

LAND WEST OF SHEFFIELD ROAD, HOYLAND, BARNSELEY

NOISE IMPACT ASSESSMENT

VC-103210-EN-RP-0001

R00

16TH JUNE 2020



VANGUARDIA

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1. INTRODUCTION

- 1.1. Vanguardia has been instructed by Newlands Development Ltd to undertake a noise impact assessment to support a hybrid planning application for a development involving employment uses (B1, B2 and B8). Additionally, the proposals include a new link road and associated works including provision of internal access roads, drainage and landscaping on land to the West of Sheffield Road in Hoyland, Barnsley.
- 1.2. The hybrid application includes:
 - Outline with all matters reserved apart from means of access for up to 71,515 sq.m of B1, B2 and B8 employment uses.
 - Full application for 31,571 sq.m of B8 employment use, a new link road including a new roundabout to link with the Hoyland South Masterplan Area (Local Plan references HS68, HS65, HS61, HS58, HS6, SL5)
- 1.3. This report provides a description of the proposed development, discusses the relevant national and local planning policy, presents the results of the noise survey and approach to the assessment of potential noise impacts and effects from the various sources of noise associated with the development. This report also details the results of the assessment and any required mitigation measures, which have been identified in order to comply with national and local policy requirements.
- 1.4. To assist with the understanding of this report, a glossary of acoustic terms is provided in Appendix A.

2. SITE AND PROPOSED DEVELOPMENT

CURRENT ENVIRONS

- 2.1. The proposed development site is located west of Sheffield Road, Hoyland, Barnsley. The land is currently used for mixed agricultural and livestock farming.
- 2.2. With regard to the area surrounding the masterplan site, adjacent to the western boundary is the M1 motorway, with junction 36 and the associated highways to the north west of the proposed development. To the east of the application site are residential properties in Hoyland. The A6135 (Sheffield Road) is situated between the application site and the Hoyland residences. Hoyland Common Primary School is situated to the north east of the application site with a number of residences to the west of Sheffield Road, on Tankersley Lane.

PROPOSED DEVELOPMENT

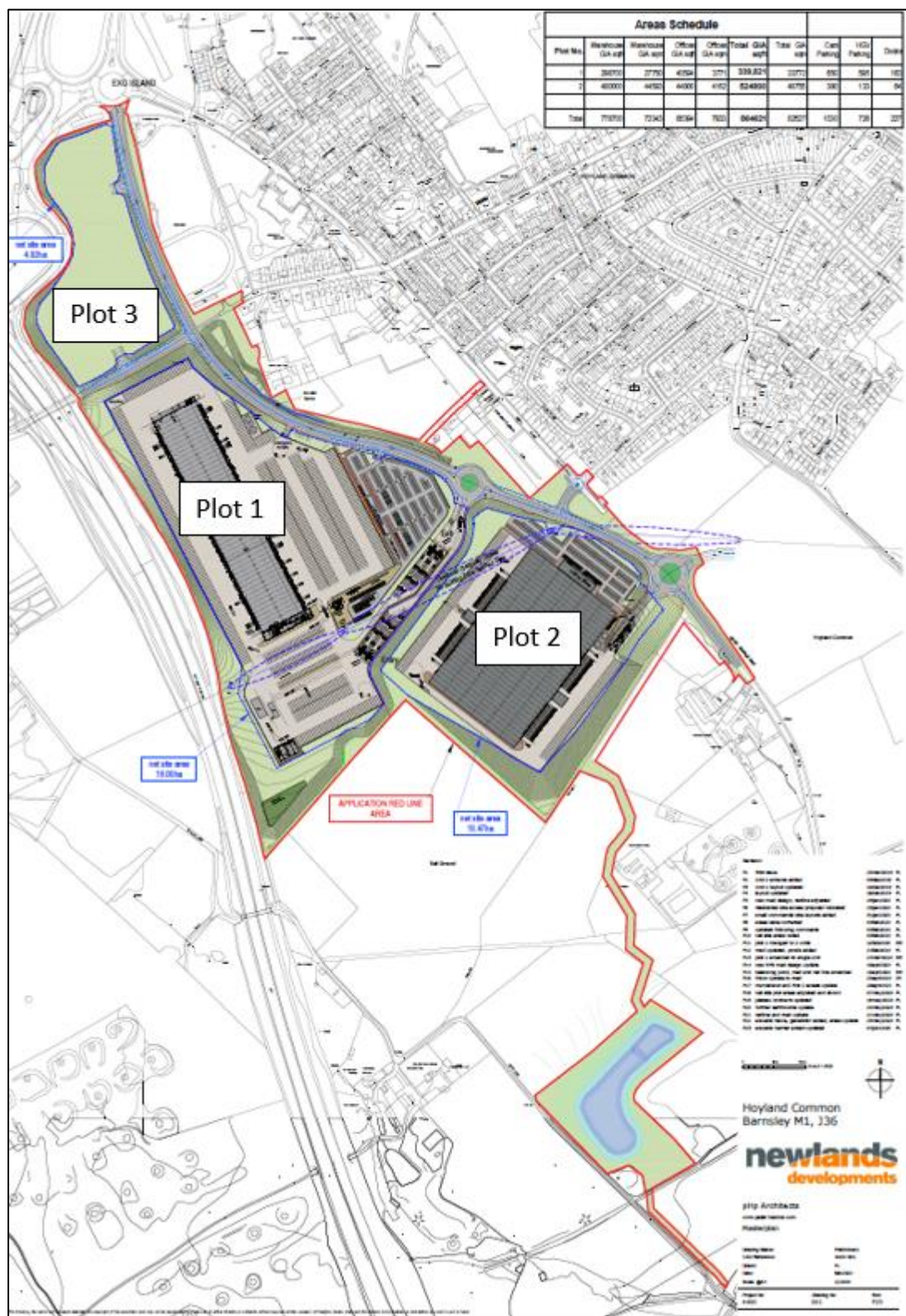
- 2.3. As described above, this assessment supports a hybrid planning application, but with a full detailed application for plot 1 which is to be operated by Hermes. That site will be used as a major distribution hub operating 24 hours a day.
- 2.4. Plot 1 is located to the centre of the wider outline application site and consists of 31,568 sq.m of B8 use warehousing. The site layout of this individual plot is presented below in Figure 1.

Figure 1 Location of Plot 1



2.5. The outline development includes the construction of up to 71,515 sq.m of commercial warehousing which would be a mixture of B1 business, B2 industrial and B8 distribution/logistics. The proposed masterplan of the outline application that the assessment has been based upon is presented below in Figure 2.

Figure 2 Proposed outline development masterplan



2.6. For this assessment, the noise impact was determined from three plots within the masterplan site. These were the Hermes site within the centre of the masterplan area (plot 1), plot 2 towards the south of the site and plot 3 to the north.

2.7. The proposed development has the potential to generate noise effects from the following sources:

- Ground works and construction of the proposed development;
- Changes in road traffic flows on the surrounding road network outside of the site boundary;
- Operational activities within the site, including vehicles travelling on the internal access roads, HGV manoeuvres and loading/unloading in the service yards; and
- Mechanical services plant associated with the proposed units.

3. NATIONAL AND LOCAL POLICY

NATIONAL PLANNING POLICY FRAMEWORK 2019 (NPPF)

3.1. The NPPF was first published in 2012, with the latest revision being issued in June 2019. It sets out the Government's planning policies for England and how these are expected to be applied.

3.2. Paragraph 180 of the NPPF states that:

"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:

- 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;..."

3.3. The NPPF refers to the Noise Policy Statement for England (NPSE) 2010 for advice on the implementation of this policy.

NOISE POLICY STATEMENT FOR ENGLAND (NPSE) 2010

3.4. The NPSE is the overarching Government policy on noise. It seeks to clarify the underlying principles and aims in past and existing policy documents, legislation and guidance in relation to all forms of noise including environmental noise, neighbour noise and neighbourhood noise (but not noise in the workplace).

3.5. It uses the established concepts of No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL). The NPSE 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 occur. However, the explanatory note to the NPSE states that it is not possible to identify a single objective value to define SOAEL for noise 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.

3.6. The NPSE sets out the following noise policy aims, 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.

3.7. The second aim of the NPSE refers to noise impacts that lie somewhere between LOAEL and SOAEL. The NPSE asserts that, while this means that 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)

- 3.8. 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.
- 3.9. The hierarchy table 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.

LOCAL POLICY AND CONSULTATION

- 3.10. Policy GD1 General Development of the Barnsley Council Local Plan (2019) sets out 10 policy targets, the two relevant to this assessment are reproduced below:

Proposals for development will be approved if:

There will be no significant adverse effect on the living conditions and residential amenity of existing and future residents.

Any adverse impact on the environment, natural resources, waste and pollution is minimised and mitigated.

- 3.11. The local plan also states in paragraph 6.9

We will assess impact on living conditions and residential amenity in relation to:

Noise, smell, dust, vibration, light, air, surface water, groundwater or other pollution and disturbance from any proposed activity, including traffic related noise and the comings and goings of visitors to premises particularly when late evening activity is involved. Planning conditions will be used to control the construction process.

-
- 3.12. Liaison occurred with the Barnsley Council environmental health team regarding the proposed methodology, including monitoring locations, for the baseline survey and it was confirmed that they were suitable.

4 . A S S E S S M E N T M E T H O D O L O G Y

- 4.1. In general, the method of prediction and assessment for each of the noise sources associated with the proposed development are different. The assessment methodologies used for each element are described below.

CONSTRUCTION NOISE & VIBRATION

- 4.2. The potential noise effects of construction works at the proposed development site have been predicted at the nearest noise sensitive receivers (highlighted in Para 4.42). This assessment has been based on preliminary estimates of construction plant and machinery that would be used for site activities, using the methodology contained within Annex F of the British Standard BS 5228-1:2009+A1:2014¹.
- 4.3. BS 5228-1:2009+A1:2014 provides several methodologies to determine the significance of noise from construction activities. The noise values detailed in Annex E of the standard have been adopted for this assessment, which advocate that between 07:00 and 19:00 hours, the noise level from construction works outside the window of the occupied room closest to the site boundary should not exceed:
- 70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise; and
 - 75 decibels (dBA) in urban areas near main roads in heavy industrial areas.
- 4.4. It has been assumed that these values are stated in terms of the $L_{Aeq,T}$ noise level (see the glossary in Appendix A for further details).
- 4.5. The site is located close to the M1 Motorway, and therefore the acoustic environment of the surrounding area is dominated by the resulting road traffic noise. Consequently, the value of 75 dBA has been adopted for the receptors close to the motorway. For all other receptors, a value of 70 dBA has been adopted.

¹ BS 5228-1:2009 +A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

- 4.6. For the site clearance and earthworks phase the noise level has been predicted for two source positions relative to each receptor to give the potential range of noise levels that might affect each receptor. These include:
- when the activity is around the central area of the site relative to the receptors, which is likely to give the best indication of the typical noise levels considering the size of the site,
 - when the activity is relatively near to the receptors
- 4.7. For all other construction phases, the predicted location of activities related to the construction of the warehouse itself have been restricted to the building footprint. Due to the length of plot 1, predictions have been made for two source positions at each end of the warehousing to give a range of noise levels.
- 4.8. It should be noted that, for the predicted construction noise levels near to the receptors, the result is considered to be particularly worst-case as all of the plant is unlikely to be situated and operating at a particular location for the full construction hours. However, the results have been included to provide context and to provide an indication of the range of levels that might occur at the receptors.

Construction vibration

- 4.9. With regard to construction vibration, typically, for works associated with developments of this type, only piling would be anticipated to result in potentially significant levels of vibration at nearby dwellings. As piling is not expected to be carried out as part of the works, it is considered unlikely that any significant vibration effects would occur as a result. On this basis, construction vibration has not been considered any further in this assessment.

ROAD TRAFFIC NOISE

- 4.10. The potential change in road traffic noise has been predicted using the environmental noise modelling software IMMI, this incorporates the methodology for calculating road traffic noise (CRTN²). This methodology assumes that the modelled residential locations are downwind of the source.
- 4.11. The noise levels arising from a change in road traffic activity have been predicted at the relevant residential locations for the following 'Do Minimum' (DM) i.e. without the proposed development and 'Do Something' (DS) i.e. with the proposed development scenarios:

² Calculation of Road Traffic Noise: 1988

- 2019 Baseline;
- 2029 DM and DS where it is presumed that all plots on the site would be operational;
- 2039 DM and DS representative of the future year approximately 10 years after all plots are operational.

4.12. Traffic data in the form of Annual Average Weekday Traffic (AAWT) flows were provided by Fore Consulting on 15th May 2020. The speed of vehicle movements has been assumed to be the maximum speed limit of the individual roads, to cater for a worst-case scenario. There would be a large increase in HGV traffic due to the proposed development. On this basis, detailed modelling of road traffic noise is considered necessary for the immediate surrounding area.

4.13. The significance of potentially adverse road traffic noise effects has been based on a combination of the change in noise exposure between the DM and DS scenarios, and the resulting noise exposure. The noise exposure thresholds are set out in Table 1. These have been derived from the effects that road traffic noise can have on those affected³ and are expressed in terms of Government policy.

Table 1 Threshold of potential effects of road traffic noise for all residential modelling locations

Effect	Time period	Threshold value ($L_{Aeq,T}$) ^{a,b}
LOAEL	Day (07:00-23:00)	50
	Night (23:00-07:00)	40
SOAEL	Day (07:00-23:00)	65
	Night (23:00-07:00)	55

Notes:

^a This is the average daily value at a position one metre from a residential building façade containing a window, ignoring the effect of an acoustic reflection from that façade.

^b For the night-time period of 23.00 – 07.00, the relevant noise indicator is L_{night} .

³ The evidence for using some these values can be found in guidance from the World Health Organisation. Similar values have been used for the assessment of other schemes such as A14 DCO.

- 4.14. If the daytime LOAEL threshold is exceeded, the data in Table 2 sets out how the magnitude of the impact is described taking account of the change in daytime noise exposure and the resulting exposure.

Table 2 Descriptors of magnitude of daytime road traffic noise change

Magnitude of Impact	Between LOAEL and SOAEL	SOAEL or greater
No Change	0	0
Negligible	Up to 2.9 dB(A)	Up to 0.9 dB(A)
Minor	3 – 4.9 dB(A)	1.0 – 2.9 dB(A)
Moderate	5.0 – 9.9 dB(A)	3.0 – 4.9 dB(A)
Major	10.0 dB(A) and over	5.0 dB(A) and over

- 4.15. Whether or not a significant adverse effect is expected to occur is determined by comparing the predicted noise level (with the Proposed Development) with the LOAEL and SOAEL values shown in Table 1, and also considering the increase in noise due to the Proposed Development. If the result for any property falls in the categories shown by the shaded boxes with text in bold in Table 2, that indicates that the property is regarded as experiencing a significant adverse effect with respect to Government policy due to an increase in road traffic noise during the daytime period.
- 4.16. If the night-time LOAEL threshold is exceeded, the data in Table 3 sets out how the magnitude of the impact is described taking account of the change in night-time noise exposure and the resulting exposure.

Table 3 Descriptors of magnitude of night-time road traffic noise change

Magnitude of Impact	Between LOAEL and SOAEL	SOAEL or greater
No Change	0	0
Negligible	Up to 0.9 dB(A)	Up to 0.9 dB(A)
Minor	1 – 2.9 dB(A)	1.0 – 2.9 dB(A)
Moderate	3.0 – 4.9 dB(A)	3.0 – 4.9 dB(A)
Major	5.0 dB(A) and over	5.0 dB(A) and over

- 4.17. Whether or not a significant adverse effect is expected to occur is determined by comparing the predicted noise level (with the proposed development) with the LOAEL and SOAEL values shown in Table 1, and also considering the increase in noise due to the proposed

development. If the result for any property falls in the categories shown by the shaded boxes with text in bold in Table 3, that indicates that the property is regarded as experiencing a significant adverse effect with respect to Government policy due to an increase in road traffic noise during the night-time period.

