



Azymuth Acoustics UK

Professional Acoustic Services

Noise Impact Assessment Ref: Z58999.2

**Land at Barnhill Street/
Raby Street**
Moss Side,
Manchester

On behalf of

Caddick / MSV Housing
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1.0 Introduction

Azymuth Acoustics UK (henceforth Azymuth) has been contracted by Caddick Construction / MSV Housing to perform a Noise Impact Assessment (NIA) in relation to a new build development site located at the land at Barnhill Street/Raby Street in Moss Side, Manchester. The development shall consist of 212no. new units spread across 6no. blocks for the first phase of the development.



Figure 1 – Ground floor plan of the proposed development

The site is adjacent to both the Heineken factory to the north and the West Indian Sports & Social Club (WISSC) which is located to the east of the site.

This noise impact assessment is intended to provide information relating to potential noise levels affecting the site such as that that originate from the surrounding roads, Heineken factory and the WISSC in order to support the detailed planning application for the residential development. In particular, the report sets out the following details:

- The results of a baseline noise survey undertaken in the vicinity of the site located in Moss Side
- The results of noise measurements taken in and around the WISSC during a typical event
- The appropriate assessment criteria and guidance relating to noise in the environment as associated with this kind of development
- Recommendations to meet the targets as set out by the assessment criteria



2.0 Baseline Noise Survey

2.1 Environmental Noise Measurement Procedures

The instrumentation used for the NIA consisted of a SvanTek 977 and two different SvanTek 971 type 1 precision sound level meters.

Equipment Type	Serial Number	Date of Last Calibration Check.	Cal. Certificate Number
2023 Surveys			
SvanTek 977 Sound Level Meter	46460	16.12.22	2022-1104
SvanTek 971 Sound Level Meter	133507	10.01.23	(new)
SvanTek 971 Sound Level Meter	131636	09.02.23	1504520-1
Larson Davis CAL200	16088	24.06.22	UCRT22/1801
Larson Davis CAL200	16088	27.06.23	UCRT23/1843
SvanTek SV33B	83898	17.08.23	06408/1
2025 Surveys			
SvanTek 977 Sound Level Meter	46460	22.11.24	2024-1110
SvanTek 971 Sound Level Meter	133507	01.03.24	1508065-1
SvanTek 971 Sound Level Meter	131636	25.04.25	2025-0461
Larson Davis CAL200	16088	21.10.24	UCRT24/2381
SvanTek SV33B	83898	06.11.24	06979/1

Table 1 – Equipment used and calibration information

The equipment was calibrated before and after measurements. The sound level meters measured A-weighted (fast response) noise levels as well as octave bands noise levels for all measurement record.

Daytime (07:00hrs to 23:00hrs) noise level measurements were undertaken between the following times:

- 12:54hrs and 16:33hrs on Tuesday 16th May 2023
- 19:42hrs and 21:53hrs on Thursday 25th May 2023
- 14:09hrs and 16:37hrs on Tuesday 30th May 2023
- 15:59hrs and 18:58hrs on Monday 19th June 2023
- 09:47hrs and 12:48hrs on Thursday 22nd June 2023
- 07:01hrs and 11:48hrs on Thursday 29th June 2023
- 10:20hrs and 12:34hrs on Saturday 1st July 2023
- 17:57hrs and 19:08hrs on Wednesday 5th July 2023
- 08:35hrs and 15:12hrs on Thursday 3rd April 2025

Night-time (23:00hrs to 07:00hrs) noise level measurements were undertaken between the following times:

- 23:05hrs and 01:45hrs on Wednesday 31st May / Thursday 1st June 2023
- 05:03hrs and 07:00hrs on Thursday 29th June 2023
- 23:05hrs and 00:43hrs on Thursday 13th / Friday 14th July 2023
- 01:55hrs and 03:45hrs on Thursday 15th May 2025

The noise level measurements were undertaken using the sound level meter at the positions shown in Figure 2 below:

- Position 1: Princess Road / Moss Lane East (~7m from Princess Road roadside)
- Position 2: Princess Road / Raby St (~6m from roadside)
- Position 3: Barnhill Street (~1.5m from roadside)
- Position 4: Westwood Street / Moss Lane East (~3m from Moss Lane East roadside)
- Position 5: Princess Road (~4m from bus stop layby)
- Position 6: Raby Street (~1m from roadside)
- Position 7: Moss Lane East (~1.5m from roadside)

Additional measurements were undertaken between 20:44hrs and 00:19hrs on Saturday 1st / Sunday 2nd July 2023 in and around the WISSC during an event. Measurement positions for this survey are shown in Figure 2 below:

- Position A: WISSC site boundary
- Position B: ~1m outside door/window
- Roaming: Internal noise measurements in variety of locations in the WISSC

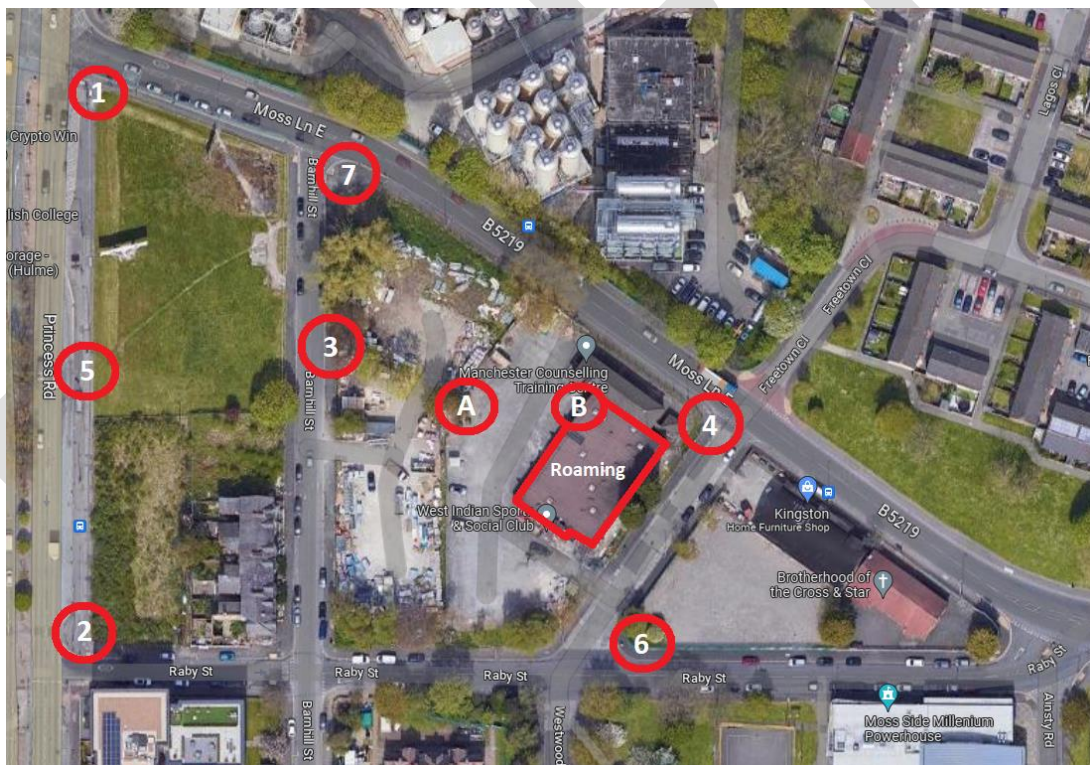


Figure 2 – Environmental noise measurement positions

2.2 Heineken Brewery Site Visit Measurement Procedures

The instrumentation used for the Heineken Brewery site visit consisted of SvanTek 977 and 971 type 1 precision sound level meters. The equipment was calibrated before and after measurements. The sound level meters measured A-weighted (fast response) noise levels as well as octave bands noise levels for all measurement record.

Near-field noise level measurements were undertaken between 11:59hrs and 12:48hrs on Thursday 24th April 2025.

The noise level measurements were undertaken using the sound level meters at the positions shown in Figure 3 below:

- Position H1: Site boundary adjacent to the Boiler Room and Silo block
- Position H1A: Close to the gap between Boiler Room and Silo block
- Position H2: Site boundary adjacent to the Silo block vehicle turning area
- Position H3: Close to Fermentation Vessels (understood to be no.s 1 to 6)
- Position H4: On top of building
- Position H5: On top of masceration vessel (no.s 24-25)
- Position H6: On top of Boiler Room – main noise source observed as Brew House vent
- Position H7: On stairs (approx 15m above ground) adjacent to Fermentation Tanks
- Position H8: On roof of Admin Block at 1m from kitchen extract fan

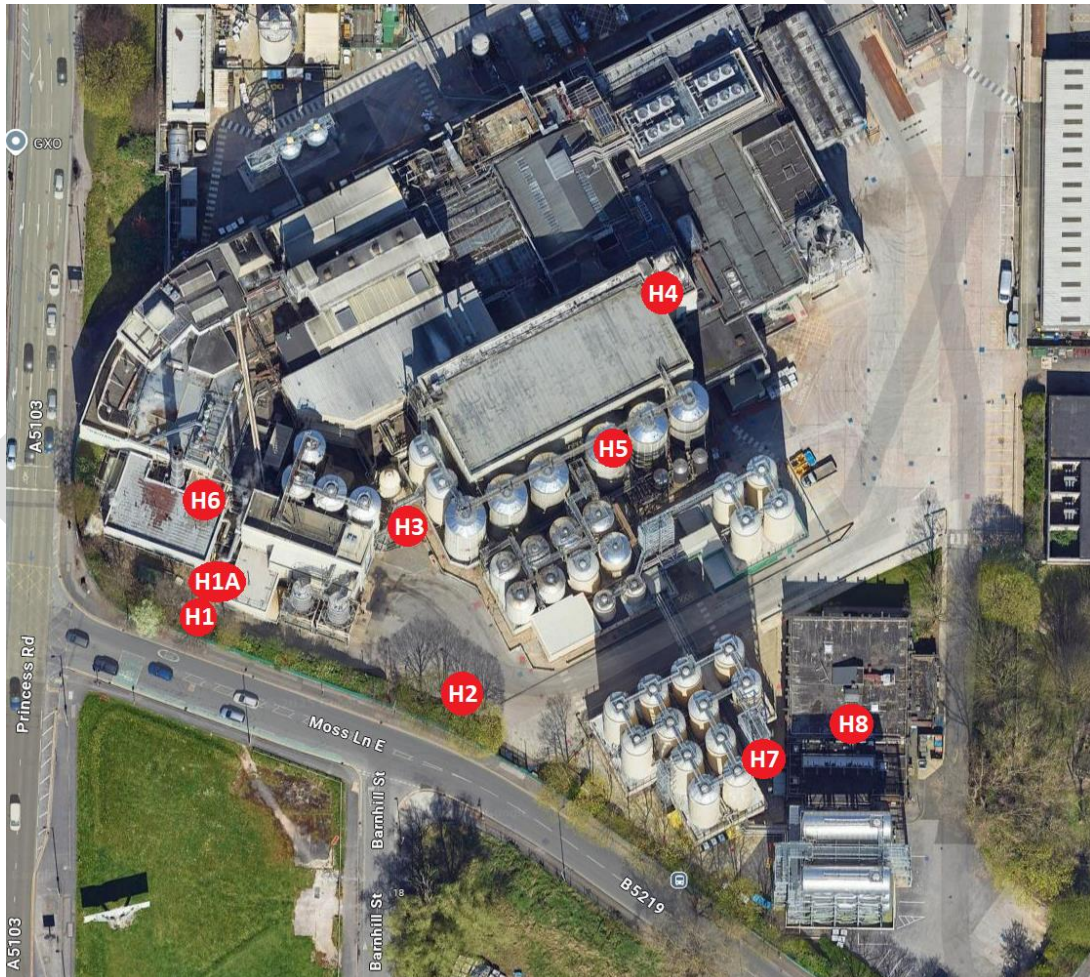


Figure 3 – Heineken Brewery noise measurement positions



2.3 Summary of Environmental Noise Measurements

2.3.1 Baseline Noise Survey

The following table summarises the results of the noise measurements undertaken at the proposed site in terms of the average daytime (07:00hrs to 19:00hrs), evening (19:00hrs to 23:00hrs) and night-time (23:00hrs to 07:00hrs) noise levels.

Azymuth have completed an extensive noise survey with ~30 hours of noise measurements being undertaken around the site as well as in the WISSC and Heineken Brewery.

Location	Period	L _{AFmax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
1) Princess Road / Moss Lane East	Day	82.4	71.9	72.2	68.2	61.4
	Evening	74.5	67.3	68.8	66.1	62.7
	Night	81.0	67.8	70.3	63.9	58.7
2) Princess Road	Day	80.1	69.1	70.2	65.0	57.6
	Evening	83.5	70.6	68.4	64.7	59.3
	Night	76.2	64.8	67.6	60.3	53.4
3) Barnhill Street	Day	74.4	59.6	59.4	55.2	52.6
	Night	60.7	50.9	53.7	49.4	47.2
4) Westwood Street / Moss Lane East	Day	82.8	68.5	69.7	62.7	55.6
	Evening	88.5	71.7	72.4	63.7	56.2
	Night	80.4	63.4	66.7	52.8	46.7
5) Princess Road	Day	76.5	67.6	68.8	64.0	58.6
	Evening	68.8	63.4	64.2	61.1	59.0
	Night	73.8	64.8	68.2	63.2	56.4
6) Raby Street	Day	72.9	56.8	55.5	49.4	46.2
	Evening	67.6	51.7	53.2	50.0	48.1
	Night	66.5	51.9	50.1	45.1	42.5
7) Moss Lane East	Day	80.7	65.8	68.2	62.5	57.4
	Night	81.9	64.4	64.3	55.2	51.3

Table 2 – Summary of noise measurements in the vicinity of the site

Full results of the noise levels recorded during the course of the survey are included in Appendix B of this report.



2.3.2 Assessment of Environmental Night-time L_{Amax} Data

Azymuth has carried out an assessment of the available night-time L_{Amax} noise level data at the worst-affected measurement position, Position 1 (referenced to ~7m from Princess Road). The highest measured L_{Amax} value was 91.5dB and the duration of the night-time survey at this position was exactly 1hr and 40 mins hence it is estimated that the 10th highest L_{Amax} value over the entire 8hr night-time period is likely to be around 89dB or slightly lower.

2.3.3 Description of Surrounding Noise Climate

The main sources of noise that affect the site originate from Princess Road and the Heineken Brewery. Princess Road is a busy road that connects the centre of Manchester to the outer ring road. Traffic on this road is fairly consistent from 06:00hrs to 01:00hrs.

There was a slight hum that was observed from the Heineken Brewery which was more prominent during the night-time measurement periods when the overall background sound level is much quieter.

The weather during the majority of the measurement periods was dry with low wind speeds due to the surveys being undertaken in the spring/summer months.

2.4 Summary of Night-time Noise from the West Indian Sports & Social Club

Music from the WISSC originates from a DJ playing a variety of Reggae and Dub music which is typically bass heavy, in addition, the event involved various guest vocalists performing to the backing tracks. The WISSC suggested this event as a typical music event at the venue.

The sound levels from the DJ night were measured from 20:44hrs on 01/07/2023 and stopped around 00:19hrs on 02/07/2023. Up to 3no. sound level meters were used simultaneously in order to measure the sound levels at various locations within and around the Sports and Social Club. There were two stacks of speakers which were observed to offer up to 1kW of power output per channel. The music was observed to get louder as the night progressed, and the venue began to fill up.

Azymuth Acoustics have analysed the octave band noise levels measured at the rear of the premises (Position A) which are shown in the table below. Based on this analysis it is found that the 63Hz and 125Hz noise levels from the WISSC venue are ~70dB and 61dB respectively (as measured at the site boundary location).

Location	Octave Band Centre Frequency (Hz)								L_{Aeq} (dB)	L_{Amax} (dB)
	63	125	250	500	1k	2k	4k	8k		
A) Noise contribution at 25m from WISSC adjacent to proposed site boundary	69.9	61.0	52.1	54.1	45.7	38.7	37.8	33.9	56	70
B) Noise level at 1m outside part open window or door	81.1	73.6	63.5	63.2	59.6	54.1	49.9	47.0	66	79
Roaming) Internal levels during a reggae night	103.1	96.9	93.8	95.2	87.5	83.0	77.9	80.6	95	104

Table 3 - Summary of noise measurements at West Indian Sports and Social Club



2.5 Summary of Noise from the Heineken Brewery

Azymuth were granted access to the Heineken Brewery premises on Thursday 25th April 2025, the purpose of this visit was to quantify the noise levels produced by the brewery which may affect future residents of the proposed site. Discussions were had with representatives of Heineken to identify noisy areas.

