

SHARPS REDMORE

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Report- draft

Phase 2 - Manor Farm, Elkesley, Retford

Environmental noise report and
acoustic design statement for
residential development

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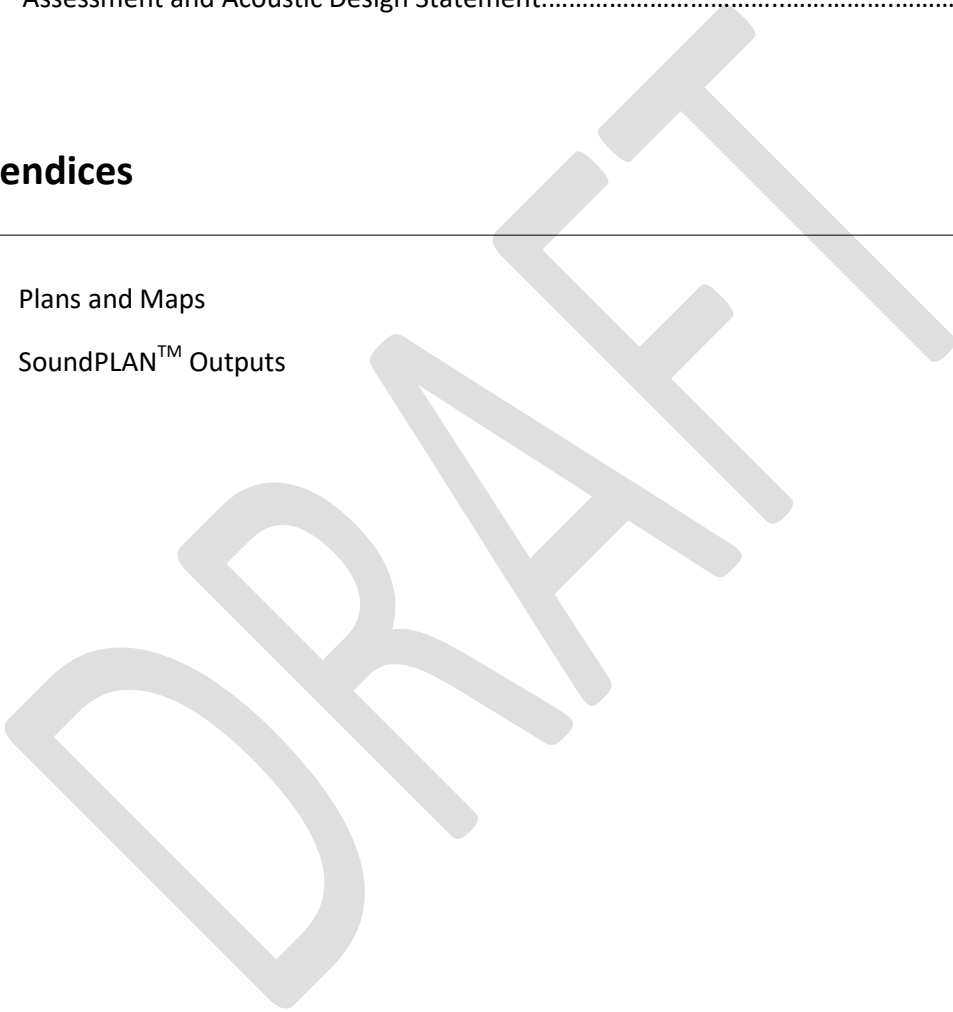


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This report has been prepared with all reasonable skill, care and diligence commensurate with an acoustic consultancy practice under the terms and brief agreed with our client at that time. Sharps Redmore provides no duty or responsibility whatsoever to any third party who relies upon its content, recommendations or conclusions.

1.0 Executive Summary

- 1.1 Sharps Redmore have been instructed by William Saunders to produce a noise assessment and acoustic design statement to accompany a planning application for a proposed residential development on a site off Twyford Lane, Elkesley adjacent the A1 (Worksop Road). This application is Phase 2 of a project which received planning permission in August 2018 (ref no. 18/00623/FUL)
- 1.2 This report details the extent to which the site is affected by existing environmental noise and makes recommendations with reference to BS 8233:2014 and World Health Organisation Guidelines for Community Noise against national and local policy aims.
- 1.3 Consideration has also been given to the Professional Practice Guidance on Planning and Noise (ProPG):2017 which was published in May 2017. It provides guidance on a recommended approach to the management of noise within the planning system and encourages acoustic design for new residential development particularly where new development is exposed to noise from transport sources.
- 1.4 Based on measured levels an initial noise risk assessment put the proposal in the Low-Medium category for the purposes of ProPG:2017.
- 1.5 An attended noise survey was carried out on site and the results compared to relevant criteria. Acceptable levels at external amenity spaces can be achieved with a good acoustic design in terms of layout and orientation.
- 1.6 Appropriate internal noise levels can be achieved (further to guidance within BS B8233:2014) using high quality acoustic glazing and alternative means of ventilation with appropriate acoustic performance, as set out. Specifications for these systems would need to be dealt with post grant of planning permission and incorporated into the building design.

