2-4 Hale Street, Botany | Building Waste Transfer Facility

Noise and Vibration Impact Assessment

Project No.	P00945
Revision	007
Issued	11 February 2025
Client	CFT No. 16 Pty Limited ACN 657 318 244 atf Coombes Family Trust No 16

E-LAB Consulting

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Document QA and Revisions

ISSUE	DATE	COMMENTS	ENGINEER	REVIEWER
1	23/02/2024	Draft Issue	Artie Rattananikom	Tom Candalepas
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Authorised by:

Engineering Lab NSW Pty Ltd

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Acoustics & Vibration

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1 EXECUTIVE SUMMARY

This Noise and Vibration Impact Assessment has been prepared by E-LAB Consulting to accompany a State Significant Development Application for the proposal at 2-4 Hale Street, Botany. The proposal will involve construction of a waste transfer station and associated spaces on a lot of approximately 7,439.3m^2 that will comprise of the following:

- Warehouse building which will include:
- Light waste
- Heavy waste
- Metal waste
- Tipping areas
- Sorting area
- Bins
- Amenities
- External car parking
- Office building
- Gate house
- Weigh bridge
- 24/7 operational hours

This report concludes that the proposal is acceptable and supportable subject to the implementation of the mitigation measures outlined below.

- Controls for noise generated by external vehicles movements (trucks, cars and other moving equipment) and warehouse activities from general operation of the site.
- Typical mitigation measures for mechanical plant and equipment are outlined in Section 10.1, to be refined and finalised during the design development stage once equipment selections and detailed designs have progressed further.
- Reasonable and feasible construction noise and vibration mitigation measures in-line with the recommendations of the ICNG and AS2436 are outlined in Section 9.

Following implementation of the above mitigation measures, the proposal is appropriate from a noise and vibration perspective.

1.1 NSW EPA COMMENTS

The Department of Planning, Housing and Infrastructure (DPHI) have provided comments from the NSW Environment Protection Authority (EPA) on the *Noise and Vibraiton Impact Assessment* Revision 004 dated 16th April 2024 by ELAB Consulting. Table 1 provides a summary of these comments, and responses detailing how each item has been addressed in the current revision of the Noise and Vibration Impact Assessment.

Table 1: Response to NSW EPA Comments

NSW EPA COMMENT	ELAB RESPONSE	REPORT REFERENCE
Identification of sensitive receivers		
• The assessment has categorized nearby residential areas into two groups: RC1 and RC2. As shown in Figure 1 and Table 2 of the NVIA, RC1 is a residential area located within the industrial zone, approximately 80 meters from the proposed development. While the specific addresses of the residential dwellings within RC1 have not been provided, ambient noise monitoring has been conducted at a location identified as LT1 - 3 Hale Street Botany, at the corner of Luland Street. Based on the information presented in Figure 1, it appears that LT1 and RC1 are likely located at 3 Luland Street Botany, rather than 3 Hale Street Botany. Further clarification regarding the exact locations of RC1 and LT1 is necessary.	Table 3 and Figure 3 have been updated to clarify the location of residential receivers RC1 (3 Luland Street, Botany). The residences along Bay Street and Erith Street have also been separated into two receiver catchments (RC2 and RC6).	Section 3.1
• The assessment currently does not include or consider the potential noise impacts on residential properties located on Erith Street, approximately 100 meters from the proposed development. It is essential to evaluate the noise exposure of residences on the northern side of Erith Street within the NVIA.	The Erith Street residences approximately 100m from the proposed development were previously assessed as RC2 (specifically 26 Erith Street, the western-most residence closest to the proposed development). An updated site map and receiver catchment description is provided in Table 3 and Figure 3 to reflect this.	Section 3.1
• A comprehensive land use survey should be conducted to accurately determine the location of sensitive receptors, such as residential properties, schools, and hospitals, in relation to the proposed development. This information will be crucial for assessing potential noise impacts and implementing appropriate mitigation measures.	The NSW Government Sharing and Enabling Environmental Data (SEED) land zoning maps are referenced in Figure 2 to determine the land zoning of nearby development, and to determine the most affected receivers surrounding the proposed development. The corresponding assessments in Section 7 and 8 have been updated to incorporate specific land zoning where applicable.	Section 3.1

NSW EPA COMMENT	ELAB RESPONSE	REPORT REFERENCE
Ambient background noise monitoring		
• Noise Monitoring Equipment: The NVIA indicates that long-term ambient background noise monitoring was conducted at three locations: LT1, LT2, and LT3. The monitoring equipment used was a Convergence Instruments Sound Level Meter Data Logger (NSRT_mk3 Type 1). However, the Noise Policy for Industry (NPfI) stipulates that background noise levels should be measured using a noise data logger that meets the accuracy specifications of a Class 2 meter, as defined in AS IEC 61672.1. The Convergence instrument, equipped with a MEMS microphone, is unable to be certified against this standard and therefore does not comply with the NPfI requirements.	The NPfI requires RBL's be measured with a noise data logger that has an accuracy at least equivalent to the specifications of a Class 2 meter as defined in AS IEC 61672.1. AS IEC 61672 superseded the AS IEC 60651 standard. In circumstances where a sound level meter cannot be calibrated to IEC 61672, NATA currently permits calibration to the superseded standard, IEC 60651, providing the laboratory is accredited to the standard. Background noise levels in this assessment have been obtained from additional monitoring conducted in October-November 2024 using the following: • 1 x Acoustic Research Labs Ngara Real Time Sound Acquisition System (S/N: 8780C7) • 2 x Convergence Instruments Sound Level Meter Data Logger (NSRT_mk3 Type 1) o S/N: AFrUJvWw290%qpHAS8pZHD o S/N CNBcj1UQ8fe3gDPgZ0B5HD The NSRT_mk3 monitors above have been calibrated by Calibre Technology, who are accredited to provide calibrations to IEC 60651 and the conformance statement in the certificate is in accordance with NATA requirements. Calibration certificates are provided in Appendix C. On this, these monitors are considered to meet the accuracy specifications equivalent to the definitions in AS IEC 61672.1.	Section 4.1
• Monitoring Instrument Placement: The NVIA does not provide specific details regarding the placement of the background noise monitoring instruments, such as their height above ground and proximity to reflective surfaces. The NPfI outlines the necessary	Background noise levels in this assessment have been obtained from additional monitoring conducted in October-November 2024. The locations of noise monitors we provided as follows:	Section 3.1, 4.3 and Appendix A

NSW EPA COMMENT	ELAB RESPONSE	REPORT REFERENCE
requirements for the location of monitoring equipment used to assess background noise levels. It is essential to provide comprehensive information about the micro location of the monitoring instruments, along with an evaluation demonstrating compliance with the NPfI's locational guidelines.	• Approximate locations in the site map in Figure 3. • Detailed descriptions provided in Table 6. • Photographs of noise monitor locations in Appendix A.	

• Monitoring Location Requirements: The NVIA indicates that the same monitoring locations, LT1, LT2, and LT3, were used to assess both background noise levels and existing traffic noise levels. However, the locational requirements for measuring background noise and traffic noise differ. The NPfI mandates a free-field location, while the Road Noise Policy (RNP) requires a reverberant location within 1 meter of the exposed façade. As highlighted earlier, it is crucial to provide a detailed description of the monitoring instruments' micro locations and justify their compliance with the specific requirements of both the NPfI and RNP. Depending on the actual placement, adjustments to the measured noise levels may be necessary. Furthermore, it is unlikely that the noise levels measured at LT1 or LT2 accurately represent the noise exposure experienced by residents on Erith Street Botany.	Background noise levels in this assessment have been obtained from additional monitoring conducted in October-November 2024. Detailed descriptions and photographs have been provided in the sections noted above. The following is noted:
	• For the purpose of our assessment, noise monitoring has been used to determine background noise levels (L_{90}) and equivalent continuous noise levels (L_{eq}).
	• In the assessment of traffic noise generation from the proposed development, we have noted:
	  ○ Heavy vehicles entering and departing the site will not create any significant noise impacts to surrounding residences due to the direction of travel. All heavy vehicles will enter and depart the site from the west.
	  ○ Light vehicles entering and departing the site have been conservatively assumed as 4 movements in a peak hour. The increase in noise from additional traffic generated by the development will satisfy the RNP requirements identified in Section 6.2 (in isolation of existing traffic noise levels).
	  ○ The proposed development will result in a net traffic generation reduction during both AM and PM peak periods.
		Section 3.1 and 8.4

NSW EPA COMMENT	ELAB RESPONSE	REPORT REFERENCE
Project noise trigger levels (premises-based noise emissions)		
• The NPfI stipulates that project noise trigger levels (PNTLs) must be established based on the more stringent of either the project intrusiveness level or the project amenity level, adjusted to an LAeq,15min, dBA descriptor. Given the uncertainties highlighted earlier regarding the acquired background noise levels, the EPA does not support the established project intrusiveness level.	Background noise levels in this assessment have been obtained from additional monitoring conducted in October-November 2024. This has been undertaken to address the uncertainties highlighted above, including: • Additional monitoring undertaken directly opposite Erith Street residences. • Additional monitoring undertaken using equipment that has been calibrated by a NATA certified laboratory to meet the accuracy specifications of AS IEC 61672 (or a NATA approved equivalent).	Section 3.1, 4.1 and 4.3
• The NVIA has presented project amenity noise levels by setting them 10 dB below existing industrial noise levels. While the NPfI permits this approach, the NVIA appears to have assumed that measured traffic noise levels are equivalent to existing industrial noise levels without providing any explanation or justification. This approach is not appropriate and does not conform to the NPfI guidelines. Consequently, the EPA does not support the presented project amenity noise levels for RC1 and RC2. These discrepancies will likely impact the established PNTLs and the overall compliance of the proposed development.	Additional noise monitoring has been undertaken as detailed in Section 4.3 of the report, using an Acoustic Research Labs Ngara Real Time Sound Acquisition System. Based on our review of the recorded WAV audio files, the dominant source during all periods of the day is industrial noise within the area at noise monitoring location LT1.	-
• In addition to the points discussed above, NVIA asserts that RC1, a residential flat building located at 3 Luland Street Botany, should be assigned higher PNTLs than those established in the assessment. This recommendation is based on two factors: o Location within an Industrial Zone: The residential flat building is situated within an industrial zone. o Aircraft Noise Exposure: The building is located in a 30-35 ANEF zone, indicating exposure to aircraft noise. It has been designed to ensure that internal noise levels comply	The NPfI states the following with regard to establishing project noise trigger levels and general assessments: • Section 2.3: Intrusiveness noise levels are not used directly as regulatory limits. They are used in combination with the amenity noise level to assess the potential impact of noise, assess reasonable and feasible mitigation options and subsequently determine achievable noise requirements.	Section 6.1

NSW EPA COMMENT	ELAB RESPONSE	REPORT REFERENCE
with the aircraft noise requirements specified in AS2021-2:2015. The residential flat building at 3 Luland Street Botany appears to be of modern construction, rather than a legacy structure. Considering that a recent planning decision has permitted a sensitive land use within the industrial zone, the relevant planning authorities should determine an appropriate noise assessment goal for this receiver. This goal should strike a balance between the objectives of the industrial zone and the reasonable level of amenity expected for an approved sensitive land use.	• Section 2.4: For isolated residences within an industrial zone the industrial amenity level of 70dB(A) would usually apply. RC1 is located on land zoned as IN1 – General Industrial. • Section 2.7: The industrial interface assessment provisions recognise that a marginally reduced acoustic amenity is acceptable for existing residences co-located with existing industry, and that the availability of noise mitigation measures might be limited in these circumstances. In consideration of the above, we have applied a project noise trigger level based on a project amenity level (corrected based on measured existing industrial noise affecting the residence, as opposed to adopting the industrial amenity level as allowed in Section 2.4 of the policy). The resultant project amenity level is 16dB more stringent at night when compared to the industrial amenity level applied to isolated residences in an industrial zone. On this basis, a balance between the objectives of the industrial zone and the reasonable level of amenity expected for an approved sensitive land use within an industrially zoned area is achieved.	
Operational Noise Mitigation • The NVIA has not explicitly identified the proposed construction details of the warehouse that were considered in the noise modelling. Furthermore, the assessment has not provided specific recommendations regarding the warehouse's construction to ensure compliance with the established acoustic goals. It is essential to include detailed information about the warehouse construction requirements necessary to meet the confirmed PNTLs within the NVIA.	The assessment in Section 8 and corresponding mitigation measures in Section 10.2 have been updated to include controls regarding the construction of the proposed development to ensure compliance with the established acoustic goals.	Section 8.3.3 and 10.2.2

2 INTRODUCTION

This Noise and Vibration Impact Assessment (NVIA) has been prepared to accompany a State Significant Development Application (SSDA) for the development to be located at 2-4 Hale Street, Botany. The proposal includes the construction of a waste transfer station and associated spaces.

In summary, this assessment shall address the following key acoustics considerations:

- Noise generated by external vehicle movements (trucks, cars and other moving equipment) and warehouse activities from general operation of the site
- Noise impacts of additional traffic on surrounding local roads generated by the proposed development
- Noise emissions from mechanical plant associated with the development
- Noise and vibration impacts from the construction of the development

The acoustic, noise and vibration legislation, standards and guidelines applicable to the proposal include:

- Planning Secretary's Environmental Assessment Requirements for SSD- 62855708, dated 25 October 2023 (**SEARs**)
- NSW EPA *Road Noise Policy* 2011 (**RNP**)
- NSW EPA Noise Policy for Industry 2017 (**NPfI**)
- NSW EPA Interim Construction Noise Guideline 2009 (**ICNG**)
- AS 2436:2010 (R2016) Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites (AS 2436:2010)
- BS 6472:1992 Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz) (BS 6472)
- BS 7385.2:1993 Evaluation and Measurement for Vibration in Buildings Part 2: Guide to Damage Levels from Ground-borne Vibration (BS 7385)
- DIN 4150.3:1999 Structural Vibration Part 3: Effects of Vibration on Structures (DIN 4150)

2.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

This NVIA has been prepared to address the SEARs for SSD- 62855708 dated 25 October 2023, as outlined in Table 2.

