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MOOREBANK INTERMODAL PRECINCT EAST

Annual Noise Review - April 2023 to April 2024

17 July 2024

The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the Moorebank Industrial Warehouse Trust

TL116-05F23 MPE Annual Review 2024 (r4).docx

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1 Introduction

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stages 1 and 2 of the Moorebank Precinct East (MPE) Project (SSD 6766 and SSD 7628 respectively), which together comprise the two stages of development under the MPE Concept Approval (MP10_0193).

This **Annual Noise Review** report **for Year 4 Operations (April 2023 to April 2024)** has been prepared to address the requirements of Approval Condition B90 of SSD 7628 as follows:

> *For the duration of operation, the Applicant must:*
>
> *a) continue to implement all reasonable and feasible best practice noise mitigation measures;*
>
> *b) continue to investigate ways to reduce noise generated by the development, including maximum noise levels which may result in sleep disturbance; and*
>
> *c) report on these investigations and the implementation and effectiveness of these measures in the Annual Review to the satisfaction of the Secretary.*

Table 1 provides a summary of the noise-related Approval Conditions and how these are addressed in this Annual Noise Review.

Appendix A contains a glossary of acoustic terms used in this report.

Appendix B contains a copy of the reports referred to in this report that are not publicly available on the SIMTA website.

2 Compliance Matrix

Table 1 provides a summary of the Approval Conditions which relate to operational noise emission monitoring for Year 4 operations, and a discussion of the operational noise monitoring results. Where required, additional information is provided in later sections of this report or the appendices.

Table 1 Compliance matrix

Condition ID	Condition	Comments on compliance	Reference for further information
SSD 6766			
G7	The Applicant shall install and maintain a rail noise monitoring system on the rail link at the commencement of operation to continuously monitor the noise from rail operations on the rail link. The system shall capture the noise from each individual train passby noise generation event, and include information to identify: a) Time and date of freight train passbys; b) Imagery or video to enable identification of the rolling stock during day and night; c) $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ from rail operations; and d) $L_{AF(max)}$ and SEL of individual train passbys, measured in accordance with ISO3095; or e) Other alternative information as agreed with, or required by, the Secretary. The results from the noise monitoring system, shall be publicly accessible from a website maintained by the Applicant. The noise results from each train shall be available on the website within 24 hours of it passing the monitor, unless unforeseen circumstances (i.e. a system malfunction) have occurred. The $L_{Aeq(15hour)}$ and $L_{Aeq(9hr)}$ results from each day shall be available on the website within 24 hours of the period ending. Prior to the commencement of operation, the Applicant shall submit for the approval of the Secretary, justification supporting the appropriateness of the location for rail noise monitoring, including details of any alternative options considered and reasons for these being dismissed. The rail noise monitoring system shall not operate until the Secretary has approved the proposed monitoring location. The Applicant shall provide an annual report to the Secretary with the results of monitoring for a period of 5 years, or as otherwise agreed with the Secretary, from the commencement of operation of the IMEX terminal. The Secretary shall consider the need for further reporting following a review of the results for year 5.	The commencement of IMT operations occurred in May 2020. The new rail link was commissioned in November 2019. A description of the noise monitoring systems are provided in Section 5 and capture the information required by this approval. A Functional and Performance Specification for the permanent noise monitoring system and angle of attack monitoring system was prepared for approval by the Secretary before the rail link commissioning. A summary of the noise monitoring results for Year 4 operations is provided in Section 5.1.	https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/TJ741-04F04-AoA-and-Functional-Spec-for-Permanent-Noise-Monitor-r9_redacted.pdf https://moorebanknoisemonitor-emsbk.trackiq.net/NoiseMonitor/ Section 5

Condition ID	Condition	Comments on compliance	Reference for further information
G7A	The applicant shall install and maintain a wayside angle of attack monitoring system on the rail link at the commencement of operation to continuously monitor the angle of attack to the rail of rolling stock wheels. The system shall capture the angle of attack from a wheel on each axle of every train, and include information to identify: a) Time and date of each axle passby; and b) The identification number of each item of rolling stock. The results from the angle of attack monitoring system shall be: • accessible by train operators from a website maintained by the Applicant. Angle of attack results from each train shall be available on the website within 24 hours of it passing the monitor, unless unforeseen circumstances have occurred. • included in a six-monthly report to the Secretary. The report should at least identify the number of wagons with wheels that exceed the ASA standard angle of attack and the action taken by operators to improve steering performance. Prior to the commencement of operation, the Applicant shall submit for the approval of the Secretary, justification supporting the appropriateness of the location for angle of attack monitoring, the format of the information to be accessible to operators and the format of the public report. The angle of attack monitoring system shall not operate until the Secretary has approved the proposed monitoring location and reporting arrangements.	An Angle of Attack (AoA) monitoring system was installed on the new rail link in May 2020. The monitoring system captures the AoA of each axle passby and compares the measured values with the acceptable value in the applicable Asset Standards Authority minimum operating standard. The AoA values for each axle are available to operators in accordance with the approval condition. A Functional and Performance Specification for the permanent noise monitoring system and angle of attack monitoring system was prepared for approval by the Secretary before the rail link commissioning. A summary of the AoA noise monitoring results of the Year 4 operations is provided in Section 6.1. The monitoring identified 1 train where the maximum AoA value exceeded the alarm level. The single exceedance of the AoA alarm levels was viewed as a one-off instance, occurring irregularly.	Section 6
G8	The following measures must be implemented during operation: a) The use of automatic rail lubrication equipment in accordance with ASA Standard T HR TR 00111 ST Rail Lubrication and top of rail friction modifiers, where required; and b) Measures to ensure the rail cross sectional profile is maintained in accordance with ETN–01-02 Rail Grinding Manual for Plain Track to ensure the correct wheel / rail contact position and hence to encourage proper rolling stock steering.	Two rail friction modifier systems were installed on the rail link on 22 November 2019 per ASA Standard. These are positioned on the MIMT North Track at Chainage 39.739 km and the MIMT South Track at Chainage 39.860 km. Monthly track inspections and maintenance is undertaken by Qube's maintenance contractor, Taylor Rail, to ensure alignment with maintenance standards. Rail grinding has been performed so that the rail profile is consistent with maintenance standards.	FCMM 3B
SSD 7628			
B79	The permitted hours of warehouse and distribution operation as detailed in Table 4. Table 4: Hours of Operation **Activity** / **Day** / **Time** Operation / Monday to Sunday / 24 hours	MPE operates 24 hours per day, 365 days per year, consistent with the permitted hours of operation.	n/a

Condition ID	Condition	Comments on compliance	Reference for further information
B80	B80. Noise generated by operation of the development inclusive of MPE Stage 1 operations must not exceed the noise limits in Table 5. Table 5: Noise Limits dB(A) Notes: To determine compliance with the LAeq,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 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy must also be applied to the measured noise levels where applicable. To determine compliance with the LA1,1 minute 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 11 of the NSW Industrial Noise Policy). 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.	For each new warehouse and when noise monitoring is undertaken in response to complaints, the measured noise levels are compared with the noise limits in this condition This condition specifies the operational noise limits for MPE operations. However, when undertaking any compliance assessment, it is noted that the SSD 7628 B80 noise limit table states "*…inclusive of MPE Stage 1 operations*" therefore was intended to apply to the cumulative noise emissions of noise generating activities in SSD 6766 and SSD 7628. However, MPE Stage 1, has specific noise limits included in SSD 6766, approved as part of L&EC Proceedings (No 2017/81889) which are higher than these levels. This requirement presents a consistency issue, as the requirement is inconsistent with the EIS derived noise limits in accordance with NSW EPA policy, the expected noise emission performance from MPE, and previous approvals. As part of Modification 1 to SSD 7709 (MPW Stage 2), which identifies cumulative noise limits for MPW + MPE, EPA agreed there was an inconsistency issue. Following which, it was agreed that MPW + MPE should achieve the cumulative noise limits in SSD 7709 B131.	Section 3 – Warehouse noise monitoring Section 7 - Noise monitoring in response to complaints
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 Plan must be submitted to the Secretary within two months of occupation or each tenancy to verify predicted mechanical plant and equipment noise levels.	Warehouse noise monitoring is required to be undertaken following the occupation of each warehouse. Warehouse noise monitoring was undertaken during May 2024 for MPE Warehouse E7 where valid data could be obtained, with data analysis currently being undertaken.	Section 3

Condition ID	Condition	Comments on compliance	Reference for further information
B88	To ensure the operational noise impacts are appropriately managed, the following measures apply: a) use of best practice plant; and b) preparation of a risk assessment to determine if non-tonal reversing alarms can be fitted as a condition of site entry. Alternatively, site design may include traffic flow that does not require or precludes reversing of vehicles.	The following additional best practice plant / measures have been implemented within the current reporting period: 1. The use of electric cranes commenced so that all rail loading and container stacking is performed by the electric cranes, with reach stackers now only required for truck loading. The cranes have non-tonal movement alarms. 2. 'Quackers' or broadband reversing alarms were fitted to all reach stackers and combilifts. 3. IMEX staff briefings were undertaken, reminding staff and drivers of noise management obligations and will be ongoing as part of regular reminders. The risk assessment relating to the use of non-tonal reversing alarms is addressed in the Table 2-3 B88 of the ONVMP. Further measures have been identified in the F5A management plan, which include both mitigation and management measures, including container handling and truck operations.	Operational Noise and Vibration Management Plan (Rev 013, 23/01/2023) (ONVMP) https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/09/ONVMP_V13_clean_compiled_Redacted-compressed.pdf Section 7
B90	For the duration of operation, the Applicant must: a) continue to implement all reasonable and feasible best practice noise mitigation measures; b) continue to investigate ways to reduce noise generated by the development, including maximum noise levels which may result in sleep disturbance; and c) report on these investigations and the implementation and effectiveness of these measures in the Annual Review to the satisfaction of the Secretary.	The following additional best practice plant / measures have been implemented within the current reporting period: 1. The use of electric cranes commenced so that all rail loading and container stacking is performed by the electric cranes, with reach stackers now only required for truck loading. 2. 'Quackers' or broadband reversing alarms were fitted to all reach stackers and combilifts. 3. IMEX staff briefings were undertaken, reminding staff and drivers of noise management obligations and will be ongoing as part of regular reminders. The permanent rail noise monitoring results (Section 5) for Year 4 operations indicate similar passby noise levels to Year 1 operations and increased L_{Aeq} noise levels consistent with the rail link usage. The AoA monitoring data for train axles is reviewed by operators to identify wagons that may require maintenance to improve steering performance. Noise monitoring as part of a Noise Measurement Program was undertaken on three occasions during 2023. A range of mitigation and management recommendations were then identified and incorporated into the updated F5A management plan to manage operational noise emissions from the IMEX terminal (Section 7).	Sections 3, 4, 5, 6 and 7

Condition ID	Condition	Comments on compliance	Reference for further information
Final Compilation of Mitigation Measures (FCMM) for MPE Stage 1 and Stage 2			
Stage 2 2D	In the event of any noise or vibration related complaint or adverse comment from the community, noise and ground vibration levels (as relevant) would be investigated. Remedial action would be implemented where feasible and reasonable. The procedures for managing complaints would be provided within the Community Information and Awareness Strategy.	Noise monitoring as part of a Noise Measurement Program was undertaken on three occasions during 2023. A range of mitigation and management recommendations were then identified and incorporated into the updated F5A management plan to manage operational noise emissions from the IMEX terminal (Section 7).	Section 7
Operational Noise and Vibration Management Plan – Section 4.1.1 Summary of Monitoring Requirements			
Table 4.1 Rail noise monitoring	Continuous rail noise monitoring will be undertaken from the commencement of operations of the IMEX terminal. The monitoring system will capture the following information: • Noise from each train passby • Time and date of each train passby • Imagery or video recording to identify rolling stock • $L_{AF(max)}$ and Sound Exposure Level (SEL) of individual train passbys, measured in accordance with ISO 3095:2013 • $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ noise levels for each 24-hour period, which will be calculated based on the number of train passbys during the day and night periods and the corresponding SEL noise levels, consistent with the procedure in Clause 3.4.1.1 of the Rail Infrastructure Noise Guideline (EPA, 2013). • Other information as required by the Secretary	Refer comments related to SSD 6766 G7	SSD 6766 G7
Wayside Angle of Attack Monitoring	Continuous wayside angle of attack monitoring will be undertaken from the commencement of operations of the IMEX terminal. The monitoring system will capture the following information: • Angle of attack from a wheel on each axle of every train • Time and date of each axle passby • Identification number of each item of rolling stock	Refer comments related to SSD 6766 G7A	SSD 6766 G7A
Brake Squeal Noise	Continuous (unattended monitoring system) from the commencement of operations of the IMEX terminal – to assess potential noise impacts of rail link at western receivers	Refer comments related to SSD 6766 G7. The permanent noise monitoring system is positioned at a location on the rail link where it can capture noise levels associated with curve brake squeal should this occur.	SSD 6766 G7
Operational Noise Monitoring	Noise monitoring to compare actual noise performance of the MIP East Precinct against the noise management levels will be undertaken as follows: • Regular performance monitoring • Within 12 months of the commencement of operation of the IMEX terminal and Warehouse 1 Precinct • Within 12 months of occupation of the first warehouse, 50% occupation of the site and 100% occupation of the site, or as otherwise agreed by the Secretary • For a minimum of 12 months following occupation of the entire site	Sections 3, 4, 5, 6 and 7	Sections 3, 4, 5, 6 and 7

Condition ID	Condition	Comments on compliance	Reference for further information
Operational Noise Monitoring	Attended noise monitoring will be undertaken to determine compliance against the noise management levels upon receipt of a noise complaint	Noise monitoring as part of a Noise Measurement Program was undertaken on three occasions during 2023. A range of mitigation and management recommendations were then identified and incorporated into the updated F5A management plan to manage operational noise emissions from the IMEX terminal (Section 7).	Section 7
Noise Assessment of Mechanical Plant and other equipment	Conducted for the freight village and each warehouse for a period of 1 week after construction and submitted to secretary within 2 weeks of occupation. Compliance against the noise management levels.	Refer comments related to SSD 7628 B85	SSD 7628 B85
Continuous Unattended Noise Monitoring	Continuous noise monitoring will be conducted at the following locations for a period of twelve months following the occupation of the entire site: • CM1: 10 Talbot Court, Wattle Grove • CM2: 24 Glenelg Court, Wattle Grove North • CM3: 14 Dunmore Crescent, Casula • CM4: 26 Goodenough Street, Glenfield	Refer comments related to SSD 7628 B64 (refer Section 4)	SSD 7628 B64 Section 4

3 Warehouse noise monitoring

Warehouse noise monitoring is required to be undertaken following the occupation of each warehouse.

Noise monitoring was undertaken during May 2024 for MPE Warehouse E7 where valid data could be obtained. Processing and analysis of this monitoring data is currently being undertaken and will be reported as part of the 2024-2025 annual review.

No additional warehouses commenced operations where valid monitoring data can be measured within the reporting period.

4 Continuous noise monitoring in residential areas

Continuous noise monitoring at sensitive receivers is required to be undertaken at sensitive receivers in accordance with the approval conditions for MPE Stage 2 (SSD 7628 Condition B64). Whilst this condition relates to construction noise, the noise monitoring results can also be utilised to measure operational noise and to investigate noise complaints (if required).

Details of the continuous noise monitoring and measurement locations (CM1 to CM4) are provided in Section 4.1.2 and Figure 3-1 of the MPE ONVMP (Rev 13, 24/01/2023). The measurement systems comprise four Envirosuite permanent noise monitors. The monitoring locations are:

- CM1: 10 Talbot Court, Wattle Grove
- CM2: 24 Glenelg Court, Wattle Grove North
- CM3: 14 Dunmore Crescent, Casula
- CM4: 26 Goodenough Street, Glenfield

The primary purpose of the permanent noise monitoring systems is to measure construction-related noise in accordance with the requirements of SSD 7628 Condition B64. This noise monitoring is ongoing.

