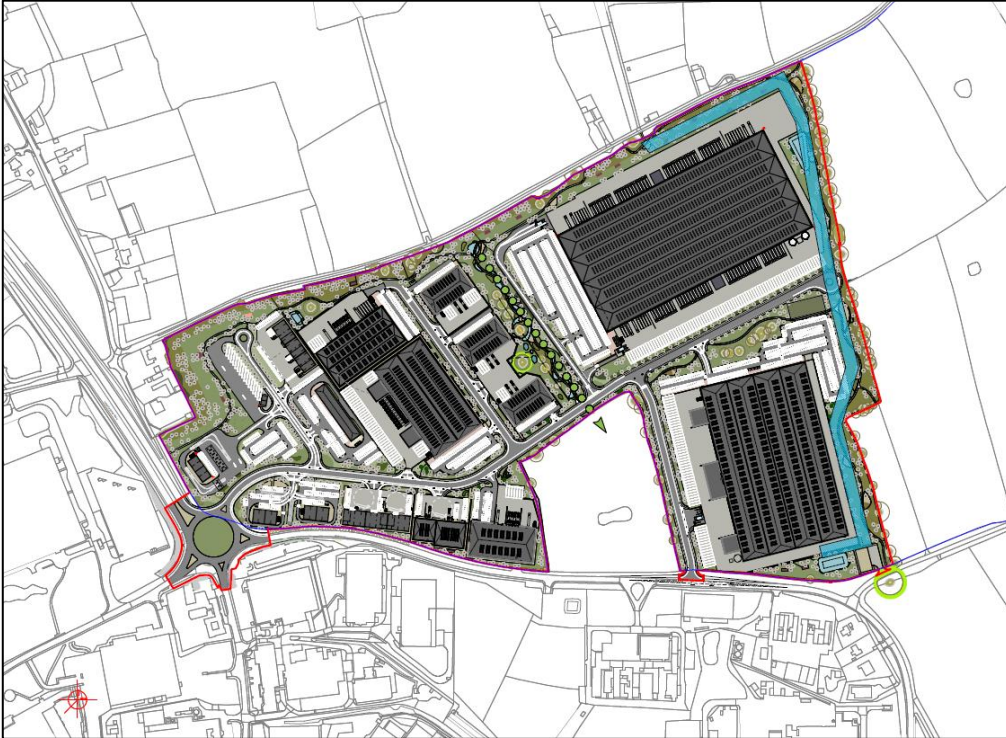


Appendix 10.2: Completed Development Stage Noise Assessment

Land at Bryn Lane, Wrexham, LL13 9YD

Traffic and Operational Noise Assessment

784-B032645



Net World Sports Limited

July 2023

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



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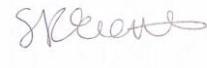
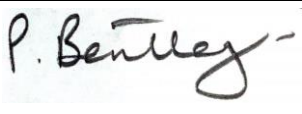
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APPENDICES

Appendix A: Glossary of Terminology

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1.0 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This report presents the findings of the traffic and operational noise assessments to support a hybrid planning application for a proposed industrial/commercial development at Land North of Bryn Lane, Wrexham. The proposed development consists of the following:

- Detailed Component:
 1. Demolition of existing buildings, site clearance and preparation works, including removal of vegetation and reprofiling of topsoil, where necessary;
 2. Construction of a new warehouse unit, providing 33,595 sqm Gross External Area (GEA) for B1c (light industry appropriate in a residential area), B2 (general industrial) and B8 (storage & distribution) uses (Unit 2);
 3. Construction of 8 new smaller units (Units 3-7; 14-16), providing a total of 29,659 sqm GEA for B1c (light industry appropriate in a residential area), B2 (general industrial) and B8 (storage & distribution) uses;
- Outline Component:
 1. Construction of up to 72,635 sqm GEA for employment uses (B1c (light industry appropriate in a residential area), B2 (general industrial) and B8 (storage & distribution) uses), ancillary retail/drive thru facilities and potential for a hotel and petrol filling station (A1, A3, C1 or sui generis). The overall quantum of A1, A3, C1 or sui generis use would not exceed 16,150 sqm GEA;
 2. The proposed buildings will be up to 28.5m in height above ground level;
- Site Wide:
 1. Access and parking provision, including new access junctions, internal roads, service yards and car and HGV parking. Two new junctions are proposed (in detail) providing vehicular access, as well as cycle and pedestrian access, from Bryn Lane/Industrial Estate Road with an additional access road for a substation. Car parking spaces, HGV trailer spaces and HGV lorry spaces are proposed across the application site;
 2. Retention and enhancement of some existing on-site green spaces and provision of landscaping around the application site; and
 3. Implementation of drainage/attenuation measures.

A description of the existing noise environment in and around the site is provided. Noise surveys have been undertaken and the results used to verify predictions of the short-term and long-term effects of noise. The noise levels from the proposed commercial activities and associated traffic flows have been predicted at existing and proposed sensitive receptors using CadnaA noise modelling software which incorporates Iso 9613-2 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. Future Wales: The National Plan 2040 and Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. They are supplemented by a series of Technical Advice Notes (TANs), Technical Advice Note 11 which relates to Noise, Welsh Government Circulars, and policy clarification letters, which together provide the national planning policy framework for Wales. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation. A well-functioning planning system is fundamental for sustainable development and achieving sustainable places.

Paragraph 6.7.5 of PPW says *“In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.”*

Paragraphs 6.7.6 and 6.7.7 say *“In proposing new development, planning authorities and developers must, therefore:*

address any implication arising as a result of its association with, or location within, air quality, noise action planning priority areas or areas where there are sensitive receptors;

- not create areas of poor air quality or inappropriate soundscape; and*
- seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.*

To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer.”

Paragraph 6.7.24 says *“The potential impacts of noise pollution arising from existing development, be this commercial, industrial, transport-related or cultural venues (such as music venues, theatres or arts centres), must be fully considered to ensure the effects on new development can be adequately controlled to safeguard amenity and any necessary measures and controls should be incorporated as part of the proposed new development. This will help to prevent the risk of restrictions or possible closure of existing premises or adverse impacts on transport infrastructure due to noise and other complaints from occupiers of new developments. It will be important that the most appropriate level of information is provided, and assessment undertaken.”*

TAN 11 provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business.

1.3 ACOUSTIC CONSULTANTS' QUALIFICATIONS AND PROFESSIONAL MEMBERSHIPS

The lead project Acoustic Consultant is Najwa Adnan-Smith. The report has been checked by Suzy Everett and verified by Paul Bentley. Relevant qualifications, membership and experience are summarised in Table 1.1 below.

Table 1.1: 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	-	-
Suzy Everett	BEng 2018	Jul 2018	Aug 2018	Sep 2022
Paul Bentley	BSc 2004 MSc 2005 PgDip 2012	Feb 2008	Jun 2012	Jun 2016

2.0 ASSESMENT CRITERIA

2.1 BACKGROUND COMPARISON ASSESSMENT

A comparison of noise from the proposed development with existing background noise levels has been undertaken with reference given to the guidance provided within BS 4142:2014+A1:2019, 'Methods for rating and assessing industrial and commercial sound'. This standard sets down the following guidelines for assessing the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes, based upon the difference between the measured background noise level and the rating level of the source under consideration. In particular, the standard states:

- a) *Typically, the greater the difference, the greater the magnitude of the impact.*
- b) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- d) *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

In addition to noise levels the significance of the impact depends on the individuals affected and to the acoustic features present which may be assessed subjectively or objectively as appropriate. Section 9 of BS 4142:2014+A1:2019 recommends that correction factors be applied to the specific noise level if the noise contains certain acoustic features such as:

- tonality
- impulsivity
- other sound characteristics which are readily distinctive
- intermittency

It should be noted that the significance of an industrial sound source depends upon both the margin by which the rating level exceeds the background sound level and the overall context in which the sound occurs.

2.2 NOISE INTRUSION ASSESSMENT CRITERIA

The criteria in BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' has been chosen as a suitable method for determining an adequate level of noise control to ensure that noise levels within existing sensitive receptors and proposed office spaces and hotel rooms of the development meet the following recommended noise level targets; these targets are:

Living rooms	$L_{Aeq,T} = 35$ dB	
Bedrooms	$L_{Aeq,T} = 30$ dB	L_{Amax} , night-time = 45 dB*
Offices	$L_{Aeq,T} = 50$ dB	

*Derived from World Health Organisation '*Guidelines for Community Noise*', 1999

Typical façades, regardless of construction, will offer around 15dB sound insulation when windows are open. For the purposes of this assessment, the maximum external noise level from the source under consideration will be 50 dB(A) during the daytime, and 45 dB(A) during the night-time to ensure a maximum daytime $L_{Aeq,T}$ of 35 dB, and a maximum night-time $L_{Aeq,T}$ of 30 dB within habitable rooms are achieved.

