101 North Steyne, Manly

Noise and Vibration Impact Assessment

Project No.	P01454
Revision	001
Issued	10 December 2024
Client	Manly Land 101 Pty Ltd c/o Time & Place

E-LAB Consulting

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Document QA and Revisions

ISSUE	DATE	COMMENTS	ENGINEER	REVIEWER
1	10/12/2024	Final Issue	Artie Rattananikom	Imran Khan
2				
3				
4				

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Acoustics & Vibration

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1 INTRODUCTION

1.1 DOCUMENT PURPOSE

This report has been prepared to accompany a Development Application (DA) for a multi-storey residential flat building development to be located at 101 North Steyne, Manly. The development is expected to be 5 storeys high comprising of residential apartments from Ground Level to Level 04, and one basement level.

In summary, the purpose of this report is to:

- Identify surrounding noise-sensitive receivers
- Identify relevant standards and guidelines and to establish noise and vibration project requirements for the use of the development;
- Provide a noise and vibration assessment for the operation of the site, which discusses both noise emissions from the proposed development, and noise intruding into the development from external road noise sources; and
- Outline mitigation measures and recommendations to ensure project noise and vibration requirements are satisfied.

1.2 RELEVANT DOCUMENTS

The following standards, guidelines and drawings have been used to establish the project specific acoustic design requirements for the development.

- Architectural drawings prepared by Smart Design Studio Architects dated December 2024 (DA Drawings);
- Northern Beaches Council “Manly Development Control Plan 2013” (DCP);
- AS/NZS 2107:2016 “Acoustics - Recommended design sound levels and reverberation times for building interiors”; and
- NSW EPA’s Noise Policy for Industry 2017 (NPI).

2 PROJECT OVERVIEW

2.1 SITE DESCRIPTION

The location of the proposal, noise monitoring and measurement positions, and the surrounding noise-sensitive receivers are shown in Figure 1. The noise-sensitive receivers have been delineated into receiver catchments (RCs) as noted in Figure 1 . Receiver catchments have been identified with a detailed description in Table 1 below.

Figure 1: Acoustic site plan identifying the surrounding noise-sensitive receivers and noise monitoring locations

Table 1: Description of nearby noise sensitive receiver catchments

RECEIVER CATCHMENT	DESCRIPTION
RC1 - Residential	Existing residential flat building situated south along the common boundary, and future residential use development currently under construction at 96 North Steyne.
RC2 – Residential	Existing multi-storey residential flat buildings situated north beyond the common boundary.
RC3 – Residential	Existing residential use development situated west across Pine Lane (multi-storey apartment flat buildings and dwellings).

2.2 DEVELOPMENT PROPOSAL

The development application at 101 North Steyne, Manly seeks approval for:

- Demolition of the existing buildings and structures on site;
- Construction of a multi-storey residential flat building comprising of:
  - One basement level
  - 7 residential apartments across Ground Level to Level 04.

3 NOISE SURVEYS

3.1 INSTRUMENTATION

The equipment used for the noise survey was the following:

- NSRT_mk3 Type 1 Sound Level Meter Dataloggers
- B&K 2250 Class 1 Sound Level Meter, S/N: 3031115
- B&K 4231 Class 1 Sound Level Calibrator, S/N: 3334640

All equipment was calibrated before and after the measurements and no significant drift was found. All equipment carries current traceable calibration certificates that can be provided upon request.

3.2 LONG-TERM NOISE MONITORING

Long term noise monitoring has been undertaken for the project site at locations shown in Figure 1 to measure the background and ambient noise that is representative of the surrounding noise and vibration sensitive receivers. Detailed noise monitoring results are presented in Appendix A.

3.2.1 Background Noise

Background noise levels and subsequent Rating Background Noise Level (RBL) have been established in accordance with the Noise Policy for Industry 2017 using the results of the noise monitoring at locations LT1 and LT2 (as indicated in Figure 1). The local ambient noise environment is typical of an Urban residential environment (as described by the NPI).

Table 2: Unattended noise monitoring results

LOCATION	MEASURED EQUILAVENT CONTINUOUS NOISE LEVEL – L_{EQ} dB(A)			MEASURED RATING BACKGROUND NOISE LEVELS – L_{90} dB(A)		
	DAY	EVENING	NIGHT	DAY	EVENING	NIGHT
LT1	66	64	59	56	53	50
LT2	53	53	46	43	43	41

General Note: Noise Policy for Industry (NPfI) assessment periods – Daytime: 7:00 am to 6:00 pm Monday to Saturday, 8:00 am to 6:00 pm Sundays and Public Holidays; Evening: 6:00 pm to 10:00 pm; Night: 10:00 pm to 8:00 am Monday to Saturday, 10:00 pm to 8:00 am Sundays and Public Holidays.