5 Continuous rail link noise monitoring

The commencement of Intermodal Terminal operations occurred in May 2020. The new rail link was commissioned earlier in November 2019. In conjunction with the rail link commissioning, a temporary rail noise monitoring system (RNMS) was established to quantify the passby noise levels in accordance with the requirements of SSD6766 Condition G7.

The temporary RNMS was positioned at a location near one of the small radius curves and where freight trains are likely to be braking. The microphone of the RNMS monitoring system was positioned on the western side of rail link at a distance of 10.5 m from the near track centreline (Up track) and 15.5 m from the far track centreline (Down track).

The temporary RNMS was operational between 1 November 2019 and 8 July 2020. During this period, procurement of a permanent noise monitoring system occurred, compliant with the requirements of the *Functional and Performance Specification for Permanent Noise Monitor and Proposed Noise and AoA Monitoring Locations*. This functional specification provided justification supporting the appropriateness of the proposed monitoring location and was approved by the Secretary.

The permanent noise monitoring system was commissioned on 9 July 2020 at the same location as the temporary RNMS. The permanent system incorporates two microphones, one adjacent to each track, at a distance of 7.5 m from the track centreline. Noise measurement results of all passbys are provided here[1].

Below is a summary of the noise monitoring results for Year 4 operations.

5.1 Year 4 rail operations noise monitoring report

This report covers rail movements between 30 April 2023 and 2 May 2024. A summary of the key statistics are provided below:

- Number of days in monitoring period - 368 days.
- Number of valid train passby events – 1040 (day), 564 (night), 1604 (day + night)
- Number of days that included one or more train events – 307, representing 84% of days (5.9 days per week)
- Number of nights that included one or more train events – 256, representing 70% of nights (4.9 nights per week)

[1] Available https://moorebanknoisemonitor-emsbk.trackiq.net/NoiseMonitor/

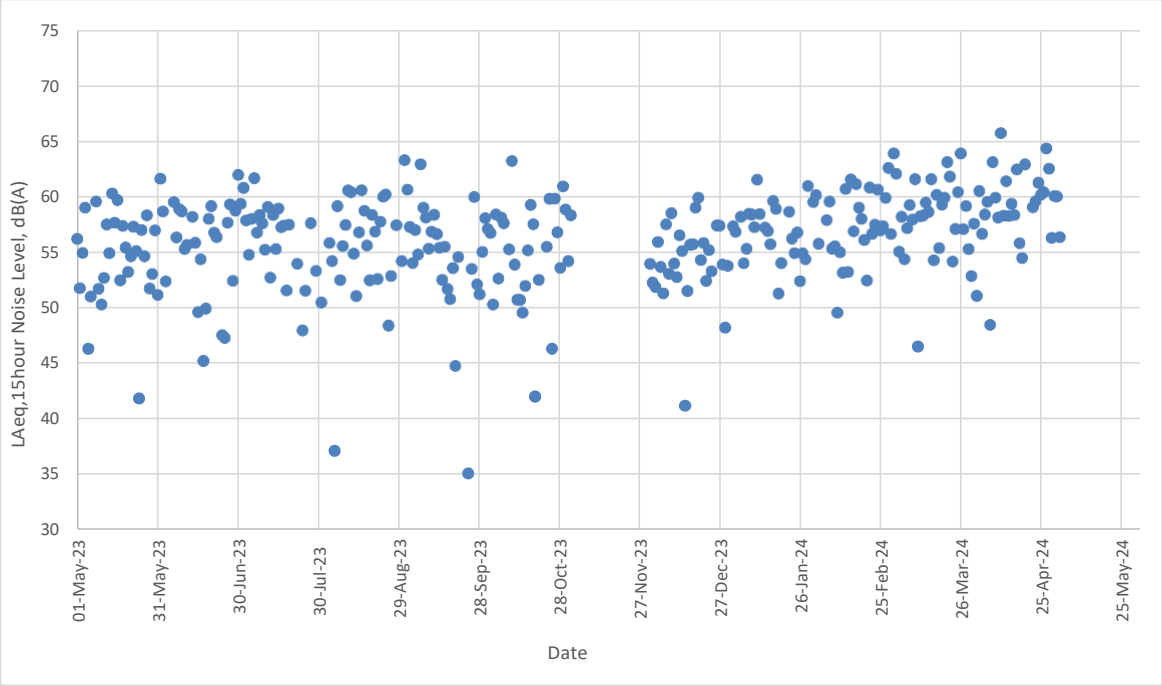
For each train passby, the noise monitoring system recorded the L_{AFmax} and SEL[2] noise levels at a measurement distance of 7.5 m from the track centreline. The SEL noise levels are utilised to calculate the $L_{Aeq(15hour)}$ daytime and $L_{Aeq(9hour)}$ noise levels each day. A summary of the measured $L_{Aeq(15hour)}$ daytime noise levels, normalised to a measurement distance of 30 m is provided in Figure 1. The corresponding noise levels for the night-time period are provided in Figure 2.

It is noted that the nearest residential receiver (Glenfield Farm) is approximately 400 m from the rail link at the closest point and approximately 850 m from the noise monitoring system. The noise levels at Glenfield Farm are estimated to be approximately 14 dB(A) or more below the values in Figure 1 and Figure 2.

Based on the results in Figure 1 and Figure 2, the measured $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ noise levels appear to be approximately 3 dB(A) higher than the Year 3 noise monitoring results (see Reference 3). This increase is mostly related to the increased usage of the rail link between Year 3 and Year 4 (i.e. additional trains), and may also be due to an increase in the average length of the train consists.

The missing AoA data between 2 November 2023 and 31 November 2023 occurred because there was a rake of stationary wagons stabled on the north track between MT4 and MT11 (i.e. the same track as the AoA measurement equipment).

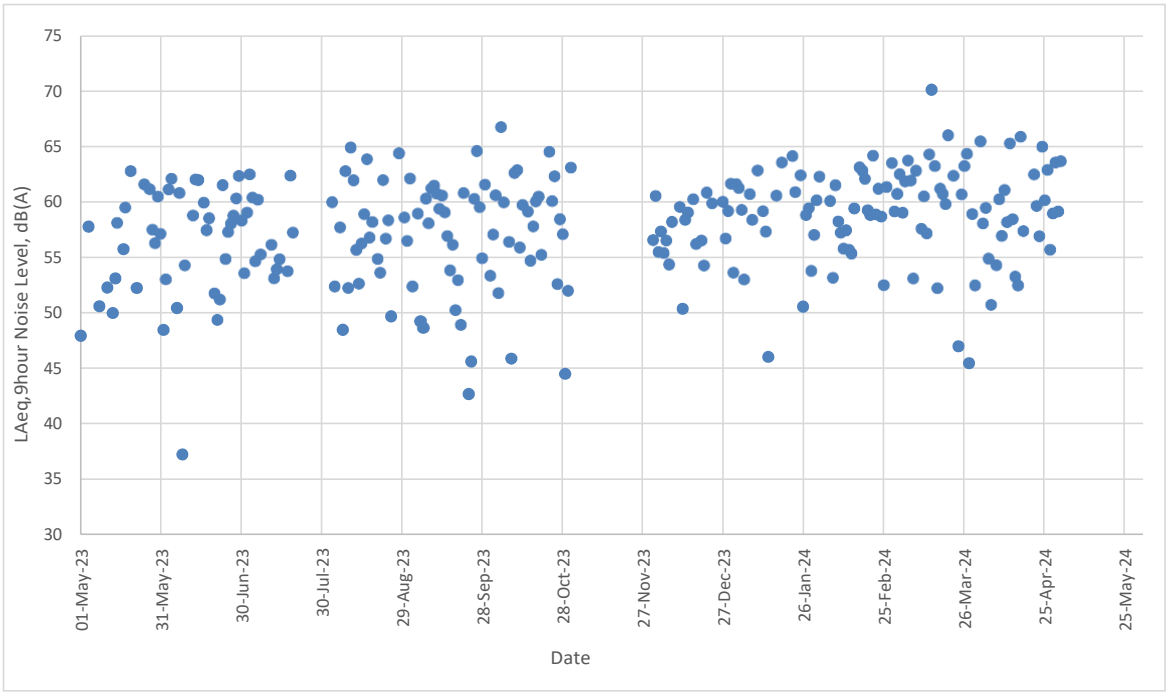
Figure 1 Measured $L_{Aeq(15hour)}$ daytime noise levels at 30 m from track centreline



[2] SEL represents the single-event Sound Exposure Level of the train passby. This represents the total noise energy of the train passby event, normalised to a measurement interval of one second. The SEL is expressed as a dB(A) noise level.

[3] Moorebank Intermodal Terminal Annual Noise Review - May 2023, Renzo Tonin & Associates Report TL116-05F21 Annual Review May 2023 (r2) dated 6 May 2023

Figure 2 Measured $L_{Aeq(9hour)}$ night-time noise levels at 30 m from track centreline



A summary of the measured L_{AFmax} daytime noise levels at a measurement distance of 7.5 m is provided in Figure 3. The corresponding noise levels for the night-time period are provided in Figure 4.

Figure 3 Measured L_{AFmax} daytime noise levels at 7.5 m from track centreline

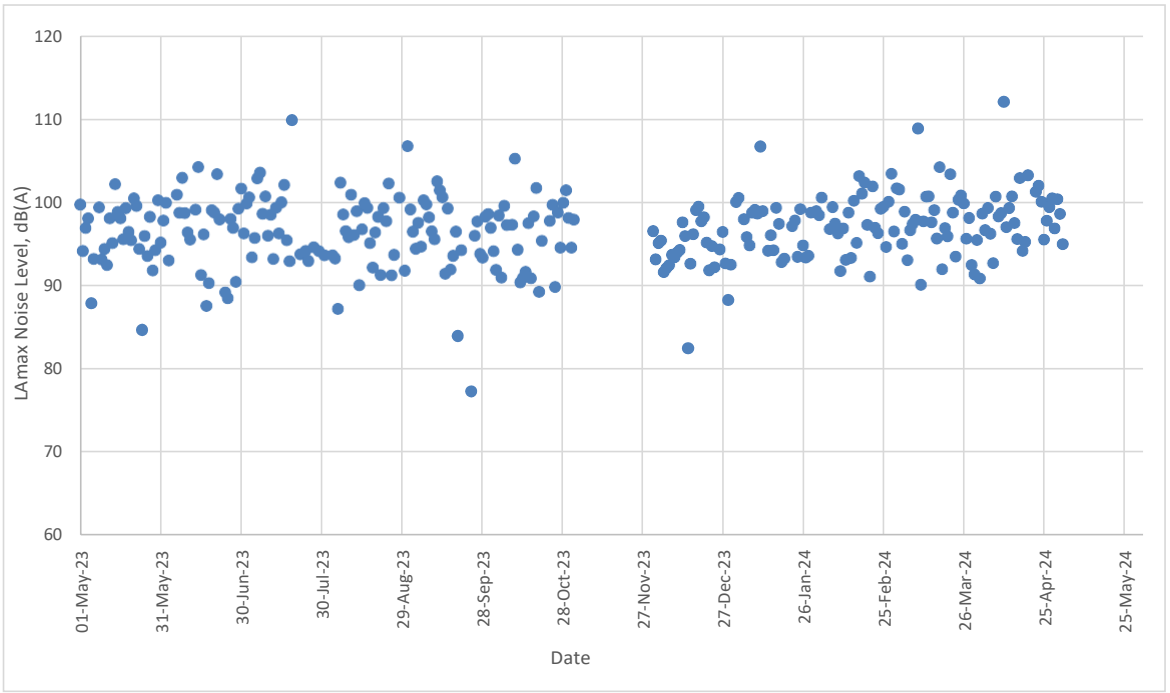
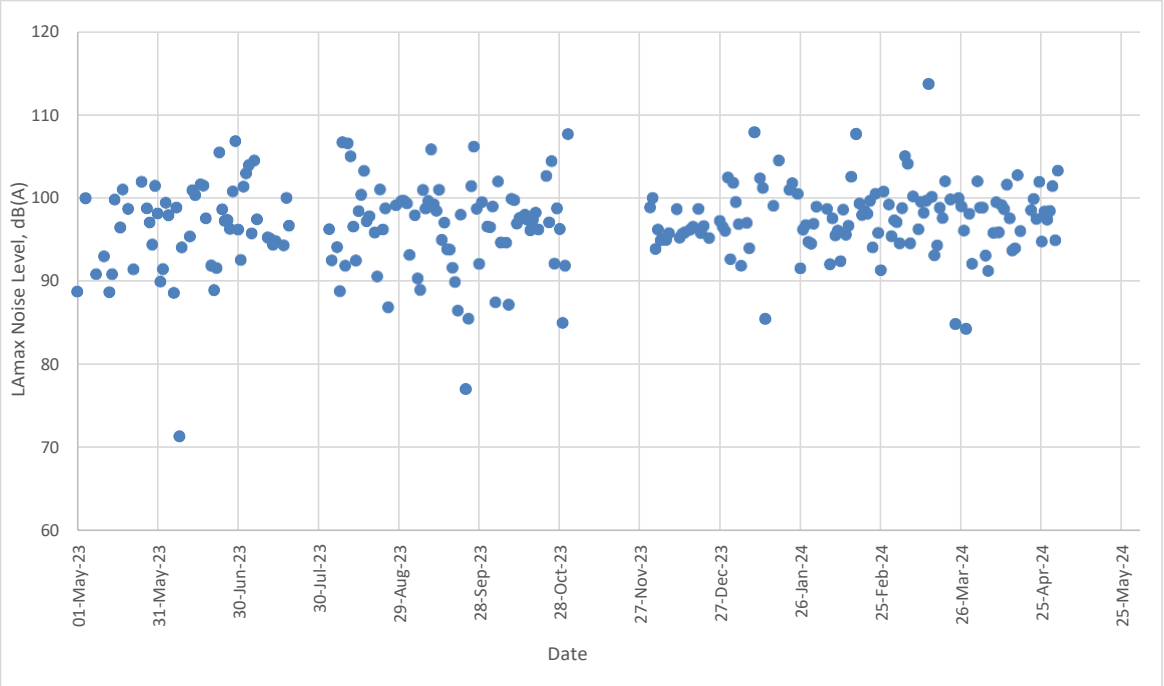


Figure 4 Measured L_{AFmax} night-time noise levels at 7.5 m from track centreline



Based on the results in Figure 3 and Figure 4, there does not appear to be any obvious trend in the measured L_{AFmax} noise levels during the monitoring period. The maximum noise levels are consistent with the Year 3 noise monitoring results (see Reference 3).

6 Rail link angle of attack (AoA) monitoring

The performance of wagon bogies and their ability to negotiate small radius curves without generating curve squeal, is assessed in terms of the angle of attack (AoA) of the wheelset. Acceptable AoA values are defined in Section 2.7.1 of Asset Standards Authority Standard T HR RS 00400 ST[4] and are a function of the curve radius and wheel base.

An AoA measurement system was installed on the rail link and partially commissioned on 13 May 2020. The system was fully commissioned on 9 July 2020 at the same time as the permanent noise monitoring system. The AoA system is installed on the eastern track.

Justification supporting the appropriateness of the proposed monitoring location is provided in the *Functional and Performance Specification for Permanent Noise Monitor and Proposed Noise and AoA Monitoring Locations*[5], and was approved by the Secretary.

As stated above, there was no AoA data for the period between 02 November 2023 and 31 November 2023 due to a parked rate of stationary wagons. AoA measurement data for Year 4 operations is available in the following six monthly report:

- Moorebank Intermodal Terminal - Six Monthly Review of AoA – November 2023 (rail movements between 1 May 2023 and 31 October 2023)

In accordance with the requirements of the SSD 6766 Condition G7A, the AoA of a wheel of each axle of each train is captured by the measurement system. This data is accessible by train operators on a website maintained by QUBE.

Below is a summary of the noise monitoring results for Year 4 operations.

6.1 Year 4 rail operations AoA monitoring

A summary of the key statistics are provided below:

- 1 November 2023 and 2 May 2024
    - Number of valid train passby events – 197
    - Number of train passby events where the measure AoA values on one or more axles were above the acceptable level defined in Section 2.7.1 of Asset Standards Authority Standard T HR RS 00400 ST – 1, representing less than 1% of passbys.

