



BELLWAY HOMES LIMITED (NORTH WEST)

LAND NORTH OF GATEWEN ROAD, NEW BROUGHTON, WREXHAM

NOISE IMPACT ASSESSMENT REPORT

NOVEMBER 2021

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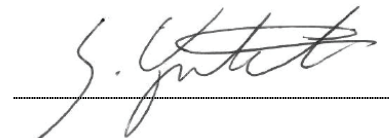
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EXECUTIVE SUMMARY

Wardell Armstrong LLP has carried out a noise assessment to accompany an application for the approval of reserved matters for the proposed residential development of 112 dwellings on land off Gatewen Road, Wrexham.

This assessment considers noise from road traffic on Gatewen Road, and any other noise sources at the site. The assessment has been undertaken in line with current planning and technical guidance.

The assessment of noise at the development site relies upon measured noise levels taken between 11th and 12th October 2021.

The measured on-site noise levels have been input into the 3D computer noise model SoundPLAN, which has been used to calculate the prorogation of noise across the site, with proposed house in place.

The computer noise modelling and calculations has shown that noise levels in proposed gardens meets with the desirable level of 50dB(A) during the daytime, without the need for mitigation.

For internal living areas, standard double glazing together with ventilation provided by acoustic ventilators has been suggested for houses which are adjacent to Gatewen Road. Internal noise guideline levels will be met for all other dwellings, even with windows open.

Noise is not considered to be a determining factor when considering an application for the approval of reserved matters.

1 INTRODUCTION

1.1.1 Wardell Armstrong LLP (WA) was commissioned by Mr Adrian Johnson on behalf of Bellway Homes Limited (North West) (Bellway) to undertake a noise assessment and to prepare a report to accompany an application for the approval of reserved matters for a proposed residential development of 112 homes at land off Gatewen Road, Wrexham.

1.1.2 The development is described as;

“Residential development, up to 112 dwellings together with vehicular / pedestrian access from Gatewen Road, open space, landscaping, sustainable drainage and other related infrastructure”

1.1.3 This report follows on from an initial technical note dated 28th September 2021, which was prepared by Wardell Armstrong LLP, to assist with the initial feasibility of the scheme. The note considered the noise propagation across the site and was based upon published traffic flows for Gatewen Road.

1.1.4 This noise assessment verifies the initial technical note by capturing measured noise levels at a location adjacent to Gatewen Road.

1.1.5 To the north and east the site is bound by a newly constructed residential development. To the south, the site is bound by Gatewen Road with residential dwellings beyond. To the west, the site is bound by a sports and recreational field and includes a Multi-Use Games Area (MUGA).

1.1.6 Outline planning permission P/2018/0674 was granted on the application site at Appeal (appeal ref. APP/H6955/A/19/3238474) on 15 February 2021 for residential development, up to 112 dwellings together with vehicular / pedestrian access from Gatewen Road, open space, landscaping, sustainable drainage and other related infrastructure.

1.1.7 This report has been prepared to accompany an application for the approval of reserved matters to agree details relating to layout, appearance, scale and landscaping. Details of access were approved with the outline planning permission. Matters to be considered as part this application should not open up for consideration the principle of the development or those matters that were considered by the outline planning permission.

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 noise from Gatewen Road and is in accordance with current guidance.

2.2 Noise Survey

- 2.2.1 As part of this assessment, WA has carried out attended and unattended noise monitoring, to assess the current ambient noise levels at a location representative of the proposed receptor locations.
- 2.2.2 The results of the noise survey are detailed in Section 3 of this report.

2.3 Noise Model

- 2.3.1 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 development buildings in place.

2.4 National Planning Legislation and Guidance

- 2.4.1 An assessment is required to consider any potentially noise sensitive areas of the site and existing sensitive receptors located close to the development. The potential impacts of the existing and future sources of noise on the proposed and existing residential receptors have been assessed with reference to:

- Planning Policy Wales.
- Technical Advice Note 11 Noise, including any published updates (TAN11).
- British Standard 8233:2014 Guidance on Sound Insulation and noise reduction or buildings (BS8233).

- 2.4.2 The above guidance documents are detailed further in Appendix A.

2.5 Acoustic Design Criteria

- 2.5.1 The adopted acoustic design criteria have been taken from BS8233 are summarised as follows.
- 50 dB $L_{Aeq,16h}$ as a desirable level, with 55 dB $L_{Aeq,16h}$ considered as an upper level during the daytime in outdoor living areas.

- 35 dB $L_{Aeq,16hour}$ during the daytime in living rooms and bedrooms.
- 30 dB $L_{Aeq,8hour}$ during the night-time in bedrooms.
- 45 dB $L_{Amax,f}$ during the night time in bedrooms.

2.6 COVID-19

- 2.6.1 The noise survey was carried out during the COVID-19 pandemic, which could have had a potential effect on the ambient noise levels measured at the site. However, the noise assessment was undertaken during the Government's 'Plan A' for Autumn/Winter 2021. Therefore, the majority of restrictions placed upon the population of Wales to reduce the spread of Covid-19 has been lifted.
- 2.6.2 Therefore, during the survey, people were generally going about their daily lives as normal, and road traffic flows, and subsequent noise levels were considered to be 'typical'.

3 BASELINE CONDITIONS

3.1 Introduction

3.1.1 Wardell Armstrong LLP (WA) has carried out unattended noise monitoring to assess the levels of road traffic noise at the proposed development site. Details of the surveys undertaken are described in detail in this Section of the report.

3.2 Details of the Noise Survey

3.2.1 The noise survey was carried out at one monitoring location between the 11th and 12th October 2021 at the proposed development site to measure noise from road traffic on Gatewen Road.

3.2.2 The noise measurements were made using a Class 1, integrating sound level meter. The microphone was mounted on a tripod with the diaphragm horizontal, 1.5m above the ground and more than 3.5 metres from any other reflecting surfaces.

3.2.3 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.

3.2.4 For this assessment daytime hours are taken to be 0700 to 2300 hours and night-time hours to be 2300 to 0700 hours.

3.2.5 A-weighted¹ L_{eq} ² noise levels were measured to comply with the requirements of BS8233. A-weighted L_{90} ³ 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 B.

