



Planning Noise Assessment

on behalf of

ORION HOMES LTD

for the site at

WHITEHALL ROAD WEST, BIRKENSHAW

REPORT DATE: 29/08/2024

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Summary

A noise impact assessment has been undertaken to predict the potential noise impact on a proposed residential development at Whitehall Road West, Birkenshaw, opposite the West Yorkshire Fire & Rescue Services HQ. This was requested by Orion Homes Ltd to support a planning application for the site.

An environmental noise survey has been undertaken to quantify the noise climate at the site, with the results being utilised within a CadnaA noise model of the site. The results of this model have been used to determine any mitigation measures required to achieve appropriate levels of amenity within residential spaces (internal and external) and to comply with planning conditions.

Record of changes

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1	14/08/2024	First issue	JL
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3	29/08/2024	Revised appendices legends	JL

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1 Introduction

- 1.1 Miller Goodall Ltd has on behalf of Orion Homes Ltd, undertaken a noise assessment in respect of the impact of environmental noise on a new residential development at Whitehall Road West, Birkenshaw.
- 1.2 This report includes details of an environmental noise survey undertaken at the site, review of relevant standards, guidance and policy documents, and an assessment of results of noise modelling of the site.
- 1.3 Mitigation measures are proposed as required to control noise levels in external amenity areas and internal living areas to meet criteria as required by national standards and guidance documents, and by the Local Authority.

2 Site Description

- 2.1 The site is located at Whitehall Road West, Birkenshaw. The surrounding site area is predominantly rural to the east and south, and industrial to the north and west. The Status International (UK) Limited facility forms the western boundary of the site, with the service yard at the northern half of the site boundary. It is understood that the site is open / operative between approximately 8:30 and 17:00 on weekdays only and appears to be primarily a distribution warehouse unit for lighting and electrical accessories.
- 2.2 To the north, Whitehall Road West forms the northern boundary of the site, with the West Yorkshire Fire and Rescue Services HQ directly across the road. This appears to be a training facility with parking space for smaller first-responder type vehicles rather and does not appear to incorporate emergency services vehicles generally. Noise from this facility is therefore not anticipated to include sirens from emergency services operations which would not be required for training purposes.
- 2.3 To the east and south, the site is bounded by adjacent residences on Whitehall Road West, Elmfield Crescent and Lockgate Rise, with no separating roads. Beyond these residences to the south and east are large residential areas.

3 Proposed Development

- 3.1 The proposal is to develop a plot of land at Whitehall Road West to provide 23 new residences with three / four beds each. These will be a mix of detached and semi-detached dwellings, with a single

terrace of three dwellings in the middle of the side. Access to the site will be via a new cul-de-sac from Whitehall Road West, adjacent to the access to No. 15 Whitehall Road West.

4 Policy, Guidance and Assessment Methodology

- 4.1 National planning policy is outlined in **Appendix 1: Planning Policy**. The acoustic standards and assessment techniques referred to in this assessment are outlined in **Appendix 2: Acoustic Standards and Guidance**.

5 Local Authority Conditions

- 5.1 Planning permission has been granted for the development with the following planning condition in relation to noise:

“Before construction work commences, a further noise assessment report shall be submitted to and approved in writing by the Local Planning Authority.

The report shall:

- *Clearly show which habitable rooms in which plots will not achieve satisfactory indoor sound levels with windows open and for these rooms provide a detailed specification of the noise mitigation measures that are necessary to achieve satisfactory indoor sound levels, including an alternative ventilation scheme which shall show how these rooms shall be provided with sufficient ventilation to help control thermal comfort and avoid over heating during hot weather without the need to open windows.*
- *The acoustic specification of the proposed ventilation system demonstrating that when operated it will not cause indoor noise target levels to be exceeded.*
- *The ventilation Scheme must demonstrate how habitable rooms of these plots shall be provided with sufficient ventilation to help control thermal comfort and avoid over heating during hot weather without the need to open windows. This should include details of the air intake location and any summer bypass for any heat recovery system including a calculation for air changes/hour. A Standard Assessment Procedure (SAP) assessment would be acceptable to demonstrate that a risk of overheating is minimised.*

- *Clearly show which external amenity areas at which plots will have daytime noise levels that exceed 50dB LAeq,16hour and for these plots provide a detailed specification for the noise mitigation measures that are required for outdoor noise levels of no more than 50dB LAeq,16hour to be achieved at these plots.*

All works which form part of the approved scheme shall be completed prior to occupation of the aforementioned plots and retained thereafter."

6 Noise Survey

6.1 Measurements of Existing Noise Sources

6.1.1 Noise measurements were undertaken at a location consistent with the proposed development in accordance with BS 7445-1: 2003¹ by Steve Maslivec of Miller Goodall Ltd. The calibration of the sound level meter was checked before and after measurements with negligible deviation (≤ 0.1 dB). Details of the equipment used are shown in **Table 1**.

Table 1: Noise monitoring equipment

Equipment Description	Type Number	Manufacturer	Serial No.	Date Calibrated	Calibration Certification Number
Class 1 ^{2,3} Integrating Real Time 1/3 Octave Sound Analyser	NTi XL2-TA	NTi Audio	A2A-11111-E0	16/10/2023	05451/1
Pre-amplifier	Nti MA220	NTi Audio	6908	16/10/2023	05451/1
Microphone	NTi MC230A	NTi Audio	A14423	16/10/2023	05451/1
Class 1 Calibrator ⁴	CAL 200	Larson Davies	14154	13/09/2023	06431/1
Outdoor microphone housing	NTi WP30	NTi Audio	N/A	N/A	N/A

6.1.2 Background and ambient noise monitoring was undertaken at the times specified in **Table 2**, below. Weather conditions were determined both at the start and on completion of the survey. It is

¹ BS 7445-1: 2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures

² IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

³ IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

⁴ IEC 60942 (2003) Electroacoustics – Sound calibrators

considered that meteorological conditions were appropriate for environmental noise measurements. Measurement locations are shown in **Appendix 3: Monitoring Position**.

Table 2: Dates, times and weather conditions during noise measurements

Measurement Locations	Date/Time	Weather conditions																								
		Description	At Start of Survey	On Completion																						
MPI	14:30 24/07/2024 to 10:30 26/07/2024	Temperature:	23 °C	18 °C																						
<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">Cloud Cover</p> <table border="0"> <tr> <td>Symbol</td> <td>Scale in oktas (eighths)</td> </tr> <tr> <td></td> <td>0 Sky completely clear</td> </tr> <tr> <td></td> <td>1</td> </tr> <tr> <td></td> <td>2</td> </tr> <tr> <td></td> <td>3</td> </tr> <tr> <td></td> <td>4 Sky half cloudy</td> </tr> <tr> <td></td> <td>5</td> </tr> <tr> <td></td> <td>6</td> </tr> <tr> <td></td> <td>7</td> </tr> <tr> <td></td> <td>8 Sky completely cloudy</td> </tr> <tr> <td></td> <td>(9) Sky obstructed from view</td> </tr> </table> </div>		Symbol	Scale in oktas (eighths)		0 Sky completely clear		1		2		3		4 Sky half cloudy		5		6		7		8 Sky completely cloudy		(9) Sky obstructed from view	Precipitation:	Dry	Dry
		Symbol	Scale in oktas (eighths)																							
			0 Sky completely clear																							
			1																							
			2																							
			3																							
			4 Sky half cloudy																							
			5																							
			6																							
	7																									
	8 Sky completely cloudy																									
	(9) Sky obstructed from view																									
Cloud cover (oktas – see opposite):	6	5																								
Any fog/snow/ice?	No	No																								
Any damp roads/wet ground?	No	No																								
Wind speed:	Very Light	Very Light																								
Wind direction:	Westerly	Westerly																								
Any conditions that may cause temp. inversion (e.g. calm nights with no cloud):	No	No																								

6.1.3 Measurements were taken at times considered to be representative of the periods during which the proposed residential accommodation would be subject to the highest levels of ambient noise over an approximate 24-hour period. Measurements were made under free-field conditions at a height of 1.5 m above local ground level.

6.1.4 The measurement locations are detailed below and indicated in **Appendix 3: Monitoring Position**

- MPI approximately 10 m from the road edge and 20 m from the western site boundary

6.1.5 The noise sources within the vicinity of the measurement locations are summarised in **Table 3**, overleaf:

Table 3: Description of noise sources affecting the site

Measurement Locations	Noise Sources
MP1	Construction noise from the site, and noise from Whitehall Road. No audible noise from the training centre to the north or the commercial unit to the west during set-up or collection.

