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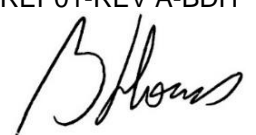
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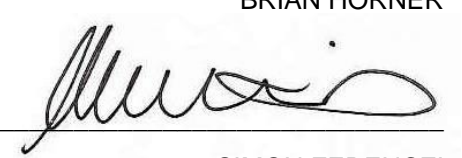
Environmental Noise Impact Assessment
P2121-REP01-REV A-BDH
23 May 2023

PROJECT: Grid Powr EfW
Houghton Main
Environmental Noise Impact Assessment

CLIENT: Sol Environment Ltd
Unit 5.3 Paintworks
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BS4 3EH

DOCUMENT
REFERENCE: P2121-REP01-REV A-BDH

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DATE: 23 May 2023

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1 EXECUTIVE SUMMARY

Sol Acoustics Ltd (“Sol”) has been appointed to provide an environmental noise impact assessment for the proposed Energy from Waste (“EFW”) site, which is to be located off the Houghton Main Colliery Roundabout, Park Spring Road (A6195) in Little Houghton, Barnsley S72 7GX.

This acoustic assessment report considers the environmental noise impact as arising from the operation of all plant and processes associated with the intended installation, as at the nearest Noise Sensitive Receptors (NSRs) during the proposed hours of operation (namely 24/7 operation).

The pre-existing environmental noise climate at the identified NSRs has been measured by Sol, between Friday 3rd February and Tuesday 7th February 2023 (inclusive).

The environmental noise emissions that shall be arising from the operation of the complete plant have been quantified, modelled, and assessed using proprietary “CadnaA” 3D noise modelling software.

It is the conclusion of this environmental noise impact assessment that the total, aggregate environmental noise impact arising from the proposed operation of the plant in its entirety, in full compliance with the plant noise specification as presented herein, results in a “low” noise impact at the worst affected noise sensitive receptors, all as assessed in accordance with British Standard BS4142: 2014+A1: 2019. The assessment also indicates that the requirements of Planning Condition 12 of the 2018 Planning Consent (Planning Application number: 2018/1437) are capable of being met.

Noise from the complete plant is expected to slightly exceed the “no likely effect” threshold of 55dB $L_{Aeq,T}$ at the nearest *ecological* receptor (Site of Special Scientific Interest – SSSI) as located 13 metres distance to the site. However, the “no likely effect” threshold will be met at c.10 metres distance into the boundary of the worst affected SSSI for daytime periods, and c.3 metres distance into the site boundary of the worst affect SSSI for night time periods. Further afield, and for all other SSSI, LWS, the predicted specific sound level is expected to fall below the “no likely effect” threshold.

Please refer to the main report and appendices for further information.

2 INTRODUCTION

Sol Acoustics Ltd (“Sol”) has been appointed to provide an environmental noise impact assessment for the proposed Energy from Waste (“EfW”) site that is to be located off the Houghton Main Colliery Roundabout, Park Spring Road (A6195) in Little Houghton, Barnsley S72 7GX (hereinafter referred to as the “Facility”). The purpose of this acoustic assessment is as follows:

- To 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 proposed Facility.
- To determine the prevailing, pre-existing baseline background noise climate at the worst affected NSR, through direct, environmental noise measurement.
- To identify all significant noise sources associated with the proposed Facility.
- To 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.
- To 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.

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 has 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.
- 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 provides details of the acoustic louvre used to inform this assessment.*
- *Appendix G presents the noise data as provided by the Client.*
- *Appendix H gives details and qualifications of contributing Sol Acoustics' staff.*

3 DESCRIPTION OF SITE

3.1 General Overview and Noise Sensitive Receptors (NSRs)

The proposed site for the Facility is located off the Houghton Main Colliery Roundabout, Park Spring Road (A6195) in Little Houghton, Barnsley S72 7GX. The Facility is to be located in a rural area. To the east of the site is the existing GXO Logistics/ASOS industrial building.

The nearest identified existing residential housing to the proposed Facility are as follows:

- A. Housing off Park Lane, c.980 metres distance to the north east
- B. Housing off Ings Lane, c.660 metres distance to the south
- C. Housing off Edderthorpe Lane, c.630 metres distance to the south west
- D. Housing off Storrs Mill Lane, c.740 metres distance to the west

Figure 1 overleaf indicates the location of the Facility in relation to the identified residential NSRs, and also the corresponding locations of the noise monitoring positions that have been used in order to inform this acoustic assessment (all as discussed in Section 4 of this report).

In addition to residential housing, there are a number of Sites of Special Scientific Interest (“SSSI”) and Local Wildlife Sites (“LWS”) in the vicinity of the proposed Facility (i.e. *ecological* receptors). Figure 2 and Figure 3 show the location of the nearby SSSI and LWS in relation to the Facility respectively.

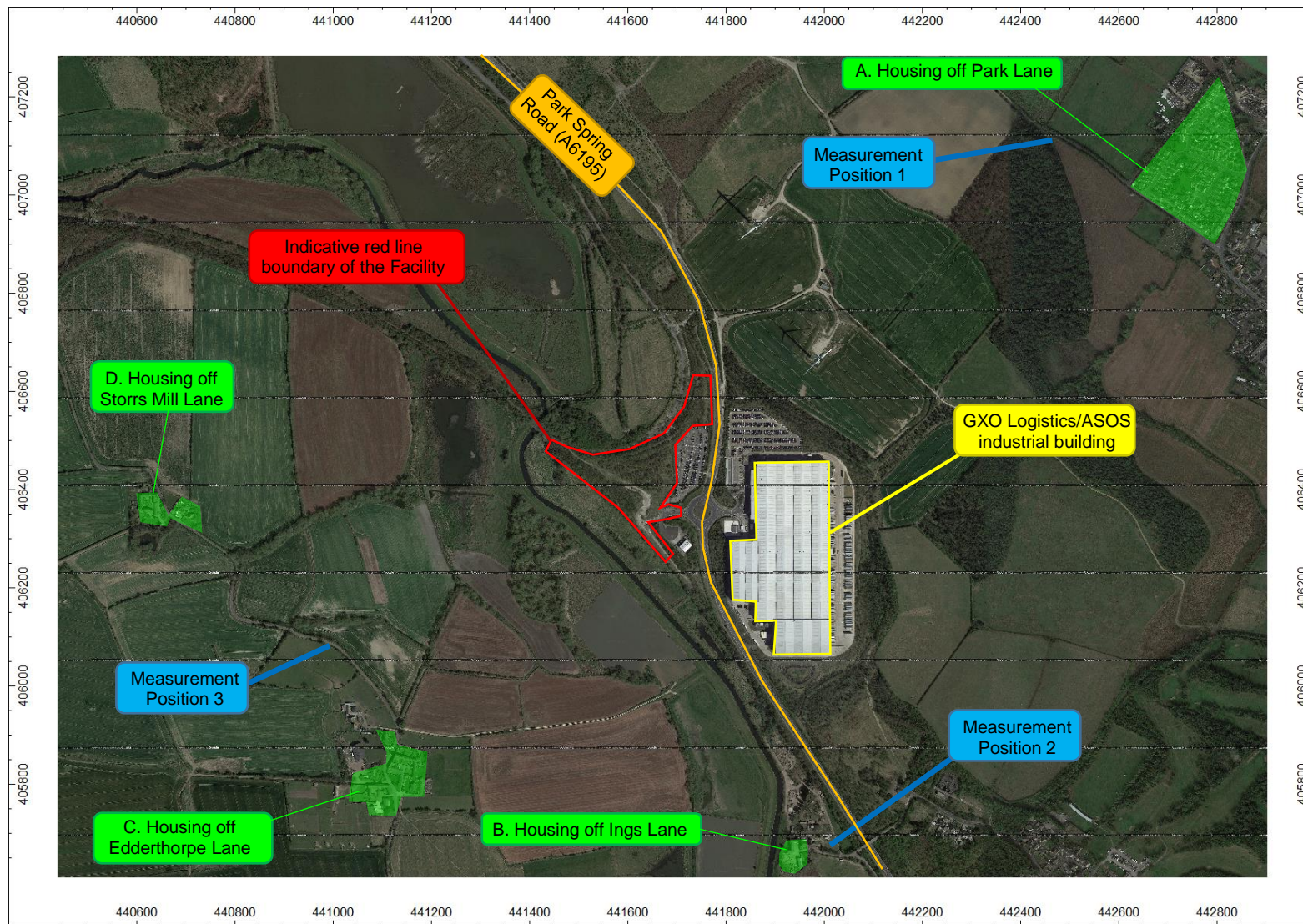


Figure 1: Aerial photo overlaid with noise sensitive receptors and monitoring locations in relation to the Facility (Google 2023)

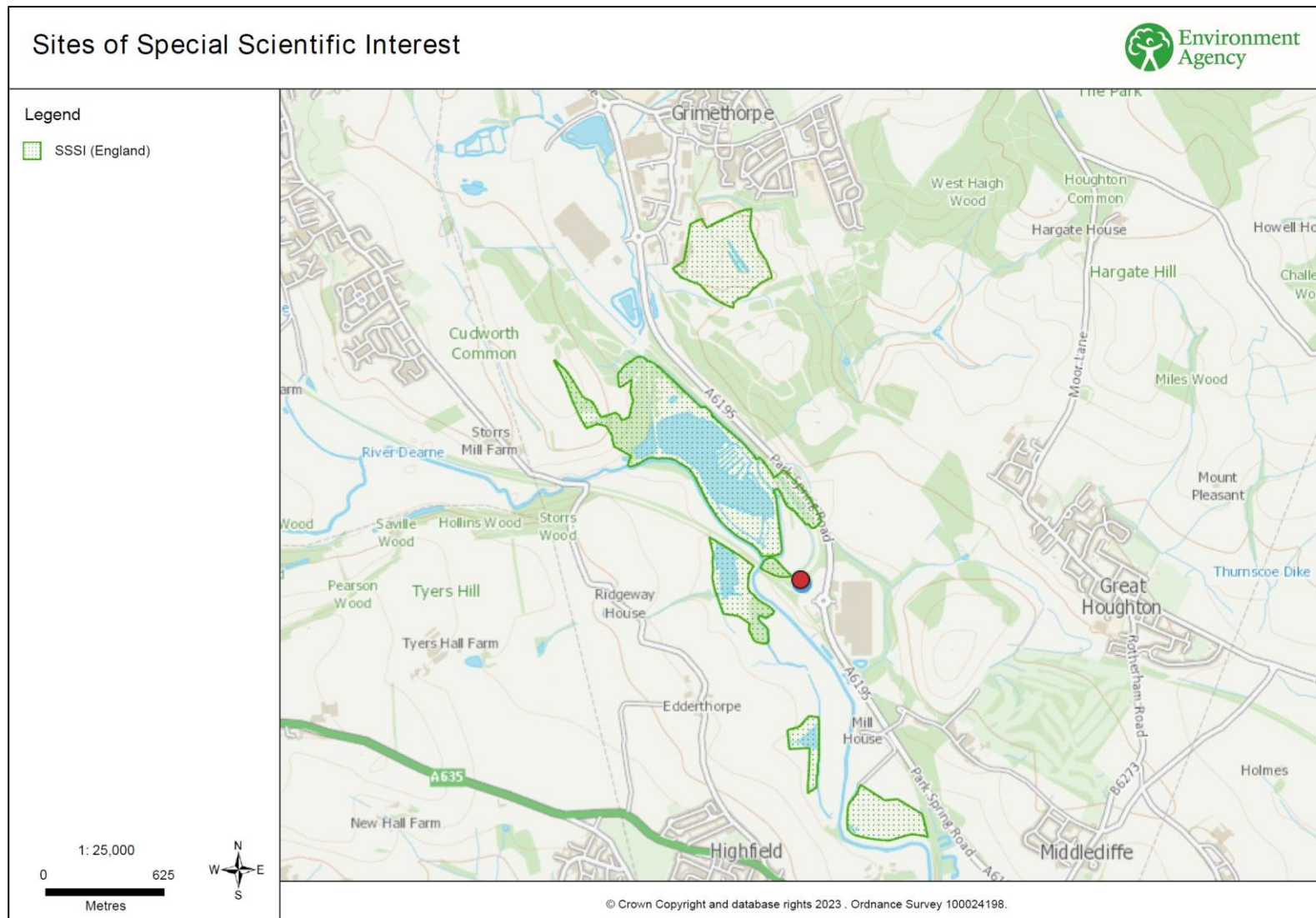


Figure 2: Location of SSSI sites in the vicinity of the Facility

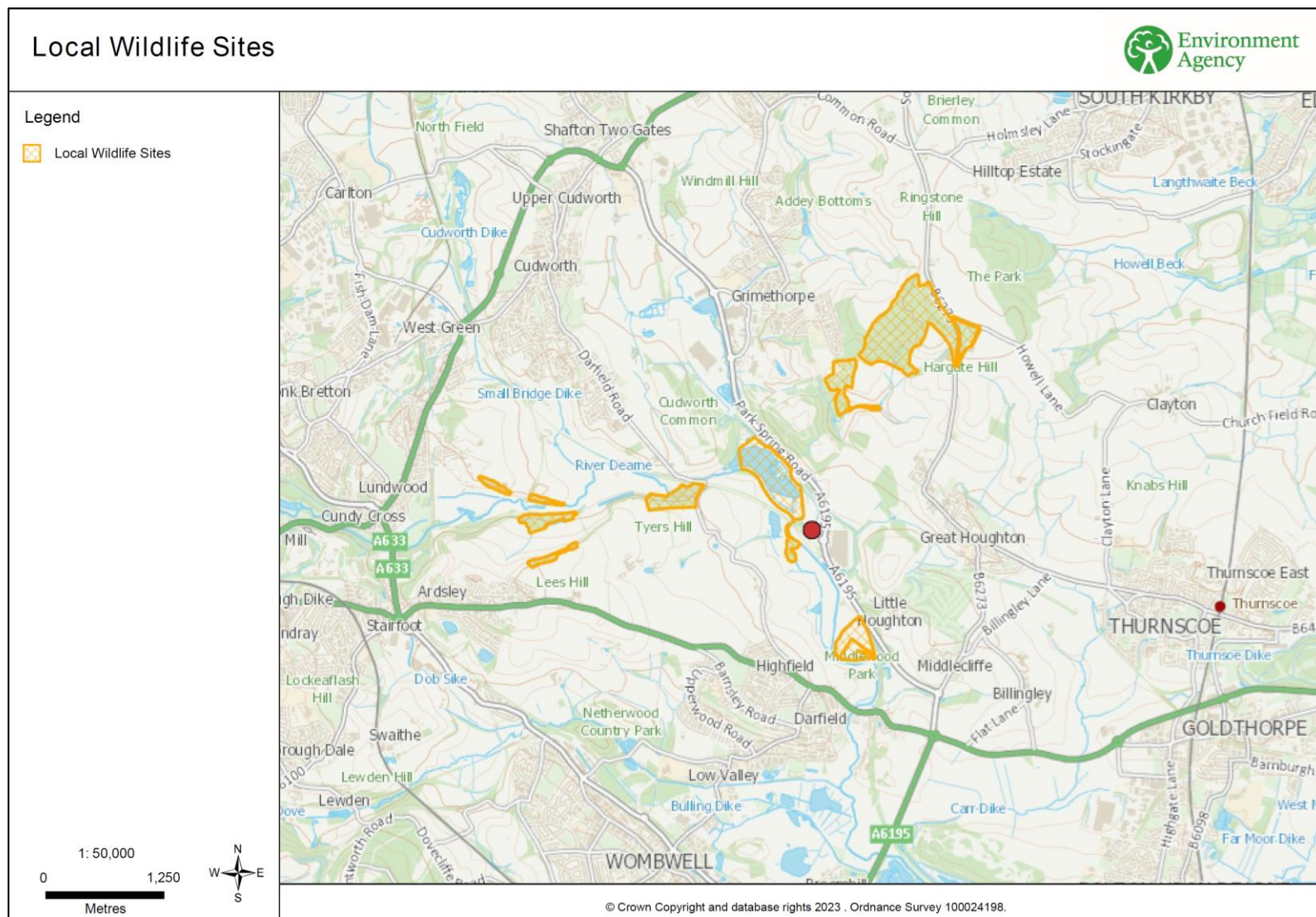


Figure 3: Location of LWS in the vicinity of the Facility

3.2 Characteristics of the Facility

The proposed Facility is to accept and process up to 260,000 tonnes per annum of waste wood and/or Refuse Derived Fuel (RDF) feedstocks and shall be capable of generating up to 22MWe of electrical power (Maximum Continuous Rating, MCR). The proposed Facility will include the following key elements:

- Fuel Reception Hall
- Process Building
- Turbine Room
- Air-cooled condenser (ACC)
- Silos
- Firewater tanks
- Substation
- Office and admin areas

Figure 4 indicates the proposed site layout of the Facility. Figure 5 and Figure 6 provides the proposed building elevations.

