



Debenhams & Vue at The Oracle, Reading

Acoustic Planning Report

For The Oracle Limited Partnership

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1. Introduction

Hydrock is appointed by The Oracle Limited Partnership to undertake an environmental noise survey and impact assessment for the proposed residential development at The Oracle, Bridge St, Reading RG1 2AT.

The Proposed Development (PD) consists of a conversion of two mixed use developments:

- » **Yield Hall Place 1 (Former Debenhams):** comprises 202 no residential units, a proposed leisure unit of 935sqm, a retained retail unit, a ground floor co-working space with maker units and a ground floor restaurant,
- » **Yield Hall Place 2 (Vue Cinema):** comprises 247 no residential units, a replacement cinema, and a ground floor commercial space.

commercial areas into to a scheme that comprises circa 440 Build to Rent homes with associated amenity spaces, flexible commercial spaces at ground floor, and reconfigured Leisure and Retail space within part of the existing shopping centre.

This report presents the results of the environmental noise survey undertaken to establish the existing noise climate across the site. The survey results have been used to assess the suitability of the site for residential development in accordance with relevant policy and guidance.

Preliminary guidance has been given on the mitigation measures that are likely to be required to ensure that noise incident at the development is controlled to a suitable level. It should be noted that such measures are subject to further development during technical design (notably the acoustic specifications for external building fabric elements).

Appropriate noise emission limits have also been determined for fixed building services plant associated with the development. It is anticipated that these will be achieved through selection of appropriately quiet fixed plant, in combination with attenuation measures (screening etc.) where needed.

2. Site description

2.1 Existing Site and Noise Sensitive Receptors

The Proposed Development site (PD) is located at The Oracle, Bridge St, Reading, and falls under the jurisdiction of Reading Borough Council (RBC), and comprises of two separate buildings:

- » PD A1 (*Yield Hall Place 1*)
- » PD A2 (*Yield Hall Place 2*)

Existing surroundings are occupied by commercial areas including The Oracle Shopping Centre, which the PD is also part of. The site is bounded by the following:

- » A329 Road to the south;
- » Yield Hall Pl to the east;
- » The Oracle shopping centre to the north and west;
- » Riverside Car park to the west; and
- » Pedestrian area and the river Kennet crossing through the PD.

A site plan showing the location of the proposed buildings are presented below in Figure 1.

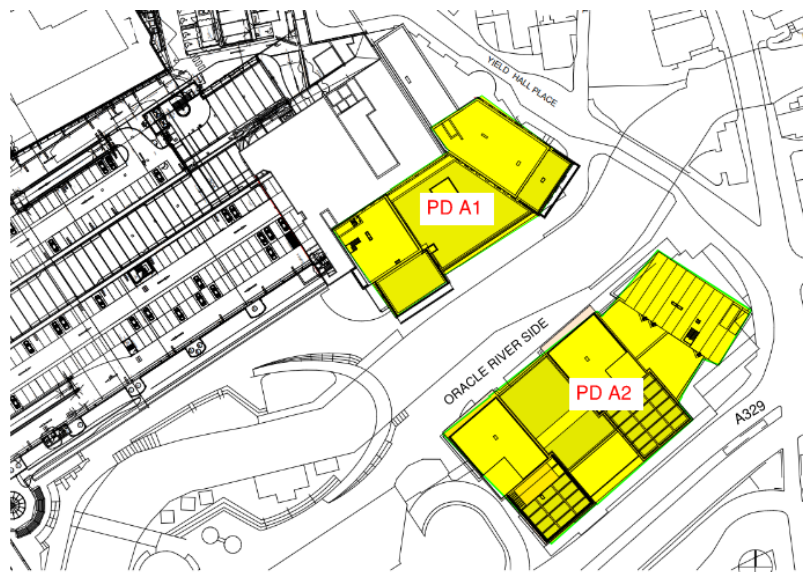


Figure 1: Location of the proposed development

2.2 Noise Sources Affecting the Site

The main noise sources affecting the PD are the traffic movement from the adjacent A329 road and The Oracle Shopping Centre visitors.

2.3 Proposed Development

The Proposed Development (PD) consists of a conversion of two mixed use developments:

- » **Yield Hall Place 1 (PD A1):** The former Debenhams building comprises 202 no residential units, a proposed leisure unit of 935sqm, a retained retail unit, a ground floor co-working space with maker units and a ground floor restaurant,
- » **Yield Hall Place 2 (PD A2):** The scheme comprises 247 no residential units, a replacement cinema, and a ground floor commercial space.

3. Planning Policy and Guidance

The following policy, standards and guidance documents will apply to the proposed development which are detailed in below sections:

- » National Planning Policy Framework (NPPF);
- » Noise Policy Statement for England (NPSE);
- » World Health Organisation (WHO) 1999: Guidelines for Community Noise;
- » BS 8233:2014 - Guidance on sound insulation and noise reduction for buildings;
- » BS 4142:2014 + A1 2019 - Methods for rating and assessing commercial and industrial sound; and
- » Local Planning Policy

3.1 National Planning Policy Framework (NPPF)

Revised in July 2021, this document sets out the Government's planning policies for England and supersedes the previous version of the NPPF (first published in 2012). It makes the following reference to noise in the section entitled Conserving and Enhancing the Natural Environment:

"170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

[...]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

It also makes the following references to noise in the Section entitled Ground Conditions and Pollution:

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

a) mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁵;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

65 See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."

And

"187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse

effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

3.2 Noise Policy Statement for England (NPSE)

Published in March 2010, the Noise Policy Statement for England (NPSE) sets out the long-term vision of Government noise policy as follows:

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

The NPSE identifies three observed effect levels, names "No Observed Effect Level" (NOEL), "Lowest Observed Adverse Effect Level" (LOAEL) and "Significant Observed Adverse Effect Level" (SOAEL).

The NPSE contains little detail on assessment methodologies and specific parameters at which the varying observed effect levels would occur in the context of a residential development.

3.3 BS 8233:2014 - Guidance on sound insulation and noise reduction for buildings

As discussed above, there is no specific guidance on noise assessment methods or criteria contained within the NPPF and NPSE. In lieu of this, the approach that is generally adopted when assessing the impact of environmental noise sources on residential developments is to undertake an assessment in accordance with BS 8233:2014.

BS8233:2014 provides internal and external ambient noise level criteria which are applicable to steady noise without a specific character affecting dwellings. The standard states it is desirable that the internal ambient noise levels not exceed the criteria set out in the table below:

Table 1: BS 8233 Internal noise limits

Activity	Location	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or L_{AFmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: Guidelines for Community Noise.

With respect to external amenity spaces, such as gardens and balconies, it is stated that it is desirable that the noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

3.4 World Health Organisation (WHO) 1999: Guidelines for Community Noise

This document draws upon research from *Vallet* and *Vernet* to provide the following advice on night-time noise:

"For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night"

3.5 BS 4142:2014 + A1 2019 - Methods for rating and assessing commercial and industrial sound

BS 4142 describes methods for rating and assessing the impact of industrial and commercial sound on dwellings, including fixed plant installations.

The methods 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.

A BS 4142 assessment is made by determining the difference between the specific noise under consideration and the background sound level, as represented by the L_{A90} parameter, determined in the absence of the commercial sound. The L_{A90} parameter is defined as the level exceeded for 90% of the measurement time. This parameter therefore excludes short duration noise events, such as individual vehicle movements, and represents the underlying continuous noise.

The commercial or industrial sound is assessed in terms of the equivalent continuous noise level, L_{Aeq} . The equivalent continuous noise level (L_{Aeq}) of the commercial or industrial sound, over the applicable assessment period, is known as the specific sound level.