- 4.18. CRTN calculates road traffic noise levels in terms of the $L_{A10,18h}$ index. In order to compare these results to the noise exposure thresholds for the night-time period, the $L_{A10,18hr}$ values have been converted to L_{night} values using method 3 of the Defra commissioned report by TRL/Casella Stanger⁴.

⁴ Method for Converting the UK Road Traffic Noise Index $L_{A10,18h}$ to the EU Noise Indices for Road Noise Mapping, TRL/Casella Stanger for Defra (2006)

OPERATIONAL NOISE

- 4.19. The primary sources of operational noise from the proposed development are identified as HGV manoeuvres and associated loading/unloading activities within the service yards.
- 4.20. With regard to the prediction of noise from these sources, an acoustic model of the proposed development and the surrounding area, including topography, has been constructed using the environmental noise modelling software IMMI. Predictions of noise from HGV activities in the service yards have been modelled as point sources using the methodology described in ISO 9613-2:1996⁵.
- 4.21. Plot 1 will be occupied by Hermes, who will use the site as a distribution centre operating 24 hours a day. Other plots on the masterplan site currently do not have an occupier but a provision for day and night time operations has been included in this assessment.
- 4.22. Hourly HGV profile movements were provided by Fore Consulting on 15th May 2020. Figures for the Hermes plot (plot 1) are based on a similar Hermes site based in Rugby, Warwickshire, but scaled to the proposed size of this site. Vehicle movements for the projected plots as part of the outline application were predicted using the TRICS database. To cater for a lack of night time data provided by this database, night time flows relating to similar daytime HGV movements from Vanguardia's database were used to consider the potential impact of night time operation of Plot 2 (to the south of the masterplan)
- 4.23. Table 4 below presents the estimated peak hour of two-way HGV movements for the day and night periods from each plot.

Table 4 Peak two-way HGV movements

Plot number	Daytime (07:00-23:00)	Night-Time (23:00-07:00)
Plot 1 (Centre of site)	97	92
Plot 2 (South of site)	37	17
Plot 3 (North of site)	15	1

⁵ ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of calculation, ISO (1996)

4.24. The model considers the likely number of manoeuvres (i.e. an HGV reversing into the service yard and pulling out of the service yard) and loading/unloading activities taking place within the peak hour of the day and night period. Octave frequency band source levels for these activities have been taken from Vanguardia's measurement library and, where the activity takes place for less than the duration of the assessment period, the levels have been corrected to take account of their duration, or on-time. Table 5 below presents the octave frequency band sound power levels used in this assessment

Table 5 HGV Source terms

Activity	Sound Power Levels Lw (dB) in each octave band (Hz)								LwA (dB)
	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	
HGV Reverse	101	94	94	91	94	95	84	79	99
HGV Start-up & Pull away	107	101	98	97	97	94	87	78	101
HGV Load	90	89	90	89	86	83	79	73	91
Cab picking up trailer (Lmax)	113	106	107	108	108	107	102	92	113

4.25. For the daytime assessment period It has been assumed that manoeuvres take 42 seconds to complete and loading/unloading takes 1 hour. For the night-time assessment period the same assumptions apply to manoeuvres, but no on-time correction is applied to loading/unloading as this is likely to overrun the 15-minute night-time assessment period.

4.26. The on-time correction applied to each HGV activity have been presented for the day and night time periods below in Table 6.

Table 6 Details of HGV on time correction for service yard activities

Activity	Daytime assessment period (1 hour)		Night time assessment period (15 minutes)	
	Assumed on time (mm:ss)	On Time Correction (dB)	Assumed on time (mm:ss)	On Time Correction (dB)
HGV Reversing with alarm sounding	00:42	-19	00:42	-13
HGV Start up and pull away	00:42	-19	00:42	-13
HGV being loaded or unloaded (dock leveller or forklift)	60:00	0	15:00	0

4.27. In addition to HGV yard loading activities, vehicle movements from the entrance to each plot around the site have been modelled using the methodology for hauls roads set out in BS

5228-1:2009 +A1:2014. In the model these movements use a broadband sound power level of 101 dB based on experience from other sites.

Assessment of operational noise

- 4.28. The likelihood of any adverse effects arising from operational sound has been assessed based on the methodology described in BS 4142:2014+A1:2019⁶.
- 4.29. The standard indicates that certain features can increase the impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are discernible at the assessment location, the standard states that a character correction should be added to the specific sound level to obtain the rating level.
- 4.30. With regard to background sound levels, the standard states that the value used should be typical of that which occurs at the assessment locations during the assessment periods; the objective is not simply to identify the lowest level. Typical background sound levels are usually identified using statistical analysis; see the baseline survey section below for further information.
- 4.31. Once the specific sound level is corrected to the rating level, the representative background sound level is subtracted from the rating level to provide an initial estimate of the impact. The greater the difference, the greater the magnitude of the impact. 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.
 - 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.
- 4.32. The standard states that while the difference between the rating level and the background sound level provides an initial estimate of impact, other factors should be considered in terms of context, such as the absolute noise levels and how the character and level of the source relates to the existing sound environment.

⁶ BS 4142:2014+A1:2019: Method for rating and assessing industrial and commercial sound, BSI (2019)

4.33. Regarding consideration of the absolute levels of sound, the relevant guideline values provided in BS 8233:2014⁷ 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 7 below.

Table 7 Desirable internal levels from 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.

4.34. The values shown in Table 7 above are generally regarded as LOAEL for steady external noise. If the noise has character, a lower value can be regarded as LOAEL.

4.35. 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.”

4.36. To provide an assessment of the potential impact of discrete noise events over the night time period the WHO Guidelines for Community Noise provide a series of recommended noise exposure levels. This document provides a precautionary approach and should be used appropriately.

4.37. The guidelines state that at night, sound pressure levels at the outside facades of living spaces should not exceed 60 dB L_{Amax} more than 10 – 15 times a night so that people may sleep with bedroom windows open. These values have been obtained by assuming that the reduction from outside (façade level) to inside with the windows partly open is 15 dB⁸.

⁷ BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings, BSI (2014)

⁸ Although the WHO published its Environmental Noise Guidelines for the European Region in 2018, they do not cover the impact of maximum values. As such the 1999 Guidelines are still valid for that aspect of the noise impact.

MECHANICAL PLANT

- 4.38. While any fixed mechanical plant installed as part of the proposed development (e.g. used for ventilation or cooling) is considered to be a component of operational sound, the specific mechanical units, locations and operational details can only be identified when the commercial unit occupiers and their requirements are known. Therefore, no assessment has been made of the noise arising from such sources in this assessment. As well as careful consideration of the selection and location of any plant, specific mitigation measures such as local screening, enclosures and in-duct attenuators can also be implemented as required.
- 4.39. On this basis, it is considered that noise from fixed mechanical plant can be covered by a suitable planning condition; this will require an assessment to be submitted once details of the proposed plant installation are known, demonstrating that any noise emissions will comply with national and local policy.

NOISE SENSITIVE LOCATIONS

Traffic Noise

4.40. The potential effects due to traffic noise have been considered at several residential dwellings in the area where there will be changes to the volume of road traffic.

4.41. The residential receptor locations for traffic noise are presented in the following table and figure. A modelled height of 1.5m representative of ground floor (GF) windows has been used for the day-time period and a height of 4.5m, representative of first floor (FF) windows, has been used for the night time period, unless the property has no first floor (e.g. location T2).

4.42. Table 8 below lists the receptors assessed for traffic noise and Figure 3 presents the location of the receptors relative to the proposed development site.

Table 8 List of road traffic residential modelling locations

Residential Modelling Location		Height (m)
T1	Sheffield Road / Regent Street GF	1.5
	Sheffield Road / Regent Street FF	4.5
T2	Hoyland Common Primary School	1.5
T3	Sheffield Road Crossroads GF	1.5
	Sheffield Road Crossroads FF	4.5
T4	Parkside Road GF	1.5
	Parkside Road FF	4.5
T5	Parkside Farm GF	1.5
T6	Tankersley Lane West GF	1.5
	Tankersley Lane West FF	4.5
T7 (same as O3)	Green Lane Farm GF	1.5
	Green Lane Farm FF	4.5

Figure 3 Traffic noise residential modelling locations



4.43. According to Barnsley Council's Local Plan (2019) the Green Lane Farm receptor (T7) sits within committed residential development land (ref HS57) so for the purposes of this assessment receptor T7 (and O2 for the operational assessment below) is also considered representative of a potential future residential development at this location.

Operational noise

4.44. With regard to operational noise, the potential effects have 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.

4.45. The modelling locations used for the operation noise assessment are presented in Table 9 and relative to the masterplan site in Figure 4 below. To provide a robust assessment the most exposed façade of the building has been considered.

Table 9 List of operational sound residential modelling locations

Residential Modelling Location		Height (m)
O1	Hoyland Common Primary School GF	1.5
O2	Green Lane Farm GF	1.5
	Green Lane Farm FF	4.5
O3 (same as T7)	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

4.46. 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).

Figure 4 Operational noise modelling locations



4.47. The operational noise receptors have also been used for the construction noise assessment as they reflect the nearest sensitive receptors most likely to be affected by the proposed works.

5 . B A S E L I N E C O N D I T I O N S

5.1. 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 to characterise and quantify the existing noise environment.

5.2. 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 5 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 5 Location of baseline noise survey measurements



- 5.3. 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.
- 5.4. 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.

- 5.5. 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

- 5.6. 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.
- 5.7. 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 (18Kmph). It is noted that generally the wind direction was south westerly with the exception of one day where 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.
- 5.8. Following the principles of BS 4142-2014+A1-2019, the typical noise level has 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.
- 5.9. If the measured data sits relatively evenly around the measured modal (most commonly occurring) value of the data, the modal value is usually considered representative.
- 5.10. However, at some sites, the background sound level is not evenly spread about the modal value. To check if that were the case, the following process was adopted. For the measurements made at each monitoring location, the value of the result was identified for which 75% of the all the measured values were higher. This value is known as the lower quartile. If 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. This means that a robust approach to the consideration of typical background sound levels in the assessment has been followed.

5.11. Based on the method described above, the modal and lower quartile background sound levels for each monitoring position have been presented below in Table 10.

Table 10 Modal and lower quartile background levels used for assessment of operational noise

Monitoring location	Daytime (07:00 – 23:00)			Night time (23:00-07:00)		
	Modal (dB LA90)	Lower quartile (dB LA90)	Sensitivity test required?	Modal (dB LA90)	Lower quartile (dB LA90)	Sensitivity test required?
L1	51	52	NO	48	46	NO
L2	56	49	YES	46	46	NO
L3	54	49	YES	45	44	NO
L4	54	47	YES	43	41	NO
L5	51	51	NO	49	44	YES

6. CONSTRUCTION NOISE ASSESSMENT

- 6.1. As discussed above, the noise emissions from the various plant expected to be used for each activity has been predicted at two distances relative to the receptor. The noise levels also take into account the expected on-time of the plant for a typical working day (e.g. how many hours they will be used for), and any specific mitigation measures, which are discussed further below.
- 6.2. It is understood that the draft construction start times are as follows:
- Site clearance and earthworks – October 2020;
 - External works – Mid January 2021;
 - Drainage and substructure – February 2021;
 - Superstructure and envelope – Mid March 2021.
- 6.3. It is Vanguardia's understanding that no piling will be required as part of this development, so has not been included in this assessment.
- 6.4. On weekdays, construction working hours are anticipated to be 07:00 – 18:00 hours, with the construction hours for Saturday being 07:00 – 13:00 hours. The construction work would be carried out under the Considerate Contractors Scheme which aims to minimise the noise impact on nearby receptors.
- 6.5. Construction noise impacts have been considered for the 4 main phases of the development at nearby noise sensitive receivers highlighted in Figure 4. The assumptions with regard to construction activities, indicative items of plant, equipment on times and the number of each item of plant likely to be used during each phase is presented in Appendix E. The source noise levels presented have been taken from BS 5228-1:2009+A1:2014.
- 6.6. The predictions of construction noise for each activity are presented below in Table 11. The ranges stated below for the earthworks phase are from a distance nearby each receptor and to the central position of the site. For all other construction phases, the range is from the closest of the two identified positions at either end of the plot 1 development site. These locations are presented in Appendix E.

Table 11 Predicted construction noise level at the nearest noise sensitive properties.

Phase	Predicted Construction Noise Levels LAeq, 11 hours (dB)						
	O1	O2	O3	O4	O5	O6	O7
Site Clearance & Earthworks	59-67	66-73	58-71	55-68	55-66	57-60	59-62
External Works	52-59	56-65	53-54	50-53	50-53	58-58	57-57
Drainage & Substructure	53-60	57-66	54-55	51-54	51-54	55-59	56-58
Superstructure & Building Envelope	45-52	48-57	46-46	43-46	42-46	47-50	48-50

- 6.7. The construction noise levels at all receptors are predicted to be below the thresholds set out in paragraph 4.5 above. Therefore, no significant adverse effects are expected from the construction works. However, it is recognised, that when the works are particularly close to a receptor, the levels for a shorter period of time may be higher.
- 6.8. The receptor likely to be most affected by the construction works is receptor O2. To minimise the impact of construction noise at this receptor, it is recommended that mitigation described later in this document is prioritised early in the construction phase to minimise the potential impact.
- 6.9. Overall, the construction noise is likely to be audible at most of the receptors from time to time, but any adverse impact and effects will be mitigated and reduced to a minimum by the use of best practicable means, including the prioritisation of the proposed mitigation.

7. TRAFFIC NOISE ASSESSMENT

7.1. The predicted noise levels for the road traffic scenarios modelled are presented in Tables 19-22 in Appendix D. The change in noise level have been determined for the following:

- Difference between 'Do Something' (DS) and 'Do Minimum' (DM) scenarios
- Difference between 2019 Baseline and DS scenarios.

7.2. The purpose of this assessment is to assess the potential impact on noise levels at nearby sensitive receptors as a result of the proposed development, with specific consideration of the change between DS and DM scenarios.

7.3. During the daytime assessment period during the 2029 DS scenario, there would be a minor decrease at 4 receptors, a negligible decrease at 3 receptors, a negligible increase at 3 receptors, and a moderate increase at 2 receptors. The comparison with the daytime 2039 DS scenario and DM shows the same impact magnitude as the 2029 comparison.

7.4. The two receptors that fall within the moderate increase impact are at receptor T7 and when considering the absolute noise level sits between the LOAEL and SOAEL. Therefore, no significant adverse effect is expected to occur.

7.5. During the night-time period, for the 2029 scenario, there is predicted to be a minor decrease at 6 receptors, a negligible decrease at 1 receptor, and a negligible increase at 5 receptors. For the 2039 scenario during the night time assessment period, when considering the change between DS and DM the same result occurs.

7.6. It can be seen from the above that no significant adverse impacts are expected from changes in the road traffic as a result of the development. Furthermore, the impact of the proposed development will result in a reduction in noise levels at the majority of noise sensitive receptors considered in this assessment.