3.2.2 *External Building Fabric*

The wall and constructions to all proposed buildings shall comprise insulated cladding panels. There are number of ventilation grilles and roller shutters forming part of the proposed façades of the various buildings.

3.2.3 *Mobile Plant*

A telescopic handler/front loader shall operate within the Reception Building to load the shredder as during the daytime only.

Fork lift trucks are also expected to operate at the Facility.

3.2.4 *Site Deliveries and Collections*

Planning Condition 13 of the 2019 Planning Consent (Planning Application number: 2018/1437, see Section 6.1 for further details) limits deliveries and collections; these are restricted to the following periods only:

- 07:00 – 19:00 hours Monday to Friday
- 08:00 – 18:00 hours Saturday and Sunday

3.2.5 *Anticipated Noise Level Emissions*

The Client has provided to Sol the anticipated noise level emissions as expected from key plant in processes in broadband A-weighted terms. This information is summarised in Appendix G of this report.

Where deemed appropriate, Sol has included additional noise sources which are expected to operate on the site but have not been formally identified by the Client at the time of reporting (May 2023).

Appendix E provides a full inventory of all identified acoustically significant plant and processes which have the potential to create an environmental noise impact at nearby NSRs; this information has been used to inform this acoustic assessment.

The list of noise sources will be required to be updated by Sol as details develop. The Noise Management Plan will also need to be updated accordingly by Sol.

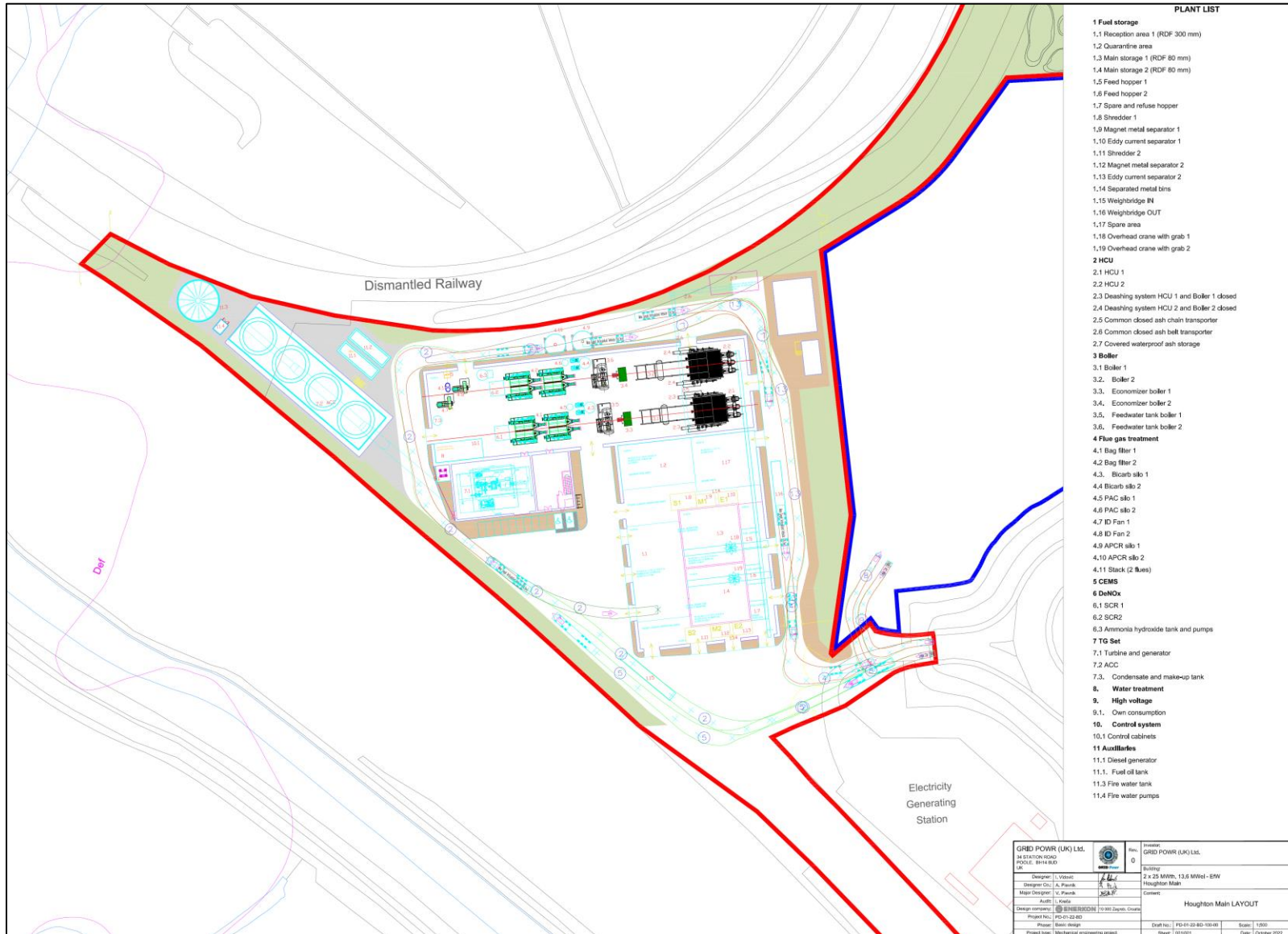


Figure 4: Proposed site plan of the Facility

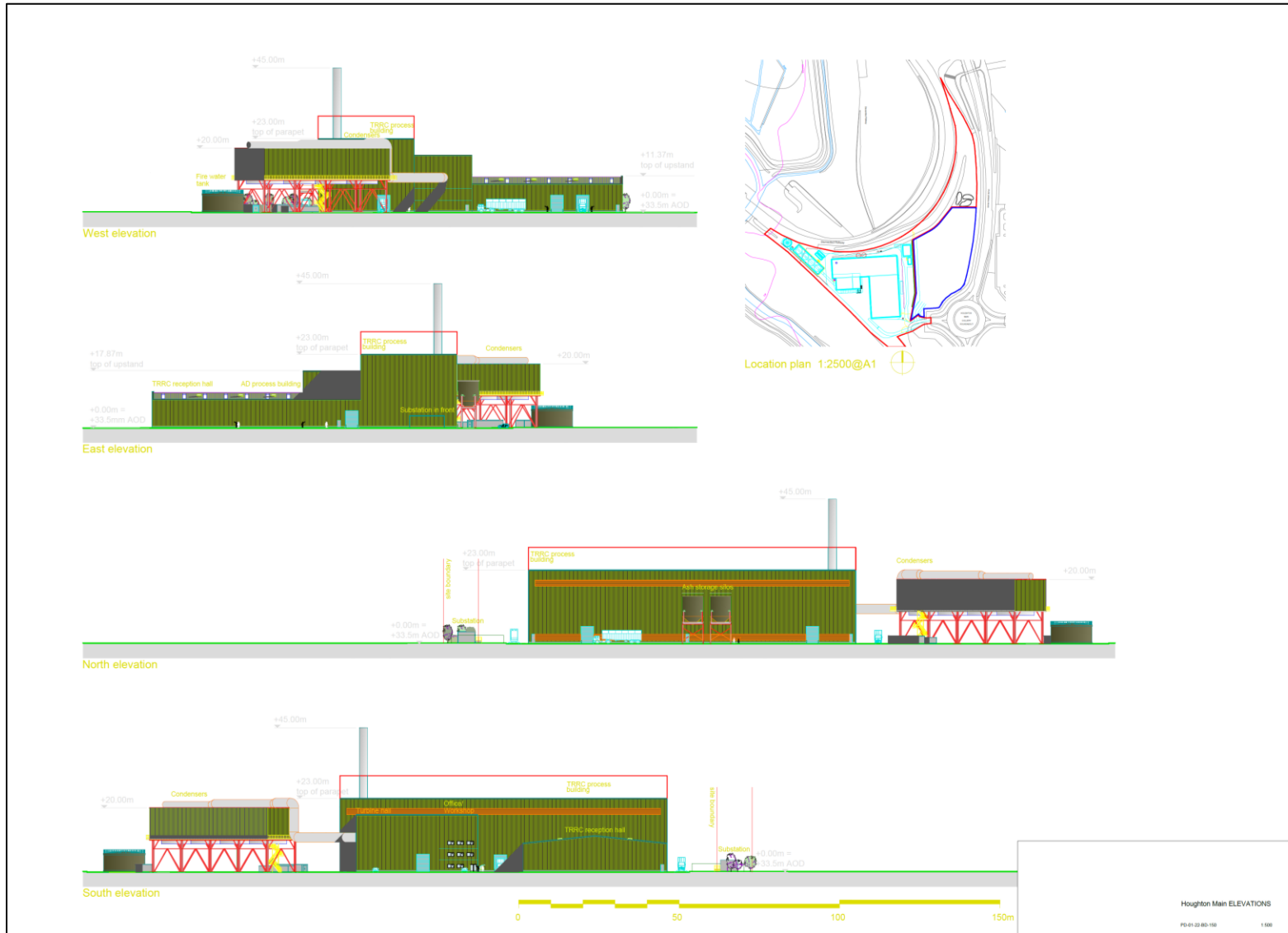


Figure 5: Proposed building elevations of the Facility



Figure 6: Proposed building elevations of the Facility

4 DETAILS OF INVESTIGATION

4.1 Pre-Existing Environmental Noise Climate

In order to inform this environmental noise benchmarking assessment, an environmental noise survey has been conducted by Sol between c.12:00 hours during Friday 3 February and c.11:00 hours during Tuesday 7 February 2023. The purpose of the survey was to determine the prevailing pre-existing Background Sound Levels at the nearest noise sensitive premises to the Facility, as during typical weekend and weekday, daytime and night time periods for environmental noise benchmarking and subsequent acoustic impact assessment purposes.

The environmental noise survey consisted of three environmental noise measurement positions, as follows:

- **Noise Monitoring Position 1:** Mast-mounted microphone at c.1.6 metres above local ground level and c.190 metres distance to the northwest of the housing off Park Lane. The microphone was mounted in so-called “free-field” acoustic conditions. Key noise sources included birdsong and faint road traffic noise from the A6195. The Background Sound Levels as recorded at this position are deemed to be representative of those as expected at the housing off Park Lane, which is located at a similar distance to the A6195.
- **Noise Monitoring Position 2:** Mast-mounted microphone at c.1.5 metres above local ground level and c.40 metres distance to the east of the housing off Ings Lane. The microphone was mounted in so-called “free-field” acoustic conditions. Key noise sources included road traffic noise from the nearby A6195, the occasional vehicle on Ings Lane and infrequent animal noises. The Background Sound Levels as recorded at this position are deemed to be representative of those as expected at the housing off Ings Lane.
- **Noise Monitoring Position 3:** Mast-mounted microphone at c.1.8 metres above local ground level and c.160 metres distance to the northwest of the housing off Edderthorpe Lane. The microphone was mounted in so-called “free-field” acoustic conditions. Key noise sources included road traffic on the fairly busy adjacent road, birdsong, and occasional animal noise. The Background Sound Levels as recorded at this position are deemed to be representative of those as expected at the housing off Edderthorpe Lane, and the housing off Storrs Mill Lane, which are both located at a similar distance to the A6195.

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.

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).

Meteorological data was recorded at Noise Monitoring Position 2 for the duration of the noise survey, as using a Professional Grade Vaisala "WXT530" weather station. The average wind speed remained favourable (below 5ms^{-1}) and there was no rainfall for the duration of the survey.

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

Appendix B provides fully detailed time history information for the environmental noise levels as recorded for the duration of the environmental noise survey.

Table 1 below and 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 – 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)
1	Friday 3 February 2023	53*	37	35	28
	Saturday 4 February 2023	49	37	37	32
	Sunday 5 February 2023	46	36	41	32
	Monday 6 February 2023	51	35	43	33
	Tuesday 7 February 2023	52*	38	-	-
2	Friday 3 February 2023	56*	45	46	33
	Saturday 4 February 2023	53	44	51	34
	Sunday 5 February 2023	55	43	52	34
	Monday 6 February 2023	55	44	50	35
	Tuesday 7 February 2023	58*	49	-	-
3	Friday 3 February 2023	59*	36	49	28
	Saturday 4 February 2023	58	38	48	31
	Sunday 5 February 2023	58	34	43	32
	Monday 6 February 2023	58	37	52	32
	Tuesday 7 February 2023	60*	37	-	-

* 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 Noise Related Planning Conditions

Planning Permission for a Renewable Energy Park using Refuse Derived Fuel (“RDF”) and waste wood was granted during 17 April 2019 (Planning Application number: 2018/1437) by Barnsley Metropolitan Borough Council. The Planning Consent was subject to a number of Planning Conditions. Planning Condition 11, 12 and 13 relate to noise and these are reproduced below:

‘... 11 *Construction or remediation work comprising the use of plant, machinery or equipment, or deliveries of materials which are audible at the monitoring locations M01 to M07 detailed in the noise report supporting Application No. 2015/0137 shall only take place between the hours of 0800 to 1800 Monday to Friday and 0800 to 1600 on Saturdays and at no time on Sundays or Bank Holidays.*

Reason: In the interests of the amenities of local residents and in accordance with Local Plan Policy Pol1.

12 *Once operational, the level of noise emitted from the site shall not exceed the existing background noise levels (LA0 +0db) as measured at the monitoring locations M01 to M07 detailed in the noise report supporting this application. Once the plant is fully commissioned and operational the applicant shall submit a report demonstrating that the site facility is operational within the limits defined within this condition. In the event that the noise level from the development is above the stated levels then the applicant shall submit a mitigation scheme for the written approval of the Local Planning Authority in order to identify measures to reduce the noise of the development to within acceptable levels. The approved scheme shall then be implemented. In the event that the noise level from the development cannot be brought to within acceptable levels, as defined above, the development shall not continue to operate without the written consent of the Local Authority.*

Reason: In the interests of the amenities of local residents and in accordance with Local Plan Policy Poll1.

13 *Deliveries with the transfer of waste to and from the site shall only take place between the hours of 07:00 to 19:00 Monday to Friday, and between 08:00 to 18:00 on Saturday and Sunday. All deliveries are to take place in accordance with the details of the submitted lorry routing and management plan.*

Reason: In the interests of the amenities of local residents and in accordance with Local Plan Policy Poll1. ...’

Note, this noise impact assessment report considers the *operational phase* noise impact from the Facility only and therefore does not consider the requirements of Planning Condition 11, which relate to *construction*.

