8.1.2 In accordance with the requirements of BS 4142: 2014+A1: 2019, Sol has undertaken the following steps to limit the level of uncertainty in the acoustic assessment:

1. All noise measurements have been carried out using Type 1 Precision Grade noise mounting equipment. All noise measuring instruments have traceable laboratory calibration certification.
2. All noise measurements were accompanied by continuous meteorological measurements as conducted at, or close to, the measurement position in order to ensure that the measurement data was not adversely affected by unfavourable weather conditions.
3. Calculations have been conducted in line with appropriate and nationally recognised acoustic standards (ISO 9613-2, BS12354: 2000), and using proprietary 3D noise modelling software, CadnaA.
4. The assessment assumes downwind propagation in all cases as this represents the worst case.

9 Conclusion

- 9.1 Sol has been appointed to provide an environmental noise impact assessment to support a Permit Variation for the existing New Horizon Biofuel site that is located at Units 9 – 11, Vauxhall Industrial Estate, Johnstown, Wrexham LL14 6HA.
- 9.2 The pre-existing environmental noise climate has been determined by direct measurement at the existing NSRs. Using this benchmark environmental noise measurement data, it has been possible to set appropriate environmental noise limits for the proposed Facility, all as based on applicable BS 4142:2014+A1: 2019 guidance.
- 9.3 *It is the conclusion of this environmental noise impact assessment that the predicted total, aggregate environmental noise impact as arising from the proposed operation of the Facility (including all pre-existing, as well as new plant and processes cumulatively), albeit assuming full compliance with the additional noise mitigation requirements as specified and presented within this report, results in an "adverse" noise impact at the worst affected noise sensitive receptors during daytime periods (07:00 - 19:00 hours), following the consideration of context, all as assessed in accordance with British Standard BS4142: 2014+A1: 2019.*
- 9.4 *An assessment has also been undertaken which compares the predicted Rating Levels for the current site to those as presented in Sol's previous assessment P2385-REP02-REV B-BDH (as referenced in IPRC2 of the Permit Variation) which shows very marginal exceedances (up to 1dB) at NSR E only.*
- 9.5 *This report will need to be updated again once the PET wash plant, wood pellet line and fixed rigid line are operating.*

APPENDIX A

Glossary of Acoustic Terms

Term	Abbreviation	Description
Decibel	dB	A scale for comparing the ratios of two quantities, including sound pressure and sound power.
A-weighting	dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the change in sensitivity of the human ear at varying frequencies.
Sound Pressure Level	L_{pA}	A measure of the sound pressure at a particular location. Typically expressed in dB(A) referenced to 2×10^{-5} Pascals.
Equivalent Continuous Sound Level	$L_{Aeq,T}$	The steady level of sound over a prescribed period of time which would contain the same total sound energy as the actual fluctuating noise under consideration in the same period of time.
Statistical Sound Levels	L_{A10} and L_{A90}	The level of noise exceeded for a percentage of the time period being sampled, namely 10% or 90% respectively.
Background Sound Level	$L_{A90,T}$	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of the time period being sampled.
Maximum Sound Level	L_{Amax}	The maximum sound or noise level determined with instrumentation set to either a fast time weighting, L_{AFmax} , or a slow time weighting, L_{Asmax} , as occurring during the time period being sampled.
Sound Power Level	L_{WA}	A measure of the total sound energy radiated from a source. Like sound pressure levels, this is also expressed in dB(A) terms, but it is referenced to 1×10^{-12} W.
Broadband		Sound sampled over a wide range of frequencies.
Narrow band		Sound sampled over a specific, restricted frequency range. Used to ascertain the amplitude and significant of individual, audible tones, and to assist in identifying particular sources of noise within a complex, multi-source soundscape environment.
Ambient Sound	$L_{eq,T}$	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far.
Specific Sound Level	$L_{eq,T}$	The Equivalent Continuous A-Weighted Sound Level at an assessment position produced by a specific sound over a given reference time interval, T_r
Rating Level	L_{Ar,T_r}	The Specific Sound Level plus any adjustment for the acoustic characteristic features of the noise (e.g. intermittency, tones etc.).
Residual Noise	$L_{Aeq,T}$	The ambient sound remaining at given position in a given situation, when the specific sound source is suppressed to such an extent that it no longer contributes to the ambient sound.
Sound Reduction Index	SRI	The reduction in sound energy when transmitted through a panel or similar planar element, typically used in relation to single octave or one-third octave frequency band values.
Weighted Sound Reduction Index	R_w	The Sound Reduction Index expressed as a single figure, as expressed against a reference curve.
Dynamic Insertion Loss	DIL	Reduction in acoustic energy resulting from the insertion of a noise control element (e.g. an attenuator, acoustic enclosure etc.).
Free Field		Noise measuring location that is free from the presence of sound reflecting objects (except the ground), usually taken to mean being at least 3.5 metres distance from reflective surface(s) or greater.

