



EG on the Move Ltd

Markfield Services, Little Shaw Lane

Noise Impact Assessment

DC5363-NR1



Report Version Issue Log

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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 on the Move Ltd has appointed Dragonfly Consulting to carry out a Noise Impact Assessment for a proposed motorway services at Little Shaw Lane, Markfield.

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

1.1.1 Existing Site Conditions

The proposed development site is the former 'Moto Markfield Services', situated off Little Shaw Lane west of the M1 Motorway. The former services included fast food establishments and a petrol filling station (PFS), which are now permanently closed. The services also included a Travelodge Hotel towards the southwest of the development site; the hotel is still in active use and will remain as part of the new services development. The site is bound by the following:

- Little Shaw Lane running along the northern boundary with residential dwellings adjacent and the M1 Motorway running along the eastern boundary further afield;
- A Paintballing facility to the southeast;
- Grassland to the south and west; and
- Old Cliffe Hill Quarry to the south further afield.

1.1.2 Proposed Site Conditions

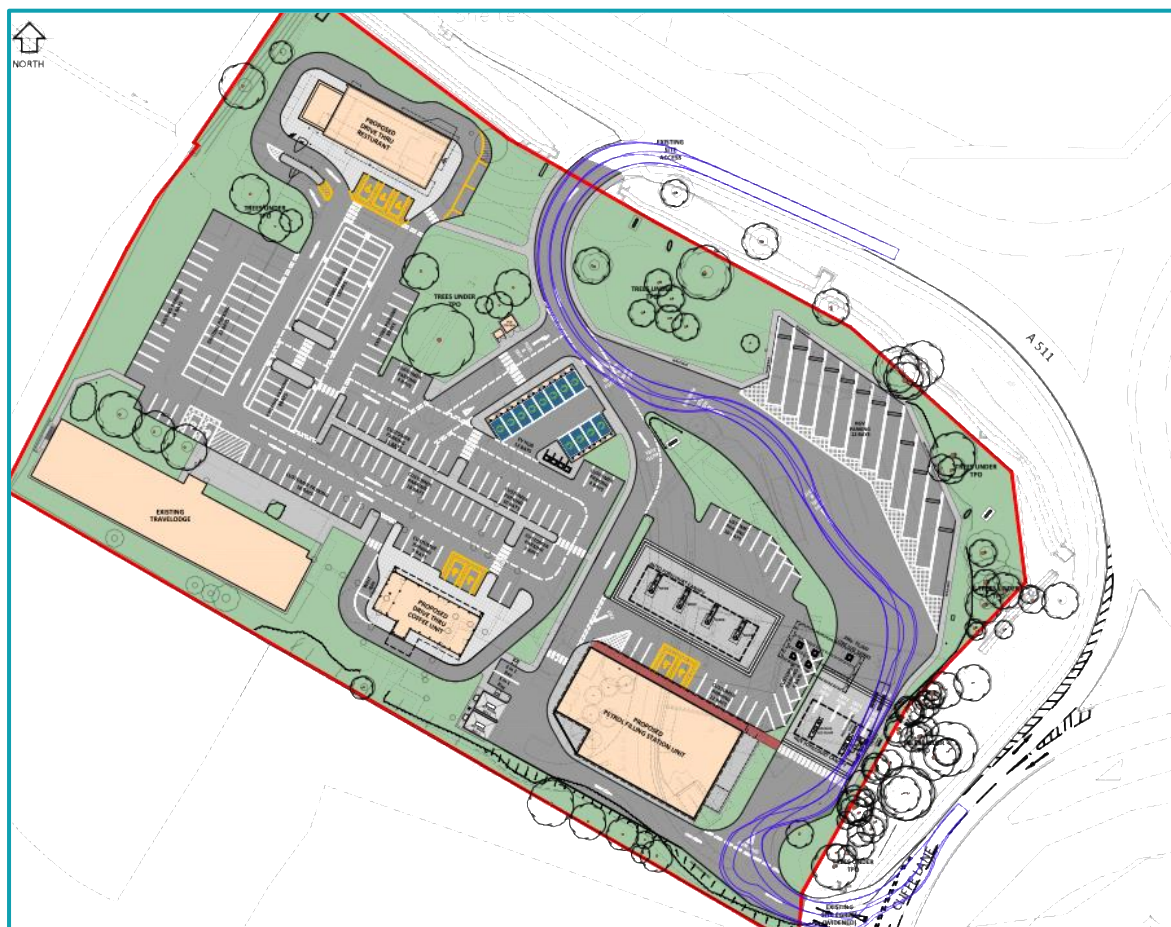
It is proposed to develop a new Motorway Services at the development site comprising of a PFS and two drive-thru units, each with associated car parking facilities, including Electric Vehicle (EV) Charging Bays and associated HGV parking bays. Vehicle site access will be from A511 Little Shaw Lane to the north, with egress from Cliffe Lane to the southeast.

It is understood that the proposed development site was formally a Moto Services including fast food establishments and a PFS. Therefore, the development site has already existing permitted use for a PFS and HGV access to the site, however, given the development proposals are introducing further drive-thru units and repositioning the former PFS Pumps, the assessment considers this to be a new application to ensure the changes do not cause adverse impact upon nearby residential use.

At this stage, and for the purposes of this assessment, it is proposed that the petrol filling station and drive-thru units will all operate 24 hours a day.

The proposed layout of the site, provided by Jennings Design (ref. 251141-SK02 Feasibility November 2025) can be seen in Figure 1.1 overleaf.

Figure 1.1
Proposed Site Layout



1.1.3 Noise Sensitive Receptor (NSR) Locations

Noise contributions have been considered at the following noise sensitive receptors (NSRs) based on their proximity to the site:

Table 1.1
Noise Sensitive Receptor (NSR) Locations

Reference	Address	Cardinal/Ordinal Direction	Description
NSR1	Travelodge Leicester, Little Shaw Lane, Markfield LE67 9PP.	Southwest.	Two-Storey Hotel.
NSR2	Residential dwellings along 192 Little Shaw Lane, Markfield, Leicester LE67 9PP.	North.	Two-Storey Residential Dwelling.

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

NSR locations are shown in Appendix C.

2.0 GUIDANCE

2.1 National Planning Guidance

2.1.1 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 187 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 198 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..."