6.2 Guidance on Noise and vibration Management: Environmental Permits

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 23 July 2021, and subsequently updated 31 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*’ (BS4142). A summary of this Standard is provided in Section 6.3.
- 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 Agency will expect a minimum acoustic character correction of +3dB unless otherwise justified.
- The BS4142 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 (as during both so-called “NOC” and “OTNOC” conditions) must not result in a BS4142 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 BS4142 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 BS4142 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.).

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

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

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.

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.”

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.

For the daytime, the assessment is conducted over a one-hour period, and over a 15-minute period at night. The daytime and night time periods are defined as occurring between 07:00 hours to 23:00 hours, and 23:00 hours to 07:00 hours, respectively.

Table 2 specifies appropriate maximum permissible Rating Level limits which shall be applicable to Facility at the identified NSR in order to achieve a BS 4142: 2014+A1:2019 defined *Low Impact*.

Noise Sensitive Receptors	Representative Noise Measurement Position	Maximum Permissible Noise Rating Level Limit, dB $L_{Ar,Tn}$, for BS4142 defined <i>Low Impact</i>	
		Daytime (07:00 hours – 23:00 hours)	Night Time (23:00 hours – 07:00 hours)
A. Housing off Park Lane (c.980 metres to the north east)	1	37	32
B. Housing off Ings Lane (c.660 metres to the south)	2	44	34
C. Housing off Edderthorpe Lane (c.630 metres to the south west)	3	36	32
D. Housing off Storrs Mill Lane (c.740 metres distance to the west)	3	36	32

Table 2: Maximum permissible Rating Level limits, dB $L_{Ar,Tn}$, to achieve a BS 4142:2014+A1: 2019 defined *low impact*

The above maximum permissible noise level limits are specified in terms of the BS 4142: 2014+A1:2019 defined Rating Level. The acoustic character of the sound generated from the Facility must therefore be considered and where appropriate, an acoustic character correction (penalty) must be applied to the predicted Specific Sound Level when assessing compliance with the above specified receptor noise level limits.

6.4 Ecological Receptors

Argus Ecology Ltd has undertaken an ecological assessment of the proposed Facility (refer Argus Ecology Ltd report ref. “K23.003 V1” dated 6 August 2023). Section 3.3 of the ecology assessment sets out appropriate noise criteria applicable to the identified bird species at the identified ecological receptor locations:

‘... The Waterbird Disturbance Mitigation Toolkit classifies a number of wetland bird species according to sensitivity to noise and disturbance, based on a range of empirical data. Although primarily developed to inform construction works on non-breeding birds in estuarine habitats, it is relevant for inland wetland habitats, with some of the same species represented. For those which are not represented, application of values from the most sensitive species provides a precautionary approach. The table below gives disturbance thresholds for species which are notified features or members of the wetland bird assemblages present at Dearne Valley Wetlands SSSI.

Species	Disturbance potential	Caution advised above...	Background Noise Threshold
<i>Shelduck</i>	<i>High</i>	<i>60dB</i>	<i>70dB</i>
<i>Lapwing</i>	<i>Moderate</i>	<i>55dB</i>	<i>72dB</i>
<i>Redshank</i>	<i>High (for noise)</i>	<i>55dB</i>	<i>70dB</i>

[Table 3]: *Noise disturbance thresholds for wetland bird species*

*Notified species such as gadwall, shoveler and pochard, together with members of the wetland bird assemblage such as avocet and snipe are not listed in the Toolkit; however, **application of the 55dB threshold should define a 'no likely effect' zone of low level noise stimulus for both sudden and continuous noise. Sudden noise of >55dB, and continuous noise above 70dB are defined by the Toolkit as a 'moderate disturbance stimulus' ...***

Sol has discussed the above criteria with the Project Ecologist during 10 May 2023. Whilst the noise levels as stated in the above excerpt are stated in dB terms (which implies linear and unweighted noise levels), they are actually to be interpreted in dB(A) terms (i.e. A-weighting correction to be applied) as the hearing response of humans and birds is purportedly similar (as advised to Sol by the Project Ecologist).

In short, therefore, and where practicably achievable, noise emissions from the Facility should be controlled to be below 55dB(A) $L_{Aeq,T}$ threshold to ensure “no likely effect” on the identified ecological receptors.

7 ENVIRONMENTAL NOISE MODEL

7.1 Methodology and Basis of 3D Environmental Noise Models

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:

- (a) The noise model was set up to apply the noise prediction methodology set out in ISO 9613-2: ‘Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation’.
- (b) The model was set to include third order reflected noise from solid structures.
- (c) 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).
- (d) 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 emapsite.com.
- (e) The noise impact as expected the surrounding residential receptors has typically been modelled at a height of 4 metres above local ground level (first floor height).
- (f) The noise model assumes that all identified noise sources for all site operating modes including normal operating conditions (“NOC”) in addition to all other than normal operating conditions (“OTNOC”, such as start-up, shutdown, and bypass etc.) are operating simultaneously. Noise sources associated with emergency operation are not considered at this stage.
- (g) The noise model assumes that on average up to five 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.
- (h) 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.
- (i) 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 and the specified sound pressure level. In the absence of a detailed 3D BIM model (Navisworks) for the project or detailed plans, Sol have made basic assumptions regarding the physical dimensions of the plant in each case.

- (a) Octave band noise data has not been provided by the client for the various noise source. Therefore, Sol has assumed a typical noise spectrum for each modelled noise source as based upon experience of similar plant on other projects.
- (b) The proposed building shall be of a steel frame construction and the wall and roof constructions shall cladding panels. Noise egress from the proposed roller shutter doors and ventilation openings has also been modelled. Table 4 provides an acoustic specification for the key elements of the external façade to all buildings. This stated minimum building element acoustic performance is required in all cases, and this forms part of the required Noise Management Plan appertaining to the Facility. The location and construction details of other building elements, such as building roller shutters, personnel doors and building ventilation louvres are not shown on the proposed building elevations (as presented in Figure 5 and Figure 6):

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	100mm thick insulated cladding panels, (i.e. Europanel S5)	18	22	27	31	31	25	52	30
Roller shutter	Ascot Doors Roller Shutter	14	14	17	18	15	19	19	18
Personnel doors	Booths 29H 45mm Metal Door	18	24	25	28	30	29	34	30
Ventilation louvres	Allaway Acoustics AL3015 single banked acoustic louvre or similar (note c.30% free area)	5	6	8	11	18	25	20	17

Table 4: Minimum required acoustic performance of external building fabric elements

- (c) The noise contribution from the identified plant proposed to be installed within the buildings has been predicted from the derived sound power level of each identified noise source (refer to Appendix E). This data has been used to determine the resultant reverberant sound pressure level within the building. Specifically, a reverberation time of 2 seconds has been assumed within all buildings.
- (d) The loading shovel, shredder and associated conveying system within the Reception Building shall not operate as during the night time. A correction of -7.5dB has been applied to the Reception Building as during the night time period to account for the reduction in noise level from these noise sources.

Figure 7 provides a three-dimensional visualisation of the noise model used to inform the noise impact assessment.

Appendix D provides further information in respect of the 3D computer environmental noise model.

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.

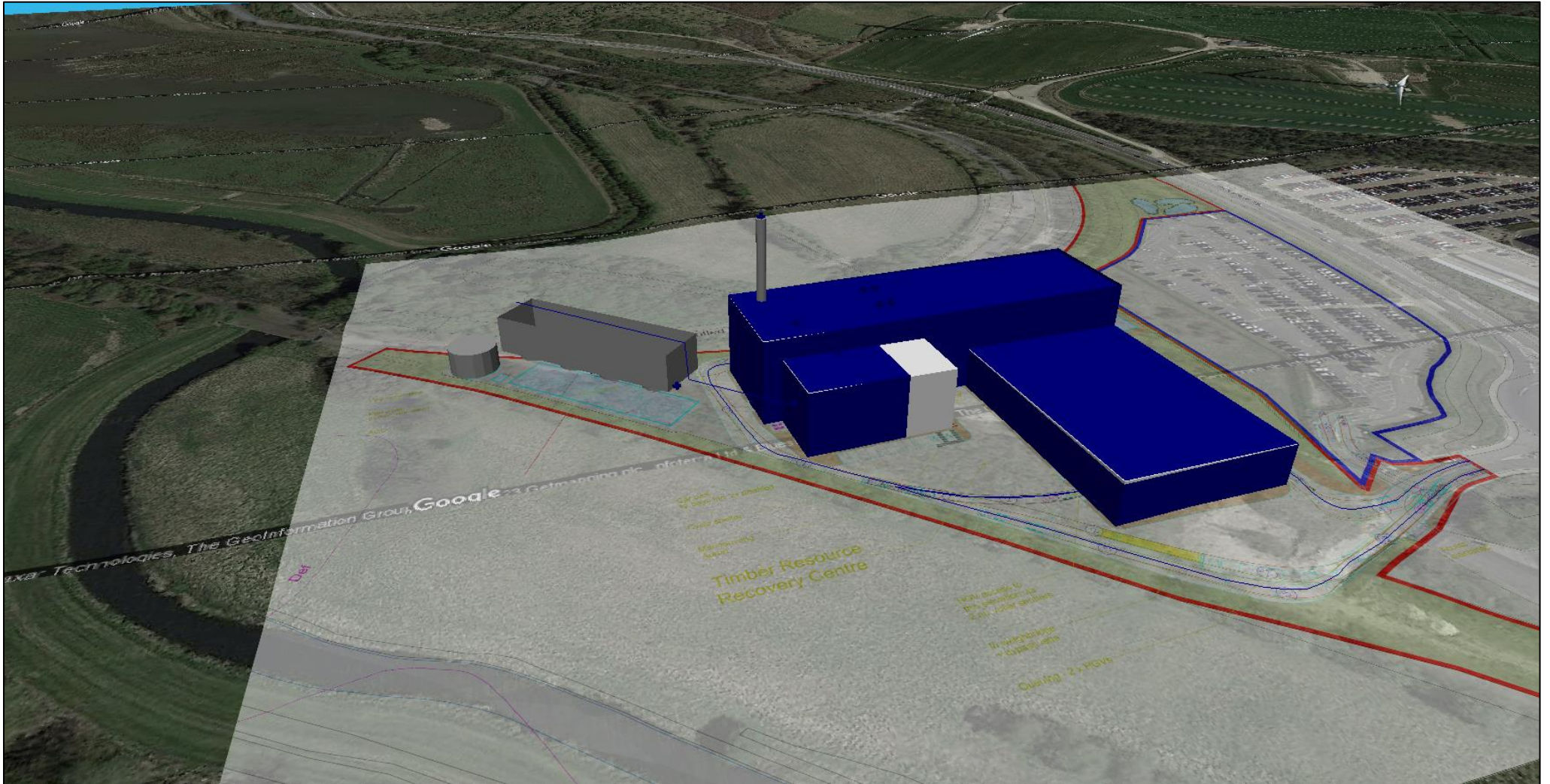


Figure 7: 3D view of the noise model of the Facility (Google 2022)



8 ENVIRONMENTAL NOISE IMPACT ASSESSMENT

8.1 Residential Housing (BS4142 Assessment)

Table 5 presents the predicted overall A-weighted, BS4142-defined Rating Level at the identified NSRs.

Appendix D provides full details of CadnaA noise maps which present the daytime and night-time Specific Sound Levels expected.

It shall be noted from the at-receptor partial noise level tables as presented within Appendix D that the noise contributions from all individual noise sources are each below the existing Background Sound Level, at each receptor. As a result, any acoustic character associated with individual noise sources is not expected to be clearly discernible at the nearest noise sensitive receptor above the pre-existing environmental noise climate.

On this basis, and in accordance with BS4142, a conservative 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 BS4142 defined Rating Level for acoustic assessment purposes:

Noise Sensitive Receptor	Assessment Period	Predicted Specific Level, dB $L_{Aeq,T}$	Acoustic Character Correction, dB	Predicted Rating Level, dB $L_{Ar,Tr}$	Typical Background Sound Level, dB L_{A90}	Rating Level sub. Background \pm dB
A. Housing off Park Lane (c.980 metres to the north east)	Daytime (07:00hrs – 23:00hrs) T = 1 hour	23	+3	26	37	-11
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	20	+3	23	32	-9
B. Housing off Ings Lane (c.660 metres to the south)	Daytime (07:00hrs – 23:00hrs) T = 1 hour	30	+3	33	44	-11
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	27	+3	30	34	-4
C. Housing off Edderthorpe Lane (c.630 metres to the south west)	Daytime (07:00hrs – 23:00hrs) T = 1 hour	33	+3	36	36	+0
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	29	+3	32	32	+0
D. Housing off Storrs Mill Lane (c.740 metres distance to the west)	Daytime (07:00hrs – 23:00hrs) T = 1 hour	30	+3	33	36	-3
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	27	+3	30	32	-2

Table 5: BS4142 summary assessment



The total, aggregate environmental noise impact as arising from the proposed operation of the Facility does not exceed the typical Background Sound Level at any identified noise sensitive receptor. This corresponds to an indication of an ‘... *low impact, depending on the context...*’ in BS4142 terms. In this case, the context in which the sound occurs is not expected to affect the outcome of the assessment. Therefore, the resultant noise impact is expected to be “*low*”.

Furthermore, as the predicted Rating Level does not exceed the Background Sound Level at any of the identified noise sensitive, the requirements of Planning Condition 12 of the 2018 Planning Consent (Planning Application number: 2018/1437) are capable of being met.

8.2 Ecological Receptors

The nearest identified ecological receptor is the SSSI site that is located c.13 metres to the north of the site (refer to Figure 2).

Figures D3 and D4 in Appendix D show the predicted Specific Sound Levels as expected from the Facility at the nearest SSSI. The noise map shows that the noise levels as expected at the boundary of the nearest SSSI areas are expected to be 57dB $L_{Aeq,T}$ and 56dB $L_{Aeq,T}$ during both daytime and night time periods respectively, which just exceeds the 55dB $L_{Aeq,T}$ threshold to ensure “no likely effect” on the identified ecological receptors.

The noise model indicates that the “no likely effect” threshold will be met at c.10 metres distance into the site boundary of the worst affected SSSI for the daytime period and c.3 metres distance into the site boundary of the worst affect SSSI for the night time period. Further afield, and for all other SSSI, LWS, the predicted specific sound level is expected to fall below the “no likely effect” threshold.

The noise model shows that noise at this ecological receptor is dominated by noise from HGV movements, the four ACC fans and the condensate pump.

The noise levels as generated during HGV movements on site would be expected to generate higher instantaneous noise levels. Noise from the ACC fans and condensate pump will be likely to be constant and unvarying. Therefore, other than the temporal noise impact as during HGV movements, it is considered unlikely that the ecological receptors would be exposed to significant impulsive noise events as during NOC and OTNOC operation (i.e. excluding noise from any emergency steam relief valves etc.).



8.3 Preliminary Noise Management Plan (NMP)

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.

