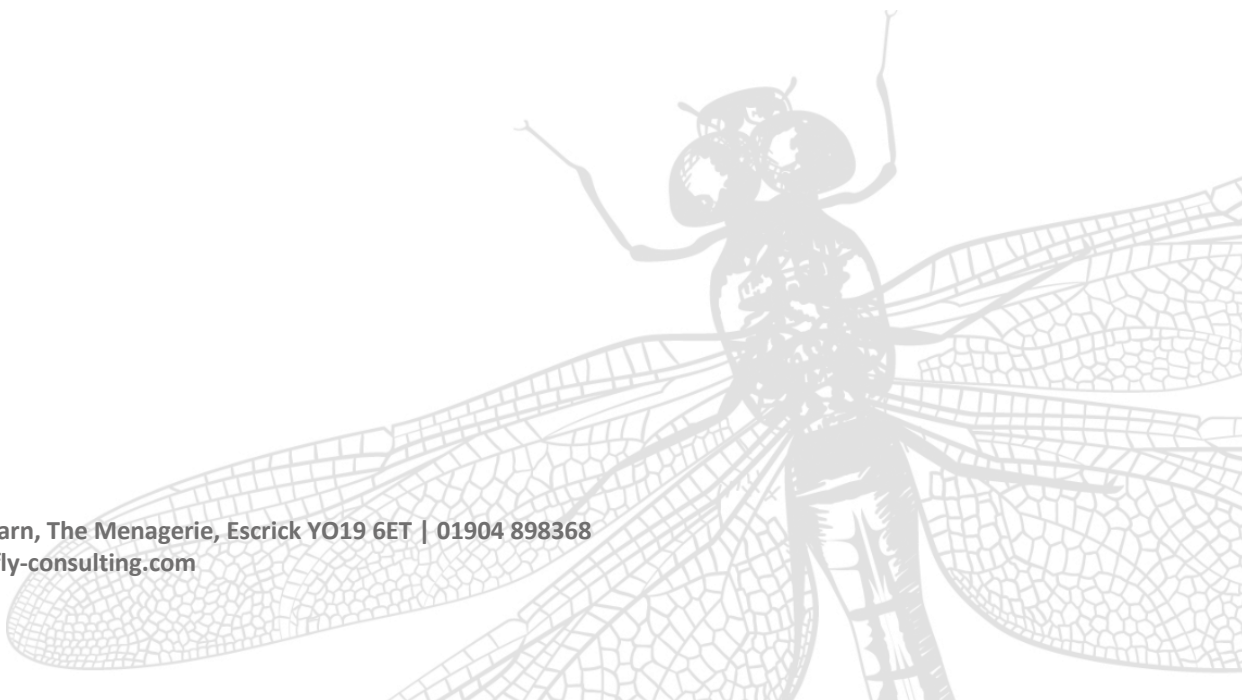




EG Group
Kingsway Business Park, Rochdale
Noise Impact Assessment
DC4220-NR1v3



Report Version Issue Log

Report Number	Issue Date	Note or Change	Author	Reviewed	Approval for Issue
DC4220-NR1v3	16.10.23	Minor Amendments	BH	--	AS
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This report has been prepared by Dragonfly Consulting with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client.

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Limitations to this Report

This report entails a physical investigation of the site with a sufficient number of sample measurements to provide quantitative information concerning the type and degree of noise affecting the site. The objectives of the investigation have been limited to establishing sources of noise material to carrying out an appropriate assessment.

The number and duration of noise measurements have been chosen to give reasonably representative information on the environment within the agreed time, and the locations of measurements have been restricted to the areas unoccupied by building(s) that are easily accessible without undue risk to our staff.

As with any sampling, the number of sampling points and the methods of sampling and testing cannot preclude the existence of “hotspots” where noise levels may be significantly higher than those actually measured due to previously unknown or unrecognised noise emitters. Furthermore, noise sources may be intermittent or fluctuate in intensity and consequently may not be present or may not be present in full intensity for some or all of the survey duration.

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1.0 INTRODUCTION

EG Group has appointed Dragonfly Consulting to carry out a Noise Impact Assessment for a proposed commercial development on Kingsway Business Park, Rochdale.

The noise assessment has been conducted with reference to the National Planning Policy Framework, the (NPPF) and *Noise Policy Statement for England* (NPSE) and to appropriate British Standards, recognised guidance and reference documents relevant to this site.

A glossary of technical terminology is included in Appendix A to support this document.

1.1 Site Conditions

The existing site currently consists of several operating commercial units, it is bound by:

- Residential properties to the north;
- A large distribution building to the east;
- A6193 with residential properties further afield to the south;
- The Hornet public house with the A664 further afield to the west.

The proposed development is to create a petrol filling station (PFS) with fifteen (15) associated car parking spaces and twelve (12) EV charging spaces, an automatic car wash and two (2) hand wash car bays as well as two (2) drive-thru units with forty-five (45) associated car parking spaces total. Delivery operations to the site will occur during the daytime period (0700h-2300h) only. It has been confirmed as part of this assessment that HGV engines and chiller units will be turned off during these operations to ensure noise are mitigated. The car washes will operate during the hours of 0800h-2100h.

Figure 1.1
Proposed Site Plan



1.2 Noise Sensitive Receptor (NSR) Locations

Noise contributions have been considered at the following noise sensitive locations based on their proximity to the site:

- NSR1 – 2-6 Helmsman Lane, Rochdale OL16 4PS (2-Storey residential properties);
- NSR2 – 1-5 Wallis Avenue, Rochdale OL16 4GP (2-Storey residential properties);
- NSR3 – 29 & 31 Wallis Avenue, Rochdale OL16 4GP (2-Storey residential properties);
- NSR4 – 33 Wallis Avenue, Rochdale OL16 4GP & 1 Michael Faraday Avenue, Rochdale OL16 4GN (2-Storey residential properties);
- NSR5 – 62 & 64 Stiups Lane, Rochdale OL16 4XB (2-Storey residential properties).

Where applicable, the assessment has been undertaken based on predicted noise contributions at both ground floor (1.5 m) and first floor (4.0 m) windows.

The locations of each receptor are presented in Appendix C.

2.0 GUIDANCE

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the NPPF with the objective of contributing to the achievement of sustainable development.

The NPPF states that the planning system has three overarching objectives in achieving sustainable development including a requirement to 'contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'

Paragraph 174 of the NPPF states:

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

...

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability."

Additionally, Paragraph 185 of the NPPF states:

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

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

2.1.1 Noise Policy Statement for England

The 'Noise Policy Statement for England' sets out the following vision for ongoing noise policy:

"Promote good health and a quality of life through the effective management of noise within the context of Government policy on sustainable development."

