



Harworth Estates

Proposed Residential Development

Wakefield Road,

Athersley

Noise Assessment

September 2017

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1.0 Introduction

This Noise Assessment has been prepared by WYG on behalf of Harworth Estates to inform an outline planning application for a proposed residential development on land to the west of Wakefield Road, Athersley. Consultation has been undertaken with Paul Denton, Environmental Health Officer (EHO), Barnsley Council to agree the scope of works.

A description of the existing noise environment in and around the site is provided. A Noise survey has been undertaken and the results used to verify predictions of the effects of noise from sources in the vicinity of the development site. The noise levels across the site have been predicted at proposed receptors using CADNA noise modelling software, which incorporates ISO 9613 and CRTN methodologies and calculations.

1.1 Legislative Context (England)

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 proposed development. Policy guidance with respect to noise is found in National Planning Policy Framework. With regard to noise and planning, NPPF contains the following 4 short statements (section 123):

- A. Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- B. Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- C. Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- D. Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

In support of the NPPF, The Planning Practice Guidance: Noise (PPG) web-based resource was launched by the Department for Communities and Local Government (DCLG) on 6 March 2014 to support the National Planning Policy Framework and make it more accessible. 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, 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 NPPG and repeated as follows:

Table 1.1 Noise Exposure Hierarchy

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

The NPPF, NSPE 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 Proposed Development, national planning policy and appropriate guidance documents, including the 'BS 8233 – Guidance on sound Insulation and Noise Reduction for Buildings' (2014), 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.*



2.0 Assessment Criteria

2.1 LOAEL and SOAEL Assessment Criteria

In order to enable the assessment of the proposed development in terms of LOAEL and SOAEL, Table 2.1 presents equivalent noise levels and associated actions with the target noise level criteria identified.

Table 2.1 Noise Level Criteria and Actions

Effect Level	Assessment	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level (NOAEL)	Proposed Residents	Internal noise levels less than: Bedrooms (night-time) – 42 dBL _{Amax} Living Rooms (daytime) – 30 dBL _{Aeq,16hours} External noise levels less than: Night-time – 40 dBL _{night}	No Action Required Within BS8233 / WHO
	Electrical Substation	Source noise rating levels 10 dB below background L _{A90} noise levels	No Action Required Source noise levels below the background noise is an indication of the sound source having a low impact
Lowest Observed Adverse Effect Level (LOAEL)	Proposed Residents	Internal noise levels achieve (with windows open): <i>Bedrooms (night-time) – 30 dBL_{Aeq,8hours} / 45 dBL_{Amax}</i> <i>Living Rooms (daytime) – 35 dBL_{Aeq,16hours}</i> Private external Amenity Space (daytime) – 50 dBL _{Aeq,16hours}	None Within BS8233 / WHO Criteria
	Electrical Substation	Difference between source noise rating levels and existing background levels of zero to 5 dB	Action: None Justification: + 5 dB above background is considered an indication of where adverse noise impacts may occur.
Significant Observed Adverse Effect Level (SOAEL)	Proposed Residents	Internal noise levels exceed (with windows closed): Bedrooms (night-time)– 30 dBL _{Aeq,8hours} / 45 dBL _{Amax} Living Rooms (daytime)– 35 dBL _{Aeq,16hours} Depending on context, external noise levels exceed: Private external Amenity Space (daytime) – 55 dBL _{Aeq,16hours}	Mitigate to achieve (with windows closed): Bedrooms – 30 dBL _{Aeq,8hours} / 45 dBL _{Amax} Living Rooms – 35 dBL _{Aeq,16hours} <i>Depending on context, external Amenity Space – 55 dBL_{Aeq,16hours}</i> Within BS8233 / WHO Reasonable Criteria
	Electrical Substation	Difference between source noise rating levels and existing background levels of 5 to 10 dB	Action: Mitigate as far as practicable:



Effect Level	Assessment	Noise Level Criteria	Action / Justification
			Justification: Depending on context, a difference of +10dB to be an indication of a significant adverse impact.
Unacceptable Observed Adverse Effect Level (UOAEI)	Proposed Residents	Internal noise levels with windows closed exceed: Bedrooms (night-time) – 51 dBL _{Aeq,8hours} Living Rooms (daytime) – 57 dBL _{Aeq,16hours}	Avoid Values correspond with PPG24 Category D (mixed sources), planning permission should normally be refused.
	Electrical Substation	Difference between source noise rating levels and existing background levels of greater than 15 dB	Action: Reduce as far as practicable depending on context Justification: +10dB above existing background is an indication of a likely significant adverse impact

Following consultation with the EHO, it was confirmed that in general noise levels at the site are dominated by transportation sources and the movement of vehicles / mobile plant (lifts) associated with the commercial premises to the south of the site. Therefore, it was agreed that an assessment with regard to absolute noise levels should be undertaken in accordance with the noise criteria stated within BS 8233:2014.

A departure from this approach is the assessment of noise from the electricity substation. This effectively results in a noise level of 5 dB below the BS 8233 night-time criteria of 30 dB whilst taking into account noise generation at lower frequencies. In addition consideration has also been given to the guidance within 'NANR 45: Proposed criteria for the assessment of low frequency noise disturbance', February 2005, University of Salford. With regard to noise levels in gardens, an assessment with reference to the guidance provided within BS 4142:2014 has been undertaken.

