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**2 HEXHAM ROAD,
READING**

PLANT NOISE ASSESSMENT

Technical Report: R9933-2 Rev 1

Date: 18th November 2024

For: Morgan Sindall Construction & Infrastructure Ltd
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24 Acoustics Document Control Sheet

Project Title: 2 Hexham Road, Reading – Plant Noise Assessment

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CONTENTS	PAGE
1.0 INTRODUCTION	4
2.0 SITE DESCRIPTION	4
3.0 CRITERIA	5
4.0 ENVIRONMENTAL NOISE SURVEY	6
5.0 PLANT NOISE ASSESSMENT	7
6.0 CONCLUSIONS	10
REFERENCES	11
FIGURES	12
APPENDIX A – ACOUSTIC TERMINOLOGY	15
APPENDIX B – MEASUREMENT RESULTS	16

1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been appointed by Morgan Sindall Construction & Infrastructure Ltd to undertake an assessment of noise from plant associated with the new development at no. 2 Hexham Road, Reading to address Planning Condition 14. The new building services plant is proposed to be installed to the east of the building in the bicycle store and on the roof. This noise assessment has included:
- Environmental noise monitoring;
 - Consideration of background noise levels at nearby noise sensitive properties;
 - Assessment of noise from the new plant.
- 1.2 This report presents the results of the assessment, following site visits and an environmental noise survey undertaken between 27th April to 5th May 2021.
- 1.3 All sound pressure levels quoted in this report are in dB relative to 20 µPa. A glossary of the acoustic terminology used in this report is provided in Appendix A.
- 1.4 An aerial view and site location are shown in Figure 1.

2.0 SITE DESCRIPTION

- 2.1 The new development at 2 Hexham Road, Reading is to comprise a day centre providing social care services (Use Class E(f)) and specialist housing (Use Class C3) with landscaping, car parking and access from Hexham Road. A site plan is shown in Figure 2
- 2.2 Distant road noise is the main source of background noise in the area.
- 2.3 New plant is to be installed in the following locations:
- Sub-station – Located in new brick building to the north-east of the building
 - ASHPs – Located in new cycle store to the east of the building
 - Condensers – Located on the roof of the first and second floors
- 2.4 The plant will operate on demand over a 24-hour period, 7 days a week. The plant location is shown in Figure 2.
- 2.5 The nearest receptors to the plant are described below and shown on Figure 1:
- Receptor 1 – 1 & 8 Bede Walk to the east
 - Receptor 2 – 21 Hexham Road to the north

- Receptor 3 – New building at no. 2 Hexham Road

3.0 CRITERIA

Planning Condition 14

- 3.4 Condition 14 from the planning consent (Ref. 230279) issued by Reading Borough Council is reproduced below:

"No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by the Local Planning Authority. The assessment shall be carried out for in accordance with BS4142:2014+A1:2019 methodology. The predicted specific sound level ($L_{Aeq,TR}$) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive facade shall be at least 10dB below the pre-existing background sound level, $LA_{90,T}$ during daytime hours (07:00 - 23:00) and at least 5dB below the pre-existing background sound level, $LA_{90,T}$ during night-time hours (23:00 - 07:00) when all plant/equipment (or any part of it) is in operation. The predicted rating level, $L_{Ar,Tr}$ (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to the nearest noise-sensitive façade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, $LA_{90,T}$ when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment and shall thereafter be maintained so that it operates to the same standard.

REASON: To safeguard the amenities of the adjoining premises and the area generally, in accordance with Policy CC8 and EN17 of the Reading Borough Local Plan 2019."

BS 4142:2014 Methods for Rating Industrial and Commercial Sound

- 3.5 BS 4142:2014 + A1 2019 [Reference 1] provides a method for rating the effects of industrial and commercial sound on residential areas.
- 3.6 The standard advocates a comparison between the representative measured LA_{90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.

