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**FORMER MARKETING SUITE,
KENNET ISLAND, READING**

NOISE IMPACT ASSESSMENT

Technical Report: R7279-1 Rev 1

Date: 7th March 2018

For: Berkeley Homes (Western) Ltd
Green Park
Reading
Berkshire
RG2 6GB

24 Acoustics Document Control Sheet**Project Title:** Former marketing suite, Kennet Island, Reading, Noise Impact Assessment**Report Ref:** R7279-1 Rev 1**Date:** 7th March 2018

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Document Status and Approval Schedule

Revision	Description	Prepared By	Approved By
0	Approved for Issue	Jonathan Munns	Reuben Peckham
1	Amended following comments from client	Jonathan Munns	Reuben Peckham

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CONTENTS	PAGE
1.0 INTRODUCTION	4
2.0 SITE DESCRIPTION	4
3.0 STANDARDS AND GUIDANCE	5
4.0 ENVIRONMENTAL NOISE SURVEY	7
5.0 CALCULATIONS AND NOISE IMPACT ASSESSMENT	9
6.0 CONCLUSIONS	10
REFERENCES	11
FIGURES	12
APPENDIX A – ACOUSTIC TERMINOLOGY	14
APPENDIX B – AMBIENT NOISE SURVEY RESULTS	15

1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been retained by Berkeley Homes (Western) Ltd to provide a noise impact assessment for the redevelopment of the former sales & marketing suite to residential accommodation at the Kennet Island development in Reading.
- 1.2 The primary source of noise in the area is road traffic, particularly from the A33. Accordingly, this noise impact assessment has included:
- Environmental noise monitoring;
 - Consideration of the noise arising from road traffic affecting the site;
 - Assessment of internal noise levels within the proposed dwellings;
- 1.3 This report presents the results of the assessment, following site visits and ambient noise survey undertaken between 8th and 13th February 2018.
- 1.4 All sound pressure levels quoted in this report are in dB relative to 20 μ Pa. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 SITE DESCRIPTION

- 2.1 The proposed development site is located on the western side of the Kennet Island development, which is in the south of Reading, close to the A33. Drake Way runs down the immediate east of the site, Lindisfarne Way lies to the south and the A33 to the west.
- 2.2 Currently located on the site is a sales and marketing suite for the Kennet Island development, which has planning consent for six years beginning in 2013.
- 2.3 It is proposed to build a four-story block of apartments on the site. The redevelopment will comprise of eleven two-bedroom and one one-bedroom flats with car parking off Drake Way. The site layout for the proposed scheme is shown in Figure 1.

3.0 STANDARDS AND GUIDANCE

National Planning Policy Framework and Noise Policy Statement for England

- 3.1 The National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should aim to:
- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
 - Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions, while recognising that many developments will create some noise.
- 3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.
- Avoid significant adverse impacts on health and quality of life;
 - Mitigate and minimise adverse impacts on health and quality of life.
- 3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

- 3.4 The Planning Practice Guidance (PPG) [Reference 3] is written to support the NPPF with more specific planning guidance. The PPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The PPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.
- 3.5 The PPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.
- 3.6 The NPPF, NPSE and PPG documents do not refer to specific noise criteria. For residential developments 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 8233: 2014 and guidance from the World Health Organisation are adopted for internal noise levels within dwellings.

BS 8233:2014 and WHO Guidelines

- 3.7 BS 8233:2014 [Reference 4] provides design guidance for dwelling houses, flats and rooms in residential use and recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16 \text{ hour}}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq, 16 \text{ hour}}$ in dining rooms during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ in bedrooms at night.
- 3.8 The standard states that the above limits apply to steady external noise sources without specific character, and also states the following:
- "Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."*
- 3.9 BS 8233:2014 also notes that *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night."*

- 3.10 Although the guidelines have no formal standing, the World Health Organisation (WHO) provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines [Reference 5] suggest internal night-time noise levels not exceeding 30 dB $L_{Aeq, 8 \text{ hour}}$ or regularly (10 – 15 times per night) exceeding 45 dB $L_{Amax, f}$ for 'a good night's sleep'.
- 3.11 BS 8233:2014 suggests an upper guideline value of 55 dB $L_{Aeq, 16 \text{ hour}}$ for noise levels in external amenity spaces such as gardens. This is considered an aspirational limit and BS 8233 recognises that the desirable noise levels for external amenity areas are not always achievable in certain locations. BS 8233 also states that development should not be prohibited on the basis of noise levels within external amenity areas.