3.2.2 Traffic Noise

In addition to background noise, long-term noise monitoring was also conducted at the project site to establish traffic noise levels respectively for the site and have been summarised in Table 3. The locations in Figure 1 were chosen to be suitable as there was an unshielded and direct line of sight to traffic along adjacent streets.

Table 3: Long-term traffic noise monitoring results

LOCATION	MEASURED TRAFFIC NOISE LEVELS, $L_{Aeq,period}$ dB(A)	
	DAY (7AM – 10PM)	NIGHT (10PM – 7AM)
LT1	65	59
LT2	54	45

3.3 SHORT-TERM (ATTENDED) NOISE MONITORING

Short-term noise measurements were conducted at the subject site to determine the environmental noise characteristics on Thursday 5th September between the hours of 3pm to 4pm. The results of the measurements are presented in Table 4.

Table 4: Short-term noise measurement summary

MEASUREMENT LOCATION	MEASUREMENT TIME	L_{Aeq} dB(A)	L_{A90} dB(A)	L_{A10} dB(A)	COMMENTS
ST1	Thursday 5th September 2024 3:00pm – 4:00pm	63	53	64	North Steyne ▪ Dominant sound sources including intermittent traffic and general environmental noise from beach

4 PROJECT NOISE AND VIBRATION CRITERIA

4.1 INTERNAL NOISE LEVELS

4.1.1 Northern Beaches Council DCP

The Manly DCP 2013 does not provide specific internal noise targets for residential development impacted by road noise. Suitable noise criteria have been adopted from other applicable guidelines and standards, discussed below.

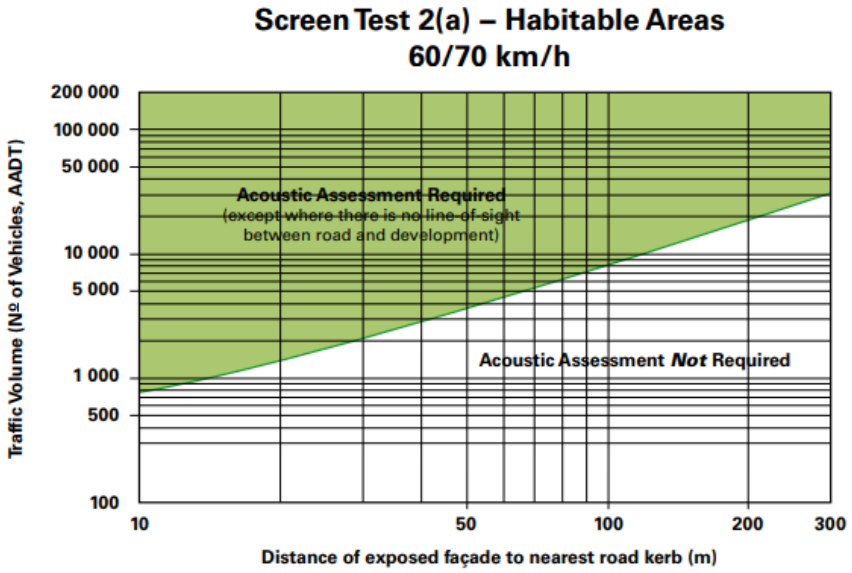
4.1.2 Development Near Rail Corridors and Busy Roads – Interim Guideline

Road Noise

Figure 2 has been extracted from the Interim Guideline, and provides a screening test for noise sensitive developments that takes into account the volume of traffic and the distance between the proposed development and the busy road. Clause 2.120 of the State Environmental Planning Policy (Transport and Infrastructure) 2021, through which the Interim Guideline road noise criteria applies through, only applies for roads with an annual average daily traffic volume of more than 20,000 vehicles, or if the road is a freeway, tollway or transitway. The screen test has been conducted to establish whether or not an acoustic assessment is required.

In this case, Map 13A of the Transport for NSW traffic volume maps for Transport and Infrastructure SEPP indicates roads adjoining the site (North Steyne and Pine Lane) are not classified as roads requiring mandatory assessment under Clause 2.120 of SEPP (Transport and Infrastructure) 2021.