3.2.6 The following noise measurements were undertaken.

Monitoring Location 1 (ML1): Located at the southern site boundary to the north of Gatewen Road. The monitoring location is shown on Drawing GM11916-001. The noise monitoring has been undertaken as described in Table 1 below.

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.

Table 1: Details of the Noise Monitoring				
Monitoring Location	Attended / Unattended	Start Date & Time	End Date & Time	Observations
ML1	Partially Attended	1453hrs 11 th October 2021	1501hrs 12 th October 2021	Noise from road traffic on Gatewen Road is the dominant source of noise. Noise from birdsong, and pedestrians also audible.

3.2.7 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 at the site.

3.2.8 Weather conditions during the survey were as follows:

- Wind: 4-5ms⁻¹;
- Temperature approximately 16°C; and
- Dry with approximately 10-20% cloud cover.

3.2.9 A site walk over during noise monitoring allowed observations and detailed notes to be made of the significant noise sources which contribute to each of the measured levels. The observations identified the following:

Road Traffic Noise: Noise from Gatewen Road was found to be dominant across the proposed development site.

Other Sources: Occasional bird song was noted, as well as occasional pedestrians passing nearby.

3.3 Measured Noise Levels

3.3.1 The results of the noise survey are shown in Table 2 below. The values for L_{Aeq} , L_{A90} are the average levels over the measured time period, and the $L_{AMax,F}$ has been assessed as the 10th highest value in accordance with ProPG.

Table 2: Measured Noise Levels (Figures in dB)				
Monitoring Point	Measurement Time Period	Measured Noise Levels (Noise Exposure Category)		
		L_{Aeq}	L_{A90}	$L_{AMax,F}$
ML1	Daytime (0700-2300)	59 (B)	43	--
	Night-time (2300-0700)	51 (B)	32	73

3.3.2 In terms of TAN 11, the site is in Category B. For sites in category B, TAN 11 states.

‘Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.’

4 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTY.

4.1 Introduction

4.1.1 The assessment is affected by the following assumptions, limitations and uncertainty.

4.2 Assumptions

4.2.1 The following assumptions have been made.

- Proposed dwellings will be 8m high and comprise 2 storeys.
- An open window provides approximately 13dB noise attenuation.
- Fences around gardens of dwellings are not required to provide acoustic attenuation.

4.3 Limitations

4.3.1 Finished site ground levels have not been included into the noise model.

4.4 Uncertainty

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

- In accordance with guidance, the microphone was mounted vertically on a tripod 1.5m above the ground, unless otherwise stated. Monitoring locations were 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 locations of the development.

5 NOISE IMPACT ASSESSMENT

5.1 Existing Road Traffic Noise Levels

5.1.1 The measured road traffic noise levels from the noise survey have been summarised in Table 2. These measured levels have been used in this assessment.

5.2 Noise Modelling

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

5.2.2 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.

5.2.3 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.

5.2.4 The model has an assumed temperature of 10°C, 70% humidity, and 1013.3mbar air pressure. The intervening ground between Gatewen Road 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).

5.2.5 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 are shown in Table 3 below.

Table 3: Noise Model Calibration (Figures in dB)					
Monitoring Location	Measurement Time Period	Parameter	Measured	Modelled	Difference
ML1	Daytime (0700-2300)	L _{Aeq,16hour}	59	60	+1
	Night-time (2300-0700)	L _{Aeq,8hour}	51	52	+1
		L _{AMax,F}	73	73	0

5.2.6 The calibration shows a slight over prediction by the model of 1dB. However, as the results of the noise monitoring and noise modelling are in agreement with one another, the model itself is considered robust and has been used to determine the noise impact from road traffic sources, and to establish mitigation measures for proposed sensitive receptors, where appropriate.

5.3 Road Traffic – Noise Impact Assessment

5.3.1 The following figures have been prepared using the results of the noise model.

- Drawing GM11916-002 shows the noise level in gardens of the proposed dwellings.
- Drawing GM11916-003 shows the daytime average $L_{Aeq,16hour}$ noise at each façade of each proposed dwelling.
- Drawing GM11916-004 shows the night-time average L_{Aeq} noise at each façade of each proposed dwelling.
- Drawing GM11916-005 show the maximum $L_{Af,Max}$ noise level at each façade of each proposed dwelling.

5.3.2 Drawing GM11916-002 details noise contours across the development during the daytime and show that the desirable noise guideline level of 50dB(A) would be met in outdoor living areas of all dwellings. Therefore, noise mitigation measures for outdoor living areas are not required.

5.3.3 However, drawings GM11916-003 to 005 the noise modelling show that during the daytime and night-time that, internal noise guideline levels would be exceeded with windows open for ventilation for some properties closest to Gatewen Road, when considering that an open window provides approximately 13dB attenuation.

5.3.4 Therefore, some noise sensitive facades adjacent to Gatewen Road would require mitigation to achieve internal noise guideline levels during the daytime period.

5.3.5 The mitigation measures are discussed in Section 6 of this report.

6 NOISE MITIGATION MEASURES

6.1 Outdoor Living Areas

6.1.1 Mitigation measures are not required to achieve guideline noise levels in garden areas.

6.2 Internal Living Areas

6.2.1 Drawings GM11916-006 and 007 show the noise at the facades of the proposed dwellings. When assessing noise levels in noise sensitive rooms, the noise attenuation provided by the overall building façade should be considered. The façade noise levels from the model have been considered and appropriate glazing, and where required, alternative means of ventilation, to that of an open window, have been specified to meet the internal noise criteria.

6.2.2 Drawings GM11916-006 and 007 show the facades (labelled yellow) which require standard double glazing and acoustically attenuated ventilation in order to meet internal noise guideline levels for ground floor and first floor noise sensitive rooms (i.e. living rooms and bedrooms). The mitigation scheme is as follows:

- Green facades - will meet internal noise guideline levels with standard thermal double glazing and ventilation provided by an open window.
- Yellow facades – 4/16/4 and acoustically attenuated ventilation (e.g. Greenwoods 5000EA.AC2)

6.2.3 Glazing is the building elements that provide the least noise attenuation. Subsequently, noise break-in calculations have been undertaken for which consider these building elements of noise sensitive rooms (i.e. living rooms and bedrooms) across the development.

