Appendix 8 – Noise

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Project Helios
Newton, Aycliffe

Environmental Noise Impact Assessment
P1911-REP02-REV D-BDH
14 April 2021

PROJECT HELIOS

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

P1911-REP02-REV D-BDH

PROJECT:	Project Helios Newton, Aycliffe Environmental Noise Impact Assessment
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1 EXECUTIVE SUMMARY

Sol Acoustics Ltd ("Sol") has been appointed to provide an environmental noise impact assessment for the proposed new High Temperature Incineration Plant to be located off Heighington Lane, DL5 6QG (the "Facility").

The purpose of this acoustic assessment is to determine appropriate maximum permissible environmental noise "Rating Level" limits and suggested corresponding "Specific Sound Level" limits to be achieved at all nearby noise sensitive residential housing, during daytime and night time periods, all in accordance with the methodology prescribed in relevant Standards and guidance (i.e. British Standard BS4142: 2014+A1:2019).

These adopted environmental noise limits have been derived from the results obtained from the benchmark environmental noise survey conducted by Sol, as carried out between c.13:00 hours during Friday 11 September and c.15:45 hours during Tuesday 15 September 2020, and also between c.11:00 hours during Wednesday 7 April and c.12:00 hours during Monday 12 April 2021.

This report also provides an acoustic assessment of the environmental noise impact that is expected to arise from the anticipated operation of key plant and processes associated with the proposed Facility at the nearest noise sensitive residential housing (i.e. receptors).

It is the conclusion of this environmental noise impact assessment that the total, aggregate environmental noise impact as arising from the proposed operation of the Facility, with duly implemented Noise Mitigation Plan (NMP), is capable of meeting the specified maximum permissible environmental noise Rating Level limits, resulting in a "low impact" at the worst affected noise sensitive receptors, as during both daytime and night time periods, and all as assessed in accordance with British Standard BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.

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 new High Temperature Incineration Plant to be located off Heighington Lane, DL5 6QG (the "Facility"). The purpose of this acoustic assessment is as follows:

- Identify the nearest pre-existing housing to the site, (i.e. noise sensitive receptors, NSRs), which is most likely to be affected by environmental noise arising from plant and/or processes associated with the operation of the Facility.

- Determine the prevailing, pre-existing daytime and night time background noise climate at the NSRs, through direct, environmental noise measurement.

- Suggest appropriate environmental noise level limits for the Facility, in the form of "Specific Sound Level" and "Rating Level" limits at the identified NSRs, all in accordance with the methodology prescribed in relevant Standards and guidance (i.e. British Standard 4142: 2014+A1:2019).

- Identify key noise sources which are likely to form part of the Facility, such as specific, fixed items of processing plant and machinery, as well as noise generated from HGVs and other mobile plant movements.

- Obtain indicative source noise level data for the various acoustically significant plant items identified (as based on Sol's experience and noise level data as obtained at similar facilities).

- Calculate the resultant environmental noise contribution and impact at the NSRs, as during daytime and night time periods, taking germane factors into account such as distance to receptors, acoustic screening and other environmental features.

- Specify, in outline terms, the likely requirements for any noise mitigation to be implemented such that the environmental noise levels arising from the Facility are capable of achieving the derived Rating Level limits.

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 confirms the results of the benchmark environmental noise survey.
- Section 6 provides a summary of the pertinent acoustic Standard, namely BS4142, for the assessment of the potential noise impact.
- Section 7 provides a summary of the proprietary 3D acoustic models constructed and acoustic calculations undertaken.
- Section 8 provides a BS4142 acoustic assessment, and a summary description of the environmental noise mitigation measures which will be required.
- Section 9 provides a conclusion statement.

3 DESCRIPTION OF SITE

3.1 General Overview and Noise Sensitive Receptors (NSRs)

The Facility is to be located to the south west of the Aycliffe Industrial Estate, i.e. within a predominantly industrial and commercial area. It is to be located immediately adjacent to the existing Hitachi Rail facility.

The nearest pre-existing residential Noise Sensitive Receptors (NSRs) to the Facility are as follows:

A. Housing off Hawthorn Drive, located c.830 metres to the north west

B. Housing at East Field Farm, located c.655 metres to the north west

C. Housing at Brakkes Farm, located c.965 metres to the south west

Figure 1 indicates the location of the Facility in relation to the nearest pre-existing NSRs and other nearby commercial operations, and also the locations of the noise monitoring positions that were used in order to inform the acoustic assessment (these are discussed in Section 4 of this report).

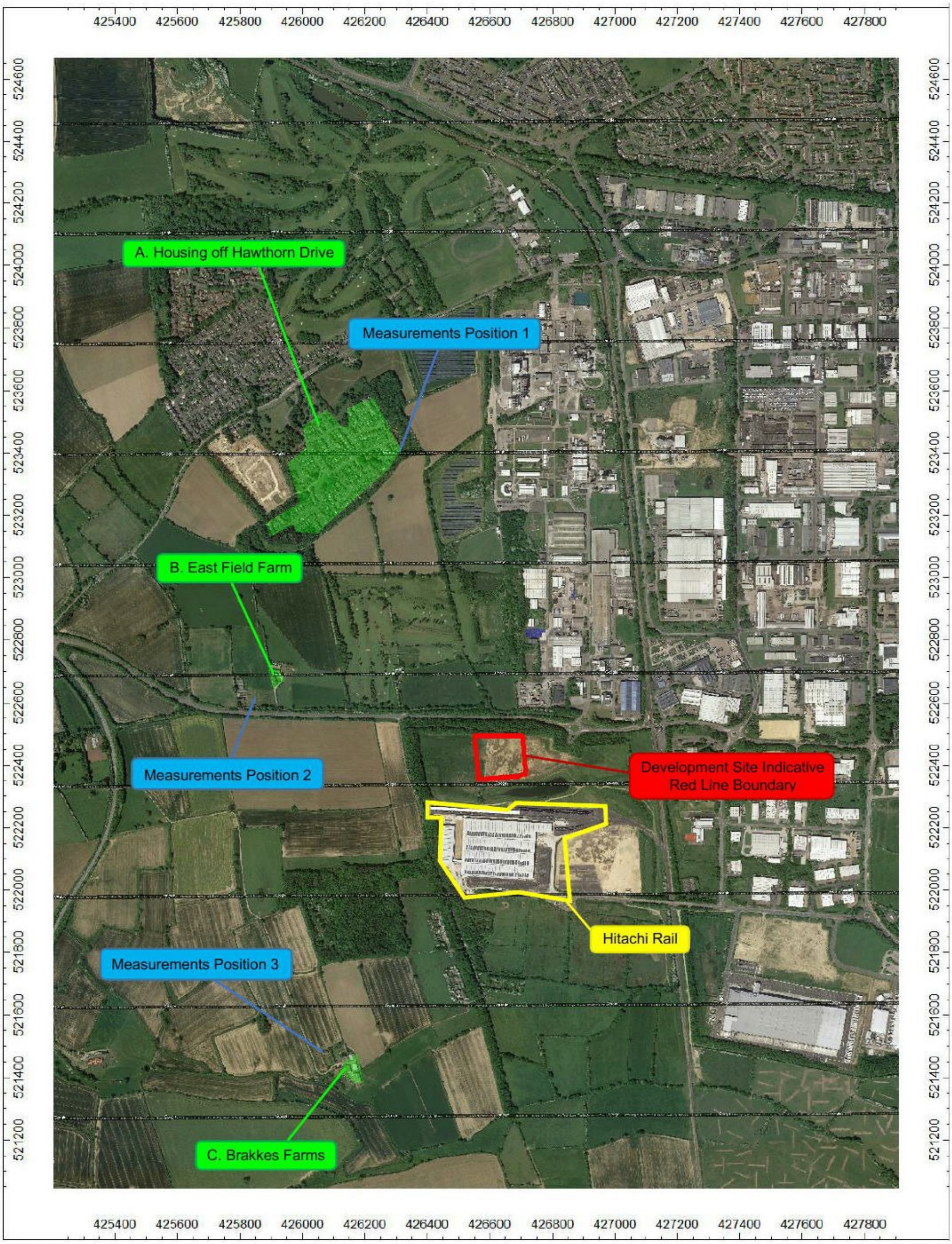

Figure 1: Aerial photography showing noise sensitive receptors and monitoring locations in relation to the Facility

3.2 Characteristics of the Facility

3.2.1 Overview

The Facility is to comprise of a small-scale High Temperature Incineration Plant for the disposal of clinical and hazardous waste. The key aspects of the Facility shall include the following elements:

- Waste reception and storage
- 1.25 tonne per hour high temperature incineration line
- Steam boiler
- Emissions clean-up and abatement, including ash and reagent storage
- Bin cleaning and disinfection
- Loading bay

Figure 2 shows the site plan for the Facility. Figures 3 to 5 show the proposed (lower and upper) ground and mezzanine floor plans respectively.

3.2.2 External Building Fabric

Figures 6 and 7 provides the proposed building elevations. The Facility shall comprise of a single purpose-built steel framed industrial building of approximate dimensions 103 metres long x 51 metres wide, extending to c.17 metres in height at its tallest point.

A “Twintherm” built-up insulated cladding panel construction is proposed to the majority of the external building envelope. Ventilation louvres are located on all sides of the building, and the external façade to the Incineration Plantroom is to be almost entirely louvred.

3.2.3 Mobile Plant

Fork lift trucks shall operate internally within the bin storage area.

3.2.4 Site Deliveries and Collections

The Client has confirmed that the following site deliveries and collections are likely to occur, all as occurring during daytime hours only (i.e. only between 07:00 to 23:00 hours):

- 12 off deliveries of waste per day
- 1 off delivery of lime per week
- 3 off skips collections for ash and general packaging waste per week
- 2 off pallet collection, miscellaneous skip collection, consumable deliveries, and other miscellaneous materials per day

3.2.5 Anticipated Noise Level Emissions

At this stage, the actual/anticipated noise levels expected to be generated by the plant are not yet known. In the absence of specific plant noise level data at the time of reporting (April 2021), this acoustic assessment is based on typical noise level emissions as expected from the identified key plant, as determined by Sol (as based on experience and noise level data as obtained at similar sites), together with individual plant noise limits generated by the 3D noise model.

The actual noise levels generated by the plant may thus differ from those presented herein. It is therefore necessary for an updated environmental noise impact assessment to be carried out prior to finalisation of the detailed scheme design, once full, specific plant details become available to the Operator, in order to confirm that noise emissions from the Facility do not exceed the maximum permissible environmental noise "Rating Level" acoustic performance specification limits specified within this report.

Appendix E provides an indicative inventory of the likely key acoustically significant plant and processes, as identified by Sol from the current development plans for the Facility, which have the potential to create an environmental noise impact at nearby NSRs.

