Bank Street Park
Blackwattle Bay / Tjerruing

SSD-53386706

Appendix AJ

Noise and Vibration Impact Assessment (Stantec)

December 2023

Bank Street Park

Noise & Vibration Impact Assessment for State Significant Development Application

29/11/2023

Ref: 301351267

PREPARED FOR:

Infrastructure NSW

PREPARED BY:

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Stantec

Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer
001	04/08/2023	Draft Issue	Jonathan Salim	Mathew McGrory
002	31/10/2023	Final Draft Issue	Jonathan Salim	Mathew McGrory
003	29/11/2023	Issue for SSDA	Jonathan Salim	Mathew McGrory

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1. Executive Summary

This Noise & Vibration Impact Assessment has been prepared by Stantec Australia to accompany the State Significant Development Application (SSDA) for the proposed Bank Street Park development located at 1A-19 Bank Street, Pyrmont and includes the harbour development in Blackwattle Bay. The site is approximately 1 hectare in size and is situated at the north of the Blackwattle Bay Precinct, surrounding the southern pylon of the Anzac Bridge. The cadastral details for land development can be found on Table 1 below.

Table 1: Cadastral details for land development

Street Name	Cadastral Details
1A Bank Street	Lot 1 DP 85206 Lot 1 DP 188671
1-3 Bank Street	Lot 1-2 DP 1089643 Lot 1 DP 439245
5 Bank Street	Lot 20 DP 803159
7 Bank Street	Lot 19 DP 803159
9 Bank Street	Lot 21 DP 803159
11 Bank Street	Lot 22 DP 803159
17-19 Bank Street	Lot 5-6 DP 803159

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD- 53386706).

This report concludes that the acoustic and vibration impacts of the proposed development are acceptable and do not warrant application of any specific acoustic mitigation measures.

2. Introduction

This report has been prepared to support a State Significant Development Application (SSDA) for a new waterfront public park within Blackwattle Bay, to be known as Bank Street Park (SSD-53386706). Bank Street Park is located at 1A-19 Bank Street, Pyrmont on the shoreline of Tjerruing Blackwattle Bay and adjacent areas of Blackwattle Bay.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessments Requirements (SEARs) issued on 11 May 2023 for application SSD-53386706. Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Item	Description of requirement	Section reference (this report)
8. Environmental Amenity	Address how good internal and external environmental amenity is achieved, including access to natural daylight and pedestrian movement throughout the site and connections with the wider area. Assess amenity impacts on the surrounding locality including lighting impacts, wind, noise and vibration.	Section 6
13. Noise and Vibration	Provide a noise and vibration assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.	Section 6.1
14. Construction impacts	Provide an assessment of likely construction impacts including hours or work, noise, vibration, traffic and pedestrian, air quality, soil, water and waste management.	Section 7

This report is based on our understanding of the proposed project, application of the relevant state guidelines and professional experience within the acoustic field. This report shall not be relied upon as providing any warranties or guarantees.

2.1 Blackwattle Bay Precinct

Bank Street Park forms part of the Blackwattle Bay Precinct, which is an area of predominantly government owned land located on the western edge of the Pyrmont Peninsula and adjoining the waters of Blackwattle Bay (Figure 1).

Figure 1 Blackwattle Bay Precinct (Source: INSW)

The precinct was rezoned in December 2022 to facilitate a new mixed-use community, providing for around 2,000 new residents and 5,600 new jobs and creating a vibrant 24/7 economy. Updated planning and land use controls were incorporated into the Sydney Local Environmental Plan 2012, along with site specific design guidance in the *Blackwattle Bay Design Guidelines*. The new planning controls will come into effect on 8 September 2023.

A critical part of the Blackwattle Bay Precinct is the high quality public domain which includes a series of parks and open spaces connected by a foreshore promenade. Bank Street Park will bring new active and passive recreation uses into a unique park environment, catering for both existing and future communities in the vicinity.

3. Project Overview

3.1 Site Description

Bank Street Park is located at 1A-19 Bank Street, Pyrmont. The site is approximately 1 hectare in size and is situated at the north of the Blackwattle Bay Precinct, surrounding the southern pylon of the Anzac Bridge. The cadastral details for land development can be found on Table 1 below.

Table 2: Cadastral details for land development

Street Name	Lot and Deposited Plan details	Ownership
1A Bank Street, Pyrmont NSW 2009	Lot 1 DP 85206 Lot 1 DP 188671	Transport for NSW
1-3 Bank Street, Pyrmont NSW 2009	Lots 1-2 DP 1089643 Lot 1 DP 439245	Infrastructure NSW
5 Bank Street, Pyrmont NSW 2009	Lot 20 DP 803159	Transport for NSW
7 Bank Street, Pyrmont NSW 2009	Lot 19 DP 803159	Transport for NSW
9 Bank Street, Pyrmont NSW 2009	Lot 21 DP 803159	Transport for NSW
11 Bank Street, Pyrmont NSW 2009	Lot 22 DP 803159	Transport for NSW
17-19 Bank Street, Pyrmont NSW 2009	Lots 5-6 DP 803160	Transport for NSW
Sydney Harbour	Lot 5 DP 1209992	Roads and Maritime Services (Transport for NSW)
Sydney Harbour	Lot 107 in DP 1076596	Transport for NSW
Part Bank Street road reserve	N/A	City of Sydney Council

Bank Street Park is located on Gadigal Land, one of the twenty-nine clans of the great Eora Nation. It adjoins the foreshores of Glebe to the west and Pyrmont Bridge Road and Wentworth Park to the south.

Figure 2 Site context map (The indicative site location is outlined in red). Source: SixMaps with Architectus edits (2023)

Figure 3 Bank Street Park site location within Blackwattle Bay State Significant Precinct (the indicative site location is outlined in red). Source: Blackwattle Bay Design Guidelines with Architectus edits (2023)

3.2 Proposed Development

3.2.1 Overview

Development consent is being sought for a *recreation area* for the primary purpose of a *public park*, comprising:

- Site preparation works, including tree removal, earthworks and remediation to facilitate the proposed use;
- Demolition of three existing buildings at 1-3 Bank Street;
- New and adapted facilities for community use, including:
  - New single storey building to accommodate flexible community space, café, and marina office/store facilities, with green roof and photovoltaics;
  - Adaptive reuse of Building D for public amenities, bin and other storage;
  - Boat launching ramp and pontoon for passive watercraft, including dragon boats and kayaks;
  - Boat storage building with change facilities for dragon boat users with publicly accessible rooftop deck;
- Public domain works, including:
  - 'Interpretation Garden' in existing building 'ruins' at 1-3 Bank Street;
  - Split level foreshore promenade;
  - Multi-purpose court with edge seating and partial fence;
  - Nature-based inclusive playspace for ages 2-12;
  - Fitness equipment;
  - Public plaza and grassed open space areas;
  - New tree plantings and planter beds;
  - Public art, wayfinding and interpretative signage, lighting, bike parking and seating;
- Harbour works including:
  - Overwater boardwalk;
  - Land/water interface works, including sandstone terracing into water and support structure, to improve marine habitat;
  - Demolition and construction of a new timber launching ramp for dragon boats;
  - Kayak/passive craft pontoon; and
  - Restoration, repair and alterations to the existing seawall for new stormwater outlets.
- Works to Bank Street road reserve, including:
  - Road space reallocation to provide separated cycleway;
  - Cycleway transition to Bank Street to continue south as part of future works;
  - Reinstatement of existing on-street parallel parking;
  - Tree planting;
  - Accessible parking space; and
  - Loading zone adjacent 1-3 Bank Street.

3.2.2 Hours of Operation

Bank Street Park will be accessible to the public 24 hours a day, however some of the amenities will only be available during daylight hours (e.g., amenities). Other proposed hours of operation include:

Table 3 Hours of operation

Item	Hours of Operation	Days
Dragon boat storage and amenities	Daylight hours (approx. 6am – 7pm)	7 days
Community space	7am – 6pm	7 days
Café/kiosk	7am – 6pm	7 days
Marina office	7am – 1am	7 days

Access to marina office and storage areas may be required outside regular business hours for post charter activities. These hours align with the existing approved hours for the marina office on 5-19 Bank Street. All activities would be undertaken in accordance with a future Plan of Management endorsed by Placemaking NSW and/or Transport for NSW.

4. Noise Survey

4.1 Overview

Attended and unattended noise surveys were conducted in the locations shown in Table 4 to establish the ambient and background noise levels of the site and surrounds. Noise surveys have been carried out in accordance with the method described in the AS/NZS 1055:2018 'Acoustics – Description and measurement of environmental noise'.

The site is broadly located between Blackwattle Bay and Bank Street in Pyrmont. Refer to Figure 4 for the location of the proposed development and measurement positions. Figure 4 also presents the location of the most affected/sensitive receivers for the development.

4.2 Instrumentation

The following equipment was used for the noise surveys:

- Hand-held sound spectrum analyzer B&K 2250, S/N 2709742
- Sound Calibrator B&K Type 4231, S/N 2709826
- Bruel and Kjear Noise Logger B&K 2250 S/N 3011814
- CASELLA Noise Logger CEL-63X S/N 1488204

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.

Figure 4: Overview of the site and measurement locations (Source: nearmap.com)

4.3 Unattended Noise Survey Results

An unattended noise survey was undertaken on the site between 1st to the 14th of June 2023 to quantify the local noise environment and to establish the noise criteria to the nearest noise sensitive receivers surrounding the site. Refer to Figure 4 for the monitoring locations on site. The local ambient noise environment is dominated by noise from the ANZAC bridge and local traffic.

In accordance with NSW noise guidelines, the averaged background noise level for each assessment period (day/evening/night) is called "*the Rating Background Level*" (RBL) and are the levels used for assessment purposes.

The measured background noise levels are used to determine the single-figure RBL for each assessment period and are shown in Table 4. The results of the unattended ambient noise survey and the determined RBLs representing each of the assessment periods over the whole monitoring period are shown in Table 4. Results of the monitoring are presented in the following subsections and graphs of these logged results are provided in Appendix A.

The results of the unattended background and ambient noise survey are shown in Table 4 and Table 5. As required in the NSW NPI, any data likely to be affected by rain, wind or other extraneous noise has been excluded from the calculations.

Table 4: Unattended noise measurements

Location	Equivalent Continuous Noise Level $L_{Aeq,period}$ – dB(A)			Background Noise Level RBL – dB(A)		
	Day	Evening	Night	Day	Evening	Night
L1	66	63	61	61	59	54
L2	60	58	55	57	54	45

Table 5: Unattended traffic noise measurements

Location	Equivalent Continuous Noise Level $L_{Aeq,period}$ - dB(A)	
	Day ($L_{Aeq,\ 15\ Hour}$)	Night ($L_{Aeq,\ 9\ Hour}$)
L1	65	61
L2	60	55

4.4 Attended Noise Survey Results

Attended noise measurements of 15-minute period were conducted on site in order to characterise the acoustic environment for the noise intrusion into the development and to determine any noise impact on the surrounding receivers. A summary of the attended noise measurements taken at the site are shown on Table 6. Refer to Figure 4 for the measurement locations.

Table 6: Attended noise measurements

Measurement Location	Measurement Time	$L_{Aeq,duration}$, dB(A)	$L_{Amax,\ duration}$, dB(A)	Comments
P1	26/06/2023 – 02:40 PM	$L_{Aeq,15mins}$ 64	$L_{Amax,15mins}$ 77	Background dominated by traffic noise along ANZAC Bridge and intermittent local traffic on Bowman Street
P2	26/06/2023 – 02:59 PM	$L_{Aeq,15mins}$ 63	$L_{Amax,15mins}$ 76	Background dominated by traffic noise along ANZAC bridge
P3	14/06/2023 – 10:18AM	$L_{Aeq,5mins}$ 65	$L_{Amax,5mins}$ 83	Dominated by traffic noise along ANZAC bridge. 10 cars pass by along Bowman Street.
	26/06/2023 – 03:17 PM	$L_{Aeq,15mins}$ 64	$L_{Amax,15mins}$ 77	Background dominated by constant traffic noise along ANZAC bridge. 45 cars pass by along Bowman Street.
P4	26/06/2023 – 03:40PM	$L_{Aeq,10mins}$ 63	$L_{Amax,10mins}$ 73	Background dominated by traffic noise along ANZAC bridge with intermittent local traffic on Bowman Street

5. Noise Criteria

5.1 Sydney Local Environment Plan (LEP) 2012

Relevant Planning Documents from City of Sydney Council have been reviewed for any noise requirements or criteria.

