Proposed Redevelopment of Former Petrol Filling Station

Dove Road, Wombwell, Barnsley, S73 0NZ

soundsolution CONSULTANTS

Noise Impact Assessment

TECHNICAL REPORT

43356-R1

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Noise Impact Assessment

Prepared for: Jennings Design, 8 Feast Field, Horsforth, Leeds LS18 4TJ

Site location: Dove Road, Wombwell, Barnsley, S73 0NZ

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PROJECT NUMBER:	43356	DOCUMENT REFERENCE:	43356-R1
ORIGINATED		CHECKED	
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RELEASE	DATE	CHANGE DESCRIPTION	
1	26/02/2026	Original release.	

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1 INTRODUCTION

1.1 A commercial development has been proposed at Dove Road, Wombwell, Barnsley, S73 0NZ (hereinafter, "The Site"). A plan highlighting the boundary of The Site has been provided in Appendix B with development proposal drawings in Appendix C.

1.2 The development site is located off Brampton Road (B6089) to the northeast, at the junction with Dove Road, bounding the site to the southeast.

1.3 The former petrol filling station (Brampton Road Service Station) currently operates as a car wash, with some automated facilities.

1.4 This document has been prepared to support a planning application for the proposed redevelopment of the site, to comprise 3no. units for retails use, with vehicle parking and electric vehicle (EV) charging bays.

1.5 Concern has been noted to the potential noise impact and loss of amenity of nearby receptors due to the proposed operations and associated plant/equipment. This report has been prepared to inform of commercial noise impacts accordingly.

1.6 The nearest noise sensitive receptors to the development proposals have been noted as the residential dwellings to the south, west and north, with residential flats to the east, separated by Brampton Road.

1.7 The proposal has been considered in line with potential operating periods:

- "Daytime" (07:00 – 23:00); and
- "Night-time" (23:00 – 07:00) (as defined under British Standards).

1.8 The proposal has been assessed in accordance with National Planning Guidance and BS 4142:2014+A1:2019.

1.9 Where specific tenants have yet to be specified, an indicative noise impact assessment has been carried out, including recommended noise limiting levels.

1.10 A Glossary of Acoustic Terms has been provided in Appendix A that may assist with the terminology used within this report.

2 NOISE CRITERIA

NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

2.1 The Department for Communities and Local Government introduced the National Planning Policy Framework (NPPF) in March 2012, latest revision of the NPPF dated December 2024.

2.2 The Framework replaced most planning policy, circulars and guidance including Planning Policy Guidance 24: Planning and Noise (1994). The NPPF defines the Government's planning policies for England and sets out the framework, within which local authorities must prepare their local and neighbourhood plans, reflecting the needs and priorities of their communities. The Government's stated purpose in producing the NPPF was to streamline policy, so the planning process is less restrictive, to give a more easily understood framework for delivering sustainable development.

2.3 Under the heading of "Conserving and Enhancing the Natural Environment", specific noise pollution aims are detailed in Section 15 of the NPPF. It is stated that planning policies and decisions should contribute to and enhance the natural and local environment by:

"preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of … noise pollution…"

2.4 Considering "Ground Conditions and Pollution" it is also stated in paragraph 198 of the NPPF that planning policies and decisions should also ensure that any new development is appropriate for its location considering the likely effects of pollution on health, living conditions, the natural environmental, sensitivity of the site and wider area and impacts that could arise from the development. The aims in doing so should:

- *"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 life".*
- *"identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

2.5 Planning policies and decisions should also ensure that any new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). The applicant (or 'agent of change') is required to provide suitable mitigation to avoid significant adverse effects, to avoid established businesses/facilities having unreasonable restrictions placed upon them as a result of the new permitted development.

2.6 It is stressed that the above references to noise should not be considered in isolation and that the theme, referred to as the "golden thread" of sustainability that runs through the NPPF is integral to noise. The NPPF acknowledges that there is a host of existing sources of national and international guidance which can be used, in conjunction with the Framework, to inform the production of Local Plans and decision making.

NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

2.7 The Noise Policy Statement for England (NPSE) was published in March 2010. It sets out the long-term vision of government noise policy, which is fundamentally to: "Promote good health and good quality of life through the effective management and control of noise within the context of Government policy on sustainable development". The vision is supported by three key aims:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and reduce to a minimum, other adverse impacts on health; and
- Where possible, contribute to the improvement of health and quality of life.

2.8 The NPSE should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise but does not apply to noise in the workplace. The NPSE adopts the following concepts, to help consider whether noise is likely to have "significant adverse" or "adverse" effects on health and quality of life:

SOAEL – Significant Observed Adverse Effect Level.

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

LOAEL – Lowest Observed Adverse Effect Level.

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

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.

2.9 The NPSE emphasises that:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available (Defra, 2010)."

NATIONAL PLANNING PRACTICE GUIDANCE (PPG)

2.10 Revised Planning Practice Guidance was released in March 2014 to support the NPPF and last updated in July 2019. The Guidance stipulates that Local Planning Authorities' plan making and decision making should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

2.11 The table below is in the Guidance to assist recognising "when noise could be a concern".

Perception	Examples of Outcomes	Increasing Effect Level	Action
Unnoticeable	No Effect	NOEL	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	
		LOAEL	
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 sleep disturbance. Affects acoustic character of the area and creates a perceived change in quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		SOAEL	
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

Table 1 – Planning Practice Guidance to Support National Planning Policy Framework.

BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

2.12 The British Standard BS 4142:2014 +A1:2019 "Methods for Rating and Assessing Industrial and Commercial Sound" describes methods for rating and assessing sound of an industrial or commercial nature. The scope of the standard includes relevant topics for commercial development, such as sound from fixed installations (mechanical and electrical plant and equipment). The standard is applicable to the determination of rating levels for sources of sound as well as ambient, background and residual levels. The Standard was amended in June 2019.

2.13 Certain acoustic features can increase the significance of impact that might be expected from a comparison of the specific sound level to the background sound level where these features are likely to affect perception and response. Where such features are present at the assessment location, a character correction (or penalty) to the specific sound level is made to obtain the rating level. This can be approached from subjective, objective and reference methods.

+ Tonality: A correction of 0dB to +6dB for sound ranging from not tonal to prominently tonal.

+ Impulsivity: A correction of up to +9dB can be applied for sound that is impulsive.

+ Intermittency: A penalty of +3dB can be applied if on/off conditions are readily distinctive within the reference time interval over the period of the greatest amount of on-time.

+ Other characteristics: A penalty of +3dB can be applied in the absence of all other defined characteristics, where the specific sound contains a distinctive feature in the residual acoustic environment.

2.14 Character corrections are normally added arithmetically where more than one feature is present, however, if any single feature is dominant to the exclusion of others, then it may be appropriate to reduce the correction or apply a zero correction for the minor characteristics. The rating sound level is equal to the specific sound level if there are no acoustic features present or expected to be present.

2.15 The significance of sound depends upon both the margin by which the rating level exceeds the background sound level and the context in which the sound occurs. An initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level. The context of the development is important in assessing the impact.

- 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 significant adverse

impact. Where the rating level does exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.16 The scope of the Standard recognises that human response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact can depend on various factors such as the exceedance to the background level, its absolute level, time of day and change in environment, as well as local attitudes to the source of sound and character of the neighbourhood.

3 ENVIRONMENTAL SURVEY SUMMARY

3.1 An environmental survey has been undertaken between 19th – 20th February 2026 to quantify sound levels at the nearest noise sensitive receptors (NNSRs) in accordance with BS 4142. Details of the study have been provided in Appendix D with results summarised herein this section.

3.2 Baseline sound measurements were taken over a typical 24-hour midweek period to be representative of the underlying noise climate before the development proposals have been instated; used to evaluate the environmental noise impact for the development.

3.3 The residual sound field was notably made up by near-constant road traffic and existing commercial activities at The Site, including vehicle movements and jet wash operations.

3.4 The 'typical' background and residual sound levels have been reported in this section in accordance with BS 4142, as established from histograms of the recorded dB $L_{A90,\ 15min}$ and $L_{Aeq,\ 15min}$ data at Position 1, shown in Appendix D.

3.5 In line with Section 8.1.4 of BS 4142, the monitoring duration should reflect the range of sound levels for the period assessed. In practice, there is no single level for background or residual sound as these are fluctuating parameters, although a representative value of the period should be used. Note that this is not either the lowest or mean average values of dB $L_{A90,\ 15min}$ / $L_{Aeq,\ 15min}$.

Measurement Data			Background Sound Level	
			Free Field Sound Pressure Level, dB $L_{A90,\ T}$ re. 20µPa	
Position	Period	Time HH:MM	Range	Representative
1	Day	07:00 – 23:00	46 – 61	56
	Night	23:00 – 07:00	39 – 51	41
2	Day	07:00 – 23:00	44 – 59	50
	Night	23:00 – 07:00	38 – 50	41

Table 2 – Background sound level summary, dB $L_{A90,\ T}$.

Measurement Data			Residual Sound Level	
			Free Field Sound Pressure Level, dB $L_{Aeq,\ T}$ re. 20µPa	
Position	Period	Time HH:MM	Range	Representative*
1	Day	07:00 – 23:00	51 – 63	58
	Night	23:00 – 07:00	45 – 56	47
2	Day	07:00 – 23:00	50 – 70	57
	Night	23:00 – 07:00	43 – 56	45

** Representative values of residual have been noted at times of representative background sound.*

Table 3 – Residual sound level summary, dB $L_{Aeq,\ T}$.

4 NOISE IMPACT ASSESSMENT

4.1 The recognised methodology for assessment has been taken from BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* which includes consideration of sound from fixed plant installations.

4.2 In the absence of specific equipment specifications and M&E ducting plans, an indicative BS 4142 assessment has been provided below, based on typical (indicative) plant data (provided in Appendix C) with limiting levels outlined in Section 5, to minimise the potential for noise impact at the nearest sensitive receptors.

PREDICTED SPECIFIC SOUND LEVELS

4.3 The proposed development would comprise 3no. commercial units, car parking, EV charging bays, with an associated substation.

4.4 As depicted in architectural drawings in Appendix C, the development would include a "Shop", scheduled for retail use, whereas "Unit 1" and "Unit 2" are designated to serve hot food and drink. The development buildings would be served by external mechanical services equipment such as A/C condensers and ventilation extract units. Based on similar developments and scheme elevation drawings, it is assumed that this would comprise a minimum of 2no. A/C condensers for each Unit and at least 1no. kitchen extract.

4.5 The impact of commercial/industrial sound from the proposed development on the surrounding environment would depend on several factors, including (but not limited to) the time of day, frequency of occurrence and nature of sound source. Development activities naturally pose a greater risk of impact where they are permissible during noise sensitive periods, where the likelihood of annoyance or sleep disturbance increases. To understand a specific sound level for the purposes of assessment, it has been necessary to make some level of assumption to the proposed usage/on-times of the above plant/operations (outlined below).

EV Chargers

4.6 The proposed development would incorporate 3no. EV charging stations, serving 6no. charging bays. Where specific equipment has yet to be specified, sound data has been based on 'Konect' *All-in-One 200 kW EV Chargers.* Technical data sheets and noise emission test report information for these illustrative products have been provided in Appendix C, Figure C5 for reference, with a listed **operating noise level of < 70 dB at 1 m distance**.

4.6.1 EV charging units have been modelled as point sources at 1.5 m AGL.

4.6.2 EV charging sessions could take place in any hour of the day or night. It is understood that a typical vehicle charging session lasts approximately 30 – 40 minutes, and it is projected that each charging bay could be used up to 5 no. times per day (equating to approximately 30 no. vehicles charging at The Site per typical 24-hours). Figure 1 below has been included to illustrate the typical distribution of charging sessions by time of day, where 10:00 – 20:00 represent the busiest times.

