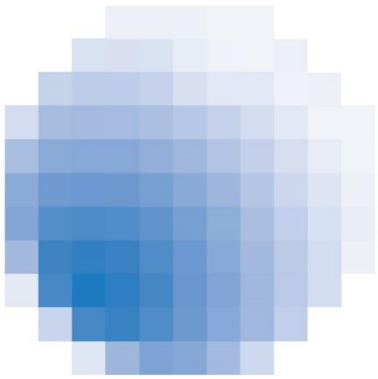


sol
acoustics

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

tel 01565 632 535
email info@solacoustics.co.uk
web www.solacoustics.co.uk

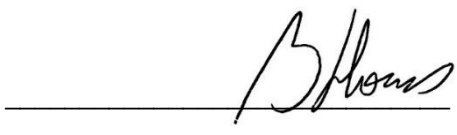
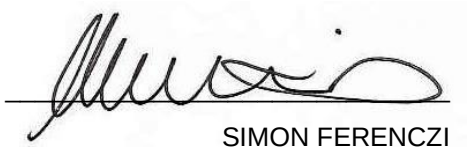
Real Alloy

Waunarlwydd, Swansea

Environmental Noise Impact Assessment

P1970-REP02-REV A-BDH

28 April 2022

PROJECT:	Real Alloy Waunarlwydd, Swansea Environmental Noise Impact Assessment
CLIENT:	Sol Environment Ltd 7 Greenway Farm Bath Road, Wick Bristol BS30 5RL
DOCUMENT REFERENCE:	P1970-REP02-REV A-BDH
SIGNED:	 BRIAN HORNER
CHECKED:	 SIMON FERENCZI
DATE:	28 April 2022

CONTENTS

1 EXECUTIVE SUMMARY

Sol Acoustics has been appointed to provide an environmental noise impact assessment to support a Permit Variation Application for a proposed new shredder, with ancillary plant, to be installed at the existing Real Alloy industrial premises, as located at Westfield Industrial Park, Waunarlwydd, Swansea, SA5 4SF.

This acoustic assessment report considers the environmental noise impact as arising from the operation of all existing and new proposed plant and processes associated with the site at the nearest Noise Sensitive Receptors (NSRs).

The pre-existing environmental noise climate at the identified NSRs has been measured by Sol Acoustics, as occurring between c.14:30 hours during Friday 9 July and c.12:00 hours during Tuesday 13 July 2021.

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

It is the conclusion of this environmental noise assessment that the environmental noise impact as arising from the normal operation of the development, including the proposed new plant, with duly and satisfactorily implemented Noise Mitigation Plan (NMP) as described herein, results in a sub-Adverse environmental noise impact at the worst affected NSR, 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 to support a Permit Variation Application for a proposed new shredder, with ancillary plant, which is to be installed at the existing Real Alloy industrial premises as located at Westfield Industrial Park, Waunarlwydd, Swansea, SA5 4SF (hereinafter referred to as the "Facility"). The purpose of this acoustic assessment is as follows:

- To 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 the normal operation of the Facility.
- To determine the prevailing, pre-existing daytime and night time background noise climate at the NSRs, as through direct, environmental noise measurement.
- To obtain indicative source noise level data for all existing and proposed new plant.
- To calculate the resultant environmental noise contribution and impact at NSRs, as during daytime and night time periods, taking germane factors into account such as distance to receptors, acoustic screening, and other environmental features.
- To carry out an environmental noise assessment of the Facility in accordance with the assessment methodology that is prescribed in relevant Standards and other acoustic guidance, in order to determine the likely significance of the noise impact generated.
- To 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 provides the results of the benchmark environmental noise survey.
- Section 6 provides a summary of pertinent assessment criteria, for the purposes of assessment and rating of environmental 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.
- *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 recommended noise control measures.*
- *Appendix F provides the composite sound insulation performance calculations for the modelled facades of key buildings as located on site.*
- *Appendix G gives details and qualifications of contributing Sol Acoustics' staff.*

3 DESCRIPTION OF SITE

3.1 General Overview and Noise Sensitive Receptors (NSRs)

The existing Facility is located within the Westfield Industrial Park in Waunarlwydd, Swansea, i.e. within a predominantly industrial and commercial area.

The nearest pre-existing residential Noise Sensitive Receptors (NSRs) are located on Oak Drive, c.45 metres distance from the nearest site boundary, as located on the opposite side of the railway embankment.

Figure 1 indicates the location of the Facility in relation to the nearest pre-existing NSRs, and also the location of the noise monitoring position that was used in order to inform the acoustic assessment (this is further discussed in Section 4 of this report).

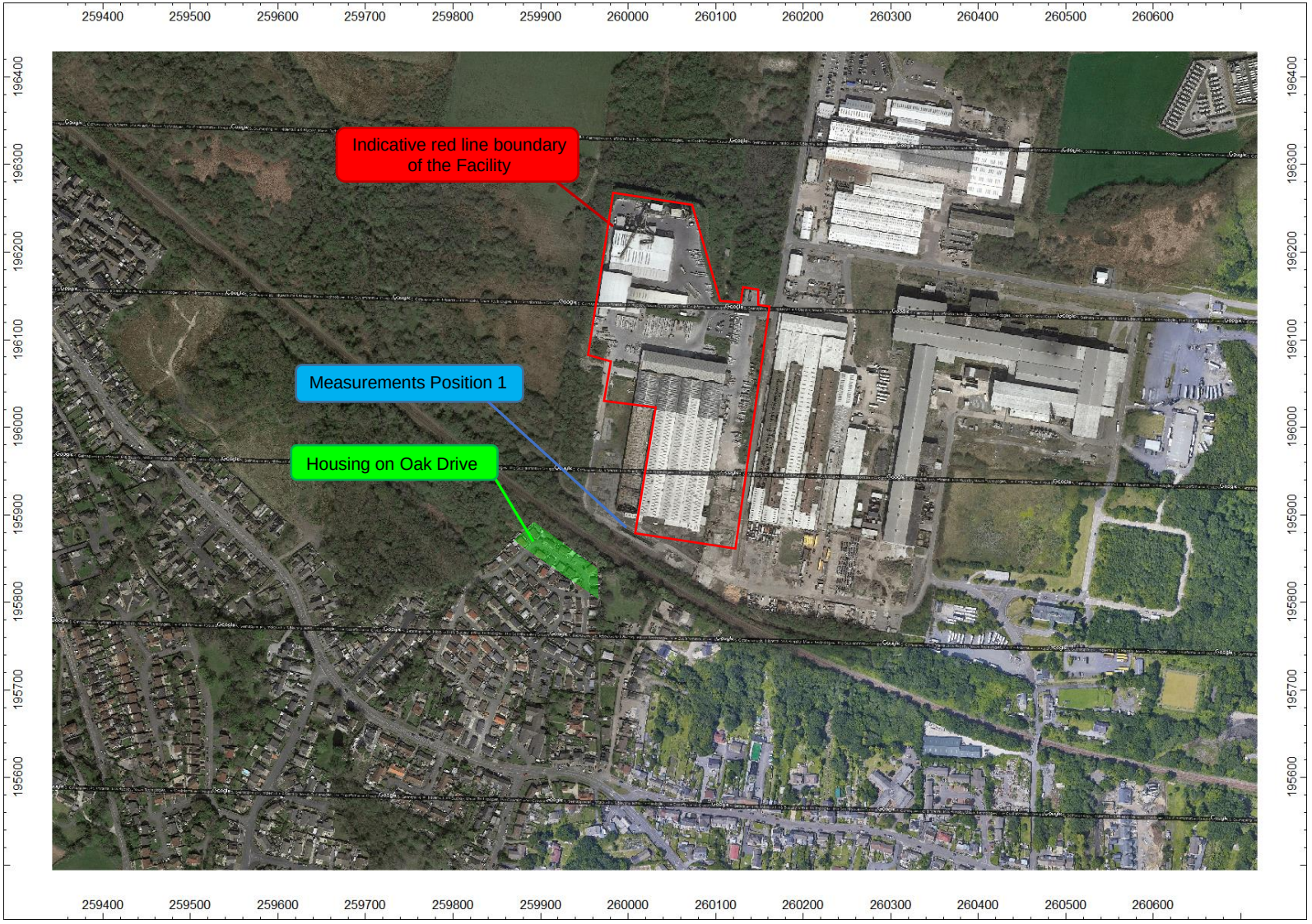


Figure 1: Aerial photography showing noise sensitive receptors and monitoring locations in relation to the Facility (Google Maps 2022)

3.2 Characteristics of the Facility

3.2.1 Overview

The existing Facility processes and recycles aluminium into reusable metals and alloys. There will be no changes to the main process resulting from this proposed permit variation.

The existing plant on site comprises of two furnaces, as located with the "Furnace Room". Airflow to each furnace is provided by and externally sited intake air fan and externally mounted ID fan. Both ID fans are ducted into a 23 metre height ID fan stack. The furnaces and ancillary plant operate 24 hours a day.

A salt cake storage building is located to the south of the site.

A new [redacted] shredder, with ancillary plant, is proposed to be installed on site within the "Shredder Room" on site. The shredder is expected to operate up to 24 hours per day.

The location of key site buildings is shown in Figure 2.

Figure 3 provides plan and elevation drawings of the new shredder.

3.2.2 Mobile Plant

JCB 417 loading shovels operate within the existing "Furnace Room" and the "Storage Room".

A Still RX 70-80 forklift truck currently operates externally within the loading bay area and will be used to load and unload the shredder within the Shredder Room.

3.2.3 Site Deliveries and Collections

The Client has advised that up to 42 deliveries/collections are likely to occur as during daytime hours only (i.e. between 06:00 to 23:00 hours) Monday to Friday.

