



ACOUSTIC CONSULTANTS LTD
noise and acoustic specialists since 1987

Noise Impact Assessment

Proposed Industrial Development
Dove Valley Park, Derby

Reference: 7925/PR/BL
Date: October 19



Client:		Acoustic Consultant:
PGFI III Ltd		 ACOUSTIC CONSULTANTS LTD <i>noise and acoustic specialists since 1987</i>

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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the external noise aspects as included in this report. We provide advice only in relation to noise and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.



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1. Introduction

PGF III Ltd appointed Acoustic Consultants Limited to carry out a noise impact assessment from the proposed industrial development operations at Dove Valley Park, Derby in support of a planning application.

The brief was to monitor existing background sound levels and provide a British Standard 4142:2014 noise impact assessment of activities associated with the proposed industrial operations and associated vehicle delivery movements on the nearby sensitive receivers around the site.

The impact assessment has been undertaken in accordance with the guidance in the National Planning Policy Framework (NPPF), Noise Policy Statement for England (NPSE), National Planning Practice Guidance (NPPG) and British Standard 4142:2014 (BS4142).

The author of this report is a Full Member of the Institute of Acoustics (MIOA) with a recognised acoustic qualification and over nine years' experience within the field of noise and acoustics and as such is suitably qualified and experienced to undertake a British Standard 4142:2014 assessment.

2. The Site

The site is located at Land North East of Dove Valley Park, Derby. The proposal is for a "Part single, two-storey facility for the extraction, processing, bottling and distribution of water-based products (combined B2 and B8 use), with associated parking and landscaping".

The nearest noise sensitive residential dwellings are those located to the north on the northern boundary facing Littlemeadow Lane and north west boundary abutting Woodyard Lane.

The nearest noise sensitive receivers in relation to the proposed site operations are the existing dwellings to the South and East of the site.

The main source of noise source currently affecting the site is road traffic in the surrounding road network, including distant road traffic on A50 (Foston – Hatton – Hilton Bypass) and industrial noise from the existing operations around the site.

The existing aerial view and proposed site plan are shown in Figures below.

Figure 1: Aerial Google view of the existing industrial site at Dove Valley Park

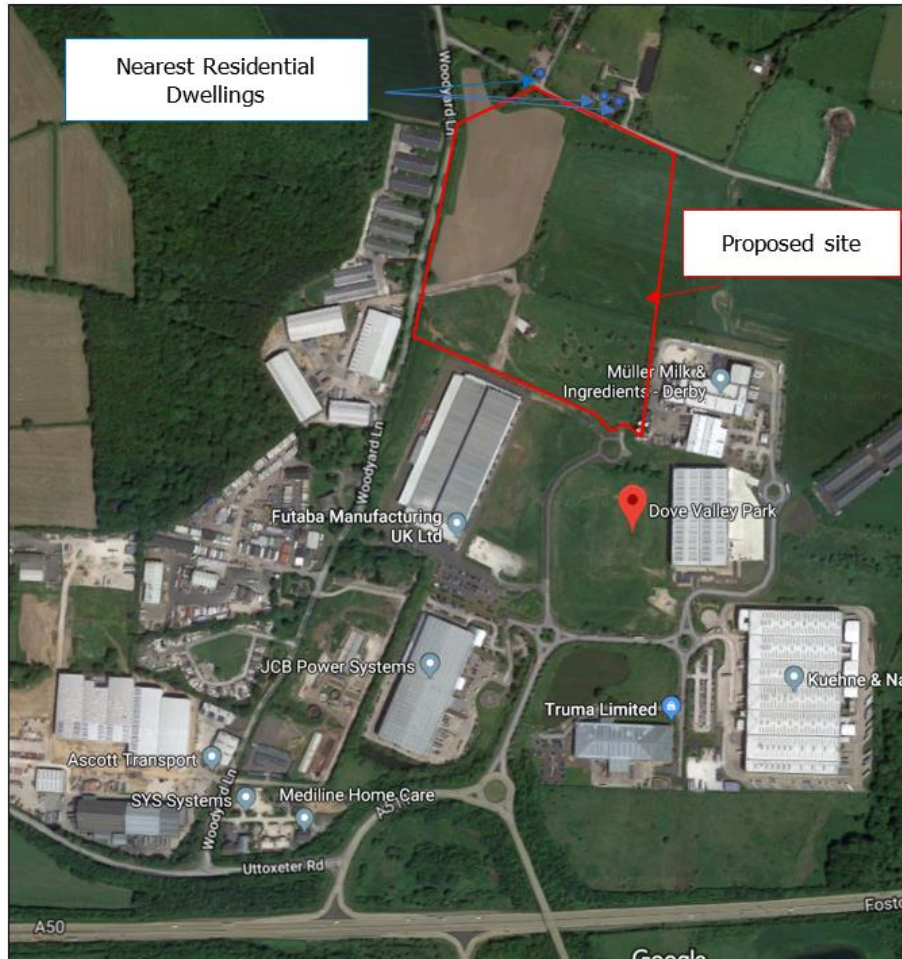
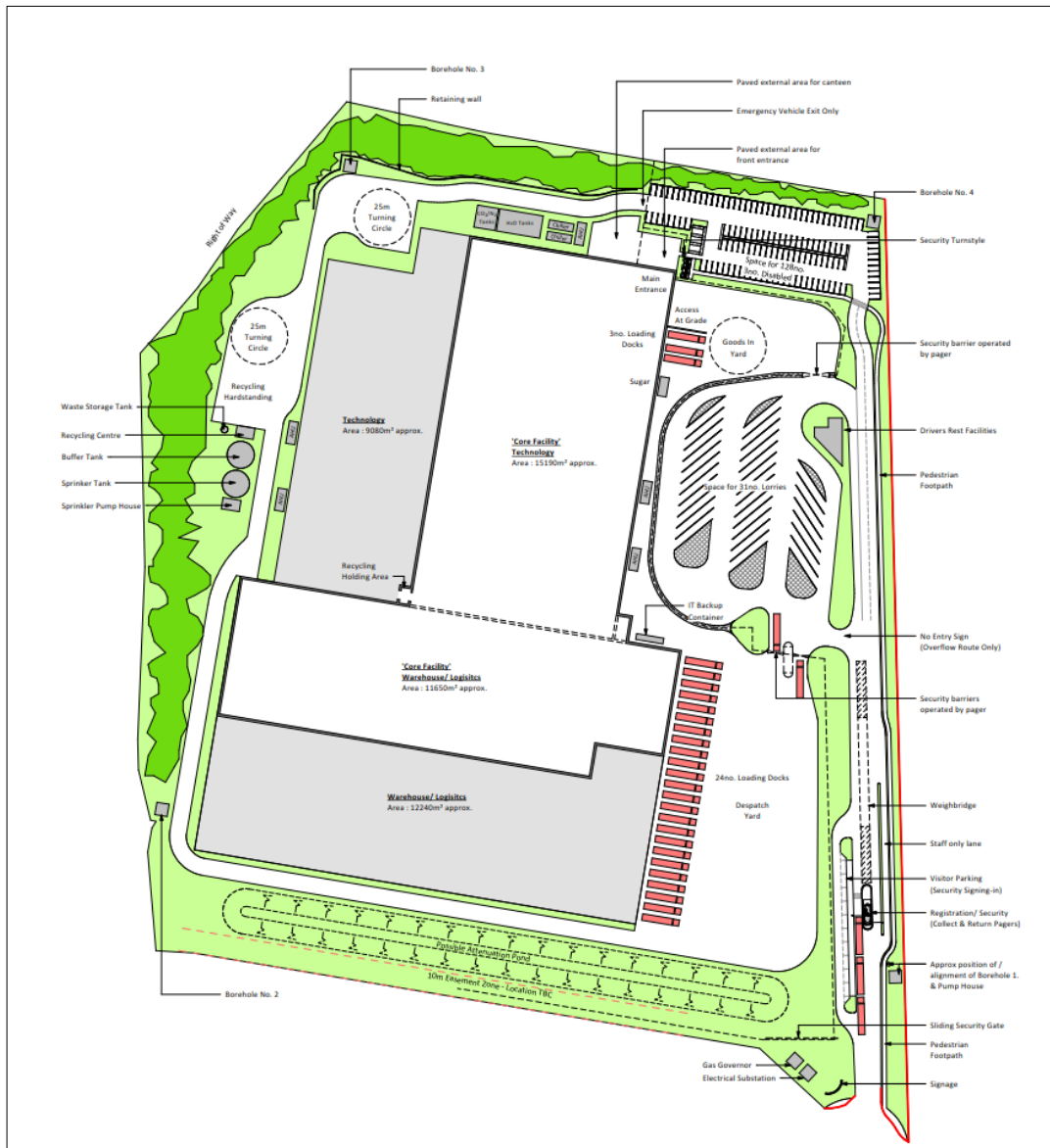


