

University of Gloucestershire  
**University of Gloucestershire, City  
Campus**

Noise Assessment for Planning

GCC -ARUP-ZZ-XX-RP-Z-0002

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**ARUP**

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Noise Survey

# 1 UoG Debenhams Plant Noise Assessment

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This assessment considers the effects of noise generated by new fixed building services plant associated with the proposed redevelopment of the Debenhams building for the University of Gloucester city campus.

The proposed limits for noise emissions from new normally operational plant, at the nearest residential noise-sensitive receivers, are that the rating noise level should be no greater than 5dB below the existing background noise level, or 35dB LAeq, whichever is greater. This aligns with the Gloucester City Council policy of noise emissions being no greater than 5dB below the existing background noise level and the proposed 35dB LAeq fixed limit follows guidance in BS4142:2014 that a fixed limit may be considered suitable when background noise levels are very low.

## 2 University of Gloucester Debenhams site

The University of Gloucester city campus development involves the renovation of the existing Debenhams building on the corner of Northgate Street and The Oxbode (outlined in Green in the site map in Figure 1). Northgate street to the north-west of the site comprises mixed residential but mostly commercial development. The Oxbode along the south-west also comprises of commercial buildings, opening onto Kings Square on the south-east of the site, with commercial developments alongside pubs and bars.

The closest noise sensitive receivers are adjacent to the development's roof on St Aldgate Street, followed by the mixed-use residential and commercial Provincial Court on Northgate Street. Other receivers include the New Inn Hotel on Northgate Street and residential properties along College Court near to the cathedral.

The daytime noise climate is dominated by foot traffic and more infrequent cyclists, mobility scooters and motor vehicles on Northgate Street. In the evening, local traffic on Northgate Street remained similar with less foot traffic, plant noise from surrounding commercial businesses became more dominant.