Please note that the noise impact from any plant which not listed in Appendix E 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:

8.3.1 Site Buildings

- (a) **Roller shutter and personnel doors:** Roller shutters and personnel doors must always be kept closed when not in use for immediate, momentary vehicle/personnel ingress/egress. They must not be used for ventilation or heat dissipation purposes etc. Induction loop automatic open/close operation is recommended.
- (b) **External Building Fabric:** The construction of the external building fabric to the Reception Building, Process Building and Turbine Hall must achieve the minimum sound insulation performance as set out in Table 6: *(NB: the requirement for acoustic louvres, including louvred doors where applicable, should be particularly noted. The specified acoustic louvres have a depth of 300mm and a free area of c.30%. Others must advise whether this will provide the minimum required ventilation to the building. Further details of the proposed ventilation louvres are provided in Appendix F):*

Building Element	Construction	Minimum Sound Reduction Index (SRI, dB) @ Octave Band Centre Frequency (Hz)							dB R _w
		63	125	250	500	1k	2k	4k	
Cladding	100mm thick insulated cladding panels, (i.e. Europanel s5)	18	22	27	31	31	25	52	30
Roller shutter	Ascot Doors roller shutter	14	14	17	18	15	19	19	18
Personnel doors	Booths 29H 45mm metal door	18	24	25	28	30	29	34	30
Ventilation louvres	Allaway Acoustics' AL3015 single banked acoustic louvre or similar (note c.30% free area)	5	6	8	11	18	25	20	17

Table 6: Minimum required sound insulation performance to be achieved by external building fabric



- (c) **Internal reverberant sound pressure levels:** based upon the list of anticipated internal noise sources and the assumed noise level emissions (as listed in Appendix E), as well as the anticipated sound insulation performance to be provided by the external building fabric, Table 7 sets out the predicted maximum permissible reverberant sound pressure levels to be achieved within the Reception Building, Process Building and Turbine Hall:

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	
Reception Building	Daytime (07:00hrs – 23:00hrs)	90	91	88	87	85	82	79	73	90
	Night Time (23:00hrs – 07:00hrs)	80	81	80	76	78	76	71	66	82
Process Building	Anytime	83	88	80	80	79	76	76	71	84
Turbine Hall	Anytime	73	76	77	79	79	79	80	77	86

Table 7: Maximum permissible reverberant sound pressure levels within buildings

8.3.2 Reception Building

- (d) **Loading Shovels (1 no.):** The loading shovels within the Reception Building are only permitted to operate during the daytime period: 07:00 – 23:00 hours.
- (e) **Deliveries:** Deliveries to and from the site must only take place between the hours of 07:00 to 19:00 Monday to Friday, and between 08:00 to 18:00 hours on Saturdays and Sundays (requirement of Planning Condition 13).
- (f) **Shredders (2 no.):** The shredders within the Reception Building are only permitted to operate during the daytime period: 07:00 – 23:00 hours.
- (g) **Ferrous reject (2 no.):** The ferrous reject within the Reception Building is only permitted to operate during the daytime period: 07:00 – 23:00 hours.

8.3.3 *Process Building*

- (h) **Air fan intakes (16 no.):** Noise from the air intake grille must not exceed 80dB $L_{Aeq,T}$ at one metre distance (maximum, when on full load and as measured on-axis). Attenuator required.
- (i) **Secondary fan intakes (2 no.):** Noise from the secondary fan air intake grilles must not exceed 80dB $L_{Aeq,T}$ at one metre distance (maximum, when on full load and as measured on-axis). Attenuator required.
- (j) **Tertiary fan intake (2 no.):** Noise from the tertiary fan air intake grille must not exceed 80dB $L_{Aeq,T}$ at one metre distance (maximum, when on full load and as measured on-axis). Attenuator required.
- (k) **Flue Gas Mills (4 no.):** An acoustic enclosure is required to each of the flue gas mills, to achieve a maximum allowable sound pressure level of 80dB $L_{Aeq,T}$ at one metre from any surface. Attenuated forced draught ventilation to the enclosure will be needed, complete with run and standby fans (for plant resilience purposes).
- (l) **ID fan inlet attenuator (1 no.):** An inlet attenuator is required inlet splitter attenuator required to be fitted within the ductwork to the ID fan to achieve an insertion loss performance of 15dB(A) or greater.
- (m) **ID fan casing and motor (1 no.):** An acoustic enclosure is required to the ID fan, to achieve a maximum allowable sound pressure level of 80dB $L_{Aeq,T}$ at one metre measuring distance from any surface. Attenuated forced draught ventilation to the enclosure will be needed, complete with run and standby fans (resilience).
- (n) **Blowers (Var):** Make provisions for acoustic enclosures to be fitted to the material blowers ensure that the noise levels produced do not exceed 80dB $L_{Aeq,T}$ at one metre from any surface in each case. Attenuated forced draught ventilation to the enclosure will be needed, complete with run and standby fans (resilience).
- (o) **Diesel generator (1 no.):** The diesel generator to be mounted within the Process Building and fitted with an acoustic enclosure (complete with exhaust gas silencer – separate item). Noise from the casing of the generator enclosure must not exceed sound pressure level of 75dB $L_{Aeq,T}$ at one metre from any surface.
- (p) **Sootblowing (var.):** All sootblowers plant and activities to occur during the daytime period (i.e. between 07:00 - 23:00 hours) only.
- (q) **Pneumatic blow-offs (var.):** All pneumatic blow-offs and solenoids et al, must be fitted with high performance 'Silvent' pneumatic silencers or similar:

<http://www.silvent.com/en-uk/products/?group=1702-air-nozzles>

8.3.4 External

- (r) **Steam silencers (4 no.):** A steam blowoff silencer must be fitted to the outlet of each steam blowoff, in order to achieve a maximum allowable sound pressure level of 80dB $L_{Aeq,T}$ at one metre from each outlet (90° off longitudinal axis), for all possible modes of operation, including worst case.
- (s) **ID fan stack outlet (1 no.):** Noise from the ID fan stack outlet must not exceed a sound pressure level of 75dB $L_{Aeq,T}$ at one metre from stack outlet edge (and 90° off longitudinal axis of the stack) at any design speed/mode. Make provisions for duct attenuator(s) to be fitted to the discharge side of the ID fan (including an allowance for the ensuing attenuator static pressure loss can be accommodated at maximum required gas flowrates).
- (t) **ACC fans (4 no.):** The sound power level of each ACC fan shall not exceed 99dB L_{wA} at maximum operating speed in each case.
- (u) **ACC steam header (1 no.):** Acoustic cladding required to achieve a maximum allowable sound pressure level of 70dB $L_{Aeq,T}$ at one metre distance as during any mode of operation, including steam bypass (and during start up and shut down conditions also).
- (v) **Condensate pumps (2 no.):** An acoustic enclosure is required to the condensate pumps to achieve a maximum allowable sound pressure level of 75dB $L_{Aeq,T}$ at one metre from any external enclosure surface.
- (w) **LPPH pumps (2 no.):** An acoustic enclosure is required to the LPPH pumps to achieve a maximum allowable sound pressure level of 70dB $L_{Aeq,T}$ at one metre from any external enclosure surface.
- (x) **Vacuum skid (1 no.):** Noise from the vacuum skid must not exceed 70dB $L_{Aeq,T}$ at one metre distance from any surface for any design speed/mode (except for emergency). If this noise limit is exceeded, further noise control e.g. acoustic enclosure will be required.
- (y) **Auxiliary cooler (2 no.):** Noise from the auxiliary coolers must not exceed 70dB $L_{Aeq,T}$ at one metre distance. It is likely that a bespoke acoustic package shall be required to be fitted to the coolers.
- (z) **Turbine Bypass outlet (1 no.):** A silencer must be fitted to outlet of the turbine bypass outlet, in order to achieve a maximum allowable sound pressure level of 75dB $L_{Aeq,T}$ at one metre (90° off longitudinal axis), for all possible modes of operation, including worst case.
- (aa) **Diesel generator exhaust outlet (1 no.):** The diesel generator exhaust must be ducted to the roof/façade of the Process Building. Noise from the exhaust must not exceed 75dB $L_{Aeq,T}$ at one metre from the exhaust outlet (90° off longitudinal axis of the exhaust outlet) at any design speed/mode including when fully on load. Make provisions for an exhaust gas silencer to be fitted to the discharge side of the generator exhaust.

- (bb) **Mobile plant:** 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).

8.4 Uncertainty

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...'

In accordance with the requirements of BS4142, 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

Sol has been appointed to provide an environmental noise impact assessment for the proposed Flexible Energy from Waste (“EfW”) site that is to be located off the Houghton Main Colliery Roundabout, Park Spring Road (A6195) in Little Houghton, Barnsley S72 7GX.

The pre-existing environmental noise climate has been determined by direct measurement at the existing noise sensitive receptors (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.

It is the conclusion of this environmental noise impact assessment that the total, aggregate environmental noise impact arising from the proposed operation of the plant, in full compliance with the plant noise specification as presented herein, results in a “low” noise impact at the worst affected noise sensitive receptors, all as assessed in accordance with British Standard BS4142: 2014+A1: 2019. The assessment also indicates that the requirements of Planning Condition 12 of the 2018 Planning Consent (Planning Application number: 2018/1437) are capable of being met.

Noise from the Facility is expected to slightly exceed the “no likely effect” threshold of 55dB $L_{Aeq,T}$ at the nearest ecological receptors (site of special scientific interest – SSSI) as located 13 metres distance to the noise. However, the “no likely effect” threshold will be met at c.10 metres distance into the SSSI site boundary of the worst affected SSSI for daytime periods, and c.3 metres distance into the SSSI site boundary of the worst affected SSSI for night time periods. Further afield, and for all other SSSI, LWS, the predicted specific sound level is expected to fall below the “no likely effect” threshold.



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	<i>SRI</i>	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	<i>DIL</i>	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

Little Houghton, Barnsley S72 7GX.

DATES, TIMES, AND WEATHER CONDITIONS

Date	Daytime (07:00 hours – 23:00 Hours)				Night Time (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
03/02/2023	10	0.0	W	1.5	9	0.0	SW	0.6
04/02/2023	10	0.0	SW	1.9	3	0.0	N	1.4
05/02/2023	4	0.0	N	0.7	-2	0.0	NE	0.5
06/02/2023	4	0.0	NE	0.7	1	0.0	SE	0.6
07/02/2023	2.7	0.0	E	0.5	-	-	-	-

PERSONNEL

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)

Measurement Position 2

- 01dB Cube Sound level meter (serial no. 12069)
- 01dB Pre22 Microphone preamplifier (serial no. 1936019)
- GRAS 40CD Microphone capsule (serial no. 330553)
- 01dB Cal21 acoustic calibrator (serial no. 34675320)
- Vaisala WXT520 Weather Station

Measurement Position 3

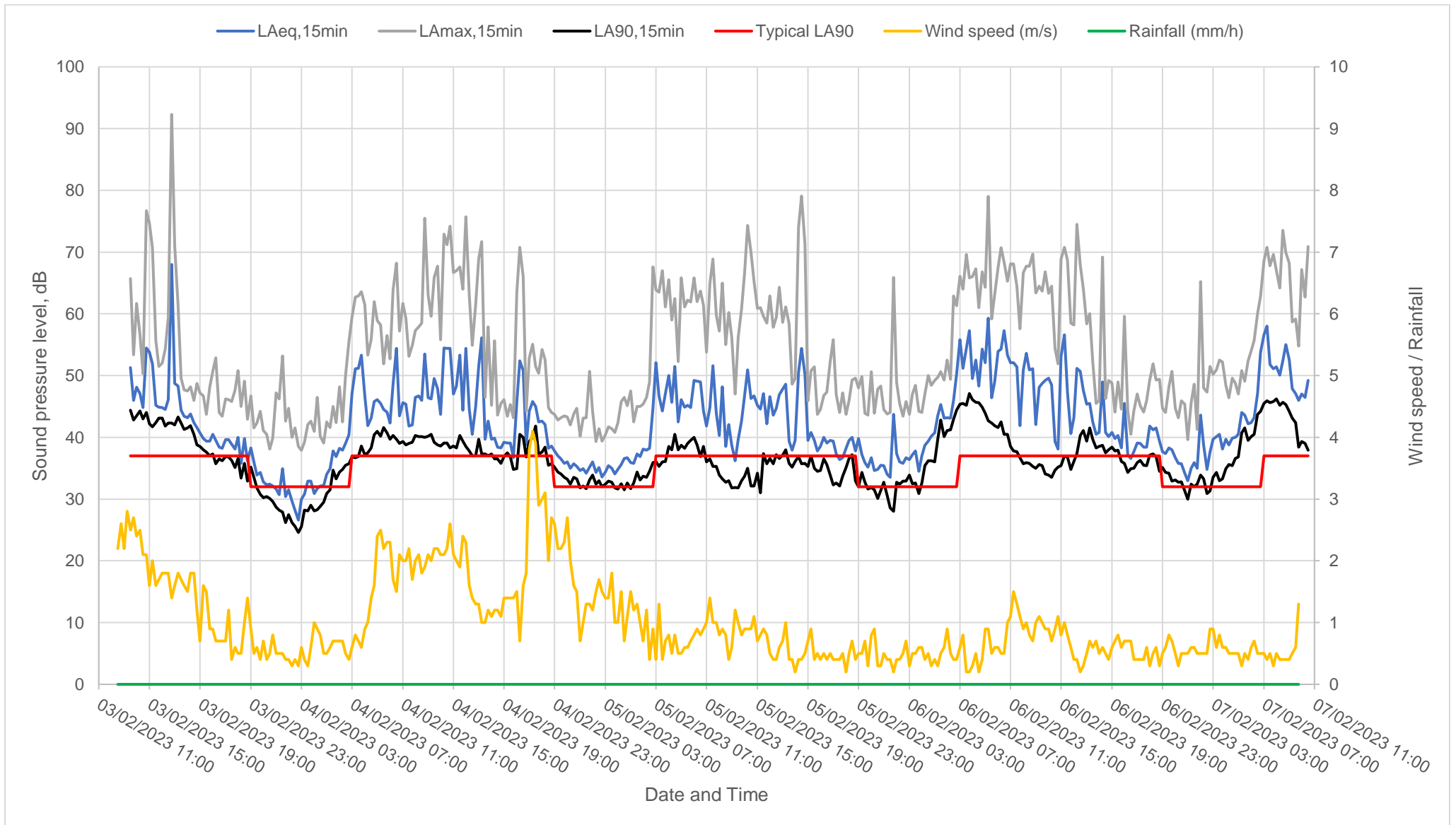
- 01dB Cube Sound level meter (serial no. 11495)
- 01dB Pre22 Microphone preamplifier (serial no. 1805327)
- GRAS 40CD Microphone capsule (serial no. 331753)
- 01dB Cal21 acoustic calibrator (serial no. 34675320)

METHODOLOGY

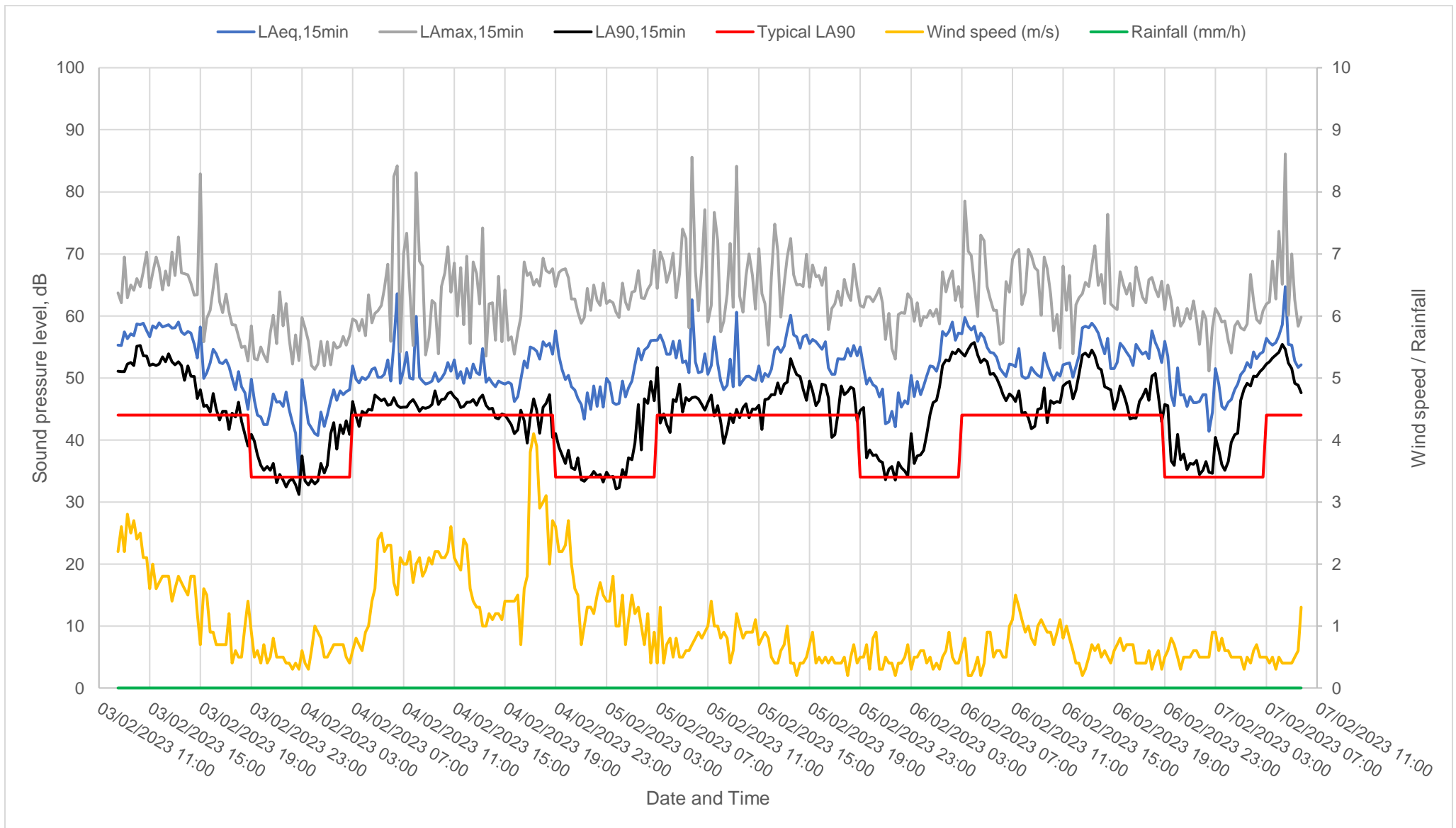
Before and after the measurements the noise monitoring equipment was calibrated to an accuracy of ± 0.1 dB using the Cal 21 Calibrator. The calibrator produces a sound pressure level of 94 dB re 2×10^{-5} Pa @ 1 kHz.

