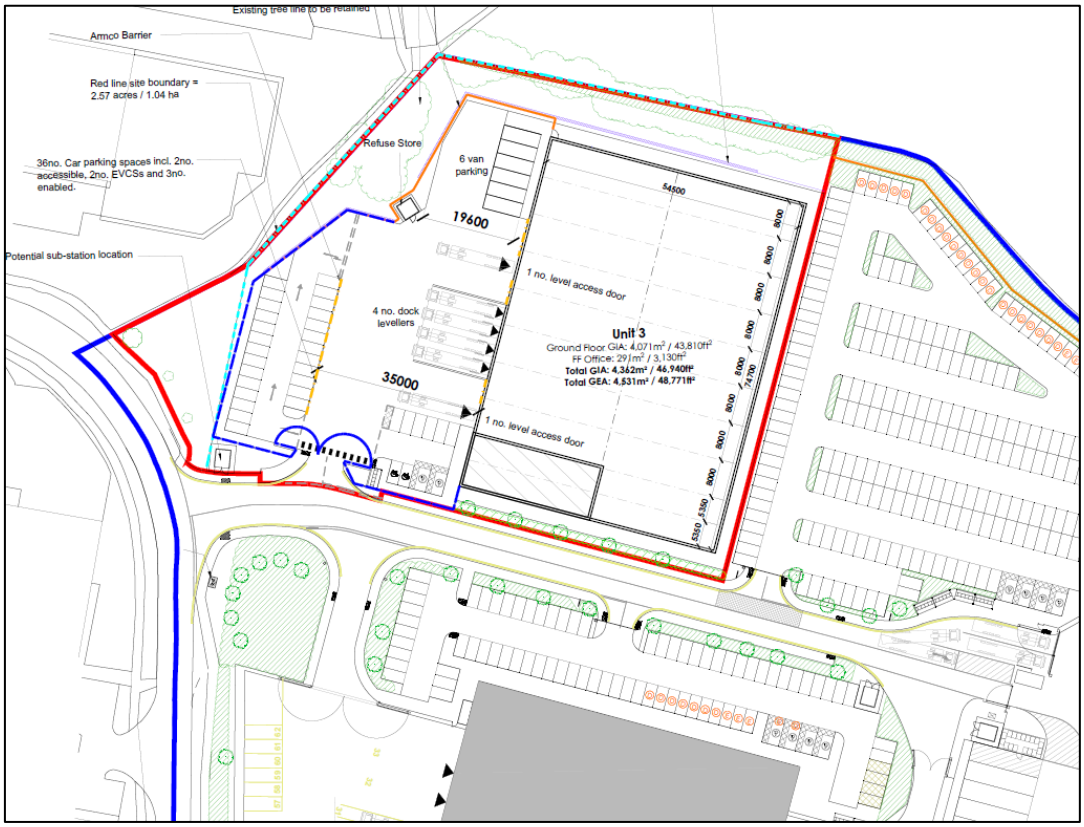
2.2.2 Noise Assessment

Plot 3, Wingates Industrial Estate, Bolton, BL5 3XN

Noise Assessment

784-B039340



Panattoni UK Developments Ltd

28th October 2022

Document prepared on behalf of Tetra Tech Group Limited. Registered in England number: 6595608

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1.0 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This report presents the findings of a noise assessment for a development at the Wingates Industrial Estate, Bolton, in order to discharge Conditions 6, 17 and 18 of planning permission 08439/20 which states:

"6. No above ground construction works within Phase 2, as shown on the approved plan Parameters Plan drawing number B9756-AEW-XX-XX-DR-A-0503 rev P7, shall take place until a noise assessment is submitted to and approved in writing by the Local Planning Authority. The scope of the assessment shall be agreed with the Local Planning authority prior to completion of the report and shall, as a minimum, follow the methodology determined by BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial sound (and any amendments). It shall include an assessment of noise from all sources associated with the development, when operating simultaneously or individually. The report shall include all the information specified in Clause 12 of BS4142:2014+A1:2019 and details of any mitigation proposed to achieve the agreed rating level.

Note: The Council will expect that the rating level, as defined in BS4142:2014+A1:2019 shall not exceed the measured daytime and/or night-time background sound level at the closest sensitive premises at any time."

"17. Phase 2 - Before the approved/permitted development, within Phase 2, is first brought into use, an operational Noise Management Plan shall be submitted to and approved in writing by the Local Planning Authority. This shall ensure that any noise associated with the development does not cause detriment to amenity or a nuisance, especially to those living and working in the vicinity. The measures set out in the approved Operational Noise Management Plan shall be maintained thereafter. Any amendments to the Operational Noise Management Plan shall be agreed in writing by the Local Planning Authority."

The Operational Noise Management Plan (ONMP) produced for the Phase one development at the site will be adopted for the Phase two development, in order to control and minimise noise associated with ongoing operations, as per the requirement of Condition 17. The ONMP is presented in Appendix D.

"18. The rating level from any fixed plant and equipment, with Phase 1 and Phase 2 of the development hereby approved, as defined in BS4142:2014+A1:2019 shall not exceed the measured daytime and/or night-time background sound level at any sensitive premises at any time. A noise assessment shall be carried out and a report submitted to and approved in writing by, the Local Planning Authority prior to the installation of any fixed plant or equipment within each phase. The report shall include all the information specified in Clause 12 of BS4142:2014+A1:2019 and details of any mitigation proposed to achieve the rating level. The approved details shall be carried out in full and retained thereafter."

The application is to support the Phase two development at the site, following Phase one having gained detailed consent.

This report considers the potential noise impact of the daytime and night-time operation of the following external noise sources associated with the proposed development:

- Building Services Plant (BSP);
- Heavy Goods Vehicles (HGV) Movements and Loading/Unloading; and
- Staff Car Parking

A description of the noise environment in and around the site is provided. Noise surveys have been undertaken. The noise levels from the proposed development have been predicted at local representative receptors using CadnaA noise modelling software which incorporates ISO 9613 methodologies and calculations.

A list of acoustic terminology and abbreviations used in this report is provided in Appendix A and Report Conditions 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 proposed development. Policy guidance with respect to noise is found in the National Planning Policy Framework (NPPF), published in July 2021. With regard to noise and planning, the NPPF contains the following statement at paragraph 174:

> *"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."

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 is, 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 below in Table 1.1.

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
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 (LOAEL)			
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 (SOAEL)			

Perception	Examples of Outcomes	Increasing Effect Level	Action
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 PPG 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 'BS 8233 – Guidance on Sound Insulation and Noise Reduction for Buildings' (2014) and 'BS 4142: 2014 Methods for Rating and Assessing Industrial and Commercial Sound'. Section 2.0 presents the noise level criteria used as a basis of this assessment.

The PPG 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 ACOUSTIC CONSULTANTS' QUALIFICATIONS AND PROFESSIONAL MEMBERSHIPS

The lead project Acoustic Consultant is Ashley Shepherd. The report has been verified by Nigel Mann. Relevant qualifications, membership and experience are summarised in Table 1.2 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)
Najwa Adnan-Smith	BSc 2016	Oct 2022	-	-
Ashley Shepherd	BSc 2013	Feb 2014	Feb 2014	Nov 2017

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)
Nigel Mann	BSc 1997 MSc 1999	Nov 1998	Nov 2001	July 2005

2.0 ASSESMENT CRITERIA

2.1 NATIONAL PLANNING PRACTICE GUIDANCE

In order to enable the assessment of the proposed development in terms of NOAEL, LOAEL and SOAEL, Table 2.1 presents equivalent noise levels and associated actions with the target noise level criteria identified. The noise level criteria detailed below have been derived from standards and design guidance:

- BS 4142:2014, 'Methods for rating and assessing industrial and commercial sound'
- BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings – Code of practice'
- IEMA 'Guidelines for Environmental Noise Impact Assessment' (2014).

Table 2.1: Noise Level Criteria and Actions

Effect Level	Assessment	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level	Background Comparison	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, depending on context
	Noise Intrusion Assessment	Noise levels are below: Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} *Bedrooms: 45 dB L_{Amax}*	Action: No Action Required
	Assessment of Overall Change in Noise Levels	Up to 3.0dB Change or a Reduction in Noise Levels	No Action Required – Change in noise levels unlikely to be perceptible
Lowest Observed Adverse Effect Level (LOAEL)	Background Comparison	BS4142 Score of +5 or lower	No Action Required Difference of +5 dB likely to be an indication of an adverse effect, depending on context BS4142 Score of + 5 or lower
	Noise Intrusion Assessment	Noise levels are above: Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms: 35 dB $L_{Aeq,16hours}$	Within BS8233 guideline criteria
	Assessment of Overall Change in Noise Levels	Up to 3.0dB Change or a Reduction in Noise Levels	No Action Required – Slight Impact at Receptor of Some Sensitivity

Significant Observed Adverse Effect Level (SOAEL)	Background Comparison	BS4142 Score greater than +5	Difference of up to +10 dB likely to be an indication of a significant adverse effect, depending on context Mitigate to achieve: BS4142 Score of + 5 or lower
	Noise Intrusion Assessment	Noise levels are exceeded: Bedrooms: 35 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms: 40 dB $L_{Aeq,16hours}$	Mitigate and reduce to a achieve: Bedrooms: 35 dB $L_{Aeq,8hours}$ Living Rooms: 40 dB $L_{Aeq,16hours}$
	Assessment of Overall Change in Noise Levels	3.0 to 5.0 dB change in Noise Levels 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)	Background Comparison	BS4142 Score of + 10 or higher	Avoid, depending on context Mitigate to achieve: BS4142 Score of 5 dB or lower
	Noise Intrusion Assessment	Noise levels are exceeded: Bedrooms: 40 dB $L_{Aeq,8hours}$ / 50 dB L_{Amax} Living Rooms: 45 dB $L_{Aeq,16hours}$	Mitigate and reduce to a achieve: Bedrooms: 35 dB $L_{Aeq,8hours}$ Living Rooms: 40 dB $L_{Aeq,16hours}$
	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

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	Ordnance Survey	LIDAR 2m DTM
Building heights – around site	Tetra Tech Observations	8 m height for two storey residential properties.
Barrier heights	Tetra Tech Observations	3.0m high existing barrier included for Phase one development
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
Absorbent Ground	CADNA	Frequency dependant ground absorption has been applied based on values specified in VDI 2714/16 clause 6.3.
Proposed Plans	AEW Architects and Designers	Proposed Site Plan 12737-AEW-03-ZZ-DR-A-0503 Rev P4 Dated Sep 2022

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

3.2.1 Building Services Plant

As the proposed plant design is not confirmed at this stage a detailed plant noise assessment cannot be undertaken. Therefore, point sources have been defined in the model to represent potential plant associated with the development. The maximum sound pressure levels of the point sources at 3 and 10

metres were estimated in the model as a conditional maximum level that the noise levels at nearby receptors were predicted to meet the required criteria of a noise rating level of 10 dB below the background noise level at sensitive residential receptor locations.

