Appendix D – Noise and Vibration Impact Assessment

Prepared for
Transport for New South Wales
ABN: 18 804 239 602

Moss Vale Station and Stabling Yard Upgrade

Noise and Vibration Impact Assessment

25-Oct-2023
Noise and Vibration Impact Assessment
Doc No. 60712013

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Client: Transport for New South Wales

ABN: 18 804 239 602

Prepared by

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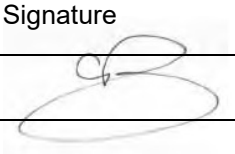
3	25-Oct-2023	Updated Final	Catherine Brady Technical Director	

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Glossary of terms and abbreviations

Term	Definition
Sound power level	The total sound emitted by a source.
Sound pressure level	The amount of sound at a specified point.
Decibel [dB]	The measurement unit of sound.
A Weighted decibels [dB(A)]	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1 kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB(A) increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB(A) increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows: 0 dB(A) Threshold of human hearing 30 dB(A) A quiet country park 40 dB(A) Whisper in a library 50 dB(A) Open office space 70 dB(A) Inside a car on a freeway 80 dB(A) Outboard motor 90 dB(A) Heavy truck pass-by 100 dB(A) Jack hammer/subway train 110 dB(A) Rock concert 115 dB(A) Limit of sound permitted in industry 120 dB(A) 747 take off at 250 metres
Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
Insertion loss	Reduction in noise by inserting a barrier between the source and receiver.
L_{max}	The maximum sound pressure level measured over the measurement period.
L_{min}	The minimum sound pressure level measured over the measurement period.
L_{10}	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L_{10}.
L_{90}	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L_{90}.
Ambient noise	The all-encompassing noise at a point composed of sound from all sources near and far.

Term	Definition
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L_{90} sound pressure level is used to quantify background noise.
Traffic noise	The total noise resulting from road traffic. The L_{eq} sound pressure level is used to quantify traffic noise.
Day	Construction noise: The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays. Road traffic noise: The period from 0700 to 2200 h every day of the week.
Evening	Construction noise: The period from 1800 to 2200 h Monday to Sunday and Public Holidays. Road traffic noise: Not applicable.
Night	Construction noise: The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays. Road traffic noise: The period from 2200 to 0700 h every day of the week.
Assessment background level [ABL]	The overall background level for each day, evening and night period for each day of the noise monitoring.
Rating background level [RBL]	The overall background level for each day, evening and night period for the entire length of noise monitoring.
Noise management level [NML]	The level which represents the point above which there may be some community reaction to noise.

1.0 Introduction

Transport for NSW (Transport) is the NSW Government agency responsible for the delivery of major transport infrastructure projects in NSW and is the proponent for the Moss Vale Station and Stabling Yard Upgrade (the proposal).

The proposal involves an accessibility upgrade of Moss Vale Station to improve accessibility and amenities for customers. The proposal also involves the installation of new track-side infrastructure at the Moss Vale stabling yard as part of the Regional Rail Project (RRP), which consists of replacing ageing NSW regional rail fleet of XPT, Xplorer and Endeavour trains.

AECOM Australia Pty Ltd (AECOM) has been commissioned by Transport to undertake a noise and vibration impact assessment of the construction and operation of the station upgrade aspect of the proposal as part of the Review of Environmental Factors (REF). The noise and vibration impact assessment of the stabling yard upgrade has been completed by Aurecon Australasia Pty Ltd (Aurecon) (Reference 509729, dated 4 August 2023; refer to Appendix C) and has been relied on in AECOM's assessment for the operational noise impact assessment of the stabling yard.

1.1 Proposal overview

The proposal involves an accessibility upgrade to Moss Vale Station and an upgrade to its adjoining stabling yard to accommodate the new regional intercity trains.

A summary of the key features of the proposal is as follows:

- installing three new lifts to provide access to the existing footbridges
- upgrading the existing footbridges, including replacement of stairs, handrails, and decking
- upgrading the station entrances at Argyle Street, Lackey Road and Dalys Way and interchange facilities
- reconfiguring several rooms within the station building and replacement of the existing unisex toilet with a family accessible bathroom
- reconfiguring the train stabling area to accommodate new regional intercity trains, including lengthening of the track at the stabling yard and providing for train clearances
- utilities and services work at the station and stabling yard
- establishing a permanent compound area to accommodate a mobile train simulator that would travel and park in Moss Vale Station periodically for training purposes.

A detailed description of the proposal is provided in Section 3.0.

1.2 Site description

The proposal area is within the Wingecarribee Shire Local Government Area (LGA) and is located within several land zones, including SP2: Infrastructure, R2: Low Density Residential, E1: Local Centre, E3: Productivity Support, E4: General Industrial, and RE1: Public Recreation under the *Wingecarribee Local Environmental Plan (WLEP) 2010.* The proposal area is located within a mainly residential suburban environment. The closest residential receivers are located on Lackey Road to the west of the site. Commercial receivers are also located adjacent to the proposal area along Argyle Street to the east and south-west. The proposal area and receivers are shown on Figure 1.

Figure 1 - Proposal location and assessment receivers

N

0 280 560 Meters

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Proposal Area
Ancillary Facility
Construction Footprint

Building Usage

Active Recreation
Commercial
Community Centre
Education
Industrial
Passive Recreation
Place of Worship
Residential

2.0 Methodology

2.1 Scope

This assessment provides a noise and vibration impact assessment of the construction and operation of the station upgrade aspect of the proposal. The noise and vibration impact assessment of the stabling yard upgrade has been completed by Aurecon Australasia Pty Ltd (Aurecon) (Reference 509729, dated 4 August 2023; refer to Appendix C) and has been relied on in AECOM's assessment for the operational noise impact assessment of the stabling yard. As additional information regarding the stabling yard construction methodology and staging has become available since the completion of the Aurecon report, the construction noise impact assessment for the stabling yard has been updated by AECOM and is detailed in this report. The cumulative impacts of the construction of the stabling yard and the station upgrade are also detailed in this report.

In summary, the scope of this noise and vibration impact assessment is to:

- establish the existing background noise levels in the vicinity of the proposal
- establish construction noise management levels and vibration limits that would apply to the proposal
- predict noise levels at affected residential and non-residential receivers due to the construction of the proposal, including the predicted cumulative construction noise levels from the station and stabling yard upgrade
- consider the combined noise impact from the operation of the station upgrade along with Aurecon's assessment of the operation of the stabling yard upgrade (provided in Appendix C)
- outline mitigation measures, if required, relating to noise and vibration during the construction and operational phases of the proposal.

2.2 Policies and guidelines

The policies and guidelines listed below have been considered in the preparation of this assessment.

2.2.1 Construction

- *Interim Construction Noise Guideline* (NSW Department of Environment and Climate Change, 2009) (ICNG)
- *Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006) (AVTG)
- *NSW Road Noise Policy* (Department of Environment, Climate Change and Water, 2011) (RNP)
- *Construction Noise and Vibration Guideline (Public Transport Infrastructure)* (Transport, 2023) (CNVG-PTI)
- *Australian Standard AS 2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites*
- *British Standard 5228: Part 1 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1: Noise*, 2009, including Amendment 1, 2014
- *DIN Standard 4150: Part 3 2016 Vibration in Buildings - Effects on Structures 1999*
- *British Standard 7385: Part 2 1993 Evaluation and Measurement of Vibration in Buildings 1993*
- *British Standard 6472: Evaluation of human exposure to vibration in buildings (1-80 Hz) 1992.*

2.2.2 Operation

- *NSW Protection of the Environment Operations Act 1997* (POEO Act 1997)
- *NSW Noise Policy for Industry* (NSW Environment Protection Authority, 2017) (NPfI)
- *Rail Infrastructure Noise Guideline*, Environment Protection Authority, 2013) (RING).

Definitions for acoustic terminology used within this report can be found in Appendix A.

3.0 Proposal description

3.1 The proposal

The proposal would involve an accessibility upgrade of Moss Vale Station, which would improve accessibility and amenities for customers. The proposal would also include an upgrade to the Moss Vale stabling yard as part of the Regional Rail Project, in order to accommodate a new fleet of trains and associated stabling and maintenance requirements.

The proposal would include the following key elements:

Moss Vale Station upgrade:

- upgrading the station's eastern access from Argyle Street, including:
  - installing two new lifts, one at each end of the existing footbridge
  - upgrading existing footbridge, stairs and walkway
  - upgrading accessibility to the existing bus stop and taxi drop-off near Diamond Jubilee Park
  - upgrading Argyle Street entrance including seating and signage, and improved accessible pedestrian pathway at the forecourt
- formalising parking within the station forecourt, including new accessible parking spaces, kiss-and-ride zone and bus/coach drop off
- adjusting some station doors, and ground levels at the station including resurfacing at Platform 2
- replacing existing unisex toilet with a family accessible bathroom
- installing tactile markers and boarding assistance zones on both platforms
- improving communications equipment, public address (PA) system, and security features/systems
- upgrading station power services, communications room, lighting and CCTV, line marking, landscaping, and adjustment to station ticketing facilities
- upgrading the station's western access from Lackey Road, including:
  - installing a new lift to provide access to the existing footbridge
  - upgrading existing footbridge and stairs including new handrails and decking
  - upgrading footpath and installing new seating at the new lift entrance near Lackey Road
  - installing a pedestrian crossing at Lackey Road and Dalys Way
  - upgrading footpath accessibility at Dalys Way towards the station, including fencing, drainage, car parking and retaining wall.

Moss Vale Stabling Yard upgrade:

- upgrading the train stabling area to accommodate the new regional intercity trains, including track lengthening at the stabling yard and providing train clearances and buffer stops
- installing new walkways within the stabling yard and a dedicated access driveway for ARTC
- upgrading the existing Lackey Road staff vehicle access area including entry and exit gates, and a new sealed car park
- building retaining walls
- installing noise treatments. Based on the recommendations of the noise assessment, operational noise treatment may include the installation of a noise barrier approximately 250 metres in length and 5.5 metres in height, along the western side of the stabling yard. The noise barrier is subject to further assessment and the final operational noise solution may include at-property treatments. Further discussion is provided in Section 6.6

- installing CSR along the western side of the station and both sides of stabling yard
- installing provisioning services
- upgrading low voltage and shore power supply for existing and new equipment, including communications equipment
- relocating existing amenity blocks and storage container about 60 metres north to the new stabling yard access area
- carrying out ancillary work including utilities/services relocations, lighting, fencing and gates, and drainage
- building a temporary stabling yard for use during construction of the upgrades to the existing stabling yard
- installing a new diesel exhaust fluid system including 10,000-litre capacity self-bunded tank, to service the train fleet
- building elevated safety access platforms, new hose reels and water supply points for each set of trains.

Mobile train simulator compound

- building a permanent hardstand compound area with amenities to accommodate a MTS that would periodically park in the area.

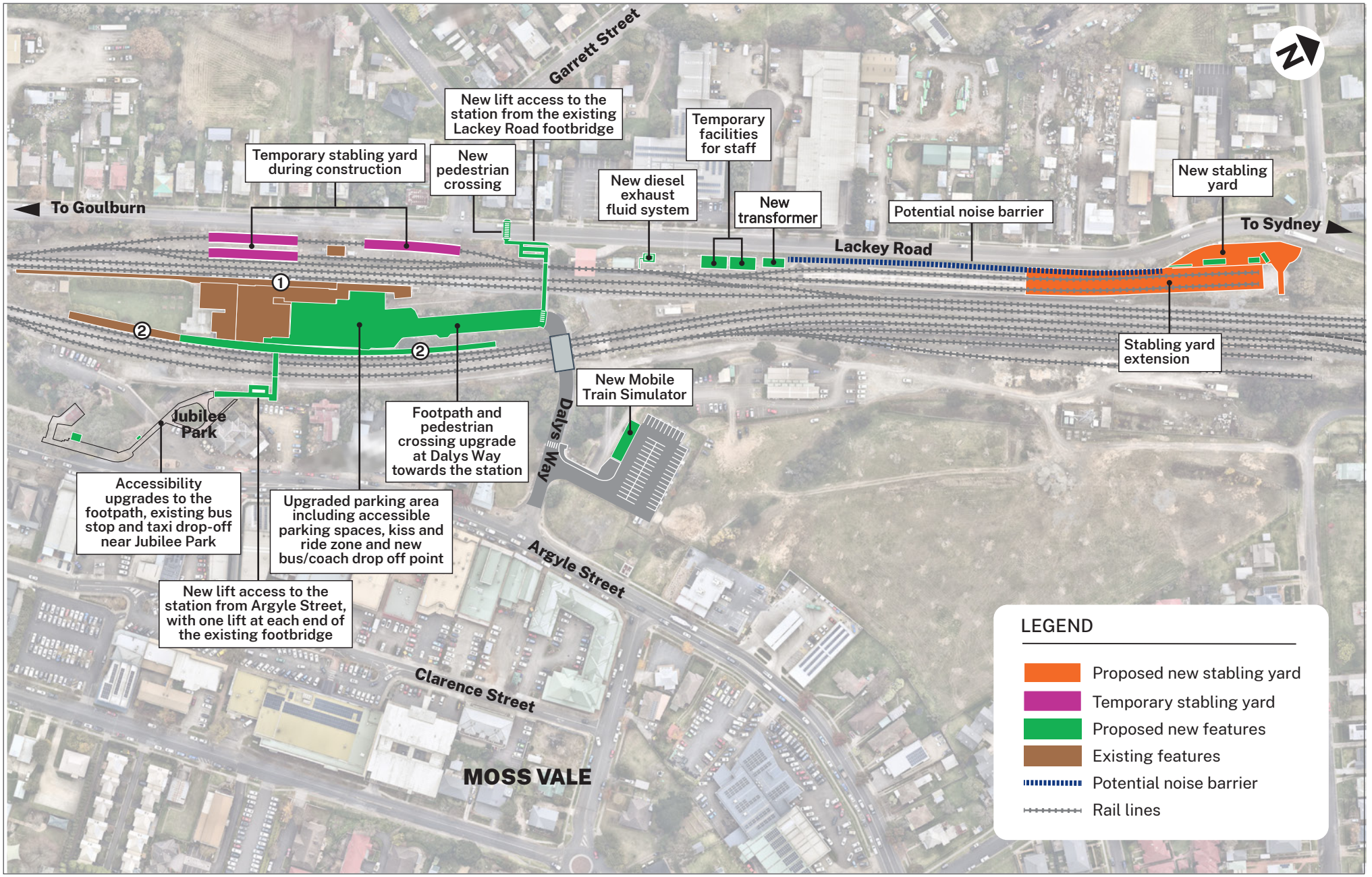

Figure 2 - Key elements of the proposal

3.2 Construction

3.2.1 Construction staging

Subject to approval, construction of the proposal is expected to commence in early 2024 and be completed in late 2025. The indicative construction stages, corresponding activities and scheduling times are shown in Table 3-1. The construction methodology would be further developed during the detailed design of the proposal by the nominated Contractor in consultation with Transport.

Table 3-1 Indicative construction staging

ID	Construction stage	Activities	Scheduling
1	Site establishment and enabling works	• implement traffic control • mobilise vehicles and machinery to site • carry out survey investigations including examining geophysical, hydrological, and contamination conditions • carry out dilapidation surveys, identifying and recording the condition and location of buildings, structures, and services (including investigation of the crane location) • establish temporary fencing and other temporary features as required in work areas (e.g. temporary noise barriers, pedestrian diversions, signage, hoarding, scaffolding, formwork, establish crane and piling pads, temporary toilets, etc.) • install temporary erosion and sediment controls and fence off 'no-go' areas • establish ancillary facilities (e.g. erect fencing, site office/s, amenity blocks, temporary parking areas, and plant/material storage areas) • tree/vegetation removal and trimming • temporarily relocate utilities.	Standard Hours
2	Building and platform works[1]	• remove bins, seats, and footings • install new drainage infrastructure[3] • resurface Platform 2[3] • install new station furniture, line marking and wayfinding signage • strip out and relocate existing communications room, update room access, repaint and refloor[3].	Standard Hours and Possession Period
3	Argyle Street entrance[2]	• remove concrete footpath, pavements, and existing stairs[3] • install lift shafts, lifts, and landings[3] • carry out modifications to footbridge, stairs and ramp[3] • construct drainage infrastructure[3] • install street furniture, bus stop upgrades, signage and line marking.	Standard Hours and Possession Period
4	Forecourt/ Interchange works	• remove footpath and pavement[3] • excavate areas of the forecourt • upgrade drainage infrastructure[3] • install new kerb, footpath, line markings and street furniture[3].	Standard Hours and Possession Period

ID	Construction stage	Activities	Scheduling
5	Communication equipment and services	• install new communication services including communications equipment and cabling, CCTV, emergency help points, ticketing facilities and lighting[3] • install mechanical services including the lifts and air-conditioning • install hearing loop and water fountain • install tactile markers and provide line markings[3].	Standard Hours and Possession Period
3	Lackey Road entrance[2]	• demolish existing stairs, concrete and fencing • install lift shaft, lift, and landing[3] • carry out modifications to footbridge[3] • construct new footpath and pedestrian crossing[3] • line marking and install signage and tactile markers[3] • install new rail boundary fencing • install drainage infrastructure and street furniture[3].	Standard Hours and Possession Period
3	Dalys Way works[2]	• install pedestrian crossing, modify footpath, ramps and fencing[3] • carry out asphalt and kerb works.	Standard Hours and Possession Period
2	Remaining buildings and platform works[1]	• reconfigure bathroom to family accessible bathroom[3] • upgrade ticketing room including the waiting room[3].	Standard Hours and Possession Period
6	Temporary stabling yard provisions	• install temporary siding works including power supply, access pathways, site security and fencing • install temporary maintenance facilities • relocate and/or protect existing services • disconnect and remove redundant services.	Standard Hours
7	Permanent stabling yard construction works	• extend storage and service roads • relocate stabling yard facilities buildings • construct stabling yard access roads, carpark and footpaths • carry out CSR works • potentially install noise barrier[4] • install diesel exhaust fluid system • complete drainage and stormwater works • install elevated safety access platforms • install mobile train simulator.	Standard Hours
8	Services upgrade at stabling yard	• install electrical services including lighting • provide power supply • services relocation • install hydraulic services including water and sewerage supply • install wayfinding and legislation signage • install tactile markers • install fencing and security systems • carry out earthing and bonding.	Standard Hours
9	Landscaping works	• carry out landscaping (install new trees and plants, reinstate garden beds, etc.) • install signage • carry out line marking.	Standard Hours

ID	Construction stage	Activities	Scheduling
10	Demobilisation, testing and commissioning	• dismantle existing site compound/hoarding areas • test electrical, communications and signalling components.	Standard Hours

Notes:

1. *Modelled as one construction scenario: Building and Platform Works.*
2. *Modelled as one construction scenario: Station Entrance Works.*
3. *Activities likely to be undertaken during rail possession periods.*
4. *Conditional to requirement. The noise impacts of construction activities at the stabling yard have been assessed on the assumption that the noise barrier is not providing attenuation at the time of the works.*

3.2.2 Temporary ancillary facilities

Four temporary construction ancillary facilities would be required for the proposal to accommodate a site office, amenities, and laydown and storage areas for materials. The areas nominated for the ancillary facilities are on land owned by Transport, subject to ARTC lease, TAHE and within the road reserve on land under the care, control and management of Wingecarribee Shire Council as the roads authority. These areas would be reinstated following the completion of their use for construction.

3.2.3 Construction program

An indicative schedule for construction is provided in Table 3-2.

Table 3-2 Indicative construction program

ID	Task / stage	Date/ duration
1	Site establishment and enabling works	Early 2024
2	Building and platform works	Early 2024 – Early 2025
3	Station entrance works	Early 2024 – Early 2025
4	Forecourt/Interchange works	Early 2024 – Late 2024
5	Communication equipment and services upgrade	Early 2024 – Late 2024
6	Temporary stabling yard provisions	Early 2024 – Mid 2025
7	Permanent stabling yard construction works	Mid 2024 – Early 2025
8	Services upgrade at stabling yard	Mid 2024 – Early 2025
9	Landscaping works	Early 2025 – Mid 2025
10	Demobilisation	Mid 2025

3.2.4 Construction equipment and vehicles

An indicative list of the plant and equipment that would be used to construct the proposal is provided in Table 3-3. The plant/equipment list would be further refined during detailed design.

Table 3-3 Indicative construction equipment and plant

Plant and equipment to be used during construction	
1: Site establishment and enabling works[1]	
Crane truck	Lighting tower
Diesel generator	Loader – skid steer
Elevated work platform	Power tools
Excavator (5 tonne)	Truck – road/truck and dog
Hand tools	Woodchipper/mulcher

Plant and equipment to be used during construction	
2: Building and platform works[1]	
Concrete saw	Hi-rail truck
Excavator (5 tonne)	Jackhammer
Hand tools	Line marking truck
Hi-rail crane	Pavement laying machine
Hi-rail elevated work platform	Truck - concrete
3: Station entrance works	
Concrete pump	Hi-rail crane
Crane - franna	Loader – skid steer
Crane - mobile	Slew crane
Crane truck	Truck – concrete
Drilling rig	Truck – medium rigid
Elevated work platform	Truck – road/truck and dog
Excavator (8 tonne)	Vibratory roller
Excavator (14 tonne)	Woodchipper/mulcher
4: Forecourt / Interchange works	
Asphalt paver	Loader – skid steer
Asphalt truck	Truck – concrete
Crane truck	Truck – road/truck and dog
Excavator (5 tonne)	Vibratory roller
Excavator (14 tonne)	
5: Communication equipment and services upgrade[1]	
Crane truck	Lighting tower
Diesel generator	Loader – skid steer
6: Temporary stabling yard provisions	
Bored piling rig	Loader – skid steer
Concrete pump	Truck – concrete
Crane truck	Truck – medium rigid
Elevated work platform	Truck – road/truck and dog
Excavator (5 tonne)	Vibratory roller
Excavator (8 tonne)	Woodchipper/mulcher
7: Permanent stabling yard construction works	
Asphalt truck	Kerb machine[2]
Bored piling rig	Loader – skid steer
Concrete pump	Pavement laying machine
Crane - mobile	Smooth drum roller
Crane truck	Truck – concrete
Elevated work platform	Truck – medium rigid

Plant and equipment to be used during construction	
Excavator (5 tonne)	Truck – road/truck and dog
Excavator (8 tonne)	Vibratory roller
Excavator (14 tonne)	Woodchipper/mulcher
8: Services upgrade at stabling yard	
Concrete pump	Excavator (14 tonne)
Crane – franna	Truck – concrete
Crane truck	Truck – medium rigid
Excavator (5 tonne)	Truck – vacuum
Excavator (8 tonne)	Vibratory roller
9: Landscaping works[1]	
Crane – franna	Light vehicle (4WD)
Elevated work platform	Line marking truck
10: Demobilisation, testing and commissioning[1]	
Crane truck	Loader – skid steer
Diesel generator	Power tools
Hand tools	Truck – road/truck and dog
Lighting tower	Truck - vacuum
Light vehicle (4WD)	

Notes:

1. *Indicative equipment list based on equipment lists for corresponding scenarios from past AECOM Transport Access Program projects.*
2. *Noise from a kerb machine is considered to be negligible, in comparison to other equipment in this scenario.*

3.2.5 Construction traffic

During the construction of the proposal, there would be minor increases in traffic volumes on the local road network associated with construction vehicle movements. Construction vehicles would access the site from Lackey Road and Argyle Street. Daily construction traffic would be expected to include:

- about 30 light vehicles and two heavy vehicles for the station upgrade
- about 15 light vehicles and 10 heavy vehicles for the stabling yard upgrade.

It is noted that in Aurecon's report (2023) (refer Appendix C), the daily construction traffic for the stabling yard was expected to include six light vehicles and four heavy vehicles. The expected volume of construction traffic for the stabling yard upgrade has increased based on development of the design and construction planning for the proposal.

3.2.6 Construction hours

The majority of construction work required for the proposal would be undertaken during standard construction hours. The *Interim Construction Noise Guideline* (Department of Environment and Climate Change NSW, 2009) defines standard construction hours as follows:

- Monday – Friday 7:00 am to 6:00 pm
- Saturday 8:00 am to 1:00 pm
- No work on Sundays or public holidays.

It is estimated that approximately seven rail possessions would be used to carry out works during the construction period. Rail possessions are scheduled closures that would occur regardless of the proposal when part of the rail network is temporarily closed and trains are not operating. The station upgrade activities that are likely to be undertaken during rail possession periods are indicated in Section 3.2.1 above. The construction stages related to the stabling yard upgrade would be undertaken during standard construction hours only.

Other activities that may be required during the evening and night-time hours would be undertaken in accordance with an out-of-hours works procedure and include:

- works which do not cause noise emissions more than 5 dB(A) above the rating background level (RBL) at any nearby residential property and/or other noise sensitive receivers
- the delivery of plant, equipment and materials required outside these hours as requested by police or other authorities for safety reasons and with suitable notification to the community as agreed by Transport's Director of Environment and Sustainability (DES)
- emergency situations to avoid the loss of lives, property and/or to prevent environmental harm
- any other work as agreed by the DES (or delegate) and considered essential to the proposal.

Approval from Transport would be required for any out-of-hours work and the affected community would be notified as outlined in Transport's *Construction Noise and Vibration Guideline (public transport infrastructure* (CNVG-PTI) (Transport, 2023).

3.3 Operation

Upon completion, the station's accessibility would be improved and key elements of the station would be compliant with DSAPT, including interchange facilities. The station would be subject to existing maintenance procedures currently in place, which would be updated to include the new features (e.g. lift servicing and cleaning).

Operation at the stabling yard would involve regular stabling and maintenance of up to six (three car) new regional intercity trains, with a new diesel exhaust fluid system to be integrated into the existing refuelling infrastructure.

The MTS would be brought to Moss Vale Station and would be parked in the new compound area for a period of several weeks at a time while training activities are undertaken.

The majority of structures constructed under this proposal would be maintained by Sydney Trains and ARTC. However, footpaths and adjacent garden/landscape areas would continue to be maintained by Wingecarribee Shire Council as per existing arrangements. The operation and maintenance activities of the upgraded station and stabling yard components are subject to further discussions with Sydney Trains, ARTC, Transport and Wingecarribee Shire Council.

4.0 Existing acoustic environment

4.1 Noise sensitive receivers

The existing acoustic environment is largely defined by light industrial and commercial sites, rail, and road traffic noise. Noise sensitive receivers which could potentially be affected by the proposal are shown in Figure 1. This assessment considers noise sensitive receivers within a 1.5 kilometre radius from the proposal. The closest residential receivers that could potentially be affected by the proposal are as follows:

- residential properties to the west along Lackey Road, Parkes Road, Innes Road, and Garrett Street
- residential properties to the east along Baker Road, Hoskin Street, Hawkins Street, and Valetta Street.

Several non-residential sensitive receivers that could potentially be affected by the proposal have also been identified as follows:

- St Paul's Catholic Parish Primary School to the west, along Garrett Street
- St Paul's Parish Catholic Church to the west, along Garrett Street
- Moss Vale Public Library to the south-east, along Elizabeth Street
- St Paul's International College to the south-west, along Waite Street
- Leighton Gardens, along Argyle Road
- Diamond Jubilee Park and Fountain, along Argyle Road
- Lackey Park, along Lackey Road.

4.2 Noise catchment areas

To assist in determining noise criteria for the receivers surrounding the proposal, two noise catchment areas (NCAs) were identified. The noise environment at each residential receiver within each NCA is considered to be similar. The NCAs are shown in Figure 3. NCA 1 consists of a noise environment dominated by noise from commercial activities and road traffic noise from Lackey Road and Argyle Street/Illawarra Highway. NCA 2 consists of a noise environment dominated by general suburban noise and some rail/industrial noise.

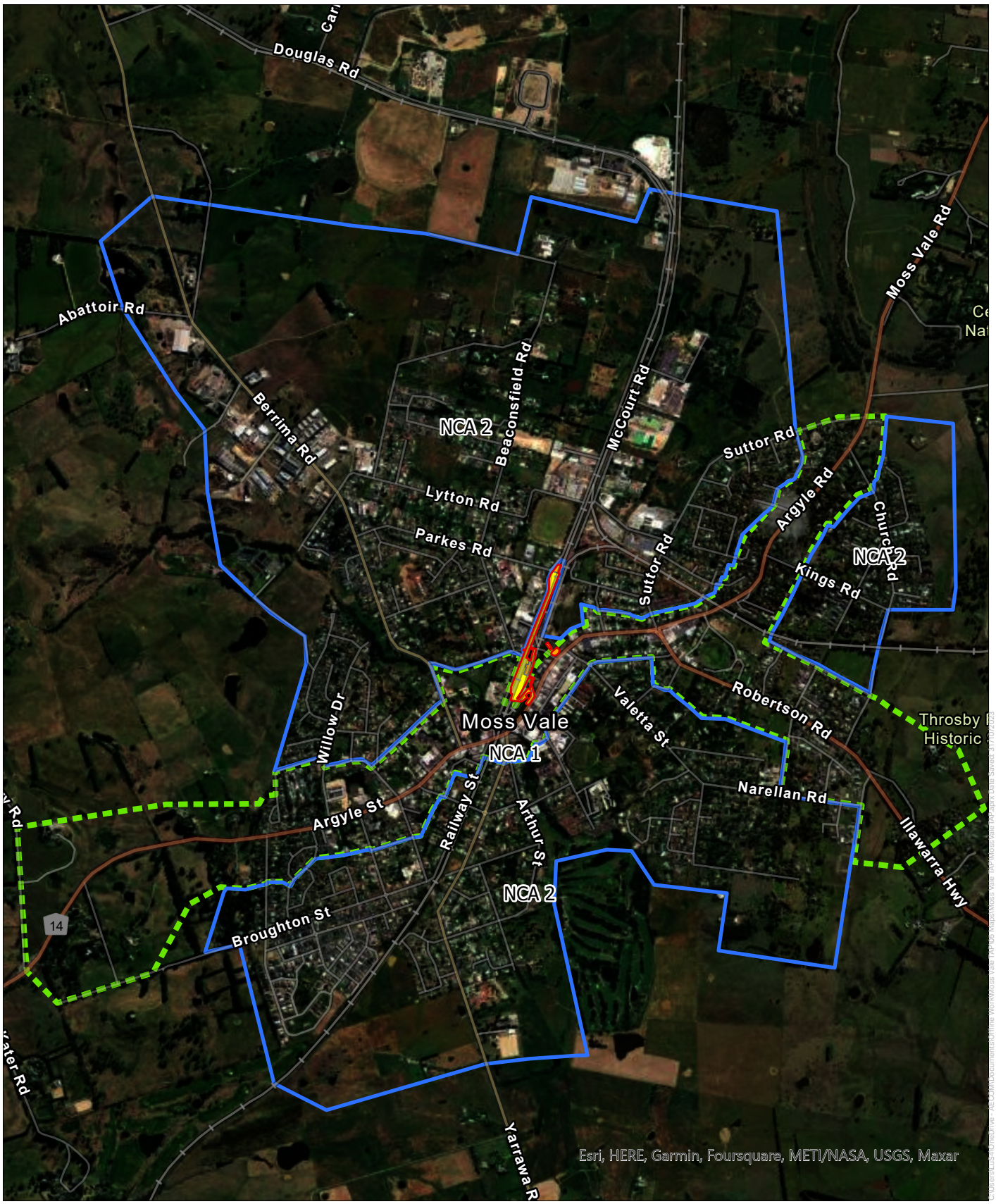

Figure 3 - Noise catchment areas

N

0 360 720 Meters

AECOM

- Proposal Area
- Ancillary Facility
- Construction Footprint
- NCA 1
- NCA 2

4.3 Unattended noise monitoring

Long term unattended noise monitoring was previously conducted at one initial location close to the stabling yard by Aurecon, and then at two locations in the vicinity of the proposal area by others (Renzo Tonin & Associates). The noise logging completed by Renzo Tonin is considered to be more representative of noise sensitive receivers in the vicinity of the proposal and was completed between Tuesday 27 June and Thursday 6 July 2023. The noise loggers were placed at:

- 177 Lackey Road (L1)
- Corner of Hoskins Street and Baker Road (L2).

The noise monitoring locations are shown in Figure 4.

Figure 4 - Unattended noise monitoring locations

N

0 80 160 Meters

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- Proposal Area
- Ancillary Facility
- Construction Footprint
- Noise Monitoring Locations

4.4 Noise monitoring results

The background noise level is defined by the EPA as '*the underlying level of noise present in ambient noise… when extraneous noise is removed*'. It can include sounds that are normal features of a location and may include birds, traffic, insects, etc. The background noise level is represented by the L_{A90} descriptor. The noise levels previously measured provide a single RBL for each day, evening, and night period in accordance with the EPA's NPfI for each monitoring location. The RBL is established by determining the lowest tenth percentile level of the L_{A90} noise data acquired over each period of interest. A summary of the measurement data is presented in Table 4-1.

Table 4-1 Existing background (L_{A90}) and ambient (L_{Aeq}) noise levels

Noise monitoring location	L_{Aeq} ambient noise levels, dB(A)			L_{A90} background noise levels, dB(A)		
	Day[1]	Evening[1]	Night[1]	Day[1]	Evening[1]	Night[1]
L1	64	61	57	45	35	(29) 30[2]
L2	55	46	48	39	34	30

Notes:

1. *Day is defined as 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays.*
   Evening is defined as 6pm to 10pm Monday to Sunday and Public Holidays.
   Night is defined as 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.
2. *Where the rating background level is found to be less than 35 dB(A) during the daytime then it is set to 35 dB(A). Where it is found to be less than 30 dB(A) during evening or night-time then it is set to 30 dB(A) in accordance with NSW NPfI*

4.5 Heritage items

There are a number of heritage-listed items located in the vicinity of the proposal. Within the proposal area, Moss Vale Station is a State heritage listed railway station. The 'Moss Vale Railway and Yard Group' is listed on the NSW State Heritage Register (SHR) (SHR no. #01200).

Additionally, the Moss Vale Rail Underbridge over Argyle Street to the station's south is also listed on the SHR (SHR no. #1049).

Moss Vale Station is also subject to three listings on the Section 170 Register maintained by NSW Government agencies under the NSW *Heritage Act 1977*:

- Moss Vale Railway Precinct – TAHE
- Moss Vale Railway Precinct – ARTC
- Moss Vale Rail Underbridge (Argyle Street) – ARTC.

Other locally heritage listed items within the study area include:

- 'Former Station Master's Residence' at 249 Argyle Street, Moss Vale. This property lies adjacent to the east of the footbridge of Moss Vale.
- 'Moss Vale Court House' at 356 Argyle Street, Moss Vale. This building lies approximately 100 metres south east of Moss Vale.
- 'St Paul's International College' at 463 Argyle Street, Moss Vale. This complex of buildings lies approximately 400 metres south west of Moss Vale Station.

On the eastern side of the rail corridor there are also other locally listed heritage items, such as Leighton Gardens, Throsby Manor, which was the former Council Chamber, and Whytes Shop.

On the western side of the rail corridor there are other locally listed heritage items, such as St Paul's Roman Catholic Church, former St John's Anglican Rectory, Moss Vale Public School, and St Andrew's Presbyterian Church.

Several Heritage Conservation Areas (HCAs) lie within the study area, each containing many locally significant heritage items. HCAs surrounding the station include:

- Argyle Street North Conservation Area – C1836 (WLEP 2010) – Moss Vale Station and part of its rail corridor are included within this HCA which extends east up to Clarence Street, covering approximately half of Moss Vale Local Centre.
- Throsby/Arthur Street Conservation Area – C1838 (WLEP 2010) – Located on the eastern side of the rail corridor and south of Argyle Street North HCA, covering residential developments.
- Valletta Street Conservation Area – C1840 (WLEP 2010) – Located on the eastern outskirt of the study area, covering low density residential areas.
- Argyle/Browley Street Conservation Area – C1837 (WLEP 2010) – Located on the western side of the rail corridor, south of Whites Creek, and covering a mix of Moss Vale Local Centre and medium density residential areas.

The locations of the listed heritage items are shown in Section 6.5 of the REF.

Refer to Appendix C of the REF (Statement of Heritage Impact) for more information on these heritage listings and their significance.

5.0 Construction noise and vibration criteria

5.1 Construction noise

The potential risk of adverse construction noise impacts on a receiver is determined by the extent of its emergence above the existing background noise level, the duration of the event and the characteristics of the noise.

The *Interim Construction Noise Guideline* (ICNG) is a NSW Government document (DECC, 2009) that identifies ways to manage impacts of construction noise on residences and other sensitive land uses. It is the principal guideline for the assessment and management of construction noise in NSW and is used to establish construction noise management levels.

As the construction stage of the proposal is expected to continue for a period of more than three weeks and construction activity would occur within relatively close proximity to noise sensitive receivers, a quantitative assessment based on 'reasonable' worst case construction scenarios, has been carried out for these works, in accordance with the ICNG.

Noise levels resulting from construction activities are predicted at nearby noise sensitive receivers using environmental noise modelling software SoundPlan 8.2 and compared to the noise management levels, derived in accordance with the ICNG.

Where an exceedance of the noise management levels is predicted, the ICNG advises that receivers can be considered 'noise affected' and the proponent should apply all feasible and reasonable work practices to minimise the noise impact. The proponent should also inform all potentially affected residents of the nature of the works to be carried out, the expected noise level and duration, as well as provide contact details to facilitate feedback from affected residents during construction.

Where construction noise levels at a receiver reach 75 dB(A), residential receivers are considered to be 'highly noise affected' and the proponent should, in consultation with the community, consider restrictions to the hours of construction to provide respite periods.

The ICNG defines what is considered to be feasible and reasonable as follows:

Feasible

> *A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements.*

Reasonable

> *Selecting reasonable measures from those that are feasible involves making a judgment to determine whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the measure.*

The construction noise management levels (NMLs) for the residential receivers in proximity to the proposal are detailed below.

5.1.1 Residential receivers

Guidance for setting construction noise management levels for residential receivers is summarised in Table 5-1.

Table 5-1 ***Interim Construction Noise Guideline*** **residential noise management levels**

Time of day	NML, $L_{Aeq,15min}$, dB(A)[1]	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	'Noise affected' level RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise: • Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level • The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details.
	'Highly noise Affected' level 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise: • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	'Noise affected' level RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours • The proponent should apply all feasible and reasonable work practices to meet the noise affected level • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community • The ICNG provides guidance on negotiating agreements.

Notes:

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

The CNVG-PTI sets out community perceptions of construction noise dependent upon the level of exceedance of the rating background level and noise management levels. These are presented in Table 5-2.

Table 5-2 Community perception of construction noise

Perception	dB(A) above rating background level	dB(A) above noise management level – Standard hours	dB(A) above noise management level – Out-of-hours
Noticeable	5-10	0	0-5
Clearly audible	11-20	1-10	6-15
Moderately intrusive	21-30	11-20	16-25
Highly intrusive	>30	>20	>25

Details of the construction noise management levels for residential receivers in each NCA are provided in Table 5-3.

Table 5-3 Noise catchment areas and construction noise management levels

NCA	Representative logger	Period	Rating background level, dB(A)	Construction noise management level (NML)[2]
1	L1	Day	45	55 (50)[3]
		Evening	35	40
		Night	(29) 30[1]	35
2	L2	Day	39	49 (44)[3]
		Evening	34	39
		Night	30	35

Notes:
1. *In accordance with Noise Policy for Industry Table 2.1, a minimum RBL has been adopted where the measured RBL is less than 35 dB(A) during the day, 30 dB(A) for the evening, or 30 dB(A) at night.*
2. *Standard hours day noise management levels = RBL + 10 dB(A), out-of-hours (OOH) daytime/evening/night noise management levels = RBL + 5 dB(A)*
3. *Daytime OOH*

5.1.2 Non-residential criteria

Construction noise management levels recommended by the ICNG for non-residential sensitive land uses, such as schools, hospitals or places of worship are provided in Table 5-4. Noise management levels for commercial and industrial premises are provided in Table 5-5.

Table 5-4 Construction noise management levels – non-residential sensitive land uses

Land use	Construction noise management level, $L_{Aeq(15\ min)}$
Education (classrooms at schools and other educational institutions)	Internal noise level 45 dB(A)
Places of worship	Internal noise level 45 dB(A)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dB(A)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dB(A)
Community centres	Depends on the intended use of the centre. Refer to the recommended “maximum” internal levels in AS2107 for specific uses.

Table 5-5 Construction noise management levels – commercial and industrial land uses

Land use	Construction noise management level, $L_{Aeq(15min)}$
Industrial premises	External noise level 75 dB(A)
Offices, retail outlets	External noise level 70 dB(A)

5.1.3 Sleep disturbance criteria

The ICNG requires a sleep disturbance analysis where construction work is planned to extend over more than two consecutive nights. The L_{A1} noise levels and number of expected L_{A1} noise events should be predicted in order to determine the likelihood of potential sleep disturbance.

The EPA recommends that to minimise the risk of sleep disturbance during the night-time period (10.00 pm to 7.00 am), the $L_{A1(1\ min),}$ noise level outside a bedroom window should not exceed the $L_{A90\ (15\ minute)}$ background noise level by more than 15 dB(A). If this screening criterion is found to be exceeded, then a more detailed analysis must be undertaken and include the extent that the maximum noise level exceeds the background noise level and the number of times this is likely to happen during the night-time period.

Sleep disturbance research presented in the *NSW Road Noise Policy* (DECCW 2011) concludes that *'maximum internal noise levels below 50-55 dB(A) are unlikely to cause awakening reactions'*. Therefore, given that an open window provides approximately 10 dB in noise attenuation from outside to inside, external noise levels of 60-65 dB(A) are unlikely to result in awakening reactions.

Based on the measured background noise levels during the night-time period, the sleep disturbance criteria for the nearest noise sensitive residential receivers are presented in Table 5-6.

Table 5-6 Sleep disturbance criteria

Noise catchment area	Night-time background noise level (L_{A90}), dB(A)	Sleep disturbance criteria, $L_{A1(1\ minute)}$, dB(A) (external)	
		Screening level	Awakening reaction
1	30	45	60 – 65
2	30	45	60 – 65

5.1.4 Construction road traffic noise criteria

Noise from construction traffic on public roads is not covered by the ICNG. However, the ICNG does refer to the *Road Noise Policy* (RNP) for the assessment of noise arising from construction traffic on public roads.

In accordance with the RNP, to assess noise impacts from construction traffic, an initial screening test should be undertaken by evaluating whether existing road traffic noise levels would increase by more than 2 dB(A). Where the predicted noise increase is 2 dB(A) or less, then no further assessment is required. However, where the predicted noise level increase is greater than 2 dB(A), and the predicted road traffic noise level exceeds the road category specific criterion, then noise mitigation should be considered for those receivers affected. The road category specific criteria are presented in Table 5-7 below. The RNP does not require assessment of noise impacts to commercial or industrial receivers.

Table 5-7 Road traffic noise assessment criteria

Road category	Type of land use	Assessment criteria, dB(A)	
		Day (7am – 10pm)	Night (10pm – 7am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq(15\ hour)}$ 60 dB(A)	$L_{Aeq(9\ hour)}$ 55 dB(A)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq(1\ hour)}$ 55 dB(A)	$L_{Aeq(1\ hour)}$ 50 dB(A)

5.2 Construction vibration criteria

The relevant standards and guidelines for the assessment of construction vibration are summarised in Table 5-8.

Table 5-8 Standards/guidelines used for assessing construction vibration

Item	Standard/guideline
Structural damage	• Heritage structures – *German Standard DIN 4150 – Part 3 – Structural Vibration in Buildings – Effects on Structures* • Non-heritage structures – *Evaluation and Measurement for Vibration in Buildings Part 2, (British Standard (BS) 7385: Part 2-1993)*
Human comfort (tactile vibration)	• NSW Department of Environment and Conservation, *Assessing Vibration: A Technical Guideline, 2006 (AVATG, 2006)*[1]

Notes:

1. *This document is based upon the guidelines contained in British Standard 6472:1992, "Evaluation of human exposure to vibration in buildings (1-80 Hz)". This British Standard was superseded in 2008 with BS 6472-1:2008 "Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting" and the 1992 version of the Standard was withdrawn. Although a new version of BS 6472 has been published, the Environment Protection Authority still requires vibration to be assessed in accordance with the 1992 version of the Standard at this point in time.*

Vibration, at levels high enough, has the potential to cause damage to structures and disrupt human comfort. Vibration and its associated effects are usually classified as continuous, impulsive, or intermittent as follows:

- continuous vibration continues uninterrupted for a defined period and includes sources such as machinery and continuous construction activities
- impulsive vibration is a rapid build up to a peak followed by a damped decay. It may consist of several cycles at around the same amplitude, with durations of typically less than two seconds and no more than three occurrences in an assessment period. This may include occasional dropping of heavy equipment or loading activities
- intermittent vibration occurs where there are interrupted periods of continuous vibration, repeated periods of impulsive vibration or continuous vibration that varies significantly in magnitude. This may include intermittent construction activity, impact pile driving, or the use of jackhammers.

5.2.1 Structural damage

At present, no Australian Standards exist for the assessment of building damage caused by vibration. DIN 4150 and BS 7385-2 provide recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are presented in Table 5-9 and Table 5-10. DIN 4150 states that buildings exposed to higher levels of vibration than recommended limits would not necessarily result in damage. Structural damage criteria for heritage items have been taken from DIN 4150, whilst criteria for commercial/residential items have been taken from BS 7385-2.

Table 5-9 Structural damage safe limits (DIN 4150) for building vibration

Group	Type of structure	At foundation – Less than 10 Hz	At foundation - 10 Hz to 50 Hz	At foundation - 50 Hz to 100 Hz[1]	Vibration at the horizontal plane of the highest floor for all frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20 mm/s	20 to 40 mm/s	40 to 50 mm/s	40 mm/s
2	Dwellings and buildings of similar design and/or use	5 mm/s	5 to 15 mm/s	15 to 20 mm/s	15 mm/s
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order/heritage listed)	3 mm/s	3 to 8 mm/s	8 to 10 mm/s	8 mm/s

Notes:

1. At frequencies above 100 Hz, the values given in this column may be used as minimum values.

Table 5-10 BS 7385-2: Transient vibration guide values for cosmetic damage

Group	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

5.2.2 Human comfort

Humans are sensitive to vibration such that they can detect vibration levels well below those required to cause any risk of damage to a building or its contents. Criteria to avoid annoyance are therefore more stringent than those to prevent structural damage.

5.2.2.1 Intermittent vibration

The assessment of intermittent vibration outlined in *Assessing Vibration: A Technical Guideline* is based on Vibration Dose Values (VDVs). The VDV accumulates the vibration energy received over the daytime and night-time periods.

Maximum and preferred VDVs for intermittent vibration arising from construction activities are listed in Table 5-11. The VDV criteria are based on the likelihood that a person would be annoyed by the level of vibration over the entire assessment period.

Table 5-11 Preferred and maximum vibration dose values for intermittent vibration (m/s$^{1.75}$)

Location	Day time		Night-time	
	Preferred	Max	Preferred	Max
Critical areas[1]	0.10	0.20	0.10	0.20
Residences[2]	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes:

1. *Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria.*
2. *Criteria for residences are lower than schools as people expect to be able to relax/sleep in their homes without annoyance and are generally more concerned about structural damage than would be the case within schools and offices.*

5.2.2.2 Continuous and impulsive vibration

Acceptable levels of human exposure to continuous and impulsive vibration are dependent on the time of day and the activity taking place in the occupied space. *Assessing Vibration: A Technical Guideline* provides the preferred values for continuous and impulsive vibration. These are presented in Table 5-12.

There is low probability of adverse comment or disturbance to building occupants at vibration values below the preferred values in Table 5-12. Situations exist where vibration above the preferred values can be acceptable, particularly for temporary disturbances and infrequent events of short duration. Vibration levels above those indicated in Table 5-12 may be dealt with through negotiation with the regulator of the affected community.

Table 5-12 Peak particle velocity for continuous and impulsive vibration (mm/s)

Location	Assessment period	Preferred	Maximum
Continuous vibration			
Residences[1]	Day Night	0.28 0.20	0.56 0.40
Offices, schools, educational institutions and places of worship	When in use	0.56	1.10
Impulsive vibration			
Residences[1]	Day Night	8.60 2.80	17.0 5.60
Offices, schools, educational institutions and places of worship	When in use	18.0	36.0

Notes:

1. *Criteria for residences are lower than schools as people expect to be able to relax/sleep in their homes without annoyance and are generally more concerned about structural damage than would be the case within schools and offices.*

6.0 Operational noise criteria

The proposal includes changes to the station and maintenance facilities for rolling stock (the stabling yard) only. As a result, operational noise is to be assessed in accordance with the Environment Protection Authority (EPA) *Noise Policy for Industry* (NPfI), rather than with the EPA Rail Infrastructure Noise Guideline (2013).

6.1 EPA – NSW NPfI

The NPfI provides guidance in relation to acceptable noise limits for industrial noise emissions, which includes, but is not limited to, noise emissions from mechanical plant. The NPfI sets out a procedure to determine project noise trigger levels relevant to a development. If it is predicted that the development is likely to exceed the project noise trigger level at existing noise sensitive receivers, then management measures need to be considered to reduce the predicted noise level.

The assessment procedure in the NPfI has two components:

- controlling **intrusive** noise impacts in the short term for residences
- maintaining noise level **amenity** for residences and other land uses.

Both components are assessed at the boundary of the noise sensitive receiver site, or if the site boundary is more than 30 metres from the noise sensitive building, a distance of 30 metres from the noise sensitive building.

6.1.1 Intrusive noise impacts

The NPfI states that the intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (L_{Aeq} level), measured over a 15-minute period, does not exceed the background noise level measured by more than 5 dB. The RBL is the background noise level to be used for assessment purposes and is determined by the methods given in Section 3.1 of the NPfI.

The intrusive noise criteria for the proposal are shown in Table 6-1 below.

Table 6-1 Recommended $L_{Aeq,\ 15\ minute}$ intrusive noise criteria levels from industrial noise sources

Noise catchment area	Time of day[1]	RBL ($L_{A90,\ 15\ minute}$), dB(A)	Intrusive criterion RBL + 5 ($L_{Aeq,\ 15\ minute}$)
NCA 1	Day	45	50
	Evening	35	40
	Night	30	35
NCA 2	Day	39	44
	Evening	34	39
	Night	30	35

Notes:

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

6.1.2 Protecting noise amenity

To limit continuing increases in noise levels, the maximum ambient noise level resulting from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.1 of the NPfI. The proposal area and its surroundings consist of light-industry and commercial premises, rail, and traffic flows along Argyle Street, Illawarra Highway, and Berrima Road. Therefore, the residential receivers are considered to be within a suburban amenity area. The relevant amenity criteria is shown in Table 6-2.

Table 6-2 Recommended L_{Aeq} amenity noise levels from industrial noise sources

Type of Receiver	Time of Day	Recommended L_{Aeq} Noise Level dB(A)
Residences - Suburban	Day	55
	Evening	45
	Night	40
School classroom - Internal	Noisiest 1-hour period when in use	40[1]
Place of worship – Internal	When in use	40
Active recreation area	When in use	55
Passive recreation area	When in use	50
Commercial premises	When in use	65
Industrial premises	When in use	70
Industrial interface (applicable only to residential noise amenity areas)[1]	All	Add 5 dB(A) to recommended noise amenity area

Notes:

1. *In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable L_{Aeq} noise level may be increased to 40 dB $L_{Aeq(1hr)}$.*
2. *An area that is in close proximity to existing industrial premises and that extends out to a point where the existing industrial noise from the source has fallen by 5 dB or an area defined in a planning instrument. Beyond this region the amenity noise level for the applicable category applies. This category may be used only for existing situations.*

According to Section 2.4 of the NPfI, the amenity level applicable to the proposal is equal to the recommended level minus 5 dB(A). This takes into account the cumulative impacts of other industrial noise sources in the area.

As per the NPfI, the project amenity level is converted to a 15-minute period by adding 3 dB(A).

A summary of the project amenity levels for residential and non-residential receivers is presented in Table 6-3.

Table 6-3 Project $L_{Aeq,15\ minute}$ amenity noise levels

Type of Receiver	Time of Day	Project $L_{Aeq,15\ minute}$ Amenity Noise Level dB(A)
Residences – Suburban[1]	Day	53
	Evening	43
	Night	38
Industrial interface 117-133 Lackey Road, Moss Vale	Day	58
	Evening	48
	Night	43
School classroom - Internal	Noisiest 1-hour period when in use	38
Place of worship – Internal	When in use	38
Active recreation area	When in use	53
Passive recreation area	When in use	48
Commercial premises	When in use	63
Industrial premises	When in use	68

Notes:1. Except for 117-133 Lackey Road, Moss Vale which are located within an industrial interface.

6.1.3 Project specific noise criteria

Section 6.1 of the NPfI acknowledges that many existing industrial sources were designed for higher noise levels than the project noise trigger levels determined in line with this policy. The NPfI notes that there is no 'one-size-fits-all' approach to determine the impact from an existing industry, such as the Moss Vale Stabling Yard. The following governing principles should be applied when determining the project noise trigger levels and/or assessment requirements for existing industry:

- The project noise trigger levels should not be applied as mandatory noise limits. The project noise trigger level is the level used to assess noise impact and drive the process of assessing all feasible and reasonable control measures.
- Where an existing industry has been in operation for more than ten years and existing site operations exceed the project amenity noise level, the project amenity noise level may be adopted as the project noise trigger level to assess existing, and existing plus proposed site operations, as relevant.
- Where a development proposal involves a discrete process, and premises-wide mitigation has or is to be considered outside of the development proposal, a project noise trigger level for noise from new/modified components (not the whole site) of the operation may be set at 10 dB(A) or more below existing site noise levels or requirements. This approach means that the increase in noise from the whole site is minimised and provides scope for existing components to achieve noise reductions over time.

Therefore, considering the average noise level results from Aurecon's attended noise measurements and that Moss Vale Stabling Yard has been in operation for more than ten years, the project amenity noise level is to be adopted as the project noise trigger level to assess the noise from the stabling yard operations.

A summary of the project noise trigger levels for the proposal is presented in Table 6-4.

Table 6-4 Project specific noise levels

Receiver area	Period[1]	Project specific noise criteria, ($L_{Aeq,15\ minute}$)
Residences - NCA 1[1]	Day	53
	Evening	43
	Night	38
Residences - NCA 1 117-133 Lackey Road, Moss Vale	Day	58
	Evening	48
	Night	43
Residences - NCA 2	Day	53
	Evening	43
	Night	38
School classroom - Internal	Noisiest 1-hour period when in use	38
Place of worship – Internal	When in use	38
Active recreation area	When in use	53
Passive recreation area	When in use	48
Commercial premises	When in use	63
Industrial premises	When in use	68

Notes:

1. Except for 117-133 Lackey Road, Moss Vale which are considered to be located within an industrial interface.

6.2 Operational vibration

Operational vibration is not expected to be an issue as a result of the proposal as the operational activities would not involve vibration generating activities that would create significant vibration levels at nearby sensitive receivers or adjacent properties. Therefore, an assessment of the operational vibration impacts is not required.

7.0 Construction noise and vibration assessment

7.1 Construction noise modelling scenarios

Table 7-1 provides a summary of the construction noise scenarios modelled, including the proposed construction plant/equipment for each scenario and their associated sound power levels. The following construction stages were assessed:

- Stage 1 – Site establishment and enabling works
- Stage 2 – Building and platform works
- Stage 3 – Station entrance works
- Stage 4 – Forecourt/Interchange works
- Stage 6 – Temporary stabling yard provisions
- Stage 7 – Permanent stabling yard construction works
- Stage 8 – Stabling yard services upgrade
- Stage 10 – Demobilisation, testing and commissioning.

Construction stage 5 (communication equipment and services upgrade) and stage 9 (landscaping works) were not assessed as they are expected to be relatively low noise impact activities. Construction stage 5 was also not modelled for out-of-hours work as it was expected to be the least noisy out of the other out-of-hours work scenarios (construction stages 2, 3, and 4).

Out-of-hours work would likely be required during about seven rail shutdown periods over the 19-month construction period to minimise traffic impacts and allow for work which requires track access. It should be noted that night-time construction work during scheduled rail shutdown periods would effectively serve as a respite mitigative measure as works would not take place over more than two consecutive nights. This would provide some respite to surrounding receivers during weekdays between work.

Table 7-1 Construction assessment stages and scheduling

ID	Construction stage	Scheduling	Equipment	SWL per unit, dB(A)[1]
1	Site establishment and enabling works	Standard Hours	Crane truck	107[2]
			Diesel generator	103
			Elevated work platform	97
			Excavator (5 tonne)	93
			Hand tools	94
			Lighting tower	88
			Loader – skid steer	105
			Power tools	91[2]
			Truck – road/truck and dog	105[2]
			Woodchipper/mulcher	116
			Total	**117**
2	Building and platform works	Standard Hours and Possession Period	Concrete saw	118[2,3]
			Excavator (5 tonne)	93
			Hand tools	94
			Hi-rail crane	107[2]

ID	Construction stage	Scheduling	Equipment	SWL per unit, dB(A)[1]
			Hi-rail elevated work platform	97
			Hi-rail truck	103
			Jackhammer	110[2]
			Line marking truck	108
			Pavement laying machine	114
			Truck - concrete	109
			Total	**121**
3	Station entrance works	Standard Hours and Possession Period	Concrete pump	109
			Crane – franna	97[2]
			Crane – mobile	112[2]
			Crane truck	107[2]
			Drilling rig	109[2]
			Elevated work platform	97
			Excavator (8 tonne)	99
			Excavator (14 tonne)	111
			Hi-rail crane	107[2]
			Loader – skid steer	110
			Slew crane	112[2]
			Truck – concrete	109
			Truck – medium rigid	103
			Truck – road/truck and dog	105[2]
			Vibratory roller	109[2,3]
			Woodchipper/mulcher	116
			Total	**121**
4	Forecourt/ Interchange works	Standard Hours and Possession Period	Asphalt paver	114
			Asphalt truck	106
			Crane truck	107[2]
			Excavator (5 tonne)	93
			Excavator (14 tonne)	111
			Loader – skid steer	110
			Truck - concrete	109
			Truck – road/truck and dog	105[2]
			Vibratory roller	109[2,3]
			Total	**119**

ID	Construction stage	Scheduling	Equipment	SWL per unit, dB(A)[1]
6	Temporary stabling yard provisions	Standard Hours	Bored piling rig	111[2]
			Concrete pump	109
			Crane truck	107[2]
			Elevated work platform	97
			Excavator (5 tonne)	93
			Excavator (8 tonne)	99
			Loader – skid steer	110
			Truck – concrete	109
			Truck – medium rigid	103
			Truck – road/truck and dog	105[2]
			Vibratory roller	109[2,3]
			Woodchipper/mulcher	116
			Total	**120**
7	Permanent stabling yard construction works	Standard Hours	Asphalt truck	106
			Bored piling rig	111[2]
			Concrete pump	109
			Crane – mobile	112[2]
			Crane truck	107[2]
			Elevated work platform	97
			Excavator (5 tonne)	93
			Excavator (8 tonne)	99
			Excavator (14 tonne)	111
			Loader – skid steer	110
			Pavement laying machine	114
			Smooth drum roller	102[2]
			Truck – concrete	109
			Truck – medium rigid	103
			Truck – road/truck and dog	105[2]
			Vibratory roller	109[2,3]
			Woodchipper/mulcher	116
			Total	**122**

ID	Construction stage	Scheduling	Equipment	SWL per unit, dB(A)[1]
8	Services upgrade at stabling yard	Standard Hours	Concrete pump	109
			Crane – franna	97[2]
			Crane truck	107[2]
			Excavator (5 tonne)	93
			Excavator (8 tonne)	99
			Excavator (14 tonne)	111
			Truck – concrete	109
			Truck – medium rigid	103
			Truck – vacuum	109
			Vibratory roller	109[2,3]
			Total	**117**
10	Demobilisation, testing and commissioning	Standard Hours	Crane truck	107[2]
			Diesel generator	103
			Hand tools	94
			Lighting tower	88
			Light vehicle (4WD)	103
			Loader – skid steer	110
			Power tools	91[2]
			Truck – road/truck and dog	105[2]
			Truck – vacuum	109
			Total	**115**

Notes:

1. *It is highly unlikely that all construction stage noise sources would be generating noise simultaneously.*
2. *Sound powers are time weighted (i.e. expected utilisation percentage per 15 minute period) in accordance with the following:*
    a. *Bored piling rig – 33%*
    b. *Concrete saw – 33%*
    c. *Crane – 75%*
    d. *Jackhammer – 50%*
    e. *Power tools – 50%*
    f. *Roller (smooth drum and vibratory) – 33%*
    g. *Truck – road/truck and dog – 50%*
3. *A +5 dB(A) correction has been added in accordance with the Construction Noise and Vibration Guideline (Public Transport Infrastructure) (TfNSW, 2023) to account for noise with special audible characteristics.*

7.2 Noise modelling methodology

Noise levels due to the construction activities shown in Section 7.1 have been predicted at nearby noise sensitive receivers using SoundPLAN 8.2 noise modelling software and the CONCAWE (Concawe, 1981) method. This method is suited to predicting noise propagation over large distances because it accounts for a range of atmospheric conditions that can significantly influence the propagation of noise over large distances.

