REAP 3 Limited

PLOTS 4 AND 5, CENTRAL SQUARE, CITY CENTRE, CARDIFF

Noise Impact Assessment

UK0040270.4485-RP-AC-001-R02
AUGUST 2025

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APPENDICES

1 INTRODUCTION

1.1.1. WSP has been appointed by REAP 3 Limited to provide acoustic consultancy services in relation to the proposed development at Plot 4 and 5, Central Square Cardiff.

1.1.2. The description of the proposed development is as follows:

1.1.3. "Mixed-use development to provide residential accommodation, flexible non-residential uses, cycle parking, landscaping and other associated works"

1.1.4. In summary, this application is seeking to deliver the following:

- A landmark 50 storey building with a maximum height of up to 177.85m AOD.
- 528 new homes (Class C3) comprising a mix of 1-bed and 2-beds.
- A pavilion building within Central Square comprising up to 601sqm of flexible non-residential floorspace (flexible Class A1 and A3).
- 2,856.5sqm of high quality internal and external amenity space through provision of roof terraces, lounges, coworking, gym and other wellbeing spaces.
- A basement level providing ancillary residential floorspace.
- A car free development with 528 cycle parking spaces within proposed building, including 5% accessible spaces, and a publicly accessible bike hub and café. Additionally, 52 public cycle spaces are provided within adjacent square provided as Sheffield stands.

1.1.5. This report has been prepared in support of the detailed planning application being submitted by REAP 3 Limited ('the Applicant') to Cardiff Council ('the Council') in support of a full planning application for the development of Plots 4 and 5, Central Square, City Centre, Cardiff ('the site').

1.1.6. This report outlines the key criteria relating to noise, and summarises the noise surveys conducted, and noise modelling and assessments. Façade mitigation measures have been recommended to ensure suitable internal acoustic conditions for residential development

1.2 SITE DESCRIPTION

1.2.1. The site sits within the administrative area of Cardiff Council, who are the relevant Local Planning Authority for the determination of this application.

1.2.2. The site is bound by Wood Street to the south, Scott Road to the west, Park Street Lane to the north-west, and a public square to the east. St Mary's Street, located further to the east of the site, is the most trafficked road in the local area (and as such a dominant noise source).

1.2.3. The Media Wales office building is located at 6 Park Street, immediately adjacent to the north west of the site. The HMRC building is located immediately adjacent to the north east of the site. The Millennium Plaza leisure complex is located immediately to the west. To the south cross Wood Street lies the Cardiff University School of Journalism, Media and Culture, the BBC Cymru building, and Wood Street House. Mechanical plant is located on the roofs of all of the above buildings and will be in line of sight of higher levels of the development.

1.2.4. The Principality Stadium is located to the north. It hosts sporting events and (typically) a summer season of weekend music events.

1.2.5. Cardiff Central Station is 0.1 miles south-east of the site, and serves train lines connecting south Wales and south west England. Adjacent to the site is Wood Street bus stop, with further bus stops along St Mary Street, approximately 2-minutes' walk from the site.

1.2.6. The site benefits from full planning permission for the following development (Ref: 21/02984/MJR), which was granted by the Council on 2nd May 2024:

'Full planning application for a mixed-use building providing commercial uses at ground floor/mezzanine level (Use Classes A1/A2/A3/B1/D1/D2) and residential accommodation above (Use Class C3 and including non C3 Use Class residential), a pavilion (Use Classes A1/A2/A3), public realm, cycle parking, access, drainage and other infrastructure works required for the delivery of Central Square Plots 4 and 5.'

1.2.7. Whilst the development differs in a number of respects to the previous application, this approval demonstrates that the site is suitable for a residential development of this nature.

1.3 ENTERTAINMENT NOISE

1.3.1. The site is in close proximity to the Principality Stadium, and as such will be exposed to potentially elevated noise levels during music and sporting events.

1.3.2. The previous planning permission included conditions requiring that an assessment of music noise should be completed to ensure adequate protection for future occupants against noise from events.

1.3.3. In anticipation of a similar condition on this application, noise surveys conducted for this noise impact assessment were undertaken over periods of time which included music and sports events.

1.3.4. During the July 2025 survey, monitors captured noise from four music events which took place at the Principality Stadium on 4th, 5th, 11th, and 12th of July.

1.3.5. It is acknowledged that music noise will require careful assessment to ensure suitable internal noise levels during event days are achieved. In order to ensure that the assessment is robust, the Principality Stadium have been engaged and have indicated willingness to cooperate and provide additional data to enable a full and detailed assessment of music noise impact. However, at the time of writing this information has not yet been received. As such, it has not been possible to assess noise from music events at the Principality Stadium at this stage.

1.3.6. Consultation will be sought with Cardiff City Council to agree an approach to the methodology of this assessment and discharge the anticipated planning condition.

2 POLICY AND GUIDANCE

2.1 PLANNING POLICY WALES – EDITION 12

2.1.1. Planning Policy Wales (PPW) recently updated as of February 2024, sets out the land use planning policies of the Welsh Government.

2.1.2. Section 6.7 of PPW, Air Quality and Soundscape, provides the following guidance with regards to noise:

6.7.5 … The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.

6.7.12 Planning authorities must consider current and future sources of air and noise pollution as part of developing their strategies for locating new development...

6.7.13 … When proposing to introduce a development activity into an area the impacts which existing pollution sources (including roads, railways and industrial or commercial operations) have in terms of air and noise pollution should be carefully considered, particularly taking into account any increases in pollution levels which may be reasonably expected in the foreseeable future as a result of increased transport activity.

6.7.14 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.

6.7.24 The potential impacts of noise pollution arising from existing development, be this commercial, industrial, transport-related or cultural venues (such as music venues, theatres or arts centres), must be fully considered to ensure the effects on new development can be adequately controlled to safeguard amenity and any necessary measures and controls should be incorporated as part of the proposed new development. This will help to prevent the risk of restrictions or possible closure of existing premises or adverse impacts on transport infrastructure due to noise and other complaints from occupiers of new developments. It will be important that the most appropriate level of information is provided and assessment undertaken.

2.2 TECHNICAL ADVICE NOTE (WALES) 11, NOISE - OCTOBER 1997

2.2.1. This note provides advice on how to minimise the adverse impact of noise without placing unreasonable restrictions on development.

2.2.2. In order to assist in assessing proposals, TAN 11 presents 4 noise exposure categories for residential development near a source of noise. The categories are:

A) *Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.*

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

C) *Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.*

D) *Planning permission should normally be refused.*

2.2.3. TAN 11 also presents example noise levels corresponding to the noise exposure categories. Given the sites urban location, Table 2-1 presents reproduced values for “mixed sources”.

Table 2-1 - Recommended noise exposure categories for new dwellings near existing noise sources

Noise Source		Noise Levels corresponding to the Noise Exposure Categories $L_{Aeq,T}$ dB			
		A	B	C	D
Mixed Sources	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66

2.2.4. Values in Table 2-1 refer to noise levels measured on an open site at the position of the proposed dwellings, well away from any existing buildings, and 1.2m to 1.5m above the ground.

2.2.5. Mixed sources does not include industrial activity or noise from recreational and sporting/entertainment events. As discussed above, a further assessment of music noise will be undertaken once additional information is available.

2.3 LOCAL POLICY

2.3.1. The relevant sections of the Cardiff Local Development Plan are included below:

POLICY KP5: GOOD QUALITY AND SUSTAINABLE DESIGN

“*To help support the development of Cardiff as a world-class European Capital City, all new development will be required to be of a high quality, sustainable design and make a positive contribution to the creation of distinctive communities, places and spaces by:*
…Ensuring no undue effect on the amenity of neighbouring occupiers and connecting positively to surrounding communities”

POLICY H5: SUB-DIVISION OR CONVERSION OF RESIDENTIAL PROPERTIES

“*Proposals for any conversion to flats or Houses in Multiple Occupation will be permitted where:*
…There would be no material harm to the amenity of existing, nearby residents by virtue of general disturbance, noise or overlooking.”

POLICY EN13: AIR, NOISE, LIGHT POLLUTION AND LAND CONTAMINATION

“*Development will not be permitted where it would cause or result in unacceptable harm to health, local amenity, the character and quality of the countryside, or interests of nature conservation,*

landscape or built heritage importance because of air, noise, light pollution or the presence of unacceptable levels of land contamination."

2.4 BS8233:2014 'GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS'

2.4.1. The scope of this Standard is the provision of recommendations for the control of noise in and around buildings. The standard suggests the following suitable internal noise levels within dwellings:

- Living room: 35 dB $L_{Aeq,\ 16hour}$ for daytime (0700 – 2300)
- Dining room: 40 dB $L_{Aeq,\ 16hour}$ for daytime (0700 – 2300)
- Bedroom: 35 dB $L_{Aeq,\ 16hour}$ for daytime (0700 – 2300)
- Bedroom: 30 dB $L_{Aeq,\ 8hour}$ for night time (2300 – 0700)

2.4.2. With regards to external amenity areas, BS 8233 suggests external noise levels do not exceed 50 dB $L_{Aeq,T}$ (with a 55 dB $L_{Aeq,T}$ upper limit). However, it also states that for balconies, roof gardens and terraces, specification of noise limits is not necessarily appropriate. Instead, it offers that in high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels.

2.5 BS4142 2014 + A1 2019 Methods for rating and assessing industrial and commercial sound

2.5.1. The Standard describes methods for determining noise levels from industrial and commercial sources, and a method for assessing impact of said noise source on people residing in the receptor building.

2.5.2. The method presented involves the prediction of a rating level for the noise source, equal to the "specific" noise level emitted by the source with the addition of a correction for tonality, impulsivity, or irregularity.

2.5.3. The likelihood of impact is then assessed by subtracting the measured background level from the rating level. The greater this difference the greater the impact. The Standard states:

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

2.6 PROFESSIONAL PRACTICE GUIDANCE ON PLANNING & NOISE: NEW RESIDENTIAL DEVELOPMENT, MAY 2017 (PROPG)

2.6.1. The Professional Practice Guidance on Planning & Noise (ProPG: Planning & Noise, 2017) was produced by a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH), together with practitioners from a planning and local authority background, to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

2.6.2. In terms of noise criteria, the document references, and builds upon, those contained in BS 8233, as presented above. Figure 2 in the ProPG presents the internal noise level guidelines as set-out in Section 7.7.2 of BS 8233, but with elaborated guidance in the accompanying notes. The additional guidance from Note 4, Note 5 and Note 7 is provided below:

2.6.3. Note 4 proposes the WHO-based limit of 45 dB L_{AFmax}, with the following accompanying text:

"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 45dB $L_{Amax,F}$ 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 the source, number, distribution, predictability and regularity of noise events (see Appendix A)."

