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Environmental Statement Volume III

Appendix 9.1: Noise Assessment

Axis J9, Phase 3

SEPTEMBER 2021

Q210470

Axis J9, Phase 3

Noise Assessment

784-B030696

Noise Assessment for Proposed Employment Development

August 2021

Prepared on Behalf of Albion Land

tetratecheurope.com

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1.0 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This report presents the findings of a noise assessment for a proposed employment development, located at land to the west of Howes Lane, North West Bicester, known as 'Axis J9, Phase 3.' The Development will deliver 17,808 sqm Gross External Area (GEA) of fully flexible employment development (Use Class E(g)(iii) and/or B2 and/or B8) within 11 employment units (Units 1-11). The final uses could be up to 100% of any of these use classes, except offices which will only be ancillary.:

This report considers the potential noise impact by assessing the following sources:

- Off-site including access road traffic
- HGV activity (manoeuvring, docking events and trailer parking)
- Building services plant
- Staff car parking
- Construction

Noise surveys have been undertaken and the results used to verify predictions of the short-term and long-term effects of noise. The noise levels from all proposed noise sources associated with site have been predicted at local representative receptors using CADNA noise modelling software which incorporates ISO 9613 and CRTN methodologies and calculations.

A list of acoustic terminology and abbreviations used in this report is provided in Appendix A. Location plans and noise contour plots are presented in Appendix B.

1.2 LEGISLATIVE CONTEXT

This report is intended to provide information relevant to the local planning authority and their consultees in support of a planning application for the above Development. Policy guidance with respect to noise is found in the revised National Planning Policy Framework (NPPF), published on 20th July 2021. Section 15, Conserving and enhancing the natural environment of the National Planning Policy Framework (NPPF 2021) provides the following guidance in relation to noise impacts.

"*174 Planning policies and decisions should contribute to and enhance the natural and local environment by:*

> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of 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…"*

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

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

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…"

"187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

188. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

Planning Practice Guidance (PPG): Noise provides further guidance with regard to the assessment of noise within the context of Planning Policy. The overall aim of this guidance, tying in with the principles of the NPPF and the Explanatory Note of the Noise Policy Statement for England (NPSE), is to *'identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.'*

A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the PPG and repeated as follows:

Table 1.1 NPPG Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No Specific Measures Required

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

The NPPF, NPSE and NPPG do not, however, present absolute noise level criteria which define SOAEL, LOAEL and NOEL which is applicable to all sources of noise in all situations. Therefore, within the context of the Development, national planning policy and appropriate guidance documents including 'BS 4142: 2014 + A1:2019 '*Methods for Rating and Assessing Industrial and Commercial Sound'*, BS8233:2013 '*Guidance on sound insulation and noise reduction for buildings'*, BS5288:2009 '*Code of practice for noise and vibration control on construction and open sites – Part 1: Noise';* IEMA '*Guidelines for Environmental Noise Impact Assessmen*t' and DMRB LA 111 (May 2020) *'Design Manual for Roads and Bridges.'* Section 2.0 presents the noise level criteria used as a basis of this assessment.

The NPPG also states that *neither the NPSE nor the NPPF (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of the proposed development.*

1.3 LOCAL PLANNING POLICY

Policy '*SLE1: Employment Development'* within the Cherwell Local Plan 2011-2031 Part 1 discusses the need to carefully consider the potential impact of employment sites on sensitive receptors and

residential amenity. The aspects of Policy SLE1 that could be considered as being relevant to noise impacts on sensitive receptors have been provided below:

"New employment proposals within rural areas on non-allocated sites will be supported if they meet the following criteria:

- *They will be small scale unless it can be demonstrated that there will be no significant adverse impacts on the character of a village or surrounding environment.*
- *The proposal and any associated employment activities can be carried out without undue detriment to residential amenity, the highway network, village character and its setting, the appearance and character of the landscape and the environment generally including on any designated buildings or features (or on any non-designated buildings or features of local importance).*
- *The proposal will not give rise to excessive or inappropriate traffic and will wherever possible contribute to the general aim of reducing the need to travel by private car."*

1.4 ACOUSTIC CONSULTANTS' QUALIFICATIONS, PROFESSIONAL MEMBERSHIPS

The lead acoustic consultant for this assessment is Emma Aspinall. The report has been verified by Nigel Mann. Relevant qualifications, membership and experience are summarised below.

Table 1.2 Acoustic Consultants' Qualifications & Experience

Name	Education	Experience in Undertaking Noise Assessments (Start date of working in noise & acoustics)	Attained Associate Membership of the Institute of Acoustics (date)	Attained Membership of the Institute of Acoustics (date)
Emma Aspinall	MGeol (2017)	Jul (2017)	Jan (2021)	-
Ashley Shepherd	BSc 2013	Feb 2014	Feb 2014	Nov 2017
Nigel Mann	BSc (1997) Msc (1999)	Nov (1998)	Nov (2001)	Jul (2005)

2.0 ASSESSMENT CRITERIA

2.1 NOISE ASSESSMENT CRITERIA

In order to enable the assessment of the Development in terms of LOAEL and SOAEL, Tables 2.1-2.3 present the equivalent noise levels and associated actions with the target noise level criteria identified. The noise level criteria detailed below have been derived from the following standards and design guidance:

- BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings – Code of practice*'
- BS 4142:2014 + A1:2019 *'Methods for rating and assessing industrial and commercial sound'*
- BS 5228-1: 2009 + A1:2014 *'Code of Practice for Noise and vibration control on construction and open sites – Part 1: Noise'*
- World Health Organisation 'Guidelines on Community Noise' 1999
- Tables 3.54aof *LA 111 'Noise and Vibration' (Design Manual for Roads and Bridges)*
- IEMA (Institute for Environmental Management and Assessment) *'Guidelines for Environmental Noise Impact Assessment October 2014'*

Table 2.1 Noise Level Criteria and Actions

Effect Level	Assessment	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level (NOAEL)	Goods Deliveries/Service Yard Activities/Car Parking	BS4142 Score of zero or lower	No Action Required Score of zero or lower is an indication of the sound source having a low impact
		Noise levels less than: Bedrooms (night-time) – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms (daytime) – 35 dB $L_{Aeq,16hours}$ Open Plan Office – 50 dB $L_{Aeq,T}$	No Action Required Within BS8233 / WHO
	Assessment of Overall Change in Noise Levels	Up to 3.0 dB Change or a Reduction in Noise Levels	No Action Required – Change in noise levels unlikely to be perceptible
Lowest Observed Adverse Effect Level (LOAEL)	Goods Deliveries/Service Yard Activities/Car Parking	*BS4142 Score of +5 or lower*	No Action Required Difference of +5 dB likely to be an indication of an adverse effect BS4142 Score of plus 5 or lower
		Noise levels exceed: Bedrooms (night-time) – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms (daytime) – 35 dB $L_{Aeq,16hours}$ Open Plan Office– 50 dB $L_{Aeq,T}$	Mitigate to achieve: *Bedrooms – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms – 35 dB $L_{Aeq,16hours}$ Open Plan Office – 50 dB $L_{Aeq,T}$* Within BS8233 / WHO
	Assessment of Overall Change in Noise Levels	Up to 4.9 dB Increase in Noise Levels	No Action Required Slight Impact at Receptor of Some Sensitivity

Effect Level	Assessment	Noise Level Criteria	Action / Justification
Significant Observed Adverse Effect Level (SOAEL)	Goods Deliveries/Service Yard Activities/Car Parking	BS4142 Score between +5 and +10	Difference of up to +10dB likely to be an indication of a significant adverse effect Mitigate to achieve: BS4142 Score of + 5 or lower
		Noise levels exceed: Bedrooms (night-time)– 35 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms (daytime)– 45* dB $L_{Aeq,16hours}$ Open Plan Office –50 dB $L_{Aeq,T}$	Mitigate to achieve: *Bedrooms – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms – 35 dB $L_{Aeq,16hours}$ Open Plan Office – 50 dB $L_{Aeq,T}$* Within BS8233 / WHO * Values correspond with PPG24 Category B (15 dB open window reduction)
	Assessment of Overall Change in Noise Levels	3.0 to 5.0 dB Change in Noise Levels at at receptor of high sensitivity or Up to 5.0 dB Increase in Noise Levels	Mitigate to achieve: Increase in Noise Levels of less than 3.0 dB (high sensitivity) or Increase in Noise Levels of less than 5.0 dB (receptor of some sensitivity)
Unacceptable Observed Adverse Effect Level (UOAEL)	Goods Deliveries/Service Yard Activities/Car Parking	BS4142 Score of + 10 or higher	Avoid Mitigate to achieve: BS4142 Score of 5 dB or lower
		Noise levels exceed: Bedrooms (night-time) – 51 dB $L_{Aeq,8hours}$ / 67 dB L_{Amax} Living Rooms (daytime) – 57 dB $L_{Aeq,16hours}$ Open Plan Office – 80 dB $L_{Aeq,16hours*}$	Avoid Values correspond with PPG24 Category D (mixed sources), planning permission should normally be refused. L_{Amax} noise levels based on PPG24 regular exceedance of 82 dB L_{Amax} less 15 dB for an open window. *Noise at Work Regulations Lower Action Value
	Assessment of Overall Change in Noise Levels	Greater than 5.0 dB Increase in Noise Levels	Mitigate to achieve: Increase in Noise Levels of less than 5.0 dB