The noise model was created to represent ‘reasonable’ worst-case periods of construction works. The following features were included in the noise model:

- ground topography

- ground absorption and reflection
- receivers
- construction noise sources.

There may be differences between predicted and measured noise levels due to variations in instantaneous operating conditions, plant/equipment in operation during the measurement and also the location of the plant/equipment. The acoustic shielding calculated in the model due to fixed building structures would also vary as the construction plant/equipment moves around the site.

7.2.1 Construction modelling assumptions

The following assumptions have been made in modelling all construction noise scenarios:

- for all construction scenarios, all equipment would be operating at the same time, which is unlikely, and is a conservative assumption
- plant/equipment is assumed to be operating at the proposal area boundary at the closest point to each receiver, in order to present the worst-case scenario for each receiver. In reality, the plant/equipment would only be at the closest point to each receiver for limited periods
- neutral atmospheric conditions, i.e. relatively calm, no wind.

Additionally, it is assumed that limited deliveries would be received during out-of-hours and therefore this has not been assessed in detail. Emergency situations have also not been assessed in detail during out-of-hours. It is assumed that receipt of deliveries and emergency activities would be undertaken in accordance with an Out-of-hours Works procedure.

7.3 Predicted construction noise levels

The identified residential and non-residential receivers have been assessed against the standard hours and out-of-hours night-time NMLs. The level of impact may change depending on the final construction methodology and further assessment would be undertaken if required.

All construction noise modelling scenarios were assessed during standard construction hours. Three scenarios – building and platform works, station entrance works, and forecourt/interchange works – were also assessed during night-time hours to assess the noise impacts of these scenarios during rail shutdown periods.

Construction noise contours calculated at 1.5 m above ground level are presented in Appendix B.

7.3.1 Residential receivers

Table 7-2 and Table 7-3 present the construction noise modelling results for residential receivers and shows the number of receivers where the construction NMLs are likely to be exceeded during standard hours and night-time hours respectively. The tables also present the number of receivers where noise levels are predicted to exceed the highly affected level, 75 dB(A). The community perception of noise is defined as ‘noticeable’, ‘clearly audible’, ‘moderately intrusive’ and ‘highly intrusive’ as defined in Table 5-2.

Table 7-2 Number of residential receivers where noise levels may exceed NMLs during standard construction hours

Construction stage	Number of residential receivers where noise levels may exceed the applicable NML			
	Exceedance of NMLs during ICNG standard construction hours			Highly affected
	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	> 75 dB(A)
Site establishment and enabling works	313	42	21	15
Building and platform works	367	30	13	12

Construction stage	Number of residential receivers where noise levels may exceed the applicable NML			
	Exceedance of NMLs during ICNG standard construction hours			Highly affected
	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	> 75 dB(A)
Station entrance works	424	40	13	10
Forecourt/Interchange works	233	22	9	7
Temporary stabling yard provisions	338	64	12	6
Permanent stabling yard construction works	457	96	18	7
Services upgrade at stabling yard	228	31	8	5
Demobilisation, testing and commissioning	214	31	16	14

Table 7-3 Number of residential receivers where noise levels may exceed NMLs during night-time works

Construction stage	Number of residential receivers where noise levels may exceed NML across the proposal area				
	Exceedance of NMLs outside of standard construction hours (night-time)				Highly affected
	1 – 5 dB(A)	6 – 15 dB(A)	16 – 25 dB(A)	> 25 dB(A)	> 75 dB(A)
Building and platform works	413	1,019	364	48	12
Station entrance works	450	1,041	421	65	10
Forecourt/ Interchange works	434	910	239	34	7

The results show that construction noise levels are predicted to exceed the NMLs during both standard hours and (out-of-hours) night-time hours for all assessed construction stages. The largest number of exceedances occur during permanent stabling yard construction works for standard construction hours, and during station entrance works for night-time works.

It is important to consider that this assessment is representative of the worst-case 15-minute period of construction activity, with the construction equipment located at the closest distance from each sensitive receiver location. The assessed scenarios do not represent the ongoing day-to-day noise impact at noise sensitive receivers for an extended period of time.

Particularly noisy activities, such as mulching and concrete sawing, are likely to persist for only a fraction of the overall construction period. Typical noise levels could be 5 to 10 dB(A) lower dependent on the site and nature of works.

There are residential receivers predicted to be ‘highly affected’ for the construction stages assessed during standard and night-time hours. The ICNG states additional consideration for mitigation should be afforded for ‘highly noise affected’ receivers. These receivers would receive additional consultation with

regards to specific timing and impacts of construction works. Respite periods would also be considered for these receivers in accordance with the ICNG.

Feasible and reasonable mitigation measures would be detailed in a Construction Noise and Vibration Management Plan for the proposal (refer to Section 7.8.1).

7.3.2 Non-residential receivers

Table 7-4 presents the construction noise modelling results for non-residential receivers and shows the number of receivers where the NMLs are likely to be exceeded during the receivers' hours of use. It is important to consider that this assessment is representative of the worst case 15-minute period of construction activity, while the construction equipment is at the nearest location to each receiver location. The results show that construction activities are expected to exceed the NMLs at a number of non-residential receivers.

Table 7-4 Number of non-residential receivers where noise levels may exceed NMLs when in use

Construction stage	Number of non-residential receivers where noise levels may exceed NML across the proposal area		
	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)
Site establishment and enabling works	19	9	0
Building and platform works	17	12	1
Station entrance works	15	13	2
Forecourt/Interchange works	18	7	0
Temporary stabling yard provisions	18	5	2
Permanent stabling yard construction works	18	4	4
Services upgrade at stabling yard	9	6	0
Demobilisation, testing and commissioning	10	9	0

7.4 Sleep disturbance assessment

A sleep disturbance assessment was undertaken to assess the potential impact of night-time works during the rail possession periods on sleep disturbance. Table 7-5 below presents the number of residential receivers where predicted noise levels exceed the sleep disturbance criteria and the sleep awakening reaction criteria.

Table 7-5 Number of residential receivers where noise levels exceed the sleep disturbance criteria

Construction stage	Sleep disturbance criteria, dB(A)	Awakening reaction criteria, dB(A)	Maximum $L_{A1(1min)}$ noise level at receivers, dB(A)	Number of receivers where predicted noise levels exceed	
				Sleep disturbance criteria	Awakening reaction criteria
Building and platform works	45	65	98	1,844	145

Construction stage	Sleep disturbance criteria, dB(A)	Awakening reaction criteria, dB(A)	Maximum $L_{A1(1min)}$ noise level at receivers, dB(A)	Number of receivers where predicted noise levels exceed	
				Sleep disturbance criteria	Awakening reaction criteria
Station entrance works	45	65	96	1,307	40
Forecourt/ Interchange works	45	65	87	901	24

A large number of exceedances of the sleep disturbance screening criteria have been predicted due to the night-time construction work associated with the proposal. Exceedances of the awakening reaction screening criterion have also been predicted at several receivers. These exceedances are attributed to the close proximity of the construction site to the residences.

It is noted that the work would generally be progressive so that not all receivers would be affected at any one time, or for the overall duration of the work. The majority of construction activities, including particularly noisy activities, would be undertaken during the day where feasible.

Given the number of NML exceedances, an effective communication plan and noise management measures must be developed during detailed design to minimise the impacts upon affected residential receivers.

7.5 Construction traffic assessment

The predicted construction traffic volumes required for the proposal include the following:

- About 30 light vehicles and two heavy vehicles per day for the station upgrade
- About 15 light vehicles and ten heavy vehicles per day for the stabling yard upgrade.

Traffic modelling for Moss Vale was previously conducted by Stantec for Wingecarribee Council. This information is presented as an attachment to the Council meeting report dated March 2022 (*Agenda Attachment 3 – TRACKS Moss Vale Bypass 2016 – 2036 All Vehicle Bypass Plots*, available at: https://www.yoursaywingecarribee.com.au/MVbypass). The traffic modelling provided existing daily traffic flow volumes for 2021, indicating an average of over 15,700 vehicles for Argyle Street and 1,500 vehicles for Lackey Road.

Given the existing traffic volume on Argyle Street and Lackey Road, the indicative construction traffic volumes for the proposal of 45 light vehicles and 12 heavy vehicles per day would have a negligible impact on the road network. Road traffic noise levels would not increase by more than 2 dB(A) and would therefore comply with the RNP criteria.

However, to minimise the construction traffic noise levels, construction traffic management should still be considered as part of the CNVMP.

7.6 Cumulative construction noise impacts

7.6.1 Overlapping construction stages

While most construction activities are expected to occur at distinct scheduled times and at different locations, it is possible that noisy construction activities for the proposal may occur at the same time in close proximity to each other. In these cases, it is possible that an increase of up to 3 dB(A) of the highest noise level predicted for any construction stage may occur (assuming that at any one location equal noise levels from two stages of works are experienced). In this case, this increase is not expected to create any further exceedances in the NMLs.

Overlapping construction stages and identification of receivers subject to increased noise levels would be determined during detailed design. Additional mitigation measures would also be identified during detailed design if required.

7.6.2 Cumulative noise from station and stabling yard construction

Where noise from construction works at the station and the stabling yard occur simultaneously, there is the potential to increase noise levels at nearby sensitive receivers. For the cumulative construction noise impact assessment, the permanent stabling yard construction works scenario (Stage 7) from AECOM's assessment was considered instead of the noisiest construction scenario (Stage 2) from Aurecon's report. Although both scenarios have similar overall SWLs, the permanent stabling yard construction works scenario was selected as it is based on the most recent equipment and staging information for this proposal.

As indicated in Table 7-1, permanent stabling works is the noisiest construction scenario. For the cumulative construction noise impact assessment, the permanent stabling yard construction works stage was assessed together with the noisiest station works stage. The indicative construction program provided by Degnan Constructions, dated 17 July 2023, was reviewed to identify station works scenarios which are scheduled to overlap with the permanent stabling yard construction works schedule. The overlapping construction stages are presented in Table 7-6.

Table 7-6 Station and stabling yard works with overlapping construction schedules

Construction stage	Schedule	SWL, dB(A)
Station works		
Building and platform works	22 April 2024 – 20 September 2024	121
Station entrance works	30 January 2024 – 13 December 2024	121
Forecourt/Interchange works	22 April 2024 – 29 November 2024	118
Demobilisation	13 January 2025 – 7 February 2025	115
Stabling yard works		
Permanent stabling yard construction works	24 July 2024 – 23 April 2025	122

As shown in Table 7-6, building and platform works and station entrance works have the same SWLs. However, building and platform works was selected for the cumulative noise impact assessment as the works cover a larger area and it consists of more noise intensive construction activities, including jackhammering and concrete sawing.

The cumulative noise levels due to the simultaneous occurrence of building and platform works and permanent stabling yard construction works have been predicted at nearby noise sensitive receivers using the same noise modelling methodology and assumptions described in Section 7.2. The noise levels were predicted for standard construction hours only as there would be no night works associated with the permanent stabling yard construction works stage. Table 7-7 and Table 7-8 presents the predicted cumulative construction noise results for residential receivers and shows the number of receivers where the construction NMLs are likely to be exceeded during standard hours, compared against the single construction scenarios assessed.

Table 7-7 Number of residential receivers where noise levels may exceed NMLs during standard hours due to cumulative construction noise

Construction stage	Number of residential receivers where noise levels may exceed NMLs across the proposal area			
	Exceedance of NMLs during ICNG standard construction hours			Highly affected
	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)	> 75 dB(A)
Building and platform works	367	30	13	12
Permanent stabling yard construction works	457	96	18	7
Cumulative (both stages)	572	106	28	18

Table 7-8 Number of non-residential receivers where noise levels may exceed NMLs when in use due to cumulative construction noise

Construction stage	Number of non-residential receivers where noise levels may exceed NMLs across the proposal area		
	1 – 10 dB(A)	11 – 20 dB(A)	> 20 dB(A)
Building and platform works	17	12	1
Permanent stabling yard construction works	18	4	4
Cumulative (both stages)	20	12	4

For residential receivers, the predicted results for the cumulative construction scenario show an increase in the number of exceedances for receivers affected by noise levels considered to be 'clearly audible' (exceedance of 1 – 10 dB(A)), 'moderately intrusive' (exceedance of 11 – 20 dB(A)), and 'highly intrusive' (exceedance over 20 dB(A)), as well as 'highly affected' (exceedance over 75 dB(A)) receivers.

For non-residential noise sensitive receivers, the results for the cumulative construction scenario show a slight increase in the number of exceedances for receivers affected by noise levels considered to be 'clearly audible' (1 - 10 dB(A)). The number of exceedances for the cumulative construction scenario between 11-20 dB(A) and greater than 20 dB(A) remain the same between building and platform works and permanent stabling yard construction works respectively.

Although the cumulative construction scenario is predicted to have an impact on the surrounding receivers, it is important to consider the following:

- Predicted construction noise impacts at each receiver are considered to be reasonable worst-case 15-minute impacts. Noise levels are likely to be lower than stated in this assessment for substantial periods of time.
- Where a receiver is affected by noise from two sources simultaneously, it is likely that noise levels from one would be dominant and, therefore, overall noise levels would increase only slightly, if at all.
- Detailed construction planning for these stages would be required for a more detailed assessment.

To ensure that adverse impacts at sensitive receivers are minimised, the noise mitigation measures described in Section 7.8 should be implemented.

7.7 Construction vibration assessment

Vibration intensive work may include the use of the following items of equipment:

- jackhammer
- bored piling rig.

The minimum working distances of these items of equipment from off-site receivers are shown in Table 7-9. These minimum distances are based on recommendations of the Transport *Construction Noise and Vibration Guideline (public* (CVNS, 2023) and AECOM's previous project experience. If these minimum working distances are complied with, no adverse impacts from vibration intensive works are likely in terms of human response or cosmetic damage.

The closest residential and commercial receivers are more than 9 and 20 metres from the proposal area respectively, therefore, the proposal can comply with the minimum working distances for residential/commercial receivers at this location.

Several of the heritage-listed items listed in Section 4.5 are located within the proposal area, including Moss Vale Station itself. Vibration intensive work would likely be required within the minimum working distances of the heritage listed station building and its associated components. In this case, mitigation measures to control excessive vibration would be implemented as outlined in Section 7.8.

Table 7-9 Recommended safe working distances for vibration intensive plant

Plant	Rating/ Description	Minimum working distances		
		Cosmetic damage		Human response
		Heritage	Commercial/ Residential	
Jackhammer	Handheld	2 m (nominal)	1 m (nominal)	3 m
Piling rig – bored	≤ 800 mm	5 m	2 m (nominal)	7 m

7.8 Construction mitigation measures

7.8.1 Construction Noise and Vibration Management Plan

A CNVMP would be developed and implemented for the proposal. The CNVMP would include feasible and reasonable safeguards to manage noise emissions from the proposal and complaints received in relation to construction noise or vibration. The CNVMP should include, as a minimum, the following:

- identification of nearby residences and other sensitive land uses
- description of approved hours of work
- description and identification of all construction activities, including work areas, equipment, and duration
- description of what work practices (generic and specific) would be applied to minimise noise and vibration
- a complaints handling process
- noise and vibration monitoring procedures, including for heritage structures
- overview of community consultation required for identified high impact work.

Construction work should be planned and carried out during standard construction hours wherever possible. Table 7-10 presents a summary of the standard mitigation measures contained within the CNVG-PTI which should be considered as mitigation measures within the CNVMP.

Table 7-10 Transport *Construction Noise and Vibration Guideline (Public Transport Infrastructure)* standard mitigation measures

Action required	Safeguard details
Management measures	
Implement stakeholder consultation measures	Periodic notification (monthly letterbox drop and website notification) detailing all upcoming construction activities, would be delivered to sensitive receivers at least 7 days prior to commencement of relevant work or other period as approved to by the relevant Community and Place Director.
Site inductions	All employees, contractors and subcontractors would receive an environmental induction.
Behavioural practices	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.
Noise monitoring	A noise monitoring program would be implemented to assist in confirming and controlling the site-specific potential for disturbance at particularly sensitive localities at the commencement of activities and periodically during the construction program as the work progresses. The program would be developed in accordance with the CNVMP and any approval/licence conditions. The results would be reviewed to determine if additional mitigation measures are required. All measurements would be undertaken in accordance with Australian Standard *1055.2018 – Acoustics – Description and measurement of environmental noise.*
Source controls	
Construction hours and scheduling	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods as far as practicable. This would include the use of demolition saws, coring machines, grinders, impact drills and jackhammers.
Construction respite period	Noise with special audible characteristics and vibration generating activities (including jack hammering) would only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block. 'Continuous' includes any period during which there is less than a 1-hour respite between ceasing and recommencing any of the work. No more than two consecutive nights of noise with special audible characteristics and/or vibration generating work would be undertaken in the same NCA over any 7-day period, unless otherwise approved by the relevant authority.
Equipment selection	Quieter and less vibration emitting construction methods would be used where feasible and reasonable (e.g. rubber wheeled instead of steel tracked plant). Equipment would be regularly inspected and maintained to ensure it is in good working order.
Maximum noise levels	The noise levels of plant and equipment would have operating sound power or sound pressure levels that would meet the predicted noise levels.

Action required	Safeguard details
Rental plant and equipment	Noise emissions would be considered as part of the selection process.
Use and siting of plant	Simultaneous operation of noisy plant within discernible range of a sensitive receiver would be avoided. The offset distance between noisy plant and adjacent sensitive receivers would be maximised. Plant used intermittently would be throttled down or shut down. Plant and vehicles would be turned off when not in use. Noise-emitting plant would be directed away from sensitive receivers where reasonable and feasible.
Plan work site and activities to minimise noise and vibration	Traffic flow, parking and loading/unloading areas would be planned to minimise reversing movements within the site. Truck drivers would be advised of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices (i.e. minimising the use of engine brakes, and no extended periods of engine idling).
Non-tonal reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) would be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out-of-hours work.
Minimise disturbance arising from delivery of goods to construction sites	Loading and unloading of materials/deliveries would occur as far as possible from sensitive receivers. Site access points and roads would be selected as far as possible away from sensitive receivers. Dedicated loading/unloading areas would be shielded if close to sensitive receivers. Delivery vehicles would be fitted with straps rather than chains for unloading, wherever possible.
Silencers on mobile plant	Where possible, noise from mobile plant would be reduced through additional fittings including: • residential grade mufflers • silencing air parking brake engagement.
Construction related traffic	Vehicle movements would be routed away from sensitive receivers and scheduled during less sensitive times. The speed of vehicles would be limited and the use of engine compression brakes would be minimised. On-site storage capacity would be maximised to reduce the need for truck movements during sensitive times.

Action required	Safeguard details
Vibration minimum working distances	If vibration intensive equipment is to be used within the minimum working distances for cosmetic damage, as presented in Table 7-9, then attended vibration measurements would be undertaken when work commences, to determine “site specific minimum working distances”. The minimum working distances for cosmetic damage from Table 7-9 are generally considered to be conservative. Working within them would not necessarily result in damage as factors such as work practices and intervening structures can affect vibration levels. Alternative construction methodology with smaller minimum working distances would be adopted if feasible and reasonable, including consideration of avoiding use of vibration generating equipment (e.g. use of hand tools). In addition, vibration intensive work would not proceed within the site-specific minimum working distances unless a permanent vibration monitoring system is installed approximately one metre from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective. It is also advisable to carry out building condition surveys of sensitive historical structures before construction work begins. Further mitigation measures related to heritage structures are provided in Section 6.5 of the REF (non-Aboriginal heritage).
Path controls	
Shield stationary noise sources such as pumps, compressors, fans etc.	Stationary noise sources would be enclosed or shielded to the greatest extent possible whilst ensuring that the occupational health and safety of workers is maintained.
Shield sensitive receivers from noisy activities	Structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) would be used.

7.8.2 Community consultation and complaints handling

All residents and sensitive receivers impacted by noise levels from the proposal where noise levels are expected to exceed the NML should be consulted prior to the commencement of the particular activity, with the highest consideration given to those that are predicted to be most affected as a result of the work.

The information provided to the residents would include:

- programmed times and locations of construction work
- the hours of proposed work
- construction noise and vibration impact predictions
- construction noise and vibration mitigation measures being implemented on site.

Community consultation regarding construction noise and vibration would be detailed in a Community Liaison Plan for the construction of the proposal and would include a 24-hour hotline and complaints management process.

7.8.3 Transport Construction Noise and Vibration Guideline (Public Transport Infrastructure) – Additional mitigation measures

The CNVG-PTI provides practical guidance on how to minimise, to the fullest extent practicable, the impacts on the community from airborne noise, ground-borne noise and vibration generated during the construction of Transport projects. This is managed through the application of all feasible and reasonable mitigation measures. Where exceedances are still expected to occur after standard mitigation measures have been applied, the CNVG-PTI recommends the implementation of additional mitigation measures. These mitigation measures are specified within the CNVG-PTI and presented in Table 7-11.

The provision of additional mitigation is based on the predicted exceedances above RBLs and when the exceedances occur. The construction noise contours in Appendix B indicate where these additional mitigation measures should be applied in accordance with the CNVG-PTI. Transport will confirm the application of these at each receiver and implement the measures during detailed design/construction planning and construction as relevant.

Table 7-11 Additional mitigation measures matrix

Time period		Action level[1] (mitigation measures)[2]				
		dB(A) above RBL				
		0 – 10 Noticeable	>10 – 20 Clearly audible	20 – 30 Moderately intrusive	>30 Highly intrusive	≥75
Standard	Weekday (7am - 6pm), Saturday (8am - 1pm), Sunday/PH (Nil)	-	-	PN, V	PN, V	PN, V SN
Out-of-Hours Work Period 1	Weekday (6pm - 10pm), Saturday (7am - 8am, 1pm - 10pm), Sunday/PH (8am - 6pm)	-	PN, RP[3], DR[3]	PN, V, SN, RO, RP[3], DR[3]	PN, V, SN, RO, RP[3], DR[3]	-
Out-of-Hours Work Period 2	Monday - Saturday (12am - 7am, 10pm – 12am), Sunday/Public Holiday (12am – 8am, 6pm - 12am)	PN	PN, V, SN, RO[4], RP[3] DR[3]	PN, V, SN, RO[4], RP[3] DR[3]	PN, V, SN, RO[4], RP[3] DR[3], AA	-

Notes:

3. *Action level is $L_{Aeq(15\ minute)}$ noise level above background (RBL) - qualitative assessment of noise levels*
4. *The following abbreviations have been used (refer to* Table 7-12 *for further details):*
   - *PN: Project notification*
   - *V: Verification monitoring*
   - *SN: Specific notification*
   - *RP: Respite period*
   - *DR: Duration Respite*
   - *RO: Project specific respite offer*
   - *AA: Alternative accommodation*
5. *Respite periods and duration reduction are not applicable when works are carried out during OOHW Period 1 Day only (i.e. Saturday 7am-8am and 1pm-6pm, Sundays/Public Holidays 8am-6pm)*
4. *Respite offers during OOHW Period 2 are only applicable for evening periods (i.e. Sundays/Public Holidays 6pm-10pm), and may not be required if a respite offer has already been made for the immediately preceding OOHW Period 1.*

Table 7-12 describes the additional mitigation measures, as outlined in the CNVG-PTI.

Table 7-12 Description of additional mitigation measures

Abbreviation	Mitigation measure	Explanation
PN	Periodic notification	A notification entitled 'Project Update' or 'Construction Update' is produced and distributed to stakeholders via letterbox drop and distributed to the project postal and/or email mailing lists. The same information will be published on the Transport website. Periodic notifications provide an overview of current and upcoming work across the project and other topics of interest. The objective is to engage, inform and provide project-specific messages. Advanced warning of potential disruptions can assist in reducing the impact on stakeholders. The approval conditions for projects specify requirements for notification to sensitive receivers where work may impact on them. Content and length are determined on a project-by-project basis and must be approved by Transport prior to distribution. Most projects distribute notifications on a monthly basis.
V	Verification monitoring	Verification monitoring of noise and/or vibration during construction may be conducted at the affected receiver or a nominated representative location. Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to confirm that: • construction noise and vibration from the project are consistent with the predictions in the noise assessment • mitigation and management of construction noise and vibration is appropriate for receivers affected by the works Where noise monitoring finds that the actual noise levels exceed those predicted in the noise assessment then immediate refinement of mitigation measures may be required.

Abbreviation	Mitigation measure	Explanation
SN	Specific notifications	Specific notifications are in the form of a personalised letter, or phone call to identified stakeholders no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives. Alternatively (or in addition to), communications representatives from the contractor would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities and provide an individual briefing. Letters may be letterbox dropped or hand distributed. Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and their specific needs. Individual briefings are used to inform stakeholders about the impacts of noisy activities and mitigation measures that would be implemented. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project. Specific notifications are used to support periodic notifications, or to advertise unscheduled work and must be approved by Transport prior to implementation/distribution.
RO	Respite offer	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact. The offer could comprise pre-purchased movie tickets, bowling activities, meal vouchers or similar offer. This measure is determined on a case-by-case basis.
AA	Alternative accommodation	Alternative accommodation options may be provided for residents living in close proximity to construction work that are likely to incur unreasonably high impacts. Alternative accommodation will be determined on a case-by-case basis and should provide a like-for-life replacement for permanent residents, including provisions for pets, where reasonable and feasible.
RP	Respite period	OOHW during evening and night periods will be restricted so that receivers are impacted for no more than three consecutive evenings and no more than two consecutive nights in the same NCA in any one week, except where this is a Duration Reduction. A minimum respite period of four evenings/five nights shall be implemented between periods of evening and/or night works. Strong justification must be provided where it is not feasible and reasonable to implement these period restrictions (e.g. to minimise impacts to rail operations), and approval must be given by Transport through the OOHW Approval Protocol.

Abbreviation	Mitigation measure	Explanation
DR	Duration reduction	Where Respite Periods are considered to be counterproductive to reducing noise and vibration impacts to the community, it may be beneficial to increase the number of consecutive evenings and/or nights through Duration Reduction to minimise the duration of the activity. This measure is determined on a project-by-project basis. Impacted receivers must be consulted and evidence of community support for the Duration Reduction must be provided as justification for the Duration Reduction. A community engagement strategy must be agreed with and implemented in consultation with Project Community Engagement Representatives.

8.0 Operational noise

8.1 Stabling yard

Additional operational components at the stabling yard would involve regular stabling and maintenance of up to six new regional intercity trains, as well as the operation of the mobile train simulator. The operational noise impact from the stabling yard was assessed by Aurecon and mitigation recommendations were provided in its Noise and Vibration Impact Assessment (Reference 509729, dated 4 August 2023) (refer to Appendix C).

Aurecon assessed a total of seven worst-case stabling yard operational scenarios. The results from Aurecon's assessment indicated that noise levels associated with stabling yard operations for both existing and proposed new fleet would frequently exceed the project operational noise trigger levels at the nearest receivers within all assessed NCAs.

The operational scenarios included assessments of noise from town and country horn operations on residential receivers, for horn testing and horn warning. The town horn is the quieter of the two, with a maximum sound power level 10 dB less than the country horn for the existing fleet, and 5 dB less for the new fleet. The horn warning scenario considered two horn use locations – before entering the stabling yard, and prior to departure from the stabling yard.

Residences within NCA 3 (residential receivers to the east along Hoskins Street, Baker Road, and Hawkins Street) were predicted to be the most affected by horn warning noise at the two horn locations. Noise from the town horn of the new fleet resulted in more exceedances of the external noise criteria at receivers than the town horn of the existing fleet. The highest noise level predicted from the town horn warning at residential receivers within NCA 3 was 71 dB(A) for the new fleet, compared to a predicted noise level of 56 dB(A) for the existing fleet. The country horn was also predicted to result in greater exceedances than the town horn for both fleets at both horn warning locations. Maximum predicted noise levels at residential receivers within NCA 3 from the country horn warning were approximately 40 – 50 dB(A) higher than those from the town horn warning operations.

Horn testing was found to impact all NCAs and exceed the external noise criteria at more residential receivers than the horn warning scenarios. Overall, the horn testing scenarios resulted in 154 more exceedances of the external noise criteria than the horn warning scenarios combined. No exceedances were predicted at any of the non-residential receivers assessed.

8.1.1 Stabling Yard Operational Noise Mitigation Measures

To mitigate operational noise, Aurecon proposed a hierarchical approach with the following strategies:

1. Control noise at the source e.g. use of track lubrication, soft rail pads, and welding to smooth discontinuities
2. Control noise in transmission e.g. consideration of a new continuous noise barrier (noise barrier). This could potentially be up to 5.5 metres high and 250 metres long, to replace the existing wall.

   The Aurecon report details modelling which was completed taking the noise barrier into account. The report notes that the noise barrier would provide noise attenuation for most operational scenarios located within the proposed stabling yard re-configuration. However, the results show that the attenuation is generally limited to residential receivers to the west of the stabling yard and may increase noise levels at residential receivers to the east. The noise barrier would reduce noise impacts of the horn testing scenario, however not enough to achieve compliance.

   Due to the potential of noise reflections associated with the barrier, Aurecon recommends absorptive facing (minimum noise reduction coefficient of 0.35) for the internal face of the barrier, along areas immediately adjacent to stabled fleets. The report states that the design of the noise barrier would be further investigated in greater detail in future design stages of the proposal. A detailed noise barrier analysis would be undertaken to confirm the noise barrier and its preferred height based on feasible and reasonable considerations, including for example, possible aspects such as stormwater drainage, wind loading, shadowing, urban design and aesthetic considerations, and cost among others.

3. Control noise at the receiver e.g. an Operational Noise and Vibration Management Plan would be developed and implemented, including consideration of architectural treatments for affected receivers and installation of Automatic Warning Systems (AWSs) and train-based warning systems instead of horn use.

Due to the findings above, additional investigations were also recommended by Aurecon during detailed design when details of the noise levels for the new train fleet would be confirmed.

8.2 Railway station

Additional operational components at the station would include three new lifts, upgrades to footbridges and interchange facilities, station room upgrades including a new family accessible bathroom which would not produce significant noise emissions. Additional car parking provisions are not proposed as part of the proposal. The existing parking in the station forecourt would be reconfigured to provide 22 parking spaces (eight less than the existing spaces). As such, the operational noise environment of the station is expected to remain largely unchanged and have negligible cumulative operational noise impacts with the stabling yard.

If required, operational noise emissions would be further addressed during the detailed design phase in order to comply with operational noise criteria as per the NPfI. Operational noise criteria are presented in Section 6.0.

9.0 Conclusions

A construction and operational Noise and Vibration Impact Assessment has been completed for the proposal. Noise and vibration sensitive receivers were identified. Measured noise levels from unattended monitoring were used to establish construction NMLs and operational noise criteria.

The proposal is expected to commence construction in early 2024 and take up to 19 months to complete. The majority of construction works would be undertaken during standard construction hours. Some work would need to occur outside standard hours and would include night work and work during routine rail possession periods, which are scheduled closures that would occur regardless of the proposal.

Construction work stages have been provided by Transport and the proposed equipment and plant has been described within this report. Thirteen distinct construction stages were identified and eight were used in a computer-based noise model to predict the noise levels from construction works at sensitive receivers. Construction noise impacts were assessed at all residential and non-residential noise sensitive receivers within a 1.5-kilometre radius from the proposal.

9.1 Construction noise

The predicted construction noise levels exceed the construction NMLs for all scenarios at a large number of residential and non-residential noise sensitive receivers. Noise exceedances are generally unavoidable given the proposed work and proximity to receivers, notwithstanding the implementation of feasible and reasonable noise mitigation measures. The largest impacts would be experienced by residents along Lackey Road. Fifteen residential receivers (the highest out of all the modelled scenarios) are predicted to be ‘highly affected’ (noise levels greater than 75 dB(A)) during site establishment and enabling works.

During night-time work, noise levels at a large number of receivers are expected to exceed the NMLs for all three night-time work stages. However, these exceedances would be limited to the rail shutdown periods where work would not be undertaken for more than two consecutive nights. Construction work generating high noise and/or vibration levels would be scheduled during less sensitive time periods as far as practicable.

Implementation of mitigation measures outlined in Section 7.8 would aim to minimise and manage noise impacts where possible. Mitigation measures have been recommended in line with Transport’s CNVG-PTI in order to minimise and manage the impact of construction noise on noise sensitive receivers.

9.2 Sleep disturbance assessment

A sleep disturbance assessment was undertaken for the proposed night work based on the construction information available. A large number of exceedances of the sleep disturbance screening criteria have been predicted for the night-time construction work associated with the proposal. Noise associated with some of the work would also exceed the awakening reaction screening criterion at a number of residential receivers. The exceedances are attributed to the close proximity of the receivers to the proposal area.

It should be noted that the predicted construction noise levels are the worst-case noise levels, therefore the majority of the actual $L_{A1(1min)}$ noise levels are likely to be less than those predicted.

Implementation of mitigation measures outlined in Section 7.8 would minimise and manage noise impacts where possible.

9.3 Construction vibration

Minimum working distances to nearby structures have been recommended for nominated vibration intensive plant. If the minimum working distances are maintained, then no adverse impact from the vibration intensive work is likely in terms of human response or cosmetic damage. If vibration intensive equipment is to be used within the minimum working distances for cosmetic damage, then attended vibration measurements would be undertaken when work commences, to determine “site specific

minimum working distances". Alternative construction methodologies with smaller minimum working distances would also be considered if feasible and reasonable (including use of hand tools).

In addition, vibration intensive work would not proceed within the site-specific minimum working distances unless a permanent vibration monitoring system is installed approximately one metre from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective.

Building condition surveys of sensitive historical structures would be completed before construction work begins.

Further mitigation measures related to heritage structures are provided in Section 6.5 of the REF (non-Aboriginal heritage).

9.4 Operational noise

During the operation of the proposal, there would be noise emissions from the stabling yard including train movements, air conditioning plant, brakes and horns. The worst affected receivers from the stabling yard operation would be the residential receivers to the west of the stabling yard, along Lackey Road, Garrett Street, and Parkes Road. The operational noise impacts of the stabling yard upgrade have been assessed by Aurecon (refer Appendix C). The predicted results from existing and new fleet stabling operations indicated exceedance of the project operational noise trigger levels at the surrounding affected receivers. A hierarchical approach for operational noise mitigation is recommended, starting with noise control at the source, transmission (e.g. installation of noise barrier mitigation), and lastly, the receiver (e.g. architectural treatments for affected receivers) in order to comply with operational noise criteria as per the NPfI.

A noise barrier has been proposed along the western side of the railway corridor adjacent to the permanent stabling area as a potential mitigation option to reduce noise levels at noise sensitive receivers. This noise barrier will however be subject to further noise analysis in the detailed design stage, with consideration of engineering issues such as floodway and stormwater flow obstruction, maintenance access, wind loading, shadowing, urban design considerations, cost and consideration of community views, among others.

Additional operational components at the station, which include new lifts, upgrades to footbridges and interchange facilities, and station room upgrades, would not produce significant noise emissions. Additional car parking provisions are also not proposed as part of the proposal. As such, the operational noise environment of the station is expected to remain largely unchanged and have negligible cumulative operational noise impacts with the stabling yard.

Appendix A

Acoustic Terminology

Appendix A Acoustic Terminology

The following is a brief description of acoustic terminology used in this report.

Sound power level	The total sound emitted by a source.
Sound pressure level	The amount of sound at a specified point.
Decibel [dB]	The measurement unit of sound.
A Weighted decibels [dB(A)]	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:

0dB(A)	Threshold of human hearing
30dB(A)	A quiet country park
40dB(A)	Whisper in a library
50dB(A)	Open office space
70dB(A)	Inside a car on a freeway
80dB(A)	Outboard motor
90dB(A)	Heavy truck pass-by
100dB(A)	Jackhammer/Subway train
110 dB(A)	Rock Concert
115dB(A)	Limit of sound permitted in industry
120dB(A)	747 take off at 250 metres

Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
L_{max}	The maximum sound pressure level measured over the measurement period.
L_{min}	The minimum sound pressure level measured over the measurement period.
L_{10}	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L_{10}.

L_{90}	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L_{90}.
Ambient noise	The all-encompassing noise at a point composed of sound from all sources near and far.
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L_{90} sound pressure level is used to quantify background noise.
Traffic noise	The total noise resulting from road traffic. The L_{eq} sound pressure level is used to quantify traffic noise.
Day	The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays.
Evening	The period from 1800 to 2200 h Monday to Sunday and Public Holidays.
Night	The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays.
Noise catchment area [NCA]	The noise environment at each of the sensitive receivers within a noise catchment area is considered to be similar to the unattended monitoring location within that NCA.
Assessment background level [ABL]	The overall background level for each day, evening and night period for **each day** of the noise monitoring.
Rating background level [RBL]	The overall background level for each day, evening and night period for the **entire length** of noise monitoring.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 *"Acoustics – Glossary of terms and related symbols"*, the EPA's *Noise Policy for Industry* and the EPA's *Road Noise Policy*.

Appendix B

Predicted Noise Contours - Construction

Moss Vale Station and Stabling Yard Upgrade
Construction Noise - Site Establishment and Enabling Works

Noise contours are shown 1.5 metres above ground level

N

0 360 720 Meters

AECOM

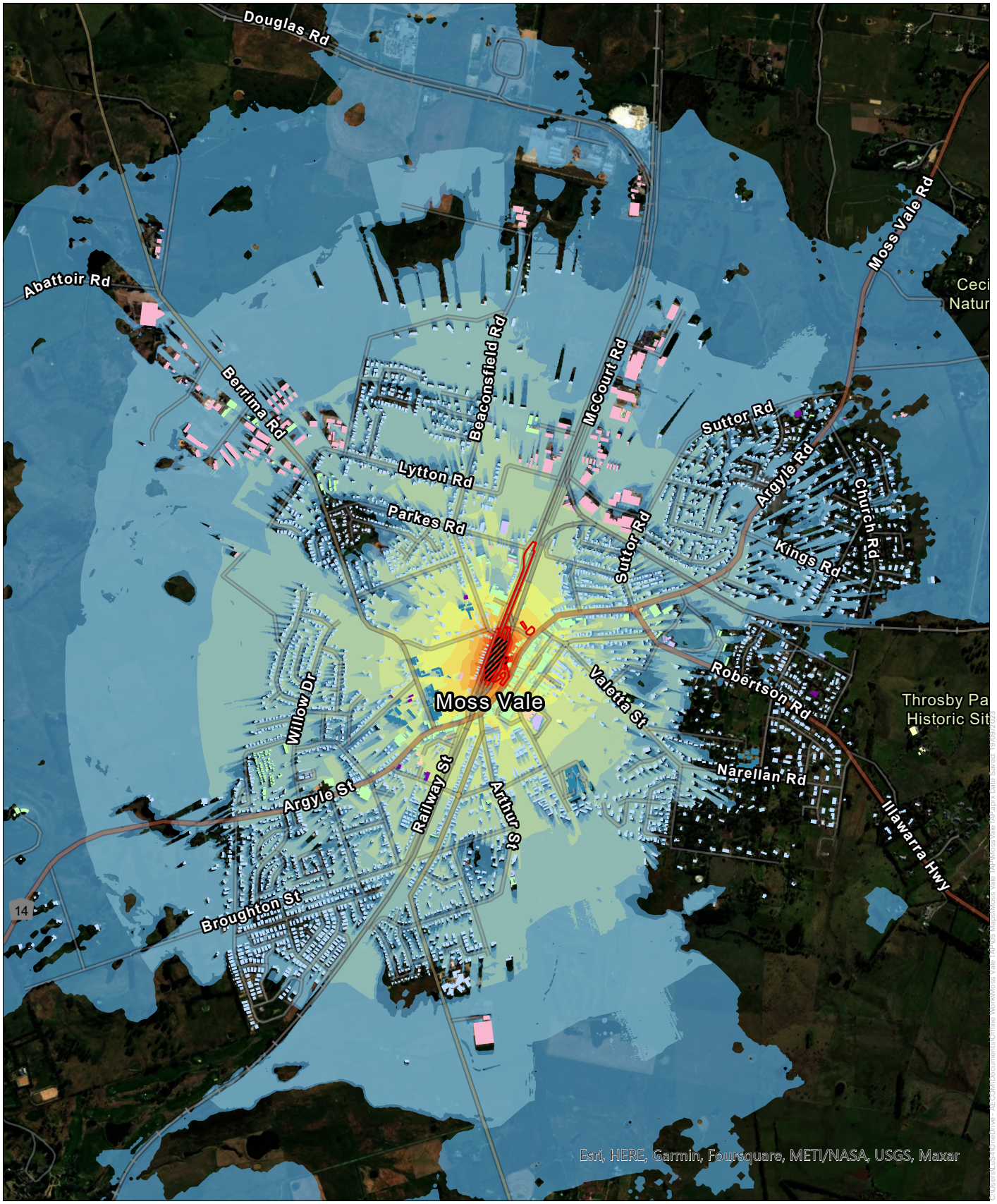
- Proposal Area
- Site Establishment and Enabling Works

Building Usage

- Active Recreation
- Commercial
- Community Centre
- Education
- Industrial
- Passive Recreation
- Place of Worship
- Residential

Predicted Noise Level $L_{Aeq,15min}$ dB(A)

<35 | 35 - 40 | 40 - 45 | 45 - 50 | 50 - 55 | 55 - 60 | 60 - 65 | 65 - 70 | 70 - 75 | 75 - 80 | >80



Moss Vale Station and Stabling Yard Upgrade
Construction Noise - Building and Platform Works

Noise contours are shown 1.5 metres above ground level

Proposal Area

Building and Platform Works

Building Usage

- Active Recreation
- Commercial
- Community Centre
- Education
- Industrial
- Passive Recreation
- Place of Worship
- Residential

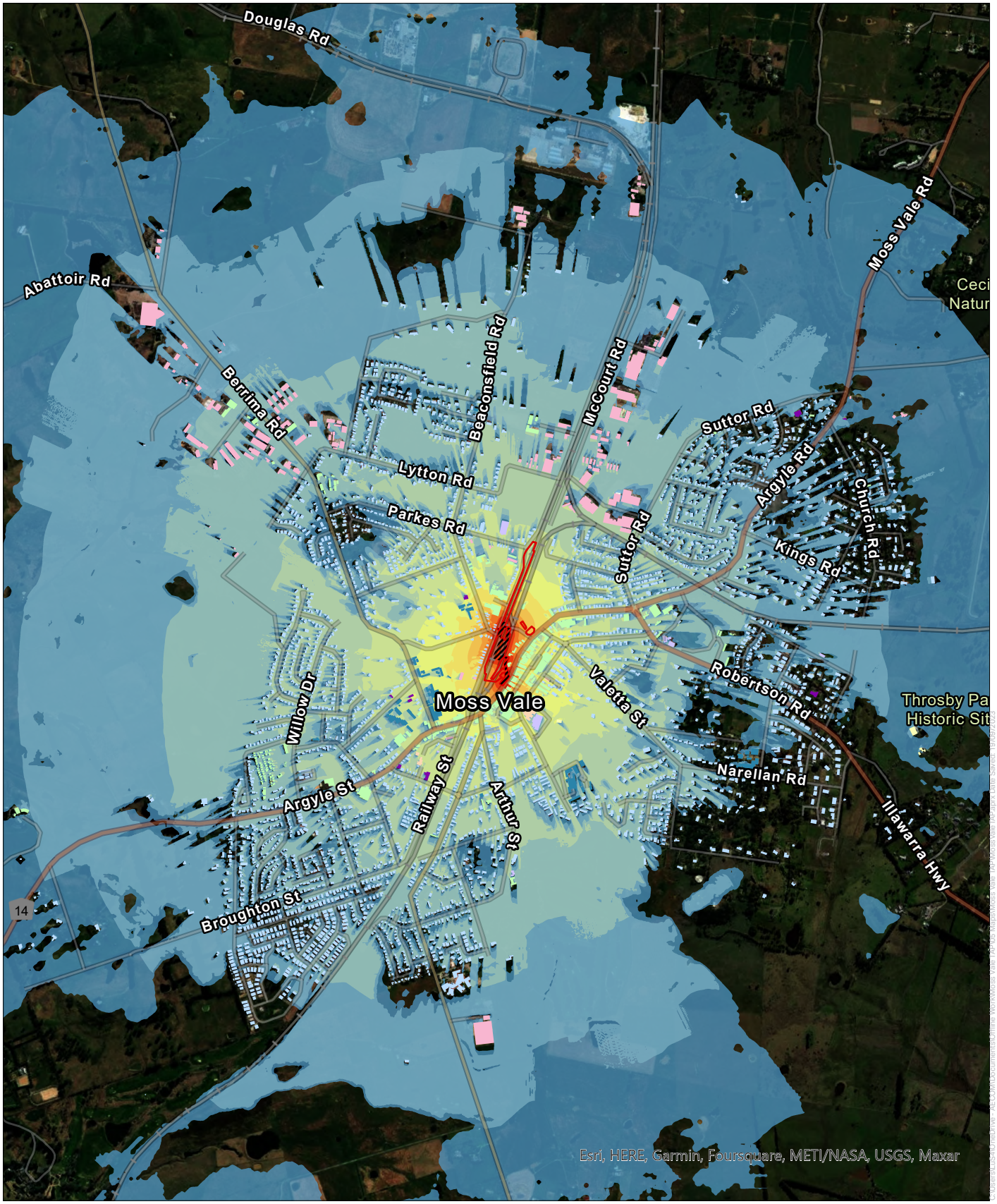
Predicted Noise Level $L_{Aeq,15min}$ dB(A)

< 35 | 35 - 40 | 40 - 45 | 45 - 50 | 50 - 55 | 55 - 60 | 60 - 65 | 65 - 70 | 70 - 75 | 75 - 80 | > 80

N

0 360 720 Meters

AECOM



Moss Vale Station and Stabling Yard Upgrade
Construction Noise - Station Entrance Works

Noise contours are shown 1.5 metres above ground level

N

0 360 720 Meters

AECOM

- Proposal Area
- Station Entrance Works

Building Usage

- Active Recreation
- Commercial
- Community Centre
- Education
- Industrial
- Passive Recreation
- Place of Worship
- Residential

Predicted Noise Level $L_{Aeq,15min}$ dB(A)

< 35 | 35 - 40 | 40 - 45 | 45 - 50 | 50 - 55 | 55 - 60 | 60 - 65 | 65 - 70 | 70 - 75 | 75 - 80 | > 80

Moss Vale Station and Stabling Yard Upgrade
Construction Noise - Forecourt / Interchange Works

Noise contours are shown 1.5 metres above ground level

Proposal Area

Forecourt / Interchange Works

Building Usage

- Active Recreation
- Commercial
- Community Centre
- Education
- Industrial
- Passive Recreation
- Place of Worship
- Residential

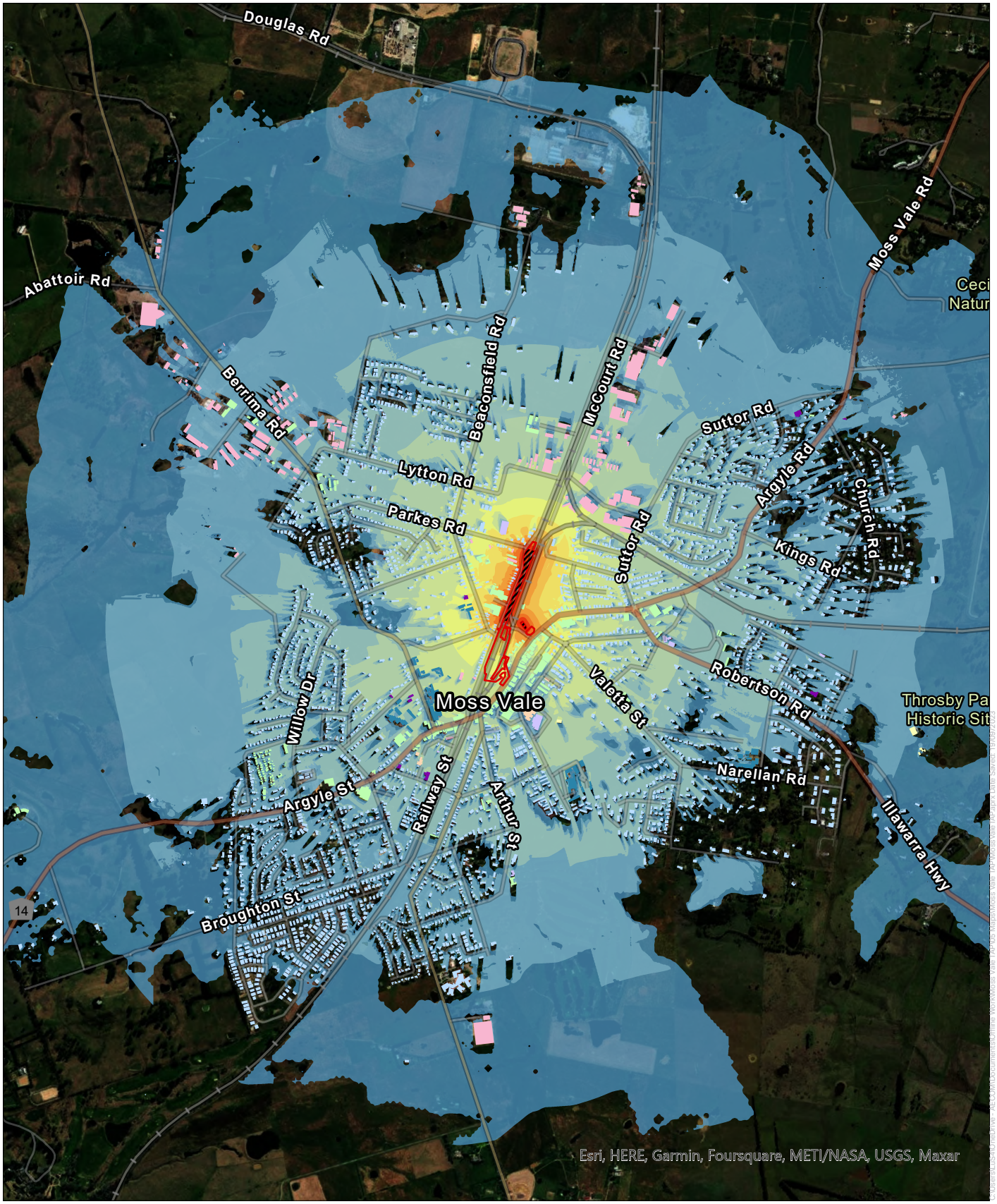
Predicted Noise Level $L_{Aeq,15min}$ dB(A)

< 35 | 35 - 40 | 40 - 45 | 45 - 50 | 50 - 55 | 55 - 60 | 60 - 65 | 65 - 70 | 70 - 75 | 75 - 80 | > 80

N

0 360 720 Meters

AECOM



Moss Vale Station and Stabling Yard Upgrade
Construction Noise - Temporary Stabling Yard Provisions

Noise contours are shown 1.5 metres above ground level

N

0 360 720 Meters

AECOM

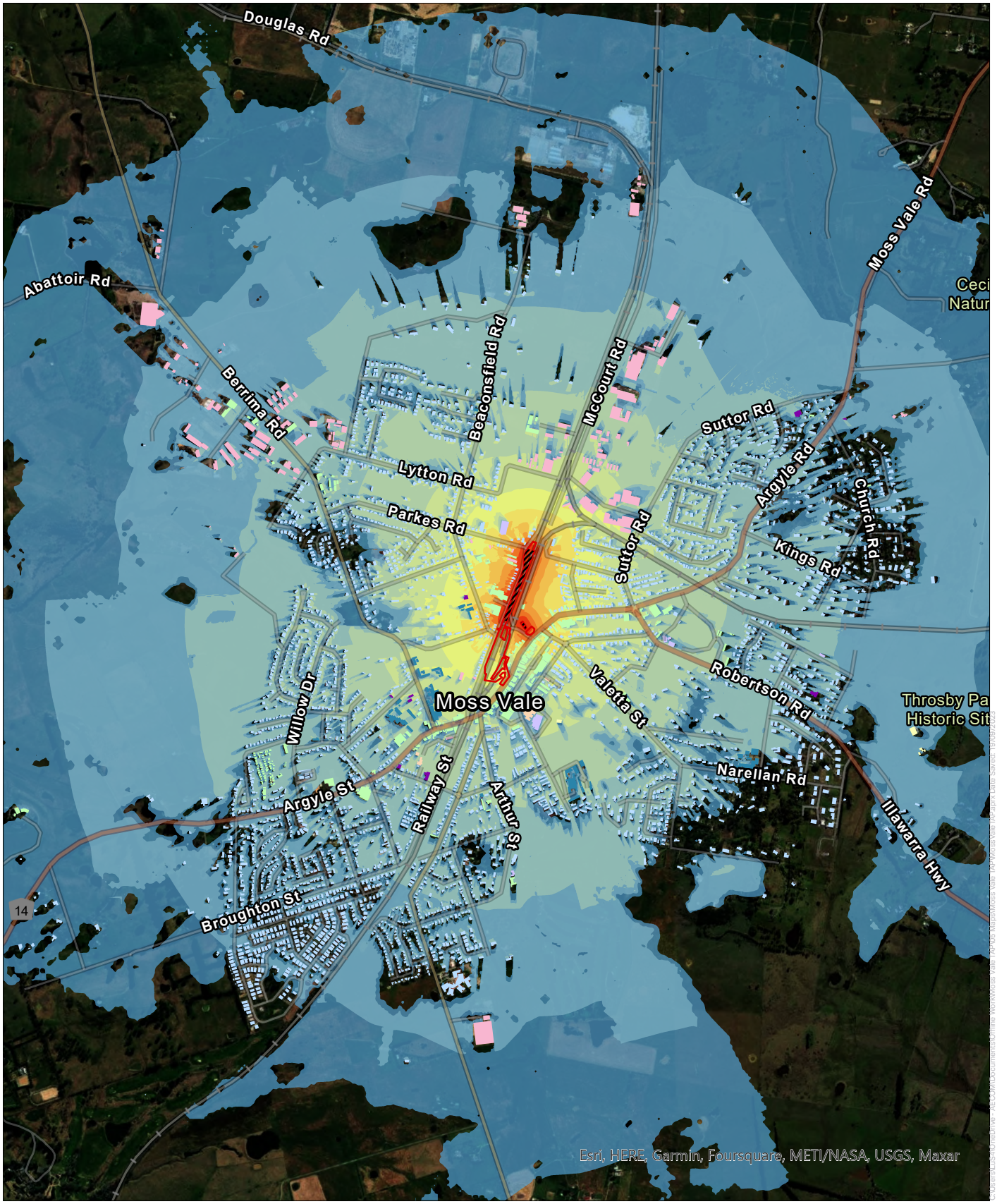
- Proposal Area
- Temporary Stabling Yard Provisions

Building Usage

- Active Recreation
- Commercial
- Community Centre
- Education
- Industrial
- Passive Recreation
- Place of Worship
- Residential

Predicted Noise Level $L_{Aeq,15min}$ dB(A)

<35 | 35 - 40 | 40 - 45 | 45 - 50 | 50 - 55 | 55 - 60 | 60 - 65 | 65 - 70 | 70 - 75 | 75 - 80 | >80



Moss Vale Station and Stabling Yard Upgrade
Construction Noise - Permanent Stabling Yard Works

Noise contours are shown 1.5 metres above ground level

- Proposal Area
- Permanent Stabling Yard Works

Building Usage

- Active Recreation
- Commercial
- Community Centre
- Education
- Industrial
- Passive Recreation
- Place of Worship
- Residential

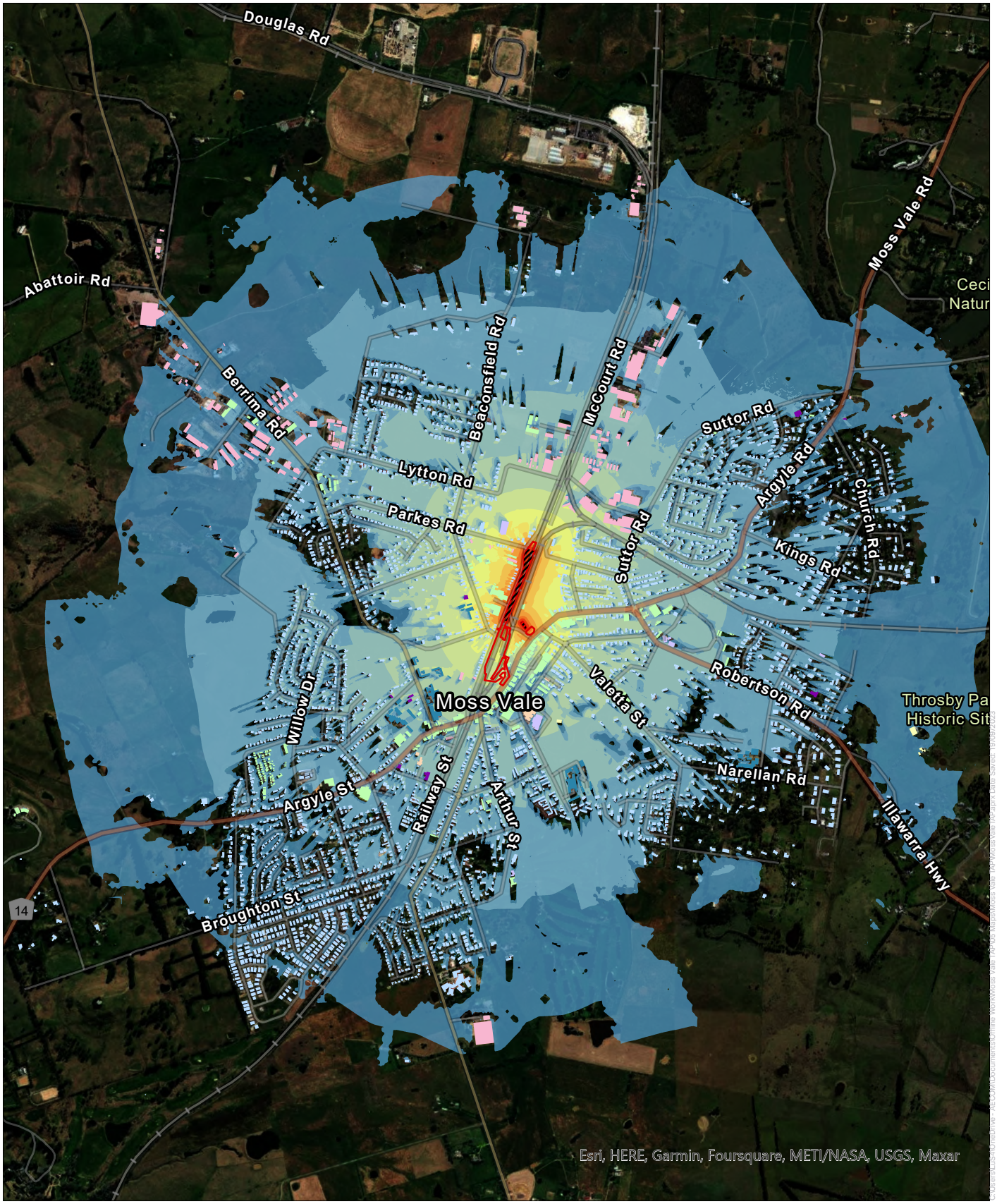
Predicted Noise Level $L_{Aeq,15min}$ dB(A)