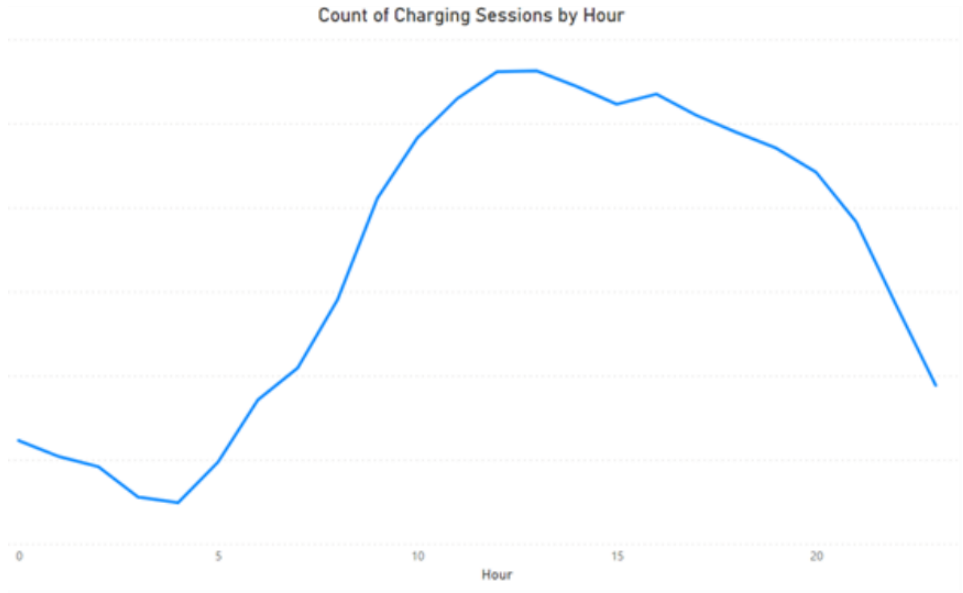


Figure 1 – Graph showing distribution of charging sessions over typical day/night.

4.7 From the figure above, it is evident that multiple EV charging bays could be in use throughout a typical daytime hour (identified as the correct period of assessment between 07:00 – 23:00). To assume a realistic worst-case, it has therefore been assumed that each of the 6no. bays could be in use in an hour (N = 6) for a total of 30 minutes each (equivalent to a 50 % on-time).

4.8 Where the distribution graph has shown significantly decreased activity over the night-time period, it has been assumed that only half of the bays would be use in a realistic worst-case; however, the on-time would be 100% for this 15-minute period of assessment.

Substation

4.9 To power the proposed EV charging units, the development would include an enclosed substation along the southeast boundary of The Site, as shown in Appendix C.

4.9.1 The proposed substation enclosure is understood to comprise a solid composite construction with louvered vents where required. A conservative 10 dB insertion loss provided by the enclosure has been assumed in this assessment, in lieu of a more rigorous calculation of enclosure break-out. It has been assumed that the enclosure would likely mitigate any acoustically distinguishing characteristics of the substation sound emissions, including as any low frequency components which may be generated (such as low, electrical “hum”).

4.9.2 In the absence of specific source data for the substation**, a sound power level of 61 dB(A)** has been used in this assessment, based upon Wilson Power Solutions data sheet for a substation of a 1,500 kVA transformer rating. The data sheet has been provided in Appendix C, Figure C6.

4.9.3 The substation has been modelled as a building with noise radiating walls and roof, and it has been assumed to operate for 100 % of the day and night-time assessment period.

4.9.4 Similar LV cabinets have been observed to generate negligible noise levels, so this item has not been included in the noise model.

4.9.5 For the purposes of this high-level assessment, it has been assumed that EV chargers may be open to the public for 24-hour use. For this reason, the operation of both the EV charger units and associated substation must be considered during the daytime and night-time hours.

Building Services / Extract Plant

4.10 Kitchen extract plant is proposed to be ducted up to the roof, as illustrated in Figure C4, with representative outlet sound power level data provided in Figure C7 in Appendix C. An indicative assessment using standard retail services plant has been provided below to inform the feasibility of the development in the absence of specified equipment for The Site.

4.11 The outlet sound power level from the standard kitchen extract plant has been calculated based upon the methods provided by CIBSE[1] and ISO 9613 and information presented in the representative HVAC Extract Specification sheet (Figure C4).

4.11.1 The CIBSE calculation process comprises four components, the sound level from the extract outlet and (where relevant) extract duct breakout, supply inlet and supply breakout. In this case, only the extract outlet has been considered. However, supply fans may need to be factored into the assessment if not sited internally.

4.11.2 Following initial calculations (shown in Table E1 in Appendix E), it was established that additional sound attenuation would be required for the fan unit at this site.

4.11.3 A 600 mm circular silencer has been recommended with the following attenuation loss performance:

Recommended Silencer Sound Reduction, dB						
125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
5	8	16	25	19	14	15

Table 4 – Insertion loss of recommended 600 mm, circular silencer

4.11.4 The following outlet sound power level has been calculated, based on a 2.0 m duct length:

Procedure	Sound Level over octave band centre frequencies, dB							dB(A)
	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Plant In-duct sound power level, Lw	74	83	88	91	88	82	75	94
Outlet sound power level, Lw (no silencer)	65	75	82	87	84	78	71	90
Silencer attenuation	5	8	16	25	19	14	15	-
Outlet sound power level (with silencer), Lw	**60**	**67**	**66**	**62**	**65**	**64**	**56**	**71**

Table 5 – Summary of extract outlet calculations (using CIBSE calculation process).

4.12 Based on similar sized development sites, each building Unit is assumed to be served by 2no. Mitsubishi A/C plant items: 1no. *PUZ-ZM71VHA* and 1no. *PUZ-ZM140VK*A (sound data provided in Appendix C, Figures C8 and C9). Based on the scheme layout plans in Appendix C, it is likely that these units would be sited along the west façade of the proposed buildings, with a solid 3.0 m screen running along the west site boundary.

[1] Noise and vibration control for building services equipment. CIBSE Guide B4:2016. The Chartered Institution of Building Services Engineers CIBSE, 2016.

4.12.1 The precise operating hours of the proposed buildings have yet to be confirmed, however, it is understood that, in a worst case, the business would only have patron visitation within daytime hours (07:00 – 23:00).

4.12.2 Condenser plant serving refrigeration units may run continuously throughout the day and night-time period and it is conceivable that certain operations may take place within the building in the early morning period, such as food preparation works. For these reasons, all external plant/building service equipment has been assumed to operate during the day and night-time assessment periods for 100% of the time to inform a worst-case.[2]

Deliveries

4.13 HGV/LGV unloading procedures may occur outside the front of the proposed units during the daytime period.

4.13.1 The preferred prediction method heavy/light goods vehicle movements about a small space, involves inputting the access route as a line source in the noise model. The access road line source can then be allocated a sound power level based on a prediction method taken from Noise Advisory Council document "*A Guide to Measurement and Prediction of Equivalent Continuous Sound Level L_{eq}*" published in 1978.

4.13.2 An average speed of 16 km/h (10 mph) has been assumed along access route/parking area, which has been considered a worst-case upper limit of the typical speeds for this contained space.

4.13.3 Noise levels have been predicted and assessed in terms of $L_{Aeq,1hr}$ and $L_{Aeq,15min,}$ accordingly, using Noise Advisory Council (NAC) document "A Guide to Measurement and Prediction of Equivalent Continuous Sound Level L_{eq}" 1978, sound exposure levels (SEL) of light goods vehicle passbys can be predicted using the following equation:

$$SEL = 37.8 + 20log(v)$$

Where: v = speed in km/h

4.13.4 Based on the average speed assumption of 16 km/h, this equation provides a SEL value of 62 dB for individual vehicle passbys.

4.13.5 The L_{eq} level can then be calculated using the following equation:

$$L_{eq} = SEL + 10log(n) – 10log(T)$$

Where: n = number of events; and T = time in seconds

4.13.6 Based on the assumed number of 2no. individual vehicle movements (passing in and out of the site) and 3,600 seconds (equating to 1-hour daytime period), this equation provides an of 29 dBA $L_{Aeq,1hour}$ at 10 m from the access road centre.

[2] This informs a worst-case, where kitchen extract plant is not likely to operate before 06:00 – 07:00 "early morning" period, where background sound levels would be higher than the representative level detailed in Table 2 for the entire 23:00 – 07:00 period.

4.13.7 Based on the assumed number of 1no. individual vehicle movement (in or out of The Site) in 900 seconds (equating to 15-minute night-time period), this equation provides an of 32 dBA $L_{Aeq,1hour}$ at 10 m from the access road centre.

4.14 Delivery activities (unloading events) have been modelled as a point source at 2.0 m height above ground level, based on source data captured at comparable site (Co-op Foodstore, The Street, Holbrook IP9 2PZ). The data in this section is therefore used to define specific sound levels of delivery activity, for both HGV and LGV activity.

4.14.1 A microphone was located nominally 5 m from the service yard activity and 4 m from any reflective surface: to consider a free-field noise measurement. A summary of the source measurements has been provided in the table below:

Delivery activity at 5 m from source (SSC Library Data for Unloading Events)						
Type	Duration (Minutes)	Specific Sound Level	On-Time Corrections, dB		Activity Sound Level, dB	
		$L_{Aeq,T}$ dB	On time Day	On-time Night	Daytime $L_{Aeq,1hr}$	Night-time $L_{Aeq,15\ min}$
HGV	32	66	-3	0	63	66
LGV	22	65	-4	-1	61	64

Table 6 – Sound levels of delivery activities measured at similar sized retail sites.

4.14.2 It has been assumed that up to 1no. HGV/LGV unloading procedures may occur outside the front of the proposed units during a worst-case daytime hour. Following initial numerical assessments, it was concluded that night-time delivery operations may lead to a significant adverse impact on the closest neighbouring residents (see Table E1 in Appendix E). **For this reason, it is recommended that all store deliveries are precluded between the hours of 23:00 – 07:00.**

Car Park

4.15 The existing and historic use of the site comprises various vehicle movements, including car parking. For this reason, the impact from the proposed car parking area is likely to have a minimal impact on surrounding receptors.

4.16 Notwithstanding, the noise model has included an area source across the parking area, based on the maximum number of parking bays (38no.) using the methodology outlined within Parking Area Noise – "*Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centers and Bus Stations as well as of Multi-Storey Car Parks and Underground Car Parks*".

4.17 Additional consideration has been given to car door slamming events. The sound generated by a single car door closing/slamming takes place over less than a second, and has an average measured level of approximately 65 dB $L_{Aeq,T}$ at 10 m. It has been predicted that up to 38no. door slamming events might take place about The Site over the hour of assessment, and 12no. over a 15-minutes in the night.

ASSESSMENT AT NEAREST NOISE SENSITIVE RECEPTORS (NNSRS)

4.18 To inform a robust assessment, it has been assumed that ground and upper floor rooms of all surrounding dwellings/flats could be used as amenity spaces in the day or night, when residents may be trying to relax or sleep within their homes.

4.19 The cumulative specific sound levels from the above listed commercial sources have been calculated at the nearest receptors based on the assumed on-times and derived sound levels, incorporating relevant proposed/existing mitigation measures).

4.20 Due to the complexity of The Site, sound pressure level calculations have been undertaken using IMMI™ v2023 prediction software using octave-band sound levels of proposed operations. Calculations for emission have been made in accordance with ISO 9613, describing an industry standard method for environmental noise prediction as applicable to commercial operations.

4.21 It has been noted that the accuracy of a noise model is dependent on the software user to generate both valid and representative results, accounting for proposed topography and form. Equated values have been verified by manual calculation methods to ensure that the modelled results have been considered accurate for the scope of this report, to absolve the likelihood of modelling error.