A summary of the maximum AoA value measured for each train is provided in Figure 5. As stated above, there was no AoA data for the period between 02 November 2023 and 31 November 2023 due to a

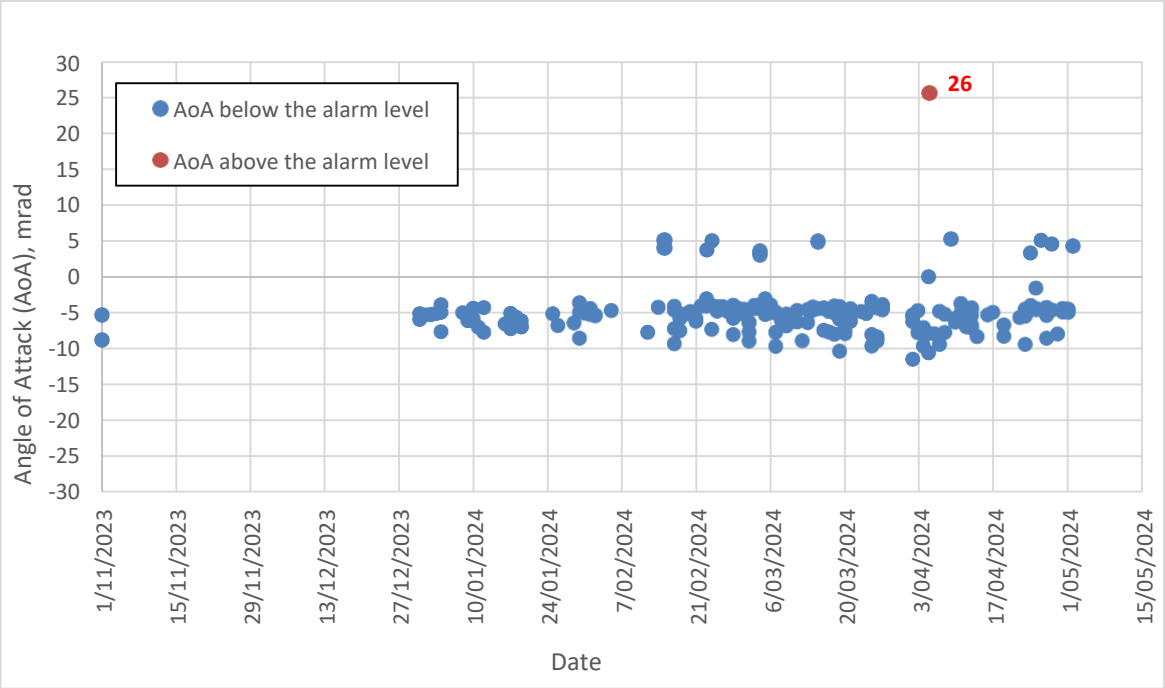
[4] Transport for NSW Asset Standards Authority T HR RS 00400 ST *RSU 400 Series – Minimum Operating Standards for Rolling Stock – Freight Vehicle Specific Interface Requirements* Version 2.0 dated 24 August 2017

[5] Renzo Tonin & Associates Report TJ741-04F04 AoA and Functional Spec for Permanent Noise Monitor (r8)

parked rate of stationary wagons . The results show that the maximum AoA value is typically less than 10 mrad. 1 train passby had maximum AoA value greater than the established alarm level of approximately 26 mrad.

The single AoA alarm event did not result in elevated noise levels at the permanent noise monitoring location (refer Section 5.1). The single exceedance of the AoA alarm levels was viewed as a one-off instance.

Figure 5 Maximum AoA value for each train - 1 November 2023 to 2 May 2024



7 Noise monitoring in response to complaints

In the current reporting period, a small number of complaints (4) relating to operational noise levels were reported by residents in Wattle Grove and Casula. The complaints referenced terminal activities, with container handling noise, and general evening and night-time noise events in the direction of MPE (related to hours of operation).

The number of operational noise-related complaints each month is summarised in the below table, for the period of 30 April 2023 to 2 May 2024. The number of noise complaints were highest in April 2024. Only one noise complaint was received in the 11 months prior months to April 2024 during the current reporting period.

Period	Number of operational noise-related complaints
May 2023	0
June 2023	0
July 2023	0
August 2023	1
September 2023	0
October 2023	0
November 2023	0
December 2023	0
January 2024	0
February 2024	0
March 2024	0
April 2024	3

Following previous complaint investigation noise monitoring in August 2022 in the previous reporting period, QUBE committed to undertaking further noise monitoring in the community to review the ongoing implementation of noise mitigation and management measures at the IMEX terminal.

Renzo Tonin and Associates were subsequently engaged to undertake a noise measurement program to review the facility noise emissions, also considering the following noise mitigation measures that were implemented by the development:

a) Commencement of container stacking to east of the IMEX terminal, forming a defacto noise barrier as the container stacks will provide a natural mitigation barrier for noise to the east from the rail activities.

b) The commencement of electric cranes, with all rail loading and yard container stacking performed by the electric cranes with reach stackers only required for truck container handling.

c) 'Quackers' or broadband reversing alarms were fitted to all reach stackers and combilifts onsite.

d) IMEX truck briefings were undertaken reminding drivers of noise management obligations and will be ongoing as part of regular reminders.

This noise monitoring program was undertaken during 2023, with periods of attended and unattended noise monitoring undertaken on 3 occasions, during periods when IMEX operations were taking place.

The noise monitoring surveys determined that the noise emissions from IMEX operational works were lower than the SSD 6766 Conditions of Consent (CoC) $L_{Aeq15min}$ noise limits at all surrounding receiver locations for all monitoring periods. Typically, the maximum noise levels from the IMEX operations were compliant with the $L_{A1,1minute}$ noise limits, however, five periods were identified during the third monitoring round where the $L_{A1,1minute}$ noise levels were above the $L_{A1,1minute}$ noise limit for residences in Wattle Grove.

The sources of these noise events were further investigated, and mitigation measures identified. Recommend mitigation and management measures to be implemented based upon the noise monitoring investigation were incorporated into the updated F5A management plan (PREC-QPMS-EN-PLN-0004 , Rev 08, 22/1/2023) (formerly Container Noise Barrier Management Plan) to address Condition F5A of SSD 6766 for the IMEX terminal, including the sources of high noise events.

Additionally, the plan was updated to cover the operational change to electrified automatic night-time stacking of containers (quieter compared to manual process) via the use of Cantilever Automated Stacking Cranes for yard stacking and electrified Automated Stacking Cranes for rail servicing.

Noise management measures were also included to address the increase of the operational capacity of the IMEX facility, from up to 250,000 twenty-foot equivalent units (TEU containers) p.a to 500,000 TEU p.a. This included management measures based upon the noise monitoring undertaken and observations and understanding of onsite operations.

The F5A management plan was provided to DPHI and was approved 13 May 2024.

8 Other noise-related tasks

8.1 IMEX operations

The preparation of a noise impact assessment was undertaken June-August 2023 to support an application for a Complying Development Certificate (CDC) under the State Environmental Planning Policy (SEPP) (Transport and Infrastructure) 2021 (TISEPP), to increase the operational capacity of the IMEX facility from 250,000 twenty-foot equivalent units (TEU containers) p.a up to 500,000 TEU.

This included a detailed quantitative noise assessment, with consideration of MPE and MPW cumulative noise emissions, and recommended a suite of mitigation and management measures to be implemented as part of the IMEX facility operations.

These mitigation and management measures were also then incorporated into the updated F5A management plan (PREC-QPMS-EN-PLN-0004, Rev 08, 22/1/2023) (formerly Container Noise Barrier Management Plan) to address Condition F5A of SSD 6766 for the IMEX terminal.

The CDC application for the increased throughput was approved 6 March 2024. The F5A management plan was provided to DPHI and was approved 13 May 2024.

8.2 Moorebank Cumulative Noise Management

Planning work is continuing for the management of cumulative noise from the Moorebank Intermodal Precinct (MIP). This work currently aims to manage cumulative noise emissions from the various noise generating components (eg. warehouse and IMEX operations), to manage overall cumulative noise emissions against the applicable consent requirements.

9 Conclusion

This **Annual Noise Review** report **for Year 4 Operations** has been prepared to address the requirements of Approval Condition B90 of SSD 7628.

The following operational noise monitoring has been performed in accordance the Approval Conditions in SSD 6766 and 7628:

- Continuous rail noise and angle of attack (AoA) monitoring on the rail link to monitoring rail traffic noise and to assist in identifying potential high noise events (e.g. excessive locomotive noise, brake squeal or curve squeal).
- Noise monitoring as part of a noise measurement program was undertaken on three occasions during 2023 to review the ongoing implementation of noise mitigation and management measures at the IMEX terminal in response to noise complaints from 2022. A range of mitigation and management recommendations were then identified and incorporated into the updated F5A management plan, to manage operational noise emissions from the IMEX terminal. This plan was provided to DPHI and was approved 13 May 2024.
- Warehouse noise monitoring was undertaken during May 2024 for MPE Warehouse E7 where valid data could be obtained, with data analysis currently being undertaken.

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.

Absorption Coefficient α	The absorption coefficient of a material, usually measured for each octave or third-octave band and ranging between zero and one. For example, a value of 0.85 for an octave band means that 85% of the sound energy within that octave band is absorbed on coming into contact with the material. Conversely, a low value below about 0.1 means the material is acoustically reflective.
Adverse weather	Weather effects that enhance noise (particularly wind and temperature inversions) occurring at a site for a significant period of time. In the NSW INP this occurs when wind occurs for more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of nights in winter.
Air-borne noise	Noise which is fundamentally transmitted by way of the air and can be attenuated by the use of barriers and walls placed physically between the noise source and receiver.
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.
AoA	Angle of Attack - As the wheels on a bogie negotiate a tight curve, the leading wheelset typically presents an Angle-of-Attack (AoA) to the rail. The AoA of a leading wheelset with good steering performance can be calculated from AoA = wheelbase (m) / curve radius (m). AoA is normally measured in milliradian (mrad).
Amenity	A desirable or useful feature or facility of a building or place.
AS	Australian Standard
ASA	Asset Standards Authority
Assessment period	The time period in which an assessment is made. e.g. Day 7am-10pm & Night 10pm-7am.
Assessment Point	A location at which a noise or vibration measurement is taken or estimated.
Attenuation	The reduction in the level of sound or vibration.
Audible Range	The limits of frequency which are audible or heard as sound. The normal hearing in young adults detects ranges from 20 Hz to 20 kHz, although some people can detect sound with frequencies outside these limits.
A-weighting	A filter applied to the sound recording made by a microphone to approximate the response of the human ear.
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. 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 LA90 noise level if measured as an overall level or an L90 noise level when measured in octave or third-octave bands.
Barrier (Noise)	A natural or constructed physical barrier which impedes the propagation of sound and includes fences, walls, earth mounds or berms and buildings.
Berm	Earth or overburden mound.
Buffer	An area of land between a source and a noise-sensitive receiver and may be an open space or a noise-tolerant land use.
Bund	A bund is an embankment or wall of brick, stone, concrete or other impervious material, which may form part or all of the perimeter of a compound.
BS	British Standard

CoRTN	United Kingdom Department of Environment entitled "Calculation of Road Traffic Noise (1988)"		
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our environment:		
	threshold of hearing	0 dB	The faintest sound we can hear, defined as 20 micro Pascal
		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 decibel. 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 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 (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies. The dB(C) level is not widely used but has some applications.		
Diffraction	The distortion of sound waves caused when passing tangentially around solid objects.		
DIN	German Standard		
ECRTN	Environmental Criteria for Road Traffic Noise, NSW, 1999		
ENMM	Environmental Noise Management Manual, Roads and Maritime Services (Transport for NSW)		
EPA	Environment Protection Authority		
Field Test	A test of the sound insulation performance in-situ. See also 'Laboratory Test' The sound insulation performance between building spaces can be measured by conducting a field test, for example, early during the construction stage or on completion. A field test is conducted in a non-ideal acoustic environment. It is generally not possible to measure the performance of an individual building element accurately as the results can be affected by numerous field conditions.		
Fluctuating Noise	Noise that varies continuously to an appreciable extent over the period of observation.		
Free-field	An environment in which there are no acoustic reflective surfaces. Free field noise measurements are carried out outdoors at least 3.5m from any acoustic reflecting structures other than the ground.		
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.		

Ground-borne noise	Vibration propagated through the ground and then radiated as noise by vibrating building elements such as wall and floor surfaces. This noise is more noticeable in rooms that are well insulated from other airborne noise. An example would be vibration transmitted from an underground rail line radiating as sound in a bedroom of a building located above.
Habitable Area	Includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom. Excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.
Heavy Vehicle	A truck, transporter or other vehicle with a gross weight above a specified level (for example: over 8 tonnes).
IGANRIP	Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects, NSW DEC 2007
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.
INP	NSW Industrial Noise Policy, EPA 1999
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.
Intrusive noise	Refers to noise that intrudes above the background level by more than 5 dB(A).
ISEPP	State Environmental Planning Policy (Infrastructure), NSW, 2007
ISEPP Guideline	Development Near Rail Corridors and Busy Roads - Interim Guideline, NSW Department of Planning, December 2008
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L10(1hr)	The L10 level measured over a 1 hour period.
L10(18hr)	The arithmetic average of the L10(1hr) levels for the 18 hour period between 6am and 12 midnight on a normal working day.
L90	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).
LAeq or Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time, which would produce the same energy as a fluctuating sound level. When A-weighted, this is written as the LAeq.
LAeq(1hr)	The LAeq noise level for a one-hour period. In the context of the NSW EPA's Road Noise Policy it represents the highest tenth percentile hourly A-weighted Leq during the period 7am to 10pm, or 10pm to 7am (whichever is relevant).
LAeq(8hr)	The LAeq noise level for the period 10pm to 6am.
LAeq(9hr)	The LAeq noise level for the period 10pm to 7am.
LAeq(15hr)	The LAeq noise level for the period 7am to 10pm.
LAeq (24hr)	The LAeq noise level during a 24 hour period, usually from midnight to midnight.
Lmax	The maximum sound pressure level measured over a given period. When A-weighted, this is usually written as the LAmax.
Lmin	The minimum sound pressure level measured over a given period. When A-weighted, this is usually written as the LAmin.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is four times or 400% the loudness of a sound of 65 dB.

Microphone	An electro-acoustic transducer which receives an acoustic signal and delivers a corresponding electric signal.
MPE	Moorebank Precinct East
NCA	Noise Catchment Area. An area of study within which the noise environment is substantially constant.
NCG	Noise Criteria Guideline, Roads and Maritime Services (Transport for NSW)
NMG	Noise Mitigation Guideline, Roads and Maritime Services (Transport for NSW)
Noise	Unwanted sound
Pre-construction	Work in respect of the proposed project that includes design, survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or ecological communities would be affected), establishing ancillary facilities such as site compounds, or other relevant activities determined to have minimal environmental impact (e.g. minor access roads).
Reflection	Sound wave reflected from a solid object obscuring its path.
RING	Rail Infrastructure Noise Guideline, NSW, May 2013
RMS	Root Mean Square value representing the average value of a signal.
Rw	Weighted Sound Reduction Index A measure of the sound insulation performance of a building element. It is measured in very controlled conditions in a laboratory. The term supersedes the value STC which was used in older versions of the Building Code of Australia. Rw is measured and calculated using the procedure in ISO 717-1. The related field measurement is the DnT,w. The higher the value the better the acoustic performance of the building element.
R'w	Weighted Apparent Sound Reduction Index. As for Rw but measured in-situ and therefore subject to the inherent accuracies involved in such a measurement. The higher the value the better the acoustic performance of the building element.
RNP	Road Noise Policy, NSW, March 2011
Sabine	A measure of the total acoustic absorption provided by a material. It is the product of the Absorption Coefficient (alpha) and the surface area of the material (m2). For example, a material with alpha = 0.65 and a surface area of 8.2m2 would have 0.65 x 8.2 = 5.33 Sabine. Sabine is usually calculated for each individual octave band (or third-octave).
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 by conversion to thermal energy.
Sound Insulation	Sound insulation refers to the ability of a construction or building element to limit noise transmission through the building element. The sound insulation of a material can be described by the Rw and the sound insulation between two rooms can be described by the DnT,w.
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 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 of 1 pico watt.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone referenced to 20 mico Pascal.
Spoil	Soil or materials arising from excavation activities.

