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11 January 2023

STONEHAM LOCAL CENTRE BLOCK B – NOISE MANAGEMENT PLAN

Hours of Use

1. Use of the commercial units within Block B will be limited to 06.00 – 23.00.
2. Any activity outside this period shall be subject to specific permission from the Local Authority, including an acoustic appraisal of potential impact to neighbouring residential properties.

Internal Operations

3. Internal activity shall be controlled such that noise levels do not exceed 75 dB(A) $L_{Aeq,t}$ during the operational hours defined in (1) above. This limit is determined by the acoustic performance of the shell construction, and appropriate British Standards for residential amenity. Should tenants wish to exceed this level, suitable measures must be included within the fit-out works.
4. Any permanent PA systems should incorporate a tamper proof noise limiting device (or other approved means of control) to ensure the limits of (3) are not exceeded. This should be commissioned by the Acoustic Consultant, prior to first use.
5. Loudspeakers should be mounted on suitable antivibration support/hangers.

External Noise Emissions¹

6. In order to protect the amenity of adjacent occupiers, internal noise levels during operating hours should not exceed 80 dB(A) $L_{Aeq,t}$ if the windows and doors are closed (but note limits imposed by (3) above), or 60 dB(A) $L_{Aeq,t}$ if windows or doors are open. Should a higher value be required when windows are closed, glazing should be enhanced from the assumed 30 dB R_w units assumed.
7. Any new plant of equipment emitting noise to the outside of the buildings should be designed, installed and maintained to ensure that noise levels do not exceed the following limits:

¹ Values derived from Ramboll Associates 'North Stoneham Park Local Centre Noise Impact Assessment', November 2018

The cumulative noise emitted by Building Services Plant shall not exceed the following Rating levels, assessed 1m from the façade of any noise sensitive property, as determined in accordance with the methodology of BS4142:2014:

0700 – 2300	39 dB(A) L_{Ar} , 1hr
2300 – 0700	30 dB(A) L_{Ar} , 15 mins

8. Equally, all plant should be design, installed and maintained to ensure noise level do not exceed CIBSE guidelines within any other part of the building. Any vibration imparted into the structure must be imperceptible in residential parts of the building,

Neighbouring Relations

9. The operators of the commercial units should provide residents of the Local Centre with the responsible employee (contact name and details) to be used in the event of any noise disturbance.
10. Any complaints should be logged at the time, and complainants should receive a response within 24 hours. All investigations & resolution of the complaints should be recorded within the files.
11. These files should be retained in perpetuity and should be available for inspection by the landlord and/or Environmental Health officers.

Intended for
Highwood Homes

Document type
Report

Date
November 2018

NORTH STONEHAM PARK LOCAL CENTRE NOISE IMPACT ASSESSMENT

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1. EXECUTIVE SUMMARY

Ramboll UK Ltd ('Ramboll') has been commissioned by Highwood Homes to undertake a Noise and Vibration assessment, to accompany a full planning application for a proposed development of a Local Centre at North Stoneham Park, Southampton. The proposed development is located within an environment dominated by road traffic noise.

The assessment has comprised the following scope of works:

- Quantify the existing noise climate in the local area;
- Determine plant noise emission limits; and
- Determine requirements for façade sound insulation performance.

For the completed development stage, plant noise emissions limits have been set at each receptor location, based on achieving a level equal to a representative measured background noise level. With the provision of plant screening and attenuation measures it is considered that these limits are achievable, and no significant adverse effects are therefore predicted.

An assessment of external noise break-in to the proposed development has been undertaken. The assessment is based on achieving BS8233:2014 and WHO Guideline levels and the target internal ambient noise levels can be achieved with attenuated/mechanical ventilation and façade glazing specifications as set out in this report.

By controlling plant noise emission to the specified targets and providing building elements with the acoustic performance detailed in this report, the acoustic design would achieve the regulatory requirements and no significant adverse noise effects are predicted as a result.

It is therefore considered that the proposed development would not give rise to significant noise effects.

This report also sets out design constraints for two additional parcels of land being considered for development by Highwood Homes. Outline mitigation advice is provided in terms of achieving ProPG (2017) and BS8233:2014 performance criteria.

2. INTRODUCTION

2.1 Overview

This report has been prepared in support of the reserved matters application being submitted by Highwood Homes ('the Applicant') to Test Valley Council and Eastleigh Borough Council ('the Council') for redevelopment of areas of land as part of the North Stoneham Park Development ('the site').

The application seeks full planning permission for the following description of development:

"Reserved matters for appearance, landscaping, layout and scale (pursuant to outline planning permission O/15/76023 which was subject to Environmental Impact Assessment) for the provision of a Local Centre on the North Stoneham Park site including retail, café, gymnasium, community centre, nursery, offices and 26 age restricted flats in addition to associated access roads, drainage, car parking, refuse storage, boundary treatments and other supporting works and infrastructure"

The reserved matters application is submitted following the previous grant of planning permission for the surrounding Stoneham Park Phases, namely Phases 1 to 4. The noise impact assessment for Phase 1 was submitted to Test Valley and Eastleigh Borough Councils in April 2017 and presented in Ramboll report 61033023/NV/R03. The noise impact assessment for Phases 2 to 4 was submitted to Test Valley and Eastleigh Borough Councils in July 2017 and presented in Ramboll report 61033023/NV/R04.

2.2 Scope and Objectives

The report summarises the methodology and results of noise surveys undertaken on 11 to 17 October 2018. The 2018 surveys are considered to be valid for assessment purposes and representative of baseline conditions.

This report also provides assessments of the following:

- Plant noise emission limits;
- Façade performance requirements for the Local Centre; and
- Design constraints (Site Suitability) for parcels of land to the west of the Local Centre, namely the 'CCRC Site' and the 'Old Mansion Site', not currently included as part of the reserved matters application.

2.3 Consultation

David Harbon MIOA consulted via email with Test Valley and Eastleigh Council on 08 October 2018 with regard to the assessment methodology. No objections have been received to the proposed methodology from either authority at the time of writing. Therefore, it is considered to be valid and suitable for use with the proposed development under consideration.

3. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

3.1 Application Site Location and Description

The Local Centre is situated adjacent to Stoneham Lane in the south eastern corner of the wider Stoneham Park developments and presented in Drawing 17.005.100 (in Appendix 1 to this document).

The planning application description is given in Section 2.1. The areas described are displayed on Drawing no 17.005.201 (in Appendix 2 to this document) which shows the ground floor arrangement.

3.2 Current and Future Noise Sensitive Receptors

The nearest noise sensitive receptors (NSRs) to the application site are shown in Figure 3.1.