3.2.2 Delivery Event Noise Data

The source noise levels for delivery events are based on the same data used in the noise assessment for units 1 and 2 of the development. It is considered that the assessed scenarios for both daytime and night-time periods represent a reasonable worst-case scenario with regard to the proposed source noise levels. This includes vehicle movements, events from every other assumed delivery bay and van parking from every other van parking bay illustrated on the site plan per hour during the daytime and night-time periods.

HGV Delivery Vehicle Docking and Unloading

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

  3 minutes at L_p 62 dB at 10 m distance (vehicle arriving and manoeuvring)

  30 minutes at L_p 63 dB at 10 m distance (vehicle unloading / loading)

  0.5 minutes at L_p 66 dB at 10 m distance (vehicle leaving)

  26.5 minutes of quiet (associated with no activities, documentation, waiting with engine off)

  $L_{Aeq(1hr)}$ = $10\log(1/60)(3\text{mins} \times 10^{0.1 \times 62dB} + 30\text{mins} \times 10^{0.1 \times 63dB} + 2\text{mins} \times 10^{0.1 \times 66dB})$

  = 60.5 dB at 10 m distance

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

  3 minutes at L_p 62 dB at 10 m distance (vehicle arriving and manoeuvring)

  12 minutes at L_p 63 dB at 10 m distance (vehicle unloading / loading)

  $L_{Aeq(15mins)}$ = $10\log(1/15)(3\text{mins} \times 10^{0.1 \times 62dB} + 12\text{mins} \times 10^{0.1 \times 63dB})$

  = 62.8 dB at 10 m distance

- *L_{Amax} Noise levels*

  L_{Amax} used is as 86 dB at 10 m distance

HGV Delivery Vehicle Arriving/Exiting along service yard access road

The following calculations have been used to represent this as a line source in the model.

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

  2 x 20 seconds L_p = 66.4 dB at 10 m distance (vehicle arriving and leaving)

  $L_{Aeq(1hr)}$ = $10\log(1/3600\text{sec})(20\text{ sec} \times 10^{0.1 \times 66.4\ dB} + 20\text{ sec} \times 10^{0.1 \times 66.4\ dB})$

  = 46.9 dB at 10 m distance

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

  1 x 20 seconds L_p = 66.4 dB at 6 m distance (vehicle arriving or leaving)

  $L_{Aeq(15mins)}$ = 10log(1/900sec)(20 sec x $10^{0.1x66.4\ dB}$)

  = 49.8 dB at 10 m distance

- *L_{Amax} Noise levels*

  L_{Amax} = 68.6 dB at 10 m distance

Van Parking Event Noise Data

- *Daytime $L_{Aeq,1hr}$ Noise Level* = 30.7 dB at 10 m distance
- *Night-time $L_{Aeq,15min}$ Noise Level* = 36.7 dB at 10 m distance
- *Night-time L_{Amax}* as 53 dB at 10 m distance

3.2.3 Car Park Noise Data

Noise levels from proposed car parking areas 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 area sources across each car parking area.

- *$L_{Aeq,1hr}$ Noise Level* = 54 dB at 1.5m height
- L_{Amax} used is as 76 dB at 3 m distance

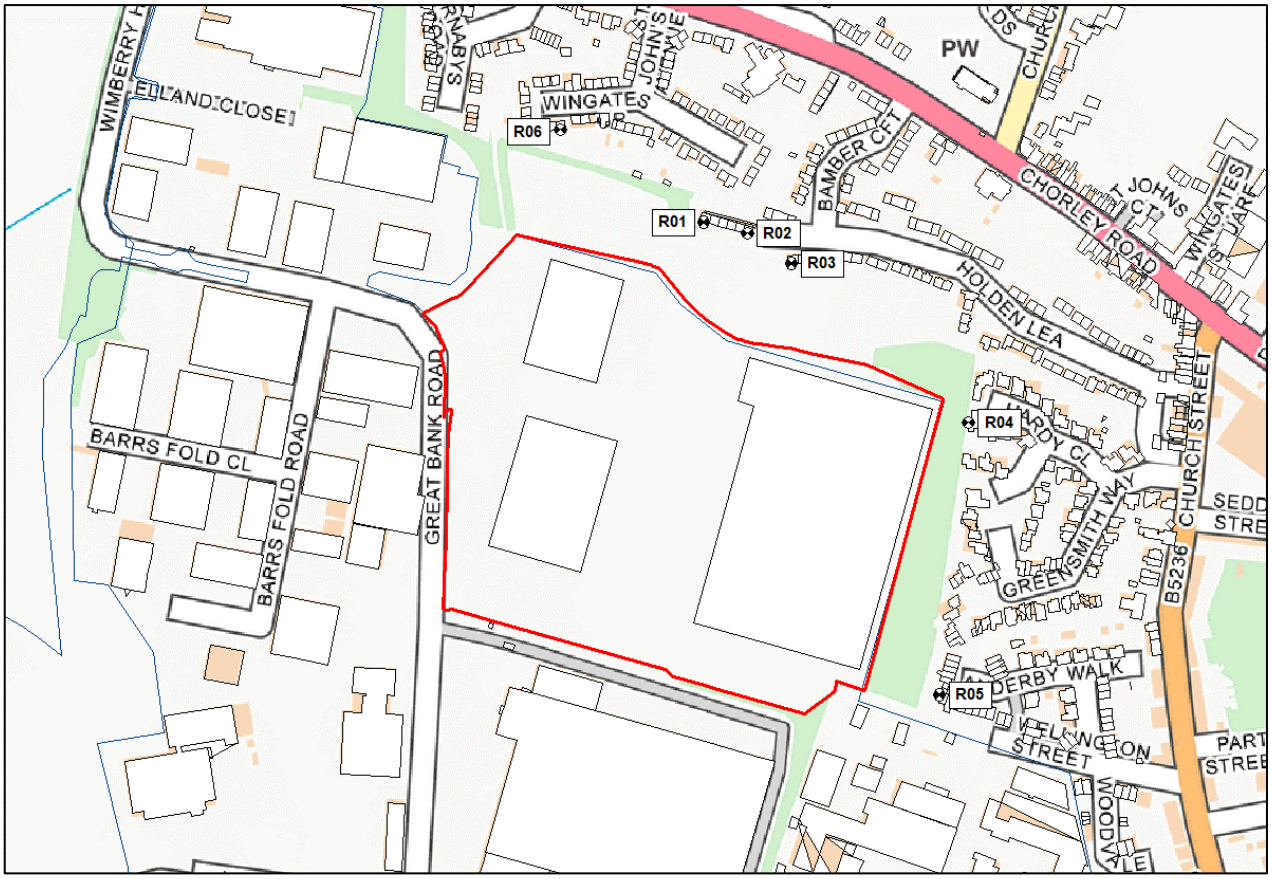
3.3 SENSITIVE RECEPTORS

Table 3.2 below summarises receptor locations that have been selected to represent worst-case residential receptors with respect to direct noise from the site. Ground and first floor façades of the nearest noise sensitive properties have been represented. The locations of the receptors are shown in Figure 3.1 below.

Table 3.2: Sensitive Receptor Locations

Ref.	Description	Height (m) Daytime / Night-time
R01	104 Holden Lee	1.5 / 4.0
R02	94 Holden Lee	1.5 / 4.0
R03	69 Holden Lee	1.5 / 4.0
R04	21 Hardy Close	1.5 / 4.0
R05	37 Anderby Walk	1.5 / 4.0
R06	32 Wingates Grove	1.5 / 4.0

Figure 3.1: Sensitive Receptor Locations



3.4 TRANQUILLITY RATING

An assessment of the existing tranquillity level of the site has been done 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).