Azymuth were provided with full access to a variety of locations on-site to undertake noise measurements for various items of plant, extract flues and other noise generating processes. The survey included short duration near-field noise measurements as well as longer duration ambient measurements in and around the site boundary closest to the proposed residential development.

A summary of the measurements undertaken during the site visit have been provided below.

Location	Octave Band Centre Frequency (Hz)								L _{Aeq} (dB)	L _{Amax} (dB)
	63	125	250	500	1k	2k	4k	8k		
H1) Site boundary	70.5	63.9	61.4	59.2	58.2	53.5	46.4	40.9	62.2	69.9
H1A) Between boiler room and silo block	69.8	66.7	61.5	58.5	56.4	50.9	44.7	38.9	61.0	69.7
H2) Site boundary	68.4	61.3	58.6	53.5	54.1	49.9	42.7	37.6	58.2	66.0
H3) Fermentation vessels	64.8	63.9	69.5	61.4	62.8	59.5	52.2	45.7	66.9	69.5
H4) On roof	66.9	59.1	58.4	53.2	48.8	43.7	40.5	28.4	55.3	57.3
H5) Above masceration vessel	63.8	58.8	56.0	54.3	52.6	49.1	41.8	28.1	57.1	60.4
H6) Boiler room roof	69.4	66.3	72.2	70.5	67.3	62.4	57.6	50.3	71.9	73.0
H7) On stairs	64.3	62.3	58.0	60.7	57.7	53.0	45.7	34.4	62.1	63.5
H8) Admin block roof (kitchen extract)	84.1	81.9	80.9	81.4	77.5	72.2	66.6	59.4	82.3	83.1

Table 4 – Summary of noise measurements on Heineken premises

Noise emanating from the Boiler Room roof was observed to be the most dominant and could be distinguished in multiple locations on both the Heineken Brewery site and on the site of the proposed residential development. The noise levels at the 250Hz and 500Hz octave band frequencies are characteristic of the noise source in question (likely to be the Boiler room flue).

3.0 Assessment Criteria

In order to assess the extent of any measures required in order to comply with suitable conditions relating to potential noise sources, Azymuth Acoustics UK has reviewed various guidance documents and standards, these include:

- ProPG: Professional Practice Guidance on Planning and Noise (New residential development) 2017
- National Planning Policy Framework (NPPF) 2024
- British Standard 8233: 2014
- World Health Organisation Environmental Noise Guidelines (ENG) 2018
- British Standard 4142: 2014
- IOA Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O 2024
- Acoustics Ventilation and Overheating Residential Design Guide 2020
- Manchester City Council Planning and Noise Technical Guidance 2022

3.1 ProPG: Planning and Noise 2017

This Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The National Planning Policy Framework (NPPF) encourages improved standards of design. The CIEH, IOA and the ANC have worked together to produce this guidance which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.

The Professional Practice Guidance on Planning and Noise States 'The recommended approach is intended to give the developer, noise practitioner, and decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of acoustic issues that would be faced'. It is important that acoustic design is reviewed at an early stage of the development process.

3.2 National Planning Policy Framework (NPPF) 2024

The NPPF provides guidance to local authorities taking into account noise in making planning decisions. Paragraph 198 of the National Planning Policy Framework (NPPF) states that planning policies and decisions should aim to:

- Mitigate and reduce to a minimum to a minimum potential adverse impacts resulting from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life,
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;

Paragraphs 187-188 of the NPPF state that the planning system should distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework. In addition, the planning system should 'prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability'.

Paragraph 200 of the NPPF states new developments should provide suitable mitigation measures to prevent adverse impact of existing business or community facilities, with responsibility for mitigation measures on the applicant or 'agent of change'.



3.3 British Standard 8233: 2014

BS 8233 provides a code of practice for the sound insulation of a variety of building types affected by general environmental noise. It provides recommendations for control of noise in and around buildings and suggests appropriate internal ambient noise level criteria / limits for a variety of different situations including residential properties.

The following table summarises the noise limits suggested by BS 8233 applying to residential properties:

Activity	Room	Good Design Range $L_{Aeq,T}$ dB	
		07:00-23:00hrs	23:00-07:00hrs
Resting	Living Room	35	-
Dining	Dining Room / Area	40	-
Sleeping (daytime resting)	Bedroom (at night)	35	30

Table 5 – Noise Limits for Residential Properties Suggested in BS 8233

3.4 World Health Organisation Environmental Noise Guidelines (ENG) 2018

The main purpose of the 2018 WHO guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from the following sources: transportation (road traffic, railway and aircraft), wind turbines and leisure activities.

The guidelines set out to define recommended exposure levels for environmental noise in order to protect population health. Exposure limits are average levels defined over a period of one year, measured outdoors in free field at the most exposed façade. It should be noted that the document does not provide guideline limit values for multiple noise sources in combination.

The 2018 guidelines supersede the Community Noise Guidelines from 1999. Nevertheless, the document recommends that all CNG indoor guideline values and any values not covered by the current guidelines should remain valid. As such, the following guidance would remain appropriate:

For protection against sleep disturbance inside dwellings, night-time noise levels should not exceed 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for typical single sound events (which are exceeded 15 times or more per night – see ProPG Appendix A.12 for more details).

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise (interpreted as noise from all sources combined) should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas.

It should be noted that exposure levels defined in ENG and CNG are for guidance purposes as relates potential adverse health impacts and should not be interpreted as absolute limits or regulations.

3.5 British Standard 4142:2014+A1: 2019

British Standard 4142 “Methods for assessing and rating industrial sound” describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

- Typically, the greater the difference between background sound and industrial/commercial noise, the greater the magnitude of the impact.



- 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 or a significant 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.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.

BS 4142 notes that: "Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."

3.6 IOA Guide for the Noise Requirements of Approved Document O 2024

Approved Document O 'Overheating' was released in December 2021 and came into effect in England on 15th June 2022. It introduces requirements for various types of residential premises to limit unwanted solar gains in summer and provide an adequate means to remove heat from the indoor environment (Requirement O1 (1)). Requirement O1(2)(a) of the regulation requires that account must be taken of the safety of an occupant, and their reasonable enjoyment of the residence. There is also a requirement (O2(b)) that mechanical cooling may only be used where sufficient heat cannot be removed from the indoor environment without it.

The guide aims to set out a method to demonstrate compliance to the Building Control Body of the noise constraints in Approved Document O. This guide provides clarity for practitioners and regulators so that assessments can be carried out consistently, and the outcome is repeatable and reliable.

3.7 Acoustics Ventilation and Overheating Residential Design Guide 2020

The Acoustics, Ventilation and Overheating Guide (AVO) is intended to be used by acoustic practitioners as well as all those involved in the planning, development, design and commissioning of new dwellings.

It recommends an approach to acoustic assessments for new residential developments that take due regard of the interdependence of provisions for acoustics, ventilation and overheating. Application of the AVO Guide is intended to demonstrate good acoustic design as described in the ProPG, when considering internal noise level guidelines.

3.8 Manchester City Council Planning and Noise Technical Guidance 2022

For Industrial & Commercial developments, Manchester City Council (MCC) suggests an assessment based upon BS 4142 is performed. From this, rating level relative to the background sound level can be used to indicate the adverse impact of the development. The lower the rating level (L_{Aeq}) relative to the background sound level (L_{A90}), the lower the likelihood of an adverse impact.

The objective with regards to noise from entertainment venues:

"Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}) respectively."

The guidance also states that:



“Entertainment noise (L_{Aeq}) should be controlled to 5dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location”.

The objective with regards to noise from new industrial developments:

“The development should be designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.”

3.9 Recommended Noise Assessment Criteria

3.9.1 General Environmental Noise Criteria

Based on the guidance above it is recommended that the following criteria would be reasonable with the aim of minimising the impact of the general environmental noise on the proposed new residential accommodation:

- Daytime noise levels not to exceed 35dB $L_{Aeq, 16hr}$ in living rooms / bedrooms
- Daytime noise levels not to exceed 40dB $L_{Aeq, 16hr}$ in dining room / kitchen
- Night-time noise levels in bedrooms not to exceed 30dB $L_{Aeq, 8hr}$
- Night-time single sound events in bedrooms not to exceed 45dB L_{Amax} more than 15 times a night

Table 4, Note 5 of BS 8233 states: ‘If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.

3.9.2 Entertainment Noise Criteria (WISSC)

Based on the guidance above (Section 3.8) it is recommended that the following criteria would be reasonable with the aim of minimising the impact of entertainment noise on the proposed new residential accommodation as per MCC guidance:

- Not exceeding 47dB at 63Hz inside nearby habitable rooms of (proposed) dwellings, equivalent to 60dB at 63Hz outside a part open window
- Not exceeding 41dB at 125Hz inside nearby habitable rooms of (proposed) dwellings, equivalent to 54dB at 125Hz outside a part open window

The overall assessment of the noise levels as implied by the “agent of change” aspect of the scheme are addressed with particular mitigation measures to allow future operation of the WISSC to remain without constraints or significant noise impacts.

3.9.3 Industrial Noise Criteria (Heineken)

The above guidance documents (Sections 3.1 – 3.8) do not provide specific noise level recommendations for new residential accommodation impacted by an existing industrial development. As such, an assessment based upon BS 4142 will be used in order to minimise the impact of industrial noise on the proposed new residential accommodation. Also the assessment will ensure that the “agent of change” aspect of the scheme is addressed.

It is worth noting this assessment relates to new residential accommodation and an existing industrial development, in contrast to BS 4142 and MCC Planning and Noise Technical Guidance which relate to new industrial developments and existing noise sensitive receptors.



4.0 Assessment of Results

4.1 General (Environmental) Assessment of Noise Risk

The following noise risk assessments highlight the level of risk of an adverse noise effect based on the guidance from the ProPG and AVO documents.

Azymuth have calculated the likely range of noise levels to be experienced by each façade of the development using both measured levels and those derived from the SoundPLAN noise model. In each instance the worst-case noise level has been used to assess the risk of adverse noise effect and overheating.

Location	Time of Day	Calculated Noise Levels (dBA)	ProPG Risk of Adverse Effect	AVO Guide Risk (overheating) Category
Block A North Elevations on Moss Lane East	Daytime $L_{Aeq, 16hr}$	68-70	Medium-High	High
	Night-time $L_{Aeq, 8hr}$	62-65	High	High
East Elevations of Proposed Site	Daytime $L_{Aeq, 16hr}$	52-61	Low	Low-Medium
	Night-time $L_{Aeq, 8hr}$	50-56	Low-Medium	Medium
West / Princess Road Elevations	Daytime $L_{Aeq, 16hr}$	69-71	Medium-High	High
	Night-time $L_{Aeq, 8hr}$	63-66	High	High
South Boundary / Elevations	Daytime $L_{Aeq, 16hr}$	60-62	Low-Medium	Medium
	Night-time $L_{Aeq, 8hr}$	56-58	Medium	High

Table 6 – Noise risk assessment for the proposed site

As shown above, the façades facing directly onto Princess Road / Moss Lane East would represent the most significant risk in terms of potential adverse impact. These elevations possess an elevated risk of overheating requiring enhanced ventilation that would normally be offered by opening windows. The noise risk assessment indicates that relying on opening windows would result in significant noise intrusion, thus disrupting normal sleep. The AVO guide specifically states the following example outcomes if noise levels are deemed to be too high.

“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.”

It should be noted that ProPG does not account for daytime L_{Amax} instances that may arise from cars passing by. These instances may cause annoyance during the day to the potential residents. As such, extra mitigation has been recommended in order to minimise noise complaints to the premises.

The overall design of the background and purge ventilation for the Princess Road and Moss Lane East elevations has been assessed with the assumption that windows on (all floor levels of) these elevations will not normally be open owing to the elevated noise levels present.

4.2 SoundPLAN Model

Azymuth has undertaken acoustic modelling with the SoundPLAN 9.1 noise modelling software to predict and visualise the impact of noise on the proposed development site, including road traffic, WISSC (entertainment) and Heineken Brewery (industrial) noise. This supplements the noise monitoring results by allowing the noise levels to be extrapolated to upper floor levels and between measurement positions.

Environmental noise maps show the effect of traffic noise, both day and night, on the development.

Noise maps relating to the WISSC assess a worst-case scenario where an event is taking place into the early hours of the morning (2300 to 0200hrs) and where the general background level is less i.e. where any potential noise impacts shall be at their greatest and most distinguishable.

Noise maps relating to the Heineken Brewery also aim to show a worst-case (night-time) scenario where multiple noise sources are operating simultaneously.

NB noise map colour scales vary by what source is being assessed; colours from different assessed sources can therefore not be directly compared to one another.

4.2.1 General Environment Grid Noise Maps (GNM)

Azymuth have produced the following grid noise maps (GNM) which generally show the effects of environmental (traffic) noise at a height of 1.5m above ground floor level for daytime (0700hrs to 2300hrs) and night-time (2300hrs to 0700hrs).

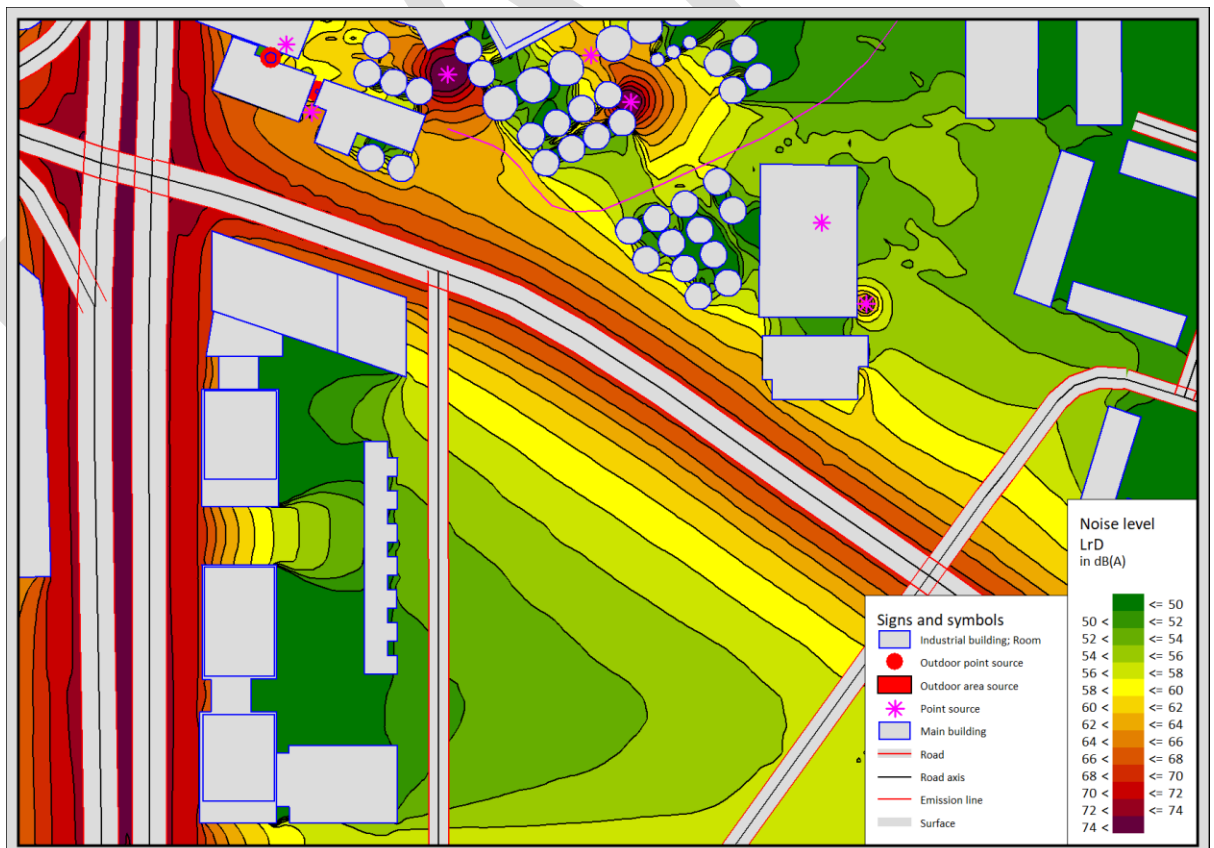


Figure 4 – GNM of general environmental noise affecting the site, daytime



Figure 5 – GNM of general environmental noise affecting the site, night-time

4.2.2 General Environmental Façade Noise Maps (FNM)

An array of FNMs for the general environmental noise affecting the site can be found in Appendix E. These FNMs cover both daytime and night-time periods.

4.2.3 West Indian Sports & Social Club Grid Noise Map (GNM)

The following grid noise map (GNM) shows the effect of noise generated by the WISSC during an event at peak operational hours during the night ('worst case', 2300hrs to 0200hrs). The noise map has again been generated at ground floor level (1.5m height).