2.2 ProPG Planning and Noise

Professional Practice Guidance on Planning and Noise for new residential development (ProPG) was published in May 2017 by the Chartered Institute of Environmental Health (CIEH), the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA). The guidance has been published to provide practitioners with guidance on the management of noise within the planning system in England.

The guidance is specifically for 'new residential development' that would be exposed predominantly to noise from existing transport sources and reflects the Government's overarching Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF), and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance.



The guidance provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, it aims to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- Promote appropriate noise exposure standards; and
- Assist the delivery of sustainable development (ADS).

There are two stages of the overall approach outlined in the ProPG:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of 4 key elements which is underpinned by an Acoustic Design Statement.

With regard to Stage 1, the ProPG provides guidance for producing an initial site risk assessment, pre-mitigation, with regards to noise based on the prevailing daytime and night time noise levels across the site, from which the site (or areas thereof) can be allocated a Noise Risk as shown in Figure 2.1, overleaf. This shows the various Noise Risks Categories (NRC) together with their corresponding sound levels as referred to in the ProPG. It should be noted that the categories are not distinct which allows context to be included within the assessment with the purpose of the Stage 1 assessment to determine the likely acoustic challenges on the site.



Figure 2.1 ProPG Stage 1, Noise Risk Assessment

Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
<p>Indicative Daytime Noise Levels $L_{Aeq,16hr}$</p> <p>Indicative Night-Time Noise Levels $L_{Aeq,8hr}$</p> <p>70 dB / 60 dB (High)</p> <p>65 dB / 55 dB (Medium)</p> <p>60 dB / 50 dB (Low)</p> <p>55 dB / 45 dB</p> <p>50 dB / 40 dB (Negligible)</p>	<p>Increasing risk of adverse effect</p>	<p>High noise levels indicate that there is an increased risk that development may be refused on noise grounds. The risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.</p> <p>As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigate and minimised, and which clearly demonstrates that a significant adverse noise impact will be avoided in the finished development.</p> <p>At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.</p>
	<p>No adverse effect</p>	<p>These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.</p>

At Stage 2, which is not required to be progressed if the Stage 1 assessment determines a negligible risk, there are 4 elements which should be undertaken in parallel. These are:

- Good Acoustic Design Process
- Internal Noise Level Guidelines
- External Amenity Area Noise Assessment
- Assessment of Other Relevant Issues

There is then the requirement to present an ADS to provide sufficient evidence that the ProPG Stage 1 and Stage 2 Elements 1 to 4 have been followed. At this outline stage, a detailed site layout is not available and, therefore, an ADS is not required. However, noise design measures will be established on how the site could be brought forward in adherence of the requirements of the ProPG.



3.0 Assessment Methodology

3.1 Noise Modelling Methodology

Three dimensional noise modelling has been undertaken based on the monitoring data to predict L_{Aeq} and L_{Amax} noise levels at a large number of locations both horizontally and vertically. CADNA noise modelling software has been used which is based on the Department of Transport Calculation of Road Traffic Noise (CRTN) and ISO 9613 noise propagation methodology.

The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data, assumptions and model settings as given in the table below have been used.

Table 3.1 Modelling Parameters Sources and Assumptions

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	Ordnance Survey	2m contours
Ground levels – other areas	Site Observations and Ordnance Survey	2m contours
Traffic data surrounding roads	WYGE	WYGE observations and validated noise levels.
Building heights – around site	WYGE Observations	8 m height for two storey residential properties
Barrier heights	WYGE Observations	A barrier around the perimeter of the HSS and, partially, the Stagecoach depot of 2.5m
Receptor positions	WYGE	Height of 1.5 m for ground floor, 4 m for first floor receptors. Garden receptors, 1.5m above ground level. 1.5 m and 4 m height for model grids and monitoring locations for validation.
Absorbent Ground	CADNA	Frequency dependant ground absorption has been applied based on values specified in VDI 2714/16 clause 6.3.
Site Layout	JRP	P17 5091 03

It is acknowledged that a number of these assumptions will affect the overall noise levels presented in this report. However it should be noted that certain assumptions made, as identified above, are worst case.



3.2 Model Input Data

Noise from road traffic and nearby commercial sources within the Wakefield Road Industrial Estate to the south of the site, including the HSS Plant Hire and Stagecoach Depot, have been assessed. In addition, noise from the Arc carwash, an electricity substation, and the Stagecoach car park on Wakefield Road to the east of the site have been included within the assessment. Based on observations made during the noise survey and a review of audio recordings there were no clearly discernible events occurring within the commercial premises to the north of the site with road traffic noise being the principal source of noise in this location. All premises, except for the bus depot, only operate during the daytime period.

The noise sources considered with a brief discussion regarding the proposed assessment approach are outlined below with further details regarding the noise survey and observations made on site presented in Section 4.

3.2.1 HSS Noise Verification

To present a worst case assessment of noise emanating from the HSS depot, which comprises engine noise / movement of plant (lifts) a source noise level of 55 dB $L_{Aeq,1hour}$ has been established following a review of the noise data at LT3.

Table 3.2 Daytime Modelled vs. Monitored Results $L_{Aeq,T}$

Monitoring Position	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between modelled and measured noise level (dB)
LT3	55.0	55.0	0.0
ST3	51.0	55.6	4.6

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

At LT3 the verification point is equivalent to the worst case source noise level. A difference of 5 dB is modelled at ST3 when activities within the HSS depot were occurring which demonstrates the worst case assessment. The models are considered suitably verified.