MEASUREMENT RESULTS

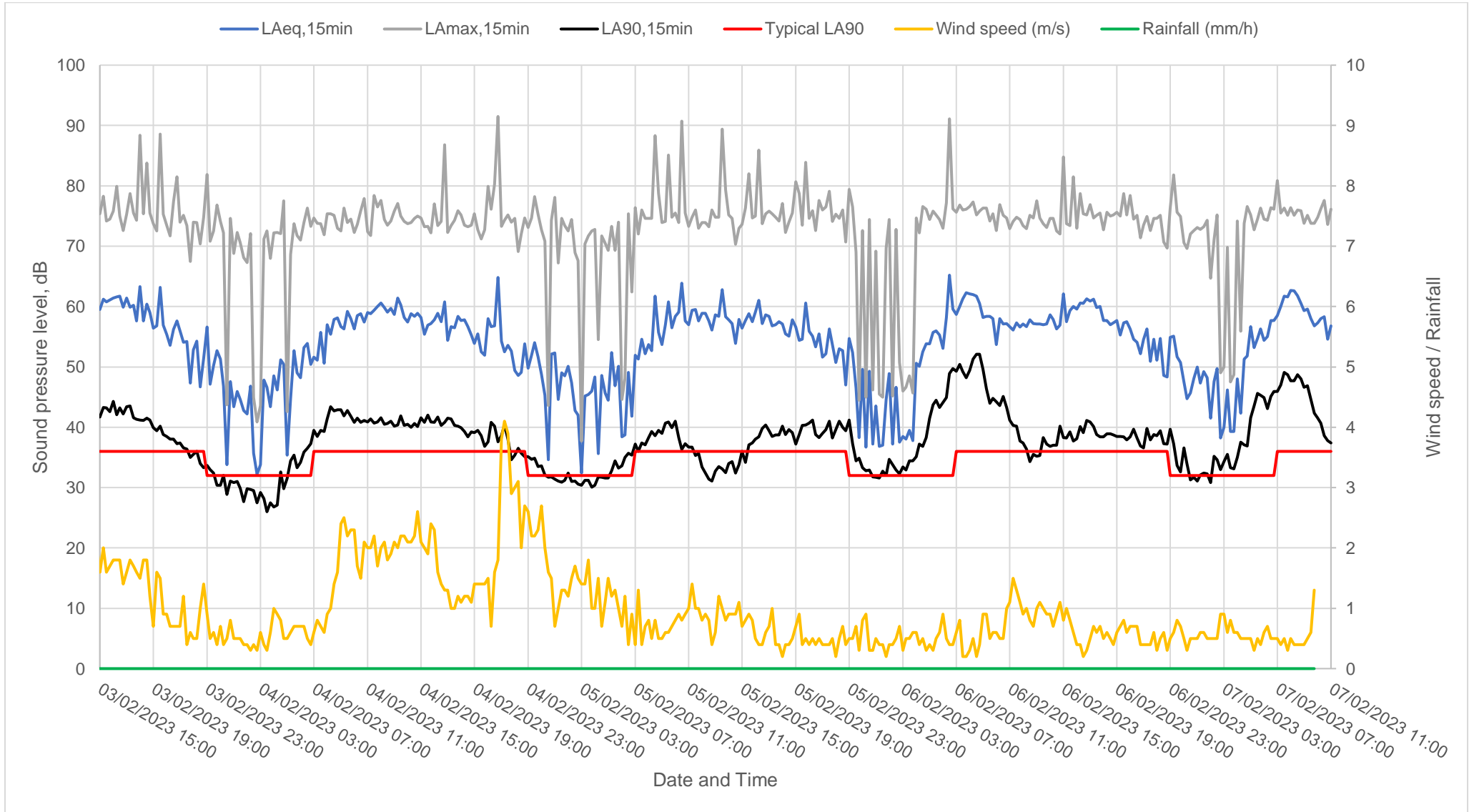
Graphs B1 and B2 summarises the broadband A-weighted results obtained at Measurement Positions 1, 2 and 3 respectively.



Graph B1: A-weighted environmental noise levels at Noise Monitoring Position 1, 3 February to 7 February 2023



Graph B2: A-weighted environmental noise levels at Noise Monitoring Position 2, 3 February to 7 February 2023



Graph B3: A-weighted environmental noise levels at Noise Monitoring Position 3, 3February to 7 February 2023

APPENDIX C
SITE PLAN INDICATING THE LOCATION OF THE NOISE SOURCES

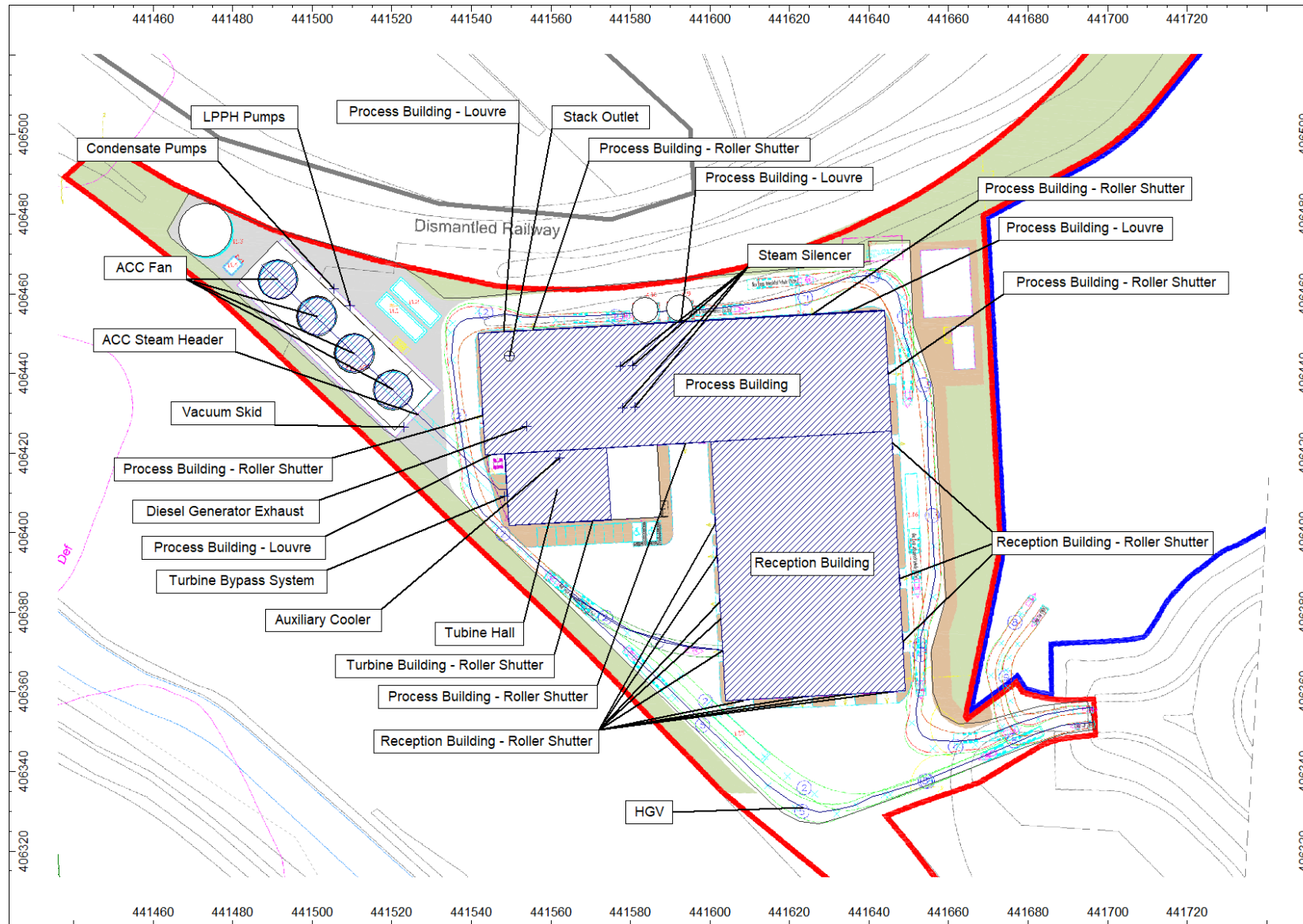


Figure C1: Site plan indicating grid coordinate references x, y coordinates for all external modelled noise sources

APPENDIX D
ENVIRONMENTAL NOISE MODELLING RESULTS

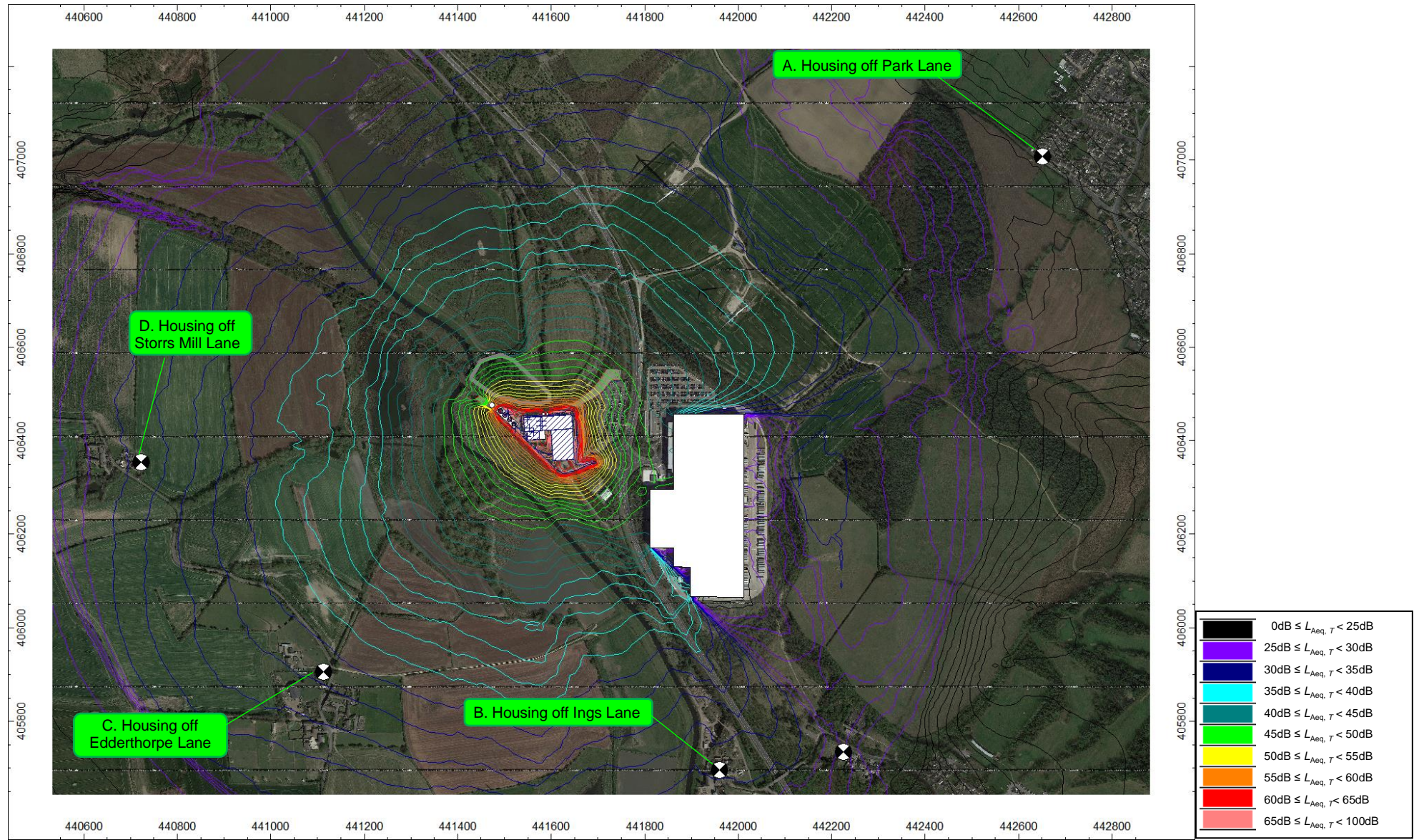


Figure D1: Predicted daytime Specific Sound Level, $L_{Aeq,1hour}$, from the installation, at 4 metres grid height (Google 2023)

