Noise CONSULTANTS

Noise Assessment: Pheasant Oak Farm, Waste Lane, Balsall

September 2023






Experts in noise and vibration assessment and management

Document Control

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1 Introduction

1.1 This report describes the potential impact of noise upon a proposed residential development on Land at Pheasant Oak, Balsall Common (the 'Site'). The assessment has been carried out by Noise Consultants Ltd (NCL) on behalf of the applicant Barwood Development Securities Ltd ('BDSL') for the purposes of an Outline Application for Residential Development (up to 250 homes, including 40% affordable) with vehicular access off Waste Lane; demolition of existing buildings/structures; associated landscaping and new public open spaces; community growing area/orchard; and enhancements to Millennium Way through the Site'..

1.1 The report describes the existing ambient noise climate at the Site, and the impacts existing ambient noise upon the proposed residential development at the Site.

1.2 This noise assessment considers the suitability of the Site for noise-sensitive development through the consideration of local ambient noise sources, including current and future road traffic noise from the local road network. The report also considers the potential impact of sound associated with proposed building services plant and commercial activities on existing Noise Sensitive Receptors (NSRs) as well as noise impacts associated with road traffic intensification due to the development.

1.3 This report has been prepared taking into account all relevant local and national policy, guidance and regulations.

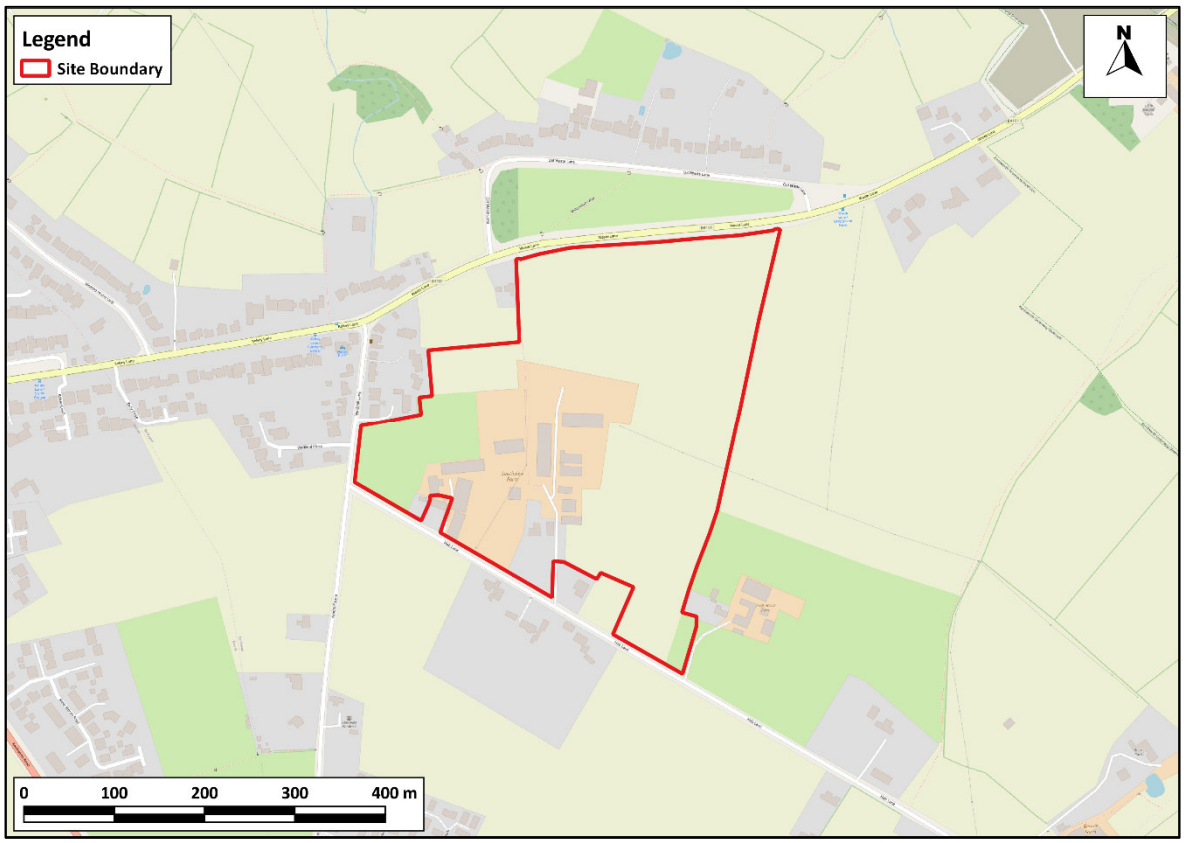
1.4 To assist with the understanding of this report, a glossary of acoustic terms is provided in **Appendix A1.**

2 Existing Site and Proposed Development

Existing Site

2.1 The Site is located on the site of Pheasant Oak Farm. The Site comprises an area of 12.67 hectares and currently is currently used for agricultural, light industrial and commercial uses. **Figure 1** presents the site location plan.

Figure 1: Proposed Site Location



(Contains data from © OpenStreetMap contributors)

2.2 The Site is situated approximately 1.4km southeast of the centre of the village of Balsall Common which is within the Metropolitan Borough of Solihull, England. The Site is in a semi-rural location with pockets of residential dwellings nearby. The Site is bounded by Waste Lane (B4101), Windmill Lane and Hob Lane and these are expected to be the main sources of ambient sound affecting the Site. The A452 is located approximately 600m to the west and is expected to contribute to background sound levels at the Site and the nearby NSRs.

Proposed Development

2.3 The proposed development is a residential development comprising c. 7 hectares of residential dwellings. The development proposals also include:

- *Pedestrian routes;*
- *Attenuation areas and wildflower areas for ecological enhancement; and*
- *Landscaping.*

Figure 2: Proposed Development

(Brownhill Hayward Brown, Land at Pheasant Oak Farm, Balsall Common: Illustrative Masterplan, Drawing No: 3444 - 04, Rev D, Aug '22)

2.4 The development proposals are not expected to introduce any significant sources of noise to the area. It is possible that the development could lead to increased levels of road traffic noise at nearby NSRs due to development associated road traffic intensification and this is, therefore, assessed in this noise assessment report (see **Section 7**).

2.5 As indicated in **Section 7**, it is not expected that levels of road traffic noise affecting the Site itself would significantly increase in the future scenario. It has also been identified that the proposed High-

Speed 2 (HS2) Phase 1 railway line is being constructed 440m northeast of the site. A review of the Environmental Statement for HS2 Phase 1 finds that, for locations south of Old Waste Lane, “Generally no adverse effect is expected” therefore, operational noise due to HS2 in the future scenario has been scoped out of this noise assessment.

2.6 Impacts associated with HS2 construction traffic are considered in **Section 7.**

3 Relevant Policy and Guidance

3.1 Relevant national policy and guidance is discussed in the following appendices:

- **Appendix A2** - Relevant Policy and Guidance;
- **Appendix A3** - Site Suitability Assessment Guidance;
- **Appendix A4** - Operational Sound (Building Services and Other Sound of an Industrial and/or Commercial Nature) Assessment Guidance; and
- **Appendix A5** - Operational Sound (Road Traffic) Assessment Guidance; and

3.2 Local policy and consultation with the Local Planning Authority (LPA) is summarised below.

Local and Regional Policy

3.3 The site is located within the administrative area of Solihull Metropolitan Borough Council (SMBC). Relevant local policy is set out below.

Local Policy

Solihull Local Plan (adopted December 2013)

Policy P15 Amenity

3.4 Policy P14 of the Solihull Local Plan relates to amenity and sets out the following statement relevant to noise:

"The Council will seek to protect and enhance the amenity of existing and potential occupiers of houses, businesses and other uses in considering proposals for new development, and will:

i. Permit development only if it respects the amenity of existing and proposed occupiers and would be a good neighbour; […]

vii. Seek to minimise the adverse impact of noise. Development likely to create significant noise will be permitted only if it is located away from noise sensitive uses or it incorporates measures to ensure adequate protection against noise. Noise sensitive development will be permitted only if it is located away from existing sources of significant noise, or if no suitable alternatives exist, the development incorporates measures to reduce noise intrusion to an acceptable level;

viii. Protect the amenity of residential and shopping areas, community facilities and open space from bad neighbour uses. Development that would be significantly harmful because of smell, noise or atmospheric pollution will not be permitted, whilst development that would be potentially harmful to such areas will be expected to incorporate appropriate attenuation,

mitigation or compensatory measures. In locations close to existing bad neighbour uses, the Council will not permit new residential or other sensitive development, unless the effects can be satisfactorily mitigated as part of the development; […] and

x. Protect the tranquil and locally distinctive areas in the Borough by guiding new development, particularly those that will create significant noise, either directly or through associated transport, to locations that will avoid or minimise adverse impacts."

Balsall Parish Neighbourhood Development Plan (2018 – 2033)

Policy NE.5: Minimising Pollution

3.5 Policy NE.5 of the Balsall Parish Neighbourhood Development Plan (2018 – 2033) sets out the following policy which, in part, is relevant to noise:

"Where appropriate, development proposals will be required to demonstrate how measures to address and mitigate as necessary the impact of air, noise and water pollution have been considered. Appropriate instances will include but not be limited to proposals that:

a) are within the scope of the SMBC Clean Air Strategy (when adopted);

b) relate to a site currently or formerly with land-use(s) which have the potential to have caused contamination of the underlying soils and groundwater; and

c) sit within the Birmingham Airport Noise Preferential Route corridors either side of the Standard Instrument Departure (SID) or below the arrival flight paths."

3.6 It is important to note that the proposed development is outside of the Birmingham City Airport Runway 15 Noise Preferential Route corridor.

Solihull Local Plan – Draft Submission Plan (October 2020)

Policy P14 Amenity

3.7 The above Policy P15 within the adopted Local Plan is retained as 'Policy P14 Amenity' in the emerging Solihull Local Plan – Draft Submission Plan and is expanded upon as follows:

i. Permit development only if it secures high quality design (see Policy P15), whilst respecting the amenity of existing and future occupiers; and the character of the surrounding area;

vi. Seek to minimise the adverse impact of noise and vibration. Development likely to create significant noise or vibration effects will be permitted only if located away from sensitive uses, unless measures can be incorporated to adequately protect against such impacts. Similarly, sensitive development will only be permitted if located away from sources of significant noise or vibration, unless incorporating measures proven to reduce impacts to acceptable levels. Developers will be required to adequately assess and quantify potential noise and vibration

impacts and to consider both existing pre-development and resultant post-development acoustic outcomes along with resultant internal and external noise environments. The transmission of structure- borne / ground -borne noise and vibration as well as airborne noise may need to be considered, and where development presents such potential effects, will be required to demonstrate scheme design and operation so as to adequately address and mitigate significant impacts. Mitigation shall be based on proven methods to adequately remove, minimise, attenuate or otherwise control adverse impacts. The assessment of noise and vibration and conclusions drawn shall recognise, and accommodate, requirements contained in relevant legislation, standards and guidance.

Policy P15 Securing Design Quality

3.8 Related to 'Policy P14 Amenity' within the Draft Submission Plan is 'Policy P15 Securing Design Quality', specifically:

"In delivering high quality design, development proposals will be expected to:

ii. Ensure new developments include useable private outdoor amenity space and provide public and private open spaces where there is a choice of areas of shade, shelter and access to recreation that will benefit people, wildlife and provide flood storage and carbon management".

Consultation

3.9 SMBC were approached by NCL for consultation via email on 14 November 2022. Prior to this, the LPA were provided with a noise briefing note (dated 1st August 2022) which sets out the baseline survey methodology and the assessment scope and methodology.

3.10 The following comment was from Paul Samms (Public Protection Office) regarding the scope of the noise assessment:

"The submitted information indicates there will be contaminated land, air quality and noise assessments submitted. I have not looked at the methodologies, (with the exception of a quick look at the noise methodology). I note the noise methodology has not included the potential impact of the future HS2 project (particularly the HS2 construction lorries that may use the roads in the area of the development). I advise the applicant's noise consultant give thought to the possible impact of such vehicles upon sensitive receptors of the proposed development."

3.11 Following a review of the relevant Schedule 17 applications[1] on the SMBC planning portal, it is understood that, although HS2 construction traffic had used the A452, Kelsey Lane and Waste Lane

[1] Application references: PL/2019/01276/HS2DIS; PL/2021/00471/HS2DIS; PL/2022/00256/HS2DIS; and AP/2022/00014/REF.

during the establishment phases of the nearby HS2 construction compound, this was likely not the case during the baseline noise or traffic surveys, therefore, a review of the written statement associated with the 2022 Schedule 17 application has been carried out and assessed as part of this noise impact and site suitability assessment report.

4 Baseline Conditions Assessment

Sound Survey Methodology

4.1 A baseline sound survey was undertaken between Monday 15 and Tuesday 16 August 2022 to quantify current levels of ambient and background sound at the site during the daytime (07:00 – 23:00) and night-time (23:00 – 07:00) periods.

4.2 Semi-attended noise monitoring stations were deployed at 3 No. locations at the south, west and north-eastern perimeter of the Site, to capture contiguous sound measurements over a typical 24-hour period.

4.3 The semi-attended measurements were supplemented with attended noise measurements carried out at several locations around existing development, including a road traffic noise measurement done in accordance with the CRTN '*Shortened Measurement Procedure*' over a period of 3-hours.

4.4 Measurement locations were carefully chosen so that sounds associated with existing site activities – which would not be present in the with development scenario – could not unduly influence measured noise levels.

4.5 **Figure 3** presents the noise survey locations, which are described in **Table 1** below. The Site boundary is also presented. Photographs of the noise monitoring locations, taken whilst on site, can be found and referenced in **Appendix A6**.

4.6 The noise monitoring locations were selected to coincide with the principle road traffic noise sources affecting the site, namely:

- **Monitoring Location 1** – chosen to capture road traffic noise levels from Hob Lane;
- **Monitoring Location 2** – chosen to capture road traffic noise levels from Waste Lane;
- **Monitoring Location 3** – chosen to capture noise from typical residential activities, including the adjacent riding school; and
- **Monitoring Location 4 -** chosen to capture road traffic noise levels from Windmill Lane;

4.7 The format of the survey included periods of unattended monitoring.

4.8 Monitoring was supplemented by observations of the noise climate at each monitoring location during the survey. The sound level meters (SLMs) were configured to capture continuous audio which could be reviewed, where necessary, to identify any noise events during unattended periods.

