Langtree PP and Panattoni

Six 56 Warrington

Addendum to Environmental Statement

Part 2 – Noise and Vibration Technical Paper 7

Revision 4<u>12</u> ~~22 March 2019~~ <u>14 October 2020</u>

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1. Introduction

1.1. This document now constitutes part of an addendum to the Environmental Statement originally submitted to Warrington Borough Council (WBC) in March 2019 to accompany the outline planning application for warehouse development (Use Class B8 with ancillary B1(a) offices) and associated infrastructure at the Application Site referred to as Six 56 Warrington.

1.2. Since the submission of the planning application, consultation responses have been received from key consultees and further discussions have taken place with the Council and their key consultees (namely WBC Highway Officers, Highways England (HE) and their consultants Atkins, WBC Environmental Protection Officers, Historic England and WBC Conservation Officer and Ramboll landscape designers acting on behalf of WBC).

1.3. Further clarification and information has been provided in line with requests by HE and WBC Highway's Officer relating to the design of the mitigation and the WMMTM traffic model.

1.4. Environmental Protection have concerns with exposure to high noise levels that will be experienced at existing properties on Cartridge Lane and sensitive receptors within the site comprising Bradley Hall Cottages and Bradley View to potentially unacceptably high noise levels, even with mitigation in place, based on the worst case estimates of the proposals as illustrated on submitted masterplan and parameters plans.

1.5. Landscape Consultants Ramboll's acting on behalf of the Council have also recommended further supplementary information, including an assessment of potential effects on the visual amenity of properties in the vicinity, in order to provide greater transparency to the LVIA and its findings and to aid WBC in its determination of the application.

1.6. Consequently, the indicative masterplan and parameters plans have evolved to address comments raised by these key consultees and reduce the noise impacts on sensitive receptors within the site with realignment of estate roads. Further assessments have also been undertaken in respect of noise and vibration and landscape and visual impacts and cultural heritage. This addendum therefore includes additional and updated information to address the comments raised by key consultees. Part 2 of this addendum includes addendums to the following technical papers:

- Traffic and Transportation

- Water Quality and Drainage
- Landscape and Visual Impact
- Ecology and Nature Conservation
- Noise and Vibration
- Cultural Heritage
- Socio-Economic

1.7. This addendum should however be read in conjunction with the original ES submitted to WBC in April 2019 as the other technical papers (Ground Conditions and Contamination; Socio-Economic, Air Quality, Utilities, Energy, Waste and Agricultural Land and Soils) have not been amended or subject to change and as such are not included within this addendum, but still remain valid and still form part of the ES for the planning application. See Appendix 18 of the ES Part 1 Addendum which provides Consultants confirmation that there are no changes to the significance of impacts in the Ground Conditions and Contamination; Air Quality, Utilities, Energy, Waste and Agricultural Land and Soils Technical Papers arising from the updated project description presented in this ES Addendum.

1.8. In order to make the addendum more understandable and to avoid extensive cross referencing, changes have been integrated within the original text of this technical paper to form a single addendum to the ES. Wherever changes or additions have been made to the text of the original technical paper, the text has been underlined and anything that is no longer relevant or valid has been struck through but retained within the text. A log is also included within Appendix 7.4 of this technical paper addendum so that the text to be removed (i.e. the text struck through within the paper) is identified and a reason for its removal provided.

1.9. This Addendum Paper, prepared by Cundall on behalf of Langtree PP and Panattoni, presents the potential noise and vibration effects of the Proposed Development.

1.10. The Addendum Paper describes: the measured baseline conditions at the Application Site and surroundings; the assessment methodology; the anticipated significant environmental effects; and the outline mitigation measures required to prevent, reduce, or offset any significant adverse effects.

1.11. In order to assess the prevailing levels of environmental noise affecting nearby noise-sensitive receptors to the site, environmental noise surveys have been undertaken at six different locations in August 2017.

1.12. Effects are considered during both the construction and operational phases. Consideration is given in the assessment to the following potential effects:

- Noise and / or vibration effects on existing sensitive receptors and their occupants during the proposed construction works;
- Effects on occupants of existing sensitive receptors due to noise from operational activities associated with the operation of the Proposed Development; and
- Effects on occupants of existing sensitive receptors associated with increased noise from changes in traffic flows due to the Proposed Development.

1.13. This Paper is supported by the following appendices:

- Appendix 7.1 – Plan of Sensitive Receptors
- Appendix 7.2 – Baseline Survey Results
- Appendix 7.3 – Acoustic Barrier Mitigation Proposal
- Appendix 7.4 – Addendum Deleted Text Table

2. Documents Consulted

National Planning Policy Guidance

2.1. The National Planning Policy Framework (NPPF) was published in March 2012 and amended in ~~2018~~ February 2019. The NPPF is part of government reform to make the planning system less complex and more accessible, and to promote sustainable growth. It replaces existing national planning policies such as Planning Policy Guidance PPG24: Planning and Noise. The NPPF states:

"170 - Planning policies and decisions should contribute to and enhance the natural and local environment by; […]

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

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

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;"

2.2. With specific reference to noise effects, the Framework refers to the Noise Policy Statement for England (NPSE) (2010). The NPSE provides guidance which enables decisions to be made regarding the acceptable noise burden to place on society, using three key phrases – the No Observed Effect Level (NOEL), the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL).

Local Planning Policy Guidance

2.3. Warrington Borough Council's Local Planning Framework comprises several documents which are intended to guide development decisions in the borough.

2.4. The Local Plan Core Strategy (adopted July 2014) sets out a planning framework for the borough up to 2027. The document sets out Policy QE 6 – 'Environment and Amenity Protection' which is relevant to this paper:

"The Council, in consultation with other Agencies, will only support development which would not lead to an adverse impact on the environment or amenity of future occupiers or those currently occupying adjoining or nearby properties, or does not have an unacceptable impact on the surrounding area. The Council will take into consideration the following: […]

- *Noise and vibration levels and times when such disturbances are likely to occur; […]*
- *The need to respect the living conditions of existing neighbouring residential occupiers and future occupiers of new housing schemes in relation to overlooking/loss of privacy, outlook, sunlight, daylight, overshadowing, noise and disturbance; […]"*

2.5. The Warrington Borough Council Supplementary Planning Document (SPD) 'Design and Construction' (dated October 2010, amended February 2016) provides more detail as follows:

"Location and Transport

The suitability of sites and locations for development is also important to ensure their long-term viability.

- *Development proposals will be assessed with regard to the appropriateness of the juxtaposition of different uses, as it affects the amenity of occupiers and users of the site and of the surrounding area. This will include a consideration of noise generation, air quality, odours, contamination etc. Both the effect of development on existing occupiers in the area and the suitability of the site for the proposed development considering its surroundings will be taken into account."*

Relevant British Standards and Guidance

2.6. The effects of the Proposed Development upon the existing noise sensitive receptors are to be assessed by reference to the relevant British Standard and relevant guidance as set out in the table below:

Source	Description
BS5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites (BS 5228)	Recommendations for basic methods of noise and vibration control relating to construction sites where work activities may generate significant noise and / or vibration. It also provides guidance on methods of predicting and measuring noise and vibration, and assessing its impact on receptors.
BS8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233)	Recommendations for desirable internal and external ambient noise levels in dwellings that should not be exceeded for steady external noise sources.
BS4142:2014 Methods for rating and assessing industrial and commercial sound (BS 4142)	Methods for determining, at the outside of a building, noise levels from industrial and manufacturing premises, fixed installations and other associated activities. The rating method takes into account specific source characteristics, such as tonality, impulsivity and intermittency.
Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 7 Noise and Vibration (DMRB)	Advice on the assessment of noise and vibration impacts due to road traffic. The guidance provides a classification of magnitude of impacts related to changes in road traffic noise levels.
The Department of Transport/Welsh Office Memorandum 'Calculation of Road Traffic Noise' (CRTN)	Describes procedures for traffic noise calculation, and is suitable for environmental assessments of schemes where road traffic noise may have an impact.
British Standard 7385 'Evaluation and Measurement for Vibration in Buildings' (BS 7385).	Presents guide values or limits for transient vibration, above which there is a likelihood of cosmetic damage.
The World Health Organisation 'Guidelines for Community Noise' (WHO 1999).	Provides evidence based research on the effect of environmental noise on communities / residential occupants.

Table 7:1 - Relevant British Standards and Guidance

3. Consultations

3.1. The following scoping response was issued by Warrington Borough Council, on 6 April 2018:

"13. Noise & Vibration

The details in the above sections of the scoping report are acceptable. However, the following areas need to be incorporated in any future EIA submission:

- *The proposal does not include management of the demolition of buildings, as outlined in the description of the development statement on page 9, section 1.2 (noise, vibration and dust controls required).*
- *The proposal does not include noise assessments and monitoring of locations off site.*
- *There is no consideration of the existing dwellings located in the middle of the site, should they remain. Noise, odour and dust assessments are required for the demolition, construction and operational stages.*
- *Careful consideration is required regarding routes for vehicles and vehicle movements in respect to dwellings and assessment of any impacts from traffic noise and vibration for the demolition, construction and operational stages."*

3.2. Details of consultation between Robert Turner of Cundall and Steve Smith, Principal Officer (Environmental Protection) at Warrington Borough Council at pre-application EIA scoping stage and post-submission, are detailed below.

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Noise assessment methodology	14-11-17	Steve Smith – Principal Officer (Environmental Protection) at Warrington Borough Council	Email	Project summary with proposed site uses. Provided a red line boundary drawing with identified nearest noise sensitive receptors. Proposed a noise assessment methodology for review and confirmation of acceptance.	The proposed assessment methodology has been accepted, with attention being drawn on two additional receptors to the south west of the proposed site, and on assessment of operational noise specifically from the B2/B3 uses of the new development during night-time, which are close to existing receptors.
	23-11-17			Confirmation of the location of the additional noise sensitive receptors was sought.	Their location was clarified.

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Noise and Vibration ES Review	15-08-19	Steve Smith – Principal Officer (Environmental Protection) at Warrington Borough Council	Email	Formal feedback on the noise & vibration chapter which formed part of the original ES. Concerns raised regarding the predicted operational noise impact at properties on Cartridge Lane and Bradley View / Bradley Hall Cottages towards the centre of the site.	This feedback led to the fundamental changes to the illustrative masterplan and accompanying noise mitigation strategy which is documented and assessed in this addendum.

Table 7.2: Summary of Consultations and Discussions

4. Methodology and Approach

4.1. There are several potential significant noise and vibration related environmental impacts which will be fully assessed at sensitive receptors. Most of these relate to the impact of noise on existing residential receptors in the locality of the site at both construction and operational phases.

4.2. It is considered unlikely that any element of the typical operational activities undertaken at the Proposed Development will result in significant vibration impacts. This is based on the nature of operations associated with B8 storage and distribution units.

4.3. It is therefore considered that the only potential source of vibration associated with the operational phase of the scheme is additional HGV movements on existing road networks. However, due to existing quantities of HGV movements on the local road network, vibration values attributable to additional HGVs travelling to / from the Application Site would not be considered significant.

4.4. On this basis, the assessment of potential Operational vibration impacts can be scoped out of the ES assessment.

Construction Phase

4.5. Potential noise and vibration related environmental impacts which may arise during the Construction Phase are considered to be as follows:

- noise and vibration impacts associated with construction related fixed and mobile plant, including piling; and
- noise impacts associated with increases in traffic to and from the Application Site due to construction related vehicles

Operational Phase

4.6. Potential noise related environmental impacts which may arise during the Operational Phase are as follows:

- noise impact associated with the "industrial" noise emissions from the Proposed Development e.g. movement of industrial vehicles, operation of service yards and loading bays and operation of building services plant; and

- noise impacts associated with resultant increases in traffic on the local highway network surrounding the Application Site following completion of the Proposed Development.

Receptors

4.7. Noise-sensitive and vibration-sensitive receptors in proximity to the site which have been taken into consideration in this assessment are detailed in the following table:

Designation	Receptors
International	None
National	None
Regional	None
County	None
Borough/District	Receptors adjacent to roads assessed as part of transport assessment will be considered. These may be situated on the wider highway network.
Local/Neighbourhood	Residential receptors at: A. Grappenhall Lodge B. Dwellings on Cartridge Lane: – Southott – Hunters Lodge and Hunters Croft – Manors Farm with The Old Stables – Croftside – The Bungalow – 5 Cartridge Lane – 7 Cartridge Lane – Cliff Lane Farm, Cartridge Lane* C. Bradley View Cottage D. Howshoots Farm E. Tan House Farm F. Barleycastle Farm G. Bradley Hall Cottages H. Beehive Farm I. Booth's Farm
*Note – this property is also owned and inhabited by the land owner of the Application Site.	

Table 7:3 – Receptors

4.8. The approximate location of noise-sensitive receptors highlighted in the above table is presented in Figure 7:1 and Appendix 7.1.

Figure 7:1 - Noise Sensitive Receptors

Environmental Impacts

Construction Stage

Construction Noise

4.9. BS 5228 provides practical information on demolition and construction noise and vibration reduction measures and promotes a 'Best Practicable Means' (BPM) approach to control noise and vibration. The calculation method provided in BS 5228 is based on the numbers and types of equipment operating, their associated sound power levels (SWL), and the distance to receptors, together with the effects of any screening. The types and numbers of construction plant used in this assessment will be based on information presented within the Construction Programme.

4.10. There are no current national standards or guidelines that provide specific noise limits for construction sites. However, as a guide, typical daytime levels for noisy temporary works at neighbouring premises usually lie in the range of 70 – 80 dB L_{Aeq}.

4.11. It is therefore recommended that the following good practice limits apply to construction noise levels at each identified noise-sensitive receptor:

- 70dB L_{Aeq} Monday – Friday; and
- 70dB L_{Aeq} Saturday and Sunday

4.12. The Magnitude of Impact criteria for construction noise have been derived from BS 5228 guidance. A semantic scale for description of the magnitude of construction noise effects is shown in the table below:

Description	Magnitude of Impact
Daytime noise levels more than 10 dB below existing background levels	Neutral
Daytime noise levels less than or equal to 65 dB L_{Aeq}	Negligible
Daytime noise levels between 65 and 70 dB LAeq	Minor
Daytime noise levels between 70 and 75 dB LAeq	Moderate
Daytime noise levels greater than 75 dB L_{Aeq} for a total of less than 10 days in any 15-day period, or for a total of days less than or equal to 40 in any 6-month period	High
Daytime noise levels greater than 75 dB L_{Aeq} for a total of more than 10 days in any 15-day period, or for a total of days more than 40 in any 6-month period	Substantial

Table 7.4: Construction Noise Magnitude Criteria

4.13. Prior to commencing work, contractors would agree hours of working with the Local Authority. Proposed house of working are as follows:

- 08:00 – 18:00 hrs on Monday – Friday;
- 08:00 – 13:00 hrs on Saturday; and
- No working on Sunday or bank holidays

Construction Traffic Noise

4.14. Construction traffic will be assessed by considering the short-term increase in traffic flows during works, following the principles of CRTN and DMRB.

4.15. The criteria for the assessment of the magnitude of the temporary impact of traffic noise changes arising from construction works have been based on Table 3.2 of DMRB and are provided in the table below.

Description (change in dBA)	Magnitude of Impact
0 dBA	Neutral
0.1 – 2.9 dBA	Negligible
3.0 – 4.9 dBA	Minor
5.0 – 9.9 dBA	Moderate
10 - 14.9 dBA	High
15 dBA or more	Substantial

Table 7.5: Construction Traffic Noise Magnitude Criteria

Construction Vibration

4.16. BS 5228 Part 2 provides further guidance on the perception of vibration resulting from construction activities within occupied buildings. This provides a simple method of determining annoyance alongside evaluation of cosmetic damage associated with vibration.

4.17. The table below details potential vibration levels measured in terms of 'Peak Particle Velocity' (PPV), and provides a semantic scale for description of construction vibration impacts on human receptors.

Peak Particle Velocity Level	Description	Magnitude
0 mm/s	No vibration perceptible	Neutral
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
0.3 mm/s	Vibration might be just perceptible in residential environments.	Minor

1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.	Moderate
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	High
15 mm/s	Vibration will be intolerable	Substantial

Table 7.6: Guidance on Effects of Construction Vibration (PPV) Levels

4.18. Construction activities that produce vibration may impact on adjacent buildings. The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage. The principal concern is generally transient vibration due to piling, which at this stage cannot be ruled out as necessary. Cosmetic damage is most likely to occur within the first 20 metres (m) of piling activities; at greater distances damage is less likely to occur. Likely levels of vibration at given distances can be estimated from existing piling vibration data, as provided in BS 5228 Part 2.

4.19. BS 7385 establishes the basic principles for carrying out vibration measurements and processing the data, with regard to evaluating vibration effects on buildings. Recommended PPV vibration limits for transient excitation for different types of buildings are presented in the following table.

Type of Building	**Peak Component Particle Velocity in Frequency Range of Predominant Pulse**[1]	
	4 Hz to 15 Hz	*15 Hz and above*
Reinforced or framed structures.	50 mm/s at 4 Hz and above	
Industrial and heavy commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz[2]	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

[1] - Values referred to are at the base of the building;

[2] - At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded; mm/s – millimetres per second.

Table 7.7: Peak Particle Velocity Limits for Cosmetic Damage to Buildings

4.20. Where vibration experienced at structures exceeds the values shown in the table above, this would be considered to indicate a significant adverse impact.

Operational Phase

Operational Traffic Noise

4.21. Operational traffic noise will be assessed by considering the long-term increase in traffic flows following completion of the Proposed Development, following the principles of CRTN and DMRB.

4.22. The criteria for the assessment of the magnitude of the long-term impact of traffic noise changes arising from the Proposed Development will be based on Table 3.2 of DMRB and are provided in the table below. Among the factors which influence noise change values shown in the table below are flow counts, traffic composition (i.e. percentage of heavy goods vehicles), and speed limits.

Description (Long term change in dBA)	**Magnitude**
0 dBA	Neutral
0.1 – 2.9 dBA	Negligible
3.0 – 4.9 dBA	Minor
5.0 – 9.9 dBA	Moderate
10 - 14.9 dBA	High
15 dBA or more	Substantial

Table 7.8: Operational Traffic Noise Impact Magnitude Criteria

4.23. In addition to the above, the DMRB states the following

"In the period following a change in traffic flow, people may report positive or negative benefits when the actual noise changes are as small as 1 dB(A). As this noise change is equivalent to an

increase of 25% or a decrease in traffic flow of 20%, this reaction may be partly attributed to an awareness of the changes in traffic rather than noise."

4.24. As such, it is considered that in the short-term, overall traffic flow increase of less than 25% would cause changes in road traffic noise impact levels of negligible magnitude.

Industrial Noise

4.25. Industrial noise emissions will be assessed in accordance with the methodology set out in BS 4142. This standard provides an assessment methodology and criteria relating to the following industrial noise sources:

> "a) *sound from industrial and manufacturing processes;*
>
> b) *sound from fixed installations which comprise mechanical and electrical plant and equipment;*
>
> c) *sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and*
>
> d) *sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site."*

4.26. The proposed criteria for the assessment of the magnitude of impact of industrial noise emissions from the Proposed Development are provided in the table below and are based on the relative level difference between the BS 4142 Rating Level ($L_{Ar,Tr}$) of the industrial noise sources and the representative background sound levels ($L_{A90,T}$).

Description	**Magnitude**
$L_{Ar,Tr} = L_{A90,T} - 10$ dB	Neutral
$L_{Ar,Tr} = L_{A90,T} - 5$ dB	Negligible
$L_{Ar,Tr} = L_{A90,T}$ dB	Minor
$L_{Ar,Tr} = L_{A90,T} + 5$ dB	Moderate
$L_{Ar,Tr} = L_{A90,T} + 10$ dB	High

$L_{Ar,Tr} = L_{A90,T} + 15$ dB	Substantial

Table 7.9: BS 4142 Noise Impact Magnitude Criteria

Significance of Effects

4.27. The significance of effect is determined using the significance matrix in Section 6 of the Environmental Statement Addendum Part 1 Report. This identifies the receptor level across the top of the matrix and the magnitude of environmental impact down the side and where they meet within the matrix identifies the significance of the effect.

4.28. For noise and vibration impacts, several factors will be considered when identifying whether significant effects have occurred, such as:

- the context in which the impact occurs;
- the duration of the impact;
- the sensitivity of the receptor; and
- the number of receptors affected.

Impact Prediction Confidence

4.29. It is also of value to attribute a level of confidence by which the predicted impact has been assessed. The criteria for these definitions are set out below:

Confidence Level	Description
High	The predicted impact is either certain i.e. a direct impact, or believed to be very likely to occur, based on reliable information or previous experience.
Low	The predicted impact and its levels are best estimates, generally derived from first principles of relevant theory and experience of the assessor. More information may be needed to improve confidence levels.

Table 7.10: Confidence Levels

5. Baseline Information

Description of local conditions

5.1. The Site sits predominantly[1] within the jurisdiction of Warrington Borough Council and, due to the size of the Application Site, the prevailing noise climate is affected by a number of sources. These include:

- Ambient noise levels to the north and northwest portions of the site are largely driven by road traffic on Grappenhall Lane.
- Ambient noise levels in the northeast corner of the site are largely driven by road traffic on Cliff Lane.
- Ambient noise levels in the southern portion of the site are dominated by road traffic on the M6 and M56.
- Background noise levels across the site are generally dominated by distant road traffic noise from the M6 to the east and the M56 to the south.

Baseline Noise Survey

5.2. To ascertain the prevailing environmental noise levels at the Site, continuous unattended noise logging measurements were undertaken in six different locations.

5.3. The following subsections provide a summary of the recorded baseline data. Full details of the baseline survey measures (including meteorological data, single figure measurement results, subjective assessments of noise climates etc.) are detailed within the Cundall Baseline Results Survey Report presented in Appendix 7.2.

5.4. The table below documents the monitoring positions and the corresponding measurement type / period.

Monitoring position	Monitoring location	Measurement duration
MP 1	North-west corner of the site, approximately 3m from the boundary hedge to Grappenhall Lane. Assumed to be representative of the prevailing background noise climate at the Grapppenhall Lodge, approximately 45m away.	Unattended measurement undertaken between 16 and 17 August 2017.

[1] A small section of the site identified for ecological mitigation is within the Cheshire East Authority boundary

Monitoring position	Monitoring location	Measurement duration
MP 2	North boundary of the site, approximately 3m from the boundary hedge to Grappenhall Lane. Assumed to be representative* of the prevailing background noise climate at the dwellings on Cartridge Lane, approximately 40m away.	Unattended measurements undertaken between 17 and 18 August 2017.
MP 3*	North-east corner of the site, approximately 3m from the boundary hedge to Cliff Lane. Assumed to be representative of the prevailing background noise climate at Howshoots Farm approximately 16m away.	Unattended measurements undertaken between 24 and 30 August 2017.
MP 4	South-east corner of the site, on the site boundary. Assumed to be representative of the prevailing background noise climate at Tan House Farm on Barleycastle Lane, approximately 150m away.	Unattended measurements undertaken between 24 and 30 August 2017.
MP 5	On the south boundary of the site. Assumed to be representative of the prevailing background noise climate at Barleycastle Farm on Barleycastle Lane, approximately 150m away.	Unattended measurements undertaken between 24 and 30 August 2017.
MP 6	Near the eastern pond in the centre of the site, on the boundary to Bradley View Cottages.	Unattended measurements undertaken between 24 and 30 August 2017.
*Note – background noise levels at this location are dictated by distant roads (i.e. the M6 and M56 motorways) and not vehicles on the adjacent Grappenhall Lane. Background noise levels are therefore considered representative of properties on Cartridge Lane to the north.		

Table 7:11 - Monitoring Positions and Measurement Periods

5.5. A figure detailing the approximate location of each unattended measurement position is presented in the figure below.

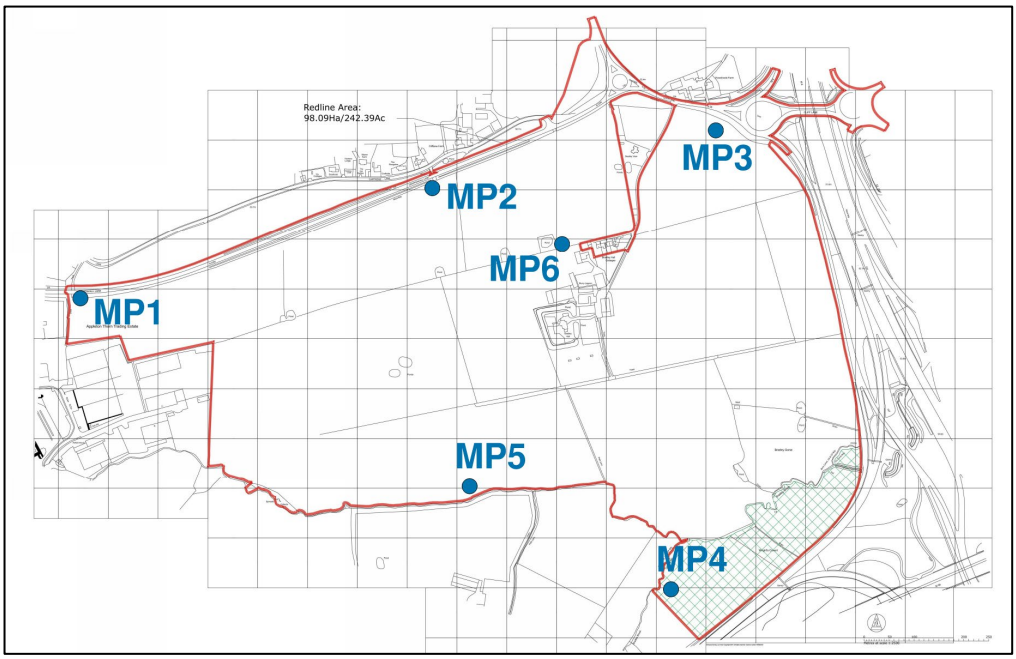

Figure 7:2 - Approximate Baseline Noise Monitoring Locations

5.6. Based on survey results and subjective impressions from Cundall engineers who attended site, the following table provides a review of existing noise sources noted to contribute to the existing noise climate at each measurement position.