8. OPERATIONAL NOISE ASSESSMENT

- 8.1. As described previously, the potential adverse effects from operational noise at the residential modelling locations have been assessed based on the methodology described in BS 4142-2014+A1-2019. The typical and sensitivity test background sound levels for the day and night-time periods used in the assessment are presented in Table 10.
- 8.2. 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 the sound from the proposed development will have any specifically tonal, impulsive, or intermittent characteristics at the assessment locations to the extent where they will attract attention at the assessment locations. However, it is possible that the operational sound will have features that are readily distinctive during both the day and night-time assessment periods. Therefore, as a precautionary approach, a correction of +3 dB has been applied to predicted operational sound levels to derive the rating level.
- 8.3. The operational noise level from all three plots has been presented as the noise level at all receptors is largely affected by Plot 1, there is only one receptor where the noise level has increased as a result of plot 2 to the south of the site, this is highlighted in the following section.
- 8.4. The predicted rating levels together with the initial estimate of the impact from all three plots within the masterplan site are presented in Table 12 below for the daytime period

Table 12 Predicted noise level from operational noise sources during the day time assessment period (using modal background sound values)

Operational Modelling Location	Residual Level (LAeq, 15 mins dB)	Typical Background (LA90, 15mins dB)	Predicted Specific Noise Level (LAeq, 1 hour dB)	Correction dB	Rating Level (LA _r , 1 hour dB)	Difference (Rating – Background)
O1	53	51	37	3	40	-11
O2	54	56	50	3	53	-3
O3	52	54	44	3	47	-7
O4	49	54	39	3	42	-12
O5	49	54	37	3	40	-12
O6	53	51	35	3	38	-13
O7	53	51	42	3	45	-6

8.5. It can be seen from Table 12 that during the day, the rating level does not exceed the typical modal background sound level at any operational receptor location. As identified in section 5, a sensitivity test has been undertaken of the predicted rating levels at receptors O2, O3, O4 and O5 against the lower quartile background sound levels. This assessment is presented in Table 13 below.

Table 13 Predicted noise level from operational noise sources during the day time assessment (sensitivity test)

Operational Modelling Location	Residual Level (LAeq, 15 mins dB)	Sensitivity Background (LA90, 15mins dB)	Predicted Specific Noise Level (LAeq, 1 hour dB)	Correction dB	Rating Level (LA _r , 1 hour dB)	Difference (Rating – Background)
O2	54	49	50	3	53	+4
O3	52	49	44	3	47	-2
O4	49	47	39	3	42	-5
O5	49	47	37	3	40	-7

8.6. Table 13 shows that for receptors O3, O4 and O5 the operational noise levels are below the sensitivity test background sound values which indicates that the operational noise during the daytime period would have less than a low impact and therefore no adverse effects are likely at these locations. For receptor O2 the sensitivity test indicates that during the daytime the rating level would exceed the background level by 4dB, which according to BS4142 indicates that the impact would be between a low impact and a potentially adverse effect, depending on the context.

8.7. Table 14 below presents the predicted noise rating levels together with the initial estimate of the impact of noise from all three plots within the masterplan site on operational noise sensitive receptors at night.

Table 14 Predicted noise level from operational noise sources during the night time assessment period

Operational Modelling Location	Residual Level (LAeq, 15 mins dB)	Typical Background (LA90, 15mins dB)	Predicted Specific Noise Level (LAeq, 15 mins dB)	Correction dB	Rating Level (LA _r , 15 mins dB)	Difference (Rating – Background) (dB)
O1	49	48	37	3	40	-8
O2	48	46	51	3	54	+8
O3	46	45	44	3	47	+2
O4	44	43	37	3	40	-3
O5	44	43	36	3	39	-4
O6	48	49	37	3	40	-9
O7	48	49	41	3	44	-5

- 8.8. For the night time assessment period, the rating level does not exceed the typical background sound level at O1, O4, O5, O6 and O7, indicating less than a low impact and therefore no adverse effects are likely at these locations.
- 8.9. At O3, the predicted rating level exceeds the typical background sound level by 2 dB which according to BS4142 indicates that the impact would be between a low impact and a potentially adverse effect, depending on the context. This is the only receptor that demonstrated an increase in noise level when compared to noise sources from Plot 1 alone, this increase was +1dB, so overall the noise impact at receptor O3 is similar with or without operational noise sources from plot 2.
- 8.10. At receptor O2 the noise rating level is predicted to increase the modal background sound level by 8dB. BS4142 indicates that the estimated impact falls between an adverse and significant adverse effect. As a result of this predicted noise level, mitigation is proposed, as described in the following section to reduce the impact at this receptor.
- 8.11. The noise level at receptor O3 was the only receptor affected by a plot other than plot 1, increasing the predicted level by 1dB. Concerning the noise impact from plot 1 only, the impact of this increase of 1dB is just above the threshold described as unlikely to give rise to any adverse effects. Similarly, with the projected peak night time values from both plot 1 and plot 2 a rise to 2dB above the background sound level indicates that the impact would be between a low impact and a potentially adverse effect, depending on the context.
- 8.12. BS 4142 states that the initial estimate of impact can be modified based on the context. With regard to the potential adverse effects at O3 during the night-time period, the key assessment location at night would be indoors (i.e. inside bedrooms). Assuming a reduction of 12 dB for

MAXIMUM NOISE LEVELS

- 8.16. The impact of maximum noise levels that may occur during operational activity at night has been considered at various locations around each plot on the overall site. The maximum source noise level was taken from the Vanguardia database and would occur during a reversing manoeuvre of an HGV when the cab couples with the trailer. The predicted maximum noise levels at each receptor location are presented in Table 16 below.

Table 16 Predicted external maximum sound levels from the proposed development

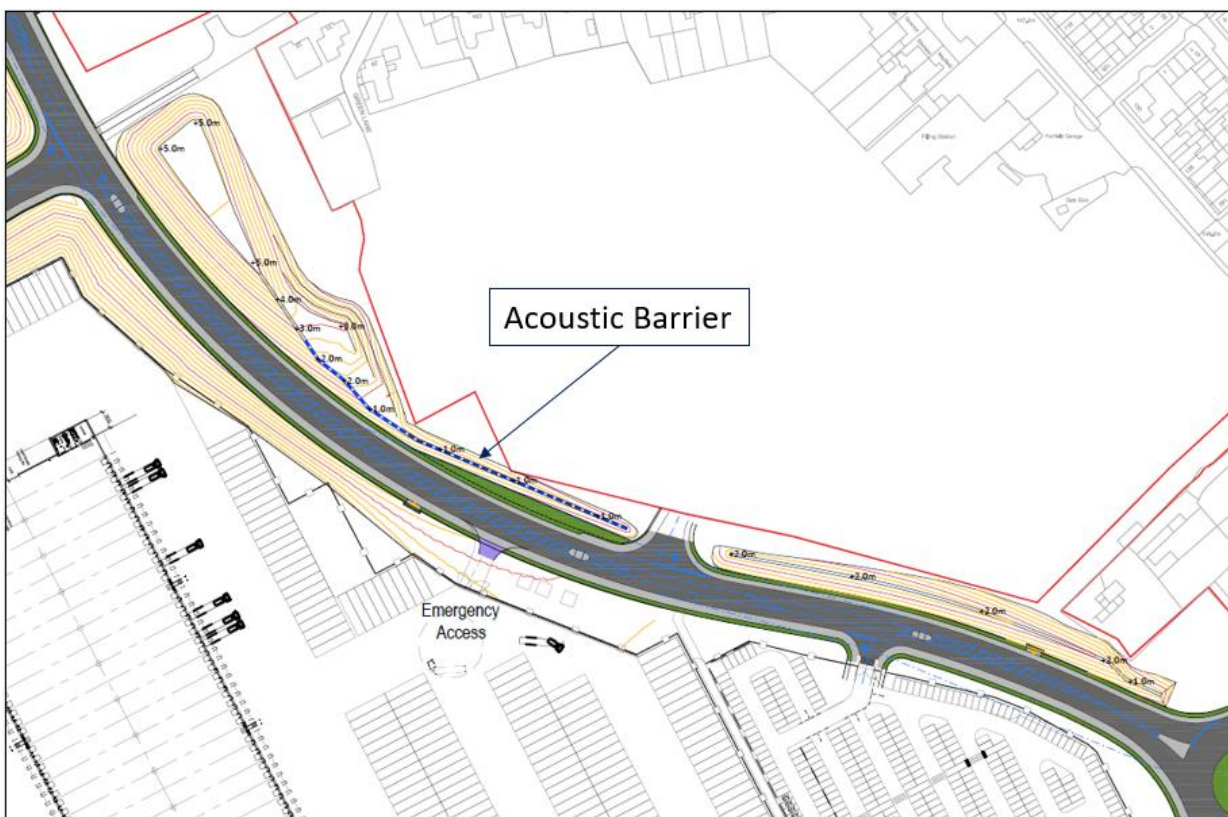
Residential modelling locations	Predicted L _{Amax} (dB) sound level
O1	49
O2	65
O3	53
O4	52
O5	56
O6	45
O7	55

- 8.17. The predicted maximum noise levels at most receptors is below this external criterion level of 60 dB at the façade and therefore no adverse effect due to the maximum levels is expected. The expected impact at Receptor O2 is above this threshold and there is a predicted exceedance of 5dB. As mentioned in paragraph 8.10 above, there is a need for mitigation for this location and this is discussed in the next section.

9. MITIGATION

- 9.1. Due to its proximity to the application site, The Green Farm Lane receptor (identified as T7 for the traffic assessment, O2 for the operational assessment) has the potential to be significantly affected by operational noise from the proposed development. To mitigate the potential adverse impact, the effect of a barrier placed to the east of the new link road has been modelled. Figure 6 below presents the proposed location of the planned mitigation

Figure 6 Proposed mitigation location



- 9.2. The barrier between the development site and the O2 receptor would be made up of bunding which varies in height as the space available to construct a bund permits. Where this is not possible, an acoustic closed boarded barrier with a mass of at least 15 kg/m² would fill in the gaps to provide a constant 4m high barrier.
- 9.3. As mentioned previously, the land where receptor O2 is located is within committed land allocated for residential use in the Barnsley Council's Local Plan (2019). So, mitigation at this location would benefit both the current occupiers of the land and prospective residences in the future.

Traffic noise

9.4. Although the mitigation is not required to manage the traffic noise impact, Table 17 below presents the predicted noise levels at receptor T7 (O2) as a result of the proposed bunding and acoustic barrier.

Table 17 Predicted noise impact on traffic noise levels during the day time with the 4m high barrier

Receptor		2029 DS - 2029 DM				2039 DS - 2039 DM			
		No Mitigation		With Mitigation		No Mitigation		With Mitigation	
		Noise change (dB)	Impact magnitude	Noise change (dB)	Impact magnitude	Noise change (dB)	Impact magnitude	Noise change (dB)	Impact magnitude
T7	Green Lane Farm GF	+5.2	Moderate Increase	-0.7	Negligible Decrease	+5.1	Moderate Increase	-0.8	Negligible Decrease
	Green Lane Farm FF	+5.3	Moderate Increase	-0.1	Negligible Decrease	+5.3	Moderate Increase	-0.1	Negligible Decrease

9.5. Table 17 demonstrates that there is a decrease in noise levels at the Green Lane Farm receptor (T7), the magnitude of impact is predicted to change to a negligible decrease between the DS and DM scenarios. On this basis with the barrier installed, no significant adverse effects are predicted to occur from traffic noise associated with the proposed development.

Operational noise

9.6. Table 18 below summarises the noise impact this barrier is predicted to have on the Green Farm Lane receptor (O2) during the night time assessment period.

Table 18 Comparison of noise level at receptor O2 with the 4m high acoustic barrier.

	Background (LA90, 15mins dB)	Rating level without mitigation (dB)	Rating level with mitigation (dB)	Noise reduction with mitigation (dB)	Difference to background without mitigation (dB)	Difference to background with mitigation (dB)
Daytime (sensitivity test background)	49	53	48	5	+4	-1
Night-time (modal background)	46	54	51	3	+8	+5

9.7. Table 18 shows that during the daytime operational assessment period, the proposed barrier provides a reduction of 5dB at the ground floor Green Farm lane receptor (O2), this reduces

the difference between the sensitivity test and rating level to -1dB. BS4142 indicates that the operational noise during the daytime period would have a low impact at both the modal and sensitivity test value and therefore no adverse effects would be expected.

- 9.8. Table 18 also shows that with the installation of a 4m high barrier, a 3dB reduction is predicted during the night time assessment period at the first floor Green Farm Lane receptor (O2). This reduces the predicted noise level from night time operations to 5dB above the background sound level, BS4142 indicates that the impact of this operational noise level would be an indication of a potentially adverse effect, depending on the context.
- 9.9. As mentioned in paragraph 4.28, BS4142 requires context to be taken into account including the absolute sound level. With the mitigation, the predicted sound level at night during the peak 15 minute period is a rating level of 50 dB. This equates to an internal level of 35 – 38 dB, with windows partially open for ventilation. Table 7 shows the desirable internal level averaged over an 8 hour period is 30 – 35 dB and that these values are regarded as LOAEL.
- 9.10. It is, therefore, expected that over the night period, with the mitigation in place, there would be little to no adverse effect from the overall operational noise.
- 9.11. Furthermore, the proposed barrier also reduces the noise impact from maximum noise level events at receptor O2 by 5dB. This means that the maximum noise levels would be below the 60dB threshold set out in the WHO guidelines for community noise.

10. CONCLUSION

- 10.1. Vanguardia has been instructed by Newlands Development Ltd to undertake a noise impact assessment to support a hybrid planning application including a detailed assessment of a B8 unit and outline application on land to the West of Sheffield Road in Hoyland, Barnsley.
- 10.2. A construction noise assessment has been undertaken based on preliminary estimates of construction plant and machinery likely to be used which has been provided by the appointed contractor. The typical construction noise levels are such that no significant adverse effects are expected at the receptor locations. However, it is recognised, that when the works are particularly close to a receptor, the levels for a shorter period of time may be higher.
- 10.3. The receptor likely to be most affected is receptor O2. To minimise the impact of construction noise at this receptor, it is recommended that construction of the mitigation proposed in this report is prioritised in the construction schedule.
- 10.4. Overall, the construction noise is likely to be audible at most of the receptors from time to time, but any adverse impact and effects will be mitigated and reduced to a minimum by the use of best practicable means, including the prioritisation of the proposed mitigation mentioned above.
- 10.5. The potential noise impacts and effects that may arise as a result of the increase of traffic and ongoing operation of the proposed site have been assessed in accordance with relevant Government and Local Policy.
- 10.6. With regard to the change in road traffic noise that may occur as a result of the proposed development, when considering the change in noise exposure between the DM and DS scenarios and the resulting noise exposure, the assessment indicates that a significant adverse effect is not expected to occur.
- 10.7. The assessment of operational noise indicates that without mitigation during the day, the predicted rating level from the proposed development would not exceed the background sound level at most of the modelled locations and therefore no adverse effects are expected. During the night, the predicted rating levels at most of the modelled locations are also below the background sound level, indicating that no adverse effects are expected; the exceptions to this are highlighted below.
- 10.8. During the daytime operational assessment period without mitigation there is an exceedance of the sensitivity test background sound level at receptor O2.
- 10.9. During the night-time operational assessment period, there are three receptors where the background level is exceeded without mitigation, O2, O3 and O7. At receptor O7 the

sensitivity test background sound level is exceeded by 1dB. The standard describes this as a low impact, and it is considered that the slight exceedance of the sensitivity test background sound level is unlikely to give rise to any adverse effects.