- 3.7 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, also depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

4.0 ENVIRONMENTAL NOISE SURVEY

- 4.1 Environmental noise measurements were undertaken between 27th April and 5th May 2021, in order to establish existing ambient noise levels at the site. The noise measurement locations are described below and shown in Figure 1.

- 4.2 Long-term measurements were undertaken in free-field conditions, and the location is described as follows:

- Location 1: Facing Hexham Road, approx. 1.5m height.

- 4.3 The following instrumentation was used:

- 1 x Rion NL31 Class 1 accuracy sound level meter;
- Bruel and Kjaer Type 4231 Class 1 accuracy acoustic calibrator.

- 4.1 Noise measurements were undertaken in samples of 5 minutes in terms of the overall free-field A-weighted L_{eq} , L_{90} and $L_{max,f}$ noise levels. Measurements were made in accordance with BS 7445:1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 2].

- 4.2 The instrumentation's calibration was checked before and after the survey in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. Calibration of 24 Acoustics' equipment is traceable to National Standards. All instruments were fitted with environmental weather shields during the surveys.

- 4.3 The weather conditions during the majority of the survey period were fine and dry, with wind speeds below 5 m/s. Periods of rainfall and/or high winds have been omitted from the analysis.

Background Noise Measurements – Results

- 4.4 The results of the environmental survey are presented in graphical format in Appendix B and summarised in Table 1.

Date	Measured Minimum Background Noise Level	
	Day 07:00 to 23:00 dB LA90, 15 mins	Night-time 23:00 to 07:00 dB LA90, 15 mins
Tuesday 27/4/2021	34	27
Wednesday 28/4/2021	41	33
Thursday 29/4/2021	38	26
Friday 30/4/2021	39	32
Saturday 1/5/2021	37	30
Sunday 2/5/2021	36	31
Monday 3/5/2021	42	Omitted due to Weather
Tuesday 4/5/2021	Omitted due to Weather	33
Wednesday 5/5/2021	41	-
Representative Value	38	30

Table 1: Summary of Measured Background Noise Levels.

5.0 PLANT NOISE ASSESSMENT

- 5.1 The original services design placed the ASHPs and condensers in a plant room adjacent to the substation at the front of the development. Significant mitigation measures would have been required in this location to mitigate plant noise levels to the nearest windows, which had direct line of site to the plant enclosure. 24 Acoustics was advised that the required acoustic attenuation would have resulted in insufficient airflow for the equipment to operate effectively.
- 5.2 The condensers have been relocated to the second-floor roof (with screening) and space constraints required the ASHPs to be relocated to the cycle store at ground level, which will provide significant acoustic screening without affecting airflow to the units. In this manner, noise from the equipment shall be mitigated to a minimum.

5.3 The plant will operate on demand over the 24-hour period, 7 days a week. The proposed plant consists of the following units.

- Sub-station – Located in new brick building to the north-east of the building
- 2 No. ASHPs – Located in new cycle store to the east of the building
- 4 No. Condensers – Located at roof level on the second and third floor

5.4 The locations of the plant are shown in Figures 2-4 and the manufacturer's noise data is summarised in Table 2.

Unit	Sound Pressure Level @ 1 m(dB) Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Mitsubishi PUZ-ZM60VHA Condenser	53	52	53	44	43	39	33	27	49
Mitsubishi PUZ-HWM140VHA ASHP	56	57	54	51	48	43	39	35	53
500 kVA Substation	58	49	43	39	31	44	25	25	47

Table 2: Manufacturer's Sound Pressure Level @ 1 m (dB) Data

5.5 The ASHPs have been selected for low noise emissions and will be programmed to operate on a night set-back mode between the hours of 23:00 and 07:00 which will reduce the overall noise output of the units by at least 5 dBA.

5.6 The closest residential window is to the east at 8 Bede Walk, at an approximate distance of 6 m from the nearest plant. The nearest residential windows at No. 21 Hexham Road are at an approximate distance of 35 m from the plant. The nearest residential windows in the new building are on the first floor at a distance of 6 m from the plant.