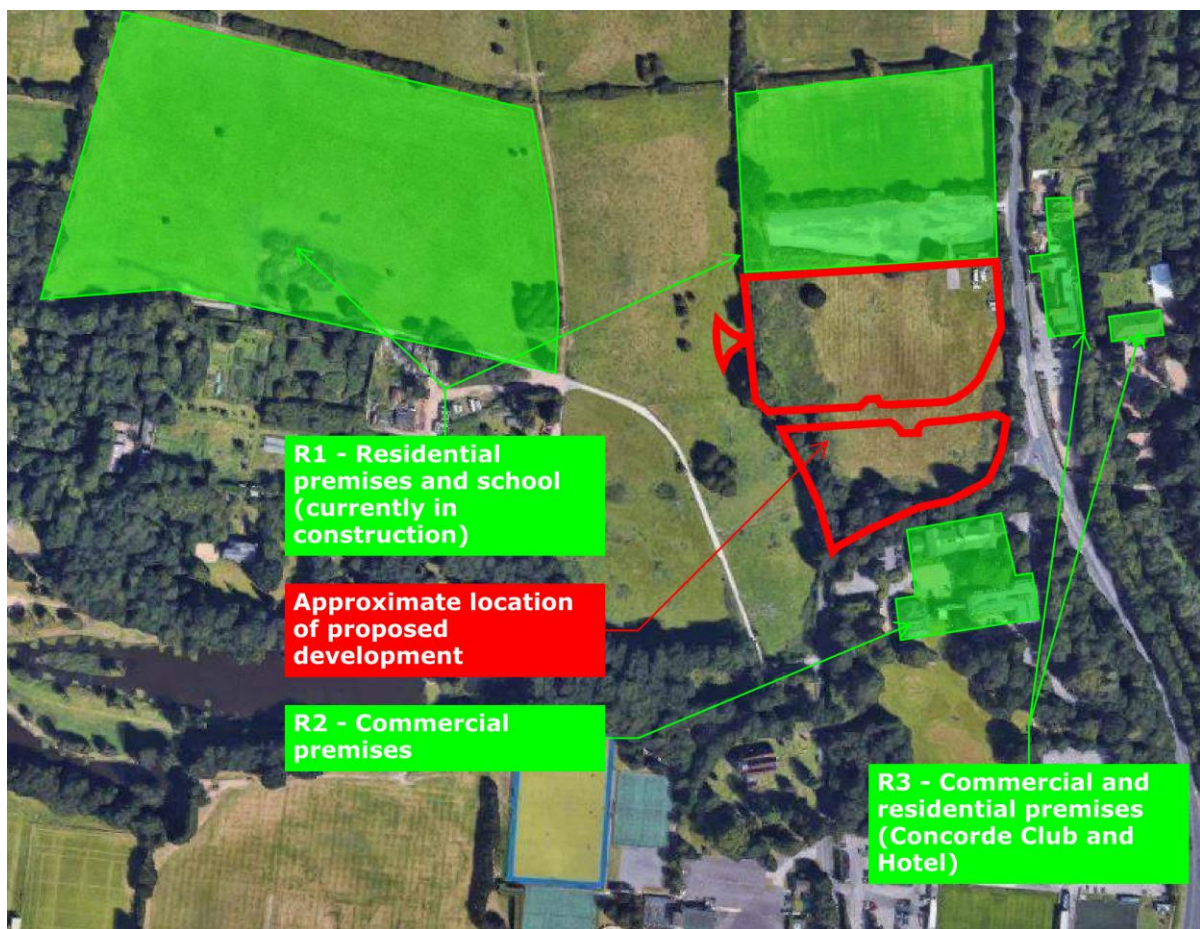


Figure 3.1 Nearest Noise Sensitive Receptors

The NSRs are listed below:

- **R1:** Phase 1 Residential Receptors, future residential receptors and school currently under construction, to the north of the development site;
- **R2:** Commercial Premises (offices) on Stoneham Place, south of the development site;
- **R3:** Commercial and Residential Premises (Concorde Club and Hotel), east of the development site, on the other side of Stoneham Lane.

4. LEGISLATION AND POLICY FRAMEWORK

4.1 National Planning Policy Framework (2018)

The National Planning Policy Framework (NPPF)¹ adopted in 2018 in England outlines the Government's planning policies and requirements for the planning system. The NPPF forms a material consideration in planning decisions and hence, must be complied with for planning permission to be granted.

Regarding noise, the NPPF states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

Hence the planning system should seek to:

- mitigate and reduce to a minimum, potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; and
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

To achieve these aims the NPPF refers to the Noise Policy Statement for England 2010.

4.2 Noise Policy Statement for England (2010)

The Noise Policy Statement for England (NPSE)² sets out the long-term vision of Government noise policy: 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.

The NPSE outlines the following three aims for the effective management and control of environmental, neighbour and neighbourhood noise:

- Avoid significant adverse effects on health and quality of life;
- Mitigate and minimise adverse effects on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life.

The guidance states that it is not possible to have a single objective noise-based measure that defines "Significant Observed Adverse Effect Level (SOAEL)" that is applicable to all sources of noise in all situations and that not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

4.3 Planning Practice Guidance – Noise

In March 2014, the Department for Communities and Local Government (DCLG) released its Planning Practice Guidance – Noise (PPG-Noise)³ web-based resource to support the NPPF. The guidance advises that local planning authorities' should consider:

- *"Whether or not a significant adverse effect is occurring or likely to occur;*
- *Whether or not an adverse effect is occurring or likely to occur; and*
- *Whether or not a good standard of amenity can be achieved."*

¹ Department for Communities and Local Government, 2018. National Planning Policy Framework. HMSO.

² Department of Environment, Food and Rural Affairs, 2010. Noise Policy Statement for England.

³ GOV.UK. 2018. Noise. [ONLINE] Available at: <https://www.gov.uk/guidance/noise--2>. [Accessed 31 August 2018].

PPG-Noise introduces the additional concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). Full details of the Planning Practice Guidance on effects are provided in Table 4.1.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 4.1 Planning Policy Guidance

Factors to be considered in determining if noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts.

4.4 Professional Practice Guidance on Planning and Noise (ProPG), 2017

ProPG⁴ considers new residential development that will be exposed predominantly to airborne noise from transport sources. The preparation of this guidance was overseen by a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of mental Health (CIEH), together with practitioners from a planning and local authority background.

This guidance has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. It takes into account the guidance on the control and mitigation of noise detailed in the NPPF (2012) and the NPSE and presents them in one overall document. It also provides further clarification and

⁴ Institute of Acoustics. 2018. ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development. [ONLINE] Available at: <https://www.ioa.org.uk/sites/default/files/14720%20ProPG%20Main%20Document.pdf>. [Accessed 31 August 2018].

guidance for appropriate noise levels and suitable design, such as proposing suitable maximum noise levels in bedrooms at night.

The guideline criteria for internal ambient noise levels are consistent with BS8233:2014:

- 35 dB $L_{Aeq,16hour}$ in living rooms;
- 30 dB $L_{Aeq,8hour}$ in bedrooms; and
- 45 dB L_{AFmax} should not normally be exceeded 10-15 times a night in bedrooms.

The adopted significance threshold for noise in external amenity spaces is the 55 dB $L_{Aeq,16hr}$ upper guideline level from BS 8233:2014.

ProPG Stage 2: Element 3 – External Amenity Area Noise Assessment, states the following:

"3(v) Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to: a relatively quiet façade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance)."

4.5 Calculation of Road Traffic Noise (CRTN)

CRTN⁵ (Department of Environment, 1988) sets out standard procedures for calculating noise levels from road traffic. The calculation method uses a number of input variables, including traffic flow volume, average vehicle speed and percentage of heavy goods vehicles (HGVs), to predict the $L_{A10,18hour}$ or $L_{A10,1hour}$ noise level for any receptor point at a given distance from the road.

4.6 British Standards BS4142:2014 – 'Methodology for rating and assessing industrial and commercial sound'

BS4142:2014 – *Method for rating and assessing industrial and commercial sound*⁶ provides a method for assessing the significance of noise emissions from industrial and/or commercial sound source.

The significance of industrial and commercial sound is assessed based on the difference between the rating level resulting from plant operation measured or predicted at the nearest noise sensitive premises, and the existing background noise level in the area, as determined by a noise survey. BS 4142 states:

- "a) Typically, the greater this difference, the greater the magnitude of the impact.*
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.*

⁵ Department of Transport and the Welsh Office, 1988. Calculation of Road Traffic Noise, DoT & Welsh Office.

⁶ British Standards Institute, 2014. British Standard 4142: Method for rating and assessing industrial and commercial sound. BSI.

Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

e) A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value.”

BS4142 also sets out the following rating penalties based on the characteristics of the noise source:

- Tonality: up to 6 dB rating penalty applicable depending on its perception;
- Impulsivity: up to 9 dB rating penalty applicable depending on its perception;
- Intermittency: a 3 dB penalty is applicable; and
- Other sound characteristics: a 3 dB penalty applicable for readily distinctive sound feature characteristics that are neither tonal or impulsive.

4.7 British Standard 8233:2014 – ‘Sound insulation and noise reduction for buildings – Codes of Practice’

For residential parts of the proposed development, it is proposed to adopt the limits for internal noise level as set out in BS8233:2014⁷. This guidance recommends that for resting/sleeping conditions in living rooms and bedrooms, the internal noise levels should not exceed 35 dB $L_{Aeq,16hour}$ and 30 dB $L_{Aeq,8hour}$ for daytime and night time respectively. To ensure that noise intrusion is sufficiently controlled, and given that the nature of the noise emissions from traffic can feature high individual noise levels during night time periods, an internal noise level target of 45 dB L_{AFmax} will also be adopted (not to be exceeded more than 10 times per night in line with WHO Guidelines⁸ and ProPG).

Table 4.2 summarises the limits that would apply to non-residential parts of the development.

Location	Design limit $L_{Aeq,T}$ (dB)
Kitchens	50
Café, Reception, Gym, Retail, Offices	40
Conference Rooms	35

Table 4.2 Indoor Ambient Noise Level Criteria for non-residential buildings

BS 8233:2014 suggests that it is desirable for the steady noise level within external residential amenity areas to not exceed 50 $L_{Aeq,T}$ dB with an upper guideline value of 55 $L_{Aeq,T}$ dB which would be acceptable in noisier environments. Exceedance of the 50 dB(A) external criterion would typically be regarded as a moderate adverse effect, whilst the exceedance of the 55 dB(A) external criterion would typically be regarded as a major adverse effect.

4.8 World Health Organisation Guidelines 1999

The World Health Organisation (WHO) published its Guidelines for Community Noise in 1999⁹. The document sets out guidance on appropriate noise levels for different scenarios to ensure that communities are not subjected to unacceptable levels of noise. It should be noted that the WHO guidelines, although widely referenced in UK, have no legal status. An extract of the relevant noise levels is presented in Table 4.3.