This vision should be achieved through the following Noise Policy Aims:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;*
- mitigate and minimise adverse impacts on health and quality of life; and*
- where possible, contribute to the improvement of health and quality of life."*

To achieve this vision, the Noise Policy Statement sets 3 noise levels to be defined by the assessor:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms: below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the Policy Statement requires that:

“...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development... This does not mean that such adverse effects cannot occur.”

Where noise levels are below the LOAEL, it is considered there will be no adverse effect. Once noise levels are below the NOEL, there will be no observable change.

Summaries of the relevant standards are given below.

2.2 Local Policy

2.2.1 Rochdale: Adopted Core Strategy (October 2016)

For noise impacts from developments, the following policy within the Rochdale Borough Council Local Plan is deemed most relevant for the proposed development.

“Policy G9 – Reducing the impact of pollution, contamination and land instability

We will reduce all forms of pollution, contamination and land instability in the borough, by:

b. Requiring that development does not have impacts that lead to an unacceptable increase in air, water, noise, light or other pollution;”

2.3 Best Practice and Other Relevant Guidance

2.3.1 Bayerisches Landesamt für Umwelt (BayLfU) 2007 Parking Area Noise. Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centers and Bus Stations as well as of Multi-Story Car Parks and Underground Car Parks (Bayerisches Landesamt für Umwelt) ISBN: 3-936385-26-2

BayLfU presents the recommended calculation method for determining noise emissions from parking areas serving a variety of uses. It provides details of the input quantities and the relevant calculation methodologies. Application of this standard is considered appropriate in lieu of there being a recognised and reliable British standard.

2.3.2 *British Standard (BS) 7445-1:2003 – Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures*

This document defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.

The methods and procedures described in this British Standard are intended to be applicable to sounds from all sources, individually and in combination, which contribute to the total noise at a site. This British Standard does not specify limits for environmental noise.

2.3.3 *BS 4142:2014+A1:2019 Method for Rating and Assessing Industrial and Commercial Sound*

BS 4142:2014+A1:2019 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

2.3.4 *ISO 9613 Attenuation of Sound during Propagation Outdoors*

ISO 9613 presents a calculation methodology for the determination of the attenuation of sound outdoors. The methodology enables the prediction the levels of environmental noise at a distance from a variety of sources.

3.0 ASSESSMENT METHODOLOGY

3.1 Assessed Sources of Environmental Noise

With reference to the guidance detailed within Section 2.0, Table 3.1 presents the specific methodology adopted for the assessment of noise arising from the development proposals.

Table 3.1
Assessed Sources of Environmental Noise

Potential Noise Source	Relevant Assessment Methodology
Site Servicing Arrangements (i.e HGV Deliveries)	BS 4142:2014+A1:2019
Car Parking	BS 8233:2014
Fixed Plant/Electric Vehicle Charger (EVC)	BS 4142:2014+A1:2019
Automatic/Hand Car Wash	BS 4142:2014+A1:2019

3.2 Selection of Assessment Criteria

The following criteria have been selected to determine the threshold of effect levels in the context of the National Planning Policy Framework and Noise Policy Statement for England.

Table 3.2
Assessment Criteria: BS 4142:2014+A1:2019

Effect Level	Criteria	Justification
Lowest Observed Adverse Effect Level (LOAEL)	Free-field external noise levels at adjacent sensitive receptor locations within +5 dB of representative background noise level	Noise levels + 5 dB above background are considered an indication of where adverse noise impacts may occur in the context of BS 4142. Noise levels below this level are an indication that it is less likely that the specific sound source will have an adverse impact
Significant Observed Adverse Effect Level (SOAEL)	Free-field external noise levels at receptor above +10 dB of representative background noise level	None – Planning guidance requires that impacts must be reduced below the SOAEL through mitigation, with adverse impacts above the Lowest Observable Adverse Impact Level (LOAEL) but below the SOAEL being mitigated as far as is reasonable.

Table 3.3
Assessment Criteria: BS 8233:2014

Effect Level	Criteria	Justification
Lowest Observed Adverse Effect Level (LOAEL)	Internal Noise Levels at adjacent sensitive receptor locations below 35 dB $L_{Aeq, 16hr}$ / 30 dB $L_{Aeq, 8hr}$ / 45 dB L_{AfmMax}	Noise Levels within BS 8233:2014 target criteria.
Significant Observed Adverse Effect Level (SOAEL)	Internal Noise Levels at adjacent sensitive receptor locations exceed 40 dB $L_{Aeq, 16hr}$ / 35 dB $L_{Aeq, 8hr}$ / 50 dB L_{AfmMax}	None – Planning guidance requires that impacts must be reduced below the SOAEL though mitigation, with adverse impacts above the Lowest Observable Adverse Impact Level (LOAEL) but below the SOAEL being mitigated as far as is reasonable.

4.0 ENVIRONMENTAL NOISE SURVEY

Daytime and night-time measurements were undertaken from the 27th of April to the 2nd of May 2023 and 17th to the 18th of May 2023. The noise measurements established typical external ambient and background noise levels at the site.

4.1 Survey Methodology

The equipment used during the survey is detailed in Appendix B. Sound level meters were calibrated before and after the measurements and no significant calibration drifts were found to have occurred (>0.2dB). All of the noise monitoring equipment had been calibrated to a traceable standard within the twenty-four months preceding the survey. Calibration certificates are available on request.

Two measurement locations were surveyed in order to establish the typical ambient and background noise levels at the proposed development site. The measurement locations are hereby referred to in this report as follows:

- 'Location 1' – sound level meter positioned approximately 1.5m from the ground on the northern boundary of the site;
- 'Location 2' – sound level meter positioned approximately 2m from the ground in the garden of 29 Lichfield Terrace, Rochdale.

The measurement locations are shown in Appendix C.

4.2 Survey Results

The weather during the unattended survey was suitable for all of the noise measurements, it being dry with low wind speeds. A summary of the measured data is shown in Table 4.1 overleaf. Full survey results are available on request.

