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Fallowfield Campus, University of Manchester

Noise Impact Assessment

DC5526-NR1v3

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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

1.1 Details of Instruction

Halliday Meecham Architects Ltd, on behalf of The University of Manchester, has appointed Dragonfly Consulting to carry out a Noise Impact Assessment relating to the proposal of a new facility located on an existing car park, adjacent to Richmond Park Student Halls, Fallowfield Campus.

The noise assessment has been conducted with reference to the National Planning Policy Framework and the appropriate British Standards, recognised guidance & 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.

A glossary of technical terminology is included in Appendix A.

1.2 Site Description

1.2.1 Site Conditions

The Site extends to c. 0.43ha and is located within the boundary of the existing Richmond Park car park located at the University owned and managed Fallowfield Campus.

The car park primarily serves nearby student residences within the Campus, and offers approximately 130 spaces, including disabled car parking bays for neighbouring halls. This allocation of car parking is shared between the Energy Centre, Richmond Park student accommodation and other university land uses.

The Site features centrally positioned trees, street lighting, and a bike shelter. It is situated within the northern part of the wider Campus. It benefits from two points of access from within the Campus – one to the west via Whitworth Lane and one to the east via Chancellors Way.

The northern boundary of the Site is bordered by trees, vegetation, and a boundary wall, behind which lies Redshaw Close, comprising a small cluster of modern two storey residential properties and an area of green space. The surrounding context to the east, west and south is provided by University owned and managed buildings which comprise the residential Fallowfield Campus, including Richmond Park student accommodation to the south, Unsworth Park student residential accommodation to the east and Ashburne Hall student residential accommodation to the west on the opposite side of Whitworth Lane.

Vehicular access to the Site is provided principally via Whitworth Lane on the western side which connects the Campus to the public highway at Old Hall Lane to the north. A secondary access is available via Chancellors Lane to the east which connects to the public highway at Mosely Road running along the southern boundary of the Campus. The Campus is well-connected with pedestrian and cycle paths, along with numerous green spaces, making Whitworth Lane a key thoroughfare running north to south.

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1.2.2 Planning History

A Planning Application (Application no. 141536/FO/2024) at the proposed development site was previously submitted in November 2024, the proposals were as follows:

"Erection of a facilities and services building to accommodate catering facilities, maintenance storage space and office space (sui generis use) with associated car parking and landscaping"

As part of this proposal, Dragonfly Consulting had extensive communication with Manchester City Council (MCC), before submitting a Noise Impact Assessment (NIA) as part of the development. The Planning Application was approved, subject to a number of planning conditions.

Conditions 18 a, b & c and Condition 19 were in relation to Noise Impacts, and recommendations by Dragonfly Consulting ensuring Noise Impacts from the proposals were in the interests of the residential amenity and compliant with the relevant Standards and Guidance.

"18) a) Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level no greater than the typical background (LA90) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved the scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority.

b) Prior to the operation of the scheme a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met.

c) In the event of any non-conformity with the approved scheme, then any further measures that are required to ensure conformity shall be carried out. Any required measures/mitigation shall continue until conformity has been achieved and agreed in writing by the City Council as local planning authority, prior to first occupation of the development.

Reason - To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site pursuant to policy DM1 of the Core Strategy and saved Unitary Development Plan policy DC26.

19) Deliveries, servicing and collections, including waste collections shall be undertaken in accordance with the approved Noise Impact Assessment (reference DC4816-NR1v3) and details of servicing contained within the email received by the City Council on the 3rd February 2025, for the avoidance of doubt the activities by Heavy Goods Vehicles shall not take place at the site outside of the following hours: 07:00 to 23:00hrs, Monday to Saturday, no deliveries on Sundays/Bank Holidays.

Reasons - In the interests of residential amenity pursuant to policy DM1 of the Core Strategy."

It is now understood that this application has since been withdrawn, and the University has decided to progress a new scheme at the same site location.

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1.2.3 Development Proposals

It is proposed to develop a new facility which will provide spaces for the Facilities, Maintenance & Compliance (FMC) team, as well as storage for the Environmental Services Unit (ESU) & Residential Support Teams (RST). The development is as follows:

"Erection of a single-storey, new-build steel portal frame facilities management services building (sui generis use), incorporating maintenance storage, office accommodation and associated staff welfare facilities, together with associated car parking and landscaping."