These levels are also comparable to the World Health Organisation Recommendations in their '*Guidelines for Community Noise*' (1999) publication which states that outdoor levels of 45 dB $L_{Aeq,T}$ for open windows at night or internal levels of 30 dB $L_{Aeq,T}$ are guideline values to prevent sleep disturbance. Similarly, outdoor levels of 60 dB L_{Amax} for open windows at night or internal levels of 45 dB L_{Amax} are also maximum guideline values to prevent sleep disturbance.

2.3 TRAFFIC NOISE ASSESSMENT CRITERIA

Table 2.1 below has been produced with reference to Tables 3.54a and 3.54b of Design Manual for Roads and Bridges LA 111 'Noise and Vibration' published in May 2020, which present an example classification of the magnitude of noise impacts suitable for the assessment of changes in traffic noise levels.

Table 2.1: Noise Level Criteria (Traffic Noise Assessment)

Effect Level	Change in Traffic Noise Levels $L_{A10\ 18hr}$ or L_{night}	
	Short Term Assessment	Long Term Assessment
Negligible	< 1.0 dB	<3.0 dB
Minor	1.0 – 2.9 dB	3.0 – 4.9 dB
Moderate	3.0 – 4.9 dB	5.0 – 9.9 dB
Major	≥5.0 dB	≥10.0 dB

3.0 ASSESSMENT METHODOLOGY

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

Table 3.1: Modelling Parameters Sources and Input Data

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	DEFRA	LIDAR 2m DTM
Building heights – around site	Tetra Tech Observations	8 m height for two storey residential properties, and 4 m for Bungalows.
Receptor positions	Tetra Tech	1 m from façade, height of 1.5 m for ground floor, 4 m for first floor properties. 1.5 m height for model grid and monitoring locations for validation.
Proposed Plans	SGP Architects + Masterplanners	Drawing Title: Illustrative Masterplan Drawing No: 22136-SGP-ZZ-ZZ-DR-A-111001 Rev. G Dated: 24/04/2023 Drawing Title: Hybrid Application Boundaries Plan Drawing No: 22136-SGP-ZZ-ZZ-DR-A-111005 Rev. B Dated: 27/03/2023
Ground Absorption	Tetra Tech	G = 0.5 (Intermediate ground)
Order of Reflections	Tetra Tech	3 no.

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 Road Traffic Data

All roads expected to make a significant contribution have been included within this assessment. Traffic flows and HGV percentage have been based on traffic data provided by Cora IHT transport consultants, whilst vehicle speeds have been set to the speed limit of the road. Due to the flexibility in the potential uses being sought by the Applicant in respect of the outline component, AAWT traffic data has been provided for two options to ensure the worst-case trip calculations have been assessed. The two options are set out in the Environmental Statement (ES) Chapter 8: Transport, which include a fully industrial scheme (Option 1) or an industrial scheme with alternative land uses (Option 2). Given that Option 1 represents a worst-case in respect to AAWT traffic data across all road links, the noise assessment has only considered Option 1. Baseline data has been provided for the Opening Year 2030 and two scenarios detailed within Table 3.2 have been considered to represent traffic levels in the year 2030.

Table 3.2: AAWT 18hr Traffic Data – Option 1

Road	2030 Baseline		Scenario A 2030 Baseline + Development Traffic		Scenario B 2030 Baseline + Development Traffic + Cumulative	
	AAWT 18hr	HGV %	AAWT 18hr	HGV %	AAWT 18hr	HGV %
A534	31583	9	33235	9	35047	8
Sandy Lane	338	35	712	22	735	21
Borras Hall Lane	1404	1	1404	1	1404	1
A534 Wrexham Road	6694	6	6741	6	6841	6
Industrial Estate Road (North)	13697	10	14944	10	15779	10
Industrial Estate Road (South)	12904	8	14151	8	14986	8
Abenbury Way	5114	15	5270	15	5280	15
Ash Road North	6386	7	6534	7	7376	6
Bryn Lane	3410	13	4657	12	4657	12
Site Access 1	0	0	0	0	0	0
Site Access 2	0	0	1559	10	1559	10
Bryn Lane (East)	3094	14	3094	14	3094	14
Ridley Wood	2320	2	2320	2	2320	2
B5130 (North)	1940	1	1940	1	1940	1
B5130 (South)	1058	3	1058	3	1058	3

3.2.2 HGV Activities

Noise of a delivery event has been known to vary from site to site by as much as 22 dB $L_{Aeq,T}$ at 3m distance even with the same vehicle type. Similarly, individual events using the same vehicle and at the same location have been recorded to vary by as much as 14 dB.

As such, Table 3.3 summarises the modelled noise sources and the sound pressure levels for the HGV activities. These levels are based on worst-case measurements of refrigerated, articulated HGVs delivering consumables. All measurements were undertaken by Tetra Tech during a noise survey at Amazon DWN2 Knowsley site and were in free-field conditions. In addition to noise from the unloading process, the levels used in the assessment include noise from the vehicle pulling up to the unloading bay, manoeuvring into position and then pulling away once unloading/loading is complete, together with other sources such as trolleys and reversing alarms.

As the end users of the units are currently unknown, 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.

Table 3.3: Modelled Sound Pressure Levels for HGV Activities

Noise Level	Data Source	Modelled Source Type	Details	Sound Pressure Level Per Point at 3m Distance (dB)		
				Daytime $L_{Aeq,1hour}$	Night-time $L_{Aeq,15minutes}$	Night-time L_{Amax}
HGV Parking	Tetra Tech Survey, Amazon DWN2 Knowsley	Point Source	1 per Space Daytime Occupancy: 100% Night-time Occupancy: 100%	52.7	57.7	89.4
HGV Unloading/Loading		Point Source	1 per Space Daytime Occupancy: 100% Night-time Occupancy: 100%	73.8	76.3	89.4
HGV Movements		Line Source (Moving Point)	Daytime: 349no. HGVs Night-time: 349no. HGVs	73.0		

3.2.3 Car Park Noise Data

Worst-case noise levels from car parking at the proposed development have been based upon observations and measurements taken at the centre of an existing distribution centre car park during a shift change. This has been modelled using area sources. During a worst-case daytime 1-hour period, 100% of the carpark areas are in use while 50% are in use during a worst-case night-time 15-minute period.

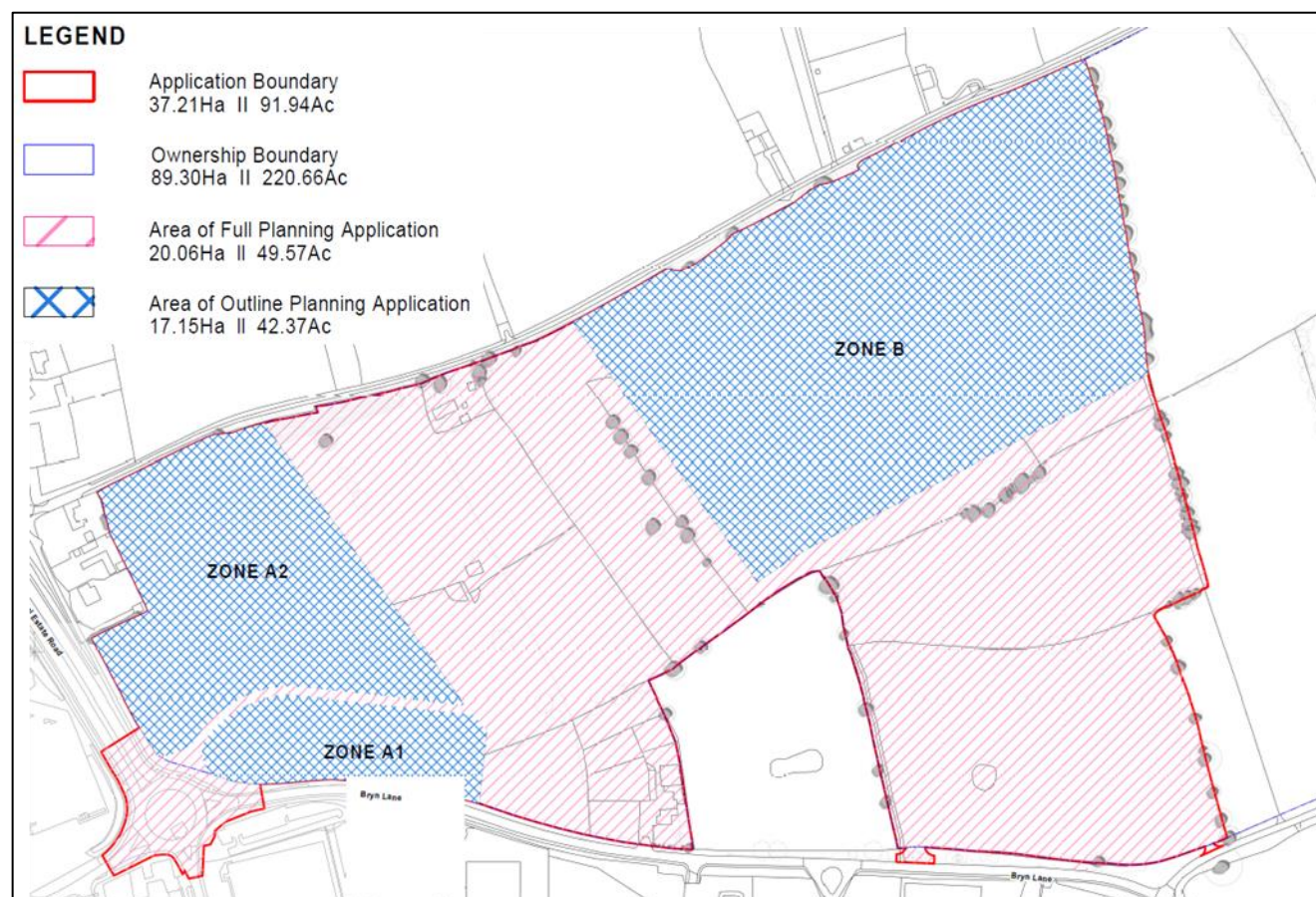
$$L_{Aeq,T} = 54.0 \text{ dB at 1.0 m height}$$

