Noise Impact Assessment

Wren Kitchens Transport Yard

Wren Kitchens, Falkland Way, Barton upon Humber, North Lincolnshire

Wren Kitchens

SHF.550.003.NO.R.001

'Experience and expertise working in union'

enzygo.com

Wren Kitchens Transport Yard
Wren Kitchens, Barton-upon-Humber

Contact Details:

Enzygo Ltd.
Samuel House,
5 Fox Valley Way
Stocksbridge
Sheffield
S36 2AA

tel: 0114 321 5151
email: acoustics@enzygo.com
www: enzygo.com

Noise Impact Assessment

Project:	SHF.550.003.NO.R.001
For:	Wren Kitchens
Status:	FINAL
Date:	March 2022
Author:	Ed Barnett BSc MIOA
Reviewer:	Darren Lafon-Anthony MSc MIOA FIQ

Contents

Tables & Figures

1 Introduction

1.1 Project Introduction

1.1.1 Enzygo Limited has been commissioned by Wren Kitchens Ltd to undertake an environmental noise impact assessment for a proposed new transport yard located on land off Victory Way, Barton-upon-Humber.

1.1.2 The assessment has been undertaken to assess compliance with the relevant standards at the nearest noise-sensitive receptors.

1.1.3 Details of the assessment methodology employed, together with the results of the baseline survey, assessment and conclusions are presented within this report.

1.2 Site Description

1.2.1 The site is located to the east of Barton-upon-Humber on Victory Way.

1.2.2 To the north of the site is scrubland with a rail line and wetlands beyond. To the east and south-east is the Bakkavor Pizza and Bread Barton factory and associated buildings. To the south-west is Falkland Way, with industrial/commercial buildings, scrubland and Field View Day Nursery beyond. To the west is Victory Way with scrubland and Grayton industrial premises beyond.

1.2.3 The nearest noise-sensitive receptors to the proposed site are shown in Table 1-1 below.

Table 1-1: Nearest noise-sensitive receptors

NSR	Description	Sensitivity of the Receptor	Direction
1	Properties on Lower Meadows	Residential	South-west
2	Property on Pasture Road South	Residential	South-east
3	Properties on Orangeleaf Way	Residential	South
4	Field View Day Nursery	Nursery/education	West

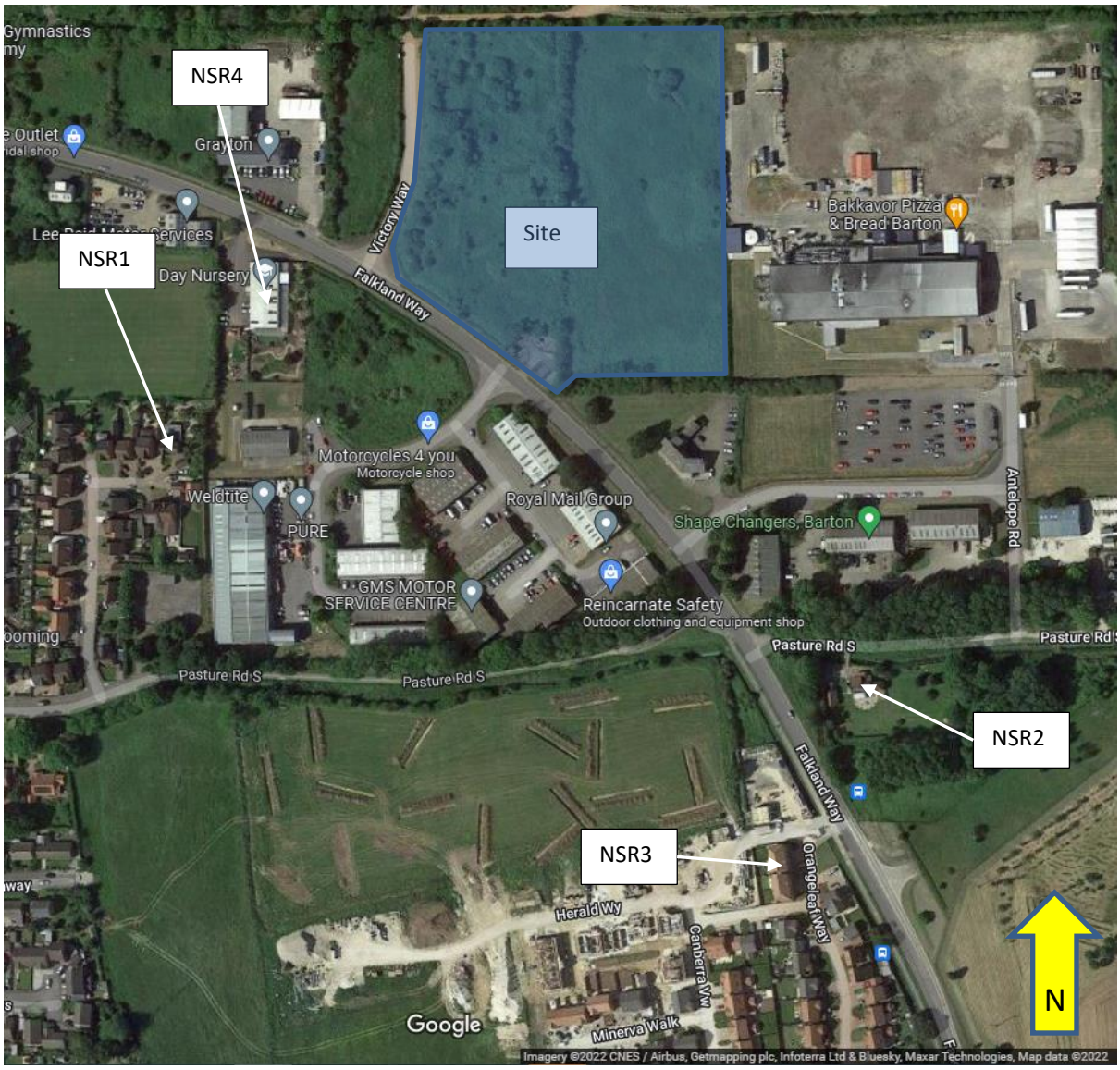
1.2.4 The site and nearby noise-sensitive receptors are also shown in Figure 1-1.