Table 4.1
Summary of Measured Noise Levels – 27/04/23 - 02/05/23 & 17/05/23 - 18/05/23 – free field, dB

Location	Date	Period	Time (h)	L _{Aeq, T}	L _{A10}	L _{A90}	L _{AFMax}
1	17/05/23	Daytime	2100h-2300h	50.7	51.9	45.2	74.9
	17/05/23-18/05/23	Night-time	2300h-0100h	47.0	48.4	39.0	83.7
	18/05/23	Night-time	0600h-0700h	53.7	55.1	51.6	66.3
	18/05/23	Daytime	0700h-0800h	54.0	55.3	51.4	76.0
2	27/04/23	Daytime	1700h-2300h	51.8	53.0	48.3	70.2
	27/04/23-28/04/23	Night-time	2300h-0700h	49.7	50.9	44.2	73.5
	28/04/23	Daytime	0700h-2300h	51.7	53.6	46.0	77.6
	28/04/23-29/04/23	Night-time	2300h-0700h	48.9	49.7	42.4	75.5
	29/04/23	Daytime	0700h-2300h	50.3	51.8	44.8	80.9
	29/04/23-30/04/23	Night-time	2300h-0700h	47.4	48.6	42.0	78.0
	30/04/23	Daytime	0700h-2300h	51.0	52.2	47.0	79.9
	30/04/23-01/05/23	Night-time	2300h-0700h	46.8	47.5	39.4	77.0
	01/05/23	Daytime	0700h-2300h	48.4	49.9	42.5	77.0
	01/05/23-02/05/23	Night-time	2300h-0700h	48.4	48.8	42.3	74.8
	02/05/23	Daytime	0700h-2300h	64.0	57.4	48.3	101.5

4.2.1 Observations

The noise environment at the development site was dominated by road traffic noise from the surrounding road network; primarily attributed to the A6193 Sir Isaac Newton Way to the south and the A664 Rochdale Bypass to the west.

4.2.2 BS 4142:2014+A1:2019 Background (L_{A90}) Statistical Analysis

In accordance with the methodology detailed at Section 8 of BS 4142:2014+A1:2019, representative background noise levels have been determined through statistical analysis of all 15-minute samples and are expressed as integers (with 0.5 dB being rounded up).

In this scenario, at Location 1, due to the small number of samples that were collected during the survey, a statistically averaged background could not be calculated for use within the assessment. Therefore, the lowest $L_{A90,15min}$ of 43dB(A) during the daytime and 37dB(A) during the night-time have been selected as the representative background noise levels for the site.

The results of the statistical analysis of measured background noise levels at Location 2 are presented in a graphical format for both daytime and night-time, in Figures 4.1 to 4.2 below. The records highlighted in teal in each figure denote the representative background levels used within this assessment.

Figure 4.1
Location 2 – Daytime Background (L_{A90}) Analysis

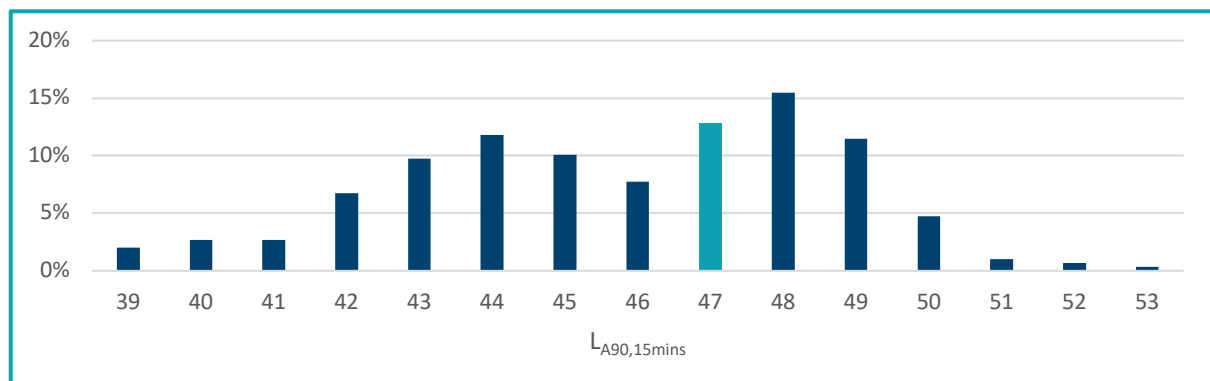
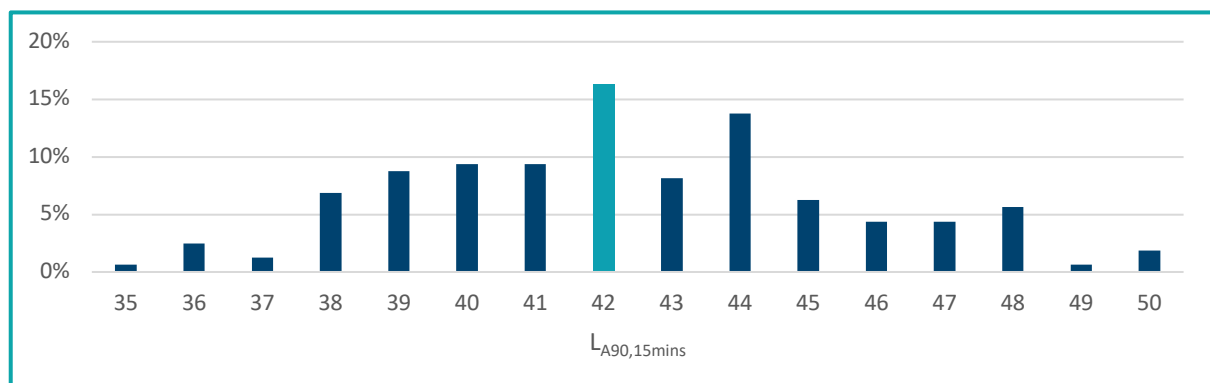


Figure 4.2
Location 2 – Night-time Background (L_{A90}) Analysis



5.0 NOISE MODELLING METHODOLOGY

5.1 Data Sources

Modelling calculations have been undertaken based on the spatial settings and data sources identified in the Table below.

Table 5.1
Noise Model Input Data

Parameter	Scenario	Data Source	Assumptions
Site Plans	Existing	OS Mastermap Data	Existing building heights modelled as 8.5m AGL (typical 2-storey building height)
	Proposed	Feasibility 1826-4 ADS Design 31 st May 2022	None
Ground Heights	All	Environment Agency Open Data LiDAR Digital Terrain Model (2.0m resolution)	None
Ground Absorption	All	n/a	Hard ground on and off site (G=0), roads hard/reflective (G=0)
Reflections	All	n/a	3 rd order reflections have been accounted for within the noise model
Barriers/Boundary Treatment	Proposed	n/a	Please See Figure 6.1

5.2 Source Noise Assumptions

5.2.1 Fixed Plant/Electric Vehicle Charger

Noise source measurements have been undertaken of an Electric Vehicle Charger, during use, of a unit similar to the unit proposed. A summary of the assessed noise sources associated with Electric Vehicle Charging (EVC) is presented in Table 5.2.