⁷ British Standards Institute, 2014. British Standard 8233: Guidance on sound insulation and noise reduction for buildings. BSI.

⁸ World Health Organisation: 1999 Guidelines for Community Noise.

⁹ World Health Organisation, 1999. WHO Guidelines for Community Noise. WHO 1999

Specific Environment	Critical Health Effect(s)	L _{Aeq} dB	Time Base (hrs)	L _{AFmax} dB
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Table 4.3 WHO Guidelines Criteria

4.9 World Health Organisation Night Noise Guidelines for Europe 2009

The WHO Regional Office for Europe set up a working group of experts to provide scientific advice¹⁰ to the Member States for the development of future legislation and policy action in the area of assessment and control of night noise exposure. The working group reviewed available scientific evidence on the health effects of night noise, and derived health-based guideline values. In December 2006, the working group and stakeholders from industry, government and nongovernmental organizations reviewed and reached general agreement on the guideline values and key texts for the final document of the Night noise guidelines for Europe.

Although these guidelines are neither standards nor legally binding criteria, they are designed to offer guidance in reducing the health impacts of night noise based on expert evaluation of scientific evidence in Europe.

5. METHODOLOGY

5.1 Baseline Noise Surveys

Noise surveys have been undertaken by Ramboll to establish existing baseline noise conditions at the application site. The assessment has been undertaken based on these baseline measurements.

5.1.1 Measurement Details

Short-term and long-term measurements were undertaken around the application site between 11 and 17 October 2018. All measurements were undertaken in line with BS7445-1:1997.

Unattended measurements were conducted during daytime and night-time periods using noise data loggers positioned at locations LT1 and LT2:

- **LT1** – undertaken on the western boundary of the 'Old Mansion Site' (representative of noise levels affecting R1);
- **LT2** – undertaken at the eastern boundary of the proposed development site, adjacent to Stoneham Lane (representative of noise levels affecting R2 and R3).

Attended measurements were undertaken during daytime period at location ST1, on the southern boundary of the development site.

The measurement positions along with a summary of the results are shown in Figure 5.1.

¹⁰ World Health Organisation, 2009. Night Noise Guidelines for Europe. WHO 2009

5.1.2 Measurement Equipment

Attended and unattended noise measurements were carried out using the following equipment:

- | | | |
|------|---------------------------------------|---|
| i. | 01dB DUO Class 1 Sound Level Meter | Serial no. 10500 (sensor serial 144989) |
| ii. | 01dB CUBE Class 1 Sound Level Meter | Serial no. 10694 (sensor serial 224223) |
| iii. | 01dB FUSION Class 1 Sound Level Meter | Serial no. 10325 (sensor serial 207533) |
| iv. | 01dB CAL21 Calibrator | |
| v. | Microphone booms | |

The calibration of SLM was checked before and after the measurements were taken and no significant drift was observed. All equipment owned or hired by Ramboll is subject to frequent calibration checks traceable to national standards. Calibration certificates for the survey equipment are available upon request.

5.1.3 Weather Conditions

During deployment of the noise logging kits, the wind speed was 4.5 m/s from a southerly direction, with no precipitation and moderate cloud cover.

During collection of the noise logging kits, the wind speed was 1 m/s from a northerly direction with some light drizzle.

There were periods of light rain noted on 11-14 and 17 October 2018, however these were short in duration and are not considered to have significantly affected the measured noise levels. Wind speeds were generally below 5 m/s, with some periods of high wind (above 5 m/s) noted on 11-14 October 2018.

5.1.4 Measurement results

Time history graphs of the measurements at locations LT1 and LT2 are shown on Figure 5.2 and Figure 5.3 respectively.



Figure 5.1 Measurement Positions and Results Summary

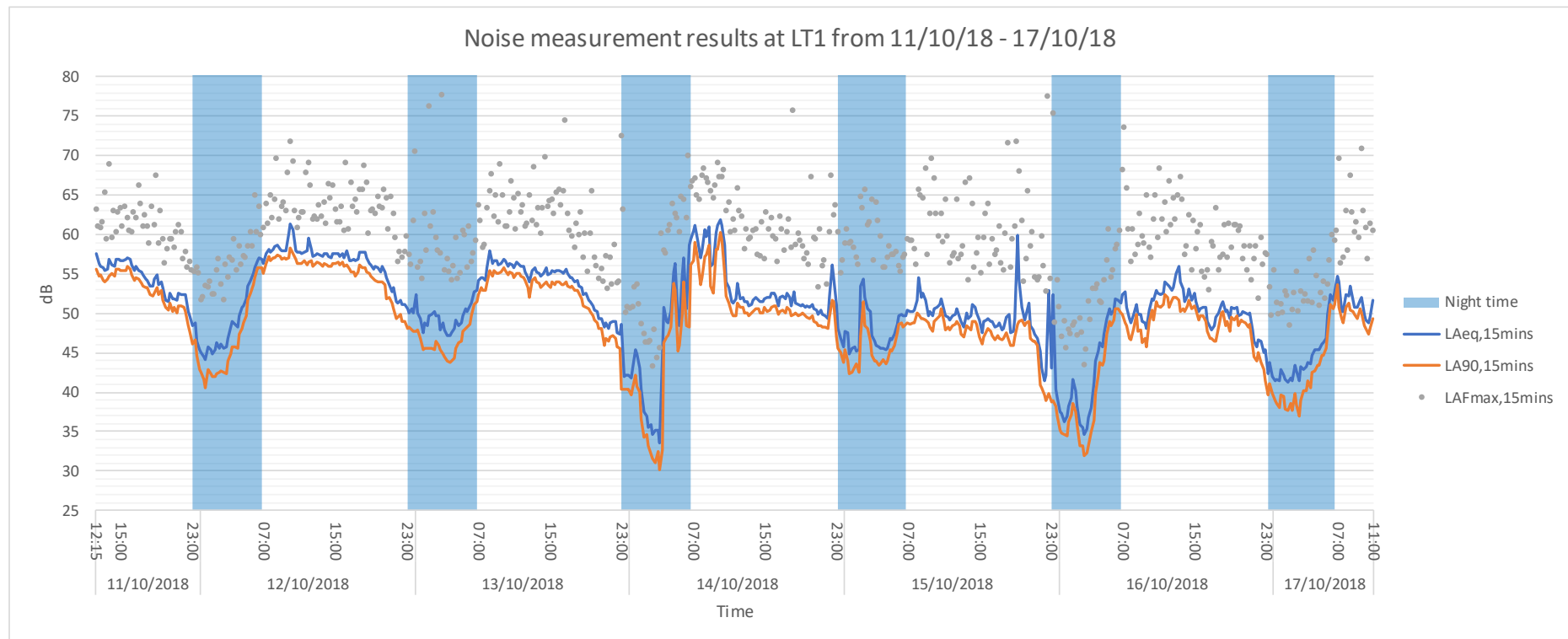


Figure 5.2 Time History of Unattended Measurements at LT1

The noise climate at location LT1 was dominated by traffic noise from the M3 and M27 motorways. Ambient noise levels varied between 42-62 dB $L_{Aeq,15mins}$ during daytime (07:00-23:00), and between 34-60 dB $L_{Aeq,15mins}$ during night time (23:00-07:00). The higher noise levels measured on in the morning of Sunday 14th October are likely due to lawn maintenance equipment (e.g. mowers) from the Stoneham golf course. No significant difference between weekday and weekend noise levels can be seen on Figure 5.2.