2.1.2 Noise Policy Statement for England

The 'Noise Policy Statement for England' (NPSE) 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.

2.2 Local Planning Guidance

Hinckley and Bosworth Borough Council are undergoing the process of developing a new local plan. The most recent version is the **Consultation Draft Plan Regulation 18**, published in June 2021, and is for 2020-2039.

The Hinckley and Bosworth Borough Council Local Plan (2020-2039) states the following policies for new developments to protect amenity and the environment:

PMD01 High Quality Design

“Development will be supported where it positively takes into consideration the adopted Hinckley & Bosworth Good Design Guide (SPD), the National Design Guide and National Model Design Code, any Design Guide contained in a made Neighbourhood Plan, and any other relevant national design guidance.

Development will be supported where the following requirements are met:

...

b) The amenity and privacy of nearby residents are not adversely affected, including by matters of lighting, air quality, odour, noise, vibration and visual intrusion;”

PMD03 Preventing Pollution

“Adverse impacts from pollution will be prevented by ensuring that development proposals demonstrate that:

...

d) It would not cause noise or vibrations of a level which would disturb areas that are valued for their tranquillity in terms of recreation or amenity. Development proposals that generate significant levels of noise must be accompanied by a scheme to mitigate such effects, having regard to the nature of surrounding uses;”

2.3 Best Practice and Other Relevant Guidance

2.3.1 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.

2.3.2 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.

2.3.3 BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

BS 8233:2014 provides a methodology to calculate the noise levels entering a building through facades and façade elements and provides details of appropriate measures for sound insulation between dwellings. It includes recommended internal noise levels which are provided for a variety of situations.

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.

2.3.5 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.

2.3.6 IEMA Guidelines for Environmental Noise Impact Assessment

The guidelines state that, for any assessment, the noise level threshold and significance statements should be determined by the assessor, based upon the specific evidence and likely subjective response to the noise.

The impact scale adopted in this assessment is shown in Table 2.1 below.

Table 2.1
Impact Scale for Comparison of Future Noise against Existing Noise

Degree of Effect	Effect Descriptor
None / Not Significant	Less than 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.
Slight	A 3.0 to 4.9dB L_{Aeq} change in sound level at a receptor of some sensitivity.
Moderate	A 3.0 to 4.9dB L_{Aeq} change in sound level at a sensitive or highly sensitive noise receptor, or a greater than 5dB L_{Aeq} change in sound level at a receptor of some sensitivity.
Substantial	Greater than 5.0dB L_{Aeq} change in sound level at a noise sensitive receptor or a 5.0 to 9.9dB L_{Aeq} change in sound level at a receptor of great sensitivity to noise.
Very Substantial	Greater than 10.0dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise.

The criteria above reflect key benchmarks that relate to human perception of sound. A change of 3dB(A) is generally considered to be the smallest change in noise that is perceptible. A 10dB(A) change in noise represents a doubling or halving of the noise level.

It is considered that the criteria specified in the above table do provide a good indication as to the likely significance of changes in noise levels in this case. Therefore, the above noise threshold levels and significance statements have been used to supplement the criteria provided by the British Standard to assess the impact on a listener.

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
Delivery Events, Petrol Filling, Fixed Plant and Electric Vehicle Charging.	BS 4142:2014+A1:2019
Car Park, Drive-thru and Petrol Station Visitations and Customer Refuelling Activities.	BS 8233:2014

Impacts on the existing Travelodge Hotel (NSR1) are considered in terms of the absolute change in noise levels, in accordance with IEMA guidance, rather than the more stringent criteria applied to residential receptors. Due to its transient use, hotels are of lower sensitivity and are designed with the existing environmental conditions in mind. Assessing impacts in the context of absolute change ensures that the design intentions of the facility are maintained, and that the proposed development would not be a limiting factor should internal noise levels within the building be deemed unsuitable.

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 $L_{A_{fMax}}$.	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 $L_{A_{fMax}}$.	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 3.4
Assessment Criteria: IEMA Guidelines (L_{Aeq})

Effect Level	Criteria	Justification
Lowest Observed Adverse Effect Level (LOAEL)	Less than 2.9dB L_{Aeq} change in sound level at adjacent sensitive receptor locations.	IEMA degree of effect – None/ Not Significant.
Significant Observed Adverse Effect Level (SOAEL)	More than 5.0dB L_{Aeq} change in sound level at adjacent sensitive receptor locations.	IEMA degree of effect – Substantial Mitigate and minimise adverse effects on health and quality of life.

4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Survey Methodology

Daytime and night-time measurements were undertaken at two (2no.) measurement locations from the 19th to the 23rd of January 2026. The noise measurements established typical external ambient and background noise levels at the 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, southwest of the proposed development site adjacent to NSR1 Travelodge; and
- 'Location 2' – sound level meter positioned approximately 1.5m from the ground, east of the proposed development site, equidistant to the M1 Motorway as NSR2.

The equipment used during the survey is detailed in Appendix B. The sound level meters were calibrated before and after the measurements and no significant calibration drifts were found to have occurred (>0.2dB). 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.

The measurement locations are shown in Appendix C.

4.2 Survey Results

Weather conditions were collated throughout the duration of the survey, and all periods were screened. Any periods with rain or wind speeds above 5 m/s were removed. Table 4.1 below details the unsuitable weather periods.

Table 4.1
Unsuitable Weather Periods

Date	Time Periods Removed (h)
20/01/2026	0945h-1015h
	1345h-1415h
	2115h-0000h
21/01/2026	0000h-0030h
	0130h-0200h
	0915h-1100h
	1315h-1730h
22/01/2026	0245h-0330h
	0445h-0615h
	0845h-1215h
	1930h-2015h
	2200h-2230h
23/01/2026	2330h-0000h
	0000h-0100h

Summaries of the measured noise levels are given in Table 4.2 overleaf. Full survey data is available upon request.