4.22 The following, general modelling assumptions have been made when reviewing the sound level emission from existing and proposed noise generating units at the NNSRs:

- Sound power levels have been derived from illustrative source data, measurements of similar/identical equipment operating in-situ, and relevant SSC library data. Sound levels have been adjusted based on the approximated on-times in a realistic worst-case daytime hour and 15-minutes in the night (as described above).
- Mechanical plant/equipment and stationary activities have been modelled as individual point sources, set at appropriate heights for each item/operation.
- Specified vehicle movements have been modelled as line sources, set at appropriate heights above ground level.
- All equipment has been assumed to operate simultaneously and coherently throughout the periods of assessment, to inform a worst-case.
- Site geometry and proposed development layout has been taken from architectural scheme drawings presented in Appendix C, calibrated to online satellite mapping and topographic data imported from Bluesky Mapshop[3]. Simplified screens and building structures have been modelled based on supplied drawings in Appendix C.
- Surface attenuation factors have been considered, where all hard surfaces/concrete surfaces would be reflective G = 0.0, and soft areas as 1.0 (as defined by ISO 9613-2).

[3] https://www.blueskymapshop.com

- Ground floor receiver locations (including external amenity areas) have been taken 1.5 m above relative ground level, increasing by 3 m for each floor of a building façade.

4.23 Predicted development sound pressure levels have been presented graphically in Appendix E, showing results in the day and night-time periods of assessment.

4.24 A summary of the highest predicted sound pressure levels has been provided in the below table. All calculations have represented a 'realistic worst-case', based on a review of operational hours over the day and night-time assessment periods.

4.24.1 The below sound levels include on-time corrections and therefore represent the predicted "specific sound levels" for the development, according to BS 4142. A full breakdown of sound levels at all the nearest receptors has been included in Appendix E, Table E1.

Representative Measurement Position	Worst-Case Receptor	Sound pressure level (L_P) at NNSRs, dB	
		Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
1 Southwest	SE 1	**41**	**35**
	S 1	**36**	**32**
	SW 1	**39**	**35**
2 Northwest	NW1	**34**	**33**
	N	**46**	**32**
	NE1	**44**	**35**
	NE 2	**43**	**35**

Table 7 – Summary of rating sound level predictions at all NNSRs.

4.25 The highest cumulative specific sound level outside neighbouring sensitive receptors has been predicted as 46 dB $L_{Aeq,\,T}$ during the daytime and 35 dB $L_{Aeq,\,T}$ during the night-time assessment periods.

4.26 The following numerical assessment has been provided in accordance with BS 4142 to provide a comparison between the rating sound level of the proposal against the background sound level existing prior to development.

INDICATIVE BS 4142 ASSESSMENT

4.27 The following numerical assessments have been provided in accordance with BS 4142 to provide a comparison between the rating sound level of the proposal against the background sound levels existing prior to development.

BS 4142 Numerical Assessment – Nearest Sensitive Windows			
Result	Daytime 07:00 – 23:00	Night 23:00 – 07:00	Commentary
Background sound level, dB $L_{A90,\,T}$	50	41	Estimated as representative from histogram of background sound levels in Figure D2 in Appendix D.

BS 4142 Numerical Assessment – Nearest Sensitive Windows			
Result	**Daytime 07:00 – 23:00**	**Night 23:00 – 07:00**	**Commentary**
Residual sound level, dB $L_{Aeq, T}$	58	47	Representative based on the underlying range of measured levels in Figure D3 in Appendix D.
Reference time interval	1-hour	15-minute	Relevant time interval for assessment period from BS 4142.
Specific sound level, dB $L_{Aeq, T}$	46	35	As derived above in Table 7.
Acoustic feature correction, dB	3	3	Precautionary 3 dB character correction for any distinctive character audible at the nearest receptors. This should be reviewed in context, where the existing use of the site may be relevant.
Rating level, dB $L_{Ar, Tr}$	49	38	The rating level is equal to the specific sound level plus acoustic feature corrections.
Excess of rating level over background sound level	**-1**	**-3**	
Assessment indicates likely indication of: *depending on the context	Low Impact	Low Impact	Where the rating level does not exceed the background sound level during any period of operation, this is an indication of the specific sound source having a low impact, depending on the context.
Uncertainty of the assessment	Low		See Statement of Uncertainty.

Table 8 – Numerical Assessment in Accordance with BS 4142 at Nearest Receptor Windows (Night Deliveries)

4.28 The numerical assessments in the above table have highlighted a low impact at the nearest noise sensitive receptor during all periods of potential operation, where the rating sound level has been predicted to fall below the representative background sound levels.

4.29 It has been acknowledged that the numerical assessment must be considered in context, following the requirements of BS 4142. The concept of "context" has been notably emphasised in Section 11 of BS 4142 when considering numerical impacts established from applying the standard.

4.29.1 It should be noted that the existing noise climate is dominated by road traffic noise and operations associated with the existing service station (including existing mechanical plant operations around the sales building).

4.29.2 Where the existing site already comprises mechanical plant operations, vehicle movements, and sounds of a highly impulsive and intermittent commercial nature, the precautionary

character correction in the above table may be considered an overestimation, and the development is unlikely to alter the existing character of the sound climate.

4.29.3 Where the predicting specific sound levels lie ≥ 10 dB below the representative residual sound level, significant masking is likely to be afforded. Due to the large level difference between the residual and proposed activities, it has been further reviewed in context that these development activities would be largely indistinguishable for the majority of the time and would not increase the overall ambient sound level at The Site.

4.29.4 The consideration of context relevant to the assessed sound sources has been viewed to support the notion of a "low impact" assessment in accordance with BS 4142, subject to suitable silencer selection (as recommended above). It is also recommended that deliveries are precluded between the hours of 23:00 – 07:00, as outlined above.

STATEMENT OF UNCERTAINTY

4.30 Uncertainty inevitably limits the accuracy associated with all steps of any noise assessment, including measurement, calculation, or prediction. Factors include, but are not limited to:

- The inherent accuracy limitation of methodology in Standards and guidance.
- Variability in meteorological conditions.
- The accuracy of sound source input data of a calculation.

4.31 It is imperative to minimise the uncertainty to a level commensurate with the intention of the assessment objective. The following measures have been considered to reduce uncertainty to a level considered not to have any significance to the outcome of this assessment:

- Baseline sound levels have been measured over a reasonably long period and therefore provide a good indication of representative background and residual sound levels.
- Sound level measurements were undertaken in accordance with recognised Standards, using a tall environmental windshield and were undertaken during reasonable weather conditions e.g. acceptably low wind speeds and precipitation.
- A direct measurement location was used and is considered to provide a representative basis for background noise levels at the nearest receiver locations to the development.
- Field calibration checks were undertaken before and after measurements to record very low levels of equipment drift.
- The sound source data for the assessment has been based on equipment specifications from similar development sites (including manufacturer test data).
- The calculations have been conservative as not to under-predict the resulting impacts.

5 NOISE LIMITING LEVELS

5.1 An indicative BS 4142 assessment has been provided in Section 4 based on equipment specifications at similar commercial developments. In case the ultimate scheme deviates from the above assumptions/equipment selections, suitable noise limit levels have been derived in this Section.

5.2 During the day, the worst-case representative background sound level relative to the nearest residential receptors has been established as 50 dB $L_{A90,\,T}$ and 41 dB $L_{A90,\,T}$ (as shown in Table 2 above).

5.3 In accordance with BS 4142, where a rating level is predicted to be equal to or below the existing background sound level this is an indication that the commercial sound source(s) would have a low impact at the receptor. A robust initial limit on commercial noise should therefore be below the representative background sound level in the day and night-time period, by at least 1 dB.

5.3.1 A precautionary 3 dB correction has been included within the below calculations to account for a character which could be perceived at the receptor; resulting in a sound pressure level at the receptor 4 dB below the representative background sound level.

5.3.2 To illustrate a realistic worst-case, it has been assumed that all development operations could operate simultaneously and coherently throughout the assessment period (worst-case 1-hour in the day and 15-minutes in the night).

5.4 The recommended rating level noise emission limits at 1 m from the nearest noise sensitive window has been stipulated in the below table:

Time Period	Representative background sound level, dB $L_{A90,15min}$	Recommended plant noise emissions limits (BS 4142)		Difference between Rating Level and Background, dB
		Specific Level, dB $L_{Aeq\,T}$	Rating Level*, dB $L_{Ar,\,Tr}$	
Daytime (07:00 – 23:00)	50	46	**49**	-1
Night (07:00 – 23:00)	41	37	**40**	-1

** Accounting for precautionary 5 dB correction for noise character perceptible at the receptor(s).*

Table 9 – Recommended plant noise emissions limits expressed as BS 4142 "Specific Level" and "Rating Level" at 1 m from nearest noise sensitive receptor.

5.5 The above noise limits should be readily achievable by careful selection equipment, duct silencer(s) and existing, imperforate boundary screening (as demonstrated in Section 4 above).

6 CONCLUSIONS

6.1 An assessment of environmental sound levels has been carried out for a proposed development at Dove Road, Wombwell, Barnsley, S73 0NZ. Environmental sound levels have been taken from a site survey at the boundary of the development site.

6.2 A noise impact assessment has been carried out in line with BS 4142 methodology. Cumulative rating sound levels have been predicted at the nearest residential receptors, based on illustrative manufacturer sound data and operations defining the development emission of proposed use.

6.3 The numerical assessment in Section 4 has predicted rating levels below the background sound level during the day and night periods of operation, which indicates the likelihood of a low impact at the closest receptors, verified by a contextual review of the site.

6.4 In the absence of detailed proposals for external mechanical equipment, a cumulative noise limit for has been set out in Section 5. The indicative assessment in Section 4 (based on equipment and activities at similar retail developments) has shown that the proposed rating noise limit can be met through careful plant selection, silencer attenuation, and boundary mitigation.

6.5 It has been concluded from the findings of this assessment that noise should not present reasonable grounds for planning refusal. The likely acoustic effects have been established about the LOAEL threshold of the NPSE, such that noise may be heard but does not cause any change in behaviour or attitude. The development is unlikely to significantly alter the acoustic character of the area.

6.6 Where it is deemed appropriate to grant approval of the proposed development, commensurate noise mitigation and management can be controlled by limiting the hours of delivery to daytime hours, and through appropriate selection and installation of in-duct silencers.

6.7 In the absence of specific equipment selections, the local authority may wish to condition noise limits on the proposed development. It is recommended that the cumulative noise rating level should not exceed the following limits (at 1 m from the nearest habitable residential window(s)):

- **49 dB $L_{Ar,\,Tr}$ in the daytime period (07:00 – 23:00)**
- **40 dB $L_{Ar,\,Tr}$ in night-time period (23:00 – 07:00)**

6.8 It is recommended that the final proposals are reviewed by a suitably qualified acoustician.

Appendix A: Glossary of Acoustic Terms

'A' weighting dB(A): Correction applied to the frequency range of a noise in order to approximate the response of the human ear. Noise measurements are often A-weighted using an electronic filter in the sound level meter.

Attenuation: Sound reduction, measured in decibels (dB).

Ambient Sound: The totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far. Note: The ambient sound comprises the residual sound and the specific sound when present.

Background sound level: A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

Calibration: A check of the function of a sound level meter by comparing the meter reading with a known sound pressure level.

Decibel (dB): The unit of sound level and noise exposure measurement. The range of audible sound pressures is approximately 0 dB to 140 dB.

Frequency (Hz): The pitch of the sound, measured in Hertz.

LAeq,T: The A-weighted equivalent continuous sound pressure level during a period. It is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period, T.

Octave-bands: A division of the frequency range into recognised bands.

