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HARRON HOMES LTD

HIGH STREET, GREAT HOUGHTON

NOISE ASSESSMENT REPORT

OCTOBER 2021

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HARRON HOMES LTD

HIGH STREET, GREAT HOUGHTON

NOISE ASSESSMENT REPORT

OCTOBER 2021

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CONTENTS

EXECUTIVE SUMMARY	1
1 INTRODUCTION	2
2 ASSESSMENT METHODOLOGY	3
2.1 Scope of Works.....	3
2.2 Consultations.....	3
2.3 Noise Survey.....	3
2.4 Noise Model	3
2.5 Overheating.....	3
2.6 Assessment Methodology	4
3 NOISE SURVEY	5
3.1 Introduction.....	5
3.2 Measured Noise Levels	6
4 SITE RISK ASSESSMENT	8
4.1 Noise Risk Assessment	8
4.2 Overheating Risk Assessment	9
5 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTY	10
5.1 Introduction.....	10
5.2 Assumptions	10
5.3 Limitations.....	10
5.4 Uncertainty.....	11
6 CONSTRUCTION PHASE ASSESSMENT	12
6.1 Existing Sensitive Receptors.....	12
6.2 Assessment of Noise	12
6.3 Assessment of Vibration	14
7 DETAILS OF THE NOISE MODEL.....	16
7.1 Introduction.....	16
7.2 Noise Model Set-up.....	16
7.3 Modelling Results	17
8 NOISE IMPACT ASSESSMENT	18
8.1 Introduction.....	18
8.2 Assessment of Noise in External Areas	18
8.3 Assessment of Daytime Noise Levels in Living Rooms and Dining Rooms	18
8.4 Assessment of Night-time Noise Levels in Bedrooms.....	19
8.5 Internal Sound Insulation	20

9	NOISE MITIGATION MEASURES	22
9.1	Introduction.....	22
9.2	Construction Noise Mitigation	22
9.3	Construction Vibration Mitigation	23
9.4	External Noise Levels in Gardens	24
9.5	Internal Noise Levels in Living Rooms and Bedrooms	24
10	CONCLUSIONS	26

APPENDICES

Appendix A	Noise Legislation and Guidance
Appendix B	Noise Monitoring Results
Appendix C	Early Stage Overheating Risk Tool

DRAWINGS TITLE

GM12043-001	Noise Monitoring and Existing Sensitive Receptor Plan
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FIGURES TITLE

Figure 1	Daytime Noise Contour Plot
Figure 2	Daytime Façade Noise Map
Figure 3	Night-time Façade Noise Map
Figure 4	Night-time Façade Noise Map
Figure 5	Daytime Noise Contour Plot, with Mitigation Measures

EXECUTIVE SUMMARY

Wardell Armstrong (WA) LLP has been instructed by Harron Homes Ltd to carry out a noise assessment for a scheme to comprise 91 proposed dwellings, on land off High Street, Great Houghton. The assessment is required to accompany a full planning application. The proposed development is located off High Street, and bordered by open agricultural land and existing agricultural buildings.

The assessment has been undertaken in accordance with current planning and technical guidance.

A baseline noise survey has been undertaken during the daytime and night-time, to establish the sound levels from High Street affecting the proposed development site, as well as the baseline acoustic environment, at properties to the east of the site.

A noise model has been set-up for the development site, with all surrounding noise sources included. The noise model has been used to calculate noise levels across the developed site, and to determine if and what mitigation measures are required to achieve the internal and external noise guideline levels. Some bedrooms located on the western façades of the proposed dwellings, closest to and facing High Street, will require mitigation measures to achieve internal noise guideline levels. Where required, the mitigation measures comprise standard, thermal double glazing, together with an alternative means of ventilation to remove the need to open the windows for ventilation when the resident so chooses. Facades of dwellings facing away from High Street will be able to open windows for ventilation during the daytime and night-time periods.

The likelihood of an adverse noise impact occurring during the construction phase of the proposed development has been considered. It has been established that with appropriate mitigation measures and operating procedures, it is likely that an adverse noise impact during construction of the proposed development would be avoided.

The assessment demonstrates that with the implementation of appropriate glazing and ventilation systems, as recommended by national guidance and policy, noise from the transportation sources can be mitigated to provide acceptable living conditions for future residents.

1 INTRODUCTION

- 1.1.1 By instruction from Harron Homes Ltd (Harron), Wardell Armstrong LLP (WA) was commissioned to undertake a noise assessment for a proposed residential development, off High Street, Great Houghton.
- 1.1.2 To the north and east, the site is bound by open agricultural land. To the south-east, the site is bound by open agricultural land, with allotments and existing dwellings on Garraby Close and School Street beyond. To the south, the site is bound by existing agricultural buildings, with residential premises beyond. To the west, the site is bound by High Street, with existing residential premises beyond.
- 1.1.3 The proposed development comprises 91 dwellings, with associated infrastructure.
- 1.1.4 This noise assessment has been prepared to accompany a full planning application for the development.

2 ASSESSMENT METHODOLOGY

2.1 Scope of Works

- 2.1.1 The scope of this noise assessment comprises a consideration of noise at the proposed residential areas, specifically in terms of the potential impact of existing transportation and industrial noise and is in accordance with current guidance.

2.2 Consultations

- 2.2.1 Consultations have been carried out with Mr Adam Cattell, an Environmental Health Officer (EHO) at Barnsley Metropolitan Borough Council (BMBC), to agree a proposed assessment methodology, however requested that an assessment of construction noise is carried out. An agreement regarding this was received from BMBC via email on the 5th October 2021.

2.3 Noise Survey

- 2.3.1 As part of this assessment, WA has carried out unattended noise monitoring, to assess the current ambient and background noise levels at proposed receptor locations. Attended noise monitoring was carried out at nearby existing receptors to establish the background sound levels.
- 2.3.2 The results of the noise survey are detailed in Section 3 of this report.

2.4 Noise Model

- 2.4.1 The computer noise modelling software, SoundPLAN Version 8.2, has been used to accurately assess the propagation of road traffic noise across the development site, with the proposed dwellings in place.

2.5 Overheating

- 2.5.1 The proposed development comprises of dwellings located within a close proximity to a road. This may require some of the windows to be closed for some of the time to mitigate the noise. Therefore, this assessment includes a consideration of the potential risk of overheating in some dwellings.

2.6 Assessment Methodology

2.6.1 An assessment is required to consider any potentially noise sensitive areas of the site. The potential impacts of the existing sources of noise on the proposed residential area of the development have been assessed with reference to.

- National Planning Policy Framework, 2021 (NPPF).
- Planning Practice Guidance – Noise, 2019 (PPG).
- Noise Policy Statement for England, 2010 (NPSE).
- British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS8233).
- British Standard BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS4142).
- British Standard 5228-1:2009+A1:2014 “Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise” (BS5228-1);
- British Standard 5228-2:2009+A1:2014 “Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration” (BS5228-2);
- Acoustics Ventilation and Overheating Residential Design Guide – January 2020 (AVO).
- Building Regulations Approved Document E: Resistance to the Passage of Sound, 2010 (ADE).
- Department for Transport’s Technical Memorandum – Calculation of Road Traffic Noise, 1988 (CRTN).

3 NOISE SURVEY

3.1 Introduction

- 3.1.1 Wardell Armstrong has carried out attended and unattended noise monitoring to assess the levels of sound from road traffic at the proposed development site. Background noise monitoring was also carried out to establish the baseline acoustic environment at nearby receptors. Details of the surveys undertaken are described in detail in this Section of the report.
- 3.1.2 The sound level meter was calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No significant drift in calibration was measured during the survey.
- 3.1.3 For the purpose of this assessment daytime hours are taken to be 0700 to 2300 hours and night-time hours to be 2300 to 0700 hours.
- 3.1.4 A-weighted¹ L_{eq} ² noise levels were measured to comply with the requirements of BS8233. A-weighted L_{90} ³ to comply with BS4142 and L_{10} ⁴ noise levels, together with the maximum and minimum sound pressure levels, were also measured to provide additional information. The measured noise levels are set out in full in Appendix A.
- 3.1.5 The noise measurements were made using a Class 1, integrating sound level meter. The microphone was mounted vertically on a tripod 1.5m above the ground and more than 3.5 metres from any other reflecting surfaces.
- 3.1.6 Wardell Armstrong LLP carried out a noise survey on the 7th and 8th October 2021 at the proposed development site.
- 3.1.7 Noise measurements were taken at a location representative of noise from High Street, which was found to be the dominant noise source affecting the site. A site walkover was carried out at the time of equipment set up and collection, however, no other noise sources, which affected the sound levels at the proposed development site were identified. The monitoring locations are as follows and are shown on Drawing Number GM12043-001.

