

Statement of Case

Appendix 17

Noise Statement of Case – prepared by
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**TOWN AND COUNTRY PLANNING ACT 1990
(AS AMENDED BY THE PLANNING AND COMPENSATION ACT 1991)**

PROPOSED RESIDENTIAL DEVELOPMENT AT 55 VASTERN ROAD, READING

STATEMENT OF CASE ON NOISE

REUBEN PECKHAM BENG MPHIL CENG MIOA

Technical Report: R8848-1 Rev 6

Date: 25th May 2021

For: Berkeley Homes Ltd (Oxford and Chiltern)
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0.0 REUBEN PECKHAM - STATEMENT OF CAPABILITY AND EXPERIENCE

- 0.1** I am a principal consultant and director of 24 Acoustics Ltd. I hold an undergraduate degree in Engineering Acoustics and Vibration and a post-graduate research degree in Whole Body Vibration, both awarded by the Institute of Sound and Vibration Research at Southampton University. I am a corporate member of the Institute of Acoustics and a Chartered Engineer. 24 Acoustics Ltd is a full member of the Association of Noise Consultants.
- 0.2** I have in excess of 25 years' experience in industry, research and consultancy relating to engineering acoustics, noise and vibration. Prior to joining 24 Acoustics Ltd in 2005, I held senior positions at two major multi-disciplinary engineering/ environmental consultancy companies.
- 0.3** I have presented expert evidence relating to noise, vibration and acoustics in planning appeals, public inquiries and courts of law (at Magistrates, County and High Court level) on many previous occasions.

1.0 INTRODUCTION

1.1 This Statement of Case on Noise has been prepared by 24 Acoustics Ltd on behalf of Berkeley Homes Ltd (Oxford and Chiltern) ('the Appellants') who have submitted an appeal under Section 78 of the Town and Country Planning Act 1990 (as amended), following the refusal by Reading Borough Council ('RBC') to grant full planning permission in respect of planning application reference 200188 ('the Planning Application') by notice dated 9 April 2021.

1.2 The Planning Application relates to 55 Vastern Road, Reading ('the Site') and is described as follows:

"Demolition of existing structures and erection of a series of buildings ranging in height from 1 to 11 storeys, including residential dwellings (C3 use class) and retail floorspace (A3 use class), together with a new north-south pedestrian link, connecting Christchurch Bridge to Vastern Road."

1.3 The site is affected by noise from road traffic using Vastern Road, from aircraft movements and from the operation of the neighbouring electricity substation.

1.4 Reason for refusal 4 relates to noise, as follows:

The proposed development has failed to demonstrate that a suitable quality of accommodation can be provided for all future occupiers as the mitigation measures submitted would not be sufficient to minimise the impact of nearby noise pollution thereby contrary to Policies CC8, EN16 and CR6 of the Reading Borough Local Plan (2019).

1.5 This statement of case builds upon the submissions provided to Reading Borough Council as part of the planning application (which are appended to this document) and addresses the council's reason for refusal relating to noise.

1.6 I have been involved with this site, on Berkeley Homes' behalf, since the Summer of 2018 (prior to their purchase of the site) and have worked closely with their architects and design teams throughout to ensure that the scheme is designed to mitigate the noise impact upon the proposed new dwellings.

2.0 POLICY AND ASSESSMENT CRITERIA

Local Policy

Reading Borough Council EN16 & CR6

- 2.1** These policies form part of the Reading Borough Local Plan (adopted November 2019) and relate to 'New development in a historic context' and 'Accessibility and intensity of the development respectively'. As such they do not relate to noise and these aspects of reason for refusal 4 are not considered within this statement of case.

Reading Borough Council CC8- Safeguarding Amenity

- 2.2** Policy CC8 of Reading Borough Council's local plan (adopted November 2019) [Reference 1] relates to the safeguarding of amenity. Of relevance to noise and the appeal site, the policy states that development should not cause unacceptable living conditions for new residential properties.

- 2.3** The policy states overall that a 'key concern' is to ensure that new development creates a quality living environment for future residents. It states that tensions between different uses can mostly be avoided by **careful design, siting and orientation of buildings and space**, paying particular attention to those aspects which are most likely to cause issues and which are most sensitive to effects (e.g. outdoor spaces, habitable rooms and children's play areas).

National Policy

- 2.4** A more detailed description of national planning policy and guidance which relates to noise is provided in Section 3 of 24 Acoustics' technical report (Reference R8220-2 Rev 3) which was submitted as part of the planning application for the scheme and is reproduced in Appendix A of this statement of case. The pertinent points to this Statement of Case from the relevant policies are summarised below:

National Planning Policy Framework (NPPF)

- 2.5** The NPPF [Reference 2] states (paragraph 180) that planning policies and decisions should '*mitigate and reduce to a minimum, potential adverse impacts resulting from noise from new developments- and avoid noise giving rise to significant adverse impacts on health and quality of life*'. It also refers (paragraph 182) to the Agent of Change, stating that existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. It states that, where the operation of an existing business or community facility could have a significant adverse effect on new development in its vicinity, the applicant (or agent of change) should be required to provide suitable mitigation before the development has been completed.

Noise Policy Statement for England (NPSE)

- 2.6** The NPSE [Reference 3] sets out the government's 'long-term vision to promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development'. This is supported by the following aims:
- Avoiding significant adverse impacts on health and quality of life;
 - Mitigating and minimising adverse impacts on health and quality of life.

Planning Practice Guidance (PPG)

- 2.7** The Planning Practice Guidance (PPG) reflects the NPSE and states (Paragraph 001) 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 (Paragraph 001) that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The PPG states (Paragraph 002) that noise can override other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.
- 2.8** The PPG expands upon the concept of Significant Observable Adverse Effects Level (SOAEL) (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) (Paragraphs 003 and 004) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.

- 2.9** In general terms it is considered that a noise impact with an effects level which is lower than SOAEL is acceptable (providing the effect is mitigated to a minimum) and indeed a noise impact at the lower end of SOAEL should be 'avoided' but not necessarily prevented. There are currently, however, limited objective technical criteria for use in planning noise impact assessments which reflect the above semantics. Nevertheless, objective technical criteria in accepted technical documents set out criteria for what is an acceptable noise level for housing. For this site it is considered that the appropriate (technical and objective) standards for use in assessing the noise impact are British Standard 8233: 2014 and guidance from the World Health Organisation for habitable rooms in the proposed development and those of British Standard 4142 for proposed plant items associated with the development.
- 2.10** The PPG also makes reference to the agent of change (Paragraph 009), stating that the applicant will need to clearly identify the effects of existing businesses that may cause a nuisance (which includes noise) and the likelihood that they could have a significant adverse effect on new residents.
- 2.11** It further states (paragraph 009) that the agent of change will also need to define clearly the mitigation being proposed to address any potential significant adverse effects that are identified. Adopting this approach may not prevent all complaints from the new residents/users about noise or other effects, but can help to achieve a satisfactory living or working environment, and help to mitigate the risk of a statutory nuisance being found if the new development is used as designed (for example, keeping windows closed and using alternative ventilation systems when the noise or other effects are occurring). The PPG adds that it can be helpful for developers to provide information to prospective purchasers or occupants about mitigation measures that have been put in place, to raise awareness and reduce the risk of post-purchase/occupancy complaints.