3.2.4 Outline Application Zones

As details for Zones A1 and A2 shown in Figure 3.1 below are not yet finalised and may contain alternative land use, the activities that would be carried out within the two areas are unknown. Therefore, to ensure the worst-case scenarios are assessed, area sources covering the entirety of the two zones have been used to model potential noise that would be emitted from those areas. The area sources have been set at 1m above the ground with a sound power level per square metre (L_w) of 60 dB.

It should be noted that Zone B of the outline application has been modelled to include a large warehouse unit with a service yard and parking facilities based on the Illustrative Masterplan Revision G dated 24th April 2023. As such, the modelling input for Zone B is included within Sections 3.2.2 and 3.2.3.

Figure 3.1: Hybrid Application Boundaries Plan dated 27th March 2023



3.2.5 Building Services Plant

Due to there being no fixed building services plant information available at this stage of the proposed development, it is not possible to undertake predictions to determine whether appropriate standards might be met. Instead, appropriate plant noise emission limits have been set which can feed into the future detailed design.

3.3 SENSITIVE RECEPTORS

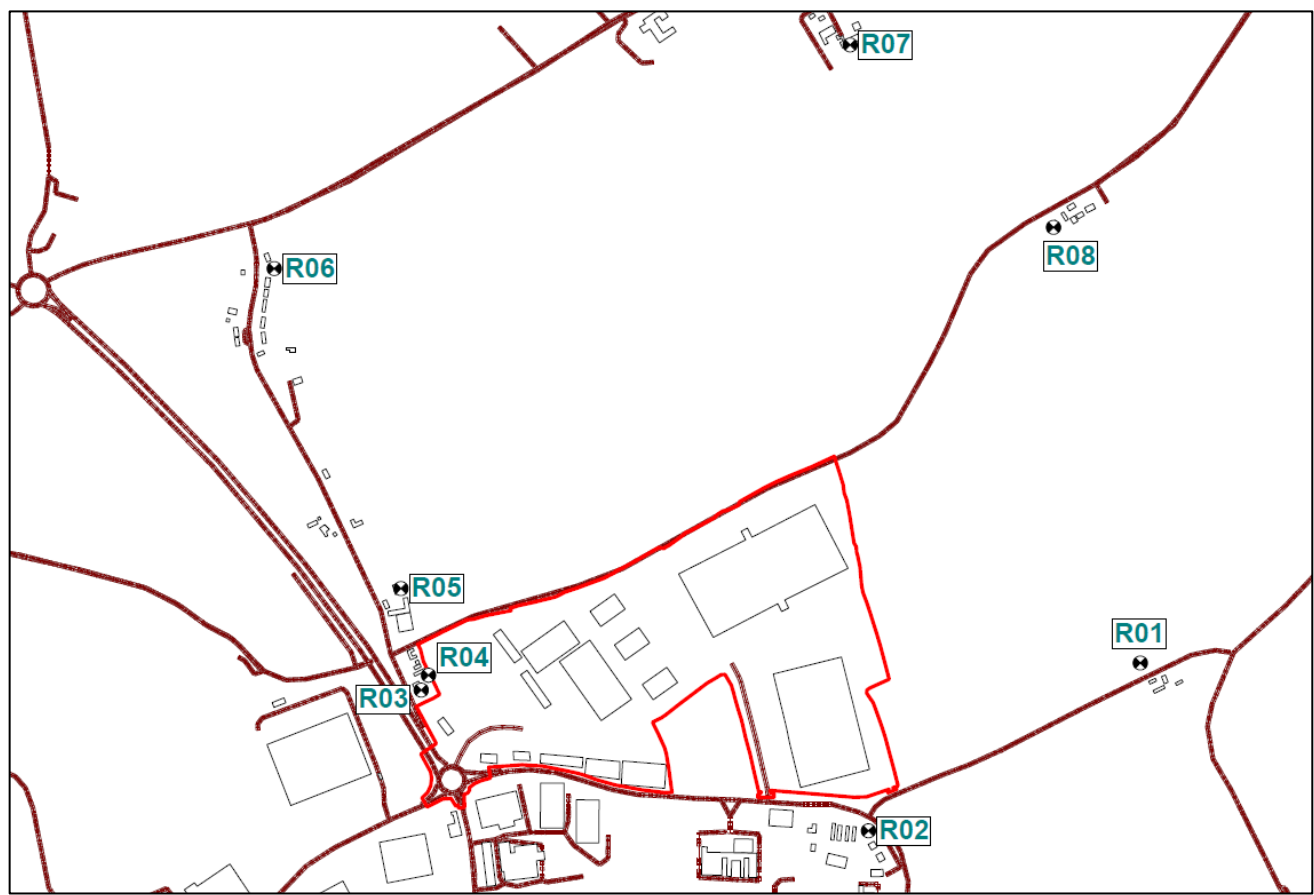
Table 3.4 below summarises receptor locations that have been selected to represent the nearest existing sensitive receptors with respect to direct noise from the site as well as the proposed hotel receptors based

on the Illustrative Masterplan Revision G. The locations of the receptors are shown in Figures 3.2 and 3.3 below.