Summary

- 3.12 It is understood that there is no specific LOAEL or SOAEL set out by the local authority for new noise sensitive developments. Therefore, the impact of noise upon the site has been assessed using the following methodology:
- BS 8233:2014 and the WHO Guidelines for recommended internal noise levels, inside the properties, due to road traffic. An upper internal daytime level of 35 dB $L_{Aeq, 16 \text{ hour}}$ for bedrooms, living rooms and communal lounges should apply; and a night-time level for bedrooms of 30 dB $L_{Aeq, 8 \text{ hour}}$ should apply. Similarly, a maximum night-time internal level of 45 dB $L_{Amax, f}$ should apply in bedrooms for regular events.

4.0 ENVIRONMENTAL NOISE SURVEY

- 4.1 An ambient noise survey was undertaken from 8th to 13th February 2018 to determine the existing noise levels arising from road traffic noise. Ambient noise levels were measured using the following equipment:
- Rion precision sound level meter Type NL-52;
 - Brüel & Kjær acoustic calibrator Type 4231.
- 4.2 Noise monitoring equipment was located at the western edge of the proposed building at a height of 2.5 m. The survey location is shown in Figure 1.

- 4.3 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 6].
- 4.4 The instrumentation calibration was checked before and after the surveys 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.
- 4.5 There was rain on some days during the survey. Wind speeds were typically lower than 5 m/s during the site visits. Data adversely affected by weather has been removed from the analysis for the report.
- 4.6 The results of the ambient noise survey are shown graphically in Figure B1 and summarised in Table 1.

Location	Daytime Ambient Level, dB L_{Aeq} , 16 hour	Night-Time Ambient Level, dB L_{Aeq} , 8 hour	Typical Night-Time Maximum Level, dB $L_{Amax,f}$ 5min
Thursday 08/02/18	63	59	72
Friday 09/02/18	66	57	69
Saturday 10/02/18	63	58	72
Sunday 11/02/18	64	58	70
Monday 12/02/18	64	57	74
Tuesday 13/02/18	64	-	-
Design Level	64	58	72

Table 1: Summary of Measured Ambient Noise Levels.

- 4.7 Note 24 Acoustics determines the typical maximum level to be the tenth highest level measured in the period.

5.0 CALCULATIONS AND NOISE IMPACT ASSESSMENT

- 5.1 Calculations have been undertaken to determine the noise level in residential rooms. The analysis given below has been based on 24 Acoustics' understanding of the envelope construction and ventilation to be used for this scheme (based on a cavity masonry construction with natural ventilation).
- 5.2 The calculations are based on the latest floorplans and elevations by Robert Rigby Architects Ltd, provided to 24 Acoustics in February 2018. If there are any future changes to the room layouts, room volumes or elevations, these calculations should be revised accordingly.
- 5.3 Calculations have been undertaken to determine the acoustic requirements for glazing and ventilators to the proposed new building, which will ensure that the noise levels inside the properties do not exceed 35 dB $L_{Aeq, 16 \text{ hour}}$ during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ at night, and also do not regularly exceed 45 dB $L_{Amax,f}$ at night.
- 5.4 The minimum acoustic requirements for glazing apply to all habitable rooms. Type A glazing and ventilators should be used in bedrooms on all façades except the eastern, and type B glazing and ventilators elsewhere. This is shown in Figure 2.
- 5.5 The required glazing performance specifications are summarised in Table 2 below.

Glazing	Minimum SRI (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Type A	24	22	29	40	44	46
Type B	24	20	25	35	38	35

Table 2: Required Glazing Performance

- 5.6 In making a comparison with the values in Table 2, it is important that the glazing figures used are the result of tests in accordance with ISO 10140, Part 2: 2010 and that the quoted minimum sound reduction specifications are met by the entire glazing system as a whole, including frames, seals, any insulated panels and not just the glass. The requirements also apply to any glazed doors to habitable rooms.
- 5.7 In order to assist with the selection process, the following glazing configurations, if installed properly, would be capable of achieving the required sound reduction performances:
- Type A glazing: 4 mm glass; 12 mm cavity (minimum); 6.4 mm Stadip Silence glass (or equivalent)
 - Type B glazing: 4 mm glass; 12 mm cavity (minimum); 4 mm glass (or equivalent)

5.8 The acoustic performance criteria for background ventilators are shown in Table 3.

Ventilation	Minimum Acoustic Performance $D_{ne,w}$ (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Type A	40	38	32	47	54	48
Type B	37	36	35	36	34	56

Table 3: Ventilation Acoustic Performance

5.9 In order to assist with the selection process, the following ventilators, if installed properly, would be capable of achieving the required sound reduction performance:

- Vent Type A: Aralco PyrAcoust 5000AE with Pyramid Vent, inside and outside parts (or equivalent acoustically attenuated passive trickle vent, minimum 42 dB $D_{ne,w}$).
- Vent Type B: Acoustically attenuated trickle vent, minimum 36 dB $D_{ne,w}$.