2.0 Introduction

- 2.1 Sharps Redmore have been instructed by William Saunders to carry out an environmental noise assessment to assist with planning to develop 4 residential units including 2 conversions and 1 conversion/extension, as shown in indicative site plans in Appendix A (Figures A1 – A3).
- 2.2 The objective of the assessment is to consider the impact from environmental noise (primarily from road traffic at this site) on the proposed development. The study considers existing noise levels with reference to current national and local guidelines and, where appropriate, recommendations are made on mitigation options to ensure an acceptable noise environment for future residents.
- 2.3 The proposed development area, currently comprising farm buildings and gardens, is situated just south of the A1 (Worksop Road) at the north-eastern corner of Elkesley village surrounded by quiet residential roads. The site is dominated by road traffic noise from the nearby A-road with occasional aircraft audible from the nearby Retford (Gamston) airport and Flying School. The surrounding area is a mixture of rural farmland, villages and commercial units north of the A1.
- 2.4 Section 3.0 contains a discussion of the available methodology and assessment criteria.
- 2.5 Section 4.0 of this report contains details of the environmental noise survey and Section 5.0 contains the noise assessment.
- 2.6 Plans showing monitoring locations and indicative site plans are shown in Appendix A and predicted noise contours and mitigation schemes are found in Appendix B.

3.0 National Planning Policy and Guidance, Assessment Methodology and Criteria

National Policy

- 3.1 The National Planning Policy Framework (NPPF), revised in 2019, sets out the Government's economic, environmental and social planning policies for England and, in relation to noise (in paragraph 180), requires that:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative 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:

- a) 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;*
- b) 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 reinforces the March 2010 DEFRA publication, “Noise Policy Statement for England” (NPSE), which states three policy aims, as follows:

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

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

- 3.3 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

“... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such effects cannot occur.”

- 3.4 Paragraph 170 of the NPPF advises that the planning system should:

“...contribute to and enhance the natural and local environment by...preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of... noise pollution...”

NPPG

- 3.5 The “National Planning Practice Guidance note – Noise” was published online in March 2014. It reinforces the concepts discussed above and seeks to define a person's perception at different effect levels using the following definitions:

- NOEL (No Observable Effect Level);
- LOAEL (Lowest Observable Adverse Effect Level); and
- SOAEL (Significant Observable Adverse Effect Level)

- 3.6 It is notable that the NPPG describes the NOEL as “noise can be heard, but does not cause any change in behaviour or attitude”, whereas at a LOAEL “noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly...” The former is described as “noticeable and not intrusive” whereas the latter is described as “noticeable and intrusive”.
- 3.7 A “significant” effect is described as “noticeable and disruptive” resulting in “a material change in behaviour and/or attitude...”
- 3.8 The NPPG provides a hierarchy of planning actions required for different perceptions and effects of noise. Between LOAEL and SOAEL the recommended action is to mitigate noise and reduce to a minimum. At SOAEL the action recommended is to avoid. These are the same terms used in the NPPF and NPSE.
- 3.9 Therefore taking an overview of national policy it is clear that when considering the impact of noise one must consider the significance of any impact. The presence of an adverse impact in itself is not sufficient to refuse permission.

Alternative approaches for deriving specific criteria

- 3.10 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:
- i) The effect may be determined by reference to guideline noise values. British Standard (BS) 8233:2014 and World Health Organisation (WHO) “*Guidelines for Community Noise (CNG)*”¹ contain such guidelines.
 - ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.
 - iii) Another method is described within BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

Guideline noise values

- 3.11 Guidance for suitable internal and external noise levels is contained in BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'. BS 8233:2014 recommends the following. This recommends design to the standards shown in Table 3.1 below.

¹ WHO's updated document “Environmental Noise Guidelines” (published in 2018) recommends that all values not covered in the latest update (including indoor guideline values) should remain valid

Table 3.1: BS 8233 design recommendations for internal and external environments

Activity	Location	Period	
		Day (0700 to 2300 hours)	Night (2300 to 0700 hours)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16hr}$	
Sleeping	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$
Use of external amenity space	Outdoor areas such as gardens	50 dB, $L_{Aeq, 16 hr}$, with an upper guideline value of 55 dB $L_{Aeq, 16 hr}$ in higher noise areas.	-

- 3.12 Although not mentioned within BS 8233: 2014, the recommended guideline LOAEL value for peak levels within bedrooms at night (from the WHO Community Noise Guidelines 2000, which is still applicable, despite a general update of WHO advice in relation to external noise areas in 2018) is:

$$L_{Amax} = 45 \text{ dB}$$

- 3.13 This is considered a robust but balanced view in the context of current policy towards supporting residential development. These criteria have been discussed with a number of local authorities and have been considered robust design targets. Where a development is considered necessary or desirable, despite external noise levels above these guidelines, the internal targets may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

- 3.14 On external amenity areas, such as gardens and patios, 8233:2014 states:

“...it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

“Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

- 3.15 BS 8223:2014 therefore recognises that where design standards cannot be achieved for these external amenity areas (gardens and patios) then the ‘lowest practical levels’ should be achieved.