Table 3.4: Receptor Locations

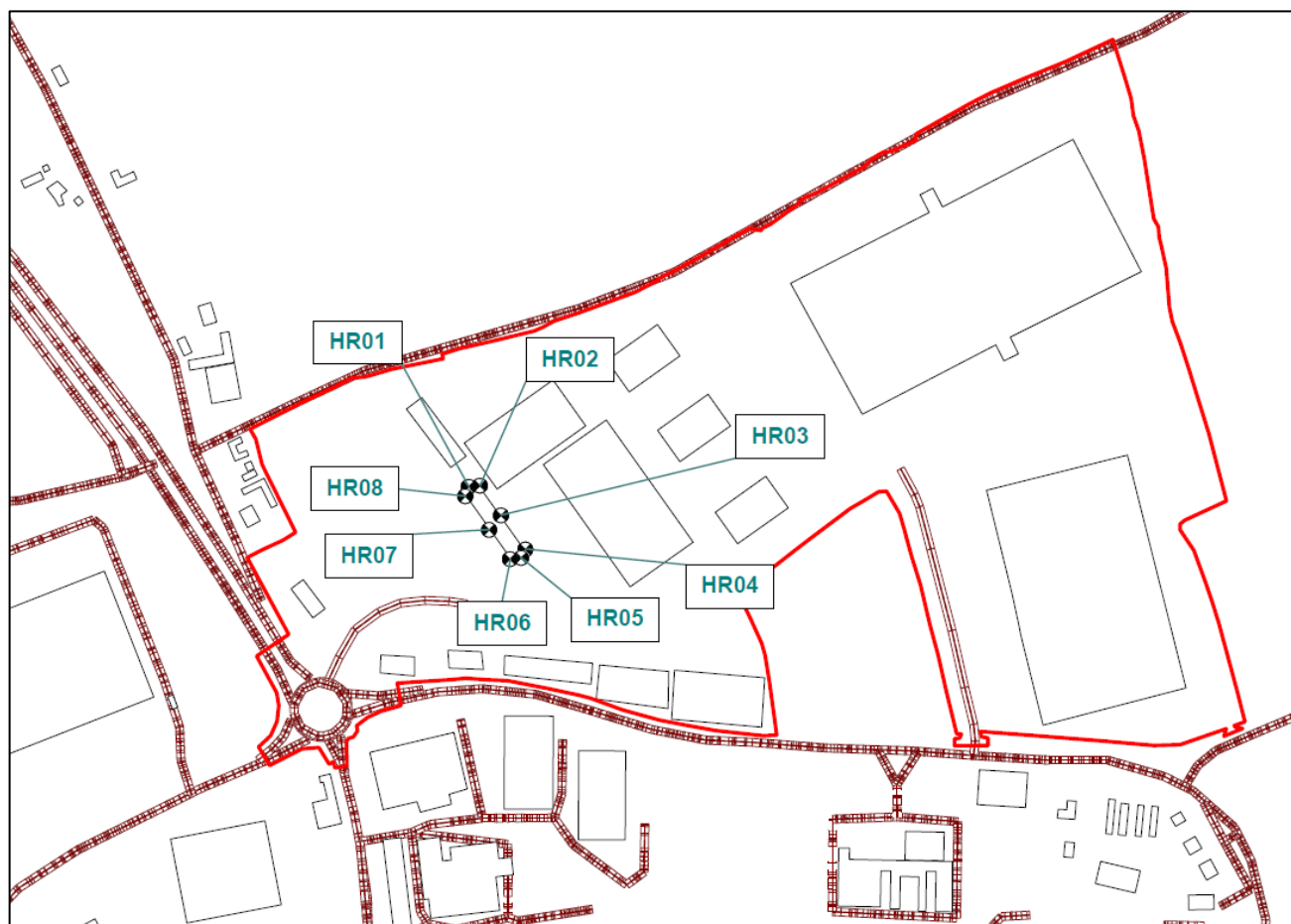
Ref.	Description	Type of Use	Height (m) Daytime / Night-time
R01	Harcourt, Ridley Wood	Existing Residential	1.5
R02	2 Bryn Lane	Existing Residential	1.5
R03	Spring Grove, Hugmore Lane	Existing Residential	1.5/4.0
R04	Ty Gwanwyn, Hugmore Lane	Existing Residential	1.5/4.0
R05	Holt Lodge Farm	Existing Residential	1.5/7.0
R06	Ambergate, Hugmore Lane	Existing Residential	1.5/4.0
R07	Yr Efail, Wrexham Road	Existing Residential	1.5/4.0
R08	Aldersey Farm	Existing Residential	1.5/4.0
HR01	Proposed Development	Proposed Hotel	1.5, 4.0 and 7.0
HR02	Proposed Development	Proposed Hotel	1.5, 4.0 and 7.0
HR03	Proposed Development	Proposed Hotel	1.5, 4.0 and 7.0
HR04	Proposed Development	Proposed Hotel	1.5, 4.0 and 7.0
HR05	Proposed Development	Proposed Hotel	1.5, 4.0 and 7.0
HR06	Proposed Development	Proposed Hotel	1.5, 4.0 and 7.0
HR07	Proposed Development	Proposed Hotel	1.5, 4.0 and 7.0
HR08	Proposed Development	Proposed Hotel	1.5, 4.0 and 7.0

Figure 3.2: Existing Sensitive Receptor Locations



Not to scale

Figure 3.3: Proposed Receptor Locations



Not to scale

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	Building Acoustics Analyser	s/n 1402989
Rion NL-52	Environmental Noise Analyser (WYG18)	s/n 843173
Rion NL-52	Environmental Noise Analyser (WYG26)	s/n 219904
Rion NL-52	Environmental Noise Analyser (WYG27)	s/n 264490
Rion NC-75	Sound Calibrator	s/n 35270131

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 0.0 dB was observed for the meter with s/n 1402989 and 264490. A drift of +0.1dB was observed for the meter with s/n 843173 and 219904. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

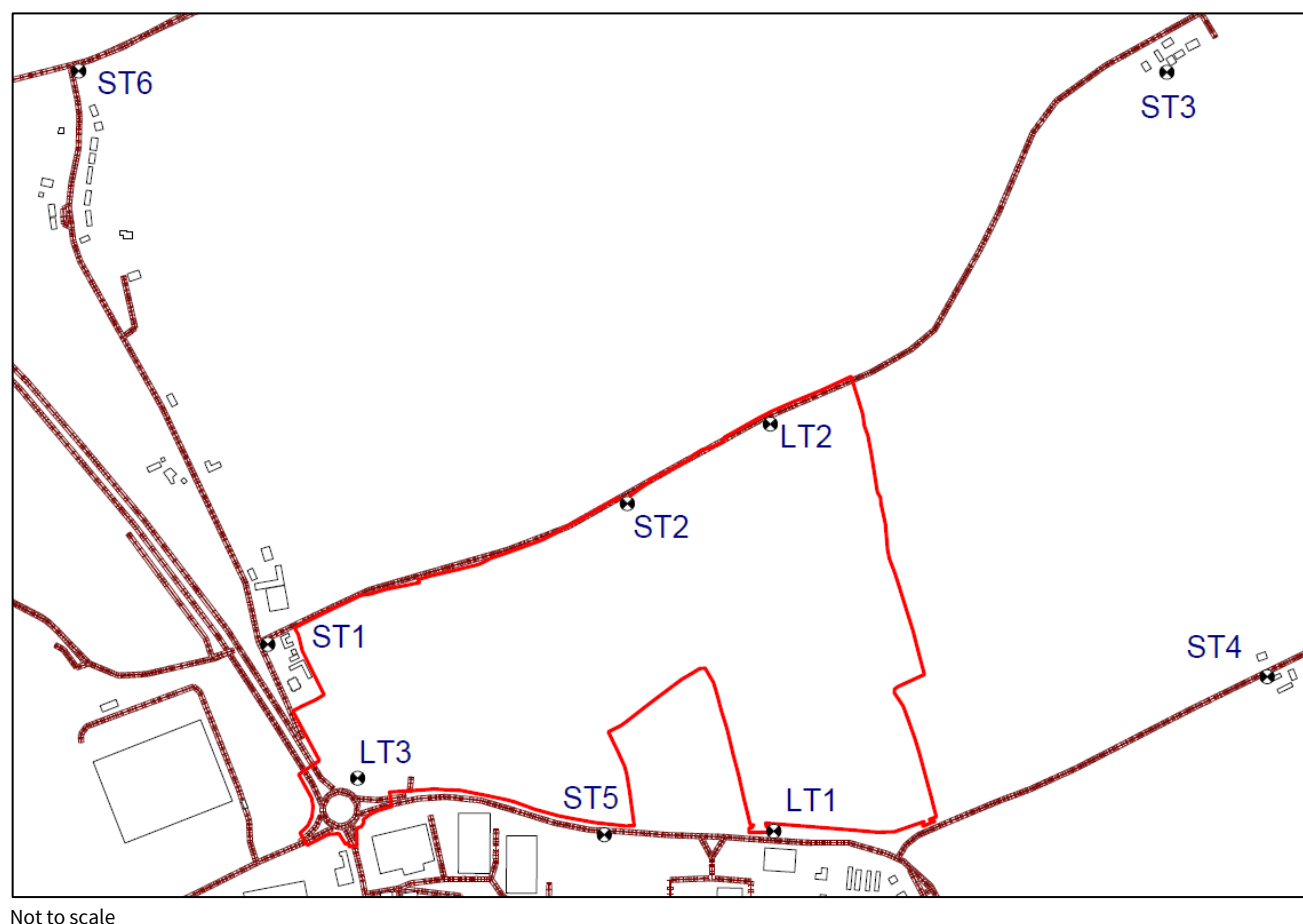
A baseline monitoring survey was undertaken at nine locations (as specified in the following table) from Tuesday 26th October 2021 to Tuesday 2nd November 2021. Attended short term measurements were undertaken at six locations during day, evening and night-time periods with three additional locations being measured unattended over a 166-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 and partly cloudy. Anemometer readings confirmed that wind speeds were less than 5 ms⁻¹ at all times during the survey, with a predominant northerly wind direction during the survey.

Table 4.1: Noise Monitoring Locations

Ref	Description
LT1	On the Southern Site Boundary, opposite Meridian Foods LTD just off Bryn Lane
LT2	On the Northern Site Boundary just off Francis Lane
LT3	On the Southwest corner of site by the roundabout on Industrial Estate Road
ST1	On the Corner of Francis Lane and Hugmore Lane to the East of site
ST2	On Francis Lane located to the North of site by the residents
ST3	On Francis Lane by the Wrexham Equine Centre north of site
ST4	On Ridley Wood Lane towards the East of site
ST5	On Bryn Lane, south of site by the entrance to CrossFit Wrexham
ST6	Northwest of site on the junction of Hugmore Lane and the A534

Figure 4.1: Noise Monitoring Locations



4.1 NOISE SURVEY RESULTS

The ambient noise climate was dominated by Road Traffic Noise, the main sources of this noise were; Bryn Lane, the A534, Francis Lane and Industrial Estate Lane.