APPENDIX B

Noise Survey Details and Summary Results

Location

Ruabon, Wales

Dates, Times and Weather Conditions

Date	Daytime (07:00 hours – 23:00 Hours)				Nighttime (23:00 hours – 07:00 hours)			
	Temp, °C	Rain, mm/h	Wind Direction	Mean Wind Speed, ms ⁻¹	Temp, °C	Rain, mm/h	Wind Direction	Mean Wind Speed, ms ⁻¹
04/04/2024	12	0.1	SE	0.9	11	0.6	SE	1.3
05/04/2024	13	0	SE	1.5	12	0.6	S	1.2
06/04/2024	13	0.2	S	1.8	9	0.5	SE	1.6
07/04/2024	12	0.1	S	1.5	8	0	NW	0.3
08/04/2024	9	0	S	0.4	-	-	-	-

Personnel

Brian Horner BSc Hons MIOA – Sol Acoustics

Chris Downing MMath – Sol Acoustics

Instrumentation

Measurement Position 1

01dB Cube Sound level meter (serial no. 11348)

01dB Pre22 Microphone preamplifier (serial no. 1805362)

GRAS 40CD Microphone capsule (serial no. 260642)

01dB Cal21 acoustic calibrator (serial no. 34675320)

Vaisala WXT520 Weather Station

Measurement Position 2

01dB Cube Sound level meter (serial no. 14027)

01dB Pre22 Microphone preamplifier (serial no. 2105097)

GRAS 40CD Microphone capsule (serial no. 428400)

01dB Cal21 acoustic calibrator (serial no. 34675320)

Measurement Position 3

01dB Cube Sound level meter (serial no. 12070)

01dB Pre22 Microphone preamplifier (serial no. 1915040)

GRAS 40CD Microphone capsule (serial no. 288057)

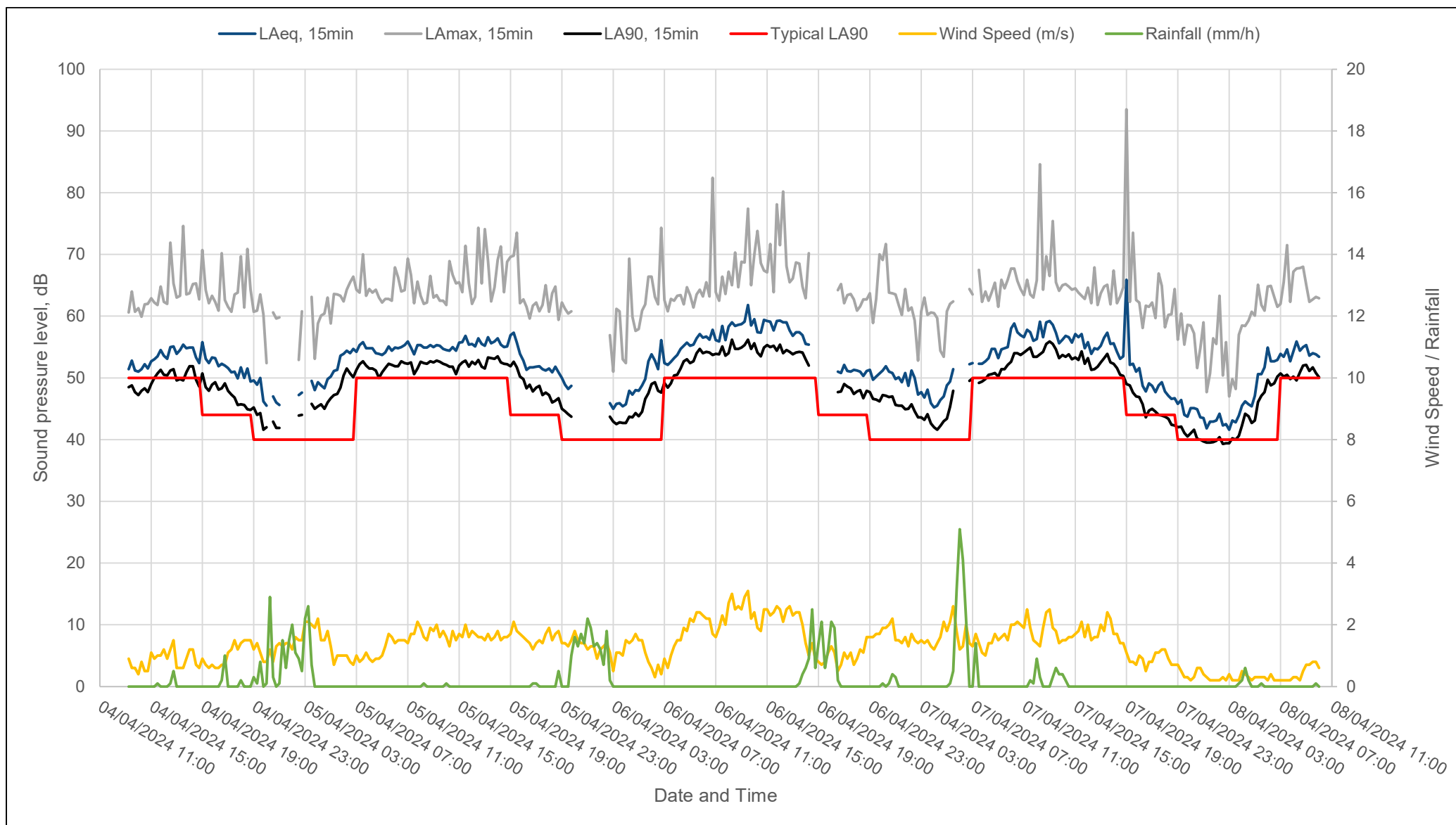
01dB Cal21 acoustic calibrator (serial no. 34675320)