3.2.2 Stagecoach Depot and Car Park Verification

To present a worst case assessment, the noise model has been verified against the worst case measured $L_{Aeq,15mins}$ during the early morning period at ST2 with noise from the site comprising buses entering, manoeuvring around and exiting the depot. In addition, the worse case L_{Amax} associated with vehicle movements has been used for this assessment. The comparison between the monitoring and modelling results are shown in the tables overleaf.



Table 3.3 Bus Depot Daytime Modelled vs. Monitored Results $L_{Aeq,T}$

Monitoring Position	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between modelled and measured noise level (dB)
ST2	48.2	48.2	0.0

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

Table 3.4 Bus Station Night-time Modelled vs. Monitored Results L_{Amax}

Monitoring Position	Monitored L_{Amax}	Modelled L_{Amax}	Difference between modelled and measured noise level (dB)
ST2	67.7	67.7	0.0

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

The verification points show a divergence between monitored and modelled results of 0 dB. The bus depot models are considered suitably verified.

Noise levels from the existing car parking area on Wakefield Road which services the bus depot have been determined based upon observations within an existing distribution centre during a staff changeover period. L_{Aeq} noise levels, as follows, are modelled as an area source across the entire car park.

- $L_{Aeq,1hr}$ Noise Level = 54 dB at 1.5m height
- L_{Amax} = 76.3 dB @3m

3.2.3 ARC Carwash Verification

There were minimal activities and noise occurring from the Car Wash site with road traffic noise being dominant at the site. However, specific noise measurements were obtained at the car wash including noise from the internal car wash and an external jet spray (which is screened by a Perspex barrier from the site). The comparison between the monitoring and modelling results are shown in the tables below.

Table 3.4 Daytime Modelled vs. Monitored Results $L_{Aeq,T}$

Monitoring Position	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between modelled and measured noise level (dB)
Adjacent to northern part of car wash	74.4	74.4	0.0
Adjacent to car being washed (jetspray)	75.4	75.4	0.0



3.2.4 Electrical Substation Verification

With regard to noise levels from the electrical substation, the noise models have been validated against the measured noise levels based on measurements at and near the boundary of the substation. The comparison between the monitoring and modelling results are shown in the tables below.

Table 3.5 Daytime Modelled vs. Monitored Results $L_{Aeq,T}$

Monitoring Position	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between modelled and measured noise level (dB)
Substation (Northern boundary)	54.0	55.8	1.8
Substation 2 (Western boundary)	57.4	58.2	0.8
Substation 3 (On-site – approx. 19m from sub station))	46.0	44.1	-1.9

In addition, verification across the frequency range has been undertaken based on the measurements collected at the boundary of the sub station with the results presented in the table below.

Table 3.6 Daytime Modelled vs. Monitored Results $L_{Aeq,T}$

Monitoring Position		1/3 Octave Band Frequency (dB)							dB(A)
		63	125	500	1000	2000	4000	8000	
Substation 1	Measured	66.1	67.3	57.3	50.2	48.8	41.2	39.0	54.0
	Modelled	65.9	64.1	56.1	50.1	48.7	40.6	33.0	55.8
	Difference	0.2	3.2	1.2	0.0	0.1	0.6	6.0	1.8
Substation 2	Measured	67.2	71.0	60.0	49.4	48.2	42.9	43.5	57.4
	Modelled	67.2	71.0	60.0	49.9	48.1	43.2	43.6	58.2
	Difference	0.0	0.0	0.0	-0.5	0.1	-0.3	-0.1	0.8

The verification points show a divergence between monitored and modelled results of around 3 dB or less. Therefore, models are considered suitably verified.

3.3.5 Road Traffic Noise Verification

With regards to road traffic noise, the models have been validated against the closest long term measurement positions to the Wakefield Road. At the other monitoring locations road traffic verification was not possible due to the level of birdsong and other sources influencing the measured levels. The comparison between the monitoring and modelling results are shown in the tables below.

**Table 3.7 Daytime Modelled vs. Monitored Results $L_{Aeq,T}$**

Monitoring Position	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between modelled and measured noise level (dB)
LT1	49.7	49.7	0.0
LT5	58.5	59.0	0.5

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

Table 3.8 Night-time Modelled vs. Monitored Results $L_{Aeq,T}$

Monitoring Position	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between modelled and measured noise level (dB)
LT1	45.5	44.6	-0.9
LT5	53.9	53.9	0.0

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

As all of the verification points show a divergence between monitored and modelled results of no more than 3 dB, the models are considered suitably verified.

3.3.6 Sensitive Receptors

The location of proposed receptor locations are presented in SK02a (facades) and SK02b (gardens) in Appendix B.

3.3 Tranquillity Rating

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 Zone 1.



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:

Norsonic 140	Environmental Noise Analyser	s/n	1402987
Norsonic 1251	Sound Calibrator	s/n	31043
Rion NL-52	Environmental Noise Analyser (WYG13)	s/n	1221575
Rion NL-52	Environmental Noise Analyser (WYG16)	s/n	1221576
Rion NL-52	Environmental Noise Analyser (WYG20)	s/n	253702
Rion NL-52	Environmental Noise Analyser (WYG23)	s/n	732146

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice and no drift 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 five locations (as specified in the following table and shown in SK01 of Appendix B) from Friday 2nd June 2015 to Wednesday 14th June 2017. Attended short term measurements were undertaken at seven locations during the early morning, daytime, evening, peak and night-time periods with four additional locations being measured unattended over a 140 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 dry with scattered showers. Anemometer readings confirmed that wind speeds were less than 5 ms⁻¹ at all times during the survey with a predominant westerly wind direction.