Measurement Position	Existing noise climate
MP1	The L_{Aeq} noise climate is largely driven by road traffic noise on Grappenhall Lane, while background noise levels (L_{A90} values) are largely dominated by distant road traffic noise from the M6 and the M56.
MP2	
MP3	The L_{Aeq} noise climate is largely driven by road traffic noise on Cliff Lane, while background noise levels (L_{A90} values) are largely dominated by distant road traffic noise from the M6 and the M56.
MP4	The noise L_{Aeq} and background noise climate largely dominated by the road traffic noise from the M6 and the M56.
MP5	
MP6	

Table 7:12 - Description of Baseline Conditions

5.7. Whilst not considered as a noise-sensitive receptor for the purpose of this Addendum Technical Paper, subjective impressions were also observed and noted at the Bradley Hall

Farm Scheduled Ancient Monument (SAM). As with all other receptors, the acoustic environment was noted to be dominated by road traffic noise from the M6 and the M56 with a low level of perceived tranquility. This is in line with Campaign to Protect Rural England (CPRE) tranquility mapping which identifies the Application Site as being is the 'least tranquil' category.

5.8. A summary of the average daytime (07:00 – 23:00 hours) and night-time (23:00 – 07:00 hours) ambient noise levels recorded is detailed within the following table. The values are the logarithmically averaged LAeq,15min, the maximum LAFmax,15min and range of LA90,15min dB values measured. All values have been rounded to the nearest integer value (as fractions of a decibel are imperceptible) and are given in dBA.

Period	Location	Average $L_{Aeq,15min}$ (dB)	Highest $L_{AF,Max}$ (dB)	Highest $L_{AF10,15min}$ (dB)	Range $L_{AF90,15min}$ (dB)
Daytime (measurements between 07:00 – 23:00 hours)	MP1	68	106	81	43 – 58
	MP2	66	93	73	46 – 56
	MP3	69	100	82	48 – 68
	MP4	59	89	69	48 – 66
	MP5	56	97	73	40 – 58
	MP6	47	96	72	36 – 47
Night-time (measurements between 23:00 – 07:00 hours)	MP1	65	100	73	46 – 57
	MP2	64	87	73	44 – 54
	MP3	66	96	75	44 – 66
	MP4	59	96	69	47 – 66
	MP5	53	74	60	40 – 59
	MP6	42	65	56	36 – 47

Table 7:13 - Summary of Baseline Monitoring Results

5.9. Based on statistical analysis of measured $L_{AF90,15min}$ dB values (see Baseline Results Summary Report in Appendix 7.2), Table 7.14 below presents a summary of representative background levels at each monitoring location during the daytime and night-time:

Period	Location	Representative $L_{A90,15min}$ (dB)
Daytime (measurements between 07:00 – 23:00 hours)	MP1	52
	MP2	51
	MP3	59
	MP4	56
	MP5	50
	MP6	38
Night-time (measurements between 23:00 – 07:00 hours)	MP1	49
	MP2	47
	MP3	57
	MP4	54
	MP5	48
	MP6	37

Table 7:14 - Measured Representative Background Noise Levels

6. Alternatives Considered

6.1. A series of alternatives have been considered as part of the evolution of the proposals. This has led to iterative process of assessing each potential alternative with respect to noise and vibration impacts at identified sensitive receivers. Cundall have been an active member of the project design and have provided design advice which has informed the current proposals, Parameters Plans and Illustrative Masterplan.

6.2. Cundall have assisted in the perimeter bunding mitigation strategy which is in place to attenuate noise egress from the site during the operational phase. Through iterative use and assessment of detailed SoundPLAN noise models, the location and height of these bunds have been refined to provide effective mitigation. This process has been further refined to take account of EHO comments received in August 2019 and ~~This~~ has led to the current bunding proposals which are documented on the Cundall "Proposed Finished Level Including Mounds" drawing (ref: ~~CLXX(52)4002~~ CLXX(52)4003 Issue P4) and the informative guidance shown on the Acoustic Considerations Parameters Plan (ref: 16-184-P114) which confirms that the bunds will have a maximum 1:3 gradient slope and maximum height of 5m. The height and location of the of acoustic fencing measures incorporated on top of the building mitigation are identified in Appendix 7.3 of this ES Addendum Noise and Vibration Technical Paper and will range between 2-3m in height. See updated proposed parameters plans (Appendix 5 of the ES Addendum Part 1 Report). The details of these bunds and acoustic fencing are also provided in paragraph 7.54 of this Technical Paper. The location and height of these bunds and fences detailed on these plans can be conditioned with any subsequent outline planning permission.

6.3. The construction of the bunds will be incorporated within the initial site enabling and infrastructure phase of the wider construction works. Prior to the completion of the bunds, the measures identified in the CEMP and the 'Best Practicable Means' (BPM) approach identified in Paragraph 8.1 of this Addendum will assist with control noise during site enabling works.

6.4. In addition, Cundall have also assisted the team in relation to unit orientation and the location of loading bay / service yards in order to minimise noise impact at sensitive receptors. Earlier iterations of the iterative masterplan included zones of potential noise generating activities (e.g. loading bays and service yards) facing key residential receptors. Due to the potential for increased noise effects at these receptors the masterplan has been amended to avoid this

adjacency. The ~~current~~ updated Illustrative Masterplan and updated Parameter Plans are therefore the result of early and ongoing consideration of noise effects by the design team.

7. Potential Environmental Effects

7.1. The following sub-sections provide an assessment of noise and vibration effects through the construction and operational phases against the significance criteria listed above.

Construction Phase

7.2. A 3D SoundPLAN noise model has been used to predict the noise impact created during the construction of the Proposed Development and associated infrastructure, in accordance with BS 5228.

7.3. Detailed construction information was not available at the time of writing. Therefore, Cundall's extensive experience of similar developments has been used to formulate construction phasing scenarios and select typical noisy activities for the noise assessment.

7.4. To determine the worst-case construction noise impact, and based upon current anticipated construction phasing and Illustrative Masterplan plot layout, the noise model has simulated the following construction scenarios:

- Scenario 1 – Concurrent site-wide earth work operations, demolition of existing structures around Scheduled Ancient Monument.
- Scenario 2 –Road Construction to Plots 1 & 2
- Scenario 3 – Substructure Plot 1
- Scenario 4 – Substructure Plot 2 & Road Construction to Plot 3
- Scenario 5 – Substructure Plot 3 & Remaining Road Construction
- Scenario 6 – Substructure Plot 5 & 6
- Scenario 7 – Substructure Plot 7
- Scenario 8 – Substructure Plot 4

7.5. It is anticipated that noise emissions from the construction site will be highest during the groundworks and substructure phases of construction. Construction plant noise source data has been taken from BS 5228. The following table lists the source data used in the modelling process, as well as the percentage 'on time' during a working day.

Construction Phase	Plant Item	Quantity	Sound Pressure Level @ 10 m / dBA	On Time	BS 5228:2009 Reference
Phase 1	Breaker Mounted on Excavator 15t	1	90	80%	Table C.1 Ref no. 9

Construction Phase	Plant Item	Quantity	Sound Pressure Level @ 10 m / dBA	On Time	BS 5228:2009 Reference
Earthworks & Demolition	Tracked Excavator 44t (Loading Dump Truck)	2	85	80%	Table C.1 Ref no. 10
	Articulated Dump Truck 29t	3	80	80%	Table C.1 Ref no. 11
	Tracked Excavator 44t	1	82	80%	Table C.1 Ref no. 12
	Wheeled Backhoe Loader 8t	3	68	80%	Table C.2 Ref no. 8
	Dozer 28t	6	79	80%	Table C.2 Ref no. 11
	Tracked Excavator 40t	6	79	80%	Table C.2 Ref no. 14
	Wheeled Loader	3	79	80%	Table C.2 Ref no. 26
	Dump Truck (Empty) 29t	3	87	80%	Table C.2 Ref no. 31
	Roller (Rolling Fill) 18t	3	79	80%	Table C.2 Ref no. 37
	Vibratory Plate (Petrol) 62kg	3	80	80%	Table C.2 Ref no. 41
	Directional Drill	3	77	80%	Table C.2 Ref no. 44
	Water Pump	3	62	100%	Table C.2 Ref no. 46
Phase 2 Road Construction	Dozer 11t	3	82	80%	Table C.5 Ref no. 13
	Articulated Dump Truck 25t	3	81	80%	Table C.5 Ref no. 16

Construction Phase	Plant Item	Quantity	Sound Pressure Level @ 10 m / dBA	On Time	BS 5228:2009 Reference
	Road Roller 22t	3	80	80%	Table C.5 Ref no. 19
	Asphalt Paver (+Tipper Lorry) 18t	3	77	80%	Table C.5 Ref no. 31
	Concrete mixer truck	3	80	100%	Table C.4 Ref no. 20
Phase 3 Plot 1 On Illustrative Masterplan Substructure	Grinder	2	80	100%	Table C.4 Ref no. 93
	Hydraulic vibratory compactor	1	78	80%	Table C.2 Ref no. 42
	Concrete mixer truck	2	80	100%	Table C.4 Ref no. 20
	Tracker Excavator 40t	1	79	80%	Table C.2 Ref no. 14
	Dumptruck	1	81	80%	Table C.2 Ref no. 33
	Generator	1	74	100%	Table C.4 Ref no. 84
Phase 44 Plot 2 On Illustrative Masterplan Substructure & Road Construction	Dozer 11t	1	82	80%	Table C.5 Ref no. 13
	Articulated Dump Truck 25t	1	81	80%	Table C.5 Ref no. 16
	Road Roller 22t	1	80	80%	Table C.5 Ref no. 19
	Asphalt Paver (+Tipper Lorry) 18t	1	77	80%	Table C.5 Ref no. 31
	Concrete mixer truck	3	80	100%	Table C.4 Ref no. 20
	Grinder	2	80	100%	Table C.4 Ref no. 93

Construction Phase	Plant Item	Quantity	Sound Pressure Level @ 10 m / dBA	On Time	BS 5228:2009 Reference
	Hydraulic vibratory compactor	1	78	80%	Table C.2 Ref no. 42
	Tracker Excavator 40t	1	79	80%	Table C.2 Ref no. 14
	Dumptruck	1	81	80%	Table C.2 Ref no. 33
	Generator	1	74	100%	Table C.4 Ref no. 84
5 Plot 3 On Illustrative Masterplan Substructure & Road Construction	Dozer 11t	2	82	80%	Table C.5 Ref no. 13
	Articulated Dump Truck 25t	2	81	80%	Table C.5 Ref no. 16
	Road Roller 22t	2	80	80%	Table C.5 Ref no. 19
	Asphalt Paver (+Tipper Lorry) 18t	2	77	80%	Table C.5 Ref no. 31
	Concrete mixer truck	4	80	100%	Table C.4 Ref no. 20
	Grinder	2	80	100%	Table C.4 Ref no. 93
	Hydraulic vibratory compactor	1	78	80%	Table C.2 Ref no. 42
	Tracker Excavator 40t	1	79	80%	Table C.2 Ref no. 14
	Dumptruck	1	81	80%	Table C.2 Ref no. 33
	Generator	1	74	100%	Table C.4 Ref no. 84
6	Grinder	2	80	100%	Table C.4 Ref no. 93

Construction Phase	Plant Item	Quantity	Sound Pressure Level @ 10 m / dBA	On Time	BS 5228:2009 Reference
Plot 5 & 6 On Illustrative Masterplan Substructure	Hydraulic vibratory compactor	1	78	80%	Table C.2 Ref no. 42
	Concrete mixer truck	2	80	100%	Table C.4 Ref no. 20
	Tracker Excavator 40t	1	79	80%	Table C.2 Ref no. 14
	Dumptruck	1	81	80%	Table C.2 Ref no. 33
	Generator	1	74	100%	Table C.4 Ref no. 84
7 Plot 7 On Illustrative Masterplan Substructure	Grinder	2	80	100%	Table C.4 Ref no. 93
	Hydraulic vibratory compactor	1	78	80%	Table C.2 Ref no. 42
	Concrete mixer truck	2	80	100%	Table C.4 Ref no. 20
	Tracker Excavator 40t	1	79	80%	Table C.2 Ref no. 14
	Dumptruck	1	81	80%	Table C.2 Ref no. 33
	Generator	1	74	100%	Table C.4 Ref no. 84
8 Plot 4 On Illustrative Masterplan Substructure	Grinder	2	80	100%	Table C.4 Ref no. 93
	Hydraulic vibratory compactor	1	78	80%	Table C.2 Ref no. 42
	Concrete mixer truck	2	80	100%	Table C.4 Ref no. 20

Construction Phase	Plant Item	Quantity	Sound Pressure Level @ 10 m / dBA	On Time	BS 5228:2009 Reference
Tracker Excavator 40t	1	79	80%	Table C.2 Ref no. 14	Tracker Excavator 40t
Dumptruck	1	81	80%	Table C.2 Ref no. 33	Dumptruck
Generator	1	74	100%	Table C.4 Ref no. 84	Generator

Table 7.15: Construction Noise Source Data

7.6. The following table shows the magnitude of the predicted noise impact at existing nearby noise sensitive receptors, during the construction phases described above. It should be noted that the noise levels predicted are based upon plant source noise data taken from BS 5228.

7.7. The predicted noise levels do not take account of the Best Practicable Means (BPM) of noise control - pragmatic construction noise mitigation measures detailed in the mitigation section below. Actual noise impact magnitude is therefore likely to be lower than predicted when BPM are implemented.

7.8. The magnitude of impact has been determined at each receptor by comparing predicted worst case noise levels (taken from the SoundPLAN noise model) with the construction noise magnitude criteria shown in Table 7.4.

Construction Phase	Receptor	Sensitivity	Predicted Worst Case Noise Level / $L_{Aeq,T}$ dB	Magnitude of Impact	Significance of Effect
1	A	High	54	Negligible	Negligible
	B	High	60	Negligible	Negligible
	C	High	61	Negligible	Negligible
	D	High	58	Negligible	Negligible
	E	High	51	Negligible	Negligible
	F	High	53	Negligible	Negligible
	G	High	75	High	Minor Adverse
	H	High	47	Negligible	Negligible
	I	High	48	Negligible	Negligible
2	A	High	40	Negligible	Negligible

Construction Phase	Receptor	Sensitivity	Predicted Worst Case Noise Level / $L_{Aeq,T}$ dB	Magnitude of Impact	Significance of Effect
	B	High	63	Negligible	Negligible
	C	High	59	Negligible	Negligible
	D	High	61	Negligible	Negligible
	E	High	42	Negligible	Negligible
	F	High	43	Negligible	Negligible
	G	High	62	Negligible	Negligible
	H	High	38	Negligible	Negligible
	I	High	38	Negligible	Negligible
3	A	High	35	Negligible	Negligible
	B	High	54	Negligible	Negligible
	C	High	60	Negligible	Negligible
	D	High	54	Negligible	Negligible
	E	High	39	Negligible	Negligible
	F	High	41	Negligible	Negligible
	G	High	64	Negligible	Negligible
	H	High	34	Negligible	Negligible
	I	High	35	Negligible	Negligible
4	A	High	35	Negligible	Negligible
	B	High	45	Negligible	Negligible
	C	High	55	Negligible	Negligible
	D	High	54	Negligible	Negligible
	E	High	45	Negligible	Negligible
	F	High	48	Negligible	Negligible
	G	High	58	Negligible	Negligible
	H	High	35	Negligible	Negligible
	I	High	37	Negligible	Negligible
5	A	High	51	Negligible	Negligible
	B	High	65	Minor	Minor Adverse

Construction Phase	Receptor	Sensitivity	Predicted Worst Case Noise Level / $L_{Aeq,T}$ dB	Magnitude of Impact	Significance of Effect
	C	High	49	Negligible	Negligible
	D	High	49	Negligible	Negligible
	E	High	48	Negligible	Negligible
	F	High	50	Negligible	Negligible
	G	High	53	Negligible	Negligible
	H	High	44	Negligible	Negligible
	I	High	43	Negligible	Negligible
6	A	High	46	Negligible	Negligible
	B	High	56	Negligible	Negligible
	C	High	44	Negligible	Negligible
	D	High	44	Negligible	Negligible
	E	High	38	Negligible	Negligible
	F	High	39	Negligible	Negligible
	G	High	47	Negligible	Negligible
	H	High	40	Negligible	Negligible
	I	High	40	Negligible	Negligible
7	A	High	58	Negligible	Negligible
	B	High	47	Negligible	Negligible
	C	High	35	Negligible	Negligible
	D	High	36	Negligible	Negligible
	E	High	35	Negligible	Negligible
	F	High	39	Negligible	Negligible
	G	High	38	Negligible	Negligible
	H	High	45	Negligible	Negligible
	I	High	46	Negligible	Negligible
8	A	High	42	Negligible	Negligible
	B	High	45	Negligible	Negligible
	C	High	41	Negligible	Negligible

Construction Phase	Receptor	Sensitivity	Predicted Worst Case Noise Level / $L_{Aeq,T}$ dB	Magnitude of Impact	Significance of Effect
	D	High	41	Negligible	Negligible
	E	High	45	Negligible	Negligible
	F	High	46	Negligible	Negligible
	G	High	46	Negligible	Negligible
	H	High	45	Negligible	Negligible
	I	High	45	Negligible	Negligible

Table 7.16: Construction Noise Assessment

7.9. It can be seen from the results in the table above that noise effects as a result of construction are predicted to be mostly negligible, with two instances of a minor adverse effect.

7.10. It should be noted that the modelling exercise completed calculates predicted noise impact based upon fixed plant locations. In practice, much of the plant may be mobile, so the magnitude of construction noise impacts will be subject to change through the various phases of construction. The assessment undertaken has, however, been based on assumed typical 'worst-case' scenarios. It will be the responsibility of the main contractor on site to limit construction noise impact at nearby noise sensitive receptors.

7.11. Examples of BPM are presented in the mitigation section of this Paper, in order to reduce noise impacts. This noise model did not take account of the suggested best practice mitigation techniques when determining worst case impact levels. It is worth noting that noise effects associated with the construction phase will be temporary, and will be restricted to daytime hours only, thus avoiding the more sensitive evening and night-time periods.

7.12. It should also be remembered that the assessment of noise impact during the construction stage, does not include the sound attenuation provided by the perimeter bunding to the site, in order to assess a worst case. In reality, the impact of much of the later stages of construction operations will be reduced as the bunding will be in place.

Construction Traffic Noise

7.13. Changes in 18-hour traffic noise levels have been calculated using methodologies in line with CRTN guidance. Baseline and construction traffic flow data has been provided as part of the traffic assessment (as part of this ES Addendum, see Paper 2: Transport).

7.14. It is understood from the transport consultant that the maximum number of daily HGV movements to and from site will be less than 10% of the base HGV flows on each highway link during construction.

7.15. The following table presents the construction traffic noise assessment, estimated based on the baseline 18-hour AAWT Traffic Flows. Only the road links immediately adjacent to the site are included, as it is assumed most construction related traffic would arrive from either the M6 or M56.

7.16. The magnitude of impact has been determined at each receptor by comparing calculated noise change with the construction traffic noise magnitude criteria shown in Table 7.5.

Road Link	Baseline 18-hour AAWT Traffic Flow (2017)		Baseline + Construction 18-hour AAWT Traffic Flow (2017)		Noise Change dB	Magnitude of Impact
	Total Vehicles	%HGV	Total Vehicles	%HGV		
Barleycastle Lane	13043	13%	13210	14%	0.1	Negligible
Grappenhall Rd W	14992	12%	15167	13%	0.1	Negligible
Grappenhall Rd Mid	14992	12%	15167	13%	0.1	Negligible
Grappenhall Rd E	14907	12%	15085	13%	0.1	Negligible

Table 7.17: Road Traffic Noise Change – Construction Traffic

7.17. Assuming the presence of highly sensitive receptors on all relevant road links, and with reference to the construction traffic noise assessment criteria, it is predicted that the significance of effect of construction traffic noise will be negligible.

7.18. From an NPSE perspective, the predicted construction traffic noise impact is at a level considered the LOAEL at all positions.

7.19. The Construction Environmental Management Plan for this development will detail various measures to minimise noise impacts (see Framework CEMP in Appendix 9 of the ES Addendum Part 1 Report). Provision will be made, wherever possible, to ensure that unloading of vehicles will be carried out onsite rather than on the adjacent roads. All construction traffic entering and leaving the site will be closely controlled. Vehicles making deliveries will travel via designated traffic routes previously agreed with Local Authorities and interested parties.

Construction traffic will be controlled by means of a vehicle arrival and departure management plan to achieve an even spread of vehicle movements during the working day. Access and egress for construction vehicles may vary according to the particular stage or phase of the works.

Construction Vibration

7.20. It is understood that the need for piling cannot be ruled out at this stage. To this end, it is necessary to consider the potential vibration impacts associated with piling activities.

7.21. BS 5228 indicates that construction activities (particularly piling) generally only generate vibration impacts when they are located less than 20 m from sensitive locations (approximate distance of Bradley Hall Cottages from Plot 1). The impact depends on the type of piling, ground conditions, and receptor distance.

7.22. It is understood that a piling strategy has not yet been developed for the site and would be dependent upon a detailed building design carried out at Reserved Matters stage. To assess a worst-case scenario, we have liaised with the project civil and geotechnical engineers who have confirmed that piling would likely comprise of augered piles. Indicative vibration levels for this piling method, based on the possible plan distances between areas of piling works and receptor locations (sourced from BS5228 Part 2) are presented in the following table.

BS 5228 Reference	Soil Conditions	Mode	Plan Distance / m	PPV / mms^{-1}
Table D.6 Ref No. 106	Made up ground over bedrock	Augering	5[1]	0.54
		Surging casing	5[1]	0.36
		Twisting in casing	5[1]	0.22
		Spinning off	5[1]	0.42
		Boring with rock auger	5[1]	0.43

[1] – note that the closest plan distance between a potential piling location (i.e. the closest part of Plot 1) and the residential properties at Bradley Hall Cottages is approximately 20 m. It can therefore be seen that use of this data will represent a severe worst-case assessment.

Table 7.18: Example Piling Vibration Levels

7.23. Based on the example vibration levels at the plan distance in the table above and the construction works vibration criteria, potential vibration levels from auger piling affecting nearby human receptors (i.e. occupants of the closest adjacent residential dwellings to a potential development cell) is not expected to exceed a minor adverse magnitude impact. However, at 20 m from the piling vibration source (nearest sensitive receptor) is likely that the vibration levels will be significantly reduced and of negligible impact.

7.24. In comparison to the BS 7385 vibration thresholds for cosmetic damage to structures (Table 7.), example vibration levels from piling are below the BS 7385 thresholds for cosmetic damage to structures (i.e. surrounding residential structures). As such, it is considered very unlikely that cosmetic damage to the adjacent sensitive structures will occur. Therefore, impacts on buildings (in terms of cosmetic damage) due to vibration from piling would be likely to have a negligible effect.

7.25. It should be noted that the above assessment of potential construction vibration effects is based upon a theoretical worst-case assessment that piles will be required within 20 m of existing nearby sensitive receptors. As stated, piling will be avoided wherever possible. Any piling required will be carried out over as short a period of time as possible.

Summary of Construction Phase Effects

7.26. The table below summarises the identified noise and vibration effects through the construction phase.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
Construction noise impacting on existing noise sensitive receptors	Local	Neutral to Minor Negative	Neutral to Minor Adverse	Low[I]
Construction traffic noise impacting on existing noise sensitive receptors	Local	Negligible	Negligible	High
Construction vibration impacting on existing noise sensitive receptors	Local	Negligible	Negligible	High

[I] – confidence level is low as noise modelling carried out demonstrates potential noise impact based upon a defined set of construction plant. In reality, plant items and operation requirements will vary on a daily basis, depending upon the phase of construction. The modelling exercise undertaken has been based on assumed 'worst-case' typically scenarios; however, it will remain the responsibility of the main contractor to adhere to agreed construction noise limits.

Table 7.19: Significance of Effect - Construction Phase

Operational Phase

Industrial Noise

7.27. It can be seen from the assessment methodology section above that industrial noise emissions from the operational phase of the Proposed Development are to be assessed in accordance with BS 4142. The following sub-sections provide additional background information to the BS 4142 assessment methodology and detail the outcomes of an updated computer noise modelling assessment exercise.

BS 4142 Summary of Assessment Method

7.28. BS 4142 provides methods for rating and assessing sound of an industrial and / or commercial nature, which includes sound from industrial and manufacturing processes, fixed services plant, sound generated by the loading/unloading of goods and sound from mobile plant / vehicles associated with industrial / commercial premises (e.g. fork-lift trucks).