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	01/11/2021 14:13	11	1-2	N	5	Road Traffic Noise from Blackwood Way
Day ST2	01/11/2021 14:33	11	1-2	N	5	Distant Road Traffic Noise from A534
Day ST3	01/11/2021 14:54	11	1-2	E	4	Distant Road Traffic Noise from A534

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Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Day ST4	01/11/2021 15:16	11	1-2	SW	4	Road Traffic Noise from Riley Wood Road
Day ST5	01/11/2021 15:35	11	1-2	W	4	Road Traffic Noise from Bryn Lane
Day ST6	01/11/2021 15:54	11	1-2	S	3	Road Traffic Noise from A534
Evening ST1	01/11/2021 19:21	9	0-1	N	3	Road Traffic Noise from Blackwood Way
Evening ST2	01/11/2021 19:40	9	0-1	S	3	Distant Road Traffic Noise from A534
Evening ST3	01/11/2021 19:59	9	0-1	S	3	Distant Road Traffic Noise from A534
Evening ST4	01/11/2021 20:47	9	0-1	NW	3	Distant Road Traffic Noise
Evening ST5	01/11/2021 14:13	9	0-1	S	3	Distant Road Traffic Noise
Evening ST6	01/11/2021 19:06	9	0-1	S	4	Road Traffic Noise on A534
Night ST1	01/11/2021 23:20	8	0-1	NW	5	Road Traffic Noise from Blackwood Way
Night ST2	01/11/2021 23:40	8	0-1	S	5	Distant Road Traffic Noise from A534
Night ST3	02/11/2021 00:46	8	0-1	NE	5	Distant Road Traffic Noise from A534
Night ST4	02/11/2021 01:07	8	0-1	SW	4	Wind Noise and Occasional Road Traffic Noise
Night ST5	02/11/2021 01:26	8	0-1	NE	4	Some distant continuous plant noise
Night ST6	01/11/2021 23:02	8	0-1	SE	5	Road Traffic Noise from A534

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: 2×10^{-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	110 Hours	26/10/2021 – 29/10/2021 13:00 – 23:00 01/11/2021 – 02/11/2021 07:01 – 11:06	LT1	64.5	94.3	40.6	66.6	58.0
Weekday Night-time 23:00 – 07:00	103 Hours	26/10/2021 – 29/10/2021 23:06 – 23:56 01/11/2021 – 02/11/2021 00:01 – 06:56		59.6	90.6	38.9	59.9	46.0
Weekend Daytime 07:00 – 23:00	40 Hours	30/10/2021 – 31/10/2021 07:01 – 23:00		62.0	91.8	42.1	64.5	50.0
Weekend Night-time 23:00 – 07:00	48 hours	30/10/2021 – 31/10/2021 00:01 – 23:56		58.0	84.8	41.1	57.2	46.0
Weekday Daytime 07:00 – 23:00	109 Hours	26/10/2021 – 29/10/2021 13:24 – 22:59 01/11/2021 – 02/11/2021 07:00 – 10:49	LT2	53.6	78.4	37.1	53.5	48.0
Weekday Night-time 23:00 – 07:00	104 Hours	26/10/2021 – 29/10/2021 23:04 – 23:59 01/11/2021 – 02/11/2021 00:04 – 06:54		52.9	76.0	33.7	51.4	40.0
Weekend Daytime 07:00 – 23:00	40 Hours	30/10/2021 – 31/10/2021 07:00 – 23:00		56.3	85.3	37.8	51.6	44.0
Weekend Night-time 23:00 – 07:00	48 hours	30/10/2021 – 31/10/2021 00:04 – 23:59		46.5	71.5	36.4	46.4	42.0
Weekday Daytime 07:00 – 23:00	109 Hours	26/10/2021 – 29/10/2021 12:39 – 23:00 01/11/2021 – 02/11/2021 07:00 – 10:39	LT3	62.3	88.6	38.8	64.4	52.0
Weekday Night-time 23:00 – 07:00	110 Hours	26/10/2021 – 29/10/2021 23:04 – 23:59 01/11/2021 – 02/11/2021 00:04 – 06:54		56.8	86.6	37.1	53.6	49.0
Weekend Daytime 07:00 – 23:00	40 Hours	30/10/2021 – 31/10/2021 07:00 – 22:59		59.3	86.1	37.4	60.0	44.0
Weekend Night-time 23:00 – 07:00	48 hours	30/10/2021 – 31/10/2021 00:04 – 23:59		53.8	80.7	35.8	48.4	40.0
Daytime 07:00 – 19:00	15 Mins	01/11/2021 14:13	ST1	63.8	71.8	52.3	66.8	58.3
	15 Mins	01/11/2021 14:33	ST2	53.2	80.0	43.8	53.2	46.7
	15 Mins	01/11/2021 14:54	ST3	58.0	85.3	39.2	48.6	42.7
	15 Mins	01/11/2021 15:16	ST4	67.7	90.8	44.9	65.5	47.5
	15 Mins	01/11/2021 15:35	ST5	75.0	89.2	47.7	79.6	52.6
	15 Mins	01/11/2021 15:54	ST6	72.6	83.1	53.1	77.2	59.5

Land at Bryn Lane, Wrexham, LL13 9YD
Traffic and Operational Noise Assessment

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)
Evening 19:00 – 23:00	15 Mins	01/11/2021 19:21	ST1	60.2	86.2	42.4	63.8	47.8
	15 Mins	01/11/2021 19:40	ST2	54.9	84.5	40.6	50.8	44.5
	15 Mins	01/11/2021 19:59	ST3	42.7	58.2	37.1	44.8	39.2
	15 Mins	01/11/2021 20:47	ST4	55.7	81.2	38.7	53.1	40.7
	15 Mins	01/11/2021 14:13	ST5	61.8	87.6	42.8	52.8	45.0
	15 Mins	01/11/2021 19:06	ST6	69.3	82.4	49.3	74.7	53.0
Night-time 23:00 – 07:00	15 Mins	01/11/2021 23:20	ST1	54.0	67.6	39.9	58.1	42.7
	15 Mins	01/11/2021 23:40	ST2	44.5	56.0	37.7	46.6	40.7
	15 Mins	02/11/2021 00:46	ST3	47.4	79.8	31.0	40.4	32.5
	15 Mins	02/11/2021 01:07	ST4	41.7	54.2	38.1	42.7	40.0
	15 Mins	02/11/2021 01:26	ST5	61.6	88.2	44.6	49.9	46.1
	15 Mins	01/11/2021 23:02	ST6	60.2	78.9	30.9	59.4	34.9

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

4.2 REPRESENTATIVE BACKGROUND LEVELS

Using the data collected during the baseline survey, representative background noise levels have been derived for all receptor locations presented in Figure 3.1. Table 3.4 presents the representative background noise levels considered appropriate for the existing sensitive receptors within the area (the lower of the respective daytime and evening measurements have been used to represent daytime noise levels, where appropriate).

Table 4.4: Representative Background Noise Levels (All Receptors)

Receptors	Monitoring Location	Time Period	Representative Background Noise Level ($L_{A90,T}$ dB)*
R01, R02	LT1	Daytime (07:00 – 23:00)	50.0
		Night-time (23:00 – 07:00)	46.0
R03, R04, R05	LT3	Daytime (07:00 – 23:00)	44.0
		Night-time (23:00 – 07:00)	40.0
R06	ST6	Daytime (07:00 – 23:00)	60.0
		Night-time (23:00 – 07:00)	35.0
R07, R08	LT2	Daytime (07:00 – 23:00)	44.0
		Night-time (23:00 – 07:00)	40.0

*Lowest $L_{A90,T}$ value selected from either Weekday or Weekend.

The representative noise levels presented in Table 4.4 have been used to inform the assessment presented in Section 4.0.

5.0 ASSESSMENT OF EFFECTS

5.1 TRAFFIC NOISE ASSESSMENT

Based on the traffic data provided by Cora IHT transport consultants, a Design Manual for Roads and Bridges (DMRB) assessment was conducted to compare the different scenarios given to determine the change in road traffic noise levels resulting from the proposed development. The traffic data used within this assessment are presented in Table 3.2.

Table 5.1: Difference in Traffic Noise (Short-Term Assessment)

Receptor Location	2030 Baseline Noise Level $L_{A10,18hr}$ (dB)	(Scenario A) 2030 Development Traffic Noise Level $L_{A10,18hr}$ (dB)	(Scenario B) 2030 Development Traffic + Cumulative Noise Level $L_{A10,18hr}$ (dB)	Change between 2030 Baseline and (Scen. A) (dB)	Change between (Scen. A) and (Scen. B) (dB)	Change between 2030 Baseline and (Scen. B) (dB)
R01	44.7	42.9	43.0	-1.8	0.1	-1.7
R02	61.8	62.2	62.2	0.4	0.0	0.4
R03	63.4	63.4	63.6	0.0	0.2	0.2
R04	48.4	46.8	46.9	-1.6	0.1	-1.5
R05	45.7	44.8	44.9	-0.9	0.1	-0.8
R06	53.5	53.5	53.6	0.0	0.1	0.1
R07	41.6	41.3	41.5	-0.3	0.2	-0.1
R08	44.3	44.0	44.2	-0.3	0.2	-0.1
HR01	55.9	55.5	55.7	-0.4	0.2	-0.2
HR02	55.7	55.3	55.4	-0.4	0.1	-0.3
HR03	56.0	55.7	55.9	-0.3	0.2	-0.1
HR04	56.4	56.4	56.5	0.0	0.1	0.1
HR05	56.7	56.8	56.9	0.1	0.1	0.2
HR06	56.9	57.0	57.1	0.1	0.1	0.2
HR07	56.4	56.4	56.5	0.0	0.1	0.1
HR08	56.2	55.8	56.0	-0.4	0.2	-0.2

When the differences of the above scenarios are compared against the noise change criteria presented in Table 2.1 of this report, the short-term change in noise levels due to traffic from the proposed development is predicted to be less than 1 dB and therefore ‘negligible’ significance at all existing sensitive receptors.