SSFL	Southern Sydney Freight Line
STC	Sound Transmission Class A measure of the sound insulation performance of a building element. It is measured in controlled conditions in a laboratory. The term has been superseded by Rw.
Structure-borne Noise	Audible noise generated by vibration induced in the ground and/or a structure. Vibration can be generated by impact or by solid contact with a vibrating machine. Structure-borne noise cannot be attenuated by barriers or walls but requires the isolation of the vibration source itself. This can be achieved using a resilient element placed between the vibration source and its support such as rubber, neoprene or springs or by physical separation (using an air gap for example). Examples of structure-borne noise include the noise of trains in underground tunnels heard to a listener above the ground, the sound of footsteps on the floor above a listener and the sound of a lift car passing in a shaft. See also 'Impact Noise'.
Tonal Noise	Sound containing a prominent frequency and characterised by a definite pitch.
Transmission Loss	The sound level difference between one room or area and another, usually of sound transmitted through an intervening partition or wall. Also the vibration level difference between one point and another. For example, if the sound level on one side of a wall is 100dB and 65dB on the other side, it is said that the transmission loss of the wall is 35dB. If the transmission loss is normalised or standardised, it then becomes the Rw or R'w or DnT,w.
Wheelbase	The wheelbase is the distance between the centres of the front and rear wheels on a 2-axle bogie.

APPENDIX B Detailed noise monitoring/ assessment/ management reports

B.1 Angle of Attack Monitoring Report - 1 May 2023 and 31 October 2023

Renzo Tonin Report TL116-05F22 AoA Report November 2023 (r1)

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aaac Association of Australian Acoustical Consultants

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1 Introduction

1.1 Project overview

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stages 1 and 2 of the Moorebank Precinct East (MPE) Project (SSD 6766 and SSD 7628 respectively), which together comprise the two stages of development under the MPE Concept Approval (MP10_0193).

This report has been prepared to address the requirements of Approval Condition G7A of SSD 6766, which requires the submission of a six-monthly report to the Secretary, which identifies the number of wagons with wheels that exceed the ASA standard angle of attack and the action taken by operators to improve steering performance.

Appendix A contains a glossary of acoustic terms used in this report.

2 Compliance Matrix

Table 1 provides a summary of the Approval Conditions which relate to this report.

Table 1 Compliance matrix

Condition ID	Condition	Comments on compliance	Reference for further information
SSD 6766			
G7	The Applicant shall install and maintain a rail noise monitoring system on the rail link at the commencement of operation to continuously monitor the noise from rail operations on the rail link. The system shall capture the noise from each individual train passby noise generation event, and include information to identify: a) Time and date of freight train passbys; b) Imagery or video to enable identification of the rolling stock during day and night; c) $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ from rail operations; and d) $L_{AF(max)}$ and SEL of individual train passbys, measured in accordance with ISO3095; or e) Other alternative information as agreed with, or required by, the Secretary. The results from the noise monitoring system, shall be publicly accessible from a website maintained by the Applicant. The noise results from each train shall be available on the website within 24 hours of it passing the monitor, unless unforeseen circumstances (i.e a system malfunction) have occurred. The $L_{Aeq(15hour)}$ and $L_{Aeq(9hr)}$ results from each day shall be available on the website within 24 hours of the period ending. Prior to the commencement of operation, the Applicant shall submit for the approval of the Secretary, justification supporting the appropriateness of the location for rail noise monitoring, including details of any alternative options considered and reasons for these being dismissed. The rail noise monitoring system shall not operate until the Secretary has approved the proposed monitoring location. The Applicant shall provide an annual report to the Secretary with the results of monitoring for a period of 5 years, or as otherwise agreed with the Secretary, from the commencement of operation of the IMEX terminal. The Secretary shall consider the need for further reporting following a review of the results for year 5.	This condition is not directly related to this report. It is referenced herein on the basis that noise levels from the rail noise monitoring system provides information that may correlate with the Angle of Attack measurement results.	https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/TJ741-04F04-AoA-and-Functional-Spec-for-Permanent-Noise-Monitor-r9_redacted.pdf https://moorebanknoisemonitor-emsbk.trackiq.net/NoiseMonitor/

Condition ID	Condition	Comments on compliance	Reference for further information
G7A	The applicant shall install and maintain a wayside angle of attack monitoring system on the rail link at the commencement of operation to continuously monitor the angle of attack to the rail of rolling stock wheels. The system shall capture the angle of attack from a wheel on each axle of every train, and include information to identify: a) Time and date of each axle passby; and b) The identification number of each item of rolling stock. The results from the angle of attack monitoring system shall be: • accessible by train operators from a website maintained by the Applicant. Angle of attack results from each train shall be available on the website within 24 hours of it passing the monitor, unless unforeseen circumstances have occurred. • included in a six-monthly report to the Secretary. The report should at least identify the number of wagons with wheels that exceed the ASA standard angle of attack and the action taken by operators to improve steering performance. Prior to the commencement of operation, the Applicant shall submit for the approval of the Secretary, justification supporting the appropriateness of the location for angle of attack monitoring, the format of the information to be accessible to operators and the format of the public report. The angle of attack monitoring system shall not operate until the Secretary has approved the proposed monitoring location and reporting arrangements.	An Angle of Attack (AoA) monitoring system was installed on the new rail link in May 2020. The monitoring system captures the AoA of each axle passby and compares the measured values with the acceptable value in the applicable Asset Standards Authority minimum operating standard. The AoA values for each axle are available to operators in accordance with the approval condition. A Functional and Performance Specification for the permanent noise monitoring system and angle of attack monitoring system was prepared for approval by the Secretary before the rail link commissioning. A summary of the AoA noise monitoring results for the current six month period is provided in Section 3.1. The monitoring identified 12 trains where the maximum AoA value exceeded the alarm level. None of these events resulted in elevated noise levels at the permanent noise monitoring location.	Section 3

3 Rail link angle of attack (AoA) monitoring

The performance of wagon bogies and their ability to negotiate small radius curves without generating curve squeal, is assessed in terms of the angle of attack (AoA) of the wheelset. Acceptable AoA values are defined in Section 2.7.1 of Asset Standards Authority Standard T HR RS 00400 ST[1] and are a function of the curve radius and wheel base.

An AoA measurement system was installed on the rail link and partially commissioned on 13 May 2020. The system was fully commissioned on 9 July 2020 at the same time as the permanent noise monitoring system. The AoA system is installed on the eastern track.

Justification supporting the appropriateness of the proposed monitoring location is provided in the *Functional and Performance Specification for Permanent Noise Monitor and Proposed Noise and AoA Monitoring Locations*[2], and was approved by the Secretary.

This report provides a summary of the AoA measurement data for the period between 1 May 2023 and 31 October 2023. In accordance with the requirements of the SSD 6766 Condition G7A, the AoA of a wheel of each axle of each train is captured by the measurement system. This data is accessible by train operators on a website maintained by QUBE.

Below is a summary of the monitoring results.

3.1 AoA monitoring results for current six-month period

This report covers rail movements between 1 May 2023 and 31 October 2023. A summary of the key statistics is provided below:

- Number of valid train passby events – **274**
- Number of train passby events where the measure AoA values on one or more axles were above the acceptable level defined in Section 2.7.1 of Asset Standards Authority Standard T HR RS 00400 ST – **12** (representing 4% of passbys).

A summary of the maximum AoA value measured for each train is provided in Figure 1. The results show that the maximum AoA value is typically less than 10 mrad. Twelve train passbys had maximum AoA values greater than the established alarm level of approximately 19 mrad.

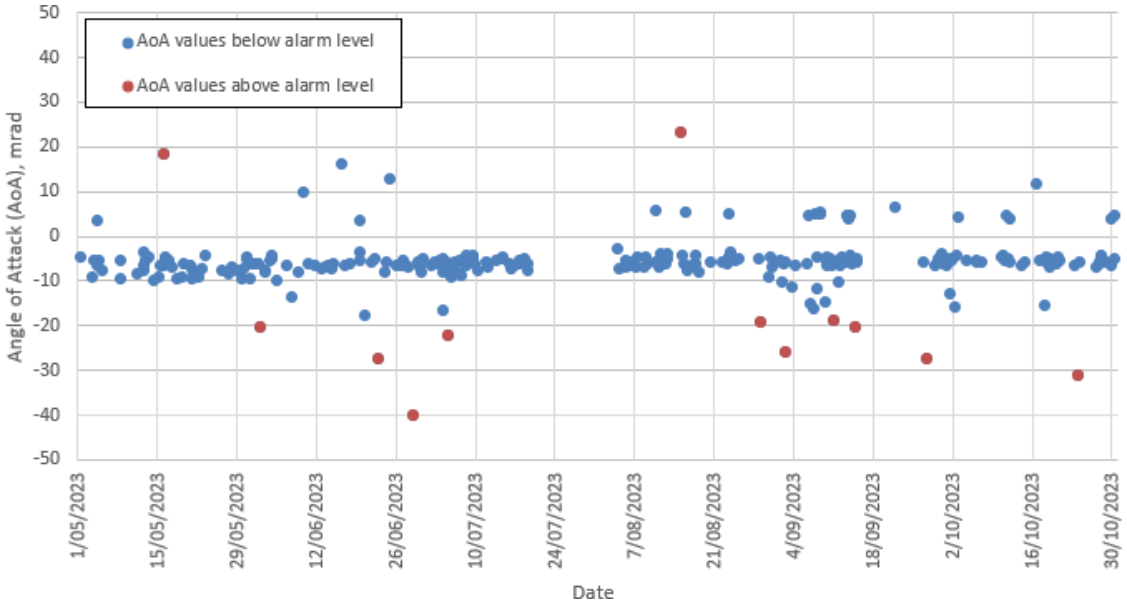
[1] Transport for NSW Asset Standards Authority T HR RS 00400 ST *RSU 400 Series – Minimum Operating Standards for Rolling Stock – Freight Vehicle Specific Interface Requirements* Version 2.0 dated 24 August 2017

[2] Renzo Tonin & Associates Report TJ741-04F04 AoA and Functional Spec for Permanent Noise Monitor (r8) – available https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/TJ741-04F04-AoA-and-Functional-Spec-for-Permanent-Noise-Monitor-r9_redacted.pdf

A detailed review of the AoA exceedances identified that Wagon ID CQMY 003099 exceeded the AoA alarm level on seven occasions. The owner of this wagon has been notified of these exceedances and is in the process of determining the required rectification works.

None of the twelve train passby events with AoA alarm levels resulted in elevated noise levels at the permanent noise monitoring location [i.e. where the calculated $L_{Aeq(9hour)}$ noise levels at 30 m were above 60 dB(A)].

Figure 1 Maximum AoA value for each train passby



4 Conclusion

This report has been prepared to address the requirements of Approval Condition G7A of SSD 6766, which requires the submission of a six-monthly report to the Secretary, which identifies the number of train passbys and wagons with wheels that exceed the ASA standard angle of attack and the action taken by operators to improve steering performance.

For rail movements between 1 May 2023 and 31 October 2023, twelve train passbys had maximum AoA values greater than the established alarm level of approximately 19 mrad. Wagon ID CQMY 003099 exceeded the AoA alarm level on seven occasions. The owner of this wagon has been notified of these exceedances and is in the process of determining the required rectification works.

None of twelve train passby events with AoA alarm levels caused elevated noise levels at the permanent noise monitoring location [i.e. where the calculated $L_{Aeq(9hour)}$ noise levels at 30 m were above 60 dB(A)].

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.

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Amenity	A desirable or useful feature or facility of a building or place.
AS	Australian Standard
ASA	Asset Standards Authority
Assessment period	The time period in which an assessment is made. e.g. Day 7am-10pm & Night 10pm-7am.
Assessment Point	A location at which a noise or vibration measurement is taken or estimated.
Attenuation	The reduction in the level of sound or vibration.
Audible Range	The limits of frequency which are audible or heard as sound. The normal hearing in young adults detects ranges from 20 Hz to 20 kHz, although some people can detect sound with frequencies outside these limits.
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Barrier (Noise)	A natural or constructed physical barrier which impedes the propagation of sound and includes fences, walls, earth mounds or berms and buildings.
Berm	Earth or overburden mound.
Buffer	An area of land between a source and a noise-sensitive receiver and may be an open space or a noise-tolerant land use.
Bund	A bund is an embankment or wall of brick, stone, concrete or other impervious material, which may form part or all of the perimeter of a compound.
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	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 decibel. 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 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 (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies. The dB(C) level is not widely used but has some applications.		
Diffraction	The distortion of sound waves caused when passing tangentially around solid objects.		
DIN	German Standard		
ECRTN	Environmental Criteria for Road Traffic Noise, NSW, 1999		
ENMM	Environmental Noise Management Manual, Roads and Maritime Services (Transport for NSW)		
EPA	Environment Protection Authority		
Field Test	A test of the sound insulation performance in-situ. See also 'Laboratory Test' The sound insulation performance between building spaces can be measured by conducting a field test, for example, early during the construction stage or on completion. A field test is conducted in a non-ideal acoustic environment. It is generally not possible to measure the performance of an individual building element accurately as the results can be affected by numerous field conditions.		
Fluctuating Noise	Noise that varies continuously to an appreciable extent over the period of observation.		
Free-field	An environment in which there are no acoustic reflective surfaces. Free field noise measurements are carried out outdoors at least 3.5m from any acoustic reflecting structures other than the ground.		
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.		

Ground-borne noise	Vibration propagated through the ground and then radiated as noise by vibrating building elements such as wall and floor surfaces. This noise is more noticeable in rooms that are well insulated from other airborne noise. An example would be vibration transmitted from an underground rail line radiating as sound in a bedroom of a building located above.
Habitable Area	Includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom. Excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.
Heavy Vehicle	A truck, transporter or other vehicle with a gross weight above a specified level (for example: over 8 tonnes).
IGANRIP	Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects, NSW DEC 2007
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.
INP	NSW Industrial Noise Policy, EPA 1999
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.
Intrusive noise	Refers to noise that intrudes above the background level by more than 5 dB(A).
ISEPP	State Environmental Planning Policy (Infrastructure), NSW, 2007
ISEPP Guideline	Development Near Rail Corridors and Busy Roads - Interim Guideline, NSW Department of Planning, December 2008
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L10(1hr)	The L10 level measured over a 1 hour period.
L10(18hr)	The arithmetic average of the L10(1hr) levels for the 18 hour period between 6am and 12 midnight on a normal working day.
L90	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).
LAeq or Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time, which would produce the same energy as a fluctuating sound level. When A-weighted, this is written as the LAeq.
LAeq(1hr)	The LAeq noise level for a one-hour period. In the context of the NSW EPA's Road Noise Policy it represents the highest tenth percentile hourly A-weighted Leq during the period 7am to 10pm, or 10pm to 7am (whichever is relevant).
LAeq(8hr)	The LAeq noise level for the period 10pm to 6am.
LAeq(9hr)	The LAeq noise level for the period 10pm to 7am.
LAeq(15hr)	The LAeq noise level for the period 7am to 10pm.
LAeq (24hr)	The LAeq noise level during a 24 hour period, usually from midnight to midnight.
Lmax	The maximum sound pressure level measured over a given period. When A-weighted, this is usually written as the LAmax.
Lmin	The minimum sound pressure level measured over a given period. When A-weighted, this is usually written as the LAmin.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is four times or 400% the loudness of a sound of 65 dB.