Table 2.2 Noise Level Criteria and Actions (Traffic Noise Assessment)

Effect Level	Noise Level Criteria
No Observed Adverse Effect Level Negligible	Short Term Change in Noise Levels $L_{A10\ 18hr}$ ≥ 0.1 dB –0.9 dB
Lowest Observed Adverse Effect Level Minor	Short Term Change in Noise Levels $L_{A10\ 18hr}$ ≥ 1.0 dB – 2.9 dB
Significant Observed Adverse Effect Moderate	Short Term Change in Noise Levels $L_{A10\ 18hr}$ ≥ 3 dB – 4.9dB
Unacceptable Observed Adverse Effect Major	Short Term Change in Noise Levels $L_{A10\ 18hr}$ ≥ 5 dB

Table 2.3 Noise Level Criteria and Actions (Construction Noise Assessment)

Effect Level	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level	Fixed Limits In rural areas noise levels exceed 50dB In urban areas noise levels exceed 55dB	No Action Required Complaints Relating to Construction Noise Unlikely
Lowest Observed Adverse Effect Level	Fixed Limits In rural areas noise levels exceed 60dB In urban areas noise levels exceed 65dB	Mitigate to achieve total noise levels below relevant category threshold
Significant Observed Adverse Effect	Fixed Limits In rural areas noise levels exceed 70dB In urban areas noise levels exceed 75dB	Mitigate to achieve total noise levels below relevant category threshold
Unacceptable Observed Adverse Effect	Fixed Limits In rural areas noise levels exceed 80dB In urban areas noise levels exceed 85dB	Mitigate to achieve total noise levels below relevant category threshold

3.0 ASSESSMENT METHODOLOGY

3.1 NOISE MODELLING METHODOLOGY

Three-dimensional noise modelling has been undertaken based on the monitoring data to predict noise levels at a number of locations both horizontally and vertically. CADNA noise modelling software has been used. This model is based on ISO 9613 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken for large numbers of receptor points and different noise emission scenarios both horizontally and vertically. The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data and model settings as given in the table below have been used.

Table 3.1 Modelling Parameters Sources and Input Data

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	Ordnance Survey	Ordnance Survey
Ground levels – other areas	Site Observations and Ordnance Survey	OS 1:25,000 contours and OS 1:10,000 spot heights.
Traffic data – main surrounding roads	David Tucker Associates	Provided by David Tucker Associates
Traffic data – local roads	David Tucker Associates	Provided by David Tucker Associates
Building heights – around site	Tetra Tech Observations	8 m height for two storey residential properties, and 4 m for Bungalows. 3m per storey for multi-storey developments.
Barrier heights	Tetra Tech Observations	All existing garden fences at 1.8 m with the exception of hedges and trees which are considered to offer no noise protection. Phase1 and 2 benefits from a 2.4 m between the eastern units. A 4.0m acoustic fence is also proposed between Units 10 & 11.
Receptor positions	Tetra Tech	1 m from façade, height of 1.5 m for ground floor, 4 m for first floor properties. 1.5 m height for model grid and monitoring locations for validation.
Proposed Plans	Cornish Architects	Drawing Title: Proposed Site Plan Drawing No.: 20019-TP-003 Rev B Dated: 29/07/21

It is acknowledged that a number of the values of parameters chosen will affect the overall noise levels presented in this report. However, it should be noted that the values used, as identified above, are worst-case.

3.2 MODEL INPUT DATA – OPERATIONAL PHASE

3.2.1 Summary of Noise Levels

A summary of the operational phase noise levels, used within the model, for daytime and night-time L_{Aeq} and night-time L_{Amax}, are presented in Table 3.2 below. Further explanation on how each noise level was calculated, for each noise source, can be found in the sub-sections below.

Table 3.2 Summary of Noise Source, Noise levels during Daytime & Night-time

Noise Source	Noise Level (dB)		
	Daytime $L_{Aeq,1hour}$	Night-time $L_{Aeq,15min}$	Night-time L_{Amax}
HGV Docking	71.3	76.2	89.4
HGV Movements	47.5	47.5	73.0
Van Docking	60.6	62.5	80.3
Car Parking	53.0	53.0	71.9

3.2.2 HGV/Van Docking Event; Noise Data

Noise of a docking delivery event has been known to vary from site to site by as much as 22 dB L_{Aeq} at 5 m distance even with the same vehicle type. Similarly, individual events using the same vehicle and at the same store have been recorded to vary by as much as 14 dB.

As such, the following worst-case calculations have been based on measurements of HGVs and vans delivering goods. All measurements were undertaken in free-field conditions. In addition to noise from the unloading process, the levels used in the assessment include noise from the vehicle pulling up to the unloading bay, manoeuvring into position and then pulling away once unloading/loading is complete, together with other sources such as trolleys and reversing bleepers. During the daytime, the assessment is based on 100% of the docking bays having an HGV/van arrive, unload and depart in any 1-hour period, during the night-time the assessment is based on, in any 15–minute period, one event occurs at 50% of the available docking spaces. Events are modelled as a point source.

HGV Unloading Event Noise Data

- *Specific Noise Level*
  1 x 120 seconds at L_p 84 dB at 3 m distance (vehicle arriving and manoeuvring)
  1 x 1800 seconds at L_p 70 dB at 3 m distance (vehicle unloading)
  1 x 60 seconds at L_p 75 dB at 3 m distance (vehicle leaving)

$$\text{Daytime } L_{Aeq(60\ mins)} = 10\log(1/3600)(120 \times 10^{0.1 \times 84dB} + 1800 \times 10^{0.1 \times 70dB} + 60 \times 10^{0.1 \times 75dB})$$

$$= 71.3 \text{ dB at 3 m distance}$$

$$\text{Night-time } L_{Aeq(15\ mins)} = 10\log(1/900)(120 \times 10^{0.1 \times 84dB} + 780 \times 10^{0.1 \times 70dB})$$

$$= 76.2 \text{ dB at 3 m distance}$$

- *Maximum Noise Level*

Night-time L_{Amax} = 89.4 dB at 3 m distance

Van Unloading Event Noise Data

- *Specific Noise Level*

2 minutes at L_p 65.5 dB at 3 m distance	(vehicle arriving and manoeuvring)
36 minutes at L_p 61.9 dB at 3 m distance	(vehicle unloading)
2 minutes at L_p 65.5 dB at 3 m distance	(vehicle leaving)

Daytime $L_{Aeq(1hour)} = 10\log(1/60)(2\text{mins} \times 10^{0.1 \times 65.5\ dB} + 36\ \text{mins} \times 10^{0.1 \times 61.9\ dB} + 2\ \text{mins} \times 10^{0.1 \times 65.5\ dB})$

= 60.6 dB at 3 m distance

Night-time $L_{Aeq\ (15mins)} = 10\log(1/15)(2\text{mins} \times 10^{0.1 \times 65.5\ dB} + 13\ \text{mins} \times 10^{0.1 \times 61.9\ dB})$

= 62.5 dB at 3 m distance

- *Maximum Noise Level*

Night-time L_{Amax} = 80.3 dB at 3m distance

3.2.4 HGV Movements; Noise Data

The following calculations have been used to represent HGVs/vans arriving/exiting along the access road. As a worst-case assumption, 20 HGVs have been predicted to arrive/leave along the access road per hour. Therefore, as a worst-case scenario, it has been calculated that 20 HGVs arrive/leave in a 1-hour period during the daytime (07:00 – 23:00) period. During night-time (23:00-07:00) the assessment has used 25% of the predicted HGVs/vans arriving/leaving, in any 15-minute period. The HGV/van movements have been included as a line source in the model.

- *Daytime $L_{Aeq,1hr}$ Noise Level*

20 x 10 seconds at L_p	= 60.1 dB at 3 m distance (vehicle arriving/leaving)
$L_{Aeq(60\ mins)}$	$= 10\log(1/3600)(200\ \text{sec} \times 10^{0.1 \times 60.1\ dB})$
Daytime $L_{Aeq(60\ mins)}$	= 47.5 dB at 3 m distance

- *Night-time $L_{Aeq,15\ mins}$ Noise Level*

5 x 10 seconds at L_p	= 60.1 dB at 3 m distance (vehicle arriving/leaving)
$L_{Aeq(15\ mins)}$	$= 10\log(1/900)(50\ \text{sec} \times 1 \times 10^{0.1 \times 60.1\ dB})$
Night-time $L_{Aeq(15\ mins)}$	= 47.5 dB at 3 m distance

- *Night-time L_{Amax}*

Night-time L_{Amax}	= 73.0 dB at 3 m distance

3.2.5 Building Service Plant; Noise Data

Point sources have been used in the model to represent the proposed plant associated with the scheme. The maximum sound pressure levels of the point sources at 1 and 3 metres were estimated in the model as a conditional maximum level that the noise levels at nearby receptors were predicted to meet the BS 4142 assessment criteria. Noise emission limits have been specified to ensure that plant noise rating levels are at least 10 dB below existing night-time background noise levels.