1.3 Project Description

1.3.1 The proposed development comprises a new transport yard which will provide lorry parking for empty HGVs within 1km of Wren's main factory, The Nest. As present, HGVs are stored at other facilities in Brough, Howden and Scunthorpe, causing additional travel and routing through the centre of Barton-upon-Humber. The proposal would serve to divert HGVs from these distant yards to the application site.

1.3.2 The site layout (shown on drawing no. Wren2-BED-ST-ZZ-DR-A-0111 Revision P02, dated 14 December 2021) is included in Appendix A.

Figure 1-1: Site and Receptor Locations



1.4 Noise Assessment Methodology

1.4.1 The noise assessment has been undertaken based on traffic data taken from the transport assessment conducted by Bryan G Hall in their '*Falkland Way Lorry Park'* report dated December 2021.

1.4.2 The data provided by Bryan G Hall comprises projected 2021 two-way peak hour weekday morning and evening HGV traffic flows.

1.4.3 The noise assessment has been split into two parts, that being noise emanating from the transport yard, and the increase in noise from increased HGV numbers on the local road network.

1.4.4 The noise assessment for the transport yard has been conducted in accordance with the guidance contained within British Standard 4142:2014+A1:2019 '*Method for rating and assessing industrial and commercial sound*' (BS4142), British Standard 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' (BS8233).

1.4.5 Section 1.3 of BS4142:2014 states that the standard should not be applied to the passage of vehicles on public roads. On this basis the increase in noise from HGVs on the public road have been assessed as a change in noise level based on the Environmental Management and Assessment (IEMA) effect descriptors.

1.4.6 The Bryan G Hall traffic data shows that traffic numbers would be low and slow moving, i.e. not at national speed limits on some roads. The Calculation of Road Traffic Noise (CRTN) states that the calculation procedure is not an appropriate for low traffic numbers or for slow moving traffic. On this basis typical noise levels for HGVs have been used and predictions made using the calculation methodology in ISO9613:1996 '*Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*' (ISO 9613) using the proprietary noise modelling software CadnaA.

1.4.7 The assessment is based upon the results of a baseline noise survey undertaken at locations representative of the nearest noise-sensitive receptors over representative periods.

2 Standards and Guidance

2.1 Planning Practice Guidance for Noise

2.1.1 The guidance contained within the Planning Practice Guidance for Noise indicates that noise should be considered when:

- New developments may create additional noise; and/or
- New developments would be sensitive to the prevailing acoustic environment.

Table 2-1: Planning Practice Guidance – Noise Exposure Hierarchy

Perception	Example of Outcomes	Increasing Effect Level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation and/or awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.1.2 The guidance indicates that Local Planning Authorities should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or is likely to occur; and
- Whether or not a good standard of amenity can be achieved.

2.1.3 The impact of noise is rated within the policy document in terms of the relative '*Observed Effect Level*'. The Planning Practice Guidance provides the matrix shown in Table 2-1.

2.2 British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*

2.2.1 BS4142 provides a methodology for rating and assessing sound associated with both industrial and commercial premises. The purpose of the Standard is clearly outlined in the opening section where it states that the method is appropriate for the consideration of:

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

2.2.2 The Standard is based around the premise that the significance of the noise impact of an industrial/commercial facility can be derived from the numerical subtraction of the background noise level (not necessarily the lowest background level measured, but the typical background of the receptor) from the measured/calculated rating level of the specific sound under consideration. This comparison will enable the impact of the specific sound to be concluded based upon the premise that typically "*the greater this difference, the greater the magnitude of the impact*". This difference is then considered as follows:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB is likely to be an indication of an adverse impact, depending upon context; and,
- 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.

2.2.3 BS4142 further states that "*where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact*" again depending upon the specific context of the site. The Standard further qualifies the assessment protocol by outlining conditions to the comparative assessment and stating that "*not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact*", thus implying that all sites should be assessed on their own merits and specifics.

2.2.4 The Standard quantifies the typical reference periods to be used in the assessment of noise, namely:

Typical Daytime	07:00 – 23:00	1-hr assessment period
Typical Night-time	23:00 – 07:00	15-min assessment period

2.2.5 The Standard outlines methods for defining appropriate "*character corrections*" within the rating levels to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency. These are a) the Subjective Method, b) the Objective Methods for tonality and c) the Reference Method. It is noted by the Standard that where multiple features are present the corrections should be added in a linear fashion to the specific level.

2.2.6 The Subjective Method is based on the following corrections:

Table 2-2: BS4142 Subjective Method Rating Corrections

Level of Perceptibility	Tonal Correction	Impulsivity Correction	Correction for "Other sound characteristics"	Intermittency Correction
No Perceptibility	+0 dB	+0 dB	Where neither tonal nor Impulsive but clearly identifiable +3 dB	If intermittency is readily identifiable +3 dB
Just Perceptible	+2 dB	+3 dB		
Clearly Perceptible	+4 dB	+6 dB		
Highly Perceptible	+6 dB	+9 dB		

2.3 British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings*

2.3.1 BS8233 provides guidance and recommendations for the control of noise from outside sources to maintain an internal acoustic environment appropriate for the intended use. The Standard suggests appropriate criteria and limits for differing situations which are, primarily, intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes to the external noise climate. However, it is considered that the guidance provides suitable criteria for the assessment of internal noise levels in this instance.

2.3.2 The Standard suggests suitable guidance values for residential dwellings shown in Table 2-3.

Table 2-3: BS8233 Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 Hours	23:00 to 07:00 Hours
Resting	Living room	35dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

2.3.3 The Standard suggests that the level of noise reduction provided by a partially open window would be approximately 15dB.

2.3.4 Note 7 relating to Table 4 of the standard suggests that, where development is considered necessary or desirable, internal levels may be relaxed by up to 5dB and reasonable internal conditions still achieved.

2.4 Institute of Environmental Management and Assessment – Guidelines for Environmental Noise Impact Assessment

2.4.1 The Institute of Environmental Management and Assessment document Guidelines for Environmental Noise Impact Assessment provides an assessment for the change in noise level where noise from traffic generated onto the existing highway network is the principle consideration. The effect in the change in noise level is summarised in Table 2-4.