Comparatively to the previous proposals, the new facility has a considerably lower footprint, and the proposed Catering Central Processing Unit (CPU) has not been included as part of the new development proposals. The omission of the CPU will remove a large number of the fixed plant which was proposed to service this building use.

This NIA assumes that the fixed plant as part of the new development proposals will operate 24hrs per day and will be assessed based on a maximum load basis.

For the purposes of site servicing, it has been assumed that the site will receive deliveries between 0700hrs and 2300hrs; this is compliant with Condition 19 on the previous application.

The following NIA will assess noise impacts from the site proposals and will aim to conclude the previous Conditions 18 and 19 on the approved planning application from the previous site development proposals will remain valid.

The proposed site plan utilised to inform this assessment, provided by Halliday Meecham Architects (drawing ref: 5938-HMA-LIM-00-DR-A-00110_P3) is shown in Figure 1.1, below.

Figure 1.1
Indicative Site Plan



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2.0 GUIDANCE

2.1 National Policy

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 document '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;*

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- *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 Manchester City Council Planning Guidance

2.2.1 Local Planning Requirements

The following local planning requirements have been identified within Policy DM1 of the Manchester Local Plan:

"Development Management

All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:-

- *Appropriate siting, layout, scale, form, massing, materials and detail.*
- *Impact on the surrounding areas in terms of the design, scale and appearance of the proposed development. Development should have regard to the character of the surrounding area.*
- *Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise.*

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2.2.2 Local Planning Guidance

The MCC guidance document '*Planning & Noise - Technical Guidance'* sets out the following for commercial developments which may be relevant, based on the fixed plant noise sources.

In reference to commercial uses, the guidance states the following at Section 3.7.1.5:

"*BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises (section 3.5). One of the indications of the impact of a BS 4142 assessment is the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

The Council consider that new developments should contribute and enhance the area in which they are located and where possible i.e. prevent 'noise creep', contribute to the improvement of people's health and quality of life as per the NPSE. With this in mind, the design objective should be:

'The development should be designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.'

Where this criterion cannot be achieved, the various noise control measures considered as part of the assessment should be fully explained (i.e. relocation of noise sources, use of quieter equipment, enclosures, screening, restriction of the hours of operation) and the achievable noise level should be identified. This information will allow a judgement to be made concerning the application and its likely impact on the surrounding area."

In reference to residential uses, the guidance states the following at Section 3.7.1.1:

The Council has adopted the following noise limits for residential properties:

- Bedrooms (night time - 23.00h - 07.00h) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 10 times)
- Living Rooms (daytime - 07.00h - 23.00h) 35 dB L_{Aeq}
- Gardens and terraces (daytime) 55 dB L_{Aeq}

2.3 British Standards and Guidance Documents

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.

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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

IS0 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.

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3.0 ASSESSMENT METHODOLGY

3.1.1 Noise Sensitive Receptor (NSR) Locations

Neither MCC local guidance nor national guidance directly considers the situation where a receptor has some noise sensitivity but form part of the same premises as the proposed new noise sources. This scenario exists in many rooms for residential use schemes such as hotel uses, care homes and student accommodation.

In these scenarios, the guidance assumes that these controls sit largely outside of the planning regime. In this circumstance, it is considered that it would be appropriate to ensure that noise from commercial operations within the university estate is controlled, but that considering noise impacts for university buildings in the same context as those outside the university estate would be unduly onerous.

Therefore, to ensure that the assessment of noise impact considers all potentially noise sensitive receptors, those receptors have been considered as either 'offsite' noise sensitive receptors, which have been considered in-line with the guidance set out in BS 4142:2014+A1:2019 to consider noise impacts from the development proposals, or 'on-site' which have been considered in line with the guidance set out in BS 8233:2014 for the same sources.

This approach is consistent with the approach taken towards the design of the recent Unsworth Park accommodation scheme, where buildings within the university estate were considered based on the above approach. This includes the assessment of noise emissions from the Energy Centre which formed part of that scheme.

Noise contributions will be considered at the following sensitive receptor locations as follows:

Off-site Receptors:

- NSR1 – Residential Dwellings along Redshaw Close, Manchester M14 6JB (North).

On-site Receptors:

- NSR2 – Richmond Park Accommodation Block, Whitworth Lane, Fallowfield, Manchester M14 6YY (Southwest);
- NSR3 – Richmond Park Accommodation Block, Whitworth Lane, Fallowfield, Manchester M14 6YY (Southeast); and
- NSR4 – Unsworth Park Accommodation Block, Wilmslow Road, Manchester M14 6FZ (East).