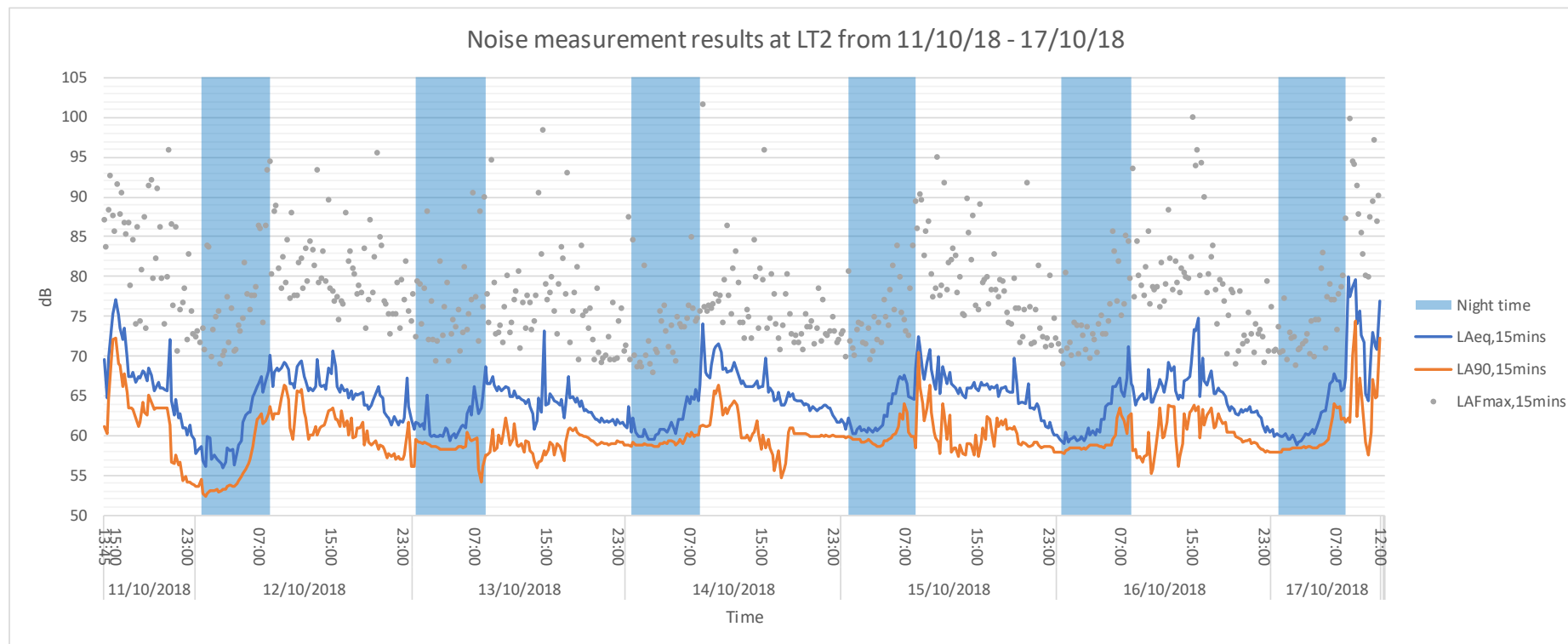


Figure 5.3 Time History of Unattended Measurements at LT2

The noise climate at location LT2 was dominated by traffic noise from Stoneham Lane, and some construction noise from the roadworks on the new access road, adjacent to the site. Some noise from the M27 and M3 motorways was also audible. Ambient noise levels varied between 60-80 dB $L_{Aeq,15mins}$ during daytime, and 56-68 dB $L_{Aeq,15mins}$ during night time. With reference to the time history graph, the 80 dB $L_{Aeq,15mins}$ only occurs during the morning of the 17th October and is considered to be due to construction noise – this level has therefore not been used in the assessment. Evening and night time construction works were undertaken on Friday 13th and Saturday 14th October. No increase in noise levels can be seen on the time history graph for this period (Figure 5.3), therefore it is considered that the construction works had a minimal impact on the measurement results.

5.1.5 Measurement Parameters

A comprehensive suite of noise level metrics was recorded. The following noise level indices are relevant to this assessment:

- $L_{Aeq,T}$ The A-weighted equivalent continuous noise level over the measurement period;
- $L_{A90,T}$ The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise; and
- L_{AFmax} The A-weighted maximum noise level with a fast time-weighting.

5.2 Completed Development Assessment

5.2.1 Plant Noise Emissions

The type, quantity and location of fixed mechanical and electrical (M&E) plant associated with the proposed development has not been finalised at this stage in the design. Plant noise emission limits have been set to be equal to the representative measured background noise level (as established during the survey). If the limits are achieved, then no adverse effect on the surrounding noise sensitive receptors is expected.

5.2.2 Environmental Noise Modelling

Noise levels at the application site have been predicted using CadnaA noise modelling software. This software utilises standard acoustic principles in conjunction with approved prediction methodologies and is an industry standard method for predicting and assessing the impact of noise from a variety of sources.

2017 Prediction Methodology

In order to establish how the future road traffic noise would affect the proposed development, a noise prediction model was constructed. The model considered noise from Chestnut Avenue, Stoneham Lane and the M3 and M27 Motorways, which were expected to contribute to the noise climate on the development site. Specific site ground topography, ground absorption and attenuation afforded by the foliage were all taken into account.

The predictions of road traffic noise were made according to the method presented in Calculation of Road Traffic Noise (CRTN)¹¹. Sound attenuation effects afforded by foliage were calculated separately according to ISO 9613-2 *Acoustics – Attenuation of sound during propagation outdoors - Part 2 General method of calculation*. The effects of foliage attenuation were calculated as a noise level difference map within the study area, between situation with and without foliage in the propagation model. The level difference map of foliage effects used line sources with relative noise emission between individual road links corresponding to noise emissions calculated in accordance with CRTN. The foliage difference map was applied to the road traffic noise contour map.

The noise levels measured during the baseline noise survey undertaken in July 2014 (ref. 61033023/NV/R01) were used to validate the noise propagation model. Following the noise survey in 2014, a new road surface was introduced on the Motorway links surrounding the application sites. The new road surface altered the noise emissions from road traffic. Therefore, an additional noise survey was carried out in June 2017 to determine the road noise emissions.

Adjustments within the noise propagation model were made to the road surface texture depth, a parameter that affects noise level emissions in the Calculation of Road Traffic Noise (CRTN) method. The surface correction applied to the noise emissions is between -4 dB on the M3 to M27

¹¹ Calculation of Road Traffic Noise, Department of Transport, Welsh Office, HSMO, London, 1988.

westbound slip road, to -8 dB on other Motorway links. The calibration of road traffic noise emissions was made at five noise monitoring locations in proximity to the road links and in proximity to Parcel 1A within Phase 2.

The predicted noise levels at the monitoring locations were within +1 dB margin of the measured noise levels in the baseline year without the development.

2018 Updated Prediction Methodology

The measured noise levels during the 2018 baseline noise survey have been used to further validate the noise model. The predicted noise levels at the monitoring locations are still within +1 dB margin of the measured noise levels in the 2018 baseline year without the development.

The daytime ambient $L_{Aeq,16h}$ values resulting from the road traffic have been derived by subtracting 2 dB from the predicted $L_{A10,18h}$ values, in line with the difference observed in the measured noise levels within the development site.

Internal noise levels have been calculated based on the predicted free-field noise levels at the location of the proposed buildings, and taking into account the octave band acoustic frequency data measured during the survey undertaken in 2018. Calculations of internal noise levels have been made in accordance with the methodology in BS 8233:2014.

General modelling parameters

The noise propagation model includes topography from a LiDAR survey covering the study area, including the development site and adjacent road links.

Ground absorption $G=1$ for soft ground has been used in the model.

Building heights have been specified according to the Building Elevations drawings provided by HGP Architects.

The results of the calculations have been used to specify suitable façade, glazing and ventilation strategies for compliance with the internal noise level criteria. Provided these strategies are implemented, the internal noise limits will be achieved, resulting in no adverse effect on the users of the building.

5.2.3 Traffic Data Details

The opening year considered for this assessment is 2025, when all the land within the application site is developed.

The daytime and night-time traffic flows for the opening year 2025 have been provided by Paul Basham Associates and are detailed in Table 5.1. This traffic data includes the proposed development, other committed developments, and a new link through the proposed development. The links described in Table 2 can be seen in Appendix 3.

Link ID	Daytime traffic flows (AAWT)		Night-time traffic flows (AAWT)		Daytime-night time noise level difference (dB)*	% HGVs	Speed [km/h]
	6-24h	7-23h	23-7h	24-6h			
M1	65,039	62,049	5044	2,054	11	8	112
M2	63,129	59,962	4880	1,713	11	8	112
M3	27,597	26,653	2177	1,233	11	9	112

Link ID	Daytime traffic flows (AAWT)		Night-time traffic flows (AAWT)		Daytime-night time noise level difference (dB)*	% HGVs	Speed [km/h]
	6-24h	7-23h	23-7h	24-6h			
M4	26,142	24,926	2027	810	11	10	112
M5	76,281	73,733	6187	3,638	11	9	112
M6	35,840	34,125	2789	1,074	11	8	112
M7	41,453	39,538	3327	1,412	11	10	112
M8	70,385	13,604	1122	546	11	11	112
M9	73,800	14,532	1206	425	11	9	112
M10	14,181	71,118	5754	1,908	11	4	112
M11	15,313	71,285	5741	2,333	11	5	112
M12	74,964	14,613	1300	602	11	7	112
M13	74,693	40,257	3299	1,779	11	7	112
M14	15,311	33,476	2888	1,859	11	11	112
M16	41,777	35,037	2853	903	11	7	112
M17	34,504	62,049	5044	2,054	11	10	112
M18	37,442	59,962	4880	1,713	11	7	112
M19	36,987	26,653	2177	1,233	11	7	112
A1	22,735	21,643	1,477	385	12	3	48
A2	20,858	19,864	1,354	360	12	3	48
A3	28,871	27,495	1,874	498	12	4	48
A4	32,427	30,843	2,113	530	12	3	64
A5	6,118	5,824	398	104	12	3	48

Table 5.1 Traffic Flows and Details for Opening Year 2025

* The noise level difference was calculated as: $10 \cdot \log_{10}(\text{day 7-23h} / \text{night 23-7h flows})$

The traffic flows shown in Table 5.1 show that the noise level difference between daytime and night-time traffic flows is around 11 dB or more. Given that the criteria for internal noise level in bedrooms is 5 dB more stringent during daytime than during night-time, the assessment concentrates on the internal noise levels in bedroom during daytime, as this presents the worst-case scenario. Any glazing and ventilation specification which satisfies the internal noise level criteria within the development during daytime will also satisfy the internal noise level criteria during night-time.