Table 4.1 Noise Monitoring Locations

Ref	Description	Grid Reference	
		X	Y
LT1	Eastern boundary of the site	434833.27	408749.38
LT2	Positioned along south eastern edge of site perimeter opposite the bus depot	434824.46	408647.93
LT3	Positioned along south eastern edge of site perimeter, opposite the HSS depot	434779.91	408614.91
LT4	Positioned on northern boundary of site	434643.76	408870.34
LT5	Positioned 20m from Wakefield Road: direct line of site onto carriageway	434859.79	408810.38
ST1	Located next to LT1 position	434836.21	408742.15



Ref	Description	Grid Reference	
		X	Y
ST2	Southern part of the site opposite bus depot	434827.66	408653.26
ST3	Southern Part of the site opposite HSS	434778.71	408609.44
ST4	Northern boundary of the site	434702.94	408891.20
ST5	Northern part of the site	434640.83	408872.21
ST6	South western part of the site	434699.75	408566.90
ST7	5m from Wakefield Road	434876.49	408820.06
Sub 1	Northern boundary of electricity substation	434905.38	408668.56
Sub 2	Western boundary of electricity substation	434901.09	408656.18
Sub 3	Approximately 19m from the boundary of the substation	434881.16	408662.05
Wash 1	Opposite northern part of car wash	434899.67	408743.12
Wash 2	Opposite external jet wash area (during jet washing)	434884.09	408764.09

4.2 Noise Survey Results

The noise climate across the site consisted mainly of road traffic noise from the A61 Wakefield Road and surrounding local road network. In addition, noise was observed from the adjacent Stagecoach bus service depot and noise from plant movements within the HSS service yard. Occasional distant rail movement was just audible from the Darton to Barnsley Rail line. During the evening and early morning periods bird song was also a prominent source of noise, in particular at positions LT2, LT3.

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	Wind Speed	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
ST1	13/06/2017 – 15:21	24 °C	1 m/s	W	1	Traffic along Wakefield Road, low level hum from substation, noise from plant movement in HSS depot
ST2	09/06/2017 – 14:31	24 °C	1 m/s	W	1	Traffic along Wakefield Road, prominent hum from substation, noise from plant movement in HSS depot
ST3	13/06/2017 - 15:57	24 °C	1 m/s	W	1	Noise from plant movement in HSS depot, engine idling and distant road and rail traffic noise just perceptible
ST4	13/06/2017 – 13:04	24 °C	1 m/s	W	1	Traffic along Wakefield Road, spoken voice from factory
ST5	13/06/2017 – 14:10	24 °C	1 m/s	W	1	Traffic along Wakefield Road
ST6	13/06/2017 – 16:19	24 °C	1 m/s	W	1	Noise from plant movement in HSS depot, engine idling and distant road and rail traffic noise



Survey Location/	Date & Time	Temperature	Wind Speed	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
ST7	13/06/2017 – 20:30	21 °C	1 m/s	W	1	Traffic along Wakefield Road, Birdsong
ST2	13/06/2017 – 21:00	20 °C	1 m/s	W	1	Traffic along Wakefield Road, prominent hum from substation, Birdsong
ST3	13/06/2017 – 21:17	20 °C	1 m/s	W	1	Traffic along Wakefield Road and local network, occasional distant rail movements, birdsong
ST4	13/06/2017 – 19:48	20 °C	1 m/s	W	1	Traffic along Wakefield Road and local network, occasional distant rail movements just perceptible, birdsong
ST5	13/06/2017 – 20:07	20 °C	1 m/s	W	1	Traffic along Wakefield Road and local network, occasional distant rail movements just perceptible, birdsong
ST2	14/06/2017 – 05:45	19 °C	1 m/s	W	1	Traffic along Wakefield Road, vehicle movement within bus depot, hum from substation, Birdsong prominent

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). For the LT locations, the presented L_{Aeq,T} and L_{A10,T} are average noise levels whilst the L_{A90} is the modal noise level of each 5-minute measurement over the stated survey period.

Table 4.3 Results of Baseline Noise Monitoring Survey

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)
Day 07:00 - 23:00	113 hours	02/06/2017 – 14/06/2017 07:00 - 23:00	LT1	49.7	88.4	33.2	50.2	42
Night 23:00 – 07:00	56 hours	02/06/2017 – 14/06/2017 23:00 - 07:00		45.5	74.5	27.6	46.5	42
Day 07:00 - 23:00	80 hours	09/06/2017 - 14/06/2017 07:00 - 23:00	LT2	53.3	85.6	31.9	51.7	44
Night 23:00 – 07:00	40 hours	09/06/2017 - 14/06/2017 23:00 - 07:00		48.3	77.5	26.8	46.5	36
Day 07:00 - 23:00	144 hours	02/06/2017 – 14/06/2017 07:00 - 23:00	LT3	51.8	97.4	30.2	50.3	38
Night 23:00 – 07:00	63 hours	02/06/2017 – 14/06/2017 23:00 - 07:00		50.4	95.9	25.4	45.3	41
Day 07:00 - 23:00	141 hours	02/06/2017 – 14/06/2017 07:00 - 23:00	LT4	55.9	89.1	30.4	53.8	40
Night 23:00 – 07:00	64 hours	02/06/2017 – 14/06/2017 23:00 - 07:00		50.0	86.6	24.8	46.7	40
Day 07:00 - 23:00	15 hours	13/06/2017 – 14/06/2017 07:00 - 23:00	LT5	58.5	94.1	37.5	61.1	48
Night 23:00 – 07:00	8 hours	13/06/2017 – 14/06/2017 23:00 - 07:00		53.9	81.0	26.3	54.2	34