Table 2-4: IEMA Effect Descriptors

IEMA Description	IEMA Definition
Very Substantial	Greater than a 10dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise
Substantial	Greater than a 5dB L_{Aeq} change in sound level at a noise-sensitive receptor, or a 5 to 9.9dB L_{Aeq} change in sound level at a receptor of great sensitivity
Moderate	A 3 to 4.9dB L_{Aeq} change in sound level at a sensitive or highly sensitive receptor, or a greater than 5dB L_{Aeq} change in sound level at a receptor of some sensitivity
Slight	A 3 to 4.9dB L_{Aeq} change in sound level at a receptor of some sensitivity
None/Not Significant	Less than a 2.9dB L_{Aeq} change in sound level and/or all receptors are of negligible sensitivity to noise or marginal to the zone of influence of the proposals

2.5 ISO9613 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*

2.5.1 The noise levels generated by the increase in HGVs have been predicted using the calculation methodology set out in ISO9613-2. The methodology considers the distance between the sources and the receptors and applies the amount of attenuation due to atmospheric absorption and other site-specific characteristics.

2.5.2 The methodology assumes downwind propagation, i.e., a wind direction that assists the propagation of noise from the source to all receptors.

2.6 BB93 - Acoustics design of schools: performance standard Building bulletin 93 – February 2015

2.6.1 BB93 sets out minimum performance standards for the acoustics of school buildings and provides guidelines for Internal Ambient Noise Level (IANL) upper limits in nursery schools along with other acoustic requirements.

2.6.2 The guideline IANL for Nursery School rooms in new buildings is 35 dB $L_{Aeq,30mins}$.

3 Baseline Noise Monitoring Survey

3.1 Baseline Noise Survey

3.1.1 An attended noise survey was undertaken between approximately 12:30 and 16:45 hours on Sunday 6th March to gather background and ambient noise levels representative of the nearest noise-sensitive receptors to the proposed development site.

3.1.2 The monitoring locations used for the survey are detailed in Table 3-1 and shown in Figure 3-1 below. At each location the measurement microphone was mounted on a tripod with a windshield approximately 1.5m above local ground level in free-field conditions.

Table 3-1: Noise Monitoring Locations

Location	Receptor	Approximate Distance from Site Boundary (m)	Reflecting Surfaces between Source & Receptor(1)	Topography of Intervening Ground	Justification for Choice of Measurement Location
MP1	Properties on Lower Meadows and Field View Day Nursery	90	none	Ground remains relatively flat	Location representative of properties
MP2	Property on Pasture Road South	155	Buildings on Ardent Road		
MP3	Properties on Orangeleaf Way	265			

Note (1) – Reflecting surfaces other than the ground

3.1.3 The noise monitoring equipment used during the survey is shown in Table 3-2, and was set to record a number of parameters, including the $L_{Aeq,T}$, L_{A90}, L_{A10} and L_{AFmax}.

