DRAGONFLY

CONSULTING

Advanced Research Clusters GP Limited

ARC Oxford Plot 4200

John Smith Drive, Oxford

Noise Impact Assessment

DC4347-NR1v2

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Report Version Issue Log

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1.0 INTRODUCTION

Dragonfly Consulting has been appointed on behalf of Advanced Research Clusters GP Limited to carry out a noise impact assessment in support of a full planning application at Plot 4200, ARC Oxford, John Smith Drive, Oxford (the 'Site').

The development proposals consist of a full planning application for the demolition of existing office buildings and erection of 1no. laboratory-enabled office building for research and development with ancillary commercial space (all within use Class E). Provision of new access, enhancements to existing footpath, motor vehicle and cycle parking, landscaping and services infrastructure.

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

Measurements of external noise levels have been conducted at the proposed development to allow demonstration by calculation that suitable noise levels will be achieved at the nearest Noise Sensitive Receptors (NSRs).

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

1.1 Site Description

1.1.1 Existing Site Conditions

The Site is located at ARC Oxford Plot 4200, John Smith Drive, Oxford, OX4 2RU.

Plot 4200 lies within the southern part of ARC Oxford to the west of John Smith Drive. It currently comprises of 7 individual office buildings organised around areas of car parking and intermittent tree planting. Residential development lies to the west and an existing private footpath runs alongside the southern side of the site.

1.1.2 Proposed Site Conditions

The development proposals includes the demolition of existing office buildings followed by the construction of a laboratory-enabled office building.

The primary changes to the noise environment within the now enclosed yard space will be the introduction of the following new items of machinery:

1. Air Source Heat Pumps – 3 x Sintesis Balance CMAF 165 HE XLN EC or similar;
2. Air Handling Unit – 6 x Geniox 22 or similar;
3. Air Handling Unit – 1 x Geniox 18 or similar;
4. Tenant Extract Flues – To be installed by future tenants if required, no specification.

1.1.3 Noise Sensitive Receptor (NSR) Locations

Noise contributions will be considered at the following sensitive receptor locations based on their proximity to the site:

- NSR1 – Residential Property off Phipps Road (Grid Ref: 454725, 203849);
- NSR2 – Residential Property of Bailey Road (Grid Ref: 454709, 203810);
- NSR3 – Residential Property off Fredrick Road (Grid Ref: 454685, 203780);
- NSR4 – Residential Property off Fredrick Road (Grid Ref: 454669, 203755); and,
- NSR5 – Residential Property off Fredrick Road (Grid Ref: 454659, 203723).

Receiver heights have been assumed as 1.5m to represent ground floor windows and 4m to represent upper floor windows. NSR2 is a ground floor property only. NSR locations are shown in Appendix C.

2.0 GUIDANCE

2.1 Local Planning Requirements

2.1.1 Oxford Local Plan

The Oxford Local Plan was adopted in June 2020 and provides a vision for Development of the area up to 2036. The policies that are considered most relevant to this assessment are as follows:

Policy RE7 – Managing the Impact of Development states:

"Planning permission will only be granted for development that:

a) ensures that the amenity of communities, occupiers and neighbours is protected; and

b) does not have unacceptable transport impacts affecting communities, occupiers, neighbours and the existing transport network; and

c) provides mitigation measures where necessary.

The factors the City Council will consider in determining compliance with the above elements of this policy include:

d) visual privacy, outlook;

e) sunlight, daylight and overshadowing;

f) artificial lighting levels;

g) transport impacts;

h) impacts of the construction phase, including the assessment of these impacts within the Construction Management Plans;

i) odour fumes and dust;

j) microclimate;

k) contaminated land; and

l) impact upon water and wastewater infrastructure

Policy RE8 – Noise and Vibration states:

Planning permission will only be granted for development proposals which manage noise to safeguard or improve amenity, health, and qua*lity of life."*

"Planning permission will not be granted for development that will generate unacceptable noise and vibration impacts. Planning permission will not be granted for development sensitive to noise in locations which experience high levels of noise, unless it can be demonstrated, through a noise assessment, that appropriate attenuation measures will be provided to ensure an acceptable level of amenity for end users and to prevent harm to the continued operation of existing uses.