3.2.6 Car Park; Noise Data

Worst case noise levels from car parking at the employment centre have been based upon observations and measurements taken at a similar sized employment centre car park during a shift change. The L_{Amax} noise levels account for impulsive events such as car-door slams. The noise data has been included in the model as an area source at 1.5m height. The noise levels used are presented in Table 3.2 above.

3.2.7 Road Traffic Noise Data

All roads (including the site access road) expected to make a significant contribution have been included within this assessment. Traffic flows and HGV percentages have been provided by David Tucker Associates; the following scenarios have been provided:

- **2020 Base**
- 2025 + Committed Development **(Do Minimum DM 2025)**
- 2025 + Committed Development + Development **(Do Something DS 2025)**

Table 3.3 Traffic Data (AAWT 18 hour)

Road Link	2020 Base	HGV %	DM 2025	HGV %	DS 2025	HGV %
Howes Lane	13760	9	-	-	-	-
Middleton Stoney Road East	15542	4	17426	3	17671	3
Vendee Drive	18568	7	21217	7	21387	7
Middleton Stoney Road West	16399	5	22391	4	22399	4
SLR North	-	-	14819	10	15138	10
SLR South	-	-	14819	10	15242	10
Phase 1 & 2 Access Road	-	-	1534	22	1534	22

3.3 CONSTRUCTION DATA

Information regarding noise emissions from equipment used during the construction phase has been obtained from Annex C of BS 5228-1:A1 - 2014 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*. This annex presents a range of current sound level data on typical site equipment and common site activities.

This data is obtained by field measurements for items of plant in actual use on construction and open sites in the UK. Levels quoted in the database are based on an average (logarithmic) of measured sound levels, and where appropriate have been derived from more than one model of similarly sized plant. The results are presented as un-weighted octave band activity L_{eq} levels, and overall A-weighted activity L_{eq} levels in dB. All sound pressure levels are standardized to 10 metres from the plant.

The items of plant and associated noise levels shown in Table 3.4 below has been used for the purposes of this assessment and consider the range of typical activities likely to be employed during the construction phase of the Development. Items of mobile plant have been positioned in the areas on the development site that are close to existing residential dwellings.

Table 3.4 Mobile Plant Construction Phase

Mobile Plant	BS 5228-1:2009 Annex C Ref.	Octave Band Sound Pressure Levels (Hz)								Model Input $L_{Aeq,1hour}$ at 10 m
		63	125	250	500	1K	2K	4K	8K	
Articulated Dump truck	Table C.2 No.33	85	87	77	75	76	73	69	62	81 dB
Tracked Excavator- loading truck	Table C.1 No.10	82	78	82	81	81	78	72	64	85 dB
Tracked Excavator	Table C.2 No.19	95	84	79	73	70	68	64	57	77 dB
Crane	Table C.4 No.48	82	77	80	76	66	66	56	50	76 dB
Delivery Trucks	Table C2 No.34	73	78	78	78	74	73	68	66	80 dB
Concrete Pumps	Table C4 No.28	79	80	73	72	69	68	59	53	75 dB
Hand-held Pneumatic Breaker	Table C.1 No. 6	83	83	81	74	73	76	78	77	83 dB
Piling Rigs*	Table C.12 No. 34	66	84	81	85	86	86	77	68	92 dB
Road Sweeper	Table C.4 No.90	80	75	69	75	71	67	61	58	76 dB
Angle Grinding (Power Tools)	Table C.4 No.93	57	51	52	60	70	77	73	73	80 dB
Concrete Mixer Truck	Table C.4 No.20	83	74	66	69	70	78	60	55	80 dB
Lifting Platform	Table C.4 No.57	78	76	62	63	60	59	58	49	67 dB
Water Pump (diesel)	Table C.4 No.88	70	65	66	64	64	63	56	46	68 dB
Forklift	Tetra Tech Data	81	67	65	67	67	67	67	67	62 dB

All values are sound pressure levels in dB re: 2x 10-5 Pa
*typical frequency spectra derived for piling rig derived from BS 5228

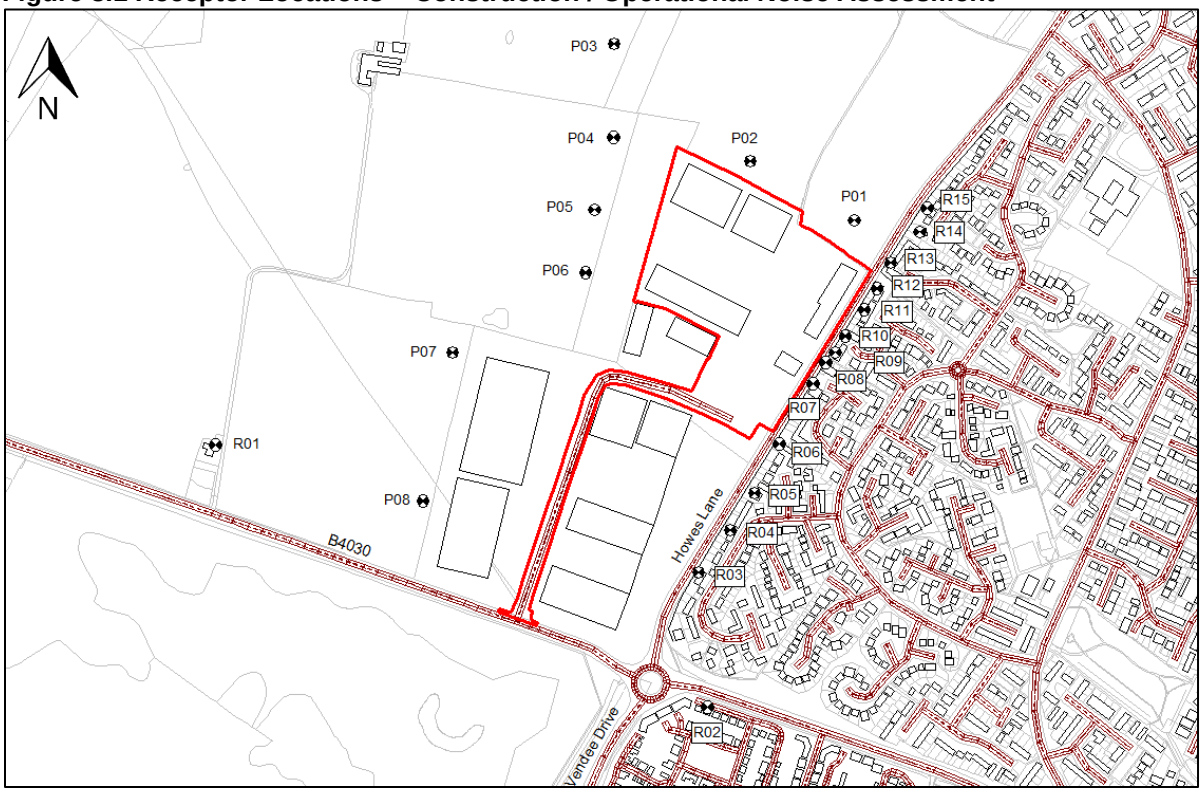
3.4 SENSITIVE RECEPTORS

The tables below summarise receptor locations that have been selected to represent worst-case residential receptors with respect to site related traffic noise and direct noise from the site. Ground and first floor facades (adjacent and facing the Development) of nearest properties have been represented. Proposed receptors to the north and west of the development have also been assessed within the operational assessment to represent potential future receptors for planning application 14/01641/OUT. The locations of the receptors are shown on Figure 3.1 and 3.2 below.

Table 3.5 Receptor Locations – Construction / Operational Noise Assessment

Ref.	Description	Height (m) Daytime/Night-time
R01	Himley Farm, Middleton Stoney Road	1.5 / 4.0
R02	11 Colwell Close	1.5 / 4.0
R03	78 Isis Avenue	1.5 / 4.0
R04	64 Isis Avenue	1.5 / 4.0
R05	50 Isis Avenue	1.5 / 4.0
R06	30 Isis Avenue	1.5 / 4.0
R07	20 Wensum Crescent	1.5 / 4.0
R08	21 Wensum Crescent	1.5 / 4.0
R09	21 Beckdale Close	1.5 / 4.0
R10	29 Beckdale Close	1.5 / 4.0
R11	51 Beckdale Close	1.5 / 4.0
R12	59 Beckdale Close	1.5 / 4.0
R13	18 Dove Green	1.5 / 4.0
R14	10 Derwent Road	1.5 / 4.0
R15	12 Derwent Road	1.5 / 4.0
P01	Northern Proposed Development	1.5 / 4.0
P02	Northern Proposed Development	1.5 / 4.0
P03	Western Proposed Development	1.5 / 4.0
P04	Western Proposed Development	1.5 / 4.0
P05	Western Proposed Development	1.5 / 4.0
P06	Western Proposed Development	1.5 / 4.0
P07	Western Proposed Development	1.5 / 4.0
P08	Western Proposed Development	1.5 / 4.0

