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MOOREBANK INTERMODAL PRECINCT EAST

Monitoring Report for Mechanical Plant (SSD 7628 B85) - Warehouse E6

11 May 2025

The Trust Company (Australia) Limited (ACN 000 000 993) As Trustee of The Moorebank Industrial Warehouse Trust (ABN 51 402 161 047) c/- ESR Developments (Australia) Pty Ltd

TM306-05F03 E6 Warehouse B85 Operational Noise Monitoring (r1)

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Document details

Detail	Reference
Doc reference:	TM306-05F03 E6 Warehouse B85 Operational Noise Monitoring (r1)
Prepared for:	The Trust Company (Australia) Limited (ACN 000 000 993) As Trustee of The Moorebank Industrial Warehouse Trust (ABN 51 402 161 047) c/- ESR Developments (Australia) Pty Ltd
Attention:	Mark Howley

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
11.05.2025	Initial issue (draft)	0	1	M. Ali	A. Leslie	A. Leslie

File Path: \\192.168.168.249\data\AssocSydProjects\TM301-TM350\TM306 ale Moorebank Intermodal Terminal (LOGOS)\Task5 Monitoring\1 Docs\05 MPE E6\TM306-05F03 E6 Warehouse B85 Operational Noise Monitoring (r1).docx

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1 Introduction

1.1 Monitoring report purpose

Renzo Tonin & Associates was engaged by ESR Developments (Australia) Pty Ltd (ESR) on behalf of The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the Moorebank Industrial Warehouse Trust to undertake noise monitoring of the warehouse mechanical plant and other noisy equipment to satisfy the State Significant Development (SSD) 7628 B85 consent condition (CoC) for Warehouse E6.

The Moorebank Intermodal Precinct (MIP) is located approximately 27 kilometres south-west of the Sydney Central Business District and approximately 26 kilometres west of Port Botany, within the Liverpool Local Government Area. The MIP is divided into an East Precinct and a West Precinct, located east and west of Moorebank Avenue respectively, as shown in Figure 1. Warehouse E6 is located within the Moorebank Precinct East (MPE).

Warehouse E6 is separated into E6A (western warehouse), and E6B (eastern) warehouse. The western warehouse (E6B) is currently tenanted by the Qube Holdings Logistics (Qube), while the eastern warehouse (E6A) is currently tenanted by Ceva Logistics (Ceva).

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 2 of the MPE development, State Significant Development (SSD) 7628. The approval includes 300,000m^2 GFA of warehousing. These warehouse operations, including Warehouse E6, fall under the area and activities approved as part of SSD 7628.

Specifically, this report has been prepared to address the noise emissions from the fixed mechanical plant and equipment of the warehouse that operate as part of typical warehouse operations in accordance SSD 7628 CoC B85 of, and as detailed in the MPE Operational Noise and Vibration Management Plan[1] (MPE ONVMP).

SSD 7628 Consent Condition B85 requires noise monitoring of valid data for comparison against the mechanical plant and equipment noise levels predicted in the SSD 7628 Consent Condition B84 assessment prepared by Pulse White Noise Acoustics (PWNA) (*LOGOS MPE 6 & 7 – Acoustic Design Report*, Report number: *220518 - LOGOS MPE 6&7 - Acoustic Design Report – R5*, 28 March 2023) (B84 assessment).

This report is technical in nature and uses acoustic terminology throughout. APPENDIX A contains a glossary of acoustic terms used in this report.

[1] Arcadis & Renzo Tonin & Associates, Operational Noise and Vibration Management Plan for Moorebank Logistics Park – East Precinct, Revision 013, dated 24/01/2023, reference PREC-QPMS-EN-PLN-0008, available https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/09/ONVMP_V13_clean_compiled_Redacted-compressed.pdf, accessed 21/07/2024

1.2 Warehouse operations description – Warehouse E6 (Tenant: E6B (Qube) & E6A (Ceva)

1.2.1 Operational activities and facilities and hours of operation

Warehouse E6 is tenanted by both Qube (E6B) and Ceva (E6A). The warehouses are separated into two sections (E6A and E6B) with an internal dividing wall. The key activities of these warehouse tenant are:

- **Ceva (E6A)** - A car carrier/transportation and storage facility
- **Qube (E6B)** - Ambient temperature storage and distribution warehouse

Qube (E6B) warehouse and distribution observed activities typically occur 4:00am to 12:00am Monday to Friday, with the mechanical plant and equipment operating 24 hours per day, 7 days per week. The truck despatch and receiving activities occur on the southern side of the warehouse including both at-grade and in recessed loading docks. Additionally, on the northern side of the warehouse (including both E6A/B) containers from the IMEX terminal are transported to and from via reach stacker or straddle carrier operation and stored for unloading along the northern side of the warehouse.

Ceva (E6A) typical hours of operations have been advised as substantially variable. The Ceva trucks (car carriers) are understood to operate infrequency, with an expected frequency of 2 trucks per fortnight in/out of the facility. The warehouse main office and associated mechanical plant and equipment are not being used by this warehouse tenant.

The key noise generating components of Warehouse E6 and the various day to day activities that occur are as follows:

- **Warehouse (E6A/6B) northern side docks/hardstand:**
  - Receipt and despatch of containers from the MPE IMEX terminal
  - Internal packing and unpacking of containers from internal
- **Qube (E6B) southern side docks/hardstand:**
  - Despatching and receiving truck movements in and out of the facility. Typically, via sideloading with forklifts on the hardstand at the on-grade docks. For recessed loading docks, this is typically for container trucks, where containers are unloaded typically is via forklift via the rear from within the warehouse space.
  - Forklift (electric/internal and gas/external) operations on hardstand.
- **Ceva (E6A) southern side docks/hardstand:**
  - Typical car carrier truck loading/unloading activities with Ceva car carrier/truck loading/unloading cars and movements on the hardstand at the on-grade docks in and out of the facility.
  - Typical car unloading activity occurs via truck back drop ladder and the truck driver driving cars out (unloading) of the truck on the hardstand at the on-grade docks and then driving/parking into the warehouse for storage.

    - Typical car loading activity occurs via the truck driver driving cars from the warehouse on the hardstand via the on-grade docks, and then driving cars into the truck via truck back drop ladder (on the hardstand) and parking the cars on truck stand/s.
- **Warehouse (E6B) offices:** General office administrative and support functions.
- **Warehouse (E6A) offices:** Ceva is not using the main office as part of warehouse operations. Noting this, it has been excluded from this assessment as it does not form an operational noise source.

1.2.2 Mechanical plant and other noisy equipment

The following fixed mechanical plant and equipment operate as part of typical warehouse operations, which are further detailed in Section 5.1.

- **Qube (E6B) (west)**
    - Smoke exhaust fans (do not form part of typical operations)
    - Main office rooftop mechanical plant/equipment (including air-conditioning/condenser units)
    - Office area ground floor mechanical plant and equipment (east)
    - Office area mechanical plant/louvers affixed to the office wall (east)
    - Mechanical plant for dock office, including rooftop plant/equipment and on ground air-conditioning plant (1 x condenser unit)
- **Ceva (E6A) (east)**
    - Mechanical plant for dock office, including rooftop and air-conditioning plant/condenser/s.
    - Main office rooftop mechanical plant/equipment are installed but are not used as part of tenant operations and have been excluded form this assessment.

2 Nearby sensitive receivers

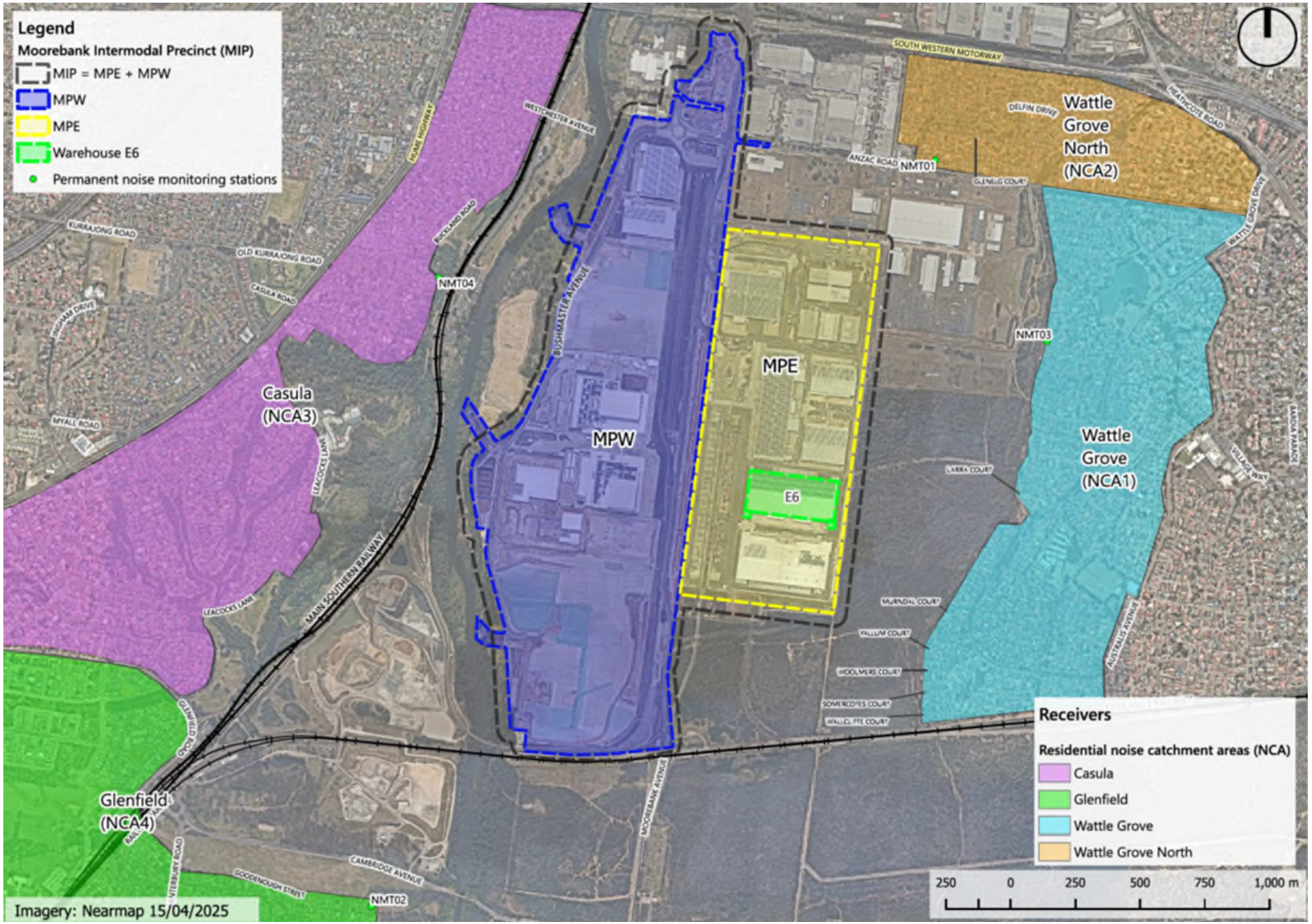
The potentially affected residential receivers nearby to Warehouse E6 around MPE are located in the suburbs of Casula, Glenfield, Wattle Grove and Wattle Grove North. The closest and potentially most affected residential receivers are located within Wattle Grove.