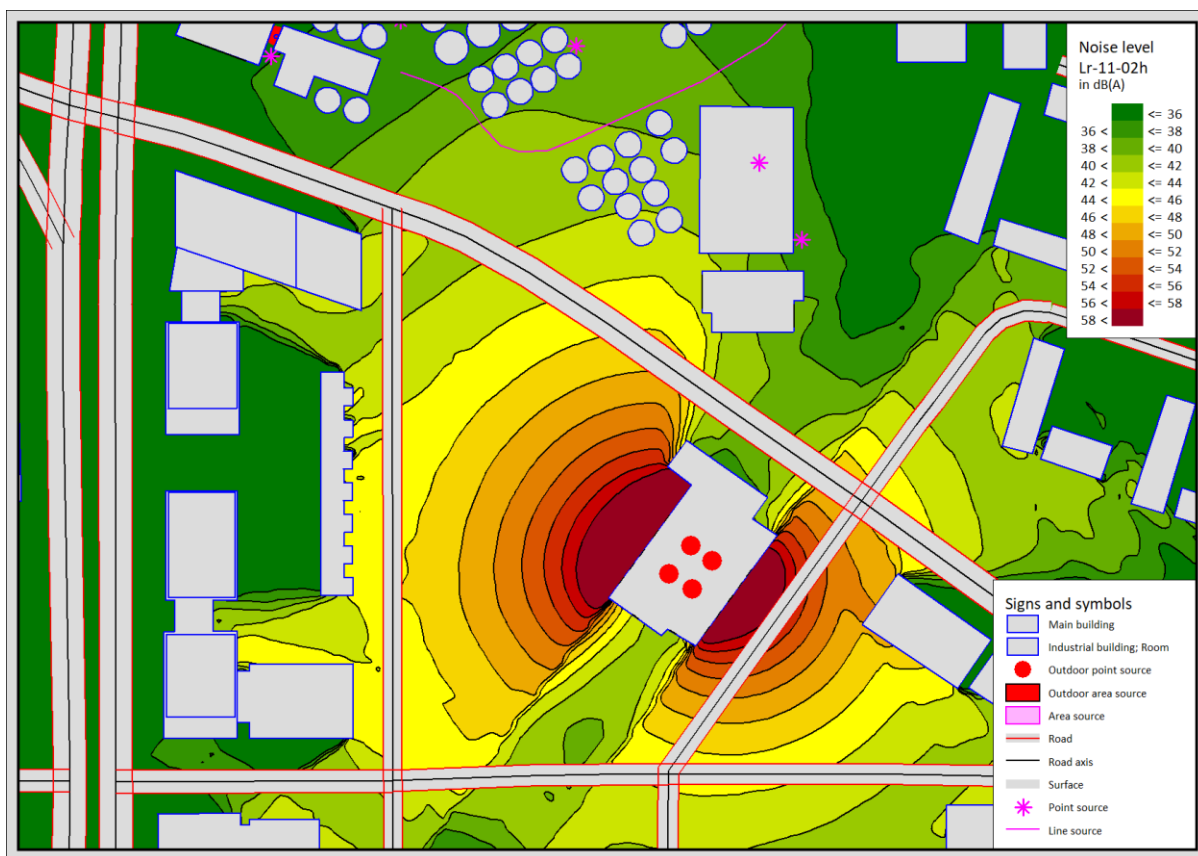


Figure 6 – GNM of WISSC entertainment noise affecting the site (between 2300 to 0200hrs)

4.2.4 West Indian Sports & Social Club Façade Noise Maps (FNM)

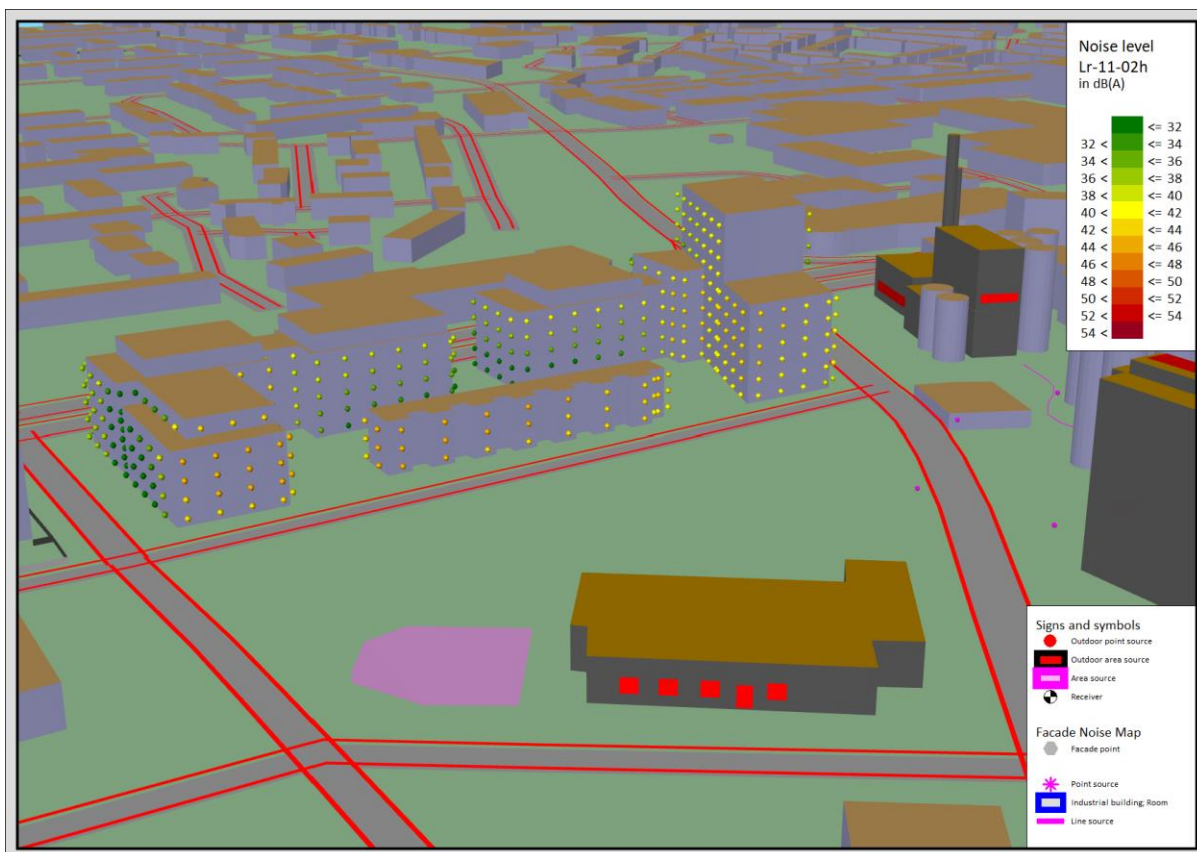


Figure 7 – FNM of WISSC entertainment noise affecting the site (between 2300 to 0200hrs)

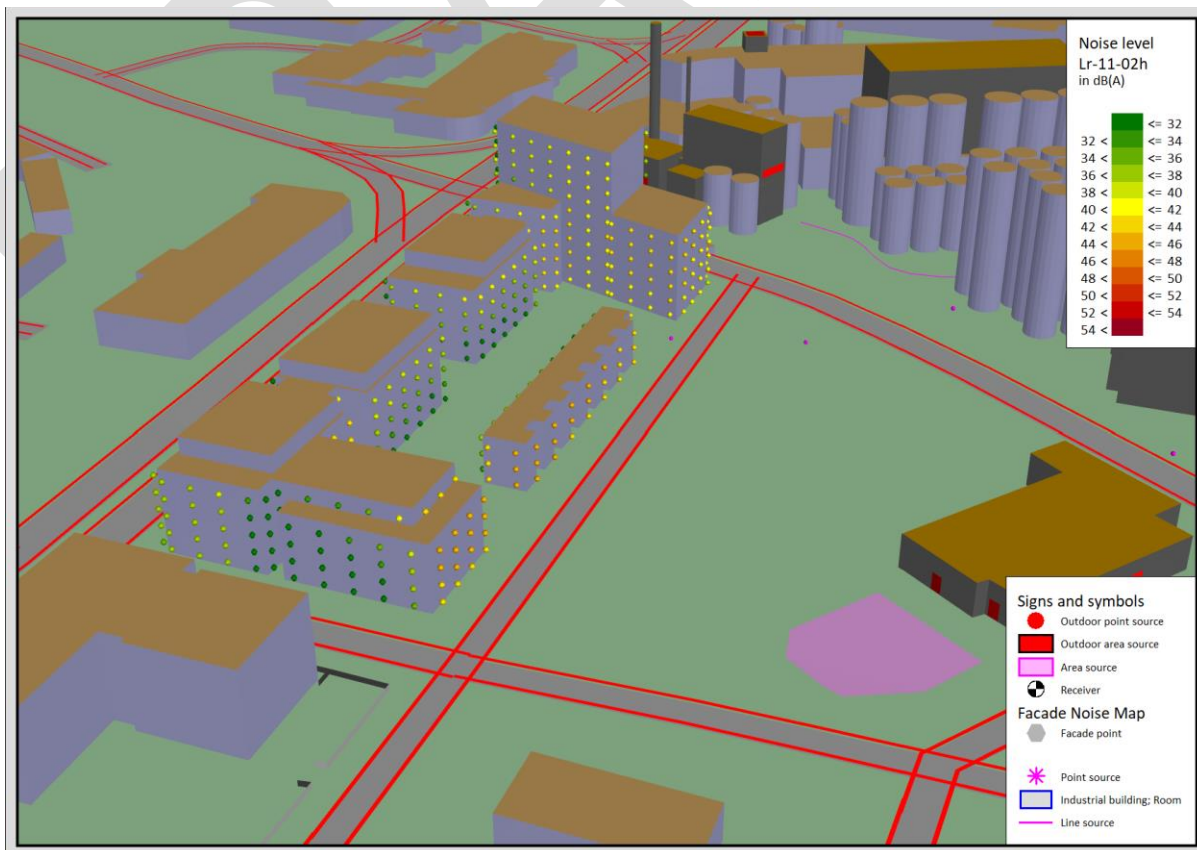


Figure 8 – FNM of WISSC entertainment noise affecting the site (between 2300 to 0200hrs)



4.3 Assessment of Noise from West Indian Sports & Social Club

The measured sound level at the WISSC boundary is ~54dBA. This level is representative of an event period lasting from 2300hrs to 0200hrs (WISSC licensed hours).

Azymuth have assessed noise from the WISSC against the MCC criteria for entertainment noise in two scenarios, windows partly open (for ventilation) and windows closed for noise mitigation for the above event duration times.

4.3.1 With Open Windows at Receptor locations

The below table identifies the octave band spectrums measured and predicted by Azymuth during a typical WISSC event (the windows here being partly open) at the blocks of the proposed site. Each measured/calculated value has been colour coded as to indicate where the levels may exceed the associated external MCC targets with partly openable windows. (≤ 60 dB at 63Hz and ≤ 54 dB at 125Hz, Section 3.9.2).

The top and bottom levels of the worst-affected blocks have been included to show the range of values incident on each façade.

Receptor	Octave Band Centre Frequency (Hz)								Total dBA
	63	125	250	500	1k	2k	4k	8k	
WISSC Boundary (measured entertainment noise)	69.9	61.0	52.1	54.1	45.7	38.7	37.8	33.9	54.1
WISSC Boundary (measured ambient noise with no entertainment)	59.5	54.0	49.4	49.6	49.8	46.2	41.4	37.0	53.7
Block A, Ground Floor (calculated)	61.1	51.3	40.3	36.8	38.0	30.3	24.0	12.9	42.6
Block A, 5 th Floor (calculated)	60.9	52.0	45.8	40.9	38.7	30.4	24.1	12.9	44.3
Block B/C Ground Floor (calculated)	52.9	42.1	36.0	24.9	19.5	11.4	2.3	-12.6	32.2
Block B/C Fourth Floor (calculated)	55.8	48.3	44.3	39.3	37.5	29.2	22.6	10.4	42.4
Block D Ground Floor (calculated)	60.7	52.3	42.4	39.3	40.6	32.8	26.3	14.6	44.5
Block D 5 th Floor (calculated)	60.7	53.0	48.0	43.3	41.2	32.8	26.4	14.8	46.3
Block E, Ground Floor (calculated)	62.8	53.2	43.0	40.0	41.1	33.3	27.2	17.2	45.3
Block E, 3 rd Floor (calculated)	62.7	53.8	48.1	44.0	41.7	33.4	27.5	17.5	47.0
Block E, 4 th Floor (set back) (calculated)	58.6	50.9	47.5	43.0	41.3	33.0	26.9	16.7	45.9
Block F, Ground Floor (calculated)	63.7	54.3	44.0	40.1	41.0	33.3	27.5	18.6	45.6
Block F, 2 nd Floor (calculated)	63.7	53.8	48.8	43.6	41.4	33.3	27.6	18.6	47.0

Table 7 – Octave band (entertainment noise) levels at the proposed site and WISSC boundary with partly opened window



The predicted noise levels on the eastern façades of Blocks A, D, E, and F are 60-64dBA in the 63Hz octave frequency band and on the eastern façade of Block F (ground floor) the predicted levels are ~54dBA in the 125Hz octave frequency band. These levels exceed the Manchester City Council targets as set out in Section 3.9 by 1-4dB. As such, extra mitigation shall be required to achieve acceptable internal levels.

4.3.2 With Windows Closed at Receptor Locations

The table below shows the internal noise levels to be experienced by dwellings with elevations facing the WISSC (their windows being open) but with receptors windows closed as a mitigation strategy. Azymuth have calculated the break-in noise level to the worst-affected dwellings using the proposed glazing specifications of min. 43dB R_w and 36dB R_w+C_{tr} for Block A and 40dB R_w and 33dB R_w+C_{tr} for Blocks D, E and F as per Section 5.1 of this report. An external wall construction with an average Sound Reduction Index (SRI) of ~55dB (worst-case) was also used in the calculation, Azymuth anticipates that the actual rating of the external wall shall exceed this and would therefore yield greater results.

The external levels as used in Table 7 have been used for the assessment in Table 8 below. Noise levels have been highlighted **Green** as to indicate where they are below the associated internal MCC targets with windows closed. (≤ 47 dB at 63Hz and ≤ 41 dB at 125Hz, Section 3.9.2).

The top and bottom levels of the worst-affected blocks have been included to show the range of values incident on each façade.

Receptor	Octave Band Centre Frequency (Hz)							Total dBA
	63	125	250	500	1k	2k	4k	
Block A, Ground Floor Bedroom (calculated)	39	27	9	-3	-13	-21	-34	15.5
Block A, 5 th Floor Bedroom (calculated)	41	30	17	3	-10	-19	-31	18.1
Block E, Ground Floor Bedroom (calculated)	42	30	13	1	-9	-17	-29	18.4
Block D Ground Floor Bedroom (calculated)	42	31	14	2	-8	-15	-28	18.6
Block D 5 th Floor (calculated)	42	32	20	6	-7	-15	-28	19.5
Block E, 3 rd Floor Bedroom (calculated)	42	31	18	5	-8	-17	-29	18.9
Block E, 4 th Floor (set back) (calculated)	40	30	20	7	-6	-14	-27	18.5
Block F, Ground Floor Bedroom (calculated)	46	34	22	8	-5	-14	-25	22.6
Block F, 2 nd Floor Bedroom (calculated)	46	34	17	4	-6	-14	-26	22.4

Table 8 – Octave band (entertainment noise) levels at proposed site with habitable windows closed

The calculated internal noise levels in the 63Hz and 125Hz frequency bands are compliant with the MCC criteria for entertainment noise within a dwelling for all Blocks.



The internal background levels shall be controlled by noise emitting from mechanical equipment inside dwellings such as MVHR units, fridges etc, greater differences between the background level and calculated internal level shall determine how distinctive the noise may be perceived.

4.4 Assessment of Noise from Heineken Brewery Site

4.4.1 External Noise Levels at Receptor Locations

The below table identifies the octave band spectrums measured and predicted by Azymuth from the Heineken Brewery external to Block A.

Each calculated external value has been colour coded based on its compliance with the relevant target (background level). **Green** indicates no or minor (less than 5dB) exceedances, **Yellow** indicates exceedances between 5-10dB and **Orange/Red** indicates exceedances exceeding 10dB. The ground floor is the least affected by the noise whereas the 7th floor is most affected, both these receptors have been included in the calculations below.