5.10 In making a comparison with the specifications in Table 3, it is important that the figures used are the result of laboratory tests. Note that the stated minimum performance values assume one ventilator per habitable room.

5.11 The above assessment demonstrates that the internal noise level criteria for noise from road traffic (outlined in section 3.12) would be readily achievable, subject to the appropriate specification and design of the external façade elements.

6.0 CONCLUSIONS

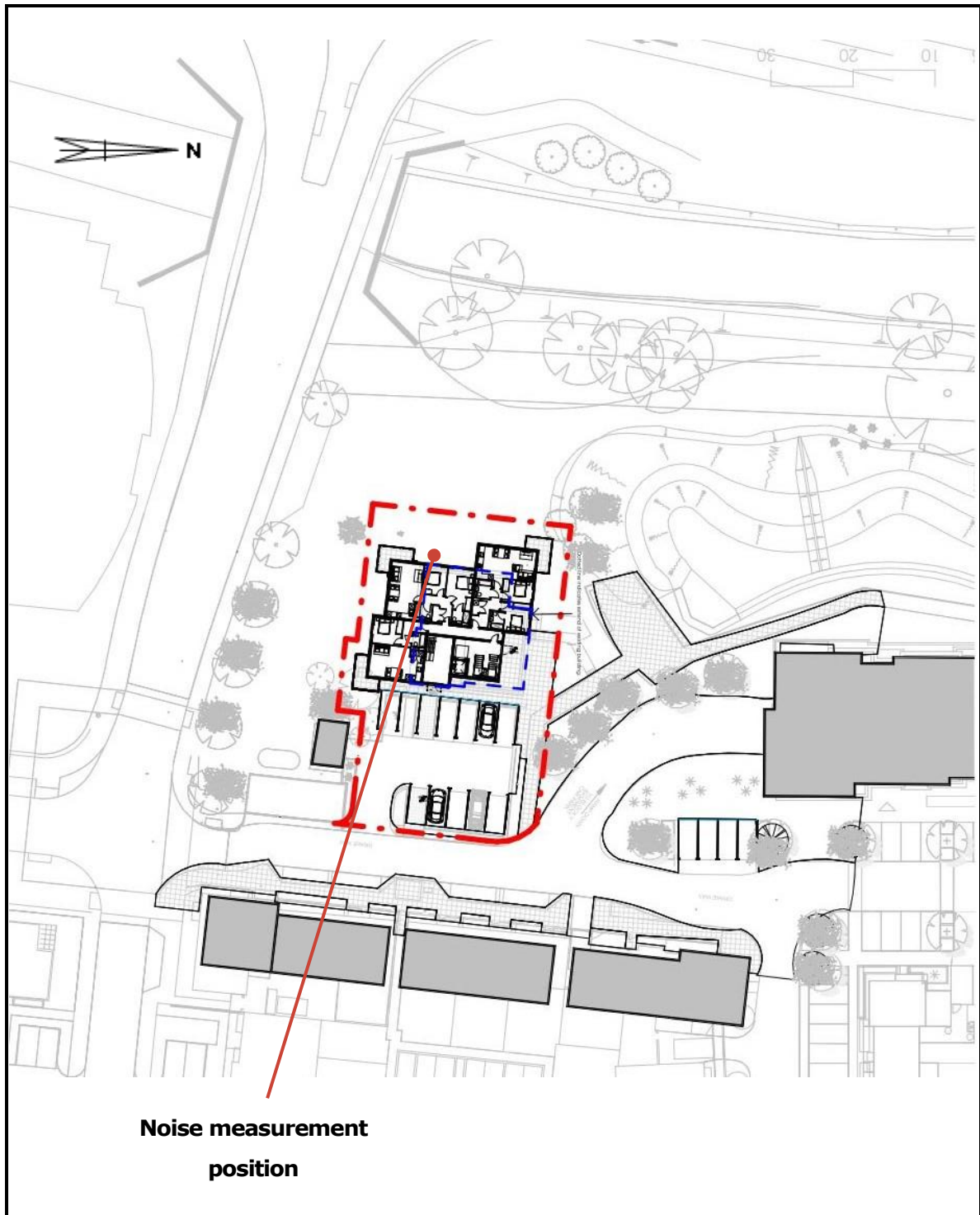
6.1 24 Acoustics Ltd has been instructed by Berkeley Homes (Western) Ltd to undertake an assessment of the noise impact for proposed apartments at Kennet Island in Reading. This report has addressed the impact of noise from road traffic on the proposed dwellings.

6.2 An ambient noise survey has been carried out at the site to determine existing noise levels during daytime and night-time periods.