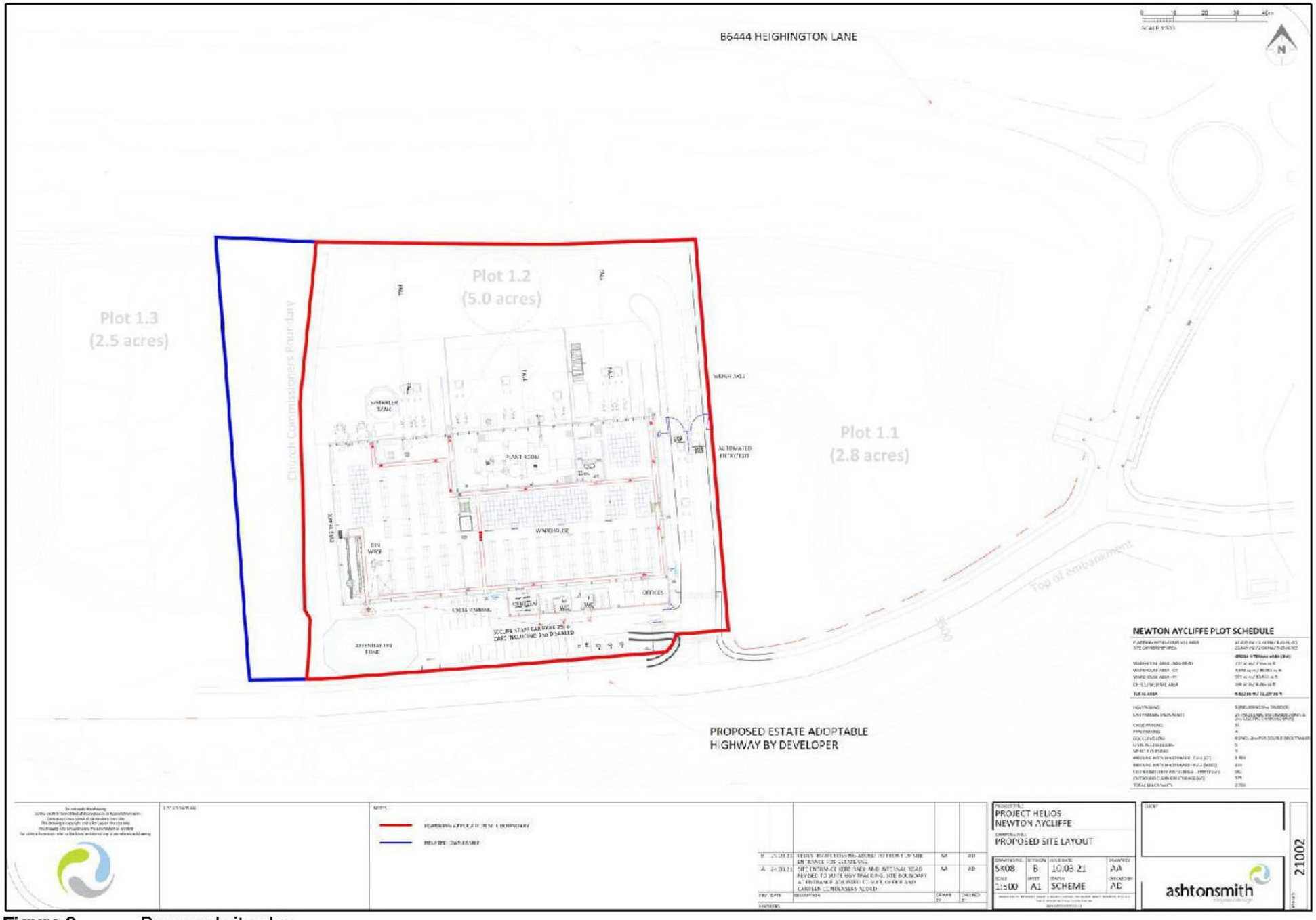

Figure 2: Proposed site plan

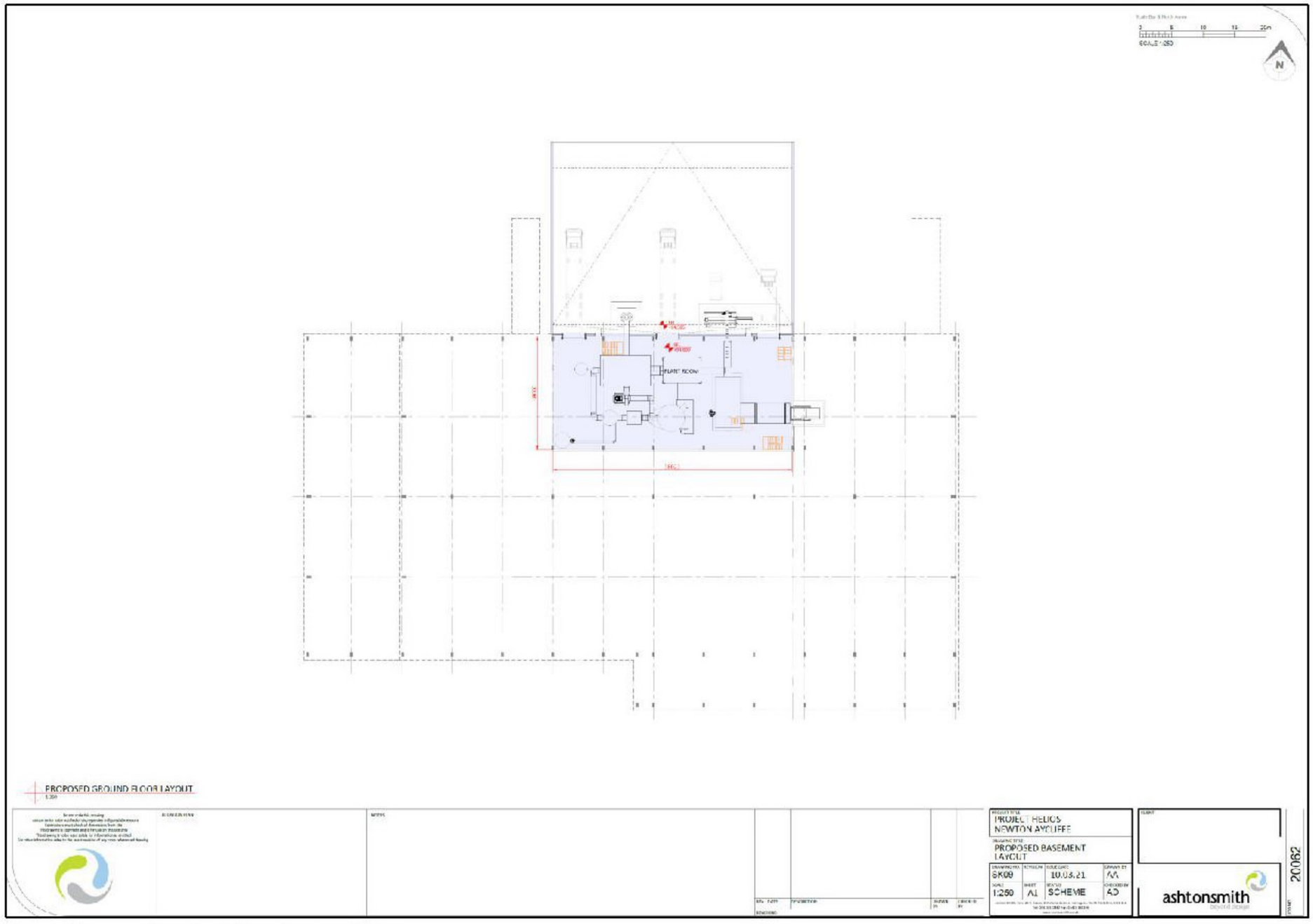

Figure 3: Site plan, (lower) ground floor

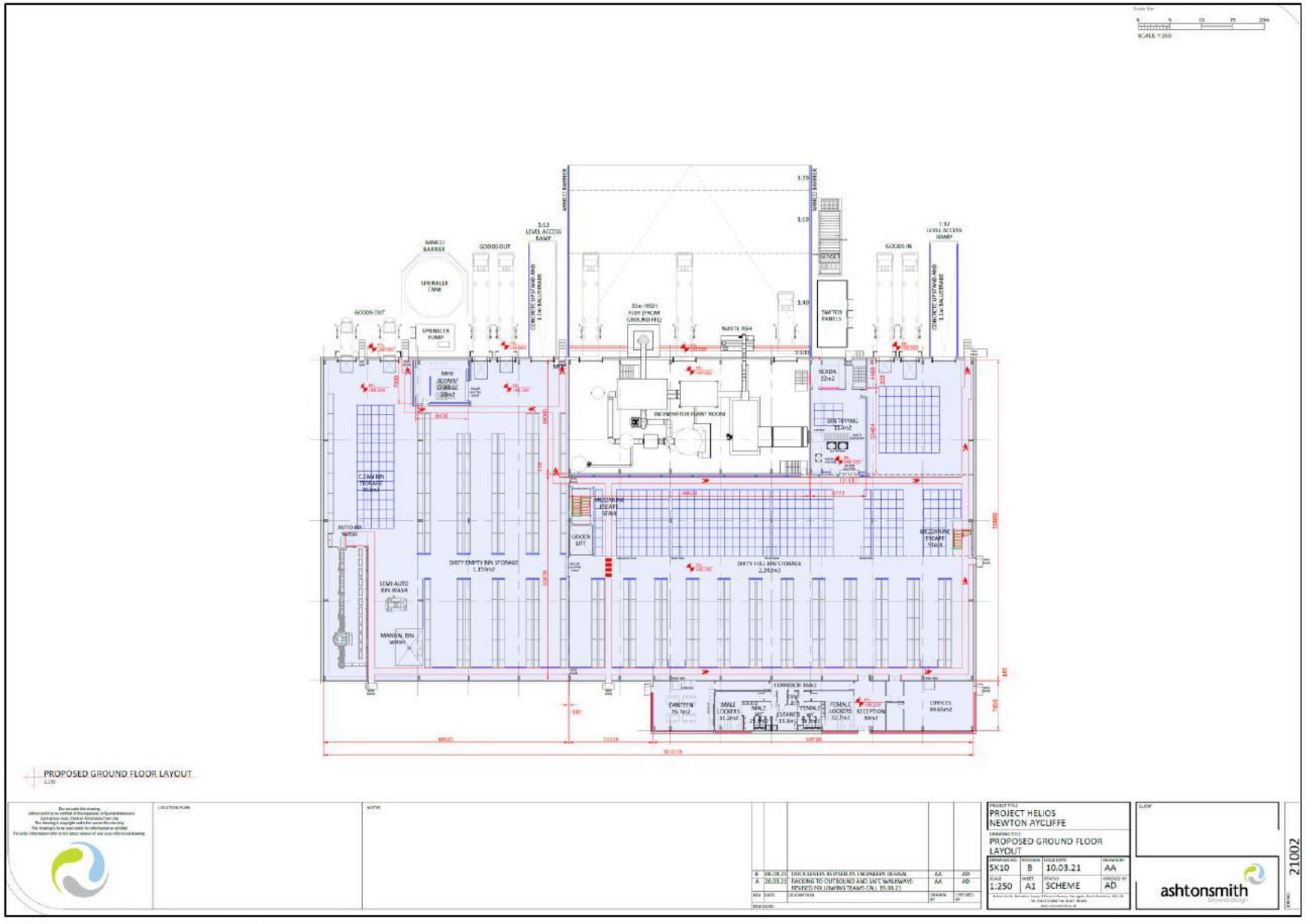

Figure 4: Site plan, (upper) ground floor

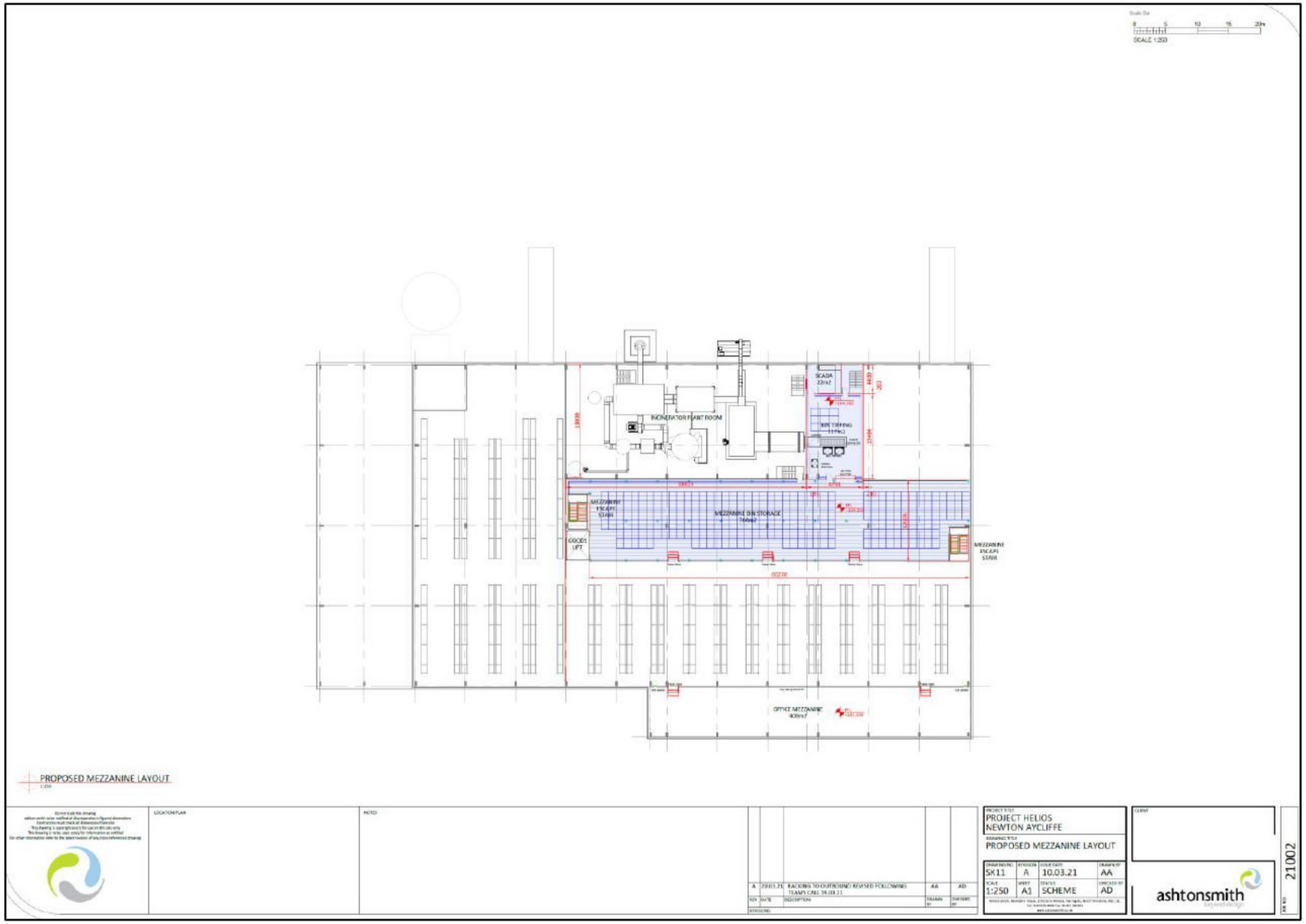

Figure 5: Site plan, mezzanine level

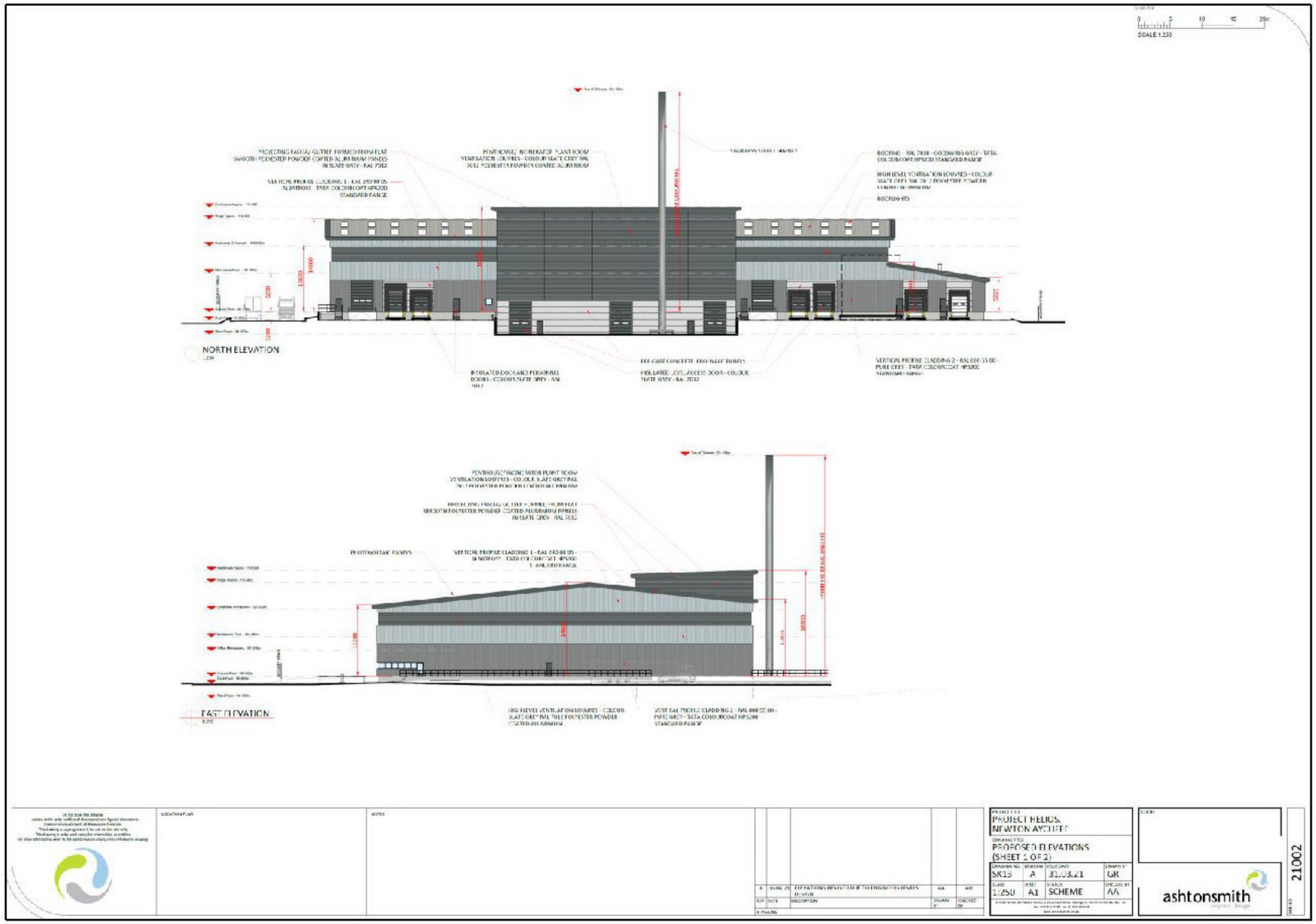

Figure 6: Proposed north and east building elevations

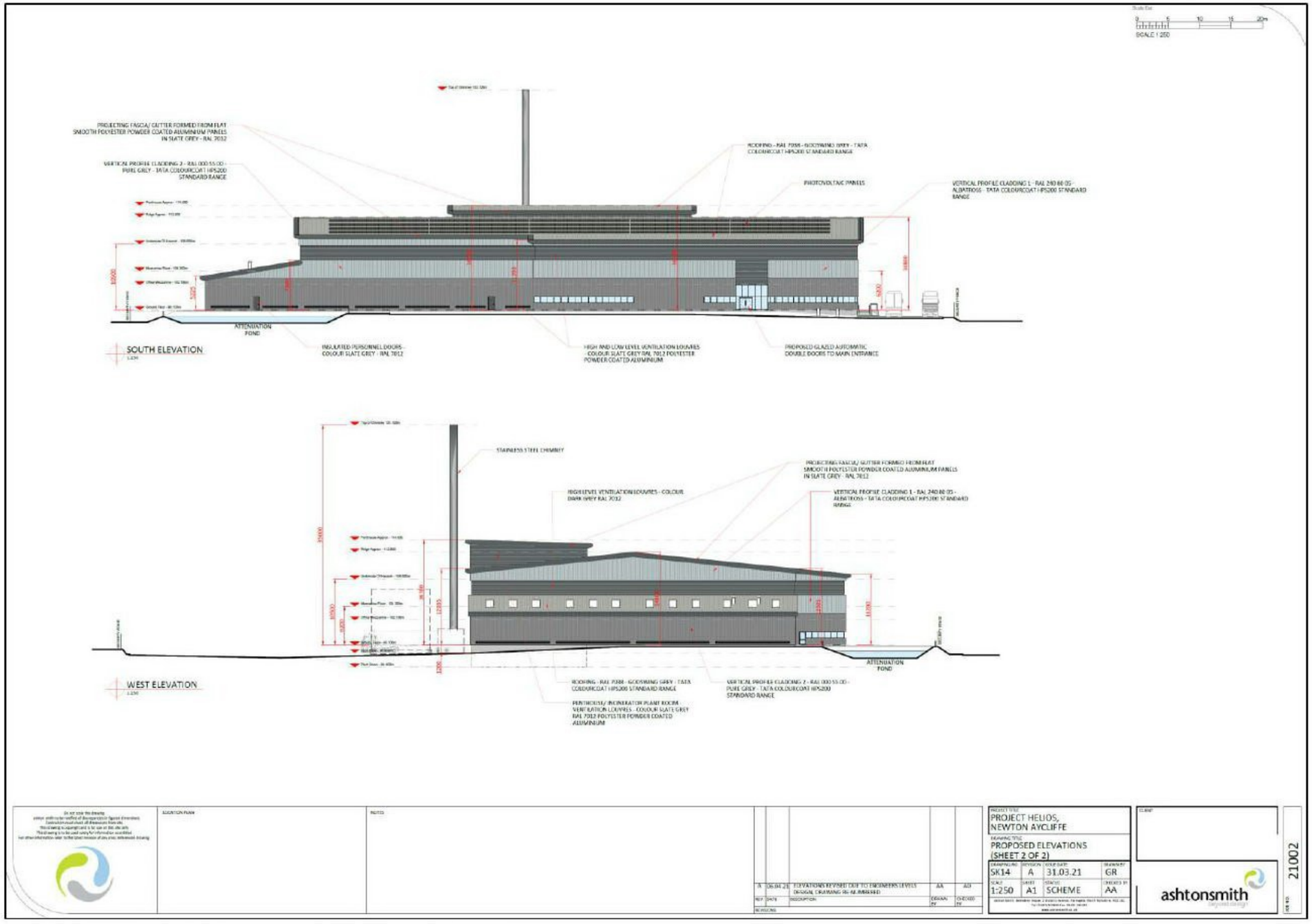

Figure 7: Proposed south and west building elevations

4 DETAILS OF INVESTIGATION

4.1 Pre-Existing Environmental Noise Climate

In order to inform the acoustic assessment, an environmental noise survey have been conducted by Sol between c.12:00 hours during Friday 11 September and c.16:00 hours during Tuesday 15 September 2020, and again between c.11:00 hours during Wednesday 7 April and c.12:00 hours during Monday 12 April 2021. The purpose of the surveys 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 mounted at c.2.1 metres above local ground level within the garden of No. 10 Magnolia Close. Long-term unattended environmental noise levels were recorded at this position between c.13:30 hours during Friday 11 September 2020 and c.20:00 hours during Monday 14 September 2020. Key noise sources included distant road traffic noise from School Aycliffe Lane and birdsong.

- **Noise Monitoring Position 2**: Mast mounted microphone mounted at c.2.0 metres above local ground level along the fence line of East Field Farm. Long-term unattended environmental noise levels were recorded at this position between c.11:00 hours during Wednesday 7 April and c.12:00 hours during Monday 12 April 2021. Key noise sources included road traffic noise on Heighington Lane and birdsong.

- **Noise Monitoring Position 3**: Mast mounted microphone mounted at c.3.0 metres above local ground level fixed to the fence line of Brakkes Farm. Long-term unattended environmental noise levels were recorded at this position between c.10:30 hours during Wednesday 7 April and c.07:30 hours during Monday 12 April 2021. Key noise sources included distant road traffic noise from Heighington Lane, plant noise from the Hitachi Rail Facility and birdsong.

The locations of the noise monitoring positions are shown in Figure 1. The full results are as presented in Appendix B.

The noise survey was carried out using Type 1 Precision Grade noise monitoring equipment, and the complete measuring systems were field calibrated immediately prior to, and following the noise survey period. (Full details of the noise monitoring systems are retained on file by Sol, including traceable calibration records; these are available for review if needed).

Meteorological data was recorded at Noise Monitoring Positions 1 and 3 for the duration of the noise survey, as using a Professional Grade Vaisala “WXT530” weather station. The prevailing weather conditions remained favourable for the whole survey period for the purposes of environmental noise assessment. The average windspeed throughout the survey was less than 5 ms^{-1}.

Notwithstanding the weather conditions recorded, the microphone systems were entirely weatherproofed and fitted with all-weather environmental windshields, each with bird spike.

5 ENVIRONMENTAL NOISE SURVEY RESULTS

5.1 Pre-Existing Environmental Noise Climate

Appendix B provides a detailed time history for the background noise levels as recorded at each of the measurement positions for the duration of the environmental noise survey and provides confirmation of the equipment used.

Table 1 provides a basic summary of the typical overall, A-weighted noise levels measured at each measurement position, in $L_{Aeq,T}$ and $L_{A90,T}$ terms. The specific, measured noise levels pertinent to the required BS4142 environmental noise assessment are highlighted in ***bold, italic*** text:

Measurement Position	Date	Daytime (07:00 Hours - 23:00 Hours)		Night Time (23:00 Hours – 07:00 Hours)	
		dB $L_{Aeq,16hour}$	dB $L_{A90,15min}$ (Typical)	dB $L_{Aeq,8hour}$	dB $L_{A90,15min}$ (Typical)
1	Friday 11 September 2020	45[1]	***34***	38	***31***
	Saturday 12 September 2020	52	38	54	40
	Sunday 13 September 2020	51	41	40	35
	Monday 14 September 2020	43[1]	38	-	-
2	Wednesday 7 April 2021	59[1]	42	55	***32***
	Thursday 8 April 2021	61	47	54	33
	Friday 9 April 2021	60	***40***	52	42
	Saturday 10 April 2021	57	42	49	40
	Sunday 11 April 2021	56	41	54	***32***
	Monday 12 April 2021	61[1]	43	-	-
3	Wednesday 7 April 2021	43[1]	38	41	***25***
	Thursday 8 April 2021	53	47	42	29
	Friday 9 April 2021	43	37	41	36
	Saturday 10 April 2021	43	***36***	41	35
	Sunday 11 April 2021	45	39	42	31
[1] Measurement not conducted for the full 16-hour daytime assessment period					

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

6 ENVIRONMENTAL NOISE PERFORMANCE SPECIFICATION REQUIREMENTS

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

British Standard BS4142: 2014+A1: 2019: '*Method for rating and assessing industrial and commercial sound*' (BS4142) is intended to be used to assess environmental noise of an industrial nature, which includes sound from fixed installations, which comprise mechanical and electrical plant and equipment.

The procedure contained in BS4142 for assessing the 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 "Background Sound Level". Where the noise contains attention attracting characteristics (i.e. acoustic features) such as tonal, impulsive, intermittent elements, it may be appropriate to apply a correction to the Specific Sound Level to obtain the "Rating Level".

BS4142 states that the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level and the context in which the sound occurs:

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the Rating Level is relative to the measured Background Sound Level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the Rating Level does not exceed the Background Sound Level, this is an indication of the specific sound source having a low impact, depending on the context.

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

In full accordance with BS4142 methodology, the context in which the sound occurs must be taken into consideration when demining the magnitude of the noise impact. In this case, the Facility is located within an existing and operational industrial estate. Industrial noise from the proposed Facility is expected to be within context of the site and the surroundings and as such, the context of the site is not expected to affect the magnitude of the noise impact generated.

On this basis, and based upon the results of the environmental noise survey, Table 2 confirms appropriate maximum permissible Rating Level limits which shall be applicable to Facility at each of the identified NSRs in order to achieve a BS4142 defined *Low Impact*:

Noise Sensitive Receptors	**Representative Noise Measurement Position**	**Maximum Permissible Noise Rating Level Limit, dB $L_{Ar,Tr}$, for BS4142 defined *Low Impact***	
		Daytime (07:00 hours – 23:00 hours)	**Night Time (23:00 hours – 07:00 hours)**
Housing off Hawthorn Drive (north west of the Facility)	1	34	31
Housing at East Field Farm (west of the Facility	2	40	32
Housing at Brakkes Farm (south west of the Facility)	3	36	25

Table 2: Maximum permissible Rating Level limits, dB $L_{Ar,Tr}$, to achieve a BS4142 defined *low impact*

The above maximum permissible noise level limits are specified in terms of the BS4142 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.