6.2.4 The break-in calculations are based on the calculated noise levels at the proposed dwelling façades and the worst-case ratio of room volume to glazing surface.

6.2.5 The break-in calculations show that internal noise guideline levels will be achieved with windows closed.

6.2.6 Other products or specifications may be suitable, it is recommended that the acoustic performance of the glazing and ventilation meets the specifications assumed in Table 4 below, for each octave band between 63Hz and 8kHz.

Table 4: Glazing and Ventilation Specification of example products assumed in the noise calculations								
Product	Noise Attenuation (dB)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Glazing 4/16/4	21	22	18	33	41	46	36	36
Greenwoods 5000EA.AC2	32	40	38	32	47	53	48	50

- 6.2.7 Any acoustic ventilation proposed at the site should, as a minimum, comply with Building Regulations 2000 Approved Document F Means of Ventilation and British Standard BS5925 1991: “Code of Practice for Ventilation Principles and Designing for Natural Ventilation”. Therefore, we would recommend that any proposed ventilation strategy is confirmed with a mechanical engineer prior to installation.
- 6.2.8 The implementation of the recommended glazing together with acoustically attenuated ventilation would ensure that the noise guideline levels are achieved during the day and night-time.

7 CONCLUSIONS

- 7.1.1 Wardell Armstrong LLP has carried out a noise assessment the approved residential development of up to 112 dwellings on land off Gatewen Road, Wrexham.
- 7.1.2 This assessment considers noise from road traffic on Gatewen Road, and any other noise sources at the site. The assessment has been undertaken in line with current planning and technical guidance.
- 7.1.3 The assessment of noise at the development site relies upon measured noise levels taken between 11th and 12th October 2021.
- 7.1.4 The measured on-site noise levels have been input into the 3D noise model SoundPLAN, which has been used to calculate noise across the development site.
- 7.1.5 Modelling has shown that in outdoor living areas, the 50dB $L_{Aeq,16hour}$ noise guideline level will be met for dwellings without the need for mitigation.
- 7.1.6 For internal living areas, 4/16/4 glazing together with acoustically attenuated ventilation has been suggested for plots adjacent to Gatewen Road to achieve the internal noise guideline levels during the daytime and night-time. Dwellings further into the development will meet internal guideline noise levels with standard thermal double glazing and ventilation provided via an open window.
- 7.1.7 Therefore, noise is not considered to be a determining factor when considering the application for approval of reserved matters.

APPENDICES

Appendix A – Planning and Guidance

Appendix A: Noise Legislation and Guidance

Planning Policy Wales

- A.1 Planning Policy Wales (PPW) makes several references to noise, however, in term oof this site, PPW states;

6.7.20 Where sensitive developments need to be located close to existing transportation infrastructure for sustainable movement and access they should be designed, as far as practicable, to limit harmful substances and noise levels within and around those developments both now and in the future. This may include employing the principles of good acoustic design and the inclusion of active travel or travel management measures as part of development proposals. Such development, however, should preferably be located away from existing sources of significant noise, which may include aircraft noise or roads, particularly new roads or those with programmed route improvements.

Technical Advice Note 11 Noise

- A.2 Technical Advice Note 11 provides guidance to developers and governing bodies on the assessment of proposed development next to transport infrastructure, and states.

7. Noise Exposure Categories (NECs) (see Annex A) have been derived to assist local planning authorities in their consideration of planning applications for residential development near transport related noise sources.

BS8233 Guidance on sound insulation and noise reduction for buildings

- A.3 British Standard 8233 “Guidance on sound insulation and noise reduction for buildings” 2014 bases its advice on the WHO Guidelines. In addition, for internal noise levels it states:

- A.4 “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.”

- A.5 Furthermore, with regard to external noise, the Standard states:

“For traditional external areas that are used for amenity space such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guidance value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. 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.”

Department of Transport’s memorandum, “Calculation of Road Traffic Noise” (CRTN), 1998;

- A.6 The memorandum was prepared to enable entitlement under the Noise Insulation Regulations 1975 to be determined; but it is stated in the document, that the guidance is equally appropriate for the calculation of traffic noise for land use planning purposes.
- A.7 The procedures outlined in CRTN assume typical traffic and noise propagation conditions that are consistent with moderately adverse wind velocities and directions during specified periods. In CRTN, all noise levels can be expressed in terms of the index $L_{10(18 \text{ hour})}$ dB(A).

Appendix B – Measured Noise Levels

File	20211011_145312_000000_1				
Periods	5m				
Start	11/10/2021 15:00				
End	12/10/2021 15:00				
Location	ML1				
Weighting	A				
Data type	Fast Inst				
Unit	dB				
Period start	LAeq	L Amin	L Amax	LA90	LA10
11/10/2021 15:00	60.4	43.9	70.6	46.5	65.5
11/10/2021 15:05	58.9	42.7	73.4	44.4	63.4
11/10/2021 15:10	62.4	41.1	78.3	44.1	66.1
11/10/2021 15:15	60.8	42.4	75.2	44.8	64.4
11/10/2021 15:20	61.5	41.9	71.3	45.6	65.9
11/10/2021 15:25	59.2	40.2	71.8	43.5	63.3
11/10/2021 15:30	59.3	38.8	72.2	41.7	64.0
11/10/2021 15:35	59.7	40.5	69.5	43.2	64.5
11/10/2021 15:40	59.8	40.4	74.2	43.9	64.2
11/10/2021 15:45	60.6	42.8	74.4	46.5	65.0
11/10/2021 15:50	59.9	39.4	78.2	42.5	63.9
11/10/2021 15:55	59.5	38.8	73.3	42.5	63.7
11/10/2021 16:00	57.7	38.3	72.1	40.7	62.7
11/10/2021 16:05	60.8	38.9	76.7	42.5	64.5
11/10/2021 16:10	59.4	41.6	71.8	43.9	63.4
11/10/2021 16:15	61.1	40.9	71.7	44.9	65.7
11/10/2021 16:20	59.4	40.3	68.6	44.6	63.3
11/10/2021 16:25	58.8	38.5	73.5	40.8	62.7
11/10/2021 16:30	59.6	39.9	72.5	42.7	63.5
11/10/2021 16:35	59.5	38.0	71.9	40.4	63.7
11/10/2021 16:40	58.1	39.0	70.3	40.9	63.3
11/10/2021 16:45	60.5	40.8	73.1	45.6	64.5
11/10/2021 16:50	59.0	39.7	71.0	41.9	63.4
11/10/2021 16:55	60.1	41.0	71.6	44.6	65.2
11/10/2021 17:00	60.4	39.2	72.8	43.1	65.0
11/10/2021 17:05	61.1	40.1	73.9	46.1	65.3
11/10/2021 17:10	59.6	42.3	72.0	45.5	64.0
11/10/2021 17:15	63.8	42.1	81.5	44.2	66.5
11/10/2021 17:20	61.2	41.1	74.4	45.6	64.9
11/10/2021 17:25	60.3	42.2	75.7	45.4	63.7
11/10/2021 17:30	59.8	40.5	72.7	45.4	63.8
11/10/2021 17:35	59.6	39.6	71.6	43.2	64.0
11/10/2021 17:40	61.9	41.8	77.8	48.0	65.2
11/10/2021 17:45	62.2	42.9	76.5	48.2	65.3
11/10/2021 17:50	60.8	42.0	70.6	46.6	65.5
11/10/2021 17:55	61.5	40.4	79.6	43.4	64.1
11/10/2021 18:00	58.7	37.2	70.5	42.2	63.3
11/10/2021 18:05	60.9	41.0	72.1	45.0	65.2
11/10/2021 18:10	58.0	39.5	70.0	42.8	62.6
11/10/2021 18:15	61.3	38.8	81.5	44.4	63.6
11/10/2021 18:20	58.9	37.1	74.3	39.6	63.6

