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263-273 COWARD STREET AND 76-82 KENT ROAD, MASCOT

Planning Proposal Acoustic Assessment

5 October 2023

Perpetual Corporate Trust Limited as the trustee of the LMLP 1 and 2 Trust

TN132-01F03 Coward Street Planning Proposal (r2).docx

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Contents

List of tables

List of figures

1 Introduction

1.1 Overview and purpose of report

Renzo Tonin & Associates (RTA) has been engaged by Perpetual Corporate Trust Limited as the trustee of the LMLP 1 and 2 Trust (the applicant) to undertake an acoustic assessment to support the planning proposal to amend the floor space ratio (FSR) controls and introduce site-specific additional permitted uses for 263-273 and 273A Coward Street and 62-86 Kent, Mascot (the site).

The Planning Proposal seeks to amend Bayside Local Environmental Plan 2021 (the LEP) by increasing the maximum floor space ratio (FSR) to 2:1 and introduce site-specific additional permitted uses including Office Premises, Cafe or Restaurant under Schedule 1.

This acoustic assessment has been carried out to review acoustic matters relevant to the Planning Proposal with consideration of the relevant policies, guidelines and standards required by Bayside Council and the NSW Environment Protection Authority (EPA), with particular reference to aircraft noise and noise generation by likely activities associated with the Planning Proposal.

1.2 Planning proposal

The Planning Proposal seeks to amend Bayside Local Environmental Plan 2021 (the LEP) by increasing the maximum floor space ratio (FSR) to 2:1 and introduce site-specific additional permitted uses including Office Premises, Cafe or Restaurant under Schedule 1.

No changes are proposed to the existing E4 General Industrial zoning (previously known as IN1 General Industrial) or the 44 metre maximum height of building control which currently applies in accordance with the LEP.

The proposed amendment seeks to optimise the floor space that may delivered in accordance with the current land use zoning and maximum height, delivering critically needed industrial floor space which services the international trade gateways of Sydney Airport and Port Botany.

The Planning Proposal also seeks to simplify the existing FSR controls, which are land use activity dependant.

1.3 Preliminary concept proposal

The purpose of increasing the maximum FSR to 2:1 is to facilitate the economic and efficient development of the site in accordance with the E4 General Industrial zoning (previously known as IN1 General Industrial) and the maximum 44 metre building height control. The proposed plan amendment is sought to enable the delivery of critically needed additional industrial floor space close to Sydney Airport, Port Botany and the Sydney Central Business District (CBD).

A preliminary concept proposal for a proposed multi-level warehouse development (QF1 and QF2) has been prepared which complies with the amended FSR control. It is proposed to redevelop the site in stages to accommodate continuation of the existing operations in the Qantas Sydney Distribution Centre (SDC). With the ultimate concept plan including two four level buildings up to 44 metres high with warehouse and distribution centre tenancies with associated offices and ancillary offices along the Coward Street frontage to activate the primary frontage.

The preliminary concept proposal includes four levels of warehouse with associated hardstands. The hardstands are located on the east and west side of each building, with the hardstand side location alternating each floor level. Ramps on the perimeter of the warehouses would allow access for heavy vehicles to each warehouses level.

Future development of the site assumes that the facilities or parts of, would operate 24 hours per day, seven days per week.

On-site parking for some 824 vehicles is located within basement parking areas beneath the two buildings. These parking spaces would replace the existing on-site parking for Qantas staff (some 650 spaces).

The preliminary concept proposal is indicative only and has been prepared for the sole purpose of demonstrating that the planning proposal can deliver a viable scheme within the amended controls being proposed. A perspective view of the preliminary concept proposal is presented in Figure 1.

Figure 1: Concept Plan warehouse concept (from north-west) (source: Lacoste + Stevenson, Rev B, 28/4/2023)

1.4 Site description

1.4.1 Location

The site is located at 263-273 and 273A Coward Street and 76-82 Kent, Mascot. It is bound by Coward Street along the northern boundary, the Port Botany rail freight line runs along the southern boundary of the site, beyond which is Qantas Drive and Sydney Kingsford Smith Airport. The site also partially fronts onto Kent Road on the eastern side, as shown in Figure 2.

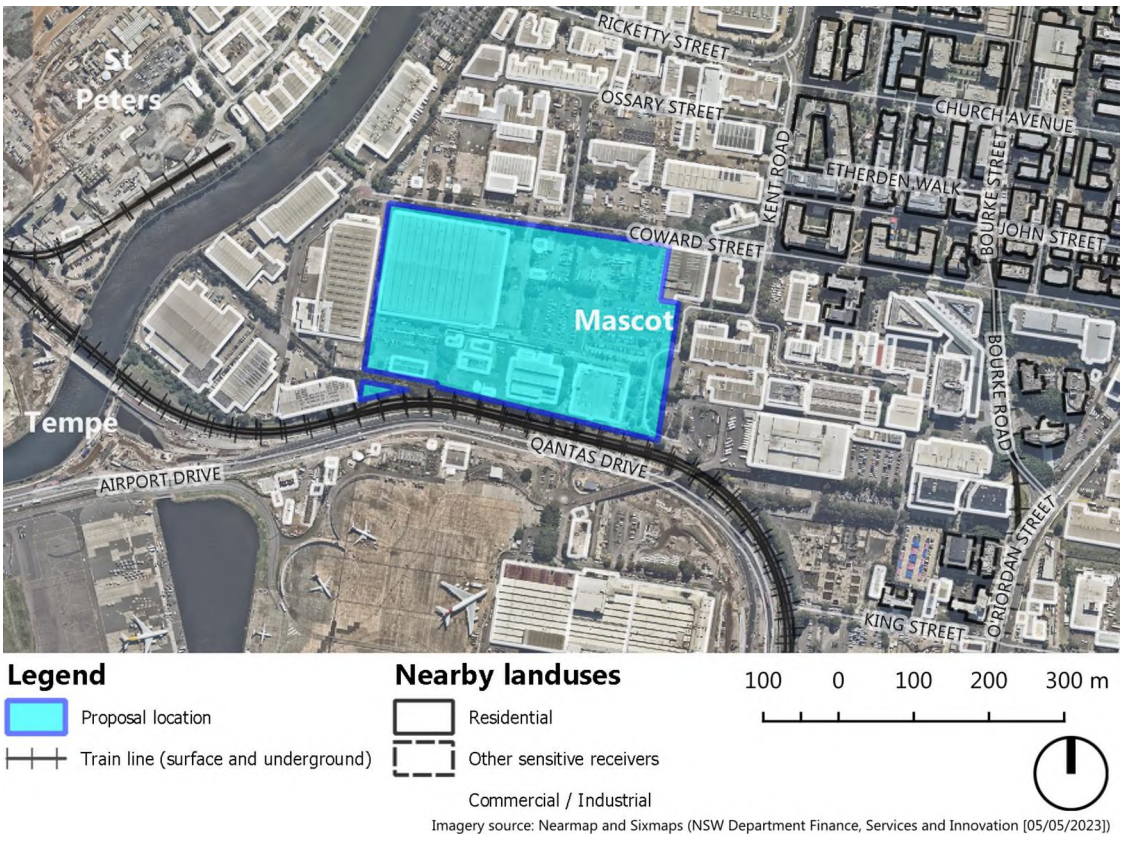
The site is located within the Bayside Local Government Area (LGA) and is zoned E4 General Industrial (previously known as IN1 General Industrial).

1.4.2 Access

Access to the site will be provided via separate access driveways onto Coward Street and Kent Road.

The Planning Proposal site is close to Airport Drive / Qantas Drive to the south, which provides local and regional access to the site via O'Riordan Street and Bourke Road. The site is also close to the WestConnex M8 tunnels to the north, accessed via Kent Road and Gardeners Road. There is also an alternate access to the site directly from Sydney Airport, via the Qantas Service Road which provides direct access from Kent Road to Sydney Airport via a bridge link over the freight line and Qantas Drive, which would be maintained as part of the site.

Figure 2: Site location



1.5 Acoustic assessment scope

This acoustic assessment has been prepared in support of the change in FSR of the site and proposed site-specific additional permitted uses. As the Planning Proposal will not provide consent for the construction of buildings, this report does not provide detailed recommendations for proposed building developments, but rather determines the acoustic requirements for the site, to establish what elements will require consideration for any future development application, in order to then satisfy relevant noise criteria.

As such, the scope of this study is to:

- Identify the existing acoustic environment and identify nearby sensitive receivers surrounding the site.
- Identify the relevant acoustic policies and standards that are likely to govern the future development and the related acoustic objectives, to be confirmed at later application stages.
- Undertake a review of the acoustic factors that may influence the future assessment and design of the site, with reference to a qualitative review of the preliminary concept proposal, a proposed multi-level warehouse development (QF1 and QF2), and potential noise emissions and key features affecting noise impacts.

As part of the scoping advice provided by Bayside Council, it was also identified that an aircraft noise assessment would be required to support the Planning Proposal. The advice noted that:

At its closest point, the site is around 700 metres from the extended centre line of Sydney Airport's main north-south runway. As the site is between the Sydney Airport Australian Noise Exposure Forecast (ANEF) 25 and 30 contours, all permissible land uses listed in schedule 1, clause 14 of the LEP are either acceptable or conditionally acceptable under Australian Standard 2021:2015: Acoustics – Aircraft noise intrusion – Building siting and construction. NASF Guideline A outlines where it may be appropriate to install noise insulation within a particular building depending on the proposed land use.

Based on the proposed likely usage as a warehouse and distribution facility, and with consideration of the requested information from Bayside Council, the primary acoustic matters relevant to the Planning Proposal have been identified as:

- Aircraft noise exposure onto the site
- Future operational noise emissions from the land uses to nearby residential receivers

1.6 Acoustic terms & quality

This report is technical in nature and uses acoustic terminology throughout. A summary and explanation of the common acoustic terms that have been used in this report is presented in APPENDIX A Section A.1. Some of the key acoustic concepts used in this report are outlined in APPENDIX A Section A.2.

2 Nearby noise sensitive receivers

2.1 Proposal site and surrounding land uses

The land immediately surrounding the site is commercial and industrial in nature, and the Mascot Station Town Centre Precinct is located approximately 160 metres north-east of the site.

The following describes the various receiver types surrounding the site:

North and west: Directly north and west of the site are a mixture of industrial and commercial developments.

East: Directly east of the site is a mixture of industrial and commercial developments, including the newly constructed 1 Chalmers Crescent, Mascot. A childcare centre is located on the southern side of Coward Street, within the commercial tower at 247 Coward Street, Mascot.

North-East: North-east of the site is the Mascot Station Town Centre Precinct, which is approximately 160 metres at the closest point. This generally consists of residential or short-stay / hotel towers, up to 13 levels tall. These typically have commercial tenancies on the ground floor.

South: The site is bound to the south by the Port Botany rail freight line, beyond which is Qantas Drive and Sydney Kingsford Smith Airport.

Figure 4 shows the location of the site, the nearby noise sensitive receivers and land uses.

2.2 Nearby receivers and noise catchments

There are a range of different receiver types located nearby to the site, made up of both residential and non-residential premises. A map showing the nearby buildings and associated uses (based upon the most stringent land use type in each building for the acoustic assessment) is presented in Figure 4.

The closest residential receivers to the site are located at 39 Kent Road, Mascot, approximately 160 metres from the site boundary. As the existing acoustic environment varies at the nearby residential receivers, these residential receivers have been grouped into Noise Catchment Areas (NCAs) based receivers exposed to similar acoustic environments. This has been done to logically group the receivers to assist with the assessment and allocate the appropriate project noise trigger levels to the various receivers. The following noise catchments have been identified:

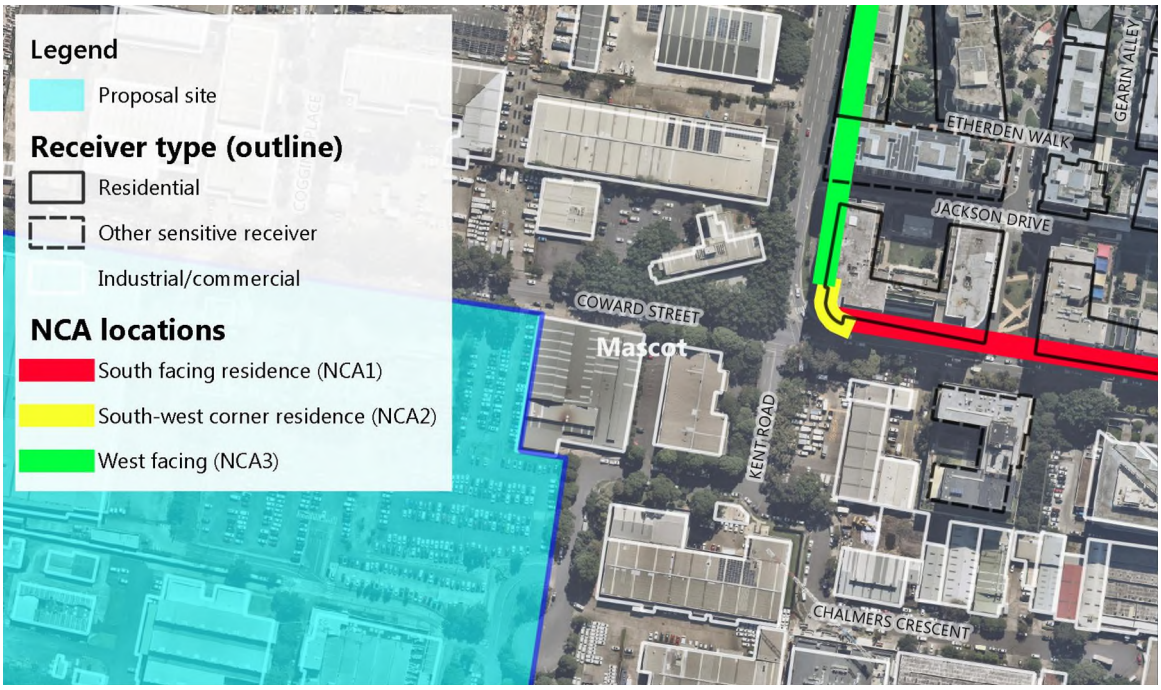
- **NCA1** contains multi-level residential towers (up to 13 floors) on Coward Street facing south, with commercial tenancies on the ground level. The noise levels are dominated by road traffic on Coward Street.
- **NCA2** contains multi-level residential towers (up to 13 floors) on the corner of Kent Road and Coward Street, Mascot, with commercial tenancies on the ground level. The noise levels are

dominated by road traffic on both Kent Road and Coward Street, and the associated intersection.

- **NCA3** contains multi-level residential towers (up to 13 floors) on Kent Road, Mascot facing west, with commercial tenancies on the ground level. The noise levels are dominated by road traffic on Kent Road.

The locations of these noise catchment area boundaries are also shown in Figure 3.