3.2.4 Anticipated Noise Level Emissions

Sol attended the existing and operational site during Wednesday 23 February 2022 in order to conduct close-quarters noise measurements of the existing. *A summary of the close-quarters noise measurements is presented in Appendix E.*

The results obtained from these individual noise measurements have been used to inform the detailed 3D computer noise model of the site, as constructed using proprietary "CadnaA" noise modelling software. *The Client has advised that the operation of all plant as during the measurements was representative of typical operating conditions. (During the site visit, Furnace 1 was not operational as due to preventative maintenance. However, as Furnace 1 is identical to Furnace 2, which was fully operational during the site visit, this assessment assumes that both furnaces generate similar levels of noise).*

It was not possible to measure noise from the outlet of the 23 metre height ID fan stack, as due to working at height restrictions. However, it is understood that both ID fans have been fitted with an outlet attenuator, albeit the acoustic performance of these attenuators is not known to Sol.

This acoustic assessment assumes that the attenuated ID fan outlet achieves a sound pressure level of 75dB $L_{Aeq,T}$ when measured at one metre distance at 90° off axis, which is considered to be a reasonably practicable noise level. *However, Real Alloy however will need to check and subsequently confirm that this acoustic performance requirement is achieved in practice, for all required fan speeds and operational conditions.*

Noise arising from mobile plant, including from HGVs, has been assessed as based upon published noise data as presented in British Standard 5228-1:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites – Part 1*: *Noise*' (BS5228), or alternatively as based upon noise data available from the vehicle manufacturer.

3.2.5 History of Complaints

Real Alloy have provided Sol with a summary of noise complaints as reported by local residents since May 2015.

Appendix G of this report provides the complaints log as provided by Real Alloy.

The noise compliant log includes seven reported incidents that have occurred since May 2015. A complaint was raised by a local resident during May 2015 which was considered most likely to be noise from fixed plant associated with the Facility, namely the "bag house fans". Real Alloy have advised that extensive attenuation work was subsequently implemented on site.

All subsequent noise complaints appear to relate to noise from Operatives and/or to noise arising from other third-party sites/activities that were not associated with Real Alloy. Therefore, this would suggest that noise from the existing plant and typical operations on the site currently does not result in an adverse noise impact at nearby NSRs.

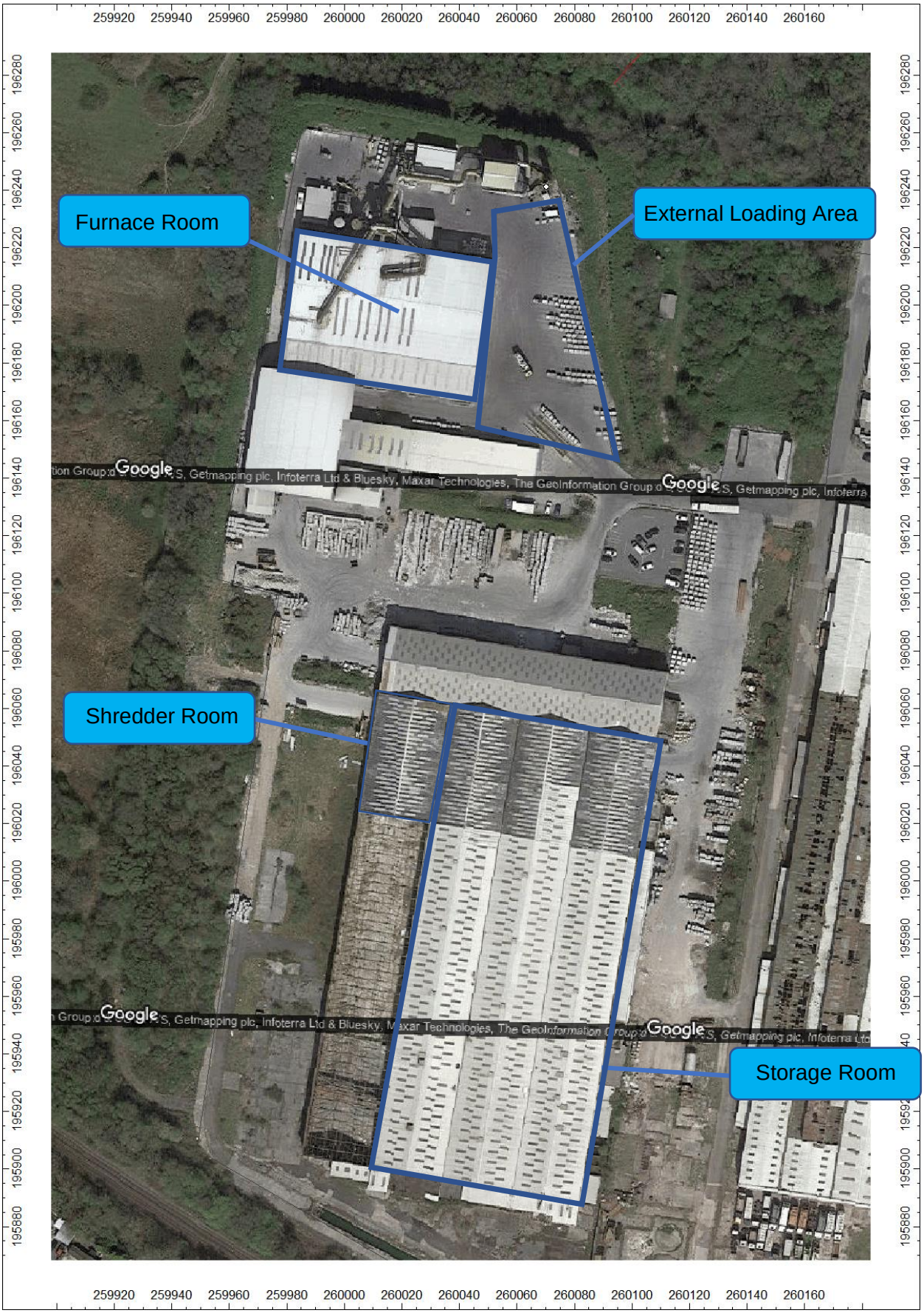


Figure 2: Aerial photograph of the site indicating the location of key buildings on site (Google Maps 2022)

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.14:30 hours during Friday 9 July and c.12:00 hours during Tuesday 13 July 2021. 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. It is understood that the existing plant was not operational as during the environmental noise survey.

The environmental noise survey consisted of a single environmental noise measurement position as follows:

- **Noise Monitoring Position 1**: Mast mounted microphone mounted at c.2.1 metres height above local ground level to the south of the Facility. Key noise sources included intermittent mobile plant (HGVs etc.) to the north of the Facility and within the wider industrial estate; noise from passing trains and birdsong.

The location of the noise monitoring position is 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 Position 1 for the duration of the noise survey, as using a Professional Grade Vaisala “WXT530” weather station. Periods of rainfall were recorded during 9 July, 11 July and 12 July 2021. The environmental noise levels as measured during heavy rainfall have been omitted from the assessment.

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 for the duration of the environmental noise survey and details 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 9 July 2021	51[1]	34	51	***29***
	Saturday 10 July 2021	51	***36***	51	27
	Sunday 11 July 2021	53	***36***	51	37
	Monday 12 July 2021	52	37	49	30
	Tuesday 13 July 2021	51[1]	39	-	-
[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 Guidance on Noise and vibration Management: Environmental Permits

This guidance is as published by the Environment Agency, 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 6.2.

- When applying for a variation, the environmental noise impact assessment must consider all the noise resulting from the Facility, including ***all existing and new proposed noise sources***. The noise impact assessment must present the potential noise impact from all existing and new proposed noise separately and also added together.

- 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 a 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. The Facility must not be operational during the environmental noise level measurements.

- Noise arising from the normal operation of the Facility (both "NOC" and "OTNOC") 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 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 stipules 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.

6.2 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 methods prescribed in the British Standard use *outdoor sound levels* to assess the likely effects of sound on people who might be *inside or outside a dwelling or premises used for residential purposes* upon which sound is incident.

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 daytime periods, the acoustic assessment is carried out over a one-hour period, and over a 15-minute period for night time periods. 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.

BS4142 states that in using the Background Sound Level in the method for rating and assessing industrial and commercial sound, it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a *lowest* measured Background Sound Level, but rather to quantify what is *typical* during particular time periods.

In full accordance with BS4142 methodology, the context in which the sound occurs must be taken into consideration when determining the magnitude of the noise impact.

On this basis, Table 2 presents a summary of the as measured typical Background Sound Level at each of the identified residential noise sensitive receptors (NSRs):

Noise Sensitive Receptors	**Representative Noise Measurement Position**	**Typical Background Sound Level, dB $L_{A90,15min}$**	
		Daytime (07:00 hours – 23:00 hours)	**Night Time (23:00 hours – 07:00 hours)**
Housing on Oak Drive (south of the Facility)	1	36	29

Table 2: Summary of typical Background Sound Levels applicable at the NSR

6.3 BS8233: 2014

This Standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the criteria set out in Table 3.

BS8233: 2014 – Indoor ambient noise levels for dwellings			
Activity	**Location**	**07:00 to 23:00**	**23:00 to 07:00**
Resting	Living room	35dB $L_{Aeq,16hours}$	-
Dining	Dining room / area	40dB $L_{Aeq,16hours}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hours}$	30dB $L_{Aeq,8hours}$

Table 3: Indoor ambient noise levels for dwellings

With respect to external amenity space such as gardens and patios, it is stated that it is desirable that the noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments.

The Standard also advises that higher external noise criteria may be appropriate under certain circumstances, such as within city centres urban areas and locations adjoining the strategic network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource. In these cases, the development should be designed to achieve the lowest practicable levels in external amenity spaces but should not be prohibited.

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 nearest and worst affected housing on Oak Drive are single-storey dwellings only. Therefore the noise impact as expected from the shredder been determined at a receptor grid height of 1.5 metres above local ground level only.

(f) The assessment assumes that the shredder , and ancillary plant, is 100% utilised during the daytime and night time period as this presents the worst case.

(g) 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 in question and the results of the close-quarters noise level measurements as conducted by Sol. 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.