At the time of reporting (April 2021), it is not possible to confirm the actual acoustic character that is expected to be present for noise specifically being emitted by the Facility, when perceived at the surrounding residential housing. However, environmental noise emissions from the Facility should be controlled such that the total aggregate noise level from all plant and processes does not include any discernible acoustic character (i.e. such as tonal, impulsive, intermittent features), for all normal operating condition and other than normal operating condition states (i.e. “NOC” and “OTNOC” respectively).

BS4142 states that ‘… *Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied …*’ On this basis, Table 3 overleaf provides the corresponding maximum permissible Specific Sound Level limits which are applicable to the aggregate noise level emissions from all plant and processes associated with the Facility at the identified NSRs.

Noise Sensitive Receptors (Residential Housing)	Representative Noise Measurement Position	Maximum Permissible Specific Sound Level Limit, dB $L_{Aeq,T}$, for BS4142 defined *low Impact*	
		Daytime (07:00 hours – 23:00 hours)	Night Time (23:00 hours – 07:00 hours)
Housing off Hawthorn Drive (north west of the Facility)	1	31	28
Housing at East Field Farm (west of the Facility)	2	37	29
Housing at Brakkes Farm (south west of the Facility)	3	33	22

Table 3: Maximum permissible Specific Sound Level limits, dB $L_{Aeq,T}$, (no discernible tonal, impulsive, intermittent features present)

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 building all the noise models:

(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 second 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 plant 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 at the worst affected NSRs during both the daytime and night time periods has been determined at a receptor grid height of 4 metres above local ground level to approximate first floor (bedroom) height.

(f) Sol is advised that the proposed building shall be of a steel frame construction with "Twintherm" cladding to the external walls and roof. Construction details of other building elements have not been determined. In the absence of full details at the time of reporting (April 2021), this acoustic assessment has been based on the sound insulation performance of a basic doorset and acoustic rated roller shutter (as well as acoustic rated ventilation louvres), all as summarised in Table 4. 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.

Building Element	Construction	Sound Reduction Index (SRI, dB) @ Octave Band Centre Frequency (Hz)							dB R_w
		63	125	250	500	1k	2k	4k	
Façade cladding and roof	Twintherm cladding by CA group	15	19	30	42	45	50	66	41
Rooflights	Kingspan KS1000 DLTR	13	9	12	17	22	24	19	21
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 (bin storage)	Allaway Acoustics type AL1515 single bank acoustic louvre or similar *(note c.30% free area)*	4	4	5	8	12	16	15	12
Ventilation louvres (incineration room)	Allaway Acoustics type AL3015 single bank 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

(g) The composite sound insulation performance for each façade and roof has been calculated as based on the sound insulation performance presented in Table 4 and proposed building elevations as presented in Figures 6 and 7. The corresponding composite calculations are shown in Appendix F.

(h) The noise contribution from the identified plant proposed to be installed within the building has been predicted from the derived sound power level of each identified new 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 2.5 seconds have been assumed within the Bin Storage Room and a reverberation time of 2.0 seconds has been assumed within the Incineration Plantroom (note: much of the external façade to the Incineration Plantroom is louvred).

(i) Noise breakout from internal plant have been modelled by determining the level of noise radiated from the external building fabric of the building based upon the assessment methodology provided within British Standard *BS12354-4:2000: 'Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 4: Transmission of indoor sound to the outside'*. The sound power level per unit area for each external building element has been determined from the predicted resultant reverberant sound pressure level calculations for each room by applying a "diffusivity term", as defined in BS12354-4 and subtracting the calculated composite sound insulation performance of each building face. Specifically, a diffusivity term of -5dB have been assumed.

(a) The noise model assumes that on average up to three HGVs could arrive at and depart from the Facility during a typical 1-hour daytime assessment period. No HGV are expected to at or depart the Facility during the night-time period.

Figure 8 provides a three-dimensional visualisation of the noise model used to inform the noise impact assessment. The location of all modelled noise sources is shown in Appendix C.

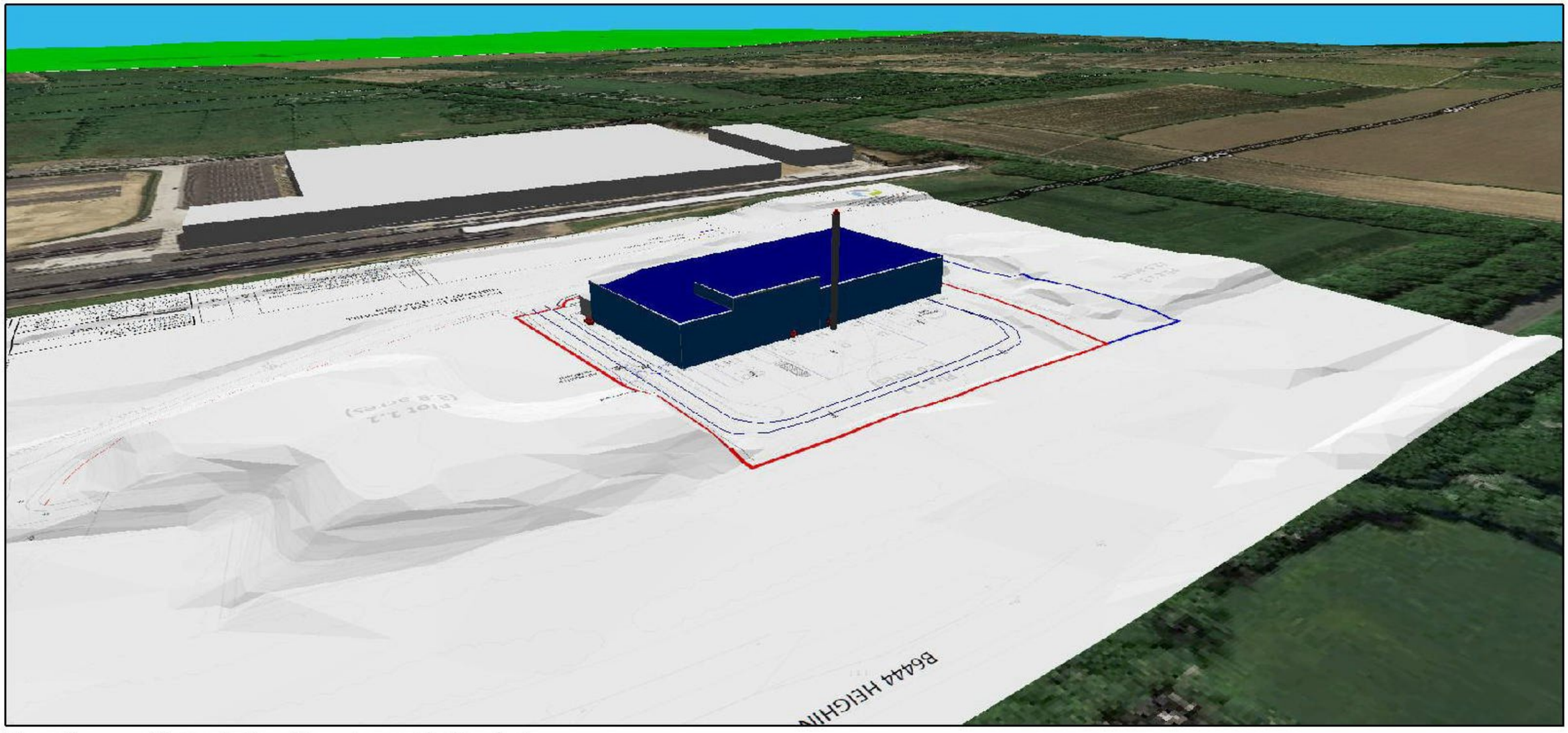

Figure 8: 3D visualisation of the noise model of the plant

8 ENVIRONMENTAL NOISE IMPACT ASSESSMENT

8.1 BS4142 Assessment

Table 5 presents the predicted indicative overall A-weighted, BS4142-defined "Rating Level" at the identified NSRs with the Noise Management Plan as presented in Section 8.2 duly and fully implemented. 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 noise level tables presented within Appendix D that the noise contribution from all individual noise sources is below the existing Background Sound Level in each case. 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 existing environmental noise climate.

Furthermore, whilst individual noise sources associated with the Facility are likely to generate noise with a particular acoustic character (i.e. such as tonal, impulsive, intermittent features), it is considered that such features would not be as prominent when observed when the remainder of the plant is running. For example, the tonal character of any individual noise source is likely to be less prominent when observed whilst other noise sources of similar magnitude, each with its own distinctive acoustic features, are running.

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 $L_{Aeq,T}$**	**Predicted Rating Level, dB $L_{Ar,Tr}$**	**Maximum Permissible Noise Rating Level Limit, dB $L_{Ar,Tr}$, for BS4142 Defined *Low Impact***	**Exceedance, dB**
Hawthorn Drive (north west of the Facility)	Daytime (07:00hrs - 23:00hrs) T = 1 hour	29	32	34	-2
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	26	29	31	-2
Housing at East Field Farm (west of the Facility	Daytime (07:00hrs - 23:00hrs) T = 1 hour	29	32	40	-8
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	28	31	32	-1
Housing at Brakkes Farm (south west of the Facility)	Daytime (07:00hrs - 23:00hrs) T = 1 hour	21	24	36	-12
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	21	24	25	-1

Table 5: Indicative BS4142 summary assessment (NMP fully implemented)

Thus, the total, aggregate environmental noise impact as arising from the proposed operation of the Facility, with duly implemented Noise Mitigation Plan (NMP), is capable of meeting the specified maximum permissible environmental noise Rating Level limits, resulting in a “low impact” at the identified NSRs, during both daytime and night time periods, all as assessed in accordance with BS4142.

8.2 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 and 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 once this information becomes available:

(a) **Mobile plant**: All HGVs, forklifts etc. under the direct control of the Operator shall only use non-intrusive broadband noise type vehicle reversing alarms and/or reversing cameras. There shall be no use of pulsed and/or tonal reversing alarms (e.g. reversing bleepers).

(b) **External building fabric**: The construction of the external building fabric shall 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 G*):

Building Element	Typical Construction	Sound Reduction Index (SRI, dB) @ Octave Band Centre Frequency (Hz)							dB R_w
		63	125	250	500	1k	2k	4k	
Cladding and roof	Twintherm cladding by CA Group	15	19	30	42	45	50	66	41
Rooflights	Kingspan type KS1000 DLTR	13	9	12	17	22	24	19	21
Roller shutter	Ascot Doors roller shutter	14	14	17	18	15	19	19	18
Personnel doors	Booths type 29H 45mm metal door	18	24	25	28	30	29	34	30
Ventilation louvres (bin storage)	Allaway Acoustics' type AL1515 single banked acoustic louvre or similar *(note c.30% free area, 300mm depth)*	4	4	5	8	12	16	15	12
Ventilation louvres (incineration room)	Allaway Acoustics' type AL3015 single banked acoustic louvre or similar *(note c.30% free area, 300mm depth)*	5	6	8	11	18	25	20	17

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

(c) **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.

(d) **ID fan stack outlet**: Noise from the ID fan stack outlet shall not exceed 75dB $L_{Aeq,T}$ at 1 metre from stack outlet edge, 90º off longitudinal axis of the stack for any and all required fan speeds and 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).

(e) **ID fan casing and motor**: An acoustic enclosure shall be required to the ID fan casing and motor, encapsulating any exposed flexible connectors within the adjoining ductwork, to achieve a sound pressure level of 75dB $L_{Aeq,T}$ at 1 metre from any external acoustic enclosure surface(s), including where ductwork and pipe penetrations occur. Attenuated, fan-assisted ventilation to the acoustic enclosure shall be needed, complete with separate run and standby fans (plant resilience) and attenuators.

(f) **Pneumatic blow-offs**: All pneumatic blow-offs and solenoids *et al*, such as those associated with the bag filter (Baghouse), must be fitted with high performance 'Silvent' pneumatic silencers or similar. Typical product link:

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

8.3 Uncertainty

Section 10 of BS4142: 2014 (BS4142) 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 have 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. Periods of adverse weather conditions have been excluded from the assessment.

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.

Once the Noise Management Plan has been agreed, implemented and installed on site, Sol advises that comprehensive, post-completion acoustic testing be carried out to ensure that the noise impact has been suitably controlled.

9 CONCLUSION

Sol has been appointed to provide an environmental noise impact assessment for the proposed new High Temperature Incineration Plant to be located off Heighington Lane, DL5 6QG.

The purpose of this acoustic assessment is to determine appropriate maximum permissible environmental noise Rating Level limits and suggested corresponding Specific Sound Level limits for the Facility to be achieved at all nearby noise sensitive residential housing, during daytime and night time periods, all in accordance with the methodology prescribed in relevant Standards and guidance (i.e. British Standard BS4142: 2014+A1:2019).

This acoustic assessment report provides an indicative assessment of the environmental noise impact as expected to arise from the anticipated operation of key plant and processes associated with the proposed Facility at the nearest noise sensitive residential housing.