A summary of the approximate distance to the nearest residential receivers in the surrounding area are provided in Table 1, as identified in SSD 7628 CoC B80. The locations of the residential noise catchment areas (NCAs) are shown in Figure 1.

Table 1 Noise sensitive receivers and approximate distance from MPE Warehouse E6

Noise Catchment Area (NCA)	Receiver type	Approximate distance from Warehouse E6, metres
Wattle Grove (NCA1)	Residential	540
Wattle Grove North (NCA2)		1,250
Casula (NCA3)		1,360
Glenfield (NCA4)		2,050

Figure 1 Warehouse E6 location, MIP, MPE and MPW precincts



3 Summary of noise objectives

This report has been prepared to address the noise emissions from the fixed mechanical plant and equipment of the warehouse that operate as part of typical warehouse operations in accordance CoC B85 of SSD 7628, and as detailed in the MPE ONVMP.

CoC B85 requires that the monitored noise levels be compared against the predicted levels reviewed in accordance with CoC B84. The CoC B84 noise assessment, is required to demonstrate that the plant and equipment has been selected to meet the overall noise limits specified in SSD 7628 CoC B80 (Table 5). As such, the following section outlines the requirements for both CoC B85 and the overall CoC B80 (Table 5) noise limits.

3.1 Operational noise limits

The operational noise limits applicable for the warehouse operations within MPE are presented in Table 5 of SSD 7628 CoC B80 and are reproduced in Table 2 below. These noise limits are as per Table 3-5 of the MPE ONVMP. The noise limits are applicable not only to all operational noise sources approved under SSD 7628 but are inclusive of operations as part of MPE Stage 1 (approval SSD 6766).

The $L_{Aeq(15\ minute)}$ criteria are applicable during the day, evening and night-time periods and the $L_{A1\ (1\ minute)}$ sleep disturbance noise limits are applicable during the night-time period.

The noise limits are applicable under prevailing meteorological conditions of wind speeds of up to 3 m/s at 10 metres above ground level or stability category 'F' temperature inversion conditions.

Table 2 SSD 7628 CoC B80 noise limits, dB(A)

Sensitive receiver	Day [1] $L_{Aeq,\ 15\ minute}$	Evening [1] $L_{Aeq,\ 15\ minute}$	Night [1] $L_{Aeq,\ 15\ minute}$	Night [1] $L_{A1\ (1\ min)}$
Wattle Grove (NCA 1)	35	35	35	52
Wattle Grove North (NCA 2)	35	35	35	52
Casula (NCA 3)	35	35	35	52
Glenfield (NCA 4)	35	35	35	52

Notes:

1. In accordance with the INP, day is the period from 7:00 am to 6:00 pm Monday to Saturday; or 8:00 am to 6:00 pm on Sundays and public holidays; evening is the period from 6:00 pm to 10:00 pm; and night is the remaining periods.
2. To determine compliance with the $L_{Aeq,15\ minute}$ noise limits, noise from the development is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling where the dwelling is more than 30 metres from the boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance (see Chapter 7 Noise Policy for Industry - NPfI) The modification factors in Section 4 of the INP must also be applied to the measured noise levels where applicable.
3. To determine compliance with the L_{A1} noise limits, noise from the project is to be measured at 1 metre from the dwelling façade. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance (see Chapter 7 of the NPfI).
4. The noise emission limits identified above apply under meteorological conditions of:

   (i) wind speeds of up to 3 m/s at 10 metres above ground level; or

   (ii) 'F' atmospheric stability class.

3.2 Discussion of assessment noise limits

As noted in Section 3.1, the noise limits detailed in SSD 7628 CoC B80 are applicable not only to all operational noise sources approved under SSD 7628, but are also inclusive of operations as part of the MPE Stage 1 approval for SSD 6766. Importantly, when assessing compliance with these noise limits, the most affected residential receiver for any individual operations will not necessarily be at the same location. Additionally, it is unlikely that the reasonable worst-case noise levels from any individual operations would also occur in the same 15-minute period.

As part of the SSD 7709 Moorebank Precinct West (MPW) – Stage 2 Modification 1 (SSD 7709 MOD 1) submitted July 2020, a review of the applicable operational noise requirements across Moorebank Precinct West (MPW) and Moorebank Precinct East (MPE) was undertaken (Renzo Tonin and Associates document reference *TJ741-11F05 (r4),* dated 30 June 2020). The review identified that there are a number of approval conditions that are applicable across both the MPW and MPE sites for operational noise, and that in the application of these approvals to the site activities it became apparent that the operational noise requirements were not consistent across the MPE and MPW sites.

Additionally, the review identified that the operational noise limits across MPE and MPW were set substantially below both the noise criteria and the predicted noise levels (even with feasible and reasonable mitigation measures) established during the environmental assessment stages for the cumulative operational noise levels from all MPE and MPW operations.

As such, the review recommended that an overall approach for cumulative operational noise management of the MIP (for East and West precincts) for a "*whole of complex*" approach be adopted, and that consistent noise management objectives for the Moorebank intermodal terminal precinct's operational noise be adopted to cover all operations within MPE and MPW. Appropriate and achievable noise management objectives consistent with EPA's noise policies were also developed in the review.

Following the modification application for SSD 7709 (MOD 1), the submission received from the NSW Environment Protection Authority (NSW EPA) noted the following:

However, the current noise limits are set below the predicted noise levels and are not based on the Project Specific Noise Levels (PSNL) derived under the then-applicable Industrial Noise Policy 2000 (now superseded by the Noise Policy for Industry 2017)…. The EPA considers that the resulting noise limits are not achievable for MPW, nor are they achievable for the cumulative MPW and MPE sites.

Additionally, Liverpool City Council included in their submission:

Council considers that site regulation in regard to noise management may be assisted by adopting a precinct approach consistent with the NSW EPA's Noise Policy for Industry (2017)…. Whilst it is acknowledged that current criteria in the Approval may be impracticable, it will be necessary for the Department to consider applying suitable noise limits that are achievable and capable of protecting the amenity and wellbeing of sensitive receivers.

SSD 7709 MOD 1 was approved 24 December 2021, along with the revised cumulative noise goals for the overall MIP (MPW & MPE). However, these have not then been adjusted as part of the relevant MPE approvals (SSD 6766 and SSD 7628). Noting the above regulator comments, it is appropriate to assume that the overall MIP (MPW & MPE) operational noise emissions should be managed consistent with the SSD 7709 MOD 1 update, and this will likely be incorporated into a future modification of in SSD 7628.

However, independent of this, as the updates have not yet occurred, this assessment has been done against the existing SSD 7628 noise limit requirements, without further considerations of cumulative MIP noise emissions. These comments have been included for important context relating to cumulative noise considerations.

3.3 CoC B85 assessment noise requirements

3.3.1 Requirements

The management of operational noise emissions from warehouse mechanical plant and equipment activities within MPE Stage 2 is outlined in the MPE ONVMP. Specifically, this report has been prepared to address the requirements of CoC B85 in SSD 7628, as detailed in Section 4.1.1 of the MPE ONVMP.

This report includes noise monitoring performed to address the requirements in CoC B85 as detailed in Table 4-1 in Section 4.1.1 of the MPE ONVMP.

The requirements of CoC B85 state:

> *B85 The Applicant must carry out noise monitoring of mechanical plant and other noisy equipment for a minimum period of one week where valid data is collected following occupation of each warehouse. The monitoring program must be carried out by a suitably qualified and experienced person(s) and a* ***Monitoring Report for Mechanical Plant*** *must be submitted to the Secretary within two months of occupation or each tenancy to verify predicted mechanical plant and equipment noise levels.*

CoC B85 requires that the monitored noise levels be compared against the predicted levels reviewed in accordance with CoC B84.

An assessment of mechanical plant and equipment noise levels was prepared by Pulse White Noise Acoustics (PWNA) (*LOGOS MPE 6 & 7 – Acoustic Design Report*, Report number: *220518 - LOGOS MPE 6&7 - Acoustic Design Report – R5*, 28 March 2023) (B84 assessment). However, this report did not provide specific warehouse predicted noise levels for all nearby noise sensitive receivers for verification under CoC B85 or separate warehouse E6 and E7. Instead, the report identified that noise emissions have been designed to achieve the overall noise levels presented in Table 5 of CoC B80 of 35 dB(A) $L_{Aeq\ 15minute}$, during all time periods.

Table 3-20 and Table 3-21 of the MPE ONVMP detail the predicted $L_{Aeq\ 15\ minute}$ intrusiveness and L_{Amax} sleep disturbance noise levels respectively for the overall MPE operations at the Environmental

Assessment stage. Although these are for the overall MPE operations and not for an individual warehouse, they can be used as reference for consistency verification CoC B85 as per the monitoring requirements detailed in Table 4-1 in Section 4.1.1 of the MPE ONVMP.