Technical Noise Guidance

- 2.12** The following technical references (all summarised in greater detail in Technical Report Reference R8220-2 Rev 3) have been used in my assessment. All are considered to represent use of best practice.

Professional Practice Guidance on Planning and Noise (ProPG)

- 2.13** The ProPG (published by the Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health) [Reference 5] applies to transportation noise sources upon proposed new residential development sites and strives to ensure good acoustic design and consideration of internal and external amenity space noise levels. Primarily, it is considered that the spirit of its intent is to ensure that, for sites which are affected by transportation noise, that appropriate acoustic design measures are considered at an early stage in the project.

British Standard 8233:2014/ World Health Organisation Guidelines for Community Noise

- 2.14** BS 8233 [Reference 6] and World Health Organisation Guidelines [Reference 7] both provide acoustic design advice and guidance for dwellings and specifically suggest acceptable upper internal noise levels in habitable rooms.

British Standard 4142:2014+A1:2019

- 2.15** BS 4142 [Reference 8] provides a method for rating the effects of industrial and/ or commercial sound on residential areas by comparing the industrial/ commercial source noise level (corrected for noise character if appropriate) at a receptor with the prevailing background noise level. Semantics are assigned according to the extent of the difference and any relevant context (such as the frequency of occurrence of the noise, site history etc). The standard has been used for determining acceptable levels of noise from the substation within external amenity areas.

NANR45

- 2.16** NANR (published by the University of Salford on behalf of DEFRA) 45 [Reference 9] identifies a maximum threshold noise level for low frequency noise inside dwellings. This has been used to set internal design criteria for noise from the substation in the proposed new dwellings.

3.0 SUMMARY OF NOISE IMPACT ASSESSMENT AND STATEMENT OF CASE

3.1 24 Acoustics' technical report reference R8220-2 Rev 3 provides a full assessment of the noise impact as submitted as part of the planning application for the proposed development is provided in full in Appendix A of this document. A further submission from 24 Acoustics was made to RBC on 5/10/2020 (document Reference R8220-4 Rev 0). This is provided in Appendix B.

3.2 The proposed development is subject to noise from road traffic using Vastern Road, from the neighbouring SSE substation and from general ambient noise, including aircraft and railway movements. 24 Acoustics has worked with Berkeley Homes and their design team since Summer 2018 in accordance with the agent of change principle defined in the NPPF and PPG to optimise the design of the site to minimise noise impact. We have had input into masterplanning and internal dwelling layout (for example orientating properties so that a minimum of properties have line of sight towards the substation), designing some units to be single aspect, and using some as acoustic barriers to the remainder of the site.

3.3 The noise case is summarised below.

Noise Levels from SSE Operations in External Amenity Areas

3.4 As detailed in Paragraphs 6.1 to 6.3 of Report R8220-2 Rev 3.

3.5 Noise from the substation is made up of low frequency tonal noise from the transformers (dominating at 100 Hz) and broadband noise from the transformer cooling fans (which operate very intermittently). Detailed site noise surveys and acoustic modelling was undertaken to determine the daytime impact of noise from the substation operations throughout the appeal site relative to the background noise level in accordance with the rating methodology of BS 4142:2014+A1:2019. From this assessment, recommendations to the design team were made to optimise the site layout in order to ensure that the noise impact at all external amenity areas will be acceptable.

Noise Levels from SSE Operations in Internal Areas

- 3.6** This is detailed in Paragraphs 6.4 to 6.7 of Report R8220-2 Rev 3.
- 3.7** My approach to establishing an acceptable internal noise environment has been to measure and model the noise from the substation and calculate the acoustic specifications for the building façade and glazing systems to determine acceptable noise levels in accordance with the guidance of BS 8233 and NANR 45. Where these specifications can only be achieved with windows closed Berkeley Homes have committed to providing background and purge ventilation by mechanical means (in accordance with Approved Document F of the Building Regulations) and to designing the dwellings so that they will not overheat. Thus residents will have free choice to occupy their dwellings with windows open or not, with no requirement to open their windows for ventilation or cooling purposes. It is noteworthy that the PPG refers (Paragraph 005) to the use of closed windows and alternative means of ventilation as an acceptable design measure when considering the agent of change in common with very many city centre development schemes.
- 3.8** These measures may be enforced by condition if appropriate.

Noise Levels from Road Traffic Using Vastern Road

- 3.9** As detailed in Paragraph 6.8 of Report 8220-2 Rev 0.
- 3.10** Noise from road traffic will be mitigated by appropriate specification of glazing and alternative means of ventilation/ measures to prevent overheating to ensure that noise levels internally are compliant with the guidelines set out in BS 8233. This again may be enforced by condition if appropriate.

4.0 CONCLUSIONS

- 4.1** I have been involved with this site, on Berkeley Homes' behalf, since the Summer of 2018 (prior to their purchase of the site) and have worked closely with their architects and design teams throughout to ensure that the scheme is designed to mitigate the noise impact upon the proposed new dwellings.
- 4.2** As a result I am of the opinion that the design of the site and the noise impact from the neighbouring SSE operations is mitigated to a minimum and fully compliant with the requirements of the agent of change as described in the NPPF and PPG.
- 4.3** The development is engineered to ensure an acceptable acoustic environment both inside and outside of the proposed new dwellings. On this basis I consider that there is no reason why this appeal should not be allowed.

REFERENCES

1. Reading Borough Council. Local Plan Policy CC8, Safeguarding Amenity, adopted November 2019.
2. National Planning Policy Framework, Department for Communities and Local Government, 2019.
3. Noise Policy Statement for England, Defra, 2010.
4. National Planning Practice Guidance, Department of Communities and Local Government, 2019.
5. Association of Noise Consultants, Institute of Acoustics, Chartered Institute of Environmental Health. Pro PG Planning and Noise, May 2017.
6. British Standards Institution. British Standard 8233: Guidance on Sound Insulation and Noise Reduction for Buildings, 2014. World Health Organisation, Guidelines for Community Noise, 2000.
7. World Health Organisation. Guidelines for Community Noise, 2000.
8. British Standards Institution. British Standard 4142+A1:2019: Methods for rating and assessing industrial and commercial sound, 2019.
9. University of Salford, Manchester. DEFRA Research Contract NANR45. Proposed criteria for the assessment of low frequency noise disturbance, 2011.