Table 4.2
Summary of Measured Noise Levels – 19/01/26 to 23/01/26 – Free Field, dB

Location	Date	Period	Time (h)	L _{Aeq, T}	L _{A10}	L _{A90}	L _{AFMax}
1	19/01/26	Daytime	1200h-2300h	60.2	61.1	58.0	80.6
	19/01/26-20/01/26	Night-time	0700h-2300h	58.3	59.1	54.1	72.7
	20/01/26	Daytime	0700h-2300h	63.7	64.7	61.8	84.9
	20/01/26-21/01/26	Night-time	2300h-0700h	58.1	58.4	53.5	71.0
	21/01/26	Daytime	0700h-2300h	64.6	65.3	62.4	79.9
	21/01/26-22/01/26	Night-time	2300h-0700h	60.8	61.9	57.3	71.9
	22/01/26	Daytime	0700h-2300h	65.4	66.1	63.4	94.0
	22/01/26-23/01/26	Night-time	2300h-0700h	61.2	61.1	56.8	79.3
	23/01/26	Daytime	0700h-1100h	67.0	68.0	65.4	83.5
2	19/01/26	Daytime	1200h-2300h	65.4	66.5	63.0	85.2
	19/01/26-20/01/26	Night-time	0700h-2300h	63.0	64.3	58.7	78.4
	20/01/26	Daytime	0700h-2300h	67.5	68.6	65.5	87.4
	20/01/26-21/01/26	Night-time	2300h-0700h	63.2	64.3	58.8	79.5
	21/01/26	Daytime	0700h-2300h	68.0	68.9	65.8	82.5
	21/01/26-22/01/26	Night-time	2300h-0700h	64.1	65.5	60.3	76.5
	22/01/26	Daytime	0700h-2300h	68.3	69.2	66.3	90.7
	22/01/26-23/01/26	Night-time	2300h-0700h	64.7	65.7	60.7	83.4
	23/01/26	Daytime	0700h-1200h	69.3	70.3	67.7	83.5

4.2.1 Observations and Comments

The noise environment at the measurement locations was dominated by road traffic noise from the immediate surrounding road network, predominantly the M1 Motorway to the east.

For the assessment, it is considered that the levels measured are representative of the typical acoustic environment at the survey location.

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

In accordance with the methodology detailed in 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).

The results of the statistical analysis of measured background noise levels during the daytime and night-time are presented in a graphical format in Figures 4.1 to 4.4 overleaf. The records highlighted in teal in each figure denote the representative background levels used within this assessment.