Receptor	Octave Band Centre Frequency (Hz)								Total dBA
	63	125	250	500	1k	2k	4k	8k	
Position 7 (calculated Heineken noise)	56.3	50.2	48.3	44.8	47.8	44.4	35.9	25.0	51.1
Position 7 (measured night-time ambient noise)	66.0	61.0	58.5	56.8	59.4	55.7	46.5	37.6	62.5
Position 7 (measured night-time L_{90})	55.5	50.5	48.0	46.3	48.9	45.2	36.0	27.1	52.0
Block A, Ground Floor (calculated)	60.1	53.8	53.6	51.5	50.1	44.9	36.6	25.0	54.1
Block A, 7 th Floor (calculated)	61.9	56.8	59.0	57.2	55.0	49.9	42.7	31.8	59.3

Table 9 – Octave band (Heineken noise) levels at the proposed site and Position 7

Noise levels emanating from the Heineken Brewery have been calculated to be between 54-59dBA externally at the worst affected elevation of the proposed site, Block A. When applying a BS 4142 methodology these levels exceed the lowest measured background level (night-time, L_{90}) by 2 to 7dB.

4.4.2 Internal Levels with Windows Closed

The below table identifies the octave band spectrums to be experienced within dwellings at night (worst-case) as a result of noise from the Heineken Brewery only as predicted and calculated by Azymuth with windows closed as a mitigation strategy. Noise levels have been assessed against the internal noise level criteria for bedrooms at night from BS 8233 and contained within Section 3.9.1 of this report i.e. 30dB $L_{Aeq,8hr}$.



Azymuth have calculated the break-in noise level in the worst-affected dwellings using the proposed glazing specifications of min. 48dB R_w / 41dB R_w+C_{tr} and 43dB R_w / 36dB R_w+C_{tr} (Section 5.1) for dwellings on the Moss Lane East elevation of Block A. An external wall construction with an average Sound Reduction Index (SRI) of ~55dB (worst-case) was also used in the calculations.

Receptor	Octave Band Centre Frequency (Hz)							Total dBA
	63	125	250	500	1k	2k	4k	
Min. 48dB R _w and 41dB R _w +C _{tr} Windows within 9m of Princess Road								
Block A, Ground Floor Bedroom (calculated)	41	28	20	9	0	-9	-25	18.0
Block A, 7 th Floor Bedroom (calculated)	42	31	25	15	4	-4	-19	21.4
Min. 43dB R _w and 36dB R _w +C _{tr} Windows within 40m of Princess Road								
Block A, Ground Floor Living Room (calculated)	39	31	24	12	2	-2	-16	19.4
Block A, 5 th Floor Living Room (calculated)	41	33	29	17	4	0	-13	23.0

Table 10 – Internal octave band Heineken levels at proposed site with windows closed

The mitigation provided by the glazing and ventilation specifications shall ensure that noise from the Heineken Brewery does not adversely affect future occupants of the new dwellings as it is less dominant than the traffic noise. Hence, the level of protection provided by the proposed glazing and other mitigation measures is sufficient to deal with the overall noise levels on the Moss Lane East elevation.



5.0 Recommendations for Noise Mitigation

Based on survey data and the predicted noise levels derived from SoundPLAN, Azymuth have produced the following recommendations in order to mitigate the effects of noise within the dwellings of the proposed development. If these recommendations are followed, noise levels within the development will satisfy the criteria as set out in Section 3.9.

5.1 Recommended Glazing Specification

The table below outlines the glazing specifications Azymuth would recommend in order to achieve the target indoor ambient noise levels. The recommendations are colour coded with reference to Figure 9.

Location (Habitable Spaces)	Glazing Specification	Appropriate / (as examples of) Compliant Glazing Types
Princess Road elevation and on Moss Lane East within 40m of Princess Road junction	High quality glazing system certified to provide min. 48dB R_w and 41dB R_w+C_{tr}	Acoustic glazing e.g 8.8/16 argon/12.8mm Optiphon acoustic double (or suitable triple) glazing in a glazing system with matching acoustic seals on opening elements
Moss Lane East elevation	High quality glazing system certified to provide min. 43dB R_w and 36dB R_w+C_{tr}	Acoustic glazing e.g 10/16 argon/8.8mm Optiphon acoustic double (or suitable triple) glazing in a glazing system with matching acoustic seals on opening elements
All other elevations	Thermal double glazing system to provide min. 40dB R_w and 33dB R_w+C_{tr}	Acoustic glazing e.g 6/16 argon/6.8mm Optiphon acoustic double (or suitable triple) glazing in a glazing system with matching acoustic seals on opening elements

Table 11 – Azymuth recommended glazing specification for the proposed site

NB additional care will be needed with the overall glazing systems on the Princess Road and Moss Lane East elevations in order to ensure that the window / patio door frames are compatible with the target sound insulation values. Manufacturers / suppliers will need to confirm that the entire glazing system is capable of achieving the desired sound insulation targets and not just the double-glazed units employed.

Min. 48dB Rw and 41dB Rw+Ctr
Min. 43dB Rw and 36dB Rw+Ctr
Min. 40dB Rw and 33dB Rw+Ctr

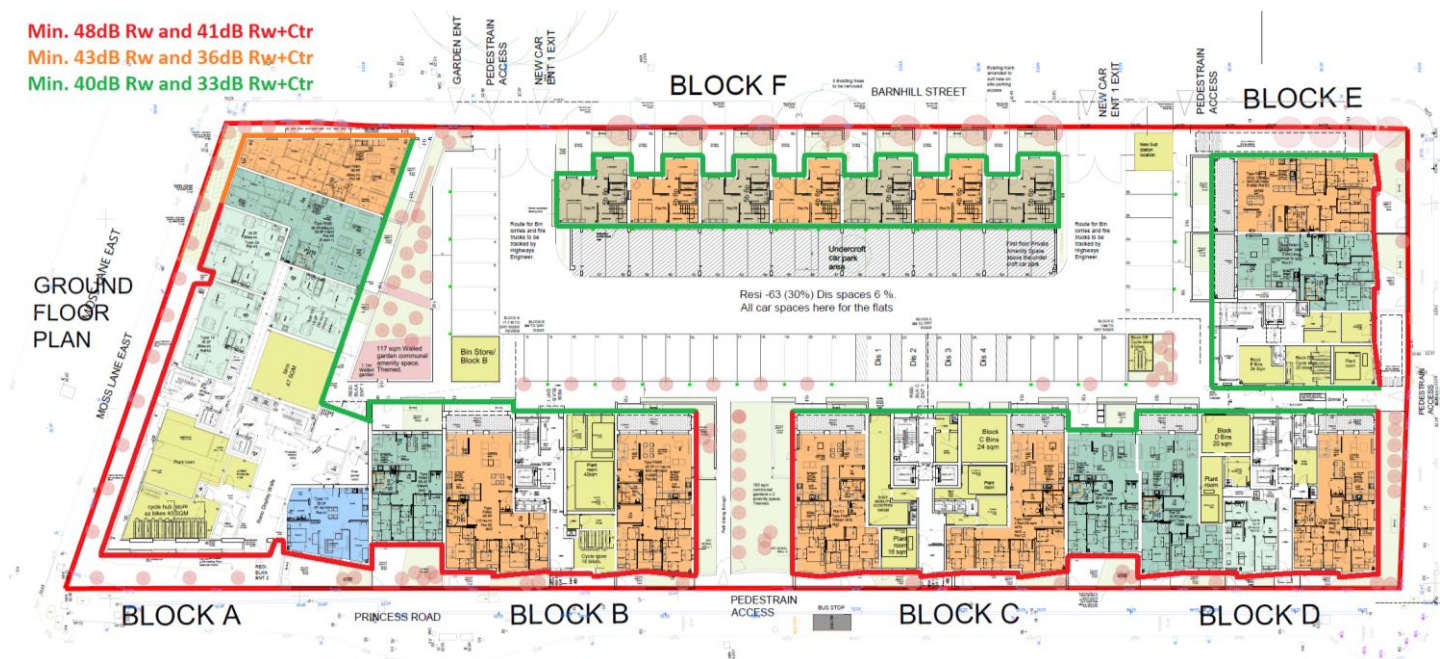


Figure 9 – Glazing Specifications for the proposed site (all habitable floor levels)

5.2 Recommended Ventilation Specification

Table 12 outlines the recommended ventilation that should be paired with the glazing specifications to ensure the appropriate sound insulation targets are met. With reference to the AVO and ProPG guidance, Azymuth recommends the following ventilation specifications to ensure sufficient air flow to dwellings whilst also achieving internal noise level targets.

Specifications apply to whole dwellings that have any single elevation that faces onto any of the mentioned roads.

The recommendations are colour coded with reference to Figure 10.

Location (Habitable Spaces)	Ventilation Specification	Appropriate Ventilation Types
Dwellings with Princess Road and Moss Lane East Elevations	System 4 MVHR	No trickle vents. Any air inlets/outlets for MVHR should be appropriately attenuated. Plus additional measures to consider the specifics of the potential over-heating risk for this site.
Dwellings with elevations facing only onto (former) Barnhill Street	System 4 MVHR or System 3 with acoustically rated trickle vents or air-bricks rated at min. 38dB D _{new}	Where needed Titon TALH&M '9x6' Acoustic AirLiner (achieves up to 40dB D _{new}) or other similar acoustic vents

Table 12 – Azymuth recommended ventilation specification for the proposed site

Based on the over-heating calculations carried out by the energy assessor a ventilation strategy has been developed which satisfactorily addresses the Approved Document O over-heating / noise related issues (assuming windows being closed for the majority of the daytime and night-time periods on the Princess Road and Moss Lane East elevations which



experience the higher levels of noise). Ventilation on worst-affected elevations shall be via boosted mechanical ventilation rates to satisfy Approved Document O.

In terms of the calculated entertainment noise levels (on Barnhill Street elevation) windows would generally remain closed at night to manage noise, although this is not necessarily every night and would only be applicable during nights where there are amplified music events on at the WISSC.

Azymuth understands that dwellings with elevations facing onto Barnhill Street are likely to be installed with MVHR units which would be more than acceptable to mitigate the effects of both noise and overheating.

MVHR, no Trickle Vents
MEV, Trickle Vents min. 38dB Dnew

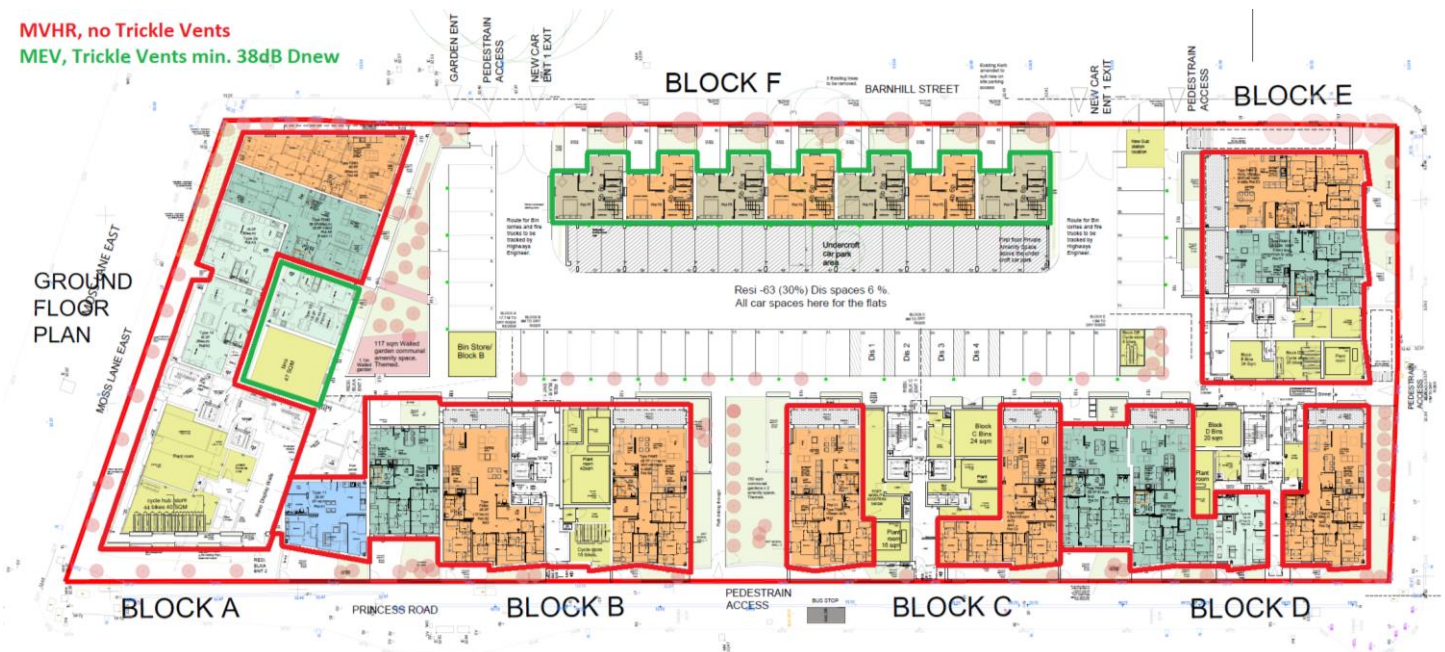


Figure 10 – Example ventilation specifications for the proposed site (all habitable floor levels)

5.3 Other Elements of Building Envelope

Other elements of the building envelope should have the following sound insulation performance:

- External Walls: minimum sound insulation 58dB R_w . This minimum is likely to be significantly exceeded by a normal brickwork façade. Where alternative external wall types (eg composite cladding panels / Metsec build-ups) are proposed on habitable areas it will be appropriate to check whether they comply with the target 58dB R_w .
- Roof: minimum sound insulation 50dB R_w . This minimum would likely be exceeded by a suitably insulated concrete roof or composite flat roof. (NB for composite flat roof build-ups a minimum 200mm roof void and 100mm mineral wool insulation would be recommended over and above the rigid insulation required to provide the required levels of thermal insulation). Further acoustic design advice may be needed in order to ensure that composite roof structures can achieve the 50dB R_w recommended here.

6.0 Summary

6.1 Summary of Findings

Azymuth has undertaken a Noise Impact Assessment (NIA) in relation to a new development consisting of 212no. units spread across 6no. blocks located in Moss Side, Manchester.

The proposed site is adjacent to the West Indian Sports and Social Club (WISSC). The WISSC regularly host events that run into the night, Azymuth has undertaken extensive noise monitoring surrounding the development site as well as in the WISSC during an event. Over 30 hours of general environmental noise measurements have been made in order to provide robust acoustic recommendations for the development site plus several additional hours of noise measurements associated with the WISSC and the Heineken brewery sites. As well as the WISSC, the other main source of noise affecting the site originates from traffic noise along both Princess Road and Moss Lane East. Princess Road sees a continuous flow of traffic from 0600hrs to 0100hrs.

Noise levels along Princess Road are typically between 67-73dB L_{Aeq} during the daytime and between 65-68dB L_{Aeq} during the night-time. Noise levels along Moss Lane East are typically between 66-71dB L_{Aeq} during the daytime and between 63-66dB L_{Aeq} during the night-time.

Noise levels at the boundary of WISSC during an event were measured to be ~70dBA in the 63Hz frequency band, 61dBA in the 125Hz frequency band and ~54dBA overall. The predicted noise levels on the western façades of Blocks A, D, E, and F shall result in internal ambient levels that exceed the recommended low frequency targets as set out in Section 3.9 if windows are to be kept partly open (assuming 13dB attenuation). With windows closed the internal levels in these dwellings shall comply with the MCC target criteria for entertainment noise in the 63Hz and 125Hz frequency bands assuming that all recommendations relating to glazing and building fabric included within this report are adhered to.

Noise levels emanating from the Heineken Brewery have been calculated to be between 54-59dBA at the worst affected elevation of the proposed site, Block A and as such would exceed the lowest measured background level (night-time, L_{90}) by up to 7dB. The mitigation provided by the glazing and ventilation specifications shall also ensure that noise from the Heineken Brewery does not affect future occupants of the new dwellings as it is less dominant than the traffic noise.

6.2 Summary of Noise Mitigation Measures

Azymuth would recommend the following noise mitigation measures in order to achieve the internal ambient noise level targets as set out in Section 3.9.

Glazing specification:

- Princess Road elevations and elevations on Moss Lane East within 40m from Princess Road: min. 48dB R_w and 41dB R_w+C_{tr}
- Other Moss Lane East elevations: min. 43dB R_w and 36dB R_w+C_{tr}
- All other elevations: min. 40dB R_w and 33dB R_w+C_{tr}

Ventilation specification:

- Princess Road and Moss Lane East, elevations where significant over-heating risk has been identified: System 4 MVHR (no trickle vents and with boost function as a minimum specification).
Carry out a detailed over-heating assessment by a suitably qualified consultant to ensure



that opening windows are not needed to ventilate the flats even on the hottest of the year (into the future). This is likely to require specific measures to minimise solar gain and allow rapid ventilation without opening windows.