5.7 The cycle store housing two ASHP's will be constructed to the following minimum specification to provide acoustic screening to nearby residential receptors:

- Solid on the south and east sides as well as the roof, constructed of a material with a minimum density of 12 kg/m²
- No gaps between the walls and the roof

5.8 A solid barrier will be installed around the plant at second-floor level. The barrier should be constructed to the following minimum specifications:

- Installed on the east, west and north sides of the plant, constructed of a material with a minimum density of 12 kg/m²
- The barrier should be at least 500 mm from the top of the plant
- Imperforate with no holes or gaps between sides

5.9 With corrections for distance and attenuation as recommended, calculations have been undertaken to confirm the plant noise levels at each receptor. The plant is not expected to emit notable tonal or other distinctive characteristics at the receptor locations.

5.10 Tables 3 - 5 present the calculated noise levels at each receptor, during daytime and night-time hours, compared to the background noise levels.

	Daytime 07:00 to 23:00	Night-time 23:00 to 07:00
Predicted Plant Noise Level	28 dB L _{Aeq, Tr}	23 dB L _{Aeq, Tr}
Background Noise Level	39 dB L _{Aeq, 1 hour}	30 dB L _{Aeq, 15 mins}
Level Difference	-10 dB	-7 dB

Table 3: Predicted Plant Noise Levels – 8 Bede Walk

	Daytime 07:00 to 23:00	Night-time 23:00 to 07:00
Predicted Plant Noise Level	23 dB L _{Aeq, Tr}	23 dB L _{Aeq, Tr}
Background Noise Level	39 dB L _{Aeq, 1 hour}	30 dB L _{Aeq, 15 mins}
Level Difference	-16 dB	-7 dB

Table 4: Predicted Plant Noise Levels – 21 Hexham Road

	Daytime 07:00 to 23:00	Night-time 23:00 to 07:00
Predicted Plant Noise Level	17 dB L _{Aeq, Tr}	14 dB L _{Aeq, Tr}
Background Noise Level	39 dB L _{Aeq, 1 hour}	30 dB L _{Aeq, 15 mins}
Level Difference	-22 dB	-16 dB