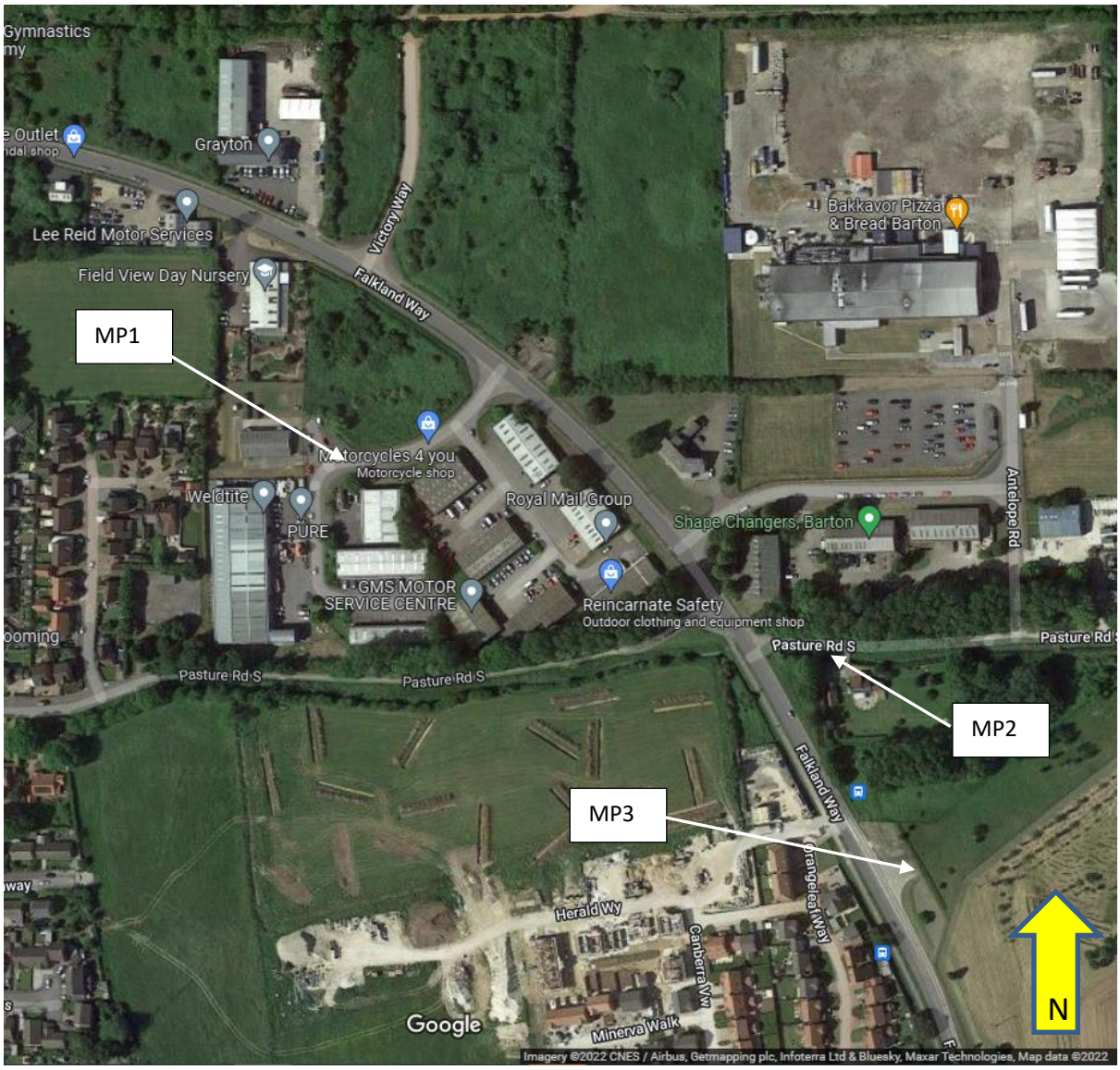
Table 3-2: Survey Equipment

Location Reference	Equipment Description	Serial Number	Calibration Date Prior to Survey	Calibrator Reference Level
MP1 and MP3	01dB Black Solo Class 1 sound level meter	65396	22/02/22	
MP2	01dB Black Solo Class 1 sound level meter	65445	23/03/20	-
All	Cirrus CR:515 Acoustic calibrator	59522	22/02/22	94 dB

3.1.4 Measurements were taken over a 2-hour period at each location.

3.1.5 The 01dB sound level meters were field calibrated to 94dB, using an electronic calibrator, prior to commencement and upon completion of the overall survey. The external calibration documentation for the equipment used is available upon request.

Figure 3-1: Noise Monitoring Locations



3.2 Weather

3.2.1 The weather conditions during the survey are detailed in Table 3-3 below:

Table 3-3: Weather Conditions

Date	Precipitation	Cloud Cover	Max. wind-speed	Wind Direction	Temperature
6th March	None	80%	<5ms^{-1}	NW	8°C

3.3 Survey Results

3.3.1 The 1-hour L_{Aeq} results from each measurement position are summarised in Table 3-4.

Table 3-4: Summary of Baseline Survey Results, dB

Location	Time	$L_{Aeq,T}$	L_{Amax}	L_{A90}	L_{A10}
MP1	12:30 – 13:30	49.3	67.6	41.0	53.6
	13:30 – 14:30	49.7	65.0	40.2	53.6
MP2	12:30 – 13:30	52.1	65.2	45.0	55.9
	13:30 – 14:30	51.8	66.6	43.7	55.5
MP3	14:35 – 15:35	60.1	77.8	45.1	64.7
	15:35 – 16:35	60.0	76.9	45.1	64.2

3.4 Subjective Field Monitoring Notes

3.4.1 At positions 1 and 2 the noise climate was predominantly controlled by traffic on the surrounding road network. In addition, plant noise emanating from buildings on Ardent Road affected the measured levels.

3.4.2 At position 3 the noise climate was predominantly controlled by traffic on Falkland Way, with plant noise emanating from the Wren Kitchens site also affecting the measured levels.

4 Transport Yard Noise Assessment

4.1 Introduction

4.1.1 This section of the report outlines the prediction and assessment of noise generated by the transport yard at the closest noise-sensitive residential receptors.

4.1.2 The predictions have been made using the calculation methodology outlined in ISO9613. The assessment of potential noise impacts at the residential receptors has been undertaken in accordance with BS4142 and BS8233.

4.1.3 Section 1 of BS4142:2014 states that the standard should be used to assess the effect of sound on people at residential premises, or for premises used for residential purposes. Therefore, the assessment of potential noise impacts at the nursery has been undertaken in accordance the guideline values for nursery school rooms in BB93.

4.1.4 The noise survey was undertaken by Craig Williams who has 15 years' professional experience. The assessment was undertaken by Edward Barnett BSc MIOA who has 8 years' professional experience and reviewed by Darren Lafon-Anthony BSc MIOA FIQ who has 30 years' professional experience in acoustics.

4.2 Site Operations

4.2.1 As described in Section 1.3, the proposed development comprises a new transport yard which provides a temporary parking facility for HGVs on the way to and from Wren Kitchen's Barton-upon-Humber facility.

4.3 HGV Movements

4.3.1 The noise assessment considers the worst case 1-hour period based on the total number of HGV movements on and off site, taken from the Bryan G Hall Transport Assessment.

4.3.2 The morning and evening peak hour HGV movements, which are taken from the Bryan G Hall Transport Assessment are between 08:00 to 09:00 hours and 17:00 to 18:00 hours. Table 4-1 presents the number of HGV movements taken from Table 7.3 in the Bryan G Hall report.

Table 4-1: Peak vehicle movements

Period	Vehicle movements on and off site		
	Arrival	Departure	Two-way
08:00 – 09:00 hours	16	16	32
17:00 – 18:00 hours	25	25	50

4.4 Noise Emissions

4.4.1 Noise emissions associated with the transport yard are presented in Table 4-2 and are taken from previously measured noise levels from similar sites.

Table 4-2: Modelled Source Emissions

Description	Sound Power Level, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
HGV manoeuvre without reverse alarm (forward movement)	102	93	88	91	92	91	84	75	
HGV manoeuvre with reverse alarm (backwards movement)	102	93	88	91	92	91	90	75	
HGV start and idle	-	-	-	-	-	-	-	-	91
HGV Door Slam	-	-	-	-	-	-	-	-	77

4.5 Noise Modelling

4.5.1 The noise model was constructed using the proprietary noise modelling software package CadnaA. The potential noise impacts at the nearby noise-sensitive residential receptors have been predicted using the calculation methodology outlined in ISO9613.

4.5.1 The noise model was constructed using Google Maps geo-referenced 1:1 scaled aerial photography and noise source data from previous measurements. Topographical information is based on Ordnance Survey Terrain 50 data.

4.5.2 Modelled noise levels based on the hourly peak HGV movements form the basis of the calculated specific sound level.

4.5.3 HGV manoeuvres have been modelled as moving point sources which includes the arrival of the HGV, the reverse manoeuvre into a parking bay including reverse alarms, the HGV door slam, the start-up of the HGV engine, and the departure of the vehicle.