The zoning of the land area of the site is RE1 Public Recreation under Sydney Local Environmental Plan 2012. The surrounding areas are zoned as R1 (General Residential), RE1 (Public Recreation), and E2 (Commercial Centre).

Figure 5: Land Zoning of the site and surroundings.

5.2 Blackwattle Bay Design Guidelines

Blackwattle Bay Design Guidelines 2023 require a Noise and Vibration Impact Assessment (NVIA) to accompany development applications for new mixed-use, residential or commercial development, or a use which the consent authority considers is likely to be noise-sensitive or noise-generating. The NVIA is to consider and respond to noise and vibration impacts from the surrounding road network, harbour activity, port operations, and the future activation of the precinct and other potential noise sources.

Noise and Vibration Assessment shall include, but not be limited to the following (or where updated or superseded), as relevant to the proposed use:

- NSW State Environmental Planning Policy (Transport and Infrastructure) 2021 (not applicable for this development)
- Development Near Rail Corridors and Busy Roads – Interim Guideline 2008 (not applicable for this development)
- Glebe Island and White Bay Port Noise Policy 2020 (not applicable for this development)
- NSW Noise Policy for Industry 2017 (assessed in Section 5.3.1)
- NSW Assessing Vibration: A Technical Guideline 2006 (assessed in Section 5.6.3)

5.3 External Noise Criteria

5.3.1 NSW Noise Policy for Industry (NPI)

The NSW Environment Protection Authority (EPA) sets out criteria in its Noise Policy for Industry (NPI) to control the noise emission from industrial noise source or continuous steady state noise. The external noise due to the mechanical services from the proposed development will later be addressed in order to ensure the compliances with NSW EPA's NPI guidelines.

The calculation is based on the results of the ambient and background noise unattended monitoring, addressing two components:

- Controlling intrusive noise into nearby residences (Intrusiveness Criteria)
- Maintaining noise level amenity for particular land uses (Amenity Criteria)

Once both criteria are established the most stringent for each considered assessment period (day, evening, night) is adopted as the Project Noise Trigger Level (PNTL).

Intrusiveness Criteria

The NSW EPA NPI states the following:

"The intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the Laeq descriptor), measured over a 15-minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB(A)."

The intrusiveness criterion can be summarised as L_{Aeq}, 15 minute ≤ RBL background noise level plus 5 dB(A).

Table 7: NSW NPI intrusiveness criteria for Bank Street Receiver (50 Bank Street)

Period	Noise Descriptor – dB(A)	Noise Criteria – dB(A)
Day (7:00am to 6:00pm)	$L_{Aeq,15min}$ ≤ RBL + 5	66
Evening (6:00pm to 10:00pm)	$L_{Aeq,15min}$ ≤ RBL + 5	64
Night (10:00pm to 7:00am)	$L_{Aeq,15min}$ ≤ RBL + 5	59

Table 8: NSW NPI intrusiveness criteria for 1 Distillery Drive Receiver

Period	Noise Descriptor – dB(A)	Noise Criteria – dB(A)
Day (7:00am to 6:00pm)	$L_{Aeq,15min}$ ≤ RBL + 5	62
Evening (6:00pm to 10:00pm)	$L_{Aeq,15min}$ ≤ RBL + 5	59
Night (10:00pm to 7:00am)	$L_{Aeq,15min}$ ≤ RBL + 5	50

Amenity Criteria

The NSW NPI states the following:

> "To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.1 of the NPI. Meeting the acceptable noise levels in table 2.1 will protect against noise impacts such as speech interference, community annoyance and to some extent sleep disturbance. These levels represent best practice for assessing industrial noise sources, based on research and a review of assessment practices used overseas and within Australia."

The applicable parts of Table 2.1: Recommended L_{Aeq} Noise Levels from Industrial Noise Sources – dB(A) which are relevant to the project are reproduced below:

Table 9: NSW NPI amenity criteria for external noise levels

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended $L_{Aeq,period}$ Noise Level, dB(A)	Project Amenity Noise Level[1], $L_{Aeq,\ 15mins}$, dB(A)
Residential	Urban[2]	Day	60	58
		Evening	50	48
		Night	45	43
Commercial	All	When in use	65	63
Passive recreation (Park)	All	When in use	50	48

Notes:

1. Project amenity noise level is Recommended Noise Level minus 5 dB(A) plus 3 dB(A) to convert from period level to a 15-minute level.
2. Urban area as defined in EPA NSW NPI Table 2.3

'Modifying Factor' Adjustments

The NSW NPI also states:

> "Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level."

In order to take into account the potential annoying character of the noise an adjustment of 5 dB(A) for each annoying character aspect and cumulative of up to a total of 10 dB(A), is to be added to the measured value to penalise the noise for its potentially greater annoyance aspect.

Table 4.1 of Chapter 4 of the NSW DECCW NPI (see Table 10 below) provides procedures for determining whether an adjustment should be applied for greater annoyance aspect.

Table 10: Table 4.1 from the NSW DECCW NPI – Modifying factor corrections

Factor	Assessment / Measurement	When to Apply	Correction[1]	Comments
Tonal Noise	One-third octave or narrow band analysis	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: - **5 dB** or more if the centre frequency of the band containing the tone is above 400 Hz - **8 dB** or more if the centre frequency band containing the tone is 160 to 400 Hz inclusive	5 dB[2]	Narrow-band frequency analysis may be required to precisely detect occurrence.

Factor	Assessment / Measurement	When to Apply	Correction[1]	Comments
		- **15 dB** or more if the centre frequency of the band containing the tone is below 160 Hz		
Low Frequency Noise	Measurement of C-weighted and A-weighted level	Measure / assesses C- and A-weighted levels over same time period. Correction to be applied if the difference between the two levels is 15 dB or more	5 dB[2]	C-weighting is designed to be more responsive to low-frequency noise, especially at higher overall levels
Impulsive Noise	A-weighted fast response and impulsive response	If difference in A-weighted maximum noise levels between fast response and impulse response is greater than 2 dB	Apply difference in measured levels as the correction, up to a maximum of 5 dB.	Characterised by a short rise time of 35 milliseconds (ms) and decay time of 1.5 s.
Intermittent Noise	Subjectively assessed	Level varies by more than 5 dB	5 dB	Adjustment to be applied for **night-time only.**
Duration	Single-event noise duration may range from 1.5 min to 2.5 h	On event in any 24-hour period	0 to – 20 dB(A)	The acceptable noise level may be increased by an adjustment depending on duration of noise.
Maximum Adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10dB(A)[2] (excluding duration correction)	

Notes:
1. Corrections to be added to the measured or predicted levels.
2. Where a source emits tonal and low-frequency noise, only one 5 dB correction should be applied if the tone is in the low-frequency range.

Project Noise Trigger Levels (PNTL)

The following criteria is applicable for the external noise emissions from the development, as detailed below in Table 11. These project noise trigger levels are in accordance with the requirements of the NSW NPI and shall be assessed to the most affected point on or within the residential boundary.

Table 11: Project noise trigger levels

Period	Descriptor	PNTL dB(A)
Residential receivers		
Day (7:00am to 6:00pm)	$L_{Aeq,15min}$	58
Evening (6:00pm to 10:00pm)	$L_{Aeq,15min}$	48
Night (10:00pm to 7:00am)	$L_{Aeq,15min}$	43
Commercial receivers		
When in use	$L_{Aeq,15min}$	63
Passive Recreation (Park)		
When in use	$L_{Aeq,15min}$	48

Where necessary, noise mitigation measures will be incorporated in the design to ensure that noise levels comply with the recommended noise emission criteria noted above.

5.4 Traffic Generation Noise Criteria

Road traffic noise impact is assessed in accordance with the introduced NSW Road Noise Policy (Office of Environment and Heritage July 2011) which supersedes the *NSW Environmental Criteria for Road Traffic Noise* (ECRTN, Department of Environment Climate Change and Water 1999). The criterion (Table 3 – Road Traffic Noise Assessment Criteria for Residential Land Uses) divides land use developments into different categories and lists the respective criteria for each case. The category that is relevant to the proposed use of the site is shown below in Table 12.

Table 12: NSW Road Noise Policy – Traffic noise assessment criteria

Road Category	Type of project/land use	Assessment Criteria – dB(A)	
		Day (7am – 10pm)	Night (10pm – 7am)
Arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,1\ hour}$ 60 (external)	$L_{Aeq,1\ hour}$ 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq,1\ hour}$ 55 (external)	$L_{Aeq,1\ hour}$ 50 (external)

In the event that the traffic noise at the site is already in excess of the criteria noted above, the NSW RNP states that the primary objective is to reduce the existing level through feasible and reasonable measures to meet the criteria above.

If this is not achievable, Section 3.4.1 Process for applying the criteria – Step 4 states that for existing residences affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise should be limited to 2dB above that of the corresponding 'no build option'.

5.5 Construction Noise Criteria

Noise criteria for construction sites are established in accordance with the Interim Construction Noise Guideline (*ICNG July 2009*) by the NSW Office of Environment & Heritage (NSW OE&H) currently under The NSW Environment Protection Authority (EPA). It is important to note that the recommended criteria are for planning purposes only. Numerous other factors need to be considered when assessing potential noise impacts from construction works.

However, in undertaking the assessment of potential noise intrusion associated with the proposed construction activities, Chapter 4 of the NSW EPA ICNG (July 2009) were specifically referenced. The noise limits are presented in Table 13, and are applicable to the development.

Table 13: NSW ICNG Construction noise criteria

Time of Day	Management Level $L_{Aeq,15min}$ *	How to Apply
Recommended Standard Hours: Mon – Fri (7am – 6pm) Sat (8am – 1pm) No work on Sunday & Public Holidays	Noise Affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residences of the nature of works to be carried out, the expected noise levels and duration as well as contact details.
	Highly Noise Affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur in, taking into account: • Times identified by the community when they are less sensitive to noise (such as before and after school, for works near schools, or mid-morning or mid-afternoon for works near residences) • If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside Recommended Standard Hours	Noise Affected RBL + 5dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2. of NSW EPA ICNG (July 2009).

NOTE: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Source: Chapter 4 (Table 2 Sec 4.1.1) of NSW EPA ICNG

5.6 Construction Vibration Criteria

The NSW Environment Protection Authority (EPA) developed a document, "Assessing vibration: A technical Guideline" in February 2006 to assist in preventing people from exposure to excessive vibration levels within buildings. The guideline does not however address vibration induced damage to structures or structure-borne noise effects. Vibration and its associated effects are usually classified as continuous, impulsive or intermittent.

5.6.1 Human Comfort – Continuous and Impulsive Vibration Criteria

Structural vibration in buildings can be detected by occupants and can affect them in many ways including reducing their quality of life and also their working efficiency. Complaint levels from occupants of buildings subject to vibration depend upon their use of the building and the time of the day.

Maximum allowable magnitudes of building vibration with respect to human response are shown in Table 14. It should be noted that the human comfort for vibration criteria are more stringent than the building damage criteria.