Conditions will be used to secure such mitigation measures and operational commitments. Measures to mitigate the impacts of noise and vibration associated with demolition and construction will be secured by legal agreement through Construction Management Plans."

2.2 National Planning Requirements

2.2.1 National Planning Policy Framework

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

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

Paragraph 174 of the NPPF states:

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

…

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

Additionally, Paragraph 185 of the NPPF states:

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

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

2.2.2 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;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

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

NOEL – No Observed Effect Level

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

LOAEL – Lowest Observed Adverse Effect Level

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

SOAEL – Significant Observed Adverse Effect Level

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

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

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

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

Summaries of the relevant standards are given below.

2.3 British Standards and Guidance

2.3.1 British Standard (BS) 7445-1: 2003

The assessment of noise impact for this development has been undertaken by measuring external noise levels in accordance with the guidance detailed in 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

British Standard 4142:2014+A1:2019 – *Methods for rating and assessing industrial and commercial sound*. This new edition of BS 4142 clarifies the application of the standard and introduces the consideration of uncertainty as part of the assessment methodology. The standard provides a method for rating and assessing sound of an industrial or commercial nature, including:

- Sound from industrial and manufacturing process;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;

- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises;
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as from FLTs or that from train or ship movements on or around an industrial/commercial site.

The standard is intended for use for both the assessment of complaints and the assessment of the impact of commercial and industrial noise on both new and existing residential developments.

The method described in this British Standard 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 at which the sound is incident. The standard specifically excludes itself for the use of determination of nuisance.

The procedure contained in BS 4142 for assessing the likelihood of complaint requires the calculation of the noise level from the source to be assessed at a location immediately outside the relevant dwelling; this is described as the 'specific sound level'. Where the specific noise source already exists, its noise level can be derived by measuring the total noise present, or 'ambient noise', and subtracting from it the noise from sources that are not under consideration. Noises not under consideration are called the 'residual noise'.

A 'rating level' is then calculated from the specific sound level. The rating level is then compared with the measured background noise level at that measurement location. If the specific noise source does not yet exist but the details of the intended plant are known, the specific sound level can be derived from first principles using manufacturers' and other data.

The specific, ambient and residual noise levels are measured in terms of $L_{Aeq,T}$ values and the background noise level is measured in terms of an L_{A90} value.

BS 4142 considers that certain acoustic features can increase impact of a new noise source over that expected from a simple comparison between the specific noise level and the background noise level. These features can be assessed in one of three ways:

- Objective method - comparing adjoining third octave band noise levels (if available) for the sound source;
- The reference method by analysing measured plant noise levels using the Joint Nordic method;
- Using the prescribed subjective methodology.

These features and the penalties applied to calculate a rating level when assessing subjectively as defined by BS 4142 are as follows:

- Tonality – For sound ranging from not tonal to prominently tonal, the Joint Nordic Method gives a correction of between 0 and +6dB for tonality.
    - 2dB for a tone which is just perceptible;
    - 4dB where it is clearly perceptible;
    - 6dB where it is highly perceptible.

- Impulsivity – A correction of up to 9dB can be applied for sound that is highly impulsive, considering both the rapidity of change in sound level and the overall change in sound level.
    - 3dB just perceptible impulsivity;
    - 6dB clearly perceptible impulsivity;
    - 9db highly perceptible impulsivity.
- Intermittency – Where the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time period that contain the greatest amount of 'on' time. This can necessitate measuring the specific sound over a number of shorter periods that are in combination less that the reference time interval in total.
    - If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.
- Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive from the residual acoustic environment, a 3dB penalty can be applied.