A character correction penalty can be applied to the specific sound level where the commercial noise exhibits distinguishable tones, impulsiveness, intermittency or other characteristics which "are otherwise readily distinctive against the residual acoustic environment".

The specific noise level with the character correction (if necessary) is known as rating level (L_{Ar}) and the difference between the background noise and the rating level is determined to make the BS 4142 assessment. The following is then considered.

"Typically, the greater this difference, the greater the magnitude of impact. 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."

The standard highlights the importance of considering the context in which a sound occurs. Factors including the absolute sound level, the character of the sound, the sensitivity of the receptor and the existing acoustic character of the area should be considered when assessing the noise impact.

3.6 Local Planning Policy

The development is located within the administrative boundary of the Reading Borough Council (RBC). The Reading Borough Local Plan adopted in November 2019 sets out the Council's supplementary planning advice for controlling noise from new development and protecting noise sensitive new development from existing noise.

Policy EN17: Noise Generating Equipment, in section 4 -General Policies, of the aforementioned document refers to control of noise pollution, and states the following:

EN17: NOISE GENERATING EQUIPMENT

Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor.

4.2.92 The Local Plan proposals will see a high level of development within Reading. Reading is a densely populated town with many new planning developments taking place. Residents live in close proximity to commercial activities; therefore, it is important to minimise background creep in order to protect the noise environment and maintain quality of life for people living and working in the town. The negative impact of environmental noise on health is becoming better understood (for example WHO 1999, 2009 and 2011).

4.2.93 Planning Practice Guidance on noise states that no specific measures are required to manage the acoustic environment in situations where noise can be heard as a result of a development and there is a slight effect on the acoustic character of the area but there is no effect on the behaviour and attitude of people exposed to the noise. However, the guidance also states that:

The cumulative impacts of more than one source of noise should be considered; and

In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring.

4.2.94 The Council considers that the above two factors apply due to the town being densely populated and there being a high likelihood of subsequent noise generating plant being installed in a particular location. It is therefore necessary for each planning application for noisy plant to protect the acoustic environment and as far as possible prevent the increase in background noise levels because the cumulative impact of installation of noisy plant which causes an increase in background noise level is likely to lead to an adverse effect.

4.2.95 The Planning Practice Guidance on noise also states that local planning authorities may decide to develop specific standards to apply to various forms of proposed development in their area. It cautions against the implementation of fixed thresholds because specific circumstances may justify some variation being allowed. Because this policy sets a noise target in relation to the background noise level, this allows variation of the threshold with the local circumstances because it does not set an absolute noise level that the plant must achieve, it relates it to the local noise level. The noise source specific level is the measured noise level, as opposed to the rating level, which is the specific level with correction factors included. World Health Organisation (WHO) (1999), Guidelines for Community Noise; WHO (2009), Night Noise Guidelines for Europe; WHO (2011), Burden of Disease from Environmental Noise: Quantification of healthy life years lost in Europe

4.2.96 Where the plant noise rating level does not meet this standard, the background noise will increase. When subsequent new plant is added it will be assessed against this higher background level which results in an increasing benchmark against which subsequent new plant is introduced.

This leads to an incremental increase in the noise in an area each time new plant is introduced ('background creep'). This policy standard has been applied by Reading Borough Council for a number of years and experience has demonstrated it to be achievable in most cases. In addition, noise control technology is improving, therefore further increasing the achievability of this standard.

3.6.1 Consultation with the Local Authority

The survey methodology has been discussed and agreed with Environmental Health Officer (EHO) Rebecca Moon from the Reading Borough Council.

It is understood that noise from cleaning of the Oracle Car Park, carried out during night time periods, has been an issue in the past and therefore it should be considered for the purpose of this assessment.

Consultation has been sought with the client and the team at the Oracle Control Room to determine the periods when the cleaning takes place, however it is understood that there is no fixed schedule for the car park cleaning, and exact periods were not known.

Therefore, we were not able to measure the noise from the cleaning of the Oracle Car Park during the noise survey.

Residential buildings can successfully be delivered close to multi-story car parks without giving rise to complaints. Therefore, it should be possible for the proposed development to go ahead without unreasonable restrictions placed on the on-going operations of the Oracle Car Park and its presence does not need to be a determining factor at the planning stage. Noise from car park cleaning can be considered further post-planning with appropriate input from the car park operators.

In addition to above, management procedures shall be implemented to ensure that cleaning procedures are undertaken at appropriate times and do not adversely impact upon the residential properties.

4. Environmental Noise Survey

4.1 Survey Equipment

Noise measurements were made using Class 1, integrating sound level meters. Microphones were positioned vertically on a tripod at least 1.2m above the ground and at least 3.5m from any other reflecting surfaces. The sound level meter was fitted with a wind shield at all times and calibrated to a reference level of 94 dB at 1kHz both prior to, and on completion of the noise survey. No significant drift in calibration was noted during the survey (≤ 0.5 dB). All measurement equipment has been laboratory calibrated within the appropriate calibration interval.

Details of the equipment used for the environmental noise measurements are shown in Table 2.

Table 2: Environmental Noise Survey Equipment

Measurement Locations	Manufacturer	Instrument	Type	Serial No./Version	Due Laboratory Calibration
ML	01dB	Sound Level Meter	Fusion	12242	19/07/2023
		Microphone	40CD	347053	
AMLs (All attended measurement locations)	Rion	Sound Level Meter	NL52	775959	19/07/2023
		Pre-Amplifier	NH25	54394	
		Microphone	UC59	11689	
ML1 & AMLs	Rion	Acoustic Calibrator	NC74	35157400	12/07/2023

4.2 Weather Conditions

The survey included periods of rain. Periods with significant rain fall, as reported for Reading on meteostat.net/ and www.lightningmaps.org/, have been excluded from the survey results. Periods with wind speeds greater than 5m/s were noted, however, due to the wind direction (mainly from south), the noise measurement location would have been shielded from the wind by the building itself (Please see Figure 2). Therefore, wind speeds at the microphone are unlikely to have exceeded 5m/s.

Audio recordings of these periods were reviewed and compared against the data where the wind speeds were below 5m/s to confirm that wind noise on the microphone was not significant.

4.3 Survey Methodology

An unattended noise survey was undertaken at the PD site between the 15:00 hrs on the 27th of October (Thursday), and the 12:00 hrs on the 1st of November (Tuesday) 2022.

For the purposes of this assessment, and in accordance with current guidance, daytime hours are taken to be 07:00 to 23:00 hours and night-time hours to be 23:00 to 07:00 hours.

Continuous automated noise monitoring was undertaken on the PD site. Additional short term attended measurements were made on the pedestrian area between PD A1 and PD A2, as well as at the Yield PL, to the east of PD A1.

All attended measurement locations (AMLs), long-term monitoring location (ML) are further detailed in Table 3 and shown in Figure 2 below.

Table 3: Measurement Locations Summary

Measurement Location	Description	Monitoring Period
ML	Unattended free-field monitoring was undertaken at the east part of the site. This location was chosen to be representative of the A329 traffic noise and shopping centre visitors noise impacting all the area. This location was found to be safest location to leave the equipment unattended for a long-term noise measurement.	15:00hrs 27/10/2022 to 12:00hrs 01/11/2022
AML 1	Short term attended measurement was undertaken at the Pedestrian area, front of the VUE Cinema. Traffic noise, noise from the pedestrians, and low volume of ambient music from the restaurants were the predominant noise sources.	13:53hrs to 14:08 hrs 27/10/2022
AML 2	Short term attended measurement was undertaken at the Pedestrian area, front of the "The Real Greek" restaurant. Traffic noise, noise from pedestrians, and plant noise were the predominant noise sources.	13:15 hrs to 13:30 hrs 27/10/2022
AML 3	Short term attended measurement was undertaken at the Pedestrian access point from the Yield Hall PL. Traffic noise and the noise from pedestrians were the predominant noise sources.	13:35 hrs to 13:50 hrs 27/10/2022



Figure 2: Long Term measurement location (ML) and attended measurement locations (AML).

