

LAND WEST OF SHEFFIELD ROAD, HOYLAND, BARNSLEY

PLOT 2A & 2B PLANT NOISE IMPACT ASSESSMENT TO SUPPORT THE DISCHARGE OF CONDITION 9

VC-054927-EN-RP-0001

R00

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1. INTRODUCTION

- 1.1. Vanguardia has been commissioned by Winvic Construction Ltd. to predict and assess the potential noise impacts associated with the proposed fixed plant associated with Plots 2A and 2B at the land to the west of Sheffield Road, Hoyland, Barnsley.
- 1.2. The wider Hoyland West development received planning consent in November 2020 (application reference 2020/0647). This was a hybrid application comprising a full application for the development of Plot 1, associated earthworks, new link road and access and outline application for Plots 2 and 3.
- 1.3. In December 2021 consent was received against a Full Planning Application for the development of 2 storage and distribution units (Class B8) with ancillary offices, including creation of access roads, parking, associated landscaping and infrastructure (application reference 2021/1159). This related to Plot 2 which is comprised of two plots; Plot 2A and Plot 2B as shown below in Figure 1.

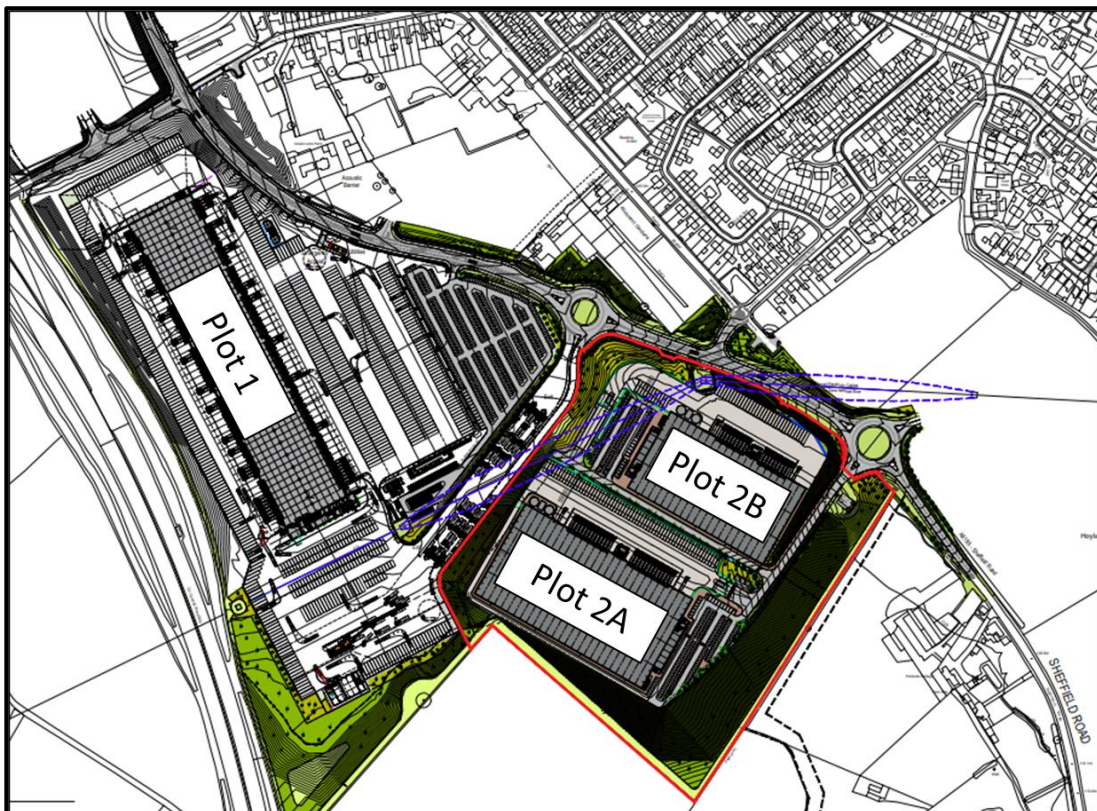


Figure 1 Site development plan showing Plot 2A and 2B.

- 1.4. Condition 9 of the Planning Consent for Plot 2, requires that prior to occupation of either unit, a noise impact assessment shall be undertaken to determine the noise impact from any fixed plant and equipment associated with that unit.

- 1.5. The purpose of the noise assessment contained in this report is to support the discharge of condition 9 of the Full Planning Application (ref: 2021/1159). As such the assessment determines the likely noise impact of the proposed fixed plant associated with the base build specification of the units at the agreed nearby noise sensitive receptors and where required will identify any mitigation required to comply with the planning condition.
- 1.6. It should be noted that, at the time of writing, there are no identified occupiers for Plots 2A and 2B, therefore it is possible that once an occupier is on board, they may require additional fixed plant which would need to be subject to further assessment.
- 1.7. To aid in the understanding of this report, a glossary of acoustic terms has been provided in Appendix A.

2. NATIONAL & LOCAL POLICY CONTEXT

NATIONAL PLANNING POLICY FRAMEWORK 2021

- 2.1. Vanguardia has been commissioned by Newlands Developments to undertake a noise impact assessment to accompany a full planning application for Plot 2 of the Land West of Sheffield Road, Hoyland, Barnsley.
- 2.2. The National Planning Policy Framework (NPPF), last amended in July 2021, sets out the government planning policy for England. At its heart is an intention to promote more sustainable development.
- 2.3. The relevant paragraphs concerning noise in the NPPF are:
 - Paragraph 174: “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 noise pollution”. Furthermore, development should, wherever possible, should help to improve local environmental conditions.
 - Paragraph 185: “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 life;”

- 2.4. The NPPF makes direct reference to the Noise Policy Statement for England for advice on the achievement of these policy aims.

NOISE POLICY STATEMENT FOR ENGLAND 2010

- 2.5. The Noise Policy Statement for England (NPSE) sets out the government’s overall policy on noise management. It aims to promote good health and a good quality of life through the effective management of noise in the context of government policy on sustainable development.

- 2.6. It uses the previously established concepts of No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL), and extends these concepts by introducing Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life are likely to occur. However, the explanatory note to the NPSE states that it is not possible to identify a single objective value to define SOAEL that is applicable to all sources of noise in all situations. It is likely to be different for different noise sources, for different receptors and at different times.
- 2.7. The NPSE sets out the following long-term vision of noise policy and supporting aims in paragraphs 1.6 and 1.7:

“Noise Policy Vision

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims

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.”

- 2.8. The second aim of the NPSE refers to noise impacts that lie somewhere between LOAEL and SOAEL; while these may be considered as adverse effects, they are not considered as significant.
- 2.9. The NPSE asserts that, while all reasonable steps should be taken to mitigate and minimise adverse effects, this does not mean that such adverse effects cannot occur.

PLANNING PRACTICE GUIDANCE: NOISE (2019)

- 2.10. Further government guidance on the consideration of noise for planning has been published as the Planning Practice Guidance for Noise (PPG:N), last revised in July 2019. The PPG:N supports the NPPF by providing a range of advice and includes a noise exposure hierarchy table, and again makes reference to the NPSE.
- 2.11. The hierarchy table (replicated in Table 1 below), provides descriptive (i.e. non-numerical) guidance on the potential effects of noise exposure at levels corresponding to the NOEL, LOAEL and SOAEL as described in the NPSE, and confirms that adverse effects (between LOAEL and SOAEL) should be mitigated and reduced to a minimum, and significant adverse

effects (above SOAEL) should be avoided, taking account of the economic and social benefit of the activity causing or affected by the noise.

Table 1 PPG:N Noise Exposure Hierarchy

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

PLANNING CONDITION

- 2.12. Vanguardia have been instructed to provide a noise impact assessment to support the discharge of Condition 9 of the Full Planning Application (ref: 2021/1159), which states: following Planning Condition:

'Prior to occupation of any unit within the proposed development, a noise impact assessment shall be undertaken to determine the noise impact from any fixed plant or equipment associated with the unit.'

The assessment shall seek to demonstrate that, at relevant receptors, the predicted Rating Levels arising from noise generated by any fixed plant and equipment would not exceed the sensitivity test background sound levels set out in the 'Plot 2 Noise Impact Assessment produced by Vanguardia dated August 2021, ref: VC-103566-EN-RP-0001'. If the assessment indicates a potential exceedance of these background levels, it shall be demonstrated that planning noise policy requirements are met once context and the absolute level of sound have been taken into account. If that is not achieved, mitigation measures shall be identified to reduce the impact.'

The assessment shall be carried out by a suitably qualified acoustic consultant/engineer and follow the principles contained in BS 4142:2014 Methods for rating and assessing industrial and commercial sound.

The results of this assessment shall be submitted to and approved in writing by the Local Planning Authority. The approved details shall thereafter be fully implemented before the building is first occupied or the use commences and shall be thereafter maintained

Reason: To reduce or remove adverse impacts on health and the quality of life, especially for people living and/or working nearby, in accordance with Local Plan Policy POLL1.

- 2.13. Liaison was undertaken with the Environmental Health Officer on 18th October 2022 to confirm the background sound levels to be used for the assessment. It was agreed that the modal background sound levels from Plot 2 Noise Impact Assessment report identified in the condition would be used as there was not a sensitivity test background sound level for each receptor location.

3. APPROACH TO PLANT NOISE ASSESSMENT

ASSESSMENT METHODOLOGY

- 3.1. The assessment of potential noise impacts from fixed plant associated with the operation of the Proposed Development has been undertaken using the methodology outlined in BS 4142¹. This methodology provides an initial estimate of impact based on the difference between sound from the source being assessed, corrected for acoustic features where required (the rating sound level), and the existing background sound level at the receptor location. The initial assessment of impact can be subsequently modified due to various contextual considerations if necessary.
- 3.2. As mentioned above, the standard states that certain characteristics, if apparent at the receptor location, can increase the extent of the impact over that expected from a simple difference in noise levels. These characteristics include tonality, impulsivity and intermittency. The standard describes various options for taking any such features into account and for determining what is described in the standard as a 'rating level'.
- 3.3. The standard states that an initial estimate of the extent of the impact can be determined by subtracting the representative background sound level from the rating level. The greater the difference the greater the magnitude of the initial impact estimate. The standard states that:
- 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;
 - 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; and
 - 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.
- 3.4. The standard states that while the difference between the rating level and background sound level provides an initial estimate of the impact, an effective assessment cannot be conducted without considering the context. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.

¹ BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

- 3.5. Regarding consideration of the absolute levels of sound, the relevant guideline values provided in BS 8233:2014² have been referenced. Table 4 of that standard sets out desirable internal levels to be achieved in new dwellings from external sources. Information is also provided regarding desirable levels of sound for external amenity spaces associated with dwellings. The various values from BS 8233:2014 are summarised in Table 2 below.

Table 2 Desirable noise levels according to BS8233:2014

Source	Location (activity)	Time Period	Desirable Sound Level not to be exceeded
BS 8233:2014	Inside Bedrooms and Living Rooms (resting)	Day (07:00 – 23:00)	35 - 40 dB $L_{Aeq,T}$
	Inside Bedrooms (sleeping)	Night (23:00 – 07:00)	30 - 35 dB $L_{Aeq,T}$
	External Amenity Space	Day (07:00 – 23:00) [^]	50 - 55 dB $L_{Aeq,T}$

Notes:

[^] Time period not defined but assumed to be day.

- 3.6. The values shown in Table 2 above are generally regarded as LOAEL for steady external noise. If the noise has character, then either a lower value can be regarded as LOAEL or a correction can be applied to the predicted level to take into account the character.
- 3.7. It should also be noted that BS 8233:2014 also states that “Where development is necessary or desirable.... the internal target levels can be relaxed by up to 5dB and reasonable internal conditions achieved.”

PLANT INFORMATION

- 3.8. It is understood that 6 Daikin plant condenser units would be installed on each warehouse unit. The condenser models are further outlined in Table 3 below.

² BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings, BSI (2014)

Table 3 Plant Information

Plot	Model	Quantity	Sound Power Level dB L _w
2A	Daikin REYQ32U7Y1B	1	99
2A	Daikin REYQ26U7Y1B	1	95
2B	Daikin REYQ26U7Y1B	1	95
2B	Daikin REYQ22U7Y1B	1	94

- 3.9. The locations of the fixed plant in the site development are further detailed in Appendix D.
- 3.10. The noise from fixed plant has been characterised as a series of point sources located in the model where the plant is located. The model uses the propagation methodology described in ISO 9613-2:1996.