2.6.4. Note 5 from BS 8233 has been rewritten in the ProPG as follows:

"Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7."

2.6.5. The following is added to Note 7:

"The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (see Section 3.D)."

2.6.6. Key to note from the above, therefore, is that:

- The use of a guideline of 45 dB L_{AFmax} (not to be typically exceeded by more than 10 individual events per night) is further supported.
- Where there is a need to assess noise with windows closed, any façade openings used to provide whole dwelling ventilation should be assumed to be open.
- Where sound levels exceed the targets by more than 5 dB, they are likely to be regarded as "unreasonable", and "unacceptable" when more than 10 dB above.
- Where industrial and/or commercial noise is dominant, the ProPG states that regard should be had to the guidance in BS 4142 (as presented above).

3 NOISE SURVEY

3.1.1. Two noise surveys have been undertaken on the site; one to capture a sporting event (February 2025) and one to capture music events at the Principality Stadium (July 2025). Both surveys also captured noise levels over the surrounding weeks from typical noise sources such as:

- Road traffic on Wood Street, Park Street, St Mary's Street and other local roads
- Mechanical ventilation and cooling plant on surrounding building roofs
- Rail noise from Cardiff Station and the rail line it serves
- Pedestrian activity
- Air traffic

3.1.2. The following sections provide descriptions of the surveys completed, observations made on site during the noise survey and a summary of the noise data collected.

3.2 METHODOLOGY

3.2.1. Measurements of were taken at the following free-field positions:

- MP1 - unattended long-term noise measurements between 19 Feb 2025 – 26 Feb 2025 and 3 Jul 2025– 14 Jul 2025. The equipment was located on the 12th floor terrace of Wood Street House, Wood Street, Cardiff, CF10 1FX. This measurement position, in conjunction with simultaneous measurements at ground level and on Level 24, was chosen to understand how the environmental noise profile changed with height. In addition, the measurement position had line of sight of the Principality Stadium Roof.
- MP2 - attended short-term noise measurement on 19 Feb 2025 and unattended long-term noise measurements between 3 Jul 2025– 14 Jul 2025. Equipment was located on the 24th floor of Wood Street House. In addition to the aforementioned relationship of noise profile and height, this position also had a clear line of sight to the stadium roof, and was further from other noise sources such as adjacent rooftop mechanical plant.
- MP3 - attended short-term noise measurements on 19 Feb 2025. The equipment was located at ground level in Central Square. This position was chosen to capture road and pedestrian noise, and to feed into the understanding of how the local noise profile changed with height.
- MP4 - unattended long-term noise measurements between 3 Jul 2025– 14 Jul 2025. The monitor was located within the empty site. It was considered representative of the northern façade of the proposed development, with a clear line of sight of the Principality Stadium. It was intended to capture the typical noise environment (from sources such as local traffic and rooftop plant) as well as music noise during weekend evening events.

3.2.2. MP1 and MP2 were undertaken on the terrace/roof area of Wood Street House to provide a proxy of the noise levels likely to be experienced at the upper floors of the development.

3.2.3. The difference in height of synchronous measurement positions allows for a informed prediction of façade noise levels at different levels of the proposed building.

3.2.4. All measurement locations are identified on the aerial markup in Figure 3-1. Photos of the logging positions in-situ are presented in Figure 3-2 to Figure 3-5.

3.2.5. All measurements were made by class 1 instrumentation with in-date traceable calibration certification. A full list of the equipment used can be found in Appendix A.

3.2.6. Field calibrations were performed before and after measurements and found no significant calibration drift.

Figure 3-1 - Measurement Locations (with site indicated in red)

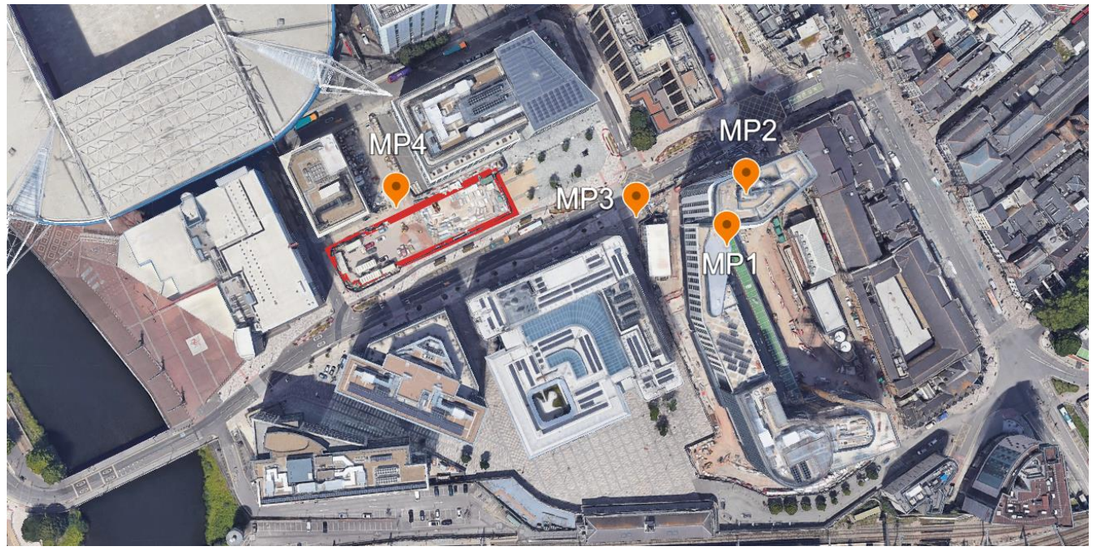


Figure 3-2 – Noise Measurement Position MP1 on 12th Floor Level of Wood Street House

Figure 3-3 – Noise Measurement Position MP2 on 24th Floor Level of Wood Street House

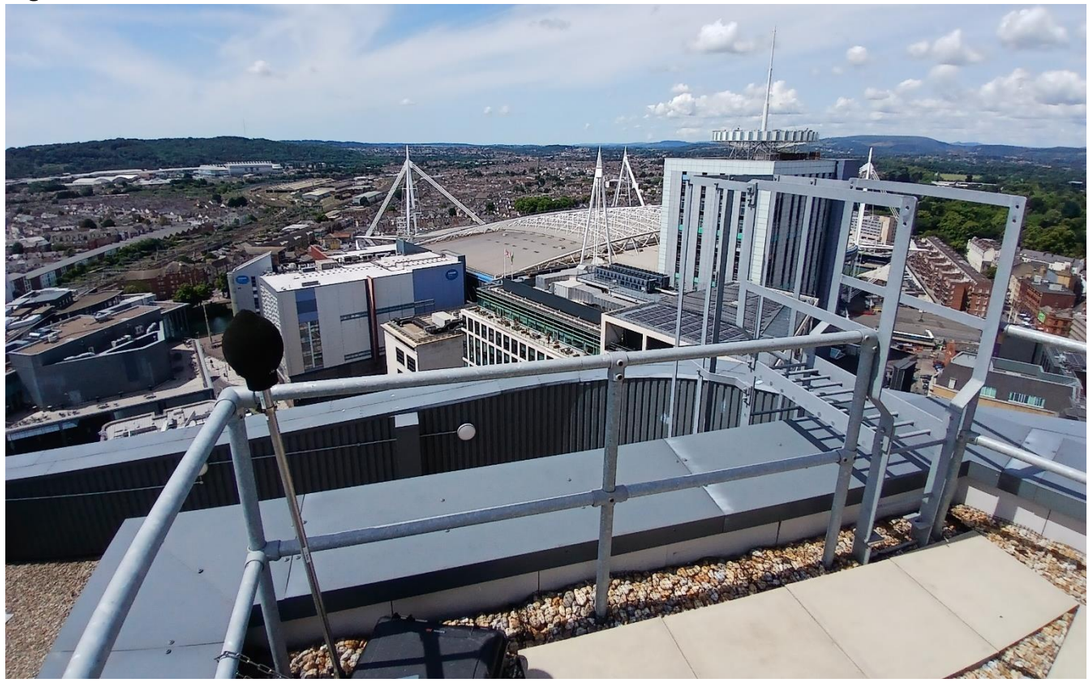


Figure 3-4 - Noise Measurement Position MP3 at Ground Level in Central Square

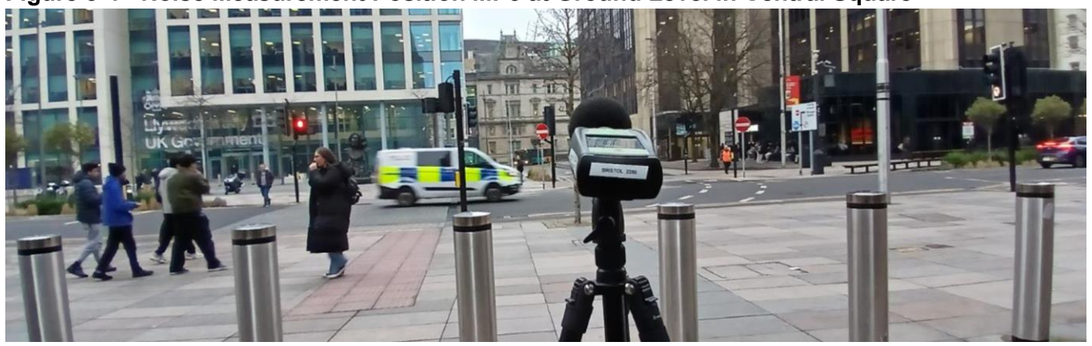
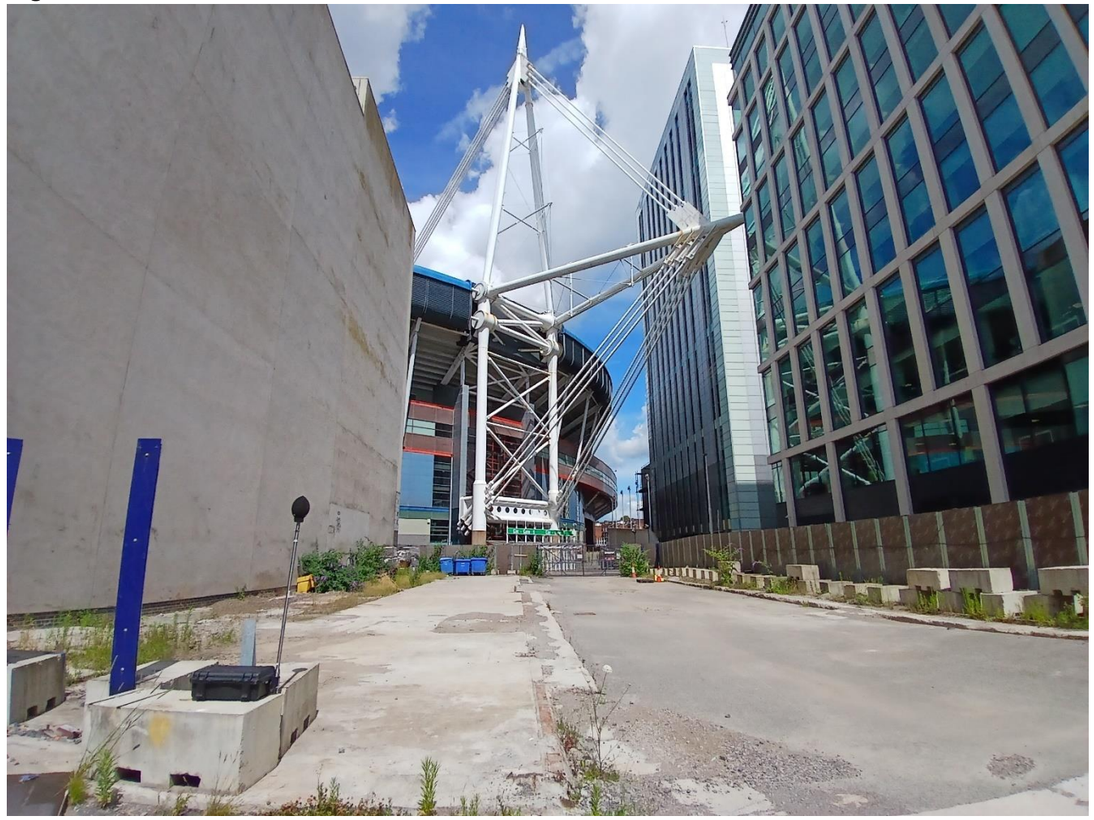