4.0 NOISE SURVEY

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	25010
Rion NL-52	Environmental Noise Analyser	s/n	342867
Rion NL-32	Environmental Noise Analyser	s/n	976224
Rion NL-52	Environmental Noise Analyser (WYG16)	s/n	1221576
Rion NL-52	Environmental Noise Analyser (WYG26)	s/n	264488
Rion NC-74	Sound Calibrator	s/n	35046823

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 +0.2 dB was observed. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

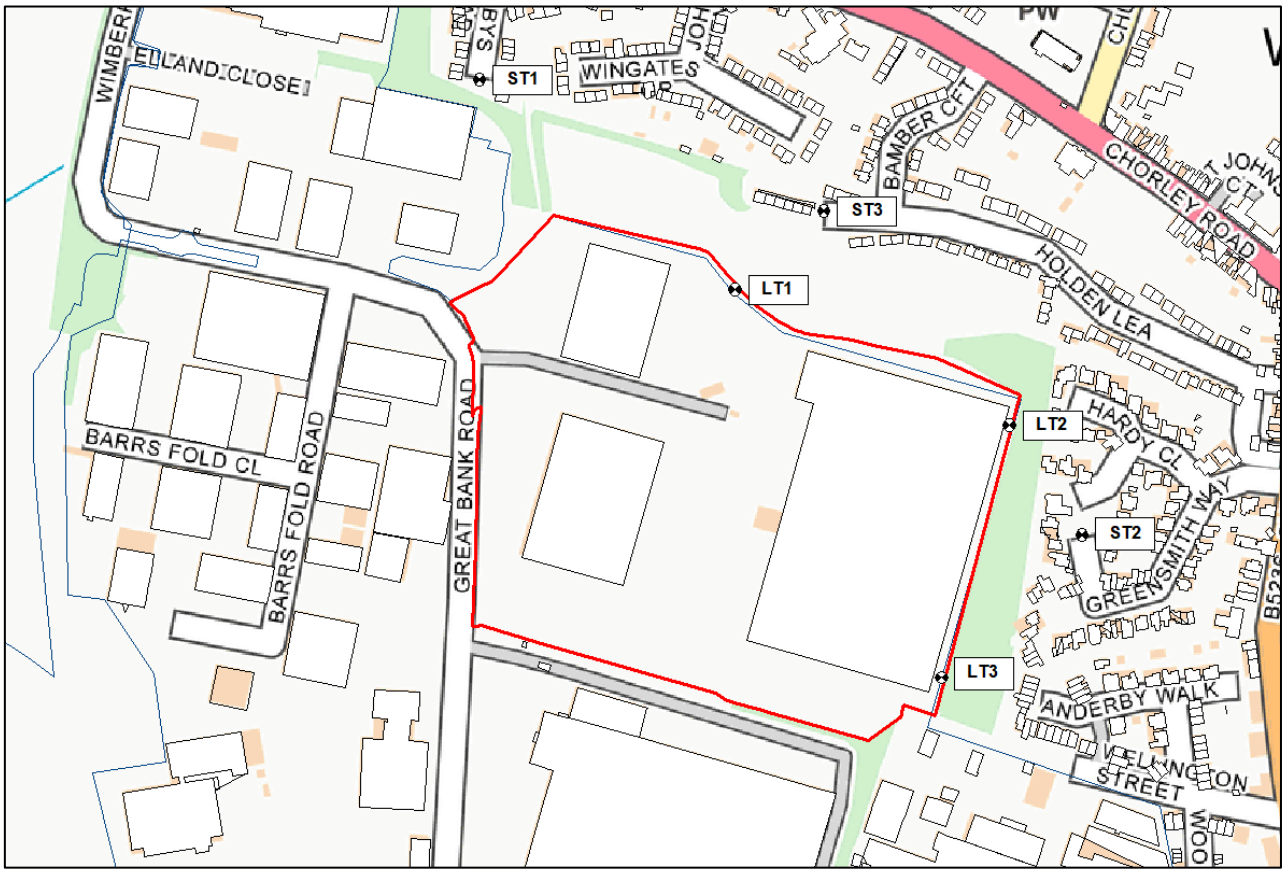
A baseline monitoring survey was undertaken at six locations from Thursday 21st November 2019 to Tuesday 26th November 2019 as specified in Table 4.1 and shown in Figure 4.1. Attended short term measurements were undertaken at three locations during day, evening and night-time periods with three additional locations being measured unattended over a 118-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 south-easterly wind direction during the survey.

Table 4.1 Noise Monitoring Locations

Ref	Description
LT 1	Northern boundary of the site.
LT 2	North-eastern boundary of the site.
LT 3	South-eastern boundary of the site.
ST 1	North of the site, by 45 Barnabys Road.
ST 2	East of the site, by 36 Greensmith Way
ST3	North of the site, by 94 Holden Lea

Figure 4.1: Noise Monitoring Locations



4.1 NOISE SURVEY RESULTS

The dominant noise sources found in the area include road traffic noise from Chorley Road/Church Street, noise associated with Wingates Industrial Estate, and occasional aircraft.

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). For the long-term (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 4.2: 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	25/11/2019 13:13	10	2-3	SE	8	Road traffic noise Chorley Road.
Day ST2	25/11/2019 13:57	10	1-2	SE	8	Road traffic noise from Church Street.
Day ST3	25/11/2019 12:11	10	2-3	SE	8	Road traffic noise Chorley Road.
Evening ST1	25/11/2019 19:51	10	1-2	SE	8	Road traffic noise Chorley Road.
Evening ST2	25/11/2019 21:09	10	0-1	SE	8	Road traffic noise from Church Street.
Evening ST3	25/11/2019 20:29	10	0-1	SE	8	Road traffic noise Chorley Road.
Night ST1	25/11/2019 23:36	10	0-1	SE	8	Road traffic noise Chorley Road.
Night ST2	26/11/2019 00:55	10	0-1	SE	8	Road traffic noise from Church Street.
Night ST3	25/11/2019 00:16	10	0-1	SE	8	Road traffic noise Chorley Road.

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	47 Hours	21/11/2019 – 26/11/2019 12:00 – 10:15	LT1	53.3	83.3	39.4	53.9	53
Weekday Night-time 23:00 – 07:00	24 Hours	21/11/2019 – 26/11/2019 23:00 - 07:00		48.4	66.0	33.0	47.9	45
Weekend Daytime 07:00 - 23:00	32 Hours	23/11/2019 – 24/11/2019 07:00 - 23:00		52.3	78.9	35.3	52.4	54
Weekend Night-time 23:00 – 07:00	16 hours	23/11/2019 – 24/11/2019 23:00 - 07:00		48.4	74.1	32.1	49.7	45
Weekday Daytime 07:00 - 23:00	46 Hours	21/11/2019 – 26/11/2019 12:59 – 10:24	LT2	51.5	99.8	34.1	49.7	47
Weekday Night-time 23:00 – 07:00	24 Hours	21/11/2019 – 26/11/2019 23:00 - 07:00		42.9	66.8	27.3	42.2	33
Weekend Daytime 07:00 - 23:00	32 Hours	23/11/2019 – 24/11/2019 07:00 - 23:00		48.8	85.0	31.7	47.7	38
Weekend Night-time 23:00 – 07:00	16 hours	23/11/2019 – 24/11/2019 23:00 - 07:00		43.4	74.0	25.4	43.5	41
Weekday Daytime 07:00 - 23:00	46 Hours	21/11/2019 – 26/11/2019 13:31 – 10:56	LT3	50.9	96.8	34.5	50.4	49
Weekday Night-time 23:00 – 07:00	24 Hours	21/11/2019 – 26/11/2019 23:00 - 07:00		44.1	77.6	27.5	43.3	34
Weekend Daytime 07:00 - 23:00	32 Hours	23/11/2019 – 24/11/2019 07:00 - 23:00		49.5	88.9	30.3	48.6	50
Weekend Night-time 23:00 – 07:00	16 hours	23/11/2019 – 24/11/2019 23:00 - 07:00		44.8	71.7	26.2	45.5	42

Daytime 07:00 - 19:00	15 Mins	25/11/2019 13:13	ST1	51.4	69.4	47.0	53.2	48.6
	15 Mins	25/11/2019 13:57	ST2	49.2	65.7	45.4	49.9	46.8
	15 Mins	25/11/2019 12:11	ST3	53.8	73.0	50.3	54.4	51.8
Evening 19:00 - 23:00	15 Mins	25/11/2019 19:51	ST1	50.0	70.9	38.1	50.6	46.8
	15 Mins	25/11/2019 21:09	ST2	48.2	62.3	38.3	51.4	40.4
	15 Mins	25/11/2019 20:29	ST3	44.5	63.3	40.8	46.1	42.4
Night-time 23:00 - 07:00	15 Mins	25/11/2019 23:36	ST1	44.3	65.5	36.8	44.6	39.0
	15 Mins	26/11/2019 00:55	ST2	32.5	49.1	27.5	34.1	29.9
	15 Mins	25/11/2019 00:16	ST3	42.7	70.4	36.9	44.6	38.8

4.2 REPRESENTATIVE BACKGROUND LEVELS

Appendix C contains the background noise level graphs from which representative background noise levels have been derived for all receptor locations presented in Figure 3.1. Table 4.4 presents the representative background noise levels considered appropriate for the existing sensitive receptors within the area.

Table 4.4: Representative Background Noise Levels (All Receptors)

Receptors	Monitoring Location	Time Period	Representative Background Noise Level ($L_{A90,T}$ dB)
R01, R02, R03 and R06	LT1	Daytime (07:00 – 23:00)	53.0
		Night-time (23:00 – 07:00)	44.0
R04	LT2	Daytime (07:00 – 23:00)	46.0

		Night-time (23:00 – 07:00)	40.0
R05	LT3	Daytime (07:00 – 23:00)	49.0
		Night-time (23:00 – 07:00)	40.0

The representative noise levels presented in Table 4.4 have been used to inform the assessment presented in Section 5.0.

5.0 ASSESSMENT OF EFFECTS

5.1 OPERATIONAL PHASE – UNIT 3 ONLY

5.1.1 BS 4142 Noise Assessment – Building Services Plant

The assessment has been undertaken in order to establish the effect of noise from the proposed building services plant. The assessment compares the predicted noise levels from the plant with the existing measured average daytime and night-time background noise L_{A90} at the closest existing residential receptors.