Methodology

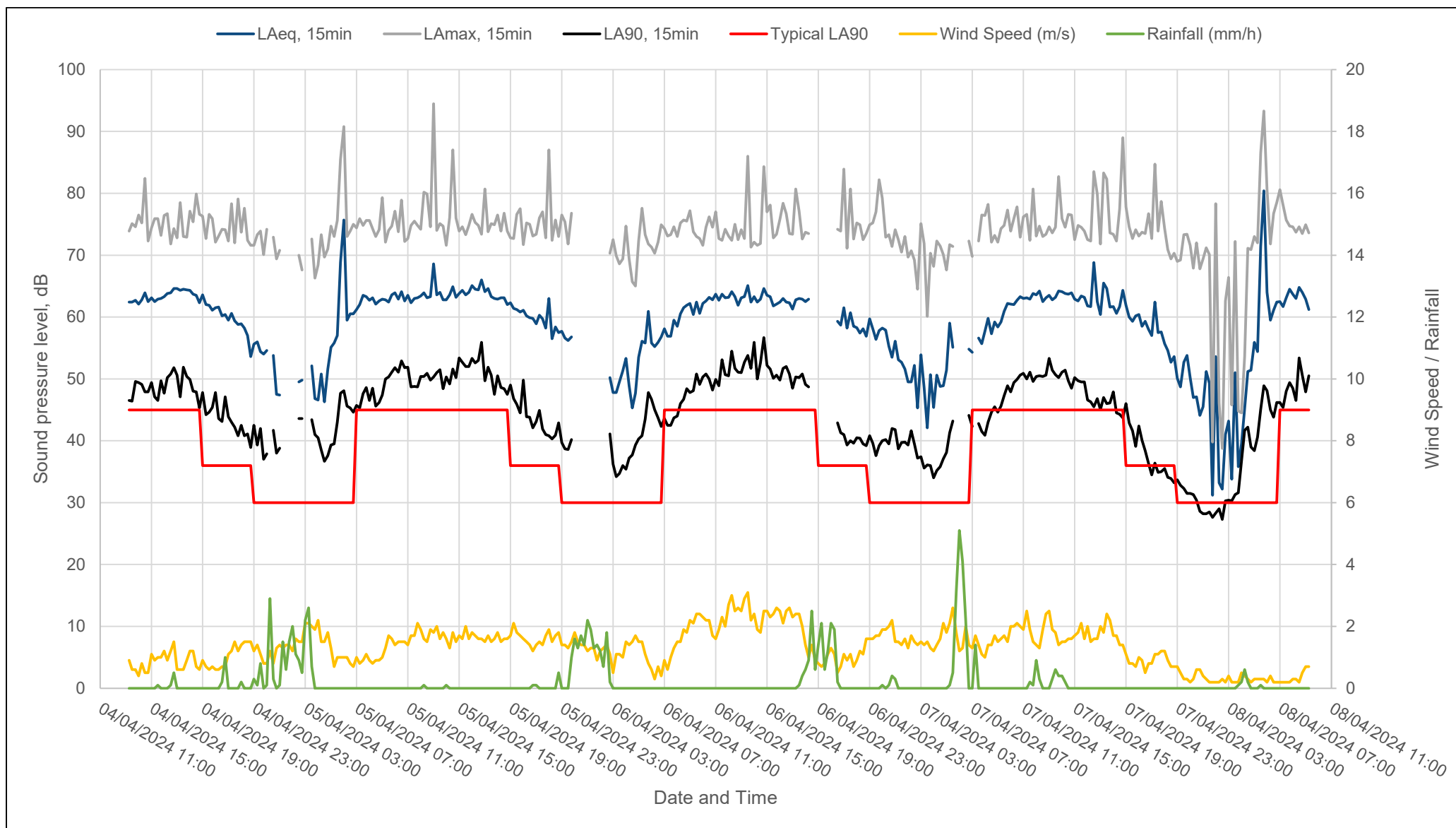
Before and after the measurements the noise monitoring equipment was calibrated to an accuracy of $\pm 0.1\text{dB}$ using the Cal 21 Calibrator. The calibrator produces a sound pressure level of $94\text{dB re } 2 \times 10^{-5} \text{ Pa @ } 1\text{kHz}$.