Appendix B - Noise Monitoring Data

11/10/2021 18:25	59.9	39.9	78.5	42.8	62.1
11/10/2021 18:30	57.2	39.5	70.5	42.3	61.4
11/10/2021 18:35	58.7	38.8	68.7	42.3	64.1
11/10/2021 18:40	57.1	38.3	69.3	42.2	62.0
11/10/2021 18:45	59.9	40.2	71.3	43.7	64.2
11/10/2021 18:50	62.8	38.5	80.4	42.0	64.7
11/10/2021 18:55	60.3	40.6	77.7	43.0	63.0
11/10/2021 19:00	57.7	41.3	69.3	43.2	62.8
11/10/2021 19:05	58.5	41.0	68.7	43.1	63.6
11/10/2021 19:10	56.5	39.1	70.5	41.9	60.6
11/10/2021 19:15	58.1	41.6	71.0	42.8	62.7
11/10/2021 19:20	57.2	39.5	70.6	41.5	62.0
11/10/2021 19:25	59.7	40.6	75.7	43.2	63.7
11/10/2021 19:30	58.9	39.9	73.3	41.5	63.7
11/10/2021 19:35	58.3	41.0	76.4	42.4	61.3
11/10/2021 19:40	55.9	38.8	69.0	40.9	59.7
11/10/2021 19:45	56.8	38.1	69.0	40.7	62.0
11/10/2021 19:50	58.9	39.1	73.3	41.3	63.9
11/10/2021 19:55	52.9	35.4	68.7	37.8	54.6
11/10/2021 20:00	57.5	38.5	71.3	40.9	62.6
11/10/2021 20:05	57.9	39.2	69.8	41.5	63.1
11/10/2021 20:10	56.4	34.4	72.1	37.0	58.5
11/10/2021 20:15	55.5	36.7	69.4	39.4	60.2
11/10/2021 20:20	56.6	34.5	74.6	37.6	59.0
11/10/2021 20:25	57.2	37.8	69.2	41.3	62.5
11/10/2021 20:30	55.4	35.1	70.2	37.5	58.5
11/10/2021 20:35	56.1	35.1	75.9	37.4	57.9
11/10/2021 20:40	54.2	32.6	73.5	36.7	54.5
11/10/2021 20:45	53.5	33.8	67.9	36.0	57.0
11/10/2021 20:50	54.4	35.3	68.9	36.8	59.0
11/10/2021 20:55	53.4	32.6	73.3	34.9	52.1
11/10/2021 21:00	52.0	32.4	66.3	35.6	55.9
11/10/2021 21:05	52.1	32.4	70.4	35.5	48.7
11/10/2021 21:10	52.5	32.2	71.6	35.6	54.5
11/10/2021 21:15	55.1	35.1	72.0	37.8	59.2
11/10/2021 21:20	54.9	33.9	69.1	36.7	58.8
11/10/2021 21:25	54.4	32.9	68.7	34.1	55.6
11/10/2021 21:30	54.5	34.5	70.5	36.5	57.2
11/10/2021 21:35	57.7	31.5	71.6	34.5	62.6
11/10/2021 21:40	54.6	31.3	70.7	33.1	56.0
11/10/2021 21:45	53.2	29.7	71.1	32.1	54.4
11/10/2021 21:50	54.8	33.4	71.0	35.9	56.1
11/10/2021 21:55	53.1	30.6	69.0	33.4	54.2
11/10/2021 22:00	55.3	30.3	72.2	34.2	58.6
11/10/2021 22:05	45.9	30.6	64.6	33.0	41.5
11/10/2021 22:10	52.9	32.9	67.6	34.7	56.0
11/10/2021 22:15	57.5	31.9	77.7	33.6	54.3
11/10/2021 22:20	52.7	29.8	68.8	32.7	55.8
11/10/2021 22:25	54.3	32.1	74.1	34.1	54.3
11/10/2021 22:30	53.4	28.1	71.9	31.2	53.1