It should also be noted that the monitoring is to be undertaken "*… for a minimum period of one week where valid data is collected*". As such, it is important that operations are representative of typical operations for the monitored data to be valid. This is of note for this assessment, as the monitored noise levels were determined to be representative of the future operational noise emissions, specifically regarding Warehouse E6B (Qube) operations. However, it is understood that the main office mechanical plant and equipment associated with the Warehouse 6A (Ceva) is currently not operational and hence excluded from this assessment. Warehouse E6B (Qube) main office mechanical plant and equipment is currently operational and hence included/assessed in this assessment.

3.3.2 Noise monitoring timing

It is understood that the Warehouse E6 commenced operations from January 2025.

During this time period the tenant warehouse operations were still ramping up to typical levels. As such, monitoring of valid noise data could not be conducted initially following operations. As such, the earliest period when valid noise monitoring data could be collected was from March 2025. Noise monitoring was then undertaken end of March 2025, due to a two-week delay to allow for appropriate weather conditions during the monitoring period.

It is noted that the warehouse E6A/B facilities had ramped up operations to approximately full capacity at the time of the noise monitoring. The assessment herein has been performed to assess the potential noise impact of current operations as the key operational noise sources were running at suitable capacity (eg. main office mechanical plant/equipment).

This report presents the mechanical plant and equipment noise emissions and assessment in accordance with the requirements of CoC B85 in SSD 7628, as detailed in Section 4.1.1 of the MPE ONVMP.

4 Measurement methodology and results

4.1 Noise monitoring approach

The NSW Environment Protection Authority's (EPA) *Noise Policy for Industry* (NPfI) provides guidance in Chapter 7 for monitoring the performance of a noise-generating industrial facility. NPfI Section 7.1.1 provides guidance as to how to review noise emissions, which includes direct measurement at a receiver location, direct measurement at alternative or intermediate location/s, unattended monitoring and modelling, in order or preferred to least preferred. It notes that this range of compliance assessment techniques may be used individually, or in combination, to provide a means of determining compliance with a noise limit. At times, the best available compliance assessment methodology will only allow for a balance-of-probabilities type determination of compliance, and repeat assessment may be needed. It also makes clear that "*A noise limit applies to the noise from a particular development/activity and not to general ambient noise. Therefore it is often necessary to use techniques to attempt to separate the noise from a facility versus noise from other sources*."

For the CoC B85 Warehouse E6 assessment, the following points were considered:

- A site inspection undertaken on 28 February 2025, identified that at the residences in the closest residences in Wattle Grove operational noise emissions were not audible or distinguishable in the direction of the Warehouse E6 during daytime operations.
- The Warehouse E6 mechanical plant were expected to be more than 10 dB below the existing noise levels, measured at the surrounding NCAs by RTA during previous MIP noise monitoring. This previous attended noise monitoring found the existing ambient noise levels to typically be greater than 40 dB(A) $L_{Aeq15min}$, and controlled by noise sources outside of MIP, such as road traffic noise (ie. M5 and Hume Highway road traffic noise).
- Access to Wattle Grove residences and Warehouse E6 was possible during the attended monitoring period, however access to a suitable intermediate location between the Wattle Grove residences and Warehouse E6 was note very limited.
- A number of co-located noise generating warehouse and industrial operations, including the IMEX terminal, operate co-currently within the MIP, in particular across MPE.
- Noise source locations are both roof mounted and ground level mounted.

Noting the above points, and that the existing ambient noise levels are already high at receivers compared with the expected noise emission levels at receivers, quantification of the noise under investigation via direct noise measurement of operational noise emissions from the warehouse mechanical plant and equipment operations is not possible at the residential receiver locations because of poor signal-to-noise ratio. The NPfI also provides guidance about using noise modelling to review the performance of an industrial operation that is co-located with separate but noise-generating industrial sites impacting the same receiver, similar to the Warehouse E6 within the MIP situation.

As such, the CoC B85 noise monitoring has used a combination of on-site and intermediate location attended noise measurements, unattended monitoring, and noise modelling to quantify the noise emission performance of the warehouse mechanical plant and equipment.

4.2 Compliance measurement methodology

The noise monitoring undertaken to satisfy the requirements of CoC B85 has included the following noise monitoring and assessment steps.

4.2.1 Noise monitoring

The following noise monitoring was undertaken:

1. **Unattended noise monitoring** nearby to the key mechanical plant items for a period of 10 days, to confirm the noise levels of the mechanical plant when operations occurred.

2. **On-site attended measurement** of all mechanical plant and other noisy equipment items to quantify noise emission levels of mechanical plant and equipment that operate as part of the Warehouse E6 operations (Section 5.2.3).

3. **Receiver and intermediate attended measurements** to confirm that the mechanical plant and other noisy equipment items were not quantifiable at the nearest critical receiver locations (Wattle Grove), and/or assist with contribution estimations of noise emissions levels, and provide noise monitor data to aid with confirming the performance of the noise model used to determine noise emission estimations at receivers. For the estimate warehouse mechanical noise contribution at the intermediate and receiver locations, where noise in the direction Warehouse E6 is not audible, it is assumed that the warehouse mechanical noise contribution is at least 10 dB(A) below the corresponding measured L_{A90} or L_{Amin} 15minute noise level as appropriate.

4.2.2 Data analysis and assessment

Following the noise monitoring, the following steps were undertaken to assess the noise level contributions at the nearby sensitive receivers:

1. **Noise source analysis** - Review the mechanical plant and equipment attended measurement data, analyse results and quantify noise source levels from all the fixed mechanical plant and equipment for Warehouse E6.

2. **Noise model setup and performance review** - Setup and calibrate the noise model for individual mechanical plant items, including the rooftop main office mechanical plant and equipment as well as the dock office mechanical equipment for the assessment of reasonable worst-case noise operations.

3. **Noise emission quantification** - Calculate the fixed mechanical plant and equipment noise levels from the Warehouse E6 operations to all nearby surrounding receivers and determine the noise level contribution at the property with the highest noise levels within each NCA.

4.3 Instrumentation

A range of noise monitoring equipment was used to undertake the compliance noise monitoring. A summary of measurement equipment and calibration dates is provided in Table 3.

All of the noise monitoring equipment are Class 1 instruments, with calibration certificates current at the time of the measurements. Before and after each series of measurements, the calibration of the sound level meters was verified using a reference calibration of 94 dB at 1 kHz. The difference between pre- and post-calibration levels was within 0.5 dB for all measurements.

Table 3 Noise measurement equipment

Monitoring location/ purpose	Monitoring period used	Equipment (RTA ref.)	Serial number	Last date calibrated
On-site attended noise measurements	28/3/2025, 3/4/2025	NTi XL2 (XL2-B)	A2A- 16217 -E0	04/08/2023
On-site attended noise measurements	3/4/2025	NTi XL2 (XL2-A)	A2A-12270-E0	09/12/2024
Unattended on-site noise measurements (E6 (B) Office Roof)	28/3/2025 - 11/4/2025	NTi XL2 (RTA07-052)	A2A-17457-E0	17/07/2023
Unattended receiver measurements (nearby to Wattle Grove Residences)[1]	28/3/2025 - 11/4/2025	NTi XL2 (RTA07-043)	A2A-20131-E0	28/02/2024
Field calibration	28/3/2025, 3/4/2025, 11/4/2025	NTi XL2 (XL2-B)	3009707	18/12/2024
Field calibration	3/4/2025	NTi XL2 (XL2-A)	2677710	06/01/2025

Notes: 1. Unattended noise monitor was installed within defence bushland between E6 and Wattle Grove Residences nearby to 76 Corryton Court, Wattle Grove.

4.4 Meteorological conditions

Meteorological conditions during the period of noise measurement surveys have been reviewed to determine the prevailing wind and temperature inversion conditions were appropriate. For a period of the monitoring, data from the MIP meteorological data monitoring station adjacent to Bushmaster Avenue, established in accordance with SSD 7709 (MPW Stage 2) CoC A54, has been sourced and reviewed.

During the attended noise measurement periods at Warehouse E6 and the nearby receivers, the weather conditions were as detailed in Table 4.

Table 4 Attended noise measurement surveys weather observations

Date / Time period	Air temperature, °C	Relative humidity, %	Average wind speed (at 10 m above ground level), m/s	Wind direction, degrees and Cardinal	Cloud cover	Rain
3/4/2025 3:30AM – 6:00AM Receivers/ Intermediate monitoring	12 to 14	95 to 96	Up to 0.3 m/s	Ranged from SW to W	Clear skies throughout	None
3/4/2025 6:00AM – 2:00PM Onsite monitoring	12 to 41	26 to 96	0 to 3.5 m/s	Generally ranged from SW to NW	Clear skies throughout	None

Notes: 1. During the attended monitoring, a handheld anemometer was used, and confirmed wind speeds at the sound level meter were not above 5m/s, as required by the NPfI.

The noise limits in SSD 7628 are applicable for wind speeds up to 3 m/s (10.8 km/h) at 10 metres above ground level. This meteorological station data was used to exclude weather affected data (wind (greater than 5m/s) or rain) in the unattended noise monitoring presented in APPENDIX B in accordance with the NPfI.