7.29. The standard utilises various descriptors to assess the likelihood of complaints, the impact of sound associated with proposed industrial / commercial activities on existing sound-sensitive

receptors, or the impact and likely suitability of siting new sound-sensitive receivers in the vicinity of existing industrial / commercial sound sources.

7.30. The standard specifically precludes the assessment of internal sound levels arising from external sound, or from the assessment of various sound sources for which other (more relevant) guidance exists, including music/entertainment sound, person sound and construction sound.

7.31. The magnitude of impact is assessed by subtracting the measured background sound level, at a location representative of the nearest sound-sensitive receptor, from the 'rating level' of the sound source (the specific sound source to be introduced into the locality, corrected for acoustically distinguishing characteristics which may make it more subjectively prominent).

7.32. Typically, the greater the difference between the background and rating level, the greater the magnitude of impact, although BS 4142 emphasises that this is highly context-specific.

7.33. As a guideline, BS 4142 states that:

- A difference (between the background and rating level) of around +10 dB or more is likely to be indicative of significant adverse impact, depending on context
- A difference (between the background and rating level) of around +5 dB or more is likely to be indicative of adverse impact, depending on context
- The lower the rating level relative to the background level, the less likely it is that the specific sound will have an adverse impact
- Where the rating level does not exceed the background level, this in an indication that the specific sound will have a low impact, depending on context

7.34. Whilst BS 4142 states that "*a difference of +10dB or more is likely to be an indication of a significant adverse impact*", it also states that the estimation of potential impacts should also be modified for context. Examples of factors that BS 4142 considers pertinent are as follows:

- The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low. Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.
- Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

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

7.35. Above all, BS 4142 requires qualified engineering consultants and technical planning professionals (e.g. Environmental Health Officers) to use a combination of quantitative assessment techniques and rational qualitative judgements to come to a sensible and reasonable conclusion.

Definitions

7.36. BS 4142 uses several specific terms to define the various levels used in assessments, as follows:

- Specific sound – the commercial / industrial sound source under consideration;
- Residual sound – the sound level at the sound-sensitive receivers in the absence of the specific sound;
- Ambient sound – the sound level at the sound-sensitive receivers in the presence of the specific sound (i.e. ambient = residual + specific);
- Background sound level – the sound pressure level which is exceeded by the residual sound for 90% of the measurement period;
- Rating level – the specific sound, corrected for acoustically distinguishing characteristics.

Background sound level

7.37. BS 4142 emphasises that the background sound level ($L_{A90,T}$) is in fact a range of levels, not one absolute value. Whilst stating that the measurements of background sound should be normally not less than 15 minutes, the focus is on obtaining a level for use in assessment that is representative of typical conditions at the sound-sensitive receivers.

7.38. An example methodology by which this typical value may be obtained is given in the document. In this example, monitoring of $L_{A90,15mins}$ is undertaken during periods which represent when the specific sound will be operational. After obtaining a sequence of representative contiguous or disaggregated results, it is then proposed that the modal value is representative of the 'typical' background level.

Specific sound level

7.39. BS 4142 requires that the specific sound level ($L_{Aeq,Tr}$) is obtained over a reference period of 1 hour (daytime) and 15 mins (at night). Ideally, measurements would be taken of the ambient sound and residual sound at the assessment location, with these measurements used to accurately calculate the specific sound (ambient – residual = specific).

7.40. Where the source (specific sound) is not yet operational, it is permissible to measure the specific sound elsewhere (or to use known manufacturers' or library data) and then model the impact of this and compare against the known background level.

7.41. The specific sound level should typically represent the cumulative level at the receiver from all new industrial sound sources and be representative of 'normal' conditions i.e. the assessment shouldn't focus only on the worst-case operational scenario.

Rating level

7.42. Once the specific sound level has been determined, it may be necessary to add a correction to account for acoustically distinctive characteristics. These corrections reflect the increased subjective impact that a sound may have at a receiver when it contains characteristics that are particularly noticeable or annoying.

7.43. BS 4142 states that it is normally possible to carry out a subjective assessment of characteristics, based on the following correction guidelines:

- Tonality: +2 dB for a 'just perceptible' tone, +4 dB for 'clearly perceptible', rising to +6 dB for 'highly perceptible' tones;
- Impulsivity (rapidity of change and overall change in level): +3 dB for 'just perceptible' impulsivity, +6 dB for 'clearly perceptible', rising to +9 dB for 'highly perceptible' impulsivity;
- Intermittency: if the on/off-time of the specific sound is readily distinctive at the sound-sensitive receivers, +3 dB.

7.44. It should be noted that where one feature is clearly perceived as dominant, it may be applicable to correct for that feature only. Where multiple features are likely to affect perception and response, each should be added arithmetically.

Assessment Profile

7.45. At this stage, final operators for each of the proposed units have not been confirmed. It is recognised that each may have differing requirements in terms of type of operation and hours of use, however reasonable worst-case assumptions will be modelled.

7.46. On this basis, it is assumed that each operator requires cold storage and therefore external chiller plant, together with refrigerated HGV units.

7.47. The site will operate 24 hours per day, therefore, the night-time BS 4142 assessment will provide a worst-case assessment of the potential impacts.

SoundPLAN Noise Model

7.48. In order to accurately assess the noise impact at the nearest residential receptors, an updated 3D noise model of the site has been created using SoundPLAN ~~7.4~~ 8.0 software. This model has been built using the following information:

- Cundall drawing no. CLXX(52)4003 Issue P4 - This 'Proposed Finish Level Including Mounds' drawing shows the proposed bund heights as incorporated within the noise model.
- Appendix 7.3 of this ES Addendum Noise and Vibration Technical Paper - This figure shows the heights of the five acoustic barrier fences located on top of bunds.
- Stephen George & Partners LLP Illustrative Masterplan 16-184-F013 Rev AG this drawing shows an option for how the Proposed Development could be delivered. This drawing has been used in the model to show building and source locations.
- Stephen George & Partners LLP Illustrative Masterplan 16-184-F013 Rev AG this drawing shows an option for how the Proposed Development could be delivered. This drawing has been used in the model to show building and source locations.
- Stephen George & Partners LLP Heights Parameters Plan 16-184-P115 Rev G – this drawing shows the maximum proposed building heights in AOD. This drawing has been combined with proposed unit slab levels to determine possible industrial unit building heights. In order to provide a worst-case assessment (with less acoustic shielding than may be possible with taller buildings), the following plot heights have been used in the model:
  - Plot 1 – 15m
  - Plot 2 – 20m
  - Plot 3 – 20m
  - Plot 4 – 30m
  - Plot 5 – 15m
  - Plot 6 – 15m
  - Plot 7 – 12m

~~7.49. The main noise sources associated with distribution operations are as follows:~~

- ~~Movement of cars and HGVs around the development – this will be dependent upon shift patterns and specific haulage company requirements; however, it is understood from the Transport Consultant that a reasonable worst case estimate would be as follows:~~
  - ~~Up to a total of 1400 two-way movements within the site between 0500 and 0600 hours~~
  - ~~10% of flows to be HGVs~~
  - ~~Distribution within the site based upon floor area of each unit in relation to overall site~~
- ~~Operation of HGV trailer condenser units – it is understood that condenser units attached to chilled / frozen food trailers can operate in both electric and diesel modes. Electric mode is typically activated when condenser units are connected to mains power, when the units are stationary within loading bays. Diesel mode is operated without the need for a mains connection. To assess~~

~~the worst-case impact, diesel refrigerant units will be incorporated within the model~~

- ~~External chiller plant – this will be required for cold storage operations~~
- ~~Other fixed building services plant including the proposed substation~~

~~7.50. To reflect a worst-case scenario, all the noise sources listed above were assumed to be in continuous operation for the full Specific Noise Level night-time assessment i.e. 15 minutes.~~

7.51. The main noise sources associated with distribution operations are as follows:

- Movement of HGVs around the development – this will be dependent upon shift patterns and specific haulage company requirements; however, it is understood from the Transport Consultant that a reasonable worst case estimate would be as up to a total of 1400 two-way movements within the site between 0500 and 0600 hours. It is understood the distribution of these would be 50/50 between the two main site entrances. The quantity of HGVs on various sections of road has subsequently been assumed to directly correlate to the floor area of each Plot the HGV traffic will be servicing, for which the distribution has been measured to be as follows;
  - Plot 1 – 8%
  - Plot 2 – 29%
  - Plot 3 – 10%
  - Plot 4 – 32%
  - Plot 5 – 11%
  - Plot 6 – 7%
  - Plot 7 – 3%
- HGV noise levels when in motion have been assigned a Sound Power Level of 104 dBA, and assumed to be moving at all times at 50 km/h along roads.
- Refrigerant units to HGVs have been assumed to have a Sound Power Level of 85 dBA. Based on the aforementioned HGV movements, the model has considered that between 0500 to 0600 hours, one in four loading bays will be occupied by an HGV with its refrigerant unit operating continuously. The loading bays with refrigerant units have been incorporated as line sources in the model (3m above ground level) with the equivalent Sound Power of the corresponding number of bays multiplied by the Sound Power of as single bay. The number of bays modelled in this scenario for each plot are as follows;
  - Plot 1 – 7 Bays
  - Plot 2 – 32 Bays
  - Plot 3 – 8 Bays
  - Plot 4 – 39 bays
  - Plot 5 – 8 Bays
  - Plot 6 – 6 Bays
  - Plot 7 – 3 Bays
- External chiller plant – this will be required for cold storage operations. Assumed Sound Power Level of 85 dBA
- Other fixed building services plant including the proposed substation – Assumed Sound Power Level of 89 dBA

Perimeter Bunding

7.52. As noted above, following Cundall input, the design team incorporated a significant landscaped bund at key locations around the perimeter of the site. This bunding provides acoustic shielding to nearby noise sensitive receptors from external noise-generating activities.

7.53. Detailed elevation levels associated with this bund have been incorporated within the updated SoundPLAN digital ground model.

7.54. The 'Proposed Finish Level Including Mounds' drawing (Cundall drawing no. ~~CLXX(52)4003 Issue –~~ CLXX(52)4003 Issue P4) shows the proposed bund as incorporated within the noise model. ~~The proposed landscaped bund is primarily to the south and west perimeter of the site, and to the north-east. It should be noted that the effective height of the bund varies from approximately 3m to 7m, dependent upon location.~~ The proposed landscaped bunding is primarily to the east and south of Plot 1 and the west of Plot 2. The bunds to the east and south of Plot 1 incline to a 1 in 3 gradient to a maximum height of approximately 5m, with a 1.2m level off at the bund peak to enable the construction of fencing. The bunds to the east and south of Plot 2 also incline to a 1 in 3 gradient to a maximum height of approximately 4.5m, and also include a 1.2m level off at the bund peak to enable the construction of fencing.

7.55. In addition to the bunding, acoustic timber fencing will also be provided in certain locations on sections of these bunds to mitigate against noise impacts. A total of five fences will be erected at the locations indicated in Appendix 7.3 of this ES Addendum Noise and Vibration Technical Paper. A summary description of each of these acoustic barrier locations is also provided below;

- 3m Fence to the north of the roundabout at the eastern site entrance
- 2.5m Fence to the south east of the roundabout at the eastern site entrance
- 3m Fence on the bund peak to the north east of Plot 1 - west of Bradley View Cottages
- 3m Fence on the bund peak to the south of Plot 1 - west of Bradley Hall Cottages
- 3m Fence the bund peak to the west of Plot 2 - east of Bradley Hall Cottages

7.56. The figures below show a clipped excerpt from Appendix 7.3 as well as a 3D view of proposed timber fencing.

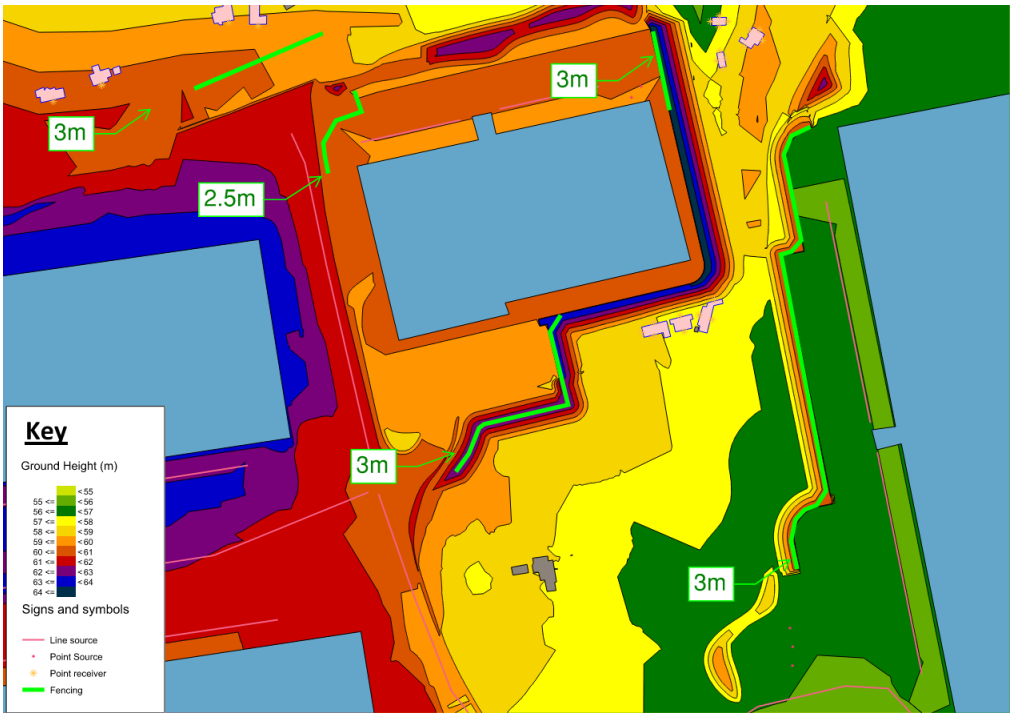

Figure 7.2a: Extent of bund and acoustic barrier mitigation measures – 2D Plan

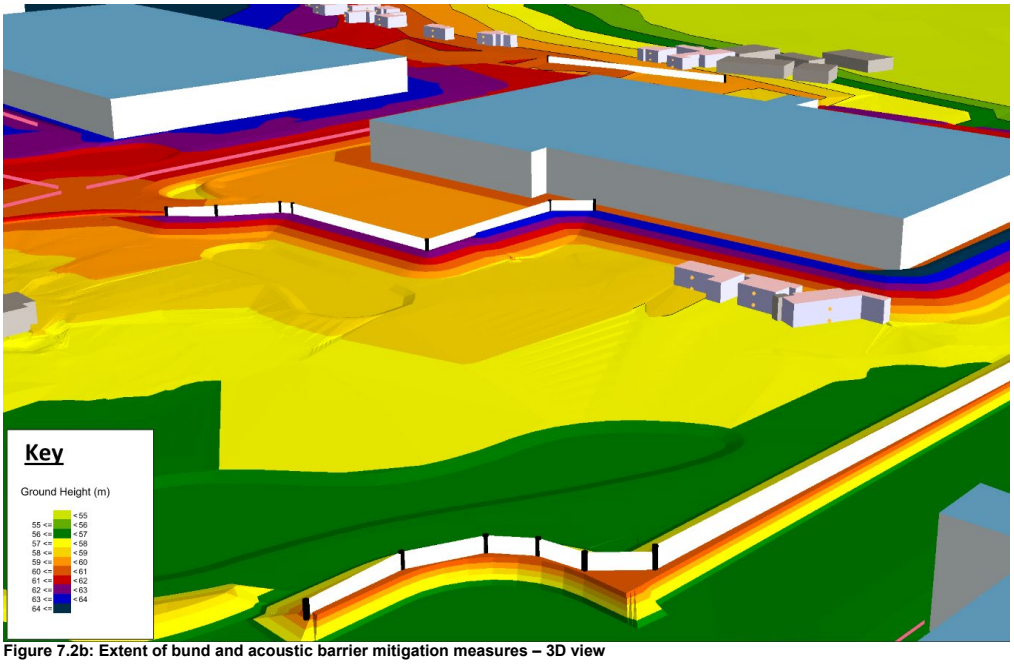

Figure 7.2b: Extent of bund and acoustic barrier mitigation measures – 3D view

Results

7.57. The figure below shows the night-time noise map based upon the operation of noise sources listed above. The night-time noise map has a calculation height of 4.5 m to display the noise impact at first floor residential window level (a worst case as ground floor levels are reduced).

Figure 7.3: Predicted grid noise map at height of 4.5 metres

7.58. The table below shows predicted worst-case noise levels at the most exposed existing residential locations during the night-time period. The predicted levels are effectively BS 4142 specific noise levels.

~~Receptor~~	~~Predicted Night-time $L_{Aeq,15mins}$ dB~~
~~A~~	~~42~~
~~B~~	~~52~~
~~C~~	~~51~~
~~D~~	~~53~~
~~E~~	~~48~~
~~F~~	~~49~~
~~G~~	~~57~~

~~Receptor~~	~~Predicted Night-time $L_{Aeq,15mins}$ dB~~
~~H~~	~~42~~
~~I~~	~~42~~

~~Table 7.20: Predicted BS 4142 Night-time Specific Noise Level~~

Receptor	Predicted Night-time $L_{Aeq,15mins}$ dB
A	35
B	44
C	40
D	36
E	38
F	39
G	42
H	40
I	41

Table 7.20: Predicted BS 4142 Night-time Specific Noise Level

Determination of BS 4142 Acoustic Feature Corrections

7.59. The specific sound levels determined above must be corrected in terms of the subjective prominence of the impact of the sound at sound-sensitive receivers, and the extent to which acoustically distinctive characteristics will attract attention.

7.60. The sound sources considered are typically broad-band in nature, without specific tonal elements, but could be distinctive in terms of impulsiveness and intermittency.

7.61. Therefore, an additional 6 dB correction for acoustic characteristics has been applied to the specific sound levels above to determine the rating level.

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7.62. The magnitude of impact is assessed by subtracting the measured background sound level at a location representative of the nearest sound-sensitive receiver, from the rating level.

7.63. Typically, the greater the difference between the background and rating level, the greater the magnitude of impact, although BS 4142 emphasises that this is highly context-specific.

7.64. With reference to the magnitude of impact criteria, the table below summarises the assessment for first-floor receptors. The magnitude of impact has been determined at each receptor by comparing predicted worst case noise levels (taken from the SoundPLAN noise model) with the operational noise magnitude criteria shown in Table 7.9.

~~Receptor~~	~~Specific noise level / dB $L_{Aeq,15min}$~~	~~Acoustic feature correction* / dB~~	~~Rating Level / dB $L_{Ar,15min}$~~	~~Background Level / dB $L_{A90,15min}$~~	~~Difference~~	~~Magnitude of Impact~~
~~A~~	~~42~~	~~+6~~	~~48~~	~~49~~	~~-1~~	~~Negligible~~
~~B~~	~~52~~	~~+6~~	~~58~~	~~47~~	~~11~~	~~High~~
~~C~~	~~51~~	~~+6~~	~~57~~	~~38~~	~~19~~	~~Substantial~~
~~D~~	~~53~~	~~+6~~	~~59~~	~~57~~	~~2~~	~~Minor~~
~~E~~	~~48~~	~~+6~~	~~54~~	~~54~~	~~0~~	~~Minor~~
~~F~~	~~49~~	~~+6~~	~~55~~	~~48~~	~~7~~	~~Moderate~~
~~G~~	~~57~~	~~+6~~	~~63~~	~~37~~	~~26~~	~~Substantial~~
~~H~~	~~42~~	~~+6~~	~~48~~	~~49~~	~~-1~~	~~Negligible~~
~~I~~	~~42~~	~~+6~~	~~48~~	~~49~~	~~-1~~	~~Negligible~~
~~Correction for acoustically distinguishable characteristics based on 0 dB correction for tonality, +3 dB correction for impulsivity, and +3 dB correction for intermittency~~						

~~Table 7.21: Impact of noise from operational phase~~

Receptor	Specific noise level / dB $L_{Aeq,15min}$	Acoustic feature correction* / dB	Rating Level / dB $L_{Ar,15min}$	Background Level / dB $L_{A90,15min}$	Difference	Magnitude of Impact
A	35	+6	41	49	-8	Neutral
B	44	+6	50	47	+3	Minor
C	40	+6	46	38	+8	Moderate
D	36	+6	50	57	-7	Neutral
E	38	+6	44	54	-10	Neutral

Receptor	Specific noise level / dB $L_{Aeq,15min}$	Acoustic feature correction* / dB	Rating Level / dB $L_{Ar,15min}$	Background Level / dB $L_{A90,15min}$	Difference	Magnitude of Impact
F	39	+6	45	48	-3	Negligible
G	42	+6	48	37	+11	High
H	40	+6	46	49	-3	Negligible
I	41	+6	47	49	-2	Negligible
Correction for acoustically distinguishable characteristics based on 0 dB correction for tonality, +3 dB correction for impulsivity, and +3 dB correction for intermittency						

Table 7.21: Impact of noise from operational phase

7.65. With reference to the industrial noise impact criteria, it can be seen from the results in the table above that the magnitude of impact associated with operational noise impacts range from ~~negligible~~ neutral to ~~substantial~~ high adverse.

7.66. As all receptors are considered have a 'Local' sensitivity value, this equates to a significance of effect ranging from negligible to ~~moderate~~ minor adverse.

Operational Road Traffic Noise

7.67. Changes in 18-hour traffic noise levels have been calculated using methodologies in line with CRTN guidance. Baseline and operational traffic flow data has been provided as part of the traffic assessment (as part of this ES, see Paper 2: Transport).

7.68. The following tables present the operational traffic noise assessment for the assessment years 2021 and 2029. Traffic flow diagrams for assessed road links are included in the updated Transport Assessment submitted with this Application and appended to the ES. The magnitude of impact has been determined at each receptor by comparing calculated noise change with the operational traffic noise magnitude criteria shown in Table 7.8.

Road Link	Baseline 18-hour AAWT Traffic Flow (2021)		Baseline + Development 18-hour AAWT Traffic Flow (2021)		Noise Change dB	Magnitude of Impact
	Total Vehicles	%HGV	Total Vehicles	%HGV		
A50 Knutsford Rd N	19028	4%	20117	4%	0.2	Negligible
A50 Knutsford Rd Mid	17484	4%	18852	4%	0.3	Negligible
A50 Knutsford Road S	17331	4%	18016	4%	0.2	Negligible
A56 Chester Road W	12320	3%	13299	3%	0.3	Negligible
A56 Chester Road Mid	9708	3%	9708	3%	0.0	Neutral
Stockport Road	13203	3%	13482	3%	0.1	Negligible
Church Lane N	5092	2%	6071	2%	0.8	Negligible
Church Lane Mid	1811	3%	1811	3%	0.0	Neutral
Church Lane S	1790	3%	1790	3%	0.0	Neutral
Stockton Lane	179	0%	179	0%	0.0	Neutral
Broad Lane N	3678	2%	4658	2%	1.0	Negligible
Broad Lane S	19200	10%	21017	9%	0.4	Negligible
B5356 Grappenhall Ln	12836	2%	14654	2%	0.6	Negligible
Barleycastle Lane	13344	13%	13344	13%	0.0	Neutral
Grappenhall Road W	16429	11%	19226	9%	0.7	Negligible
Grappenhall Road Mid	16429	11%	26422	15%	2.1	Negligible
Grappenhall Road E	16343	11%	33532	19%	3.1	Minor
A50 Cliff Lane W	32007	8%	47829	14%	1.8	Negligible
A50 Cliff Lane Mid	23752	16%	24124	16%	0.1	Negligible
A50 Cliff Lane E	9900	4%	10272	4%	0.2	Negligible
M6 Slip NW	17661	9%	21726	12%	0.9	Negligible
M6 Slip NE	6531	11%	10612	16%	2.1	Negligible
M6 Slip SW	15834	13%	19553	17%	0.9	Negligible
M6 Slip SE	12639	13%	16225	18%	1.1	Negligible
B5158 Cherry Lane	8450	2%	8450	2%	0.0	Neutral
Lymm Service access	13198	25%	13198	25%	0.0	Neutral

Table 7.22: Road Traffic Noise Change - Operation Phase - 2021

Road Link	Baseline 18-hour AAWT Traffic Flow (2029)		Baseline + Development 18-hour AAWT Traffic Flow (2029)		Noise Change dB	Magnitude of Impact
	Total Vehicles	%HGV	Total Vehicles	%HGV		
A50 Knutsford Rd N	20323	4%	21411	4%	0.2	Negligible

Road Link	Baseline 18-hour AAWT Traffic Flow (2029)		Baseline + Development 18-hour AAWT Traffic Flow (2029)		Noise Change dB	Magnitude of Impact
	Total Vehicles	%HGV	Total Vehicles	%HGV		
A50 Knutsford Rd Mid	18674	4%	20041	4%	0.3	Negligible
A50 Knutsford Road S	18510	4%	19195	4%	0.2	Negligible
A56 Chester Road W	13125	3%	14105	3%	0.3	Negligible
A56 Chester Road Mid	10336	3%	10336	3%	0.0	Neutral
Stockport Road	14069	3%	14348	3%	0.1	Negligible
Church Lane N	5438	2%	6418	2%	0.7	Negligible
Church Lane Mid	3929	2%	4908	2%	1.0	Negligible
Church Lane S	1912	3%	1912	3%	0.0	Neutral
Stockton Lane	191	0%	191	0%	0.0	Neutral
Broad Lane N	3929	2%	4908	2%	1.0	Negligible
Broad Lane S	20432	10%	22249	9%	0.4	Negligible
B5356 Grappenhall Ln	13635	2%	15452	2%	0.5	Negligible
Barleycastle Lane	14252	13%	14252	13%	0.0	Neutral
Grappenhall Road W	17472	11%	20269	9%	0.6	Negligible
Grappenhall Road Mid	17472	11%	27465	15%	2.0	Negligible
Grappenhall Road E	17380	11%	34570	19%	3.0	Minor
A50 Cliff Lane W	34111	8%	49933	14%	1.7	Negligible
A50 Cliff Lane Mid	25355	16%	25727	16%	0.1	Negligible
A50 Cliff Lane E	10573	4%	10946	4%	0.1	Negligible
M6 Slip NW	18843	9%	22908	12%	0.9	Negligible
M6 Slip NE	14649	10%	18729	13%	1.1	Negligible
M6 Slip SW	16896	13%	20614	17%	0.9	Negligible
M6 Slip SE	13485	13%	17071	17%	1.0	Negligible
B5158 Cherry Lane	9023	2%	9023	2%	0.0	Neutral
Lymm Service access	14097	25%	14097	25%	0.0	Neutral

Table 7.23: Road Traffic Noise Change - Operation Phase - 2029

7.69. Assuming the presence of highly sensitive receptors on all road links assessed, and with reference to the traffic noise assessment criteria, it is predicted that the significance of effect of operational traffic noise will be negligible (in most cases) rising to minor adverse at the eastern-most Grappenhall Road link.