4.4 Noise Survey Results

Measurements were undertaken using a time interval of 15 minutes. To inform the assessment in accordance with the criteria outlined in Section 2 of this report, the following parameters have been derived from the survey results for the long-term measurement location:

- » Daytime and night-time equivalent continuous noise levels ($L_{Aeq,T}$)
- » Lowest background noise levels measured each day and night period ($L_{A90,T}$)
- » Typical night-time maximum event levels (L_{AFmax})

These levels are used to determine sound insulation requirements for the building envelope and to set the building services noise emission limits. The results of the survey are presented below in Table 4 and provided within Appendix B of this report in graphical form.

Table 4 Summary of measured noise levels at the long-term measurement location (ML).

Location	Week Period	Daytime 07:00-23:00 Hrs		Night time 23:00-07:00 Hrs		
		$L_{Aeq,16h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,8h}$ dB	$L_{A90,15min}$ dB	* L_{AFmax} dB
ML	Weekday	68	53	62	43	80
	Weekend	67	47	61	42	82

* The 'Typical' L_{AFmax} value is the 90th percentile of the measured L_{AFmax} levels during the respective period.

The equivalent continuous noise levels and background noise levels measured at AMLs during the daytime period are presented in Table 5.

Table 5: Short Term Attended Measurements Results

Measurement Location	Measurement Period	$L_{Aeq,15min}$ dB	$L_{A90,15min}$ dB
AML 1	13:53hrs to 14:08 hrs 27/10/2022	59	55
AML 2	13:15 hrs to 13:30 27/10/2022	58	55
AML 3	13:35 hrs to 13:50 27/10/2022	56	50

Full noise-survey data can be provided upon request.

5. Noise Mapping

5.1 Overview

The noise levels incident on the façades of the proposed buildings are determined by creating a 3D noise model of the site using DataKurstik CadnaA software based on the measured noise levels at the site. Both PD buildings, and surrounding buildings, have been modelled in height and dimensions provided by the architectural drawings.

The following prediction methodologies and assumptions were adopted and implemented in to the acoustic model:

- » Scale mapping of the Site and the surrounding area was calibrated into the noise model based on information provided by the design team together with Ordinance Survey vector mapping grid reference points;
- » A Digital Terrain Model (DTM) has been created within the acoustic model based on eMap Terrain 2m resolution topographical data of the Site and surrounding area;
- » Existing buildings that will not be demolished as part of the proposed development are incorporated within the acoustic model to allow prediction of any reflection or screening effects across the Site. Buildings are assumed to have fully reflective facades;
- » Noise propagation is predicted in accordance with ISO 9613-2:1996 'Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of calculation' (ISO9613);
- » 1st order reflections included in predictions;
- » Ground absorption set to 0.2
- » Order of reflection set to 1

Appendix C of this report provides the noise level maps of the proposed site showing the noise levels incident at the facades of each proposed building during daytime (07:00-23:00hrs) and night-time hours (23:00-07:00hrs).

The presented noise levels are in terms of daytime and night-time equivalent continuous noise levels ($L_{Aeq,T}$) and night time maximum levels (L_{AFmax}).

5.2 Predicted Noise Levels

Predicted daytime and night-time equivalent continuous noise levels ($L_{Aeq,T}$) and night time maximum levels (L_{AFmax}) at the site are shown in Figures 3 to 5 respectively in terms of noise contour plots. The predicted noise levels at different facades of each proposed building are further shown within Appendix C of this report.

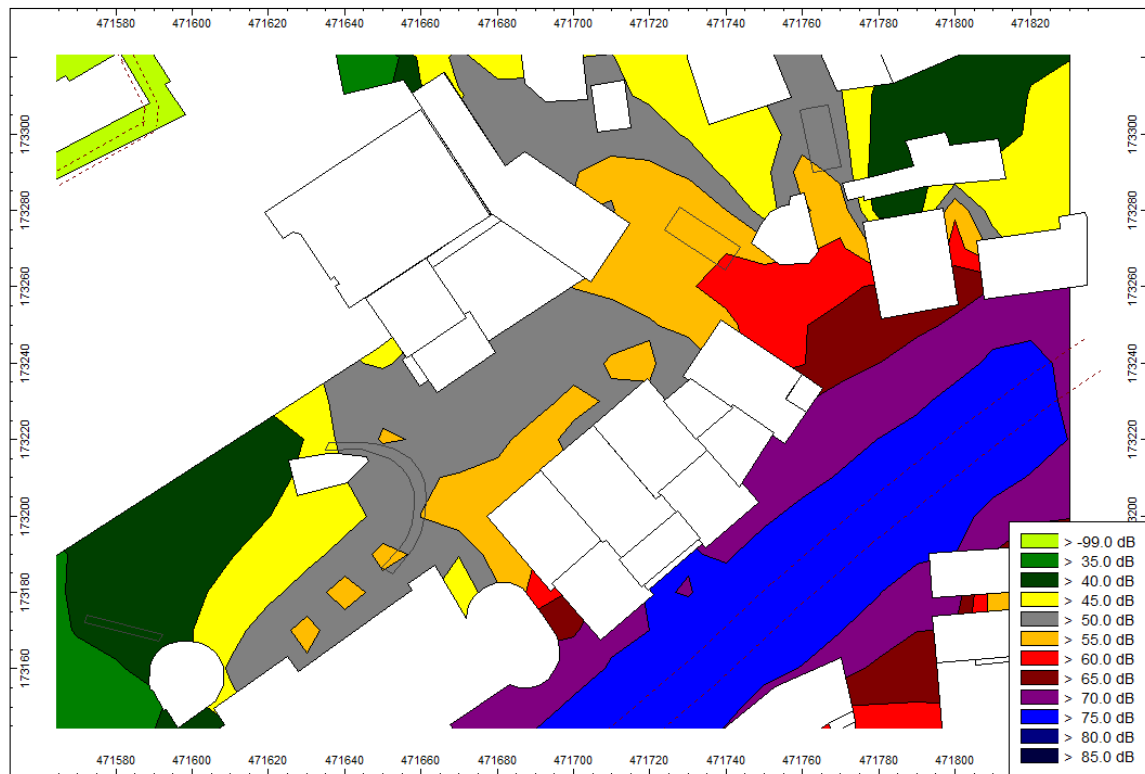


Figure 3 Predicted daytime equivalent continuous noise levels ($L_{Aeq,16hrs}$) at the PD.