4. RECEPTORS

- 4.1. The potential noise impact from fixed plant has been considered at several residential locations which are the closest dwellings to the proposed development. Other residential dwellings are considered to have a lower level of exposure to operational noise than those considered and therefore a lower likelihood of experiencing adverse effects.
- 4.2. The modelling locations used for the assessment are presented in Table 4 and relative to the masterplan site in Figure 2 below. To provide a robust assessment the most exposed façade of the building has been considered.

Table 4 List of operational sound residential modelling locations

	Receptor Modelling Location	Height (m)
O1	Hoyland Common Primary	1.5
O2	Green Lane Farm GF	1.5
	Green Lane Farm FF	4.5
O3	Parkside Road GF	1.5
	Parkside Road FF	4.5
O4	Parkside Farm GF	1.5
	Parkside Farm FF	4.5
O5	Property South of Site GF	1.5
	Property South of Site FF	4.5
O6	Black Lane GF	1.5
	Black Lane FF	4.5
O7	Tankersley Lane West GF	1.5
	Tankersley Lane West FF	4.5

- 4.3. During the daytime period, the predicted sound levels are at a height of 1.5m. During the night-period, where the primary sensitive area is likely to be bedrooms, the predicted sound levels are at a height of 4.5m, representing first-floor windows, unless the property does not have a window at that height as indicated in the table above. Sound has been predicted at a distance 1 m from the residential modelling location façade, but without the effect of an acoustic reflection from that façade (i.e. a free-field level).

- 4.4. According to Barnsley Council's Local Plan (2019) the Green Lane Farm receptor (O2) sits within committed residential development land (ref HS57) so for the purposes of this assessment receptor O2 is also considered representative of a potential future residential development at this location.



Figure 2 Operational noise modelling locations (shown against the red line boundary of the original hybrid application)

5. BASELINE CONDITIONS

- 5.1. The condition indicates that the assessment should be undertaken against the background sound levels identified in the Noise Impact Assessment for Plot 2. These were derived from the baseline survey results for the original hybrid application, the details of this survey are set out below.
- 5.2. To characterise and quantify the existing noise environment, an unattended baseline noise survey was undertaken between Tuesday 3rd March 2020 and Tuesday 11th March 2020 at five locations within close proximity to the development site.
- 5.3. The monitoring positions are considered representative of the nearest noise sensitive dwellings to the site. The survey locations and representative noise sensitive properties are detailed below and presented in Figure 3 below:

L1 - Hoyland Common Primary School: This was installed to the rear of the school grounds in a wooded area away from the children. This was intended to be representative of the school and properties to the north of Tankersley Lane.

L2 – Land west of Sheffield Road (near Shell garage): this meter was installed in a field approximately 100m south west of Sheffield Road. This was intended to be representative of the properties to the South of Tankersley Lane, Green Lane Farm and the potential development of residential properties allocated in the local plan.

L3 – Land south east of the allotments on Sheffield Road: This was installed to be representative of properties on Parkside Road.

L4 – Land to the south east of the development site: This was intended to be representative of the nearest farm houses to the south of the development site.

L5 – St Peters Church: This meter was installed in the graveyard of the church to be representative of properties on Black Lane and Tankersley Lane to the west of the M1.



Figure 3 Location of baseline noise survey measurements

- 5.4. All measurements were undertaken using Class 1 monitoring equipment at a height of 1.5 m above local ground level. The sound level meters were field calibrated prior to and following the measurements using a Class 1 acoustic calibrator with no significant drift in calibration being indicated. Further details about the survey are included in Appendix B.
- 5.5. Observations made during the surveys confirmed that, during the day, the dominant source of noise was road traffic noise from the M1 Motorway. There were also contributions affecting the majority of receptors from vehicle movements on Sheffield Road. Additionally, it was noted birdsong and livestock contributed to the noise character of the area. During the night, although not experienced, it is anticipated that the dominant noise source would similarly be road traffic noise from the M1.

- 5.6. There was an unexpected equipment failure of the sound level meter at monitoring location L2 during the survey. This limited the measured data at this location to only from 3rd March to 6th March 2020. To cater for reduced measured data, an offset was calculated between positions L2 and L3 for the day and night time period. The noise level was predicted for the duration of the survey (6th March till 11th March) at monitoring location L2 using the calculated offset and measured data at monitoring location L3.

BACKGROUND SOUND LEVELS USED FOR ASSESSMENT

- 5.7. As described above, a typical background sound level at the residential modelling locations needs to be defined to undertake the assessment of operational sound from the proposed development.
- 5.8. All measured data from the survey was processed and adverse weather conditions which may have affected the measurements, were excluded from the data set. Adverse weather included any period where there was rainfall and where the wind speed was over 5m/s (18kph). It is noted that generally the wind direction was south westerly with the exception of one day when the wind direction shifted to a north easterly direction. Details of the weather data during the survey and the data excluded is presented in Appendix B.
- 5.9. The typical (modal) background sound levels have been defined through a statistical analysis of the measured data from the baseline survey. Appendix C presents the statistical distribution graphs of all measurement locations over the day and night periods.
- 5.10. Following consultation with the EHO on 18th October 2022 It was agreed that the modal background sound levels could be used for the assessment. The modal background sound levels are set out in Table 5 below.

Table 5 Modal background sound levels used for assessment of operational noise

Monitoring location	Modal Background Sound Level (dB LA90)	
	Daytime (07:00 – 23:00)	Night time (23:00-07:00)
L1	51	48
L2	56	46
L3	54	45
L4	54	43
L5	51	49

6. PLANT NOISE IMPACT ASSESSMENT PLOT 2

DAYTIME

- 6.1. The predicted operational noise levels of the plant together with the modal background sound values and the resulting initial estimate of impact from Plot 2 (i.e. Units 2A and 2B) are presented in Table 6 below for the daytime period.
- 6.2. As discussed, a correction can be applied to the operational sound levels to take account of certain acoustic characteristics that may be present at the assessment locations, based on the type of source and the existing acoustic environment. It is considered unlikely that the sound from the plant will have any specifically tonal, impulsive, or intermittent characteristics at the assessment locations to the extent that they would attract attention at the assessment locations. Furthermore, given that the predicted specific sound levels are substantially below the background sound levels, it is considered that the specific sound will not have any features that are readily distinctive against the existing background. Therefore, no correction has been applied to the predicted specific sound levels to derive the rating level.

Table 6 Predicted operational noise level during the daytime assessment period (using modal background sound values)

Receptor Location	Residual Level (LAeq, 15 mins dB)	Typical Background (LA90, 15mins dB)	Predicted Specific Noise Level (LAeq, 1 hour dB)	Acoustic Feature Correction (dB)	Rating Level (LA _r , 1 hour dB)	Difference (Rating – Background) (dB)
O1	53	51	12	0	12	-39
O2	54	56	19	0	19	-37
O3	52	54	27	0	27	-27
O4	49	54	10	0	10	-44
O5	49	54	25	0	25	-29
O6	53	51	0	0	0	-51
O7	53	51	11	0	11	-40

- 6.3. It can be seen from Table 6 that during the day, the rating level does not exceed the typical modal background sound level at any operational receptor location. Consequently, the requirements of Planning Condition 9 are met during the daytime period. Furthermore, in terms of BS 4142, the plant noise during the daytime period would have less than a low impact at the receptors and therefore no adverse effects are likely at these locations.

NIGHT-TIME

- 6.4. Table 7 below presents the predicted operational noise levels of the plant together with the modal background sound values and the resulting initial estimate of impact from Plot 2 at the noise sensitive receptors at night.
- 6.5. As per paragraph 6.2 above, it is not considered appropriate to apply any corrections to the predicted specific noise level to account for any acoustic features of the noise which would be perceptible at the receptor locations.

Table 7 Predicted noise level from operational noise sources during the night-time assessment period (using modal background sound levels).

Receptor Location	Residual Level (LAeq, 15 mins dB)	Typical Background (LA90, 15mins dB)	Predicted Specific Noise Level (LAeq, 15 mins dB)	Acoustic Feature Correction (dB)	Rating Level (LA _r , 15 mins dB)	Difference (Rating – Background) (dB)
O2	49	48	20	0	20	-28
O3	46	45	32	0	32	-13
O4	44	43	20	0	20	-23
O5	44	43	26	0	26	-17
O6	48	49	0	0	0	-49
O7	48	49	13	0	13	-36

Note that no assessment has been undertaken for the night-time period at O1 as this receptor is a primary school and therefore would not be a sensitive receptor during the night-time period.

- 6.6. It can be seen from the table that, for the night-time period, the rating level does not exceed the modal background sound level at any receptor location, indicating less than a low impact and that no adverse effects are likely. Consequently, the requirements of Planning Condition 9 are met during the night-time period.
- 6.7. Individual contributions from each Plot (2A and 2B) towards both daytime and night-time predicted specific noise levels at the receptor locations are set out in Appendix E.

7. CONCLUSION

- 7.1. Vanguardia has been commissioned by Winvic Construction Limited to predict and assess the potential noise impacts likely to arise from the proposed fixed plant associated with Plots 2A and 2B at the land to the west of Sheffield Road, Hoyland, Barnsley.
- 7.2. The purpose of the noise assessment contained in this report is to support the discharge of condition 9 of the Full Planning Application (ref: 2021/1159).
- 7.3. A plant noise assessment has been undertaken based on information supplied by the project team regarding the fixed plant and equipment that will be installed as part of the base build specification to serve Plots 2A and 2B. The predicted noise levels for both daytime and night-time periods are below the background sound levels at all receptor locations and therefore meet the requirements set out in planning condition 9. Furthermore, the predicted levels are such that in terms of BS 4142, no adverse effects are expected at the receptor locations.
- 7.4. It should be noted that, at the time of writing, there are no identified occupiers for Plots 2A and 2B, therefore it is possible that once an occupier is on board, they may require additional fixed plant which would need to be subject to further assessment.

APPENDIX A – ACOUSTIC GLOSSARY

- a. Noise is usually defined as unwanted sound. The perception of sound arises from small pressure fluctuations at the eardrum leading to the sense of hearing. Human ears can respond to sound in the frequency range of approximately 20 Hertz (Hz) (low pitch) to 20,000 Hz (high pitch). Whilst the level of sound could be described in terms of different pressures, the range of sensitivity of the human ear is very large and it is easier to use the unit of decibel (dB) to quantify sounds. The human ear can detect sounds in the approximate range of 0 dB (the threshold of perception) to 140 dB (commonly described as the threshold of pain).
- b. The ear does not respond equally to sounds of the same magnitude at different frequencies, but, instead, it is more responsive to mid frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, an electronic weighting mechanism is used when sound is measured. This weighting reduces the importance of lower and higher frequencies, in a similar manner to the human ear. The most commonly used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement and assessment, and the levels are denoted as dB(A).
- c. Whether sound is perceived as noise depends on a number of factors, which should be considered in any assessment. Generally, the extent of the impact and effect of noise depends upon:
- its level;
 - the margin by which the particular source of noise exceeds the prevailing baseline level;
 - the character of the source in relation to the character of the baseline noise environment;
 - how the sound varies over a given period of time;
 - when the sound occurs, i.e. during the day, evening or night; or at weekdays or weekends; and
 - the acoustic features of the source (such as its general frequency content, whether it has tonal qualities or whether the source is impulsive in nature).
- d. The decibel scale is logarithmic. This means that if two sources of the same sound pressure level are combined, this doubling of the sound energy gives a resultant level 3 dB higher than the decibel value of the single source.

- e. Subjectively, experiments have shown that in general a 10 dB increase is regarded as a doubling of perceived loudness, and a change in sound level of 3 dB is generally the minimum difference that can be perceived under normal listening conditions.
- f. Sound levels are rarely constant, and a range of indicators are used to describe the varying sounds that occur. A description of the main indicators is given below, along with some other technical terms that tend to be used in noise impact assessments.

$L_{Aeq,T}$ The equivalent continuous A-weighted sound or noise level over the time period (T). This is the A-weighted sound pressure level of a continuous, steady sound that, over the given time period (T), contains the same sound energy as the actual fluctuating sound over the same time period.

$L_{A90,T}$ This is the 'A' weighted noise level exceeded for 90% of the measurement period, T. This is often described the background sound or noise level.

$L_{A10,T}$ This is the 'A' weighted noise level exceeded for just 10 % of the measurement period, T.