7.70. From an NPSE perspective, the predicted cumulative traffic noise impact is at a level considered to be between the NOEL and the LOAEL.

Summary of Operational Phase Effects

7.71. The table below summarises the identified noise[2] effects through the operational phase.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
Industrial noise impacts associated with Development – Most Receptors	Local	~~Minor~~ Neutral to ~~high~~ minor negative	Minor adverse	High
Industrial noise impacts associated with Development - Bradley Hall Cottages and Bradley View	Local	~~Substantial~~ High negative	~~Moderate~~ Minor adverse	High
Increase in traffic on local road networks	Local	Negligible to minor negative	Negligible to minor adverse	High
[1] – worst-case assumptions have been made in noise modelling, therefore the confidence level in a minor adverse impact not being exceeded is high.				

Table 7.24: Significance of Effect - Operation Phase

[2] Note – as documented at the beginning of this Paper, there are no significant sources of vibration which form part of the Proposed Development. Operational vibration effects are therefore scoped out of this assessment.

8. Proposed Mitigation

Construction Phase

8.1. It is anticipated that main contractors delivering the scheme will be required to submit a detailed Construction Environmental Management Plan (CEMP) as part of future Reserved Matters planning applications (a Framework CEMP is included in Appendix 9 of the ES Addendum Part 1 Report). It is likely that they will therefore be committed to following Best Practicable Means (BPM) to minimise the noise and vibration impact on nearby noise sensitive properties. Such measures include the following:

- All construction plant and equipment should comply with EU noise emission limits.
- Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.
- Proper use of plant with respect to minimising noise emissions and regular maintenance. All vehicles and mechanical plant used for the purpose of the works should be fitted with effective exhaust silencers and should be maintained in good efficient working order.
- Selection of inherently quiet plant where appropriate. All major compressors should be 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use and all ancillary pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers.
- Plant and equipment such as flatbed lorries, skips and chutes should be lined with noise attenuating materials. Materials should be handled with care and be placed, not dropped.
- Care should be taken when erecting or striking scaffolds to avoid impact noise from banging steel. All operatives undertaking such activities should be instructed on the importance of handling the scaffolds to reduce noise to a minimum before access is possible.
- All ancillary plant such as generators, compressors and pumps should be positioned so as to cause minimum noise disturbance. If necessary, localised screens and enclosures should be used to reduce noise from particular noisy, static operations.
- Wherever possible, the use of hydraulic attachments or other means of crushing concrete and hard materials should be used in preference to pneumatic breakers. Where the use of impact hammers is necessary, their attachment to larger and heavier excavators often can reduce the level of vibration.
- Deliveries should be programmed to arrive during daytime hours wherever practicable. Care should be taken when unloading vehicles to minimise noise. Delivery vehicles should be routed so as to minimise disturbance to local residents. Delivery vehicles should be prohibited from waiting on the highway or within the site with their engines running.

- Construction contractors would be obliged to adhere to the codes of practice for construction working and piling given in British Standard BS 5228 and the guidance given therein minimising noise emissions from the site.
- Piling should be avoided wherever possible and low vibration piling techniques such as continuous flight auger piling should be adopted wherever practicable.

8.2. Problems concerning noise from construction works can sometimes be avoided by taking a considerate and neighbourly approach to relations with the local residents. Anticipated working hours are 08:00 to 18:00 Monday to Friday, 08:00 to 13:00 on Saturday and no proposed working Sundays and bank holidays.

8.3. As noted in Paragraph 6.3, the formation of the acoustic bunds should be included as part of the enabling works with the above BPM used to mitigate possible enabling work noise impacts prior to their completion.

8.4. A formal CMP will be produced by the main contractor prior to site works being undertaken.

Operational Phase

8.5. The assessment provided has been based on several worst-case assumptions, as final operators for each of the proposed units have not been confirmed. Assumptions on potential scales of operation of each proposed unit have been based on the updated Development Cells Parameters Plan (Drawing No: 16-184-P110 ~~Rev D~~ Rev G).

8.6. On this basis, the use of refrigerated HGV units and external chiller plant have been incorporated into the noise model. It is noted that an ambient storage operator would not require such facilities, and the associated noise impact would therefore be reduced.

8.7. It is also recognised that the number of HGV movements onto the site and within service yards have been based on the Transport Consultant's current assumptions on vehicle flows. It is further understood that provided flows are based upon survey data obtained from the Omega distribution hub which are significantly higher than industry standard prediction methods.

8.8. Future Reserved Matters planning applications should therefore include further assessments on noise impacts, based on confirmed proposals such as building layout, operating procedures, plant requirements, and vehicle flows.

8.9. These future assessments may affect the mitigation measures required, such as the detailed design of perimeter bunding currently included within the outline application.

8.10. Nevertheless, mitigation measures to limit noise impacts should be adopted as detailed within the Parameters Plans. Noise considerations that have been incorporated during development of these Parameters Plans include:

- The orientation of loading bays / docks with respect to sensitive receptors.
- The location of services plant to maximize distance from noise-sensitive receivers and the potential screening effects afforded by proposed units.

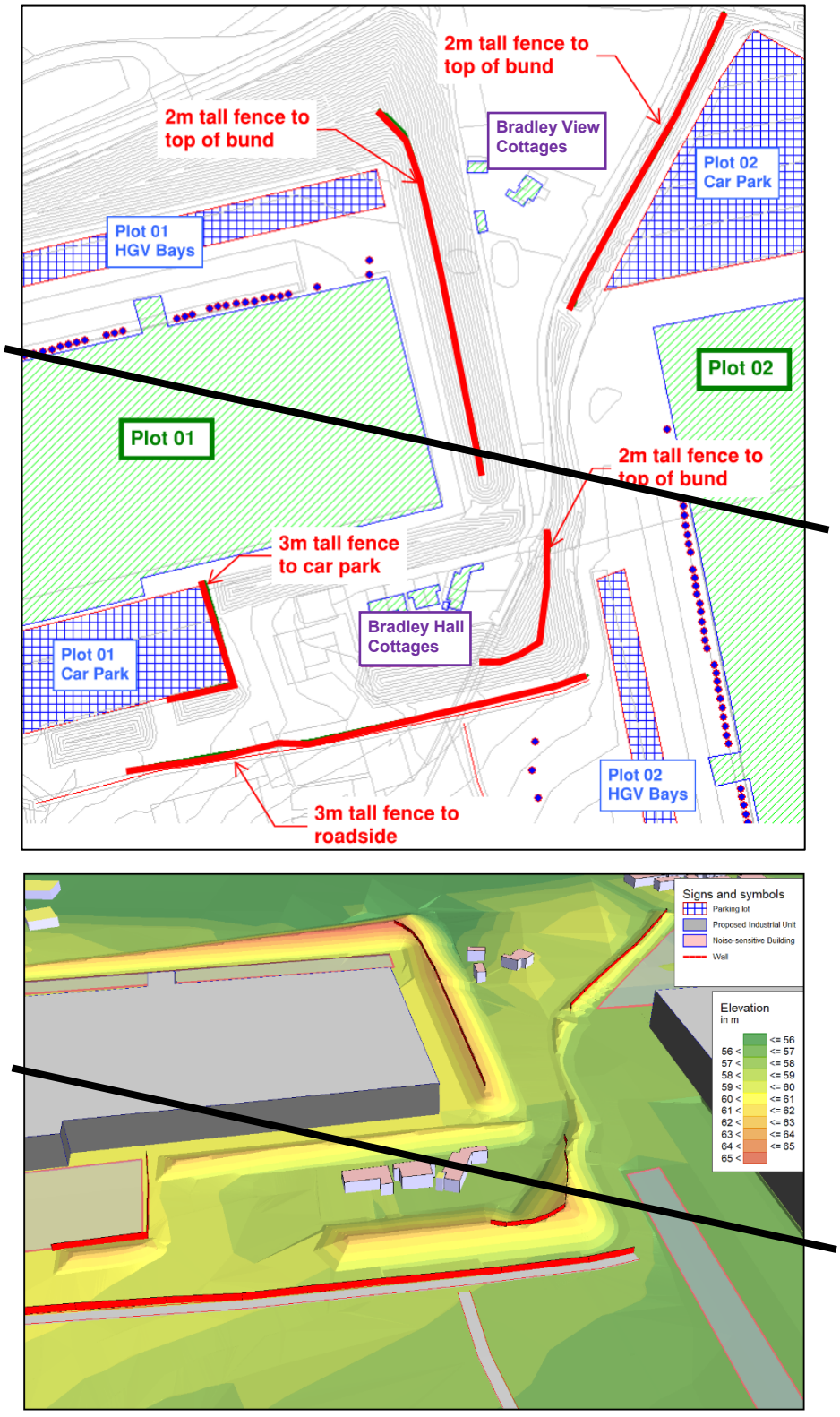
8.11. The final mitigation strategy would be dependent upon the Reserved Matters applicant.

~~**Bradley Hall Cottages**~~

~~8.12. Through interrogation of the 3D noise model results for Operational Phase impacts at Bradley Hall Cottages and Bradley view (i.e. the two worst affected receptors), it has been determined that the dominant source of noise contribution is associated with LGV and HGV traffic movements along new access road and within parking areas.~~

~~8.13. Whilst it is considered unlikely that significant adverse effects can be avoided at these receptors, providing additional acoustic barrier screening to carefully considered roadside and bund locations should result in up to a 5 dB reduction in specific noise levels at these receptors.~~

~~8.14. The suggested extents and height of bunding and additional acoustic screening proposals are indicated in the following figures. All barrier should have a minimum area density of 10 kg/m^2 with no holes or gaps.~~



~~Figure 7:4 – Example barrier mitigation proposals~~

Bradley Hall and Bradley View Cottages

8.15. The updated Operational noise modelling has identified a significant reduction in the expected magnitude of impact at Bradley View Cottages and Bradley Hall Cottages in comparison to the original Operational noise modelling exercise. This is in part due to the re-alignment of the Plot 2 estate road which was previously located immediately to the south of Bradley Hall Cottages, but is now positioned further away on the opposite side of the Scheduled Ancient Monument (SAM) to the north of Plot 3. In addition, an increase in the effective height of bunds and timber fencing in various location nearby to Bradley Hall Cottages has resulted in an increase in the level of sound attenuation provided to these receptors.

8.16. Further to the updated modeling, the significance effect at both receptors is now predicted to be minor adverse. Table 7.26 of this Addendum Technical Paper has therefore been amended to reflect that operational phase industrial noise impacts associated with Development are expected to be no greater than minor adverse at any receptor.

8.17. It should be noted that the current assessment can be considered an absolute worst-case assessment. The noise associated with peak operational road traffic flows on internal roads (based upon the Omega Development) has been combined with service yard operational noise sources on each development plot. BS 4142 acoustic feature corrections have then been added to the noise from all sources operating concurrently and compared against night-time background noise levels at nearby receptors. In reality, the probability of all such sources operating concurrently is reasonably low and could only been assessed in detail once specific operators come forward with Reserved Matters applications. At this point, detailed mitigation measure requirements could be determined and should be implemented prior to occupation of the associated neighbouring industrial unit(s).

9. Potential Residual Effects

9.1. The following tables show the residual significance of the environmental effect from noise post mitigation, through both the construction and operational phase.

9.2. The 'Significance of Effect' refers to the Significance Matrix table given in Section 6 of the Environmental Statement Addendum Part One.

Potential Residual Effects – Construction Phase

9.3. The overall impact of the proposal in terms of noise and vibration issues during the construction phase is highlighted in the table below:

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Significance of Effect
Construction noise impacting on existing noise sensitive receptors	Local	Neutral to Minor Negative	Neutral to Minor Adverse	Low	Construction Environmental Management Plans	Negligible
Construction traffic noise impacting on existing noise sensitive receptors	Local	Negligible	Negligible	High	Construction Environmental Management Plans	Negligible
Construction vibration impacting on existing noise sensitive receptors	Local	Negligible	Negligible	High	Limit piling activities / utilise low vibration plant techniques	Negligible

Table 7.25: Residual Significance of Effect - Construction Phase

9.4. With reference to the impact of noise during the construction stage, it should be noted that the assessment undertaken did not include the sound attenuation provided by the perimeter bunding to the site, to assess a worst case. In reality, the impact of much of the later stages of groundwork operations will be significantly reduced.

Potential Residual Effects – Operational Phase

9.5. The overall impact of the proposal in terms of noise issues during the operational phase is highlighted in the table below:

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Significance of Effect
Industrial noise impacts associated with Development – Most Receptors	Local	~~Minor~~ Neutral to ~~high~~ minor negative	Minor adverse	High	-	Minor adverse
Industrial noise impacts associated with Development - Bradley Hall Cottages and Bradley View	Local	~~Substantial~~ High negative	~~Moderate~~ Minor adverse	High	~~Additional acoustic barriers to screen operational road sources~~	~~Moderate~~ Minor adverse
Increase in traffic on local road networks	Local	Negligible to minor negative	Negligible to minor adverse	High	None	Negligible

Table 7.26: Residual Significance of Effect - Operation Phase

~~9.6. With reference to industrial noise impacts associated with the Proposed Development, it should be noted that worst-case assumptions have been made in noise modelling, therefore the confidence level in a moderate adverse impact not being exceeded at most receptors is high. As noted in Paragraph 8.14, it is likely that noise effects could be reduced once detailed proposals are brought forward by specific operators at Reserved Matters application stage. This is the point at which detailed mitigation proposals would be developed which would reduce noise impacts at sensitive receptors.~~

9.7. As noted in Paragraph 8.15 of this Addendum, whilst the original residual significance of effect at Bradley Hall Cottagers and Bradley View was predicted to be moderate adverse, the updated modelling has identified that this is predicted to have reduced to minor adverse. Table 7.26 has above therefore been updated to reflect that the predicted residual significance of effect is in line with other receptors across the scheme.

9.8. With reference to industrial noise impacts associated with the Proposed Development, it should be noted that worst-case assumptions have been made in noise modelling, therefore the confidence level in a moderate adverse impact not being exceeded at most receptors is

high. The outputs from the noise modelling process assume that all units on the site will store chilled / frozen materials which would result in refrigerated trailers operating in loading bays throughout the night. Whilst this cannot be ruled out at this stage in the planning process, it is considered reasonably unlikely that all future operators would have all loading bays occupied by refrigerated trailers simultaneously.

9.9. In addition, the HGV movements around the site have been based upon flows provided to Cundall by Curtins (the project transport consultant). It is understood that these flows are based upon those surveyed at the Omega Warrington site, rather than on industry guidance for a development of this nature. The use of these flows also contributes to the worst-case nature of this outline noise assessment.

9.10. The scheme of mitigation proposed has been based upon detailed interrogation of the predicted noise impacts at the most affected receptors. The combination of bunding / acoustic fencing has been developed based upon the worst-case operational assumptions made whilst also being sympathetic to the issue of visual impact. It is considered that the currently developed scheme of mitigation provides adequate protection to receptors in principle.

9.11. As future Reserved Matters applications come forward, the proposed operators will be in a position to provide further clarity in relation to the assumptions made on:

- Operating hours
- HGV flows
- The need for refrigerated trailer operation
- Services plant equipment

Due to the worst-case nature of the assumptions made in this assessment, it is expected that the provision of detailed information by Reserved Matters applicants will provide a betterment of the predicted noise impact at sensitive receptors.

10. Additive Impacts (Cumulative Impacts and their Effects)

10.1. For the purposes of this ES we define the additive cumulative effects as:

> ***'Those that result from additive impacts (cumulative) caused by other existing and/or approved projects together with the project itself***

10.2. The developments that are likely to have a cumulative impact when considered with the proposed development have been scoped with the Local Authority and Key Consultees during the preparation of this ES (a full list is included within Section 9 of the ES Addendum Part One Report). The following table includes the agreed list of cumulative developments that have been assessed in respect of Noise and Vibration. These are also shown geographically on the plan included at Appendix 11of the ES Addendum Part One Report.

10.3. The assessment results contained within this section for the Cumulative Impact Assessment are presented as a worst-case scenario. They assess the Liberty Properties / Eddie Stobart proposal which is now subject of a SoS Call In. ~~has recently been refused planning permission.~~ This cumulative assessment is based upon information available to date, as shown in Table 7.27.

10.4. Within this Cumulative Assessment, third party forecast traffic flow data has been used (see the updated Transport Assessment in Appendix 2.1 of the ES Addendum Traffic and Transport Technical Paper). That data was produced through the creation of a wide area traffic model.

10.5. Two cumulative assessment scenarios have been considered at the future years of 2021 and 2029 with no mitigation contained within the associated traffic modelling process. This represents a worst-case assessment of all known potential developments which are likely to influence the study area.

No.	**Possible Cumulative Development**	**Details**	**Status**	**Justification for Cumulative**
1	Land bounded by Pewterspear Green Road, Ashford Drive, Stretton, Warrington LPA Ref: 2016/28807 Applicant - HCA	Outline Planning Application for 180 dwellings.	Planning permission granted by WMBC 28-09-2017 (3 years to implement planning permission)	It is a committed development and therefore included within the future baseline and assessed within the assessment of the Proposed Development. It does not therefore need reconsidering in the cumulative assessment for noise and vibration.
2	Land bounded by Green Lane &, Dipping Brook Avenue, Appleton, Warrington, WA4 5NN LPA Ref: 2017/29930 Applicant – HCA	Outline Planning Application for 370 dwellings	Planning permission granted by WMBC 22-01-2018 (3 years to implement planning permission)	
3	Land South of Astor Drive, East of Lichfield Avenue &, South of Witherwin Avenue, Grappenhall Heys, Warrington, WA4 3LG LPA Ref: 2017/29929 Applicant – HCA	Outline Planning Application for 400 dwellings	Planning permission granted by WMBC 22-01-2018 (3 years to implement planning permission)	
4	Land North of Barleycastle Lane, Appleton, Warrington Liberty Properties Development Ltd & Eddie Stobart LPA Ref: 2017/31757	Full Planning application (Major) - Demolition of all existing on-site buildings and structures and construction of a National Distribution Centre building (Use Class B8) with ancillary office accommodation (Class B1(a)), vehicle maintenance unit, vehicle washing area, internal roads, gatehouse, parking areas, perimeter	Refused Planning Permission by WMBC 14-11-2018. Decision subsequently appealed (Appeal reference: APP/M0655/W/19/3222603) and considered at Public Inquiry. Decision pending following closure of Inquiry. New planning application submitted under Ref: 2019/34739 and granted planning permission at planning committee by WBC in July 2019. Referred to the SoS.	Potential relationship in terms of construction and operational noise if the plan is consented in future. However, if consented, it is assumed the Liberty Properties / Eddie Stobart development will be designed to limit the cumulative impact of noise and vibration at sensitive receptors during both construction and operational phases. Whilst the planning application has been ~~refused~~ referred to the SoS it is still to form part of a sensitivity test for traffic and therefore included within the assessment of the Proposed

		fencing, waste management area, sustainable urban drainage system, landscaping, highways improvements and other associated works. (Gross internal floor space of 56,197m², together with 1,858m² of ancillary office)	On the 21st May 2020, the SoS confirmed that that the new application (Ref: 2019/34739) should be called in. The SoS states that as the appeal scheme and the new application scheme are effectively identitical, they should be joined. As an inquiry has already been held into the appeal scheme, he does not consider that a further inquiry is necessary. The SoS has therefore invited representations on any material change in circumstances, fact or policy, that may have arisen since the inquiry. A decision on both these schemes is therefore pending.	Development. It does not therefore need reconsidering in terms of traffic generation in respect of noise and vibration.
5	Land to the east of Stretton Road, north of Pepper Street, Stretton Road, Appleton Thorn, Warrington LPA Ref: 2017/31848	Full Planning Application for 71 dwellings	Planning permission granted by WMBC 24-10-2018 (3 years to implement planning permission)	It is a committed development and therefore included within the future baseline and assessed within the assessment of the Proposed Development. It does not therefore need reconsidering in the cumulative assessment for noise and vibration.
6	Blue Machinery Ltd, Barleycastle Trading Estate, Lyncastle Road, Warrington, WA4 4SY LPA Ref: 2016/28994	Full Planning Application for new industrial warehouse building for storage (replacing smaller storage building), single storey extension to existing building for further storage and two storey extension for additional office space, associated parking provision and landscaping. (1,699m² new build, 180m² and 265m² extensions)	Planning permission granted by WMBC 17-02-2017 (3 years to implement planning permission)	The traffic generation is not considered to be significant and therefore there is not considered to be a relationship in respect of noise and vibration.
7	Land off Lyncastle Way, Barleycastle Lane, Appleton, Warrington, WA4 4SN LPA Ref:	Full Planning Application for industrial / warehouse development (Sui Generis) to facilitate a plant hire business with	Planning permission granted by WMBC 16-10-2015	The traffic generation is not considered to be significant and therefore there is not considered to be a relationship in respect of noise and vibration.