Figure 4.1
'Location 1' – Daytime Background ($L_{A90,15min}$) Analysis

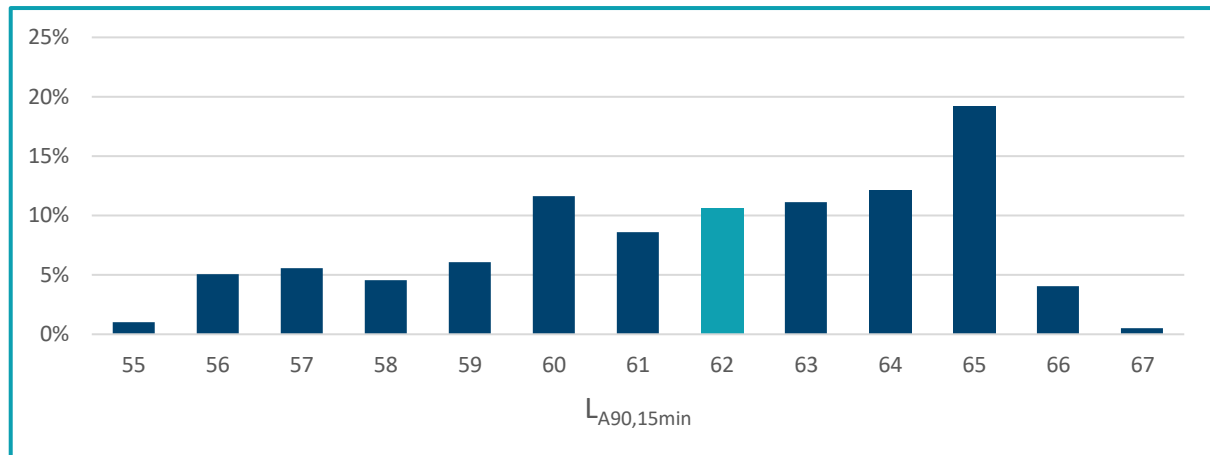


Figure 4.2
'Location 1' – Night-Time Background ($L_{A90,15min}$) Analysis

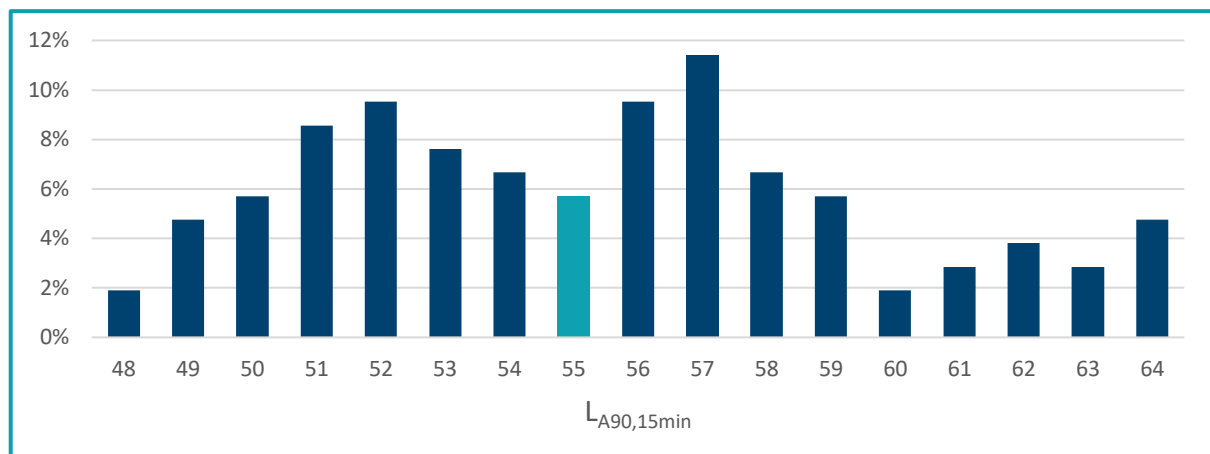


Figure 4.3
'Location 2' – Daytime Background ($L_{A90,15min}$) Analysis

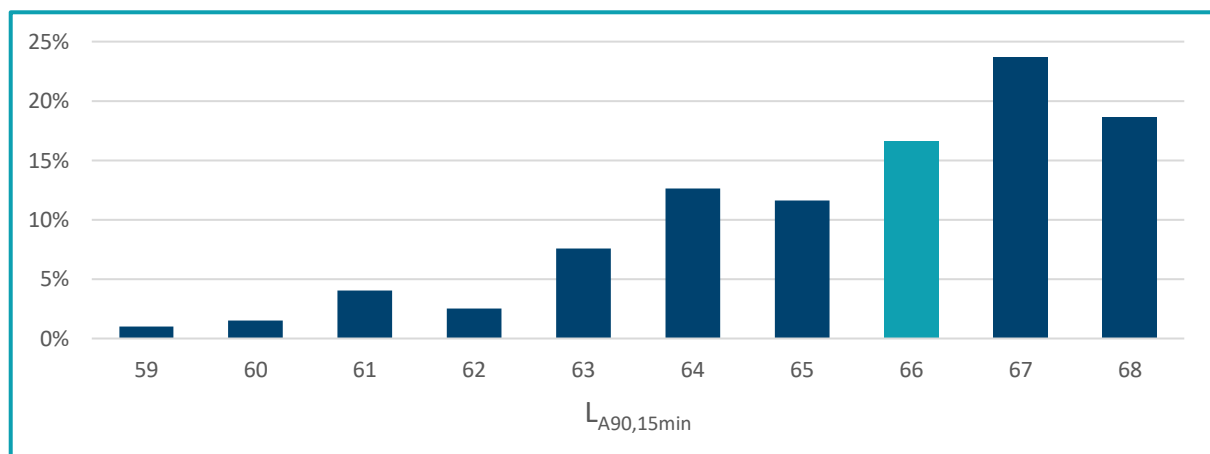
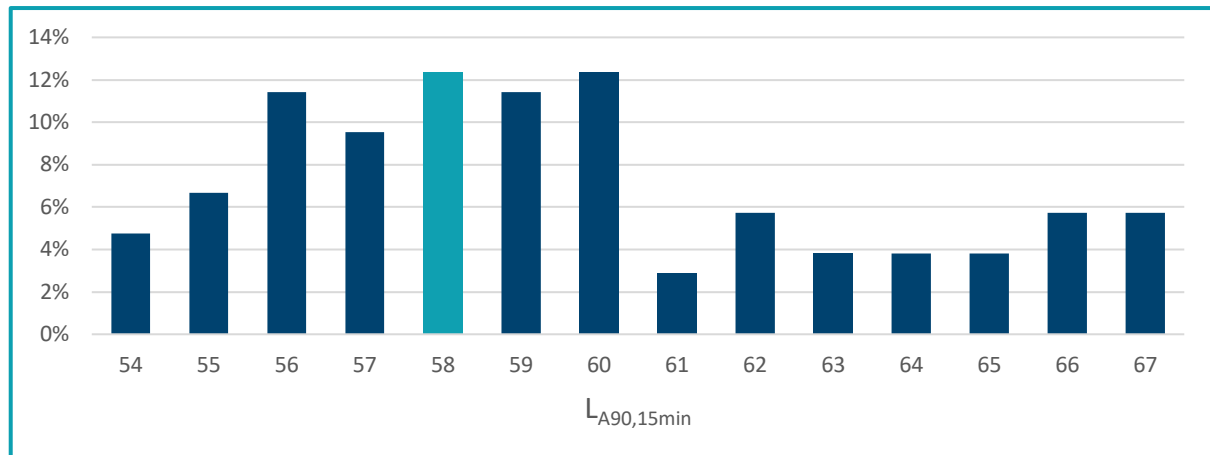


Figure 4.4
'Location 2' – Night-Time Background ($L_{A90,15min}$) Analysis



5.0 NOISE MODELLING METHODOLOGY

5.1 Data Sources

Modelling calculations have been undertaken based on the spatial settings and data sources identified in Table 5.1 below.

Table 5.1
Noise Model Input Data

Parameter	Scenario	Data Source	Assumptions
Site Plans	Existing	<i>OS Mastermap Data</i>	Existing building heights modelled as 8.5m AGL (typical 2-storey building height) unless otherwise stated through global mapping software.
	Proposed (Site Layout)	<i>Feasibility (ref: 251141-SK02) Jennings Design, November 2025</i>	Drive-thru unit modelled as 4.0m AGL (typical 1-storey building height).
Ground Heights	All	Environment Agency Open Data LiDAR Digital Terrain Model (2.0m resolution)	None.
Ground Absorption	All	<i>n/a</i>	Hard ground conditions on site (G=0), mixed ground conditions off site (G=0.5).
Reflections	All	<i>n/a</i>	3 rd order reflections have been accounted for within the noise model.

5.2 Source Noise Assumptions

5.2.1 Fixed Plant

At the current design stage, there is no fixed M&E strategy. 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.

As location plans for the fixed plant item associated with the PFS and Drive-thru units have not yet been finalised, the fixed plant items have been modelled as a point source, located on the roof at a height of 1.0m. Indicative plant locations are represented by a blue "+" in Figure 5.1, overleaf.

[illegible]

Table 5.2
Fixed Plant Noise Limits

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.

5.2.2 Electric Vehicle Charging

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Table 5.3
Electric Vehicle Charging Data Summary

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

Source noise level data utilised in the assessment of ambient noise (L_{Aeq}) contributions are presented in the Table 5.4.

Table 5.4
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))								Sum dB(A)
	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	75.7

Table 5.5 presents a summary of the operational assumptions accounted for within the noise model to determine ambient noise contributions at adjacent sensitive receptor locations.

Table 5.5
Operational Assumptions (Electric Vehicle Charging)

Noise Source	Source Type	Height Above Ground Level (AGL)	Operational Assumptions
Electric Vehicle Charger	Point Source	1.5m	Assumed 100% on-time throughout 1hr daytime and 15-minute night-time reference periods.

5.2.3 Servicing Arrangements (i.e. Deliveries and Petrol Tanker Offloading)

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 goods delivery operations will be undertaken externally to the amenity building with unloading undertaken via the use of a roll cage and tail lift, as is typical of developments of this nature. It has also been assumed that petrol tanker offloading operations, considered to be an HGV petrol tanker, refilling the underground fuel storage tanks at the proposed PFS site, will take place externally in proximity to the proposed bulk fuel storage tank location for the site.

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 5.6 overleaf. The Table also provides details of the associated data sources utilised to inform the assessment.