5 Monitoring and analysis

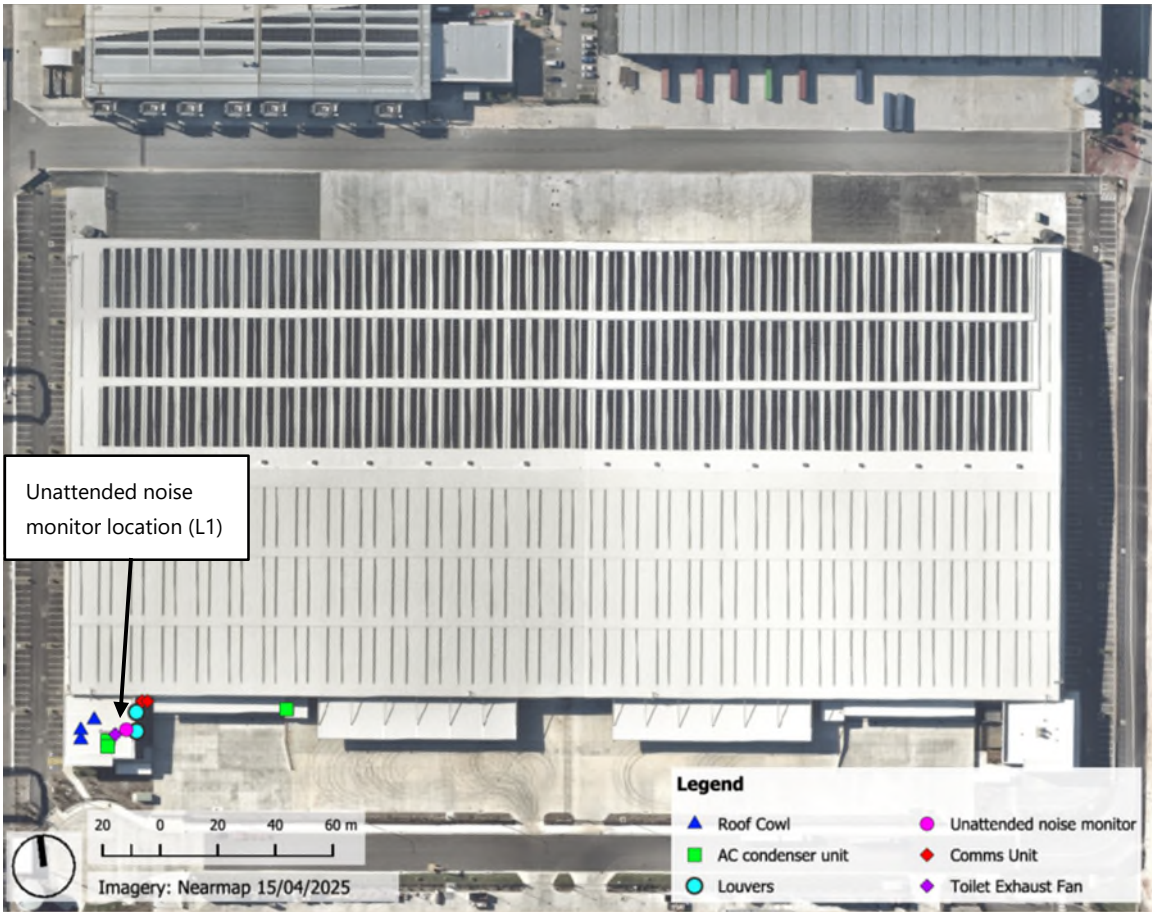
5.1 Key mechanical plant and equipment noise sources

Based on as-built construction information, site inspections, site personal observations, attended and unattended noise measurements, the main sources for the mechanical plant and equipment are as follows:

- Main office (E6B) rooftop mechanical plant and equipment
- Mechanical plant deck on main office (E6B) roof with 2 condenser units installed
- Toilet Exhaust Fan (TEF) on main office (E6B) roof adjacent to condensers
- Main office (E6B) ground area (east) mechanical plant (2 x COMMS units)
- Main office (E6B) area mechanical plant/louvers affixed to the office wall (east)
- Mechanical plant for dock office (E6A and E6B), including rooftop plant/equipment and on ground air-conditioning plant (1 x condenser unit)

The ridgeline smoke exhaust fans do not operate as part of normal operations and only operate in emergencies or during testing, and so do not form part of the assessment. The relevant locations of the key noise generating mechanical plant items are presented in Figure 2.

Figure 2 Key mechanical plant noise source locations and unattended noise monitor location (L1)



5.2 Noise monitoring

5.2.1 Receiver noise monitoring

Noise monitoring was undertaken at the receiver locations shown in Figure 3 to aid with confirming the likely mechanical noise contribution levels at the nearest residential receivers from the warehouse in each of the surrounding NCAs. The location of these measurements is presented in Figure 3. A summary of the measured noise levels are provided in Table 5, with further details for each of the measurements provided in APPENDIX B.

Table 5 also presents total statistical noise levels measured during the attended noise survey and estimated noise contributions from Warehouse E6 based on short-term audible noise measured at the attended measurement locations that could be attributed as coming from Warehouse E6 operations.

Figure 3 Key receiver noise monitoring locations

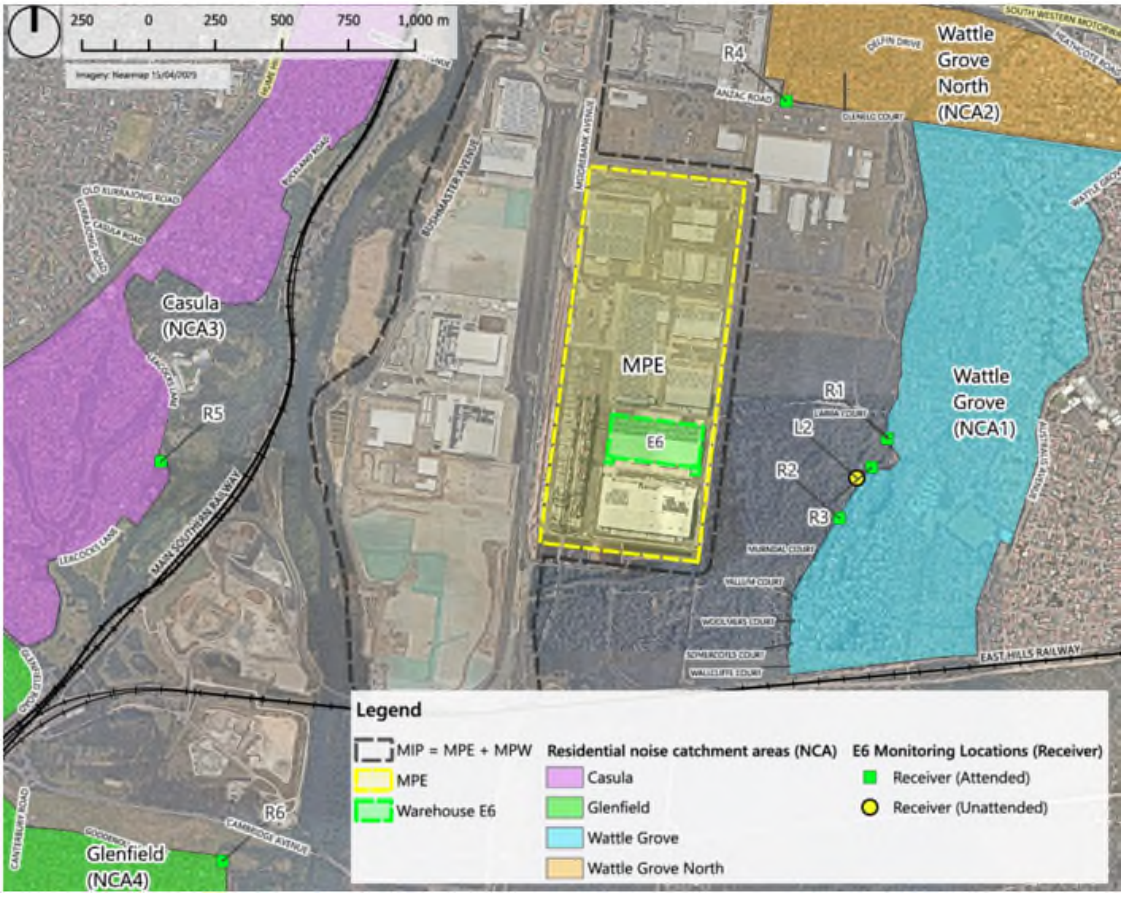


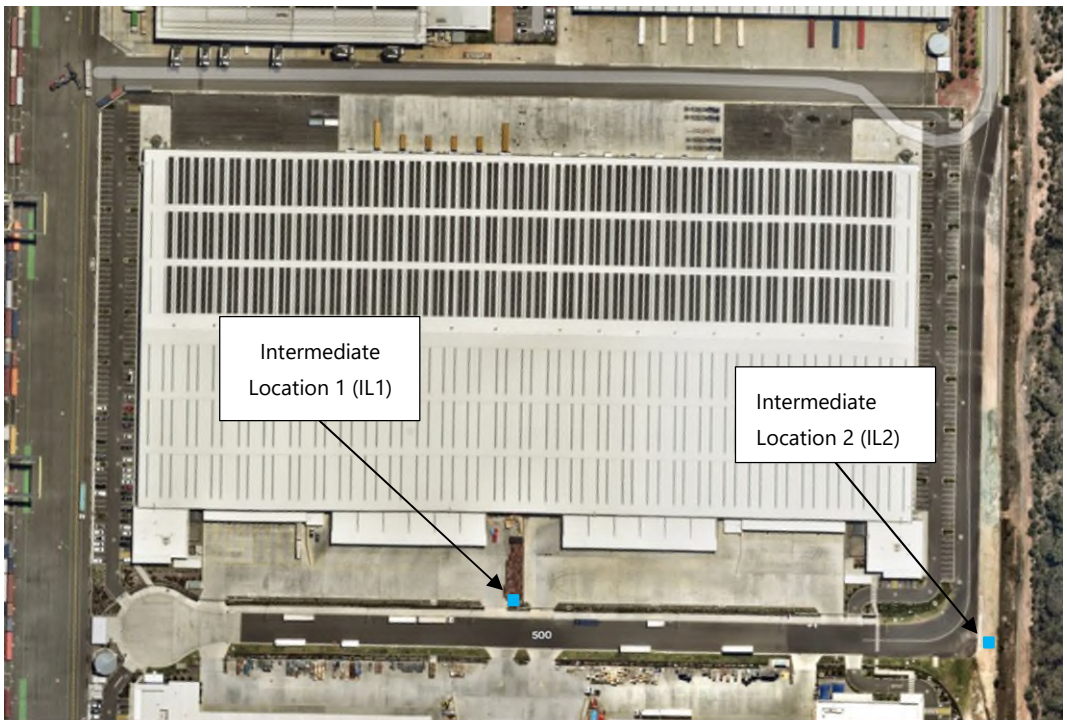
Table 5 Receiver attended noise measurement results (3 April 2025)

ID	Location	Start time	Measured noise levels (15-minute), dB(A)				Estimated warehouse mechanical contribution, $L_{Aeq, 15minute}$, dB(A)
			L_{AFmax}	L_{Aeq}	L_{A90}	L_{AFmin}	
R1	15 Larra Court, Wattle Grove	4:06am	57	43	40	39	< 30
R2	52 Corryton Court, Wattle Grove	4:57am	52	43	41	40	< 31
R3	82 Corryton Court, Wattle Grove	4:33am	70	45	43	41	< 33
R4	30 Goodenough Street, Glenfield	5:04am	71	53	47	44	< 37
R5	73A Leacocks Lane, Casula	4:31am	69	53	43	41	< 33
R6	39 Glenelg Court, Wattle Grove	4:02am	82	59	44	43	< 34

5.2.2 Intermediate noise monitoring

As it was not possible to confidently quantify warehouse noise emissions at the receiver locations through the receiver monitoring, intermediate measurements were undertaken between the receivers and the warehouse, in addition to boundary locations around the warehouse. Noise monitoring was undertaken at the intermediate location shown in Figure 4. Accessible locations between the source and the receiver location/s were selected, where the signal-to-noise from the warehouse noise sources would be higher than at the residential receiver locations. These intermediate monitoring locations were selected to assist with determining the likely contribution from the warehouse at these intermediate locations and to aid with reviewing the compliance noise modelling and likely upper bound of noise emissions.