Figure 3.1 Receptor Locations – Construction / Operational Noise Assessment

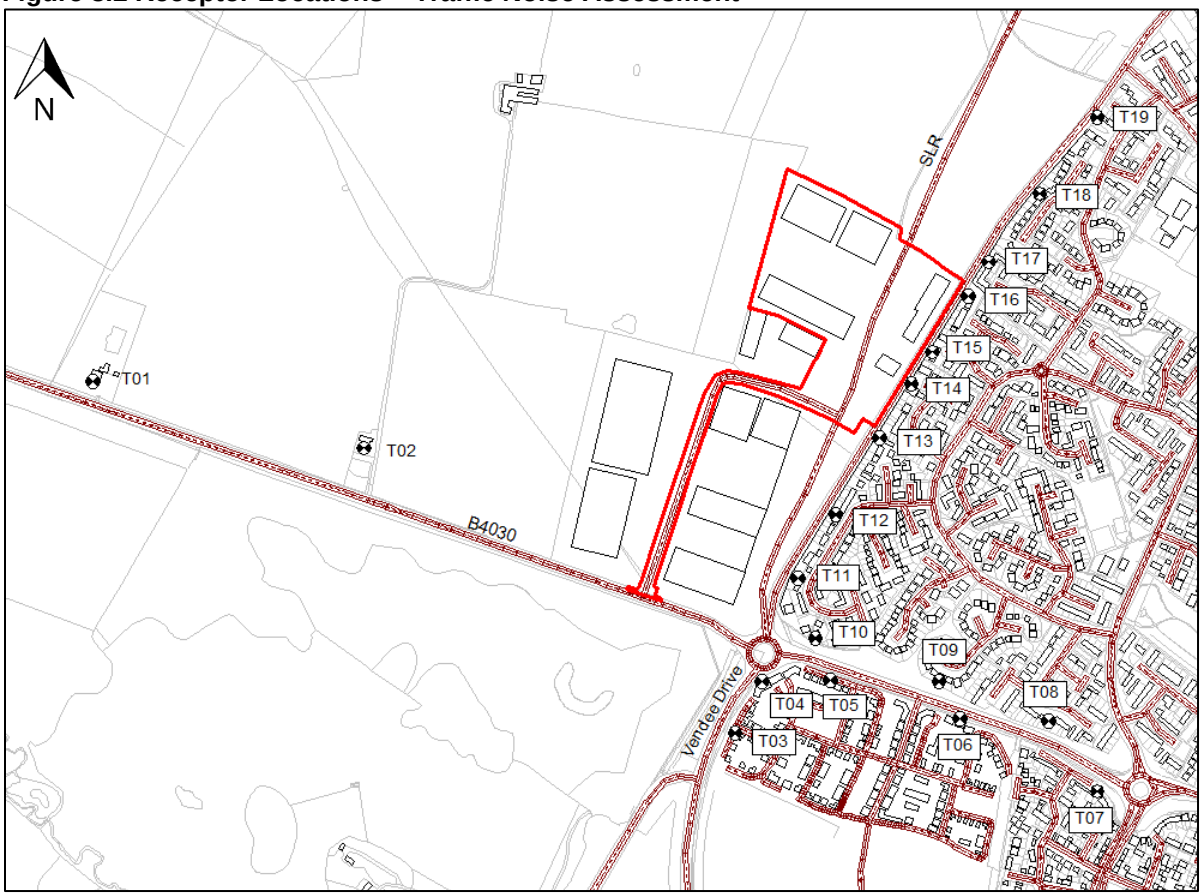


Not to scale
OS Licence No. AL553611

Table 3.6 Receptor Locations – Traffic Noise Assessment

Ref.	Description	Height (m)
T01	Lovelynch House, Middleton Stoney Road	4.0
T02	Himley Farm, Middleton Stoney Road	4.0
T03	Cala Homes Development	4.0
T04	Cala Homes Development	4.0
T05	7 Colwell Close	4.0
T06	Cala Homes Development	4.0
T07	56 Kempton Close	4.0
T08	46 Shannon Road	4.0
T09	17 Eden Way	4.0
T10	96 Isis Avenue	4.0
T11	84 Isis Avenue	4.0
T12	64 Isis Avenue	4.0
T13	30 Isis Avenue	4.0
T14	20 Wensum Crescent	4.0
T15	23 Beckdale Close	4.0
T16	59 Beckdale Close	4.0
T17	21 Dove Green	4.0
T18	17 Derwent Road	4.0
T19	14 Dryden Avenue	4.0

Figure 3.2 Receptor Locations – Traffic Noise Assessment



Not to scale
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3.5 TRANQUILLITY RATING

An assessment of the existing tranquillity level of the site has been based on the mapping data published by CPRE, the countryside charity. This uses a colour coded system and a 500m assessment grid for the whole of England, and a tranquillity rating of between 1 and 10 is assigned (1 being least tranquil and 10 being most).

4.0 NOISE SURVEY

4.1 NOISE SURVEY METHODOLOGY

A monitoring survey was undertaken to characterise baseline ambient noise levels currently experienced on the site and to establish the relative local background and traffic noise levels. Equipment used during the survey included:

Rion NL-52	Environmental Noise Analyser (WYG15)	s/n	620585
Rion NL-52	Environmental Noise Analyser (WYG18)	s/n	843173
Rion NL-52	Environmental Noise Analyser (WYG20)	s/n	219905
Rion NC-75	Sound Calibrator	s/n	35480543

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice, a drift of -0.1 dB for s/n 620858, -0.2 dB for s/n 219905 and -0.1 dB for s/n 843173 was observed. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

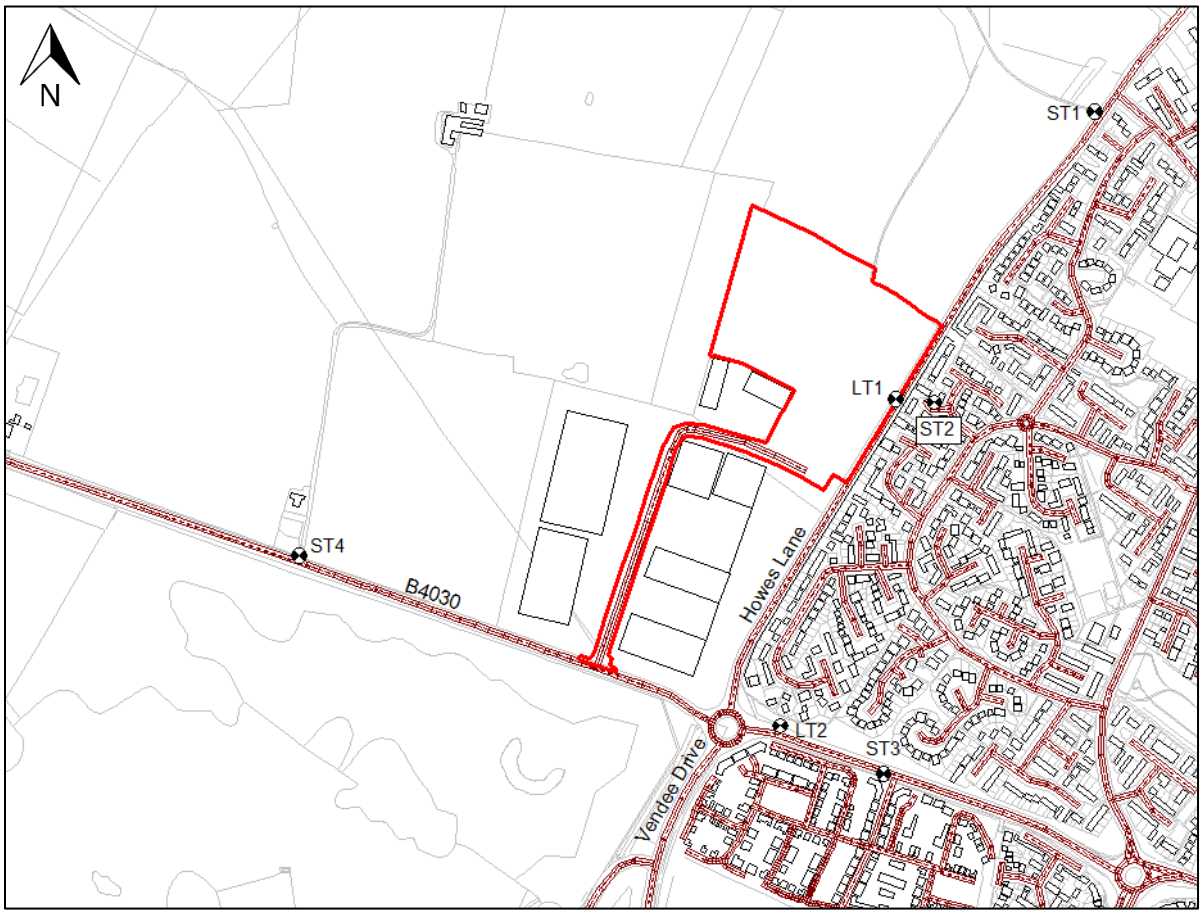
A baseline monitoring survey was undertaken at six locations (as specified in the following table and shown in Figure 4.1) from Wednesday 21st July 2021 – Monday 26th July 2021. Attended short term measurements were undertaken at four locations during day, evening and night-time periods with two additional locations being measured unattended over a 120-hour period. The raw data collected from the long-term monitoring is available upon request.

Measurements were taken in general accordance with BS 7445-1:2003 *The Description and Measurement of Environmental Noise: Guide to quantities and procedures*. Weather conditions during the survey period were observed as being hot and dry. Anemometer readings confirmed that wind speeds were less than 5 ms^{-1} at all times during the survey, with a predominant north-easterly wind direction.