Noise contributions at all NSRs have been considered at First Floor (4.0m AGL) during daytime (0700h-2300h) and night-time (2300h-0700h) hours.

The NSR locations are shown in Appendix C.

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3.2 Potential Sources of Environmental Noise

The following sources of environmental noise have been considered relevant to this assessment:

Table 3.1
Assessed Sources of Environmental Noise

Scenario	Receptor Type	Relevant Assessment Methodology
Site Servicing Operations (Delivery Events), Fixed Plant and Waste Compactor	Offsite	BS 4142:2014+A1:2019
	Onsite	BS 8233:2014

3.3 Selection of Assessment Criteria

With reference to the guidance detailed in Section 2.0, 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.

It is acknowledged that local guidance seeks to establish a target criteria of 5dB below background for the purposes of a BS 4142 assessment. While this target is suitable for protecting against background noise creep in noisier environments, such as Manchester City Centre, it can be unduly onerous in situations where background noise levels are within the normal range. In such cases, strictly adhering to this target may not be reasonably achievable without imposing disproportionate constraints on the development. Therefore, for this instance where background levels are typical and the scheme includes for significant inherent noise mitigation in the design, the standard BS 4142 assessment criteria is considered more reasonable and appropriate. Accordingly, we will apply the standard criteria detailed above, aligned with NPPF objectives.

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Table 3.3
Assessment Criteria: BS 8233:2014

Effect Level	Criteria	Justification
Lowest Observed Adverse Effect Level (LOAEL)	Internal noise levels achieve the requirements of the BS 8233:2014 standard assuming windows are closed, and an additional source of ventilation is provided	Noise Levels within BS 8233:2014 target criteria
Significant Observed Adverse Effect Level (SOAEL)	Internal noise levels fail to achieve the BS 8233:2014 standard by more than 5dB assuming windows are closed, and an additional source of ventilation is provided	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

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4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Survey Methodology

Daytime and night-time measurements were previously undertaken at two (2no.) measurement locations from the 27th to the 30th of September 2024, as part of the previous planning application Noise measurements gathered during this period are still considered appropriate and representative of the existing noise environment at the measurement locations.

The noise measurements established typical external ambient and background noise levels at the site. The measurement location is hereby referred to in this report as follows:

- 'Location 1' – sound level meter positioned on northern site boundary, adjacent to rear of NSR1, approximately 3m above ground level (AGL); and
- 'Location 2' – sound level meter positioned on south-eastern site boundary, adjacent to Richmond Hall, approximately 3m AGL.

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

All monitored noise data has been screened to remove samples influenced by adverse conditions, including periods of rainfall and high wind speeds (>5m/s), which has been obtained from a nearby weather monitoring station on the Met Office Weather Observations Website (WOW) database. Table 4.1 provides a summary of periods excluded from the results due to adverse weather conditions; all other periods not excluded were considered suitable for noise monitoring.

Table 4.1
Excluded Periods

Excluded Monitoring Periods	Excluded Monitoring Periods
28/09/2024	1330h-1715h
29/09/2024	1015h-1130h
	1700h-1945h
	2045h-0000h
30/09/2024	0145h-0300h
	0400h-1045h

Summaries of the measured noise levels are given in Tables 4.2 and 4.3 overleaf. Full survey results are available on request.

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Table 4.2
Summary of Measured Noise Levels – 'Location 1' – Free Field, dB

Date	Period	Time (h)	$L_{Aeq,T}$	L_{A10}	L_{A90}	L_{AFMax}
27/09/24	Daytime	1515h-2300h	53.7	47.9	42.2	85.5
27/09/24-28/09/24	Night-time	2300h-0700h	64.4	47.9	41.0	85.7
28/09/24	Daytime	0700h-0930h	46.3	47.9	41.2	73.4
28/09/24-29/09/24	Night-time	2300h-0700h	45.0	44.1	38.7	80.5
29/09/24	Daytime	0700h-0930h	49.2	50.5	43.4	76.9
29/09/24-30/09/24	Night-time	2300h-0700h	52.5	54.9	45.2	73.9