In order to assess the significance of the impact, the background noise level is subtracted from the rating level. The standard considers that the greater the difference, the greater the significance.

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;
- 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 standard goes on to highlight that these values are not absolute. There are a number of factors that should be taken in to account when assessing the impact and significance of the noise including:

- The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low;
- Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night;
- Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts. The margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse;
- The character and level of the residual sound compared to the character and level of the specific sound;

- The sensitivity of the receptor and if the receptor already includes acoustic design features to mitigate noise.

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
Fixed Plant	BS 4142:2014+A1:2019

3.2 Selection of Assessment Criteria

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

The standard sets clear values subject to context. When setting these limits the following contextual factors have been considered:

- The site has a current permitted use which is unrestricted.

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 Mitigate to achieve LOAEL Criteria

4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Survey Methodology

A noise survey, conducted by Dragonfly Consulting, was undertaken to establish daytime and night-time noise levels at two locations over the period 26th to 27th October 2023.

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

The measurement locations are hereby referred to in this report as follows:

- 'Location 1' – sound level meter positioned approximately 3m from the ground in a location at the north end of existing site (Grid Ref: 454733, 203862);
- 'Location 2' – sound level meter positioned approximately 3m from the ground in a location at the centre of existing site. (Grid Ref: 454713, 203814).

The measurement locations are shown in Appendix C.

4.2 Survey Results

The weather during the unattended survey was suitable for noise measurement with no rainfall and low wind speeds.

Summaries of the measured noise levels are given in Tables 4.1 and 4.2. Copies of the full data set are available in full upon request from Dragonfly Consulting.

Table 4.1
Summary of Measured Noise Levels – Location 1 – 26/10/23 to 27/10/23 – free field, dB

Location	Date	Period	Time (h)	$L_{Aeq,T}$	L_{A10}	L_{A90}	L_{AFMax}
1	26/10/23	Daytime	1315h - 2300h	46.5	47.3	42.7	84.0
	26/10/23 - 27/10/23	Night-time	2300h - 0700h	41.7	42.0	37.2	71.1
	27/10/23	Daytime	0700h - 1145h	49.1	48.6	42.6	75.3

Table 4.2
Summary of Measured Noise Levels – Location 2 – 26/10/23 to 27/10/23 – free field, dB

Location	Date	Period	Time (h)	$L_{Aeq,T}$	L_{A10}	L_{A90}	L_{AFMax}
2	26/10/23	Daytime	1315h - 2300h	46.6	47.7	43.1	76.6
	26/10/23 - 27/10/23	Night-time	2300h - 0700h	40.0	41.2	36.9	58.6
	27/10/23	Daytime	0700h - 1130h	48.0	48.6	43.7	72.4

4.3 Observations and Comments

The noise environment at both measurement locations is characterised as being predominantly road traffic noise and general noise from the business park and surrounding road network.

The existing office units at Nash Court are all served by both heating/cooling plant equipment and air handling equipment.

It is considered that the levels measured are sufficiently representative of the typical acoustic environment at the survey locations when no existing plant is operational to permit a reliable assessment to be completed.

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

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

The results of the statistical analysis of measured background noise levels are as follows:

- Location 1:
    - Daytime – 42dB(A);
    - Night-time – 36dB(A).
- Location 2:
    - Daytime – 42dB(A);
    - Night-time – 35dB(A).

Background (L_{A90}) statistical analysis graphs are shown in Figures 4.1 - 4.4, below and overleaf respectively.