Appendix B - Noise Monitoring Data

11/10/2021 22:35	49.6	29.9	66.7	32.7	46.9
11/10/2021 22:40	48.8	29.6	66.6	32.3	43.6
11/10/2021 22:45	33.5	25.8	45.5	27.7	36.2
11/10/2021 22:50	49.8	28.4	69.3	30.8	45.5
11/10/2021 22:55	51.6	29.5	68.8	32.3	53.3
11/10/2021 23:00	34.8	29.0	41.8	30.2	37.9
11/10/2021 23:05	51.5	29.4	70.1	31.5	52.3
11/10/2021 23:10	51.6	29.5	67.3	32.6	53.3
11/10/2021 23:15	46.9	30.9	68.0	32.9	41.0
11/10/2021 23:20	50.1	30.1	67.7	32.0	48.1
11/10/2021 23:25	44.8	29.0	62.9	30.5	40.2
11/10/2021 23:30	52.3	30.7	71.5	33.9	49.4
11/10/2021 23:35	55.2	31.0	79.3	33.0	44.3
11/10/2021 23:40	53.6	31.4	73.2	34.1	54.1
11/10/2021 23:45	42.9	30.8	59.6	32.6	39.6
11/10/2021 23:50	51.0	29.1	71.0	30.6	49.7
11/10/2021 23:55	33.7	28.9	41.4	29.9	36.2
12/10/2021 00:00	47.6	28.5	66.4	30.7	43.2
12/10/2021 00:05	52.3	27.4	72.9	30.2	44.3
12/10/2021 00:10	51.5	26.5	71.6	27.8	45.4
12/10/2021 00:15	36.4	29.5	48.1	30.9	38.5
12/10/2021 00:20	50.0	32.9	67.9	34.2	43.7
12/10/2021 00:25	46.2	34.1	66.6	35.9	42.3
12/10/2021 00:30	44.6	33.5	62.7	35.1	40.2
12/10/2021 00:35	46.5	32.8	67.6	34.7	43.7
12/10/2021 00:40	49.3	33.9	67.9	36.1	45.1
12/10/2021 00:45	45.1	35.2	62.0	36.7	44.3
12/10/2021 00:50	46.3	32.7	65.6	35.5	42.0
12/10/2021 00:55	47.0	30.8	67.3	32.6	40.4
12/10/2021 01:00	44.9	32.6	64.9	34.2	42.4
12/10/2021 01:05	49.7	32.8	67.3	34.8	45.4
12/10/2021 01:10	35.3	30.1	42.2	31.7	38.5
12/10/2021 01:15	37.0	29.9	44.5	30.9	40.7
12/10/2021 01:20	33.2	27.9	39.8	29.2	35.8
12/10/2021 01:25	34.2	28.0	43.9	29.4	37.1
12/10/2021 01:30	36.2	30.4	42.1	32.2	39.1
12/10/2021 01:35	40.8	29.1	58.2	31.6	38.6
12/10/2021 01:40	35.7	29.2	43.5	30.8	38.4
12/10/2021 01:45	38.5	30.5	46.5	32.1	41.9
12/10/2021 01:50	38.1	32.0	44.3	34.7	40.8
12/10/2021 01:55	35.3	30.1	41.0	30.9	38.4
12/10/2021 02:00	35.2	29.5	42.2	30.7	38.8
12/10/2021 02:05	35.2	28.5	42.3	31.0	38.4
12/10/2021 02:10	35.2	26.6	42.4	29.8	38.3
12/10/2021 02:15	32.6	25.5	45.0	27.8	34.6
12/10/2021 02:20	29.3	24.8	39.0	25.7	31.4
12/10/2021 02:25	30.8	25.3	45.5	26.6	32.6
12/10/2021 02:30	28.3	24.4	35.4	25.1	31.1
12/10/2021 02:35	30.0	25.5	37.8	26.9	32.1
12/10/2021 02:40	49.1	25.9	66.1	28.3	45.5

Appendix B - Noise Monitoring Data

12/10/2021 02:45	31.4	26.2	44.4	27.1	34.2
12/10/2021 02:50	43.7	27.4	64.5	29.0	39.0
12/10/2021 02:55	43.9	26.1	64.1	27.6	36.7
12/10/2021 03:00	46.9	25.5	66.9	27.3	37.8
12/10/2021 03:05	30.0	24.0	39.0	25.1	33.1
12/10/2021 03:10	28.9	25.1	38.2	25.6	31.5
12/10/2021 03:15	31.0	26.0	38.4	27.1	33.7
12/10/2021 03:20	33.2	26.4	38.0	29.0	35.7
12/10/2021 03:25	42.4	27.8	60.7	29.2	37.8
12/10/2021 03:30	47.8	25.9	66.7	27.8	39.7
12/10/2021 03:35	32.8	26.5	42.0	28.4	35.5
12/10/2021 03:40	32.8	26.1	42.7	28.5	35.5
12/10/2021 03:45	28.1	24.1	34.8	24.9	30.2
12/10/2021 03:50	29.3	24.5	34.9	25.6	32.0
12/10/2021 03:55	42.5	24.4	61.0	26.0	33.7
12/10/2021 04:00	31.2	24.4	40.9	25.5	33.8
12/10/2021 04:05	30.6	24.2	40.3	25.7	33.3
12/10/2021 04:10	34.5	23.9	46.2	25.1	39.3
12/10/2021 04:15	40.3	23.9	59.7	24.5	32.8
12/10/2021 04:20	27.4	24.7	31.9	25.6	28.8
12/10/2021 04:25	41.4	26.0	60.0	27.0	42.1
12/10/2021 04:30	50.1	32.3	65.6	33.2	51.0
12/10/2021 04:35	43.2	30.1	61.9	32.4	43.0
12/10/2021 04:40	50.6	30.0	68.0	32.6	49.1
12/10/2021 04:45	44.3	27.3	63.7	28.2	41.2
12/10/2021 04:50	49.5	27.1	65.7	29.5	46.7
12/10/2021 04:55	32.0	26.4	44.7	27.8	33.9
12/10/2021 05:00	45.0	29.6	62.7	32.9	43.1
12/10/2021 05:05	52.0	29.9	69.7	31.2	51.6
12/10/2021 05:10	53.6	29.7	75.9	31.0	46.2
12/10/2021 05:15	45.0	29.9	60.6	32.0	45.9
12/10/2021 05:20	52.7	32.4	71.2	34.2	53.4
12/10/2021 05:25	47.5	31.4	67.6	32.8	40.1
12/10/2021 05:30	53.1	30.3	70.2	33.2	55.3
12/10/2021 05:35	52.8	31.7	71.0	34.4	50.5
12/10/2021 05:40	58.9	36.0	75.8	39.0	61.5
12/10/2021 05:45	55.9	32.7	73.2	34.9	54.0
12/10/2021 05:50	54.2	32.4	71.8	34.3	51.3
12/10/2021 05:55	49.6	31.8	68.4	33.1	45.7
12/10/2021 06:00	51.8	32.3	70.4	33.8	50.9
12/10/2021 06:05	53.6	34.0	71.6	35.6	53.8
12/10/2021 06:10	56.8	34.5	72.7	38.0	60.9
12/10/2021 06:15	54.8	35.0	71.6	37.9	58.1
12/10/2021 06:20	54.5	34.0	72.9	35.9	51.7
12/10/2021 06:25	58.5	35.3	72.6	36.4	62.8
12/10/2021 06:30	57.2	34.9	72.5	38.1	61.4
12/10/2021 06:35	59.0	37.3	75.6	40.1	62.2
12/10/2021 06:40	52.7	36.8	67.6	38.0	54.4
12/10/2021 06:45	58.0	37.4	74.8	39.1	59.9
12/10/2021 06:50	57.4	39.4	75.5	41.1	59.4