Figure 3: Monitoring Locations

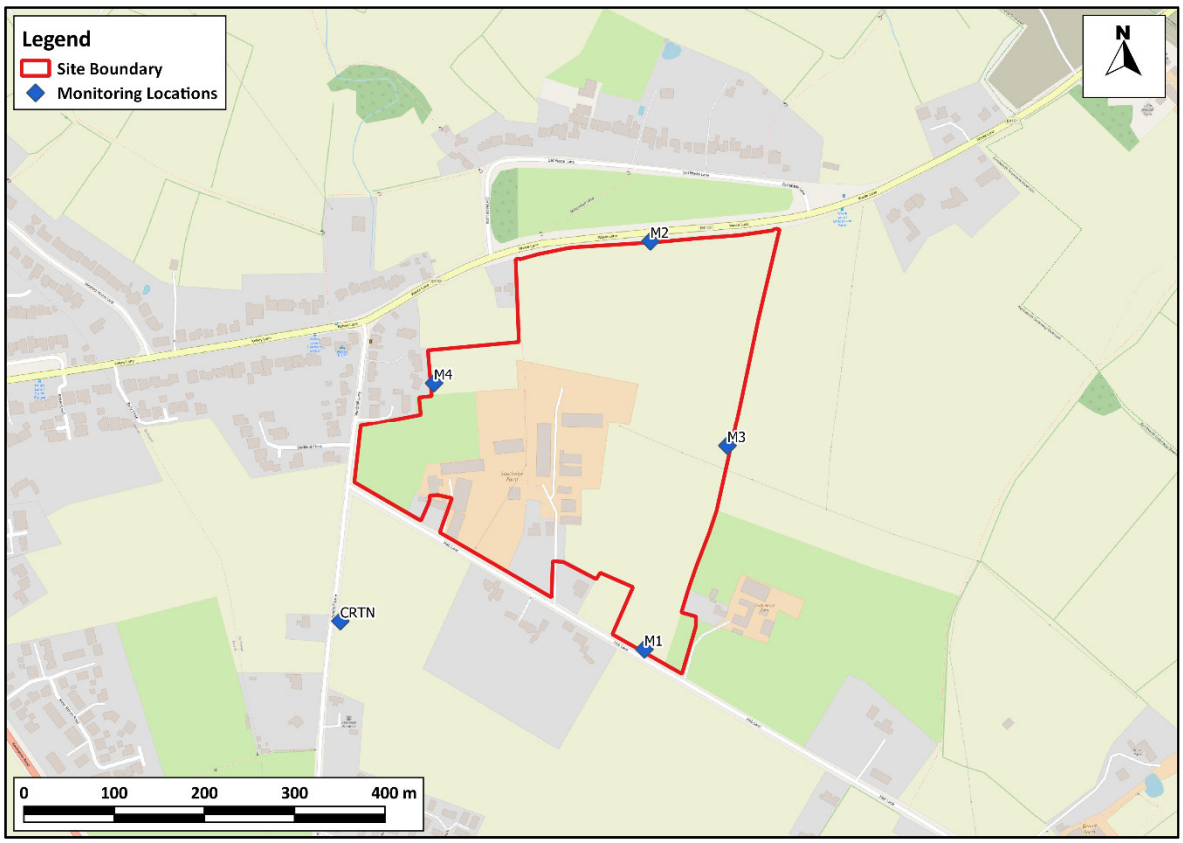


Table 1: Summary of Survey Locations

Location	Description	Measurement Details
M1	Measurement location to quantify road traffic noise levels from Hob Lane Unattended SLM. S/N 01176453 Positioned approximately 9m north of Hob Lane.	15/08/2022 11:00 hrs - 16/08/2022 11:30 hrs
M2	Measurement location to quantify road traffic noise levels from Waste Lane Unattended SLM. S/N 01176433 Positioned approximately 11m south of Waste Lane.	15/08/2022 12:00 hrs - 16/08/2022 12:00 hrs
M3	Measurement location to capture representative existing ambient level at the boundary nearest the adjacent riding school. Unattended SLM. S/N 01009670	15/08/2022 12:15 hrs - 16/08/2022 12:15 hrs

Location	Description	Measurement Details
M4	Measurement location to quantify road traffic noise levels from Waste Lane and Windmill Lane at the rear of existing properties Unattended SLM. S/N 00909494 Positioned approximately 70m south of Waste Lane.	15/08/2022 11:45 hrs - 16/08/2022 11:45 hrs
CRTN	Measurement location to quantify road traffic noise levels from Windmill Lane Attended SLM. S/N 00687043 Positioned approximately 4m from the roadside kerb of Windmill Lane.	15/08/2022 13:45 hrs - 15/08/2022 17:00 hrs

Photos of the monitoring locations, taken whilst on site, can be found and referenced in **Appendix A6**. All measurements were conducted in accordance with BS 7445-1:2003 'Description and measurement of environmental noise. Guide to quantities and procedures' (BS 7445, 2003) and were undertaken with the microphone at a height of 1.5 m above local ground level and were undertaken under acoustically free-field conditions. Monitoring was supplemented by detailed observations of the sound climate at each monitoring location during the survey and included manual traffic counts for short periods.

4.9 The calibration levels of the SLM were checked before and after each measurement with drift a in calibration level not exceeding 0.2 dB. Windshields were fitted to the microphones to minimise the effects of any wind-induced noise.

4.10 Details of the monitoring instrumentation (model/serial numbers and calibration details) are presented in **Appendix A7**. All instrumentation was configured to report the environmental parameters L_{Aeq}, L_{A10}, L_{90} and L_{Amax} in one-third octave bands.

Sound Survey Results

Survey Observations

4.11 Observations of the noise climate at the survey locations are summarised in **Table 2**.

Table 2: Noise survey observations at each survey location

Location Ref	Observations
M1	Road traffic from Hob Lane was observed to be the dominant contributor to the noise climate, though traffic was infrequent, becoming busier during rush hour. Bird song was also audible. Noise from residential and existing farm activities was audible on occasion. Also audible was distant road traffic noise from the north direction (likely from Waste Lane).

Location Ref	Observations
M2	Road traffic from Waste Lane was observed to be the dominant contributor to the noise climate. Noise from residential and existing farm activities was audible on occasion.
M3	The noise climate was observed to be quiet, with distant road traffic noise from Waste Lane being the dominant contributor. Infrequent noise from riding school activity audible during the daytime.
M4	Road traffic from Waste Lane was observed to be the dominant contributor to the noise climate, though traffic was infrequent, becoming busier during rush hour. Noise from residential activities was audible on occasion. Noise from the existing farm was frequently audible during the daytime, mainly livestock at this location. Also audible was distant road traffic noise from the west direction from Windmill Lane
CRTN	Road traffic noise from Windmill Lane was observed to be the dominant contributor to the noise climate. Activity from South View Farm operational on the Site was not audible at this location

4.12 The main source of noise within the Site was observed to be from road traffic movements on Waste Lane.

4.13 Road traffic movements on Windmill Lane were also observed to the west of the Site. Distant road traffic noise to the west of the Site was also audible in periods of low traffic flow on Waste Lane and Windmill Lane.

4.14 No known atypical local traffic conditions (e.g. roadworks or temporary speed limits) were observed during this survey.

Meteorological Conditions during Survey

4.15 The weather conditions from the 15 – 16 of August 2022 were clear and dry with wind speeds less than 5 ms^{-1}. There were no periods of rainfall or high winds during the survey. The average temperature was 21.5°C during the daytime period and 15.5°C during the night-time. The prevailing wind direction was from the north-west.

4.16 There were no periods of adverse weather during the survey, therefore it was not necessary to exclude captured noise data due to weather conditions.

Measured Noise Levels

4.1 **Appendix A8** presents the measured noise levels at each location. The average and maximum levels are summarised below for the purposes of deriving assessment levels. **Table 3** presents the results of the noise survey at Location M1 – Location M4.

Table 3: Summary of measured levels at the sound survey locations

Location	Period	$L_{Aeq,T}$ (dB)	$L_{AFmax, 5min}$ (10^{th} Highest) (dB)	Mean $L_{A90,15mins}$ (dB)	Mode $L_{A90,15mins}$ (dB)	$L_{A90,15mins}$ Range (dB)
M1	Daytime (07:00-23:00)	52	81 (74)	36	37	26-49
	Night-time (23:00-07:00)	44	73 (62)	25	21	21-38
M2	Daytime (07:00-23:00)	63	83 (79)	40	41	25-47
	Night-time (23:00-07:00)	55	79 (75)	25	22	21-41
M3	Daytime (07:00-23:00)	44	72 (65)	37	38	27-42
	Night-time (23:00-07:00)	38	63 (53)	26	23	21-39
M4	Daytime (07:00-23:00)	47	73 (70)	38	38	25-45
	Night-time (23:00-07:00)	40	65 (55)	27	25	23-40

Table 4: Short Term Noise Measurement Results

Measurement Location	Date	Period	Measured $L_{A10,3hr}$ (dB)	Calculated $L_{A10,18hr}$ (dB)[2]	Calculated Daytime $L_{Aeq,16hr}$ (dB)[3]	Calculated Night-time $L_{Aeq,8hr}$ (dB)
CRTN	15/08/2022	14:00-17:00	66	65	63	55[4]

[2] Calculated using the CRTN correction $L_{A10,18hr} = L_{A10,3hr} - 1$ dB

[3] Calculated using the British Standard 8233 correction $L_{Aeq,16hr} = L_{A10,18hr} - 2$ dB

[4] Calculated using the TRL Method 3 correction for non-motorway roads ($L_{night} = 0.90 \times L_{A10,18hr} - 3.77$).

5 Sound Propagation Model and Results

5.1 To determine external sound levels across the Site, a sound propagation model was developed.

5.2 The model was developed using LimA® computational sound modelling software (v2020) and has been configured to calculate sound levels in accordance with ISO9613-2:1996 *'Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation'*.

Model Calibration

5.3 The model includes the road traffic noise sources calibrated to measurements on site**.** The emission levels of the sound sources were adjusted through an iterative process until the modelled levels matched the measured levels (see **Table 5**).

Table 5: Road traffic noise calibration levels dB $L_{Aeq,T}$ (free-field)

Sound source	Octave band centre Frequency (Hz)								A
	63	125	250	500	1k	2k	4k	8k	
M1 (day)	56	52	49	48	49	42	32	25	52 (A)
M1 (night)	48	42	41	42	41	34	24	20	44 (A)
M2 (day)	64	59	56	56	61	55	45	36	63 (A)
M2 (night)	54	50	47	48	53	47	36	27	55 (A)
CRTN (day)	64	60	57	57	61	54	45	35	63 (A)
CRTN (night)[5]	56	52	49	49	53	46	37	27	55 (A)

Future Year with Development Sound Levels

5.4 To establish future sound levels, a review was carried out of road traffic data provided by the transport consultant for the roads bounding the site. Basic Noise Levels (BNLs) for the 'Baseline' and '2024 With Development' scenarios were calculated using the method described in Calculation of Road Traffic Noise (CRTN, 1988). The differences between the calculated BNLs (see **Table 10**) were used to account for potential increases in road traffic noise in the future.

5.5 As shown, the increase in road traffic noise levels between the baseline year (2022) and the Future Year (2024) With Development scenarios is less than 1 dB, this is, therefore, considered to be negligible change in noise impact terms.

[5] Levels calculated using the CRTN 'shortened measurement procedure' and the application of TRL Method 3 Calculated using the TRL Method 3 correction for non-motorway roads (L_{night} = 0.90 x $L_{A10,18hr}$ – 3.77). .

Results

5.6 The results of the sound modelling exercise are summarised as noise maps (**Figure 4** and **Figure 5**). Importantly, the noise maps represent an open site and do not account for the influence that the massing of the proposed development would have on the propagation of sound across the site.

External Free-field Sound Levels

Figure 4: 2024 With Development – Daytime Noise Maps, Free-field Levels ($L_{Aeq,16h}$) – noise levels modelled at 1.5 m above local ground level

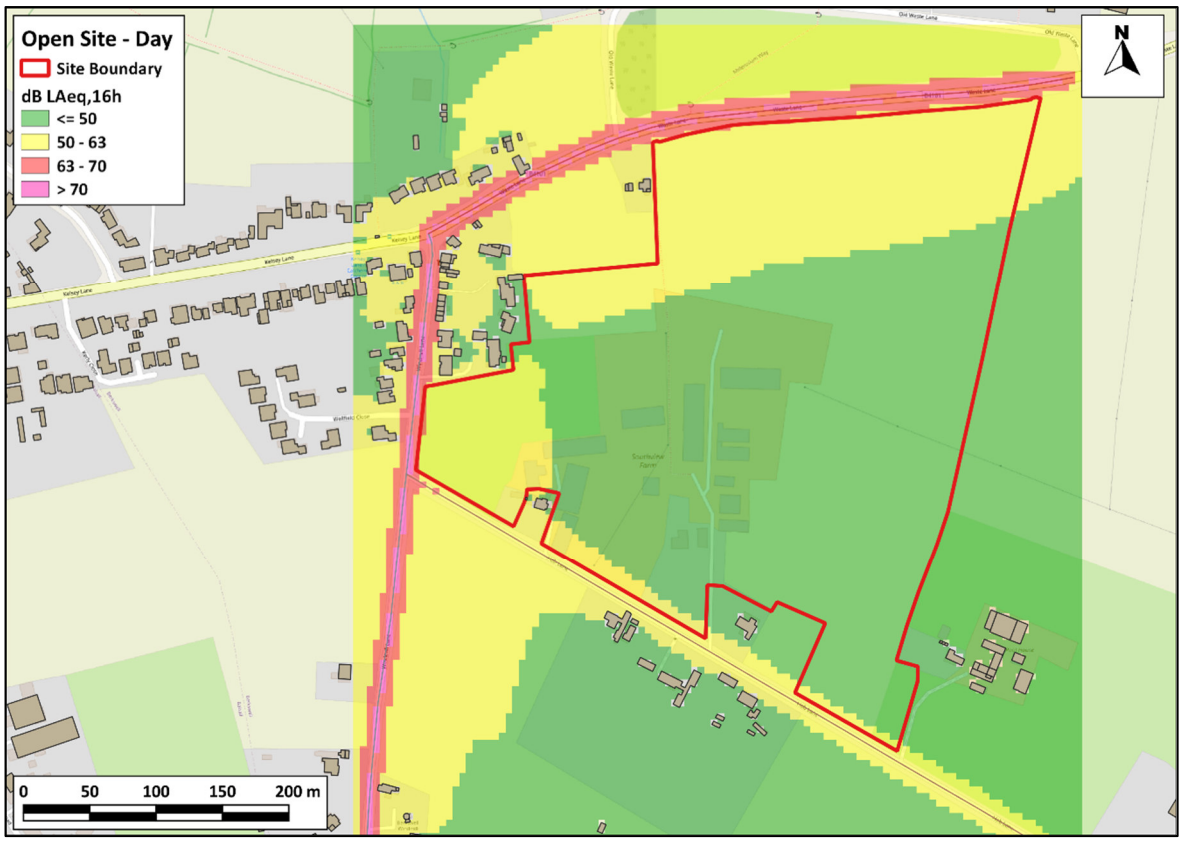
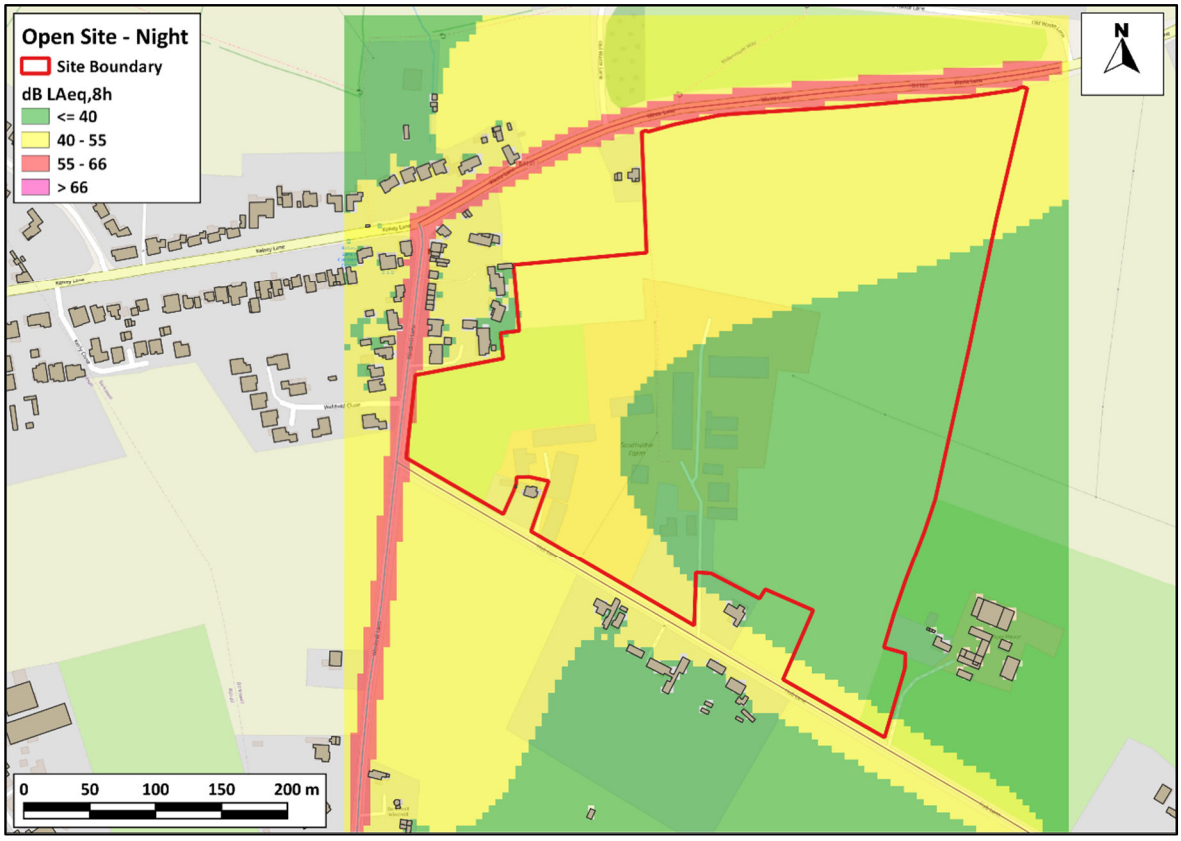


Figure 5: 2024 With Development – Night-time Noise Maps, Free-field Levels ($L_{Aeq,8h}$) – noise levels modelled at 4.0 m above local ground level