4.5.4 In addition to the above, the following assumptions have been made during the modelling process:

- 0% ground absorption across the site and road system and 100% ground absorption across grassed areas external to the site
- Reflections have been set to two

4.6 Predicted Sound Levels

4.6.1 Noise levels generated by the proposed development have been predicted to the site facing façade of the nearest identified noise-sensitive residential receptors identified in Section 1-2.

4.6.1 All the noise-sensitive residential receptors are two-storey properties. Therefore, predictions have been made to a height of 1.5m for ground floor windows and 4m for second-floor windows to represent daytime resting in living rooms and bedrooms. The highest figure has been presented.

4.6.2 Table 4-3 details the results for noise emanating from the Transport Yard.

Table 4-3: Predicted Specific Sound Levels at the Noise-Sensitive Receptors

Location	Specific Sound Level $L_{Aeq,1hr}$ dB
NSR1 - Properties on Lower Meadows	38
NSR2 - Property on Pasture Road South	38
NSR3 - Properties on Orangeleaf Way	36

4.7 Sound Rating Level

4.7.1 In accordance with the guidance contained in BS4142 the specific sound level has been corrected for tonal, impulsive, intermittent or other acoustic characteristics, which may be present at the receptors, to determine the sound rating level.

4.7.2 As stated in Section 3.4, the noise climate during the noise survey was predominantly controlled by traffic on the surrounding road network. On this basis, any tonal, impulsive, intermittent or other acoustic characteristics associated with the transport yard should be indistinguishable against the residual noise climate.

4.7.3 The transport yard would not exhibit any other sound characteristics. Therefore, no further corrections have been applied.

4.7.4 Table 4-4 details the derived sound rating levels.

Table 4-4: Sound Rating Levels

Location	Specific Sound Level dB $L_{Aeq,T}$	Penalties Applied, dB	Sound Rating Level dB $L_{Ar,T}$
NSR1 - Properties on Lower Meadows	38	0	38
NSR2 - Property on Pasture Road South	38	0	38
NSR3 - Properties on Orangeleaf Way	36	0	36

4.8 BS4142 Background Noise Level

4.8.1 The BS4142 background noise levels are shown in Table 4-5 and have been derived from the lowest 1-hour L_{A90} noise level measured at each location.

Table 4-5: BS4142 Derived Background Noise Levels

Location	BS4142 Background Sound Level $L_{A90,T}$ dB
NSR1 - Properties on Lower Meadows	40
NSR2 - Property on Pasture Road South	44
NSR3 - Properties on Orangeleaf Way	45

4.9 BS4142 Initial Estimate of Impact Assessment

4.9.1 The predicted sound rating levels have been assessed against the measured background noise levels in accordance with the guidance contained in BS4142. Table 4-6 details the results of the assessment. It should be noted that the assessment has been undertaken during peak vehicle movement periods. The assessment is therefore considered worst-case.

Table 4-6: BS4142 Assessment

Location	Background Noise Level dB $L_{A90,T}$	Sound Rating Level dB $L_{Ar,T}$	Level Exceeding Background dB
NSR1 - Properties on Lower Meadows	40	38	-2
NSR2 - Property on Pasture Road South	44	38	-6
NSR3 - Properties on Orangeleaf Way	45	36	-9

4.9.2 Table 4-6 shows that the predicted sound rating levels at the nearest noise-sensitive receptors are below the prevailing background noise level indicating that the specific sound levels should have a low impact at all the nearest noise-sensitive residential receptors, depending on the context.

4.10 Context

4.10.1 BS4142 states that where the initial estimate of impact needs to be modified due to the context, all pertinent factors should be taken into consideration.

The Absolute Level of Sound

4.10.2 The specific sound levels during the worst-case 1-hour assessment period are predicted to be below the otherwise prevailing average ambient ($L_{Aeq,T}$) noise levels at the nearest noise-sensitive residential receptors.

4.10.3 Furthermore, an assessment has been made of the predicted internal noise levels at the noise-sensitive residential receptors in accordance with the guidance levels contained in BS8233, specifically those relating to daytime resting in bedrooms, i.e., 35dB $L_{Aeq,16hr}$.

4.10.4 Table 4-7 details the results of the assessment when considering a 15dB reduction for a window left partially open for ventilation.

Table 4-7: BS8233 Assessment

Location	Predicted External Specific Sound Level dB $L_{Aeq,T}$	Reduction Through Open Window dB $L_{Aeq,T}$	Predicted Internal Noise Level dB $L_{Aeq,T}$	Difference to 35dB $L_{Aeq,16hr}$
NSR1 - Properties on Lower Meadows	38	15	23	-12
NSR2 - Property on Pasture Road South	38		23	-12
NSR3 - Properties on Orangeleaf Way	36		21	-14

4.10.5 Table 4-7 shows that the predicted internal noise levels generated by HGV movements on the Transport Yard during the worst-case 1-hour assessment period would be well below the guideline values for daytime resting conditions in bedrooms at the nearest noise-sensitive residential receptors.

The Character and Level of the Residual Sound

4.10.6 The specific sound levels from a worst-case assessment are predicted to be below the measured background noise level at all noise sensitive residential receptors. Furthermore, the otherwise prevailing noise climate is predominantly controlled by traffic on the surrounding road network which is similar to the noise emanating from the transport yard. On this basis, the character and level of the sound are likely to be indistinguishable against the residual noise climate.

The Sensitivity of the Receptor

4.10.7 The nearest residential noise-sensitive receptors are likely to be ventilated via openable windows and are therefore sensitive to noise. However, the worst case 1-hour noise levels are predicted to be below the otherwise prevailing ambient and background noise levels at all the nearest noise-sensitive residential receptors.

Summary of the Context

4.10.8 Based on the above, the context should not affect the initial estimate of impact. Therefore, , noise from the transport yard would have a low impact when assessed in accordance with BS4142.

4.11 Assessment of Observed Effect Level

4.11.1 The BS4142 assessment has shown that when taking context into account, the predicted specific sound levels from the transport yard would have a low impact and therefore fall into the NOEL threshold of impact at all the nearest noise-sensitive residential receptors.