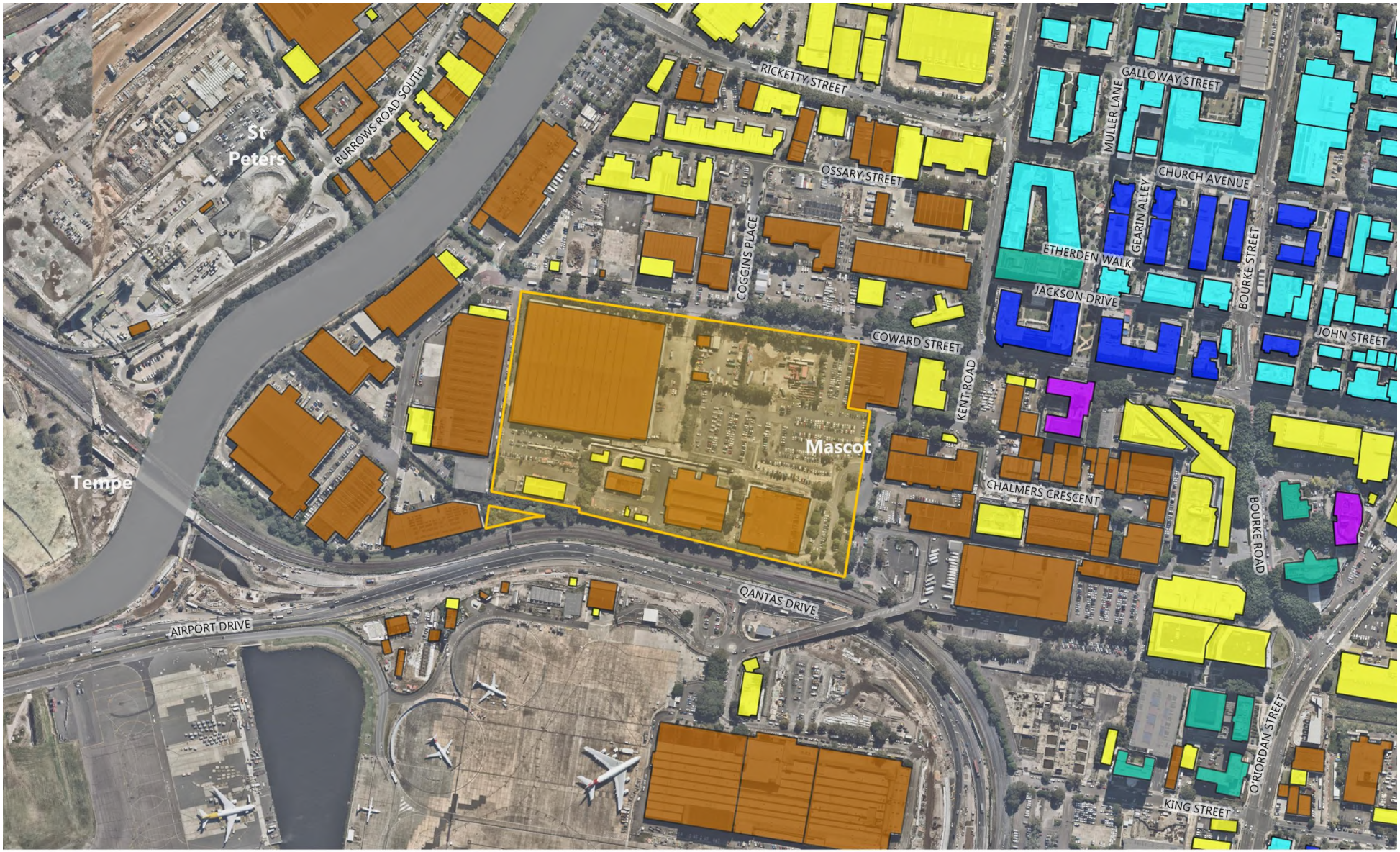
Figure 3: Residential noise catchment locations



There are also range of non-residential receivers located nearby to the site, which are summarised below.

- **Hotels –** A hotel (Meriton Suites Mascot Central, 8 Jackson Dr, Mascot) is located approximately 170 metres north-east from the site boundary.
- **Childcare** – A childcare, located on the third level of an eight-storey commercial tower at 247 Coward Street, Mascot. The childcare includes an outdoor play area on the western and southern sides of the commercial tower.
- **Commercial and industrial receivers** – The site is bounded by a number of commercial and industrial premises are located around the site.

Figure 4: Site location, nearby noise sensitive receivers, land uses



Landuse classification based upon a desktop review only, subject to further review and detailed design.
Imagery source: Nearmap and Sixmaps (NSW Department Finance, Services and Innovation [05/05/2023])

3 Existing noise environment and noise monitoring

Noise criteria for the assessment of operational and construction noise are usually derived from the existing noise environment of an area, excluding noise from the subject development.

As the noise environment of an area almost always varies over time, background and ambient noise levels need to be determined for the operational times of the proposed development. Background noise varies over the course of any 24-hour period, typically from a minimum at 3:00am in the morning to a maximum during morning and afternoon traffic peak hours. Therefore, the NSW Environment Protection Authority (EPA) *Noise Policy for Industry* (NPfI) (EPA 2017) requires that the level of background and ambient noise be assessed separately for the daytime, evening and night-time periods. Fact Sheet B of the NPfI outlines the methods for determining the background noise level of an area.

The typical time periods in accordance with the NPfI are as follows:

- **Day** is defined as 7:00am to 6:00pm, Monday to Saturday and 8:00am to 6:00pm Sundays & Public Holidays.
- **Evening** is defined as 6:00pm to 10:00pm, Monday to Sunday & Public Holidays.
- **Night** is defined as 10:00pm to 7:00am, Monday to Sunday & Public Holidays.

Shoulder periods

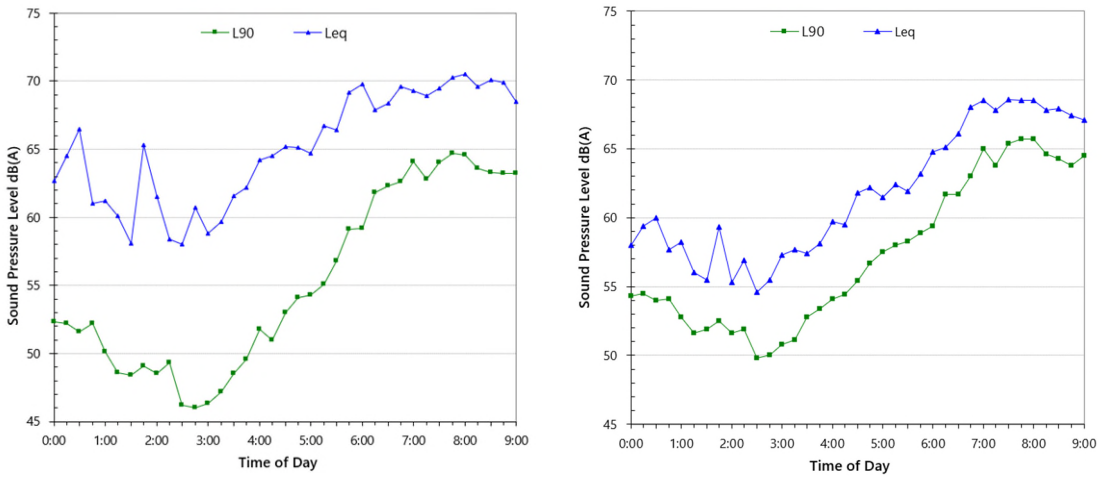
Fact Sheet B of the NPfI outlines the methods for determining the background noise level of an area. The NPfI also outlines methods for assessing 'shoulder periods' being shorter periods on either side of a standard period, where the standard period noise levels are not well represented. For example, a 'shoulder period' may be warranted for 5:00am-7:00am or 10:00pm-12:00am during which the night-time period background noise level is not well represented. Fact Sheet A, Section A3 of the NPfI outlines suitable methods to determine the shoulder period background noise level.

Data from Thursday 30 March 2023 presented in Figure 5 as a representative example from the unattended noise monitoring for the early morning period at two residential monitoring locations. This clearly shows the background noise levels are steadily rising in the early morning hours (5:00am-7:00am) at nearby receivers. This pattern is seen in the other long term noise monitoring presented in APPENDIX B.

Because the nearby arterial roads (predominately Kent Road and Coward Street) dominate the ambient noise environment at nearby residential receivers, and these roads have steadily rising traffic noise levels during the early morning period from around 4:00am, it is appropriate to establish a morning shoulder period in accordance with NPfI Section A3.

Figure 5: Sample early morning background noise levels (Thursday 30 March 2023)

a) Unit 307, 260 Coward Street, Mascot **b) Unit 1307, 39 Kent Road, Mascot**



Accordingly, the time periods established for the assessment in accordance with the NPfI are as follows:

- **Day** is defined as 7:00am to 6:00pm, Monday to Saturday and 8:00am to 6:00pm Sundays & Public Holidays.
- **Evening** is defined as 6:00pm to 10:00pm, Monday to Sunday & Public Holidays.
- **Night** is defined as 10:00pm to 5:00am, Monday to Sunday & Public Holidays.
- **Morning shoulder** is defined as 5:00am to 7:00am, Monday to Saturday and 5:00am to 8:00am Sundays & Public Holidays.

3.1 Environmental noise monitoring

Noise measurements have been carried out at both the nearest and potentially most affected residential locations surrounding the site considering the current project design stage.

The monitoring was undertaken or sourced for receiver locations facing both west overlooking Kent Road and south overlooking Coward Street, and on the intersection of both these arterial roads, as they have direct line-of-sight to elements of the site.

These monitoring locations were adopted to determine the variation in background and ambient noise level at all potentially impacted nearby receivers.

Fact Sheet B of the NSW EPA NPfI outlines two methods for determining the background noise level of an area, being '*B1 – Determining background noise using long-term noise measurements*' and '*B2 – Determining background noise using short-term noise measurements*'. This assessment has used long-

term noise monitoring to determine background noise levels, supported by short-term noise measurements.

Unattended long-term noise monitoring was carried out for continuous periods during March/April 2023 to measure ambient and background noise levels. Long-term noise monitoring was conducted using the instrumentation presented in Table 3-1. Long-term noise monitoring was conducted in general accordance with Fact Sheet B of the NSW EPA NPfI.

The equipment used for noise measurements were NTi Audio Type XL2 precision sound level analysers which are a Class 1 instruments having accuracy suitable for field and laboratory use. All instrumentation complies with IEC 61672 (parts 1-3) '*Electroacoustics - Sound Level Meters*' and IEC 60942 '*Electroacoustics - Sound calibrators*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

The equipment calibration was field checked prior and subsequent to the measurement period using a Bruel & Kjaer Type 4231 calibrator, with no significant calibration drift observed.

Table 3-1: Unattended noise monitoring equipment

Reference location	Address	Location	Logger reference	Monitoring period
L1	39 Kent Road, Mascot	Level 13, south-west corner	RTA06-010	28/3/2023 - 10/4/2023
L2	260 Coward Street, Mascot	Level 3, south side	RTA06-009	28/3/2023 - 5/4/2023

Noise monitoring locations were undertaken in the free field or at 1 metre from the nearest facade, and representative of the ambient noise environment for the associated residential receivers. The locations of the unattended long-term noise monitoring are presented in Figure 6.

Noise measurements affected by extraneous noise, wind (greater than 5m/s) or rain were excluded from the recorded data in accordance with the NPfI. Determination of extraneous meteorological conditions was based on data provided by the nearest Bureau of Meteorology (BOM) station, which was the Sydney Airport automatic weather station (Station 066037) approximately 2.5 km from the site. The long-term noise monitoring data was reviewed and all extraneous noise events (eg nearby local noise events and extraneous meteorological conditions) that were identified as not a usual feature of the area, were excluded as shown by the 'greyed' out areas of the graphs presented in APPENDIX B of this report.

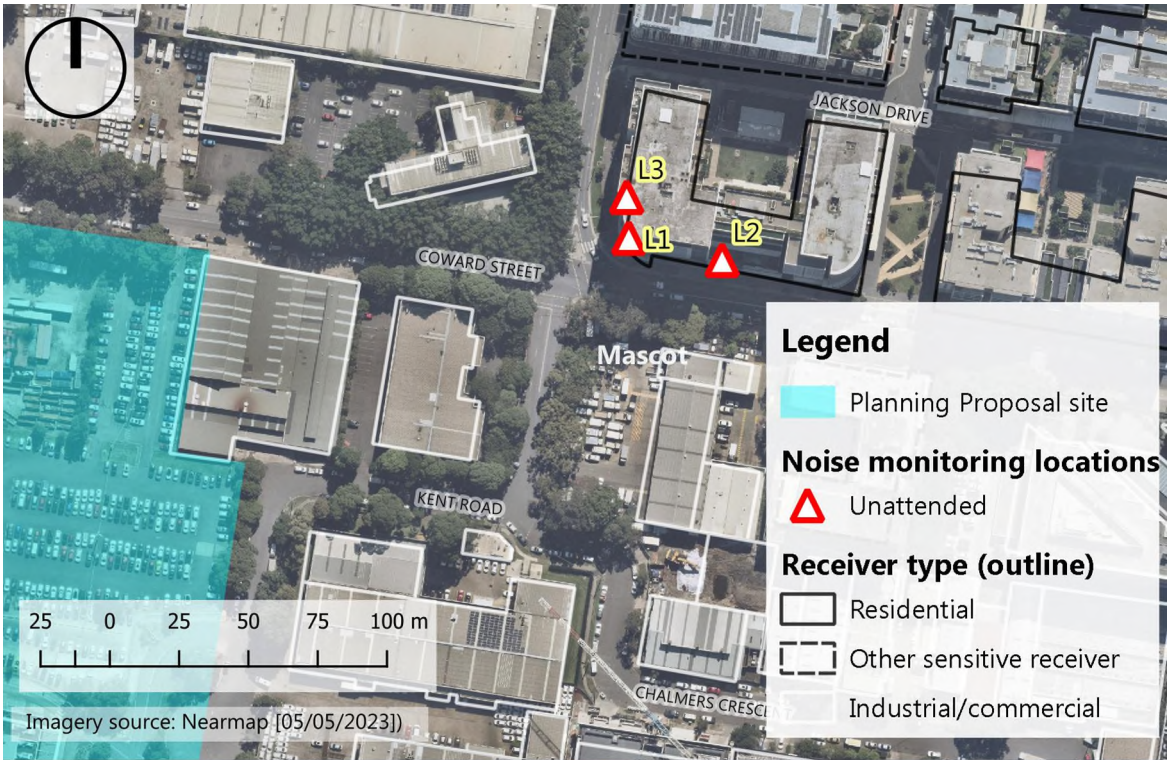
A summary of the unattended noise monitoring results along with a graphical recorded output from the long-term noise monitoring is included in APPENDIX B. The graphs in APPENDIX B were analysed to determine an assessment background level (ABL) for each day, evening and night period in each 24-hour period of noise monitoring. Based on the median of individual ABLs an overall single Rating Background Level (RBL) for the day, evening and night period is determined over the entire monitoring period in accordance with the NPfI. The RBL values for the morning shoulder period (5:00am to 7:00am) were established in accordance with Fact Sheet A, Section A3 of the NPfI.

The unattended noise monitoring locations and observed noise environment are summarised in the Table 3-2 below.

Table 3-2: Unattended noise monitoring locations

Reference location	Address and location description	Observed noise environment
L1	39 Kent Road, Mascot (Level 13, apartment 1307, south-western façade) Noise logger was located on the balcony of apartment 1307 on Level 13 with line of sight to the Coward Street – Kent Road intersection. The microphone was located 2.1m above local ground level measuring on the balcony edge and 1m from the nearest façade.	Day: Controlled by constant road traffic on Kent Road and Coward Street (~ 65-70 dBA) when moving, (~ 61-63 dBA) when traffic lights stopped. Intermittent aircraft flyovers were observed (~74-80 dBA). Night: Controlled by road traffic on adjacent roads (Kent Road and Coward Street).
L2	206 Coward Street, Mascot (Level 3, apartment 307, south façade) Noise logger was located on the balcony planter of apartment 307 on Level 3. The logger had line of sight to Coward Street. The microphone was located approximately 2.4m above local ground level measuring on the balcony edge in the free field.	Day: Controlled by constant road traffic on Coward Street (~ 68-74 dBA) when moving, (~ 56-63 dBA) when traffic lights stopped. Intermittent aircraft flyovers were observed (~68-74 dBA). Some distant construction noise was occasionally audible such as power tool use to the south of the building (~ up to 56 dBA). Night: Controlled by road traffic on adjacent roads (Kent Road and Coward Street).