- Apartments facing onto Raby Street or Barnhill Street: System 4 MVHR or System 3 MEV with acoustically rated trickle vents or air-brick ventilators rated at min. 38dB D_{new} to allow enhanced background ventilation.

Other specifications:

- External walls: min. sound insulation 58dB R_w
- Roof: min. sound insulation 50dB R_w

If the recommendations outlined above are to be adhered to then the internal noise levels within dwellings shall satisfy the assessment criteria contained within Section 3.9.

Relevant Sections

- Environmental noise measurements: 2.1 and 2.3
- WISSC measurements: 2.1 and 2.4
- Heineken Brewery measurements: 2.2 and 2.5
- Assessment of environmental noise: 4.1
- Assessment of WISSC noise: 4.3
- Assessment of Heineken Brewery noise: 4.4
- Noise mitigation: 5.0



Appendix A – Glossary of Acoustic Terms

Decibel (dB)

This is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro Pascal to 100 Pascal).

dB (A)

This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound of different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level

The human ear is sensitive to sound over a range of frequencies between approximately 20Hz to 20kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it.

L_{Aeq}

This is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or sometimes T_{30} or T_{60})

This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60dB, after the source has been switched off. The reverberation time is frequency dependent and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)

Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy entering the receiving room (usual range 100 - 3150Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory in either octave or one-third octave bands.

$SRI = L_1 - L_2 + 10 \log (S/A)$, where:

L_1 = Noise level in the source room

L_2 = Noise levels in the receiving room

S = Surface area of test specimen

A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)

This is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves.



Appendix B – Environmental Noise Survey Data

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Tuesday 16 th May 2023							
12:54:37	1	00:05:00	91.7	68.4	71.6	66.5	58.5
12:59:50	1	00:05:00	81.3	68.2	71.4	66.5	60.1
15:58:00	1	00:05:00	79.7	70.7	72.7	70.3	66.7
16:03:00	1	00:05:00	78.5	68.4	70.7	67.7	63.5
16:08:00	1	00:05:00	80.2	68.5	71.4	67.6	59.7
16:13:00	1	00:05:00	85.8	68.5	70.9	66.5	59.7
Thursday 25 th May 2023							
19:42:00	1	00:05:00	74	69.4	72	69.4	55.9
19:48:00	1	00:05:00	85	70.9	74.3	69.1	61.9
19:52:00	1	00:05:00	80.4	70.1	73.5	68.3	61
19:58:00	1	00:05:00	75.6	64.1	67.2	61.5	56.2
20:03:00	1	00:05:00	79.9	63	66	60.7	55.9
20:08:00	1	00:05:00	75.8	67.2	69.4	66.9	62.6
20:13:00	1	00:05:00	73.7	68	69.4	67.6	66.1
20:18:00	1	00:05:00	73.6	67.3	69	67.1	64.8
20:23:00	1	00:05:00	71.7	66	67.4	65.7	64.1
20:28:00	1	00:05:00	71.7	66.1	67.5	65.7	64.2
20:33:00	1	00:05:00	74.5	68.3	70.1	68.1	65
20:38:00	1	00:05:00	74.6	68.9	70.2	68.7	67.1
20:43:00	1	00:05:00	74.7	68.9	70.2	68.7	67.1
20:48:00	1	00:05:00	74	67.8	69.9	68.1	61.5
20:53:00	1	00:05:00	68.4	62.6	64.7	62	59.6
Tuesday 30 th May 2023							
14:09:00	1	00:05:00	85.5	70.1	72.6	68.2	58.2
14:14:00	1	00:05:00	80.9	69.2	72	68.1	59.1
14:19:00	1	00:05:00	90.2	71.4	72.5	68.8	60.3
14:24:00	1	00:05:00	92.1	71.9	73.5	68.6	60.9
14:29:00	1	00:05:00	109.6	86	76.7	70	65.2
14:34:00	1	00:05:00	88.9	74.3	77.6	70.5	62.9
14:39:00	1	00:05:00	84.9	71	73.6	68.9	61.8
14:44:00	1	00:05:00	84.7	71.8	75.2	69	61.2
14:49:00	1	00:05:00	91.7	72.4	73.8	68.7	60.1
14:54:00	1	00:05:00	97.5	74.9	72.2	68.5	63
14:59:00	1	00:05:00	83.7	69.4	72.2	68.1	61.8
Wednesday 31 st May 2023							
23:05:00	1	00:05:00	76.1	68.1	71	67.7	60
23:10:00	1	00:05:00	81.3	69.7	72.4	68.7	63.5
23:15:00	1	00:05:00	77.2	68.8	72	67.8	61.2
23:20:00	1	00:05:00	81.5	70.3	72.8	69.6	63.8
23:25:00	1	00:05:00	82.4	69.8	72.4	69.1	63.8
23:30:00	1	00:05:00	84.2	69.2	71.5	67.7	61.4
Monday 19 th June 2023							
15:59:00	1	00:05:00	83.8	69.9	72.6	68.1	59.9
16:04:00	1	00:05:00	83	69.7	72.2	68.8	60.6
16:09:00	1	00:05:00	75.5	68.5	71.3	67.8	59.9



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
16:14:00	1	00:05:00	83.7	69.9	72.6	68.6	60.8
16:19:00	1	00:05:00	87.4	69.7	71.6	67.5	59.9
16:24:00	1	00:05:00	89.2	70.5	71	67.3	61
16:29:00	1	00:05:00	73.5	67.8	70.5	67.3	59.8
16:34:00	1	00:05:00	77.3	68.7	71.6	67.9	62.9
16:39:00	1	00:05:00	81.6	68.4	70.6	67.4	61.6
16:44:00	1	00:05:00	81.1	68.7	71.4	67.5	60.8
16:49:00	1	00:05:00	90.4	73	73.9	68	61.1
16:54:00	1	00:05:00	79.8	68.1	70.7	67.7	60.2
Thursday 29 th June 2023							
05:03:00	1	00:05:00	83.3	66.8	68.9	61.1	56.2
05:08:00	1	00:05:00	87.2	66	68.7	61.5	57.8
05:13:00	1	00:05:00	96.6	75.8	70.1	61.7	57.5
05:18:00	1	00:05:00	90.7	69	71.8	63	57.2
05:23:00	1	00:05:00	91.5	70.5	72.5	64.7	58.7
05:28:00	1	00:05:00	88.8	67.8	70.2	62.2	57.5
08:14:00	1	00:05:00	79.6	70.2	72.9	69.2	61.4
08:19:00	1	00:05:00	95.8	73.2	73.7	69.3	61
08:24:00	1	00:05:00	94.5	73.3	74.2	69.7	61.8
08:29:00	1	00:05:00	84.5	70.7	73.5	69.5	64.6
08:34:00	1	00:05:00	92.3	71.2	72.9	68.3	61
08:39:00	1	00:05:00	96.6	75.4	72.9	69	64.2
10:21:00	1	00:05:00	78.9	67.9	71.8	65.3	57.1
10:26:00	1	00:05:00	75.8	67.9	71.8	66	57.7
10:31:00	1	00:05:00	79.6	71	74.8	69.4	59.8
10:36:00	1	00:05:00	78.3	71.3	75.4	68.2	57.3
10:41:00	1	00:05:00	80.1	70.2	74.1	68.6	58.1
10:46:00	1	00:05:00	92.8	71.9	74.2	69.5	62.5
Saturday 1 st July 2023							
10:20:00	1	00:05:00	95.1	74.8	75.9	70.6	61.7
10:25:00	1	00:05:00	84.1	73	75.6	71.8	63.2
10:30:00	1	00:05:00	85.8	71.7	74.8	70.3	60.3
10:35:00	1	00:05:00	80.2	71.5	74.4	70.2	60.9
11:34:00	1	00:05:00	82	71.4	74.3	70	63.2
11:39:00	1	00:05:00	82	70.1	73.3	68.9	60.7
11:44:00	1	00:05:00	78.1	69.3	72.4	67.8	61.8
11:49:00	1	00:05:00	76.2	69.2	72.2	68.2	60.4
Friday 14 th July 2023							
00:13:00	1	00:05:00	77.7	67.3	70.8	64.6	58.3
00:18:00	1	00:05:00	80.5	68.3	71.9	65.8	61.3
00:23:00	1	00:05:00	81.5	67.7	71.2	64.9	60.5
00:28:00	1	00:05:00	74.8	66.1	70.3	62.9	58.5
Thursday 3 rd April 2025							
09:12:00	1	00:05:00	84.2	70.5	72.6	69.6	62.5
09:17:00	1	00:05:00	85.2	71	73.1	70.1	64.4
09:22:00	1	00:05:00	78.9	70.1	72.7	69.8	61.2
09:27:00	1	00:05:00	80.7	70.5	72.8	70	65.4
09:32:00	1	00:05:00	80.3	70.3	73.2	69.4	62.7
09:37:00	1	00:05:00	82.5	70.7	73.4	69.3	63.5



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
13:35:00	1	00:05:00	81.5	70.5	73.4	69.1	61.4
13:40:00	1	00:05:00	74.3	68.2	70.6	68.1	59.1
13:45:00	1	00:05:00	84.5	70.1	72.7	69	59.2
13:50:00	1	00:05:00	83.2	69.8	72.1	68.5	62.6
13:55:00	1	00:05:00	84.8	70.4	72.7	68.5	63.1
14:00:00	1	00:05:00	84.7	69.8	71.9	69	63
14:40:00	1	00:05:00	75.4	68.6	-	-	-
14:45:00	1	00:05:00	83.3	69.6	-	-	-
14:50:00	1	00:05:00	82.1	69.5	-	-	-
15:02:00	1	00:05:00	78.5	69.2	72	68.5	59.9
15:07:00	1	00:05:00	77.6	69.4	72	68.8	61
15:12:00	1	00:05:00	82.6	69.1	71.2	68	60.3
Thursday 15 th May 2025							
02:44:00	1	00:05:00	73.7	62.1	66.1	58.9	54
02:49:00	1	00:05:00	76.4	61.3	65.3	55.5	52.3
02:54:00	1	00:05:00	75.5	62.4	66.8	58.3	53.7
02:59:00	1	00:05:00	75.3	63.9	68.4	59.5	54.9

Table B1 – Fully tabulated noise measurement results, Position 1

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Tuesday 16 th May 2023							
15:31:00	2	00:05:00	84.9	68.6	72.8	64.3	55.8
15:36:00	2	00:05:00	81.5	70.2	74.5	66.5	58.7
15:41:00	2	00:05:00	96.7	77.3	77.8	72.1	65.9
15:46:00	2	00:05:00	83	73.3	76.1	72	66.8
15:51:00	2	00:05:00	82.2	70.3	73.7	68.8	58.4
16:23:00	2	00:05:00	89.4	73.7	76.5	67.3	54.8
16:28:00	2	00:05:00	79.8	66.7	71.1	61.9	55.6
16:33:00	2	00:05:00	85.3	69.8	74.2	64.4	55
Tuesday 30 th May 2023							
15:42:00	2	00:05:00	76.5	64	67.1	62.6	55.2
15:47:00	2	00:05:00	71.1	63.7	67.1	62.5	56.2
15:52:00	2	00:05:00	74.2	64.7	67.2	63.4	55.9
15:57:00	2	00:05:00	72.6	64.7	67.9	63.9	55.2
16:02:00	2	00:05:00	83.3	65.9	68.5	63.8	54.5
16:07:00	2	00:05:00	82.8	66.3	67.9	63.1	55.9
16:12:00	2	00:05:00	82.3	66	68.7	63.2	57.9
16:17:00	2	00:05:00	76.2	65.5	68.4	63.7	57.9
16:22:00	2	00:05:00	86.5	64.8	67.1	63.8	56
16:27:00	2	00:05:00	94.9	71.2	68.2	63.5	56.3
16:32:00	2	00:05:00	74.2	64.4	66.8	63.8	57.3
16:37:00	2	00:05:00	88.3	67.9	68.6	64.2	55.1
Thursday 1 st June 2023							
00:12:00	2	00:05:00	73	65.4	68.3	65.1	57
00:17:00	2	00:05:00	74.1	64.7	68.1	63.1	56.5
00:22:00	2	00:05:00	75.5	65.2	68.8	63.5	55
00:27:00	2	00:05:00	76.3	65.2	68.8	62.9	55.2
00:32:00	2	00:05:00	75.1	64.1	68.4	59.8	54
00:37:00	2	00:05:00	76.9	64.5	68.3	61	53.2



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Monday 19 th June 2023							
17:02:00	2	00:05:00	76.9	63.6	66	62.4	58.4
17:07:00	2	00:05:00	75.5	64.9	67.2	64.1	58.1
17:12:00	2	00:05:00	77.4	64.6	67	63	56.7
17:17:00	2	00:05:00	99.5	78.2	70.8	64.2	56.3
17:22:00	2	00:05:00	73.6	63.7	66.8	62.5	57.1
18:07:00	2	00:05:00	81.9	69.4	74	66.3	58
18:12:00	2	00:05:00	81	70.3	73.8	68.1	61.3
18:17:00	2	00:05:00	79.5	69.9	73.8	67.1	58.5
18:22:00	2	00:05:00	86.2	66.3	68.2	63.2	54.1
18:27:00	2	00:05:00	77.5	70.6	74.8	67.9	58.4
18:32:00	2	00:05:00	77.2	67.9	72.1	65.2	55.4
Thursday 29 th June 2023							
06:41:00	2	00:05:00	77.6	66.3	69.6	64.1	57.7
06:46:00	2	00:05:00	79	67.5	70.9	65.2	59.1
06:51:00	2	00:05:00	75.2	67.1	70.4	65.2	60.1
06:56:00	2	00:05:00	76.9	66.7	69.8	65	59.1
07:01:00	2	00:05:00	78.8	67.5	70.9	64.4	58.5
07:06:00	2	00:05:00	77.8	66.7	70.1	64.6	56.4
07:11:00	2	00:05:00	75.2	67.6	71.3	65.6	58.3
08:46:00	2	00:05:00	90.7	68.3	70.4	63.9	56
08:51:00	2	00:05:00	85.4	67.6	70.6	62	56.2
08:56:00	2	00:05:00	77.3	66	68.9	64.4	56.6
09:01:00	2	00:05:00	79.3	66.5	69.5	65.3	56.4
09:06:00	2	00:05:00	74.6	66.2	69.7	64.2	56.2
09:11:00	2	00:05:00	78.3	66.3	69.8	64.4	55.6
Saturday 1 st July 2023							
10:46:00	2	00:05:00	75.9	67.8	70.9	66.7	59.5
10:51:00	2	00:05:00	75.4	66.7	70.5	64.8	58.1
10:56:00	2	00:05:00	75.5	67.6	70.9	66.5	58.5
11:02:00	2	00:05:00	81.7	67.7	70.7	66.6	60
11:55:00	2	00:05:00	76.4	66.9	69.7	65.7	58.4
12:00:00	2	00:05:00	75.8	64.7	67.4	63.9	57.1
12:05:00	2	00:05:00	80.5	67.2	70.1	65.3	59.7
12:10:00	2	00:05:00	73.5	66	69	65.3	58.9
Wednesday 5 th July 2023							
18:58:00	2	00:05:00	75.1	64.3	66.8	63	58.5
19:03:00	2	00:05:00	80.7	66.3	68	64.7	59.8
19:08:00	2	00:05:00	94.8	74.4	70.3	66.3	59.6
Friday 14 th July 2023							
00:38:00	2	00:05:00	78.5	63.3	67	59.7	52.2
00:43:00	2	00:05:00	76	63.8	67.9	59.9	49
Thursday 3 rd April 2025							
10:13:00	2	00:05:00	76.3	67.2	70.4	65.9	58.2
10:18:00	2	00:05:00	75.6	66.8	69.6	66.3	59.1
10:23:00	2	00:05:00	77.2	67.3	71	64.4	57.2
10:28:00	2	00:05:00	78.3	67.7	71	66.5	57.1
10:33:00	2	00:05:00	74.4	66.4	70.1	63.6	58.1
11:07:00	2	00:05:00	78.3	67.7	70.8	66.2	57.6



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
11:12:00	2	00:05:00	78.1	67.2	70.4	65.6	56.8
11:17:00	2	00:05:00	76.6	67.7	70.2	67	60.3
11:22:00	2	00:05:00	78.7	67.4	69.9	66.2	58.1
11:27:00	2	00:05:00	75.4	66.5	69.7	65	56.5
Thursday 15 th May 2025							
03:07:00	2	00:05:00	73.3	57.8	59	48.6	44
03:12:00	2	00:05:00	79.5	62.6	66.3	54.8	47.2
03:17:00	2	00:05:00	73.7	59.9	63.7	53.1	46.7
03:22:00	2	00:05:00	77.8	62.7	65.9	53.1	47.7