Table 5.6
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).
LGV Manoeuvre (Pass-by)		Broadband Noise Output	Bayerisches landesamt für Umwelt – Parking Area Noise (BayLfU, 2007).
		Spectral Data	Dragonfly Report DC3417-R1v2 (Land South of High Street, Wootton PA/2021/610).
Vehicle 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).
Petrol Tanker Offloading (Re-filling of the bulk fuel storge tank)		Broadband Noise Output	Bayerisches landesamt für Umwelt – Parking Area Noise (BayLfU, 2007).
		Spectral Data	Dragonfly Report DC3468-R1v5 (Bawtry Road, Selby 2020/0976/FUL).
Vehicle Refrigeration Unit		Broadband Noise Output	Manufacturer Data for Reciprocating Compressor (Thermoking A500 Whisper Pro).
		Spectral Data	Manufacturer Data for Reciprocating Compressor (Thermoking MK8500).
Vehicle Reverse Alarm		Broadband Noise Output	Manufacturer Data for Tonal Reverse Alarm (Lightbar Uk Limited Product ref – SKU AC.RA102S).
		Spectral Data	None – assumed tonal noise output at 1kHz as is typical with alarms of this nature.
Vehicle Starting (Ignition Noise)	L _{Amax}	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 Compressed Air (Air Brakes)		Broadband Noise Output	Bayerisches landesamt für Umwelt – Parking Area Noise (BayLfU, 2007).
		Spectral Data	None – assumed flat (i.e., all octave bands emit the same contribution) to present a reasonable worst-case assessment.
(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	
	L _{Amax}	Broadband Noise Output	Dragonfly Delivery Noise Survey (Planning Application: Harrogate – 17/0045/FULM).
		Spectral Data	

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

Table 5.7
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
LGV Manoeuvre (Pass-by)	99.0	82.0	81.0	76.0	78.0	74.0	71.0	66.0	82.4
Vehicle Idling (Stand Noise)	97.7	92.8	95.0	92.7	91.9	85.9	78.5	68.9	95.6
(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 Offloading	57.2	57.8	69.7	80.8	85.1	86.7	84.6	74.9	91.0
Vehicle Refrigeration Unit	77.9	78.9	79.9	80.9	78.9	76.9	72.9	65.9	83.9

Table 5.8
Servicing Arrangements: Assessed Noise Source Sound Power Levels
(Maximum Noise Level L_{AffMax} Assessment)

Noise Source	Octave Band Sound Power Level (L_w), Hz (dB(Z))								Sum dB(A)
	63	125	250	500	1000	2000	4000	8000	
Compressed Air (Air Brakes)	Compressed Air Release – Spectrum Modelled as Flat.								109.7
Vehicle Starting (Ignition Noise)	105.6	100.7	102.9	100.6	99.8	93.8	86.4	76.8	103.5
Vehicle Reverse Alarm	-	-	-	-	102.0	-	-	-	102.0
(Un)loading	108.4	110.0	116.7	115.7	110.0	107.5	102.9	98.7	116.5

Operational Assumptions – Site Servicing Arrangements

Site specific details relating to site servicing arrangements are not available. To provide an indication of the development's potential noise output, reasonable assumptions have been made around delivery events occurring during both daytime and night-time periods. This assumption also ensures that a reasonable worst-case approach has been followed when considering the sites potential for noise impacts.

Table 5.9 presents a summary of the operational assumptions accounted for within the noise model to determine ambient noise contributions at adjacent sensitive receptor locations. Assumptions are based around a typical delivery / collection taking 15 minutes to complete unless stated otherwise.

Table 5.9
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	HGV travelling at 10km/h along access route. 2 complete manoeuvres per event (i.e., 1 in and 1 out daytime, 1 in or 1 out night-time).
LGV Manoeuvre (Pass-by)		1.0m	LGV travelling at 10km/h along access route. 2 complete manoeuvres per event (i.e., 1 in and 1 out daytime, 1 in or 1 out night-time).
Vehicle Idling (Stand Noise)	Point Source	1.0m	30sec total idling (30sec on arrival or 30sec pre-departure).

Noise Source	Source Type	Height Above Ground Level (AGL)	Operational Assumptions
(Un)loading Using Roll Cage and Tail Lift		1.0m	(Un)loading operations take approximately 15mins to complete.
HGV Petrol Tanker Offloading		1.0m	HGV Petrol Tanker Offloading operations take approximately 30 mins to complete* *Assumed 100% on-time throughout 15-minute night-time period.
Vehicle Refrigeration/Chiller Units		2.0m	Cooling aggregates run approximately 15mins in the hour.

5.2.4 Car Parking, Petrol Filling Station and Drive-thru Visitations

Operational Assumptions

Noise emissions from car parking and PFS and drive-thru visitations have been modelled in accordance with 'BayLfU Parking Area Noise'. The existing car park associated with the Travelodge has not been included as part of this assessment.

Table 5.10
BayLfU Modelling Input Data – Car Parking

Parameter	Input
Customer Parking	
Emissions Calculation	LfU-Study-2007
No. Parking Spaces	Varies per car park (150 total)
Events per space (1hr – Day)	3.5 (per space)
Events per space (1hr – Night)	0.7 (per space)
HGV Parking	
Emissions Calculation	LfU-Study-2007
No. Parking Spaces	12
Events per space (1hr – Day)	1.5 (per space)
Events per space (1hr – Night)	0.5 (per space)
EV Parking	
Emissions Calculation	LfU-Study-2007
No. Parking Spaces	12
Events per space (1hr – Day)	1.0 (per space)
Events per space (1hr – Night)	0.03 (per space)

Table 5.11
BayLfU Modelling Input Data – Vehicle Visitations

Parameter	Input
PFS Visitation	
Emissions Calculation	LfU-Study-2007
Visitations (Car) (1hr – Day)	40
Visitations (Car) (1hr – Night)	15
Drive-thru Visitations	
Emissions Calculation	LfU-Study-2007
Visitations (Car) (1hr – Day)	40
Visitations (Car) (1hr – Night)	6

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	101.2	95.1	95.6	93.5	96.1	92.3	88.4	85.8	99.6

5.3 Uncertainty

5.3.1 Survey

Given the duration of the survey and the use of the highest measured daytime and night-time 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 5.13
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 +/- 3.1dB.

