



Environmental Noise Assessment
for Proposed Residential Care Home
Hawthorn Gardens
Loanhead

Prepared by
The Airshed
5 Lauder Place, East Linton
East Lothian EH40 3DB
Tel. 01620 860 529
mail@theairshed.com
www.theairshed.com
Registered in Scotland
Company No. SC309129

Record of changes

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1	23 rd May 2023	Draft for internal review
2	9 th June 2023	Updated to include additional barrier height assessment
3	11 th June 2023	For client review
4	12 th June 2023	Clarification of barrier details

Executive Summary

Mansfield Care Ltd, 20 Alva Street, Edinburgh proposes to make an application for planning permission to Midlothian Council for a new 50 bed residential care home at Hawthorn Gardens, Loanhead. Planform Architects has instructed Airshed on behalf of the applicant to conduct an assessment of environmental noise for the proposed development. Midlothian Council has confirmed the requirements to protect residents against sleep disturbance and their amenity. This includes the requirement that noise from road traffic should not exceed 50 dB LA_{eq} 07:00 - 23:00 in outdoor living areas and that peak noise from traffic should not exceed 42 dB LAF_{max} inside bedrooms at night.

A baseline noise survey has been conducted at the proposed development to quantify current noise exposure. Daytime and night-time noise levels have been predicted across the development site in accordance with the requirements of ISO 9613 as implemented by SoundPlan 9.0. Two scenarios have been used to predict and assess road traffic noise across the proposed development site:

- Scenario 1 - predicts road traffic noise to enable comparison with the measured levels; and
- Scenario 2 – includes the proposed residential care home. This considers a range of heights for the acoustic barrier along the southern boundary to protect outdoor amenity within the south-facing gardens.

Noise impacts have been assessed in accordance with Midlothian Council's requirements, the Scottish Government's Technical Advice Note (TAN), WHO Guidelines for outdoor living areas and Table 4 of BS 8233:2014 criteria for noise inside habitable rooms.

Noise from road traffic during the daytime is predicted to be of Negligible Significance in terms of the Scottish Government's assessment framework set out in Section 2, subject to the effective implementation of the mitigation measures outlined in Section 6. Some mitigation in the form of acoustic double-glazing and trickle vents will be required on exposed elevations.

An acoustic barrier (4m in height) would be required to ensure that traffic noise will not exceed 50 dB LA_{eq} 07:00 -23:00 within the proposed secure garden on the south-facing elevation. The assessment considers the options for barrier heights and proposes that an acoustic barrier at a constant level of 147.1m AOD at the top of the barrier would be more appropriate for this urban setting (approximately equivalent to 1.8m in height).

Midlothian Council has confirmed that in these circumstances that noise in the south-facing outdoor living areas should comply with WHO's upper limit for garden amenity of 55 dB LA_{eq} 07:00 - 23:00.

The proposed mitigation measures should ensure that these impacts will comply with Midlothian's design requirements for environmental noise.

Scenario 3 considers noise from fixed plant. Noise from fixed plant associated with buildings services is predicted to comply with NR25 inside all habitable rooms, assuming partially open windows, subject to the effective implementation of the mitigation measures outlined in Section 6.

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Acronyms

ATC	Automatic Traffic Counter
BS	British Standard
CRTN	Calculation of Road Traffic Noise (a method specified by the UK Department of Transport)
dB	decibels – the logarithmic scale used to measure noise
dBA	A weighted dB – measured levels adjusted for the effect on human hearing
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment (a series of organised activities – a process)
EPA	Environmental Protection Act 1990
ES	Environmental Statement (a document or documents)
ISO	International Standards Organisation
$LA_{eq T}$	The equivalent (eq) A weighted (A) average noise level (L) over a given period of time (T)
$LA_{90 T}$	The A weighted (A) noise level (L) exceeded over 90% (₉₀) of a given period of time (T)
L_{WA}	Sound Power Level – a convenient unit of noise measurement independent of distance
m/s	metres per second
WHO	World Health Organisation

GLOSSARY

Acoustic studies make use of terminology that is specific to this type of assessment. The terminology employed in the report is discussed in this section.

dB

Noise is defined as unwanted sound. The range of audible sound is from 0 dB to 140 dB. The frequency response of the ear is usually taken to be about 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 dB(A) weighting. This is an internationally accepted standard for noise measurements.

Loudness

For variable noise sources such as traffic, a difference of 3 dB(A) is just perceptible by most people. In addition, a doubling of traffic flow will increase the overall noise by 3 dB(A). The "loudness" of a noise is a purely subjective parameter but it is generally accepted that an increase/decrease of 10 dB(A) corresponds to a doubling/halving in perceived loudness. Road traffic noise changes as flow varies during the day and will also fluctuate within shorter time periods as vehicles pass the reception point.

Free Field

Free field measurements are taken at least 3.5m from any building or other hard reflecting surface. Noise standards within the UK are normally specified as external free field limits for ease of enforcement e.g. to avoid the necessity of gaining access to people's houses late at night. Noise standards at sensitive receptors can be expressed as the noise level measured or predicted inside a habitable room as in the case of the World Health Organisation sleep disturbance criteria; or as an external level where it is considered important to protect the amenity of the garden. Some noise standards are specified as façade levels as in the case of road traffic noise.

Statistical Level, L_N

The most commonly used statistical levels are the LA_{10} and LA_{90} .

The LA_{10} is a statistical sound level, being the dBA level exceeded for 10% of a given time. For example, if the hourly LA_{10} is 70 then during that hour the noise level was greater than 70dBA for 6 minutes (10%) and less than or equal to 70dBA for the remaining 54 minutes.

LA_{90} is the level exceeded for 90% of the time, which corresponds to the "quieter" periods. The LA_{90} is defined in BS4142: 1990 Rating Industrial Noise Affecting Mixed Residential and Industrial Areas, as the background noise level.

LA_{eq}

The LA_{eq} is used to describe ambient sound. The Noise Advisory Council Guide to the measurement and prediction of the Equivalent Continuous sound level, defined the LA_{eq} as follows:

The equivalent continuous noise level, LA_{eq} , is the level of notional steady sound which, at a given position and over a defined period of time would have the same A-weighted acoustic energy as the fluctuating noise.

A-Weighted

The "A" in LA_{eq} (or LA_{90}) refers to the A-weighted sound pressure level of the noise in decibels. Weighting is a filter contained in the sound level meter which is designed to produce the relative response of the human ear to sound at different frequencies.

Background to Report

- 1.1. Mansfield Care Ltd, 20 Alva Street, Edinburgh proposes to make an application for planning permission to Midlothian Council for a new 50 bed residential care home at Hawthorn Gardens, Loanhead. The application proposes to demolish the existing buildings and erect a three-storey building. The location of the proposed development site is shown in Figure 1.
- 1.2. Planform Architects has instructed Airshed on behalf of the applicant to conduct an assessment of environmental noise for the proposed development as presented in Appendix 1. Planform has advised Airshed that the noise impact assessment must consider the following criteria required by Midlothian Council:
- 50 dB LA_{eq} 07:00 – 23:00 for daytime external garden amenity¹;
 - 35 dB LA_{eq} 07:00 – 23:00 for daytime internal living apartments;
 - 30 dB LA_{eq} 23:00 – 07:00 for night time internal living apartment; and
 - 42 dB LA_{max} inside bedrooms at night.

Potential Adverse Impacts

- 1.3. Noise from road traffic on Hawthorn Gardens has the potential to affect residential amenity and disturb the sleep of future residents.
- 1.4. Noise from fixed plant outside the proposed building has the potential to adversely affect existing noise-sensitive receptors nearby as well as future residents within the development.
- 1.5. Noise from the construction operations for the proposed development has some limited potential to adversely affect the amenity of adjacent residential uses. These impacts are outwith the scope of the current assessment. Mitigation measures to be implemented during construction are discussed in Section 6.

Scope of Assessment

- 1.6. This assessment takes account of the requirements of Midlothian Council's noise criteria set out in section 1.2 above.
- 1.7. Noise from road traffic has been assessed in accordance with the framework set out in the Technical Advice Note (TAN)² which forms part of the Scottish Government's Planning and Noise Advice 1/2011.³
- 1.8. Noise from road traffic has been assessed using the TAN assessment framework, WHO criteria for outdoor living areas and Table 4 criteria set out in BS 8233:2014 for noise levels inside habitable rooms.

¹ Mhairi-Anne Cowie Planning Officer Midlothian Council 24th May 2023 by email 'I passed your email to my colleagues in Environmental Health for their comments. They have considered your request to increase the design standard for the external garden areas located at the front of the above proposed development from 50 dB LA_{eq}(16hr) to 55 dB LA_{eq}(16hr). As this garden area appears very small, located adjacent to a busy road and there will be landscaped external garden areas to the rear which should comply with the 50 dB LA_{eq}(16hr), Environmental Health would have no objection to the increase in the design standard in this area '

² Scottish Government 2011. Technical Advice Note. Assessment of Noise

³ Scottish Government 2011. Planning Advice Note 1/2011 Planning and Noise

- 1.9. Noise from building services associated with the new development affecting noise-sensitive receptors has been assessed against NR25 inside habitable rooms assuming partially open windows.
- 1.10. Current non-statutory professional Guidance⁴ suggests that noise from road traffic generated by a project is likely to be insignificant where road traffic is predicted to increase by <33% (as this would result in an increase of <1 dB). A change in predicted noise of <1 dB is considered to be of Negligible significance in the Scottish Government Planning and Noise TAN. The road traffic generated by this proposal is likely to be insignificant in terms of the trigger threshold. Accordingly, the potential significance of noise from increased road traffic affecting existing noise-sensitive receptors has not been considered further.
- 1.11. This noise assessment has been conducted by Steve Fraser BSc MPhil MIOA CEnv who has more than 40 years of professional experience as an environmental consultant, Environmental Health Officer and Environmental Protection Officer. The baseline survey was conducted by an experienced Airshed technician who holds an IoA Certificate of Competence in Environmental Noise Measurement.

Difficulties in Assessment

- 1.12. No baseline road traffic flow data is available for Hawthorn Gardens. Accordingly, this assessment is based on measured noise levels.

Report Layout

- 1.13. Relevant noise standards are discussed in Section 2. Baseline noise is described in Section 3. The noise prediction methodology is outlined in Section 4. The results from the prediction exercise are presented in Section 5. Mitigation measures are proposed in Section 6. The overall significance of the noise affecting the proposed development is considered in Section 7.

⁴ IEMA Version 1.2 (November 2014) Guidelines for Environmental Noise Impact Assessment.

Approach to Assessment

- 2.1. Noise from road traffic is assessed using the assessment framework for transport noise as set out in the Scottish Government’s Technical Advice Note (TAN) which forms part of Planning Advice Note (PAN) 1/2011. Noise from fixed plant has been assessed against NR25.

Planning Advice Note (PAN) 1/2011

- 2.2. PAN 1/2011 Planning and Noise provides advice to planning authorities in Scotland on how they must seek to minimise the adverse impact of noise arising from new development. This guidance is not prescriptive with respect to specific noise standards and is mainly concerned with the advice on good practice for environmental noise assessment. The noise impact assessment method set out in PAN 1/2011 Technical Guidance states: "The choice of appropriate criteria noise levels and relevant time periods are the responsibility of the local authority. Although this may lead to inconsistencies between different local authorities and, indeed, across areas within a given local authority, it does provide flexibility, allowing particular circumstances to be taken into account and the use of the latest guideline values to be included where appropriate."

TAN – Transport Noise

- 2.3. The Technical Advice Note (TAN) issued to accompany the PAN for the assessment of noise proposes methods to consider how transport noise would affect proposed residential uses where the ambient noise at the proposed dwellings is compared to a target noise level, usually based on World Health Organisation (WHO) environmental noise criteria. This approach is set out in Table 2.1 below. This assessment assumes that the daytime target noise level is 50 dB LA_{eq} 07:00 – 23:00 and that the night-time target noise level is 45 dB LA_{eq} 23:00 - 07:00.

Table 2.1 – Assessing Significance of Noise on Proposed New Residential Area	
(Existing – Target) Noise Level (x) dB LA _{eq} (07:00-23:00) dB	Magnitude of Impact
$x \geq 10$	Major adverse
$5 \leq x < 10$	Moderate adverse
$3 \leq x < 5$	Minor adverse
$0 \leq x < 3$	Negligible adverse
$x < 0$	No change

- 2.4. The TAN also proposes a methodology to assess the significance of a change in noise from road traffic on existing noise-sensitive receptors potentially affected by a proposed new scheme where the change in ambient noise level is assessed using the criteria in Table 2.2 below. This indicates that a change in noise <1 dBA at existing receptors would be of Negligible significance.

Table 2.2 – Magnitude of Noise Impacts	
Magnitude	Change in Noise Level dB LA _{eq T} (After – Before)
Major	>5
Moderate	3 – 4.9
Minor	1 – 2.9
Negligible	0.1 – 0.9
No Change	0

Statutory Nuisance

- 2.5. The Environmental Protection Act 1990 (EPA) imposes a duty on local authorities to periodically survey environmental noise levels and to investigate noise complaints. The Act requires local authorities to serve notice when noise nuisance exists. Under this regime the investigation and response to noise complaints would be the responsibility of Midlothian Council. Noise from road traffic is outwith the scope of the EPA.

World Health Organisation Noise Guidelines

- 2.6. WHO published Environmental Noise Guidelines in 2018.⁵ These Guidelines have not been adopted into Scottish Planning Policy and have not been considered further. Table 2.3 below presents the criteria from WHO's previously published Guidelines for Community Noise (in 1999), which complement the 2018 Guidelines.⁶

Environment	Critical Health Effect	Sound Level dB	Time (hours)
Outdoor living areas	Annoyance	50 - 55 ¹	16
Inside dwellings	Speech intelligibility	35 ¹	16
Bedrooms	Sleep disturbance	30 ¹	8
		42 ²	-

N.B. units Note 1 = dB LA_{eq T} Note 2 = LA_{max}

Attenuation Provided by Open Windows

- 2.7. The calculations for internal noise levels in this assessment assume partially open windows with a mean attenuation of 15 dBA. This is based on the WHO rule-of-thumb estimate of a reduction of 15 dBA between external and internal noise levels, assuming partially open windows. In considering the attenuation provided by windows, the 2018 WHO Guidance states: 'The differences between indoor and outdoor levels are usually estimated at around 10 dB for open, 15 dB for tilted or half-open and about 25 dB for closed windows.'⁸ Traditionally acousticians have used a value of 10 – 15 dBA based on the WHO 1999 Community Noise Guidelines. The estimate of attenuation proposed in the WHO's latest Guidance is based on more recent research⁹, which reflects improvements in standard window attenuation over the last 20 years.

Noise Assessment Criteria

- 2.8. The following assessment criteria have been adopted to help determine the significance of the environmental noise impacts. These criteria are based on Midlothian Council's requirements, BS 8233 and WHO criteria. These criteria are set out in Table 2.4 below.

Predicted Noise Level	Justification
50 – 55 dB LA _{eq} 07:00 – 23:00	Lower range recommended by WHO criteria for outdoor living areas including private gardens and balconies. Midlothian Council has confirmed that the upper limit of 55 dB would be acceptable in the circumstances prevailing at the proposed development site and taking

⁵ World Health Organisation 2018. Environmental Noise Guidelines for the European Region.

⁶ World Health Organisation Geneva 1999. Guidelines for Community Noise.

⁷ <http://www.who.int/mediacentre/factsheets/fs258/en/>

⁸ WHO 2018. Environmental Noise Guidelines for the European Region Section 2.2.2 page 9

⁹ Barbara Locher et al. 2018. Differences between Outdoor and Indoor Sound Levels for Open, Tilted and Closed Windows. International Journal of Environmental Research and Public Health 2018 15,149. This reported a mean value of 16 dBA for tilted windows.

Table 2.4 - Environmental Noise Assessment Criteria	
Predicted Noise Level	Justification
30 dB LA _{eq} 1-hour	account of the site layout.
42 dB LA _{max}	Critical noise level to prevent sleep disturbance inside bedrooms, based on WHO criteria (Midlothian Council).
NR25	Requirement to control noise from fixed plant assuming partially open windows (BS 8233).

3.0 BASELINE NOISE

Baseline Survey

- 3.1. A baseline noise survey was conducted at one location during the daytime on a weekday, 17th May 2023, between 12:30 and 15:35. A further survey was conducted at night on 23rd May after midnight, to quantify typical night-time exposure. The aim of the baseline surveys was to assess existing ambient noise levels at the proposed development site. The location of the survey site used to quantify baseline sound is noise is shown in Figure 2.
- 3.2. The selected location was intended to quantify baseline noise from road traffic near the proposed development.
- 3.3. Noise levels were recorded at 1 second intervals. The parameters LA_{eq} and LA_{max} are reported. Measurements were taken using a Norsonic Type 1 sound level meter. The instrumentation was calibrated at the beginning and end of the survey period. The instrumentation was contained within a sealed weather-proof case with full outdoor microphone protection. Wind speed, wind direction and other meteorological conditions were recorded during the survey. Further detail of the sound characteristics at the survey site is set out in Table 3.1 below.

Site	Site Conditions
Site 1	This site was located 6m from the nearside kerb and 3.5m from the corner of the existing stone building. The main source of ambient noise was from road traffic on Hawthorn Gardens.

- 3.4. The baseline survey data is presented in Appendix 2 and summarised in Table 3.2 below. The measured levels are plotted in Charts 1 and 2 at the end of the text. The exceptionally high peaks in Chart 2 during the daytime represent periods where vehicles passed close to the noise meter on the access road. The average 1/3rd octave spectra from the daytime survey are plotted in Chart 3. The night-time survey results are plotted in Chart 4.

Site	Time Start	Time End	LA_{eq}	LAF_{max}	LA_{90}
Site 1	12:31	15:35	66	90	48
	00:08	01:12	51	83	42

N.B. Units = dB LA_T

Proposed Design Criteria

- 3.5. Pragmatically this assessment adopts a design criterion that minimises the potential adverse impacts on the proposed development in terms of the Scottish Government's TAN. The daytime ambient sound levels assumed for this assessment are as presented in Table 3.2.

Justification for Approach

- 4.1 There are no available baseline road traffic flows for local roads. Accordingly noise from road traffic at the proposed development is based on measured levels which have then been extrapolated using a noise prediction model in accordance with ISO 9613 as implemented by SoundPlan 9.0. This assessment assumes that the worst-case peak noise level is 83 dB LAF_{max} as reported in the night-time survey.
- 4.2 Noise from building services has been predicted based on a conceptual design in accordance with ISO 9613 using typical procurement specifications for the ASHPs and kitchen extract and other fans.

Noise Model Setup

- 4.3 The existing site layout was obtained from the OS map base at scale 1:10,000, a site walkover and OS Terrain 5 spot heights. The model layout includes existing buildings that may contribute to noise reflection. Three orders of reflection are included in the noise predictions. Dimensions were obtained using a GIS interface. Variations in local ground height were taken into account based on OS Terrain 5 data. Mixed reflective ground was assumed across the study area. The as proposed model Scenarios (Scenarios 2 and 3) include for changes to the finished ground levels within the proposed development site.
- 4.4 Noise from road traffic and building services was predicted in accordance with ISO 9613 as implemented by SoundPlan 9.0. ISO 9613 specifies an engineering method for calculating the attenuation of sound to predict sound levels at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (LA_{eq}) under meteorological conditions favourable to propagation from sources of known sound emission. ISO 9613 may be applied to the prediction of noise from roads, industry and many other ground-based sources. This prediction technique is considered to be appropriate for the road traffic and fixed plant noise sources under consideration in this assessment.
- 4.5 The model includes for geometrical divergence, atmospheric absorption, ground effects, reflection from surfaces, and screening by obstacles. The model allows for the use of correction factors for ground cover. For hard surfaces such as water or tarmac the correction is applied simply as 3 dB for all frequencies and distances. Where the ground cover is soft, such as grass, woodland, or other less reflective material, an empirical relationship between ground attenuation and frequency and distance may be used. Mixed ground (0.5) has been assumed across the study area for all Scenarios.
- 4.6 These predictions assume downwind meteorological conditions which are favourable for noise propagation from the source to a receiver, where the predicted noise level is seldom exceeded. The estimated accuracy using this method is ± 3 dBA. The estimate of error in the ISO Standard is based on situations where there are no effects of attenuation due to screening.
- 4.7 Source estimates for road traffic (Scenarios 1 and 2) are based on the measured levels at Baseline Site 1. Source estimates for fixed plant are based on information provided by the applicant's architect and M&E

consultants and typical procurement specifications. Details of the source estimates used in the prediction model (Scenario 3) are presented in Appendix 3.

Noise Prediction Scenarios

- 4.8 Three scenarios have been used to help predict and assess noise across the proposed development site:
- Scenario 1 - predicts the noise from road traffic to enable comparison with the measured levels at Baseline Site 1;
 - Scenario 2 - includes the building footprint from the proposed layout (as shown in Appendix 1) based on the same daytime and night-time source estimates as Scenario 1. This Scenario considers five options, with no acoustic barrier and where an acoustic barrier is erected at the site boundary with Hawthorn Gardens to protect outdoor amenity on the south-facing elevation. This considers four barrier heights (1.8m, 2m, 3m and 4m);
 - Scenario 3 - predicts noise from building services to allow comparison with NR25 inside habitable rooms.
- 4.9 The model layouts for Scenario 2 are shown in Figures 3.1 – 3.5. The model layout for Scenario 3 is shown in Figure 3.6.
- 4.10 The predicted impacts are discussed in Section 5. The detailed noise model outputs are presented in Appendix 3.

Outdoor Living Areas

- 5.1 The noise contours for daytime exposure for Scenario 2 (with the 4 barrier options) are plotted in Figures 4.1 - 4.5. The thick white line shown in Figures 4.1 - 4.5 represents the predicted ≤ 50 dB LA_{eq 07:00 - 23:00} contour, which is the WHO's recommended lower limit to protect amenity in outdoor living areas, as specified by Midlothian Council. This demonstrates that a 4m high acoustic barrier would be needed to achieve the criteria proposed by Midlothian Council in all outdoor living areas. Midlothian Council has confirmed that in these circumstances, a lower acoustic barrier would be more appropriate.
- 5.2 The thick green line shown on these contour plots represents the 55 dB LA_{eq 07:00 - 23:00} contour which is the upper limit recommended by the WHO for outdoor living areas. Midlothian Council has confirmed that this criterion is acceptable for the south-facing garden areas.
- 5.3 The results from the prediction model indicate that glass screens would need to be erected at the two front-facing terraces if these were considered to be balconies rather than viewing areas.
- 5.4 The 50 dB LA_{eq 07:00- 23:00} contour in Figure 4.1 shows the extent of the zone where mitigation is likely to be required within the proposed development (based on daytime exposure at ground level). This indicates that acoustic mitigation will be required for the habitable rooms, dining rooms and day rooms that face onto Hawthorn Gardens and for the north-west-facing elevation.

Road Traffic Noise Impacts at Proposed Development

- 5.5 The worst-case predicted noise level at the proposed new residential care home is up to 63 dB LA_{eq 07:00 - 23:00} on the first floor south-west-facing elevation (Room 19) which looks onto Hawthorn Gardens (assuming no acoustic barrier). This level of exposure would require acoustic insulation. The predicted noise levels at specific elevations are presented in more detail in Appendix 3 (Scenario 2). The room numbers detailed in the assessment model outputs are based on the first-floor layout.
- 5.6 Erecting a 2m barrier would reduce the exposure at 1st floor level by around 3 dB, but have no effect in reducing noise exposure at 2nd floor level. A 3m high barrier would further reduce exposure at ground and 1st floor levels but would not reduce exposure at 2nd floor level. A 4m high acoustic barrier is predicted to reduce noise exposure at all floor levels.
- 5.7 The detailed predictions at the most exposed and more sheltered elevations are presented in Table 5.1 at the end of the text. These are based on the erection of a 1.8m high acoustic barrier. The erection of an acoustic barrier 1.8m in height (where the top of the barrier is at 147.1m AOD) would reduce the noise from road traffic to below 55 dB LA_{eq 07:00 - 23:00} in the front garden adjacent to the proposed terraced areas. [See Figure 4.5].
- 5.8 Additional mitigation measures will be required to ensure that noise levels inside the proposed home comply with WHO recommended criteria for habitable rooms. The proposed noise mitigation measures to protect residential amenity are set out in Section 6.

Noise from Proposed Building Services

- 5.9 The noise sources considered in the assessment of impacts from building services include local exhaust ventilation (LEV) units from the kitchen ventilation system, small-scale mechanical ventilation and heat recovery units (MVHR), and air source heat pumps (ASHPs). The predicted noise contours, with the mitigation scheme in place, are plotted in Figure 5.
- 5.10 The worst-case combined impact from all building services is predicted at the bedrooms on the north-east-facing elevations east of the ASHPs, at 2nd floor level (Room 12). The worst-case external free-field noise level at the nearest habitable room is 44 dB LA_{eq 15-minutes}. This assumes that all fixed plant may operate at night. The worst-case impact at any off-site receptor is predicted to be 37 dB LA_{eq 15-minutes} at Edgefield Gardens to the east of the proposed ASHPs.
- 5.11 The worst-case impact within the proposed development has been assessed against NR25 in Table 5.2 at the end of the text. The comparison with NR25 is also plotted in Chart 5 at the end of the text. This shows that the worst-case impact is predicted to comply with NR25 inside all habitable rooms within the proposed development and elsewhere assuming partially open windows, where it is assumed that all fixed plant may operate at night.

Impacts on Existing Noise-Sensitive Receptors

- 5.12 The impacts on existing noise-sensitive receptors are likely to be of Negligible significance in terms of the criteria set out in Table 2.2.