- 3.16 The Planning Practice Guidance on Noise, published on www.gov.uk/guidance/noise--2, gives further consideration relating to mitigating the impact of noise on residential developments and considers that noise may be partially off-set if residents of the dwellings have access to:
- A relatively quiet façade (containing windows to habitable rooms) as part of their dwelling;
 - A relatively quiet external amenity space for their sole use, (e.g. a garden or balcony) which is generally considered as desirable;
 - A relatively quiet, protected, nearby external space for use by a number of residents as part of the amenity of their dwellings, and/or;
 - A relatively quiet, protected, external, publicly accessible amenity space that is nearby (e.g. within a 5 minute walk).
- 3.17 The Professional Practice Guidance on Planning and Noise jointly published by the Institute of Acoustics, Chartered Institute of Environmental Health and Association of Noise Consultants in May 2017 (ProPG:2017) aims to provide guidance on a recommended approach to the management of noise within the planning system in England to run alongside and complement the NPPF and NPSE as outlined above.
- 3.18 ProPG:2017 considers two stages in its approach; Stage 1 is an initial noise risk assessment of the proposed development site and Stage 2 considers four key elements; Good acoustic design, internal noise level guidelines, external amenity noise levels and any other relevant issues.
- 3.19 This approach is considered within this report and a road traffic noise survey undertaken as an initial risk assessment, which considers noise impact on future residential occupiers. Further consideration has been given to acoustic design and layout together with reference to the relevant standards for internal noise environments and external amenity levels as outlined in 3.10 above.

4.0 Noise survey details

- 4.1 An environmental noise assessment was carried out on the 5th of March 2018 at position shown in Figure A1 in Appendix A. As the A1 (Worksop Road) was found to be the key noise source at the site, the measurement position was chosen 9m from the main road siding to observe and gather noise levels which were then extrapolated to the residential development proposed.
- 4.2 The maximum traffic levels inform the quality of glazing that will be required to the proposed dwellings and inform the best internal layout.
- 4.3 The instrument used to carry out the noise survey was a Brüel & Kjær 2236, Type 1 precision sound level meter (SLM).
- 4.4 The SLM was set to measure the following “A” weighted parameters: L_{Aeq} , L_{A10} , L_{A90} and L_{Amax} . The measurement sample period was generally 15 minutes. Immediately before and after the measurements were carried out, the SLM was calibrated using an acoustic calibrator and no drift was noted.
- 4.5 Measurements were made at 1.2 metres above ground level in a free field location.
- 4.6 The weather was suitable for the measurement of environmental noise during the survey.

Table 4.1: Noise measurement summary

Road Traffic Noise (RTN) survey results								
Time	Duration (min)	No. of Cars	No. of HGVs	Approximate speed (mph)	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
					dB			
14:45	15	524	214	50	79	88	83	69
15:10	15	598	230	50	80	90	83	72
16:01	15	612	224	50	80	90	84	71

- 4.7 Spot measurements informed that the typical maximum levels measured (L_{Amax} values in Table 4.1) were caused by HGVs passing (on both sides of the road); these levels determine the necessary glazing required to achieve good internal levels in proposed houses (see Section 5).
- 4.8 The Calculation of Road Traffic Noise (CRTN) document outlines a process to obtain an estimate of traffic noise $L_{Aeq, 16hr}$ from L_{A10} values measured over 3 consecutive hours; this is known as the “shortened measurement method” along with the conversion method from the now superseded guidance document PPG 24 (whose policy is no longer in use, but whose calculation methods remain valid). For the shortened measurement procedure in CRTN:

$L_{A10, (18 \text{ hour})} = L_{A10 (3 \text{ hour})} - 1 \text{ dB}$ (see CRTN, paragraph 43) (where $L_{A10 (3 \text{ hour})}$ is the arithmetic mean of the three consecutive values of hourly L_{A10})

$L_{Aeq, 18hr} = L_{A10, (18 \text{ hour})} - 3 \text{ dB}$ (see PPG 24, annex 1, paragraph 9 and annex 2, paragraph 7).

$L_{Aeq, 16hr} = L_{Aeq, 18hr} + 1 \text{ dB}$ (see PPG 24, annex 2, paragraph 7).

Therefore, the $L_{Aeq, 16hr}$ will be equal to the measured $L_{A10, (3 \text{ hour})} - 3 \text{ dB}$.

5.0 Assessment and Acoustic Design Statement

- 5.1 The measured noise levels (shown in Table 4.1) were used in conjunction with topographical data and online resources (detailing typical daily traffic flows) to construct and calibrate a 3D SoundPLAN™ model which was used to predict noise levels across the site.
- 5.2 The model was used to predict the levels incident on the proposed dwellings (as façade levels) with the typical ground floor ambient level at the most northern proposed dwellings being 54 - 64 dB, ($L_{Aeq, 16hr}$) with a typical worst-case night time L_{Amax} of 74 dB at 1st floor level (as shown in Figures B1 and B2 in Appendix B). The noise climate at the proposed development therefore places the proposal in the Low-Medium category for the purposes of ProPG:2017 and the initial noise risk assessment.
- 5.3 As discussed in section 3.18 of the report the full assessment should cover 4 main elements as follows in line with the guidance provided by ProPG:2017:
- Element 1 – demonstrating a “Good Acoustic Design Process”;
 - Element 2 – observing internal “Noise Level Guidelines.”
 - Element 3 – Undertaking an “External Amenity Area Noise Assessment”
 - Element 4 – Consideration of “Other Relevant Issues.”