- 10.10. The noise level at receptor O3 was the only receptor affected by a plot other than plot 1, increasing the predicted level by 1dB. Concerning the noise impact from plot 1 only, the impact of this increase of 1dB is just above the threshold described as unlikely to give rise to any adverse effects. The cumulative noise impact from both plots is considered to be between a low impact and a potentially adverse effect, depending on the context. When considering the context, the predicted rating level falls within the internal residential guideline figure of up to 35dB during the night time period. As a result, it is an indication that the impact from cumulative operations from the site will not have a significant adverse effect on receptor O3.
- 10.11. With regard to Receptor O2 during the night time assessment period, without mitigation an increase of 8dB is predicted at the first-floor receptor location, which according to BS4142 indicates that the estimated impact falls between an adverse and significant adverse effect. With the proposed mitigation option this increase is predicted to reduce by 3dB to 5dB above the background sound level, the potential impact would be considered to be a potentially adverse effect, depending on the context. It is considered that in line with the principles set out in the NPPF (2019) this assessment has demonstrated that reasonable steps have been undertaken to mitigate and reduce to a minimum, the potential adverse impact at receptor O2.
- 10.12. The maximum noise levels from operational HGV activities at night have also been considered and with the exception of one receptor are below the relevant threshold for adverse effects. The mitigation also reduces the maximum noise level impact by 5dB reducing it below the 60dB threshold set out in the WHO guidelines for community noise.
- 10.13. It is concluded that the operation of the proposed development is unlikely to result in any significant adverse noise effects at the assessment receptors and this complies with all relevant national and local planning policy requirements regarding noise.

APPENDIX A – ACOUSTIC GLOSSARY

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).

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).

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).

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.

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.

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:

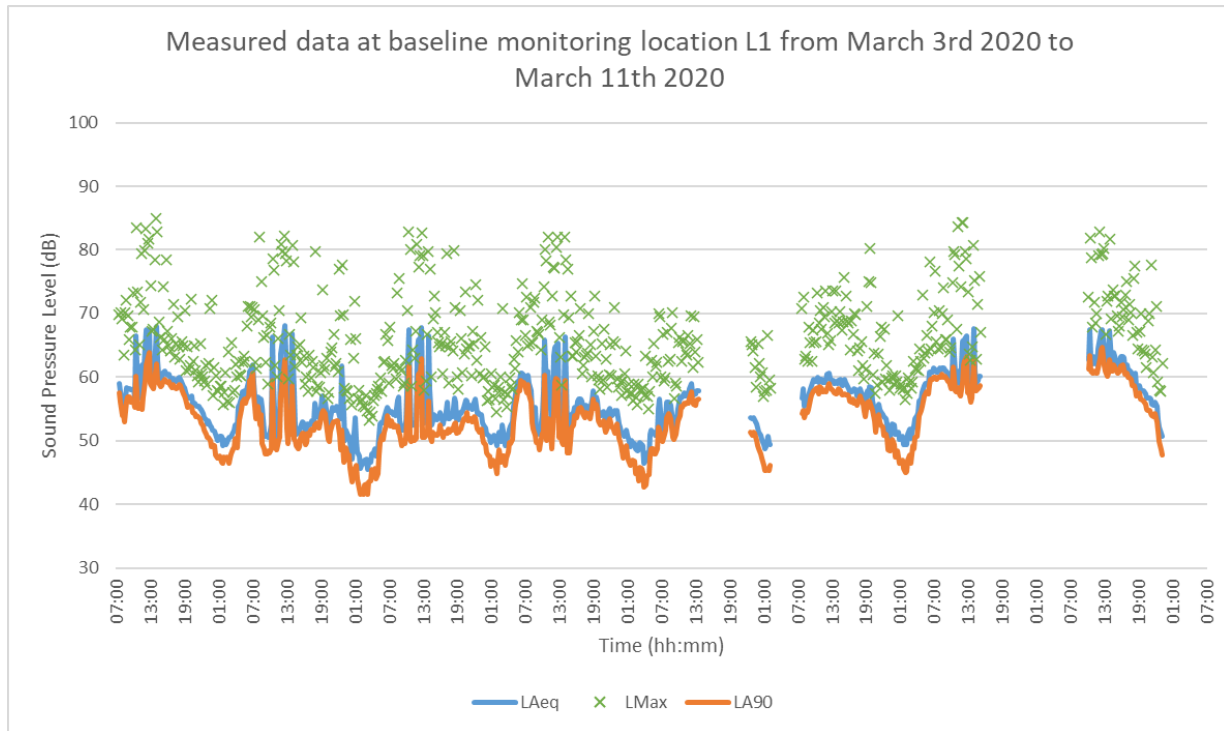
Set up: Vince Parker (MIOA)

Collection: Vince Parker (MIOA)