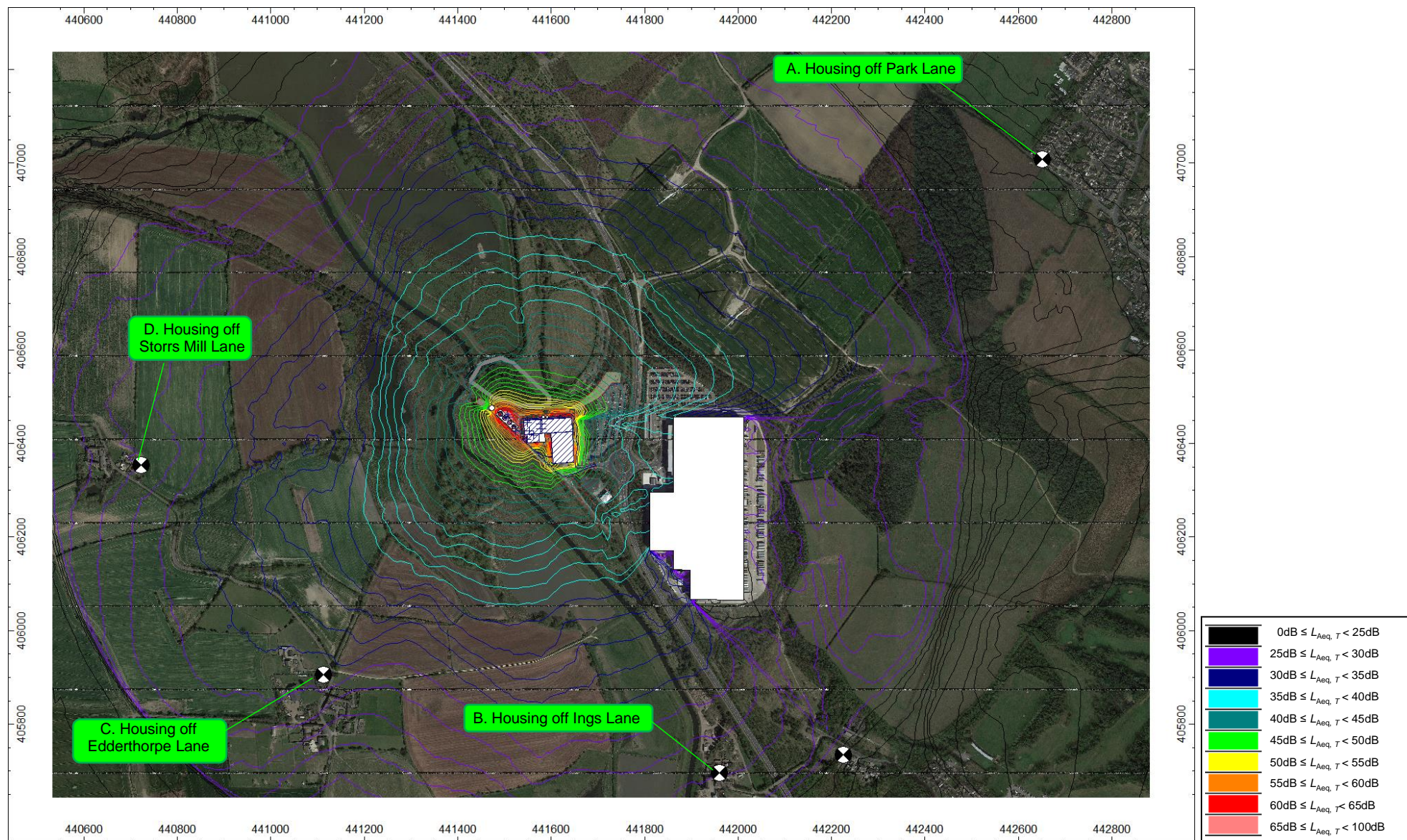


Figure D2: Predicted night time Specific Sound Level, $L_{\text{Aeq},1\text{hour}}$, from the installation, at 4 metres grid height (Google 2023)

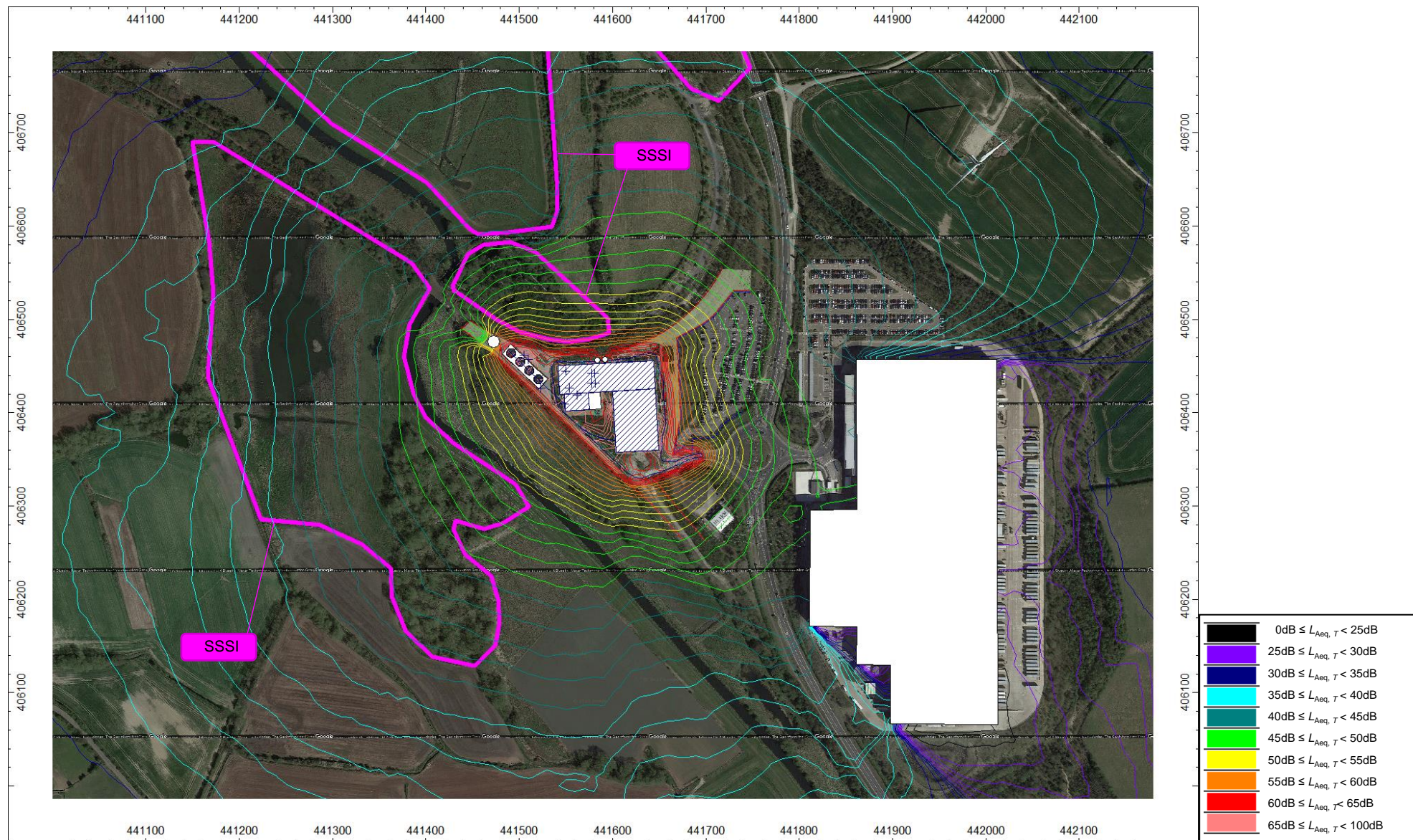


Figure D3: Predicted daytime Specific Sound Level, $L_{Aeq,1hour}$, from the installation, at 4 metres grid height (Google 2023)

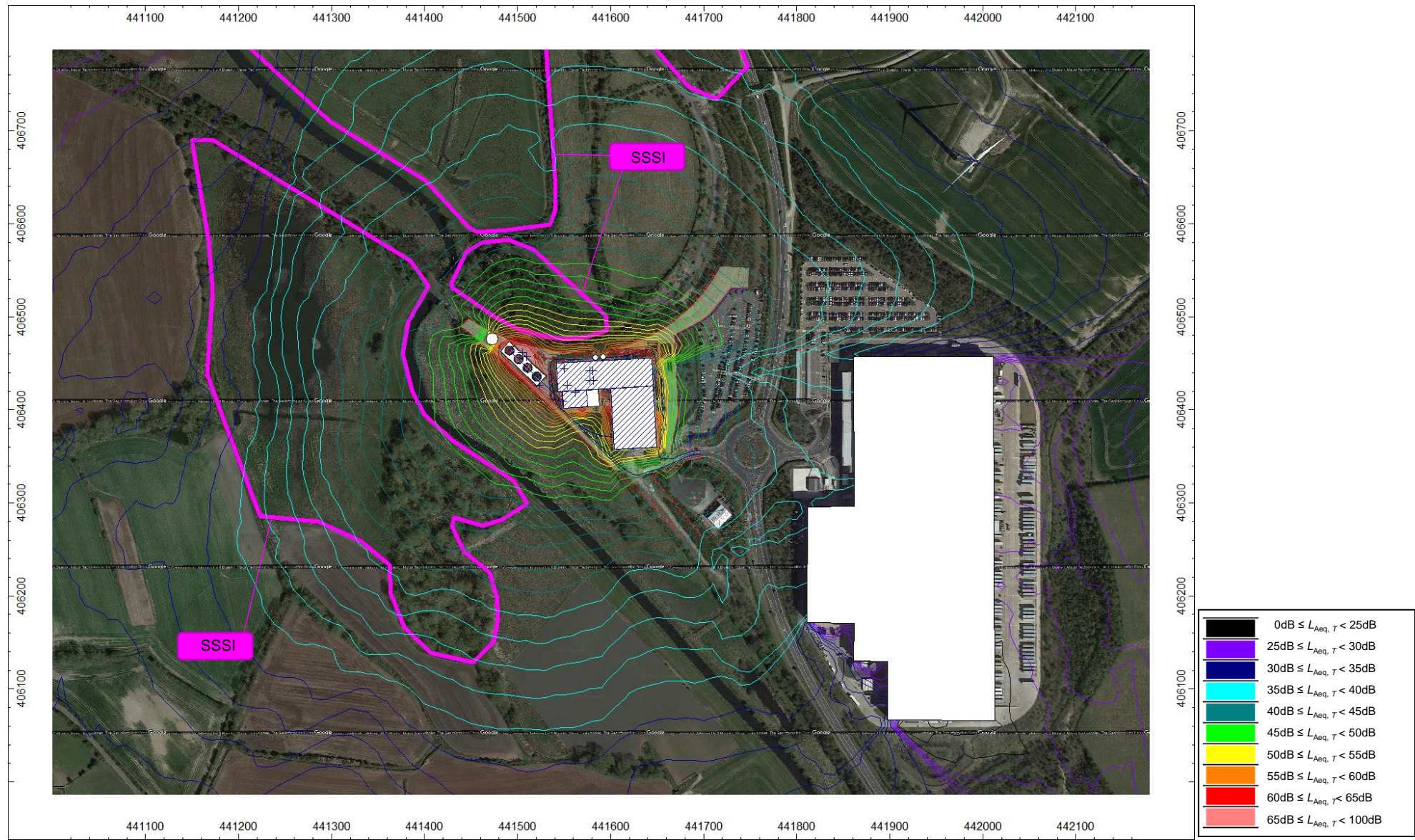


Figure D4: Predicted night time Specific Sound Level, $L_{Aeq,1\text{hour}}$, from the installation, at 4 metres grid height (Google 2023)

A. Housing off Park Lane Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	Specific Sound Level, dB $L_{Aeq,T}$
HGV	20.2
Process Building - Louvre	14.5
Process Building - Cladding	8.4
Reception Building - Cladding	8.2
Steam Silencer	7.4
Steam Silencer	7.4
Reception Building - Roof	7.0
Steam Silencer	6.8
Steam Silencer	6.7
Process Building - Louvre	6.6
ACC Fan	5.0
Stack Outlet	4.8
ACC Steam Header	4.2
Reception Building - Roller Shutter	4.0
Reception Building - Roller Shutter	3.8
Reception Building - Roller Shutter	3.7
ACC Fan	3.3
Process Building - Louvre	2.3
Diesel Generator Exhaust	1.8
Condensate Pumps	1.7
Process Building - Louvre	0.9
ACC Fan	0.8
Process Building - Louvre	0.8
LPPH Pumps	0.6
Process Building - Roof	0.4
ACC Fan	0.4
Auxiliary Cooler	-0.3
Process Building - Roller Shutter	-4.1
Process Building - Roller Shutter	-4.8
Process Building - Roller Shutter	-4.8
Process Building - Roller Shutter	-4.8
Vacuum Skid	-8.3
Reception Building - Roller Shutter	-12.1
Turbine Hall - Roof	-12.3
Reception Building - Roller Shutter	-12.3
Reception Building - Roller Shutter	-12.6
Reception Building - Roller Shutter	-13.2
Total	23.2

Table D1: A. Housing off Park Lane
Specific Sound Levels, daytime

A. Housing off Park Lane Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	Specific Sound Level, dB $L_{Aeq,T}$
Process Building - Louvre	14.5
Process Building - Cladding	8.4
Steam Silencer	7.4
Steam Silencer	7.4
Steam Silencer	6.8
Steam Silencer	6.7
Process Building - Louvre	6.6
ACC Fan	5.0
Stack Outlet	4.8
ACC Steam Header	4.2
ACC Fan	3.3
Process Building - Louvre	2.3
Diesel Generator Exhaust	1.8
Condensate Pumps	1.7
Process Building - Louvre	0.9
ACC Fan	0.8
Process Building - Louvre	0.8
Reception Building - Cladding	0.7
LPPH Pumps	0.6
Process Building - Roof	0.4
ACC Fan	0.4
Auxiliary Cooler	-0.3
Reception Building - Roof	-0.5
Reception Building - Roller Shutter	-3.5
Reception Building - Roller Shutter	-3.7
Reception Building - Roller Shutter	-3.8
Process Building - Roller Shutter	-4.1
Process Building - Roller Shutter	-4.8
Process Building - Roller Shutter	-4.8
Vacuum Skid	-8.3
Turbine Hall - Roof	-12.3
Turbine Bypass System	-15.8
Reception Building - Roller Shutter	-19.6
Reception Building - Roller Shutter	-19.8
Reception Building - Roller Shutter	-20.1
Reception Building - Roller Shutter	-20.7
Total	19.5

Table D2: A. Housing off Park Lane
Specific Sound Levels, night time

B. Housing off Ings Lane Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	Specific Sound Level, dB $L_{Aeq,T}$
HGV	26.2
ACC Fan	18.7
ACC Fan	18.7
ACC Fan	18.5
ACC Fan	18.3
Reception Building - Cladding	17.5
Auxiliary Cooler	16.0
Process Building - Louvre	15.1
Reception Building - Roof	13.6
Reception Building - Roller Shutter	13.2
ACC Steam Header	12.9
Steam Silencer	11.7
Steam Silencer	11.7
Reception Building - Roller Shutter	11.7
Vacuum Skid	11.4
Process Building - Cladding	11.2
Steam Silencer	9.6
Steam Silencer	9.6
Reception Building - Roller Shutter	8.8
Reception Building - Roller Shutter	8.4
Reception Building - Roller Shutter	8.3
Stack Outlet	8.2
Reception Building - Roller Shutter	8.1
Reception Building - Roller Shutter	7.5
Condensate Pumps	7.1
Turbine Building - Roller Shutter	6.5
LPPH Pumps	5.9
Diesel Generator Exhaust	5.9
Reception Building - Roller Shutter	5.2
Turbine Hall - Cladding	4.7
Process Building - Roof	4.1
Reception Building - Roller Shutter	4.1
Reception Building - Roller Shutter	3.9
Process Building - Roller Shutter	2.6
Turbine Hall - Roof	-1.3
Process Building - Louvre	-1.9
Total	30.3

Table D3: B. Housing off Ings Lane
Specific Sound Levels, daytime

B. Housing off Ings Lane Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	Specific Sound Level, dB $L_{Aeq,T}$
ACC Fan	18.7
ACC Fan	18.7
ACC Fan	18.5
ACC Fan	18.3
Auxiliary Cooler	16.0
Process Building - Louvre	15.1
ACC Steam Header	12.9
Steam Silencer	11.7
Steam Silencer	11.7
Vacuum Skid	11.4
Process Building - Cladding	11.2
Reception Building - Cladding	10.0
Steam Silencer	9.6
Steam Silencer	9.6
Stack Outlet	8.2
Condensate Pumps	7.1
Turbine Building - Roller Shutter	6.5
Reception Building - Roof	6.1
LPPH Pumps	5.9
Diesel Generator Exhaust	5.9
Reception Building - Roller Shutter	5.7
Turbine Hall - Cladding	4.7
Reception Building - Roller Shutter	4.2
Process Building - Roof	4.1
Process Building - Roller Shutter	2.6
Reception Building - Roller Shutter	1.3
Reception Building - Roller Shutter	0.9
Reception Building - Roller Shutter	0.8
Reception Building - Roller Shutter	0.6
Reception Building - Roller Shutter	0.0
Turbine Hall - Roof	-1.3
Process Building - Louvre	-1.9
Reception Building - Roller Shutter	-2.3
Turbine Bypass System	-2.3
Reception Building - Roller Shutter	-3.4
Reception Building - Roller Shutter	-3.6
Total	27.1