It is the preliminary conclusion of this environmental noise assessment that, subject to the limitations described below, the total, aggregate environmental noise impact as arising from the proposed operation of the Facility, with duly implemented Noise Mitigation Plan (NMP), is capable of meeting the specified maximum permissible environmental noise Rating Level limits, resulting in a "low impact" at the worst affected noise sensitive receptor, during both daytime and night time periods, and all as assessed in accordance with British Standard BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.

It should be noted, however, that at the time of reporting (April 2021) the actual/anticipated noise levels expected to be generated by the plant are not yet formally determined/advised to Sol. In the absence of confirmed noise level data, therefore, this acoustic assessment has been necessarily based on estimated plant noise level emissions as expected from the identified key plant, as based on Sol's experience and plant noise database as obtained from other similar projects.

The actual noise levels generated by individual plant/processes may thus differ from those presented herein. It is therefore necessary for an updated environmental noise impact assessment to be carried out prior to finalisation of the detailed scheme design, once full, specific plant details become available to the Operator, in order to confirm that noise emissions from the Facility do not exceed the maximum permissible environmental noise Rating Level acoustic performance specification limits for noise sensitive receptors as specified within this report.

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APPENDIX A
GLOSSARY OF ACOUSTIC TERMS

Term	Abbreviation	Description
Sound Pressure Level	L_{pA}	A measure of the (usually instantaneous) A-weighted sound pressure level. Typically expressed in dB(A) referenced to 2 x 10^{-5} Pascals.
Equivalent Continuous Sound Level	$L_{Aeq,T}$	The steady level of sound over a prescribed time period (T) which would contain the same total sound energy as the actual fluctuating noise under consideration as during the same time period (time-averaged noise level).
Statistical Sound Levels	L_{A10} and L_{A90}	The A-weighted sound pressure level that is statistically exceeded for a percentage of the time period being sampled, either 10% or 90% respectively.
Background Sound Level	$L_{A90,T}$	The A-weighted sound pressure level of the residual noise at an assessment position (e.g. receptor) that is statistically exceeded for 90% of a given time period (T).
Maximum Sound Level	L_{Amax}	The maximum sound or noise level recorded during a defined measurement time interval, with sound measuring instrumentation set to either a fast time weighting, L_{AFmax}, or a slow time weighting, L_{ASmax}.
Sound Power Level	L_{wA}	A measure of the total A-weighted sound energy radiated from a source (e.g. item of plant). Like sound pressure levels this is also expressed in dB(A), albeit referenced to 1 x 10^{-12} W.
Broadband		Noise data comprising of a wide frequency range (e.g. $L_{Aeq,T}$), as opposed to octave, one-third octave or narrow frequency band noise data.
Narrow-band		Acoustic Energy over a restricted range of frequencies. Used to identify the frequency of audible tones, and to assist in identifying sources of noise in a complex sound environment (e.g. via prominent, tell-tale narrow frequency spectrum).
Ambient Sound		Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
Specific Sound Level	$L_{eq,Tr}$	The Equivalent Continuous A-Weighted Sound Level at an assessment position produced by a specific sound over a given referred time interval, Tr
Rating Level	$L_{Ar,Tr}$	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 a degree such that it no longer contributes to the ambient sound.
Sound Reduction Index	SRI	The reduction in sound energy when transmitted through a panel or similar planar element, used typically 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.
Dynamic Insertion Loss	DIL	Reduction in acoustic energy resulting from the insertion of a noise control element (e.g. an attenuator).

APPENDIX B
NOISE SURVEY DETAILS AND SUMMARY RESULTS

LOCATION

Newton Aycliffe

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	Average Wind Speed, m/s	Temp, °C	Rain, mm/h	Wind Direction	Average Wind Speed, m/s
11/09/2020	15	0.1	SW	0.7	12	0.0	SW	0.4
12/09/2020	15	0.0	SW	0.8	15	0.0	SW	1.2
13/09/2020	18	0.0	W	1.0	12	0.0	S	0.4
14/09/2020	19	0.0	S	0.3	12	0.0	W	0.3
15/09/2020	21	0.0	S	0.3	-	-	-	-
07/04/2021	5	0.0	NW	2.1	1	0.0	SW	0.4
08/04/2021	8	0.1	SW	1.8	4	0.9	W	2.2
09/04/2021	5	0.9	NE	1.2	-2	0.0	N	0.7
10/04/2021	4	0.1	NE	1.4	-1	0.0	NW	1.7
11/04/2021	3	0.3	NW	2.1	-2.	0.0	NW	1.0

PERSONNEL

Ciaron Murphy AMIOA – Sol
Dr Tim Walton AMIOA – Sol

INSTRUMENTATION

Measurement Position 1

01dB Cube sound level meter (serial no. 11117)
01dB Pre22 microphone preamplifier (serial no. 1610404)
GRAS 40CD microphone capsule (serial no. 260827)
01dB Cal21 acoustic calibrator (serial no. 34675320)
Vaisala WXT520 Weather Station (serial no. M3640013)

Measurement Position 2

01dB Cube Sound level meter (serial no. 11114)
01dB Pre22 Microphone preamplifier (serial no. 1610399)
GRAS 40CD Microphone capsule (serial no. 260807)
01dB Cal21 acoustic calibrator (serial no. 34375244)

Measurement Position 3

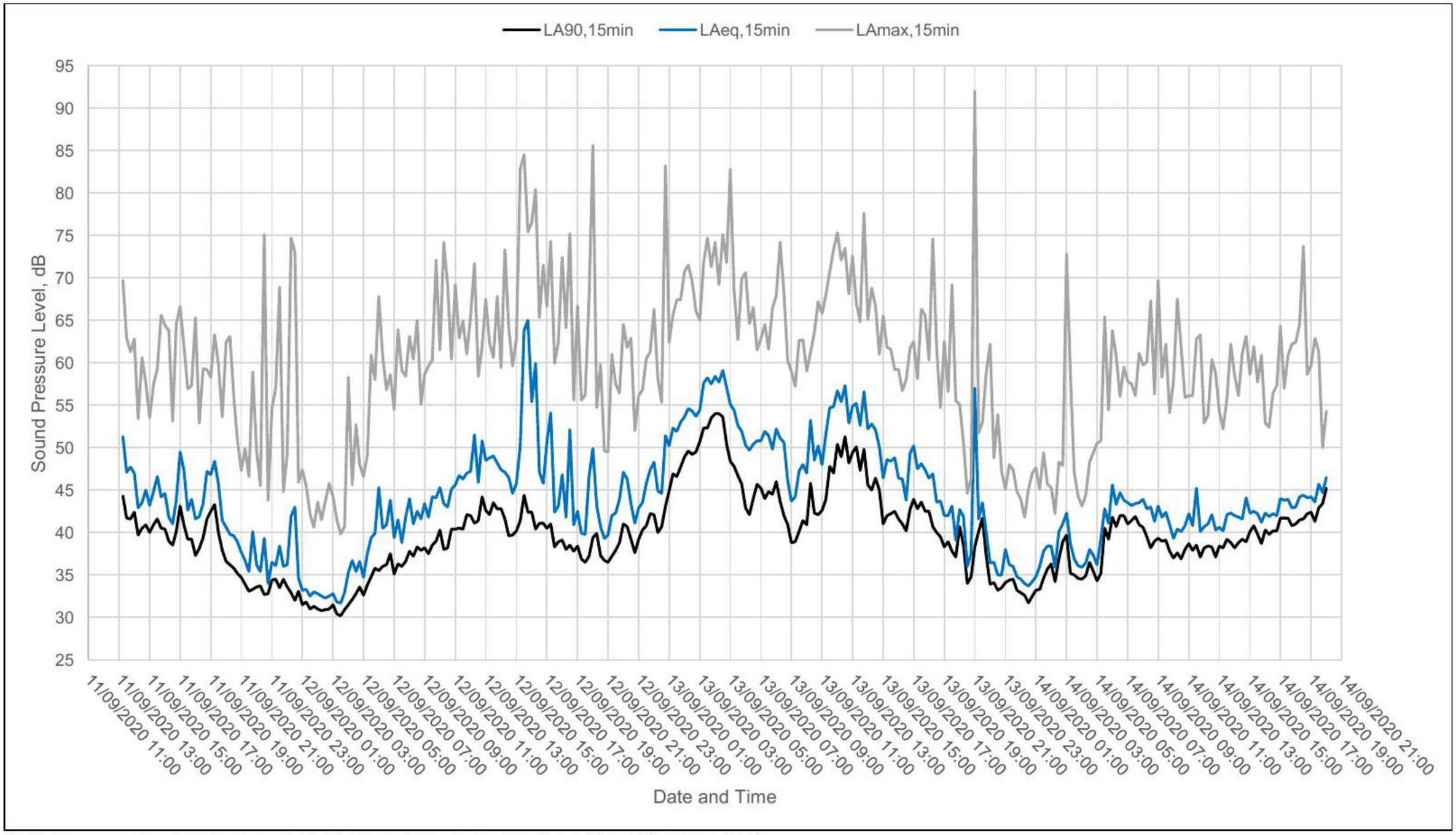
01dB Cube Sound level meter (serial no. 11117)
01dB Pre22 Microphone preamplifier (serial no. 1610404)
GRAS 40CD Microphone capsule (serial no. 260827)
01dB Cal21 acoustic calibrator (serial no. 34375244)
Vaisala WXT520 Weather Station (serial no. M3640013)

METHODOLOGY

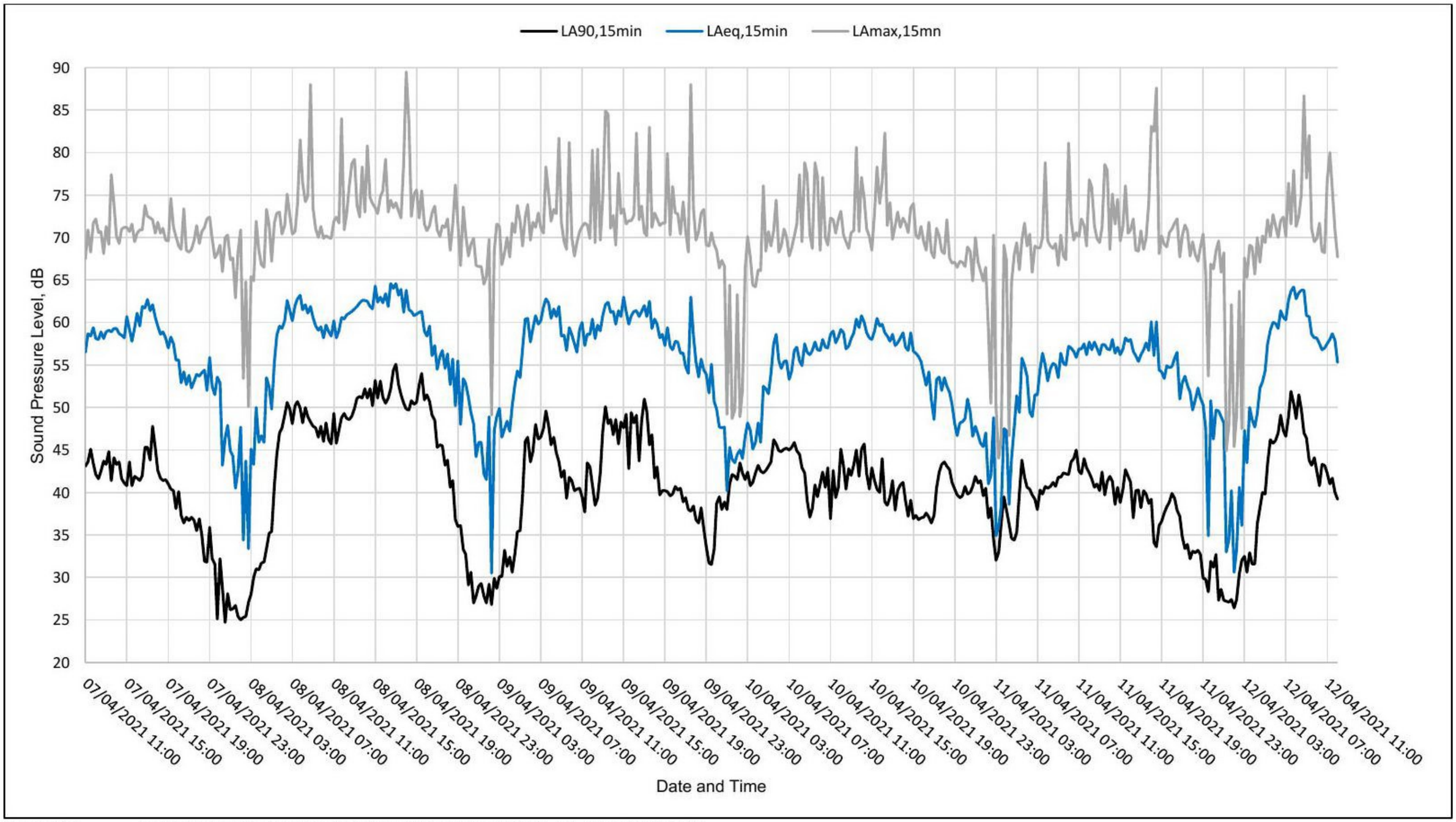
Before and after the measurements the noise monitoring equipment was calibrated to an accuracy of ±0.3dB using the Cal 21 Calibrator. The calibrator produces a sound pressure level of 94dB re 2 x 10^{-5} Pa @ 1kHz.