Table 5.2
Electric Vehicle Charging Data Summary

Noise Source	Assessed Metric	Parameter	Data Source(s)
Electric Vehicle Charger	L _{Aeq}	Broadband Noise Output	Source noise measurements taken at 1m adjacent to a 150kW Hypercharger Station
		Spectral Data	

Source noise level data utilised in the assessment of ambient noise (L_{Aeq}) contributions for the EVC are presented in the Table 5.6.

Table 5.3
Electric Vehicle Charging: Assessed Noise Source Sound Power Levels
(Ambient Noise Level L_{Aeq} Assessment)

Noise Source	Octave Band Sound Power Level (L_w), Hz (dB(Z))							
	63	125	250	500	1000	2000	4000	8000
Electric Vehicle Charger	73.2	70.0	70.9	74.0	72.1	65.3	63.4	51.9

However, at the current design stage, there is no fixed M&E strategy for the drive-thru units and PFS. However, for the purposes of presenting a robust assessment and to give an indication of the development's potential operational noise output, indicative plant limits have been determined for the development operating.

Once details of the confirmed M&E strategy become available, further assessment should be undertaken to ensure plant noise contributions are adequately controlled.

For the basis of this assessment, fixed plant has been assumed to be located 1.5m above ground level with the plant compound to the north-west of the proposed coffee shop. Indicative plant locations and EVC locations are represented by a teal "+" in Figure 5.1, overleaf.

Figure 5.1
Indicative Fixed Plant Location



N.b. In accordance with ISO 9613-1, where spectral content of assessed noise sources is not available, such as indicative fixed plant limits, the attenuation terms for 500Hz are applied to determine noise contributions at adjacent sensitive receptor locations.

Indicative plant limits have been determined based on their cumulative noise output falling 10dB below the existing ambient noise environment. This ensures that the conclusions associated with other elements within this assessment will not be affected by noise from fixed plant, and the existing ambient noise environment will not be altered by the inclusion of plant items.

Indicative plant limits are presented overleaf:

Table 5.4
Fixed Plant Noise Limits

Time Period	Operational Noise Output L_{WA} dB (per unit)
Daytime	79.1
Night-time	72.5

5.2.2 Servicing Arrangements (i.e. HGV Deliveries)

Given the inherent variability in noise output from site servicing operations, modelling has been undertaken based on knowledge of typical delivery operations from similar sites.

It has been assumed that all delivery operations will be undertaken externally to the petrol station and drive-thru units with unloading undertaken via the use of tail lift and roll cages, as is typical of developments of this nature. Petrol filling operations will take place externally in close proximity to the proposed petrol pump locations.

Where available, current industry research has been utilised as the preferred source of data for the assessment. Although in some instances there is a lack of research available, and reliance has been placed on noise survey data from similar operations.

A summary of all assessed noise sources associated with site servicing is presented in Table 5.5 overleaf. The Table also provides details of the associated data sources utilised to inform the assessment.

Table 5.5
Site Servicing Data Summary

Noise Source	Assessed Metric	Parameter	Data Source(s)
HGV Manoeuvre (Pass-by)	L _{Aeq}	Broadband Noise Output	Bayerisches landesamt für Umwelt – Parking Area Noise (BayLfU, 2007)
		Spectral Data	Dragonfly Delivery Noise Survey (Planning Application: Harrogate – 17/0045/FULM)
HGV Idling (Stand Noise)		Broadband Noise Output	Bayerisches landesamt für Umwelt – Parking Area Noise (BayLfU, 2007)
		Spectral Data	Dragonfly Delivery Noise Survey (Planning Application: Harrogate – 17/0045/FULM)
HGV (Un)loading Using Roll Cage and Tail Lift	L _{Aeq}	Broadband Noise Output	Dragonfly Report DC3417-R1v2 (Land South of High Street, Wootton PA/2021/610)
		Spectral Data	
Petrol Tanker Unloading (Filling up of the underground petrol storage)	L _{Aeq}	Broadband Noise Output	Bayerisches landesamt für Umwelt – Parking Area Noise (BayLfU, 2007)
		Spectral Data	Dragonfly Report DC3468-R1v5 (Bawtry Road, Selby 2020/0976/FUL)

Source noise level data utilised in the assessment of ambient noise (L_{Aeq}) and maximum noise (L_{Amax}) contributions are presented in the Tables below. All data is presented as sound power levels with no 'on-time', speed or other corrections.

Table 5.6
Servicing Arrangements: Assessed Noise Source Sound Power Levels
(Ambient Noise Level L_{Aeq} Assessment)

Noise Source	Octave Band Sound Power Level (L _w), Hz (dB(Z))								Sum dB(A)
	63	125	250	500	1000	2000	4000	8000	
HGV Manoeuvre (Pass-by)	107.7	102.8	105.0	102.7	101.9	95.9	88.5	78.9	105.6
HGV Idling (Stand Noise)	97.7	92.8	95.0	92.7	91.9	85.9	78.5	68.9	95.6
HGV (Un)loading Using Roll Cage and Tail Lift	78.2	78.1	77.6	81.2	79.0	74.8	69.0	60.1	83.1
Petrol Tanker Unloading	57.2	57.8	69.7	80.8	85.1	86.7	84.6	74.9	91.0

Operational Assumptions – Delivery Events

The following are the proposed number of HGVs entering and exiting the site:

- 1no. during the daytime worst-case 1-hour period.

For the purposes of this assessment, it is assumed that Drive-Thru and Petrol deliveries will only take place during the daytime period; 0700h-2300h.

In accordance with BS 4142:2014+A1:2019, Table 5.7 presents a summary of the operational assumptions accounted for within the noise model to determine L_{Aeq,1hr} noise contributions at adjacent sensitive receptor locations during the daytime reference periods respectively. Assumptions are based around a typical delivery / collection taking 15mins to complete unless stated otherwise.

Table 5.7
Operational Assumptions (Per Assessed Delivery Event)

Noise Source	Source Type	Height Above Ground Level (AGL)	Operational Assumptions
HGV Manoeuvre (Pass-by)	Moving Point Source	1.0m	HGVs travelling at 10km/h along access route. 1 complete manoeuvre per event (i.e., 1 in or 1 out)
HGV Idling (Stand Noise)	Point Source	1.0m	30sec total idling (30sec on arrival or 30sec pre-departure)
HGV (Un)loading Using Roll Cage and Tail Lift		1.0m	(Un)loading operations take approximately 15mins to complete
Petrol Filling Delivery		1.0m	Petrol filling operations take approximately 30 mins to complete

5.2.3 Car Parking

Operational Assumptions – Car Parking and Drive Thru/Petrol Station Visitations

Noise emissions from car parking events have been modelled in accordance with ‘BayLfU Parking Area Noise’. The trip data for the proposed PFS and drive thru units has been provided by Dynamic Transport.