	2015/25255 Morley Estates	elements of vehicle / plant repair, servicing, maintenance and plant storage / distribution / parking and associated offices / welfare facilities, vehicular access via existing service road, acoustic bunding and fencing and other means of enclosure, soft landscaping, 36 car park spaces, fuel pumps (and associated underground tanks), vehicle / plant wash bay and sub-station (Resubmission of 2014/24618) (4,545sqm industrial warehouse building)		
8	Former Stretton Airfield, Warrington, WA4 4RG LPA Ref: 2014/2332 Hensmill Property	Proposed construction of subterranean car storage facility (B8 Use Class) with ancillary office development and associated demolition and landscaping accessed from Crowley Lane.	Planning permission granted 23-06-2015	The traffic generation is not considered to be significant and therefore there is not considered to be a relationship in respect of noise and vibration.
9*	Warrington Garden Suburb as identified in the Council's Preferred Development Option Consultation Document (July 2017) and Submission version of the Local Plan (March 2019)	The Warrington Garden Suburb is identified as a Preferred Development Option, in the July 2017 Consultation Document which provides the potential development of around 7,000 new homes to be delivered over the full 20 years of the Plan, therefore we have assessed relevant phases with the Cumulative Assessment. It should be noted that since the original ES was prepared and		Potential relationship in terms of socio economic. The 1021 dwellings that form part of the Garden Suburb Phase 1 are already assessed as committed development and therefore included within the future baseline and assessed within the assessment of the Proposed Development. It does not therefore need reconsidering in the cumulative assessment for traffic and transport, noise and vibration and air quality. The 15.7ha of employment land at Land North of Barley Castle Lane (Liberty Properties and Stobart) and the additional 1,995 residential units expected to be delivered in Phase 2 of the Garden Suburb will be

		submitted the Council have published their Proposed Submission Version Local Plan (March 2019), which states that the Garden Suburb will deliver around 7,400 homes, with around only 5,100 of these homes to be delivered within the Plan Period, up to 2037. Policy MD2 of the Submission Version Local Plan does not identify a phasing or development trajectory, therefore this assessment remains based on the information contained in the Preferred Development Option Consultation Document (July 2017). On this basis, the cumulative assessment of 700 homes over the plan period of 20 years undertaken as part of the original ES provides a robust assessment. Using the Development Trajectory (Table 20 Garden City Suburb Employment Land Trajectory of the Preferred Development Option Consultation Document) we have based the cumulative assessment ONLY on the quantum of development within the Garden Suburb expected to come forward in parallel with the delivery timeframe for the Six 56 Application Proposals. *Due to the limited information available		assessed in the Traffic and Transportation, Noise and Air Quality cumulative assessments based on traffic assessments and Warrington Council's Multi Model Highways Model produced for the emerging Local Plan, which takes account of additional Local Plan Growth in the area. The Cumulative Assessment will be based on the assumptions made within this model in terms of timing of delivery and distribution of traffic on the network. Agricultural Land and Socio Economic cumulative assessments will be based on the residual residential quantum of development (1995 dwellings) identified in the Garden Suburb Phase 2. There is not sufficient information available in terms of spatial delivery for cumulative assessments to be undertaken in respect of the other technical areas, which include Geology and Ground Conditions; Flood Risk and Drainage; Landscape and Visual Impact; Ecology and Nature Conservation; Cultural Heritage and Archaeology; Utilities; Waste; and Energy. As such it is not possible to undertake a cumulative assessment in respect of these technical areas.

		in respect of the Garden Suburb, the Six 56 Warrington Cumulative Assessment will be a non-spatial assessment.		
	Warrington Garden Suburb Phase	**Uses and Quantum identified in Preferred Development Option (July 2017)**	**Uses and Quantum to be identified in Six 56 Cumulative Assessment**	
	Phase 1 0-5 years Assumed 2020-2025	406 residential units (non- Green Belt sites) 22ha employment (employment areas include Six 56 Warrington and Land around Barley Castle Lane)	Six 56 Proposals will be under construction, with part delivered within Phase 1 of the Garden Suburb. The following form part of the Garden Suburb Phase 1 and will be included within the Cumulative Assessment: • HCA sites (950 dwgs)* • 71 dwgs associated with land to east of Stretton Road* • Land North of Barley Castle Lane (Liberty Properties and Stobart) (LPA Ref: 2017/31757) - 15.7ha* *Note that these sites are already included as part of the Cumulative Assessment and already referenced as sites 1, 2, 3 and 4.	
	Phase 2 6-10 years Assumed 2026-2030	2610 residential units (includes 496 non-Green Belt sites and 2,114 Green Belt sites) 30.3 ha employment (employment areas include Six 56 Warrington and Land around Barley Castle Lane)	Six 56 Proposals will be completed during ~~2027~~/2029. The following form part of the Garden Suburb Phase 2 and will be included within the Cumulative Assessment: Garden City Suburb Phase 1 and 2 employment land equates to 52.3ha, beyond the 30 ha referenced in the Phase 1 and Phase 2 employment trajectory set out in the PDO. Six 56 Warrington developable area and planning application for Land North or Barley Castle Lane (LPA Ref: 2017/31757) already	

			equates to 77.52 ha and is already included as part of the Cumulative Assessment. Garden Suburb Phase 1 and 2 residential units equates to a total of 3016 units. The Cumulative Assessment already includes 1,021 residential units. Therefore this Cumulative Assessments should include an **additional 1995 residential units** (i.e. the residual number of units identified in Preferred Development Option that not already included within Six 56 Cumulative Assessment)	
	Phase 3 11-15 years Assumed 2031-2035	2,144 ha residential units 45.9 ha employment	The Six 56 Proposals will be fully operational Given this Phase of the Garden City Suburb will be beyond the delivery of Six 56 Proposals this phase will not to be included within the Six 56 Cumulative Assessment	
	Phase 4 16-20 years Assumed 2036-2040	2,144 residential units 18.6ha employment	The Six 56 Proposals will be fully operational Given this Phase of the Garden City Suburb will be beyond the delivery of Six 56 Proposals this phase will not to be included within the Six 56 Cumulative Assessment	

Table 7.27: Cumulative Development

Cumulative Construction and Operational Noise and Vibration

10.6. Both the proposed development and the Liberty Properties / Eddie Stobart planning application have been considered as cumulative developments in terms of construction and operational Noise & Vibration. Where developments highlighted in Table 7.27 have been identified as committed developments (e.g. Warrington Garden Suburb), these have already been included within the future baseline and assessed within the assessment of the Proposed Development. These committed developments do therefore not need reconsidering in the

cumulative assessment for noise and vibration. No other cumulative developments have been considered as they are sufficiently far away from the development site,

10.7. It is assumed that (if consented) the Liberty Properties / Eddie Stobart development will be designed to limit the cumulative impact of noise and vibration at sensitive receptors during both construction and operational phases.

10.8. Previously identified sensitive receptors that are most likely to be affected by cumulative impacts associated with the Liberty Properties / Eddie Stobart development are those to the southwest of the site and include:

- E - Tan House Farm
- F - Barleycastle Farm
- H - Beehive Farm
- I - Booth's Farm

10.9. Where receptors are located elsewhere, the possibility of cumulative noise impacts is reduced due to distance and acoustic screening afforded by the proposed industrial units.

10.10. The table below details the previously predicted noise levels at the identified receivers, as well as the resultant magnitude of impact assuming a further +3 dB increase due to cumulative impacts. This would represent a doubling in the number noise sources affecting the receptors (assuming the noise sources are identical) and is considered worst-case.

~~Receptor~~	~~Original assessment~~		~~Revised assessment including +3 dB allowance for cumulative impacts~~	
	~~BS 4142 assessment outcome~~	~~Magnitude of Impact~~	~~BS 4142 assessment outcome~~	~~Magnitude of Impact~~
~~E~~	~~0~~	~~Minor~~	~~3~~	~~Minor~~
~~F~~	~~7~~	~~Moderate~~	~~10~~	~~High~~
~~H~~	~~-1~~	~~Negligible~~	~~2~~	~~Minor~~
~~I~~	~~-1~~	~~Negligible~~	~~2~~	~~Minor~~

~~Table 7.28: Predicted operational noise impact~~

Receptor	Original assessment		Revised assessment including +3 dB allowance for cumulative impacts	
	BS 4142 assessment outcome	Magnitude of Impact	BS 4142 assessment outcome	Magnitude of Impact
E	-10	Neutral	-7	Neutral
F	-3	Negligible	0	Minor
H	-3	Negligible	0	Minor
I	-2	Negligible	1	Minor

Table 7.28: Predicted operational noise impact

10.11. It can be seen from the above that with a 3 dB increase in predicted noise levels at the receptors, the noise impact magnitude would potentially increase at some receptors, but the significance of effect would minor adverse at worst.

Cumulative Road Traffic Noise

10.12. The following tables present the cumulative traffic noise assessment for the assessment years 2021 and 2029. Traffic flow diagrams for assessed road links are included in the Traffic and Transport Paper.

Road Link	Baseline 18-hour AAWT Traffic Flow (2021)		Cumulative 18-hour AAWT Traffic Flow (2021)		Noise Change dB	Magnitude of Impact
	Total Vehicles	%HGV	Total Vehicles	%HGV		
A50 Knutsford Rd N	19028	4%	20154	4%	0.2	Negligible
A50 Knutsford Rd Mid	17484	4%	18889	4%	0.3	Negligible
A50 Knutsford Road S	17331	4%	18053	4%	0.2	Negligible
A56 Chester Road W	12320	3%	12960	3%	0.2	Negligible
A56 Chester Rd Mid	9708	3%	9387	3%	-0.1	Neutral
Stockport Road	13203	3%	13482	3%	0.1	Negligible
Church Lane N	5092	2%	6071	2%	0.8	Negligible
Church Lane Mid	1811	3%	4771	2%	4.2	Minor
Church Lane S	1790	3%	1790	3%	0.0	Neutral
Stockton Lane	179	0%	179	0%	0.0	Neutral
Broad Lane N	3678	2%	4658	2%	1.0	Negligible
Broad Lane S	19200	10%	23071	10%	0.8	Negligible
B5356 Grappenhall Ln	12836	2%	14889	2%	0.6	Negligible
Barleycastle Lane	13344	13%	15633	14%	0.7	Negligible
Grappenhall Road W	16429	11%	21256	11%	1.1	Negligible
Grappenhall Road Mid	16429	11%	28360	16%	2.4	Negligible
Grappenhall Road E	16343	11%	35470	19%	3.4	Minor
A50 Cliff Lane W	32007	8%	42342	17%	1.2	Negligible
A50 Cliff Lane Mid	23752	16%	20284	19%	-0.7	Neutral
A50 Cliff Lane E	9900	4%	9902	4%	0.0	Neutral
M6 Slip NW	17661	9%	22467	12%	1.1	Negligible
M6 Slip NE	6531	11%	18386	14%	4.5	Minor
M6 Slip SW	15834	13%	19797	17%	1.0	Negligible
M6 Slip SE	12639	13%	16570	18%	1.2	Negligible
B5158 Cherry Lane	8450	2%	8454	2%	0.0	Neutral
Lymm Service access	13198	25%	13198	25%	0.0	Neutral

Table 7.29: Road Traffic Noise Change – Cumulative – 2021

Road Link	Baseline 18-hour AAWT Traffic Flow (2029)		Cumulative 18-hour AAWT Traffic Flow (2029)		Noise Change dBA	Magnitude of Impact
	Total Vehicles	%HGV	Total Vehicles	%HGV		
A50 Knutsford Rd N	20323	4%	21448	4%	0.2	Negligible
A50 Knutsford Rd Mid	18674	4%	20078	4%	0.3	Negligible
A50 Knutsford Road S	18510	4%	19232	4%	0.2	Negligible
A56 Chester Road W	13125	3%	14105	3%	0.3	Negligible
A56 Chester Road Mid	10336	3%	10336	3%	0.0	Neutral
Stockport Road	14069	3%	14348	3%	0.1	Negligible
Church Lane N	5438	2%	6418	2%	0.7	Negligible
Church Lane Mid	3929	2%	5021	2%	1.1	Negligible
Church Lane S	1912	3%	1912	3%	0.0	Neutral
Stockton Lane	191	0%	191	0%	0.0	Neutral
Broad Lane N	3929	2%	4908	2%	1.0	Negligible
Broad Lane S	20432	10%	24303	10%	0.8	Negligible
B5356 Grappenhall Ln	13635	2%	15688	2%	0.6	Negligible
Barleycastle Lane	14252	13%	16541	14%	0.7	Negligible
Grappenhall Road W	17472	11%	22296	11%	1.1	Negligible
Grappenhall Road Mid	17472	11%	29403	16%	2.3	Negligible
Grappenhall Road E	17380	11%	36507	19%	3.2	Minor
A50 Cliff Lane W	34111	8%	33811	17%	0.0	Neutral
A50 Cliff Lane Mid	25355	16%	25727	16%	0.1	Negligible
A50 Cliff Lane E	10573	4%	10946	4%	0.1	Negligible
M6 Slip NW	18843	9%	23649	12%	1.0	Negligible
M6 Slip NE	14649	10%	19307	13%	1.2	Negligible
M6 Slip SW	16896	13%	20858	17%	0.9	Negligible
M6 Slip SE	13485	13%	17416	18%	1.1	Negligible
B5158 Cherry Lane	9023	2%	9027	2%	0.0	Neutral
Lymm Service access	14097	25%	14097	25%	0.0	Neutral

Table 7.30: Road Traffic Noise Change – Cumulative – 2029

10.13. Assuming the presence of highly sensitive receptors on all road links assessed, and with reference to the traffic noise assessment criteria, it is predicted that the significance of effect of cumulative traffic noise will be neutral to adverse minor.

10.14. It should be noted that the above assessment is based on the assumption that the Liberty Properties / Eddie Stobart development is operational; however, at the time of writing the

development has ~~been refused~~ not been formally granted planning permission and has been referred to the SoS. .

11. Conclusion

11.1. This Addendum technical Paper has assessed the environmental impact of Noise & Vibration.

11.2. The assessment concludes that the proposals may have minor adverse impact ~~on most of~~ the affected sensitive receptors at this stage.

~~11.3. However, at two receptors – Bradley Hall Cottages and Bradley View Cottage – a possible moderate adverse significance effect has been identified.~~

11.4. The control of construction noise and vibration will be addressed by an appropriate Construction Environmental Management Plan, developed by the main contractors, as part of future Reserved Matters planning applications. A number of best practice construction noise mitigation measures have been provided.

11.5. Outline mitigation measures have been set out for the control of noise impacts during the development's operational phase, and these will be refined as part of future Reserved Matters planning applications, once development proposals are finalised. A number of general mitigation methods to limit the potential for noise impacts have been presented, and these should be adopted within any development of the scheme.

~~11.6. At Bradley Hall Cottages and Bradley View local receptors, it is considered unlikely that the substantial adverse environmental impacts resulting in a moderate adverse significance of effect can be avoided. However, additional screening mitigation can be provided to reduce predicted noise impacts at these receptors. The current noise model upon which these findings are based makes a number of worst-case assumptions on noise sources which could affect these receptors. It is therefore likely that noise impact is predicted to be significantly lower once finalized proposals are submitted by industrial operators as part of future Reserved Matters applications.~~

11.7. The updated Operational noise modelling has identified a significant reduction in the expected magnitude of impact at Bradley View Cottages and Bradley Hall Cottages in comparison to the original Operational noise modelling exercise. This is in part due to the re-alignment of the Plot 2 estate road which was previously located immediately to the south of Bradley Hall Cottages, but is now positioned further away on the opposite side of the Scheduled Ancient Monument (SAM) to the north of Plot 3. In addition, an increase in the effective height of

bunds and timber fencing in various location nearby to Bradley Hall Cottages has resulted in an increase in the level of sound attenuation provided to these receptors.

11.8. Cumulative impacts have been considered in relation to the Liberty Properties / Eddie Stobart proposals. The employment of BPM will be required to mitigate cumulative construction noise and vibration impacts. During operation, neutral to minor adverse cumulative effects are expected at affected receptors.

12. Reference List

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- British Standards Institution (2009); 'BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise', British Standards Institution, London.
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Appendix 7.1 – Plan of Sensitive Receptors

Appendix 7.2 – Baseline Survey Results

Appendix 7.3 – Acoustic Barrier Mitigation

Appendix 7.4 – Addendum Deleted Text Table

1015524 | A1

DO NOT SCALE FROM THIS DRAWING

Nearest noise sensitive receptors:

A. Grappenhall Lodge

B. Dwellings on Cartridge Lane:
- Ivy Cottages
- Southoott
- Hunters Lodge and Hunters Croft
- Manor Farm with The Old Stables
- Croftside
- The Bungalow
- 5 Cartridge Lane
- 7 Cartridge Lane
- Cliff Lane Farm

C. Bradley View Cottage

D. Howshoots Farm

E. Tan House Farm

F. Barleycastle Farm

G. Bradley Hall Cottages

H. Beehive Farm

I. Booth's Farm

Issue	Date	Description	By	Chkd	Verfd
RevC	13/03/2020	Added receptors	SE	MP	RT
RevB	23/11/2017	Updated red line and added receptors	LN	MP	RT
RevA	13/11/2017	Removed survey positions, added receptors	LN	MP	RT
-	12/09/2017	Environmental noise mark-up	LN	MP	RT

Project

Warrington Interchange MP

Client

First Industrial / Langtree

Architect

Stephen George and Partners LLP

Title

Environmental noise mark-up

Drawing No.	Drawing Status
ASXX(90)1001	S2
Job No.	**Scale**
1015524	NTS

Originator	Checker	Verified	Issue
SE	MP	RT	RevC

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True scale at 1:1

Six 56 Warrington

Environmental Noise Assessment – Baseline Survey Results

First Panattoni / Langtree

Job No:	1015524
Doc Ref:	1015524-RPT-AS-001
Revision:	A
Date:	18 March 2020

Project title	Warrington Interchange MP	**Job Number**
Report title	Environmental Noise Assessment – Baseline Survey Results	1015524

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—	15/09/2017	First Issue
A	18/03/2020	Revised following comments from Spawforths

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Principal author	Checked by	Verified by
Signed by: Everett, Simon	Signed by: Everett, Simon	Signed by: Everett, Simon

Contents

1.0 Introduction

Cundall has been commissioned to undertake baseline noise monitoring of noise levels affecting noise sensitive receptors located nearby the new development site off Cliff Road, Warrington.

The purpose of this report is to detail the prevailing noise levels affecting noise-sensitive receptors and to establish representative daytime and night-time background levels at each measurement location for the purpose of future assessment.

2.0 Environmental noise survey

In order to assess the prevailing levels of environmental noise affecting nearby noise sensitive receivers, environmental noise surveys were undertaken at six different locations.

Due to access and security requirements, continuous unattended noise logging measurements were undertaken on the development land at positions representative of the noise climate at the nearest and most exposed noise-sensitive receptors.

Table 2.1 below documents the monitoring positions and the corresponding measurement duration.

Monitoring position	Monitoring location	Measurement duration
MP 1	North-west corner of the site, approximately 3m from the boundary hedge to Grappenhall Lane. Assumed to be representative of the prevailing background noise climate at the Grapppenhall Lodge, approximately 45m away.	Unattended measurement undertaken between 16 and 17 August 2017.
MP 2	North boundary of the site, approximately 3m from the boundary hedge to Grappenhall Lane. Assumed to be representative of the prevailing background noise climate at the dwellings on Cartridge Lane, approximately 40m away.	Unattended measurements undertaken between 17 and 18 August 2017.
MP 3*	North-east corner of the site, approximately 3m from the boundary hedge to Cliff Lane. Assumed to be representative of the prevailing background noise climate at Howshoots Farm approximately 16m away.	Unattended measurements undertaken between 24 and 30 August 2017.
MP 4	South-east corner of the site, on the site boundary. Assumed to be representative of the prevailing background noise climate at Tan House Farm on Barleycastle Lane, approximately 150m away.	
MP 5	On the south boundary of the site. Assumed to be representative of the prevailing background noise climate at Barleycastle Farm on Barleycastle Lane, approximately 150m away.	
MP 6*	Near the eastern pond in the centre of the site, on the boundary to Bradley View Cottages.	
**The monitoring position representative of the prevailing background noise climate at Bradley View Cottage is to be identified at the next stage of the acoustic assessment.*		

Table 2.1 - Monitoring positions and measurement periods

The drawing referenced in Appendix I of this report details the approximate location of each unattended measurement position.

Noise measurements were made using three 01dB Cube (serial numbers 10619, 10692 and 11112) and one Casella CEL 63X (serial number 1211404) precision sound level meters, generally in accordance with BS EN 60651:1994 and BS 7445:1993. All meters were field calibrated before and after with no significant drift witnessed. Calibration certificates for all equipment are available upon request.

2.1 Weather conditions

A summary of weather conditions for the duration of the surveys is presented in Table 2.2.

Date	Wind speed – average (km/h)	Wind speed – high (km/h)	Average temperature (°C)	Precipitation (mm)
16th August 2017	4	10	15	0.5
17th August 2017	1	3	18	8.4
18th August 2017	1	6	13	7.9
23rd August 2017	1	8	16	0
24th August 2017	0	3	16	0.3
25th August 2017	1	5	16	0
26th August 2017	2	8	15	0
27th August 2017	1	5	15	0
28th August 2017	1	3	19	0
29th August 2017	2	8	14	0.5
30th August 2017	2	8	13	0

Table 2.2 - Summary of weather conditions

2.2 Results summary

A summary of the average daytime (07:00h - 23:00h) and night-time (23:00h - 07:00h) ambient noise levels recorded is detailed within Table 2.3 and Table 2.4. The values are the logarithmically averaged $L_{Aeq,15min}$, the maximum $L_{AF,max}$, the maximum $L_{AF10,15min}$ and range of $L_{A90,15min}$ dB values measured. All values have been rounded to the nearest integer value (as fractions of a decibel are imperceptible) and are given in dBA.

Location	Date	Average $L_{Aeq,15min}$ (dB)	Highest $L_{AFMax,15min}$ (dB)	Highest $L_{AF10,15min}$ (dB)	Range $L_{AF90,15min}$ (dB)
1	16th – 17th August 2017	68	106	81	43 – 58
2	17th – 18th August 2017	66	93	73	46 – 56
3	23rd August 2017*	69	88	73	54 – 66
	24th August 2017	70	87	74	53 – 67
	25th August 2017	70	92	75	50 – 67
	26th August 2017	71	100	82	49 – 60
	27th August 2017	68	95	73	54 – 62
	28th August 2017	68	82	72	50 – 63
	29th August 2017	70	93	74	48 – 67
	30th August 2017*	71	84	74	57 – 68
4	23rd August 2017*	57	68	62	49 – 59
	24th August 2017	60	77	68	50 – 63
	25th August 2017	61	75	69	51 – 66
	26th August 2017	59	85	65	48 – 59
	27th August 2017	61	89	66	52 – 62
	28th August 2017	59	71	64	52 – 61

Location	Date	Average $L_{Aeq,15min}$ (dB)	Highest $L_{AFMax,15min}$ (dB)	Highest $L_{AF10,15min}$ (dB)	Range $L_{AF90,15min}$ (dB)
	29th August 2017	56	70	61	51 – 56
	30th August 2017*	60	66	64	53 – 62
5	23rd August 2017*	50	68	55	42 – 52
	24th August 2017	52	73	60	41 – 56
	25th August 2017	53	73	60	40 – 58
	26th August 2017	49	73	56	40 – 52
	27th August 2017	61	97	73	44 – 55
	28th August 2017*	52	72	56	45 – 53
6	23rd August 2017*	41	68	49	36 – 47
	24th August 2017	41	68	47	36 – 44
	25th August 2017	42	65	49	36 – 47
	26th August 2017	41	63	46	37 – 42
	27th August 2017	55	96	72	37 – 45
	28th August 2017	40	64	44	37 – 41
	29th August 2017	42	62	47	37 – 43
	30th August 2017*	42	72	43	38 – 41

Table 2.3 - Summary survey results, daytime (07:00h – 23:00h)

Location	Date	Average $L_{Aeq,15min}$ (dB)	Highest $L_{AFMax,15min}$ (dB)	Highest $L_{AF10,15min}$ (dB)	Range $L_{AF90,15min}$ (dB)
1	16th – 17th August 2017	65	100	73	46 – 57
2	17th – 18th August 2017	64	87	73	44 – 54
3	23rd – 24th August 2017	67	86	75	55 – 66
	24th – 25th August 2017	67	89	75	54 – 66
	25th – 26th August 2017	65	82	73	46 – 60
	26th – 27th August 2017	65	96	71	51 – 60
	27th – 28th August 2017	64	80	71	55 – 61
	28th – 29th August 2017	66	80	75	47 – 61
	29th – 30th August 2017	66	81	74	44 – 64
4	23rd – 24th August 2017	61	71	69	51 – 65
	24th – 25th August 2017	61	83	69	53 – 66
	25th – 26th August 2017	57	66	63	48 – 60
	26th – 27th August 2017	62	96	64	53 – 60
	27th – 28th August 2017	59	73	64	52 – 60
	28th – 29th August 2017	54	66	58	47 – 56
	29th – 30th August 2017	57	67	64	48 – 62
5	23rd – 24th August 2017	54	71	60	45 – 58
	24th – 25th August 2017	53	65	60	47 – 59
	25th – 26th August 2017	49	62	55	40 – 52

Location	Date	Average $L_{Aeq,15min}$ (dB)	Highest $L_{AFMax,15min}$ (dB)	Highest $L_{AF10,15min}$ (dB)	Range $L_{AF90,15min}$ (dB)
6	26th – 27th August 2017	53	69	58	48 – 54
	27th – 28th August 2017	52	74	58	47 – 54
	23rd – 24th August 2017	43	58	49	38 – 47
	24th – 25th August 2017	43	56	49	38 – 47
	25th – 26th August 2017	40	63	46	36 – 41
	26th – 27th August 2017	43	65	55	39 – 43
	27th – 28th August 2017	42	65	52	38 – 43
	28th – 29th August 2017	41	60	46	36 – 43
	29th – 30th August 2017	40	64	56	36 – 42

Table 2.4 - Summary of survey results, night-time (23:00h – 07:00h)

A graphical representation of survey results at unattended logging locations is presented in Appendix II of this report.

2.3 Discussion

Based on survey results and subjective impressions from Cundall engineers who attended site, Table 2.5 provides a review of existing noise sources noted to contribute to the existing noise climate at measurement position.

Measurement position	Existing noise climate
MP 1	The L_{Aeq} noise climate is largely driven by road traffic noise on Grappenhall Lane, while background noise levels (L_{A90} values) are largely dominated by distant road traffic noise from the M6 and the M56.
MP 2	
MP 3	The L_{Aeq} noise climate is largely driven by road traffic noise on Cliff Lane, while background noise levels (L_{A90} values) are largely dominated by distant road traffic noise from the M6 and the M56.
MP 4	The noise L_{Aeq} and background noise climate largely dominated by the road traffic noise from the M6 and the M56.
MP 5	
MP 6	

Table 2.5 - Description of existing noise climates

2.4 BS 4142 representative background levels

When assessing the level of adverse impact upon existing dwellings to the introduction of new industrial and commercial sound sources, the relevant British Standard (BS 4142:2014) requires that the predicted level of new impact (Rating Level) be compared against the existing 'representative' background sound level.

Statistical analysis has been used to determine the most commonly occurring $L_{AF90,15min}$ value during each reference period. In all instances, this value has been considered as the 'representative' background level.

Histograms showing the percentage occurrence of each $L_{AF90,15min}$ value at location are presented in Appendix III of this report.

2.4.1 Proposed representative background values

Based on information detailed in Table 2.3, Table 2.4 and Appendix III, Table 2.6 below presents a summary of assumed representative background levels at each monitoring location during the daytime and night-time:

Period	Monitoring location	Representative background level (dB)
Daytime (07:00h – 23:00h)	MP1	52
	MP2	51
	MP3	59
	MP4	56
	MP5	50
	MP6	38
Night-time (23:00h – 07:00h)	MP1	49
	MP2	47
	MP3	57
	MP4	54
	MP5	48
	MP6	37

Table 2.6 - Proposed representative background levels

3.0 Conclusions

Unattended environmental noise surveys have been conducted in order to establish the prevailing noise levels at noise-sensitive dwellings situated nearby the proposed development at land off Cliff Lane, Warrington.

Based on the noise survey results obtained, data analysis has been performed to establish proposed representative background levels for the purpose of future assessments.