Figure 3-5 - Noise Measurement Position MP4 at Ground Level at the site



3.3 MEASUREMENT RESULTS

LONG TERM MEASUREMENT POSITION

3.3.1. Time histories showing the noise measurement data at the long-term measurement positions can be seen in Appendix B. The graphs also present wind speed during the measurement periods, to understand where data could have been affected by adverse weather conditions. Weather data from Cardiff International Airport, located 14 km from the site, was used. There was no precipitation recorded over the measurement periods; however, there were periods of high wind speed. Measurement data has been excluded where wind speeds exceeded 5 m/s from the assessed levels shown in subsequent sections of this report.

3.3.2. Typical noise contributions affecting the measured noise levels include road traffic from various surrounding roads, train noise and plant noise emissions from adjacent rooftop terraces.

3.3.3. Table 3-1 to Table 3-4 show the average ambient noise levels derived from the long-term measurement data for each daytime (0700-2300) and night-time (23-00-0700) period at each measurement position. Measurements deemed to be affected by adverse weather conditions (wind speeds exceeding 5 m/s) have been excluded. Measurements during music noise events (which will be the subject of a separate assessment) have also been excluded.

3.3.4. The method chosen for deriving the typical L_{A90} is the mode (based on guidance from BS 4142), and the method used for selecting typical L_{Amax} values is the 10th highest recorded within each period (based on guidance from ProPG).

Table 3-1 – MP1 noise measurement results (February) (free-field)

Day	Typical Ambient dB, $L_{Aeq,16/8hr}$		Typical background dB, $L_{A90,15mins}$		Typical dB, $L_{Amax,15mins}$
	Day	Night	Day	Night	Night
Wed - 19/02/2025	57*	54	55*	51	69
Fri - 21/02/2025	58	54	56	51	69
Sat - 22/02/2025	59	53	56	50	68
Sun - 23/02/2025	56	54	54	51	72
Mon - 24/02/2025	57	53**	55	49**	66**

*Measurement period started at 12:30

**Measurement period ended at 03:15

Table 3-2 - MP1 noise measurement results (July) (free-field)

Day	Typical Ambient dB, $L_{Aeq,16/8hr}$		Typical background dB, $L_{A90,15mins}$		Typical dB, $L_{Amax,15mins}$
	Day	Night	Day	Night	Night
Thurs – 03/07/2025	59*	55	56*	50	71
Sun - 06/07/2025	58	55	53	50	71
Mon - 07/07/2025	60	54	62	48	73
Tues - 08/07/2025	58	55	53	48	72
Weds - 09/07/2025	61	58	62	53	72
Thus - 10/07/2025	64	56	64	53	72
Fri - 11/07/2025	64	60	64	53	72
Sat - 12/07/2025	64	58	64	52	74
Sun - 13/07/2025	63	57	63	55	70
Mon - 14/07/2025	60**	-	56**	-	-

*Measurement period started at 12:45

**Measurement period ended at 12:00

Table 3-3 – MP2 noise measurement results (free-field)

Day	dB, $L_{Aeq,\ 16/8hr}$		Typical background dB, $L_{A90,15mins}$		Typical dB, $L_{Amax,15mins}$
	Day	Night	Day	Night	Night
Thurs – 03/07/2025	58*	52	54*	51	62
Sun - 06/07/2025	61	51	53	49	62
Mon - 07/07/2025	55	51	54	45	67
Tues - 08/07/2025	56	51	53	49	61
Weds - 09/07/2025	56	52	54	50	66
Thus - 10/07/2025	61	52	55	51	64
Fri - 11/07/2025	61	53	54	51	65
Sat - 12/07/2025	59	52	54	49	63
Sun - 13/07/2025	56	51	52	48	62
Mon - 14/07/2025	56**	-	54**	-	-

**Measurement period started at 13:15

***Measurement period ended at 11:45

Table 3-4 – MP4 noise measurement results (free-field)

Day	dB, $L_{Aeq,\ 16/8hr}$		Typical background dB, $L_{A90,15mins}$		Typical dB, $L_{Amax,15mins}$
	Day	Night	Day	Night	Night
Thurs – 03/07/2025	56*	54	54*	53	67
Sun - 06/07/2025	56	54	53	53	66
Mon - 07/07/2025	56	54	53	53	65
Tues - 08/07/2025	56	54	53	53	65
Weds - 09/07/2025	56	54	54	53	66
Thus - 10/07/2025	57	54	54	53	65
Fri - 11/07/2025	60	55	54	53	66
Sat - 12/07/2025	60	55	56	53	66
Sun - 13/07/2025	55	54	55	52	63
Mon - 14/07/2025	56**	-	54**	-	-

**Measurement period started at 11:45

***Measurement period ended at 11:00

ATTENDED MEASUREMENTS

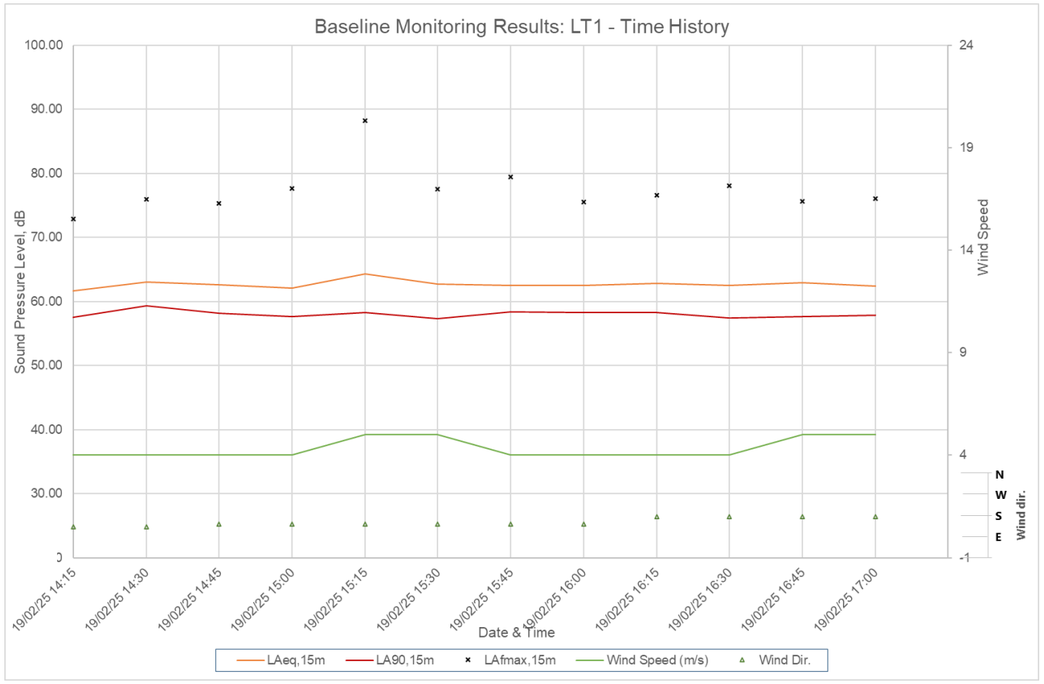
3.3.5. Attended noise measurements were undertaken at MP3 between 14:15 and 17:15 on 19/02/2025. The microphone was located 10 m from Wood Street and positioned 1.5 m above ground level in a free-field position.

3.3.6. The primary noise source in this position was road traffic along Wood Street. However, other significant contributions included train noise, noise from passing pedestrians, and plant noise.

3.3.7. This position was chosen to quantify the noise from these sources and, using synchronous noise measurements at height, develop understanding of how the local noise profile changed with height. This understanding would, in turn, allow for better prediction of the noise environment at higher level facades of the development, leading to more accurate specification of façade sound insulation performance.

3.3.8. Figure 3-6 presents the noise measurement data and wind speed recorded.

Figure 3-6 - Attended Measurement Results (MP3)



3.3.9. Table 3-5 provides a summary of the attended measurements. The method chosen for deriving the typical L_{A90} values is the mode (based on guidance from BS 4142), and the method used for selecting representative L_{Amax} values is the highest recorded across the measurement period in order to present a precautionary assessment.