Table B2 – Fully tabulated noise measurement results, Position 2

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Tuesday 16 th May 2023							
14:23:00	3	00:05:00	95	59.8	54	48.9	46
14:30:00	3	00:05:00	66.1	50.8	53.4	49.4	46.6
Thursday 29 th June 2023							
11:07:00	3	00:05:00	78.1	59.7	60.9	58	55.4
11:12:00	3	00:05:00	70.6	58.6	60.2	57.9	55.5
11:17:00	3	00:05:00	87.5	66.3	66.9	59.3	55.8
Thursday 3 rd April 2025							
09:45:00	3	00:05:00	71.2	57.6	58.1	56.1	53.7
09:50:00	3	00:05:00	67.5	56.9	58.4	55.7	53.9
09:55:00	3	00:05:00	65.3	55.5	57.1	54.8	52.4
10:00:00	3	00:05:00	73	58.5	60.4	55.6	53.1
10:05:00	3	00:05:00	71.1	57.9	58.9	56.2	53.4
12:04:00	3	00:05:00	75.7	59.3	61.4	55.5	53.4
12:09:00	3	00:05:00	74.5	58.7	59	55.2	52.3
12:14:00	3	00:05:00	73.3	58.6	59	55.3	52.1
12:19:00	3	00:05:00	78.7	60.8	63.7	55.2	53
12:24:00	3	00:05:00	68.4	57.4	59.9	55.2	53
Thursday 15 th May 2025							
02:00:00	3	00:05:00	61.7	51.3	54.4	49.9	47.1
02:05:00	3	00:05:00	60	50.7	53.7	49.2	46.8
02:10:00	3	00:05:00	62	51.1	54.3	48.7	46.4
02:15:00	3	00:05:00	61.1	50.8	54.1	49.1	46.3
03:30:00	3	00:05:00	62.9	51	53.4	49.4	47.8
03:35:00	3	00:05:00	60.7	51.4	54.2	50	48.1
03:40:00	3	00:05:00	56.9	50.7	53.6	49.4	47.3
03:45:00	3	00:05:00	60.2	50	52.1	49.1	47.5

Table B3 – Fully tabulated noise measurement results, Position 3

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Thursday 1 st June 2023							
01:20:00	4	00:05:00	85.3	64.4	67	50.8	44.7
01:25:00	4	00:05:00	75.4	62.7	68	52.5	45
01:30:00	4	00:05:00	77.6	62.3	66.5	51.9	44.5
01:35:00	4	00:05:00	80.8	63.1	66.1	47.1	45.1
01:40:00	4	00:05:00	77.8	61.9	65.8	47.2	45.3
01:45:00	4	00:05:00	77.8	62.9	67.1	52.4	46.3



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Monday 19 th June 2023							
18:38:00	4	00:05:00	75.1	65	69	62	54.7
18:43:00	4	00:05:00	96.5	71.4	73.7	65.4	60.6
18:48:00	4	00:05:00	91.5	73.1	76.1	69.5	59.5
18:53:00	4	00:05:00	92.4	75.1	76.8	63.8	53.4
18:58:00	4	00:05:00	87	65.5	66.6	57.9	52.9
Thursday 29 th June 2023							
06:00:00	4	00:05:00	75.8	60.9	64.6	49.5	45.2
06:05:00	4	00:05:00	74.1	58.8	61	46.8	44.4
06:10:00	4	00:05:00	77.3	59.7	62.6	48.4	45.6
06:15:00	4	00:05:00	77	61.4	65.5	52.7	47
06:20:00	4	00:05:00	95.8	73.6	66.9	55.4	48.4
06:25:00	4	00:05:00	85	65.3	68.4	57.8	51.7
06:30:00	4	00:05:00	88.1	65.4	67.4	56.1	49.7
09:22:00	4	00:05:00	81.4	67.4	71.1	63.7	51.8
09:27:00	4	00:05:00	77.4	64.7	69.4	59	50.4
09:32:00	4	00:05:00	83.5	67	70.7	64.2	50.5
09:37:00	4	00:05:00	76	65	69.3	60.5	51.4
09:42:00	4	00:05:00	76.5	66.3	70.4	63.6	52.6
09:47:00	4	00:05:00	79.5	67.8	71.7	65.1	55.5
11:23:00	4	00:05:00	80.8	66.3	69.7	63.3	59.4
11:28:00	4	00:05:00	87.1	67.5	69.9	64	60.8
11:33:00	4	00:05:00	83.8	66.3	69.1	63.6	59.8
11:38:00	4	00:05:00	86	67.1	68.7	62.3	58.4
11:43:00	4	00:05:00	76.6	64.6	67.7	62.5	59.4
11:48:00	4	00:05:00	77.3	66.6	69.9	64.7	60.8
Saturday 1 st July 2023							
11:10:00	4	00:05:00	83.7	63.3	67.1	52.2	33.4
11:15:00	4	00:05:00	90	64.1	63.8	56	50.7
11:20:00	4	00:05:00	79.2	57.5	59.6	52.8	48.1
11:25:00	4	00:05:00	74.7	56.9	58.6	53.1	49.5
12:19:00	4	00:05:00	79.6	66.6	70.6	62.8	52.5
12:24:00	4	00:05:00	86.5	69.1	72.6	65.4	57.1
12:29:00	4	00:05:00	84.8	68.3	71.4	65.1	55.5
12:34:00	4	00:05:00	78.6	67.5	71.6	64.5	54.3
Thursday 13 th July 2023							
23:27:00	4	00:05:00	76.5	64.5	69.8	56.3	46.9
23:32:00	4	00:05:00	79.1	63.4	67.5	56.8	48.5
23:37:00	4	00:05:00	86.2	66.2	69.8	58.1	47.6
23:42:00	4	00:05:00	77.2	64.8	69.2	57	47.6

Table B4 – Fully tabulated noise measurement results, Position 4

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Thursday 25 th May 2023							
21:03:00	5	00:05:00	63.2	57	58.8	56.6	54.8
21:08:00	5	00:05:00	63.3	57.1	58.8	56.6	54.7
21:13:00	5	00:05:00	63.5	57	58.7	56.6	54.7
21:18:00	5	00:05:00	75.7	63.1	67.5	57.8	55.3
21:23:00	5	00:05:00	72.1	67.1	68.7	66.9	65



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
21:28:00	5	00:05:00	72.3	67.1	68.7	66.8	65
21:33:00	5	00:05:00	73.1	65	67.8	63.5	60.3
21:38:00	5	00:05:00	68.4	62.4	64.3	61.9	59.8
21:43:00	5	00:05:00	68.3	62.4	64.4	61.9	59.8
21:48:00	5	00:05:00	68.3	62.4	64.4	61.9	59.9
21:53:00	5	00:05:00	68.5	62.3	64.2	61.9	59.8
Wednesday 31 st May 2023							
23:38:00	5	00:05:00	74.1	64.2	67.6	62.6	56.6
23:43:00	5	00:05:00	71.2	65.3	68.4	64.8	58.6
23:48:00	5	00:05:00	73	64.5	68	63.1	55.8
23:53:00	5	00:05:00	73.1	64.9	68.3	63.5	57
23:58:00	5	00:05:00	73	65	68.6	63.2	56.3
00:03:00	5	00:05:00	78.6	64.8	68.3	61.8	54
Thursday 22 nd June 2023							
09:47:00	5	00:05:00	83.2	69.8	73.8	66	60.4
09:53:00	5	00:05:00	85	73.7	78.6	66	58.6
09:58:00	5	00:05:00	89.3	73.4	78.1	61.9	51.7
10:03:00	5	00:05:00	80.9	71.2	75.8	67.3	62.2
10:08:00	5	00:05:00	83	67.5	70.6	66.3	61
10:13:00	5	00:05:00	78.7	67.7	70.9	64.9	58.7
11:09:00	5	00:05:00	82.3	68	70.2	66.3	59.6
11:14:00	5	00:05:00	91.6	70.8	70.4	65.8	59.3
11:19:00	5	00:05:00	76.3	66.5	69.8	65.1	57.5
11:24:00	5	00:05:00	80.8	68.4	71.6	66.9	58.9
Wednesday 5 th July 2023							
17:57:00	5	00:05:00	78.4	66.5	69.1	65.4	58.7
18:02:00	5	00:05:00	74.7	65.7	69	65	57.8
18:07:00	5	00:05:00	76.1	65.1	67.9	64.4	57.9
Thursday 3 rd April 2025							
10:40:00	5	00:05:00	78.8	66.3	69.6	64.4	58.1
10:45:00	5	00:05:00	73.1	66.2	69.2	65.5	58
10:50:00	5	00:05:00	77.6	67.8	71.1	65.9	58.6
10:55:00	5	00:05:00	76.4	66.5	70.1	64.3	58.2
11:00:00	5	00:05:00	75.8	67	70	65.8	58.1
12:33:00	5	00:05:00	73.9	65.6	68.8	64.4	57.9
12:38:00	5	00:05:00	77	66	68.8	64.6	59
12:43:00	5	00:05:00	77.4	67.9	70.1	66.1	58.7
12:48:00	5	00:05:00	95	68.8	70.5	65.8	56.2
12:53:00	5	00:05:00	79.6	66.2	69.1	65.7	56.5

Table B5 – Fully tabulated noise measurement results, Position 5

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Thursday 1 st June 2023							
00:46:00	6	00:05:00	66.3	49.6	51.8	45.9	44.3
00:51:00	6	00:05:00	56.8	46.9	49	45.8	44.2
00:56:00	6	00:05:00	53.4	44.9	46.8	44	42
01:01:00	6	00:05:00	56.7	45	46.8	43.8	42.2
01:06:00	6	00:05:00	63	45.7	47.9	44.4	42.4
01:11:00	6	00:05:00	59.8	46.8	49.8	44.6	42



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Thursday 22 nd June 2023							
10:46:00	6	00:05:00	69.3	51	51.8	46.1	43.4
10:51:00	6	00:05:00	81	57.1	55	46.5	43.7
10:56:00	6	00:05:00	85.4	62	54.7	46.6	43.6
11:01:00	6	00:05:00	70.6	52.8	55.1	48.3	45.3
11:53:00	6	00:05:00	63.8	49.3	51.9	47.3	44.6
11:58:00	6	00:05:00	68.4	50.7	52.4	46.9	44.7
12:03:00	6	00:05:00	79.2	60.5	64	51.4	45.1
12:08:00	6	00:05:00	81.5	61.7	64.7	53.1	45.9
12:14:00	6	00:05:00	77.7	61.3	65.1	54.7	47.4
12:19:00	6	00:05:00	77.5	57.6	59.6	48.4	45.9
12:24:00	6	00:05:00	66.9	53.6	56.7	51.4	48.7
12:29:00	6	00:05:00	75.4	54.7	53.8	49.4	47.2
Thursday 29 th June 2023							
05:37:00	6	00:05:00	84.2	56.2	52.9	46.6	42
05:42:00	6	00:05:00	65.6	48.4	52.1	44.3	41.7
05:47:00	6	00:05:00	61.3	48	51.3	44.6	41.9
05:52:00	6	00:05:00	64.9	46.5	48.3	44.2	42.2
09:56:00	6	00:05:00	84.3	60.2	53.8	49.5	46.4
10:01:00	6	00:05:00	75.4	55.4	54.3	49.3	46.7
10:06:00	6	00:05:00	65.9	50.1	51.7	48	44.9
10:11:00	6	00:05:00	70.6	54.5	56	51.1	47
10:16:00	6	00:05:00	70.8	54.7	55.4	49.3	46.7
10:21:00	6	00:05:00	70.5	52.4	53	50.3	47.5
Wednesday 5 th July 2023							
18:35:00	6	00:05:00	67.1	50.9	52.2	49.6	47
18:40:00	6	00:05:00	71	50.9	52.3	48.9	47.3
18:45:00	6	00:05:00	68.4	52.5	53.9	50.7	48.9
18:50:00	6	00:05:00	64	52.2	54.2	50.9	49
Thursday 13 th July 2023							
23:05:00	6	00:05:00	69.2	50.7	51.3	46.3	43
23:10:00	6	00:05:00	70.2	51.8	51.4	47	44.3
23:15:00	6	00:05:00	78.9	55.4	49.2	45.2	41.8
23:20:00	6	00:05:00	81.3	58.2	53.2	44.8	40.9

Table B6 – Fully tabulated noise measurement results, Position 6

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Thursday 22 nd June 2023							
10:22:00	7	00:05:00	91.5	70.7	68.2	62.9	55.9
10:27:00	7	00:05:00	79.8	65	67.9	62.3	55.9
10:32:00	7	00:05:00	87.8	68.1	69	64	56.7
10:37:00	7	00:05:00	86.1	66.7	68.9	64.1	56
11:32:00	7	00:05:00	82.6	65.5	68.5	61.1	56
11:37:00	7	00:05:00	77	65.3	68.3	62.9	57.7
11:42:00	7	00:05:00	76.7	63.9	67.7	60.8	56.8
12:38:00	7	00:05:00	86	65.8	68.3	63.4	58.2
12:43:00	7	00:05:00	86.9	66.1	68.2	63.2	57.2
12:48:00	7	00:05:00	85.4	66.6	69.3	64.4	60.3
Wednesday 5 th July 2023							



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
18:14:00	7	00:05:00	79.1	64	66.9	61.1	58.1
18:19:00	7	00:05:00	87.3	67.7	69.1	62.1	57
18:24:00	7	00:05:00	80.1	66.4	69.9	63.5	55.2
Thursday 13 th July 2023							
23:50:00	7	00:05:00	93.8	69.6	68	60.8	55.7
23:55:00	7	00:05:00	85.1	66.5	68.2	60.9	55.2
00:00:00	7	00:05:00	79.7	64.5	68.3	60.2	55.4
00:05:00	7	00:05:00	76.4	62.6	66.6	57.8	53.7
Thursday 3 rd April 2025							
08:40:00	7	00:05:00	75	64.8	67.4	63.8	59.9
08:45:00	7	00:05:00	73	63.7	66.9	61.8	57.8
08:50:00	7	00:05:00	70.8	63.1	66	61.8	58.6
08:55:00	7	00:05:00	72	64.3	67.9	62.5	58.3
09:00:00	7	00:05:00	80.1	64.6	67.7	61.8	58.2
09:05:00	7	00:05:00	81.5	66.7	69.7	64.3	59.5
13:02:00	7	00:05:00	73.1	62.3	65.2	60.5	56.9
13:07:00	7	00:05:00	74.5	64.8	68.6	61.8	57.2
13:12:00	7	00:05:00	88	65.7	68.2	62	54.4
13:17:00	7	00:05:00	80.2	65.2	68.6	61.5	56.4
13:22:00	7	00:05:00	74.7	65.2	68.9	62.5	56.7
13:27:00	7	00:05:00	86.4	65.4	68.2	63.1	57.4
14:08:00	7	00:05:00	78.1	66	69.2	63.7	58
14:13:00	7	00:05:00	78.9	64.6	68	61.1	57.8
14:18:00	7	00:05:00	85.4	66.4	68	62.4	58.8
14:23:00	7	00:05:00	78.7	66.1	69.2	63.6	57.9
14:28:00	7	00:05:00	81	65.3	68.5	62.5	57.1
14:33:00	7	00:05:00	83.1	64.6	68.5	60.8	57.4
Thursday 15 th May 2025							
02:22:00	7	00:05:00	80.8	58.9	60.3	50.5	48
02:27:00	7	00:05:00	81.3	60.8	62.5	50.2	47.4
02:32:00	7	00:05:00	78	58.3	59.4	50.4	47.8
02:37:00	7	00:05:00	80	60	61.4	50.8	47.4