Table D4: B. Housing off Ings Lane
Specific Sound Levels, night time

C. Housing off Edderthorpe Lane Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	Specific Sound Level, dB $L_{Aeq,T}$
HGV	30.1
ACC Fan	19.8
Reception Building - Cladding	19.7
ACC Fan	19.5
ACC Fan	19.4
ACC Fan	19.1
Auxiliary Cooler	18.4
ACC Steam Header	18.4
Process Building - Louvre	16.1
Reception Building - Roller Shutter	15.8
Reception Building - Roller Shutter	15.7
Reception Building - Roller Shutter	15.7
Condensate Pumps	15.5
Turbine Bypass System	15.5
Vacuum Skid	15.2
Reception Building - Roof	15.2
Reception Building - Roller Shutter	15.1
LPPH Pumps	14.2
Process Building - Cladding	13.6
Reception Building - Roller Shutter	13.6
Steam Silencer	13.3
Steam Silencer	13.3
Turbine Hall - Cladding	11.9
Steam Silencer	11.4
Steam Silencer	11.3
Turbine Building - Roller Shutter	11.3
Stack Outlet	10.1
Reception Building - Roller Shutter	10.1
Reception Building - Roller Shutter	10.1
Reception Building - Roller Shutter	9.9
Process Building - Roller Shutter	8.9
Diesel Generator Exhaust	7.9
Process Building - Roof	5.6
Process Building - Roller Shutter	4.2
Turbine Hall - Roof	0.6
Process Building - Louvre	0.0
Total	33.4

Table D5: C. Housing off Edderthorpe Lane Specific Sound Levels, daytime

C. Housing off Edderthorpe Lane Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	Specific Sound Level, dB $L_{Aeq,T}$
ACC Fan	19.8
Reception Building - Cladding	12.2
ACC Fan	19.5
ACC Fan	19.4
ACC Fan	19.1
Auxiliary Cooler	18.4
ACC Steam Header	18.4
Process Building - Louvre	16.1
Reception Building - Roller Shutter	8.3
Reception Building - Roller Shutter	8.2
Reception Building - Roller Shutter	8.2
Condensate Pumps	15.5
Turbine Bypass System	15.5
Vacuum Skid	15.2
Reception Building - Roof	7.7
Reception Building - Roller Shutter	7.6
LPPH Pumps	14.2
Process Building - Cladding	13.6
Reception Building - Roller Shutter	6.1
Steam Silencer	13.3
Steam Silencer	13.3
Turbine Hall - Cladding	11.9
Steam Silencer	11.4
Steam Silencer	11.3
Turbine Building - Roller Shutter	11.3
Stack Outlet	10.1
Reception Building - Roller Shutter	2.6
Reception Building - Roller Shutter	2.6
Reception Building - Roller Shutter	2.4
Process Building - Roller Shutter	8.9
Diesel Generator Exhaust	7.9
Process Building - Roof	5.6
Process Building - Roller Shutter	4.2
Turbine Hall - Roof	0.6
Process Building - Louvre	0.0
Process Building - Louvre	-3.8
Total	29.4

Table D6: C. Housing off Edderthorpe Lane Specific Sound Levels, night time

D. Housing off Storrs Mill Lane Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	Specific Sound Level, dB $L_{Aeq,T}$
HGV	27.0
ACC Fan	20.4
ACC Fan	20.3
ACC Fan	17.6
Auxiliary Cooler	15.3
ACC Steam Header	14.5
Process Building - Louvre	13.3
Condensate Pumps	12.5
ACC Fan	12.1
LPPH Pumps	11.2
Reception Building - Roller Shutter	11.2
Turbine Bypass System	11.1
Reception Building - Roller Shutter	11.1
Reception Building - Cladding	10.7
Reception Building - Roof	10.2
Vacuum Skid	9.9
Steam Silencer	9.7
Steam Silencer	9.7
Steam Silencer	9.6
Process Building - Cladding	9.6
Steam Silencer	9.5
Stack Outlet	8.5
Process Building - Louvre	8.2
Reception Building - Roller Shutter	7.5
Reception Building - Roller Shutter	7.3
Turbine Hall - Cladding	6.3
Diesel Generator Exhaust	6.0
Process Building - Louvre	5.1
Turbine Building - Roller Shutter	4.7
Reception Building - Roller Shutter	3.9
Reception Building - Roller Shutter	3.2
Process Building - Roof	3.1
Reception Building - Roller Shutter	2.8
Reception Building - Roller Shutter	2.4
Process Building - Roller Shutter	2.1
Process Building - Roller Shutter	-1.9
Total	30.3

Table D7: D. Housing off Storrs Mill Lane Specific Sound Levels, daytime

D. Housing off Storrs Mill Lane Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	Specific Sound Level, dB $L_{Aeq,T}$
ACC Fan	20.4
ACC Fan	20.3
ACC Fan	17.6
Auxiliary Cooler	15.3
ACC Steam Header	14.5
Process Building - Louvre	13.3
Condensate Pumps	12.5
ACC Fan	12.1
LPPH Pumps	11.2
Turbine Bypass System	11.1
Vacuum Skid	9.9
Steam Silencer	9.7
Steam Silencer	9.7
Steam Silencer	9.6
Process Building - Cladding	9.6
Steam Silencer	9.5
Stack Outlet	8.5
Process Building - Louvre	8.2
Turbine Hall - Cladding	6.3
Diesel Generator Exhaust	6.0
Process Building - Louvre	5.1
Turbine Building - Roller Shutter	4.7
Reception Building - Roller Shutter	3.7
Reception Building - Roller Shutter	3.6
Reception Building - Cladding	3.2
Process Building - Roof	3.1
Reception Building - Roof	2.7
Process Building - Roller Shutter	2.1
Reception Building - Roller Shutter	0.0
Reception Building - Roller Shutter	-0.2
Process Building - Roller Shutter	-1.9
Process Building - Louvre	-2.1
Reception Building - Roller Shutter	-3.6
Reception Building - Roller Shutter	-4.3
Reception Building - Roller Shutter	-4.7
Turbine Hall - Roof	-4.8
Total	27.2

Table D8: D. Housing off Storrs Mill Lane Specific Sound Levels, night time



APPENDIX E
NOISE SOURCE SCHEDULE

Equipment Name	Location	Data type	Data Source / Specification	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, L_{WA} , dB	Utilisation		Source: Area (A) Line (L) Point (P) or internal (I)	Comment	Outline Noise Mitigation Design
					31.5	63	125	250	500	1k	2k	4k					8k	Daytime (07:00 - 23:00)			
Duty																					
Internal																					
Reception Building																					
Mobile telehandler / loading shovel	Reception Building	Sound pressure level at 10m distance	Noise spectrum taken from BS5228 Table C.10 reference 5 ("Wheeled loader": 232kW 39t)	1	-	84	88	81	74	74	71	66	65	80	10	628	108	50%	0%	I	Daytime (07:00 – 23:00 hours) operation only
Shredder	Reception Building	Sound pressure level at 1m distance	Client advised sound pressure level of 90dB(A). Typical octave band noise spectrum assumed	2	86	89	89	89	88	84	81	81	73	90	1	172	112	100%	100%	I	Daytime (07:00 – 23:00 hours) operation only
Conveying system	Reception Building	Sound pressure level at 1m distance	No data provided. Typical octave band noise spectrum assumed	2	-	84	83	82	78	81	78	72	55	85	1	107	105	100%	100%	I	Daytime (07:00 – 23:00 hours) operation only
Ferrous reject	Reception Building	Sound pressure level at 1m distance	No data provided. Typical octave band noise spectrum assumed	2	-	84	83	82	78	81	78	72	55	85	1	33	100	100%	100%	I	Daytime (07:00 – 23:00 hours) operation only
Conveying system to feed chute / hopper	Reception Building	Sound pressure level at 1m distance	No data provided. Typical octave band noise spectrum assumed	2	-	84	83	82	78	81	78	72	55	85	1	107	105	100%	100%	I	
Process Building																					
Air fans casing and motor	Process Building	Sound pressure level at 1m distance	Client advised sound pressure level of 75dB(A). Typical octave band noise spectrum assumed	16	73	76	82	72	70	69	66	67	62	75	1	54	92	100%	100%	I	
Air fans intake	Process Building	Sound pressure level at 1m distance	No data provided. Typical octave band noise spectrum assumed	16	81	78	92	80	77	72	63	54	45	80	1	1	80	100%	100%	I	Noise from the air intake grille shall not exceed 80dB $L_{Aeq,T}$ at 1 metre distance (maximum, when on full load and as measured on-axis). Attenuator required
Secondary fan	Process Building	Sound pressure level at 1m distance	Assumed sound pressure level of 85dB(A). Typical octave band noise spectrum assumed	2	83	86	92	82	80	79	76	77	72	85	1	54	102	100%	100%	I	
Secondary fan intake	Process Building	Sound pressure level at 1m distance	No data provided. Typical octave band noise spectrum assumed	2	81	78	92	80	77	72	63	54	45	80	1	1	80	100%	100%	I	Noise from the air intake grille shall not exceed 80dB $L_{Aeq,T}$ at 1 metre distance (maximum, when on full load and as measured on-axis). Attenuator required
Tertiary fan	Process Building	Sound pressure level at 1m distance	Assumed sound pressure level of 85dB(A). Typical octave band noise spectrum assumed	2	83	86	92	82	80	79	76	77	72	85	1	54	102	100%	100%	I	
Tertiary fan intake	Process Building	Sound pressure level at 1m distance	No data provided. Typical octave band noise spectrum assumed	2	81	78	92	80	77	72	63	54	45	80	1	1	80	100%	100%	I	Noise from the air intake grille shall not exceed 80dB $L_{Aeq,T}$ at 1 metre distance (maximum, when on full load and as measured on-axis). Attenuator required
Flue gas treatment fan casing and motor	Process Building	Sound pressure level at 1m distance	Client advised sound pressure level of 75dB(A). Typical octave band noise spectrum assumed	2	73	76	82	72	70	69	66	67	62	75	1	54	92	100%	100%	I	

Equipment Name	Location	Data type	Data Source / Specification	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, L_{WA} , dB	Utilisation		Source: Area (A) Line (L) Point (P) or internal (I)	Comment	Outline Noise Mitigation Design	
					31.5	63	125	250	500	1k	2k	4k					8k	Daytime (07:00 - 23:00)				Night Time (23:00 - 07:00)
Flue gas mills	Process Building	Sound pressure level at 1m distance	Client advised sound pressure level of 95dB(A). Typical octave band noise spectrum assumed	4 (2 standby)	76	77	78	76	78	74	71	68	70	80	1	172	102	100%	100%	I		An acoustic enclosure is required to each of the flue gas mills, to achieve a maximum sound pressure level of 80dB $L_{Aeq,T}$ at 1m distance from any external surface. Attenuated forced draught ventilation to the enclosure will be needed, complete with run and standby fans (resilience)
ID fan casing and motor	Process Building	Sound pressure level at 1m distance	Client advised sound pressure level of 90dB(A). Typical octave band noise spectrum assumed	1	68	68	67	61	64	76	74	72	60	80	1	54	97	100%	100%	I		An acoustic enclosure is required to the ID fan, to achieve a maximum sound pressure level of 80dB $L_{Aeq,T}$ at 1m distance from any external surface. Attenuated forced draught ventilation to the enclosure will be needed, complete with run and standby fans (resilience)
Recirculation fan casing and motor	Process Building	Sound pressure level at 1m distance	Assumed sound pressure level of 85dB(A). Typical octave band noise spectrum assumed	2	83	86	92	82	80	79	76	77	72	85	1	54	102	100%	100%	I		
Boiler	Process Building	Sound pressure level at 1m distance	No data provided. Assumed unattenuated sound pressure level of 75dB(A) at 1m	1	77	76	72	68	73	69	68	65	59	75	1	217	98	100%	100%	I		
Hybrid combustion unit	Process Building	Sound pressure level at 1m distance	No data provided. Assumed unattenuated sound pressure level of 75dB(A) at 1m	1	77	76	72	68	73	69	68	65	59	75	1	217	98	100%	100%	I		
Boiler feed water pumps	Process Building	Sound pressure level at 1m distance	Client advised sound pressure level of 84dB(A). Typical octave band noise spectrum assumed	4 (2 standby)	68	73	74	77	79	78	80	73	71	84	1	12	95	100%	100%	I		
Sodium bicarbonate blower	Process Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	1	77	69	71	79	77	76	70	68	59	80	1	21	93	100%	100%	I		Make provisions for acoustic enclosures to be fitted to the material blowers to ensure that the noise levels produced do not exceed 80dB $L_{Aeq,T}$ at 1m distance from any external surface in each case. Attenuated forced draught ventilation to the enclosure will be needed, complete with run and standby fans (resilience)
PAC blower	Process Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	1	77	69	71	79	77	76	70	68	59	80	1	21	93	100%	100%	I		Make provisions for acoustic enclosures to be fitted to the material blowers to ensure that the noise levels produced do not exceed 80dB $L_{Aeq,T}$ at 1m distance from any external surface in each case. Attenuated forced draught ventilation to the enclosure will be needed, complete with run and standby fans (resilience)
Recirc blower	Process Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	1	77	69	71	79	77	76	70	68	59	80	1	21	93	100%	100%	I		Make provisions for acoustic enclosures to be fitted to the material blowers to ensure that the noise levels produced do not exceed 80dB $L_{Aeq,T}$ at 1m distance from any external surface in each case. Attenuated forced draught ventilation to the enclosure will be needed, complete with run and standby fans (resilience)

Equipment Name	Location	Data type	Data Source / Specification	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, L_{WA} , dB	Utilisation		Source: Area (A) Line (L) Point (P) or internal (I)	Comment	Outline Noise Mitigation Design	
					31.5	63	125	250	500	1k	2k	4k					8k	Daytime (07:00 - 23:00)				Night Time (23:00 - 07:00)
Ash blowers	Process Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	2	77	69	71	79	77	76	70	68	59	80	1	21	93	100%	100%	I		Make provisions for acoustic enclosures to be fitted to the material blowers to ensure that the noise levels produced do not exceed 80dB $L_{Aeq,T}$ at 1m distance from any surface in each case. Attenuated forced draught ventilation to the enclosure will be needed, complete with run and standby fans (resilience)
Screw conveyors	Process Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	2	73	75	75	74	75	80	73	70	67	82	1	63	100	100%	100%	I		
Sootblower	Process Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	10	86	81	85	87	102	98	92	87	73	102	1	12	113	Twice per day	0%	I		
Pneumatic blowoffs	Process Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	var	-	-	-	-	-	-	-	-	-	-	-	-	-			I		All plant (e.g. bag filter plant with blowdown nozzles) to be fitted with pneumatic silencers (e.g. Silvent)
Diesel generator	Process Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	1	82	79	84	78	72	69	63	57	51	75	1	71	94			I	OTNOC operation only	The diesel generator to be mounted within the Process Building. Acoustic enclosure required, complete with exhaust gas silencer also. Noise from the casing of the generator enclosure must not exceed sound pressure level of 75dB $L_{Aeq,T}$ at 1m distance from any external surface
Turbine Room																						
Steam turbine and generator	Turbine Room	Sound pressure level at 1m distance	Manufacturer advised sound pressure level of 85dB(A). Typical octave band noise spectrum assumed	1	71	73	75	76	77	78	78	79	77	85	1	169	107	100%	100%	I		
Gland steam condenser fan	Turbine Room	Sound pressure level at 1m distance	No data provided. Typical octave band noise spectrum assumed	1	59	62	71	77	82	79	79	78	69	86	1	21	99	100%	100%	I		
External																						
Steam silencer	Process Building roof	Sound pressure level at 1m distance	Client advised sound pressure level of 90dB(A). Typical octave band noise spectrum (post silencer) assumed	4	79	78	86	79	76	71	75	69	62	80	1	6	88	100%	100%	P	Bypass operation	A steam blowoff silencer is to be fitted to the outlet of each steam blowoff, in order to achieve a maximum allowable sound pressure level of 80dB $L_{Aeq,T}$ at 1m distance from each outlet (90° off longitudinal axis), for all possible modes of operation, including worst case
Stack outlet	Process Building roof	Sound pressure level at 1m distance	Client advised sound pressure level of 85dB(A). Typical octave band noise spectrum (post silencer) assumed	1	93	94	87	73	66	63	62	64	59	75	1	6	83	100%	100%	P		Noise from the ID fan stack outlet must not exceed a noise level of 75dB $L_{Aeq,T}$ at 1m distance from stack outlet edge (and 90° off longitudinal axis of the stack) at any design speed/mode. Make provisions for duct attenuator(s) to be fitted to the discharge side of the ID fan (including an allowance for the ensuing attenuator static pressure loss can be accommodated at maximum required gas flowrates)