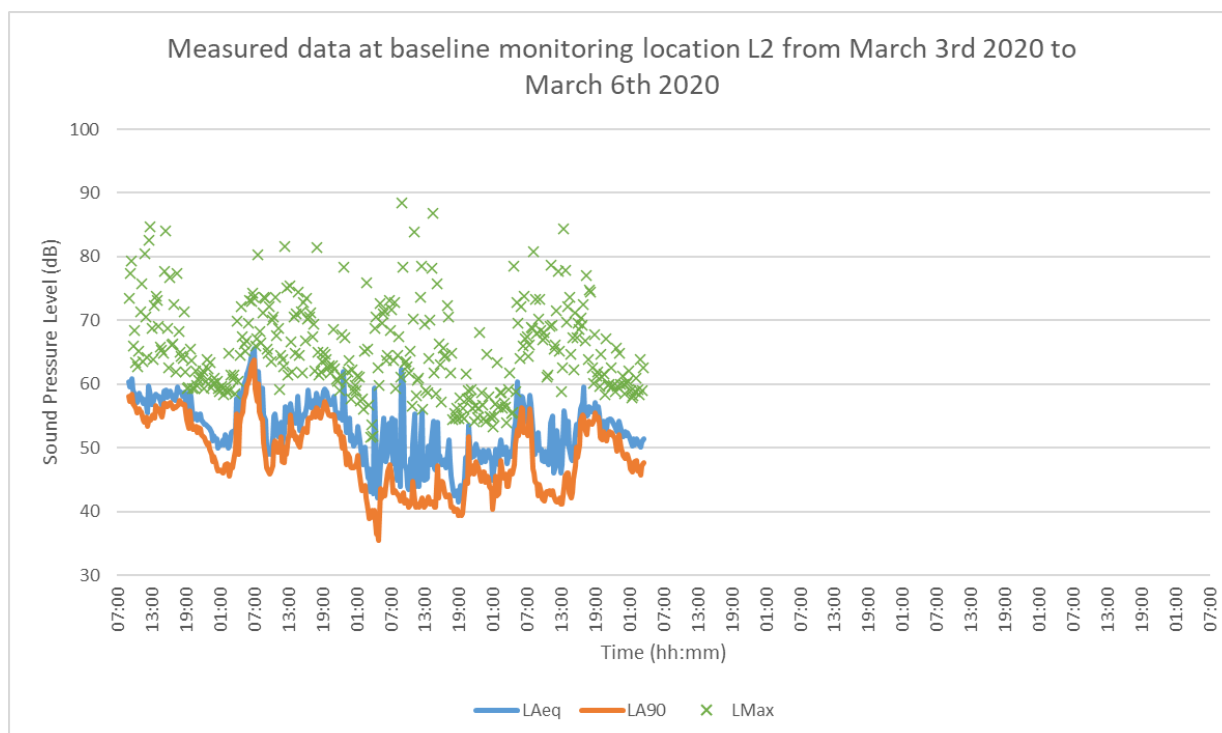
MEASURED DATA

The measured data from each baseline measurement location are presented below

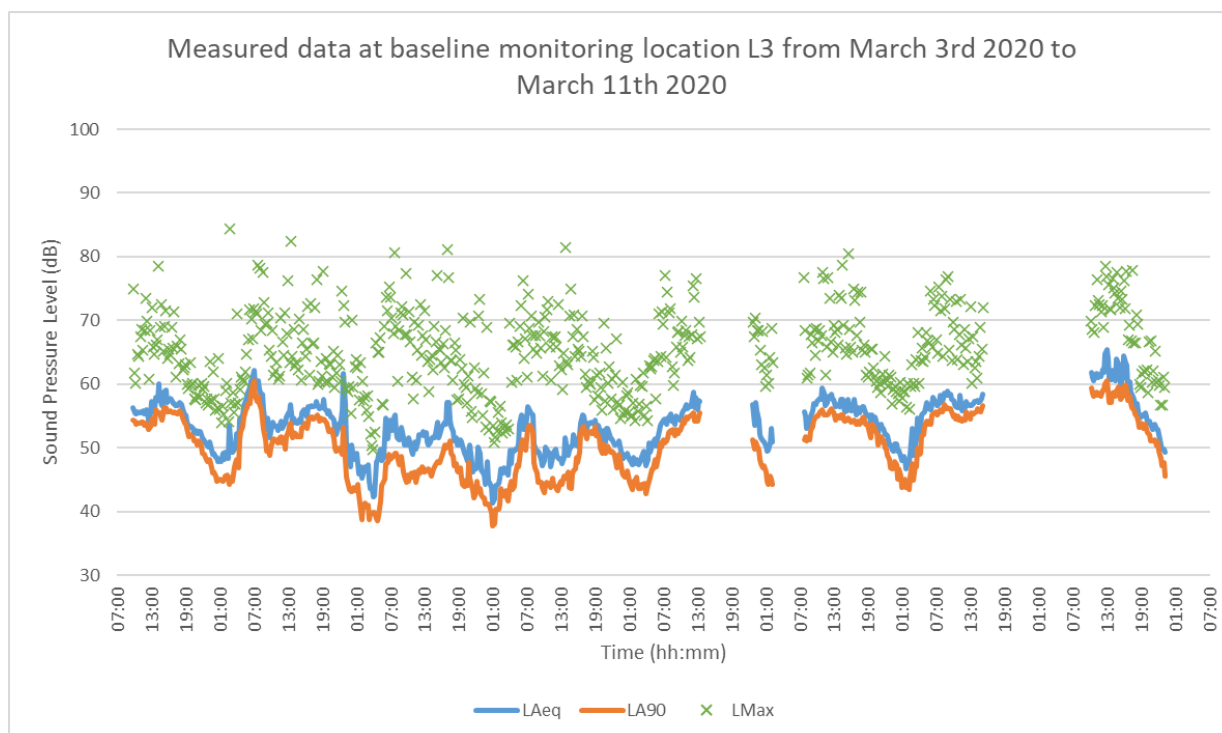
Baseline measurement location L1



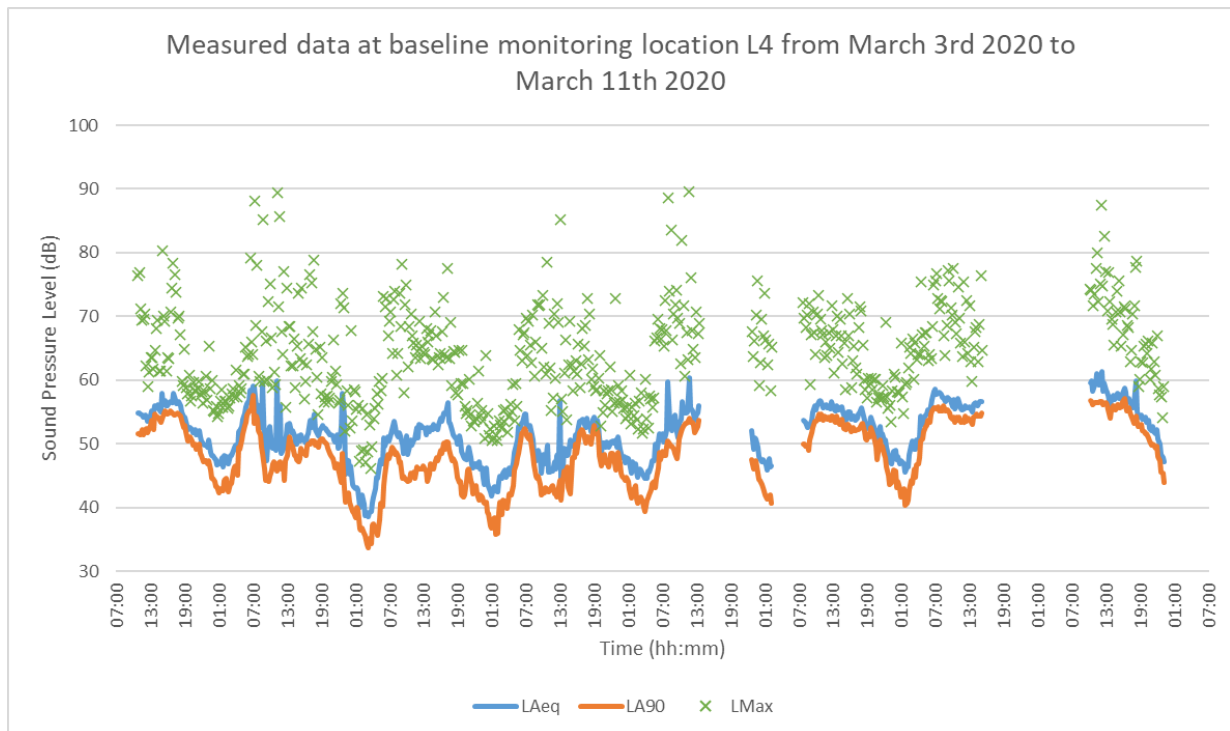
Baseline measurement Location L2



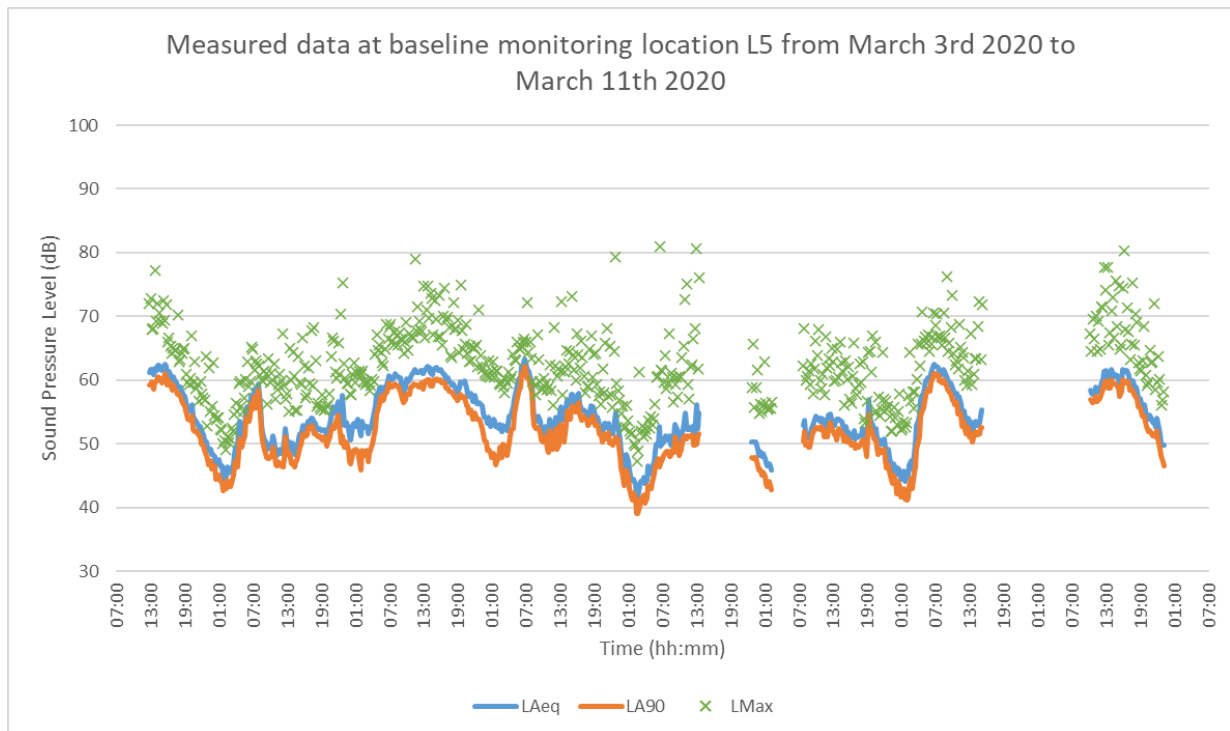
Baseline measurement Location L3



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

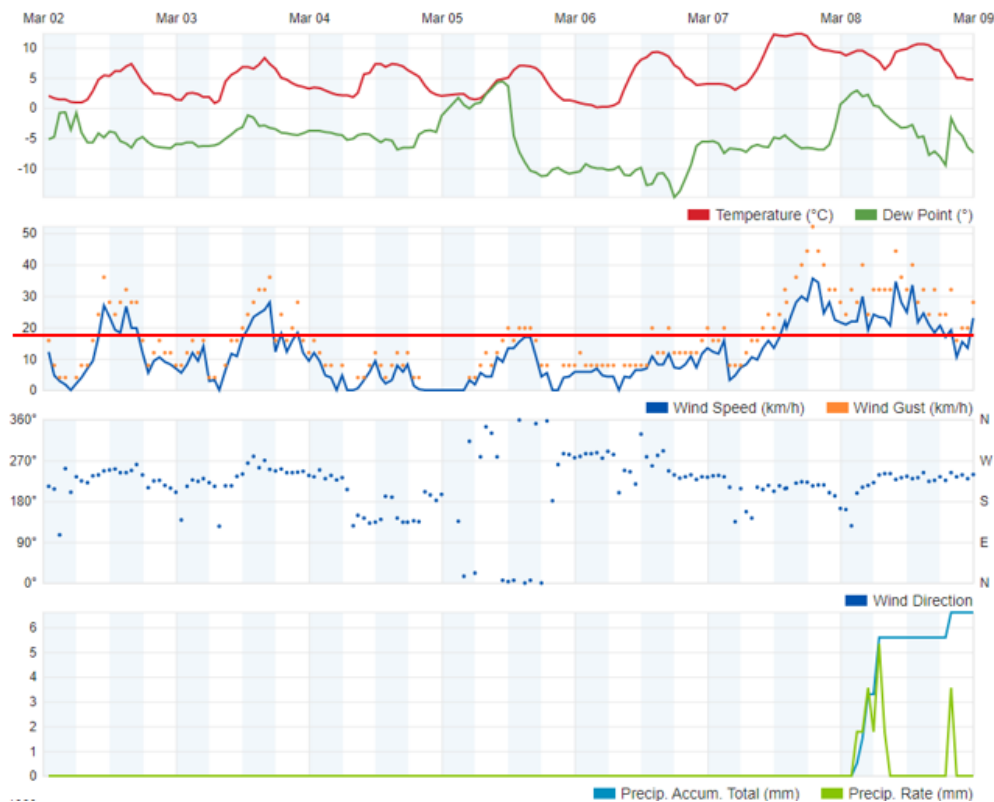
Date	Temp (°C)			Wind Speed (kmph)		Wind Direction N,E,S,W	Precipitation (mm)		
	High	Low	Average	High	Average		Total amount	Rain From	Rain To
03/03/2020	8	1	4	30	8	W	0	-	-
04/03/2020	9	0	4	13	1	W	0	-	-
05/03/2020	8	0	3	16	2	NNE	0	-	-
06/03/2020	9	-1	4	11	2	WNW	0	-	-
07/03/2020	13	3	8	27	4	WSW	0	-	-
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 IBARNSE14, IROTHERH19 and IECCLESF2 on April 22nd 2020.

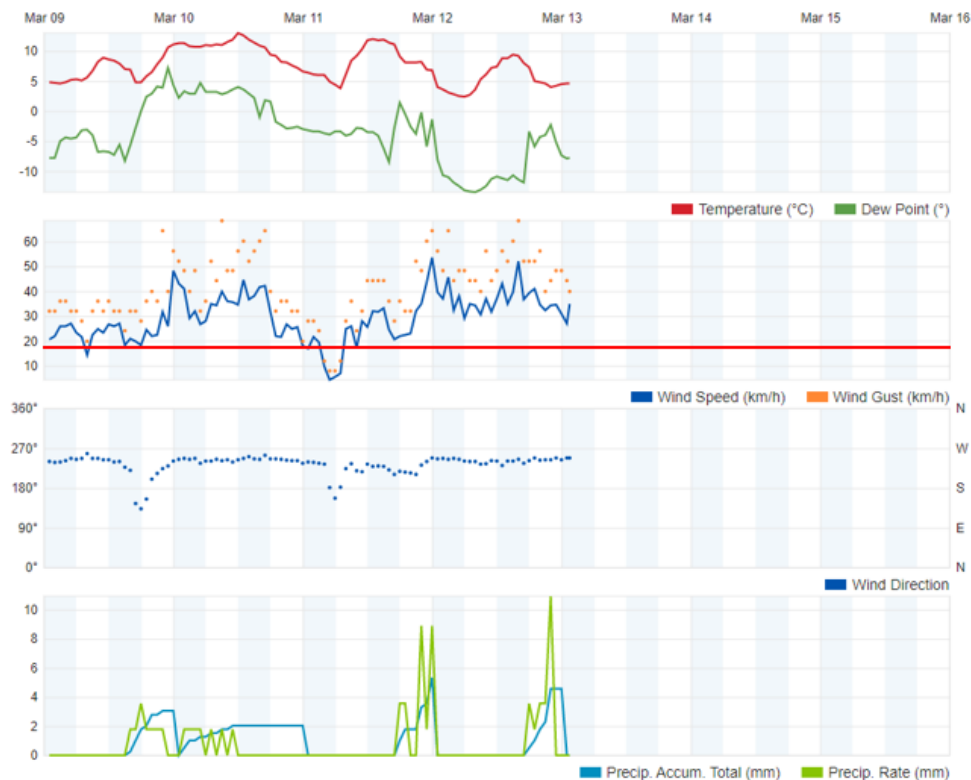
Graphs of the weather data from the three weather stations are presented below:

Weather conditions from IBARNSE14 weather station

March 2, 2020 - March 8, 2020

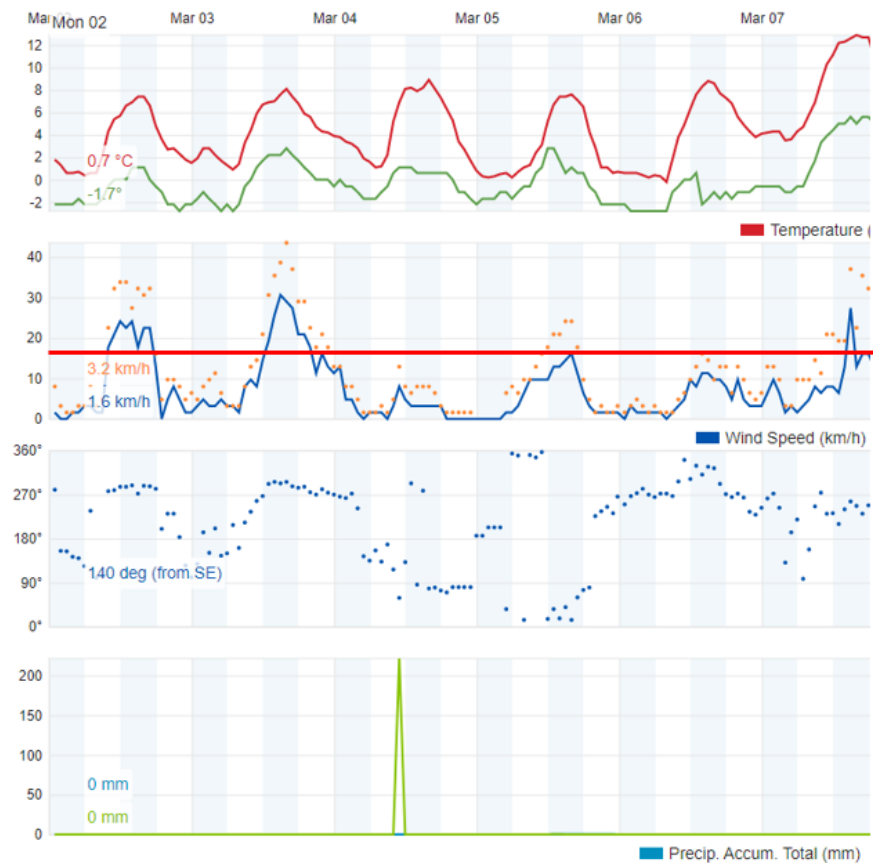


March 9, 2020 - March 15, 2020

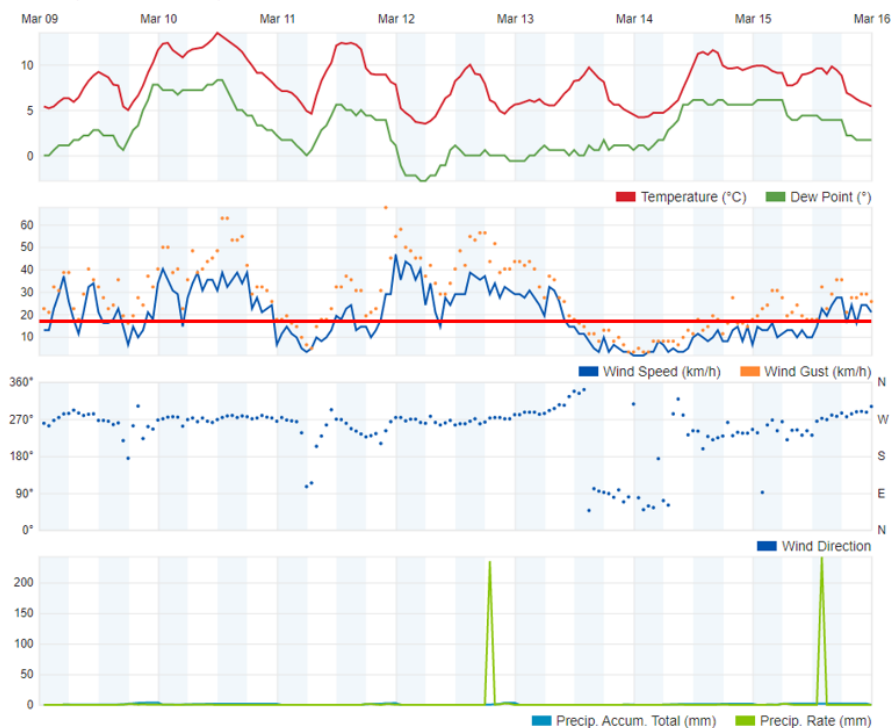


Weather conditions from IROTHERH19 weather station

March 2, 2020 - March 8, 2020

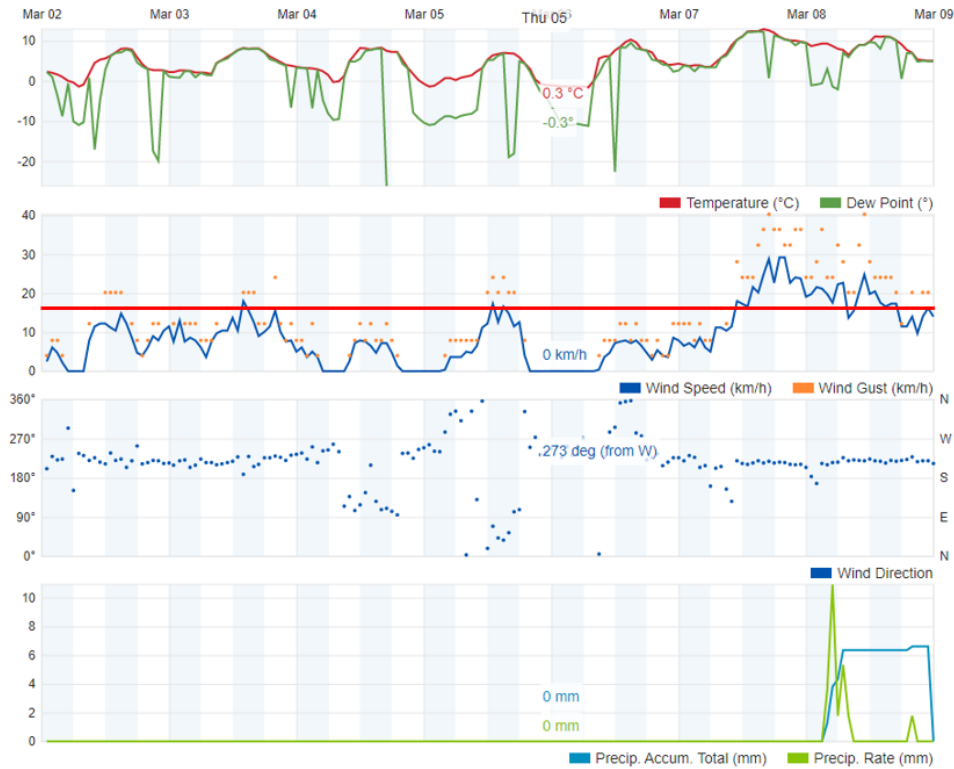


March 9, 2020 - March 15, 2020

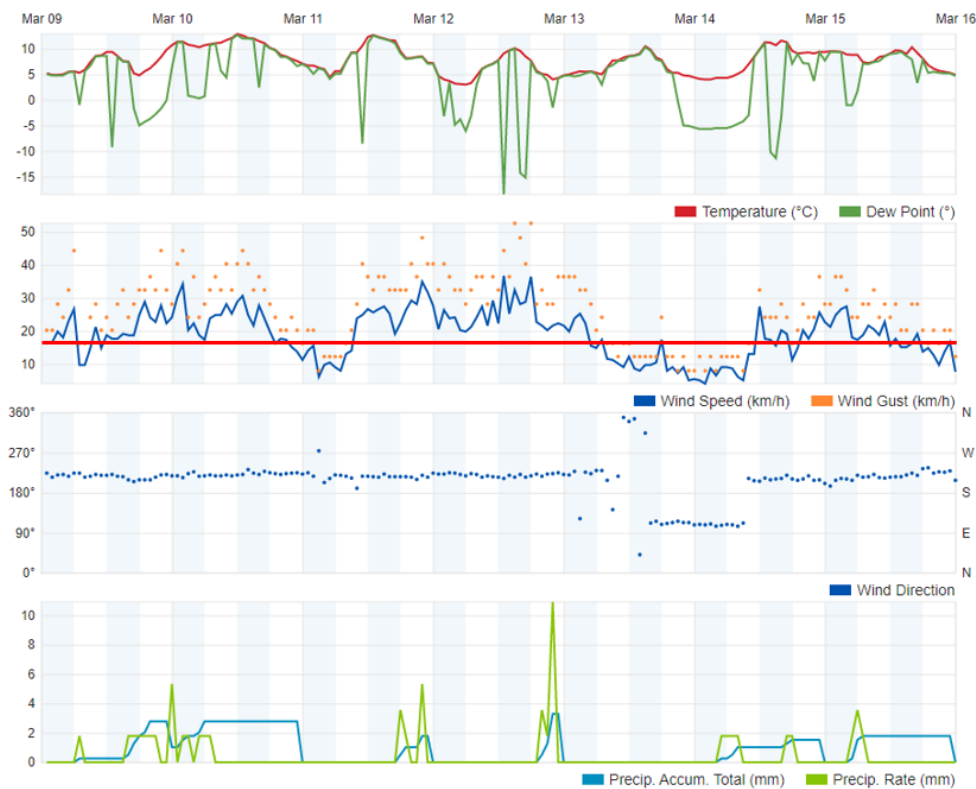


Weather conditions from IECCLESF2 weather station

March 2, 2020 - March 8, 2020



March 9, 2020 - March 15, 2020



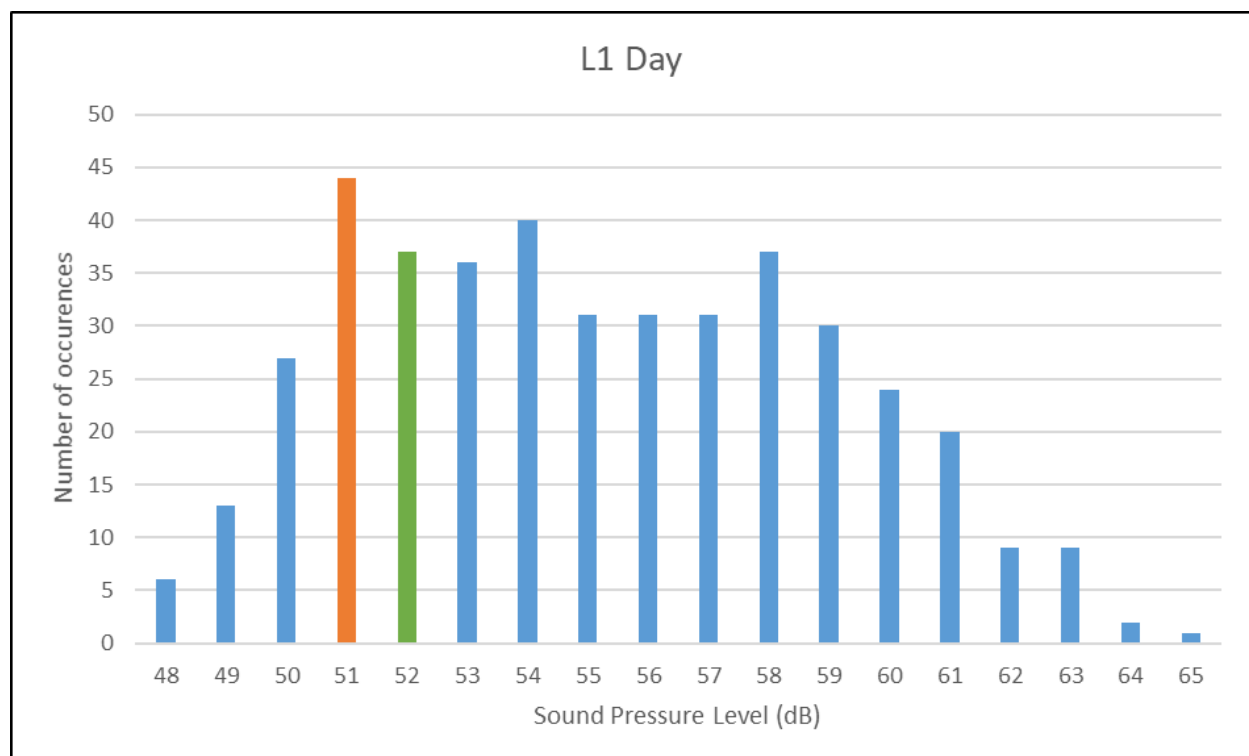
APPENDIX C – STATISTICAL ANALYSIS OF BACKGROUND SOUND LEVELS

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.

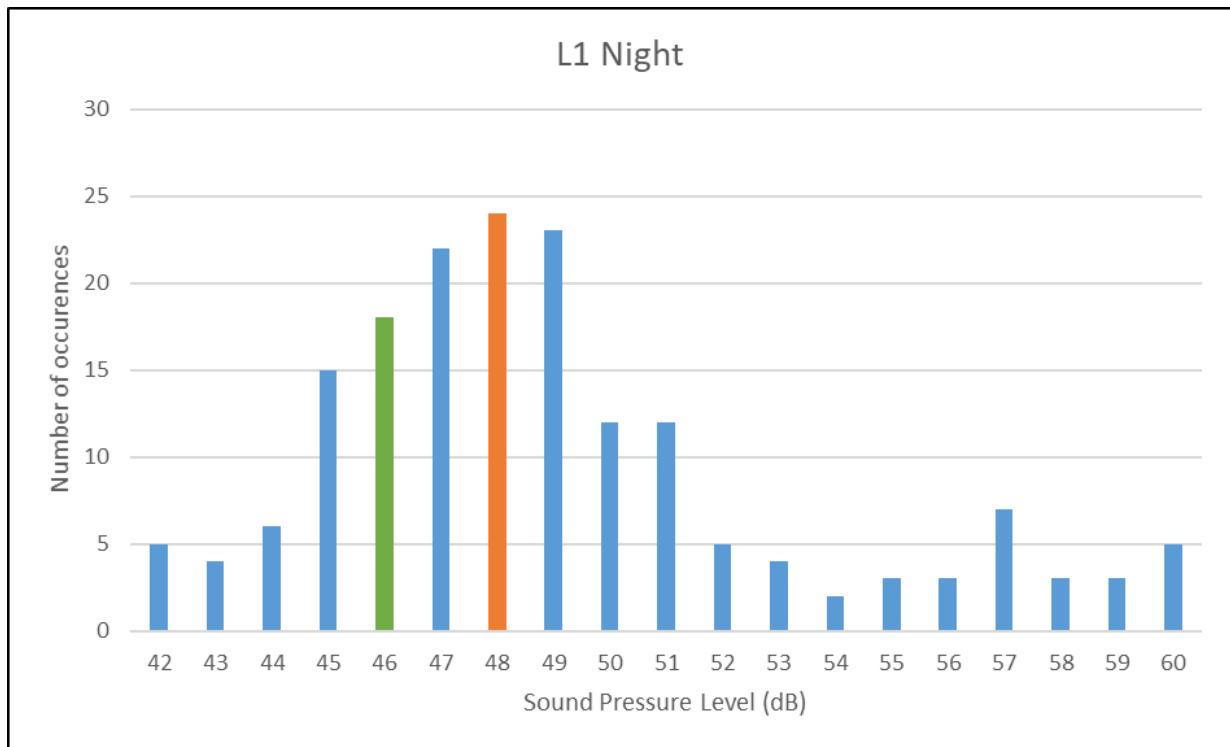
Note that where the lower quartile value was more than 2 dB(A) below the modal value, this was considered an indication that there was unevenness in the distribution of the background sound level. In those cases, the lower quartile value was used as a sensitivity test in the operational sound assessment, 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.

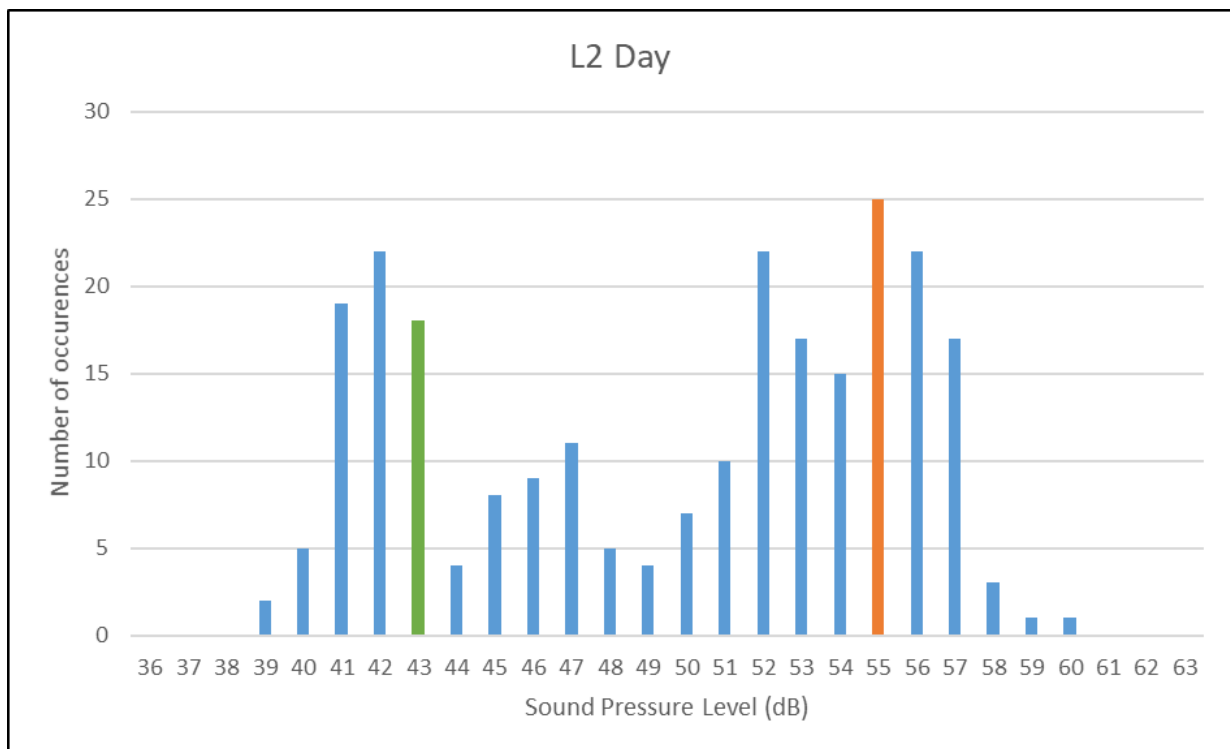
Baseline measurement location L1 Day



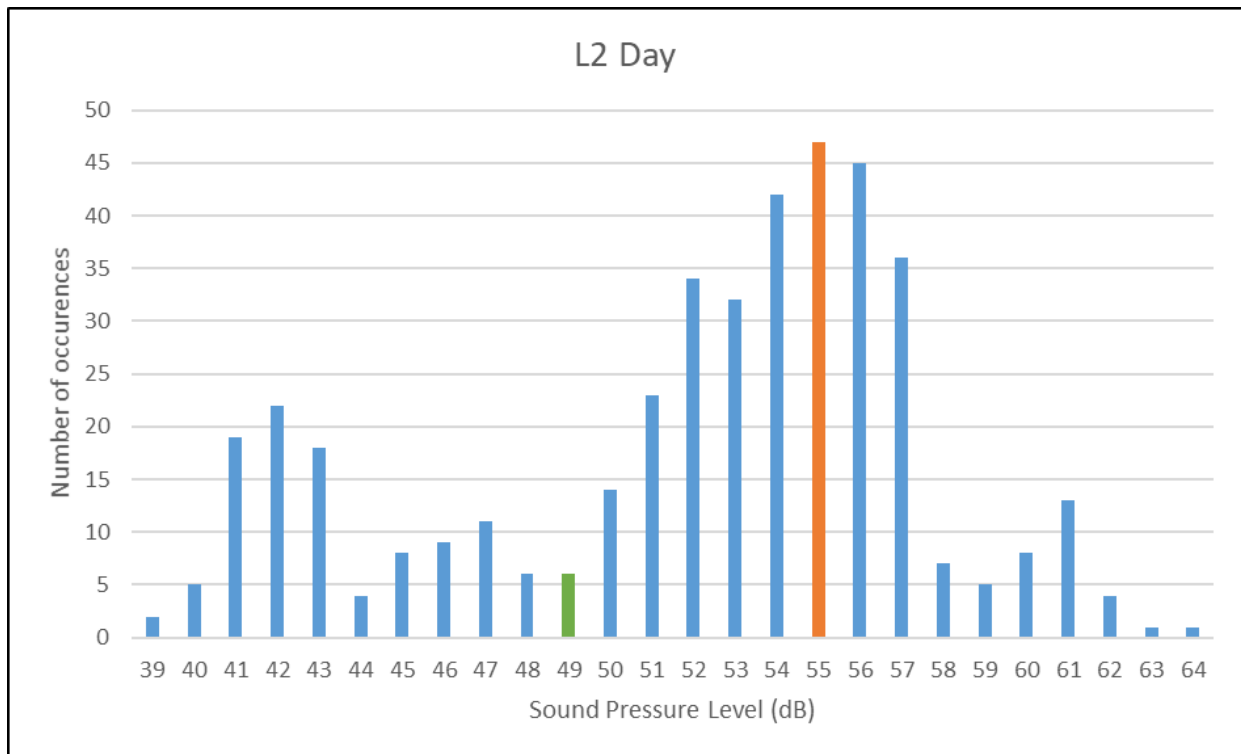
Baseline measurement location L1 Night



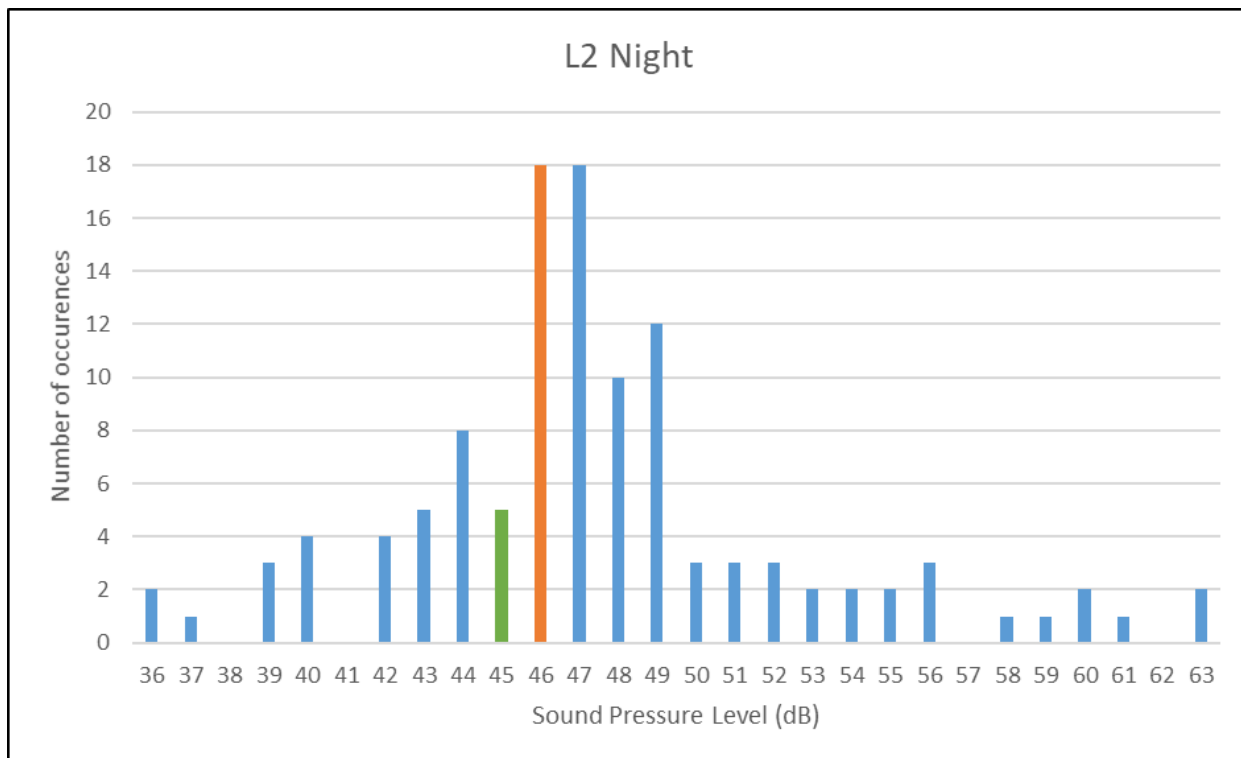
Baseline measurement location L2 Day (measured data)