(h) Noise breakout from buildings has been modelled by determining the level of noise radiated from the external fabric of the site building where such plant is located, as based on 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 as measured reverberant sound pressure level as measured by, by applying a so-called "diffusivity term" as defined in BS12354-4 (Specifically, a diffusivity term of -5dB has been assumed) and subtracting the sound insulation performance of each element of external building fabric.

(i) The individual noise contributions from open roller shutter doors have been modelled separately. The noise model assumes that roller shutters are open during the daytime but remain closed during the night time.

(j) Construction details of the various building elements have not been provided by have been determined based upon site inspection by Sol. Sound insulation data for the various elements of the external building fabric of each building have been based upon site inspection by Sol and third-party acoustic consultant data for similar constructions. Table 4 provides the assumed sound insulation performance data for each building element of each building. The composite sound reduction indexes for each modelled building façade are presented in Appendix F:

Building Element	**Construction**	**Sound Reduction Index (SRI, dB) @ Octave Band Centre Frequency (Hz)**							**dB R_w**
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	
Concrete push wall / Brick Wall	140mm thick brick	38	39	36	44	51	58	62	48
Cladding	Single sheet cladding	11	14	16	15	18	22	25	19
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

Table 4: Assumed acoustic performance of external building elements of the Main Hall

(k) The HGV movements for deliveries have been modelled as a moving point source located along the proposed access road within the site boundary.

(l) The noise model assumes that on average up to 4 HGVs could arrive at and depart from the Facility during a typical 1-hour daytime assessment period.

Figure 5 overleaf provides a three-dimensional visualisation of the noise model used to inform the noise impact assessment.

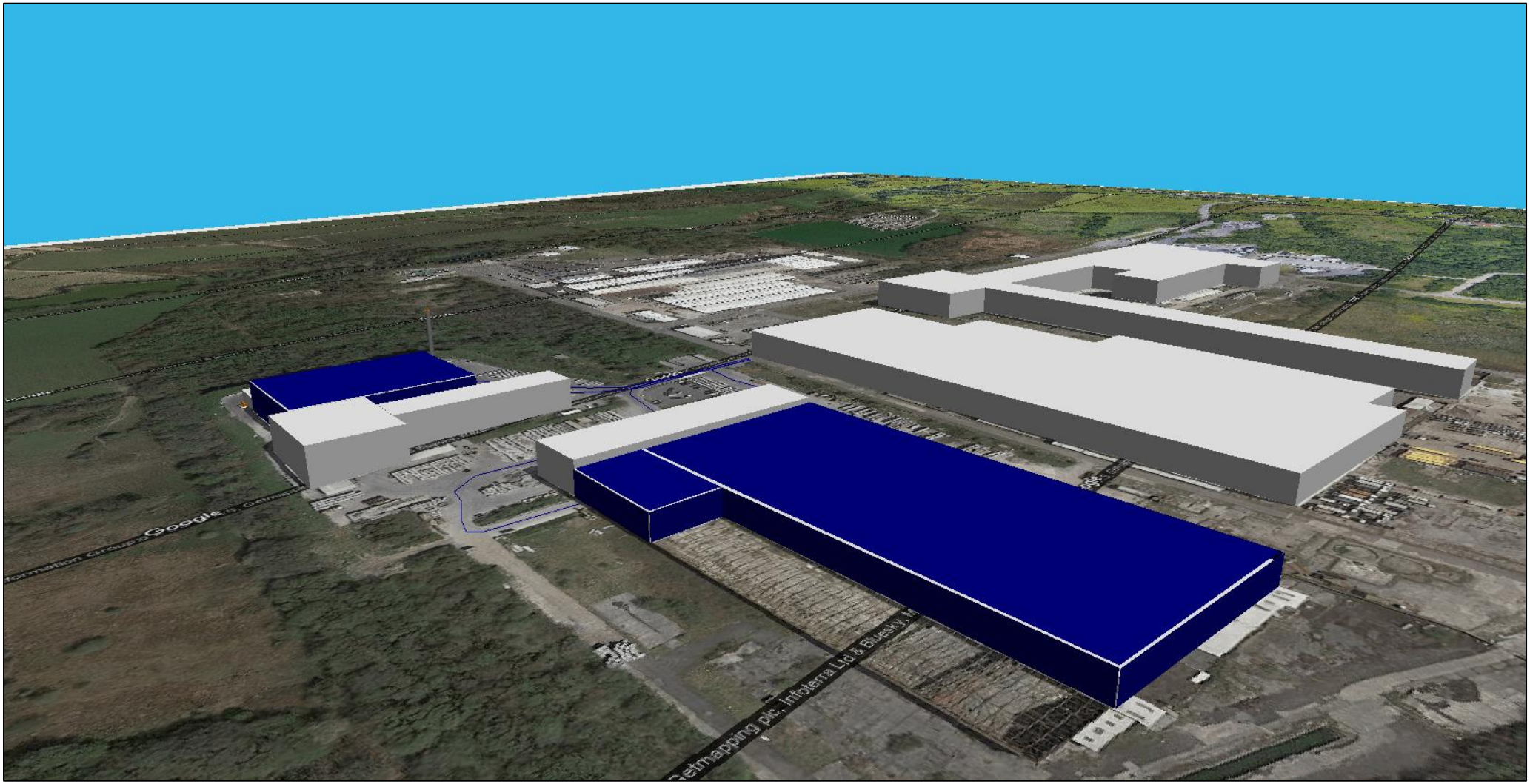


Figure 5: 3D visualisation of the noise model of the plant

8 ENVIRONMENTAL NOISE IMPACT ASSESSMENT

8.1 BS4142 Assessment

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

1. Existing plant and processed only
2. New plant and processes only
3. All plant and processes

The 3D noise model has been used to predict the Specific Sound Level at the worst affected residential receptor for each of the three identified operating scenarios. *Appendix D provides full details of CadnaA noise maps which present the Specific Sound Levels predicted.*

In accordance with BS4142, a correction of +3dB has been applied to the calculated Specific Sound Level, as arising at the noise sensitive receptors from the Facility in order to allow for any residual "readily distinctive" acoustic features, in order to determine the BS4142 defined "Rating Level" for acoustic assessment purposes:

Table 5 presents the predicted overall A-weighted, BS4142-defined "Rating Level" at the identified NSRs with the Noise Management Plan (NMP) as presented in Section 8.2 duly and fully implemented:

Scenario	Assessment Period	Predicted Specific Level, dB $L_{Aeq,T}$	Predicted Rating Level, dB $L_{Ar,Tr}$	Typical Background Sound Level, dB L_{A90}	Rating Level sub. Background ±dB
1 Existing Plant	Daytime (07:00hrs - 23:00hrs) T = 1 hour	38	41	36	+5
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	35	38	29	+9
2 New Plant	Daytime (07:00hrs - 23:00hrs) T = 1 hour	30	33	36	-3
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	26	29	29	0
3 All plant	Daytime (07:00hrs - 23:00hrs) T = 1 hour	38	41	36	+5
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	35	38	29	+9

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

For modelled Scenario 1 (i.e. existing plant and processed only), Table 5 shows that the calculated and assessed Rating Level at the worst affected NSR exceeds the typical Background Sound Level by up +5dB as during the daytime and up to +9dB as during the night time. This is just below the threshold for an indication of '*…significant adverse impact, depending on the context*…' in BS4142 terms.

The calculated and assessed Rating Level as arising from the proposed new plant and processes *only* (i.e. Scenario 2) does not exceed the typical Background Sound Level at any time and is thus an indication of '*…low impact, depending on the context…*' in BS4142 terms.

With *all existing and new plant and processes operating* (i.e. Scenario 3), the calculated and assessed Rating Level is unchanged from that as predicted for Scenario 1. This suggests that environmental noise that is anticipated from the proposed new plant is not significant and furthermore does not alter the magnitude of the predicted noise level impact as currently experienced, with the as-existing Facility operating normally.

The predicted magnitude of the impact is subject to the consideration of context. In this case, it has been demonstrated that the introduction of the proposed new plant and processes (with the Noise Management Plan as presented in Section 8.2 herein having been duly and fully implemented) does not change the magnitude of the existing environmental noise level impact.

As discussed in Section 3.2.5, Sol understands that following remedial works carried out to the "bag house fans" during May 2015, there have no noise complaints which relate specifically to noise from any plant or processes as associated with the Real Alloy site. Given that the magnitude of the predicted noise impact is not expected to change as a result of the introduction of the proposed new plant onto the site, there is no reason to believe that the number of complaints (again relating specifically to noise from any plant or processes as associated with the Real Alloy site) would increase.

Furthermore, the predicted Specific Sound Levels of 38dB $L_{Aeq,T}$ during daytime periods and 35dB $L_{Aeq,T}$ during night time periods are considered to be low in absolute terms. The predicted daytime noise level of 38dB $L_{Aeq,T}$ is significantly below the BS8233 defined *desirable* limit of 50dB $L_{Aeq,16hours}$ (see Section 6.3) for external amenity spaces.

Furthermore, and allowing for a 12dB reduction for a partially open window, the predicted noise level within the worst affected dwelling is likely to be 26dB $L_{Aeq,1hour}$ during daytime periods and 23dB $L_{Aeq,15min}$ during night time periods, which are below the BS8233 desirable limits for resting, dining, and sleeping activities (see Section 6.3)

Therefore whilst noise arising from Real Alloy may be audible at these worst affected receptors, the resultant noise level impact is not expected to result in a loss of amenity for local residents. ***Taking context into consideration, the magnitude of the resultant impact is expected to be below the threshold for an adverse impact.***

If subsequent complaints are made, then it would be appropriate to further mitigate the noise level emissions from the existing plant. It is considered unlikely that further noise mitigation (in addition to that as set out within this report) to the proposed new plant would be needed. The specification of further noise mitigation to the existing plant is outside the scope of this assessment.

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.