Figure 2: Proposed Site Industrial Site Plan





3. Planning and Noise

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and revised in February 2019. Section 15 entitled 'Conserving and enhancing the natural environment addresses noise as a requirement of planning. Paragraph 170 states:

"170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."*

Paragraph 180 states:

"180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁰*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

⁶⁰ See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010).

The NPPF does not prescribe any assessment methodology or criteria to assess the adverse effect of noise.



3.2. Noise Policy Statement for England

The NPPF refers to the Noise Policy Statement for England (NPSE). This was published in March 2010 and aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

The NPSE sets out the long-term vision of Government noise policy. This long-term vision is supported by three noise policy aims as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

The NPSE introduces the concept of "Significant adverse" and "Adverse" impacts of noise which relate to the noise policy aims. These are applied as follows:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The Noise Policy Statement for England (NPSE) states that noise levels above the Lowest Observed Adverse Effect Level are acceptable in planning where reduced to a minimum.

With regard to where there is potential for noise impact it states the following in relation to the second noise policy aim:



"The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur."

The NPSE does not provide any assessment criteria for the noted effect levels and each case must be considered on its merits. The NPSE does, however, emphasise that in dealing with noise Local Planning Authorities are required to take a balanced approach in considering the benefits of development as against any adverse effects which arise. Paragraph 2.18 of the NPSE is particularly relevant in this respect and states:

"There is a need to integrate consideration of the economic and social benefits of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focusing solely on the noise impact without taking into account other related factors."

The planning need is outside the scope of noise and acoustics and will need to be addressed by others.

3.3. **National Planning Practice Guidance, Noise**

The National Planning Practice Guidance (NPPG) on noise referred to here is based on the current version (January 2015) as provided on the Planning Guidance Website. It states that *"Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment."*

It provides generic guidance on how to determine the noise impact and what factors could be a concern.

It includes the option types to mitigate any adverse effects of noise stating that there are four broad types of mitigation. These are engineering, layout, using planning conditions or obligations and noise insulation.

Paragraph 5 of the NPPG provides a table identifying the effect level and examples of effect relating to the impact effect levels provided in the NPSE. The table is duplicated below:



Table 1: NPPG Noise – Perception of Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

The table does not provide any objective assessment which equates to the noted effect levels however the NPPG identifies that where noise is audible it is not necessarily intrusive. The effect and impact on people is based primarily on the level of noise.



4. Assessment Methodology

For industrial and delivery noise the most relevant guidance is provided within British Standard 4142:2014. The British Standard 4142:2014 entitled 'Method for rating and assessing industrial and commercial sound' was published on the 31st October 2014.

The methods described in the British Standard use outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premises used for residential purposes. The principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'.

The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours). Section 9 entitled 'Rating Level' states: *"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."*

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location.

In Section 11 of the Standard, entitled 'Assessment of the Impacts', it states:

"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9), and consider the following.

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

Based on the initial assessment outcomes of British Standard 4142, and depending on context, it is our opinion that the NOEL, LOAEL and SOAEL levels stated in the Noise Policy Statement for England would generally fall within the following categories when considered in conjunction with the effect levels of the NPPG Noise.