APPENDIX A: TECHNICAL REPORT REFERENCE R8220-2 Rev 3

Submitted in support of planning application



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PROPOSED RESIDENTIAL DEVELOPMENT AT VASTERN ROAD, READING
NOISE IMPACT ASSESSMENT

Technical Report: R8220-2 Rev 3

Date: 17th July 2020

For: Berkeley Homes (Chiltern) Ltd
Berkeley House,
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24 Acoustics Document Control Sheet

Project Title: Proposed Residential Development at Vastern Road, Reading
Noise Impact Assessment

Report Ref: R8220-2 Rev 3

Date: 17th July 2020

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This report was completed by 24 Acoustics Ltd on the basis of a defined programme of work and terms and conditions agreed with the Client. The report has been prepared with all reasonable skill, care and diligence within the terms of the Contract with the Client and taking into account the project objectives, the agreed scope of works, prevailing site conditions and the degree of manpower and resources allocated to the project.

24 Acoustics Ltd accepts no responsibility whatsoever, following the issue of the report, for any matters arising outside the agreed scope of the works.

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EXECUTIVE SUMMARY

24 Acoustics Ltd has been retained by Berkeley Homes (Chiltern) Ltd to assess the impact of noise upon their proposed residential development at Vastern Road in Reading.

The site is affected by noise from road traffic using Vastern Road, from aircraft and train movements and from the SSE transformer substation which neighbours the proposed development site.

In order to assess the noise impact on the site detailed noise surveys and acoustic calculations have been undertaken between September 2018 and December 2019. Following this feedback has been provided to the design team to optimise the design of the site to minimise noise impact.

Measures have been taken to ensure that the noise levels both externally and internally within the proposed new development will be acceptable. This will involve detailed acoustic design post-planning and will require alternative means of ventilation and design measures to prevent excess thermal build up to allow residents to occupy their dwellings with windows closed (if they so wish).

On this basis it is considered that an acceptable noise environment can be obtained within the proposed development and it is considered that there are no noise grounds for refusal of planning consent.

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1.0 INTRODUCTION

- 1.1** 24 Acoustics Ltd has been retained by Berkeley Homes (Chiltern) Ltd to assess the impact of noise upon their proposed residential development at Vastern Road in Reading.
- 1.2** The site is affected by noise from road traffic using Vastern Road, from aircraft and train movements and from the SSE transformer substation which neighbours the proposed development site.
- 1.3** This report presents the findings and recommendations for the assessment following detailed on-site noise surveys and acoustic modelling undertaken on site between September 2018 and December 2019.
- 1.4** All noise levels are presented 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 AND PROPOSED DEVELOPMENT

- 2.1** The proposed development site is located on land formerly occupied by Scottish and Southern Electric (SSE) between Vastern Road and the River Thames. The site currently comprises the former SSE office buildings (which front Vastern Road) with car parking and a substation to the rear. Figure 1 provides an aerial image of the undeveloped site.
- 2.2** It is proposed to demolish a number of the existing structures and erect a series of buildings to form a predominantly residential scheme (specified as 208 residential units – 59x1, 137x2 & 12x3-bed units) with a cafe and a new north-south pedestrian link connecting Christchurch Bridge to Vastern Rd towards Reading Station. Figure 2 provides a plan of the proposed development scheme.
- 2.3** The site is affected by noise from road traffic using Vastern Road together with ambient city noise which includes distant road traffic, aircraft and rail movements. In addition, the site is affected by noise from the neighbouring SSE transformer substation. This generates a continuous low level low frequency 'hum' from the transformers (which is more noticeable at night when background noise levels are lower) and a higher level of broadband noise from the transformer cooling fans which operate intermittently at any time (according to the status of the transformers and the ambient temperature/ humidity).

3.0 ACOUSTIC ASSESSMENT CRITERIA

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 ensure that new development is appropriate for its location taking into account the likely 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:

- 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 quality of life;
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The NPPF 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** In 2014 the Planning Practice Guidance (PPG) was finalised [Reference 3]. This 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** In general terms it is considered that a noise impact with an effects level which is lower than SOAEL is acceptable (providing the effect is mitigated to a minimum). There is currently, however, a discontinuity between the above guidance and objective technical criteria for use in planning noise impact assessments. For this site it is considered that the appropriate (technical and objective) standards for use in assessing the noise impact are British Standard 8233: 2014 and guidance from the World Health Organisation for habitable rooms in the proposed hotel and those of British Standard 4142 for proposed plant items associated with the development.

Professional Practice Guidance on Planning & Noise (ProPG)

- 3.7** The Professional Practice Guidance on Planning and Noise (ProPG) [Reference 4] was published jointly by the Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health in May 2017. The guidance relates to the consideration of existing sources of transportation noise upon proposed new residential development and strives to:
- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
 - Encourage the process of good acoustic design in and around new residential developments;
 - Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
 - Improve understanding of how to determine the extent of potential noise impact and effect; and
 - Assist the delivery of sustainable development.

3.8 The guidance describes a recommended approach for new residential development, which includes four key elements of the assessment process, identified below:

- i. Good acoustic design process;
- ii. Internal noise level guidelines;
- iii. External amenity area noise assessment;
- iv. Assessment of other relevant issues.

3.9 It is important to note that the guidance in the ProPG does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy. It is provided for guidance only and has no formal place within planning legislation.

BS 8233:2014 and WHO Guidelines

3.10 BS 8233:2014 [Reference 5] 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 $L_{Aeq,16\text{ hr}}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq,16\text{ hr}}$ in dining rooms during the day and 30 dB $L_{Aeq,8\text{ hr}}$ in bedrooms at night.

3.11 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."

3.12 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."*

3.13 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 6] suggest internal night-time noise levels not exceeding 30 dB $L_{Aeq,8\text{ hr}}$ or regularly (10 – 15 times per night) exceeding 45 dB $L_{Amax,f}$ for 'a good night's sleep'.

BS 4142:2014 Methods for Rating Industrial and Commercial Sound

3.14 BS 4142:2014 [Reference 7] provides a method for rating the effects of industrial and commercial sound on residential areas.

- 3.15** The standard advocates a comparison between the typical measured L_{A90} 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.
- 3.16** The standard states that a difference between the rating level and the background level of around +10 dB is an indication of a significant adverse impact, depending on the context and a difference of around +5 dB is likely to be an indication of an adverse impact, 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).
- 3.17** BS 4142 requires the noise impact to be assessed depending on the context. In relation to situations where background noise levels are low, the standard states *"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."*
- 3.18** If the noise emissions are tonal or contain other noticeable characteristics then a suitable correction is applicable, in accordance with BS 4142:2014.