Figure 6: Noise monitoring locations



Additionally, noise monitoring at 39 Kent Road, Mascot, Level 5, on the western façade, during the period of 25 July 2019 to 11 August 2019, is used from the *Sydney Gateway Road Project Road Technical Advisory and Environmental Advisory Services Technical Working Paper 2 - Noise and Vibration* (SLR,

2019, reference 610.17858-R02 Version v1.3) (Sydney Gateway NVIA). This is identified as location L3 in Figure 6.

The monitored existing ambient and background noise levels measured are presented Table 3-3, relevant to the potentially impacted residential receiver locations.

Table 3-3: Measured existing background and ambient noise levels, dB(A)

Ref	Address	Location description	Rating background noise levels (RBL), $L_{A90,\ 15\ minute}$				Ambient noise levels[5], $L_{Aeq,\ 15\ minute}$			
			Day[1]	Eve[2]	Night[3]	Shoulder[4,6]	Day[1]	Eve[2]	Night[3]	Shoulder[4]
L1	39 Kent Street, Mascot	Level 13 balcony, south-west corner	59	57	52	56	65	63	60	62
L2	260 Coward Street, Mascot	Level 3 balcony	60	54	47	53	69	67	65	67
L3[7]	39 Kent Street, Mascot	Level 5	60	56	50	53[8]	71	68	67	64[8]

Notes:
1. Day: 7.00am to 6.00pm Monday to Saturday and 8.00am to 6.00pm Sundays & Public Holidays
2. Evening: 6.00pm to 10.00pm Monday to Sunday & Public Holidays
3. Night: 10.00pm to 5.00am Monday to Sunday & Public Holidays
4. Morning shoulder: 5.00am to 7.00am Monday to Saturday and 5.00am to 8.00am Sundays & Public Holidays
5. As required by the NPfI, the external ambient noise levels presented are free-field noise levels. [ie. no facade reflection]
6. Shoulder period RBL levels determined as per NPfI Fact Sheet A3
7. Sourced from *Sydney Gateway Road Project Road Technical Advisory and Environmental Advisory Services Technical Working Paper 2 - Noise and Vibration* (SLR, 2019, reference 610.17858-R02 Version v1.3) (*Sydney Gateway NVIA)*.
8. No shoulder periods were presented in the *Sydney Gateway NVIA, as such,* consistent with Fact Sheet A, Section A3 of the NPfI, which outlines suitable methods to determine the shoulder period background and ambient noise levels, and adopting a conservative approach, the 5:00am monitored values were adopted, with the background values based upon the lowest 10th percentile of the 5:00am monitored values consistent with the approach detailed in NPfI Fact Sheet A3.

3.2 Measured road traffic noise levels

At each of the noise monitoring locations, road traffic noise dominated the existing noise environment. The existing traffic noise levels were monitored, and the results are summarised in Table 3-4. Noise levels and described in accordance with the requirements of the *NSW Road Noise Policy* (RNP) (*Department of Climate Change and Water, 2011*).

As Coward Street and Kent Street are arterial or sub-arterial roads, the relevant descriptors for traffic noise are $L_{Aeq(15hr)}$ and $L_{Aeq(9hr)}$, which represent the existing day and night traffic noise levels, respectively.

Where the noise monitoring location was positioned in the free-field (ie. away from buildings), a +2.5 dB(A) correction was applied to the measured road traffic noise levels to represent an equivalent road traffic noise level at one metre from a building facade, in accordance with the requirements of the RNP. Alternatively, the noise monitor was located at one metre from the building façade.

Table 3-4: Measured road traffic noise levels

Ref	Address	Location description	Measured road traffic noise level, dB(A)	
			Day $L_{Aeq,15hour}$ (7:00am to 10:00pm)	Night $L_{Aeq,9hour}$ (10:00pm to 7:00am)
L1	39 Kent Road, Mascot	Level 13[2]	67	62
L2	260 Coward Street, Mascot	Level 3[1]	71	67

Notes:
1. Unattended monitoring was undertaken in the acoustic free-field. Noise levels presented are representative of road traffic noise level at one metre from a building facade, as per RNP.
2. Noise levels were measured at one metre from a building facade, as per RNP.

4 Acoustic objectives

4.1 Relevant policies, guidelines and standards

This acoustic assessment has been carried out to review acoustic matters relevant to the Planning Proposal with consideration of the relevant policies, guidelines and standards required by Bayside Council and the NSW EPA, with particular reference to aircraft noise and noise generation by likely activities associated with the Planning Proposal. The following policies and standards are identified to be relevant to the Planning Proposal, and have been considered in this acoustic assessment, and should be considered as part of future development applications.

Table 4-1: Policies, guidelines and standards relevant to future development applications

Acoustic aspect	Noise sources	Relevant policies, guidelines and/or standard	Applicability for future development applications
Operational noise emissions	Activities within the site boundary to nearby receivers	NSW *Noise Policy for Industry* (NPfI) (EPA 2017) Bayside Development Control Plan 2022 (See Section 4.2) (Bayside DCP)	The NPfI applies to noise emissions during the operational stage of a development. It covers all industrial type noise sources within the site boundary, such as building services equipment, onsite operations, such as onsite vehicle movements, loading docks activities and carparks. This assessment will also address the noise emissions requirements detailed in the Bayside DCP. An acoustic assessment at the development application stage should quantify existing ambient noise levels, establish appropriate acoustic criteria, assess likely levels of noise emission from the premises, and identify feasible and reasonable acoustic mitigation and management measures. Further discussed in Section 5.2.
	Additional road traffic on public roads	NSW *Road Noise Policy* (RNP) (DECCW 2011)	Noise from road traffic generated on the surrounding road network by the development and its potential impact to noise sensitive premises nearby to these roads would generally be assessed in accordance with the RNP. An acoustic assessment at the development application stage should quantify likely day and night traffic generated by the development, with consideration of the different vehicle types likely to operate through the facility and determine if this traffic on the likely routes would achieve the requirements of the RNP. Further discussed in Section 5.3.
Aircraft noise	Aircraft noise impacts on the site	Australian Standards AS2021:2015 – *Acoustics Noise Intrusion – Building Siting and Construction.* Bayside Development Control Plan 2022 (See Section 4.2)	Developments potentially impacted by aircraft noise should be assessed to determined that they are constructed such they achieve suitable internal aircraft noise levels. An acoustic assessment is to be undertaken during the detailed design phase of the development, with consideration of the final design of tenant fitout. Further addressed in Section 4.2.

Acoustic aspect	Noise sources	Relevant policies, guidelines and/or standard	Applicability for future development applications
Noise and vibration impact on the development	Road noise Rail noise and vibration	Bayside Development Control Plan 2022 (See Section 4.2) NSW Assessing Vibration – A Technical Guideline (AVTG) (DEC 2006)	There are no internal noise requirements for road or rail noise in commercial or industrial facilities in NSW. The exception is where a tenant proposed internal uses or spaces with particular noise sensitivity. Noise requirements of the NSW Department of Planning '*Development Near Rail Corridors and Busy Roads - Interim Guidelines, December 2008*' are not applicable to impacts on commercial/industrial sites. Where a future design or future tenant fitout proposes to include noise sensitive spaces (ie. private offices and meeting/conference rooms) on the southern building façade and exposed to high levels of road or rail noise, then suitable additional acoustic treatments should be considered for the use of these spaces. Although not mandatory, guidance as to suitable internal noise levels for these spaces for commercial buildings, for road and rail impacts can adopted from AS 2107, as per AS 3671. In regard to vibration, the NSW AVTG should be considered.
Construction noise and vibration		NSW Interim Construction Noise Guideline (ICNG) (DECC 2009) NSW Assessing Vibration – A Technical Guideline (AVTG) (DEC 2006)	Planning of construction works will need to consider and adopt feasible and reasonable management and mitigation methodologies to minimise the effects of noise and vibration on nearby sensitive receivers during the construction phase.

4.2 Bayside Development Control Plan 2022

As part of scoping advice provided by Bayside Council, it identified that the Planning Proposal must consider the Botany Bay DCP 2013. This document was superseded in April 2023.

The Bayside Development Control Plan (DCP) 2022 (Bayside DCP) was adopted by Council on 22 March 2023, and is effective as of 10 April 2023. Bayside DCP identifies a number of applicable requirements for noise for the site, including:

- Section 3.13 *"Development in areas subject to aircraft noise and affected by Sydney Airport's prescribed airspace"*
- Section 3.14 *"Noise, Wind, Vibration and Air Quality"*
- Section 6.4 *"Industrial Premises"*

Additionally, the site falls within the "*Mascot West Employment Lands"* (Bayside DCP Section 7.7), as shown in Figure 7. However, this section of the Bayside DCP does not outline any specific controls related to noise from an industrial/warehouse facilities in addition to those detailed in the sections above.

Figure 7: Bayside DCP 2022 - Mascot West Employment Lands Application Map

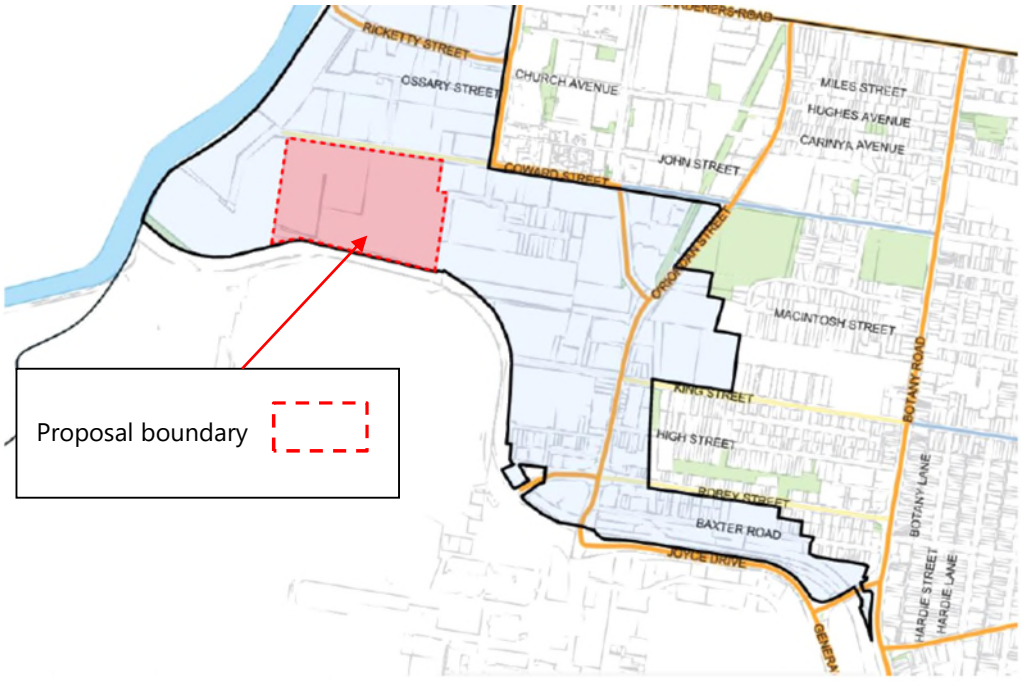


Figure 92: Mascot West Employment Lands Application Map

Controls identified in the Bayside DCP that are applicable to noise emissions from the future development of the site have been reviewed.

By assessing the potential noise impacts against the NSW EPA guidelines, as detailed in Section 4.1 as part of future applications, will generally also achieve the outcomes as required by the Bayside DCP for the proposed commercial or industrial development types.

Requirements regarding aircraft noise are addressed in Section 5.

5 Acoustic review

5.1 Aircraft noise

Future developments potentially impacted by aircraft noise should be assessed to determine if they can achieve the noise level requirements of *Australian Standards AS2021 – Acoustics Noise Intrusion – Building Siting and Construction*. Based on the Sydney Airport ANEF 2039 chart the site is located within the ANEF 25 to 30 contours.

Reference to the *National Airports Safeguarding Framework (NASF) Guideline A* has also been made as requested by Sydney Airport Corporation Limits (SACL) as part of the scoping proposal advice provided by Bayside Council.

5.1.1 Aircraft noise objectives

5.1.1.1 National Airports Safeguarding Framework (NASF) Guideline A

As requested by SACL as part of the scoping proposal advice provided by Bayside Council, identifies that the *National Airports Safeguarding Framework (NASF) Guideline A* should be considered as part of the Planning Proposal.

The *NASF Guideline A*, was prepared by the National Airports Safeguard Advisory Group (NASAG), to provide guidance to Commonwealth, State, Territory and Local Government decision makers to manage the impacts of noise around airports including assessing the suitability of developments. It provides guidance to planning officials for managing noise impacts when considering the following scenarios:

i. rezoning of greenfield areas for noise sensitive uses (i.e. areas that are predominantly rural or non-urban, including specifically identified urban boundary areas around airport sites);

ii. rezoning of brown-field areas for noise sensitive uses (i.e. areas that are predominantly urban where changes of land use from industrial, commercial or low-density residential are being considered); and

iii. assessment of new developments applications for noise sensitive uses within existing residential areas. [4, p. 3].

However, as the Planning Proposal does not fall into any of these three categories, further consideration to the requirements in the *NASF Guideline A* are not required for the Planning Proposal.

5.1.1.2 AS2021-2015 – aircraft noise intrusion

Aircraft noise intrusion from take-off, landing and circuit training operations at civil aerodromes or military airfields is assessed using Australian Standard AS2021-2015 – '*Acoustics – Aircraft Noise Intrusion – Building Siting and Construction*' ('AS2021'). This section of the report outlines the application of AS2021. The scope of AS2021-2015 is stated as:

> *This standard, together with the relevant Australian Noise Exposure Forecast (ANEF) chart provides guidelines for determining-*
>
> *a. whether the extent of aircraft noise intrusion makes building sites 'acceptable', 'unacceptable' or 'conditionally acceptable' for the types of activity to be, or being, undertaken (Clause 2.3);*
>
> *b. for 'conditionally acceptable' sites, the extent of noise reduction required to provide acceptable noise levels indoors for the types of activity to be, or being, undertaken; and*
>
> *c. the type of building construction necessary to provide a given noise reduction, provided that external windows and doors are closed.*

5.1.1.3 Building site acceptability

AS2021 contains advice on the acceptability of building sites based on Australian Noise Exposure Forecast (ANEF) zones. The ANEF chart provides a predicted cumulative exposure to aircraft flyover noise in communities near aerodromes. The chart presents zones represented by noise contours overlaid on a locality map specific to an airport. The ANEF system was developed as a land use planning tool aimed at controlling encroachment on airports by noise sensitive buildings. Table 2.1 of AS2021 sets acceptability zones for different building types and land uses. Table 5-1 reproduces the sections of AS2021 Table 2.1 relevant to the Planning Proposal and given it is situated between the 25 and 30 contour it is classified as conditionally acceptable. The preliminary concept proposal considers potential uses being commercial, including office premises, cafes or restaurants, or industrial uses within the site.

Table 5-1: Building site acceptability based on ANEF zones (Table 2.1 of AS2021)

Building type	ANEF zone of site		
	Acceptable	Conditional acceptable	Unacceptable
Commercial building	Less than ANEF 25	25 to 35 ANEF	Greater than 35 ANEF
Light industrial	Less than ANEF 30	30 to 40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

Section 2.3 of AS2021 details the actions resulting from the acceptability determination. Table 5-2 presents the outcomes as a result of the concept schemes being classified as acceptable or conditionally acceptable, based upon the various tenancies within the Concept Proposal.

Table 5-2: Description of building site acceptability

Zone	Description
Acceptable	If from Table 2.1, the building site is classified as 'acceptable', there is usually no need for the building construction to provide protection specifically against aircraft noise. However, it should not be inferred that aircraft noise will be unnoticeable in areas outside the ANEF 20 contour. (See Notes 1, 2 and 3 of AS2021:2015 Table 2.1.)
Conditionally Acceptable	In Conditionally Acceptable zones the maximum aircraft noise levels for the relevant aircraft and the required noise reduction should be determined from the procedures of Clause 3.1 and 3.2 of AS2021-2015, and the aircraft noise attenuation to be expected from the proposed construction should be determined in accordance with Clause 3.3.