Table 2: BS4142 Difference in Relation to Effect Levels

BS4142 Assessment Difference	Corresponding Effect level*	Action*
≤ -10 dB	No Observed Effect	No specific measures required
-9.9 dB to 0 dB	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level		
0.1 dB to 5 dB	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level		
5.1 dB to 10 dB	Significant Observed Adverse Effect	Avoid
≥ 10.1 dB	Unacceptable Adverse Effect	Prevent

* BS4142 states that "where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration". Therefore the assessment levels and effect levels above are not definitive and maybe modified in some instances due to context.

In terms of context British Standard 4142:2014 states:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

- 1) Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.*
- 2) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*



NOTE 3 Consideration ought to be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

- 3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*
- i) façade insulation treatment;*
 - ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
 - iii) acoustic screening."*



5. Noise Monitoring

A partially attended noise monitoring exercise was undertaken between the 08th October and 10th October 2019 to determine the existing environmental ambient noise levels at the proposed site.

5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Sound Level Meter with a half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2005 and in accordance with British Standard EN 10012:2003 and traceable to the National Standards.

This equipment was checked and calibrated as noted below and the certificates are available for inspection. Table 3 provides the equipment and calibration status.

Table 3: Equipment and Calibration Status

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, NTI, XL2	A2A-11053-E0	17/04/18	28365
Pre-Amp, NTI, MA220	5871	17/04/18	28365
Microphone, NTI, MC230A	9276	16/04/18	28364
Calibrator, Larson Davis, CAL200	12605	16/04/18	283673

The measurement systems were checked before and after use with the calibrators and no significant drift was detected.

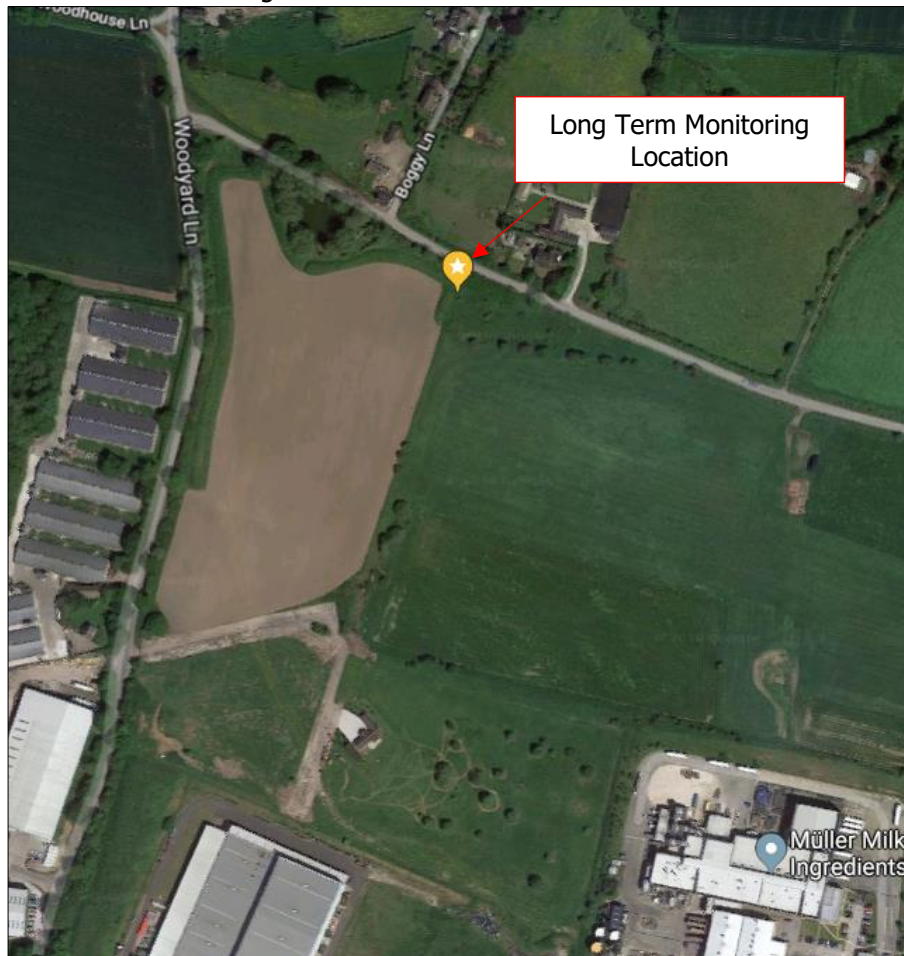
5.2. Weather Conditions

During the measurement the weather was partially dry with occasional periods of rain during the daytime period an average temperature of approximately 9-13 degrees Celsius. Wind speeds during the night time period were calm with average speeds below 5 m/s. During the daytime period, there were occasions where wind speeds were slightly above 5 m/s. Nevertheless, weather conditions are not expected to have adversely affected the measured noise data.

5.3. Monitoring Procedure

A partially attended baseline noise monitoring exercise was undertaken between 13:30 hours on the 08th October 2019 and 12:00 hours on the 10th October 2019 at the monitoring location shown on figure below. The microphone was situated on a tripod at a height of 1.5 metres above the ground, in a free-field position.