Low Frequency Noise- NANR45

- 3.19** Research by the University of Salford for DEFRA [Reference 8] identifies a maximum threshold for low frequency noise. This is shown in Table 1 below.

1/3 Octave Band, Hz and L_{eq} Sound Pressure Level												
10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
92	87	83	74	64	56	49	43	42	40	38	36	34

Table 1: NANR45 Low Frequency Noise Thresholds

- 3.20** The guidance is intended to provide a procedure to help determine whether a low frequency environmental noise exists that could be the cause of complaints and therefore is considered to represent a reasonable maximum threshold for low frequency noise inside the proposed new dwellings. The guidelines are broadly consistent with national criteria in Germany, Sweden, Denmark, Poland and the Netherlands.

Consultation with LPA

- 3.21** Feedback from Reading Borough Council's Environmental Health Department has indicated that they are happy with the use of the standards described above to assess the noise impact. They also stressed that complaints about noise from the transformers have been received in the past and they would expect to see BS 4142 used to assess the noise impact in private external amenity spaces.

4.0 ASSESSMENT AND CALCULATION METHODOLOGY

Summary of Acoustic Design Criteria

- 4.1** On the basis of the review above 24 Acoustics is of the opinion that the noise environment at the proposed new dwellings will be acceptable if the following criteria are complied with:
- Noise levels internally in habitable rooms not to exceed 30 dB $L_{Aeq, 16 \text{ hour}}$ during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ at night;
 - Low frequency noise levels internally not to exceed the thresholds shown above in Table 1.
 - Where the above criterion is reliant on closed windows to provide ventilation by mechanical means in accordance with Part F of the building regulations and to ensure that each property is designed to minimise excessive thermal build up;
 - Noise levels in private external amenity areas, should not exceed the prevailing representative daytime background noise level by more than 5 dBA (with a correction applied for noise character, if necessary), in accordance with the requirements of BS 4142:2014.
- 4.2** 24 Acoustics has liaised extensively with Berkeley Homes and their architects/ design team to optimise the acoustic design of the scheme to minimise noise impact.
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Calculation Methodology

- 4.3** The recommendations set out in this report are based upon noise surveys undertaken by 24 Acoustics in the Spring and Summer of 2018 and a further, detailed, sound power survey of the noise from the plant undertaken on Friday 1st March 2019. Further surveys were also taken on Monday 25th March 2019 to quantify the dominant tones from the plant. A night-time survey was undertaken in the early hours of 1 April 2019 and again on 5th December 2019 to quantify the noise from the substation alone (taken at night to minimise the impact of ambient noise) and a further site survey undertaken on 13th November 2019.
- 4.4** The survey data has been used to populate a three-dimensional acoustic model of the site. This has predicted the noise levels from SSE cooling fan operations at the proposed building facades at each floor of the proposed development. Noise from the transformer operation (dominant in the 100 Hz 1/3 octave band) was found to be too diffuse on site and hence cannot be modelled. Hence this has been determined from survey data at various locations across the site.
- 4.4 This data has been used to quantify noise levels in external amenity spaces and to determine the acoustic specification for window systems and alternative means of ventilation where required.

5.0 NOISE SURVEYS AND CALCULATIONS

Vastern Road Facade

- 5.1** The noise level from road traffic (and other sources) at the Vastern Road frontage of the site was measured in an unattended noise survey undertaken between 1st and 9th March 2019. Measurements were undertaken at a height of 1.5 m above local grade at the location of the proposed new façade fronting Vastern Road, as shown in Figure 3. An environmental windshield was fitted.
- 5.2** The measurements were undertaken in samples of 5 minutes in terms of the overall A-weighted and linear octave band L_{eq} , L_{90} and $L_{Max,f}$ sound pressure level in dB. The following instrumentation was used:
- Rion NL-32 Class 1 accuracy sound level meter;
 - Bruel and Kjaer 4231 acoustic calibrator.

- 5.3** The instrumentation was calibrated before and after the surveys in accordance with the manufacturer’s recommendations. No drift in calibration was recorded.
- 5.4** The results of the survey are shown graphically in Appendix B and are summarised in Table 2 below.

Day and Date	Period and Noise Level, dB		
	Day	Night	
	L _{Aeq, 16 hr}	L _{Aeq, 8 hr}	L _{Amax, f}
Friday 1/3/2019	-	65	80
Monday 4/3/2019	69	63	80
Tuesday 5/3/2019	69	65	81
Wednesday 6/3/2019	70	63	80
Thursday 7/3/2019	69	64	79
Representative	70	64	80

Table 2: Noise Survey Results, Vastern Road Frontage

Noise from SSE Transformers

- 5.5** The SEE transformers emit a continuous low-frequency tonal noise centred in the 100 Hz 1/3 octave band. Observations on site have indicated that the propagation and prediction of this noise does not follow the usual ‘rules’ and is also somewhat variable (presumably as a result of the variation in power through the substation). For this reason, a number of site visits have been made and surveys undertaken at different locations across the site at different times of the day (and night). All measurements were undertaken in 1/3 octave bands used properly calibrated class 1 accuracy instrumentation.
- 5.6** The results from the various surveys have been collated and are presented graphically in Appendix B.

Noise from SSE Cooling Fans

- 5.7** A noise survey was undertaken on 1st March 2019 to determine the sound power level from the transformer cooling fans, when operational under full duty. Measurements were undertaken using a Norsonic Nor-118 Class 1 accuracy sound level meter which was calibrated before and after the surveys using a Bruel and Kjaer 4231 acoustic calibrator. No drift in calibration was recorded. The measurements were undertaken in 1/3 octave bands and revealed the following plant sound power level. The full 1/3 octave band data is provided in Appendix B.

Noise Source	Overall Sound Power Level, dB L _{WA}
A1MP (Main Transformer 1)	96
A2MP (Main Transformer 2)	95
Small fans (per package)	72

Table 3: Transformer Cooling Fans Sound Power Level

- 5.8** The cooling fan sound power data has been used to populate an acoustic model of the site, showing the propagation of noise from the cooling fans across the proposed development. Immi v2017 noise-mapping software has been used which has adopted the propagation methodology of ISO9613 [Reference 9]. Noise contour maps and predictions have been carried out for each building façade on each floor. An example of the noise contour map is shown in Appendix B (relating to the first floor only).