6.0 ASSESSMENT

6.1 Fixed Plant Limits – Fixed Plant

The assessment of ambient noise contributions (L_{Aeq}) from fixed plant items associated with the PFS Unit and Drive-thru Units has been undertaken following the guidance within BS 4142:2014+A1:2019, and operational assumptions detailed in in Section 5.2.1.

As the operational noise characteristics of the plant associated with the PFS Unit and Drive-thru Units 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.

As the finalised details of the fixed plant units to be installed as part of the proposed development are not yet finalised, for ease, a BS 4142:2014 assessment has also been taken for NSR1.

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
BS 4142 Assessment of Fixed Plant Noise Impact Daytime / Night-time, L_{ArTr} dB

NSR	Existing Measured Background (L_{A90})		Predicted Rating Level (L_{ArTr})		Difference, dB	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
1	62	55	62.0	55.0	0.0	0.0
2	66	58	47.5	40.5	-18.5	-17.5

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 parity with the existing background noise levels during both the daytime and night-time, inclusive of a +4dB character correction for uncertainty.

Noise impacts arising from the cumulative operation of fixed plant items is therefore predicted to below the LOAEL, as defined in Section 3.0.

6.2 Electric Vehicle Charging

The assessment of ambient noise contributions (L_{Aeq}) from Electric Vehicle Chargers (EVC) has been undertaken following the guidance within BS 4142:2014+A1:2019, the IEAM Guidelines, and operational assumptions detailed in in Section 5.2.2.

Table 6.2
Comparison of Existing and Predicted Noise Levels at NSR1 – EVC – L_{Aeq} dB

NSR	Period	Existing Measured Noise Level (L_{Aeq})	Predicted Noise Contribution (L_{Aeq})	Predicted Future Noise Level (L_{Aeq})	Change
1	Daytime	60.3	42.2	60.4	+0.1
	Night-time	58.1	42.2	58.2	+0.1

As shown in Table 6.2, the maximum change in ambient noise level at NSR 1 predicted to be 0.1dB. In accordance with IEMA Guidelines the level of effect is '*None / Not Significant*'.

For NSR2, it has been determined that no character corrections are necessary to be applied when determining the noise rating level for the electric vehicle chargers. The noise output is not considered to be impulsive in nature, and remains continuous throughout the measurement period, removing any intermittent penalties. Spectral analysis also confirms the absence of any tonal components and therefore, in accordance with BS 4142:2014+A1:2019, no acoustic penalties are warranted.

The results of the assessment are shown in Table 6.3. 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
BS 4142 Assessment of EVC Noise Impact Daytime / Night-time at NSR2, L_{ArTr} dB

NSR	Existing Measured Background (L_{A90})		Predicted Rating Level (L_{ArTr})		Difference, dB	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
2	66	58	34.2	34.2	-31.8	-23.8

As shown in Table 6.2 above, noise contributions will be at least 31.8dB below the existing background noise levels during the daytime period, and at least 23.8dB below during the night-time.

Noise impacts arising from the EVC are therefore predicted to be below the LOAEL during both the daytime and night-time periods at all NSRs, as defined in Section 3.0.

6.3 Site Servicing Operations (Goods Deliveries / Collections)

The assessment of ambient noise contributions (L_{Aeq}) from site servicing operations has been undertaken following the guidance within BS 4142:2014+A1:2019, and operational assumptions detailed in in Section 5.2.3.

Table 6.4
Comparison of Existing and Predicted Noise Levels at NSR1 – Site Servicing Operations (Good Deliveries / Collections) – L_{Aeq} dB

NSR	Period	Existing Measured Noise Level (L_{Aeq})	Predicted Noise Contribution (L_{Aeq})	Predicted Future Noise Level (L_{Aeq})	Change
1	Daytime	60.3	49.4	60.6	+0.3
	Night-time	58.1	54.6	59.7	+1.6

As shown in Table 6.4, the maximum change in ambient noise level at NSR 1 predicted to be 1.6dB. In accordance with IEMA Guidelines the level of effect is '*None / Not Significant*'.

For NSR2, in accordance with BS 4142:2014+A1:2019, a +3dB acoustic character correction, to account for the intermittent nature of the operations as a whole, and +4 dB for clearly perceptible tonality associated with reverse alarms, 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 6.5 overleaf. In accordance with BS 4142 Para 8.6, background levels are expressed as integers (with 0.5 dB being rounded up):

Table 6.5
BS 4142 Assessment of Servicing Noise Impact (Goods Deliveries) Daytime/ Night-time, L_{A+Tr} dB

NSR	Existing Measured Background (L_{A90})		Predicted Rating Level (L_{A+Tr})		Difference, dB	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
2	66	58	41.1	46.2	-24.9	-11.8

As shown in Table 6.3 above, noise contributions will be at least 24.9dB below the existing background noise levels during the daytime period, and at least 11.8dB below the during the night-time.

Noise impacts arising from site servicing operations (deliveries / collections) are therefore predicted to be below the LOAEL during both the daytime and night-time periods at all NSRs, as defined in Section 3.0.

6.3.1 Night-time Maximum Noise Level Assessment – BS 8233:2014

An assessment of maximum noise level (L_{Amax}) contributions associated with site servicing operations (deliveries) is presented in Table 6.6. Internal noise levels have been calculated based on a nominal reduction of 15dB for noise attenuation through a partially open window.

Table 6.6
BS 8233:2014 Assessment of Servicing Noise Impact (Deliveries) Night-time, L_{Amax} dB

NSR	External Noise Levels, L_{Amax}	Internal Noise Levels, L_{Amax}	Internal Criteria, L_{Aeq} (Night-time)	Within Criteria
1	68.0	53.0	45	✗
2	61.2	46.2		✗

The results of the assessment show that night-time maximum (L_{Amax}) noise level contributions associated with site servicing operations (deliveries / collections) exceed the BS 8233:2014 internal noise criteria at the NSRs.

Night-time Maximum Noise Level Assessment – BS 8233:2014 – Site Servicing Operations (Goods Deliveries / Collections) Comparison

Existing maximum noise events measured at Locations 1 and 2 have been compared against the maximum noise level events from site servicing operations (goods deliveries and collections) at NSRs 1 and 2. The absolute maximum event during the night-time period ($L_{Amax,1min}$) and typical maximum values, chosen by taking the 10th highest maximum level over the course of the night, have been used for comparison.