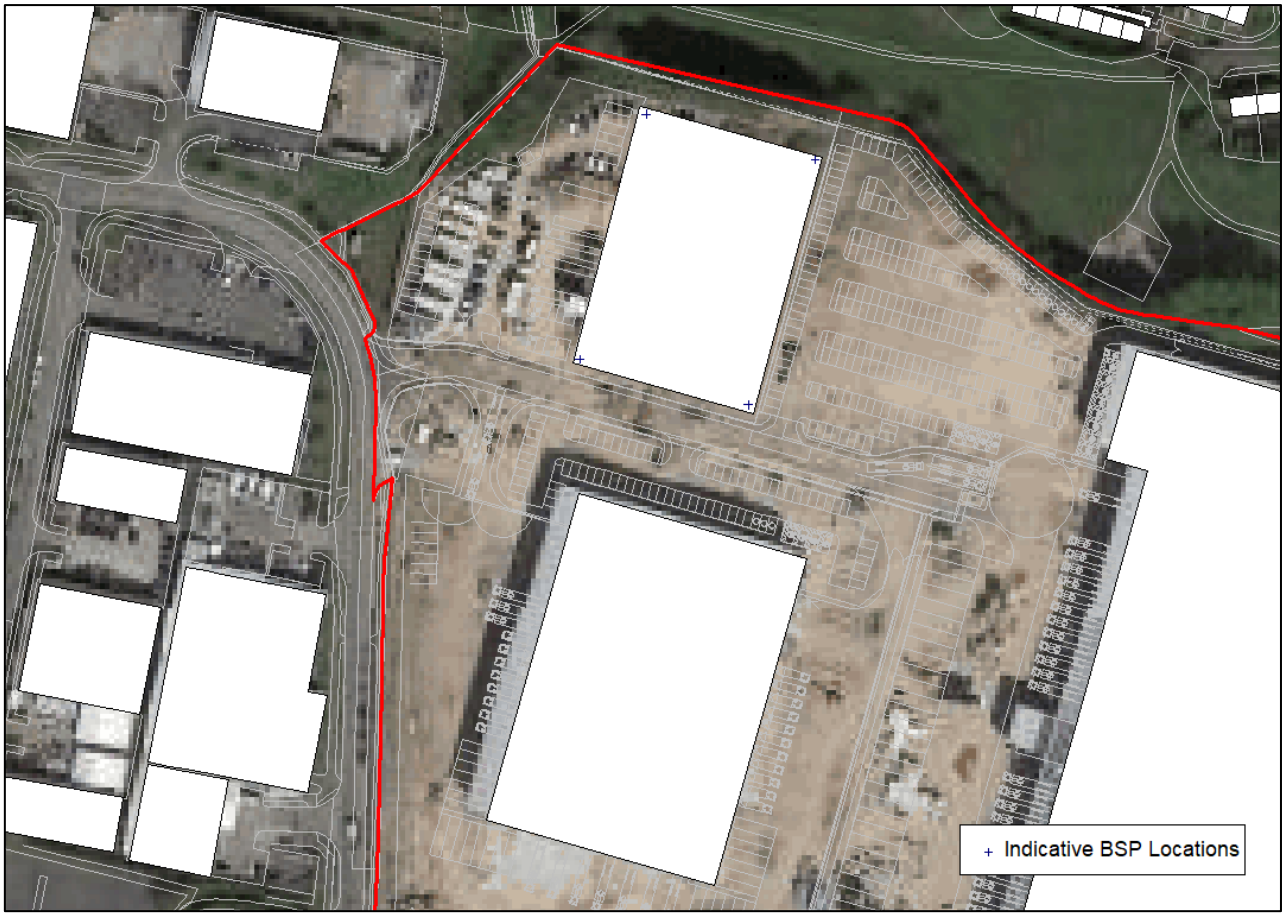
As details relating to proposed BSP are currently not known, noise from a series of predictions were made by defining different sound power levels (assuming hemi-spherical radiation) at the point source. When the sound pressure levels are set as shown in Table 5.1 (which is considered to be achievable), the rating levels at all the representative receptors are predicted to be 10 dB below the background levels during the period when the plant could be operational as shown in Table 5.2. The assessed plant location is presented in Figure 5.1.

Table 5.1: Proposed Emission Limits (Per Unit) for BSP as Modelled

BSP Location	Noise Emission Limit – Sound Pressure Level (dB (A)) *	
	Daytime	Night-time
1 m above Roof	69.0 dB at 3 m OR 58.5 dB at 10 m	60.0 dB at 3 m OR 49.5 dB at 10 m

*Different plant configurations could apply depending on a number of variables, including operating periods and location of plant, which would be established during the detailed M&E design

Figure 5.1: Assessed Plant Location



Typically, when considering noise generation from such developments where there are a large number of plant items, the noise character is considered to be 'bland' without a distinguishable tonal or impulsive characteristic. However, to account for any uncertainty, a +2 dB correction has been applied to the predicted noise level to create the 'Rating Level'.

Table 5.2: BS 4142 Proposed BSP Assessment

Location	Existing Measured Background L_{A90}		Noise rating level (with +3 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	53	44	43	34	-10	-10
R02	53	44	38	29	-15	-15
R03	53	44	36	28	-17	-17
R04	46	40	27	21	-19	-19
R05	49	40	25	17	-24	-23
R06	53	44	42	33	-12	-11

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.

As shown in the table above the noise rating levels from the proposed BSP are expected to be below background noise levels at the nearest sensitive receptors during the daytime and night-time. Noise levels are therefore well below the *No Observed Adverse Effect Level (NOAEL)* set out in Section 2.

5.1.2 BS 4142 Noise Assessment – Unit 3

The assessment presented on the table below compares existing typical background noise levels (L_{A90}) with predicted noise levels from Plot 3, including the BSP, HGV delivery and staff carpark, at the nearest residential dwellings. Given the large number of assessed noise sources and low predicted absolute noise levels, it is considered that applying a character correction of +3 dB would be reasonable to account for potential impulsive characteristics of the proposed delivery events being 'just perceptible'. The assessment is based on the model input data presented in Section 3.2.

Table 5.3: BS 4142 Unit 3 Noise Assessment

Location	Existing Measured Background L_{A90}		Noise rating level (with +3 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	53	44	41	35	-12	-9
R02	53	44	38	33	-15	-11
R03	53	44	36	30	-17	-14
R04	46	40	26	22	-20	-18
R05	49	40	24	20	-25	-21
R06	53	44	46	47	-7	3

The assessment in Table 5.3 shows that the noise rating levels are predicted to be below the background noise level during the daytime and night-time periods except for the noise level at receptor R06.

During the night-time period, the predicted noise level at receptor R06 is below +5 dB of the background noise level and is therefore predicted to be below LOAEL. In addition, to provide context, the site is a brownfield site and located within an existing industrial estate. Furthermore, particularly during the 15-minute night-time assessment period, a significant number of noise sources have been modelled to be occurring simultaneously. Therefore, considering the context of the assessment, noise associated with the operations of Unit 3 will result in a Low Impact when assessed in accordance with BS 4142.

5.1.3 Noise Intrusion Assessment – Unit 3

Internal ambient noise levels at nearby sensitive receptors have also been assessed both with windows open, where a reduction from a partially open window of 15 dBA has been used, and with windows closed where an assumption of single glazing with a sound reduction of 30 dBA has been used. Table 5.4 to Table

5.6 below show the noise intrusion levels from Unit 3 of the development during the daytime and night-time periods.

Table 5.4: Unit 3 Daytime Noise Intrusion Levels $L_{Aeq,1hour}$

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	37.7	22.7	7.7	35
R02	35.4	20.4	5.4	35
R03	33.3	18.3	3.3	35
R04	23.1	8.1	0	35
R05	21.3	6.3	0	35
R06	42.6	27.6	12.6	35

Table 5.5: Unit 3 Night-time Noise Intrusion Levels $L_{Aeq,15min}$

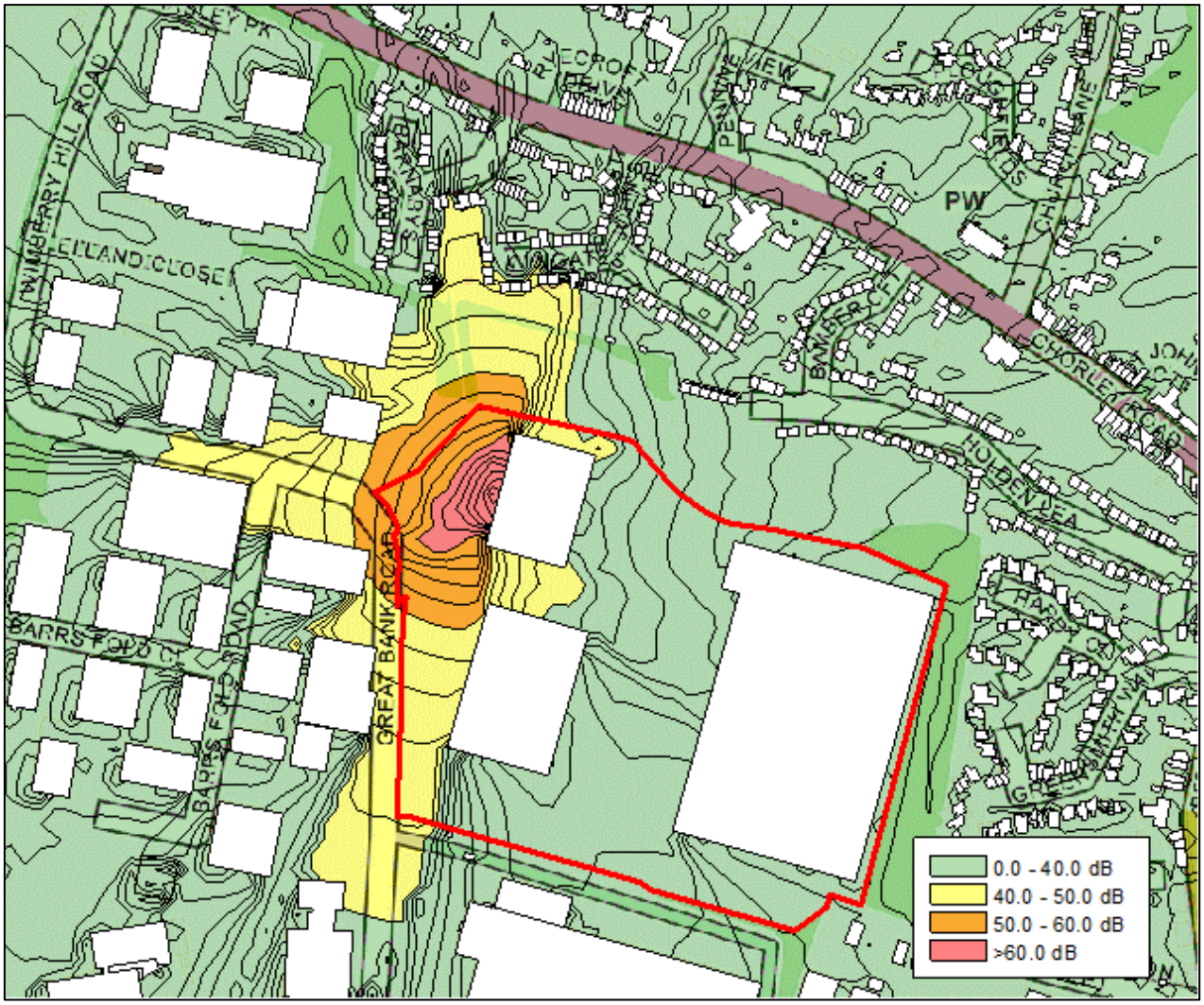
Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	31.9	16.9	1.9	30
R02	29.8	14.8	0	30
R03	27.1	12.1	0	30
R04	19.2	4.2	0	30
R05	16.5	1.5	0	30
R06	44.4	29.4	14.4	30