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)
Day 07:00 - 19:00	15 Mins	09/06/2017 – 14:12	ST1	48.5	62.7	41.9	50.0	45.0
		13/06/2017 – 15:21		44.8	61.0	38.6	46.9	41.8
	15 Mins	09/06/2017 – 14:31	ST2	48.4	69.3	42.2	50.4	44.7
		09/06/2017 – 14:46		46.6	62.7	40.2	49.1	43.0
		13/06/2017 – 15:39		45.1	62.7	36.6	47.8	40.8
	15 Mins	09/06/2017 – 15:04	ST3	50.3	64.7	41.1	53.6	43.4
		09/06/2017 – 15:19		47.3	63.4	40.2	50.1	42.2
		09/06/2017 – 15:34		52.2	65.6	41.1	56.1	46.2
		09/06/2017 – 15:49		49.8	64.3	42.7	54.0	44.0
		13/06/2017 - 15:57		51.8	67.6	37.0	55.7	41.5
		14/06/2017 – 07:07		48.3	62.2	40.0	51.1	42.3
		14/06/2017 – 07:22		50.8	68.1	38.8	53.8	41.2
		14/06/2017 – 07:37		52.1	65.3	37.1	57.1	39.6
	15 Mins	14/06/2017 – 11:42	ST4	49.5	64.6	36.3	52.1	39.6
		14/06/2017 – 11:57		40.9	61.5	32.6	42.7	36.1
		13/06/2017 – 13:04		43.2	63.8	38.5	44.4	40.2
		13/06/2017 – 13:19		44.4	56.2	38.0	47.0	40.3
		13/06/2017 – 13:34		46.1	63.3	39.1	48.4	42.1
		13/06/2017 – 13:49		46.6	71.0	38.8	47.8	41.8
	15 Mins	14/06/2017 – 09:47	ST5	46.0	68.8	41.1	47.8	43.4
14/06/2017 – 10:02		45.7		58.6	39.9	47.7	42.2	
13/06/2017 – 14:10		41.4		71.9	35.2	42.3	37.1	
13/06/2017 – 14:25		42.1		67.9	34.1	44.0	37.9	
13/06/2017 – 14:40		43.0		60.6	35.2	44.4	37.2	
13/06/2017 – 14:55		41.9		59.0	34.5	42.9	36.6	
15 Mins	14/06/2017 – 10:21	ST6	43.8	62.7	36.9	44.6	39.3	
	14/06/2017 – 10:36		44.7	70.0	37.0	45.9	40.0	
Evening 19:00 - 23:00	15 Mins	13/06/2017 – 16:19	49.5	76.1	38.3	51.5	41.5	
	15 Mins	13/06/2017 – 21:00	48.0	68.3	33.3	48.6	36.4	
	15 Mins	13/06/2017 – 21:17	42.7	60.7	30.7	46.3	35.2	
	15 Mins	13/06/2017 – 19:48	44.1	65.0	36.9	46.4	39.6	
	15 Mins	13/06/2017 – 20:07	44.0	71.5	33.2	44.9	36.5	
Early Morning 05:30 - 07:00	15 Mins	13/06/2017 – 20:30	ST7	67.4	86.0	42.5	71.5	48.4
		14/06/2017 – 05:45	ST2	48.0	64.6	37.6	50.1	43.4
		14/06/2017 – 06:00		46.5	67.7	38.1	49.2	40.8
		14/06/2017 – 06:15		46.8	66.6	38.7	49.6	41.9
		14/06/2017 – 06:30		48.2	62.8	39.2	50.8	43.1
		14/06/2017 – 06:45		47.7	63.5	39.8	49.9	43.0

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

In addition to the above, measurements of the existing electricity substation have been undertaken. The measurements were taken at the current fence line of the substation positioned in the south-eastern corner of the development site. The results are presented in Table 4.4.



Table 4.4 Results of Electricity Substation Noise Monitoring Survey

Date	Ref	L _{Aeq}	L _{AFmax}	L _{Amin}	L _{A10}	L _{A90}	L _{eq}		
							80 Hz	100 Hz	125 Hz
20:51 13/06/2017	S1	54.0	66.4	49.8	56.9	50.1	64.5	63.8	49.7
20:53 13/06/2017	S2	57.4	73.4	54.8	57.9	55.4	55.0	70.8	55.6
20:57 13/06/2017	S3	46.0	53.1	41.6	48.4	42.7	47.3	52.9	40.9

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



5.0 Assessment of Key Effects

5.1 ProPG Stage 1 Risk Assessment

Table 5.1 below presents, a typical range of noise levels measured at the site.

Table 5.1 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Location	L _{Aeq,T} (dB)	ProPg Stage 1 Risk Assessment Noise levels
Daytime L _{Aeq,16hr}	LT1	50	Low
	LT2	53	Low
	LT3	52	Low
	LT4	56	Low
	LT5	59	Low
Night-time L _{Aeq,8hr}	LT1	46	Low
	LT2	48	Low
	LT3	50	Low
	LT4	50	Low
	LT5	54	Low

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

On the basis of the above, the Stage 1 risk assessment shows that whilst the acoustic challenges at the site are low, a good acoustic design process will be required to be followed.