This report section provides a summary of required noise mitigation to the proposed new plant only. The finalised, actual noise mitigation strategy to be implemented must be reviewed, further developed, refined and ultimately approved by Sol prior to any finalisation or implementation. 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. 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) **Shredder**: An acoustic enclosure (or dedicated acoustically insulated building, with lobbied doors) shall be required to the fully enclose the shredder in order to achieve a maximum allowable sound pressure level of 75dB $L_{Aeq,T}$ at one metre distance from any external acoustic enclosure surface(s), including where any conveyors, ductwork and pipe penetrations, doors, louvres/vents etc. occur.

In the event of any ducting of ventilation air to outside, e.g. via roof fabric, the maximum permissible noise level at all such external ventilation louvres, cowls etc. must be separately reviewed by Sol and shall be more onerous than 75dB $L_{Aeq,T}$ at one metre.

Safety, maintenance and user access needs, ventilation, fire protection, lighting, visual and maintenance access, health and safety, dust and explosion risk requirements must all be carefully considered by others, all prior to any finalisation and procurement. Attenuated, fan-assisted (and likely spark arrested) ventilation to the acoustic enclosure shall be needed, complete with separate run and standby fans (plant resilience) and attenuators.

(b) **Bailer**: An acoustic enclosure (or dedicated acoustically insulated building, with lobbied doors) shall be required to the fully enclose the Bailer to achieve a maximum allowable sound pressure level of 70dB $L_{Aeq,T}$ at one metre distance from any external acoustic enclosure surface(s), including where any conveyors, ductwork and pipe penetrations, doors, louvres/vents etc. occur.

As per the shredder acoustic enclosure, safety, maintenance and user access needs, ventilation, fire protection, lighting, visual and maintenance access, health and safety, dust and explosion risk requirements must all be carefully considered by others, all prior to any finalisation and procurement. Attenuated, fan-assisted (and likely spark arrested) ventilation to the acoustic enclosure shall be needed, complete with separate run and standby fans (plant resilience) and attenuators.

(c) **Roller shutter and personnel doors**: Roller shutters and personnel doors must always be kept closed when not in use for immediate, momentary vehicle ingress/egress (an automatic door actuation “induction loop” system or similar is recommended). These doors must not be used for ventilation or heat dissipation purposes etc. Roller shutter doors need to remain closed during night time periods.

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

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 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 (NMP) 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 to support a Permit Variation Application for a proposed new shredder, with ancillary plant, to be installed at the existing Real Alloy industrial premises as located at Westfield Industrial Park, Waunarlwydd, Swansea, SA5 4SF.

This acoustic assessment report considers the environmental noise impact as arising from the operation of all existing and new proposed plant and processes associated with the site at the nearest Noise Sensitive Receptors (NSRs).

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

It is the conclusion of this environmental noise assessment that the environmental noise impact as arising from the normal operation of the Facility, including the proposed new plant, with duly and satisfactorily implemented Noise Mitigation Plan (NMP) as described herein, results in a sub-Adverse environmental noise impact at the worst affected NSR, 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’.

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

Swansea, Wales

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
09/07/2021	16	0.0	E	0.7	14	0.3	E	0.8
10/07/2021	17	0.0	E	1.3	15	0.0	SE	0.6
11/07/2021	16	3.1	E	2.4	14	0.1	E	1.0
12/07/2021	17	10.7	W	1.4	15	0.0	W	0.9
13/07/2021	18	0.0	W	1.8	-	-	-	-

PERSONNEL

Jamie Ross MIOA – 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. 34375244)

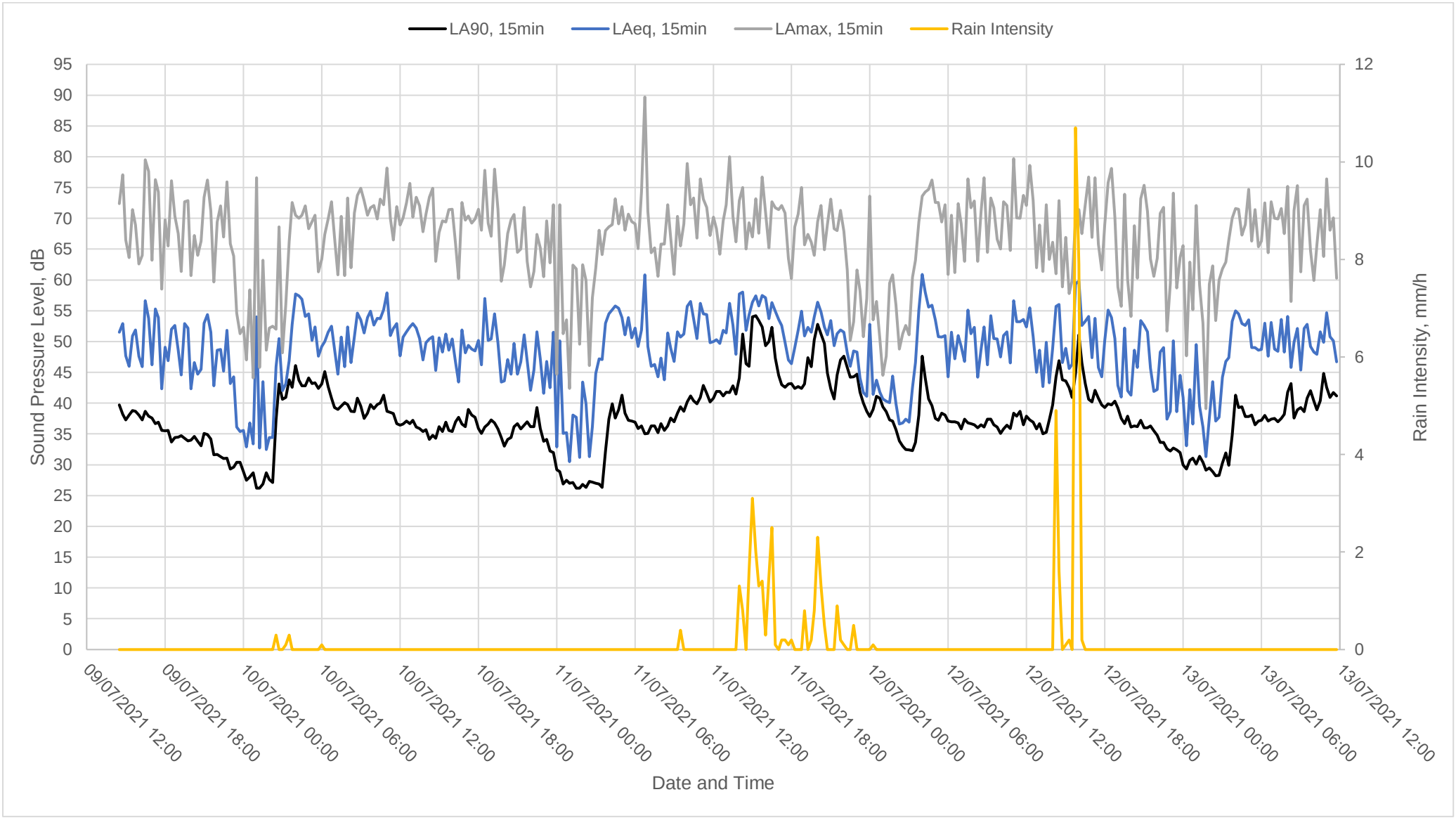
Vaisala WXT520 Weather Station (serial no. M3640013)

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

Graph B1 summarises the broadband A-weighted results obtained at Monitoring Position 1.



Graph B1: A-weighted environmental noise levels at Measurement Position 1, 9 to 13 July 2021

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

APPENDIX D

ENVIRONMENTAL NOISE MODELLING RESULTS

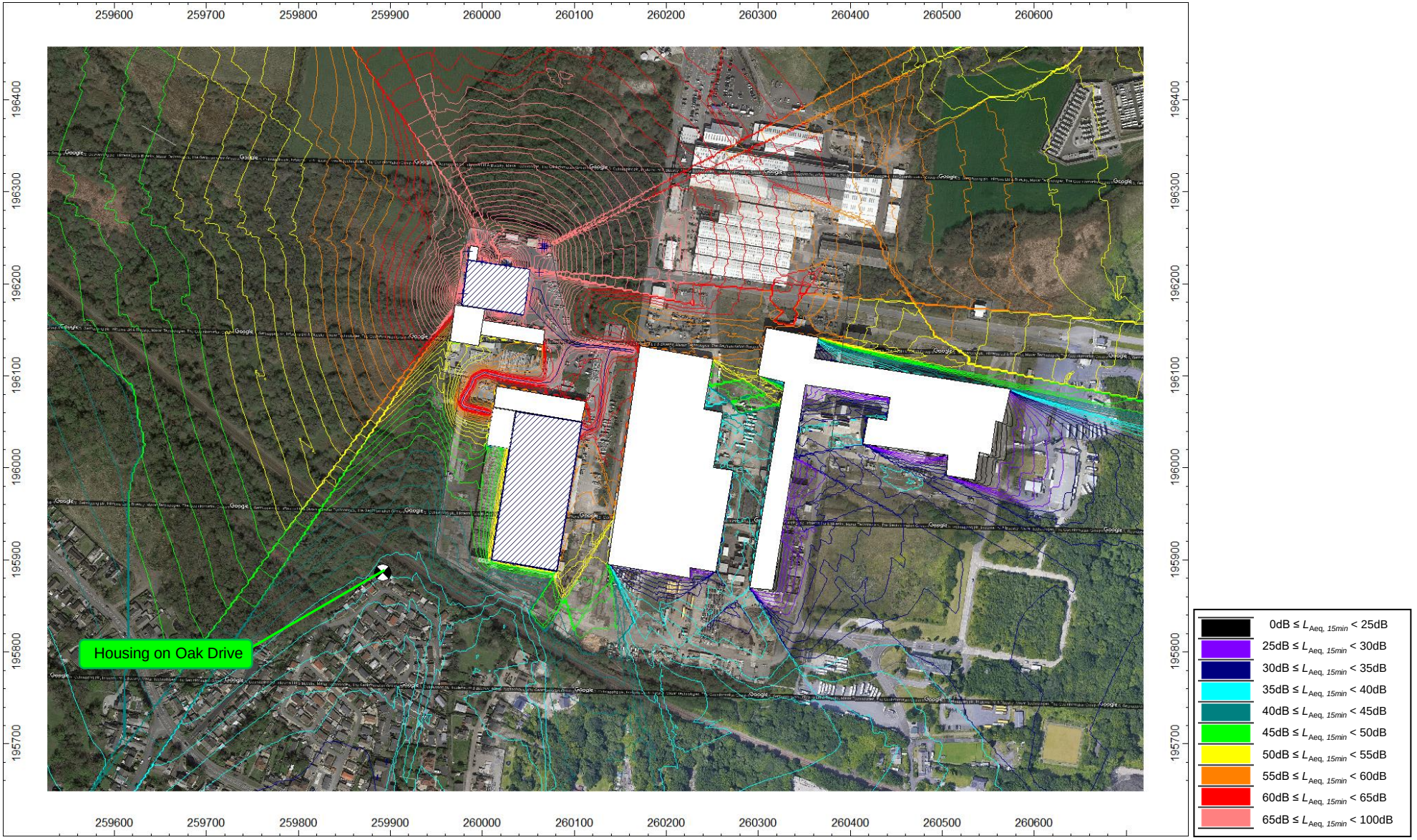


Figure D1: Scenario 1 - existing plant and processes only predicted daytime $L_{Aeq,1hour}$ Specific Sound Level, at 1.5 metres grid height