Figure 2: Screen tests for habitable areas of multiple dwellings (noting that any exposed facade is direct line-of-sight)



4.1.3 Australian/New Zealand Standard AS/NZS 2107:2016

AS/NZS 2107:2016 "Acoustics - Recommended design sound levels and reverberation times for building interiors" provides recommended design sound levels within occupied spaces for various building types and usages. Table 5 below provides design sound levels applicable to the development.

Table 5: AS/NZS 2107:2016 design sound levels

TYPE OF OCCUPANCY / ACTIVITY	DESIGN SOUND LEVEL - L_{Aeq} dB(A)
Apartment common areas	45 – 50
Living areas	30 – 40
Sleeping areas	30 - 35

4.2 EXTERNAL NOISE EMISSIONS

NSW EPA Noise Policy for Industry (NPI) 2017 – Industrial Noise (Plant and Equipment)

The NSW EPA's Noise Policy for Industry (NPI) 2017 has been implemented to assess the noise impacts of mechanical plant and equipment, as well as other industrial noise sources on the surrounding receiver catchments.

The NPI sets out a framework for the derivation of project noise trigger levels that are used to assess the potential impacts of noise from industry (and industrial noise sources) and indicate the noise level at which feasible and reasonable noise management measures should be considered.

This policy applies to noise sources from activities listed in Schedule 1 of the POEO Act and those regulated by the EPA. This includes noise sources from mechanical plant and equipment within the proposed redevelopment, for which this policy will be applied.

The project noise trigger level provides a benchmark for assessing a proposal, where if exceeded, indicates a potential noise impact on the community and so triggers a management response such as additional mitigation measures. The project noise trigger level is the lower (the more stringent) value of the project intrusiveness noise level and project amenity noise level determined in Sections 2.3 and 2.4 of the NPI, respectively.

Project Intrusiveness Noise Level

The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (in terms of L_{Aeq}) measured over a 15-minute period does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. The project intrusiveness noise level is only applicable to surrounding residential receivers.

To account for the temporal variation of background noise levels, the method outlined in Fact Sheet A of the NPI establishes a method in determining the Rating Background Noise Level (RBL) to be used in the assessment.

The intrusiveness noise level is determined as follows:

$L_{Aeq,15min}$ (Intrusiveness Criteria) = Rating Background Noise Level (RBL) + 5 dB(A)

Table 6 provides the project intrusiveness noise levels applicable to each of the surrounding residential noise-sensitive receivers. Receiver catchments are provided in Figure 1.

Table 6: Project intrusiveness noise level criteria for each residential receiver catchment

RECEIVER CATCHMENT	TIME OF DAY	MEASURED RBL - dB(A)	PROJECT INTRUSIVENESS NOISE LEVELS - $L_{Aeq,15min}$ dB(A)
RC1-RC3	Day	43	48
	Evening	43	48
	Night	41	46

Project Amenity Noise Level

The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows:

Project Amenity Noise Level = Recommended Amenity Noise Level (see Table 7) – 5 dB(A)

The following exceptions to the above method to derive the project amenity noise level apply:

- In areas with high traffic noise levels. Where the level of transport noise, road traffic noise in particular is high enough to make noise from an industrial source inaudible, the project amenity noise level shall be set at 15 dB(A) below the measured $L_{Aeq,period(traffic)}$ for the particular assessment period
- In proposed developments in major industrial clusters
- Where the resultant project amenity noise level is 10 dB(A) or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB(A) below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time
- Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such cases the relevant amenity noise level is assigned as the project amenity noise level for the development

The recommended amenity noise level, project amenity noise level, and converted project amenity noise level for comparison with the intrusiveness criteria (from time-of-day period to 15-minute) is provided for each surrounding receiver catchment in Table 7.

Table 7: Project amenity noise level criteria for each receiver catchment

RECEIVER CATCHMENT	RECEIVER TYPE	TIME OF DAY	RECOMMENDED AMENITY NOISE LEVEL - $L_{Aeq,period}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,period}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,15min}$ dB(A)
RC1 & RC2	Residential – Urban[1]	Day	60	55	58
		Evening	50	45	48
		Night	45	40	43

Note 1: Urban residential as classified in Table 2.3 of the Noise Policy for Industry (NPI) 2017.

Sleep Disturbance and Maximum Noise Level Assessment

Where the proposed redevelopment night-time noise levels generated at a residential location exceed either:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB(A), whichever is greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB(A), whichever is greater,

a detailed maximum noise level event assessment should be undertaken.