6. ASSESSMENT RESULTS

6.1 Plant Noise Emission Limits

Plant noise emission limits have been set at the nearest NSRs based on the methodology set out in BS4142:2014 and baseline background noise levels measured at LT1 and LT2. In order to achieve a 'Low Impact' (as defined in BS4142:2014), the Rating Level should not exceed the representative Background Levels at the NSRs. Comparative statistical analysis of the measured $L_{A90,15\text{mins}}$ levels during each period has been undertaken to determine representative background levels at each NSR. The proposed limits are shown in Table 6.1 below. These would normally be secured by an appropriately worded planning condition.

Noise sensitive receptor considered (based on measurement location)	Daytime (07:00-23:00)		Night time (23:00-07:00)	
	Representative Background Level, L_{A90} (dB)	Maximum plant Rating Level at NSR, $L_{Ar,T}^*$	Representative Background Level, L_{A90} (dB)	Maximum plant Rating Level at NSR, $L_{Ar,T}^*$
R1 (LT1)	49	49	40	40
R2 (LT2)	63	63	58	58
R3 (LT2)	63	63	58	58

* including all relevant penalties for tonality, intermittency, and impulsivity

Table 6.1 Proposed Plant Noise Emissions Limits

The proposed limits are achievable with careful plant selection and the use of standard mitigation measures (including duct attenuators, and plant screens if required).

With the implementation of the proposed limits, plant noise emissions from the development are expected to result in no significant impact of the NSRs.

6.2 Environmental Noise Break-in

6.2.1 Modelled Sound Levels

Figure 6.1 shows the predicted façade incident noise levels for the proposed development during daytime, along with noise levels in external amenity areas.

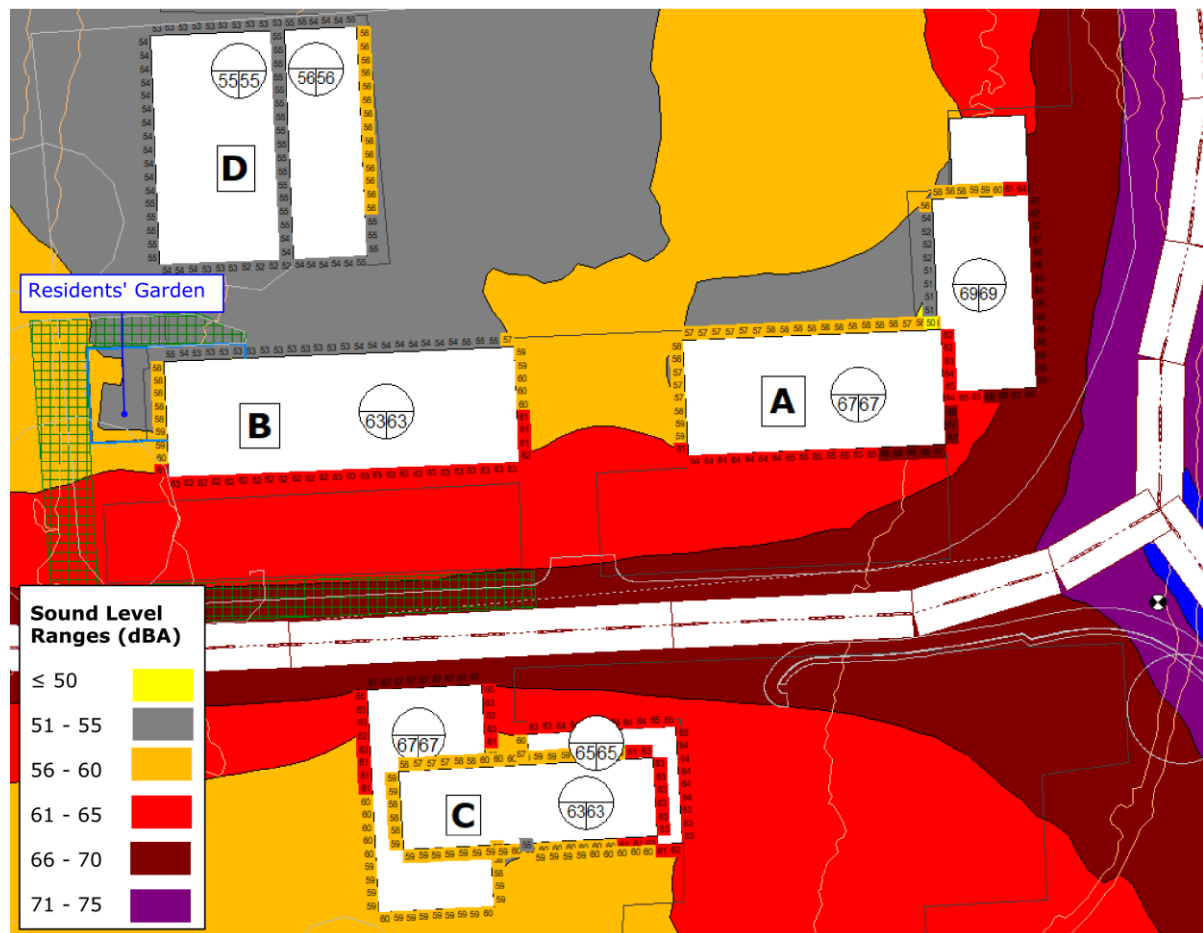


Figure 6.1 Predicted Façade Incident Noise Levels (Daytime)

6.2.2 Façade Sound Insulation Strategy

To achieve the required level of sound reduction for each façade, glazing and cladding specifications have been recommended to achieve the appropriate minimum performance standards for internal noise levels.

Table 6.2 outlines the potential façade performance standards which would be suitable to achieve the required level of attenuation, rationalised to provide four different façade treatments.

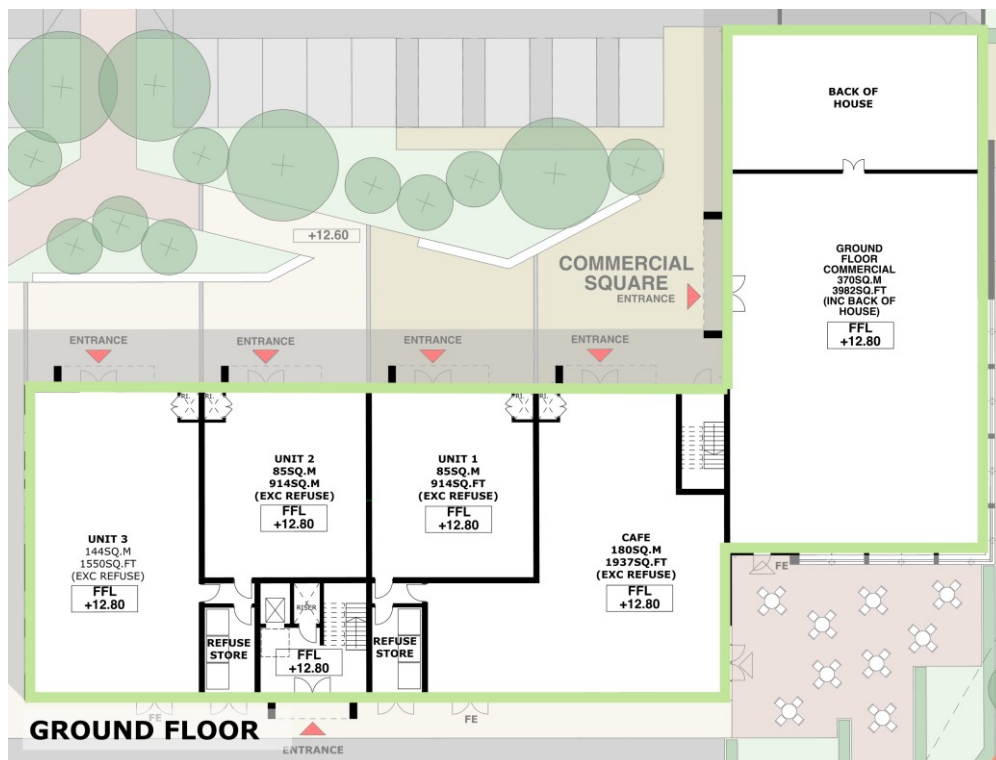
Nominal cladding attenuation $R_w + C_{tr}$ (dB)	Minimum glazing attenuation $R_w + C_{tr}$ (dB)	Recommended minimum ventilation requirements		
		Residential	Commercial/ Retail	Community/ Education
55	30	Standard Trickle Vents	Opening Windows	Cross/roof natural ventilation
55	33	$D_{ne,w}$ 36 dB Acoustic Trickle Vents	$D_{ne,w}$ 40 Attenuated vent (assuming opening area no greater than 1m ² per 10 m ² internal floor area)	
55	33	Mechanical Ventilation		
55	40	Mechanical Ventilation		