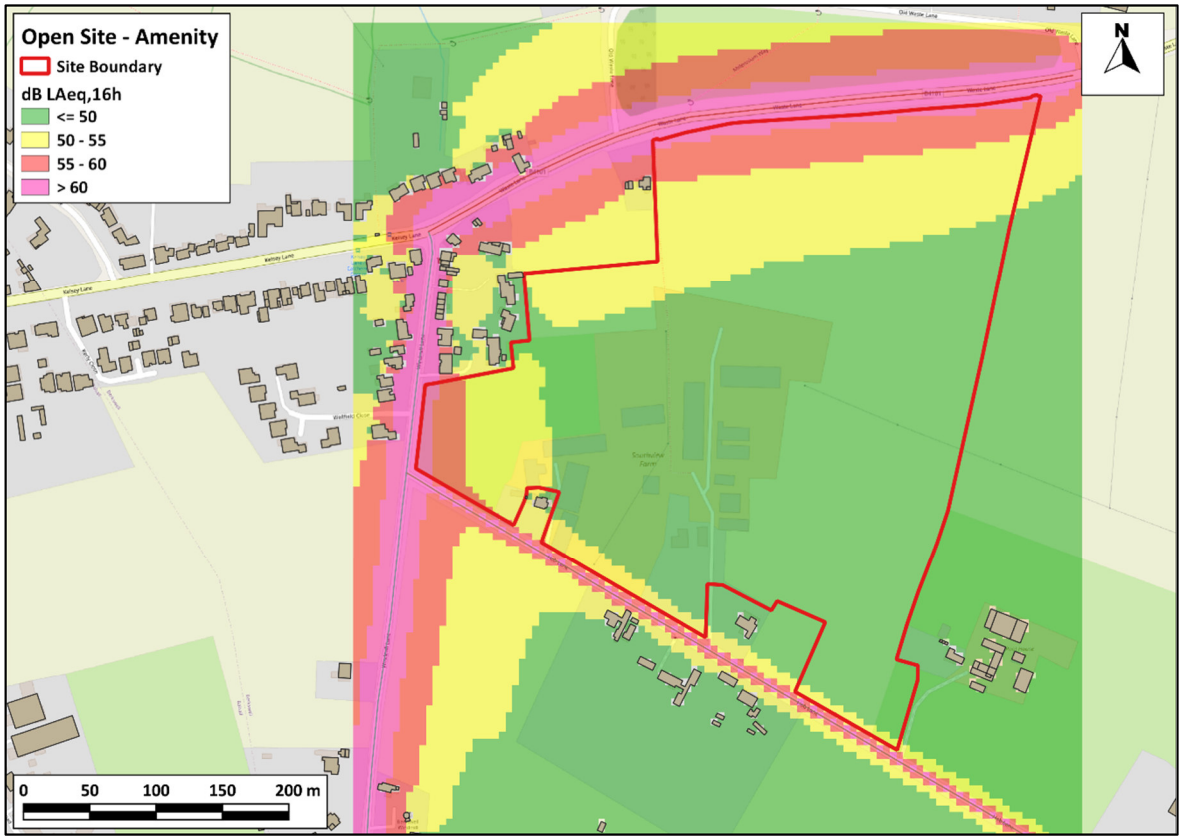
Night-Time Sound Events

5.7 With regards to night-time sound events, maximum (L_{Amax}) sound levels have not been modelled. Instead, an analysis has been conducted of the measured sound survey data to estimate the 10th highest maximum sound levels ($L_{Afmax,5min}$) that might be expected during the night-time.

Modelled Sound Levels in External Amenity Spaces

5.8 **Figure 6** (below) shows the same daytime noise levels as presented in **Figure 4**, however the colour coding has been simplified so that levels across the site can be more easily compared with the external amenity design criteria presented in BS 8233:2014.

Figure 6: External Amenity Noise Map ($L_{Aeq,16h}$)



6 Site Suitability Assessment

6.1 In accordance with the policies, standards and guidance outlined in **Section 3,** assessment criteria have been selected. The following sections present the assessment criteria adopted within the site suitability assessment which has been designed to follow the approach advocated in ProPG.

Residential Site Suitability Assessment Methodology

Site Risk Classification

6.2 The ProPG site risk classification presented in **Table A3.1** is a sliding scale that does not define precise noise exposure limits to site risk classification. For the purposes of this report, the noise thresholds that have been adopted in order to classify site risk are defined in **Table 6** and are set for the daytime and night-time periods.

Table 6: Site Risk Noise Exposure Thresholds

ProPG Site Risk Category	Noise Exposure Threshold dB $L_{Aeq,16\text{-}hour}$	Noise Exposure Threshold dB $L_{Aeq,8\text{-}hour}$	ProPG Based Pre-Planning Application Advice
Negligible (below LOAEL)	<50	<40	Indicates development site is likely to be acceptable from a noise perspective
Low (LOAEL – SOAEL)	50 – 63	40 – 55	Indicates development site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and demonstrated
Medium (SOAEL – UAEL)	63 – 70	55 – 66	Indicates the development site is less suitable from a noise perspective. A subsequent application may be refused unless a good acoustic design process is followed and demonstrated
High (above UAEL)	>70	>66	Indicates an increased risk that the development would be refused on noise grounds. However, this risk may be reduced following a good acoustic design process.

6.3 With respect to the $L_{Amax\ (night)}$, ProPG states that *"the initial site noise risk assessment should include the consideration of the individual noise events when the external $L_{Amax,F}$ exceeds 60 dB. A site should not be regarded as negligible risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 60 dB more than 10 times a night. A site should be regarded as high risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 80 dB more than 20 times a night."*

6.4 Therefore, taking this into account the LOAEL and UAEL thresholds for the L_{Afmax} for the purposes of this assessment:

- A 'negligible' risk is deemed to occur where the 10th highest measured $L_{Afmax,5min\ (night)}$ is less than 60 dB; and

- a 'high' risk is deemed to occur where the 20th highest measured $L_{Afmax,5min\ (night)}$ is greater than 80 dB.

Internal Noise Guidelines

6.5 For internal noise levels, the assessment references the internal noise guidelines set out in BS 8233:2014, as advocated by ProPG. Adherence to these guidelines is considered in the design of the building envelope.

6.6 The assessment also considers maximum noise levels (L_{Afmax}) within bedrooms. The design of the building envelope considers the number of 45 dB L_{Amax} exceedances during the night-time.

External Amenity Noise

6.7 With respect to external amenity spaces, BS 8233:2014 states that *"it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments"* and, therefore, these values have been adopted as the lower and upper guideline values.

Residential Suitability Assessment

Stage 1 Initial Site Noise Risk Assessment

6.8 An initial site risk assessment has been undertaken based upon the modelling results presented in **Section 5**.

Daytime ($L_{Aeq,16h}$) noise exposure

6.9 **Figure 4** shows that daytime noise levels for the vast majority of the site fall within the negligible risk category (i.e. <50 dB $L_{Aeq,16h}$). At locations near to the roads, daytime noise levels are expected to approach (but be less than) 63 dB $L_{Aeq,16h}$ which would place those parts of the site in the 'low' ProPG risk category.

Night-time ($L_{Aeq,8h}$) noise exposure

6.10 **Figure 5** shows that night-time noise levels for the vast majority of the site fall within the negligible risk category (i.e. <40 dB $L_{Aeq,8h}$). At locations near to the roads, night-time noise levels are expected to approach (but be less than) 55 dB $L_{Aeq,8h}$ which would put those parts of the site in the 'low' ProPG risk category.

Night-time (L_{Afmax}) noise exposure

6.11 The 10th highest measured night-time $L_{Amax,\ 5\ min}$ are presented in **Table 7.**

Table 7: Night-time (L_{Afmax}) Levels

Location	Dominant Source	$L_{Amax\ (night)}$[1]
M1*	Road Traffic	62 [54]
M2*	Road Traffic	75 [59]
M3	Distant Road Traffic, Birdsong	53
M4	Distant Road Traffic, Birdsong	55

[1] 10th highest measured $L_{Amax,\ 5\ min}$ during the night-time period.
Note: number in square brackets is the calculated L_{Amax} levels when propagated back to the nearest proposed I

6.12 The results in **Table 7** indicate that any dwellings located along the northern and southern edges of the site (near Waste Lane and Hob Lane) may not be regarded as negligible risk as the $L_{Amax,F}$ could exceed 60 dB more than 10 times for dwellings located near to these roads and, therefore, the impact of single event noise levels has been considered within the ADS as a precaution.

Summary

6.13 For the vast majority of the site, the outcome of the ProPG Stage 1 Initial Risk Assessment is that there is a 'negligible' risk of adverse effects from noise without the implementation of mitigation measures. Therefore, the Stage 2 assessment, and the Acoustic Design Statement (ADS), will focus on the parts of the site where a potential non-negligible noise risk has been identified. The level of detail presented within the ADS is, therefore, proportionate with the level of risk. The parts of the site with negligible noise risk will not be considered further within the ADS. This approach is consistent with the guidance given in ProPG which states *"An ADS should not be necessary for a site assessed as negligible risk".*

Stage 2 - Acoustic Design Statement (ADS)

Good Acoustic Design

6.14 The main source of noise affecting the development site is road traffic noise from waste lane. The location of the designated green and recreational space to the north of the development site (see **Figure** 2) serves to maximise the distance between the proposed dwellings and the main source of noise affecting the site helping to safeguard residential amenity for future occupants.

6.15 As the design progresses, the following opportunities for good acoustic design would be explored where requried:

- *Orienting non-habitable rooms towards sources of road traffic noise and, inversely, orienting habitable rooms away from sources of road traffic noise; and*
- *Using the building layout to shield external amenity spaces from road traffic noise.*

Internal Ambient Sound Levels

6.16 A high-level assessment of internal noise levels has been carried out. The assessment considers internal noise levels during conditions when windows are closed as well as when windows are partially open for the control of overheating. An outline assessment, which considers the worst affected proposed dwellings (i.e., those nearest to Waste Lane, Windmill Lane and Hob Lane – shown in **Figure 7)** is presented in **Table 8.**

Figure 7: Noise Ingress Calculation Locations

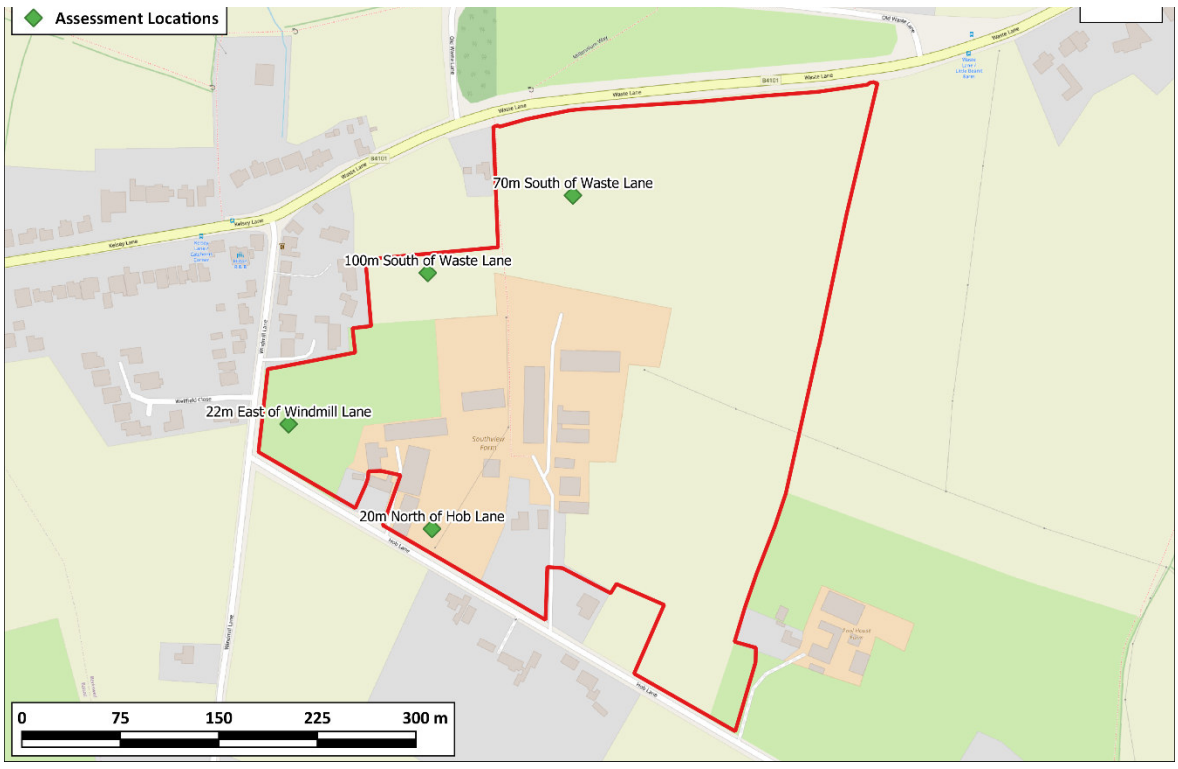


Table 8: Calculated internal noise levels

Location	Window Condition	Estimated Internal Sound Level (dB)			Comment
		$L_{Aeq, 16\text{-}hour}$	$L_{Aeq, 8\text{-}hour}$	$L_{Amax\ (night)}$	
Proposed Dwellings to the South of the Site (c. 20m from Hob Lane)	Partially Open[6]	38	30	41	Bedrooms and dining areas achieve BS 8233:2014 guidelines with partially open windows. Living rooms are within +5 dB of guideline levels.
	Closed[7]	26	18	29	All rooms achieve BS 8233:2014 guidelines with closed windows.
Proposed Dwellings in the southwest corner of the Site (c. 22m east of Windmill Lane)	Partially Open	45	37	54*	Bedrooms and living rooms exceed BS 8233:2014 guidelines with windows partially open. Dining areas are within +5dB of guideline levels
	Closed	33	25	42*	All rooms achieve BS 8233:2014 guidelines with closed windows

[6] Assuming a 13 dB reduction for a partially open window

[7] Assuming a 25 dB reduction in noise for a closed window using conservative assumptions regarding the glazing specification

Location	Window Condition	Estimated Internal Sound Level (dB)			Comment
		$L_{Aeq, 16\text{-}hour}$	$L_{Aeq, 8\text{-}hour}$	$L_{Amax\ (night)}$	
Proposed Dwelling to the northwest of the site (c. 100m South of Waste Lane)	Partially Open	39	30	42	Dining areas and bedrooms achieve BS 8233:2014 guidelines with partially open windows. Living rooms are within +5 dB of guideline levels.
	Closed	27	18	30	All rooms achieve BS 8233:2014 guidelines with closed windows
Proposed Dwelling to the northeast of the site (c. 70m South of Waste Lane)	Partially Open	40	32	46	Dining areas achieve BS 8233:2014 guidelines with partially open windows. Living rooms and bedrooms are within +5 dB of guideline levels.
	Closed	28	20	34	All rooms achieve BS 8233:2014 guidelines with closed windows

Key	
BS 8233:2014 Internal Noise Levels	**Action**
Achieve BS 8233:2014 Guidelines or < 45 dB L_{Amax} in bedrooms	No Action
Within +5 dB of BS 8233:2014 Guidelines	Mitigate and reduce if sustainable
Exceeds BS 8233:2014 Guidelines and/or > 45 dB L_{Amax} in bedrooms	Avoid – sound attenuated measures required

* assumed worst-case max level based on measurements made at Location M2.

6.17 **Table 8** demonstrates that suitable internal noise levels are achievable at the worst-affected dwelling when windows are closed.

6.18 By reference to Table 3-3 of Acoustics Ventilation and Overheating: Residential Design Guide (AVO Guide, 2020) (repeated in **Table A3.6**), worst case internal daytime and night-time noise levels with windows partially open are at a level below which "noise causes a material change in behaviour" (i.e. <50dB $L_{Aeq,T}$ daytime and <42 dB $L_{Aeq,T}$ night-time) therefore reliance upon openable windows for the control of overheating[8] would be acceptable in noise terms. Additionally, all noise levels set out

[8] passive measures could be used to reduce the frequency upon which openable windows are relied upon for the control of overheating. Such measures include limiting unwanted solar gains in summer by way of shading devices as well as glazing design and providing adequate means of removing excess heat.

within **Table 8** are below the relevant limits[9] set out within The Building Regulations 2010 'Approved Document O – Overheating'.

External Amenity Assessment

6.19 An assessment has been carried out with regards to potential noise impacts in external amenity areas, consisting primarily of rear gardens, of the proposed development. **Figure 6** shows external noise levels on an open site basis, as worst-case.

6.20 As illustrated in **Figure 6**, external noise levels are less than 50 dB for a majority of the site, with parts of the site to the north and to the west being between 50 – 60 dB. Where external noise levels exceed 60 dB $L_{Aeq,16h}$ is at locations very close road traffic noise sources, where external amenity areas would not principally be proposed. As a worst-case, the external amenity areas of the proposed site are within or below the BS 8233:2014 'relaxed' design range of 55 – 60 dB $L_{Aeq,\ 16h}$.

6.21 The influence of the proposed buildings, as shown in the illustrative masterplan (**Figure 2**), would likely reduce noise levels in rear garden external amenity areas to levels within or below BS 8233:2014 'desirable' design range of 50 – 55 dB $L_{Aeq,\ 16h}$ and, therefore, suitable levels of external amenity, with respect to noise, are considered to be achievable for this site.