Microphone	An electro-acoustic transducer which receives an acoustic signal and delivers a corresponding electric signal.
MPE	Moorebank Precinct East
NCA	Noise Catchment Area. An area of study within which the noise environment is substantially constant.
NCG	Noise Criteria Guideline, Roads and Maritime Services (Transport for NSW)
NMG	Noise Mitigation Guideline, Roads and Maritime Services (Transport for NSW)
Noise	Unwanted sound
Pre-construction	Work in respect of the proposed project that includes design, survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or ecological communities would be affected), establishing ancillary facilities such as site compounds, or other relevant activities determined to have minimal environmental impact (e.g. minor access roads).
Reflection	Sound wave reflected from a solid object obscuring its path.
RING	Rail Infrastructure Noise Guideline, NSW, May 2013
RMS	Root Mean Square value representing the average value of a signal.
Rw	Weighted Sound Reduction Index A measure of the sound insulation performance of a building element. It is measured in very controlled conditions in a laboratory. The term supersedes the value STC which was used in older versions of the Building Code of Australia. Rw is measured and calculated using the procedure in ISO 717-1. The related field measurement is the DnT,w. The higher the value the better the acoustic performance of the building element.
R'w	Weighted Apparent Sound Reduction Index. As for Rw but measured in-situ and therefore subject to the inherent accuracies involved in such a measurement. The higher the value the better the acoustic performance of the building element.
RNP	Road Noise Policy, NSW, March 2011
Sabine	A measure of the total acoustic absorption provided by a material. It is the product of the Absorption Coefficient (alpha) and the surface area of the material (m2). For example, a material with alpha = 0.65 and a surface area of 8.2m2 would have 0.65 x 8.2 = 5.33 Sabine. Sabine is usually calculated for each individual octave band (or third-octave).
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 by conversion to thermal energy.
Sound Insulation	Sound insulation refers to the ability of a construction or building element to limit noise transmission through the building element. The sound insulation of a material can be described by the Rw and the sound insulation between two rooms can be described by the DnT,w.
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 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 of 1 pico watt.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone referenced to 20 mico Pascal.
Spoil	Soil or materials arising from excavation activities.

SSFL	Southern Sydney Freight Line
STC	Sound Transmission Class A measure of the sound insulation performance of a building element. It is measured in controlled conditions in a laboratory. The term has been superseded by Rw.
Structure-borne Noise	Audible noise generated by vibration induced in the ground and/or a structure. Vibration can be generated by impact or by solid contact with a vibrating machine. Structure-borne noise cannot be attenuated by barriers or walls but requires the isolation of the vibration source itself. This can be achieved using a resilient element placed between the vibration source and its support such as rubber, neoprene or springs or by physical separation (using an air gap for example). Examples of structure-borne noise include the noise of trains in underground tunnels heard to a listener above the ground, the sound of footsteps on the floor above a listener and the sound of a lift car passing in a shaft. See also 'Impact Noise'.
Tonal Noise	Sound containing a prominent frequency and characterised by a definite pitch.
Transmission Loss	The sound level difference between one room or area and another, usually of sound transmitted through an intervening partition or wall. Also the vibration level difference between one point and another. For example, if the sound level on one side of a wall is 100dB and 65dB on the other side, it is said that the transmission loss of the wall is 35dB. If the transmission loss is normalised or standardised, it then becomes the Rw or R'w or DnT,w.
Wheelbase	The wheelbase is the distance between the centres of the front and rear wheels on a 2-axle bogie.

B.2 Condition F5A Management Plan, Moorebank Intermodal Precinct– East Precinct

Noise management plan: PREC-QPMS-EN-PLN-0004, Rev 08, 22/11/2023)

Department of Planning, Housing & Infrastructure

Our ref: SSD-6766-PA-63

[redacted]
Director
Aspect Environmental Pty Limited
Suite 117, 25 Solent Circuit
BAULKHAM HILLS, NSW 2153

Via Email: [redacted]

13/05/2024

Dear [redacted]

Moorebank Intermodal Precinct East (MPE)– Stage 1 (SSD-6766)
Container Noise Barrier Management Plan, Condition F5A

I refer to the updated Container Noise Barrier Management Plan (CNBMP): Moorebank Intermodal Precinct – East Precinct submitted for the approval of the Planning Secretary of the Department of Planning, Housing and Infrastructure (the Department) under condition F5A of SSD-6766. I also acknowledge and thank you for your response to the Department's review comments and request for additional information.

I note the updated CNBMP:

- has been prepared by Arcadis (project consultant), Renzo Tonin & Associates (acoustics consultants), and revised by Aspect (environmental consultant);
- was reviewed by the Applicant and no issues were raised to the Department; and
- contains the information required by conditions F5A.

I also note that the CNBMP has been updated to cover the operational shift to electrified automatic (quieter compared to manual process) night-time stacking of containers via the use of Cantilever Automated Stacking Cranes for yard stacking and electrified Automated Stacking Cranes for rail servicing.

The updated CNBMP states that the plan has also been updated to consider noise management measures for the increase of the operational capacity of the IMEX facility. The Department has been advised that increase in container volume operational capacity from up to 250,000 twenty-foot equivalent units (TEU containers) p.a as per SSD-6766 to 500,000 TEU is to be via a Complying Development Certificate under the *State Environmental Planning Policy (SEPP) (Transport and Infrastructure) 2021* (TISEPP). As the Department's decision-making powers for the CNBMP are set under the SSD-6766 consent, the Department's assessment of the CNBMP covers updates made to the CNBMP to the extent relevant to 250,000 TEU throughput.

Accordingly, as nominee of the Planning Secretary, I approve the updated CNBMP: Moorebank Intermodal Precinct – East Precinct, Revision 08 dated 22 November 2023 under condition F5A of SSD-6766.

Please note that if there are any inconsistencies between the updated CNBMP and the conditions of consent, the conditions will prevail.

Also, please ensure you make the CNBMP available for public access on the project website at the earliest convenience.

If you have any questions, please contact Swati Sharma at swati.sharma@planning.nsw.gov.au.

Yours sincerely

Director
Infrastructure Management

As nominee of the Planning Secretary

Condition F5A MANAGEMENT PLAN

Moorebank Intermodal Precinct– East Precinct

MOOREBANK INTERMODAL PRECINCT

Moorebank Intermodal Precinct – East Precinct

Condition F5A Management Plan

Authors	[redacted]
Checker	[redacted]
Approver	[redacted]
Report No	PREC-QPMS-EN-PLN-0004
Date	22/11/2023
Revision	08

Original Author Details

Author/Reviewer Details	Qualifications and Experience
[redacted] Arcadis Level 16/580 George Street Sydney NSW 2000	MSc BSC (hons) [redacted] has 14 years of environmental management experience in post approval roles including the development of construction and operational environmental management plans, auditing, compliance and on-site environmental management. [redacted] has completed the Certificate of Competence in Environmental Noise Measurement issued by the Institute of Acoustics (UK)
[redacted] Renzo Tonin & Associates Level 1, 418a Elizabeth Street Surry Hills NSW 2010	FIEAust, CPEng, BEng, MAAS [redacted] has more than 20 14 years of NSW experience as a noise and vibration consultant and assessing the potential impacts and mitigation required for large infrastructure projects

This Revision Author Details

Author/Reviewer Details	Qualifications and Experience
[redacted] Aspect Environmental	BEnvSc (Hons1), GradCert EnvPl [redacted] has 16 years of experience in environmental planning, assessment and management.
[redacted] Aspect Environmental	BAE., MAE., Phd.EnvSc [redacted] has 5 years of experience in environmental research, planning and assessment.

REVISIONS

Revision	Date	Description	Prepared by	Approved by
001	16/04/2019	Draft – issued for Client Review	[redacted]	[redacted]
002	23/04/2019	Draft- Addressed Client Comments	[redacted]	[redacted]
003	24/05/2019	Update to address DP&E Comments	[redacted]	[redacted]
004	19/06/2019	Update to address further DP&E Comments	[redacted]	[redacted]
005	03/02/2020	Update to include Area 2 as an operational area	[redacted]	[redacted]
006	19/03/2020	Update to address Mod 2	[redacted]n	[redacted]
007	28/03/2023	Updated for change in ownership, Department changes and warehouse layout changes		[redacted]
008	22/11/2023	Update to address IMEX Terminal TEU increase capacity	[redacted]	[redacted]

ACRONYMS AND DEFINITIONS

Acronym / Term	Meaning
C-ASC	Cantilever automated stacking cranes
CoC	Condition(s) of Consent
dB(A)	A-weighted decibel. 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 is denoted as dB(A). Practically all noise is measured using the A filter.
DCCEEW	Department of Climate Change, Energy, the Environment and Water (formerly DotEE)
DotEE	Commonwealth Department of the Environment and Energy (now DCCEEW)
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
Facility	The MPE Concept (MP10_0193), MPE Stage 1 (SSD 6766) and MPE Stage 2 (SSD 7628) Project, including the operation of the IMEX Terminal, warehousing and distribution facilities. A rail link is included as part of MPE Stage 1 (SSD 6766) and connects the Facility to the Southern Sydney Freight Line.
FCMM	Final Compilation of Mitigation Measures
IMEX Terminal	Import Export Terminal. Includes the following key components: • Truck processing, holding and loading areas with entrance and exit from Moorebank Avenue • Rail loading and adjacent container storage areas serviced by container handling equipment • Administration facility and associated car parking with light vehicle access from Moorebank Avenue.
L_{Aeq} or L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time, which would produce the same energy as a fluctuating sound level. When A-weighted, this is written as the LAeq.
$L_{Aeq,15min}$	The Laeq noise level for over a period of 15 minutes.
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{max}	The maximum sound pressure level measured over a given period.
MIP	Moorebank Intermodal Precinct (formerly Moorebank Logistics Park)

Acronym / Term	Meaning
MIP East Approvals	• Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Approval (No. 2011/6229), March 2014 • MPE Concept Approval received 29 September 2014 (MP10_0193). • MPE Stage 1 approved 12 December 2016 (SSD 6766) as modified by Appeal Number 2017/81889 Stage 1 Approval (SS 6766) outcome dated 13 March 2018
MIP East Precinct	The term referred to the operations of MPE Stage 1 and MPE Stage 2 Projects under the MPE Concept Approval (MP 10_0193) including the operation of a rail link to the Southern Sydney Freight Line, IMEX and warehousing and distribution facilities.
MPE	Moorebank Precinct East
MPW	Moorebank Precinct West
NCA	Noise Catchment Area
NML	Noise Management Level
NIA	Noise Impact Assessment
OEMP	Operational Environmental Management Plan
PUD	Pick-up and delivery vehicles
Rail link	Part of MPE Stage 1 (SSD 6766), connecting the MPE Site to the Southern Sydney Freight Line. The Rail link is to be utilised for the operation of the Facility.
RtS	Response to Submissions
SHEQ	Safety, Health, Environment and Quality
SSD	State significant development
TEU	Twenty-foot equivalent unit
TISEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021

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1 INTRODUCTION

The approval for the construction and operation of the Moorebank Intermodal Precinct (MIP) (formerly Moorebank Logistics Park) was obtained progressively as follows:

- Moorebank Precinct East (MPE) Concept Approval (MP10_0193) on 29 September 2014
- MPE Stage 1 (Stage significant development (SSD) 6766) on 12 December 2016
- MPE Stage 2 (SSD 7628) on 31 January 2018, as modified
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval and Mitigation Measures (No. 2011/6229) on 6 March 2014.

A management plan addressing Condition F5A of SSD 6766 was originally prepared by Arcadis (Container Noise Barrier Management Plan Rev 4, June 2019) to outline the management practices and procedures that would be implemented during night-time operations of the MPE Stage 1 Import Export (IMEX) Terminal.

This revised Condition F5A Management Plan continues to address the relevant requirements of CoC F5A for the management of container stacking during night-time operations of the IMEX Terminal. This management plan now also includes consideration of the operational shift to electrified automatic night-time stacking via the use of Cantilever Automated Stacking Cranes (C-ASC) (large gantry cranes) for yard stacking and electrified Automated Stacking Cranes (ASC) for rail servicing. This system, which is quieter than manual operations has only recently been implemented onsite and so has not previously been considered as part of the measures to mitigate potential noise impacts associated with night-time container stacking.

Approval to increase the operational capacity of the IMEX has also recently been sought (Section 1.2). In support of the application, a Noise Impact Assessment (NIA) (Renzo Tonin & Associates, August 2023) was prepared to identify any potential adverse acoustic impacts associated with the operational capacity increase, and outline management measures required to mitigate these impacts. This management plan has been updated to include these measures.

The title of the plan has been amended to reflect the dynamic, transient, and temporary nature of container placement on site. Additionally, it removes any undue perceptions of a singular permanent structure being in place on the MPE 1 Site to mitigate and manage noise emissions, which does not reflect the actual nature of onsite container operations and working container management or the required outcomes of CoC F5A. Recent modelling completed by Renzo Tonin & Associates (RTA) (August 2023) has found that noise emissions generated by operations at the IMEX requires mitigation via a number of measures working in parallel, along with consideration of prevailing meteorological conditions. Container stacks acting as noise barriers were found to be only one potential component of a wider strategy that can more effectively manage the impacts of noise emissions on sensitive receivers.

1.1 Background

The MIP is an integral component of the Freight, Ports and Transport strategies of both the NSW and Commonwealth governments to help manage the challenges of an expected tripling of freight volumes at Port Botany by 2031.

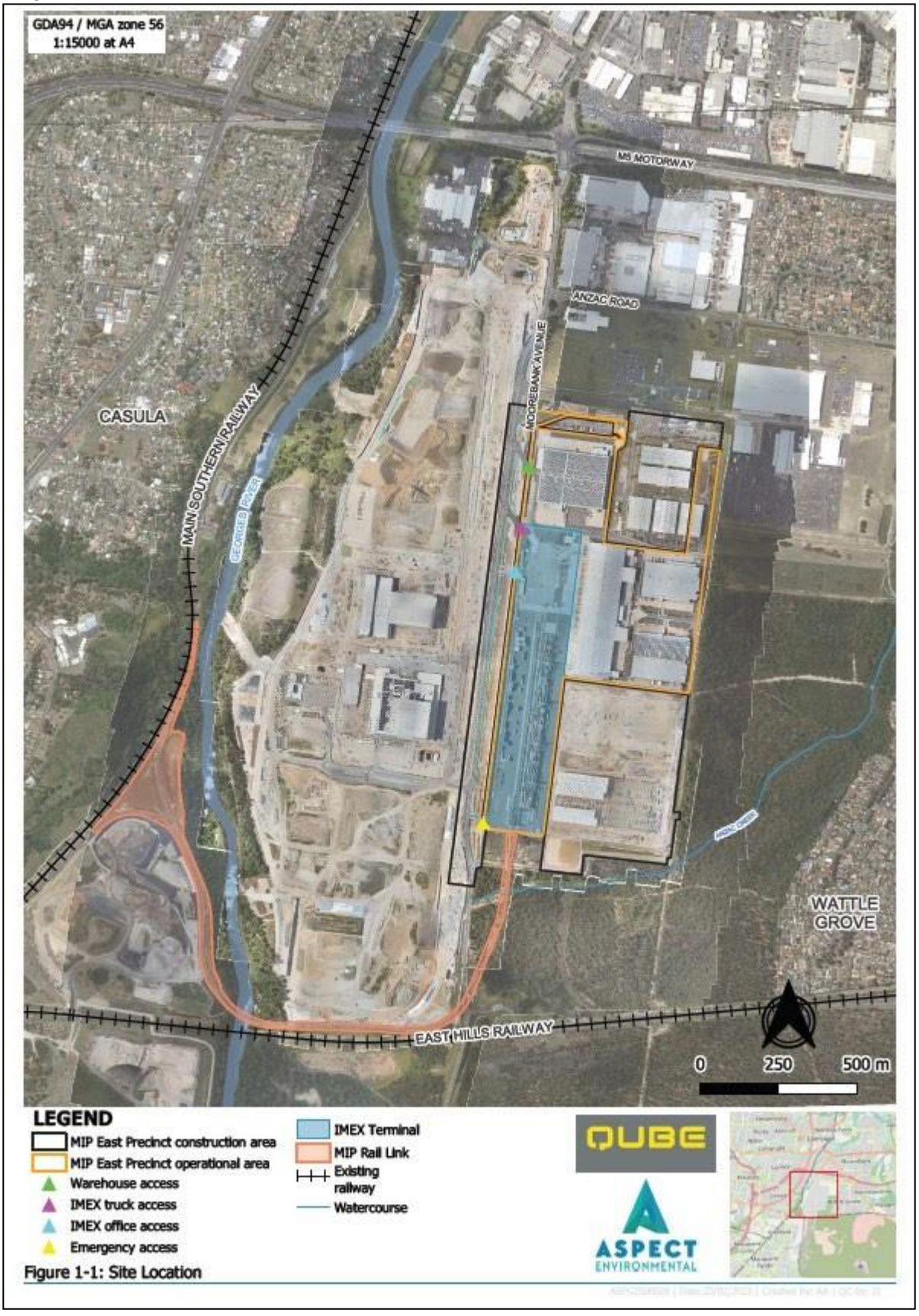
The MIP aims to streamline the freight logistics supply chain from port to store, deliver savings to businesses and consumers, and help service the rapidly growing demand for imported goods in south-west Sydney. It is located approximately 27km south-west of the Sydney Central Business District and approximately 26km west of Port Botany within the Liverpool Local Government Area. The MIP is divided into an East Precinct (MPE) and a West Precinct (MPW), located east and west of Moorebank Avenue respectively, (Figure 1-1).