Table 2: SEARs – Noise and vibration assessment requirements

ISSUE AND ASSESSMENT REQUIREMENTS	DOCUMENTATION AND REFERENCES
Noise and Vibration a quantitative noise and vibration impact assessment undertaken by a suitably qualified acoustic consultant in accordance with the relevant EPA guidelines and Australian Standards which includes:	Noise and Vibration Impact Assessment.
▪ the identification of impacts associated with construction, operation and traffic generation at noise affected sensitive receivers, including the provision of operational noise contours and a detailed sleep disturbance assessment	Refer to Section 7 and 8.
▪ details of noise monitoring survey, background noise levels, noise source inventory and 'worst case' noise emission scenarios	Refer to Section 4 and 8.
▪ a cumulative impact assessment inclusive of impacts from other developments	Refer to Section 3.4.
▪ details and analysis of the effectiveness of proposed management and mitigation measures to adequately manage identified impacts, including a clear identification of residual noise and vibration following application of mitigation these measures and details of any proposed compliance monitoring programs	Refer to Section 9 and 10.

3 PROJECT OVERVIEW

3.1 SITE DESCRIPTION

The location of the proposal, noise monitoring and measurement positions are shown in Figure 1. Figure 1 also presents a summary of the most affected noise-sensitive receivers which have been delineated into receiver catchments (RCs).

A detailed description for each receiver catchment is provided in Table 3, including the development land zoning based on the NSW Government Sharing and Enabling Environmental Data (SEED) land zoning maps (refer to Figure 2).

Table 3: Description of noise sensitive receiver catchments

RECEIVER CATCHMENT	DESCRIPTION OF RECEIVERS	LAND ZONING	DISTANCE
RC1	Isolated residential use development (apartments) inside the industrial area at 3 Luland Street, Botany	IN1 – General Industrial	80m
RC2	Residential dwellings situated along Erith and Bay Street	E3 – Productivity Support	100m
RC3	Botany Public School	R2 – Low density residential	350m
RC4	Commercial use development on the corner of McFall Street and Bay Street	E3 – Productivity Support	520m
RC5	Industrial use development surrounding the project site, assessed at the worst affected receivers immediately south across Hale Street.	IN1/IN2 – General/Light Industrial	-
RC6	Residential dwellings situated along Bay Street	E3 – Productivity Support	320m

Figure 1: Acoustic site plan identifying the surrounding noise-sensitive receivers and relevant noise monitoring locations (source: SixMaps NSW)

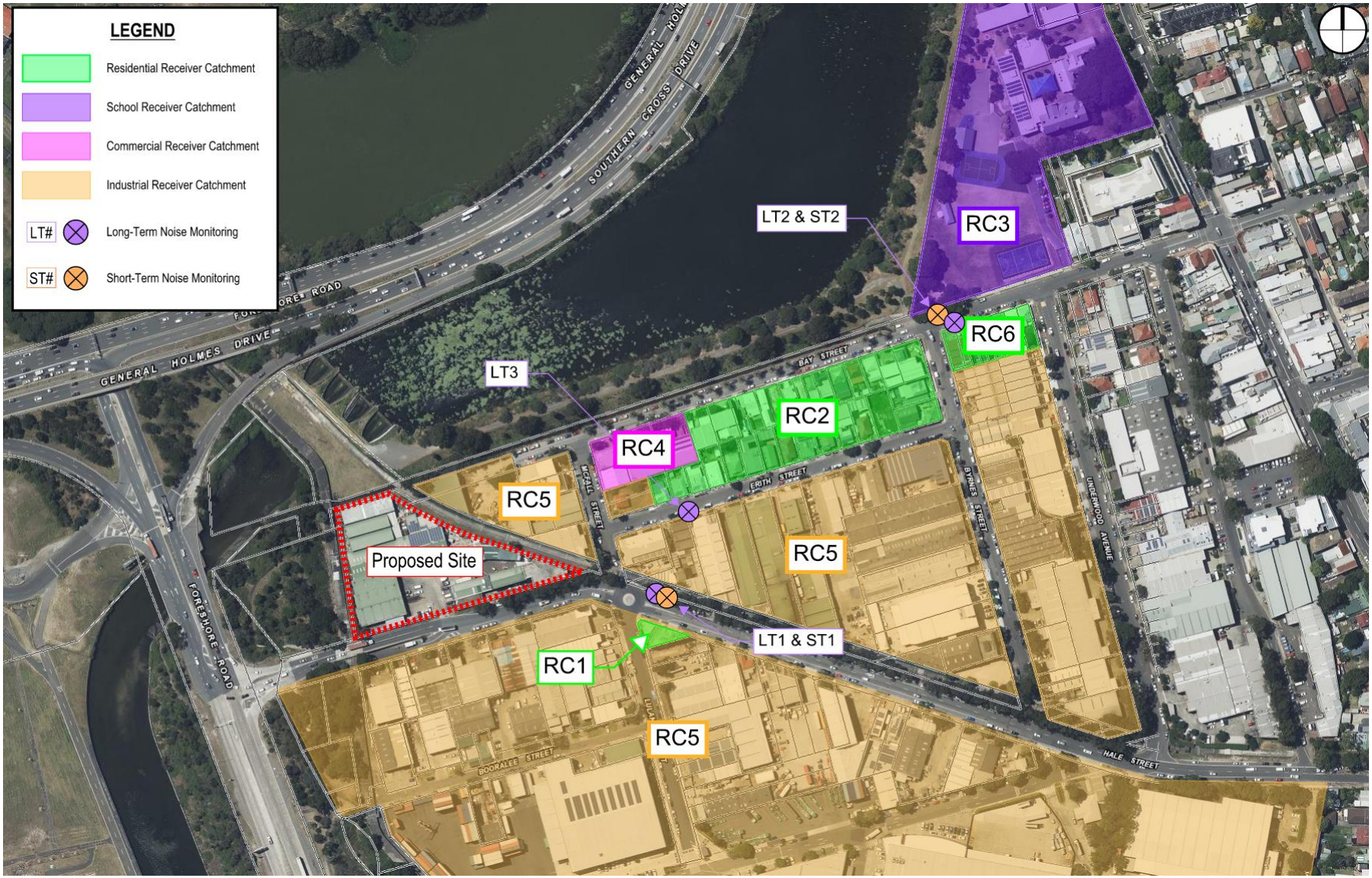


Figure 2: Land zoning of nearby development (source: NSW Government SEED Database)

3.2 DEVELOPMENT PROPOSAL

The proposal is for the construction and operation of a waste transfer station that will comprise of the following:

- Warehouse building which will include:
- Light waste
- Heavy waste
- Metal waste
- Tipping areas
- Sorting area
- Bins
- Amenities
- External car parking
- Office building
- Gate house
- Weigh bridge
- 24/7 operational hours

A layout of the site is shown in Figure 3.

3.3 SITE ACOUSTIC CONSIDERATIONS

Upon reviewing the design documentation prepared for the SSDA, the noise and vibration impacts to consider in this NVIA include the following:

- Noise generated by heavy vehicles movements within areas on the project site, and from general operation of the site;
- Noise impacts of additional traffic on surrounding local roads generated by the proposed development;
- Noise emissions from mechanical plant associated with the development to surrounding noise-sensitive receivers; and
- Noise and vibration impacts during the construction of the development to surrounding noise sensitive receivers.

Figure 3: General site layout (Drawing Sheet Number 120011_A005, Issue N dated 3rd December 2024)

3.4 CUMULATIVE IMPACTS CONSIDERING OTHER DEVELOPMENTS

The proposed development is among a group of proposed/determined industrial developments within the area. To consider the cumulative impacts of other developments that are proposed or approved in the suburb of Botany, the following information was defined for each of the proposed/approved developments:

- Are the developments built and operating or under construction?
- Are they in close proximity to this proposal and do they constitute a "cluster" of industrial developments?

Table 4 below provides a brief summary of the information considered above for each of the proposed/approved developments within Botany.

Table 4: Summary of relevant information for proposed/approved developments within Botany

DEVELOPMENT ADDRESS	STATUS OF DEVELOPMENT	DISTANCE TO THIS PROPOSAL
350 King Street, Mascot (Warehouse, SSD-59024711)	Prepare EIS	1,890m North
121 Robey Street, Mascot (Hotel Precinct, Sydney Airport, SSD-11508731)	Prepare EIS	1,740m North
34 & 36 McPherson Street, Banksmeadow & 1 Beauchamp Road, Banksmeadow (Road Transport of FOGO Waste)	Approved	3,050m South East
2-8 Baker Street, Banksmeadow (Multi-level Warehouse)	Approved	2,430m East
297 King Street, Mascot (Multi-level Warehouse)	Response to Submissions	2,040m North

Given the large geographical spread of the proposed/approved developments, we do not consider the collective developments described in Table 4 in combination with this proposal to be a cluster of industrial developments with multiple noise-generating premises.

Therefore the cumulative impacts of the proposal and the other identified developments are likely to be negligible.

4 NOISE SURVEYS

4.1 INSTRUMENTATION

The equipment used for noise surveys is summarised below:

- Bruel and Kjaer 2250 Integrating Sound Level Meter (S/N: 3031115)
- Bruel and Kjaer type 1 microphone – comprising of:
  - ZC 0032 preamplifier (S/N: 31930)
  - 4189 capsule (S/N: 3334640)
- Bruel and Kjaer Sound calibrator Type 4231 (S/N: 3029638)
- 1 x Acoustic Research Labs Ngara Real Time Sound Acquisition System (S/N: 8780C7)
- 2 x Convergence Instruments Sound Level Meter Data Logger (NSRT_mk3 Type 1)
  - S/N: AFrUJvWw290%qpHAS8pZHD
  - S/N CNBcj1UQ8fe3gDPgZ0B5HD

All equipment was calibrated prior to the measurement period, and no significant drift was observed following the measurement period. All equipment carries current traceable calibration certificates that can be provided upon request.

4.2 SHORT-TERM (ATTENDED) NOISE MONITORING

Short-term attended noise measurements have been conducted at the subject site to qualify and supplement long-term unattended noise monitoring, and to determine environmental noise characteristics and ultimately confirming that the selection of the long-term monitoring location is valid.

4.2.1 Ambient Noise Levels

Attended noise measurements were conducted on Friday 10 November 2023. The results of attended noise measurement conducted at the locations indicated in Figure 1 is provided in Table 5.

Table 5: Short-term noise measurement summary – Ambient Noise – Friday 7 July 2023

MEASUREMENT LOCATION	MEASUREMENT TIME	L_{Aeq} dB(A)	L_{A90} dB(A)	COMMENTS
ST1	2:48pm	70	58	▪ Traffic including trucks ▪ Industry ▪ Planes ▪ Truck trailers noisy straddling the round about
ST2	3:07pm	67	55	▪ Planes ▪ Nature sounds ▪ Some traffic mostly cars and some small trucks ▪ Distant industry / traffic

4.3 LONG-TERM NOISE MONITORING

4.3.1 Description of Location

Long-term noise monitoring has been conducted at the project site at locations LT1 to LT3 as labelled in Figure 1. A detailed description of the monitoring locations, and acoustic characteristics of the surrounding environment are provided in Table 6. Also refer to Appendix A for photographs of the noise monitor locations, and Appendix B for the specific dates of the monitoring periods.

Table 6: Noise monitoring locations and description

MONITOR LOCATION	MONIITOR ADDRESS AND DESCRIPTION	ACOUSTIC CHARACTERISTICS OF ENVIRONMENT
LT1	Opposite 3 Luland Street, Botany (on Hale Street side) – 1.5m above ground level	▪ Traffic including trucks ▪ Industry ▪ Planes ▪ Truck trailers noisy straddling the round about
LT2[1]	Infront of 45 Bay Street, Botany – 2.5m above ground level	▪ Planes ▪ Natural environment ▪ Intermittent traffic noise (mostly cars) ▪ Distant industry / traffic
LT3[1]	Opposite 24 Erith Street, Botany – 2.5m above ground level	▪ Planes ▪ Natural environment ▪ Intermittent traffic noise ▪ Distant industry / traffic

Note 1: Noise monitors at LT2 and LT3 were installed at an elevated height of 2.5m to minimise the risk of vandalism during the monitoring period.

Existing traffic and background noise levels obtained from long-term noise monitoring are presented in Section 4.3.2 and 4.3.3 respectively. Noise descriptor definitions are provided below.

- L_{90} is a statistical measurement giving the sound pressure level which is exceeded for 90 percent of a measurement period. L_{90} is commonly referred to as a basis for measuring the background noise level.
- $L_{Aeq,T}$ is the equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

4.3.2 Traffic Noise

Traffic / Industry noise levels obtained from long-term noise monitoring are presented in Table 7. The description of time of day is outlined as follows.

- Day – the period from 7:00am to 10:00pm
- Night – the period from 10:00pm to 7:00am

Table 7: Unattended traffic noise monitoring results

LOCATION	MEASURED TRAFFIC NOISE LEVELS – dB(A) $L_{Aeq,period}$	
	DAY (MEASURED)	NIGHT (MEASURED)
LT1	66	64
LT2	65	58
LT3	64	57

4.3.3 Background Noise

Background noise levels and subsequent Rating Background Noise Levels (RBLs) have been established in accordance with the Noise Policy for Industry 2017 using the results of the noise monitoring.

We note the NPfI recognises that there are times of day when there is a clear change in the noise environment (such as early morning shoulder periods), where it may be unreasonable to expect operations to be assessed against the night-time project noise trigger levels as background noise levels steadily rise in early morning hours. Appendix A3 of the policy provides a method in deriving a shoulder period rating background noise level.

In light of the above, time periods used in this assessment have been determined in accordance with the NPfI and are summarized as follows:

- Day – the period from 7:00am to 6:00pm Monday to Saturday, 8am to 6pm on Sundays and public holidays
- Evening – the period from 6:00pm to 10:00pm
- Night – the period from 10:00pm – 7:00am

Table 8 provides a summary of ambient noise levels in line with the periods listed above. Also refer to graphical noise monitoring data provided in Appendix A.