Table 5.6: Unit 3 Night-time Noise Intrusion Levels L_{Amax}

Location	External L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	Criteria L_{Amax}
R01	45.5	30.5	15.5	45
R02	43.1	28.1	13.1	45
R03	38.3	23.3	8.3	45
R04	32.7	17.7	2.7	45
R05	28.7	13.7	0	45
R06	61.8	46.8	31.8	45

The results from delivery noise intrusion assessment of Unit 3 demonstrate that the internal L_{Aeq} noise levels from the proposed operations during both daytime and night-time periods with windows open or closed are predicted to be within the BS 8233 criteria at all sensitive receptor locations. However, the night-time L_{Amax} value at receptor R06 is predicted to exceed the night-time L_{Amax} criteria of 45 dB with windows opened, therefore further mitigation is considered in Section 6.

Figure 5.2: Noise Contour Plot – Unit 3 (Night-time)



5.1.4 Change in Noise Level Assessment – Unit 3

An assessment has been undertaken to compare worst-case noise levels from the existing noise levels ($L_{Aeq,T}$) to the proposed scheme noise at identified existing residential receptors. The differences between the 'existing' and the 'proposed' development scenarios including, HGV deliveries within the site, car parking and building services plant are presented in the following tables. For indicative purposes, the daytime and night-time noise contour plot are presented in Figures 5.3 and 5.4.

Table 5.7: Difference between Existing Conditions and Contribution from Development (Daytime)

Location	Existing $L_{Aeq,T}$ (monitored)	Proposed $L_{Aeq,1hr}$ (modelled)	Combined L_{Aeq}	Contribution from Proposed Scheme
R01	52.3	37.7	52.4	0.1
R02	52.3	35.4	52.4	0.1
R03	52.3	33.3	52.4	0.1
R04	48.8	23.1	48.8	0.0

R05	49.5	21.3	49.5	0.0
R06	52.3	42.6	52.7	0.4

Table 5.8: Difference between Existing Conditions and Contribution from Development (Night-time)

Location	Existing $L_{Aeq,T}$ (monitored)	Proposed $L_{Aeq,15mins}$ (modelled)	Combined L_{Aeq}	Contribution from Proposed Scheme
R01	48.4	31.9	48.5	0.1
R02	48.4	29.8	48.5	0.1
R03	48.4	27.1	48.4	0.0
R04	42.9	19.2	42.9	0.0
R05	44.1	16.5	44.1	0.0
R06	48.4	44.4	49.9	1.5

The results in the tables above show the change in noise levels between the existing day time and night-time L_{Aeq} noise levels and the contribution from the development. The differences between the 'existing' and 'proposed' scenarios are +1.5 dB or below at all receptors for daytime and night-time. Therefore, in terms of the change in noise level associated with on-site operational noise sources, noise effects are negligible and will fall below the LOAEL.

5.2 OPERATIONAL PHASE – ALL UNITS

5.2.1 BS 4142 Noise Assessment – All Units

The assessment presented on the table below compares existing typical background noise levels (L_{A90}) to the predicted noise levels from all units within the development at the nearest residential dwellings. A character correction of +3 dB has been applied to account for potential impulsive characteristics of the proposed noise events.

Table 5.9: BS 4142 All Units Noise Assessment

Location	Existing Measured Background L_{A90}		Noise rating level (with +3 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	53	44	46	48	-8	4
R02	53	44	45	48	-9	4
R03	53	44	43	46	-10	2
R04	46	40	32	35	-14	-5
R05	49	40	38	42	-11	2
R06	53	44	49	51	-4	7

The results show that the daytime noise levels from the development are below the existing background levels and therefore are predicted to result in a NOAEL. However, the night-time noise levels from the development exceed the existing background noise levels at receptors R01, R02, R03 and R05 by +4 dB or less and by +7 dB at receptor R06, which is to the north of the development.

5.2.2 Noise Intrusion Assessment – All Units

Tables 5.10 to 5.12 below represent the results for the noise intrusion assessment done on all 3 units of the development. As done in Section 5.1.3, a reduction by 15 dB for a partially open window and 30 dB for a closed window have been applied at each sensitive receptor.

Table 5.10: All Units Daytime Noise Intrusion Levels $L_{Aeq,1hour}$

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	42.5	27.5	12.5	35
R02	41.5	26.5	11.5	35
R03	39.8	24.8	9.8	35
R04	29.2	14.2	0	35
R05	34.8	19.8	4.8	35
R06	46	31	16	35

Table 5.11: All Units Night-time Noise Intrusion Levels $L_{Aeq,15min}$

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	44.7	29.7	14.7	30
R02	44.5	29.5	14.5	30
R03	43.3	28.3	13.3	30
R04	31.6	16.6	1.6	30
R05	39.3	24.3	9.3	30
R06	48.4	33.4	18.4	30

Table 5.12: All Units Night-time Noise Intrusion Levels L_{Amax}

Location	External L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	Criteria L_{Amax}
R01	53.7	38.7	23.7	45
R02	55	40	25	45
R03	53.2	38.2	23.2	45
R04	39.8	24.8	9.8	45
R05	57.3	42.3	27.3	45
R06	61.8	46.8	31.8	45

The predicted noise levels are generally within the criteria set in BS 8233 apart from the night-time L_{Aeq} and L_{Amax} at receptor R06.

5.2.3 Change in Noise Level Assessment – All Units

The assessment below shows the change in the measured ambient level at the existing receptors during the daytime and night-time periods as a result of all units within the development.

Table 5.13: All Units Change in Noise Level Assessment (Daytime)

Location	Existing $L_{Aeq,T}$ (monitored)	Proposed $L_{Aeq,1hr}$ (modelled)	Combined L_{Aeq}	Contribution from Proposed Scheme
R01	52.3	42.5	52.7	0.4
R02	52.3	41.5	52.6	0.3
R03	52.3	39.8	52.5	0.2
R04	48.8	29.2	48.8	0.0
R05	49.5	34.8	49.6	0.1
R06	52.3	46	53.2	0.9

Table 5.14: All Units Change in Noise Level Assessment (Night-time)

Location	Existing $L_{Aeq,T}$ (monitored)	Proposed $L_{Aeq,15mins}$ (modelled)	Combined L_{Aeq}	Contribution from Proposed Scheme
R01	48.4	44.7	49.9	1.5
R02	48.4	44.5	49.9	1.5
R03	48.4	43.3	49.6	1.2
R04	42.9	31.6	43.2	0.3
R05	44.1	39.3	45.3	1.2
R06	48.4	48.4	51.4	3.0

It is predicted that the development will contribute to the ambient noise level by +3 dB or less. Therefore, in combination noise effects are negligible and fall within the No Observed Adverse Effect Level.

5.3 TRANQUILLITY ASSESSMENT

By reference to the mapping data published by Campaign to Protect Rural England (CPRE) the site and immediate surrounding area is assessed as falling into Zones 1 – 3 and of low to medium tranquillity value. A public Right of Way exists adjacent to the western boundary of the site, along Great Bank Road. The scheme consists of a development on an existing brownfield site and access along the public right of way will not be disrupted. Therefore, the proposed development is not expected to have an adverse impact on access to areas of greater tranquillity.