Figure 4.1
Location 1 – Daytime Background (L_{A90}) Analysis

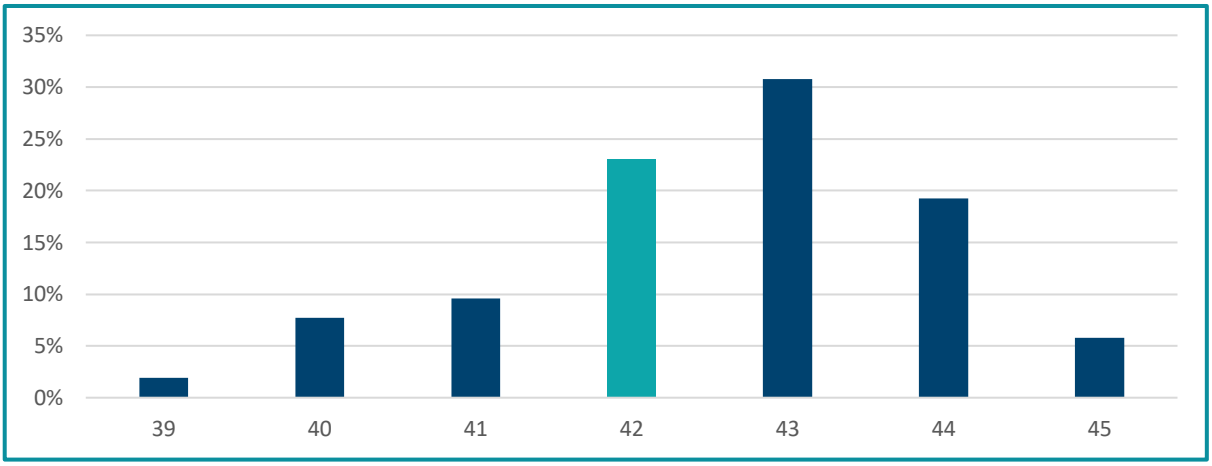


Figure 4.2
Location 1 – Night-time Background (L_{A90}) Analysis

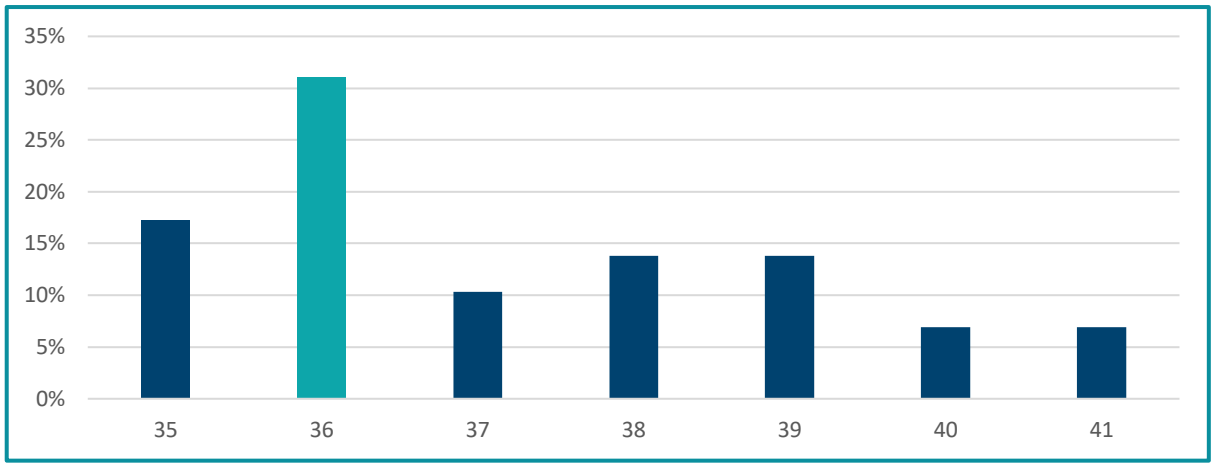


Figure 4.3
Location 2 – Daytime Background (L_{A90}) Analysis