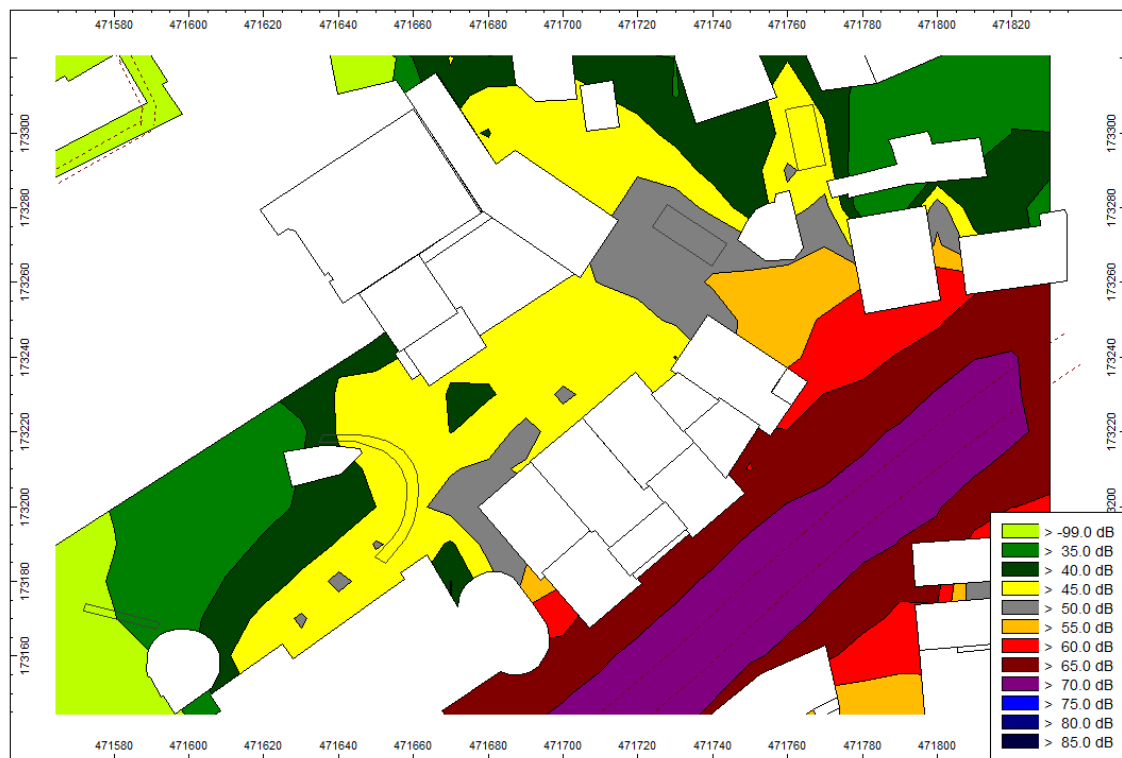


Figure 4: Predicted night-time equivalent continuous noise levels ($L_{Aeq,8hrs}$) at the PD.

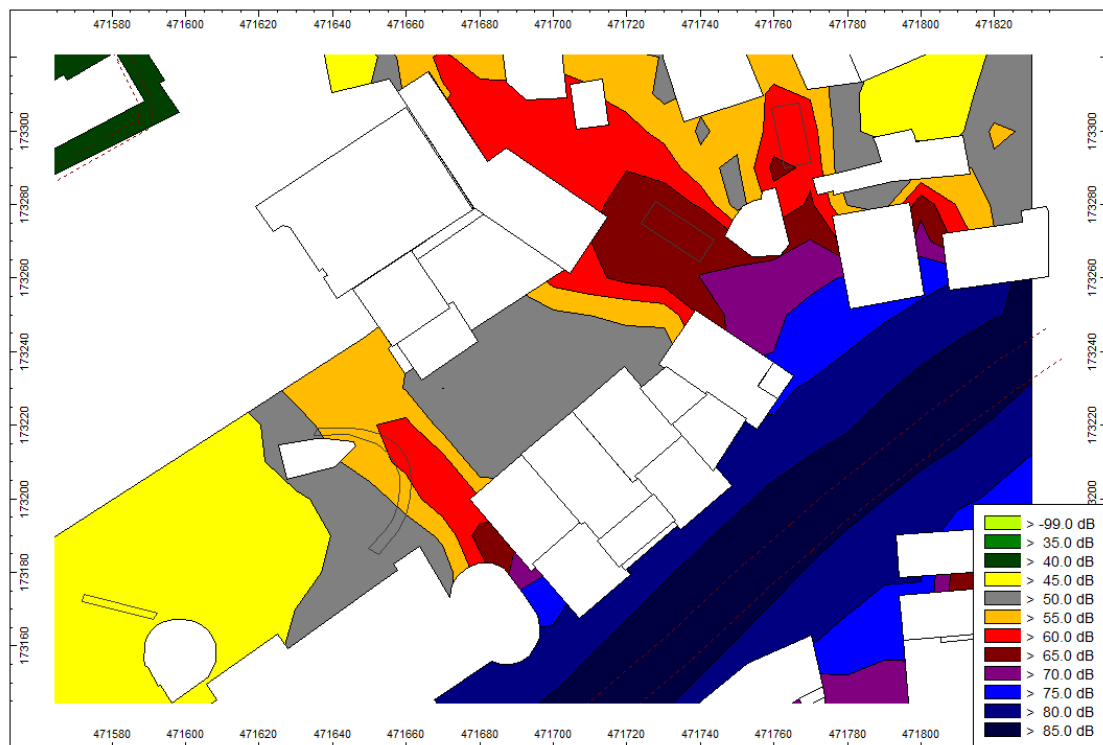


Figure 5: Predicted night-time maximum noise levels (L_{AmaxN}) at the PD.

6. Building Fabric and Ventilation

6.1 Purge Ventilation Requirements

The use of opening windows for rapid purge ventilation (i.e. to expel paint fumes or burnt toast odours as per Approved Document F) is acceptable at all facade. This is on the basis that windows will be opened for short periods and may be closed at occupant discretion once odours are purged.

6.2 Relief of Summertime Overheating

6.2.1 *Approved Document O*

Approved Document (ADO) was published on the 15th December 2021. This is an entirely new Approved Document which provides the normal means of complying with Part O to the Building Regulations 2010. Part O addresses overheating in residential buildings and came into force in June 2022. Overheating has not previously been addressed in the Building Regulations.

The simple way to comply with Part O is to provide adequate window openings such that comfortable internal temperatures can be maintained during the hottest times of the year. However, the document precludes the use of open windows for overheating control at night if this would result in internal noise levels above 40 dB L_{Aeq} or 55 dB L_{Amax} .

ADO does not appear to offer any flexibility with respect to how often windows might be required to be opened. Therefore, the noise limits are absolute. I.e., if they will be exceeded with windows open at any time of the year, then the only option would be to install mechanical cooling or otherwise ensure windows do not need to be opened to maintain comfortable internal temperatures. It should be noted that Part O to the Building Regulations took effect on 15th June 2022. It does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work is started on site before 15th June 2023.

6.3 Building Fabric & Ventilation Strategy for the Proposed Development

An open window will provide, at best, 15 dB attenuation and possibly much less if it is wide open. For areas at a medium-risk of overheating (such as Reading), the attenuation of an open window during the overheating condition may only be 9 dB.

Therefore, where night-time external noise levels exceed 49 dB L_{Aeq} and/or 64 dB L_{Amax} at night, windows can be opened only for purge ventilation and mechanical cooling and alternative means of negating the need to open windows for thermal comfort may be required.

ADO noise limits are expected to be exceeded with open windows at some facades of the proposed development (Please see Appendix C of this document for the noise levels predicted on the facades).

When windows are closed and background ventilation provided by MVHR or other Part F compliant strategy, internal noise levels are determined by noise emissions through windows, external walls and ventilation openings.

In order to determine the required sound insulation performance of the façade elements and suitable ventilation strategy for the PD, an assessment has been undertaken with a view to meeting the internal requirements of BS8233:2014 provided within Table 1 of this report.

The assessment is based on following information:

- » The predicted noise levels at the building facades by 3D noise modelling,
- » A room size of 3m x 4m x 2.7m has been used based on the provided architectural drawings,
- » External walls are assumed to achieve a minimum 50 dB R_w sound insulation performance,
- » It is assumed that 50% of the façade will be glazing,
- » A reverberation time of 0.5 seconds in habitable rooms;

The minimum sound insulation performance required for glazing together with the recommended ventilation strategy are provided within Table 6 and shown in Figure 6 and Figure 7 below for the facades of PD A1 and PD A2 respectively.