MEASUREMENT RESULTS

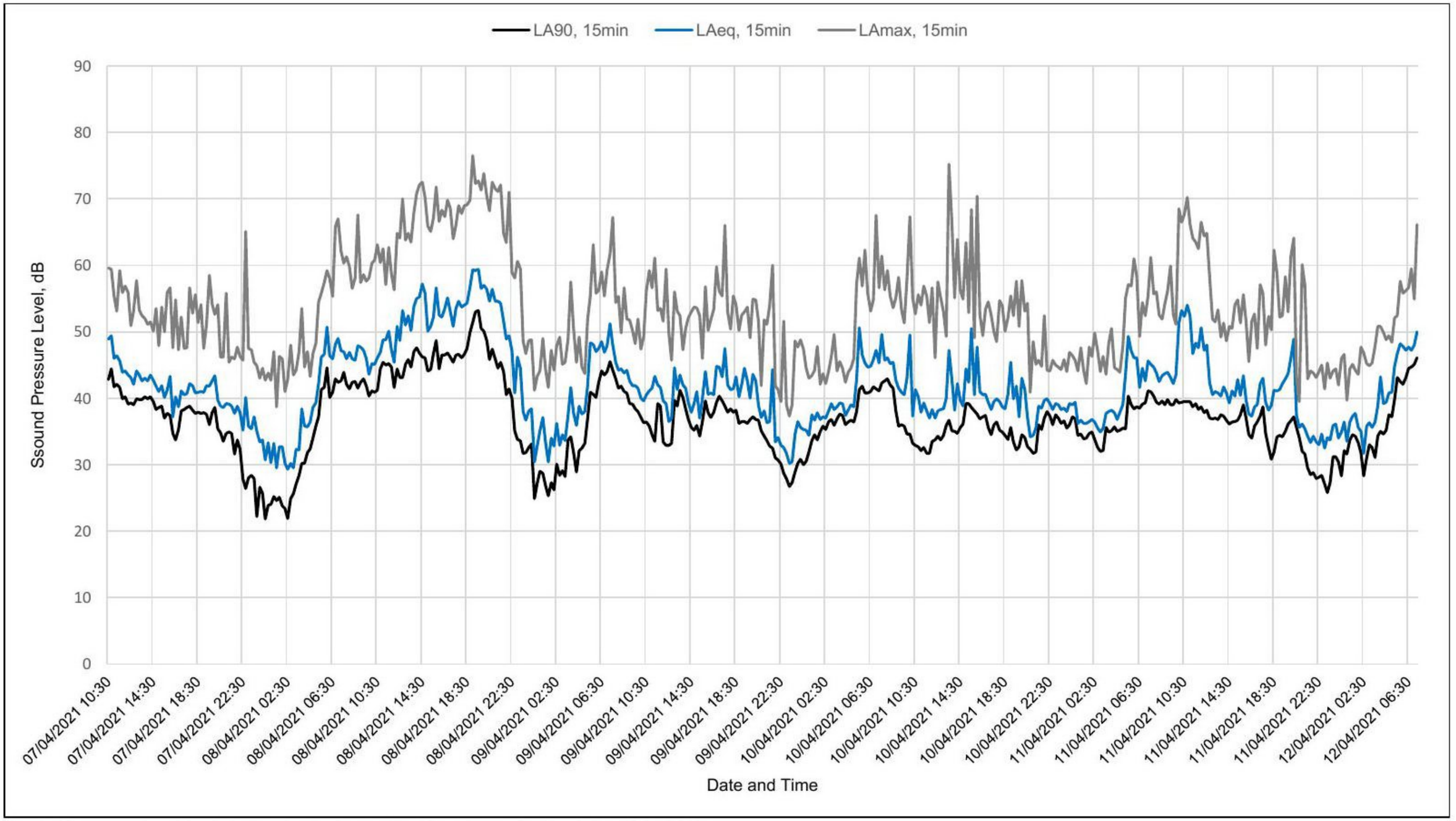
Graphs B1, B2 and B3 summarises the broadband A-weighted results obtained at Monitoring Positions 1, 2 and 3.



Graph B1: A-weighted environmental noise levels at Measurement Position 1, 11 to 14 September 2020



Graph B2: A-weighted environmental noise levels at Measurement Position 2, 7 to 12 April 2021



Graph B3: A-weighted environmental noise levels at Measurement Position 3, 7 to 12 April 2021

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APPENDIX C
SITE PLAN INDICATING LOCATION OF NOISE SOURCES

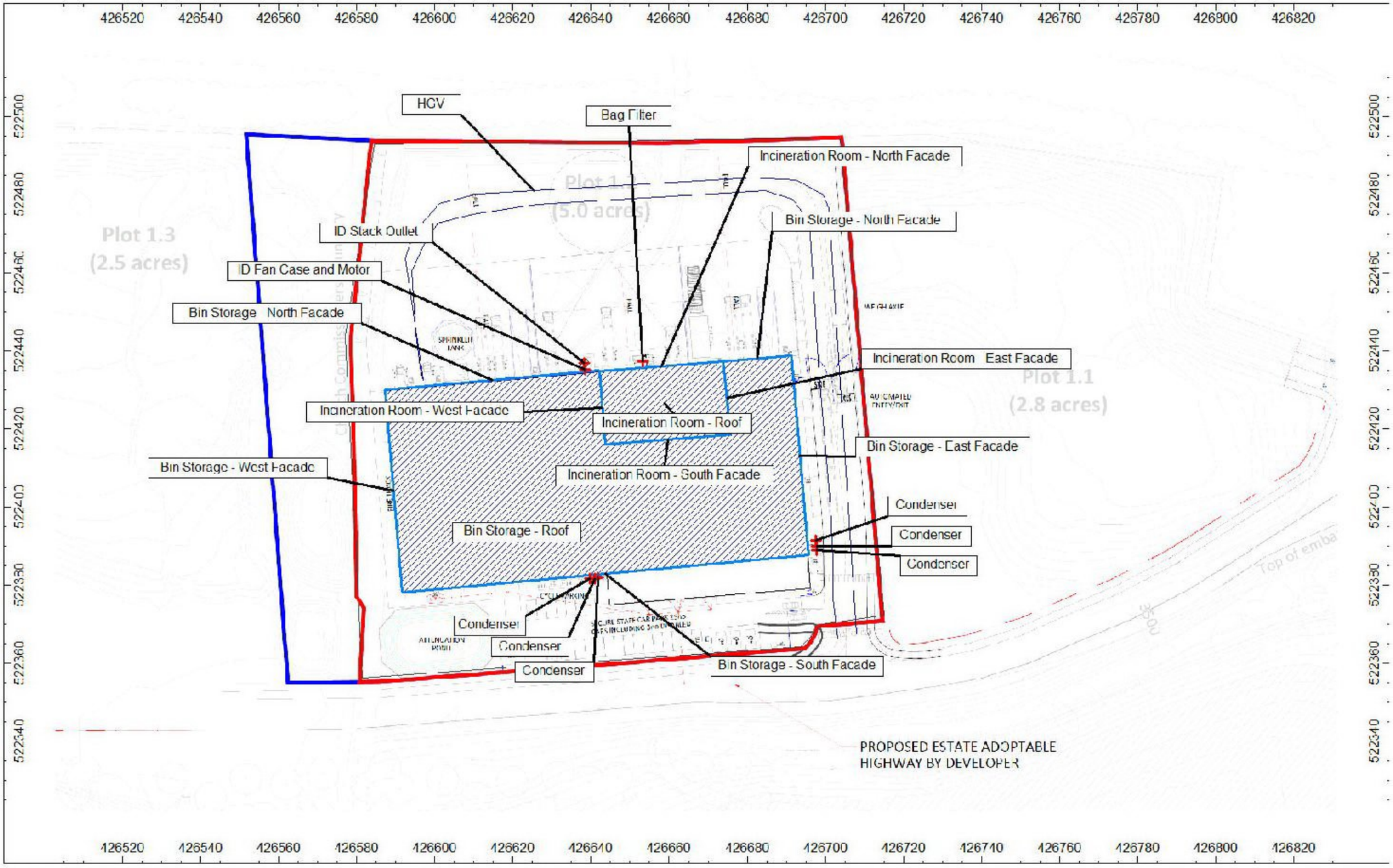

Figure C1: Site plan indicating x, y grid coordinate references for all external modelled noise sources (duty)

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APPENDIX D
ENVIRONMENTAL NOISE MODELLING RESULTS

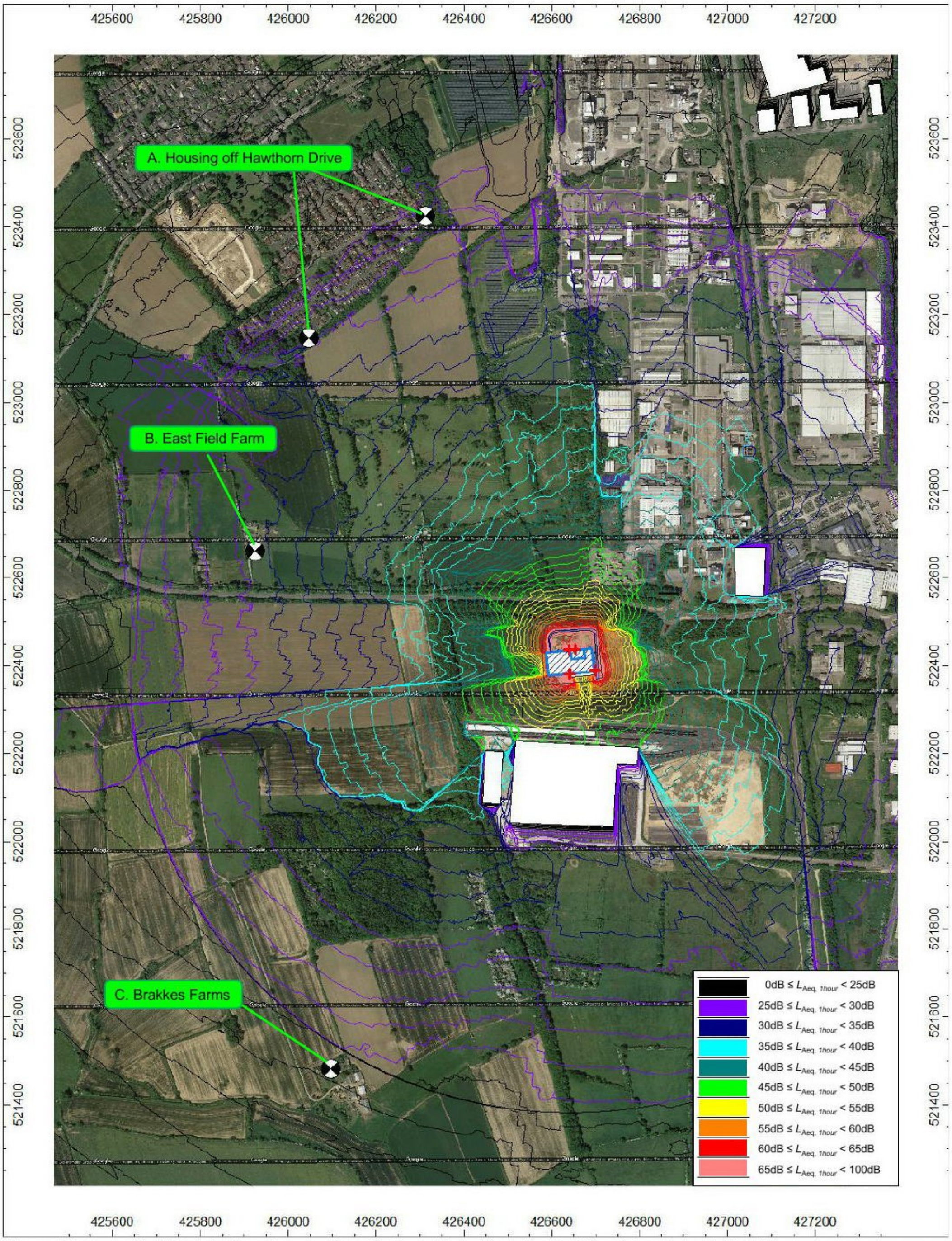

Figure D1: Predicted daytime $L_{Aeq,1hour}$ Specific Sound Level from the Facility, at 4 metres grid height