Figure 3: Baseline Noise Monitoring Location



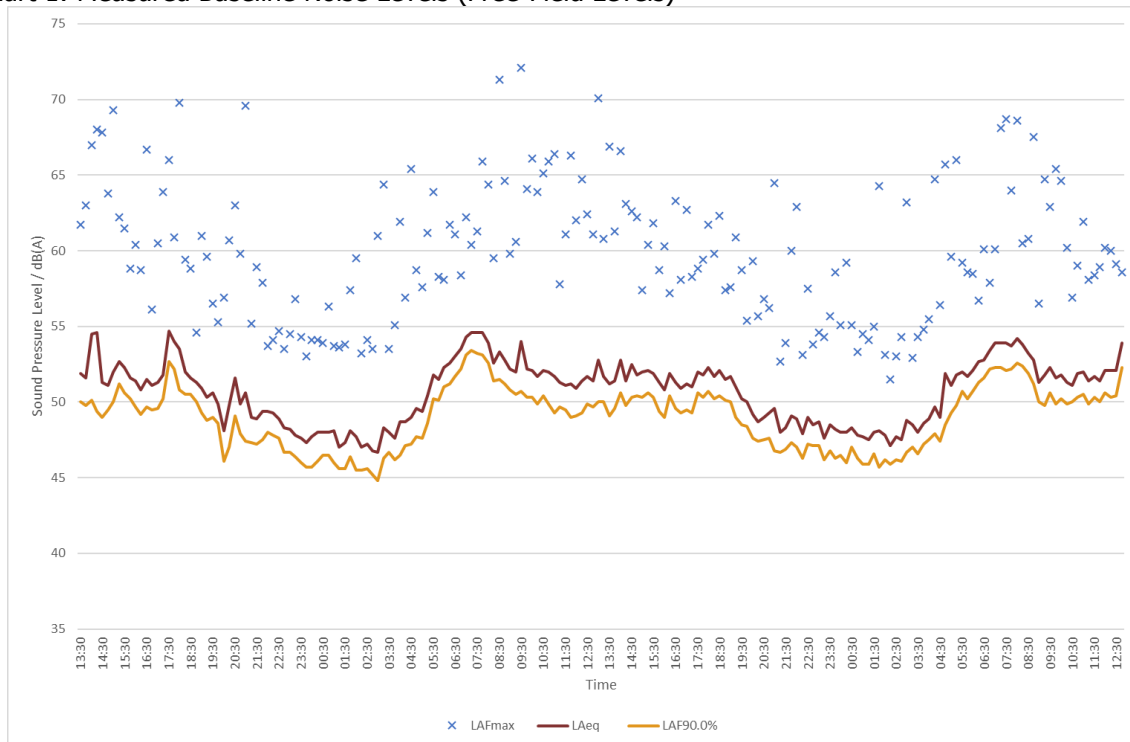
Borehole operations are currently taking place on site at Borehole Location No.1; see Figure 2 above.

These operations have started on Wednesday 9th October 2019 and are understood to run only during the daytime period between 10:00 and 17:00 hours. Nevertheless, the noise impact from the borehole operations at the measurement location were considered negligible when compared to the surrounding noise sources and therefore this measurement location and measured background sound levels can be considered representative of the nearest noise sensitive receivers. This is also shown in Chart 1 and summary result table below, where the variation in noise was considered consistent and similar throughout the whole survey period.

5.4. Measured Levels

The variation in A-weighted baseline background sound levels and equivalent noise levels are provided in Chart 1 below. The tabular data is available upon request.

Chart 1: Measured Baseline Noise Levels (Free-Field Levels)



From the measured data, we have determined the following design background sound level and equivalent noise level over the monitoring period for the assessment proposed critical operational periods. The levels are free-field levels.

Table 4: Summary of Measured Noise Levels (free-field levels)

Parameter	L _{A90} (T)		L _{Aeq} (T)	
	Range	Mode	Range	Mode
Daytime (07:00 – 23:00 hours)	46 - 53	50	48 - 55	52
Night Time (23:00 – 07:00 hours)	45 - 52	46	47 - 54	48

We would consider the above modal background sound levels and equivalent noise levels to be typical for the noise-sensitive receivers during the operational assessment critical hours.



6. Industrial Noise Assessment

To determine noise levels across the site, noise modelling has been undertaken using computer modelling package Cadna:A by DataKustik and the measured data noted above. The software predicts industrial noise using the general method of calculation from ISO 9613-1.

6.1. Proposed Industrial Operations

The Mitteldeutsche Erfrischungsgetränke (MEG) group of companies, a subsidiary of the Schwarz Group is proposing to build a beverage production at the Dove Valley Park, Derby site.

It is understood that the proposed plant and operations that will take place at the new proposed industrial site will be very similar to the current ones taking place at the existing Germany sites.

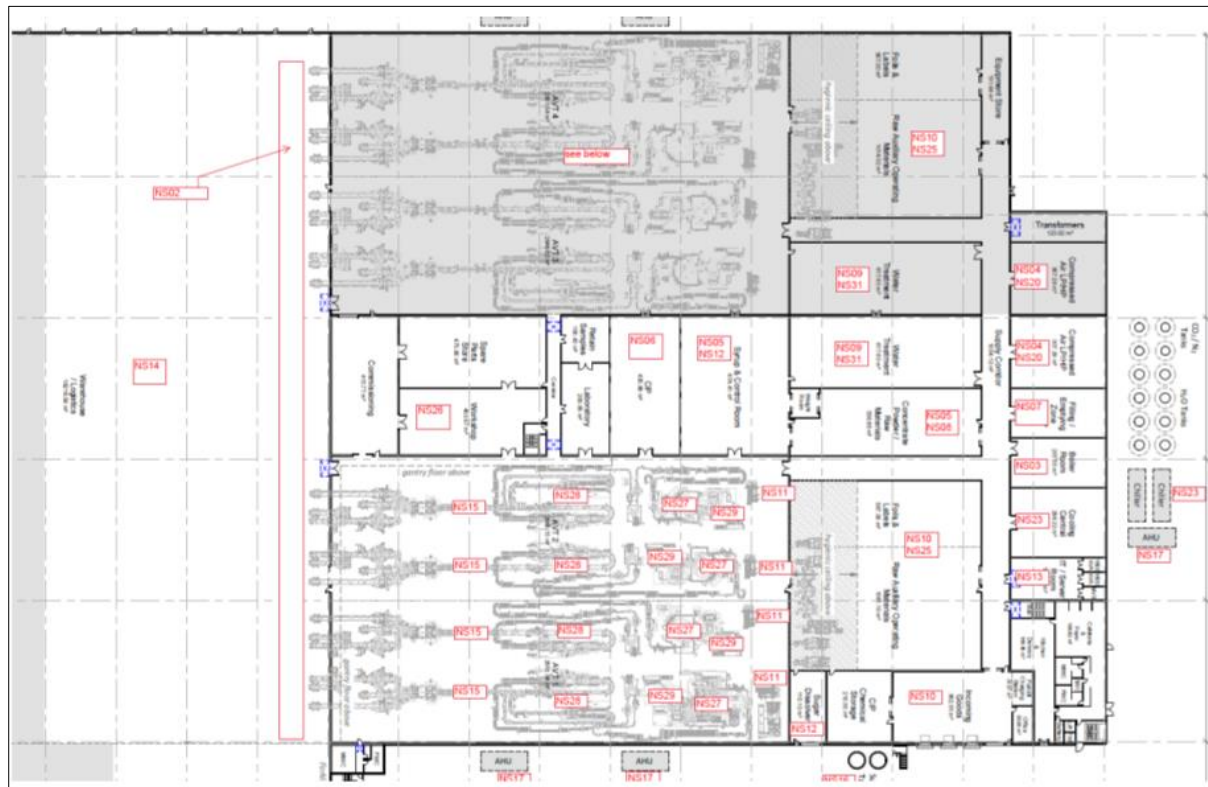
For this reason, plant noise levels have been supplied to us by the PGF III's European acoustic consultant.