Measurement Results

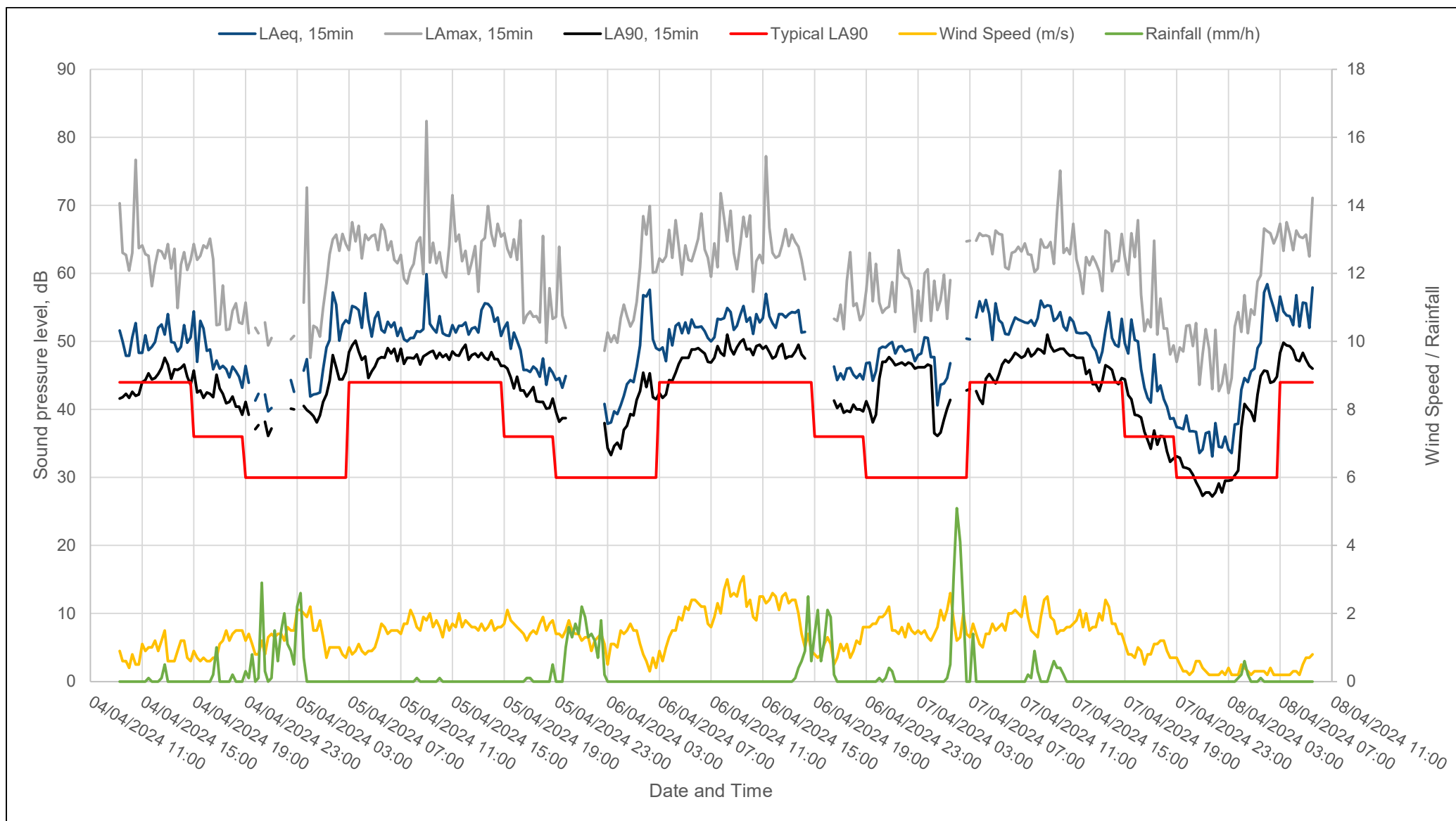
Graphs B1, B2 and B3 summarise the broadband A-weighted results obtained at Measurement Positions 1, 2 and 3 respectively



Graph B1: A-weighted environmental noise levels at Noise Monitoring Position 1, 4 April to 8 April 2024



Graph B2: A-weighted environmental noise levels at Noise Monitoring Position 2, 4 April to 8 April 2024



Graph B3: A-weighted environmental noise levels at Noise Monitoring Position 3, 4 April to 8 April 2024

APPENDIX C

Site Plan Indicating the Location of the Noise Sources



Figure C1: Site plan indicating grid coordinate references x, y coordinates for all external modelled noise sources

APPENDIX D

Environmental Noise Modelling Results



Figure D1: Predicted daytime Specific Sound Level, $L_{Aeq,1hour}$ from the installation, at 4 metres grid height (Google 2026) – 1: existing site only