Tables 5.8-5.11 below provides a summary of all parameters included within the BayLfU parking area sources.

Table 5.8
BayLfU Modelling Input Data – PFS Parking

Parameter	Input
Emissions Calculation	LfU-Study-2007
No. Parking Spaces	28
Events per space (1hr – Day)	3.5 (per space)
Events per space (15min – Night)	0.7 (per space)

Table 5.9
BayLfU Modelling Input Data – Petrol Station Visitations

Parameter	Input
Emissions Calculation	LfU-Study-2007
Visitations (Car) (1hr – Day)	40
Visitations (Car) (1hr – Night)	15
Visitations (Truck) (1hr – Day)	5
Visitations (Truck) (1hr – Night)	3

Table 5.10
BayLfU Modelling Input Data – Drive-Thru Parking

Parameter	Input
Emissions Calculation	LfU-Study-2007
No. Parking Spaces	Varies per car park
Events per space (1hr – Day)	3.5 (per space)
Events per space (15min – Night)	0.7 (per space)

Table 5.11
BayLfU Modelling Input Data – Drive-Thru Visitations

Parameter	Input
Emissions Calculation	LfU-Study-2007
Visitations (Car) (1hr – Day)	40
Visitations (Car) (1hr – Night)	15

The noise model input data for the assessment of car parking maximum noise events is presented in Table 5.12 below.

Table 5.12
Car Parking: Assessed Noise Source Sound Power Levels
(Maximum Noise Level L_{Amax} Assessment)

Noise Source	Octave Band Sound Power Level (L_{WA}), Hz (dB(A))								Sum dB(A)
	63	125	250	500	1000	2000	4000	8000	
Car Parking L_{Amax} Event	63.8	67.8	75.8	79.1	84.9	82.3	78.2	73.5	88.5

5.2.4 Car Washing Events

It is proposed for the automatic car wash that once a car is within the car wash the roller shutter doors on either side would close automatically and will remain close until the cycle/wash is over. It has been assumed as a worst-case that all sides of the building enclosing the car wash's will be 1mm steel as it worse performing than glass or a roller shutter door. Table 5.13 below shows the sound reduction index of the steel.

Table 5.13
4.5mm Steel Sound Reduction Performance

Sound Reduction Performance, dB R								Weighted Average, dB R_w
63	125	250	500	1000	2000	4000	8000	
15	15	17	22	27	32	38	38*	28

**Noise data for 8kHz unavailable therefore assumed
to be consistent with adjacent octave band*

A summary of all assessed noise sources associated with site servicing is presented in Table 5.14 below. The Table also provides details of the associated data sources utilised to inform the assessment.

Table 5.14
Car Wash Data Summary

Noise Source	Assessed Metric	Parameter	Data Source(s)
Car Wash (WashTec EasyWash)	L _{Aeq}	Broadband Noise Output Spectral Data	Dragonfly Petrol Filling Station Assessment, (<i>Planning Application: Selby – 2020/0976/FUL</i>).
Car Wash (Hand Car Wash)	L _{Aeq}	Broadband Noise Output Spectral Data	Dragonfly Car Wash Assessment (<i>Planning Application: Broxtowe – 22/00426/FUL</i>)

The potential impact of the proposed hand car wash has been assessed using the following associated noise levels:

Table 5.15
Car Wash Noise Source Sound Power Level – free-field, dB

Noise Source	Octave Band Sound Power Level (L _{WA}), Hz (dB(A))								Sum dB(A)
	63	125	250	500	1000	2000	4000	8000	
Hand Car Wash	64.1	73.5	82.6	90.0	94.5	95.1	94.2	91.9	100.6
Automatic Car Wash	59.5	67.5	77.1	79.5	85.3	87.1	84.8	81.4	91.6

Table 5.16 presents a summary of the operational assumptions accounted for within the noise model to determine ambient noise contributions at adjacent sensitive receptor locations.

Table 5.16
Operational Assumptions (Per Assessed Delivery Event)

Noise Source	Source Type	Height Above Ground Level (AGL)	Operational Assumptions
Car Wash (WashTec EasyWash)	Area/Vertical Area Sources	3.0m	Operating for 15 minutes within a 1 hour period during the daytime
Car Wash (Hand Car Wash)	Area/Vertical Area Sources	3.0m	Operating for 15 minutes within a 1 hour period during the daytime

5.3 Uncertainty

5.3.1 Survey

Given the duration of the survey and the use of the highest measured daytime and night-night noise levels to ascertain noise propagation across the site, it is considered that the limits of Class 1 sound level meters are the only limiting factor when considering survey uncertainty.

Standard equipment uncertainties have been considered by applying allowable tolerances minus the maximum allowable test laboratory uncertainties given in IEC 61672-1, as defined by Narang and Bell (*Narang, P. and Bell, T., 2008. New IEC standards and periodic testing of sound level meters. Proceedings of the Internoise, Shanghai, China, pp.26-29*).

The following table provides an overview of standard equipment uncertainties relevant to the SLM class utilised within the survey.

Table 5.17
Standard uncertainties using allowable tolerances minus test laboratory tolerances given in IEC 61672-1 (source: Narang and Bell, Table 14)

SLM Class	Frequency Weighting	Directional Response	Level Linearity	Toneburst Response	Calibrator (IEC 61672)	Supply Voltage	Combined Standard Uncertainty +/- dB
Class 1	0.5	0.5	0.4	0.25	0.125	0.05	0.9

5.3.2 Modelling

CadnaA noise modelling software has been utilised to ascertain how noise propagates throughout the proposed development. The software directly incorporates the ISO 9613 calculation procedure which has an uncertainty rating of +/- 3dB.

5.3.3 Combined Uncertainty

Based on the information provided above, the combined Root Sum Squared (RSS) uncertainty for the assessment has been calculated as +/- 3.2dB.