Figure 4 shown expected noise sources and their respective sound levels at the proposed industrial site. Their respective sound levels are based on sound level measurements obtained at MEG Löningen GmbH & Co. KG (Germany) in 2017. These are also identified on Figure 5 mark-up plan below.

Figure 4: Proposed plant, respective sound power levels, and operating times

noise source	unit / area	sound level [dB]	operating time
NS02	warehouse, telpher	89	00:00 to 24:00 o'clock
NS03	steam / boiler room	69	00:00 to 24:00 o'clock
NS04	compressed air, LP	86	00:00 to 24:00 o'clock
NS05	process technology, general	63	00:00 to 24:00 o'clock
NS06	process technology, CIP	69	00:00 to 24:00 o'clock
NS07	process technology, valve island	85	00:00 to 24:00 o'clock
NS08	pulver solution	63	00:00 to 24:00 o'clock
NS09	water house	68	00:00 to 24:00 o'clock
NS10	incoming warehouse, raw auxiliary operating materials	70	00:00 to 24:00 o'clock
NS11	filling and packing line, mixer & flash pasteurizer	85	00:00 to 24:00 o'clock
NS12	sugar dissolver	80	00:00 to 24:00 o'clock
NS13	low voltage distribution	80	00:00 to 24:00 o'clock
NS14	warehouse, general	63	00:00 to 24:00 o'clock
NS15	filling and packing line, general	85	00:00 to 24:00 o'clock
NS16	sugar delivery	89	06:00 to 22:00 o'clock
NS17	ventilating systems	60	00:00 to 24:00 o'clock
NS20	compressed air, hp	85	00:00 to 24:00 o'clock
NS23	chiller	85	00:00 to 24:00 o'clock
NS25	filling and packing line, preform supply	79	00:00 to 24:00 o'clock
NS26	workshop, general	80	00:00 to 24:00 o'clock
NS27	filling and packing line, filling unit	90	00:00 to 24:00 o'clock
NS28	filling and packing line, foil shrinking unit	83	00:00 to 24:00 o'clock
NS29	filling and packing line, blowing station	87	00:00 to 24:00 o'clock
NS31	water treatment	84	00:00 to 24:00 o'clock

Figure 5: Proposed ground floor layout plan and plant



6.2. Industrial Noise Levels

6.2.1. Predicted Industrial Indoor Noise Levels

Based on the supplied plant sound power noise levels above, we have predicted the cumulative indoor noise levels expected within each room of the building. The rooms were considered reflective (average α of 0.1) and dimensions are based on the supplied Stride Treglown architectural drawings. Calculations also assume plant to be at the centre of the room ($Q=2$) and distance from source to receiver of 1 metre (worst case). Predicted indoor plant noise level are shown below. All levels below operate continuously over 24 hours.



Table 5: Predicted indoor noise levels

Room area	Indoor Noise Level (dBA)
Warehouse & Logistics	72
NS26-Workshop	73
NS06 - CIP	61
Syrup & Control Room	72
Folls & LAbels _Raw Aux Operating Materials	72
Water Treatment	76
Water Treatment	76
Concrete Powder / Raw Materials	58
Folls & LAbels / Raw Aux Operating Materials	72
Incoming Goods	63
Sugar Dissolver	73
Compressed Air	73
Compressed Air	73
Filling / Emptying Zone	78
Boiler Room	62
Cooling Central	78
Server Room	73
Production Hall 1	92
Production Hall 2	92

6.2.2. Proposed Industrial External Plant Noise Levels

We have summarised the proposed external plant noise sources levels based on the supplied plant and sound power levels above. It is understood that a total of 5No. AHU and 2No. chiller units are being proposed. This is shown in Figure 2 above.

Source	Sound Power Level (per Unit) (dBA)
AHU (NS17)	60
Chiller (NS23)	85

6.2.3. Proposed Industrial Delivery Noise

It understood that the proposed site will include HGV movements and loading/unloading of goods operations at the proposed loading docks shown on the proposed site plan above. The proposed HGV circuits are shown in Figure 6 below.

Figure 6: Vehicle movement's strategy and proposed loading docks location



It is also understood that the proposed HGV movements are as follows:

- Outgoing Goods (24no. loading docks to south of the site) = 0600 – 2200
- Incoming Goods (3no. loading docks and silos to north of the site) = 0700 – 1900

The respectively HGV circuits are marked up in pink and red colour above (Goods In/ Out). There is also one HGV circuit used occasionally to access the recycling area and Gas/ H2O tanks located to the north of the site.

6.2.4. Predicted Industrial Delivery Noise

It is also understood that each 1no. HGV takes 35 minutes to arrive to a dock, load the trailer, and leave. On this basis, we have assumed the following:

- Max of 48 no. HGV movements (24no. loading docks to south of the site) – at 60-minute intervals
- Max of 12 no. HGV movements (3no. loading docks and silos to north of the site) – at 15-minute intervals, (note – this has been calculated assuming $\frac{1}{4}$ of the 60-minute HGV movements).

Acoustic Consultants Limited have measured the HGV vehicle movements on many industrial sites. The typical noise level of an HGV manoeuvring back including reverse alarm beeping is shown in Table 6 below. Noise levels were then used and been modelled in the noise modelling software CadnaA.



The measured levels are free-field levels and have been corrected to a distance of 10 metres where appropriate. The microphone was situated on a tripod at a height of 1.5 metres above the ground, in a free-field position.