Table 14: Preferred and maximum weighted RMS values for continuous and impulsive vibration

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Continuous vibration					
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night time	0.007	0.005	0.014	0.010
Impulsive vibration					
Residences	Daytime	0.30	0.21	0.60	0.42
	Night time	0.10	0.071	0.20	0.14

Human Comfort – Intermittent Vibration Criteria

Disturbance caused by vibration will depend on its duration and its magnitude. This methodology of assessing intermittent vibration levels involves the calculation of a parameter called the Vibration Dose Value (VDV) which is used to evaluate the cumulative effects of intermittent vibration. Various studies support the fact that VDV assessment methods are far more accurate in assessing the level of disturbance than methods which is only based on the vibration magnitude.

Table 15: Acceptable Vibration Dose Values for Intermittent Vibration (m/s1.75)

Location	Daytime (7:00am to 10:00pm)		Night-time (10:00pm to 7:00am)	
	Preferred value	Maximum value	Preferred value	Maximum value
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and place of worship	0.40	0.80	0.40	0.80

5.6.2 Structural Damage – Vibration Criteria

Ground vibration criteria are defined in terms of levels of vibration emission from construction activities which will avoid the risk of damaging surrounding buildings or structures. It should be noted that human comfort criteria are normally expressed in terms of acceleration whereas structural damage criteria are normally expressed in terms of velocity.

Most commonly specified structural vibration levels are defined to minimize the risk of cosmetic surface cracks and are set below the levels that have the potential to cause damage to the main structure. Structural damage criteria are presented in German Standard DIN4150-Part 3 “Structural vibration in buildings – Effects on structures” and British Standard BS7385-Part 2: 1993 “Evaluation and Measurement for Vibration in Buildings”. Table 16 indicates the vibration limits presented in DIN4150-Part 3 to ensure structural damage doesn’t occur.

Table 16: Guideline value of vibration velocity, vi, for evaluating the effects of short-term vibration

Line	Type of Structure	Vibration velocity, vi, in mm/s			
		Foundation			Plane of floor of uppermost full storey
		At a frequency of			
		Less than 10Hz	10 to 50Hz	50 to 100*Hz	All Frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that, because of their particular sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

*For frequencies above 100Hz, at least the values specified in this column shall be applied

5.6.3 Vibration Objectives

Table 17 indicates the vibration criteria for the nearest residential and commercial properties to the development.

Table 17: Construction vibration criteria summary

Location	Period	Human Comfort Vibration Objectives			Building damage Objectives – Velocity (mm/s)
		Continuous mm/s^2 (RMS)		Intermittent m/s$^{1.75}$ (VDV)	
		z-axis	x- and y-axis		
Residential	Daytime	10 - 20	7 - 14	0.20 - 0.40	5
	Night time	7 - 14	5 - 10	0.13 - 0.26	5
Commercial	Any time	20 - 40	14 - 28	0.40 – 0.80	20

6. Noise Impact Assessment

6.1 Mechanical Noise Emissions (Community, Café, and Marina Building)

Noise generation by mechanical equipment in association with the proposed development is to be managed to ensure external noise emissions are not intrusive and does not impact the amenity of the nearest sensitive receivers.

Due to the early stage of works the exact mechanical plant selections and layout for the project haven't been selected, therefore, it is not possible to undertake a detailed assessment of the noise emissions generated by mechanical plant. Nevertheless, to meet the external noise emissions requirements for noise generated by the mechanical plant and equipment the following are some typical practices to mitigate noise from operation of mechanical plant.

- Where possible, locate plant as far away from possible noise sensitive receivers as practical to minimise the aggregate noise level.
- Select low noise mechanical equipment.
- Acoustic louvres or solid barriers may be required, surrounding plant items on the rooftop. This mitigation will likely be driven by internal noise criteria within the residential spaces of the proposed development.
- Where possible, locate noisy plant within an enclosed plant space.

A detailed acoustic assessment of the mechanical plant noise is recommended prior to Crown Certificate for building works to ensure no adverse noise impacts from external mechanical plant in accordance with the criteria outlined in Section 5.2.

6.2 Community, Café, and Marina Building

A noise assessment for the proposed Community, Café, and Marina Building has been carried out. The proposed location for the Community, Café, and Marina Building is shown in Figure 6 below. The proposed building includes community a flexible community space, marina storage, office spaces, and a café/kiosk.

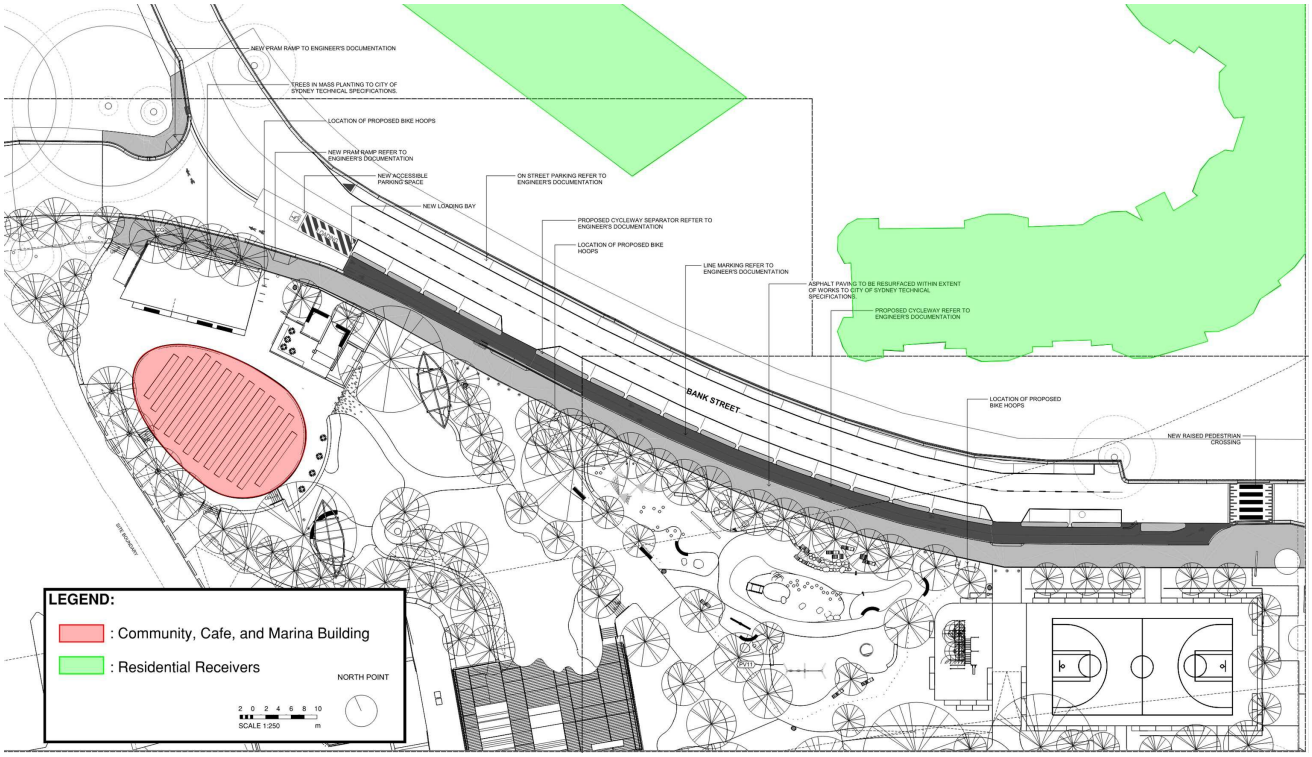


Figure 6: Proposed location for the new Community, Café, and Marina Building

To assess the noise impact from the use/operation of the proposed building, a 3D noise model was developed using noise modelling SoundPlan (Version 8.2). The model implements noise prediction standard ISO9613-2 and considers the heights of the sources and receptors, reflective surfaces, octave band level for each noise source and ground type. This modelling software is recognized by regulatory authorities around Australia and is endorsed by the NSW EPA for the use in projects of this scale. The acoustic modelling was undertaken considering no specific meteorological characteristics such as dominant wind direction and speed or temperature therefore it was considered under neutral conditions. The model setup details are provided in Table 18 below.

The existing background/traffic noise (including the traffic noise from Anzac Bridge) has been considered to do determine the noise criteria at the nearest receivers.

Table 18: Summary of model setup and data inputs

Parameter	Value
Building reflection loss	2.5 dB
Ground elevation contours	City of Sydney 1m contour line
Max. number of patron – Indoor community centre	100
Max. number of patron – Café	Max. 10 people (internal) + max. 30 people (external)

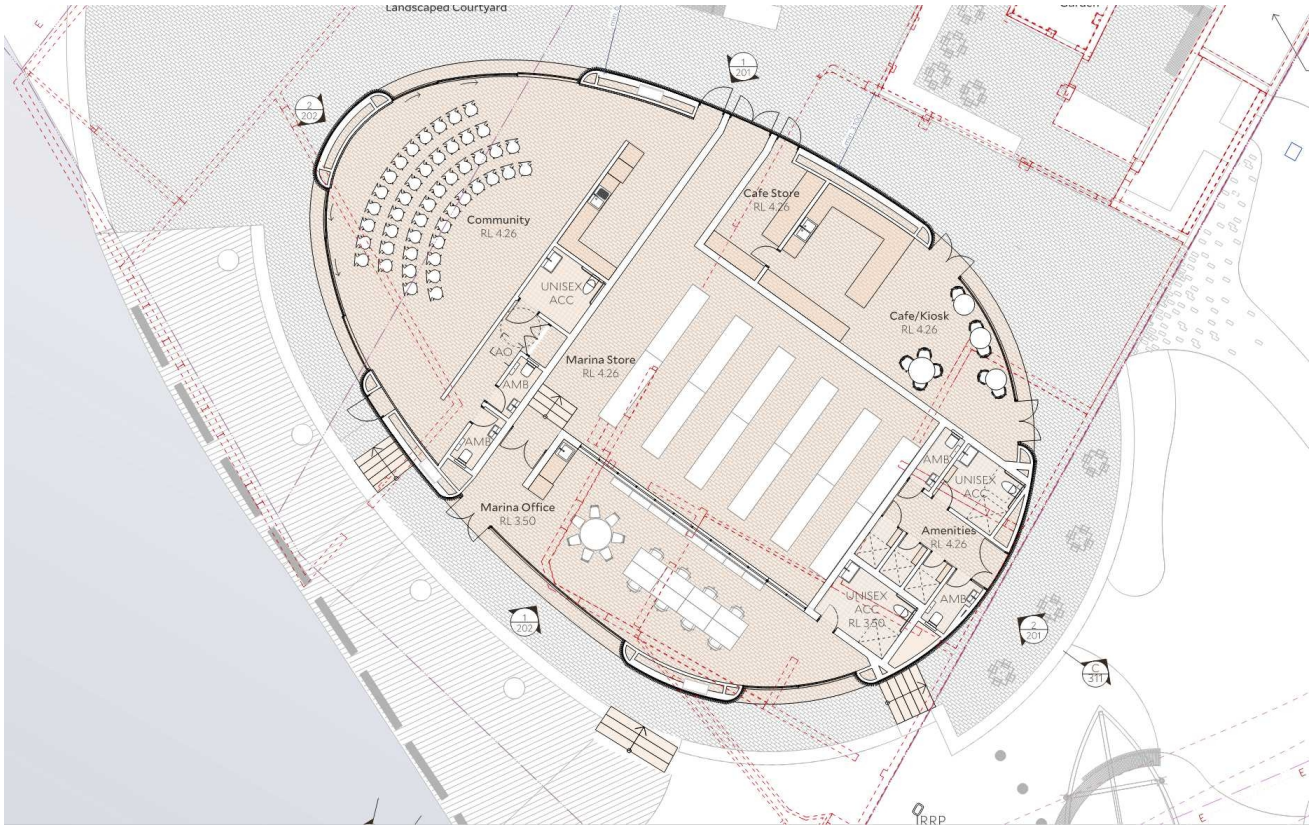


Figure 7: Proposed new Community, Café, and Marina Building layout

For a conservative assessment, the community centre's doors have been assumed to be left open during the anticipated use of the spaces. Table 19 presents the assumed noise level for this assessment.