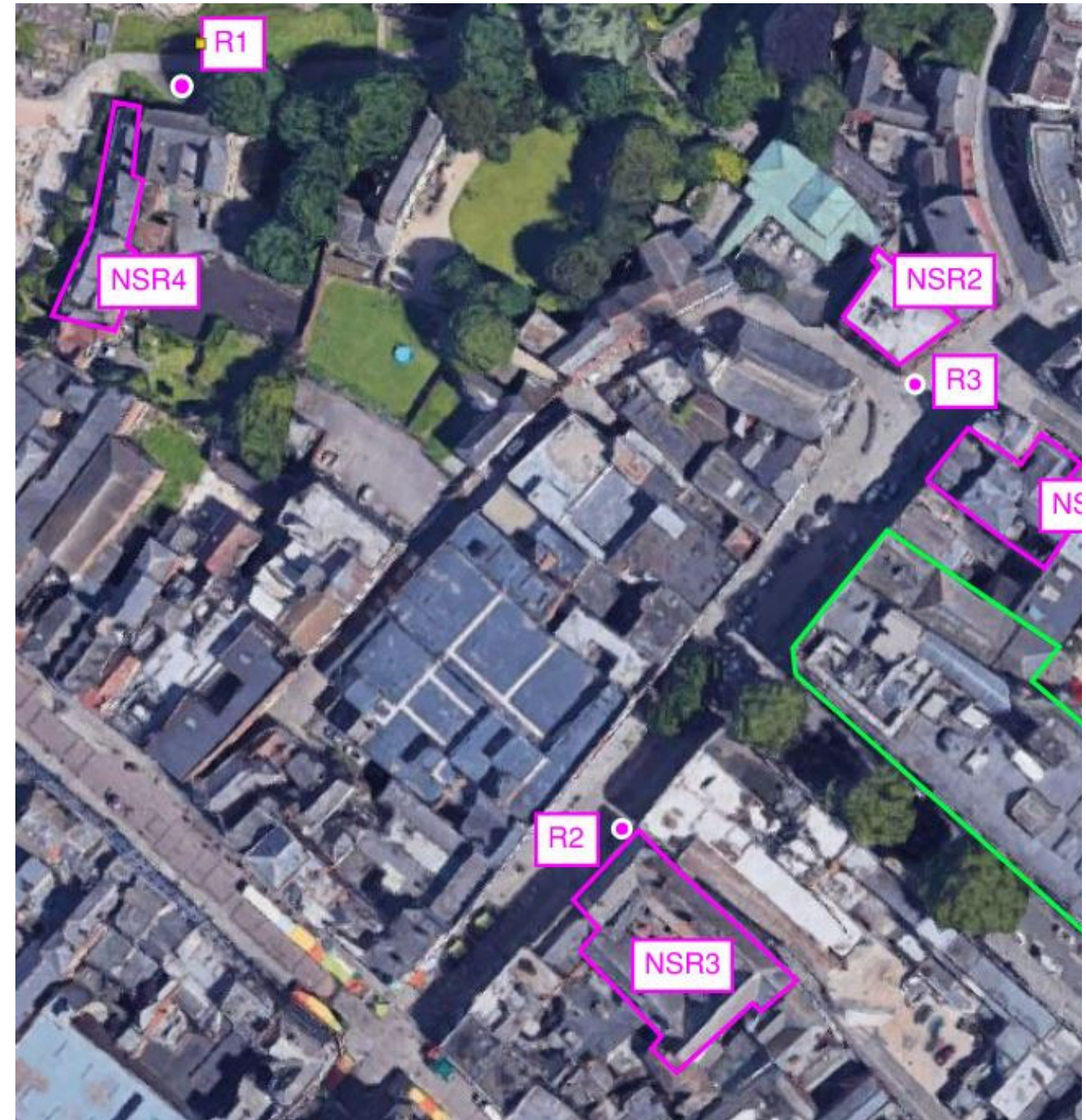


Figure 1 Site map, the development (outlined in green), noise sensitive receivers (outlined in purple) and measurement points (pinned in purple)

### 3 Methodology overview

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The main new noise source from the development will be the new normally operational rooftop plant. The main noise sources are anticipated to be chillers, air-handling units and air-source heat pumps. There is some additional plant at street level in the courtyard off St Aldgate Street. Noise emissions from new or replacement building services noise sources will be controlled so that the rating noise from normally operational plant will be no greater than 5dB below the existing background noise level, or 35dB LAeq, whichever is greater at the nearest noise-sensitive receiver.

For the emergency generator, which will only normally operate when being tested during the daytime, the noise emissions limit would typically be more relaxed and this will be discussed and agreed with Gloucester City Council (GCC) once a testing regime for the generator is established.



## 4 Baseline

A noise survey, including daytime and evening manned measurements was carried out on the 10th November 2021 to establish baseline noise conditions. Figure 1 shows the measurement locations. Location R3 is representative of the mixed-use residential building on the corner of Northgate Street and residential properties above St Aldgate Street. Location R2 is representative of the New Inn Hotel, and Location R1 is representative of the residential properties on College Court.

Noise loggers were installed on the roof of the Debenhams building to also measure night-time background noise levels. However, difficulties with controlling the existing rooftop plant meant that the daytime, evening and night-time noise levels measured by loggers were affected by existing Debenhams operational rooftop plant noise. The logged measurements have therefore not been included in the assessment.

### 4.1 Attended measurements

Short sample attended measurements of 10-15 minutes duration were undertaken to represent the typical periods that operational noise impacts may occur. Weather conditions did not affect the ambient noise levels – there was no precipitation and the wind speed in any direction did not exceed 5m/s. During each attended measurement the microphone was located 1.2m to 1.5m from the ground and more than 2m from any building facade.

The results of the noise measurement survey are summarised in Table 1 and Table 2 which shows the typical LA90 and LAeq obtained during the survey. Full attended measurement results are given in Appendix A.