With regard to the ProPG Stage 2 requirements, at this outline stage, a detailed site layout is not available and, therefore, an ADS is not formally included. However, noise design measures will be established on how the site could be brought forward in adherence of the requirements of the ProPG. Assessments of noise from all sources with regard to noise levels in proposed internal sensitive rooms and private external amenity areas have been undertaken in Section 5.4. In addition to transportation noise, noise from the substation and commercial premises as outlined in Section 3 have been included within the assessment.

With regard to Good Acoustic Design, a constraints assessment was undertaken to inform the illustrative masterplan. Recommendations were made for orientating the proposed buildings to screen gardens from Wakefield Road and the electrical substation with including separating the residential premises as far as practicable away from the HSS hire as far as practicable. These are considered to be inherent design measures which should be included within the detailed design.

The following Sections establish predicted noise levels at receptor locations determined from the illustrative masterplan which takes into account these inherent design measures.



5.2 Assessment of Electricity Substation

5.2.1 Substation Noise Intrusion Assessment

An assessment of predicted internal noise levels at the closest assessed dwelling (R4) during the night-time period has been undertaken with regard to noise from the electricity substation with windows open and closed. Tables 5.2 and 5.3 below present a comparison of the predicted internal noise levels associated with the substation with windows open and closed against an internal noise level criteria of NR20. A standard double glazing specification of 4mm/16mm/6mm has been assessed with windows open providing 15 dB attenuation.

Table 5.2 Predicted Internal Noise Level Comparison with NR 20 (Night-time: Windows Open)

Parameter	Sound pressure Level (dB)/ Frequency (Hz)						
	63	125	250	500	1000	2000	4000
External noise level	55.1	53.7	41.8	35.3	35.1	28.4	26.5
Glazing Sound Insulation Performance (4mm/16mm/6mm)	15	15	15	15	15	15	15
Interior noise level	40.1	38.7	26.8	20.3	20.1	13.4	11.5
NR 20	51.3	39.4	30.6	24.3	20	16.8	14.4
Noise level difference	-11.2	-0.7	-3.8	-4.0	0.1	-3.4	-2.9

Table 5.3 Predicted Internal Noise Level Comparison with NR 20 (Night-time: Windows Closed)

Parameter	Sound pressure Level (dB)/ Frequency (Hz)						
	63	125	250	500	1000	2000	4000
External noise level	55.1	53.7	41.8	35.3	35.1	28.4	26.5
Glazing Sound Insulation Performance (4mm/16mm/6mm)	17	23	22	27	38	40	41
Interior noise level	38.1	30.7	19.8	8.3	-2.9	-11.6	-14.5
NR 20	51.3	39.4	30.6	24.3	20	16.8	14.4
Noise level difference	-13.2	-8.7	-10.8	-16.0	-22.9	-28.4	-28.9

As can be seen, internal noise levels are predicted to be within or below the NR 20 criteria with windows open and below with windows closed at the closest receptor.

In addition to the above, as noted previously, a dominant tone was identified at 100Hz. The assessment of low frequency noise and disruption caused by such noise is limited, however guidance is available in the form of 'NANR 45: Proposed criteria for the assessment of low frequency noise disturbance', February 2005, University of Salford. This guidance was produced on behalf of DEFRA and provides a method to follow when complaints have been received about low frequency noise. Whilst this document is not intended for planning purposes, in the absence of other applicable guidance, the criteria outlined within the guidance is considered



to suitable for use as part of this assessment. The guidance presents noise values above which disturbance could occur which are presented in the table below:

Table 5.4 Low Frequency Reference Curve (linear): Internal Noise Level Criteria

Hz	100 (Fluctuating Noise)	100 (Steady Noise)
dB, L_{Leq} (Night)	38	43

When comparing the level of noise against the predicted internal noise level at R4 of 38.7 at 125Hz, which is dominated by noise level at 100Hz, with windows open, the predicted noise level is slightly greater than the fluctuating noise criteria specified in Table 5.4. With windows closed, the predicted internal noise level is 30.7 dB and thus the criteria is met with standard double glazing. Therefore, to consider a worst case, alternative ventilation will be required for the closest properties to the substation. Alternative ventilation can be provided in several ways from acoustic trickle vents (which should to have a comparable acoustic performance as the glazing), other passive ventilation systems or mechanical ventilations systems.

5.2.2 BS 4142 Noise Assessment (External Amenity)

The assessment compares the predicted noise levels from the substation with the existing measured background noise L_{A90} representative of proposed residential receptors in the absence of noise from the substation. The representative existing measured background noise level for each receptor has been established from a review of the ST data and a statistical analysis of the LT1 and LT3 noise survey data. Noise from the substation was clearly audible in the south-eastern area of the site. Subjectively there was a perceptible dominant tone at 100Hz and this has been verified following a review of the 1/3 octave data. Whilst this was less dominant within the site (as can be seen in table 4.4), a character correction of +4dB has been included within the assessment.

Table 5.5 presents the difference between the background noise level and noise rating level associated with the electrical substation at the closest external amenity receptor locations.

Table 5.5 Electricity Substation BS 4142 assessment

Ref	Measured Typical Pre-Installation Background L_{A90}	Noise Rating Level ($L_{Aeq,T}$)	Difference between background and noise rating level
	Daytime	Daytime	Daytime
G1	38	28	-11
G2	38	27	-11
G3	42	31	-11
G4	42	37	-5
G5	42	38	-4
G6	42	32	-10

All values are sound pressure levels in dBA re: 2×10^{-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 arithmetics in the above table may appear to be up to 1 dB incorrect due to this rounding.