Rating level, LAr,Tr: The specific sound level plus any adjustment for the character of the sound.

Residual sound: Ambient sound remaining in the absence of the specific sound or that it is supressed as not to contribute to the ambient sound level.

Residual sound level, Lr or Leq,T: The equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given reference time interval, T.

Sound pressure level (SPL): The basic measure of sound, expressed in decibels, usually measured with an appropriate frequency weighting (e.g. the A-weighted SPL in dB(A)).

Sound power level (Lw): The sound energy radiated per unit time by a sound source measured in watts (W). Sound power can be weighted (e.g. A-weighted) and is not influenced by environmental or physical factors such as weather or distance.

Specific sound: Sound source being assessed.

Specific sound level, Ls or Leq,T: The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval, T.

Appendix B: Annotated Location Plan

Figure B1 – Location plan with measurement positions and worst-case receptors annotated in orange

Appendix C: Scheme Design and Illustrative Equipment Data

Figure C1 – Proposed development site plan

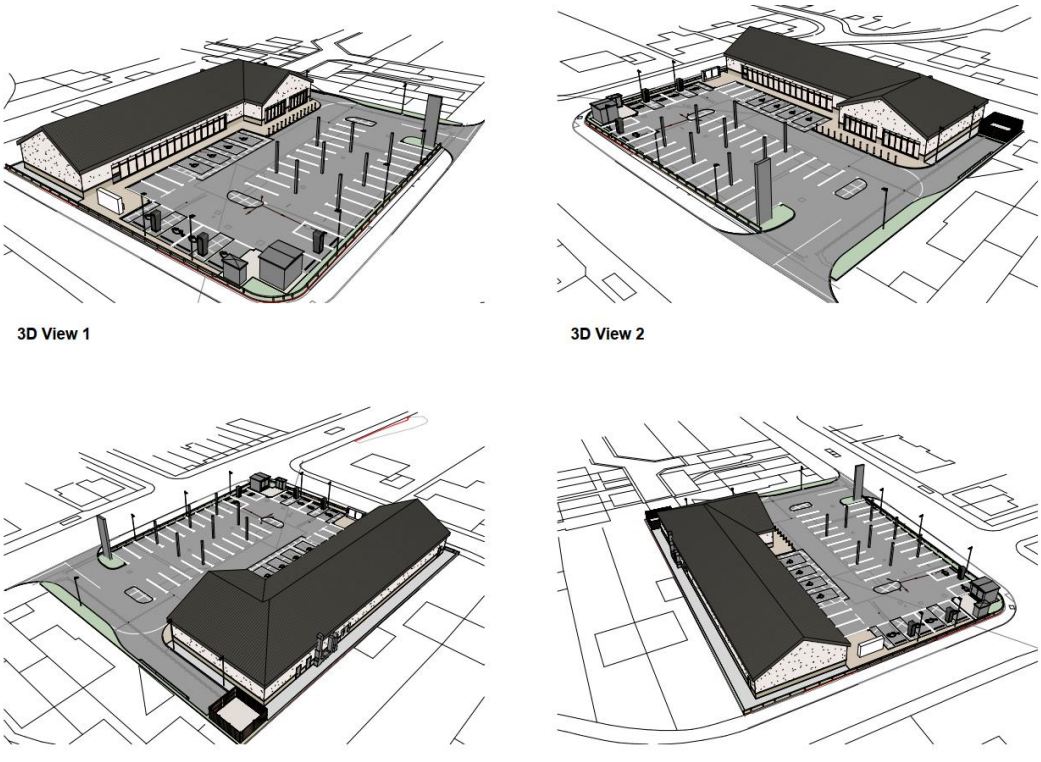


Figure C2 – Proposed building elevations

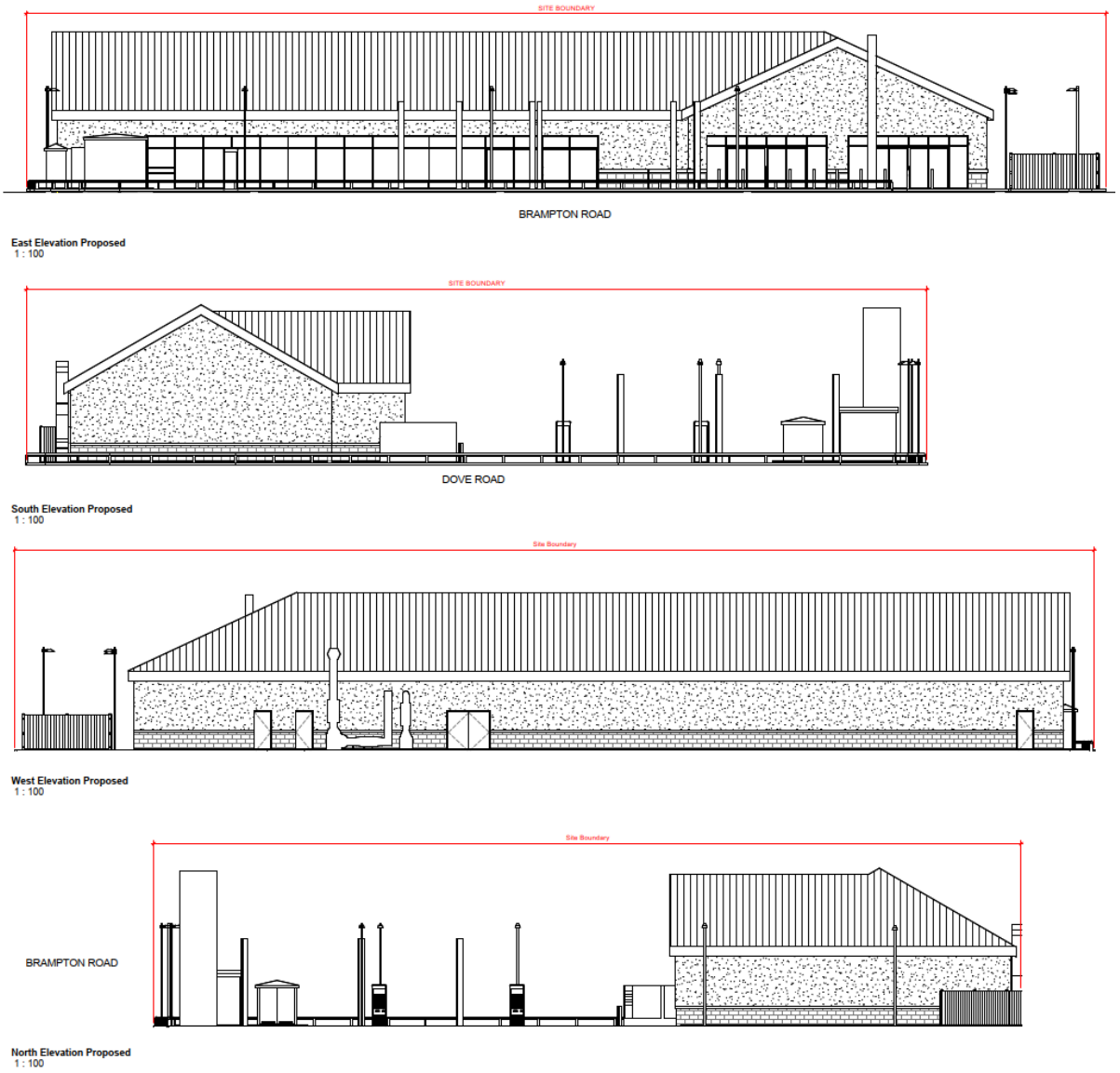


Figure C3 – Proposed site elevations

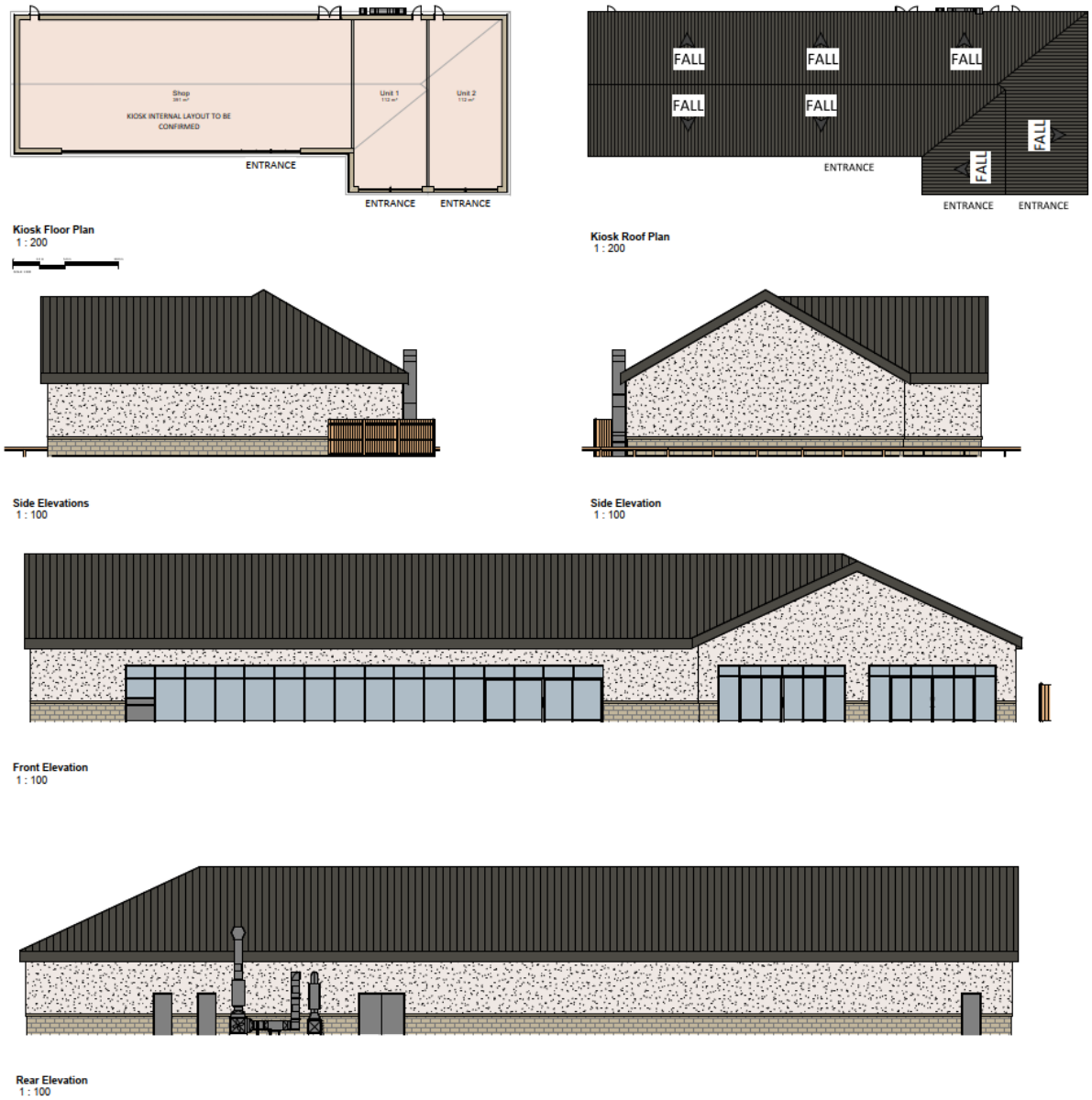


Figure C4 – Proposed Kiosk Details

Konect All-in-One 200 kW EV Charger

Charger Specifications

	North America	Europe
General		
Operating Noise	< 70dB @ 1m	
Protection	Over Voltage, Over Current, Proximity Loss, FG Disconnection Detect, AC Surge, DC Surge, Insulation Monitor Device, NEMA 3R, IK10 (Touch screen, IK08)	
Standards Compliance	NRTL (UL), FCC Part 15, UL2202, UL2231-1, UL2231-2, UL991, UL1998, CSA, Energy Star, CTEP (NTEP), ADA, IEC 61851-23, IEC 61851-24 *CTEP/NTEP Certified with current SW.	CE, EMC, IEC 61851-23, IEC 61851-24, MID