For the identified ANEF zones, Table 5-3 summarises the acceptability of proposed uses for the subject site.

Table 5-3: Acceptability of uses for site

Building type	Less than 20 ANEF	20-25 ANEF	25-30 ANEF	30-35 ANEF	35-40 ANEF	Greater than 40 ANEF
Commercial building	Acceptable	Acceptable	Conditionally Acceptable	Conditionally Acceptable	Unacceptable	Unacceptable
Light industrial	Acceptable	Acceptable	Acceptable	Conditionally Acceptable	Conditionally Acceptable	Unacceptable
Other industrial	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable

According to the ANEF map, the warehouse and distribution tenancies would be considered *Acceptable*, while the with commercial tenancies being considered *Conditionally Acceptable*.

5.1.1.4 Indoor design sound levels for determination of aircraft noise reduction

The indoor design sound level for the activity or building type under consideration is outlined in AS2021 Table 3.3. Table 5-4 reproduces the criteria relevant to the subject site, along with the applicable table notes.

Table 5-4: Indoor design sound levels for determination of aircraft noise reduction (Table 3.3 from AS2021)

Building type and activity	Indoor design sound level*, dB(A)
Commercial	
Private offices, conference rooms	55
Drafting, open offices	65
Typing, data processing	70
Shops, supermarkets, showrooms	75
Industrial	
Inspection, analysis, precision work	75
Light machinery, assembly, bench work (ie. typical warehouse spaces)	80

Notes * These indoor design sound levels are not intended to be used for measurement of adequacy of construction. For measurement of the adequacy of construction against aircraft noise intrusion see AS 2021:2015 Appendix D of the Standard.

1. The indoor design sound levels in Table 5-4 Column 2 are hypothesized values based on Australian experience. A design sound level is the maximum level (dB(A)) from an aircraft flyover which, when heard inside a building by the average listener, will be judged as not intrusive or annoying by that listener while carrying out the specified activity. Owing to the variability of subjective responses to aircraft noise, these figures will not provide sufficiently low interior noise levels for occupants who have a particular sensitivity to aircraft noise.
2. Some of these levels, because of the short duration of individual aircraft flyovers, exceed some other criteria published by Standards Australia for indoor background noise levels (see AS/NZS 2107).
3. The indoor design sound levels are intended for the sole purpose of designing adequate construction against aircraft noise intrusion and are not intended to be used for assessing the effects of noise. Land use planning authorities may have their own internal noise level requirements which may be used in place of the levels above.
4. The provisions of this Standard relating to different internal design sound levels for different indoor spaces could result in the use of different construction and materials in contiguous spaces, and require the construction of substantial barriers between habitable spaces, e.g. heavy self-closing internal doors, detracting from the amenity of the building. Therefore consideration should be given to a uniform perimeter insulation approach.

5.1.2 Aircraft noise assessment

5.1.2.1 Building acceptability

The site is located directly north of Sydney's Kingsford Smith Airport, approximately 100 metres, over Qantas Drive.

Based on the Sydney Airport ANEF 2039 chart the site is located within the ANEF 25 to 30 contours, as shown in Figure 8.

Based upon the location, the site is potentially affected by aircraft movements on the parallel north-south runway, namely landings to the south on runway 16L and departures take offs to the north from the 34L runway.

Figure 8: Site location and the Sydney Airport ANEF 2039

5.1.3 Maximum aircraft noise levels

Aircraft noise exposure levels were calculated for the site based on Australian Standard AS2021. Buildings are required to be designed to meet the relevant internal noise levels presented in Table 5-4. The Aircraft Noise Reduction (ANR) for the building type construction is determined using the maximum external aircraft noise level and the indoor design sound level.

To determine resultant aircraft noise levels the following factors were considered as specified in the Standard;

- The site's position relative to each runway, including take-off and landing distances and runway centre line offsets;
- Elevation of the site compared with the elevation of the runways; and,
- Type of aircraft and associated maximum noise level during take-off and landing.

Using these factors, the resultant maximum noise levels were determined for each aircraft type. This calculation is not based on ANEF contours but on the location of the site relative to the runways.

The operation of runway 16L for arrivals to Kingsford Smith Airport will most impact the site.

It should be noted that larger international jets including the Boeing 747-400 and Airbus A380 do not use runways 16L for arrivals and 34R for departures.

In accordance with clause 3.1.4 of the Standard, "*where there is evidence that the particular aircraft type and movement which produced that noise level do not constitute a typical operation, then the noise level can be ignored and the next lowest noise level selected*".

Aircraft noise movement statistics published with the ANEF 2039 have been used for this assessment.

In accordance with clause 3.1.4, the upper 5% of movements are assumed to "not constitute a typical operation" and were excluded.

As the site is approximately 400 metres east-west, and approximately 250 metres north-south, there is a potential range of aircraft noise levels that would be experienced across the site. The site is located under the landing path of landings to the south on runway 16L. As such, potential aircraft noise levels were determined for the minimum and maximum distances from the site boundary, with the highest aircraft noise levels from this process then identified for the assessment.

Table 5-5 below shows the maximum design noise level at the site.

Table 5-5: Maximum Noise Levels at Assessment Location as per AS2021

Aircraft Type	Mode of Operation	Maximum Noise Level dB(A)
Boeing 737-800	Arrival on Runway 16L	83

It should be noted that variations in flight paths and aircraft operational characteristics may generate external noise levels greater than calculated here.

Table 5-6 below shows the required ANR for areas in the concept schemes based on a Boeing 737-800 landing on Runway 16L, with a maximum noise level of 83 dB(A).

Table 5-6: Required aircraft noise reduction (ANR) for the Planning Proposal

Area	Required ANR
Commercial	
Private offices, conference rooms	28
Drafting, open offices	18
Typing, data processing	13
Shops, showrooms	8
Industrial	
Inspection, analysis, precision work	8
Light machinery, assembly, bench work (ie. typical warehouse spaces)	3

5.1.4 Aircraft noise assessment outcomes

Appendix G of AS2021:2015 provides one method for determining appropriate building materials and constructions to achieve a required ANR value. While Appendix G is intended to serve only as a guide to the types of construction, it has been used here to demonstrate the ability of proposed building types to satisfy the internal noise levels required of AS2021.

In general, where a specific ANR is required, buildings require external windows and doors to be kept closed, as when opened for ventilation purposes the aircraft noise reduction of the building envelope will be significantly reduced. Where it is necessary to close windows and doors to comply with this Standard, building ventilation should be designed in accordance with the Building Code of Australia on the assumption that windows and doors are not operable. Mechanical ventilation or air conditioning systems complying with AS 1668.2 should be installed.

The ANR is calculated by subtracting the indoor design level from the maximum aircraft noise level. The resulting value is an estimate of the ANR in dB(A) to be achieved by the building's envelope.

AS2021 also provides guidance on the type of construction necessary to achieve the required ANR. Various rooms in a building may require different indoor design levels and consequently different treatment.

For the concept schemes, in-principle treatment for building construction has been established in order to demonstrate the ability of the future development to be designed appropriately for the proposed uses. During future design stages, the building constructions are to be designed so as to achieve the internal aircraft noise levels identified.

For typical buildings, the weakest elements of the building construction in regard to noise intrusion are doors and windows (glazed). However, contributions from all building elements, including windows, doors, wall structures, and the roof/ceiling structure, are to be considered when designing to achieve the required ANR.

To achieve the required ANR for the identified spaces, typical commercial and industrial façade constructions will likely achieve these internal noise levels.

The exception is where a future design or tenant fitout proposes to include noise sensitive spaces (ie. private offices and meeting/conference rooms) on the building façade, or as part of the roof level tenancy. In these cases, further review is required to determine the appropriate building constructions to achieve the required internal noise levels, and additional acoustic treatments may need to be considered. These spaces should be designed to achieve the internal noise levels identified in AS2021:2015, which are also detailed in Table 5-4, considering the ANR values presented in Table 5-6. For these noise sensitive spaces, this level of noise reduction can be readily achieved through typical upgraded constructions for commercial buildings.

A detailed acoustic assessment is to be undertaken during the detailed design phase of the development to determine the required building constructions for the proposed design.

Before committing to any form of construction or committing to any contractor, advice should be sought from an acoustic consultant to certify that the forms of construction selected comply with the criteria nominated in this report and adequate provisions are made for any variations which may occur as a result of changes to the recommended forms of construction.

As previously noted, the calculated ANR and acoustic ratings are considered to be based on a worst-case scenario with the highest aircraft noise level on the site. It therefore demonstrates that buildings can be designed to meet the internal maximum noise level requirements of AS2021:2015.

5.2 Operational noise emissions

5.2.1 Operational noise objectives

This assessment aims to quantify the potential operational noise emissions from the future development of the site in accordance with the NPfI. The assessment procedure has two components:

- Controlling intrusive noise impacts in the short-term for residences; and
- Maintaining noise level amenity for residences and other land uses.

In accordance with the NPfI, noise impact should be assessed against the project noise trigger level which is the lower value of the project intrusiveness noise levels and project amenity noise levels.

5.2.1.1 Intrusive noise levels

According to the NPfI, the intrusiveness of a noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the $L_{Aeq,15min}$ descriptor) does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). The project intrusiveness noise level, which is only applicable to residential receivers, is determined as follows:

$L_{Aeq,15minute}$ Intrusiveness noise level = Rating Background Level ('RBL') plus 5 dB(A)

For the purposes of assessing operational noise impacts, rating background noise levels representative of the nearby affected residential receivers were described and presented in Section 3.1. The intrusiveness noise levels for residential receivers are reproduced in Table 5-7 below.

Table 5-7: Intrusiveness noise levels

Monitoring location	Logger	Intrusiveness noise level, $L_{Aeq,15min}$			
		Day	Evening	Night	Shoulder period (morning)[4]
39 Kent Rd (Unit 1307, Level 13, south-west facing)	L1	59 + 5 = 64	57 + 5 = 62	52 + 5 = 57	56 + 5 = 61
260 Coward Street (Unit 307, Level 3, south facing)	L2	60 + 5 = 65	54 + 5 = 59	47 + 5 = 52	53 + 5 = 58
39 Kent Rd (Level 5, west facing)	L3[5]	60 + 5 = 65	56 + 5 = 61	50 + 5 = 55	53[5] + 5 = 58

Notes:
1. Day: 7:00am to 6:00pm Monday to Saturday and 8:00am to 6:00pm Sundays & Public Holidays
2. Evening: 6:00pm to 10:00pm Monday to Sunday & Public Holidays
3. Night: 10:00pm to 5:00am Monday to Sunday & Public Holidays
4. Shoulder period 5:00am to 7:00am Monday to Saturday and 5:00am to 8:00am Sundays & Public Holidays
5. See Section 3.1.

5.2.1.2 Amenity noise levels

The project amenity noise levels for different time periods of day are determined in accordance with Section 2.4 of the NPfI. The NPfI recommends amenity noise levels ($L_{Aeq,period}$) for various receivers including residential, commercial, industrial receivers and sensitive receivers such as schools, hotels, hospitals, churches and parks. These "recommended amenity noise levels" represent the objective for total industrial noise experienced at a receiver location. However, when assessing a single industrial development and its impact on an area then "project amenity noise levels" apply. The recommended amenity noise levels applicable for the subject receiver areas are reproduced from the NPfI Table 2.2 in Table 5-8 below.

Table 5-8: Recommended amenity noise levels

Type of receiver	Noise amenity area	Time of day	Recommended amenity noise level, L_{Aeq}, dB(A)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom (internal)	All	Noisiest 1-hour period when in use	35[5]
Hospital ward	All		
- Internal		Noisiest 1-hour	35
- External		Noisiest 1-hour	50
Place of worship (internal)	All	When in use	40
Passive recreation (e.g. national park)	All	When in use	50
Active recreation (e.g. school playground, golf	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	When in use	Add 5 dB(A) to recommended noise amenity area

Notes:
1. Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am.
2. On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.
3. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.
4. The recommended amenity noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated
5. In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable LAeq noise level may be increased to 40 dB LAeq(1hr)

5.2.1.2.1 Residential amenity category

Table 2.3 "*Determining which of the residential receiver categories applies*" of the NPfI provides guidance on assigning residential receiver noise categories. Guidance from NSW EPA in the journal *Acoustics Australia (Volume 50, No. 3, September 2022)* (EPA updated amenity guidance) provided clarification on how to use the table to determine the noise amenity category for residential receivers.

The methodology outlines that the land use zoning should be used to determine the residential receiver amenity categories, and only after this can it be varied where there is strong justification.

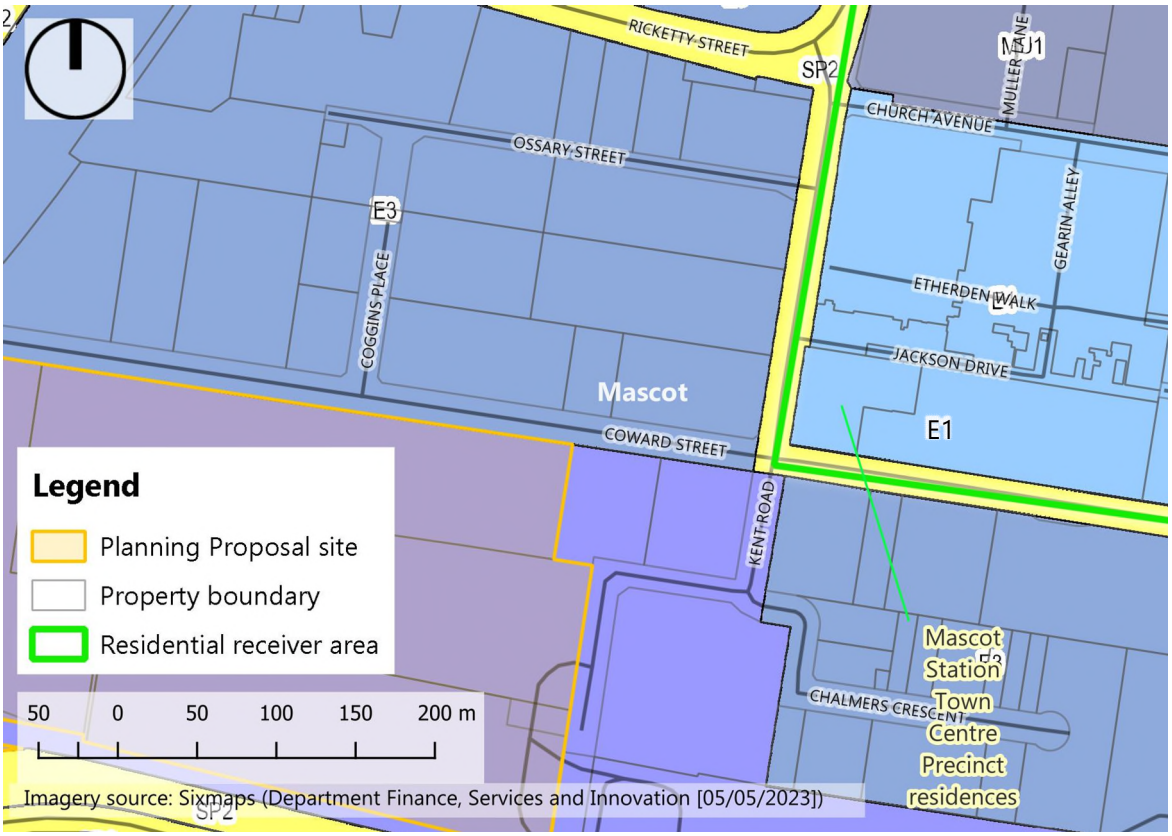
Following the above approach, the land use zoning for nearby residential receivers, is shown in Figure 9, and the applicable residential receiver category that aligns with the typical land use zoning (column 2 of NPfI Table 2.3) is presented in Table 5-14. All zoning names and categories are based upon the superseded names as presented in the NPfI. The updated zoning categories are included in the table notes.