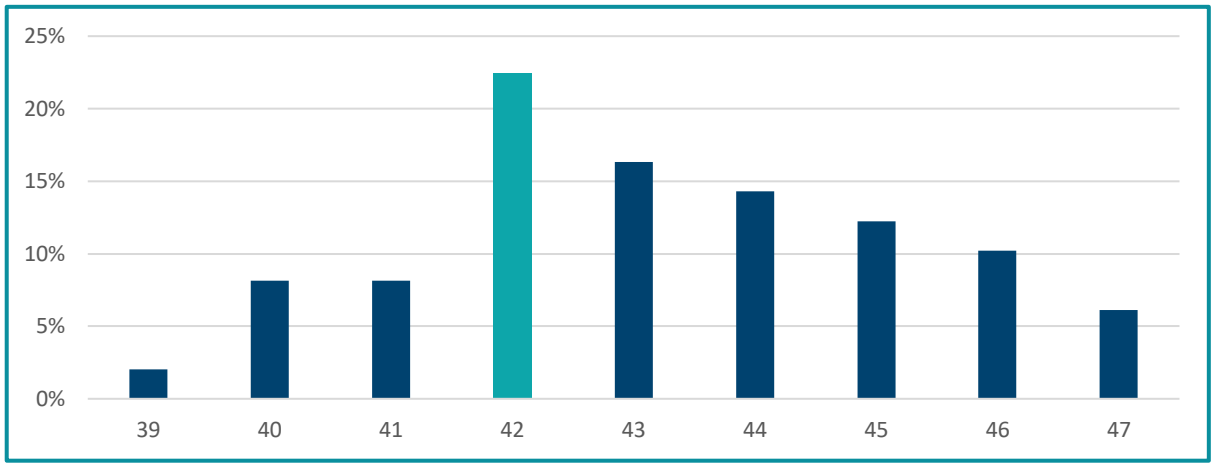
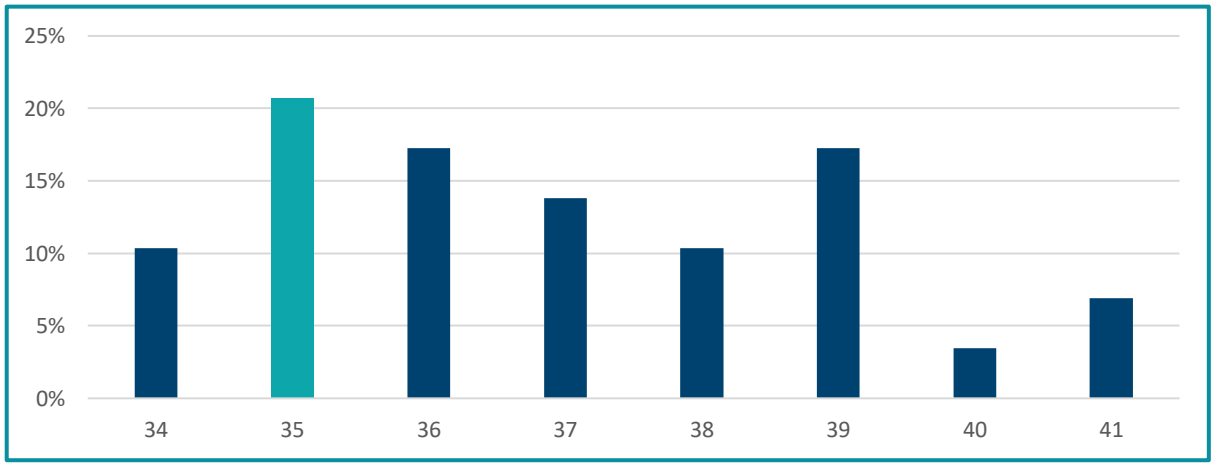


Figure 4.4
Location 2 – Night-time Background (L_{A90}) Analysis



5.0 NOISE MODELLING METHODOLOGY

5.1 Data Sources

Modelling calculations have been undertaken based on the spatial settings and data sources identified below:

Table 5.1
Noise Model Input Data

Parameter	Scenario	Data Source	Assumptions
Site Plans	Existing	NCO-SP-ZZ-00-DR-A-0010, Issued by Spratley Partners	Existing building heights modelled as 8.5m AGL (typical 2-storey building height)
	Proposed	NCO-SP-ZZ-00-DR-A-0010 and NCO-SP-ZZ-RF-DR-A-0054, Issued by Spratley Partners	Existing building heights modelled as set out below.
Ground Heights	All	Environment Agency Open Data LiDAR Digital Terrain Model (2.0m resolution)	None
Ground Absorption	All	*n/a*	Mixed ground conditions on and off site (G=0.5)
Reflections	All	*n/a*	3rd order reflections have been accounted for within the noise model

5.2 Source Noise Assumptions

5.2.1 Fixed Plant Noise Emissions

The following sound power levels have been assumed for the noise emissions of the identified plant items. The values in Tables 5.2 to 5.4 have been derived from the manufacturers published noise data.

Table 5.2
Sintesis Balance CMAF 165 HE XLN EC Sound Power Levels

Noise Source	Octave Band Sound Power Level (L_w), Hz (dB(Z))								Sum
	63	125	250	500	1000	2000	4000	8000	dB(A)
Sintesis Balance CMAF 165 HE XLN EC	73.2	95	90	89	86	79	78	70	91
Each Sintesis Balance CMAF 165 is enclosed within a bespoke noise enclosure reducing the overall noise emissions by 10dB									81

Table 5.3
Geniox 22 Sound Power Levels

Noise Source		Octave Band Sound Power Level (L_w), Hz (dB(Z))								Sum
		63	125	250	500	1000	2000	4000	8000	dB(A)
Geniox 22	Atmosphere Intake	70	72	62	48	28	24	25	27	58
	Atmosphere Exhaust	78	79	69	59	44	44	52	55	66
	Breakout from Unit Body	74	74	61	58	58	56	50	36	64

Table 5.4
Geniox 18 Sound Power Levels

Noise Source		Octave Band Sound Power Level (L_w), Hz (dB(Z)) 63	125	250	500	1000	2000	4000	8000	Sum dB(A)
Geniox 18	Atmosphere Intake	69	76	69	67	59	52	44	41	58
	Atmosphere Exhaust	77	84	78	80	76	73	69	68	82
	Breakout from Unit Body	70	72	56	56	53	47	42	29	59

5.2.2 Sound Insulation of Proposed Structures

The following sound insulation value has been assumed for the proposed louvred structure to be constructed around the AHU units. This data has been supplied by IAC for the Slimshield 150 Louvre.

Table 5.5
Louvre Sound Insulation

Element	Octave Band Sound Reduction Index R_W, Hz (dB(Z)) 63	125	250	500	1000	2000	4000	8000
Slimshield 150 Louvre	6	6	8	10	14	18	16	15

5.3 Uncertainty

5.3.1 Survey

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 5.6
Standard uncertainties using allowable tolerances minus test laboratory tolerances given in IEC 61672-1 (source: Narang and Bell, Table 14)

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

5.3.2 Modelling

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

5.3.3 Combined Uncertainty

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

6.0 ASSESSMENT

For the assessment of the noise impact of the proposed new plant equipment, noise levels at the following Noise Sensitive Receptors (NSRs) have been considered. The measured background noise level location identified as being representative of each receptor is also identified below:

- NSR 1 – Residential Property off Phipps Road (Location 1);
- NSR 2 – Residential Property of Bailey Road (Location 1);
- NSR 3 – Residential Property off Fredrick Road (Location 2);
- NSR 4 – Residential Property off Fredrick Road (Location 2); and
- NSR 5 – Residential Property off Fredrick Road (Location 2).

A noise model, constructed in CadnaA by DataKustik, was created using the noise level data and settings detailed in Section 5 above. The specific noise level has been obtained by calculating the noise level at the nearest noise sensitive receptors using this noise model.

6.1 BS 4142:2014+A1:2019 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 noise sensitive dwellings due to the noise generated by the proposed fixed plant and machinery units. For the purposes of this assessment, it is assumed that all noise sources will operate at full capacity, during both daytime and night-time hours.