Table 4.1 Noise Monitoring Locations

Ref	Description
LT1	Off to the West of Howes Lane, to the West of Beckdale close and in line with ST2.
LT2	Near roundabout at the end of Middleton Stoney Road and North West from CALA Homes entrance (OX26 1AD).
ST1	Lay-by North of Howes Lane and to the South of the Police Station.
ST2	On the corner of Beckdale Close in line with LT1.
ST3	On the grass verge in between the roundabout and the Northern entrance of CALA Homes (OX26 1AD).
ST4	In the driveway entrance of Himley Farm, towards the West of Bicester via the B4030.

Figure 4.1 Noise Monitoring Locations



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OS Licence No. AL553611

4.2 NOISE SURVEY RESULTS

Existing ambient noise levels in the area are dominated by road traffic noise along Howes Lane and the B4030.

Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively. Road traffic noise is generally described using the L_{A10} index (i.e. the level exceeded for 10% of the measurement period).

Table 4.2 Meteorological Conditions during the Survey

Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Day ST1	22/07/2021 09:30	22	1-2	E	1	Road Traffic Noise from Howes Lane
Day ST2	21/07/2021 16:08	29	1-2	N/E	4	Road Traffic Noise from Howes Lane
Day ST3	21/07/2021 14:59	29	1-2	N/E	4	Road Traffic Noise from Middleton-Stoney Road

Day ST4	21/07/2021 15:38	29	1-2	N/E	5	Road Traffic Noise from the B4030
Evening ST1	21/07/2021 19:00	30	1-2	N/E	2	Road Traffic Noise from Howes Lane
Evening ST2	21/07/2021 19:21	30	1-2	N/E	2	Road Traffic Noise from Howes Lane
Evening ST3	21/07/2021 19:44	30	1-2	N/E	2	Road Traffic Noise from Middleton-Stoney Road
Evening ST4	21/07/2021 20:08	30	1-2	N/E	2	Road Traffic Noise from the B4030
Night ST1	21/07/2021 23:00	22	2-3	N/E	3	Road Traffic Noise from Howes Lane
Night ST2	21/07/2021 23:21	22	2-3	N/E	2	Road Traffic Noise from Howes Lane
Night ST3	21/07/2021 23:44	22	2-3	N/E	3	Road Traffic Noise from Middleton-Stoney Road
Night ST4	22/07/2021 00:15	22	2-3	N/E	1	Road Traffic Noise from the B4030

The results of the statistical measurements and frequency measurements conducted during the survey are summarised in the following table. All values are sound pressure levels in dB (re: 2 x 10^{-5} Pa).

Table 4.3 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Duration (T)	Monitoring Date and Times	Location	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekday Daytime 07:00 - 23:00	43 hours	21/07/2021 – 26/07/2021 07:00 - 23:00	LT1	71.4	104.7	29.9	75.3	51.0
Weekday Night-time 23:00 – 07:00	24 hours	21/07/2021 – 26/07/2021 23:00 - 07:00		65.0	99.5	19.0	54.9	34.0
Weekend Daytime 07:00 - 23:00	32 Hours	21/07/2021 – 26/07/2021 07:00 - 23:00		70.7	115.1	20.5	73.9	50.0
Weekend Night-time 23:00 – 07:00	16 hours	21/07/2021 – 26/07/2021 23:00 - 07:00		61.1	91.9	21.6	50.6	30.0
Weekday Daytime 07:00 - 23:00	43 hours	21/07/2021 – 26/07/2021 07:00 - 23:00	LT2	63.4	98.1	32.7	66.9	45.0
Weekday Night-time 23:00 – 07:00	24 hours	21/07/2021 – 26/07/2021 23:00 - 07:00		54.8	87.5	21.6	45.5	34.0
Weekend Daytime 07:00 - 23:00	32 Hours	21/07/2021 – 26/07/2021 07:00 - 23:00		62.3	94.1	22.7	65.4	44.0
Weekend Night-time 23:00 – 07:00	16 hours	21/07/2021 – 26/07/2021 23:00 - 07:00		52.7	86.4	22.4	46.3	38.0
Daytime 07:00 - 19:00	15 Mins	22/07/2021 09:30	ST1	71.5	88.1	46.1	75.5	54.4
	15 Mins	21/07/2021 16:08	ST2	49.1	66.0	37.8	49.3	42.4
	15 Mins	21/07/2021 14:59	ST3	64.9	84.6	42.6	69.3	50.1
	15 Mins	21/07/2021 15:38	ST4	71.8	94.0	36.4	77.2	43.6
Evening 19:00 - 23:00	15 Mins	21/07/2021 19:00	ST1	68.2	82.0	44.8	72.6	54.9
	15 Mins	21/07/2021 19:21	ST2	47.7	68.0	35.5	49.1	40.2
	15 Mins	21/07/2021 19:44	ST3	64.2	83.1	39.6	68.3	46.7

Period	Duration (T)	Monitoring Date and Times	Location	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
	15 Mins	21/07/2021 20:08	ST4	69.9	95.3	37.6	72.9	40.9
Night-time 23:00 - 07:00	15 Mins	21/07/2021 23:00	ST1	66.4	87.9	34.6	66.3	41.5
	15 Mins	21/07/2021 23:21	ST2	43.4	66.7	29.1	43.2	33.1
	15 Mins	21/07/2021 23:44	ST3	54.2	78.7	31.7	51.6	34.5
	15 Mins	22/07/2021 00:15	ST4	63.1	87.0	33.6	55.1	35.9

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa

5.0 ASSESSMENT OF KEY EFFECTS

5.1 CONSTRUCTION ASSESSMENT

Noise levels from potential construction activity associated with the development of the site have been assessed in accordance with BS 5228 criteria which indicates if a significant effect is likely to occur at noise sensitive properties.

This assessment has been undertaken in order to establish the maximum external noise levels at neighbouring properties for the proposed construction activity of the site and whether typical plant and activities will be within these levels. In order to present a worst-case assessment, the model predicts that all sources will be operating together for a total of 15 minutes every hour.

Significance Based on fixed limits

The table below shows predicted levels of construction noise at existing noise sensitive properties for comparison with the BS 5228-1 recommended noise limit criterion of 75 dBA.

Table 5.1 Construction Noise Assessment Results (Fixed Limits Method)

Ref	Construction Noise Level (dBA)	Criterion (dBA)	Within Recommended Fixed Noise Limit?
R01	42.2	75	Yes
R02	42.5	75	Yes
R03	49.4	75	Yes
R04	52.6	75	Yes
R05	53.6	75	Yes
R06	58.9	75	Yes
R07	65.7	75	Yes
R08	65.2	75	Yes
R09	64.3	75	Yes
R10	64.3	75	Yes
R11	63.7	75	Yes
R12	62.3	75	Yes
R13	54.1	75	Yes
R14	53.6	75	Yes
R15	52.1	75	Yes

All values are sound pressure levels in dB re: 2x 10-5 Pa.

The results indicate that the noise levels at the façades of the existing noise sensitive properties would be within the recommended criteria. Noise levels within the fixed limit criteria are likely to result in internal conditions where conversation would not be difficult.

5.2 BUILDING SERVICES PLANT NOISE ASSESSMENT

This assessment has been undertaken in order to establish the maximum external noise levels from the proposed building services plant located at a worst-case position on the proposed units. This includes nine indicative sources of roof mounted plant. The assessment compares the predicted worst-case breakout noise levels from the plant with the existing measured average daytime and night-time background noise L_{A90} at the closest existing residential receptors.

A series of predictions were made by defining different sound power levels at a point source. When the sound pressure levels are set as shown in Tables 5.2 (which are considered to be achievable), the noise levels at all the existing receptors are predicted to be at least 10 dB below existing background levels during the daytime and night-time as shown in Tables 5.3. All predicted rating noise levels fall within the No Observed Adverse Effect Level; specific noise levels at proposed receptors are predicted to be below the measured background noise levels.

As the new building service plant could have tonal characteristics which may be just perceptible at nearby receptor locations, a subjective +2 dB correction has been applied to the predicted noise levels at receptor before comparison with background levels in accordance with section 9.2 of BS4142:2014 + A1:2019.