5.2 OPERATIONAL PHASE ASSESSMENT

The detailed aspect of the proposed development includes multiple delivery areas, loading docks, and HGV Parking spaces. An assessment has been carried out in accordance with the full scope of BS4142:2014 in order to assess potential daytime and night-time impacts associated with the delivery areas, loading docks, and HGV Parking Spaces.

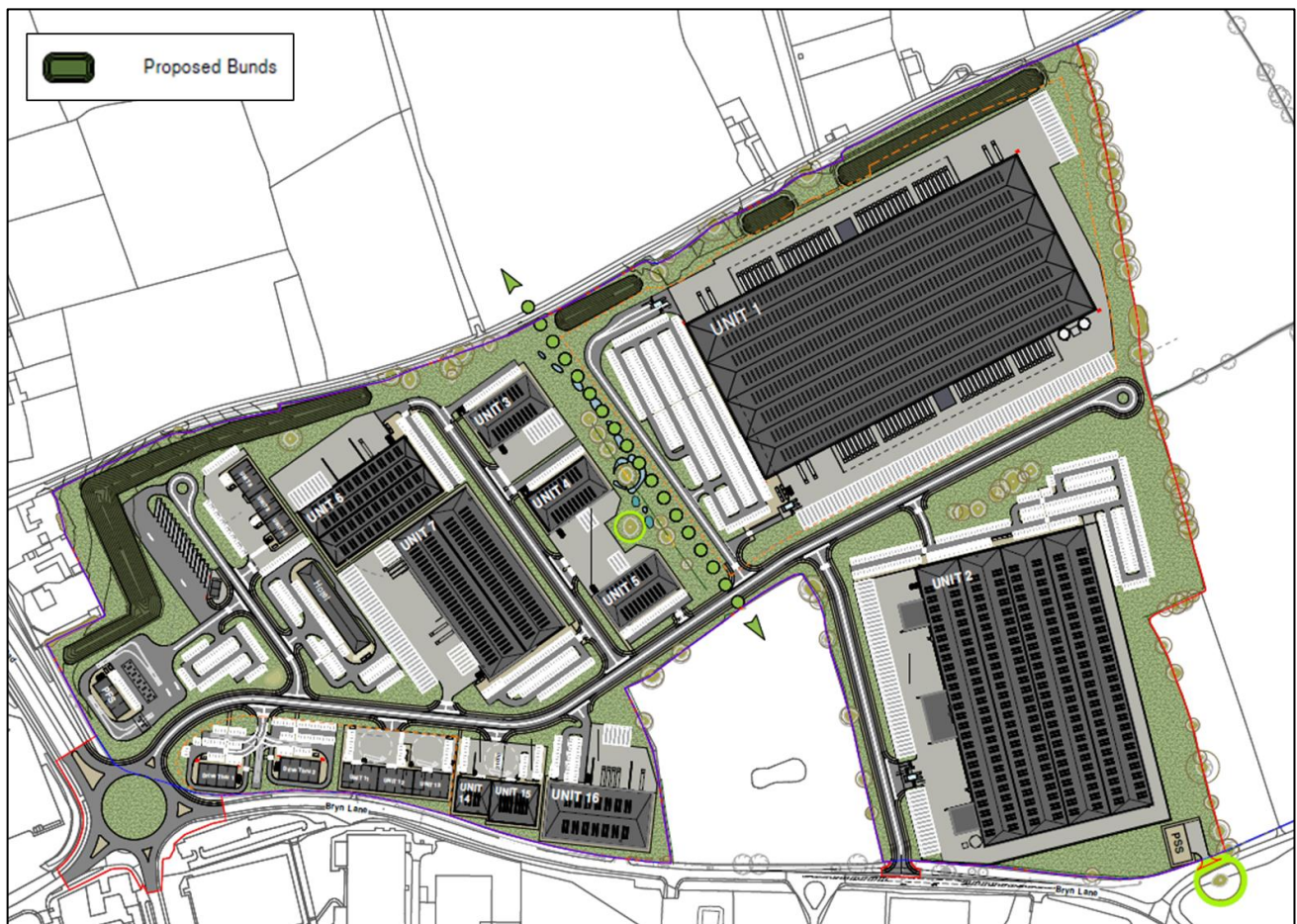
The proposed development also includes the provision of ancillary fixed plant associated with the servicing of the buildings. Given this is a hybrid application, full detailed information relating to any proposed fixed plant and/or building services is not available at this stage. However, guideline noise limits have been established based on the measured background sound levels in accordance with the initial part of BS4142:2014, but do not take in to account the context in which associated noise will occur.

Given that the proposed development would operate 24 hours per day and 7 days a week, the assessment has been undertaken against day-time and night-time noise limits. As the application is hybrid, and to carry out a robust assessment of the worst case, no reductions have been made to night-time operations at the site.

Given that matters relating to the scale, layout and proposed land uses in the outline component of the proposed development will be reserved for determination at the reserved matters stage, all potential uses and layouts that could come forward in these parts of the application site have been reviewed to ensure the assessment considers a worst case scenario. For this aspect of the assessment, area noise sources have been used in the model. The area sources have been set at a 60dB sound pressure at 1m (Lp),. This is considered to represent a worst case in terms of noise impacts from the outline component of the proposed development on the noise sensitive receptors.

As bunding is proposed along the north-eastern, northern and north-western boundaries of the application site (as shown in the Detailed Landscaping Strategy & Parameter Plan; see ES Chapter 4 Proposed Development), these have been included within the completed development stage model.

Figure 5.1: Proposed Bund Location as Indicated on the Illustrative Masterplan



Not to scale

5.2.1 Completed Development Stage Operational Activities Assessment

The completed development stage operational activities assessment compares the existing typical background daytime and night-time noise levels ($L_{A90,T}$) at the nearest sensitive receptors to the predicted noise from the proposed development, including noise from all operational noise from HGV activities, carparks, and the potential noise from Zones A1 and A2.

A character correction of +3 dB has been applied to account for potential acoustic feature corrections, such as tonal characteristics, associated with the specific noise generating events.

Table 5.2: BS4142 Assessment (Completed Development Stage Operational Activities)

Location	Existing Measured Background $L_{A90,T}$		Specific Sound Level $L_{Aeq,T}$		Noise Rating Level $L_{A,Tr}$ (With +3 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	50	46	40	41	43	44	-7	-2
R02	50	46	42	43	45	46	-5	0
R03	44	40	58	59	61	62	17	22
R04	44	40	58	59	61	62	17	22
R05	44	40	53	54	56	57	12	17
R06	60	35	41	42	44	45	-16	10
R07	44	40	37	39	40	42	-4	2
R08	44	40	38	40	41	43	-3	3

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 arithmetic's in the above table may appear to be up to 1 dB incorrect due to this rounding.

The result of the BS 4142 assessment above indicates that the predicted noise levels at the closest existing sensitive receptors from the operations of the proposed development are above the existing background noise levels by up to +17 dB during the daytime period and up to +22 dB during the night-time period. The predicted noise levels would therefore result in a significant adverse impact during both the daytime and night-time periods at the closest sensitive receptors. Considering the results, additional mitigation would be required. However, given the outline component of the proposed development, the detailed design & mitigation would need to be developed during the reserved matters application stage which is to be secured by an appropriately worded planning condition.

5.2.2 Building Services Plant

Based on the baseline noise monitoring data detailed in Section 4 of this report, maximum plant emission levels have been set for controlling fixed building services plant to an acceptable level. Noise limits apply at a position 1 m from the façade of the nearest sensitive receptors and include the total contribution of noise from all plant items associated with the proposed development that may run during any particular period.

In order to reduce the risk of fixed plant noise making a significant contribution to background noise levels in the area, a target for fixed plant Rating Level ($L_{A,Tr}$) has been set to be at the existing night-time background levels. Representative worst-case background noise levels at existing receptors have been used to determine appropriate fixed plant noise limits.

The maximum permissible external noise levels from the potential fixed plant are presented in Table 5.3 below.