4.12 BB93 Assessment – Non-domestic Buildings

4.12.1 As stated in Section 4.1, BS4142:2014 states that the standard should be used to assess the effect of sound on people at residential premises, or for premises used for residential purposes. On this basis, the assessment of potential noise impacts at the nursery has been undertaken in accordance the guideline values for nursery school rooms in BB93.

4.12.2 An assessment of the predicted internal noise levels at NSR4 (Field View Day Nursery) has been made against the guideline IANL for nursery school rooms in new buildings of 35dB $L_{Aeq,30mins}$.

4.12.3 Table 4-8 details the results of the assessment when considering a reduction of 15dB for a window left partially open for ventilation.

Table 4-8: BB93 Assessment - Nursery School Rooms

Description	Predicted External Noise Level at the Façade, dB $L_{Aeq,T}$	Reduction through a Partially Open Window	Predicted Internal Noise Level dB $L_{Aeq,T}$	Upper IANL Limit dB $L_{Aeq,T}$	Difference
NSR4 - Field View Day Nursery	43	15	28	35	-7

4.12.4 Table 4-8 shows that predicted internal noise levels in NSR4 (Field View Day Nursery) would be well below the guideline upper IANL limit for nursery school rooms specified in BB93.

5 Assessment of Increased HGV numbers on the Local Road Network

5.1 Introduction

5.1.1 This section of the report outlines the prediction and assessment of noise generated by the increase in HGV movements on the local road network at the nearest noise-sensitive receptors.

5.1.2 The noise assessment has been undertaken based traffic data taken from the transport assessment conducted by Bryan G Hall in their '*Falkland Way Lorry Park'* report dated December 2021.

5.1.3 The data provided by Bryan G Hall comprises projected 2021 two-way traffic flows for peak hour weekday morning and evening periods.

5.1.4 The Bryan G Hall traffic data shows that traffic numbers would be low and slow moving, i.e., not at national speed limits on some roads. The Calculation of Road Traffic Noise (CRTN) states that the calculation procedure is not an appropriate for low traffic numbers therefore predictions made using previously measured noise data for HGVs and the calculation methodology in ISO9613:1996 '*Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*' (ISO 9613) using the proprietary noise modelling software CadnaA.

5.2 Basis of Assessment

5.2.1 The assessment is based on the change in noise level from the existing ambient noise levels from the noise survey to the projected 2021 two-way peak morning and evening hour HGV traffic flows.

5.2.2 The predicted increase in noise from HGVs on the public road have been assessed as a change in ambient noise level based on the Environmental Management and Assessment (IEMA) effect descriptors.

5.3 Bryan G Hall Traffic Data

5.3.1 The data provided by Bryan G Hall for the proposed two-way traffic flows used in the assessment which are presented in Table 5-1.

Table 5-1: Proposed Two-way HGV movements by Road

Period	Two-Way HGV Movements
Morning Peak Hour	
Wren Kitchens main site to Falkland Way	47
Falkland Way	55
Victory Way	32
Evening Peak Hour	
Wren Kitchens main site to Falkland Way	55
Falkland Way	52
Victory Way	50

5.4 Noise Emissions

5.4.1 The noise levels used for HGVs on the public road are presented in Table 4-2. The noise data for 'HGV manoeuvre without reverse alarm (forward movement)' have been used.

5.5 Noise Modelling

5.5.1 The noise model was constructed using the proprietary noise modelling software package CadnaA. The potential noise impacts at the nearby noise-sensitive receptors have been predicted using the calculation methodology outlined in ISO9613.

5.5.2 The noise model was constructed using Google Maps geo-referenced 1:1 scaled aerial photography and noise source data from previous measurements. Topographical information is based on Ordnance Survey Terrain 50 data.

5.5.3 Modelled noise levels based on the proposed hourly peak HGV movements form the basis of the calculated specific sound level.

5.5.4 HGV manoeuvres have been modelled as moving point sources at the speed limit along Falkland Way, and at 30kp/h along Victory Way and the Wren Kitchens main site to Falkland Way.

5.5.5 In addition to the above, the following assumptions have been made during the modelling process:

- 0% ground absorption across the road system and 100% ground absorption across grassed
- Reflections have been set to two

5.6 Change in Traffic Noise Level

5.6.1 Using the Cadna model, the proposed traffic noise levels have been calculated to the nearest noise-sensitive properties identified in Section 1.2, with the results shown in Table 5-2.

Table 5-2: Change in Noise Levels

Property	Peak Hour Assessment Period	Existing External Noise Level dB $L_{Aeq,T}$	Proposed HGV Noise Level dB $L_{Aeq,T}$	Resultant Ambient Noise Level dB $L_{Aeq,T}$	Change +/- dB $L_{Aeq,T}$	IEMA Effect Level
NSR1 - Properties on Lower Meadows	AM	49	35	49.2	+0.2	None/ Not significant
	PM		34	49.1	+0.1	None/ Not significant
NSR2 - Property on Pasture Road South	AM	52	43	52.5	+0.5	None/ Not significant
	PM		43	52.5	+0.5	None/ Not significant
NSR3 - Properties on Orangeleaf Way	AM	60	47	60.2	+0.2	None/ Not significant
	PM		47	60.2	+0.2	None/ Not significant
NSR4 - Field View Day Nursery	AM	49	48	51.5	+2.5	None/ Not significant
	PM		44	50.2	+1.2	None/ Not significant

5.7 Table 5-2 shows that the change in noise level during the peak morning and evening hour is between no effect/ no significant effect at all the nearest-noise-sensitive receptors.

5.7.1 In addition, the client has advised that the proposed transport yard would reduce the noise impact on other noise-sensitive receptors in the wider area of Barton-upon-Humber.

6 Conclusion

6.1 Background

6.1.1 Enzygo Limited (Enzygo) has been commissioned by Wren Kitchens Ltd to undertake an environmental noise impact assessment for a new transport yard located on Victory Way in Barton-upon-Humber.

6.1.2 The assessment has been undertaken to assess compliance with the relevant standards at the nearest noise-sensitive receptors and to provide outline mitigation advice, where considered necessary.

6.1.3 The noise assessment has been undertaken based traffic data from the transport assessment conducted by Bryan G Hall in their '*Falkland Way Lorry Park'* report dated December 2021.