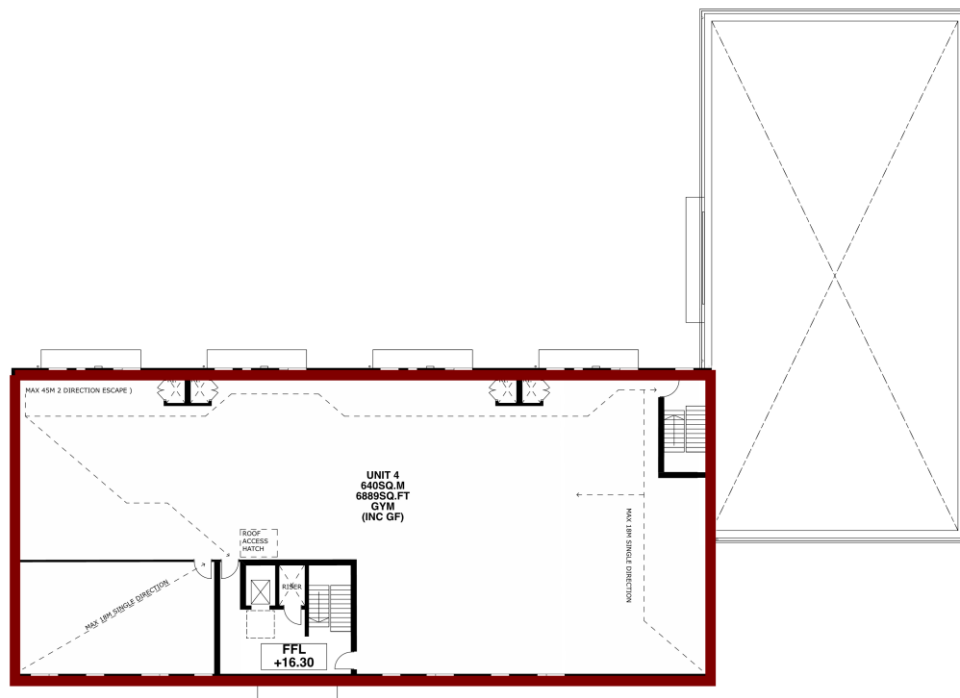
Table 6.2 Recommendations for sound insulation performance of building façade

During detailed design there may be a need to adjust the sound insulation performance for some areas to enable coordination with non-acoustic design issues. Therefore, these figures should be treated as minimum performance standards, not absolute performance requirements.

Based on the results of the modelling, and calculations of noise break-in, the façade acoustic design strategy has been applied to each elevation of the proposed development as shown in the following figures. The mark-ups are in accordance with the colours in Table 6.2.

Block A



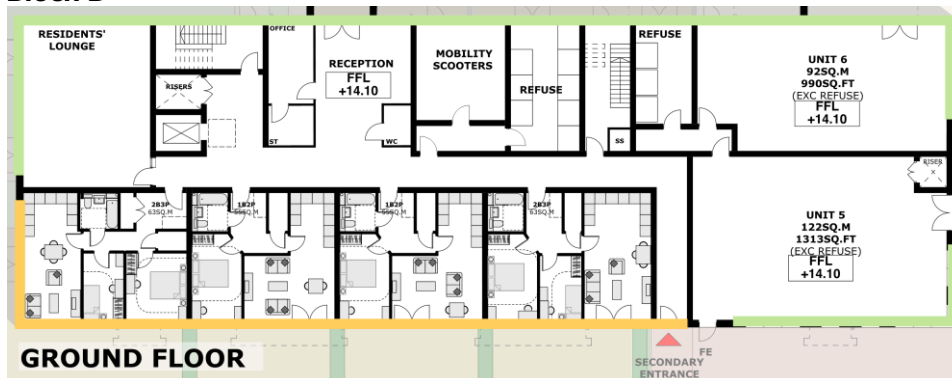


FIRST FLOOR

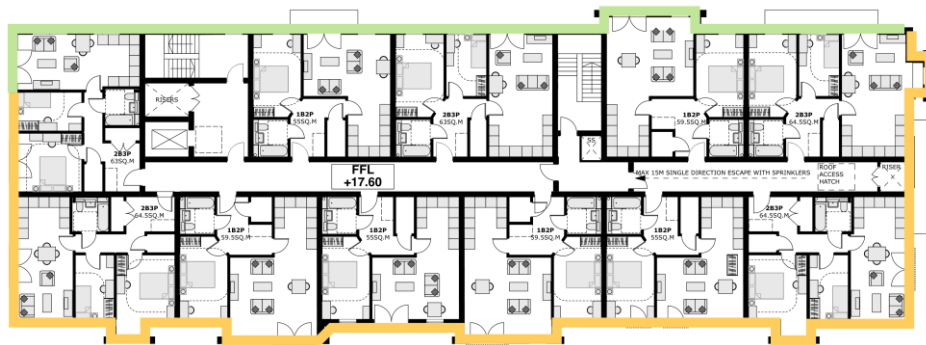
Figure 6.2 Façade Acoustic Design Strategy Block A

The above sound insulation strategy has also considered the potential for noise break-out from the gym, which often utilises high level music e.g. for spin classes. With a typical level of music within the gym of 95 dBA and the above recommended sound insulation strategy, then the resultant noise level outside Block A would be 55 dBA which is within the typical range of ambient noise levels already affecting the site.