6.2 In addition to the measurement position, subjective notes from around the site included that there was no noise evident from the substation to the south of the site and there was no activity witnessed on the minor roads. Any noise associated with the operation of the commercial unit has been recorded within the noise survey but was not distinct from other noise sources at the site.

6.3 Monitoring Results

6.3.1 A summary of the broadband measurement data is provided in **Table 4** below. All data are sound pressure levels in dB re 20 μ Pa.

Table 4: Summary of noise measurements

Measurement Location	Start Time (hh:mm)	End Time (hh:mm)	$L_{Aeq,T}$ (dB)	Overall $L_{AF,max}$ (dB)	$L_{A90,T}$ (dB)
MP1	17:00	23:00	60.5	83.4	50
MP1	23:00	07:00	54.0	79.7	42
MP1	0700	023:00	62.7	96.8	53
MP1	23:00	07:00	55.3	78.5	44
MP1	0700	023:00	63.9	89.7	57

6.3.2 Each measurement period consisted of sequential 100 ms samples which therefore allowed the variation in noise level over time to be assessed. This data was subsequently used to determine a 'typical' $L_{AF,max}$ noise level which was then utilised within the noise model.

6.3.3 The 100 ms noise levels have not been presented in this report but are kept on file for future reference.

7 ProPG Noise Risk Level Assessment

7.1 The results of the noise monitoring have been assessed against the ProPG noise risk levels to determine the potential effect of noise on the proposed site without mitigation measures. The risk

level has been determined based on the predicted daytime and night time noise levels at the worst affected façade(s) for the proposed development.

Table 5: ProPG Noise Risk Level Assessment

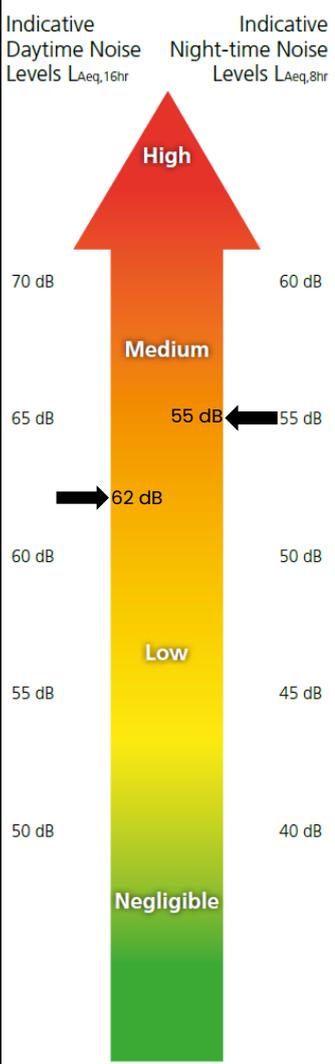
Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
 <p>Indicative Daytime Noise Levels $L_{Aeq,16hr}$</p> <p>Indicative Night-time Noise Levels $L_{Aeq,8hr}$</p> <p>High</p> <p>70 dB</p> <p>65 dB</p> <p>60 dB</p> <p>55 dB</p> <p>50 dB</p> <p>45 dB</p> <p>40 dB</p> <p>Medium</p> <p>Low</p> <p>Negligible</p> <p>62 dB</p> <p>55 dB</p>	<p>Increasing risk of adverse effect</p>	<p>High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.</p> <p>As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS (Acoustic Design Statement) which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.</p> <p>At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.</p>
	<p>No Adverse effect</p>	<p>These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.</p>
Typical Night-time L_{Amax} (dB)	> 60 dB?	L_{Amax} Level Comment
<p>74</p>	<p>Yes</p>	<p>An indication that that there may be more than 10 noise events at night-time with $L_{Amax} > 60$ dB means the site should not be regarded as negligible risk.</p>

Table Notes:

- a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is not dominant.

- 7.2 As can be seen in **Table 5** above, the noise levels measured at the site indicate moderate noise levels and therefore the site is less suitable from a noise perspective and may be refused planning unless a good acoustic design process is followed and demonstrated in an ADS (Acoustic Design Statement) which describes how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrates that a significant adverse noise impact will be avoided in the finished development.
- 7.3 Octave band frequency data was obtained during surveying and this was utilised within noise ingress calculations to determine suitable mitigation in terms of glazing and ventilation requirements.

8 Impact of Noise on the Development

8.1 Computer Modelling

- 8.1.1 Predictions of existing noise levels on the site have also been undertaken using the CadnaA noise modelling package. Specific model parameters were applied as follows:
- Propagation of noise using algorithms within ISO 9613-2:2024 *Acoustics - Attenuation of sound during propagation outdoors*.
 - Roads were modelled as line sources at a height of 0.5 m above ground level and calibrated using spectral data measured during the survey.
 - Default ground absorption $G = 0.5$ (equivalent to mixed ground cover and consistent with the dominant ground cover at the site).
 - Ground attenuation: spectral all sources
 - No adverse meteorological effects
 - Two orders of reflection
 - Topographical data was obtained using DEFRA LIDAR contours for the site and surrounding assessment area.

8.2 Validation of the Noise Model

8.2.1 Noise level receptor points were incorporated into the CadnaA model at the noise survey measurement locations to calibrate the model using the measured octave band L_{eq} and L_{Fmax} noise levels. The modelled results agreed with the measured results to within ± 1 dB L_{Aeq} and ± 1 dB $L_{AF,max}$.

8.3 Noise Model Predictions

8.3.1 Three scenarios have been modelled using the indicative master plan provided: daytime L_{Aeq} noise levels affecting the site, night-time L_{Aeq} noise levels and night-time $L_{AF,max}$ noise levels.

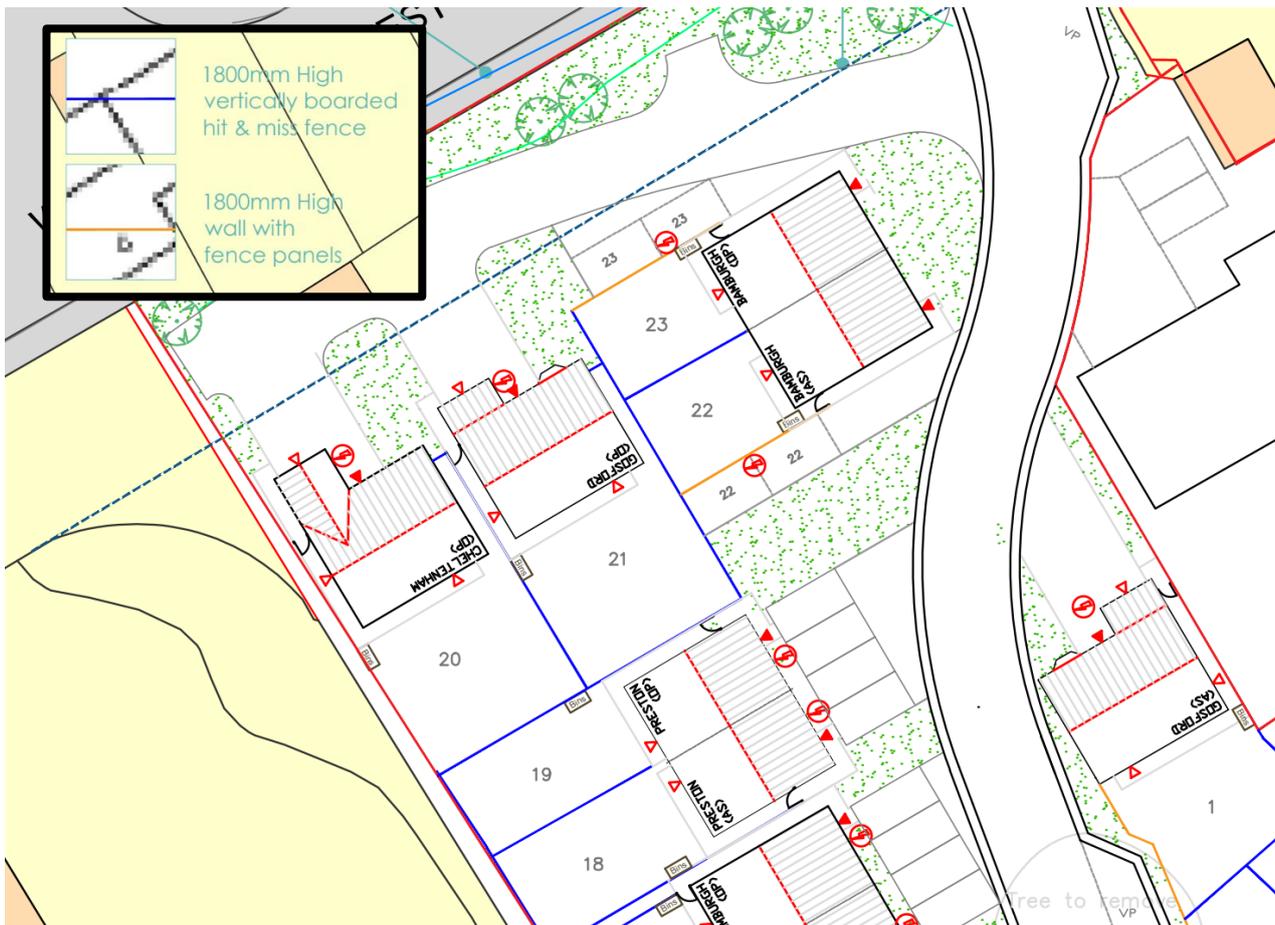
8.3.2 Two types of fencing are proposed at the site, 1800 mm hit & miss fencing, and 1800 mm wall with fence panels. For the purpose of making a worst-case assessment, hit & miss fencing has not been modelled due to its relatively poor acoustic performance. Only the wall with fence panels has been modelled, and only at the north of the site around the external amenity areas associated with plots 20 – 23.