Table 8: Long-term 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	67	66	63	53	52	42
LT2	66	65	56	52	52	41
LT3	64	65	52	48	47	38

5 CONSTRUCTION NOISE AND VIBRATION CRITERIA

5.1 CONSTRUCTION NOISE CRITERIA

The noise criteria outlined within the Interim Construction Noise Guideline (ICNG) 2009 has been adopted for the assessment of noise emissions from the construction of the proposal.

5.1.1 Airborne Noise – Residential Receiver Catchments

The airborne noise criteria for surrounding residential receiver catchments (RC1 and RC2) has been extracted from Table 2 of the ICNG and is presented in Table 9 below.

Table 9: NSW ICNG construction noise criteria for surrounding residential receiver catchments

TIME OF DAY	MANAGEMENT LEVEL $L_{Aeq,15min}$ [1]	HOW TO APPLY
Recommended Standard Hours: Monday – Friday 7am – 6pm Saturday 8am – 1pm No work on Sundays or 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	▪ 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.

Note 1: 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.

5.1.2 Airborne Noise – Other Sensitive Land Uses

Section 4.1.3 Table 3 of the ICNG provides guidance in establishing noise management levels for construction noise impacts at other sensitive land uses. Noise management levels applicable to noise sensitive receivers surrounding the site have been summarised in Table 10.

Table 10: ICNG noise management levels for other sensitive land uses

RECEIVER CATCHMENT	LAND USE	MANAGEMENT LEVEL, $L_{Aeq(15min)}$ (APPLIES WHEN PROPERTIES ARE BEING USED)
RC3	School	45 (Internal – Classrooms) 55 (External – Classrooms) 65 (External – Active Recreation Areas)
RC4	Commercial	70 (External)
RC5	Industrial	75 (External)

5.1.3 Ground-borne Noise – Residential Receiver Catchments

Ground-borne noise is noise generated by vibration transmitted through the ground into a structure, such as an excavator with a hydraulic hammer attachment, or impact/bore piling. The following ground-borne noise levels for residences have been extracted from Section 4.2 of the ICNG and indicate when management actions should be implemented.

- Evening (6pm to 10pm) – Internal Noise Level: $L_{Aeq,15min}$ 40 dB(A)
- Night-time (10pm to 7am) – Internal Noise Level: $L_{Aeq,15min}$ 35 dB(A)

An assessment of ground-borne noise to these levels is only required when the ground-borne noise levels are higher than airborne noise levels, and for surrounding residential receiver catchments. The ground-borne noise levels are for evening and night-time periods only. The levels shall be assessed at the centre of the most affected habitable room.

5.2 CONSTRUCTION VIBRATION CRITERIA

5.2.1 Human Comfort – Continuous and Impulsive Vibration Criteria

Where occupants can detect vibration in buildings, this may potentially impact on their quality of life or working efficiency. The level of vibration that affects the amenity of occupants within a building is lower than that associated with building damage. The NSW DEC have prepared a guideline, *"Assessing vibration: a technical guideline"*, which presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques.

Acceptable values of human exposure to continuous and impulsive vibration are dependent on the time of day and the activity taking place in the occupied space. Guidance on preferred values for continuous and impulsive vibration acceleration is provided in Table 11.

Table 11: Preferred and maximum weighted RMS values for continuous and impulsive vibration acceleration (m/s^2) 1-80 Hz

LOCATION	ASSESSMENT PERIOD[1]	PREFERRED VALUES		MAXIMUM VALUES	
		z-axis	x- and y-axes	z-axis	x- and y-axes
CONTINUOUS VIBRATION					
Critical[2]	Day- or night time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day- or night time	0.020	0.014	0.040	0.028
Workshops	Day- or night time	0.04	0.029	0.080	0.058
IMPULSIVE VIBRATION					
Critical[2]	Day- or night time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.30	0.21	0.60	0.42
	Night time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day- or night time	0.64	0.46	1.28	0.92
Workshops	Day- or night time	0.64	0.46	1.28	0.92

Note 1: Daytime is 7:00am to 10:00pm and night time is 10:00pm to 7:00am

Note 2: Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specified above. Stipulation of such criteria is outside the scope of this policy, and other guidance documents (e.g. relevant standards) should be referred to. Source: BS 6472–1992.

5.2.2 Human Comfort – Intermittent Vibration Criteria

Intermittent vibration is vibration which is perceived in separately identifiable repeated bursts. Its onset can be sudden, or there might be a gradual onset and termination bounding a more sustained event. The vibration dose value (VDV) defines a relationship that yields a consistent assessment of intermittent vibration and correlates well with subjective human response. Acceptable values of vibration dose have been extracted from Table 2.4 of the guideline and are presented in.

Table 12: Acceptable vibration dose values for intermittent vibration ($m/s^{1.75}$)

LOCATION	DAYTIME		NIGHT-TIME	
	PREFERRED VALUE	MAXIMUM VALUE	PREFERRED VALUE	MAXIMUM VALUE
Critical	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

5.2.3 Building Cosmetic Damage

Structural vibration thresholds are set to minimize the risk of cosmetic surface cracks and lie below the levels that have the potential to cause damage to the main structure. Table 13 presents guide values for building vibration, based on the vibration thresholds above which cosmetic damage has been demonstrated outlined within BS7385-Part 2:1993. These values are evaluated to give a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as 95% probability of no effect.

Table 13: Transient vibration guide values for cosmetic damage – BS 7385-2:1993

TYPE OF BUILDING	PEAK PARTICLE VELOCITY IN FREQUENCY RANGE OF PREDOMINANT PULSE (PPV)	
	4 HZ TO 15 HZ	15 HZ AND ABOVE
Reinforced or framed structures Industrial or light commercial type buildings	50mm/s	N/A
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s	20mm/s (50mm/s at 40Hz and above)

5.2.4 Building Structural Damage

Structural damage criteria are established within DIN4150-Part 3 “Structural vibration in buildings – Effects on structures”. Table 14 indicates the vibration limits presented in DIN4150-Part 3, where upon exceeding these thresholds lies the risk in inducing structural damage.

Table 14: Guideline value of vibration velocity, vi, for evaluating the effects of short-term vibration – DIN4150-3

LINE	TYPE OF STRUCTURE	VIBRATION VELOCITY, IN MM/S FOUNDATION AT A FREQUENCY OF			PLANE OF FLOOR OF UPPERMOST FULL STOREY
		LESS THAN 10HZ	10 TO 50HZ	50 TO 100HZ*	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					

6 OPERATIONAL NOISE AND VIBRATION CRITERIA

6.1 OPERATIONAL NOISE EMISSIONS

6.1.1 NSW EPA Noise Policy for Industry (NPI) 2017 – Industrial Noise

The NSW EPA's Noise Policy for Industry (NPfI) 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 NPfI 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, as well as activities in the operation of the site generally 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 NPfI, 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 15 provides the project intrusiveness noise levels applicable to each of the surrounding residential noise-sensitive receivers based on the measured background noise levels provided in Table 8.

Table 15: Project intrusiveness noise level criteria for each residential receiver

RECEIVER	TIME OF DAY	MEASURED RBL - dB(A)	PROJECT INTRUSIVENESS NOISE LEVELS - $L_{Aeq,15min}$ dB(A)
RC1 – Residential[1]	Day	53	58
	Evening	52	57
	Night	42	47
RC2 – Residential[2]	Day	48	53
	Evening	47	52
	Night	38	43
RC3 – Residential[3]	Day	52	57

RECEIVER	TIME OF DAY	MEASURED RBL - dB(A)	PROJECT INTRUSIVENESS NOISE LEVELS - $L_{Aeq,15min}$ dB(A)
	Evening	52	57
	Night	41	46

Note 1: Based on noise monitoring results at LT1.
Note 2: Based on noise monitoring results at LT3.
Note 3: Based on noise monitoring results at LT2.

Further to the above, we note that Section 2.3 of the NPfI states that intrusiveness noise levels are not used directly as regulatory limits, but rather to be used in combination with the amenity noise levels to assess the potential impact of noise, assess reasonable and feasible mitigation options and subsequently determine achievable noise requirements.

Additionally, Section 2.7 of the NPfI states that "*the industrial interface assessment provisions recognise that a marginally reduced acoustic amenity is acceptable for existing residences co-located with existing industry, and that the availability of noise mitigation measures might be limited in these circumstances*".

Further discussion is provided above Table 17 in establishing suitable noise emission requirements to residential receivers within the industrial zoned area identified in Figure 1.

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 17) – 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 an area that is defined as an industrial zone on a local environment plan;
- 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
- As per the notes under Table 2.2 (Amenity Noise Levels), for isolated residences within an industrial zone the industrial amenity level of 70dB(A) would usually apply.

Table 2.3 of the NPfI provides guidance on assigning residential receiver noise categories; being Rural, Suburban or Urban. The following descriptions have been replicated from the policy:

Table 16: Residential receiver category descriptions for Suburban and Urban residences

RECEIVER CATEGORY	TYPICAL EXISTING RBL'S	DESCRIPTION
Urban	Daytime > 45dB(A) Evening > 40dB(A) Night > 35dB(A)	An area with an acoustical environment that: ▪ Is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound

RECEIVER CATEGORY	TYPICAL EXISTING RBL'S	DESCRIPTION
		of many unidentifiable, mostly traffic and/or industrial related sound sources ▪ Has through-traffic with characteristically heavy and continuous traffic flows during peak periods ▪ Is near commercial districts or industrial districts ▪ Has any combination of the above

In consideration of the above, we note the following based on long-term noise monitoring and on-site observations:

- Existing background noise levels at nearby residences are generally consistent with those associated with an Urban" residence.
- Existing land-use surrounding the site is predominantly industrial, or commercial.
- Ambient noise levels in the existing acoustical environment are governed by industrial noise sources and traffic (trucks and other heavy vehicles), both located adjacent to the site and further in the distance.

On this basis, the receiver noise category most applicable to nearby residences is the Urban classification. The recommended amenity noise level, project amenity noise level, and converted project amenity noise level for a 15-minute, is provided for each surrounding receiver catchment in Table 17.

Table 17: Project amenity noise level criteria for each 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 – Residential (Urban)[1]	Day	60	57	60
	Evening	50	56	59
	Night	45	53	56
RC2 – Residential (Urban)	Day	60	55	58
	Evening	50	45	48
	Night	45	40	43
RC6 – Residential (Urban)	Day	60	55	58
	Evening	50	45	48
	Night	45	40	43
RC3 – School Premises (Classroom)	When in use	45 (External)	40	43
RC4 – Commercial Premises	When in use	65	60	63

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)
RC5 – Industrial Premises	When in use	70	65	68

Note 1: In accordance with the NPfI, where the resultant project amenity noise level is 10dB or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10dB below the existing industrial noise levels if it can be demonstrated that the existing industrial noise levels are unlikely to reduce over time (Section 2.4 of the NpfI).

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 18 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.

In the assessment of residential receiver RC1 (3 Luland Street, Botany), we note:

- Receiver RC1 is located on land zoned IN1 (general industrial), for which the NPfI allows a project amenity level (period) of 70dB(A).
- Based on predicted noise levels presented in Section 8.3.4, typical NPfI project trigger noise levels are satisfied at all residences (except the isolated residence at RC1).
- In accordance with Australian Standard AS2021:2015 (Acoustics - Aircraft Noise Intrusion - Building Siting and Construction), receiver RC1 is within the ANEF 30-35 zone for aircraft noise which is categorised as “Unacceptable” where construction of the proposed building should not normally be considered. In consideration of this, we understand that this residence has been acoustically treated to address aircraft noise impacts (as advised by the Bayside Council Letter Ref: PDA-2022/15 dated 20th June 2022) which will inherently help with industrial noise sources.
- In consideration of the above, following the application of all reasonable and feasible mitigation measures it is proposed that a marginally reduced project amenity noise level will be adopted in establishing the project trigger noise level for the following periods based on the project amenity noise level:
    - Night: 56dB(A)$L_{eq(15min)}$

Table 18: Project noise trigger levels (PNTL) to be applied to each surrounding receiver type

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 – Residential (Urban)	Day	58	60	-	58
	Evening	57	59	-	57
	Night	47	56	45dB(A)L_{eq} and 57dB(A)L_{max}	56dB(A)L_{eq} and 57dB(A)L_{max}
RC2 – Residential (Urban)	Day	53	58	-	53
	Evening	52	48	-	48
	Night	43	43	46dB(A)L_{eq} and 53dB(A)L_{max}	43dB(A)L_{eq} and 53dB(A)L_{max}
RC6 – Residential (Urban)	Day	57	58	-	57
	Evening	57	48	-	48
	Night	46	43		43dB(A)L_{eq} and 56dB(A)L_{max}
RC3 – School Premises	When in use	-	43	-	43
RC4 – Commercial Premises	When in use	-	63	-	63
RC5 – Industrial Premises	When in use	-	68	-	68

6.1.2 Sleep Disturbance

Noise Policy for Industry

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. The NPfI, in Section 2.6 also outlines that an external noise level of Lamax 60-65dB(A) is unlikely to cause awakening reactions.

Road Noise Policy

Furthermore, the RNP provides research over 30 years for sleep disturbance and concludes the following:

- maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep
- one or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly.

We have based our sleep disturbance assessment on the above descriptors and is summarised as follows:

- An external L_{Amax} noise level of 60-65dB(A) is unlikely to awaken people from sleep
- For one or two L_{Amax} events of 75-80dB(A) are not likely to adversely affect health and wellbeing significantly

  This is based on the assumption that there is a 10dB(A) reduction from outside to inside

Based on the abovementioned research and applicable guidelines, an L_{Amax} 65dB(A) as an external noise level has been used in this assessment for sleep awakenings.

6.2 TRAFFIC NOISE GENERATION

Road traffic noise impact is assessed in accordance with the NSW Road Noise Policy (RNP). 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 19.