Table 5.2 Proposed Emission Limits for BSP as Modelled

BSP Location	Noise Emission Limit - Sound Pressure Level (Per Unit)	
	Daytime	Night-time
9 x Indicative Building Services Plant	71.5 dB(A) at 1 m OR 61.9 dB(A) at 3 m	55.1 dB(A) at 1 m OR 45.5 dB(A) at 3 m

Table 5.3 BS 4142 Assessment – Building Services Plant

Location	Existing Measured Background L_{A90}		Specific noise level from plant		Noise rating level from plant (with +2 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	44	36	14	0	16	2	-28	-34
R02	44	34	16	2	18	4	-26	-30
R03	44	34	20	5	22	7	-22	-27
R04	50	34	22	7	24	9	-26	-25
R05	50	34	24	9	26	11	-24	-23
R06	50	34	28	13	30	15	-20	-19
R07	50	34	37	22	39	24	-11	-11
R08	50	34	37	22	39	24	-11	-10
R09	50	34	37	22	39	24	-11	-10
R10	50	34	36	21	38	23	-12	-11
R11	50	34	38	22	40	24	-10	-10
R12	50	34	37	22	39	24	-11	-11
R13	50	34	33	18	35	20	-15	-14
R14	50	34	28	14	30	16	-21	-18

Location	Existing Measured Background L_{A90}		Specific noise level from plant		Noise rating level from plant (with +2 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R15	50	34	25	12	27	14	-23	-20
P01	50	34	31	16	33	18	-17	-16
P02	50	34	32	16	34	18	-16	-16
P03	50	34	21	6	23	8	-27	-27
P04	50	34	24	8	26	10	-24	-24
P05	50	34	26	11	28	13	-22	-22
P06	50	34	27	12	29	14	-21	-20
P07	44	36	20	4	22	6	-23	-30
P08	44	36	12	0	14	2	-30	-34

All values are sound pressure levels in dBA re: 2x 10^{-5} Pa.

All calculations used to derive the above table (including averaging of background noise levels and predicted source noise levels) have been undertaken to 1 decimal place to avoid perpetuation of rounding errors. However, in accordance with BS4142 para 8.6 the levels are expressed as integers (with 0.5 dB being rounded up). This may mean that the arithmetic's in the above table may appear to be up to 1 dB incorrect due to this rounding.

5.3 COMBINED NOISE INTRUSION ASSESSMENT

All assessments below are inclusive of intrinsic mitigation in the form of a 4.0m high acoustic barrier between Unit 10 and 11. The location of the barrier is shown in Section 6.0.Tables 5.4 – 5.6 below present the external noise levels at nearby sensitive receptors from all sources of potential operational noise associated with the Development (including HGV/van movements, unloading, parking and staff parking). Internal L_{Aeq} and L_{Amax} noise levels have been assessed both with windows-open, where a reduction from a partially open window of 15 dB has been used, and with windows-closed where an assumption of single glazing with a sound reduction of 30 dB has been used. Daytime noise levels are shown illustratively on Figure 5.1.

Table 5.4 Residential Dwellings: Noise Intrusion Levels L_{Aeq} (Daytime)

Location	External Façade Levels $L_{Aeq(1\ hr)}$	Internal $L_{Aeq(1\ hr)}$ with windows open	Internal $L_{Aeq(1\ hr)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}
R01	23.3	8.3	0.0	35
R02	20.2	5.2	0.0	35
R03	23.5	8.5	0.0	35
R04	26.8	11.8	0.0	35
R05	28.1	13.1	0.0	35
R06	31.6	16.6	1.6	35
R07	37.4	22.4	7.4	35
R08	38.5	23.5	8.5	35
R09	38.4	23.4	8.4	35
R10	37.3	22.3	7.3	35
R11	38.6	23.6	8.6	35
R12	37.7	22.7	7.7	35
R13	33.6	18.6	3.6	35
R14	31.4	16.4	1.4	35
R15	28.7	13.7	0.0	35
P01	38.7	23.7	8.7	35
P02	37.1	22.1	7.1	35
P03	31.3	16.3	1.3	35
P04	37.4	22.4	7.4	35
P05	40.2	25.2	10.2	35
P06	38.2	23.2	8.2	35
P07	29.1	14.1	0.0	35
P08	20.2	5.2	0.0	35

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa.

Table 5.5 Residential Dwellings: Noise Intrusion Levels L_{Aeq} (Night-time)

Location	External Façade Levels $L_{Aeq(15\ min)}$	Internal $L_{Aeq(15\ min)}$ with windows open	Internal $L_{Aeq(15\ min)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}
R01	25.6	10.6	0.0	30
R02	20.3	5.3	0.0	30
R03	27.0	12.0	0.0	30
R04	28.7	13.7	0.0	30
R05	30.9	15.9	0.9	30
R06	34.5	19.5	4.5	30
R07	33.9	18.9	3.9	30
R08	39.2	24.2	9.2	30
R09	37.0	22.0	7.0	30
R10	33.0	18.0	3.0	30
R11	32.7	17.7	2.7	30
R12	32.6	17.6	2.6	30
R13	32.0	17.0	2.0	30
R14	33.3	18.3	3.3	30
R15	31.4	16.4	1.4	30
P01	39.8	24.8	9.8	30
P02	37.2	22.2	7.2	30
P03	34.8	19.8	4.8	30
P04	41.3	26.3	11.3	30
P05	45.8	30.8	15.8	30
P06	43.1	28.1	13.1	30
P07	31.3	16.3	1.3	30
P08	21.1	6.1	0.0	30

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa.

Table 5.6 Residential Dwellings: Noise Intrusion Levels L_{Amax} (Night-time)

Location	External Façade Levels L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	WHO Criterion – Internal L_{Amax}
R01	32.7	17.7	2.7	45
R02	31.5	16.5	1.5	45
R03	37.0	22.0	7.0	45
R04	40.4	25.4	10.4	45
R05	43.4	28.4	13.4	45
R06	47.8	32.8	17.8	45
R07	47.7	32.7	17.7	45
R08	54.2	39.2	24.2	45
R09	52.5	37.5	22.5	45
R10	50.7	35.7	20.7	45
R11	47.2	32.2	17.2	45
R12	43.0	28.0	13.0	45
R13	39.2	24.2	9.2	45
R14	40.9	25.9	10.9	45
R15	40.2	25.2	10.2	45
P01	57.4	42.4	27.4	45
P02	45.2	30.2	15.2	45
P03	45.3	30.3	15.3	45
P04	48.9	33.9	18.9	45
P05	52.0	37.0	22.0	45
P06	50.6	35.6	20.6	45
P07	38.2	23.2	8.2	45
P08	28.0	13.0	0.0	45

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Figure 5.1 Worst-case Operational Noise Contour Plot $L_{Aeq,1hour}$

Not to scale
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Grid height: 1.5m

The assessment presented in the tables above shows that internal daytime L_{Aeq}, night-time L_{Aeq} and night-time L_{Amax} noise levels from all sources of noise at the proposed Site are predicted to be within the WHO/BS 8233 criteria at all existing sensitive receptors with windows open or closed. All residential receptors are also predicted to be within the BS 8233 lower limit of 50dB for gardens and private external spaces.

With regards to proposed sensitive receptors surrounding the development site, the internal night-time L_{Aeq} criteria of 30dB has the potential to be marginally exceeded at P05 assuming a windows-open scenario. Given this marginal exceedance, additional mitigation is outlined in Section 6.0 in order to protect future sensitive receptors surrounding the site.

5.4 OVERALL CHANGE IN NOISE LEVEL ASSESSMENT

This assessment has been undertaken to compare worst-case noise levels from the 'existing ambient noise levels' (L_{Aeq}) to the 'proposed scheme' noise at identified existing and proposed residential receptors. The differences between the 'existing' and the 'proposed' development scenarios including

deliveries, car parking and plant noise during the daytime and night-time are presented in tables 5.7 and 5.8 below.

Table 5.7 Overall Change in Noise Levels L_{Aeq} (Daytime)

Location	External L_{Aeq} Noise Level at (Existing Baseline)	External L_{Aeq} Noise Level at 1 metre from façade (with Proposed)	Difference Between Existing and Proposed
R01	71.8	71.8	0.0
R02	62.3	62.3	0.0
R03	62.3	62.3	0.0
R04	70.7	70.7	0.0
R05	70.7	70.7	0.0
R06	70.7	70.7	0.0
R07	70.7	70.7	0.0
R08	70.7	70.7	0.0
R09	70.7	70.7	0.0
R10	70.7	70.7	0.0
R11	70.7	70.7	0.0
R12	70.7	70.7	0.0
R13	70.7	70.7	0.0
R14	70.7	70.7	0.0
R15	70.7	70.7	0.0
P01	70.7	70.7	0.0
P02	70.7	70.7	0.0
P03	70.7	70.7	0.0
P04	70.7	70.7	0.0
P05	70.7	70.7	0.0
P06	70.7	70.7	0.0
P07	71.8	71.8	0.0
P08	71.8	71.8	0.0

Table 5.8 Overall Change in Noise Levels L_{Aeq} (Night-time)

Location	External L_{Aeq} Noise Level at (Existing Baseline)	External L_{Aeq} Noise Level at 1 metre from façade (with Proposed)	Difference Between Existing and Proposed
R01	63.1	63.1	0.0
R02	52.7	52.7	0.0
R03	52.7	52.7	0.0
R04	61.1	61.1	0.0
R05	61.1	61.1	0.0
R06	61.1	61.1	0.0
R07	61.1	61.1	0.0
R08	61.1	61.1	0.0
R09	61.1	61.1	0.0
R10	61.1	61.1	0.0
R11	61.1	61.1	0.0
R12	61.1	61.1	0.0
R13	61.1	61.1	0.0
R14	61.1	61.1	0.0
R15	61.1	61.1	0.0
P01	61.1	61.1	0.0
P02	61.1	61.1	0.0
P03	61.1	61.1	0.0
P04	61.1	61.1	0.0
P05	61.1	61.2	0.1
P06	61.1	61.2	0.1
P07	63.1	63.1	0.0
P08	63.1	63.1	0.0

The results presented in the tables above show the change in noise levels between the existing monitored L_{Aeq} noise levels and the cumulative contribution from the proposed scenario. The differences between the 'existing' and 'proposed' scenario are no greater than 0.1 dB(A) at all receptors which is considered to be negligible (noise level changes of ± 3 dB are generally imperceptible to the human ear). Therefore, in terms of the change in noise level associated with store deliveries, noise effects fall within the No Observed Adverse Effect Level.