Corrections for Annoying Noise Characteristics – Noise Policy for Industry Fact Sheet C

Fact Sheet C contained within the Noise Policy for Industry outlines the correction factors to be applied to the source noise level at the receiver before comparison with the project noise trigger levels established within this report, to account for the additional annoyance caused by these modifying factors.

The modifying factor corrections should be applied having regard to:

- The contribution noise level from the premises when assessed/measured at a receiver location, and
- The nature of the noise source and its characteristics (as set out in Fact Sheet C)

Table C1 within Fact Sheet C sets out the corrections to be applied for any assessment in-line with the NPI. The corrections specified for tonal, intermittent and low-frequency noise are to be added to be added to the measured or predicted levels at the receiver before comparison with the project noise trigger levels. The adjustments for duration are to be applied to the criterion.

Project Noise Trigger Levels

Table 8 presents the project intrusiveness and project amenity noise levels for each period, and each receiver catchment, as well as the resultant project noise trigger levels (PNTLs) that shall be applied for any assessment of impacts of mechanical plant and equipment noise on the surrounding receiver catchments.

Table 8: Project noise trigger levels (PNTL) to be applied to each surrounding receiver catchment

RECEIVER CATCHMENT	RECEIVER TYPE	TIME OF DAY	PROJECT INTRUSIVENESS NOISE LEVEL - $L_{Aeq,15min}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,15min}$ dB(A)	SLEEP DISTURBANCE NOISE LEVEL - dB(A)	PROJECT NOISE TRIGGER LEVEL - $L_{Aeq,15min}$ dB(A)
RC1 – RC3	Residential – Urban	Day	48	58	N/A	48
		Evening	48	48	N/A	48
		Night	46	43	46dB(A)L_{eq} and 61dB(A)L_{max}	46dB(A)L_{eq} and 61dB(A)L_{max}

5 OPERATIONAL NOISE AND VIBRATION ASSESSMENT

5.1 MECHANICAL PLANT AND EQUIPMENT NOISE EMISSION

This assessment has considered the noise emissions from indicative major mechanical plant items proposed to serve the proposal. These noise sources have been used to predict the worst- case scenario noise impact of the proposed use of the site to the nearby sensitive receivers. The assessment has been conducted to achieve noise levels as per the NSW NPI and have been assessed at the most affected external point at the surrounding receivers.

While exact equipment selections may change during the detailed design stage, the following equipment sound power levels have been adopted in this assessment:

Table 9: Preliminary mechanical plant and equipment selections

MECHANICAL PLANT ITEM	MAKE/MODEL	QUANTITY	EQUIPMENT SOUND POWER LEVEL – dB(A)$L_{EQ(15MIN)}$
Residential AC Condensers	Daikin RSUYQ8AYM	12	75

The noise generated by outdoor AC condensers has been assessed to surrounding noise sensitive receivers, with consideration of the following conservative assumptions:

- For residential AC condensers, 50% of condensers operating during the Day, 60% of condensers operating during the Evening, and 20% of condensers operate during the Night (Day, Evening, and Night in line with NSW EPA NPfI defined periods).

Based on the assumptions presented above, noise emissions from external mechanical plant identified in Table 9 are compliant with the noise emission targets established in Section 4.2 without additional noise mitigation measures. A detailed assessment shall be undertaken during the Design Development stage once equipment selections and locations are finalised to ensure on-going compliance with noise emission targets are achieved.

5.2 TRAFFIC NOISE INTRUSION

A preliminary façade noise model of the development to predict the road noise incident on the facades of the development.

Appendix A provides façade noise maps to present road noise on each of the facades of the proposal development. The modelling takes into account building shielding, directivity and calculations for road noise.

Mitigation measures are detailed in Section 6.2.

5.3 NOISE FROM CARPARK USE

The carpark for the existing residential flat building at 101 North Steyne is accessed via Pine Lane, and is open such that vehicle movements are in direct line of sight of neighbouring. The proposed development shall also be accessed via Pine Lane, however the carpark is enclosed within the basement level.

In consideration of the above, no adverse impacts are expected from the use of the proposed basement carpark.

6 MITIGATION MEASURES

6.1 MECHANICAL SERVICES

A preliminary review of major external mechanical plant has been undertaken in Section 5.1. It is concluded that noise emission targets are achievable without specific acoustic treatment.