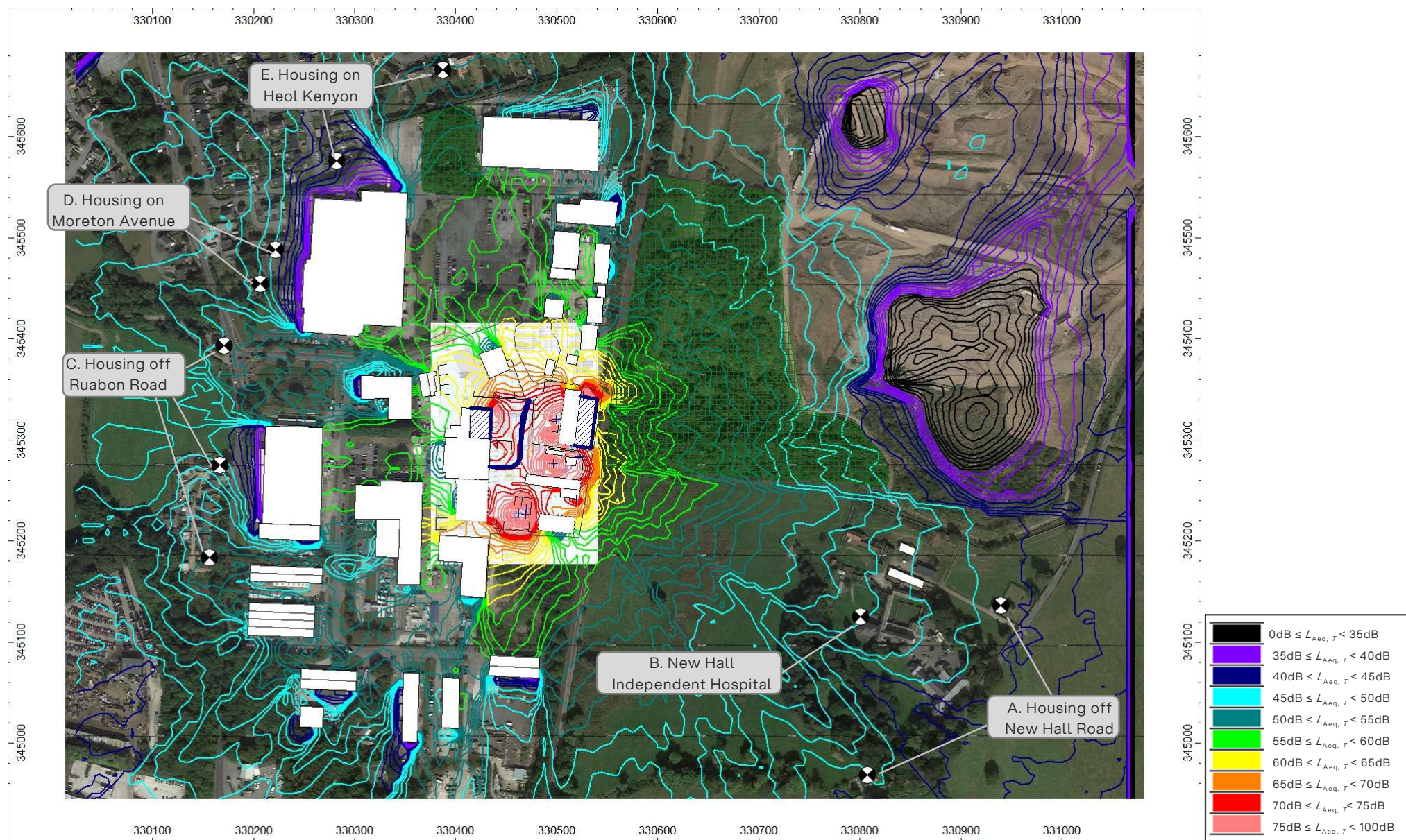


Figure D2: Predicted daytime Specific Sound Level, $L_{Aeq,1hour}$ from the installation, at 4 metres grid height (Google 2026) – 2: new Permit Variation activities