Table 3-5 – Attended measurement summary (free-field)

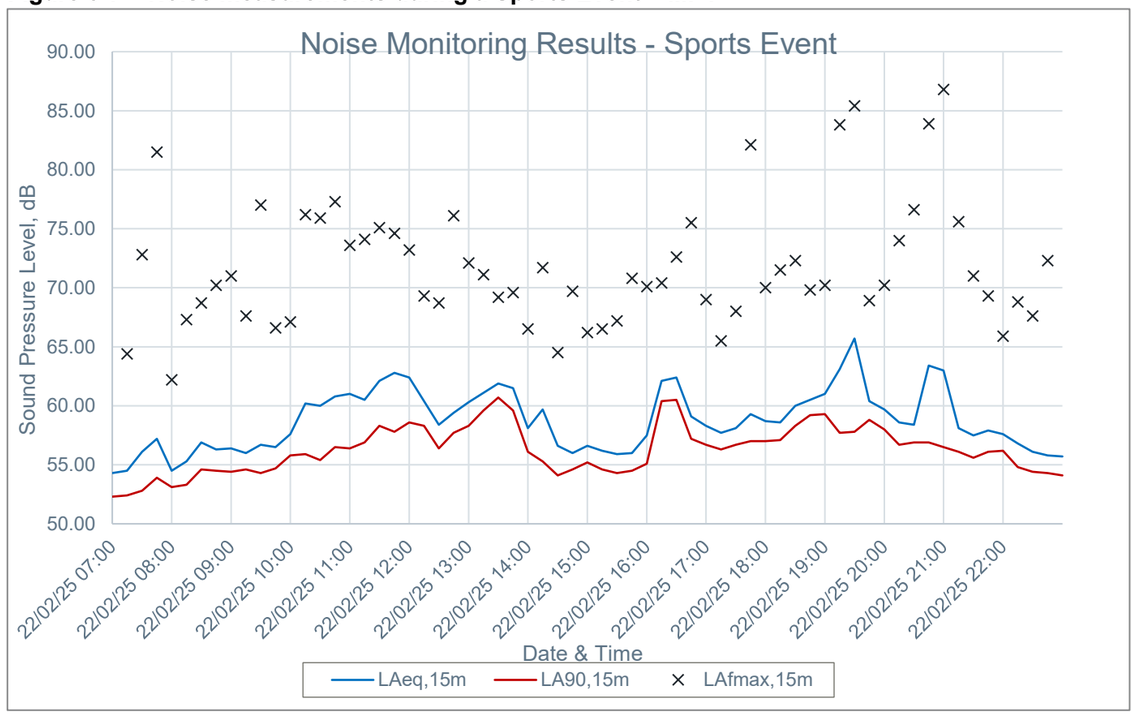
Measurement No.	Location	Date	Duration	dB, $L_{Aeq,15mins}$	dB, $L_{A90,15mins}$	dB, $L_{Amax,15mins}$
1	Ground Floor - Central Square	19/02/2025	3 hours	63	58	88

EVENT NOISE

Sport

3.3.10. During the February 2025 survey, MP1 captured noise from a sports event taking place at the Principality Stadium (Six Nations Rugby – Wales vs Ireland). Figure 3-7 shows noise levels across the daytime period (07:00-23:00) on the day of the event. The sports event took place from 14:15 to 16:00 on 22/02/2025. MP1 was located on the 12th floor of Wood House, with line of sight of the stadium roof (which was closed during the event) and the roads and pedestrianised areas leading to the stadium. This location was chosen to capture noise from the stadium (unscreened by surrounding buildings) and noise from crowd movements to and from the stadium.

Figure 3-7 – Noise measurements during a Sports Event – MP1



3.3.11. Ambient (L_{Aeq}) and background (L_{A90}) noise levels were highest immediately before and after the event, with noise levels reducing during the event. This is likely due to pedestrian noise from attendees travelling through Central Square, located between the stadium and train station.

3.3.12. Additionally, event day noise was not higher than typical daytime ambient noise levels measured at the same measurement position, as seen in Table 3-1.

3.3.13. As highlighted in Section 5.6, consultation will be sought with Cardiff City Council to agree an approach to assessing the impact of music noise on the development in order to discharge the anticipated planning condition.

4 NOISE MODELLING

4.1.1. A 3D noise model has been constructed in the CadnaA software of the site and surrounding area. This model includes the following layers:

- Key local roads and rail
- Point noise sources to represent rooftop plant on adjacent buildings
- Proposed ground height topographical data for the area surrounding Central Square, Cardiff.
- Existing buildings.
- A ground absorption of 0 (acoustically hard ground).
- The Proposed development based on elevation and plan drawings from 5plus (The Architect): 06159 5PA-B1-ZZ-DR-A-052201 and 06159 5PA-B1-XX-DR-A-022203

4.1.2. Figure 4-1 to Figure 4-8 present daytime and night-time predicted façade noise levels (dB L_{Aeq}).

4.1.3. Given it was not possible to access to adjacent roofs to measure the noise from plant directly, a balance of the contributions to the local noise environment from rooftop plant, nearby roads, and rail noise, was estimated. Measured noise data taken during the attended and unattended noise surveys has been used to assist in this prediction.

4.1.4. The model was also checked against measurements taken during a previous noise survey (Hydrock Document Ref 21518-HYD-ZZ-XX-RP-Y-1001) (conducted by another consultant for the previous planning application). These noise measurements align well with measurements obtained during noise surveys conducted by WSP.

4.1.5. Whilst the model was calibrated against measured noise data as best as practicably possible, there will always be an element of uncertainty associated with noise modelling. In lieu of measuring noise on the proposed building, modelling represents the best estimate of noise levels which will be experienced at the façade of the proposed building.

4.1.6. A conservative approach to the development of the model was taken (e.g. taking the highest measured noise levels to calibrate against). Further, a cautious approach was adopted in estimating noise levels associated with surrounding building services plant. The noise measurements were undertaken in July 2025 while temperatures were high and so building services plant was likely to be operating at a high duty. This can be seen in the difference between noise measurements at MP1 in February and those taken in July (where plant noise is dominant). This robust approach should ensure that the internal noise level targets will be achieved in the “worst case” scenario.

Figure 4-1 - Predicted facade noise levels (dB, L_{Aeq}), daytime, eastern view

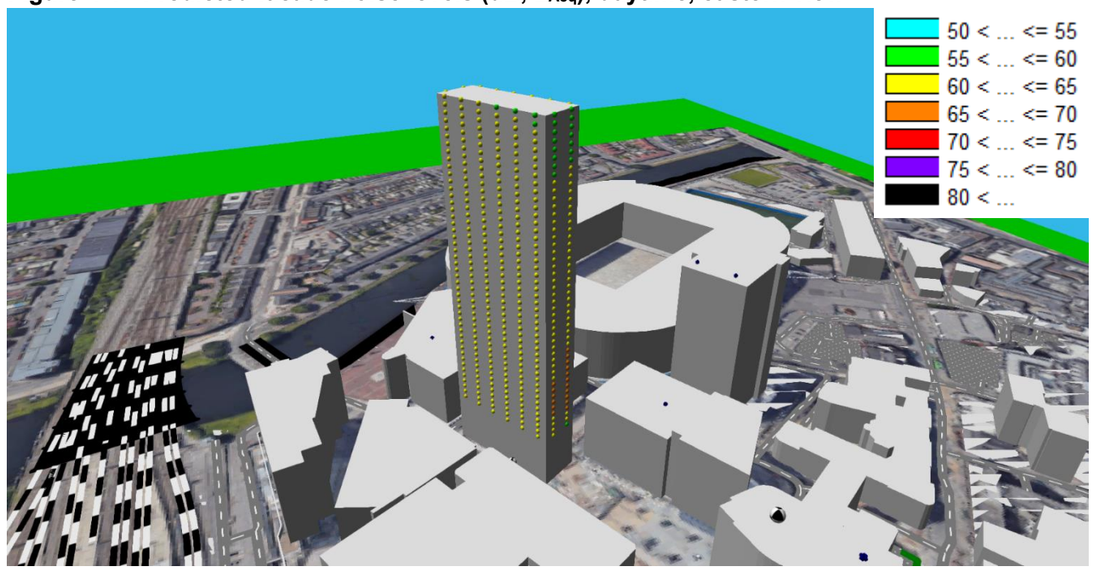


Figure 4-2 - Predicted facade noise levels (dB, L_{Aeq}), night time, eastern view

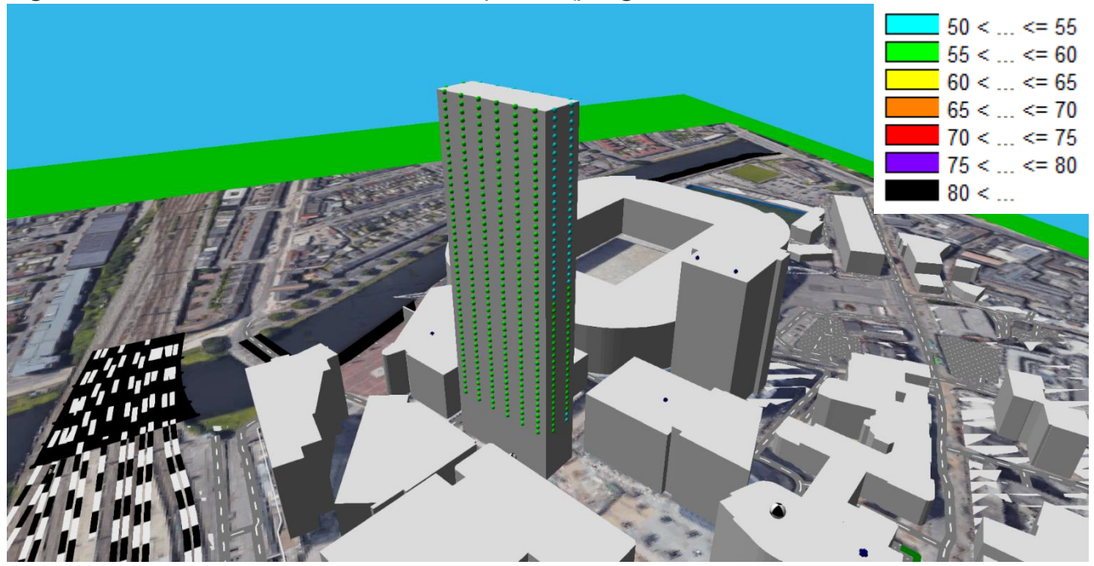


Figure 4-3 - Predicted facade noise levels (dB, L_{Aeq}), daytime, southern view

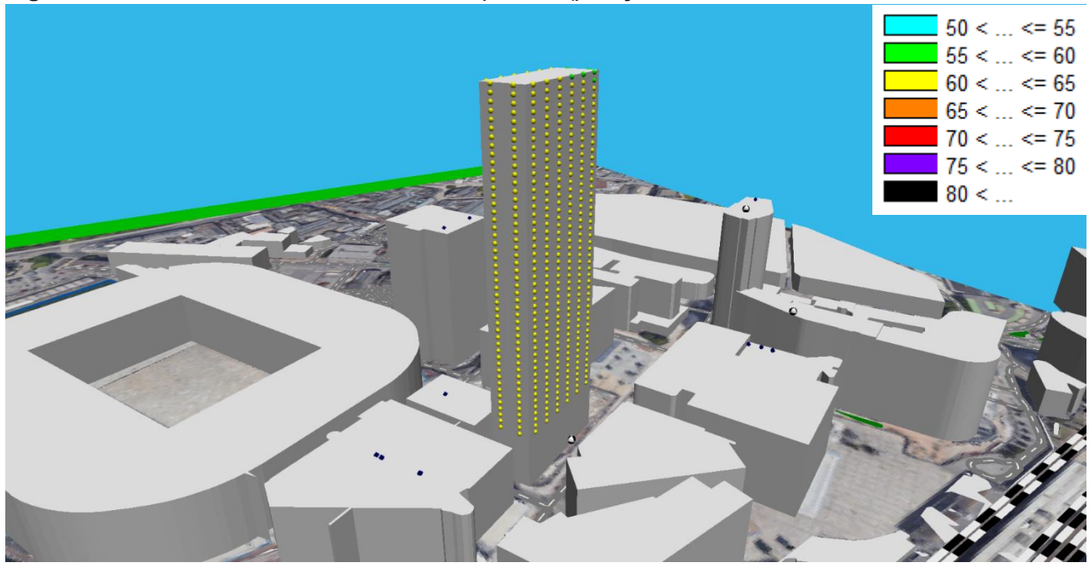


Figure 4-4 - Predicted facade noise levels (dB, L_{Aeq}), night time, eastern view