6.0 MITIGATION

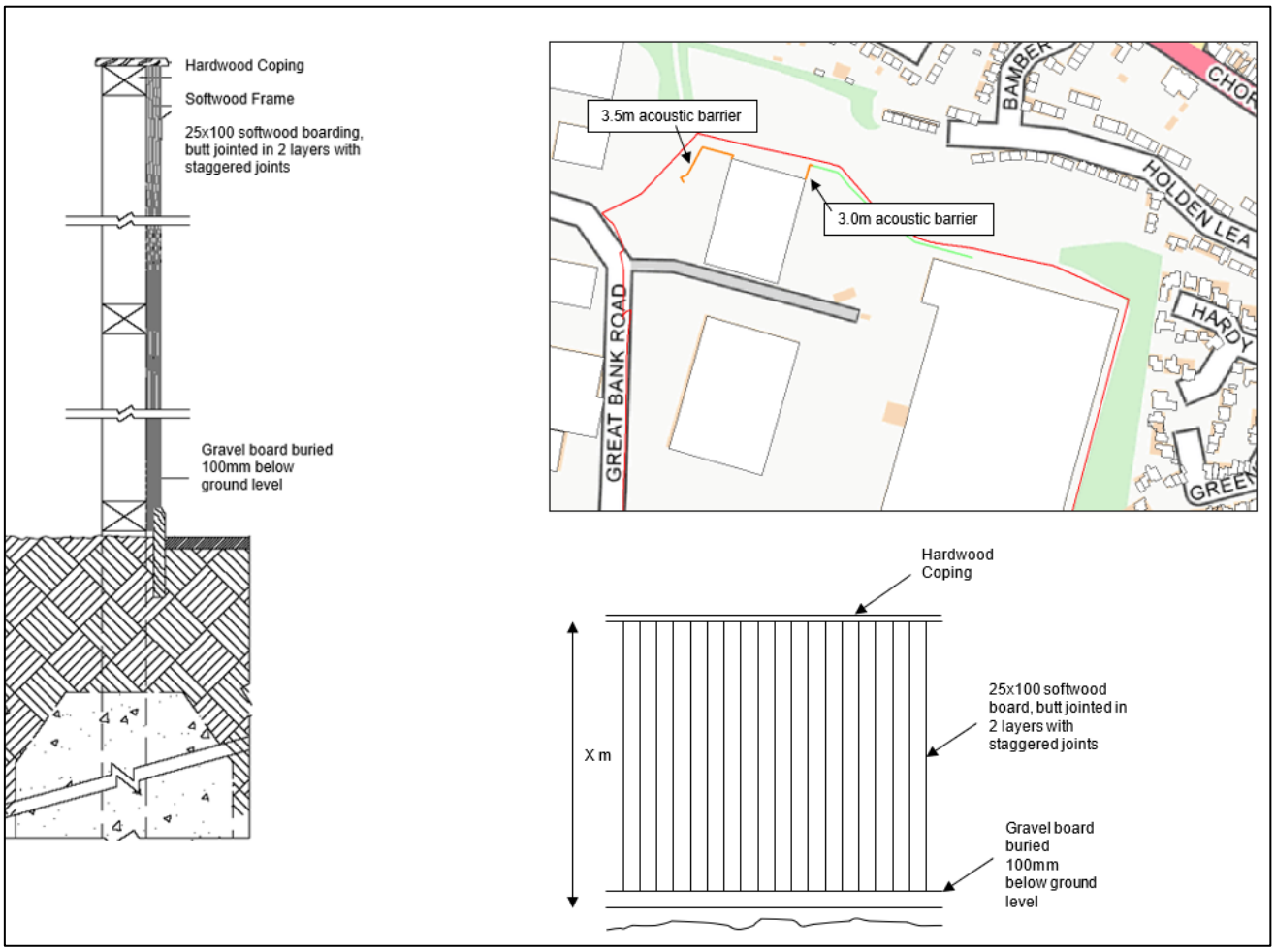
6.1 NOISE MITIGATION

In order to reduce noise levels at the closest sensitive receptors from the noise associated with the proposed development, the following mitigation has been included within the model and the assessments below:

- 3.5 m high, 57 m long acoustic barrier along the northern side of the service yard for Unit 3.
- 3 m high, 13 m long extension acoustic barrier along the north-western side of the staff car park for Unit 2.

Acoustic barriers will be of a close boarded construction with a minimum mass per square metre of 10 kg/m^2. The location of the acoustic barrier is shown in Figure 6.1.

Figure 6.1: Location of Acoustic Barrier



6.1.1 BS 4142 Assessment – Including Mitigation

6.1.1.1 BS 4142 Assessment – Including Mitigation (Unit 3 Only)

The assessment below represents the BS 4142 of the noise levels including the mitigation described above.

Table 6.1: Unit 3 BS 4142 Assessment – Including Mitigation

Location	Existing Measured Background L_{A90}		Noise rating level (with +3 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	53	44	41	35	-12	-9
R02	53	44	38	33	-15	-11
R03	53	44	36	30	-17	-14
R04	46	40	26	22	-20	-18
R05	49	40	24	20	-25	-21
R06	53	44	42	42	-11	-2

The results in Table 6.1 indicate that the noise levels from Unit 3 are predicted to be below the background level at the nearest sensitive receptors and therefore meet the requirement of discharge Condition 6 of planning permission 08439/20.

6.1.1.2 BS 4142 Assessment – Including Mitigation (Unit 1,2 & 3)

Table 6.2: All Units BS 4142 Assessment – Including Mitigation

Location	Existing Measured Background L_{A90}		Noise rating level (with +3 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	53	44	46	48	-8	4
R02	53	44	45	48	-9	4
R03	53	44	43	46	-10	2
R04	46	40	32	35	-14	-5
R05	49	40	38	42	-11	2
R06	53	44	45	48	-8	4

As demonstrated in Table 6.2 above, inclusive of the noise mitigation plan, rating levels from all units within the development are expected to be within +5 dB of background noise levels at the nearest sensitive receptors during the night-time and below background during the daytime. Noise levels are therefore within the LOAEL in accordance with the derived limits set out within Section 2 and are considered to result in a Low Impact when assessed in accordance with BS 4142.

6.1.2 Noise Intrusion Assessment – Including Mitigation

6.1.2.1 Noise Intrusion Assessment – Including Mitigation (unit 3 Only)

Below are the results of the noise intrusion assessment for Unit 3 including the mitigation described above.

Table 6.3: Unit 3 Daytime Noise Intrusion Assessment $L_{Aeq,1hr}$ – Including Mitigation

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	37.7	22.7	7.7	35
R02	35.4	20.4	5.4	35
R03	33.3	18.3	3.3	35
R04	23.1	8.1	0	35
R05	21.3	6.3	0	35
R06	38.7	23.7	8.7	35

Table 6.4: Unit 3 Night-time Noise Intrusion Assessment $L_{Aeq,15min}$ – Including Mitigation

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	31.9	16.9	1.9	30
R02	29.8	14.8	0	30
R03	27.1	12.1	0	30
R04	19.2	4.2	0	30
R05	16.5	1.5	0	30
R06	39.4	24.4	9.4	30

Table 6.5: Unit 3 Night-time Noise Intrusion Assessment L_{Amax} – Including Mitigation

Location	External L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	Criteria L_{Amax}
R01	45.5	30.5	15.5	45
R02	43.1	28.1	13.1	45
R03	38.3	23.3	8.3	45
R04	32.7	17.7	2.7	45
R05	28.7	13.7	0	45
R06	55.6	40.6	25.6	45

6.1.2.2 Noise Intrusion Assessment – Including Mitigation (Units 1,2 & 3)

Below are the results of the noise intrusion assessment for all units including the mitigation described above.

Table 6.6: All Units Daytime Noise Intrusion Assessment $L_{Aeq,1hr}$ – Including Mitigation

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	42.5	27.5	12.5	35
R02	41.5	26.5	11.5	35
R03	39.8	24.8	9.8	35
R04	29.2	14.2	0	35
R05	34.8	19.8	4.8	35
R06	42.4	27.4	12.4	35

Table 6.7: All Units Night-time Noise Intrusion Assessment $L_{Aeq,15min}$ – Including Mitigation

Location	External L_{Aeq}	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria L_{Aeq}
R01	44.7	29.7	14.7	30
R02	44.5	29.5	14.5	30
R03	43.3	28.3	13.3	30
R04	31.6	16.6	1.6	30
R05	39.3	24.3	9.3	30
R06	45	30	15	30

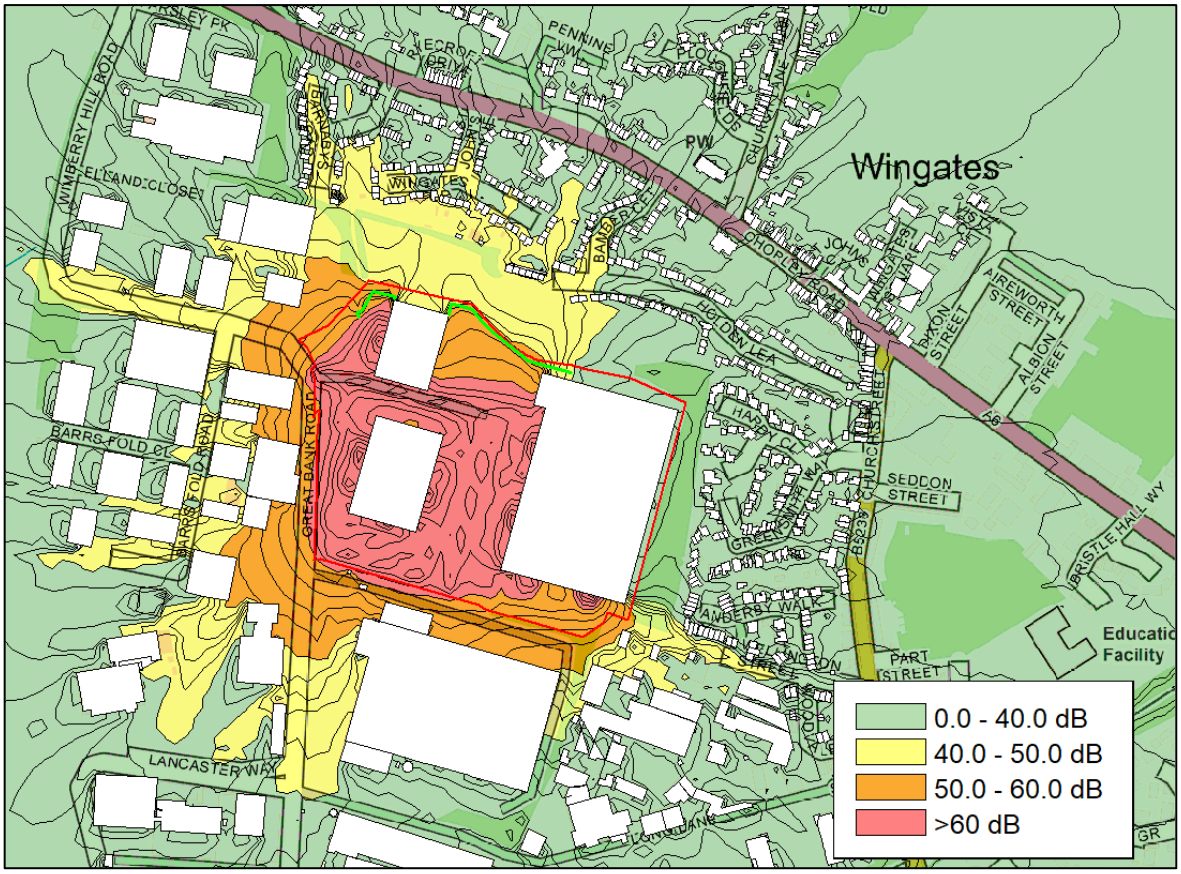
Table 6.8: All Units Night-time Noise Intrusion Assessment L_{Amax} – Including Mitigation

Location	External L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	Criteria L_{Amax}
R01	53.7	38.7	23.7	45
R02	55	40	25	45
R03	53.2	38.2	23.2	45
R04	39.8	24.8	9.8	45
R05	57.3	42.3	27.3	45
R06	55.6	40.6	25.6	45

The internal L_{Aeq} and L_{Amax} noise levels from all potential sources within the development, during both daytime and night-time periods are predicted to be below the BS 8233 criteria at all sensitive receptor locations.