Table B7 – Fully tabulated noise measurement results, Position 7



Appendix C – WISSC Noise Survey Data

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Saturday 1 st July 2023							
20:44:00	A	00:05:00	58	53.7	55.3	53.4	51.6
20:49:00	A	00:05:00	85.6	58.1	56.5	54.4	52.1
20:54:00	A	00:05:00	72.9	57	59.3	55.7	53.1
20:59:00	A	00:05:00	75.2	58.6	60.9	57	54.7
21:04:00	A	00:05:00	73.1	62	64.6	60.4	56.6
21:09:00	A	00:05:00	73.7	61.3	64	60.3	55.6
21:14:00	A	00:05:00	60.7	54.8	56.8	54.6	51.5
21:19:00	A	00:05:00	65.6	56	57.9	55.6	53.1
21:24:00	A	00:05:00	67.4	56.1	58.4	55.3	52.6
21:29:00	A	00:05:00	64.6	56.9	59.1	56.3	52.7
21:34:00	A	00:05:00	66.6	57.6	60	56.5	54.1
21:39:00	A	00:05:00	64.9	57.5	60.1	56.6	53.7
21:44:00	A	00:05:00	71.6	61.7	65.9	58.4	55.9
21:49:00	A	00:05:00	68.9	58.3	59.8	55.9	53.5
21:54:00	A	00:05:00	68.6	56.8	59	55.6	53.7
21:59:00	A	00:05:00	62.7	56.1	58.7	54.9	53
22:04:00	A	00:05:00	77.2	60.7	58.7	55.1	53.4
22:09:00	A	00:05:00	61.6	55.2	57	54.9	52.6
22:14:00	A	00:05:00	63.9	55.2	56.7	54.9	53.2
22:19:00	A	00:05:00	73.2	56.1	57.8	55.2	53.3
22:24:00	A	00:05:00	71.7	56.2	56.9	54.8	53.1
22:29:00	A	00:05:00	65.3	55.8	58.1	54.4	52.3
22:34:00	A	00:05:00	58.3	54.5	55.8	54.3	53
22:39:00	A	00:05:00	65	54.9	56.4	54.6	52.6
22:44:00	A	00:05:00	72.8	55.3	55.7	53.8	51.3
22:49:00	A	00:05:00	69.9	54.2	55.9	53.6	51.1
22:54:00	A	00:05:00	60.6	54.8	56.6	54.3	52.4
22:59:00	A	00:05:00	62.6	55.3	57.4	54.5	52.3
23:04:00	A	00:05:00	61.9	55.5	57.6	55	52.8
23:09:00	A	00:05:00	68.8	56	57.9	55.3	52.7
23:14:00	A	00:05:00	65.3	55.5	57.6	55	52.3
23:19:00	A	00:05:00	62.2	54.8	56.8	54.2	51.6
23:24:00	A	00:05:00	66.7	56.5	59.1	55	52.1
23:29:00	A	00:05:00	69.5	56.8	59.6	55.1	51.9
23:34:00	A	00:05:00	59	53.9	56	53.4	51.1
23:39:00	A	00:05:00	70	55.7	57.4	55.2	52.9
23:44:00	A	00:05:00	61.5	54.6	56.6	54	52.1
23:49:00	A	00:05:00	75.7	57.9	58.7	55.7	53.3
23:54:00	A	00:05:00	68.8	55.6	57.2	55.3	53.2
23:59:00	A	00:05:00	64.2	55.6	57.5	55.1	53.1
Sunday 2 nd June 2023							
00:04:00	A	00:05:00	74.9	57.8	57.1	54.9	53
00:09:00	A	00:05:00	96.4	66.3	58.8	55.8	53
00:14:00	A	00:05:00	65	56.4	59.1	55.2	53.2

Table C1 – Fully tabulated WISSC car park noise measurement results



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Saturday 1 st July 2023							
20:46:00	Roaming	00:05:00	54.6	50.8	52	50.2	49.4
20:56:00	Roaming	00:05:00	100.3	91.8	95.3	90.2	81.7
21:01:00	Roaming	00:05:00	110.2	93.9	99.3	93.5	83.4
21:06:00	Roaming	00:05:00	110.2	94.9	96.9	89.4	50.6
21:11:00	Roaming	00:05:00	103.5	92.6	-	-	-
21:31:00	Roaming	00:05:00	89.7	79.5	84	76	66.7
21:36:00	Roaming	00:05:00	89.7	81.8	86	82.3	71.9
21:41:00	Roaming	00:05:00	90	81.7	83.7	79.3	71.3
21:46:00	Roaming	00:05:00	90	78.8	80.2	75.3	67.9
21:51:00	Roaming	00:05:00	89.7	78.4	83.3	76.2	59.8
21:56:00	Roaming	00:05:00	88	78.5	81.1	76.8	71
22:01:00	Roaming	00:05:00	89.2	79.8	84	79.2	73.3
22:06:00	Roaming	00:05:00	89.8	82.2	86.2	82.1	73.7
22:11:00	Roaming	00:05:00	90.8	83.2	86.6	82	75.7
22:16:00	Roaming	00:05:00	90.8	83.5	86.7	82.6	75.9
22:21:00	Roaming	00:05:00	90.7	82.6	85.1	80.2	73.2
22:26:00	Roaming	00:05:00	93.1	82.4	86	81.6	75.3
22:31:00	Roaming	00:05:00	93.5	83.4	87.7	81.7	56.8
22:36:00	Roaming	00:05:00	93.5	83.8	-	-	-
22:41:00	Roaming	00:05:00	91.5	85.4	88.6	84.5	77.5
22:46:00	Roaming	00:05:00	97.2	87.4	90.4	86.1	80.3
22:51:00	Roaming	00:05:00	101.8	93.8	96.6	92.9	87.3
22:56:00	Roaming	00:05:00	103.6	94	97.3	92.7	85.9
23:01:00	Roaming	00:05:00	107	95.6	98.9	93.7	84.8
23:06:00	Roaming	00:05:00	104.4	95.7	98.7	94.5	88.3
23:11:00	Roaming	00:05:00	105.7	96.8	99.9	95.8	88.3
23:16:00	Roaming	00:05:00	102.7	94.1	97.4	92.9	86
23:21:00	Roaming	00:05:00	102.8	92.3	95.3	90.8	84.8
23:26:00	Roaming	00:05:00	103.3	94	97.2	92.9	86.2
23:31:00	Roaming	00:05:00	102.5	93	96.1	91.7	86.8
23:36:00	Roaming	00:05:00	104.6	94.3	98	92.8	87.4
23:41:00	Roaming	00:05:00	106.2	93.7	98.4	85.8	60.3
23:46:00	Roaming	00:05:00	107.3	94.1	97.6	90.9	71.7
23:51:00	Roaming	00:05:00	109.6	93.9	96.5	91.2	83.3
23:56:00	Roaming	00:05:00	109.6	93.9	97.7	90.6	78.7
Sunday 2 nd July 2023							
00:01:00	Roaming	00:05:00	109.6	94.5	98	92	83.7
00:06:00	Roaming	00:05:00	109.6	95.3	99.3	92.5	70.9
00:11:00	Roaming	00:05:00	106.8	96.2	100.4	93.2	79.6
00:12:20	Roaming	00:05:00	105.4	96.3	-	-	-

Table C2 – Fully tabulated WISSC internal noise measurement results



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Saturday 1 st July 2023							
21:12:00	B	00:05:00	92.2	75.4	80.4	60.5	54.7
22:52:00	B	00:05:00	94.4	82.4	88.3	65.1	59.9
22:57:00	B	00:05:00	94.4	78.6	71	64.7	58
23:02:00	B	00:05:00	80.1	67.9	71.2	66.2	60.9
23:07:00	B	00:05:00	78.3	68.1	70.4	64.8	59.3
23:12:00	B	00:05:00	102.3	93.5	97	92	84.6
23:17:00	B	00:05:00	102.3	93.5	-	-	-
23:32:00	B	00:05:00	99.9	91.6	95.1	89.7	84
23:37:00	B	00:05:00	99.9	91.6	-	-	-
23:57:00	B	00:05:00	70	61.3	63.7	60.5	56.3
Sunday 2 nd July 2023							
00:02:00	B	00:05:00	78.7	65.8	68.8	64	57.5
00:07:00	B	00:05:00	77.5	66.4	69.6	64.3	56.8
00:12:00	B	00:05:00	78.2	63.8	67.7	60.3	55.4

Table C3 – Fully tabulated WISSC noise measurement results, ~1m from window/door



Appendix D – Heineken Brewery Noise Survey Data

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Thursday 24 th April 2025							
11:59:00	H1	00:02:00	71.8	63.2	65.8	61.9	59.1
12:01:00	H1	00:02:00	67.4	61.6	63.1	61.4	57.6
12:03:00	H1	00:02:00	70.3	61.4	62.9	61.2	58.5
12:05:00	H1	00:02:00	66.7	61.7	63.7	61.4	58
12:07:00	H1	00:02:00	69.9	62	63.9	61.2	59
12:09:00	H1	00:02:00	66.9	60.7	62.8	60.4	57.2
12:11:00	H1	00:02:00	70.3	62.1	63.9	61.4	57.9
12:13:00	H1	00:02:00	72.2	62.3	64.4	61.4	59.3
12:15:00	H1	00:02:00	70.6	62.7	65.8	61.7	57.6
12:17:00	H1	00:02:00	70.3	62.5	65.2	61.2	59.4
12:19:00	H1	00:02:00	72.8	63.6	65.6	62.7	60.1
12:24:00	H2	00:02:00	62	56.9	59.2	56	54.5
12:26:00	H2	00:02:00	60.7	56.9	59.1	56.3	54.1
12:28:00	H2	00:02:00	74.3	60.5	63.3	57.7	55.4
12:30:00	H2	00:02:00	64	58.3	60.6	57.5	55.3
12:32:00	H2	00:02:00	62.2	57.3	59.9	56.3	54
12:34:00	H2	00:02:00	66.3	57.6	59.8	57	54.3
12:36:00	H2	00:02:00	73.7	59.4	61.9	57	55.2
12:38:00	H2	00:02:00	64.4	58.1	60.6	57.2	55
12:40:00	H2	00:02:00	66	57.8	60.4	56.7	54.3
12:45:00	H3	00:02:00	67.9	66.8	67.6	66.6	66.1
12:47:00	H3	00:02:00	71	66.9	67.7	66.8	66.1
12:53:00	H1A	00:02:00	66.8	60.9	62.9	60.4	57.7
12:55:00	H1A	00:02:00	72.6	61.1	61.9	60	57.7
12:04:13	H4	00:00:30	58.5	55.1	55.7	55	54.3
12:04:43	H4	00:00:30	56.9	55.4	56	55.3	54.7
12:05:13	H4	00:00:30	56.6	55.4	56.1	55.4	54.7
12:07:46	H5	00:01:00	64.8	56.4	56.8	56.1	55.4
12:08:46	H5	00:01:00	59.5	56.9	58	56.8	55.6
12:09:46	H5	00:01:00	59.2	56.8	57.6	56.7	55.9
12:10:46	H5	00:01:00	59.2	57.4	58.1	57.4	56.8
12:11:46	H5	00:01:00	59.3	57.7	58.4	57.7	56.9
12:20:17	H6	00:00:30	79.4	73.3	76	72.1	71.4
12:20:47	H6	00:00:30	78.5	72.5	72.7	72.1	71.4
12:21:17	H6	00:00:30	78.2	73.5	76.3	72.4	71.4
12:22:22	H6	00:00:10	72.8	72.1	72.7	72	71.4
12:22:32	H6	00:00:10	73	72.1	72.6	72	71.4
12:22:42	H6	00:00:10	72.7	72	72.5	71.9	71.3
12:22:52	H6	00:00:10	72.6	72	72.4	71.9	71.4
12:23:02	H6	00:00:10	72.5	71.9	72.4	71.9	71.3
12:23:12	H6	00:00:10	74	71.8	72.2	71.7	71.3
12:23:22	H6	00:00:10	72.6	71.8	72.3	71.8	71.2
12:23:32	H6	00:00:10	73.8	71.8	72.4	71.7	71
12:23:42	H6	00:00:10	73.2	71.8	72.4	71.6	71.1



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
12:34:50	H7	00:00:10	62.7	61.7	62.3	61.5	60.9
12:35:00	H7	00:00:10	64.6	62.7	63.7	62.5	61.4
12:35:10	H7	00:00:10	64.9	62.4	63.8	62.2	61.1
12:35:20	H7	00:00:10	62.9	61.7	62.4	61.6	60.8
12:35:30	H7	00:00:10	63.6	62.2	63	62.1	61.4
12:35:40	H7	00:00:10	62.8	61.9	62.5	61.9	60.9
12:35:50	H7	00:00:10	63	61.6	62.3	61.5	60.7
12:36:00	H7	00:00:10	63.5	62.4	63.2	62.2	61.7
12:36:10	H7	00:00:10	63.1	62.1	62.8	62	61.2
12:47:12	H8	00:00:10	83.2	82.3	82.8	82.2	81.6
12:47:22	H8	00:00:10	83.1	82.2	82.8	82.1	81.6
12:47:32	H8	00:00:10	82.9	82.2	82.8	82.1	81.5
12:47:42	H8	00:00:10	83.1	82.3	82.8	82.1	81.6
12:47:52	H8	00:00:10	83	82.3	82.7	82.2	81.8
12:48:02	H8	00:00:10	83.3	82.5	83.1	82.4	81.9
12:48:12	H8	00:00:10	83.2	82.4	83	82.3	81.6
12:48:22	H8	00:00:10	83.3	82.4	83	82.4	81.8
12:48:32	H8	00:00:10	83.2	82.3	83	82.2	81.5
12:47:12	H8	00:00:10	83.2	82.3	82.8	82.2	81.6

Table D1 – Fully tabulated Heineken Brewery near-field noise measurement results



Appendix E – General Environmental Façade Noise Maps (FNM)