8.3.3 The unmitigated noise levels across the site are shown in **Appendix 4: Noise Grid Maps**. The noise modelling demonstrates the drop-off in noise levels with increasing distance from Whitehall Road West, the most significant noise source affecting the site.

External amenity areas

8.3.4 The model indicates that the external amenity area noise levels at all properties, with the exception of plots 22 & 23, are below the level of 55 dB L_{Aeq} during the day recommended by WHO for these areas. Noise levels within the gardens of plots 22 & 23 are not expected to exceed 57 dB at worst, and are likely to be slightly lower than this in plot 22 due to a separating hit & miss fence between the gardens of plots 22 & 23 but this fence has not been modelled due to limited acoustic performance.

8.3.5 The northern (worst-affected) area of the site as proposed showing plot numbers is highlighted in **Figure 1** overleaf:

Figure 1: Plot numbers at north of site

8.3.6 Based on current fencing proposals, a number of external amenity areas would be expected to exceed 50 dB $L_{Aeq,16hr}$, the criteria set by the local authority. This would also be the case if hit-and-miss fencing was replaced with close-boarded fencing. Mitigation measures must therefore be considered in order to achieve this criteria, as discussed in Section 9.

Internal Noise Levels

8.3.7 The Planning Condition for the site requires that noise incident on the development is controlled to 30 dB $L_{Aeq,8hr}$ in bedrooms at night and 35 dB $L_{Aeq,16hr}$ in habitable rooms during the day, and that noise from individual events such as vehicle pass-bys does not regularly exceed an indoor level of 45 dB $L_{AF,max}$.

8.3.8 The generally accepted rule of thumb is that a window left open for ventilation provides 10 – 15 dB attenuation from external noise sources with the WHO Guidelines for Community Noise suggesting

15 dB. The DEFRA report NANR116: Open/Closed Window Research⁵ suggests the figure to be between 12 and 18 dB for road and rail traffic. ProPG indicates that where external noise levels are more than 15 dB higher than the internal noise targets, openable windows should not be relied upon as the sole means of ventilation and some form of acoustically attenuated ventilation may be required. This equates to an external noise level of 45 dB L_{Aeq} / 60 dB $L_{AF,max}$ during the night or 50 dB L_{Aeq} during the day.

8.3.9 External noise levels recorded at the site are above the threshold levels below which internal noise levels remain achievable with the use of open windows for ventilation, and therefore mitigation measures to reduce the noise impact have been applied as described in the following section of this report.

9 Mitigation for Achieving Good Acoustic Design

9.1 Building Envelope

9.1.1 In order to assess the potential glazing and ventilation requirements for dwellings where closed windows are required, noise ingress calculations have been undertaken based on the methodology in BS EN 12354-3⁶. The following assumptions were made regarding the internal rooms:

- Assessed within first floor bedrooms with an internal volume of 30 m³
- Assessed within ground floor living rooms with an internal volume of 48 m³
- 'Normal' internal surface finishes e.g. carpeted with curtains etc.
- Glazed area of 1.5 m² per bedroom and 4 m² per living room
- Two ventilators in ground floor rooms, one ventilator in first floor rooms
- Typical twin-leaf masonry façade construction, and tiled roof with 450 mm mineral wool and 12.5 mm plasterboard ceiling

9.1.2 The worst-case areas of the proposed site where internal noise may exceed the standards have been assessed, i.e. façades closest to Whitehall Road West. A summary of noise ingress calculations is provided in **Table 6**.

⁵ NANR116: 'Open/closed window research' Sound Insulation through ventilated open windows, Defra April 2007

⁶ BS EN 12354-3:2000 Building acoustics. Estimation of acoustic performance in buildings from the performance of elements - Airborne sound insulation against outdoor sound

Table 6: Predicted internal noise levels

Description	External Noise Levels		Proposed Glazing and Ventilation	BS 8233 Criteria		Predicted Internal Noise Levels		Exceedance of Criteria	
	dB	dB		dB	dB	dB	dB	dB	dB
	$L_{Aeq,T}$	$L_{AF,max}$		$L_{Aeq,T}$	$L_{AF,max}$	$L_{Aeq,T}$	$L_{AF,max}$	$L_{Aeq,T}$	$L_{AF,max}$
Daytime, Ground Floor Living Rooms	58	N/A	Façade 1	35	N/A	35	N/A	0	N/A
Night-Time, First Floor, Bedrooms	56	75	Façade 2	30	45	26	44	-4	-1

- **Facade 1**

- Glazing with minimum weighted sound reduction index of 27 dB $R_w + C_{tr}$ (e.g. 4 mm float glass pane / 12 mm air gap / 4 mm laminated glass, i.e. standard thermal double glazing); and
- Ventilators with a minimum element normalised sound level difference of 36 dB $D_{ne,w}$ (e.g. Titon (2500EA) V50 + C25).

- **Facade 2**

- Glazing with minimum weighted sound reduction index of 27 dB $R_w + C_{tr}$ (e.g. 4 mm float glass pane / 12 mm air gap / 4 mm laminated glass, i.e. standard thermal double glazing); and
- Ventilators with a minimum element normalised sound level difference of 35 dB $D_{ne,w}$ (e.g. Titon (2500EA) V50 + Standard Canopy).

9.1.3 It can be seen from **Table 6** that rooms on the noisiest elevations are predicted to satisfy the internal noise level requirements with appropriate mitigation installed. Mitigation is required on all non-green façades in **Appendix 5 Façade Mitigation Measures**. Figure 5A relates to the ground floor and Figure 5B relates to the first floor.

9.1.4 If preferred, it would be appropriate to use Façade 1 throughout (vent unit with C25 canopy), but it would not be appropriate to use Façade 2 throughout (vent unit with standard canopy). All façades marked with green may utilise openable windows.

9.1.5 Where noise levels are highest, facing Whitehall Road West to the north, windows will be provided with a degree of solar shading by the dwellings themselves, reducing the risk of overheating in these spaces.

9.2 External Noise Levels

- 9.2.1 The predicted daytime noise levels in gardens across the site are generally below 55 dB $L_{Aeq,16hr}$. Away from Whitehall Road West noise levels in gardens are below 50 dB $L_{Aeq,16hr}$ due to increased distance and screening losses. This can be seen in the daytime noise grid presented in **Appendix 4: Noise Grid Maps**. However, to achieve the Local Authority criteria of less than 50dB $L_{Aeq,16hr}$ across the site, additional acoustic screening must be considered.
- 9.2.2 To achieve 50 dB $L_{Aeq,16hr}$ in the worst affected external amenity areas (i.e. plot 23), fencing around this garden must be up to 4.5 m in height. Additionally, other fencing around the north of the site and along the western boundary of the site will need to be enhanced from the baseline proposal. Locations where different heights of fencing will be required are shown in **Appendix 6: Garden Mitigation** along with the resultant noise levels.
- 9.2.3 If it is not considered appropriate to install a 4 m barrier to achieve external ambient noise levels in gardens, a reasonable level of amenity (i.e. below 55 dB $L_{Aeq,16hr}$) would be achieved with strategically located 2.8 m barriers. This would comply with the criteria in ProPG. These options and resultant noise levels are also shown in **Appendix 6: Garden Mitigation**.
- 9.2.4 Barriers are to be constructed from continuous, imperforate material with a minimum mass of 12 kg/m². Close-boarded or overlapped timber panelling would be suitable in this regard; hit-and-miss fencing would not.