Table 19: NSW RNP – Traffic Noise Assessment Criteria

<table>
<tr><th rowspan="2">ROAD CATEGORY</th><th rowspan="2">TYPE OF PROJECT/LAND USE</th><th colspan="2">ASSESSMENT CRITERIA – dB(A)</th></tr>
<tr><th>DAY
(7AM – 10PM)</th><th>NIGHT
(10PM – 7AM)</th></tr>
<tr><td rowspan="3">Freeway/ arterial/ sub-arterial roads</td><td>1. Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors</td><td>$L_{Aeq, (15\ hour)}$ 55</td><td>$L_{Aeq, (15\ hour)}$ 50</td></tr>
<tr><td>2. Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads</td><td rowspan="2">$L_{Aeq, (15\ hour)}$ 60</td><td rowspan="2">$L_{Aeq, (15\ hour)}$ 55</td></tr>
<tr><td>3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments</td></tr>
<tr><td rowspan="2">Local Roads</td><td>4. Existing residences affected by noise from new local road corridors</td><td rowspan="2">$L_{Aeq, (1\ hour)}$ 55</td><td rowspan="2">$L_{Aeq, (1\ hour)}$ 50</td></tr>
<tr><td>5. Existing residences affected by noise from redevelopment of existing local roads</td></tr>
</table>

ROAD CATEGORY	TYPE OF PROJECT/LAND USE	ASSESSMENT CRITERIA – dB(A)	
		DAY (7AM – 10PM)	NIGHT (10PM – 7AM)
	6. Existing residences affected by additional traffic on existing local roads generated by land use developments		

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 of the RNP 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 2 dB above that of the corresponding 'no build option'.

Also, the inherent quality of noise from vehicles on public roads arriving to and departing from the site would be indistinguishable from other traffic noise on public roads.

7 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

7.1 CONSTRUCTION PROGRAMME

A breakdown of the indicative stages of work associated with the proposal is provided in Table 20.

Table 20: Indicative stages of work and expected duration

STAGE OF WORKS	ACTIVITIES TO BE UNDERTAKEN
Demolition and Civil Works	• Demolition of existing structures and tree removal • Bulk earthworks to level and terrace the site
Construction and Landscaping	• Construction and landscaping including earthworks, drainage and essential services

The proposed hours of construction are expected to be in-line with the recommended standard hours in Section 2.2 of the ICNG, as summarised in Table 21:

Table 21: ICNG Recommended Standard Construction Hours

DAY OF THE WEEK	ICNG RECOMMENDED STANDARD CONSTRUCTION HOURS
Monday to Friday	7am to 6pm
Saturday	8am to 1pm
Sunday or public holidays	No work

In the event works are proposed to be conducted outside of those listed above, further discussion is provided in Section 9.1.3.

7.2 EXPECTED CONSTRUCTION EQUIPMENT

The equipment sound power levels (SWL) have been extracted from AS2436:2010 "Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites" and from onsite measurements of similar equipment.

Table 22: Indicative construction equipment and respective noise levels

STAGES	EQUIPMENT	SWL – dB(A)	ACOUSTICAL USAGE FACTOR (%)	USAGE IN 15-MINUTE PERIOD (MINUTES)	TIME CORRECTED SWL – dB(A) $L_{Aeq,15min}$	QUANTITY
Demolition & Civil Works	Excavator breaker[1]	120	40	6	116	2
	Bobcat	107	70	10.5	105	3
	Dump truck	108	40	6	104	2
	General truck	107	40	6	103	3
	Powered hand tools	102	50	7.5	99	-

STAGES	EQUIPMENT	SWL – dB(A)	ACOUSTICAL USAGE FACTOR (%)	USAGE IN 15-MINUTE PERIOD (MINUTES)	TIME CORRECTED SWL – dB(A) $L_{Aeq,15min}$	QUANTITY
Construction	Mobile Crane	110	100	15	110	1
	General Truck	107	40	6	103	4
	Concrete Pump Truck	107	100	15	107	2
	Powered Hand Tools	102	50	7.5	99	-
	Bobcat / Forklift	107	50	7.5	104	4

Note 1: Adjusted by a 5dB(A) penalty where noise sources are considered particularly annoying (typically such as saw cutting and hammering).

7.3 NOISE MODELLING AND ASSUMPTIONS

To assess the noise impact from the site during the various construction stages, a noise model was prepared using commercial software SoundPLAN v9.0, which is a comprehensive software package for conducting three-dimensional complex noise propagation modelling. Using the software, a 3D model of the site and its surroundings was constructed including the nearby buildings, and the construction plant and equipment were positioned as noise sources. Within the model, the effects of the environment (built and natural) on propagation of sound were considered to reliably estimate the resulting noise effects on the surrounding noise sensitive receivers.

The noise model represents the 'reasonable' worst case periods of construction activities, meaning that all the equipment of each stage is operating simultaneously during a 15-minute observation period.

The assumptions that were made within the assessment include the following:

- The predicted noise levels represent the worst-case scenario for each receiver
- The mitigation measures outlined in Section 9 are implemented
- Neutral weather conditions

7.4 PREDICTED NOISE LEVELS

Noise levels have been assessed to the construction noise management levels established in Section 5.1. The noise contour maps produced by the three-dimensional noise propagation modelling are provided in Appendix E for indicative works. Predicted noise levels for the demolition, civil works and construction stages have been presented in Table 23 to Table 24. Corresponding noise emission contours are presented in Appendix E.

Table 23: Predicted noise levels – Demolition Works & Civil Works

RECEIVER CATCHMENT	PREDICTED LEVEL RANGE dB(A) $L_{Aeq,15min}$	NOISE MANAGEMENT LEVEL dB(A) $L_{Aeq,15min}$	NOISE MANAGEMENT LEVEL EXCEEDANCE dB	COMPLIES WITH HIGHLY NOISE AFFECTED LEVEL (YES/NO)
RC1 – Residential	67	63	3	Yes
RC2 – Residential	56	58	0	Yes
RC6 – Residential	50	62	0	Yes
RC3 – School	48	55	0	N/A
RC4 – Commercial	58	70	0	N/A
RC5 – Industrial	74	75	0	N/A

Table 24: Predicted noise levels – Construction

RECEIVER CATCHMENT	PREDICTED LEVEL RANGE dB(A) $L_{Aeq,15min}$	NOISE MANAGEMENT LEVEL dB(A) $L_{Aeq,15min}$	NOISE MANAGEMENT LEVEL EXCEEDANCE dB	COMPLIES WITH HIGHLY NOISE AFFECTED LEVEL (YES/NO)
RC1 – Residential	60	63	0	Yes
RC2 – Residential	53	58	0	Yes
RC6 – Residential	48	62	0	Yes
RC3 – School	44	55	0	N/A
RC4 – Commercial	55	70	0	N/A
RC5 – Industrial	71	75	0	N/A

7.5 CONSTRUCTION VIBRATION ASSESSMENT

Based on the indicative expected works and activities summarised in Table 22, vibration intensive activities are expected to be in use during the construction of the development.

Safe working distances for vibration intensive plant for both "cosmetic" damage (in accordance with BS 7385) and human comfort (in accordance with Assessing Vibration – a technical guideline), have been provided, based on the Transport for NSW's "Construction Noise Strategy (2013)". The recommended safe working distances for vibration intensive plant listed above are provided in Table 25.

Table 25: Recommended safe working distances for vibration intensive plant

ACTIVITY / ITEM	SAFE WORKING DISTANCE (METRES)	
	COSMETIC DAMAGE (BS 7385)	HUMAN RESPONSE (OH&E VIBRATION GUIDELINE)
Small Hydraulic Hammer (5t to 12t excavator)	2m	7m
Medium Hydraulic Hammer (12t to 18t excavator)	7m	23m
Large Hydraulic Hammer (18t to 34t excavator)	22m	73m

A detailed assessed of construction vibration is to be undertaken once construction methodologies are determined for the development prior to the Construction Certificate stage. In the event vibration intensive activities are proposed, vibration monitoring may be considered to verify the safe working distances provided in Table 25.

If there are exceedances, reasonable and feasible mitigation measures should be considered to lessen the impact, such as an alternative method of activity or using machinery with less capacity, and additional vibration monitoring should be conducted.

8 OPERATIONAL NOISE AND VIBRATION IMPACT ASSESSMENT

8.1 NOISE-ENHANCING METEOROLOGICAL CONDITIONS

Noise enhancing meteorological conditions have been conservatively adopted for all assessment periods as discussed in Fact Sheet D of the NPfI. This includes assessing against the following parameters; Pasquill-Gillford stability category F with winds up to 2 m/s at 10m.

8.2 MODELLING ASSUMPTIONS

3D acoustic modelling for operational noise emissions levels has been conducted using the software SoundPLAN v9.0. Operational noise emissions were predicted using the CONCAWE noise propagation algorithm which allows for the effects of meteorological conditions (as identified in Section 8.1) to be accounted for when assessing noise propagation over large distances.

The resultant operational noise contours from SoundPLAN modelling are presented in Appendix D.

8.3 OPERATIONAL NOISE ASSESSMENT

An assessment of noise generated by operational activities associated with the waste transfer station has been conducted to calculate the noise impacts on surrounding noise sensitive receivers. A breakdown of typical activities, equipment, and vehicle movements associated with the development is presented in sections below.

8.3.1 Mechanical Plant and Equipment Noise Impact Assessment

Major external mechanical plant and equipment servicing the proposed site are expected to be limited to roof-mounted exhaust fans and outdoor air-conditioning condensers. At this stage of the proposed development, mechanical plant and equipment selections have not been made. During the design development stage of the project, the mitigation measures outlined in Section 10.1 should be considered when preparing the mechanical services to design to ensure compliance with the external noise emissions criteria established in Section 6.1.

Notwithstanding, an assessment of noise from mechanical plant and equipment has been undertaken based on the following assumptions:

- Equipment sound power levels, quantity and location are as per Table 26.

Table 26: Indicative noise levels for major external plant and equipment

EQUIPMENT TYPE	QUANTITY	LOCATION	ASSUMED SOUND POWER LEVEL $L_{Aeq,period}$ - dB(A)
Roof Mounted Exhaust Fans -	5	Evenly distributed across warehouse roof area.	80
Outdoor AC Condenser Units (VRV's)	4	Assumed to be located on southern edge of the proposed warehouse.	85

8.3.2 On-site Light Vehicle Movements

A *Traffic Impact Assessment (TIA)* for the development has been undertaken by Traffix dated December 2024, which assesses parking and traffic impact.

For the purpose of the NVIA, we have adopted the following acoustic assumptions in line with the Traffic TIA:

- It has been conservatively assumed that all 11 staff spaces will be accessed in a peak 1-hour commuter period. This equals up to 3 cars in any given 15-minute period.
- All vehicles are assumed to travel at a speed of 10km/h while on the premises.
- The sound power level of a car travelling at 10km/h is assumed to be 84dB(A)L_{eq}.
- The sound power level of a car engine starting is assumed to be 85dB(A)L_{max}.

8.3.3 Waste Management Operations

8.3.3.1 Equipment Sound Power Levels

ELAB have undertaken attended noise measurements at an existing site currently in use by the operator of the proposed development, located at 7-9 Brennan Close, Asquith. Sound power levels of heavy machinery and vehicles have been calculated from these measurements, as summarised in Table 27 below.

Table 27: Heavy machinery and vehicle sound power levels

EQUIPMENT MODEL/MAKE	EQUIPMENT DESCRIPTION / ACTIVITY	CALCULATED SOUND POWER LEVEL $L_{Aeq,period}$ - dB(A)	CALCULATED SOUND POWER LEVEL L_{Amax} - dB(A)
Hyundai HX145CR 14T Excavator	Excavator sorting waste with "grabs" attachment	112	130
	Reverse buzzer	108	123
	Excavator sorting waste with "grabs" attachment	110	128
Hyundai HL7571 15T Front End Loader (FEL)	FEL pushing waste items around	108	114
	FEL carrying load to truck for transport (empty truck)	116	135
	FEL dumping waste from stockpile to skip truck	111	128
	FEL dragging bucket (sweeping ground waste debris)	109	122
	FEL dropping load into empty large skip (at high level – 2.5m above ground)	120	131
	FEL dropping load into empty large skip (at ground level)	118	128
	Empty large skip being pushed around by FEL	121	131
- Regular Skip (Truck)	Truck idling	101	108
	Skip driving forwards at 10km/h	100	107

EQUIPMENT MODEL/MAKE	EQUIPMENT DESCRIPTION / ACTIVITY	CALCULATED SOUND POWER LEVEL $L_{Aeq,period}$ - dB(A)	CALCULATED SOUND POWER LEVEL L_{Amax} - dB(A)
	Skip dropping waste material	112	127
Isuzu FYJ 300 350 Large Skip Truck	Large skip driving 10km/h	99	112
	Large skip driving 10km/h with airbrake	105	111
	Large skip reverse beeper	100	108
	Empty bin being unloaded	95	101
	Large skip full bin loading full bin	99	114
Isuzu 550 Regular Skip Truck	Regular skip reverse beeper with airbrake	111	118
	Regular skip airbrake	108	117
	Unloading empty bin	104	119
	Pick up of empty stack of bins	99	116

8.3.3.2 Internal Warehouse Operation

ELAB have been advised of the typical activities and machinery for internal warehouse operations, as summarised in Table 28. Sound power levels have been corrected from those calculated in Table 27 where heavier machinery is proposed to be used at the new development, and based on the activities carried out over a 15-minute period.

Table 28: Summary of activities/machinery for use in warehouse

HEAVY MACHINERY/VEHICLE	SOURCE/ACTIVITY SOUND POWER LEVEL	
	SOUND POWER LEVEL $L_{Aeq,period}$ - dB(A)	SOUND POWER LEVEL L_{AMAX} - dB(A)
Excavator – Up to 30T	115	133
Front End Loaders	118	131
Regular Skip Trucks	105	127
Large Skip Trucks	108	114

For the purpose of this assessment, we have conservatively assessed that roller doors to the warehouse will generally remain open during the Day and Evening periods, and will be closed when not used for truck entry/departure at Night.