6.0 NOISE IMPACT ASSESSMENT

Noise Level in External Amenity Spaces

- 6.1** It is difficult to accurately establish the prevailing background noise level due to the continuous operation (and hence noise) from the transformers. However, the surveys have indicated typical representative background noise levels of around 40 dB L_{A90} at the rear of the site (away from Vastern Road) during the day. On the basis of the criterion derived above this implies that rating noise levels from SSE operations (corrected for noise character, if necessary) determined on the basis of BS 4142:2014 in external areas during the day that may be used as amenity spaces should be no greater than 45 dB L_{Aeq}.

6.2 The noise from the transformers is tonal in nature and hence a character correction of + 6 dB is considered appropriate. When operating with the transformers the fans are less tonal (and mask the transformer noise) and a correction of + 4 dB is considered appropriate. This results in the following noise 'limits' in external amenity areas:

- Transformers: 39 dB L_{Aeq} ;
- Cooling fans: 41 dB L_{Aeq} .

6.3 The acoustic model has been optimised to show the boundary between the 41 dB L_{Aeq} noise contours and this is presented in Figure 4. The areas in red are representative of the areas external areas which are likely to be subject to noise levels from the cooling fans in excess of 41 dB L_{Aeq} which potentially may be unacceptable. The design of the scheme has been optimised such that there are no private amenity areas within this region and hence, on this basis, it is considered that noise from SSE operations will not cause disturbance in the private amenity spaces which are located within other parts of the development.

Internal Noise Levels from SSE Operations

6.4 A small number of the properties facing the River Thames will be capable of achieving the internal noise limits using natural ventilation (opening windows), however, many of the new dwellings may be reliant on closed windows as a means of noise mitigation in order to achieve the internal noise targets. Mechanical ventilation and heat recovery systems will be provided where necessary so that residents need not open their windows. In addition, where necessary, ventilation air will not be directly drawn from building facades.

6.5 Calculations have been undertaken to determine the acoustic specification for glazing systems on each building façade to ensure that the development complies with the acoustic criteria set in Section 3 above. Figure 8 shows our recommendations on each façade.

6.6 The table below summarises the window acoustic specifications recommended in Figure 5. These will be revised and rationalised as necessary during the detailed design phase of the project and glazing selections made accordingly.

Glazing Type	Minimum Level of Sound Insulation	
	125 Hz Octave Band SRI	Weighted Sound Reduction Index, R_w
1	24 dB	31 dB
2	30 dB	39 dB
3	36 dB	57 dB

Table 4: Acoustic Specification of each Window System

- 6.7** The sound insulation performance data shown in Table 4 applies to the entire window system including the frame and seal and not just the glass and Berkeley Homes will commit to ensuring that the acoustic performance of each window system will be guaranteed by the vendor, supported with laboratory acoustic test reports as appropriate.

Noise from Road Traffic Using Vastern Road

- 6.8** The noise environment on the southern façade of the proposed new flat blocks will be dominated by road traffic using Vastern Road and it will be necessary to engineer these to ensure that internal noise levels do not exceed the standards defined in Section 3. Our recommendations are provided in Figure 8 (and assume that MVHR will be provided throughout).

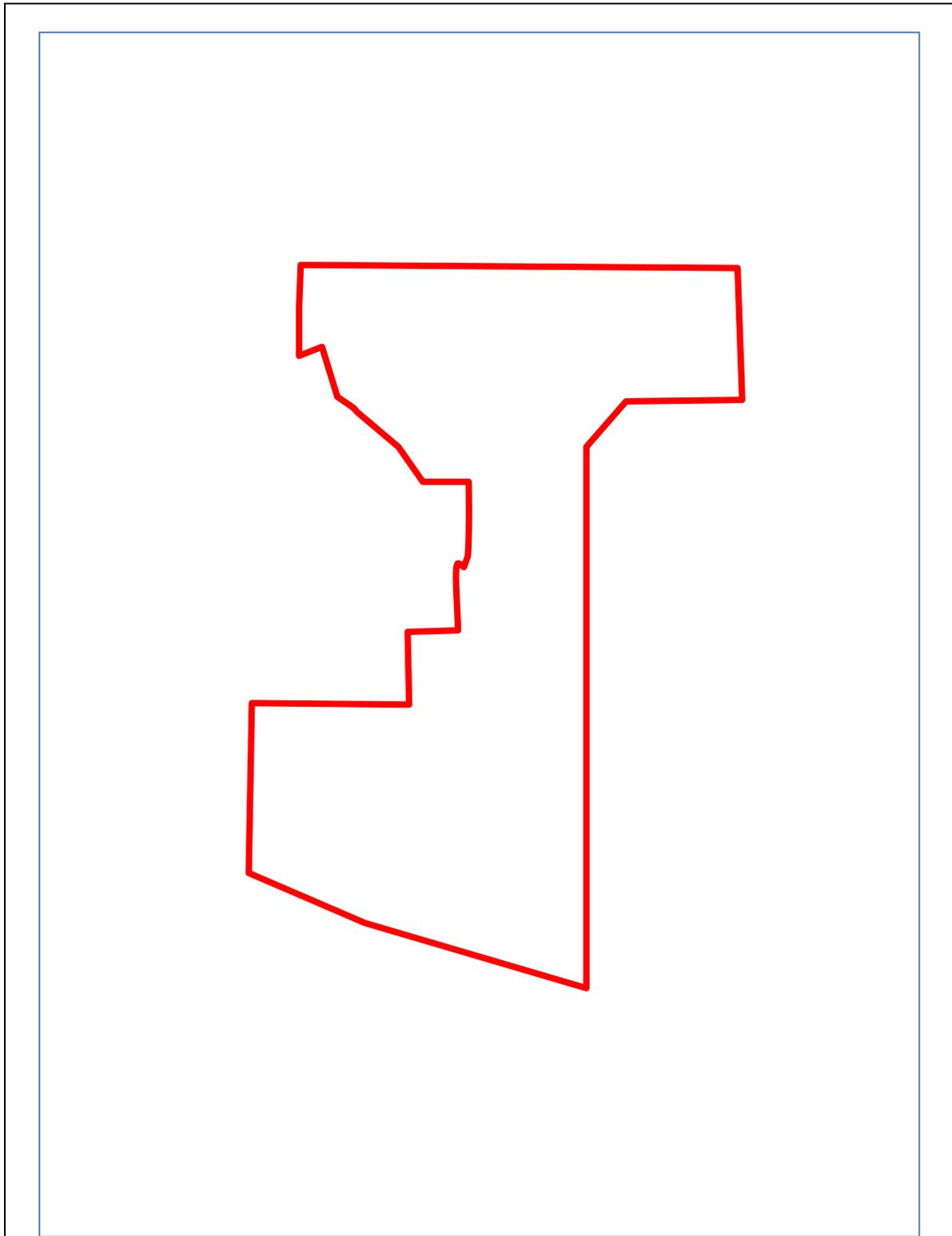
7.0 SUMMARY

- 7.1** 24 Acoustics Ltd has been retained by Berkeley Homes (Chiltern) Ltd to assess the impact of noise upon their proposed residential development at Vastern Road in Reading.
- 7.2** The site is affected by noise from road traffic using Vastern Road, from aircraft and train movements and from the SSE transformer substation which neighbours the proposed development site.
- 7.3** In order to assess the noise impact on the site detailed noise surveys and acoustic calculations have been undertaken between September 2018 and December 2019. Following this feedback has been provided to the design team to optimise the design of the site to minimise noise impact.