For indicative purposes, the night-time noise contour plot inclusive of all potential noise sources from all units is presented in Figure 6.2.

Figure 6.2: Noise Contour Plot (All Units Night-time $L_{Aeq,15min}$) – Including Mitigation



6.1.3 Change in Noise Level Assessment – Including Mitigation

This assessment compares the measured ambient level L_{Aeq} at the existing receptors during the daytime and night-time periods with the predicted noise level from the proposed scenario from all noise sources associated with the proposed development. The difference between the 'existing' ambient noise level and the predicted 'worst-case proposed' noise level is presented in the tables below.

6.1.3.1 Change in Noise Level Assessment – Including Mitigation (Unit 3 Only)

Table 6.9: Unit 3 Change in Noise Level Assessment (Daytime) – Including Mitigation

Location	Existing $L_{Aeq,T}$ (monitored)	Proposed $L_{Aeq,1hr}$ (modelled)	Combined L_{Aeq}	Contribution from Proposed Scheme
R01	52.3	37.7	52.4	0.1
R02	52.3	35.4	52.4	0.1
R03	52.3	33.3	52.4	0.1
R04	48.8	23.1	48.8	0.0
R05	49.5	21.3	49.5	0.0
R06	52.3	38.7	52.5	0.2

Table 6.10: Unit 3 Change in Noise Level Assessment (Night-time) – Including Mitigation

Location	Existing $L_{Aeq,T}$ (monitored)	Proposed $L_{Aeq,15mins}$ (modelled)	Combined L_{Aeq}	Contribution from Proposed Scheme
R01	48.4	31.9	48.5	0.1
R02	48.4	29.8	48.5	0.1
R03	48.4	27.1	48.4	0.0
R04	42.9	19.2	42.9	0.0
R05	44.1	16.5	44.1	0.0
R06	48.4	39.4	48.9	0.5

Table 6.11: All Units Change in Noise Level Assessment (Daytime) – Including Mitigation

Location	Existing $L_{Aeq,T}$ (monitored)	Proposed $L_{Aeq,1hr}$ (modelled)	Combined L_{Aeq}	Contribution from Proposed Scheme
R01	52.3	42.5	52.7	0.4
R02	52.3	41.5	52.6	0.3
R03	52.3	39.8	52.5	0.2
R04	48.8	29.2	48.8	0.0
R05	49.5	34.8	49.6	0.1
R06	52.3	42.4	52.7	0.4

6.1.3.2 Change in Noise Level Assessment – Including Mitigation (Units 1, 2 & 3)

Table 6.12: All Units Change in Noise Level Assessment (Night-time) – Including Mitigation

Location	Existing $L_{Aeq,T}$ (monitored)	Proposed $L_{Aeq,15mins}$ (modelled)	Combined L_{Aeq}	Contribution from Proposed Scheme
R01	48.4	44.7	49.9	1.5
R02	48.4	44.5	49.9	1.5
R03	48.4	43.3	49.6	1.2
R04	42.9	31.6	43.2	0.3
R05	44.1	39.3	45.3	1.2
R06	48.4	45	50.0	1.6

The differences between the 'existing' and 'proposed' scenarios with the mitigation included are less than 2 dB at all receptors for daytime and night-time periods. Therefore, in terms of the change in noise level associated with on-site operational noise sources, noise effects are negligible and will fall below the LOAEL.

7.0 CONCLUSIONS

A noise assessment was undertaken to inform the planning application for a development at Wingates Industrial Estate, Bolton.

Additional mitigation has been included in the form of acoustic barriers to provide screening to the nearby residential properties.

The Operational Noise Management Plan (ONMP) produced for the Phase one development at the site will be adopted for the Phase two development, in order to control and minimise noise associated with ongoing operations, as per the requirement of Condition 17. The ONMP is presented in Appendix D.

With regard to new building services plant, noise emission limits have been specified to ensure that rating noise levels are predicted to be at least 10 dB(A) below baseline daytime and night-time background noise levels.

Cumulative noise intrusion assessments (inclusive of the existing Units 1 & 2 as well as Unit 3) of worst-case external noise levels from site operations have shown that noise levels from the proposed scheme are predicted to be below the Lowest Observable Adverse Effect Level criteria at nearby sensitive receptor locations.

An assessment of operational noise undertaken for Unit 3 only in accordance with the guidance presented within BS 4142:2014 has shown that noise levels are predicted to be below existing background L_{A90} noise levels at the closest sensitive receptors, as per the requirement of Condition 6.

Furthermore, a cumulative assessment of operational noise undertaken in accordance with the guidance presented within BS4142:2014 has shown that cumulative noise levels are predicted to be no more than 4 dB above the existing background LA90 noise levels at the closest sensitive receptor locations, which in accordance with the guidance presented within BS 4142, is an indication of a Low Impact and falls within the Lowest Observed Adverse Effect Level.

An assessment of the overall change in noise levels has shown that the proposed development is expected to have a negligible contribution to existing ambient noise levels at nearby properties.

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 Acorus (“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.

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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.