Table 5-9: Review of residential receiver amenity category

NCA	Receiver zoning	Zoning residential receiver category[2]	Amenity noise levels		
			Day	Eve	Night
NCA1, NCA2 and NCA3	*E1 (previously B2*[1])	Urban	60	50	45

Notes:
1. E1 Local Centre (previously B2 – Local Centre)
2. Column 2 of NPfI Table 2.3

Figure 9: Zoning surrounding the site



5.2.1.2.2 Project amenity noise levels

To ensure that the total industrial noise level (existing plus new) remains within the recommended amenity noise levels for an area, the project amenity noise level should apply for each new industrial noise source is determined as follows:

$L_{Aeq,period}$ Project amenity noise level = $L_{Aeq,period}$ Recommended amenity noise level – 5 dB(A)

Furthermore, given that the intrusiveness noise level is based on a 15 minute assessment period and the project amenity noise level is based on day, evening and night assessment periods, the NPfI provides the following guidance on adjusting the $L_{Aeq,period}$ level to a representative $L_{Aeq,15minute}$ level in order to standardise the time periods.

$L_{Aeq,15minute}$ = $L_{Aeq,period}$ + 3dB(A)

The project amenity noise levels ($L_{Aeq,\ 15min}$) applied for future development of the site are reproduced in Table 5-10.

Table 5-10: Project amenity noise levels

Type of receiver	Noise amenity area	Time of day	Recommended noise level, dB(A)	
			$L_{Aeq,\ Period}$	$L_{Aeq,\ 15min}$
Residence	Urban	Day	60 – 5 = 55	55 + 3 = **58**
		Evening	50 – 5 = 45	45 + 3 = **48**
		Night[1]	45 – 5 = 40	40 + 3 = **43**
		Morning shoulder[4]	60 – 5 = 55	55 + 3 = **58**
Hotel	Urban	Day	65 – 5 = 60	60 + 3 = **63**
		Evening	55 – 5 = 50	50 + 3 = **53**
		Night[1]	50 – 5 = 45	45 + 3 = **48**
		Morning shoulder[4]	65 – 5 = 60	60 + 3 = **63**
School classroom (external)[3,5] (adopted for childcare)	All	Noisiest 1-hour period when in use	60[5] – 5 = 55	55[5] + 3 = **58**
Active recreation area (school playground)[6] (adopted for childcare play area)	All	When in use	55 – 5 = 50	50 + 3 = **53**
Commercial Premises	All	When in use	65 – 5 = 60	60 + 3 = **63**
Industrial premises	All	When in use	70 – 5 = 65	65 + 3 = **68**

Notes:
1. Daytime 7:00am to 6:00pm; Evening 6:00pm to 10:00pm; Night-time 10:00pm to 5:00am, and Morning-shoulder 5:00am - 7:00am. On Sundays and Public Holidays, Daytime 8:00am - 6:00pm; Evening 6:00pm - 10:00 pm; Night-time 10:00pm - 5:00am, Morning-shoulder 5:00am - 7:00am.
2. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.
3. In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable LAeq noise level may be increased to 40 dB LAeq(1hr)
4. Based upon recently guidance from NSW EPA in the journal Acoustics Australia (Volume 50, No. 3, September 2022) it details that the NSW EPA expects that where a morning shoulder period has been justified that the corresponding day-time period amenity level would be applicable.
5. Conversion of trigger levels from internal to external for Story House Early Learning Mascot assumes 20 dB(A) loss from outside to inside through closed façade, as the building is mechanically ventilated as noise monitoring directly opposite on Coward Street shows existing high noise levels.
6. Adopted for the childcare outdoor play area.

5.2.1.2.3 Amenity noise levels in areas of high traffic noise

Where the levels of transport noise, in particular road traffic noise are high enough to make noise from an industrial source effectively inaudible, even though the L_{Aeq} noise level from that industrial noise source may exceed the project amenity noise level, the NPfI sets out criteria to take this into account.

In such cases NPfI Section 2.4.1 details that the project amenity noise level may be derived from the $L_{Aeq,\ period(traffic)}$ minus 15 dB(A). It is noted that in a similar manner to the derivation of the project amenity noise level, the minus 15 dB(A) includes a 5 dB(A) reduction to take into account cumulative other industrial noise contributions, to ensure that the total industrial noise level (existing plus new) remains within the recommended amenity noise levels for an area.

This high traffic project amenity noise level may be applied only if all the following apply:

- traffic noise is identified as the dominant noise source at the site
- the existing traffic noise level (determined using the procedure outlined in A2, Fact Sheet A, that is, measuring traffic instead of industrial noise) is 10 dB or more above the recommended amenity noise level for the area
- it is highly unlikely traffic noise levels will decrease in the future.

The applicability of these traffic noise provisions needs to be determined for each assessment period (that is, day, evening and night).

Due to the dominance of Coward Street/Kent Street to the ambient noise levels at the nearby residential receivers, as presented in Section 3.1, amenity noise levels in areas of high traffic noise are applicable for a number of receiver locations during different assessment periods for this NVIA. With considering the nearby road upgrade projects currently under construction, such as the Sydney Gateway major infrastructure project, it is highly unlikely that traffic noise will reduce on these arterial roads over time.

Furthermore, given that the intrusiveness noise level is based on a 15 minute assessment period and the project amenity noise level is based on day, evening and night assessment periods, the NPfI provides the following guidance on adjusting the $L_{Aeq,period}$ level to a representative $L_{Aeq,15minute}$ level in order to standardise the time periods.

$$\mathbf{L_{Aeq,15minute} = L_{Aeq,period} + 3dB(A)}$$

Therefore, Table 5-11 reviews and determines where applicable, that the high traffic noise provisions in the Noise Policy for Industry, Section 2.4.1 should be adopted to derive the project amenity trigger levels.

Table 5-11: High traffic project amenity noise level

NCA	Existing traffic noise levels[1], $L_{Aeq, 15\ minute}$				Existing traffic noise levels 10 dB(A) or more above ANL?				High traffic project amenity noise level[2], $L_{Aeq, 15\ minute}$			
	Day	Eve	Night	Shoulder	Day	Eve	Night	Shoulder	Day	Eve	Night	Shoulder
NCA1	65	63	60	62	No	Yes	Yes	No	-[3]	51	48	-[3]
NCA2	69	67	65	67	No	Yes	Yes	No	-[3]	55	53	-[3]
NCA3	71	68	67	64[4]	Yes	Yes	Yes	No	59	56	55	-[3]

Notes:
1. Noise levels measured as per NPfI Section 2.4.1, which noted that the traffic noise levels are to be determined using the procedure outlined in A2, Fact Sheet A, that is, measuring traffic instead of industrial noise. These are free-field L_{Aeq} noise levels.
2. High traffic project amenity noise level is existing traffic levels minus 15 dB(A) plus 3 dB(A) to convert from a period level to a 15-minute level.
3. High traffic project amenity noise level does not apply
4. See Section 3.1.

5.2.1.3 Project noise trigger levels

The project noise trigger levels have been converted to $L_{Aeq\ 15min}$ values and are presented in Table 5-12. The project intrusive noise levels are also presented as per Section 5.2.1.1.

Table 5-12: Project noise trigger levels for residential receivers

Receiver location	$L_{Aeq, 15min}$ Project noise trigger levels, dB(A)							
	Day		Evening		Night		Morning shoulder	
	Intrusive	Amenity	Intrusive	Amenity	Intrusive	Amenity	Intrusive	Amenity
NCA1	64	**58**	62	**51**	57	**48**	61	**58**
NCA2	65	**58**	59	**55**	**52**	53	58	**58**
NCA3	65	**59**	61	**56**	**55**	55	58	**58**

Notes: 1. **Bold** font indicates the controlling project noise trigger level (the more stringent of the two trigger levels).

In accordance with the NPfI the project noise trigger levels (PNTL) for the site, are presented in Table 5-13.

Table 5-13: Summary of project noise trigger levels

Receiver location	$L_{Aeq, 15min}$ Project noise trigger levels, dB(A)			
	Day	Evening	Night	Morning shoulder
Residential receivers[3]				
NCA1	58	51	48	58
NCA2	58	55	52	58
NCA3	59	56	55	58
Other sensitive receivers[2,4]				
Childcare	53	n/a[3]	n/a[3]	53
Hotel	63	53	48	63
Commercial	63	63[2]	63[2]	63[2]
Industrial	68	68[2]	68[2]	68[2]

Notes:
1. Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 5.00 am, Morning-shoulder 5.00 am - 7.00 am. On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 5.00 am, Morning-shoulder 5.00 am - 7.00 am.
2. Project noise trigger level is only applicable when the receiver type is in use.
3. For a residence, the project noise trigger level and maximum noise levels are to be assessed at the reasonably most-affected point on or within the residential property boundary.
4. For commercial or industrial premises, the noise level is to be assessed at the reasonably most-affected point on or within the property boundary.

5.2.1.4 Cumulative industrial noise

The management of cumulative operational noise is required by the NPfI. By addressing cumulative noise impacts consistent with the NPfI, this will also sufficiently address cumulative impacts in accordance with the DPE guideline "*Cumulative Impact Assessment Guidelines for State Significant Projects*" (DPE, 2021) as detailed in Section 3.5 of that document.

As stated in Section 2.1 of the NPfI "*The project intrusiveness noise level aims to protect against significant changes in noise levels, whilst the project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses.*".

The NPfI amenity noise criteria derived herein aims to control the total industrial noise level (existing plus new) with the aim for it to remain within the recommended amenity noise levels for the area. As such, the potential cumulative noise impacts as a result of the future development have been considered in the assessment through the derivation of criteria in accordance with the NPfI, and assessment against these levels.

As any future development application is likely to contain multiple warehouse tenancies that would be undertaking operations separately from each other (as illustrated in the concept designs), there is potential cumulative noise from all operating tenancies which should be considered. Considering this, potential management approaches to achieve the project noise trigger levels should be incorporated into future management of the site and consideration of future tenants, with consideration of the elements detailed in NPfI Section 2.8 Noise management precinct. As there are many different ways to

manage these potential cumulative noise emissions, this should be considered as part of the Operational Noise Management Plan developed for any future development application.

5.2.1.5 Sleep disturbance noise levels

The potential for sleep disturbance due to maximum noise level events from the site during the night-time period needs to be considered. In accordance with NPfI, a detailed maximum noise level event assessment should be undertaken where the subject development night-time noise levels at a residential location exceed the following noise trigger levels:

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

The sleep disturbance noise trigger levels for the site are presented in Table 5-14.

Table 5-14: EPA NPfI Sleep disturbance assessment trigger levels

Receiver location	Night (10:00pm to 5:00am)		Morning shoulder period (5:00am to 7:00am)	
	Assessment level $L_{Aeq,15min}$	Assessment level L_{AFmax}	Assessment level $L_{Aeq,15min}$	Assessment level L_{AFmax}
NCA1	52 + 5 = 57	52 + 15 = 67	56 + 5 = 61	56 + 15 = 71
NCA2	47 + 5 = 52	47 + 15 = 62	53 + 5 = 58	53 + 15 = 68
NCA3	50 + 5 = 55	50 + 15 = 65	53 + 5 = 58	53 + 15 = 68

Notes:
1. As per NPfI Section 2.5, minimum screening level is the greater of L_{Aeq} 40 dB(A) of RBL + 5dB.
2. As per NPfI Section 2.5, minimum screening level is the greater of L_{AFmax} 52 dB(A) of RBL + 15dB.

The detailed assessment should consider all feasible and reasonable noise mitigation and management measures with a goal of achieving the sleep disturbance noise trigger levels. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW *Road Noise Policy* (RNP) (see Section 5.2.1.5.1).

Other factors that may be important in assessing the extent of impacts on sleep include:

- how often high noise events will occur
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development
- whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)
- current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night (see Section 5.2.1.5.1).

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response.

As per the NPfI, only residential receivers where a person/s permanently reside have been assessed for maximum noise events. The NPfI notes that premises where a person resides but which is associated with a commercial undertaking is not classified as a residential receiver, this includes developments such as caretakers' quarters, hotels, motels, transient holiday accommodation and caravan parks.

5.2.1.5.1 Current reference literature on sleep disturbance

NSW RNP

In relation to maximum noise level events, the NSW RNP identifies in its summary on sleep disturbance research to date that:

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

The above references identify that internal noise levels of 50 to 55 dB(A), are unlikely to cause awakenings. On the assumption that there is a 10 dB(A) outside-to-inside noise loss through an open window (see Section 2.6 of the NPfI, p15), this indicates that external noise levels of L_{Amax} 60 to 65 dB(A) are unlikely to cause awakening reactions. Given the equivalent external noise levels and considering the second point above, an L_{Amax} 65 dB(A) has then been used as the assessment noise level to determine the potential for awakening reactions.

World Health Organisation reports

As stated in the NPfI, other factors that may be important in assessing the extent of impacts on sleep, includes current scientific literature regarding the impact of maximum noise level events at night. The organisation that reports on the current scientific literature pertaining to night-time impacts on sleep is the World Health Organisation (WHO).

The latest guidelines produced by the WHO relating to night-time impacts on sleep, were produced in 2009 and 2018. These reports mainly focus on sleep disturbance from transportation noise sources, such as aircraft, road and rail, with the 2018 guideline also providing recommendations for wind turbine and leisure noise sources. As stated in the later report, it does not provide specific recommendations for industrial activity noise due to lack of information and data.

However, given that some of the future land uses of the Planning Proposal, may have a similar nature and character of noise to road traffic noise, guidance and limits relating to road traffic noise are referred to in this NVIA to assess potential sleep disturbance from site operations and activities.

Following the publication of community noise guidelines in 1999, the WHO released the *Night Noise Guidelines for Europe (WHO 2009)* in 2009, which uses $L_{night\ (outside)}$ as a primary measure of night-time noise. The $L_{night\ (outside)}$ is an A-weighted noise level at the most exposed facade outdoors over all night periods determined as a long-term average over a year, and is roughly equivalent to the external $L_{Aeq,9hour}$ night-time descriptor.

The report recommends a long-term $L_{night\ (outside)}$ noise guideline level of 40 dB(A), with an interim $L_{night\ (outside)}$ target level of 55 dB(A). The interim target is only intended as an intermediate step in localised situations as health impacts, particularly on vulnerable groups, are apparent at this noise level. The report notes:

1. For $L_{Aeq(9hour)}$ (external) levels above 55 dB(A), adverse health effects occur frequently, and a sizeable proportion of the population is highly annoyed and sleep disturbed.

2. For $L_{Aeq(9hour)}$ (external) levels between 40 dB(A) and 55 dB(A), adverse health effects are observed and vulnerable groups are more severely affected.