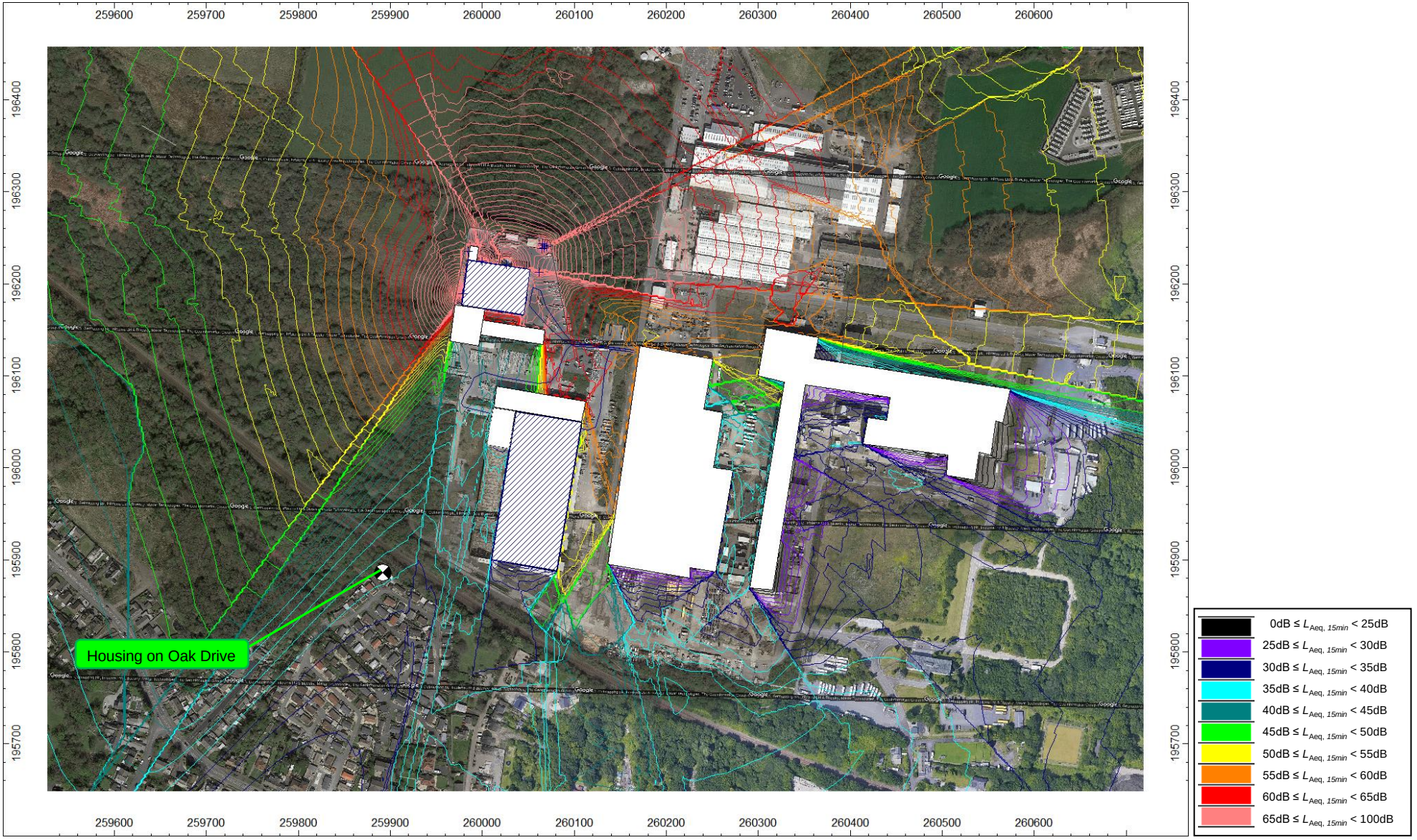


Figure D2: Scenario 1 - existing plant and processes only predicted night time $L_{Aeq,1hour}$ Specific Sound Level, at 1.5 metres grid height

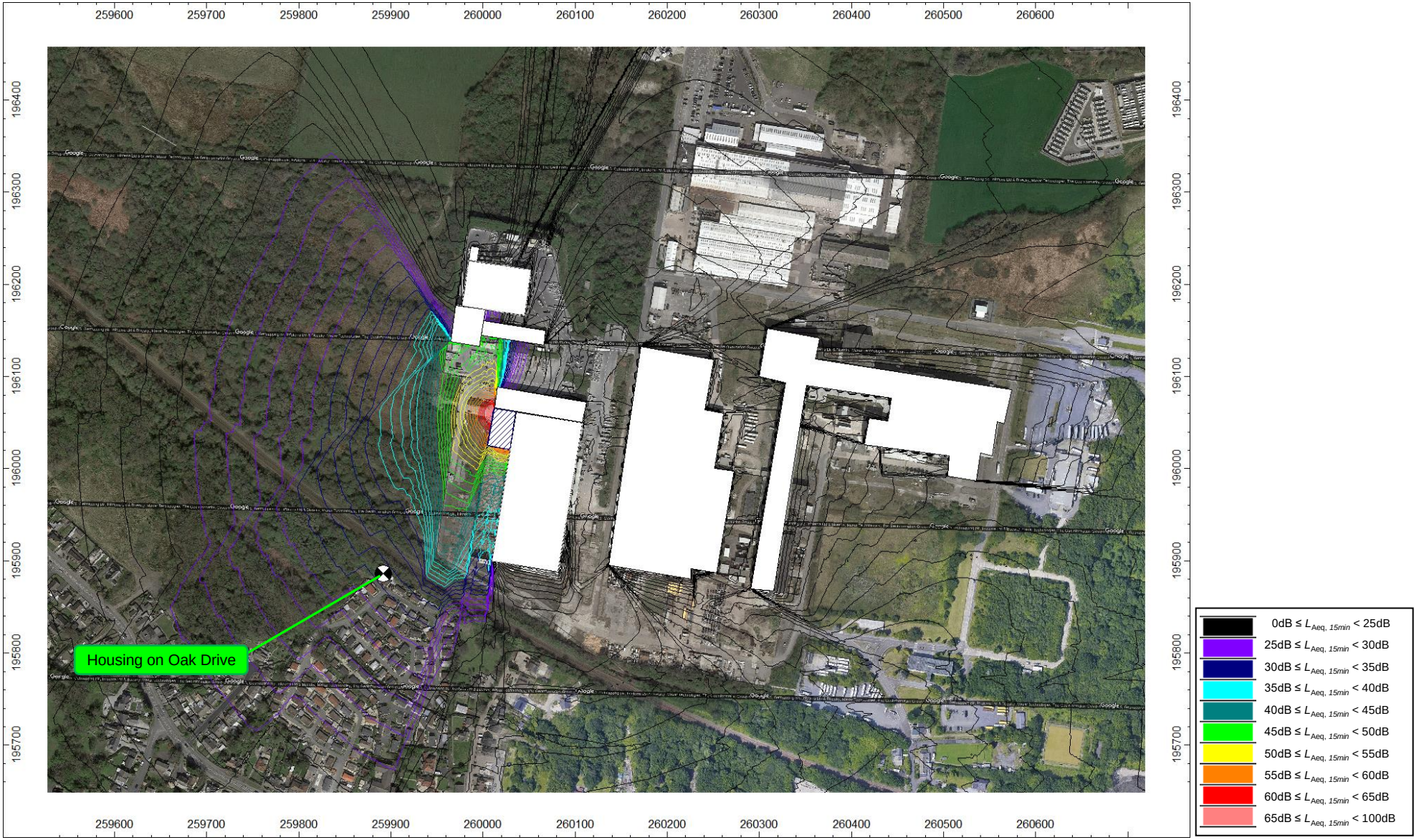


Figure D3: Scenario 2 - New plant and processes only predicted daytime $L_{Aeq,1hour}$ Specific Sound Level, at 1.5 metres grid height