<35 | 35 - 40 | 40 - 45 | 45 - 50 | 50 - 55 | 55 - 60 | 60 - 65 | 65 - 70 | 70 - 75 | 75 - 80 | >80

N

0 360 720 Meters

AECOM



Moss Vale Station and Stabling Yard Upgrade
Construction Noise - Services Upgrade at Stabling Yard

Noise contours are shown 1.5 metres above ground level

- Proposal Area
- Services Upgrade at Stabling Yard

Building Usage

- Active Recreation
- Commercial
- Community Centre
- Education
- Industrial
- Passive Recreation
- Place of Worship
- Residential

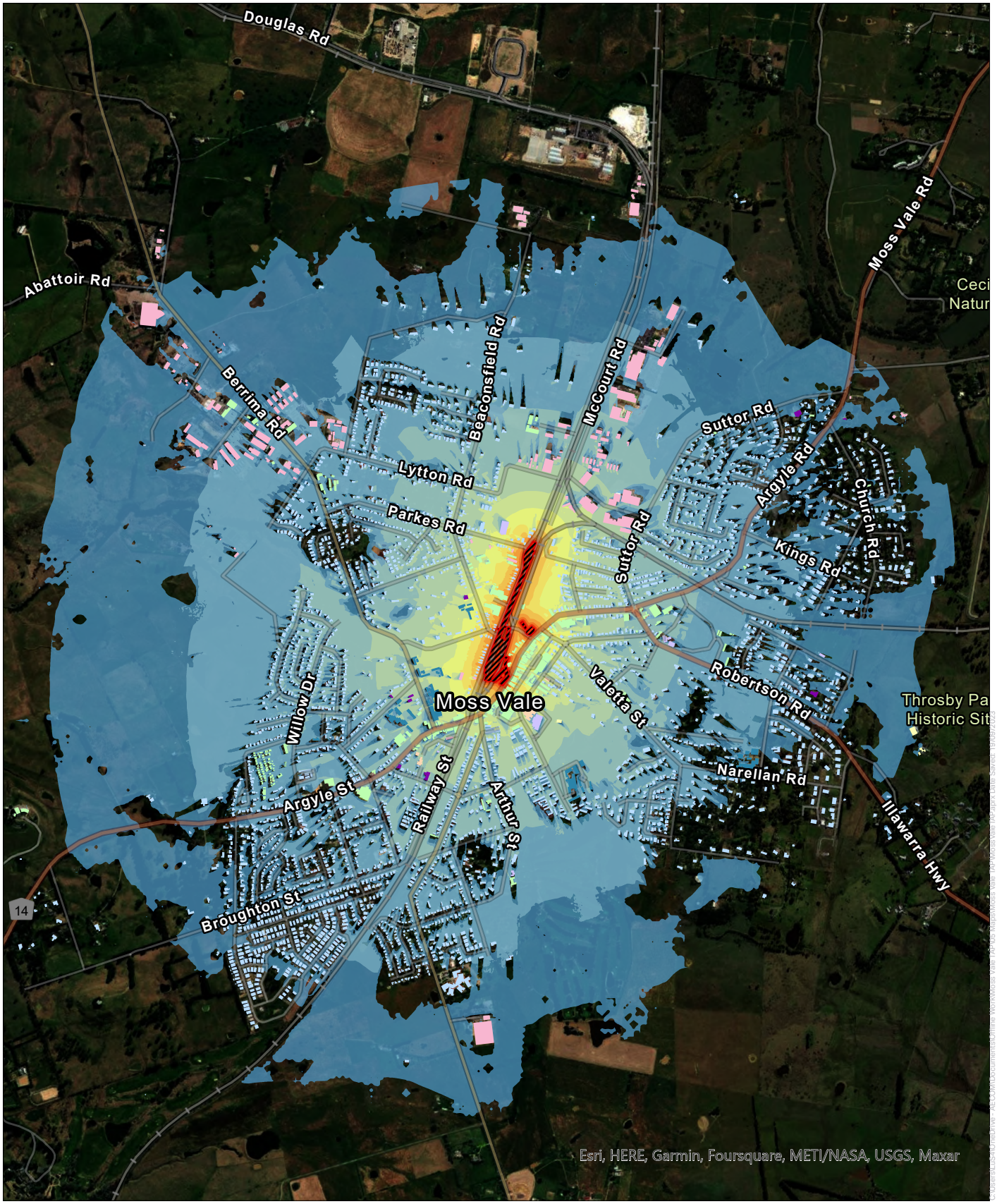
Predicted Noise Level $L_{Aeq,15min}$ dB(A)

<35 | 35 - 40 | 40 - 45 | 45 - 50 | 50 - 55 | 55 - 60 | 60 - 65 | 65 - 70 | 70 - 75 | 75 - 80 | >80

N

0 360 720 Meters

AECOM



Moss Vale Station and Stabling Yard Upgrade Construction Noise - Demobilisation, Testing and Commissioning

Noise contours are shown 1.5 metres above ground level

- Proposal Area
- Demobilisation, Testing and Commissioning

Building Usage

- Active Recreation
- Commercial
- Community Centre
- Education
- Industrial
- Passive Recreation
- Place of Worship
- Residential

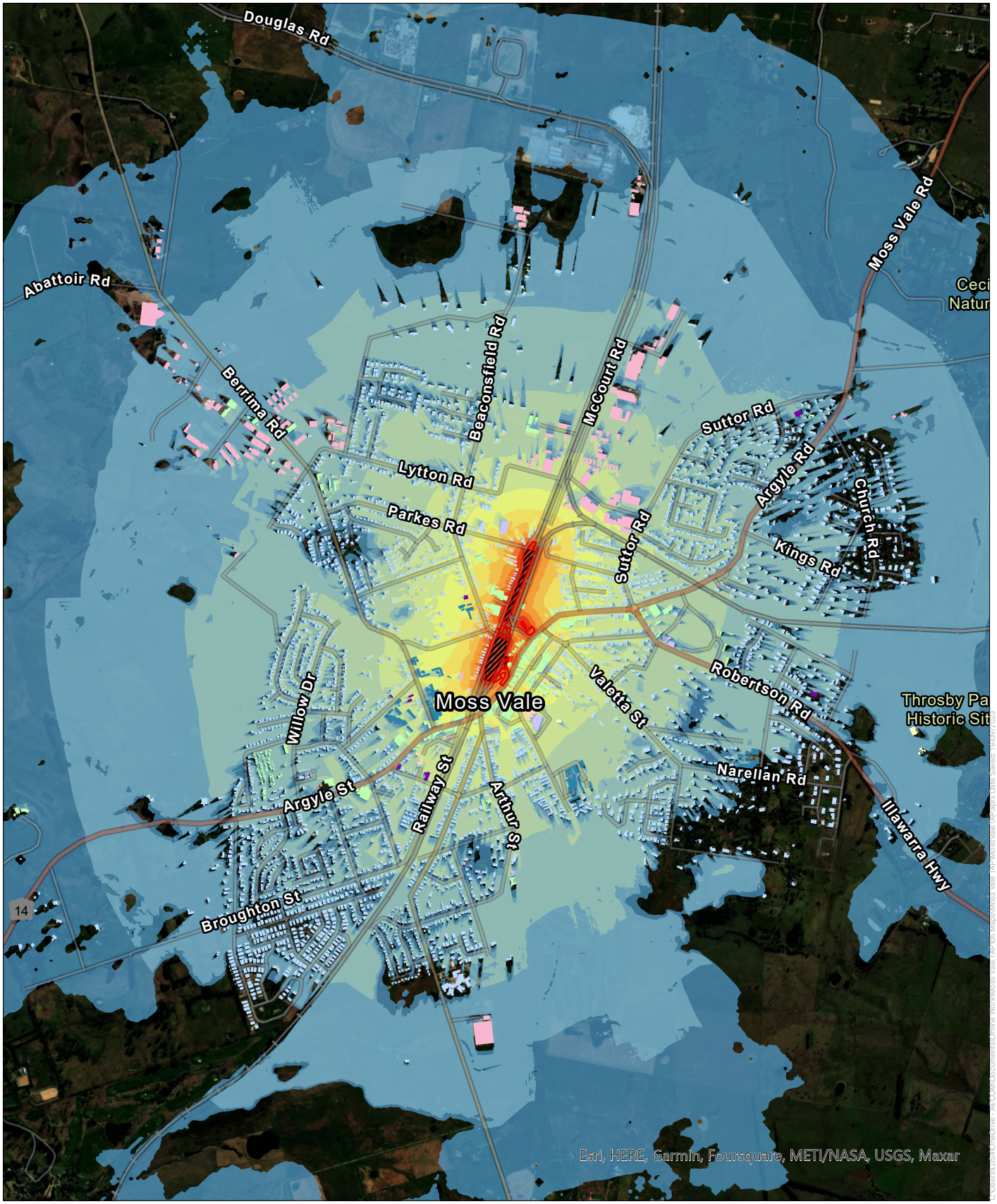
Predicted Noise Level $L_{Aeq,15min}$ dB(A)

<35 | 35 - 40 | 40 - 45 | 45 - 50 | 50 - 55 | 55 - 60 | 60 - 65 | 65 - 70 | 70 - 75 | 75 - 80 | >80

N

0 360 720 Meters

AECOM



Moss Vale Station and Stabling Yard Upgrade
Construction Noise - Cumulative Construction Works

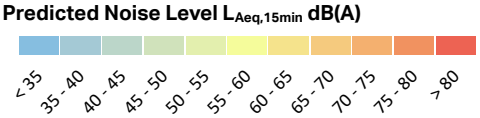
Noise contours are shown 1.5 metres above ground level

- Proposal Area
- Cumulative Construction Works

Building Usage

- Active Recreation
- Commercial
- Community Centre
- Education
- Industrial
- Passive Recreation
- Place of Worship
- Residential

Predicted Noise Level $L_{Aeq,15min}$ dB(A)



N

0 360 720 Meters

AECOM

Appendix C

Noise and Vibration Impact Assessment – Moss Vale Stabling Yard (Aurecon)

Regional Rail Enabling Works – Moss Vale Stabling Yard

Noise & Vibration Impact Assessment

Transport for NSW

Reference: 509729

Revision: 6

2023-08-04

aurecon

Bringing ideas to life

Document control record

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3	2021-08-27	Update for PDR design and construction methodology	Y Kalkunte	S Alper M Drowley R Slaviero		R Slaviero
4	2022-02-11	Updated noise information for new fleet and comparison of assessment with existing noise walls vs proposed PDR modifications to noise wall	Y Kalkunte	M Manraj M Drowley R Slaviero		R Slaviero
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Current revision		**6**				

Approval			
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Contents

Figures

Tables

Abbreviations

Term	Meaning
AS	Australian Standard
ARTC	Australian Rail Track Corporation
AVTG	Assessing Vibration: A Technical Guideline (DEC 2006)
AWS	Automatic Warning System
BS	British Standard
CDR	Concept Design Review
CNVS	Construction Noise and Vibration Strategy (TfNSW)
CNVMP	Construction Noise and Vibration Management Plan
CSR	Combined Service Route
DEC, DECC, DECCW	See DPIE
DPIE	The Department of Planning, Industry and Environment (DPIE), formerly the Department of Environment and Conservation (DEC) before becoming the Department of Environment and Climate Change (DECC), later known as the Department of Environment Climate Change and Water (DECCW).
DIN	German Institute for Standardisation
EIS	Environment impact statement
EIA	Environment impact assessment
ENMM	Environmental Noise Management Manual
EPA	Environment Protection Authority
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EWP	Elevating Work Platform
GST	Galvanised Steel Troughing
HV	High Voltage
ICNG	Interim Construction Noise Guideline (DECC 2009).
INP	NSW Industrial Noise Policy
ISO	International Organization for Standardization
LGA	Local Government Area
LEP	Local Environmental Plan
mm/s	Millimetres per second
m/s	Metres per second
NCA	Noise catchment area
NPfI	Noise Policy for Industry (EPA 2017)
NSW	New South Wales
NML	Noise management level
NRC	Noise Reduction Coefficient
PDR	Preliminary Design Review
OOHW	Out-of-Hours Work
ONVMP	Operational Noise and Vibration Management Plan
PDR	Preliminary Design Review
RBL	Rating Background Level
RING	Rail Infrastructure Noise Guideline (EPA 2013)

Term	Meaning
RNP	Road Noise Policy (DECCW 2011)
RRP	Regional Rail Project
TfNSW	Transport for NSW
ULX	A service crossing beneath a rail line
VDV	Vibration Dose Value

Qualitative Interpretation of Construction Noise Impacts

This qualitative description of construction noise impacts has been provided to clarify interpretation of the quantitative results presented in this report, and to facilitate understanding of the level of impact for affected receivers. The qualitative descriptions are related to the quantitative predicted noise levels as follows:

- $L_{Aeq(15minute)}$ noise levels 5 to 10 dB(A) above the background – Noticeable.
- $L_{Aeq(15minute)}$ noise levels 10 to 20 dB(A) above the background – Clearly audible
- $L_{Aeq(15minute)}$ noise levels 20 to 30 dB(A) above the background – Moderately intrusive
- $L_{Aeq(15minute)}$ noise levels more than 30 dB(A) above the background – Highly intrusive

Glossary

Term	Meaning
A-weighted decibels [dB(A)]	The A-weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Airborne noise	Airborne noise is sound transmitted through the air/atmosphere, e.g. conversation between people.
Ambient noise	The all-encompassing noise at a point composed of sound from all sources near and far.
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L_{90} sound pressure level is used to quantify background noise.
Community	A group of people living in a specific geographical area or with mutual interests that could be affected by the Project.
Decibel [dB]	The measurement unit of sound.
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume.
Equivalent continuous sound level [L_{eq}] and A-weighted equivalent continuous [$L_{Aeq(15min)}$]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy. The ICNG defines $L_{Aeq(15min)}$ as 'the A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as industry, road, rail and the community.
Feasible	Feasible relates to engineering considerations such as constructability, reliability, maintenance, and safety.
Ground-borne vibration	Ground-borne vibration is vibration transmitted from source to receiver via the medium of the ground.
Heavy vehicle	A vehicle what has a gross vehicle mass (GVM) or aggregate trailer mass (ATM) of more than 4.5 tonnes.
L_{A1}	The A-weighted sound pressure level exceeded for 1% of the measurement period.
$L_{A90\ (Time)}$	The A-weighted sound pressure level that is exceeded for 90% of the measurement period. This is considered to represent the background noise.
L_{AFmax}	The maximum sound pressure level measured over the measurement period.
Noise intensive works	Works which include the use of power saws for the cutting of timber, masonry and steel; grinding of metal, concrete or masonry; rock/line drilling; bitumen milling and profiling; jack hammering, rock hammering and rock breaking; or impact piling.
Peak Particle Velocity (PPV)	The maximum vector vibration velocity that occurs in any of the individual x, y or z orthogonal directions. Current practices for assessments of the risk of structural damage to buildings use measurements of PPV in millimetres per second.
Rating Background Level [RBL]	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
Reasonable	Considers cost, noise impacts, mitigation benefits, community views and state government requirements to determine if a noise mitigation proposal is reasonable.
RMS	Root mean square
Sound Exposure Level (SEL)	The SEL (or L_{AE}) is the single event level used to indicate the total acoustic energy of an individual train passby event. This parameter is used in the calculation of $L_{pAeq,day\ or\ night}$ values based on the number of passbys and representative SEL noise levels.
Sound Power Level (SWL)	The total sound emitted by a source.
Sound Pressure Level (SPL)	20 times the logarithm to the base 10 of the ratio of the RMS sound pressure level to the reference sound pressure level of 20 micro Pascals.
Tonality	Noise containing a prominent frequency or frequencies characterised by a definite pitch.

Term	Meaning
Vibration	The variation in magnitude of a quantity which is descriptive of the motion or position of a mechanical system, when the magnitude is alternately greater and smaller than some average value or reference. Vibration can be measured in terms of its displacement, acceleration, or velocity. Common units include mm/s (or m/s) and mm/s^2 (or m/s^2).
Vibration dose value (VDV)	Vibration dose value is given by the fourth root of the integral of the fourth power of the frequency weighted acceleration (British Standard 6472 – 1992).
Vibration intensive works	Works which use vibration intensive equipment such as jack hammers, piling rigs and rock breakers.

Executive Summary

The Regional Rail Project (RRP) involves replacing the ageing NSW regional rail fleet of XPT, XPLORER and Endeavour trains. A new regional rail fleet will be integrated into the existing regional rail network, which will require enabling works to ensure the existing regional rail infrastructure can support the new fleet. Moss Vale Stabling Yards was identified by Transport for NSW (TfNSW) as an area that would require works to facilitate the stabling of the new fleet (the project). Aurecon was engaged by TfNSW to prepare an Environment Impact Assessment (EIA) checklist, for the construction and operation of the project. This report addresses the potential noise and vibration impacts associated with the construction and operation of the project, to support the EIA checklist. This assessment is based on the Preliminary Design Review (PDR) design, which is the current phase of the RRP Enabling Works and is based on the findings of the Systems Definition Review and comments received from stakeholders.

Nearby noise and vibration sensitive receivers were identified, and unattended and attended noise measurements were completed to characterise the existing ambient noise environment. The surrounding noise sensitive receivers were grouped into noise catchment areas (NCAs) as illustrated in Figure 3-4, to provide a logical grouping of receivers to assist with the noise assessment, including any requirement for mitigation and management measures (consultation, notification etc.). The results of the noise survey were used to establish project operational noise trigger levels and construction noise management levels.

Construction and operational noise impacts associated with the project were modelled, using SoundPLAN 8.2 noise modelling software. SoundPLAN is recognised and accepted by both TfNSW and the EPA.

Construction noise and vibration

Construction activities are only proposed to be carried out during standard construction hours and have been modelled based on the three construction stages, detailed in Table 6-1.

- For residential receivers:
  - Exceedances of the construction Noise Management Levels (NMLs) are predicted at most of the residential receivers in NCA 1, NCA2 and NCA3, during all three construction stages. Residential properties along Lackey Road in NCA1 and NCA2 are expected to experience the worst-case noise impacts, as they are located directly adjacent to the construction works.
  - Six residences in NCA1 and NCA2 are predicted to exceed the highly noise affected management level, during Stages 1 and 2. Exceedances of up 4dB(A) are predicted during Stage 2 at residential properties 121 and 117-119 Lackey Road. All other exceedances are predicted to be within 2dB(A) of the highly noise affected management level.
  - Beyond the first row of receivers located adjacent to the construction works, the level of exceedance would typically decrease by 5 – 7 dB(A), due to noise levels decreasing with distance and shielding from the first row buildings.
  - There are a number of exceedances of the NMLs for the temporary Car Siding Road 3 scenarios within NCA2 and NCA4 for the residential receivers. This is due to the locality of Car Siding Road 3 to those residential receivers within NCA2 and NCA4.
  - Exceedances of the sleep disturbance noise level occur for the brake release and horn testing within Car Siding Road 3. Residential properties in NCA2 are greatly affected with exceedances of all sleep disturbance scenarios. All other NCAs also exceed the sleep disturbance noise levels for both horn testing scenarios, however, do not exceed the sleep disturbance noise level for the brake release scenario.
- For non-residential receivers, exceedances are predicted at:
  - the commercial properties at 1 & 3 Farmers Place and 135-157 Lackey Road (Harvey Norman Moss Vale), during Stage 2.
  - intermittent exceedances are also forecasted at St Paul's Catholic Parish Primary School and St Paul's Parish Catholic Church properties, during Stages 1 and 2, however these are expected to be fleeting and non-intrusive.

Construction generated road traffic is unlikely to result in any exceedances of relevant management levels.

There is potential for some human comfort impacts in relation to vibration when roller, piling and compactor operations are carried out within 10 metres of the western project boundary. Potential exceedance of the structural damage target for sensitive heritage items (i.e. deemed to be structurally unsound) is also predicted for the Moss Vale Signal Box structure, when compactor and excavator related operations are carried out within 24m and 6m respectively of this structure.

Standard techniques for controlling noise and vibration impacts during construction are presented in the *Interim Construction Noise Guideline* (ICNG) (NSW DECC 2009) and the Construction Noise and Vibration Strategy (CNVS) (TfNSW). A Construction Noise and Vibration Management Plan (CNVMP) would be prepared prior to construction which considers these measures.

Typical mitigation measures and management procedures that need to be considered are detailed in Section 7.2. Safe working buffer distances have also been recommended for the proposed vibration intensive plant in Table 6-14.

A CNVMP is recommended during subsequent stages of the project (when a construction programme and methodology is finalised), which will accurately determine and highlight the level of impact on surrounding affected receivers and develop site-specific management strategies.

Additional mitigation is required for the residential properties within NCA2 and NCA4 due to the temporary use of Car Siding Road 3 due to construction of the project. These mitigation measures include operational considerations, temporary noise walls and possible temporary relocation of receivers during heavy use of the stabling road 3. These mitigation measures are to be explored further in future design stages and when the proposed use of the Car Siding Road 3 undergoes the Out-Of-Hours Work (OOHW) application process.

Operational noise emissions

Stabling yard operations are primarily carried out during the night period (10pm to 7am) and have been modelled based on the operational scenarios detailed in Table 5-1. The operational scenarios include three situations to predict sleep disturbance/maximum event noise impacts at the surrounding residential properties during the night period (Scenarios 4, 5 and 6a/b). With the exception of Scenario 5 (maximum noise impacts from use of proposed new carparking area), operational noise impacts for both the existing and proposed new fleet are predicted to exceed the project operational noise trigger levels during all other scenarios, at the nearest affected residential receivers within NCAs 1, 2, 3 and 4

- Exceedances are predicted during Scenarios 1, 2 and 3 at the potentially nearest affected residential properties within all NCAs, with particular emphasis on NCA1 and NCA2.
- Sleep disturbance assessments have been undertaken with respect to Scenarios 4, 5 and 6a/b. Exceedance of the sleep disturbance 65dB(A)L_{max} external noise target is predicted for Scenarios 4 and 6a/b (Brake Release and Horn Warning/Testing respectively). Exceedances of the external noise target of up to 18 dB for Scenario 4 and 45 dB for Scenario 6 a and b are predicted at residential receivers due to their proximity to the stabling yard works and removal of existing noise wall to allow space for the project.

No exceedances are predicted for any of the identified surrounding commercial, industrial, educational institutes and places of worship receivers.

Given the varying levels of exceedances based on the different operational scenarios, receiver locations and the two noise wall options being considered, a hierarchical approach for mitigation is recommended to control operational noise impacts from the stabling facility. This will ensure mitigation options likely to offer the greatest benefit to the largest number of affected receivers are considered before more localised mitigation options.

- To understand noise at the source, testing is ongoing for the proposed new and existing fleet to update future assessments.
- The proposed orientation of the lengthened roads does not include any sharp bends or turnouts, which will reduce the risk of wheel squeal, and additional track measures that should be considered include:
    - Welding to smooth discontinuities
    - Lubrication
    - Use of soft rail pads

- To control noise impacts associated with Scenario 6a (Horn warning), operational considerations have been proposed in the form of Automatic Warning Systems (AWSs), as well as proposed horn testing on the Main Line rather than the stabling yard. Furthermore, it should be noted that the new fleet will be fitted with a train-based warning system (TBWS) in the form of a low broadband alarm which could be used to warn of movement instead of horns. Use of the TBWS shall be confirmed at the ONVMP stage and would need an appropriate NSWTL procedure. Noise walls have also been investigated as an alternate source of mitigation for horn noise, however, the exceedances of the sleep disturbance external noise target are too extensive that the reduction achieved with noise walls is not adequate to achieve compliance with the external noise target.
- A PDR noise wall has been proposed to replace the removed Section 2 of the existing noise wall to potentially assist with the noise emissions from the operational stabling facility. Lower levels of exceedances are predicted (typically in the order of 1 to 13 dB(A) lower, based on the scenario and receiver location) if the existing noise wall is replaced by the PDR noise wall. However, due to reflections from the proposed PDR noise wall, the number of residential receivers exceeding the operational noise targets increase within NCA 3. It should be noted that the PDR noise wall does not assist with the mitigation of Scenario 6a.
- Utilising the worst-case scenario, Scenario 6b – "*New Fleet Country Horn Testing at Location 1 without the PDR Noise Wall",* a total of 87 residential receivers within all the NCAs assessed are predicted to exceed the sleep disturbance external noise target. With the PDR noise wall, there is a reduction in predicted noise level, however the total residential receivers exceeding the sleep disturbance target level only decreased to 75. A cost benefit analysis should be undertaken to ascertain if the PDR noise wall is the best approach in terms of mitigation.
- The existing noise walls provided little to no attenuation given their low heights. As discussed above, the PDR noise wall replacement will result in a reduction of operational noise impacts when compared to retaining the existing noise wall. The PDR Noise wall does provide noise reductions and does reduce the number of residential receivers exceeding the project operational noise trigger levels; however, the PDR Noise wall may not be the best solution from a cost benefit standpoint and additional mitigation would still be required to ensure full compliance with the project operational noise trigger levels (see below for additional noise mitigation options and solutions).
- If the PDR noise wall is to be built, given the potential for noise reflections associated with this noise wall, absorptive facing is recommended to the inside face of the wall (facing the fleet), along areas immediately adjacent to where fleets will be stabled. Minimum NRC 0.35 (e.g. Woodtex) is recommended for the absorptive facing.
- As strict compliance with the project operational noise trigger levels is still not achieved following the investigation of feasible and reasonable mitigate measures above, complementary management at the point of impact should be considered. This will include at receiver treatments in the form of upgrade of building fabric elements (i.e. façade glazing). An appropriate ventilation system (e.g. air-conditioning) will also typically need to be incorporated into the design, for this solution to be effective. Site visits must be coordinated during subsequent stages of design, to confirm property layout of the identified properties and determine specific architectural treatments.

An Operational Noise and Vibration Management Plan (ONVMP) should be prepared during subsequent stages of design, when final/confirmed noise information is available for the new fleet. Hence, this updated acoustic information must be used to update this prediction assessment, to determine any efficiencies and/or compensations to the proposed mitigation treatments.

1 Introduction

The NSW Government is undertaking the Regional Rail Project (RRP), with Transport for NSW (TfNSW) as its lead agency. The RRP consists of replacing the ageing NSW regional rail fleet of XPT, XPLORER and Endeavour services, which includes trains that are up to 37 years old. Integration of this new rail fleet into the existing regional rail network is a key responsibility for the project, with enabling works determining the additions and modifications required to ensure compatibility of the new regional fleet with existing regional rail infrastructure.

As part of the enabling works scope, Moss Vale Stabling Yard was identified as an area that would need to be upgraded to facilitate the stabling of the new fleet (the project). Aurecon was engaged by TfNSW to prepare an Environment Impact Assessment (EIA) checklist, for the construction and operation of the project. Impacts to the local noise and vibration environment have been identified as a potential risk during the project and are assessed in this noise and vibration impact assessment to support the EIA checklist.

This assessment is based on the Preliminary Design Review (PDR) design, which is the current phase of the RRP Enabling Works and is based on the findings of the Systems Definition Review and comments received from stakeholders. It will:

- Provide a general overview of the project, including any aspects particularly relevant to noise and vibration (Section 2)
- Identify key construction and operational noise and vibration risks (Section 2.1)
- Characterise key features of the project site (existing stabling yard and its operations) and study area, including location of nearby sensitive receivers, land uses, terrain features, and ambient noise environment (Section 3)
- Identify relevant noise and vibration standards and guidelines applicable to the project, and formulate project specific objectives for operational and construction impacts (Section 4)
- Assess potential noise and vibration impacts associated with the construction of the project (Section 6)
- Assess potential noise and vibration impacts associated with the operation of the project (Sections 5)
- Recommend mitigation measures and management strategies as required, to control identified noise and vibration impacts (Section 6)

2 Project Overview

Moss Vale is currently able to stable six (2-car) Endeavour train sets on the existing City Rail Storage and Service roads on the City end of Moss Vale Station. When the new Regional trains are introduced onto the network, Moss Vale will be required to stable six (3-car) Short Units. The facility will also need to provide shore supply and provisioning services for the new Regional fleet. Key features of the project include:

- Lengthening the two existing storage and service roads located on the city side of the fuel point (on the Up side) to accommodate six (6) 3-car sets and associated earthworks, drainage (track drainage and stormwater drainage), footpaths, lighting, gates, fencing and potable water to accommodate the reconfigured stabling yard
- Introduction of friction buffer stop for each track (a stop to prevents trains from going past the end of the track)
- Upgrade the existing access off Lackey Road to include a vehicular entry gate on the northern side and a vehicular exit gate on the southern side of the stabling yard. A new access road and gate will be provided for the existing signal box, adjacent to the vehicular entry gate. The upgraded site access will also include a new parking area (provision for up to 4 car spaces) and bin store.
- Relocation of the existing amenities block (including associated services required such as communications, data, power, water, sewer) and storage container to the new site access areas, approx. 60m to the north of existing location from.
- Introduction of new high voltage (HV) supply for shore supply points to suit stabling extension including upgraded cables, switch board(s), cabinets, and connection to the new trains
- Installation of a new footpath on the Canberra side of the fuel point. The footpath would be about 175 metres long, 1.2 metres wide and would be made of asphalt.
- Installation of combined services route (CSR), including trenching work for underground cables and galvanised steel troughing (GST):
    - Trenching for underground CSR on the Canberra side of the fuel point. The trench would be about 175 metres long, 0.5 metres wide and would not exceed three metres deep.
    - Trenching for underground CSR on the city side of the fuel point. Trenches would be located within the new stabling yard alongside the new tracks and the parking bays. The trenches would vary in lengths and would 0.5 metres wide. The deepest trench routes would be required for the under-track crossings at two metres deep, with all other routes in this area between 0.5 to a metre deep.
    - The GST would be above ground within the extended stabling yard, trying into the existing GST. The total width of the GST (combined and new) would not exceed five metres. The GST would be about 1.2 metres tall, with the footings being between 0.5 and 0.6 metres deep.
- The stabling of the existing fleet until the delivery and use of the new fleet. The transition time is unknown; however the stabling yard is the be assessed and have the ability to stable both train types.

2.1 Key noise and vibration risks

The elements of the project that would be most likely to give rise to noise or vibration impacts include:

- Potential operational impacts:
  - Noise from train movements (arrival/departure)
  - Noise associated with horn testing.
  - Noise from train cleaning and preparation activities
- Potential construction impacts:
  - Noise from construction activities, especially concrete breaking, excavation, and earthworks
  - Noise from construction vehicle traffic (delivery of construction materials, waste removal etc.)
  - Vibration on buildings and/or heritage structures from excavation and breaking operations
  - Noise from temporary stabling operations proposed at Car Siding Road 3, during the upgrade works. Operations will include train movements (arrival/departure), horn testing and train cleaning and preparation. The temporary stabling operations are only expected for the existing fleet.

3 Existing Environment

3.1 Project site description

The project is located within the Wingecarribee local government area (LGA) in Moss Vale. The project area is currently zoned as SP2: Infrastructure: Rail Infrastructure under the *Wingecarribee Local Environmental Plan 2010* (Wingecarribee LEP 2010). All land required for the project is State or local government owned within the rail corridor on Lots 1, 3 and 4 DP1173719.

Land within the rail corridor in the project area is occupied by Australian Rail Track Corporation (ARTC) and Sydney Trains. In the project area there are ARTC and Sydney Trains rail lines with associated rail infrastructure such as signalling equipment, stabling areas, maintenance facilities and buildings. The South Coast Line, Southern Highlands Line and Southern NSW Line service Moss Vale Station.

Key features of the project (see Section 2) with reference to the site location are shown in Figure 3-1.

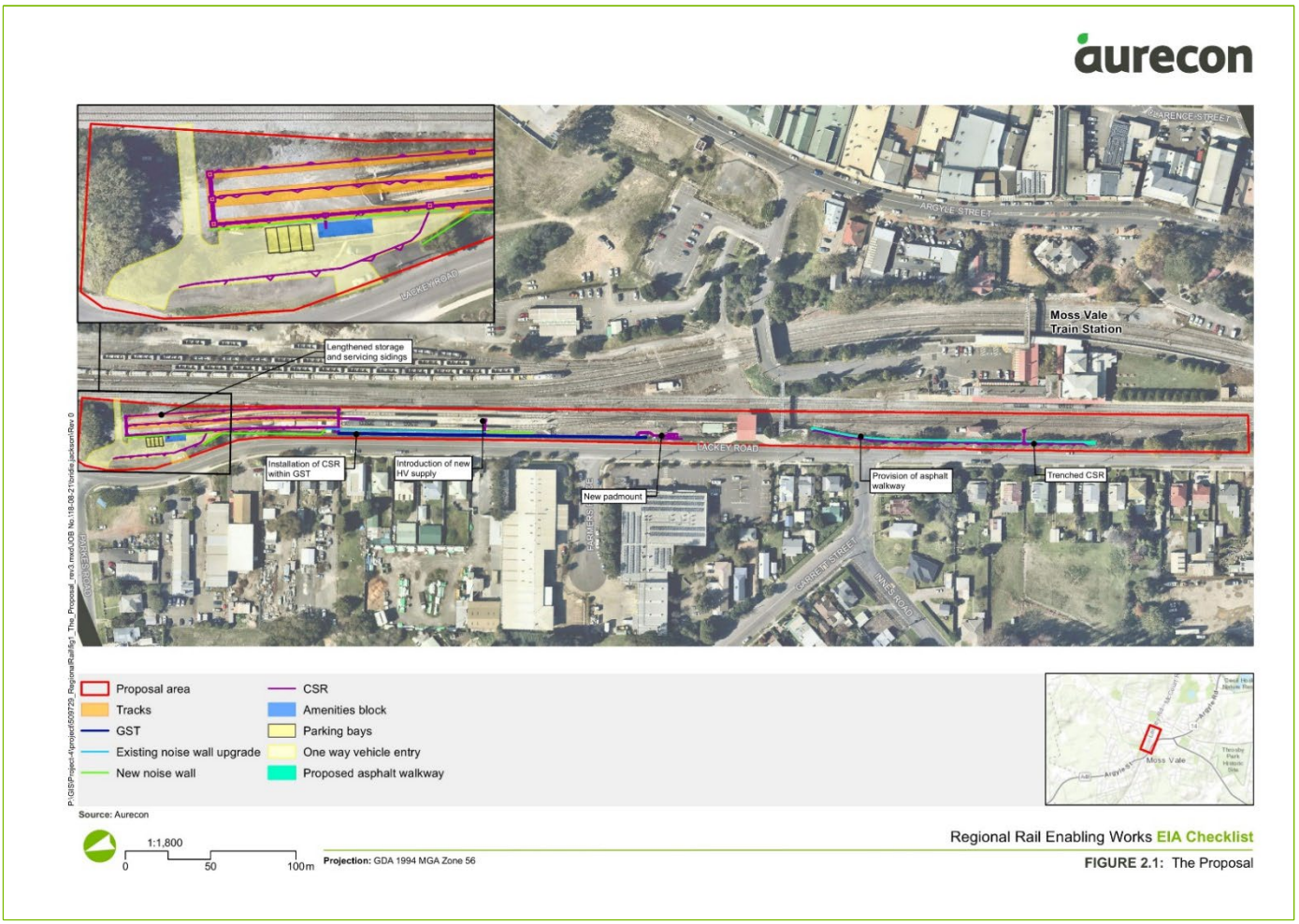


Figure 3-1: Project site layout & key features

3.2 Study area

Moss Vale Station is accessible via Lackey Road or the Illawarra Highway/Argyle Street, which provides access to retail areas and services.

- Area to the north of the project includes the rail corridor (to Sydney/city), residential properties and recreational, facilities. Properties in this area are spread out, with pockets of recreational facilities and social infrastructure throughout. There are also industrial businesses and large supplier type businesses located further to the north, followed by rural/agricultural properties.

- Area south of the project includes the rail corridor (to Canberra) and denser residential areas, with small local businesses and facilities clustered around the Illawarra Highway/Argyle Street.
- Areas to the east and west of the project are comprised of residential suburbs, social infrastructure, and local businesses. This includes small to large retail shops, recreational facilities, restaurants, cafés and community services that border Lackey Road and the Illawarra Highway/Argyle Street.

3.3 Existing stabling yard operations

The stabling yard currently accommodates up to 6 x 2-car sets. Due to this limitation, only Endeavour type rail fleet is currently serviced as part of the stabling yard operations. Stabling yard operations primarily include cleaning, decanting, potable water refilling, refuelling, refilling coolant and preparation works (brake test, continuity test and trip valve test).

Trains typically arrive at the yard from 08:30pm to 01:45am weekdays and from 06:00pm to 02:15am weekends. Cleaning operations are carried out first, with preparation works commencing approx. 45-60mins prior to departure. Train departures commence from 03:30am on weekdays and 04:00am on weekends, with the final train departing before 06:30am and 09:30am respectively.

3.4 Existing noise wall

A noise wall currently exists at the stabling yard, split into two sections as illustrated in Figure 3-2 to 3-3.

- Section 1 – this noise wall is located to the west of the No.2 storage siding (Storage road), is approximately 1.75m high and extends for 89m (solid and continuous). Figure 3-2 illustrates the location and construction of this wall.
- Section 2 – this noise wall is located to the west of the No.1 storage siding (Service road), is approximately 1.8m high and extends for 70m. The northern half of this wall (till the end of first amenities shed) is elevated from the ground, with a gap of approx. 500mmm. The southern half of the wall is solid, with no gaps. Figure 3-3 illustrates the location and construction of this wall.

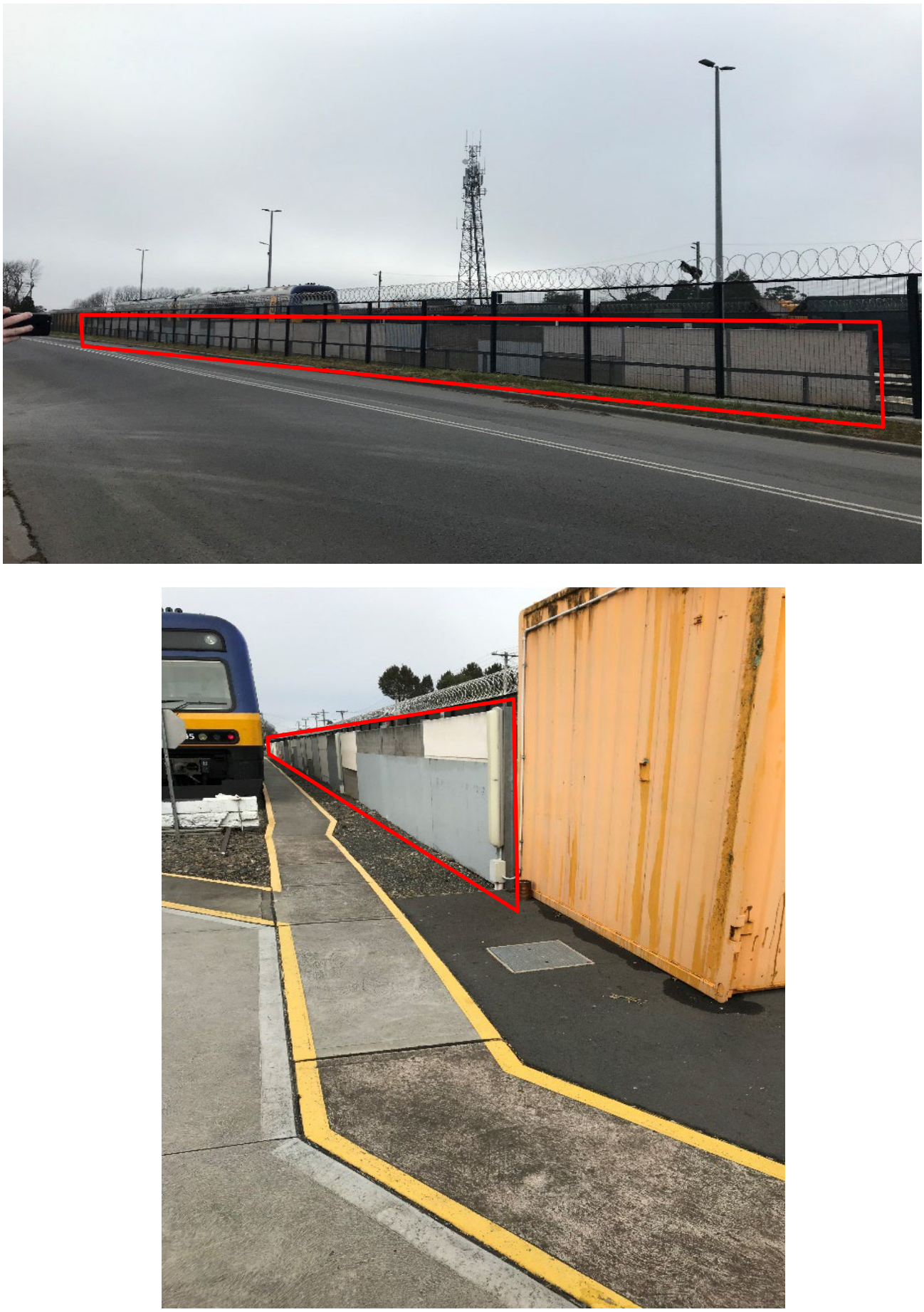


Figure 3-2: Existing noise wall (Section 1)

Figure 3-3: Existing noise wall (Section 2)

3.5 Surrounding sensitive receivers

Noise and vibration sensitive receivers are generally categorised by the type of occupancy and/or the activities performed within the property boundary. This includes:

- Residences (including multi-floor dwellings): Each floor of a multi-floor dwelling is considered to be a separate sensitive receiver as each floor could have separate property owners and/or land uses (e.g. commercial ground floor and residential first floor)
- Educational institutes (e.g. St Paul's Catholic Primary School)
- Hospitals and medical facilities
- Places of worship (e.g. St Paul's Parish Catholic Church)
- Commercial or industrial premises (e.g. Harvey Norman Moss Vale, Southern Trade Supplies – Timber Specialist, Moss Vale Mechanical Repairs)
- Passive recreational areas (e.g. parks)
- Active recreational areas (e.g. school playground, golf course). Note that recreational areas are only considered sensitive when they are in use or occupied.

The potentially nearest affected sensitive receivers in relation to the project are detailed below:

- Residential receivers
    - Residential properties to the west along Lackey Road, Parkes Road and Garrett Street
    - Residential properties to the east along Baker Road, Hoskin Street and Hawkins Street
- Non-residential receivers
    - Commercial and light-industrial properties to the west along Lackey Road (Harvey Norman Moss Vale, Southern Trade Supplies – Timber Specialist, Moss Vale Mechanical Repairs)
    - St Paul's Parish Catholic Church to the south-west, along Garrett Street
    - St Paul's Catholic Parish Primary School to the south-west, along Garrett Street
    - Retail and commercial properties to the east along Argyle Street

The locations of these surrounding sensitive receivers are illustrated in Figure 3-4.

3.6 Noise catchment areas (NCA)

It is general practice to group receivers into catchment areas for an environmental noise impact assessment. A NCA will allow for logical grouping of receivers with the potential to be impacted by similar works/activities, for different ambient noise environments. This will facilitate ease for assessment, consultation, and notification. The NCA's selected for this project are illustrated in Figure 3-4.

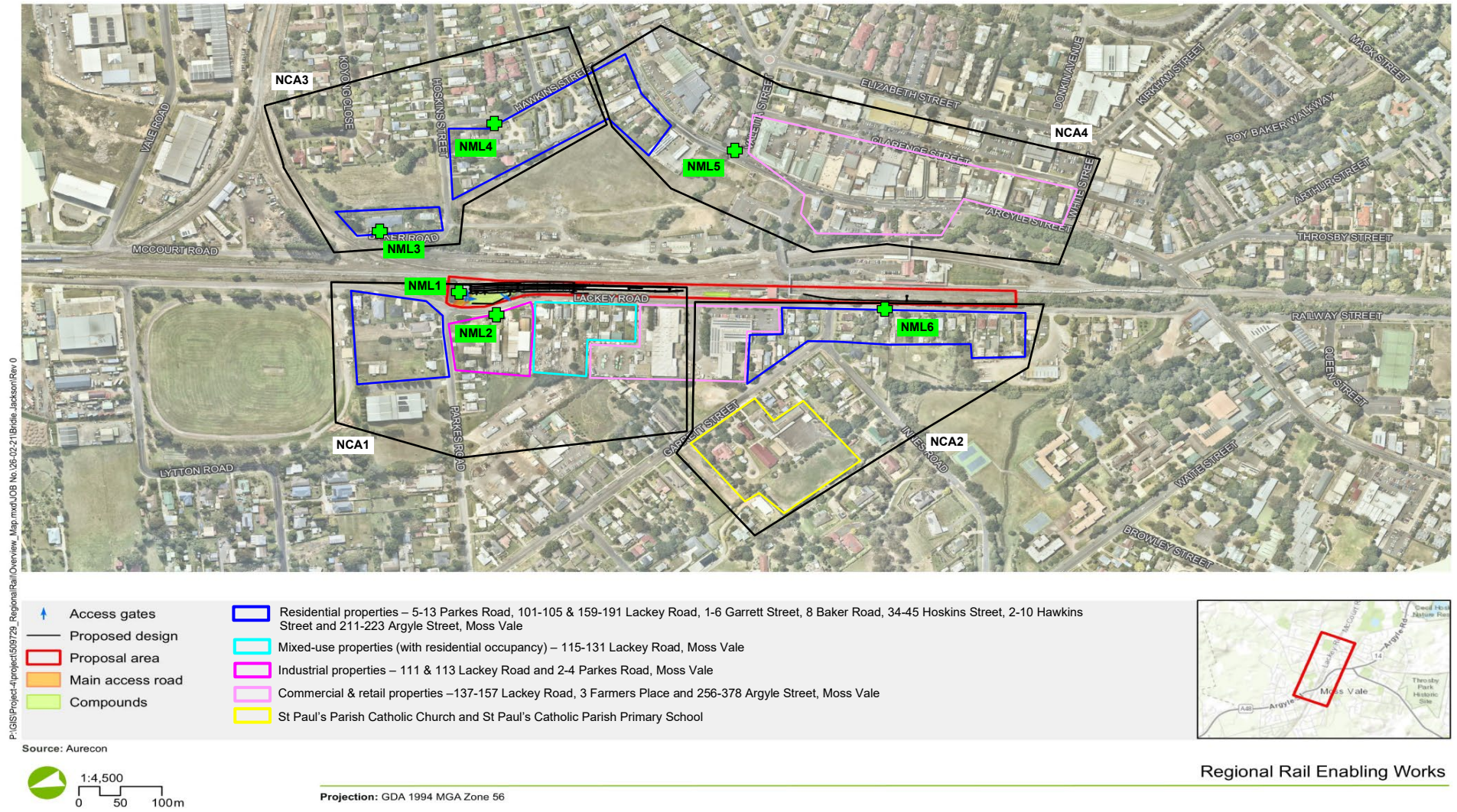


Figure 3-4: Project area, surrounding sensitive receivers and noise measurement locations

3.7 Ambient noise survey

A preliminary survey of the existing ambient noise levels adjoining the project area was conducted using both unattended and attended measurements. All instrument sets were calibrated by a NATA accredited laboratory,have current certifications and comply with Australian Standard AS-1259: *Sound Level Meters*. Noise measurements were conducted between 9 – 22 December 2020, at locations illustrated in Figure 3-4.

3.7.1 Methodology

Baseline noise measurement location considerations included land topography, distance from the project area activities and contribution from other environmental noise sources (e.g. road traffic and industrial developments).

Based on the proposed project area (see Figure 3-4), residential properties along Lackey Road are potentially the nearest affected sensitive receivers. It was noted during a site survey (9th December 2020) that the general ambient environment at these receivers is predominantly impacted by rail noise from movements associated with the Moss Vale station and stabling operations at the existing yard.

As the majority of noise impacts associated with stabling operations are proposed to occur towards the northern end of the project area (see Figure 3-1), the location for long-term noise monitoring at this preliminary EIA checklist stage was selected at NML1 (see Figure 3-4). The ambient noise levels measured at this location are representative of the ambient noise levels at the nearest affected residential properties along Lackey Road. All measurements were performed in accordance with the Australian Standard AS/NZ1055 1997 '*Acoustics – Description and measurement of environmental noise*'.

3.7.2 Unattended noise measurements

Long-term unattended noise monitoring was carried out using an Acoustic Research Labs Type EL-316 environmental noise logger, installed with microphone at a height of 1.5m and at least 2.5 m from any reflecting façade. Monitoring was conducted from the 9th to 21st December 2020, set to measure continuously using an A-weighted fast response mode. The monitor was calibrated before and after the monitoring period and no calibration drift exceeding ±1 dB(A) was observed. Detailed noise monitoring data is attached in Appendix E.

The data collected by the noise monitor was downloaded and analysed, and any invalid data removed. Invalid data generally refers to periods where average wind speeds were greater than 5m/s and/or when rainfall occurred, in accordance with the requirements of *Noise Policy for Industry* (NPfI) (NSW EPA, 2017). Approximately 30 hours of data was removed due to rain and wind. Concurrent weather data was sourced from the Bureau of Meteorology's Moss Vale (station ID: 068239) automatic weather station (AWS), to identify any periods of weather which may have affected the monitoring results.

A summary of the unattended continuous noise monitoring, in accordance with the requirements of the NPfI defined time periods, are presented in Table 3-1.

Table 3-1: Unattended noise monitoring results

Location	Time Period	Rating Background Noise Level (RBL) [1] dB(A)$L_{90(period)}$	Average Noise Level dB(A)$L_{eq(period)}$
NML1	Daytime (7am – 6pm)	42	58
	Evening (6pm – 10pm)	36	57
	Night-time (10pm – 7am)	34	55

[1] *RBL is the median of the measured LA90 noise level during the day, evening and nigh-time periods of the monitoring programme.*

3.7.3 Attended noise measurements

Attended noise measurements were also conducted at four locations (NML 2 – NML 5, see Figure 3-4) during the daytime period, to quantify the ambient environment at these locations for assessment of impacts associated with construction works (during standard hours).

Measurements were conducted on the 9th and 22nd December 2020, using a Bruel & Kjaer sound level meter (SLM), equipped with a B&K type ZC0032 pre-amplifier and a 4189 ½" microphone. The SLM was programmed to record using an 'A' frequency weighting, 'F' time weighting, and was fitted with an approved windshield. A B&K type 4230 calibrator was used to calibrate the sound level meter before and after each series of measurements with no significant calibration drift noted.

Measured noise levels, including a description of the noise environment noted at each location are presented in Table 3-2.

Table 3-2: Attended noise measurement results

Locations	Time	Background Noise Level dB(A)$L_{90(15min)}$	Average noise level dB(A)$L_{eq(15min)}$	Observations
NML2	9 December, 09:42AM	44	58	Rail and road traffic noise dominant. No freight or stabling yard trains noted during this period.
NML3	9 December, 09:42AM	43	59	Rail noise dominant. 1 x freight train pass-by noted. Industrial noise was also audible from north-west.
	22 December, 11:53AM	42	55	Rail noise dominant. Industrial noise was also audible from north-west.
NML4	9 December, 10:02AM	42	50	Intermittent traffic noise from Hoskins and Hawkins Streets. Rail pass-by noise also noted in background, in addition to dog barking and bird noise.
NML5	9 December, 09:21AM	53	62	Traffic noise dominant
	22 December, 12:25PM	52	60	Traffic noise dominant
NML6	9 December, 09:02AM	43	60	Rail noise dominant. 1 x freight train pass-by noted. Intermittent traffic on Lackey Road.
	22 December, 11:30AM	43	57	Rail noise dominant. Intermittent traffic on Lackey Road.

3.7.4 Limitations of ambient noise survey

As discussed in Section 3.7.1, long-term ambient noise monitoring was only conducted at one (1) representative location at this preliminary EIA checklist stage, to quantify the existing noise environment at the potentially nearest affected sensitive receivers along Lackey Road.

Additional ambient noise surveys shall be undertaken during subsequent stages of design, to accurately quantify the existing ambient noise environment within other NCA's (see Figure 3-4). Figure 3-5 illustrates the recommended monitoring locations.

Figure 3-5: Recommended additional noise monitoring locations

4 Noise and Vibration Objectives

Relevant noise and vibration objectives for the project are outlined in this section.

4.1 Operational noise

Operational rail noise objectives in NSW are derived from the *Rail Infrastructure Noise Guideline* (RING) (NSW EPA, 2013) and generally applies to the assessment of impacts associated with rail movements (heavy or light) from new or redevelopment rail infrastructure. However, section 1.5 of RING excludes assessment of projects involving maintenance facilities for rolling stock (including stabling yards and shunting operations) under this guideline and instead nominates for assessment of these impacts in accordance with the NSW *Industrial Noise Policy* (INP). The INP was superseded by the NPfI in 2017 and as such the provisions of this guideline will be used for this assessment.

The NPfI provides the framework and process for deriving noise trigger levels for assessments under the *Environmental Planning and Assessment Act 1979.* The guideline specifies that there are two aspects of environmental noise that require assessment. The first relates to the intrusiveness of a noise source and allows for the noise under assessment to be a margin above the background, whilst the other procedure relates to the acceptability of the resulting noise, in relation to maintaining the amenity of the surrounding area. The project noise trigger level is the more stringent value of the project amenity or intrusiveness noise levels.

4.1.1 Project intrusiveness noise level

The intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment. A noise source would generally be non-intrusive, if the monitored average noise level (L_{Aeq}) for a period does not exceed the RBL by more than 5 dB(A). Intrusiveness noise levels are only applied to residential receivers (residences).

Based on the results of noise monitoring detailed in Section 3.7.2, the following project intrusiveness noise levels are calculated in Table 4-1.

Table 4-1: Project intrusiveness noise levels

Location	Time Period	Rating Background Noise Level dB(A)$L_{90(period)}$	Allowance	Project Intrusiveness Noise Level dB(A)$L_{eq(15min)}$
All residential receivers in NCA1, NCA2 & NCA3 [2]	Daytime (7am – 6pm)	42	+5dB	47
	Evening (6pm – 10pm)	36		41
	Night-time (10pm – 7am)	34		39

4.1.2 Project amenity noise level

To limit continuing increases in noise levels from the application of intrusiveness objective alone, this guideline recommends amenity noise levels for different receivers within a study area (Table 2.2 of the NPfI), to ensure ambient levels from all sources combined within this area are suitably controlled.

To ensure that the total industrial noise levels (existing + new) remain within the recommended amenity noise levels for an area, the project amenity noise level is derived as follows:

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

[2] *Indicative only at this for residential receivers within NCA2, 3 and 4, with additional noise monitoring required as detailed in Section 3.7.4, to accurately determined RBLs for each NCA.*

However, there are exceptions to this method of deriving the project amenity noise levels, with one being areas of industrial interface.

Section 2.7 of the NPfI notes that a marginally reduced acoustic amenity is acceptable for existing residences co-located with existing industry (as the noise mitigation measures available might be limited in these circumstances) and classifies these areas as “industrial interface”.

The industrial interface assessment generally only applies to existing situations (that is, an existing residential receiver near an existing industry that is proposing expansion or modification) and only for those residential receivers that are:

- located in the immediate area surrounding the existing industry (i.e. from the boundary of the existing industry to the point where the noise level of the existing industry, measured at its boundary, has fallen by 5 dB or as agreed between the proponent and the relevant authority at the commencement of a noise impact assessment or related study), and
- where existing industrial noise levels (including noise from the premises under consideration) are above the relevant rural, suburban or urban recommended amenity noise levels.

Beyond the interface region (i.e. beyond the point where noise has fallen by 5 dB) the recommended amenity noise level relevant to the receiver category applies.

For this project, all residential receivers will generally be defined as ‘Suburban’. This classification is based on the measured existing ambient noise levels and the description of noise environments in the NPfI.

Table 4-2: NPfI recommended amenity noise levels

Receiver	Time Period	NPfI Recommended Amenity Noise Level dB(A)$L_{eq(period)}$
Residential – suburban	Daytime (7am – 6pm)	55
	Evening (6pm – 10pm)	45
	Night-time (10pm – 7am)	40
Residential – industrial interface	Daytime (7am – 6pm)	60
	Evening (6pm – 10pm)	50
	Night-time (10pm – 7am)	45
Commercial properties	When in use (typically daytime only, during standard business hours)	65
Industrial properties		70
Places of worship		40 (internal)
School classrooms		35 (internal)

4.1.3 Modifying factor adjustments

According to the NPfI, where noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other less-obtrusive noise sources at the same level. To account for this additional annoyance, the NPfI describes modifying factors to be applied when assessing amenity and intrusiveness.

Based on the definitions detailed in Fact Sheet C of the NPfI, noise sources associated with the stabling yard operations are not likely to require the addition of modifying factors.

4.1.4 Maximum noise level assessment (sleep disturbance impacts)

Noise impacts associated with stabling yard operations during the night period (10pm to 7am), have the potential to disturb people’s sleep patterns and cause awakenings.

- The NPfI provides the latest EPA guidance for the assessment of sleep disturbance. Section 2.5 of this guideline recommends an assessment of maximum noise levels, which have the potential to cause sleep disturbance impacts. Sleep disturbance impacts could include awakenings or disturbance to sleep stages. The NPfI recommends an initial screening test for maximum noise level events (such as horns, brake release test), with the following screening levels:
  - $L_{Aeq(15\ min)}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is greater
  - L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is greater.

  A detailed maximum noise level assessment should be carried out if the screening test indicates there is a potential for sleep disturbance. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period. The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the maximum noise screening levels.
- Additionally, the NSW *Road Noise Policy* (RNP) (NSW EPA, 2013) also provides guidance for the assessment of sleep disturbance. Section 5.4 of the RNP states:
  - Maximum internal noise levels below 50-55 dB(A) would be unlikely to result in people's sleep being disturbed.
  - If the noise exceeds 65-70 dB(A) once or twice each night, the disturbance would be unlikely to have any notable health or wellbeing effects.

The guidance within the RNP indicates that internal noise levels of 50 to 55 dB(A) are unlikely to cause sleep awakenings. Hence, at levels above 55 dB(A), sleep disturbance would be considered likely. Assuming that receivers may have windows partially open for ventilation, a 10 dB difference between inside and outside noise level is typical as noted in the ICNG (Section 4.1.), resulting in an external noise target of 65 dB(A)L_{max}.

4.1.5 Summary of operational noise objectives

- Based on the results of attended noise measurements of 1 x train idling on the No.2 storage siding (Storage road), the first row of residential receivers along Lackey Road in NCA1 (117-133 Lackey Road, Moss Vale) can be classified as industrial interface area (based on discussion in Section 4.1.2).These receivers are illustrated in Figure 4-1.
- Moreover, depending on the current frequency and use of Road 3, there is also a high likelihood of the first row of residential properties adjoining this road on Lackey Road (between Parker Street and Farmer Place; see Figure 4-2), being classified as industrial interface area. A combination of noise measurements and operational procedure documentation will need to be provided to confirm this.
- Section 6 of the NPfI also acknowledges that many existing industrial facilities were designed for higher noise emission levels than the project noise trigger levels derived in accordance with the policy, as is the case for the Moss Vale Stabling Yard. In these cases, the range of mitigation measures available can be limited or costly. The NPfI notes that applications for extensions to existing premises often provide an opportunity to redress issues that relate to the whole site.

  Where noise emissions from the site exceed the project noise trigger levels, the regulatory authorities and the noise-source manager will determine achievable noise trigger levels for the site, taking into account matters that must be considered in accordance with the relevant legislation or process, including negotiation with proponents and discussion with stakeholders as required.