APPENDIX C – BACKGROUND NOISE LEVEL GRAPHS

Figure C.1: LT1 Daytime L_{A90} Analysis

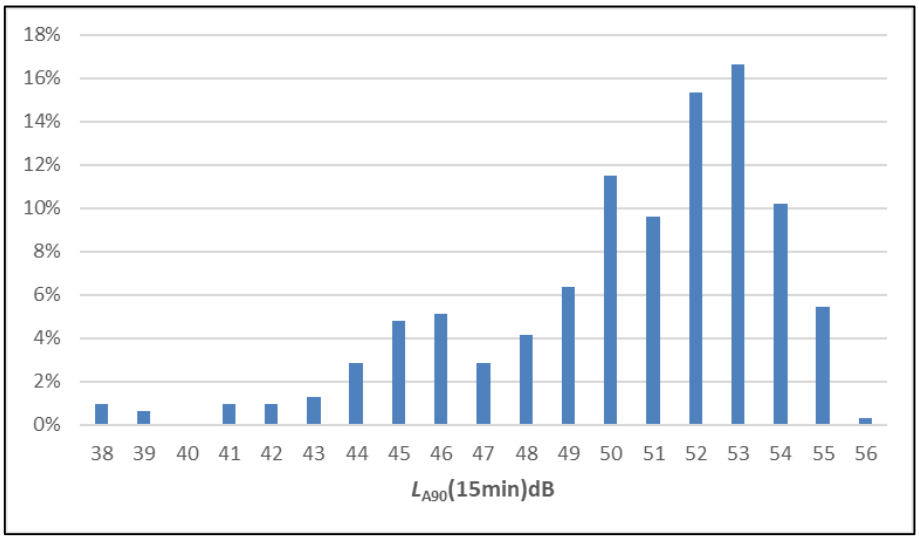


Figure C.2: LT1 Night-time L_{A90} Analysis

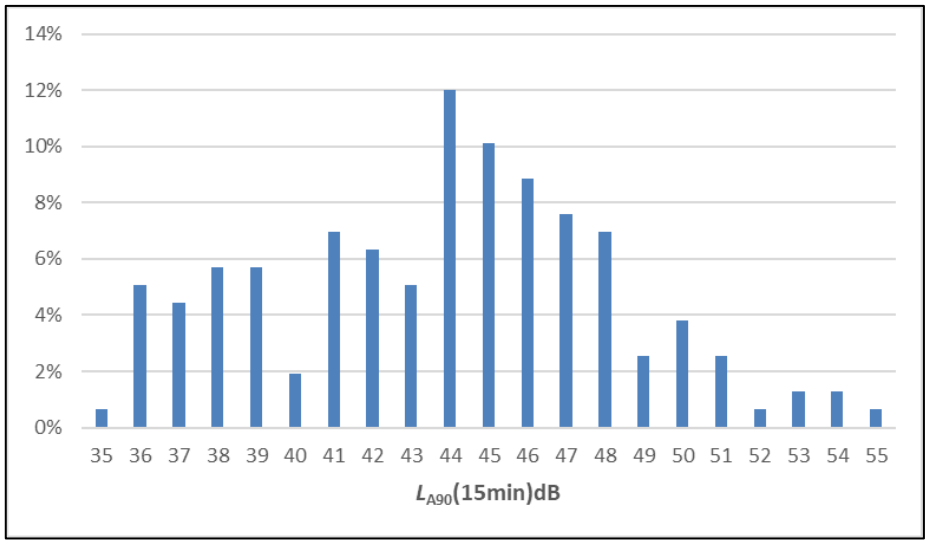


Figure C.3: LT2 Daytime L_{A90} Analysis

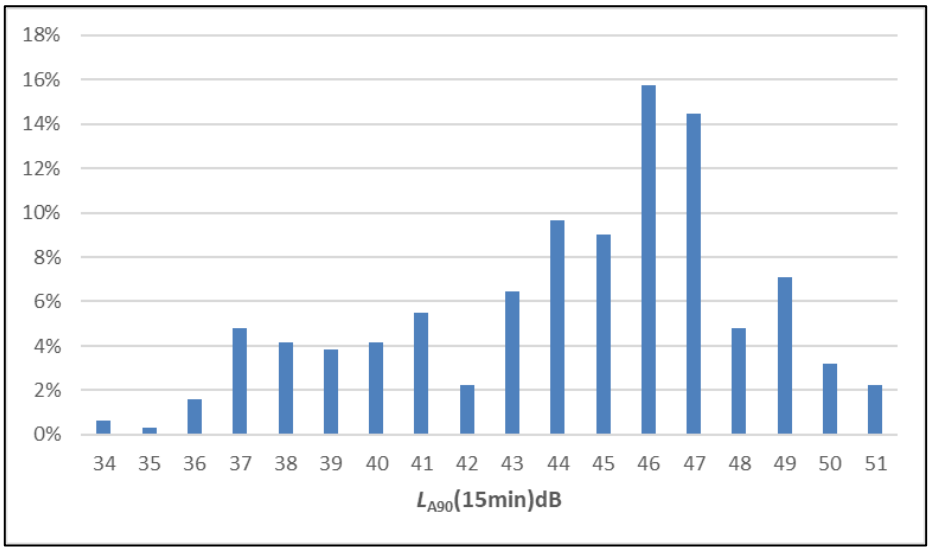


Figure C.4: LT2 Night-time L_{A90} Analysis

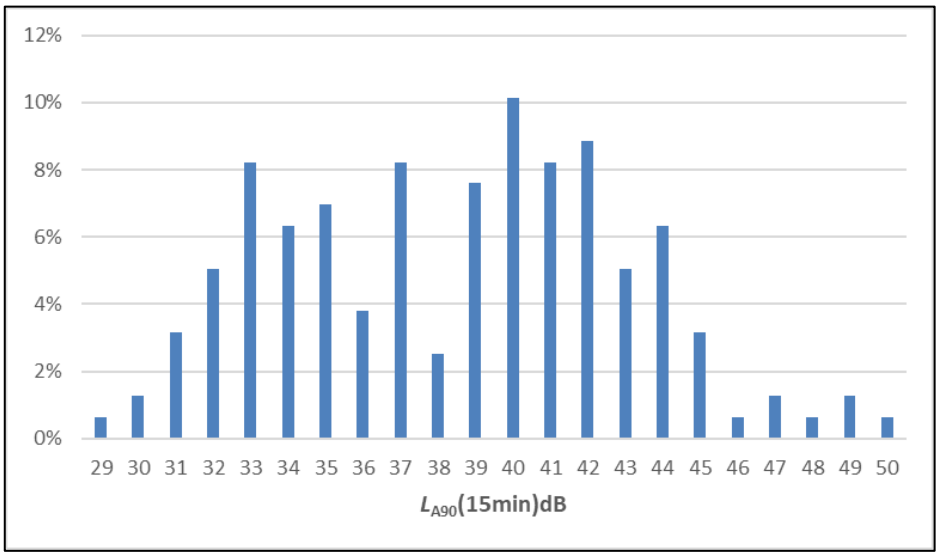


Figure C.5: LT3 Daytime L_{A90} Analysis

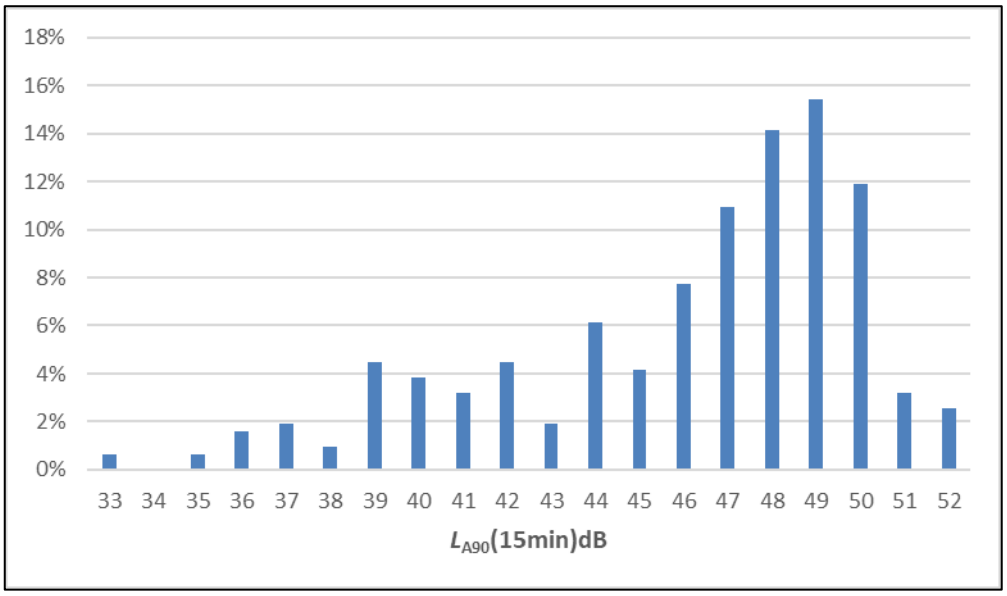
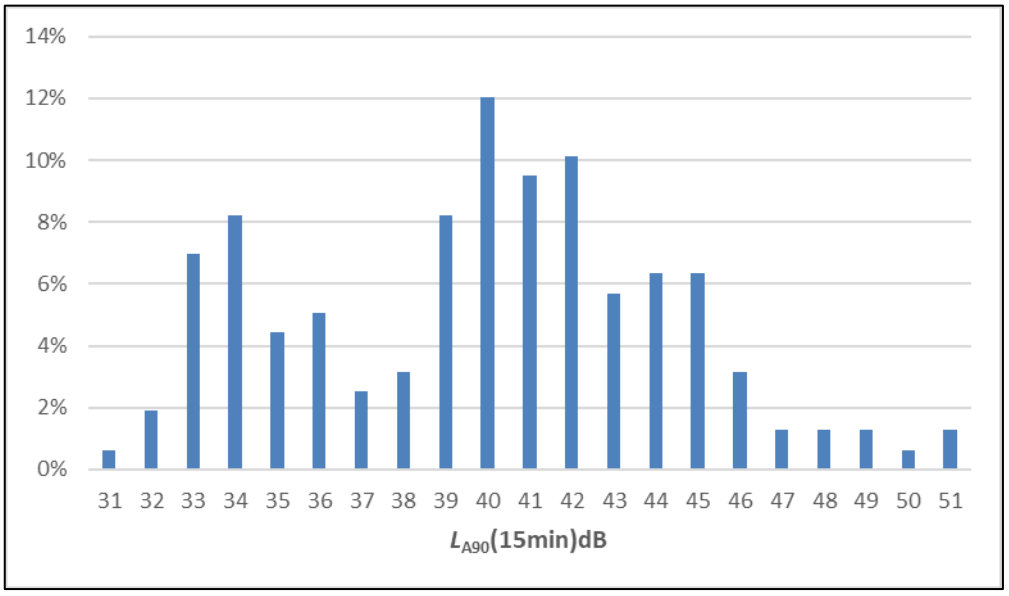


Figure C.6: LT3 Night-time L_{A90} Analysis



APPENDIX D – OPERATIONAL NOISE MANAGEMENT PLAN

Wingates Industrial Estate

Operational Noise Management Plan

Objective

The objective will be to ensure that noise is kept to a minimum and that vehicles operate efficiently and effectively when serving the depot; thereby minimising any incidence of potential disruption from potential noise disturbance to local residents. This document has been produced in accordance with the DfT Quiet Deliveries Good Practice Guidance – Key Principles and Processes for Retailers: April 2014. Relevant signage will be installed, reminding drivers and of the Noise Management Plan (NMP) principles and regular training will be provided by management to enforce the points. An activity log of ongoing checks and training will be kept and available to the Local Planning Authority (LPA) on request.

Physical Noise Mitigation Measures

This NMP includes the requirement for the following noise mitigation measures to be installed/kept:

- Surfacing of the service yard to be smooth with no cracks and mixed height joints.
- Signage to remind drivers of being quiet at night.
- Noise mitigation barriers to be kept in good order with free of any defects or damage.

Vehicle Management Strategies

A combination of strategies will contribute to the operation of the NMP. These include overriding management controls.

- Vehicle Manoeuvres
- Vehicle Schedules

Delivery Process

There are a number of management and operations measures to reduce noise levels which include: -

Unloading

- Ensure engines are switched off;
- Mobile chiller units fitted to refrigerated goods vehicles shall not be operated when parked on the site save, unless connected to on site electrical power supplies;
- Manoeuvring should be minimised;
- Goods will be loaded/offloaded from the vehicle directly from/into the internal loading bay or within the external loading areas immediately adjacent to the level access doors;
- There should be no radios left on;
- Doors should be closed without excessive force;
- There should be no shouting in the external yard area;
- There should be no use of vehicle horns in the area; and
- Drivers should seek to:
  - lower loading plates into the correct position with minimal noise;
  - avoid making contact with trailer walls, lift guardrails and other obstructions; and
  - maintain conversation to a minimum.

The Return Journey

- All vehicle doors must be closed with minimal noise; and
- Drivers should seek to:
  - engage gears with minimal noise;
  - keep engine revs to a minimum;
  - apply brakes gently; and
  - accelerate gently until the vehicle is a reasonable distance from the distribution centre.

Reversing Alarms

The occupier will endeavour to use broadband (white noise) reversing alarms on vehicles they own. While 3rd party and visiting vehicles (including maintenance vehicles) will also be encouraged to utilise broadband (white noise) reversing alarms, as the occupier is not in control of these vehicles they cannot be controlled to the same degree and therefore this would be unenforceable

Ongoing Management

Management staff will undertake monthly checks, both within and surrounding the yard areas to ensure that all equipment, gates etc. are operating efficiently and without excessive noise. This includes a check on the external yard surfacing. Similarly, management staff will check that the NMP is being adhered to and keep a log of this activity. A direct, out of hours telephone line, with contact details, will be made available to nearby residents and local authority Environmental Health Officers to aid liaison.

Signage will be provided within the yards reminding drivers to be respectful of local residents and to keep noise to a minimum.

Any defects or damage (such as squeaking gates, cracks to yard surface, gaps/splits in dock cushions, clips to stone pillars) will be reported to the centre Manager and remedied in a reasonable time.

Training and Ongoing Management

Regular training will be undertaken by management to drivers and local staff to ensure that this Management Plan and the DfT Quiet Deliveries Good Practice Guidance will be adhered to. This training will be logged and made available to the LPA upon request.

- Management staff will undertake a minimum of monthly checks, to ensure that this Management Plan is being adhered to.
  - Regional management will undertake unannounced checks (in conjunction with their existing schedule of unannounced checks) to ensure that this Management Plan is being adhered to.