6.0 ASSESSMENT

Noise levels from each location represent the NSRs as follows:

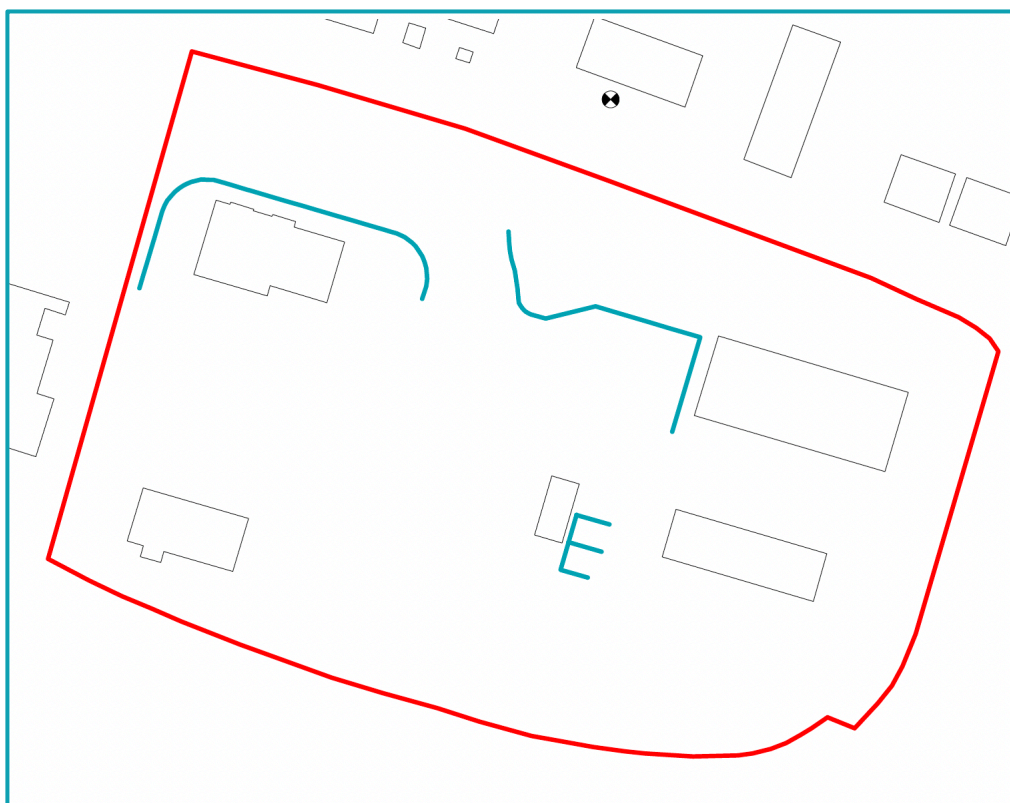
- NSR1 – Location 1;
- NSR2 – Location 1;
- NSR3 – Location 1;
- NSR4 – Location 1;
- NSR5 – Location 2.

6.1 Proposed Noise Mitigation

Investigative noise modelling has been undertaken to determine the most appropriate approach ensure that noise effects are mitigated to below the LOAEL. In this instance, it has been determined that limiting servicing operations (HGV deliveries) to daytime hours (0700h–2300h) and including boundary treatments, in the form of 2.0m reflective noise barriers to the north of the servicing area and the drive-thru lane and a 2.3m barrier around the jet wash bays, will be suitable to mitigate levels to below the LOAEL for the assessment.

The recommended boundary treatment plan is shown in Figure 6.1 with noise barriers shown in teal. Noise barriers should be a solid construction with a minimum mass of 12kg/m³.

Figure 6.1
Noise Barrier Location Plan



6.2 Fixed Plant/Electric Vehicle Charger

6.2.1 Maximum Limits Assessment

As the operational noise characteristics of the plant are not yet known, to account for any potentially adverse acoustic characteristics, a correction of +4dB has been applied to determine the rating level (L_{ArTr}) in accordance with BS 4142:2014+A1:2019. This is based on fixed plant potentially having clearly perceptible tonality which is often attributed to such noise sources.

The results of the assessment are shown in Table 6.1. In accordance with BS 4142:2014+A1:2019 Paragraph 8.6, the background levels are expressed as integers (with 0.5 dB being rounded up):

Table 6.1
Assessment of Plant Noise Impact at NSRs, dB

NSR	Floor	Existing Measured Background (L_{A90})		Predicted Noise Rating Level (L_{ArTr})		BS 4142:2014+A1:2019: Difference between Rating Level and Background	
		Daytime 0700h – 2300h	Night- time 2300h – 0700h	Daytime	Night- time	Daytime	Night- time
1	Ground Floor (GF)	43	37	41.3	36.0	-1.7	-1.0
	First Floor (FF)			41.6	36.7	-1.4	-0.3
2	GF			39.9	34.8	-3.1	-2.2
	FF			40.8	36.7	-2.2	-0.3
3	GF			42.6	36.3	-0.4	-0.7
	FF			43.0	37.0	0.0	0.0
4	GF			42.7	36.3	-0.3	-0.7
	FF			43.0	36.9	0.0	-0.1
5	GF	47	42	32.4	31.0	-14.6	-11.0
	FF			32.4	30.9	-14.6	-11.1

As shown in Table 6.1 above, providing the cumulative noise output of all external fixed plant is kept within the previously determined limits (presented in Table 5.2), noise contributions will be at most, equal to background during both the daytime and night-time reference periods, inclusive of a +4dB character correction for uncertainty. Noise impacts arising from the cumulative operation of fixed plant items is therefore predicted to be below the LOAEL for the assessment.

6.3 Servicing Arrangements (i.e. HGV Deliveries)

6.3.1 BS 4142:2014+A1:2019 Assessment

The assessment of ambient noise contributions (L_{Aeq}) from HGV deliveries has been undertaken following the guidance within BS 4142:2014+A1:2019.

In accordance with BS 4142:2014+A1:2019, a +3dB acoustic character correction, to account for the intermittent nature of the operations, has been applied to the predicted ambient noise contributions (L_{Aeq}) to determine the rating level (L_{ArTr}).

The results of the assessment are shown in Table 6.2. In accordance with BS 4142:2014+A1:2019 Paragraph 8.6, the background levels are expressed as integers (with 0.5 dB being rounded up):

Table 6.2
Assessment of Site Servicing Noise Impact at NSRs, dB

NSR	Floor	Existing Measured Background (L_{A90}) Daytime 0700h-2300h	Predicted Noise Rating Level (L_{A_rTr})	BS 4142:2014+A1:2019 Difference between Rating Level and Background
1	GF	43	46.0	+3.0
	FF		46.7	+3.7
2	GF		46.5	+3.5
	FF		47.2	+4.2
3	GF		40.7	-2.3
	FF		41.5	-1.5
4	GF		39.5	-3.5
	FF		40.1	-2.9
5	GF	47	37.2	-9.8
	FF		37.4	-9.6

The results of the assessment presented in Table 6.2 indicate that noise contributions from site servicing arrangements (including HGV Deliveries), are predicted to be at most 4.2dB above existing measured background noise levels at all NSRs during the day. Noise impacts arising from site servicing operations are therefore predicted to be below the LOAEL for the assessment.