Table 5: Predicted Plant Noise Levels – 2 Hexham Road

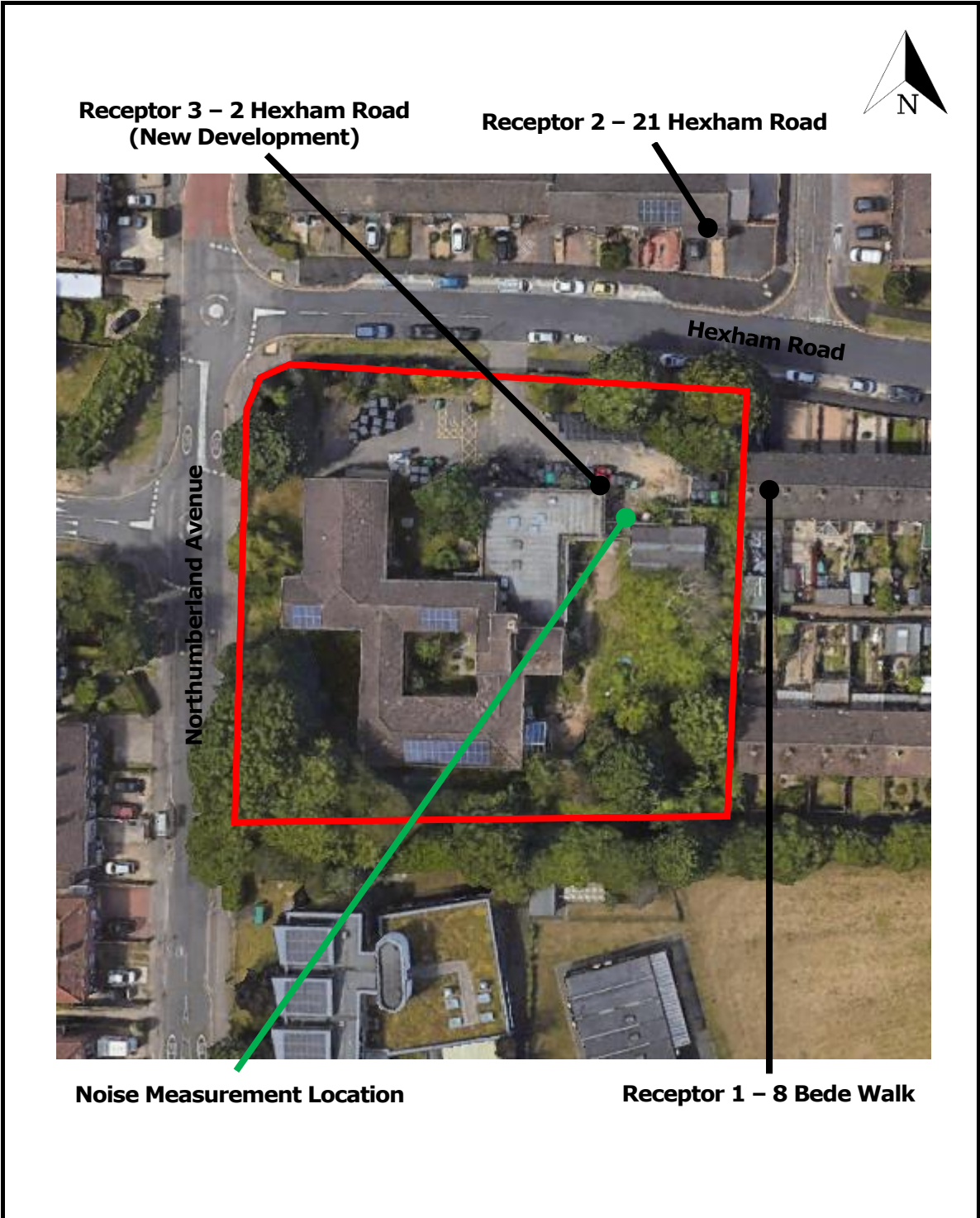
5.11 The calculations demonstrate that, with the recommended mitigation, specific noise levels from the proposed external plant would be at least 10 dB below the typical background noise level during the daytime (07:00 to 23:00) and at least 7 dB below the typical background noise level at night-time (23:00 to 07:00) at the nearest residential receptors. This is in accordance with Condition 14.