- 7.4** Measures have been taken to ensure that the noise levels both externally and internally within the proposed new development will be acceptable. This will involve detailed acoustic design post-planning and will require alternative means of ventilation and design measures to prevent excess thermal build up to allow residents to occupy their dwellings with windows closed (if they so wish).
- 7.5** On this basis it is considered that an acceptable noise environment can be obtained within the proposed development and it is considered that there are no noise grounds for refusal of planning consent.

REFERENCES

1. Ministry of Housing, Communities and Local Government. National Planning Policy Framework, , 2018.
2. DEFRA. Noise Policy Statement for England, 2010.
3. Department of Communities and Local Government, National Planning Practice Guidance, 2019.
4. Association of Noise Consultants, Institute of Acoustics, Chartered Institute of Environmental Health. Pro PG Planning and Noise, May 2017.
5. British Standards Institution. British Standard 8233: Guidance on Sound Insulation and Noise Reduction for Buildings, 2014.
6. World Health Organisation. Guidelines for Community Noise, 2000.
7. British Standards Institution. British Standard 4142: Methods for rating and assessing industrial and commercial sound, 2014.
8. University of Salford, Manchester. DEFRA Research Contract NANR45. Proposed criteria for the assessment of low frequency noise disturbance, 2011.
9. International Standards Organisation. ISO 9613: Acoustics- Attenuation of sound during propagation outdoors, 1993.



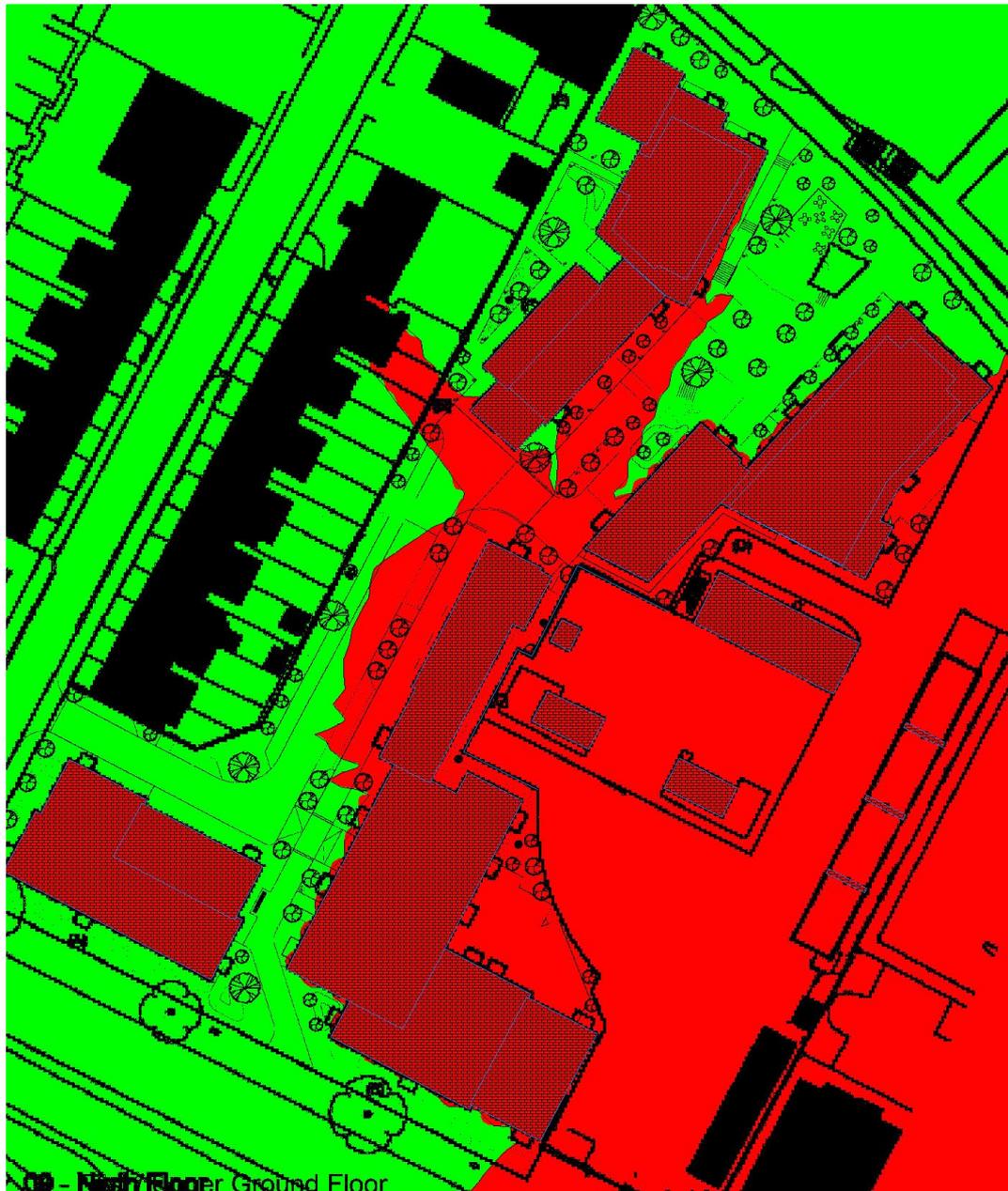
Project: Vastern Road, Reading	Title: Proposed Development Site (Indicative)		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: -	
Date: January 2020	Drawn By: RP	Job No: 8220-2	



Project: Vastern Road, Reading	Title: Proposed Development Scheme (Ground Floor)		 24Acoustics
DWG No: Figure 2	Scale: N.T.S.	Rev: -	
Date: January 2020	Drawn By: RP	Job No: 8220-2	



Project: Vastern Road, Reading	Title: Noise Survey Locations	 24Acoustics	
DWG No: Figure 3	Scale: N.T.S.		Rev: -
Date: January 2020	Drawn By: RP		Job No: 8220-2



Note

Red areas are subject to cooling fan noise levels > 41 dB L_{Aeq} and hence should not contain external amenity areas.