Table 6: Noise Levels of an HGV Manoeuvring

Activity at 10 metres	Measured duration	L _{Aeq(T)} (dB)	L _{Amax} (pass by level)	Approx. Vehicle Speed (Km/ h)
HGV manoeuvring	30 seconds	75	80	10

It is also understood that the HGV will reverse and load/ unload their goods inside the store at the loading docks. The docks are surrounded by a 'rubber curtain' which will protect some noise from escaping through the any gaps. However, we have considered that the loading dock's door to be open and therefore no sound insulation has been considered. The level radiating through the open door is considered to be similar to the above predicted indoor noise levels.

6.3. Proposed Construction

At this stage the proposed building construction is unknown. We know however that the building is likely to be built of a thermal insulated Kingspan type panel. We have assumed that both, facades and roof will be made of a typical Kingspan 'RS1000 RT + no lining' construction or any approved construction achieving the minimum sound insulation performance index R_w of 25dB.

The only exceptions to the above are the roofs and façades of both proposed Production Hall rooms 1 & 2.

We recommend that the following construction is applied to the roofs and façades of the Production Hall rooms instead:

- KS1000 RW/40
- 125mm Spacer Support System
- 50mm thick Insulation (minimum density of 33Kg/³)
- 0.7mm Profiled Sheet Liner Sheet

The above construction should be capable of achieving a minimum R_w of 40dB

Other alternative constructions can be used, as long as the minimum sound insulation index R_w is met.

6.4. Industrial Modelling Parameters

The parameters within the Cadna:A model are as follows and are considered reasonable assumptions:

- The proposed building height is based on the supplied elevations
- The existing building heights are based on site observations and vary between 7 to 15 metres high
- The 'max. Order of Reflection' was considered to be 1
- The ground across the site and surrounding area is considered hard and reflective ($G=0$).
- Buildings are considered to be reflective
- The predictions are based on the indoor, external plant and vehicle movement noise levels shown above in Section 6.1 to 6.3.
- The vehicle movements predictions are based on the measured pass by noise emission levels shown above. This level was then calibrated within CadnaA using a moving point source to represent the pass by noise level of a HGV vehicle.
- The indoor noise levels were inserted in CadnaA as an indoor area noise source with the respective R_w performances stated above.
- The topography of the site is was considered to be flat; however, supplied absolute levels have been considered to determine the height level difference between source, receiver and bund height.
- A landscape earth bund with a relative height level of approximately 5-7 metres was considered.
- The predicted noise map level is given at a height of 7.0 metres (worst case); this height was determined to be the approximately height level difference between the proposed industry ground floor level and the first-floor level window of the nearest noise sensitive dwelling.

A noise map of the industrial specific sound levels is provided below for the daytime (1 hour) and night time (1 hour/ 15 min) operations.

6.5. Industrial Modelling Results

Noise levels have been predicted based on the parameters set out above. The following noise models provide the daytime and night time predicted noise levels.