Appendix B - Noise Monitoring Data

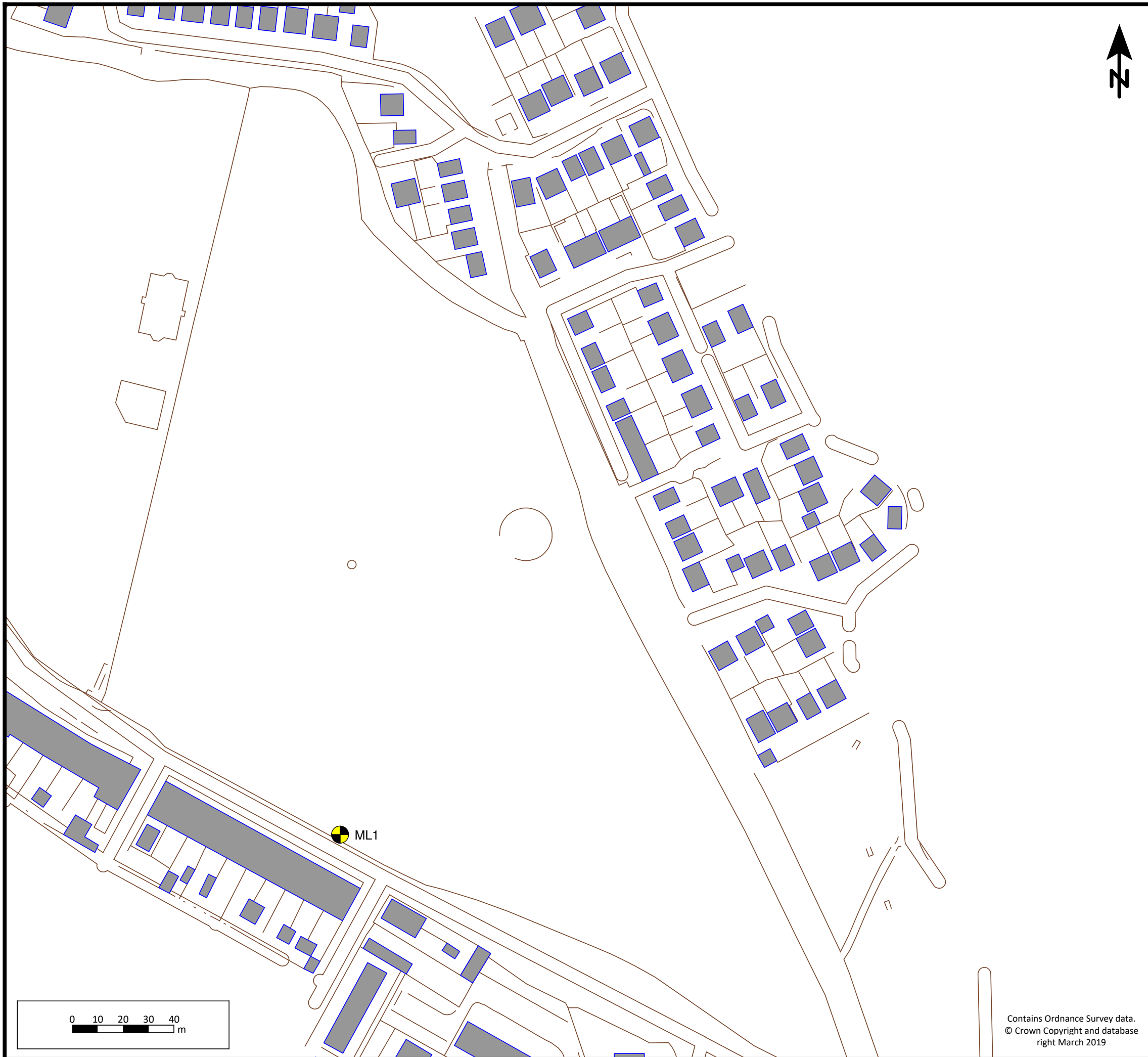
12/10/2021 06:55	57.8	38.6	74.0	43.4	60.5
12/10/2021 07:00	58.6	39.5	76.7	42.6	61.8
12/10/2021 07:05	59.0	39.2	73.2	41.2	64.2
12/10/2021 07:10	59.1	40.5	70.6	43.0	63.6
12/10/2021 07:15	58.6	39.9	69.6	43.1	63.4
12/10/2021 07:20	61.4	41.5	76.9	43.6	65.4
12/10/2021 07:25	58.8	41.3	72.1	43.2	62.8
12/10/2021 07:30	59.6	39.4	73.5	42.8	64.6
12/10/2021 07:35	61.1	43.8	73.2	46.0	65.7
12/10/2021 07:40	62.1	42.6	79.5	46.5	64.8
12/10/2021 07:45	61.9	42.8	74.3	47.3	66.3
12/10/2021 07:50	63.5	43.5	80.4	45.2	66.2
12/10/2021 07:55	61.9	44.5	74.1	47.4	67.0
12/10/2021 08:00	61.0	44.5	73.7	48.2	65.5
12/10/2021 08:05	62.8	45.3	78.1	49.2	67.1
12/10/2021 08:10	61.6	46.3	74.8	48.7	65.4
12/10/2021 08:15	64.7	45.8	83.1	47.4	66.2
12/10/2021 08:20	62.0	44.8	73.6	49.4	66.2
12/10/2021 08:25	60.3	45.3	70.1	48.1	64.2
12/10/2021 08:30	62.9	44.2	75.9	46.7	67.0
12/10/2021 08:35	61.4	44.2	74.4	48.5	65.4
12/10/2021 08:40	60.4	43.8	73.0	46.7	65.6
12/10/2021 08:45	61.4	44.5	71.7	47.9	66.0
12/10/2021 08:50	60.1	43.8	75.7	46.1	64.2
12/10/2021 08:55	60.7	44.7	77.5	46.6	64.3
12/10/2021 09:00	61.0	44.7	73.0	46.4	65.0
12/10/2021 09:05	60.9	44.1	76.2	45.5	64.5
12/10/2021 09:10	59.4	43.0	70.8	45.9	64.4
12/10/2021 09:15	57.7	42.0	71.0	43.6	62.0
12/10/2021 09:20	58.5	41.8	71.0	43.7	62.9
12/10/2021 09:25	58.5	43.8	70.7	45.1	62.9
12/10/2021 09:30	56.9	42.3	69.3	44.4	61.4
12/10/2021 09:35	56.4	41.0	69.1	43.8	59.9
12/10/2021 09:40	57.2	40.5	73.2	43.0	60.6
12/10/2021 09:45	58.2	41.1	72.1	44.1	61.7
12/10/2021 09:50	56.9	41.7	71.3	43.7	61.3
12/10/2021 09:55	56.7	40.3	71.6	42.4	60.5
12/10/2021 10:00	58.3	42.1	69.6	44.5	63.3
12/10/2021 10:05	57.9	42.7	69.4	45.1	61.9
12/10/2021 10:10	56.6	40.3	68.9	41.8	61.4
12/10/2021 10:15	57.5	41.1	70.5	43.7	62.2
12/10/2021 10:20	58.0	41.7	70.3	45.0	61.7
12/10/2021 10:25	58.1	41.7	70.1	43.8	62.9
12/10/2021 10:30	59.8	42.0	77.0	45.0	64.1
12/10/2021 10:35	57.7	42.0	68.1	44.5	62.6
12/10/2021 10:40	58.5	42.2	70.9	44.2	62.7
12/10/2021 10:45	59.4	43.1	70.7	44.6	64.0
12/10/2021 10:50	59.3	42.9	71.1	44.8	63.8
12/10/2021 10:55	57.2	40.9	68.2	44.6	61.4
12/10/2021 11:00	58.4	39.6	69.3	44.8	63.4