Figure C5 – Illustrative EV Charger Units: Konect 200 KW Technical Data Sheet

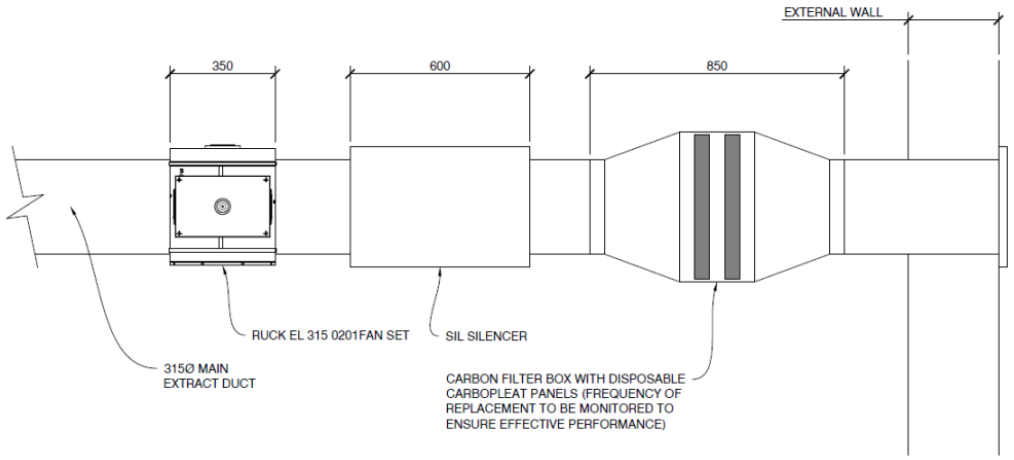
WILSON POWER SOLUTIONS

TRANSFORMER DATA SHEET		
Project Name:		--
Quote Number:		--
Manufacturer:		Wilson Power Solutions Ltd
Applicable Standard:		IEC 60076
General Arrangement Dwg #:		WPS-1500 AL-GA
Transformer Rating:	kVA	1500
Rated High Voltage @ No Load:	Volts	11000
Rated Low Voltage @ No Load:	Volts	415
Minimum Insulation class HV LI:	kV	75
Minimum Insulation class HV AC:	kV	28
Minimum Insulation class LV LI:	kV	-
Minimum Insulation class LV AC:	kV	3
Insulating Fluid:		Mineral Oil
Fans:		No
Pumps:		No
Type of Cooling:		ONAN
Number of Phases:		3
Frequency:	Hz	50
Vector Group:		Dyn11
Impedance Voltage (Z):	%	5.5
Core Material:		CRGO steel
No Load Losses:	W	1125
Load Losses @ 75°C:	W	13140
Losses as per EU Regulation No. 548/2014		Meets Tier-1 Requirement
Resistance	%	0.88
Reactance	%	5.43
Regulation type:		DETC
Tapping on HV:	%	+7.5,+5.0, +2.5, 0.0, -2.5, -5
Design Ambient Temperature:	°C	40
Temp Rise of Top Oil:	°C	60
Temp Rise of Winding:	°C	65
Altitude:	m	<1000
Pollution class:		C4
Sound Power Level:	dB(A)	61

Figure C6 – Comparative 1,500 kVA substation sound data (Wilson Power Solutions).

Extract

Typical Arrangement



SPL outlet	L_{WA}	dB(A)	1	94	-	74	83	88	91	88	82	75
			2	90	-	65	75	82	87	84	78	71
			3	87	-	52	66	77	85	81	74	67
			4	89	-	54	68	79	86	82	76	69
			5	92	-	54	69	82	90	85	79	73

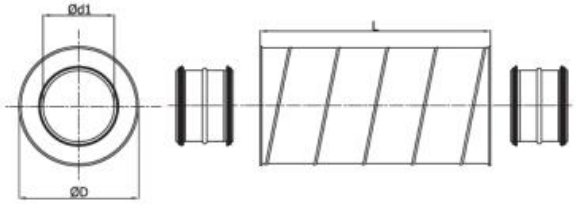
Description

The silencers are usually supplied with SPIRAL®system sealing. Diameters d_1 > 315 mm require additional NSL couplings to be ordered, which should be installed in the silencer prior to installation. These male ends are not silencer parts, and they should be ordered separately.
Glass mineral wool inside with thickness:
50 mm dla SIL-50 - depending on the dimension of the outer casing
100 mm dla SIL-100 - depending on the dimension of the outer casing

Example identification
Product code: **SIL - iii - aaa - bbb**

type
insulation thickness
Ød$_1$
L

Dimensions



Cross-section for individual types: SIL, SIRL, d_1 > 315 mm

SIL-50 - 50 mm thickness insulation

Description	Ød$_1$ nom [mm]	D nom [mm]	L [mm]	attenuation [dB] for frequency [Hz] 125	250	500	1000	2000	4000	8000	[kg]
315-600	315	400	600	5	8	16	25	19	14	15	12

Figure C7 – Illustrative extract ducting specification and in-duct silencer

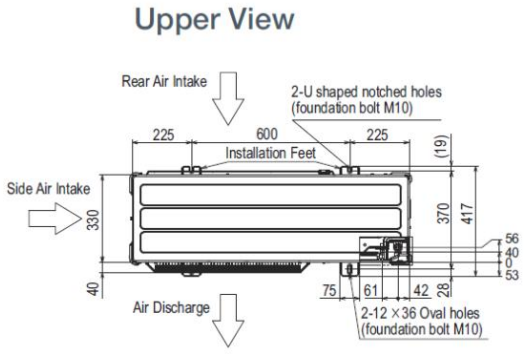
GREGGS HVAC Specification – Issue 1

Air Conditioning

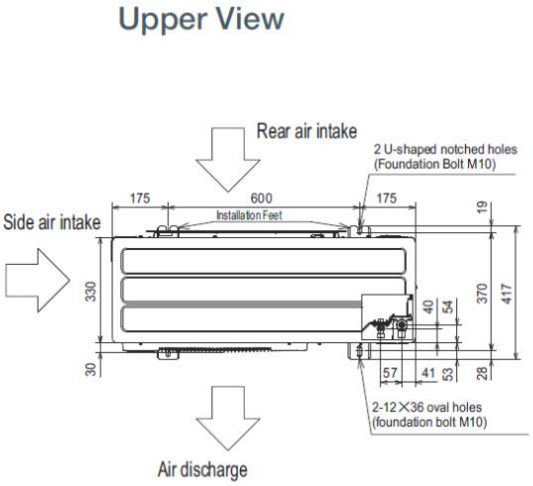
Typical Arrangement

Generally there will be two outdoor condensing units, one double (PUZ-ZM140VKA) and one single (PUZ-ZM71VHA) arranged side by side and situated ideally at ground level to accommodate safe maintenance.

Double (PUZ-ZM140VKA)



Single (PUZ-ZM71VHA)



PUZ-ZM - OUTDOOR UNITS		PUZ-ZM71VHA	PUZ-ZM140VKA
SOUND PRESSURE LEVEL (dBA)	Heating/Cooling	49 / 47	52 / 50
SOUND POWER LEVEL (dBA)	Cooling	67	70
WEIGHT (kg)		70	118
DIMENSIONS (mm)	Width x Depth x Height	950 x 330 + 25 x 943	1050 x 330 + 40 x 1338
ELECTRICAL SUPPLY		220-240v, 50Hz	220-240v, 50Hz
PHASE		Single	Single
SYSTEM POWER INPUT (kW)	Heating/Cooling (nominal)	1.818 / 1.651	4.312 / 3.772
	Heating/Cooling (UK)	1.61 / 1.39	3.83 / 3.15
STARTING CURRENT (A)		6.0	13.0
SYSTEM RUNNING CURRENT (A)	Heating/Cooling [MAX]	7.79 / 7.06 [19.3]	18.41 / 15.88 [28.7]
FUSE RATING (BS88) - HRC (A)		25	40
MAINS CABLE NO. CORES		3	3
MAX PIPE LENGTH (m)		55	100
MAX HEIGHT DIFFERENCE (m)		30	30
CHARGE REFRIGERANT (kg) / CO_2 EQUIVALENT (t)	R32 (GWP 675) - 30m	2.80 / 1.89	4.00 / 2.70
MAX ADDITIONAL REFRIGERANT (kg) / CO_2 EQUIVALENT (t)	R32 (GWP 675)	0.80 / 0.54	2.80 / 1.89

Figures C8 and C9 – Illustrative condenser plant items to serve new building

Appendix D: Environmental Survey Summary

The equipment used conforms to BS EN 61672-1:2003 (Class 1) for sound level meters and BS EN 60942 (Class 1) for sound calibrators; with at least traceable calibration history valid; no greater than two years for sound level meters and one year for sound calibrators, relevant to the times of the site assessment.

Position No.	Manufacturer	Model No.	Description	Serial No.
1	Larson Davis	LxT (ST)	3rd octave band sound level meter	2680
	Larson Davis	PRMLxT1L	Microphone preamplifier (low range)	70093
	Larson Davis	337B02	½" electret microphone	327046
2	Larson Davis	LxT (ST)	3rd octave band sound level meter	6519
	Larson Davis	PRMLxT1L	Microphone preamplifier (low range)	42418
	Larson Davis	337B02	½" electret microphone	105554
Both	Larson Davis	CAL200	Sound level calibrator	13691

Table D1 – Sound monitoring equipment

Validation checks at the end of the survey demonstrated acceptable drift across all parts of the study, across the sound level measurement equipment used, of ≤ 0.20 dB. Interval data was recorded at the measurement location at 1-minute and 15-minute periods, time synchronised to GMT. Weather conditions at the times of site attendance were deemed acceptable for surveying.

Weather Conditions	18/02/2026	19/02/2026	Additional Comments
Wind velocity	< 3 m/s average	< 3 m/s average	None
Wind direction	SE	SE	
Cloud cover/rain	100 %, no rain	75 %, no rain	
Temperature	3 °C	5 °C	

Table D2 – Recorded weather conditions

A brief description of the measurement position has been provided below:

Position 1) A free-field long term measurement position set at a height of 2.2 m AGL along the southwest boundary of The Site. The measurement position was chosen to be representative of the nearest noise sensitive receptor, identified as the adjacent residential dwelling along Dove Road.

Position 2) A free-field long term measurement position set at a height of 2.2 m AGL along the northwest boundary of The Site. The measurement position was chosen to be representative of the nearest noise sensitive receptor, identified as the adjacent residential dwelling along Eastwell Grove.