Table 19: Typical noise spectrum for major function events

Descriptions	SWL across frequency, dB								Overall SWL, dB(A)
	63 Hz	125 Hz	250Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
1 people talking with raised voice (L_{w10})	-	54	54	58	60	62	60	58	67
Function room music noise level (L_{w10})	100	100	95	95	90	90	90	90	98
Average indoor noise level (L_{w10})[1]	90	90	85	85	82	83	81	81	89

Note:

1. Including noise associated with patron and background music based on average noise levels measured at the typical function space.

Table 20 presents the estimated noise level at the nearest residential receiver (1 Distillery Drive and 50 Bank Street, Pyrmont NSW 2009) with all doors to the community space and café area left open.

Table 20: Predicted noise levels at the nearest residential receiver (1 Distillery Dr, Pyrmont NSW 2009)

Receiver location	Predicted noise level at the receiver, dB(A)	Noise criteria (NPI – Daytime Criteria)	Comply with noise criteria? (✓/✗)
1 Distillery Dr, Pyrmont NSW 2009	47	58	✓
2 Bowman Street, Pyrmont NSW 2009	49	58	✓

Discussions

Based on the predicted noise levels at the receivers, the noise emission from the use of community space and the operational noise of the café/kiosk is expected to comply with the noise emission criteria outlines by Noise Policy for Industry (NPI) during the standard operational hours (7am – 6pm everyday) without requiring any specific acoustic mitigation measures.

6.3 Multi-Purpose Court

A noise impact assessment has been carried out for the proposed multi-purpose court. The proposed location for the basketball court is shown in Figure 8 below. The assessment has considered typical use of the courts, which includes the use of referee's and whistles.

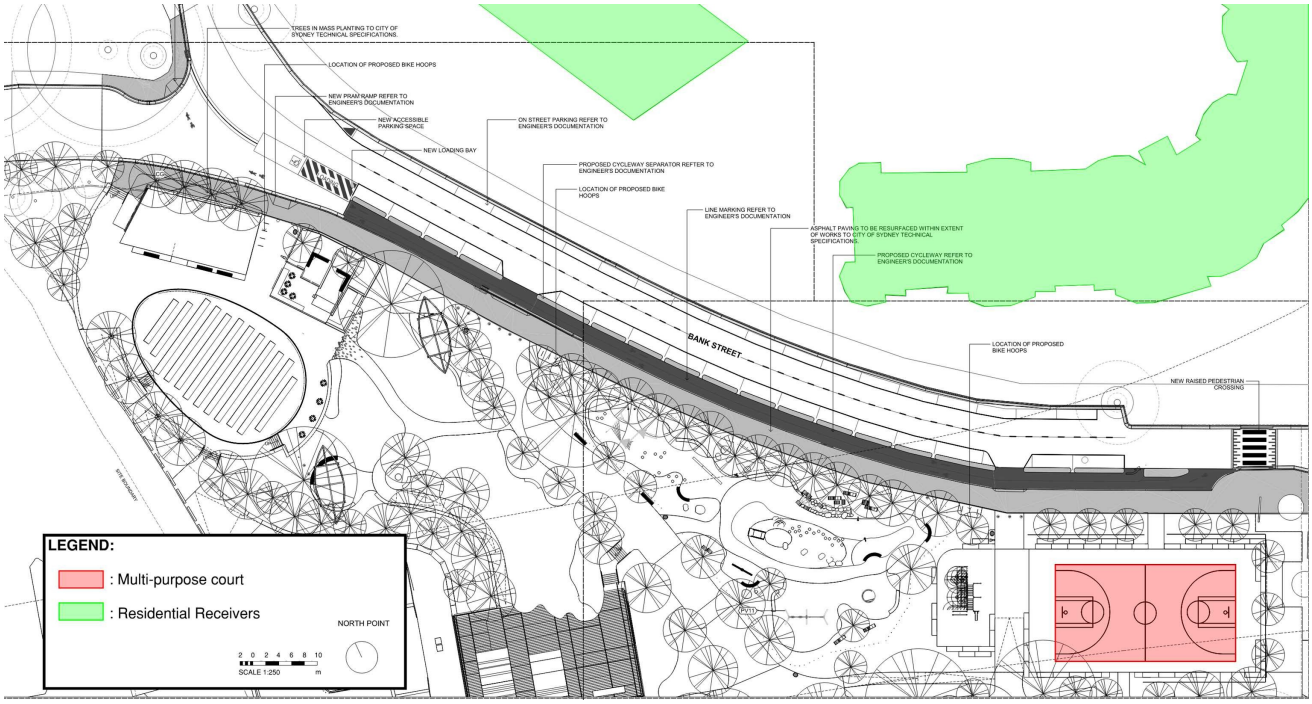


Figure 8: Proposed location for the basketball court

To assess the noise impact from the use/operation of the proposed basketball court, a 3-D noise model was developed using noise modelling SoundPlan (Version 8.2). The model implements noise prediction standard ISO9613-2 and considers the heights of the sources and receptors, reflective surfaces, octave band level for each noise source and ground type. This modelling software is recognized by regulatory authorities around Australia and is endorsed by the NSW EPA for the use in projects of this scale. The acoustic modelling was undertaken considering no specific meteorological characteristics such as dominant wind direction and speed or temperature therefore it was considered under neutral conditions. The model setup details are provided in Table 18 below.

The existing background/traffic noise (including the traffic noise from Anzac Bridge) has been considered to do determine the noise criteria at the nearest receivers.

Table 21: Summary of model setup and data inputs

Parameter	Value
Building reflection loss	2.5 dB
Ground elevation contours	City of Sydney 1m contour line
Ground Absorption	0.5

For the model, we included the three most typical noise sources:

- Bouncing of balls;
- Sound of hoop when ball impacts (measurement included backboard and hoop impacts); and
- Player communication and general sounds.

Table 22 presents the typical Sound Power Level (SWL) of noise source used for this assessment.

Table 22: Typical noise sources

Source	Type	Height	Measurement Distance	Measured SPL, L_{Aeq}(dBA)	Descriptions
Basketball games	Area sources	1.5m	10m	70	Measured noise from basketball games approximately 10m from the edge of the court
Shooting of ball	Point source	3m	10m	50	Noise from impact of ball against the backboard and the hoop.
Basketball games	Area sources	1.5m	10m	72	Typical noise from basketball games with frequent whistle blowing

Table 23 presents the estimated noise level at the nearest residential receivers (50 Bank Street, Pyrmont NSW 2009) with the use of referee and whistles.

Table 23: Predicted noise levels at the nearest residential receiver (50 Bank Street, Pyrmont NSW 2009)

Time	Intrusive Noise Criteria	Predicted Cumulative Sound Pressure Level (SPL) at the receiver's façade, $L_{Aeq,15mins}$	Complies? (✓/✗)
Day (7:00am to 6:00pm)	L_{Aeq} ≤ 66 dB(A)	62 - 66	✓
Evening (6:00pm to 10:00pm)	L_{Aeq} ≤ 64 dB(A)		✗
Night (10:00pm to 7:00am)	L_{Aeq} ≤ 59 dB(A)		✗

Table 24 presents the estimated noise level at the nearest residential receivers (50 Bank Street, Pyrmont NSW 2009) without the use of referee and whistles.

Table 24: Predicted noise levels at the nearest residential receiver (50 Bank Street, Pyrmont NSW 2009)

Time	Intrusive Noise Criteria	Predicted Cumulative Sound Pressure Level (SPL) at the receiver's façade, $L_{Aeq,15mins}$	Complies? (✓/✗)
Day (7:00am to 6:00pm)	L_{Aeq} ≤ 66 dB(A)	60 - 64	✓
Evening (6:00pm to 10:00pm)	L_{Aeq} ≤ 64 dB(A)		✓
Night (10:00pm to 7:00am)	L_{Aeq} ≤ 59 dB(A)		✗

6.3.1 Discussion

Based on the predicted noise levels at the receivers, the noise emission from the use of basketball court (without the use of whistle) is expected to comply with the intrusive noise criteria set-out by NSW NPI between 7am to 10pm without requiring any specific acoustic mitigation measures.

The use of whistles on the court after 6pm is not expected to meet the noise criteria, therefore the use of refereeing and whistles after this time is not recommended.

Furthermore, the court is not intended to be used during the night-time period (between 10pm to 7am) and. As such, we recommend that the court is not lit after 10pm to discourage its use.

6.4 Traffic Generation Noise

In accordance with traffic impact assessment conducted by JMT Consulting, since the site's location is within the close proximity to existing and future transport services, along with the objective of promoting sustainable forms of transport to and from the site, no dedicated off-street car parking is proposed as part of the project. Existing kerb-side parallel parking is available for those arriving by private vehicles.

Therefore, as the proposed development does not include additional designated car-parking spaces, the traffic noise impacts on the post-development generated traffic will be insignificant. Therefore, the proposed development is expected comply with the requirements of the NSW Road Noise Policy.

6.5 Dragon Boats Noise

Dragon boating currently operates on the site. The dragon boating operations will continue in a similar form, with no on-site parking and storage indoors. Therefore, the noise impacts from the dragon boat activities is not expected to create any additional adverse noise impact to the nearest receivers.

6.6 Loading/Deliveries Noise

6.6.1 Marina Activities

As per current approval (MP11_0001 MOD3) for the maritime (marina) facility, including the land and water-based components at 5-11 Bank Street, Pyrmont, the marina loading/delivery activities are to be undertaken during the proposed hours of deliveries:

- Monday to Friday: 7am to 6pm
- Saturday and Sunday: 8am to 1pm

The loading/delivery activities will be conducted from within the car parking area within the site. It is expected that there would be approximately six (6) food and drinks deliveries with additional 1-2 other loading/deliveries activities per week.

It is also noted that the waste collection would also be conducted by a private contractor from within the site, rather than from Bank Street to address concerns raised in public submission regarding the potential impacts on the road network. It is expected that there will be up to two waste collection vehicles per week waste collection. Any changes to the existing loading/deliveries noise associated with the use of the marina will be subject to a future DA.

6.6.2 New Park and Facilities

In addition to the previously approved loading/deliveries activities for the Marina, the traffic engineer (JMT Consulting) has estimated additional 3 to 5 deliveries per day servicing the community facilities and other park features. The loading/deliveries would typically be carried out in the form of Small Rigid Vehicles (SRV). Deliveries would typically occur between the following hours:

- Monday to Friday: 7am to 6pm
- Saturday and Sunday: 8am to 1pm

It is noted that the project makes provision for a loading zone at the northern end of Bank Street adjacent to the site of approximately 8m length (which can accommodate a SRV with a kerb ramp near the loading zone to allow goods to be

efficiently transport by trolley from the street into the site. The proposed loading zone will be located adjacent to 1-3 Bank Street, Pyrmont approximately 50m away from the nearest receiver (2 Bowman Street).

An assessment of the noise generated by activities within the loading zone has been conducted to determine the impacts on the surrounding noise-sensitive receivers. Table 25 and Table 26 outlines the sound power level (SWL) and typical duration (minutes) associated with each of the standard loading activities.

Table 25: Typical sound power levels (SWL) and duration of loading/unloading activities

Descriptions	SWL (dB_{lin}) across octave band centre frequency (Hz)								Overall dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Loading Bay Activities, L_{10}	92	91	85	79	78	74	70	64	84
Small Delivery Truck Idling, L_{10}	97	88	84	85	80	78	76	72	87
Car/Truck Doors Closing, L_{max}	71	74	77	81	80	78	72	61	84

Table 26: Typical sound power levels (SWL) and duration of loading/unloading activities

Loading Dock Activity	Typical Duration of Activity	Sound Power Level ($L_{Aeq,\ 15min}$)
Loading and unloading activities	10 minutes	88
Small rigid vehicle idling	15 minutes	84[1]
Car door slam	1second	64 (10 car door slams)

The noise generated by the activities during a 15-minute period have been predicted to the facades of the nearest surrounding noise-sensitive receivers. Using the assessment methods outlined above, the predicted noise levels at the nearest noise-affected premises are summarised below in Table 27. The following assumptions have been made for the assessment:

- 2 Small Rigid Vehicles (SRV) idling at the same time.
- Loading and unloading activities from the 2 SRVs happen at the same time.
- All loading and unloading activities happen during the daytime period (between 7am and 6pm)

Table 27: Predicted noise levels from loading/unloading activities

Most Affected Receiver	Predicted Noise Level $L_{Aeq,15min}$ - dB(A)	Project Noise Trigger Level $L_{Aeq,15min}$ - dB(A)	Compliance (✓/✱)
Residential receiver (2 Bowman Street)	44	66	✓

Table 27 shows that the predicted noise levels of the loading dock activities at the surrounding noise-sensitive receivers are expected to comply with the project noise trigger levels established in Section 5.3.1.