Table 6 Minimum sound insulation performance required for glazing and the suggested background ventilation strategy for each building façade (please read together with Figure 6 and Figure 7 below)

Façade	Suggested background ventilation	Sound insulation performance		Example glazing configuration
	Part F Mechanical Ventilation with Heat Recovery (MVHR), openable windows for purge ventilation only.	Glazing	43(-6) dB $R_w(C_{tr})$	8mm glazing /16mm airgap/ 12.8mm laminated glazing
	Part F Mechanical Ventilation with Heat Recovery (MVHR), openable windows for purge ventilation only.	Glazing	36(-3) dB $R_w(C_{tr})$	6mm glazing /12mm airgap/ 10mm glazing
	Part F Mechanical Ventilation with Heat Recovery (MVHR), openable windows for purge ventilation only.	Glazing	32(-3) dB $R_w(C_{tr})$	6mm glazing /12mm airgap/ 6mm glazing
	Part F Background ventilators and intermittent extract fans, openable windows for Purge and Overheating. Nominal acoustic trickle vent Minimum 32dB $D_{n,e,w}$ advised.	Glazing	32(-3) dB $R_w(C_{tr})$	6mm glazing /12mm airgap/ 6mm glazing

Note: Alternative glazing configurations may be suitable, subject to adequate acoustic performance being achieved. Performance requirements relate to the glazing tested "in situ" with the proposed frame system, and suitable test certificates for proposed selections should be provided to the project acoustician for evidence of compliance at the appropriate design stage.

Ventilator performance requirements are for a single vent to the room. If more than one vent is required the performance of each vent would need to be increase by $10 \times \text{Log}(n)$ where 'n' is the number of vents. I.e. For 2 vents each should be 32 dB $D_{n,e,w}$ + 10 Log(2) = 35 dB $D_{n,e,w}$ in order to archive the overall ventilator performance of 32 dB $D_{n,e,w}$.



Figure 6 Minimum sound insulation performance required for the facades of PD A1 (please read together with Table 6 above)



Figure 7 Minimum sound insulation performance required for the facades of PD A2 (please read together with Table 6 above)

7. External Amenity Areas

Based on the provided layouts, it is understood that balconies are proposed along the facades of the proposed development. An assessment has been undertaken to determine the noise levels affecting these areas.

As outlined in Section 3.3 of this document, BS8233:2014 suggests that noise levels at the amenity spaces do not exceed the upper limit of 55dB $L_{Aeq,T}$. However, it is noted in BS 8233 that this criterion is not always achievable in all circumstances and a development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

As seen from the 3D views of the facades presented in Figure 8 and Figure 9, the noise levels at the majority of the proposed amenity spaces for PD A2 will be between 60 - 74 dBA, significantly exceeding the upper limit of 55 dB $L_{Aeq,16h}$ recommended by BS 8233:2014, whereas for PD A1 the predicted noise levels at the majority of the amenity spaces are expected to meet the criteria, with 2-3 dB exceedance at some of the facades.

The use of these areas will be at the occupier's discretion; however, it is suggested that a solid 1.1m glass screen or barrier is erected around the perimeter of the proposed amenity spaces/ balconies affected from high noise levels in order to provide the best practicable reduction in ambient noise levels.



Figure 8 Predicted daytime equivalent continuous noise levels ($L_{Aeq,16hrs}$) at 1m from facades. Southeast view.

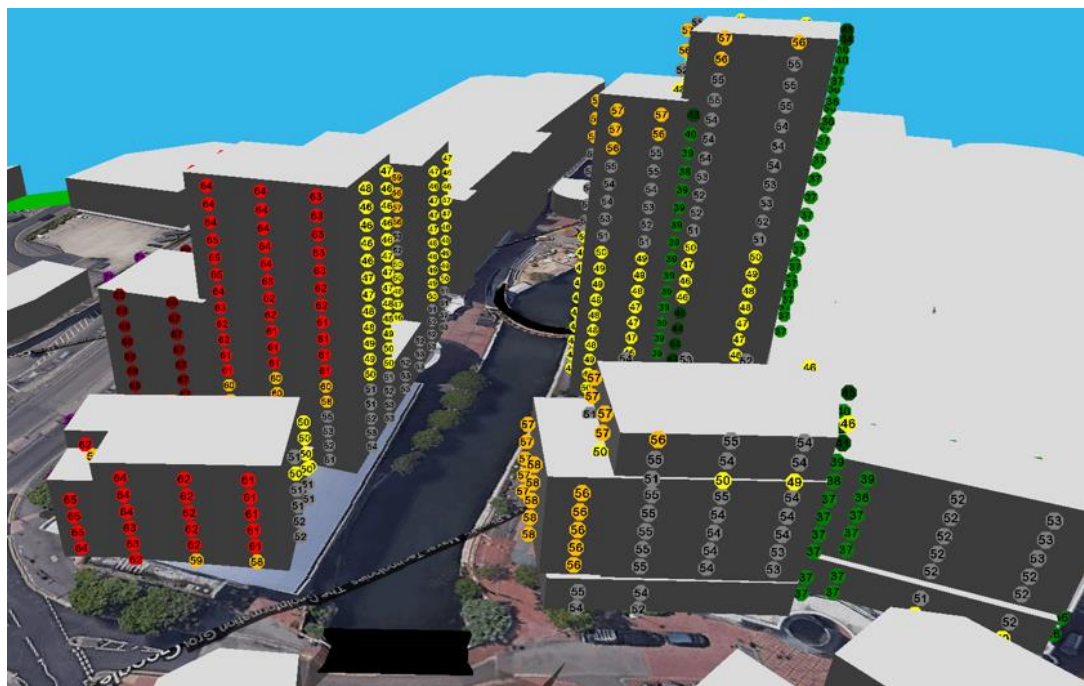


Figure 9 Predicted daytime equivalent continuous noise levels ($L_{Aeq,16hrs}$) at 1m from facades. East view

8. Building Services Noise Emission Limits

At the time of writing, it is not known whether or where specific external plant items or areas will be proposed on the site. However, there may be an expectation for external plant installations therefore an assessment has been undertaken to determine plant noise emission limits.

Plant noise emission limits are assessed in accordance with the guidance provided within the Local Planning Policy EN17 and the lowest measured background sound levels measured at the ML.

Policy EN17 is repeated below for reference:

EN17: NOISE GENERATING EQUIPMENT

Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor.

The cumulative noise emission limits that will apply to the plant items associated with the proposed development are provided in Table 7. These levels shall be achieved at 1m away from the nearest noise sensitive window.

Table 7 Building Services Noise Emission Limits

Period	Lowest Measured Background Noise ($L_{A90\ 15min}$ dB)	Building Services Criteria (Non-tonal plant), ($L_{Aeq,T}$ dB)
Daytime (07:00 - 23:00 hrs)	43	33
Night-time (23:00 – 07:00 hrs)	42	32

An assessment will be undertaken in the next design stage to determine further mitigation measures required for the proposed plant area to achieve above proposed noise emission limits at 1m away from the nearest noise sensitive window.

No specific character corrections have been applied at the present time for tonality, intermittency, or impulsiveness, upon review of proposals where appropriate, additional corrections should be applied as per the guidance found in BS4142:2014+A1 2019.

9. Conclusion

Hydrock is appointed by The Oracle Limited Partnership to undertake an environmental noise survey and impact assessment for the proposed residential development at The Oracle, Bridge St, Reading RG1 2AT.

A noise survey has been undertaken to establish representative daytime and night-time noise levels in and around the proposed site location in accordance with current guidance.