9.3 Acoustic Design Statement

Description	Statement
Relevant noise sources identified	This assessment has considered noise from road traffic on Whitehall Road West.
Greater coverage across the site (all buildings, all relevant heights)	Noise grids have been predicted to cover the entirety of the site.
Alternative site layouts considered	The proposed site layout is the result of several design iterations, whereby alternative building and barrier layout were considered.
Adequate non-sensitive use for screening	Area to front of site utilised for car parking (non-sensitive), allowing dwellings to be set back from road.
Opportunities to mitigate the noise source within the site	Unable to mitigate traffic noise at source. Proposals utilise fences and screening.
Opportunities to mitigate the noise source outside owned land; Physical mitigation;	Able to mitigate noise sources in external areas with orientation of gardens and use of fencing.

Description	Statement
Operational management	
Maximise separation	Achieved by setting back houses to rear of site.
Existing topographical advantages; Change site level	Not applicable, effectively a flat site between source and receptor.
Noise barriers – screening opportunities	Achieved – Proposals utilise fences and screening.
Site layout – protecting residential units	Achieved utilising set back and screening
Design external amenity spaces (e.g. balconies) to reduce noise entering sensitive rooms	Not possible, no balconies proposed
Site layout – protecting external amenity space	Achieved utilising self-screening by new houses. Gardens located on the quieter rear elevation.
Access to quiet open space on or off-site	Achieved by provision of shielded rear gardens.
Orientation of noise sensitive rooms away from the source of noise exposure i.e. quiet facades	Achieved where possible, within constraints of house size. Lounges and mater bedrooms on quieter elevation. Kitchens and bathrooms on noisier elevation.
Building treatment to screen openings	Not relevant
Consideration of alternative acoustic options	Considered, but not relevant within financial and design constraints.
Window location & size on affected facades	Internal noise criteria achieved by utilising acoustic glazing rather than reducing glazing size
Innovative facade and window designs e.g. plenum windows	Considered, but not possible within financial and design constraints.
Façade insulation design	Standard brick/block façade construction, is not the weak point of the façade.
Complete Acoustic Design Process throughout	Yes

10 Summary and Conclusions

- 10.1 A noise assessment has been undertaken to predict the impact of noise on a new residential development at Whitehall Road West, Birkenshaw. Noise measurements were undertaken at the site to quantify the noise levels at the site which were used to inform a noise model of the site. The results were then used to assess where openable windows were appropriate for providing ventilation and where mitigated ventilation elements would be required.
- 10.2 The assessment of the site has shown that internal ambient noise criteria can be achieved with minimal levels of acoustic mitigation, and openable windows are appropriate for most of the site. Standard thermal double glazing with $D_{ne,w}$ 36 dB trickle vents are appropriate for controlling internal ambient noise levels at the dwellings subjected to the highest incident noise levels. First floor spaces will achieve internal criteria with standard thermal double glazing and $D_{ne,w}$ 35 dB trickle vents.
- 10.3 External ambient noise levels of 50 dB $L_{Aeq,16hr}$ are achievable in all external amenity areas with mitigation but this requires barriers of up to 4.5 m tall (from local ground level). However, we consider these barrier heights are excessive and reasonable levels of amenity (in line with WHO, BS 8233 and ProPG external limits of 55 dB) are achievable in external areas with lower barriers (maximum 2.8 m tall). With barriers up to 2 m tall, the highest external noise levels would not be expected to exceed 59 dB $L_{Aeq,16hr}$ in the worst affected garden while all other gardens will be below 55 dB L_{Aeq} .

11 Advisories

11.1 Requirements of Other Disciplines

- 11.1.1 It is recommended that you confirm the suitability of all recommended noise mitigation measures with your architects, structural engineers, building contractors, fire consultants and material manufacturers prior to procurement and field application so that when the recommended noise control measures are implemented on site they will satisfy the requirements of all disciplines, therefore, should not cause any health and safety issues.

APPENDICES

Appendix 1: Planning Policy

Noise Policy Statement for England

The Noise Policy Statement for England (NPSE⁷), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are:

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

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

The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and the quality of life occur.

The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the Statement). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case:

"...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development".

Importantly, the NPSE goes on to state:

"This does not mean that such adverse effects cannot occur".

The Statement does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor and the time in question. NPSE advises that:

⁷Noise Policy Statement for England, Defra, March 2010

“Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available”

It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

National Planning Policy Framework

The National Planning Policy Framework (NPPF⁸) initially published in March 2012, was updated most recently in December 2023. One of the documents that the NPPF replaces is Planning Policy Guidance Note 24 (PPG 24) “Planning and Noise”⁹.

The revised NPPF advises that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives). One of these is an environmental objective which is described in par. 8 (c):

“to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.”

At par. 180 we are advised that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans...”

⁸ National Planning Policy Framework, Ministry of Housing, Communities and Local Government, December 2023

⁹ Planning Policy Guidance 24: Planning and Noise, DCLG, September 1994

Par. 191 goes on to state:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; ...”

Par. 193 seeks to ensure that any development does not prejudice the legally permitted operations and activities of other, existing non-residential uses, stating:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

Planning Practice Guidance – Noise

As of March 2014, a Planning Practice Guidance¹⁰ for noise was issued which provides additional guidance and elaboration on the NPPF, the guidance was updated in July 2019. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and

¹⁰ Planning Practice Guidance – Noise, <https://www.gov.uk/guidance/noise--2> 22nd July 2019.

- Whether or not a good standard of amenity can be achieved.

In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

“...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation”.

Examples of these factors include:

- The source and absolute noise level of the source along with the time of day that it occurs;
- Where the noise is non-continuous, the number of noise events and pattern of occurrence;
- The frequency content and acoustic characteristics of the noise;
- The effect of noise on wildlife;
- The acoustic environment of external amenity areas provided as an intrinsic part of the overall design;
- The impact of noise from certain commercial developments such as night clubs and pubs where activities are often at their peak during the evening and night.

The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority’s administrative boundary, although it states that:

“Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed”.

The PPG was amended in December 2014 to clarify guidance on the potential effect of noise from existing businesses on proposed new residential accommodation. Even if existing noise levels are intermittent (for example, from a live music venue), noise will need to be carefully considered and appropriate mitigation measures employed to control noise at the proposed accommodation.

Appendix 2: Acoustic Standards and Guidance

ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise – New Residential Development – May 2017

ProPG: Planning and Noise is new guidance with the aim of delivering sustainable development and promoting good health and well-being through the effective management of noise which may impact on new residential developments. The guidance aims to complement the national planning policy and encourages the use of good acoustic design at the earliest phase of the planning process. It builds upon the recommendations of various other guidance documents including NPPF, NPSE and PPG-Noise, BS 8233 and WHO.

The guidance is applicable to new residential developments which would be exposed predominantly to noise from existing transport sources. The ProPG advocates a risk-based approach to noise using a two-stage process:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of four key elements: –
 - Element 1 – demonstrating a ‘Good Acoustic Design Process’;
 - Element 2 – observing internal ‘Noise Level Guidelines’;
 - Element 3 – undertaking an ‘External Amenity Area Noise Assessment’; and
 - Element 4 – consideration of ‘Other Relevant Issues’.

The ProPG approach is underpinned by the preparation and delivery of an ‘Acoustic Design Statement’ (ADS), whereby the higher the risk for noise at the site, the more detailed the ADS. The ADS should address the following issues:

- Present the initial site noise risk assessment, including the pre-development acoustic conditions prior to development;
- Describe the external noise levels that occur across the site both before and after any necessary mitigation measures have been incorporated. The external noise assessment with mitigation measures in place should use an informed judgement of typical worst-case conditions;

- Demonstrate how good acoustic design is integrated into the overall design and how the proposed acoustic design responds to specific circumstances of the site;
- Confirm how the internal noise level guidelines will be achieved, including full details of the design measures and building envelope specifications;
- A detailed assessment of the potential impact on occupants should be undertaken where individual noise events are expected to exceed 45 dB $L_{AF,max}$ more than 10 times a night inside bedrooms;
- Priority should be given to enable the use of openable windows where practical across the development. Where this is not practical to achieve the internal noise level guidelines with windows open, then full details of the proposed ventilation and thermal comfort arrangements must be provided;
- Present the findings of the external amenity area noise assessment;
- Present the findings of the assessment of other relevant issues;
- Confirm for a low-risk site how adverse impacts of noise will be mitigated and minimised;
- Confirm for a medium or high noise risk site how adverse impacts of noise will be mitigated and minimised and clearly demonstrate that a significant adverse noise impact has been avoided.

ProPG target noise levels are based on existing guidance from BS 8233 and WHO (see below). **Table 7** below outlines the guidance noise levels for different room types during day and night times.