Incident sound was observed predominantly from the road traffic to the east and south along with vehicular/commercial activity associated with the car wash on site, including and patron vehicle movements, jet wash operations and raised voices

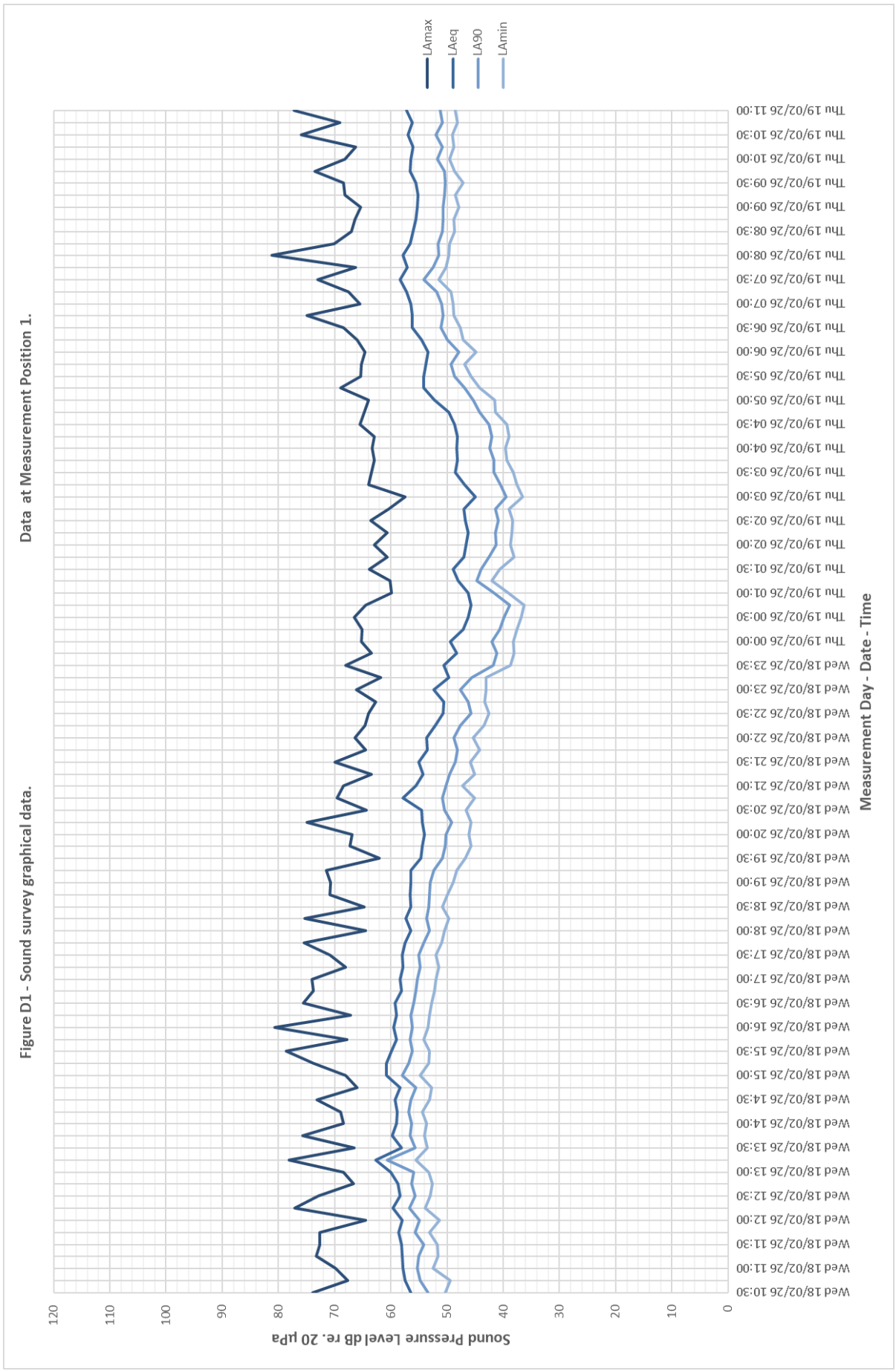


Figure D1 - Sound survey graphical data.

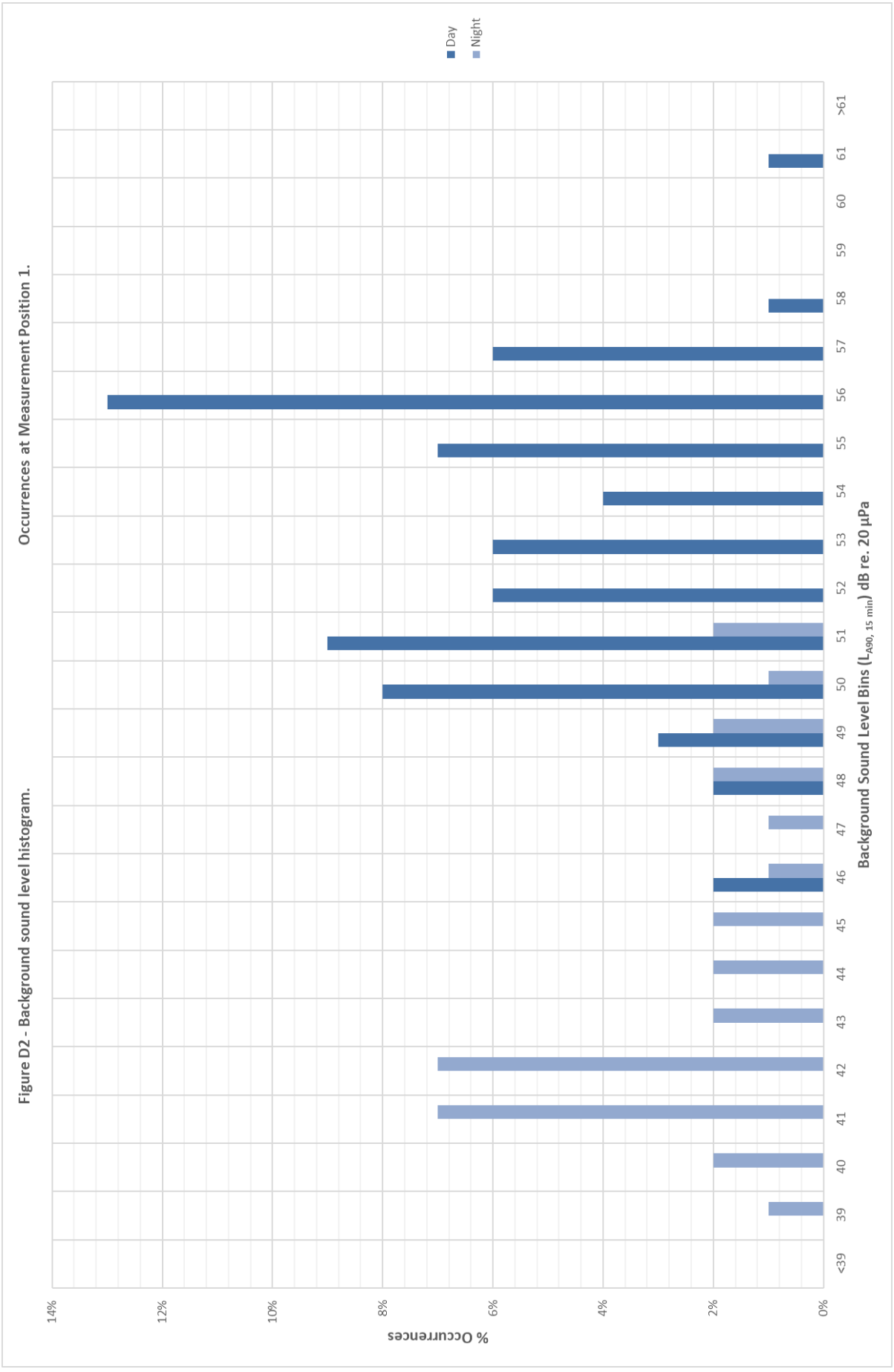


Figure D2 - Background sound level histogram.

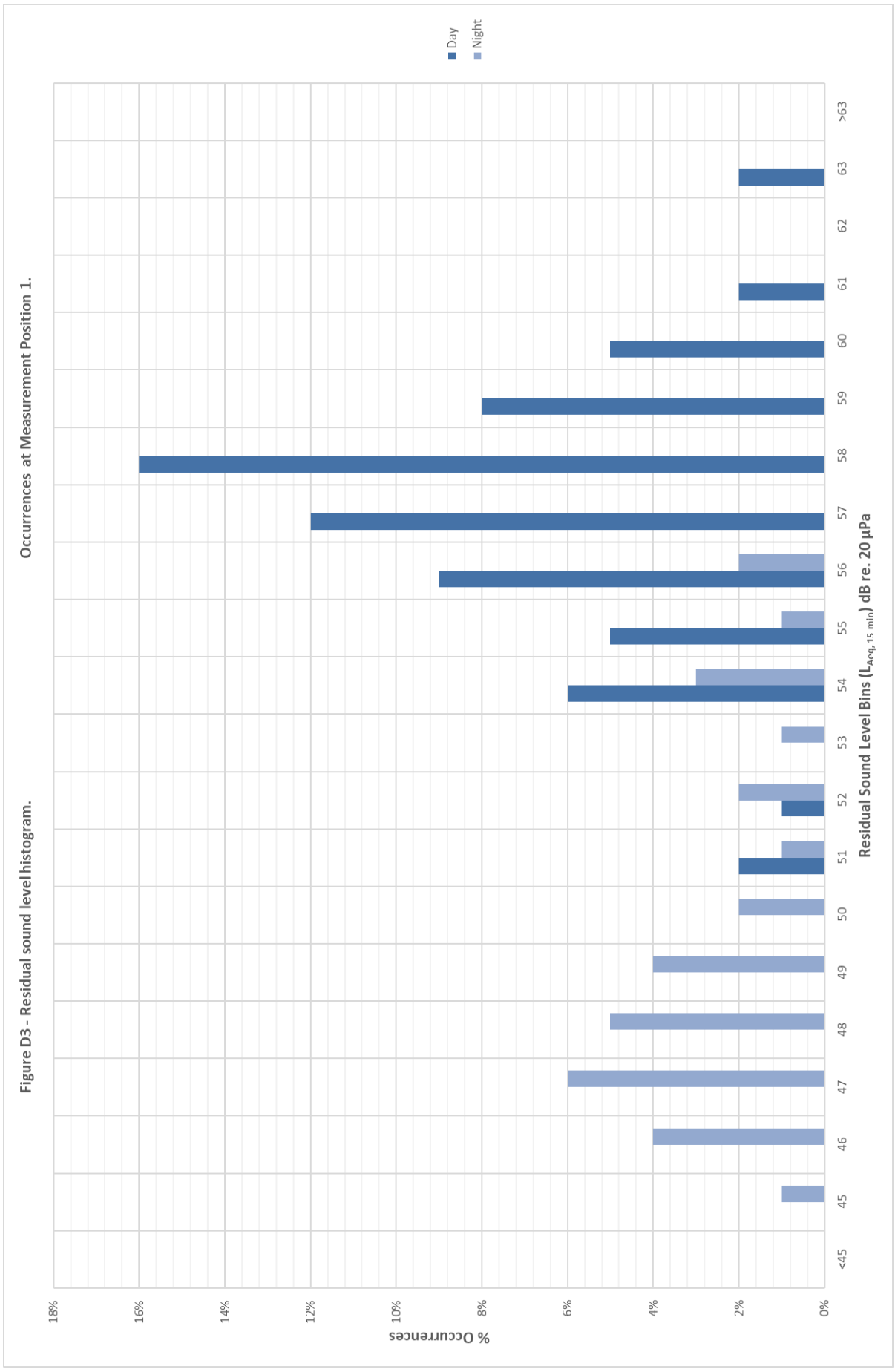
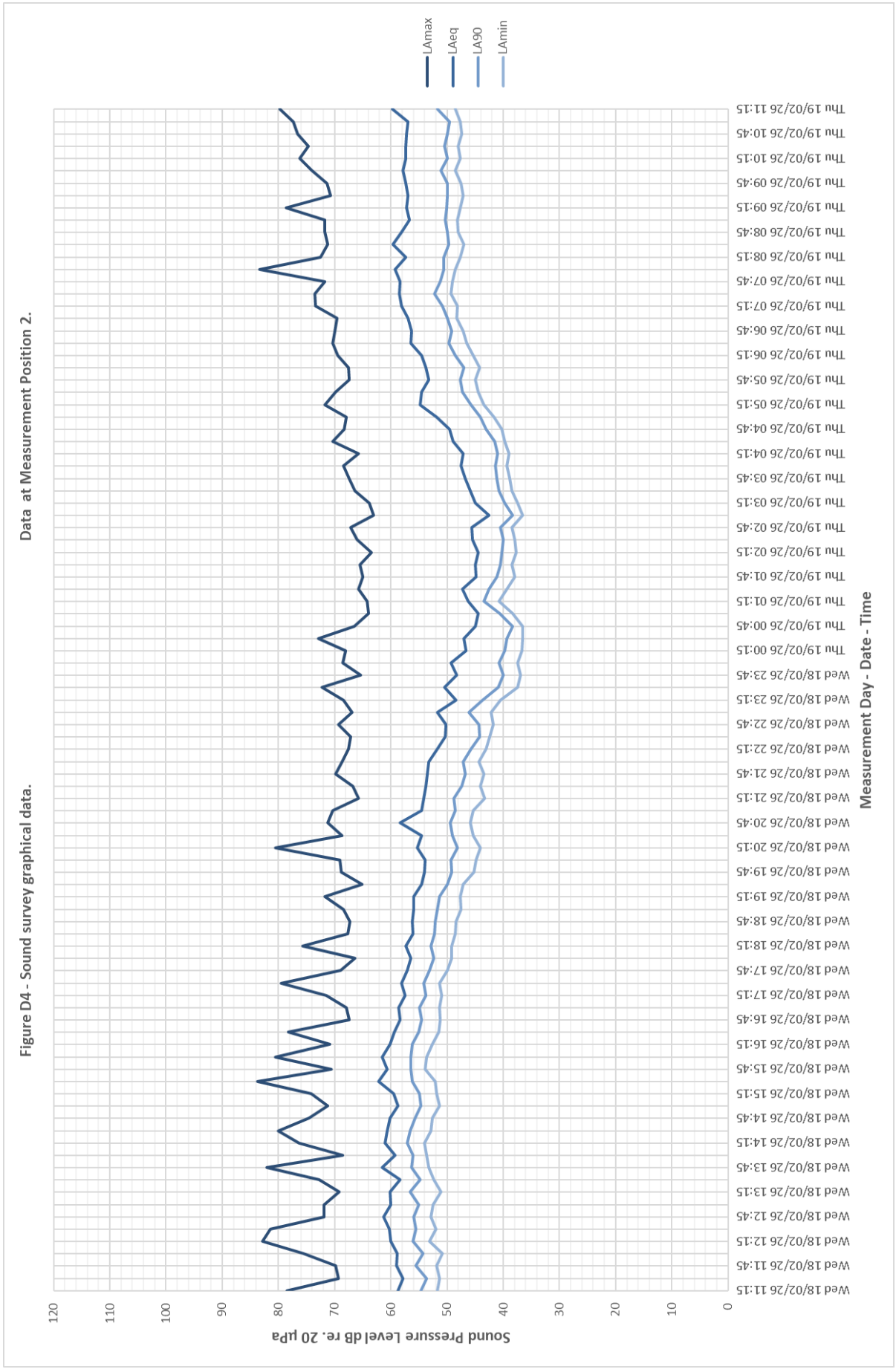