6.2 Noise Assessment

6.2.1 The noise assessment has been split into two parts, that being noise emanating from the transport yard, and the increase in noise from increased vehicle numbers on the local road network.

6.2.2 The noise assessment for the transport yard has been conducted in accordance with the guidance contained within British Standard 4142:2014+A1:2019 '*Method for rating and assessing industrial and commercial sound*' (BS4142), British Standard 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' (BS8233). Reference has also been made to the noise exposure hierarchy described in the planning practice guidance.

6.2.3 Section 1.3 of BS4142:2014 states that the Standard should not be applied to the passage of vehicles on public roads. On this basis the increase in noise from HGVs on the public road have been assessed as a change in noise level based on the Environmental Management and Assessment (IEMA) effect descriptors.

6.2.4 The BS4142 assessment of noise associated with HGV manoeuvres on the transport yard has shown that the peak 1-hour morning and evening noise levels would have a low impact at the nearest noise-sensitive receptors. Additionally, based on the noise exposure hierarchy described in the planning practice guidance, noise from the facility would fall into the NOEL threshold of impact.

6.2.5 The assessment for the increase in HGV traffic on the local road network has found that the change in noise level during the peak morning and evening hour would have no effect/no significant effect at all the nearest noise-sensitive receptors.

6.2.6 In addition, the client has suggested that the proposed transport yard would reduce the noise impact on other noise-sensitive receptors in the wider area of Barton-upon-Humber.

Glossary of Terminology

Noise is defined as unwanted sound. The range of audible sound is known to be from 0dB (threshold of hearing) to 140dB (threshold of pain). Examples of typical noise levels relating to 'everyday' occurrences are given in Table G-1 below.

Table G-1: Typical Noise Levels

Source	Sound Pressure Level in dB(A)	Subjective Level
Gun shot	160	Perforation of eardrum
Military Jet take-off	140	Threshold of pain
Jet Aircraft at 100m	120	Very Loud
Rock Concert, front seats	110	Threshold of Sensation
Pneumatic Drill at 5m	100	Very Loud
Heavy goods vehicle from pavement	90	
Traffic at kerb edge	70 – 85	Loud
Vacuum Cleaner, Hair Dryer	70	
Normal conversation at 1m	60	Moderate
Typical Office	50 – 60	
Residential area at night	40	Quiet
Rural area at night, still air	30	
Leaves Rustling	20	
Rubbing together of fingertips	10	
	0	Threshold of hearing

The frequency response of the human ear to noise is usually taken to be around 18Hz (number of oscillations per second) to 18,000Hz. However, the human ear does not respond equally to different frequencies at the same level; it is more sensitive in the mid-frequency range than lower and higher frequencies and, because of this, when undertaking the measurement of noise the low and high frequency components of any given sound are reduced in importance by applying a filtering (weighting) circuit to the noise measuring instrument. The weighting which is widely accepted to correlate best with the subjective nature of human response to noise and is most widely used to quantify this is the A-weighted filter set. This is an internationally accepted standard for noise measurement.

For variable noise sources within an area an increase of 3dB(A) would be the minimum perceptible to the human ear under normal conditions. It is generally accepted that an increase/decrease of 10dB(A) corresponds to a doubling or halving in perceived loudness. The 'loudness' of a noise is a purely subjective parameter, dependant not only upon the sound pressure of the event but also on the dynamics of the listener's ear, the time of the day and the general mood of the person.

With regard to environmental noise levels (in the open air), these are rarely steady but rise and fall according to the activities being undertaken within the surrounding area at any given time. In an attempt to produce a figure that relates this variable nature of noise to human subjective response, a number of statistical noise metrics have been developed. These and other useful terminology and descriptors are presented in Table G-2 below.

Table G-2: Terminology

Term	Definition
Sound	Pressure fluctuations in a fluid medium within the audible range of amplitudes and frequencies which stimulate the organs of hearing.
Noise	Unwanted sound emitted from a source and received by the sensitive receptor.
Decibel (dB)	Unit most often used to describe the sound pressure level. A logarithmic number, it correlates closely to the way in which humans perceive sound. Its wide range of values helps quantify sound pressures from a large variety of magnitudes.
A-Weighting (dB(A))	Human perception of sound is frequency dependant. A-weighting applies a range of corrections at each frequency to provide a 'human-averaged'. Can be frequency band or broadband values.
Frequency (Hz)	The number of cycles per second, for sound this is closely related (and often mistaken for) pitch.
Frequency Spectrum	A more detailed analysis of the frequency components that comprise a sound source.
$L_{A10,T}$	The 10th statistical percentile of a measurement period, i.e. the level that is exceeded for 10% of the measurement duration. Closely correlates with traffic sources, A-weighted.
$L_{A90,T}$	The 90th statistical percentile of a measurement period, i.e. the level that is exceeded for 90% of the measurement duration. Used to describe background sound levels, as this value is affected less by short, transient sound sources, A-weighted.
L_{Amax}	The root mean square (RMS) maximum sound pressure level within a measurement period, A-weighted.
Ambient Sound	The total sound climate of all sources incident at one location, both in the near- and far-field (*The ambient sound comprises the residual sound and the specific sound when present)*.
Ambient Sound Level $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level $L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Equivalent Continuous A-weighted Sound Pressure Level $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

Term	Definition
	$$L_{Aeq,T} = 10lg_{10}\left\{\left(\frac{1}{T}\right)\int_{t1}^{t2}\left[p_A\frac{(t)^2}{{p_0}^2}\right]dt\right\}$$ Where p_0 is the reference sound pressure (20μPA); and $P_A(t)$ is the instantaneous A-weighted sound pressure level at time t.
Measurement Time Interval T_m	Total time over which measurements are taken (*This may consist of the sum of a number of non-contiguous, short-term measurement time intervals)*
Rating level $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound, over a period of time, T.
Reference Time Interval, T_r	Specified interval over which the specific sound level is determined (This is 1hr during the day from 07:00 to 23:00 hours and a shorter period of 15-min at night from 23:00 to 07:00 hours).
Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound in a given situation at the assessment location over a given time interval, T.
Sound Pressure Level	The level of fluctuation in air pressure, caused by airborne sound sources. Measured in Pascals (Pa).
Sound Power Level	The rate at which sound is radiated by a source. This parameter is useful as it describes sound energy before environmental or decay factors. Quantified in dB and notated usually as L_w or SWL.
Specific sound level $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T.
Specific Sound Source	Sound source being assessed.