Mitigation measures for all mechanical plant should be considered during the Design Development stage (once equipment selections and locations are finalized by the contractor) so as to comply with the noise emission criteria established in Section 4.2. and internal noise levels in Section 4.1. These amelioration measures could include, but are not limited to the following:

- Positioning mechanical plant away from nearby noise sensitive receivers;
- Acoustic attenuators fitted to duct work;
- Screening around mechanical plant;
- Acoustic insulation within duct work;
- Acoustically insulated bends fitted to duct work; and
- Reselection of mechanical plant.

6.2 EXTERNAL SOUND ISOLATION – BUILDING ENVELOPE

Appendix A provides façade noise maps to present road noise on each of the facades of the proposal development. The modelling takes into account building shielding, directivity and calculations for road noise sources.

Façade glazing has been nominated in Table 10 to achieve the project internal noise targets identified in Section 4.1. The acoustic rating stated is indicative of the glazing assembly in its entirety (glass and frame).

Table 10: Acoustic Facade Arrangements

SPACE/ROOM TYPE	REQUIRED ACOUSTIC RATING (R_w, C_{tr})	TYPICAL EQUIVALENENT GLASS
All habitable spaces	32, -3	6.38mm laminated glass

Any non-glazed façade elements shall be designed to achieve a sound insulation performance of R_w45.

7 CONCLUSION

This noise and vibration report has been prepared by E-LAB Consulting to accompany a development application for the proposed mixed-use development at 101 North Steyne, Manly.

The following operational noise and vibration impacts were conducted as part of this noise and vibration impact assessment:

- Noise impact from road traffic noise on the proposed development;
- Noise impacts from the operation of the development; and
- Noise and vibration impact of mechanical plant and equipment serving the proposed development on surrounding noise and vibration sensitive receivers.

To assess each of the acoustic considerations for the proposed redevelopment, noise and vibration criteria has been established in Section 4 in accordance with the following documents:

- Northern Beaches Council "Manly Development Control Plan 2013" (DCP);
- AS/NZS 2107:2016 "Acoustics - Recommended design sound levels and reverberation times for building interiors"; and
- NSW EPA's Noise Policy for Industry 2017 (NPI).

Having given regard to the analysis conducted within this report, it is the finding of this noise and vibration impact assessment that the proposed redevelopment is compliant with the relevant noise and vibration criteria controls for this type of development, and it is expected to comply with the applicable regulations with regards to noise and vibration, particularly those listed above.

It is recommended the development application for the proposed redevelopment is approved on the basis of noise and vibration, under the implementation of the mitigation measures outlined within the report.