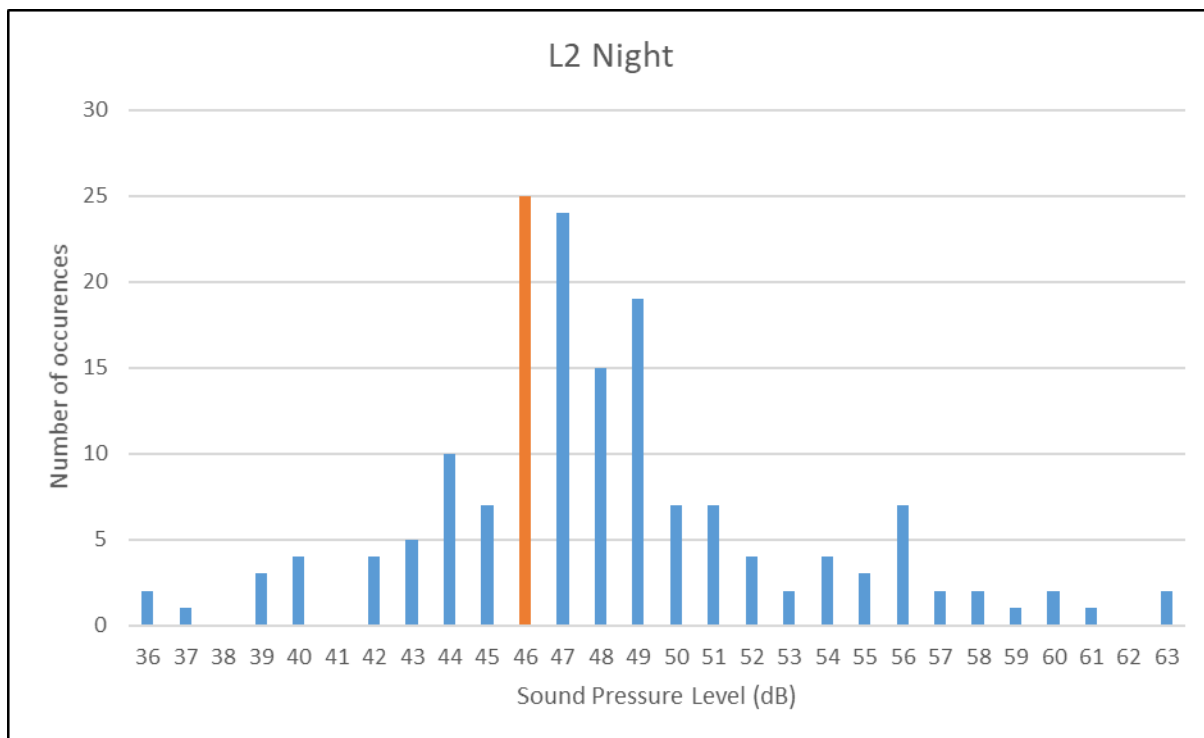
Baseline measurement location L2 Day (measured and calculated)



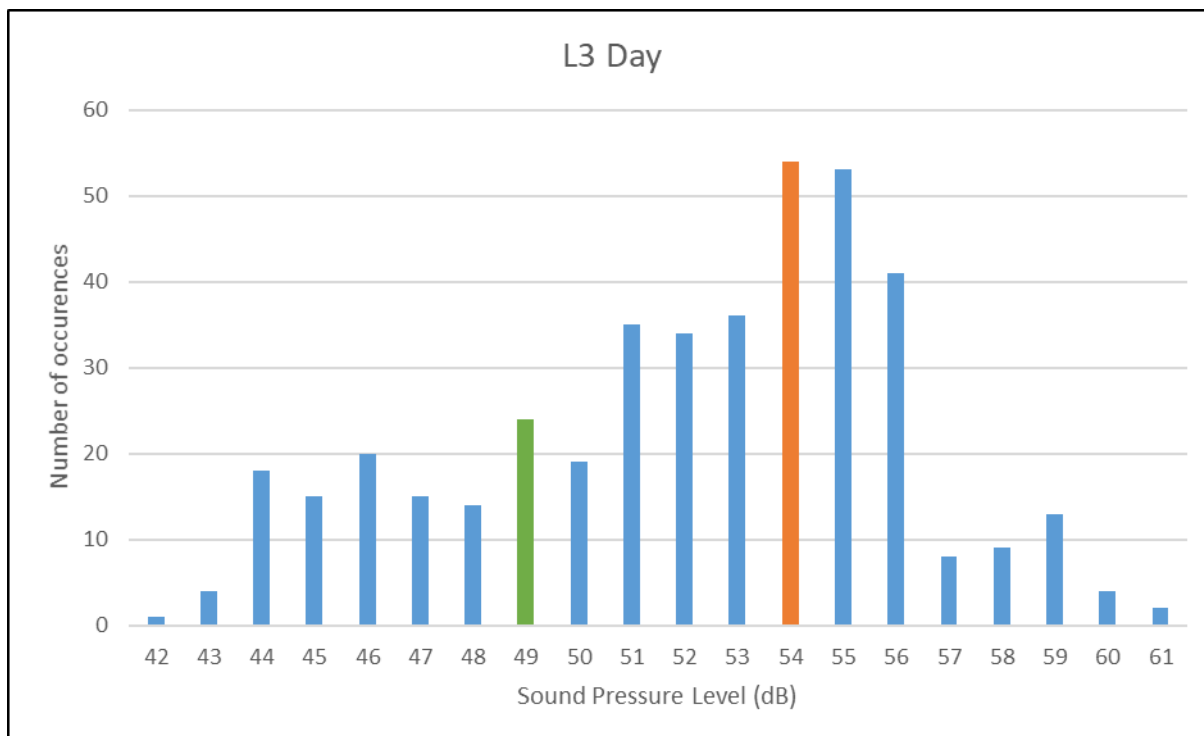
Baseline measurement location L2 Night (measured)



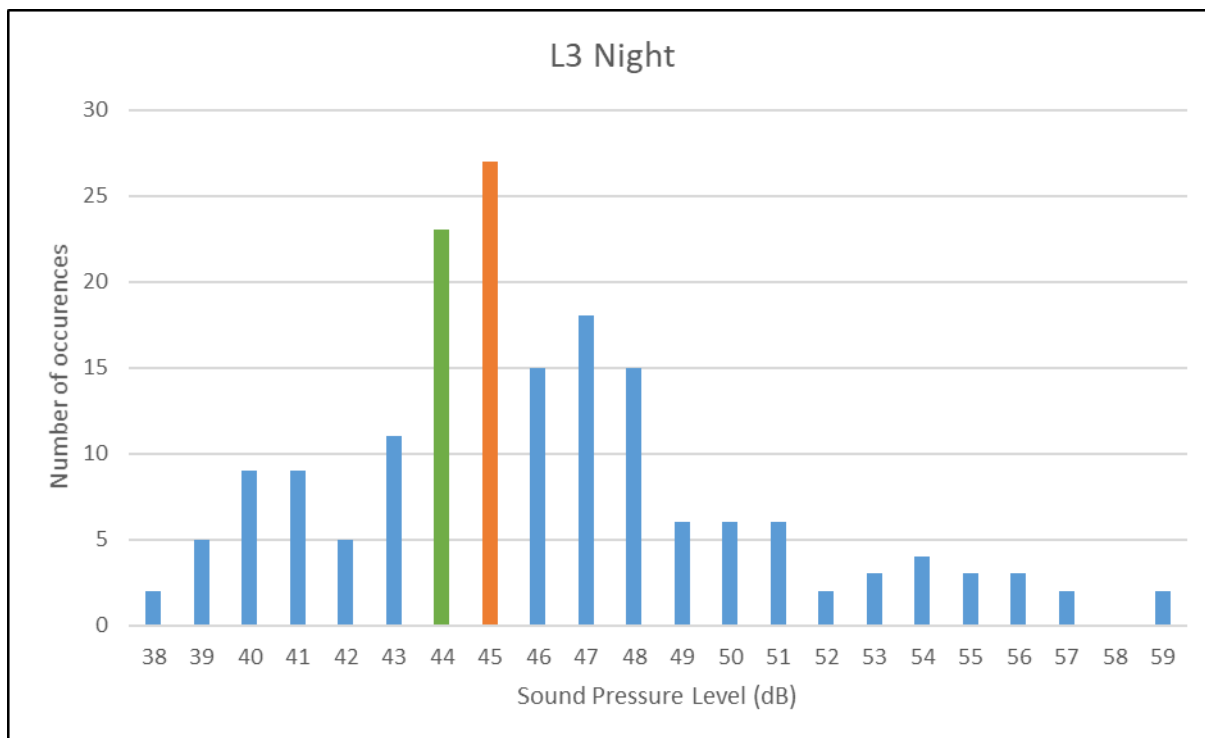
Baseline measurement location L2 Night (measured and calculated)