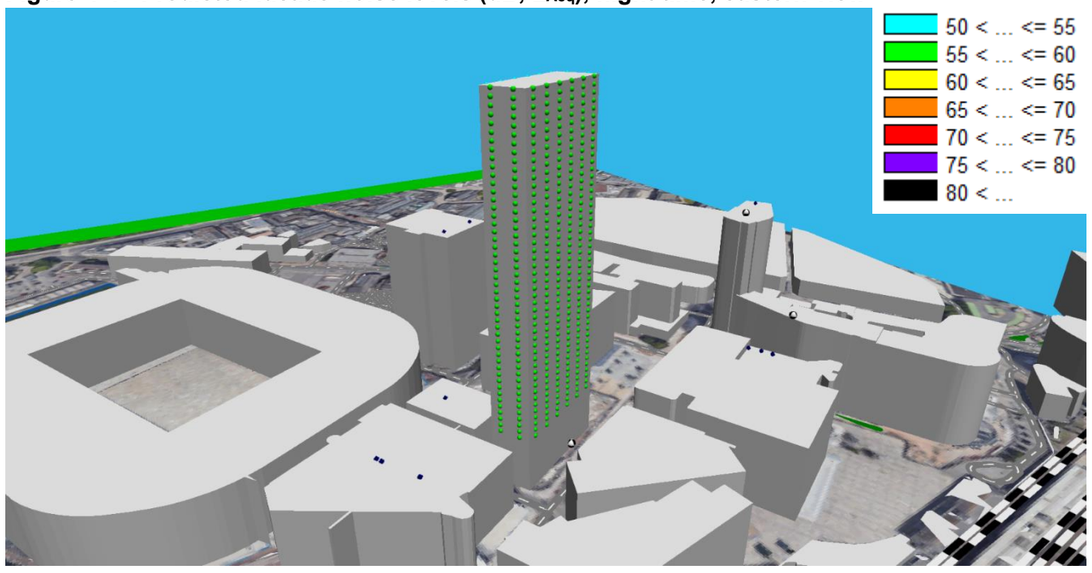


Figure 4-5 - Predicted facade noise levels (dB, L_{Aeq}), dayime, northern view

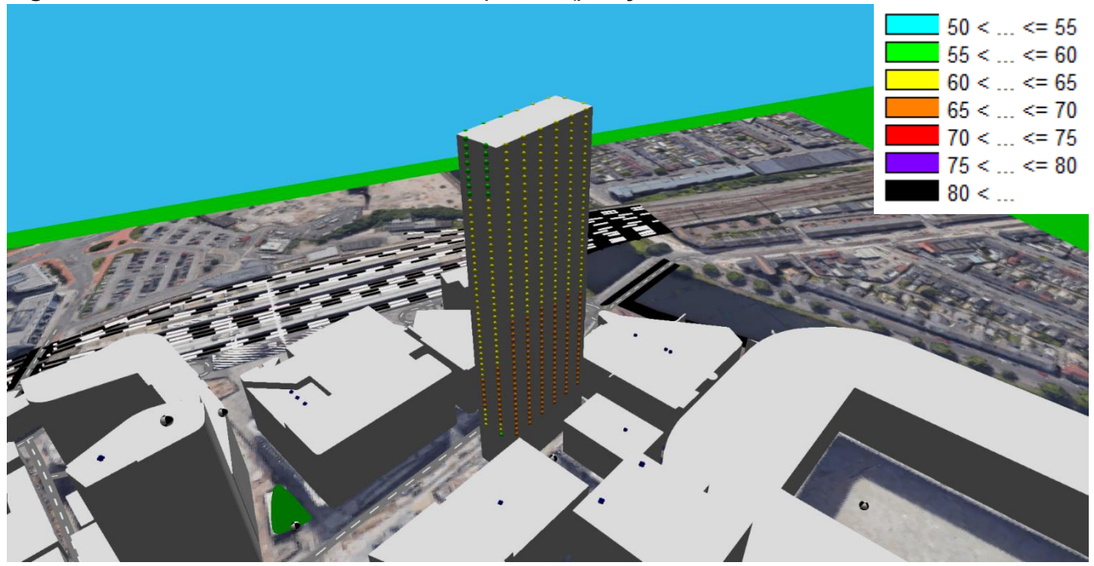


Figure 4-6 - Predicted facade noise levels (dB, L_{Aeq}), night time, northern view

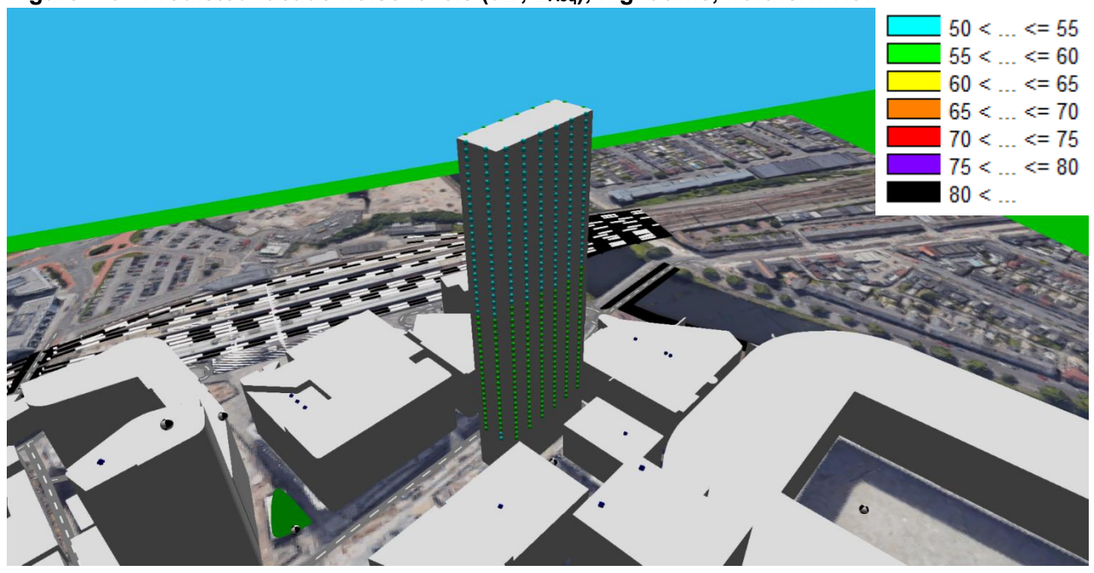


Figure 4-7 - Predicted facade noise levels (dB, L_{Aeq}), daytime, western view

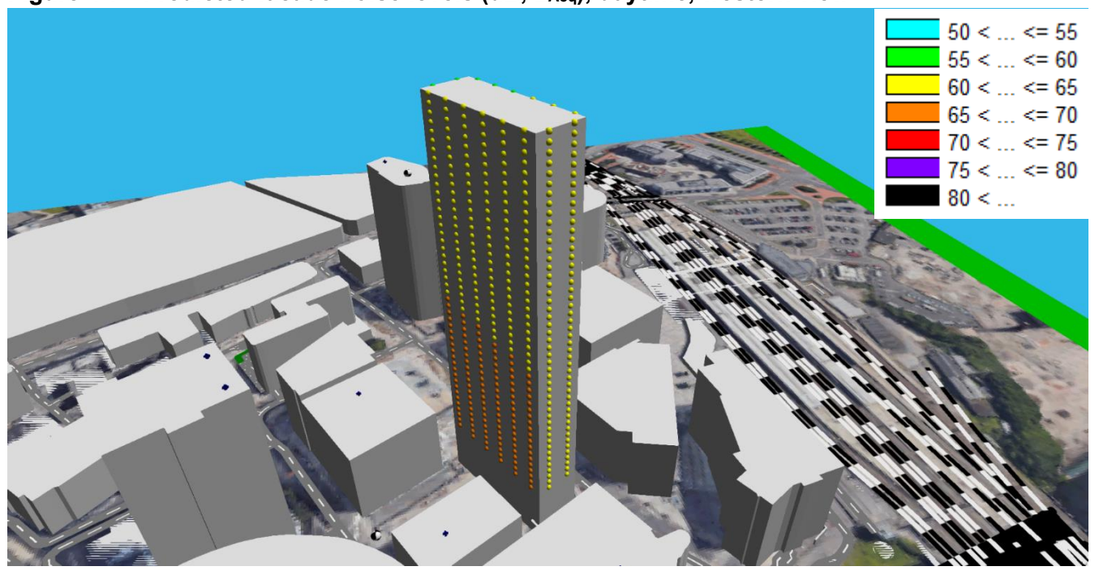
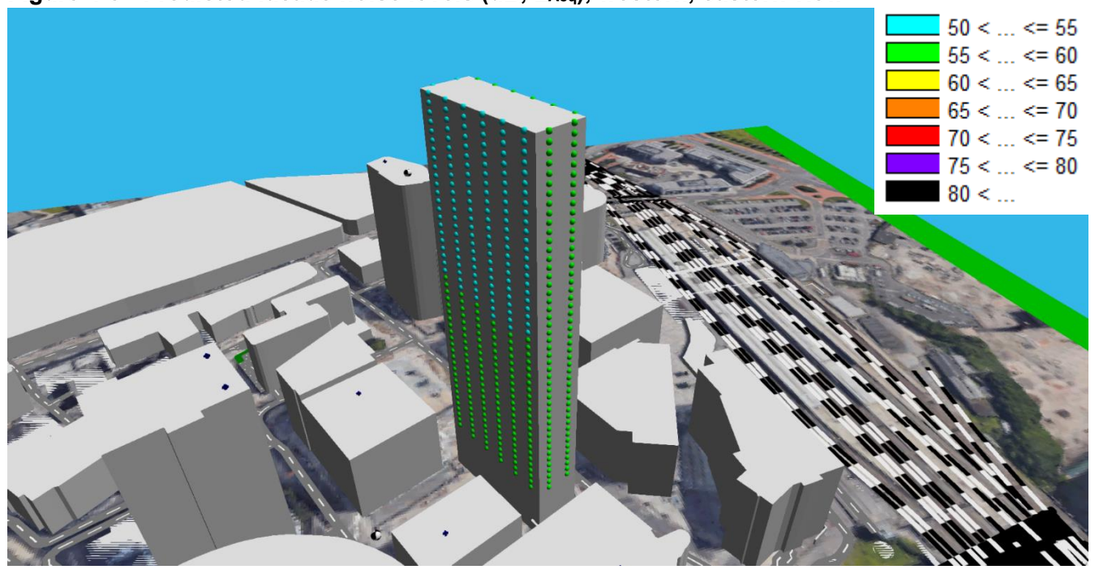


Figure 4-8 - Predicted facade noise levels (dB, L_{Aeq}), western, eastern view



5 NOISE IMPACT ASSESSMENT

5.1 NOISE CATEGORY

5.1.1. Noise levels used to assess the TAN 11 Noise Exposure Category are required to be:

"measured on an open site at the position of the proposed dwellings, well away from any existing buildings, and 1.2m to 1.5m above the ground."