The main features of the MIP East Precinct include:

- The IMEX Terminal comprised of:
  - Truck processing, holding and loading areas with an entrance and exit from Moorebank Avenue
  - Rail loading and container storage areas serviced by container handling equipment
  - An administration facility and associated car parking with light vehicle access from Moorebank Avenue
- A rail link connecting the IMEX Terminal and the Southern Sydney Freight Line
- Warehouse and distribution facilities
- A freight village including a mix of retail, commercial and light industrial spaces
- An internal road network to enable efficient movement of vehicles, dispatch of freight from the warehouses and transport of containers between the IMEX Terminal and warehouse and distribution facilities.

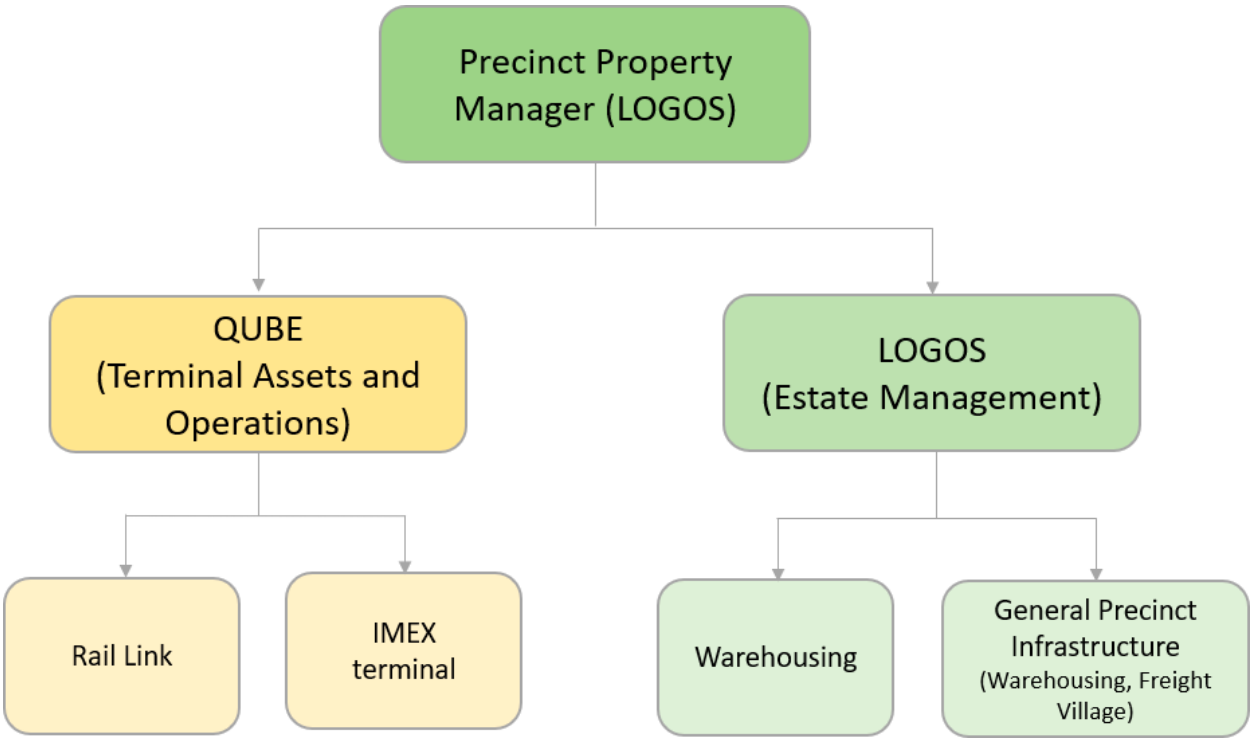
The location of the MIP East Precinct is shown in Figure 1-1.

Figure 1-1: Site location



In 2022, LOGOS Property took over the management of the warehouse and distribution facilities, as well as the overall management of the MIP East Precinct. Qube Logistics will continue to maintain responsibility for the IMEX and the Rail Link. Section 2 of the OEMP describes the operational areas of responsibilities for LOGOS Property and Qube Logistics. This is summarised in Figure 1-2.

Figure 1-2: Environmental Management Structure



1.2 IMEX Terminal Capacity Increase

The increase in IMEX Terminal capacity from 250,000 TEU to 500,000 TEU, is subject to a complying development certificate (CDC) under Chapter 6 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TISEPP). A NIA to support the application was prepared by RTA (August 2023).

The NIA assessed operational noise impacts associated with the increase in TEU capacity and identified the anticipated impact of the TEU increase on baseline noise conditions. The NIA considered noise generated by additional trains at the terminal, terminal activities and increased vehicle movements and included measures to mitigate the potential increases in noise from these operational activities. These measures were identified to control noise emissions, with consideration of other potential noise emissions from other MIP (MPW & MPE) activities along with the acoustic shielding provided by the overall MIP design, including the MPE and MPW warehousing build out adjacent to the IMEX both east and west. This assessment, also considered the interim stage while this is being constructed.

This Plan now presents mitigations and management for any potential adverse noise impacts associated with the TEU increase - including electrified automated stacking and other NIA recommend mitigation and management measures.

1.3 Purpose and Application

The purpose of this management plan is to outline the management practices and procedures to be followed during night-time operations and the methodology for stacking of containers during these night-time operations to manage noise emissions to the nearest residential receivers, where required.

This Condition F5A Management Plan has been developed to address the requirements of MPE Stage 1 CoC F5A (SSD 6766) which requires the preparation of a Management Plan, to the satisfaction of the Secretary of the Department of Planning and Environment (DPE) prior to the commencement of operation. The specific CoC and FCMMs relevant to the development of this plan are identified in Section 2.2.

The IMEX Terminal is approved for 24/7 operation and will include following noise generating activities:

- Container truck movements
- Crane operations
- Reach stacker operations
- Train operations
- Combi lift operations/ straddle carrier operations.

It will receive and dispatch containers on a 24/7 basis which will result in a varying number of stored transient working containers onsite at any one time. The most recent, approved version of this plan will be implemented to manage the Facility activities.

1.4 Objectives and Targets

Table 1-1 outlines the objectives and targets set out for IMEX Terminal for the management of container noise during night-time operations. These objectives and targets were developed by the Principal's Representative based on collective industry experience and best practice.

Table 1-1: Objective and targets

Objective	Target	Timeframe	Accountability
Minimise night-time operational noise impacts on residents through the implementation of management measures	No exceedances of noise criteria	Duration of Operations	IMEX Terminal Manager
Comply with relevant CoCs, applicable legislative and other requirements	No written warnings or infringement notices	Duration of Operations	Site Safety, Health, Environment and Quality (SHEQ) Manager/Advisor for MPE
Promptly investigate any complaints made by the surrounding residents and implement appropriate mitigation measures as required	No validated complaints from the community regarding night-time noise	Duration of Operations	IMEX Area Manager Community Liaison[1] Manager Site SHEQ Manager/Advisor for MPE

[1] Community complaints are managed by the Precinct Operator.

1.5 Approval

The CNBMP Rev 4 (Arcadis June 2019) was approved by DPE (16/08/2019).

This Condition F5A Management Plan will be submitted to the Secretary as an update to the previously approved Plan.

2 STATUTORY REQUIREMENTS

2.1 Legal and Other Obligations

The legislation, planning instruments and guidelines considered during development of this plan are listed below, with specific details provided in the Legislation Register within Appendix B of the Operational Environmental Management Plan (OEMP).

- *Environmental Planning and Assessment Act 1979*
- *Environmental Planning and Assessment Regulation 2000*
- *Environment Protection and Biodiversity (EPBC) Act 1999*
- *Protection of the Environment Operations (Noise Control) Regulation 2017*
- *State Environmental Planning Policy (Transport and Infrastructure) Amendment (Moorebank Freight Intermodal Precinct) 2022 (Moorebank SEPP)*

Additional legislation, standards and guidelines relating to the management of container noise during night-time operations include:

- *Industrial Noise Policy 2000* (NSW Environment Protection Authority (EPA))
- *Noise Policy for Industry 2017* (EPA)

2.2 Development Consent

The operation of the MIP East Precinct was approved under both the *Environmental Planning and Assessment Act 1979* (EP&A) Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Both these approvals have environmental conditions relevant to the operational works for the MIP East Precinct, which are discussed below.

The operational requirements for the Facility, including consultation, impact mitigation and management, is documented in the following suite of documents.

This Condition F5A Management Plan has been prepared in accordance with:

- EPBC Act Approval (No. 2011/6229), March 2014
- MPE Concept (MP 10_0193), 29 September 2014
- MPE Stage 1 (SSD 6766), as modified by Appeal Number 2017/81889 Stage 1 Approval (SS 6766) outcome dated 13 March 2018
- MPE Stage 1 – EIS (Arcadis Australia Pacific Pty Limited, May 2015)
- MPE Stage 1 – RtS (Arcadis Australia Pacific Pty Limited, September 2015).

The EP&A Act and EPBC Act approval requirements are discussed in the following section.

2.2.1 EPBC Act Approval

The EPBC Act approval for the MPE Concept was granted by DCCEEW (formerly DotEE) in March 2014 (No. 2011/6229).

The operation of the MIP East Precinct has been designed to be consistent with the EPBC Act approval conditions. Specific conditions and commitments that are required to be addressed in this plan are identified within Table 2-1.

Table 2-1: EPBC Act Conditions of Approval

Commonwealth	Requirement	Document Reference
Annexure A – Summary of Mitigation Measures	**Operation** To reduce noise and vibration impacts of the SIMTA proposal during operation,the following recommendations as presented within Wilkinson Murray (2013) would be implemented: SIMTA would make provisions for a potential noise barrier along the western boundary of the SIMTA site. The requirement for the barrier will be confirmed during detailed assessments at each development application stage for approval under the NSW State planning approval process.	This Plan In response to updated noise monitoring and modelling in support of the increase in IMEX Terminal capacity from 250,000 to 500,000 TEU, the Condition F5A Management Plan has been revised to implement recommendations for the mitigation and management of night-time noise levels arising from container placement at nearby residential receivers. Additionally, this Plan reflects the progressive development of the MPW Precinct to the west of Moorebank Avenue and the presence of new, large warehousing and distribution facilities which provide acoustic shielding to residences in Casula, to the west of the MPE 1 facility. This Plan focuses on providing noise mitigation for night-time container placement.

2.2.2 EP&A Act Approval

Approval for MPE Stage 1 was originally received on 12 December 2016 (SSD 6766) and subject to appeal, with revised CoC issued from the Land and Environment Court on 13 March 2018.

The CoC include requirements to be addressed in this plan and delivered during operation of the IMEX Terminal. These requirements, and how they are addressed are summarised within Table 2-2 and Table 2-3 for MP10_0193 and SSD 6766 respectively.

The MPE Stage 2 consent (SSD 7628), at Condition B80, includes LAeq noise management levels that represent a cumulative set of noise criteria for MPE 1 and MPE 2. However, as identified by RTA in their most recent Noise Impact Assessment (August 2023, Section 2.1.2), this set of criteria is inconsistent with the EIS derived noise limits derived in accordance with NSW EPA policy, the expected noise emission performance from MPE as detailed in the EIS, and former approvals.

As part of the MPW Stage 2 (SSD 7709) Modification 1, a review of the applicable operational noise requirements across MIP was undertaken (Renzo Tonin, June 2020). The review identified operational noise requirements are inconsistent across the MIP and not aligned with EPA or DPE methodologies for regulating industrial noise emissions. As a result, the updated MPW Stage 2 consolidated consent now includes, at Condition B131, a set of cumulative noise criteria applicable to operations across MPE and MPW (Table 2-4).

When assessing noise emission for IMEX operations, the noise limits specified in Condition F5B of SSD 6766 and Condition B131 of SSD 7709 would be applicable for this plan.

Table 2-2: MPE Concept CoC (MP10_0193)

Condition	Requirement	Sections or documents where requirements addressed
2.1	Under section 75P(2)(c) of the Act, the following environmental assessment requirements apply with respect to future development that is subject to Part 4 Division 4.1 Act:	Note
	Any future Development Application shall include an updated assessment of noise and vibration impacts. The assessment shall: a) The assessment shall: …	-
Noise and Vibration	ii. assess operational noise and vibration impacts and identify feasible and reasonable measures proposed to be implemented to minimise operational noise impacts of the intermodal facility and rail link, including the preparation of an Operational Noise Management and Monitoring Plan; and	Section 3
	iii. be prepared in accordance with: NSW Industrial Noise Policy (EPA 2000), Interim Construction Noise Guideline (DECC 2009), Assessing Vibration: a technical guide (DEC 2006), the Rail Infrastructure Noise Guideline (EPA 2013), Development Near Rail Corridors and Busy Roads Interim Guideline (DoP 2008), and the NSW Road Noise Policy 2011.	Section 2.1

Table 2-3: MPE Stage 1 CoC (SSD 6766)

CoC	Requirement	Sections or documents where requirements addressed
F5A	The Applicant shall prepare and implement (following approval) a **Container Noise Barrier Management Plan** (CNBMP). The plan shall be prepared by a suitably experienced and qualified acoustics consultant and shall outline the management practices and procedures that are to be followed during night-time operation of the site and for the stacking of containers to be used as noise barriers. The plan shall include, but not necessarily be limited to:	This Plan Refer to authors details on Page (i) Section 3.5
F5A(a)	the preparation of a specification for the stacking of containers to achieve the required level of noise reduction so as to comply with the project specific noise levels** and the sleep disturbance trigger levels*** for the night-time period* at the nearest affected residential receivers and which is to include such details as the minimum numbers of containers, their locations, stacking heights, orientation and maximum gap between containers. The Plan shall include any restrictions on stacking of containers above two high if this is found necessary.	Section 3
F5A(b)	The measurement of noise from operation of the site and an assessment of compliance with the project specific noise levels and the sleep disturbance trigger levels at the nearest affected residential receivers at the following times: i) not less than 3 months and not more than 6 months after commencement of operation, noise surveys shall be conducted on three separate nights for a period of not less than 2 hours whilst train wagons are being loaded with containers; ii) thereafter for 6 months on one night per month for a period of not less than 2 hours whilst train wagons are being loaded with containers. Noise measurements shall be conducted in accordance with the EPA's Industrial Noise Policy.	Section 2.1 Section 3.5 Section 4
F5A(c)	the details of each noise survey shall be documented in a report with a drawing showing the observed location of containers which are subject to the Plan, the measurement equipment used, its calibration status, environmental conditions, receiver locations, methodology, a detailed description of the activities on site, the results obtained and whether or not compliance has been achieved with the project specific noise levels and the sleep disturbance trigger levels at the nearest affected residential receivers.	Section 4
F5A(d)	if the report concludes that the project specific noise levels and the sleep disturbance trigger levels for the night-time period at the nearest affected residential receivers are not being complied with, then recommendations shall be made by the acoustic consultant to amend the Plan accordingly and the Applicant shall implement those recommendations as soon as practical provided they are feasible and reasonable.	Section 4