¹ A' Weighting	An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions
² L_{eqs}	Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.
³ L_{90}	The noise level which is exceeded for 90% of the measurement period.
⁴ L_{10}	The noise level which is exceeded for 10% of the measurement period.

3.1.8 **Monitoring Location 1 (ML1):** Located on the western site boundary, approximately 4m away from High Street. Noise monitoring was carried out to measure the noise impact of road traffic at the proposed development.

3.1.9 **Monitoring Location 2 (ML2):** Located at the eastern site boundary, nearest to existing receptors to the east of the site. Noise monitoring location was carried out to ascertain a representative background sound level.

Table 1: Details of the Noise Monitoring				
Monitoring Location	Attended / Unattended	Start Date & Time	End Date & Time	Reason for Measurement
ML1	Unattended	07/10/2021 1411hrs	08/10/2021 1500hrs	Representative of road traffic noise from High Street.
ML2	Attended	07/10/2021 1152hrs	07/10/2021 1352hrs	Background sound level at nearby dwellings.

3.1.10 The noise survey includes representative measurements of noise sources at the proposed development site, therefore allows for a robust assessment to be made of noise impact.

3.1.11 Weather conditions during the survey were as follows:

- Wind: <3ms⁻¹;
- No precipitation;
- Temperature between 10°C-18°C; and,
- Approximately 90% cloud cover.

3.1.12 Site walk overs during noise monitoring allow observations and detailed notes to be made of the significant noise sources at the site. The observations identified the following:

- **Road Traffic Noise:** Noise from High Street was found to be dominant at the proposed development site and was audible across the entire site.
- **Agricultural Noise:** A site walkover was carried out to investigate any activity associated with the nearby agricultural premises. However, no noise from agricultural activity was noticed on site. Therefore, this has not been considered further in this assessment.

3.2 Measured Noise Levels

3.2.1 The noise levels measured during the noise survey have been divided into daytime (0700-2300 hours) and night-time (2300-0700 hours) categories. The individual levels

have been arithmetically averaged to give a single daytime and night-time ambient, and background sound level. The individual event levels ($L_{AF,max}$), were analysed using the audio recording taken during the noise monitoring. Unrepresentative levels, such as those dominated by bird song were discounted. The rest of the events were found to be dominated by road traffic noise. In line with ProPG guidelines, the 10th highest event level was used for the assessment.

3.2.2 The results of the noise survey are presented in Table 2 below.

Table 2: Average Daytime and Night-time Noise Levels			
Monitoring Location	Daytime Average Measured Ambient Noise Level (Figures in dB $L_{Aeq,16hrs}$)	Night-time Average Measured Ambient Noise Level (Figures in dB $L_{Aeq,8hrs}$)	Measured Night-time 10 th Highest Max Noise Level (Figures in dB $L_{AF,Max}$)
ML1	44	-	-
ML2	62	57	78

3.2.3 The noise survey was undertaken during the Coronavirus pandemic. However, during the time of the survey, there were minimal restrictions in place to help control the spread of the virus and road traffic levels had returned to pre pandemic levels. Therefore, the noise survey results are considered to be robust.

3.2.4 Based on the above, an assessment can be made of the noise levels at the proposed development site, and of the mitigation necessary to achieve the required internal noise guideline levels at proposed receptors.

3.2.5 Further details of the measured levels are shown in Appendix A.

Existing Background Sound Levels

3.2.6 Attended noise monitoring was carried out to establish the existing background sound levels at nearby sensitive receptors.

3.2.7 A summary of the measured values of the background sound level is shown below in Table 3.

Table 3: Measured Background Sound Levels at Monitoring Location 1		
Noise Monitoring Location	Daytime	
	$L_{Aeq, 16hrs}$ (dB)	L_{A90} (dB)
ML1	44	39

4 SITE RISK ASSESSMENT

4.1 Noise Risk Assessment

4.1.1 In accordance with ProPG:2017, a Site Noise Risk Assessment (SNRA) has been carried out. The SNRA assesses the initial risk of noise from transportation sources having an adverse impact on a proposed development, based on the overall measured levels with no mitigation in place.

4.1.2 Noise monitoring was undertaken at the site boundary, closest to High Street. During the site visits and monitoring, the noise levels at the site were dominated by road traffic noise. These noise levels have been compared in Table 4 to guidance provided on Figure 1 (*Stage 1 – Initial Site Noise Risk Assessment*) of ProPG:2017, to assess the risk of an adverse impact.

Table 4: Initial Site Noise Risk Assessment Average Daytime and Night-time Noise Levels				
Risk Assessment Location	Average Daytime Noise Level (dB L _{Aeq,16hr})	Daytime Risk of Adverse Effect	Average Night-time Noise Level (dB L _{Aeq,8hr})	Night-time Risk of Adverse Effect
ML2	62	Low	57	Medium

4.1.3 Table 4 indicates that proposed receptors, located closest to High Street, are at a Low risk of experiencing an adverse noise impact due to road traffic during the daytime, and at a Medium risk of experiencing an adverse impact due to road traffic noise during the night-time periods.

4.1.4 Noise levels further into the site and further away from the western site boundary would be lower, and therefore the potential for an adverse noise impact at receptors will be reduced.

4.1.5 As there are more than 10 individual L_{AF, Max} events which exceed 60dB at ML2, the site can not be considered as negligible.

4.1.6 The SNRA shows that good acoustic design will be required for the proposed development, to ensure that the potential risk of the noise impact is minimised, and guideline internal and external noise levels are achieved. In accordance with ProPG:2017, a Stage 2 full noise assessment is required to ensure future residents are protected and good acoustic design has been implemented.

4.2 Overheating Risk Assessment

4.2.1 In accordance with the AVO guide, an Overheating Risk Assessment (ORA) has been carried out. The ORA assesses initial risk of overheating, caused by the need to mitigate against noise generated by nearby transportation sources, based on the noise levels at the development site.

4.2.2 The daytime ($L_{Aeq,16hr}$) and night-time ($L_{Aeq,8hr}$) noise levels measured at ML2 have been compared to the information provided in Table 3-2 of AVO. The results are shown in Table 5.

Table 5: Stage 1 Overheating Risk Assessment					
Risk Assessment Location	Average Daytime Noise Level (dB $L_{Aeq,16hr}$)	Daytime Risk of Overheating	Average Night-time Noise Level (dB $L_{Aeq,8hr}$)	Night-time Maximum Noise Level (dB L_{Amax})	Night-time Risk of Overheating
ML2	62	Medium	57	78	Medium

4.2.3 Table 8 indicates that during the daytime and night-time periods, proposed receptors located in the western part of the development, adjacent to High Street, would be at a Medium risk of experiencing overheating due to the likely acoustic design measures required to achieve the recommended internal noise levels.

4.2.4 Proposed receptors further away from the western site boundary would experience lower noise levels, therefore will be at a negligible risk of overheating, due to the likely acoustic design measures.

4.2.5 The Stage 1 risk assessment indicates that properties located closest to and facing High Street may be at risk of occasionally experiencing overheating.

4.2.6 However, as the proposed development is located in a rural setting, in the north of England, and the proposed properties are likely to be dual-aspect allowing for windows to be opened on the screened side of dwellings as required.

4.2.7 The 'Early Stage Overheating Risk Tool', set out by the Good Homes Alliance, was used to establish the likely risk of overheating the proposed dwelling facades, closes to High Street, are likely to experience. The 'Early Stage Overheating Risk Tool', shown in Appendix C, has demonstrated that the proposed development will be at a low risk of overheating. Therefore, a full Stage 2 overheating assessment has not been carried out.

5 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTY

5.1 Introduction

5.1.1 The assessment is affected by the following assumptions and limitations.

5.2 Assumptions

5.2.1 The following assumptions have been made;

- No noise is generated by the nearby agricultural premises, therefore an assessment of noise from this is not required.
- The model has an assumed temperature of 10°C, 70% humidity, and 1013.3mbar air pressure. The intervening ground between the noise sources and site is a mixture of hard and soft ground, hence the use of 0.6 as the term to represent ground absorption (where 0 = completely absorbent and 1 = completely reflective).
- The 1.8m high fence proposed as part of the development will be close boarded and have a minimum mass of 15kg/m² throughout its lifetime.
- Development led road traffic will not significantly affect the road traffic noise at existing receptors.
- An open window provides approximately 13dB noise attenuation.

5.3 Limitations

5.3.1 The measured noise levels from each identified noise source have been checked for accuracy against the levels in the noise model.

5.3.2 Proposed finished site levels had not been prepared at the time of assessment, therefore they have not been included into the noise model. However, these are not expected to have a significant effect on the assessment outcome.