Location	Sound pressure level, dB	
	LA90	LAeq
R1	40	47
R2	51	58
R3	49	57

Table 1: Summary of attended measured daytime noise levels (measured 1500hrs – 1700hrs)

Location	Sound pressure level, dB	
	LA90	LAeq
R1	37	43
R2	44	57
R3	46	54

Table 2: Summary of measured evening time noise levels (measured 1800hrs – 2000hrs)

### 4.2 Ambient noise sources

Between 1500 and 1700 hours, the ambient noise levels were dominated by pedestrian traffic and local motor vehicle traffic on Northgate Street. The traffic count was around 4 vehicles per minute, but with frequent parking and unloading. Noise from mobility scooters, cyclists, playing music and mopeds were occasionally audible. At Location R2, periods of plant noise from the neighbouring buildings could be heard in between passing traffic. Location R1 was dominated by pedestrian noise, individual car movements on Northgate Street were not audible, quiet organ and choral music was audible at some points.

Between 1800 and 2000 hours, the dominant noise source was still pedestrian and traffic noise along Northgate Street. Traffic count remained around 4 vehicles per minute, with more vehicles now carrying on along Northgate into the commercial centre. The dominant noise at Location R1 between pedestrian pass-bys became a background hum from external plant/lighting to the cathedral.

## 5 Control of building services noise emissions

### 5.1 Policy and guidance

In relation to noise, the National Planning Policy Framework<sup>1</sup> and notes the following:

‘Paragraph 123 of the NPPF requires planning decisions to aim to avoid, mitigate and minimise adverse impacts of noise on health and quality of life, where appropriate. This is supported by DEFRA’s Noise Policy Statement for England March 2010 (NPSE) and the Environmental Protection Act 1990.

Paragraphs 2.6 and 2.7 of the NPSE explain that the application of the NPSE should enable the noise implications of a development or other activity to be taken into account at the appropriate time, rather than not considered at an early enough stage or not be given adequate weight. ID: 30 of the PPG, contains further advice on noise and its relevance to planning. Therefore, any application proposing residential development or a sensitive use adjacent to a noise generating use such as industrial estates, major highways or rail lines will require a noise impact assessment. Similarly any application proposing a potentially noise generating use which would be sited to a residential area or sensitive use will require a noise impact assessment.’

The NPPF planning objectives for environmental noise are addressed through the Noise Policy Statement for England (NPSE)<sup>2</sup>. The NPSE states the following in paragraph 1.7:

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

avoid significant adverse health 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.”

### 5.2 Proposed noise emissions limits

A lower limit of 35dB LAeq is proposed for control of noise emissions at the nearest NSR. This is considered appropriate because a typical level difference through a partially open residential window can be taken to be 13dB to 15dB. With an external noise level of 35dB LAeq, this would result in an internal noise level of 20dB to 22dB LAeq, which is 8dB to 10dB below (better) than the recommended level for good sleeping conditions of 30dB LAeq given in BS8233:2014.

The proposed noise emissions limit is that the rating level (L<sub>A,r</sub>,Tr) from all building services plant should not exceed 5dB below the typical lowest background level or 35dB LAeq, whichever is greater at the nearest noise-sensitive receiver. Noise emissions limits are the rating noise L<sub>A,r</sub>,Tr including any penalties for noise character, including tonality in accordance with BS1412.

#### 5.2.1 Noise sensitive receivers

The nearest noise sensitive receivers (NSR) are outlined in Figure 1 and are:

NSR 1 – 1st floor residential along St Aldgate Street overlooked by the site roof. The closest window is around 10m north-east of the development, but 25m from the perimeter of the flat roof top which houses plant.

NSR 2 – Provincial House, residential rooms in a mixed use building approximately 40m north-east of the plant roof top for the development (close to R3).

NSR 3 – New Inn Hotel, hotel and pub on Northgate Street, 45m from the plant roof top of the development (close to R2).

There are some additional residential receivers in the Cathedral grounds and as these are in a more tranquil environment, noise emission to these locations has also been considered

NSR 4 – Houses on College Court, approximately 150m from the development (close to R1).