Operational Impacts – Road Traffic

6.1. The following measures are proposed to reduce the potential adverse impact of road traffic noise within the proposed development:

- Outdoor living areas will be located on sheltered elevations or screened by acoustic barriers where the daytime noise is predicted to be ≤ 55 dB LA_{eq} 07:00 – 23:00 as plotted in Figure 4.5 with a 1.8m high acoustic barrier in place. This is in accordance with Midlothian Council’s relaxation of the requirement to achieve 50 dB LA_{eq} 07:00 – 23:00 in outdoor living areas. This assessment assumes that the viewing areas on the south-facing elevations are not outdoor living areas.
- Providing acoustic insulation in the form of double-glazing and acoustic trickle vents in all habitable rooms where the free-field external noise level at exposed facades is predicted to exceed 50 dB LA_{eq} 07:00 – 23:00.
- Providing acoustic insulation in the form of double-glazing and acoustic trickle vents in all bedrooms where the free-field external noise level at exposed facades is predicted to exceed 45 dB LA_{eq} 23:00 – 07:00, or where the predicted free-field external LAF_{max} is predicted to exceed 57 dB¹⁰ outside any bedroom window.
- The predicted noise levels at specific exposed elevations are presented in Table 5.1 at the end of the text. The insulation performance requirements for windows on these elevations are presented in Table 6.1. This indicates that some windows will require a sound reduction of up to 28 dB R_w + C_{tr} and trickle vents with a combined minimum sound reduction of 28 dB D_{n,e}.
- The mitigation required to protect residents from peak noise is set out in Table 6.2. This indicates that some bedroom windows will require a sound reduction of up to 37 dB R_w + C_{tr} and trickle vents with a combined minimum sound reduction of 37 dB D_{n,e} to ensure compliance with Midlothian Council’s stated requirement that noise inside bedrooms should not exceed 42 dB LAF_{max} at night.

Operational Impacts – Building Services

6.2. The measures to reduce noise from building services are summarised in Table 6.3 below.

Table 6.3 - Proposed Noise Mitigation for Building Services	
Issue	Mitigation
Building Design	The design of walls, roofs, access doors, plant rooms, ventilation louvres and external plant to minimise noise breakout to protect residential amenity and to prevent sleep disturbance.
Fixed Plant	The location of all fixed plant shall be selected to minimise adverse impacts on noise-sensitive receptors. This shall include the erection of two acoustic barriers adjacent to the ASHPs to protect residential amenity. The sound power levels for all fixed plant shall not exceed the levels specified in the noise prediction model except by the approval of the planning authority.

¹⁰ Based on the relationship discussed in para 2.7 where a partially open window provides 15 dBA attenuation and the internal peak noise level should not exceed 42 dB LAF_{max} at night.

Table 6.3 - Proposed Noise Mitigation for Building Services	
Issue	Mitigation
	<p>Noise breakout from the plant room or laundry shall not exceed 55 dB/m² L_{WA}.</p> <p>The combined noise from fans and ducting serving the kitchen LEVs shall not exceed 75 dB L_{WA}. These units shall be screened by a parapet wall.</p> <p>The combined noise from any roof mounted fans and ducting excluding the kitchen LEVs shall not exceed 78 dB L_{WA}.</p> <p>The combined noise from the ASHPs shall not exceed 77 dB L_{WA}. The mitigation measures shall include the erection of acoustic screens.</p> <p>All plant and equipment shall be free from tonal, intermittent or impulsive characteristics.</p>

Construction Noise

6.3. Noise during ground clearance and construction has the potential to cause annoyance. The following procedures shall be adopted to ensure that noise impacts from construction operations are minimised, to protect local amenity:

- Prior to the commencement of each phase of construction, the appointed contractors shall prepare a method statement for the project. This shall include an assessment of potentially noisy operations and outline the noise mitigation measures proposed. The construction noise impact assessment shall be used to help inform the development of the detailed construction methods.
- The contractors shall be required to select the quietest item of suitable plant available for all site operations. The work programme on site shall also be phased to reduce the combined impacts arising from several noisy construction operations to reduce adverse impacts. Where practicable, noise from fixed plant and equipment shall be contained within suitable acoustic enclosures or behind acoustic screens.
- Any plant and equipment required for operation at night (23:00 – 07:00) e.g. for security lighting, shall be mains electric powered where practicable.
- The site contractors shall conduct all site operations in accordance with accredited documented procedures. This shall include a complaint investigation procedure.
- All sub-contractors appointed by the main contractor shall be formally required through contract to comply with all environmental noise conditions.

7.0 CONCLUSIONS

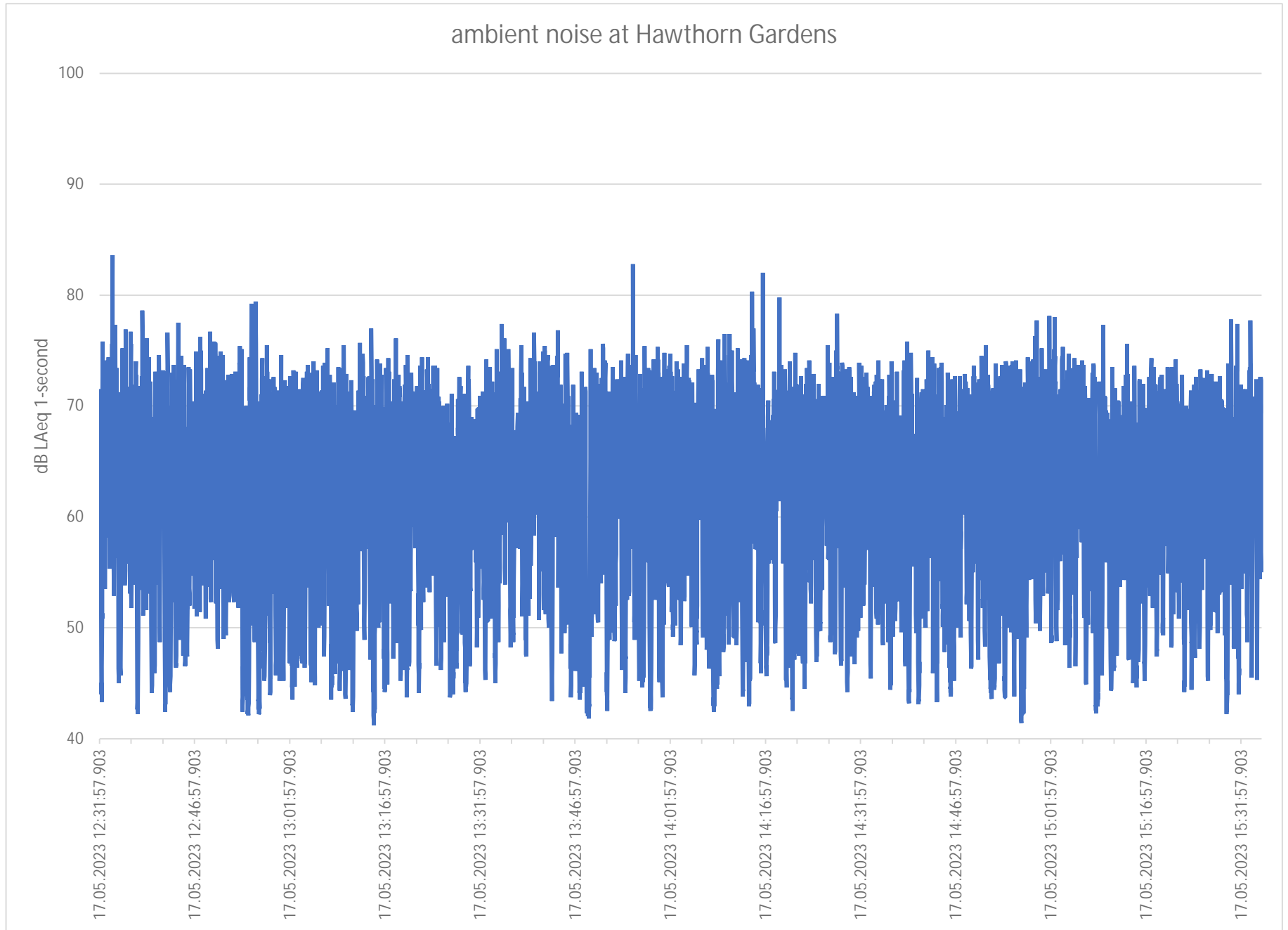
Impacts on Proposed Residential Care Home

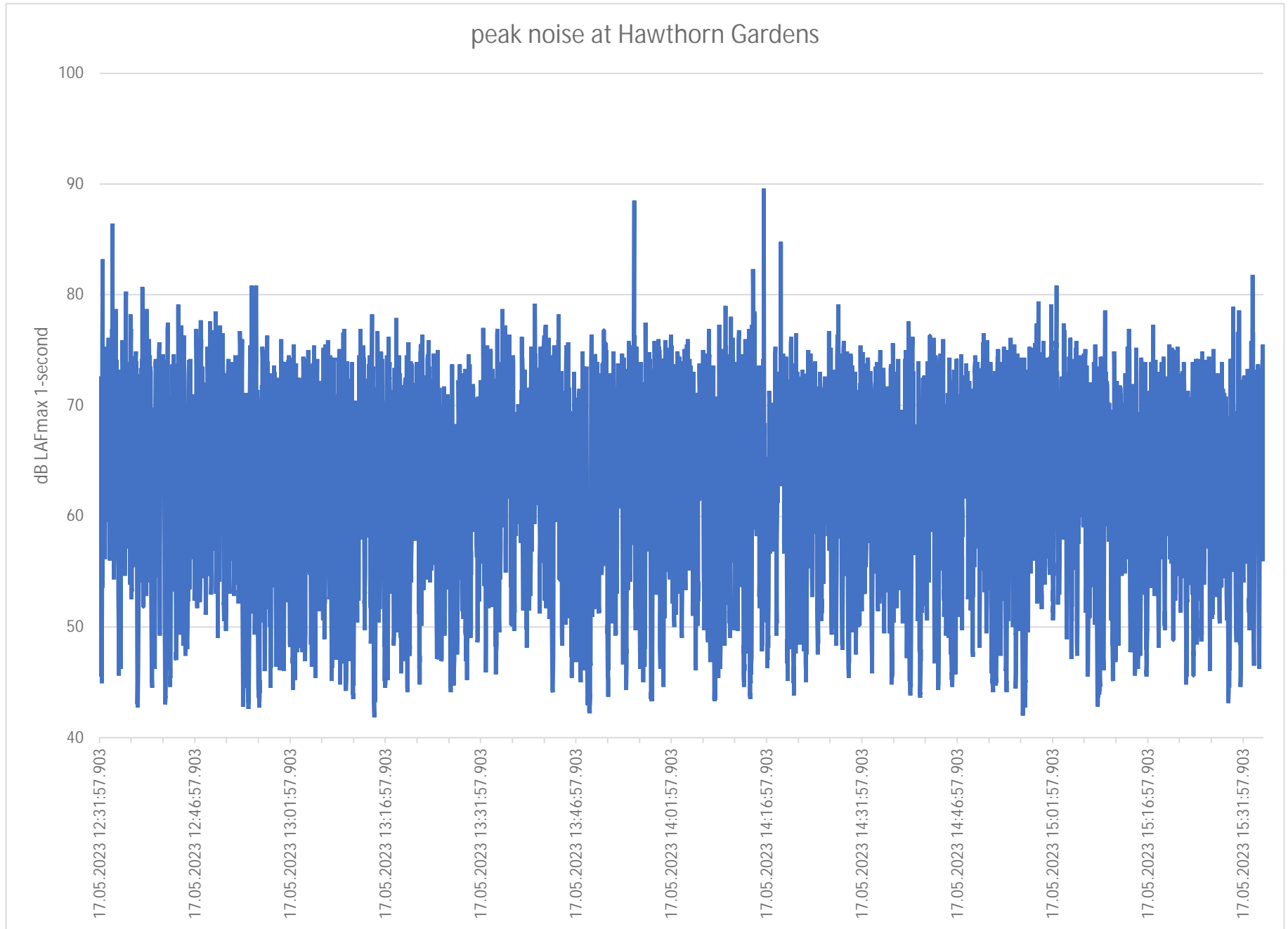
- 7.1 The results from the noise prediction exercise indicate that noise from road traffic on Hawthorn Gardens has the potential to adversely affect the amenity of the proposed residential development and to cause sleep disturbance within some bedrooms.
- 7.2 Noise from road traffic during the daytime is predicted to be of Negligible Significance in terms of the Scottish Government's assessment framework set out in Section 2, subject to the effective implementation of the mitigation measures outlined in Section 6.
- 7.3 Some mitigation in the form of acoustic double-glazing and trickle vents will be required on exposed elevations. An acoustic barrier will be required along the roadside to protect amenity in outdoor living areas on the south-facing elevation. Additional measures will be required to protect the amenity of outdoor terraces.
- 7.4 The proposed mitigation measures should ensure that these impacts are acceptable in terms of WHO criteria and Table 4 of BS 8233: 2014 inside habitable rooms.
- 7.5 Noise from fixed plant is predicted to comply with NR25 inside all habitable rooms assuming partially open windows.

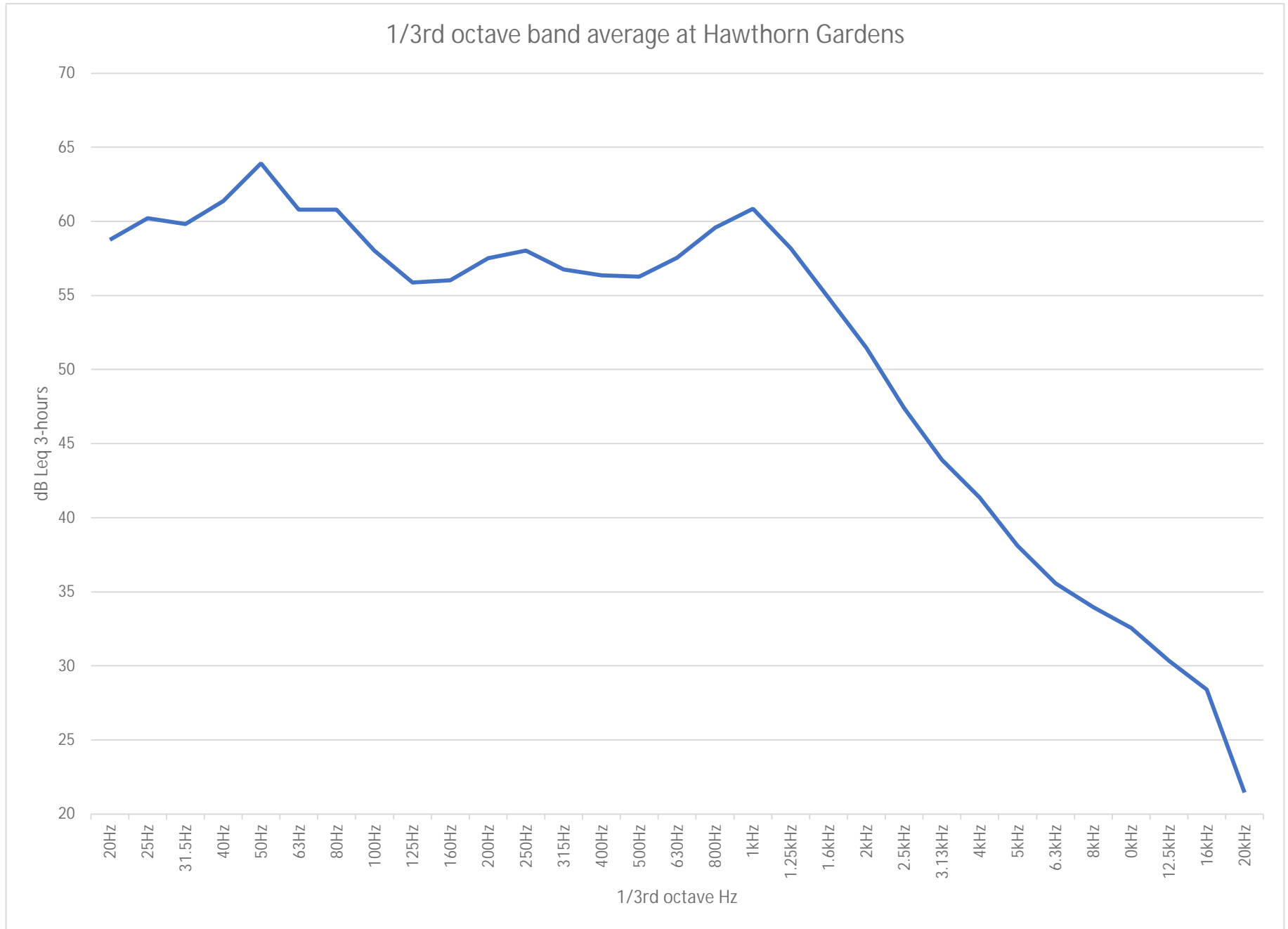
Impacts on Existing Noise-Sensitive Receptors

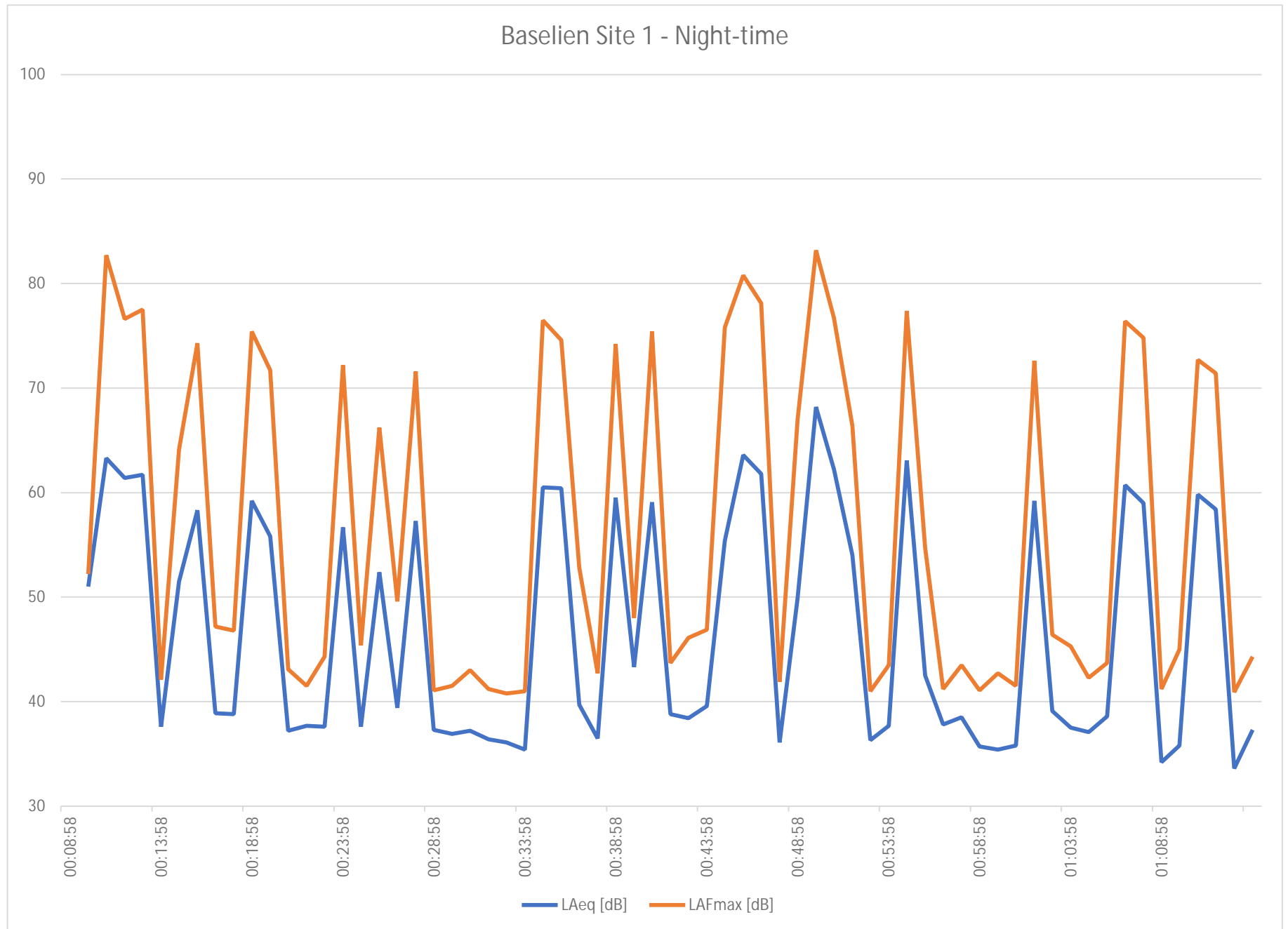
- 7.6 Impacts on existing noise-sensitive receptors are likely to be of Negligible significance.