Block B



GROUND FLOOR

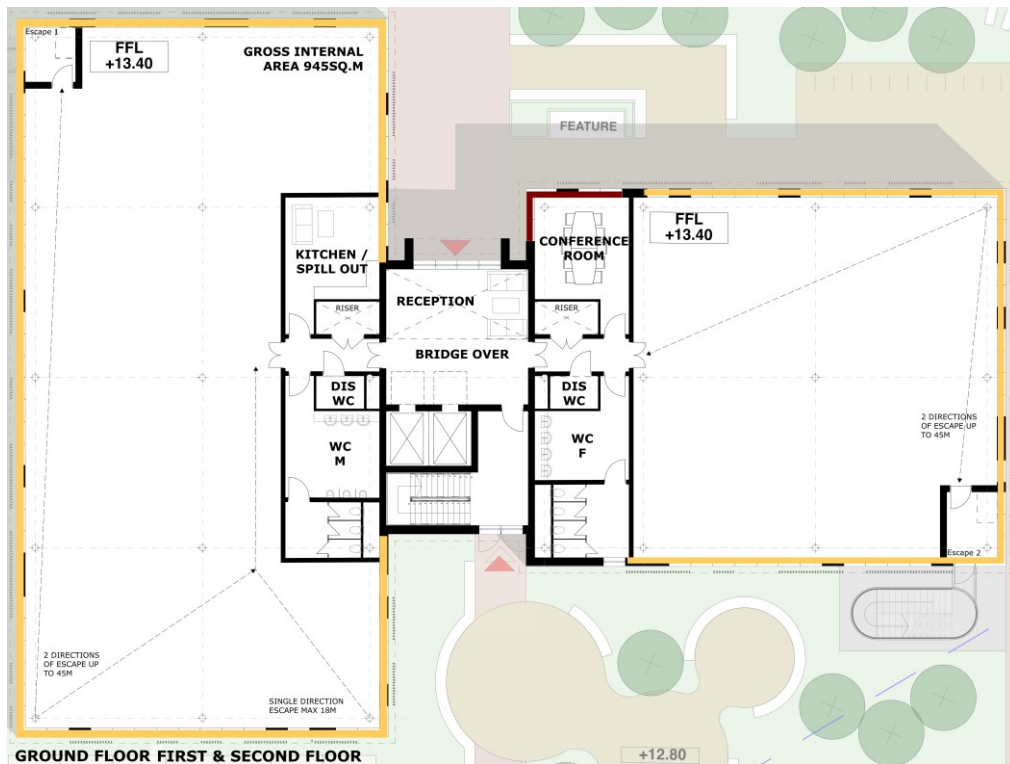


FIRST & SECOND FLOOR

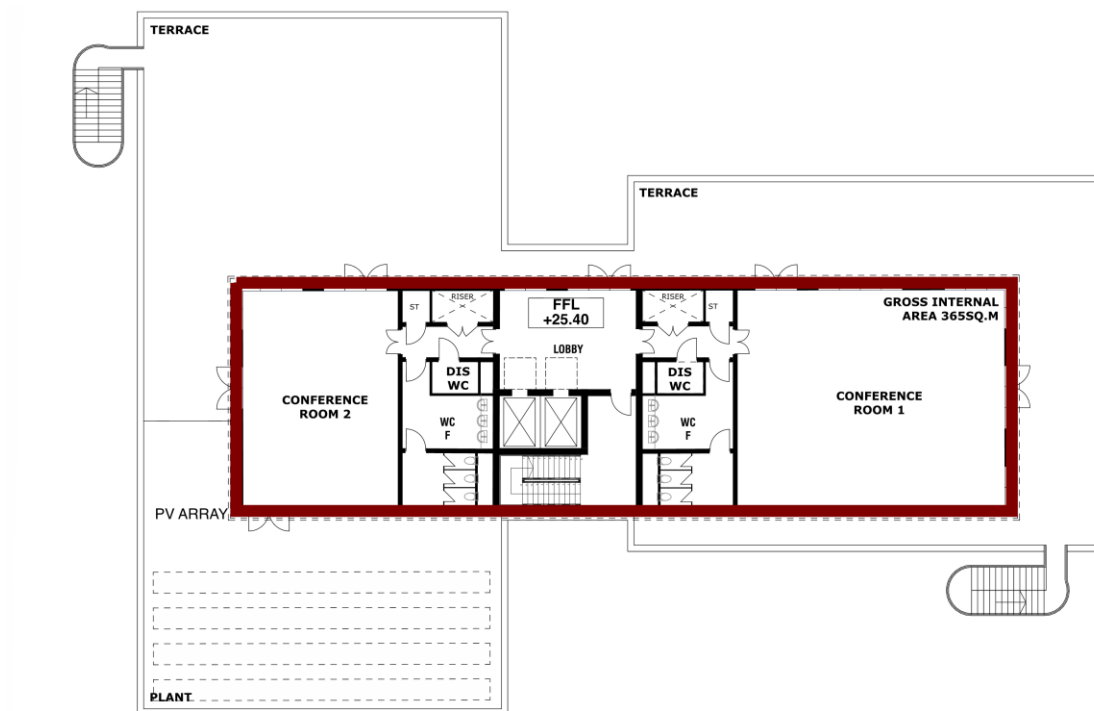
Figure 6.3 Façade Acoustic Design Strategy Block B

Should the building incorporate a Mechanical Ventilation strategy for baseline ventilation, then the minimum glazing specification above can be reduced to R_w 30 dB for the entire building.

Block C



GROUND FLOOR FIRST & SECOND FLOOR

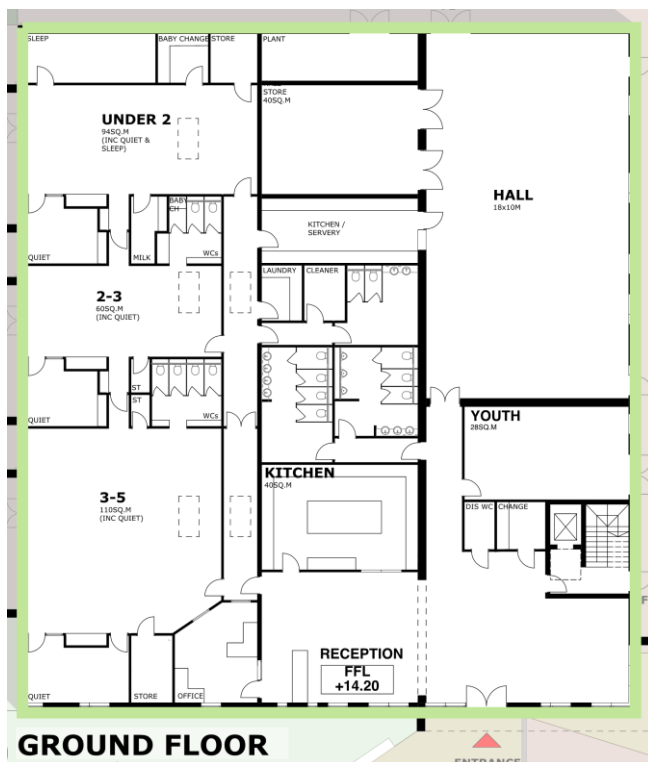


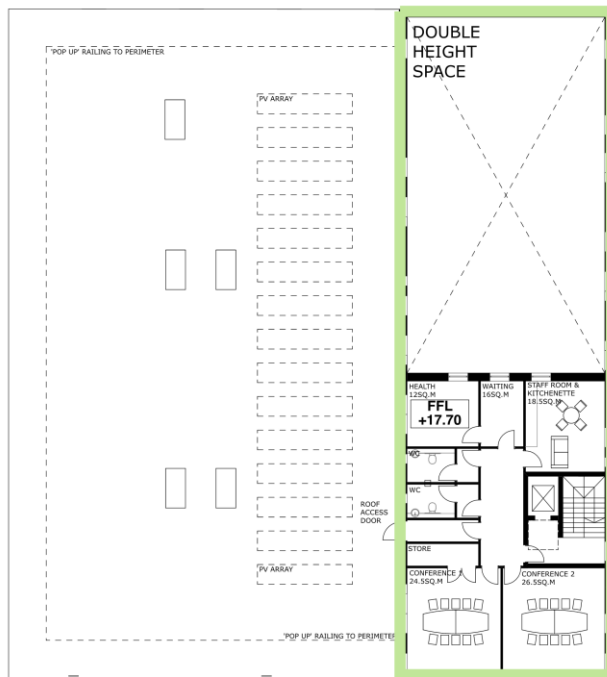
THIRD FLOOR

Figure 6.4 Façade Acoustic Design Strategy Block C

Should the building incorporate a Mechanical Ventilation strategy for baseline ventilation, then the glazing specification above can be reduced to R_w 30 dB for open plan office areas. However, the Conference Rooms should remain at R_w 40 dB.

Block D





FIRST FLOOR

Figure 6.5 Façade Acoustic Design Strategy Block D

With the application of the façade strategy shown in Figures 6.2-6.5, the internal ambient noise levels are predicted to meet the BS8233:2014 criteria.

6.3 Noise Levels in External Amenity Areas

A 2.1 metre close-board timber fence will be included to screen the Resident's Garden from the surrounding road traffic noise.

The model output in Figure 6.1 shows that the majority of the ground floor Resident's Garden for Block B will have noise levels below the BS8233 upper guideline noise level of 55 dB $L_{Aeq,16hr}$.

As such, the impact of environmental noise on external amenity areas would be predicted to be not significant.

7. DESIGN CONSTRAINTS FOR ADDITIONAL LAND PARCELS

It is understood that the proposed uses for the sites will be residential, as either care homes (CCRC Site) or individual houses (Old Mansion Site). Figure 7.1 and Figure 7.2 below show the extracts from the noise model for daytime noise levels at the Old Mansion Site and CCRC Site. With reference to the Stage 1 ProPG risk assessment, these levels are identified as 'Low Risk':

"At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development."

On this basis, Table 7.1 provides outline mitigation advice based on the predicted external levels. The locations of where such mitigation would be required is subject to detailed modelling and calculation, based on the final proposed layouts for these sites.

External noise level	Garden Fences / Screens required for external amenity	Minimum Glazing Attenuation $R_w + C_{tr}$ (dB)	Minimum Ventilation Attenuation $D_{ne,w} + C_{tr}$ (dB)
≤ 50	No	25	-
51 – 55	Recommended	25 – 30	30 – 34
56 – 60	Yes	30 – 35	34 – 38

Table 7.1 Outline mitigation advice based on external noise levels for additional land parcels

The measured night time noise levels at these sites are typically 11 dB lower than the predicted noise levels during daytime, therefore the above specifications are considered to be suitable to control external noise intrusion during both daytime and night time.