6.0 CONCLUSIONS

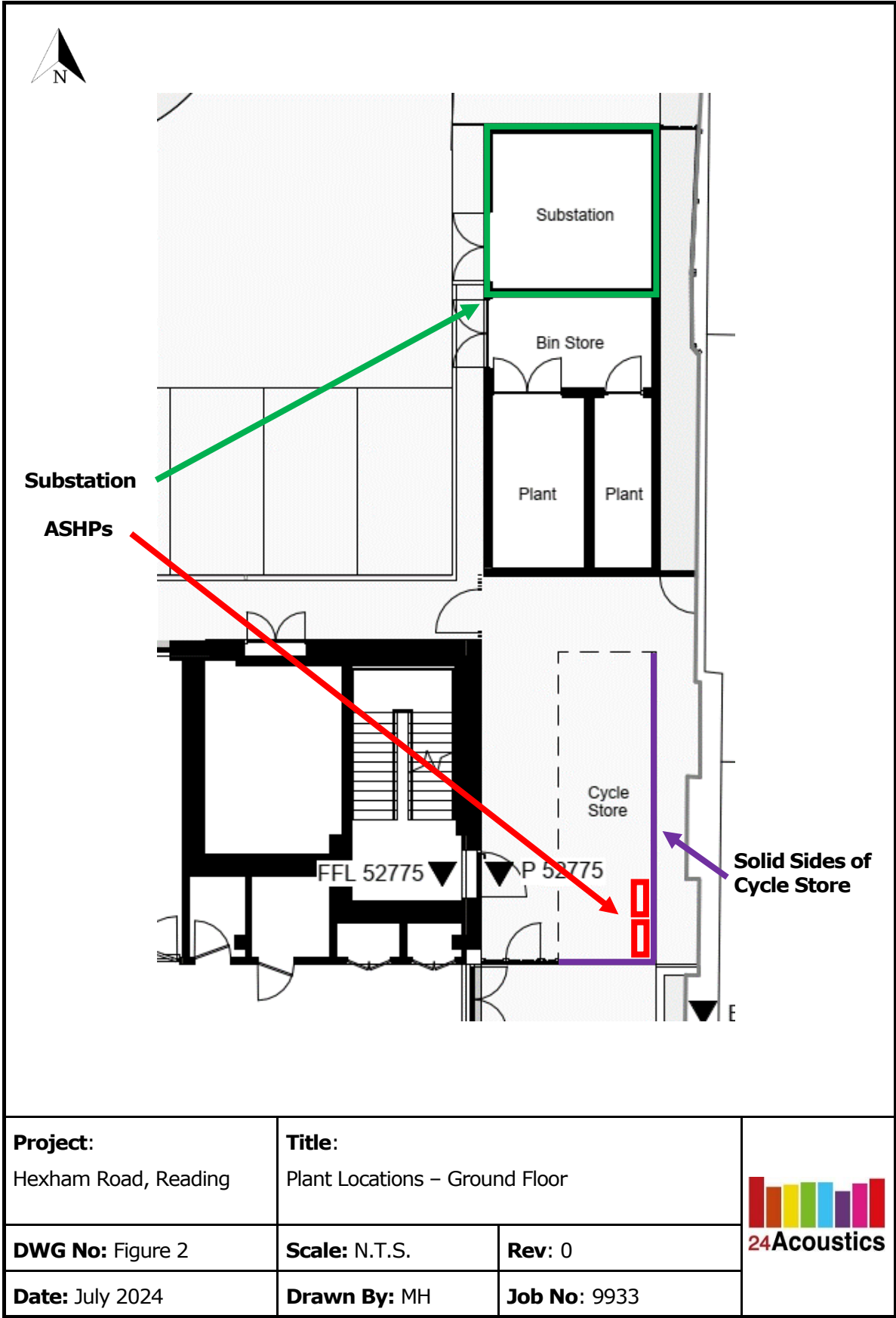
- 6.1 24 Acoustics Ltd has been instructed by Morgan Sindall Construction & Infrastructure Ltd, to undertake a noise impact assessment for new plant at 2 Hexham Road, Reading to address Condition 14 of the planning consent.
- 6.2 A noise survey has been carried out at the site to determine the prevailing background noise levels during daytime and night-time periods.
- 6.3 Calculations have determined that, with the recommended mitigation, noise from the proposed plant will achieve the requirements of Planning Condition 14.