5.5 ROAD TRAFFIC NOISE ASSESSMENT

Based on the traffic data provided by David Tucker Associates, the assessment below compares different scenarios to determine the change in noise levels resulting from the Development with and without other committed developments. The traffic data used within this assessment are presented in Table 3.3. The 'with development' flows are presented as the 'Do Something' (DS) and the 'without development' flows presented as the 'Do Minimum' (DM); the following conditions have been assessed:

- DM (2025) vs DS (2025)

Table 5.9 DM 2025 and DS 2025

Location	Traffic Noise DM 2025 $L_{A10,18hr}$ dB(A)	Traffic Noise DS 2025 $L_{A10,18hr}$ dB(A)	Difference dB(A)
T01	68.1	68.1	0.0
T02	63.2	63.2	0.0
T03	70.5	70.6	0.1
T04	73.5	73.5	0.0
T05	70.7	70.7	0.0
T06	74.4	74.5	0.1
T07	67.9	67.9	0.0
T08	67.9	67.9	0.0
T09	68.8	68.8	0.0
T10	68.7	68.7	0.0
T11	67.3	67.3	0.0
T12	67.6	67.6	0.0
T13	70.9	70.9	0.0
T14	69.7	69.4	-0.3
T15	71.0	70.8	-0.2
T16	70.0	69.8	-0.2
T17	61.8	61.5	-0.3
T18	59.6	59.5	-0.1
T19	71.1	71.1	0.0

When the differences shown in Table 5.9 are compared with the noise change criteria given in Table 2.2 of this report, all representative receptors would be considered to be of 'negligible' significance in the short-term as there is no greater change than 0.1 dB(A).

5.6 TRANQUILLITY ASSESSMENT

An assessment of the existing tranquillity level of the site has been based on the mapping data published by Campaign to Protect Rural England (CPRE). This uses a colour coded system and a 500m assessment grid for the whole of England, and a tranquillity rating of between 1 and 10 is assigned (1 being least tranquil and 10 being most). By reference to these maps the development is assessed as falling into Zones 1-2.

There is no public right of way through the site, and the proposed Development will not prevent access to more tranquil areas. As the Site forms part of an existing industrial site, there is expected to be a negligible impact on the tranquillity of the area.

6.0 MITIGATION AND CUMLATIVE NOISE ASSESSMENT

6.1 MITIGATION

Although the assessments above include intrinsic mitigation as part of the detailed proposals in the form of a 4.0m high barrier between Unit 10 and 11, the relevant night-time L_{Aeq} criteria has the potential to be exceeded at future receptors surrounding the Site. As such, to protect future sensitive receptors, additional mitigation in the form of two 2.5m high acoustic barriers between Unit 3 and 4 and upon Unit 6. The location of these barriers is shown illustratively on Figure 6.1, along with the location of the 4.0m high barrier. The assessments presented below are inclusive of this mitigaiton.

Figure 6.1 Proposed Barrier Locations

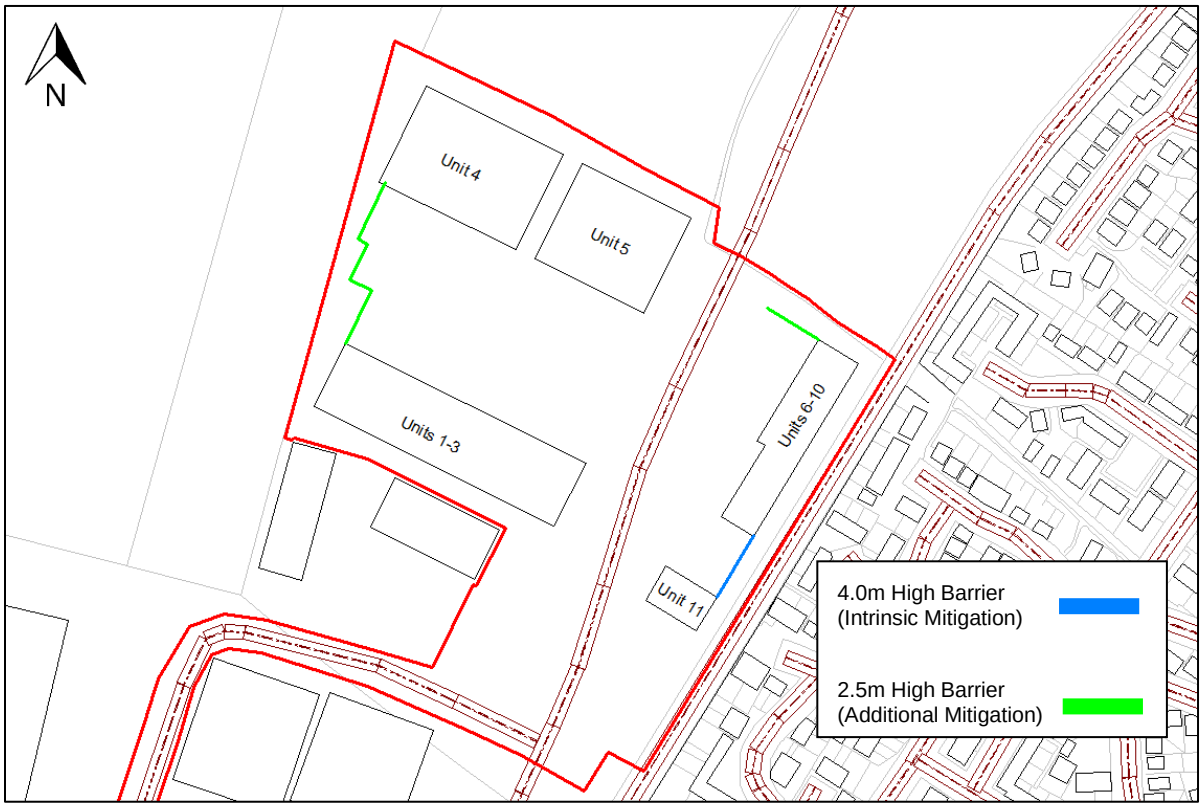

Table 6.1 Residential Dwellings: Noise Intrusion Levels L_{Aeq} (Daytime)

Location	External Façade Levels $L_{Aeq(1\ hr)}$	Internal $L_{Aeq(1\ hr)}$ with windows open	Internal $L_{Aeq(1\ hr)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}
R01	22.3	7.3	0.0	35
R02	20.2	5.2	0.0	35
R03	23.5	8.5	0.0	35
R04	26.8	11.8	0.0	35
R05	28.1	13.1	0.0	35
R06	31.6	16.6	1.6	35
R07	37.4	22.4	7.4	35
R08	38.5	23.5	8.5	35
R09	38.4	23.4	8.4	35
R10	37.3	22.3	7.3	35
R11	38.5	23.5	8.5	35
R12	37.6	22.6	7.6	35
R13	33.6	18.6	3.6	35
R14	31.4	16.4	1.4	35
R15	28.7	13.7	0.0	35
P01	37.3	22.3	7.3	35
P02	37.1	22.1	7.1	35
P03	28.7	13.7	0.0	35
P04	33.9	18.9	3.9	35
P05	38.6	23.6	8.6	35
P06	36.4	21.4	6.4	35
P07	28.2	13.2	0.0	35
P08	19.3	4.3	0.0	35

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Table 6.2 Residential Dwellings: Noise Intrusion Levels L_{Aeq} (Night-time)

Location	External Façade Levels $L_{Aeq(15\ min)}$	Internal $L_{Aeq(15\ min)}$ with windows open	Internal $L_{Aeq(15\ min)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}
R01	23.7	8.7	0.0	30
R02	20.3	5.3	0.0	30
R03	27.0	12.0	0.0	30
R04	28.7	13.7	0.0	30
R05	30.8	15.8	0.8	30
R06	34.5	19.5	4.5	30
R07	33.9	18.9	3.9	30
R08	39.2	24.2	9.2	30
R09	37.0	22.0	7.0	30
R10	33.0	18.0	3.0	30
R11	32.7	17.7	2.7	30
R12	32.6	17.6	2.6	30
R13	32.0	17.0	2.0	30
R14	33.2	18.2	3.2	30
R15	31.4	16.4	1.4	30
P01	39.0	24.0	9.0	30
P02	37.2	22.2	7.2	30
P03	30.1	15.1	0.1	30
P04	36.4	21.4	6.4	30
P05	40.6	25.6	10.6	30
P06	37.9	22.9	7.9	30
P07	29.5	14.5	0.0	30
P08	20.4	5.4	0.0	30

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Table 6.3 Residential Dwellings: Noise Intrusion Levels L_{Amax} (Night-time)

Location	External Façade Levels L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	WHO Criterion – Internal L_{Amax}
R01	31.0	16.0	1.0	45
R02	31.5	16.5	1.5	45
R03	37.0	22.0	7.0	45
R04	40.4	25.4	10.4	45
R05	43.4	28.4	13.4	45
R06	47.8	32.8	17.8	45
R07	47.7	32.7	17.7	45
R08	54.2	39.2	24.2	45
R09	52.5	37.5	22.5	45
R10	50.7	35.7	20.7	45
R11	47.2	32.2	17.2	45
R12	40.6	25.6	10.6	45
R13	39.0	24.0	9.0	45
R14	40.9	25.9	10.9	45
R15	40.2	25.2	10.2	45
P01	52.2	37.2	22.2	45
P02	45.2	30.2	15.2	45
P03	39.2	24.2	9.2	45
P04	43.4	28.4	13.4	45
P05	46.9	31.9	16.9	45
P06	45.5	30.5	15.5	45
P07	37.7	22.7	7.7	45
P08	27.3	12.3	0.0	45

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa.