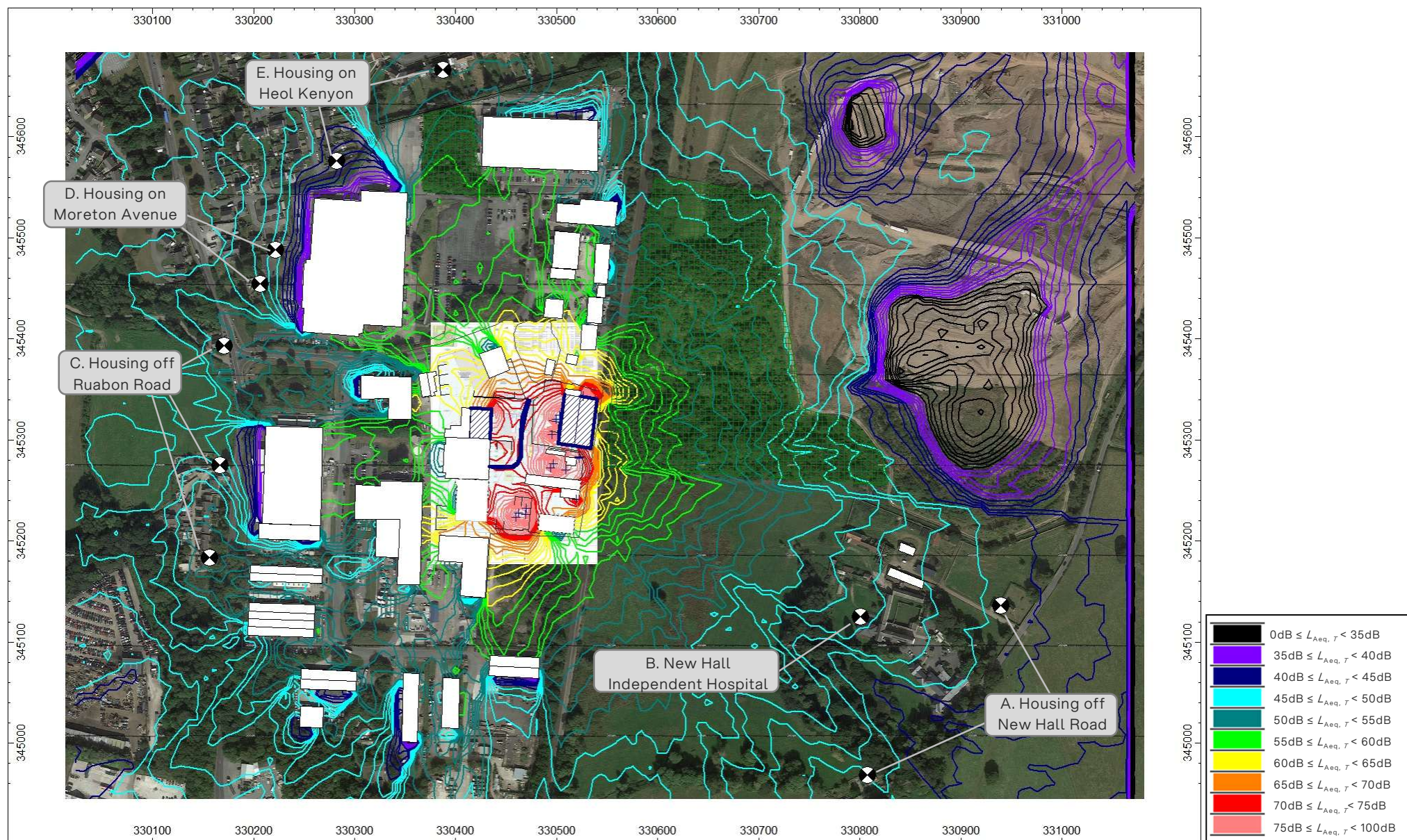


Figure D3: Predicted daytime Specific Sound Level, $L_{Aeq,1hour}$ from the installation, at 4 metres grid height (Google 2026) – 3: combined activities

Source Description	Predicted Specific Sound Level, dB $L_{Aeq,7}$				
	A. New Hall Road, First Floor	B. New Hall Independent Hospital, First Floor	C. Ruabon Road, First Floor	D. Moreton Avenue, First Floor	E. Heol Kenyon, First Floor
Bailer	35.3	36.1	38.4	32.7	39.6
Biomass Intake Grille	26.7	29.3	16.7	23.9	27.9
Bobcat E85 excavator	24.2	28.5	28.7	29.3	29.7
Bobcat E85 excavator	15.5	22.5	26.6	21.4	27.0
Centrifuge	16.9	21.9	42.0	35.7	43.9
Dust extract fan motor	26.2	22.7	22.6	24.7	23.9
Dust extract fan outlet	27.3	28.3	16.3	25.9	25.5
Dust extract fan scroll	27.0	26.6	23.3	25.1	24.6
Extract fan north scroll	19.9	18.8	17.9	16.3	31.5
Extract fan north, motor	19.1	16.1	16.5	14.7	30.8
Forklift Truck	23.6	24.1	24.5	24.2	20.4
Generator	13.7	15.9	38.7	36.1	40.8
Generator	35.7	29.0	37.3	34.2	42.7
HGV	27.3	31.1	31.2	28.1	33.5
Molson SK130 LC Excavator	20.1	19.7	37.9	34.1	41.0
Plastic Crates Room - east facade	30.5	34.8	31.8	25.8	19.3
Plastic Crates Room - north facade	13.4	19.2	26.5	23.6	28.6
Plastic Pallet Room - opening	34.8	36.5	38.6	31.1	13.4
Plastic Pallets Room	32.6	34.7	39.2	35	38.4
Unit 9 - facade	24.2	27.0	36.6	32.3	36.8
Unit 9 - roof	29.3	31.8	35.8	32.3	34.6
Unit 9 roller shutter	9.5	13.3	31.3	25.1	29.1
Unit 9 roller shutter	10.1	12.9	32.4	24.8	27.5
Unit 9 roller shutter	7.0	10.7	22.5	20.4	28.8
Unit 9 roller shutter	9.9	14.5	27.4	24.4	29.3
Untha LR1400 shredder	30.6	27.1	40.5	35.3	38.8
Wood Baling - facade	25.3	28.6	20.6	21.3	27.9
Wood Baling - Roof	24.6	26.9	31.4	27.8	30.3
Wood Hog - Shredding	39.9	44.6	42.7	42.8	43.2
Total	44.6	47.2	50.3	47.1	51.3