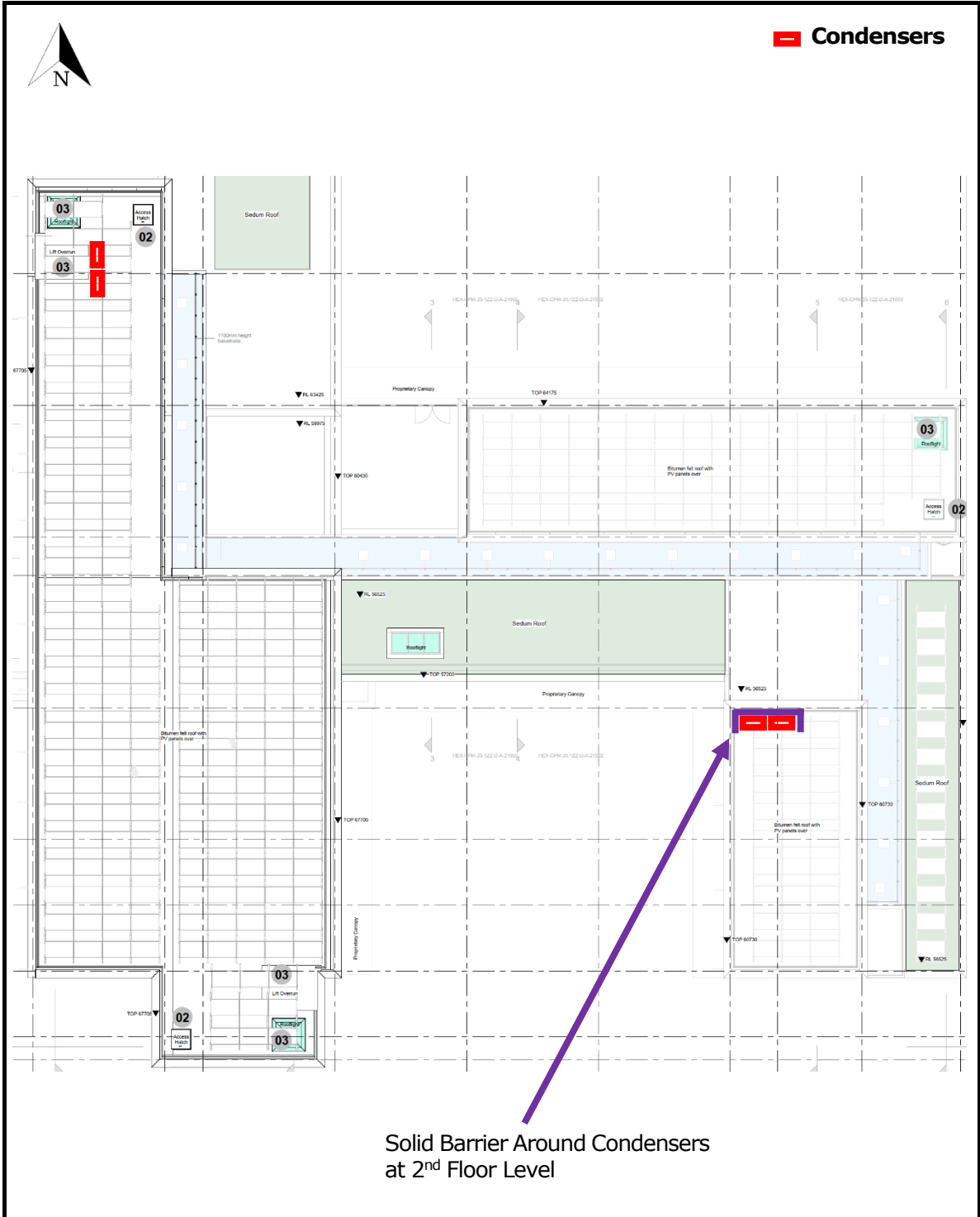
REFERENCES

1. British Standards Institution. British Standard 4142 + A1 2019. Methods for Rating Industrial and Commercial Sound, 2014.
2. British Standards Institution. British Standard 7445:1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use, 1991.



Project: Hexham Road, Reading	Title: Aerial view, measurement location & nearest receptors		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: 0	
Date: July 2024	Drawn By: MH	Job No: 9933	





Project: Hexham Road, Reading	Title: Condensing Plant Locations – Roof		 24Acoustics
DWG No: Figure 3	Scale: N.T.S.	Rev: 0	
DATE: July 2024	Drawn By: MH	Job No: 9933	

APPENDIX A – ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B – NOISE MEASUREMENT RESULTS**Environmental Noise Measurements - Hexham Road, Reading
27th April to 5th May 2021**