<p>Project: Vastern Road, Reading</p>	<p>Title: Ground Floor Noise Levels (Cooling Fans)</p>		 <p>24Acoustics</p>
<p>DWG No: Figure 4</p>	<p>Scale: N.T.S.</p>	<p>Rev: -</p>	
<p>Date: January 2020</p>	<p>Drawn By: RP</p>	<p>Job No: 8220-2</p>	



Project: Vastern Road, Reading		Title: Indicative Glazing Specifications		 24Acoustics
DWG No: Figure 5	Scale: N.T.S.	Rev: -		
Date: July 2020	Drawn By: RP	Job No: 8220		

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 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA 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.

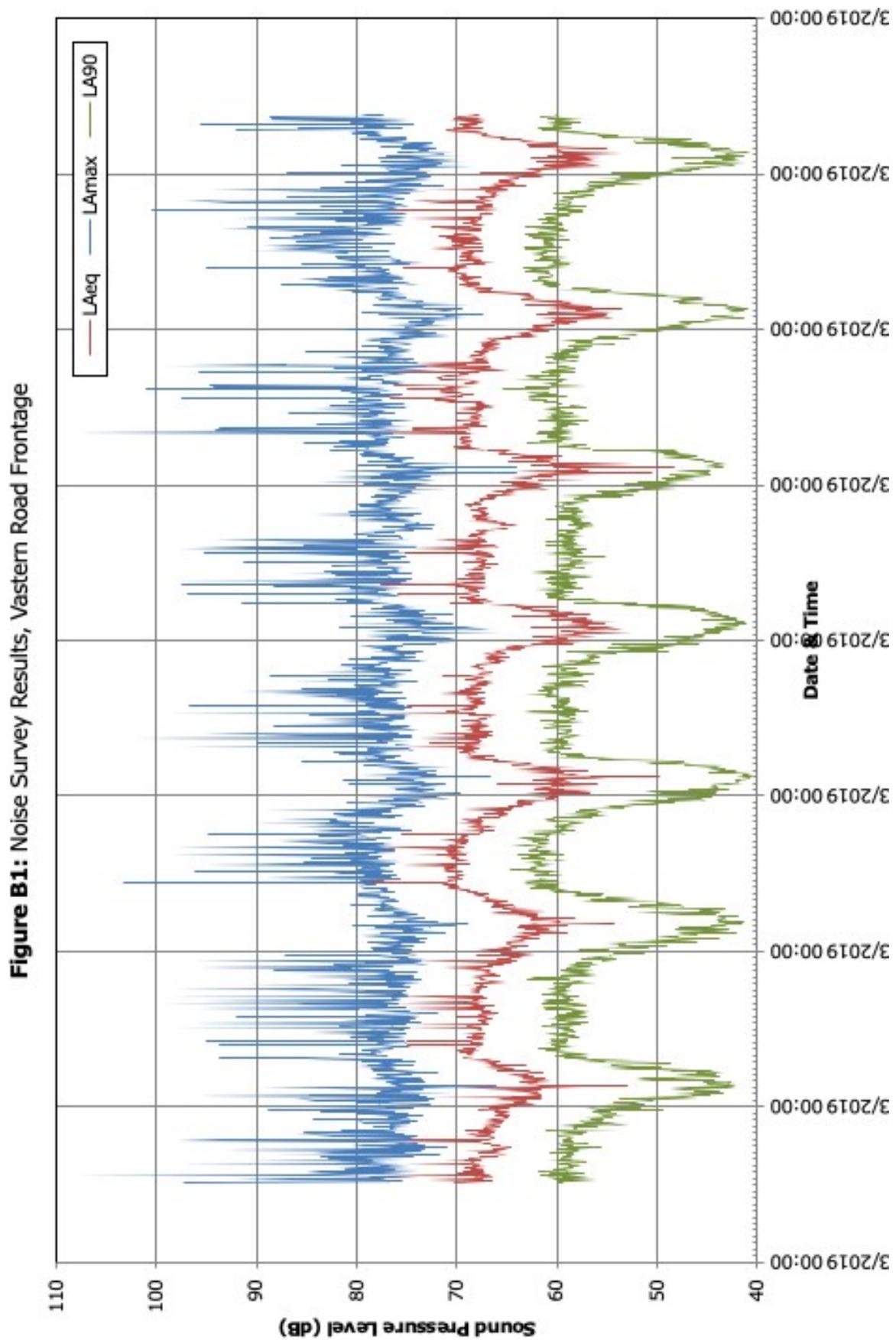
iii) The L_{A10} noise level

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 SURVEY RESULTS



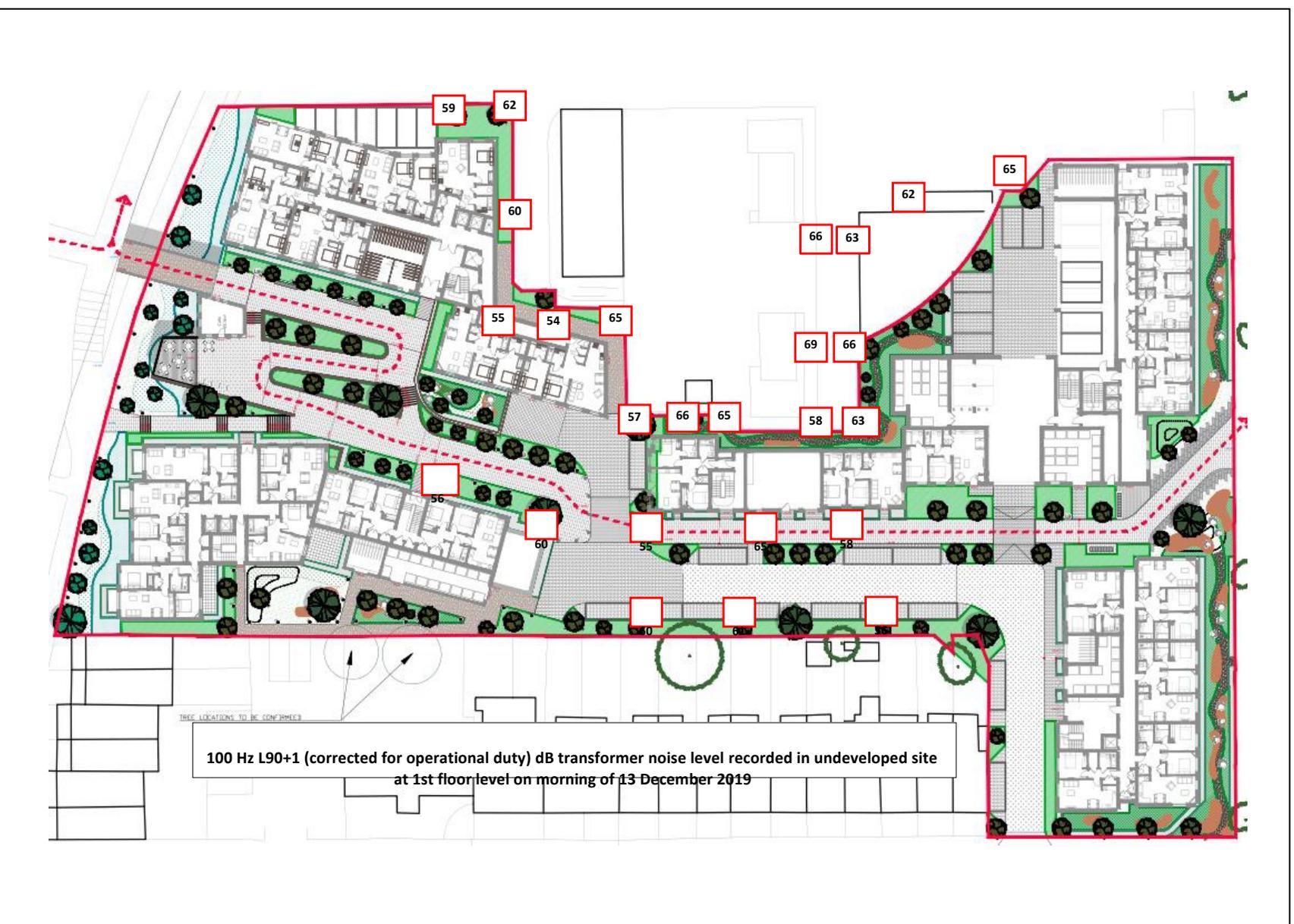


Figure B3: 100 Hz Leq Noise Levels from Transformer Operations, First Floor Level

A1MP	A	12.5 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz
	95.7	86.2	87	87.1	92.5	93.2	92.2	99.3	92.1	94.7	94.3
	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1.0 kHz	1.25 kHz
	91	89.3	89.6	87.4	88.8	86.8	88	88.2	87.7	87.3	85
	1.6 kHz	2.0 kHz	2.5 kHz	3.15 kHz	4.0 kHz	5.0 kHz	6.3 kHz	8.0 kHz	10.0 kHz		
	83.7	82.5	81.8	79.1	77.9	75.1	73.6	72.2	69.8		
A2MP	A	12.5 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz
	95.3	87.1	86.5	90.8	94.5	94.7	94.6	100.2	96.3	96.2	94.2
	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1.0 kHz	1.25 kHz
	92.1	89.8	88.5	87.6	87.9	88.4	89.2	87.1	86.5	86.1	84.4
	1.6 kHz	2.0 kHz	2.5 kHz	3.15 kHz	4.0 kHz	5.0 kHz	6.3 kHz	8.0 kHz	10.0 kHz		
	83.8	82.4	80.9	78.9	77	74.8	73.1	71.8	69.4		
Small fans (per package)	A	12.5 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz
	71.6	71.0	70.9	69.1	70.2	69.1	68.1	76.3	81.0	67.2	67.7
	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1.0 kHz	1.25 kHz
	69.1	67.5	66.8	67.5	69.0	65.2	65.2	65.2	63.1	62.2	59.9
	1.6 kHz	2.0 kHz	2.5 kHz	3.15 kHz	4.0 kHz	5.0 kHz	6.3 kHz	8.0 kHz	10.0 kHz		
	57.5	55.0	52.2	49.4	47.3	46.2	44.9	42.9	40.8		

Table B1: Transformer Cooling Fan Sound Power Levels (1/3 Octave Band Leq)

APPENDIX B: 5 OCTOBER 2020 FURTHER SUBMISSION



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Mr Gregory Simoes
Berkeley Homes (Oxford & Chiltern) Limited
Berkeley House,
Farnham Lane,
Farnham Royal,
SL2 3RQ

Date: 1st October 2020
Reference: R8220-4 Rev 0

Dear Gregory

Re: Vastern Road, Reading- Noise-Related Planning Conditions

Further to our recent correspondence I am pleased to provide formal comments to points raised by Reading Borough Council in relation to the noise impact assessment relating for your Vastern Road scheme.

The points raised by the Council are reproduced below (in italics) together with our comments.