<table>
<tr><th>CoC</th><th>Requirement</th><th>Sections or documents where requirements addressed</th></tr>
<tr><td>F5A(e)</td><td>the Plan shall include a description of the roles and responsibilities for relevant employees involved in the operation of the CNBMP, including relevant training and induction provisions for ensuring that employees are aware of their environmental and compliance obligations under the Plan.</td><td>Section 2.3
Section 2.4</td></tr>
<tr><td></td><td>The Plan shall be submitted for the approval of the Secretary no later than one month prior to the commencement of operation. Copies of the detailed reports and the Plan (as amended) shall be provided to the Secretary and made available on the Project Website.</td><td>Section 1.5
Section 4</td></tr>
<tr><td></td><td>* The night-time period is defined as 10pm-7am Mon-Sat and 10pm-8am Sundays and Public Holidays
** Contained within the LAeq (15 min) column in Table A in Condition F5B
*** Contained within the Review of Operational Sleep Disturbance Impacts</td><td>-</td></tr>
<tr><td>F5B</td><td>Industrial noise (excluding activities covered by the NSW Rail Infrastructure Noise Guideline) generated by the development is to be measured and evaluated for compliance generally in accordance with the relevant requirements of the NSW Industrial Noise Policy (as may be updated from time to time).
Table A: Noise Criteria dB(A)
<table>
<tr><th>Sensitive receiver</th><th>Day (LAeq (15 min))</th><th>Evening (LAeq (15 min))</th><th>Night (LAeq (15 min))</th><th>Night (LA1 (1 min))</th></tr>
<tr><td>Wattle Grove (NCA 1)</td><td>43</td><td>42</td><td>42</td><td>52</td></tr>
<tr><td>Wattle Grove (NCA 2)</td><td>41</td><td>41</td><td>41</td><td>51</td></tr>
<tr><td>Casula (NCA 3)</td><td>45</td><td>42</td><td>38</td><td>47</td></tr>
<tr><td>Glenfield (NCA 4)</td><td>46</td><td>46</td><td>40</td><td>50</td></tr>
</table>
Note: References to sensitive receivers should be read in conjunction with the description of sensitive receivers in the EIS noting that Casula includes Glenfield Farm.</td><td>Section 3.4
Section 4 details noise monitoring and reporting requirements which will assess compliance with noise criteria</td></tr>
<tr><td>F5C</td><td>The noise criteria in Table A of condition F5B are to apply under all meteorological conditions except the following:
a) wind speeds greater than 3 m/s at 10 metres above ground level; or
(b) stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level; or
(c) stability category G temperature inversion conditions.</td><td>Section 3.2</td></tr>
</table>

Table 2-4: MPW Stage 2 CoC (SSD 7709)

<table>
<tr><th>CoC</th><th>Requirement</th><th>Sections or documents where requirements addressed</th></tr>
<tr><td>B131</td><td>The noise generated by the development must not exceed the noise limits in Table 4 which are generated by the overall precinct operations (defined as all activities approved for MPW and MPE).
Table 4: Operational Noise Limits dB(A)
<table><tr><th>Location (residential receivers)</th><th>Day $L_{Aeq,15\ minute}$</th><th>Evening $L_{Aeq,15\ minute}$</th><th>Night $L_{Aeq,15\ minute}$</th><th>Night L_{AFmax} Sleep Arousal Screening Level</th></tr><tr><td>Casula</td><td>46 dB</td><td>44 dB</td><td>39 dB</td><td>52 dB</td></tr><tr><td>Glenfield</td><td>49 dB</td><td>46 dB</td><td>42 dB</td><td>52 dB</td></tr><tr><td>Wattle Grove</td><td>44 dB</td><td>42 dB</td><td>42 dB</td><td>52 dB</td></tr><tr><td>Wattle Grove North</td><td>41 dB</td><td>41 dB</td><td>41 dB</td><td>52 dB</td></tr></table>Notes:
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 m of a dwelling where the dwelling is more than 30 m 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 of the NPI). The modification factors in Fact Sheet C of NPI must also be applied to the measured noise levels where applicable.
To determine compliance with the LAFmax Sleep Arousal Screening Level in Table 4 above, noise from the project is to be measured at 1 m 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 NPI).

The noise emission limits identified above apply under meteorological conditions of:
(i) wind speeds of up to 3 m/s at 10 m above ground level; or
(ii) 'F' atmospheric stability class.</td><td>Section 3.3, Table 3-4

The noise limit requirements detailed within Condition B131 are applicable to operations within MPE Stage 1 (i.e. of the IMEX terminal) as the condition applies to the cumulative noise emissions of all noise generating activities in the MIP (MPE & MPW), SSD 6766, SSD 7628 and SSD 7709.

Section 4 details noise monitoring and reporting requirements which will assess compliance with noise criteria.</td></tr>
</table>

2.3 Roles and Responsibilities

Key roles and responsibilities applicable to this Condition F5A Management Plan are presented in Table 2-6.

Table 2-5: Roles and responsibilities

Roles	Responsibilities
IMEX Terminal Manager	• Co-ordinate induction and training of IMEX Terminal staff on the requirements of this Plan
Site HSEQ Manager/Advisor for MPE	• Monitoring the implementation of this Plan, including compliance with relevant CoC • Undertake the monitoring and reporting requirements of this Plan
Qualified Acoustic Consultant	• Will be engaged to undertake the noise surveys required by this Plan
Shift Supervisor	• Monitoring of weather conditions during the night-time period • Implementing this Plan, in particular the actions and activities detailed in Section 4.2 in the event that noise criteria are exceeded during night time operations.
All other personnel	• Comply with applicable requirements of this Plan • Follow instructions of Shift Supervisor, in relation to container placement during night-time operations

2.4 Training

All staff, contractors and sub-contractors shall undergo site-specific induction training which will include container handling noise mitigation and management training developed with an emphasis on understanding and managing noise impacts arising from night-time operation of the IMEX Terminal.

This site-specific induction training will include:

- The location of sensitive receivers and monitoring locations
- Relevant noise mitigation measures and procedures
- Identifying the specifications for the placement and stacking of containers during night-time operations to manage and minimise noise emissions.
- Any limitations on high noise-generating activities
- Designated loading/unloading areas and procedures
- Details of the complaints handling procedure (complaints are received by Precinct Operator)
- Details of the environmental incident procedures
- Non-conformance, preventative and corrective action procedures
- An outline of the consequences of not complying with these measures
- Plant and equipment maintenance requirements
- Operation of vehicles to minimise noise and vibration impacts, e.g., use of designated container handling areas/locations, use of non-tonal reversing beepers, using alternate

onsite signaling systems to horns, and turning off plant, equipment and vehicles when not in use.

Personnel directly involved in implementing container handling noise control measures will be given specific training in the various measures to be implemented as per Section 3, including stacking times and locations, allocated areas, priorities of containers, orientation and placement.

3 IMPLEMENTATION

This section addresses the key night-time period operational noise risks associated with operation of the IMEX Terminal in respect of container placement and stacking. In accordance with CoC F5A(a), the night-time period is defined as 10pm-7am Monday to Saturday and 10pm-8am Sundays and Public Holidays.

3.1 Existing Environment

The IMEX terminal is surrounded by the residential suburbs of Wattle Grove, Casula and Glenfield.

Background noise levels at the nearby residences were established through long-term background noise monitoring during the approval process. The noise monitoring was undertaken by Wilkinson Murray (now RWDI) for the *SIMTA Concept Plan Noise Impact Assessment* (NIA) [*Wilkinson Murray, Report No. 12186-C, Version C, 2 August 2013* (MPE Concept NIA)] in addition to further monitoring undertaken related to the Land and Environment Court Appeal No. 2017/81889.

These monitored noise levels then informed the operational noise limits identified in SSD 6766 F5B Table A.

The Rating Background Levels (RBLs) were then defined for each of the four defined residential noise catchment areas surrounding the IMEX terminal.

3.2 Meteorological Conditions

At relatively large distances from a source, the resultant noise levels at sensitive receivers can be influenced by meteorological conditions, particularly temperature inversions and winds; and can therefore vary from hour to hour and night to night.

As further explained in the NPfI, certain meteorological/weather conditions may increase noise levels at receiver locations by focusing sound-wave propagation paths at a single point. Such refraction of sound waves can occur during temperature inversions (atmospheric conditions where temperatures increase with height above ground level), and where there is a wind gradient (that is, wind velocities increasing with height) with wind direction from the source to the receiver.

As per the NPfI, these noise-enhancing meteorological conditions need to be considered when predicting the likely levels of noise emission for an industrial activity. Subject to the distance and meteorological conditions, noise-enhancing meteorological conditions can typically increase noise levels by up to 5 dB(A) at distances similar to that of receivers around MIP.

The night-time noise management levels are applicable under the meteorological conditions as outlined in CoC F5C (SSD 6766) and CoC B131 (SSD 7709), and so are applicable for all weather conditions except those detailed below:

- Wind speeds greater than 3m/s at 10m above ground level
- Stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level

- Stability category G temperature inversion conditions.

To properly manage noise emissions from the IMEX terminal, these noise-enhancing conditions require monitoring and consideration, so that the appropriate recommended management measures are adopted where required. When noise-enhancing conditions are not certain management measures would not be needed for noise emissions to achieve the noise requirements at nearby residences.

3.3 Prevailing Meteorological Conditions

3.3.1 Meteorological Station

Todoroski Air Sciences was engaged to supply and install a meteorological station on the MPE Stage 1 (required under condition A54 of SSD 7709 (MPW Stage 2)) to record weather conditions. Previous versions of this Plan identified a requirement for installation of a temporary meteorological station prior to commencement of MPE operations. The MPW Stage 2 meteorological station was utilised for this purpose and is also appropriate for use with the MPE Stage 1 requirements.

The following information is monitored by the meteorological station:

- Wind speed
- Sigma-theta (the standard deviation of wind direction)

Weather data is being stored to allow for post-processing in the event of complaints, or noise exceedances.

3.3.2 Project specific meteorological forecasting

Todoroski Air Sciences has also been engaged to provide a forecasting and monitoring tool, whereby the forecast wind and temperature inversion risks in coming days can be identified. The appropriate mitigation and management measure can be implemented as required as part of operational planning, in response to the forecast conditions.

Night-time Shift Supervisors would have access to the outputs from the meteorological station and would be aware in advance of the predicted weather conditions, to enable implementation of the applicable noise mitigation measures and operational practices.

Noise management measures, combined with the applicable prevailing meteorological conditions, are summarised in Section 3.5.

3.4 Sensitive Receivers

The residential receivers in the vicinity of the IMEX Terminal with the greatest potential for being adversely impacted by noise are located in the suburbs of Casula, Glenfield and Wattle Grove.

Table 3-1 and Figure 3-1 identifies these residential receiver noise catchment areas Figure 3-1 also identifies key potentially noise-affected receivers from IMEX terminal operations in each noise catchment area (NCA), which are where attended measurements would typically be conducted, subject to the operational activity being monitored.

Alternate monitoring locations may be appropriate subject to the operational activity being monitored. Any monitoring locations should be appropriately justified.

Table 3-1: Sensitive receivers and approximate distance from IMEX Terminal

Noise Catchment Area (NCA)	Typical Monitoring Location	Approximate distance (m) from IMEX Terminal
NCA 1: Wattle Grove	AM1	770
NCA 2: Wattle Grove North	AM2	1,050
NCA 3: Casula	AM3	960
NCA 4: Glenfield	AM4	1,750

Noise monitoring at nearby residential receivers for the Precinct noise emissions are managed by the Precinct Operator in line relevant conditions of consent, compliance monitoring requirements, and requirements of both the Construction Noise and Vibration Management Plan (CNVMP) and Operational Noise and Vibration Management Plan (ONVMP).

Figure 3-1: Noise catchment areas and typical noise monitoring locations

Figure 3-1: Noise Catchment areas and noise monitoring locations

3.5 Noise Management Criteria

As detailed in Section 2.2.2, the noise limits specified by SSD 6766 CoC F5C and SSD 7709 CoC B131 are applicable for the operation of IMEX Terminal and have therefore been adopted for this management plan.

Table 3-2 and Table 3-3 identify the operational noise limits for the operations of the IMEX Terminal during the night-time period. These noise limits apply under the meteorological conditions as outlined in CoC F5C (SSD 6766) and CoC B131 (SSD 7709).

Table 3-2: Noise criteria, dB(A) (SSD 6766)

Sensitive receiver	Day ($L_{Aeq,15\ min}$)	Evening ($L_{Aeq,15\ min}$)	Night ($L_{Aeq,15\ min}$)	Night ($L_{A1,1\ min}$)
Wattle Grove (NCA 1)	43	42	42	52
Wattle Grove North (NCA 2)	41	41	41	51
Casula (NCA 3)	45	42	38	47
Glenfield (NCA 4)	46	46	40	50

Table 3-3: Operational noise limits, dB(A) (SSD 7709)

Sensitive receiver	Day ($L_{Aeq,15\ min}$)	Evening ($L_{Aeq,15\ min}$)	Night ($L_{Aeq,15\ min}$)	Night (L_{AFmax})
Wattle Grove (NCA 1)	44	42	42	52
Wattle Grove North (NCA 2)	41	41	41	52
Casula (NCA 3)	46	44	39	52
Glenfield (NCA 4)	49	46	42	52

3.6 Noise Management

3.6.1 Application strategies

Based on the recently completed NIA by RTA (August 2023) and in accordance with NPfI, measures for reducing noise impacts from industrial activities should follow three main control strategies:

- reducing noise at source
- reducing noise in transmission to the receiver
- reducing noise at the receiver.

These control strategies should be considered in a hierarchical way so that all the measures that reduce noise for a large number of receivers (that is, source controls) are exhausted before more localised mitigation measures are considered.

The NIA by RTA (August 2023) identified that due to the actual nature of onsite container handling operations and working container management, alternate noise control strategies to the implementation of a single permanent noise barrier were required to achieve the required outcomes of CoC F5A.

In the context of the MIP, due to the distance between the IMEX terminal and the nearby residences, the prevailing meteorological conditions can result in noise enhancing conditions, which will increase the noise levels from IMEX noise generating activities at nearby receivers. Noting that this can substantially change the noise level at the potentially impacted receivers, it is important to take this into consideration when developing a noise control strategy (Section 3.2).

In accordance with CoC F5A of SSD 6766, container stacking is implemented at the IMEX Terminal to reduce noise impacts to sensitive receivers during night-time operations when required. However, the NIA prepared by RTA in support of the IMEX TEU capacity increase proposal, has found that various container yard container stack heights can alter the noise emissions to nearby receivers, through both shielding or reflection. Furthermore, the numbers of containers present onsite at any given time is variable depending on operational activities. Additionally, not all potentially impacted residential receivers may be located such that the container yard is located in between the noise sources and the receivers, where it can act as a noise barrier. As such, increasing container stacks and/or container heights does not provide a holistic solution to noise emissions mitigation.

A series of management and mitigation strategies have been developed for the IMEX operations – utilising a combination of noise control measures both ‘at source’ and ‘in the noise transmission path’ approaches. These strategies include implementation of container stacking at selected locations (depending on the location of operational activities). The level of mitigation required is driven by the prevailing meteorological conditions, which are monitored by IMEX operations staff.

With the implementation of this strategy (Section 3.5.2), the IMEX operations (up to a maximum capacity of 500,000 TEU) are then predicted to achieve the applicable noise emissions criteria. By achieving these criteria, operations will also aid the MIP in achieving the overall applicable cumulative noise limits as part of the final MIP arrangement.

3.6.2 Mitigation and Management Measures

3.5.2.1 Mitigation and Management Measures – Noise Impact Assessment Recommendations

The NIA prepared by RTA (August 2023) in support of the IMEX capacity increase to 500,000 TEU concluded that with the implementation of a number of mitigation and management measures, with consideration of the prevailing meteorological conditions, operations are predicted to achieve noise emissions criteria at sensitive receivers.

Figure 3-2, Figure 3-3, Figure 3-4 and Figure 3-5 identify the mitigation measures, the triggers for their implementation and the locations within the IMEX footprint to which they should be applied.