External building facade elements have been modelled based on the following minimum sound insulation performances:

Table 29: Sound insulation performance of external building facade

BUILDING FAÇADE ELEMENT	MINIMUM SOUND INSULATION PERFORMANCE (R_w)
External Lightweight Walls	R_w 45
External Concrete Walls	R_w 54
Roller Doors	R_w 20
Roof/Ceiling System	R_w 26

8.3.3.3 External Operation (Hardstand Areas)

ELAB have been advised of the typical activities and vehicles/machinery for use in external hardstand areas, as summarised in Table 30. Sound power levels have been corrected from those calculated in Table 27 based on the activities carried out over a 15-minute period.

Table 30: Summary of activities/machinery for external use

HEAVY MACHINERY/VEHICLE	SOURCE/ACTIVITY SOUND POWER LEVEL	
	SOUND POWER LEVEL $L_{Aeq,period}$ - dB(A)	SOUND POWER LEVEL L_{AMAX} - dB(A)
Large Truck Driving at 10km/h	105	112
Large Skip Truck Idling	101	110
Regular Skip Truck Driving at 10km/h	100	107
Regular Skip Truck Idling	100	108

Noise modelling has been undertaken based on the Traffix *Traffic Impact Assessment (TIA)* including swept path movements, and we have been able to demonstrate noise emission compliance with Section 6.1. Furthermore, our assessment also includes the following:

- Based on the Traffix TIA, up to 26 heavy vehicles are expected during the morning/evening peak hour periods, with 80% of trucks arriving between 7am-6pm and 20% between 6pm-7am.
    - This corresponds to a conservative 7 heavy vehicles (4 in, 3 out) in a 15-minute period. This has been adopted in the assessment of Day and Evening periods.
    - Based on the above, up to 1 vehicle movement is expected within a 15-minute period during the Night.
- Vehicles are expected to travel at a speed of no greater than 10km/h while in the hardstand areas.
- Table 17 of the TIA provides the following dwell times for trucks on site. This assessment has conservatively adopted an average dwell time of 10 minutes for all heavy vehicles on site.

Table 31: Truck on site dwell times from Traffix TIA

ACTIVITY	TIME - HRV	Time – B-Double
ARRIVAL		
Arrive on site, visual inspection carried out by spotter, then directed to weighbridge	Less than 30 seconds	Less than 1 minute
Weighbridge	Less than 30 seconds	Less than 30 seconds
WASTE SORTING		
Proceed into warehouse, manoeuvre into position for tip face	Less than 1 minute	Less than 2 minutes
Tip and spread of material	1 minute	2-3 minutes
Visual inspection of spread load	1 minute	2 minutes
DEPARTURE		
Proceed to weighbridge (Noting already manoeuvred into exit position)	30 seconds	30 seconds
Weighbridge	Less than 30 seconds	Less than 30 seconds
Total	**Less than 7 minutes**	**Approx. 10 minutes**

8.3.4 Predicted Noise Levels

In consideration of the assumptions detailed above, noise emissions to surrounding noise sensitive receivers have been assessed based on a typical worst case 15-minute periods.

In all scenarios above, internal and external warehouse activities will operate as described in Section 8.3.3, and mechanical plant will be operating with noise levels as described in Section 8.3.1. Predicted operational noise levels for the above scenarios are summarised in Table 32, and are also shown on operational noise contours in Appendix D.

Table 32: Predicted operational noise levels (L_{Aeq} noise emissions)

TIME OF DAY	RECEIVER CATCHMENT	PREDICTED NOISE LEVEL, $L_{AEQ(15MIN)}$	PROJECT TRIGGER NOISE LEVEL, $L_{AEQ(15MIN)}$	COMPLIES
Day	RC1 – Residential	57	58	Yes
	RC2 – Residential	48	53	Yes
	RC6 – Residential	43	57	Yes
	RC3 – School	42	43	Yes
	RC4 – Commercial	50	63	Yes
	RC5 – Industrial	65	68	Yes
Evening	RC1 – Residential	57	57	Yes
	RC2 – Residential	48	48	Yes
	RC6 – Residential	43	48	Yes
	RC3 – School	42	43	Yes
	RC4 – Commercial	50	63	Yes
	RC5 – Industrial	65	68	Yes
Night	RC1 – Residential	52	56	Yes
	RC2 – Residential	43	43	Yes
	RC6 – Residential	36	43	Yes
	RC3 – School	32	43	Yes
	RC4 – Commercial	46	63	Yes
	RC5 – Industrial	59	68	Yes

Events with the potential to cause sleep disturbances have been identified in Table 28 and Table 30. Predicted L_{Amax} noise levels are summarised in Table 33.

Table 33: Predicted operational noise levels (L_{Amax} noise emissions)

RECEIVER CATCHMENT	PREDICTED NOISE LEVEL, L_{AMAX}	SLEEP DISTURBANCE TRIGGER LEVEL, L_{AMAX}	COMPLIES
RC1 – Residential	53	56	Yes
RC2 – Residential	45	53	Yes
RC6 – Residential	< 40	56	Yes

Note 1: Noise levels have been conservatively assessed to residential receivers with windows open, assuming a 10dB loss from outside to inside.

8.4 TRAFFIC NOISE GENERATION

The Traffix *TIA* provides an analysis of traffic volume contributions from the development on surrounding road networks. This has been split into light vehicles and trucks, as shown in Figure 4 and Figure 5 respectively.

Figure 4: Light Vehicles AM/PM Peak Hour Traffic Distribution – Sourced from Traffix TIA

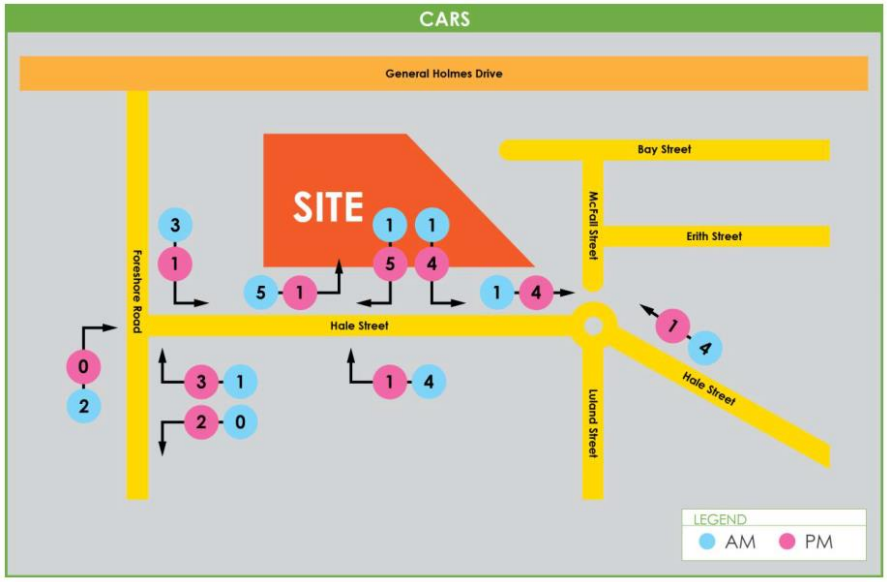
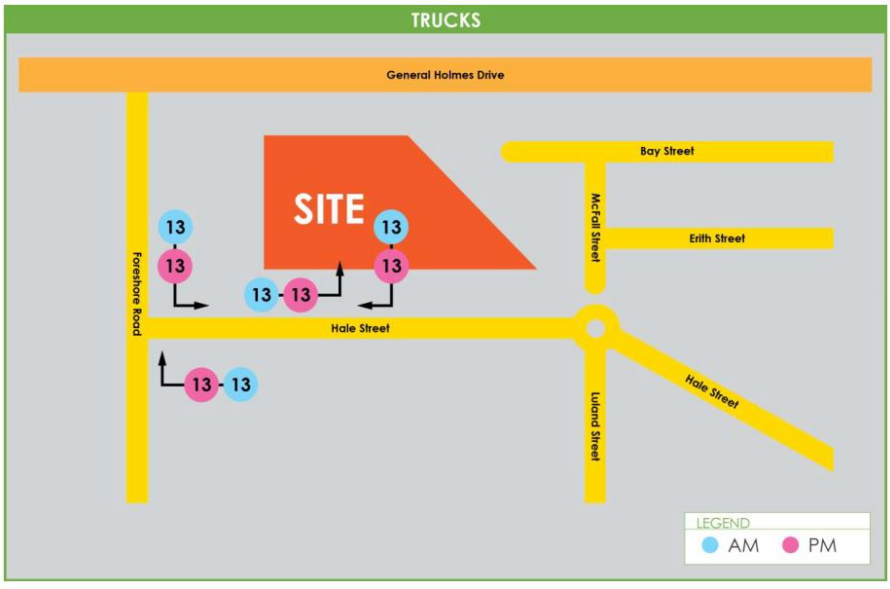


Figure 5: Heavy Vehicles AM/PM Peak Hour Traffic Distribution – Sourced from Traffix TIA



In consideration of the information above provided in the Traffix TIA, we note:

- A net traffic generation reduction is expected during both AM and PM peak periods from the proposed site operations.
- All trucks departing and entering the project site will do so from the West via Foreshore Road and General Holmes Drive. This includes the implementation of no-right turn signs on both sides of Hale Street facing westbound traffic, and no left-turn signs on the exit driveway. On this basis, heavy vehicles will not result in any significant noise impacts on noise sensitive residences identified in Section 3.
- Up to 4 light vehicles (staff vehicles) in a peak hour are expected to depart to and enter from the Easterly direction of Hale Street. On this basis, road traffic noise impacts are expected to satisfy the requirements of the NSW EPA *Road Noise Policy* in that noise from the 4 additional light vehicles travelling east from the project site will not result in an increase of more than 2dB of existing traffic noise levels.

9 CONSTRUCTION NOISE AND VIBRATION MITIGATION MEASURES

9.1 PROJECT SPECIFIC RECOMMENDATIONS

Project specific recommendations and required mitigation methods have been listed below. For general noise and vibration mitigation and management measures, refer to Section 9.2.

9.1.1 Noise

A preliminary assessment of indicative works has been undertaken in Section 7. Noise modelling indicates that construction noise emissions to nearby noise sensitive receivers will result in a minor, and likely intermittent exceedance of noise management levels during demolition and civil works when larger and louder equipment is in use. Works during the construction stage are expected to satisfy the noise management level, and the highly noise affected level is expected to be satisfied during all stages of work.

Notwithstanding the above, the following mitigation measures could be adopted as a best practice approach and reasonable and feasible measures to ensure noise emissions are minimised during each stage of construction:

- Where possible, stationary plant (such as concrete trucks, generators, vehicle hardstand areas) should be located centrally within the site or towards the western edge of the project site to maximise their distance to industrial development along the northern boundary, and residences to the east.
- As much as possible, equipment such as trucks and concrete pumps should be switched off when not in use.

Site specific construction noise mitigation measures are expected to be finalised as part of a future Construction Noise and Vibration Management Plan once construction methodologies and staging are determined where reasonable and feasible.

9.1.2 Vibration

Residential receivers identified in Figure 1 will not be affected by construction vibrations impacts associated with the development.

The nearest potentially affected structure includes industrial use buildings to the north of the project site. Based on the indicative safe working distances listed in Table 25, the risk of cosmetic damage or adverse comment from building occupants is low. Furthermore, vibration intensive works are not expected to be conducted as part of the development's construction.

In the event vibration intensive activities are proposed, site specific safe working distances should be determined once vibration emission levels are measured on site prior to continuous operation.

9.1.3 Out of Hours Construction

Noise management levels for out of hours construction activities are summarised in Table 34 based on the ICNG recommendations detailed in Table 9.

Table 34: ICNG noise management levels for out of hours works

RECEIVER	TIME OF DAY	MEASURED RBL - dB(A)	OUT OF HOURS CONSTRUCTION NOISE MANAGEMENT LEVEL - $L_{Aeq,15min}$ dB(A)
RC1 – Residential (Urban)	Evening	52	57
	Night	42	47
RC2 – Residential (Urban)	Evening	47	52
	Night	38	43
RC2 – Residential (Urban)	Evening	52	57
	Night	41	46

Some construction work may be needed to be undertaken outside of standard construction hours subject to construction methodology, and interface with airspace protection surface where cranes are in use.

At the time of writing, equipment and methodology is yet to be defined. Once equipment, methodology and air-space requirements are known, a construction noise and vibration management plan will be finalised accordingly to determine reasonable and feasible mitigation measures.

9.2 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.

9.2.1 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 demountable offices can be effective barriers); and
- Constructing barriers that are part of the project design early in the project to introduce the mitigation of site noise.

Screening

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

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.

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 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.

In many cases it is 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.

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

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:

- 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;
- Variable-level alarms reduce the emitted noise levels by detecting the background noise level and adjusting the alarm level accordingly;
- Non-audible warning systems (e.g. flashing lights, reversing cameras) may also be employed, providing safety considerations, are not compromised;
- 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; and
- Spotters or observers.

The above methods should be combined, where appropriate.

9.2.2 Vibration

Vibration can be more difficult to control than noise, and there are few generalizations that can be made about its control. It should be kept in mind that vibration may cause disturbance by causing structures to vibrate and radiate noise in addition to perceptible movement.

During the demolition works and the erection of new structures, some vibrations (transmitted through the structure from the demolition sites) are not expected to be significant or noticeable.

General principles of seeking minimal vibration at receiving structures should be followed in the first instance. Predictions of vibration levels likely to occur at sensitive receivers are recommended when they are relatively close, depending on the magnitude of the source of the vibration or the distance associated. Relatively simple prediction methods are available in textbooks, codes of practice and standards, however, it is preferable to assess site transmission and propagation characteristics between source and receiver locations through measurements.

Guidance for measures available for the mitigation of vibration transmitted can be sought in more detailed standards, such as BS 5228-2 or policy documents, such as the NSW DEC *Assessing Vibration: A technical guideline*. These measures should be considered when developing a future Construction Noise and Vibration Management Plan prior to obtaining a Construction Certificate. Identifying the strategy best suited to the control of vibration

follows a similar approach to that of noise: avoidance, control at the source, control along the propagation path, control at the receiver, or a combination of these. It is noted that vibration sources can include stationary plants (pumps and compressors), portable plants (jackhammers and pavement vibrators), mobile plants and pile-drivers amongst others. Unusual ground conditions, such as a high water-table, can also cause a difference to expected or predicted results, especially when considering the noise propagated from piling.