  The NPfI notes, there is no 'one-size-fits-all' approach to determine the impact from an existing industry and outlines the following governing principles that should be applied when determining the project noise trigger levels and/or assessment requirements for existing industry:
  - *The project noise trigger levels should not be applied as mandatory noise limits. The project noise trigger level is the level used to assess noise impact and drive the process of assessing all feasible and reasonable control measures.*
  - *Where an existing industry has been in operation for more than 10 years and existing site operations exceed the project amenity noise level, the project amenity noise level may be adopted as the project noise trigger level to assess existing, and existing plus proposed site operations, as relevant.*

- *Where a development proposal involves a discrete process, and premises-wide mitigation has or is to be considered outside of the development proposal, a project noise trigger level for noise from new/modified components (not the whole site) of the operation may be set at 10 dB(A) or more below existing site noise levels or requirements. This approach means that the increase in noise from the whole site is minimised and provides scope for existing components to achieve noise reductions over time.*

Figure 4-1: Industrial interface area adjacent to existing stabling yard

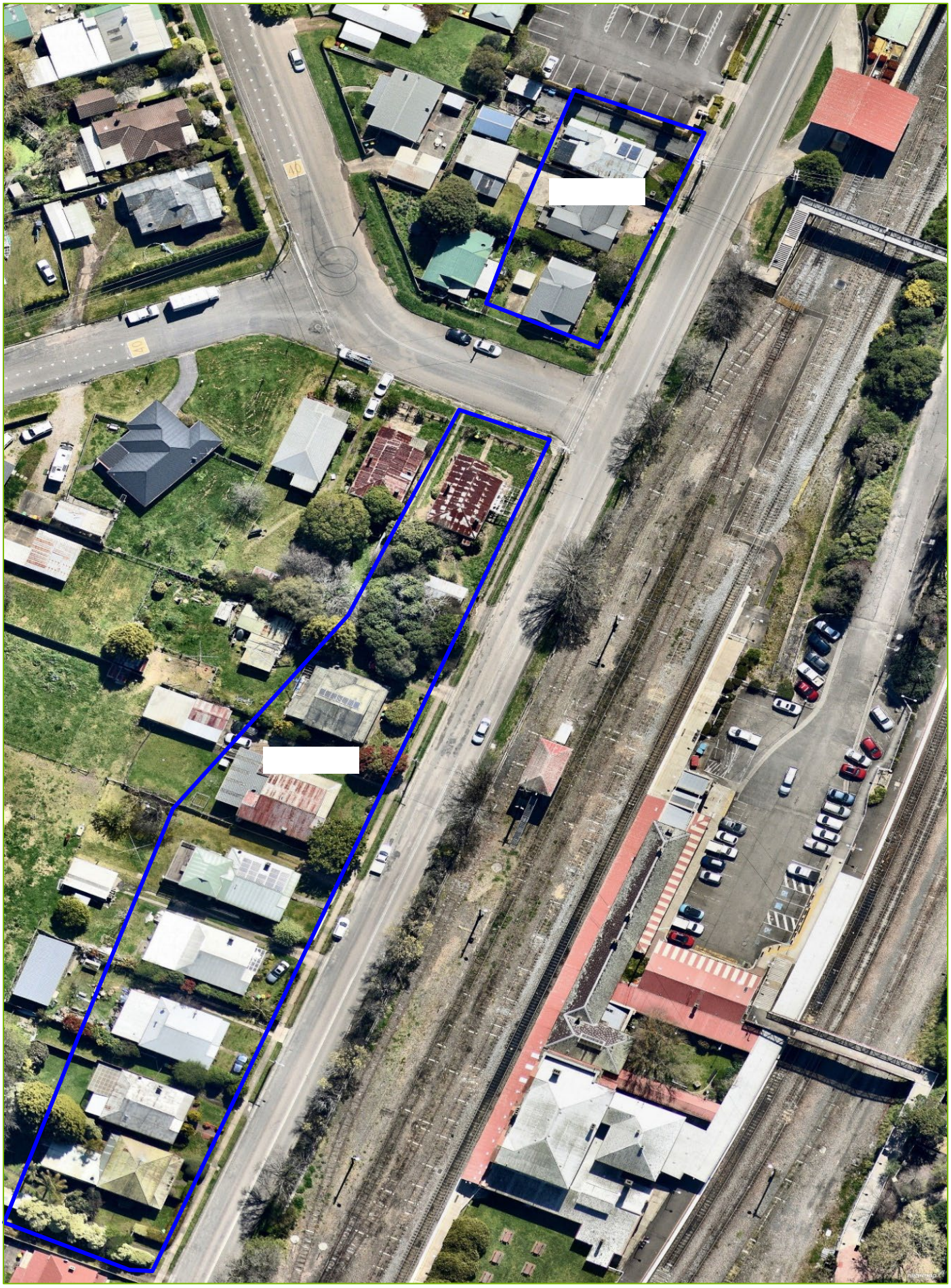


Figure 4-2: Potential areas of industrial interface in NCA2 (dependant on current Road 3 operations)

Hence, in accordance with these principles, as the Moss Vale Stabling Yard has been in operation for more than 10 years, and based upon the existing ambient conditions detailed in Table 3-2, the project amenity noise levels are to be adopted as the project noise trigger levels to assess existing, and existing plus proposed site operations.

The relevant project noise trigger levels for potentially affected residential and non-residential receivers are summarised in Table 4-3 and Table 4-4 respectively.

Table 4-3: Project operational noise trigger levels (residential receivers)

NCA	Time Period	Project Operational Noise Trigger Levels dB(A)$L_{eq(15min)}$ [3]	Sleep Disturbance Screening Test dB(A)L_{max}	Sleep Disturbance External Noise Target dB(A)L_{max}
NCA1-1A & potentially NCA2-A [4]	Daytime (7am – 6pm)	58	-	-
	Evening (6pm – 10pm)	48	-	-
	Night-time (10pm – 7am)	43	52	65
All other surrounding residential properties in NCA1, 2, 3 & 4 [5]	Daytime (7am – 6pm)	53	-	-
	Evening (6pm – 10pm)	43	-	-
	Night-time (10pm – 7am)	38	52	65

Table 4-4: Project operational noise trigger levels (non-residential receivers)

Receiver	Project Operational Noise Trigger Levels dB(A)$L_{eq(15min)}$
All commercial properties (including retail, offices etc.)	63
All industrial properties	68
Places of worship	48
Educational institutes	43

4.2 Construction noise

The *Interim Construction Noise Guideline* (ICNG) (NSW DECC 2009) generally applies to the management of construction noise in NSW. This guideline provides recommendations on standard construction hours and construction noise management levels (NMLs).

4.2.1 Recommended standard hours of work

Section 2.2. of the ICNG recommends standard hours for construction work as follows:

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

[3] *Converted from $L_{eq(period)}$ to $L_{eq(15min)}$ based on guidance provided in Fact Sheet E of the NPfI.*

[4] *Dependant on current Road 3 operations and verified by noise measurements.*

[5] *Indicative only at this stage, with additional ambient noise surveys required to confirm application of intrusiveness vs amenity noise criterion. Application of NPfI Section 6 guideline potentially likely only for residential properties at 45 Hoskins and 8 Barker Road, with all other residences at sufficient distance from industrial source.*

- No work on Sundays or public holidays

This is also consistent with the construction hours noted in the Construction Noise and Vibration Strategy (CNVS) (TfNSW).

The ICNG notes that the recommended standard hours of work are not mandatory and acknowledges that some activities could be undertaken outside the recommended standard hours of work, assuming all feasible and reasonable mitigation measures are implemented to minimise the impacts to any surrounding sensitive land uses. These activities include:

- the delivery of oversized plant or structures that police or other authorities determine requires special arrangements to transport along public roads
- work to avoid the loss of life or damage to property, or to prevent environmental harm
- maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours
- public infrastructure works that shorten the length of the project and are supported by the affected community
- works where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours
- works which maintain noise levels at receivers to below the noise management levels outside of the recommended standard construction hours.

4.2.2 Construction noise management levels

Recommended construction NMLs for residential receivers and non-residential receivers are presented in Table 4-5 and Table 4-6 respectively. The NMLs represent a noise level that, if exceeded, would require management measures including the following:

- reasonable and feasible work practices
- contact with residences to inform them of the nature of works to be carried out, the expected noise levels and durations and contact details.

The management measures aim to reduce noise impacts on the residential receivers; however, it may not be reasonable and feasible to reduce noise levels to below the noise management level. The construction NMLs are not intended as noise limits but rather as levels that, if exceeded, will require noise management.

Table 4-5: Construction NMLs at residential receivers

Time Of Day	Management Level dB(A)$L_{eq(15min)}$ [6]	How To Apply
Recommended standard hours: • Monday to Friday • 7.00 am to 6.00 pm • Saturday 8.00 am to 1.00 pm • No work on Sundays or public holidays	Noise affected RBL + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: ▪ times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) ▪ if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours (OOHW) [7]	Noise affected RBL + 5 dB(A)	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

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

[7] *OOHW Period 1 (Day) – Saturdays 7am to 8am and 1pm to 6pm; Sundays and public holidays 8am to 6pm.*
OOHW Period 1 (Evening) – Monday to Saturday 6pm to 10pm.
OOHW Period 2 – Monday to Saturday 10pm to 7am; Sundays and public holidays 6pm to 8am.

Table 4-6: Construction NMLs at non-residential receivers

Receiver Type	Time Of Day	Management Level dB(A)$Leq_{(15min)}$ [8]
Commercial properties	When in use (typically, daytime only, during standard business hours)	70 (external)
Industrial properties		75 (external)
Places of worship		45 (internal) 55 (external)[4]
Educational institutes		45 (internal) 55 (external)[4]
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)		75 (external)

4.2.3 Maximum noise level assessment (sleep disturbance impacts)

Section 4.3 of the ICNG notes that where construction works are planned to extend over more than two consecutive nights, assessment of maximum noise level impacts at affected residences is required, in line with guidance provided in the NSW *Environmental Criteria for Road Traffic Noise* (since been superseded by the NSW EPA RNP).

- Construction activities associated with the project are only expected to be undertaken during the recommended standard hours of work. Hence assessment of sleep disturbance impacts to surrounding residential receivers is not required for specific construction stages.
- The use of Car Siding Road 3 as a temporary stabling road is proposed during the project upgrade works. As a majority of the stabling operations occur during the night period (i.e. 10pm to 7am; see Section 3.3) and over more than two consecutive nights, this report will include assessment of sleep disturbance impacts associated with these operations.

As discussed in Section 4.1.4, the RNP suggests a screening level of $L_{1(1min)}$ dB(A), equivalent to the RBL + 15 dB. Where this level is exceeded, the guidance within the RNP indicates that internal noise levels of 50 to 55 dB(A) are unlikely to cause sleep awakenings.

Assuming that receivers may have windows partially open for ventilation (i.e. 10 dB difference between internal and external noise levels), an external noise target of 65 dB(A)L_{max} is adopted for the assessment of sleep disturbance impacts during construction works, to determine all feasible and reasonable safeguards.

4.2.4 Project construction noise objectives

The relevant project specific construction noise NMLs for each identified sensitive receiver type are presented in Table 4-7 for residential receivers and in Table 4-8 for non-residential receivers. The NMLs have been calculated based on the ambient noise survey results (see Section 3.7) and the guidance in Section 7.2.

[8] *Internal noise levels are to be assessed at the centre of the occupied room. External noise levels are to be assessed at the most affected point within 50 metres of the area boundary. Where internal noise levels cannot be measured, external noise levels may be used. A conservative estimate of the difference between internal and external noise levels is 10 dB. Some buildings may achieve greater performance, such as where windows are fixed (that is, cannot be opened).*

Table 4-7: Project construction NMLs for residential receivers

NCA	Recommended Standard Hours NML $dB(A)L_{eq(15min)}$	Outside of Standard Hours NML $dB(A)L_{eq(15min)}$			Highly Affected NML $dB(A)L_{eq(15min)}$	Sleep Disturbance External Noise Target $dB(A)L_{max}$
		OOHW Period 1 (day)	OOHW Period 1 (evening)	OOHW Period 2 (night)		
NCA1	52	47	41	39	75	65
NCA2	53	47	41	39	75	65
NCA3	52	47	41	39	75	65
NCA4	62	n/a*	n/a*	n/a*	75	65

** Long-term noise monitoring is required for residential receivers located within this NCA, to quantify the impact of road traffic noise from Argyle Street/Illawarra Highway, on the background noise environment.*

Table 4-8: Project construction NMLs for non-residential receivers

Receiver	Noise Management Level $dB(A)L_{eq(15min)}$
All commercial properties (including retail, offices etc.)	70 (external)
All industrial properties	75 (external)
Places of worship	55 (external)
Educational institutes	55 (external)
Active recreation areas	65 (external)

4.3 Vibration objectives (construction and operational)

The effect of vibration impacts on buildings and structures can be divided into two categories:

- Human comfort impacts – where the occupants or users of the affected building are possibly disturbed, and
- Structural impacts – effects on building contents and structural integrity.

Both RING and ICNG make reference to the *Assessing Vibration: A Technical Guideline* (AVTG) (NSW DEC, 2006), for consideration of acceptable vibration levels.

4.3.1 Human comfort

Construction vibration can adversely affect the amenity of occupants inside buildings as it may affect their quality of life or working efficiency. Human comfort impacts are experienced at levels well below those that can damage of affect a structure and its contents. Though it may not always be possible to comply with the more stringent human comfort criterion for infrastructure projects in proximity to residential dwellings, human comfort should always be used as the objective to aim for and be the basis of assessment.

Guidance in relation to acceptable vibration levels for human comfort are provided in AVTG, which in turn is based on the guidelines contained in British Standard *BS 6472 – 1992*, *Guide to Evaluation of Human Exposure to Vibration in Buildings (1 hertz (Hz) to 80 Hz)*. *BS 6472-1:2008* superseded this British Standard in 2008. Although a new version of BS 6472 has been published, AVTG still references the 1992 version of this standard and the EPA still advises vibration to be assessed in accordance with this version of the standard.

AVTG classifies vibration as one of three types:

- Continuous – where vibration occurs uninterrupted and can include sources such as machinery and constant road traffic.

- Impulsive – where vibration occurs over a short duration (typically less than two seconds) and occurs less than three times during an assessment period. This may include activities such as occasional dropping of heavy equipment or loading / unloading activities.
- Intermittent – occurs where continuous vibration activities are regularly interrupted, or where impulsive activities recur. This may include activities such as rock hammering, drilling, pile driving and pavement breakers.

Construction activities typically generate ground vibrations of an intermittent nature and are assessed using vibration dose value (VDV). VDV is calculated using the acceleration rate of the vibration event and the time over which it occurs. This method places emphases on the level of vibration rather than its duration and is a measure of the total quantity of vibration perceived. The VDV method is the most suitable for assessing human comfort amenity from intermittent vibration sources and the vibration targets relevant to the surrounding sensitive receiver types (see Section 3.3) are presented in Table 4-9.

Table 4-9: Human comfort intermittent vibration targets

Receiver Type	Assessment Period	Intermittent Vibration Dose Value, $m/s^{1.75}$	
		Preferred Values	Maximum Values
Residences	Daytime [9]	0.2	0.4
Offices, schools, educational institutions, and places of worship		0.4	0.8
Workshops		0.8	1.6

While the assessment of response to vibration in *BS 6472:1992* is based on vibration dose value and weighted acceleration, for construction related vibration, it is considered more appropriate to provide guidance in terms of a peak value. This parameter is likely to be routinely measured based on the more usual concern over potential building/structural damage.

Therefore, the peak values recommended by the British Standard, *BS 5228.2 – 2009, Code of Practice Part 2 Vibration for noise and vibration on construction and open sites – Part 2: Vibration* have been adopted for the assessment of potential human comfort vibration impacts associated with the proposed construction works and are presented in Table 4-10. The degree of human perception associated with each peak vibration level is also provided, noting that humans can detect vibration at levels which are well below those causing risk of damage to a building (typically 10 times higher).

Table 4-10: Guidance on effects of peak vibration levels on human comfort

Peak Vibration Level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration at this level in residential environments will cause complaints but can be tolerated if warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure.

4.3.2 Structural damage (including impact to heritage structures)

Vibration transmission through the ground can cause a structure and structure coupled elements (walls, windows, roof etc.) to radiate. The transmitted vibration energy has the potential to damage and compromise the integrity of a structure as well as increase the risk of damage to building contents.

There is no current Australian Standard that sets vibration targets for the assessment of building damage caused by vibrations. Guidance on limiting vibration values with the potential to cause structural damage is typically referenced from the German Standard DIN 4150: Part 3 – 1999 *Effects of Vibration on Structures* (DIN guideline).

The DIN guideline recommends maximum permissible vibration values (expressed as peak particle velocity or PPV) to reduce the likelihood of building damage, which are summarised in Table 4-11. PPV is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

It should be noted that heritage structures should be considered on a case-by-case basis, as a heritage listed structure may not necessarily be more sensitive to vibration than a standard structure. Where a heritage structure is deemed to be sensitive to damage, the guideline values in Line 3 of Table 4-11, should be considered.

[9] *The NSW EPA's Assessing Vibration guideline defines daytime period as 7am – 10pm.*

Table 4-11: Vibration targets for short-term vibration on structures

Line	Type of Structure	Peak Particle Velocity (PPV), mm/s			
		at foundation @ a frequency of			plane of floor of uppermost storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz [10]	All Frequencies
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40
2	Residential dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and have intrinsic value (e.g. heritage structures/buildings that are under a preservation order)	3	3 to 8	8 to 10	8

[10] *At frequencies above 100 Hz, the values given in this column may be used as minimum values.*

5 Operational Noise and Vibration Assessment

Stabling operations associated with increasing the length of existing car sets (from 2-car sets to 3-car sets), lengthening the two existing storage and service sidings and new regional fleet, may generate noise and vibration impacts at nearby sensitive receivers (see Section 3.3). This section details the assessment of these operational impacts.

5.1 Stabling operations overview

The lengthening of the two existing storage and servicing sidings will facilitate the stabling of 3-car sets. The stabling yard currently accommodates up to 6 x 2-car sets (Endeavour type rail fleet) and no change is proposed to this total capacity (existing or new regional fleet).

As detailed in Section 3.3, stabling operations currently occur during these time periods:

- Trains typically arrive at the yard from 08:30pm to 01:45am weekdays and from 06:00pm to 02:15am weekends,
- Cleaning operations are carried out first, with preparation works commencing approx. 45-60mins prior to departure, and
- Train departures occur between 03:30am to 06:30am on weekdays and between 04:00am to 09:30am on weekends.

No changes are proposed to these hours of operations (existing fleet or new regional feet).

5.2 Operational noise assessment

5.2.1 Noise modelling scenarios and operational noise sources

As detailed in Section 3.6, there are several activities associated with stabling operations, that have the potential to generate noise impacts. To predict potential noise impacts associated with these activities, operational scenarios have been developed in consultation with the project team and TfNSW and are presented in Table 5-1.

Operational noise sources associated with each scenario, including frequency, capacity, and location (where applicable) are detailed in Table 5-2. In all instances activity noise source levels have been provided as Sound Power Level (SWLs), with corresponding reference to source material.

Table 5-1: Operational noise modelling scenarios

Scenario	Description	Noise Sources	Noise Descriptor
Scenario 1	Trains arriving and departing the stabling yard. Trains typically travelling between speeds of 5 – 10 km/h (maximum speed of stabling lines $\leq$10km/h)	Engine powerpack unit and roof cooling system	L_{Aeq}
Scenario 2	Trains idling at the yard (Service & Storage Roads)	Engine powerpack unit and powerpack roof cooling system	L_{Aeq}
Scenario 3	Trains preparation at the yard (Service & Storage Roads)	Powerpack roof cooling system and air compressor (underframe unit)	L_{Aeq}

Scenario	Description	Noise Sources	Noise Descriptor
Scenario 4	Brake release test located at main stabling location	Air release from valves	L_{Amax}
Scenario 5	Car park activities	Car engine starting and door slams	L_{Amax}
Scenario 6a	Horn Warning undertaken south of the Moss Vale platform, with entering and departing at two difference locations	Existing and New Fleet Town Horn	L_{Amax}
		Existing and New Fleet Country Horn	L_{Amax}
Scenario 6b	Horn Testing undertaken either at location 1 or location 2 as detailed in Scenario 2.	Existing and New Fleet Town Horn	L_{Amax}
		Existing and New Fleet Country Horn	L_{Amax}

Table 5-2: Operational noise sources and associated sound power levels

Noise Source	Description	Sound Power Level (SWL)	Reference Information
Existing fleet arrival/departure	Xplorer train arriving and departing Moss Vale station [11]	95 dB(A)L_E	Attended noise measurement on site
Existing fleet idling	Endeavour train (2 car-set) idling at Storage Road	85 dB(A)L_{eq} per car	Attended noise measurement on site
Existing fleet preparation	Air-Conditioner noise – powerpack located on the roof of each car (at approx. height of 4m) Air compressor – underframe unit (at approx. height of 0.5m), assumed one at the end of each car	Air-Conditioner – 82 dB(A)L_{eq} Air compressor – 87 dB(A)L_{eq}	Based on Aurecon database information (also consistent with levels used for Northwest Rail Link stabling and maintenance noise impacts)
New fleet engine	Engine powerpack is an underframe unit (at 0.5m height) installed with a skirt (covering whole equipment). Both short intercity and regional models will have this powerpack under car 1 and 3 (no engine powerpack for car 2)	97 dB(A)L_{eq} [12]	Based on information detailed in Request for Information Response RRP-TFNSW-MOMT-RFI-000027.01 and further clarifications provided in: ■ TFNSW General Correspondence RRP-TFNSW-TFNSW-CORR-006955. ■ CAF document C.L3.97.086.27 Annex 1 Ed.B Lay-out. ■ Email from TFNSW (from Tim Renshaw) on the 16 November 2021.

[11] *Only Xplorer train movements were observed during the site visits, with Endeavour trains already stabled at the yard.*

[12] *Based on speed range (1 – 10 km/hr). SWL calculated for the engine PWP is based on reference sound pressure level (SPL) confirmed as measured at 1m. It is assumed this reference measurement was conducted in a controlled environment (i.e. acoustic laboratory or anechoic chamber). If this was tested under free-filed conditions, the resulting SWL will be 3dB lower (i.e. 94 dB(A)).*

Noise Source	Description	Sound Power Level (SWL)	Reference Information
New fleet cooling unit	Cooling unit powerpack is located on the roof (at 4m height), with a fairing, which only covers a small part of the equipment. Both short intercity and regional models will have this powerpack under car 1 and 3 (no cooling unit powerpack for car 2)	84 dB(A)L_{eq} [13]	Based on information detailed in TFNSW General Correspondence RRP-TFNSW-TFNSW-CORR-006955 and further clarifications provided in: ■ CAF document C.L3.97.086.27 Annex 1 Ed.B Lay-out. ■ Email from TFNSW (from Tim Renshaw) on the 16 November 2021.
New fleet idling	Noise from engine powerpack (at 0.5m height) and cooling unit powerpack (at 4m height)	97 dB(A)L_{eq} (per car)	Based on *standstill at maximum noise operation condition* SPL level (125kW engine at 1000rpm) detailed in RRP-IPD-19-8526-TFNSW-EW-TE-RPT-000013. SWL was calculated based on SPL measurement at 7.5 metres
New fleet preparation	Saloon HVAC & Drivers Cabin HVAC – Saloon HVAC, two per car (at 4m height), Drivers Cabin HVAC place at each end car (at 2m in height). Air compressor – underframe unit (at 0.5 metres), only one under the 2nd car	Saloon HVAC – 90 dB(A)L_{eq} Drivers Cabin HVAC – 86 dB(A)L_{eq} Air compressor – 90 dB(A)L_{eq}	As per Section 3.1 of the referenced RRP-IPD-19-8526-TFNSW-EWTE-RPT-000013 document. Air compressor location and sound power levels calculated based on sound pressure level information provided by TfNSW [14]
Brake release	Existing fleet – located at the front of each car (at 0.5 metres). New fleet – 6 in total; two (2) noise source locations are per car (adjacent to each bogie), releasing/dumping simultaneously.	Existing fleet – 105 dB(A)L_{max} New fleet – 119 dB(A)L_{max}	Existing fleet noise data based on information contained in *Regional Rail Dubbo Maintenance Facility REF – Noise and Vibration Assessment* report (final revision, dated 1 August 2018) The New Fleet brake release sound power levels (H-Set Fleet) are measured noise levels provided by Renzo Tonin [15]
Horn	Located at the front of the train Approximately 1 m above ground. Assumed same location for new fleet.	Existing Fleet: Town Horn: 127 dB(A)L_{max} Country Horn: 137 dB(A)L_{max} New Fleet: Horn: 141 dB(A)L_{max} Country Horn: 146 dB(A)L_{max}	The existing fleet noise data is based on the RSU 600 Series - Minimum Operating Standards for Rolling Stock - Multiple Unit Train Specific Interface Requirements, Version 2.0, 08 August 2019 Table 8. Whilst the new fleets horns are based on data from *RRP-PD-CAF-RS-TE-DRG-090076.-.REV.-.01* provided by TfNSW.

[13] *Upper limit of provided SWL range, which is 68 – 84 dB(A).*

[14] *Email from Steven Chong dated 11 May 2022, in response to RFI list for Regional Rail Enabling Works – Stabling Yards Due Diligence Noise Review (Stage 1).*

[15] *Email correspondence from Yogi Kalkunte at 10:13 am on the 27th of July 2022 confirming Fleet Noise Sources with Suresh Panicker of TfNSW.*

Noise Source	Description	Sound Power Level (SWL)	Reference Information
Car park activities	Car engine starting (at 0.5 metres) and car door slamming (at 1 metre)	Car engine – 94 dB(A)L_{max} Car door slamming – 91 dB(A)L_{max}	Based on Aurecon database information

5.2.2 Other noise sources

Train cleaning

Internal train cleaning does not involve external noise sources and is therefore not expected to contribute incrementally to operational noise impacts on the surrounding community.

Building air conditioning and car park vehicles

The relocated amenities building (x1) will be serviced by an air conditioning unit. The air conditioning unit is located on the track side of the amenities building, and hence will be shielded from the sensitive receivers along Lackey Road by the modular structure. This is similar to existing configuration on site and air conditioning operational noise is not audible at the property boundary along Lackey Road. Hence no contributions are expected to the surrounding community from the new air conditioning unit.

A total of four new car parking spaces are proposed adjacent to the main access road (see Figure 3-1). Based on the current volume of traffic on Lackey Road, four additional movements during a worst 1-hour period are not expected to generate any additional noise impacts.

5.2.3 Noise modelling inputs

Noise modelling was carried out using SoundPLAN Version 8.1 & 8.2 computer software, with environmental sound propagation calculated using ISO 9613-2, *Acoustics – Attenuation of sound during propagation outdoors* algorithm. The ISO 9613-2 algorithm considers the presence of a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights or 'downwind' conditions which are favourable to sound propagation.

Noise model inputs and parameters are summarised in Table 5-3.

Table 5-3: Operational noise modelling inputs

Parameter	Input data
Prediction algorithm	ISO 9613 – 2 Acoustics – Attenuation of sound during propagation outdoors
Modelling period	15-minute
Existing Terrain	1m LIDAR scans of the area sourced from the Intergovernmental Committee on Surveying and Mapping (ICSM) ELVIS (Elevation – Foundation Spatial Data) database
Buildings	Building footprints and heights have been sourced from Geoscape Australia and checked against aerial imagery, street level photography and site inspections
Receiver heights	Ground floor receivers @ 1.5m Level 1 receivers @ 4.5m
Ground absorption coefficient	Mixture of suburban soft and hard surfaces (G = 0.6)
Atmospheric absorption	Average temperature of 10°C and average humidity of 70%

5.2.4 Predicted operational noise impacts

Noise modelling was carried out under two design considerations:

- Existing and new fleet stabling operations with only existing noise wall Section 1 retained and no change to height or span (see Figure 3-2).
- Existing noise wall Section 2 demolished as part of the project (see Figure 3-3).

Detailed noise predictions and contours (at height of 1.5m with grid spacing of 5m) for each operational scenario are presented in Appendix C and D respectively. It should be noted that these are worst case predictions i.e. based on the following operational conditions:

Table 5-4: Worst case operational conditions for noise modelling

Scenario	Description	Time period
Scenario 1	Up to 2 x trains arriving or departing during a 15-minute period. We have assumed one train stabled at each storage siding.	Weekdays – evening and night-time only Weekends – day, evening, and night-time
Scenario 2	Up to 4 x trains idling at the same time during a 15-minute period. Assumed 2 x trains on each storage sidings: - Location 1 – adjacent to new amenities block and parking bays (see Figure 3-1) - Location 2 – adjacent to existing noise wall Section 1 (see Figure 3-2)	Weekdays – evening and night-time only Weekends – day, evening, and night-time
Scenario 3	Up to 2 x trains conducting preparation works at the same time during a 15-minute period. It is assumed both trains are stabled at No.2 storage siding (Storage Road, nearest to the sensitive receivers along Lackey and Parkes Roads) at the same locations as Scenario 2	Weekdays – early morning only Weekends – day and night-time
Scenario 4	For the existing fleet, brake release tests are conducted at one of the locations detailed in Scenario 2, prior to train departure. For the new fleet, brake release tests are also expected at one of the locations detailed in Scenario 2, prior to train departure.	Any day of the week – early morning and night-time only
Scenario 5	Car engine starting and car door slamming at a parking bay nearest to assessment location	Any day of the week – early morning and night-time only
Scenario 6a	Horn Warning (south of the Moss Vale platform, prior to trains entering stabling roads) Horn Location 1 – Prior to entering the stabling yard Horn Location 2 – Prior to departure of the stabling yard	3 times as the train enters the yard between 1800 h and 2400 h (Assumed worse case 3 times during the night period). 3 times as the train enters the Main Line between 2400 h and 0600 h, south of the Moss Vale platform
Scenario 6b	Horn Testing undertaken at either location of Scenario 2.	Any day of the week – early morning and night-time only

A summary of these results (Table 5-5 to Table 5-11) including a brief discussion of the impacts are detailed below.

The number of assessed residential locations for each of the NCAs are as follows:

- NCA1: 12
- NCA1-A: 8
- NCA2: 18
- NCA2-A: 15
- NCA3: 23
- NCA 4: 15.

Table 5-5: Predicted operational noise impacts at surrounding residential receivers

Noise Catchment Area	Number of Exceedances during Each Period			Predicted Noise Levels dB(A)$L_{eq(15min)}$	Exceedance Range dB(A)
	Day (53 dBA)	Evening (43 dBA)	Night (38 dBA)		
Scenario 1 - Existing Fleet					
NCA1	0	0	0	16 - 47	up to 9
NCA2	0	0	3		
NCA3	0	0	0		
NCA4	0	0	1		
Scenario 1 - New Fleet					
NCA1	0	0	4	21 - 52	Up to 14
NCA2	0	3	8		
NCA3	0	0	2		
NCA4	0	1	9		
Scenario 2 - Existing Fleet					
NCA1	2	12	13	17 - 55	Up to 17
NCA2	0	0	1		
NCA3	0	5	16		
NCA4	0	0	10		
Scenario 2 - New Fleet					
NCA1	4	7	11	26 - 60	Up to 22
NCA2	0	2	3		
NCA3	2	19	21		
NCA4	0	15	15		
Scenario 3 - Existing Fleet					
NCA1	0	4	7	13 - 50	Up to 12
NCA2	0	0	0		
NCA3	0	8	21		
NCA4	0	5	10		
Scenario 3 - New Fleet					
NCA1	0	7	9	19 to 56	Up to 18
NCA2	0	0	1		

Noise Catchment Area	Number of Exceedances during Each Period			Predicted Noise Levels dB(A)$L_{eq(15min)}$	Exceedance Range dB(A)
	Day (53 dBA)	Evening (43 dBA)	Night (38 dBA)		
NCA3	0	8	19		
NCA4	0	0	15		

Table 5-6: Predicted operational noise impacts at surrounding residential receivers (industrial interface assessment)

Noise Catchment Area	Number of Exceedances during Each Period			Predicted Noise Levels dB(A)$L_{eq(15min)}$	Exceedance Range dB(A)
	Day (58 dBA)	Evening (48 dBA)	Night (43 dBA)		
Scenario 1 - Existing Fleet					
NCA1-A	0	0	8	29 to 47	Up to 4
NCA2-A	0	0	2		
Scenario 1 - New Fleet					
NCA1-A	0	4	8	33 to 50	Up to 7
NCA2-A	0	0	10		
Scenario 2 - Existing Fleet					
NCA1-A	0	8	8	20 to 56	Up to 13
NCA2-A	0	0	0		
Scenario 2 - New Fleet					
NCA1-A	8	8	8	28 to 62	Up to 19
NCA2-A	0	2	8		
Scenario 3 - Existing Fleet					
NCA1-A	0	1	8	16 to 50	Up to 7
NCA2-A	0	0	0		
Scenario 3 - New Fleet					
NCA1-A	1	8	8	22 to 59	Up to 16
NCA2-A	0	0	2		

Table 5-7: Sleep disturbance assessment at residential receivers (operational noise impacts)

Scenario	NCA	Predicted Noise Levels dB(A)L_{max} *Existing wall Section 1 retained*	Sleep Disturbance Targets dB(A)L_{max} *Screening Test/External Noise Target*	Number of Exceedances of the External Noise Target *Existing wall Section 1 retained*	Maximum Exceedance of the External Noise Target dB(A) *Existing wall Section 1 retained*
Scenario 4 (Existing Fleet)	NCA1 & NCA1-A	Existing fleet (Location 1) – 40 to 68 Existing fleet (Location 2) – 34 to 66	52 / 65	Existing fleet (Location 1) – 2 Existing fleet (Location 2) – 1	Existing fleet (Location 1) – Up to 3 Existing fleet (Location 2) – Up to 1
	NCA2 & NCA2-A	Existing fleet (Location 1) – 27 to 52 Existing fleet (Location 2) – 29 to 54		Existing fleet (Location 1) – nil Existing fleet (Location 2) – nil	Existing fleet (Location 1) – nil Existing fleet (Location 2) – nil
	NCA3	Existing fleet (Location 1) – 41 to 59 Existing fleet (Location 2) – 33 to 54		Existing fleet (Location 1) – nil Existing fleet (Location 2) – nil	Existing fleet (Location 1) – nil Existing fleet (Location 2) – nil
	NCA4	Existing fleet (Location 1) – 33 to 52 Existing fleet (Location 2) – 44 to 54		Existing fleet (Location 1) – nil Existing fleet (Location 2) – nil	Existing fleet (Location 1) – nil Existing fleet (Location 2) – nil
Scenario 4 (New Fleet)	NCA1 & NCA1-A	New fleet (Location 1) – 55 to 83 New fleet (Location 2) – 47 to 79	52 / 65	New fleet (Location 1) – 15 New fleet (Location 2) – 12	New fleet (Location 1) – up to 18 New fleet (Location 2) – up to 14
	NCA2 & NCA2-A	New fleet (Location 1) – 42 to 65 New fleet (Location 2) – 43 to 68		New fleet (Location 1) – nil New fleet (Location 2) – 3	New fleet (Location 1) – nil New fleet (Location 2) – up to 3
	NCA3	New fleet (Location 1) – 56 to 72 New fleet (Location 2) –46 to 67		New fleet (Location 1) – 18 New fleet (Location 2) – 11	New fleet (Location 1) – up to 7 New fleet (Location 2) – up to 2
	NCA4	New fleet (Location 1) – 45 to 65 New fleet (Location 2) – 63 to 68		New fleet (Location 1) – nil New fleet (Location 2) – 8	New fleet (Location 1) – nil New fleet (Location 2) – up to 3
Scenario 5	NCA1	29 to 51	52 / 65	nil	
	NCA2	8 to 33			
	NCA3	15 to 28			

Scenario	NCA	Predicted Noise Levels dB(A)L_{max} *Existing wall Section 1 retained*	Sleep Disturbance Targets dB(A)L_{max} *Screening Test/External Noise Target*	Number of Exceedances of the External Noise Target *Existing wall Section 1 retained*	Maximum Exceedance of the External Noise Target dB(A) *Existing wall Section 1 retained*
Scenario 6a – Town Horn (Horn Warning Location 1)	NCA1 & NCA1-A	Existing fleet – 36 to 62 New fleet – 50 to 66	52 / 65	Existing fleet – nil New fleet – 12	Existing fleet – nil New fleet – up to 11
	NCA2 & NCA2-A	Existing fleet – 53 to 87 New fleet – 67 to 101		Existing fleet – 19 New fleet – 33	Existing fleet – up to 22 New fleet – up to 35
	NCA3	Existing fleet – 35 to 45 New fleet – 49 to 59 L_{Amax}		Existing fleet – nil New fleet – nil	Existing fleet – nil New fleet – nil
Scenario 6a – Town Horn (Horn Warning Location 2)	NCA1 & NCA1-A	Existing fleet – 37 to 63 New fleet – 51 to 77	52 / 65	Existing fleet – nil New fleet – 12	Existing fleet – nil New fleet – up to 12
	NCA2 & NCA2-A	Existing fleet – 58 to 89 New fleet – 73 to 103		Existing fleet – 23 New fleet – 32	Existing fleet – up to 24 New fleet – up to 38
	NCA3	Existing fleet – 35 to 56 New fleet – 49 to 71		Existing fleet – nil New fleet – 8	Existing fleet – nil New fleet – up to 6
Scenario 6a – Country Horn	NCA1 & NCA1-A	Existing fleet – 48 to 74 New fleet – 57 to 83	52 / 65	Existing fleet – 9 New fleet – 16	Existing fleet – up to 9 New fleet – up to 18

Scenario	NCA	Predicted Noise Levels dB(A)L_{max} *Existing wall Section 1 retained*	Sleep Disturbance Targets dB(A)L_{max} *Screening Test/External Noise Target*	Number of Exceedances of the External Noise Target *Existing wall Section 1 retained*	Maximum Exceedance of the External Noise Target dB(A) *Existing wall Section 1 retained*
(Horn Warning Location 1)	NCA2 & NCA2-A	Existing fleet – 46 to 60 New fleet – 55 to 69		Existing fleet – nil New fleet – 4	Existing fleet – nil New fleet – up to 4
	NCA3	Existing fleet – 61 to 91 New fleet – 70 to 108		Existing fleet – 21 New fleet – 25	Existing fleet – up to 34 New fleet – up to 43
	NCA4	Existing fleet – 48 to 80 New fleet – 57 to 89		Existing fleet – 9 New fleet – 9	Existing fleet – up to 15 New fleet – up to 24
Scenario 6a – Country Horn (Horn Warning Location 2)	NCA1 & NCA1-A	Existing fleet – 49 to 76 New fleet – 58 to 85	52 / 65	Existing fleet – 12 New fleet – 17	Existing fleet – up to 11 New fleet – up to 20
	NCA2 & NCA2-A	Existing fleet – 49 to 72 New fleet – 58 to 81		Existing fleet – 11 New fleet – 14	Existing fleet – up to 7 New fleet – up to 16
	NCA3	Existing fleet – 66 to 101 New fleet – 75 to 110		Existing fleet – 25 New fleet – 25	Existing fleet – up to 43 New fleet – up to 45
	NCA4	Existing fleet – 49 to 84 New fleet – 58 to 93		Existing fleet – 10 New fleet – 10	Existing fleet – up to 19 New fleet – up to 28

Scenario	NCA	Predicted Noise Levels dB(A)L_{max} *Existing wall Section 1 retained*	Sleep Disturbance Targets dB(A)L_{max} *Screening Test/External Noise Target*	Number of Exceedances of the External Noise Target *Existing wall Section 1 retained*	Maximum Exceedance of the External Noise Target dB(A) *Existing wall Section 1 retained*
Scenario 6b Town Horn (Location 1)	NCA1 & NCA1-A	Existing fleet – 52 to 87 New fleet – 66 to 105	52 / 65	Existing fleet – 19 New fleet – 24	Existing fleet – Up to 22 New fleet – up to 40
	NCA2 & NCA2-A	Existing fleet – 42 to 68 New fleet –57 to 83		Existing fleet – 2 New fleet – 16	Existing fleet – up to 3 New fleet – up to 18
	NCA3	Existing fleet – 56 to 74 New fleet – 67 to 88		Existing fleet – 19 New fleet – 24	Existing fleet – Up to 9 New fleet – Up to 23
	NCA4	Existing fleet – 54 to 69 New fleet – 69 to 84		Existing fleet – 12 New fleet – 15	Existing fleet – Up to 4 New fleet – Up to 19
Scenario 6b Town Horn (Location 2)	NCA1 & NCA1-A	Existing fleet – 48 to 84 New fleet – 61 to 99	52 / 65	Existing fleet – 14 New fleet – 19	Existing fleet – up to 19 New fleet – up to 34
	NCA2 & NCA2-A	Existing fleet – 45 to 72 New fleet – 60 to 87		Existing fleet – 5 New fleet – 21	Existing fleet – up to 7 New fleet – up to 22
	NCA3	Existing fleet – 47 to 73 New fleet – 60 to 86		Existing fleet – 10 New fleet – 22	Existing fleet – up to 8 New fleet – up to 21

Scenario	NCA	Predicted Noise Levels dB(A)L_{max} *Existing wall Section 1 retained*	Sleep Disturbance Targets dB(A)L_{max} *Screening Test/External Noise Target*	Number of Exceedances of the External Noise Target *Existing wall Section 1 retained*	Maximum Exceedance of the External Noise Target dB(A) *Existing wall Section 1 retained*
	NCA4	Existing fleet – 47 to 73 New fleet – 74 to 88		Existing fleet – 14 New fleet – 15	Existing fleet – up to 9 New fleet – up to 23
Scenario 6b Country Horn (Location 1)	NCA1 & NCA1-A	Existing fleet – 60 to 74 New fleet – 71 to 110	52 / 65	Existing fleet – 19 New fleet – 20	Existing fleet – up to 32 New fleet – up to 45
	NCA2 & NCA2-A	Existing fleet – 66 to 84 New fleet – 73 to 93		Existing fleet – 33 New fleet – 33	Existing fleet – up to 19 New fleet – up to 28
	NCA3	Existing fleet – 52 to 78 New fleet – 62 to 88		Existing fleet – 19 New fleet – 24	Existing fleet – up to 13 New fleet – up to 23
	NCA4	Existing fleet – 52 to 83 New fleet – 62 to 91		Existing fleet – 4 New fleet – 10	Existing fleet – up to 18 New fleet – up to 26
Scenario 6b Country Horn (Location 2)	NCA1 & NCA1-A	Existing fleet – 58 to 94 New fleet – 66 to 102		Existing fleet –15 New fleet – 20	Existing fleet – up to 29 New fleet – up to 37
	NCA2 & NCA2-A	Existing fleet – 57 to 84 New fleet – 65 to 93		Existing fleet – 29 New fleet – 33	Existing fleet – up to 19 New fleet – up to 28

Scenario	NCA	Predicted Noise Levels dB(A)L_{max} *Existing wall Section 1 retained*	Sleep Disturbance Targets dB(A)L_{max} *Screening Test/External Noise Target*	Number of Exceedances of the External Noise Target *Existing wall Section 1 retained*	Maximum Exceedance of the External Noise Target dB(A) *Existing wall Section 1 retained*
	NCA3	Existing fleet – 55 to 82 New fleet – 65 to 92		Existing fleet – 18 New fleet – 25	Existing fleet – up to 17 New fleet – up to 27
	NCA4	Existing fleet – 55 to 80 New fleet – 65 to 88	52 / 65	Existing fleet – 6 New fleet – 12	Existing fleet – up to 15 New fleet – up to 23

Table 5-8: Predicted operational noise impacts at surrounding industrial receivers

Scenario	NCA	Predicted noise levels dB(A)$L_{eq(15min)}$ *Existing wall Section 1 retained*	Project Operational Noise Trigger Level dB(A)$L_{eq(15min)}$	Exceedance dB(A) *Existing wall Section 1 retained*
Scenario 1	NCA1	Existing fleet – 50 to 58 New fleet – 43 to 52	68	nil
Scenario 2	NCA1	Existing fleet – 47 to 54 New fleet – 57 to 59		nil
Scenario 3	NCA1	Existing fleet – 43 to 45 New fleet – 45 to 50		nil

Table 5-9: Predicted operational noise impacts at surrounding commercial receivers

Scenario	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$ *Existing wall Section 1 retained*	Project Operational Noise Trigger Level dB(A)$L_{eq(15min)}$	Exceedance dB(A) *Existing wall Section 1 retained*
Scenario1	NCA1	Existing fleet – 38 to 53 New fleet – 32 to 46	63	nil
	NCA2	Existing fleet – 48 to 54 New fleet – 42 to 48		nil
	NCA4	Existing fleet – 35 to 58 New fleet – 29 to 52		nil
Scenario 2	NCA1	Existing fleet – 41 to 55 New fleet – 48 to 60	63	nil
	NCA2	Existing fleet – 35 to 42 New fleet – 44 to 52		nil
	NCA4	Existing fleet – 21 to 54 New fleet – 27 to 59		nil
Scenario 3	NCA1	Existing fleet – 32 to 46 New fleet – 41 to 56	63	nil
	NCA2	Existing fleet – 33 to 39 New fleet – 40 to 46		nil
	NCA4	Existing fleet – 21 to 45 New fleet – 28 to 41		nil

Table 5-10: Predicted operational noise impacts at surrounding educational institutes

Scenario	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$ *Existing wall Section 1 retained*	Project Operational Noise Trigger Level dB(A)$L_{eq(15min)}$	Exceedance dB(A) *Existing wall Section 1 retained*
Scenario 1	NCA2	Existing fleet – 37 to 40 New fleet – 30 to 33	43	nil
Scenario 2	NCA2	Existing fleet – 34 to 36 New fleet – 37 to 39		nil
Scenario 3	NCA2	Existing fleet – 30 to 32 New fleet – 37 to 39		nil

Table 5-11: Predicted operational noise impacts at surrounding places of worship

Scenario	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$ *Existing wall Section 1 retained*	Project Operational Noise Trigger Level dB(A)$L_{eq(15min)}$	Exceedance dB(A) *Existing wall Section 1 retained*
Scenario 1	NCA2	Existing fleet – 39 to 40 New fleet – 32 to 34	48	nil
Scenario 2	NCA2	Existing fleet – 36 to 37 New fleet – 39 to 41		nil
Scenario 3	NCA2	Existing fleet – 32 to 34 New fleet – 40 to 41		nil

5.2.5 Summary of predicted operational noise impacts

General noise impacts for stabling operations

The results presented in Table 5-5 generally indicate that noise levels associated with stabling operations (Scenarios 1 to 3) for both the existing and proposed new fleet, will frequently exceed the project operational noise trigger levels at the nearest receivers within all NCAs, inclusive of the industrial interface regions of NCAs, NCA1-A and NCA2-A.

It should be noted that predictions for existing fleet operations (with existing noise wall Section 1 retained) are consistent with the existing operational noise levels measured on site (see Appendix E), as the noise monitor was located approximately 30m from the existing stabling lines, which is similar to the distance between the proposed lengthened stabling lines and potentially nearest affected residential receivers within NCA1.

Sleep disturbance assessment for stabling operations

The three scenarios assessed for sleep disturbance impacts predicted exceedance of the 65dB(A)L_{max} external noise target for Scenarios 4 and 6a/b. No exceedance of the external noise target was predicted for Scenario 5.

- Scenario 4 exceedances are predicted for both the new and existing fleet.
  - The existing fleet only had exceedances of the external noise target, located in NCA 1 and NCA1-A
  - The new fleet's brake release mechanism (2 locations per car, assumed to be released simultaneously) and the higher sound power levels, exceeded the external noise limits at residential receivers for all NCAs.
- Similarly, Scenario 6a/b exceedances of the external noise targets are also predicted for both the new and existing fleet.
  - Scenario 6a considers two horn use locations as a warning, with the horn first sounded before entering the yard and then on a second occasion, prior to departure into the Main Line. Both the town and country horns were modelled to understand the impact of either horn on residential receivers. Exceedances of the external noise targets were found for both the town and country horn. The town horn exceeded of the noise target for specific scenarios, with no exceedances for NCA 1 and 3 for both warning locations for the existing fleet and no exceedances for warning location 1, NCA 3 for the new fleet.

    The country horn exceeded the noise target level for all locations and for both fleets, apart from NCA 2 for the existing fleet at horn warning location 1.
  - Residences within NCA 3 are predicted to be the most affected, due to their proximity and line of sight to the two considered locations. Generally, noise from horn operations new fleet more exceedances of the external noise targets, due to the greater sound power level of the town horn for the new fleet compared to the existing fleet. Whilst the impacts of the country horn are greater than that of the town horn due to the higher source noise levels.

Like Scenario 6a, Scenario 6b had two locations for horn testing, assessing both country and town horns within the stabling yard. Generally, due to the locality and source noise levels of the horns, all NCAs assessed were impacted by the horn testing.

Horn testing within the stabling yard exceeded the external noise targets at more residential properties than the horn warning leaving and entering the stabling yard due to the proximity of the stabling yard to NCA1 and NCA2 residential receivers.

Non-residential receivers

No exceedances are predicted for any of the identified surrounding commercial, industrial, educational institutes and places of worship receivers.

5.3 Operational vibration assessment

Vibration impacts are not expected from train arrival and departure at the stabling lines, given the low speeds (5 – 10 km/h) and distance to nearest affected receivers (at least 25 metres). No other stabling operations have the potential to generate vibrations.

6 Assessment of Noise and Vibration Impacts during Construction

6.1 Construction overview

The proposed construction methodology for the PDR design, including staging, preliminary program and indicative plant/equipment requirements, is detailed in the project Constructability and Staging Report (reference: *Regional Rail Program – Enabling Works Moss Vale Maintenance Facility Constructability and Staging Report*, version 0 dated 11 August 2021) prepared by ARCH Artifex.

Construction duration is estimated to be 28-30 weeks. Indicative construction activities anticipated for the project include:

- Site establishment
- Demolition
- Earthworks and excavation
- Material stockpile and processing
- Installation of CSR
- ULX construction
- Services and drainage installation
- Track work
- Relocating amenities sheds and associated services
- Concrete works, asphalting works, and pad mount construction
- Washing local road surfaces and dust suppression
- Landscaping

6.1.1 Hours of Work

All works are currently proposed to only occur during standard construction hours as per the ICNG and CNVS:

- 7:00am to 6:00pm Monday to Friday
- 8:00am to 1:00pm Saturdays
- No work on Sundays or public holidays.

6.1.2 Proposed staging

All construction works associated with the project are proposed to be carried out across three (3) stages, as detailed in Section 9 of the Constructability and Staging Report. A brief overview of this staging is presented below:

- Construction Stage 1 – This stage is proposed to extend over an approx. 9-week period and will include site establishment (temporary facilities for Maintenance Facility staff and train stabling) and works proposed to the Car Siding (Road 3 – Canberra side of the fuel point). At the completion of this stage, Car Siding (Road 3) will be brought into use temporarily, the Service Road truncated, and the maintenance/cleaners relocated into the temporary amenities' demountables.

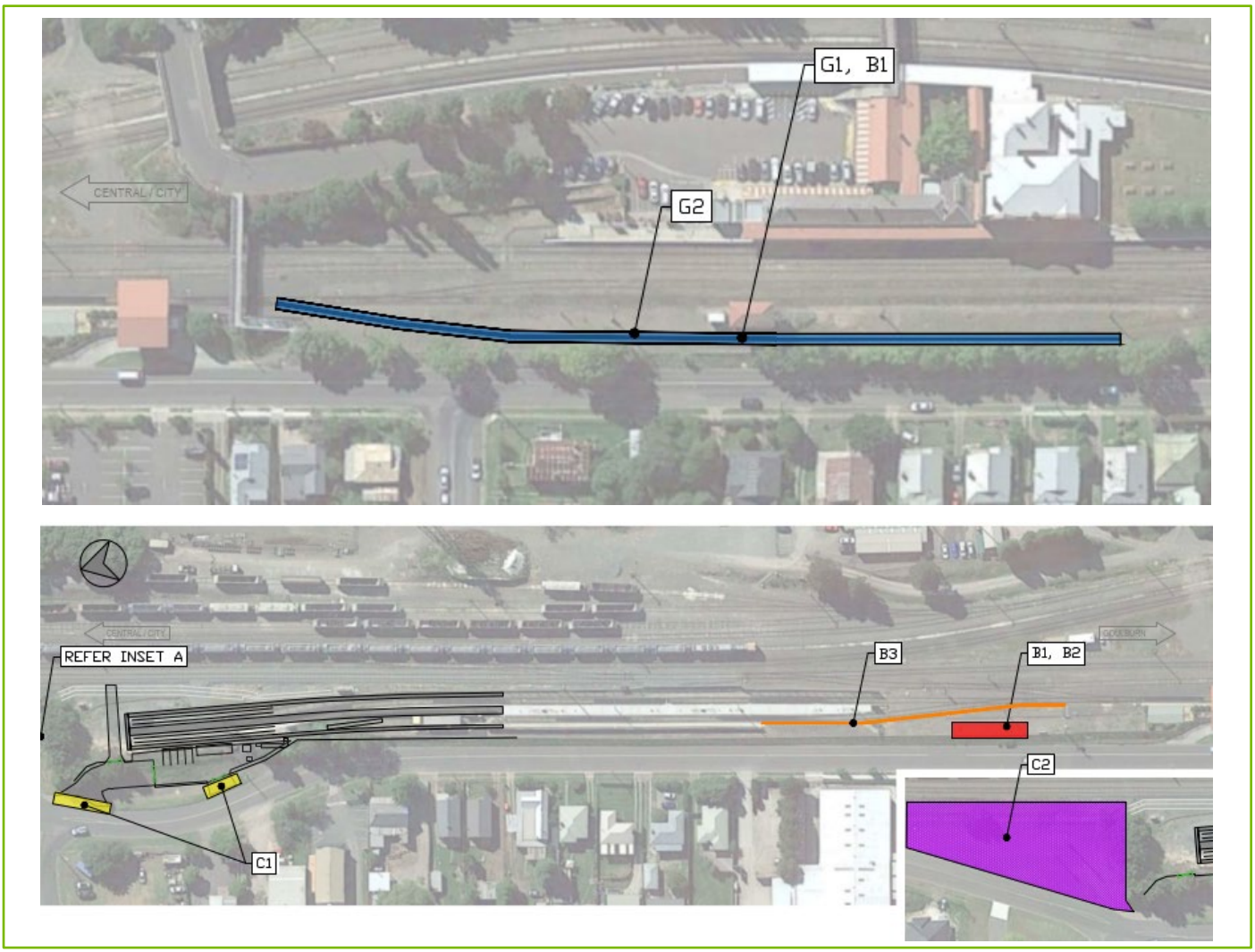
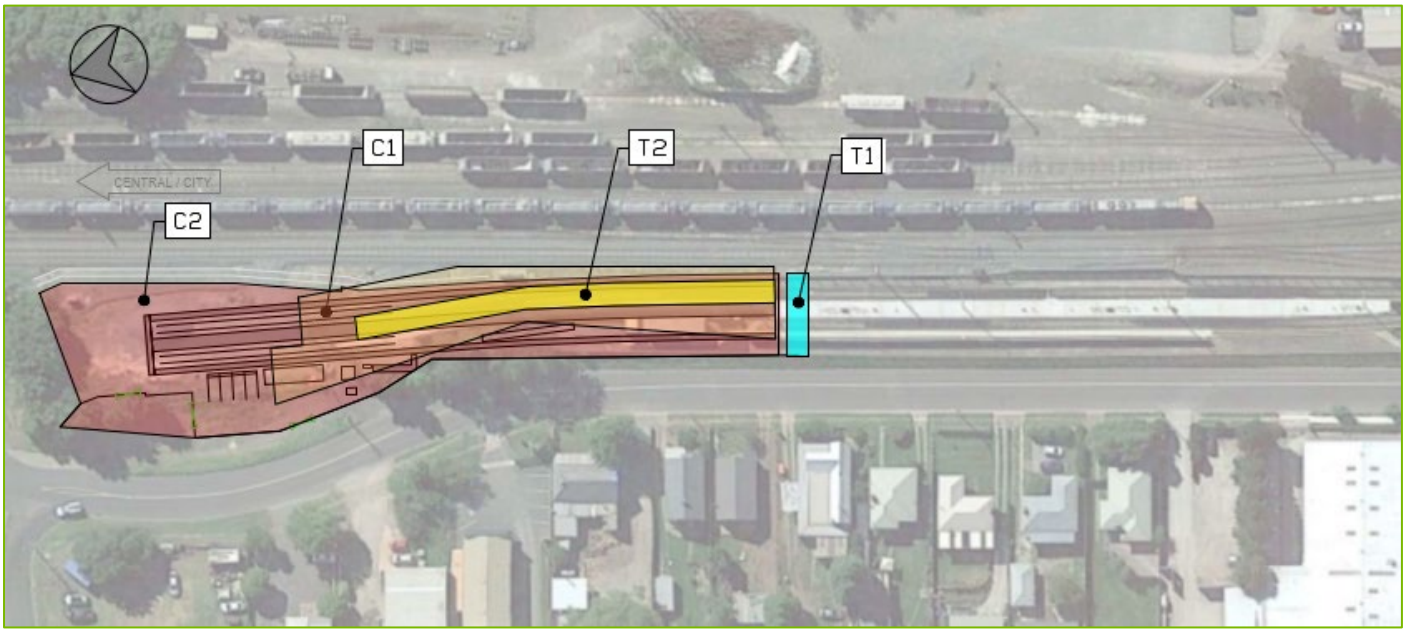


Figure 6-1: Proposed construction stage 1 work zones

- Construction Stage 2 – This stage is proposed to extend over an approx. 20-week period and is the main construction works stage for the project. This will include track, CSR/ULX's, noise walls, amenities, paving and fencing. At the completion of this stage, the upgraded stabling yard will become operational, with maintenance staff and cleaners relocated into the final Maintenance Building.



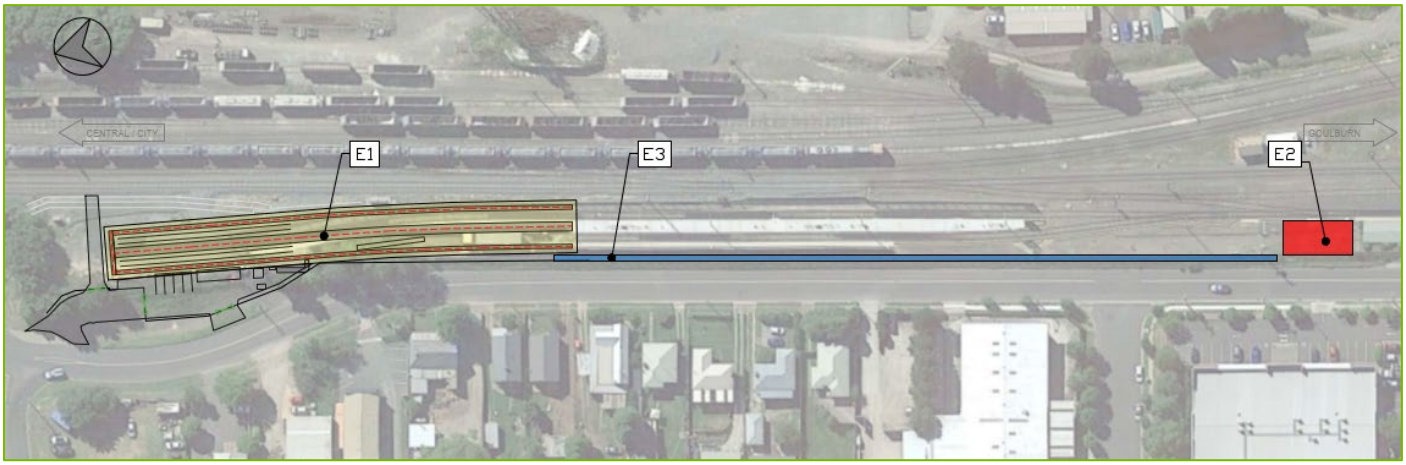


Figure 6-2: Proposed construction stage 2 work zones

- Construction Stage 3 – This stage is proposed to extend over an approx. 1 to 4-week period and will include construction demobilisation (removal of temporary maintenance facilities, fencing, construction compound and storage/laydown areas) and the make good of all areas (including any local road repairs damaged by construction works).

Figure 6-3: Proposed construction stage 3 work zones

This staging is based on the current design and may undergo minor amendments during CDR phase. If significant changes are proposed to the work zones and indicative plant/equipment, this assessment must be updated to determine changes to the predicted construction noise and vibration impacts.

6.1.3 Construction access and compounds

Three construction compounds are proposed for the project, as illustrated in Figure 6-4. Primary access to the construction site is via the existing access gate near the intersection of Parkes Road and Lackey Road. A second access gate (temporary) is proposed to be installed opposite from the intersection of Garrett Street and Lackey Road to facilitate access to the temporary storage sidings during construction.