$L_{A10,18h}$ This is the arithmetic average of the hourly ($L_{A10,1h}$) values for each of the eighteen one-hour periods between 06:00 and 24:00 hours. This indicator is normally used to describe road traffic noise.

$L_{Amax,T}$ This is the maximum 'A' weighted noise level that occurs during the measurement period, T. It is used to show the highest noise level that occurred in that time period. In some situations, the effect of noise is more associated with the maximum value than, for example, the $L_{Aeq,T}$ indicator.

Façade Level: The sound level at a position 1 m in front of a reflecting façade of a building. The façade noise level is assumed to be 3 dB(A) higher than the level measured or predicted at the same position but without the influence of the reflecting façade.

Free-field Level: The sound level in an open area well away from any buildings or other sound reflecting surfaces other than the ground. Generally, the minimum distance from building facades required for free-field measurements is 3.5 m.

Noise Policy Statement for England (NPSE) Terminology

No Observed Effect Level (NOEL): This is the level below which no effect can be detected. In simple terms, below this level, the sound has no effect at all.

Lowest Observed Adverse Effect Level (LOAEL): This is the level above which adverse effects on health and quality of life can be detected.

Significant Observed Adverse Effect Level (SOAEL): This is the level above which significant adverse effects on health and quality of life occur.

BS 4142:2014+A1:2019 Terminology

Background Sound Level: The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval. Expressed as $L_{A90,T}$ and generally considered to be the average minimum noise level.

Ambient Sound Level: Totally encompassing sound in a given situation at any given time, usually composed of sound from many sources near and far. Usually expressed in terms of $L_{Aeq,T}$ and includes the residual and specific sound when present.

Residual Sound Level: The ambient noise remaining at the assessment location when the specific noise source is suppressed to such a degree that it does not contribute to the ambient noise. Expressed in terms of $L_{Aeq,T}$.

Specific Sound Level: The equivalent continuous A-weighted sound pressure level produced by the specific sound source (being assessed) at the assessment position over a given reference time interval ($L_{Aeq,Tr}$).

Rating Level: The specific sound level plus any adjustment for the characteristic features of the sound. Expressed in terms of $L_{Ar,Tr}$.

APPENDIX B – BASELINE SURVEY EQUIPMENT AND WEATHER DATA

UNATTENDED SURVEY POSITION L1

Instrumentation: Larson Davis Class 1 LxT Sound Level Meter, serial number 0003812. The instrument was calibrated before and after the survey with a Larson Davis CAL200 acoustic calibrator, serial number 12197

Measurement Period: The survey was conducted between 07:30 hours on 3rd March 2020 and 07:00 on the 11th March 2020.

UNATTENDED SURVEY POSITION L2

Instrumentation: Larson Davis Class 1 831 Sound Level Meter, serial number 0004069. The instrument was calibrated before and after the survey with a Larson Davis CAL200 acoustic calibrator, serial number 12197

Measurement Period: The survey was conducted between 08:55 hours on 3rd March 2020 and 03:55 on the 7th March 2020.

UNATTENDED SURVEY POSITION L3

Instrumentation: Larson Davis Class 1 LxT Sound Level Meter, serial number 0003326. The instrument was calibrated before and after the survey with a Larson Davis CAL200 acoustic calibrator, serial number 12197

Measurement Period: The survey was conducted between 09:45 hours on 3rd March 2020 and 07:30 on 11th March 2020.

UNATTENDED SURVEY POSITION L4

Instrumentation: Larson Davis Class 1 LxT Sound Level Meter, serial number 0003318. The instrument was calibrated before and after the survey with a Larson Davis CAL200 acoustic calibrator, serial number 12197

Measurement Period: The survey was conducted between 10:45 hours on 3rd March 2020 and 08:00 on the 11th March 2020.

UNATTENDED SURVEY POSITION L5

Instrumentation: Larson Davis Class 1 LxT Sound Level Meter, serial number 0003816. The instrument was calibrated before and after the survey with a Larson Davis CAL200 acoustic calibrator, serial number 12197

Measurement Period: The survey was conducted between 12:45 hours on 3rd March 2020 and 08:00 on the 11th March 2020.

PERSONNEL:

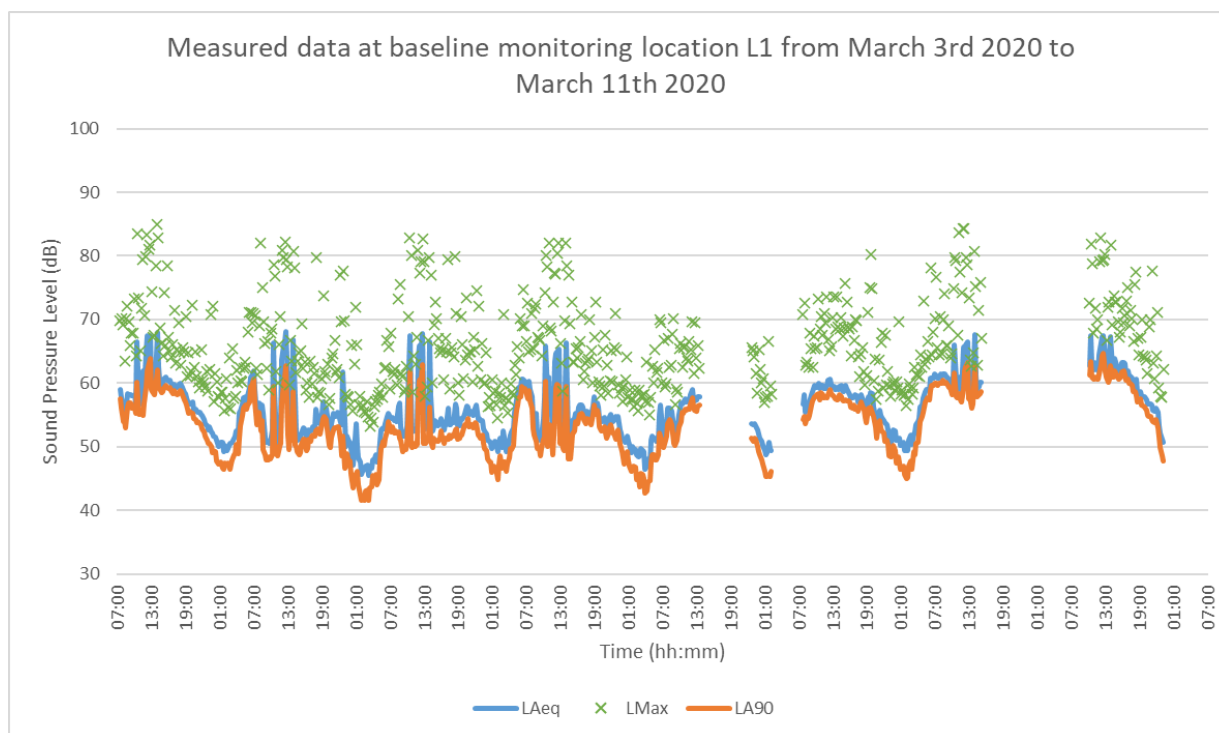
Set up: Vince Parker (MIOA)

Collection: Vince Parker (MIOA)

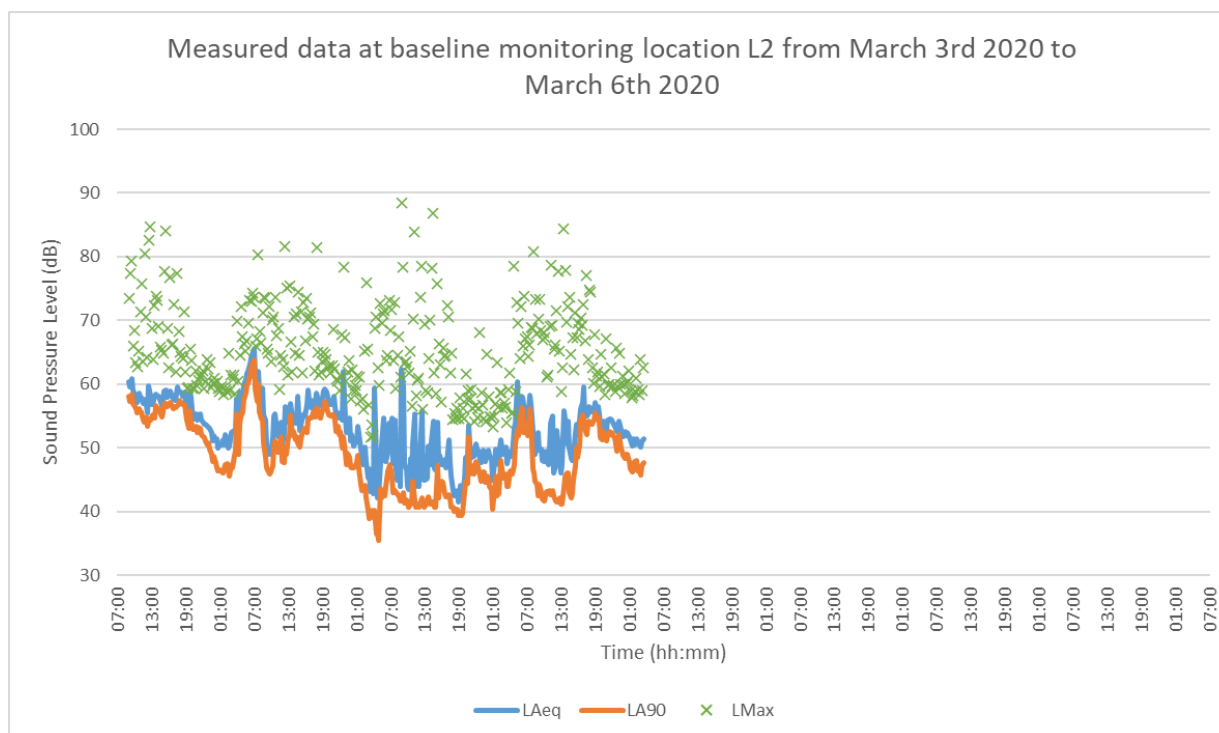
MEASURED DATA

The measured data from each baseline measurement location are presented below.