Other Considerations

HS2 Construction Traffic

6.22 An assessment of the impact of HS2 construction traffic on Waste lane is presented in **Section 7** and shows that, during the worst case period of construction traffic, road traffic noise from link 2 (Waste–Lane - between Site Access (W) and Old Waste Lane) is likely to be 2 dB louder than the current baseline. This is considered to be a minor impact in terms of road traffic noise.

[9] 40 dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am); and 55 dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)

7 Noise Impact Assessment

Noise Impact Assessment Methodology

Environmental Sound Criterion (ESC) for Industrial/Commercial Sounds

7.1 Noise of an industrial and/or commercial nature will be assessed based on the guidance advised in **Appendix A4.**

7.2 In summary, BS 4142:2014+A1:2019 states "*where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context*".

7.3 Therefore, for the purposes of this assessment, a rating level of parity with the measured background sound level has been adopted as the ESC for the proposed continuously operating building services plant.

Operational Road Traffic Noise

7.4 Operational road traffic noise will be assessed based on the guidance advised in **Appendix A5**, which is based on the principles of Design Manual for Roads and Bridges (DMRB), LA111 'Noise and vibration' (2020) LA 111 (DMRB) and comprises of the following stages:

7.5 Calculate Basic Noise Levels (BNLs) for the following scenarios:

- *Baseline Year;*
- *2024 Do-Nothing Opening Year (DNOY) – without HS2 construction traffic;*
- *2024 Do-Something Opening Year (DSOY) – without HS2 construction traffic;*
- *2024 Do-Nothing Opening Year (DNOY) – with HS2 construction traffic; and*
- *2024 Do-Something Opening Year (DSOY) – with HS2 construction traffic;*

7.6 In summary the Basic Noise Level (BNL) is calculated for the 'Baseline Year' and 'Do Something Opening Year' and a comparison made to determine the magnitude of noise change..

7.7 The short-term criteria from LA 111 has been adopted for the setting of the: very low; low; medium; and high categories by reference to the semantic scale adopted in Institute of Environmental Management and Asses–ment - Guidelines for environmental noise assessment' (2014); and the very high category was set with reference to the LA 111 the long-term magnitude of change.

7.8 The adopted magnitude of impact criteria is summarised in **Table A5.4**.

Assessment of Noise due to Commercial / Industrial Uses

7.9 The proposed development does not specifically include any sound generating non-residential uses however, it is possible that some residential properties could include sound generating building services equipment. At this stage, sound emissions relating to the aforementioned cannot be defined. Therefore, a full assessment has not been undertaken. However, considering the distances to NSR's, the mitigation of typical sound sources should be uncontroversial and can be secured by a suitably worded planning condition.

7.10 Indicative Environmental Sound Criteria (ESC) have been set out in **Table 9**, with reference to measured background sound levels (presented in **Table 3**Error! Reference source not found.), BS 4142:2014+A1:2019.

Table 9: Indicative environmental sound criterion for the ASHP (free-field)

Measurement Location	NSR Groups	ESC, dB $L_{Ar,Tr}$	
		Day*	Night
M1	Dwellings immediately south of Hob Lane	36	35**
M2	Dwellings immediately north and south of Waste Lane/Windmill Lane junction	40	35**
M4	Dwellings on Windmill Close	38	35**
* based on the lowest value from the mean and mode $L_{A90,15min}$ values presented in Table 3. **This is above the measured background but considered acceptable in absolute terms. See **Paragraph A4.9** for more information.			

Noise due to Road Traffic Intensification

7.11 An assessment of the noise impact due to road traffic intensification due to the development has been carried out. Road Traffic data for this project has been provided by the Applicant's transport consultant for all the road links for which changes in traffic flow are expected to arise as a result of the Development. It should be noted that the road traffic data includes the cumulative impact of any committed developments (excluding HS2 construction traffic) within the future scenarios and therefore an assessment of cumulative noise impacts is included within the core noise assessment.

7.12 The traffic data used for the assessment is presented in **Appendix A9**. Notably, average speed data has not been provided by the transport consultant, so a speed of 50km/h (30 mph) has been assumed for all road links as per the recommendations on Page 6 of CRTN apart from:

- *Waste Lane is a single carriageway road with a speed limit of 40 mph[10] so 50 km/h has been assumed; and*

[10] It is also proposed that the speed of this road is reduced 30 mph along the frontage of the site.

- *The A452 (link ID 20 only) is a dual carriageway road with a speed limit between 50 - 60 mph so 80 km/h has been assumed.*

7.13 The magnitude of impact associated with noise due to road traffic intensification has been assessed in accordance with the methodology described in **Appendix A5**. The outcomes of magnitude of impact assessment are summarised in **Table 10.**

Table 10: Road Traffic Noise – Magnitude of Change Assessment – without HS2 construction traffic

Link Number (See Figure A9.1)	Basic Noise Level dB $L_{A10,18hr}$			Change in BNL dB $L_{A10,18hr}$	Magnitude of Impact
	2021 B	2024 DNOY	2024 DSOY	2024 DSOY – Baseline	
1	65.1	65.3	65.6	0.3	Negligible
2	65.1	65.3	66.0	0.7	Negligible
3	65.1	65.3	66.0	0.7	Negligible
4	61.6	61.8	62.4	0.6	Negligible
6	61.1	61.3	61.9	0.6	Negligible
7	68.1	68.3	68.4	0.1	Negligible
8	65.3	65.5	65.6	0.1	Negligible
9	67.0	67.2	67.3	0.1	Negligible
10	64.4	64.6	65.1	0.5	Negligible
12	63.8	64.0	64.5	0.5	Negligible
13	67.4	67.6	67.6	0.0	Negligible
18	63.0	63.2	63.3	0.1	Negligible
19	62.9	63.1	63.1	0.0	Negligible
14	62.8	63.0	63.0	0.0	Negligible
15	67.7	67.9	68.1	0.2	Negligible
16	60.5	60.7	60.7	0.0	Negligible
17	68.5	68.7	68.9	0.2	Negligible
18	68.5	68.7	68.8	0.1	Negligible
19	59.7	59.9	59.9	0.0	Negligible
20	68.6	68.8	68.9	0.1	Negligible

7.14 The assessment demonstrates that the magnitude of impact for all roads is negligible.

7.15 As agreed during the LPA consultation, a review has been carried out of a recent Schedule 17 application by HS2[11] to use the A452, Kelsey Lane and Waste Lane as a transit route for construction traffic in order to understand cumulative impacts with respect to HS2 construction traffic. The written statement in support of the application indicates that there would be 352 additional HGV movements

[11] Application Reference: PL/2022/00256/HS2DIS, Document Reference: 1MC08-BBV-TM-STA-NS01_NL05-000001

on road links 1, 2, 3, 10, 11, 12, 15, 17, 18, and 20. An assessment of traffic noise including the HS2 construction traffic has been carried out, and is presented in **Table 11**, to estimate the potential impact upon the proposed development as well as the cumulative impacts of the proposed development with HS2 construction traffic on existing receptors.

Table 11: Road Traffic Noise – Magnitude of Change Assessment – with HS2 construction traffic

Link Number (See Figure A9.1)	Basic Noise Level dB $L_{A10,18hr}$			Change in BNL dB $L_{A10,18hr}$	Magnitude of Impact
	2021 B	2024 DNOY	2024 DSOY	2024 DSOY – Baseline	
1	65.1	67.0	67.2	2.1	Minor
2	65.1	67.0	67.5	2.4	Minor
3	65.1	67.0	67.5	2.4	Minor
10	64.4	66.6	66.9	2.5	Minor
12	63.8	66.2	66.5	2.7	Minor
15	67.7	68.9	69.1	1.4	Minor
17	68.5	69.6	69.7	1.2	Minor
18	68.5	69.5	69.7	1.2	Minor
20	68.6	69.6	69.8	1.2	Negligible

7.16 **Table 11** shows that, when combined with HS2 construction traffic, the proposed development could result in a minor noise impact for residential receptors along HS2 construction routes – although the HS2 construction traffic would be the main contributor.

8 Conclusions

8.1 Noise Consultants Ltd (NCL) was instructed to carry out a noise assessment for the proposed residential development at Land at Pheasant Oak development located development in Balsall Common, Solihull District.

8.2 The report describes the existing ambient sound climate at and around the site based on an acoustic survey undertaken at the site. The report evaluates potential impacts upon the proposed residential part of the development and the achievability of suitable noise levels within habitable rooms and external amenity areas.

8.3 An initial site risk assessment was undertaken in accordance with ProPG, which demonstrated that, for the vast majority of the site, the outcome of the ProPG Stage 1 Initial Risk Assessment is that there is a 'negligible' risk of adverse effects from noise without the implementation of mitigation measures. The northern and western parts of the site was found to be within the low noise risk category during the daytime and night-time but could be subject to adverse effects from noise without the implementation of noise mitigation. Overall, the site is considered to experience relatively low levels of environmental noise.

8.4 An acoustic design statement (ADS) was progressed for the parts of the site found to have a non-negligible noise risk. The ADS demonstrated that suitable internal ambient sound conditions compliant with BS 8233:2014 can be achieved with the application of appropriate building envelope sound insulation performance.

8.5 Internal ambient sound levels with windows open have also been evaluated by reference to the Acoustics Ventilation and Overheating: Residential Design Guide (AVO Guide, 2020). The assessment indicated that, suitable internal noise levels can be achieved with windows open during both the day and night periods where openable windows are used for the control of overheating. Additionally, measures have been identified which might typically be used to assist with the control of overheating and, therefore, reduce the reliance upon openable windows. Such measures include limiting unwanted solar gains in summer by way of shading devices as well as glazing design and providing adequate means of removing excess heat.

8.6 The report also considered the impact of building services noise on existing NSRs. Environmental Sound Criterion (ESC) limits have been specified that can be secured by a suitably worded planning condition and delivered during the detailed design of the development. The noise limits have been developed with reference to BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound', and the baseline noise survey data. Considering the distances to NSRs and existing background sound levels, the mitigation of this sound source should be uncontroversial.

8.7 Finally, the noise assessment considers the potential noise impact due to road traffic intensification as a result of the proposed development. The assessment found that there is the potential for a

'negligible' noise impact due to the Development. Consideration was given as to the cumulative impact with HS2 construction traffic which showed that, when combined with HS2 construction traffic, the proposed development could result in a minor noise impact for residential receptors along HS2 construction routes – although the HS2 construction traffic would be the primary contributor.

9 Appendices

A1 Glossary

dB	Decibel. The logarithmically scaled measurement unit of sound.
A-weighting	Frequency weighting applied to measured sound in order to account for the relative loudness perceived by the human ear.
$L_{Aeq,T}$	A-weighted equivalent continuous sound level over a given time period. It is the sound level of a steady sound that has the same energy as a fluctuating sound over the same time period.
$L_{A10,T}$	The A-weighted sound level exceeded for 10% of the measurement period. It is widely used as a descriptor of road traffic noise.
$L_{A90,T}$	The A-weighted sound level exceeded for 90% of the measurement period. Often referred to as the background sound level.
L_{Amax}	The A-weighted maximum recorded noise level during a measurement period.
R_w	The weighted Sound Reduction Index which characterises the airborne sound insulation of a building element over a range of frequencies with a single number quantity.
C and C_{tr}	Spectrum adaption terms that uses a standard reference curves to determine the weighted value of airborne sound insulation. C and C_{tr} take into account different source spectra, where C considers the A-weighted pink noise spectrum and C_{tr} considers the A-weighted urban traffic noise spectrum.

A2 Relevant Policy and Guidance

National Noise Policy

Noise Policy Statement for England (NPSE, 2010)

A2.1 The Noise Policy Statement for England (NPSE, 2010) sets out the Government's Noise Policy Vision to:

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".

A2.2 This long-term vision is supported by three Noise Policy Aims that can be delivered through effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. These aims are to:

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

A2.3 The explanatory note to the NPSE sets out 'effect levels' which are aligned to the Policy Aims. Drawing upon established concepts from toxicology, the NPSE defines the following noise effect levels:

- NOEL - 'No Observed Effect Level';
- LOAEL - 'Lowest Observed Adverse Effect Level'; and
- SOAEL - 'Significant Observed Adverse Effect Level'.

A2.4 The explanatory note describes SOAEL as the effect level above which significant adverse effects on health and quality of life occur, aligning this level with the first policy aim.

A2.5 LOAEL is described as the level at which adverse effects begin and the second aim of the NPSE refers to a situation where the effect lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. However, this does not mean that such adverse effects cannot occur.

A2.6 NOEL is described as a level of noise exposure below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life.

A2.7 The third aim seeks, where possible, to positively improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable

development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society.

A2.8 The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

A2.9 NPSE states that it is not possible to have a single, numerical definition of the SOAEL that is applicable to all sources of noise in all situations, since the SOAEL is likely to be different for different noise sources, for different receptors and at different times.

A2.10 The setting of LOAELs and SOAELs for transportation sources has however reached a form of consensus following a number of high-profile infrastructure projects in England, namely HS2 and a series of Highways England road schemes which have been successful through the Government's Hybrid Bill and Development Consent Order (DCO) consenting processes.

A2.11 In these projects, the setting of SOAEL has been aligned to Government policy and legislation in relation to the provision of noise insulation where it has been argued that significant adverse effects can be avoided through these means. **Table A2.1** provides a summary of the LOAEL and SOAEL values applied on these projects.

Table A2.1: LOAELs and SOAELs for Road and Railway Infrastructure Projects

Source / Project	Period	LOAEL	SOAEL
Road Traffic (Highway Agency A14 DCO)	Daytime	50 dB $L_{Aeq, 16hr}$	63 dB $L_{Aeq, 16hr}$
	Night-time	40 dB $L_{Aeq, 8hr}$	55 dB $L_{Aeq, 8hr}$
Rail (HS2)	Daytime	50 dB $L_{Aeq, 16hr}$	63 dB, $L_{Aeq\ 16hr}$
	Night-time	40 dB $L_{Aeq, 8hr}$ 60 dB L_{Amax}	55 dB $L_{Aeq, 8hr}$ 80/85 dB L_{Amax}

Planning Policy

National Planning Policy Framework (NPPF, 2021)

A2.12 The National Planning Policy Framework (NPPF, 2021) sets out the Government's planning policies for England and how these should be applied. The NPPF provides a framework within which locally-prepared plans for housing and other development can be produced.

A2.13 In relation to noise, it states:

> *"174. Planning policies and decisions should contribute to and enhance the natural local environment by: …*

- *preventing new and existing development from contributing to, and being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability …."*

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

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

A2.14 The NPPF makes reference to the NPSE in respect of achieving these aims.

A2.15 Notably, NPPF has also recently introduced the 'Agent of change principle as follows:

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

Planning Practice Guidance – Noise (PPG-Noise, 2019)

A2.16 The Planning Practice Guidance (PPG-Noise, 2019) provides further detail about how the effects of noise can be described in terms of perception and outcomes. It aligns this to increasing effect levels as defined in the NPSE. In addition, the PPG-Noise adds a fourth term and corresponding effect level:

- UAEL – 'Unacceptable Adverse Effect Level'.

A2.17 This effect level is higher than the significant adverse effect on health and quality of life (SOAEL) and requires that unacceptable adverse effects be prevented. In PPG-Noise, prevention is not considered in the context of Government policy on sustainable development.

A2.18 PPG-Noise includes a noise exposure hierarchy table based on the principle that once noise or vibration becomes perceptible, the effect on people and other sensitive receptors increases as the level increases. It suggests responses and example outcomes to the different effect levels, e.g. that adverse effects would typically be considered as intrusive, audible, result in small changes in

behaviour, and should be mitigating and reduced to a minimum, with significant effects being considered disruptive.

A2.19 PPG-Noise also provides guidance in terms of what factors may influence whether noise could become a concern, and how adverse effects of noise can be mitigated. Examples of mitigation measures include:

- *"layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose-built barriers, or other buildings; …*
- *mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building".*

A2.20 In the case of residential development, PPG-Noise also states that the impact of noise can be "*partially off-set"* if occupants have access to:

- *"a relatively quiet façade (containing windows to habitable rooms) as part of their dwelling, and/or;*
- *a relatively quiet external amenity space for their sole use, (eg a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur, and/or;*
- *a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;*
- *a relatively quiet, protected, external publicly accessible amenity space (eg a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within 5 minutes walking distance)".*

Table A2.2: Planning Practice Guidance – Noise Exposure Hierarchy

Perception	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 or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived 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 and/or attitude, 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 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 and/or attitude, 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 and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

A3 Site Suitability Assessment Guidance

A3.1 The suitability of the site for residential development, in terms of achieving appropriate internal and external noise levels has been assessed with reference to the following relevant British Standards and Guidance.

Professional Practice Guidance on Planning & Noise – New Residential Development

A3.2 Professional Practice Guidance: Planning & Noise - New Residential Development (ProPG, 2017) is a joint publication by the Chartered Institute of Environmental Health (CIEH), the Association of Noise Consultants (ANC) and the Institute of Acoustics (IoA).