5.1.2. Measurements at MP4 are most appropriate for the derivation of the appropriate exposure category, albeit, in an urban location such as this it is not possible to be 'well away from any existing buildings'. The MP4 noise measurements indicate that TAN 11 Noise Exposure Category B is most appropriate. TAN 11 states the following about a Category B site:

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

5.1.3. The following section therefore sets out the required noise mitigation measures to ensure suitable internal and external noise levels are achieved.

5.2 FAÇADE SOUND INSULATION

5.2.1. The highest typical noise levels (i.e. excluding music events at Principality Stadium) modelled at the façade of the residential floors of the proposed building are no greater than 67 dB L_{Aeq}. during the day and 60 dB L_{Aeq} during the night.

5.2.2. The highest of the typical maximum event noise levels is 74 dB $L_{Amax.}$ This is 14 dB higher than the highest typical ambient noise level.

5.2.3. Since the internal noise level target is 15 dB higher for maximum event noise levels than for ambient noise levels, the façade specification will be driven by ambient levels.

5.2.4. These highest noise levels occur on the 4th floor, which is the lowest floor proposed for residential use.

5.2.5. Table 5-1 presents an example façade sound insulation performance which would be required on the worst affected façade in order to meet the residential BS 8233internal noise level targets and ProPG maximum event level target. Noise break-in calculations have been undertaken adopting the approach set out in BS 8233 based on the proposed room layouts and glazing sizes for the worst affected façades.

Table 5-1 – Example façade sound insulation performance

Sound Insulation Performance (R_w) To Meet Internal Noise Level Targets at Octave Band Centre Frequency (Hz)								R_w+C_{tr}
63	125	250	500	1000	2000	4000	8000	
35	38	37	36	37	33	31	26	36 (0)

5.2.6. The calculation of this facade sound insulation performance has been based on the smallest bedroom on a typical floor plan drawing from 5plus (The Architect) 06159 5PA-B1-XX-DR-A-022202. The smallest room size would result in the most onerous facade specification.

5.2.7. The example sound insulation performance above can be achieved by a combination of acoustic laminate glazing alongside a choice of solid façade construction options (e.g. brick or Ultra High Performance Concrete).

5.2.8. The assessment above is for the highest predicted noise levels on the worst affected façade. Some façades are screened from adjacent rooftop plant, and higher building levels will experience greater attenuation due to distance from road and plant noise. As such, lower façade sound insulation specifications will adequately control noise break-in for façades and building levels exposed to lower noise levels.

5.2.9. It is anticipated that a higher façade sound insulation specification will be required for façades overlooking the Principality Stadium as a result of music noise. As discussed above, this will be undertaken to discharge an anticipated planning condition.

5.3 EXTERNAL AMENITY SPACES

5.3.1. A communal terrace is proposed on Level 49 which is the only external amenity area associated with the development.

5.3.2. The predicted noise level from the 3D model is in the region of 55 – 56 dB L_{Aeq} at this terrace during the day.

5.3.3. It is important to note the noise levels at the terrace are dominated by contributions from plant noise, the assessment of which in this report is conservative.

5.3.4. As such, whilst specification of noise limits is not necessarily appropriate for this terrace, it is assumed that screening provided by the proposed parapet will result in noise levels on the terrace below the 55 dB L_{Aeq} target.

5.4 OVERHEATING AND VENTILATION

5.4.1. The ventilation strategy proposed for the development is for mechanical ventilation and heat recovery units (MVHRs) to serve all residential spaces.

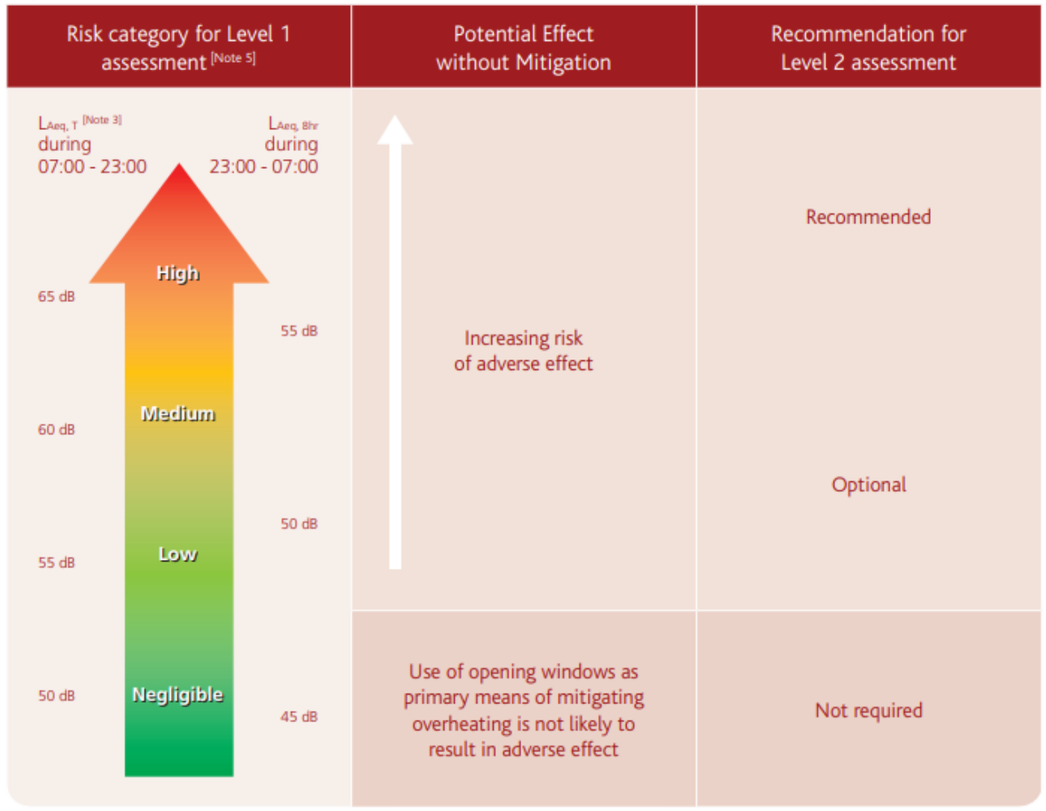
5.4.2. The development will be required to meet the ventilation requirements of Approved Document F, and the overheating requirements from Approved Document O. Where building design considers these requirements in isolation from noise control, the resulting development may require occupants to choose either acoustic comfort or indoor air quality and thermal comfort.

5.4.3. The Acoustics Ventilation and Overheating - Residential Design Guide (2020 Version 1.1) aims to assist designers to adopt an integrated approach to the acoustic design within the context of the ventilation and thermal comfort requirements.

5.4.4. Section 3 of the AVO guide outlines a 2-Level assessment of impact to internal ambient noise levels during an overheating condition (where windows are used to ventilate).

5.4.5. Level 1 relates to the external noise environment. Figure 5-1 presents the guidance given for assessing the risk of noise impacts during an overheating condition based on the external free-field noise levels.

Figure 5-1 - AVOG Guidance for Level 1 site risk assessment of noise relating to overheating



5.4.6. Based on the predicted façade noise levels, it is recommended that a Level 2 assessment be undertaken during detailed design.

5.4.7. The noise level predictions undertaken indicate that it will not be possible to rely on the use of opening windows to mitigate overheating (depending on the façade and the level) whilst achieving suitable internal noise levels.

5.5 PLANT NOISE LIMITS

5.5.1. In terms of assessing the impact of a new noise source at existing receptors, BS 4142 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"

5.5.2. Based on previous planning conditions for new developments (including the previous conditions for this site), Cardiff City Council aim to control building services emissions from new developments to 5 dB below the existing background sound level. As such, the plant noise limits for the proposed development have been set at a level 5 dB below the lowest typical measured background sound level for the day and night periods (measured at MP2).

5.5.3. Table 5-2 presents the proposed noise limits for plant associated with the proposed development.

Table 5-2 – Proposed plant noise limits

Period (hours)	Lowest Typical Measured Background Noise Level (dB $L_{A90,15\ min}$)	Proposed Plant Noise Limit (dB L_{Ar})
07:00 – 23:00	53	48
23:00 – 07:00	48	43

5.5.4. The noise limits above are 'free-field' levels and should be achieved at all nearby sensitive receptors.

5.5.5. They apply to the cumulative noise level from all building services plant associated with the development.

5.5.6. If plant noise has any tonal, intermittent or other characteristics which may make it more readily distinguishable from the residual acoustic environment, penalties may apply in line with BS 4142.

5.5.7. Assuming compliance with the above limits, noise from new plant will have a negligible impact on nearby noise sensitive receptors.

5.6 PAVILLION

The development will include a pavilion building within Central Square (flexible Class A1 and A3). It is anticipated this will operate as a restaurant/café.

Noise from plant associated with the pavilion will be required to meet the cumulative noise limit outlined in Section 5.5.

It is expected that any other noise from the pavilion will be controlled through the acoustic design of the building envelope. It is understood there will be no amplified music events held in the pavilion.

5.7 EVENT NOISE

5.7.1. Under the Agent of Change principle, the proposed development must be designed so as to avoid unreasonable restrictions being placed on the Principality Stadium due to noise from music events.

5.7.2. Whilst noise surveys undertaken have captured noise from music events, a full assessment of music noise affecting the development, and the necessary mitigation required, will require noise data from the stadium and an understanding of any restrictions placed on the stadium with regards to noise generation.

5.7.3. WSP has contacted Principality Stadium, who in turn have offered to provide noise data from monitoring which takes place during music events.

5.7.4. Additionally, WSP will liaise with Cardiff City Council to agree an assessment methodology which protects the future occupants of the development, and the ability of the stadium to operate music events.