The measures include both general ‘at source’ treatment measures (for implementation across all conditions), requirements for container stacking and other operational-based measures to reduce night-time noise emissions to nearby residences (M1 – M12).

Figure 3-2: Recommended mitigation measure (NIA, RTA, August 2023)

Table 3-9: Recommended noise mitigation measures – Noise controls

Applicable activity / noise source	Details	Mitigation control type	Applicable for	NCAs benefiting from mitigation measure
Reach stackers	5 dB(A) of mitigation to reach stackers is required, comprising the installation of residential grade mufflers to achieve a maximum pass-by noise level of 108 dB(A).	Noise source control	Noise emissions $L_{Aeq\ 15min}$	All NCAs
Cranes - broadband movement alarms	Broadband movement alarms would be shifted to the ground level.	Noise source control	Noise emissions $L_{Aeq\ 15minute}$	All NCAs

Table 3-10: Recommended additional management measures during applicable meteorological conditions

Item	Applicable activity / noise source	Applicable assessment periods Evening: 6pm – 10pm Night: 10pm – 7am	Applicable when meteorological conditions include temperature inversions OR wind as per below		Applicable for	Details	NCAs benefiting from mitigation measure
			Temperature inversion	Wind[1]			
General noise management							
M1	Minimise truck idle time on arrival/departure	Night	All met conditions	All met conditions	Noise emissions $L_{Aeq\ 15minute}$	If trucks are to wait for extended periods of time at arrival area (ie. greater than 2 minutes) they are to turn off their engine.	All NCAs
M2	Truck and reach stacker horns	Night	All met conditions	All met conditions	Noise emissions $L_{Aeq\ 15minute}$	Horns are not to be used as part of the loading process at night.	All NCAs
M3	Warehouse container operation (reach stacker)	Night	Inversion risk conditions medium or greater (ie. Class E/F)	0.5 – 3m/s (all directions)	Noise emissions $L_{Aeq\ 15minute}$	Containers are taken to warehouses combi lifts or straddle carriers only.	All NCAs
Casula noise management							
M4	Container truck loading activity noise emissions	Evening	Inversion risk conditions medium or greater (ie. Class E/F)	0.5 – 3m/s (NE to S)	Noise emissions $L_{Aeq\ 15min}$	Schedule trucks loading/unloading activities so that the number of trucks that would be loaded/unloaded within a 15-minute period would be limited to 9 truck movements. Other trucks to wait at the truck arrival area with engine switched off. When truck movements are greater than 6 movements in a 15-minute period (and no more than 9) in the evening, see M5 for warehouse container operations linked mitigation.	Casula

Figure 3-3: Recommended mitigation measure (NIA, RTA, August 2023)

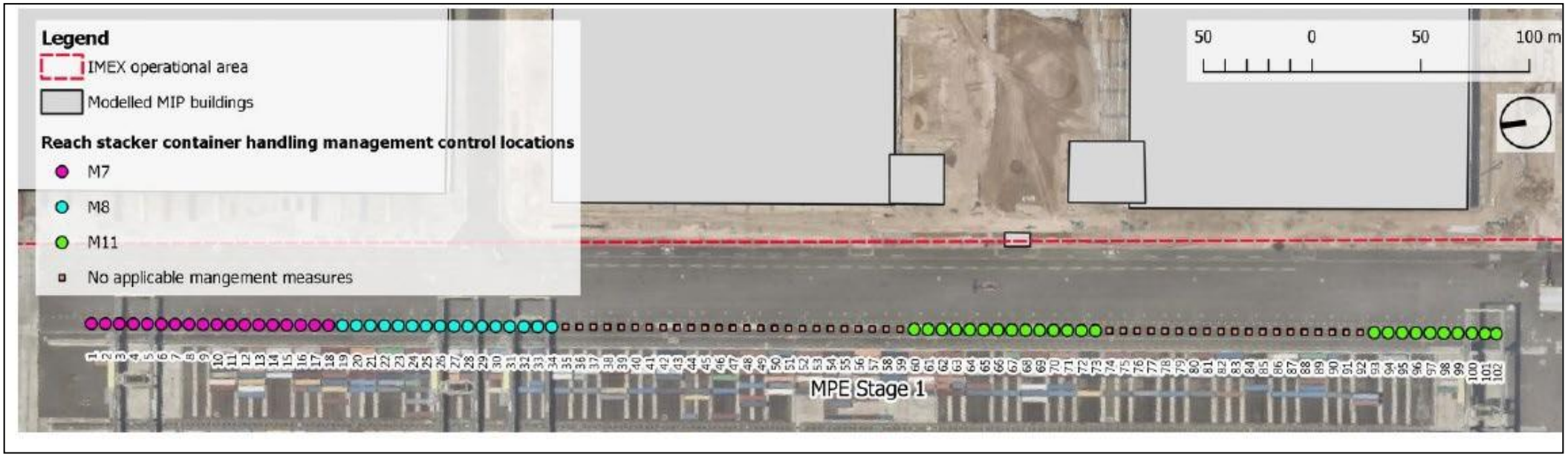
Item	Applicable activity / noise source	Applicable assessment periods Evening: 6pm – 10pm Night: 10pm – 7am	Applicable when meteorological conditions include temperature inversions OR wind as per below		Applicable for	Details	NCAs benefiting from mitigation measure
			Temperature inversion	Wind[1]			
M5	Warehouse container operations	Evening	Inversion risk conditions medium or greater (ie. Class E/F)	0.5 – 3m/s (NE to S)	Noise emissions $L_{Aeq\ 15min}$	When truck movements through the facility are greater than 6 movements in a 15-minute period, container movements to warehouses are not permitted. There should be no more than 9 truck movements in a 15-minute period (as per M4). Container movements to warehouses can only happen when truck movements through the facility are 6 trucks or less in a 15-minute period, and they are to be moved by combi lift or straddle carriers.	Casula
M6	Container truck loading activity noise emissions	Night	Inversion risk conditions low (ie. Class D)	All wind up to 3m/s (NE to S)	Maximum noise levels events (L_{Amax}) Noise emissions $L_{Aeq\ 15min}$	**Strategic container stacking (where no containers)** Where truck container loading/unloading is to take place in a location where there are no containers in the yard in the immediate vicinity of the operations, containers should be placed there to a minimum 2 containers high. These containers are to extend either side north/south of where container loading will take place for a minimum 4 containers in length. See note 2.	Casula
M7	Container handling high noise events	Night	Inversion risk conditions medium or greater (ie. Class E/F)	0.5 – 3m/s (NE to S)	Maximum noise levels events (L_{Amax})	**Strategic container stacking (yard containers up to 2 high)** Assuming the container yard is a minimum 2 containers high in the immediate night operations area (as per M6), truck container loading/unloading is to take place outside of the following locations during the night: • Slots 1 to 18 (inclusive)	Casula
M8	Container handling noise emissions	Night	Inversion risk conditions medium or greater (ie. Class E/F)	0.5 - 3m/s (NE to S)	Maximum noise levels events (L_{Amax}) Noise emissions $L_{Aeq\ 15min}$	**Strategic container stacking (yard containers up to 2 high)** Where truck container loading/unloading is proposed for: • Slot 19 to 34 (inclusive), and • existing containers are up to 2 high (per M6), the yard containers are to be increased to a minimum 4 high and extend either side of where container loading will take place for a minimum 4 containers in length. See note 2.	Casula

Figure 3-4: Recommended mitigation measure (NIA, RTA, August 2023)

Item	Applicable activity / noise source	Applicable assessment periods Evening: 6pm – 10pm Night: 10pm – 7am	Applicable when meteorological conditions include temperature inversions OR wind as per below		Applicable for	Details	NCAs benefiting from mitigation measure
			Temperature inversion	Wind[1]			
M9	Container truck loading activity noise emissions	Night	Inversion risk conditions medium or greater (ie. Class E/F)	0.5 – 3m/s (NE to S)	Noise emissions $L_{Aeq\ 15min}$	Schedule trucks loading/unloading activities so that up to 6 trucks are loaded/unloaded within a 15-minute period. Other trucks to wait at the truck arrival area with engine switched off. When truck movements are greater than 4 movements in a 15 minute period (and no more than 6) in the night, please see M10 for warehouse container operations linked mitigation.	Casula
M10	Warehouse container operations	Night	Inversion risk conditions medium or greater (ie. Class E/F)	0.5 – 3m/s (NE to S)	Noise emissions $L_{Aeq\ 15min}$	When truck movements through the facility are 4 or greater within a 15-minute period, container movements to warehouses are not permitted. There should be no more than 6 truck movements in a 15-minute period (as per M9). Container movements to warehouses can only happen when truck movements through the facility are 4 trucks or less in a 15-minute period, and they are to be moved by combi lift or straddle carriers.	Casula
Wattle Grove noise management							
M11	Container handling noise emissions and high noise events	Night	Inversion risk conditions medium or greater (ie. Class E/F)	0.5 - 3m/s (NW to SW)	Maximum noise levels events (L_{Amax}) Noise emissions $L_{Aeq\ 15min}$	Assuming the eastern container yard is a minimum 2 containers high, truck container loading/unloading is to take place outside of the following locations during the night period: • Slots 60 to 73 • Slots 93 to 102	Wattle Grove
M12	Warehouse container operation (WH7)	Evening and Night	Inversion risk conditions medium or greater (ie. Class E/F)	0.5 – 3m/s (NW to SW)	Noise emissions $L_{Aeq\ 15minute}$	Containers to be taken to WH7 only by combi lifts or straddle carriers during the evening and night.	Wattle Grove

Notes
1. Wind directions apply to + or minus 22.5 degrees from the indicated wind direction.
2. In all cases, the containers being used to shield for noise are to be located no further than 1 metre apart, and a minimum of 2 containers deep is required. If this is not the case containers will not provide an effective barrier for the majority of receivers it is protecting.
3. LAeq15minute management measures assume that all MPW (north) warehouses will be constructed, when determining measures to achieve a suitable contribution to Casula receivers.

Figure 3-5: Reach stacker container handling high noise events management - management zones (RTA, NIA, August 2023)



3.5.2.1 Additional Mitigation Measures

A number of additional management measures have been identified to be implemented to manage noise emissions during night-time operations. These measures are based on the requirements of the CoC, as well as Qube's Environmental Management System requirements and standards. These measures are summarised in Table 3-5.

Table 3-4 Management measures during night-time operations of the IMEX Terminal

ID	Management Measure	Timing	Responsibility	Reference
CN-1	A specific induction will be provided to all staff, contractors and sub-contractors working within the IMEX Terminal with an emphasis on understanding the requirements of this Plan and managing noise impacts during night-time operation of the IMEX Terminal.	Duration of Operations	Site SHEQ Manager/Advisor for MPE IMEX Terminal Manager Shift Supervisor All personnel	F5A (SSD 6766) F5B (SSD 6766) F5C (SSD 6766)
CN-2	Meteorological conditions will be monitored during the night-time period.	Duration of Operations	Shift Supervisor	F5C (SSD 6766)
CN-3	In the event of a monitored exceedance during night-time periods further investigation would be undertaken to confirm. Where appropriate the suspected noise source works would cease or reduce and an investigation would be undertaken to determine potential sources and/or causes, plant and machinery would be checked and verified for noise levels and weather conditions would be recorded. In the event that an investigation does not identify any potential sources and/or causes for the exceedance, the following alternative mitigation measures would be implemented, where reasonable and feasible. • revisiting management measures/practices/sequencing etc to reduce noise levels and minimise impacts on receivers • If the noise surveys identify noise exceedances, Qube would engage a qualified acoustic consultant to provide recommendations to amend this Plan accordingly. • Recommendations made by the acoustic consultant would be implemented as soon as practical, where feasible and reasonable.	Duration of Operations	IMEX Terminal Manager Shift Supervisor All personnel	F5A (SSD 6766)
CN-4	To minimise container stacking and loading noise, manual handling (reach stacker, combilift, straddle carrier) operators would use work practices to ensure to place containers and not drop them onto the	Duration of Operations	IMEX Terminal Manager Shift Supervisor All personnel	F5A(a) (SSD 6766)

ID	Management Measure	Timing	Responsibility	Reference
	hardstand, vehicles or container stacks.			
CN-5	All plant and equipment used at the IMEX Terminal would be maintained in a proper and efficient condition, and operated in a proper and efficient manner.	Duration of Operations	IMEX Terminal Manager Shift Supervisor All personnel	F5A(a) (SSD 6766)
CN-6	In the event of any night-time noise related complaint or adverse comment from the community as managed by the Precinct Operator, noise emission levels would be investigated. Remedial action would be implemented where feasible and reasonable in accordance with this management plan. The procedures for managing complaints is provided within the Community Communication Strategy managed by the Precinct Operator.	Duration of Operations	IMEX Terminal Manager Shift Supervisor All personnel	F5A(b) (SSD 6766) F5A(d) (SSD 6766)
CN-7	Manual stacker loading and unloading of the trains has ceased and permanent electrified automatic night-time stacking of containers has commenced. This subsequently reduce noise impacts associated with container stacking and loading within the container yard.	During Automatic Operation	IMEX Terminal Manager Shift Supervisor	F5A(a) (SSD 6766)

4 MONITORING AND REVIEW

4.1 Monitoring Requirements

Noise monitoring will be conducted as per the requirement of this Plan and the CoC. Noise measurements shall be undertaken consistent with the procedures documented in NSW EPA-*Noise Policy for Industry* (2017), which supersedes the NSW EPA Industrial Noise Policy (2000).

Noise monitoring procedures, locations and reporting will be completed in accordance with the latest approved MPE Stage 1 ONVMP.

4.2 Exceedances of Monitoring Criteria

Monitoring criteria applicable to the Condition F5A Management Plan are provided in Section 3.4. In the event that noise from the IMEX Terminal during night-time operations exceeds the operational noise criteria for the night-time period at nearby residential receivers, the following activities will be undertaken to determine the potential causes and/or sources and whether consideration of additional mitigation measures are required to minimise potential impacts.

- Identification of the monitored exceedance is to be reported to the Site HSEQ Manager/Advisor.
- Works identified as causing the exceedance will cease or reduce, at the direction of the Shift Supervisor, and an investigation will be undertaken to determine the potential sources and/or causes.
- Determine if the exceedance is an atypical or single occurrence, or sustained occurrence.
- Plant and machinery will be checked and verified for noise levels and appropriate exhaust/fittings/noise attenuators.
- Weather conditions at the time of the exceedance will be recorded.

In the event that a review of activities did not identify any potential sources and/or causes for the noise, the following alternative mitigation measures will be implemented, where reasonable and feasible.

- revisiting management measures/practices/sequencing to reduce noise levels and minimise impacts on receivers
- If the noise surveys identify noise exceedances, Qube will engage a qualified acoustic consultant to provide recommendations to amend this Plan accordingly.
- Recommendations made by the acoustic consultant will be implemented as soon as practical, where feasible and reasonable.

4.3 Review and Improvement

Review and improvement of this plan will be undertaken in accordance with the CoC and Section 6.2 of the OEMP [PREC-QPMS-EN-APP-00001]. Continuous improvement opportunities will be captured through the ongoing evaluation of environmental management performance and effectiveness of this plan against environmental policies, objectives and targets.

A copy of any updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure, as outlined in Section 1.4.1 of the OEMP. Copies of the detailed reports and the Plan (as amended) will be made available on the Project Website.

4.4 Incidents

All night-time operational noise incidents will be reported and managed in accordance with LOGOS Incident Reporting & Management Procedure (WHSMS-LOGOS-007) and Qube's Incident Reporting and Management Procedure (SHEMS-QM-13-PR-0126). Incidents are classified based on the incident's severity as shown in Section 4.6 of the OEMP [PREC-QPMS-EN-APP-00001].

All incidents will be managed and reported according to Section 4.6 of the OEMP.

4.5 Complaints

Complaints handling will be undertaken in accordance with Section 4.5.1 of the OEMP and the Community Communication Strategy (as managed by the Precinct Operator).

4.6 Non-Compliance, Non-Conformances and Corrective Actions

Non-compliance, non-conformances and resulting corrective actions will be managed in accordance with Section 6.4 of the OEMP.