Table 4.3
Summary of Measured Noise Levels – 'Location 2' – Free Field, dB

Date	Period	Time (h)	$L_{Aeq,T}$	L_{A10}	L_{A90}	L_{AFMax}
27/09/24	Daytime	1515h-2300h	48.6	49.2	44.0	72.6
27/09/24-28/09/24	Night-time	2300h-0700h	46.8	47.6	43.3	79.8
28/09/24	Daytime	0700h-0930h	48.8	49.4	43.4	88.7
28/09/24-29/09/24	Night-time	2300h-0700h	47.1	47.4	41.1	73.3
29/09/24	Daytime	0700h-0930h	48.5	49.8	43.7	77.2
29/09/24-30/09/24	Night-time	2300h-0700h	47.8	49.6	43.5	61.4

4.2.1 Observations and Comments

The noise environment during the attended portion of the survey at each location was noted as being primarily road traffic noise from the surrounding road network. At Location 1 ambient noise levels were often influenced by noise from the heavy tree cover along the northern boundary of the site, even at low wind speeds. Noise generated by tree cover does not appear to affect measured background noise levels.

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

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 and 4.2, overleaf, obtained from measurement Location 1, representative of the 'off-site' NSR1. The records highlighted in teal in each figure denote the representative background levels used within this assessment.

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Figure 4.1
L_{A90} Statistical Analysis – 'Location 1' – Daytime

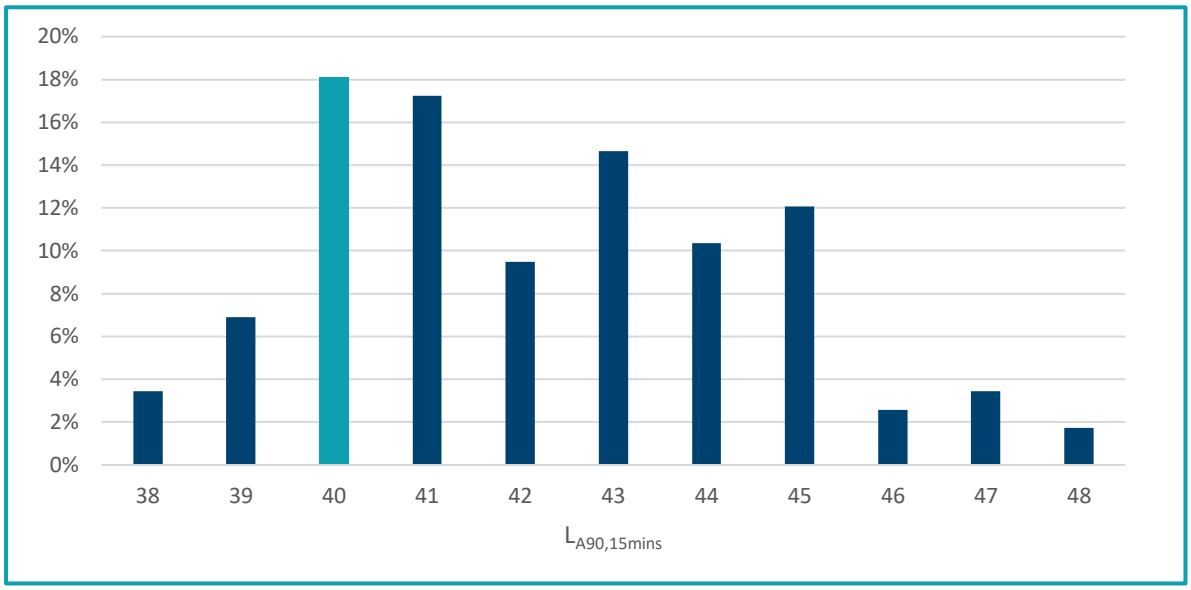
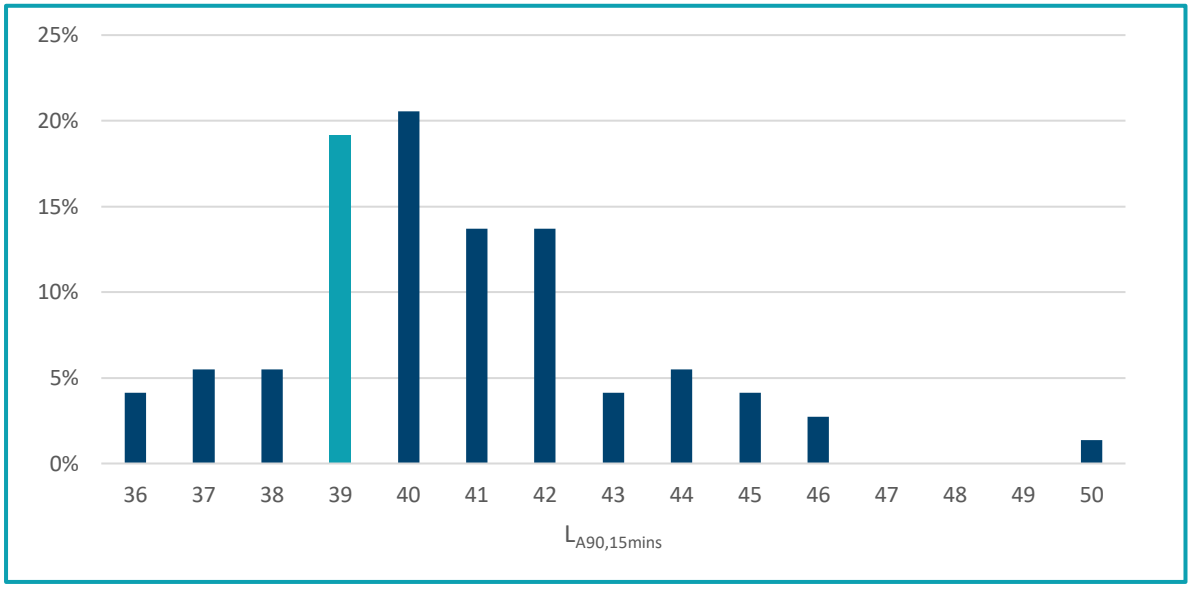