The WHO released the latest research into sleep in 2018 as the *Environmental Noise Guidelines for the European Region: A systematic Review on Environmental Noise and Effects on Sleep* (WHO 2018). The WHO 2018 guideline does not recommend criteria in terms of single-event noise indicators or maximum sound pressure levels (eg L_{Amax}), because the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The WHO guideline therefore makes no recommendations for single-event noise indicators. Thus, the WHO guideline is restricted to long-term health effects during night time and therefore only includes recommendations about average noise indicators, e.g. $L_{night\ (outside)}$.

enHealth

The enHealth Council (2004) report "*The health effects of environmental noise – other than hearing loss*", which is also quoted in the RNP, includes the following statement from the enHealth Council (2004) report, which is the summary of the research findings and states:

> *'as a rule for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A) LA, (Max) more than 10 or 15 times per night'.*

This internal noise level of 45 dB(A) L_{Amax} would be equivalent to 55 dB(A) L_{Amax} external, if the receivers have their windows open. If the windows are closed however, the noise reduction will be greater than the assumed 10 dB(A) outside to inside. As per Section 2.3 of the Australian Department of Health enHealth Council (2018) report "*The health effects of environmental noise*" which reviews updates and revises the referenced 2004 enHealth Australia report on the non–auditory effects of environmental noise, notes that "*Single and double window glazing can reduce noise by up to 30 and 35 dB(A) when closed.*"

Typically, noise reductions greater than 20 – 25 dB(A) are achievable where facades are substantial, and consist of standard to thick glazing and heavy facade construction (eg brick construction).

5.2.1.5.2 Sleep disturbance assessment noise levels

In accordance with the NPfI and current scientific literature, the sleep disturbance project assessment noise levels, are presented in Table 5-15 below.

Table 5-15: Sleep disturbance project assessment noise levels[5]

Receiver location	Sleep disturbance project assessment noise levels, dB(A)				
	EPA NPfI sleep disturbance assessment levels, L_{Amax}		Awakening reaction[3], L_{Amax}	EPA NPfI sleep disturbance assessment levels, $L_{Aeq,15min}$	
	Night[1]	Morning shoulder period[1]		Night[1]	Morning shoulder period[1]
NCA1	67	71	65	57	61
NCA2	62	68	65	52	58
NCA3	65	68	65	55	58

Notes:
1. Night-time 10:00pm to 5:00am. The morning shoulder period is 5:00am to 7:00am.
2. As per the NSW RNP, as detailed in Section 5.2.1.5.1.

By achieving the PNTLs for the concept designs presented earlier in this report, the sleep disturbance $L_{Aeq,15min}$ assessment levels presented in the table above will automatically be met, as the PNTLs are equivalent or more stringent. Therefore, no further assessment of sleep disturbance $L_{Aeq,15min}$ levels is necessary.

5.2.2 Operational noise emissions from future development of the site

5.2.2.1 Overview of likely noise generating activities

The noise sources associated with the operation of future development of the site are expected to be those of typical warehousing and distribution activities with 24/7 operations. There will also be minor contributions from the commercial tenancies, and cafes or restaurants. Based upon RTA's experience with similar warehouse and distribution facilities and commercial facilities, the noise sources associated with the operation of the future development of the site are likely to include the follow:

- truck movements within the warehouse facility, including along internal access roads, and movements up and down ramps
- loading dock receiving and dispatching activities associated with the warehouses, which could potentially include temperature-controlled warehouse/distribution activities
- internal warehouse activities, which can breakout via roller doors and façade elements
- passenger vehicle movements and car parking
- office related activities (fixed mechanical plant)

5.2.2.2 Consideration of noise emissions

As detailed in Section 2, the closest residential receivers to the site is located at 39 Kent Road, Mascot, approximately 160 metres from the site boundary.

Based upon the preliminary concept Proposal, the distance to the nearest residential receivers, and the noise objectives detailed in Section 5.2.1, it is expected that noise mitigation and management measures will likely be required to be incorporated into the design of any future development applications, this will especially be the case where future tenant activities are required to take place during the night period.

Noise emissions should be assessed during any future development application, in accordance with the guidelines and policies detailed in Section 4.

5.2.2.3 Noise control measures to be considered during development applications

As the preliminary concept proposal provides general details of potential future development of the site, and specific design details are not known, including the likely noise generation from tenancies, it is not possible to evaluate in detail the specific noise generating activities within the development, and then the associated feasible and reasonable mitigation measures.

The following mitigation and management measures have been included for the purpose of providing the indicative and strategic measures to assist with future development applications and proposed designs for commercial and warehouse developments. They provide in-principal solutions only, to minimise noise emission from the site for the purpose of the consent authority approvals process. Services of an appropriately qualified acoustic consultant should be sought for any development application or equivalent process for future noise generating tenants associated with the future development of the site once the Planning Proposal has been approved.

As part of these assessments, where the project noise trigger levels are exceeded, feasible and reasonable noise mitigation measures should be evaluated, with the aim of reducing noise to the project noise trigger levels detailed in Section 5.2.1.

The typical hierarchy of noise control strategies, through either mitigation or management are as follows:

- Reducing noise emissions at the source (ie. noise source control)
- Reducing noise in transmission to the receiver (ie. noise path control)
- Reducing noise at the receiver (ie. at-receiver control)

When determining whether noise mitigation is 'feasible and reasonable', the starting point is identifying mitigation measures that would result in achieving the relevant project noise trigger levels, and then identifying if the measures may be feasible and reasonable.

The following sections detail the noise control strategies that should be considered as part of future design development stages and when tenants and noise generating activities become known. These are to achieve the noise goals detailed in Section 5.2.1.

5.2.2.4 Noise mitigation and management measures

The following are potential strategies for mitigating and managing noise emissions at sources and in the noise transmission path, and may include the combination of several measures:

Table 5-16: Recommended operational noise control strategies for future development applications

Item	Details
Site layout and design adjustments	Noise generating activities during the night period are undertaken in locations shielded from nearby residences. Designs locate key noise generating areas (ie. hardstand, ramps, internal truck routes), so that noise generating operations/activities in these areas/locations are shielded from nearby residences.
Shielding or enclosing of key areas of noise generation	Where the location of key noise generating areas cannot be adjusted, then shielding or enclosing key areas of noise generation should be considered, especially where they have line-of-sight to the nearby residence, and/or are proposed to occur during the sensitive night-time period. Noise controls in the transmission path typically take the form of noise barriers. Barriers are more effective if they are near the source or the receiver. Their effectiveness is also determined by their height, the materials used (absorptive or reflective), and their density. Where noise reductions from feasible barriers do not sufficiently reduce noise emissions, enclosing of noise generating spaces should be considered. For any enclosed area, noise breakout via openings (ie. driveways or ventilation openings) or penetrations (ie. louvres) need to be considered and mitigated where required. This would likely include the eastern loading dock areas, and heavy vehicle ramps on the eastern and northern sides of the preliminary concept proposal.
Strategic tenant allocation	Strategic tenant allocation or tenant management approaches such as recommending or creating incentives, for potential warehouse tenancy operators that have lower noise emitting uses or only daytime operations, to occupy warehouse tenancies located closest to the residential receivers (ie. on the eastern side of the concept design warehouse buildings) or with line-of-sight to residences should be considered. This approach can assist with determining a pragmatic design, balancing noise mitigation measures required to be incorporated into the built structure with the requirements of other engineering discipline requirements. This approach provides for future louder operators a noise buffer, by providing acoustic shielding from the warehouse-built structure to nearby residences. These noise intensive operators, or 24/7 noise generating operations, should be incentivised to occupy warehouse tenancies shielded from or located further away from residences (ie. locate these tenant on western side of the concept design warehouse buildings).
Reduce concurrent noise intensive activities	Reducing peak 15 minute heavy vehicles movements across the site by staggering delivery times.
	Where practicable, do not locate tenants in adjacent warehouse lots, if they have similar noise intensive periods that will impact a shared receiver concurrently.
Mechanical plant and equipment locations	Locating fixed mechanical plant away from the most-affected sensitive receivers, such as ground-level locations away from receivers instead of rooftop locations, and/or shielded from receiver locations behind the warehouse/office structures.
Selection of quiet plant and equipment	The use of quieter mobile plant, such as electric forklifts instead of gas-powered forklifts. The use of quieter fixed mechanical plant and equipment options. When selecting plant and equipment items for the warehouses, noise emission levels should be a factor considered in purchasing/hiring.

Item	Details
Mechanical plant and equipment noise review	Undertake an acoustic assessment of building services, mechanical plant and plantroom spaces to ensure that noise emissions from mechanical plant and equipment are controlled by appropriate mechanical system design and implementation of common engineering methods, minimising noise emissions and ensure that the cumulative noise of all equipment does not exceed the applicable noise criteria cumulatively with all other noise generating activities. Where building services or mechanical plant are installed as part of a tenant fitout, it may need to achieve noise levels substantially below the criteria set in Section 5.2, or achieve an allocated noise quota, to ensure the overall Proposal can achieve the cumulative noise requirements. 5.2.1
Minimise high noise event sources at night	Ensure hardstand surfaces, roadways and vehicular access points are smooth as to not result in high noise events from truck operations. This would include: • Transitions from the external public road to the site are smooth, as to not result in jolting, or unnecessary accelerating of the truck the truck is required. • Drainage grates are designed to not result in noise events. • Ensure that trucks do not have to stop/brake and then accelerate (ie. pedestrian crossing points, security gates). Where practicable, design elements should also ensure that trucks do not have to stop/brake and then accelerate (ie. pedestrian crossing points) outside of dock areas with line of sight to nearby residential receivers, where they are required to operate during the night period.
Minimise annoying sources of noise	Any PA systems required as part of normal operations of tenancies that emit sound within the facility, are to be designed so that they would result in a negligible increase in overall noise emissions from the facility. PA announcements as part of normal operations would be restricted to within the enclosed areas of the facility during the night period.
	Alternate methods and practices to the use of horns as a safety warning for onsite moving forklifts should be reviewed and incorporated into site operations and safety practices. This would be especially the case where forklift operating in areas have direct line of sight to residences.
Warehouse design	Materials of the warehouse facility facade would be selected during detailed design, so that any noise break-out from internal activities would result in a negligible increase in overall noise emissions from the facility. This would include consideration of any openings or penetrations (ie. for air intake louvres).
Cumulative noise management	As the concept schemes contains multiple warehouse tenancies that would be undertaking operations separately from each other, there is potential cumulative noise from all operating tenancies which should be considered. Considering this, potential management approaches to achieve the project noise trigger levels set in Section 5.2 should be incorporated into future management of the site and consideration of future tenants, with consideration of the elements detailed in NPfI Section 2.8 Noise management precinct. As there are many different ways to manage these potential cumulative noise emissions, this should be considered as part of the Operational Noise Management Plan developed for the future development of the site. This should include mechanisms to review potential noise emissions from new tenants or changes of tenants. During the preparation for occupancy of a warehouse tenancy (ie. warehouse fit-out design stage) for any specific tenant (new of change of tenant), the potential noise emissions from the tenant's proposed operations are to be reviewed to confirm that the tenant can satisfy any noise emission requirements either as an individual tenant or cumulatively. This should also include mechanisms as part of the operational management of the future development of the site for coordination or awareness of operations between tenancies. This can assist with managing noise intensive periods from concurrent operations.

5.3 Road traffic noise

5.3.1 Road traffic noise objectives

Noise impacts from the potential increases in traffic on the surrounding road network due to operational activities from the future development of the site are to be assessed in accordance with the RNP.

The RNP sets out criteria to be applied to particular types of road and land uses. These noise criteria are to be applied when assessing noise impacts and determining mitigation measures for sensitive receivers that are potentially affected by road traffic noise associated with future construction and operation of the subject site, with the aim of preserving the amenity appropriate to the land use.

The future development at the site will be using sub-arterial / arterial roads and not local roads. Therefore, for existing residences affected by additional traffic on existing sub-arterial / arterial roads generated by land use developments, the following RNP road traffic noise criteria would apply.

Table 5-17: RNP Road Traffic Noise Criteria, dB(A)

Road Category	Type of Project/Land Use	Assessment Criteria, dB(A)	
		Day 7am – 10pm	Night 10pm – 7am
Freeway/arterial/sub-arterial roads	3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,(15\ hour)}$ 60 (external)	$L_{Aeq,(9\ hour)}$ 55 (external)

Further to the above, the RNP states the following for land use developments generating additional traffic:

> *"For existing residences and other sensitive land uses affected by* **additional traffic on existing roads generated by land use development***, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'."*

The RNP states that in assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

5.3.2 Road traffic noise review

As detailed in Section 5.3.1, the road traffic noise assessment needs to consider traffic movements over the entire day (7:00am to 10:00pm) and night (10:00pm to 7:00am) period in accordance with the RNP, which includes consideration of the likely breakdown in vehicle types, which will be more sensitive to specific development type and tenant specific factors.

As the likely future tenants are not known for the future development of the site, the likely day and night road traffic profile (ie. 24 hour traffic profile with vehicle breakdown) generated are not known as they driven by specific development type and tenant specific factors. As such, a specific assessment of

potential road traffic noise increases as a result of the site operations has not been undertaken as part of this report.

A preliminary traffic noise assessment has been undertaken, to determine approximate numbers of heavy vehicles that could operate through the facility in order to achieve the NSW RNP requirements of not increasing the existing road traffic noise levels at nearby noise sensitive receivers by more than 2 dB(A). The potential for increases in traffic on the surrounding road network should be assessed as part of any future development applications in accordance with the NSW RNP requirements.

Existing road traffic volumes on these roads have been sourced from traffic counts undertaken for nearby projects and are presented in Table 5-18. Kent Road already caters for a substantial number of heavy vehicle movements (approximately 20%), during both the daytime and night-time periods, which are likely either operating to and from the existing industrial developments in the vicinity of the site, or transiting through to the north to the WestConnex M8 tunnels to the north and Airport Drive to the south.

Table 5-18: Existing traffic volumes - Kent Road, Mascot

Road	Traffic monitoring location	Average hourly traffic from[3] 7:00am – 10:00pm (15 hour)				Average hourly traffic from[3] 10:00pm – 7:00am (9 hour)			
		Total Vehicles	Percentage Heavy Vehicles		Speed[2] (km/h)	Total Vehicles	Percentage Heavy Vehicles		Speed[2] (km/h)
			Medium	Heavy			Medium	Heavy	
Kent Road	Between Ossary Street and Jackson Drive	11,698	14	6	43	2,323	12	8	47

Notes:
1. Based upon an analysis of the count data for the period of Saturday 20 November 2021 to Saturday 27 November 2021.
2. Based on average vehicle speeds from traffic survey.
3. Based upon combined two-way traffic counts
4. Sourced from Renzo Tonin & Associates, Noise and Vibration Impact Assessment, Proposed Warehouse Development, 520 Gardeners Road, Alexandria, Report TM455-01F01 520 Gardeners Road NVIA (r7), dated 12/7/2022.

A warehouse and distribution facility generates a higher proportion of heavy vehicles than other commercial premises, and so it is important that as part of any assessment undertaken for any future development applications, that the likely distribution of vehicles along all access routes, the likely vehicles type breakdowns, and the likely 24 hour distribution of vehicles are all considered when assessing the potential for road traffic noise increases due to a proposed future development application in accordance with the NSW RNP.

Based upon the existing traffic volumes presented in Table 5-18, it is expected that the site could generate up to 940 heavy vehicle movements (inbound + outbound) during the day (7:00am to 10:00pm) and up to 200 heavy vehicle movements (inbound + outbound) during the night (10:00pm to 7:00am), and not increase existing road traffic noise levels at nearby noise sensitive receivers by more than 2 dB(A), in accordance within the RNP. These numbers are based upon a preliminary assessment, considering all vehicle movements are large heavy vehicles. However, as the 24 hours vehicle movement distribution and vehicle type mix are not known, these should be considered as part of any assessment undertaken for future development applications against the NSW RNP requirements.

6 Conclusion

Renzo Tonin & Associates has been engaged by Perpetual Corporate Trust Limited as the trustee of the LMLP 1 and 2 Trust to undertake an acoustic assessment to support the planning proposal to amend the floor space ratio (FSR) controls and introduce site-specific additional permitted uses for 263-273 and 273A Coward Street and 76-82 Kent, Mascot (the site). The Planning Proposal seeks to amend Bayside Local Environmental Plan 2021 (the LEP) by increasing the maximum floor space ratio (FSR) to 2:1 and introduce site-specific additional permitted uses including commercial offices, café or restaurant under Schedule 1.