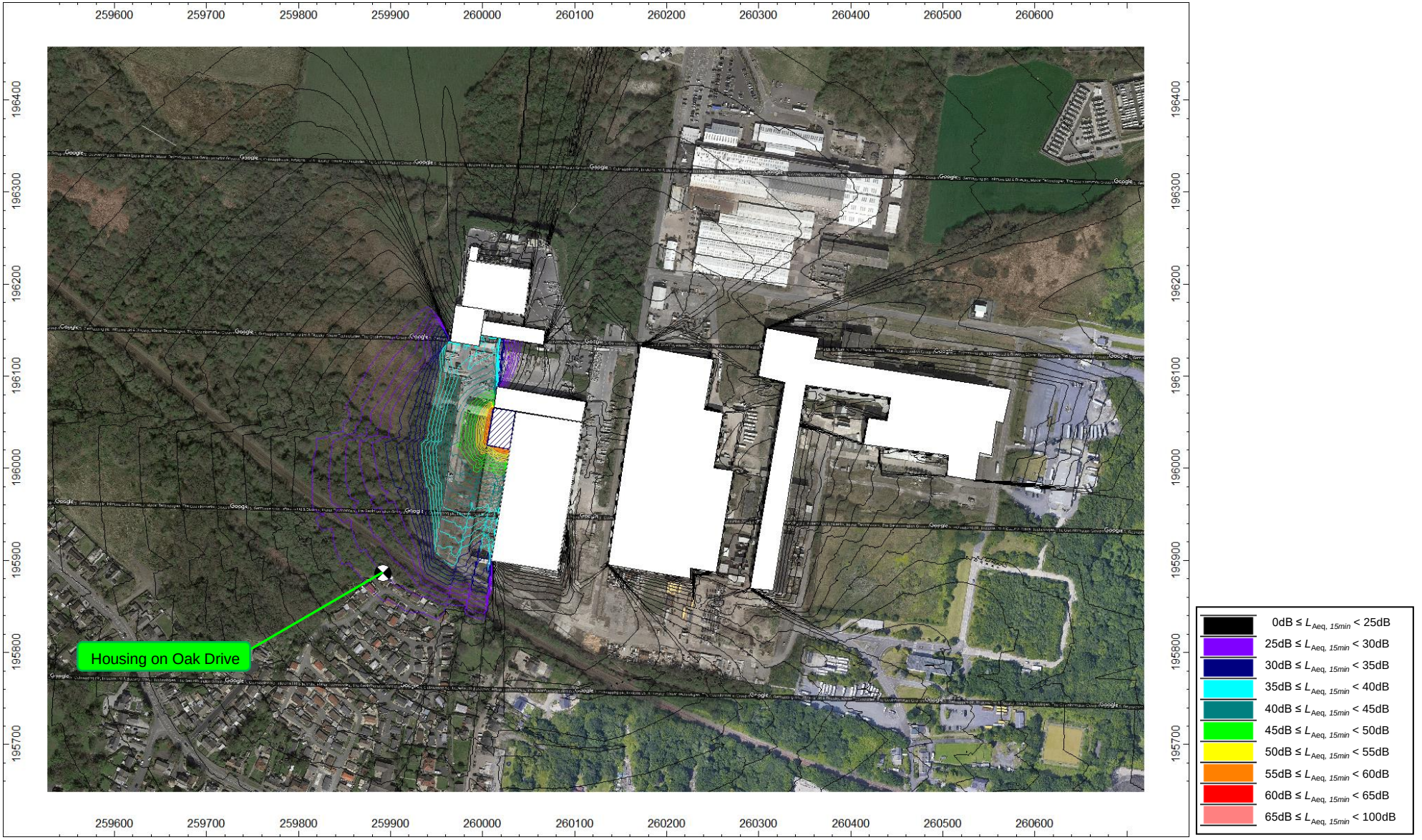


Figure D4: Scenario 2 – New plant and processes predicted night time $L_{Aeq,1hour}$ Specific Sound Level, at 1.5 metres grid height

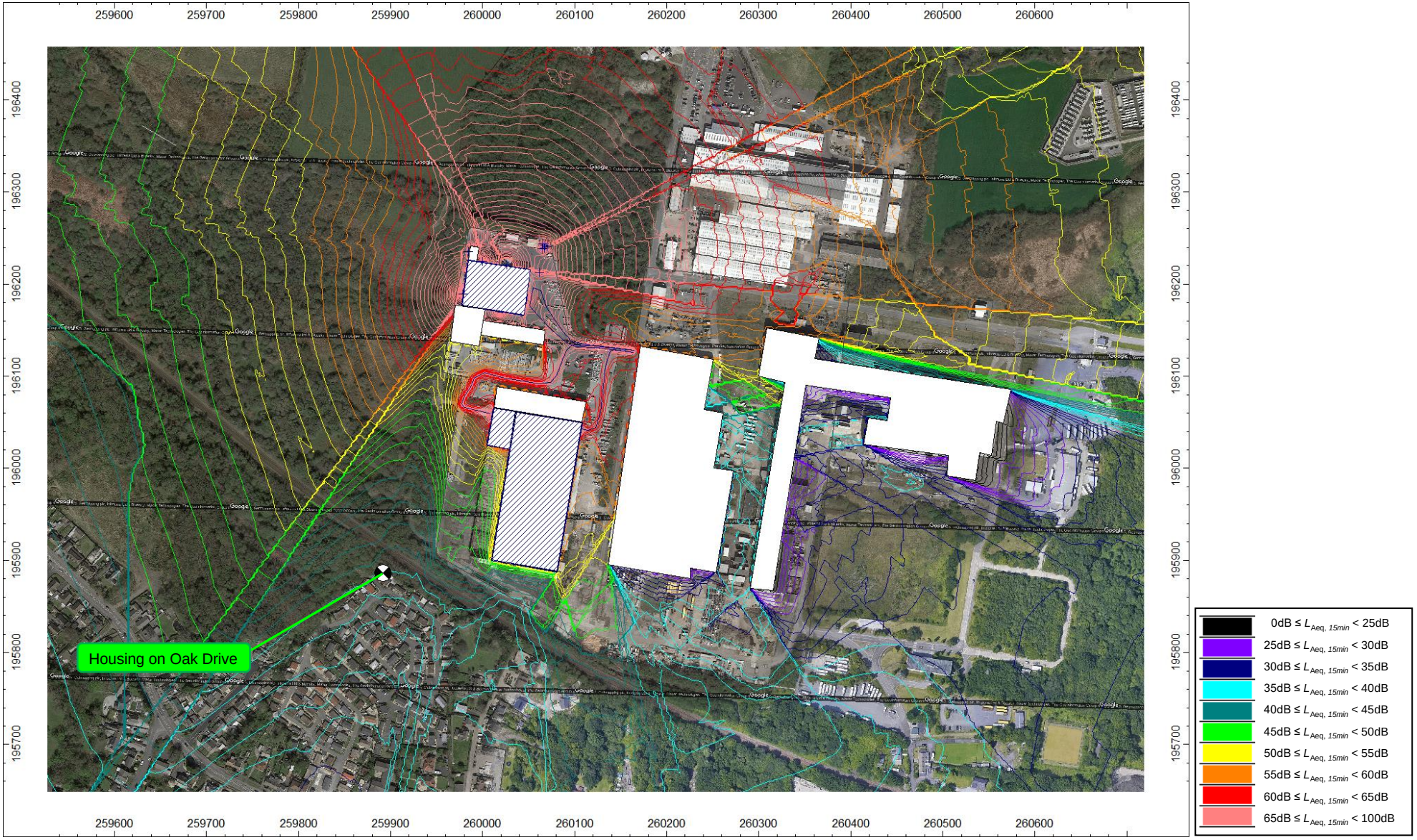


Figure D5: Scenario 3 – all plant and processes only predicted daytime $L_{Aeq,1hour}$ Specific Sound Level, at 1.5 metres grid height

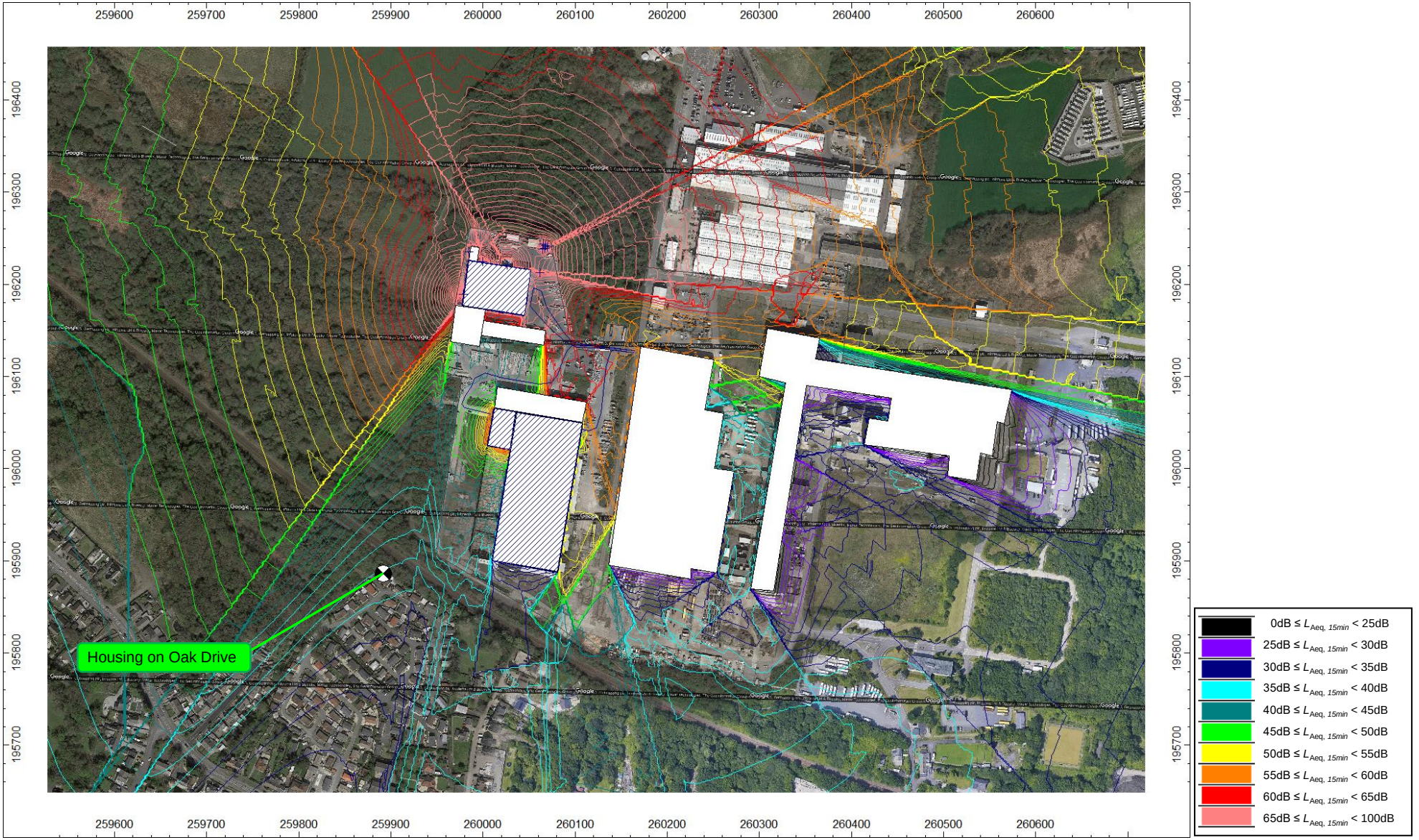


Figure D6: Scenario 3 – all plant and processes only predicted daytime $L_{Aeq,1hour}$ Specific Sound Level, at 1.5 metres grid height