Figure 7: Predicted daytime L_{Aeq} , 1 hour noise levels

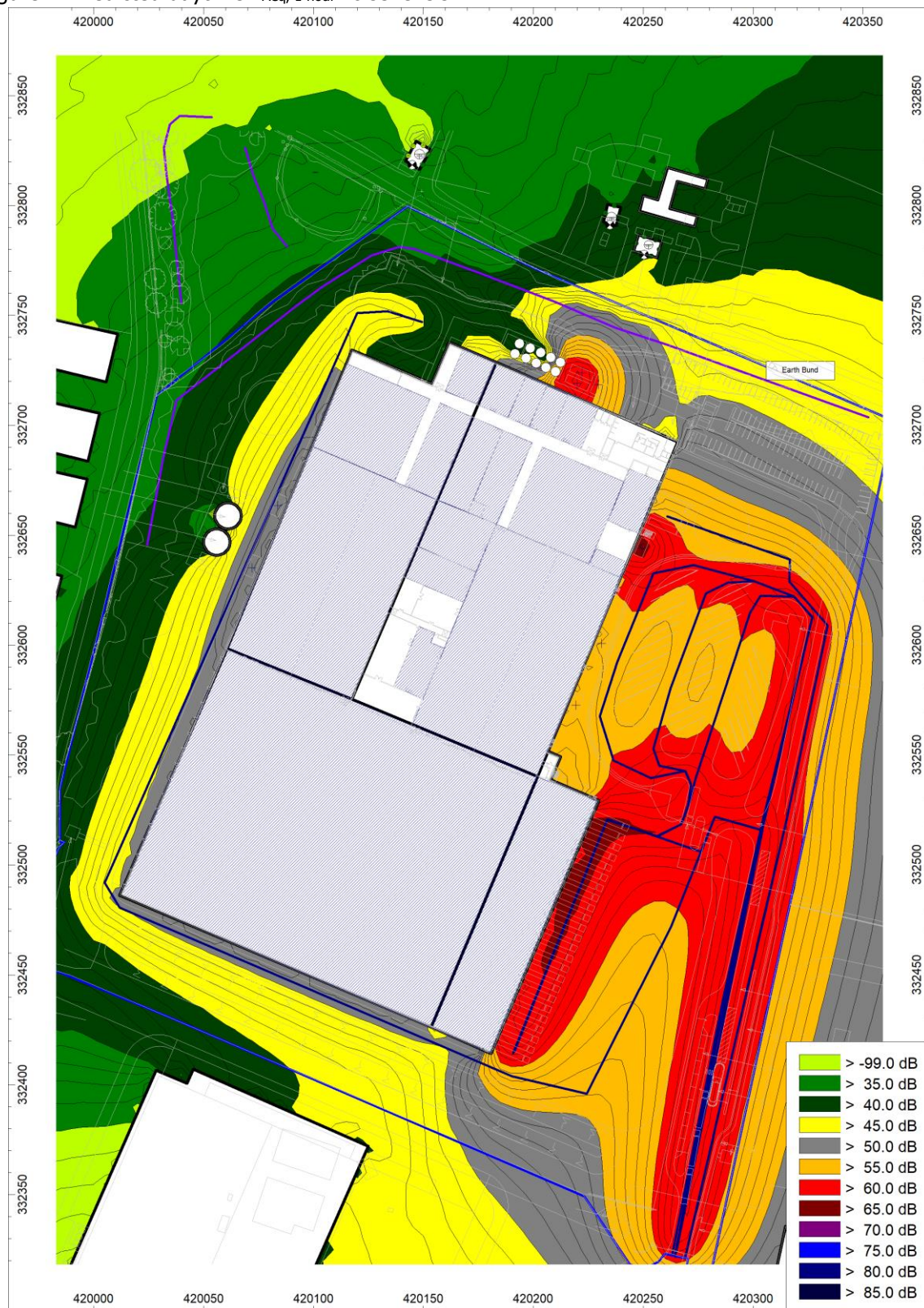


Figure 8: Predicted daytime L_{Aeq} , 1 hour noise levels at Nearest Receivers

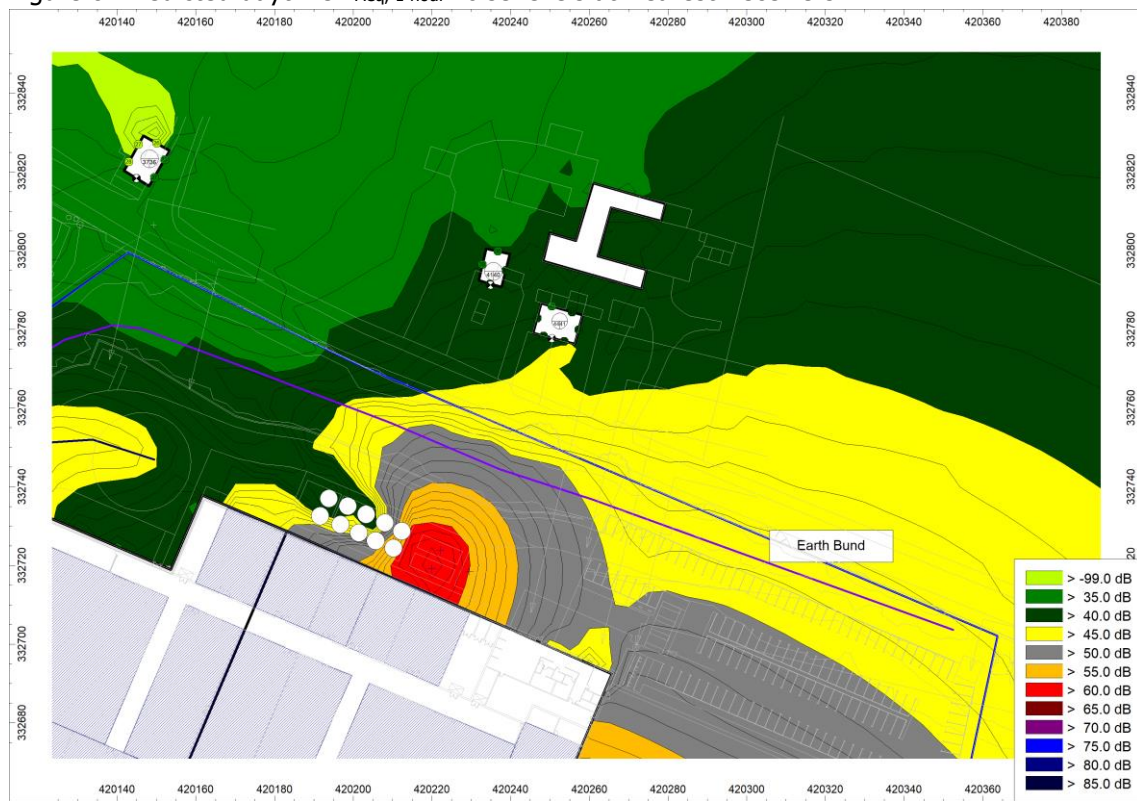
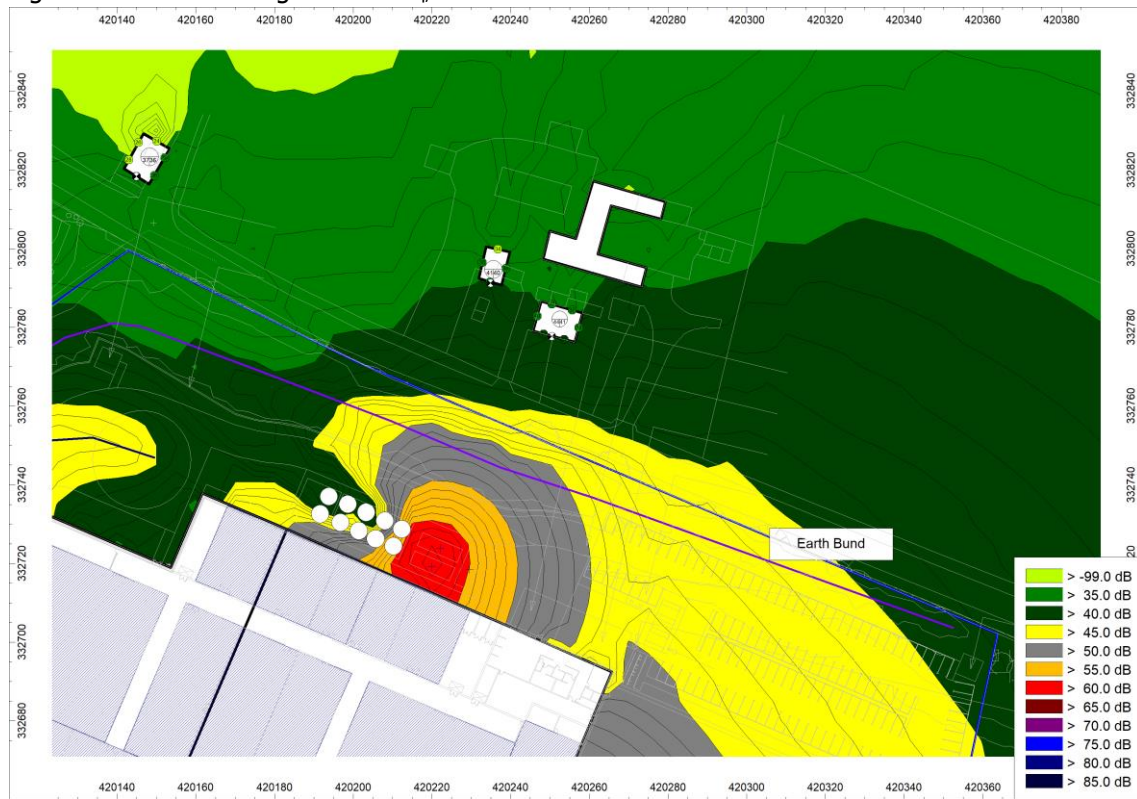