Table 5.3: Recommended Rating Level for Plant Noise at Nearby Existing Receptors

Receptors	Measurement Location	Representative Background Noise Level L_{A90} (dB)	Proposed Rating Level $L_{A,Tr}$ (dB)
Existing Receptors R01, R02 (South-east of site boundary)	LT1	46	46
Existing Receptors R03, R04, R05 (North-west of site boundary)	LT3	40	40
Existing Receptor R06 (North of site boundary)	ST6	35	35
Existing Receptors R07, R08 (North-east of site boundary)	LT2	40	40

The Rating Level associated with fixed plant should not exceed the criteria presented above. When predicting fixed plant noise, the cumulative noise from all fixed plant in the area will need to be considered to demonstrate compliance. By adhering to the fixed plant limits, the noise levels associated with building services plant would not result in an adverse impact at the closest sensitive receptors.

Noise from fixed plant and equipment can be controlled through a suitably worded planning condition requiring compliance with the Rating Levels in Table 5.3 above.

5.3 NOISE INTRUSION ASSESSMENT

5.3.1 Combined Noise Intrusion Assessment (Existing Receptors)

Internal noise levels at existing sensitive receptor locations, from all noise sources associated with the proposed development including HGVs, car parking and potential noise from Zones A1 and A2 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 glazing with specification R_w 30 dB (e.g 6/12/6mm double glazing or equivalent) has been used. The tables below present the results of the assessment. Daytime and night-time noise levels are illustratively shown in Figures 5.2 and 5.3.

Table 5.4: Daytime Noise Intrusion Levels $L_{Aeq,16hours}$ (Existing Receptors)

Location	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$ with windows open	Internal $L_{Aeq,T}$ with windows closed	Criteria $L_{Aeq,T}$
R01	39.7	24.7	9.7	35
R02	42.0	27.0	12.0	35

Location	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$ with windows open	Internal $L_{Aeq,T}$ with windows closed	Criteria $L_{Aeq,T}$
R03	58.2	43.2	28.2	35
R04	58.2	43.2	28.2	35
R05	52.6	37.6	22.6	35
R06	40.9	25.9	10.9	35
R07	37.3	22.3	7.3	35
R08	37.9	22.9	7.9	35

Predicted daytime noise levels are above the BS8233 daytime $L_{Aeq,T}$ internal criterion of 35 dB(A) at receptors R03 to R05 with windows opened. However, with windows closed, the predicted daytime noise levels are below the criterion at all existing receptors.

Table 5.5: Night-time Noise Intrusion Levels $L_{Aeq,8hours}$ (Existing Receptors)

Location	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$ with windows open	Internal $L_{Aeq,T}$ with windows closed	Criteria $L_{Aeq,T}$
R01	41.2	26.2	11.2	30
R02	42.7	27.7	12.7	30
R03	58.8	43.8	28.8	30
R04	59.0	44.0	29.0	30
R05	54.0	39.0	24.0	30
R06	42.0	27.0	12.0	30
R07	38.9	23.9	8.9	30
R08	39.8	24.8	9.8	30

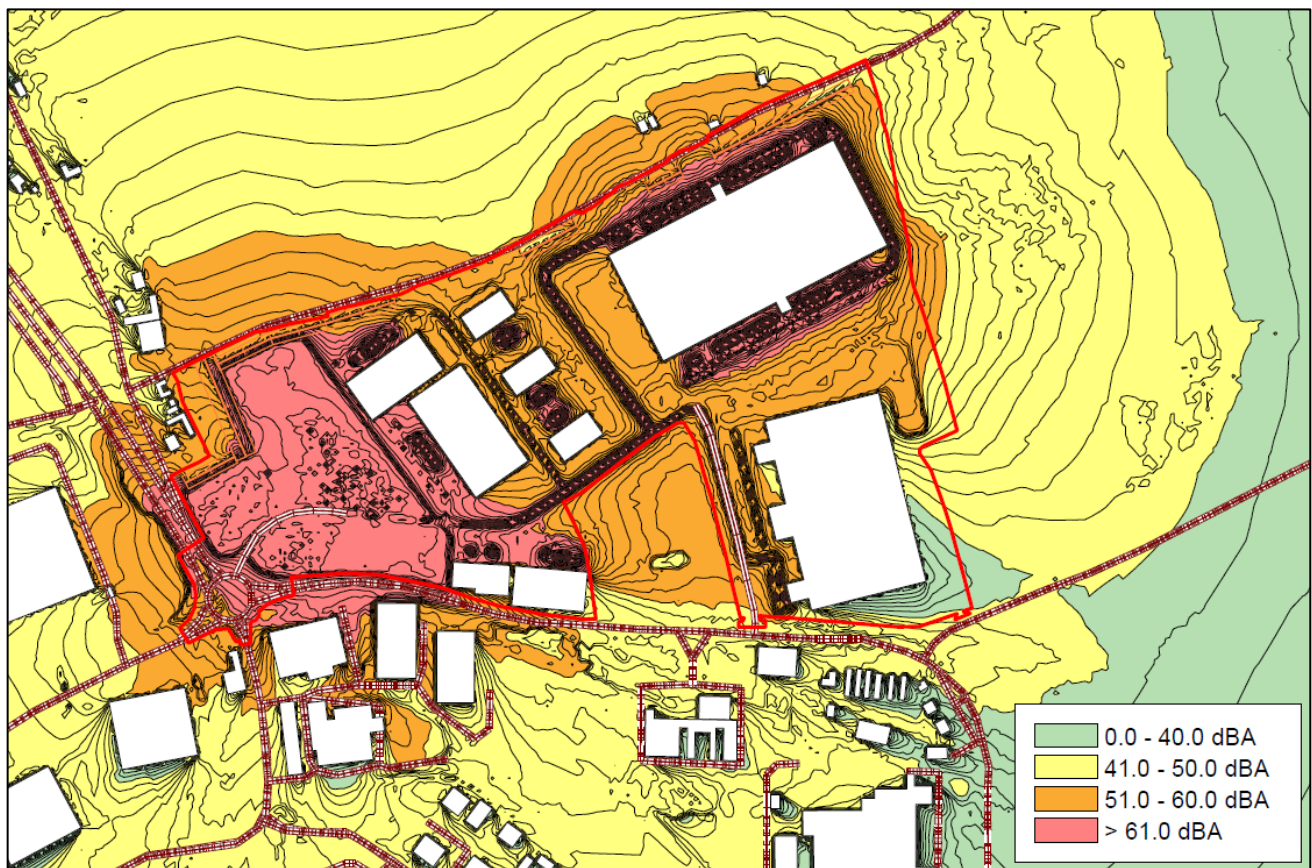
Predicted night-time noise levels are above the BS8233 night-time $L_{Aeq,T}$ internal criterion of 30 dB(A) at the receptor locations R03 to R05 with windows opened. However, with windows closed, the predicted night-time noise levels are below the criterion at all existing receptors.

Table 5.6: Night-time Noise Intrusion Levels L_{Amax} (Existing Receptors)

Location	External L_{Amax}	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	Criteria L_{Amax}
R01	37.7	22.7	7.7	45
R02	45.8	30.8	15.8	45
R03	57.9	42.9	27.9	45
R04	57.8	42.8	27.8	45
R05	52.0	37.0	22.0	45
R06	40.7	25.7	10.7	45
R07	35.0	20.0	5.0	45
R08	36.0	21.0	6.0	45