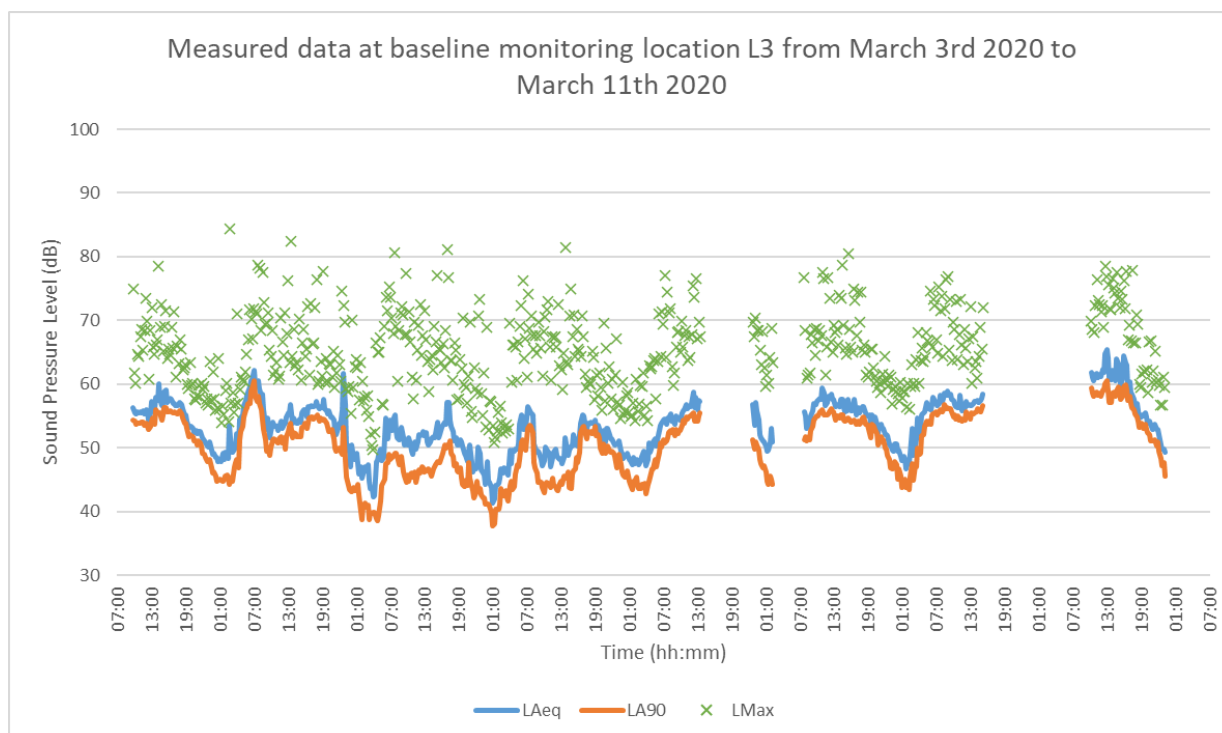
Baseline measurement location L1



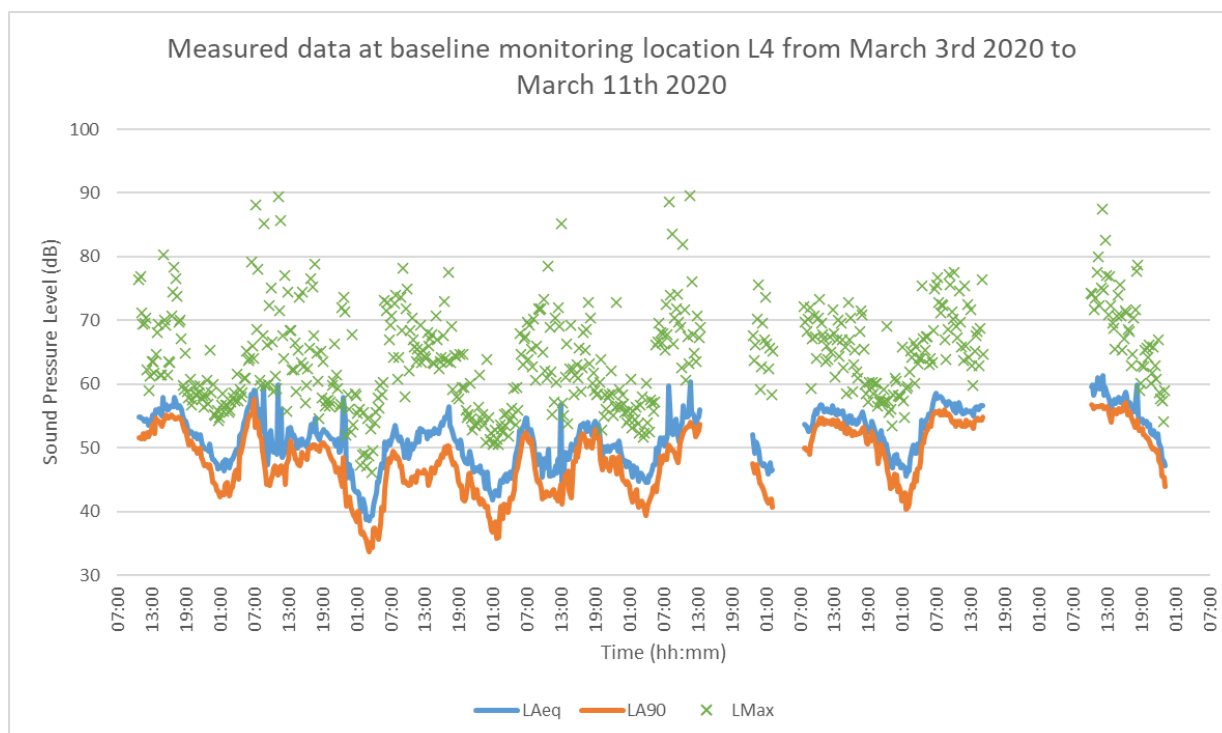
Baseline measurement Location L2



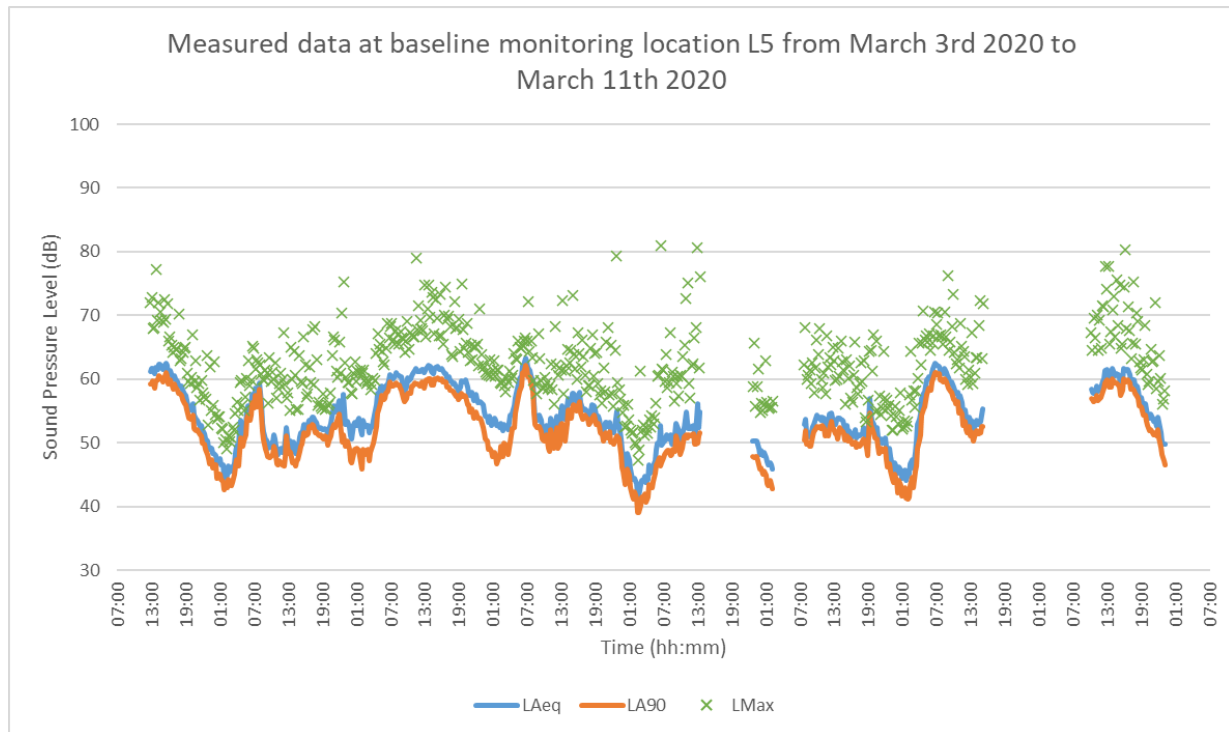
Baseline measurement Location L3



Baseline measurement Location L4



Baseline measurement Location L5



WEATHER CONDITIONS:

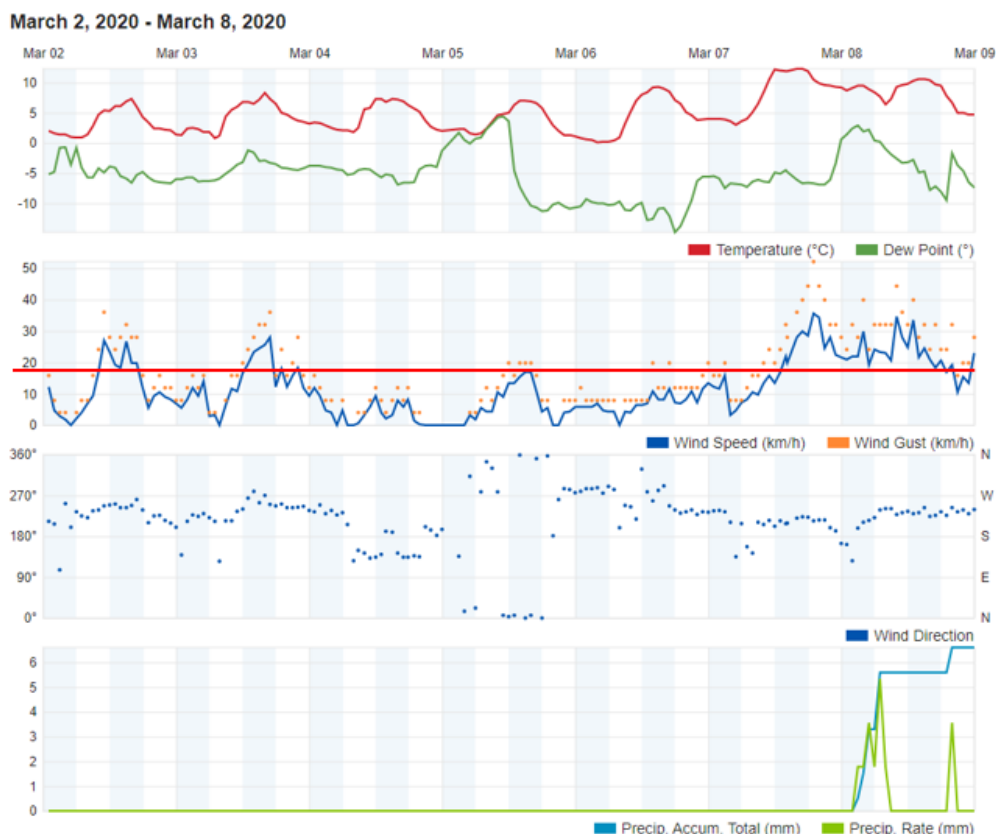
The weather conditions during the survey period were variable with periods of rainfall and high winds. Data from three of the nearest weather stations to the site were analysed and data from weather station ID IROTHERH19 was concluded to be the most representative. The following weather conditions are a summary of the weather data used for the assessment

Date	Temp (°C)			Wind Speed (kmph)		Wind Direction N,E,S,W	Precipitation (mm)		
	High	Low	Average	High	Average		Total amount	Rain From	Rain To
03/03/2020	8	1	4	30	8	W	0	-	-
04/03/2020	9	0	4	13	1	W	0	-	-
05/03/2020	8	0	3	16	2	NNE	0	-	-
06/03/2020	9	-1	4	11	2	WNW	0	-	-
07/03/2020	13	3	8	27	4	WSW	0	-	-
08/03/2020	11	4	8	24	5	WSW	5	02:30	08:00
09/03/2020	12	5	7	37	10	W	4	15:45	23:59
10/03/2020	14	7	11	40	18	W	2	00:00	10:00
11/03/2020	12	4	8	47	7	WSW	3	17:30	23:59

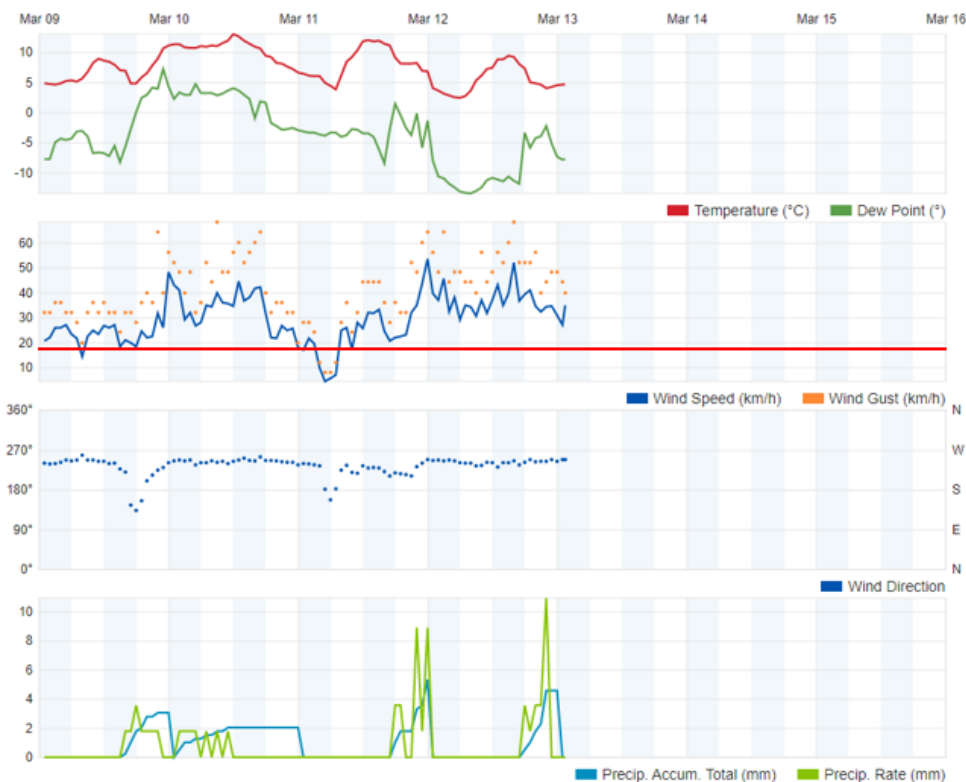
These stations are setup by members of the public and the data is publicly accessible from www.weatherunderground.com. The weather station data was accessed from the following station ID's IBARNSLE14, IROTHERH19 and IECCLESF2 on April 22nd 2020.