As can be seen the noise rating level of the substation is predicted to be below the background noise level and below the LOAEL.

5.3 Noise Intrusion Assessment (Combined Sources)

Internal noise levels at the proposed development, based on the existing ambient noise climate, 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 standard double glazing (4mm / 16mm / 6mm) with a sound reduction of 29 dB R_{tr} has been used. The predicted noise levels at the assessed receptors locations (as presented in SK02) are presented in Tables 5.6 to 5.9 below. The daytime and night-time L_{Aeq} noise contour plots are presented in SK03 and SK04. The night-time L_{Amax} noise level is based on mitigating against maximum events associated with the bus depot and the bus depot car park. Following a review of the long term noise data, by addressing the L_{Aeq} in bedrooms, the required glazing and ventilation specification is sufficient to address the majority of peak (L_{Amax}) noise levels from road traffic noise.

Table 5.6 Daytime Noise Intrusion Levels $L_{Aeq,16hr}$

Ref	External $L_{Aeq,16hr}$ Daytime	Internal $L_{Aeq,16hr}$ Daytime (Windows Open)	Internal $L_{Aeq,16hr}$ Daytime (Windows Closed)	BS 8233 Target Criteria L_{Aeq}	Below SOAEL	Mitigation Required
R1	51.9	36.9	22.9	35	No (windows open)	Yes (see below)
R2	50.6	35.6	21.6	35	No (windows open)	Yes (see below)
R3	55.5	40.5	26.5	35	No (windows open)	Yes (see below)
R4	56.8	41.8	27.8	35	No (windows open)	Yes (see below)
R5	51.5	36.5	22.5	35	No (windows open)	Yes (see below)
R6	50.1	35.1	21.1	35	Yes	None
R7	61.7	46.7	32.7	35	No (windows open)	Yes (see below)
R8	59.2	44.2	30.2	35	No (windows open)	Yes (see below)
R9	57.3	42.3	28.3	35	No (windows open)	Yes (see below)
R10	58.7	43.7	29.7	35	No (windows open)	Yes (see below)
R11	38.5	23.5	9.5	35	Yes	None
R12	34.2	19.2	5.2	35	Yes	None
R13	42.7	27.7	13.7	35	Yes	None

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

Table 5.7 Night-time Noise Intrusion Levels $L_{Aeq,8hr}$

Ref	External $L_{Aeq,8hr}$ Night-time	Internal $L_{Aeq,8hr}$ Night-time (Windows Open)	Internal $L_{Aeq,8hr}$ Night-time (Windows Closed)	BS 8233 Target Criteria L_{Aeq}	Below SOAEL	Mitigation Required
R1	38.1	23.1	9.1	30	Yes	None
R2	33.5	18.5	4.5	30	Yes	None
R3	55.7	40.7	26.7	30	No (windows open)	Yes (see below)
R4	56.2	41.2	27.2	30	No (windows open)	Yes (see below)
R5	49.9	34.9	20.9	30	No (windows open)	Yes (see below)
R6	48.2	33.2	19.2	30	No (windows open)	Yes (see below)
R7	59.5	44.5	30.5	30	No (windows open)	Yes (see below)
R8	57.5	42.5	28.5	30	No (windows open and closed)	Yes (see below)
R9	56.1	41.1	27.1	30	No (windows open)	Yes (see below)
R10	57.8	42.8	28.8	30	No (windows open)	Yes (see below)
R11	31.4	16.4	2.4	30	Yes	None
R12	30.6	15.6	1.6	30	Yes	None
R13	27.9	12.9	0.0	30	Yes	None

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

Table 5.8 Night-time Noise Intrusion Levels L_{Amax}

Ref	External L_{Amax} Night-time	Internal L_{Amax} Night-time (Windows Open)	Internal L_{Amax} Night-time (Windows Closed)	Target Criteria L_{Amax}	Below SOAEL	Mitigation Required
R1	49.1	34.1	20.1	45	Yes	None
R2	48.9	33.9	19.9	45	Yes	None
R3	73.6	58.6	44.6	45	No (windows open)	Yes (see below)
R4	70.5	55.5	41.5	45	No (windows open)	Yes (see below)
R5	63.8	48.8	34.8	45	No (windows open)	Yes (see below)
R6	59.0	44.0	30.0	45	Yes	None
R7	44.3	29.3	15.3	45	Yes	None
R8	40.7	25.7	11.7	45	Yes	None
R9	41.0	26.0	12.0	45	Yes	None
R10	38.1	23.1	9.1	45	Yes	None
R11	38.2	23.2	9.2	45	Yes	None
R12	38.7	23.7	9.7	45	Yes	None
R13	37.9	22.9	8.9	45	Yes	None

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

As shown in the tables above, with windows closed, generally standard double glazing will result in the target criteria being met throughout the site. For bedrooms positioned opposite Wakefield Road along the eastern boundary of the site there may be a slight uplift (1dB) required in the sound insulation performance of glazed



unit. This could be achieved through the sound insulation performance of the glazing or the sound insulation performance of any openings providing ventilation (e.g. acoustic trickle vents).

With windows open, internal noise levels in the southern and eastern extremities of the site are predicted to exceed the criteria. Therefore, alternative means of ventilation will be required for these receptors with whole building ventilation provided. Alternative ventilation can be provided in several ways from acoustic trickle vents (which should to have a comparable acoustic performance as the glazing), other passive ventilation systems or mechanical ventilations systems. Locations where alternative ventilation are required would be identified as part of a reserved matter application when a detailed site layout is available.