5.4 Uncertainty

5.4.1 To reduce the level of uncertainty within the assessment, the following steps have been taken:

- The noise measurement locations were selected to be representative of noise generated by the existing noise sources, on the proposed development site.
- In accordance with guidance, the microphone was mounted vertically on a tripod 1.5m above the ground. The monitoring was carried out more than 3.5 metres from any other reflecting surfaces;
- The distance between the source and nearest receptors has been measured from scale plans showing the location of the development;
- The noise measurements were undertaken during suitable weather conditions;
- The results of each measurement period were reported to the nearest 0.1dB;
- Noise measurements were made using a Class 1, integrating sound level meter; and,
- The sound level meter was calibrated prior to and following the noise survey, no significant drift in calibration was recorded.

6 CONSTRUCTION PHASE ASSESSMENT

6.1 Existing Sensitive Receptors

6.1.1 The existing receptors have been identified as representative location, that are most likely to be affected by noise and vibration from the construction phase of the development. The existing sensitive receptors can be considered as representative locations for other nearby receptors, and are shown in Table 6, and on Drawing Number GM12043-001.

Table 6: Existing Noise Sensitive Receptor Locations				
Receptor	Address	Bearing from Site	Distance from Site	Representative Monitoring Location
ESR1	31 Crabtree Drive	West	25m	ML2
ESR2	25 School Street, Great Houghton	South-east	95m	ML1

6.2 Assessment of Construction Noise

6.2.1 The construction phase assessment has been carried out for the ESRs identified in Table 6. A noise impact at other ESRs may be felt, but will be equal to or less than the assessed location. The daytime measured noise levels, from the baseline noise survey representative of the ESRs, have used in the construction phase assessment which is provided below in Table 7.

Table 7: Construction Noise Assessment Criteria (Figures in dB L _{Aeq})					
Receptor	Representative Monitoring Location	Measured Noise Levels	Ambient Noise Level Rounded to the nearest 5dB	Appropriate Category Value A, B or C in accordance with BS5228-1	Noise Level above which activities of the Construction Phase may cause a significant impact at the Receptor
ESR1	ML2	62	60	A	65
ESR2	ML1	44	45	A	65

6.2.2 During the earthworks and construction phase, any work carried out at the proposed development is likely to generate noise that may propagate beyond the site boundary.

6.2.3 At this stage, detailed information regarding the nature and timescales of activities likely to take place during the earthworks and construction phase is not known. Activities on the site, which could give rise to construction noise impacts include (but are not limited to):

- Site preparation i.e. ground excavation, levelling of ground, trenching, trench filling, unloading and levelling of hardcore and compacting filling; and
- Construction of the proposed redevelopment including piling, construction of access roads, fabrication processes e.g. planing, sanding, routing, cutting, drilling and laying foundations.

- 6.2.4 Construction vehicle movements to and from the proposed development have the potential to generate noise at existing sensitive receptors, in the immediate vicinity of the local road network.
- 6.2.5 At this stage, detailed traffic data relating to the likely numbers of construction vehicles is not available. However, the number of construction vehicles is not considered to be significant relative to the existing flows on the road links surrounding the site. It is therefore considered that the level of road traffic noise at sensitive receptor locations will not change significantly, due to construction vehicles, during the construction phases of the proposed development and this impact has not therefore been considered further.
- 6.2.6 The contractor undertaking the enabling and construction works has not yet been appointed. However, it is considered that the enabling and construction works are likely to be restricted to daytime hours, i.e. between 08:00 and 17:00 hours Monday to Friday and 09:00 to 12:00 hours on a Saturday, with no work on Sundays and Bank Holidays.
- 6.2.7 The earthworks and construction phase activities have the potential to generate short term increases in noise levels, above those recommended in BS5228-1. The levels of noise received at the receptors closest to the proposed development would depend on the sound power levels of the machines used, the distance to the properties, the presence of screening or reflecting surfaces and the ability of the intervening ground to absorb the propagating noise.
- 6.2.8 The nearest noise sensitive receptor to the proposed development, as detailed in Table 6, will vary depending on the phase of the proposed development under construction. Given the potentially short distances between the construction activities and proposed dwellings in the western part of the site, noise levels at the receptors may occur above those detailed in Table 7.

6.2.9 In addition, proposed dwellings which become occupied before the completion of the construction phase of the proposed development would experience a similar noise impact. The noise generated by the earthworks and construction phases of the proposed development may therefore exceed Category A in BS5228 at the existing and proposed sensitive receptors located in the immediate vicinity of the construction phases of the proposed development.

6.2.10 It is therefore recommended that mitigation measures be put in place that will reduce the scale of the potential effect. Details are set out in Section 9 of this report.

6.3 Assessment of Vibration

6.3.1 Wardell Armstrong's archives contain field trial measurements of ground vibration associated with types of plant likely to be used at the proposed development. The representative, measured levels, made by WA using a Vibrock B801 Digital Seismograph, are set out in Table 8.

Table 8: Measured Vibration Levels of Plant Under Normal Operating Conditions			
Plant Type	Distance from Source		
	10m (mm/s)	20m (mm/s)	30m (mm/s)
25-30 tonne excavator	0.175	0.075	Background
25 tonne dumptruck (Volvo A25)			
Loaded	1.000	0.150	Background
Empty	0.225	0.050	Background
Dozer	1.050	0.400	Background
Vibrating roller Drum			
Vibrator on	4.470	3.270	2.350
Vibrator off	0.500	0.150	0.050
Loading shovel	1.025	0.150	Background

6.3.2 The nearest sensitive properties will vary depending on the phase of the proposed development under construction. The sensitive receptors could include proposed dwellings which become occupied before the completion of the construction phase of the proposed development. As a worst-case scenario, earthworks and construction works may potentially take place at approximately 25 metres from existing residential properties.

- 6.3.3 At this distance, it is possible that vibration due to the operation of various construction plant, and in particular a vibratory roller, may be above the threshold of complaint. However, the vibration levels are highly unlikely to be above the threshold of structural damage. It is possible that residential properties would therefore potentially experience some adverse impact. However, these would be transient only and for very limited periods during the works, i.e. when activities take place at the proposed development boundaries.
- 6.3.4 In addition to the earthworks and construction works described, it is possible that piling may be required. At this time, the type(s) of piling which would be used at various locations across the site is not known and it is likely that the contractor responsible for undertaking the works at the site would decide the method of piling.
- 6.3.5 BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling. The intensity of vibration disturbance, which may be registered at a receptor, will be a function of many factors. These are set out in BS5228-2 and include:
- Energy per blow or cycle.
 - Distance between source and receptor.
 - Soil structure interaction i.e. nature of connection between soil and structure being monitored.
 - Construction of structure and location of measuring points e.g. soil surface, building foundation and internal structural element.
- 6.3.6 As the responsible contractor has not yet been appointed, detailed information regarding the above is not known. It is not therefore possible to assess the potential impacts of vibration generated by piling.
- 6.3.7 The receptors likely to be affected by piling will vary depending on the phase of the proposed development under construction. Once the precise building locations, ground conditions for each location and type(s) of piling are confirmed, vibration levels could be estimated and recommendations for control made as appropriate.

7 DETAILS OF THE NOISE MODEL

7.1 Introduction

7.1.1 This section of the report sets out the details of the methodologies used to prepare the noise model so that existing sources of noise affecting the site can be accurately determined at the proposed development. The model has also been used to determine the appropriate mitigation measures to provide a good standard of amenity for future residents.

7.2 Noise Model Set-up

7.2.1 The assessment of the propagation of sound across the developed site has been undertaken using the noise modelling software SoundPLAN version 8.2.

7.2.2 SoundPLAN software uses geographical information to create a model of the study area on which to generate noise contours and includes objects that affect the propagation of noise such as buildings and topography.

7.2.3 SoundPLAN model uses the noise prediction methodology set out in ISO 9613-2:1996 'Attenuation of sound during propagation outdoors'. The noise modelling produces noise contour plans demonstrating the levels of road traffic noise across the site.

7.2.4 The noise model has been assembled based on the layout shown on Drawing No. PL-01 Revision H, provided by the client, and includes houses and fencing as shown on the drawing.

7.2.5 The one-third octave band noise data for each source, found in the SoundPLAN data library, for noise sources identified above has been included into the noise model at the approximate location and height, and in line with guidance. The noise data input into the noise model has been checked for accuracy against the most representative measured noise level.

7.2.6 The noise modelling has been checked for accuracy against the measured noise levels. This has been undertaken to assess the suitability of the noise model to determine the propagation of noise across the site. This has been undertaken by co-locating a receptor location with the monitoring location in the model. The results of the calibration exercise are shown in Table 9 below.