Figure 4.2
L_{A90} Statistical Analysis – 'Location 1' – Night-time



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5.0 NOISE MODEL INPUT DATA

5.1.1 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) unless otherwise stated through global mapping software
	Proposed	Proposed Site Plan (Drawing ref: 5938-HMA-LIM-00-DR-A-00110_P3)	None
Ground Heights	All	Environment Agency Open Data LiDAR Digital Terrain Model (2.0m resolution)	None
Ground Absorption	Existing	*n/a*	Hard ground on and off site (G=0), roads hard/ reflective (G=0)
Reflections	All	*n/a*	3rd order reflections have been accounted for within the noise model
Barrier	Proposed	Proposed Site Plan (Drawing ref: 5938-HMA-LIM-00-DR-A-00110)	2.5, High Acoustic Fence around Refuse/Recycling Compound and Portable Waste Compactor 3.0m High Acoustic Fence around External Plant Compound Minimum mass of each acoustic fence to be 12kg/m^2

5.2 Source Noise Assumptions

5.2.1 Fixed Plant

At this stage, the fixed plant associated with the proposed Facilities, Maintenance & Compliance (FMC), Environmental Services Unit (ESU) & Residential Support Teams (RST) units have not yet been decided and as such, indicative plant items have been selected.

As part of the previous application at the development site, the proposed fixed plant had been selected to service the units. The building use is largely similar, with the exception of the University's Catering Central Processing Unit (CPU) which was previously proposed. As such, the fixed plant previously proposed will be utilised for the purposes of this assessment, with the exclusion of all fixed plant items servicing the CPU unit. The location of the indicative units will be east of the proposed building which can be seen in Figure 1.1.

The following fixed plant items (or equivalent) have been included within the assessment:

- One (1no.) Mitsubishi EAHV-M1500YCL ASHP;
- One (1no.) Mitsubishi Q-Ton ASHP;

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- One (1no.) Mitsubishi PURY-P300YSNW-A2 DX Unit; and
- One (1no.) Main AHU c/w Attenuation.

A summary of the noise emissions of all assessed fixed plant noise sources associated with the development, is presented in Table 5.2 below.

Table 5.2
Fixed Plant: Assessed Noise Source Sound Power Levels, dB

Noise Source	Octave Band Sound Power Level (L_w), Hz (dB(Z))								Sum
	63	125	250	500	1000	2000	4000	8000	dB(A)
Mitsubishi EAHV-M1500YCL	86.0	82.0	80.0	77.0	76.0	71.0	67.0	54.0	***80.0***
Mitsubishi Q-Ton ASHP	-	-	-	-	-	-	-	-	***77.0***
Mitsubishi PURY-P300YSNW-A2	93.5	89	87.5	84.5	79.5	75.5	71.0	67.0	***86.0***
Main AHU Intake c/w Attenuation	82.0	88.0	88.0	91.0	84.0	80.0	73.0	73.0	***91.0***
Main AHU Exhaust c/w Attenuation	84.0	91.0	91.0	94.0	88.0	85.0	77.0	80.0	***94.0***

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 Servicing Arrangements (i.e. 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 amenity building with unloading undertaken via the use of a roll cage and tail lift, as is typical of developments of this nature.