Equipment Name	Location	Data type	Data Source / Specification	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, L_{WA} , dB	Utilisation		Source: Area (A) Line (L) Point (P) or internal (I)	Comment	Outline Noise Mitigation Design	
					31.5	63	125	250	500	1k	2k	4k					8k	Daytime (07:00 - 23:00)				Night Time (23:00 - 07:00)
ACC	North west	Sound pressure level at 1m distance	Manufacturer advised sound pressure level of 87dB(A) at 1.5m. Typical octave band noise spectrum assumed	4 fans	93	94	92	89	83	80	79	74	68	87	1.5	14	99	100%	100%	A		The sound power level of each ACC fan shall not exceed 99dB L_{WA} at maximum speed
ACC steam header	North west	Sound pressure level at 1m distance	No data provided by Client. Not significant during normal operation but expected to be significant during Bypass operation	1	56	55	56	55	56	58	61	66	65	70	1	2.5 (per m)	97	100%	100%	L	Not significant during typical operation	Acoustic cladding required to achieve a maximum allowable noise level of 70dB $L_{Aeq,T}$ at 1m distance as during any mode of operation, including steam Bypass
Condensate pumps	North west	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	2 (1 standby)	75	71	67	69	65	64	67	71	67	75	1	23	89	100%	100%	P		An acoustic enclosure is required to the condensate pumps to achieve a maximum allowable sound pressure level of 75dB $L_{Aeq,T}$ at 1m distance from any external enclosure surface
LPPH pumps	North west	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	2 (1 standby)	73	70	72	67	64	63	66	58	52	70	1	23	84	100%	100%	P		An acoustic enclosure is required to the LPPH pumps to achieve a maximum allowable sound pressure level of 70dB $L_{Aeq,T}$ at 1m distance from any external enclosure surface
Vacuum skid	North west	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	1	79	77	70	67	63	62	65	62	56	70	1	23	84	100%	100%	P		Noise from the vacuum skid must not exceed 70dB $L_{Aeq,T}$ at 1m distance for any design speed/mode. (If this noise limit is exceeded, further noise control e.g. acoustic enclosure will be required)
Auxiliary cooler	Roof of Turbine Building	Sound pressure level at 1m distance	No data provided. Noise data taken from manufacturer confirmed data. Unattenuated unit 100dB(A) L_{WA}	2 (1 standby)	-	70	71	71	68	64	61	56	51	70	1	144	92	100%	100%	P		Noise from the auxiliary coolers shall not exceed 70dB $L_{Aeq,T}$ at 1m distance. It is likely that a bespoke acoustic package shall be required to be fitted to the coolers
Turbine bypass system	Side of Turbine Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	1	84	82	75	72	68	67	70	67	61	75	1	6	83	100%	100%	P	Operates during start-up	A silencer must be fitted to outlet of the turbine bypass outlet, in order to achieve a maximum allowable sound pressure level of 75dB $L_{Aeq,T}$ at 1m distance (90° off longitudinal axis), for all possible modes of operation, including worst case
Diesel generator exhaust	Outside Turbine Building	Sound pressure level at 1m distance	No data provided. Noise data taken from similar project	1	75	77	79	75	73	68	66	63	61	75	1	6	83	100%	100%	P	OTNOC operation only	The diesel generator exhaust must be ducted to the roof/facade of the Process Building. Noise from the exhaust must not exceed 75dB $L_{Aeq,T}$ at 1m distance from exhaust outlet edge (90° off longitudinal axis of the outlet) at any design speed/mode including when on full load. Make provisions for exhaust gas silencer to be fitted to the discharge side of the generator exhaust
Mobile Plant																						
HGV	Site access road, Reception Building	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	5/hour	nil	P		Daytime operation only

Equipment Name	Location	Data type	Data Source / Specification	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	
					31.5	63	125	250	500	1k	2k	4k					8k	Daytime (07:00 - 23:00)				Night Time (23:00 - 07:00)
Fork lift truck	Various	Sound pressure level at 10m distance	Manufacturer sound power level of 93dB L_{WA} . Noise spectrum taken from BS5228 Part 1 2009, Table C.9, ref. no.5	1	-	72	67	61	62	60	57	52	47	65	10	628	93	20%	0%	x		Daytime operation only
Emergency																						
External																						
Firewater pumps	Fire water tank	Sound pressure level at 1m distance	Client advised sound pressure level of 90dB(A). Typical octave band noise spectrum assumed.	1	74	79	80	83	85	84	86	79	77	90	1	12	101			x		

Table E1: Noise source schedule (plant noise levels shall not be exceeded)

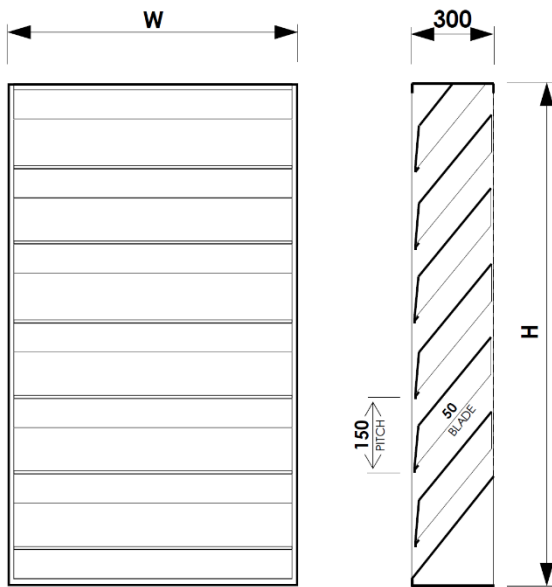
APPENDIX F
DETAILS OF ACOUSTIC LOUVRES USED TO INFORM THE ASSESSMENT

DATA SHEET L70E
ACOUSTIC LOUVRE
MODEL AL3015



THIS IS NOT A STAND ALONE DOCUMENT AND UNLESS REFERRED TO IN A DATED EQUIPMENT SCHEDULE IS SUBJECT TO REVISION WITHOUT NOTICE.

DIMENSIONS



SPECIFICATION

LOUVRES ARE CONSTRUCTED FROM FOLDED SHEET METAL AND HAVE A SERIES OF HORIZONTAL BLADES CONTAINED WITHIN A FOUR SIDED EXTERNAL FRAME.

THE MATERIAL OF CONSTRUCTION MAY BE PRE-GALVANISED STEEL (SUFFIX G) OR ALUMINIUM (SUFFIX A).

GALVANISED BIRD SCREENS ARE FITTED AS STANDARD.

CASING SIDES ARE PROVIDED WITH 10mm DIA HOLES FOR FIXING ADJACENT SECTIONS TOGETHER, OR FIXING THE LOUVRE INTO THE BUILDERSWORK OPENING.

LOUVRES ARE SUPPLIED SELF FINISH AS STANDARD OR WITH AN OPTIONAL POLYESTER POWDER FINISH (SUFFIX P).

NOTES

THIS DATA SHEET IS TO BE READ IN CONJUNCTION WITH THE EQUIPMENT SCHEDULE.

WIDTH (W) AND HEIGHT (H) DIMENSIONS GIVEN ON THE EQUIPMENT SCHEDULE ARE AS MANUFACTURED. ADEQUATE CLEARANCE MUST BE ALLOWED WHEN CONSTRUCTING THE BUILDERSWORK OPENING, A MINIMUM OF 10 mm IS RECOMMENDED.

LOUVRES WILL BE SUPPLIED WITHOUT SUPPORT STEELWORK, CLEATS, BRACKETS, FIXINGS, FLASHING, MASTIC, OR OTHER SUCH ITEMS, UNLESS OTHERWISE STATED.

EXCESSIVELY LARGE OR HEAVY LOUVRES MAY BE MANUFACTURED IN MATING SECTIONS FOR EASE OF HANDLING.

LOUVRES ARE MANUFACTURED TO STANDARD SHEET METAL TOLERANCES OF +/- 3 mm.

SUFFIX

THE SUFFIX DEFINES ADDITIONAL FEATURES OR SPECIAL CONSTRUCTIONAL DETAILS

- G GALVANISED STEEL CONSTRUCTION.
- A ALUMINIUM CONSTRUCTION.
- P POLYESTER POWDER COAT.
- X SPECIAL CONSTRUCTION - REFER TO EQUIPMENT SCHEDULE FOR DETAILS.

WEIGHT

LOUVRE WEIGHTS ARE GIVEN ON THE EQUIPMENT SCHEDULE. APPROXIMATELY:

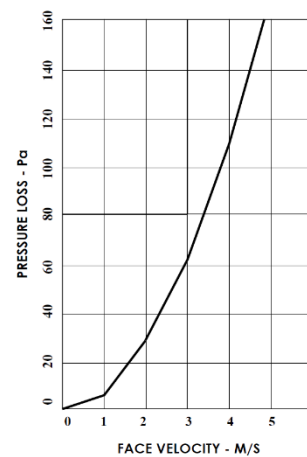
- 52kg/M² GALVANISED CONSTRUCTION
- 37kg/M² ALUMINIUM CONSTRUCTION

ACOUSTIC PERFORMANCE

SOUND REDUCTION INDEX: BS EN ISO 10140 - 2

63	125	250	500	1000	2000	4000	8000	HZ
5	6	8	11	18	25	20	16	dB

PRESSURE LOSS



STANDARD SIZES

THERE ARE NO STANDARD SIZES. ALL LOUVRES ARE MADE TO ORDER.

Figure F1: Details of the proposed AL3015 single banked acoustic louvre

APPENDIX G
CLIENT ADVISED NOISE DATA

The following information is as received by Sol during 21 February 2023:

'... NOISE EQUIPMENT LIST

1 Air fans

8 fans around the equipment. Reference document uploaded.

We can use lower speed (and noise) fans if necessary.

1.1. *Fan-1_1*

- *flow range: 8200 to 10500 m³/h @80°C*
- *total pressure: 3.500 Pa*
- *cca 15 kW installed, operating 11kW*

1.2. *Fan-1_2*

- *flow range: 2700 to 3900 m³/h @80°C*
- *total pressure: 3.500 Pa*
- *cca 5,6 kW installed, operating 4kW*

1.3. *Fan-2_1*

- *flow range: 8200 to 10500 m³/h @80°C*
- *total pressure: 3.500 Pa*
- *cca 15 kW installed, operating 11kW*

1.4. *Fan-2_2*

- *flow range: 2700 to 3900 m³/h @80°C*
- *total pressure: 3.500 Pa*
- *cca 5,6 kW installed, operating 4kW*

1.5. *Fan-3_1*

- *flow range: 8200 to 10500 m³/h @80°C*
- *total pressure: 3.500 Pa*
- *cca 15 kW installed, operating 11kW*

1.6. *Fan-3_2*

- *flow range: 2700 to 3900 m³/h @80°C*
- *total pressure: 3.500 Pa*
- *cca 5,6 kW installed, operating 4kW*

1.7. *Secondary Fan*

- *flow range: 9300 to 11700 m³/h @80°C*

- *total pressure: 3.500 Pa*
 - *cca 12 kW installed, operating 12kW*
- 1.8. *Tertiary Fan*
- *flow range: 4700 to 6500 m³/h @80°C*
 - *total pressure: 3.500 Pa*
 - *cca 11 kW installed, operating 6kW*

2 Air fans

8 fans around the equipment

Same as above.

3 Steam silencers

4 silencers on the roof for dumping steam, max noise 90 dB, can be further reduced by choosing silencers with lower emission.

Silencer angle of sound spread 110° from vertical axes (sound is mostly diverted up)

Attached referral data.

3.1. Feedwater pumps (FW pumps)

Duty-standby operation

Pumps are 160 kW of installed power.

4.6 Noise characteristics

Table 6: Surface sound pressure level $L_{pA}^{2)3)}$

Rated power input P_N [kW]	Pump		Pump set	
	1450 rpm [dB]	2900 rpm [dB]	1450 rpm [dB]	2900 rpm [dB]
2.2	56	57	60	65
3.0	58	60	62	67
4.0	59	61	63	68
5.5	61	63	65	70
7.5	63	65	66	71
9	64	66	68	73
11	65	67	68	73
15	66	68	70	75
18.5	67	69	71	76
22	68	70	72	77
30	69	71	73	78
37	70	72	74	79
45	71	73	75	79
55	71	74	75	80
75	72	74	77	82
90	72	75	77	82
110	73	75	78	83
132	73	76	78	83
160	74	76	79	84
200	75	77	80	85
250	75	78	--	--
315	76	78	--	--

Noise characteristics for higher power ratings/speeds on request.

4 Steam silencers

4 silencers on the roof for dumping steam, max noise 90 dB, can be further reduced by choosing silencers with lower emission.

Silencer angle of sound spread 110° from vertical axes (sound is mostly diverted up)

Attached referral data.

4.1. Feedwater pumps (FW pumps)

Same as above.

5 Flue gas treatment

2 fans, max noise 75 dB

2 mills (duty - stand-by), max noise 95 dB

6 Flue gas treatment

2 fans, max noise 75 dB

2 mills (duty - stand-by), max noise 95 dB

7 ID fan

Flue gas fan, noise max 90 dB, can be reduced with enclosure

ID fan

- *flow range: 105000 to 125000 m³/h @80°C*
- *total pressure: 4300 Pa*
- *cca 336 kW installed, operating 270 kW*

Recirculation fan

- *flow range: 29.000 to 36.000 m³/h*
- *total pressure: 4.500 Pa*
- *cca 52 kW installed, operating 40 kW*

8 ID fan

Flue gas fan, noise max 90 dB, can be reduced with enclosure

ID fan

- *flow range: 105000 to 125000 m³/h @80°C*
- *total pressure: 4300 Pa*
- *cca 336 kW installed, operating 270 kW*

Recirculation fan

- *flow range: 29.000 to 36.000 m³/h*
- *total pressure: 4.500 Pa*
- *cca 52 kW installed, operating 40 kW*

9 Turbine

Documents uploaded.

10 ACC

Documents uploaded.

11 Stack

max noise 85 dB, can be reduced with flue gas silencer

12 Shredders

max noise 90 dB

13 Firewater pumps

max noise 90 dB

Only during emergency.

14 Mobile plant

From the mobile plants, those will be mostly used in enclosed area for RDF (300 mm) loading to shredder hopper.

It will be front loader or bucket tele-forklift (during day shifts).

Additional forklift (small) can be used on site.

15 Diesel generator

Please advise about diesel generator placement.

We have place to position it inside if necessary.

Does that effect fire protection? ...'



APPENDIX H
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	MMath

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.