6.7 Operational Vibration Assessment

The proposed development is not expected to give rise to any vibration intensive activities during the operation that produce adverse vibration impacts to the nearest sensitive receivers. .

7. Construction Noise & Vibration Assessment

7.1 Overview

Currently a detailed construction program is not yet full defined. This section provides general recommendations only and provides applicable criteria together with feasible and reasonable noise and vibration control practices to be observed during the construction of the proposed development.

This preliminary advice provided within this assessment shall form the basis for the Contractor's detailed Construction Noise and Vibration Management Plan (CNVMP) which shall identify any noise criteria exceedances and relevant mitigation measures once construction methods and stages are known.

7.2 Proposed Construction Hours

It is expected work associated with the proposal will be carried out during the City of Sydney Standard Construction Hours outlined in *City of Sydney Code of Practice 1992 - Construction Hours/Noise within the Central Business District*. The proposed construction hours are:

- Weekdays: 7.00am – 5.30pm
- Saturdays: 7.30am – 3.30pm
- Sundays and public holidays: No work

These hours of construction are consistent with those in place for the new Sydney Fish Market project, also located within the Blackwattle Bay precinct. The appointed contractor will be responsible for instructing and controlling all subcontractors regarding the hours of work. Any work outside the approved construction hours would be subject to specific prior approval.

7.3 Construction Noise Assessment

A preliminary construction noise assessment has been carried out based on typical plant and machinery expected throughout the construction stages. The preliminary noise assessment has been considered at the nearest existing residential receivers.

7.3.1 Expected Construction Equipment

The noise sources likely to be associated with the works listed in the previous section of this report are presented in Table 28. The equipment noise levels have been extracted from *AS 2436:2010* Guide to *Noise and Vibration Control on Construction, Demolition and Maintenance Sites.*

Table 28: Cumulative impact - Construction equipment noise levels

Stages	Equipment	Quantity	Sound Power Level – dB(A)	Usage in 15-minute period (minutes)	Time Corrected Sound Power Level ($L_{Aeq,15min}$)
Early Works & Demolition	Excavator with breaker attachment	1	116	5	111
	Electric hand tools	5	99	10	97
	Bobcat	1	110	7.5	107
	Mobile Crane	1	108	3	101
	Truck	2	108	5	103
Structural Works	Powered hand tool	5	99	10	97
	Concrete pump	1	110	10	108
	Mobile crane	1	108	3	101

Stages	Equipment	Quantity	Sound Power Level – dB(A)	Usage in 15-minute period (minutes)	Time Corrected Sound Power Level ($L_{Aeq,15min}$)
	Bored Piling	1	113	5	108
	Generator	1	110	15	110
	Drum roller	1	109	10	107
	Truck	2	104	5	103

7.3.2 Predicted Noise Levels

The predicted noise levels have been presented in Table 29 and Table 30, and have been assessed against the construction noise criteria established in Section 5.5.

Table 29: Predicted noise levels – Scenario 1: Early Works & Demolition

Receiver	Predicted Noise Level Range $L_{Aeq,15min}$	Noise Management Level $L_{Aeq,15min\ dB}$[3]	Noise Management Level Exceedance (dB)	Exceeds Highly Noise Affected Level? (> 75dBA)
2 Bowman Street (R1)[1]	45 – 67	71	0	No
1 Distillery Drive (R2)[2]	50 – 70	67	+3	No
50 Bank Street (R3)[1]	61 – 71	71	0	No
120 Bank Street (C1)[1]	46 – 66	71	0	No
21-35 Bank Street (C2)[1]	55 – 69	71	0	No

Note:

1. Based on unattended noise measurement at L1.
2. Based on unattended noise measurement at L2.
3. Noise Management Level = RBL(day) + 10dB

Table 30: Predicted noise levels – Scenario 2: Structural Works

Receiver	Predicted Noise Level Range $L_{Aeq,15min}$	Noise Management Level $L_{Aeq,15min}$[3]	Noise Management Level Exceedance (dB)	Exceeds Highly Noise Affected Level? (> 75dBA)
2 Bowman Street (R1)[1]	45 – 69	71	0	No
1 Distillery Drive (R2)[2]	50 – 71	67	+4	No
50 Bank Street (R3)[1]	58 – 74	71	+3	No
120 Bank Street (C1)[1]	46 – 68	71	0	No
21-35 Bank Street (C2)[1]	55 – 70	71	0	No

Note:

1. Based on unattended noise measurement at L1.
2. Based on unattended noise measurement at L2.
3. Noise Management Level = RBL(day) + 10dB

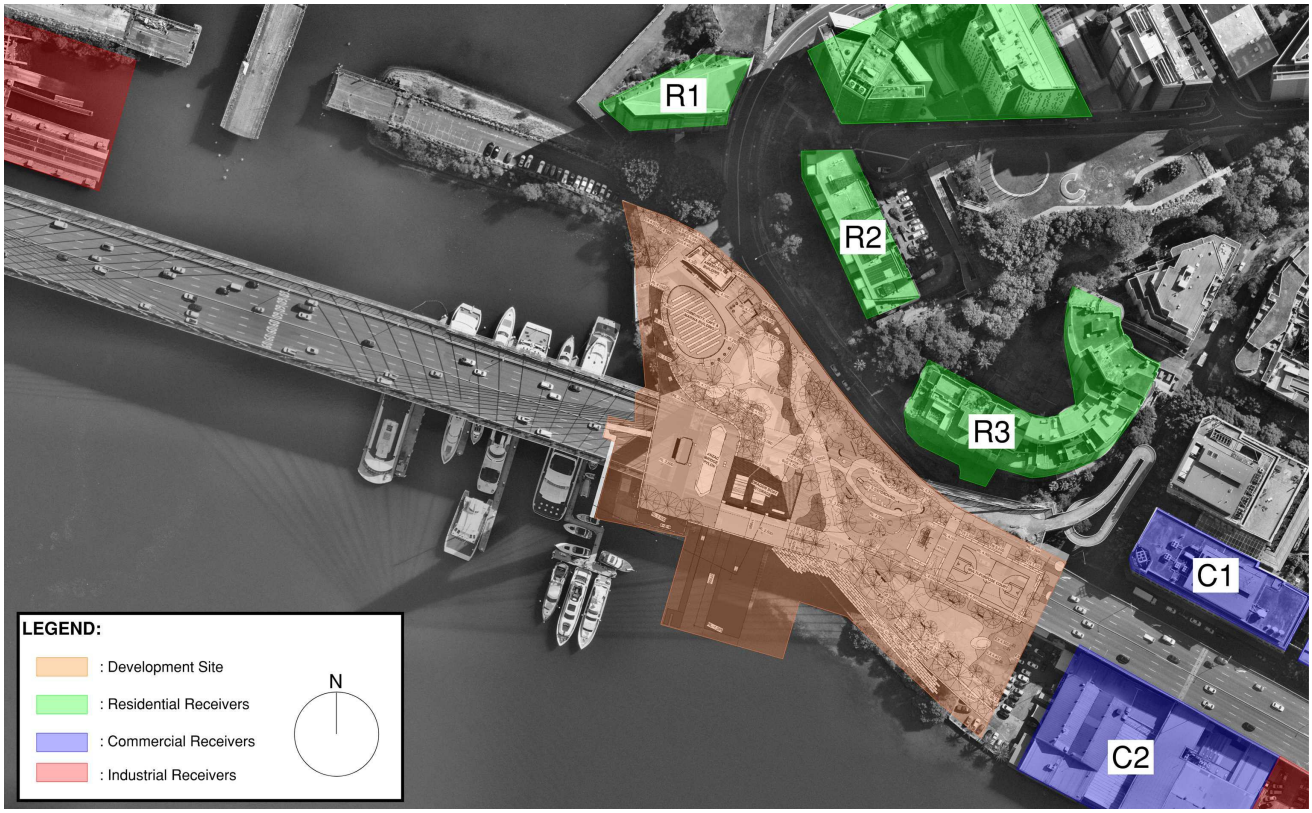


Figure 9: Location of the nearest/most affected receivers

7.4 General Acoustic Recommendations for Construction

According to AS 2436 – 2010 *"Guide to noise and vibration control on construction, demolition and maintenance sites"* the following techniques could be applied to minimize the spread of noise and vibrations to the potential receivers.

7.4.1 Noise

If a process that generates significant noise levels cannot be avoided, the amount of noise reaching the receiver should be minimized. Two ways of achieving this are to either increase the distance between the noise source and the receiver or to introduce noise reduction measures such as screens.

Physical methods to reduce the transmission of noise between the site works and residences, or other sensitive land uses, are generally suited to works where there is longer-term exposure to the noise. Practices that will reduce noise from the site include:

- Increasing the distance between noise sources and sensitive receivers.
- Reducing the line-of-sight noise transmission to residences or other sensitive land uses using temporary barriers (stockpiles, shipping containers and site office transportable can be effective barriers).
- Constructing barriers that are part of the project design early in the project to introduce the mitigation of site noise.
- Installing purpose-built noise barriers, acoustic sheds and enclosures.

7.4.2 Underwater Noise and Piling

In line with the Bank Street Park – Marine Ecology Assessment prepared by Ecological Australia for Infrastructure NSW dated November 2023, to mitigate the potential the underwater noise impacts to the environment, the following measures have been recommended for construction activities including cutting or pulling old piles, and drilling and hammering new piles:

- Gentle start up when hammering the seabed.
- Introduction of staged breaks, such as 10 mins loud, 30 min quiet.

7.4.3 Screening

On sites where distance is limited, the screening of noise may be beneficial, and this should be taken into account during the planning stages.

If structures such as stores, site offices and other temporary buildings are situated between the noisiest part of the site and the nearest dwellings, some of the noise emission from the site can be reduced. If these buildings are occupied, sound insulation measures may be necessary to protect workers inside the buildings.

A hoarding that includes a site office on an elevated structure offers superior noise reduction when compared with a standard (simple) hoarding. The acoustic performance is further enhanced when the hoarding is a continuous barrier.

Storage of building materials or the placement of shipping containers between the noise source and any noise-sensitive area may also provide useful screening and the same is true of partially completed or demolished buildings. A noisy, stationary plant can be placed in a basement, the shell of which has been completed, provided reverberant noise can be controlled. Where compressors or generators are used in closed areas, it is necessary to ensure that the exhaust gases are discharged directly to the outside air and that there is good cross-ventilation to prevent the build-up of poisonous carbon monoxide fumes and to allow an adequate air supply to maintain efficiency when operating the equipment.

Where such noise barriers are not practical, a worthwhile reduction in noise can be obtained by siting the plant behind and as close as possible to mounds of earth, which may effectively screen any noise-sensitive areas from the plant. These can often be designed into the construction schedule or site arrangement for future landscaping.

Water pumps, fans and other plant equipment that operate on a 24-hour basis may not be an irritating source of noise during the day but may be problematic at night. They should therefore be effectively screened by either situating them behind a noise barrier or by being positioned in a trench or a hollow in the ground provided this does not generate reverberant noise. In such cases, however, adequate ventilation should also be ensured. Long, temporary earth embankments can provide quite an effective noise screen for mobile equipment moving, for example, on a haulage road. When the earthworks are complete, the earth mounds should be removed if possible, with smaller, quieter excavators. A noise barrier may be a more reliable method of noise control than the imposition of restrictions on throttle settings.