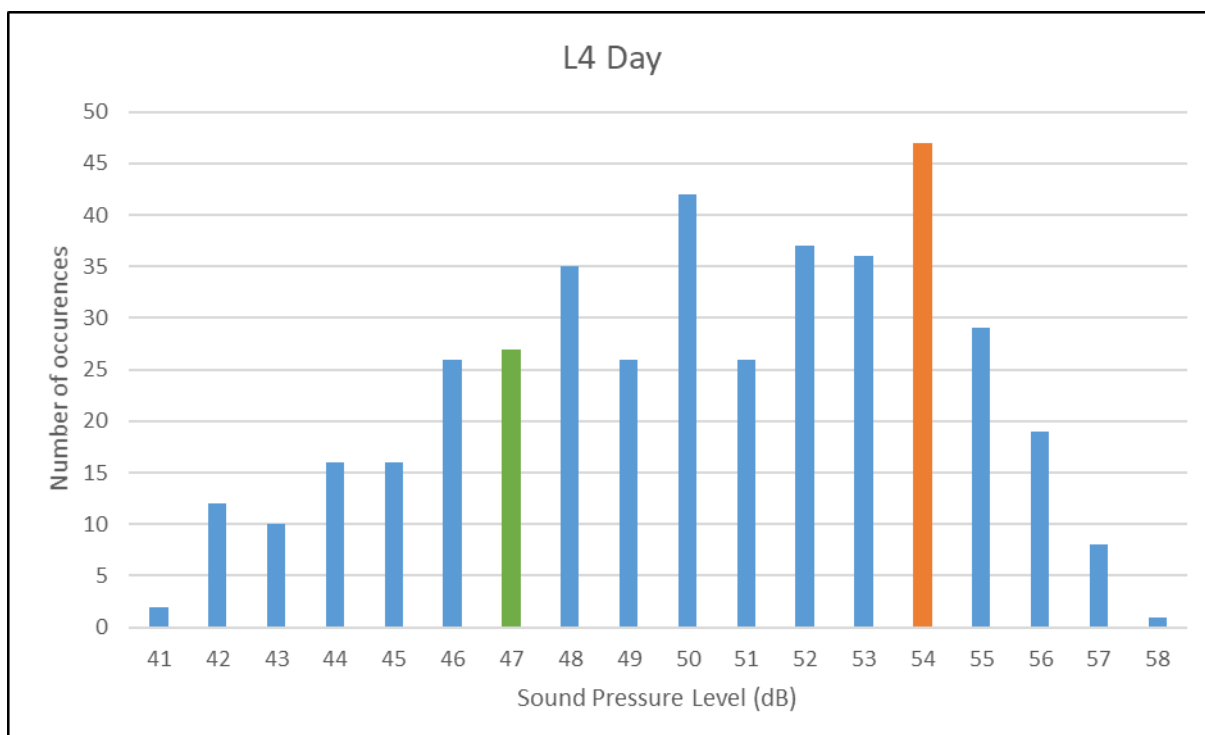
Baseline measurement location L3 Day



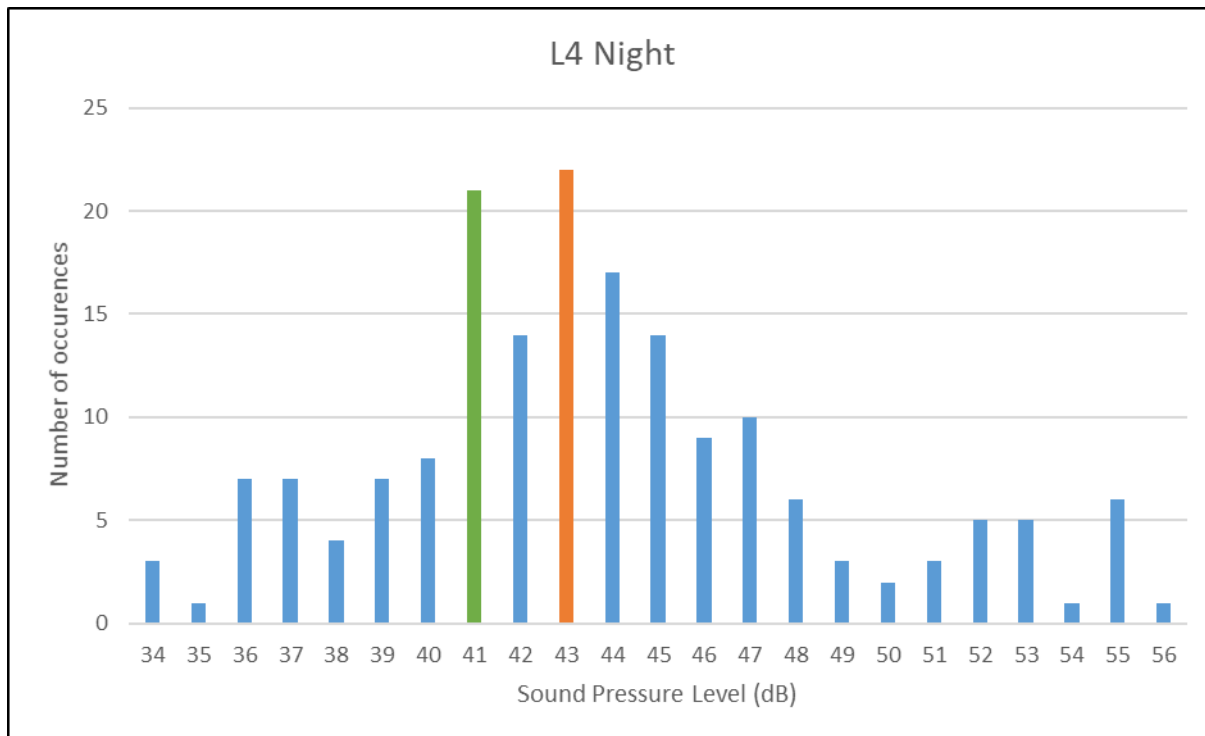
Baseline measurement location L3 Night



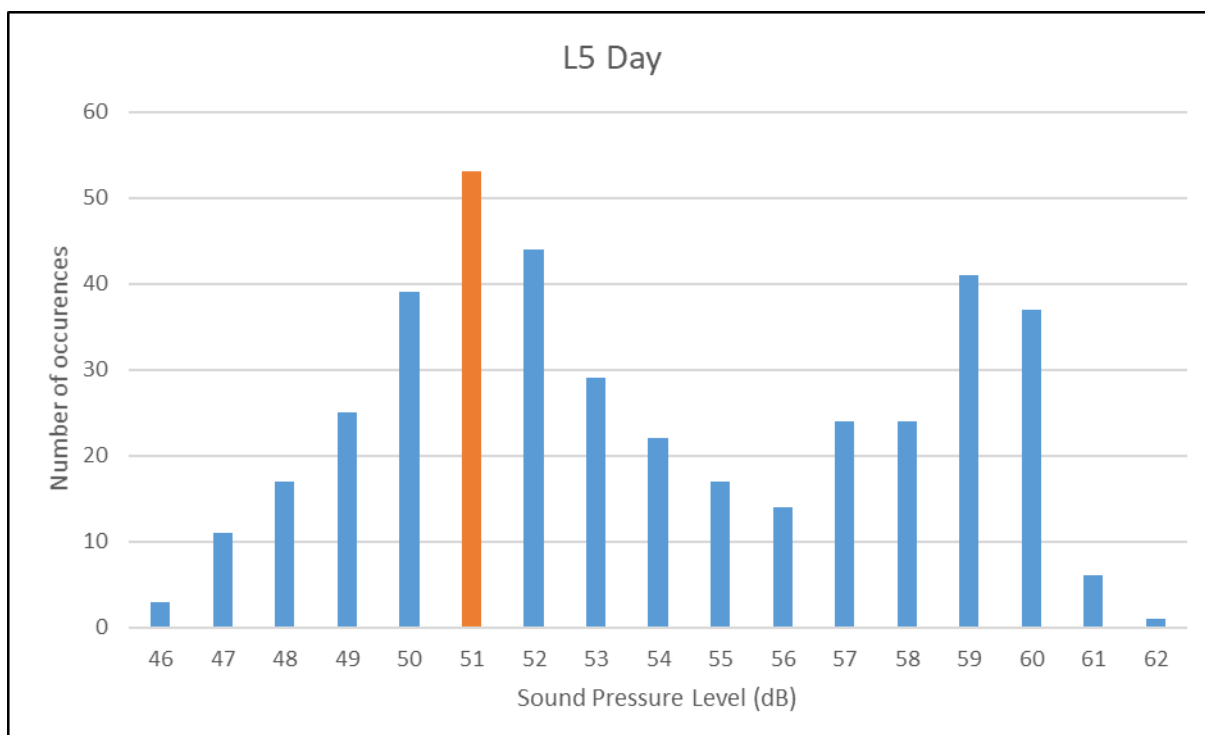
Baseline measurement location L4 Day



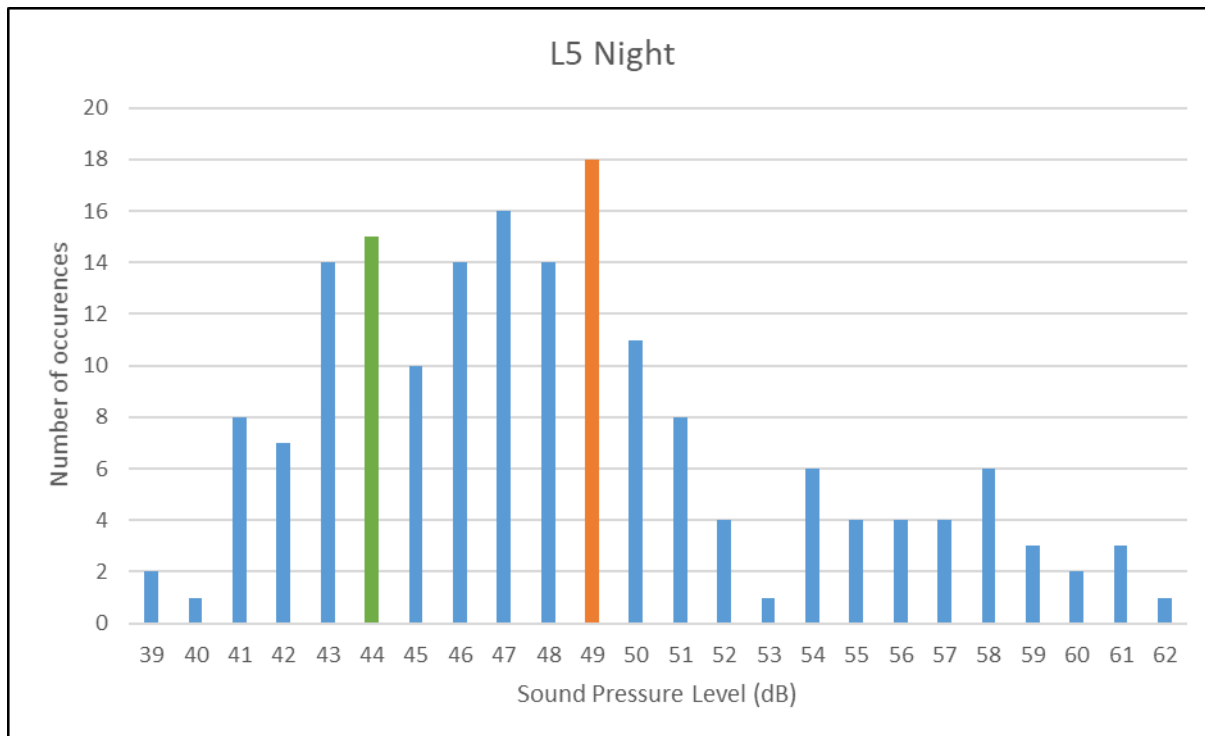
Baseline measurement location L4 Night



Baseline measurement location L5 Day



Baseline measurement location L5 Night



APPENDIX D – ROAD TRAFFIC NOISE CALCULATION RESULTS

Table 19 Road Traffic Noise Calculation Results and Assessment - Daytime, $L_{Aeq,16h}$ dB for 2029 (cells highlighted in grey indicate a potential for adverse effect)

Ref	Address	Predicted Road Traffic Noise ($L_{Aeq,16h}$ dB)			2029 DS - 2029 DM		2029 DS - 2019 Baseline	
		2019 Baseline	2029 DM	2029 DS	Noise change	Impact magnitude	Noise change	Impact magnitude
T1	Sheffield Road / Regent Street GF	65.2	65.8	64.1	-1.7	Negligible Decrease	-1.1	Negligible Decrease
	Sheffield Road / Regent Street FF	65.7	66.2	64.6	-1.6	Negligible Decrease	-1.1	Negligible Decrease
T2	Hoyland Common Primary School GF	63.1	63.7	62	-1.7	Negligible Decrease	-1.1	Negligible Decrease
T3	Sheffield Road Crossroads GF	67.4	67.9	65.8	-2.1	Minor Decrease	-1.6	Minor Decrease
	Sheffield Road Crossroads FF	67.3	67.9	65.8	-2.1	Minor Decrease	-1.5	Minor Decrease
T4	Parkside Road GF	59.1	59.6	56.4	-3.2	Minor Decrease	-2.7	Minor Decrease
	Parkside Road FF	60.3	60.7	57.8	-2.9	Minor Decrease	-2.5	Minor Decrease
T5	Parkside Farm GF	67.9	68.3	68.7	0.4	Negligible Increase	0.8	Negligible Increase
T6	Tankersley Lane West GF	62.7	63.1	63.7	0.6	Negligible Increase	1	Negligible Increase
	Tankersley Lane West FF	64.5	64.9	65.3	0.4	Negligible Increase	0.8	Negligible Increase
T7	Green Lane Farm GF	53.8	54.1	59.3	5.2	Moderate Increase	5.5	Moderate Increase
	Green Lane Farm FF	54.8	55.2	60.5	5.3	Moderate Increase	5.7	Moderate Increase

Table 20 Road Traffic Noise Calculation Results and Assessment - Daytime, $L_{Aeq,16h}$ dB for 2039 (cells highlighted in grey indicate a potential for adverse effect)

Ref	Address	Predicted Road Traffic Noise ($L_{Aeq,16h}$ dB)			2039 DS - 2039 DM		2039 DS - 2019 Baseline	
		2019 Baseline	2039 DM	2039 DS	Noise change	Impact magnitude	Noise change	Impact magnitude
T1	Sheffield Road / Regent Street GF	65.2	66.1	64.5	-1.6	Negligible Decrease	-0.7	Negligible Decrease
	Sheffield Road / Regent Street FF	65.7	66.6	64.9	-1.7	Negligible Decrease	-0.8	Negligible Decrease
T2	Hoyland Common Primary School GF	63.1	64	62.3	-1.7	Negligible Decrease	-0.8	Negligible Decrease
T3	Sheffield Road Crossroads GF	67.4	68.2	66.2	-2	Minor Decrease	-1.2	Minor Decrease
	Sheffield Road Crossroads FF	67.3	68.2	66.1	-2.1	Minor Decrease	-1.2	Minor Decrease
T4	Parkside Road GF	59.1	59.9	56.7	-3.2	Minor Decrease	-2.4	Minor Decrease
	Parkside Road FF	60.3	61	58.1	-2.9	Negligible Decrease	-2.2	Negligible Decrease
T5	Parkside Farm GF	67.9	68.6	69.3	0.7	Negligible Increase	1.4	Minor Increase
T6	Tankersley Lane West GF	62.7	63.4	64.1	0.7	Negligible Increase	1.4	Minor Increase
	Tankersley Lane West FF	64.5	65.2	65.7	0.5	Negligible Increase	1.2	Minor Increase
T7	Green Lane Farm GF	53.8	54.5	59.6	5.1	Moderate Increase	5.8	Moderate Increase
	Green Lane Farm FF	54.8	55.5	60.8	5.3	Moderate Increase	6	Moderate Increase

Table 21 Road Traffic Noise Calculation Results and Assessment – Night-time $L_{Aeq,8 \text{ hours}}$ dB for 2029

Ref	Address	Predicted Road Traffic Noise ($L_{Aeq,8h}$ dB)			2029 DS - 2029 DM		2029 DS - 2019 Baseline	
		2019 Baseline	2029 DM	2029 DS	Noise change	Impact magnitude	Noise change	Impact magnitude
T1	Sheffield Road / Regent Street GF	57.8	58.3	56.5	-1.8	Minor Decrease	-1.3	Minor Decrease
	Sheffield Road / Regent Street FF	58.4	58.9	56.9	-2	Minor Decrease	-1.5	Minor Decrease
T2	Hoyland Common Primary School GF	55.2	55.7	54.2	-1.5	Minor Decrease	-1	Negligible
T3	Sheffield Road Crossroads GF	59.3	59.8	57.9	-1.9	Minor Decrease	-1.4	Minor Decrease
	Sheffield Road Crossroads FF	59.4	59.9	57.9	-2	Minor Decrease	-1.5	Minor Decrease
T4	Parkside Road GF	53.6	54	50.7	-3.3	Moderate Decrease	-2.9	Minor Decrease
	Parkside Road FF	54.5	54.8	51.8	-3	Moderate Decrease	-2.7	Minor Decrease
T5	Parkside Farm GF	59.6	60	60.4	0.4	Negligible Increase	0.8	Negligible
T6	Tankersley Lane West GF	58.8	59.1	59.7	0.6	Negligible Increase	0.9	Negligible
	Tankersley Lane West FF	60.6	60.9	61.3	0.4	Negligible Increase	0.7	Negligible
T7	Green Lane Farm GF	51.4	51.8	52.4	0.6	Negligible Increase	1	Minor Increase
	Green Lane Farm FF	52.4	52.7	53.6	0.9	Negligible Increase	1.2	Minor Increase

Table 22 Road Traffic Noise Calculation Results and Assessment – Night-time $L_{Aeq,8 \text{ hours}}$ dB for 2039 (cells highlighted in grey indicate a potential for adverse effect)

Ref	Address	Predicted Road Traffic Noise ($L_{Aeq,8h}$ dB)			2039 DS - 2039 DM		2039 DS - 2019 Baseline	
		2019 Baseline	2039 DM	2039 DS	Noise change	Impact magnitude	Noise change	Impact magnitude
T1	Sheffield Road / Regent Street GF	57.8	58.6	56.8	-1.8	Minor Decrease	-1	Minor Decrease
	Sheffield Road / Regent Street FF	58.4	59.2	57.2	-2	Minor Decrease	-1.2	Minor Decrease
T2	Hoyland Common Primary School GF	55.2	56	54.5	-1.5	Minor Decrease	-0.7	Negligible
T3	Sheffield Road Crossroads GF	59.3	60.1	58.2	-1.9	Minor Decrease	-1.1	Minor Decrease
	Sheffield Road Crossroads FF	59.4	60.2	58.2	-2	Minor Decrease	-1.2	Minor Decrease
T4	Parkside Road GF	53.6	54.3	51.1	-3.2	Moderate Decrease	-2.5	Minor Decrease
	Parkside Road FF	54.5	55.1	52.1	-3	Minor Decrease	-2.4	Minor Decrease
T5	Parkside Farm GF	59.6	60.3	60.9	0.6	Negligible Increase	1.3	Minor increase
T6	Tankersley Lane West GF	58.8	59.4	60	0.6	Negligible Increase	1.2	Minor increase
	Tankersley Lane West FF	60.6	61.2	61.6	0.4	Negligible Increase	1	Minor increase
T7	Green Lane Farm GF	51.4	52.1	52.7	0.6	Negligible Increase	1.3	Minor increase
	Green Lane Farm FF	52.4	53	53.9	0.9	Negligible Increase	1.5	Minor increase

APPENDIX E – CONSTRUCTION NOISE ASSESSMENT ASSUMPTIONS

The following table presents the plant included in the construction noise calculations with associated on times.

Table 23 Construction noise assessment assumptions

Activity	Plant / Equipment	BS 5228 Table and reference number	Qty	On-time (%)
Site Clearance & Earthworks	40t excavator	C2.14	8	50
	30t dump trucks	C2.30	15	50
	D6 dozers	C2.12	6	50
	Bomag 213 rollers	C2.37	4	50
	Stabilisation tractor unit	C4.75	2	50
	4" pumps	C2.46	3	30
	Temporary Welfare Unit	C3.32	3	100
	Road lorries	C11.20	5	20
Drainage & Substructure	30t excavator	C2.21	3	40
	25t dump trucks	C4.1	2	40
	8t dumpers	C4.7	5	90
	13t excavator	C2.7	2	40
	5t mini digger	C4.68	1	50
	Trench compactor	C5.29	2	40
	Forklift truck	C4.54	1	40
	Pipe Saw	C5.36	2	60
Superstructure & envelope	35t mobile crane	C4.43	3	20
	Cherry picker	C4.57	9	30
	Forklift truck	C4.54	3	30
	MEWP	C4.49	6	30
Externals	20t excavator	C2.21	2	80
	8t dumpers	C4.7	3	80
	13t excavator	C2.7	2	80
	5t mini digger	C4.68	1	80
	Sthil saw	C5.36	1	80
	Pipe saw	C5.36	1	80

Figure 7 below presents the locations used for the construction noise assessment and Table 24 presents the locations used for each receptor.

Figure 7 Construction noise assessment approximate locations



Table 24 Locations used for each receptor for the construction noise assessment

Noise sensitive receptor	Locations used for Earthworks calculations	Locations used for other construction phase calculations
O1	1 & C	8 & 9
O2	3 & C	8 & 9
O3	5 & C	8 & 9
O4	6 & C	8 & 9
O5	7 & C	8 & 9
O6	4 & C	8 & 9
O7	2 & C	8 & 9

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