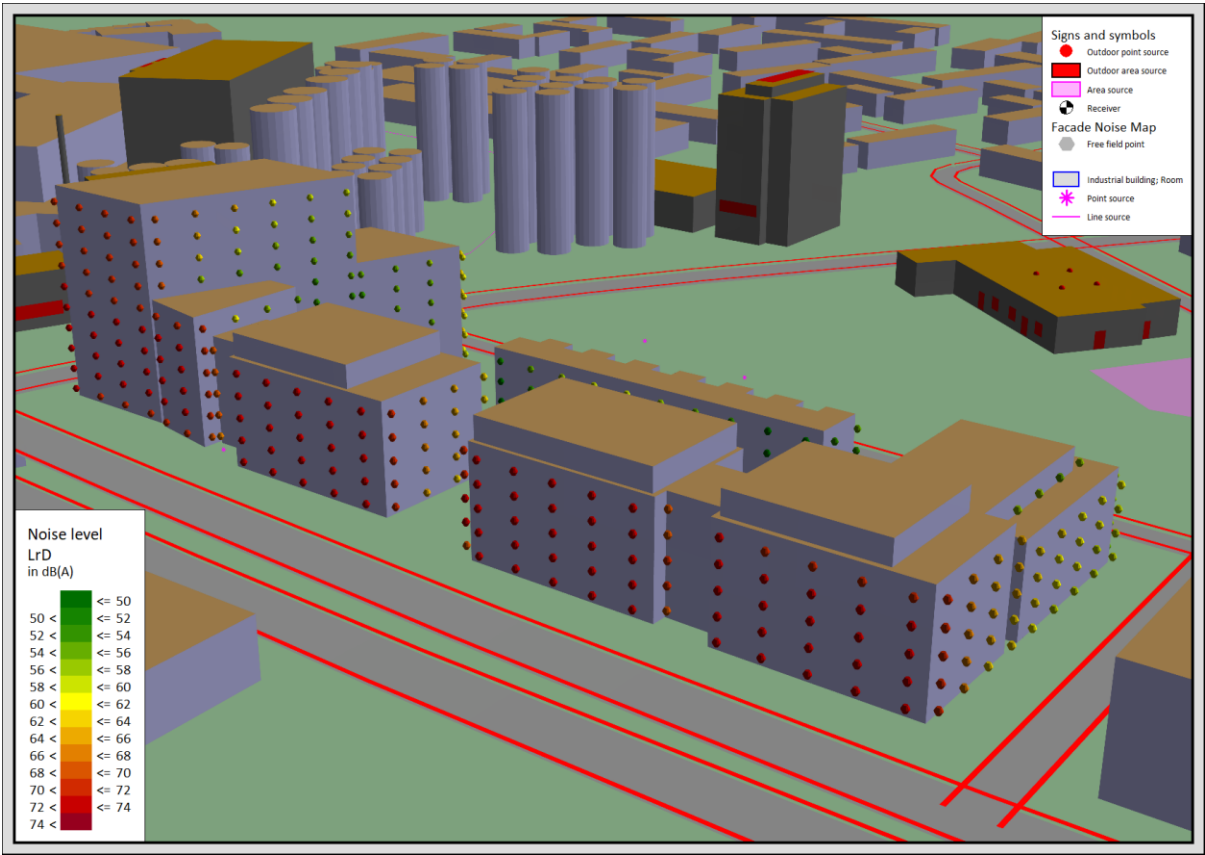


Table E1 – FNM Princess Road elevation, daytime

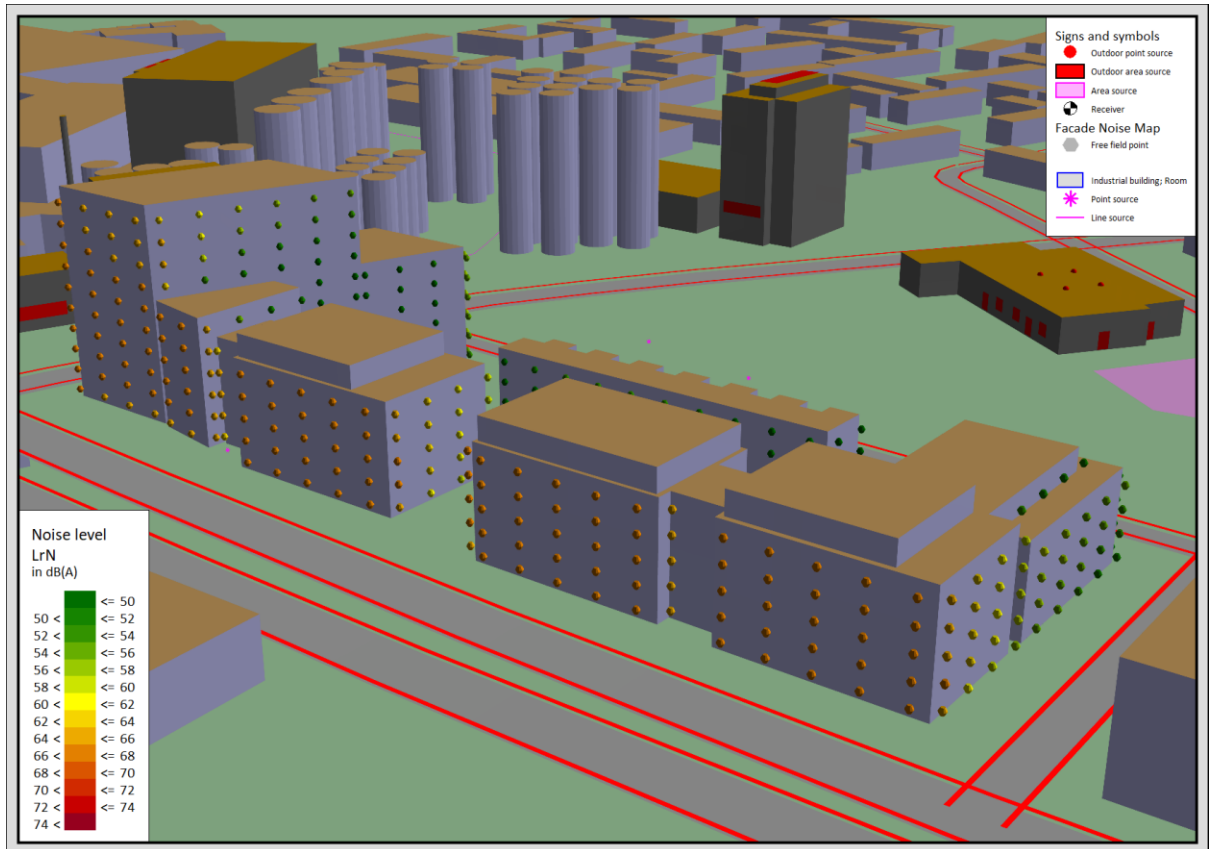


Table E2 – FNM Princess Road elevation, night-time

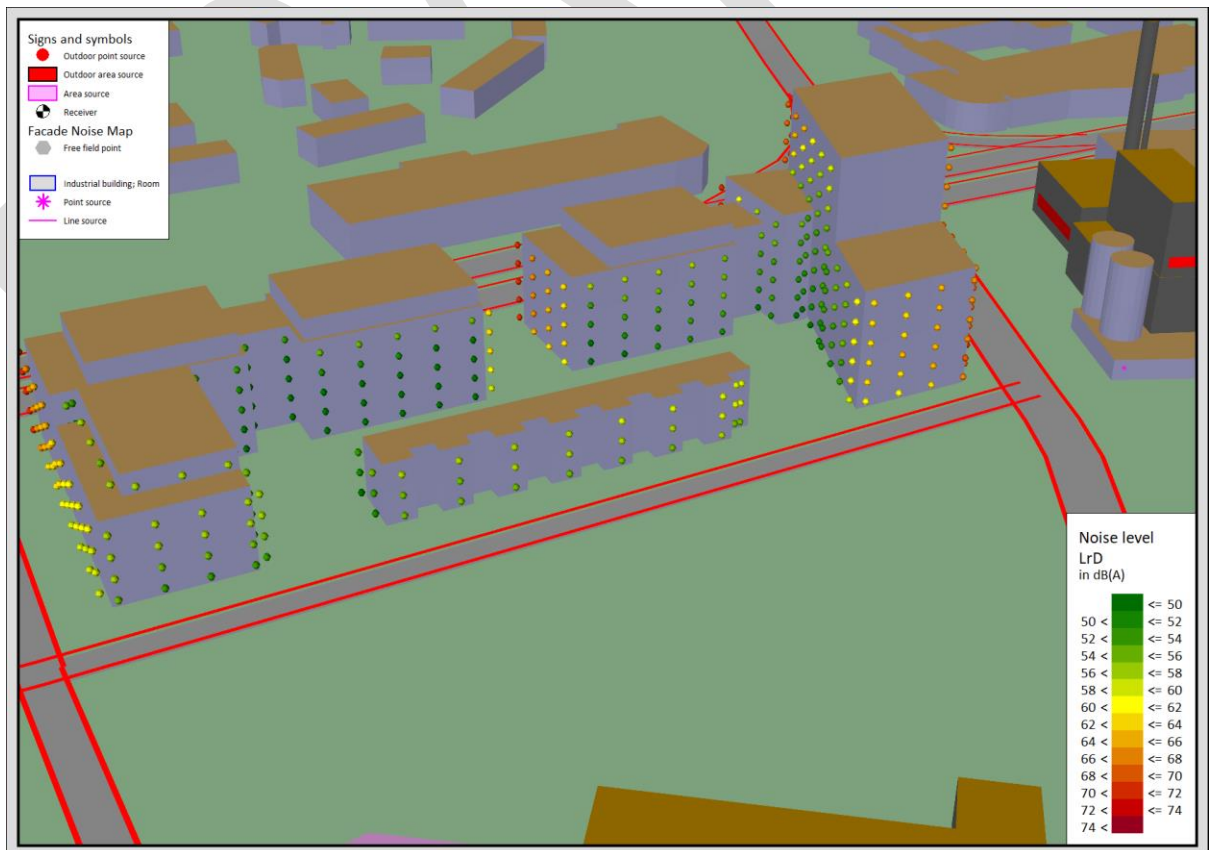


Table E3 – FNM Barnhill Road, daytime

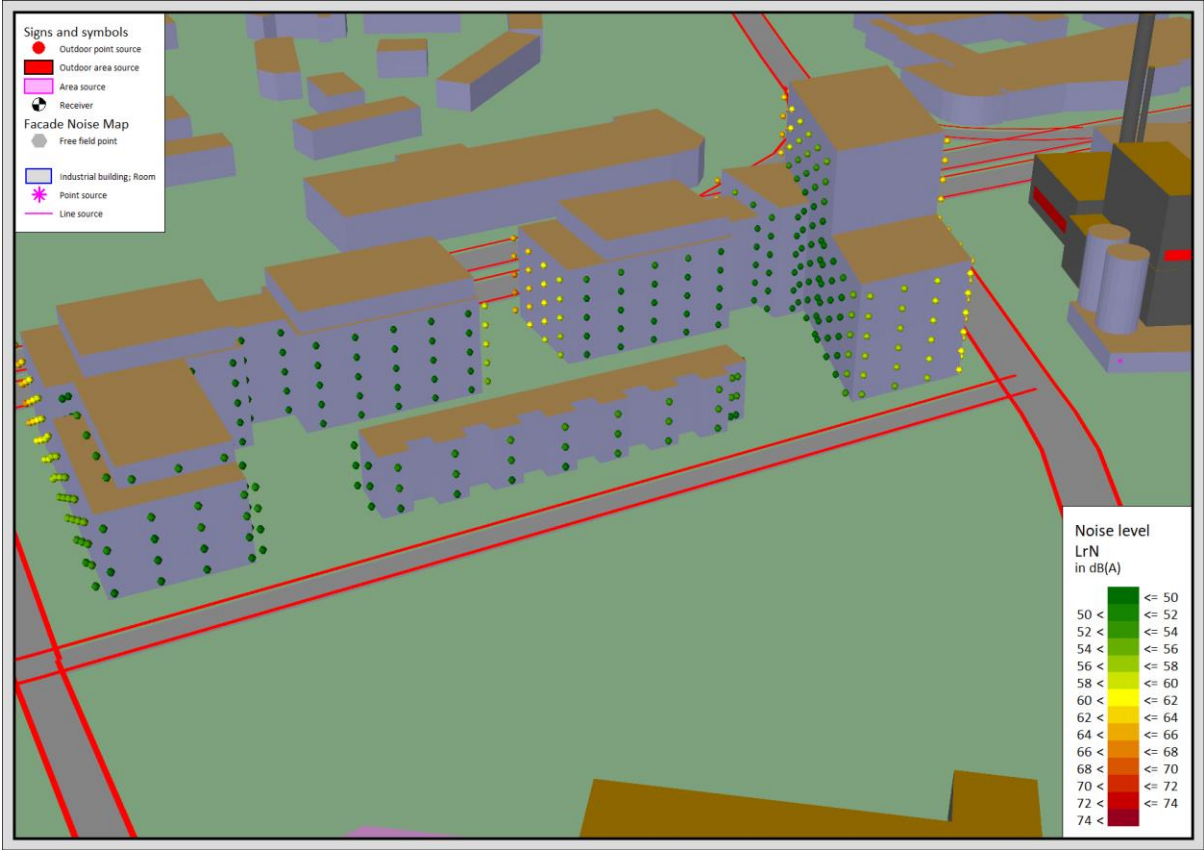


Table E4 – FNM Barnhill Road, night-time

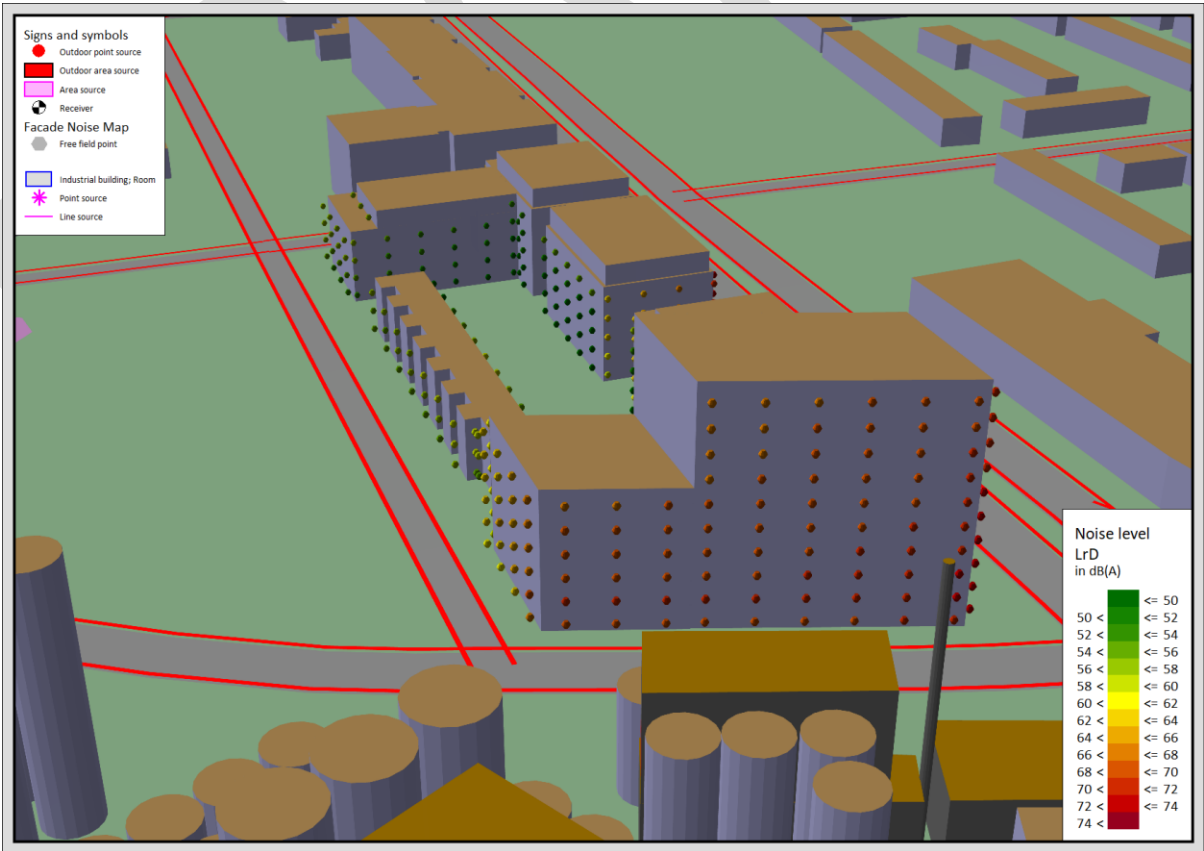


Table E5 – FNM Moss Lane East elevations, daytime

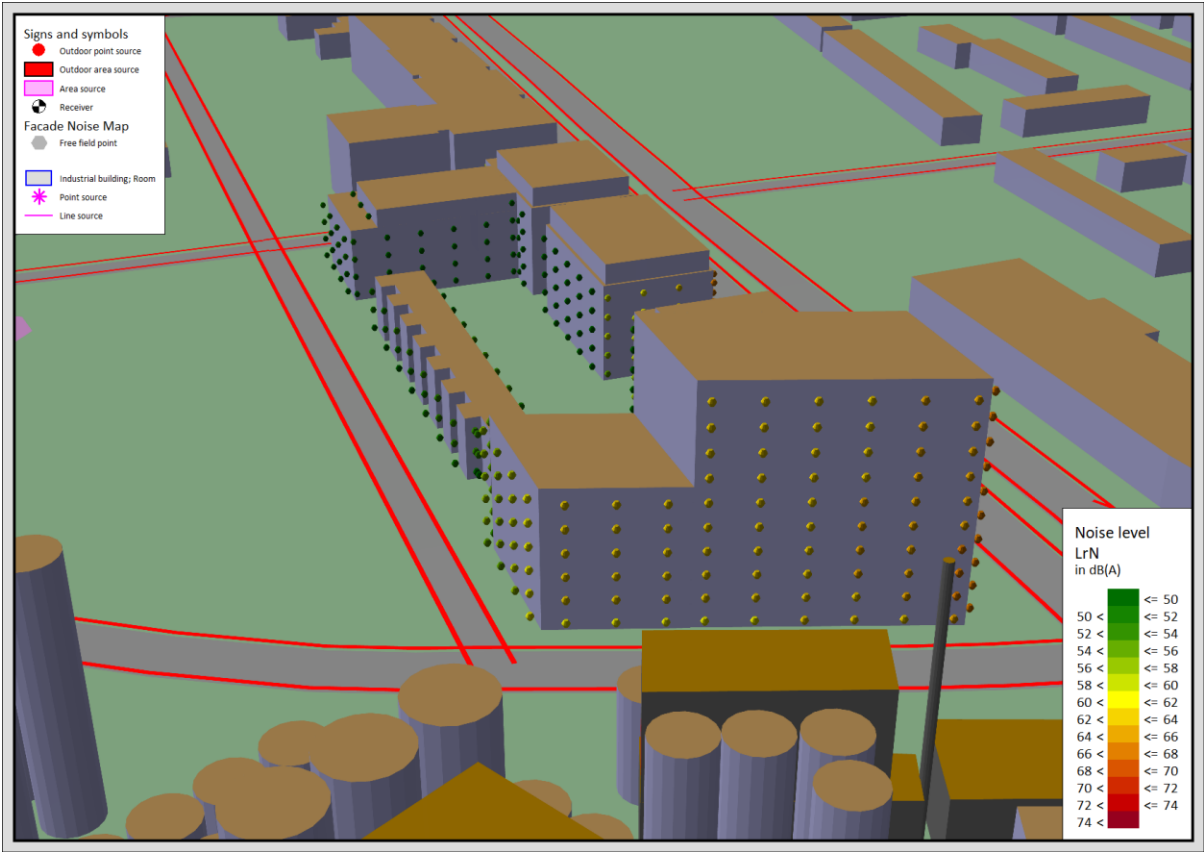


Table E6 – FNM Moss Lane East elevations, night-time



Appendix F – AVO Risk Assessment for Princess Road Elevation

Section 3

Table 3-2 Guidance for Level 1 site risk assessment of noise from transport noise sources ^[Note 1] relating to overheating condition

Risk category for Level 1 assessment ^[Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
Daytime 71dB LAeq $L_{Aeq,T}$ (Note 3) during 07:00 - 23:00 $L_{Aeq,8hr}$ during 23:00 - 07:00 Night-time 68dB LAeq 65 dB 60 dB 55 dB 50 dB High Medium Low Negligible 55 dB 50 dB 45 dB	Increasing risk of adverse effect Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Recommended Optional Not required

Figure B-3 'AVO Diagram' indicating noise levels associated with adverse effects during the night-time used in this worked example