Figure 4 Key intermediate noise monitoring locations



A summary of the measured noise levels at the intermediate monitoring locations are provided Table 6 with further measurement details provided in APPENDIX B.

Table 6 Concurrent intermediate noise measurement results (3 April 2025)

ID	Location / Comment	Start time	Measured 15-minute noise levels, dB(A)				Estimated warehouse contribution, $L_{Aeq, 15min}$, dB(A)	Key noise sources contributing to steady state noise levels
			L_{AFmax}	L_{Aeq}	L_{A90}	L_{AFmin}		
IL1	Warehouse E6-B Qube boundary towards south-east	10:05am	77	60	52	48	< 42	Nearby parking and E7 activities, and occasional IMEX noise events. Main office mechanical plant was inaudible. Full details in APPENDIX B.
IL2	MPE fence line east (corner of Marcus Place/Trajan Street)	10:05am	72	54	44	42	< 34	Distant road traffic and birds [~44 dB(A)]. Local truck movements/idle towards east of E6. IMEX and E7 activities. Main office mechanical plant was inaudible. Full details in APPENDIX B
L2 (Unattended noise monitor)[1]	During I1 and I2 attended measurement	10:05am	56	51	49	48	<39	Unattended noise monitor (within defence bushland).

Notes: 1. Unattended noise monitor data was installed within defence bushland between E6 and Wattle Grove Residences nearby to 76 Corryton Court, Wattle Grove.

5.2.3 Onsite noise measurements

Attended noise measurements of individual mechanical plant and equipment items and typical operations were undertaken at Warehouse E6 on 3 April 2025, in order to quantify the noise emissions from the installed mechanical plant and equipment in operation for input into the calibration modelling (Section 6). These noise levels have been used to develop the CoC B85 operational noise compliance noise model.

During all measurements of mechanical plant and equipment, the specific noise source being measured was the dominant noise source. All plant and equipment items were switched on and forced into full capacity for the purposes of undertaking the attended noise measurements. Observations were made of the on-site specific mechanical plant item/s (specifically, critical noise generating plant/equipment i.e. two rooftop condenser units) during operations to ensure they were operating during attended on-site measurements.

Results from the on-site attended measurements of the critical mechanical plant and equipment are summarised in Table 7. The locations the key noise generating mechanical plant noise items are presented in Figure 2.

Table 7 On-site attended mechanical plant noise measurement results (3 April 2025)

ID	Activity noise sources	Time	Measurement duration (t), sec	Measurement distance (m)	Measured noise levels, dB(A)		
					L_{AFmax}	L_{Aeq}	L_{A90}
	Office E6B roof (locations see Figure 2)[1]						
S1	Office (E6B) Condenser Unit 1 + Office (E6B) Condenser Unit 2	12:49 PM	31 sec	6	65	64	63
S2		12:44 PM	31 sec	6	65	63	63
S3	Office (E6B) Toilet Exhaust Fan (TEF)	12:41 PM	47 sec	2	64	60	60
S4	Office (E6B) – Roof Cowl 1	inaudible at 1 metre at 50 dB(A) L_{A90}					
S5	Office (E6B) – Roof Cowl 2						
S6	Office (E6B) – Roof Cowl 3						
	Hardstand and dock offices						
S7	Condenser units/COMMS 1 and 2 (Office E6B)	1:47 PM	18 sec	2.4	55	52	51
S8	Mech louvre (Office E6B - eastern wall)	1:54 PM	40 sec	4	62	52	50
S9	Roof Cowl 1 (Dock Office roof)	inaudible at ground level at 50 dB(A) L_{A90}					
S10	Roof Cowl 2 (Dock Office roof)						

Notes: 1. All plant and equipment items were switched on and forced into full capacity for the purposes of undertaking the attended noise measurements. Monitoring undertaken during steady state operations.

5.2.4 Unattended noise measurements

During the attended noise survey in Section 5.1, it was observed that the rooftop mechanical deck with two condenser units and a toilet exhaust fan (TEF) could operate continuously as part of the typical operations, and were considered to be the main noise sources for the Warehouse E6 mechanical plant noise emissions.

To confirm that the noise emissions from these key mechanical sources represented normal operations and did not substantially change over time, unattended noise monitoring was undertaken to supplement to the attended noise monitoring (Section 5.2.3), this was undertaken for a minimum one week period as required by CoC B85. The unattended noise monitoring was undertaken over the period between 28 March to 11 April 2025. The unattended noise monitor (L1), as shown in Figure 2, as located so that noise contributions from mechanical plant would dominate the monitored noise levels.

The monitoring data confirmed the condenser units only operated occasional, and turned on and off throughout the monitoring period, with some period of reduced load and lower noise levels. The modelling is based upon the maximum measured noise levels. The condenser units typically operated for a period of 1 to 3 hours at a time. Detailed results from the unattended noise monitoring are provided in APPENDIX C.

5.3 Mechanical plant and equipment noise source levels

Based upon the attended and unattended noise monitoring presented in the above sections, the following noise source levels for the key typical operating mechanical plant and equipment have been established based upon periods of typical operation. These have been based upon either direct measurement, or supplier data that has been confirmed through monitoring of cumulative noise levels (ie. condenser units on mechanical deck). Based upon noise monitoring presented in Section 5.2, the sound power level inputs presented in Table 8 were used in the CoC B85 operational noise compliance modelling detailed in Section 6 for the key noise source locations shown in Figure 2.

Table 8 CoC B85 operational noise compliance noise source levels

Site items / operation	Individual item sound power level (SWL) ($L_{Aeq,t}$), dB(A)	Comment
Office E6B (warehouse west) roof[3]		
Office condenser units (2 units) - Vertical discharge units	84	Based upon attended measurements (Unit type Daikan VRV REYQ22BYM/REYQ20BYM) and unit observations. These condenser units observed to be the key dominant noise source for office E6B.
Office (E6B) Toilet Exhaust Fan (TEF)	74	Based upon the attended measurements on office E6B rooftop.
Office (E6B) roof cowl units	48[5]	Office roof cowl units were inaudible. Based upon the attended measurements/observations on main office rooftop. Inaudible at 1m metre at 50 dB(A) $L_{A90.}$
Office 6A (warehouse east) roof[1]		
Office (E6A) rooftop mechanical plant/equipment	n/a[1]	Office (E6A) Ceva main office and associated mechanical plant and equipment is not used as part of typical operations by the tenant.
Hardstand and dock offices		
COMMS units (adjacent to Office E6B)	67[2]	Installed unit: Daikan RXC100AV1A. Two units. Intermittent operations of one or two units.
Dock office (E6B) (warehouse west) - Air conditioning condenser unit (CU-6.2-DO) - Horizontal discharge single fan unit (Daikan)	68[4]	Installed unit: Daikan RZA125CV1. Dock office air conditioning unit was not operational during attended measurements. The sound power level based upon the installed unit manufacturer sound power levels. Supplier level = Lw 68 dB(A)
Dock office (E6A) (warehouse east) - Air conditioning condenser unit (CU-6.1-DO) - Horizontal discharge single fan unit (Daikan)	68[4]	Installed unit: Daikan RZA125CV1. Measurement access was not possible. The sound power level based upon the installed unit manufacturer sound power levels.

Site items / operation	Individual item sound power level (SWL) ($L_{Aeq,t}$), dB(A)	Comment
Mech louvre (Office E6B - eastern wall)	72	Noise level based upon attended measurements conducted onsite (03/05/2025).
Roof Cowl 1 & 2 (Dock Office roof)	48[5]	Noise levels measured at ground level adjacent to dock office. Inaudible at ground level at 50 dB(A) L_{A90}.

Notes:
1. As the main office (E6A) is currently not operational. As such, the office (E6A) associated mechanical plant, and equipment is currently not operational and hence excluded from this assessment.
2. Measurements were made of where mechanical sources were audible, and these fans were quantified and modelled. Other office roof sources were not dominant, based upon observations from warehouse roof levels for cumulative measured noise levels when in operation, and so it was appropriate to model just the key dominant sources.
3. Based upon highest measured levels from multiple attended measurements and unattended noise monitoring.
4. Dock office condenser unit was not operational during attended noise measurements onsite. The sound power level data was obtained from manufacturer provided data for the relevant model number installed onsite.
5. Noise emissions were not audible in a 50 dB(A) LA90 environment, as such noise emission level is assumed to be no higher than 40 dB(A) at 1 metre.

6 CoC B85 operational noise modelling and assessment

As detailed in Section 4, it was not possible to directly measure or estimate the warehouse mechanical plant and equipment noise levels at nearby receivers without implementing a range of different noise measurement and noise modelling techniques. As such, this assessment has used a combination of on-site attended noise measurements and unattended monitoring presented in Section 5, and noise modelling described below. These techniques were used in combination to assess the noise emissions of the Warehouse E6 mechanical plant and equipment.