Table D1: Predicted Specific Sound Levels, dB $L_{Aeq,7}$

APPENDIX E

Noise Source Schedule

Equipment Name	Data Source / Specification	Data Type	Number of Sources	Average Sound Pressure Level, dB, at Octave Band Centre Frequency Hz								Average Sound Pressure Level on Measurement Surface, L_{pA}	Measurement Distance, m	Measurement Surface area at Measurement Position, m ²	Overall Sound Power Level, dB L_{wA}	Utilisation		Source: Area (A) Line (L) Point (P) or internal (I)	Comment	Outline Noise Mitigation Design	
				32	63	125	250	500	1k	2k	4k					8k	Daytime (07:00 - 23:00)				Night Time (23:00 - 07:00)
Unit 9																					
Plastic Recycling																					
Internal																					
Plastic Recycling	On site measurement during 4 April 2024	Internal reverberant SPL	1	85	85	88	94	90	87	86	87	84	94	n/a	n/a	n/a	100%	0%	I		Roller shutters and personnel doors must always be kept closed when not in use for immediate, momentary vehicle/personnel ingress/egress. Roller shutter doors must be kept closed during evening and night time periods.
External																					
Terex TDS V20 Shredder	On site measurement during 4 April 2024	Sound Pressure Level at 5m distance	1	83	86	85	90	86	86	85	82	77	92	5	781	120	100%	0%	P		The Terex TDS V20 shredder shall no longer be used. This shall be replaced by a new Untha LR1400 shredder
Molson SK130 LC Excavator	Noise spectrum taken from BS5228 Part 1 2009, Table C.2, ref. no.5 "Tracked Excavator 72kW"	Sound Pressure Level at 10m distance	1		78	70	72	68	67	66	73	65	76	10	628	104	100%	0%	P		
Generator	Manufacturer noise data states as 98dB LWA. Typical noise data assumed	Sound Pressure Level at 1m distance	2	81	77	82	85	72	71	67	61	54	79	1	88	98	100%	0%	P	Manufacturer noise data states 98dB LWA	
Centrifuge	On site measurement at the Flint site during 12 September 2024	Sound Pressure Level at 1m distance	1	84	85	89	80	78	77	78	79	74	85	1	42	101	100%	0%	P		
Wood Baling																					
Internal																					
Wood Baling room	On site measurement during 17 February 2026	Internal reverberant SPL	1	75	78	83	88	86	83	80	75	64	88	n/a	n/a	n/a	100%	0%			
Hammer Mill motor	On site measurement during 13 March 2025	Sound Pressure Level at 1m distance	1	84	98	100	102	98	97	94	91	87	102	1	25	116	100%	0%			
Hammer Mill	On site measurement during 13 March 2025	Sound Pressure Level at 1m distance	1	85	98	99	102	99	96	95	94	91	103	1	29	117	100%	0%			
External																					
Extract fan north, motor	On site measurement during 13 March 2025	Sound Pressure Level at 1m distance	1	85	77	85	87	79	74	73	73	66	83	1	21	96	100%	0%			

Equipment Name	Data Source / Specification	Data Type	Number of Sources	Average Sound Pressure Level, dB, at Octave Band Centre Frequency Hz									Average Sound Pressure Level on Measurement Surface, L_{pA}	Measurement Distance, m	Measurement Surface area at Measurement Position, m²	Overall Sound Power Level, dB L_{wA}	Utilisation		Source: Area (A) Line (L) Point (P) or internal (I)	Comment	Outline Noise Mitigation Design
				32	63	125	250	500	1k	2k	4k	8k					Daytime (07:00 - 23:00)	Night Time (23:00 - 07:00)			
Extract fan north scroll	On site measurement during 13 March 2025	Sound Pressure Level at 1m distance	1	85	81	88	85	78	72	71	67	61	81	1	37	97	100%	0%			
Dust extract fan motor	On site measurement during 13 March 2025	Sound Pressure Level at 1m distance	1	84	85	79	79	77	73	75	73	69	81	1	19	94	100%	0%			
Dust extract fan scroll	On site measurement during 13 March 2025	Sound Pressure Level at 1m distance	1	87	86	82	78	76	72	73	71	60	80	1	28	94	100%	0%			
Dust extract fan outlet	On site measurement during 13 March 2025	Sound Pressure Level at 1m distance	1	84	87	83	83	81	74	73	71	62	82	1	6	90	100%	0%			
Unit 11																					
Wood Shredding																					
External																					
Terex TDS shredding pallets	On site measurement during 3 October 2024	Sound Pressure Level at 10m distance	1	78	92	89	81	79	79	78	75	71	85	10	628	112	100%	0%	P		
Wood Hog - Shredding	On site measurement during 3 July 2025	Sound Pressure Level at 10m distance	1	77	88	89	84	83	83	83	81	75	89	5	157	111	100%	0%			
Forklift Truck	Noise spectrum taken from BS5228 Part 1 2009, Table C.9, ref. no.5	Sound Pressure Level at 10m distance	1		72	67	61	62	60	57	52	47	65	10	628	93	100%	0%	P		
Bobcat E85 excavator	Manufacturer noise data states as 98dB LWA. Typical noise data assumed	Sound Pressure Level at 10m distance	1		72	66	62	70	63	62	57	53	70	10	628	98	100%	0%	P		
Covered Loading floor	On site observation during 4 April 2024	n/a	1														100%	0%	n/a	Quiet, not measurable	
Biomass																					
Internal																					
Fain intake	On site measurement during 3 October 2024	Sound Pressure Level at 1m distance	1	103	109	114	107	99	99	96	90	79	105	1	4	111	100%	0%	n/a		
External																					
Biomass Building intake (external grille)	On site measurement during 3 October 2024	Sound Pressure Level at 1m distance	1	95	103	106	100	94	94	90	84	67	99	1	4	105	100%	0%	P		Attenuator required in order to achieve a sound pressure level of 85dB at 1 metre from the inlet to the attenuator. This equates to a broadband insertion loss performance of 14dB.
		Insertion loss		14							85	91									