Appendix B - Noise Monitoring Data

12/10/2021 11:05	58.8	40.3	73.0	42.2	63.0
12/10/2021 11:10	57.7	40.5	69.1	43.2	62.6
12/10/2021 11:15	59.0	42.9	70.6	45.4	64.1
12/10/2021 11:20	60.6	42.0	72.2	45.1	65.2
12/10/2021 11:25	59.6	41.9	71.5	45.2	63.9
12/10/2021 11:30	58.6	43.1	71.9	45.4	62.9
12/10/2021 11:35	57.9	41.1	70.6	42.5	63.2
12/10/2021 11:40	58.3	40.5	71.9	43.1	62.7
12/10/2021 11:45	55.0	40.1	70.4	41.4	58.8
12/10/2021 11:50	55.7	40.9	68.1	42.5	60.2
12/10/2021 11:55	58.0	42.6	72.0	45.5	62.3
12/10/2021 12:00	57.5	42.7	71.0	46.5	61.4
12/10/2021 12:05	61.3	45.5	71.6	48.6	65.1
12/10/2021 12:10	58.1	42.9	74.1	45.6	62.1
12/10/2021 12:15	58.0	44.4	69.0	46.5	62.0
12/10/2021 12:20	59.5	45.4	69.6	49.2	63.6
12/10/2021 12:25	60.0	42.4	74.5	44.7	63.9
12/10/2021 12:30	59.3	42.2	71.2	44.4	63.3
12/10/2021 12:35	59.4	42.6	70.3	44.9	64.2
12/10/2021 12:40	58.1	40.1	71.4	45.4	62.5
12/10/2021 12:45	59.9	43.6	70.4	45.8	64.2
12/10/2021 12:50	58.5	43.8	71.1	46.1	63.2
12/10/2021 12:55	57.1	43.8	69.7	46.2	60.2
12/10/2021 13:00	59.4	44.9	68.9	49.2	63.7
12/10/2021 13:05	59.4	43.0	73.0	45.3	63.1
12/10/2021 13:10	56.0	40.9	68.4	43.0	60.7
12/10/2021 13:15	59.8	40.9	74.8	43.1	64.0
12/10/2021 13:20	59.7	41.4	73.3	44.3	64.4
12/10/2021 13:25	59.2	40.5	70.9	44.3	63.9
12/10/2021 13:30	57.3	39.9	70.0	41.4	61.5
12/10/2021 13:35	57.8	41.7	70.1	44.9	63.1
12/10/2021 13:40	58.2	42.4	71.4	43.8	62.3
12/10/2021 13:45	59.1	39.9	72.2	42.3	64.8
12/10/2021 13:50	59.7	42.0	70.2	46.0	64.3
12/10/2021 13:55	65.1	42.8	85.0	45.5	65.0
12/10/2021 14:00	61.1	42.8	78.6	45.7	63.3
12/10/2021 14:05	59.2	46.4	70.1	49.2	63.9
12/10/2021 14:10	61.5	44.1	79.9	46.4	62.9
12/10/2021 14:15	57.9	41.9	69.5	45.2	62.2
12/10/2021 14:20	59.5	42.9	71.9	46.3	63.5
12/10/2021 14:25	59.5	43.7	74.6	45.6	63.7
12/10/2021 14:30	59.8	43.2	72.3	46.3	64.3
12/10/2021 14:35	59.7	43.2	72.3	45.6	64.3
12/10/2021 14:40	58.6	41.1	72.8	43.7	63.3
12/10/2021 14:45	58.9	41.7	69.8	45.8	63.9
12/10/2021 14:50	60.3	42.3	74.1	46.4	64.3
12/10/2021 14:55	58.5	40.0	71.9	41.8	63.1