Table 7: ProPG guideline indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,F}$

The footnotes to this table suggest that internal noise level limits can be relaxed by up to 5 dB where development is considered necessary or desirable, and still represent “reasonable” internal conditions. They also suggest that in such cases, external levels which exceed WHO guidance target levels (see WHO section below) may still be acceptable provided that reasonable internal noise levels are achieved. Although, where the acoustic environment of external amenity areas is intrinsic to the overall design, “noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$ ”. The wording of ProPG (and BS 8233:2014) is clear that exceedance of guideline noise levels in external areas should not prohibit the development of desirable developments in any event.

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

This standard carries the full weight of an adopted British Standard, provides recommended guideline acoustic design criteria for new dwellings and is supported by guidance contained within WHO GCN¹¹. The guideline noise design criteria of BS 8233 apply to external noise “without a specific character” (previously and sometimes termed or referred to as “anonymous noise”) such as that associated with road and rail traffic.

Internal Amenity

The Standard states that for external noise without a specific character, such as road traffic, it is desirable that the internal ambient noise level does not exceed the guideline values shown in **Table 8**, below.

The note to paragraph 7.7.1 states that where noise has a specific character (i.e. it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content) “lower noise limits might be appropriate”.

Table 8: BS 8233: 2014 guideline indoor ambient noise levels for dwellings

Location	Activity	07:00 to 23:00	23:00 to 07:00
Living Room	Resting	35 dB $L_{Aeq,16hr}$	-
Dining room/area	Dining	40 dB $L_{Aeq,16hr}$	-
Bedroom	Sleeping (daytime resting)	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

¹¹ World Health Organisation Guidelines for Community Noise, 1999

Note 7 to Table 4 of BS 8233 states:

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

Guidance on reasonable acoustic design criteria for individual noise events are also provided, and the Standard advises that:

“regular individual noise events...can cause sleep disturbance. A guideline value may be set in terms of SEL^{12} or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values”.

For Internal spaces, the Standard states that;

“..to avoid sleep disturbance, sound pressure levels at the outside facades of living spaces should not exceed 45 dB L_{Aeq} (taken as a façade level, and equating to a free-field external level of 42 dB L_{Aeq}) and 60 dB L_{AFmax} so that people may sleep with bedroom windows open.”

External Amenity

BS 8233:2014 adopts guideline external noise values provided in WHO for external amenity areas such as gardens, patios and private outdoor amenity spaces. BS 8233:2014 adopts guideline external noise level limits provided in WHO for external amenity areas such as gardens and patios. The standard states that it is “desirable” that the external noise does not exceed 50 dB $L_{Aeq,16hr}$ with an upper guideline value of 55 dB $L_{Aeq,16hr}$ whilst recognising in paragraph 7.7.3.2 that development in higher noise areas, such as urban areas or those close to the transport network, may require a compromise between elevated noise levels (i.e., above 55 dB $L_{Aeq,16hr}$) and other factors that determine if development in such areas is warranted. In such circumstances, the development should be designed to achieve the lowest practicable noise levels in external amenity areas, but should not be prohibited.

The standard also states:

“Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not

¹² Sound exposure level or L_{AE}

necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

World Health Organisation (WHO) Guidelines for Community Noise 1999

The WHO Guidelines 1999 recommends that to avoid sleep disturbance, indoor night-time guideline noise values of 30 dB L_{Aeq} for continuous noise and 45 dB $L_{AF,max}$ for individual noise events should be applicable. It is to be noted that the WHO Night Noise Guidelines for Europe 2009¹³ makes reference to research that indicates sleep disturbance from noise events at indoor levels as low as 42 dB $L_{AF,max}$. The number of individual noise events should also be taken into account and the WHO guidelines suggest that indoor noise levels from such events should not exceed approximately 45 dB $L_{AF,max}$ more than 10 – 15 times per night.

The WHO document recommends that steady, continuous noise levels should not exceed 55 dB L_{Aeq} on balconies, terraces and outdoor living areas. It goes on to state that to protect the majority of individuals from moderate annoyance, external noise levels should not exceed 50 dB L_{Aeq} .

¹³ WHO Night Noise Guidelines for Europe 2009

Appendix 3: Monitoring Position



Appendix 4: Noise Grid Maps

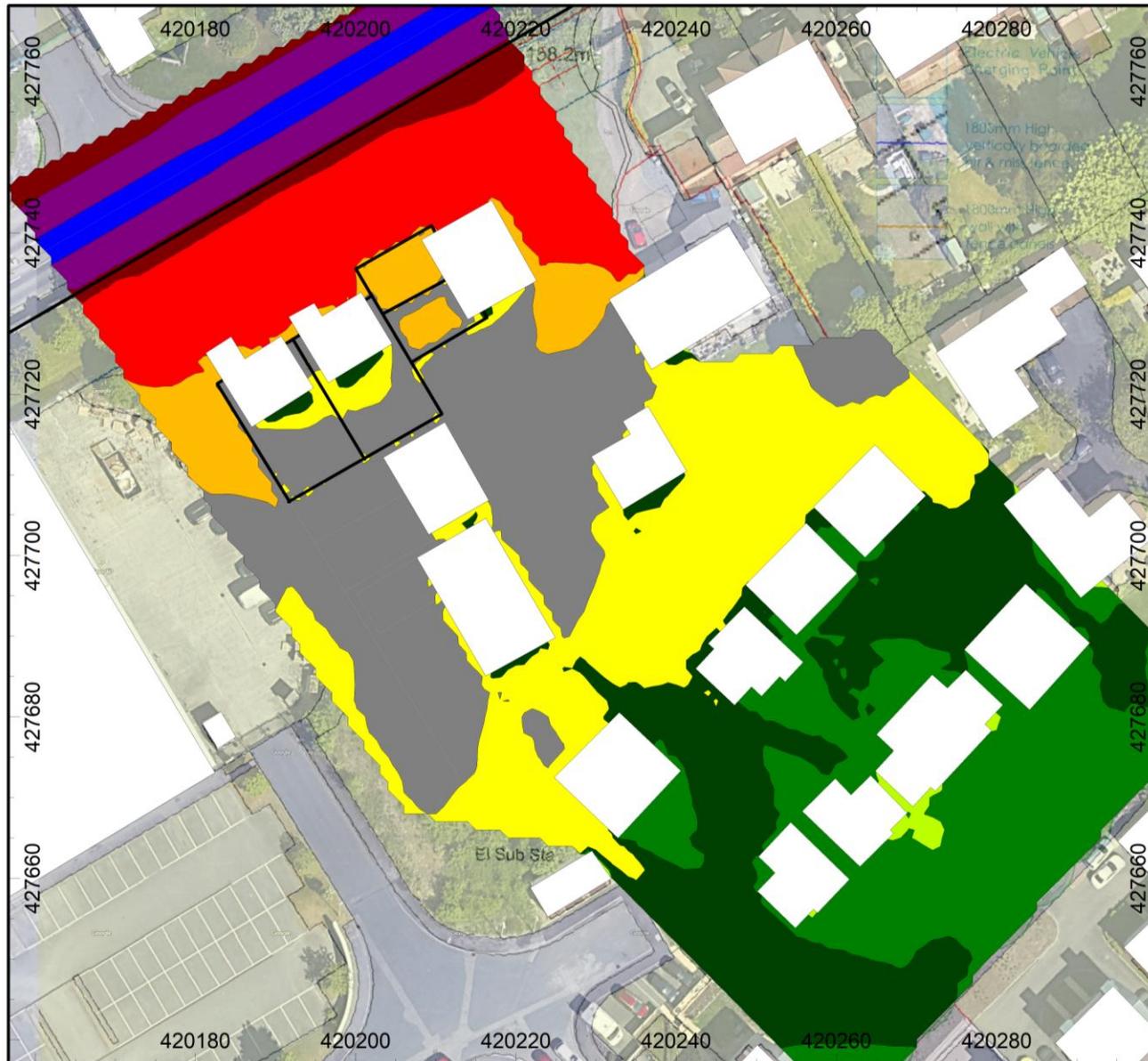


Fig 4A: Predicted LAeq,T Cumulative Daytime

Miller Goodall Ltd
 Ashworth House
 Deakins Business Park
 Egerton
 Bolton
 BL7 9RP
 Tel: 01204 596166
 E-mail: info@millergoodall.co.uk
 www.millergoodall.co.uk

Object & Grid Legend

- Line Source
- Building
- Barrier

- > -99.0 dB LAeq,T
- > 35.0 dB LAeq,T
- > 40.0 dB LAeq,T
- > 45.0 dB LAeq,T
- > 50.0 dB LAeq,T
- > 55.0 dB LAeq,T
- > 60.0 dB LAeq,T
- > 65.0 dB LAeq,T
- > 70.0 dB LAeq,T
- > 75.0 dB LAeq,T
- > 80.0 dB LAeq,T
- > 85.0 dB LAeq,T