A material storage area/stockpiling area is also proposed on the State-owned land adjacent to the existing overflow commuter carpark at Moss Vale Station (see Figure 6-5). Primary access to this stockpiling area is proposed off Illawarra Highway at the downside entry to the Station, as illustrated in Figure 6-5.

Figure 6-4: Proposed construction compounds

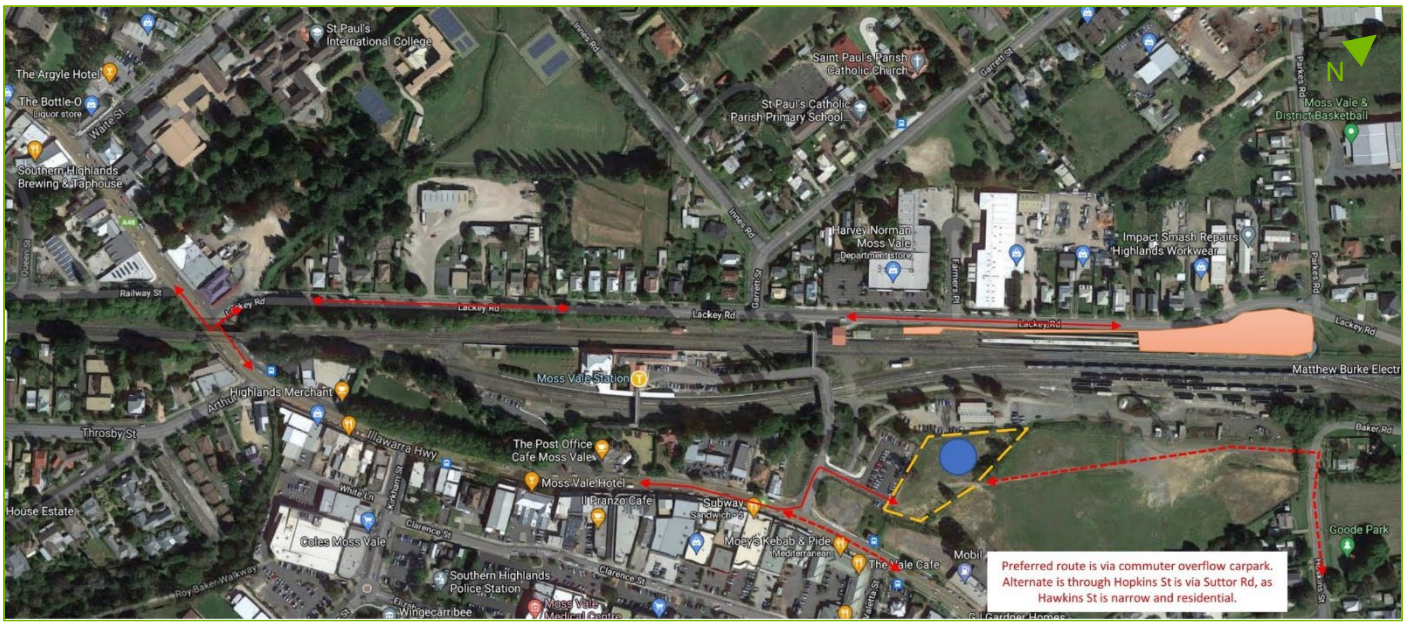


Figure 6-5: Proposed material storage area/stockpiling site and vehicle haulage routes

6.2 Overview of temporary stabling operations

Stabling operations during the construction works are proposed at Car Siding Road 3.

- Only the existing fleet will be stabled at this location during this period.
- No change is proposed to the current stabling hours of operation detailed in Section 3.3.
- Activity noise sources associated with the temporary stabling operations will include:
  - Train arrival/departure (L_{Aeq} assessment)
  - Train idling (L_{Aeq} assessment)
  - Preparation works (L_{Aeq} assessment)
  - Break Release (L_{Amax} assessment)
  - Horn testing (L_{Amax} assessment)
- As discussed in Section 5.2.2, internal train cleaning does not involve external noise sources and is therefore not expected to contribute incrementally to noise impacts at the surrounding receivers.

6.3 Construction noise assessment

6.3.1 Noise modelling scenarios and proposed equipment

Table 9 of the Constructability and Staging Report provides an indicative list of the plant and equipment required for the proposed construction works. Based on the proposed construction staging and information detailed in construction staging diagrams (Appendix A Constructability and Staging Report), typical noisy activities and associated Sound Power level (SWL) for each stage is detailed in Table 6-1. The SWLs have been sourced from:

- Table A1 of Australian Standard AS 2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites.
- Table 19 of the TfNSW CNVS.
- Department for Environment Food and Rural Affairs (DEFRA) Update of Noise Database for Prediction of Noise on Construction and Open Sites.

Table 6-1: Construction staging and activity sound power levels

Construction Stage	Equipment/Machinery/Scenarios	Sound Power Level (SWL) dB(A)L_{eq}
Stage 1	Crane (truck mounted)	108
	Crane (Franna, up to 20 tonnes)	98
	Generator (6KW diesel generator)	103
	Excavator (up to 5 tonnes for trenching activities)	95
	Roller (smooth drum)	107
	Vibratory roller (11-14 tonnes)	109
	Pavement laying machine	114
	Compactor	106
	2[16] x Trucks (medium rigid, up to 20 tonnes)	103
	Hand tools	108

[16] *Worst case assumption of quantity of construction vehicles operating in the same works zone during a 15-minute period*

Construction Stage	Equipment/Machinery/Scenarios	Sound Power Level (SWL) dB(A)L_{eq}
Stage 2	2^{12} x Excavator (up to 5 tonnes for trenching activities)	95
	Front end loader (up to 20 tonnes)	112
	Crane (Franna, up to 20 tonnes)	98
	Excavator (up to 20 tonnes for trenching activities)	105
	Concrete Saw[17]	118
	Piling with excavator (up to 20 tonnes with auger attachment)[13]	107
	Crane (truck mounted)	108
	Backhoe	111
	2^{12} x Compactors	106
	Water cart	107
	Concrete agitator (vibrator)	113
	Concrete pump truck	109
	Generator (6KW diesel generator)	103
	Hand tools	108
	Flatbed truck/trailer	113
	2^{12} x Trucks (medium rigid, up to 20 tonnes)	103
	Dump/Tip truck (up to 15 tonnes)	110
Stage 3	Crane (truck mounted)	108
	2^{12} x Trucks (medium rigid, up to 20 tonnes)	103
	Hand tools	108

Detailed information of the existing fleet stabling operations, noise sources and associated noise levels are discussed in the operational assessment section above (see Section 5.2). Table 6-2 details the assessed scenarios for the temporary stabling operations at Car Siding Road 3.

Table 6-2: Car Siding Road 3 temporary stabling scenarios and associated source noise levels

Scenario	Description	Sound Power Level (SWL)
Train arrival/departure	1 x train arriving/departing during a 15-minute assessment interval, at speeds between 5 – 10 km/h (maximum speed of stabling lines ≤10km/h)	95 dB(A)L_E
Train idling	Up to two (2) trains idling at the same time	85 dB(A)L_{eq} per car
Preparation works	Preparation works being undertaken on two trains at the same time	Air-Conditioner – 82 dB(A)L_{eq} per car Air compressor – 87 dB(A)L_{eq} per car

[17] *Not included in indicative equipment plant and equipment list detailed in Table 9 of Constructability and Staging Report, however cutting and demolish works are proposed in the staging diagrams (Stage 2A) provided in Appendix A of this report.*

Scenario	Description	Sound Power Level (SWL)
Brake Release	Brake release test when stabled (two noise source locations, at the front of each car)	105 dB(A)L_{max} per source
Horn testing	Horn test when stabled (one source location)	Existing Town Horn – 127 dB(A)L_{max}
		Existing Country Horn – 137 dB(A)L_{max}

6.3.2 Noise modelling inputs

Noise modelling was carried out using SoundPLAN Version 8.2 computer software, with environmental sound propagation calculated using ISO 9613-2, *Acoustics – Attenuation of sound during propagation outdoors* algorithm. The ISO 9613-2 algorithm takes into account the presence of a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights or 'downwind' conditions which are favourable to sound propagation.

Noise model inputs and parameters are summarised in Table 6-3.

Table 6-3: Construction noise modelling inputs

Parameter	Input Data
Prediction algorithm	ISO 9613 – 2 Acoustics – Attenuation of sound during propagation outdoors
Modelling period	Worst case 15-minute period of operation i.e. where all the construction equipment are operating concurrently for the entire period
Existing Terrain	1m LIDAR scans of the area sourced from the Intergovernmental Committee on Surveying and Mapping (ICSM) ELVIS (Elevation – Foundation Spatial Data) database
Buildings	Building footprints and heights have been sourced from Geoscape Australia and checked against aerial imagery, street level photography and site inspections
Receiver heights	Ground floor receivers @ 1.5m Level 1 receivers @ 4.5m
Ground absorption coefficient	Mixture of suburban soft and hard surfaces (G = 0.6)
Atmospheric absorption	Average temperature of 10°C and average humidity of 70%

6.3.3 Predicted construction noise impacts

Detailed noise predictions and contours (at height of 1.5m with grid spacing of 10m) for the proposed construction stages are presented in Appendix A and B respectively. A summary of these results (Table 6-4 to Table 6-11) including a brief discussion of the impacts are detailed below.

- These are worst case predictions i.e. with all identified equipment/activity (see Table 6-1) for each stage and works zones operating continuously for the 15-minute assessment period, predicted at the most exposed boundary of the residential properties.
- Water cart operations (1 x water cart operating continuously during a 15-minute assessment period) are also assumed along Lackey Road (in addition to operations within the project site and stockpiling area) during Stage 2, adjacent to the main works zone (from the intersection of Parkes Road and Lackey Road to northern property boundary of 129 Lackey Road – see Figure 6-2).
- Adopting a conservative approach, it is assumed the existing noise wall Section 2 will be demolished at the start of Stage 2 works. Hence, construction noise predictions during Stages 2 and 3 will only include screening or barrier corrections associated with existing noise wall Section 1 (no change to height or span, i.e. retained as is).

It should be noted that construction plant is generally mobile, largely intermittent and may only occur for short durations or may be present for a few days, with a significant intervening period before the activity occurs again. There may also be differences between predicted and measured noise levels due to variations in instantaneous operating conditions, plant in operation during the measurement and the location of the equipment. Actual source noise levels should be verified based on on-site operational noise measurements, during construction.

Table 6-4: Predicted construction noise impacts at surrounding residential receivers

Construction Stage	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$	Noise Management level dB(A)$L_{eq(15min)}$	Exceedance during Standard Hours of Work dB(A)
Stage 1	NCA1	52 – 71	52	Up to 19
	NCA2	59 – 77	53	Up to 24
	NCA3	47 – 59	52	Up to 7
	NCA4	45 – 54	62	nil
Stage 2	NCA1	51 – 79	52	Up to 27
	NCA2	45 – 68	53	Up to 15
	NCA3	53 – 66	52	Up to 14
	NCA4	55 – 63	62	nil (up to 1)[18]
Stage 3	NCA1	47 – 66	52	Up to 14
	NCA2	38 – 60	53	Up to 7
	NCA3	39 – 57	52	Up to 5
	NCA4	45 – 53	62	nil

Table 6-5: Predicted exceedances of the highly noise affected management level at surrounding residential receivers

Construction Stage	NCA	Location	Predicted Noise Levels dB(A)$L_{eq(15min)}$	Highly Noise Affected Management Level dB(A)$L_{eq(15min)}$	Exceedance dB(A)
Stage 1	NCA2	179 Lackey Rd & 1 Garrett St, Moss Vale	Up to 75	75	nil
		177 Lackey Rd, Moss Vale	Up to 76		nil (up to 1)[18]
		171, 173 & 175 Lackey Rd & 2 Garrett St, Moss Vale	Up to 77		Up to 2
Stage 2	NCA1	113 & 125 Lackey Rd, Moss Vale	Up to 75	75	nil
		115 & 123 Lackey Rd, Moss Vale	Up to 76		nil (up to 1)[18]
Stage 2	NCA1	121 Lackey Rd, Moss Vale	Up to 78	75	Up to 3
		117-119 Lackey Rd, Moss Vale	Up to 79		Up to 4

[18] *A 1 dB exceedance is not considered to be acoustically significant as it is generally not perceptible and hence is not considered as an exceedance.*

Table 6-6: Predicted noise levels and exceedances from temporary stabling at Car Siding Road 3 to surrounding residential receivers

Activity	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$	Number of Exceedances of the Construction Management Levels dB(A)$L_{eq(15min)}$				
			Noise Management Level dB(A)$L_{eq(15min)}$ (53, 52 or 62)	OOHW Period 1 (day) (47)	OOHW Period 1 (evening) (41)	OOHW Period 2 (night) (39)	Highly Noise Affected Management Level dB(A)$L_{eq(15min)}$
Train arrival/departure	NCA1	10 – 36	nil	nil	nil	nil	nil
	NCA2	36 – 55	8	16	29	33	nil
	NCA3	9 – 31	nil	nil	nil	nil	nil
	NCA4	18 – 55	nil	1	4	5	nil
Train idling	NCA1	12 – 39	nil	nil	nil	nil	nil
	NCA2	35 – 59	6	16	31	33	nil
	NCA3	12 – 32	nil	nil	nil	nil	nil
	NCA4	19 – 59	nil	1	3	5	nil
Preparation works	NCA1	12 – 37	nil	nil	nil	nil	nil
	NCA2	32 – 55	4	12	27	32	nil
	NCA3	13 – 33	nil	nil	nil	nil	nil
	NCA4	20 - 55	nil	2	5	5	nil

Table 6-7: Predicted sleep disturbance impacts from temporary stabling at Car Siding Road 3

Activity	NCA	Predicted Noise Levels dB(A)L_{max}	Sleep Disturbance External Noise Target dB(A)L_{max}	Number of Exceedances of the Sleep Disturbance External Noise Target
Brake Release	NCA1	26 – 52	65	0
	NCA2	35 – 73		6
	NCA3	26 – 54		0
	NCA4	34 - 63		0
Town Horn	NCA1	40 – 67		3
	NCA2	62 – 91		33
	NCA3	39 – 63		0
	NCA4	47 - 58		7
Country Horn	NCA1	50 - 77		15
	NCA2	72 - 100		36
	NCA3	49 - 73		10

Activity	NCA	Predicted Noise Levels dB(A)L_{max}	Sleep Disturbance External Noise Target dB(A)L_{max}	Number of Exceedances of the Sleep Disturbance External Noise Target
	NCA4	57 - 90		10

Table 6-8: Predicted construction noise impacts at surrounding commercial receivers

Activity	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$	Noise Management Level dB(A)$L_{eq(15min)}$	Exceedance dB(A)
Construction Stage 1	NCA1	65 – 67	70	nil
	NCA2	63 – 71		nil (up to 1) [19]
	NCA4	46 – 66		nil
Construction Stage 2	NCA1	69 – 71		nil (up to 1)[19]
	NCA2	62 – 76		Up to 6
	NCA4	48 – 66		Nil
Construction Stage 3	NCA1	65 – 67		Nil
	NCA2	63 – 71		nil (up to 1)[19]
	NCA4	38 – 57		nil
Car Siding Road 3 Temporary Stabling				
Train arrival/departure	NCA1	10 - 20	70	nil
	NCA2	19 - 43		nil
	NCA4	31 - 44		nil
Idling Train idling	NCA1	12 - 21		nil
	NCA2	21 - 44		nil
	NCA4	23 - 45		nil
Preparation	NCA1	12 – 20		nil
	NCA2	21 - 42		nil
	NCA4	21 - 45		nil

Table 6-9: Predicted construction noise impacts at surrounding educational institutes

Activity	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$	Noise Management Level dB(A)$L_{eq(15min)}$	Exceedance dB(A)
Construction Stage 1	NCA2	52 – 57	55	Up to 2
Construction Stage 2	NCA2	52 – 54		nil
Construction Stage 3	NCA2	42 – 45		nil
Car Siding Road 3 Scenarios				

[19] *A 1 dB exceedance is not considered to be acoustically significant as it is generally not perceptible and hence is not considered as an exceedance.*

Activity	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$	Noise Management Level dB(A)$L_{eq(15min)}$	Exceedance dB(A)
Train arrival/departure	NCA2	33 – 37	55	Nil
Idle	NCA2	31 – 38		Nil
Preparation	NCA2	30 - 36		Nil

Table 6-10: Predicted construction noise impacts at surrounding places of worship

Activity	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$	Noise Management Level dB(A)$L_{eq(15min)}$	Exceedance dB(A)
Construction Stage 1	NCA2	55 – 58	55	Up to 3
Construction Stage 2	NCA2	52 – 55		nil
Construction Stage 3	NCA2	44 –47		nil
Car Siding Road 3 Scenarios				
Train arrival/departure	NCA2	35 – 37	55	Nil
Idle	NCA2	37 - 39		Nil
Preparation	NCA2	35 - 37		Nil

Table 6-11: Predicted construction noise impacts at surrounding industrial receivers

Activity	NCA	Predicted Noise Levels dB(A)$L_{eq(15min)}$	Noise Management Level dB(A)$L_{eq(15min)}$	Exceedance dB(A)
Construction Stage 1	NCA1	59 – 62	75	nil
Construction Stage 2	NCA1	61 – 75		nil
Construction Stage 3	NCA1	60 – 67		nil
Car Siding Road 3 Scenarios				
Train arrival/departure	NCA1	10 – 37	75	nil
Idle	NCA1	12 – 39		nil
Preparation	NCA1	12 - 38		nil

6.3.4 Summary of predicted construction noise impacts

Residential receivers

- Construction noise impacts are expected to be dominant for the identified surrounding nearest affected residential properties in NCA1 and NCA2 (see Figure 3-4), with exceedance of the standard hours noise management level predicted during all three construction stages. The residential properties immediately across from the works zones (see Figure 6-1, Figure 6-2 and Figure 6-3) along Lackey Road, are predicted to experience the highest levels of exceedance, with:
    - exceedances of up to 19 dB(A), 27 dB(A) and 14 dB(A) predicted for receivers in NCA 1, during Stages 1, 2 & 3 respectively.

- exceedances of up to 24 dB(A), 15 dB(A) and 7 dB(A) predicted for receivers in NCA 2, during Stages 1, 2 & 3 respectively.

- Exceedances are also predicted for the nearest affected residential properties in NCA 3 (see Figure 3-4), during all three construction stages. However, these exceedances are only predicted to be minor during Stages 1 and 3 (between 5 to 7 dB(A)), with higher level of exceedance (up to 14dB(A)) only predicted during Stage 2. It should be noted that these exceedances are largely predicted for the properties along Baker Road and to the west of Hawkins Street.
- No exceedances are predicted for the residential properties in NCA 4 (211 – 223 Argyle Street, Moss Vale).
- Six residences in total (see Table 6-4) within NCA1 and NCA2 are predicted to exceed the highly noise affected management level, during Stages 1 and 2. Exceedances of up 4dB(A) are predicted during Stage 2 at residential properties 121 and 117-119 Lackey Road. All other exceedances are predicted to be within 2dB(A) of the highly noise affected management level.
- Large number of exceedances of the NMLs for the Car Siding Road 3 scenarios within NCA2 and NCA4 for the residential receivers. This is due to the locality of Car Siding Road 3 to those residential receivers within NCA2 and NCA4. No exceedances have been predicted for NCA1 and NCA3. NCA2 is situated directly adjacent to the Car Siding Road 3. In excess of 30 residential receivers exceed the night NML, which is critical as most stabling works is to be undertaken during the night period.
- Exceedances of the sleep disturbance external noise target are predicted for both brake release and horn testing operations, within Car Siding Road 3. Residential properties in NCA2 are likely to be the most affected, with exceedances predicted above 35 dB(A). Exceedances for residential receivers in NCAs 1, 3 & 4 are only predicted for the horn testing (both town and country).

  The two scenarios where the greatest number of exceedances occurred were the two horn testing scenarios. Both the country and the town horn exceeded the sleep disturbance noise levels at 71 and 43 residential receivers respectively.

Non-residential receivers

- Exceedances of up to 6 dB(A) are predicted at Harvey Norman Moss Vale (135-157 Lackey Road) in NCA 2, during Stage 2.
- Exceedances are also predicted at the St Paul's Catholic Parish Primary School and St Paul's Parish Catholic Church in NCA 2, during Stage 1. However, these are only expected to me minor and in the order of up to 2 dB(A) for the school and up to 3 dB(A) for the place of worship.
- No exceedances are predicted for any other surrounding nearest affected commercial or industrial receivers (see Figure 3-4).

6.3.5 Discussion on construction noise impacts

Exceedance of the ICNG recommended noise management levels are predicted for the construction works currently forecasted for the project. Typically, construction activities move within a designated construction area and is transitory. Impacted receivers would only experience the predicted worst-case noise levels when construction works are located closest to the receiver. Most of the time, the receivers would experience levels below the worst-case noise levels predicted as construction activities would progressively move away from the receiver as works are completed.

The level of construction impact is generally based on the level of exceedance above the NML which depends on the following factors:

- type of construction plant and activity being used on site
- location of the construction machinery relative to the sensitive receiver
- existing background noise levels
- attenuation effects from intervening terrain and structures
- time of day for construction works

As the latter three factors have already been considered for this assessment, the level of exceedance is governed by the type of operational construction equipment and the distance between the construction works and receiver. Given the predicted exceedance of noise management levels, in addition to the implementation of standard noise management measures outlined in the CNVS (see Section 7.2.1), supplementary noise management and mitigation measures are also recommended in Section 7.2.2 and should be implemented where feasible and reasonable.

It should be noted that, Car Siding Road 3 is most likely going to operate during OOHW. This will require a permit for operations and will be required to undergo the OOHW application process. Mitigation measures will most likely be required during the use of Car Siding Road 3 and options are discussed in Section 7.2.2 of this report.

6.4 Construction traffic

As detailed in Section 6.1.3, primary access to the construction site is via the existing access gate near the intersection of Parkes Road and Lackey Road. A second temporary access gate is also proposed opposite from the intersection of Garrett Street and Lackey Road to facilitate access to the temporary storage siding (Road 3) and based on the information in the *Construction and Staging Report*, it is assumed this will only be in use during Stage 1 works.

It is estimated that approximately 4 heavy vehicle trips and up to 6 light vehicle trips may be required each day during the construction period.

Based on the existing traffic volume and measured ambient noise levels along Lackey Road, off-site traffic noise impacts are highly unlikely. In order for traffic noise to increase by more than the permissible 2dB, road traffic on the street would need to increase by more than 60 percent. Given the forecast construction traffic numbers an increase of this magnitude is highly unlikely to occur.

6.5 Construction vibration assessment

Construction and demolition work have the potential to generate vibrations which can impact human comfort and/or cause structural damage to buildings.

To determine the potential for vibration impacts from the proposed construction methodology, vibration levels from surface construction plant and equipment are predicted and assessed against both the human comfort and structural damage vibration targets detailed in Section 4.3.

6.5.1 Methodology

Vibration is generated when energy from equipment is transmitted into the ground and is generally attenuated with distance. The magnitude and attenuation of ground vibration is dependent on the following:

- the ground type and topography
- the impact medium stiffness
- the efficiency of the energy transfer mechanism of the equipment (i.e. impulsive, reciprocating, rolling or rotating equipment)
- the frequency content, and
- the type of wave (surface or body)

The Roads and Maritime *Environmental Noise Management Manual* (ENMM) (RTA, 2001) and British Standard *BS 5228.1* provide guidance on typical vibration levels from vibration intensive equipment. Equipment relevant to the project based on the indicative list detailed in Table 6-1, are detailed in Table 6-12.

Table 6-12: Typical vibration levels for vibration intensive construction equipment

Equipment/Machinery	Peak Particle Velocity (PPV) at 10m, mm/s
Excavators, scrapers, graders etc.	2.5[20]
Compactor (up to 7 tonnes)	5 – 7
Piling (bored/auger)	7.4
Roller (up to 15 tonnes)	7 – 8
Dozer	2.5 – 4

6.5.2 Heritage items

Heritage structures/buildings that are under a preservation order are generally more susceptible to damage from ground vibration.

- The Moss Vale Railway Precinct, including station, platform & building, signal box and yard group are heritage listed and located within or near the project area.
- All other heritage listed items (Moss Vale Post Office, Leighton Gardens, Argyle St North Conservation Area, Throsby / Arthur St Conservation Area, Moss Vale rail underbridge Argyle Street) are located outside the project are and are unlikely to be impacted by construction vibration.

The location of these sites is shown in Figure 6-6 below.

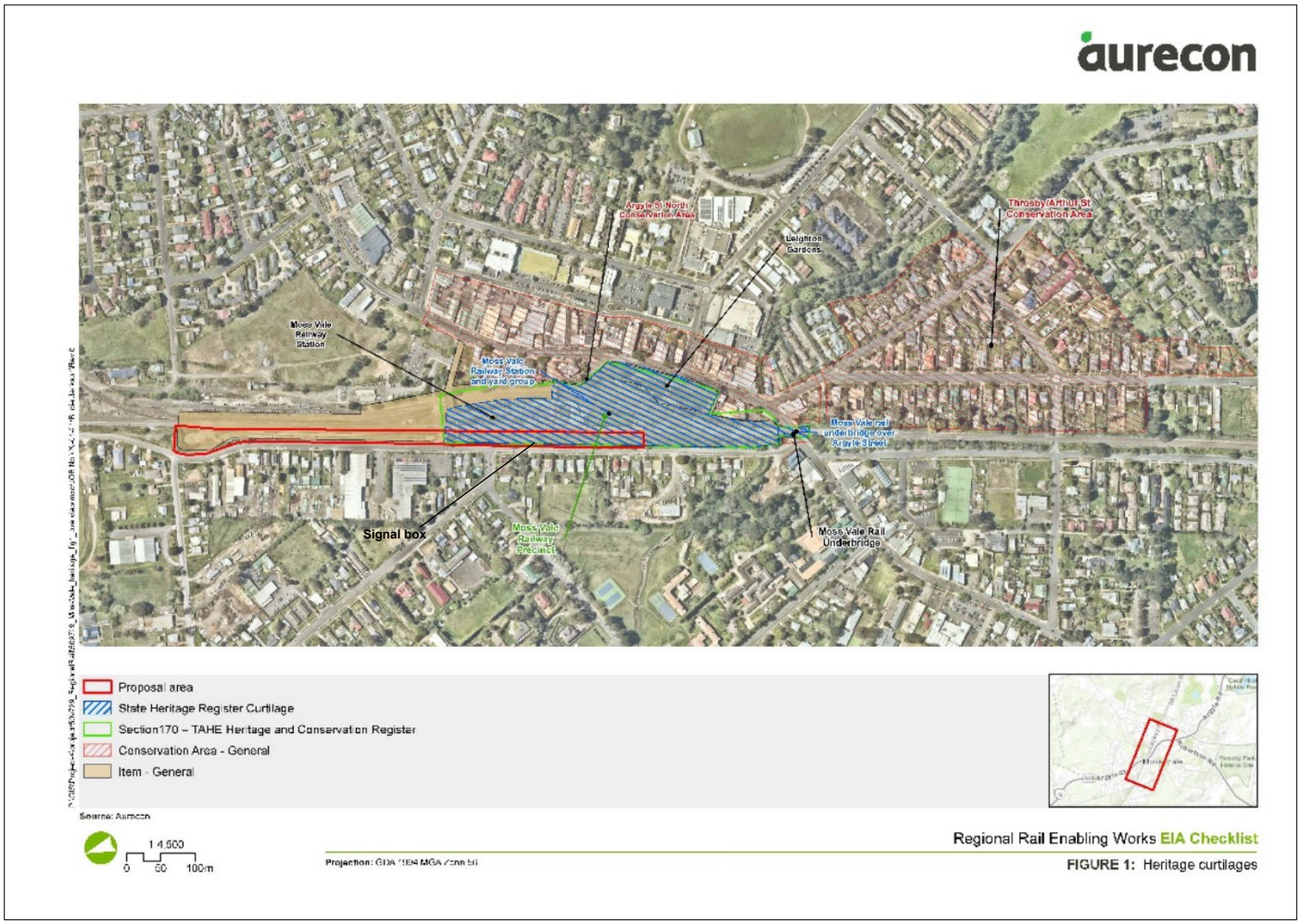


Figure 6-6: Relevant heritage listings to the project

[20] *Based on levels derived at 8 m from: Tyan, A. E. Ground Vibrations. Damaging Effects to Buildings. Road Research Board 1973.*

6.5.3 Predicted vibration levels

Based on the expected vibration intensive construction equipment peak vibration levels (see Table 6-12), typical ground conditions and the methodology detailed in the ENMM (vibration level of a source is inversely proportional to the distance between the source and receiver), indicative vibration levels have been predicted at set distances and detailed in Table 6-13.

Table 6-13: Indicative construction vibration levels

Equipment/Machinery	Distance to Source / Peak Particle Velocity (mm/s)				Human Comfort Vibration Target (BS 5228-2)	Structural Damage Vibration Target (DIN 4150-3)
	10m	20m	50m	100m		
Excavators, scrapers, graders etc.	2.1	1.2	0.6	0.3	1mm/s	▪ Heritage structures – **3 mm/s** ▪ Residential properties – **5 mm/s** ▪ Commercial, industrial and all other non-residential type properties – **20 mm/s**
Compactor (up to 7 tonnes)	6.0	3.4	1.7	1.0		
Piling (bored/auger)	7.4	4.3	2.1	1.2		
Roller (up to 15 tonnes)	8.0	4.6	2.2	1.3		
Dozer	4.0	2.3	1.1	0.6		

6.5.4 Discussion on construction vibration impacts

- The potentially nearest affected residential receivers are located approximately 25 – 30 metres from the western project boundary, across Lackey Road. There is potential for some human comfort impacts when roller, piling and compactor operations are carried out near the western project boundary.
- Potential exceedance of the structural damage target for sensitive heritage items (i.e. deemed to be structurally unsound) are predicted for the Moss Vale Signal Box structure, when compactor and excavator related operations are carried out within 24m and 6m respectively of this structure.
- No other structural damage exceedances are expected for surrounding sensitive receivers (residential and non-residential).

Safe working buffer distances were calculated based on the indicative levels predicted in Table 6-13, to determine indicative distances above which human comfort and structural damage vibration targets may be exceeded. These are listed in Table 6-14. The safe working buffer distances are dependent on the equipment that the construction contractor selects and would be refined prior to construction. The calculation of safe working buffer distances can be undertaken at the CNVMP stage of the project.

Table 6-14: Vibration safe working buffer distances

Equipment/Machinery	Human Comfort	Structural Damage	
Vibration Targets	***1 mm/s***	***5mm/s (residential properties)***	***3 mm/s (heritage structures)***
Vibration Targets Source	***BS 5228-2***	***DIN 4150-3***	***DIN 4150-3***
Excavators, scrapers, graders etc.	25 m	3 m	6 m
Compactor (up to 7 tonnes)	90 m	13 m	24 m
Piling (bored/auger)	120 m	17 m	35 m
Roller (up to 15 tonnes)	140 m	18 m	34 m
Dozer	60 m	8 m	14 m

Given the potential for construction vibration impacts at the residential properties in NCA1 & NCA2 and the Moss Vale Signal Box heritage item, supplementary vibration management and mitigation measures are recommended in Section 7.3 and should be implemented where feasible and reasonable.

7 Noise and Vibration Management Measures

7.1 Operational noise management

The predicted operational noise levels from both fleet types indicates exceedance of the project operational noise trigger levels at the surrounding nearest affected receivers to the project. Given the varying levels of exceedances based on the different operational scenarios, receiver locations and the two noise wall options being considered, a hierarchical approach for mitigation is recommended to control operational noise impacts from the stabling facility. This will ensure mitigation options likely to offer the greatest benefit to the largest number of affected receivers are considered before more localised mitigation options. The RING generally outlines three main control strategies to reduce rail noise impacts:

- Control noise at the source
- Control noise in transmission
- Control noise at receiver

7.1.1 Control noise at source

The proposed location of the lengthened stabling roads will ensure similar or more distance between the roads and surrounding sensitive receivers. There is no other practical location which will further maximise the distance to surrounding sensitive receivers. Moreover, the orientation of the lengthened roads does not include any sharp bends or turnouts, which will reduce the risk of wheel squeal. Additional track measures that should be considered include:

- Welding to smooth discontinuities
- Lubrication
- Use of soft rail pads

Fairing and skirting is to be installed on cars (See Figure 7-1 for details).

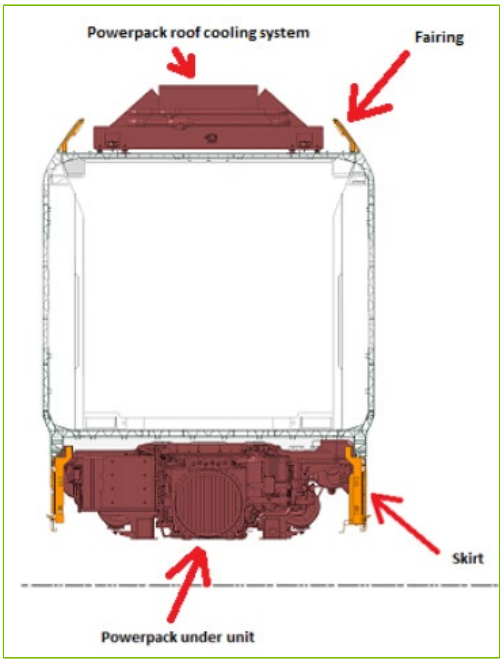


Figure 7-1: Proposed skirt and fairing to new fleet cars (source: RRP-IPD-19-8526-TFNSW-EW-TE-RPT-000013)

7.1.2 Control noise in transmission

The existing noise walls provided little to no attenuation given their low heights. This is especially relevant for noise wall Section 1 (see Section 3.4) which is lower than the undercarriage engine powerpack at some locations, as noted during site investigations (see Figure 7-2). It was also noted during the site investigations that the majority of noise from the existing fleet during idling and start-up was at a high level i.e. from the roof cooling unit and exhaust openings along the face (approx. 3.5 metres). Given the new fleet is also proposed with a rooftop powerpack cooling unit, the height of the noise walls should be increased, if any kind of practical attenuation is expected.

Figure 7-2: Relative height of existing noise wall

Proposed PDR Noise Wall

The existing noise wall Section 2 will be demolished as part of the project, with only Section 1 being retained. A new continuous noise wall is proposed as an alternative to the existing noise wall Section 1 (see Figure 7-3 and Figure 7-4). This wall is proposed to extend a further 25.4m to the south (Canberra Side) and extend north (City Side), along the project boundary and overlap with another new noise wall along the eastern side of the new vehicle entry and parking bays. The PDR noise walls are proposed at a constant height of 5.4m and at a maximum distance of 3.4m from the centreline of the track and extend approximately 240 m. It should be noted that the proposed noise wall was not designed by the project acoustic consultants and was asked to be considered as a possible mitigation option.

Figure 7-5 to Figure 7-8 illustrates the proposed locations and spans of the PDR noise walls.

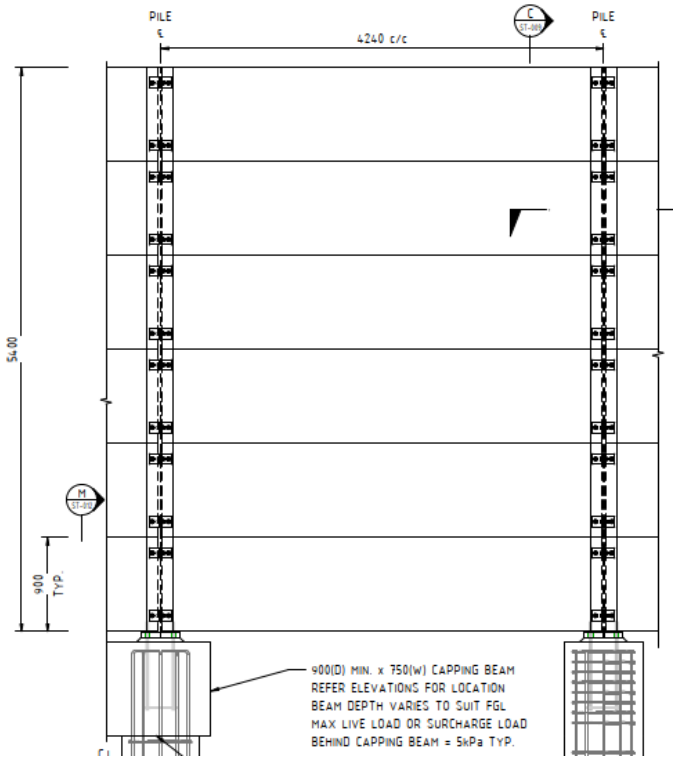


Figure 7-3: Proposed construction of the PDR Noise Wall

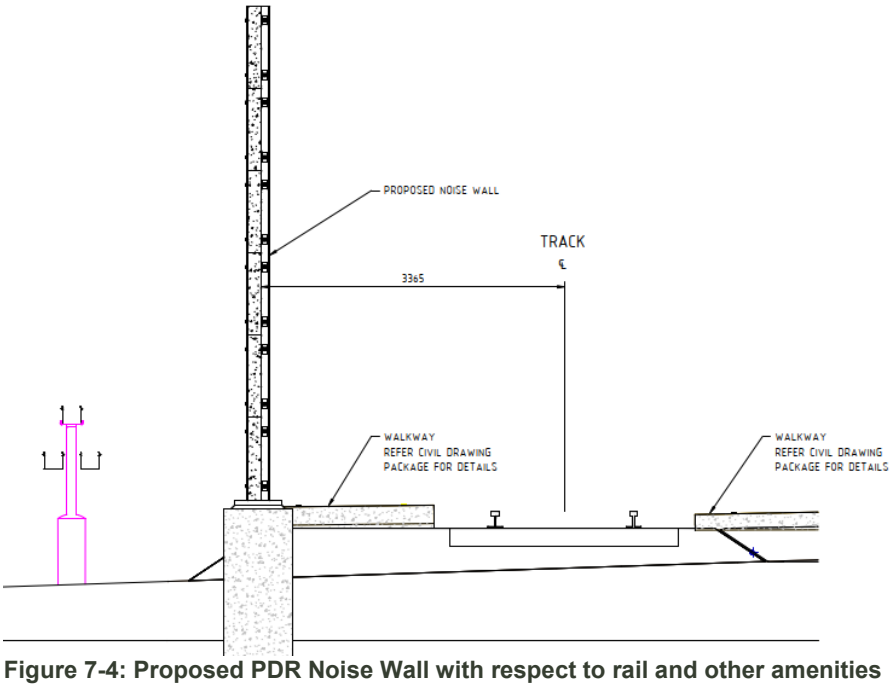


Figure 7-4: Proposed PDR Noise Wall with respect to rail and other amenities

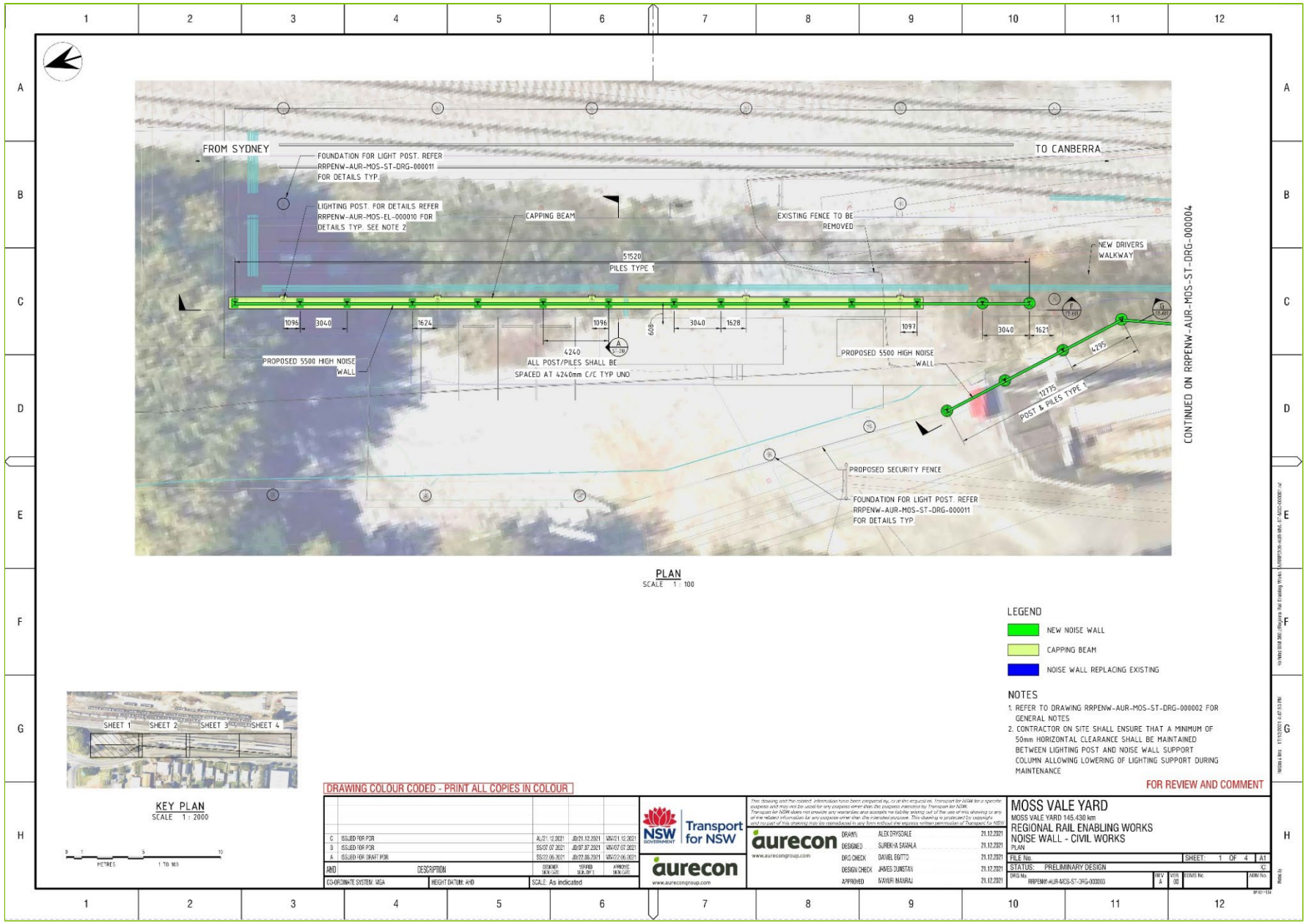


Figure 7-5: Proposed PDR Noise Wall Extents (Part 1)

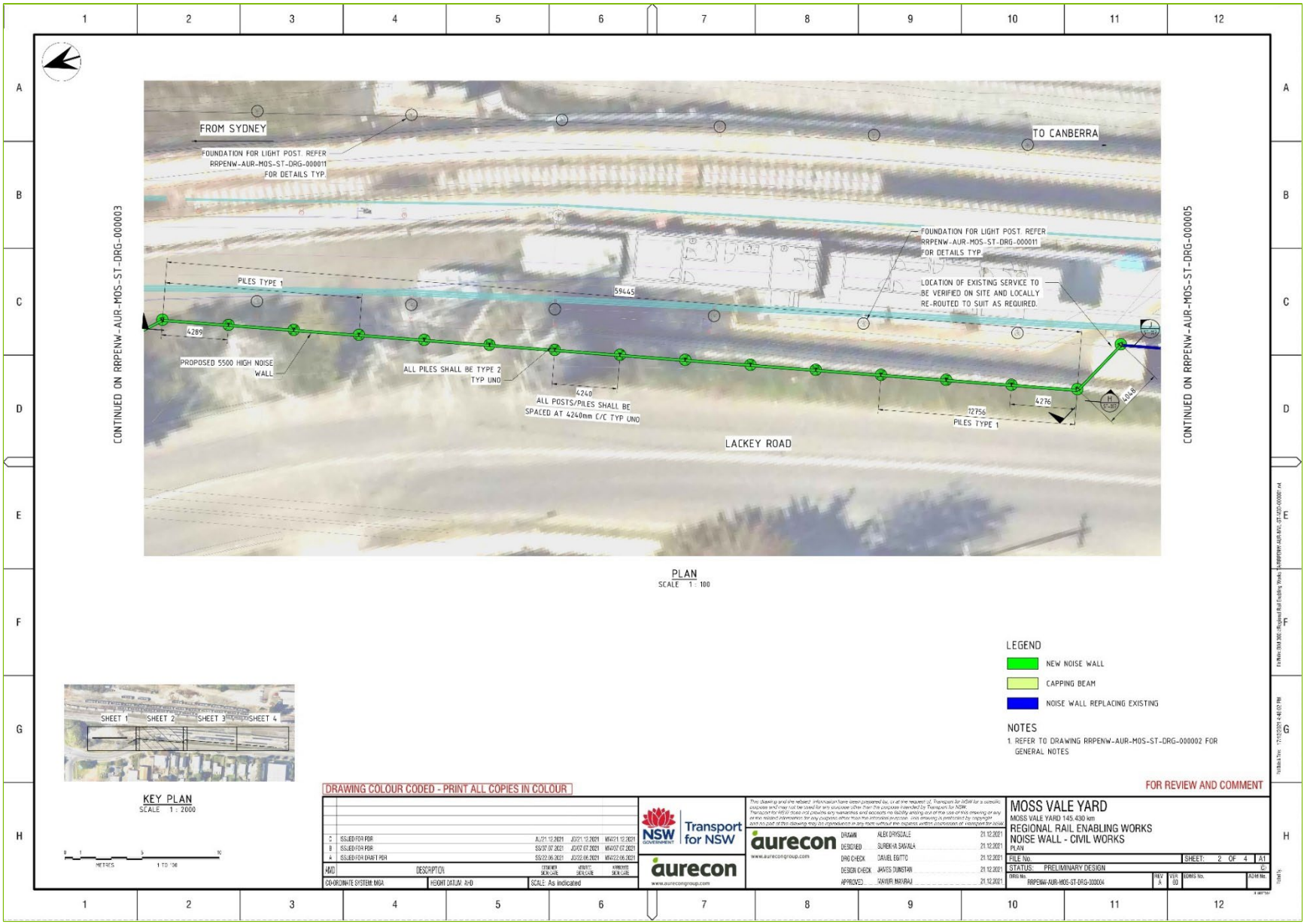


Figure 7-6: Proposed PDR Noise Wall Extents (Part 2)

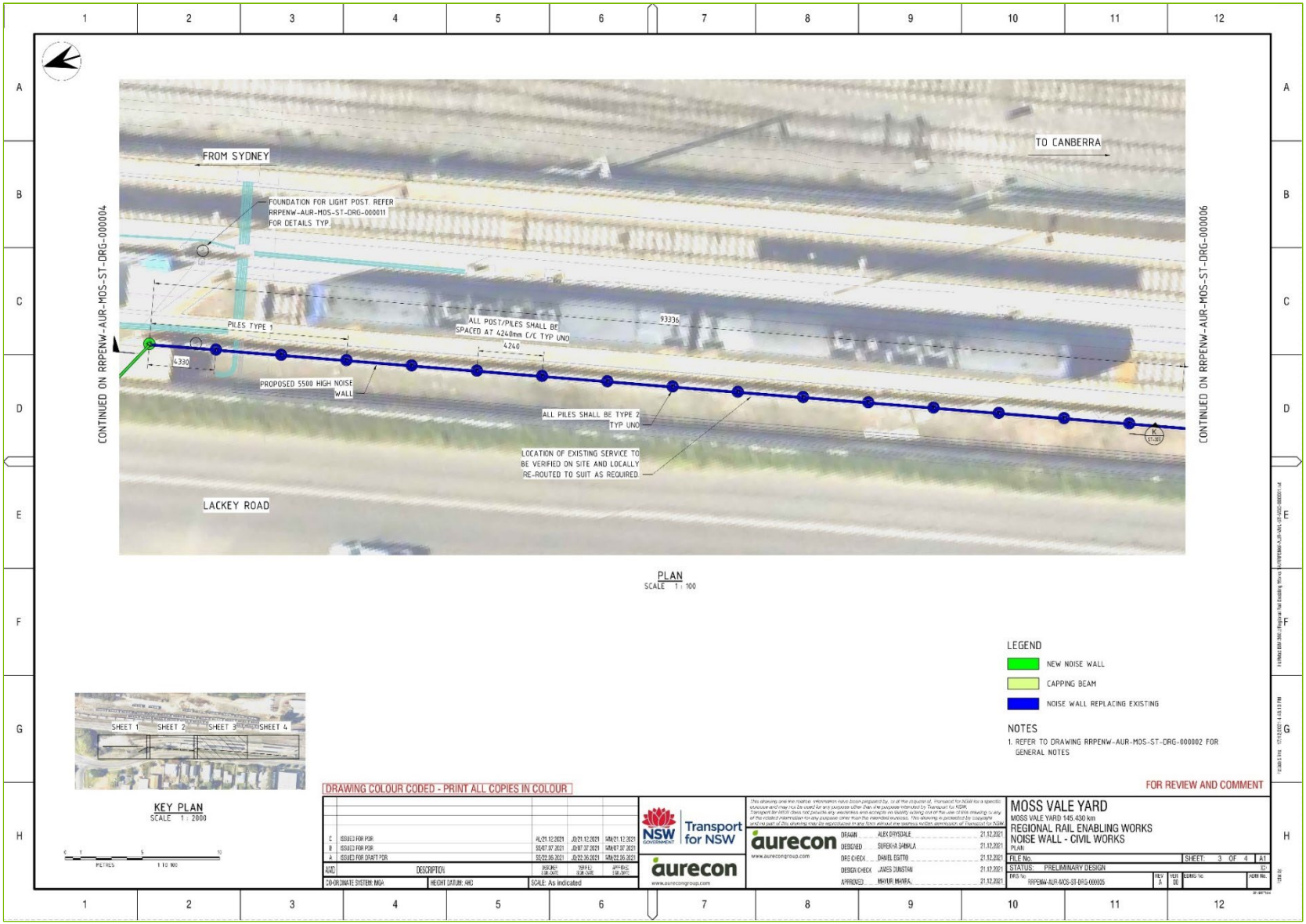


Figure 7-7: Proposed PDR Noise Wall Extents (Part 3)

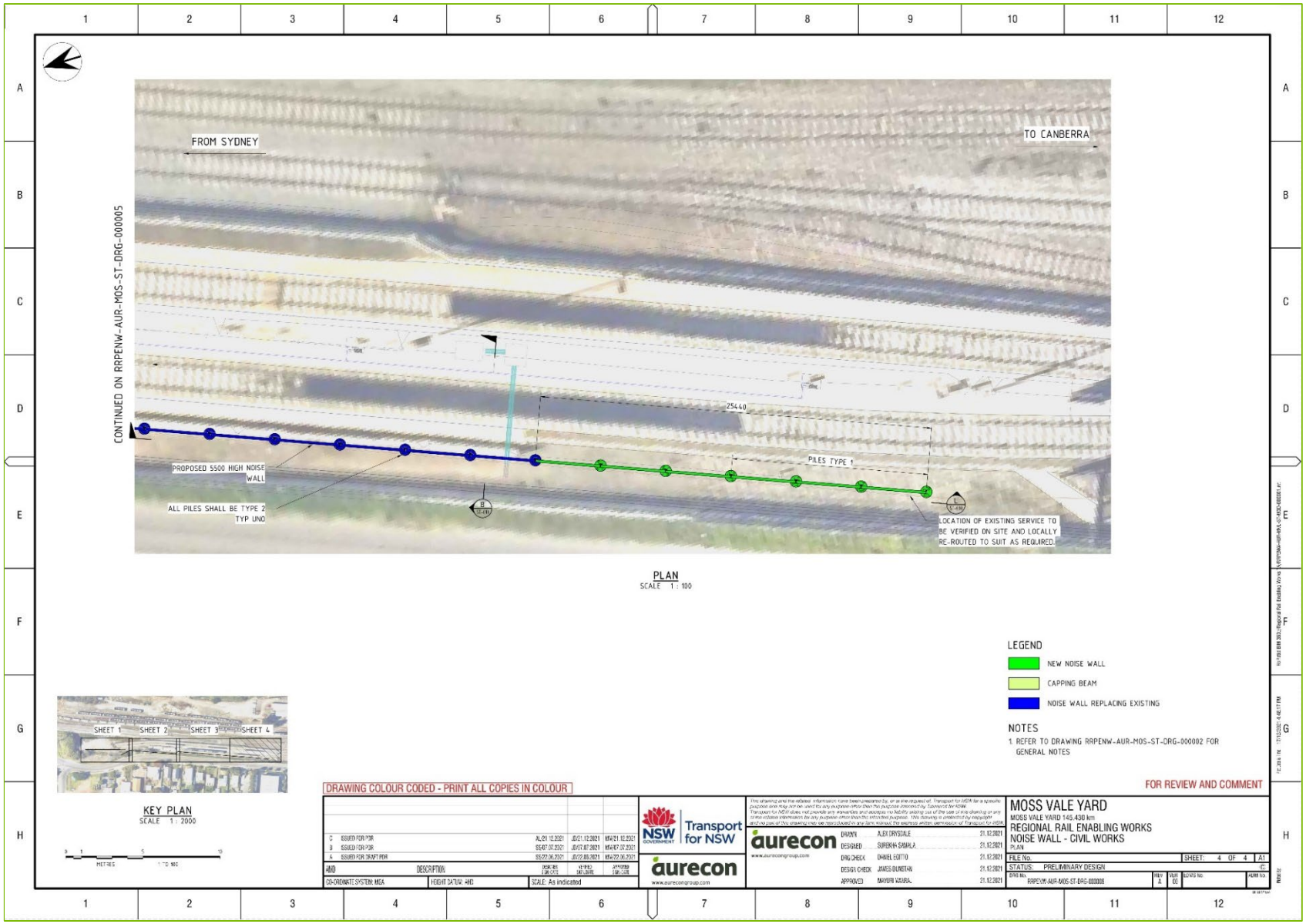


Figure 7-8: Proposed PDR Noise Wall Extents (Part 3)

Performance of PDR Noise Wall for residential receivers

To understand the effectiveness of the PDR Noise wall, the PDR Noise wall has been modelled and operational noise levels have been predicted. The performance of the PDR Noise Wall has been compared to the existing retained noise wall in Table 7-1. The performance of the PDR noise wall has been highlighted for the scenarios where the noise wall will be most effective. These scenarios include 1, 2, 3, 4 and 6b. Scenario 6a (horn warning) occurs closer to the Moss Vale platforms, away from the extents of the proposed PDR Noise Wall and has not been considered in the comparison.

Table 7-1: Predicted operational noise impacts with the PDR noise wall and overall performance

Noise Catchment Area	Existing Retained Noise Wall					PDR Noise Wall				
	Number of Exceedances during Each Period			Predicted Noise Levels dB(A)$L_{eq(15min)}$	Exceedance Range dB(A)	Number of Exceedances during Each Period			Predicted Noise Levels dB(A)$L_{eq(15min)}$	Exceedance Range dB(A)
	Day (53 dBA)	Evening (43 dBA)	Night (38 dBA)			Day (53 dBA)	Evening (43 dBA)	Night (38 dBA)		
Scenario 1 - Existing Fleet										
NCA1	0	0	0	16 - 47	Up to 9	0	0	0	15 - 46	Up to 8
NCA2	0	0	3			0	0	3		
NCA3	0	0	0			0	0	0		
NCA4	0	0	1			0	0	1		
Scenario 1 - New Fleet										
NCA1	0	0	4	21 - 52	Up to 14	0	0	2	19 to 51	Up to 13
NCA2	0	3	8			0	3	8		
NCA3	0	0	2			0	0	7		
NCA4	0	1	9			0	1	11		
Scenario 2 - Existing Fleet										
NCA1	2	12	13	17 - 55	Up to 17	0	0	6	12 to 43	Up to 5
NCA2	0	0	1			0	0	0		
NCA3	0	5	16			0	0	9		
NCA4	0	0	10			0	0	5		
Scenario 2 - New Fleet										
NCA1	4	7	11	26 - 60	Up to 22	0	6	7	26 to 55	Up to 17
NCA2	0	2	3			0	1	3		

Noise Catchment Area	Existing Retained Noise Wall					PDR Noise Wall				
	Number of Exceedances during Each Period			Predicted Noise Levels dB(A)$L_{eq(15min)}$	Exceedance Range dB(A)	Number of Exceedances during Each Period			Predicted Noise Levels dB(A)$L_{eq(15min)}$	Exceedance Range dB(A)
	Day (53 dBA)	Evening (43 dBA)	Night (38 dBA)			Day (53 dBA)	Evening (43 dBA)	Night (38 dBA)		
NCA3	2	19	21			9	21	23		
NCA4	0	15	15			1	16	16		
Scenario 3 - Existing Fleet										
NCA1	0	4	7	17 to 48	Up to 12	0	0	6	12 to 43	Up to 5
NCA2	0	0	0			0	0	0		
NCA3	0	8	21			0	0	9		
NCA4	0	5	10			0	0	5		
Scenario 3 - New Fleet										
NCA1	0	7	9	19 to 56	Up to 18	0	5	8	19 to 50	Up to 12
NCA2	0	0	1			0	0	1		
NCA3	0	8	19			0	14	22		
NCA4	0	0	15			0	0	15		

Table 7-2: Predicted operational noise impacts with the PDR noise wall and overall performance (industrial interface assessment)

Noise Catchment Area	Existing Retained Noise Wall					PDR Noise Wall				
	Number of Exceedances during Each Period			Predicted Noise Levels dB(A)$L_{eq(15min)}$	Exceedance Range dB(A)	Number of Exceedances during Each Period			Predicted Noise Levels dB(A)$L_{eq(15min)}$	Exceedance Range dB(A)
	Day (58 dBA)	Evening (48 dBA)	Night (43 dBA)			Day (58 dBA)	Evening (48 dBA)	Night (43 dBA)		
Scenario 1 - Existing Fleet										
NCA1-A	0	0	8	29 to 47	Up to 4	0	0	0	33 to 50	Nil
NCA2-A	0	0	0			0	0	0		
Scenario 1 - New Fleet										
NCA1-A	0	4	8	33 to 50	Up to 7	0	0	0	33 to 47	Up to 4
NCA2-A	0	0	10			0	0	10		
Scenario 2 - Existing Fleet										
NCA1-A	0	8	8	20 to 56	Up to 13	0	0	1	15 to 44	Up to 1
NCA2-A	0	0	0			0	0	0		
Scenario 2 - New Fleet										
NCA1-A	8	8	8	28 to 62	Up to 19	0	8	8	28 to 51	Up to 8
NCA2-A	0	2	8			0	0	4		
Scenario 3 - Existing Fleet										
NCA1-A	0	1	8	16 to 50	Up to 7	0	0	1	15 to 44	Up to 1
NCA2-A	0	0	0			0	0	0		
Scenario 3 - New Fleet										
NCA1-A	1	8	8	22 to 59	Up to 16	0	0	0	21 to 53	up to 10
NCA2-A	0	0	2			0	0	0		

Table 7-3: Predicted operational noise impacts with the PDR noise wall and overall performance (sleep disturbance scenarios)

Scenario	NCA	Sleep Disturbance External Noise Target dB(A)L_{max}	Number of Exceedances *Existing wall Section 1 retained*	Number of Exceedances *PDR noise wall*	Reduction in Noise Level due to PDR Noise Wall dB(A)
Scenario 4 (New Fleet)	NCA1	65	New fleet (Location 1) – 15 New fleet (Location 2) – 12	New fleet (Location 1) – 11 New fleet (Location 2) – 8	New fleet (Location 1) – Up to 8 New fleet (Location 2) – Up to 9
	NCA2		New fleet (Location 1) – nil New fleet (Location 2) – 3	New fleet (Location 1) – nil New fleet (Location 2) – nil	New fleet (Location 1) – Up to 3 New fleet (Location 2) – Up to 3
	NCA3		New fleet (Location 1) – 18 New fleet (Location 2) – 11	New fleet (Location 1) – 21 New fleet (Location 2) – 12	*Increase of up to 3 (Due to reflections)
Scenario 4 (Existing Fleet)	NCA1	65	Existing fleet (Location 1) – 2 Existing fleet (Location 2) – 1	Existing fleet (Location 1) – nil Existing fleet (Location 2) – nil	Existing fleet (Location 1) – up to 13 Existing fleet (Location 2) – up to 9
Scenario 6b Town Horn (Location 1)	NCA1	65	Existing fleet – 19 New fleet – 24	Existing fleet – 12 New fleet – 23	Existing fleet – Up to 16 New fleet – Up to 17
	NCA2		Existing fleet – 2 New fleet – 16	Existing fleet – 0 New fleet – 11	Existing fleet – Up to 10 New fleet – Up to 11
	NCA3		Existing fleet – 19 New fleet – 24	Existing fleet – 20 New fleet – 24	*Increase of up to 5 (Due to reflections)
	NCA4		Existing fleet – 12 New fleet – 15	Existing fleet – 12 New fleet – 15	Existing fleet – Up to 3 New fleet – Up to 5

Scenario	NCA	Sleep Disturbance External Noise Target dB(A)L_{max}	Number of Exceedances *Existing wall Section 1 retained*	Number of Exceedances *PDR noise wall*	Reduction in Noise Level due to PDR Noise Wall dB(A)
Scenario 6b Town Horn (Location 2)	NCA1	65	Existing fleet – 14 New fleet – 19	Existing fleet –8 New fleet – 16	Existing fleet – Up to 13 New fleet – Up to 15
	NCA2		Existing fleet – 5 New fleet – 21	Existing fleet – 3 New fleet – 21	Existing fleet – Up to 9 New fleet – Up to 13
	NCA3		Existing fleet – 10 New fleet – 22	Existing fleet – 12 New fleet – 23	*Increase of up to 3 (Due to reflections)
	NCA4		Existing fleet –14 New fleet – 15	Existing fleet – 13 New fleet –15	Existing fleet – Up to 2 New fleet – Up to 1
Scenario 6b Country Horn (Location 1)	NCA1	65	Existing fleet – 19 New fleet – 20	Existing fleet –18 New fleet – 20	Existing fleet – Up to 16 New fleet – Up to 17
	NCA2		Existing fleet – 33 New fleet – 33	Existing fleet –33 New fleet – 33	Existing fleet – Up to 1 New fleet – Up to 7
	NCA3		Existing fleet – 19 New fleet – 24	Existing fleet – 14 New fleet – 19	Existing fleet – Up to 10 New fleet – Up to 12
	NCA4		Existing fleet – 4 New fleet – 10	Existing fleet – 4 New fleet – 7	Existing fleet – Up to 4 New fleet – Up to 3

Scenario	NCA	Sleep Disturbance External Noise Target dB(A)L_{max}	Number of Exceedances *Existing wall Section 1 retained*	Number of Exceedances *PDR noise wall*	Reduction in Noise Level due to PDR Noise Wall dB(A)
Scenario 6b Country Horn (Location 2)	NCA1	65	Existing fleet –15 New fleet – 20	Existing fleet –13 New fleet – 12	Existing fleet – Up to 13 New fleet – Up to 22
	NCA2		Existing fleet – 29 New fleet – 33	Existing fleet – 29 New fleet – 29	Existing fleet – Up to 1 New fleet – Up to 25
	NCA3		Existing fleet – 18 New fleet – 25	Existing fleet – 17 New fleet – 17	Existing fleet – Up to 9 New fleet – Up to 26
	NCA4		Existing fleet – 6 New fleet – 12	Existing fleet – 4 New fleet – 4	Existing fleet – Up to 7 New fleet – Up to 17

Summary of the effectiveness of the PDR Noise Wall

- The PDR Noise wall does provide noise attenuation for most operational scenarios that are located within the proposed new stabling yard location. The attenuation is generally limited to residential receivers located within NCA1 and NCA2, however exceedances of the project operational noise trigger levels are still apparent even with the proposed PDR Noise wall design. This is due to the proximity of the residential receivers to the stabling yard location as well as the source noise levels for some of the stabling scenarios, with particular emphasis on the country and town horns for the existing and new fleet.
- Furthermore, the PDR Noise Wall has adverse effects on the predicted noise levels for NCA3 as the PDR Noise wall reflects the stabling yard operational noise to these residential receivers. For the PDR Noise Wall to be effective for these properties, absorption would be required on the inner face of the PDR Noise Wall to assist with the predicted reflections to the residential receivers in NCA3.
- The PDR Noise Wall does reduce the noise impacts of the country and town horn testing in Scenario 6b. However due to the magnitude of the exceedances, without the PDR Noise Wall, the performance of the PDR Noise Wall is not substantial enough to provide sufficient mitigation to achieve compliance.
- In terms of a cost-benefit solution for operational noise, the PDR Noise wall may not be the best solution and other mitigation options such as more refined noise wall locations or at-property treatments may be more beneficial in terms of overall effectiveness and cost than the proposed PDR Noise wall. It should be noted that the PDR Noise wall was proposed as a part of PDR design and further refinement could be undertaken to increase the overall performance in terms of additional length and height.