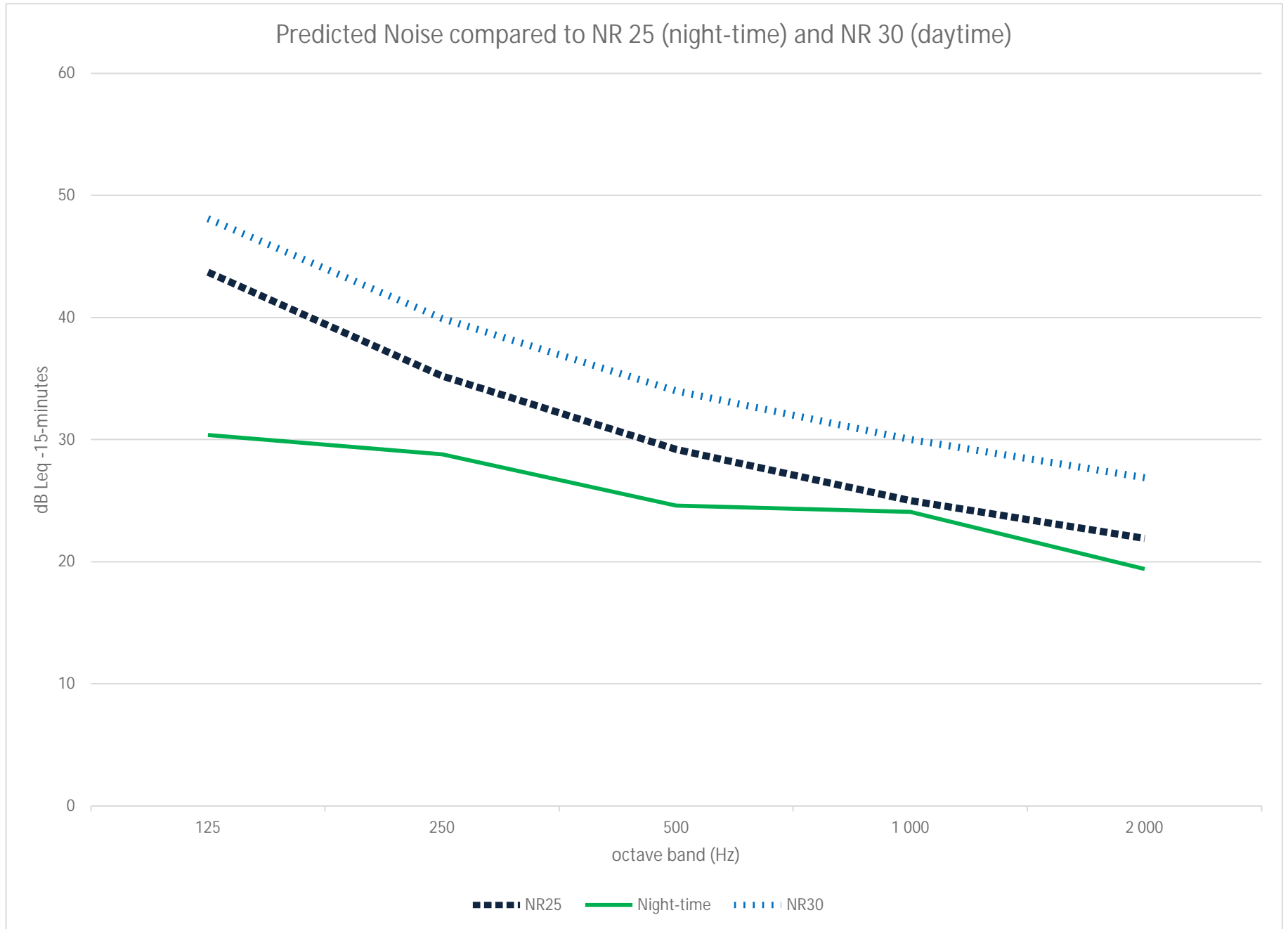
Charts











Tables

Table 5.1 - Predicted Road Traffic Noise at Proposed Residential Care Home

No	Location	Floor	Direction	OS x	OS y	Z m	dB LA _{eq}		Notes
							07:00 - 23:00	23:00 - 07:00	
1	F06 terrace	GF	SW	327933	666019	146.9	49		outdoor living area
1	F06 terrace	F 1	SW	327933	666019	149.4	54		outdoor living area
2	F06 terrace	F 3	SW	327935	666020	152.9	46		outdoor living area
3	F06 terrace	GF	NW	327933	666022	146.9	53		outdoor living area
3	F06 terrace	F 1	NW	327933	666022	149.4	54		outdoor living area
4	F06terrace	GF	SE	327937	666018	146.9	46		outdoor living area
4	F06terrace	F 1	SE	327937	666018	149.4	49		outdoor living area
5	F08 dining	GF	NW	327932	666030	146.6	53		day room
5	F08 dining	F 1	NW	327932	666030	149.1	54		day room
5	F08 dining	F 2	NW	327932	666030	151.6	55		day room
6	F08 dining	GF	SW	327931	666024	146.9	54		day room
6	F08 dining	F 1	SW	327931	666024	149.4	55		day room
6	F08 dining	F 2	SW	327931	666024	151.9	56		day room
7	F09 Quiet area	GF	NW	327935	666034	146.3	52		day room
7	F09 Quiet area	F 1	NW	327935	666034	148.8	52		day room
7	F09 Quiet area	F 2	NW	327935	666034	151.3	53		day room
8	F10 sitting area	F 1	SE	327960	666004	149.5	37		day room
8	F10 sitting area	F 2	SE	327960	666004	152	38		day room
9	F12 Bathroom	F 2	SE	327956	666001	152	38		non-habitable room
10	F22 dining	GF	SW	327932	666001	146.8	51		day room
10	F22 dining	F 1	SW	327932	666001	149.3	56		day room
10	F22 dining	F 2	SW	327932	666001	151.8	60		day room
11	F22 dining	GF	NW	327932	666006	146.8	50		day room
11	F22 dining	F 1	NW	327932	666006	149.3	53		day room
11	F22 dining	F 2	NW	327932	666006	151.8	57		day room
12	F22 Dining	GF	SW	327934	665998	146.8	51		day room
12	F22 Dining	F 1	SW	327934	665998	149.3	56		day room
12	F22 Dining	F 2	SW	327934	665998	151.8	59		day room
13	F23 terrace	GF	NW	327935	666011	146.8	49		outdoor living area
13	F23 terrace	F 1	NW	327935	666011	149.3	52		outdoor living area
14	F23 terrace	GF	SW	327936	666009	152.8	46		outdoor living area
15	F23 terrace	GF	SW	327934	666007	146.8	48		outdoor living area
15	F23 terrace	F 1	SW	327934	666007	149.3	52		outdoor living area
16	F23 terrace	GF	NE	327938	666010	146.8	45		outdoor living area
16	F23 terrace	F 1	NE	327938	666010	149.3	49		outdoor living area
17	F24 family room	GF	NW	327941	666010	146.8	45		day room
17	F24 family room	F 1	NW	327941	666010	149.3	49		day room
17	F24 family room	F 2	NW	327941	666010	151.8	52		day room
18	outdoor terrace	GF		327925	666009	146.8	52		outdoor living area
19	outdoor terrace	GF		327939	666012	146.8	48		outdoor living area
20	room 01	GF	SW	327942	666012	146.9	44	29	habitable room
20	room 01	F 1	SW	327942	666012	149.4	48	33	habitable room
20	room 01	F 2	SW	327942	666012	151.9	51	36	habitable room
21	room 02	GF	SW	327939	666015	146.9	47	32	habitable room
21	room 02	F 1	SW	327939	666015	149.4	50	35	habitable room
21	room 02	F 2	SW	327939	666015	151.9	53	38	habitable room
22	room 03	F 1	NE	327946	666033	148.9	40	25	habitable room
22	room 03	F 2	NE	327946	666033	151.4	40	25	habitable room
23	room 04	F 1	NE	327949	666030	148.9	39	24	habitable room
23	room 04	F 2	NE	327949	666030	151.4	39	24	habitable room
24	room 05	F 1	NE	327951	666027	148.9	38	23	habitable room
24	room 05	F 2	NE	327951	666027	151.4	39	24	habitable room
25	room 06	F 1	NE	327953	666024	148.9	38	23	habitable room
25	room 06	F 2	NE	327953	666024	151.4	39	24	habitable room
26	room 07	F 1	NE	327956	666021	149.1	37	22	habitable room
26	room 07	F 2	NE	327956	666021	151.6	38	23	habitable room
27	room 08	F 1	NE	327959	666018	149.2	36	21	habitable room
27	room 08	F 2	NE	327959	666018	151.7	37	22	habitable room
28	room 09	F 1	NE	327961	666015	149.3	36	21	habitable room
28	room 09	F 2	NE	327961	666015	151.8	36	21	habitable room
29	room 10	F 1	NE	327964	666012	149.4	37	22	habitable room
29	room 10	F 2	NE	327964	666012	151.9	36	21	habitable room
30	room 11	GF	NE	327956	665997	146.9	36	21	habitable room
30	room 11	F 1	NE	327956	665997	149.4	36	21	habitable room
30	room 11	F 2	NE	327956	665997	151.9	37	22	habitable room
31	room 12	GF	NE	327959	665994	147	37	22	habitable room
31	room 12	F 1	NE	327959	665994	149.5	37	22	habitable room
31	room 12	F 2	NE	327959	665994	152	37	22	habitable room
32	room 13	GF	NE	327961	665991	147	38	23	habitable room
32	room 13	F 1	NE	327961	665991	149.5	38	23	habitable room
32	room 13	F 2	NE	327961	665991	152	38	23	habitable room
33	room 14	GF	SW	327951	665977	146.8	51	36	habitable room
33	room 14	F 1	SW	327951	665977	149.3	57	42	habitable room
33	room 14	F 2	SW	327951	665977	151.8	61	46	habitable room
34	room 15	GF	SW	327948	665980	146.8	51	36	habitable room
34	room 15	F 1	SW	327948	665980	149.3	57	42	habitable room
34	room 15	F 2	SW	327948	665980	151.8	62	47	habitable room
35	room 16	GF	SW	327946	665982	146.8	51	36	habitable room
35	room 16	F 1	SW	327946	665982	149.3	57	42	habitable room
35	room 16	F 2	SW	327946	665982	151.8	62	47	habitable room
36	room 17	GF	SW	327943	665986	146.8	51	36	habitable room
36	room 17	F 1	SW	327943	665986	149.3	57	42	habitable room
36	room 17	F 2	SW	327943	665986	151.8	61	46	habitable room
37	room 18	GF	SW	327941	665988	146.8	51	36	habitable room
37	room 18	F 1	SW	327941	665988	149.3	57	42	habitable room
37	room 18	F 2	SW	327941	665988	151.8	62	47	habitable room
38	room 19	GF	SW	327938	665991	146.8	51	36	habitable room
38	room 19	F 1	SW	327938	665991	149.3	57	42	habitable room
38	room 19	F 2	SW	327938	665991	151.8	62	47	habitable room
39	room 20	GF	SW	327936	665994	146.8	51	36	habitable room
39	room 20	F 1	SW	327936	665994	149.3	57	42	habitable room
39	room 20	F 2	SW	327936	665994	151.8	61	46	habitable room
40	secure garden	GF		327930	666011	146.7	52		outdoor living area
41	Secure garden	GF		327934	666016	146.8	51		outdoor living area

Notes

All noise levels are free-field external from road noise
 Where z = above local ground level where floor heights assumed to be 2.5m
 all room numbers are based on 1st floor layout

Description	Frequency (Hz) units	125	250	500	1 000	2 000
		dBA	dBA	dBA	dBA	dBA
Receptor worst-case						
Noise model output - worst case receptor	Predicted Noise Daytime (external)	27.6	32.7	35.8	39.5	35.3
	Predicted Noise Night-time (external)	27.6	32.7	35.8	39.5	35.3
from Table A.1 BS 8233:2014	correction dBA to dB	-16.1	-8.6	-3.2	0.0	1.2
	correction dBA to dB	-16.1	-8.6	-3.2	0.0	1.2
Corrected levels from dBA to dB	Predicted Noise Daytime (external)	43.7	41.3	39.0	39.5	34.1
	Predicted Noise Night-time (external)	43.7	41.3	39.0	39.5	34.1
Assumes uniform 15 dB reduction from outside to inside	Predicted Noise Daytime (inside)	28.7	26.3	24.0	24.5	19.1
	Predicted Noise Night-time (inside)	28.7	26.3	24.0	24.5	19.1
Noise Rating Curves from Table B1 BS 8233:2014	NR 30(daytime)	48.1	39.9	34.0	30.0	26.9
	NR25 (night-time)	43.7	35.2	29.2	25.0	21.9
Compliance (internal level - NR)	daytime	-19	-14	-10	-6	-8
	night-time	-15	-9	-5	-1	-3

Based on predictions at worst-case receptor on exposed elevation
assumes uniform 15 dB attenuation for partially open window
Scenario 3

Table 6.1 - Indicative Mitigation Required for Road Traffic Noise at Proposed Care Home

No	Location	Floor	Direction	Z m	Daytime R _w dB	Night-time R _w dB	Notes
1	F06 terrace	GF	SW	146.9	N/A	N/A	outdoor living area
1	F06 terrace	F 1	SW	149.4	N/A	N/A	outdoor living area
2	F06 terrace	F 3	SW	152.9	N/A	N/A	outdoor living area
3	F06 terrace	GF	NW	146.9	N/A	N/A	outdoor living area
3	F06 terrace	F 1	NW	149.4	N/A	N/A	outdoor living area
4	F06terrace	GF	SE	146.9	N/A	N/A	outdoor living area
4	F06terrace	F 1	SE	149.4	N/A	N/A	outdoor living area
5	F08 dining	GF	NW	146.8	18	N/A	day room
5	F08 dining	F 1	NW	149.1	19	N/A	day room
5	F08 dining	F 2	NW	151.6	20	N/A	day room
6	F08 dining	GF	SW	146.9	19	N/A	day room
6	F08 dining	F 1	SW	149.4	20	N/A	day room
6	F08 dining	F 2	SW	151.9	21	N/A	day room
7	F09 Quiet area	GF	NW	146.3	17	N/A	day room
7	F09 Quiet area	F 1	NW	148.8	17	N/A	day room
7	F09 Quiet area	F 2	NW	151.3	18	N/A	day room
8	F10 sitting area	F 1	SE	149.5	no mitigation required	N/A	day room
8	F10 sitting area	F 2	SE	152	no mitigation required	N/A	day room
9	F12 Bathroom	F 2	SE	152	no mitigation required	N/A	non- habitable room
10	F22 dining	GF	SW	146.8	16	N/A	day room
10	F22 dining	F 1	SW	149.3	21	N/A	day room
10	F22 dining	F 2	SW	151.8	25	N/A	day room
11	F22 dining	GF	NW	146.8	15	N/A	day room
11	F22 dining	F 1	NW	149.3	18	N/A	day room
11	F22 dining	F 2	NW	151.8	22	N/A	day room
12	F22 Dining	GF	SW	146.8	16	N/A	day room
12	F22 Dining	F 1	SW	149.3	21	N/A	day room
12	F22 Dining	F 2	SW	151.8	24	N/A	day room
13	F23 terrace	GF	NW	146.8	N/A	N/A	outdoor living area
13	F23 terrace	F 1	NW	149.3	N/A	N/A	outdoor living area
14	F23 terrace	GF	SW	152.8	N/A	N/A	outdoor living area
15	F23 terrace	GF	SW	146.8	N/A	N/A	outdoor living area
15	F23 terrace	F 1	SW	149.3	N/A	N/A	outdoor living area
16	F23 terrace	GF	NE	146.8	N/A	N/A	outdoor living area
16	F23 terrace	F 1	NE	149.3	N/A	N/A	outdoor living area
17	F24 family room	GF	NW	146.8	no mitigation required	N/A	day room
17	F24 family room	F 1	NW	149.3	no mitigation required	N/A	day room
17	F24 family room	F 2	NW	151.8	17	N/A	day room
18	outdoor terrace	GF	NW	146.8	N/A	N/A	outdoor living area
19	outdoor terrace	GF	SW	146.8	N/A	N/A	outdoor living area
20	room 01	GF	SW	146.9	no mitigation required	No mitigation required	habitable room
20	room 01	F 1	SW	149.4	no mitigation required	No mitigation required	habitable room
20	room 01	F 2	SW	151.9	16	No mitigation required	habitable room
21	room 02	GF	SW	146.9	no mitigation required	No mitigation required	habitable room
21	room 02	F 1	SW	149.4	15	No mitigation required	habitable room
21	room 02	F 2	SW	151.9	18	No mitigation required	habitable room
22	room 03	F 1	NE	148.9	no mitigation required	No mitigation required	habitable room
22	room 03	F 2	NE	151.4	no mitigation required	No mitigation required	habitable room
23	room 04	F 1	NE	148.9	no mitigation required	No mitigation required	habitable room
23	room 04	F 2	NE	151.4	no mitigation required	No mitigation required	habitable room
24	room 05	F 1	NE	148.9	no mitigation required	No mitigation required	habitable room
24	room 05	F 2	NE	151.4	no mitigation required	No mitigation required	habitable room
25	room 06	F 1	NE	148.9	no mitigation required	No mitigation required	habitable room
25	room 06	F 2	NE	151.4	no mitigation required	No mitigation required	habitable room
26	room 07	F 1	NE	149.1	no mitigation required	No mitigation required	habitable room
26	room 07	F 2	NE	151.6	no mitigation required	No mitigation required	habitable room
27	room 08	F 1	NE	149.2	no mitigation required	No mitigation required	habitable room
27	room 08	F 2	NE	151.7	no mitigation required	No mitigation required	habitable room
28	room 09	F 1	NE	149.3	no mitigation required	No mitigation required	habitable room
28	room 09	F 2	NE	151.8	no mitigation required	No mitigation required	habitable room
29	room 10	F 1	NE	149.4	no mitigation required	No mitigation required	habitable room
29	room 10	F 2	NE	151.9	no mitigation required	No mitigation required	habitable room
30	room 11	GF	NE	146.9	no mitigation required	No mitigation required	habitable room
30	room 11	F 1	NE	149.4	no mitigation required	No mitigation required	habitable room
30	room 11	F 2	NE	151.9	no mitigation required	No mitigation required	habitable room
31	room 12	GF	NE	147	no mitigation required	No mitigation required	habitable room
31	room 12	F 1	NE	149.5	no mitigation required	No mitigation required	habitable room
31	room 12	F 2	NE	152	no mitigation required	No mitigation required	habitable room
32	room 13	GF	NE	147	no mitigation required	No mitigation required	habitable room
32	room 13	F 1	NE	149.5	no mitigation required	No mitigation required	habitable room
32	room 13	F 2	NE	152	no mitigation required	No mitigation required	habitable room
33	room 14	GF	SW	146.8	16	No mitigation required	habitable room
33	room 14	F 1	SW	149.3	22	No mitigation required	habitable room
33	room 14	F 2	SW	151.8	26	16	habitable room
34	room 15	GF	SW	146.8	16	No mitigation required	habitable room
34	room 15	F 1	SW	149.3	22	No mitigation required	habitable room
34	room 15	F 2	SW	151.8	27	17	habitable room
35	room 16	GF	SW	146.8	16	No mitigation required	habitable room
35	room 16	F 1	SW	149.3	22	No mitigation required	habitable room
35	room 16	F 2	SW	151.8	27	17	habitable room
36	room 17	GF	SW	146.8	16	No mitigation required	habitable room
36	room 17	F 1	SW	149.3	22	No mitigation required	habitable room
36	room 17	F 2	SW	151.8	26	16	habitable room
37	room 18	GF	SW	146.8	16	No mitigation required	habitable room
37	room 18	F 1	SW	149.3	22	No mitigation required	habitable room
37	room 18	F 2	SW	151.8	27	17	habitable room
38	room 19	GF	SW	146.8	16	No mitigation required	habitable room
38	room 19	F 1	SW	149.3	22	No mitigation required	habitable room
38	room 19	F 2	SW	151.8	27	17	habitable room
39	room 20	GF	SW	146.8	16	No mitigation required	habitable room
39	room 20	F 1	SW	149.3	22	No mitigation required	habitable room
39	room 20	F 2	SW	151.8	26	16	habitable room
40	secure garden	GF	SW	146.7	N/A	N/A	outdoor living area
41	Secure garden	GF	SW	146.8	N/A	N/A	outdoor living area

Notes

Attenuation requirements for windows are dB Rw+Ctr (based on urban traffic) where Rw + Ctr are as defined in BS EN ISO 717-1:2020
 Attenuation requirements for trickle vents are dB Dn,w (based on urban traffic) as defined in BS EN ISO 717-1:2020
 These calculations assume that a partially open window will provide an attenuation of 15 dBA
 The calculations assume that the minimum attenuation provided by a closed window and trickle vents = 28 dB Rw + Ctr / Dn,w

Table 6.1 - Indicative Mitigation Required for Road Traffic Noise at Proposed Care Home

No	Location	Floor	Direction	Z m	Night-time Noise dB LAFmax	Night-time R _w dB	Notes
1	F06 terrace	GF	SW	146.9	N/A	N/A	outdoor living area
1	F06 terrace	F 1	SW	149.4	N/A	N/A	outdoor living area
2	F06 terrace	F 3	SW	152.9	N/A	N/A	outdoor living area
3	F06 terrace	GF	NW	146.9	N/A	N/A	outdoor living area
3	F06 terrace	F 1	NW	149.4	N/A	N/A	outdoor living area
4	F06terrace	GF	SE	146.9	N/A	N/A	outdoor living area
4	F06terrace	F 1	SE	149.4	N/A	N/A	outdoor living area
5	F08 dining	GF	NW	146.8	N/A	N/A	day room
5	F08 dining	F 1	NW	149.1	N/A	N/A	day room
5	F08 dining	F 2	NW	151.6	N/A	N/A	day room
6	F08 dining	GF	SW	146.9	N/A	N/A	day room
6	F08 dining	F 1	SW	149.4	N/A	N/A	day room
6	F08 dining	F 2	SW	151.9	N/A	N/A	day room
7	F09 Quiet area	GF	NW	146.3	N/A	N/A	day room
7	F09 Quiet area	F 1	NW	148.8	N/A	N/A	day room
7	F09 Quiet area	F 2	NW	151.3	N/A	N/A	day room
8	F10 sitting area	F 1	SE	149.5	N/A	N/A	day room
8	F10 sitting area	F 2	SE	152	N/A	N/A	day room
9	F12 Bathroom	F 2	SE	152	N/A	N/A	non- habitable room
10	F22 dining	GF	SW	146.8	N/A	N/A	day room
10	F22 dining	F 1	SW	149.3	N/A	N/A	day room
10	F22 dining	F 2	SW	151.8	N/A	N/A	day room
11	F22 dining	GF	NW	146.8	N/A	N/A	day room
11	F22 dining	F 1	NW	149.3	N/A	N/A	day room
11	F22 dining	F 2	NW	151.8	N/A	N/A	day room
12	F22 Dining	GF	SW	146.8	N/A	N/A	day room
12	F22 Dining	F 1	SW	149.3	N/A	N/A	day room
12	F22 Dining	F 2	SW	151.8	N/A	N/A	day room
13	F23 terrace	GF	NW	146.8	N/A	N/A	outdoor living area
13	F23 terrace	F 1	NW	149.3	N/A	N/A	outdoor living area
14	F23 terrace	GF	SW	152.8	N/A	N/A	outdoor living area
15	F23 terrace	GF	SW	146.8	N/A	N/A	outdoor living area
15	F23 terrace	F 1	SW	149.3	N/A	N/A	outdoor living area
16	F23 terrace	GF	NE	146.8	N/A	N/A	outdoor living area
16	F23 terrace	F 1	NE	149.3	N/A	N/A	outdoor living area
17	F24 family room	GF	NW	146.8	N/A	N/A	day room
17	F24 family room	F 1	NW	149.3	N/A	N/A	day room
17	F24 family room	F 2	NW	151.8	N/A	N/A	day room
18	outdoor terrace	GF	SW	146.8	N/A	N/A	outdoor living area
19	outdoor terrace	GF	SW	146.8	N/A	N/A	outdoor living area
20	room 01	GF	SW	146.9	61	19	habitable room
20	room 01	F 1	SW	149.4	65	23	habitable room
20	room 01	F 2	SW	151.9	68	26	habitable room
21	room 02	GF	SW	146.9	64	22	habitable room
21	room 02	F 1	SW	149.4	67	25	habitable room
21	room 02	F 2	SW	151.9	70	28	habitable room
22	room 03	F 1	NE	148.9	57	no mitigation required	habitable room
22	room 03	F 2	NE	151.4	57	no mitigation required	habitable room
23	room 04	F 1	NE	148.9	56	no mitigation required	habitable room
23	room 04	F 2	NE	151.4	56	no mitigation required	habitable room
24	room 05	F 1	NE	148.9	55	no mitigation required	habitable room
24	room 05	F 2	NE	151.4	56	no mitigation required	habitable room
25	room 06	F 1	NE	148.9	55	no mitigation required	habitable room
25	room 06	F 2	NE	151.4	56	no mitigation required	habitable room
26	room 07	F 1	NE	149.1	54	no mitigation required	habitable room
26	room 07	F 2	NE	151.6	55	no mitigation required	habitable room
27	room 08	F 1	NE	149.2	53	no mitigation required	habitable room
27	room 08	F 2	NE	151.7	54	no mitigation required	habitable room
28	room 09	F 1	NE	149.3	53	no mitigation required	habitable room
28	room 09	F 2	NE	151.8	53	no mitigation required	habitable room
29	room 10	F 1	NE	149.4	54	no mitigation required	habitable room
29	room 10	F 2	NE	151.9	53	no mitigation required	habitable room
30	room 11	GF	NE	146.9	53	no mitigation required	habitable room
30	room 11	F 1	NE	149.4	53	no mitigation required	habitable room
30	room 11	F 2	NE	151.9	54	no mitigation required	habitable room
31	room 12	GF	NE	147	54	no mitigation required	habitable room
31	room 12	F 1	NE	149.5	54	no mitigation required	habitable room
31	room 12	F 2	NE	152	54	no mitigation required	habitable room
32	room 13	GF	NE	147	55	no mitigation required	habitable room
32	room 13	F 1	NE	149.5	55	no mitigation required	habitable room
32	room 13	F 2	NE	152	55	no mitigation required	habitable room
33	room 14	GF	SW	146.8	68	26	habitable room
33	room 14	F 1	SW	149.3	74	32	habitable room
33	room 14	F 2	SW	151.8	78	36	habitable room
34	room 15	GF	SW	146.8	68	26	habitable room
34	room 15	F 1	SW	149.3	74	32	habitable room
34	room 15	F 2	SW	151.8	79	37	habitable room
35	room 16	GF	SW	146.8	68	26	habitable room
35	room 16	F 1	SW	149.3	74	32	habitable room
35	room 16	F 2	SW	151.8	79	37	habitable room
36	room 17	GF	SW	146.8	68	26	habitable room
36	room 17	F 1	SW	149.3	74	32	habitable room
36	room 17	F 2	SW	151.8	78	36	habitable room
37	room 18	GF	SW	146.8	68	26	habitable room
37	room 18	F 1	SW	149.3	74	32	habitable room
37	room 18	F 2	SW	151.8	79	37	habitable room
38	room 19	GF	SW	146.8	68	26	habitable room
38	room 19	F 1	SW	149.3	74	32	habitable room
38	room 19	F 2	SW	151.8	79	37	habitable room
39	room 20	GF	SW	146.8	68	26	habitable room
39	room 20	F 1	SW	149.3	74	32	habitable room
39	room 20	F 2	SW	151.8	78	36	habitable room
40	secure garden	GF	SW	146.7	N/A	N/A	outdoor living area
41	Secure garden	GF	SW	146.8	N/A	N/A	outdoor living area

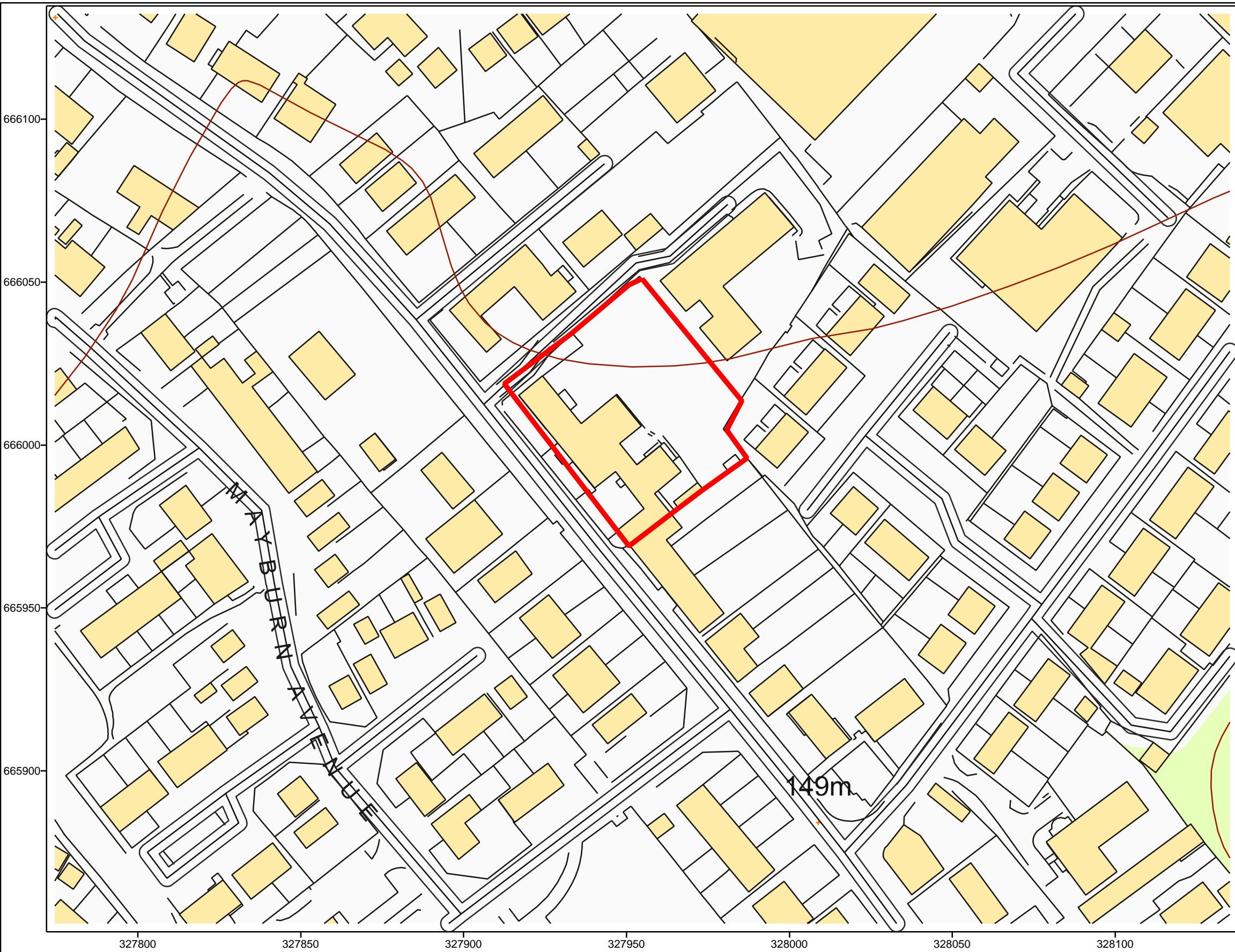
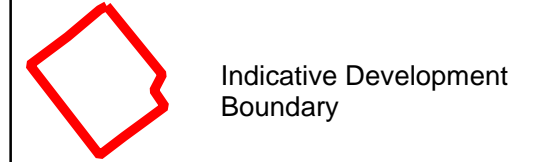
Notes

Attenuation requirements for windows are dB Rw + Ctr (based on urban traffic) where Rw + Ctr are as defined in BS EN ISO 717-1:2020
 Attenuation requirements for trickle vents are dB Dn,w (based on urban traffic) as defined in BS EN ISO 717-1:2020
 These calculations assume that a partially open window will provide an attenuation of 15 dBA
 The calculations assume that the LAF max will be (32) dB above the predicted night-time LAeq based on the relationship between the measured night-time LAFmax and LAeq
 The calculations assume that the minimum attenuation provided by a closed window and trickle vents = 28 dB Rw + Ctr / Dn,w