Graphs of the weather data from the three weather stations are presented below.

Weather conditions from IBARNSLE14 weather station

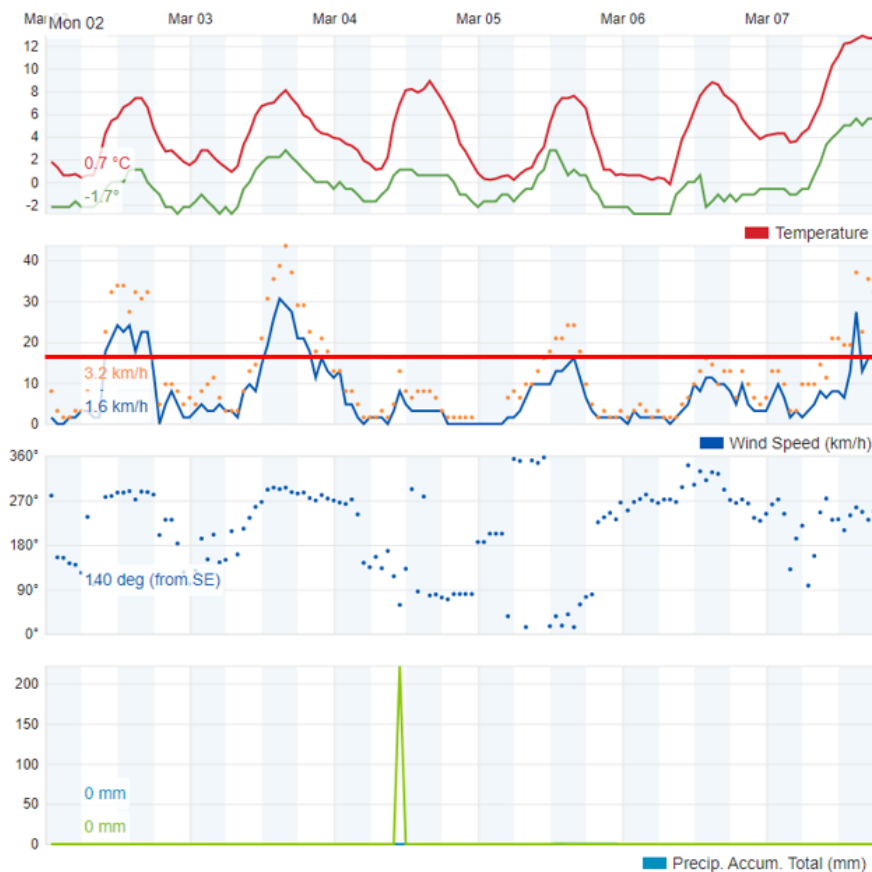


March 9, 2020 - March 15, 2020

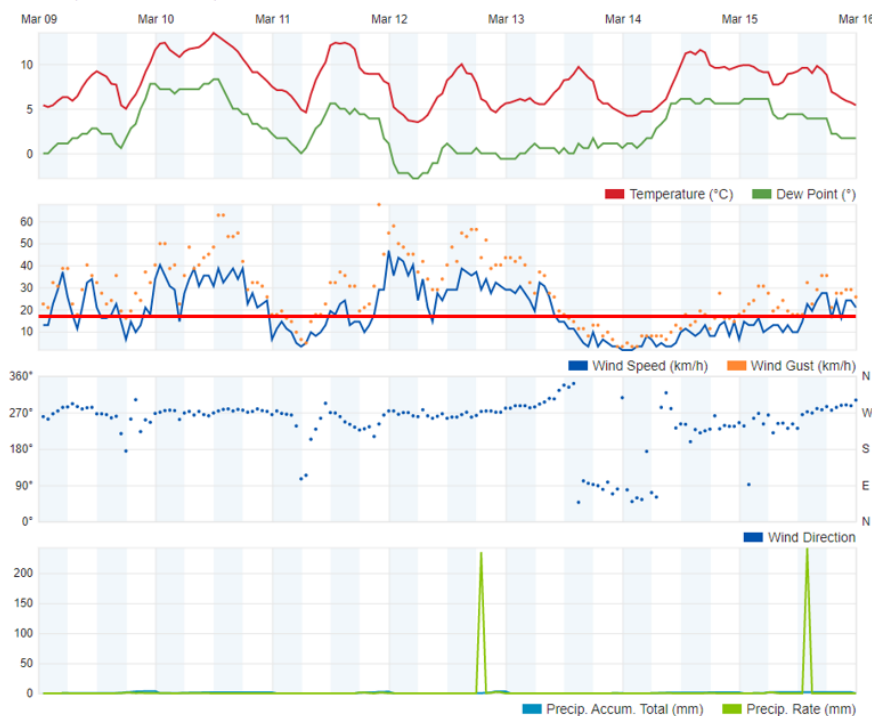


Weather conditions from IROTHERH19 weather station

March 2, 2020 - March 8, 2020



March 9, 2020 - March 15, 2020

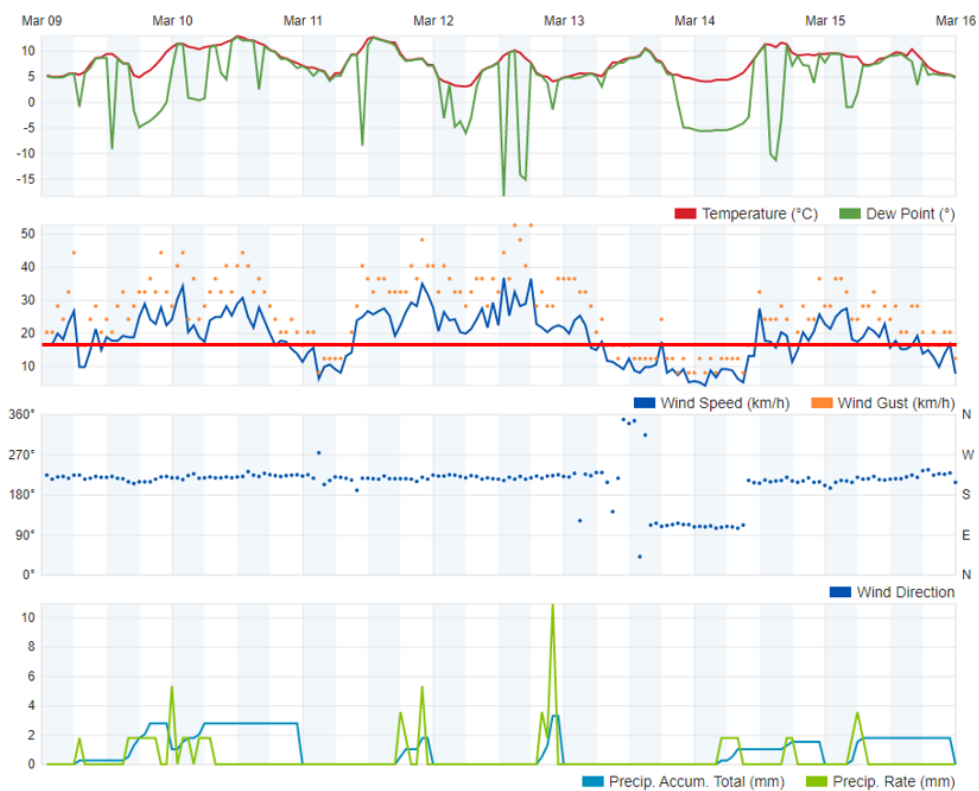


Weather conditions from IECCLSF2 weather station

March 2, 2020 - March 8, 2020



March 9, 2020 - March 15, 2020



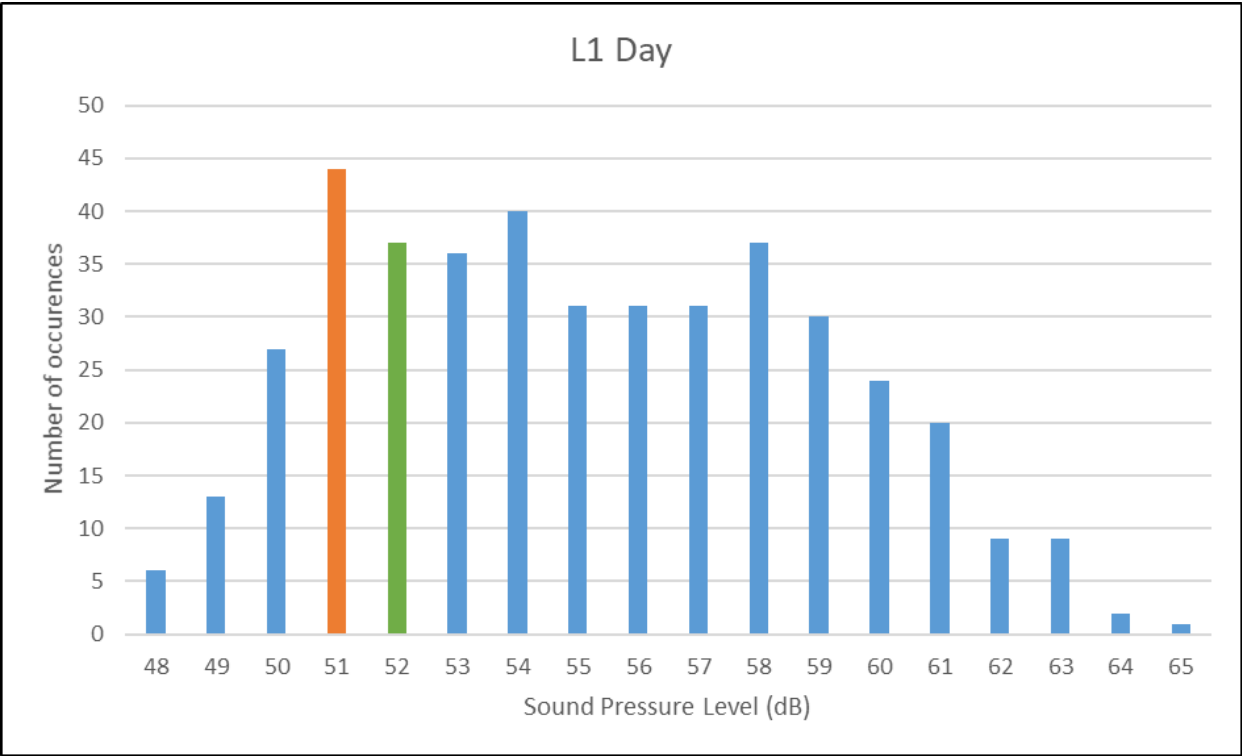
APPENDIX C – STATISTICAL ANALYSIS OF BACKGROUND SOUND LEVELS

As detailed in the main body of the report, statistical analysis of the measured background sound levels was undertaken for the day and night-time period in order to identify a typical level. The graphs which illustrate this are presented below, the modal value is shown in orange.