Table 6.7 below shows the results of the comparison utilising the predicted result from NSR2.

Table 6.7
Maximum Noise Events Comparison – Site Servicing Operations (Goods Deliveries and Collections)

NSR	Maximum Predicted External Noise Level Event	Maximum Measured External Noise Level Event	Typical Measured External Noise Level Event	Difference, dB	
				Maximum	Typical
1	68.0	79.3	70.0	-11.3	-2.0
2	61.2	78.4	72.4	-17.2	-11.2

As shown in Table 6.7, the existing measured maximum noise levels and typical maximum noise levels (10th highest) already experienced in the area exceed the predicted maximum noise levels from site servicing operations (goods deliveries and collections), as outlined in this assessment. Therefore, any predicted exceedance is unlikely to be significant, especially as these events are isolated. Within the context of the existing noise environment, they would not be discernible from other sporadic maximum noise level events, given that similar exceedances already occur. On this basis, the predicted noise levels are considered acceptable within the existing environment at the NSRs.

Maximum noise impacts arising from site servicing operations (deliveries / collections) are therefore predicted to be below the LOAEL during night-time period, as defined in Section 3.0.

6.4 Site Servicing Operations (Petrol Tanker Offloading (Restocking / Site Refilling))

The assessment of ambient noise contributions (L_{Aeq}) from site servicing operations specifically the offloading of an HGV petrol tanker, refilling the bulk fuel storage tanks at the PFS site, has been undertaken following the guidance within BS 4142:2014+A1:2019, and operational assumptions detailed in in Section 5.2.3.

Table 6.8
Comparison of Existing and Predicted Noise Levels at NSR1 – Site Servicing Operations (Petrol Tanker Offloading)– L_{Aeq} dB

NSR	Period	Existing Measured Noise Level (L_{Aeq})	Predicted Noise Contribution (L_{Aeq})	Predicted Future Noise Level (L_{Aeq})	Change
1	Daytime	60.3	49.2	60.6	+0.3
	Night-time	58.1	55.1	59.9	+1.8

As shown in Table 6.8, the maximum change in ambient noise level at NSR 1 predicted to be 1.8dB. In accordance with IEMA Guidelines the level of effect is '*None / Not Significant*'.

For NSR2, in accordance with BS 4142:2014+A1:2019, a +3dB acoustic character correction, to account for the intermittent nature of the operations as a whole, and +4 dB for clearly perceptible tonality associated with reverse alarms, has been applied to the predicted ambient noise contributions (L_{Aeq}) to determine the rating level (L_{A+Tr}).

The results of the assessment are shown in Table 6.9 below, in accordance with BS 4142 Para 8.6, background levels are expressed as integers (with 0.5 dB being rounded up):

Table 6.9
BS 4142 Assessment of Servicing Noise Impact (Petrol Tanker Offloading)
Daytime/ Night-time, L_{A+Tr} dB

NSR	Existing Measured Background (L_{A90})		Predicted Rating Level (L_{A+Tr})		Difference, dB	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
2	66	58	45.1	51.0	-20.9	-7.0

As shown in Table 6.9 above, noise contributions will be at least 20.9dB below the existing background noise levels during the daytime period, and at 7.0dB below during the night-time.

Noise impacts arising from site servicing operations (petrol tanker filling) are therefore predicted to be below the LOAEL during both the daytime and night-time periods at all NSRs, as defined in Section 3.0.

6.4.1 Night-time Maximum Noise Level Assessment – BS 8233:2014

An assessment of maximum noise level (L_{Amax}) contributions is presented in Table 6.10 below. Internal noise levels have been calculated based on a nominal reduction of 15dB for noise attenuation through a partially open window.

Table 6.10
BS 8233:2014 Assessment of Servicing Noise Impact (Petrol Tanker Offloading) Night-time, L_{Amax} dB

NSR	External Noise Levels, L_{Amax}	Internal Noise Levels, L_{Amax}	Internal Criteria, L_{Aeq} (Night-time)	Within Criteria
1	58.1	43.1	45	✓
3	57.5	42.5		✓

The results of the assessment show that night-time maximum (L_{Amax}) noise level contributions associated with site servicing operations (petrol tanker filling) fall within the BS 8233:2014 internal noise criteria at the NSRs.

Maximum noise impacts arising from Petrol Tanker Offloading operations servicing the site, are therefore predicted to be below the LOAEL during night-time period, as defined in Section 3.0.

6.5 Car Parking, Petrol Station Visitations and Drive-thru Visitations Assessment

Ambient noise contributions from car parking events and PFS and drive-thru visitations have been assessed in the tables below using the specified parameters set out in Section 5.2.4.

Table 6.11
Comparison of Existing and Predicted Noise Levels at NSR1 – Car Parking and Vehicle Visitations – L_{Aeq} dB

NSR	Period	Existing Measured Noise Level (L_{Aeq})	Predicted Noise Contribution (L_{Aeq})	Predicted Future Noise Level (L_{Aeq})	Change
1	Daytime	60.3	52.9	61	+0.7
	Night-time	58.1	45.3	58.3	+0.2

As shown in Table 6.11, the maximum change in ambient noise level at NSR 1 predicted to be 0.7dB. In accordance with IEMA Guidelines the level of effect is 'None / Not Significant'.

For NSR2, the ambient noise contributions has been assessed with windows open at the nearest NSR. To present a worst-case, a nominal reduction of 15dB has been applied to account for attenuation through a partially open window.

Table 6.12
BS 8233:2014 Assessment of Car Parking and Vehicle Visitations Noise Impact, (Daytime/Night-time) $L_{Aeq,T}$

NSR	External Noise Levels ($L_{Aeq,T}$)		Internal Noise Levels ($L_{Aeq,T}$)		BS 8233:2014 Internal Target Criteria Daytime/Night-time $L_{Aeq,T}$	Within Criteria
	Daytime	Night-time	Daytime	Night-time		
2	35.8	29.3	20.8	14.3	35 / 30	✓

As shown in Table 6.12, predicted noise contributions fall below BS 8233:2014 target internal noise criteria for both daytime (35 dB $L_{Aeq,T}$) and night-time (30dB $L_{Aeq,T}$) at NSR2.