A3.3 The primary goal of ProPG is "to assist the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise".

A3.4 The guidance has been produced to assist practitioners in matters relating to noise and new residential development. It focusses on existing transportation noise sources and has been developed to consider the Government's overarching noise policy, planning policy and policy guidance. It has also been developed to take into account other authoritative sources of guidance such as British Standard 8233:2014 '*Guidance on Sound Insulation and Noise Reduction for Buildings*' (BS 8233:2014).

A3.5 The guidance provides advice for Local Planning Authorities (LPAs) and developers, and practitioners. ProPG aims to:

- *Advocate the full consideration of the acoustic environment from the earliest possible stage of the development control process;*
- *Promote and encourage the process of good acoustic design in and around new residential developments;*
- *Set out the considerations which should be taken into account in deciding planning applications for new noise-sensitive developments;*
- *Promoting the use of appropriate noise exposure standards and policies in assessment; and*
- *Provide assistance in the delivery of sustainable development.*

A3.6 ProPG advocates a two-stage assessment approach:

- **Stage 1** – an initial noise risk assessment of the proposed development site; and
- **Stage 2** – a systematic assessment considering four key elements.

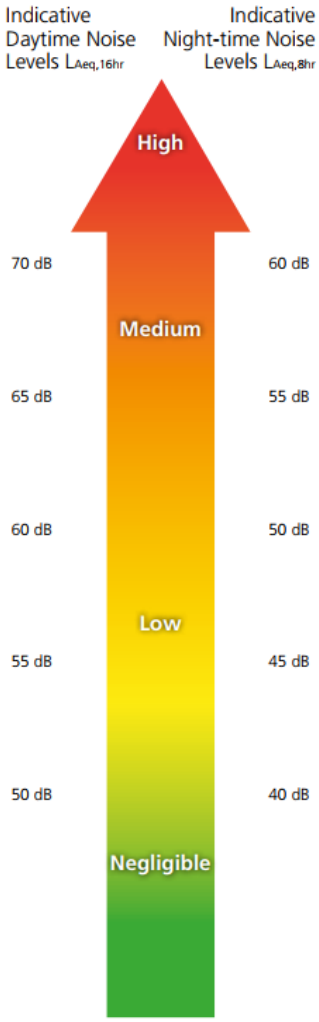
A3.7 ProPG is underpinned by the preparation and delivery of an Acoustic Design Statement (ADS).

Stage 1 – Initial Risk Assessment

A3.8 Stage 1 of ProPG provides guidance to practitioners as to whether the site poses a risk in terms of noise for any future site occupants. To identify this, ProPG sets out a number of considerations for inclusion within an 'initial risk assessment'. **Table A3.1** reproduces Figure 1 from ProPG which describes the initial site risk assessment.

A3.9 ProPG is clear that an ADS should be included as part of a planning application where the risk is above 'negligible'.

Table A3.1: ProPG – Stage 1 Initial Site Noise Risk Assessment

<table>
<tr><th>Noise Risk Assessment</th><th>Potential Effect Without Noise Mitigation</th><th>Pre-Planning Application Advice</th></tr>
<tr><td rowspan="2"> 
</td><td>Increasing risk of adverse effect</td><td>High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.

As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.

At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.</td></tr>
<tr><td>No adverse effect</td><td>These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.</td></tr>
</table>

Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
Figure 1 Notes: a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures. b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant". c. $L_{Aeq,16hr}$ is for daytime 07:00 – 23:00, $L_{Aeq,8hr}$ is for night-time 23:00 – 07:00. d. An indication that there may be more than 10 noise events at night (23:00 – 07:00) with $L_{Amax,F}$ > 60 dB means the site should not be regarded as negligible risk.		

Stage 2 – Full Assessment

A3.10 Stage 2 of ProPG describes four elements required for a full assessment. These are:

- **Element 1** – demonstrating a "Good Acoustic Design Process"
- **Element 2** – observing internal "Noise Level Guidelines"
- **Element 3** – undertaking an "External Amenity Area Noise Assessment"; and
- **Element 4** – the consideration of "Other Relevant Issues".

A3.11 A summary of the considerations required in each of the four elements is provided in **Table A3.2**.

Table A3.2: Professional Practice Guidance – Full Assessment Key Elements

Element	Considerations
Element 1 Good Acoustic Design Process	Considerations include: • Good acoustic design is not just compliance with recommended internal and external noise exposure standards. Good acoustic design should provide an integrated solution whereby the optimum acoustic outcome is achieved, without design compromises that will adversely affect living conditions and the quality of life of the inhabitants or other sustainable design objectives and requirements. • Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided. Any reliance upon building envelope insulation with closed windows should be justified in supporting documents The Planning Application MUST: • Check the feasibility of relocating, or reducing noise levels from relevant sources. • Consider options for planning the site or building layout. • Consider the orientation of proposed building(s). • Select construction types and methods for meeting building performance requirements. • Examine the effects of noise control measures on ventilation, fire regulation, • health and safety, cost, CDM (construction, design and management) etc. • Assess the viability of alternative solutions. • Assess external amenity area noise.

Element	Considerations
Element 2 Internal Noise Level Guidelines	Considerations include: • Reference to BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' for internal noise level guidelines • Most residents value the ability to open windows at will, for a variety of reasons, and LPAs should therefore normally request that designers principally aim, through the use of good acoustic design, to achieve the internal noise level guidelines in noise-sensitive rooms with windows open. Where internal noise levels are assessed with windows closed the justification for this should be included in the ADS. In the case of sites exposed to industrial and/or commercial noise: • Where industrial and/or commercial noise is present on the site and is considered to be "dominant" (i.e. where the impact would be rated as adverse or greater (subject to context)) then this is outside the scope of this ProPG and regard should be had to the guidance in BS 4142:2014. • In the special case where industrial and/or commercial noise is present on the site but is "not dominant" (i.e. where the impact would be rated as lower than adverse (subject to context) if a BS 4142:2014 assessment was to be carried out), its contribution may be included in the noise level used to establish the degree of risk in Stage 1 and may also be included in the consideration of Stage 2 Element 2 Internal Noise Level Guidelines (and if included, this should be clearly stated).
Element 3 External Amenity Area Noise Assessment	The assessment must provide and demonstrate: • Full details of the external amenity area noise assessment should be included in an Acoustic Design Statement. • The term "assessment" is deliberately used because this element concerns more than just the level of noise outside. • ProPG external amenity area noise assessment reflects and extends the advice contained in BS 8233:2014 and the current Government guidance in PPG-Noise Where external amenity areas are exposed to "dominant" industrial and/or commercial noise, the impact of the noise should be assessed in accordance with BS 4142:2014 over the time period that the amenity area is likely to be used. In the special case where industrial and/or commercial noise is present on the site but is "not dominant", its contribution may be included in the noise level used to establish the degree of risk in Stage 1 and may also be included in the consideration of Stage 2 Element 3 External Amenity Area Noise Assessment (and if included, this should be clearly stated).
Element 4 Assessment of Other Relevant Issues	Consideration should be given to: • Compliance with relevant national and local policy: ie, NPSE, PPG-Noise and The Environmental Noise Regulations. • Magnitude and extent of compliance with ProPG • Likely occupants of the development • Acoustic design vs unintended adverse consequences: Examples include sealed up balconies that result in a lack of connection with the external environment, roadside barriers that remove views or prevent crossing roads, sealed facades that affect personal control over the internal environment etc. Wherever possible, such unintended adverse consequences should be obviated by good acoustic design. Acoustic design vs wider planning objectives

Acoustic Design Statement (ADS)

A3.12 ProPG requires that the ADS provide sufficient evidence that the ProPG Stage 1 and Stage 2 Elements 1 – 4 have been followed. It also advises that the ADS should be proportionate to the scale of the development and the degree of noise risk at the proposed development site. In this context, ProPG states that the level of detail to be provided within the ADS should increase with the increasing level of risk.

Supporting Decision-Makers

A3.13 ProPG also provides advice and support to decision-makers when taking into account noise and new residential development. These recommendations are aligned to the outcomes of Stage 1 and Stage 2 of the assessment along with the considerations made within the Acoustic Design Statement. Section 3 of ProPG details the recommendations to decision-makers.

Sites Exposed to Industrial and/or Commercial Noise

A3.14 In the case of sites exposed to industrial and/or commercial noise, ProPG states that if the industrial and/or commercial noise is present but not dominant, then its contribution may be included in the noise level used to establish the degree of risk.

A3.15 If the industrial and/or commercial noise is considered to be dominant, then the risk assessment should not be applied to the industrial or commercial noise and instead the assessment should follow the methodology and guidance provided in British Standard 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*' (BS 4142:2014+A1:2019).

A3.16 ProPG states that "[t]he judgement on whether or not to undertake a BS 4142:2014 assessment to determine dominance should be proportionate to the level of risk. In low risk cases a subjective judgement of dominance, based on audibility, would normally be sufficient."

British Standard 8233:2014 '*Guidance on Sound Insulation and Noise Reduction for Buildings*'

A3.17 BS 8233:2014 provides guidance for the control of noise in and around buildings. It is applicable to the design of new buildings, or refurbished buildings undergoing a change of use.

A3.18 BS 8233:2014 provides noise guidance for buildings of different uses, however in respect to dwellings and habitable residential spaces, Table 4 of BS 8233:2014 provides guideline values that it is desirable not to exceed during daytime and night-time periods within habitable rooms. These guideline values are reproduced in **Table A3.3**.

Table A3.3: Indoor Ambient Noise Levels for Residential Dwellings

Activity	Location	Daytime Guideline (07:00-23:00hrs)	Night-time Guideline (23:00-07:00hrs)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room / Area	40 dB $L_{Aeq, 16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$

A3.19 The internal noise requirements are not intended to be met with open windows, although BS 8223:2014 states that the internal noise levels should take account of the proposed ventilation strategy. Guidance on the likely reduction in façade insulation due to an open window is provided in ProPG (2017). It states that an open window typically reduces the insulation "to no more than 10 to 15 dB(A)". For the purposes of this assessment, it is therefore considered reasonable to assume a reduction of 13 dB(A) for an "open window" scenario.

A3.20 BS 8233:2014 also notes that: "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".

A3.21 BS 8233:2014 does not provide specific guidance on noise levels for regular individual noise events, such as passing trains, which can cause sleep disturbance. Guidance on suitable noise levels for individual events is provided in ProPG, which states:

"In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax, F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as source, number, distribution, predictability and regularity of noise events".

A3.22 On this basis, it is usually considered appropriate to adopt the 10th highest $L_{Amax,F}$ noise event occurring in the night-time period when performing noise ingress calculations.

A3.23 With respect to external amenity spaces, BS 8233:2014 states that "it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments."

A3.24 BS 8233:2014 also states that it will not always be possible to achieve these guideline values for all circumstances where development may be desirable, and that development in higher noise areas, such as urban areas adjoining the strategic transport network or city centres, may warrant a compromise between elevated noise levels and other factors (for example the convenience of living in these locations). In these situations, BS 8233:2014 states that "development should be designed

to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited." This approach is also advocated in PPG-Noise.

Non-Residential

A3.25 BS 8233:2014 provides guideline values for internal ambient noise levels for non-residential uses also. **Table A3.4** summarises the BS8233:2014 guidance targets for some typical non-residential uses.

Table A3.4: BS 8233:2014 Design Targets for Internal Ambient Sound Levels

Location	Design range dB $L_{Aeq, T}$
Open Plan office [A]	45 – 50 dB
Restaurant [A]	40 – 55 dB
Night club or public house [A]	40 – 45 dB
Executive office [B]	35 – 40 dB
Staff meeting room, training room [B]	35 – 45 dB
Department store, cafeteria, canteen, kitchen [B]	50 – 55 dB
Library, gallery, museum [B]	40 – 50 dB
Notes: A) Table 2 of BS8233:2014 B) Table 6 of BS8233:2014	

Outdoor Amenity Space

A3.26 With respect to external amenity spaces, BS 8233:2014 states that "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 guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments."

A3.27 BS 8233:2014 also states that it will not always be possible to achieve these guideline values for all circumstances where development may be desirable, and that development in higher noise areas, such as urban areas adjoining the strategic transport network or city centres, may warrant a compromise between elevated noise levels and other factors (for example the convenience of living in these locations). In these situations, BS 8233:2014 states that *"development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."* This approach is also advocated in PPG-Noise.

Acoustics Ventilation and Overheating: Residential Design Guide

A3.28 The Acoustics Ventilation and Overheating: Residential Design Guide (AVO Guide, 2020) has been prepared with contributions from members of the ANC's AVO Group and committee members.

A3.29 The AVO Guide "is intended for the consideration of new residential development that will be exposed to:

- *Predominantly to airborne sound from transport sources; and*
- *Sound from mechanical services that are serving the dwelling in question."*

A3.30 The AVO states that "there is a need to address how:

- *The ventilation strategy impacts on the acoustic conditions; and*
- *The strategy for mitigating overheating impacts on the acoustic conditions, and whether a more detailed overheating assessment is required to inform this."*

A3.31 The AVO Guide "recommends an approach to acoustic assessment for new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation, and overheating. Application of the AVO Guide is intended to demonstrate good acoustic design when considering internal noise level guidelines."

A3.32 The AVO Guide details a two-level noise assessment procedure for consideration of the overheating condition. Level 1 assumes that overheating will be mitigated through use of a partially open window[12] and consists of a Site Risk Assessment based on external free-field noise levels (refer to **Table A3.5** for further details).

A3.33 Where a 'High' or 'Medium' risk is identified, it is recommended that a Level 2 assessment is undertaken. A Level 2 assessment includes consideration of provisions for mitigating overheating, whilst taking into account how frequently and for what duration the overheating condition is likely to occur, and is based on internal ambient noise levels (refer to **Table A3.6** for further details).

[12] It is assumed that a partially open window will provide an outside to inside level difference of 13 dB

Table A3.5: Guidance for Level 1 Site Risk Assessment of noise from transport noise sources relating to overheating condition (Table 3-2 of AVO Guide)

Risk category for Level 1 assessment [Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
$L_{Aeq,\ T}$ [Note 3] during 07:00 - 23:00 / $L_{Aeq,\ 8hr}$ during 23:00 - 07:00 High: 65 dB / 55 dB Medium: 60 dB / 50 dB Low: 55 dB / 50 dB Negligible: 50 dB / 45 dB	Increasing risk of adverse effect	Recommended Optional
	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

Note 1 The noise levels suggested assume a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.

Note 2 The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships, [15, 17].

Note 3 A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines [23].

Note 4 Refer also to references [1, 17, 18, 22] for further guidance regarding individual noise events. Where 78dB LAFmax is normally exceeded during the night-time period (23:00-07:00), a Level 2 assessment is recommended.

Note 5 The risk of an adverse effect occurring will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.

Note 6 To evaluate the risk category for a dwelling, all three aspects of external noise exposure (i.e. daytime, night-time and individual noise events) should be evaluated. The highest risk category for any of the three aspects applies.

Table A3.6: Guidance for Level 2 Assessment of noise from transport noise sources relating to overheating condition (Table 3-3 of AVO Guide)

Internal ambient noise level [Note 2]			Examples of Outcomes [Note 5]	
$L_{Aeq,T}$ [Note 3] during 07:00 – 23:00 [Note 6]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 [Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. 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.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. [Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{AF,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response[Note 9]. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Note 1 The noise levels suggested in Tables 3-2 and 3-3 assume a steady road traffic noise source but may be adapted for other types of transport.

Note 2 The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships such as those described in a DEFRA 2014 study [15, 21, 22]. With the exception of individual noise events, the references [15,21] are based on evidence drawn from *external* noise levels. There is currently very little robust evidence linking *internal* averaged noise levels with health outcomes and occupant behaviour. Internal ambient noise levels would normally be considered for living rooms and bedrooms during the daytime. At night, the levels would normally only be applicable to bedrooms.

Note 3 A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines.

Note 4 Refer to references [1, 17, 18, 22] for further guidance regarding individual noise events. The $L_{AF,max}$ indicator associated with the upper category is intended for road traffic; it may be more appropriate to use the "one additional noise-induced awakening" method for noise from rail traffic or aircraft.

Note 5 The potential for adverse effect will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.

Note 6 The daytime levels presented in this table may not be appropriate for residential care homes or other situations where conditions for daytime resting are known to be of particular importance.

Note 7 When evaluating the potential for adverse effect, all three aspects of noise exposure (i.e. daytime, night-time and individual noise events) should be evaluated.

Note 8 BS 8233 states that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

Note 9 It is known that physiological responses do occur at lower levels of L_{AFmax} than 45 dB.

A3.34 A more recently developed alternative to the systems above is a tempered fresh air system. These systems add a small amount of cooling to the whole dwelling ventilation supply system (e.g. to the MVHR). This provides a reduced temperature fresh air supply which can provide some cooling to a space. Unlike comfort cooling, these systems are not designed to achieve a specific temperature in a space."