Rev.	Date	Purpose	Drawn By	Approved By
3	28/08/2024	Fence Change	JL	LG



Project: Whitehall Road West

Client: Orion Homes Ltd

Not To Scale

Report Number: 103182



**Fig 4B: Predicted LAeq,T
Cumulative Night-time**

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Object & Grid Legend

- Line Source
- Building
- Barrier
- > -99.0 dB LAeq,T
- > 35.0 dB LAeq,T
- > 40.0 dB LAeq,T
- > 45.0 dB LAeq,T
- > 50.0 dB LAeq,T
- > 55.0 dB LAeq,T
- > 60.0 dB LAeq,T
- > 65.0 dB LAeq,T
- > 70.0 dB LAeq,T
- > 75.0 dB LAeq,T
- > 80.0 dB LAeq,T
- > 85.0 dB LAeq,T

Rev.	Date	Purpose	Drawn By	Approved By
2	20/08/2024	Initial Issue	JL	LG



Project: Whitehall Road West

Client: Orion Homes Ltd

Not To Scale

Report Number: 103182

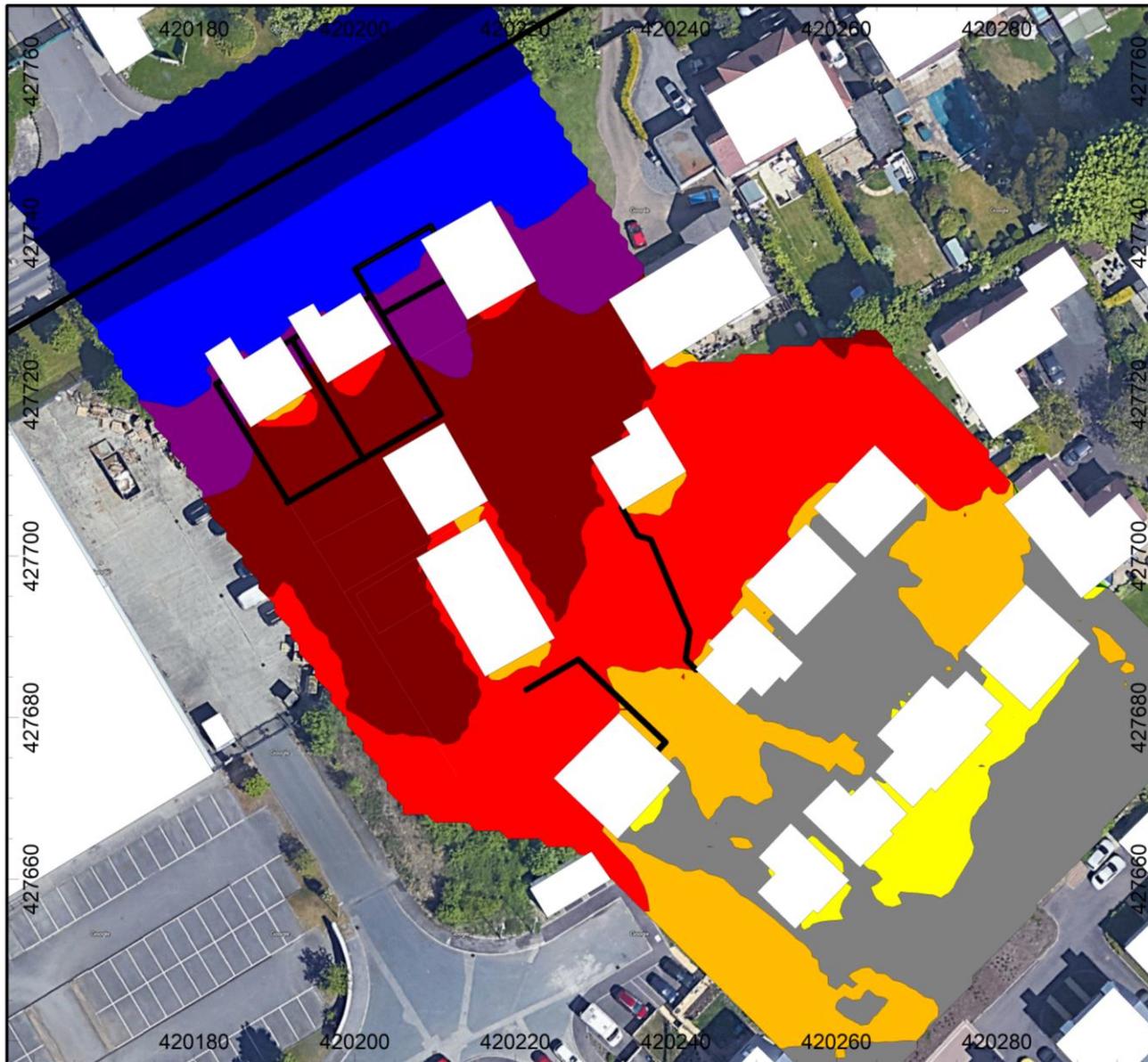


Fig 4C: Predicted LAF,max Night-time

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 Bolton
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 www.millergoodall.co.uk

Object & Grid Legend

- Line Source
- Building
- Barrier
- > 99.0 dB LAF,max
- > 35.0 dB LAF,max
- > 40.0 dB LAF,max
- > 45.0 dB LAF,max
- > 50.0 dB LAF,max
- > 55.0 dB LAF,max
- > 60.0 dB LAF,max
- > 65.0 dB LAF,max
- > 70.0 dB LAF,max
- > 75.0 dB LAF,max
- > 80.0 dB LAF,max
- > 85.0 dB LAF,max