In many cases it may not be practical to screen earthmoving operations effectively, but it may be possible to partially shield a construction plant or to build-in at the early stages protective features required to screen traffic noise. Where earth noise barriers are not practical due to lack of space, consideration should be given to the possibility of constructing temporary screens from wood or any equivalent material in surface density.

The usefulness of a noise barrier will depend upon its length, its height, its position relative to the source and to the receiver, and the material from which it is made. A barrier designed to reduce noise from a moving source should extend beyond the last property to be protected to a distance of not less than ten times the shortest measurement from the property to the barrier. A barrier designed to reduce noise from a stationary source should, where possible, extend to a distance beyond the direct line between the noise source and the receiver to a distance equal to ten times the effective barrier height, which is the height above the direct line between source and receiver.

If the works are predominately within nominally closed structures, careful consideration should be given to reducing noise breakout at any openings.

7.4.4 Crane (diesel operated)

An appropriate silencer on the muffler and acoustic screen around the engine bay are recommended to attenuate the noise emission.

7.4.5 Reversing and warning alarms

Community complaints often involve the intrusive noise of alarms commonly used to provide a safe system of work for vehicles operating on a site. Beeper reversing alarm noise is generally tonal and may cause annoyance at significant distances from the work site.

There are alternative warning alarms capable of providing a safe system of work that are equal to or better than the traditional 'beeper', while also reducing environmental noise impacts. The following alternatives should be considered for use on construction sites as appropriate:

(a) Broadband audible alarms incorporating a wide range of sound frequencies (as opposed to the tonal frequency 'beep') are less intrusive when heard in the neighbourhood.

(b) Variable-level alarms reduce the emitted noise levels by detecting the background noise level and adjusting the alarm level accordingly.

(c) Non-audible warning systems (e.g. flashing lights, reversing cameras) may also be employed, providing safety considerations, are not compromised.

(d) Proximity alarms that use sensors to determine the distance from objects, such as people or structures, and generate an audible alarm in cabin for the driver.

(e) Spotters or observers.

The above methods should be combined, where appropriate.

Figure 10: Noise mitigation management flow chart

7.5 Noise & Vibration Monitoring Strategy

7.5.1 General Methodology

Noise and vibration levels should be monitored from time to time to ensure that noise generated as a result of remediation and construction activities does not disturb local businesses.

Monitoring may be in the form of regular checks by the builder or indirectly by an acoustic consultant engaged by the builder and in response to any noise or vibration complaints. Where noise and vibration criteria are being exceeded or in response to valid complaints, noise and / or vibration monitoring should be undertaken. This would be performed inside the premises of the affected property and on site adjacent to the affected receivers.

Monitoring is to be undertaken by an experienced noise and vibration monitoring professional or an acoustic consultant. The results of any noise or vibration monitoring are to be provided to the relevant party or person in a timely manner allowing the builder to address the issue and respond to the complaints.

Noise and vibration monitoring can take two forms:

- Short term monitoring
- Long-term monitoring

Short-term monitoring

Short-term monitoring consists of attended monitoring when critical stages of the construction are occurring. This normally provides real-time assistance and guidance to the subcontractor on site letting them know when the noise and vibration criteria are exceeded allowing the selection of alternative method on construction or equipment selection to minimise noise and vibration impacts.

Long-term monitoring

Similarly, long-term monitoring uses noise and vibration loggers providing real-time alerts to the builder / site manager when the noise and vibration criteria are exceeded.

Typically, the noise and vibration loggers stay on site for a period of several months for the critical construction stages of the project. Sometimes the period of construction noise and vibration monitoring is dictated by the local authorities through the DA conditions.

Both methods are complementary and normally used simultaneously providing a significant of amount of data via the long-term monitoring but also providing information on the sources of noise and vibration generating exceedances via the short-term or attended monitoring.

7.5.2 Noise & Vibration Monitoring Program

The following monitoring program is proposed for this project. Refer to Figure 11 for the approximate monitoring locations:

1. Unattended noise monitor installed at L1 and L2 during the demolition and construction stages, at least for a time period representing the average works. To be determined upon consultation with the appointed contractor.
2. Attended noise and vibration monitoring at the start of new work phases likely to result in an adverse change in the noise emissions, and in the case of complaints.

The monitoring programme as shown above is to be carried out during the likely noisiest stages as agreed with the Acoustic engineer and Contractor. The final monitoring locations are subject to agreement with the relevant stakeholders associated with the surrounding receivers.

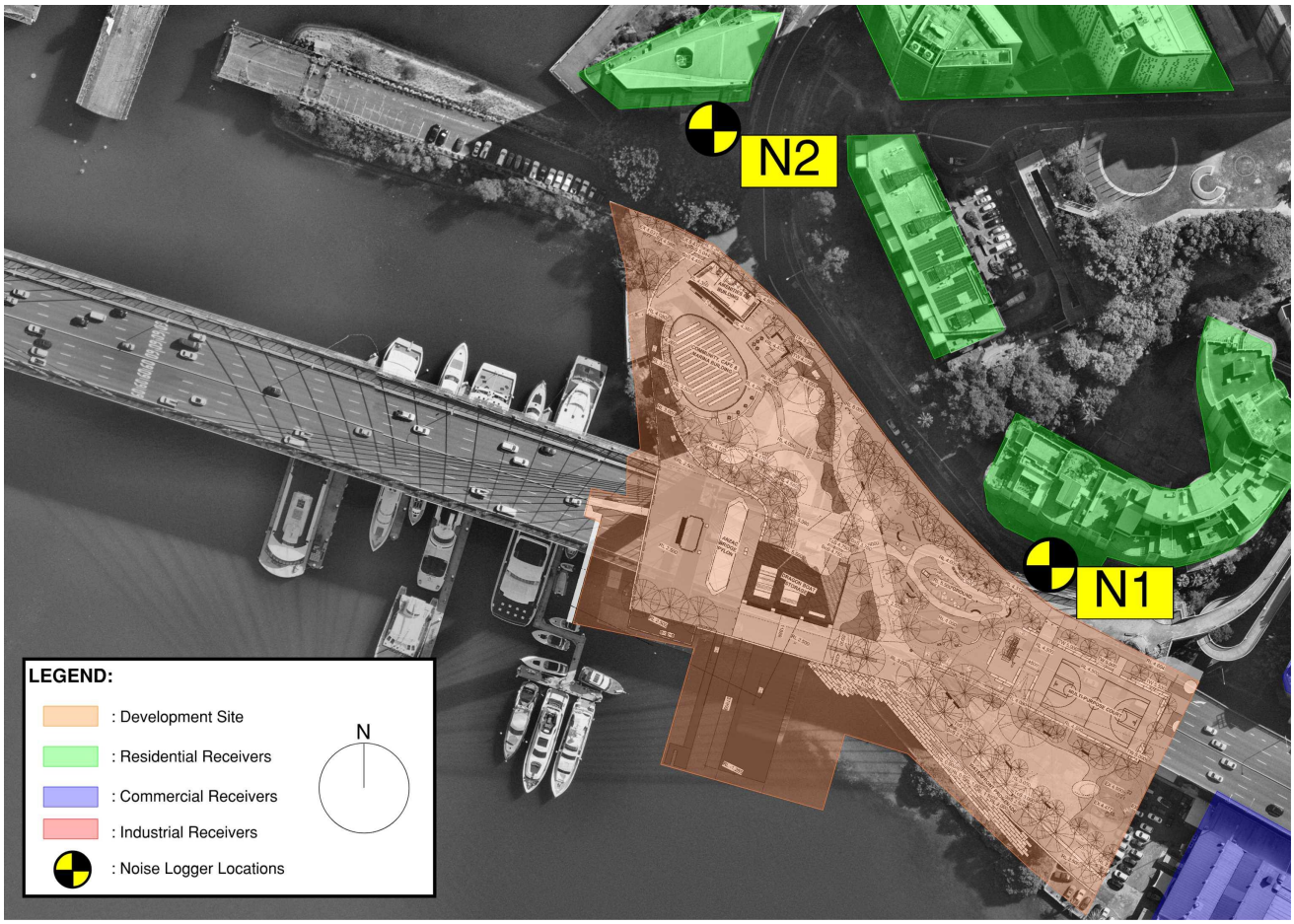


Figure 11: Proposed Noise Monitoring Locations.

7.6 Construction Traffic Noise Generation

In line with construction traffic impact assessment conducted by JMT Consulting, it is expected the construction works may generate the following level of vehicle activity:

- 5 vehicles per hour and 20 vehicles per day on a typical workday
- 10 vehicles per hour and 40 vehicles per day on a busy workday

Therefore, the traffic noise impacts during the construction activities will be insignificant and is expected to comply with the requirements of the NSW Road Noise Policy.

8. Conclusion

This Noise and Vibration Impact Assessment has been prepared by Stantec Australia to accompany the State Significant Development Application (SSDA) for the proposed Bank Street Park development at 1A-19 Bank Street, Pyrmont.

This report has provided in-principle treatment, and design requirements which aim to achieve the statutory criteria outlined in Section 5 as shown below:

- Blackwattle Bay Design Guidelines 2023
- NSW EPA Noise Policy for Industry 2017,
- NSW Road Noise Policy 2011
- Department of Environment and Climate Change NSW Interim Construction Noise Guideline

Based on analyses of the proposed development, all aforementioned criteria relating to the operation of the development is able to be satisfied, including the internal noise levels within each spaces and external noise emissions at the most affected receivers with application of typical mitigation measures. Further assessments will be conducted to provide acoustic mitigation measures such as to comply with the relevant requirements as part of the Detailed Design Phase when all plant selections and locations have been detailed.

The construction noise and vibration assessments undertaken to predict the impacts on sensitive receivers have been presented in Sections 7 of this report. Reasonable and feasible mitigation methods have been provided to limit the noise and vibration impacts on the nearest sensitive receivers during the construction. The predicted construction noise at the nearest receivers can be found on Section 7.3.2 of this report. A Detailed Construction Noise and Vibration Management Plan (CNVMP) is recommended to be carried out once a construction program and methodology are known.

In summary, the noise and vibration impacts attributed to the proposed development were found to be acceptable with the application of recommended mitigation measures.

The information presented in this report shall be reviewed if any modifications to the features of the development specified in this report occur, including and not restricted to selection of air-conditioning units, layout of equipment, modifications to the building and introduction of any additional noise sources.