A noise assessment has been undertaken, with consideration given to the following:

- » The impact of road traffic noise on the proposed development,
- » Noise impacts associated with any proposed fixed plant and/or services associated with the development,

Calculations indicate that double glazed windows would provide sufficient sound insulation to achieve the target internal ambient noise levels. The results of the assessment have also shown that background ventilation shall be provided via use of acoustic trickle vents and mechanical ventilation and heat recovery (MVHR) based on the proposed location of each building.

An assessment has been undertaken to determine the noise levels in the proposed external amenity areas. The target criterion of 55 dB $L_{Aeq,16h}$ according to BS8233:2014 is expected to be exceeded in the majority of the proposed amenity spaces along PD A2 and expected to be achieved in the majority of the amenity spaces along PD A1. Accordingly, a balanced best practicable means approach to mitigation is suggested.

Atmospheric plant noise emission limits have been established and are likely to be achieved with appropriate consideration for the selection of low-noise plant and proprietary attenuation measures as appropriate during technical design.

As demonstrated in this report, appropriate acoustic conditions can be achieved within proposed shared outdoor amenity areas, and habitable rooms, with the implementation of relatively standard acoustic mitigation measures. Therefore, it is considered that there is no reason for refusal of planning permission, on acoustic grounds.

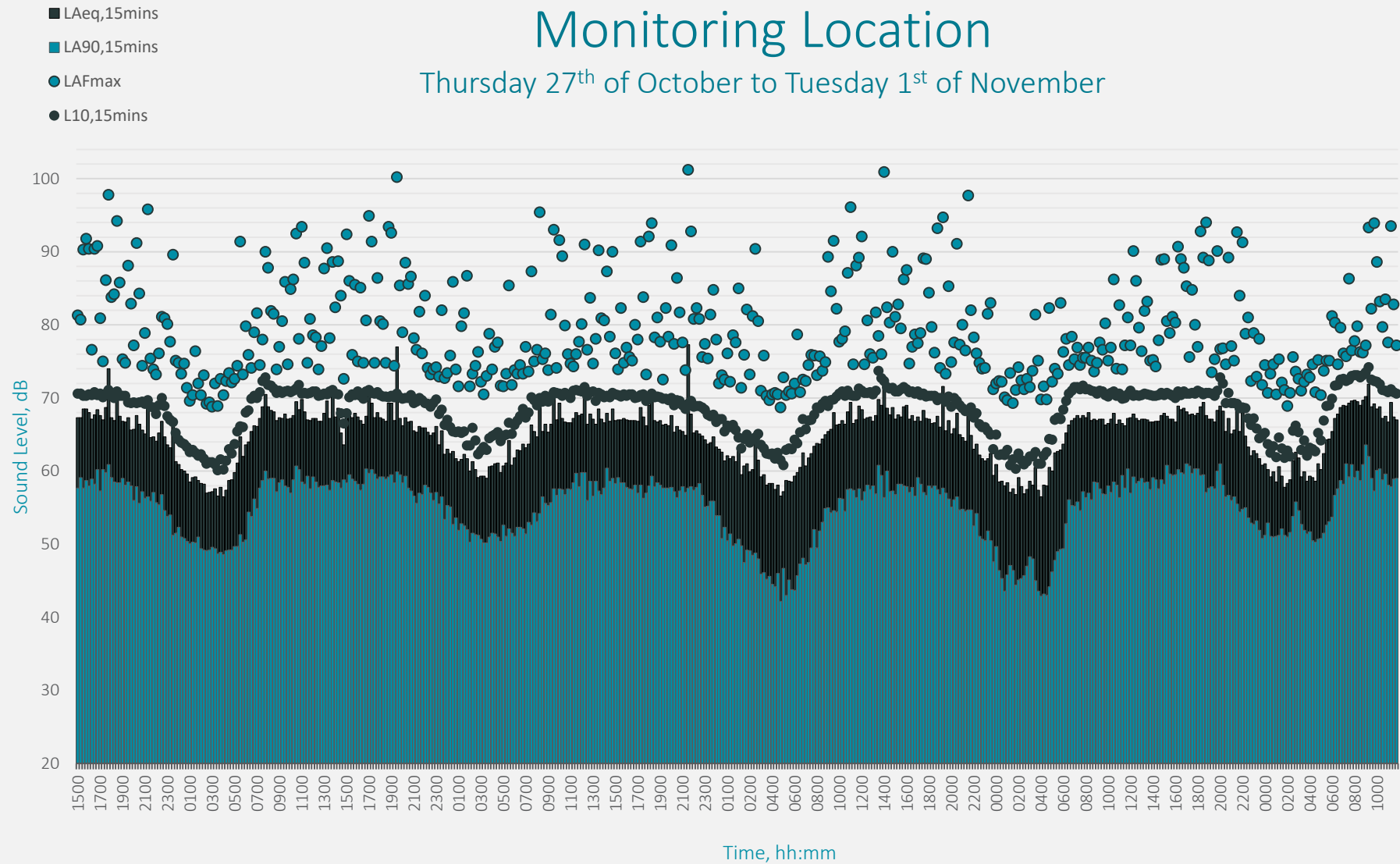
Appendix A Glossary of technical terms

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, 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_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
R_w	R_w is the single-number quantity which characterizes the sound insulating properties of a given material over a range of frequencies. This is typically measured in a laboratory in accordance with BS EN ISO 717-1.
$D_{n,e,w}$	$D_{n,e,w}$ is the single number quantity which characterizes the airborne sound insulation performance across a given 'element' and is typically used to describe the acoustic performance of trickle ventilators etc.
C_{tr}	C_{tr} is a correction term applied to single-number sound insulation values (R_w , $D_{n,e,w}$ etc.) to afford additional weighting against low frequency performance.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and at least 3m from buildings.

Appendix B Noise Survey Results

Monitoring Location

Thursday 27th of October to Tuesday 1st of November



Appendix C Predicted Noise Levels at 1m from Façade

Daytime equivalent continuous noise levels ($L_{Aeq,16h}$)

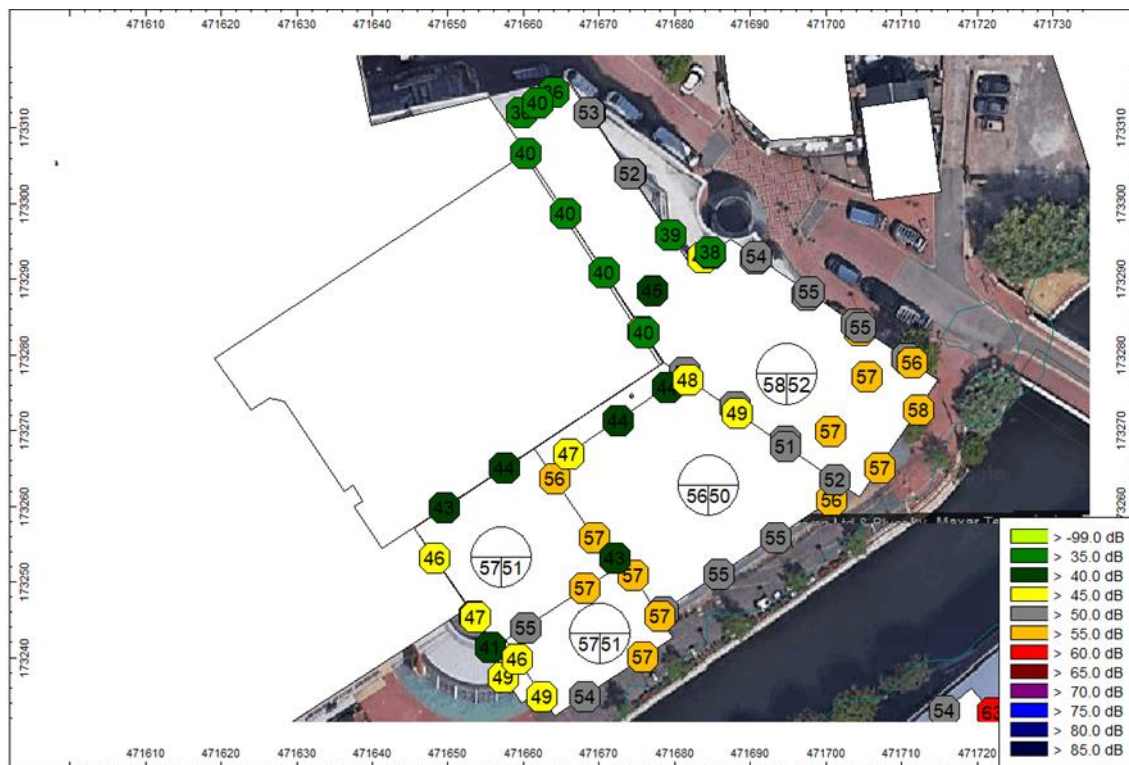


Figure 10: Predicted daytime equivalent continuous noise levels ($L_{Aeq,16h}$) at the PD A1