Figure D3 - Residual sound level histogram.


LAmax
LAeq
LA90
LAmin
Sound Pressure Level dB re. 20 µPa
120
110
100
90
80
70
60
50
40
30
20
10
0
Measurement Day - Date - Time
Wed 18/02/26 11:15
Wed 18/02/26 11:45
Wed 18/02/26 12:15
Wed 18/02/26 12:45
Wed 18/02/26 13:15
Wed 18/02/26 13:45
Wed 18/02/26 14:15
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Thu 19/02/26 09:15
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Thu 19/02/26 10:45
Thu 19/02/26 11:15
Data at Measurement Position 2.
Figure D4 - Sound survey graphical data.

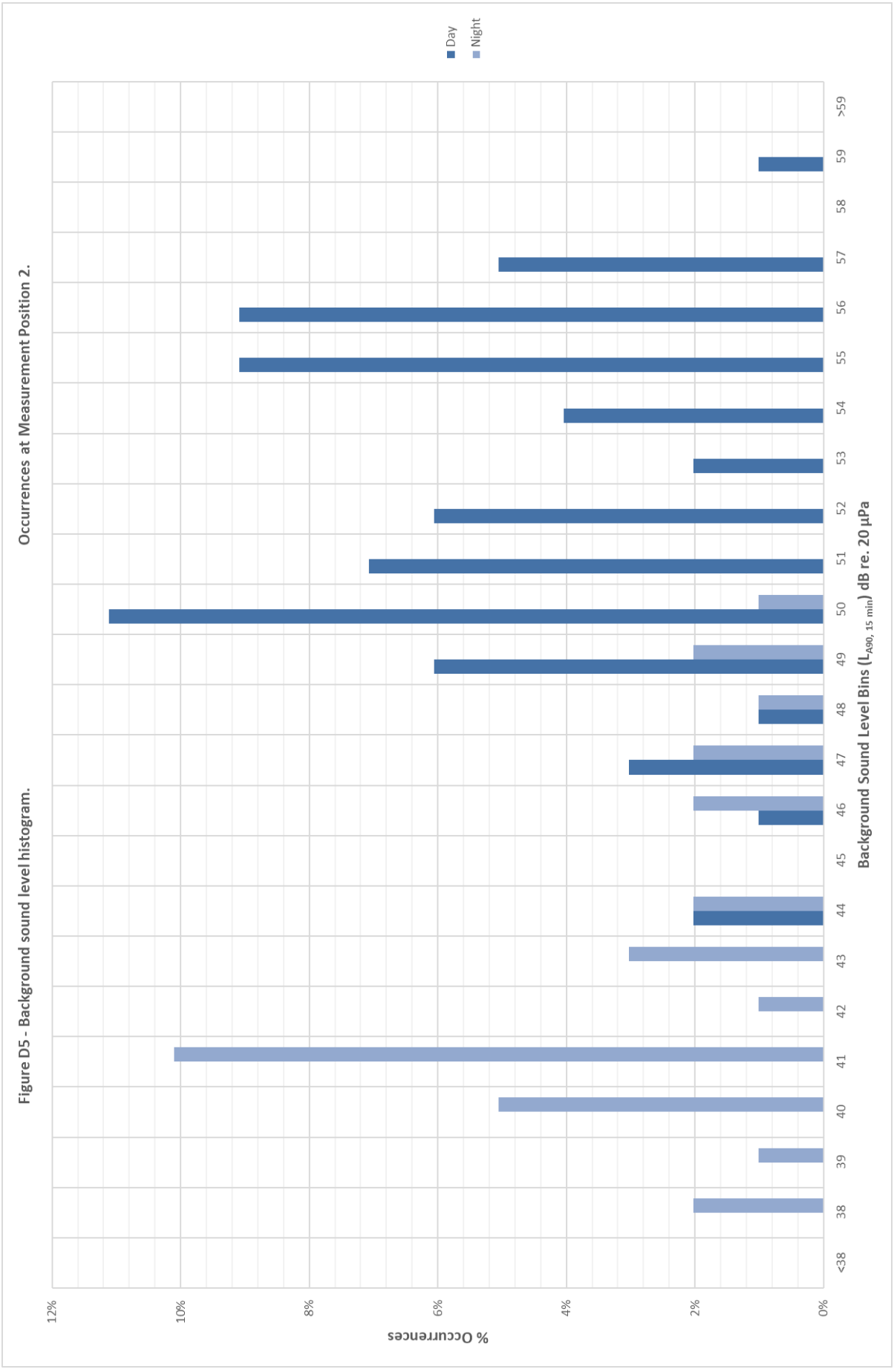

Figure D5 - Background sound level histogram.

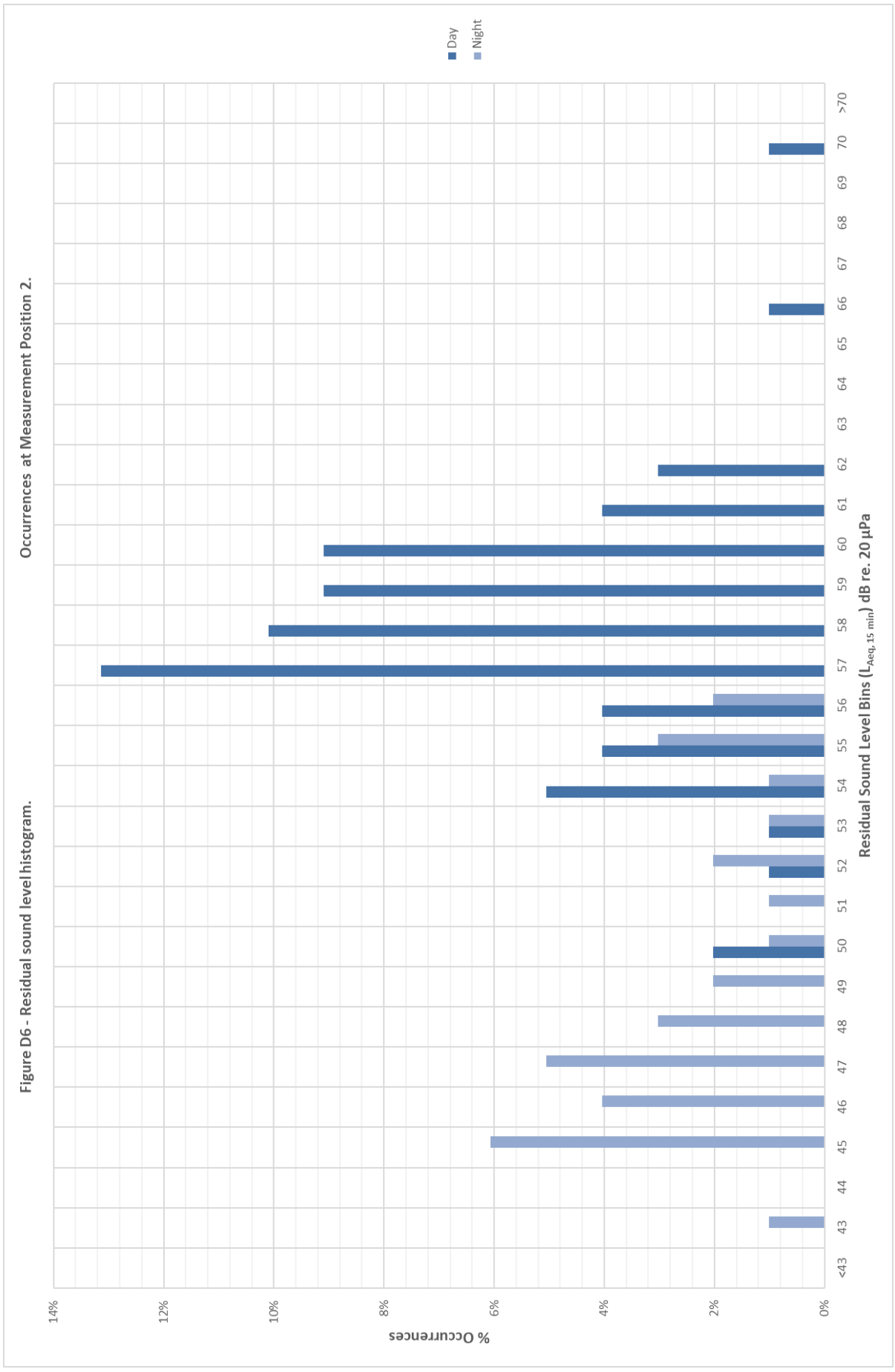

Figure D6 - Residual sound level histogram.