Rev.	Date	Purpose	Drawn By	Approved By
2	20/08/2024	Initial Issue	JL	LG



Project: Whitehall Road West

Client: Orion Homes Ltd

Not To Scale | Report Number: 103182

Appendix 5 Façade Mitigation Measures

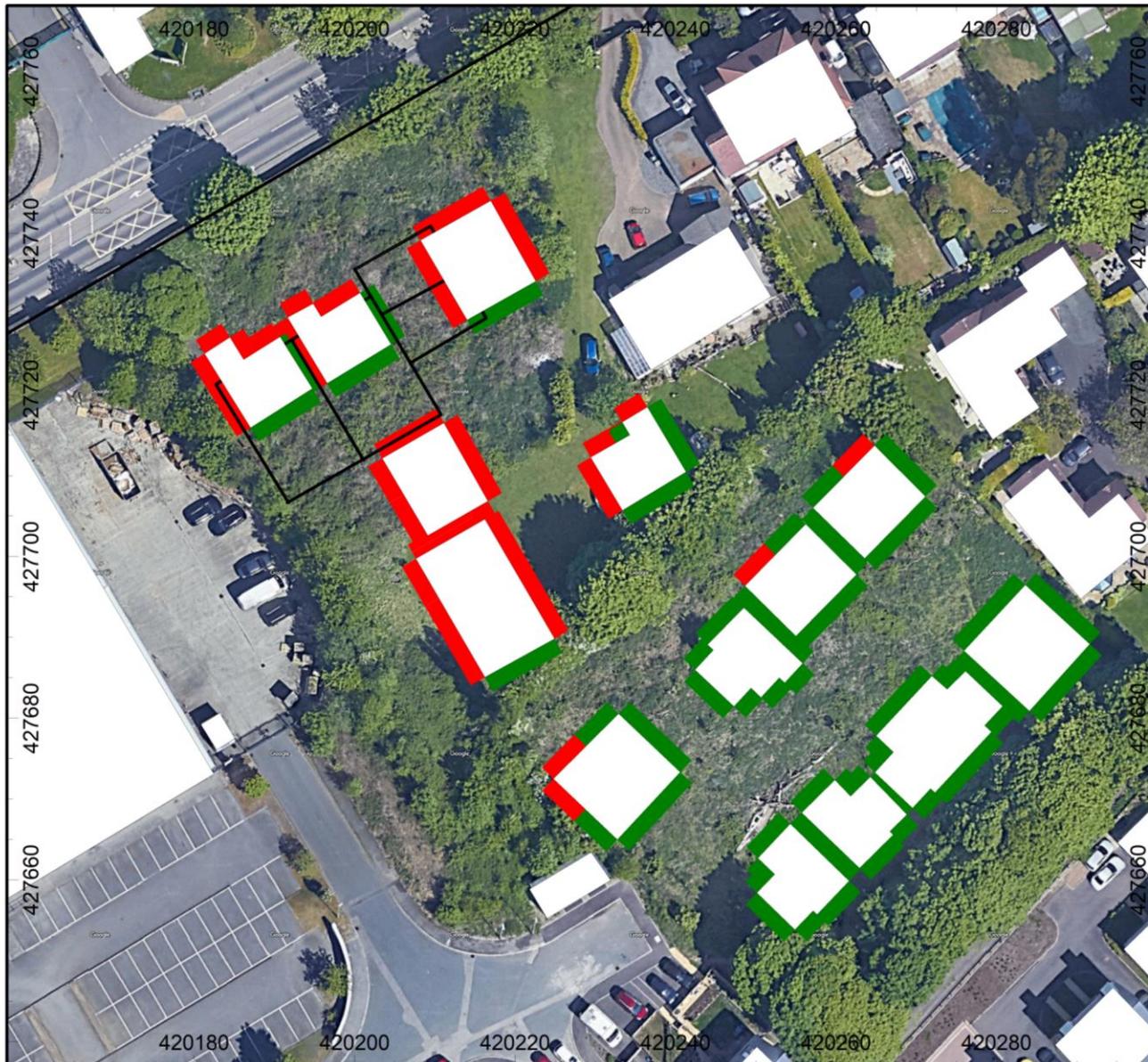


Fig 5A: Facade Mitigation Ground Floor

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Object & Grid Legend

- Line Source
- Building
- Barrier
- ⊕ Building Evaluation
- Facade 1
- Facade 2
- Openable Windows

Rev.	Date	Purpose	Drawn By	Approved By
3	28/08/2024	Legend Update	JL	LG

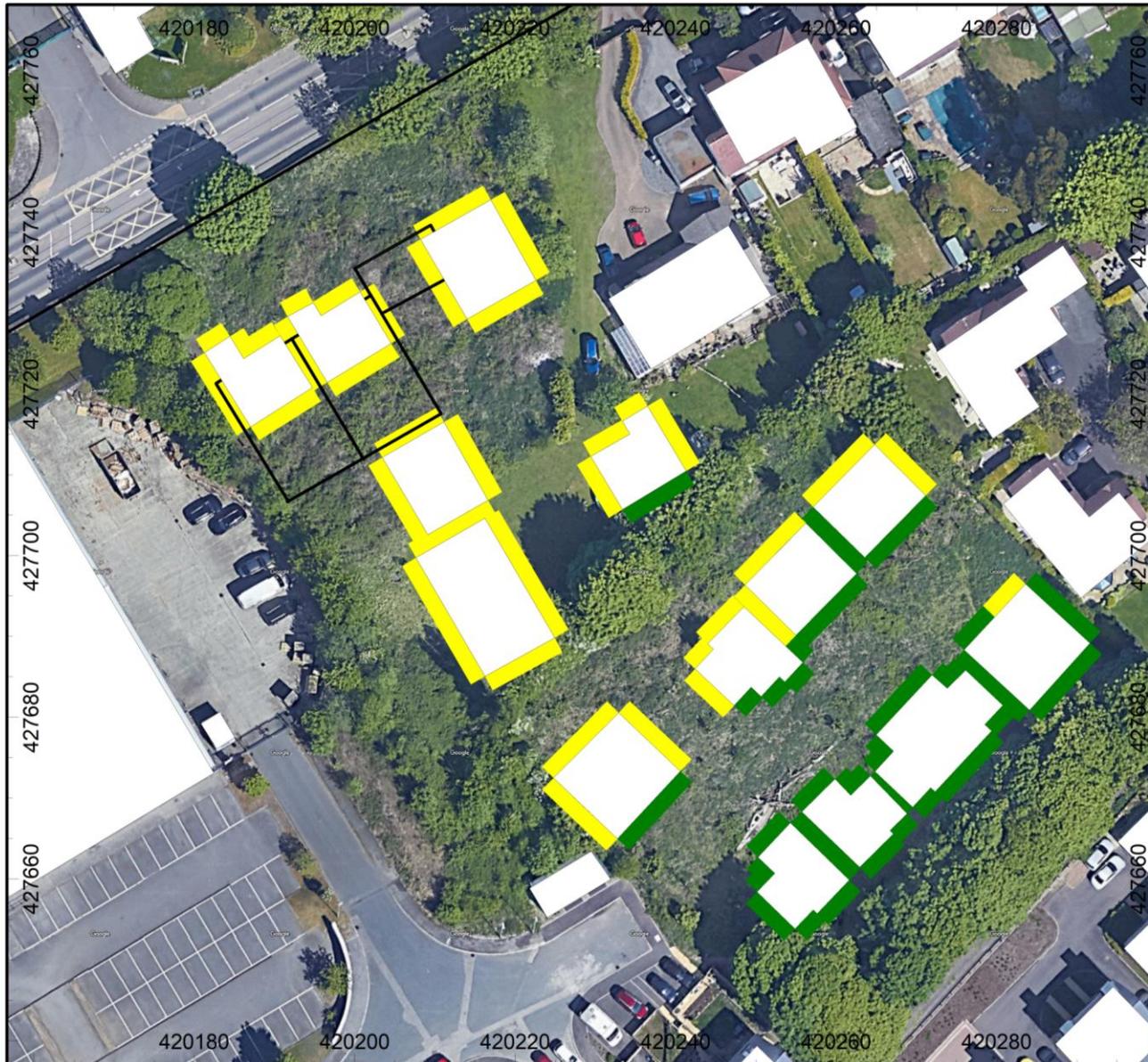


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Client: Orion Homes Ltd

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Report Number: 103182



**Fig 5B: Facade Mitigation
First Floor**

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Object & Grid Legend

- Line Source
- Building
- Barrier
- ⊕ Building Evaluation
- Facade 1
- Facade 2
- Openable Windows

Rev.	Date	Purpose	Drawn By	Approved By
3	28/08/2024	Legend Update	JL	LG



Project: Whitehall Road West

Client: Orion Homes Ltd

Not To Scale	Report Number: 103182
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Appendix 6: Garden Mitigation



**Fig 6A: Garden Mitigation
Local Authority Criteria**

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Object & Grid Legend

- Line Source
- Building
- Barrier

- > -99.0 dB LAeq,16hr
- > 35.0 dB LAeq,16hr
- > 40.0 dB LAeq,16hr
- > 45.0 dB LAeq,16hr
- > 50.0 dB LAeq,16hr
- > 55.0 dB LAeq,16hr
- > 60.0 dB LAeq,16hr
- > 65.0 dB LAeq,16hr
- > 70.0 dB LAeq,16hr
- > 75.0 dB LAeq,16hr
- > 80.0 dB LAeq,16hr
- > 85.0 dB LAeq,16hr