  Utilising the worst-case scenario, Scenario 6b – "*New Fleet Country Horn Testing at Location 1 without the PDR Noise Wall",* there are total of 87 residential receivers within all the NCAs assessed exceeding the sleep disturbance external noise target. With the PDR noise wall, there is a reduction in predicted noise level, however the total residential receivers exceeding the sleep disturbance external noise target drops to 75.

  The PDR noise wall design could be investigated in greater detail in future design stages of the project. A general exploration has been undertaken in the following section. Furthermore, a cost benefit analysis should be undertaken to ascertain if the PDR noise wall is the best approach in terms of mitigation.

Existing Noise wall and other Noise wall options

Typically:

- Extending the noise wall height to same height as the top of the rooftop powerpack unit, will result in a line-of-sight barrier with attenuation between 3 – 5 dB.
- Extending the noise wall height to 1 metre above the top of the rooftop powerpack unit, will result in a higher level of attenuation i.e. between 7 – 10 dB.

- Based on the predictions detailed in Table 7-1 and Table 7-2 , the PDR noise wall replacement will result in a considerable reduction of operational noise impacts (1 to 13 dB for NCA 1) when compared to retaining the existing noise wall Section 1. The residential properties in this NCA are forecasted to experience the highest levels of exceedances.
- Hence, further extension of the PDR noise wall was not considered to be practical. Given the potential for noise reflections associated with this PDR noise wall (proximity of the noise wall from the fleet and location of sensitive receivers in NCA3), absorptive facing is recommended to the internal face (facing the fleet) of the wall, along areas immediately adjacent to where fleets will be stabled. Minimum NRC 0.35 (e.g. Woodtex) is recommended for the absorptive facing.
- Increasing the height of the noise wall further was also investigated as a potential path control. An additional increase in barrier height of up to two metres was not sufficient to reduce the noise levels to below the trigger levels for all scenarios and at all identified sensitive surrounding receivers. Moreover, further increases to barrier height were not considered to be reasonable, as this would result in a noise wall above six metres.

7.1.3 Control noise at receiver

As strict compliance with the project operational noise trigger levels (see Table 4-3) is still not achieved following the investigation of feasible and reasonable mitigate measures above, complementary management at the point of impact should be considered.

- An Operational Noise and Vibration Management Plan (ONVMP) should be prepared during subsequent stages of design, when final/confirmed noise information is available for the new fleet. We have been advised that efforts are ongoing to further optimise operational performance to ensure compliance with the performance requirements of TfNSW, a key expectation being the new fleet is operationally less noisy than the existing fleet. Hence, this updated acoustic information must be utilised to update this prediction assessment, to determine any efficiencies and/or compensations to the proposed mitigation treatments.
- Once the assessment has been updated and other mitigation measures have been agreed upon and designed, the ONVMP will flag the residual exceedances, of which will be eligible for inspection to determine the suitability or need for at-property treatment.
- These site inspections must be coordinated during subsequent stages of design, to confirm property layout of the identified properties with predicted exceedances and determine specific architectural treatments. At-property architectural treatments potentially include the upgrade of building fabric elements (i.e. façade glazing) and/or appropriate ventilation system (e.g. air-conditioning).
- Given the proposed stabling operations are largely operating during the night-time and early morning periods, annoyance to sleeping areas is considered to be the determining factor in selecting the properties where at receiver treatments must be considered. Complaints are unlikely for intermittent continuous (L_{eq}) noise events in living rooms, given the high likelihood of elevated internal ambient noise levels (associated with TV's, amplified systems etc.).

7.1.4 Operational Controls

Operational Considerations (Horn warning/testing, Scenario 6a and 6b)

Due to location of the horn testing at Moss Vale, the number of times horn testing occurs and the number of predicted exceedances if the sleep disturbance external noise target (in excess of 50 residential properties), noise mitigation for the horn use is required.

Noise walls have been considered as a mitigation option for Scenario 6b as per the analysis of the proposed PDR noise wall, however due to the magnitude of the exceedances (up to 45 dB) noise walls would not reduce the predicted noise level enough to comply with the external noise target for sleep disturbance.

Noise walls to mitigate horn warnings for Scenario 6a have not been considered due to a lack of space within proximity of Moss Vale Station.

Furthermore, due to the number of exceedances from the proposed horn testing of the new fleet for both horn types, at receiver mitigation may not be the best cost benefit solution to mitigate for the horn testing. It can be considered in combination with other mitigation strategies for the most affected residential properties, however additional investigation is required in future design stages to refine what is required.

Other source noise controls such as operational considerations are to be considered for the project.

- Automatic Warning Systems (AWSs) are recommended to be installed within the stabling facility as it would provide sufficient safety mechanisms for the stabling yard operations without the use of the horns. This could be used as an alternative to Scenario 6a, where the horns are sounded upon arrival and departure of the Moss Vale stabling yard. These systems can warn the train drivers as well as the people within the stabling facilities without the need of using excessive noise. Furthermore, it should be noted that the new fleet will be fitted with a train-based warning system (TBWS) in the form of a low broadband alarm which could be used to warn of movement instead of horns. Use of the TBWS could be confirmed at ONVMP time and would need an appropriate NSWTL procedure.
- Furthermore, it is understood that both country and town horns are required to be tested upon departure to ensure they are operational. As there are no operational noise criteria/limits for horn operations on the Main Line under the existing license, limiting the use of these horns on the Main Line would be preferred. If the horns are tested on the Main Line instead of the stabling yard, the horn testing would not be considered an operational stabling yard scenario.

An alternative horn testing location on the Main Line would need to be identified and the associated noise assessed as part of the project ONVMP. Specific NSWTL procedures would also be required for this option.

- Operation/testing of the horns within the stabling yard would require Sleep Disturbance assessments with respect to the NPfI, which has been undertaken within this report, and it is likely in most stabling yard situations exceedances to nearby residential receivers would occur due to the high sound power levels of the horns.

7.2 Construction noise management

Based on the predicted exceedances from the preliminary assessment above (see Section 6.3.3), there may be community reaction to noise impacts resulting from construction works. Hence, all feasible and reasonable work practices should be implemented, and appropriate noise control measures developed, to limit exposure for sensitive receivers around the project site.

The following noise mitigation measures and management strategies must be considered for the project, with the preparation of a Construction Noise and Vibration Management Plan (CNVMP)(when a contractor is engaged and construction methodology/associated activities are confirmed).The CVNMP will accurately determine and highlight the level of impact on surrounding affected receivers and develop site-specific management strategies.

7.2.1 Standard noise mitigation and management measures

Section 8.1 of TfNSW CNVS details standard measures for mitigating and managing noise impacts associated with construction works. Some relevant management measures are summarised below:

Table 7-4: Standard construction noise management measures

Mitigation and Management Measure	Description
Appropriate equipment selections	■ Use quieter and less noise intrusive construction methods where feasible and reasonable. For example, use smaller bobcats and loaders in place of D10 Dozer etc, use CFA or bored piling in place of impact or driven piles. ■ Select only the necessary size and power for equipment/machinery.
Reversing alarms	■ Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles (including delivery vehicles) and mobile plant regularly used on site. ■ Minimise horn and use where possible.
Scheduling	■ Coordinate noisy plant/activities (concrete cutting, excavation breaking/ripping operations, dozer) during less sensitive time periods i.e. early morning (7am to 8am). ■ Plan an operations methodology so these noise plant/activity don't operate continuously at one location for extended duration and move to other areas of the site. ■ Limit number of equipment/machineries operating on site simultaneously by only having the required equipment on-site during a specific stage of works and equipment/machinery generally turned off when not in use.
Respite periods	■ Respite periods should be enforced for high noise intrusive activities like piling, sawing and vibratory rolling. These activities must be limited to continuous[21] blocks not exceeding 3 hours each, with a minimum respite period of 1 hour between each block. ■ Given the location of commercial and educational receivers around the project site, introduction lunch time respite periods should also be considered.
Equipment restrictions and maintenance	■ Select low noise options for plant and equipment. Ensure equipment mufflers operate in a proper and efficient manner. ■ Ensure all plant and equipment is well maintained and where possible, fitted with silencing or localised noise attenuation devices.
Plan work sites to minimise disturbance from loading/unloading areas and delivery of goods	■ Plan loading/unloading zones to minimise reversing movements ■ Recommend all delivery and loading/unloading activities adjacent to the main access road, at location of new carparking bays. This location is nearest to industrial/light-industrial receivers who also generate noise and will ensure maximum distance to residential receivers. ■ Maximise distance of stationary plant/equipment (e.g. generators) from sensitive receivers along Lackey and Parkes roads.

[21] *'Continuous' includes any period during which there is less than a 1-hour respite between ceasing and recommencing any of the work.*

Implement stakeholder consultation measures	Periodic notification detailing all upcoming construction activities delivered to sensitive receivers at least 7 days prior to commencement of relevant works.
Create a register of noise sensitive receivers	A register of the potentially most affected noise sensitive receivers should be developed and kept on site. At a minimum this register must include address and contact information.
Good construction work practices	■ No amplified music or use of radios. ■ Use designated access pathways. ■ Use designated routes for materials. ■ Locate disposal bins away from sensitive receivers. ■ Stationary plant should be place as far away as possible from sensitive receivers. ■ Turn off plant and equipment when not in use (this includes trucks idling). ■ Avoid heavy handling or materials and equipment (i.e. do not drop items). ■ Ensure construction materials and equipment do not obstruct operational areas such as public roads. ■ Avoid shouting within the site
Noise monitoring plan	A updated detailed construction noise and vibration impact study is recommended during subsequent stages of the project (when a detailed programme and construction methodology is developed), to accurately determine the level of impact on surrounding affected receivers and develop site-specific management strategies. This will help inform a project specific construction noise and vibration management plan (CNVMP). As the preliminary assessment demonstrates a high likelihood of exceedance of noise management levels, a detailed noise monitoring program should also be developed as part of the CNVMP, in accordance with the relevant approval and licence conditions.

7.2.2 Additional mitigation and management measures

Where construction noise management levels are exceeded after implementation of the standard mitigation and management measures detailed in Section 7.2.1, TfNSW CNVS recommends further measures such as project and specific notifications, verification monitoring and respite periods, based on receiver perception of the noise. The thresholds at which these measures are required are summarised in Table 9 of the CNVS and summarised below for the project:

Table 7-5: TfNSW CNVS recommended additional mitigation measures

Construction hours	Receiver perception	dB(A) exceedance of the RBL	dB(A) exceedance of construction NML	Additional mitigation measures
Standard hours of work Monday-Friday (7am to 6pm) Saturday (8am to 1pm)	Noticeable	5 to 10	0	–
	Clearly Audible	> 10 to 20	< 10	–
	Moderately intrusive	> 20 to 30	> 10 to 20	PN, V
	Highly intrusive	> 30	> 20	PN, V
	Exceeds highly noise affected management level i.e. ≥ 75 dB(A)	N/A	N/A	PN, V, SN

Notes:

PN – Project notification

V – Verification monitoring

SN – Specific notification

The above additional measures are suggested for the general construction scenarios, however the impacts of the temporary use of Car Siding Road 3 may require additional mitigation as the impact of the horn testing and brake release scenarios are considerable to residential properties. Mitigation measures that could be considered include the following:

- Operational measures such as horn testing in other locations such as the Main Line, as well as horn testing restricted to only day period only.
- Temporary noise barriers in and around the temporary stabling locations
- Temporary relocation for the most affected residential receivers.

The Car Siding Road 3 temporary stabling road is proposed to be used for discreet periods of time during construction of the project.

Additionally, these additional mitigation measures can be formalised in detail in future stages of the project.

7.3 Construction vibration management

Based on the safe working buffer distances detailed in Table 6-14, there is potential for human comfort vibration impacts for the following activities at the residential properties along Lackey Road within NCA1 and NCA 2:

- Compactor
- Piling
- Roller
- Dozer

Vibration impacts will vary for a particular equipment/activity across different construction sites, as vibration intensity and propagation are based on the geotechnical conditions of the study area. Hence benchmark testing is recommended for these activities, to determine if there is potential for human comfort impacts to the residential properties. Benchmark testing is suggested to be carried out prior to the commencement of operations on site, with equipment/activity operating at the nearest proposed location to the subject receiver and vibration measurements conducted on the ground floor slab of the receiver. The testing should include operation of equipment/activity individually and also cumulatively, where this is proposed.

Alternatively constant construction monitoring can be utilised. Construction vibration monitors will warn the contractor when the vibration limits are potentially going to exceed, allowing for work to be stopped prior.

Additionally, compactor and excavator operations carried out in the vicinity of the Moss Vale Signal Box structure (24 metres for compactor and 6 metres for excavator), have the potential to exceed the structural damage target for sensitive heritage items (i.e. deemed to be structurally unsound). The following management measures must be considered:

- A building inspection is recommended prior to the commencement of construction activities, to determine existing condition and establish suitable maximum vibration limits.
- Benchmark testing will be able to inform the contractor of the likelihood of exceedance of the maximum vibration limits, based on the proposed activity and operational distance. If benchmark testing is undertaken, it must be carried out on site at a safe distance from the heritage structure (same geotechnical conditions) to limit the potential for damage to the structure.
- Where exceedance of the maximum vibration limits is predicted, investigate the suitability of adopting low vibration methods, which may include smaller or non-vibratory rollers, the use of concrete cutting or grinding methods instead of breaking.
- The benchmark testing will also inform on the accurate safe working distances for the proposed equipment/activity on site, with a vibration monitoring plan developed for any works (which cannot be substituted with alternative processes) within this buffer zone.
- Otherwise, construction vibration monitoring shall be undertaken as the alternative to constantly monitor vibration levels at vibration sensitive locations.

8 Conclusion

Aurecon was engaged by TfNSW to undertake an assessment of the potential noise and vibration impacts associated with the redevelopment and operation of the Moss Vale Stabling Yard along Lackey Road in Moss Vale. The redevelopment is proposed to include lengthening of the two existing storage and service sidings, to facilitate the accommodation of 6 x 3-car sets and future transition of the existing fleet to the new regional fleet, proposed as part of the Regional Rail Service Plan.

- The relevant noise and vibration objectives applicable to the project are detailed in Section 4, with project specific operational noise trigger levels presented in Table 4-3 and Table 4-4, and construction noise management levels presented in Table 4-5 and Table 4-6. Construction vibration targets are specified in Section 4.3.
- Operational noise and vibration impacts associated with the lengthened sidings and future transition to the new regional fleet were assessed in Section 5.
  - The predicted noise levels from both fleet type stabling operations indicates exceedance of the project operational noise trigger levels at the surrounding nearest affected receivers to the project.
  - Higher levels of exceedances are predicted where the existing noise wall is retained (i.e. Section 1 retained and Section 2 demolished as part of the project.
  - In an attempt to mitigate operational stabling yard noise, a PDR Noise Wall has been proposed and noise levels have been predicted for the operational scenarios.
    - Overall, lower levels of exceedance predicted (typically in the order of 6 to 10 dB(A) lower, based on the scenario and receiver location) if the existing noise wall is replaced by the PDR noise wall.
    - However, the PDR Noise Wall is not effective for residential receivers in NCA3 and inherently increases the number of properties exceeding the operational noise trigger levels due to the noise reflections from the PDR noise wall.
- A hierarchical approach for operational noise mitigation is recommended in Section 7.1.
- A preliminary assessment of potential noise and vibration impacts resulting from construction operations was undertaken in this study:
  - Exceedance of the noise management levels are predicted at most residential receivers in NCA1 and NCA2 for all construction stages, based on the indicative equipment/machinery likely to be used for the proposed construction works. Exceedance of the noise management levels are also predicted for the nearest affected residential properties in NCA3 during Stages 1 and 2.
  - Six residences in total (see Table 6-4) within NCA1 and NCA2 are predicted to exceed the highly noise affected management level, during Stages 1 and 2. Exceedances of up 4dB(A) are predicted during Stage 2 at residential properties 121 and 117-119 Lackey Road. All other exceedances are predicted to be within 2dB(A) of the highly noise affected management level.
  - Exceedance of the construction noise management levels are predicted for commercial receivers within NCA1 and NCA2, during Stage 2. Intermittent exceedances are also forecast for other non-residential receivers (educational establishments, places of worship and industrial) however these are expected to be fleeting and non-intrusive.
  - Large number of exceedances of the NMLs for the Car Siding Road 3 scenarios are predicted within NCA2 and NCA4 for the residential receivers. This is due to the locality of Car Siding Road 3 to those residential receivers, with NCA2 situated directly adjacent to the Car Siding Road 3. In excess of 30 residential receivers exceed the night NML, which is critical as most stabling works is to be undertaken during the night period.
  - The use of Car Siding Road 3 as a temporary stabling location exceeds the sleep disturbance noise level for brake release and horn testing. Residential properties in NCA2 are greatly affected with exceedances of all sleep disturbance scenarios. All other NCAs also exceed the sleep disturbance noise levels for both horn testing scenarios, however, do not exceed the sleep disturbance noise level for the brake release scenario. The two scenarios where the greatest number of exceedances occurred was the two horn testing scenarios. Both the country and the town horn exceeded the sleep disturbance noise levels at 71 and 43 residential receivers respectively.

- Safe working buffer distances for vibration intrusive plant are detailed in Table 6-14.

- A CNVMP is recommended during subsequent stages of the project (when a construction programme and methodology is finalised), which will accurately determine and highlight the level of impact on surrounding affected receivers and develop site-specific management strategies.
- Typical construction noise and vibration mitigation measures and management procedures that need to be considered are detailed in Section 7.2.

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Predicted construction noise levels

Appendix Table 1: Predicted Noise Levels for Construction – Normal Working Hours – Residential Receivers (Exceedances highlighted with a red)

Receiver	No.	NCA	Type	Fl	Noise Management level	Predicted Noise Level (dBA)		
						Stage 1	Stage 2	Stage 3
133 LACKEY RD, MOSS VALE NSW 2577	1	1	Resi	GF	52	60.8	70.1	60.4
131 LACKEY RD, MOSS VALE NSW 2577	2	1	Resi	GF	52	59.3	70.5	59.5
129 LACKEY RD, MOSS VALE NSW 2577	3	1	Resi	GF	52	59.6	71.3	57.3
127 LACKEY RD, MOSS VALE NSW 2577	6	1	Resi	GF	52	60	72.3	58.1
125 LACKEY RD, MOSS VALE NSW 2577	7	1	Resi	GF	52	58.7	74.7	59.6
123 LACKEY RD, MOSS VALE NSW 2577	8	1	Resi	GF	52	57.3	76.2	61
121 LACKEY RD, MOSS VALE NSW 2577	9	1	Resi	GF	52	58.5	77.7	61.4
117-119 LACKEY RD, MOSS VALE NSW 2577	10	1	Resi	GF	52	58.7	78.7	63.8
6 PARKES RD, MOSS VALE NSW 2577 (EAST)	14	1	Resi	GF	52	52.5	52.4	46.8
6 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	14	1	Resi	GF	52	54.9	60.3	56.1
6 PARKES RD, MOSS VALE NSW 2577 (NORTH)	15	1	Resi	GF	52	58.6	50.7	49.2
12 PARKES RD, MOSS VALE NSW 2577	18	1	Resi	GF	52	53.3	51.2	49.3
14 PARKES RD, MOSS VALE NSW 2577	19	1	Resi	GF	52	51.6	48.9	43.7
8 PARKES RD, MOSS VALE NSW 2577 (NORHT)	20	1	Resi	GF	52	55.5	54.7	54.1
8 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	20	1	Resi	GF	52	51.9	60.9	56.3
10 PARKES RD, MOSS VALE NSW 2577	21	1	Resi	GF	52	54.2	50.7	50.7
5 PARKES RD, MOSS VALE NSW 2577 (EAST)	22	1	Resi	GF	52	70.2	69.3	64.9
5 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	22	1	Resi	GF	52	67.4	69.2	65.7
7 PARKES RD, MOSS VALE NSW 2577	23	1	Resi	GF	52	54.7	67.8	63
9 PARKES RD, MOSS VALE NSW 2577	25	1	Resi	GF	52	54.8	66.4	60.5
11-13 PARKES RD, MOSS VALE NSW 2577 (E)	27	1	Resi	GF	52	54	65.6	59.1
11-13 PARKES RD, MOSS VALE NSW 2577 (S)	27	1	Resi	GF	52	54.1	65.2	58.9
105 LACKEY RD, MOSS VALE NSW 2577	28	1	Resi	GF	52	54.6	57.4	49.3
105 LACKEY RD, MOSS VALE NSW 2577	28	1	Resi	F 1	52	55.8	57.9	50.1
105 LACKEY RD, MOSS VALE NSW 2577 (EAST)	28	1	Resi	GF	52	71.4	67.4	61.2
105 LACKEY RD, MOSS VALE NSW 2577 (SOUT)	28	1	Resi	GF	52	70.5	66	60.8
101 LACKEY RD, MOSS VALE NSW 2577	29	1	Resi	GF	52	64.8	63.1	56.1
103 Lackey Rd (New building)	111	1	Resi	GF	52	69.3	66	59.3
171 LACKEY RD, MOSS VALE NSW 2577	67	2	Resi	GF	53	77.3	59.6	52.3
2 GARRETT ST, MOSS VALE NSW 2577 (NORTH)	68	2	Resi	GF	53	73.4	61.7	55.2
4 GARRETT ST, MOSS VALE NSW 2577	69	2	Resi	GF	53	69	55.8	44.9
6 GARRETT ST, MOSS VALE NSW 2577	70	2	Resi	GF	53	66.7	52.7	44.6
1 INNES RD, MOSS VALE NSW 2577	71	2	Resi	GF	53	64.5	51.7	42
8A GARRETT ST, MOSS VALE NSW 2577 (EAST)	71	2	Resi	GF	53	65.4	51.8	46.1
8A GARRETT ST, MOSS VALE NSW 2577 (NORTH	71	2	Resi	GF	53	65.4	51.9	46.9
1 GARRETT ST, MOSS VALE NSW 2577	72	2	Resi	GF	53	75.1	65.1	57.7
161 LACKEY RD, MOSS VALE NSW 2577	73	2	Resi	GF	53	72.6	66.8	59
159 LACKEY RD, MOSS VALE NSW 2577	74	2	Resi	GF	53	70.6	68.1	60.1
3 GARRETT ST, MOSS VALE NSW 2577	75	2	Resi	GF	53	68.6	45.2	37.7

Receiver	No.	NCA	Type	Fl	Noise Management level	Predicted Noise Level (dBA)		
						Stage 1	Stage 2	Stage 3
1A INNES RD, MOSS VALE NSW 2577 (EAST)	76	2	Resi	GF	53	63	50.2	47.3
1A INNES RD, MOSS VALE NSW 2577 (NORTH)	76	2	Resi	GF	53	59.3	49.3	47.5
173 LACKEY RD, MOSS VALE NSW 2577	77	2	Resi	GF	53	77.1	59.2	52.2
175 LACKEY RD, MOSS VALE NSW 2577	78	2	Resi	GF	53	76.8	58.7	51.6
177 LACKEY RD, MOSS VALE NSW 2577	79	2	Resi	GF	53	76.1	57.8	51
179 LACKEY RD, MOSS VALE NSW 2577	80	2	Resi	GF	53	74.9	57.5	52.1
181 LACKEY RD, MOSS VALE NSW 2577	81	2	Resi	GF	53	72.9	59	52.5
183 LACKEY RD, MOSS VALE NSW 2577	82	2	Resi	GF	53	70.6	56.4	49.7
185 LACKEY RD, MOSS VALE NSW 2577	84	2	Resi	GF	53	66.7	50.5	43.1
187 LACKEY RD, MOSS VALE NSW 2577	85	2	Resi	GF	53	65.7	54.6	48.2
189 LACKEY RD, MOSS VALE NSW 2577	86	2	Resi	GF	53	64	55	48.1
191 LACKEY RD, MOSS VALE NSW 2577	87	2	Resi	GF	53	62.7	54.5	47.7
11 GARRETT ST, MOSS VALE NSW 2577	94	2	Resi	GF	53	59	64.2	42.1
9 GARRETT ST, MOSS VALE NSW 2577	96	2	Resi	GF	53	62.5	67.4	58.4
7 GARRETT ST, MOSS VALE NSW 2577	97	2	Resi	GF	53	60.5	57.8	55.9
5 GARRETT ST, MOSS VALE NSW 2577	99	2	Resi	GF	53	58.8	64.3	56.4
8 GARRETT ST, MOSS VALE NSW 2577 (GARR)	100	2	Resi	GF	53	63.7	57.4	49.9
8 GARRETT ST, MOSS VALE NSW 2577 (INNES)	100	2	Resi	GF	53	63.8	56.5	43.7
10 GARRETT ST, MOSS VALE NSW 2577	101	2	Resi	GF	53	62.7	59.9	45.9
12 GARRETT ST, MOSS VALE NSW 2577	102	2	Resi	GF	53	61.9	55.3	39.1
14 GARRETT ST, MOSS VALE NSW 2577	103	2	Resi	GF	53	60	52.4	37.9
16 GARRETT ST, MOSS VALE NSW 2577	104	2	Resi	GF	53	58.7	47.9	40.1
4 INNES RD, MOSS VALE NSW 2577	106	2	Resi	GF	53	59.9	52.1	41
2 INNES RD, MOSS VALE NSW 2577	107	2	Resi	GF	53	61.6	52.5	43.1
8 GARRETT ST, MOSS VALE NSW 2577	144	2	Resi	GF	53	61.2	55.3	43.4
35 KOYONG CL, MOSS VALE NSW 2577	30	3	Resi	GF	52	53.7	58.5	49.8
33 KOYONG CL, MOSS VALE NSW 2577	32	3	Resi	GF	52	54.4	59.2	50.8
31 KOYONG CL, MOSS VALE NSW 2577	33	3	Resi	GF	52	52.8	58.7	49.9
29 KOYONG CL	34	3	Resi	GF	52	54	60	51.4
45 HOSKINS ST, MOSS VALE NSW 2577 (SOUT)	35	3	Resi	GF	52	58.7	65.6	56.8
45 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	35	3	Resi	GF	52	59.3	65.4	56.8
8 BAKER RD (SOUTH)	36	3	Resi	GF	52	55.8	62.5	49.8
8 BAKER RD (WEST)	36	3	Resi	GF	52	59	62.6	53.9
38 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	37	3	Resi	GF	52	56.9	65.1	55.6
38 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	38	3	Resi	GF	52	55.6	58.3	54
34 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	40	3	Resi	GF	52	53.1	54	50.8
34A HOSKINS ST, MOSS VALE NSW 2577 (WEST	41	3	Resi	GF	52	55.8	64.4	54.6
34A HOSKINS ST, MOSS VALE NSW 2577 (NORT	42	3	Resi	GF	52	53.5	63.9	54.2
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	43	3	Resi	GF	52	53.8	57.6	51.7
5/8 HAWKINS ST, MOSS VALE NSW 2577 (N)	44	3	Resi	GF	52	51.9	63.4	54.3

Receiver	No.	NCA	Type	Fl	Noise Management level	Predicted Noise Level (dBA)		
						Stage 1	Stage 2	Stage 3
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	45	3	Resi	GF	52	53.8	63.4	54
2/8 HAWKINS ST, MOSS VALE NSW 2577	46	3	Resi	GF	52	38.4	58.3	39.3
5/8 HAWKINS ST, MOSS VALE NSW 2577 (S)	47	3	Resi	GF	52	54.4	64.1	53.6
12/6 HAWKINS ST, MOSS VALE NSW 2577 (N)	48	3	Resi	GF	52	54.1	63.1	53.2
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	49	3	Resi	GF	52	55.2	63.8	53.6
4/6 HAWKINS ST, MOSS VALE NSW 2577	50	3	Resi	GF	52	47.4	61.9	49.9
9/6 HAWKINS ST, MOSS VALE NSW 2577	51	3	Resi	GF	52	51.2	57.1	44.3
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	Resi	GF	52	53	63.9	52
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	Resi	F 1	52	55.2	64.3	53
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	Resi	GF	52	54.2	62.8	52.3
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	Resi	F 1	52	54.9	63.1	53.2
10/6 HAWKINS ST, MOSS VALE NSW 2577	54	3	Resi	GF	52	43.2	52.7	41.6
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	55	3	Resi	GF	52	54.7	63.4	52.7
34 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	109	3	Resi	GF	52	51.5	62.5	52.4
36 Hoskins St NSW 2577	112	3	Resi	GF	52	54	56.7	53
27 Koyong Cl, Moss Vale NSW 2577	113	3	Resi	GF	52	54.1	60.4	51.6
25 Koyong Cl, Moss Vale NSW 2577 (W)	114	3	Resi	GF	52	55.1	62.2	52
25 Koyong Cl, Moss Vale NSW 2577 (S)	115	3	Resi	GF	52	53.7	62	51.6
31 Hoskins St	117	3	Resi	GF	52	52.9	59.8	50.6
33 Hoskins St	118	3	Resi	GF	52	53.3	60.5	52
29 Hoskins St Moss Vake 2577	119	3	Resi	GF	52	48.1	59.6	48.6
215 ARGYLE ST, MOSS VALE NSW 2577	57	4	Resi	GF	62	44.5	59.4	46.4
217 ARGYLE ST, MOSS VALE NSW 2577	58	4	Resi	GF	62	51.7	60.9	51.9
219 ARGYLE ST, MOSS VALE NSW 2577	59	4	Resi	GF	62	51.7	61.4	51.2
223 ARGYLE ST, MOSS VALE NSW 2577	60	4	Resi	GF	62	51.2	61	50.9
225 ARGYLE ST, MOSS VALE NSW 2577	60	4	Resi	GF	62	56.7	65.2	54.9
221 ARGYLE ST, MOSS VALE NSW 2577	61	4	Resi	GF	62	54.1	62.5	52.8
239A ARGYLE ST, MOSS VALE NSW 2577	62	4	Resi	GF	62	63.9	64.8	56.6
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	Resi	GF	62	62.4	65.2	56.7
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	Resi	F 1	62	63.4	65.7	57.3
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	Resi	GF	62	63.7	59.8	52.5
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	Resi	F 1	62	64.1	59.9	52.3
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	Resi	GF	62	65.8	59.9	53.6
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	Resi	F 1	62	66.3	60.6	53.8
2 GARRETT ST, MOSS VALE NSW 2577 (EAST)	66	4	Resi	GF	62	77.4	62.6	55.3
240 Argyle St, Moss Vale	121	4	Resi	GF	62	57.4	64	54
374 Argyle St, Moss Vale	127	4	Resi	GF	62	53.9	48.7	45.1

Appendix Table 2: Predicted Noise Levels for Construction – Normal Working Hours – Non - Residential Receivers (Exceedances highlighted with a red)

Receiver	Obj.-No.	NCA	Type	Fl	Predicted Noise Level (dBA)		
					Stage 1	Stage 2	Stage 3
ST PAUL'S PARISH CATHOLIC CHURCH	146	2	Church	GF	55.7	53.7	47.0
ST PAUL'S PARISH CATHOLIC CHURCH	146	2	Church	F 1	57.8	55.3	47.4
(Commercial) Pacific Furniture	122	4	Commercial	GF	56.7	63.1	54.6
SHOP 11 256 ARGYLE ST, MOSS VALE NSW 257	124	4	Commercial	GF	58.8	65.4	54.2
SHOP 11 256 ARGYLE ST, MOSS VALE NSW 257	124	4	Commercial	F 1	59.2	65.7	54.8
115 LACKEY RD, MOSS VALE NSW 2577	130	1	Commercial	GF	59.0	76.2	66.4
113 LACKEY RD, MOSS VALE NSW 2577	131	1	Commercial	GF	59.9	75.2	66.8
111 LACKEY RD, MOSS VALE NSW 2577	132	1	Commercial	GF	61.0	72.9	66.7
4 PARKES RD, MOSS VALE NSW 2577 (EAST)	134	1	Commercial	GF	62.0	66.6	62.6
4 PARKES RD, MOSS VALE NSW 2577 (NORTH)	135	1	Commercial	GF	59.0	61.4	60.3
3 FARMERS PL, MOSS VALE NSW 2577	137	1	Commercial	GF	65.7	70.6	66.0
3 FARMERS PL, MOSS VALE NSW 2577	137	1	Commercial	F 1	66.7	71.3	67.2
HARVEY NORMAN (155-157 LACKEY RD) (EAST)	142	2	Commercial	GF	70.2	74.8	69.6
HARVEY NORMAN (155-157 LACKEY RD) (EAST)	142	2	Commercial	F 1	71.4	75.9	70.9
HARVEY NORMAN (155-157 LACKEY RD) (NORTH	143	2	Commercial	GF	62.1	62.0	63.3
HARVEY NORMAN (155-157 LACKEY RD) (NORTH	143	2	Commercial	F 1	62.9	63.4	64.1
245 ARGYLE ST, MOSS VALE NSW 2577	148	4	Commercial	GF	64.6	60.4	55.3
243 ARGYLE ST, MOSS VALE NSW 2577	149	4	Commercial	GF	66.0	63.0	56.8
SHOP 4 249 ARGYLE ST, MOSS VALE NSW 2577	150	4	Commercial	GF	54.9	55.3	50.0
SHOP 11 256 ARGYLE ST, MOSS VALE NSW 257	152	4	Commercial	GF	59.4	63.8	55.5
SHOP 11 256 ARGYLE ST, MOSS VALE NSW 257	152	4	Commercial	F 1	59.8	65.0	55.7
262-266 ARGYLE ST, MOSS VALE NSW 2577	153	4	Commercial	GF	58.4	63.6	55.3
262-266 ARGYLE ST, MOSS VALE NSW 2577	153	4	Commercial	F 1	59.4	64.0	55.5
262-266 ARGYLE ST, MOSS VALE NSW 2577	154	4	Commercial	GF	58.9	63.9	55.3
262-266 ARGYLE ST, MOSS VALE NSW 2577	154	4	Commercial	F 1	59.5	64.3	55.5
(Commercial) 14 CLARENCE ST	123	4	Industrial	GF	50.9	53.5	44.4
(Commercial) 14 CLARENCE ST	123	4	Industrial	F 1	54.3	56.6	48.8
(Commercial) Southern Rise Bakery	125	4	Industrial	GF	45.5	50.4	43.1
Moss Vale Court House	126	4	Industrial	GF	52.7	48.4	38.2
ST PAUL'S CATHOLIC PARISH PRIMARY SCHOOL	145	2	School	GF	51.6	52.0	43.5
ST PAUL'S CATHOLIC PARISH PRIMARY SCHOOL	145	2	School	F 1	56.6	54.2	45.4

Appendix Table 3: Predicted Noise Levels for Construction – Car Siding Road 3 - Outside of Working Hours – Residential Receivers (Exceedances highlighted with a red)

Receiver	No.	NCA	Type	Fl	Predicted Noise Level (dBA)	Arrival and Departure					Predicted Noise Level (dBA)	Idle					Predicted Noise Level (dBA)	Preparation				
						STD NML	OOHW 1 (DAY)	OOHW 1 (EVENING)	OOHW 1 (NIGHT)	Highly Affected (75)		STD NML	OOHW 1 (DAY)	OOHW 1 (EVENING)	OOHW 1 (NIGHT)	Highly Affected (75)		STD NML	OOHW 1 (DAY)	OOHW 1 (EVENING)	OOHW 1 (NIGHT)	Highly Affected (75)
133 LACKEY RD, MOSS VALE NSW 2577	1	1	Resi	GF	25.2	N	N	N	N	N	37.2	N	N	N	N	N	35.6	N	N	N	N	N
131 LACKEY RD, MOSS VALE NSW 2577	2	1	Resi	GF	22.8	N	N	N	N	N	28.9	N	N	N	N	N	30.3	N	N	N	N	N
129 LACKEY RD, MOSS VALE NSW 2577	3	1	Resi	GF	25.8	N	N	N	N	N	38.5	N	N	N	N	N	36.7	N	N	N	N	N
127 LACKEY RD, MOSS VALE NSW 2577	6	1	Resi	GF	25.9	N	N	N	N	N	38.1	N	N	N	N	N	36.4	N	N	N	N	N
125 LACKEY RD, MOSS VALE NSW 2577	7	1	Resi	GF	23.2	N	N	N	N	N	35.4	N	N	N	N	N	33.7	N	N	N	N	N
123 LACKEY RD, MOSS VALE NSW 2577	8	1	Resi	GF	17.8	N	N	N	N	N	26.4	N	N	N	N	N	25.2	N	N	N	N	N
121 LACKEY RD, MOSS VALE NSW 2577	9	1	Resi	GF	22.4	N	N	N	N	N	34.6	N	N	N	N	N	32.9	N	N	N	N	N
117-119 LACKEY RD, MOSS VALE NSW 2577	10	1	Resi	GF	21.9	N	N	N	N	N	34.2	N	N	N	N	N	32.5	N	N	N	N	N
6 PARKES RD, MOSS VALE NSW 2577 (EAST)	14	1	Resi	GF	8.6	N	N	N	N	N	18.1	N	N	N	N	N	17.5	N	N	N	N	N
6 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	14	1	Resi	GF	5.9	N	N	N	N	N	16.4	N	N	N	N	N	16.3	N	N	N	N	N
6 PARKES RD, MOSS VALE NSW 2577 (NORTH)	15	1	Resi	GF	0.2	N	N	N	N	N	12	N	N	N	N	N	12.5	N	N	N	N	N
12 PARKES RD, MOSS VALE NSW 2577	18	1	Resi	GF	1.5	N	N	N	N	N	13.2	N	N	N	N	N	13	N	N	N	N	N
14 PARKES RD, MOSS VALE NSW 2577	19	1	Resi	GF	0.1	N	N	N	N	N	12.2	N	N	N	N	N	12.3	N	N	N	N	N
8 PARKES RD, MOSS VALE NSW 2577 (NORHT)	20	1	Resi	GF	1.7	N	N	N	N	N	13	N	N	N	N	N	12.9	N	N	N	N	N
8 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	20	1	Resi	GF	14.1	N	N	N	N	N	22.2	N	N	N	N	N	21.3	N	N	N	N	N
10 PARKES RD, MOSS VALE NSW 2577	21	1	Resi	GF	0.5	N	N	N	N	N	12.2	N	N	N	N	N	12.4	N	N	N	N	N
5 PARKES RD, MOSS VALE NSW 2577 (EAST)	22	1	Resi	GF	18.7	N	N	N	N	N	29	N	N	N	N	N	29.1	N	N	N	N	N
5 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	22	1	Resi	GF	18.5	N	N	N	N	N	29	N	N	N	N	N	29.1	N	N	N	N	N
7 PARKES RD, MOSS VALE NSW 2577	23	1	Resi	GF	16.3	N	N	N	N	N	25.8	N	N	N	N	N	26	N	N	N	N	N
9 PARKES RD, MOSS VALE NSW 2577	25	1	Resi	GF	13.8	N	N	N	N	N	24.7	N	N	N	N	N	24.3	N	N	N	N	N
11-13 PARKES RD, MOSS VALE NSW 2577 (E)	27	1	Resi	GF	10.4	N	N	N	N	N	20.5	N	N	N	N	N	19.5	N	N	N	N	N
11-13 PARKES RD, MOSS VALE NSW 2577 (S)	27	1	Resi	GF	11	N	N	N	N	N	21.2	N	N	N	N	N	20.5	N	N	N	N	N
105 LACKEY RD, MOSS VALE NSW 2577	28	1	Resi	GF	23.2	N	N	N	N	N	34.4	N	N	N	N	N	33	N	N	N	N	N
105 LACKEY RD, MOSS VALE NSW 2577	28	1	Resi	F 1	24.9	N	N	N	N	N	36	N	N	N	N	N	34.7	N	N	N	N	N
105 LACKEY RD, MOSS VALE NSW 2577 (EAST)	28	1	Resi	GF	20.5	N	N	N	N	N	32.3	N	N	N	N	N	31.1	N	N	N	N	N
105 LACKEY RD, MOSS VALE NSW 2577 (SOUT)	28	1	Resi	GF	18.3	N	N	N	N	N	29.4	N	N	N	N	N	28.9	N	N	N	N	N
101 LACKEY RD, MOSS VALE NSW 2577	29	1	Resi	GF	17.2	N	N	N	N	N	29.8	N	N	N	N	N	28	N	N	N	N	N
103 Lackey Rd (New building)	111	1	Resi	GF	20.1	N	N	N	N	N	32.3	N	N	N	N	N	30.6	N	N	N	N	N
171 LACKEY RD, MOSS VALE NSW 2577	67	2	Resi	GF	45.3	N	N	Y	Y	N	59.2	Y	Y	Y	Y	N	55	Y	Y	Y	Y	Y
2 GARRETT ST, MOSS VALE NSW 2577 (NORTH)	68	2	Resi	GF	41.4	N	N	Y	Y	N	54.4	Y	Y	Y	Y	N	49.8	N	Y	Y	Y	Y
4 GARRETT ST, MOSS VALE NSW 2577	69	2	Resi	GF	37.4	N	N	N	N	N	50.3	N	Y	Y	Y	N	47.9	N	Y	Y	Y	Y
6 GARRETT ST, MOSS VALE NSW 2577	70	2	Resi	GF	35	N	N	N	N	N	48.4	N	Y	Y	Y	N	46.2	N	N	N	N	N
1 INNES RD, MOSS VALE NSW 2577	71	2	Resi	GF	33.8	N	N	N	N	N	47	N	N	Y	Y	N	45.8	N	N	N	N	N
8A GARRETT ST, MOSS VALE NSW 2577 (EAST)	71	2	Resi	GF	34.8	N	N	N	N	N	48.8	N	Y	Y	Y	N	46.5	N	N	N	N	N
8A GARRETT ST, MOSS VALE NSW 2577 (NORTH	71	2	Resi	GF	33.8	N	N	N	N	N	47.9	N	Y	Y	Y	N	44	N	N	N	N	N
1 GARRETT ST, MOSS VALE NSW 2577	72	2	Resi	GF	43.7	N	N	Y	Y	N	53	N	Y	Y	Y	N	51.4	N	Y	Y	Y	Y
161 LACKEY RD, MOSS VALE NSW 2577	73	2	Resi	GF	42.1	N	N	Y	Y	N	50.3	N	Y	Y	Y	N	48.8	N	Y	Y	Y	Y
159 LACKEY RD, MOSS VALE NSW 2577	74	2	Resi	GF	40.6	N	N	N	Y	N	48.6	N	Y	Y	Y	N	47.2	N	Y	Y	Y	Y

Receiver	No.	NCA	Type	Fl	Predicted Noise Level (dBA)	Arrival and Departure					Predicted Noise Level (dBA)	Idle					Predicted Noise Level (dBA)	Preparation				
						STD NML	OOHW 1 (DAY)	OOHW 1 (EVENING)	OOHW 1 (NIGHT)	Highly Affected (75)		STD NML	OOHW 1 (DAY)	OOHW 1 (EVENING)	OOHW 1 (NIGHT)	Highly Affected (75)		STD NML	OOHW 1 (DAY)	OOHW 1 (EVENING)	OOHW 1 (NIGHT)	Highly Affected (75)
3 GARRETT ST, MOSS VALE NSW 2577	75	2	Resi	GF	37.1	N	N	N	N	N	50.1	N	Y	Y	Y	N	47.6	N	Y	Y	Y	Y
1A INNES RD, MOSS VALE NSW 2577 (EAST)	76	2	Resi	GF	31.6	N	N	N	N	N	43.8	N	N	Y	Y	N	39.5	N	N	N	N	N
1A INNES RD, MOSS VALE NSW 2577 (NORTH)	76	2	Resi	GF	28.7	N	N	N	N	N	42.2	N	N	Y	Y	N	40.9	N	N	N	N	N
173 LACKEY RD, MOSS VALE NSW 2577	77	2	Resi	GF	44.9	N	N	Y	Y	N	58	Y	Y	Y	Y	N	53.6	Y	Y	Y	Y	Y
175 LACKEY RD, MOSS VALE NSW 2577	78	2	Resi	GF	45	N	N	Y	Y	N	56	Y	Y	Y	Y	N	53.5	Y	Y	Y	Y	Y
177 LACKEY RD, MOSS VALE NSW 2577	79	2	Resi	GF	44.8	N	N	Y	Y	N	53.1	Y	Y	Y	Y	N	51	N	Y	Y	Y	Y
179 LACKEY RD, MOSS VALE NSW 2577	80	2	Resi	GF	44.6	N	N	Y	Y	N	50.7	N	Y	Y	Y	N	48.9	N	Y	Y	Y	Y
181 LACKEY RD, MOSS VALE NSW 2577	81	2	Resi	GF	44.5	N	N	Y	Y	N	49.7	N	Y	Y	Y	N	48.1	N	Y	Y	Y	Y
183 LACKEY RD, MOSS VALE NSW 2577	82	2	Resi	GF	44.6	N	N	Y	Y	N	47.8	N	Y	Y	Y	N	46.1	N	N	N	N	N
185 LACKEY RD, MOSS VALE NSW 2577	84	2	Resi	GF	42.7	N	N	Y	Y	N	45.5	N	N	Y	Y	N	44	N	N	N	N	N
187 LACKEY RD, MOSS VALE NSW 2577	85	2	Resi	GF	41.7	N	N	Y	Y	N	44.7	N	N	Y	Y	N	43.1	N	N	N	N	N
189 LACKEY RD, MOSS VALE NSW 2577	86	2	Resi	GF	39.2	N	N	N	Y	N	43.6	N	N	Y	Y	N	42.2	N	N	N	N	N
191 LACKEY RD, MOSS VALE NSW 2577	87	2	Resi	GF	36.2	N	N	N	N	N	42.8	N	N	Y	Y	N	41.2	N	N	N	N	N
11 GARRETT ST, MOSS VALE NSW 2577	94	2	Resi	GF	30.8	N	N	N	N	N	38.4	N	N	N	N	N	37.2	N	N	N	N	N
9 GARRETT ST, MOSS VALE NSW 2577	96	2	Resi	GF	32.2	N	N	N	N	N	39.5	N	N	N	Y	N	39.5	N	N	N	N	N
7 GARRETT ST, MOSS VALE NSW 2577	97	2	Resi	GF	29.7	N	N	N	N	N	38.7	N	N	N	N	N	38.5	N	N	N	N	N
5 GARRETT ST, MOSS VALE NSW 2577	99	2	Resi	GF	25.6	N	N	N	N	N	35.4	N	N	N	N	N	35.4	N	N	N	N	N
8 GARRETT ST, MOSS VALE NSW 2577 (GARR)	100	2	Resi	GF	32.5	N	N	N	N	N	45.4	N	N	Y	Y	N	43.5	N	N	N	N	N
8 GARRETT ST, MOSS VALE NSW 2577 (INNES)	100	2	Resi	GF	32.7	N	N	N	N	N	45.5	N	N	Y	Y	N	43.4	N	N	N	N	N
10 GARRETT ST, MOSS VALE NSW 2577	101	2	Resi	GF	31.4	N	N	N	N	N	44.8	N	N	Y	Y	N	41.8	N	N	N	N	N
12 GARRETT ST, MOSS VALE NSW 2577	102	2	Resi	GF	31	N	N	N	N	N	43.6	N	N	Y	Y	N	41.3	N	N	N	N	N
14 GARRETT ST, MOSS VALE NSW 2577	103	2	Resi	GF	29.2	N	N	N	N	N	41.6	N	N	Y	Y	N	39.6	N	N	N	N	N
16 GARRETT ST, MOSS VALE NSW 2577	104	2	Resi	GF	28.1	N	N	N	N	N	40.3	N	N	N	Y	N	38.7	N	N	N	N	N
4 INNES RD, MOSS VALE NSW 2577	106	2	Resi	GF	30.3	N	N	N	N	N	42.1	N	N	Y	Y	N	41	N	N	N	N	N
2 INNES RD, MOSS VALE NSW 2577	107	2	Resi	GF	31.4	N	N	N	N	N	43.4	N	N	Y	Y	N	41.7	N	N	N	N	N
8 GARRETT ST, MOSS VALE NSW 2577	144	2	Resi	GF	31.6	N	N	N	N	N	43.6	N	N	Y	Y	N	42.6	N	N	N	N	N
35 KOYONG CL, MOSS VALE NSW 2577	30	3	Resi	GF	15	N	N	N	N	N	25	N	N	N	N	N	26.1	N	N	N	N	N
33 KOYONG CL, MOSS VALE NSW 2577	32	3	Resi	GF	17.7	N	N	N	N	N	26.3	N	N	N	N	N	28.7	N	N	N	N	N
31 KOYONG CL, MOSS VALE NSW 2577	33	3	Resi	GF	9.2	N	N	N	N	N	19	N	N	N	N	N	20.1	N	N	N	N	N
29 KOYONG CL	34	3	Resi	GF	15.6	N	N	N	N	N	24.9	N	N	N	N	N	26.9	N	N	N	N	N
45 HOSKINS ST, MOSS VALE NSW 2577 (SOUT)	35	3	Resi	GF	17.5	N	N	N	N	N	26.3	N	N	N	N	N	28.5	N	N	N	N	N
45 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	35	3	Resi	GF	18	N	N	N	N	N	27.4	N	N	N	N	N	28.5	N	N	N	N	N
8 BAKER RD (SOUTH)	36	3	Resi	GF	18.1	N	N	N	N	N	28.2	N	N	N	N	N	28.2	N	N	N	N	N
8 BAKER RD (WEST)	36	3	Resi	GF	17.7	N	N	N	N	N	27.9	N	N	N	N	N	27.6	N	N	N	N	N
38 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	37	3	Resi	GF	18.4	N	N	N	N	N	26.8	N	N	N	N	N	29.1	N	N	N	N	N
38 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	38	3	Resi	GF	0.3	N	N	N	N	N	12.5	N	N	N	N	N	13.4	N	N	N	N	N
34 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	40	3	Resi	GF	-0.8	N	N	N	N	N	11.8	N	N	N	N	N	12.6	N	N	N	N	N
34A HOSKINS ST, MOSS VALE NSW 2577 (WEST	41	3	Resi	GF	18.7	N	N	N	N	N	28.3	N	N	N	N	N	31.4	N	N	N	N	N
34A HOSKINS ST, MOSS VALE NSW 2577 (NORT	42	3	Resi	GF	2.9	N	N	N	N	N	15.3	N	N	N	N	N	16.2	N	N	N	N	N

Receiver	No.	NCA	Type	Fl	Predicted Noise Level (dBA)	Arrival and Departure					Predicted Noise Level (dBA)	Idle					Predicted Noise Level (dBA)	Preparation				
						STD NML	OOHW 1 (DAY)	OOHW 1 (EVENING)	OOHW 1 (NIGHT)	Highly Affected (75)		STD NML	OOHW 1 (DAY)	OOHW 1 (EVENING)	OOHW 1 (NIGHT)	Highly Affected (75)		STD NML	OOHW 1 (DAY)	OOHW 1 (EVENING)	OOHW 1 (NIGHT)	Highly Affected (75)
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	43	3	Resi	GF	13	N	N	N	N	N	23.1	N	N	N	N	N	25.6	N	N	N	N	N
5/8 HAWKINS ST, MOSS VALE NSW 2577 (N)	44	3	Resi	GF	-0.3	N	N	N	N	N	12.4	N	N	N	N	N	13.3	N	N	N	N	N
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	45	3	Resi	GF	18.5	N	N	N	N	N	28.6	N	N	N	N	N	31.6	N	N	N	N	N
2/8 HAWKINS ST, MOSS VALE NSW 2577	46	3	Resi	GF	3.9	N	N	N	N	N	15.7	N	N	N	N	N	16.7	N	N	N	N	N
5/8 HAWKINS ST, MOSS VALE NSW 2577 (S)	47	3	Resi	GF	19.8	N	N	N	N	N	29.1	N	N	N	N	N	31.9	N	N	N	N	N
12/6 HAWKINS ST, MOSS VALE NSW 2577 (N)	48	3	Resi	GF	14.5	N	N	N	N	N	22.8	N	N	N	N	N	26.5	N	N	N	N	N
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	49	3	Resi	GF	20.3	N	N	N	N	N	29.8	N	N	N	N	N	32.2	N	N	N	N	N
4/6 HAWKINS ST, MOSS VALE NSW 2577	50	3	Resi	GF	8	N	N	N	N	N	18.6	N	N	N	N	N	20.4	N	N	N	N	N
9/6 HAWKINS ST, MOSS VALE NSW 2577	51	3	Resi	GF	18.1	N	N	N	N	N	29.8	N	N	N	N	N	31.1	N	N	N	N	N
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	Resi	GF	18.7	N	N	N	N	N	30.9	N	N	N	N	N	32.1	N	N	N	N	N
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	Resi	F 1	18.9	N	N	N	N	N	32	N	N	N	N	N	32.3	N	N	N	N	N
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	Resi	GF	20.7	N	N	N	N	N	31.1	N	N	N	N	N	32.5	N	N	N	N	N
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	Resi	F 1	20.9	N	N	N	N	N	32.3	N	N	N	N	N	32.7	N	N	N	N	N
10/6 HAWKINS ST, MOSS VALE NSW 2577	54	3	Resi	GF	8.5	N	N	N	N	N	19.9	N	N	N	N	N	20.9	N	N	N	N	N
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	55	3	Resi	GF	19.6	N	N	N	N	N	29.9	N	N	N	N	N	32.2	N	N	N	N	N
34 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	109	3	Resi	GF	17.4	N	N	N	N	N	24.8	N	N	N	N	N	27.2	N	N	N	N	N
36 Hoskins St NSW 2577	112	3	Resi	GF	2.7	N	N	N	N	N	14.5	N	N	N	N	N	15.2	N	N	N	N	N
27 Koyong Cl, Moss Vale NSW 2577	113	3	Resi	GF	15.5	N	N	N	N	N	24.3	N	N	N	N	N	26.6	N	N	N	N	N
25 Koyong Cl, Moss Vale NSW 2577 (W)	114	3	Resi	GF	18.3	N	N	N	N	N	26.7	N	N	N	N	N	30.3	N	N	N	N	N
25 Koyong Cl, Moss Vale NSW 2577 (S)	115	3	Resi	GF	12.1	N	N	N	N	N	22.3	N	N	N	N	N	24	N	N	N	N	N
31 Hoskins St	117	3	Resi	GF	10.6	N	N	N	N	N	21.5	N	N	N	N	N	23.3	N	N	N	N	N
33 Hoskins St	118	3	Resi	GF	10.5	N	N	N	N	N	20.6	N	N	N	N	N	22.6	N	N	N	N	N
29 Hoskins St Moss Vake 2577	119	3	Resi	GF	13.6	N	N	N	N	N	22.9	N	N	N	N	N	25.4	N	N	N	N	N
215 ARGYLE ST, MOSS VALE NSW 2577	57	4	Resi	GF	11.8	N	N	N	N	N	22	N	N	N	N	N	24	N	N	N	N	N
217 ARGYLE ST, MOSS VALE NSW 2577	58	4	Resi	GF	8	N	N	N	N	N	19.2	N	N	N	N	N	20.2	N	N	N	N	N
219 ARGYLE ST, MOSS VALE NSW 2577	59	4	Resi	GF	14.5	N	N	N	N	N	24	N	N	N	N	N	24.7	N	N	N	N	N
223 ARGYLE ST, MOSS VALE NSW 2577	60	4	Resi	GF	13.7	N	N	N	N	N	23.9	N	N	N	N	N	25.8	N	N	N	N	N
225 ARGYLE ST, MOSS VALE NSW 2577	60	4	Resi	GF	23	N	N	N	N	N	33.6	N	N	N	N	N	35.1	N	N	N	N	N
221 ARGYLE ST, MOSS VALE NSW 2577	61	4	Resi	GF	19.5	N	N	N	N	N	29.7	N	N	N	N	N	30.4	N	N	N	N	N
239A ARGYLE ST, MOSS VALE NSW 2577	62	4	Resi	GF	32	N	N	N	N	N	42.3	N	N	Y	Y	N	42.5	N	N	N	N	N
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	Resi	GF	30.4	N	N	N	N	N	40.8	N	N	N	Y	N	41.2	N	N	N	N	N
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	Resi	F 1	31.3	N	N	N	N	N	40.9	N	N	N	Y	N	41.7	N	N	N	N	N
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	Resi	GF	32.5	N	N	N	N	N	43.3	N	N	Y	Y	N	44.9	N	N	N	N	N
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	Resi	F 1	33.1	N	N	N	N	N	43.4	N	N	Y	Y	N	45.4	N	N	N	N	N
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	Resi	GF	34.6	N	N	N	N	N	45.6	N	N	Y	Y	N	47	N	N	N	N	N
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	Resi	F 1	35	N	N	N	N	N	45.6	N	N	Y	Y	N	47.5	N	Y	Y	Y	Y
2 GARRETT ST, MOSS VALE NSW 2577 (EAST)	66	4	Resi	GF	45.2	N	N	Y	Y	N	59.1	N	Y	Y	Y	N	54.9	N	Y	Y	Y	Y
240 Argyle St, Moss Vale	121	4	Resi	GF	23.5	N	N	N	N	N	32.5	N	N	N	N	N	35.5	N	N	N	N	N
374 Argyle St, Moss Vale	127	4	Resi	GF	27	N	N	N	N	N	25.2	N	N	N	N	N	20.1	N	N	N	N	N