Old Mansion Site

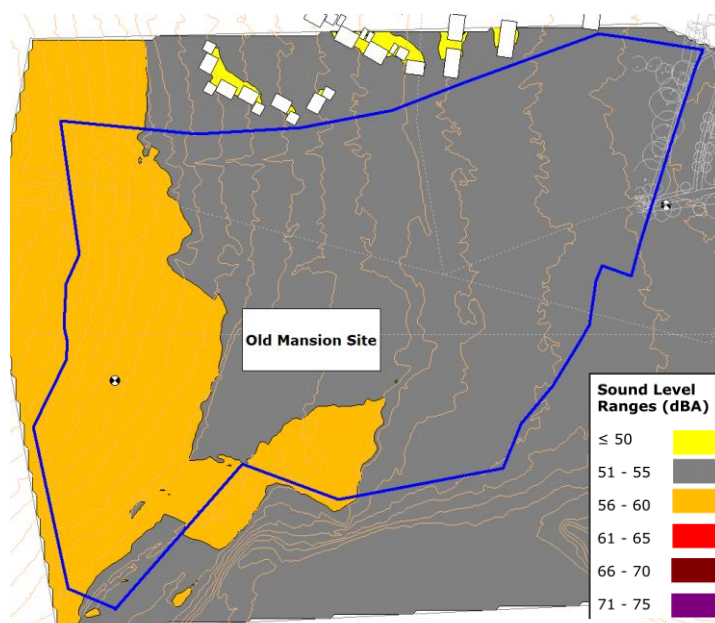


Figure 7.1 Daytime noise levels (Grid at 1.5 metres above local ground level) – Old Mansion Site

The above model output indicates that there should not be any major layout considerations for the site.

CCRC Site

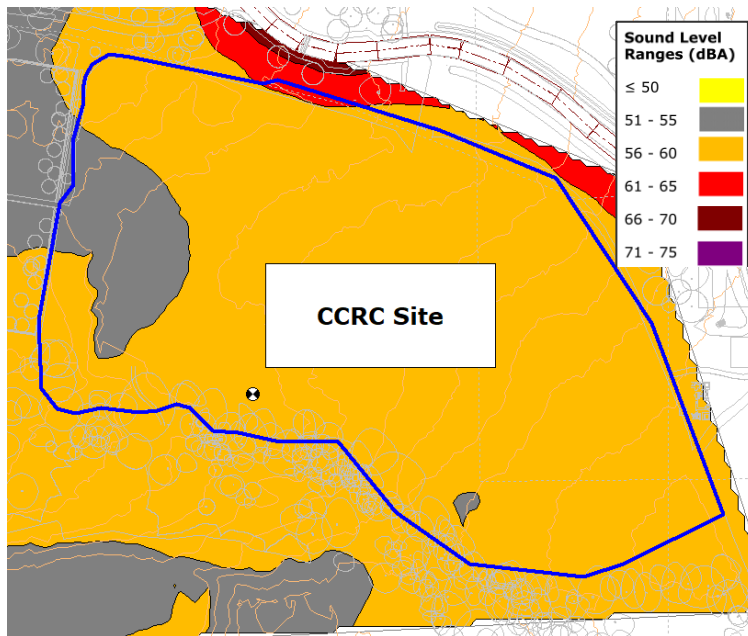


Figure 7.2 Daytime noise levels (Grid at 1.5 metres above local ground level) – CCRC Site

On the basis of the above model output, it is recommended that building massing is implemented close to the roads to provide screening to reduce noise levels in any external amenity areas behind.

8. CONCLUSIONS

Plant noise emission limits have been set to equal the representative background noise levels at the application site. It is considered that these limits can be achieved with the proposed plant equipment by including appropriate attenuation measures where required.

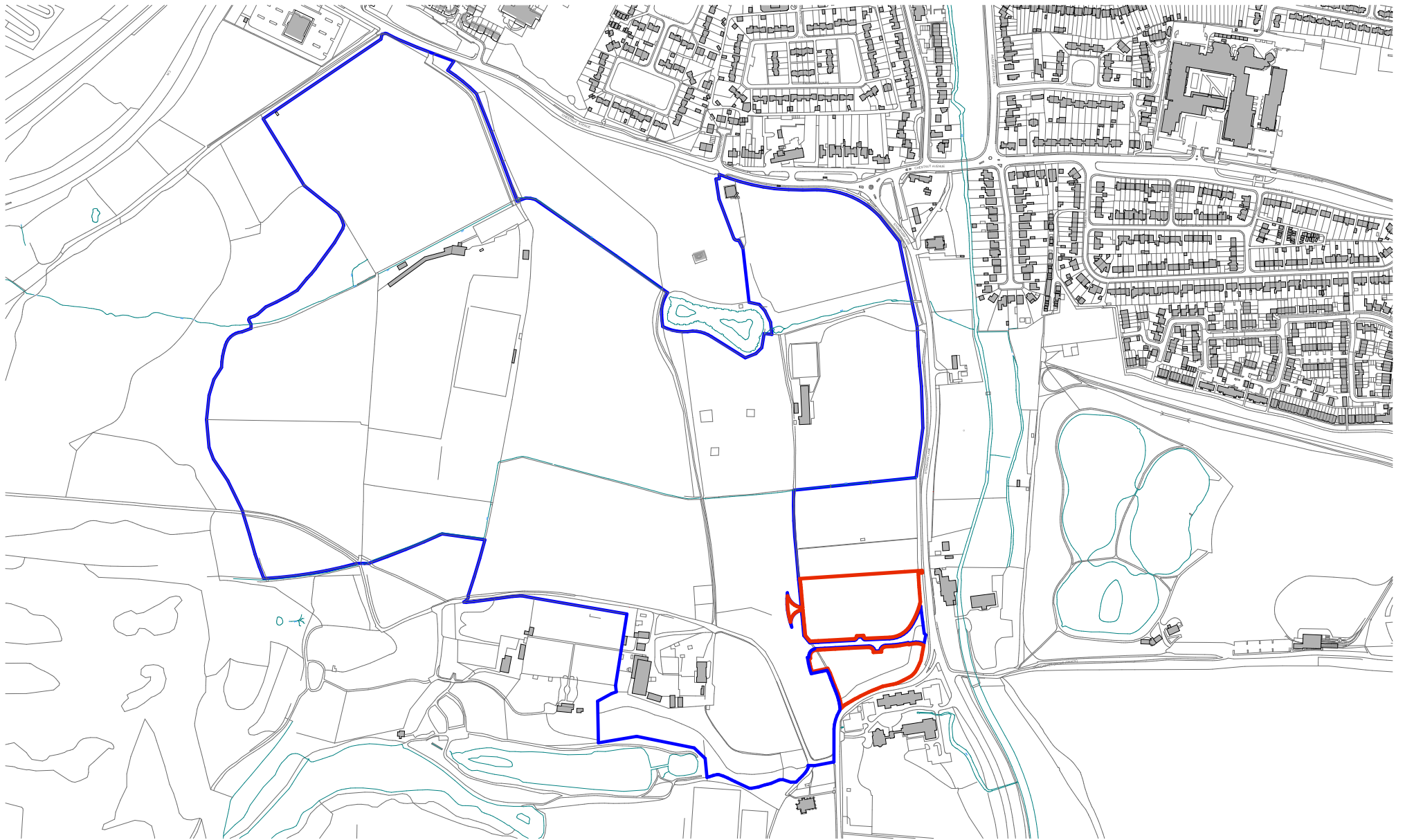
An assessment of the environmental noise break-in to the proposed development has been undertaken. The performance requirements for cladding, glazing and ventilation strategy have been calculated to meet internal ambient noise level criteria set out in BS 8233:2014.

By controlling plant noise emission to the specified receptors and providing building elements with the acoustic performance detailed in this report, the acoustic design will achieve the regulatory requirements and no significant adverse noise or vibration effects are predicted as a result.

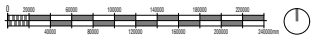
Outline design constraints for additional land parcels to the west of the application site have also been provided to inform future planning applications.

APPENDIX 1

DRAWING 17.005.100



- APPLICATION BOUNDARY
- APPLICANT OWNERSHIP



NOTES:
FOR PLANNING



LOCAL CENTRE, STONEHAM
LOCATION PLAN

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REVISIONS

1/1/250 WT

Scale Up To: 1:2500
Date: NOVEMBER 2018
Drawn By: WT
Checked By: CK
Drawing No: 17.005.100



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Check status on site.

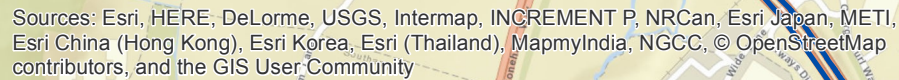
APPENDIX 2

DRAWING 17.005.201



APPENDIX 3

ROAD TRAFFIC LINKS



— Road links

Figure 5
Road links included in
traffic noise calculations

Site North Stoneham Park



HIGHWOOD
HIGHWOOD LAND LLP

Scale 1:12 000 @ A4