5.7.5. Noise measured during music noise events was materially higher than from sporting events. As such, assessing music noise events should ensure adequate protection for future occupiers of the development from sports noise.

6 CONCLUSION

6.1.1. WSP have conducted noise surveys, modelling, and calculations to form this Noise Impact Assessment.

6.1.2. Measurements at the site in line with TAN 11 place the site in Noise Exposure Category B.

6.1.3. TAN 11 states "Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection".

6.1.4. An example façade sound insulation specification has been provided which should ensure that noise break-in during typical day and night times does not exceed the target internal levels.

6.1.5. The target external noise level of 55 dB $L_{Aeq,T}$ is anticipated to be achieved in the Level 49 roof terrace.

6.1.6. Based on the predicted façade noise levels, a Level 2 assessment as set out in the AVO Guide is recommend to be undertaken during design. It will not be possible to solely rely on the use of opening windows to mitigate overheating (depending on the façade and the level) whilst still achieving suitable internal noise levels in habitable rooms.

6.1.7. Plant noise limits have been set to ensure low or negligible noise impact on adjacent noise sensitive premises from plant associated with the development.

6.1.8. It is assumed that an assessment of music noise from the Principality Stadium will be conditioned by Cardiff City Council. An assessment of the impact of music noise will require coordination with Principality Stadium (which is ongoing) and the Council.

6.1.9. The limitations to this report are included in Appendix D.

Appendix A

TECHNICAL GLOSSARY

Table A-1 - Acoustic Glossary

Terminology	Description
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa ($20x10^{-6}$ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. Generally used to describe road traffic noise.
Free-field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Ambient noise	The composite of airborne sound from many sources near and far associated with a given environment. No particular sound is singled out for interest.
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed (or absent) to such a degree that it does not contribute to the ambient sound.
Specific sound	Specific sound source being assessed.
Sound Exposure Level (SEL)	Level of a sound, of one second duration, that has the same sound energy as the actual sound event considered.
$L_{night,\ outside}$	In terms of assessments of night-time road traffic noise based on the DMRB, the $L_{night,outside}$ index is the equivalent continuous sound level $L_{Aeq,8h}$ for the period 23:00 to 07:00 hours assessed outside a dwelling and is free-field.