World Health Organization 'Environmental Noise Guidelines for the European Region' (WHO, 2018)

A3.35 The guidelines presented within the World Health Organization's (WHO) *'Environmental Noise Guidelines for the European Region'* (WHO, 2018) complement the WHO *'Guidelines for Community Noise'* (WHO, 1999) and the WHO *'Night Noise Guidelines for Europe'* (WHO NNG, 2009).

A3.36 The guidelines recommend noise exposure-response relationships that are mostly related to the noise exposure indicators L_{den} and L_{night}, with the aim of *"protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway, aircraft) noise, wind turbine noise and leisure noise".*

A3.37 The guidelines provide source-specific recommendations on noise exposures. **Table A3.7** presents the recommendations relating to transportation sources from the guidance.

Table A3.7: Source Specific Recommendations on Noise Exposures

Source	Average Noise Exposure	Night Noise Exposure
Road traffic noise	Below 53 dB L_{den} strongly recommended	Below 45 dB L_{night} strongly recommended
Railway noise	Below 54 dB L_{den} strongly recommended	Below 44 dB L_{night} strongly recommended
Aircraft noise	Below 45 dB L_{den} strongly recommended	Below 40 dB L_{night} strongly recommended

A3.38 Notably, the L_{den} parameter in **Table A3.7** is a compound noise indicator and is representative of the average sound pressure level over all days, evenings and night in a year, subject to an evening penalty of 5 dB and a night penalty of 10 dB. Whilst the WHO guidelines (2018) adopt the L_{den} as an appropriate indicator for adverse health effects, the $L_{Aeq, T}$ parameter, as advocated in Government policy and legislation and summarised in **Table A2.1**, is deemed to be the appropriate parameter for the determination of likely adverse impacts on health and quality of life.

A4 Operational Sound (Building Services and Other Sound of an Industrial and/or Commercial Nature) Assessment Guidance

A4.1 With regards to building services sound, consistent with many schemes, details of potential sources of sound are unknown at the planning application stage, therefore it is expected that sound emission limits can be specified at existing receptors through a planning condition and controlled by design.

A4.2 Adverse effect thresholds for operational sound of a commercial / industrial nature in Government policy terms are based upon on BS 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*' (BS 4142. 2019), which is the principal assessment methodology used to carry out the assessment of sound of an industrial and/or commercial nature.

A4.3 The assessment is performed by comparing the rating level of the sound source(s), $L_{Ar,Tr}$, against the background sound level, $L_{A90,T}$. The background sound level should be measured during a period in absence of the influence of sound from the industrial source. With regards to the assessment of impacts, BS 4142 (2019) states that:

"a) Typically, the greater the difference, the greater the magnitude of the impact

b) A difference of around + 10 dB or more is likely to be an indication of significant adverse impact, depending on the context

c) A difference of around + 5 dB is likely to be an indication of an adverse impact, depending on the context

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

A4.4 BS 4142 (2019) in respect of context advises that *"an effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*

A4.5 In particular BS 4142 (2019) advises that account be taken of the sensitivity of the receptor, stating "*take all pertinent factors into consideration, including… The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as*:

i) facade insulation treatment;

ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and

iii) *acoustic screening"*

A4.6 For the daytime and night-time period, the SOAEL is 10 dB greater than the background sound level. When this threshold is exceeded, it also indicates that a significant adverse effect is likely to occur, subject to factors relating to context.

A4.7 The LOAEL threshold is exceeded where the rating level is equal to or exceeds the background sound level. **Table A4.1** summarises the threshold levels relating to operational sound.

Table A4.1: Thresholds of Potential Effects of Commercial/Industrial Sound at Residential Receptors in Terms of Government Policy

Period	LOAEL	SOAEL
Daytime (0700-2300hrs)	Rating level ($L_{Ar,Tr}$) less than or equal to background sound level, $L_{A90,T}$ (with consideration of context)	Rating level ($L_{Ar,Tr}$) +10 dB above background sound level, $L_{A90,T}$ (with consideration of context)
Night-time (2300-0700hrs)		

A4.8 Based upon the principles of BS4142, adopted impact magnitude criteria are summarised in **Table** A4.2, by reference to the semantic scale adopted in Institute of Environmental Management and Assessment - Guidelines for environmental noise assessment' (2014).

Table A4.2: Adopted Classification of Magnitude of Noise Impacts

Rating level ($L_{Ar,Tr}$) above background	Magnitude of Impact
< - 5	Very low
-5 - 0	Low
0 - 5	Medium
5 - 10	High
> 10	Very high

A4.9 Importantly, BS 4142: 1997 'Method for Rating industrial noise affecting mixed residential and industrial areas', states that "(…) background noise level below about 30 dB and rating levels below about 35 dB are considered to be very low." Additionally, BS 4142:2014+A1:2019 states that "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night".

A5 Operational Sound (Road Traffic) Assessment Guidance

Calculation of Road Traffic Noise (CRTN, 1988)

A5.1 In the UK, operational road traffic noise is predicted using the Calculation Road Traffic Noise (CRTN, 1988). CRTN provides methodologies for the calculation of road traffic noise emissions, based on traffic data, through the calculation of a Basic Noise Level (BNL) which is the noise level at 10m from the kerb. The use of BNL enables a direct comparison to be made between traffic scenarios for each section of road.

Design Manual for Roads and Bridges (DMRB), LA111 'Noise and vibration' (2020)

A5.2 Adverse effect levels for road traffic in government policy terms are presented in **Table A5.1**, by reference to LA 111 (DMRB), which in turn is cognisant of guidance from the World Health Organization (WHO) Guidelines for Community Noise, WHO Night Noise Guidelines for Europe, the Noise Insulation Regulations 1975 (as amended), and best practice from other precedent projects.

Table A5.1: Effect thresholds Levels for operational road traffic noise

Time Period	LOAEL	SOAEL
Day (06:00-24:00)	55 dB $L_{A10,18hr}$ facade[13]	68 dB $L_{A10,18hr}$ facade[14]
Night (23:00-07:00)	40 dB L_{night} (free-field)	55 dB L_{night} (free-field)

A5.3 **Table A5.2** below shows the response to changes in noise, as set out in the DMRB, for short-term impacts (i.e. the opening year of the Development).

Table A5.2: Magnitude of change for road Traffic Noise – short term

Noise change (dBA)	Magnitude of change (short-term)
less than 1.0	Negligible
1.0 to 2.9	Minor
3.0 to 4.9	Moderate
Greater than or equal to 5.0	Major

A5.4 The short-term criteria were developed in response to research which indicated an increased sensitivity of receptors to abrupt noise change soon after opening of a new or altered road, compared

[13] Equivalent to 50 dB $L_{Aeq,16h}$ free-field road traffic noise level for a 16-hour day (07:00 – 23:00)

[14] Equivalent to 63 dB $L_{Aeq,16h}$ free-field road traffic noise level for a 16-hour day (07:00 – 23:00)

to steady state dose response curves. The Design Manual for Roads and Bridges Volume 11 Section 3 (DMRB HD 213/11 – Revision 1, 2011) recognised this in stating that:

"A change of 1 dB(A) in the short-term (e.g. when a project is opened) is the smallest that is considered perceptible. In the long-term, a 3 dB(A) change is considered perceptible, and such an increase should be mitigated if possible."

A5.5 Importantly it should also be noted that DMRB is specifically designed for the assessment of highways schemes and is not necessarily well suited to the assessment of indirect changes in road traffic on existing roads. Notably, for the Proposed Development, abrupt noise changes are not expected, therefore more weight should be given to the long-term steady state response.

A5.6 The long-term change magnitude of impact criteria is presented in **Table A5.3**.

Table A5.3: Magnitude of change for road Traffic Noise – long term

Noise change (dBA)	Magnitude of change (long-term)
less than 3.0	Negligible
3.0 to 4.9	Minor
5.0 to 9.9	Moderate
Greater than or equal to 10.0	Major

A5.7 In summary, the short term change impact criteria presented in LA 111 was used to determine the: very low; low; medium; and high categories by reference to the semantic scale adopted in Institute of Environmental Management and Assessment - Guidelines for environmental noise assessment' (2014). The very high category was determined based on the principles demonstrated for the long-term change impact criteria. The adopted impact magnitude criteria are summarised in **Table A5.4**.

Table A5.4: Magnitude of impact criteria for road traffic noise

Change in Noise Level, dB $L_{A10,18hr}$	Magnitude of Impact
<1.0	Very Low
1.0 – 2.9	Low
3.0 – 4.9	Medium
5.0 – 9.9	High
>10	Very High

A5.8 From recent precedent highways schemes, greater weight was given to noise change where the existing baseline noise levels were already in excess of the relevant SOAEL. This is to reflect the consideration of health effects. In these situations, the magnitude of the impact and effect caused by a change in noise levels attributable to the scheme is determined by reference to short-term change criteria (**Table A5.2**).

A5.9 However, because the assessment is based upon the calculation of a Basic Noise Level (BNL), which is the noise level at 10m from the kerb, the calculated noise levels may not reflect the absolute noise levels at receptors, which may be located at different distances form the kerb. Where this is the case, this is discussed qualitatively where further consideration is given to the absolute noise levels and associated noise change.

A6 Site Photographs

Figure A6.1: Monitoring Location M1

Figure A6.2: Monitoring Location M2

Figure A6.3: Monitoring Location M3

Figure A6.4: Monitoring Location M4

Figure A6.5: Monitoring Location 'CRTN'

A7 Sound Level Meter Specifications

Figure A7.1: M1 S/N 01176453

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 03 August 2020

Certificate Number: UCRT20/1737

Issued by:
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Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	Noise Consultants Limited 6 Bankside Crosfield Street Warrington WA1 1UD			
Order No.	133			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	01176453
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	76472
	Rion	Microphone	UC-59	12404
	Rion	Calibrator	NC-75	34291339
		Calibrator adaptor type if applicable		NC-75-022
Performance Class	1			
Test Procedure	TP 2.SLM 61672-3 TPS-49 *Procedures from IEC 61672-3:2006 were used to perform the periodic tests.*			
Type Approved to IEC 61672-1:2002	YES	Approval Number	21.21 / 13.02	
	If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003			
Date Received	31 July 2020	ANV Job No.	UKAS20/07417	
Date Calibrated	03 August 2020			

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	14 August 2019	UCRT19/1909	0653

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CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number UCRT20/1737

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52	
SLM instruction manual ref / issue		11-03	
SLM instruction manual source		Manufacturer	
Internet download date if applicable		N/A	
Case corrections available		Yes	
Uncertainties of case corrections		Yes	
Source of case data		Manufacturer	
Wind screen corrections available		Yes	
Uncertainties of wind screen corrections		Yes	
Source of wind screen data		Manufacturer	
Mic pressure to free field corrections		Yes	
Uncertainties of Mic to F.F. corrections		Yes	
Source of Mic to F.F. corrections		Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002		Yes	
Specified or equivalent Calibrator		Specified	
Customer or Lab Calibrator		Customers Calibrator	
Calibrator adaptor type if applicable		NC-75-022	
Calibrator cal. date		03 August 2020	
Calibrator cert. number		UCRT20/1734	
Calibrator cal cert issued by		0653	
Calibrator SPL @ STP	94.00	dB	Calibration reference sound pressure level
Calibrator frequency	1000.00	Hz	Calibration check frequency
Reference level range	25 - 130	dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End		
Temperature	24.42	24.61	± 0.30	°C
Humidity	49.8	49.0	± 3.00	%RH
Ambient Pressure	100.57	100.57	± 0.03	kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.1	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise — This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A			C			Z		
	11.1	dB	UR	15.8	dB	UR	22.2	dB	UR
Uncertainty of the electrical self generated noise ±							0.12	dB	

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

..... END .....

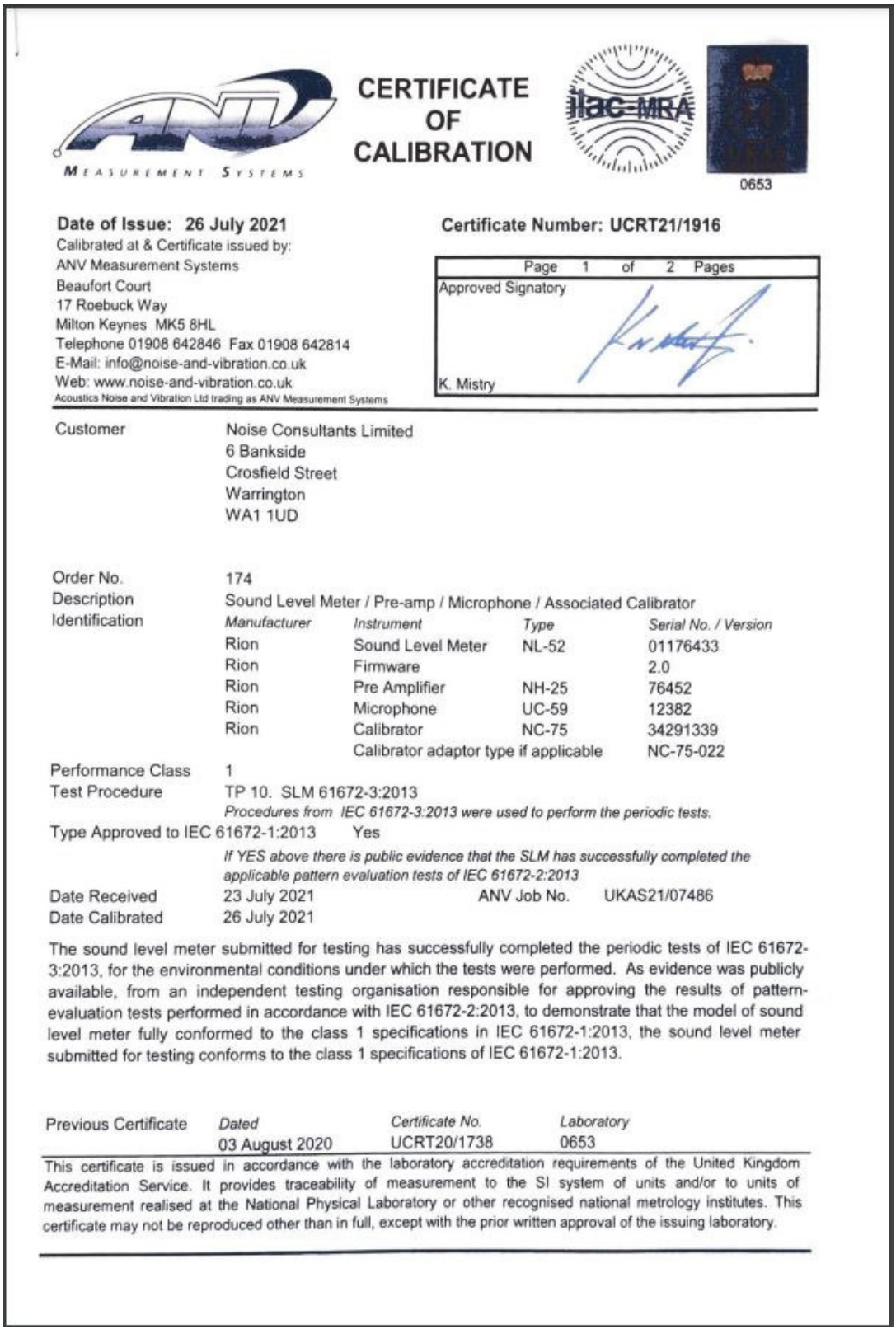
R 2

Calibrated by: B. Bogdan

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

Figure A7.2: M2 S/N 01176433



MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 26 July 2021

Certificate Number: UCRT21/1916

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Calibrated at & Certificate issued by:
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17 Roebuck Way
Milton Keynes MK5 8HL
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E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer: Noise Consultants Limited, 6 Bankside, Crosfield Street, Warrington, WA1 1UD

Order No. 174

Description: Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	01176433
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76452
Rion	Microphone	UC-59	12382
Rion	Calibrator	NC-75	34291339
	Calibrator adaptor type if applicable		NC-75-022

Performance Class: 1

Test Procedure: TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013: Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received: 23 July 2021 ANV Job No. UKAS21/07486

Date Calibrated: 26 July 2021

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	03 August 2020	UCRT20/1738	0653

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA

0653

Date of Issue: 26 July 2021

Certificate Number: UCRT21/1916

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer: Noise Consultants Limited, 6 Bankside, Crosfield Street, Warrington, WA1 1UD

Order No. 174

Description: Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	01176433
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76452
Rion	Microphone	UC-59	12382
Rion	Calibrator	NC-75	34291339
	Calibrator adaptor type if applicable		NC-75-022

Performance Class: 1

Test Procedure: TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013: Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