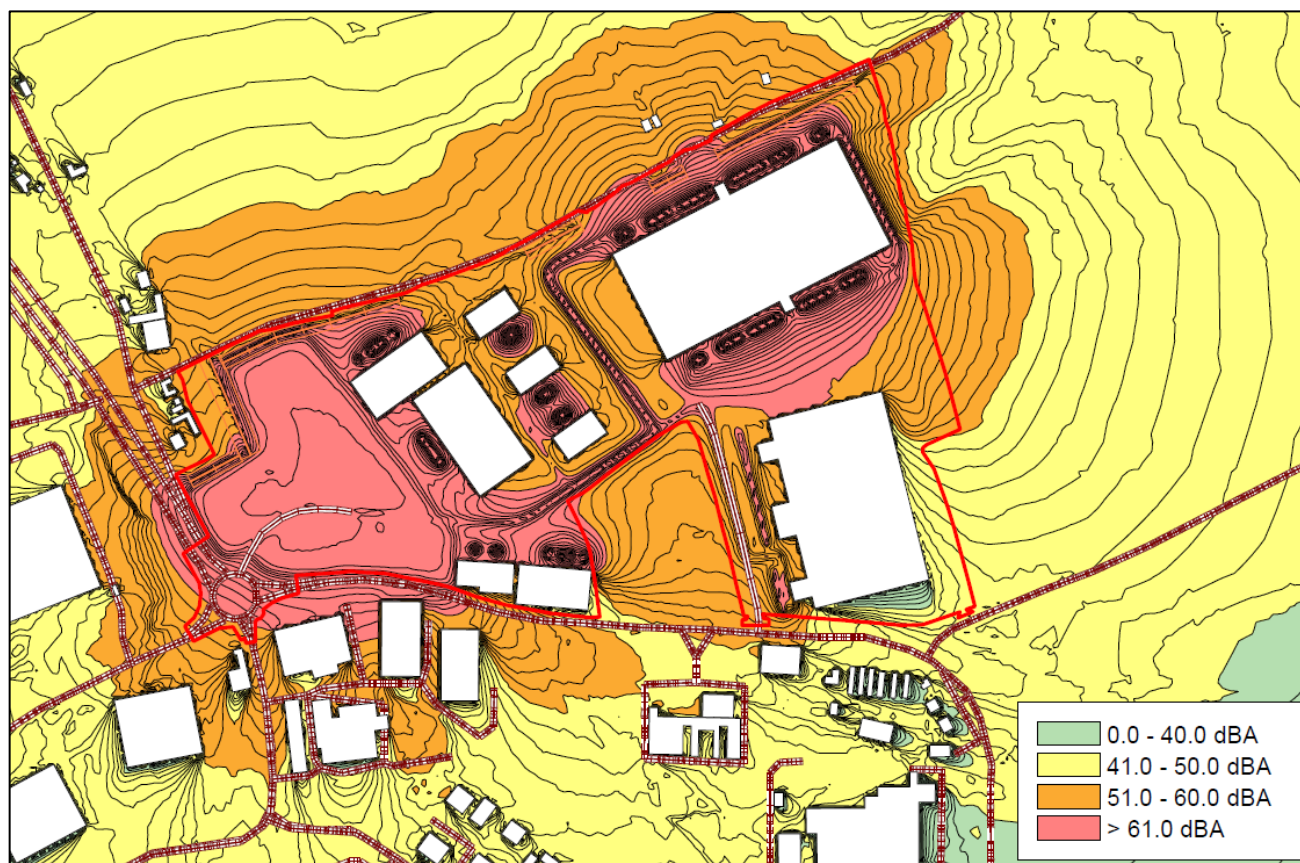
Predicted night-time L_{Amax} noise levels are below the BS8233 night-time L_{Amax} internal criterion of 45 dB(A) at all existing receptors with windows opened or closed.

Figure 5.2: $L_{Aeq,16hours}$ Daytime Operational Noise Contour Plot (1.5m)



Not to scale

Figure 5.3: $L_{Aeq,8hours}$ Night-Time Operational Noise Contour Plot (4m)



Not to scale

5.3.2 Combined Noise Intrusion Assessment (Proposed Receptors)

It is assumed that the hotel will be of a modern construction and incorporate modern double glazing and ventilation heating system such as a mechanical ventilation with heat recovery (MVHR), thus typically requiring the windows to be closed at all times. Therefore, internal noise levels at the proposed hotel receptor locations based on the Illustrative Masterplan Revision G, from all noise sources including HGVs, car parking, and potential noise from Zones A1 and A2 have been assessed with windows closed where an assumption of glazing with specification R_w 30 dB (e.g 6/12/6mm double glazing or equivalent) has been used.

The daytime and night-time $L_{Aeq,T}$ and night-time L_{Amax} have been assessed based on the modelled operational noise levels on site. The operational noise levels have a much larger contribution to the noise levels at the façades of the proposed hotel receptors, making the contribution from the road traffic noise negligible.

The tables below present the results of the assessment for the worst-case scenario at each proposed receptor location.

Table 5.7: Daytime Noise Intrusion Levels $L_{Aeq,16hours}$ (Proposed Receptors)

Location	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$ with windows closed	Criteria $L_{Aeq,T}$
HR01	74.0	44.0	35
HR02	73.3	43.3	35

Location	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$ with windows closed	Criteria $L_{Aeq,T}$
HR03	73.2	43.2	35
HR04	73.7	43.7	35
HR05	74.6	44.6	35
HR06	75.8	45.8	35
HR07	75.4	45.4	35
HR08	74.5	44.5	35

Predicted daytime noise levels are above the BS8233 daytime $L_{Aeq,16hours}$ internal criterion of 35 dB(A) at all proposed receptors with a window closed scenario.

Table 5.8: Night-time Noise Intrusion Levels $L_{Aeq,8hours}$ (Proposed Receptors)

Location	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$ with windows closed	Criteria $L_{Aeq,T}$
HR01	74.0	44.0	30
HR02	73.3	43.3	30
HR03	73.2	43.2	30
HR04	73.8	43.8	30
HR05	74.7	44.7	30
HR06	75.8	45.8	30
HR07	75.4	45.4	30
HR08	74.5	44.5	30

Predicted night-time noise levels are above the BS8233 night-time $L_{Aeq,8hours}$ internal criterion of 30 dB(A) at all proposed receptors with a window closed scenario.

Table 5.9: Night-time Noise Intrusion Levels L_{Amax} (Proposed Receptors)

Location	External L_{Amax}	Internal L_{Amax} with windows closed	Criteria L_{Amax}
HR01	73.9	43.9	45
HR02	73.1	43.1	45
HR03	73.0	43.0	45
HR04	73.5	43.5	45
HR05	74.5	44.5	45
HR06	75.6	45.6	45
HR07	75.3	45.3	45
HR08	74.4	44.4	45

Predicted night-time L_{Amax} noise levels are above the BS8233 night-time L_{Amax} internal criterion of 45 dB(A) at the proposed receptors locations HR06 and HR07 with a window closed scenario.

Considering the results above, a glazing and ventilation strategy has been proposed in Section 6 of this report to ensure that the BS8233 internal criteria are met within all proposed hotel rooms.

6.0 MITIGATION

Mitigation measures will be needed to control noise impact from both the detailed and outline components of the scheme.

For the hotel scheme, the glazing and ventilation strategy has been designed to achieve BS8233 internal criteria for daytime 35 dB $L_{Aeq,16hours}$, night-time 30 dB $L_{Aeq,8hours}$ and night-time 45 dB L_{Amax} within habitable rooms of the proposed hotel development with windows closed.

It is assumed that openable windows will not be the primary means of ventilation and therefore all hotel rooms will require an alternative means of ventilation such as a mechanical ventilation with heat recovery (MVHR). Any ventilation system is required to provide sufficient airflow to demonstrate compliance with Building Regulations Approved Document F.

Furthermore, the proposed habitable rooms will require windows with sound reduction of up to R_w 46 dB which can be achieved with the use of 10mm Pilkington K Glass/20mm argon cavity/8.8 Pilkinton Optiphon™. Once detailed site layouts and proposed planning class uses are known additional assessments can be undertaken to value engineer the proposed glazing performance.

Considering the results of the BS4142 assessment and the noise intrusion assessments undertaken to assess the noise impact on existing sensitive receptors, additional mitigation would be required. However, given the outline component of the proposed development, the detailed design & mitigation would be developed during the reserved matters application stage which is to be secured by an appropriately worded planning application.

To help in the design of the outline application the following general mitigation measures should be considered;

- Planning class uses selection should be considered at an early stage. Class E(g)(iii) is preferred in close proximity to the sensitive receptors with B8 and B2 uses being further away.
- Service yards should be screened by the building and should not be overlooked by existing residential properties.
- Haul routes should be screened where possible by the proposed buildings.
- Where additional screening is needed these should be provided by close boarded timber fencing
- External plant and equipment should be considered at the earliest opportunity which should include proposed location and loudness of the individual units.

With the implementation of good acoustic design it is considered the impact can be suitably mitigated, especially from the outline application area, to ensure that the impact of noise on existing noise sensitive receptors is not above the Lowest Observed Adverse Effect Level (LOAEL) threshold.

7.0 CONCLUSIONS

A noise assessment was undertaken for a planning application for a proposed industrial/commercial development at Land North of Bryn Lane, Wrexham.

The results of the BS4142 and noise intrusion assessments undertaken to assess the noise impact on existing sensitive receptors presented above indicate that noise associated with the proposed development, including HGVs, car parking and potential noise from the outline application Zones A1 and A2, would result in a significant adverse impact during the daytime and night-time periods at the closest existing sensitive receptor locations.

Therefore, additional mitigation will be required, however, given the outline component of the proposed development, the detailed design & mitigation will be need to be developed during the reserved matters application stage which is to be secured by an appropriately worded planning condition. General advice has been provided in terms of requirements that need to be considered when developing the reserved matters application.

Moreover, it is assumed that the proposed hotel will be of a modern construction and incorporate ventilation heating system such as a mechanical ventilation with heat recovery (MVHR) thus typically requiring the windows to be closed at all times. Glazing specifications have therefore been recommended based upon the required sound attenuation with a maximum sound reduction of R_w 46 dB which can be achieved.

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 16-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

PPG – Planning Practice Guidance
UDP – Unitary Development Plan
UKAS – United Kingdom Accreditation Service

APPENDIX B – REPORT CONDITIONS

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