#### 5.2.2 Background noise levels

Because of the noise from the operational rooftop plant, it was not possible to measure accurate night-time background noise levels using the installed noise loggers, Therefore the night-time background noise levels have been estimated based on a typical difference in an urban environment between daytime and night-time LA90 of 8dB to 10dB. These differences corroborate with other noise surveys undertaken by Arup in and around Gloucester.

The night-time background noise levels given in Table 3 are based on this estimate.

Receptor	Background noise level LA90 dB		
	Daytime (0700hrs -1900hrs)	Evening (1900hrs – 2300hrs)	Estimated night-time (2300 hrs – 0700hrs)
NSR1 St Aldgate Street	49	46	36 -38
NSR2 Provincial House	49	46	36 -38
NSR3 New Inn Hotel	51	44	34 -36
NSR4 College Court	40	37	27 - 29

Table 3 Background noise levels at the nearest noise sensitive receivers

<sup>1</sup> Ministry of Housing, Communities & Local Government (Revised July 2021) *National Planning Policy Framework*

<sup>2</sup> Department for Environment, Food and Rural Affairs (2010), *Noise Policy Statement for England*

Receptor	Maximum building services noise emissions level dB LAr,Tr		
	Daytime (0700hrs -1900hrs)	Evening (1900hrs – 2300hrs)	Night-time (2300 hrs – 0700hrs)
NSR1 St Aldgate Street	44	41	35
NSR2 Provincial House	44	41	35
NSR3 New Inn Hotel	46	39	35
NSR4 College Court	35	35	35*

Table 4 Proposed building services plant noise emissions limits for normally operational plant

\*It is noted that by achieving 35dB LAr,Tr at the nearest receivers (NSR 1 -3), the night-time noise emissions levels at the College Court properties in the Cathedral grounds are expected to be lower than 20dB LAr,Tr which is a very low noise level and more than 5dB below the existing night-time background noise level at this location.



## Appendix A

### Noise Survey

## A1 Introduction

An environmental baseline noise survey has been undertaken to determine the existing noise climate and character in and around the development. This appendix details the baseline noise survey and results.

The noise survey work was carried out by Holly Cowperthwaite and Grace Lampkin of Arup, on 10th November 2021.

### A1.1 Site Description

The development is a disused Debenhams building in Gloucester City Centre, a baseline noise survey has been undertaken to determine current background noise levels at the closest noise sensitive receivers, to inform plant emissions limits.