It is worthy of note that the predicted external noise contributions also fall below the BS 8233 target external amenity criteria (50dB/55dB $L_{Aeq,T}$).

6.5.1 Night-time Maximum Noise Level Assessment – BS 8233:2014

An assessment of maximum noise level (L_{Amax}) contributions associated with car parking events is presented in Table 6.13. Internal noise levels have been calculated based on a nominal reduction of 15dB for noise attenuation through a partially open window.

Table 6.13
BS 8233 Assessment of Car Parking Noise Impact Night-time, L_{Amax} dB

NSR	External Noise Levels, L_{Amax}	Internal Noise Levels, L_{Amax}	Internal Criteria, L_{Aeq} (Night-time)	Within Criteria
1	64.2	49.2	45	✗
2	46.7	31.7		✓

The results of the assessment presented in Table 6.13 demonstrate that maximum noise level events from car parking events exceed the recommended internal limits of 45 dB L_{Amax} at NSR1 and fall below at NSR2.

Night-time Maximum Noise Level Assessment – BS 8233:2014 – Car Parking Events

Existing maximum noise events measured at Location 1 have been compared against the maximum noise level events from car parking events predicted at NSR2. The absolute maximum event during the night-time period ($L_{Amax,1min}$) and typical maximum values, chosen by taking the 10th highest maximum level over the course of the night, have been used for comparison.

Table 6.14 below shows the results of the comparison utilising the predicted result from NSR1.

Table 6.14
Maximum Noise Events Comparison – Car Parking (NSR2)

NSR	Maximum Predicted External Noise Level Event	Maximum Measured External Noise Level Event	Typical Measured External Noise Level Event	Difference, dB	
				Maximum	Typical
1	64.2	79.3	70.0	-15.1	-5.8

As shown in Table 6.14, the existing measured maximum noise levels and typical maximum noise levels (10th highest) already experienced in the area exceed the predicted maximum noise levels from car parking events, as outlined in this assessment. Therefore, any predicted exceedance is unlikely to be significant, especially as these events are isolated. Within the context of the existing noise environment, they would not be discernible from other sporadic maximum noise level events, given that similar exceedances already occur. On this basis, the predicted noise levels are considered acceptable within the existing environment at the NSRs.

Noise impacts arising from maximum car parking events and PFS and drive-thru visitations are therefore predicted to be below the LOAEL for the assessment, as defined in Section 3.0.

6.6 Jet Wash Noise

The assessment of ambient noise contributions (L_{Aeq}) from use of the jet wash has been undertaken following the guidance within BS 4142:2014+A1:2019 and IEAMA Guidelines, and operational assumptions detailed in in Section 5.2.4.

Table 6.15
Comparison of Existing and Predicted Noise Levels at NSR1 – Jet Wash – L_{Aeq} dB

NSR	Period	Existing Measured Noise Level (L_{Aeq})	Predicted Noise Contribution (L_{Aeq})	Predicted Future Noise Level (L_{Aeq})	Change
1	Daytime	60.3	51.2	60.8	+0.5
	Night-time	58.1	57.2	60.7	+2.6

As shown in Table 6.15, the maximum change in ambient noise level at NSR 1 predicted to be 2.6dB. In accordance with IEAMA Guidelines the level of effect is '*None / Not Significant*'.

For NSR2, to account for any potential intermittency and sporadic use, a correction of +3dB has been applied to determine the rating level ($L_{A_{rTr}}$) in accordance with BS 4142:2014+A1:2019.

The results of the assessment are shown in Table 6.16. 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 6.16
BS 4142 Assessment of the Jet Wash Noise Impact Daytime / Night-time, $L_{A_{rTr}}$ dB

NSR	Existing Measured Background (L_{A90})		Predicted Rating Level ($L_{A_{rTr}}$)		Difference, dB	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
2	66	58	39.7	45.7	-26.3	-12.3

As shown in Table 6.16 above, noise contributions will be at least 26.3dB below the existing background noise levels during the daytime period, and at 12.3dB below during the night-time.

Noise impacts arising from use of the jet wash are therefore predicted to be below the LOAEL during both the daytime and night-time periods, as defined in Section 3.0.

6.7 Assertion of Competence

This assessment has been completed by Adam Shaw, Senior Acoustic Consultant with responsibilities for completing acoustic reports on behalf of Dragonfly Consulting. I am a Corporate Member of the Institute of Acoustics and an Associate Member of the British Occupational Hygiene Society.

I hold a Bachelor of Science in Sound Engineering, with Honours, from Birmingham City University.

7.0 CONCLUSIONS

EG on the Move Ltd has appointed Dragonfly Consulting to carry out a Noise Impact Assessment for a proposed motorway services at Little Shaw Lane, Markfield.

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.

This report describes a noise survey of the site and the subsequent analysis to determine the noise environment of the proposed development. It then compares the results with the adopted criteria and, where applicable, recommendations are made with respect to the design of the development.

The assessment indicates that noise from all operations is predicted to fall below the LOAEL during both daytime and night-time reference periods.

Therefore, it is considered that noise impacts from the site proposals are predicted to below the LOAEL.

The NPPF defines the LOAEL as:

LOAEL – Lowest Observed Adverse Effect Level

The level above which adverse effects on health and quality of life can be detected.

7.1 Recommendation to Decision Makers

Based on the assessment detailed within this report, it is not considered that noise should be a barrier to the development. It is recommended that the site be granted planning consent with the addition of a suitable condition to address the following item:

- Fixed Plant – at the current design stage no fixed M&E details are available. It is therefore recommended that a pre-occupation condition be included to facilitate the assessment of site fixed plant requirements as and when these become available.

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 ($2 \times 10^{-5} \text{Pa}$).

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.

L_{10} & L_{90} 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. L_{10} is the level exceeded for 10% of the time and is often used as a descriptor for road traffic noise. Similarly, L_{90} 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 L_{10} 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
01dB Fusion Sound Level Meter	12298
G.R.A.S 40CD Microphone	332011
01dB PRE22N Preamplifier	1936193
01dB Cube Sound Level Meter	10889
G.R.A.S 40CD Microphone	231555
01dB PRE22N Preamplifier	1610358
Cirrus CR:515 Acoustic Calibrator	103792

Appendix C – Measurement Locations

Figure C-1
Measurement Locations



-  Measurement Locations
-  Noise Sensitive Receptors
-  Development Site