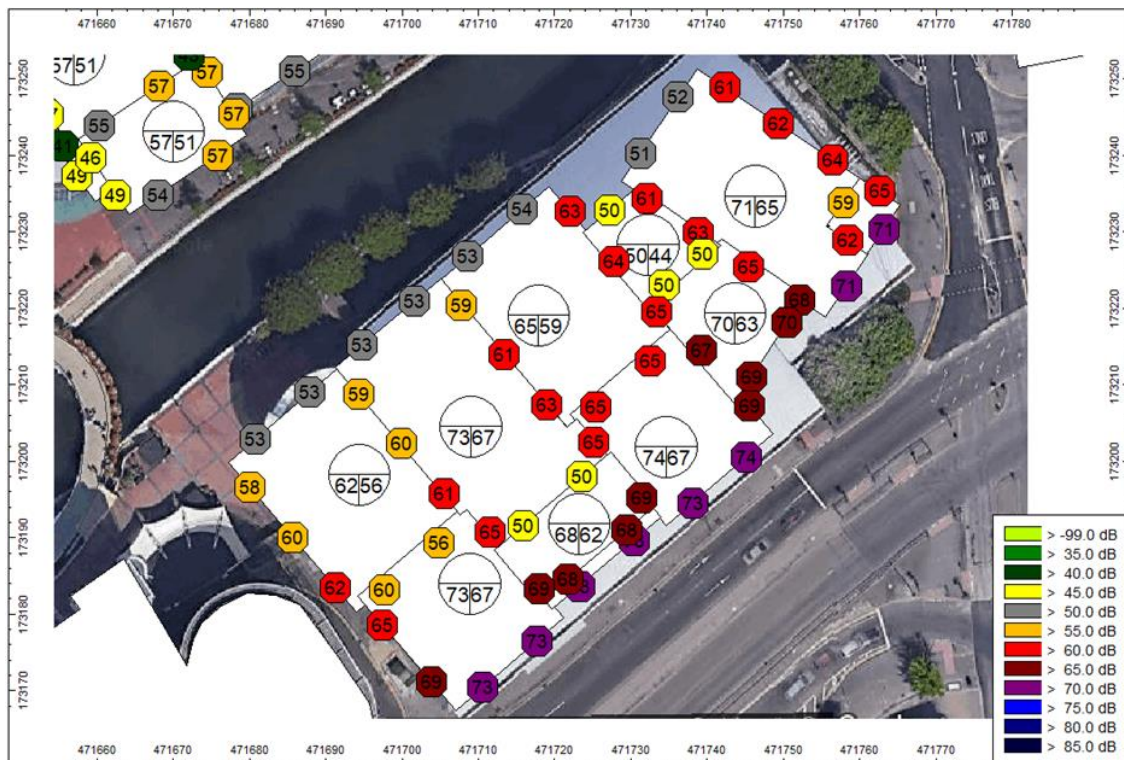


Figure 11: Predicted daytime equivalent continuous noise levels ($L_{Aeq,16h}$) at the PD A2

Night time equivalent continuous noise levels ($L_{Aeq,8h}$)

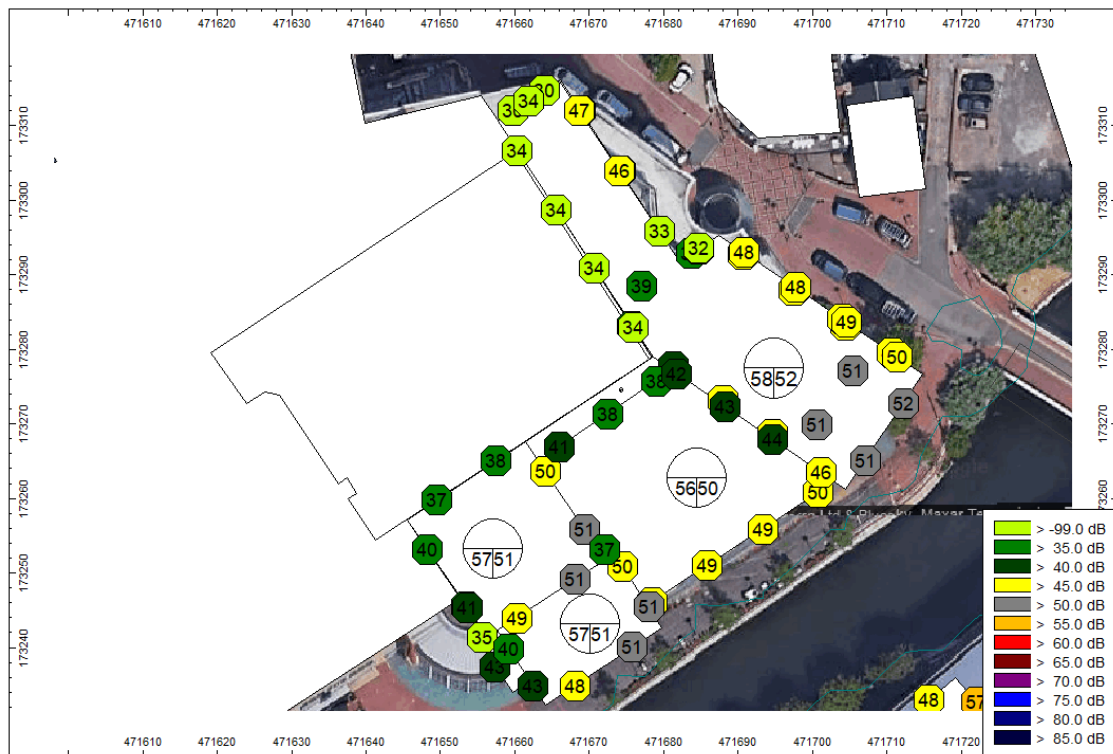


Figure 12 Predicted night time equivalent continuous noise levels ($L_{Aeq,8hrs}$) at the PD A1.