Figures

Residential Care Home
Loanhead

Figure 1
Site Location

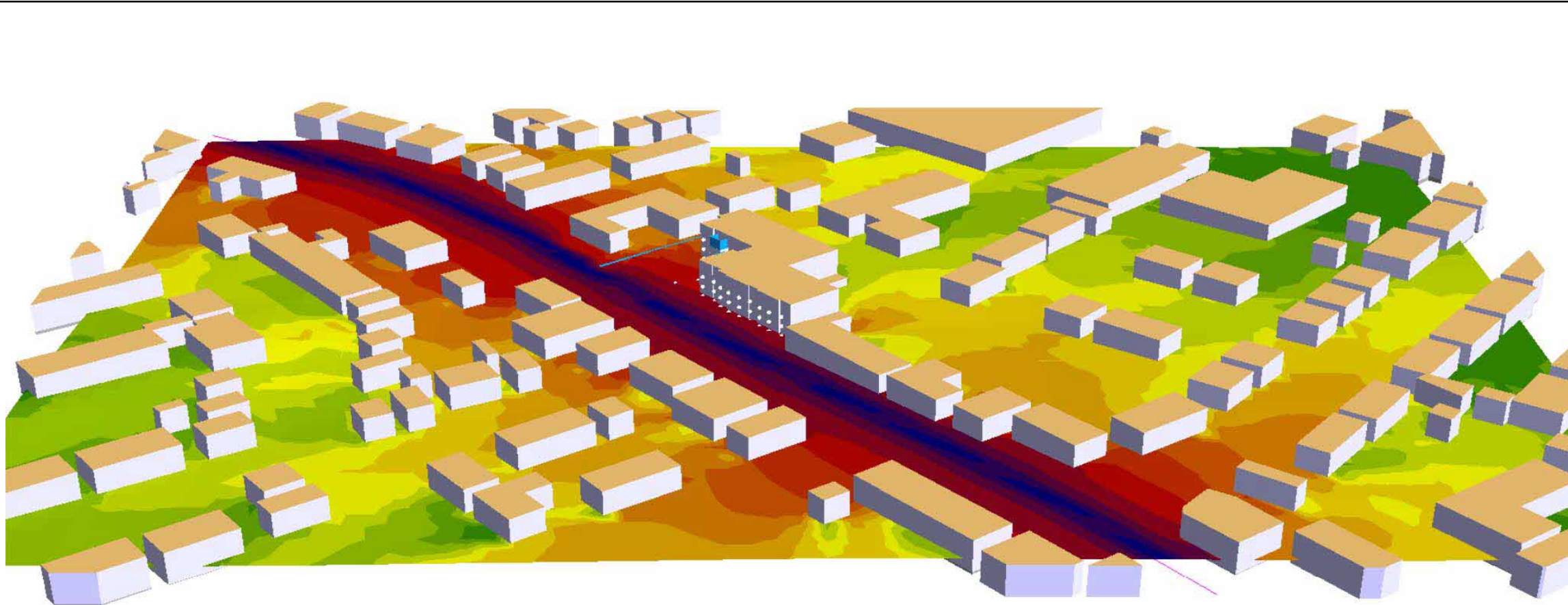




Residential Care Home
Loanhead

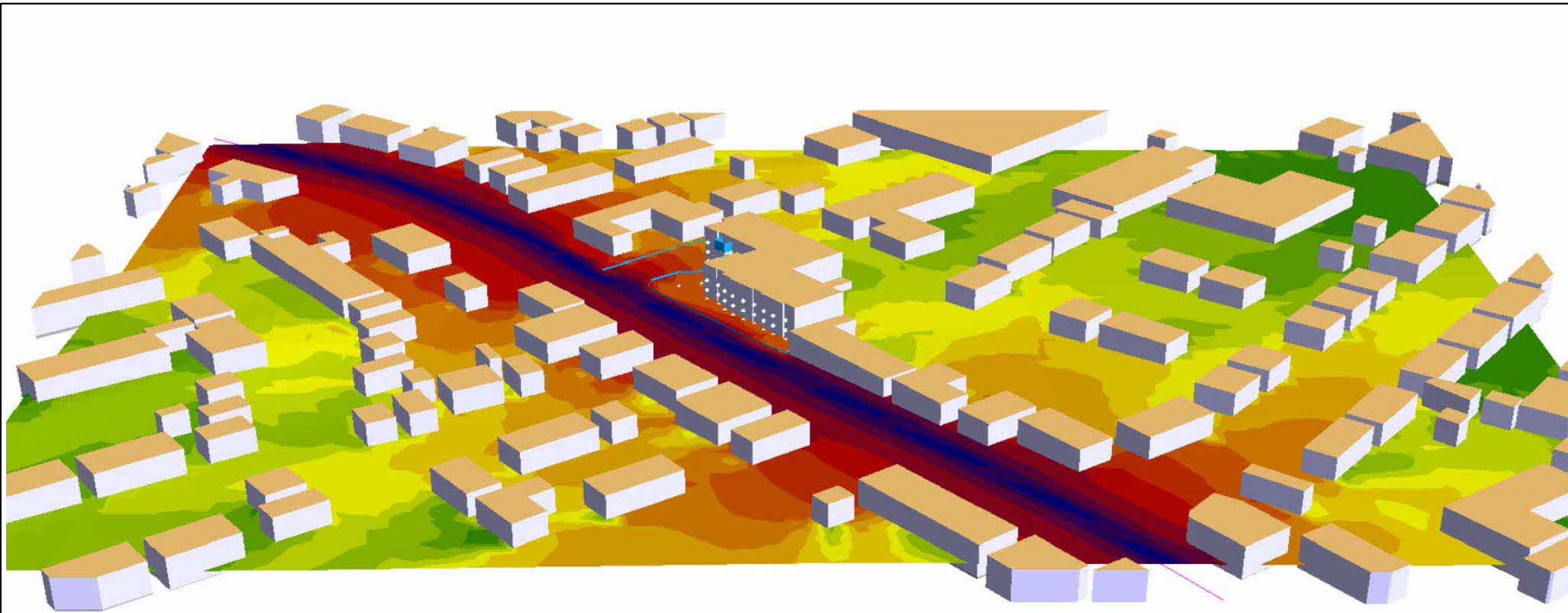
Figure 2
Baseline Survey

⊕ location of baseline survey



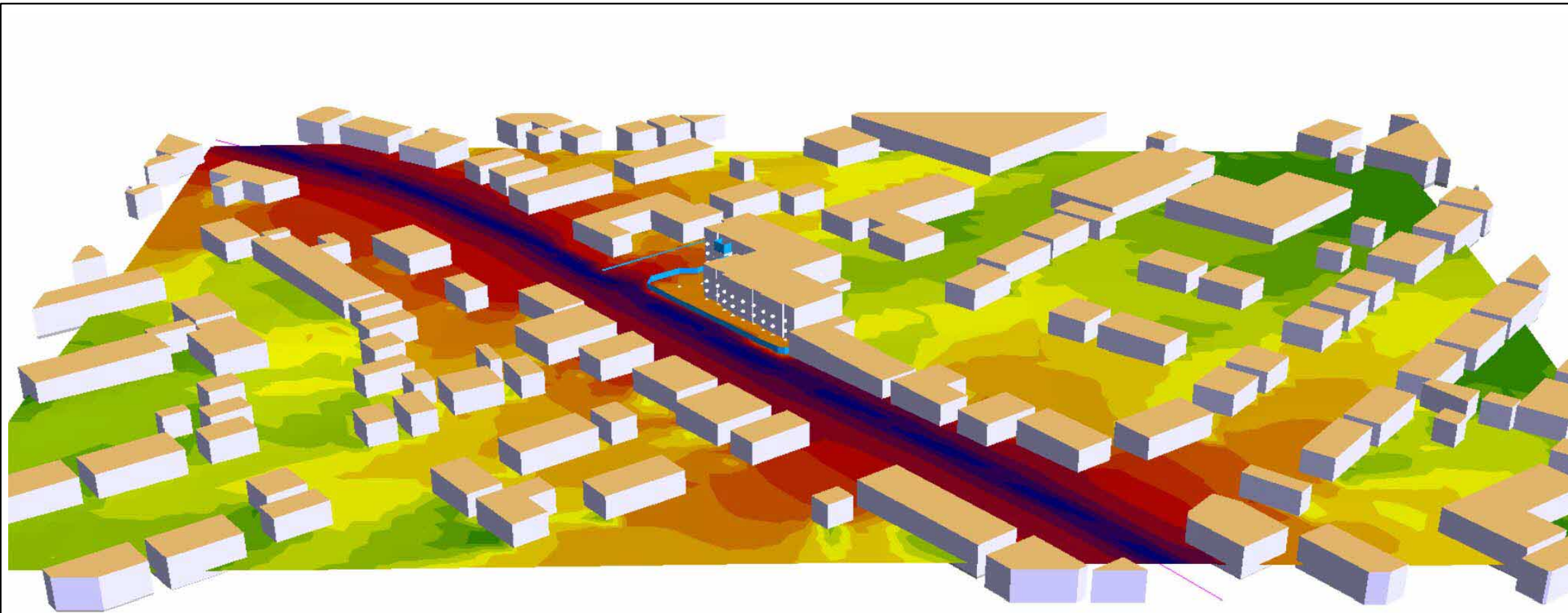
Residential Care Home
Loanhead

Figure 3.1 - Scenario 2
Model Layout - No barrier



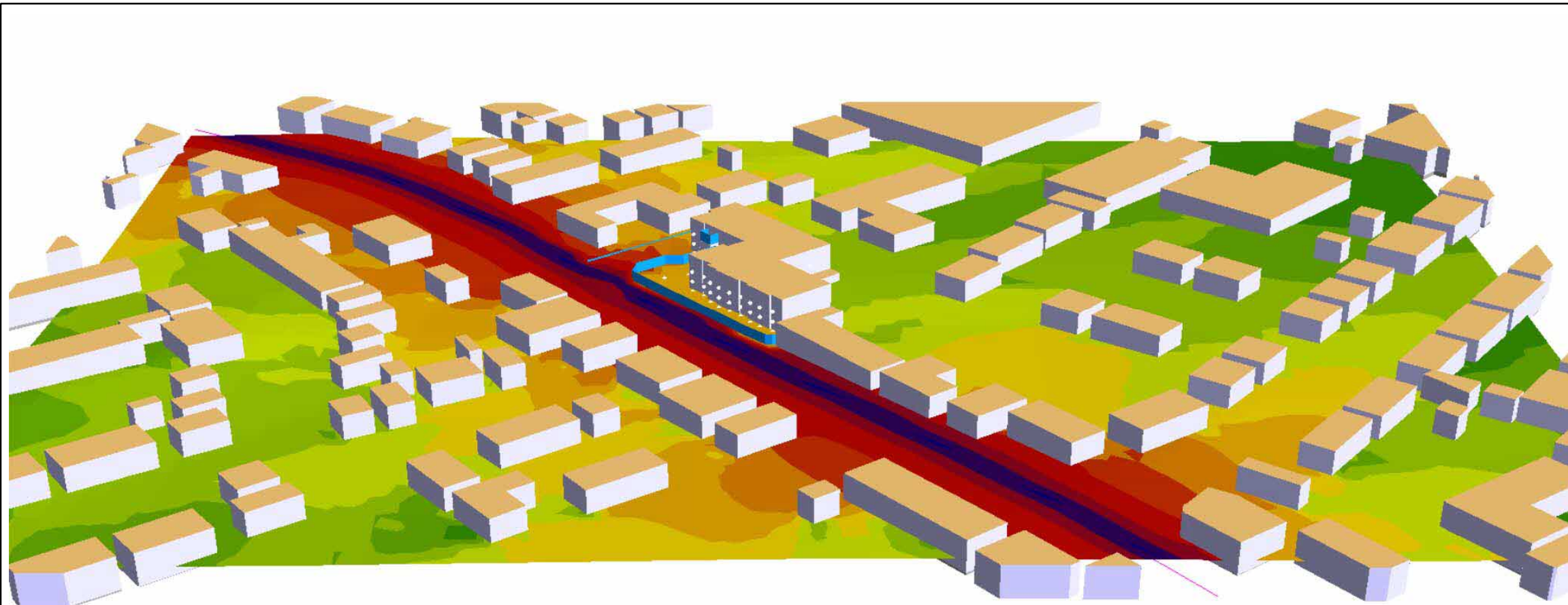
Residential Care Home
Loanhead

Figure 3.2 - Scenario 2
Model Layout - 2m barrier



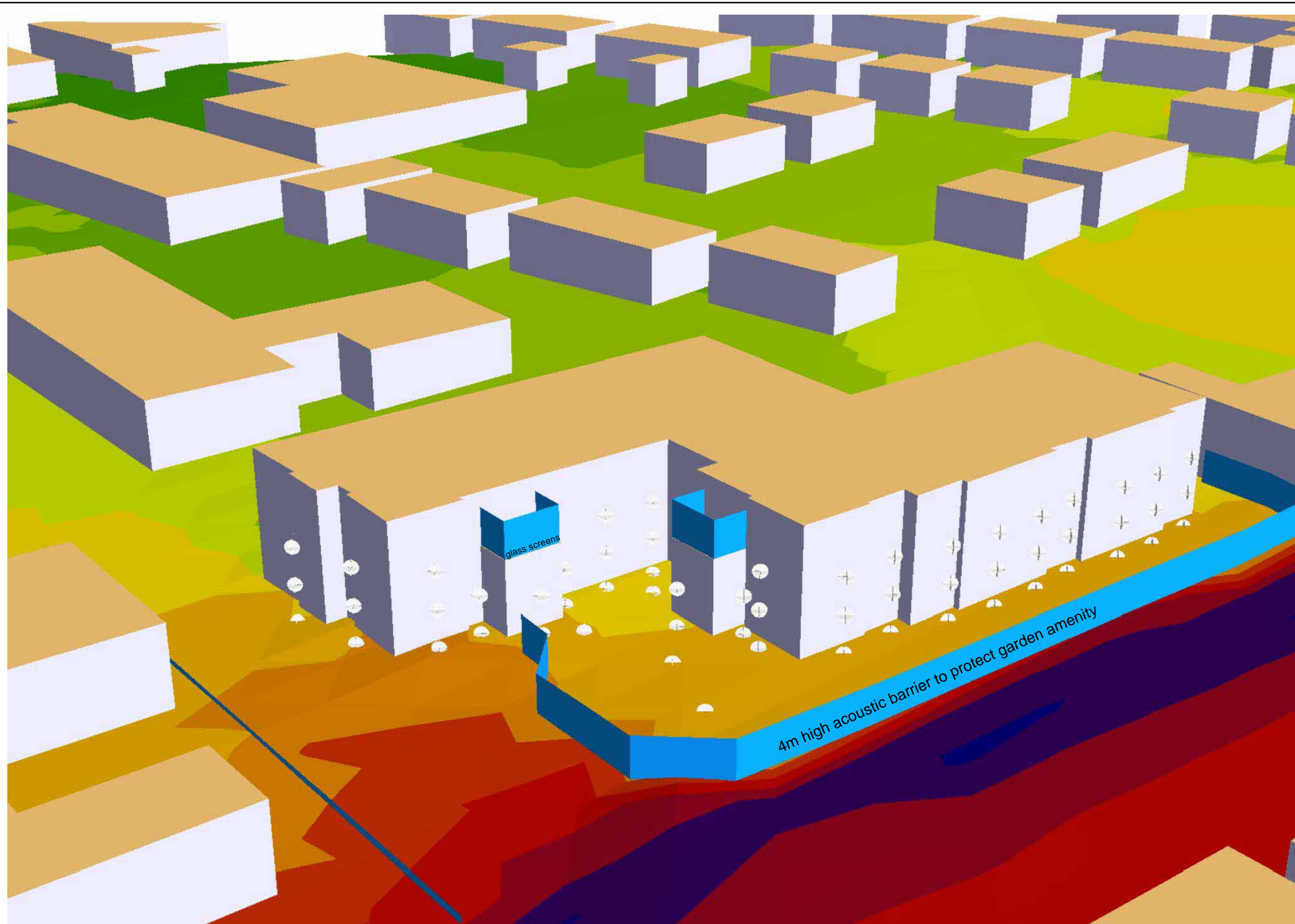
Residential Care Home
Loanhead

Figure 3.3 - Scenario 2
Model Layout - 3m barrier



Residential Care Home
Loanhead

Figure 3.4 - Scenario 2
Model Layout - 4m barrier

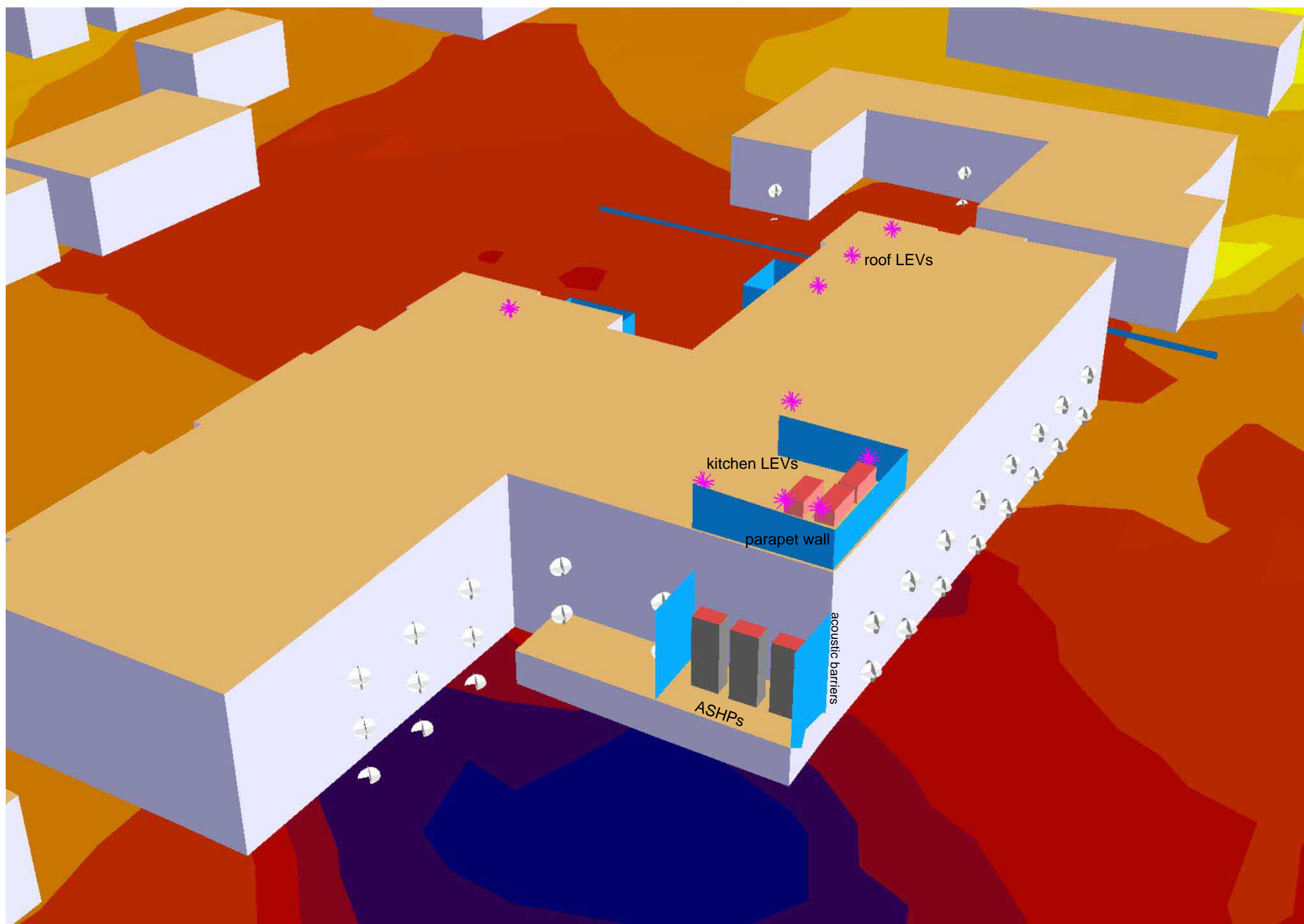


Residential Care Home
Loanhead

Figure 3.5 - Scenario 2
Model Layout - 4m barrier

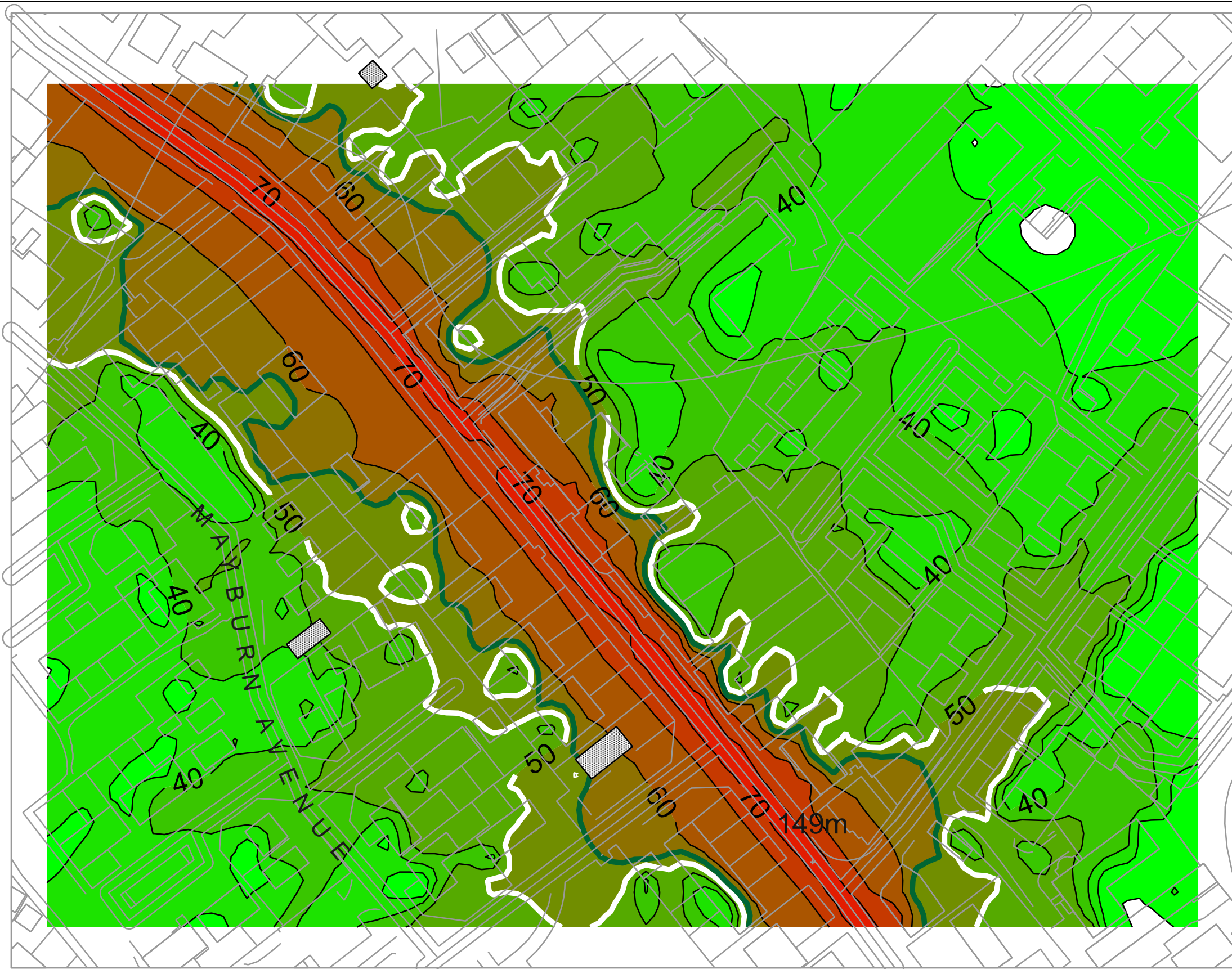
Residential Care Home
Loanhead

Figure 3.6 - Scenario 3
Model Layout



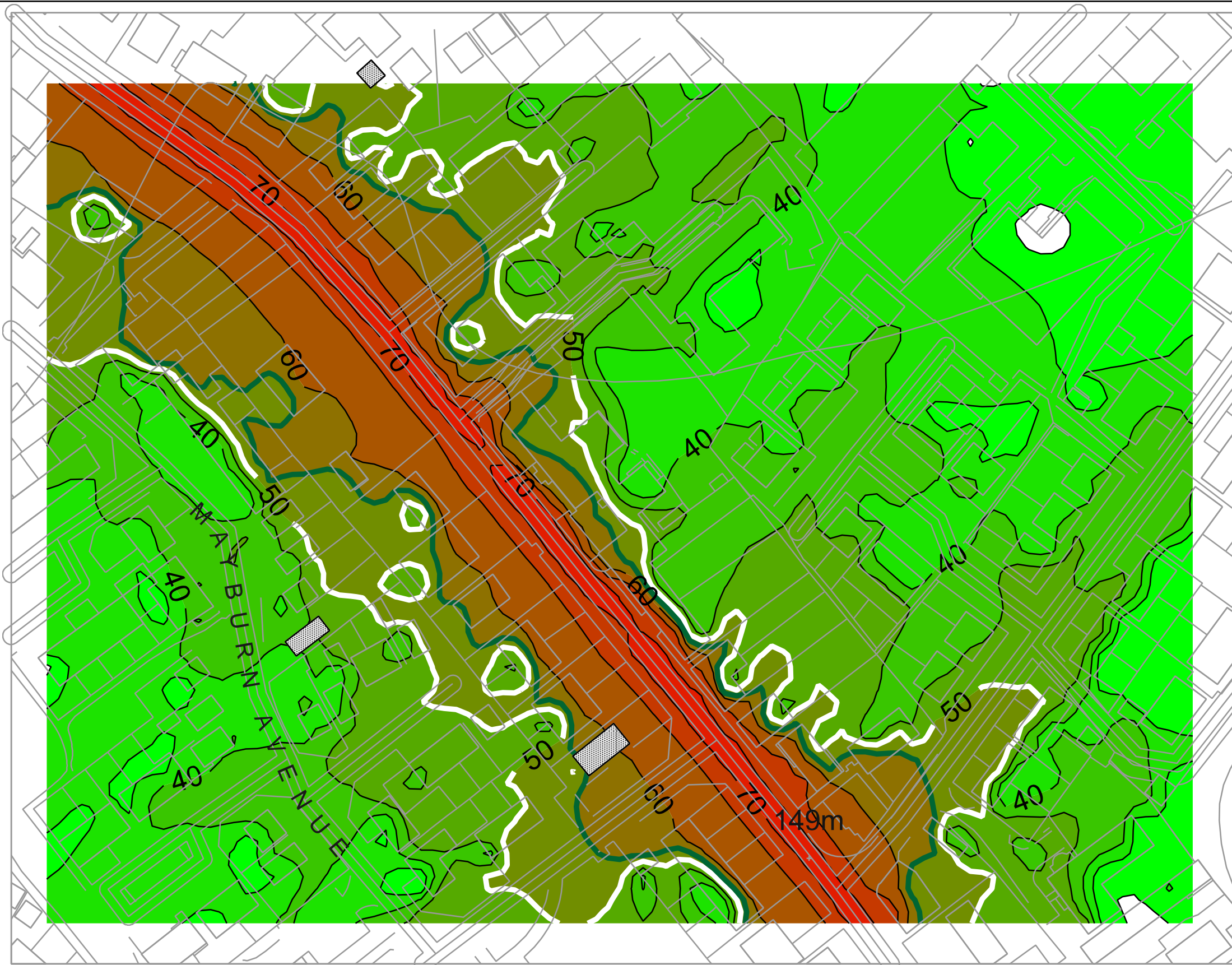
Residential Care Home
Loanhead

Figure 4.1 - Daytime
Predicted Road Noise



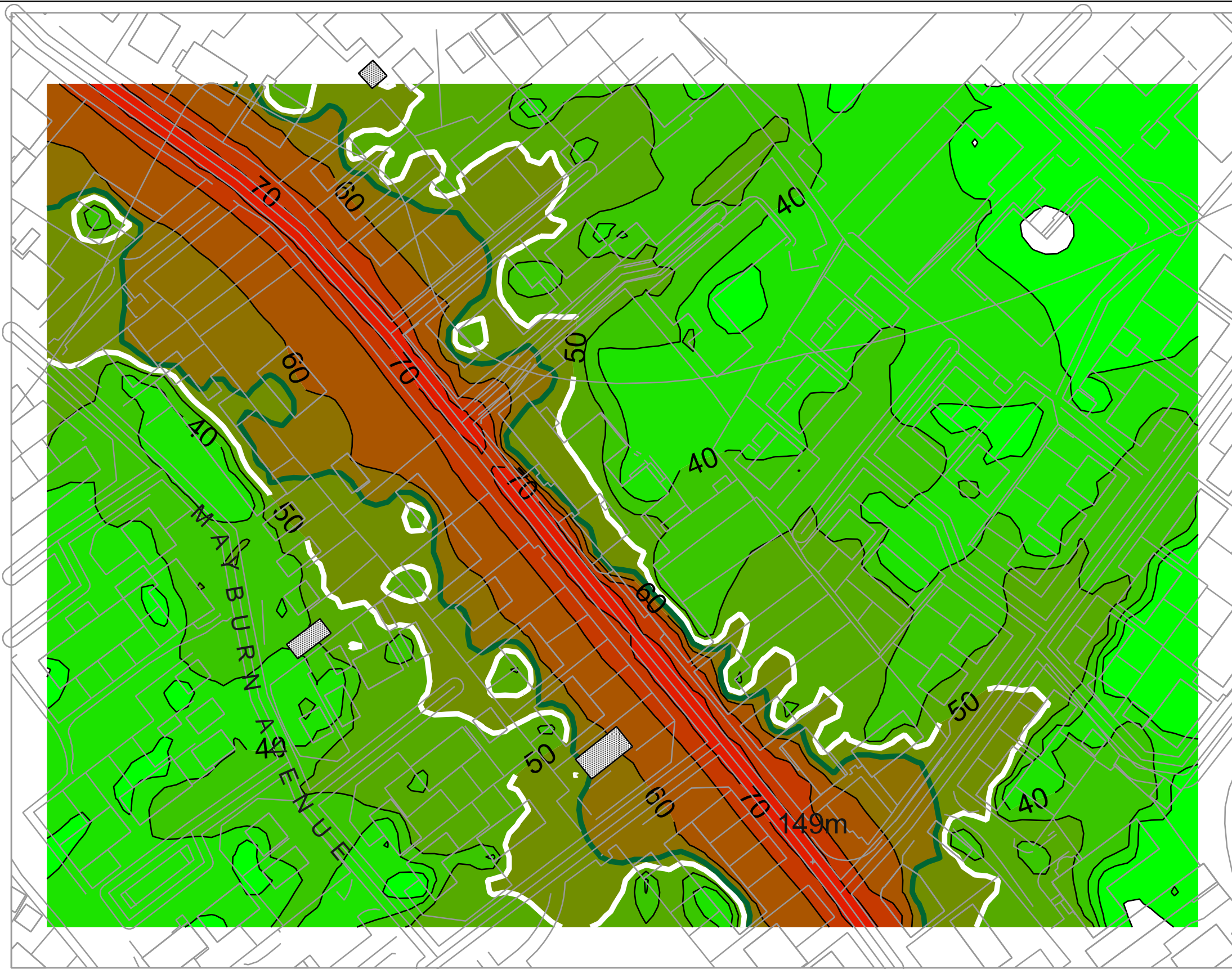
Residential Care Home
Loanhead

Figure 4.2 - Daytime
Predicted Road Noise



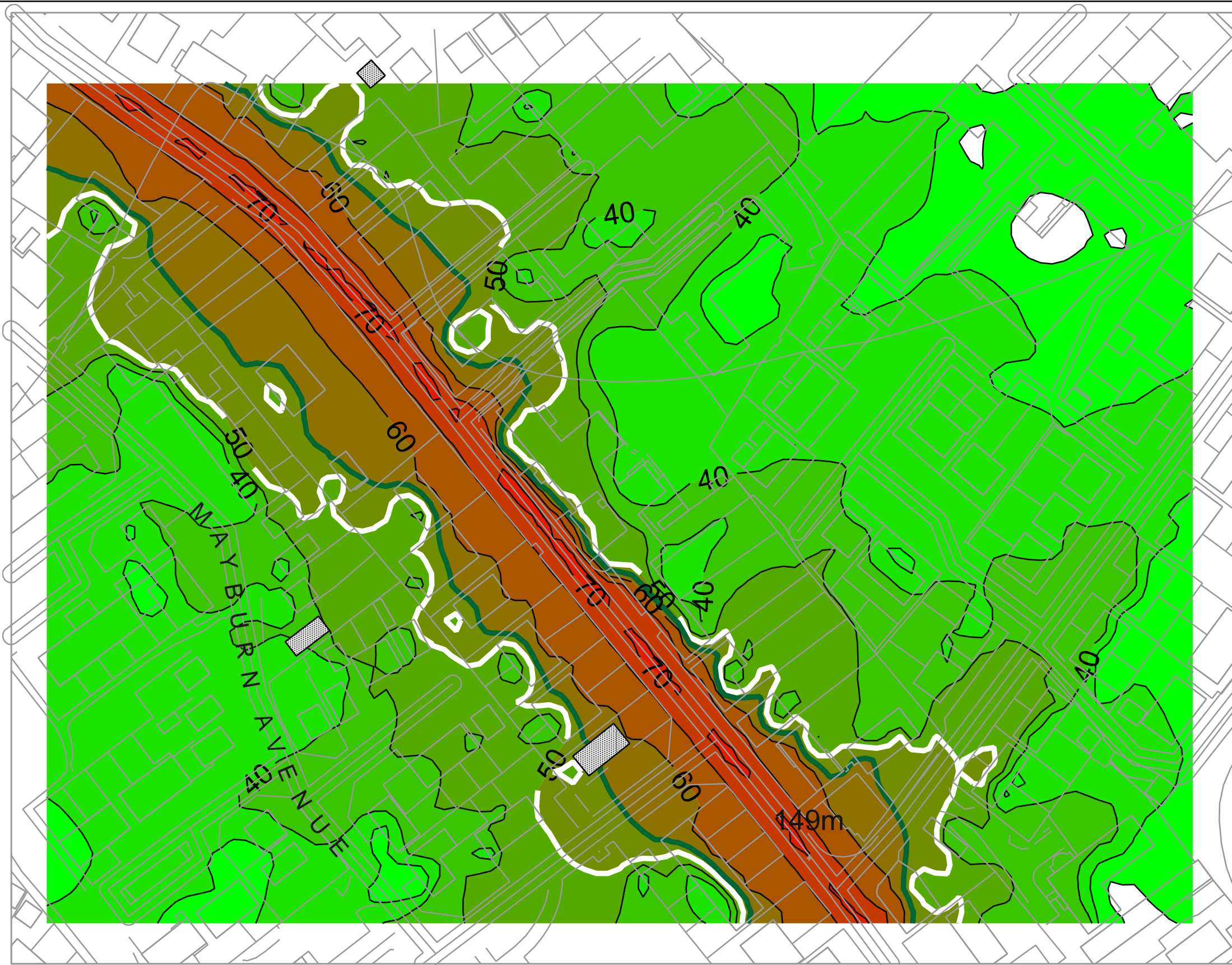
Residential Care Home
Loanhead

Figure 4.3 - Daytime
Predicted Road Noise



Residential Care Home
Loanhead

Figure 4.4 - Daytime
Predicted Road Noise



Residential Care Home
Loanhead