6.1 General modelling assumptions and methods

Modelling and assessment of warehouse noise emissions was determined by modelling the noise sources, receiver locations, existing built structures and topographical features, using CadnaA (version 2025. The noise predictions are based on the CONCAWE noise prediction algorithms, noting that the nearby critical noise sensitive receivers are greater 100 metres from the site. The CONCAWE environmental noise prediction method is an appropriate method for predicting the noise propagation in these circumstances. The performance of the noise model used is reviewed in Section 6.2.

The noise prediction model considers:

- Location of all noise sources.
- Height of sources and receivers referenced to digital ground contours both onsite and outside the warehouse and MIP areas.
- Noise source levels of individual mechanical plant and equipment. All fixed mechanical plant and equipment operational noise sources associated with Warehouse E6 operations have been included.
- Separation distances between sources and receivers.
- Ground type between sources and receivers.
- Attenuation from buildings and built structures and topography (natural and purpose built).
- Atmospheric losses and assessment meteorological conditions.

The modelled activities and assumptions for the operational mechanical plant and equipment and their duration and frequency of operation as part of the 'reasonable' worst-case operational scenarios are described in Section 6.3.

6.2 Noise model performance

The base CadnaA model prepared for the E7 noise monitoring assessment (*TM306-05F02 E7 Warehouse B85 Operational Noise Monitoring (r1),* dated 24 January 2025) (E7 B85 noise monitoring report) was used to develop the compliance monitoring modelling for this assessment.

Section 6.2 of the E7 B85 noise monitoring report demonstrated that through reviewing correlated noise events between onsite noise monitoring and intermediate monitoring locations toward Wattle Grove receivers that the noise model is considered suitable for modelling and assessing noise emissions at nearby receivers. As the assessment is concerned with similar receivers in Wattle Grove, this model performance review is also appropriate for this assessment and demonstrates the base model is suitable.

Similarly, the intermediate monitoring in Section 5.2.2 was further used to confirm the model was predicting as expected. As mechanical plant and equipment levels were inaudible at the intermediate locations, it is assumed they were at least 10 dB(A) below the measured background noise level (L_{A90}). This is confirmed as per Table 9.

Table 9 Comparison between measured and modelled noise levels - Intermediate monitoring locations (3/4/2025)

Location	Measured contribution noise level, dB(A) $L_{eq,T}$	Model predicted noise level, dB(A) $L_{eq,T}$
IL1 (Qube/Ceva boundary SE)	<42 (10 dB(A) below BG)	35
IL2 (Cnr. Marcus Pl/Trajan St)	<34 (10 dB(A) below BG)	31

6.3 Assessment operational scenarios

All key measurable noise-generating mechanical plant and equipment that operate as part of typical operations have been included in the assessment modelling as required by CoC B85. These are listed in Table 8. The locations of these sources are shown in Figure 2.

The office (E6B) rooftop two (2) condenser units and a toilet exhaust fan (TEF) are the main (dominant) mechanical plant and equipment noise sources for Warehouse E6 operations for the reasonable worst case 15-minute scenario assessment. All office mechanical plant and equipment identified in Section 5.3 have been assumed to operate during all assessment periods, although these plant items typically only operate when the office is in use (assessment considered 24 hours a day and 7 days operation).

6.4 Noise compliance assessment

Mechanical plant and equipment operational noise levels are presented in Table 10. The noise levels have been modelled to residential receiver noise catchments surrounding the MIP and the highest residential receiver noise level in each catchment area reported in Table 10. These noise levels represent the reasonable worst-case operational scenario (15-minute period) from typical mechanical plant and equipment operations of the warehouse.

The modelling incorporated the worst-case prevailing meteorological conditions, as required by CoC B85, which are wind speeds of up to 3 m/s at 10 metres above ground level or stability category 'F' temperature inversion conditions.

The mechanical plant and equipment noise sources are steady-state or quasi-steady-state. Therefore, there is unlikely to be significant variation between $L_{Aeq,15min}$ values and $L_{A1,\ 1minute}$ values, and no significant peak noise events are expected. As such, by achieving the night period $L_{Aeq\ (15\text{-}minute)}$ requirements, the noise emissions will achieve the $L_{A1,\ 1minute,}$ sleep arousal screening level requirements of 52 dB(A) $L_{A1,\ 1minute}$.

The results in Table 10 show that the predicted CoC B85 operational compliance noise levels are below the SSD 7628 CoC B80 noise limits. Furthermore, although the B84 assessment report did not provide specific warehouse predicted noise levels for all nearby noise sensitive receivers for verification under CoC B85, noise emissions are aiming to achieve appropriate noise levels below the SSD 7628 CoC B80 noise limits to assist ESR with managing the cumulative noise emissions from the MIP.

As such, it can be concluded that the E6 mechanical plant and equipment noise emissions achieve these requirements, such that they have been selected and installed to achieve the overall noise limits specified in SSD 7628 Table 5 (CoC B80).

Table 10 CoC B85 operational noise levels – Mechanical plant and equipment - Warehouse E6

NCA	Operational compliance assessment noise levels[1,2,3] $L_{Aeq,\ 15\ minute}$			SSD 7628 CoC B80 noise limits $L_{Aeq,\ 15\ minute}$		
	Day	Evening	Night	Day	Evening	Night
Wattle Grove (NCA 1)	< 20	< 20	< 20	35	35	35
Wattle Grove North (NCA 2)	< 20	< 20	< 20	35	35	35
Casula (NCA 3)	< 20	< 20	< 20	35	35	35
Glenfield (NCA 4)	< 20	< 20	< 20	35	35	35

Notes
1. Modelling meteorological were as follows, consistent with the range applicable for the B131 noise limits:
   a. Day/Evening - Winds speeds of 3m/s at 10 meters above ground level (all directions)
   b. Night - Atmospheric stability category F (with no wind).
2. Modelling based upon average temperature and humidity conditions during the monitoring period.
3. For estimated levels less than 20 dB(A) LAeq, 15minute, "< 20dB(A)" is presented.

7 Conclusion

Renzo Tonin & Associates was engaged by ESR Developments (Australia) Pty Ltd on behalf of The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the Moorebank Industrial Warehouse Trust to undertake noise monitoring of the warehouse mechanical plant and other noisy equipment to satisfy the State Significant Development (SSD) 7628 B85 consent condition (CoC) for the Warehouse E6.

Warehouse E6 is located within the Moorebank Precinct East (MPE), which forms part of the Moorebank Intermodal Precinct (MIP) at Moorebank, NSW. Warehouse E6 is separated into E6A (western warehouse), and E6B (eastern) warehouse. The western warehouse (E6B) is currently tenanted by the Qube Holdings Logistics (Qube), while the eastern warehouse (E6A) is currently tenanted by Ceva Logistics (Ceva).

This report has been prepared to address the noise emissions from the fixed mechanical plant and equipment of the warehouse that operate as part of typical warehouse operations in accordance CoC B85 of SSD 7628, and as detailed in the MPE ONVMP. CoC B85 requires noise monitoring of actual mechanical plant and other noisy equipment operations for a minimum period of one week where valid data is collected following the commencement of operations of each warehouse within MPE. The CoC B84 noise assessment report did not provide specific warehouse predicted noise levels for all nearby noise sensitive receivers for verification under CoC B85. As such, this report has been prepared to confirm that the actual mechanical plant and other noisy equipment operations achieve the overall noise levels presented in Table 5 of CoC B80 of 35 dB(A) $L_{Aeq\ 15minute}$, during all time periods.

SSD 7628 Consent Condition B85 requires noise monitoring of valid data for comparison against the above noise requirements. The NSW EPA *Noise Policy for Industry* (NPfI) provides guidance for monitoring the performance of a noise-generating industrial facility, which includes direct measurement at a receiver location, direct measurement at alternative or intermediate location/s, unattended monitoring and modelling. As the existing ambient noise levels are already high at residences nearby to Warehouse E6 compared with the expected noise emission levels, a combination of on-site, intermediate and receiver attended noise measurements, unattended monitoring, and noise modelling have been used to quantify the noise emission performance of the warehouse mechanical plant and equipment.

Unattended noise monitoring was conducted on the warehouse roof nearby to the key noise generating mechanical plant items over the period of 28 March to 11 April 2025. In addition, attended noise measurements were undertaken on 3 April 2025. The aim of the measurements was to quantify fixed mechanical plant and equipment operational noise levels on-site, to develop a compliance noise model and estimate the noise emission levels at nearby residences.

The monitoring data was analysed to confirm the warehouse mechanical plant and equipment noise source levels. These were used to then develop a noise model for the warehouse. The noise model was

reviewed against onsite, intermediate and receiver concurrent noise measurements to confirm its suitability to assessing the CoC B85 noise emissions.

This assessment concluded that the warehouse mechanical plant and equipment noise emission levels achieve the overall noise levels presented in Table 5 of CoC B80 of 35 dB(A) $L_{Aeq\ 15minute}$, during all time periods as required by CoC B84 and CoC B85.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment Point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our daytime environment:

threshold of hearing	0 dB	The faintest sound we can hear
	10 dB	Human breathing
almost silent	20 dB	
	30 dB	Quiet bedroom or in a quiet national park location
generally quiet	40 dB	Library
	50 dB	Typical office space or ambience in the city at night
moderately loud	60 dB	CBD mall at lunch time
	70 dB	The sound of a car passing on the street
loud	80 dB	Loud music played at home
	90 dB	The sound of a truck passing on the street
very loud	100 dB	Indoor rock band concert
	110 dB	Operating a chainsaw or jackhammer
extremely loud	120 dB	Jet plane take-off at 100m away
threshold of pain	130 dB	
	140 dB	Military jet take-off at 25m away

dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (E63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.

Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Noise monitoring survey information

Table 11 Attended noise monitoring results (receivers) (monitoring locations shown in Figure 3)

ID	Location / Time	Prevailing meteorological conditions[1]	Measured noise level, dB(A)						Comments on measured noise levels
			L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A90}	L_{Amin}	
R1	Wattle Grove (adjacent to 15 Larra Court) 4:06am – 4:21am 3 April 2025	Wind – nil to 0.3 m/s Direction – WSW Humidity – 95% Temperature - 13°C Stability Class F/G[2]	57	49	44	43	40	39	*Warehouse E6 related noise emissions:* Warehouse E6 were not audible/distinguishable. *Estimate warehouse mechanical noise contribution:* $L_{Aeq\ (15minute)}$ = < 30 dBA [*inaudible at 40 dB(A)*] L_{Amax} = < 30 dBA [*inaudible at 40 dB(A)*] *Other noise source contributions:* **Background noise environment –** Background L_{A90} was controlled by distant road traffic [~40-43 dB(A)] and natural sources (frogs). **Ambient noise environment** - Ambient L_{Aeq} noise level was contributed to by distant road traffic [~40-43 dB(A)] (W to NNW), ambulance noise [just audible ~44-45 dB(A)], train movement noise [~47-49 dB(A)] and natural sources [frogs ~44-47 dB(A)]. **High noise events** – Distant traffic accelerating noise (~47-49 dB(A) (N), distant horn (~49 dB(A)) (N/NW) and industrial activities.
R2	Wattle Grove (adjacent to 52 Corryton Court) 4:57am – 5:12am 3 April 2025	Wind – 0 m/s Direction – n/a Humidity – 95% Temperature - 13°C Stability Class G[2]	52	47	44	43	41	40	*Warehouse E6 related noise emissions:* Warehouse E6 were not audible/distinguishable. *Estimate warehouse mechanical noise contribution:* $L_{Aeq\ (15minute)}$ = < 31 dBA [*inaudible at 41 dB(A)*] L_{Amax} = < 31 dBA [*inaudible at 41 dB(A)*] *Other noise source contributions:* **Background noise environment –** Background L_{A90} was controlled by distant road traffic [~41-44 dB(A)] and natural sources (cicadas). **Ambient noise environment** - Ambient L_{Aeq} noise level was contributed to by distant road traffic [~41-44 dB(A)] (N to NW), local road traffic passbys [~44-46 dB(A)], terminal operation events [~42-49 dB(A)], and natural sources [cicadas ~41-43 dB(A)]. **High noise events** – Motorbike passby at distance [up to 52 dB(A)] and local road loud car passbys [up to ~46-47 dB(A)] and industrial activities.

ID	Location / Time	Prevailing meteorological conditions[1]	Measured noise level, dB(A)						Comments on measured noise levels
			L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A90}	L_{Amin}	
R3	Wattle Grove (adjacent to 82 Corryton Court) 4:33am – 4:48am 3 April 2025	Wind – 0 m/s Direction – n/a Humidity – 96% Temperature - 13°C Stability Class G[2]	70	49	46	45	43	41	*Warehouse E6 related noise emissions:* Warehouse E6 were not audible/distinguishable. *Estimate warehouse mechanical noise contribution:* $L_{Aeq\ (15minute)}$ = < 33 dBA [*inaudible at 43 dB(A)*] L_{Amax} = < 33 dBA [*inaudible at 43 dB(A)*] *Other noise source contributions:* **Background noise environment –** Background L_{A90} was controlled by distant road traffic [~43-45 dB(A)] and natural sources (frogs/cicadas). **Ambient noise environment** - Ambient L_{Aeq} noise level was contributed to by local road traffic passbys [~46-48, up to 50 dB(A)], natural sources [frogs ~43-45 dB(A)] and distant road traffic [~43-45 dB(A)] (N to NW), terminal operation events [~41-44 dB(A)], distant train movement noise [~44-48 dB(A)] (SW) and **High noise events** – Motorbike passby at distance [up to 51 dB(A)] and local road loud car passbys [up to ~48-50 dB(A)] and industrial activities.
R4	30 Goodenough Street, Glenfield 5:04am – 5:19am 3 April 2025	Wind – 0 m/s Direction – n/a Humidity – 95% Temperature - 13°C Stability Class G[2]	71	66	53	53	47	44	*Warehouse E6 related noise emissions:* Warehouse E6 were not audible/distinguishable. *Estimate warehouse mechanical noise contribution:* LAeq (15minute) = < 37 dBA [inaudible at 47 dB(A)] LAmax = < 37 dBA [inaudible at 47 dB(A)] Other noise source contributions: **Background noise environment** – Background L_{A90} was controlled by distant road traffic [~53-57 dB(A)] and natural sources (cicadas). **Ambient noise environment** - Ambient L_{Aeq} noise level was contributed to by Cambridge Ave road traffic passbys [~53-71 dB(A)], natural sources [cicadas ~43-53 dB(A)], distant rail traffic [~48-54 dB(A)] **High noise events** – Cambridge Avenue vehicle passbys [up to ~65-71 dB(A).
R5	73A Leacocks Lane, Casula 4:31am – 4:46am 3 April 2025	Wind – 0 m/s Direction – n/a Humidity – 96% Temperature - 13°C Stability Class G[2]	69	65	55	53	43	41	Warehouse E6 related noise emissions: Warehouse E6 were not audible/distinguishable. Estimate warehouse mechanical noise contribution: LAeq (15minute) = < 33 dBA [inaudible at 43 dB(A)] LAmax = < 33 dBA [inaudible at 43 dB(A)] Other noise source contributions: **Background noise environment** – Background L_{A90} was controlled by distant road traffic (M5) [~42-45 dB(A)] and natural sources (birds, cicadas). **Ambient noise environment** - Ambient L_{Aeq} noise level was contributed to by Hume Highway/M5 road traffic [~40-45 dB(A)], local vehicle passbys [up to ~62-69 dB(A)], natural sources [possum/bats ~45-54 dB(A)], distant rail [~47-53 dB(A)] **High noise events** – local vehicle passbys [up to ~62-69 dB(A)], natural sources [birds, cicadas ~53-54 dB(A)].

ID	Location / Time	Prevailing meteorological conditions[1]	Measured noise level, dB(A)						Comments on measured noise levels
			L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A90}	L_{Amin}	
R6	39 Glenelg Court, Wattle Grove (or Anzac Road) 4:02am – 4:17am 3 April 2025	Wind – 0 m/s Direction – n/a Humidity – 95% Temperature - 13°C Stability Class G[2]	82	72	55	59	44	43	*Warehouse E6 related noise emissions:* Warehouse E6 were not audible/distinguishable. *Estimate warehouse mechanical noise contribution:* $L_{Aeq\ (15minute)}$ = < 34 dBA [*inaudible at 44 dB(A)*] L_{Amax} = < 34 dBA [*inaudible at 44 dB(A)*] *Other noise source contributions:* **Background noise environment –** Background L_{A90} was controlled by distant road traffic [~44-47 dB(A)] and natural sources (cicadas). **Ambient noise environment** - Ambient L_{Aeq} noise level was contributed local vehicle passbys on Anzac Road [up to ~75-79 dB(A)], natural sources (cicadas) and industrial activities. **High noise events** – local vehicle passbys [up to ~75-82 dB(A)] and industrial activities.

Notes:
1. Meteorological data from the MIP meteorological data monitoring station adjacent to Bushmaster Avenue.
2. Night time stability class, based upon NPfI Fact Sheet D '*Use of sigma-theta data*'

Table 12 Attended noise monitoring results (intermediate monitoring locations shown in Figure 4)

ID	Location / Time	Prevailing meteorological conditions[1]	Measured noise level, dB(A)						Comments on measured noise levels
			L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A90}	L_{Amin}	
IL1	Intermediate Location 1 (IL1) – E6B boundary fence (SE) intermediate location (south-east of Project/E6-B) 10:05am – 10:20am 3 April 2025	Wind – 0.5-1 m/s (calm *at monitoring location*) Direction – W to N Humidity – 55% Temperature - 32°C Stability Class C[2]	77	71	63	60	52	48	*Warehouse E6 related noise emissions:* Warehouse E6 were not clearly audible/distinguishable. *Estimate warehouse mechanical noise contribution:* $L_{Aeq\ (15minute)}$ = < 42 dB(A) [*inaudible at 52dB(A)*]. L_{Amax} = < 42 dBA [*inaudible at 52 dB(A)*]. *Other noise source contributions:* **Background noise environment –** Background LA90 was controlled by truck parking on local road (ie. truck idle) and E7 hardstand truck idle. **Ambient noise environment** - Ambient LAeq noise level was contributed by local vehicle passbys on Marcus Place and nearby IMEX and E7 activities. **High noise events –** Airplane flyby overhead [(~63-65 dB(A)] and industrial activities.

ID	Location / Time	Prevailing meteorological conditions[1]	Measured noise level, dB(A)						Comments on measured noise levels
			L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A90}	L_{Amin}	
IL2	Intermediate Location 2 (IL2) – Corner Marcus Place & Trajan Street near defence land boundary fence (south-east of Project/E6-A boundary) 10:05am – 10:20am 3 April 2025	Wind – 0.5-1 m/s (calm *at monitoring location*) Direction – W to N Humidity – 55% Temperature - 32°C Stability Class C[2]	72	66	57	54	44	42	*Warehouse E6 related noise emissions:* Warehouse E6 were not clearly audible/distinguishable. *Estimate warehouse mechanical noise contribution:* $L_{Aeq\ (15minute)}$ = < 34 dB(A) [*inaudible at 44dB(A)*]. L_{Amax} = < 34 dBA [*inaudible at 44 dB(A)*]. *Is Other noise source contributions:* **Background noise environment –** Background LA90 was controlled by distant road traffic [~44 dB(A)]. **Ambient noise environment** - Ambient LAeq noise level was contributed local vehicle/trucks passbys on Marcus Place [up to ~63-65 dB(A)] and nearby industrial activities (ie. E7 hardstand trucks). **High noise events –** Airplane flyby overhead [(~63-65 dB(A)], construction vehicle passby [up to ~63-64 dB(A)] and industrial activities.