Appendices

Appendix A Unattended Noise Survey Results

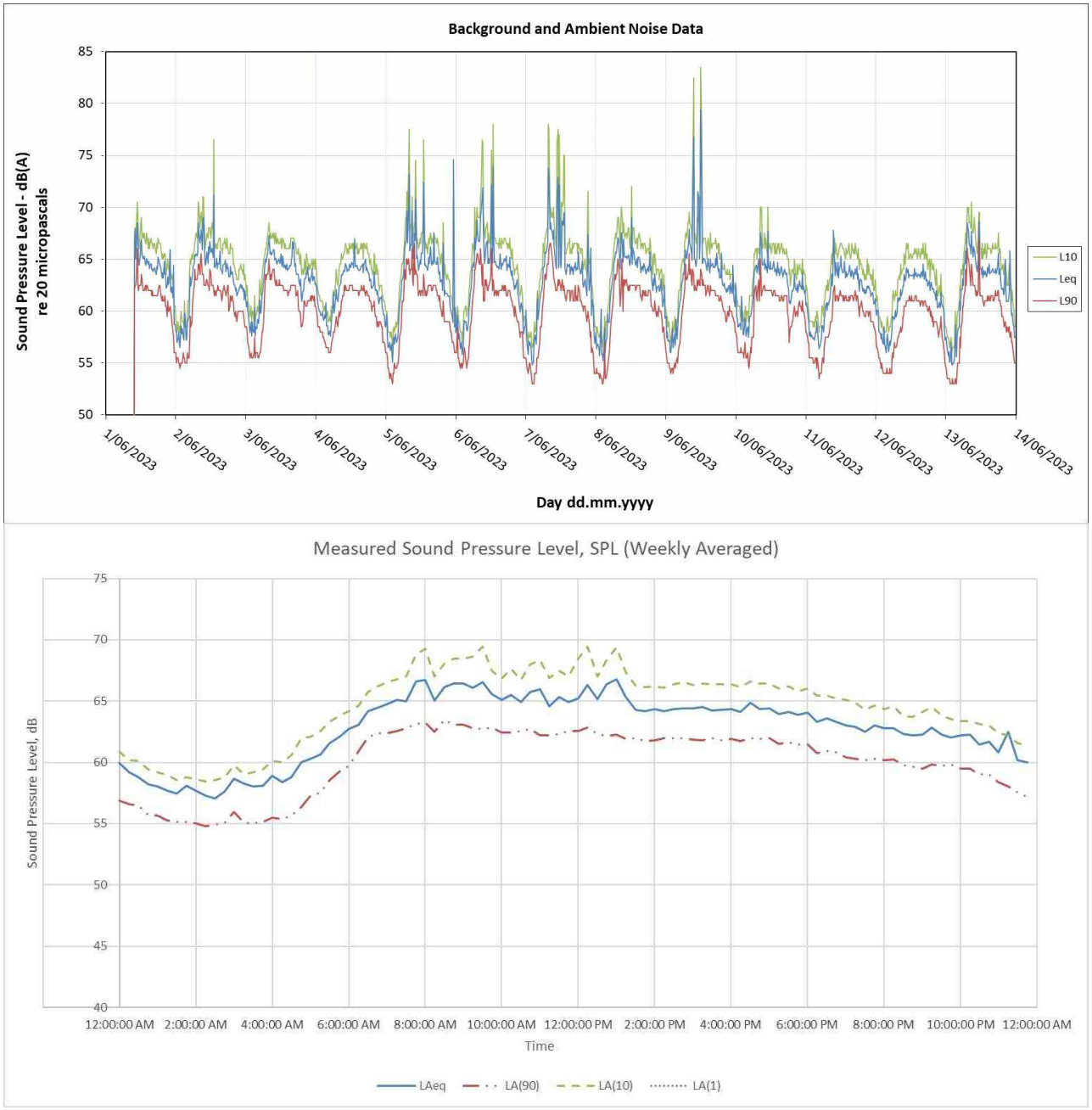
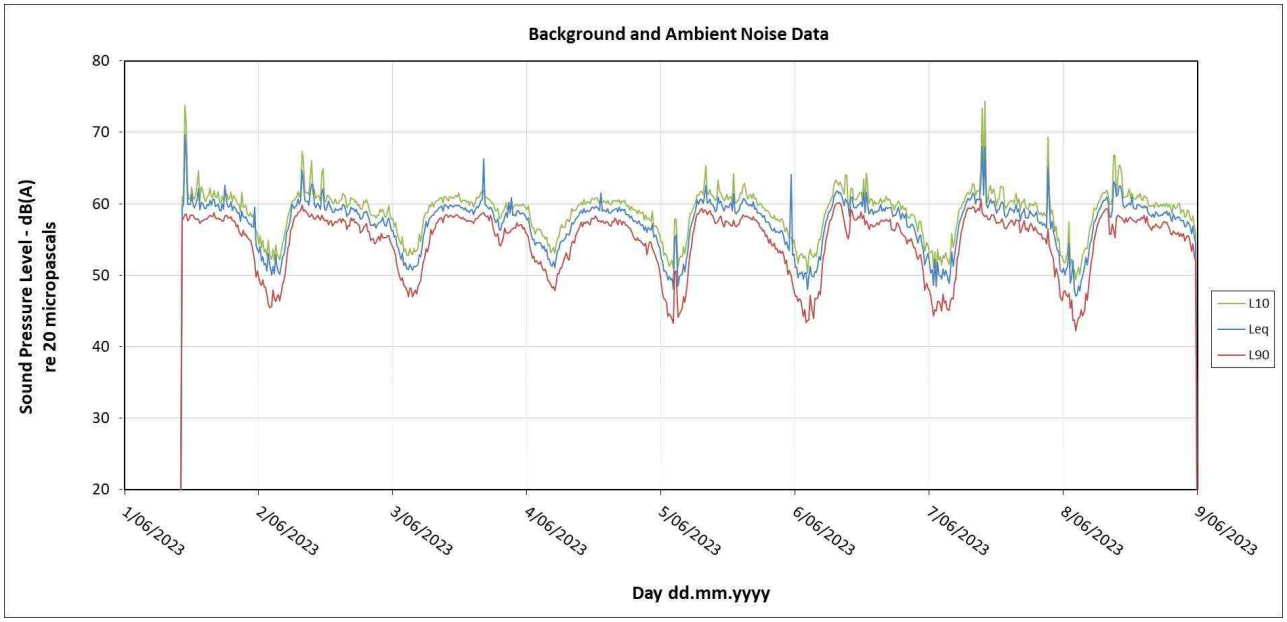


Figure 12: Logger data L1



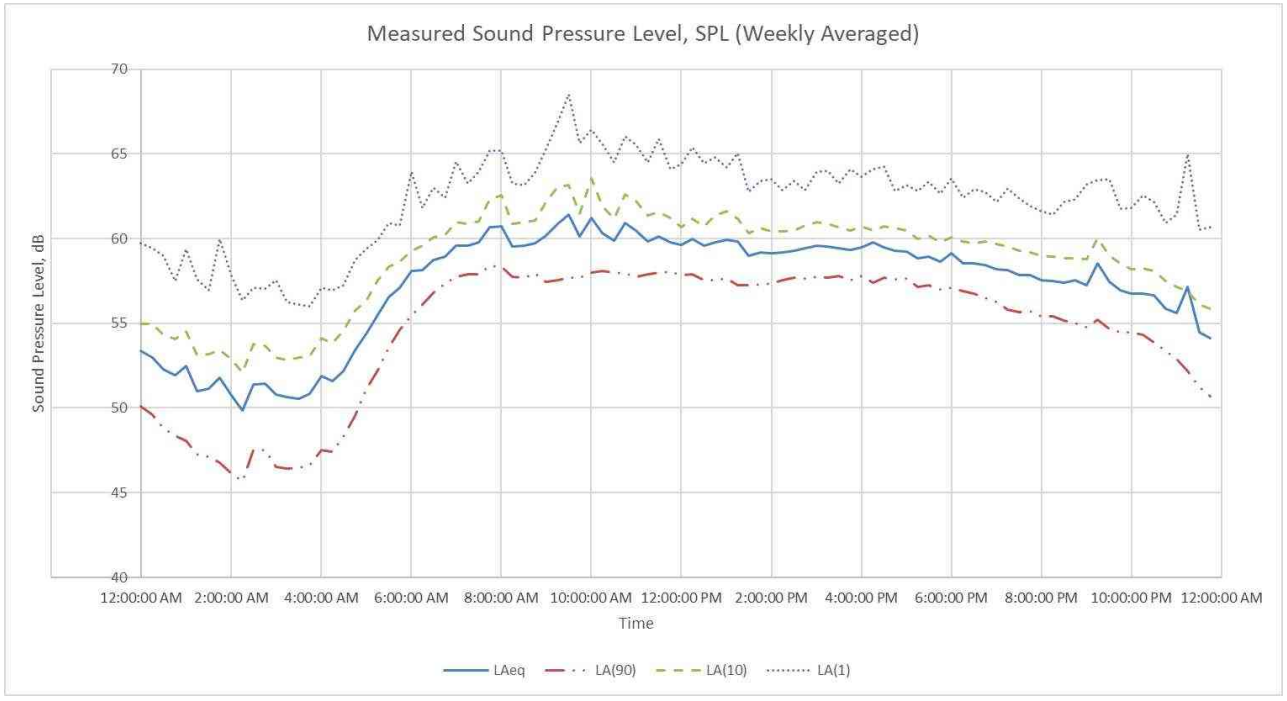


Figure 13: Logger data L2

Appendix B Façade Noise Map (Community, Café, and Marina Building)