DRAWINGS

GM11916-001	Noise Monitoring Location Plan	1:1,500
GM11916-002	Daytime Noise Levels	1:1,500
GM11916-003	Daytime Noise Levels at Proposed Dwellings, L_{Aeq}	1:1,500
GM11916-004	Night-time Noise Levels at Proposed Dwellings, L_{Aeq}	1:1,500
GM11916-005	Night-time Noise Levels at Proposed Dwellings, $L_{Af,Max}$	1:1,500
GM11916-006	Livingroom Mitigation Requirements	1:1,500
GM11916-007	Bedroom Mitigation Requirements	1:1,500



Key

-  Road axis
-  Emission line
-  Surface
-  Buildings
-  Monitoring Location

CLIENT: Bellway Homes (North West) Limited

PROJECT: Land off Gatewen Rd

DRAWING TITLE: Noise Monitoring Location Plan

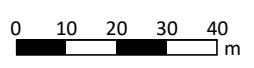
DRG NO: GM11916/001	REV: A
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DRG SIZE: A3	SCALE: 1:1500	DATE: 08/11/2021
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DRAWN BY RC	CHECKED BY RC	APPROVED BY CMD
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- NEWCASTLE UPON TYNE | TEL 0191 232 0943
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| ☐ BOLTON | ☐ LONDON |
| ☐ CARDIFF | ☐ MANCHESTER |
| ☐ CARLISLE | ☐ SHEFFIELD |
| ☐ EDINBURGH | ☐ STOKE ON TRENT |



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Key

-  Road
-  Proposed building
-  Existing building
-  Garage
-  1.8m Fence/Wall

Daytime L_{Aeq} dB

-  ≤ 50.0
-  50.0 - 55.0
-  55.0 - 60.0
-  > 60.0

CLIENT: Bellway Homes (North West) Limited

PROJECT: Land off Gatewen Rd

DRAWING TITLE: Daytime Noise Contours

DRG NO: GM11916/002	REV: A
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DRG SIZE: A3	SCALE: 1:1500	DATE: 08/11/2021
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DRAWN BY RC	CHECKED BY RC	APPROVED BY CMD
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- NEWCASTLE UPON TYNE | TEL 0191 232 0943
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- | | |
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| ☐ EDINBURGH | ☐ STOKE ON TRENT |

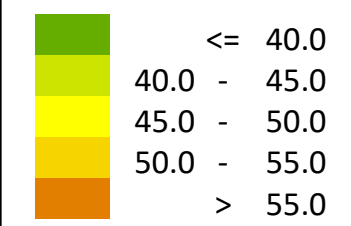
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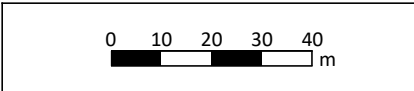
Key

- Road
- Proposed building
- Existing building
- Garage
- 1.8m Close boarded fence/wall
- Facade point

Daytime $L_{Aeq,16Hour}$ dB



CLIENT: Bellway Homes (North West) Limited		
PROJECT: Land off Gatewen Rd		
DRAWING TITLE: Daytime Noise Levels at Proposed Dwellings		
DRG NO: GM11916/003	REV: A	
DRG SIZE: A3	SCALE: 1:1500	DATE: 08/11/2021
DRAWN BY RC	CHECKED BY RC	APPROVED BY CMD



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☐ SHEFFIELD

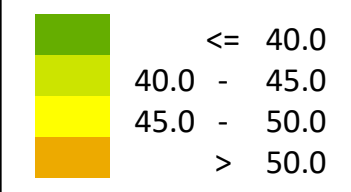
☐ STOKE ON TRENT



Key

- Road
- Proposed building
- Existing building
- Garage
- 1.8m Close boarded fence/wall
- Facade point

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



CLIENT: Bellway Homes (North West) Limited		
PROJECT: Land off Gatewen Rd		
DRAWING TITLE: Night-time Noise Levels at Proposed Dwellings		
DRG NO: GM11916/004	REV: A	
DRG SIZE: A3	SCALE: 1:1500	DATE: 08/11/2021
DRAWN BY RC	CHECKED BY RC	APPROVED BY CMD



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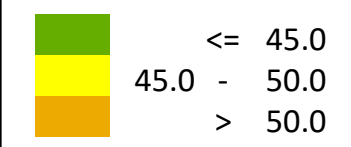
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Key

- Road
- Proposed building
- Existing building
- Garage
- 1.8m Close boarded fence/wall
- Facade point

Night-time $L_{Af,Max}$ dB



CLIENT: Bellway Homes (North West) Limited

PROJECT: Land off Gatewen Rd

DRAWING TITLE: Night-time L_{Max} Noise Levels at Dwellings

DRG NO: GM11916/005	REV: A
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DRG SIZE: A3	SCALE: 1:1500	DATE: 08/11/2021
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Key

- Road
- Proposed building
- Existing building
- Garage
- 1.8m Close boarded fence/wall
- Facade point

Livingroom Mitigation

- Open Windows
- Standard Glazing & Vents
- Acoustic Glazing and PIV

CLIENT: Bellway Homes (North West) Limited		
PROJECT: Land off Gatewen Rd		
DRAWING TITLE: Living Room Mitigation		
DRG NO: GM11916/006	REV: A	
DRG SIZE: A3	SCALE: 1:1500	DATE: 08/11/2021
DRAWN BY RC	CHECKED BY RC	APPROVED BY CMD

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Key

- Road
- Proposed building
- Existing building
- Garage
- 1.8m Close boarded fence/wall
- Facade point

Bedroom Mitigation

- Open Windows
- Standard Glazing & Vents
- Acoustic Glazing and PIV

CLIENT: Bellway Homes (North West) Limited		
PROJECT: Land off Gatewen Rd		
DRAWING TITLE: Bedroom Mitigation Requirements		
DRG NO: GM11916/007	REV: A	
DRG SIZE: A3	SCALE: 1:1500	DATE: 08/11/2021
DRAWN BY RC	CHECKED BY RC	APPROVED BY CMD

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