Element 1 - Good Acoustic Design Process

- 5.4 Generally, there is a hierarchy of noise control that should be considered in all cases, and the layout should demonstrate that the following logical process, which would represent good design, should be followed as far as possible:
- Maximise the spatial separation of noise source(s) and receptor(s)
 - Using existing topography and existing structures to screen the proposed development site from significant sources of noise;
 - Incorporating noise barriers as part of the scheme to screen the proposed site from significant sources of noise
 - Using the layout of the scheme to reduce noise propagation across the site
 - Using the orientation of buildings to reduce the noise exposure of noise sensitive rooms
 - Using the building envelope to mitigate noise to acceptable levels.
- 5.5 To reduce the requirement of high-grade glazing, it is advised to orientate the layout such that sensitive windows face away from the dominant noise source. In this case, this would mean siting sensitive windows towards the south or southwest (where possible). Furthermore, any balcony or terrace areas should be positioned similarly to mitigate northern transport noise.
- 5.6 Indicative drawings display the ground and first floor internal layouts of the proposed units (shown in Figures A3 and A4 in Appendix A).

Element 2 – Internal Noise Level Guidelines

- 5.7 Where high noise levels are found to be incident on sensitive windows (for instance bedroom windows at night) a good acoustic design is required (as outlined in 5.4) to ensure internal noise levels are compliant with the guideline values within BS 8233:2014 as discussed in 3.11 above.

- 5.8 As part of a good acoustic design, consideration is given to façade performance including glazing and ventilation to meet the requirements of the Building Regulations.
- 5.9 This report provides an initial view by assessing the façades with the highest incident noise levels (hence the most challenging internal levels needed to be achieved) and gives indicative specifications which would suitably protect the amenity of future occupiers.
- 5.10 For a living room situated at ground floor (at the northern/eastern façade of Units 3 or 4) the worst-case external level would be 64 dB $L_{Aeq, 16hr}$; which would therefore require a window specification of 29, $R_W + C_{tr}$ to meet the internal design target of 35 dB L_{Aeq} .
- 5.11 For a first floor bedroom within either Unit 3 or 4, a worst case night time level along the northern façade of 74 dB, L_{Amax} might be typical; a sound reduction for a bedroom at night would also require 29, $R_W + C_{tr}$ to meet the target of 45 dB, L_{Amax} .
- 5.12 These performance requirements are readily achievable using “off the shelf” units. It is worth re-emphasising that the external levels would be lower at other units (and other facades of Units 3 & 4) and these calculations only help to inform the maximum glazing that could be required.
- 5.13 Any such windows would need to be closed to achieve the required acoustic performance of the structure. They can be openable windows to allow for purge ventilation, but generally, if a good acoustical environment is desired windows would need to be closed.
- 5.14 Alternative means of background ventilation would therefore be necessary to satisfy the requirements of Building Regulations Approved Document F. If passive means of ventilation were to be used, then the facades of these rooms would need to be treated with acoustic air bricks or mechanical ventilators of good acoustic standard ($D_{n,eW} = 34$ dB or better).
- 5.15 Where habitable rooms would be sited facing away from the A1 (to the north) this would reduce the level of required insulation and hence lower acoustic specification would be needed. It is recommended that a more detailed assessment of acoustic performance is provided once planning permission is granted and glazing areas, room sizes and internal layouts are finalised in order to match glazing performance to design (and thereby achieve cost savings).

Element 3 – External Amenity

- 5.16 All the proposed dwellings have associated private gardens sited either to the south or south east of the houses. Based on the indicative layout of the proposed development, in most circumstances, the natural mitigation of the building envelope is utilised to reduce external levels in the amenity spaces; which is an example of *good acoustic design* (5.4). However, as shown in Figure B1 (in Appendix B), some gardens would require additional screening to reduce traffic noise to reasonable external levels.
- 5.17 BS 8223:2014 considers outdoor areas and external amenity areas (e.g. gardens) recommending that it is desirable that the external noise level does not exceed 50 dB $L_{Aeq, 16hr}$ with an upper guideline of 55 dB $L_{Aeq, 16hr}$ for noisier environments; it is also recognized that:

“... these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted.”

And that:

“In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited”.

5.18 The guidance therefore affords some tolerance to the desirable noise levels in the context of this development, as a compromise between elevated noise levels and the convenience of the adjacent transport network should be taken into account.