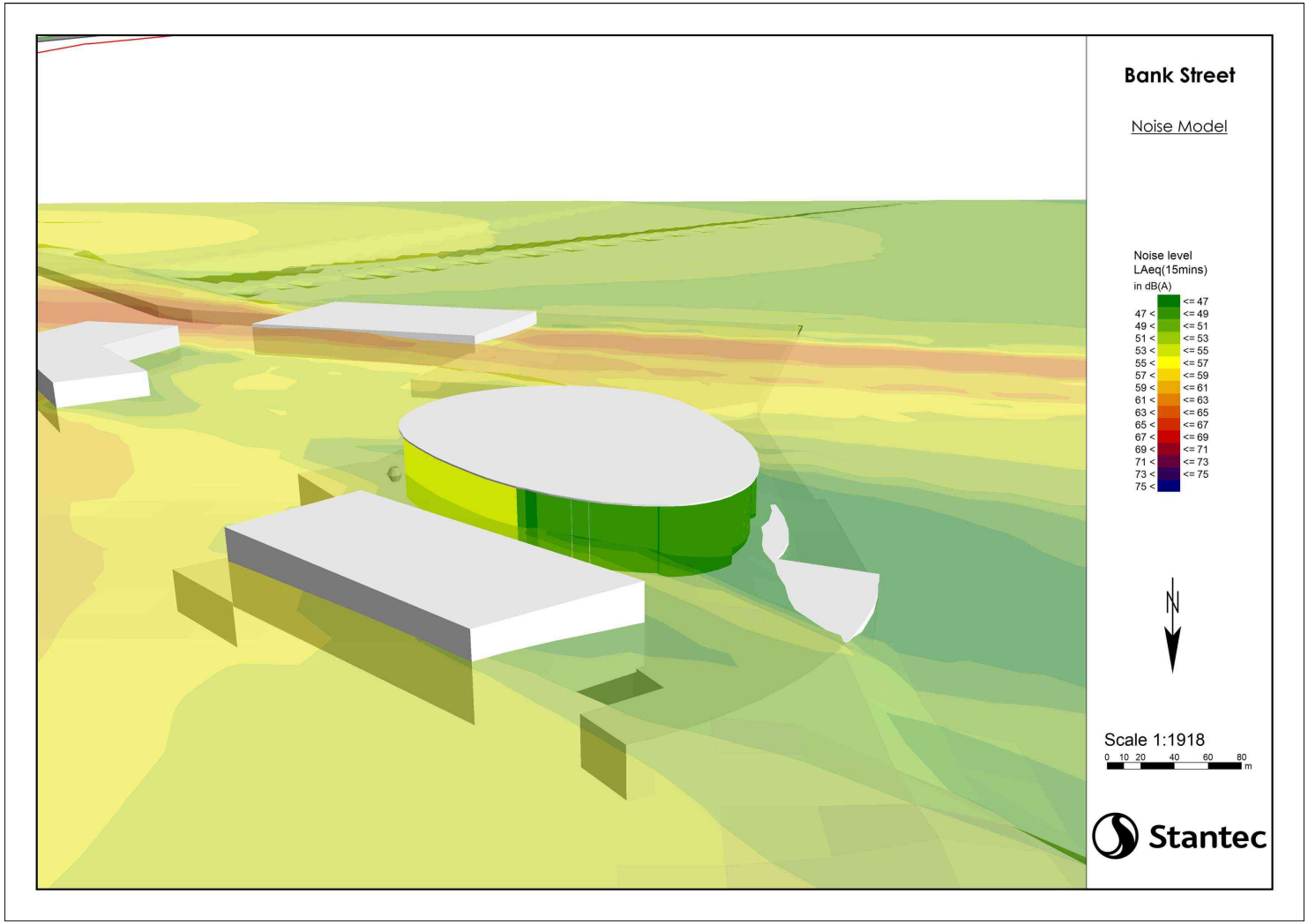


Figure 14: 3D noise model of the proposed Community, Café, and Marina Building

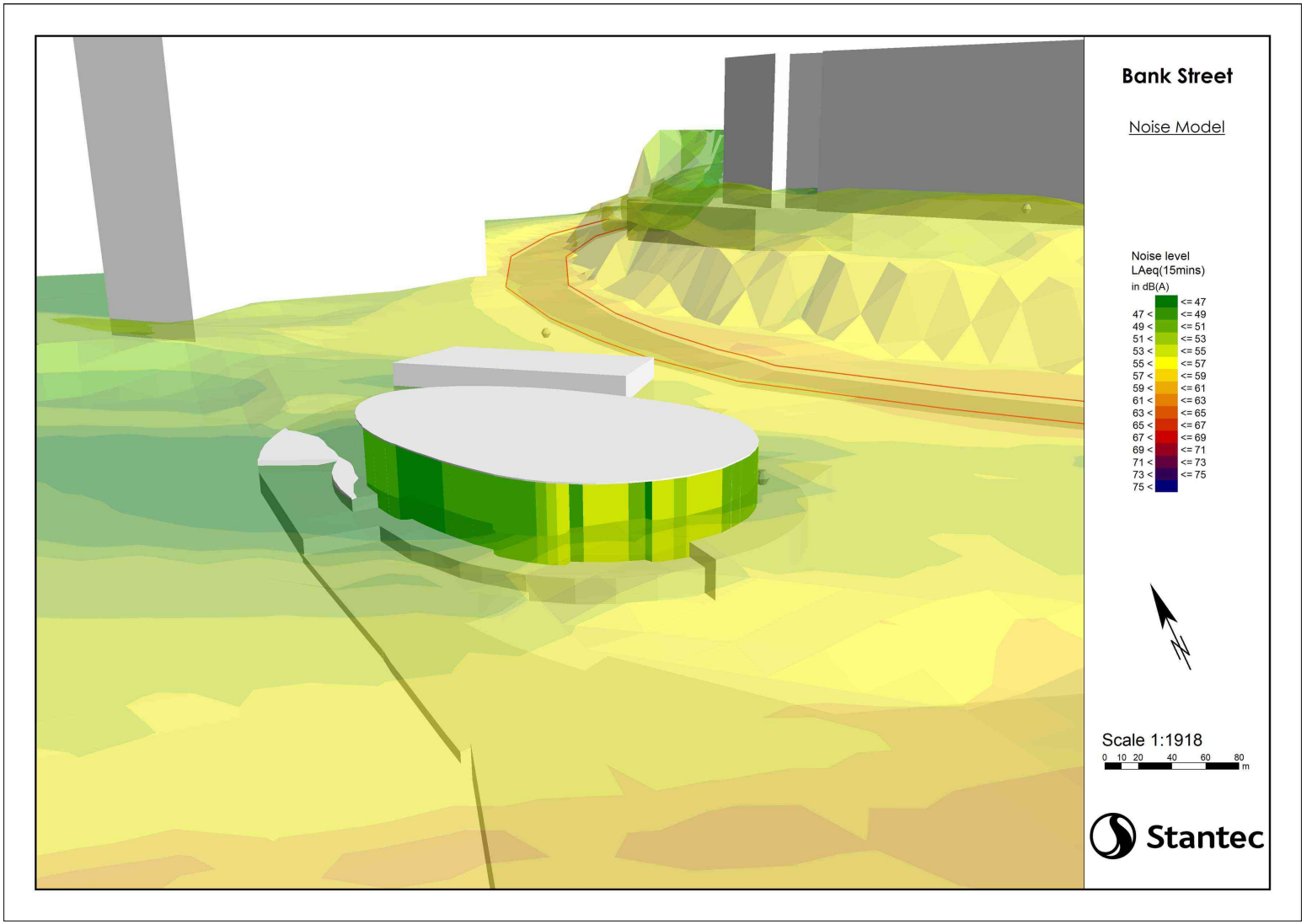


Figure 15: 3D noise model of the proposed Community, Café, and Marina Building

Appendix C Noise Emission Assessment

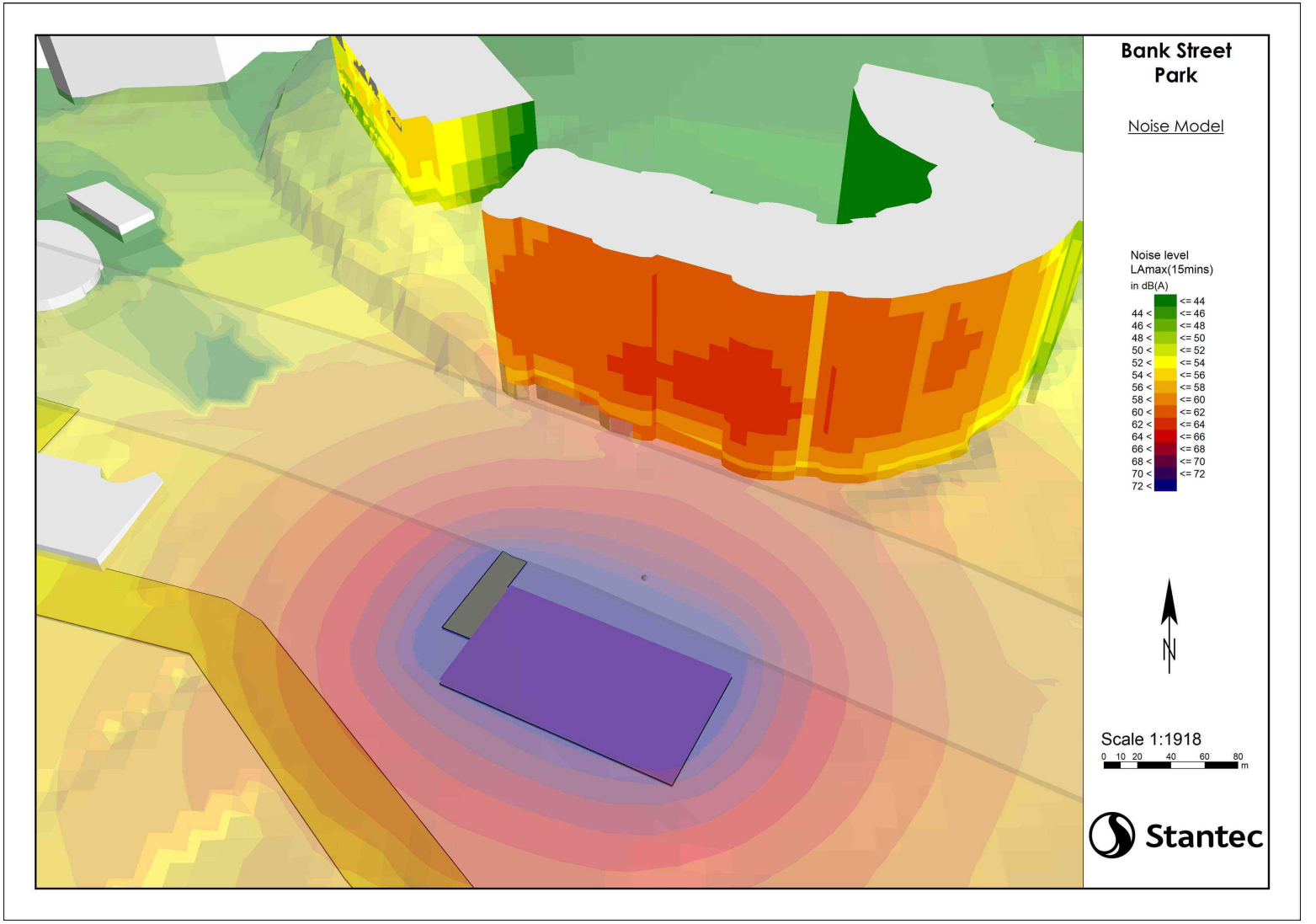


Figure 16: 3D noise model of the basketball court use (without whistle)

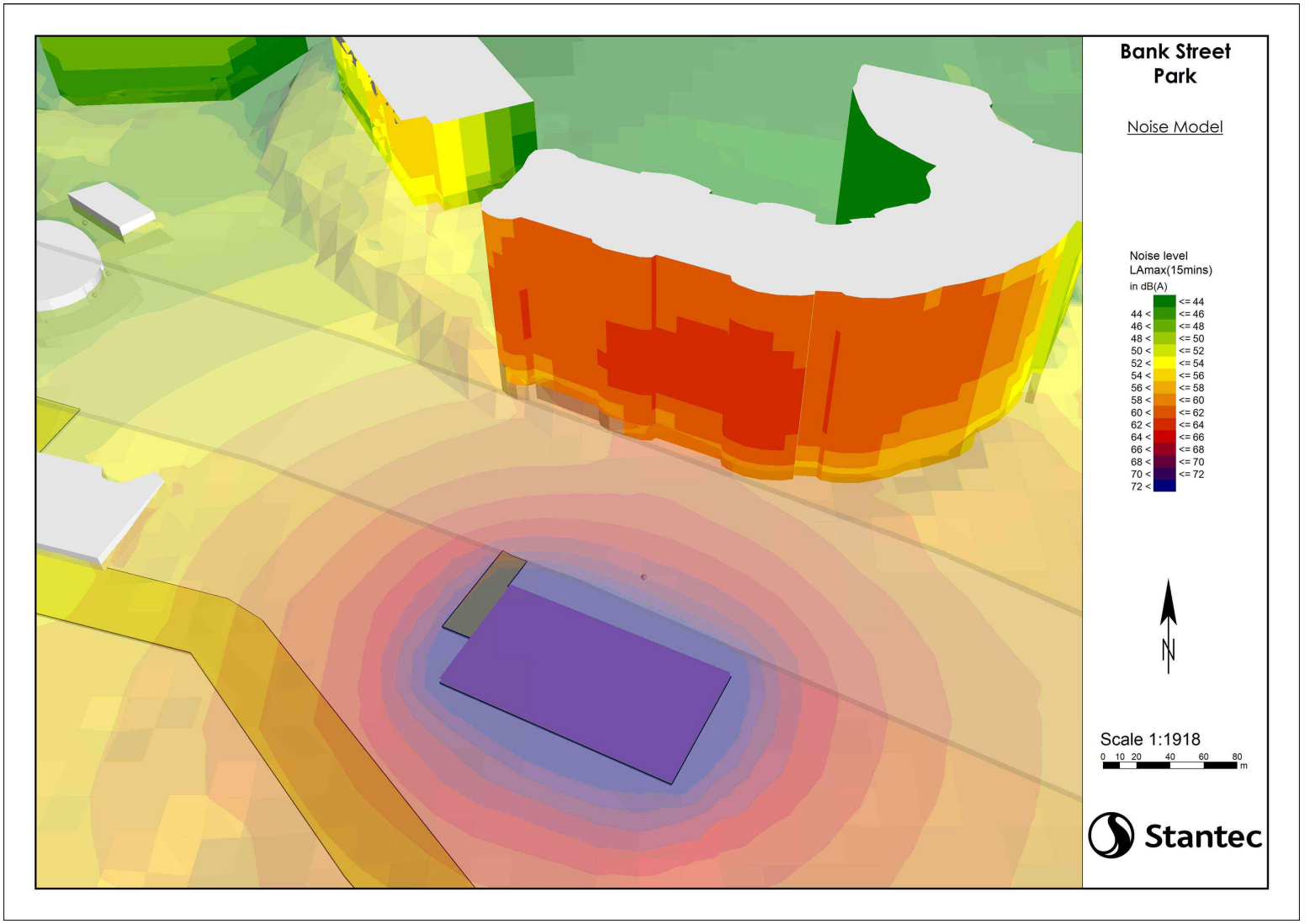


Figure 17: 3D noise model of the basketball court use (with whistle in use)

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