This acoustic assessment has been carried out to review acoustic matters relevant to the Planning Proposal with consideration of the relevant policies, guidelines and standards required by Bayside Council and the NSW EPA, with particular reference to aircraft noise and noise generation by likely activities associated with the Planning Proposal.

The study includes the following:

- Identify existing acoustic environment and identify nearby sensitive receivers surrounding the site.
- Identifies the relevant acoustic policies and standards that are likely to govern the future development and the related acoustic objectives, to be confirmed at later application stages.
- Undertake a review of the acoustic factors that may influence the future assessment and design of the site, with reference to the qualitative review of the preliminary concept proposal, a proposed multi-level warehouse development (QF1 and QF2), and potential noise emissions and key features affecting noise impacts.

As the site is located in close proximity to Sydney's Kingsford Smith Airport a noise assessment has been carried out in accordance with current accepted procedures for aircraft noise, consistent with AS/NZS 2021:2015 *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction*, with reference to the Sydney Airport ANEF 2039. Typical commercial and industrial façade constructions are expected to achieve the required internal aircraft noise levels, expect in the case of noise sensitive spaces (ie. private offices and meeting/conference rooms) on the building facades or roof tenancy. Which are to be designed to achieve the required internal aircraft noise levels.

Noise objectives for noise emissions from the Planning Proposal site were established, and potential noise emissions from the preliminary concept proposal reviewed. It was identified that as part of future development applications, noise mitigation and management measures will likely be required to be incorporated into the design to achieve these noise objectives, subject to the future tenant activities. A range of noise control measures that are to be considered during these future development applications has been included.

Additionally, as warehouse and distribution facilities can generate a higher proportion of heavy vehicles than other commercial premises, it is important that the likely distribution of vehicles, the vehicles types,

and the likely 24 hour distribution of vehicles are all considered when assessing the potential for increases in road traffic noise levels in accordance with the NSW RNP on the surrounding road network due to a proposed future development application, so as to not substantially change the existing road traffic noise levels at nearby noise sensitive receivers. A preliminary traffic noise assessment was undertaken, and approximate numbers of heavy vehicles that could operate through the facility have been provided.

References

1. NSW Department of Climate Change and Water (2011), *Road Noise Policy* (RNP)
2. NSW Department of Environment and Climate Change (2009), *Interim Construction Noise Guideline* (ICNG)
3. NSW Environment Protection Authority (2017), *Noise Policy for Industry* (NPfI)
4. NSW Environment Protection Authority (2022*), Approved methods for measurement and analysis of environmental noise in NSW*
5. Standards Australia (2018), *Acoustics—Description and measurement of environmental noise,* AS1055:2018
6. World Health Organisation (2009), *Night Noise Guidelines for Europe*
7. World Health Organisation (2018), *Environmental Noise Guidelines for the European Region: A systematic Review on Environmental Noise and Effects on Sleep*
8. Environmental Health Standing Committee (enHealth) Council (2004), *The health effects of environmental noise: other than hearing loss*
9. Environmental Health Standing Committee (enHealth) Council (2018), *The health effects of environmental noise*

APPENDIX A Technical terms and concepts

A.1 Glossary of terminology

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

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

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

dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.

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

A.2 Acoustic concepts

A.2.1 Sound and noise

The terms 'sound' and 'noise' are almost interchangeable, except that in common usage 'noise' is often used to refer to unwanted sound. Sound is a vibration that travels as an audible wave of pressure through the air from a source to a receiver location such as the human ear. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) is a unit of measurement used to express the ratio of a quantity to another on a logarithmic scale to make the wide range of sound pressure more manageable.

Sound power is the rate at which a source emits acoustic energy and is unaffected by the environment. It is a property of the source that is emitting acoustic energy.

In contrast, **sound pressure** is the effect, and it is affected by factors associated with the built and natural environment such as distance, direction, obstacles etc. The sound pressure is the acoustic energy or 'noise level' at a distance away from the noise source. The relationship between sound power and sound pressure can be explained by considering the analogy of an electric heater, which radiates heat into a room and temperature is the effect. Like sound pressure, temperature also reduces with distance from the source following the inverse square law.

In this technical working paper, **sound power level** is identified by the symbols **SWL** or $\mathbf{L_w}$, while **sound pressure level** is represented by **SPL** or $\mathbf{L_p}$, and both have the same scientific unit in dB.

A.2.2 Individual's perception of sound

The loudness of sound depends on its sound pressure level. The A-weighted decibel [dB(A)] is generally used for the purposes of environmental noise impact assessment as it has been adjusted to account for the varying sensitivity of the human ear to different frequencies of sound. People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dB(A) is a good measure of the loudness of environmental noise to the human ear as it considers this frequency dependant sensitivity.

Different noise sources having the same dB(A) level generally sound equally loud. However, the frequency of a sound is what gives it a distinctive pitch or tone – for example, the rumble of distant thunder is an example of a low frequency sound and a whistle is an example of a high frequency sound. Most sounds we hear in our daily lives have sound pressure levels in the range of 30 to 90 dB(A). The following table provide some points of reference, measured in dB(A), of familiar sounds and those from construction activities.

Table A-1 Perception of sound - familiar sounds and construction noise

Common sounds	Construction noise	Sound pressure level
Leaf blower at operator's ear	Concrete saw or jack hammer 7 metres away	90 dB(A)
Airplane cabin during cruise (Airbus 321)	Excavator (with bucket) 7 metres away	80 dB(A)
General traffic noise kerbside next to Military Road	Towable compressor 7 metres away	75 dB(A)
Normal conversation at 1 metre		60 dB(A)
Outdoor air conditioning unit 1 metre away	Towable compressor 50 metres away	55 dB(A)
General office		50 dB(A)
Inside private office	Ground-borne noise from road header tunnel excavation between depths of 20 metres to 50 metres	40 dB(A)
Inside bedroom		30 dB(A)

In terms of sound perception, a change of 1 dB(A) or 2 dB(A) in the sound pressure level is difficult for most people to detect, whilst a 3 dB(A) to 5 dB(A) change corresponds to a small but noticeable change in loudness. An increase in sound level of 10 dB(A) is perceived as a doubling of loudness. However, individuals may perceive the same sound differently since many factors can influence an individual's response, including:

- The specific characteristics of the noise (eg. frequency, intensity, duration of the noise event)
- Time of day noise events occur
- Individual sensitivities and lifestyle
- Reaction to an unfamiliar sound
- Understanding of whether the noise is avoidable and the notions of fairness.

A.2.3 Environmental noise assessment indicators

Environmental noise is an accumulation of noise pollution that occurs outside and is most commonly attributed to various modes of transport as well as industrial and construction activities. Environmental noise has been shown to have an adverse effect on the quality of life, especially following long-term exposure. The focus of the present technical assessment is on annoyance and sleep disturbance as they constitute most of the burden related to the impact of environmental noise on health outcomes. Noise annoyance is defined by the World Health Organization as a feeling of displeasure, nuisance, disturbance or irritation caused by a specific sound. Sleep disturbance relates to difficulty with sleep initiation, consolidation as well as awakening and reduced quality of sleep.

In New South Wales, contemporary environmental noise assessment criteria for addressing noise annoyance and sleep disturbance are specified by the Environment Protection Authority (EPA). Potential

road traffic noise impact is assessed in accordance with the NSW Road Noise Policy. For industrial facilities that are permanently fixed, and associated noise emissions are long-term in nature, noise criteria have been adopted in accordance with the Noise Policy for Industry. For enabling construction activities which are temporary in nature and highly variable, EPA's Interim Construction Noise Guideline provides the underlying assessment principles for the determination of potential construction noise impact. These policies use the following noise indicators.

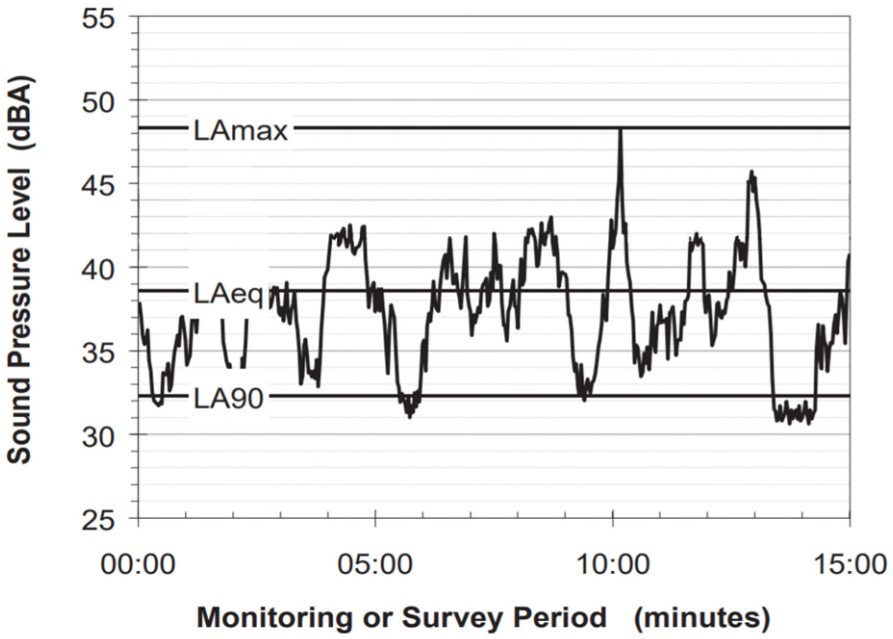
L_{Aeq} - To protect against long-term repeated noise exposure, the indicator for assessing the cumulative noise exposure level over a specific time interval is the equivalent sound pressure level, denoted as L_{Aeq}. The L_{Aeq} indicator accounts for the total energy content from all sources of sound under consideration. The fact that the L_{Aeq} is a cumulative measure means that louder activities have greater influence over the L_{Aeq} level than do quieter ones, and activities that last longer in time have greater L_{Aeq} than do shorter ones. An increase in the number of events also increases the L_{Aeq}. Further, people react to the duration of noise events, judging longer events to be more annoying than shorter ones, assuming equal maximum noise levels.

L_{Amax} - It is important to note that L_{Aeq} levels are numerically lower than maximum noise levels (denoted as L_{Amax}). None of the noise is ignored, just as all the rain that falls in the rain gauge in one hour counts toward the total. In the case of noisy but short-lived maximum noise events, which can sometime result in immediate short-term awakening reaction, potential impact is assessed using the L_{Amax} indicator in which its emergence above the background noise environment is evaluated.

L_{A90} - The L_{A90} is the level of noise that is present almost constantly, or for 90 per cent of the time and is commonly referred to as the background noise. Typical examples of what types of noise may contribute to the background noise levels are continuously flowing traffic or air conditioner noise.

These three noise indicators of L_{Amax}, L_{Aeq} and L_{A90} are presented in Figures A-1 for a sample noise monitoring survey period showing the sound pressure level of a varying noise environment such as environmental noise.

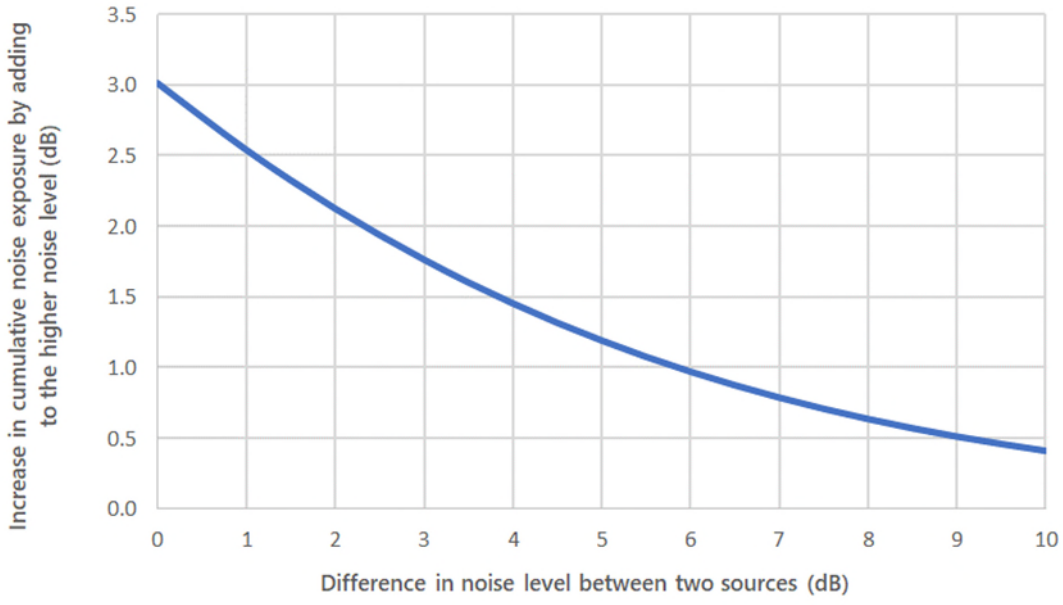
Figure A-1: Environmental noise assessment indicators



A.2.4 Cumulative sound exposure

As illustrated in Figure A-2, for two activities that result in the same amount of acoustical energy or noise level at a receiver location, the cumulative sound exposure level would be 3 dB higher than the level of just one single activity. This is because the decibel (dB) scale is logarithmic. Conversely, if the activity closer to your home results in noise exposure level that is 10 dB higher than the activity occurring further away, the quieter works would contribute very little to the cumulative noise exposure level.

Figure A-2: Difference in noise level between two sources



APPENDIX B Existing acoustic environement

B.1 Unattended monitoring

Acoustic
Vibratio
Structural Dynamic

sydney@renzotonin.com.a
www.renzotonin.com.a

Monitoring ID: L1
Address: Unit 1307, Level 13, 39 Kent Road, Mascot
Description: Balcony overlooking intersection

Background & Ambient Noise Monitoring Results

	L_{A90} Background Noise Levels				L_{Aeq} Ambient Noise Levels			
	Day[1]	Evening[2]	Night[3]	Shoulder[4,6]	Day[1]	Evening[2]	Night[3]	Shoulder[4]
Representative Week[5]	59	57	52	56	65	63	60	62

Notes:

1. Day: 7.00am to 6.00pm Monday to Saturday and 8.00am to 6.00pm Sundays & Public Holidays
2. Evening: 6.00pm to 10.00pm Monday to Sunday & Public Holidays
3. Night: 10.00pm to 5.00am Monday to Sunday & Public Holidays
4. Shoulder period: 5:00am to 7:00am
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}
6. Shoulder period RBL levels determined as per NPfI Fact Sheet A3

Road Monitoring Results (at one metre from façade[4])