9.2.3 Community Consultation to be Undertaken

The contractor shall directly contact adjacent noise sensitive receivers and provide them with the following information:

- The contact details for a nominated representative in order to make noise / vibration complaints.
- Explain the timeframe for the construction works and the proposed activities, i.e. the proposed start / stop dates of work and a description of the noise producing equipment that will be used.
- Notify the noise sensitive receivers and Council in a timely manner should there be any need for an extension to the proposed arrangements.
- Provide them with a copy of this report as may be approved.
- Council should be notified of the nature and details of any complaints received (time, complainant etc.) and what remedial action has taken place, if any.
- Where noise is demonstrated as being compliant with criteria, this should not limit the proponent in undertaking further additional reasonable and feasible steps to reduce noise emissions.

9.2.4 Complaint Handling Procedures and Community Liaison

To assist in the management of noise and vibration complaints various procedures are to be followed. These include, but are not limited to:

- Clearly visible signage identifying any key personnel along with their contact details to be erected along the perimeter of the building site including:
  - A 24-hour contact name, phone number and email address provided for the resident to address any complaint. The signage will declare; “For any enquiry, complaint or emergency relating to this site at any time please contact…”
- The contact details for a nominated representative in order to make noise / vibration complaints.
- Explain the timeframe for the construction works and the proposed activities, i.e. the proposed start / stop dates of work and a description of the noise producing equipment that will be used.
- Notify the noise sensitive receivers and Council in a timely manner should there be any need for an extension to the proposed arrangements.
- Provide them with a copy of this report as approved by Council.
- Where noise is demonstrated as being compliant with criteria, this should not limit the proponent in undertaking further additional reasonable and feasible steps to reduce noise emissions.
- Give complaints a fair hearing.
- Have a documented complaints process, including an escalation procedure so that if a complaint is not satisfied there is a clear path to follow.
- Call back as soon as possible to keep people informed of action to be taken to address noise problems. Call back at night time only if requested by the complainant to avoid further disturbance.
- Implement all feasible and reasonable measures to address the source of the complaint.
- A register is to be kept by the contractor to keep a record of complaints and detail any information associated with them. The contents of the register will include:

- The name and the address of the complainant
- Time and date of the complaint
- The nature of the complaint (Noise/Vibration)
- Subsequent details
- Remedial action undertaken

The contents of the register will be maintained and updated with any new complaint without delay. The complaints will be reported to both Council and the Contractor. The investigation of the complaint and any remedial actions will be performed by the builder and/or client representative.

In the event of noisy works scheduled, the builder will notify residents minimum 48 hours in advance.

9.3 NOISE & VIBRATION MONITORING STRATEGY

General Methodology

Noise and vibration levels should be monitored from time to time to ensure that noise and vibration generated as a result of construction activities is appropriate.

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; and
- 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 in order 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.

Both methodologies 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.

9.3.1 Noise & Vibration Monitoring Program

Noise and vibration monitoring programme shall be developed in a future Construction Noise and Vibration Management Plan as part of the submission for a Construction Certificate. This way, the noise and vibration monitoring strategy will be tailored specifically for the methods of construction used once the design has developed.

10 RECOMMENDED OPERATIONAL NOISE MITIGATION MEASURES

10.1 MECHANICAL PLANT AND EQUIPMENT NOISE IMPACT ASSESSMENT

In the absence of specific equipment selections, we have assessed mechanical plant noise emissions based on indicative and typical equipment sound power levels expected for this type of development as scheduled in Table 26. Based on the scheduled equipment sound power levels and equipment siting, noise emission requirements are achieved without any specific mitigation measures for mechanical plant and equipment.

Notwithstanding the above, we expect that a detailed review of equipment selections and siting is to be undertaken during the design development stage to ensure compliance with the outlined criteria at the nearest sensitive receiver catchments.

10.2 NOISE MITIGATION MEASURES

10.2.1 Operational Noise Mitigation Measures

Operational noise emissions have been assessed in Section 8.3, with operational assumptions detailed in Section 8.3.2 and Section 8.3.3. This includes the following reasonable and feasible mitigation measures:

- Scheduling of heavy vehicle movements such that peak hour movements in the Traffix TIA are not exceeded, being up to 26 during the Day and Evening peak hours, and 4 during a Night time peak hour.
- Speed limit signage of no more than 10km/h in hardstand areas.
- Signage to ensure heavy vehicles departing the project site are prevented from travelling east along Hale Street.

The operational management plan is to reference this report and all noise controls are to be adhered to.

10.2.2 Building Construction Noise Mitigation Measures

The construction of the warehouse building shall be designed to achieve the following noise minimum sound insulation performance:

Table 35: Sound insulation performance of external building façade – mitigation measures

BUILDING FAÇADE ELEMENT	MINIMUM SOUND INSULATION PERFORMANCE (R_w)
External Lightweight Walls	R_w 45
External Concrete Walls	R_w 54
Roller Doors	R_w 20
Roof/Ceiling System	R_w 26

11 CONCLUSION

This Noise and Vibration Impact Assessment has been prepared in support of a Sate Significant Development Application Development Application (DA) made to the NSW Department of Planning and Environment for the proposed waste transfer station and associated spaces to be located at 2-4 Hale Street, Botany.

The following has been assessed as part of this noise and vibration impact assessment:

- Noise generated by external vehicles movements (trucks, cars and other moving equipment) and warehouse activities from general operation of the site
- Noise impacts of additional traffic on surrounding local roads generated by the proposed development
- Noise emissions from mechanical plant associated with the development
- Noise and vibration impacts from the construction of the development

The acoustic, noise and vibration legislation, standards and guidelines applicable to the proposal include:

- Planning Secretary's Environmental Assessment Requirements for SSD- 62855708, dated 25 October 2023 (**SEARs**)
- NSW EPA *Road Noise Policy* 2011 (**RNP**)
- NSW EPA Noise Policy for Industry 2017 (**NPfI**)
- NSW EPA Interim Construction Noise Guideline 2009 (**ICNG**)
- AS 2436:2010 (R2016) Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites (AS 2436:2010)
- BS 6472:1992 Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz) (BS 6472)
- BS 7385.2:1993 Evaluation and Measurement for Vibration in Buildings Part 2: Guide to Damage Levels from Ground-borne Vibration (BS 7385)
- DIN 4150.3:1999 Structural Vibration Part 3: Effects of Vibration on Structures (DIN 4150)

Having given regard to the analysis conducted within this report, it is the finding of this noise and vibration impact assessment that the proposal 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, subject to the mitigation measures outlined within Section 9 and Section 10 of this report.

Appendix A **Noise Monitoring Locations**

Figure 6: Noise monitor location LT1 (Image 1)

Figure 7: Noise monitor location LT1 (Image 2)

Figure 8: Noise monitor location LT2 (Image 1)

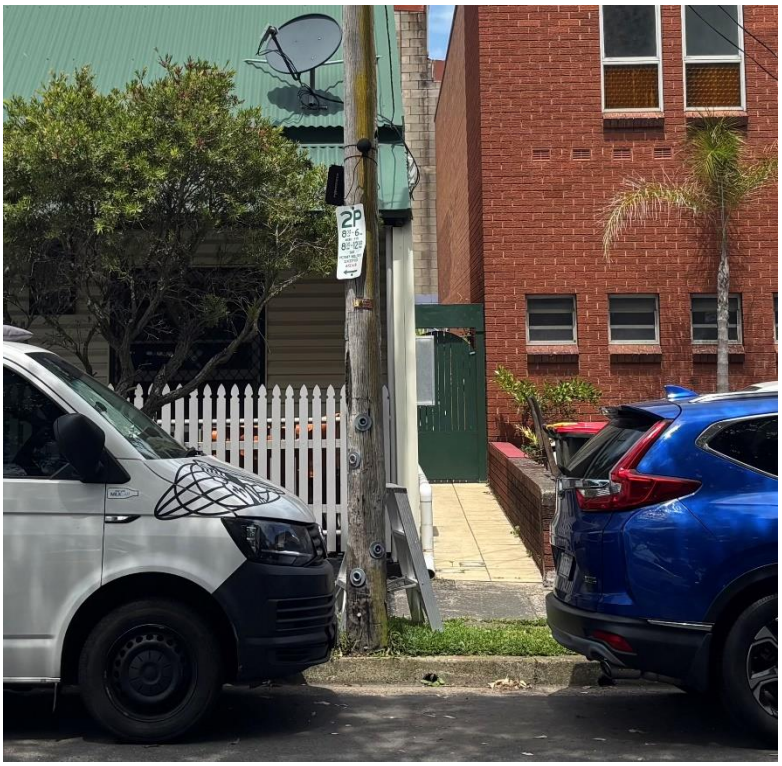


Figure 9: Noise monitor location LT2 (Image 2)

Figure 10: Noise monitor location LT3 (Image 1)

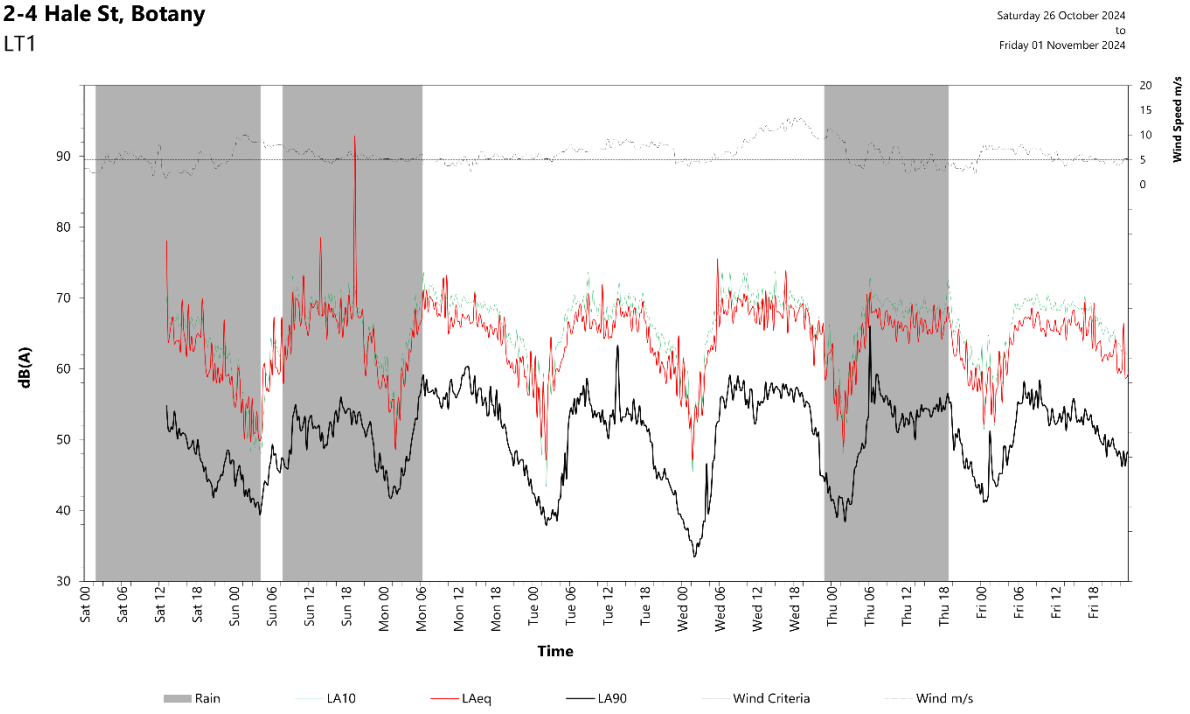
Figure 11: Noise monitor location LT3 (Image 2)

Appendix B **Long-term Noise Monitoring Results**

Figure 12: Long-term noise monitoring data graph (LT1)