Appendix A **Noise Monitoring Results**

Figure 3: Noise monitoring results – LT1

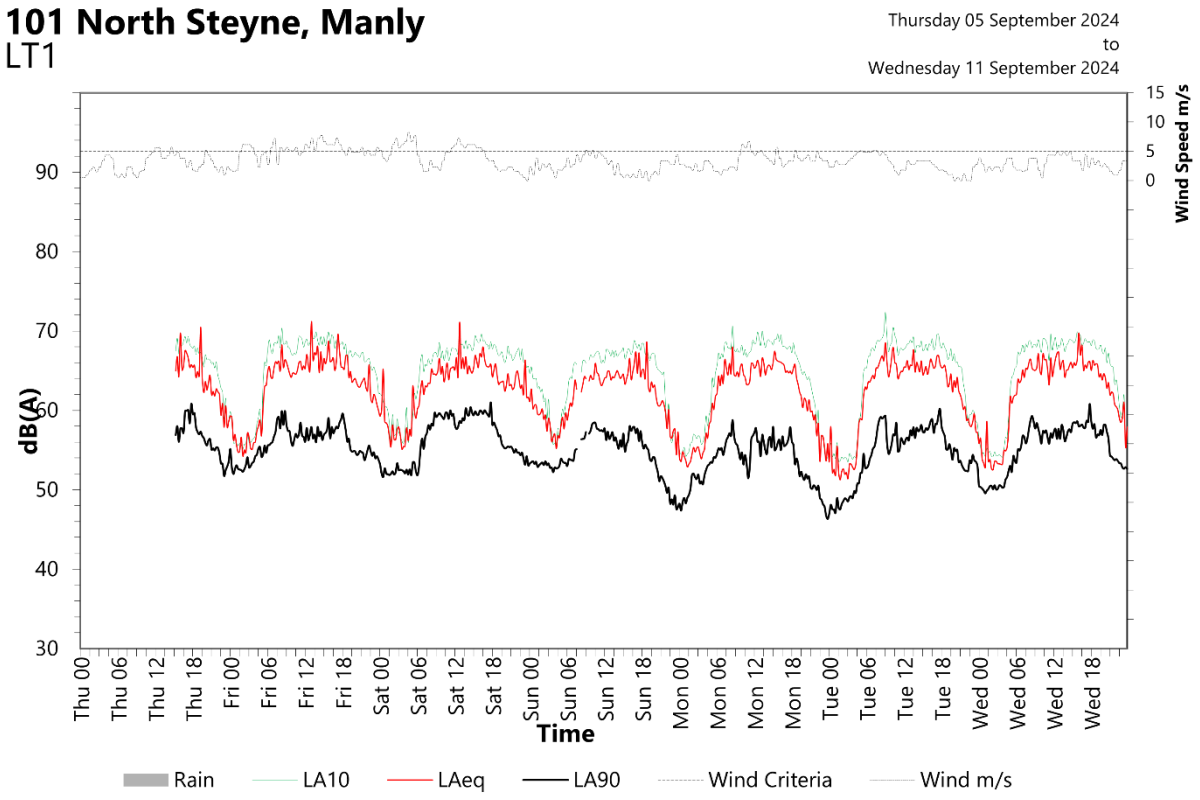
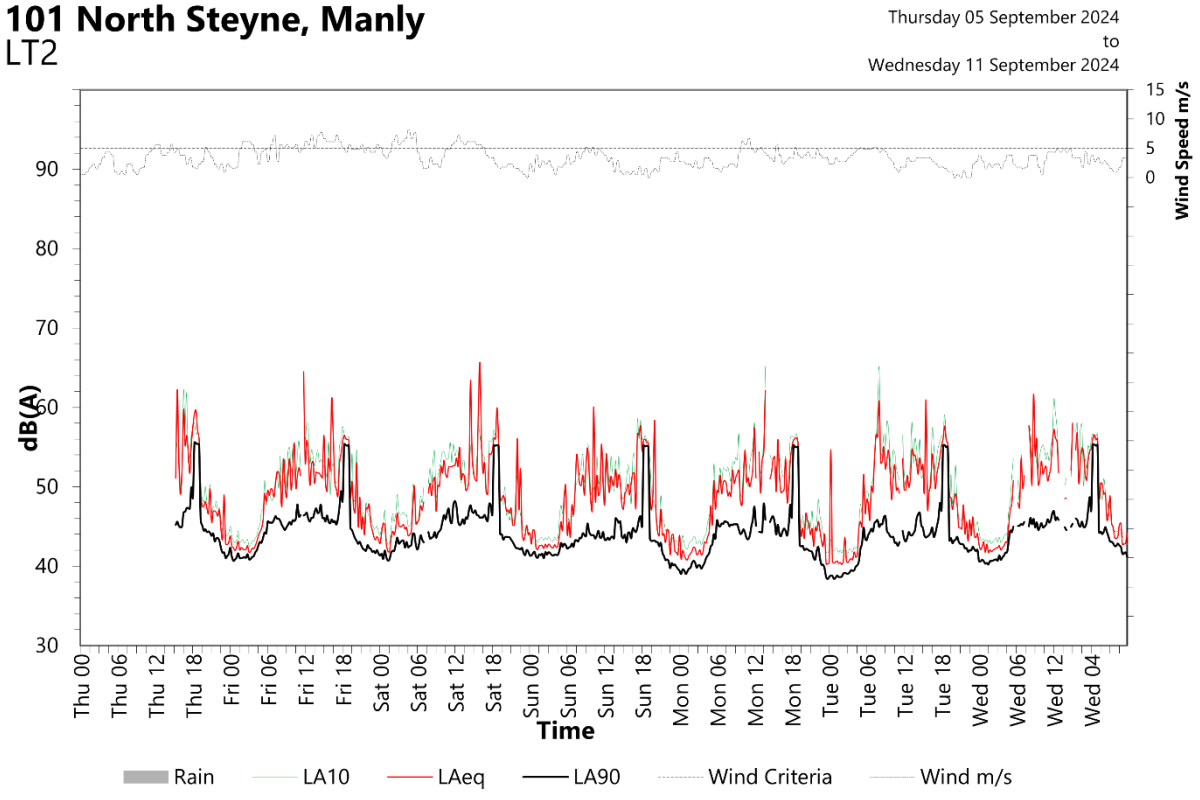


Figure 4: Noise monitoring results – LT2



Appendix B **Façade Noise Map**

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