When calculating the rating level, there are four correction types that can be considered. They are:

- Tonality;
- Impulsivity;
- Intermittency;
- Specific noise readily distinctive from the residual environment.

Based on experience from similar systems of comparable scale, it is not anticipated that there will be any tonal elements to the noise emissions from the site that will meet the threshold for the inclusion of a tonal noise penalty. In addition, the existing office facilities currently on the site have both air handling and air source heating/cooling systems to serve those offices.

However, it understood that whilst there is no restriction on hours of use of the current systems, those current systems do not typically operate at night. It is therefore considered reasonable to add a correction to account for a change in the character of the night-time noise that might be readily distinctive from the residual noise environment.

Therefore, the following corrections have been included.

- Night-time Only – Readily Distinctive – 3dB.

The results of the assessment are shown in Table 6.1 below.

Table 6.1
Assessment of Noise Impact at NSRs, dB

NSR	Floor	Existing Measured Background (L_{A90})		Predicted Rating Level ($L_{Ar'Tr}$)		Difference between Rating Level and Background	
		Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
1	Ground	42	36	32	35	-11	-2
	First	42	36	33	36	-9	0
2	Ground	42	36	35	38	-7	2
3	Ground	42	35	32	35	-11	-1
	First	42	35	32	35	-10	0
4	Ground	42	35	31	34	-12	-2
	First	42	35	31	34	-11	-1
5	Ground	42	35	33	36	-9	1
	First	42	35	33	36	-9	1

The results of the assessment presented in Table 6.1 indicate that noise contributions from fixed plant and machinery do not exceed the threshold of 5dB above the representative background at all NSRs during wither the daytime or night periods, inclusive of a +3dB character correction for a readily distinctive character at night.

Noise impacts arising from fixed and machinery plant are therefore predicted to be below the LOAEL for the assessment.

6.2 Assertion of Competence

This assessment has been completed by Chris Chittock, Principal Consultant with responsibility for completing and oversight of acoustic reports on behalf of Dragonfly Consulting. I hold a Bachelor of Science in Audio Technology, with Honours, from the University of Salford and I am a Part-Time Lecturer at Leeds Beckett University for the Institute of Acoustics Diploma in Acoustics and Noise Control. I have over 20 years of professional experience within the acoustics industry and I am a Corporate Member of the Institute of Acoustics.

I have completed several assessments under BS 4142:2014 and I assert that I am competent to undertake this assessment under the requirements of BS 4142:2014.

7.0 CONCLUSIONS

Dragonfly Consulting has been appointed on behalf of Advanced Research Clusters GP Limited to carry out a noise impact assessment in support of a full planning application at Plot 4200, ARC Oxford, John Smith Drive, Oxford (the 'Site').

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

This report therefore 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.

Measurements of external noise levels have been conducted at the proposed development to allow demonstration by calculation that suitable noise levels will be achieved at the nearest Noise Sensitive Receptors (NSRs).

7.1 Fixed Plant and Mechanical Ventilation

The results of the assessment indicate that noise contributions from fixed plant, specifically ventilation and heating and cooling plant, are predicted to be less than 5dB above the existing measured background noise levels at all NSRs during the daytime and night-time period.

Therefore, noise impacts arising from fixed plant are predicted to be below the LOAEL for the assessment.

On this basis, the assessment demonstrates that the proposed development will not cause an unacceptable noise impact and therefore meets the requirements of the NPPF and the Oxford Local Plan.

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

Appendix B – Monitoring Equipment

Table B-1
Noise Monitoring Equipment

Equipment	Serial Number
Svantek SV307 Noise Monitoring Station	87841
Svantek ST30 Microphone	113978
Svantek SV307 Noise Monitoring Station	87849
Svantek ST30A Microphone	123393
O1dB Cal31 Acoustic Calibrator	89089

Appendix C – Measurement Locations

Figure C-1
Measurement Location Plan

Measurement Locations

Noise Sensitive Receptors

Development Site