2-4 Hale St, Botany

LT1



2-4 Hale St, Botany

LT1

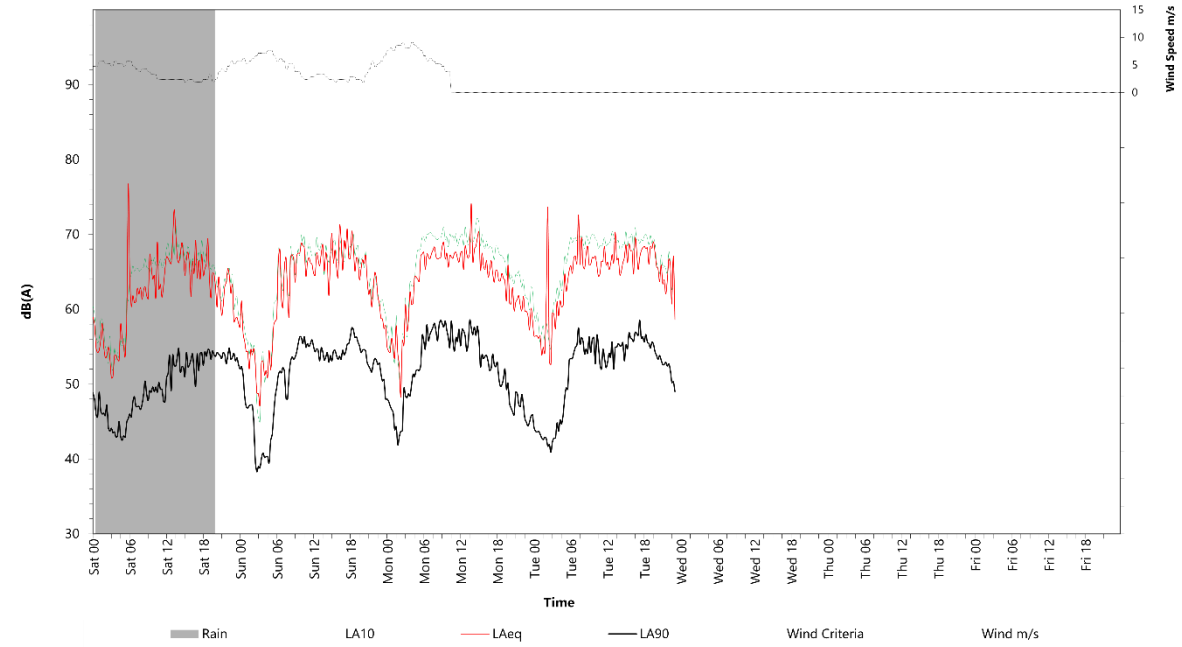
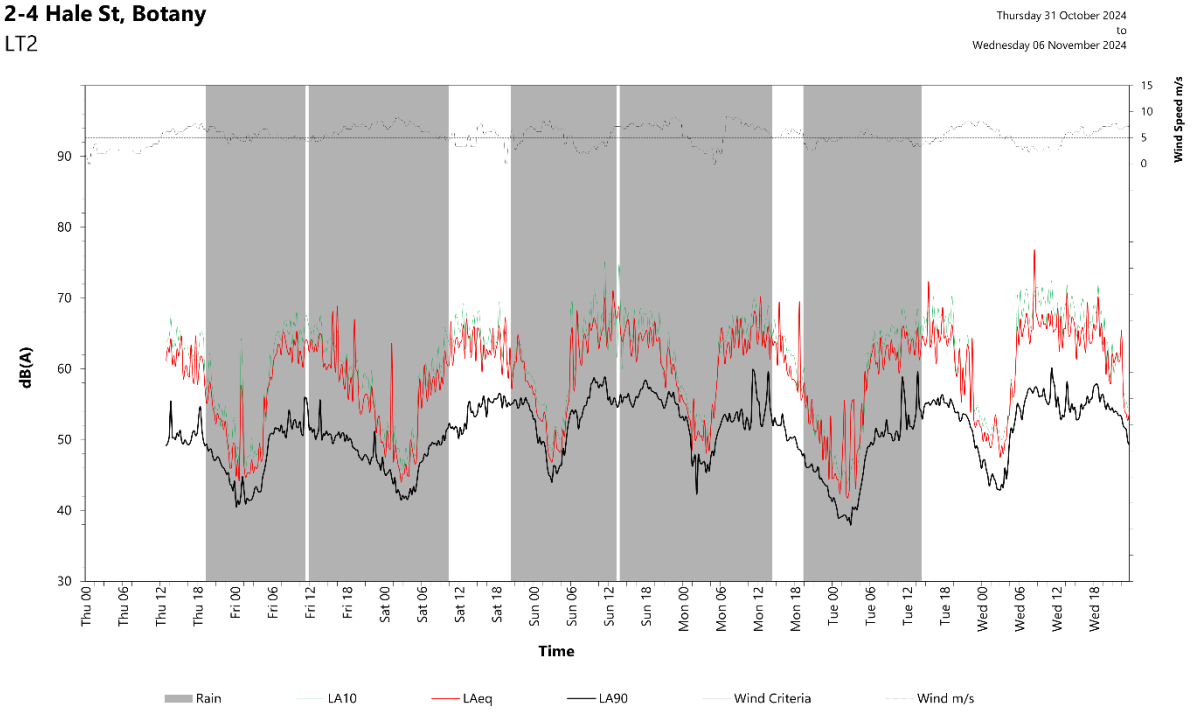


Figure 13: Long-term noise monitoring data graph (LT2)



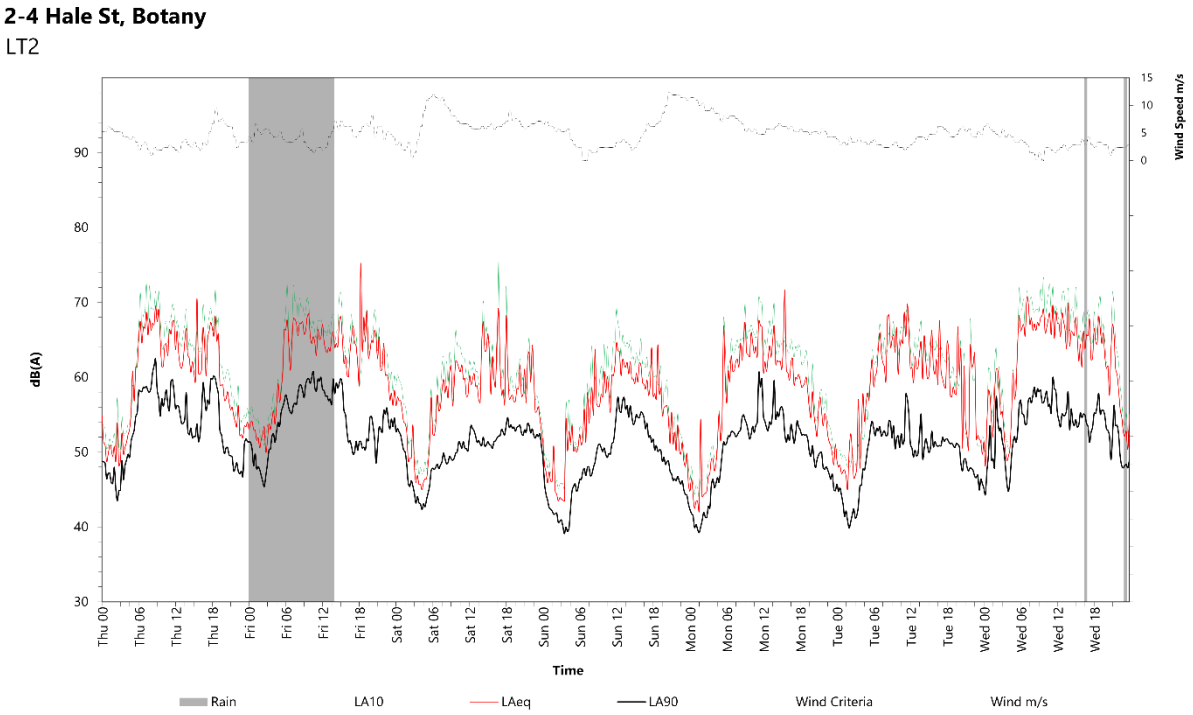
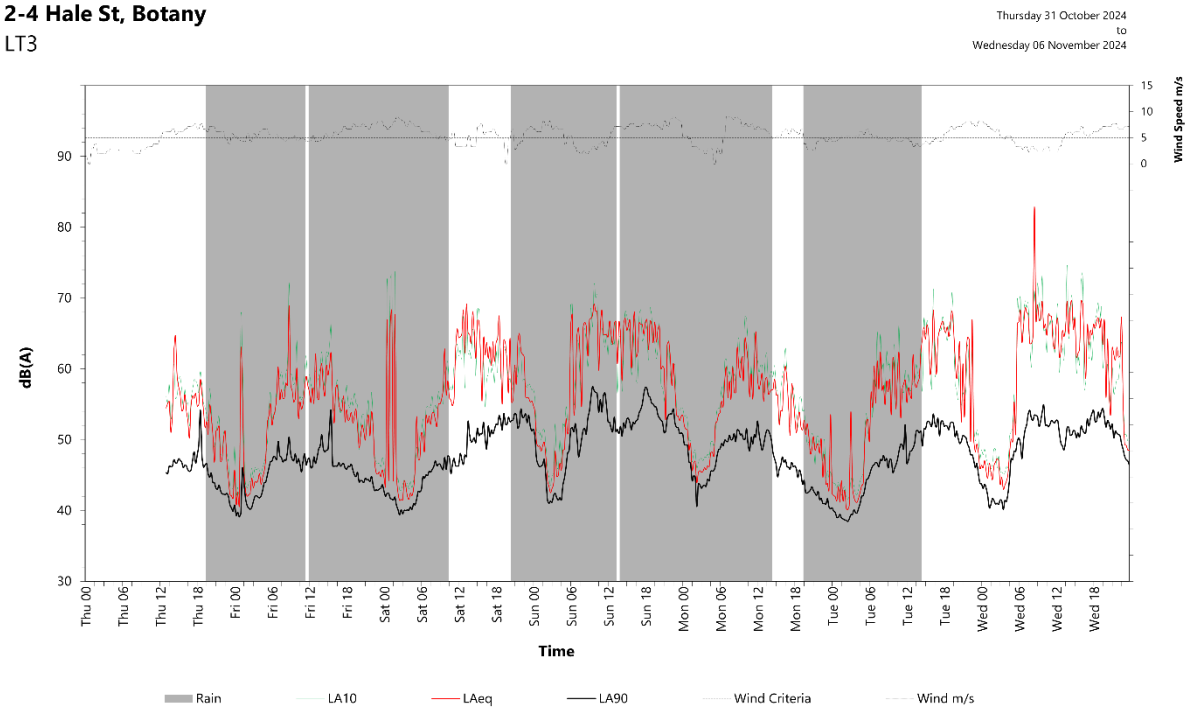
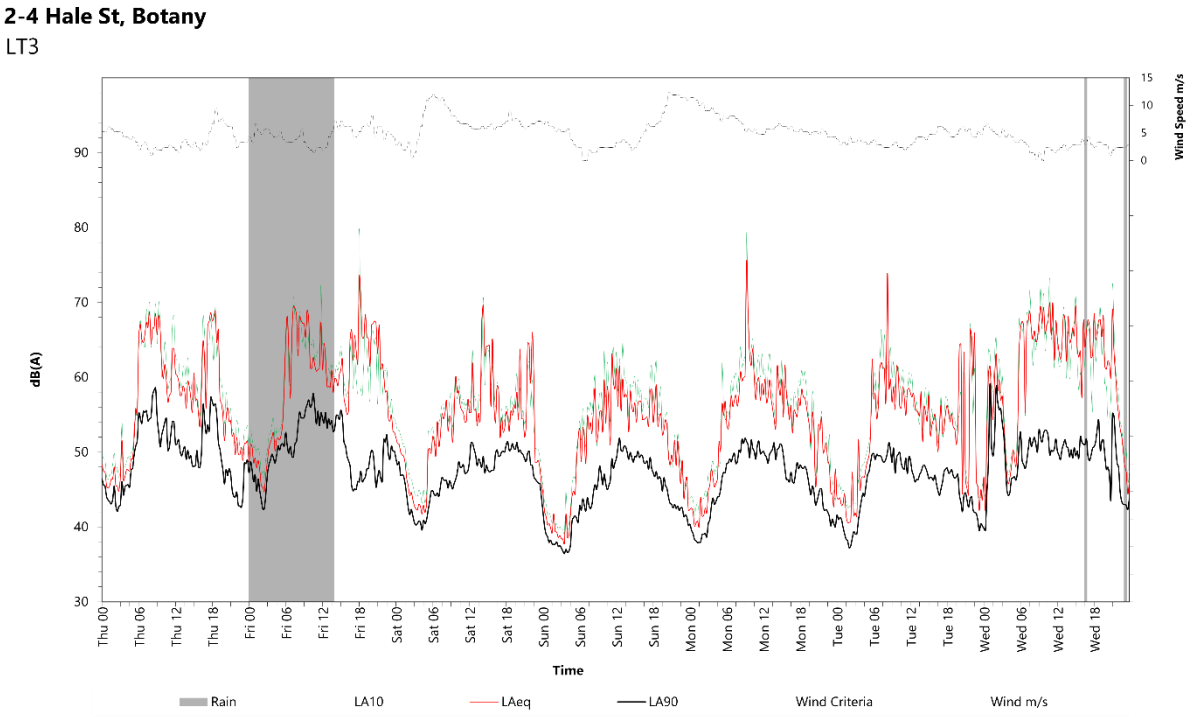


Figure 14: Long-term noise monitoring data graph (LT3)





Appendix C **Noise Monitor Calibration Certificates**

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C24351

Client Details	Acoustic Research Labs Pty Ltd Unit 36, 14 Loyalty Road North Rocks NSW 2151
Equipment Tested/ Model Number :	Ngara
Instrument Serial Number :	8780C7
Microphone Serial Number :	318886
Pre-amplifier Serial Number :	28005
Firmware Version :	v12.6

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	23.8 °C	**Ambient Temperature :**	24.6 °C
Relative Humidity :	58.7 %	**Relative Humidity :**	57.9 %
Barometric Pressure :	100.85 kPa	**Barometric Pressure :**	100.85 kPa

Calibration Technician :	Peter Elters	**Secondary Check:**	Rhys Gravelle
Calibration Date :	13 May 2024	**Report Issue Date :**	13 May 2024

Approved Signatory :  Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*N/A*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*N/A*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13 dB*	*Temperature*	*±0.1 °C*
1kHz	*±0.13 dB*	*Relative Humidity*	*±1.9 %*
8kHz	*±0.14 dB*	*Barometric Pressure*	*±0.11 kPa*
Electrical Tests	*±0.13 dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

CERTIFICATE OF CALIBRATION

Certificate Number: 8359

NATA Accreditation No: 20688

Customer: **E-Lab Consulting**
Level 6, 200 Adelaide Street
Brisbane City, QLD, Australia 4000

Test object:	Manufacturer:	Test object:	Serial no:	ID:
Sound level meter	Convergence Instruments	NSRT_mk3	AFrUJvWw290%qpHAS8pZHD	8359
Microphone:	Included	NSRT_mk3	AFrUJvWw290%qpHAS8pZHD	8359
Preamplifier	Included	NSRT_mk3	AFrUJvWw290%qpHAS8pZHD	8359
Calibrator	-	-	-	-
Wind screen	-	-	-	-

Information:

Test Configuration:	Acoustic Test
Instrument Manual:	NSRT_MK3 User Manual
Firmware Version:	n/a
Class of Instrument:	Class 1
Source of Correction Data:	Convergence Instruments

Environmental Conditions:	Pressure:	Temperature:	Relative Humidity:
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Conditions Before Measurement:	101.42 kPa	23.1 °C	35.2 % RH
Conditions After Measurement:	101.56 kPa	23.4 °C	35.6 % RH

The laboratory environmental conditions remained within the acceptable limits as defined in IEC 61672.3 and IEC 61260 throughout the calibration test.