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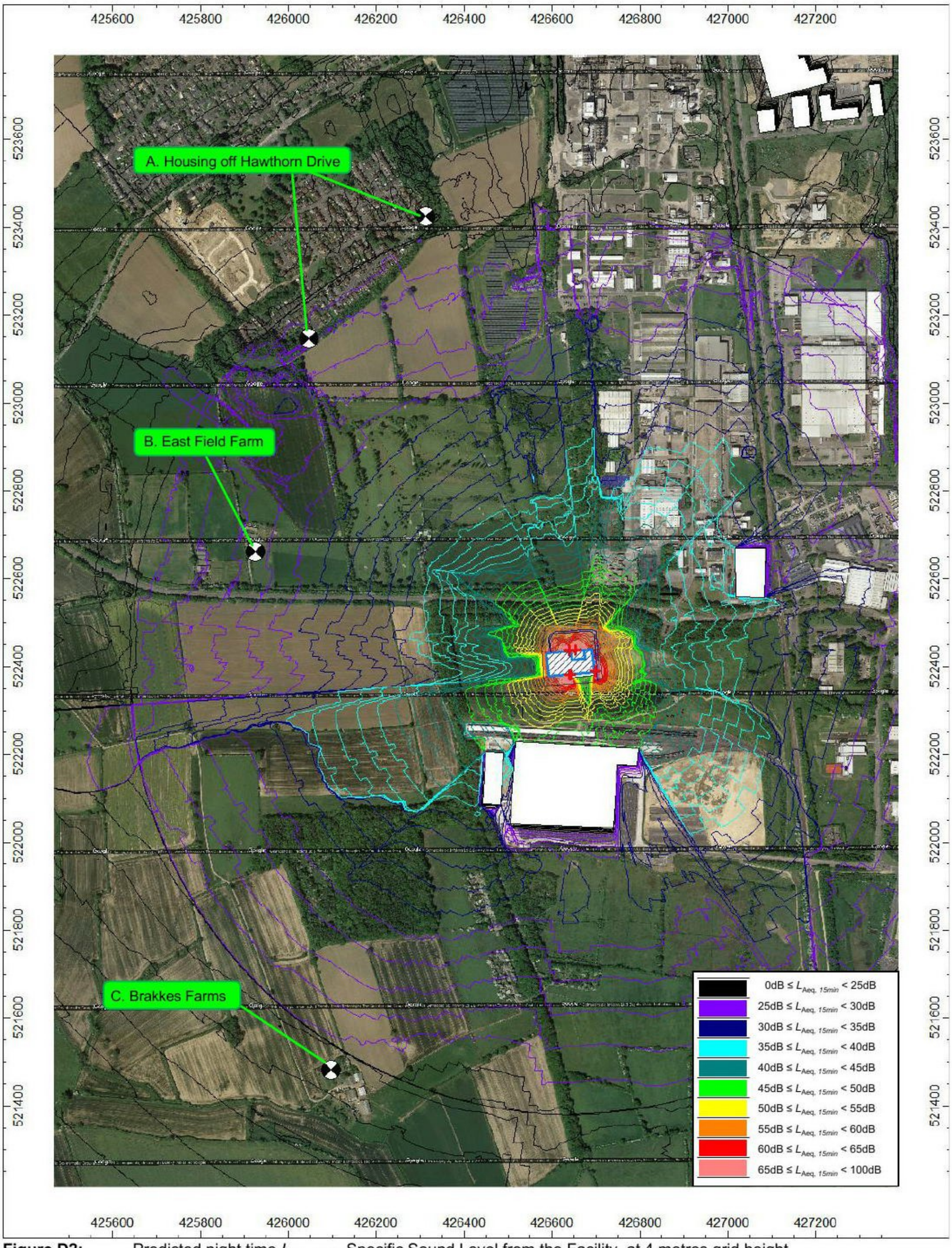

Figure D2: Predicted night time $L_{Aeq,15min}$ Specific Sound Level from the Facility, at 4 metres grid height

A – Housing off Hawthorn Drive NMP Duly Implemented Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
HGV	25.3
ID Fan Case and Motor	20.9
Incineration Room - North Facade	20.3
Bag Filter	16.8
ID Stack Outlet	15.5
Bin Storage - West Facade	12.3
Incineration Room - West Facade	12.3
Bin Storage - North Facade	11.6
Bin Storage - Roof	4.8
Bin Storage - North Facade	3.8
Incineration Room - South Facade	3.8
Incineration Room - East Facade	2.8
Incineration Room - Roof	1.8
Condenser	0.0
Condenser	0.0
Condenser	-0.1
Condenser	-1.1
Condenser	-1.2
Condenser	-1.3
Bin Storage - South Facade	-2.4
Bin Storage - East Facade	-2.8
Total	**28.6**

Table D1: A - Housing off Hawthorn Drive NMP duly implemented Specific Sound Levels, daytime

A – Housing off Hawthorn Drive NMP Duly Implemented Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
ID Fan Case and Motor	20.9
Incineration Room - North Facade	20.3
Bag Filter	16.8
ID Stack Outlet	15.5
Bin Storage - West Facade	12.3
Incineration Room - West Facade	12.3
Bin Storage - North Facade	11.6
Bin Storage - Roof	4.8
Bin Storage - North Facade	3.8
Incineration Room - South Facade	3.8
Incineration Room - East Facade	2.8
Incineration Room - Roof	1.8
Condenser	0.0
Condenser	0.0
Condenser	-0.1
Condenser	-1.1
Condenser	-1.2
Condenser	-1.3
Bin Storage - South Facade	-2.4
Bin Storage - East Facade	-2.8
HGV	-
Total	**25.8**

Table D2: A - Housing off Hawthorn Drive NMP duly implemented Specific Sound Levels, night time

B – Housing at East Field Farm NMP Duly Implemented Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
HGV	24.3
ID Fan Case and Motor	22.5
Incineration Room - North Facade	21.8
Bag Filter	18.8
ID Stack Outlet	17.4
Bin Storage - North Facade	15.1
Incineration Room - West Facade	14.2
Bin Storage - West Facade	13.5
Bin Storage - Roof	7.2
Incineration Room - South Facade	7.1
Bin Storage - North Facade	5.2
Condenser	4.4
Condenser	4.4
Condenser	4.3
Incineration Room - Roof	3.8
Incineration Room - East Facade	3.3
Condenser	2.1
Condenser	2.0
Condenser	2.0
Bin Storage - South Facade	1.3
Bin Storage - East Facade	-2.9
Total	**29.3**

Table D3: B – Housing at East Field Farm NMP duly implemented Specific Sound Levels, daytime

B – Housing at East Field Farm NMP Duly Implemented Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
ID Fan Case and Motor	22.5
Incineration Room - North Facade	21.8
Bag Filter	18.8
ID Stack Outlet	17.4
Bin Storage - North Facade	15.1
Incineration Room - West Facade	14.2
Bin Storage - West Facade	13.5
Bin Storage - Roof	7.2
Incineration Room - South Facade	7.1
Bin Storage - North Facade	5.2
Condenser	4.4
Condenser	4.4
Condenser	4.3
Incineration Room - Roof	3.8
Incineration Room - East Facade	3.3
Condenser	2.1
Condenser	2.0
Condenser	2.0
Bin Storage - South Facade	1.3
Bin Storage - East Facade	-2.9
HGV	-
Total	**27.6**

Table D4: B – Housing at East Field Farm NMP duly implemented Specific Sound Levels, night time

C – Housing at Brakkes Farm NMP Duly Implemented Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
HGV	13.6
Condenser	13.2
Condenser	13.2
Condenser	13.2
ID Stack Outlet	12.8
Incineration Room - South Facade	10.6
Bin Storage - West Facade	7.2
Bin Storage - South Facade	7.1
Incineration Room - West Facade	7.0
Bin Storage - Roof	3.1
Incineration Room - Roof	0.0
Incineration Room - North Facade	-0.8
Condenser	-3.6
Condenser	-3.6
Incineration Room - East Facade	-4.2
ID Fan Case and Motor	-4.8
Condenser	-7.2
Bin Storage - North Facade	-8.0
Bag Filter	-8.4
Bin Storage - East Facade	-10.1
Bin Storage - North Facade	-15.1
Total	**21.4**

Table D5: C – Housing at Brakkes Farm NMP duly implemented Specific Sound Levels, daytime

C – Housing at Brakkes Farm NMP Duly Implemented Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
Condenser	13.2
Condenser	13.2
Condenser	13.2
ID Stack Outlet	12.8
Incineration Room - South Facade	10.6
Bin Storage - West Facade	7.2
Bin Storage - South Facade	7.1
Incineration Room - West Facade	7.0
Bin Storage - Roof	3.1
Incineration Room - Roof	0.0
Incineration Room - North Facade	-0.8
Condenser	-3.6
Condenser	-3.6
Incineration Room - East Facade	-4.2
ID Fan Case and Motor	-4.8
Condenser	-7.2
Bin Storage - North Facade	-8.0
Bag Filter	-8.4
Bin Storage - East Facade	-10.1
Bin Storage - North Facade	-15.1
HGV	-
Total	**20.6**

Table D6: C – Housing at Brakkes Farm NMP duly implemented Specific Sound Levels, night time

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APPENDIX E

NOISE SOURCE SCHEDULE AND OUTLINE REQUIRED BAT NOISE CONTROL MEASURES

Equipment Name	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	Night time			
Incineration Plant Room																				Refer to Table 6 for required minimum sound insulation performance to be achieved by the external building fabric.
Rotary Kiln	No data provided. Assumed unattenuated sound pressure level of 80dB $L_{Aeq,T}$ at 1 metre. Typical spectrum applied.	1	82	81	77	73	78	74	73	70	64	80	1	174	102	100%	100%	I		
Afterburner (EBK)	No data provided. Assumed unattenuated sound pressure level of 80dB $L_{Aeq,T}$ at 1 metre. Typical spectrum applied.	1	82	81	77	73	78	74	73	70	64	80	1	188	103	100%	100%	I		
Steam Boiler	No data provided. Assumed unattenuated sound pressure level of 80dB $L_{Aeq,T}$ at 1 metre. Typical spectrum applied.	1	82	81	77	73	78	74	73	70	64	80	1	206	103	100%	100%	I		
Boiler	No data provided. Assumed unattenuated sound pressure level of 80dB $L_{Aeq,T}$ at 1 metre. Typical spectrum applied.	1	82	81	77	73	78	74	73	70	64	80	1	160	102	100%	100%	I		
Multiclone	No data provided. Assumed unattenuated sound pressure level of 75dB $L_{Aeq,T}$ at 1 metre. Typical spectrum applied.	1	68	68	73	73	70	70	68	65	63	75	1	93	95	100%	100%	I		
Ash Transporter	No data provided. Assumed unattenuated sound pressure level of 80dB $L_{Aeq,T}$ at 1 metre. Typical spectrum applied.	1	79	79	78	77	73	76	73	67	50	80	1	70	98	100%	100%	I		
Bin Store Room																				Refer to Table 6 for required minimum sound insulation performance to be achieved by the external building fabric.
Hopper	No data provided. Assumed unattenuated sound pressure level of 70dB $L_{Aeq,T}$ at 1 metre. Typical spectrum applied.	1	63	68	69	62	59	61	57	67	53	70	1	33	85	100%	100%	I		
Ram	No data provided. Assumed unattenuated sound pressure level of 70dB $L_{Aeq,T}$ at 1 metre. Typical spectrum applied.	1	64	68	69	63	59	61	57	67	53	70	1	33	85	100%	100%	I		
Water Pumps	No data provided. Assumed unattenuated sound pressure level of 85dB $L_{Aeq,T}$ at 1 metre. Typical spectrum applied.	2	69	74	75	78	80	78	80	74	71	85	1	9	95	100%	100%	I		
Manual Bin Movement	Noise level measurements conducted by Sol on 3 September 2019 at a similar site	3	74	75	76	75	73	74	70	66	62	78	1	6	85	100%	100%	I		
Bins Unloaded from HGV	Noise level measurements conducted by Sol on 3 September 2019 at a similar site	1	73	77	75	74	71	72	68	63	59	76	1	6	84	100%	100%	I		
Bins Loaded onto HGV	Noise level measurements conducted by Sol on 3 September 2019 at a similar site	1	81	80	82	80	79	80	76	73	71	84	1	6	92	100%	100%	I		
Fork Lift Truck	No noise data provided. Noise data taken from similar project based upon manufacturer noise data.	2	79	79	79	69	71	64	64	55	48	72	10	628	100	100%	100%	I		Mobile plant under the direct control of the Operator shall only use non-intrusive broadband vehicle reversing alarms and/or reversing cameras. No use of pulsed and/or tonal reversing alarms (e.g. reversing bleepers)

Equipment Name	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	Night time			
Bin Wash	No data provided. Assumed unattenuated sound pressure level of 80dB $L_{Aeq,T}$ at 1 metre	3	78	82	84	77	74	75	72	72	67	80	1	57	98	100%	100%	P		
External																				
Bag Filter	No data provided. Assumed unattenuated sound pressure level of 75dB $L_{Aeq,T}$ at 1 metre	1	68	68	73	73	70	70	68	65	63	75		68	93	100%	100%	P		All pneumatic blow-offs and solenoids *et al* must be fitted with high performance 'Silvent' pneumatic silencers or similar
ID Fan Case and Motor	No data provided. Assume post attenuated sound pressure level of 75dB $L_{Aeq,T}$ at 1 metre	1	72	71	73	73	70	70	68	65	62	75		150	97	100%	100%	P		An acoustic enclosure is required to the ID fan casing and motor, encapsulating any exposed flexible connectors within the adjoining ductwork, to achieve a sound pressure level of 75dB $L_{Aeq,T}$ at 1m from any surface. Force draught attenuated ventilation to the enclosure will be needed with run and standby fans (resilience).
Stack Outlet	Noise data not provided by Client. Sound Spectrum taken for a similar project, post attenuator	1	96	96	86	78	60	41	50	33	29	75	1	28	90	100%	100%	P		Noise from the ID fan stack outlet shall not exceed 75dB $L_{Aeq,T}$ at 1 metre from stack outlet edge, 90° off longitudinal axis of the stack at any speed. Make provisions for duct attenuators fitted to the discharge side of the fan.
AC Condenser	No data provided. Assumed unattenuated sound pressure level of 80dB(A) at 1 metre	6	74	75	76	76	73	69	66	61	56	75	1	59	93	100%	100%	P		
HGV	Noise spectrum taken from BS5228 Table C.2 reference 34 ("Lorry": 4-axle wagon).	3/hour		73	78	78	78	74	73	68	66	80	10	628	108	3/hour	0	Moving P		Mobile plant under the direct control of the Operator shall only use non-intrusive broadband vehicle reversing alarms and/or reversing cameras. No use of pulsed and/or tonal reversing alarms (e.g. reversing bleepers)
Genests		2	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	0%	0%		Emergency plant. Not modelled	