Appendix Table 4: Predicted Noise Levels for Construction – Car Siding Road 3 Sleep Disturbance Scenarios (Exceedances highlighted with a red)

Receiver	No.	NCA	Type	Fl	Predicted Noise Level (dB LAmax)		
					Brake Release	Town Horn	Country Horn
133 LACKEY RD, MOSS VALE NSW 2577	1	1	Resi	GF	50.8	65.2	75.2
131 LACKEY RD, MOSS VALE NSW 2577	2	1	Resi	GF	46.6	59.4	69.4
129 LACKEY RD, MOSS VALE NSW 2577	3	1	Resi	GF	52.1	66.6	76.6
127 LACKEY RD, MOSS VALE NSW 2577	6	1	Resi	GF	51.7	66.2	76.2
125 LACKEY RD, MOSS VALE NSW 2577	7	1	Resi	GF	49.0	63.5	73.5
123 LACKEY RD, MOSS VALE NSW 2577	8	1	Resi	GF	43.9	56.7	66.7
121 LACKEY RD, MOSS VALE NSW 2577	9	1	Resi	GF	48.3	62.8	72.8
117-119 LACKEY RD, MOSS VALE NSW 2577	10	1	Resi	GF	47.8	62.3	72.3
6 PARKES RD, MOSS VALE NSW 2577 (EAST)	14	1	Resi	GF	31.2	43.0	53.0
6 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	14	1	Resi	GF	30.2	42.0	52.0
6 PARKES RD, MOSS VALE NSW 2577 (NORTH)	15	1	Resi	GF	25.6	46.7	56.7
12 PARKES RD, MOSS VALE NSW 2577	18	1	Resi	GF	26.7	39.8	49.8
14 PARKES RD, MOSS VALE NSW 2577	19	1	Resi	GF	25.6	39.8	49.8
8 PARKES RD, MOSS VALE NSW 2577 (NORHT)	20	1	Resi	GF	26.6	39.9	49.9
8 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	20	1	Resi	GF	36.7	49.8	59.8
10 PARKES RD, MOSS VALE NSW 2577	21	1	Resi	GF	25.7	39.8	49.8
5 PARKES RD, MOSS VALE NSW 2577 (EAST)	22	1	Resi	GF	44.6	60.0	70.0
5 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	22	1	Resi	GF	44.6	58.8	68.8
7 PARKES RD, MOSS VALE NSW 2577	23	1	Resi	GF	40.3	52.1	62.1
9 PARKES RD, MOSS VALE NSW 2577	25	1	Resi	GF	39.5	52.4	62.4
11-13 PARKES RD, MOSS VALE NSW 2577 (E)	27	1	Resi	GF	34.5	48.3	58.3
11-13 PARKES RD, MOSS VALE NSW 2577 (S)	27	1	Resi	GF	33.0	44.2	54.2
105 LACKEY RD, MOSS VALE NSW 2577	28	1	Resi	GF	47.4	54.2	64.2
105 LACKEY RD, MOSS VALE NSW 2577	28	1	Resi	F 1	48.9	58.5	68.5
105 LACKEY RD, MOSS VALE NSW 2577 (EAST)	28	1	Resi	GF	46.6	61.3	71.3
105 LACKEY RD, MOSS VALE NSW 2577 (SOUT)	28	1	Resi	GF	44.4	58.8	68.8
101 LACKEY RD, MOSS VALE NSW 2577	29	1	Resi	GF	43.5	57.9	67.9
103 Lackey Rd (New building)	111	1	Resi	GF	41.1	60.6	70.6
171 LACKEY RD, MOSS VALE NSW 2577	67	2	Resi	GF	72.3	87.1	97.1
2 GARRETT ST, MOSS VALE NSW 2577 (NORTH)	68	2	Resi	GF	72.9	61.8	71.8
4 GARRETT ST, MOSS VALE NSW 2577	69	2	Resi	GF	61.5	72.9	82.9
6 GARRETT ST, MOSS VALE NSW 2577	70	2	Resi	GF	58.1	67.8	77.8
1 INNES RD, MOSS VALE NSW 2577	71	2	Resi	GF	57.1	78.8	88.8
8A GARRETT ST, MOSS VALE NSW 2577 (EAST)	71	2	Resi	GF	62.5	70.1	80.1
8A GARRETT ST, MOSS VALE NSW 2577 (NORTH	71	2	Resi	GF	61.2	67.8	77.8
1 GARRETT ST, MOSS VALE NSW 2577	72	2	Resi	GF	61.0	75.7	85.7
161 LACKEY RD, MOSS VALE NSW 2577	73	2	Resi	GF	64.6	74.5	84.5
159 LACKEY RD, MOSS VALE NSW 2577	74	2	Resi	GF	62.4	73.7	83.7
3 GARRETT ST, MOSS VALE NSW 2577	75	2	Resi	GF	61.1	69.8	79.8

Receiver	No.	NCA	Type	Fl	Predicted Noise Level (dB LAmax)		
					Brake Release	Town Horn	Country Horn
1A INNES RD, MOSS VALE NSW 2577 (EAST)	76	2	Resi	GF	61.6	68.2	78.2
1A INNES RD, MOSS VALE NSW 2577 (NORTH)	76	2	Resi	GF	56.8	74.4	84.4
173 LACKEY RD, MOSS VALE NSW 2577	77	2	Resi	GF	57.3	90.8	100.8
175 LACKEY RD, MOSS VALE NSW 2577	78	2	Resi	GF	72.4	90.9	100.9
177 LACKEY RD, MOSS VALE NSW 2577	79	2	Resi	GF	72.5	87.7	97.7
179 LACKEY RD, MOSS VALE NSW 2577	80	2	Resi	GF	69.7	84.5	94.5
181 LACKEY RD, MOSS VALE NSW 2577	81	2	Resi	GF	66.4	82.1	92.1
183 LACKEY RD, MOSS VALE NSW 2577	82	2	Resi	GF	64.6	80.5	90.5
185 LACKEY RD, MOSS VALE NSW 2577	84	2	Resi	GF	62.6	77.6	87.6
187 LACKEY RD, MOSS VALE NSW 2577	85	2	Resi	GF	60.0	76.6	86.6
189 LACKEY RD, MOSS VALE NSW 2577	86	2	Resi	GF	59.2	75.1	85.1
191 LACKEY RD, MOSS VALE NSW 2577	87	2	Resi	GF	57.8	73.8	83.8
11 GARRETT ST, MOSS VALE NSW 2577	94	2	Resi	GF	51.0	68.5	78.5
9 GARRETT ST, MOSS VALE NSW 2577	96	2	Resi	GF	52.1	64.6	74.6
7 GARRETT ST, MOSS VALE NSW 2577	97	2	Resi	GF	52.1	67.1	77.1
5 GARRETT ST, MOSS VALE NSW 2577	99	2	Resi	GF	51.9	62.8	72.8
8 GARRETT ST, MOSS VALE NSW 2577 (GARR)	100	2	Resi	GF	48.9	70.5	80.5
8 GARRETT ST, MOSS VALE NSW 2577 (INNES)	100	2	Resi	GF	58.1	67.3	77.3
10 GARRETT ST, MOSS VALE NSW 2577	101	2	Resi	GF	57.8	72.8	82.8
12 GARRETT ST, MOSS VALE NSW 2577	102	2	Resi	GF	57.5	71.9	81.9
14 GARRETT ST, MOSS VALE NSW 2577	103	2	Resi	GF	57.0	66.2	76.2
16 GARRETT ST, MOSS VALE NSW 2577	104	2	Resi	GF	55.5	65.9	75.9
4 INNES RD, MOSS VALE NSW 2577	106	2	Resi	GF	54.7	70.4	80.4
2 INNES RD, MOSS VALE NSW 2577	107	2	Resi	GF	54.4	75.4	85.4
8 GARRETT ST, MOSS VALE NSW 2577	144	2	Resi	GF	34.6	67.6	77.6
35 KOYONG CL, MOSS VALE NSW 2577	30	3	Resi	GF	41.0	45.4	55.4
33 KOYONG CL, MOSS VALE NSW 2577	32	3	Resi	GF	43.7	48.0	58.0
31 KOYONG CL, MOSS VALE NSW 2577	33	3	Resi	GF	32.8	40.5	50.5
29 KOYONG CL	34	3	Resi	GF	41.8	46.0	56.0
45 HOSKINS ST, MOSS VALE NSW 2577 (SOUT)	35	3	Resi	GF	43.5	44.9	54.9
45 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	35	3	Resi	GF	43.5	45.0	55.0
8 BAKER RD (SOUTH)	36	3	Resi	GF	43.0	44.9	54.9
8 BAKER RD (WEST)	36	3	Resi	GF	42.5	44.7	54.7
38 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	37	3	Resi	GF	43.4	47.5	57.5
38 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	38	3	Resi	GF	26.4	41.8	51.8
34 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	40	3	Resi	GF	25.6	39.2	49.2
34A HOSKINS ST, MOSS VALE NSW 2577 (WEST	41	3	Resi	GF	45.9	60.9	70.9
34A HOSKINS ST, MOSS VALE NSW 2577 (NORT	42	3	Resi	GF	29.2	42.7	52.7
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	43	3	Resi	GF	40.0	60.1	70.1
5/8 HAWKINS ST, MOSS VALE NSW 2577 (N)	44	3	Resi	GF	26.3	50.9	60.9
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	45	3	Resi	GF	45.8	60.8	70.8

Receiver	No.	NCA	Type	Fl	Predicted Noise Level (dB LAmax)		
					Brake Release	Town Horn	Country Horn
2/8 HAWKINS ST, MOSS VALE NSW 2577	46	3	Resi	GF	30.2	41.9	51.9
5/8 HAWKINS ST, MOSS VALE NSW 2577 (S)	47	3	Resi	GF	46.9	62.3	72.3
12/6 HAWKINS ST, MOSS VALE NSW 2577 (N)	48	3	Resi	GF	40.6	59.1	69.1
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	49	3	Resi	GF	46.7	61.4	71.4
4/6 HAWKINS ST, MOSS VALE NSW 2577	50	3	Resi	GF	34.1	46.2	56.2
9/6 HAWKINS ST, MOSS VALE NSW 2577	51	3	Resi	GF	44.8	62.6	72.6
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	Resi	GF	46.1	63.2	73.2
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	Resi	F 1	46.2	61.9	71.9
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	Resi	GF	47.1	47.7	57.7
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	Resi	F 1	47.2	48.0	58.0
10/6 HAWKINS ST, MOSS VALE NSW 2577	54	3	Resi	GF	34.0	46.3	56.3
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	55	3	Resi	GF	46.9	61.7	71.7
34 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	109	3	Resi	GF	54.4	51.7	61.7
36 Hoskins St NSW 2577	112	3	Resi	GF	46.2	39.4	49.4
27 Koyong Cl, Moss Vale NSW 2577	113	3	Resi	GF	27.9	44.3	54.3
25 Koyong Cl, Moss Vale NSW 2577 (W)	114	3	Resi	GF	39.2	47.0	57.0
25 Koyong Cl, Moss Vale NSW 2577 (S)	115	3	Resi	GF	43.7	44.8	54.8
31 Hoskins St	117	3	Resi	GF	37.7	49.4	59.4
33 Hoskins St	118	3	Resi	GF	36.6	48.5	58.5
29 Hoskins St Moss Vake 2577	119	3	Resi	GF	36.0	52.1	62.1
215 ARGYLE ST, MOSS VALE NSW 2577	57	4	Resi	GF	38.3	52.2	62.2
217 ARGYLE ST, MOSS VALE NSW 2577	58	4	Resi	GF	35.9	47.4	57.4
219 ARGYLE ST, MOSS VALE NSW 2577	59	4	Resi	GF	33.6	48.8	58.8
223 ARGYLE ST, MOSS VALE NSW 2577	60	4	Resi	GF	38.1	50.4	60.4
225 ARGYLE ST, MOSS VALE NSW 2577	60	4	Resi	GF	37.9	62.6	72.6
221 ARGYLE ST, MOSS VALE NSW 2577	61	4	Resi	GF	49.4	51.2	61.2
239A ARGYLE ST, MOSS VALE NSW 2577	62	4	Resi	GF	44.5	65.9	75.9
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	Resi	GF	58.9	65.4	75.4
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	Resi	F 1	56.6	65.4	75.4
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	Resi	GF	57.1	58.8	68.8
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	Resi	F 1	60.3	58.8	68.8
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	Resi	GF	60.9	57.7	67.7
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	Resi	F 1	62.1	57.8	67.8
2 GARRETT ST, MOSS VALE NSW 2577 (EAST)	66	4	Resi	GF	62.8	79.8	89.8
240 Argyle St, Moss Vale	121	4	Resi	GF	38.5	65.8	75.8
374 Argyle St, Moss Vale	127	4	Resi	GF	46.9	67.2	77.2

B

Construction noise contours

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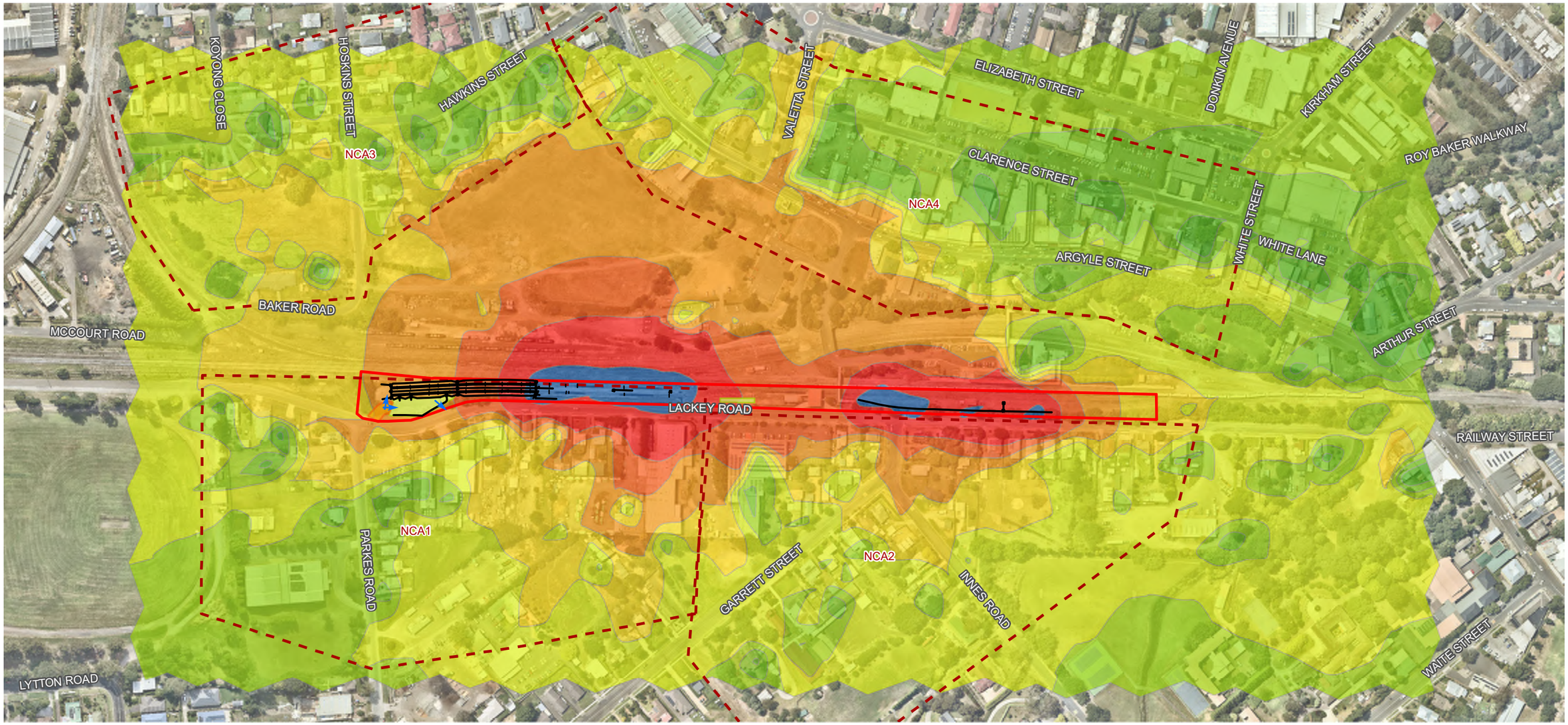

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Access gates
Proposed design
Proposal area
Main access road
Compounds
Noise Catchment Area (NCA)

Predicted Construction Noise Impacts LAeq(15min) - Scenario 1

- <40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- >80

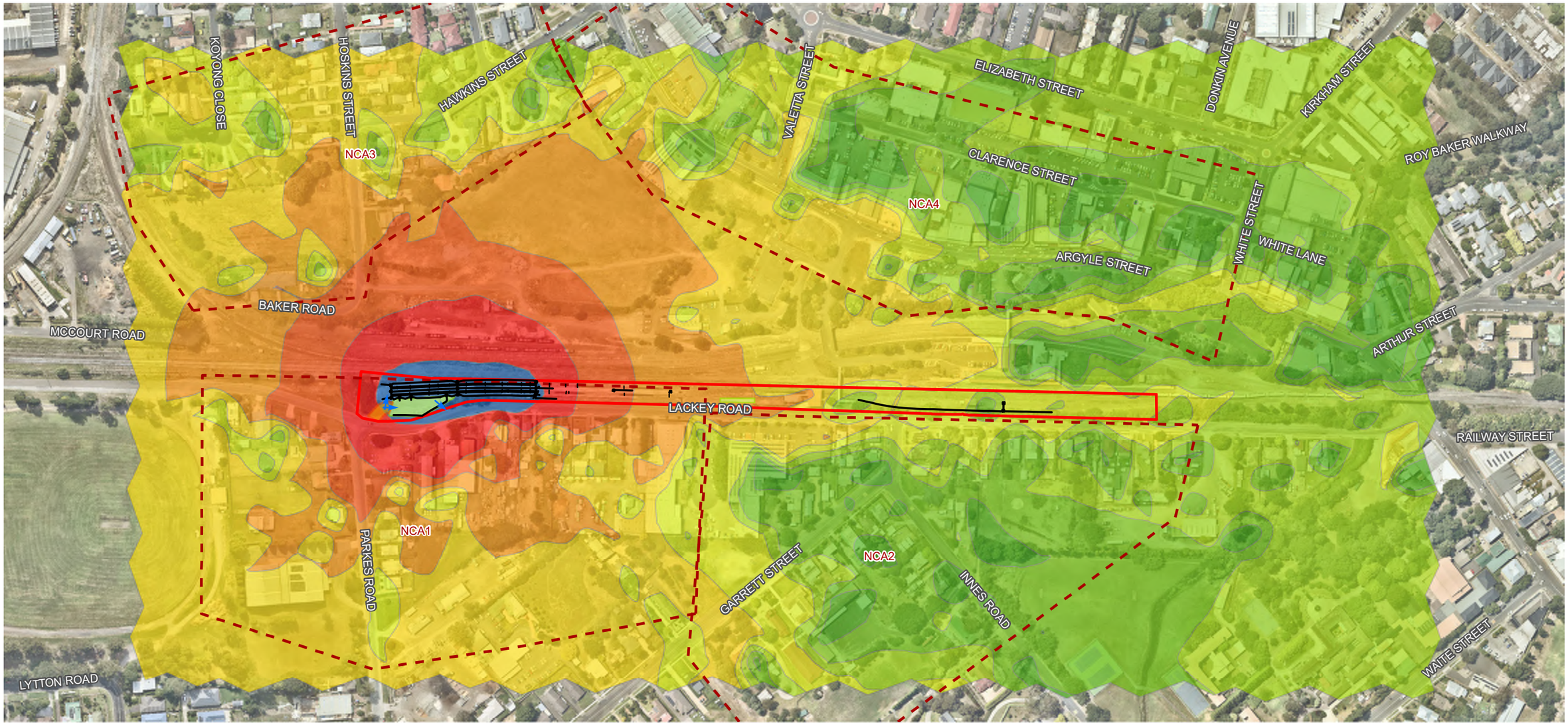
Source: Aurecon

1:3,500
0 50 100 m

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56

aurecon



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- Access gates
- Proposed design
- Proposal area
- Main access road
- Compounds
- Noise Catchment Area (NCA)

Predicted Construction Noise Impacts LAeq(15min) - Scenario 2

- <40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- >80

Source: Aurecon

1:3,500

0 50 100 m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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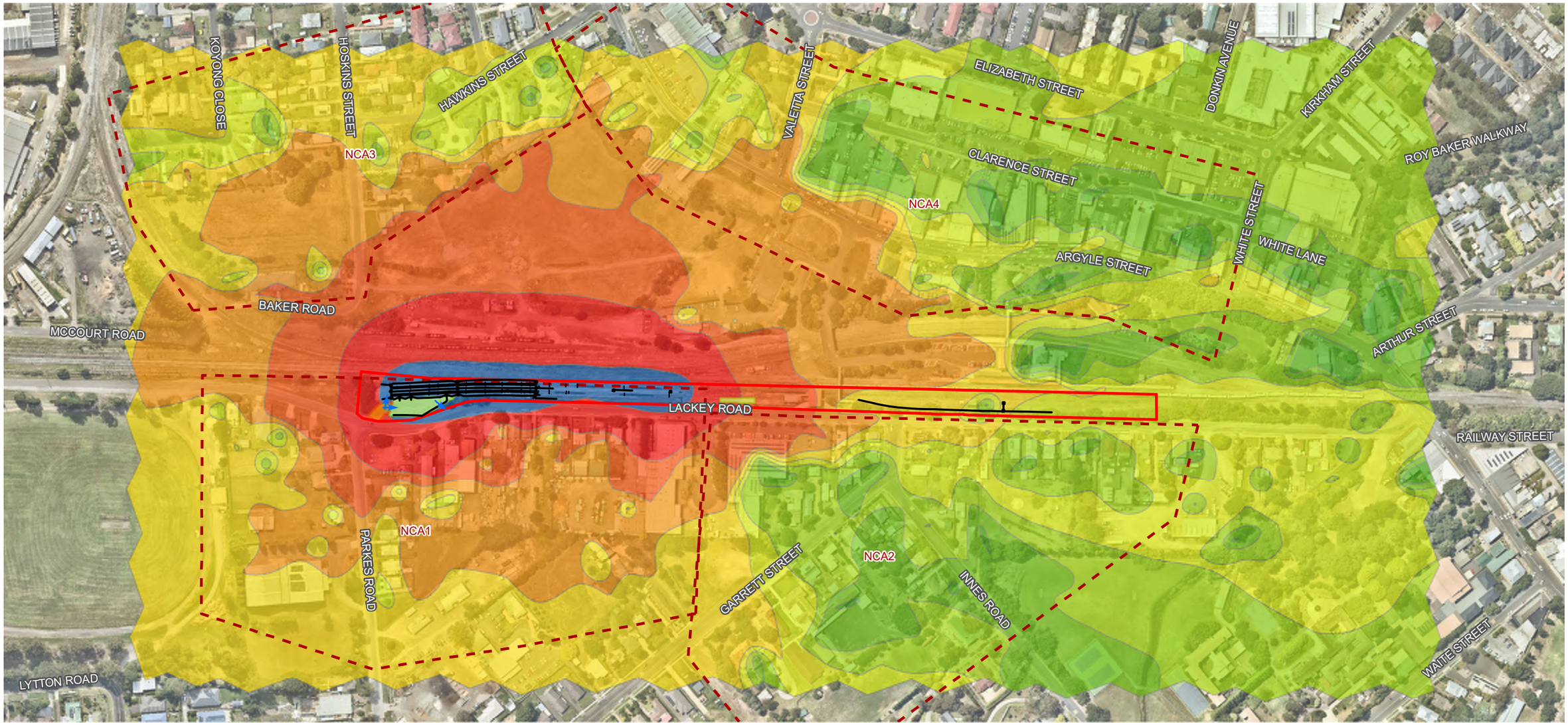

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Access gates
Proposed design
Main access road
Compounds
Proposal area
Noise Catchment Area (NCA)

Predicted Construction noise levels Leq (15 mins) in dB(A) - Scenario 3

- <40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- >80

Source: Aurecon

1:3,500
0 50 100 m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
$Leq_{(15mins)}$ in dB(A)

= 35
= 40
= 45
= 50
= 55
= 60
= 65
= 70

Construction - Arrival/ Departure - Existing Fleet

Trains arriving and departing Car Siding Road 3

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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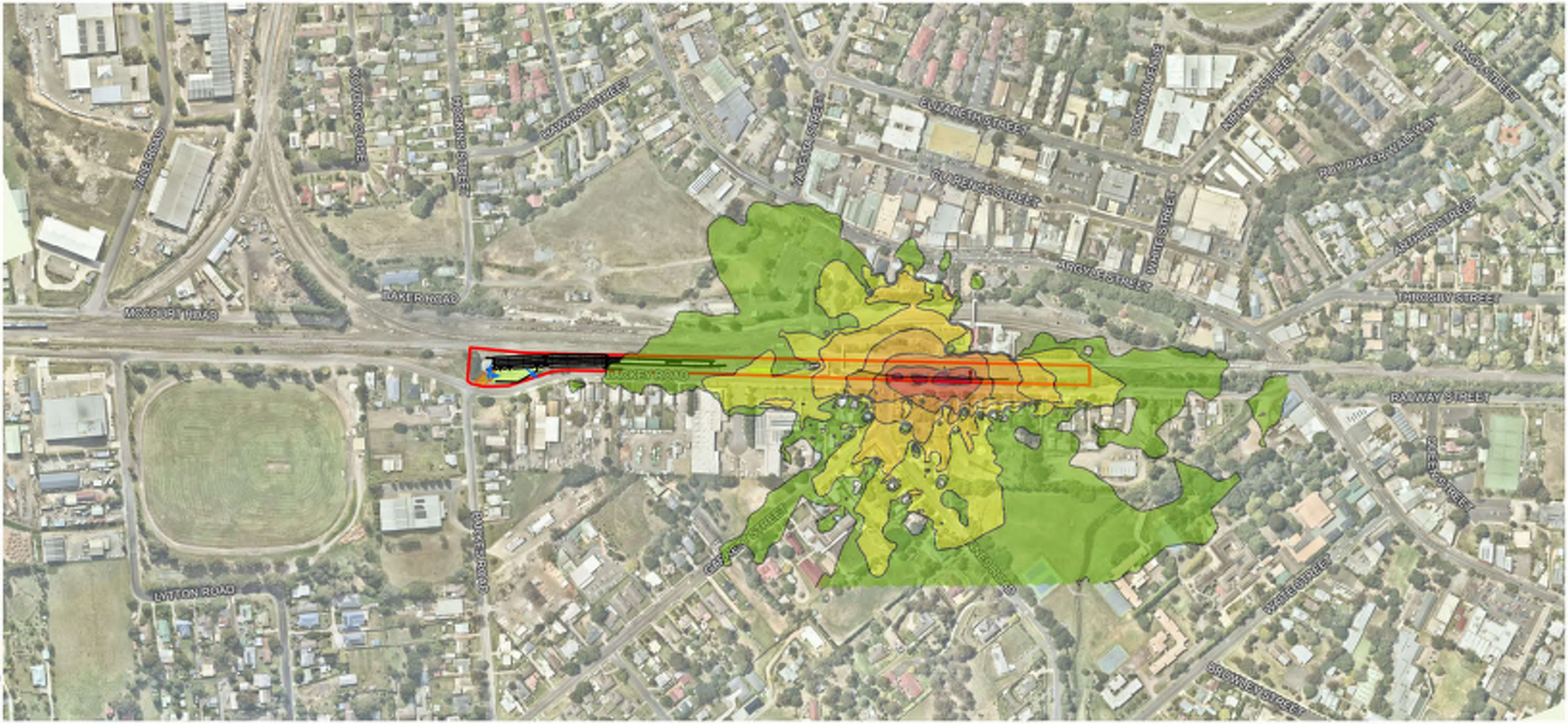

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Leq$_{(15mins)}$ in dB(A)

= 35
= 40
= 45
= 50
= 55
= 60
= 65
= 70

Construction - Idling - Existing Fleet

Temporary use of Car Siding Road 3 for stabling operations during construction - Idling

Source: Aurecon

1:4,500
0 50 100m

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56

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Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels Leq(15mins) in dB(A)

= 35
= 40
= 45
= 50
= 55
= 60
= 65
= 70

Source: Aurecon

1:4,500
0 50 100m

Construction - Preparation - Existing Fleet

Temporary use of Car Siding Road 3 for stabling operations during construction
- Train Preparation Works

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56

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Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels $LA_{(Max)}$ in dB(A)

= 65

Construction - Town Horn - Existing Fleet

Town Horn testing undertaken at Car Siding Road 3

Source: Aurecon

1:4,500
0 50 100m

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56

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- Access gates
- Proposed design
- Proposal area
- Main access road
- Compounds

Predicted noise levels $LA_{(Max)}$ in dB(A)

- = 65

Construction - Brake Release - Existing Fleet

Brake Release Test Located at Car Siding Road 3

Source: Aurecon

1:4,500

0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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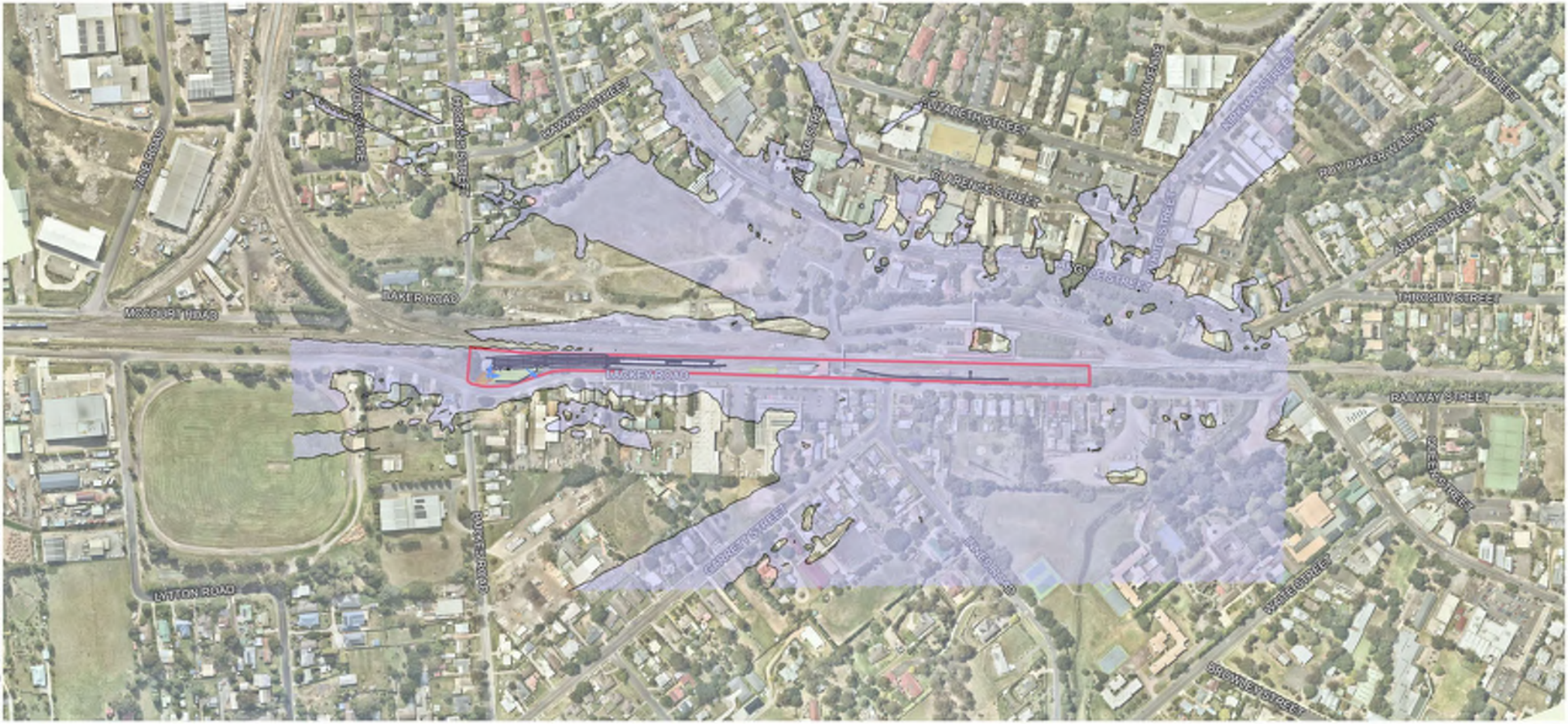

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels $LA_{(Max)}$ in dB(A)

= 65

Construction - Country Horn - Existing Fleet

Country Horn Testing undertaken at Car Siding Road 3

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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C

Predicted operational noise levels

Appendix Table 1: Predicted Noise Levels for Operational Scenarios - Residential Receivers – Standard Criteria (Exceedances highlighted with a Y)

Receiver	No.	NCA	Fl	Scenario 1							Scenario 2							Scenario 3							
				Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet				Predicted Noise Level (dBA)	New Fleet		
					Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)	Night (38)		Day (53)	Evening (43)	Night (38)
6 PARKES RD, MOSS VALE NSW 2577 (EAST)	14	1	GF	22.1	N	N	N	26.3	N	N	N	31.9	N	N	N	38.8	N	N	Y	29.8	N	N	N	N	34.2	N	N	N
6 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	14	1	GF	25.1	N	N	N	29.2	N	N	N	36.2	N	N	N	42.1	N	N	Y	31.7	N	N	N	N	38.2	N	N	Y
6 PARKES RD, MOSS VALE NSW 2577 (NORTH)	15	1	GF	17.3	N	N	N	22.1	N	N	N	29.8	N	N	N	36.5	N	N	N	28.4	N	N	N	N	31.1	N	N	N
12 PARKES RD, MOSS VALE NSW 2577	18	1	GF	18.3	N	N	N	23.1	N	N	N	31	N	N	N	37.7	N	N	N	29.2	N	N	N	N	32.4	N	N	N
14 PARKES RD, MOSS VALE NSW 2577	19	1	GF	17.3	N	N	N	21.5	N	N	N	31.5	N	N	N	35.8	N	N	N	29	N	N	N	N	31.6	N	N	N
8 PARKES RD, MOSS VALE NSW 2577 (NORHT)	20	1	GF	20.5	N	N	N	24.9	N	N	N	33.9	N	N	N	39.8	N	N	Y	31.3	N	N	N	N	34.9	N	N	N
8 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	20	1	GF	28	N	N	N	31.7	N	N	N	42.4	N	N	Y	42.4	N	N	Y	36.1	N	N	N	N	40.8	N	N	Y
10 PARKES RD, MOSS VALE NSW 2577	21	1	GF	16.1	N	N	N	21	N	N	N	28.9	N	N	N	35.8	N	N	N	27.2	N	N	N	N	29.5	N	N	N
5 PARKES RD, MOSS VALE NSW 2577 (EAST)	22	1	GF	36.3	N	N	N	40.6	N	N	Y	49.5	N	Y	Y	55.8	Y	Y	Y	46	N	Y	Y	Y	50.4	N	Y	Y
5 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	22	1	GF	36.1	N	N	N	40.4	N	N	Y	49.2	N	Y	Y	56.4	Y	Y	Y	43.3	N	Y	Y	Y	50.3	N	Y	Y
7 PARKES RD, MOSS VALE NSW 2577	23	1	GF	34.8	N	N	N	39	N	N	Y	48.2	N	Y	Y	55.1	Y	Y	Y	42.4	N	N	Y	Y	49	N	Y	Y
9 PARKES RD, MOSS VALE NSW 2577	25	1	GF	33.3	N	N	N	37.4	N	N	N	46.8	N	Y	Y	53.8	Y	Y	Y	41.1	N	N	Y	Y	47.4	N	Y	Y
11-13 PARKES RD, MOSS VALE NSW 2577 (E)	27	1	GF	32	N	N	N	36.5	N	N	N	45.8	N	Y	Y	52.7	N	Y	Y	40.2	N	N	Y	N	46.3	N	Y	Y
11-13 PARKES RD, MOSS VALE NSW 2577 (S)	27	1	GF	31.5	N	N	N	36	N	N	N	45.4	N	Y	Y	52.3	N	Y	Y	39.9	N	N	Y	N	45.9	N	Y	Y
105 LACKEY RD, MOSS VALE NSW 2577	28	1	GF	29.4	N	N	N	33	N	N	N	37.4	N	N	N	40.2	N	N	Y	33.8	N	N	N	N	41	N	N	Y
105 LACKEY RD, MOSS VALE NSW 2577	28	1	F 1	30.6	N	N	N	34	N	N	N	38	N	N	N	41.2	N	N	Y	34.7	N	N	N	N	41.7	N	N	Y
105 LACKEY RD, MOSS VALE NSW 2577 (EAST)	28	1	GF	34.8	N	N	N	39.6	N	N	Y	47.5	N	Y	Y	53.1	Y	Y	Y	46.5	N	Y	Y	Y	48.3	N	Y	Y
105 LACKEY RD, MOSS VALE NSW 2577 (SOUT)	28	1	GF	33.4	N	N	N	37.9	N	N	N	46.2	N	Y	Y	52.9	N	Y	Y	43.8	N	Y	Y	Y	47.1	N	Y	Y
101 LACKEY RD, MOSS VALE NSW 2577	29	1	GF	30.7	N	N	N	35.9	N	N	N	43.4	N	Y	Y	50.2	N	Y	Y	43.4	N	Y	Y	Y	43.8	N	Y	Y
103 Lackey Rd (New building)	111	1	GF	33.6	N	N	N	38.7	N	N	Y	46.2	N	Y	Y	52	N	Y	Y	46.1	N	Y	Y	Y	46.8	N	Y	Y
115 LACKEY RD, MOSS VALE NSW 2577	130	1	GF	42.3	N	N	Y	46.4	N	Y	Y	54.5	Y	Y	Y	59.5	Y	Y	Y	45.6	N	Y	Y	Y	56.1	Y	Y	Y
113 LACKEY RD, MOSS VALE NSW 2577	131	1	GF	41	N	N	Y	45.2	N	Y	Y	53.9	Y	Y	Y	58.2	Y	Y	Y	44.8	N	Y	Y	Y	54.8	Y	Y	Y
111 LACKEY RD, MOSS VALE NSW 2577	132	1	GF	39	N	N	Y	43.2	N	Y	Y	52.5	N	Y	Y	59.2	Y	Y	Y	44.2	N	Y	Y	Y	53.1	Y	Y	Y
4 PARKES RD, MOSS VALE NSW 2577 (EAST)	134	1	GF	33.1	N	N	N	36.6	N	N	N	47.6	N	Y	Y	54.7	Y	Y	Y	40.3	N	N	Y	N	47	N	Y	Y
4 PARKES RD, MOSS VALE NSW 2577 (NORTH)	135	1	GF	27.3	N	N	N	31.9	N	N	N	41.1	N	N	Y	48.4	N	Y	Y	32	N	N	N	N	41.1	N	N	Y
3 FARMERS PL, MOSS VALE NSW 2577	137	1	GF	46.9	N	Y	Y	50.8	N	Y	Y	47	N	Y	Y	57.4	Y	Y	Y	42.9	N	N	Y	Y	51.5	N	Y	Y
3 FARMERS PL, MOSS VALE NSW 2577	137	1	F 1	47.4	N	Y	Y	52.3	N	Y	Y	47.6	N	Y	Y	57.8	Y	Y	Y	43.9	N	Y	Y	Y	51.9	N	Y	Y
171 LACKEY RD, MOSS VALE NSW 2577	67	2	GF	42.3	N	N	Y	45.4	N	Y	Y	33.4	N	N	N	41.2	N	N	Y	31.5	N	N	N	N	34.6	N	N	N
2 GARRETT ST, MOSS VALE NSW 2577 (NORTH)	68	2	GF	40	N	N	Y	43.9	N	Y	Y	30.8	N	N	N	43.1	N	Y	Y	28.5	N	N	N	N	32.4	N	N	N
4 GARRETT ST, MOSS VALE NSW 2577	69	2	GF	36.7	N	N	N	40.7	N	N	Y	30.7	N	N	N	36	N	N	N	26.8	N	N	N	N	34.5	N	N	N
6 GARRETT ST, MOSS VALE NSW 2577	70	2	GF	34.4	N	N	N	38.8	N	N	Y	27.1	N	N	N	34.5	N	N	N	25.1	N	N	N	N	29.8	N	N	N
1 INNES RD, MOSS VALE NSW 2577	71	2	GF	33.2	N	N	N	37.1	N	N	N	20.4	N	N	N	28.1	N	N	N	19.6	N	N	N	N	22.5	N	N	N
8A GARRETT ST, MOSS VALE NSW 2577 (EAST)	71	2	GF	33.7	N	N	N	37.3	N	N	N	20.5	N	N	N	29.6	N	N	N	19.5	N	N	N	N	22.7	N	N	N
8A GARRETT ST, MOSS VALE NSW 2577 (NORTH	71	2	GF	33.4	N	N	N	36.9	N	N	N	23.8	N	N	N	30.5	N	N	N	22.7	N	N	N	N	26.8	N	N	N
1 GARRETT ST, MOSS VALE NSW 2577	72	2	GF	42.9	N	N	Y	46.8	N	Y	Y	39.3	N	N	Y	48.6	N	Y	Y	37.4	N	N	N	N	41.4	N	N	Y
11 GARRETT ST, MOSS VALE NSW 2577	94	2	GF	34.7	N	N	N	39.2	N	N	Y	21.5	N	N	N	30.6	N	N	N	21.3	N	N	N	N	24	N	N	N

Receiver	No.	NCA	FI	Scenario 1								Scenario 2								Scenario 3							
				Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet				Predicted Noise Level (dBA)	New Fleet		
					Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)	Night (38)		Day (53)	Evening (43)	Night (38)
9 GARRETT ST, MOSS VALE NSW 2577	96	2	GF	37.2	N	N	N	41.9	N	N	Y	22.2	N	N	N	32.6	N	N	N	21.7	N	N	N	N	24	N	N	N
7 GARRETT ST, MOSS VALE NSW 2577	97	2	GF	33.9	N	N	N	38.1	N	N	Y	21.8	N	N	N	30.8	N	N	N	21.5	N	N	N	N	24.4	N	N	N
5 GARRETT ST, MOSS VALE NSW 2577	99	2	GF	33.4	N	N	N	37.9	N	N	N	21.4	N	N	N	30	N	N	N	21	N	N	N	N	24.2	N	N	N
8 GARRETT ST, MOSS VALE NSW 2577 (GARR)	100	2	GF	33.1	N	N	N	36.8	N	N	N	22.9	N	N	N	30.2	N	N	N	21.8	N	N	N	N	25.9	N	N	N
8 GARRETT ST, MOSS VALE NSW 2577 (INNES)	100	2	GF	32.9	N	N	N	36.8	N	N	N	18.9	N	N	N	27.9	N	N	N	18.8	N	N	N	N	20.9	N	N	N
10 GARRETT ST, MOSS VALE NSW 2577	101	2	GF	32.4	N	N	N	36.3	N	N	N	22.8	N	N	N	30.7	N	N	N	21.8	N	N	N	N	25.7	N	N	N
12 GARRETT ST, MOSS VALE NSW 2577	102	2	GF	31.7	N	N	N	35.6	N	N	N	22.6	N	N	N	30.9	N	N	N	21.6	N	N	N	N	25.5	N	N	N
14 GARRETT ST, MOSS VALE NSW 2577	103	2	GF	30	N	N	N	33.6	N	N	N	24.3	N	N	N	32.2	N	N	N	23.3	N	N	N	N	27.3	N	N	N
16 GARRETT ST, MOSS VALE NSW 2577	104	2	GF	28.9	N	N	N	32.8	N	N	N	23.8	N	N	N	32	N	N	N	22.7	N	N	N	N	26.7	N	N	N
4 INNES RD, MOSS VALE NSW 2577	106	2	GF	30.5	N	N	N	34	N	N	N	17	N	N	N	25.9	N	N	N	16.9	N	N	N	N	19.2	N	N	N
2 INNES RD, MOSS VALE NSW 2577	107	2	GF	31.4	N	N	N	34.9	N	N	N	18.4	N	N	N	27.1	N	N	N	18.2	N	N	N	N	21	N	N	N
8 GARRETT ST, MOSS VALE NSW 2577	144	2	GF	31.9	N	N	N	35.4	N	N	N	21.7	N	N	N	29.8	N	N	N	21.3	N	N	N	N	24.4	N	N	N
35 KOYONG CL, MOSS VALE NSW 2577	30	3	GF	26.8	N	N	N	32.2	N	N	N	36.6	N	N	N	44.1	N	Y	Y	38.5	N	N	Y	N	38.5	N	N	Y
33 KOYONG CL, MOSS VALE NSW 2577	32	3	GF	27.7	N	N	N	33.1	N	N	N	38.1	N	N	Y	45.7	N	Y	Y	39.8	N	N	Y	N	39.2	N	N	Y
31 KOYONG CL, MOSS VALE NSW 2577	33	3	GF	26.5	N	N	N	31.1	N	N	N	37.9	N	N	N	44.2	N	Y	Y	39.6	N	N	Y	N	38.2	N	N	Y
29 KOYONG CL	34	3	GF	28.2	N	N	N	33.6	N	N	N	40	N	N	Y	48.1	N	Y	Y	42	N	N	Y	N	40.5	N	N	Y
45 HOSKINS ST, MOSS VALE NSW 2577 (SOUT)	35	3	GF	33.1	N	N	N	38.6	N	N	Y	46.4	N	Y	Y	53.6	Y	Y	Y	48	N	Y	Y	Y	46	N	Y	Y
45 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	35	3	GF	32.9	N	N	N	38.5	N	N	Y	46.1	N	Y	Y	52.9	N	Y	Y	47.7	N	Y	Y	Y	45.8	N	Y	Y
8 BAKER RD (SOUTH)	36	3	GF	31	N	N	N	36	N	N	N	41.6	N	N	Y	50	N	Y	Y	42.9	N	N	Y	Y	42.5	N	N	Y
8 BAKER RD (WEST)	36	3	GF	30.7	N	N	N	35.8	N	N	N	43	N	N	Y	50.5	N	Y	Y	44.6	N	Y	Y	Y	43.1	N	Y	Y
38 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	37	3	GF	33	N	N	N	38.2	N	N	Y	45.3	N	Y	Y	52.7	N	Y	Y	47.4	N	Y	Y	Y	45.5	N	Y	Y
38 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	38	3	GF	26.4	N	N	N	30.2	N	N	N	40.7	N	N	Y	46.5	N	Y	Y	42.6	N	N	Y	Y	38	N	N	N
34 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	40	3	GF	22.4	N	N	N	26.6	N	N	N	36.2	N	N	N	43.2	N	Y	Y	38.6	N	N	Y	N	35.5	N	N	N
34A HOSKINS ST, MOSS VALE NSW 2577 (WEST	41	3	GF	32.8	N	N	N	38	N	N	N	44.7	N	Y	Y	53.4	Y	Y	Y	46.9	N	Y	Y	Y	45	N	Y	Y
34A HOSKINS ST, MOSS VALE NSW 2577 (NORT	42	3	GF	30.1	N	N	N	35.2	N	N	N	43.9	N	Y	Y	50.7	N	Y	Y	46	N	Y	Y	Y	44.1	N	Y	Y
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	43	3	GF	26.9	N	N	N	31.8	N	N	N	36.6	N	N	N	43.5	N	Y	Y	38.4	N	N	Y	N	37	N	N	N
5/8 HAWKINS ST, MOSS VALE NSW 2577 (N)	44	3	GF	29.3	N	N	N	34.7	N	N	N	43.1	N	Y	Y	49.7	N	Y	Y	45.3	N	Y	Y	Y	43.3	N	Y	Y
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	45	3	GF	32.6	N	N	N	37.8	N	N	N	43.8	N	Y	Y	52.6	N	Y	Y	45.9	N	Y	Y	Y	44	N	Y	Y
2/8 HAWKINS ST, MOSS VALE NSW 2577	46	3	GF	29.5	N	N	N	34.7	N	N	N	39.3	N	N	Y	50.8	N	Y	Y	41.4	N	N	Y	N	41.4	N	N	Y
5/8 HAWKINS ST, MOSS VALE NSW 2577 (S)	47	3	GF	32.4	N	N	N	37.4	N	N	N	43.2	N	Y	Y	52.1	N	Y	Y	44.8	N	Y	Y	Y	44.3	N	Y	Y
12/6 HAWKINS ST, MOSS VALE NSW 2577 (N)	48	3	GF	31.9	N	N	N	37.1	N	N	N	44	N	Y	Y	52.3	N	Y	Y	46.1	N	Y	Y	Y	44	N	Y	Y
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	49	3	GF	32.6	N	N	N	37.8	N	N	N	44	N	Y	Y	52.1	N	Y	Y	46.2	N	Y	Y	Y	44.1	N	Y	Y
4/6 HAWKINS ST, MOSS VALE NSW 2577	50	3	GF	29.1	N	N	N	33.9	N	N	N	38.3	N	N	Y	48.1	N	Y	Y	40.8	N	N	Y	N	40.5	N	N	Y
9/6 HAWKINS ST, MOSS VALE NSW 2577	51	3	GF	24.3	N	N	N	28.8	N	N	N	30.5	N	N	N	36.3	N	N	N	32.5	N	N	N	N	33	N	N	N
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	GF	32.2	N	N	N	37.4	N	N	N	42.8	N	N	Y	52	N	Y	Y	44.9	N	Y	Y	Y	43.5	N	Y	Y
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	F 1	32.4	N	N	N	37.7	N	N	N	42.9	N	N	Y	52	N	Y	Y	45	N	Y	Y	Y	43.6	N	Y	Y
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	GF	31.5	N	N	N	36.7	N	N	N	42.4	N	N	Y	51.7	N	Y	Y	44.5	N	Y	Y	Y	42.8	N	N	Y
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	F 1	31.8	N	N	N	37.1	N	N	N	42.6	N	N	Y	51.7	N	Y	Y	44.7	N	Y	Y	Y	42.9	N	N	Y

Receiver	No.	NCA	FI	Scenario 1								Scenario 2								Scenario 3							
				Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet				Predicted Noise Level (dBA)	New Fleet		
					Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)	Night (38)		Day (53)	Evening (43)	Night (38)
10/6 HAWKINS ST, MOSS VALE NSW 2577	54	3	GF	22.8	N	N	N	28	N	N	N	29	N	N	N	35.7	N	N	N	30.8	N	N	N	N	33.4	N	N	N
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	55	3	GF	32.1	N	N	N	37.3	N	N	N	43.3	N	Y	Y	52.2	N	Y	Y	45.4	N	Y	Y	Y	43.5	N	Y	Y
34 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	109	3	GF	31.9	N	N	N	36.9	N	N	N	40.9	N	N	Y	48.7	N	Y	Y	42.7	N	N	Y	Y	42.8	N	N	Y
36 Hoskins St NSW 2577	112	3	GF	24.5	N	N	N	28.5	N	N	N	36.9	N	N	N	38.4	N	N	Y	39.1	N	N	Y	N	36.7	N	N	N
27 Koyong Cl, Moss Vale NSW 2577	113	3	GF	28.6	N	N	N	33.8	N	N	N	38.8	N	N	Y	47.1	N	Y	Y	41	N	N	Y	N	40.9	N	N	Y
25 Koyong Cl, Moss Vale NSW 2577 (W)	114	3	GF	30.6	N	N	N	35.9	N	N	N	41.4	N	N	Y	49.1	N	Y	Y	43.7	N	Y	Y	Y	42.5	N	N	Y
25 Koyong Cl, Moss Vale NSW 2577 (S)	115	3	GF	29.9	N	N	N	34.9	N	N	N	41	N	N	Y	48.9	N	Y	Y	43.5	N	Y	Y	Y	42.5	N	N	Y
31 Hoskins St	117	3	GF	28.1	N	N	N	33.2	N	N	N	39.4	N	N	Y	47.6	N	Y	Y	41.8	N	N	Y	N	40.6	N	N	Y
33 Hoskins St	118	3	GF	29	N	N	N	33.9	N	N	N	40.4	N	N	Y	47.3	N	Y	Y	42.8	N	N	Y	N	41.2	N	N	Y
29 Hoskins St Moss Vake 2577	119	3	GF	27.6	N	N	N	32.2	N	N	N	37.7	N	N	N	41.9	N	N	Y	40.2	N	N	Y	N	39.8	N	N	Y
215 ARGYLE ST, MOSS VALE NSW 2577	57	4	GF	28.7	N	N	N	33.9	N	N	N	39.4	N	N	Y	49.4	N	Y	Y	41.7	N	N	Y	N	40.9	N	N	Y
217 ARGYLE ST, MOSS VALE NSW 2577	58	4	GF	30.1	N	N	N	35.4	N	N	N	41.1	N	N	Y	50.5	N	Y	Y	43.3	N	Y	Y	Y	41.7	N	N	Y
219 ARGYLE ST, MOSS VALE NSW 2577	59	4	GF	30.1	N	N	N	35.4	N	N	N	41.5	N	N	Y	50.9	N	Y	Y	43.8	N	Y	Y	Y	42.1	N	N	Y
223 ARGYLE ST, MOSS VALE NSW 2577	60	4	GF	29.7	N	N	N	35	N	N	N	42	N	N	Y	49.4	N	Y	Y	44.3	N	Y	Y	Y	42.3	N	N	Y
225 ARGYLE ST, MOSS VALE NSW 2577	60	4	GF	33	N	N	N	38.1	N	N	Y	41.7	N	N	Y	51.6	N	Y	Y	44.1	N	Y	Y	Y	42.6	N	N	Y
221 ARGYLE ST, MOSS VALE NSW 2577	61	4	GF	31.5	N	N	N	36.6	N	N	N	41.8	N	N	Y	51.3	N	Y	Y	44.1	N	Y	Y	Y	42.3	N	N	Y
239A ARGYLE ST, MOSS VALE NSW 2577	62	4	GF	36	N	N	N	40.7	N	N	Y	39.9	N	N	Y	49.2	N	Y	Y	40.9	N	N	Y	N	42.6	N	N	Y
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	GF	35.6	N	N	N	40.4	N	N	Y	38.7	N	N	Y	49.1	N	Y	Y	40.4	N	N	Y	N	42.8	N	N	Y
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	F 1	36	N	N	N	41	N	N	Y	39.3	N	N	Y	49.6	N	Y	Y	40.8	N	N	Y	N	42.6	N	N	Y
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	GF	35.1	N	N	N	40.1	N	N	Y	35.9	N	N	N	45.8	N	Y	Y	36.6	N	N	N	N	38.3	N	N	Y
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	F 1	35.6	N	N	N	40.7	N	N	Y	36	N	N	N	45.8	N	Y	Y	36.7	N	N	N	N	38.3	N	N	Y
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	GF	36.6	N	N	N	41.6	N	N	Y	36.2	N	N	N	46.1	N	Y	Y	36.9	N	N	N	N	38.6	N	N	Y
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	F 1	37.1	N	N	N	42.2	N	N	Y	36.5	N	N	N	46.1	N	Y	Y	37.2	N	N	N	N	39.3	N	N	Y
2 GARRETT ST, MOSS VALE NSW 2577 (EAST)	66	4	GF	43	N	N	Y	46.9	N	Y	Y	38.3	N	N	Y	47.4	N	Y	Y	36.8	N	N	N	N	40.1	N	N	Y
240 Argyle St, Moss Vale	121	4	GF	32.1	N	N	N	37.1	N	N	N	40.6	N	N	Y	50.3	N	Y	Y	42.8	N	N	Y	N	41	N	N	Y
374 Argyle St, Moss Vale	127	4	GF	28.2	N	N	N	33.4	N	N	N	24.6	N	N	N	29.1	N	N	N	25.9	N	N	N	N	31.8	N	N	Y
245 ARGYLE ST, MOSS VALE NSW 2577	148	4	GF	35.7	N	N	N	40.6	N	N	Y	35.9	N	N	N	45.4	N	Y	Y	36.6	N	N	N	N	39.6	N	N	Y
243 ARGYLE ST, MOSS VALE NSW 2577	149	4	GF	37.1	N	N	N	41.9	N	N	Y	36.6	N	N	N	45	N	Y	Y	37	N	N	N	N	40.4	N	N	Y
262-266 ARGYLE ST, MOSS VALE NSW 2577	153	4	GF	32.8	N	N	N	37.5	N	N	N	37.3	N	N	N	45.5	N	Y	Y	38.4	N	N	Y	N	40.3	N	N	Y
262-266 ARGYLE ST, MOSS VALE NSW 2577	153	4	F 1	33.2	N	N	N	38.2	N	N	Y	37.7	N	N	N	46.2	N	Y	Y	39	N	N	Y	N	40.1	N	N	Y
262-266 ARGYLE ST, MOSS VALE NSW 2577	154	4	GF	32.8	N	N	N	37.6	N	N	N	37.7	N	N	N	46.1	N	Y	Y	38.8	N	N	Y	N	40.3	N	N	Y
262-266 ARGYLE ST, MOSS VALE NSW 2577	154	4	F 1	33.1	N	N	N	38.1	N	N	Y	38	N	N	N	46.5	N	Y	Y	39.3	N	N	Y	N	40.2	N	N	Y

Appendix Table 2: Predicted Noise Levels for Operational Scenarios - Residential Receivers - Industrial Interface (Exceedances highlighted with a Y)