Figure 9: Predicted night time L_{Aeq} , 15 min noise levels



Figure 10: Predicted night time L_{Aeq} , 15 min noise levels at nearest receivers



6.6. British Standard 4142:2014 Assessment

Noise from industrial activity as it affects the noise sensitive residential properties is assessed in accordance with BS4142:2014 for the proposed hours of use.

6.6.1. Specific Sound Level

The specific sound level at the worst-case receiver is daytime 44 dB $L_{Aeq}(1 \text{ hour})$ and night time 41 dB L_{Aeq} , (15 min). This is the level determined at the noise sensitive receivers without any character corrections applied.

6.6.2. Background Noise Level

From the measured data obtained at 'location F', we have determined a typical design background sound level to 50 dB L_{A90} (1 hour) during the daytime and 46 dB L_{A90} (15 min).

6.6.3. Character Corrections

Character corrections should be added to the "specific sound level" if the "specific sound level" exhibits any *tonality*, *impulsivity*, *other specific characteristics* and/or *intermittency* at the assessment location. Based on our site visit the character corrections to be applied are as follows:



- **Tonality** –we have considered a penalty of 2 dB for a tone which is just perceptible at the noise receptor
- **Impulsivity** – We do not expect that the impulsivity of the plant will be distinguishable; however, we have applied 3 dB correction for impulsivity which is just perceptible at the noise receptor
- **Intermittency** – We do not expect that the intermittency of the plant will be distinguishable at the sensitive receiver over the residual noise climate and we have not applied correction for intermittency. We have also assumed all plant is running continuously within our noise model.
- **Other Sound Characteristics** – In our view no other corrections are necessary.

6.6.4. Initial Estimate of Impact

On the basis of the above the British Standard 4142:2014 initial estimate at the most sensitive location is as follows:

Table 7: British Standard 4142:2014 Initial Estimate

Parameter	Daytime	Night Time
Background Level, $L_{A90}(T)$	50 dB	46dB
Specific Sound Level, $L_{Aeq}(T)$	44 dB	41 dB
Acoustic Character Correction	+5 dB	+5 dB
Rating Level	49 dB	46 dB
Excess of rating over background level	-1 dB	0 dB

This means that the rating noise level will result in a British Standard 4142:2014 assessment 'difference' of -1 dB during the daytime period and 0 dB during the night time period at the nearest noise-sensitive receivers.

BS 4142 states that "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."

Where the assessment difference is 0 dB or less during the daytime and night time periods, the impact is likely to be low and therefore acceptable.

6.6.5. Uncertainty

The assessment is based on the approved site plan and noise levels measured on site for the proposed plant and vehicle movements. Predictions have been undertaken using computer modelling following ISO standards.

As such, we consider the predictions to be accurate of a worst-case situation and therefore the uncertainty of the assessment to be low and acceptable.



6.6.6. **Summary of British Standard 4142:2014**

As can be seen above, once context is considered and the noise impact of the proposed site operation is compared to the existing noise climate, plus internal noise levels compared to the relevant adopted guidance of BS8233, then it is clear that the proposed site will be acceptable when assessed to British Standard 4142:2014.

6.7. **Observed Effect Level**

We would consider the noise impact of the proposed site to fall below the Lowest Observed Adverse Effect Level (LOAEL) of the NPPG and NPSE. We would therefore consider the proposed industrial site activities to be of a low impact at all noise-sensitive receivers when compared to the residual noise climate.



7. Summary and Conclusion

PGF III Ltd appointed Acoustic Consultants Limited to carry out a noise impact assessment from the proposed industrial development operations at Dove Valley Park, Derby in support of a planning application.

The brief was to monitor existing background sound levels and provide a British Standard 4142:2014 noise impact assessment of activities associated with the proposed industrial operations and associated vehicle delivery movements on the nearby sensitive receivers around the site. Baseline plant noise data from similar facilities in Germany have also been provided to us by PGF III's European acoustic consultant.

With the industrial site operating as outlined above, with noise mitigation measures installed as per our report, the rating sound level will result in a British Standard difference of -1 dB during the daytime period and 0 dB during the night time period at the nearest noise-sensitive receivers.

Where the assessment difference is 0 dB or less during the daytime period, the impact is likely to be low and therefore acceptable.

We would consider the noise impact of the proposed site to fall below the Lowest Observed Adverse Effect Level (LOAEL) of the NPPG and NPSE.



8. Appendix 1 – Glossary of Acoustic Terminology

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-pascals to 100 pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent sound absorption area of a room, A - hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m^2), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration.

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Reverberation time, T – time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped NOTE Reverberation time is usually measured in octave or third octave bands. It is not necessary to measure the decay over the full 60 dB range. The decay measured over the range 5 dB to 35 dB below the initial level is denoted by T_{30} , and over the range 5 dB to 25 dB below the initial level by T_{20} .

Weighted sound reduction index, R_w – single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies NOTE The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see Annex C and BS EN ISO 717-1).

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in pascals (Pa), typically from 20 micro-pascals to 100 pascals, but commonly simplified onto the decibel scale.



Weighted standardized impact sound pressure level, $L'_{nT,w}$ - single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies. NOTE weighted standardized impact sound pressure level is used to characterize the insulation of floors in buildings (see Annex C and BS EN ISO 717-2).

Weighted standardized level difference, $D_{nT,w}$ - single-number quantity that characterizes the airborne sound insulation between rooms. NOTE Weighted standardized level difference is used to characterize the insulation between rooms in a building (see Annex C and BS EN ISO 717-1).



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