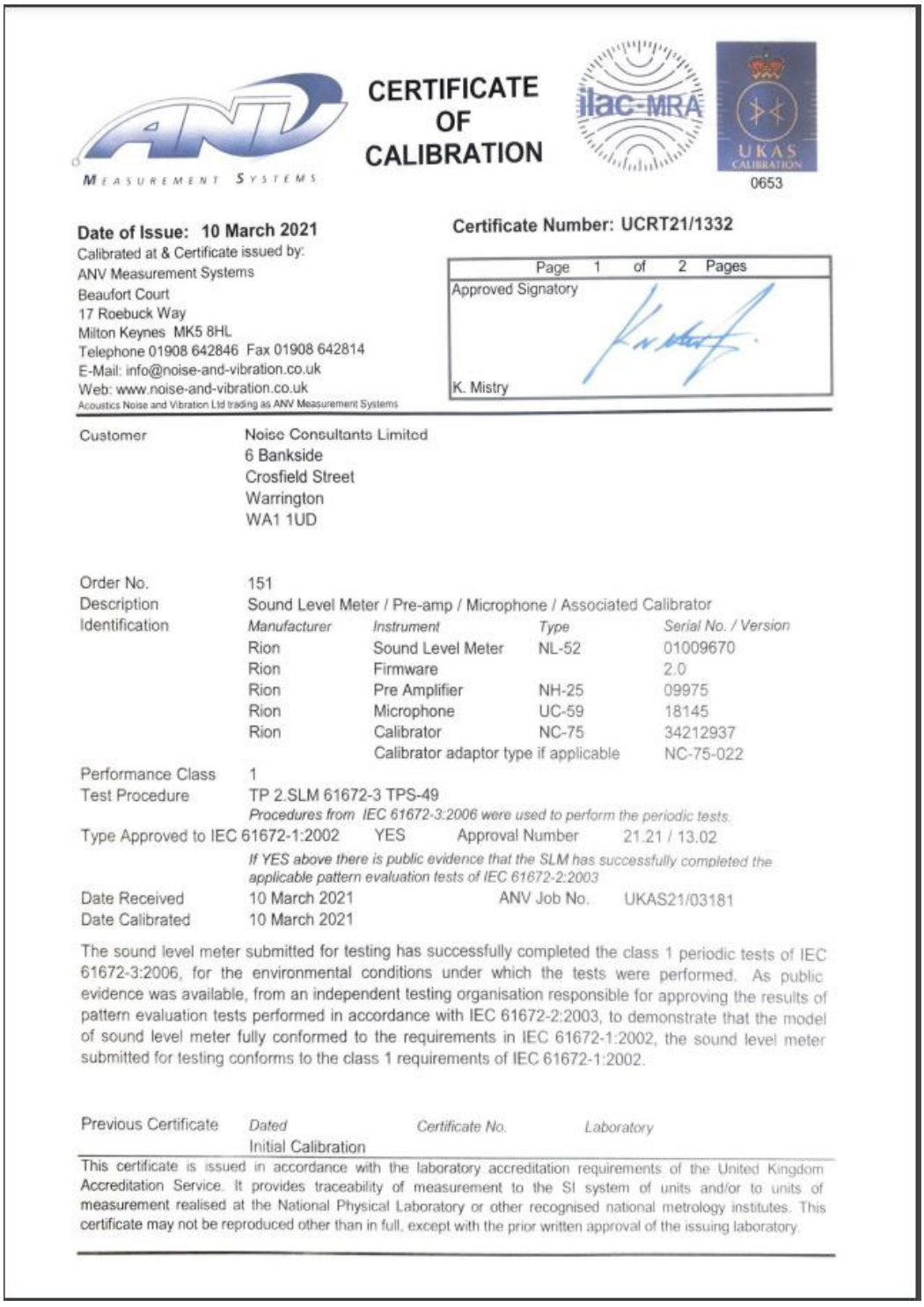
Date Received: 23 July 2021 ANV Job No. UKAS21/07486

Date Calibrated: 26 July 2021

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	03 August 2020	UCRT20/1738	0653

Figure A7.3: M3 S/N 01009670



ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 10 March 2021

Certificate Number: UCRT21/1332

Calibrated at & Certificate issued by:
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Approved Signatory

K. Mistry

Customer: Noise Consultants Limited, 6 Bankside, Crosfield Street, Warrington, WA1 1UD

Order No. 151

Description: Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification:

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	01009670
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	09975
Rion	Microphone	UC-59	18145
Rion	Calibrator	NC-75	34212937
	Calibrator adaptor type if applicable		NC-75-022

Performance Class: 1

Test Procedure: TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 10 March 2021 ANV Job No. UKAS21/03181

Date Calibrated 10 March 2021

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	Initial Calibration		

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CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653	Certificate Number UCRT21/1332
	Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52	
SLM instruction manual ref / issue		11-03	
SLM instruction manual source		Manufacturer	
Internet download date if applicable		N/A	
Case corrections available		Yes	
Uncertainties of case corrections		Yes	
Source of case data		Manufacturer	
Wind screen corrections available		Yes	
Uncertainties of wind screen corrections		Yes	
Source of wind screen data		Manufacturer	
Mic pressure to free field corrections		Yes	
Uncertainties of Mic to F.F. corrections		Yes	
Source of Mic to F.F. corrections		Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002		Yes	
Specified or equivalent Calibrator		Specified	
Customer or Lab Calibrator		Customers Calibrator	
Calibrator adaptor type if applicable		NC-75-022	
Calibrator cal. date		10 March 2021	
Calibrator cert. number		UCRT21/1329	
Calibrator cal cert issued by		0653	
Calibrator SPL @ STP	94.01	dB	Calibration reference sound pressure level
Calibrator frequency	1000.00	Hz	Calibration check frequency
Reference level range	25 - 130	dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	24.11	24.01	± 0.30 °C
Humidity	39.2	38.6	± 3.00 %RH
Ambient Pressure	98.93	98.86	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.1	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting	
Uncertainty of the microphone installed self generated noise ±	N/A	dB		

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A			C			Z		
	11.7	dB	UR	22.3	dB	UR	22.8	dB	UR
Uncertainty of the electrical self generated noise ±							0.12	dB	

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

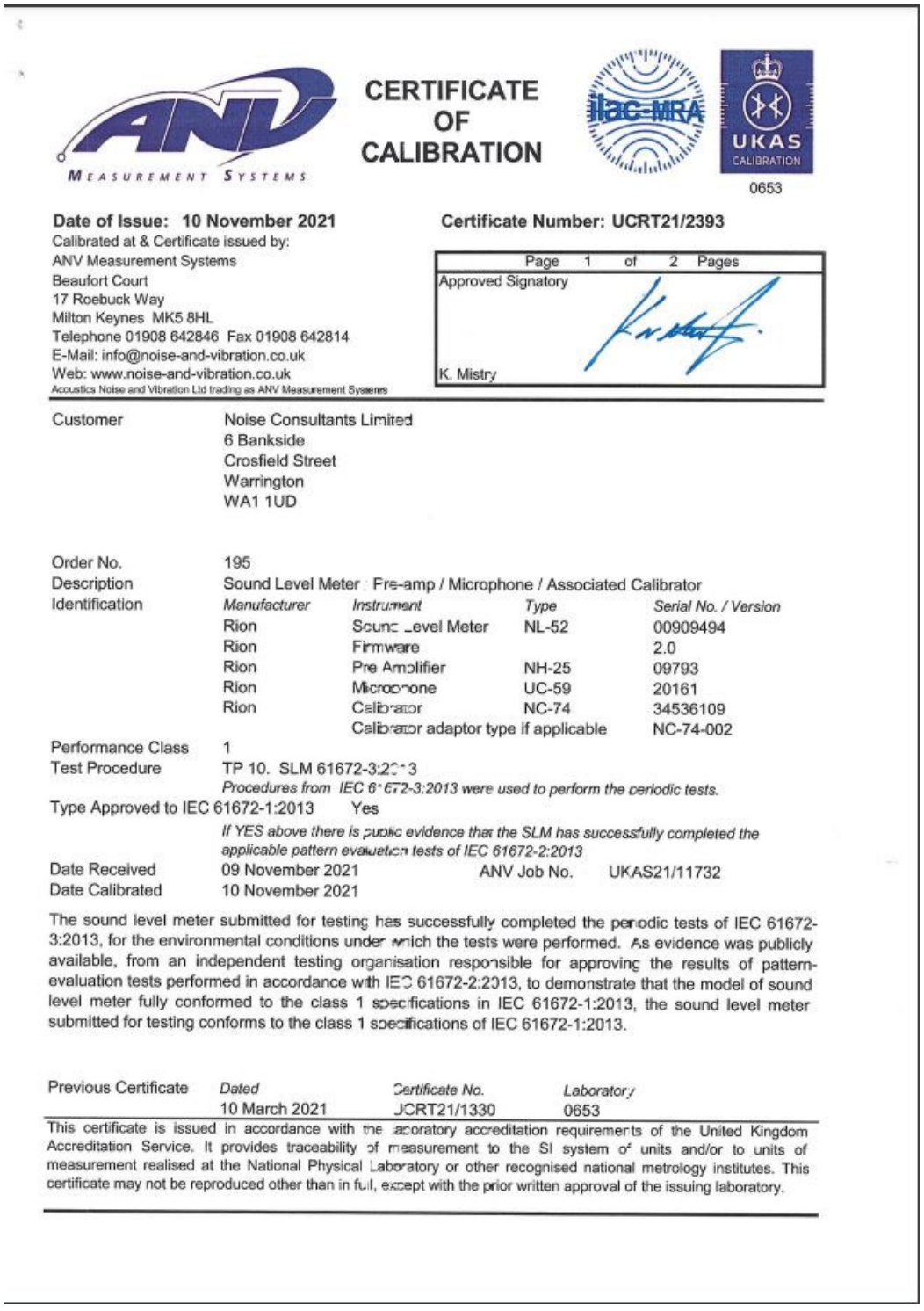
The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: C. Hirlav R 2

Additional Comments The results on this certificate only relate to the items calibrated as identified above.
None

Figure A7.4: M4 S/N 00909494



ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 10 November 2021

Certificate Number: UCRT21/2393

Calibrated at & Certificate issued by:
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Beaufort Court
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Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer: Noise Consultants Limited, 6 Bankside, Crosfield Street, Warrington, WA1 1UD

Order No. 195

Description: Sound Level Meter : Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00909494
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	09793
Rion	Microphone	UC-59	20161
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure: TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 09 November 2021 ANV Job No. UKAS21/11732

Date Calibrated 10 November 2021

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	10 March 2021	UCRT21/1330	0653

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CERTIFICATE OF CALIBRATION

Certificate Number	
UCRT21/2393	
UKAS Accredited Calibration Laboratory No. 0653	Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		

	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes

Total expanded uncertainties within the requirements of IEC 61672-1:2013	YES	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	27 October 2021	
Calibrator cert. number	UCRT21/2331	
Calibrator cal cert issued by Lab	0653	
Calibrator SPL @ STP	94.01 dB	Calibration reference sound pressure level
Calibrator frequency	1001.94 Hz	Calibration check frequency
Reference level range	Single dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.

Environmental conditions during tests	Start	End	
Temperature	25.66	24.34	± 0.30 °C
Humidity	52.0	52.8	± 3.00 %RH
Ambient Pressure	101.24	101.19	± 0.03 kPa

Indication at the Calibration Check Frequency				
Initial indicated level	94.0	dB	Adjusted indicated level	94.0 dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±				0.10 dB

Self Generated Noise

Microphone installed -	Less Than	18.5	dB	A Weighting					
Microphone replaced with electrical input device -				UR = Under Range indicated					

Weighting	A			C			Z		
	13.1	dB	UR	17.3	dB	UR	21.6	dB	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

Prior to calibration, the instrument's microphone was replaced and the meter was realigned.

..... END .....

Calibrated by: C. Hirlav

R 3

Figure A7.5: 'CRTN' S/N 00687043

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 07 March 2022

Certificate Number: UCRT22/1318

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
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Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer: Noise Consultants Ltd, 6 Bankside, Crosfield Street, Warrington, WA1 1UP

Order No. 205

Description: Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00687043
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	87198
Rion	Microphone	UC-59	13561
Rion	Calibrator	NC-75	34212937
	Calibrator adaptor type if applicable		NC-75-022

Performance Class: 1

Test Procedure: TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 04 March 2022 ANV Job No. UKAS22/03157

Date Calibrated 07 March 2022

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	24 February 2020	UCRT20/1224	0653

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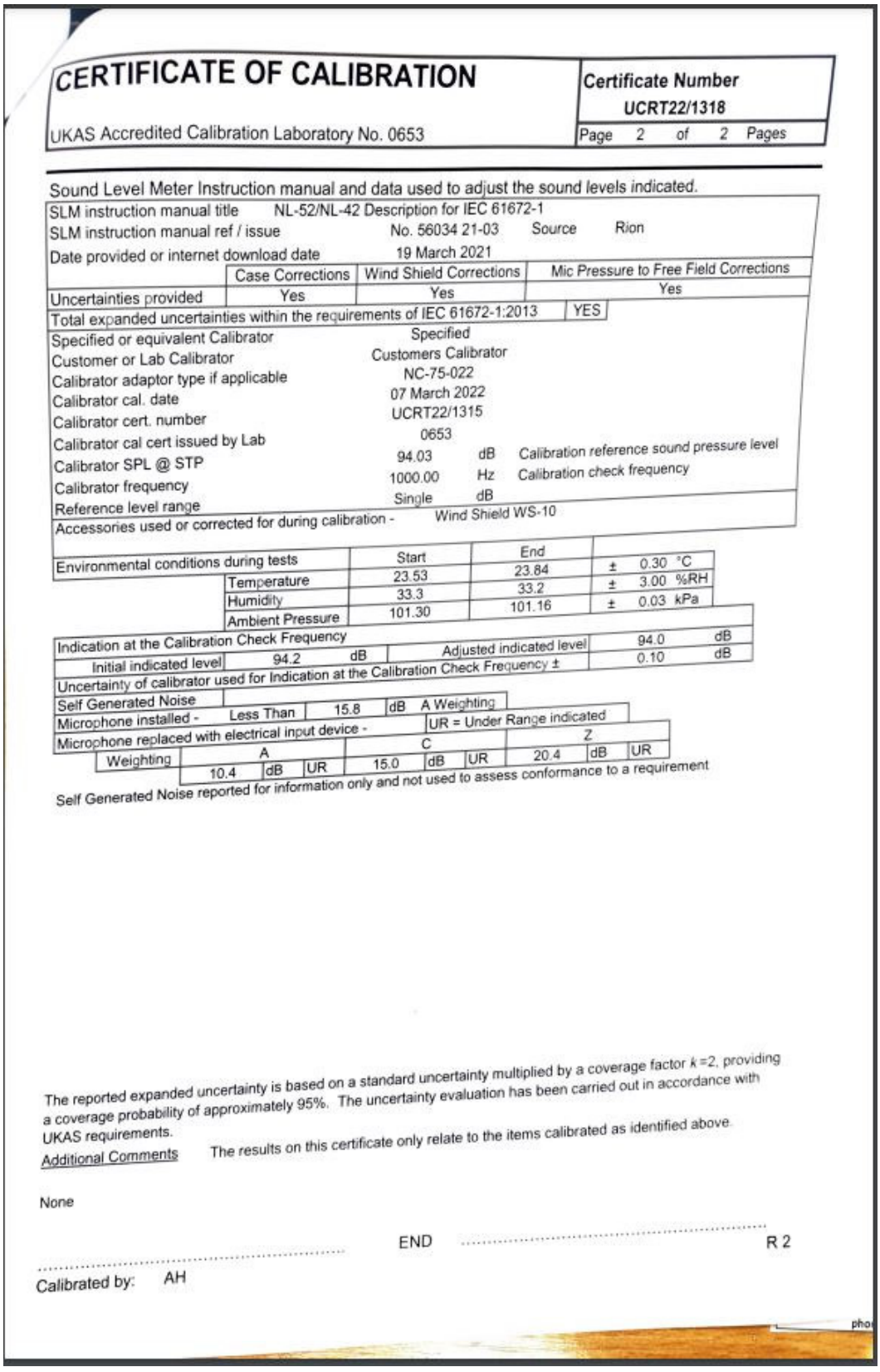


CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number UCRT22/1318

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		

	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes

Total expanded uncertainties within the requirements of IEC 61672-1:2013 YES

Specified or equivalent Calibrator	Specified		
Customer or Lab Calibrator	Customers Calibrator		
Calibrator adaptor type if applicable	NC-75-022		
Calibrator cal. date	07 March 2022		
Calibrator cert. number	UCRT22/1315		
Calibrator cal cert issued by Lab	0653		
Calibrator SPL @ STP	94.03	dB	Calibration reference sound pressure level
Calibrator frequency	1000.00	Hz	Calibration check frequency
Reference level range	Single	dB	