Table 9: Noise Model Calibration at ML2 (Figures in dB)				
Measurement Period	Measurement Parameters	Measured Noise Level	Modelled Noise Level	Calibration Difference
Daytime	L _{Aeq} , 16hrs	62.4	63.4	+1.0
Night	L _{Aeq} , 8hr	57.2	58.4	+1.2
	L _{AF} , max	77.9	79.1	+1.2

7.2.7 As shown in Table 9, the results of the noise monitoring and noise modelling are in agreement with one another, the model itself is slightly over predicting the noise levels at the site. Therefore, is considered to be a robust representation of the acoustic environment at the proposed development site.

7.3 Modelling Results

7.3.1 The following noise modelling figures have been prepared, based upon the information collected during the baseline surveys, information from the client, and development proposals, including proposed mitigation measures.

7.3.2 The following figures have been produced following the noise modelling assessment;

- Figure 1 – Daytime Noise Contour Plot (L_{Aeq}, 16hrs)
- Figure 2 – Daytime Façade Noise Map (L_{Aeq}, 16hrs)
- Figure 3 – Night-time Façade Noise Map (L_{Aeq}, 8hrs)
- Figure 4 – Night-time Façade Noise Map (L_{AF}, max)

7.3.3 These figures will be used inform the noise impact assessment in Section 8 of this report.

8 NOISE IMPACT ASSESSMENT

8.1 Introduction

8.1.1 An assessment of the noise impact generated at the site, dominated by road traffic noise from High Street, has been carried out at the development site. The assessment, prepared using the noise model outputs as described in Section 7 of this report, is detailed below.

8.2 Assessment of Noise in External Areas

8.2.1 The proposed development includes external amenity areas associated with each dwelling. Figure 1 shows that the noise levels generated by road traffic will achieve the lower noise guideline criteria, of 50dB $L_{Aeq,16hrs}$, in majority of gardens throughout the site.

8.2.2 Noise levels in only a select few properties closest to and facing High Street, marginally exceed 55dB(A). Therefore, mitigation measures are required to reduce noise levels in those specific garden areas. Mitigation measures are discussed in Section 9.

8.3 Assessment of Daytime Noise Levels in Living Rooms and Dining Rooms

8.3.1 SoundPLAN noise modelling has been used to calculate the noise levels at the façades of proposed dwellings during the daytime. The calculated noise levels at the façades of the apartments, during the daytime, are summarised in Figure 2. The facade maps show the following details:

- Less than 48dB(A) $L_{Aeq,16hour}$ – Green. (This level allows the internal guideline noise level of 35dB L_{Aeq} to be achieved with windows open, assuming that a partially open window provides 13dB(A) noise attenuation);
- 48 to 60dB(A) $L_{Aeq,16hour}$ – Yellow. (6/12/6 glazing with Greenwood 2500 EAW.AC1 acoustic trickle vents to achieve internal guideline noise levels); and,
- Over 60dB(A) $L_{Aeq,16hour}$ – Orange. (10/12/6 glazing with Greenwood 5000 EAW.AC1 acoustic trickle vents to achieve internal guideline noise levels).

8.3.2 In accordance with BS8233, the internal noise level in living rooms and bedrooms during the daytime should be no more than 35dB(A) $L_{Aeq,16hour}$, and appropriate mitigation measures have been identified in Section 9 to achieve the noise guideline levels in living rooms and bedrooms during the daytime, where yellow and orange facades occur on the noise contour plots. The glazing and ventilation strategy above, has been designed to provide the required acoustic attenuation, while maintaining suitable levels of background ventilation.

8.4 Assessment of Night-time Noise Levels in Bedrooms

Average Night-time Noise Levels ($L_{Aeq,8hrs}$)

8.4.1 SoundPLAN noise modelling has been used to calculate the noise levels at the proposed development during the night-time. The calculated average noise levels at the façades of the properties, during the night-time are summarised in Figure 3. The facade map shows the following details:

- Less than 43dB(A) $L_{Aeq,8hour}$ – Green (This level allows the internal guidance noise level of 30dB L_{Aeq} to be achieved with windows open, assuming that a partially open window provides 13dB(A) noise attenuation);
- 43 to 55dB(A) $L_{Aeq,8hour}$ – Yellow; (6/12/6 glazing with Greenwood 2500 EAW.AC1 acoustic trickle vents to achieve internal guideline noise levels); and,
- Over 55dB(A) $L_{Aeq,8hour}$ – Orange. (10/12/6 glazing with Greenwood 5000 EAW.AC1 acoustic trickle vents to achieve internal guideline noise levels).

8.4.2 In accordance with BS8233, the internal noise level in bedrooms at night should achieve 30dB(A) $L_{Aeq,16hour}$, and appropriate mitigation measures have been identified in Section 9 to achieve the noise guideline levels in bedrooms during the night-time where yellow and orange facades occur on the noise contour plots. The glazing and ventilation strategy above, has been designed to provide the required acoustic attenuation, while maintaining suitable levels of background ventilation.

Maximum Event Night-time Noise Levels ($L_{AF,max}$)

8.4.3 SoundPLAN noise modelling has been used to calculate the maximum event noise levels at the proposed development during the night-time. The calculated noise levels at the façades of the properties, during the night-time are summarised in Figure 4. The facade map shows the following details:

- Less than 58dB(A) $L_{AF,max}$ – Green (This level allows the internal guidance noise level of 45dB $L_{AF,max}$ to be achieved with windows open, assuming that a partially open window provides 13dB(A) noise attenuation);
- 58 to 70dB(A) $L_{AF,max}$ – Yellow; (6/12/6 glazing with Greenwood 2500 EAW.AC1 acoustic trickle vents to achieve internal guideline noise levels); and,
- Over 70dB(A) $L_{AF,max}$ – Orange. (10/12/6 glazing with Greenwood 5000 EAW.AC1 acoustic trickle vents to achieve internal guideline noise levels).

8.4.4 In accordance with BS8233, the internal noise level in bedrooms at night should achieve 45dB(A) $L_{AF,max}$, and appropriate mitigation measures have been identified in Section 9 to achieve the noise guideline levels in bedrooms during the night-time where yellow and orange facades occur on the noise contour plots. The glazing and ventilation strategy above, has been designed to provide the required acoustic attenuation, while maintaining suitable levels of background ventilation.

8.4.5 While both figures 3 and 4 show the attenuation requirements for the proposed dwellings, to achieve the internal noise levels during the night-time period, the requirements shown on Figure 4, to attenuate the maximum noise levels internally, are more stringent. Therefore, these should be used to design the glazing and ventilation strategy for the bedrooms.

8.5 Internal Sound Insulation

8.5.1 As some of the proposed dwellings include adjoining and terraced houses, the internal separating walls between these should be designed to attenuate noise sufficiently between noise sensitive spaces.

8.5.2 Approved Document E (ADE) provides criteria in internal airborne sound insulation which should be adhered to while designing the horizontal partitions of the proposed premises. Table 0.1a of ADE, shown in Table 10 below, sets out sound insulation requirements for walls between residential spaces.

Table 10: ADE Performance Standards for Separating Walls Between Dwellings		
Purpose built dwelling	Airborne Sound Insulation ($D_{nT,w} + C_{tr}$ dB)	Impact Sound Insulation ($L'_{nT,w}$ dB)
Floors and stairs	45	62

- 8.5.3 The construction of the walls throughout the proposed development should therefore be carefully designed to ensure compliance with ADE requirements. Junction details between various construction elements should also be assessed from an acoustic perspective to minimise the likelihood of flanking sound transmission paths forming. This can be completed at a later design stage.

9 NOISE MITIGATION MEASURES

9.1 Introduction

9.1.1 This section details the mitigation measures necessary to reduce construction and transportation noise to meet the internal noise guideline levels at the proposed development, as appropriate.

9.2 Construction Noise Mitigation

9.2.1 To reduce the potential impact of noise levels generated by the construction phase of the proposed development, at existing receptor locations in the immediate vicinity of the site, mitigation measures will be required.

9.2.2 Best working practice will be implemented during each phase of the earthworks and construction works at the Site. The construction works will follow the guidelines in BS5228-1 and the guidance in BRE Controlling particles, vapour and noise pollution from construction Sites, Parts 1 to 5, 2003.

9.2.3 The following measures will be put in place to minimise noise emissions:

- When works are taking place within close proximity to those sensitive receptors identified, screening of noise sources by temporary screens may be employed.
- All machinery should be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers.
- Site staff should be aware that they are working adjacent to a sensitive area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios.
- A further measure to reduce noise levels at the sensitive receptors would include, as far as possible, the avoidance of two noisy operations occurring simultaneously in close proximity to the same sensitive receptor.
- Adherence to any time limits imposed on noisy works by the local authority.
- Implement set working hours during the week and at weekends.
- Ensure engines are turned off when possible.
- Should earthworks and construction activities need to be carried out during night-time hours, the local authority could include a planning condition which requests advance notice and details of any night working to be provided.