Appendix E: Calculations and Model Outputs

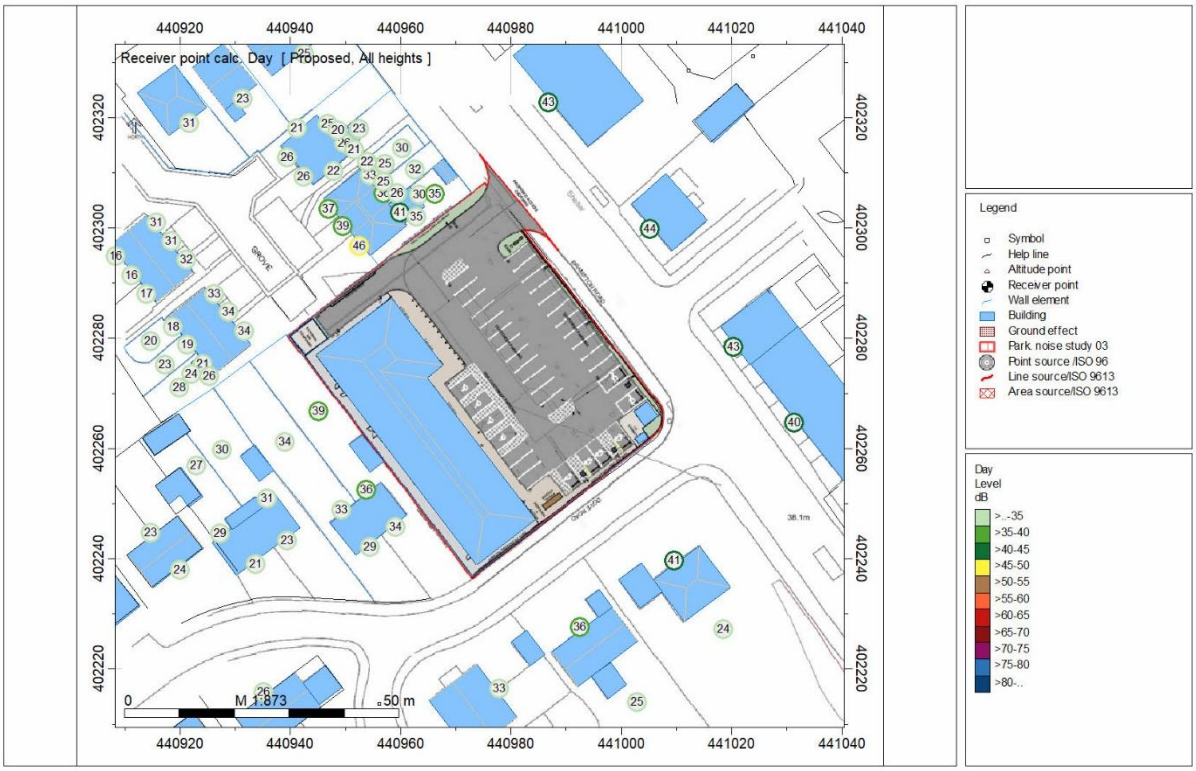

Figure E1 – IMMI Predicted Sound Pressure Levels Over Worst-Case Daytime Hour

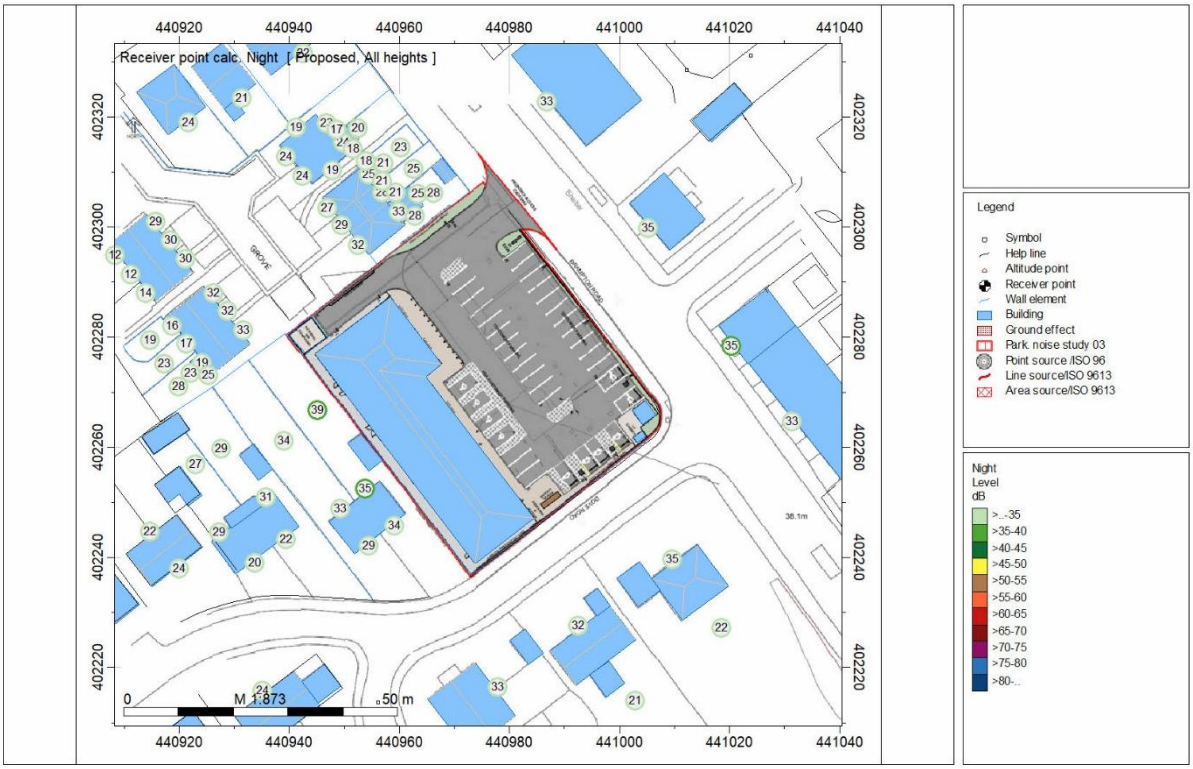

Figure E2 – IMMI Predicted Sound Pressure Levels Over Worst-Case Night-time Period (No Deliveries During Night)

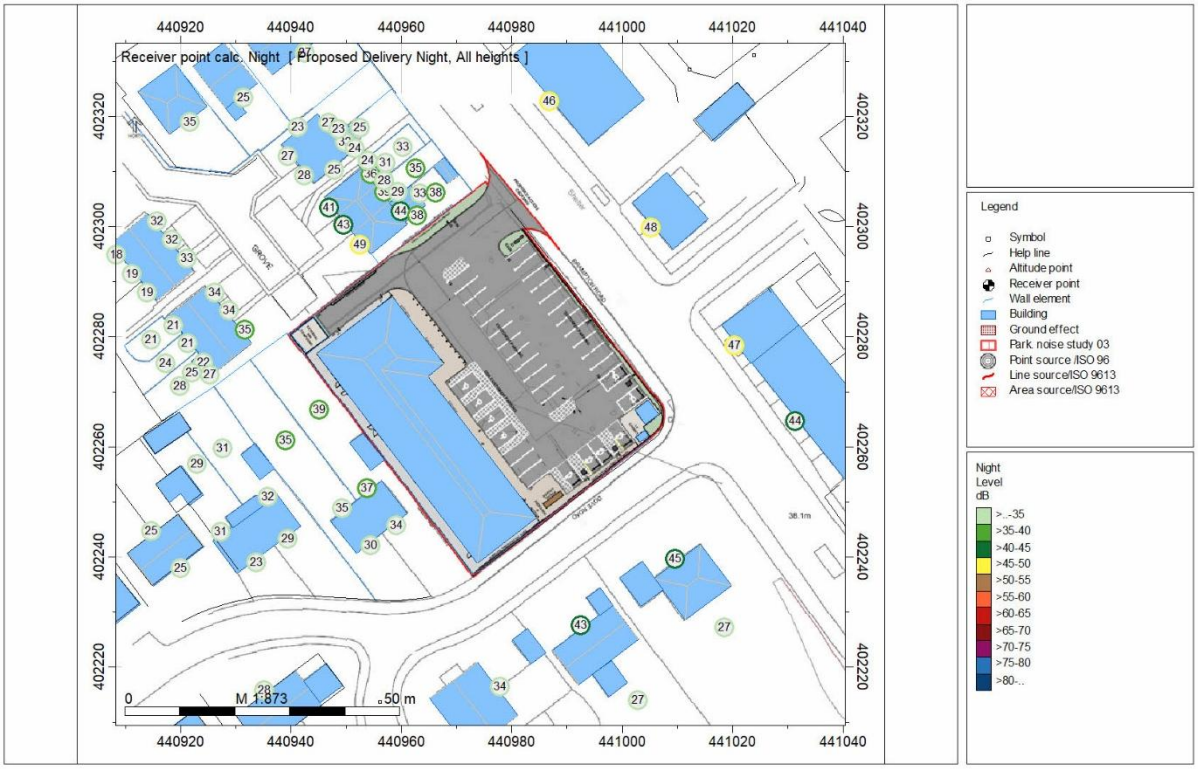

Figure E3 – IMMI Predicted Sound Pressure Levels Over Worst-Case Night-time Period (Deliveries During Night)

Representative Measurement Position	Worst-Case Receptor	Sound pressure level (L_P) at NNSRs, dB	
		Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
1 Southwest	SE 1	**41**	**45**
	S 1	**36**	**43**
	SW 1	**39**	**37**
2 Northwest	NW1	**34**	**35**
	N	**46**	**49**
	NE1	**44**	**48**
	NE 2	**43**	**47**

Table E1 – Summary of rating sound level predictions at all NNSRs (with deliveries during the night).

BS 4142 Numerical Assessment – Nearest Sensitive Windows (Deliveries During Night)			
Result	**Daytime 07:00 – 23:00**	**Night 23:00 – 07:00**	**Commentary**
Background sound level, dB $L_{A90, T}$	56	41	Estimated as representative from histogram of background sound levels in Figure D2 in Appendix D.
Residual sound level, dB $L_{Aeq, T}$	58	47	Representative based on the underlying range of measured levels in Figure D3 in Appendix D.
Reference time interval	1-hour	15-minute	Relevant time interval for assessment period from BS 4142.
Specific sound level, dB $L_{Aeq, T}$	46	49	As derived above in Table E1.
Acoustic feature correction, dB	3	3	Precautionary 3 dB character correction for any distinctive character audible at the nearest receptors. This should be reviewed in context, where the existing use of the site may be relevant.
Rating level, dB $L_{Ar, Tr}$	49	52	The rating level is equal to the specific sound level plus acoustic feature corrections.
Excess of rating level over background sound level	**-1**	**+11**	
Assessment indicates likely indication of: *depending on the context	Low Impact	Significant Adverse Impact	Where the rating level does not exceed the background sound level during the day, this is an indication of the specific sound source having a low impact, depending on the context. Where it exceeds by more than 10 dB, this indicates the likelihood of a significant adverse impact.
Uncertainty of the assessment	Low		See Statement of Uncertainty.

Table E2 – Numerical Assessment in Accordance with BS 4142 at Nearest Receptor Windows (Night Deliveries)

Appendix F: Acousticians Qualifications and Status

Dominic Attwell BEng. (Hons) MIOA

Position Held: Senior Acoustic Consultant.

Qualifications: BEng. (Hons) Audio Acoustics.

Affiliations: Member of the Institute of Acoustics.

Acoustics Experience: 9 years.

Lee Denson BSc. (Hons) MSc. MIOA

Position Held: Principal Acoustic Consultant.

Qualifications: BSc. (Hons) Music Technology.

MSc. Music Technology.

Institute of Acoustics Diploma in Acoustics and Noise Control.

Affiliations: Member of the Institute of Acoustics.

Acoustics Experience: 12 years.