Notes:
1. Meteorological data from the MIP meteorological data monitoring station adjacent to Bushmaster Avenue.
2. Stability class, based upon NPfI Fact Sheet D '*Use of sigma-theta data*'

APPENDIX C Logger location – Warehouse E6B office roof

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Acoustics
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Structural Dynamics

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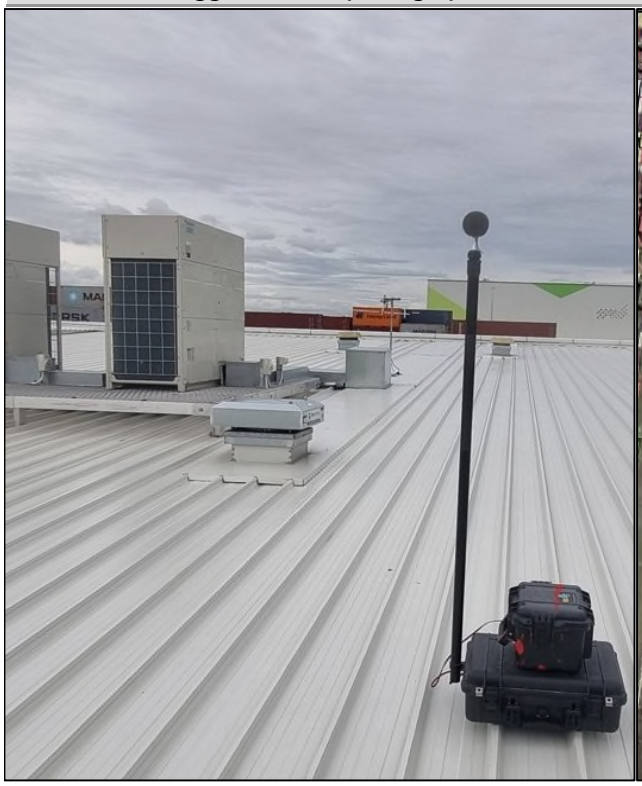
Dates of Survey: 28/03/2025 - 09/04/2025
Monitoring ID: Unattended noise monitor (L1)
Address: 6B Marcus Pl, Moorebank NSW
Description: E6B Main office roof

Background & Ambient Noise Monitoring Results						
	L_{A90} Background Noise Levels			L_{Aeq} Ambient Noise Levels		
	Day[1]	Evening[2]	Night[3]	Day[1]	Evening[2]	Night[3]
Representative Week[4]	49	47	47	56	52	52

Notes:

1. Day: 7.00am to 6.00pm Monday to Saturday and 8.00am to 6.00pm Sundays & Public Holidays
2. Evening: 6.00pm to 10.00pm Monday to Sunday & Public Holidays
3. Night: 10.00pm to 5.00am Monday to Sunday & Public Holidays
4. Rating Background Level (RBL) for LA90 and logarithmic average for LAeq

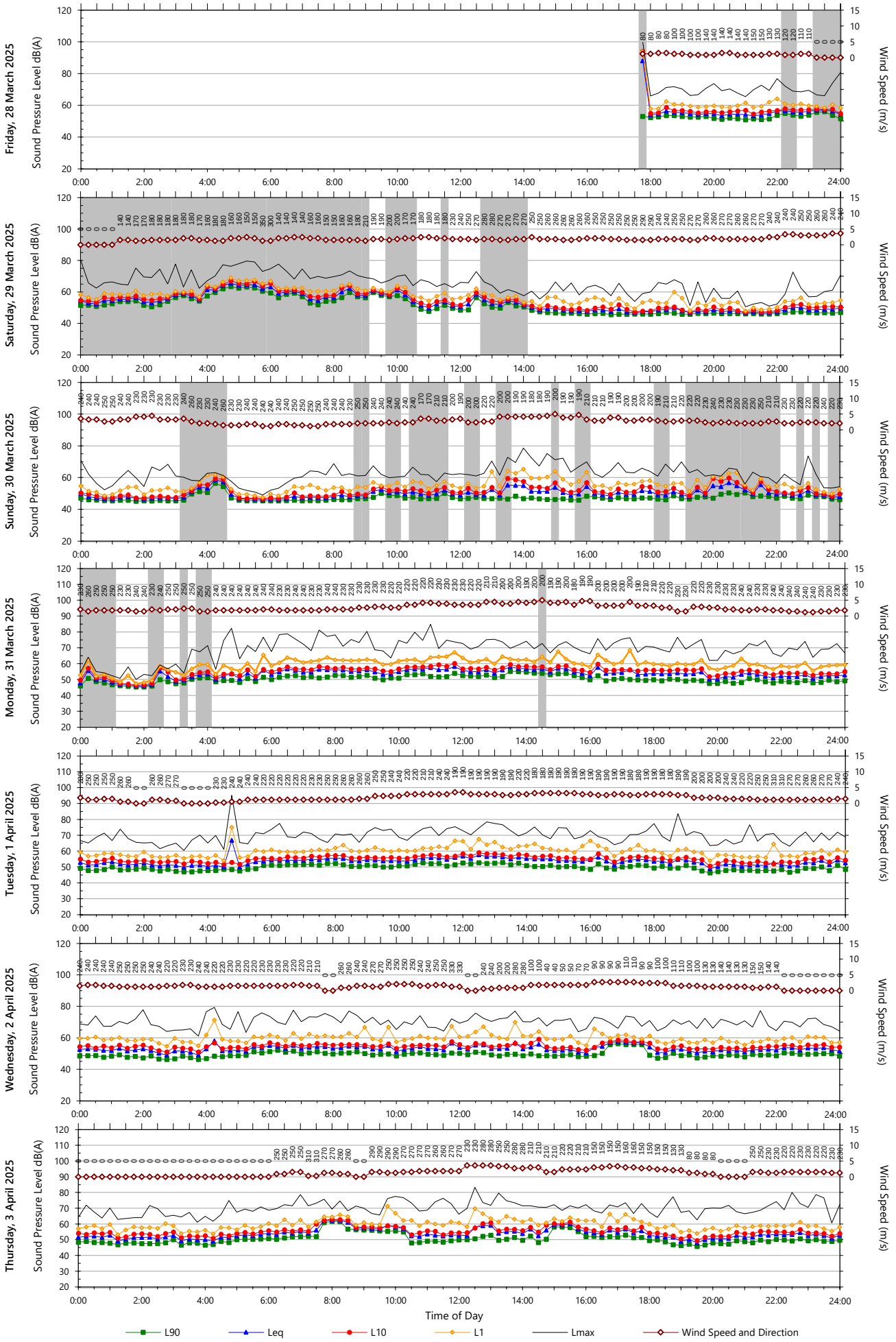
Logger location photograph



Logger location map

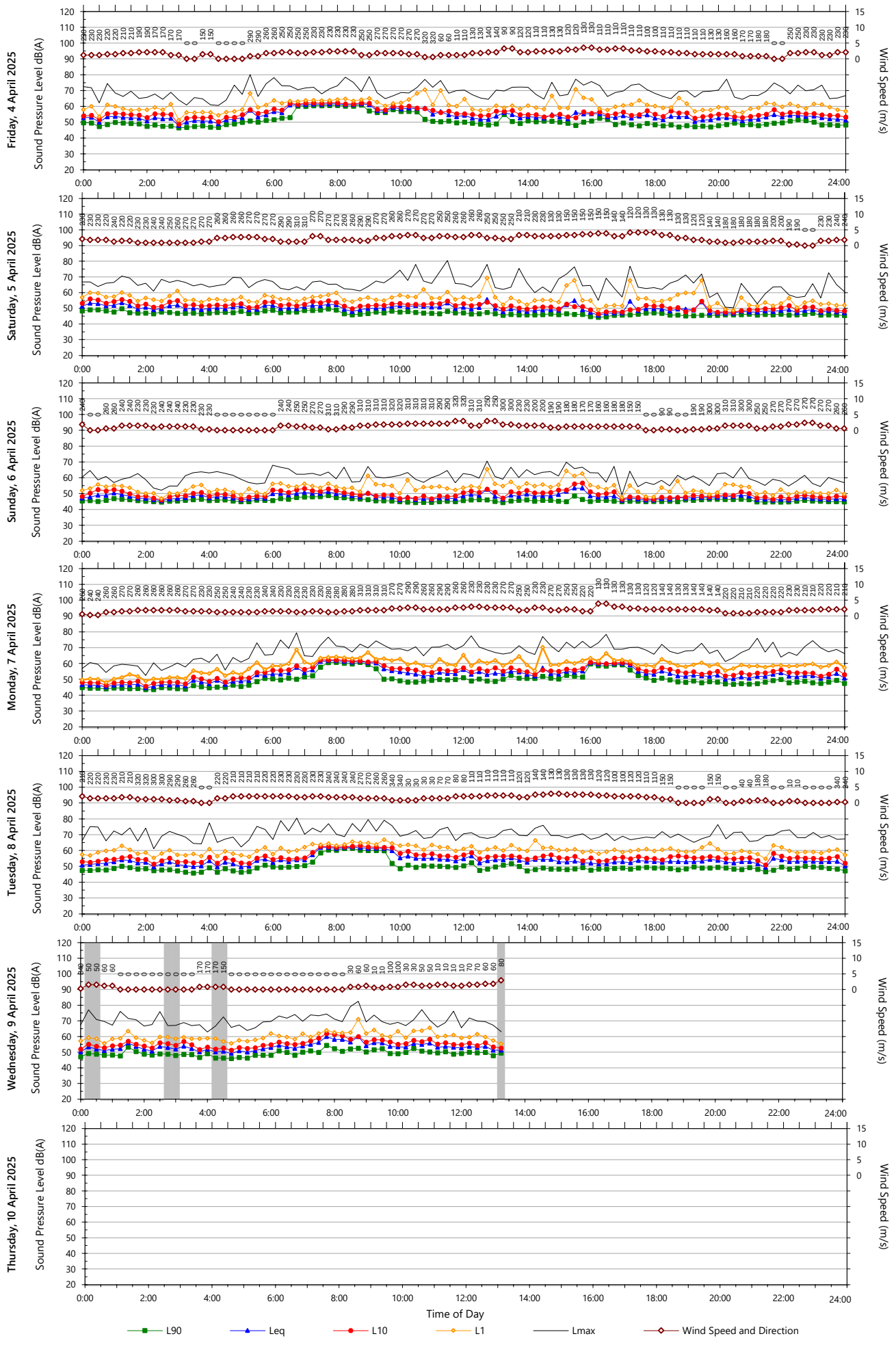
Unattended Monitoring Results

Location: 6B Marcus Pl, Moorebank NSW - E6B Main office roof



Data File: 2025-03-28_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r47)



Data File: 2025-03-28_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r47)