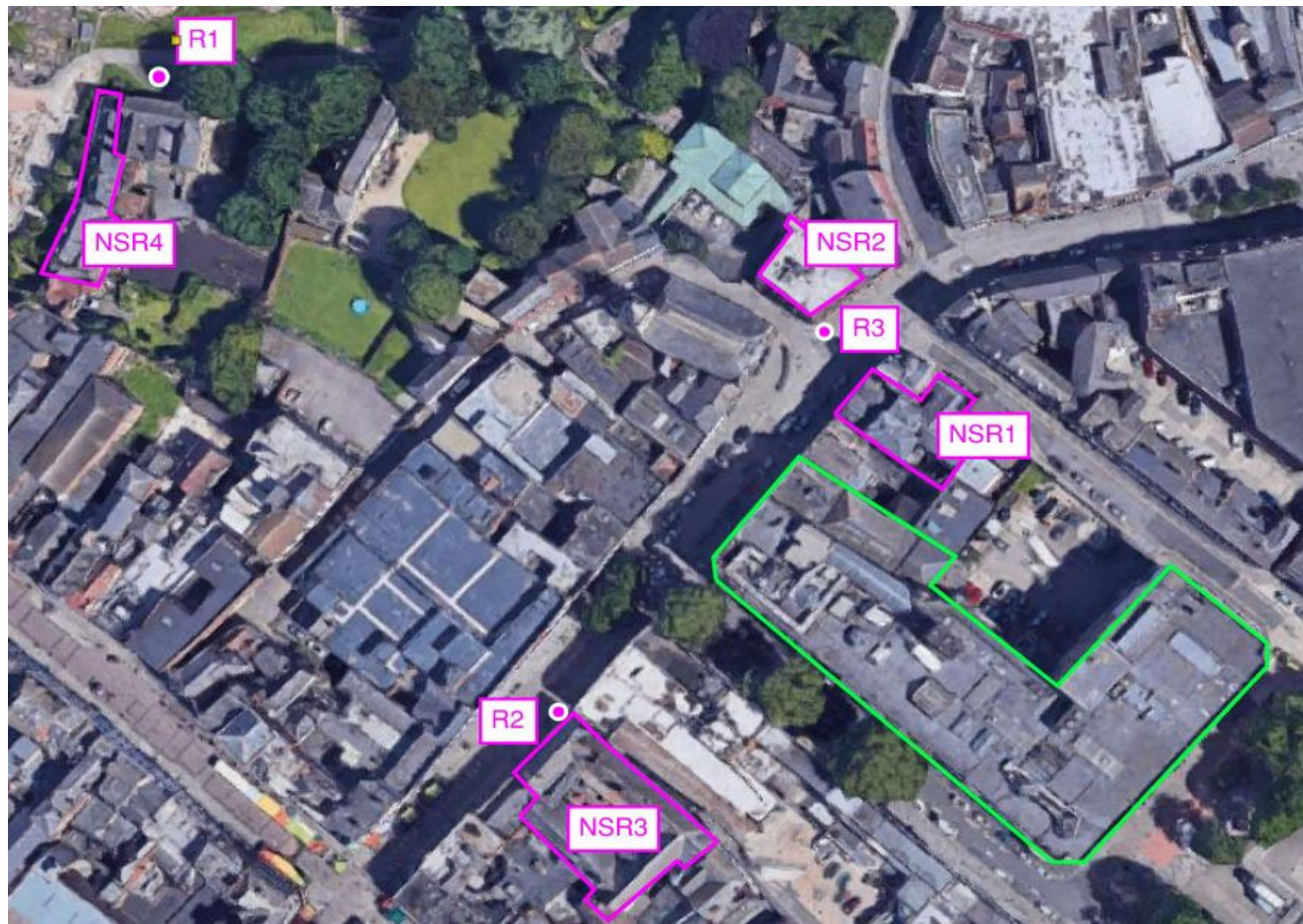


Figure A1: Site map

### A1.2 Instrumentation

The sound level meters (SLMs), microphones and sound pressure level calibrators used by Arup are Class 1 instruments, conforming to BS EN 61672-1:2013. All Arup instrumentation is calibrated annually and has full traceable calibration to national and international standards, which are undertaken by an accredited calibration laboratory. Calibration certificates can be provided upon request.

The SLM was checked for correct calibration before and after each series of measurements. No significant fluctuation in level was noted throughout each survey period.

All of the SLMs and other related noise monitoring instrumentation used to undertake the survey is described in Table A1 below.

Description	Serial Number	Item Type
Nor 1251	33849	Calibrator
Nor 140	1403425	Sound level meter
Norsonic 1209 Preamp	12578	Microphone
Norsonic 1225	98510	Microphone

Table A1: Measurement instrumentation

### A1.3 Measurement Methodology

At each location, the LAeq, LA90, LA10 and Lmax metric parameters were measured and recorded. All broadband measurements were A-weighted and used a fast time constant (0.125s).

At each measurement location, the SLM was mounted on a tripod with the microphone set between 1.2m to 1.5m above local ground level. All measurements were taken under acoustically free-field conditions, except where otherwise stated. The appropriate windshield for the SLM was fitted to the microphone throughout to minimise wind-induced noise.

Attended measurements of 15 minutes duration were made at each location, dependent upon conditions at the measurement location. In each case, the time period was appropriate to provide a good representation of the typical noise climate at each measurement location.

## A2 Measurement Results

### A2.1 Attended Measurements

The summary tables for each measurement location provide an arithmetic average of the individual measurements during each time period for LA90 and LA10, a logarithmic average for LAeq and a range of the values for Lmax.