A – Housing on Oak Drive *Existing Plant Only* Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
Furnace 1 Intake Fan	32.3
HGV	32.1
Furnace Room – Open Roller Shutter	27.2
Deox Casting Machine	25.0
ID Fan Scroll 2	24.3
Storage Room - West	24.2
ID Fan Motor 1	23.0
Furnace Room - Roof	22.4
Storage Room - Roof	22.2
ID Fan Motor 2	21.4
Furnace Room - West	20.0
Storage Room - South	18.8
HGV	18.6
Furnace 2 Intake fan	18.1
Furnace Room – Open Roller Shutter	18.0
Furnace Room - South	17.8
ID Fan Scroll 1	17.3
ID Fan Stack Outlet	12.9
Storage Room – Open Roller Shutter	9.9
Storage Room - East	9.0
Fork Lift Truck	8.1
HGV	7.9
Furnace Room - North	7.6
Furnace Room – Open Roller Shutter	-1.2
Furnace Room – East	-2.1
Furnace Room - Open Roller Shutter	-3.7
Total	**37.7**

Table D1: A - Housing on Oak Drive
Existing Plant only
Specific Sound Levels, daytime

A – Housing on Oak Drive *Existing Plant Only* Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
Furnace 1 Intake Fan	32.3
Deox Casting Machine	25.0
ID Fan Scroll 2	24.3
ID Fan Motor 1	23.0
Furnace Room - Roof	22.4
ID Fan Motor 2	21.4
Furnace Room - West	20.0
Furnace 2 Intake fan	18.1
Furnace Room - South	17.8
ID Fan Scroll 1	17.3
ID Fan Stack Outlet	12.9
Fork Lift Truck	8.1
Furnace Room - North	7.6
Furnace Room - East	-2.1
Total	**34.9**

Table D2: A - Housing on Oak Drive
Existing Plant only
Specific Sound Levels, night time

A – Housing on Oak Drive *New Plant Only* NMP Duly Implemented Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
Shredder Room – Open Roller Shutter	28.0
Shredder Room - South	21.8
Shredder Room - Roof	20.4
Shredder Room - West	19.8
Total	**29.9**

Table D3: A - Housing on Oak Drive *New Plant Only* NMP duly implemented Specific Sound Levels, daytime

A – Housing on Oak Drive *New Plant Only* NMP Duly Implemented Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
Shredder Room - South	21.8
Shredder Room - Roof	20.4
Shredder Room - West	19.8
Total	**25.5**

Table D4: A - Housing on Oak Drive *New Plant only* NMP duly implemented Specific Sound Levels, night time

A – Housing on Oak Drive *All Plant* NMP Duly Implemented Predicted Specific Sound Levels Daytime (07:00 – 23:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
Furnace 1 Intake Fan	32.3
HGV	32.1
Shredder Room – Open Roller Shutter	28.0
Furnace Room – Open Roller Shutter	27.2
Deox Casting Machine	25.0
ID Fan Scroll 2	24.3
Storage Room - West	24.2
ID Fan Motor 1	23.0
Furnace Room - Roof	22.4
Storage Room - Roof	22.2
Shredder Room - South	21.8
ID Fan Motor 2	21.4
Shredder Room - Roof	20.4
Furnace Room - West	20.0
Shredder Room - West	19.8
Storage Room - South	18.8
HGV	18.6
Furnace 2 Intake fan	18.1
Furnace Room – Open Roller Shutter	18.0
Furnace Room - South	17.8
ID Fan Scroll 1	17.3
ID Fan Stack Outlet	12.9
Storage Room – Open Roller Shutter	9.9
Storage Room - East	9.0
Fork Lift Truck	8.1
HGV	7.9
Furnace Room - North	7.6
Furnace Room – Open Roller Shutter	-1.2
Furnace Room - East	-2.1
Furnace Room - Open Roller Shutter	-3.7
Total	**38.4**

Table D5: A - Housing on Oak Drive *All Plant* NMP duly implemented Specific Sound Levels, daytime

A – Housing on Oak Drive *All Plant* NMP Duly Implemented Predicted Specific Sound Levels Night time (23:00 – 07:00 Hours)	
Source Description	**Specific Sound Level, dB $L_{Aeq,T}$**
Furnace 1 Intake Fan	32.3
Deox Casting Machine	25.0
ID Fan Scroll 2	24.3
ID Fan Motor 1	23.0
Furnace Room - Roof	22.4
Shredder Room - South	21.8
ID Fan Motor 2	21.4
Shredder Room - Roof	20.4
Furnace Room - West	20.0
Shredder Room - West	19.8
Furnace 2 Intake fan	18.1
Furnace Room - South	17.8
ID Fan Scroll 1	17.3
ID Fan Stack Outlet	12.9
Fork Lift Truck	8.1
Furnace Room - North	7.6
Furnace Room - East	-2.1
Total	35.4

Table D6: A - Housing on Oak Drive *All Plant* NMP duly implemented Specific Sound Levels, night time

APPENDIX E

NOISE SOURCE SCHEDULE AND OUTLINE REQUIRED BAT NOISE CONTROL MEASURES

Equipment Name	Component / Scenario	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, m²	Overall Sound Power Level, dB L_{wA}	Utilisation		Source: Area (A) Line (L) Point (P) or internal (I)	Plant Status	Outline Noise Mitigation Design
				31.5	63	125	250	500	1k	2K	4k	8k					Daytime	Night time			
Existing Plant																					
Furnace Room																					
Furnace Room Internal SPL	Furness 2 only	On-site sound pressure level measurement during 23/02/2022		73	86	78	77	77	76	75	71	65	81	n/a	n/a	n/a	100%	100%	I		
Furnace Room Internal SPL	Both Furness operational	+3dB added to the above values.		76	89	81	80	80	79	78	74	68	84	n/a	n/a	n/a	100%	100%	I		
Loading Shovel		JCB 417 loading shovel used. Manufacturer sound power level of 104dB L_{wA}. Noise spectrum taken from BS5228 Part 1 2009, Table C.9, ref. no.5			83	78	72	73	71	68	63	58	76	10	628	104	100%	100%	I		
External																					
Deox Casting Machine	Typical Operation	On-site sound pressure level measurement during 23/02/2022	1	81	83	88	90	95	96	97	96	88	103	1	85	122	100%	100%	P		
Furnace 2 intake fan	Typical Operation	On-site sound pressure level measurement during 23/02/2022	1	83	84	90	105	98	97	96	88	82	103	1	6	110	100%	100%	P		
Furness 1 intake fan	Typical Operation	Not operational during site visit. Noise data for Furness 2 intake fan assumed	1	83	84	90	105	98	97	96	88	82	103	1	6	110	100%	100%	P		
ID fan motor 2	Typical Operation	On-site sound pressure level measurement during 23/02/2022	1	96	100	95	91	85	83	79	80	77	90	1	25	103	100%	100%	P		
ID fan scroll 2	Typical Operation	On-site sound pressure level measurement during 23/02/2022	1	92	99	96	91	87	82	79	76	72	89	1	54	107	100%	100%	P		
ID fan motor 1	Typical Operation	On-site sound pressure level measurement during 23/02/2022	1	97	98	94	91	92	86	86	81	76	93	1	25	107	100%	100%	P		
ID fan scroll 1	Typical Operation	On-site sound pressure level measurement during 23/02/2022	1	84	92	88	84	81	75	71	70	70	82	1	54	100	100%	100%	P		
ID Stack Outlet	n/a	No data					84						75	1	6	83	100%	100%	P		
Generator	Typical Operation	On-site sound pressure level measurement during 23/02/2022	1	88	85	90	84	78	74	68	63	57	81	1	75	100	0%	0%	P	Emergency	
Loading Shovel	Typical Operation	JCB 417 loading shovel used. Manufacturer sound power level of 104dB L_{wA}. Noise spectrum taken from BS5228 Part 1 2009, Table C.9, ref. no.5	2		83	78	72	73	71	68	63	58	76	10	628	104	100%	100%	P		
Fork Lift Truck	Typical Operation	Still RX 70-50 FLT used. Manufacturer sound power level of 93dB L_{wA}. Noise spectrum taken from BS5228 Part 1 2009, Table C.9, ref. no.5	2		72	67	61	62	60	57	52	47	65	10	628	93	100%	100%	P		
HGV	Typical Operation	Noise spectrum taken from BS5228 Table C.2 reference 34 ("Lorry": 4-axle wagon).	4/hour		73	78	78	78	74	73	68	66	80	10	628	108	4/hour	n/a	L		