The measurements are performed according to *IEC 60651 Sound level meters*.

The expanded uncertainty of measurement is reported at approximately 95% confidence level with a coverage factor k, of 2.

Accredited for compliance with ISO/IEC 17025 - Calibration.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports

Date of Calibration: 19/07/2024
Date of Issue: 19/07/2024
Authorised Signatory:

Claire Richardson

CERTIFICATE OF CALIBRATION

Certificate Number: 8361

NATA Accreditation No: 20688

Customer: **E-Lab Consulting**
Level 6, 200 Adelaide Street
Brisbane City, QLD, Australia 4000

Test object:	**Manufacturer:**	**Test object:**	**Serial no:**	**ID:**
Sound level meter	Convergence Instruments	NSRT_mk3	CNBcj1UQ8fe3gDPgZ0B5HD	8361
Microphone:	Included	NSRT_mk3	CNBcj1UQ8fe3gDPgZ0B5HD	8361
Preamplifier	Included	NSRT_mk3	CNBcj1UQ8fe3gDPgZ0B5HD	8361
Calibrator	-	-	-	-
Wind screen	-	-	-	-

Information:

Test Configuration:	Acoustic Test
Instrument Manual:	NSRT_MK3 User Manual
Firmware Version:	n/a
Class of Instrument:	Class 1
Source of Correction Data:	Convergence Instruments

Environmental Conditions:	**Pressure:**	**Temperature:**	**Relative Humidity:**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Conditions Before Measurement:	101.42 kPa	23.1 °C	35.2 % RH
Conditions After Measurement:	101.56 kPa	23.4 °C	35.6 % RH

The laboratory environmental conditions remained within the acceptable limits as defined in IEC 61672.3 and IEC 61260 throughout the calibration test.

The measurements are performed according to *IEC 60651 Sound level meters*.

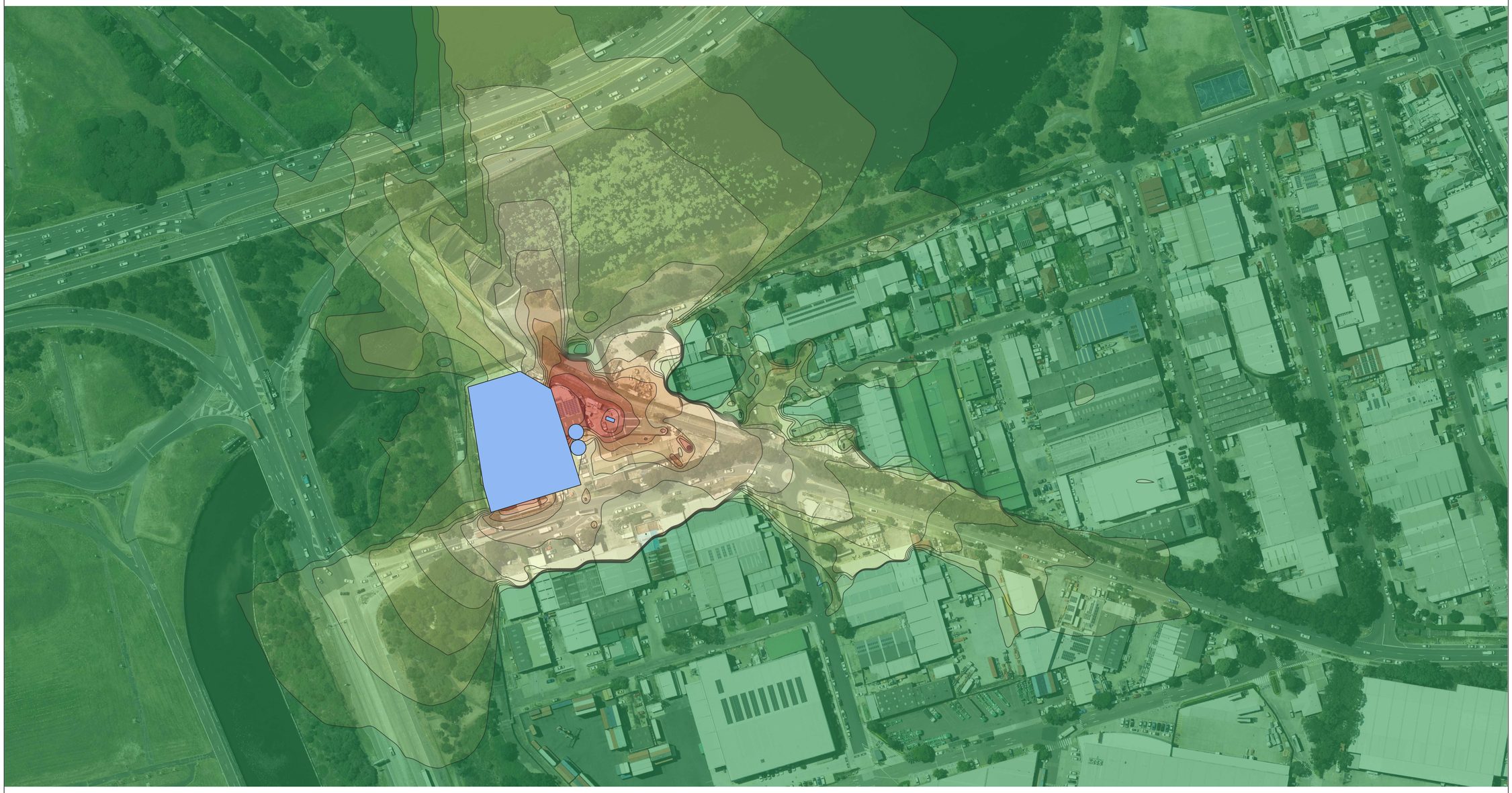
The expanded uncertainty of measurement is reported at approximately 95% confidence level with a coverage factor k, of 2.

Accredited for compliance with ISO/IEC 17025 - Calibration.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports

Date of Calibration: 19/07/2024
Date of Issue: 19/07/2024
Authorised Signatory:

Claire Richardson

Appendix D **Operational Noise Contours**



E-LAB CONSULTING

ISSUE	DATE	STATUS
1	16/04/2024	For Information
2	14/01/2025	For Information

LEGEND

Predicted Noise Level - dB(A)$L_{eq(15min)}$

- ≤ 43
- 43 - 46
- 46 - 49
- 49 - 52
- 52 - 55
- 55 - 58
- 58 - 61
- 61 - 64
- 64 - 67
- 67 - 70
- 70 - 73
- 73 - 76
- 76 - 79
- ≥ 79

NOTES

Proposed development buildings

PROJECT
2-4 HALE STREET, BOTANY

PROJECT NO.
P00945

ARCHITECT
REID CAMPBELL ARCHITECTS

CLIENT
CFT NO. 16 PTY LIMITED ACN 657 318 244 ATF COOMBES FAMILY TRUST NO 16

SCALE
NTS

STATUS
FOR INFORMATION

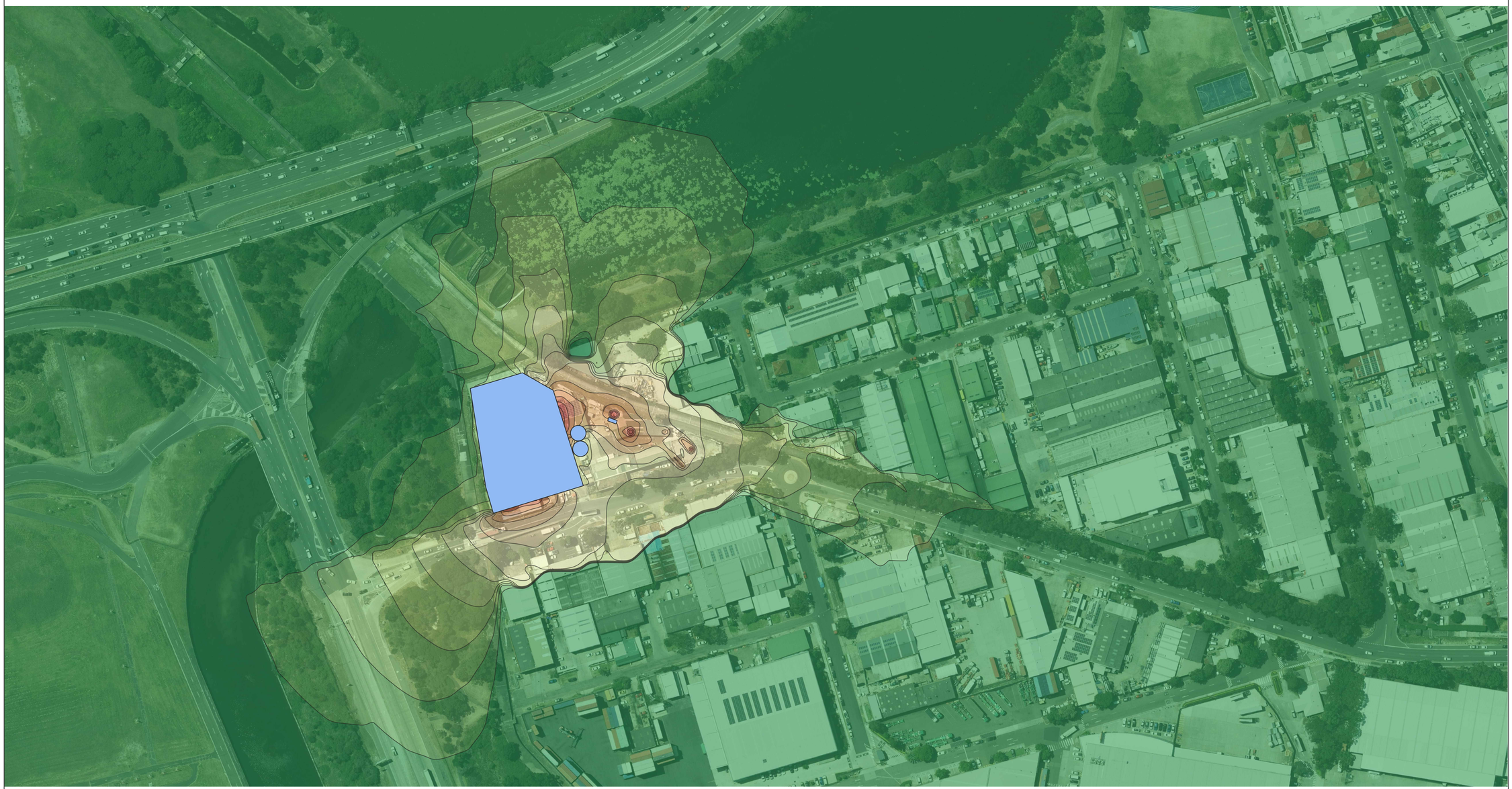
DRAWING
OPERATIONAL NOISE CONTOURS

DAY & EVENING TIME

DISCIPLINE
ACOUSTICS AND VIBRATION

DRAWING NUMBER
AC-DWG-100-01-01

REVISION
002



E-LAB CONSULTING

ISSUE	DATE	STATUS
1	16/04/2024	For Information
2	14/01/2025	For Information

LEGEND

Predicted Noise Level - dB(A)$L_{eq(time)}$

- ≤ 43
- 43 - 46
- 46 - 49
- 49 - 52
- 52 - 55
- 55 - 58
- 58 - 61
- 61 - 64
- 64 - 67
- 67 - 70
- 70 - 73
- 73 - 76
- 76 - 79
- ≥ 79

NOTES

Proposed development buildings

PROJECT
2-4 HALE STREET, BOTANY

PROJECT NO.
P00945

ARCHITECT
REID CAMPBELL ARCHITECTS

CLIENT
CFT NO. 16 PTY LIMITED ACN 657 318 244 ATF COOMBES FAMILY TRUST NO 16

SCALE
NTS

STATUS
FOR INFORMATION

DRAWING
OPERATIONAL NOISE CONTOURS

NIGHT TIME

DISCIPLINE
ACOUSTICS AND VIBRATION

DRAWING NUMBER
AC-DWG-100-02-01

REVISION
002

Appendix E **Construction Noise Contours**

E-LAB CONSULTING

ISSUE	DATE	STATUS
1	16/04/2024	For Information

LEGEND

Predicted Noise Level - dB(A)$L_{eq(15min)}$

- ≤ 55
- 55 - 58
- 58 - 61
- 61 - 64
- 64 - 67
- 67 - 70
- 70 - 73
- 73 - 76
- 76 - 79
- 79 - 82
- 82 - 85
- ≥ 85

NOTES

PROJECT
2-4 HALE STREET, BOTANY

PROJECT NO.
P00945

ARCHITECT
REID CAMPBELL ARCHITECTS

CLIENT
CFT NO. 16 PTY LIMITED ACN 657 318 244 ATF COOMBES FAMILY TRUST NO 16

SCALE
NTS

STATUS
FOR INFORMATION

DRAWING
CONSTRUCTION NOISE CONTOURS

DEMOLITION AND CIVIL WORKS

DISCIPLINE
ACOUSTICS AND VIBRATION

DRAWING NUMBER	REVISION
AC-DWG-200-01-01	001

E-LAB CONSULTING

ISSUE	DATE	STATUS
1	16/04/2024	For Information

LEGEND

Predicted Noise Level - dB(A)$L_{eq(15min)}$

- ≤ 55
- 55 - 58
- 58 - 61
- 61 - 64
- 64 - 67
- 67 - 70
- 70 - 73
- 73 - 76
- 76 - 79
- 79 - 82
- 82 - 85
- ≥ 85

NOTES

PROJECT
2-4 HALE STREET, BOTANY

PROJECT NO.
P00945

ARCHITECT
REID CAMPBELL ARCHITECTS

CLIENT
CFT NO. 16 PTY LIMITED ACN 657 318 244 ATF COOMBES FAMILY TRUST NO 16

SCALE
NTS

STATUS
FOR INFORMATION

DRAWING
CONSTRUCTION NOISE CONTOURS

CONSTRUCTION WORKS

DISCIPLINE
ACOUSTICS AND VIBRATION

DRAWING NUMBER	REVISION
AC-DWG-200-02-01	001