#### A2.1.1 Location R1

**Location Description:**  
Location R1 is situated on a pedestrian walkway near to College Court

**Environment and Observations:** quiet pedestrian walkway next to the cathedral

**Measurement Duration:**  
Wed 10/11/2021 15:48  
to  
Wed 10/11/2021 19:15

**Weather Conditions:**  
Wind Speed: <1m/s  
Summary: Mild and dry early winter conditions, 100% cloud cover, 12 degrees

**Personnel:**  
Holly Cowperthwaite and Grace Lampkin



Figure A2: Location 1

Period	Sound Pressure Level, dB(A) (re 20 µPa)			
	L90	Leq	L10	Lmax
Day (07:00-18:00)	40	47	48	64
Evening (18:00-23:00)	37	42	44	63 - 63

Table A2: Summary of averaged sound pressure levels at Location R1

Date	Time		Sound Pressure Level, dB(A) (re 20 µPa)			
	Start [hh:mm]	Duration [hh:mm:ss]	L90	Leq	L10	Lmax
Day						
10/11/2021	15:48	00:15:00	39.5	46.9	47.8	64.0
Evening						
10/11/2021	18:21	00:10:40	36.6	41.9	41.6	63.3
10/11/2021	19:04	00:10:04	37.7	43.1	44.8	62.9

Table A3: Measured sound pressure levels at Location R1

#### A2.1.2 Location R2

**Location Description:** Located outside the New Inn on Northgate Street

**Environment and Observations:** Busy pedestrian thoroughfare in the city centre, opened up to vehicular traffic in the evening

**Measurement Duration:**  
Wed 10/11/2021 16:09  
to  
Wed 10/11/2021 19:31

**Weather Conditions:**  
Wind Speed: <1m/s  
Summary: Mild and dry early winter conditions, 100% cloud cover, 12 degrees

**Personnel:**  
Holly Cowperthwaite and Grace Lampkin



Period	Sound Pressure Level, dB(A) (re 20 µPa)			
	L90	Leq	L10	Lmax
Day (07:00-18:00)	51	58	60	84
Evening (18:00-23:00)	43	56	58	78 - 81

Table A4: Summary of averaged sound pressure levels at Location R2

Date	Time		Sound Pressure Level, dB(A) (re 20 µPa)			
	Start [hh:mm]	Duration [hh:mm:ss]	L90	Leq	L10	Lmax
Day						
10/11/2021	16:09	00:10:03	50.9	58.4	60.0	83.6
Evening						
10/11/2021	18:37	00:10:08	44.1	56.2	57.0	80.6
10/11/2021	19:20	00:10:08	43.1	56.9	58.4	77.5

Table A5: Measured sound pressure levels at Location R2



### A2.1.3 Location R3

**Location Description:**

On the corner of Northgate Street and St John's Lane

**Environment and Observations:**

Pedestrian and vehicular traffic into the town centre dominant

**Measurement Duration:**

Wed 10/11/2021 16:23  
to  
Wed 10/11/2021 19:01

**Weather Conditions:**

Wind Speed: <1m/s

Summary: Mild and dry early winter conditions, 100% cloud cover, 12 degrees

**Personnel:**

Holly Cowperthwaite and Grace Lampkin



Period	Sound Pressure Level, dB(A) (re 20 µPa)			
	L90	Leq	L10	Lmax
Day (07:00-18:00)	49	57	60	76
Evening (18:00-23:00)	46	54	57	68 - 75

Table A6: Summary of averaged sound pressure levels at Location R3

Date	Time		Sound Pressure Level, dB(A) (re 20 µPa)			
	Start [hh:mm]	Duration [hh:mm:ss]	L90	Leq	L10	Lmax
Day						
10/11/2021	16:23	00:10:19	48.7	56.6	60.1	75.5
Evening						
10/11/2021	18:07	00:10:21	45.6	54.4	56.8	75.0
10/11/2021	18:50	00:10:21	46.8	53.7	56.7	68.1

Table A7: Measured sound pressure levels at Location R3