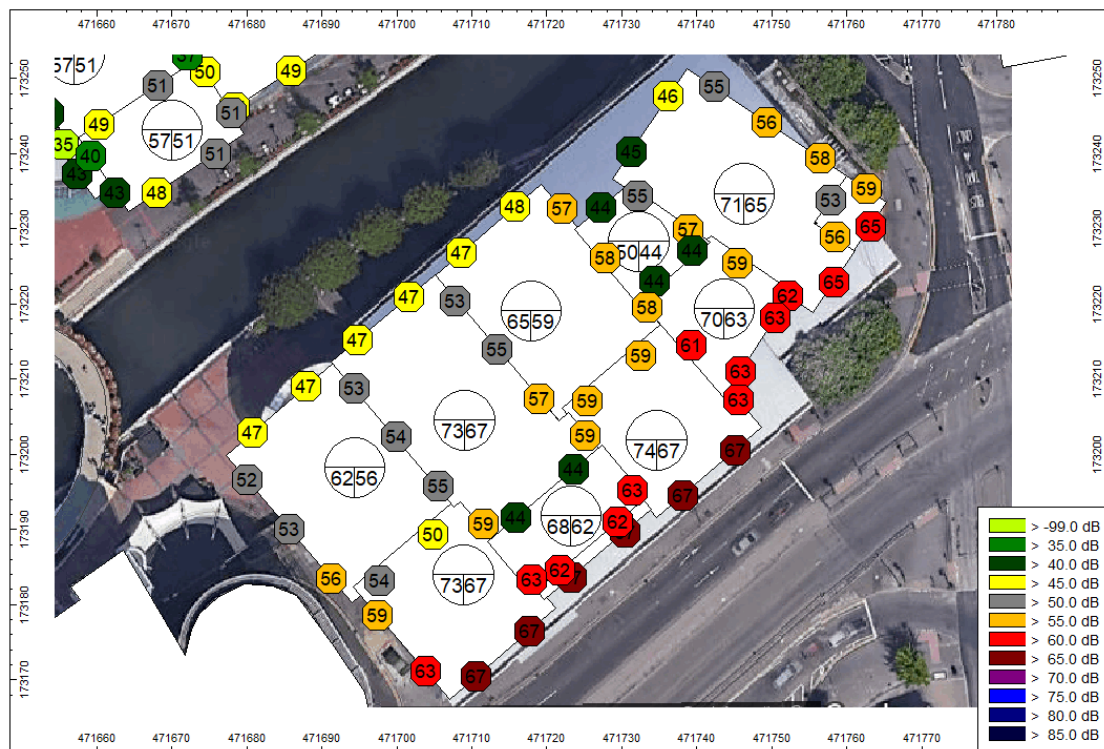


Figure 13 Predicted night time equivalent continuous noise levels ($L_{Aeq,8hrs}$) at the PD A2.

Night time maximum noise levels (L_{AFmax})

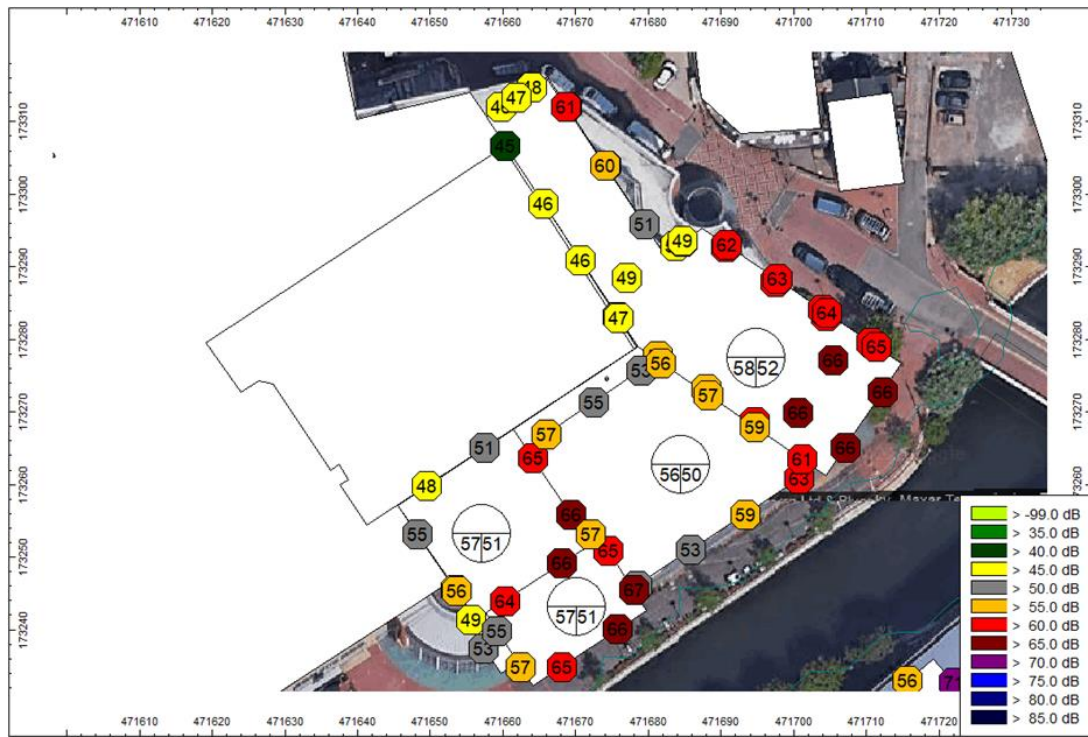


Figure 14 Predicted night time maximum noise levels (L_{AmaxN}) at the PD A1.

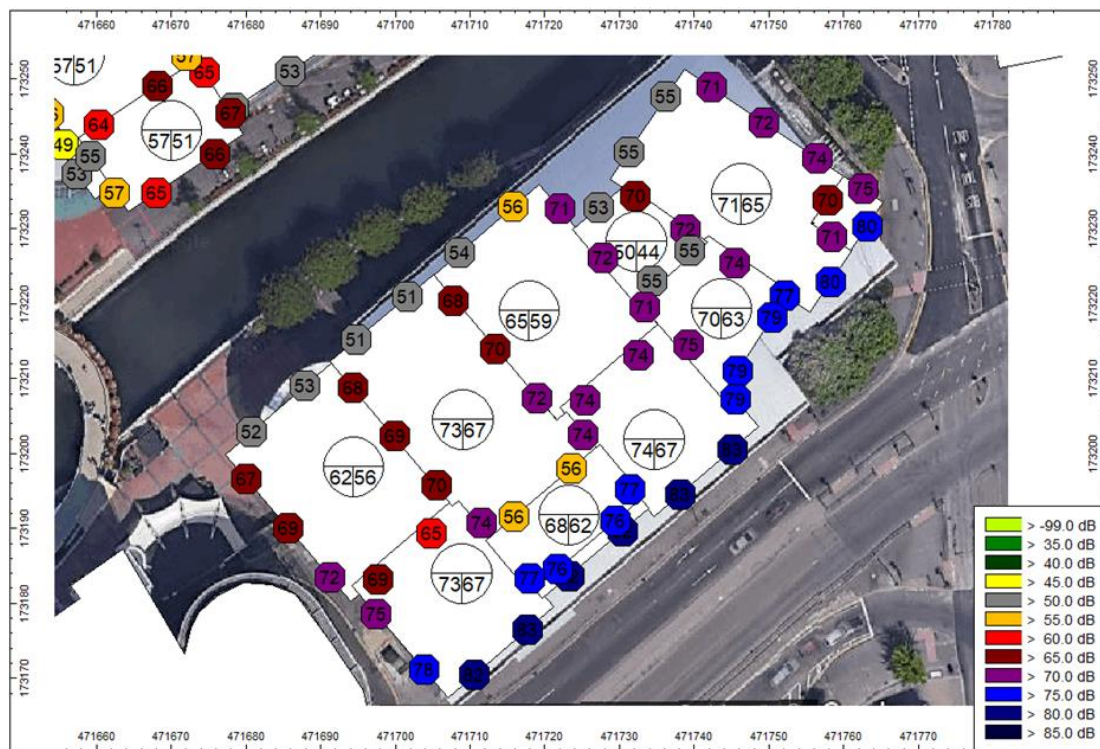


Figure 15 Predicted night time maximum noise levels (L_{AmaxN}) at the PD A2.