9.3 Construction Vibration Mitigation

- 9.3.1 BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling.
- 9.3.2 To minimise the potential for vibration to be generated by any necessary piling it is recommended that careful consideration is given to the type of piling to be used. For example, auger bored piles would be preferable to driven piles with regards to a reduced potential for noise and vibration to be generated. However, it is recognised that the piling process will need to be selected on the basis of the strata to be encountered, the loads to be supported and the economics of the system.
- 9.3.3 The receptors likely to be affected by piling will vary depending on the phase of the Proposed Development under construction. Once the precise building locations, ground conditions for each location and type(s) of piling are confirmed, vibration levels could be estimated and recommendations for control made as appropriate.
- 9.3.4 To keep ground borne vibration to a minimum the following measures, as referred to in BS5228-2, should be put in place:
- Substitution: Where reasonably practicable, plant and or methods of work likely to cause significant levels of vibration at the receptors identified, should be replaced by less intrusive plant/methods of working; and
 - Vibration Isolation of plant at source: This may prove a viable option where the plant is stationary (e.g. a compressor, generator) and located close to a receptor.
- 9.3.5 There are a number of measures which can be implemented, depending upon the type of piling chosen. BS5228-2 indicates that mitigation might include: use of alternative methods, removal of obstructions, provision of cut-off trenches, reduction of energy input per blow, reduction of resistance to penetration. Continuous flight augering would cause minimal vibration even when very close to the piling operation.
- 9.3.6 As the construction programme and methodologies become more defined it is suggested that earthworks and construction vibration be reconsidered and that a detailed strategy for control be implemented.

9.4 External Noise Levels in Gardens

- 9.4.1 The BS8233 lower guideline noise level of 50dB(A) in external areas is achieved in majority of the proposed development site. With the upper guideline noise levels of 55dB(A) being achieved in gardens closer to High Street. Noise levels in only a select few garden areas exceed the upper guideline noise level. Therefore, mitigation measures, in the form of increased fencing heights are required to reduce noise levels in some garden areas.
- 9.4.2 The required mitigation measures are shown on Figure 5 of the proposed development. This shows that with a combination of 2.0m and 2.2m high close boarded fencing in place, noise levels in all garden areas will be sufficiently reduced to achieve the external noise level criteria. The fencing should have a minimum weight of 15kg/m² throughout its lifespan.
- 9.4.3 However, the noise levels in the external amenity area of Plot 6 are considered to be sufficiently reduced by increasing the height of the wall between the garden and the road to 2.0m high.

9.5 Internal Noise Levels in Living Rooms and Bedrooms

- 9.5.1 When assessing noise levels in noise sensitive rooms, the noise attenuation provided by the overall building façade will be considered. To mitigate noise levels, the composition of the building façade will be designed to provide the level of attenuation required.
- 9.5.2 As glazing is generally the building element that attenuates noise the least, the proportion of glazing in a building façade is an important consideration when assessing overall noise attenuation. In the absence of design details for the building façades, it has been assumed that the glazing to buildings would comprise about 25% of the façade area. To calculate the overall attenuation provided by this percentage of glazing in a brick or block façade, a non-uniform partition calculation can be used.
- 9.5.3 The façade noise levels, and mitigation requirements to achieve internal guideline noise levels from road traffic noise stated in BS8233, are shown on Figures 2-4. Figure 4 shows more stringent requirements for noise attenuation than Figure 3, therefore the requirements on Figure 4 should be followed to reduce indoor noise levels sufficiently. The apartments for both the daytime and night-time have been colour coded to show:

- Green colour – Standard glazing and ventilation via opening windows to achieve guidance internal noise levels;
- Yellow colour – Standard 6/12/6 glazing with Greenwood 2500 EAW.AC1 acoustic trickle vents to achieve internal guideline noise levels, while maintaining sufficient levels of background ventilation; and,
- Orange colour – 10/12/6 glazing with Greenwood 5000 EAW.AC1 acoustic trickle vents to achieve internal guideline noise levels, while maintaining sufficient levels of background ventilation.

9.5.4 The attenuation provided by the glazing and ventilation used in the assessment is shown below in Table 11.

Table 11: Noise Attenuation of the Glazing and Ventilation used in the Assessment									
	Octave Band Centre Frequency (Hz)								
	31.5	63	125	250	500	1k	2k	4k	8k
Glazing									
6/12/6	8	14	20	19	29	33	39	45	45
10/12/6	14	20	26	27	34	40	38	46	46
Ventilation									
Greenwood 2500 EAW.AC1	26	32	39	38	29	47	43	40	40
Greenwood 5000 EAW.AC1	30	30	42	40	36	48	53	56	56

9.5.5 However, windows need not be fixed shut, and can be openable. Acoustic ventilation and openable windows allow the future resident to choose when to close the windows, and still be provided with adequate ventilation to meet building regulation requirements, or to be able to open the window for purge ventilation when required.

9.5.6 Alternative glazing and ventilation specifications are available, if an alternative specification is preferred the acoustic performance of the design should as a minimum meet the performance in Table 11.

9.5.7 The above glazing and ventilation strategy has been designed to achieve the internal guideline noise levels, while maintaining suitable levels of background ventilation, set out in Approved Document F (ADF).

9.5.8 The mitigation strategy set out for the proposed development has been considered in terms of AVO, to establish the likelihood of an overheating risk occurring. It has been found that there is low likelihood of experiencing overheating in the proposed properties closest to High Street.

10 CONCLUSIONS

- 10.1.1 Wardell Armstrong LLP has carried out an assessment for a proposed residential development. This assessment is required to accompany a full planning application.
- 10.1.2 The acoustic environment across the proposed development site is dominated by one noise source, road traffic noise on High Street, located adjacent to the site.
- 10.1.3 In policy terms, there is no presumption against development in places with high noise levels, provided that the noise can be adequately mitigated, and the noise impact be not significant.
- 10.1.4 The assessment comprises a summary of the correspondence undertaken to date, baseline noise monitoring, noise modelling, an assessment of road traffic noise, and determination of mitigation measures as appropriate. This noise assessment report also contains an assessment of noise generated as part of the construction phase of the development at the nearby existing sensitive receptors.
- 10.1.5 In addition, the assessment has considered the potential risk of overheating in the proposed apartments.
- 10.1.6 It should be remembered that the internal guideline values are health-based and are therefore relatively inflexible; however adequate noise mitigation is relatively straightforward to engineer.
- 10.1.7 The external guideline values are based on amenity and allow some flexibility for noise to be balanced against any benefits which arise from the proposed scheme.
- 10.1.8 The assessment demonstrates that the external amenity areas throughout the site, will comply with the upper noise guideline level stated in BS8233, with no mitigation measures in place, with majority of gardens on the site achieving the lower noise guideline level. Some gardens closest to High Street have been shown to exceed the upper noise guideline level. Therefore, suitable mitigation measures have been devised to reduce the noise levels in these gardens to below the guideline requirements. This includes increasing the height of the proposed fence between High Street and some garden areas. The appropriate mitigation strategy for external areas is shown on Figure 5.

- 10.1.9 The results of the computer noise model, and assessment described in this report, show that the proposed development will achieve the internal noise levels in all noise sensitive rooms, with the appropriate glazing and ventilation strategy in place. The results of the assessment show that alternative ventilation will be required on all facades during the daytime, however, some windows on the western façade can be opened to provide ventilation during the night-time period.
- 10.1.10 Appropriate glazing and ventilation options have been proposed for the development site, to control noise from nearby transportation noise sources, these are shown on Figures 2-4.
- 10.1.11 Providing alternative ventilation to negate the need to open windows is in accordance with national planning and noise guidance. This allows a resident to choose to close windows while maintaining sufficient background ventilation.
- 10.1.12 Paragraph 185(a) of NPPF states that significant adverse impacts should be reduced to a minimum. The assessment shows that existing noise from the nearby noise sources can be adequately mitigated at the development, where required, so that the impact is not significant adverse.
- 10.1.13 With the proposed mitigation in place, the impact of existing sources of noise at the proposed dwellings will be reduced to below SOAEL levels.
- 10.1.14 Therefore, there are no planning policy or technical noise reasons not to recommend the application for approval.

APPENDICES

APPENDIX A

Policy, Standards and Guidance

National Planning Policy Framework

In July 2021 the 'National Planning Policy Framework' (NPPF) was amended as the current planning policy guidance within England.

Paragraph 185 of the NPPF states:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking in 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 impact 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 impact 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'...