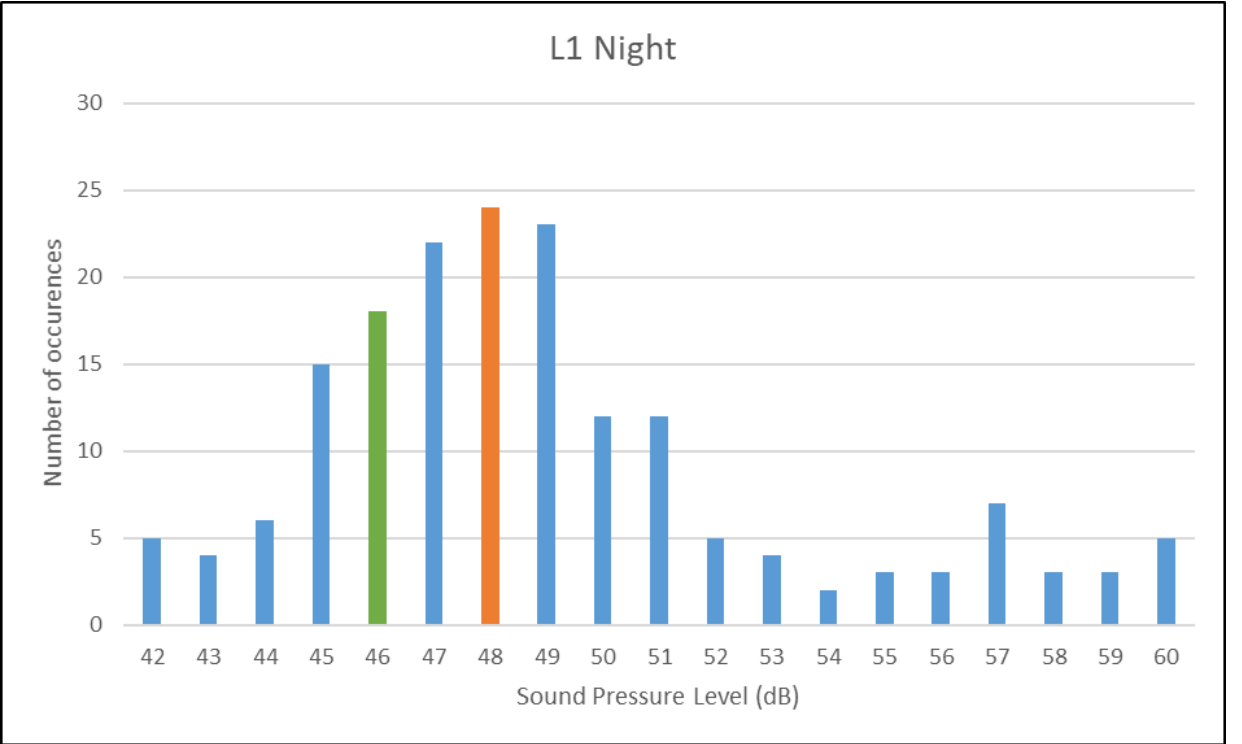
Note that where the lower quartile value was more than 2 dB(A) below the modal value, this was considered an indication that there was unevenness in the distribution of the background sound level. In those cases, the lower quartile value was used as a sensitivity test in the operational sound assessment, in addition to the modal value. The lower quartile column is shaded green on the graphs unless it matches the modal value.

Note due to an equipment failure of the measurement equipment installed at monitoring location L2, the measured data was compared to measured data from monitoring location L3 and an offset was calculated that was used to predict the measured noise level for the remainder of the survey. For clarity, the measured data and calculated data is presented below.

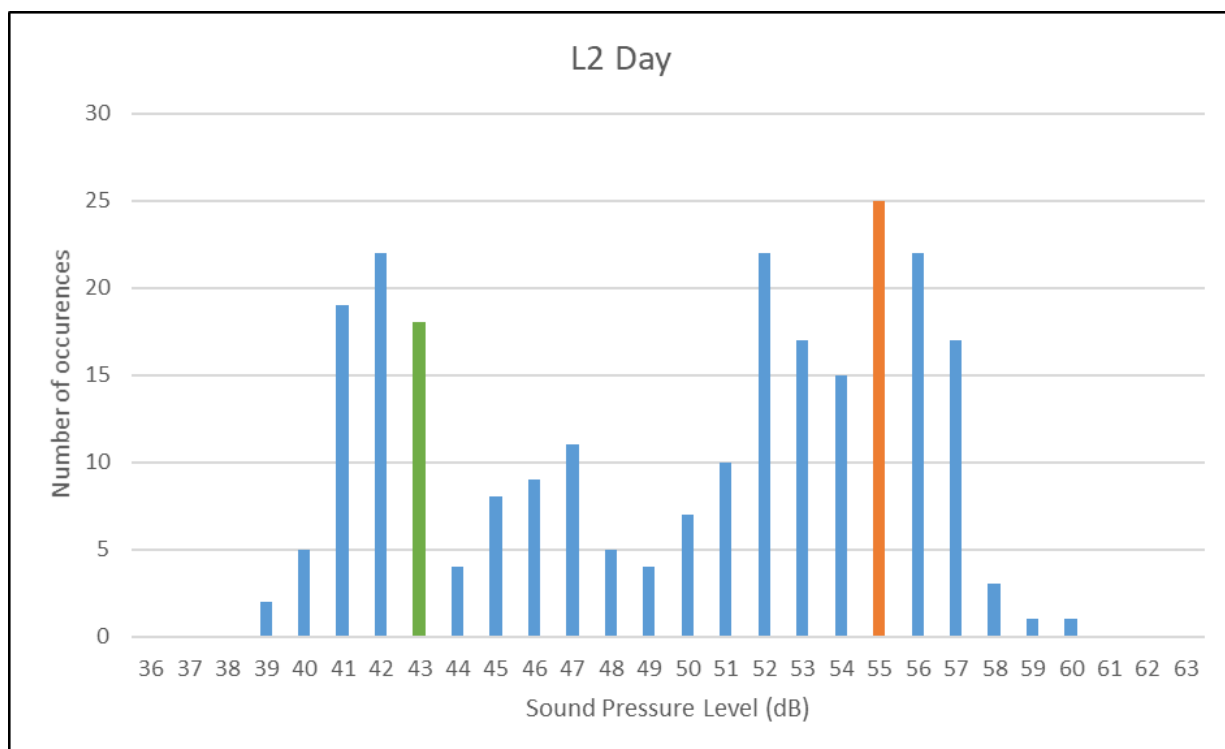
Baseline measurement location L1 Day



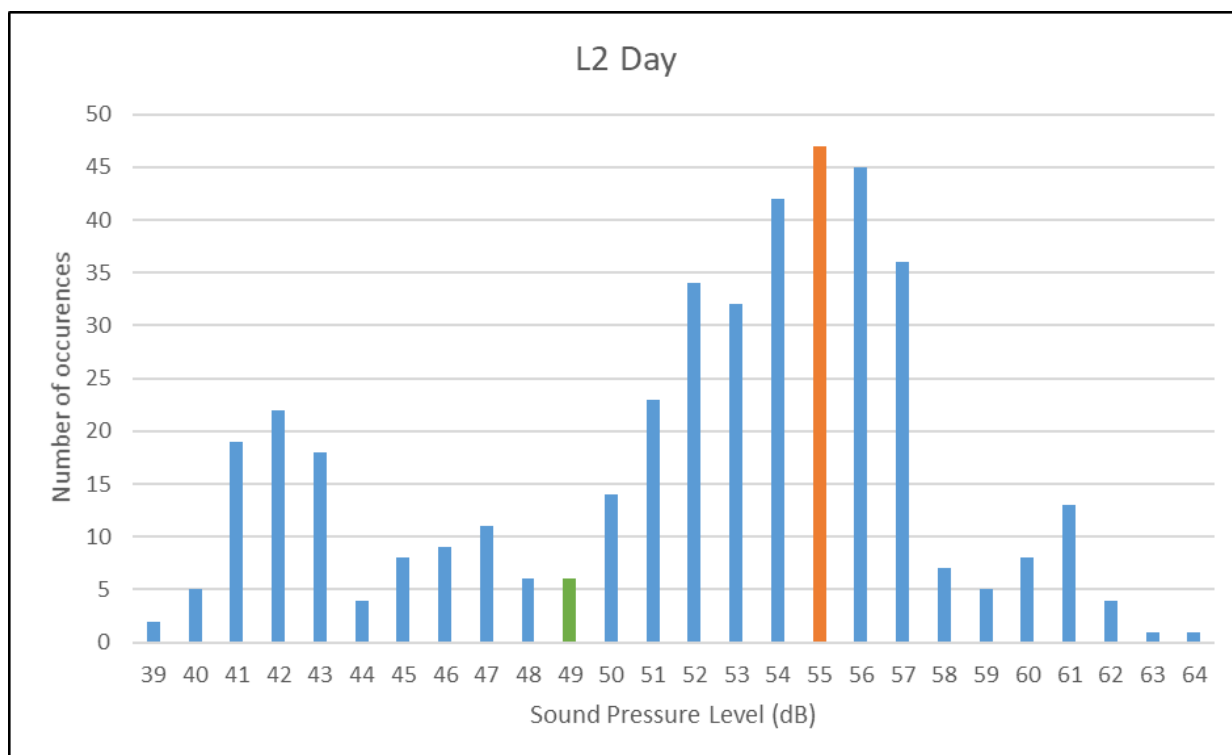
Baseline measurement location L1 Night



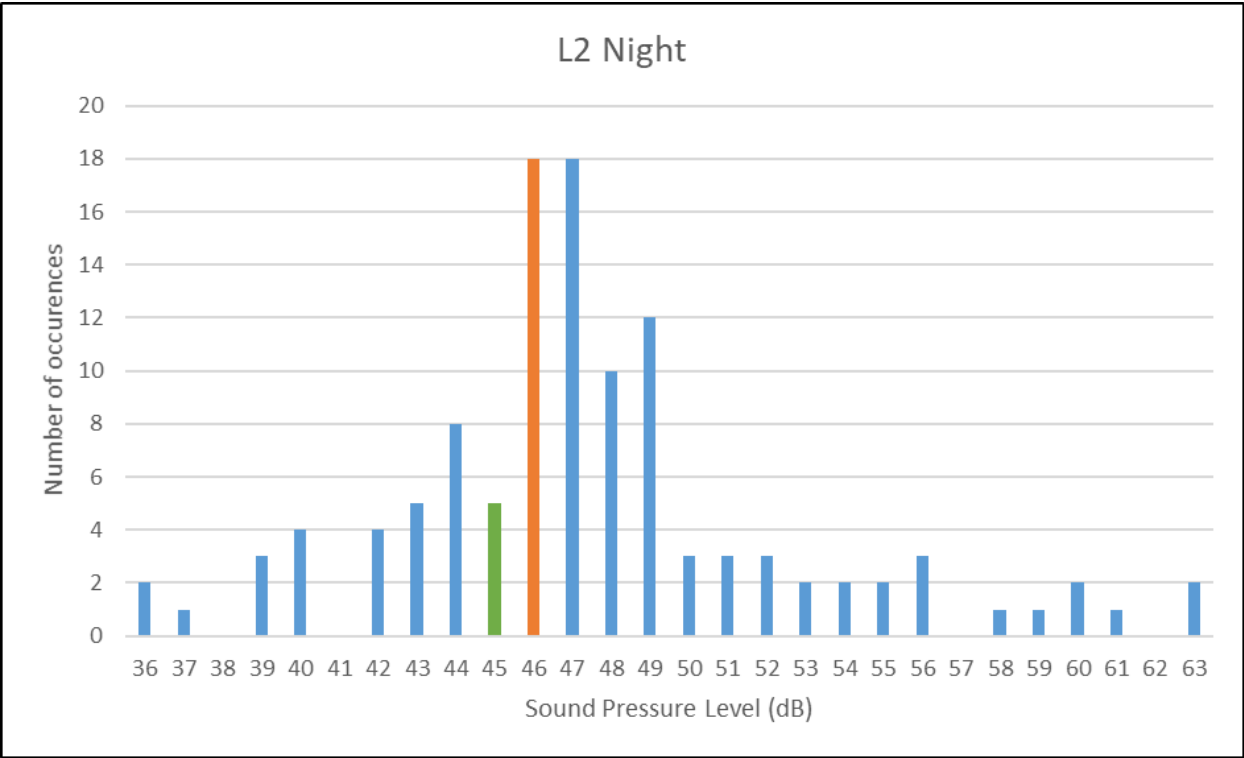
Baseline measurement location L2 Day (measured data)