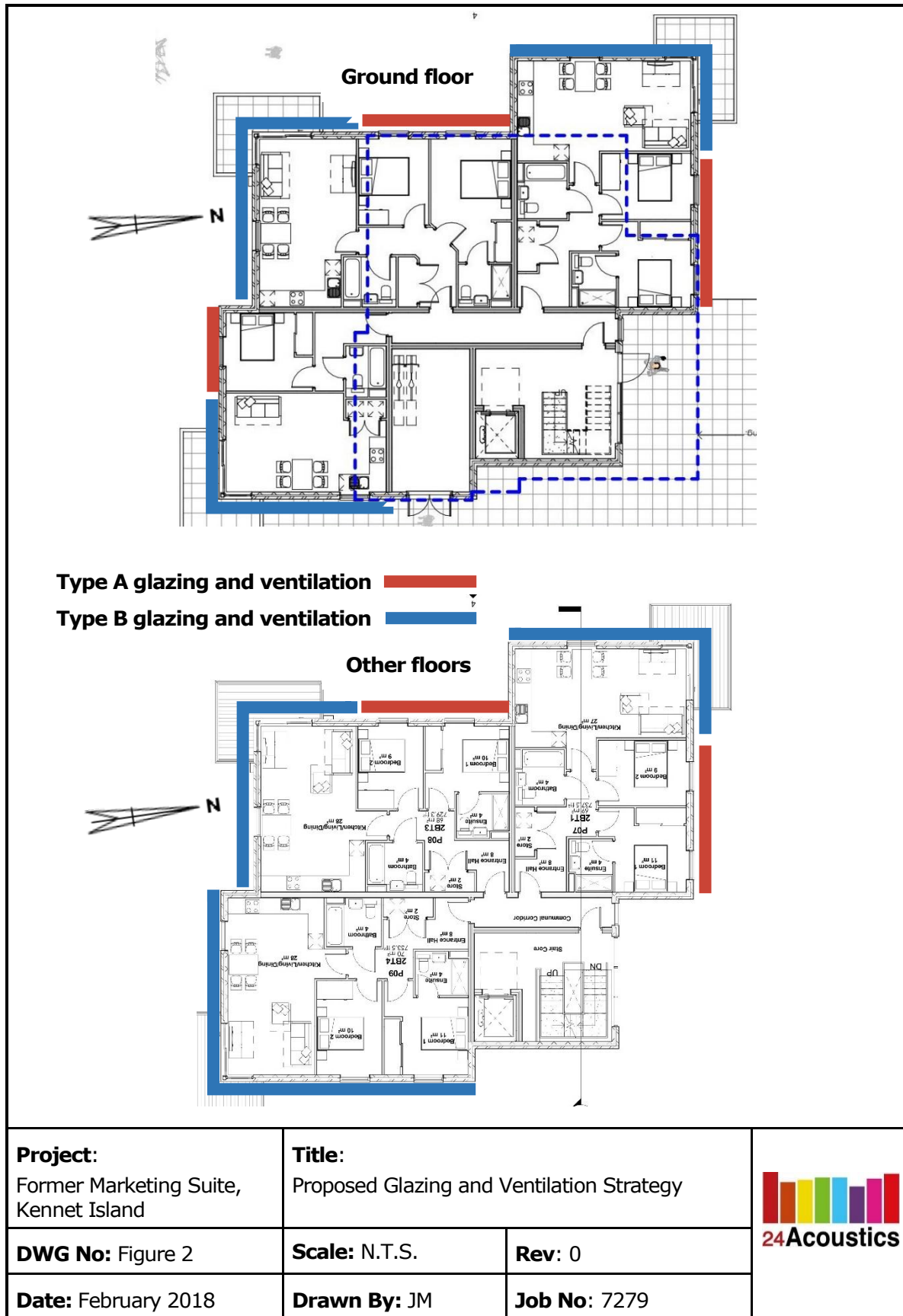
6.3 Recommendations have been provided for acoustically rated glazing and background ventilators to habitable rooms. It is concluded that with the recommended measures given, noise within habitable rooms would comply with maximum internal levels of 35 dB L_{Aeq} during the daytime, 30 dB L_{Aeq} at night and 45 dB $L_{Amax, f}$ at night for regular events.

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, 2012.
2. DEFRA. Noise Policy Statement for England, 2010.
3. Department of Communities and Local Government. Planning Practice Guidance, March 2014.
4. British Standards Institution. British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings, 2014.
5. World Health Organisation. Guidelines for Community Noise, 2000.
6. British Standards Institution. British Standard 7445:1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use, 1991.



Project: Former Marketing Suite, Kennet Island	Title: Proposed Site Plan and Survey Location		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: 0	
Date: February 2018	Drawn By: JM	Job No: 7279	



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 [Reference 6] 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 – AMBIENT NOISE SURVEY RESULTS