Figure 4.5 - Daytime
Predicted Road Noise

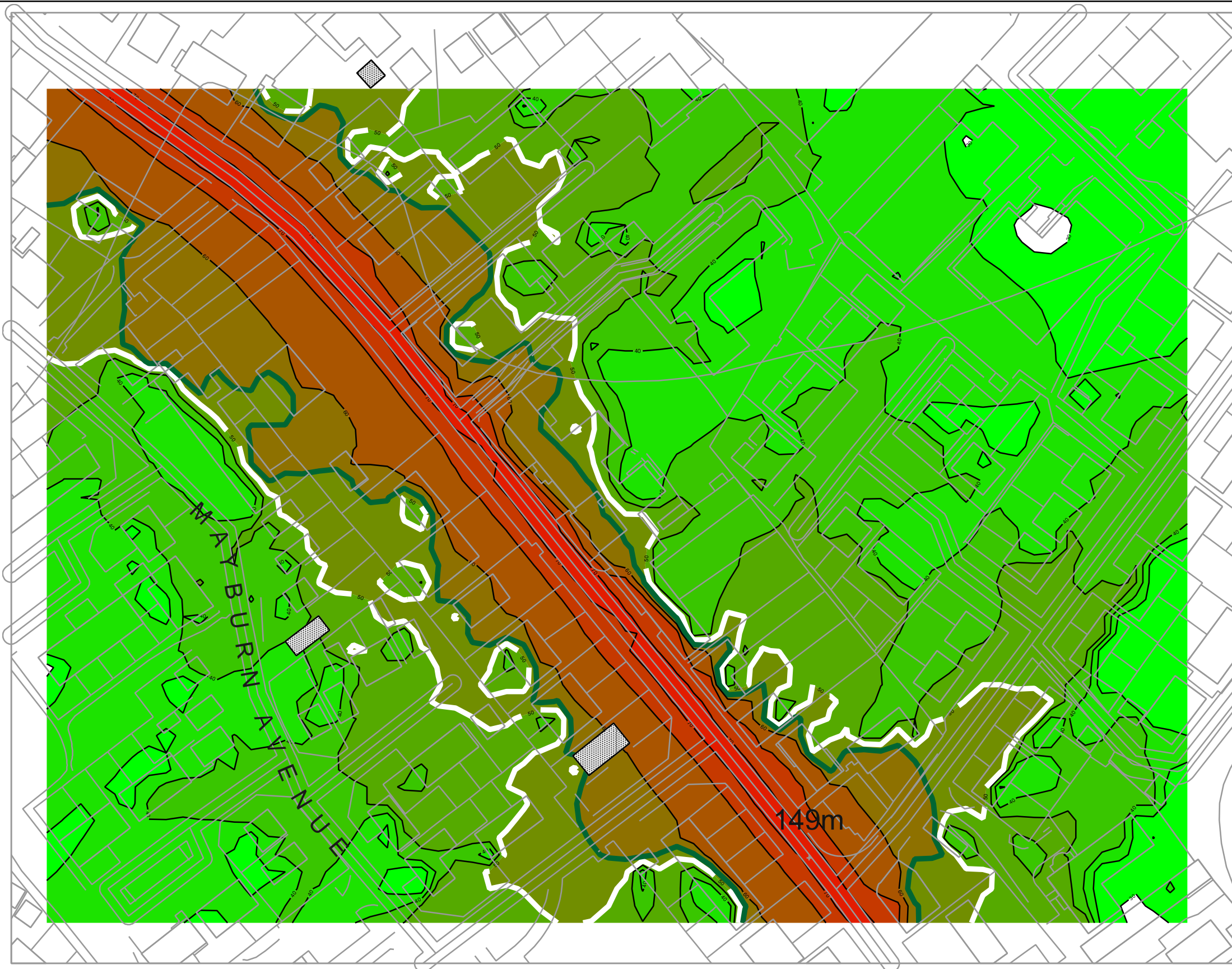
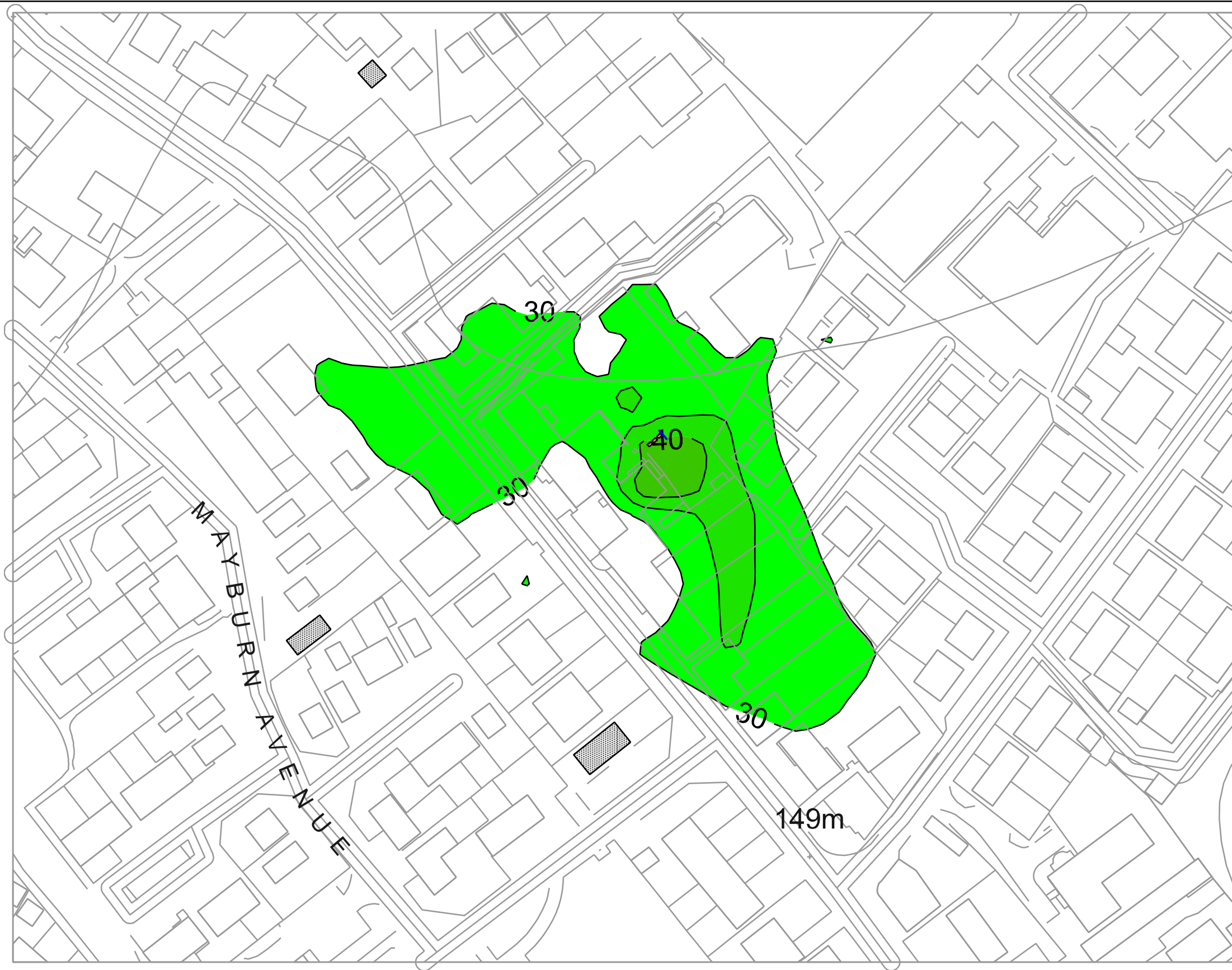
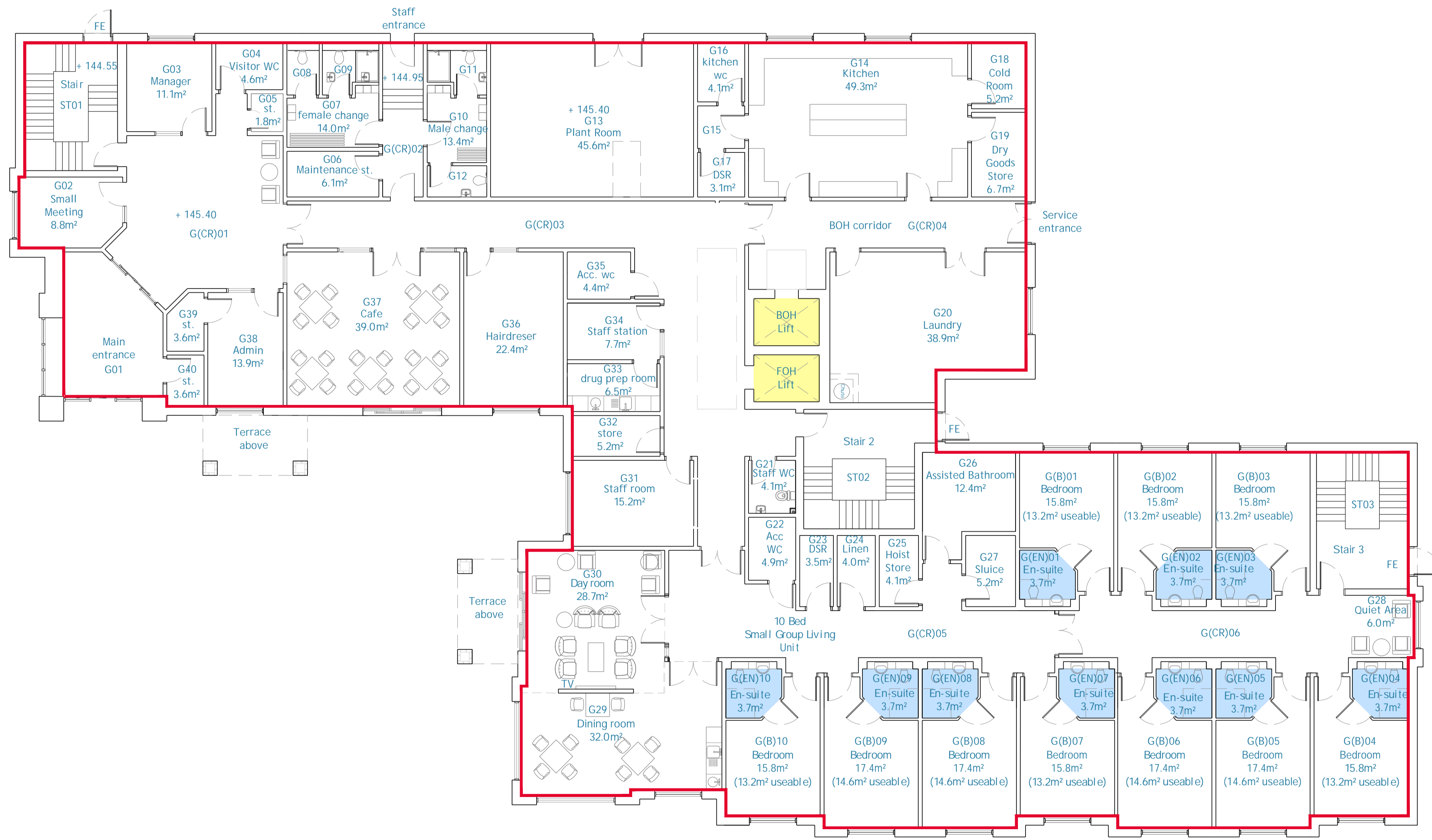


Figure 5
Noise from Fixed Plant



Appendix 1 – Project Description

Revision A	MP	01.03.23
By	MP	
• Changes as per Client's comments.		
Revision B	MP	08.03.23
By	MP	
• Changes as per Client's comments.		
Revision C	MP	24.03.23
By	MM	
• Changes as design development.		
Revision D	MM	31.03.23
By	MM	
• Overall building width reduced.		
Revision E	MP	19.04.23
By	MP	
• Manager room and visitor WC changed.		
• Sheet size updated.		



DRAWING LEGEND	
GIA area on Plan	—
Ground Floor GIA:	1004m ²
First Floor GIA:	966m ²
Second Floor GIA:	960m ²
Total GIA:	2930m ²
GIA per Resident:	58.60m ²

planform

PROPOSED 50 BED CARE HOME
HAWTHORN GARDENS
LOANHEAD

PROPOSED GROUND FLOOR PLAN

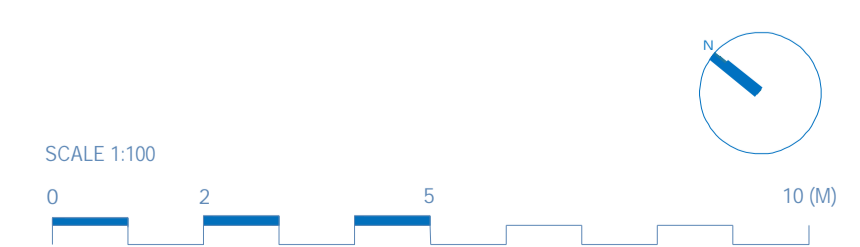
DWG NO. 173-300 REV. E

SCALE 1:100 SIZE A1

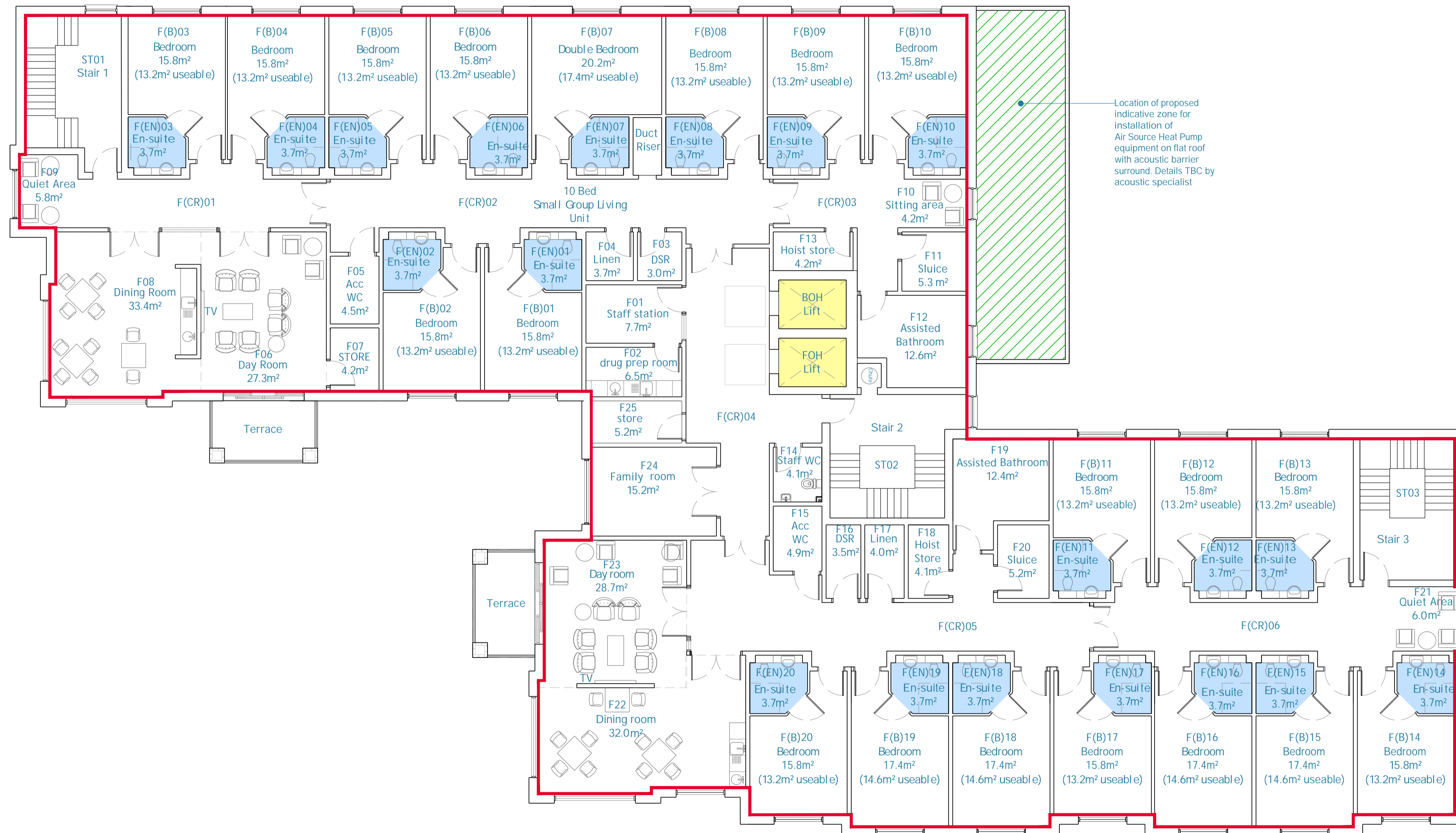
DWN BY MP CHECK BY SD

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Revision A	01.03.23
by MP	
• Changes as per Client's comments.	
Revision B	08.03.23
by MP	
• Changes as per Client's comments.	
Revision C	24.03.23
by MP	
• Changes as design development.	
Revision D	31.03.23
by MM	
• Overall building width reduced.	
Revision E	19.04.23
by MP	
• Sheet size updated.	
Revision F	16.05.23
by MM	
• Sheet size updated.	