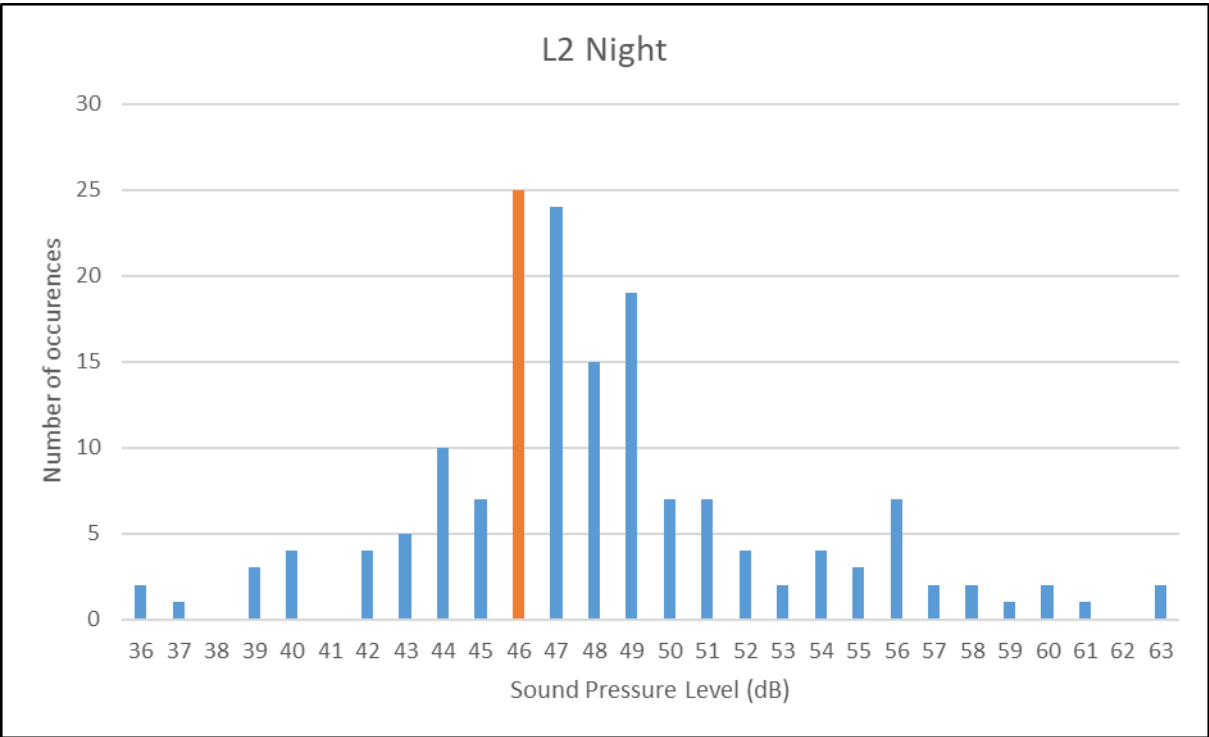
Baseline measurement location L2 Day (measured and calculated)



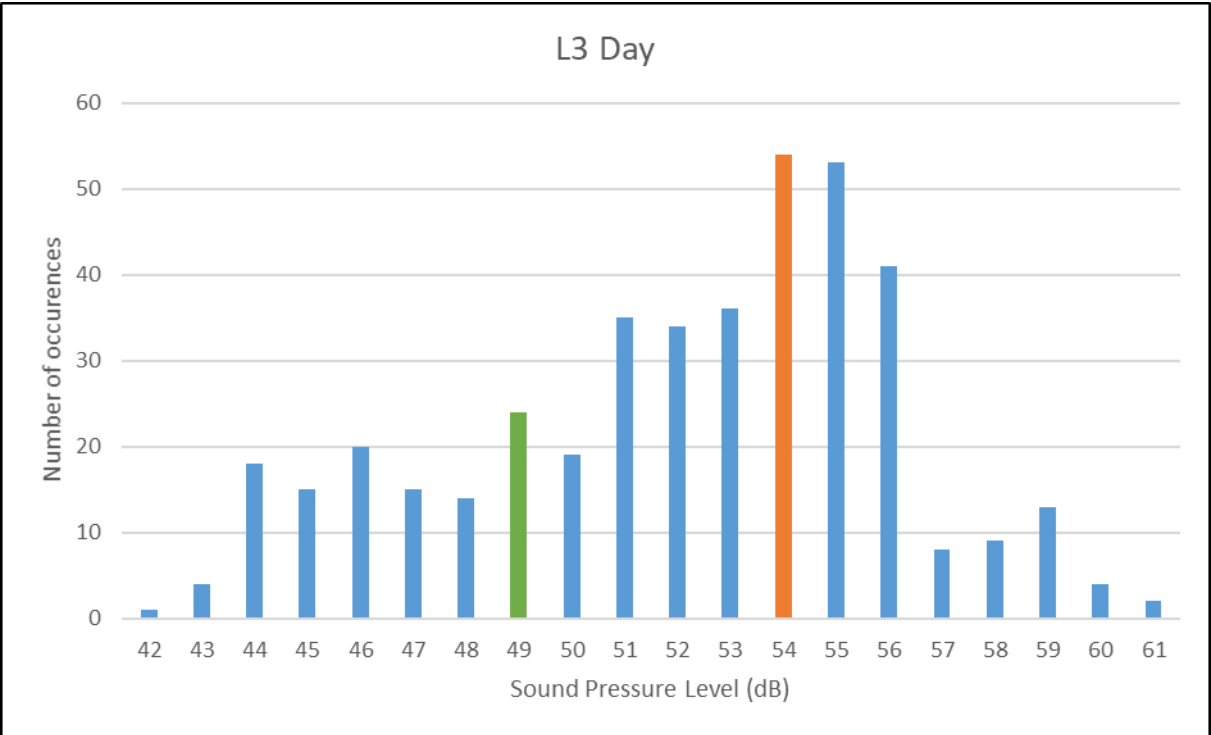
Baseline measurement location L2 Night (measured)



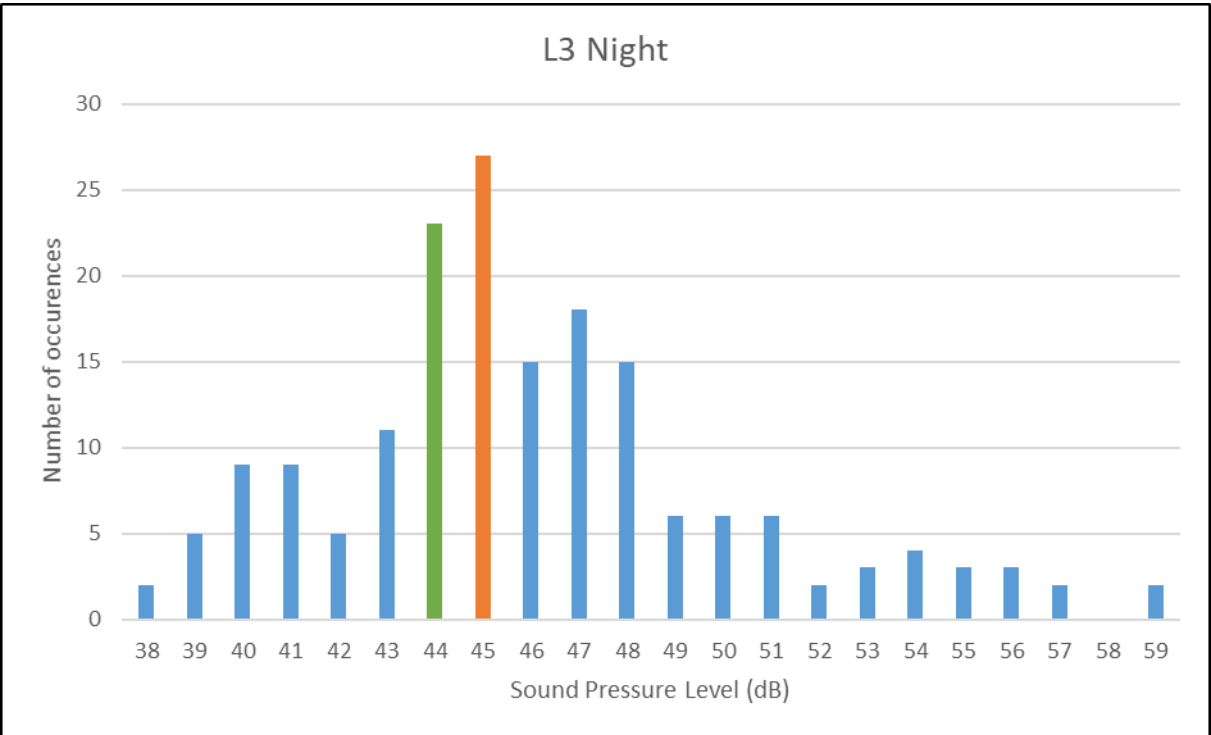
Baseline measurement location L2 Night (measured and calculated)