Appendices

Appendix I Relevant drawings

Please refer to the latest issue of the following site location drawing which details the approximate location of each survey position:

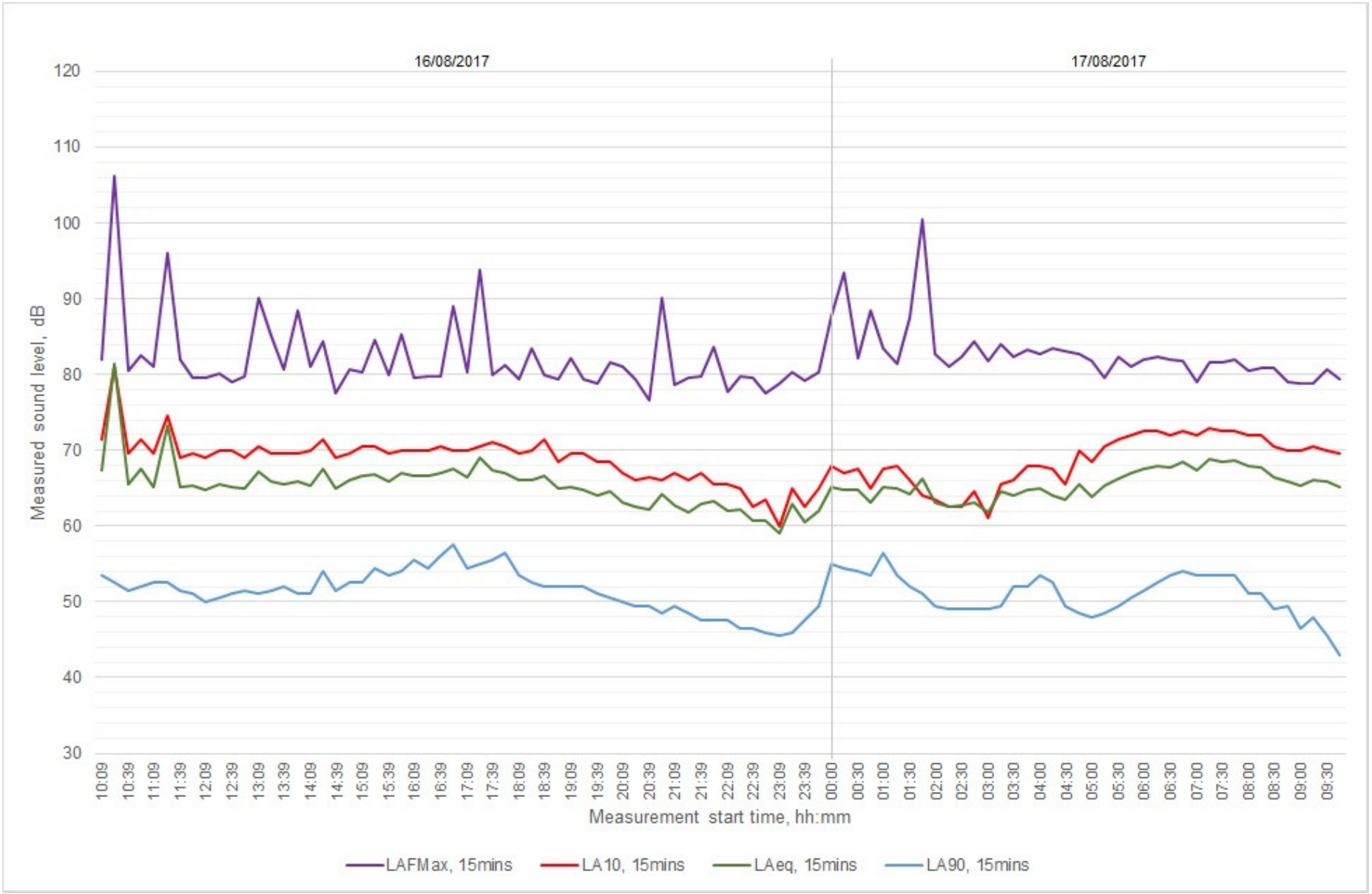
- 1015527-AS-XX(90)1001_S2 – Environmental Noise Mark-Up

Appendix II Logging survey results

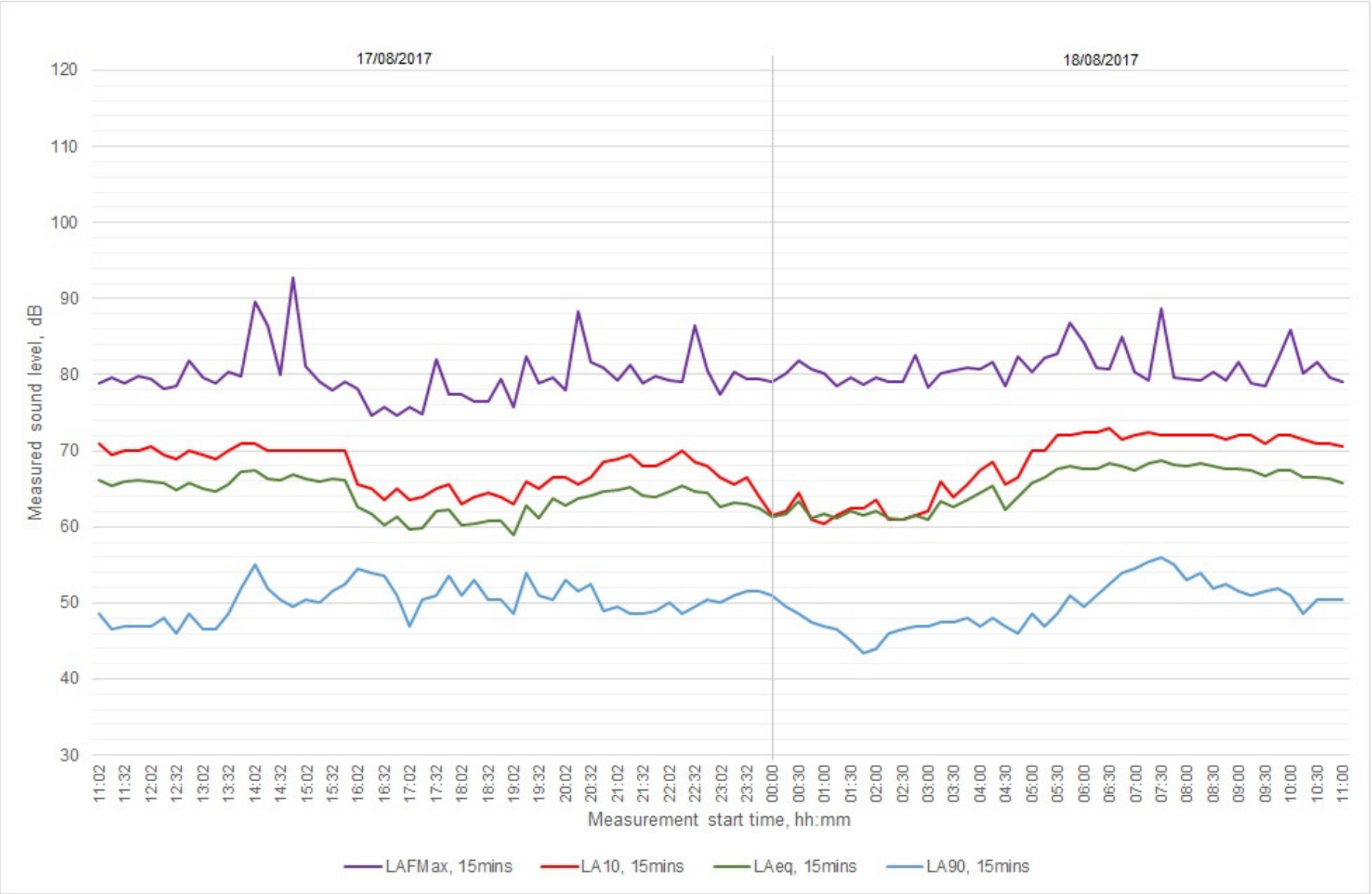
The figures below provide a graphical representation of measured survey data at each logging location (period, T = 15 minutes).

All measurements were taken in free-field conditions and are in dBA.