6.4 Servicing Arrangements (Petrol Filling)

6.4.1 BS 4142:2014+A1:2019 Assessment

The assessment of ambient noise contributions (L_{Aeq}) from petrol deliveries to the PFS has been undertaken following the guidance within BS 4142:2014+A1:2019.

In accordance with BS 4142:2014+A1:2019, a +3dB acoustic character correction, to account for the intermittent nature of the operations, has been applied to the predicted ambient noise contributions (L_{Aeq}) to determine the rating level (L_{A_rTr}).

The results of the assessment are shown in Table 6.3, overleaf. In accordance with BS 4142:2014+A1:2019 Paragraph 8.6, the background levels are expressed as integers (with 0.5 dB being rounded up):

Table 6.3
Assessment of Petrol Filling Noise Impact at NSRs, dB

NSR	Floor	Existing Measured Background (L_{A90}) Daytime 0700h-2300h	Predicted Noise Rating Level (L_{A+Tr})	BS 4142:2014+A1:2019 Difference between Rating Level and Background
1	GF	43	40.7	-2.3
	FF		41.2	-1.8
2	GF		40.4	-2.6
	FF		41.6	-1.4
3	GF		35.4	-7.6
	FF		36.6	-6.4
4	GF		33.3	-9.7
	FF		34.7	-8.3
5	GF	47	35.1	-11.9
	FF		35.2	-11.8

The results of the assessment presented in Table 6.4 indicate that noise contributions from petrol filling are predicted to be at least 1.4dB below the existing measured background noise levels at all NSRs during the daytime period. Noise impacts arising from site petrol filling are therefore predicted to be below the LOAEL for the assessment.

6.5 Car Parking Assessment

6.5.1 BS 8233:2014 L_{Aeq} Assessment

Ambient noise contributions from car parking, drive-thru visitation and petrol station visitation events have been assessed with windows open at the nearest sensitive receptors (NSRs). To present a worst-case, a nominal reduction of 15dB has been applied to account for attenuation through a partially open window. The results of the assessment are presented in Tables 6.4 to 6.6.

Table 6.4
BS 8233:2014 Assessment Levels at NSRs, (Daytime), dB

NSR	Floor	External Noise Levels $L_{Aeq,T}$	Internal Noise Levels $L_{Aeq,T}$	BS 8233:2014 Internal Target Criteria Daytime $L_{Aeq,T}$	Within BS 8233:2014 Criteria Y/N
1	GF	45.2	30.2	35	Y
	FF	46.9	31.9		Y
2	GF	44.7	29.7		Y
	FF	46.2	31.2		Y
3	GF	40.3	25.3		Y
	FF	41.6	26.6		Y
4	GF	38.2	23.2		Y
	FF	40.1	25.1		Y
5	GF	35.8	20.8		Y
	FF	36.0	21.0		Y

Table 6.5
BS 8233:2014 Assessment Levels at NSRs, (Night-time), dB

NSR	Floor	External Noise Levels L _{Aeq,T}	Internal Noise Levels L _{Aeq,T}	BS 8233:2014 Internal Target Criteria Night-time L _{Aeq,T}	Within BS 8233:2014 Criteria Y/N
1	GF	39.5	24.5	30	Y
	FF	41.0	26.0		Y
2	GF	39.0	24.0		Y
	FF	40.7	25.7		Y
3	GF	34.0	19.0		Y
	FF	35.6	20.6		Y
4	GF	32.3	17.3		Y
	FF	34.1	19.1		Y
5	GF	29.2	14.2		Y
	FF	29.4	14.4		Y

Table 6.6
BS 8233:2014 Assessment Levels at NSRs, (Night-time) L_{AfiMax}

NSR	Floor	External Noise Levels $L_{Aeq,T}$	Internal Noise Levels $L_{Aeq,T}$	BS 8233:2014 Internal Target Criteria Night-time L_{AfiMax}	Within BS 8233:2014 Criteria Y/N
1	GF	41.9	26.9	45	Y
	FF	43.9	28.9		Y
2	GF	42.0	27.0		Y
	FF	42.2	27.2		Y
3	GF	33.6	18.6		Y
	FF	37.1	22.1		Y
4	GF	32.3	17.3		Y
	FF	33.4	18.4		Y
5	GF	32.8	17.8		Y
	FF	32.8	17.8		Y

As shown in Tables 6.4 to 6.6, predicted noise contributions, fall below BS 8233:2014 target internal noise criteria for daytime (35dB $L_{Aeq,T}$), night-time (30 dB $L_{Aeq,T}$) and night-time maximum criteria (45dB L_{AfiMax}). As demonstrated above, predicted external noise contributions also fall below the target external amenity criteria (50dB/55dB $L_{Aeq,T}$). Noise impacts arising from car park operations are therefore predicted to be below the LOAEL for the assessment.

6.6 Car Wash Noise

An assessment has been made to determine the scale of impact during the operating hours for the Car Wash of 0800h-2100h.

It is considered that, as the Car Wash is different in both noise output and the sporadic nature in which it is likely to be used, a correction for intermittency (+3dB) has been included.

Table 6.7
Assessment of Car Wash Noise Impact at NSRs, dB

NSR	Floor	Existing Measured Background (L_{A90}) Daytime 0800h-2100h	Predicted Noise Rating Level ($L_{A,TTr}$)	BS 4142:2014+A1:2019 Difference between Rating Level and Background
1	GF	43	35.9	-7.1
	FF		37.9	-5.1
2	GF		42.7	-0.3
	FF		46.8	+3.8
3	GF		39.4	-3.6
	FF		41.8	-1.2
4	GF		36.3	-6.7
	FF		39.2	-3.8
5	GF	47	43.2	+0.2
	FF		43.2	+0.2

The results of the assessment presented in Table 6.7 indicate that noise contributions from the car wash, are predicted to be a maximum 3.8dB above existing measured background noise levels at all NSRs. Noise impacts arising from noise from the car wash are therefore predicted to be below the LOAEL for the assessment.

6.7 Assertion of Competence

This assessment has been completed by Bailey Hoare, Acoustic Consultant with responsibilities for completing acoustic reports on behalf of Dragonfly Consulting.

I hold the Institute of Acoustic Diploma in Acoustics and Noise Control, a Master of Science in Conservation Science, with Honours, and a Bachelor of Science in Environmental Science, with Honours, from the University of Exeter. I am an Associate Member of the Institute of Acoustics (AMIOA).

7.0 CONCLUSIONS

EG Group has appointed Dragonfly Consulting to carry out a Noise Impact Assessment for a proposed commercial development on Kingsway Business Park, Rochdale.

The noise assessment has been conducted in accordance with the National Planning Policy Framework (NPPF) and Noise Policy Statement for England (NPSE) with reference to appropriate British Standards, recognised guidance and reference documents relevant to this site.