Fencing Heights

- 1.0 m
- 1.8 m
- 2.0 m
- 2.2 m
- 2.8 m
- 4.5 m

Rev.	Date	Purpose	Drawn By	Approved By
2	20/08/2024	Initial Issue	JL	LG

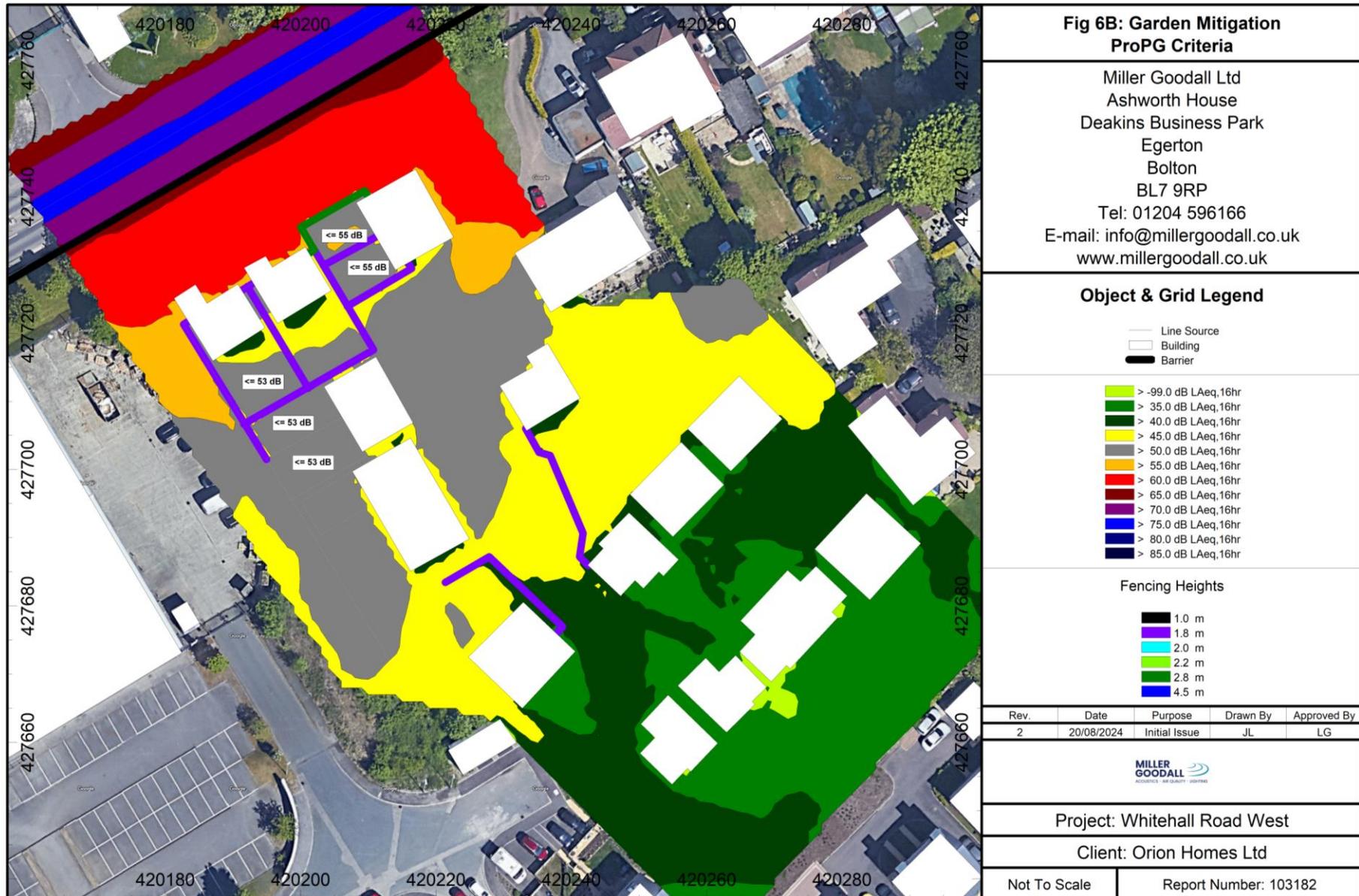


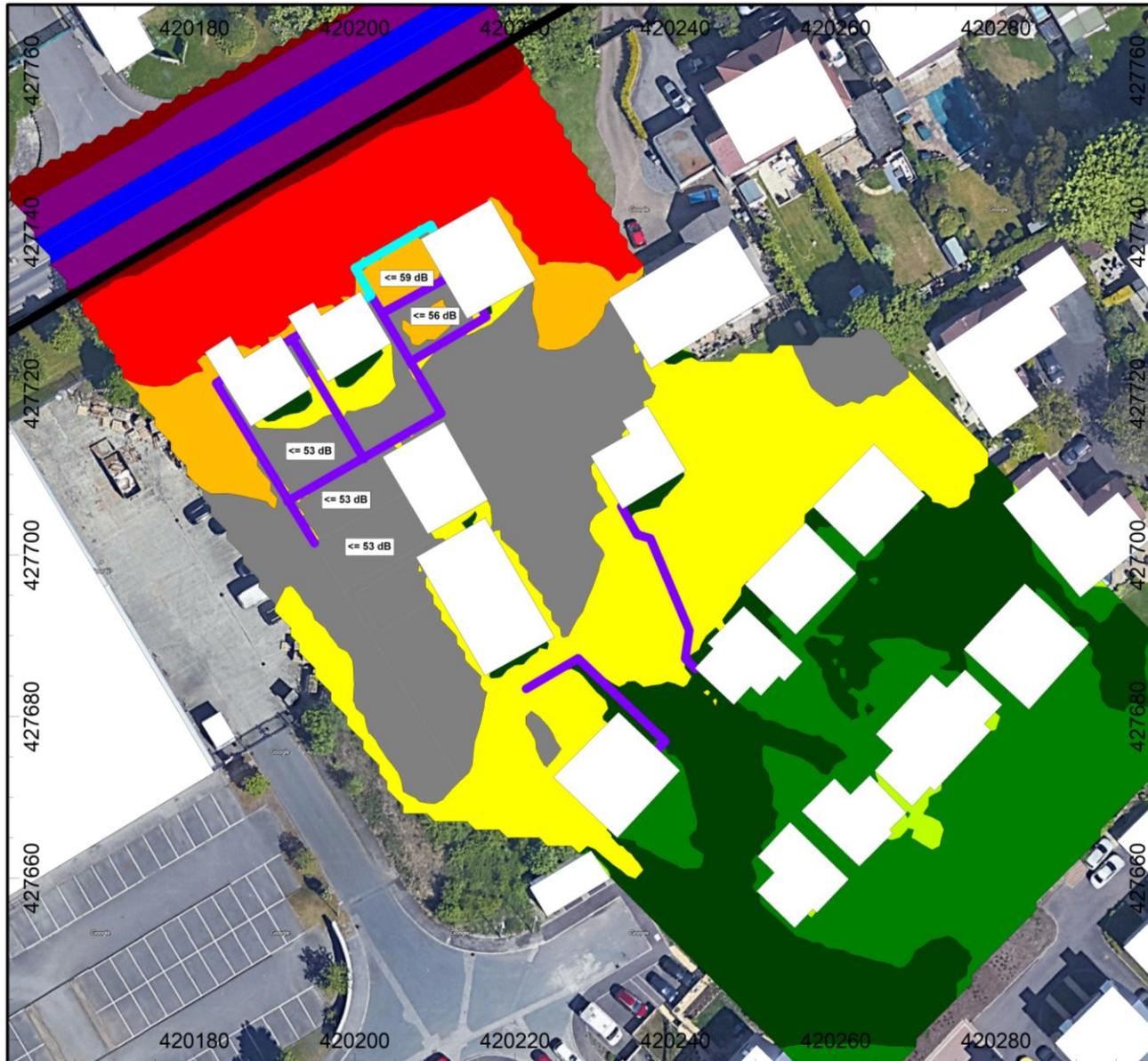
Project: Whitehall Road West

Client: Orion Homes Ltd

Not To Scale

Report Number: 103182





**Fig 6C: Garden Mitigation
Max. 2.0 m Fencing**

Miller Goodall Ltd
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Object & Grid Legend

- Line Source
- Building
- Barrier

- > -99.0 dB LAeq,16hr
- > 35.0 dB LAeq,16hr
- > 40.0 dB LAeq,16hr
- > 45.0 dB LAeq,16hr
- > 50.0 dB LAeq,16hr
- > 55.0 dB LAeq,16hr
- > 60.0 dB LAeq,16hr
- > 65.0 dB LAeq,16hr
- > 70.0 dB LAeq,16hr
- > 75.0 dB LAeq,16hr
- > 80.0 dB LAeq,16hr
- > 85.0 dB LAeq,16hr

Fencing Heights

- 1.0 m
- 1.8 m
- 2.0 m
- 2.2 m
- 2.8 m
- 4.5 m

Rev.	Date	Purpose	Drawn By	Approved By
1	20/08/2024	Initial Issue	JL	LG



Project: Whitehall Road West

Client: Orion Homes Ltd

Not To Scale

Report Number: 103182

Glossary of Terms

- Decibel (dB)** The unit used to quantify sound pressure levels; it is derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 μPa , the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is usually only perceptible under controlled conditions.
- dB L_A** Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB L_A broadly agree with an individual's assessment of loudness. A change of 3 dB L_A is the minimum perceptible under normal conditions, and a change of 10 dB L_A corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB L_A ; normal conversation about 60 dB L_A at 1 meter; heavy road traffic about 80 dB L_A at 10 meters; the level near a pneumatic drill about 100 dB L_A .
- $L_{A90,T}$** The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 2014+A1:2019 it is used to define background noise level.
- $L_{Aeq,T}$** The equivalent continuous sound level. The sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.
- L_{Amax}** The highest A weighted noise level recorded during the time period. It is usually used to describe the highest noise level that occurred during the event.
- R_w** Single number rating used to describe the sound insulation of building elements and is defined in BS EN ISO 10140-2: 2010 (formerly BSEN ISO 140-3:1995). It is derived by measurement under laboratory conditions and does not take into account the effects of flanking transmissions.
- $D_{ne,w}$** The weighted element-normalized level difference is a single figure rating used to describe the sound insulation of small elements within a larger construction and is defined in BS EN ISO 10140-2:2010 (BSEN ISO 140-10:1991). It is most often used to rate the sound insulation performance of ventilator units e.g. trickle vents.

C_{tr} A single-number spectrum adaptation term used to characterise the sound insulation rating with respect to urban traffic. It is defined in ISO 717-1:20-13.