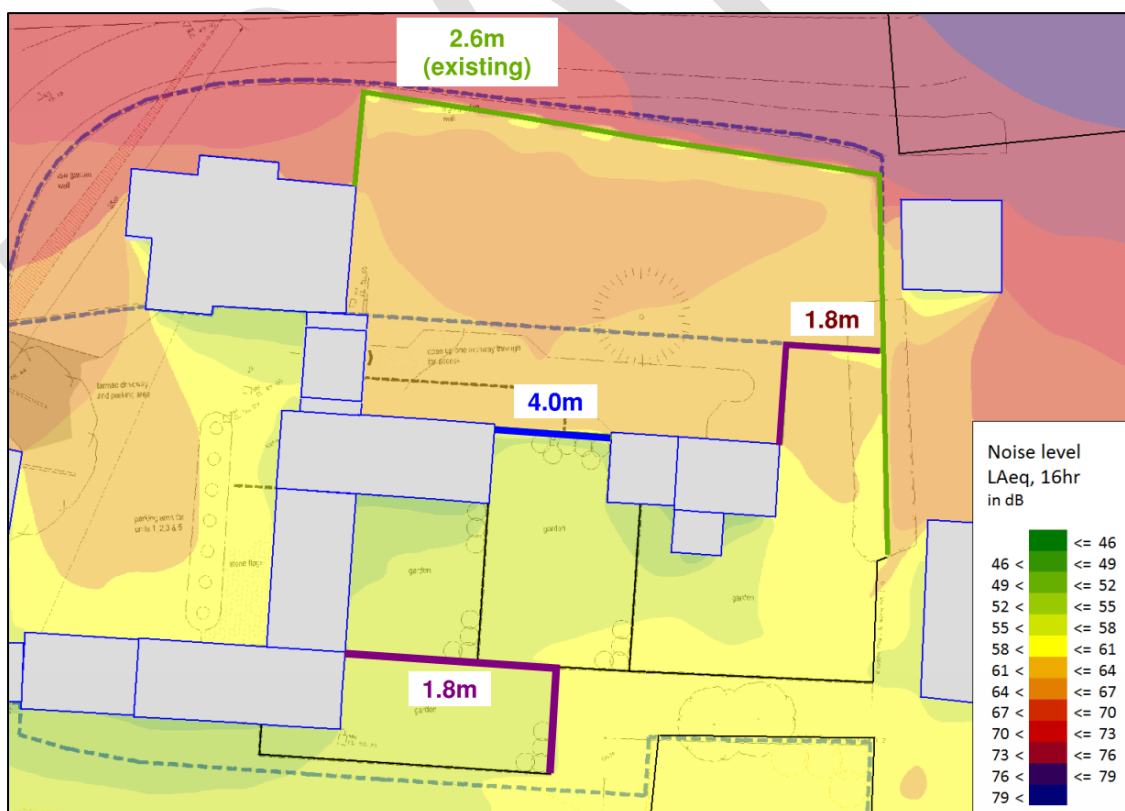
5.19 In regards to areas such as garden patios/terraces, BS 8223:2014 also states:

...“achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

5.20 A suitable mitigation scheme would therefore be one which reduces the sound in the gardens to achieve *“the lowest practicable levels”* and if possible be below the 55 dB $L_{Aeq,T}$ guideline for some of the space (e.g. near the dwellings rear entrance where patios/garden terraces are likely to be sited).

5.21 An appropriate mitigation scheme is described in Figure 5.1 below (and displayed larger in Figure B3 in Appendix B) using two 1.8m and one 4.0m solid screens (e.g. imperforate garden fences). With these screens in place, gardens of Units 1, 2 and 3 will all be below 59 dB, $L_{Aeq,16hr}$, with sound levels generally being lower closer to the shadow of the dwellings. In all gardens, there would be some areas which would be below the 55 dB, $L_{Aeq,T}$ upper guideline, which satisfies the requirements of 5.18 above.

Figure 5.1: External Amenity Mitigation Scheme



Element 4 – Assessment of other relevant issues

- 5.22 The fourth and final element of Stage 2 is an assessment of other relevant issues, including compliance with relevant national and local policy; the magnitude and extent of compliance with ProPG; likely occupants of the development; unintended adverse consequences resulting from the acoustic design and wider planning objectives.
- 5.23 In terms of noise sensitive development the main aims of the NPPF is the avoidance of significant adverse effects and the mitigation and reduction of any adverse impacts to a minimum. As discussed in section 3.0 of this report, the current nationally recommended internal noise levels for dwellings are given in BS 8233:2014 'Guidance on Sound Insulation & Noise Reduction for Buildings.'