Equipment Name	Data Source / Specification	Data Type	Number of Sources	Average Sound Pressure Level, dB, at Octave Band Centre Frequency Hz								Average Sound Pressure Level on Measurement Surface, L_{pA}	Measurement Distance, m	Measurement Surface area at Measurement Position, m²	Overall Sound Power Level, dB L_{wA}	Utilisation		Source: Area (A) Line (L) Point (P) or internal (I)	Comment	Outline Noise Mitigation Design	
				32	63	125	250	500	1k	2k	4k					8k	Daytime (07:00 - 23:00)				Night Time (23:00 - 07:00)
Tire Line																					
External																					
Bobcat E85 excavator	Manufacturer noise data states as 98dB L_{wA} . Typical noise data assumed	Sound Pressure Level at 10m distance	1		72	66	62	70	63	62	57	53	70	10	628	98	100%	0%	P	Manufacturer noise data states 98dB LWA	
Terex TDS V20 Shredder	On site measurement during 4 April 2024	Sound Pressure Level at 5m distance	1	83	86	85	90	86	86	85	82	77	92	5	300	116	100%	0%	P		The Terex TDS V20 shredder shall no longer be used. This shall be replaced by a new Untha LR1400 shredder
Untha LR1400 shredder	On site measurement during 17 February 2026	Sound Pressure Level at 10m distance	1	79	82	83	79	75	72	70	65	57	78	10	628	106	100%	0%	P		
Orkel Hi-X compactor and bailer	On site measurement during 17 February 2026	Sound Pressure Level at 10m distance	1	78	81	80	73	73	74	75	69	61	80	10	628	108	100%	0%	P		
Generator	On site measurement during 17 February 2026	Sound Pressure Level at 10m distance	1	82	86	82	75	76	74	69	63	56	78	10	628	106	100%	0%	P		
Plastic Crates Room																					
Internal																					
Plastic Crates Room	On site measurement during 3 July 2025	Internal reverberant SPL	1	68	70	73	74	75	88	90	75	63	93	n/a	n/a	n/a	50%	0%			
External																					
Plastic pallet east façade	On site measurement during 3 July 2025	Sound Pressure Level at 1m distance	1	69	69	67	64	63	71	73	56	39	76	1	1	76	50%	0%	A		
Plastic Pallet opening	On site measurement during 3 July 2025	Sound Pressure Level at opening	1	69	68	71	73	73	80	85	71	58	87	1	1	87	50%	0%	A		
Plastic pallet north façade	On site measurement during 3 July 2025	Sound Pressure Level at 1m distance	1	67	61	60	60	56	63	65	50	42	68	1	1	68	50%	0%	A		
Dispatch																					
Internal																					
Forklift Truck	Noise spectrum taken from BS5228 Part 12009, Table C.9, ref. no.5	Sound Pressure Level at 10m distance	1		72	67	61	62	60	57	52	47	65	10	628	93	100%	0%	P	Low level and intermittent. Not modelled	
External																					
HGV	Sound pressure Level at 10m	Noise spectrum taken from BS5228 Table C.2 reference 34 ("Lorry": 4-axle wagon).	1		73	78	78	78	74	73	68	66	80	10	628	108	4/hour	nil	L		Deliveries to and from the Facility must only take place between 07:00 – 19:00 hours during Monday to Friday (excluding bank holidays) only.

Table E1: Noise source schedule indicating maximum permissible noise levels (per plant item) and outline noise mitigation required

APPENDIX F

Details and Professional Qualifications of Contributing Sol Staff

Company Details

Name of Organisation:	Sol Acoustics Limited
Status:	Private Limited Company
Address:	Unit 11, Brunel Court, Gadbrook Park CW9 7LP
Telephone Number:	01565 632535
E-Mail:	info@solacoustics.co.uk
Nature of Business:	Acoustic Consultancy
Directors:	Simon Ferenczi
Company Registration Number:	4218702

Key Technical Personnel & Qualifications

Simon Ferenczi	Institute of Acoustics Diploma (with additional modules), MIOA
Brian Horner	BSc (Hons), MIOA
Chris Downing	MMaths

Company Accreditations

Sol Acoustics is a member of The Association of Noise Consultants (ANC) and is qualified to perform sound insulation testing under the ANC's accredited testing scheme to demonstrate compliance with the requirements of Approved Document E of the Building Regulations.