7.1 Fixed Plant Assessment

This assessment shows that the cumulative noise output of all external fixed plant is kept within the previously determined limits, noise contributions will be at most, equal to background during both the daytime and night-time reference periods, inclusive of a +4dB character correction for uncertainty. Noise impacts arising from the cumulative operation of fixed plant items is therefore predicted to be below the LOAEL for the assessment.

7.2 Servicing Arrangements (i.e., HGV Deliveries)

The results of the assessment indicate that noise contributions from site servicing arrangements (including HGV Deliveries), are predicted to be at most 4.2dB above existing measured background noise levels at all NSRs during the daytime period. Noise impacts arising from site servicing operations are therefore predicted to be below the LOAEL for the assessment.

7.3 Servicing Arrangements (Petrol Filling)

The results of the assessment indicate that noise contributions from petrol filling are predicted to be at least 1.4dB below the existing measured background noise levels at all NSRs during the daytime period. Noise impacts arising from site petrol filling are therefore predicted to be below the LOAEL for the assessment.

7.4 Car Parking Assessment

This assessment shows, predicted noise contributions, fall below BS 8233:2014 target internal noise criteria for daytime (35dB $L_{Aeq,T}$), night-time (30dB $L_{Aeq,T}$) and night-time maximum criteria (45dB $L_{A_{fMax}}$). As demonstrated above, predicted external noise contributions also fall below the target external amenity criteria (50dB/55dB $L_{Aeq,T}$). Noise impacts arising from car park operations are therefore predicted to be below the LOAEL for the assessment.

7.5 Car Wash Assessment

The results of the assessment indicate that noise contributions from the car wash, are predicted to be a maximum 3.8dB above existing measured background noise levels at all NSRs. Noise impacts arising from noise from the car wash are therefore predicted to be below the LOAEL for the assessment.

7.6 Overall Conclusion

The results of the assessment indicate that noise contributions from all processes on the proposed site, with the noise mitigation included in the design, are predicted to be below the LOAEL for the assessments.

Appendix A – Glossary of Terminology

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A-1
Sound Levels Commonly Found in the Environment

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

Acoustic Terminology

dB (decibel) The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2×10^{-5} Pa).

dB(A) A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

L_{Aeq} This is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

L₁₀ & L₉₀ If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. L₁₀ is the level exceeded for 10% of the time and is often used as a descriptor for road traffic noise. Similarly, L₉₀ is the level exceeded for 90% of the time and is often used to describe the background level. It is common practice to use the L₁₀ index to describe traffic noise.

L_{AMax} This is the maximum A-weighted sound pressure level recorded over the period stated. L_{AMax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment.

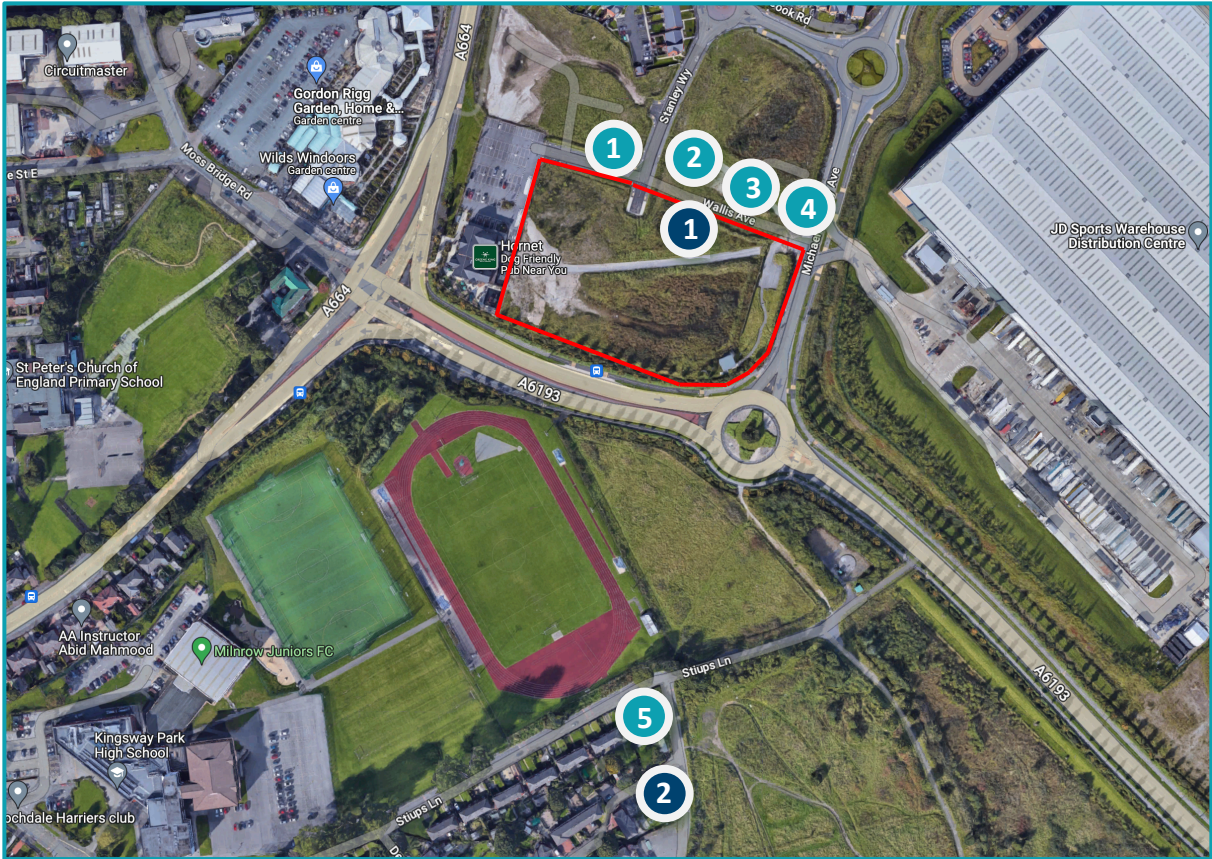
Appendix B – Monitoring Equipment

Table B-1
Noise Monitoring Equipment

Equipment	Serial Number
Svantek SV307 Noise Monitoring Station	87849
Svantek ST30 Microphone	82676
Norsonic Nor-140 Sound Level Meter	1403879
Norsonic 1209 Preamplifier	13359
Norsonic 1225 Microphone	59927
01dB Cal31 Acoustic Calibrator	89089

Appendix C – Measurement Locations

Figure C-1
Measurement Locations



-  Measurement Locations
-  Noise Sensitive Receptors
-  Development Site