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APPENDIX A

PLANS AND MAPS

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Figure A1: Monitoring location (yellow area indicates approximate site extent)

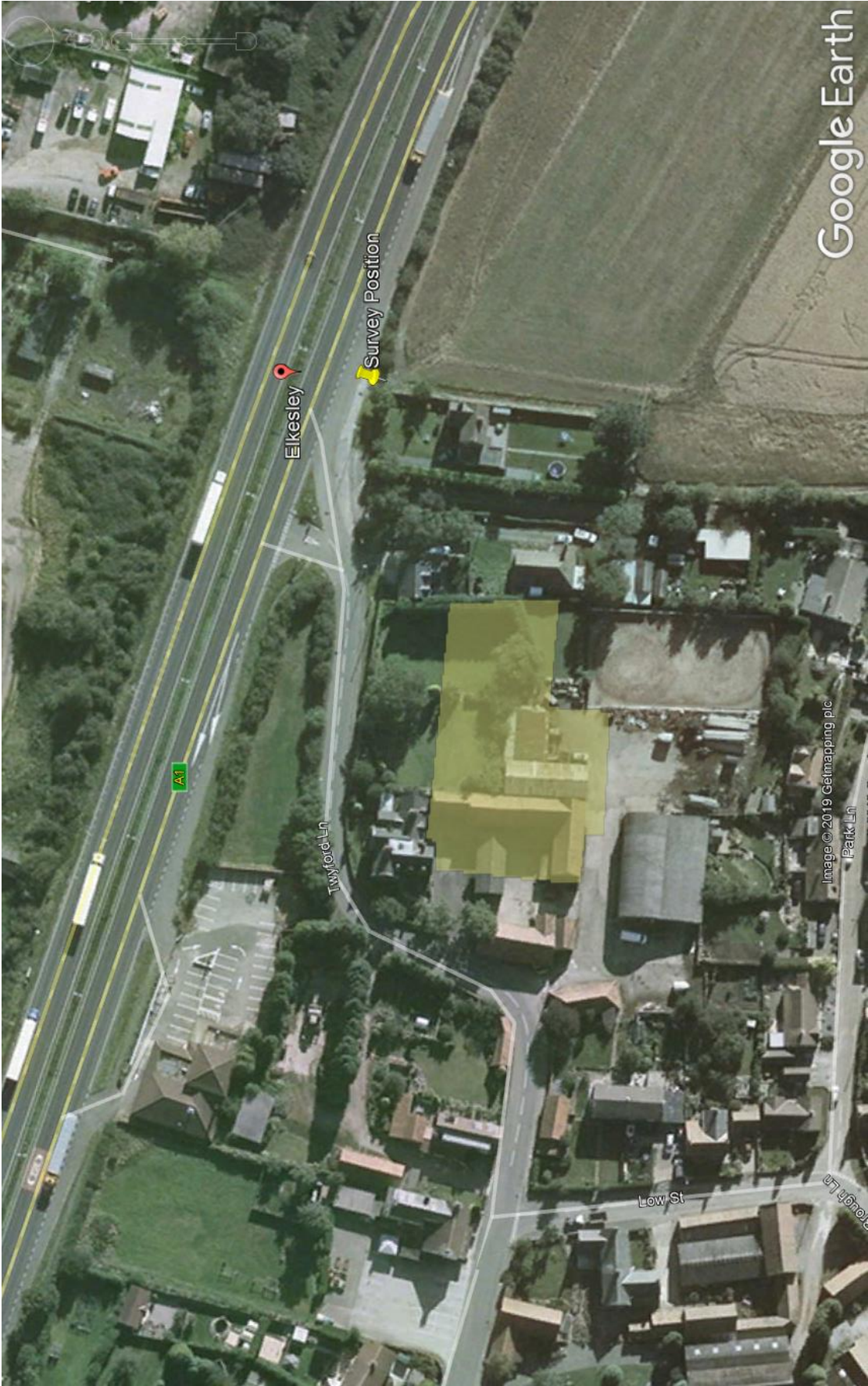


Figure A2: Proposed site layout

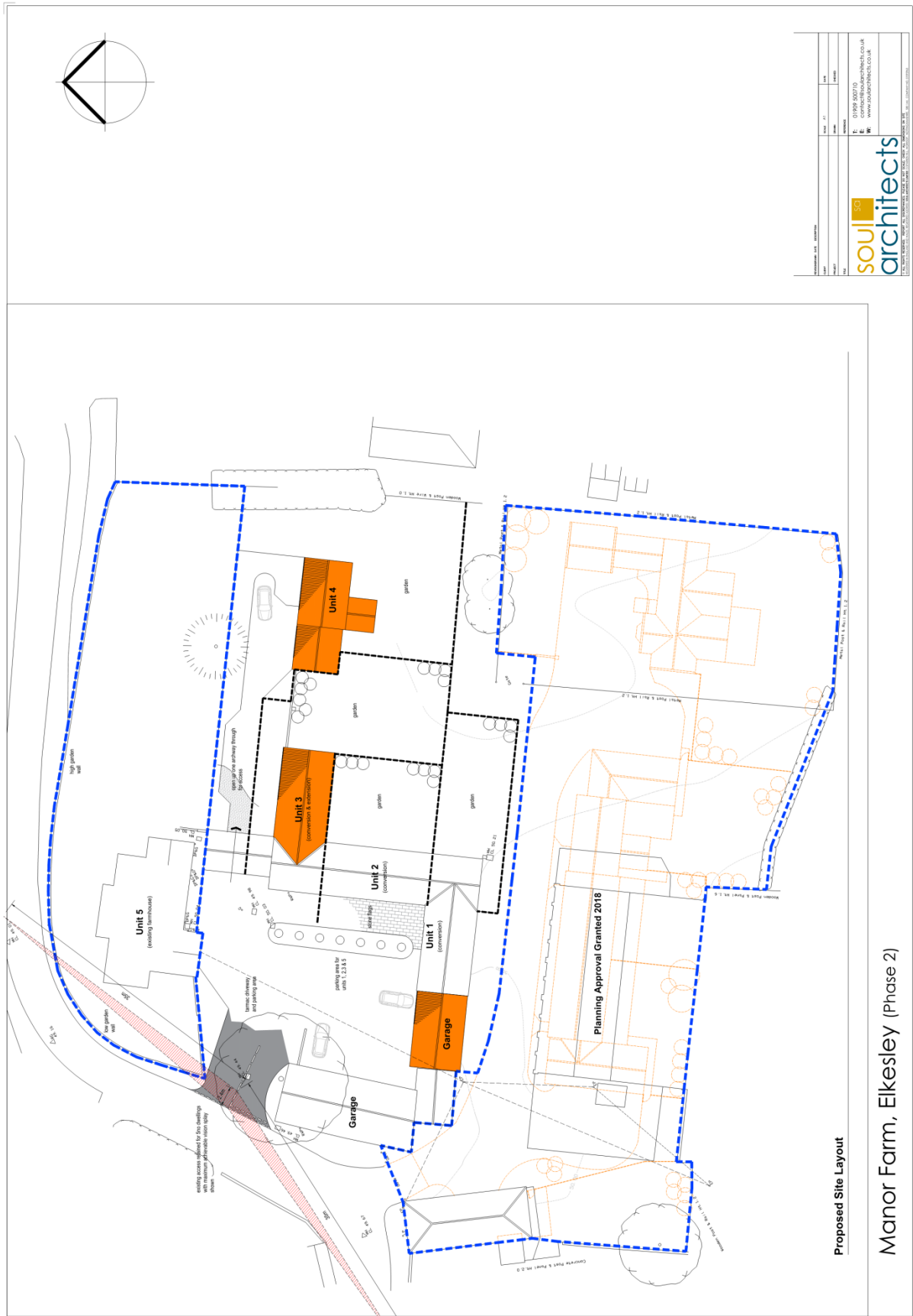
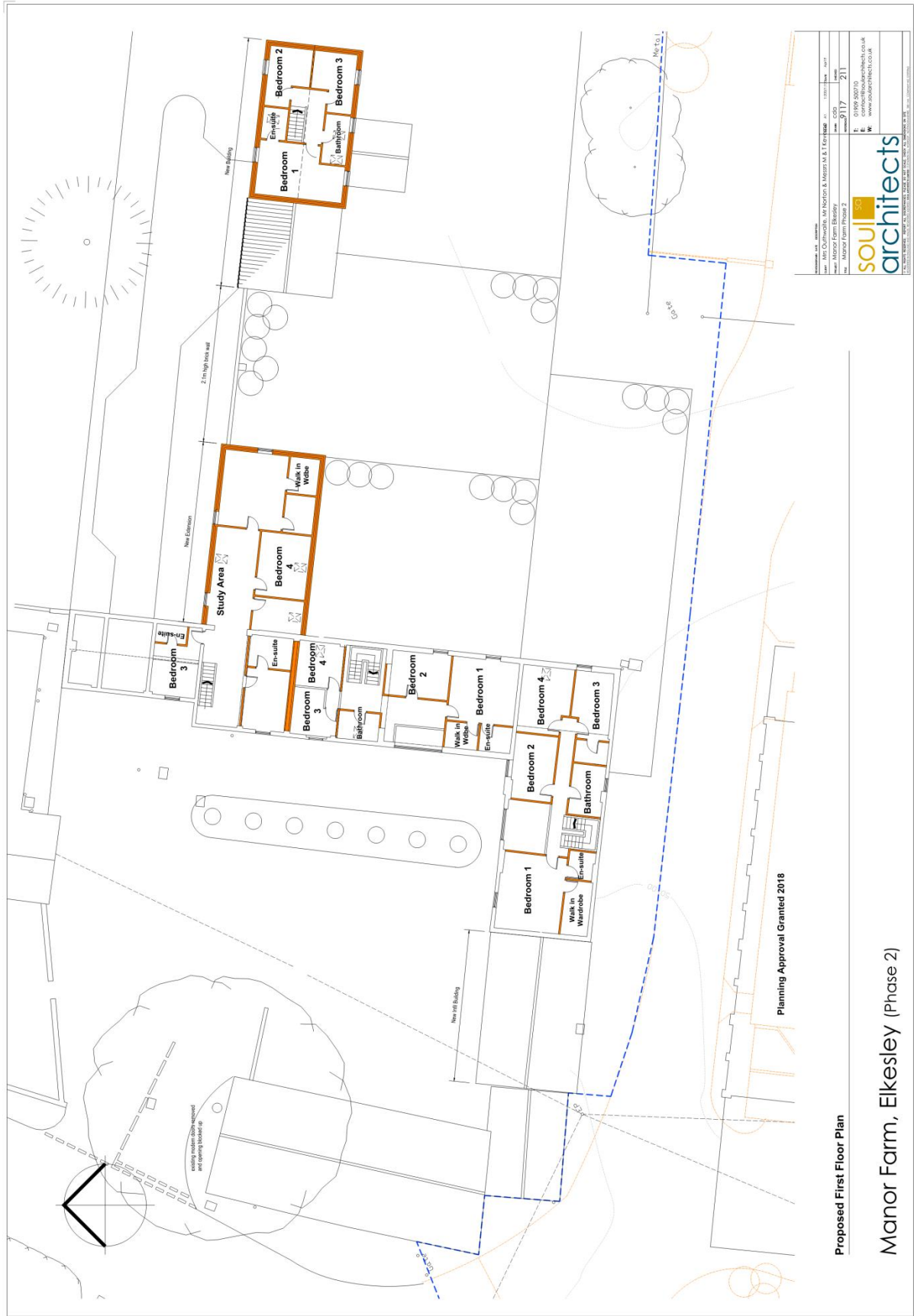