Statement of Uncertainty

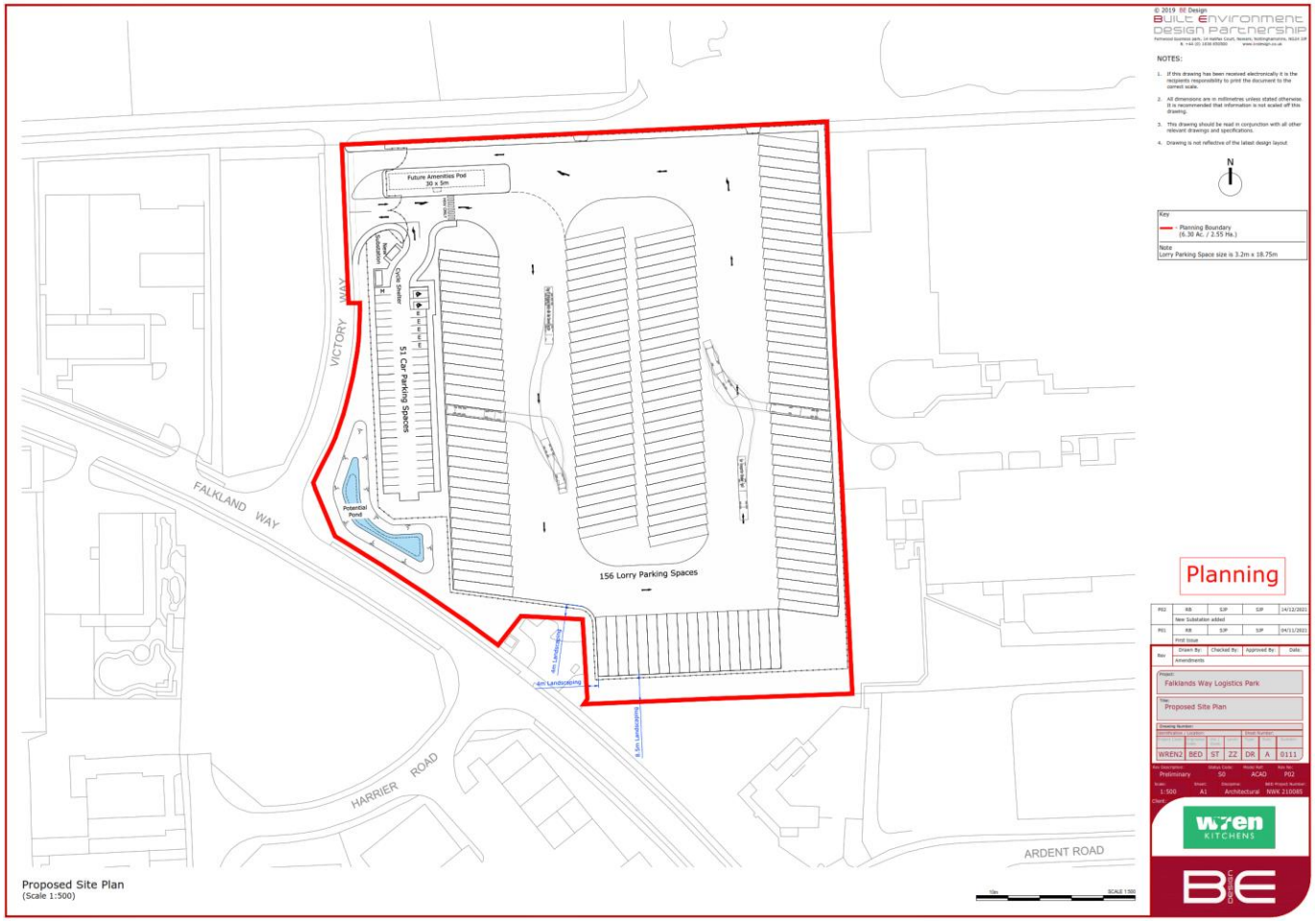
This report is based upon a range of measurements, a system of calculations and noise predictions. As such, this report attempts to quantify fluctuations in air pressure and is subject to the effects of meteorology, physical and perceived anomalies, tolerances within the measuring and monitoring equipment and accuracy margins within the noise modelling software. In the interests of repeatability, this report must be considered as being affected by common factors involved in the measurement and calculation of noise propagation.

All measurement values, outcomes and assumptions are subject to a margin of uncertainty. This has been quantified and assessed as follows:

- Rounding errors – systemic tolerance of ±1dB;
- Type 1 sound level meter – operational tolerance of ±1.1dB;
- Meteorology – allowance of ±1.9dB; and
- CadnaA noise propagation modelling software – operational accuracy of ±2.1dB

The most influential uncertainty factors for the assessment of noise are deemed to be equipment tolerances, meteorology and software accuracy. A root-sum-square statistical average has been used to provide an overall margin of uncertainty of ±3dB.

APPENDIX A – Site Layout



enzygo

Enzygo specialise in a wide range of technical services:

Property and Sites
Waste and Mineral Planning
Flooding, Drainage and Hydrology
Landscape Architecture
Arboriculture
Permitting and Regulation
Waste Technologies and Renewables
Waste Contract Procurement
Noise and Vibration
Ecology Services
Contaminated Land and Geotechnical
Traffic and Transportation
Planning Services

BRISTOL OFFICE
The Byre
Woodend Lane
Cromhall
Gloucestershire GL12 8AA
Tel: 01454 269 237

SHEFFIELD OFFICE
Samuel House
5 Fox Valley Way
Stocksbridge
Sheffield S36 2AA
Tel: 0114 321 5151

MANCHESTER OFFICE
Ducie House
Ducie Street
Manchester
M1 2JW
Tel: 0161 413 6444

Please visit our website for more information.