Table E1: Noise source schedule and outline BAT noise control measures

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APPENDIX F

COMPOSITE SOUND INSULATION PERFORMANCE OF THE EXTERNAL BUILDING FABRIC

Project	Project Helios
Project Ref.	1911
Building Ref.	Bin Room

BUILDING DIMENSIONS

Length (m)	103	Volume (m3)	67763.7
Width (m)	51	Surface Area (m2)	14479.2
Height (m)	12.9	Diffusivity term Cd (BS 12354)	-5

COMPOSITE SRI CALCULATIONS

Building Façade	Total Area	Element	Area	Octave Band Frequencies 63	125	250	500	1 k	2 k	4 k	8 k	Construction
North façade	838.5	Wall	568	15	19	30	42	45	50	66	70	Twintherm cladding
		Roller Shutter	160	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door	4	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	107	4	4	5	8	12	16	15	13	Allaway Acoustics AL1515
		Window										
	Composite SRI			**11**	**12**	**13**	**16**	**19**	**23**	**22**	**21**	
West façade	657.9	Wall	551	15	19	30	42	45	50	66	70	Twintherm cladding
		Roller Shutter		14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door		18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	107	4	4	5	8	12	16	15	13	Allaway Acoustics AL1515
		Window										
	Composite SRI			**10**	**11**	**13**	**16**	**20**	**24**	**23**	**21**	
South façade	1328.7	Wall	1139	15	19	30	42	45	50	66	70	Twintherm cladding
		Roller Shutter		14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door	4	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	186	4	4	5	8	12	16	15	13	Allaway Acoustics AL1515
		Window										
	Composite SRI			**11**	**12**	**13**	**17**	**21**	**25**	**24**	**22**	
East façade	657.9	Wall	549	15	19	30	42	45	50	66	70	Twintherm cladding
		Roller Shutter		14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door	2	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	107	4	4	5	8	12	16	15	13	Allaway Acoustics AL1515
		Window										
	Composite SRI			**10**	**11**	**13**	**16**	**20**	**24**	**23**	**21**	
Roof	5253	Roof	4728	15	19	30	42	45	50	66	70	Twintherm cladding
		Rooflight	525	13	9	12	17	22	24	19	22	Kingspan KS1000 DLTR
	Composite SRI			**15**	**16**	**21**	**27**	**32**	**34**	**29**	**32**	

Figure F1: Composite sound insulation performance calculations for the external building fabric to the Bin Room

Project	Project Helios
Project Ref.	1911
Building Ref.	Incineration Room

BUILDING DIMENSIONS

Length (m)	38	Volume (m3)	11422.8
Width (m)	18	Surface Area (m2)	3238.4
Height (m)	16.7	Diffusivity term Cd (BS 12354)	-5

COMPOSITE SRI CALCULATIONS

Building Façade	Total Area	Element	Area	Octave Band Frequencies								Construction
				63	125	250	500	1 k	2 k	4 k	8 k	
North façade	634.6	Wall	42	15	19	30	42	45	50	66	70	Twintherm cladding
		Roller Shutter	57	14	14	17	18	15	19	19	19	Ascot Doors Roller Shutter
		Door	4	18	24	25	28	30	29	34	34	Booths 29H 45mm Metal Door
		Louvres	532	5	6	8	11	18	25	20	16	Allaway Acoustics AL3015
		Window										
	Composite SRI			**6**	**7**	**9**	**12**	**18**	**24**	**20**	**17**	
West façade	59.4	Wall										
		Roller Shutter										
		Door										
		Louvres	59	5	6	8	11	18	25	20	16	Allaway Acoustics AL3015
		Window										
	Composite SRI			**5**	**6**	**8**	**11**	**18**	**25**	**20**	**16**	
South façade	125.4	Wall										
		Roller Shutter										
		Door										
		Louvres	125	5	6	8	11	18	25	20	16	Allaway Acoustics AL3015
		Window										
	Composite SRI			**5**	**6**	**8**	**11**	**18**	**25**	**20**	**16**	
East façade	59.4	Wall										
		Roller Shutter										
		Door										
		Louvres	59	5	6	8	11	18	25	20	16	Allaway Acoustics AL3015
		Window										
	Composite SRI			**5**	**6**	**8**	**11**	**18**	**25**	**20**	**16**	
Roof	684	Roof	616	15	19	30	42	45	50	66	70	Twintherm cladding
		Rooflight	68	13	9	12	17	22	24	19	22	Kingspan KS1000 DLTR
	Composite SRI			**15**	**16**	**21**	**27**	**32**	**34**	**29**	**32**	

Figure F2: Composite sound insulation performance calculations for the external building fabric to the Incineration Room

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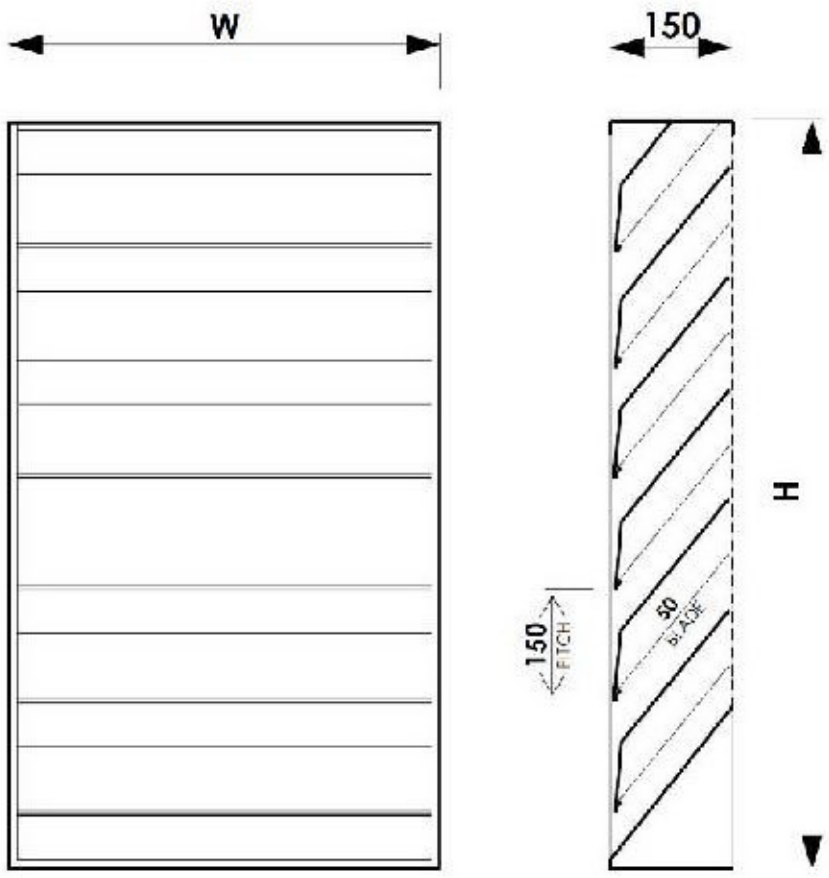
APPENDIX G
DETAILS OF ACOUSTIC LOUVRES USED TO INFORM THE ASSESSMENT

DATA SHEET **L60E**
ACOUSTIC LOUVRE
MODEL **AL1515**

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

DIMENSIONS



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:

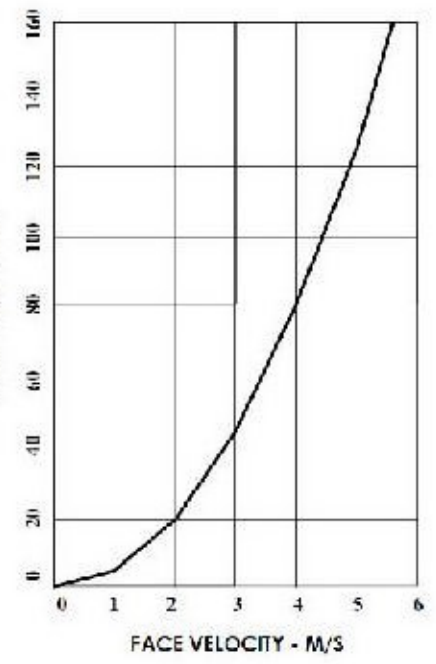
28kg/M² GALVANISED CONSTRUCTION
20kg/M² ALUMINIUM CONSTRUCTION

ACOUSTIC PERFORMANCE

SOUND REDUCTION INDEX: BS EN ISO 10140 - 2

63	125	250	500	1000	2000	4000	8000	HZ
4	**4**	**5**	**8**	**12**	**16**	**15**	**13**	**dB**

PRESSURE LOSS



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 SUB-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.

STANDARD SIZES

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

ALLAWAY ACOUSTICS LIMITED Old Police Station, 1 Queens Road, Hertford SG14 1EN
T | 01992 550825 E | enquiries@allawayacoustics.co.uk W | allawayacoustics.co.uk

Figure F1: Details of the proposed AL1515 single banked acoustic louvre (Bin Room)

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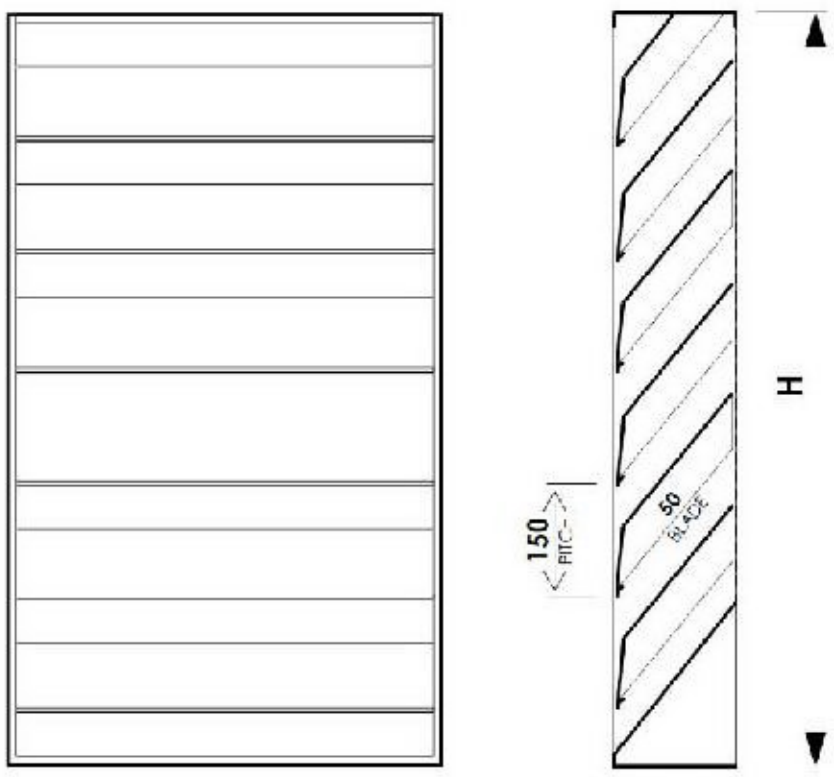
DATA SHEET **L70E**
ACOUSTIC LOUVRE
MODEL **AL3015**

allaway acoustics

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

DIMENSIONS



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:

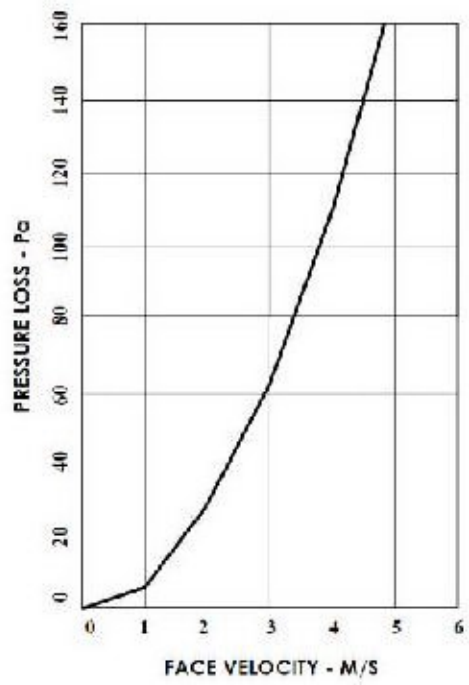
52kg/M² GALVANISED CONSTRUCTION
37kg/M² ALUMINIUM CONSTRUCTION

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



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.

STANDARD SIZES

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

ALLAWAY ACOUSTICS LIMITED Old Police Station, 1 Queens Road, Hertford SG14 1EN
T | 01992 550825 E | enquiries@allawayacoustics.co.uk W | allawayacoustics.co.uk

Figure F2: Details of the proposed AL3015 single banked acoustic louvre (Incineration Room)

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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
Ciaron Murphy	BEng (Hons), AMIOA

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.