Figure A4: Proposed internal layout (first floor)



APPENDIX B

SoundPLAN™ Outputs

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Figure B1: Daytime noise contours at 1.5m grid height (no mitigation)

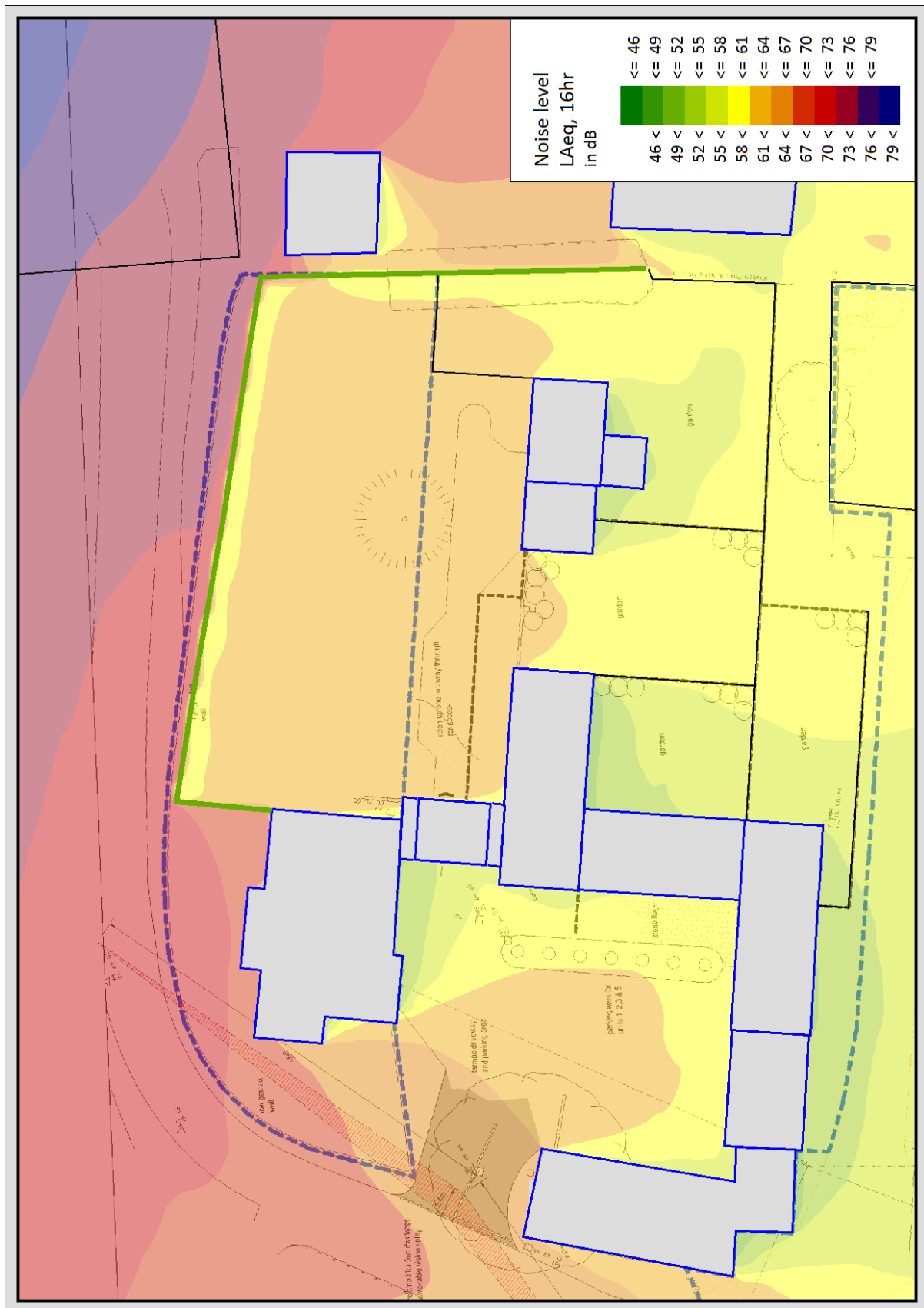


Figure B3: Daytime noise contours at 1.5m grid height (with mitigation scheme)