Appendix B

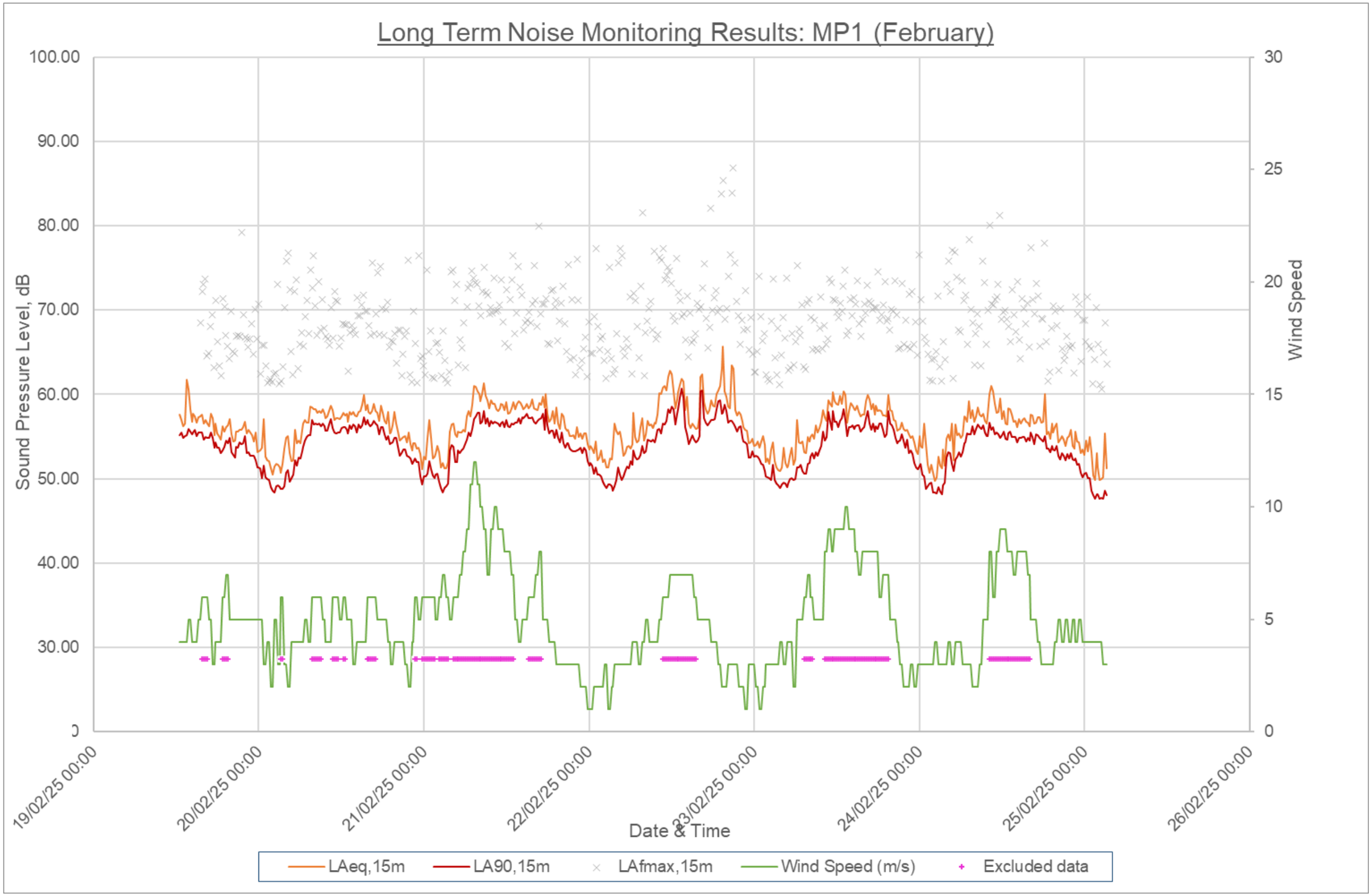
EQUIPMENT DETAILS

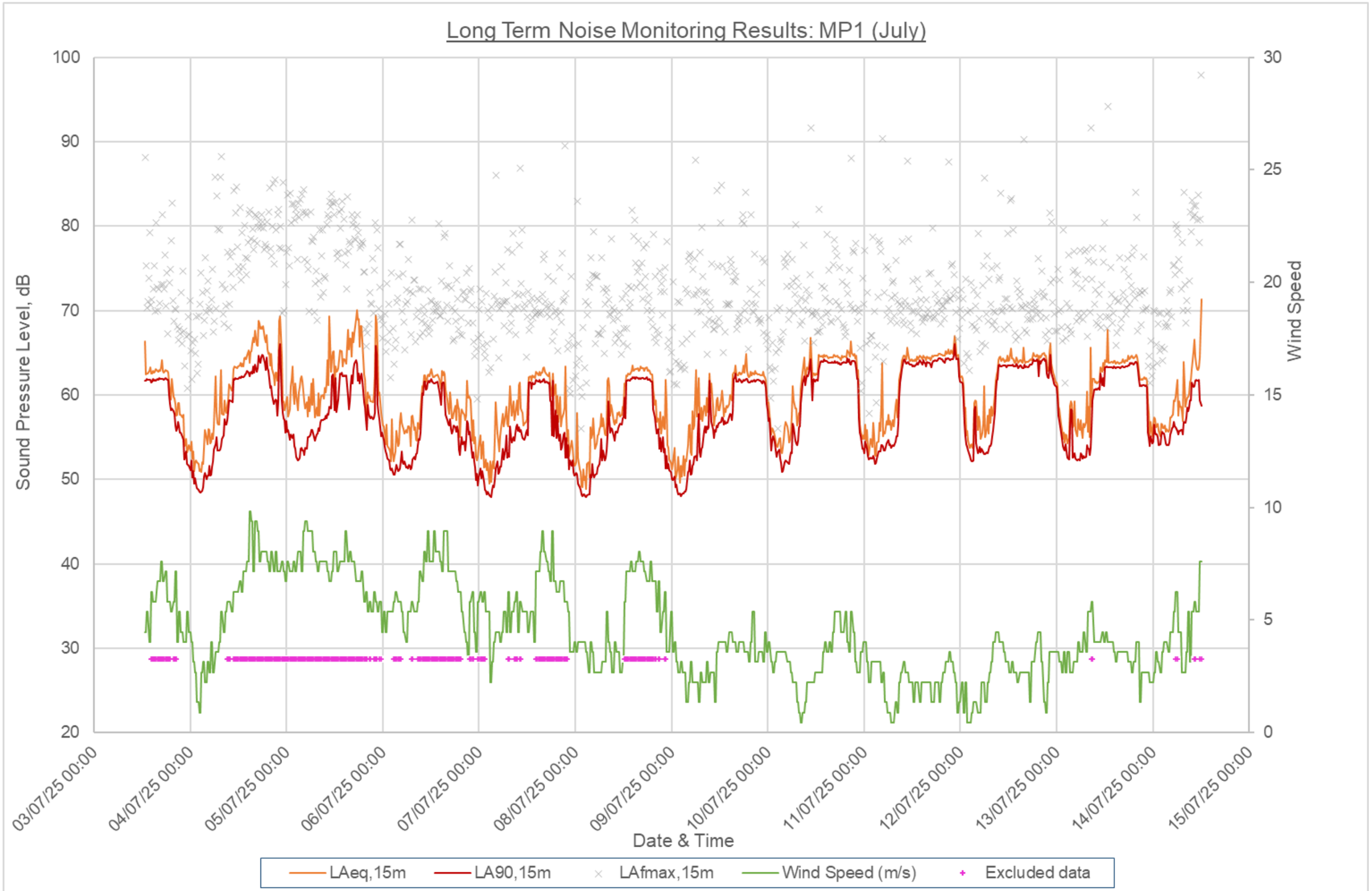
Table B-1 – Equipment details

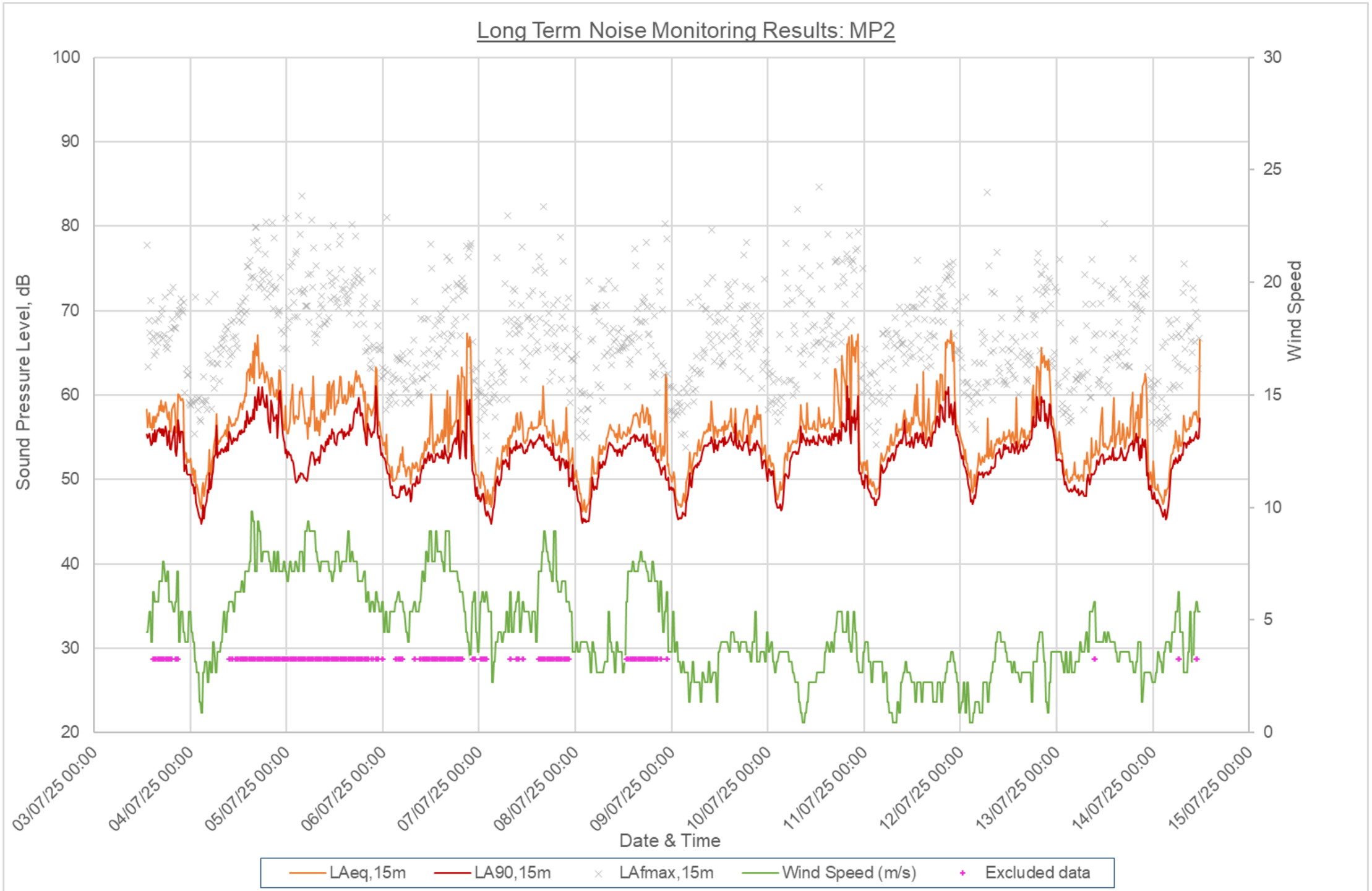
Measurement Position	Equipment	Make and model	Serial number
MP3	Sound Level Meter	B&K 2250	3011101
	Preamplifier	ZC 0032 Preamplifier	32283
	Microphone	4189 Microphone	3363965
	Calibrator	4231 Calibrator	3017654
MP1 (February)	Sound Level Meter	Rion NA-28	01070573
	Preamplifier	Rion NH-23	70589
	Microphone	Rion UC-59	00367
	Calibrator	01dB CAL21	34134167
MP1 (July)	Sound Level Meter	Rion NL52 Sound Level Meter	00821130
	Preamplifier	NH25 Preamplifier	21171
	Microphone	UC 59 Condenser Microphone	4130
	Calibrator	Cirrus CR:515 Sound Calibrator	67437
MP2	Sound Level Meter	Rion NL52 Sound Level Meter	00764965
	Preamplifier	NH25 Preamplifier	65092
	Microphone	UC 59 Condenser Microphone	10156
	Calibrator	Rion NC-74 Sound Calibrator	34251551
MP4	Sound Level Meter	Rion NL52 Sound Level Meter	00632043
	Preamplifier	NH25 Preamplifier	32071
	Microphone	UC59 Microphone	05210
	Calibrator	Rion NC-74 Sound Calibrator	1020510

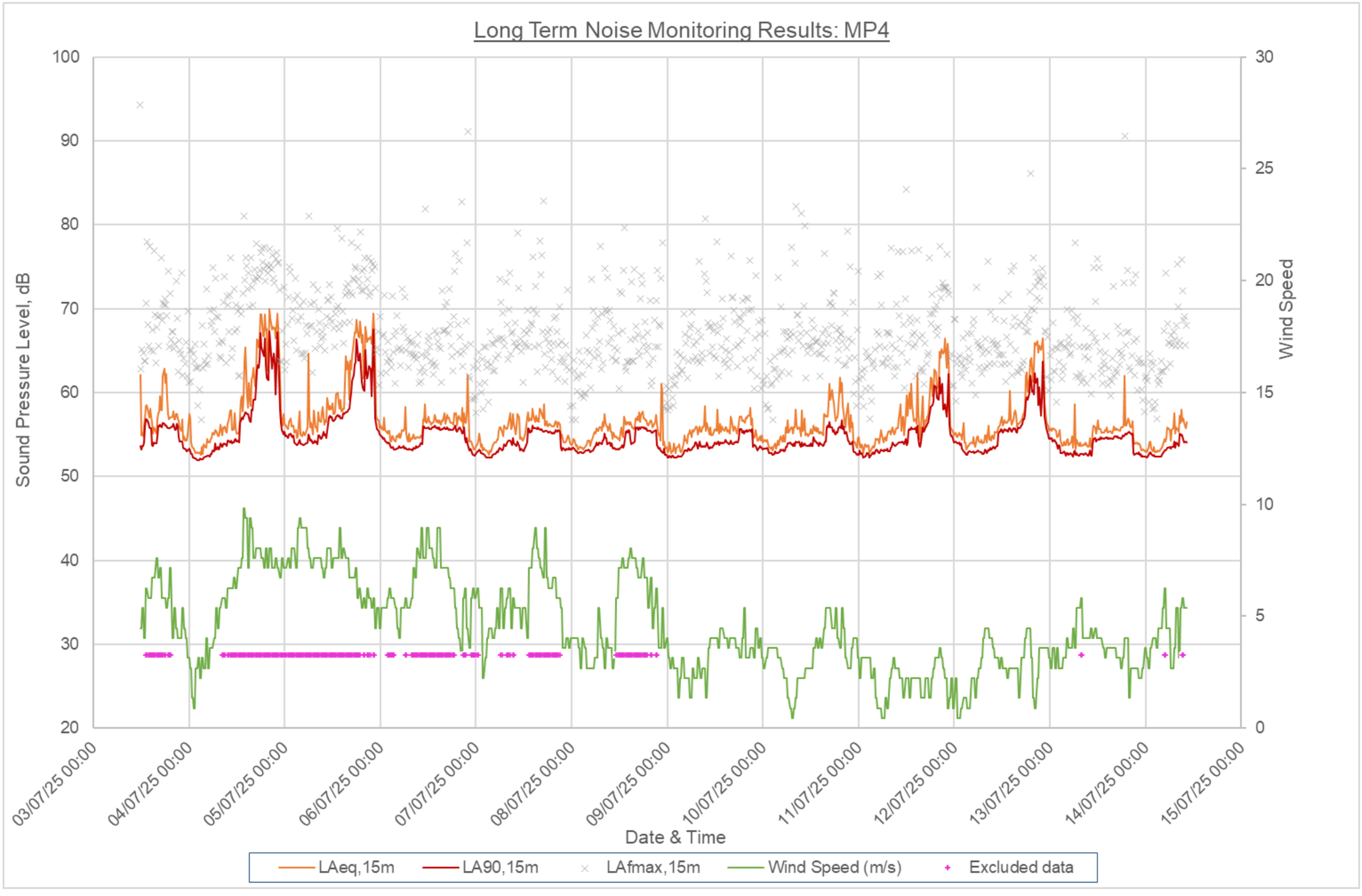
Appendix C

NOISE MONITORING TIME HISTORIES


Long Term Noise Monitoring Results: MP1 (February)
Sound Pressure Level, dB
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
0
Wind Speed
30
25
20
15
10
5
0
19/02/25 00:00
20/02/25 00:00
21/02/25 00:00
22/02/25 00:00
23/02/25 00:00
24/02/25 00:00
25/02/25 00:00
26/02/25 00:00
Date & Time
LAeq,15m
LA90,15m
LAfmax,15m
Wind Speed (m/s)
Excluded data


Long Term Noise Monitoring Results: MP1 (July)
Sound Pressure Level, dB
Wind Speed
100
90
80
70
60
50
40
30
20
30
25
20
15
10
5
0
03/07/25 00:00
04/07/25 00:00
05/07/25 00:00
06/07/25 00:00
07/07/25 00:00
08/07/25 00:00
09/07/25 00:00
10/07/25 00:00
11/07/25 00:00
12/07/25 00:00
13/07/25 00:00
14/07/25 00:00
15/07/25 00:00
Date & Time
LAeq,15m
LA90,15m
LAfmax,15m
Wind Speed (m/s)
Excluded data


Long Term Noise Monitoring Results: MP2
Sound Pressure Level, dB
Wind Speed
100
90
80
70
60
50
40
30
20
30
25
20
15
10
5
0
03/07/25 00:00
04/07/25 00:00
05/07/25 00:00
06/07/25 00:00
07/07/25 00:00
08/07/25 00:00
09/07/25 00:00
10/07/25 00:00
11/07/25 00:00
12/07/25 00:00
13/07/25 00:00
14/07/25 00:00
15/07/25 00:00
Date & Time
LAeq,15m
LA90,15m
LAfmax,15m
Wind Speed (m/s)
Excluded data


Long Term Noise Monitoring Results: MP4
Sound Pressure Level, dB
Wind Speed
100
90
80
70
60
50
40
30
20
30
25
20
15
10
5
0
03/07/25 00:00
04/07/25 00:00
05/07/25 00:00
06/07/25 00:00
07/07/25 00:00
08/07/25 00:00
09/07/25 00:00
10/07/25 00:00
11/07/25 00:00
12/07/25 00:00
13/07/25 00:00
14/07/25 00:00
15/07/25 00:00
Date & Time
LAeq,15m
LA90,15m
LAfmax,15m
Wind Speed (m/s)
Excluded data

Appendix D

LIMITATIONS OF THIS REPORT

LIMITATIONS OF THIS REPORT

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