Equipment Name	Component / Scenario	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, m²	Overall Sound Power Level, dB L_{wA}	Utilisation		Source: Area (A) Line (L) Point (P) or internal (I)	Plant Status	Outline Noise Mitigation Design
				31.5	63	125	250	500	1k	2K	4k	8k					Daytime	Night time			
New Plant																					
Shredder Room																					
Loading Shovel	Typical Operation	JCB 417 loading shovel used. Manufacturer sound power level of 104dB L_{wA}. Noise spectrum taken from BS5228 Part 1 2009, Table C.9, ref. no.5	1		83	78	72	73	71	68	63	58	76	10	628	104	100%	100%	I		
Eddy Current	Typical Operation	No noise data provided. Noise data taken from manufacturer data for a similar unit: 72dB $L_{Aeq,T}$ at one metre	1		66	61	69	64	66	63	65	64	72	1	52	89	100%	100%	I		
Shredder	Exposed Unit	ABK acoustic report for proposed shredder (119 L_{WA})	1	81	88	83	91	87	88	86	87	86	94	3	303	119	100%	100%	I		An acoustic enclosure (or dedicated acoustically insulated building, with lobbied doors and attenuated ventilation etc.) shall be required to the fully enclose the shredder to achieve a maximum allowable sound pressure level of 75dB $L_{Aeq,T}$ at one metre distance from *any* external acoustic enclosure surface(s), including where any conveyors, ductwork and pipe penetrations, doors, louvres/vents etc. occur. Safety, maintenance and user access needs, ventilation and fire protection/explosion risk requirements must all be considered (by others), and in addition also reviewed and assessed in acoustic terms. Attenuated, fan-assisted (and likely spark arrested) ventilation to the acoustic enclosure shall be needed, complete with separate run and standby fans (plant resilience) and attenuators.
	Acoustic Enclosure	**Maximum Permissible Sound Pressure level**					84						75	3	180	98					
Conveyor		No noise data provided. Assume SPL 67dB $L_{Aeq,T}$ at one metre distance	1		61	56	64	59	61	58	60	59	67	1	49	84	100%	100%	I		
Bailer	Exposed Unit	Real Alloy advised the bailer is rated with a sound power level of 105dB L_{wA}	1				82						73	1	143	95	100%	100%	I		An acoustic enclosure (or dedicated acoustically insulated building, with lobbied doors) shall be required to the fully enclose the shredder to achieve a maximum allowable sound pressure level of 70dB $L_{Aeq,T}$ at one metre distance from any external acoustic enclosure surface(s), including where any conveyors, ductwork and pipe penetrations, doors, louvres/vents etc. occur. Safety, maintenance and user access needs, ventilation and fire protection/explosion risk requirements must all be considered (by others), and in addition also reviewed and assessed in acoustic terms. Attenuated, fan-assisted (and likely spark arrested) ventilation to the acoustic enclosure shall be needed, complete with separate run and standby fans (plant resilience) and attenuators.
	Acoustic Enclosure	**Maximum Permissible Sound Pressure level**					79						70	1	214	93					

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

APPENDIX F

COMPOSITE SOUND INSULATION CALCULATIONS

Project	Real Alloy
Project Ref.	P1970
Building Ref.	Furness Room

BUILDING DIMENSIONS

Length (m)	49	Volume (m3)	39984
Width (m)	68	Surface Area (m2)	9472
Height (m)	12	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	816	Wall	147	38	39	36	44	51	58	62	62	140mm thick brick
		Roller Shutter	633	11	14	16	15	18	22	25	28	Single sheet cladding
		Rollershutter	36	14	14	17	18	15	19	19	19	Ascot Doors roller shutter
		Louvres										
		Window		15	19	23	28	32	30	35	35	6mm glass
	Composite SRI			**12**	**15**	**17**	**16**	**19**	**23**	**25**	**27**	
west façade	588	Wall	147	38	39	36	44	51	58	62	62	140mm thick brick
		Roller Shutter	405	11	14	16	15	18	22	25	28	Single sheet cladding
		Door	36	14	14	17	18	15	19	19	19	Ascot Doors roller shutter
		Louvres										
		Window										
	Composite SRI			**12**	**15**	**17**	**16**	**19**	**23**	**25**	**27**	
South façade	816	Wall	204	38	39	36	44	51	58	62	62	140mm thick brick
		Roller Shutter	612	11	14	16	15	18	22	25	28	Single sheet cladding
		Door										
		Louvres										
		Window		15	19	23	28	32	30	35	35	6mm glass
	Composite SRI			**12**	**15**	**17**	**16**	**19**	**23**	**26**	**29**	
East Façade	588	Wall	147	38	39	36	44	51	58	62	62	140mm thick brick
		Roller Shutter	441	11	14	16	15	18	22	25	28	Single sheet cladding
		Door	36	14	14	17	18	15	19	19	19	Ascot Doors roller shutter
		Louvres										
		Window		15	19	23	28	32	30	35	35	6mm glass
	Composite SRI			**12**	**15**	**17**	**16**	**19**	**23**	**25**	**27**	
Roof	3332	Roof	2998.8	11	14	16	15	18	22	25	28	Single sheet cladding
		Rooflight	333.2	13	9	12	17	22	24	19	19	Kingspan KS1000 DLTR
	Composite SRI			**11**	**13**	**15**	**15**	**18**	**22**	**24**	**26**	

Figure F1: Furness Room composite sound reduction calculations

Project	Real Alloy
Project Ref.	P1970
Building Ref.	Storage Room

BUILDING DIMENSIONS

Length (m)	325	Volume (m3)	412425
Width (m)	141	Surface Area (m2)	100038
Height (m)	9	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	N/a	Wall										
		Roller Shutter										
		Door										
		Louvres										
		Window										
	Composite SRI			####	####	####	####	####	####	####	####	
west façade	2925	Wall	2925	11	14	16	15	18	22	25	28	Single sheet cladding
		Roller Shutter										
		Door										
		Louvres										
		Window										
	Composite SRI			11	14	16	15	18	22	25	28	
South façade	1269	Brick	423	38	39	36	44	51	58	62	62	140mm thick brick
		Wall	846	11	14	16	15	18	22	25	28	Single sheet cladding
		Door										
		Louvres										
		Window										
	Composite SRI			13	16	18	17	20	24	27	30	
East Façade	2925	Wall	975	38	39	36	44	51	58	62	62	140mm thick brick
		Roller Shutter	1950	11	14	16	15	18	22	25	28	Single sheet cladding
		Door	36	14	14	17	18	15	19	19	19	Ascot Doors roller shutter
		Louvres										
		Window										
	Composite SRI			13	16	18	17	20	24	26	29	
Roof	45825	Roof	41242.5	11	14	16	15	18	22	25	28	Single sheet cladding
		Rooflight	4582.5	13	9	12	17	22	24	19	19	Kingspan KS1000 DLTR
	Composite SRI			11	13	15	15	18	22	24	26	

Figure F2: Storage Room composite sound reduction calculations

Project	Real Alloy
Project Ref.	P1970
Building Ref.	Shredder Room

BUILDING DIMENSIONS

Length (m)	40	Volume (m3)	9000
Width (m)	25	Surface Area (m2)	3170
Height (m)	9	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	N/A	Wall										
		Roller Shutter										
		Door										
		Louvres										
		Window										
		Composite SRI		###	###	###	###	###	###	###	###	
west façade	360	Brick	102	38	39	36	44	51	58	62	62	140mm thick brick
		Wall	240	11	14	16	15	18	22	25	28	Single sheet cladding
		Roller Shutter	36	14	14	17	18	15	19	19	19	Ascot Doors roller shutter
		Door	2.1	18	24	25	28	30	29	34	34	Booths 29H 45mm metal door
		Composite SRI		**12**	**15**	**17**	**16**	**19**	**23**	**25**	**26**	
South façade	225	Wall	225	11	14	16	15	18	22	25	28	Single sheet cladding
		Roller Shutter										
		Door										
		Louvres										
		Window										
		Composite SRI		**11**	**14**	**16**	**15**	**18**	**22**	**25**	**28**	
East Façade	N/A	Wall										
		Roller Shutter										
		Door										
		Louvres										
		Window										
		Composite SRI		###	###	###	###	###	###	###	###	
Roof	1000	Roof	900	11	14	16	15	18	22	25	28	Single sheet cladding
		Rooflight	100	13	9	12	17	22	24	19	19	Kingspan KS1000 DLTR
		Composite SRI		**11**	**13**	**15**	**15**	**18**	**22**	**24**	**26**	

Figure F3: Shredder Room composite sound reduction calculations

APPENDIX G NOISE COMPLAINTS LOG

Date	Detail	Comments				
Feb-22	*Noise Complaint - nearby resident - Woodlands residential*	*Resident complained to NRW & Real Alloy about noise in and around the railway track area*	*2 x NRW officers attended site to view. **NOT** Real Alloy and no further complaints to RA.*			
Mar-20	*Noise complaint - nearby resident*	*Complained about noise*	*Noise of banging loud bangs and sheet metal*	*Landlord was demolishing Bay 4 at the time and noise **not RA** - No further complaints*		
Mar-20	*Noise complaint NRW*	*Complained about noise - believe duplicate complaint as above*		*as above **not RA***		
Sep-19	*Noise complaint to RA - Neighbour*	*Complaint of sawing and banging*		*Not identified - no further complaints, **not confirmed RA***		
Aug-18	*Neighbour complaint to RA*	*Noise of banging and crashing between 2am and 4.27 am*		*Not identified - no further complaints*	*Incident communicated, reminder for employees not to make noise when moving outside at night; mgt decision not to run loose, noisy material during night time periods*	
Oct-18	*Neighbour complaint to RA*	*Noise between 4 -4.20*		*Not identified - no further complaints*	*Incident communicated, reminder for employees not to make noise when moving outside at night; mgt decision not to run loose, noisy material during night time periods*	
May-15	*Neighbour complaint to NRW*	*Noise repeatedly 22.00-07.00*	*NRW completed noise monitoring at RA. RA completed work in partnership with INVC on bag house fans.*	*No further complaints.*	*Extensive attenuation work and fan rebalancing completed by RA. RA worked with NRW on this incident, including attending complainants' home.*	*Incident was not confirmed to be Real Alloy but "most likely" associated with the bag house fans.*

Table G1: Complaint log as provided by Real Alloy

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
Jamie Ross	MSc (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.