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

Table 5.3
Site Servicing Data Summary

Noise Source	Assessed Metric	Parameter	Data Source(s)
LGV Manoeuvre (Pass-by)	L_{Aeq}	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).

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Noise Source	Assessed Metric	Parameter	Data Source(s)
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).
(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	

Source noise level data utilised in the assessment of ambient (L_{Aeq}) noise contributions are presented in Table 5.4 below. All data is presented as sound power levels with no 'on-time', speed or other corrections.

Table 5.4
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
	63	125	250	500	1000	2000	4000	8000	dB(A)
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***

Operational Assumptions – Delivery Events

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

- 1no. entering and 1 no. exiting during the daytime worst-case 1-hour period.

For the purposes of this assessment, it is assumed that deliveries will take place during the daytime period (0700h-2300h) only.

Table 5.5 below 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 5.5
Operational Assumptions (Per Assessed Delivery Event)

Noise Source	Source Type	Height Above Ground Level (AGL)	Operational Assumptions
LGV Manoeuvre (Pass-by)	Moving Point Source	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).
(Un)loading Using Roll Cage and Tail Lift		1.0m	(Un)loading operations take approximately 15mins to complete.

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5.2.3 Waste Compactor

As part of the development, it is proposed to install a Portable Waste Compactor PD731. Source noise level data utilised in the assessment of ambient noise (L_{Aeq}) contributions are presented in the Table 5.6 below.

Table 5.6
Waste Compactor: 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
	63	125	250	500	1000	2000	4000	8000	dB(A)
Waste Compactor	89.0	93.0	81.0	85.0	88.0	80.0	77.0	77.0	***90.4***

Table 5.7 presents a summary of the operational assumptions accounted for within the noise model to determine ambient noise contributions at adjacent sensitive receptor locations.

Table 5.7
Operational Assumptions (Waste Compactor)

Noise Source	Source Type	Height Above Ground Level (AGL)	Operational Assumptions
Waste Compactor	Point Source	2.0m	Assumed 25% on-time throughout 1hr 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 5.8
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

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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.

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6.0 ASSESSMENT

6.1 Off-site Receptors

6.1.1 Fixed Plant Assessment

An assessment has been carried out in accordance with the requirements of BS 4142:2014+A1:2019 to quantify the level and significance of any noise impacts on residents of the properties due to the noise generated by the proposed fixed plant units.

The specific noise level has been obtained by calculating the noise level at the nearest noise sensitive receptor due to the operation of the proposed plant, using achievable source noise levels supplied to Dragonfly Consulting.

The range of plant to be installed at the site is not expected to have any specific tonal characteristics that would attract a correction under BS 4142. Similarly, the plant is not expected to have intermittency or impulsive characteristics that would invite a correction, however a final of any applicable penalties will only be possible on final specification of all plant to be installed.

The results of the assessment are shown in Table 6.1, below. For brevity, the highest receiving point of each NSR has been utilised for the assessment. 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	Existing Measured Background (L_{A90})		Predicted Noise Rating Level ($L_{Ar,Tr}$)		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	40	39	37.1	37.1	-2.9	-1.9

The assessment demonstrates that the rating noise levels impacting on NSR1 will be at least 2.9dB below the representative background noise levels during the daytime, and 1.9dB during the night-time period.

For NSR1, the proposals should be considered against the identified criteria set out in Table 3.2 which reflect nationally recognised planning standards. When considered against this criterion, it is considered that the noise levels are below the **LOAEL** for all periods.

Once MEP Design has been finalised for fixed plant installations, the predicted noise rating level at the NSRs will likely be lower. This is due to the fixed plant being housed, as can be seen in Figure 1.1.

The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – *Free-field external noise levels at adjacent sensitive receptor locations no higher than the representative background noise level*.

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Impacts below the Lowest Observed Adverse Effect Level (LOAEL) are considered to be acceptable when assessed against the requirements of the NPPF and meet the requirements of the planning condition. On this basis. the assessment demonstrates that the proposed fixed plant will not cause an unacceptable significant adverse impact.

6.1.2 Site Servicing Operations (HGV Deliveries / Collections)

The assessment of ambient noise contributions (L_{Aeq}) from 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 noise from delivery operations being readily distinctive, has been applied to the predicted source noise contributions (L_{Aeq}) to determine the rating level ($L_{Ar'Tr}$).