It is disappointing that the site cannot be designed with the noise from the transformers controlled at source or the site layout adjusted so that the noise from the transformers does not meet the 10 dB below background criterion or even a more conservative 0 dB above background. Can the applicant clarify whether any adjustment has been made for tonality in the assessment and if so how much? What is the rating level prior to adjustments? I note that the occupants most affected have been provided with acoustic glazing and ventilation, however, it would be much more preferable if they were also able to open their windows, and the noise is constant. Is there really no options for reducing the noise at source?

Berkeley Homes have no control over the noise emission from the neighbouring substation. As a result the noise cannot be controlled at source.

Significant efforts have been made to design the site to reduce noise impact. 24 Acoustics has been working with Berkeley Homes on the design of the scheme for over 18 months. It is considered fully optimized with regards to minimising noise impact.

We have designed the site to ensure that daytime the rating noise level associated with the noise from the substation operation is no greater than 5 dB above the prevailing background noise level in external amenity areas. This is considered acceptable on the following basis:

- As an exclusively flatted development there will be very minimal private external amenity space, only balconies to some areas;
- The flats most affected by noise from the substation operations will be fitted with specialist acoustic glazing, alternative means of ventilation and measures to prevent excess heat build up. There will be no requirement to open windows on this basis and therefore the noise impact externally to dwellings (where there is no external amenity space is irrelevant);

- Appeal case history indicates that, in scenarios in which the receiver is brought to the noise (as is the case here) noise impacts of up to + 10 dB (difference between BS 4142 rating noise level and background noise level). Residents in this scenario are significantly less sensitive to noise than the scenario in which new noise is introduced to existing residents.

The tonality of the noise from the substation has been considered in the assessment and a correction to the BS 4142:2014+A1:2019 rating noise level of + 6 dB has been included. Please refer to Paragraph 6.2 of our technical report R8220-2 rev 3.

It is our opinion that in order to achieve acceptable internal noise levels inside some of the dwellings it will be necessary to rely on closed windows and alternative means of ventilation. This is considered acceptable within the constraints of a modern flatted development.

I trust you will find the above satisfactory. Please do not hesitate to contact me should you have any further queries.

Yours sincerely
For 24 Acoustics Ltd



Reuben Peckham BEng MPhil CEng MIOA
Director & Principal Consultant