DRAWING LEGEND	
GIA area on Plan	
Ground Floor GIA:	1004m ²
First Floor GIA:	966m ²
Second Floor GIA:	960m ²
Total GIA:	2930m ²
GIA per Resident:	58.60m ²

planform

PROPOSED 50 BED CARE HOME
HAWTHORN GARDENS
LOANHEAD

PROPOSED FIRST FLOOR PLAN

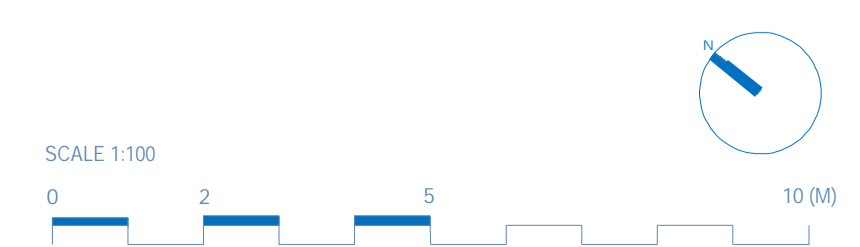
DWG NO. 173-301 REV. F

SCALE 1:100 SIZE A1

DWN BY MP CHECK BY SD

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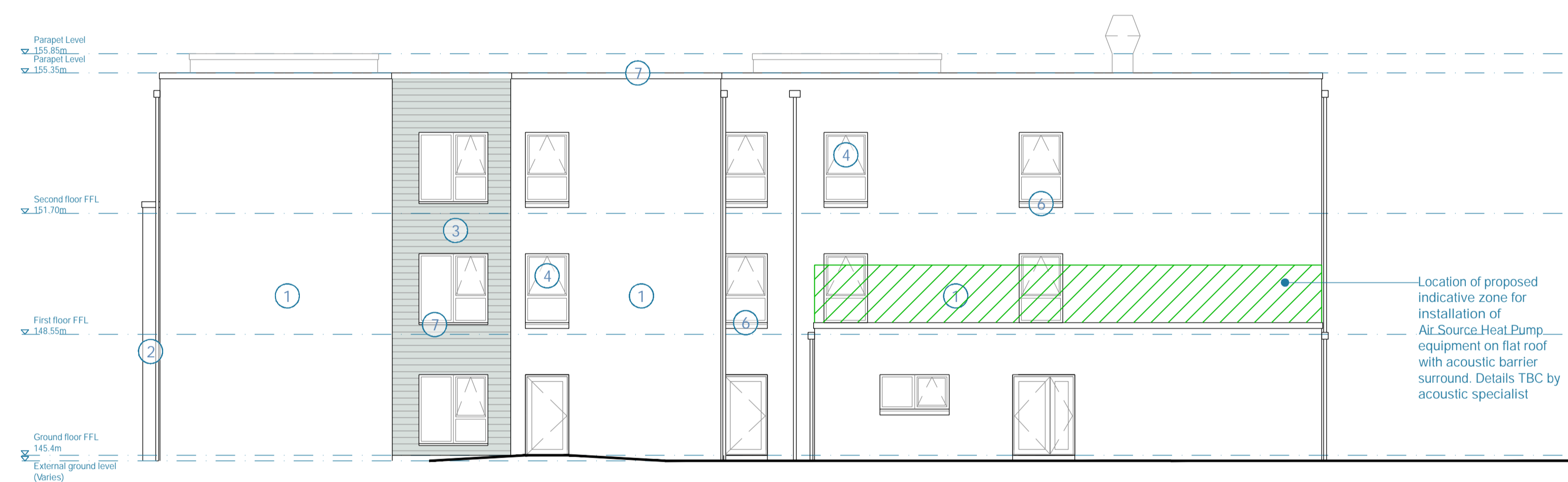


ELEVATION A: South-West Elevation to Hawthorn Gardens (Front Elevation)
 Scale- 1:100

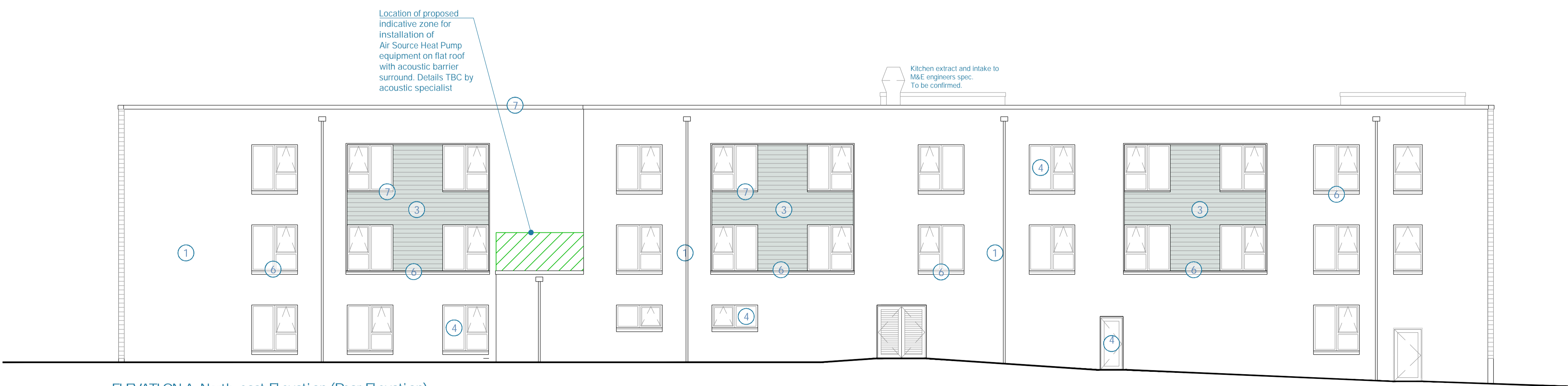
- MATERIAL LEGEND
- ① FACING BRICK (LIGHT) - VANDERSANDEN DRAYTON CREAM
 - ② FACING BRICK (DARK) - VANDERSANDEN SAO PAULO
 - ③ CEDRAL CLICK- SLATE GREY (TBC)
 - ④ GREY COLOURED UPVC TO WINDOWS, DOORS AND RAINWATER GOODS
 - ⑤ GLASS BALUSTRADE
 - ⑥ CAST STONE CILL
 - ⑦ ALUMINUM FLASHING



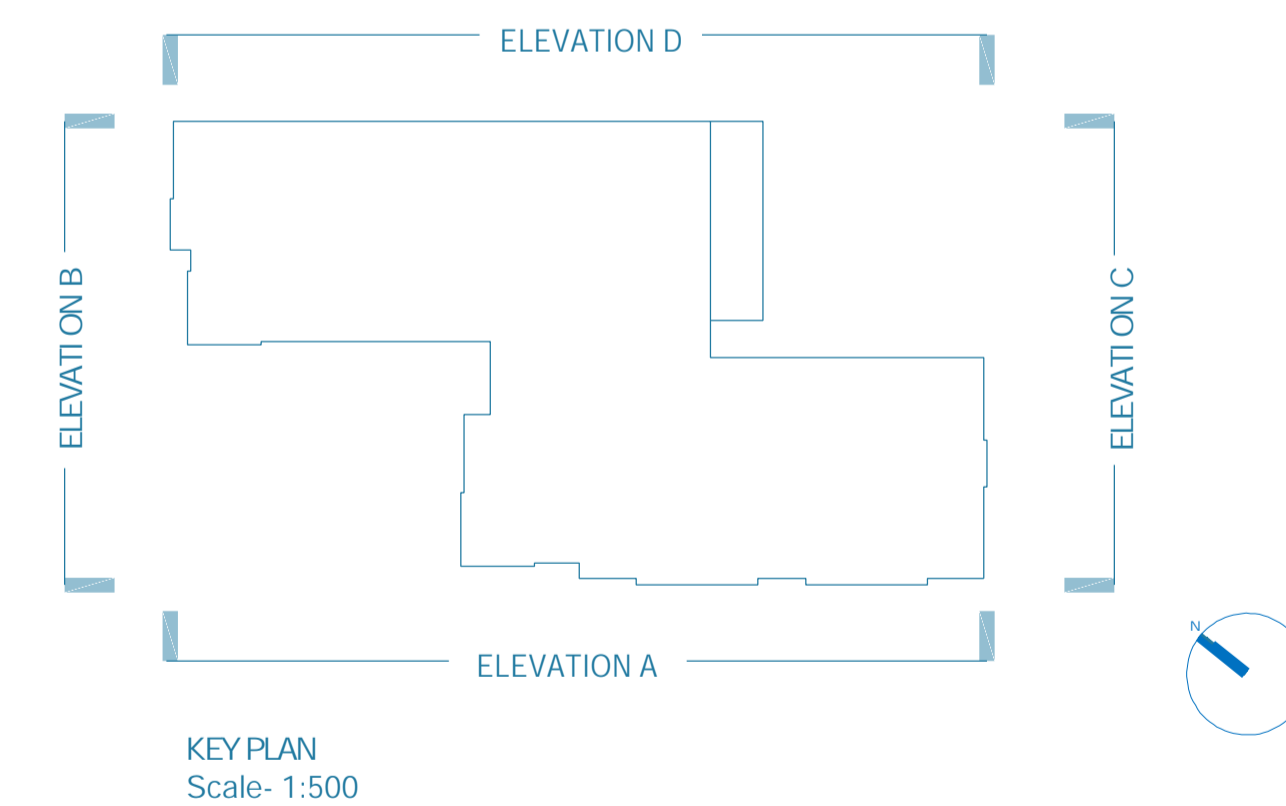
ELEVATION A: North-West Elevation (Left Elevation)
 Scale- 1:100



ELEVATION A: South-East Elevation (Right Elevation)
 Scale- 1:100



ELEVATION A: North-east Elevation (Rear Elevation)
 Scale- 1:100



KEY PLAN
 Scale- 1:500



PROPOSED 50 BED CARE HOME
 HAWTHORN GARDENS
 LOANHEAD

PROPOSED ELEVATIONS

DWG NO.	173-501	REV	A
SCALE	1:100	SIZE	A1
DWN BY	MP	CHECK BY	SD



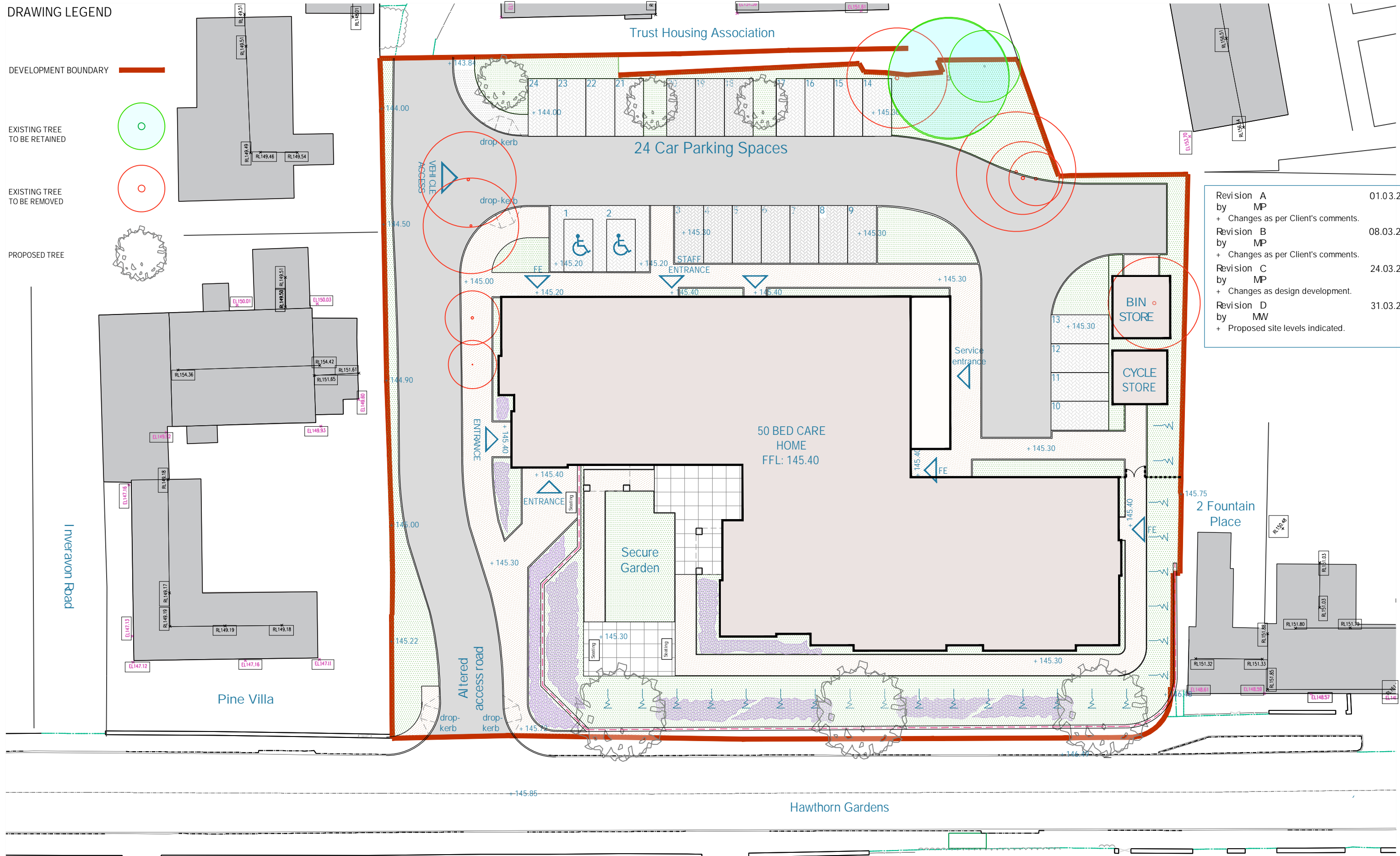
DRAWING LEGEND

DEVELOPMENT BOUNDARY

EXISTING TREE TO BE RETAINED

EXISTING TREE TO BE REMOVED

PROPOSED TREE



Revision A	01.03.23
by MP	
+ Changes as per Client's comments.	
Revision B	08.03.23
by MP	
+ Changes as per Client's comments.	
Revision C	24.03.23
by MP	
+ Changes as design development.	
Revision D	31.03.23
by MW	
+ Proposed site levels indicated.	

PROPOSED 50 BED CARE HOME
HAWTHORNE GARDENS
LOANHEAD

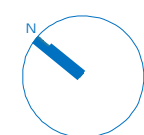
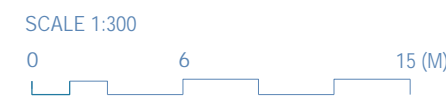
PROPOSED SITE PLAN

DWG NO: 173-201 REV. D

SCALE: 1:300

SIZE: A3

DRAWN BY: RL CHECKED BY: SD



planform

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Appendix 2 – Baseline Noise Survey

Noise Survey

Project Number: AS 0988 Project Name: Loanhead
Log Book Number: J002

Site No: 1 Start Date/Time: Wednesday 17th May 2023 12.30
Location : B702/Hawthorn Gardens End Date/Time: Wednesday 17th May 2023 15.45
6m north of nearside kerb. 3.5m from corner of existing building
Sound Level Meter: 9
Calibration at End: 113.8

Start Date/Time: Tuesday 23rd May 2023 00.10
End Date/Time: Tuesday 23rd May 2023 01.10

Norsonic Nor-1251 Acoustic Calibrator B Serial No. 34961

Norsonic Nor-145 Sound Level Meter 9 Serial No. 14530081
Norsonic 1225 Serial No. [REDACTED]
Norsonic Nor-1217 Outdoor Protection Kit Serial No. [REDACTED]
Calibration Factor 113.8



Traffic noise from B702 dominant. Occasional traffic passing meter very close on local access road.



Laboratory Location

Campbell Associates Ltd

5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
Phone 01371 871030



Certificate of Calibration and Conformance

Certificate number: U42774

Test Object: Sound Calibrator

Producer: Norsonic AS.
Type: 1251
Serial number: 34961
Customer: The Airshed Ltd
Address: 5 Lauder Place, East Linton,
East Lothian, EH40 3DB.
Contact Person: Hilary Fraser
Order No: AS-22-05

Measurement Results	Level dB	Level Stability dB	Frequency Hz	Distortion %
Measurement 1	114.00	0.05	1000.61	0.36
Measurement 2	114.01	0.05	1000.61	0.35
Measurement 3	114.01	0.04	1000.62	0.36
Result (Average):	114.01	0.05	1000.61	0.36
Expanded Uncertainty:	0.1	0.02	1	0.25
Degree of Freedom:	>100	>100	>100	>100
Coverage Factor:	2	2	2	2

The stated level is relative to 20µPa. The level is traceable to National Standards. The stated level is valid at reference conditions. The following correction factors have been applied during the measurement

Pres:0.0005 dB/kPa Temp:0.003 dB/°C Humi:0 dB/%RH Load volume: 0.0003 dB/mm³

Conditions	Pressure kPa	Temperature °C	Humidity %RH
Reference conditions	101.325	23	50
Measurement conditions	99.945 ±0.054	22.8 ±0.3	33.9 ±1.9

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.

Records: K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2022\NOR1251_34961_M1.nmf

Preconditioning

The equipment was preconditioned for more than 4 hours in the specified calibration environment.

Method

Calibration has been performed as set out in the current version of CA Technical procedure TP01

Calibration Dates:

Received date:	09/12/2022	Reviewed date:	16/12/2022
Calibration date:	14/12/2022	Issued date:	16/12/2022

Technicians:

Calibrated by:

Reviewed by:

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Certificate of Calibration

Certificate No.: 4766792542

Object: Precision Sound Analyser Nor 145
Supplier: Norsonic AS
Type: Nor 145
Serial number: 14530081
Client: The Airshed Limited

This instrument is tested and calibrated in accordance to the Norsonic production standard set for Nor145, ensuring that the instrument conforms to the following standards;

IEC 61672-1:2002 class 1
IEC 61260-1 class 1 Ed 1.0 2014-02
ANSI S1.4-1983 (R2001) with amd. S1.4A-1985 class 1
ANSI S1.43-1997 (R2002) class 1
ANSI S1.11-2004 class 1
DIN 45 657, Applicable parts
IEC 61094 part 4

Instrumentation used for calibration traceable to:

Electrical Parameters: MT, Norway
Acoustical Parameters: PTB, Germany
Environmental Parameters: Justervesenet, Norway

Adjustments: None

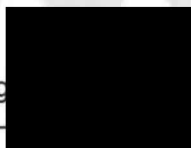
Comments: None

Date of calibration: 2023-04-13
Calibration interval recommended 2 years

The environmental parameters applicable to this calibration are kept well within limits ensuring negligible deviation on obtained measurement results.

Calibrated by:

Signature



Warranty

Norsonic products are thoroughly inspected before they leave the factory. Carefully check the shipment for any physical damage in transit. Notify the factory or the distributor and file the claim with the carrier if there is any such damage.

Product type: Precision Sound Analyser Nor 145

Serial no.: 14530081

Power: 9-15 Volt DC

Option included: 3,4,11,12,13,60

Option

description:

- 01: Built in GPS and support for external IP Camera
- 03: 1/1 & 1/3 octave filters 0,1-20kHz with reference spectrum and QC test
- 04: Audio recording and markers
- 07: Signal Generator
- 08 Reverberation time calculation. Requires option 3
- 09: Building acoustic w/calculation of field standards. Requires option 3,7,8
- 11: Enhanced noise assessment package with profile B and noise monitoring scheduler
- 12: NorCloud
- 13: FFT option
- 14: Ultrasound up to 40kHz

Application version:

5.0.2129

Id no.:

66792542

Accessories:

Preamplifier 1: Nor1209
Microphone 1: Nor1227

Serial No.: 23778
Serial No.: 516648

Related to order: SO2313006

Checked and approved 

Date: 2023-04-13

Warranty statement

Norsonic products are warranted against defects in material and workmanship. This warranty applies to 36 months from date of delivery. Rechargeable batteries and commercial available computer products and peripherals such as modems, printers etc supplied by Norsonic is covered by a 12 month warranty, unless other stated.

Norsonic AS will repair or replace equipment, which proves to be defective during the warranty period. This warranty includes labour and parts. Equipment returned to the factory, for repair must be shipped freight prepaid. Repair due to misuse of the equipment and/or use of hardware, software or interfacing not provided by Norsonic AS are not covered by this warranty.

No other warranty is expressed or implied, included, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Norsonic AS shall not be liable for consequential damages.

Appendix 3 – Noise Model Outputs

AS 0988 Loanhead Residential Care Home

Run info

Scenario 1 - baseline

Project info

Project title: AS 0988 Loanhead Residential Care Home
Project No.:
Project engineer: Steve Fraser
Customer: Mansefield Care

Description:
noise impact assessment for proposed residential care home

Run description

Calculation type: Single Point Sound
Title: Scenario 1 - baseline
Group
Run file: RunFile.runx
Result number: 2
Local calculation (ThreadCount=4)
Calculation start: 23/05/2023 17:09:43
Calculation end: 23/05/2023 17:09:46
Calculation time: 00:01:426 [m:s.ms]
No. of points: 1
No. of calculated points: 1
Kernel version: SoundPLANnoise 9.0 (17/05/2023) - 64 bit

Run parameters

Reflection order: 3
Maximum reflection distance to receiver: 200 m
Maximum reflection distance to source: 50 m
Search radius: 5000 m
Weighting: dB(A)
Allowed tolerance (per individual source): 0.100 dB
Create ground effect areas from road surfaces: No
Treat roads as terrain following: No

Standards:

Industry: ISO 9613-2: 1996
Air absorption: ISO 9613-1
regular ground effect (chapter 7.3.1), for sources without a spectrum automatically alternative ground effect
Limitation of screening loss:
single/multiple 20.0 dB /25.0 dB
Side diffraction: ISO/TR 17534-3:2015 compliant: no side diffraction if terrain blocks line of sight
Use Eqn (Abar=Dz-Max(Agr,0)) instead of Eqn (12) (Abar=Dz-Agr) for insertion loss
Environment:
Air pressure 1013.3 mbar
rel. humidity 70.0 %
Temperature 10.0 °C
Meteo. corr. C0(7-23h)[dB]=0.0; C0(23-7h)[dB]=0.0;
Ignore Cmet for Lmax industry calculation: No

The Airshed

1

AS 0988 Loanhead Residential Care Home

Run info

Scenario 1 - baseline

Parameter for screening: C2=20.0

Dissection parameters:

Distance to diameter factor	8
Minimal distance	1 m
Max. difference ground effect + diffraction	1.0 dB
Max. number of iterations	4

Attenuation

Foliage:	ISO 9613-2
Built-up area:	ISO 9613-2
Industrial site:	ISO 9613-2

Assessment: PPG24 (day/night)

Reflection of "own" facade is suppressed

Geometry data

Baseline.sit	23/05/2023 17:09:28	
- contains:		
baseline survey.geo	18/05/2023 10:34:50	
calc area.geo	18/05/2023 09:34:20	
DXF_Building Polygon (15014).geo		18/05/2023 08:39:38
existing buildings (from vectormap).geo		18/05/2023 09:23:48
ground conditions.geo	18/05/2023 09:34:22	
OS vectormap.geo	18/05/2023 10:34:50	
traffic on Hawthorn Gardens (day).geo		18/05/2023 11:20:20
traffic on Hawthorn Gardens (night).geo		23/05/2023 17:09:28
RDGM0001.dgm	18/05/2023 08:53:02	

AS 0988 Loanhead Residential Care Home
 Assessed receiver levels
 Scenario 1 - baseline

Receiver	Fl	X m	Y m	Z m	LrD dB(A)	LrN dB(A)	
Baseline Site 1	GF	327913	666014	145.3	66	51	

	The Airshed	1
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**AS 0988 Loanhead Residential Care Home
Octave spectra of the sources in dB(A) - Scenario 1 - baseline**

3

Name	Source type	I or A m,m ²	Li dB(A)	R'w dB	L'w dB(A)	Lw dB(A)	KI dB	KT dB	LwMax dB(A)	DO-Wall dB	Time histogram	Emission spectrum	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	16kHz dB(A)	
road traffic noise (day)	Line	369.70			79.2	104.9	0.0	0.0	102.2	0	daytime	Hawthorn Gardes	79.2	83.8	92.2	96.7	102.9	96.5	85.8	76.5	64.2	
road traffic noise (night)	Line	369.70			64.2	89.9	0.0	0.0	102.2	0	night	Hawthorn Gardes	64.2	68.8	77.2	81.7	87.9	81.5	70.8	61.5	49.2	

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	The Airshed	1
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AS 0988 Loanhead Residential Care Home

Run info

Scenario 2 - scheme - no barrier

Project info

Project title: AS 0988 Loanhead Residential Care Home
Project No.:
Project engineer: Steve Fraser
Customer: Mansefield Care

Description:
noise impact assessment for proposed residential care home

Run description

Calculation type: Single Point Sound
Title: Scenario 2 - scheme - no barrier
Group
Run file: RunFile.runx
Result number: 3
Local calculation (ThreadCount=4)
Calculation start: 23/05/2023 17:12:18
Calculation end: 23/05/2023 17:14:12
Calculation time: 01:52:497 [m:s.ms]
No. of points: 41
No. of calculated points: 41
Kernel version: SoundPLANnoise 9.0 (17/05/2023) - 64 bit

Run parameters

Reflection order: 3
Maximum reflection distance to receiver: 200 m
Maximum reflection distance to source: 50 m
Search radius: 5000 m
Weighting: dB(A)
Allowed tolerance (per individual source): 0.100 dB
Create ground effect areas from road surfaces: No
Treat roads as terrain following: No

Standards:

Industry: ISO 9613-2: 1996
Air absorption: ISO 9613-1
regular ground effect (chapter 7.3.1), for sources without a spectrum automatically alternative ground effect
Limitation of screening loss:
single/multiple 20.0 dB /25.0 dB
Side diffraction: ISO/TR 17534-3:2015 compliant: no side diffraction if terrain blocks line of sight
Use Eqn (Abar=Dz-Max(Agr,0)) instead of Eqn (12) (Abar=Dz-Agr) for insertion loss
Environment:
Air pressure 1013.3 mbar
rel. humidity 70.0 %
Temperature 10.0 °C
Meteo. corr. C0(7-23h)[dB]=0.0; C0(23-7h)[dB]=0.0;
Ignore Cmet for Lmax industry calculation: No

The Airshed

1

AS 0988 Loanhead Residential Care Home

Run info

Scenario 2 - scheme - no barrier

Parameter for screening: C2=20.0

Dissection parameters:

Distance to diameter factor	8
Minimal distance	1 m
Max. difference ground effect + diffraction	1.0 dB
Max. number of iterations	4

Attenuation

Foliage:	ISO 9613-2
Built-up area:	ISO 9613-2
Industrial site:	ISO 9613-2

Assessment: PPG24 (day/night)

Reflection of "own" facade is suppressed

Geometry data

Scheme - no barrier.sit	20/05/2023 10:47:52	
- contains:		
calc area.geo	18/05/2023 09:34:20	
existing buildings to be retained (from vectormap).geo		20/05/2023 10:55:18
ground conditions.geo	18/05/2023 09:34:22	
new build.geo	20/05/2023 10:55:18	
OS vectormap.geo	18/05/2023 10:34:50	
traffic on Hawthorn Gardens (day).geo		18/05/2023 11:20:20
traffic on Hawthorn Gardens (night).geo		23/05/2023 17:09:28
RDGM0001.dgm	18/05/2023 08:53:02	

AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 2 - scheme - no barrier

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
1	F06 terrace	GF	SW	327933	666019	146.7	58	43	
1	F06 terrace	F 1	SW	327933	666019	149.2	58	43	
2	F06 terrace	F 3		327935	666020	152.6	46	31	
3	F06 terrace	GF	NW	327933	666022	146.6	57	42	
3	F06 terrace	F 1	NW	327933	666022	149.1	57	42	
4	F06terrace	GF	SE	327937	666018	146.6	56	41	
4	F06terrace	F 1	SE	327937	666018	149.1	57	42	
5	F08 dining	GF	NW	327932	666030	146.5	54	39	
5	F08 dining	F 1	NW	327932	666030	149.0	55	40	
5	F08 dining	F 2	NW	327932	666030	151.5	55	40	
6	F08 dining	GF	SW	327931	666024	146.6	57	42	
6	F08 dining	F 1	SW	327931	666024	149.1	58	43	
6	F08 dining	F 2	SW	327931	666024	151.6	58	43	
7	F09 Quiet area	GF	NW	327935	666034	146.3	53	38	
7	F09 Quiet area	F 1	NW	327935	666034	148.8	53	38	
7	F09 Quiet area	F 2	NW	327935	666034	151.3	53	38	
8	F10 sitting area	F 1	SE	327960	666004	149.5	38	23	
8	F10 sitting area	F 2	SE	327960	666004	152.0	39	24	
9	F12 Bathroom	F 1	SE	327956	666001	149.6	37	22	
9	F12 Bathroom	F 2	SE	327956	666001	152.1	38	23	
10	F22 dining	GF	SW	327932	666001	147.1	63	48	
10	F22 dining	F 1	SW	327932	666001	149.6	63	48	
10	F22 dining	F 2	SW	327932	666001	152.1	63	48	
11	F22 dining	GF	NW	327932	666006	147.0	60	45	
11	F22 dining	F 1	NW	327932	666006	149.5	61	46	
11	F22 dining	F 2	NW	327932	666006	152.0	61	46	
12	F22 Dining	GF	SW	327934	665998	147.2	62	47	
12	F22 Dining	F 1	SW	327934	665998	149.7	63	48	
12	F22 Dining	F 2	SW	327934	665998	152.2	62	47	
13	F23 terrace	GF	NW	327935	666011	146.9	59	44	
13	F23 terrace	F 1	NW	327935	666011	149.4	59	44	
14	F23 terrace	GF		327936	666009	152.9	48	33	
15	F23 terrace	GF	SW	327934	666007	147.0	58	43	
15	F23 terrace	F 1	SW	327934	666007	149.5	59	44	
16	F23 terrace	GF	NE	327938	666010	146.9	53	38	
16	F23 terrace	F 1	NE	327938	666010	149.4	54	39	
17	F24 family room	GF	NW	327941	666010	146.9	53	38	
17	F24 family room	F 1	NW	327941	666010	149.4	54	39	
17	F24 family room	F 2	NW	327941	666010	151.9	55	40	
18	outdoor terrace	GF		327925	666009	146.9	63	48	
19	outdoor terrace	GF		327939	666012	146.8	57	42	
20	room 01	GF	SW	327942	666012	146.8	53	38	

	The Airshed	1
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AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 2 - scheme - no barrier

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
20	room 01	F 1	SW	327942	666012	149.3	54	39	
20	room 01	F 2	SW	327942	666012	151.8	54	39	
21	room 02	GF	SW	327939	666015	146.7	55	40	
21	room 02	F 1	SW	327939	666015	149.2	56	41	
21	room 02	F 2	SW	327939	666015	151.7	56	41	
22	room 03	F 1	NE	327946	666033	148.7	40	25	
22	room 03	F 2	NE	327946	666033	151.2	40	25	
23	room 04	F 1	NE	327949	666030	148.7	38	23	
23	room 04	F 2	NE	327949	666030	151.2	39	24	
24	room 05	F 1	NE	327951	666027	148.8	38	23	
24	room 05	F 2	NE	327951	666027	151.3	39	24	
25	room 06	F 1	NE	327953	666024	148.9	39	24	
25	room 06	F 2	NE	327953	666024	151.4	40	25	
26	room 07	F 1	NE	327956	666021	149.0	39	24	
26	room 07	F 2	NE	327956	666021	151.5	40	25	
27	room 08	F 1	NE	327959	666018	149.2	38	23	
27	room 08	F 2	NE	327959	666018	151.7	39	24	
28	room 09	F 1	NE	327961	666015	149.3	38	23	
28	room 09	F 2	NE	327961	666015	151.8	39	24	
29	room 10	F 1	NE	327964	666012	149.4	38	23	
29	room 10	F 2	NE	327964	666012	151.9	38	23	
30	room 11	GF	NE	327956	665997	147.3	37	22	
30	room 11	F 1	NE	327956	665997	149.8	37	22	
30	room 11	F 2	NE	327956	665997	152.3	37	22	
31	room 12	GF	NE	327959	665994	147.4	38	23	
31	room 12	F 1	NE	327959	665994	149.9	38	23	
31	room 12	F 2	NE	327959	665994	152.4	38	23	
32	room 13	GF	NE	327961	665991	147.4	38	23	
32	room 13	F 1	NE	327961	665991	149.9	38	23	
32	room 13	F 2	NE	327961	665991	152.4	39	24	
33	room 14	GF	SW	327951	665977	147.8	63	48	
33	room 14	F 1	SW	327951	665977	150.3	63	48	
33	room 14	F 2	SW	327951	665977	152.8	62	47	
34	room 15	GF	SW	327948	665980	147.7	63	48	
34	room 15	F 1	SW	327948	665980	150.2	63	48	
34	room 15	F 2	SW	327948	665980	152.7	63	48	
35	room 16	GF	SW	327946	665982	147.6	63	48	
35	room 16	F 1	SW	327946	665982	150.1	63	48	
35	room 16	F 2	SW	327946	665982	152.6	63	48	
36	room 17	GF	SW	327943	665986	147.5	63	48	
36	room 17	F 1	SW	327943	665986	150.0	63	48	
36	room 17	F 2	SW	327943	665986	152.5	63	48	

	The Airshed	2
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AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 2 - scheme - no barrier

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
37	room 18	GF	SW	327941	665988	147.4	63	48	
37	room 18	F 1	SW	327941	665988	149.9	63	48	
37	room 18	F 2	SW	327941	665988	152.4	63	48	
38	room 19	GF	SW	327938	665991	147.4	63	48	
38	room 19	F 1	SW	327938	665991	149.9	63	48	
38	room 19	F 2	SW	327938	665991	152.4	63	48	
39	room 20	GF	SW	327936	665994	147.3	63	48	
39	room 20	F 1	SW	327936	665994	149.8	63	48	
39	room 20	F 2	SW	327936	665994	152.3	63	48	
40	secure garden	GF		327930	666011	146.9	61	46	
41	Secure garden	GF		327934	666016	146.7	60	45	

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	The Airshed	3
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AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 2 - scheme - 2m

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
1	F06 terrace	GF	SW	327933	666019	146.9	52	37	
1	F06 terrace	F 1	SW	327933	666019	149.4	56	41	
2	F06 terrace	F 3		327935	666020	152.9	47	32	
3	F06 terrace	GF	NW	327933	666022	146.9	53	38	
3	F06 terrace	F 1	NW	327933	666022	149.4	55	40	
4	F06terrace	GF	SE	327937	666018	146.9	49	34	
4	F06terrace	F 1	SE	327937	666018	149.4	52	37	
5	F08 dining	GF	NW	327932	666030	146.6	53	38	
5	F08 dining	F 1	NW	327932	666030	149.1	54	39	
5	F08 dining	F 2	NW	327932	666030	151.6	55	40	
6	F08 dining	GF	SW	327931	666024	146.9	55	40	
6	F08 dining	F 1	SW	327931	666024	149.4	56	41	
6	F08 dining	F 2	SW	327931	666024	151.9	57	42	
7	F09 Quiet area	GF	NW	327935	666034	146.3	52	37	
7	F09 Quiet area	F 1	NW	327935	666034	148.8	52	37	
7	F09 Quiet area	F 2	NW	327935	666034	151.3	53	38	
8	F10 sitting area	F 1	SE	327960	666004	149.5	37	22	
8	F10 sitting area	F 2	SE	327960	666004	152.0	38	23	
9	F12 Bathroom	F 2	SE	327956	666001	152.0	38	23	
10	F22 dining	GF	SW	327932	666001	146.8	54	39	
10	F22 dining	F 1	SW	327932	666001	149.3	59	44	
10	F22 dining	F 2	SW	327932	666001	151.8	62	47	
11	F22 dining	GF	NW	327932	666006	146.8	52	37	
11	F22 dining	F 1	NW	327932	666006	149.3	57	42	
11	F22 dining	F 2	NW	327932	666006	151.8	59	44	
12	F22 Dining	GF	SW	327934	665998	146.8	54	39	
12	F22 Dining	F 1	SW	327934	665998	149.3	59	44	
12	F22 Dining	F 2	SW	327934	665998	151.8	62	47	
13	F23 terrace	GF	NW	327935	666011	146.8	51	36	
13	F23 terrace	F 1	NW	327935	666011	149.3	55	40	
14	F23 terrace	GF		327936	666009	152.8	47	32	
15	F23 terrace	GF	SW	327934	666007	146.8	50	35	
15	F23 terrace	F 1	SW	327934	666007	149.3	55	40	
16	F23 terrace	GF	NE	327938	666010	146.8	47	32	
16	F23 terrace	F 1	NE	327938	666010	149.3	51	36	
17	F24 family room	GF	NW	327941	666010	146.8	47	32	
17	F24 family room	F 1	NW	327941	666010	149.3	50	35	
17	F24 family room	F 2	NW	327941	666010	151.8	53	38	
18	outdoor terrace	GF		327925	666009	146.8	55	40	
19	outdoor terrace	GF		327939	666012	146.8	50	35	
20	room 01	GF	SW	327942	666012	146.9	47	32	
20	room 01	F 1	SW	327942	666012	149.4	50	35	

	The Airshed	1
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AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 2 - scheme - 2m

2

RNo	Receiver	Fl	Dir	X m	Y m	Z m	LrD dB(A)	LrN dB(A)	
20	room 01	F 2	SW	327942	666012	151.9	52	37	
21	room 02	GF	SW	327939	666015	146.9	49	34	
21	room 02	F 1	SW	327939	666015	149.4	52	37	
21	room 02	F 2	SW	327939	666015	151.9	54	39	
22	room 03	F 1	NE	327946	666033	148.9	40	25	
22	room 03	F 2	NE	327946	666033	151.4	40	25	
23	room 04	F 1	NE	327949	666030	148.9	39	24	
23	room 04	F 2	NE	327949	666030	151.4	39	24	
24	room 05	F 1	NE	327951	666027	148.9	38	23	
24	room 05	F 2	NE	327951	666027	151.4	39	24	
25	room 06	F 1	NE	327953	666024	148.9	38	23	
25	room 06	F 2	NE	327953	666024	151.4	39	24	
26	room 07	F 1	NE	327956	666021	149.1	37	22	
26	room 07	F 2	NE	327956	666021	151.6	38	23	
27	room 08	F 1	NE	327959	666018	149.2	36	21	
27	room 08	F 2	NE	327959	666018	151.7	37	22	
28	room 09	F 1	NE	327961	666015	149.3	36	21	
28	room 09	F 2	NE	327961	666015	151.8	36	21	
29	room 10	F 1	NE	327964	666012	149.4	37	22	
29	room 10	F 2	NE	327964	666012	151.9	37	22	
30	room 11	GF	NE	327956	665997	146.9	36	21	
30	room 11	F 1	NE	327956	665997	149.4	36	21	
30	room 11	F 2	NE	327956	665997	151.9	37	22	
31	room 12	GF	NE	327959	665994	147.0	37	22	
31	room 12	F 1	NE	327959	665994	149.5	37	22	
31	room 12	F 2	NE	327959	665994	152.0	37	22	
32	room 13	GF	NE	327961	665991	147.0	38	23	
32	room 13	F 1	NE	327961	665991	149.5	38	23	
32	room 13	F 2	NE	327961	665991	152.0	38	23	
33	room 14	GF	SW	327951	665977	146.8	54	39	
33	room 14	F 1	SW	327951	665977	149.3	60	45	
33	room 14	F 2	SW	327951	665977	151.8	62	47	
34	room 15	GF	SW	327948	665980	146.8	55	40	
34	room 15	F 1	SW	327948	665980	149.3	61	46	
34	room 15	F 2	SW	327948	665980	151.8	63	48	
35	room 16	GF	SW	327946	665982	146.8	55	40	
35	room 16	F 1	SW	327946	665982	149.3	61	46	
35	room 16	F 2	SW	327946	665982	151.8	63	48	
36	room 17	GF	SW	327943	665986	146.8	55	40	
36	room 17	F 1	SW	327943	665986	149.3	60	45	
36	room 17	F 2	SW	327943	665986	151.8	63	48	
37	room 18	GF	SW	327941	665988	146.8	55	40	

	The Airshed	2
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AS 0988 Loanhead Residential Care Home
 Assessed receiver levels
 Scenario 2 - scheme - 2m

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
37	room 18	F 1	SW	327941	665988	149.3	60	45	
37	room 18	F 2	SW	327941	665988	151.8	63	48	
38	room 19	GF	SW	327938	665991	146.8	55	40	
38	room 19	F 1	SW	327938	665991	149.3	60	45	
38	room 19	F 2	SW	327938	665991	151.8	63	48	
39	room 20	GF	SW	327936	665994	146.8	55	40	
39	room 20	F 1	SW	327936	665994	149.3	60	45	
39	room 20	F 2	SW	327936	665994	151.8	63	48	
40	secure garden	GF		327930	666011	146.7	54	39	
41	Secure garden	GF		327934	666016	146.8	53	38	

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	The Airshed	3
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AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 2 - scheme - 3m

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
1	F06 terrace	GF	SW	327933	666019	146.9	49	34	
1	F06 terrace	F 1	SW	327933	666019	149.4	54	39	
2	F06 terrace	F 3		327935	666020	152.9	46	31	
3	F06 terrace	GF	NW	327933	666022	146.9	53	38	
3	F06 terrace	F 1	NW	327933	666022	149.4	54	39	
4	F06terrace	GF	SE	327937	666018	146.9	46	31	
4	F06terrace	F 1	SE	327937	666018	149.4	49	34	
5	F08 dining	GF	NW	327932	666030	146.6	53	38	
5	F08 dining	F 1	NW	327932	666030	149.1	54	39	
5	F08 dining	F 2	NW	327932	666030	151.6	55	40	
6	F08 dining	GF	SW	327931	666024	146.9	54	39	
6	F08 dining	F 1	SW	327931	666024	149.4	55	40	
6	F08 dining	F 2	SW	327931	666024	151.9	56	41	
7	F09 Quiet area	GF	NW	327935	666034	146.3	52	37	
7	F09 Quiet area	F 1	NW	327935	666034	148.8	52	37	
7	F09 Quiet area	F 2	NW	327935	666034	151.3	53	38	
8	F10 sitting area	F 1	SE	327960	666004	149.5	37	22	
8	F10 sitting area	F 2	SE	327960	666004	152.0	38	23	
9	F12 Bathroom	F 2	SE	327956	666001	152.0	38	23	
10	F22 dining	GF	SW	327932	666001	146.8	51	36	
10	F22 dining	F 1	SW	327932	666001	149.3	56	41	
10	F22 dining	F 2	SW	327932	666001	151.8	60	45	
11	F22 dining	GF	NW	327932	666006	146.8	50	35	
11	F22 dining	F 1	NW	327932	666006	149.3	53	38	
11	F22 dining	F 2	NW	327932	666006	151.8	57	42	
12	F22 Dining	GF	SW	327934	665998	146.8	51	36	
12	F22 Dining	F 1	SW	327934	665998	149.3	56	41	
12	F22 Dining	F 2	SW	327934	665998	151.8	59	44	
13	F23 terrace	GF	NW	327935	666011	146.8	49	34	
13	F23 terrace	F 1	NW	327935	666011	149.3	52	37	
14	F23 terrace	GF		327936	666009	152.8	46	31	
15	F23 terrace	GF	SW	327934	666007	146.8	48	33	
15	F23 terrace	F 1	SW	327934	666007	149.3	52	37	
16	F23 terrace	GF	NE	327938	666010	146.8	45	30	
16	F23 terrace	F 1	NE	327938	666010	149.3	49	34	
17	F24 family room	GF	NW	327941	666010	146.8	45	30	
17	F24 family room	F 1	NW	327941	666010	149.3	49	34	
17	F24 family room	F 2	NW	327941	666010	151.8	52	37	
18	outdoor terrace	GF		327925	666009	146.8	52	37	
19	outdoor terrace	GF		327939	666012	146.8	48	33	
20	room 01	GF	SW	327942	666012	146.9	44	29	
20	room 01	F 1	SW	327942	666012	149.4	48	33	

	The Airshed	1
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AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 2 - scheme - 3m

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
20	room 01	F 2	SW	327942	666012	151.9	51	36	
21	room 02	GF	SW	327939	666015	146.9	47	32	
21	room 02	F 1	SW	327939	666015	149.4	50	35	
21	room 02	F 2	SW	327939	666015	151.9	53	38	
22	room 03	F 1	NE	327946	666033	148.9	40	25	
22	room 03	F 2	NE	327946	666033	151.4	40	25	
23	room 04	F 1	NE	327949	666030	148.9	39	24	
23	room 04	F 2	NE	327949	666030	151.4	39	24	
24	room 05	F 1	NE	327951	666027	148.9	38	23	
24	room 05	F 2	NE	327951	666027	151.4	39	24	
25	room 06	F 1	NE	327953	666024	148.9	38	23	
25	room 06	F 2	NE	327953	666024	151.4	39	24	
26	room 07	F 1	NE	327956	666021	149.1	37	22	
26	room 07	F 2	NE	327956	666021	151.6	38	23	
27	room 08	F 1	NE	327959	666018	149.2	36	21	
27	room 08	F 2	NE	327959	666018	151.7	37	22	
28	room 09	F 1	NE	327961	666015	149.3	36	21	
28	room 09	F 2	NE	327961	666015	151.8	36	21	
29	room 10	F 1	NE	327964	666012	149.4	37	22	
29	room 10	F 2	NE	327964	666012	151.9	36	21	
30	room 11	GF	NE	327956	665997	146.9	36	21	
30	room 11	F 1	NE	327956	665997	149.4	36	21	
30	room 11	F 2	NE	327956	665997	151.9	37	22	
31	room 12	GF	NE	327959	665994	147.0	37	22	
31	room 12	F 1	NE	327959	665994	149.5	37	22	
31	room 12	F 2	NE	327959	665994	152.0	37	22	
32	room 13	GF	NE	327961	665991	147.0	38	23	
32	room 13	F 1	NE	327961	665991	149.5	38	23	
32	room 13	F 2	NE	327961	665991	152.0	38	23	
33	room 14	GF	SW	327951	665977	146.8	51	36	
33	room 14	F 1	SW	327951	665977	149.3	57	42	
33	room 14	F 2	SW	327951	665977	151.8	61	46	
34	room 15	GF	SW	327948	665980	146.8	51	36	
34	room 15	F 1	SW	327948	665980	149.3	57	42	
34	room 15	F 2	SW	327948	665980	151.8	62	47	
35	room 16	GF	SW	327946	665982	146.8	51	36	
35	room 16	F 1	SW	327946	665982	149.3	57	42	
35	room 16	F 2	SW	327946	665982	151.8	62	47	
36	room 17	GF	SW	327943	665986	146.8	51	36	
36	room 17	F 1	SW	327943	665986	149.3	57	42	
36	room 17	F 2	SW	327943	665986	151.8	61	46	
37	room 18	GF	SW	327941	665988	146.8	51	36	

	The Airshed	2
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AS 0988 Loanhead Residential Care Home
 Assessed receiver levels
 Scenario 2 - scheme - 3m

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
37	room 18	F 1	SW	327941	665988	149.3	57	42	
37	room 18	F 2	SW	327941	665988	151.8	62	47	
38	room 19	GF	SW	327938	665991	146.8	51	36	
38	room 19	F 1	SW	327938	665991	149.3	57	42	
38	room 19	F 2	SW	327938	665991	151.8	62	47	
39	room 20	GF	SW	327936	665994	146.8	51	36	
39	room 20	F 1	SW	327936	665994	149.3	57	42	
39	room 20	F 2	SW	327936	665994	151.8	61	46	
40	secure garden	GF		327930	666011	146.7	52	37	
41	Secure garden	GF		327934	666016	146.8	51	36	

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	The Airshed	3
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AS 0988 Loanhead Residential Care Home

Assessed receiver levels

Scenario 2 - scheme - 4m

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
1	F06 terrace	GF	SW	327933	666019	146.9	47	32	
1	F06 terrace	F 1	SW	327933	666019	149.4	50	35	
2	F06 terrace	F 3		327935	666020	152.9	46	31	
3	F06 terrace	GF	NW	327933	666022	146.9	50	35	
3	F06 terrace	F 1	NW	327933	666022	149.4	52	37	
4	F06terrace	GF	SE	327937	666018	146.9	43	28	
4	F06terrace	F 1	SE	327937	666018	149.4	46	31	
5	F08 dining	GF	NW	327932	666030	146.6	51	36	
5	F08 dining	F 1	NW	327932	666030	149.1	52	37	
5	F08 dining	F 2	NW	327932	666030	151.6	52	37	
6	F08 dining	GF	SW	327931	666024	146.9	52	37	
6	F08 dining	F 1	SW	327931	666024	149.4	53	38	
6	F08 dining	F 2	SW	327931	666024	151.9	54	39	
7	F09 Quiet area	GF	NW	327935	666034	146.3	49	34	
7	F09 Quiet area	F 1	NW	327935	666034	148.8	50	35	
7	F09 Quiet area	F 2	NW	327935	666034	151.3	51	36	
8	F10 sitting area	F 1	SE	327960	666004	149.5	37	22	
8	F10 sitting area	F 2	SE	327960	666004	152.0	38	23	
9	F12 Bathroom	F 2	SE	327956	666001	152.0	37	22	
10	F22 dining	GF	SW	327932	666001	146.8	48	33	
10	F22 dining	F 1	SW	327932	666001	149.3	52	37	
10	F22 dining	F 2	SW	327932	666001	151.8	56	41	
11	F22 dining	GF	NW	327932	666006	146.8	47	32	
11	F22 dining	F 1	NW	327932	666006	149.3	51	36	
11	F22 dining	F 2	NW	327932	666006	151.8	54	39	
12	F22 Dining	GF	SW	327934	665998	146.8	48	33	
12	F22 Dining	F 1	SW	327934	665998	149.3	52	37	
12	F22 Dining	F 2	SW	327934	665998	151.8	56	41	
13	F23 terrace	GF	NW	327935	666011	146.8	46	31	
13	F23 terrace	F 1	NW	327935	666011	149.3	49	34	
14	F23 terrace	GF		327936	666009	152.8	46	31	
15	F23 terrace	GF	SW	327934	666007	146.8	46	31	
15	F23 terrace	F 1	SW	327934	666007	149.3	49	34	
16	F23 terrace	GF	NE	327938	666010	146.8	43	28	
16	F23 terrace	F 1	NE	327938	666010	149.3	46	31	
17	F24 family room	GF	NW	327941	666010	146.8	43	28	
17	F24 family room	F 1	NW	327941	666010	149.3	46	31	
17	F24 family room	F 2	NW	327941	666010	151.8	49	34	
18	outdoor terrace	GF		327925	666009	146.8	49	34	
19	outdoor terrace	GF		327939	666012	146.8	45	30	
20	room 01	GF	SW	327942	666012	146.9	42	27	
20	room 01	F 1	SW	327942	666012	149.4	45	30	

	The Airshed	1
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AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 2 - scheme - 4m

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN	
				m	m	m	dB(A)	dB(A)	
20	room 01	F 2	SW	327942	666012	151.9	49	34	
21	room 02	GF	SW	327939	666015	146.9	44	29	
21	room 02	F 1	SW	327939	666015	149.4	47	32	
21	room 02	F 2	SW	327939	666015	151.9	51	36	
22	room 03	F 1	NE	327946	666033	148.9	38	23	
22	room 03	F 2	NE	327946	666033	151.4	38	23	
23	room 04	F 1	NE	327949	666030	148.9	37	22	
23	room 04	F 2	NE	327949	666030	151.4	37	22	
24	room 05	F 1	NE	327951	666027	148.9	37	22	
24	room 05	F 2	NE	327951	666027	151.4	37	22	
25	room 06	F 1	NE	327953	666024	148.9	37	22	
25	room 06	F 2	NE	327953	666024	151.4	38	23	
26	room 07	F 1	NE	327956	666021	149.1	36	21	
26	room 07	F 2	NE	327956	666021	151.6	37	22	
27	room 08	F 1	NE	327959	666018	149.2	36	21	
27	room 08	F 2	NE	327959	666018	151.7	36	21	
28	room 09	F 1	NE	327961	666015	149.3	36	21	
28	room 09	F 2	NE	327961	666015	151.8	35	20	
29	room 10	F 1	NE	327964	666012	149.4	36	21	
29	room 10	F 2	NE	327964	666012	151.9	36	21	
30	room 11	GF	NE	327956	665997	146.9	36	21	
30	room 11	F 1	NE	327956	665997	149.4	36	21	
30	room 11	F 2	NE	327956	665997	151.9	36	21	
31	room 12	GF	NE	327959	665994	147.0	36	21	
31	room 12	F 1	NE	327959	665994	149.5	36	21	
31	room 12	F 2	NE	327959	665994	152.0	36	21	
32	room 13	GF	NE	327961	665991	147.0	37	22	
32	room 13	F 1	NE	327961	665991	149.5	37	22	
32	room 13	F 2	NE	327961	665991	152.0	37	22	
33	room 14	GF	SW	327951	665977	146.8	48	33	
33	room 14	F 1	SW	327951	665977	149.3	53	38	
33	room 14	F 2	SW	327951	665977	151.8	57	42	
34	room 15	GF	SW	327948	665980	146.8	48	33	
34	room 15	F 1	SW	327948	665980	149.3	53	38	
34	room 15	F 2	SW	327948	665980	151.8	58	43	
35	room 16	GF	SW	327946	665982	146.8	48	33	
35	room 16	F 1	SW	327946	665982	149.3	53	38	
35	room 16	F 2	SW	327946	665982	151.8	58	43	
36	room 17	GF	SW	327943	665986	146.8	48	33	
36	room 17	F 1	SW	327943	665986	149.3	52	37	
36	room 17	F 2	SW	327943	665986	151.8	57	42	
37	room 18	GF	SW	327941	665988	146.8	48	33	