Paragraph 187 of the NPPF states:

'Planning policies and decisions should ensure that new development can be integrated with existing business 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.'

Noise Policy Statement for England

With regard to 'significant adverse impacts on health and the quality of life' the NPPF refers to the 'Noise Policy Statement for England' (NPSE).

The Noise Policy Statement for England refers to the World Health Organisation when discussing noise impacts and introduces observed effect levels which are based on

established concepts from toxicology that are applied to noise impacts by WHO.

Three levels are defined as follows:

‘NOEL – No Observed Effect Level

- This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

- This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

- This is the level above which significant adverse effects on health and quality of life occur’.

The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, this does not mean that such adverse effects cannot occur.

Planning Practice Guidance – Noise

The Planning Practice Guidance (PPG) provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behaviour or attitude. Once noise crosses the LOAEL threshold it begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. Table 1 summarises the noise exposure hierarchy.

Table 1: National Planning Practice Guidance Noise Exposure Hierarchy			
Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

The PPG summarises the approach to be taken when assessing noise. It accepts that noise can override other planning concerns, but states:

“Neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separate from the economic, social and other

environmental dimensions of proposed development”

ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise

ProPG Planning and Noise provides professional practice guidance in relation to new residential development exposed to noise from transport sources. It provides practitioners with a recommended approach to the management of noise within the planning system in England.

The guidance reflects the Government’s overarching National Planning Policy Framework, the Noise Policy Statement for England, and Planning Practice Guidance (including PPG-Noise) and draws on other authoritative sources of guidance. It provides advice for Local Planning Authorities and developers, and their professional advisors, on achieving good acoustic design in and around new residential developments.

British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings

British Standard 8233 “Guidance on sound insulation and noise reduction for buildings” 2014, suggests the following guideline noise levels and states that they are based on guidelines issued by the World Health Organisation;

- 35 dB L_{Aeq} (16 hour) during the day time in noise sensitive rooms
- 30 dB L_{Aeq} (8 hour) during the night time in bedrooms
- 45 dB $L_{Amax,F}$ during the night time in bedrooms
- 50 dB L_{Aeq} (16 hour) desirable external noise levels for amenity space such as gardens and patios
- 55 dB L_{Aeq} (16 hour) upper guideline value which would be acceptable in noisier environments.

In addition, for internal noise levels it 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.”

Furthermore, with regard to external noise, the Standard states;

“However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources

to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited”.

British Standard 5228:2009 +A1:2014 “Code of Practice for noise and vibration control on construction and open Sites – Part 1: Noise” (BS5228-1)

Guidance on the prediction and assessment of noise from development sites is given in British Standard 5228 -1:2009 +A1:2014 “Code of Practice for noise and vibration control on construction and open Sites – Part 1: Noise” (BS5228-1), and BRE Controlling particles, vapour and noise pollution from construction Sites, Parts 1 to 5, 2003.

In addition to the guidance from the local authority, the Control of Pollution Act 1974 (COPA 1974) gives the local authority power to serve a notice under Section 60 imposing requirements as to the way in which works are to be carried out. This could specify times of operation, maximum levels of noise which may be emitted and the type of plant which should or should not be used.

However, it might be preferable for the chosen contractor to obtain prior consent under Section 61 of COPA 1974. Section 61, enables anyone who intends to carry out works to apply to the local authority for consent. Under Section 61 the local authorities and those responsible for construction work, have an opportunity to settle any problems, relating to the potential noise, before work starts.

In addition to COPA 1974, BS5228-1 provides guidance on significance criteria for assessing the potential noise impacts associated with the construction phase of large projects. For the purposes of this noise assessment, the noise likely to be generated by the earthworks and construction phase, have been assessed against significance criteria established, using the BS5228-1 ABC Method.

The ABC method for determining significance criteria requires the ambient noise levels at existing sensitive receptors to be determined. The ambient noise levels at each existing receptor location are then rounded to the nearest 5dB(A) to determine the appropriate threshold value in accordance with the category value A, B or C, as detailed in the following table.

Table 2: Thresholds of Significant Impact from Construction Noise at Residential Receptors in accordance with the ABC Method of BS5228-1			
Assessment Category and Threshold Value Period (LAeq)	Threshold Value, in decibels (dB)		
	Category A *1	Category B *2	Category C *3
Daytime (0700 to 1900 hours) and Saturdays (0700 to 1300 hours)	65	70	75
*1 Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value.			
*2 Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.			
*3 Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.			

The noise level likely to be generated at the receptor during the construction phase, i.e. the ambient noise level plus construction noise, is then compared to the appropriate category value. If the noise level is greater than the appropriate category value, a significant noise impact may be registered.

British Standard 5228:2009 +A1:2014 “Code of Practice for noise and vibration control on construction and open Sites – Part 2: Vibration” (BS5228-2)

Guidance on the assessment of vibration from development sites is given in British Standard 5228-2:2009 “Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration” (BS5228-2). BS5228-2:2009 indicates that vibration can have disturbing effects on the surrounding neighbourhood; especially where particularly sensitive operations may be taking place. The significance of vibration levels which may be experienced adjacent to a site is dependent upon the nature of the source.

BS5228-2 indicates that the threshold of perception is generally accepted to be between a peak particle velocity (PPV) of 0.14 and 0.3mm/sec. In an urban situation it is unlikely that such vibration levels would be noticed. BS5228 also indicates that it is likely that vibration of 1.0 mm/s in residential environments will cause complaint but can be tolerated if prior warning and explanation have been given to residents. The standard also indicates that 10 mm/s is likely to be intolerable for any more than a very brief exposure to this level.

The Highways Agency Research report No. 53 “Ground Vibration caused by Civil Engineering Works” 1986 suggests that, when vibration levels from an unusual source exceed the human threshold of perception, complaints may occur. The onset of complaints due to continuous vibration is probable when the PPV exceeds 3mm/sec.

British Standard BS6472: 2008 “Guide to Evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting” (BS6472-1) suggests that adverse

comments or complaints due to continuous vibration are rare in residential situations below a PPV of 0.8mm/sec. Continuous vibration is defined as “vibration which continues uninterrupted for either a daytime period of 16 hours or a night-time period of 8 hours”. The proposed earthworks and construction works at the site will not cause continuous vibration as defined in BS6472-1.

BS5228-2 2009 suggests that the onset of cosmetic damage is 15mm/sec (15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz for residential or light commercial type buildings).

Guidance on Assessment of Road Traffic Noise

The Department of Transport’s memorandum, “Calculation of Road Traffic Noise” (CRTN), 1998 defines a shortened measurement procedure which is used to calculate the $L_{A10,18\text{hour}}$ noise level from a measured 3 hour period. The method requires the measurement of noise over 3 consecutive hours between 1000 and 1700 hours.

From the measured 3 hour period, the arithmetic average of the three $L_{A10,1\text{Hour}}$ measurements is taken. The $L_{A10,18\text{Hour}}$ noise level is then determined using the following calculation method;

- $L_{A10,18\text{Hour}} = L_{A10,3\text{hour}} - 1$

The document “*Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping*” by P G Abbott and P M Nelson (The TRL Method) provides a calculation method to convert the calculated $L_{A10,18\text{Hour}}$ into a daytime L_{Aeq} as described below.

- $L_{\text{day}} = 0.95 \times L_{A10,18\text{hour}} + 1.44\text{dB}$

The calculation for the night-time period is shown below.

- $L_{\text{night}} = 0.90 \times L_{A10,18\text{hour}} - 3.77$

Design Manual for Roads and Bridges, Vol 11, Part 7, 2011 (DMRB)

The development generated road traffic assessment considers the impact of increased road traffic noise levels at existing receptors. The assessment is based on the significance criteria set out in DMRB for the assessment of long-term changes in road traffic noise. The criteria do not relate to the actual existing noise levels (i.e. traffic noise due to the current development) but only the predicted changes. The criteria is presented in Table 3 below.

Table 3: Road Traffic Noise Assessment Significance Criteria (DMRB)	
Magnitude of Impact	Criteria for Assessing Road Traffic Noise
Major Adverse	> 10.0 dB increase in traffic noise (equating to a doubling in the loudness of noise)
Moderate Adverse	5.0 – 9.9 dB increase in traffic noise (equating to a clearly perceptible increase in the loudness of noise)
Minor Adverse	5.0 – 9.9 dB increase in traffic noise (equating to a an increase in the loudness of noise which is at or about the threshold of perception)
Negligible	0.1 – 2.9 dB increase in traffic noise. No perceptible increase in traffic noise.