The results of the assessment are shown in Table 6.2, in accordance with BS 4142 Para 8.6, background levels are expressed as integers (with 0.5 dB being rounded up):

Table 6.2
BS 4142 Assessment of Servicing Noise Impact Daytime, $L_{Ar'Tr}$ dB

NSR	Existing Measured Background (L_{A90}) Daytime	Predicted Rating Level ($L_{Ar'Tr}$) Daytime	Difference, dB Daytime
1	40	35.2	-4.8

The assessment demonstrates that the rating noise levels impacting on NSR1 will be 4.8dB below the representative background noise levels during the daytime period.

For NSR1, the proposals should be considered against the identified criteria set out in Table 3.2 which reflect nationally recognised planning standards. When considered against this criterion, it is considered that the noise levels are below the **LOAEL** for all periods.

The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – *Free-field external noise levels at adjacent sensitive receptor locations no higher than the representative background noise level*.

Impacts below the Lowest Observed Adverse Effect Level (LOAEL) are considered to be acceptable when assessed against the requirements of the NPPF and meet the requirements of the planning condition. On this basis. the assessment demonstrates that the proposed site servicing operations will not cause an unacceptable significant adverse impact.

6.1.3 Waste Compactor

An assessment has been carried out in accordance with the requirements of BS 4142:2014+A1:2019 to quantify the level and significance of any noise impacts on residents of the properties due to the noise generated by the proposed waste compactor.

In accordance with BS 4142:2014+A1:2019, a +3dB acoustic character correction, to account for noise from the waste compactor being intermittent, has been applied to the predicted source noise contributions (L_{Aeq}) to determine the rating level ($L_{Ar'Tr}$).

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The results of the assessment are shown in Table 6.3, overleaf. For brevity, the highest receiving point of each NSR has been utilised for the assessment. 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 Waste Compactor Impact at NSRs, dB

NSR	Existing Measured Background (L_{A90}) Daytime	Predicted Rating Level ($L_{Ar,Tr}$) Daytime	Difference, dB Daytime
1	40	41.6	+1.6

The assessment demonstrates that the rating noise levels impacting on NSR1 will be 1.6dB above the representative background noise levels during the daytime period.

For the assessment, the Waste Compactor has been assumed 25% on-time throughout 1hr daytime in use and generating noise. This is based on an absolute worst-case scenario, and the Waste Compactor will likely be in use much less frequently and therefore output lower noise impacts.

Therefore, for NSR1, the proposals should be considered against the identified criteria set out in Table 3.2 which reflect nationally recognised planning standards. When considered against this criterion, it is considered that the noise levels are below the **LOAEL** for all periods.

The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – *Free-field external noise levels at adjacent sensitive receptor locations no higher than the representative background noise level*.

Impacts below the Lowest Observed Adverse Effect Level (LOAEL) are considered to be acceptable when assessed against the requirements of the NPPF and meet the requirements of the planning condition. On this basis. the assessment demonstrates that the proposed fixed plant will not cause an unacceptable significant adverse impact.

6.2 On-site Receptors

6.2.1 Cumulative Fixed Plant, Site Servicing and Waste Compactor

Internal noise levels have been calculated based on a façade reduction measured for each building by Stantec in a previous noise assessment. The façade sound insulation performances for each building were measured as follows:

Table 6.4
Sound Insulation Performance, dB

NSR	Building Name	Measured Façade Sound Level Difference
2	Richmond Park	33
3	Richmond Park	33
4	Unsworth Park	28

The predicted external and internal noise levels are presented in Table 6.5 overleaf.

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Table 6.5
BS 8233:2014 Assessment of Cumulative Noise Impact Daytime, L_{Aeq} dB

NSR	External Noise Levels, L_{Aeq}	Internal Noise Levels, L_{Aeq}	Internal Criteria, L_{Aeq} (Daytime)	Within Criteria (Y/N)
2	41.6	8.6	35.0	Y
3	51.8	18.8	35.0	Y
4	47.8	19.8	35.0	Y

Table 6.6
BS 8233:2014 Assessment of Fixed Plant Noise Impact Night-time, L_{Aeq} dB

NSR	External Noise Levels, L_{Aeq}	Internal Noise Levels, L_{Aeq}	Internal Criteria, L_{Aeq} (Night-time)	Within Criteria (Y/N)
2	35.0	<5.0	30.0	Y
3	47.7	14.7	30.0	Y
4	42.5	14.5	30.0	Y