	The Airshed	2
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AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 2 - scheme - 4m

2

RNo	Receiver	Fl	Dir	X m	Y m	Z m	LrD dB(A)	LrN dB(A)
37	room 18	F 1	SW	327941	665988	149.3	53	38
37	room 18	F 2	SW	327941	665988	151.8	57	42
38	room 19	GF	SW	327938	665991	146.8	48	33
38	room 19	F 1	SW	327938	665991	149.3	53	38
38	room 19	F 2	SW	327938	665991	151.8	57	42
39	room 20	GF	SW	327936	665994	146.8	48	33
39	room 20	F 1	SW	327936	665994	149.3	53	38
39	room 20	F 2	SW	327936	665994	151.8	57	42
40	secure garden	GF		327930	666011	146.7	49	34
41	Secure garden	GF		327934	666016	146.8	48	33

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	The Airshed	3
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AS 0988 Loanhead Residential Care Home

Run info

Scenario 3 - M&E

Project info

Project title: AS 0988 Loanhead Residential Care Home
Project No.:
Project engineer: Steve Fraser
Customer: Mansefield Care

Description:
noise impact assessment for proposed residential care home

Run description

Calculation type: Single Point Sound
Title: Scenario 3 - M&E
Group
Run file: RunFile.runx
Result number: 5
Local calculation (ThreadCount=4)
Calculation start: 19/05/2023 08:00:16
Calculation end: 19/05/2023 08:00:20
Calculation time: 00:02:931 [m:s.ms]
No. of points: 29
No. of calculated points: 29
Kernel version: SoundPLANnoise 9.0 (17/05/2023) - 64 bit

Run parameters

Reflection order: 3
Maximum reflection distance to receiver: 200 m
Maximum reflection distance to source: 50 m
Search radius: 5000 m
Weighting: dB(A)
Allowed tolerance (per individual source): 0.100 dB
Create ground effect areas from road surfaces: No
Treat roads as terrain following: No

Standards:

Industry: ISO 9613-2: 1996
Air absorption: ISO 9613-1
regular ground effect (chapter 7.3.1), for sources without a spectrum automatically alternative ground effect
Limitation of screening loss:
single/multiple 20.0 dB /25.0 dB
Side diffraction: ISO/TR 17534-3:2015 compliant: no side diffraction if terrain blocks line of sight
Use Eqn (Abar=Dz-Max(Agr,0)) instead of Eqn (12) (Abar=Dz-Agr) for insertion loss
Environment:
Air pressure 1013.3 mbar
rel. humidity 70.0 %
Temperature 10.0 °C
Meteo. corr. C0(7-23h)[dB]=0.0; C0(23-7h)[dB]=0.0;
Ignore Cmet for Lmax industry calculation: No

The Airshed

1

AS 0988 Loanhead Residential Care Home

Run info

Scenario 3 - M&E

Parameter for screening: C2=20.0

Dissection parameters:

Distance to diameter factor	8
Minimal distance	1 m
Max. difference ground effect + diffraction	1.0 dB
Max. number of iterations	4

Attenuation

Foliage:	ISO 9613-2
Built-up area:	ISO 9613-2
Industrial site:	ISO 9613-2

Assessment: PPG24 (day/night)

Reflection of "own" facade is suppressed

Geometry data

M&E.sit	19/05/2023 07:59:58
- contains:	
ASHPs.geo	19/05/2023 07:59:58
calc area.geo	18/05/2023 09:34:20
existing buildings to be retained (from vectormap).geo	18/05/2023 09:36:20
existing receptors.geo	18/05/2023 13:46:36
ground conditions.geo	18/05/2023 09:34:22
M&E fixed plant.geo	18/05/2023 14:13:00
new build.geo	18/05/2023 12:21:12
OS vectormap.geo	18/05/2023 10:34:50
RDGM0001.dgm	18/05/2023 08:53:02

AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 3 - M&E

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN
				m	m	m	dB(A)	dB(A)
6	bedroom mid	F 1	NE	327960	665993	149.5	43	43
6	bedroom mid	GF	NE	327960	665993	147.0	43	43
4	bedroom 8	F 1	NE	327964	666012	149.5	39	39
16	Edgefield Gardens	F 1	NW	327994	666005	149.7	37	37
11	day room	F 1	SW	327935	666020	149.5	36	36
4	bedroom 8	GF	NE	327964	666012	147.0	36	36
16	Edgefield Gardens	GF	NW	327994	666005	147.2	36	36
14	dinning room	F 1	SW	327931	666024	149.5	35	35
7	bedrooms	F 1	SW	327940	666014	149.5	35	35
10	day room	F 1	NW	327932	666006	149.5	35	35
28	Trust HA	F 1	SW	327976	666030	148.2	34	34
18	Family room	F 1	NW	327940	666010	149.5	34	34
17	Edgefield Gardesn	F 1	NW	328004	666023	149.3	34	34
27	terrace	GF		327935	666020	146.6	34	34
24	Pine Villa	F 1	SE	327911	666030	148.8	33	33
17	Edgefield Gardesn	GF	NW	328004	666023	146.8	33	33
14	dinning room	GF	SW	327931	666024	147.0	33	33
23	Pine Villa	F 1	SE	327930	666042	148.8	32	32
28	Trust HA	GF	SW	327976	666030	145.7	32	32
15	double bedroom	F 1	NE	327955	666022	149.5	32	32
10	day room	GF	NW	327932	666006	147.0	32	32
19	Fountain Place	F 1	NW	327958	665974	150.7	32	32
12	dining room	F 1	SW	327935	665998	149.5	32	32
13	dining room	F 1	SW	327932	666001	149.5	32	32
11	day room	GF	SW	327935	666020	147.0	32	32
22	Hawthorn Gardens (south)	F 1	NE	327908	665979	150.4	31	31
29	Trust HA	F 1	SW	327963	666045	148.2	31	31
25	Pine Villa	F 1	SE	327912	666044	148.8	31	31
24	Pine Villa	GF	SE	327911	666030	146.3	31	31
7	bedrooms	GF	SW	327940	666014	147.0	31	31
2	bedroom 1	F 1	SW	327936	665994	149.5	31	31
21	Hawthorn Gardens (south)	F 1	NE	327919	665965	150.6	31	31
18	Family room	GF	NW	327940	666010	147.0	31	31
1	bed 1	F 1	NE	327945	666035	149.5	31	31
15	double bedroom	GF	NE	327955	666022	147.0	31	31
26	terrace	GF		327936	666009	145.4	30	30
8	bedrooms 2 & 3	F 1	SW	327940	665990	149.5	30	30
12	dining room	GF	SW	327935	665998	147.0	29	29
13	dining room	GF	SW	327932	666001	147.0	29	29
1	bed 1	GF	NE	327945	666035	147.0	29	29
25	Pine Villa	GF	SE	327912	666044	146.3	29	29

	The Airshed	1
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AS 0988 Loanhead Residential Care Home
Assessed receiver levels
Scenario 3 - M&E

2

RNo	Receiver	Fl	Dir	X	Y	Z	LrD	LrN
				m	m	m	dB(A)	dB(A)
29	Trust HA	GF	SW	327963	666045	145.7	29	29
20	Hawthorn Gardens	F 1	NE	327932	665948	150.9	29	29
22	Hawthorn Gardens (south)	GF	NE	327908	665979	147.9	29	29
19	Fountain Place	GF	NW	327958	665974	148.2	29	29
2	bedroom 1	GF	SW	327936	665994	147.0	29	29
23	Pine Villa	GF	SE	327930	666042	146.3	29	29
5	bedroom 8	F 1	SW	327951	665977	149.5	29	29
21	Hawthorn Gardens (south)	GF	NE	327919	665965	148.1	28	28
9	bedrooms 5&6	F 1	SW	327947	665981	149.5	27	27
3	bedroom 4	F 1	SW	327944	665986	149.5	27	27
8	bedrooms 2 & 3	GF	SW	327940	665990	147.0	27	27
20	Hawthorn Gardens	GF	NE	327932	665948	148.4	27	27
5	bedroom 8	GF	SW	327951	665977	147.0	26	26
3	bedroom 4	GF	SW	327944	665986	147.0	25	25
9	bedrooms 5&6	GF	SW	327947	665981	147.0	24	24

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	The Airshed	2
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AS 0988 Loanhead Residential Care Home Octave spectra of the sources in dB(A) - Scenario 3 - M&E

3

Name	Source type	X	Y	Z	l or A	L'w	Lw	KI	KT	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
		m	m	m	m,m ²	dB(A)	dB(A)	dB	dB	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
ASHP 1-ASHP1	Area	327962	666005	149.0	1.11	71.6	72.0	0.0	0.0	0	100%/24h	ASHP Model ESA30 heating	57.2	57.3	60.8	64.2	68.4	63.6	61.4	53.3
ASHP 2-ASHP2	Area	327963	666007	149.0	1.11	71.6	72.0	0.0	0.0	0	100%/24h	ASHP Model ESA30 heating	57.2	57.3	60.8	64.2	68.4	63.6	61.4	53.3
ASHP 3-ASHP3	Area	327965	666008	149.0	1.11	71.6	72.0	0.0	0.0	0	100%/24h	ASHP Model ESA30 heating	57.2	57.3	60.8	64.2	68.4	63.6	61.4	53.3
small communal LEV fan exhaust No. 1	Point	327939	666004	153.6		70.0	70.0	0.0	0.0	0	100%/24h	Axial-flow fan	37.4	55.1	64.1	63.5	61.7	62.9	60.2	56.6
small communal LEV fan exhaust No. 2	Point	327942	666001	153.7		70.0	70.0	0.0	0.0	0	100%/24h	Axial-flow fan	37.4	55.1	64.1	63.5	61.7	62.9	60.2	56.6
small communal LEV fan exhaust No. 3	Point	327939	666023	153.0		70.0	70.0	0.0	0.0	0	100%/24h	Axial-flow fan	37.4	55.1	64.1	63.5	61.7	62.9	60.2	56.6
small communal LEV fan exhaust No. 4	Point	327957	666008	153.4		70.0	70.0	0.0	0.0	0	100%/24h	Axial-flow fan	37.4	55.1	64.1	63.5	61.7	62.9	60.2	56.6
small MVHR fan exhaust No. 1	Point	327937	666027	153.0		70.0	70.0	0.0	0.0	0	100%/24h	Axial-flow fan	37.4	55.1	64.1	63.5	61.7	62.9	60.2	56.6
small MVHR fan exhaust No. 2	Point	327952	666013	153.3		70.0	70.0	0.0	0.0	0	100%/24h	Axial-flow fan	37.4	55.1	64.1	63.5	61.7	62.9	60.2	56.6

The Airshed

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AS 0988 Loanhead Residential Care Home
Assessed receiver spectra in dB(A) - Scenario 3 - M&E

Time slice	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	
Receiver bedroom mid FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 43 dB(A) LrN 43 dB(A)									
LrD	28.3	27.7	32.9	35.9	39.6	35.1	32.5	23.6	
LrN	28.3	27.7	32.9	35.9	39.6	35.1	32.5	23.6	
Receiver bedroom mid FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 43 dB(A) LrN 43 dB(A)									
LrD	31.4	29.7	32.1	34.7	38.8	34.2	31.0	20.9	
LrN	31.4	29.7	32.1	34.7	38.8	34.2	31.0	20.9	
Receiver bedroom 8 FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 39 dB(A) LrN 39 dB(A)									
LrD	30.7	27.7	30.7	31.6	33.6	28.4	24.6	15.6	
LrN	30.7	27.7	30.7	31.6	33.6	28.4	24.6	15.6	
Receiver Edgefield Gardens FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 37 dB(A) LrN 37 dB(A)									
LrD	22.2	20.5	26.8	29.8	32.9	28.8	25.3	15.6	
LrN	22.2	20.5	26.8	29.8	32.9	28.8	25.3	15.6	
Receiver day room FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 36 dB(A) LrN 36 dB(A)									
LrD	13.6	23.7	31.2	29.7	27.0	27.5	23.7	17.7	
LrN	13.6	23.7	31.2	29.7	27.0	27.5	23.7	17.7	
Receiver bedroom 8 FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 36 dB(A) LrN 36 dB(A)									
LrD	29.6	26.1	27.9	27.9	29.1	24.8	21.0	12.8	
LrN	29.6	26.1	27.9	27.9	29.1	24.8	21.0	12.8	
Receiver Edgefield Gardens FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 36 dB(A) LrN 36 dB(A)									
LrD	22.1	20.8	26.0	28.0	32.0	27.6	23.9	13.2	
LrN	22.1	20.8	26.0	28.0	32.0	27.6	23.9	13.2	
Receiver dinning room FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 35 dB(A) LrN 35 dB(A)									
LrD	12.2	22.6	30.1	28.9	26.7	27.7	24.4	19.4	
LrN	12.2	22.6	30.1	28.9	26.7	27.7	24.4	19.4	
Receiver bedrooms FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 35 dB(A) LrN 35 dB(A)									
LrD	14.6	23.2	30.6	28.8	25.6	25.3	21.0	13.7	
LrN	14.6	23.2	30.6	28.8	25.6	25.3	21.0	13.7	
Receiver day room FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 35 dB(A) LrN 35 dB(A)									
LrD	12.4	21.9	29.4	28.9	26.6	26.9	22.7	15.1	
LrN	12.4	21.9	29.4	28.9	26.6	26.9	22.7	15.1	
Receiver Trust HA FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 34 dB(A) LrN 34 dB(A)									
LrD	20.9	19.9	26.7	28.4	29.1	25.9	21.1	11.1	
LrN	20.9	19.9	26.7	28.4	29.1	25.9	21.1	11.1	
Receiver Family room FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 34 dB(A) LrN 34 dB(A)									
LrD	14.8	23.4	30.4	28.3	24.6	23.9	20.1	13.2	
LrN	14.8	23.4	30.4	28.3	24.6	23.9	20.1	13.2	
Receiver Edgefield Gardesn FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 34 dB(A) LrN 34 dB(A)									
LrD	18.7	17.5	24.2	27.7	30.1	26.1	22.0	11.8	
LrN	18.7	17.5	24.2	27.7	30.1	26.1	22.0	11.8	

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AS 0988 Loanhead Residential Care Home
Assessed receiver spectra in dB(A) - Scenario 3 - M&E

Time slice	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	
Receiver terrace FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 34 dB(A) LrN 34 dB(A)									
LrD	11.2	21.3	28.6	27.7	25.5	25.1	20.1	13.3	
LrN	11.2	21.3	28.6	27.7	25.5	25.1	20.1	13.3	
Receiver Pine Villa FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 33 dB(A) LrN 33 dB(A)									
LrD	8.6	17.3	26.1	27.1	26.1	27.2	23.3	15.5	
LrN	8.6	17.3	26.1	27.1	26.1	27.2	23.3	15.5	
Receiver Edgefield Gardesn FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 33 dB(A) LrN 33 dB(A)									
LrD	18.4	17.6	22.9	25.7	29.1	25.2	20.7	8.7	
LrN	18.4	17.6	22.9	25.7	29.1	25.2	20.7	8.7	
Receiver dinning room FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 33 dB(A) LrN 33 dB(A)									
LrD	10.5	20.3	27.0	26.5	25.0	26.0	21.9	14.1	
LrN	10.5	20.3	27.0	26.5	25.0	26.0	21.9	14.1	
Receiver Pine Villa FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 32 dB(A) LrN 32 dB(A)									
LrD	9.8	18.5	26.9	26.8	24.9	24.8	20.2	11.6	
LrN	9.8	18.5	26.9	26.8	24.9	24.8	20.2	11.6	
Receiver Trust HA FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 32 dB(A) LrN 32 dB(A)									
LrD	20.5	19.6	24.9	25.7	26.9	24.1	18.9	8.0	
LrN	20.5	19.6	24.9	25.7	26.9	24.1	18.9	8.0	
Receiver double bedroom FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 32 dB(A) LrN 32 dB(A)									
LrD	19.4	19.6	26.6	25.5	25.2	23.5	20.1	12.9	
LrN	19.4	19.6	26.6	25.5	25.2	23.5	20.1	12.9	
Receiver day room FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 32 dB(A) LrN 32 dB(A)									
LrD	11.0	20.0	26.4	25.6	24.4	25.3	21.0	12.4	
LrN	11.0	20.0	26.4	25.6	24.4	25.3	21.0	12.4	
Receiver Fountain Place FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 32 dB(A) LrN 32 dB(A)									
LrD	20.2	19.9	25.7	25.9	25.5	22.6	17.6	6.9	
LrN	20.2	19.9	25.7	25.9	25.5	22.6	17.6	6.9	
Receiver dining room FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 32 dB(A) LrN 32 dB(A)									
LrD	12.7	20.2	26.9	25.4	23.3	23.7	19.7	12.3	
LrN	12.7	20.2	26.9	25.4	23.3	23.7	19.7	12.3	
Receiver dining room FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 32 dB(A) LrN 32 dB(A)									
LrD	11.7	19.9	26.6	25.3	23.4	23.7	19.6	11.9	
LrN	11.7	19.9	26.6	25.3	23.4	23.7	19.6	11.9	
Receiver day room FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 32 dB(A) LrN 32 dB(A)									
LrD	10.7	20.6	27.3	25.6	22.6	22.3	18.0	12.2	
LrN	10.7	20.6	27.3	25.6	22.6	22.3	18.0	12.2	
Receiver Hawthorn Gardens (south) FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	10.4	14.3	23.7	24.4	24.0	25.9	22.5	15.0	
LrN	10.4	14.3	23.7	24.4	24.0	25.9	22.5	15.0	

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AS 0988 Loanhead Residential Care Home
Assessed receiver spectra in dB(A) - Scenario 3 - M&E

Time slice	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	
Receiver Trust HA F I F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	15.3	16.8	25.2	25.7	24.8	23.2	18.2	8.6	
LrN	15.3	16.8	25.2	25.7	24.8	23.2	18.2	8.6	
Receiver Pine Villa F I F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	6.5	15.4	24.5	25.3	23.9	24.4	20.5	12.8	
LrN	6.5	15.4	24.5	25.3	23.9	24.4	20.5	12.8	
Receiver Pine Villa F I G F LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	7.9	16.5	23.7	24.0	23.8	25.2	21.1	14.3	
LrN	7.9	16.5	23.7	24.0	23.8	25.2	21.1	14.3	
Receiver bedrooms F I G F LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	12.8	20.4	26.4	24.3	22.0	22.2	18.6	11.9	
LrN	12.8	20.4	26.4	24.3	22.0	22.2	18.6	11.9	
Receiver bedroom 1 F I F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	13.0	18.8	25.8	24.6	22.6	23.0	19.1	11.4	
LrN	13.0	18.8	25.8	24.6	22.6	23.0	19.1	11.4	
Receiver Hawthorn Gardens (south) F I F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	12.6	14.4	23.3	23.9	23.6	25.1	21.4	13.5	
LrN	12.6	14.4	23.3	23.9	23.6	25.1	21.4	13.5	
Receiver Family room F I G F LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	13.1	20.3	26.2	24.2	21.9	22.1	18.5	11.9	
LrN	13.1	20.3	26.2	24.2	21.9	22.1	18.5	11.9	
Receiver bed 1 F I F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	13.9	17.3	25.6	24.5	22.6	22.3	18.4	10.8	
LrN	13.9	17.3	25.6	24.5	22.6	22.3	18.4	10.8	
Receiver double bedroom F I G F LrD,lim dB(A) LrN,lim dB(A) LrD 31 dB(A) LrN 31 dB(A)									
LrD	18.8	17.8	23.9	23.6	24.2	22.4	18.1	10.6	
LrN	18.8	17.8	23.9	23.6	24.2	22.4	18.1	10.6	
Receiver terrace F I G F LrD,lim dB(A) LrN,lim dB(A) LrD 30 dB(A) LrN 30 dB(A)									
LrD	10.6	18.9	25.0	23.3	21.4	21.2	16.7	10.8	
LrN	10.6	18.9	25.0	23.3	21.4	21.2	16.7	10.8	
Receiver bedrooms 2 & 3 F I F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 30 dB(A) LrN 30 dB(A)									
LrD	14.6	17.5	24.3	23.2	21.0	21.5	17.4	9.2	
LrN	14.6	17.5	24.3	23.2	21.0	21.5	17.4	9.2	
Receiver dining room F I G F LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	10.9	17.4	23.4	22.0	21.3	22.9	19.0	11.3	
LrN	10.9	17.4	23.4	22.0	21.3	22.9	19.0	11.3	
Receiver dining room F I G F LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	10.2	17.1	23.0	22.0	21.6	23.1	19.0	11.0	
LrN	10.2	17.1	23.0	22.0	21.6	23.1	19.0	11.0	

	The Airshed	3
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AS 0988 Loanhead Residential Care Home
Assessed receiver spectra in dB(A) - Scenario 3 - M&E

Time slice	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	
Receiver bed 1 FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	13.3	15.3	22.9	23.1	22.3	21.9	17.3	9.1	
LrN	13.3	15.3	22.9	23.1	22.3	21.9	17.3	9.1	
Receiver Pine Villa FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	6.0	15.2	22.6	22.4	21.6	23.1	18.8	10.0	
LrN	6.0	15.2	22.6	22.4	21.6	23.1	18.8	10.0	
Receiver Trust HA FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	15.1	16.7	22.7	23.0	22.9	20.8	15.4	4.6	
LrN	15.1	16.7	22.7	23.0	22.9	20.8	15.4	4.6	
Receiver Hawthorn Gardens FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	13.6	13.5	21.3	22.2	21.5	23.2	19.0	10.1	
LrN	13.6	13.5	21.3	22.2	21.5	23.2	19.0	10.1	
Receiver Hawthorn Gardens (south) FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	9.9	14.6	22.2	22.0	21.9	22.4	18.5	11.2	
LrN	9.9	14.6	22.2	22.0	21.9	22.4	18.5	11.2	
Receiver Fountain Place FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	18.3	17.7	21.2	21.5	23.2	20.4	16.0	5.1	
LrN	18.3	17.7	21.2	21.5	23.2	20.4	16.0	5.1	
Receiver bedroom 1 FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	11.2	16.3	22.4	21.3	20.8	22.4	18.6	10.6	
LrN	11.2	16.3	22.4	21.3	20.8	22.4	18.6	10.6	
Receiver Pine Villa FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	8.2	17.0	23.6	22.9	21.0	20.1	14.6	5.3	
LrN	8.2	17.0	23.6	22.9	21.0	20.1	14.6	5.3	
Receiver bedroom 8 FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 29 dB(A) LrN 29 dB(A)									
LrD	16.0	16.3	22.7	22.6	21.5	20.0	15.1	5.1	
LrN	16.0	16.3	22.7	22.6	21.5	20.0	15.1	5.1	
Receiver Hawthorn Gardens (south) FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 28 dB(A) LrN 28 dB(A)									
LrD	12.0	14.5	21.7	21.3	21.0	21.8	18.1	11.0	
LrN	12.0	14.5	21.7	21.3	21.0	21.8	18.1	11.0	
Receiver bedrooms 5&6 FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 27 dB(A) LrN 27 dB(A)									
LrD	15.4	16.0	22.4	21.3	19.2	17.6	12.7	4.2	
LrN	15.4	16.0	22.4	21.3	19.2	17.6	12.7	4.2	
Receiver bedroom 4 FI F 1 LrD,lim dB(A) LrN,lim dB(A) LrD 27 dB(A) LrN 27 dB(A)									
LrD	14.6	16.1	22.4	20.7	18.6	18.2	14.8	6.5	
LrN	14.6	16.1	22.4	20.7	18.6	18.2	14.8	6.5	
Receiver bedrooms 2 & 3 FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 27 dB(A) LrN 27 dB(A)									
LrD	12.5	15.0	20.6	19.4	19.4	21.1	16.9	8.7	
LrN	12.5	15.0	20.6	19.4	19.4	21.1	16.9	8.7	

	The Airshed	4
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**AS 0988 Loanhead Residential Care Home
Assessed receiver spectra in dB(A) - Scenario 3 - M&E**

Time slice	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	
Receiver Hawthorn Gardens FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 27 dB(A) LrN 27 dB(A)									
LrD	13.0	13.7	20.1	19.8	19.9	20.1	15.4	6.2	
LrN	13.0	13.7	20.1	19.8	19.9	20.1	15.4	6.2	
Receiver bedroom 8 FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 26 dB(A) LrN 26 dB(A)									
LrD	13.8	14.1	19.3	18.5	18.9	18.6	14.2	4.5	
LrN	13.8	14.1	19.3	18.5	18.9	18.6	14.2	4.5	
Receiver bedroom 4 FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 25 dB(A) LrN 25 dB(A)									
LrD	12.6	13.8	18.6	16.7	17.2	17.2	13.9	6.1	
LrN	12.6	13.8	18.6	16.7	17.2	17.2	13.9	6.1	
Receiver bedrooms 5&6 FI GF LrD,lim dB(A) LrN,lim dB(A) LrD 24 dB(A) LrN 24 dB(A)									
LrD	13.3	13.6	18.5	16.8	16.9	15.9	11.5	3.5	
LrN	13.3	13.6	18.5	16.8	16.9	15.9	11.5	3.5	

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	The Airshed	5
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