AVO: Acoustics, Ventilation and Overheating Residential Design Guide

The AVO guide recommends an approach to acoustic assessments for residential development that takes into consideration the interdependence of provisions for acoustics, ventilation and overheating. The application of the AVO Guide is intended to demonstrate good acoustic design in accordance with ProPG. A two-stage assessment approach is advised as:

- Stage 1: Site Risk Assessment
- Stage 2: Detailed Assessment of Adverse Effect

The guide provides a means of assessment to satisfy the need to consider acoustics, ventilation and overheating at the planning stage. It also assists in educating clients, environmental health officers, planning officers and other stakeholders of the interdependence of design for acoustics, ventilation and overheating.

Appendix B

Noise Monitoring Results

Monitoring Location 1				
Time	L _{Aeq} (dB)	L _{A max} (dB)	L _{A90} (dB)	L _{A10} (dB)
07/10/2021 – Daytime				
1152-1252	43.6	59.4	38.7	46.1
1252-1352	43.9	61.1	39.8	46.2

Monitoring Location 2				
Time	L _{Aeq} (dB)	L _{A max} (dB)	L _{A90} (dB)	L _{A10} (dB)
07/10/2021 – Daytime				
1411-1511	62.5	72.2	56.3	56.7
1511-1611	62.8	57.9	56.4	56.7
1711-1811	63.9	69.2	56.4	56.9
1811-1911	63.0	62.2	56.4	56.8
1911-2011	61.8	59.0	56.4	56.7
2011-2111	60.2	60.5	56.4	56.7
2111-2211	59.2	60.7	56.4	56.6
2211-2311	57.2	91.6	33	57.7
07/10/2021 – Night-time				
2300-2315	54.8	78.1	32.8	57.2
2315-2330	55.4	72.0	31.3	60.2
2330-2345	51.9	72.3	30.0	52.3
2345-0000	61.9	91.0	29.6	51.8
0000-0015	51.7	73.3	28.9	53.7
0015-0030	52.3	76.3	28.5	50.3
0030-0045	52.2	72.6	28.9	52.9
0045-0100	60.2	89.7	29.0	52.8
0100-0115	49.8	70.8	28.2	46.8
0115-0130	54.7	78.1	29.0	55.9
0130-0145	51.2	75.6	29.3	47.4
0145-0200	48.4	70.2	30.2	44.2
0200-0215	48.4	71.5	31.3	42.8
0215-0230	46.4	70.5	29.5	44.0
0230-0245	50.1	71.5	30.1	49.3
0245-0300	48.3	72.4	29.6	44.1
0300-0315	53.1	73.9	28.8	52.4
0315-0330	51.7	72.5	29.1	51.6
0330-0345	53.9	74.6	29.2	57.1
0345-0400	54.1	80.7	29.5	52.9
0400-0415	54.6	79.2	31.3	57.1
0415-0430	55.6	77.7	30.5	60.3
0430-0445	57.2	73.9	31.4	63.0
0445-0500	57.2	72.8	31.5	63.3
0500-0515	56.4	76.5	31.8	61.6
0515-0530	60.0	75.7	36.2	67.0
0530-0545	61.3	74.7	42.2	68.0
0545-0600	58.3	73.5	36.8	65.1
0600-0615	60.5	78.8	39.5	67.2
0615-0630	61.7	81.4	44.1	68.2
0630-0645	62.6	77.9	48.0	69.0

Monitoring Location 2				
Time	L _{Aeq} (dB)	L _{A max} (dB)	L _{A90} (dB)	L _{A10} (dB)
0645-0700	62.5	77.1	48.9	68.9
08/10/2021 – Daytime				
0700-0800	64.2	39.8	88.7	49.5
0800-0900	62.9	39.6	82.5	47.4
0900-1000	62.3	33.2	82.5	44.1
1000-1100	64.3	32.2	97.3	41.9
1100-1200	62.4	31.8	85.8	42.9
1200-1300	62.5	33.4	86.9	42.6
1300-1400	63.3	31.5	85.8	42.6
1400-1500	63.2	33.5	82.0	43.9

APPENDIX C

EARLY STAGE OVERHEATING RISK TOOL Version 1.0, July 2019

This tool provides guidance on how to assess overheating risk in residential schemes at the early stages of design. It is specifically a pre-detail design assessment intended to help identify factors that could contribute to or mitigate the likelihood of overheating.

The questions can be answered for an overall scheme or for individual units. Score zero wherever the question does not apply.

Additional information is provided in the accompanying guidance, with examples of scoring and advice on next steps.

Find out more information and download accompanying guidance at goodhomes.org.uk/overheating-in-new-homes.



KEY FACTORS INCREASING THE LIKELIHOOD OF OVERHEATING

KEY FACTORS REDUCING THE LIKELIHOOD OF OVERHEATING

Geographical and local context

#1 Where is the scheme in the UK? See guidance for map	South east	4	0
	Northern England, Scotland & NI	0	
	Rest of England and Wales	2	
#2 Is the site likely to see an Urban Heat Island effect? See guidance for details	Central London (see guidance)	3	0
	Grtr London, Manchester, B'ham	2	
	Other cities, towns & dense sub-urban areas	1	

#8 Do the site surroundings feature significant blue/green infrastructure? Proximity to green spaces and large water bodies has beneficial effects on local temperatures; as guidance, this would require at least 50% of surroundings within a 100m radius to be blue/green, or a rural context	1	1
---	---	---

Site characteristics

#3 Does the site have barriers to windows opening? - Noise/Acoustic risks - Poor air quality/smells e.g. near factory or car park or very busy road - Security risks/crime - Adjacent to heat rejection plant	Day - reasons to keep all windows closed	8	4
	Day - barriers some of the time, or for some windows e.g. on quiet side	4	
	Night - reasons to keep all windows closed	8	4
	Night - bedroom windows OK to open, but other windows are likely to stay closed	4	

#9 Are immediate surrounding surfaces in majority pale in colour, or blue/green? Lighter surfaces reflect more heat and absorb less so their temperatures remain lower; consider horizontal and vertical surfaces within 10m of the scheme	1	1
---	---	---

#10 Does the site have existing tall trees or buildings that will shade solar-exposed glazed areas? Shading onto east, south and west facing areas can reduce solar gains, but may also reduce daylight levels	1	1
---	---	---

Scheme characteristics and dwelling design

#4 Are the dwellings flats? Flats often combine a number of factors contributing to overheating risk e.g. dwelling size, heat gains from surrounding areas; other dense and enclosed dwellings may be similarly affected - see guidance for examples	3	0
#5 Does the scheme have community heating? i.e. with hot pipework operating during summer, especially in internal areas, leading to heat gains and higher temperatures	3	0

#11 Do dwellings have high exposed thermal mass AND a means for secure and quiet night ventilation? Thermal mass can help slow down temperature rises, but it can also cause properties to be slower to cool, so needs to be used with care - see guidance	1	1
---	---	---

#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future? Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans	>2.8m and fan installed	2	0
	> 2.8m	1	

Solar heat gains and ventilation

#6 What is the estimated average glazing ratio for the dwellings? (as a proportion of the facade on solar-exposed areas i.e. orientations facing east, south, west, and anything in between). Higher proportions of glazing allow higher heat gains into the space	>65%	12	4
	>50%	7	
	>35%	4	

#13 Is there useful external shading? Shading should apply to solar exposed (E/S/W) glazing. It may include shading devices, balconies above, facade articulation etc. See guidance on "full" and "part". Scoring depends on glazing proportions as per #6		Full	Part	1
	>65%	6	3	
	>50%	4	2	
	>35%	2	1	

#7 Are the dwellings single aspect? Single aspect dwellings have all openings on the same facade. This reduces the potential for ventilation	Single-aspect	3	0
	Dual aspect	0	

#14 Do windows & openings support effective ventilation? Larger, effective and secure openings will help dissipate heat - see guidance	Openings compared to Part F purge rates			0
	Single-aspect	= Part F	+50%	+100%
		minimum	3	4
		required	2	3

TOTAL SCORE **7** = Sum of contributing factors: **12**

minus Sum of mitigating factors: **5**

High

12

Medium

8

Low

score >12:

Incorporate design changes to reduce risk factors and increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score between 8 and 12:

Seek design changes to reduce risk factors and/or increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score <8:

Ensure the mitigating measures are retained, and that risk factors do not increase (e.g. in planning conditions)

DRAWINGS



Key

-  Monitoring Location
-  Existing Sensitive Receptor
-  Existing Buildings
-  High Street
-  Base Line

CLIENT: Harron Homes Ltd		
PROJECT: High Street, Great Houghton		
TITLE: Noise Monitoring Location and Existing Sensitive Receptor Plan		
DRG NO: GM12043-001	REV: A	
DRG SIZE: A3	SCALE: 1:1844	DATE: 21/10/2021
DRAWN BY PK	CHECKED BY SU	APPROVED BY SU