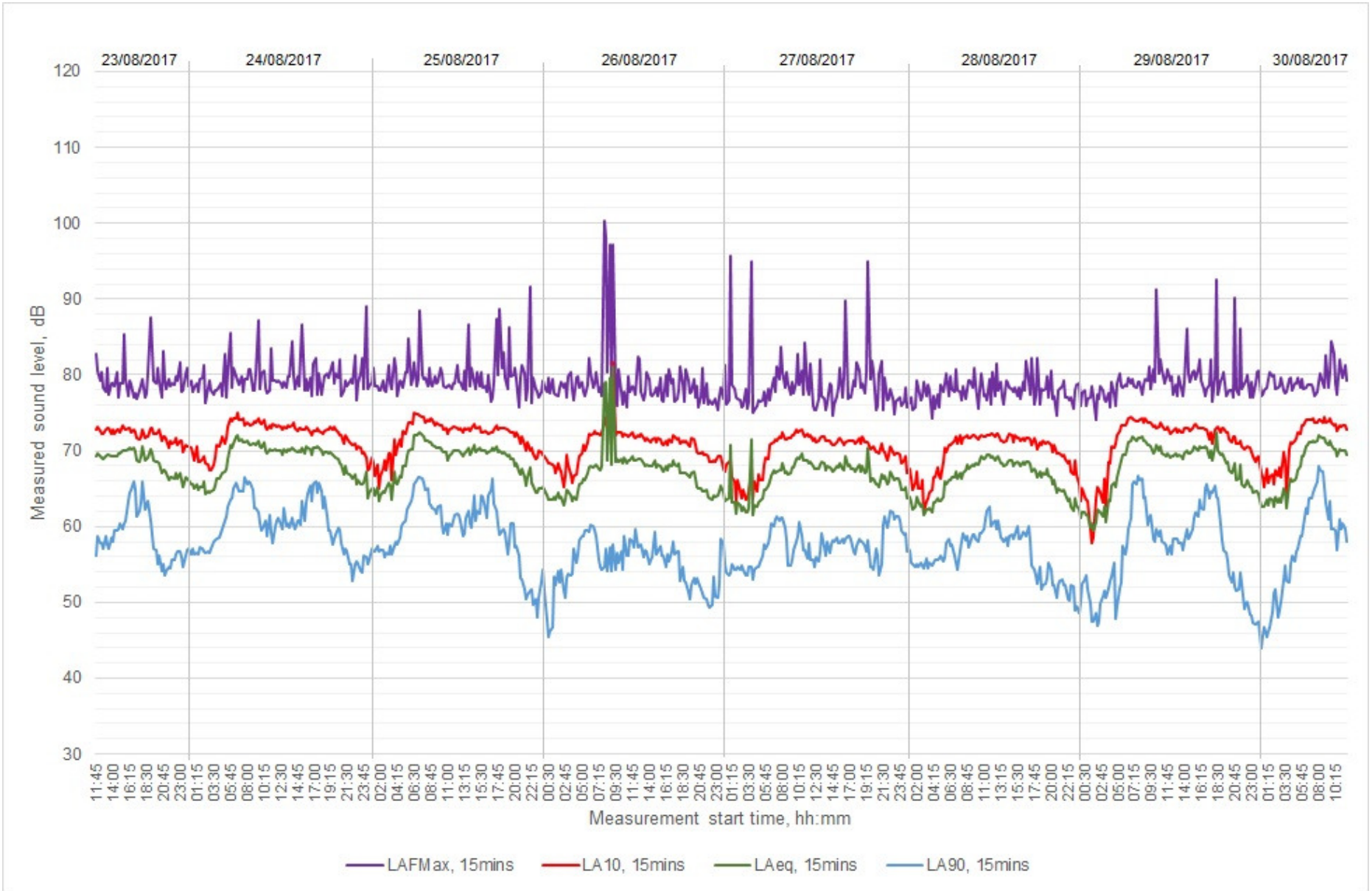
Location MP1: 16th – 17th August 2017



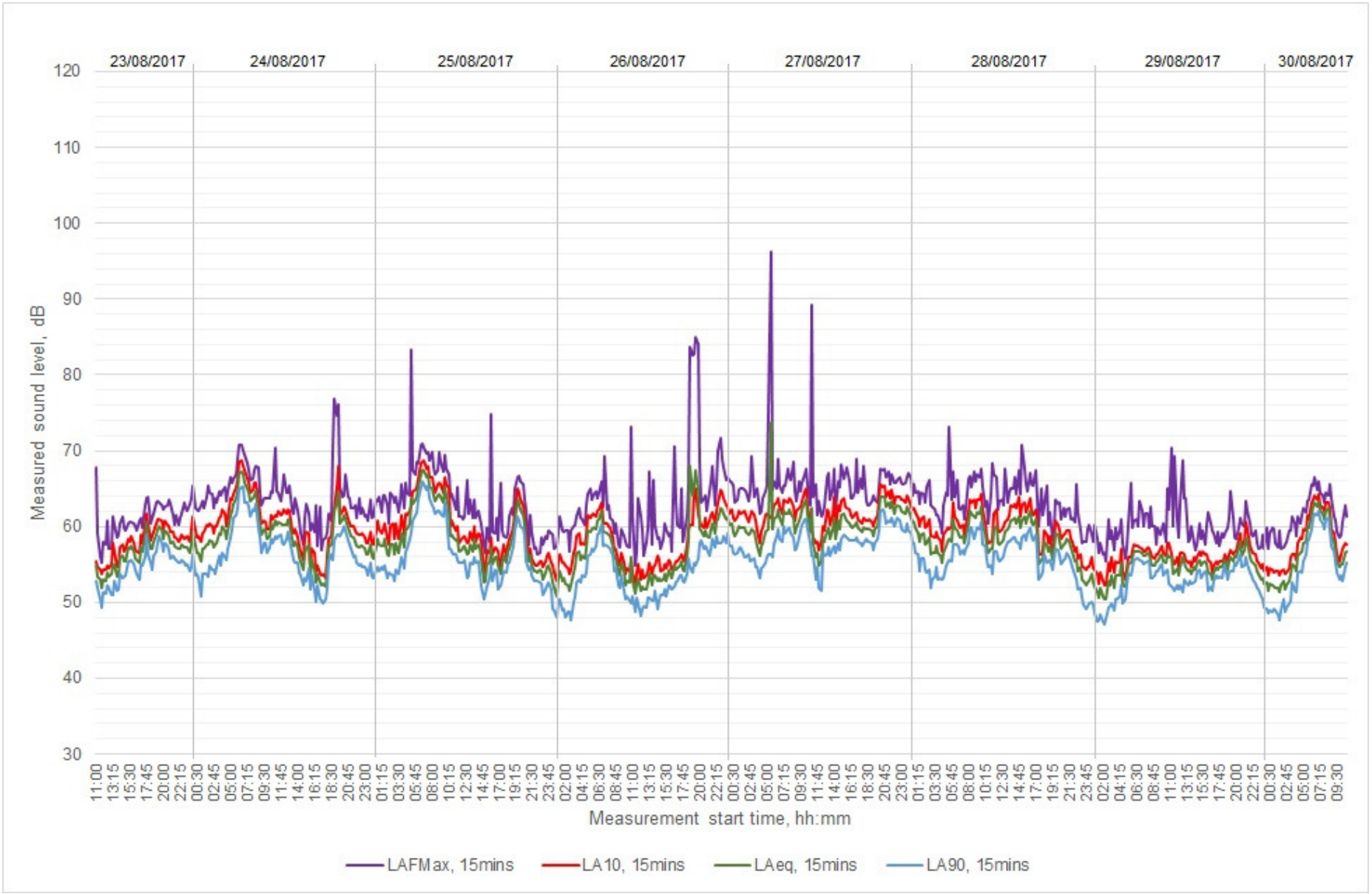
Location MP2: 17th – 18th August 2017



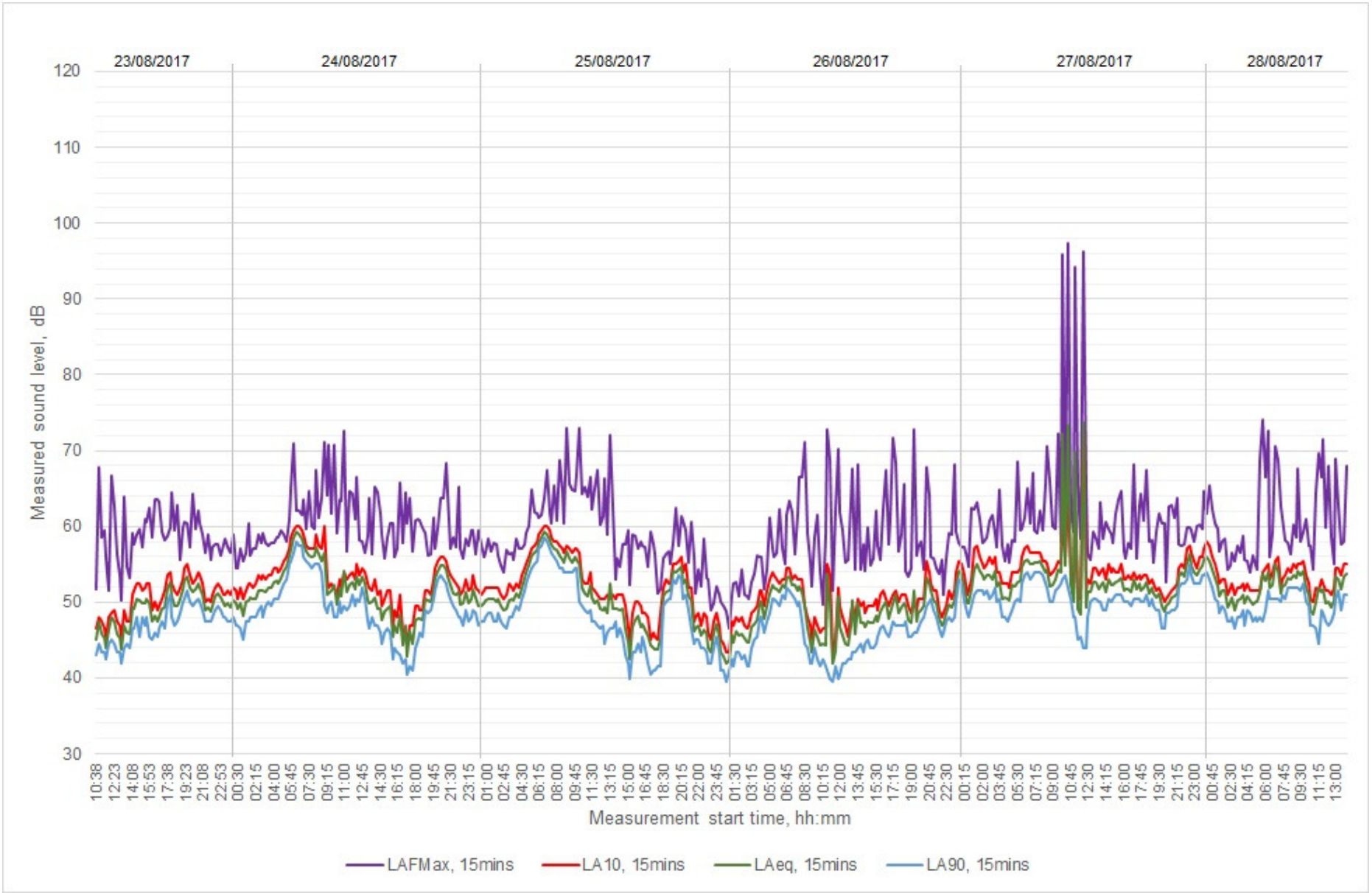
Location MP3: 23rd – 30th August 2017



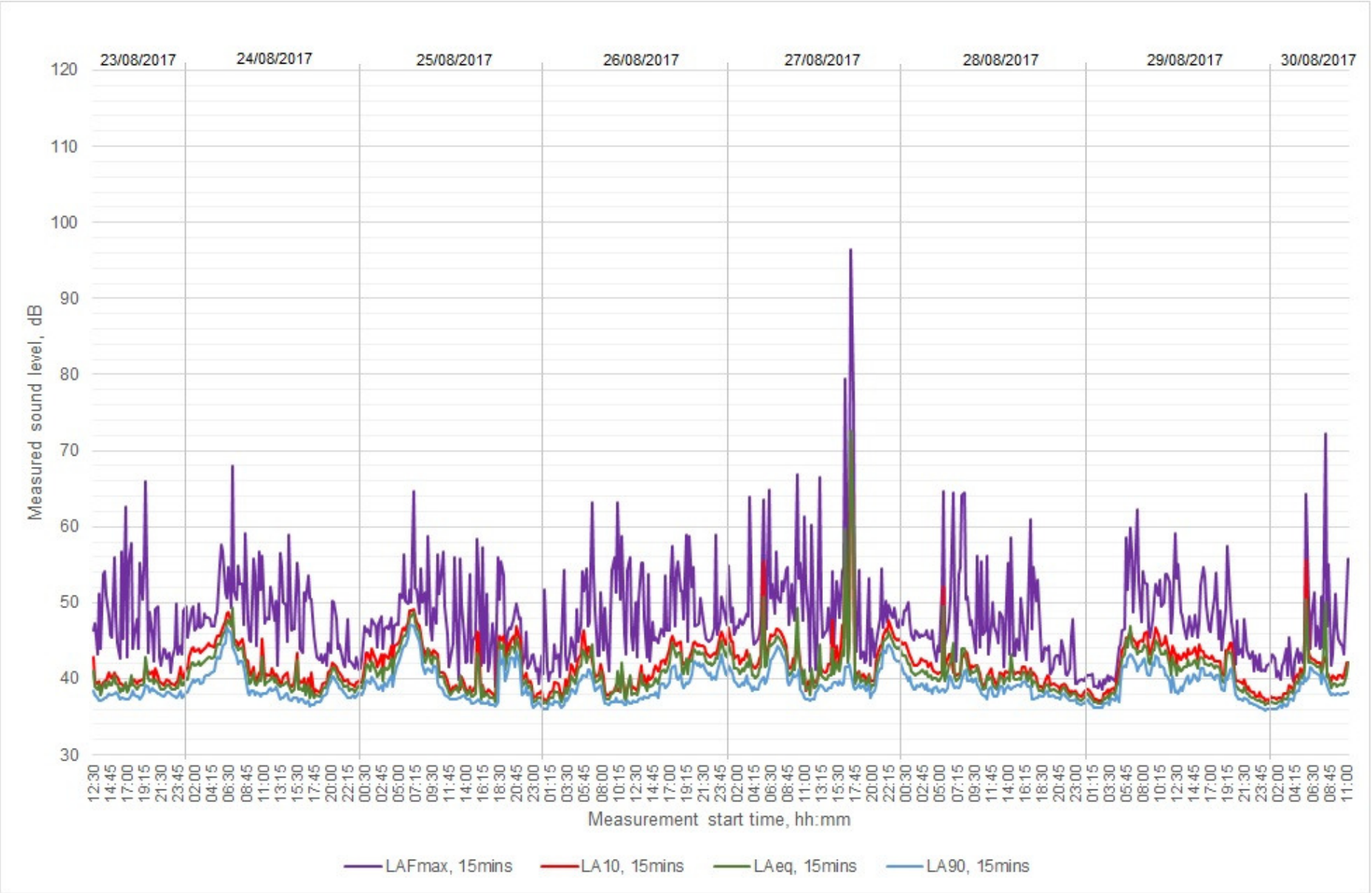
Location MP4: 23rd – 30th August 2017



Location MP5: 23rd – 28th August 2017

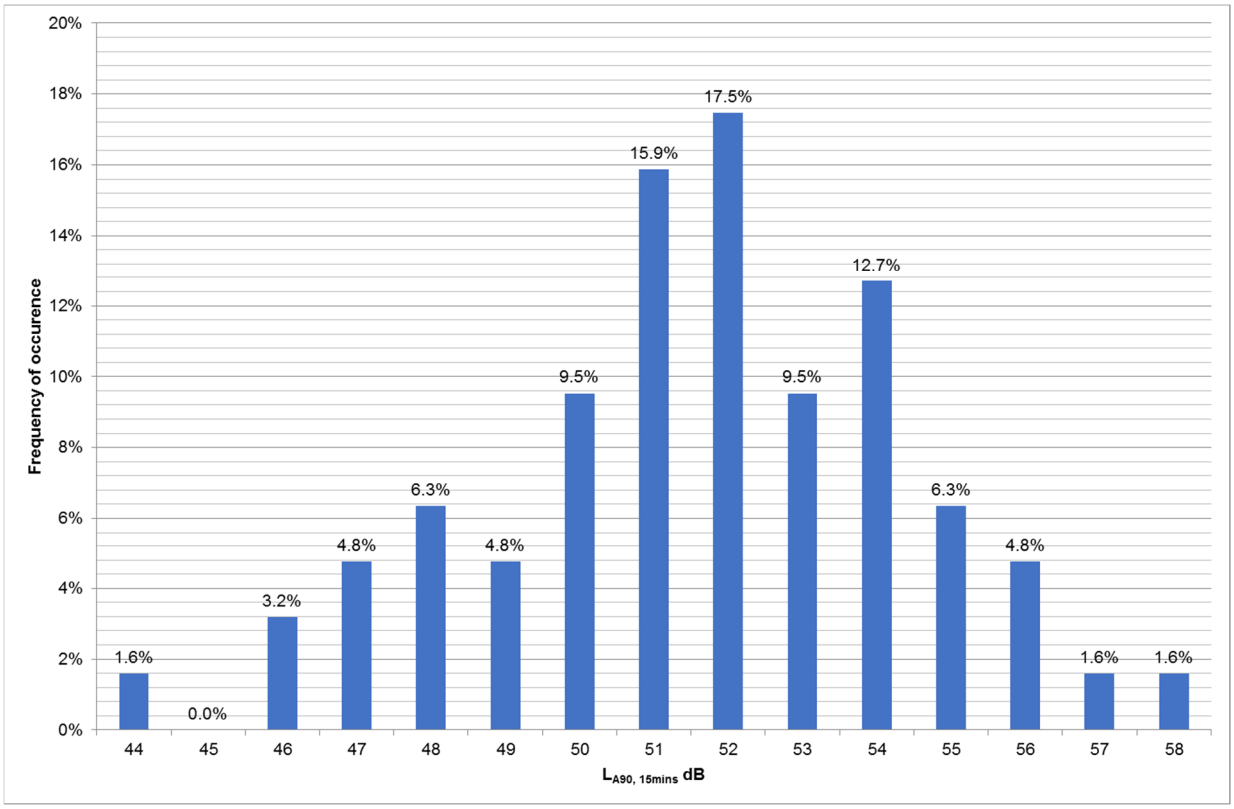


Location MP6: 23rd – 30th August 2017

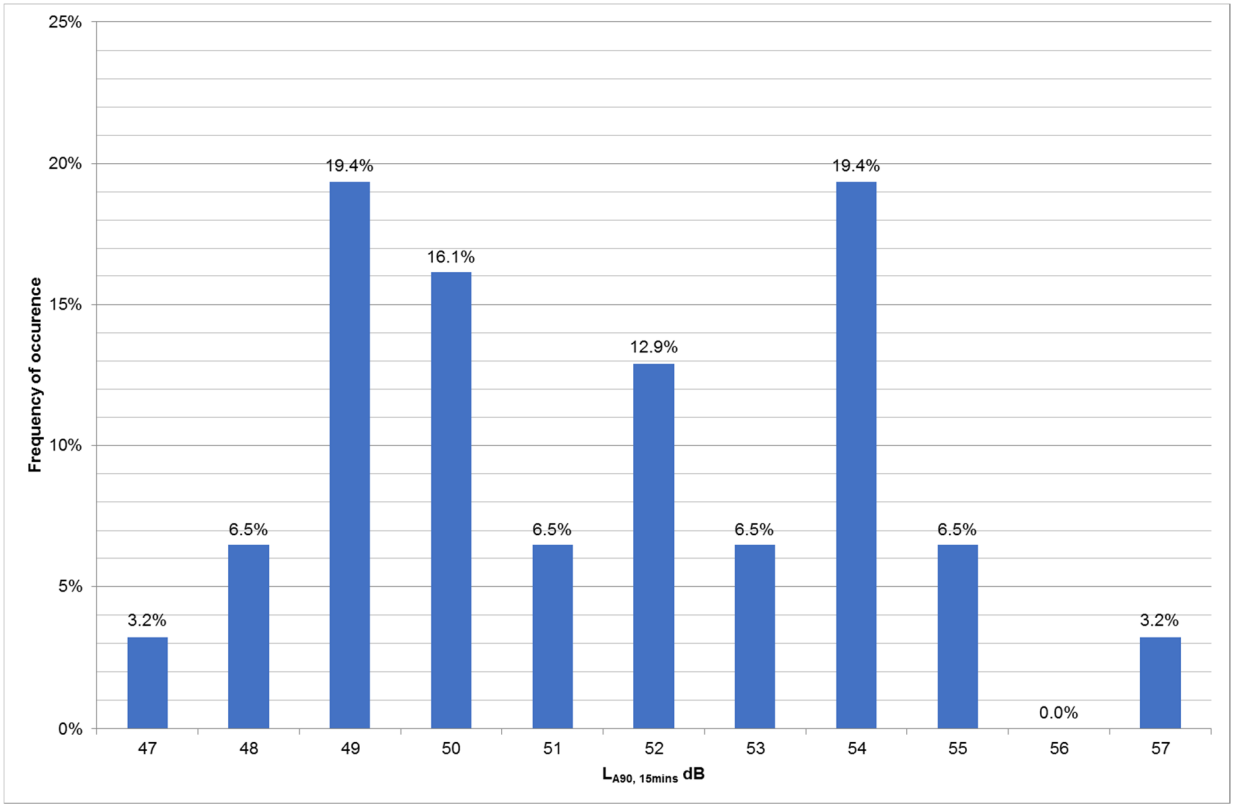


Appendix III Histogram analysis

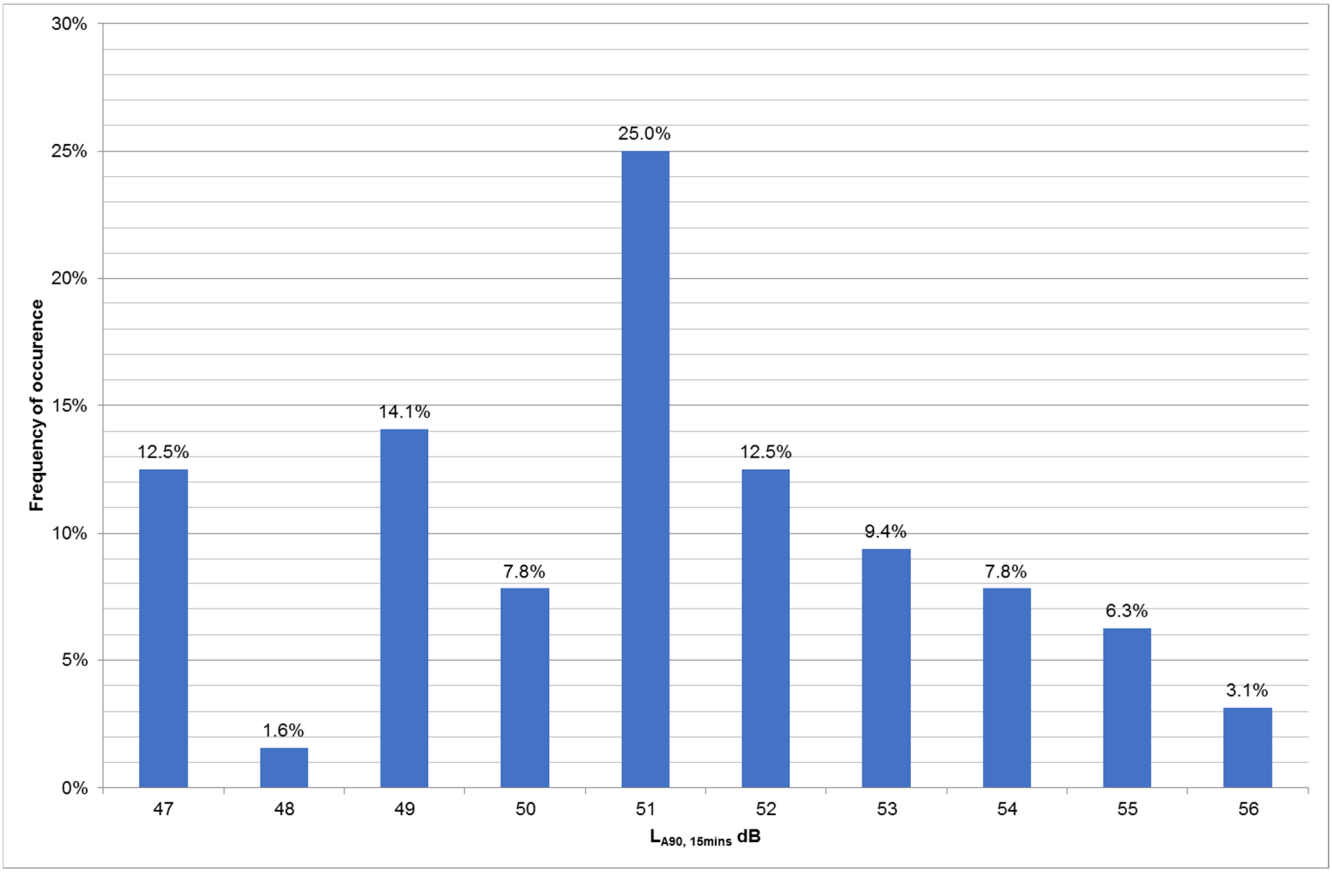
MP1 daytime background sound level distribution (07:00 – 23:00 hrs)



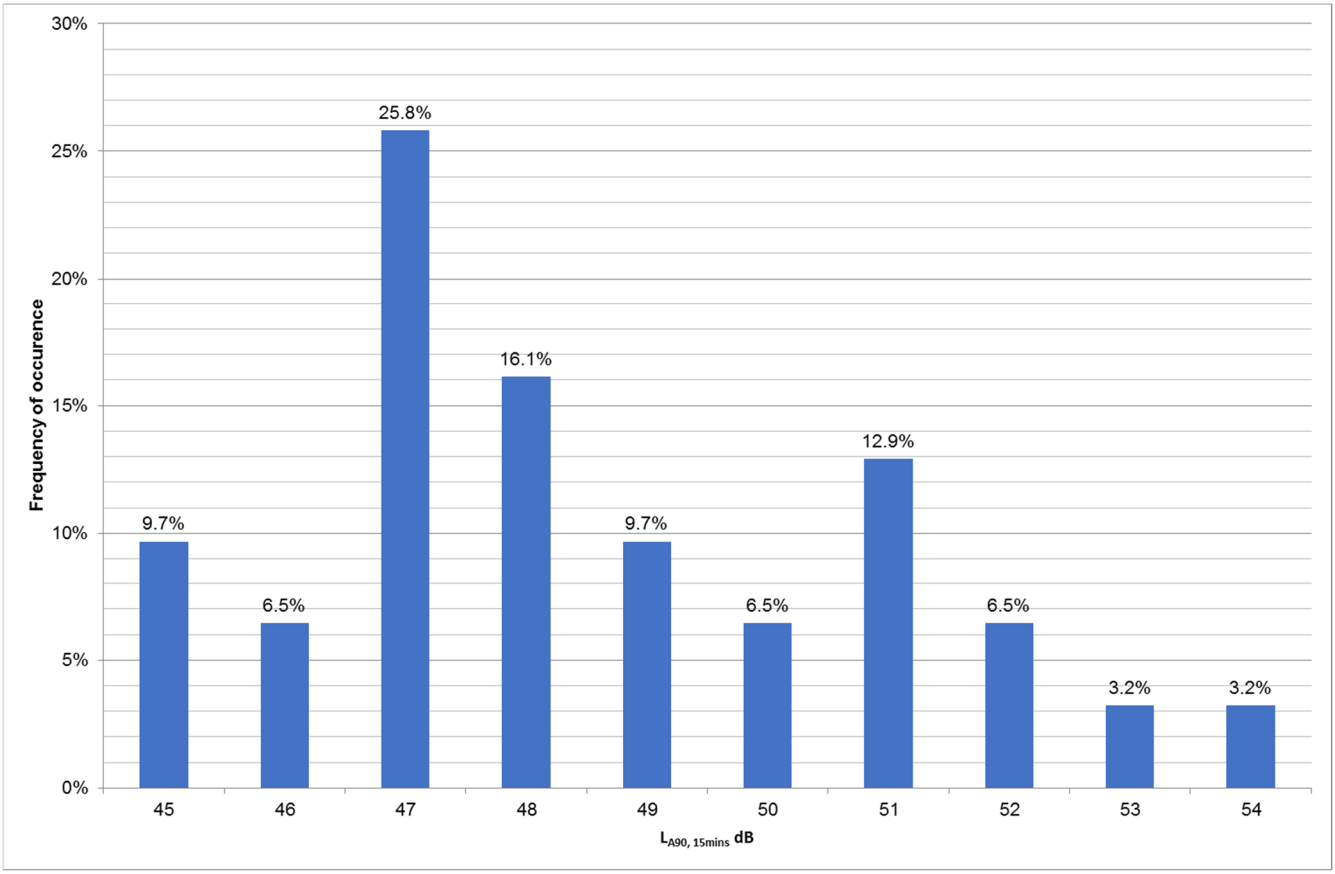
MP1 night-time background sound level distribution (23:00 – 07:00 hrs)



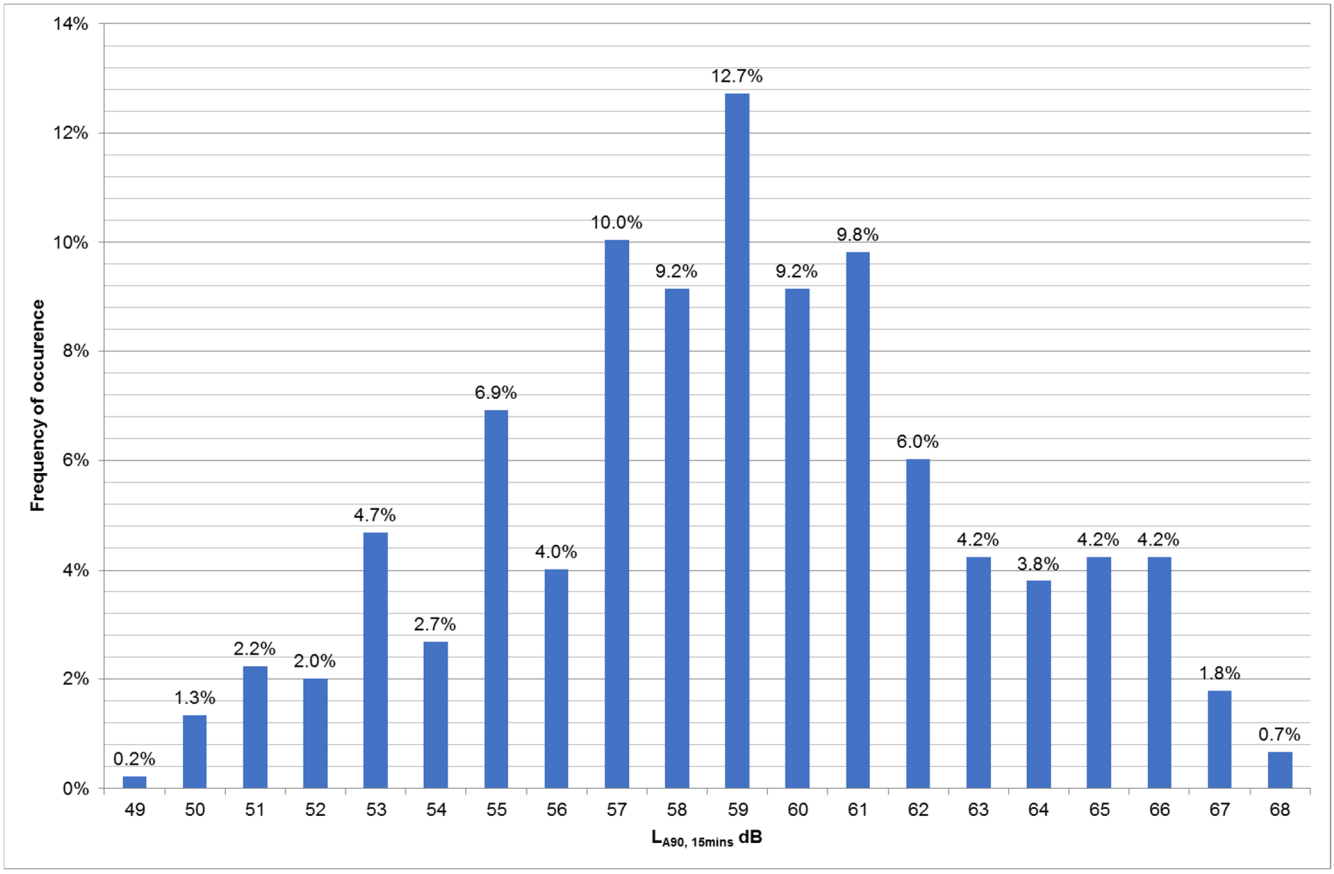
MP2 daytime background sound level distribution (07:00 – 23:00 hrs)



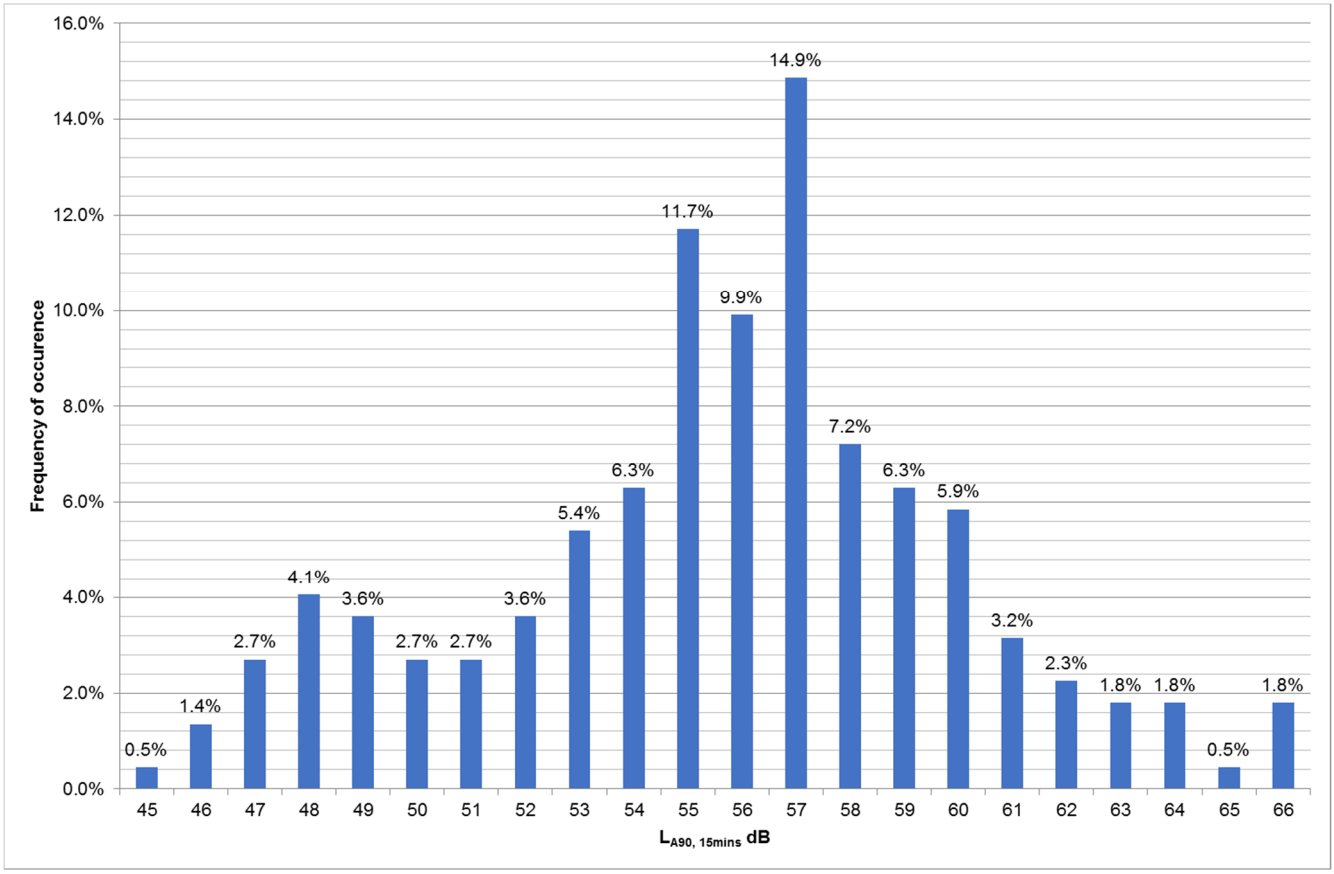
MP2 night-time background sound level distribution (23:00 – 07:00 hrs)



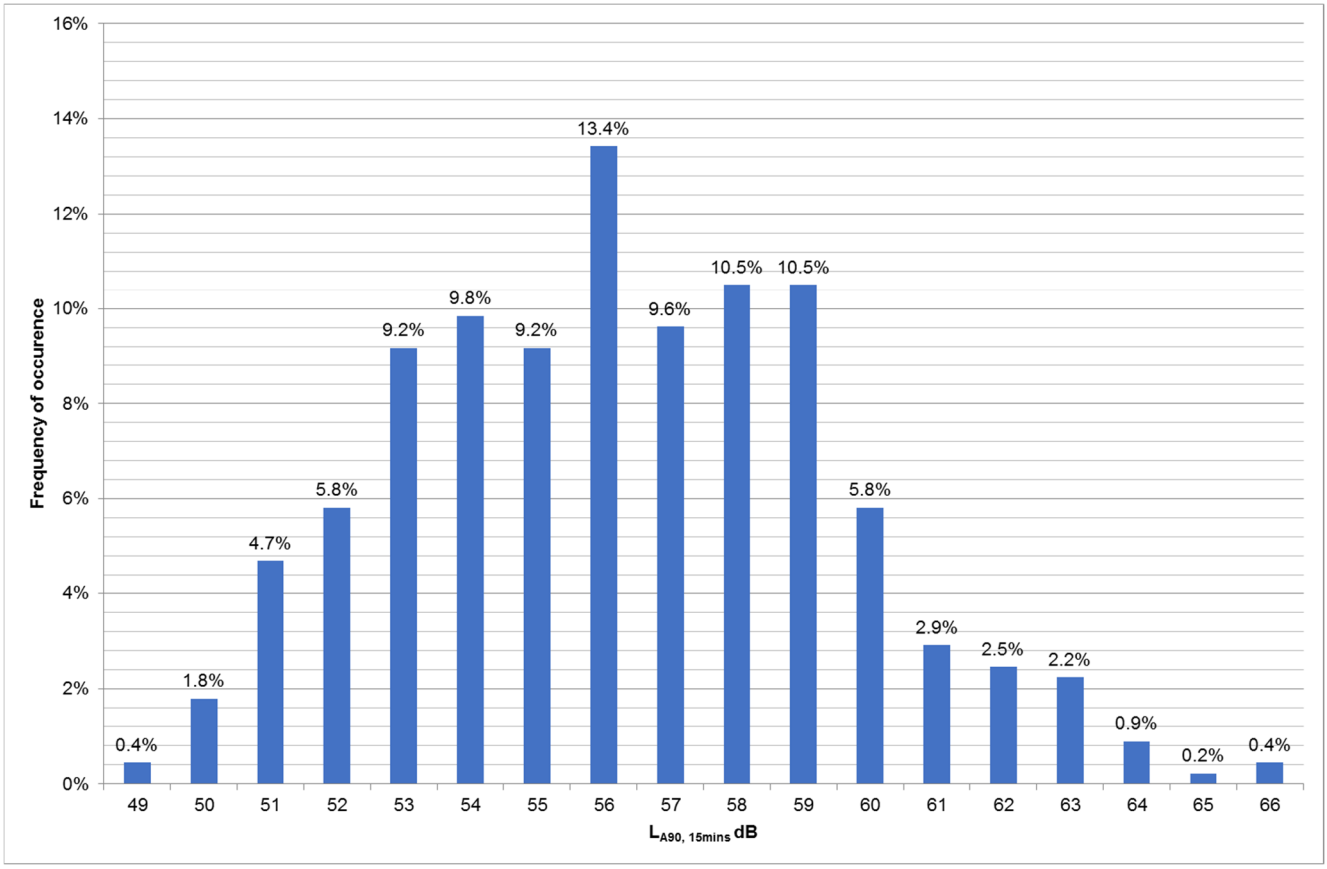
MP3 daytime background sound level distribution (07:00 – 23:00 hrs)



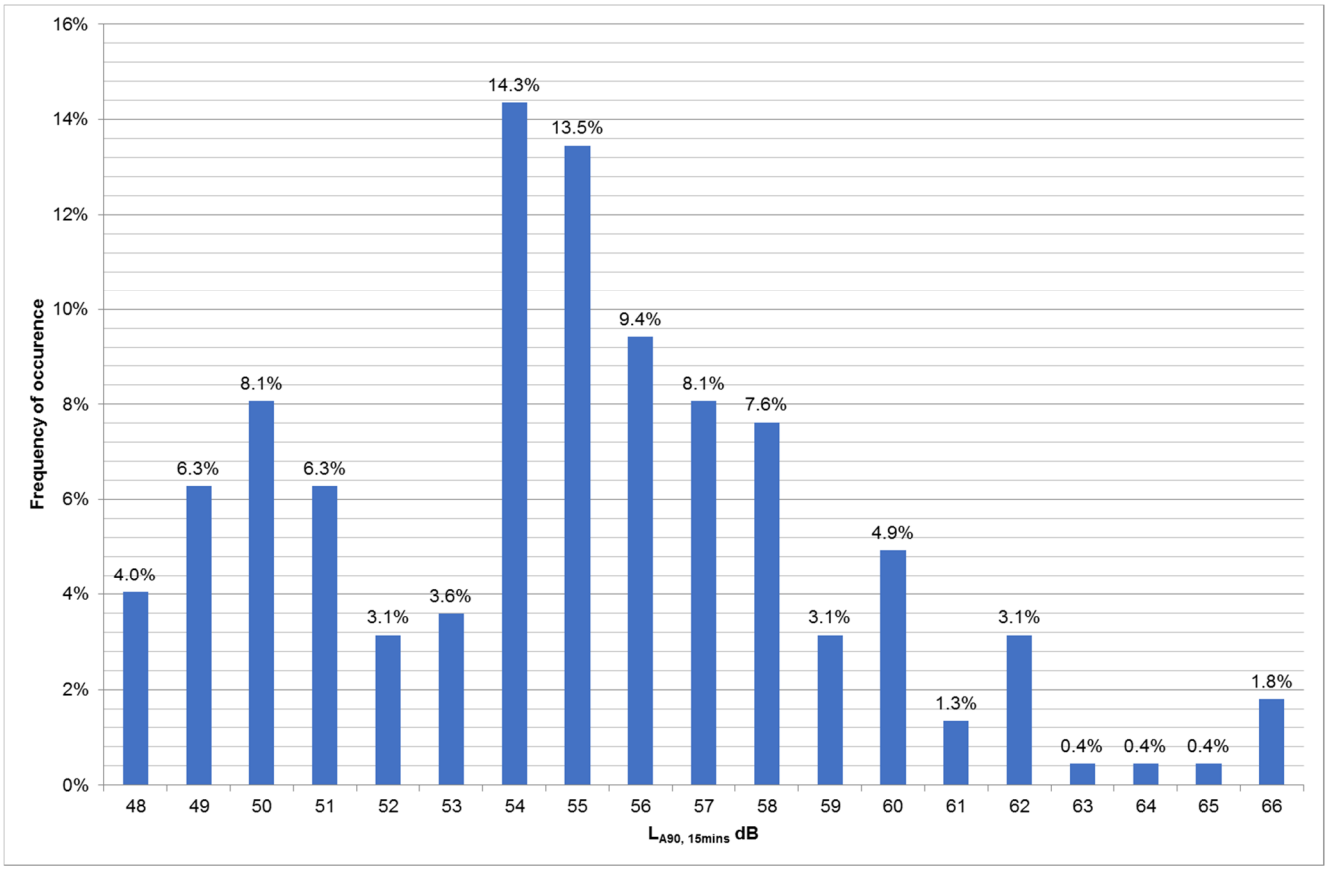
MP3 night-time background sound level distribution (23:00 – 07:00 hrs)