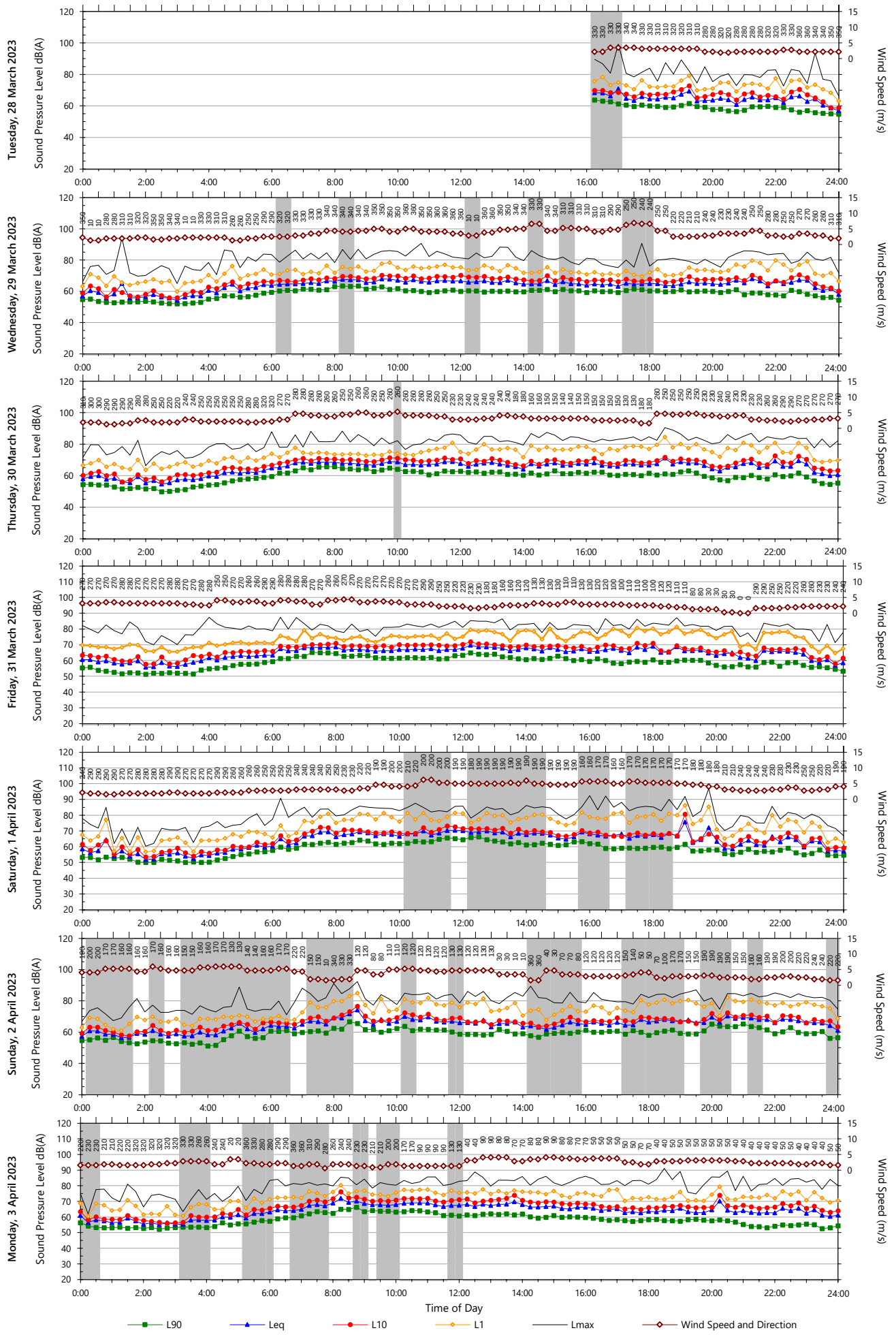
	L_{Aeq} Noise Levels[4]	
	Day[1]	Night[2]
Representative Week[3]	67	62

Notes:

1. Day is 7:00am to 10:00pm 2. Night is 10:00pm to 7:00am 3. Median of daily L_{Aeq}
4. Values are calculated at the facade. 2.5dB is added to results if logger is placed in the free field

Logger location photograph

Logger location map



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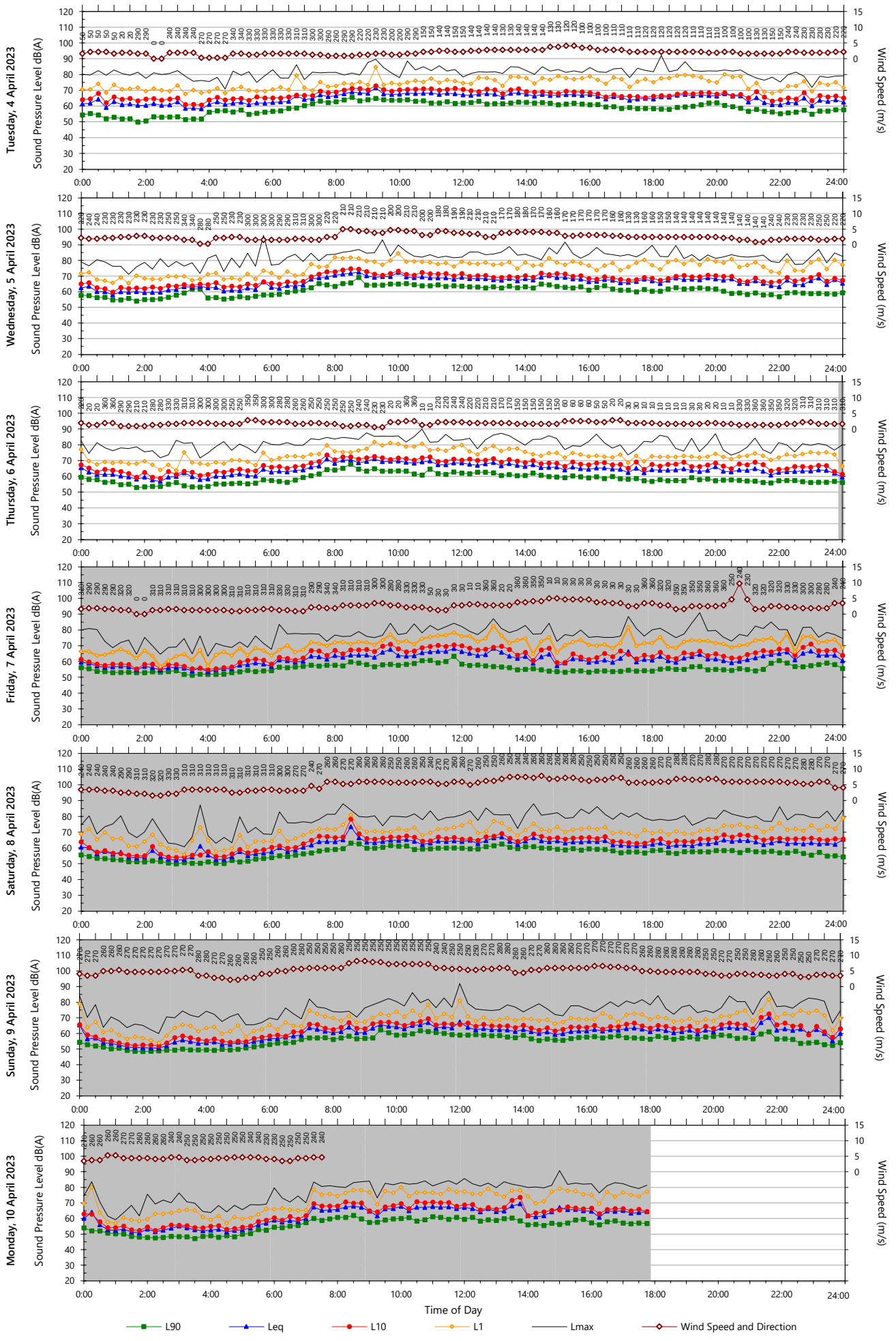
Template: QTE-26 Logger Graphs Program (r42)



Data File: 2023-03-28_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r42)

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

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Monitoring ID: L2
Address: Unit 307, Level 3, 260 Coward Street, Mascot
Description: Garden balcony overlooking Coward Street

Background & Ambient Noise Monitoring Results

	L_{A90} Background Noise Levels				L_{Aeq} Ambient Noise Levels			
	Day[1]	Evening[2]	Night[3]	Shoulder[4,6]	Day[1]	Evening[2]	Night[3]	Shoulder[4]
Representative Week[5]	60	54	47	53	69	67	65	67

Notes:

1. Day: 7.00am to 6.00pm Monday to Saturday and 8.00am to 6.00pm Sundays & Public Holidays
2. Evening: 6.00pm to 10.00pm Monday to Sunday & Public Holidays
3. Night: 10.00pm to 5.00am Monday to Sunday & Public Holidays
4. Shoulder period: 5:00am to 7:00am
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}
6. Shoulder period RBL levels determined as per NPfI Fact Sheet A3

Road Monitoring Results (at one metre from façade[4])

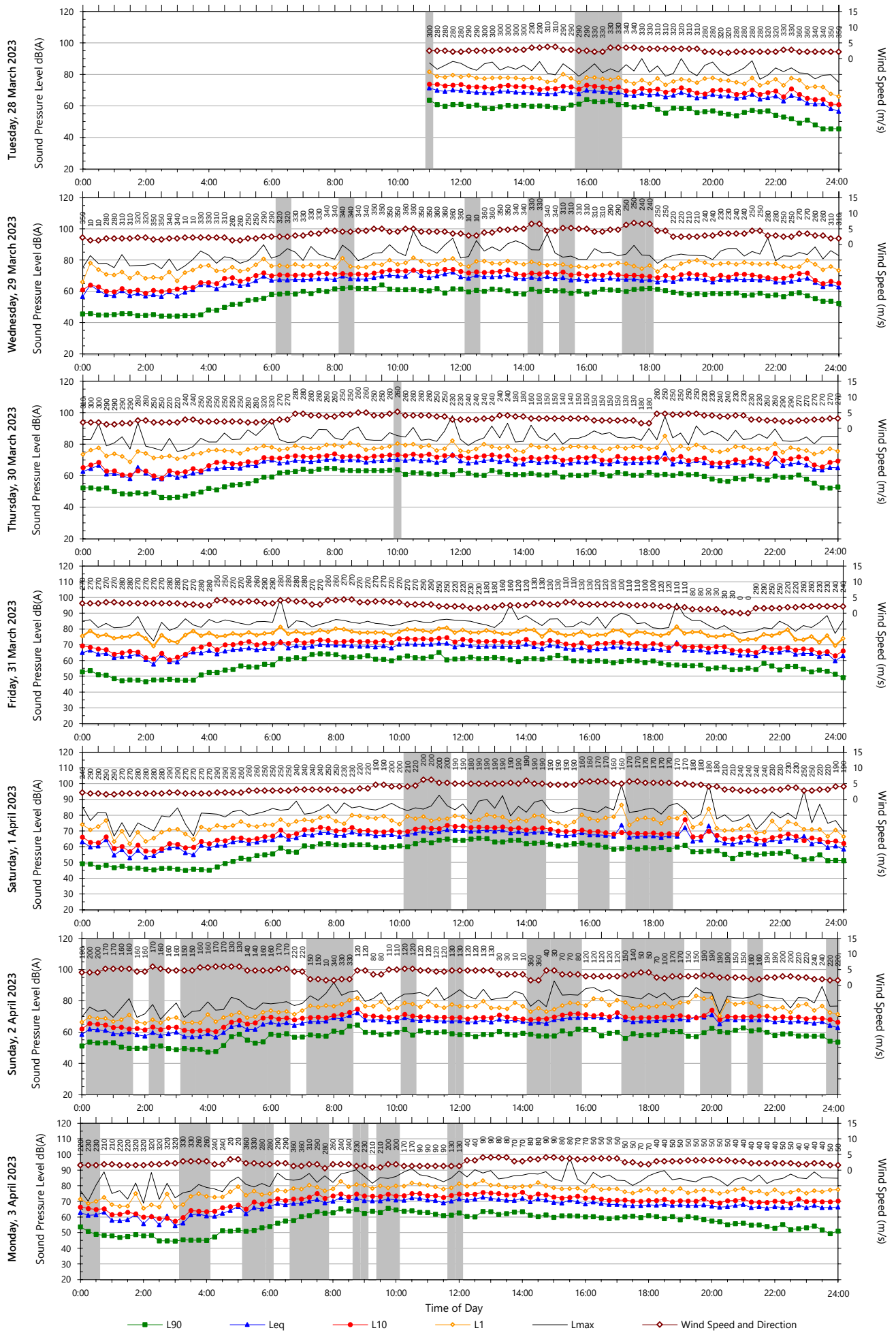
	L_{Aeq} Noise Levels[4]	
	Day[1]	Night[2]
Representative Week[3]	71	67

Notes:

1. Day is 7:00am to 10:00pm 2. Night is 10:00pm to 7:00am 3. Median of daily L_{Aeq}
4. Values are calculated at the facade. 2.5dB is added to results if logger is placed in the free field

Logger location photograph

Logger location map



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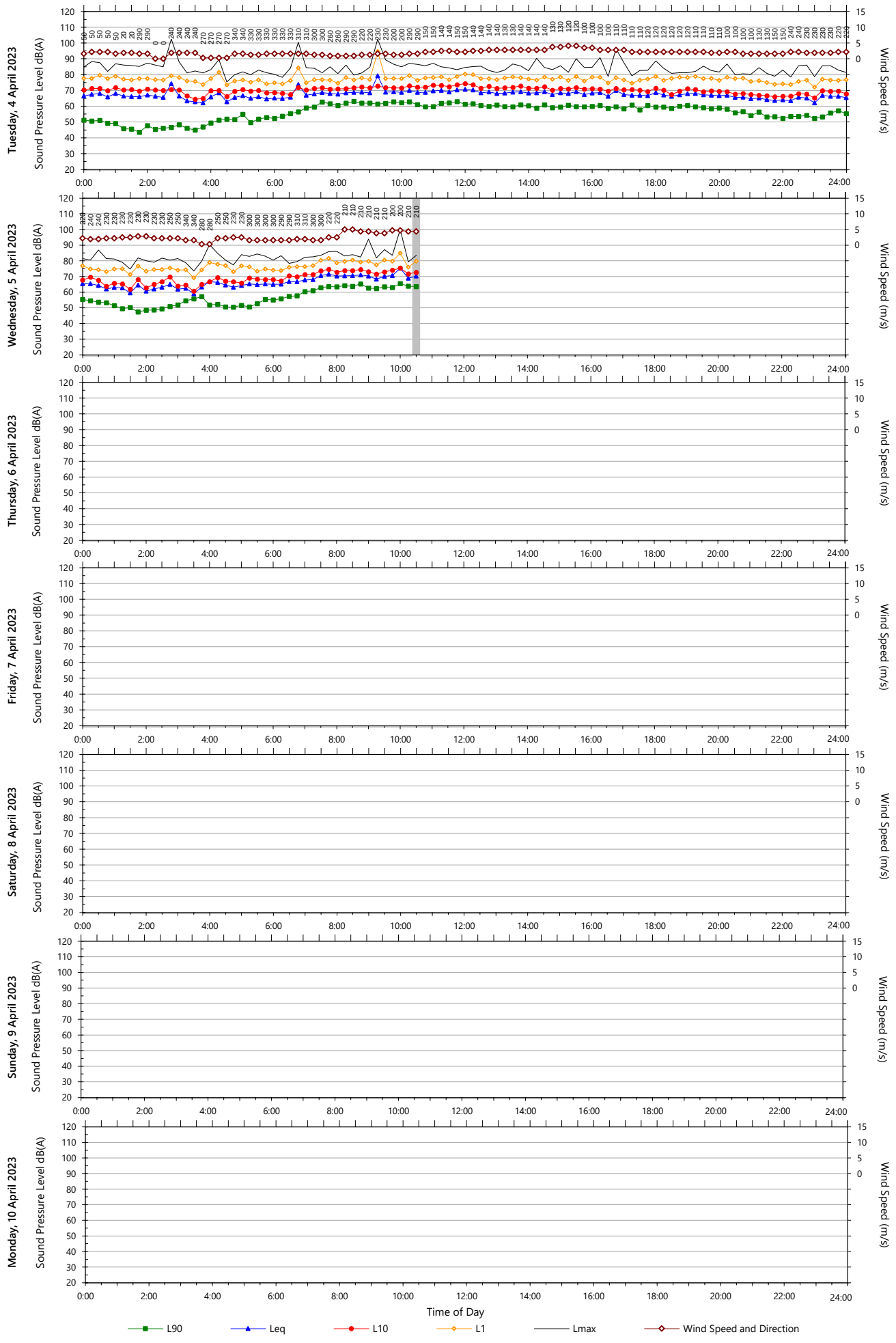
Template: QTE-26 Logger Graphs Program (r42)



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Template: QTE-26 Logger Graphs Program (r42)