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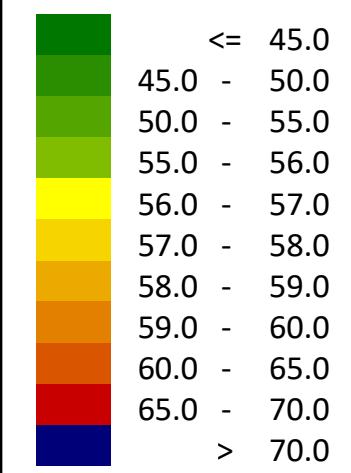
FIGURES



Key

- Proposed Dwellings
- Existing Buildings
- High Street
- Base line
- 1.8m High Fencing

Daytime $L_{Aeq,16hrs}$ dB



CLIENT:			Harron Homes Ltd		
PROJECT:			High Street, Great Houghton		
TITLE:			Figure 1 - Daytime Noise Contour Plot		
DRG NO:			Figure 1		REV: A
DRG SIZE: A3		SCALE: 1:1000		DATE: 25/10/2021	
DRAWN BY: PK		CHECKED BY: SU		APPROVED BY: SU	

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Key

-  Proposed Dwellings
-  Existing Buildings
-  1.8m High Fence
-  High Street
-  Base line

Facade Noise Map

-  Facade point

Daytime $L_{Aeq, 16hrs}$ dB

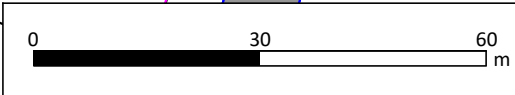
-  ≤ 48.0
-  $48.0 - 60.0$
-  > 60.0

CLIENT:			Harron Homes Ltd		
PROJECT:			High Street, Great Houghton		
TITLE:			Figure 2 - Daytime Facade Noise Levels (L_{Aeq})		
DRG NO:			Figure 2		REV: A
DRG SIZE:	A3	SCALE:	1:1000	DATE:	25/10/2021
DRAWN BY	PK	CHECKED BY	SU	APPROVED BY	SU



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Key

-  Proposed Dwellings
-  Existing Buildings
-  1.8m High Fence
-  High Street
-  Base line

Facade Noise Map

-  Facade point

Night-time $L_{Aeq, 8hrs}$ dB

-  ≤ 43.0
-  $43.0 - 55.0$
-  > 55.0

CLIENT:

Harron Homes Ltd

PROJECT:

High Street, Great Houghton

TITLE:

Figure 3 - Night-time Facade Noise Levels (L_{Aeq})

DRG NO:

Figure 3

REV:

A

DRG SIZE:

A3

SCALE:

1:1000

DATE:

25/10/2021

DRAWN BY

PK

CHECKED BY

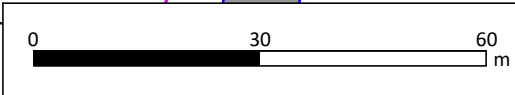
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Key

-  Proposed Dwellings
-  Existing Buildings
-  1.8m High Fence
-  High Street
-  Base line

Facade Noise Map

-  Facade point

Night-time $L_{AF, max}$ dB

-  ≤ 58.0
-  58.0 - 70.0
-  > 70.0

CLIENT:

Harron Homes Ltd

PROJECT:

High Street, Great Houghton

TITLE:

Figure 4 - Night-time Facade Noise Levels ($L_{af,max}$)

DRG NO:

Figure 4

REV:

A

DRG SIZE:

A3

SCALE:

1:1000

DATE:

21/10/2021

DRAWN BY

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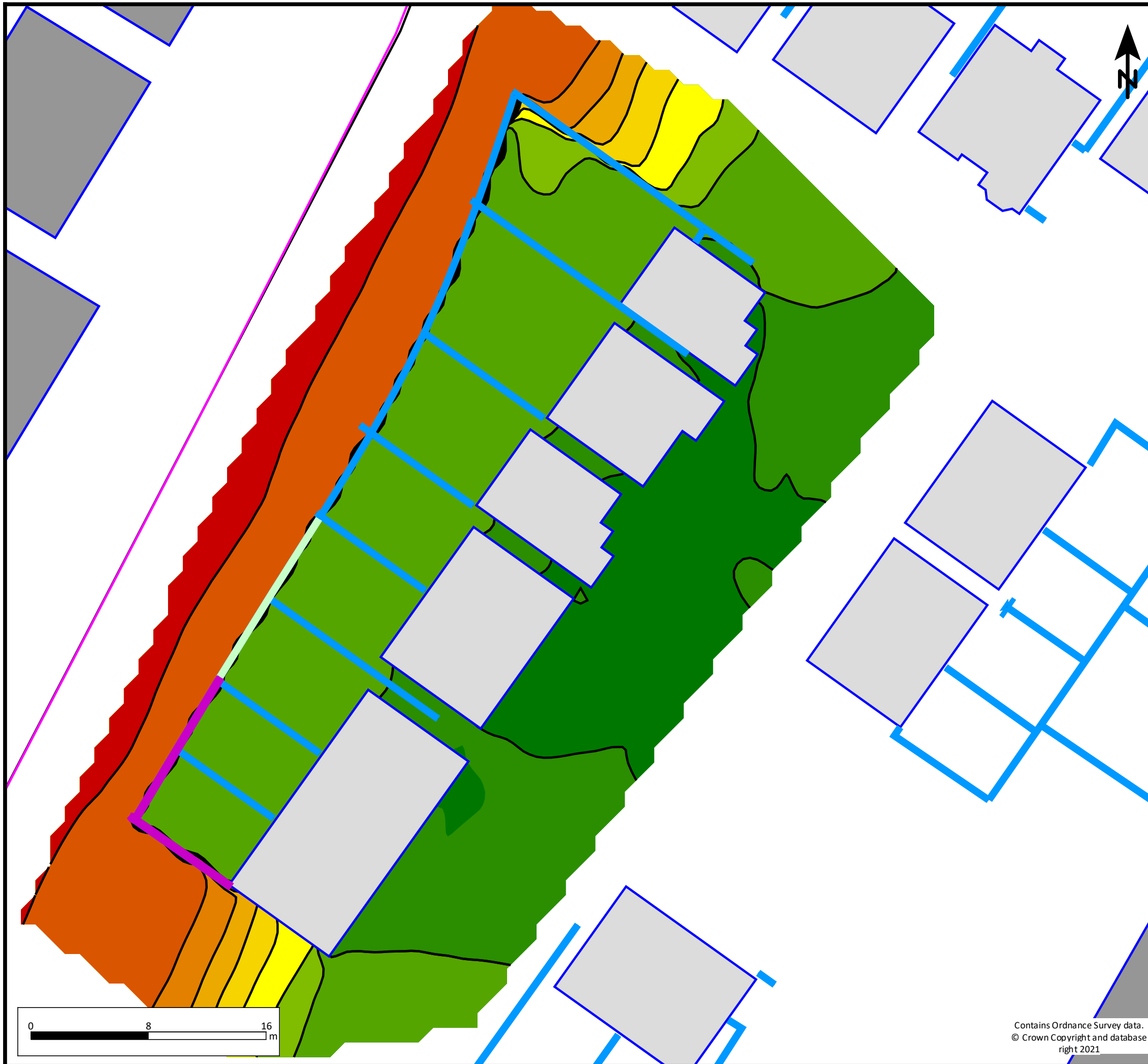
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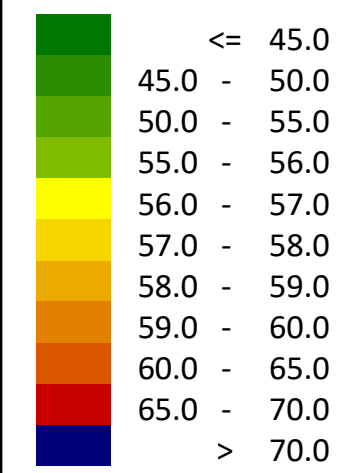
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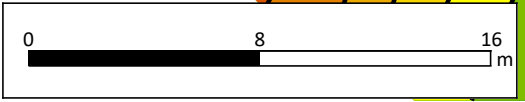
Key

-  Proposed Dwellings
-  Existing Buildings
-  High Street
-  Base line
-  1.8m High Fencing
-  2.0m High Fencing
-  2.2m High Fencing

Daytime L_{Aeq} dB



CLIENT: Harron Homes Ltd		
PROJECT: High Street, Great Houghton		
TITLE: Figure 5 - Daytime Noise Contour Plot, with Mitigation Measures in Place		
DRG NO:	Figure 5	REV: A
DRG SIZE: A3	SCALE: 1:261	DATE: 25/10/2021
DRAWN BY: PK	CHECKED BY: SU	APPROVED BY: SU



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