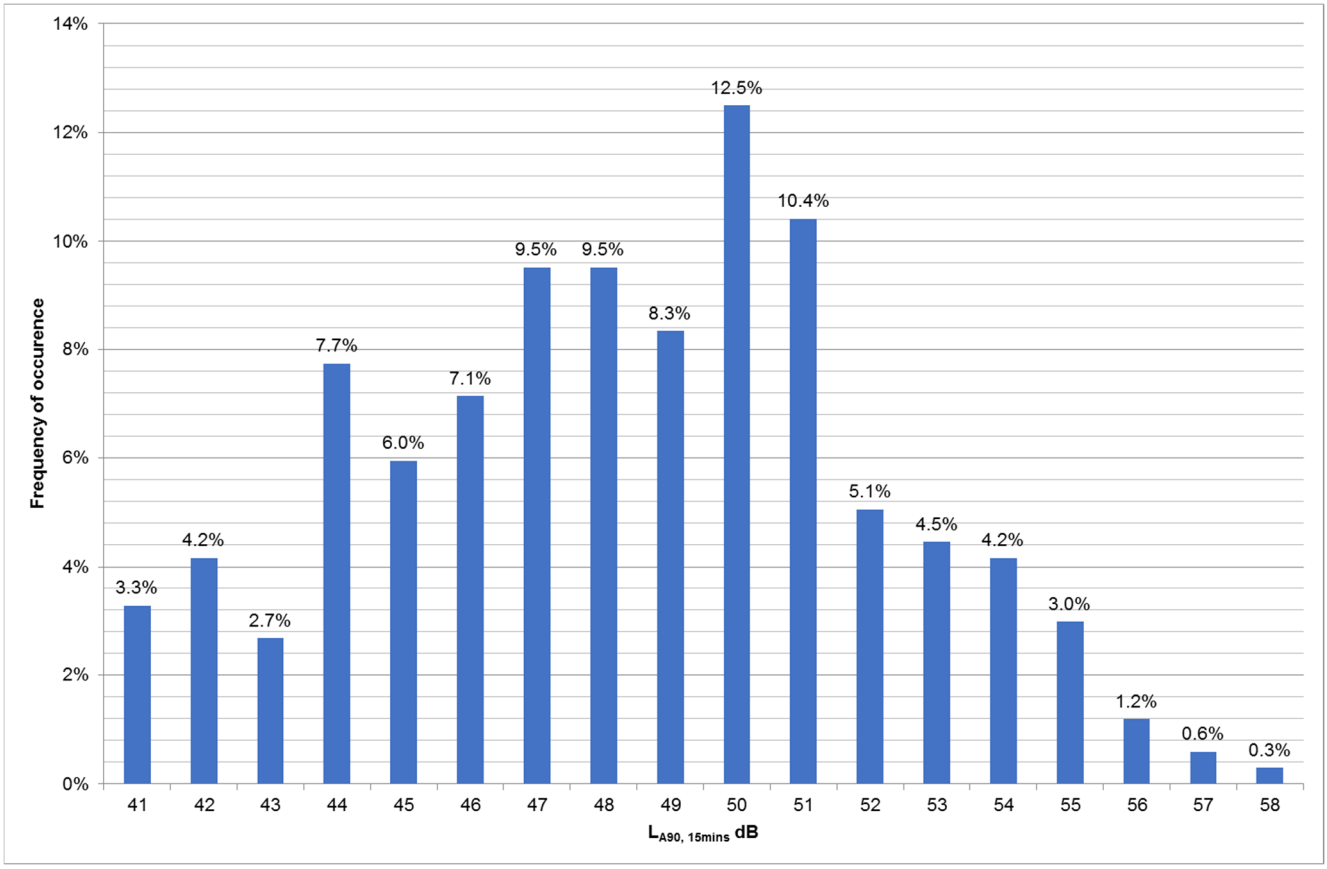
MP4 daytime background sound level distribution (07:00 – 23:00 hrs)



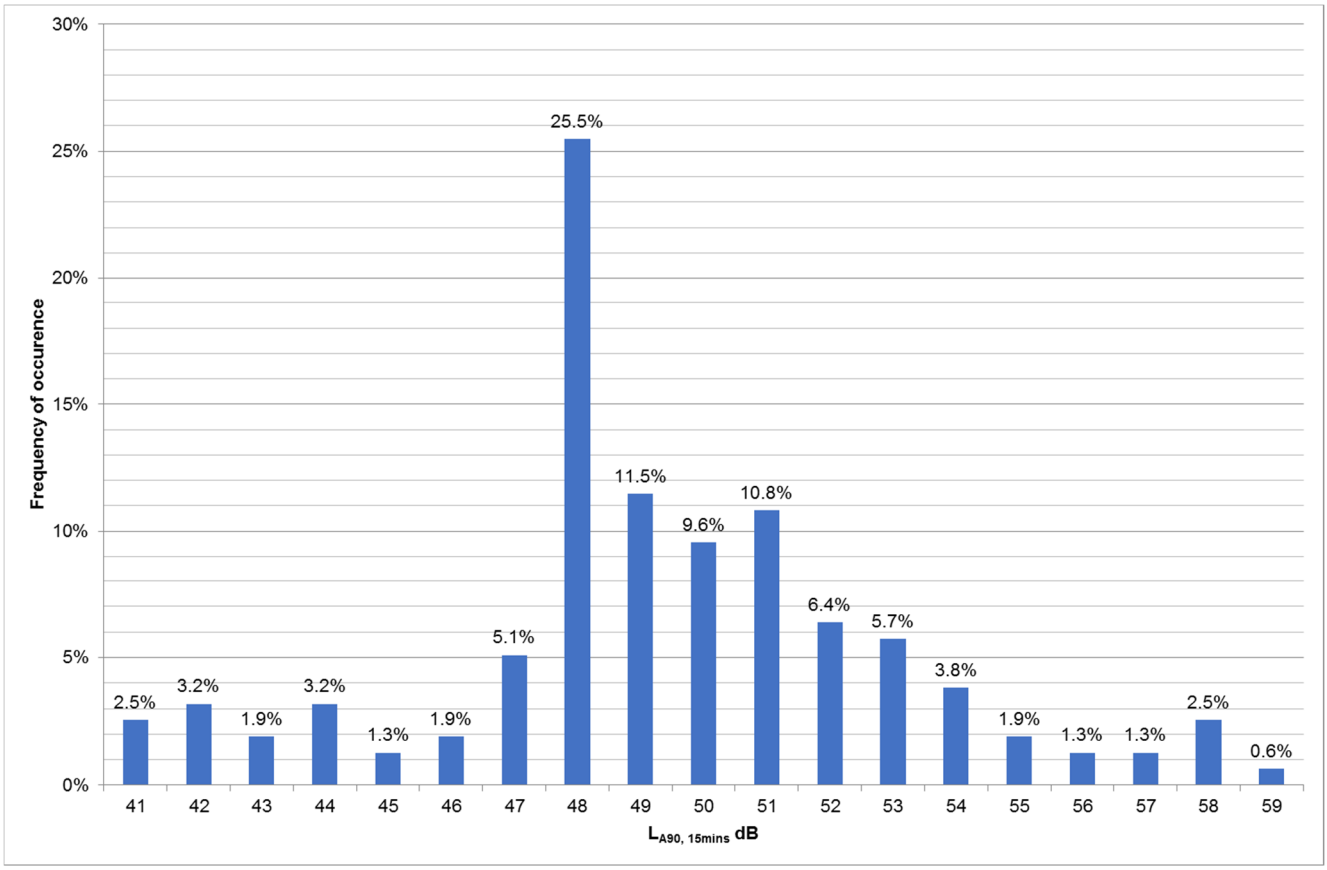
MP4 night-time background sound level distribution (23:00 – 07:00 hrs)



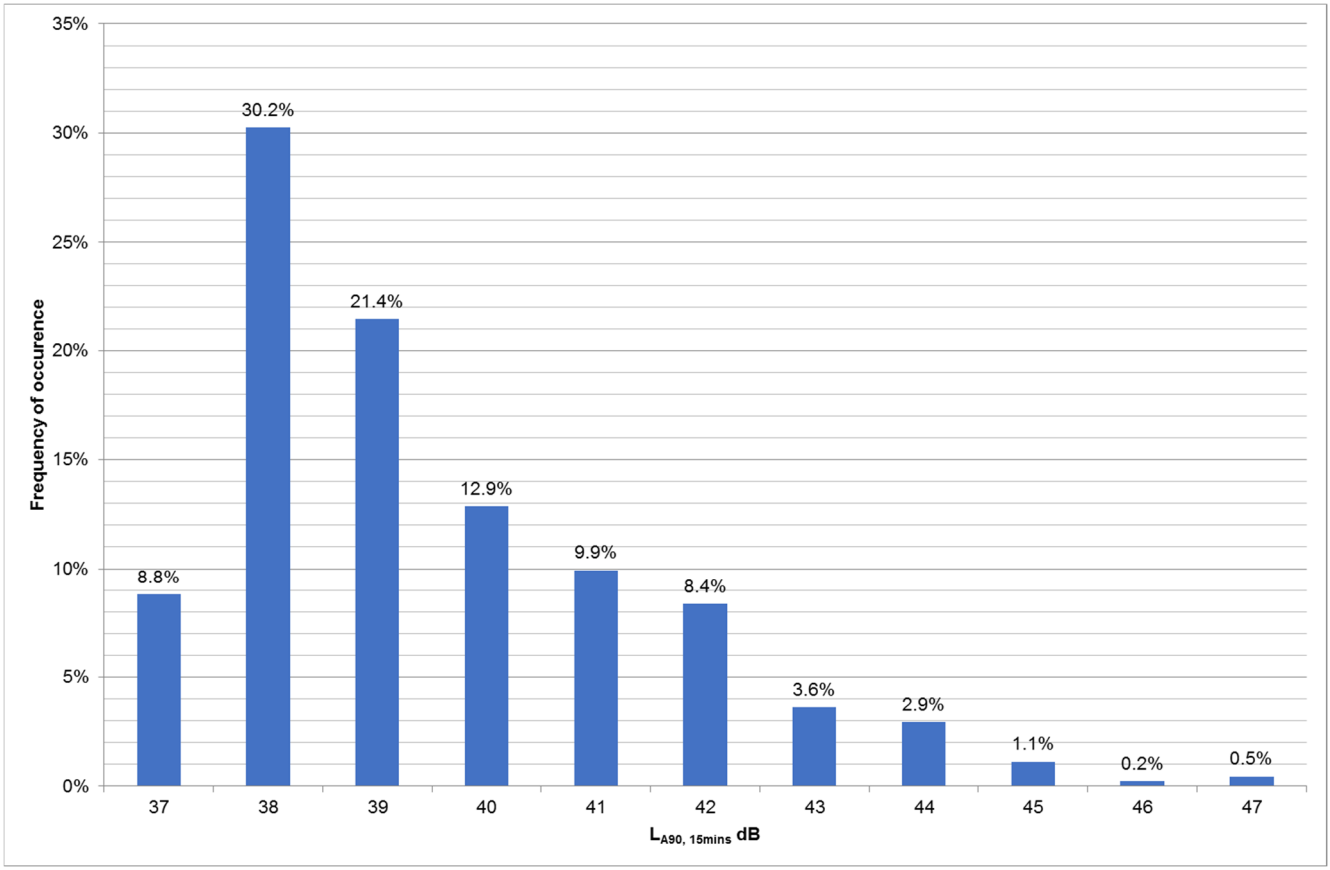
MP5 daytime background sound level distribution (07:00 – 23:00 hrs)



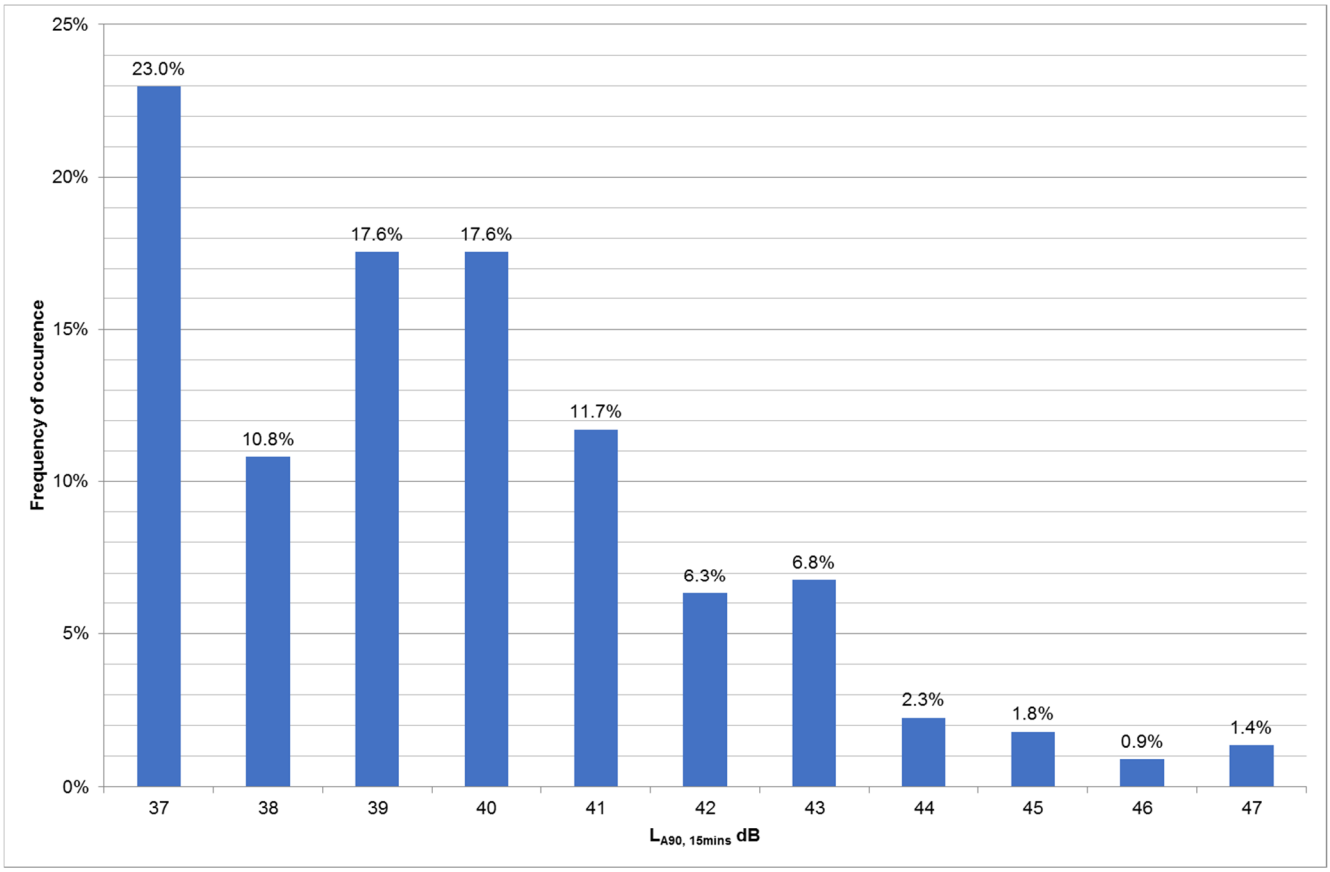
MP5 night-time background sound level distribution (23:00 – 07:00 hrs)



MP6 daytime background sound level distribution (07:00 – 23:00 hrs)



MP6 night-time background sound level distribution (23:00 – 07:00 hrs)



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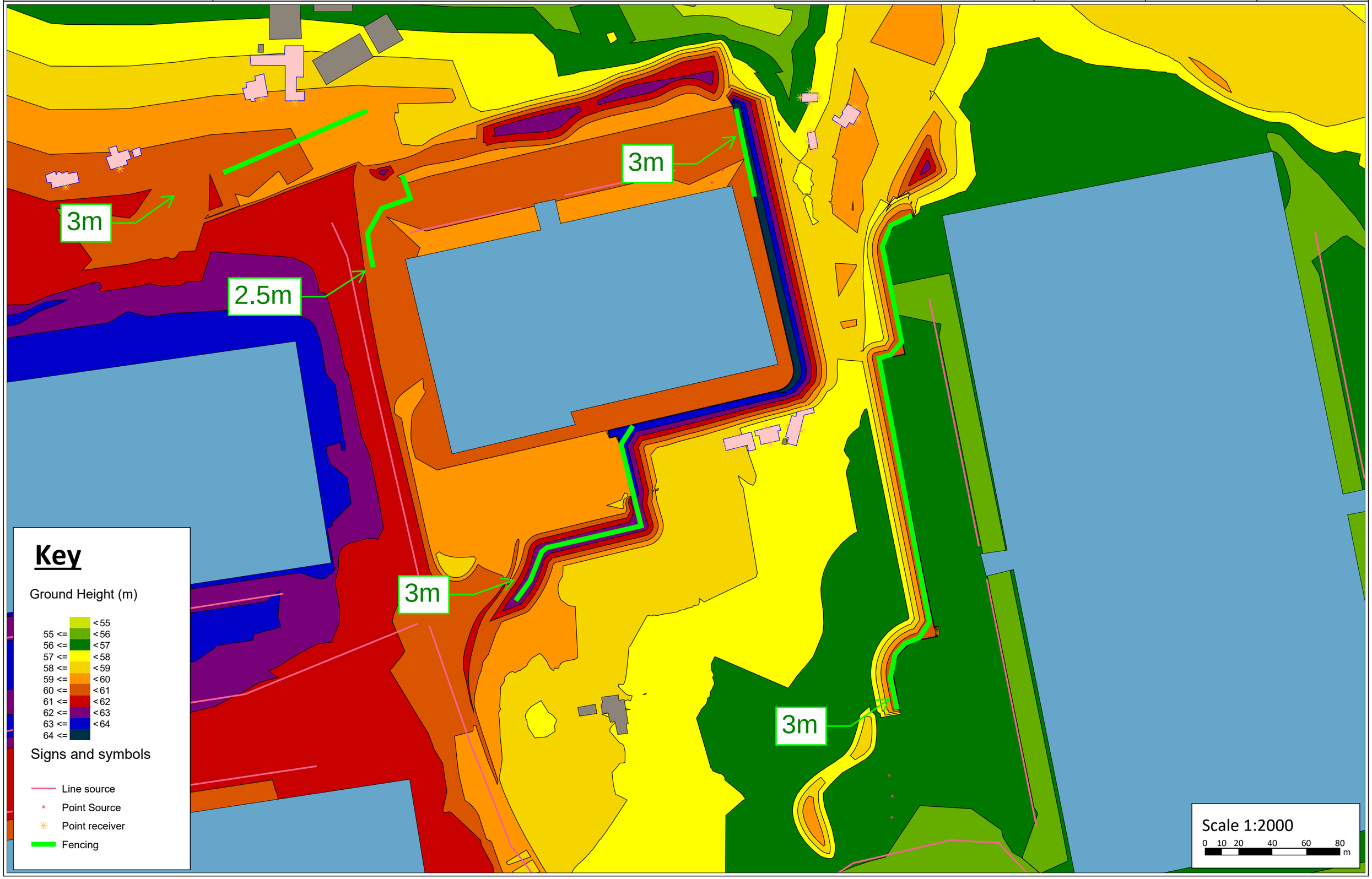

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ES Addendum – Text Deleted from Original ES Technical Paper 7 Noise & Vibration

Section Number / Paragraph Number / Table number / Figure Number in Original Paper	Text Deleted from Original ES	Reason
Section 1, Paragraph 1.7	Socio-Ecomic	Referenced in Section 1, Paragraph 1.6 instead
Section 2, Paragraph 2.1	2018	Updated to incorporate changes due to publication of NPPF February 2019 amendments.
Section 2, Figure 7.1	Figure 7.1 - Noise Sensitive Receptors	Figure updated to include Cliff Lane Farm, Cartridge Lane within 'Receptor B' grouping.
Section 6, Paragraph 6.3	current	Amended to identify that illustrative Masterplan and Parameter Plans drawings have been updated
Section 7, Paragraph 7.53	CLXX(52)4002 Issue -	Updated drawing reference inserted.
Section 7, Paragraph 7.49 and 7.50	Entirety of paragraph 7.49 and 7.50	Replaced with updated descriptive text providing additional clarity on quantity, sound power level, height and occurrence/duration of noise sources considered within the noise modelling process.
Section 7, Paragraph 7.53	CLXX(52)4002 Issue -	Updated drawing reference inserted.
Section 7, Paragraph 7.53	The proposed landscaped bund is primarily to the south and west perimeter of the site, and to the north-east. It should be	Replaced with updated descriptive text for the new finished ground level and bunding.

	noted that the effective height of the bund varies from approximately 3m to 7m, dependent upon location.	
Section 7, Figure 7.3	Figure 7.3: Predicted grid noise map at height of 4.5 metres	Figure revised to match model outputs based on new illustrative masterplan and finished ground levels
Section 7, Table 7.20	Entirety of Table 7.20: Predicted BS 4142 Night-time Specific Noise Level	Table revised to match model outputs based on new illustrative masterplan and finished ground levels
Section 7, Table 7.21	Entirety of Table 7.21: Impact of noise from operational phase	Table revised to match model outputs based on new illustrative masterplan and finished ground levels
Section 7, Paragraph 7.62	negligible	Amended to 'neutral' based on revised model outputs
Section 7, Paragraph 7.62	substantial	Amended to 'high' based on revised model outputs
Section 7, Paragraph 7.63	moderate	Amended to 'moderate' based on revised model outputs
Section 7, Table 7.24 Row 2 – 'Most receptors'	Minor High	Revised based on reduced industrial noise operational noise environmental impacts predicted following updated modelling results
Section 7, Table 7.24 Row 3 – 'Bradley Hall Cottages and Bradley View Cottages'	Substantial Moderate	Revised based on reduced industrial noise operational noise environmental impacts predicted following updated modelling results
Section 8, Paragraph 8.6	Rev D	Updated 'Development Cells Parameters Plan' drawing issue reference inserted.
Section 8, Paragraphs 8.11 to 8.14 and Figure 7:4	Entirety of Paragraphs and Figures	Section deleted as acoustic bunding and barrier mitigation is now included within the base Masterplan proposals used for the

		purpose of the revised noise modelling outputs
Section 9, Table 7.26 Row 2 – 'Most receptors'	Minor High	Revised based on reduced industrial noise operational noise environmental impacts predicted following updated modelling results
Section 9, Table 7.26 Row 3 – 'Bradley Hall Cottages and Bradley View Cottages'	Substantial Moderate Moderate	Revised based on reduced industrial noise operational noise environmental impacts predicted following updated modelling results
Section 9, Paragraph 9.6	Entirety of paragraph	Replaced with updated descriptive text referencing the confidence level of industrial noise impacts and
Section 10, Paragraph 10.3	has recently been refused planning permission	Updated to reflect that the Liberty Properties / Eddie Stobart proposal is now subject of a SoS Call In.
Section 10, Table 7.27	(Development No.4) Refused (Development No.9 Phase 2) 2027	Amended to reflect current status of information available to date for Cumulative Developments
Section 10, Table 7.28	Entirety of Table 7.26: Predicted operational noise impact	Table revised to match model outputs based new illustrative masterplan and finished ground levels
Section 10, Paragraph 10.14	Been refused	Amended to reflect current status of referral to SoS
Section 11, Paragraph 11.3	Entirety of paragraph	Text omitted following reduction of identified Significance of effect at Bradley Hall Cottages and Bradley View Cottage based on updated model outputs
Section 11, Paragraph 11.6	Entirety of paragraph	Section deleted as acoustic bunding and barrier mitigation is now included within the base Masterplan proposals used for the purpose of the revised noise modelling outputs