Inclusive of the additional mitigation, the assessment presented in the tables above shows that internal daytime L_{Aeq}, night-time L_{Aeq} and night-time L_{Amax} noise levels from all sources of noise at the proposed Site are predicted to be within the WHO/BS 8233 criteria at all existing and proposed sensitive receptors with windows open or closed. All residential receptors are also predicted to be within the BS 8233 lower limit of 50dB for gardens and private external spaces.

6.2 CUMULATIVE NOISE ASSESSMENT

The assessment presented below has been undertaken including contributions from the consented Phase 1 and 2 Developments to the south. It is assumed all units would be operating at 100% capacity during the daytime and 50% capacity during the night-time in order to represent a worst-case cumulative assessment. Daytime noise levels are illustratively shown on Figure 6.1.

Table 6.4 Residential Dwellings: Cumulative Noise Intrusion Levels L_{Aeq} (Daytime)

Location	External Façade Levels $L_{Aeq(1\ hr)}$	Internal $L_{Aeq(1\ hr)}$ with windows open	Internal $L_{Aeq(1\ hr)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}
R01	29.5	14.5	0.0	35
R02	32.2	17.2	2.2	35
R03	39.6	24.6	9.6	35
R04	39.0	24.0	9.0	35
R05	38.1	23.1	8.1	35
R06	37.0	22.0	7.0	35
R07	38.3	23.3	8.3	35
R08	38.7	23.7	8.7	35
R09	39.0	24.0	9.0	35
R10	38.1	23.1	8.1	35
R11	38.9	23.9	8.9	35
R12	38.0	23.0	8.0	35
R13	34.2	19.2	4.2	35
R14	32.6	17.6	2.6	35
R15	30.4	15.4	0.4	35
P01	37.9	22.9	7.9	35
P02	37.4	22.4	7.4	35
P03	33.1	18.1	3.1	35
P04	36.6	21.6	6.6	35
P05	40.5	25.5	10.5	35
P06	41.4	26.4	11.4	35
P07	33.5	18.5	3.5	35
P08	31.5	16.5	1.5	35

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa.

Table 6.5 Residential Dwellings: Cumulative Noise Intrusion Levels L_{Aeq} (Night-time)

Location	External Façade Levels $L_{Aeq(15\ min)}$	Internal $L_{Aeq(15\ min)}$ with windows open	Internal $L_{Aeq(15\ min)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}
R01	31.7	16.7	1.7	30
R02	34.6	19.6	4.6	30
R03	43.9	28.9	13.9	30
R04	42.6	27.6	12.6	30
R05	41.9	26.9	11.9	30
R06	40.5	25.5	10.5	30
R07	38.4	23.4	8.4	30
R08	39.4	24.4	9.4	30
R09	38.6	23.6	8.6	30
R10	35.8	20.8	5.8	30
R11	34.5	19.5	4.5	30
R12	34.1	19.1	4.1	30
R13	33.6	18.6	3.6	30
R14	34.6	19.6	4.6	30
R15	33.4	18.4	3.4	30
P01	39.7	24.7	9.7	30
P02	37.7	22.7	7.7	30
P03	34.7	19.7	4.7	30
P04	38.9	23.9	8.9	30
P05	42.9	27.9	12.9	30
P06	44.6	29.6	14.6	30
P07	34.4	19.4	4.4	30
P08	33.4	18.4	3.4	30

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa.

Table 6.6 Existing Residential Dwellings: Cumulative Noise Intrusion Levels L_{Amax} (Night-time)

Location	External Façade Levels L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	WHO Criterion – Internal L_{Amax}
R01	35.0	20.0	5.0	45
R02	37.1	22.1	7.1	45
R03	47.9	32.9	17.9	45
R04	47.3	32.3	17.3	45
R05	46.0	31.0	16.0	45
R06	47.8	32.8	17.8	45
R07	47.7	32.7	17.7	45
R08	54.2	39.2	24.2	45
R09	52.5	37.5	22.5	45
R10	50.7	35.7	20.7	45
R11	47.2	32.2	17.2	45
R12	40.6	25.6	10.6	45
R13	39.0	24.0	9.0	45
R14	40.9	25.9	10.9	45
R15	40.2	25.2	10.2	45
P01	52.2	37.2	22.2	45
P02	45.2	30.2	15.2	45
P03	39.2	24.2	9.2	45
P04	43.4	28.4	13.4	45
P05	46.9	31.9	16.9	45
P06	49.7	34.7	19.7	45
P07	39.3	24.3	9.3	45
P08	35.7	20.7	5.7	45

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa.

The cumulative assessment presented in the tables above shows that internal daytime L_{Aeq}, night-time L_{Aeq} and night-time L_{Amax} noise levels from all sources of noise at the proposed Site and from Phase 1and 2 are predicted to be within the WHO/BS 8233 criteria at all existing and proposed sensitive receptors with windows open or closed. All residential receptors are also predicted to be within the BS 8233 lower limit of 50dB for gardens and private external spaces.

Figure 6.2 Worst-case Cumulative Operational Noise Contour Plot $L_{Aeq,1hour}$ with Mitigation

7.0 CONCLUSIONS

A noise impact assessment has been undertaken for a proposed employment development located at land to the west of Howes Lane, North West Bicester, known as 'Axis J9, Phase 3.'

Construction Noise

During the construction phase of the proposed development, it has been predicted that noise levels at existing noise sensitive properties would be within the relevant criteria.

Operational Noise

Maximum noise levels from the proposed building services plant have been set and are predicted to be at least 10 dB below existing night-time background noise.

Combined operational noise levels (including staff car parking and vehicle movements, HGV activities and building services plant) from all proposed noise sources associated with the scheme (and taking into account the consented Phase 1 and Phase 2 development) are within the WHO/BS 8233 criteria with windows closed and open at the closest sensitive receptor locations for existing properties. All existing residential receptors are also predicted to meet the BS 8233 lower limit of 50 dB for gardens and private external spaces.

The change in ambient noise levels as a result of the proposed employment units are unlikely to be perceptible and therefore is expected to have a low impact at surrounding sensitive receptors.

In order to protect future residential receptors surrounding the Site, additional mitigation in the form of two 2.5m high acoustic barriers are proposed.

Cumulative operational noise levels (including contributions from Phase 1 and 2) are within the WHO/BS 8233 criteria with windows closed and open at the closest sensitive receptor locations for existing properties.

Traffic Noise

The traffic noise assessment has concluded that; traffic noise contributions are considered to be of 'negligible' significance at existing properties which is an indication of a low impact.

APPENDICES

APPENDIX A – ACOUSTIC TERMINOLOGY AND ABBREVIATIONS

Acoustic Terminology

dB — Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.

dB(A) — Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.

L_{Aeq} — Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The $L_{Aeq,\ 07:00\ –\ 23:00}$ for example, describes the equivalent continuous noise level over the 12 hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower that the $L_{Aeq,\ 07:00\ –\ 23:00}$.

L_{Amin} — The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.

L_{Amax} — The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.

L_n — Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say. 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the $L_{A10,\ 1\ hr}$ = x dB.

The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.

R_w — The *weighted sound reduction index* determined using the above *measurement* procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.

Abbreviations

CADNA – Computer Aided Noise Abatement

DMRB – Design Manual for Roads and Bridges

HGV – Heavy Goods Vehicle

PPG – Planning Practice Guidance

UDP – Unitary Development Plan

UKAS – United Kingdom Accreditation Service

APPENDIX B – REPORT CONDITIONS

This Report has been prepared using reasonable skill and care for the sole benefit of Albion Land ("the Client") for the proposed uses stated in the report by [Tetra Tech Limited] ("Tetra Tech"). Tetra Tech exclude all liability for any other uses and to any other party. The report must not be relied on or reproduced in whole or in part by any other party without the copyright holder's permission.

No liability is accepted, or warranty given for; unconfirmed data, third party documents and information supplied to Tetra Tech or for the performance, reliability, standing etc of any products, services, organisations or companies referred to in this report. Tetra Tech does not purport to provide specialist legal, tax or accounting advice.

The report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections'. Environmental conditions can vary, and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times. No investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather-related conditions. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions. The "shelf life" of the Report will be determined by a number of factors including; its original purpose, the Client's instructions, passage of time, advances in technology and techniques, changes in legislation etc. and therefore may require future re-assessment.

The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. Tetra Tech accept no liability for issues with performance arising from such factors.