The results of the assessment presented in the Tables above shows that predicted cumulative ambient noise level (L_{Aeq}) contributions are predicted to be significantly below BS 8233:2014 internal noise criteria within adjacent on-site NSRs and therefore will be below the LOAEL.s

The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – *Internal noise levels achieve the requirements of the BS 8233:2014 standard assuming windows are closed, and an additional source of ventilation is provided.*

Impacts below the Lowest Observed Adverse Effect Level (LOAEL) are considered to be acceptable when assessed against the requirements of the NPPF and meet the requirements of the planning condition. On this basis. the assessment demonstrates that the proposed site servicing operations will not cause an unacceptable significant adverse impact.

6.3 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.

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7.0 CONCLUSIONS

Halliday Meecham Architects Ltd, on behalf of The University of Manchester, has appointed Dragonfly Consulting to carry out a Noise Impact Assessment relating to the proposal of a new facility located on an existing car park, adjacent to Richmond Park Student Halls, Fallowfield Campus.

The noise assessment has been conducted with reference to the National Planning Policy Framework and the appropriate British Standards, recognised guidance & reference documents relevant to this site.

This report considered the sites suitability for development consisting of a maintenance hub to replace the existing Lines Building, located a short distance to the south-west of the proposed site.

7.1 Assessment of Offsite Noise Sensitive Receptors

The assessment demonstrates that the rating noise levels impacting on NSR1 due to fixed plant will be at least 2.9dB below and 1.9dB below the representative background noise levels during the daytime and night-time periods, respectively.

The assessment also demonstrates that the rating noise levels impacting on NSR1 due to site servicing operations and the waste compactor will be 14.4dB below the representative background noise levels during the daytime period, and 2.3dB above, respectively.

It is noted that these values for fixed plant and waste compactor noise impacts sit below the identified criteria based on national planning guidance, but above the criteria that the MCC guidance seeks to achieve. The proposed scheme is indicative, and once MEP Design has been finalised for fixed plant, the predicted noise rating level at the NSRs will likely be lower. The waste compactor has been assumed 25% on-time throughout 1hr daytime in use and generating noise. This is based on an absolute worst-case scenario, and the Waste Compactor will likely be in use much less frequently and therefore output lower noise impacts.

Therefore, for NSR1, given the context of the assessment it is considered that the noise levels are below the **LOAEL** for all periods.

The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – *Free-field external noise levels at adjacent sensitive receptor locations no higher than the representative background noise level*.

Impacts below the Lowest Observed Adverse Effect Level (LOAEL) are considered to be acceptable when assessed against the requirements of the NPPF and meet the requirements of the planning condition. On this basis. the assessment demonstrates that the proposed fixed plant will not cause an unacceptable significant adverse impact.

7.2 Assessment of Onsite Noise Sensitive Receptors

The results of the assessment show that predicted cumulative ambient noise level (L_{Aeq}) contributions are predicted to be significantly below BS 8233:2014 internal noise criteria within adjacent on-site NSRs and therefore will be below the LOAEL.

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The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – *Internal noise levels achieve the requirements of the BS 8233:2014 standard assuming windows are closed, and an additional source of ventilation is provided.*

Impacts below the Lowest Observed Adverse Effect Level (LOAEL) are considered to be acceptable when assessed against the requirements of the NPPF and meet the requirements of the planning condition. On this basis. the assessment demonstrates that the proposed site servicing operations will not cause an unacceptable significant adverse impact.

7.3 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 suitable conditions to address the following items, similar to the Conditions as part of the previous application.

- Fixed Plant – at the current design stage finalised 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.
- Site Servicing Operations – All on-site Deliveries limited to daytime hours only (0700h-2300h).

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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 ($2x10^{-5}$ 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.

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} 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.

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Appendix B – Monitoring Equipment

Table B-1
Noise Monitoring Equipment

Equipment	Serial Number
01dB Cube Sound Level Meter	10892
G.R.A.S 40CD Microphone	233511
01dB PRE22N Preamplifier	11071
Svantek SV307 Noise Monitoring Station	87841
Svantek ST30 Microphone	143326
Cirrus CR:515 Acoustic Calibrator	103792

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Appendix C – Measurement Locations

Figure C-1
Measurement Location Plan



Measurement Locations

Noise Sensitive Receptors

Development Site

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