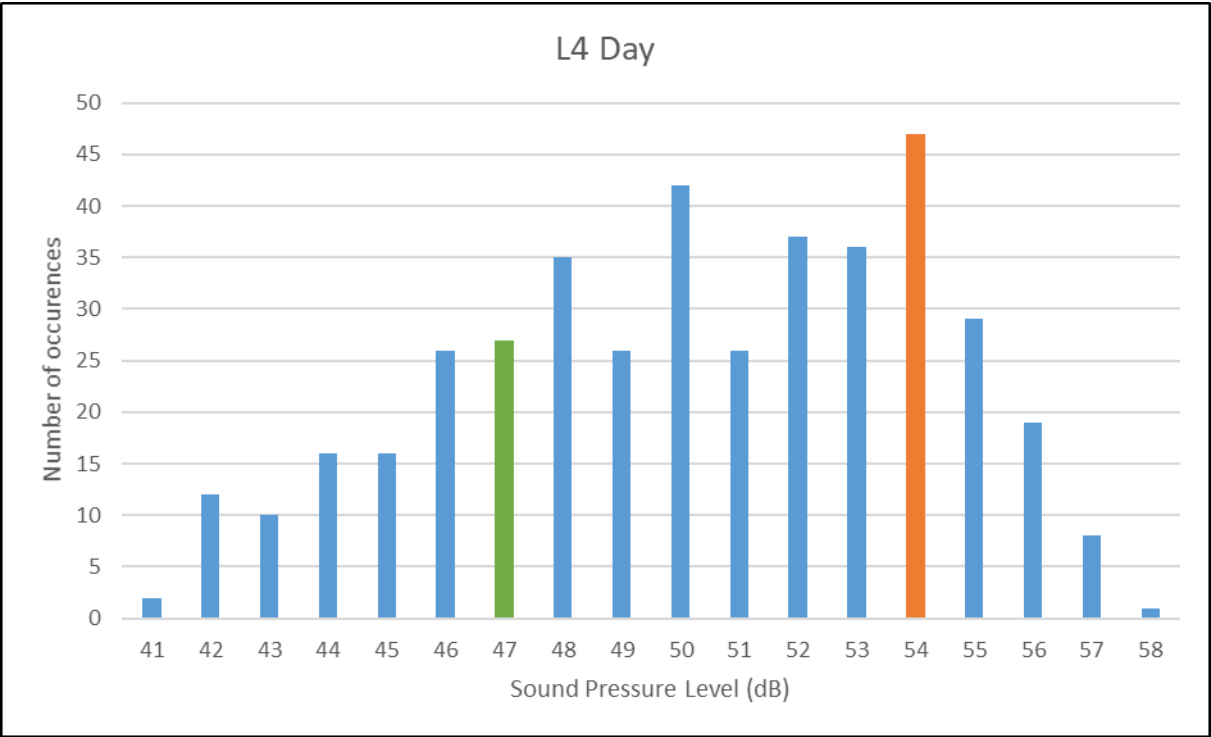
Baseline measurement location L3 Day



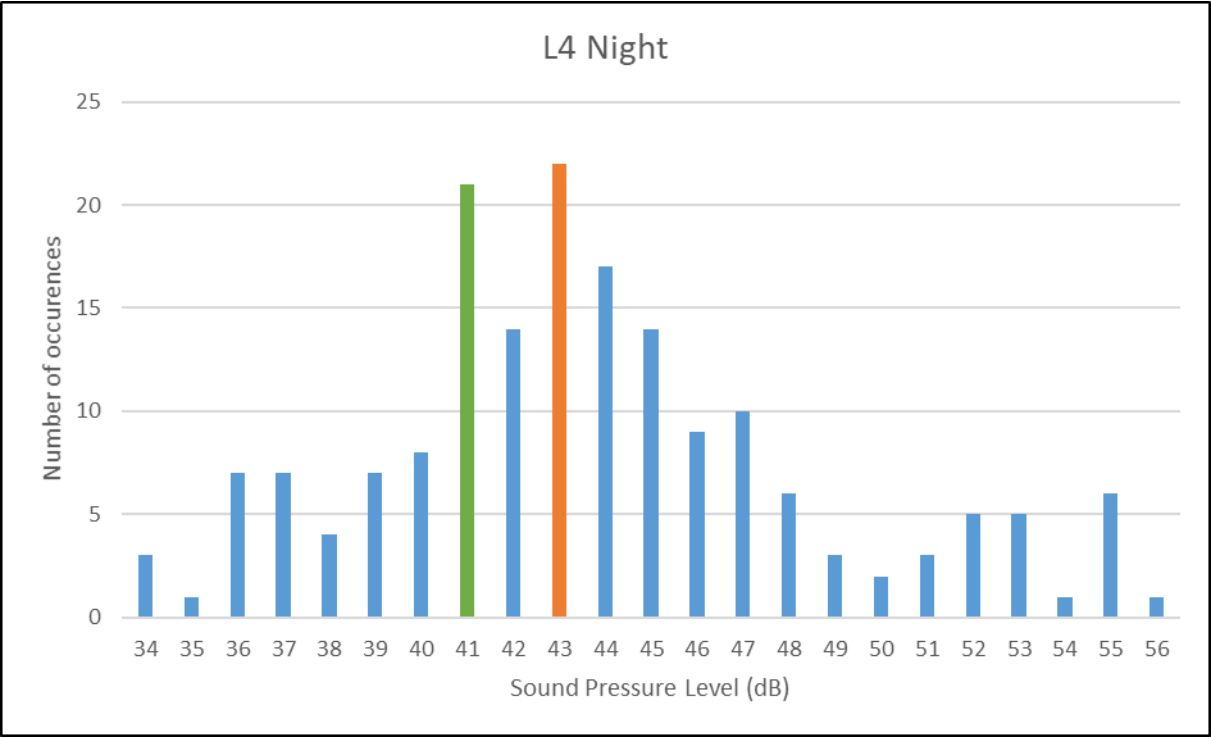
Baseline measurement location L3 Night



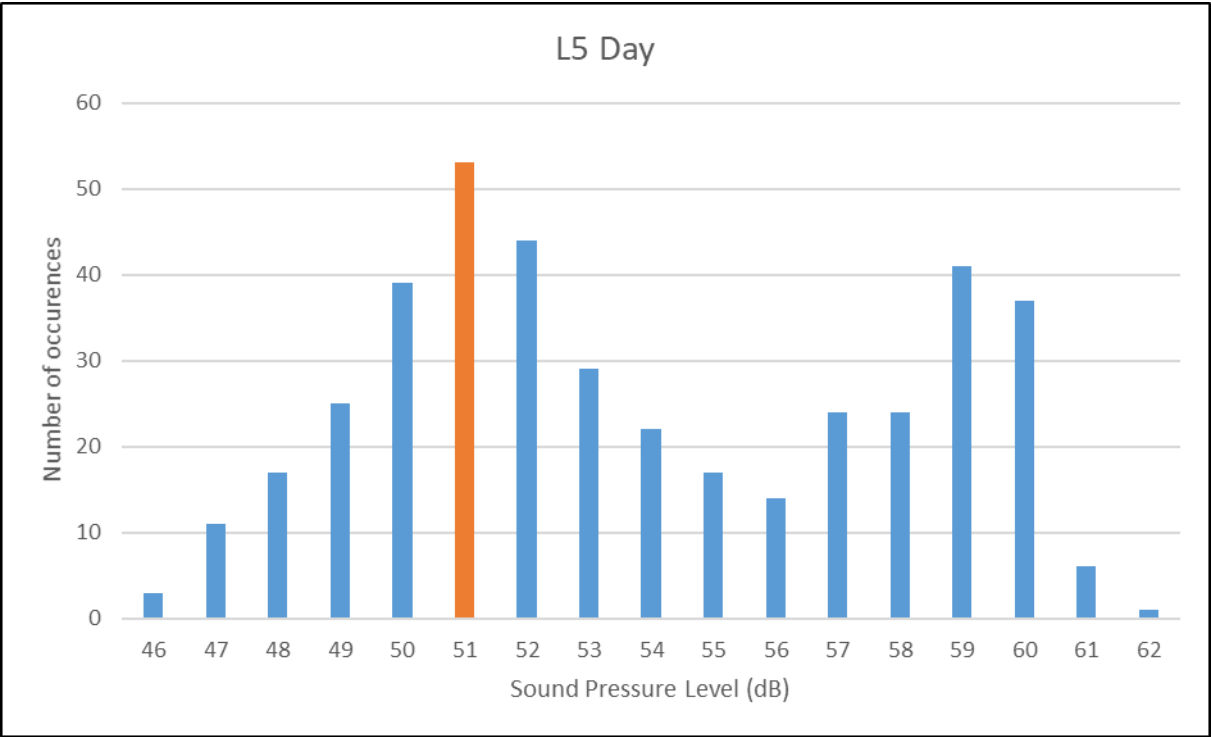
Baseline measurement location L4 Day



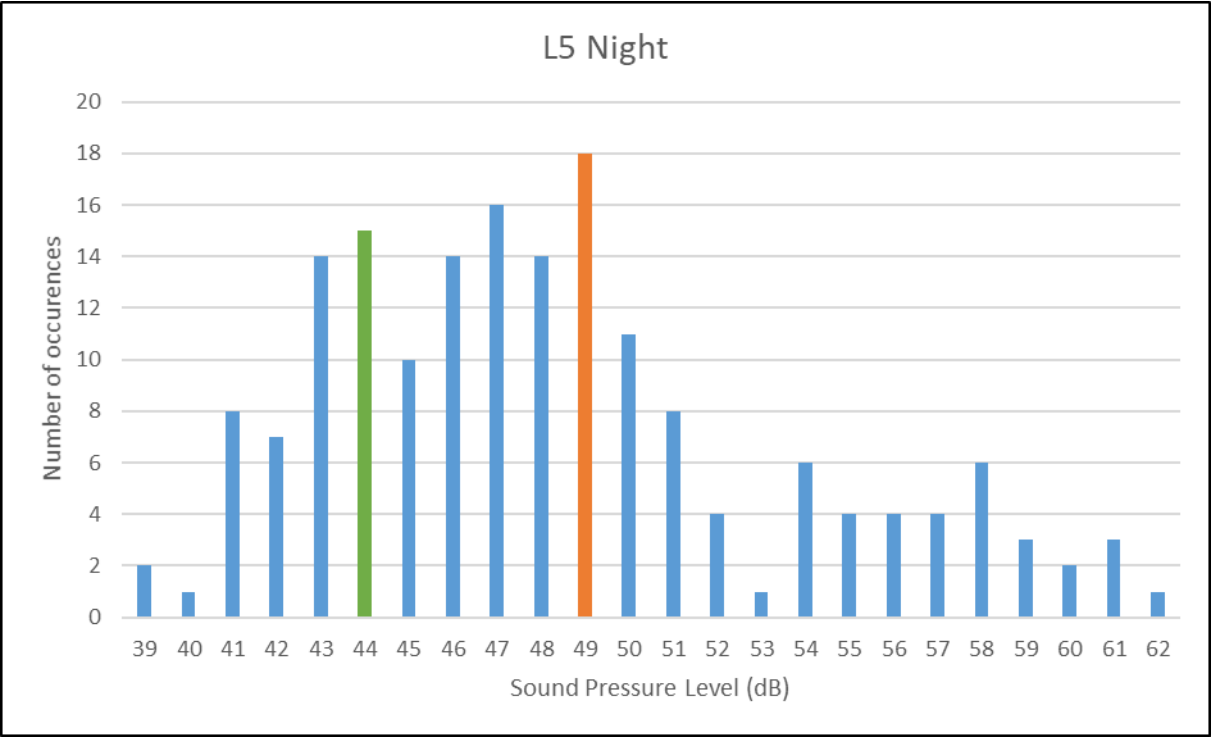
Baseline measurement location L4 Night



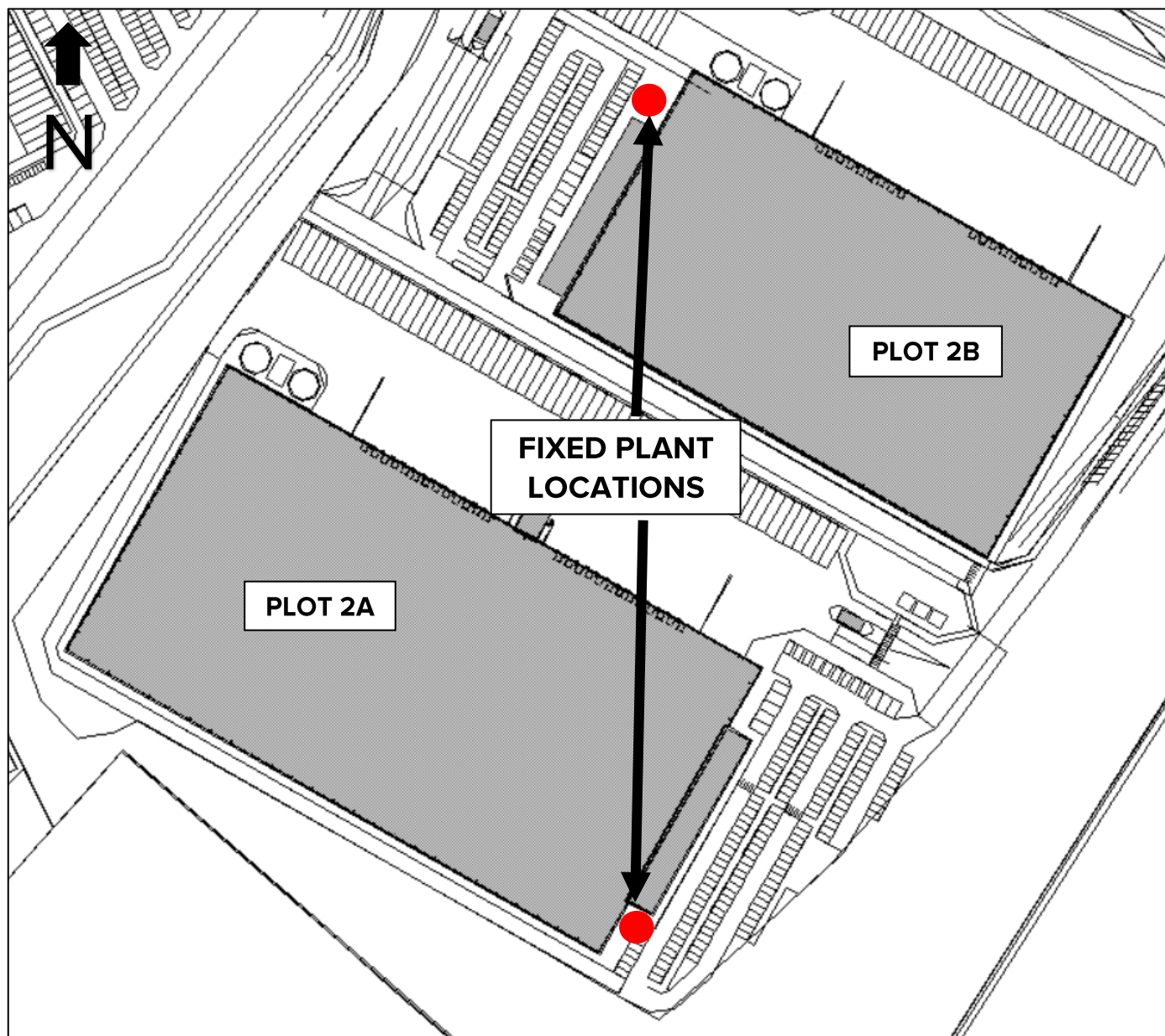
Baseline measurement location L5 Day



Baseline measurement location L5 Night



APPENDIX D – FIXED PLANT LOCATIONS



APPENDIX E – CONTRIBUTIONS FROM INDIVIDUAL PLOTS

The contributions towards the predicted specific noise levels at the receptor from the mechanical plant associated with each plot (2A and 2B) are set out in the Tables below.

Table 8 Daytime Contributions

Receptor Location	Rating Level (LAr, 1 hour dB)	Plot 2A Contribution (LAr, 1 hour dB)	Plot 2B Contribution (LAr, 1 hour dB)
O1	12	0	12
O2	19	0	19
O3	27	2	27
O4	10	10	0
O5	25	25	0
O6	0	0	0
O7	11	0	11

Table 9 Night-time Contributions

Receptor Location	Rating Level (LAr, 15 mins dB)	Plot 2A Contribution (LAr, 15 mins dB)	Plot 2B Contribution (LAr, 15 mins dB)
O2	20	0	20
O3	32	3	32
O4	20	20	0
O5	26	26	0
O6	0	0	0
O7	13	0	13

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