In addition to achieving appropriate ventilation rates compliant with Building Regulations, should open windows be considered to mitigate overheating, further consideration will be required during the reserved matters application. Should it be agreed with the EHO that thermal comfort is required to be considered, an example design would be to install a MVHR system.

5.4 External Amenity Assessment (Combined Sources)

Table 5.9 presents predicted noise levels within selected gardens based on the illustrative layout. The receptor locations are presented in SK02b and a daytime noise contour plot is presented in SK03.

Table 5.9 External Noise Levels $L_{Aeq,16hours}$

Ref	External L_{Aeq}	Target Criteria L_{Aeq}	Within Criteria
G1	46.5	55	Yes
G2	52.5	55	Yes
G3	50.9	55	Yes
G4	52.7	55	Yes
G5	52.6	55	Yes
G6	50.4	55	Yes
G7	53.0	55	Yes
G8	48.3	55	Yes
G9	45.9	55	Yes
G10	46.2	55	Yes
G11	43.6	55	Yes
G12	36.1	55	Yes
G13	40.5	55	Yes

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

As can be seen in Table 5.9 noise levels are predicted to achieve the target criteria of 55 $dBL_{Aeq,16hours}$ in all of the proposed external amenity spaces. Nevertheless, in terms of good acoustic design, during the reserved matters application consideration should be given to installing barriers in the form of close double boarded fences for any gardens along the southern and eastern boundaries of the site which have a direct or partial



line of sight to Wakefield Road or the HSS and bus depots to the south of the site. In addition, whilst noise from the commercial premises to the north of the site was not identified to be clearly discernible, a barrier should be installed along the boundary of gardens which aligning the northern boundary adjacent to these premises. Any barriers will be required to be a minimum height of 1.8m, of solid construction with no gaps and a minimum mass of 10kg/m².

5.5 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 and of low tranquillity value. There are no public rights of way within or adjacent to the site. As the proposed development, will not disrupt current public rights of way the development is considered to have a negligible effect on local access to areas of greater tranquillity.



6.0 Conclusions

This report presents the findings of a noise assessment to inform an outline planning application for a proposed residential development on land off Wakefield Road, Athersley. The assessment has been assessed against the four test points within paragraph 123 of the NPPF with the findings outlined below. Reference has been given to relevant guidance documents, including the Planning Practice Guidance: Noise, BS 8233 and BS 4142 with the assessment demonstrating the suitability of the site for residential development.

NPPF 123 A & B

In considering the NPPF test in section 123, points A & B. The proposed development is not expected to have an 'adverse impact' on health or quality of life. Similarly, with regard to NPPF (123) point B, it is considered that all 'adverse impacts on health and quality of life' (relating to noise) are mitigated by the use of appropriate mitigation which is referenced below.

An assessment has been undertaken based on the illustrative layout which includes a stand-off distance from the HSS Depot to the south of the site and buildings forming a barrier to the electric substation to the south and Wakefield Road to the east of the site. Standard double glazing (e.g. 4mm/16mm/6mm) will be acceptable throughout the site with alternative ventilation required for some living rooms and bedrooms, primarily along the eastern and southern boundaries of the site. A slight uplift in the sound insulation performance of the glazed unit (< 1dB) may be required for bedrooms along the eastern boundary of the site facing Wakefield Road. There required sound insulation performance requirements of the glazed units are achievable. As a good acoustic design measure, it is recommended that barriers in the form of close boarded fences are installed for any gardens along the northern, southern and eastern boundaries of the site which have a direct or partial line of sight to Wakefield Road or nearby commercial premises.

NPPF 123 C & D

Based on the assessments undertaken it is not considered that any existing businesses wanting to develop would be restricted by the proposals.

An assessment of the existing tranquillity level of the site undertaken and identified that the site is not highly prized for its tranquillity and recreational value in terms of noise. There will be no disruption to public rights of way which are located within or adjacent to the site. Therefore, the proposed development is considered to have a negligible effect on local access to any areas of tranquillity.

Planning Practice Guidance: Noise

The noise mitigation in Section 5 of this report is sufficient to reduce the effects of identified sources of noise being currently emitted from the surrounding environment to prevent the adopted thresholds (within the context of BS 8233 and BS 4142) of where the Significant Observed Adverse Effect Level (SOAEL) would be exceeded for future residents.



ProPG - Planning & Noise

The Stage 1 risk assessment shows that the site has a low risk in terms of acoustic challenges. The scheme proposals are currently illustrative and therefore, there is not the requirement to undertake a detailed Stage 2 assessment and provide an Acoustic Design Statement. However, noise has been considered at this stage of the planning process with this report, as summarised in the NPP 123 A&B Section above, outlining good acoustic design measures which have been considered within the illustrative layout. These measures should be taken into account within the detailed design of the site.



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 than 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

PPG24 – Planning Policy Guidance

UDP – Unitary Development Plan

UKAS – United Kingdom Accreditation Service

WYGE – WYG Environment



Appendix B – Sketches

- SK01 Noise Monitoring Location Plan
- SK02a Proposed Receptor Location Plan (Facades)
- SK02b Proposed Receptor Location Plan (Gardens)
- SK03 Noise Contour Plot Proposed Daytime $L_{Aeq,16hr}$
- SK04 Noise Contour Plot Proposed Night-time $L_{Aeq,8hr}$