Accessories used or corrected for during calibration - Wind Shield WS-10

Environmental conditions during tests	Start	End	
Temperature	23.53	23.84	± 0.30 °C
Humidity	33.3	33.2	± 3.00 %RH
Ambient Pressure	101.30	101.16	± 0.03 kPa

Indication at the Calibration Check Frequency				
Initial indicated level	94.2 dB	Adjusted indicated level	94.0	dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±			0.10	dB

Self Generated Noise

Microphone installed - Less Than 15.8 dB A Weighting

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A			C			Z		
	10.4	dB	UR	15.0	dB	UR	20.4	dB	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k =2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

END R 2

Calibrated by: AH

A8 Measured Sound Levels

Figure A8.1: Summary of Measured Baseline Survey Data M1

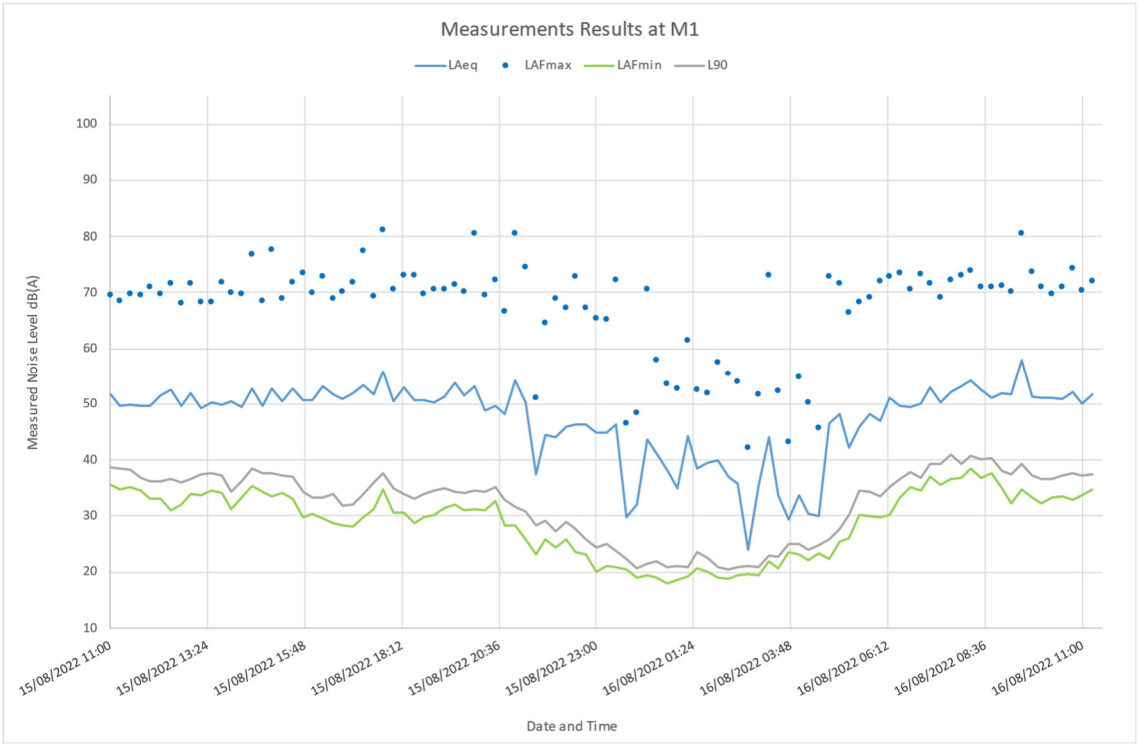


Figure A8.2: Summary of Measured Baseline Survey Data M2

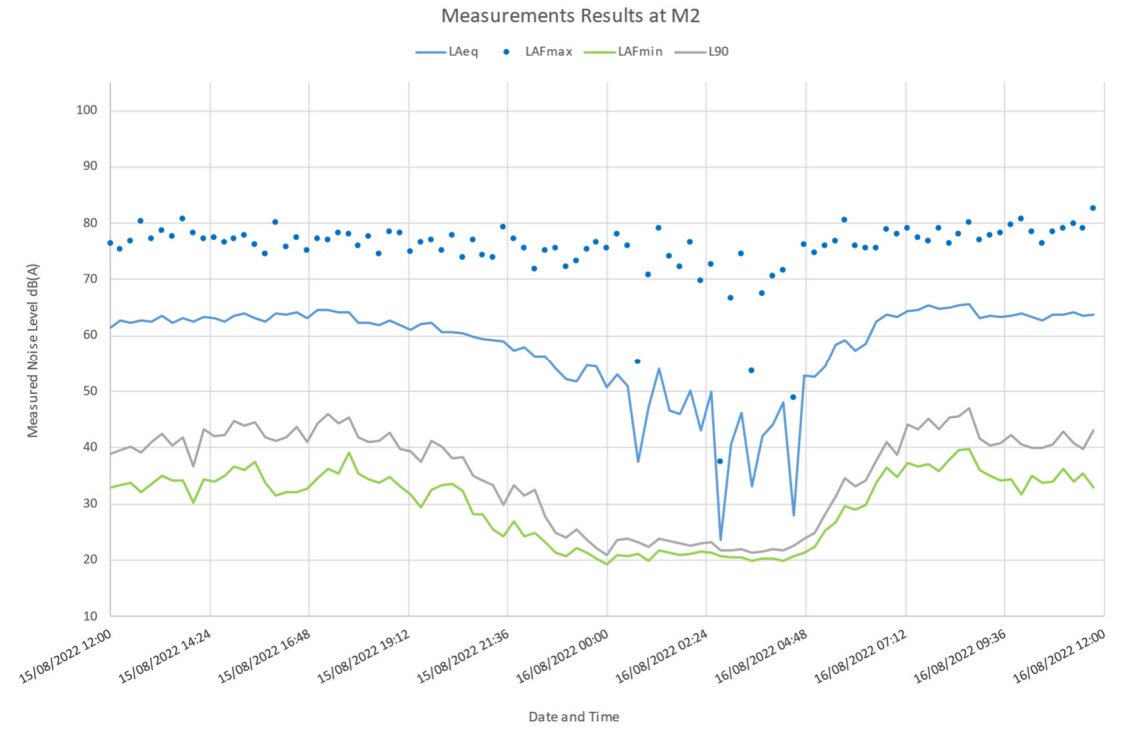


Figure A8.3: Summary of Measured Baseline Survey Data M3

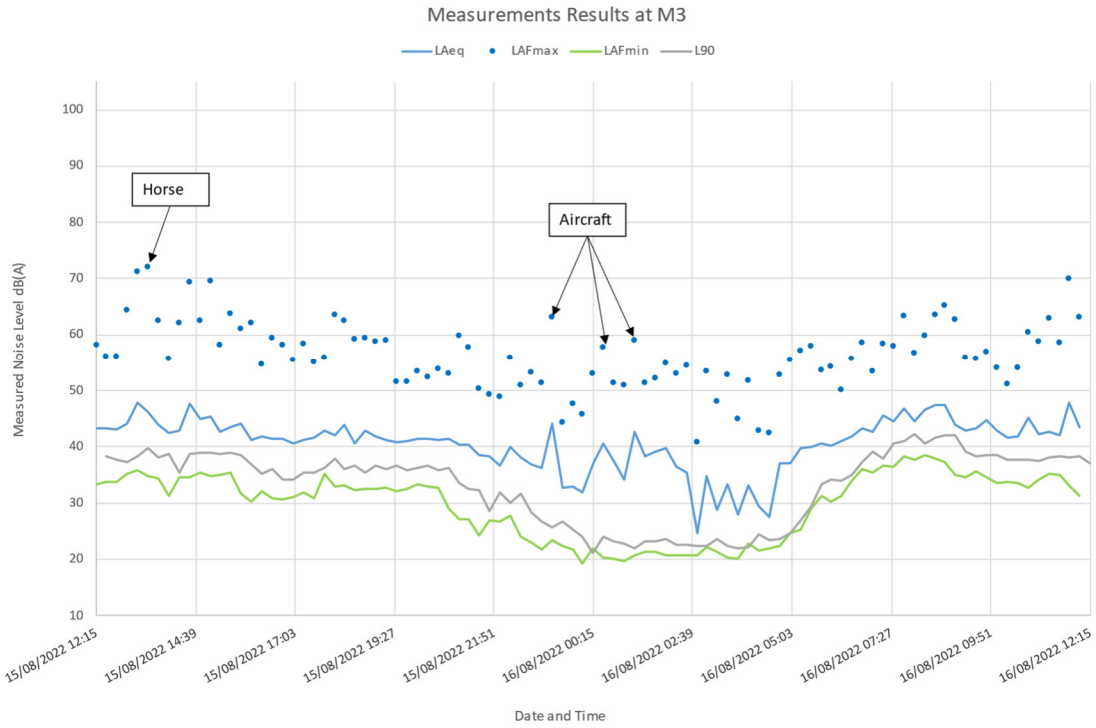
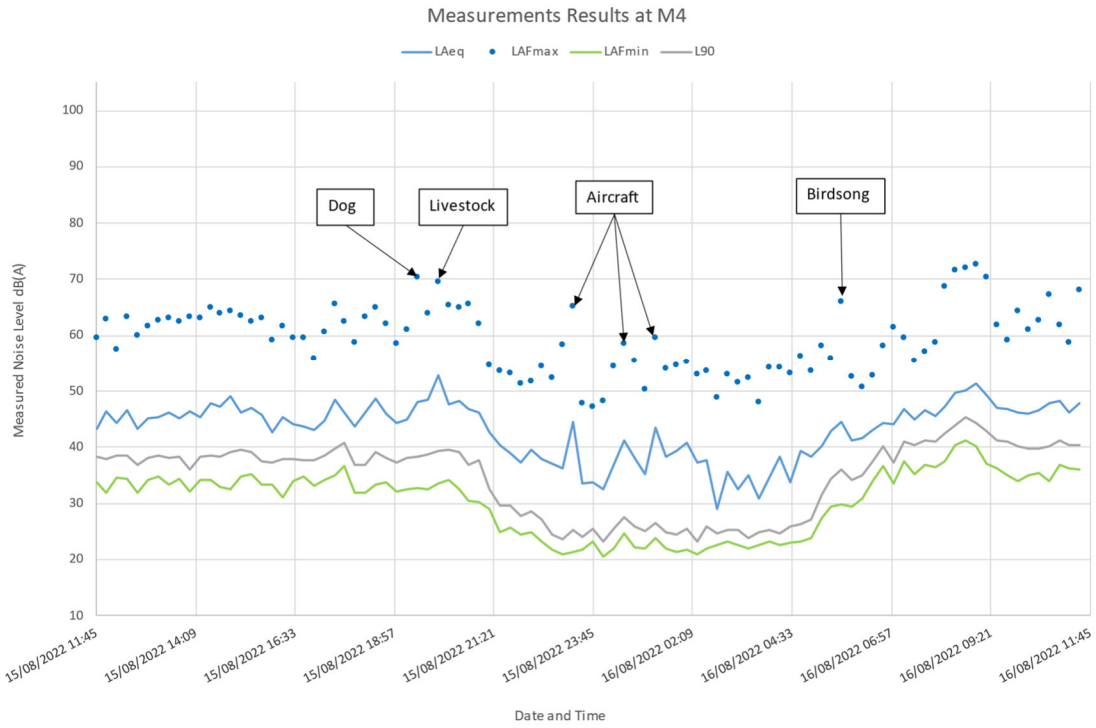


Figure A8.4: Summary of Measured Baseline Survey Data M4



A9 Road Traffic Data

Figure A9.1: Road link diagram

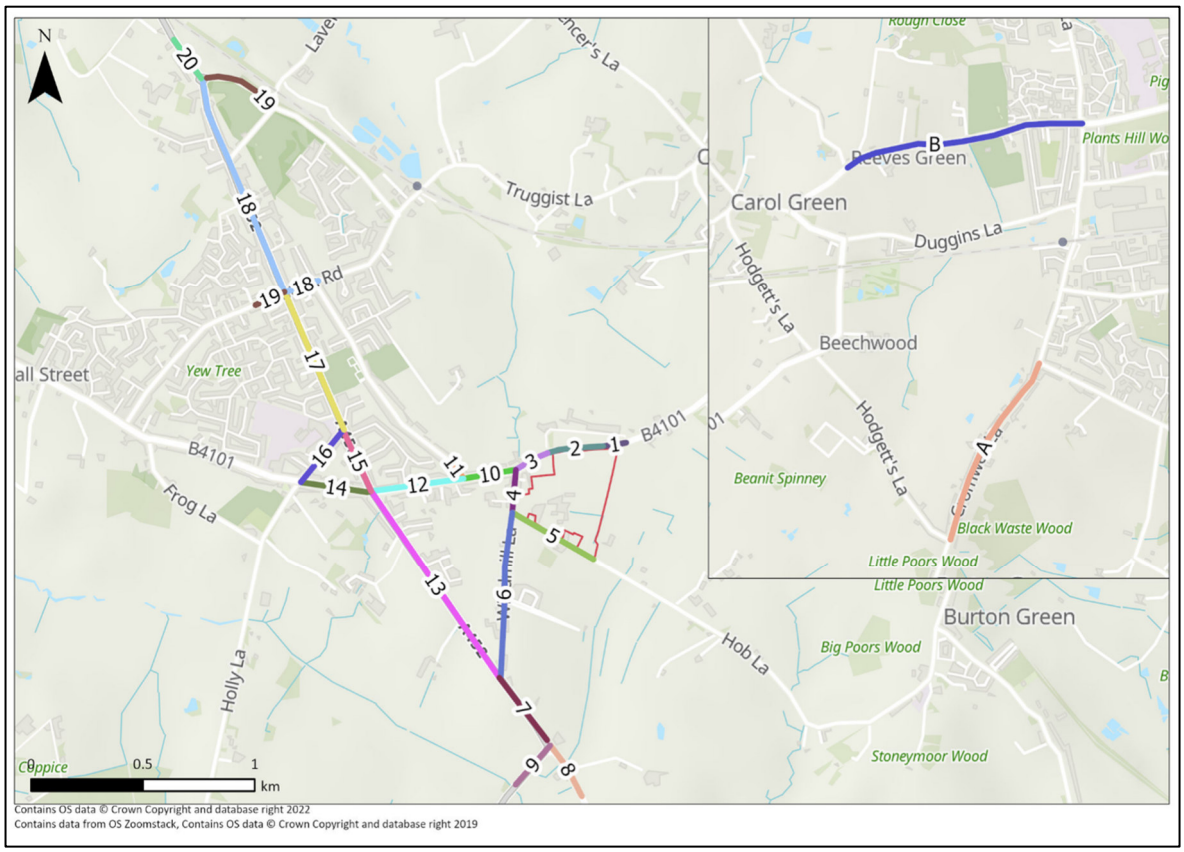


Table A9.1: 18hr AAWT traffic flow data

Link No.	Road Name	Speed (km/h)	2021		2024			
			Baseline		Do Nothing		Do Something	
			Flow	%HGV	Flow	%HGV	Flow	%HGV
1	Waste Lane - between Site Access (E) and Old Waste Lane	50	5696	3	5964	3	6550	3
2	Waste Lane - between Site Access (W) and Old Waste Lane	50	5696	3	5964	3	7279	3
3	Waste Lane (between Old Waste Lane and Windmill Lane)	50	5696	3	5964	3	7279	3
4	Windmill Lane - between Waste Lane and Hob Lane	50	2983	1	3124	1	3652	1
5	Hob Lane	50	0	0	0	0	0	0
6	Windmill Lane - between Hob Lane and A452	50	2724	1	2852	1	3381	1
7	A452 - between Windmill Lane and A4177	50	10673	4	11175	4	11704	4
8	A452 - south of A4177	50	6744	2	7061	2	7189	2
9	A4177	50	7651	5	8010	5	8410	5
10	Kelsey Lane - between Waste Lane and Meeting House Lane	50	4746	4	4969	4	5755	3
12	Kelsey Lane - between Meeting House Lane and A452	50	3969	4	4155	4	4942	3
11	Meeting House Lane	50	0	0	0	0	0	0
13	A452 - between Kelsey Lane and Windmill Lane	50	8581	5	8984	5	8984	5
18	Station Road (E)	50	4224	1	4422	1	4569	1
19	Station Road (W)	50	3776	2	3954	2	3954	2
14	Alder Lane - between A452 and Gipsy Lane	50	3812	2	3991	2	3991	2
15	A452 - between Kelsey Lane and Gipsy Lane	50	8597	6	9001	6	9787	6
16	Gipsy Lane	50	2222	2	2326	2	2326	2
17	A452 - between Gipsy Lane and Station Road	50	11219	5	11746	5	12533	4
18	A542 - between Station Road and Hallmeadow Road	50	11297	5	11828	5	12468	4
19	Hallmeadow Road	50	1602	4	1677	4	1677	4
20	A452 - north of Hallmeadow Road	80	11101	5	11623	5	12263	5

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