Receiver	No.	NCA	Scenario 1								Scenario 2								Scenario 3							
			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet		
				Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)
133 LACKEY RD, MOSS VALE NSW 2577	1	1	45.8	N	N	Y	48.0	N	N	Y	51.5	N	Y	Y	59.3	Y	Y	Y	45.6	N	N	Y	56.7	N	Y	Y
131 LACKEY RD, MOSS VALE NSW 2577	2	1	45.3	N	N	Y	47.3	N	N	Y	52.9	N	Y	Y	59.2	Y	Y	Y	46.4	N	N	Y	56.9	N	Y	Y
129 LACKEY RD, MOSS VALE NSW 2577	3	1	45.3	N	N	Y	47.1	N	N	Y	54.6	N	Y	Y	59.2	Y	Y	Y	46.8	N	N	Y	56.9	N	Y	Y
127 LACKEY RD, MOSS VALE NSW 2577	6	1	45.9	N	N	Y	47.6	N	N	Y	55.3	N	Y	Y	59.9	Y	Y	Y	47.2	N	N	Y	57.2	N	Y	Y
125 LACKEY RD, MOSS VALE NSW 2577	7	1	47.0	N	N	Y	48.6	N	Y	Y	56.2	N	Y	Y	61.2	Y	Y	Y	48.3	N	Y	Y	57.9	N	Y	Y
123 LACKEY RD, MOSS VALE NSW 2577	8	1	46.2	N	N	Y	49.0	N	Y	Y	54.1	N	Y	Y	60.8	Y	Y	Y	47.3	N	N	Y	56.8	N	Y	Y
121 LACKEY RD, MOSS VALE NSW 2577	9	1	46.6	N	N	Y	49.9	N	Y	Y	53.6	N	Y	Y	61.3	Y	Y	Y	46.8	N	N	Y	57	N	Y	Y
117-119 LACKEY RD, MOSS VALE NSW 2577	10	1	46.7	N	N	Y	50.3	N	Y	Y	53.9	N	Y	Y	62.4	Y	Y	Y	46.3	N	N	Y	58.7	Y	Y	Y
161 LACKEY RD, MOSS VALE NSW 2577	73	2	42.8	N	N	N	46.8	N	N	Y	40.8	N	N	N	49.4	N	Y	Y	38.7	N	N	N	43.1	N	N	Y
159 LACKEY RD, MOSS VALE NSW 2577	74	2	42.7	N	N	N	46.9	N	N	Y	42.0	N	N	N	51.0	N	Y	Y	39.7	N	N	N	44.1	N	N	Y
3 GARRETT ST, MOSS VALE NSW 2577	75	2	36.0	N	N	N	40.0	N	N	N	20.3	N	N	N	28.4	N	N	N	19.3	N	N	N	22.4	N	N	N
1A INNES RD, MOSS VALE NSW 2577 (EAST)	76	2	31.7	N	N	N	34.8	N	N	N	23.7	N	N	N	30.4	N	N	N	23.0	N	N	N	27.1	N	N	N
1A INNES RD, MOSS VALE NSW 2577 (NORTH)	76	2	29.3	N	N	N	33.0	N	N	N	23.8	N	N	N	29.8	N	N	N	22.3	N	N	N	27.3	N	N	N
173 LACKEY RD, MOSS VALE NSW 2577	77	2	42.5	N	N	N	45.4	N	N	Y	35.0	N	N	N	43.9	N	N	Y	33.7	N	N	N	35.9	N	N	N
175 LACKEY RD, MOSS VALE NSW 2577	78	2	43.1	N	N	Y	45.6	N	N	Y	36.1	N	N	N	45.0	N	N	Y	34.7	N	N	N	37.7	N	N	N
177 LACKEY RD, MOSS VALE NSW 2577	79	2	42.9	N	N	N	45.4	N	N	Y	35.8	N	N	N	44.6	N	N	Y	34.4	N	N	N	37.5	N	N	N
179 LACKEY RD, MOSS VALE NSW 2577	80	2	42.7	N	N	N	45.3	N	N	Y	35.5	N	N	N	44.3	N	N	Y	34.2	N	N	N	37.3	N	N	N
181 LACKEY RD, MOSS VALE NSW 2577	81	2	42.9	N	N	N	45.6	N	N	Y	37.4	N	N	N	46.1	N	N	Y	36.2	N	N	N	39.4	N	N	N
183 LACKEY RD, MOSS VALE NSW 2577	82	2	43.1	N	N	Y	45.5	N	N	Y	34.9	N	N	N	43.7	N	N	Y	33.9	N	N	N	36.7	N	N	N
185 LACKEY RD, MOSS VALE NSW 2577	84	2	42.0	N	N	N	44.3	N	N	Y	27.8	N	N	N	37.1	N	N	N	25.8	N	N	N	26.2	N	N	N
187 LACKEY RD, MOSS VALE NSW 2577	85	2	41.6	N	N	N	44.0	N	N	Y	33.2	N	N	N	42.4	N	N	N	32.1	N	N	N	34.4	N	N	N
189 LACKEY RD, MOSS VALE NSW 2577	86	2	39.8	N	N	N	42.6	N	N	N	33.9	N	N	N	42.6	N	N	N	32.9	N	N	N	35.6	N	N	N
191 LACKEY RD, MOSS VALE NSW 2577	87	2	37.3	N	N	N	40.7	N	N	N	33.6	N	N	N	42.3	N	N	N	32.6	N	N	N	35.3	N	N	N

Appendix Table 3: Predicted Noise Levels for Operational Scenarios – Non- Residential Receivers (Exceedances highlighted with a Y)

Receiver	No.	NCA	Type	Fl	Predicted Noise Levels (dBA)					
					Scenario 1		Scenario 2		Scenario 3	
					Existing Fleet	New Fleet	Existing Fleet	New Fleet	Existing Fleet	New Fleet
ST PAUL'S PARISH CATHOLIC CHURCH	146	2	Church	GF	28.8	31.9	35.7	39.4	32.1	39.6
ST PAUL'S PARISH CATHOLIC CHURCH	146	2	Church	F 1	30.2	33.6	37.0	40.8	33.6	41.0
(Commercial) Pacific Furniture	122	4	Commercial	GF	32.2	37.1	36.8	46.0	37.9	40.0
(Commercial) 14 CLARENCE ST	123	4	Commercial	GF	24.9	29.3	27.1	34.3	27.9	31.8
(Commercial) 14 CLARENCE ST	123	4	Commercial	F 1	28.2	32.4	30.8	37.6	31.6	35.6
SHOP 11 256 ARGYLE ST, MOSS VALE NSW 257	124	4	Commercial	GF	33.0	38.0	40.3	48.3	42.0	40.8
SHOP 11 256 ARGYLE ST, MOSS VALE NSW 257	124	4	Commercial	F 1	33.0	38.3	40.3	48.6	42.0	40.8
(Commercial) Southern Rise Bakery	125	4	Commercial	GF	27.4	32.1	28.1	33.8	28.4	33.1
Moss Vale Court House	126	4	Commercial	GF	28.5	33.3	21.2	27.8	21.6	25.2
115 LACKEY RD, MOSS VALE NSW 2577	130	1	Commercial	GF	42.3	46.4	54.5	59.5	45.6	56.1
4 PARKES RD, MOSS VALE NSW 2577 (EAST)	134	1	Commercial	GF	33.1	36.6	47.6	54.7	40.3	47.0
4 PARKES RD, MOSS VALE NSW 2577 (NORTH)	135	1	Commercial	GF	27.3	31.9	41.1	48.4	32.0	41.1
HARVEY NORMAN (155-157 LACKEY RD) (EAST)	142	2	Commercial	GF	42.6	47.1	41.6	51.4	38.4	45.2
HARVEY NORMAN (155-157 LACKEY RD) (EAST)	142	2	Commercial	F 1	43.5	48.1	42.4	51.8	39.3	45.7
HARVEY NORMAN (155-157 LACKEY RD) (NORTH	143	2	Commercial	GF	37.1	41.9	34.5	43.5	33.0	40.4
HARVEY NORMAN (155-157 LACKEY RD) (NORTH	143	2	Commercial	F 1	38.0	42.7	38.2	45.1	36.2	43.3
245 ARGYLE ST, MOSS VALE NSW 2577	148	4	Commercial	GF	35.7	40.6	35.9	45.4	36.6	39.6
243 ARGYLE ST, MOSS VALE NSW 2577	149	4	Commercial	GF	37.1	41.9	36.6	45.0	37.0	40.4
SHOP 4 249 ARGYLE ST, MOSS VALE NSW 2577	150	4	Commercial	GF	31.0	35.9	21.4	27.3	21.7	28.4
SHOP 11 256 ARGYLE ST, MOSS VALE NSW 257	152	4	Commercial	GF	33.0	37.9	36.6	44.3	38.1	41.0
SHOP 11 256 ARGYLE ST, MOSS VALE NSW 257	152	4	Commercial	F 1	33.2	38.3	39.7	48.1	41.0	40.6
262-266 ARGYLE ST, MOSS VALE NSW 2577	153	4	Commercial	GF	32.8	37.5	37.3	45.5	38.4	40.3
262-266 ARGYLE ST, MOSS VALE NSW 2577	153	4	Commercial	F 1	33.2	38.2	37.7	46.2	39.0	40.1
262-266 ARGYLE ST, MOSS VALE NSW 2577	154	4	Commercial	GF	32.8	37.6	37.7	46.1	38.8	40.3
262-266 ARGYLE ST, MOSS VALE NSW 2577	154	4	Commercial	F 1	33.1	38.1	38.0	46.5	39.3	40.2
113 LACKEY RD, MOSS VALE NSW 2577	131	1	Industrial	GF	41.0	45.2	53.9	58.2	44.8	54.8
111 LACKEY RD, MOSS VALE NSW 2577	132	1	Industrial	GF	39.0	43.2	52.5	59.2	44.2	53.1
3 FARMERS PL, MOSS VALE NSW 2577	137	1	Industrial	GF	46.9	50.8	47.0	57.4	42.9	51.5
3 FARMERS PL, MOSS VALE NSW 2577	137	1	Industrial	F 1	47.4	52.3	47.6	57.8	43.9	51.9
ST PAUL'S CATHOLIC PARISH PRIMARY SCHOOL	145	2	School	GF	26.9	29.9	34.2	37.4	30.1	37.2
ST PAUL'S CATHOLIC PARISH PRIMARY SCHOOL	145	2	School	F 1	29.5	33.0	36.0	39.0	32.3	39.3

Appendix Table 4: Predicted Noise Levels for Sleep Disturbance Scenarios (Exceedances highlighted with a red)

Receiver	No.	NCA	Fl	Predicted Noise Levels (dBA Lmax)																			
				Scenario 4 Existing Fleet		Scenario 4 New Fleet		Scenario 6a (Country Horn)				Scenario 6a (Town Horn)				Scenario 6b (Country Horn)				Scenario 6b (Town Horn)			
				L1	L2	L1	L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet – L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2
133 LACKEY RD, MOSS VALE NSW 2577	1	1	GF	57.1	64.6	70.3	78.7	72.8	74.4	81.8	83.4	60.3	61.9	74.3	75.9	83.7	93.8	94.4	102.4	73.7	83.8	89.4	97.4
131 LACKEY RD, MOSS VALE NSW 2577	2	1	GF	58.4	65	71.9	78.7	67.1	68.5	76.1	77.5	54.6	56.0	68.6	70.0	84.5	93.9	95.4	100.7	74.5	83.9	90.4	95.7
129 LACKEY RD, MOSS VALE NSW 2577	3	1	GF	59	65.2	72.0	78.9	74.4	75.9	83.4	84.9	61.9	63.4	75.9	77.4	86.3	93.0	97.6	98.5	76.3	83	92.6	93.5
127 LACKEY RD, MOSS VALE NSW 2577	6	1	GF	58.2	65.5	72.4	79.2	74.0	75.5	83.0	84.5	61.5	63.0	75.5	77.0	83.4	92.4	98.9	97.7	73.4	82.4	93.9	92.7
125 LACKEY RD, MOSS VALE NSW 2577	7	1	GF	62.1	65.3	75.7	79.3	71.3	72.8	80.3	81.8	58.8	60.3	72.8	74.3	89.3	91.2	101.4	96.8	79.3	81.2	96.4	91.8
123 LACKEY RD, MOSS VALE NSW 2577	8	1	GF	63.7	63.2	77.6	77.3	64.9	66.0	73.9	75.0	52.4	53.5	66.4	67.5	91.2	89.1	103.9	95.3	81.2	79.1	98.9	90.3
121 LACKEY RD, MOSS VALE NSW 2577	9	1	GF	65.3	62.3	79.4	76.5	70.8	72.1	79.8	81.1	58.3	59.6	72.3	73.6	93.0	88.1	106.5	94.6	83	78.1	101.5	89.6
117-119 LACKEY RD, MOSS VALE NSW 2577	10	1	GF	68.3	60.7	82.7	74.8	70.4	71.7	79.4	80.7	57.9	59.2	71.9	73.2	96.7	86.4	110.0	93.3	86.7	76.4	105	88.3
6 PARKES RD, MOSS VALE NSW 2577 (EAST)	14	1	GF	44.1	39.9	57.5	53.3	58.8	58.0	67.8	67.0	46.3	45.5	60.3	59.5	69.9	64.1	76.0	74.9	59.9	54.1	71	69.9
6 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	14	1	GF	48.6	42.6	64.0	56.4	51.5	51.9	60.5	60.9	39.0	39.4	53.0	53.4	76.9	66.1	79.4	74.3	66.9	56.1	74.4	69.3
6 PARKES RD, MOSS VALE NSW 2577 (NORTH)	15	1	GF	40.9	35.5	56.6	49.2	57.9	57.1	66.9	66.1	45.4	44.6	59.4	58.6	67.4	61.2	73.8	69.3	57.4	51.2	68.8	64.3
12 PARKES RD, MOSS VALE NSW 2577	18	1	GF	42.1	37.9	56.0	51.3	48.1	49.2	57.1	58.2	35.6	36.7	49.6	50.7	70.1	60.6	73.8	68.9	60.1	50.6	68.8	63.9
14 PARKES RD, MOSS VALE NSW 2577	19	1	GF	40.5	33.9	54.4	47.3	48.1	49.2	57.1	58.2	35.6	36.7	49.6	50.7	62.3	58.0	71.8	66.4	52.3	48	66.8	61.4
8 PARKES RD, MOSS VALE NSW 2577 (NORHT)	20	1	GF	43.9	35.7	59.5	49.2	48.2	49.3	57.2	58.3	35.7	36.8	49.7	50.8	80.7	64.6	88.5	67.1	70.7	54.6	83.5	62.1
8 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	20	1	GF	48.6	40.7	63.2	54.3	61.8	60.5	70.8	69.5	49.3	48.0	63.3	62.0	73.9	63.8	81.4	72.3	63.9	53.8	76.4	67.3
10 PARKES RD, MOSS VALE NSW 2577	21	1	GF	39.6	34.3	55.2	47.9	48.2	49.3	57.2	58.3	35.7	36.8	49.7	50.8	79.9	58.5	71.2	66.8	69.9	48.5	66.2	61.8
5 PARKES RD, MOSS VALE NSW 2577 (EAST)	22	1	GF	61.1	54.1	74.5	67.7	69.0	69.7	78.0	78.7	56.5	57.2	70.5	71.2	85.6	80.3	93.9	88.3	75.6	70.3	88.9	83.3
5 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	22	1	GF	58.9	53.2	73.2	67.0	67.7	68.5	76.7	77.5	55.2	56.0	69.2	70.0	86.2	78.8	94.6	86.8	76.2	68.8	89.6	81.8
7 PARKES RD, MOSS VALE NSW 2577	23	1	GF	58.9	52.6	72.1	65.8	62.6	62.3	71.6	71.3	50.1	49.8	64.1	63.8	85.2	78.5	92.5	79.1	75.2	68.5	87.5	74.1
9 PARKES RD, MOSS VALE NSW 2577	25	1	GF	57.6	48.5	70.6	61.5	62.9	62.6	71.9	71.6	50.4	50.1	64.4	64.1	84.1	70.7	91.6	74.1	74.1	60.7	86.6	69.1
11-13 PARKES RD, MOSS VALE NSW 2577 (E)	27	1	GF	55.8	42.5	69.9	57.1	59.8	59.0	68.8	68.0	47.3	46.5	61.3	60.5	83.4	63.7	91.2	71.8	73.4	53.7	86.2	66.8
11-13 PARKES RD, MOSS VALE NSW 2577 (S)	27	1	GF	55.5	40	69.8	53.9	54.6	54.3	63.6	63.3	42.1	41.8	56.1	55.8	83.5	62.9	91.3	71.5	73.5	52.9	86.3	66.5
105 LACKEY RD, MOSS VALE NSW 2577	28	1	GF	49.3	43.1	61.9	56.1	68.5	64.7	77.5	73.7	56.0	52.2	70.0	66.2	74.0	66.8	81.3	74.0	64	56.8	76.3	69
105 LACKEY RD, MOSS VALE NSW 2577	28	1	F1	49.7	45	62.3	57.7	73.3	69.0	82.3	78.0	60.8	56.5	74.8	70.5	74.5	68.9	82.1	75.3	64.5	58.9	77.1	70.3
105 LACKEY RD, MOSS VALE NSW 2577 (EAST)	28	1	GF	59.4	53.8	72.9	67.6	69.5	70.9	78.5	79.9	57.0	58.4	71.0	72.4	81.5	79.4	86.4	87.6	71.5	69.4	81.4	82.6
105 LACKEY RD, MOSS VALE NSW 2577 (SOUT)	28	1	GF	57.6	52.1	70.9	65.6	67.3	68.3	76.3	77.3	54.8	55.8	68.8	69.8	74.7	77.5	90.7	85.5	64.7	67.5	85.7	80.5
101 LACKEY RD, MOSS VALE NSW 2577	29	1	GF	55.4	50.3	68.8	64.0	63.8	67.4	72.8	76.4	51.3	54.9	65.3	68.9	80.3	75.8	88.2	83.5	70.3	65.8	83.2	78.5
103 Lackey Rd (New building)	111	1	GF	58.4	52.7	64.7	60.9	50.5	65.9	59.5	74.9	38.0	53.4	52.0	67.4	75.4	72.6	83.9	81.2	73.3	67.7	86.1	80.1

Receiver	No.	NCA	FI	Predicted Noise Levels (dBA Lmax)																			
				Scenario 4 Existing Fleet		Scenario 4 New Fleet		Scenario 6a (Country Horn)				Scenario 6a (Town Horn)				Scenario 6b (Country Horn)				Scenario 6b (Town Horn)			
				L1	L2	L1	L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet – L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2
171 LACKEY RD, MOSS VALE NSW 2577	67	2	GF	45	47.1	65.0	61.3	51.2	68.6	60.2	77.6	38.7	56.1	52.7	70.1	75.8	72.9	83.9	81.4	59.5	63.4	73.8	78.2
2 GARRETT ST, MOSS VALE NSW 2577 (NORTH)	68	2	GF	38.9	41.9	65.4	58.4	45.5	57.6	54.5	66.6	33.0	45.1	47.0	59.1	75.9	67.5	84.3	75.7	52.1	62.3	66.5	77.7
4 GARRETT ST, MOSS VALE NSW 2577	69	2	GF	43.8	40	66.1	62.3	47.3	66.6	56.3	75.6	34.8	54.1	48.8	68.1	76.3	74.0	84.9	82.4	55.9	52.2	69.8	68.9
6 GARRETT ST, MOSS VALE NSW 2577	70	2	GF	35.3	39.6	72.3	66.4	54.7	66.5	63.7	75.5	42.2	54.0	56.2	68.0	84.1	79.0	92.0	88.3	48	52.7	61.4	69.3
1 INNES RD, MOSS VALE NSW 2577	71	2	GF	29.8	31.6	72.2	66.2	51.7	67.0	60.7	76.0	39.2	54.5	53.2	68.5	83.8	77.9	90.8	86.0	42.3	45.4	56.8	60.2
8A GARRETT ST, MOSS VALE NSW 2577 (EAST)	71	2	GF	29.1	31.9	66.9	65.1	51.8	66.6	60.8	75.6	39.3	54.1	53.3	68.1	81.4	76.8	89.4	85.0	42.6	45.9	57.2	61.2
8A GARRETT ST, MOSS VALE NSW 2577 (NORTH	71	2	GF	34.4	35.1	69.3	64.1	57.7	59.6	66.7	68.6	45.2	47.1	59.2	61.1	80.1	75.9	88.2	84.1	46.8	48.5	61	63.4
1 GARRETT ST, MOSS VALE NSW 2577	72	2	GF	48.7	52.1	70.9	66.0	52.7	69.3	61.7	78.3	40.2	56.8	54.2	70.8	82.5	72.4	93.4	86.9	64.4	68.4	79.1	83.5
161 LACKEY RD, MOSS VALE NSW 2577	73	2	GF	51.4	53.3	64.3	48.7	48.0	51.3	57.0	60.3	35.5	38.8	49.5	52.8	69.4	58.4	76.3	66.5	67.2	69	81.8	84.2
159 LACKEY RD, MOSS VALE NSW 2577	74	2	GF	51.8	54.4	62.7	46.5	47.7	48.7	56.7	57.7	35.2	36.2	49.2	50.2	68.6	56.9	79.0	65.2	67.8	71.5	82.5	86.6
3 GARRETT ST, MOSS VALE NSW 2577	75	2	GF	28.7	31.8	70.0	67.4	53.2	67.7	62.2	76.7	40.7	55.2	54.7	69.2	82.8	79.3	90.4	87.6	58.8	48.3	73	63.4
1A INNES RD, MOSS VALE NSW 2577 (EAST)	76	2	GF	34.2	35.7	71.2	51.9	51.1	52.2	60.1	61.2	38.6	39.7	52.6	53.7	84.4	63.1	90.2	70.6	46.6	49.1	60.8	63.6
1A INNES RD, MOSS VALE NSW 2577 (NORTH)	76	2	GF	36.1	34	64.4	58.2	50.7	52.4	59.7	61.4	38.2	39.9	52.2	53.9	68.2	75.7	75.3	84.4	48.5	47.6	61.9	62
173 LACKEY RD, MOSS VALE NSW 2577	77	2	GF	45.7	48.2	70.6	46.4	52.3	51.7	61.3	60.7	39.8	39.2	53.8	53.2	83.6	58.8	88.6	66.6	61.1	64	75.6	79.6
175 LACKEY RD, MOSS VALE NSW 2577	78	2	GF	46	48.6	68.8	66.8	51.1	53.8	60.1	62.8	38.6	41.3	52.6	55.3	81.7	82.9	89.3	89.7	61.4	64.3	75.9	79.1
177 LACKEY RD, MOSS VALE NSW 2577	79	2	GF	45.7	48.2	55.5	66.9	49.2	50.2	58.2	59.2	36.7	37.7	50.7	51.7	66.0	80.8	79.6	89.3	61	63.9	75.6	78.6
179 LACKEY RD, MOSS VALE NSW 2577	80	2	GF	45.4	47.9	68.9	66.8	53.2	54.0	62.2	63.0	40.7	41.5	54.7	55.5	83.2	81.3	81.7	89.8	63	65.6	77.3	80.3
181 LACKEY RD, MOSS VALE NSW 2577	81	2	GF	47.5	49.9	68.1	67.2	52.7	54.3	61.7	63.3	40.2	41.8	54.2	55.8	80.2	82.6	89.3	90.3	63.2	65.5	77.3	80.2
183 LACKEY RD, MOSS VALE NSW 2577	82	2	GF	44.9	47.3	67.7	67.4	51.8	52.8	60.8	61.8	39.3	40.3	53.3	54.3	80.4	82.8	89.7	90.6	60.2	62.8	74.3	77.5
185 LACKEY RD, MOSS VALE NSW 2577	84	2	GF	35.8	39.2	64.9	60.5	51.7	52.7	60.7	61.7	39.2	40.2	53.2	54.2	79.3	64.0	85.3	88.3	49.2	54.9	60	69.3
187 LACKEY RD, MOSS VALE NSW 2577	85	2	GF	41.4	46.5	56.9	55.5	56.4	52.8	65.4	61.8	43.9	40.3	57.9	54.3	68.9	68.0	83.6	78.3	53	62	61.9	76.6
189 LACKEY RD, MOSS VALE NSW 2577	86	2	GF	44	46.1	66.8	66.9	51.7	51.6	60.7	60.6	39.2	39.1	53.2	53.1	81.4	81.2	91.9	90.7	59.2	61.6	73.4	76.1
191 LACKEY RD, MOSS VALE NSW 2577	87	2	GF	43.7	45.8	67.1	67.1	50.8	52.0	59.8	61.0	38.3	39.5	52.3	53.5	81.8	81.4	92.1	90.9	58.8	61.2	73.1	75.7
11 GARRETT ST, MOSS VALE NSW 2577	94	2	GF	31.6	34.5	66.0	66.4	52.6	53.6	61.6	62.6	40.1	41.1	54.1	55.1	79.6	81.9	89.4	90.8	47.1	50.4	61	65.9
9 GARRETT ST, MOSS VALE NSW 2577	96	2	GF	31.1	34.2	66.2	66.7	52.9	54.0	61.9	63.0	40.4	41.5	54.4	55.5	81.0	82.1	90.0	91.2	46.7	50.9	72.7	81.9
7 GARRETT ST, MOSS VALE NSW 2577	97	2	GF	32.1	34.4	56.1	55.4	53.3	53.0	62.3	62.0	40.8	40.5	54.8	54.5	69.5	68.4	71.5	87.9	46.7	60.3	60.8	75.9
5 GARRETT ST, MOSS VALE NSW 2577	99	2	GF	31.2	33.5	66.8	67.0	51.9	52.0	60.9	61.0	39.4	39.5	53.4	53.5	80.5	81.7	90.5	90.3	44.9	56.9	59.6	74
8 GARRETT ST, MOSS VALE NSW 2577 (GARR)	100	2	GF	34	34.1	55.1	64.4	52.3	54.5	61.3	63.5	39.8	42.0	53.8	56.0	69.6	81.7	80.2	90.4	46.4	47.8	60.2	62.9
8 GARRETT ST, MOSS VALE NSW 2577 (INNES)	100	2	GF	28	31.2	63.1	64.9	52.5	53.5	61.5	62.5	40.0	41.0	54.0	55.0	78.2	80.6	87.7	89.4	43.6	47.3	58.2	62.2

Receiver	No.	NCA	FI	Predicted Noise Levels (dBA Lmax)																			
				Scenario 4 Existing Fleet		Scenario 4 New Fleet		Scenario 6a (Country Horn)				Scenario 6a (Town Horn)				Scenario 6b (Country Horn)				Scenario 6b (Town Horn)			
				L1	L2	L1	L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet – L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2
10 GARRETT ST, MOSS VALE NSW 2577	101	2	GF	33.5	34.3	64.5	65.6	50.6	55.7	59.6	64.7	38.1	43.2	52.1	57.2	78.6	81.2	88.2	90.0	46.1	48.1	60.5	63
12 GARRETT ST, MOSS VALE NSW 2577	102	2	GF	32.9	34.6	64.8	66.2	51.0	59.1	60.0	68.1	38.5	46.6	52.5	60.6	77.3	81.8	88.6	92.6	45.7	48.1	60.3	63.4
14 GARRETT ST, MOSS VALE NSW 2577	103	2	GF	34.7	36.2	65.0	66.6	55.0	68.0	64.0	77.0	42.5	55.5	56.5	69.5	77.5	84.3	89.0	90.3	48.3	50.1	62.6	64.9
16 GARRETT ST, MOSS VALE NSW 2577	104	2	GF	34.1	34.9	64.4	67.4	55.2	72.0	64.2	81.0	42.7	59.5	56.7	73.5	77.5	82.4	89.0	91.6	47.4	48.6	61.6	65
4 INNES RD, MOSS VALE NSW 2577	106	2	GF	26.8	29.1	65.1	66.5	51.1	67.1	60.1	76.1	38.6	54.6	52.6	68.6	77.6	82.1	88.9	91.0	42	44.9	56.5	59.7
2 INNES RD, MOSS VALE NSW 2577	107	2	GF	29.5	30.1	64.0	67.3	59.3	67.0	68.3	76.0	46.8	54.5	60.8	68.5	76.3	80.0	85.9	89.5	50.4	45.8	64.4	60.6
8 GARRETT ST, MOSS VALE NSW 2577	144	2	GF	31.7	33.9	64.1	67.5	60.0	63.8	69.0	72.8	47.5	51.3	61.5	65.3	76.5	80.3	86.2	90.2	45.2	49.9	59.7	63.3
35 KOYONG CL, MOSS VALE NSW 2577	30	3	GF	51.2	47.7	64.2	67.7	61.1	66.8	70.1	75.8	48.6	54.3	62.6	68.3	76.7	80.5	86.3	90.4	65.4	62.6	78.9	76.2
33 KOYONG CL, MOSS VALE NSW 2577	32	3	GF	51.6	48	59.9	63.0	64.4	66.7	73.4	75.7	51.9	54.2	65.9	68.2	72.3	75.5	81.9	85.3	65.8	62.9	78.9	76.4
31 KOYONG CL, MOSS VALE NSW 2577	33	3	GF	51.9	44.7	60.1	63.2	64.6	66.7	73.6	75.7	52.1	54.2	66.1	68.2	72.4	75.7	82.0	85.4	65.9	57.5	79.3	70.7
29 KOYONG CL	34	3	GF	52.7	49	60.2	63.3	64.0	66.2	73.0	75.2	51.5	53.7	65.5	67.7	75.0	75.7	84.6	85.4	66.3	64	79.9	77.4
45 HOSKINS ST, MOSS VALE NSW 2577 (SOUT)	35	3	GF	59	53.1	61.0	63.9	64.1	66.3	73.1	75.3	51.6	53.8	65.6	67.8	75.8	76.2	85.3	85.6	74.1	69	87	83.3
45 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	35	3	GF	58.8	52.9	61.0	64.3	82.1	86.7	91.1	95.7	69.6	74.2	83.6	88.2	73.4	77.0	83.0	86.9	73.8	67.9	85.8	81
8 BAKER RD (SOUTH)	36	3	GF	54	51.8	58.1	59.8	85.1	91.8	94.1	100.8	72.6	79.3	86.6	93.3	69.5	73.4	78.8	83.2	71.4	66.8	84.4	80
8 BAKER RD (WEST)	36	3	GF	56	50.9	52.6	56.8	71.0	70.1	80.0	79.1	58.5	57.6	72.5	71.6	62.1	72.3	71.5	82.7	70.1	65.9	83.2	79.1
38 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	37	3	GF	58	51.1	56.7	52.9	76.1	76.8	85.1	85.8	63.6	64.3	77.6	78.3	65.9	62.2	74.8	73.9	72.5	62.4	88.4	81.9
38 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	38	3	GF	47.4	34.6	48.0	53.1	72.7	77.0	81.7	86.0	60.2	64.5	74.2	78.5	58.0	62.7	66.4	74.3	59.4	48.4	71.3	61.5
34 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	40	3	GF	48.2	33.3	42.9	45.2	77.5	78.3	86.5	87.3	65.0	65.8	79.0	79.8	52.3	55.4	61.8	65.2	58.6	46.9	74	60.2
34A HOSKINS ST, MOSS VALE NSW 2577 (WEST	41	3	GF	57.1	54.2	42.2	45.4	72.9	78.9	81.9	87.9	60.4	66.4	74.4	80.4	52.6	55.9	62.2	66.2	72.8	69.3	85.4	82.6
34A HOSKINS ST, MOSS VALE NSW 2577 (NORT	42	3	GF	58.7	38.6	47.2	49.2	74.6	77.4	83.6	86.4	62.1	64.9	76.1	78.9	56.8	58.5	66.0	68.4	74.4	53.1	85.2	65.6
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	43	3	GF	51.8	41.8	62.0	65.6	80.1	84.0	89.1	93.0	67.6	71.5	81.6	85.5	74.4	78.4	84.1	88.5	58.2	65.7	70.3	79.4
5/8 HAWKINS ST, MOSS VALE NSW 2577 (N)	44	3	GF	57.8	33	64.7	66.5	79.4	84.8	88.4	93.8	66.9	72.3	80.9	86.3	77.2	79.0	86.8	89.2	73.6	48.8	83.6	61.6
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	45	3	GF	55.9	53.7	65.1	68.2	79.5	84.2	88.5	93.2	67.0	71.7	81.0	85.7	77.8	81.5	87.5	91.6	71.7	72.9	84.3	84.7
2/8 HAWKINS ST, MOSS VALE NSW 2577	46	3	GF	40.7	53.1	41.7	45.2	80.3	78.8	89.3	87.8	67.8	66.3	81.8	80.3	68.8	58.3	78.0	68.4	56	70.8	74.6	84.3
5/8 HAWKINS ST, MOSS VALE NSW 2577 (S)	47	3	GF	57.3	53.7	47.2	49.4	78.5	76.9	87.5	85.9	66.0	64.4	80.0	78.4	56.6	59.1	65.8	68.6	73.2	71.3	76.7	84.8
12/6 HAWKINS ST, MOSS VALE NSW 2577 (N)	48	3	GF	55.3	53.9	48.6	47.9	75.3	75.2	84.3	84.2	62.8	62.7	76.8	76.7	58.5	57.6	66.9	67.0	70.2	72.6	84.3	85.3
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	49	3	GF	54.6	54.2	58.9	61.0	86.8	95.3	95.8	104.3	74.3	82.8	88.3	96.8	71.1	74.0	80.6	84.6	70.4	72.8	84.7	85.6
4/6 HAWKINS ST, MOSS VALE NSW 2577	50	3	GF	53.1	37.4	59.2	61.9	88.5	99.2	97.5	108.2	76.0	86.7	90.0	100.7	71.4	74.3	80.9	84.1	69.3	54	80.3	83.3
9/6 HAWKINS ST, MOSS VALE NSW 2577	51	3	GF	43.9	42.8	58.9	61.5	90.3	101.2	99.3	110.2	77.8	88.7	91.8	102.7	71.0	73.9	80.6	83.6	58.9	58	78.6	73.3
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	GF	53.7	53.3	58.6	61.2	92.1	100.1	101.1	109.1	79.6	87.6	93.6	101.6	73.0	75.6	82.3	85.3	71.4	71.2	86.9	85.7

Receiver	No.	NCA	Fl	Predicted Noise Levels (dBA Lmax)																	
				Scenario 4 Existing Fleet		Scenario 4 New Fleet		Scenario 6a (Country Horn)				Scenario 6a (Town Horn)				Scenario 6b (Country Horn)				Scenario 6b (Town Horn)			
				L1	L2	L1	L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet – L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	F1	53.9	53.6	60.8	63.2	93.3	97.3	102.3	106.3	80.8	84.8	94.8	98.8	73.2	75.5	82.3	85.2	71.8	71.4	87.1	85.9
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	GF	52.4	53.2	58.1	60.5	96.7	95.2	105.7	104.2	84.2	82.7	98.2	96.7	70.2	72.8	79.3	82.5	69.6	71.9	84.4	85.8
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	F1	52.6	53.5	48.4	54.5	99.3	91.0	108.3	100.0	86.8	78.5	100.8	92.5	59.2	64.9	65.0	74.3	71	72.1	85	86.2
10/6 HAWKINS ST, MOSS VALE NSW 2577	54	3	GF	43	41.9	51.1	59.8	98.8	89.5	107.8	98.5	86.3	77.0	100.3	91.0	63.0	72.0	66.9	81.6	59.5	58.4	66.5	82.9
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	55	3	GF	53.7	53.8	57.2	59.4	95.8	87.2	104.8	96.2	83.3	74.7	97.3	88.7	69.2	71.6	78.4	81.1	70.5	71.7	85.5	85.3
34 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	109	3	GF	55.6	54	56.9	59.1	92.7	85.5	101.7	94.5	80.2	73.0	94.2	87.0	68.8	71.2	78.1	80.7	70.1	69.8	85	83.2
36 Hoskins St NSW 2577	112	3	GF	50	38.1	55.5	57.7	84.9	82.4	93.9	91.4	72.4	69.9	86.4	83.9	67.6	69.7	76.9	79.2	63.8	50.4	76.7	63.5
27 Koyong Cl, Moss Vale NSW 2577	113	3	GF	52.8	49.5	53.5	56.4	85.6	81.3	94.6	90.3	73.1	68.8	87.1	82.8	65.6	68.2	75.5	77.5	67.5	64.5	80.9	77
25 Koyong Cl, Moss Vale NSW 2577 (W)	114	3	GF	54.1	51.6	55.6	57.4	85.4	81.8	94.4	90.8	72.9	69.3	86.9	83.3	69.6	71.6	78.9	81.1	69.8	65.8	83.2	80.1
25 Koyong Cl, Moss Vale NSW 2577 (S)	115	3	GF	55.2	50	55.3	57.1	82.3	78.9	91.3	87.9	69.8	66.4	83.8	80.4	67.5	68.9	76.6	78.4	69.6	64	83.2	79.6
31 Hoskins St	117	3	GF	52.7	48	55.1	56.8	81.5	79.1	90.5	88.1	69.0	66.6	83.0	80.6	66.7	68.7	76.0	78.1	67.2	64.6	80.7	78
33 Hoskins St	118	3	GF	53.7	48.6	44.5	47.9	78.2	78.5	87.2	87.5	65.7	66.0	79.7	80.0	57.1	60.4	66.0	70.9	68.1	64.6	81.7	77.8
29 Hoskins St Moss Vake 2577	119	3	GF	52.8	45.6	44.2	49.4	75.1	77.9	84.1	86.9	62.6	65.4	76.6	79.4	56.7	60.9	77.7	86.9	67.3	59	79.7	72.3
215 ARGYLE ST, MOSS VALE NSW 2577	57	4	GF	49.7	51.8	44.8	47.8	75.6	76.9	84.6	85.9	63.1	64.4	77.1	78.4	56.7	70.3	65.8	80.9	68.2	70.6	82.7	84.4
217 ARGYLE ST, MOSS VALE NSW 2577	58	4	GF	51.4	52.4	44.3	47.2	70.3	72.9	79.3	81.9	57.8	60.4	71.8	74.4	54.9	66.9	64.6	79.0	68.6	71.2	83.2	85
219 ARGYLE ST, MOSS VALE NSW 2577	59	4	GF	51.7	52.9	46.8	47.8	72.6	83.8	81.6	92.8	60.1	71.3	74.1	85.3	56.4	57.8	65.2	67.9	67.3	71.8	83.6	87.6
223 ARGYLE ST, MOSS VALE NSW 2577	60	4	GF	51.8	53.9	41.3	44.6	72.3	81.9	81.3	90.9	59.8	69.4	73.8	83.4	53.6	57.3	63.2	67.2	67.5	74.3	84	85.3
225 ARGYLE ST, MOSS VALE NSW 2577	60	4	GF	51.3	54.2	46.4	47.9	70.3	82.5	79.3	91.5	57.8	70.0	71.8	84.0	56.1	58.1	65.5	68.0	67.5	72.4	84	86.6
221 ARGYLE ST, MOSS VALE NSW 2577	61	4	GF	51.9	53.3	45.7	47.9	67.0	81.8	76.0	90.8	54.5	69.3	68.5	83.3	55.7	58.1	65.3	68.4	67.6	72.1	83.9	86
239A ARGYLE ST, MOSS VALE NSW 2577	62	4	GF	50.7	54	47.0	49.2	65.5	80.2	74.5	89.2	53.0	67.7	67.0	81.7	58.3	60.1	67.6	69.9	66.3	70	80.9	84.5
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	GF	50.9	54.1	46.8	48.4	65.3	71.5	74.3	80.5	52.8	59.0	66.8	73.0	57.4	58.6	66.6	70.0	66.5	70.3	81.2	85.2
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	F1	50.9	54.3	39.8	42.7	79.6	74.5	88.6	83.5	67.1	62.0	81.1	76.0	52.0	54.9	61.5	64.7	66.7	70.5	81.3	85.4
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	GF	46.8	49.7	42.2	43.5	79.4	79.4	88.4	88.4	66.9	66.9	80.9	80.9	60.4	55.8	69.4	65.6	62.3	65.5	76.9	80.3
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	F1	46.9	49.8	67.7	66.6	50.5	51.5	59.5	60.5	38.0	39.0	52.0	53.0	80.1	79.8	90.0	88.2	62.4	65.7	77	80.4
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	GF	46.9	50	71.8	66.0	69.0	70.1	78.0	79.1	56.5	57.6	70.5	71.6	83.3	77.7	91.1	85.1	65	65.7	79.6	80.4
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	F1	47.8	50.7	65.2	52.0	47.9	48.9	56.9	57.9	35.4	36.4	49.4	50.4	73.8	60.4	81.7	68.5	65.8	66.2	80.3	80.6
2 GARRETT ST, MOSS VALE NSW 2577 (EAST)	66	4	GF	47.8	51	66.2	62.7	49.6	66.7	58.6	75.7	37.1	54.2	51.1	68.2	77.5	74.5	85.9	82.0	63.4	67	78	81.9
240 Argyle St, Moss Vale	121	4	GF	50.1	52.5	67.4	64.9	49.0	51.4	58.0	60.4	36.5	38.9	50.5	52.9	79.8	75.8	88.2	85.1	65.7	72.9	80.3	88.2
374 Argyle St, Moss Vale	127	4	GF	33.3	44	68.3	63.6	48.5	49.4	57.5	58.4	36.0	36.9	50.0	50.9	79.6	74.0	88.2	84.6	53.9	60	68.8	74.3

Appendix Table 5: Predicted Noise Levels for Operational Scenarios - Residential Receivers – Standard Criteria – PDR Noise Wall (Exceedances highlighted with a Y)

Receiver	No.	NCA	FI	Scenario 1								Scenario 2								Scenario 3							
				Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet		
					Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)
6 PARKES RD, MOSS VALE NSW 2577 (EAST)	14	1	GF	20.6	N	N	N	24.3	N	N	N	25.4	N	N	N	35.5	N	N	N	25.4	N	N	N	32.3	N	N	N
6 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	14	1	GF	21.8	N	N	N	24.7	N	N	N	27.2	N	N	N	37	N	N	N	27.2	N	N	N	35.2	N	N	N
6 PARKES RD, MOSS VALE NSW 2577 (NORTH)	15	1	GF	15.8	N	N	N	20.4	N	N	N	24.7	N	N	N	34.5	N	N	N	24.7	N	N	N	29.4	N	N	N
12 PARKES RD, MOSS VALE NSW 2577	18	1	GF	17.1	N	N	N	20.7	N	N	N	24.1	N	N	N	34.6	N	N	N	24.1	N	N	N	30.9	N	N	N
14 PARKES RD, MOSS VALE NSW 2577	19	1	GF	15.2	N	N	N	18.8	N	N	N	23.8	N	N	N	32.5	N	N	N	23.8	N	N	N	29.3	N	N	N
8 PARKES RD, MOSS VALE NSW 2577 (NORHT)	20	1	GF	17.7	N	N	N	21	N	N	N	26.4	N	N	N	35	N	N	N	26.4	N	N	N	31.8	N	N	N
8 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	20	1	GF	24.8	N	N	N	27.4	N	N	N	30.2	N	N	N	36.5	N	N	N	30.2	N	N	N	36.1	N	N	N
10 PARKES RD, MOSS VALE NSW 2577	21	1	GF	14.8	N	N	N	19	N	N	N	22.7	N	N	N	33.1	N	N	N	22.7	N	N	N	28.3	N	N	N
5 PARKES RD, MOSS VALE NSW 2577 (EAST)	22	1	GF	34	N	N	N	36.9	N	N	N	40.5	N	N	Y	51.9	N	Y	Y	40.5	N	N	Y	46.9	N	Y	Y
5 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	22	1	GF	32.8	N	N	N	35.3	N	N	N	38.2	N	N	Y	48.2	N	Y	Y	38.2	N	N	Y	45.9	N	Y	Y
7 PARKES RD, MOSS VALE NSW 2577	23	1	GF	31.2	N	N	N	33.4	N	N	N	39.5	N	N	Y	47	N	Y	Y	39.5	N	N	Y	44.6	N	Y	Y
9 PARKES RD, MOSS VALE NSW 2577	25	1	GF	29.2	N	N	N	31.3	N	N	N	38.1	N	N	Y	43	N	N	Y	38.1	N	N	N	42.8	N	N	Y
11-13 PARKES RD, MOSS VALE NSW 2577 (E)	27	1	GF	27.8	N	N	N	29.6	N	N	N	35.5	N	N	N	41.2	N	N	Y	35.5	N	N	N	41.1	N	N	Y
11-13 PARKES RD, MOSS VALE NSW 2577 (S)	27	1	GF	26.9	N	N	N	28.8	N	N	N	34.9	N	N	N	40.3	N	N	Y	34.9	N	N	N	40.4	N	N	Y
105 LACKEY RD, MOSS VALE NSW 2577	28	1	F 1	28.9	N	N	N	32.3	N	N	N	28.8	N	N	N	35.8	N	N	N	28.8	N	N	N	37.9	N	N	N
105 LACKEY RD, MOSS VALE NSW 2577 (EAST)	28	1	GF	34.3	N	N	N	38.1	N	N	Y	41.7	N	N	Y	51.1	N	Y	Y	41.7	N	N	Y	47.5	N	Y	Y
105 LACKEY RD, MOSS VALE NSW 2577 (SOUT)	28	1	GF	32.4	N	N	N	35.4	N	N	N	40.4	N	N	Y	50.3	N	Y	Y	40.4	N	N	Y	44.6	N	Y	Y
101 LACKEY RD, MOSS VALE NSW 2577	29	1	GF	30.7	N	N	N	35.8	N	N	N	38.2	N	N	Y	50	N	Y	Y	38.2	N	N	Y	44.1	N	Y	Y
103 Lackey Rd (New building)	111	1	GF	33.5	N	N	N	38.4	N	N	Y	41.3	N	N	Y	51.8	N	Y	Y	41.3	N	N	Y	47	N	Y	Y
115 LACKEY RD, MOSS VALE NSW 2577	130	1	GF	33.6	N	N	N	35	N	N	N	41.3	N	N	Y	46.2	N	Y	Y	41.3	N	N	Y	48.3	N	Y	Y
113 LACKEY RD, MOSS VALE NSW 2577	131	1	GF	32.6	N	N	N	34	N	N	N	40.1	N	N	Y	45.2	N	Y	Y	40.1	N	N	Y	47.1	N	Y	Y
111 LACKEY RD, MOSS VALE NSW 2577	132	1	GF	31.6	N	N	N	32.9	N	N	N	39.5	N	N	Y	44.4	N	Y	Y	39.5	N	N	Y	45.8	N	Y	Y
4 PARKES RD, MOSS VALE NSW 2577 (EAST)	134	1	GF	25.9	N	N	N	27.6	N	N	N	35.3	N	N	N	40.4	N	N	Y	35.3	N	N	N	40	N	N	Y
4 PARKES RD, MOSS VALE NSW 2577 (NORTH)	135	1	GF	19.3	N	N	N	22.7	N	N	N	27.8	N	N	N	35.8	N	N	N	27.8	N	N	N	30.9	N	N	N
3 FARMERS PL, MOSS VALE NSW 2577	137	1	GF	45.3	N	Y	Y	49.1	N	Y	Y	38.1	N	N	Y	47.1	N	Y	Y	38.1	N	N	Y	48.8	N	Y	Y
3 FARMERS PL, MOSS VALE NSW 2577	137	1	F 1	45.8	N	Y	Y	50.7	N	Y	Y	39	N	N	Y	48.2	N	Y	Y	39	N	N	Y	49.9	N	Y	Y
171 LACKEY RD, MOSS VALE NSW 2577	67	2	GF	42.3	N	N	Y	45.3	N	Y	Y	24.6	N	N	N	39.5	N	N	Y	24.6	N	N	N	33.3	N	N	N
2 GARRETT ST, MOSS VALE NSW 2577 (NORTH)	68	2	GF	40	N	N	Y	43.9	N	Y	Y	21.1	N	N	N	42.4	N	N	Y	21.1	N	N	N	29.5	N	N	N
4 GARRETT ST, MOSS VALE NSW 2577	69	2	GF	36.6	N	N	N	40.7	N	N	Y	21.8	N	N	N	33.7	N	N	N	21.8	N	N	N	29.6	N	N	N
6 GARRETT ST, MOSS VALE NSW 2577	70	2	GF	34.4	N	N	N	38.7	N	N	Y	19.7	N	N	N	32.6	N	N	N	19.7	N	N	N	27.9	N	N	N
1 INNES RD, MOSS VALE NSW 2577	71	2	GF	33.2	N	N	N	37.1	N	N	N	14.5	N	N	N	27.5	N	N	N	14.5	N	N	N	22	N	N	N
8A GARRETT ST, MOSS VALE NSW 2577 (EAST)	71	2	GF	33.7	N	N	N	37.3	N	N	N	14.4	N	N	N	28.6	N	N	N	14.4	N	N	N	21.9	N	N	N
8A GARRETT ST, MOSS VALE NSW 2577 (NORTH	71	2	GF	33.3	N	N	N	36.8	N	N	N	17.4	N	N	N	29.7	N	N	N	17.4	N	N	N	25.5	N	N	N
1 GARRETT ST, MOSS VALE NSW 2577	72	2	GF	42.9	N	N	Y	46.7	N	Y	Y	31.5	N	N	N	45.4	N	Y	Y	31.5	N	N	N	40.9	N	N	Y
11 GARRETT ST, MOSS VALE NSW 2577	94	2	GF	34.7	N	N	N	39.2	N	N	Y	16.8	N	N	N	30.6	N	N	N	16.8	N	N	N	23.6	N	N	N

Receiver	No.	NCA	FI	Scenario 1								Scenario 2								Scenario 3							
				Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet		
					Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)
9 GARRETT ST, MOSS VALE NSW 2577	96	2	GF	37.2	N	N	N	41.9	N	N	Y	17	N	N	N	31.5	N	N	N	17	N	N	N	23.6	N	N	N
7 GARRETT ST, MOSS VALE NSW 2577	97	2	GF	33.9	N	N	N	38.1	N	N	Y	17	N	N	N	30.7	N	N	N	17	N	N	N	23.9	N	N	N
5 GARRETT ST, MOSS VALE NSW 2577	99	2	GF	33.4	N	N	N	37.9	N	N	N	16.2	N	N	N	29.7	N	N	N	16.2	N	N	N	23.6	N	N	N
8 GARRETT ST, MOSS VALE NSW 2577 (GARR)	100	2	GF	33.1	N	N	N	36.8	N	N	N	16.6	N	N	N	29.3	N	N	N	16.6	N	N	N	24.7	N	N	N
8 GARRETT ST, MOSS VALE NSW 2577 (INNES)	100	2	GF	32.9	N	N	N	36.8	N	N	N	14.1	N	N	N	27.9	N	N	N	14.1	N	N	N	20.8	N	N	N
10 GARRETT ST, MOSS VALE NSW 2577	101	2	GF	32.4	N	N	N	36.3	N	N	N	16.6	N	N	N	29.7	N	N	N	16.6	N	N	N	24.6	N	N	N
12 GARRETT ST, MOSS VALE NSW 2577	102	2	GF	31.7	N	N	N	35.6	N	N	N	16.5	N	N	N	29.5	N	N	N	16.5	N	N	N	24.3	N	N	N
14 GARRETT ST, MOSS VALE NSW 2577	103	2	GF	30	N	N	N	33.5	N	N	N	18.1	N	N	N	31.1	N	N	N	18.1	N	N	N	25.7	N	N	N
16 GARRETT ST, MOSS VALE NSW 2577	104	2	GF	28.9	N	N	N	32.7	N	N	N	17.6	N	N	N	30.9	N	N	N	17.6	N	N	N	25.1	N	N	N
4 INNES RD, MOSS VALE NSW 2577	106	2	GF	30.5	N	N	N	34	N	N	N	12.4	N	N	N	25.9	N	N	N	12.4	N	N	N	18.9	N	N	N
2 INNES RD, MOSS VALE NSW 2577	107	2	GF	31.3	N	N	N	34.9	N	N	N	13.8	N	N	N	26.9	N	N	N	13.8	N	N	N	20.6	N	N	N
8 GARRETT ST, MOSS VALE NSW 2577	144	2	GF	31.9	N	N	N	35.3	N	N	N	16.4	N	N	N	29.4	N	N	N	16.4	N	N	N	24	N	N	N
35 KOYONG CL, MOSS VALE NSW 2577	30	3	GF	28.3	N	N	N	33.6	N	N	N	35.4	N	N	N	44.6	N	Y	Y	35.4	N	N	N	41.2	N	N	Y
33 KOYONG CL, MOSS VALE NSW 2577	32	3	GF	29	N	N	N	34.3	N	N	N	35.9	N	N	N	45.9	N	Y	Y	35.9	N	N	N	41.8	N	N	Y
31 KOYONG CL, MOSS VALE NSW 2577	33	3	GF	28.1	N	N	N	32.9	N	N	N	35.3	N	N	N	44.5	N	Y	Y	35.3	N	N	N	40.9	N	N	Y
29 KOYONG CL	34	3	GF	29.8	N	N	N	35.1	N	N	N	37.1	N	N	N	49.1	N	Y	Y	37.1	N	N	N	43	N	N	Y
45 HOSKINS ST, MOSS VALE NSW 2577 (SOUT)	35	3	GF	35	N	N	N	40.5	N	N	Y	42.9	N	N	Y	54.3	Y	Y	Y	42.9	N	N	Y	48.6	N	Y	Y
45 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	35	3	GF	34.7	N	N	N	40.2	N	N	Y	42.8	N	N	Y	53.6	Y	Y	Y	42.8	N	N	Y	48.5	N	Y	Y
8 BAKER RD (SOUTH)	36	3	GF	32.3	N	N	N	37.2	N	N	N	38.3	N	N	Y	50.7	N	Y	Y	38.3	N	N	Y	44.8	N	Y	Y
8 BAKER RD (WEST)	36	3	GF	31.9	N	N	N	36.9	N	N	N	39.8	N	N	Y	51.5	N	Y	Y	39.8	N	N	Y	45.5	N	Y	Y
38 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	37	3	GF	34.9	N	N	N	40.1	N	N	Y	42	N	N	Y	53.5	Y	Y	Y	42	N	N	Y	47.7	N	Y	Y
38 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	38	3	GF	28.1	N	N	N	32.1	N	N	N	38.1	N	N	Y	46.9	N	Y	Y	38.1	N	N	Y	40.7	N	N	Y
34 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	40	3	GF	24.4	N	N	N	28.7	N	N	N	35	N	N	N	45.5	N	Y	Y	35	N	N	N	38	N	N	N
34A HOSKINS ST, MOSS VALE NSW 2577 (WEST	41	3	GF	34.6	N	N	N	39.7	N	N	Y	41.7	N	N	Y	55.2	Y	Y	Y	41.7	N	N	Y	47.4	N	Y	Y
34A HOSKINS ST, MOSS VALE NSW 2577 (NORT	42	3	GF	32	N	N	N	36.9	N	N	N	40.6	N	N	Y	52.4	N	Y	Y	40.6	N	N	Y	46	N	Y	Y
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	43	3	GF	28.1	N	N	N	33	N	N	N	34	N	N	N	45.2	N	Y	Y	34	N	N	N	39.3	N	N	Y
5/8 HAWKINS ST, MOSS VALE NSW 2577 (N)	44	3	GF	31.5	N	N	N	36.6	N	N	N	40.3	N	N	Y	51.5	N	Y	Y	40.3	N	N	Y	45.2	N	Y	Y
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	45	3	GF	34.2	N	N	N	39.4	N	N	Y	40.5	N	N	Y	54.4	Y	Y	Y	40.5	N	N	Y	46.4	N	Y	Y
2/8 HAWKINS ST, MOSS VALE NSW 2577	46	3	GF	31.3	N	N	N	36.5	N	N	N	37.4	N	N	N	52.9	N	Y	Y	37.4	N	N	N	44	N	Y	Y
5/8 HAWKINS ST, MOSS VALE NSW 2577 (S)	47	3	GF	33.9	N	N	N	39	N	N	Y	40.9	N	N	Y	53.8	Y	Y	Y	40.9	N	N	Y	46.3	N	Y	Y
12/6 HAWKINS ST, MOSS VALE NSW 2577 (N)	48	3	GF	33.7	N	N	N	39	N	N	Y	41.4	N	N	Y	53.9	Y	Y	Y	41.4	N	N	Y	47.1	N	Y	Y
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	49	3	GF	34.2	N	N	N	39.4	N	N	Y	41.2	N	N	Y	53.8	Y	Y	Y	41.2	N	N	Y	47.2	N	Y	Y
4/6 HAWKINS ST, MOSS VALE NSW 2577	50	3	GF	30.6	N	N	N	35.4	N	N	N	37.3	N	N	N	50.1	N	Y	Y	37.3	N	N	N	43	N	N	Y
9/6 HAWKINS ST, MOSS VALE NSW 2577	51	3	GF	24.9	N	N	N	29.5	N	N	N	29.5	N	N	N	37.3	N	N	N	29.5	N	N	N	35.2	N	N	N
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	GF	33.8	N	N	N	39.1	N	N	Y	40.5	N	N	Y	53.7	Y	Y	Y	40.5	N	N	Y	46.6	N	Y	Y
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	F1	34.1	N	N	N	39.4	N	N	Y	40.7	N	N	Y	53.7	Y	Y	Y	40.7	N	N	Y	46.7	N	Y	Y
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	GF	33.1	N	N	N	38.4	N	N	Y	39.9	N	N	Y	53.4	Y	Y	Y	39.9	N	N	Y	46	N	Y	Y
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	F1	33.4	N	N	N	38.7	N	N	Y	40.1	N	N	Y	53.4	Y	Y	Y	40.1	N	N	Y	46	N	Y	Y
10/6 HAWKINS ST, MOSS VALE NSW 2577	54	3	GF	23.9	N	N	N	29	N	N	N	28.3	N	N	N	36.9	N	N	N	28.3	N	N	N	35.3	N	N	N

Receiver	No.	NCA	Fl	Scenario 1								Scenario 2								Scenario 3							
				Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet		
					Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)		Day (53)	Evening (43)	Night (38)
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	55	3	GF	33.8	N	N	N	39	N	N	Y	40.6	N	N	Y	53.9	Y	Y	Y	40.6	N	N	Y	46.7	N	Y	Y
34 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	109	3	GF	33.5	N	N	N	38.5	N	N	Y	38.6	N	N	Y	49.1	N	Y	Y	38.6	N	N	Y	44.9	N	Y	Y
36 Hoskins St NSW 2577	112	3	GF	26.4	N	N	N	30.6	N	N	N	37.4	N	N	N	39.6	N	N	Y	37.4	N	N	N	39	N	N	Y
27 Koyong Cl, Moss Vale NSW 2577	113	3	GF	30.2	N	N	N	35.2	N	N	N	37.2	N	N	N	48.4	N	Y	Y	37.2	N	N	N	43.3	N	Y	Y
25 Koyong Cl, Moss Vale NSW 2577 (W)	114	3	GF	32.3	N	N	N	37.6	N	N	N	38.3	N	N	Y	50.4	N	Y	Y	38.3	N	N	Y	44.9	N	Y	Y
25 Koyong Cl, Moss Vale NSW 2577 (S)	115	3	GF	31.9	N	N	N	37	N	N	N	38.5	N	N	Y	50.2	N	Y	Y	38.5	N	N	Y	45	N	Y	Y
31 Hoskins St	117	3	GF	30	N	N	N	35.1	N	N	N	37.3	N	N	N	48.5	N	Y	Y	37.3	N	N	N	43	N	N	Y
33 Hoskins St	118	3	GF	30.8	N	N	N	35.7	N	N	N	38	N	N	N	47.8	N	Y	Y	38	N	N	N	43.6	N	Y	Y
29 Hoskins St Moss Vake 2577	119	3	GF	29.4	N	N	N	34	N	N	N	35.4	N	N	N	43	N	N	Y	35.4	N	N	N	42.2	N	N	Y
215 ARGYLE ST, MOSS VALE NSW 2577	57	4	GF	30.6	N	N	N	35.9	N	N	N	37.4	N	N	N	51.2	N	Y	Y	37.4	N	N	N	44	N	Y	Y
217 ARGYLE ST, MOSS VALE NSW 2577	58	4	GF	31.9	N	N	N	37.2	N	N	N	38.7	N	N	Y	52.3	N	Y	Y	38.7	N	N	Y	45	N	Y	Y
219 ARGYLE ST, MOSS VALE NSW 2577	59	4	GF	31.9	N	N	N	37.2	N	N	N	39.1	N	N	Y	52.6	N	Y	Y	39.1	N	N	Y	45.4	N	Y	Y
223 ARGYLE ST, MOSS VALE NSW 2577	60	4	GF	31.6	N	N	N	36.9	N	N	N	39.3	N	N	Y	51.4	N	Y	Y	39.3	N	N	Y	45.5	N	Y	Y
225 ARGYLE ST, MOSS VALE NSW 2577	60	4	GF	34.3	N	N	N	39.4	N	N	Y	39.1	N	N	Y	53.4	Y	Y	Y	39.1	N	N	Y	46	N	Y	Y
221 ARGYLE ST, MOSS VALE NSW 2577	61	4	GF	33.1	N	N	N	38.2	N	N	Y	39.3	N	N	Y	52.9	N	Y	Y	39.3	N	N	Y	45.6	N	Y	Y
239A ARGYLE ST, MOSS VALE NSW 2577	62	4	GF	36.3	N	N	N	41	N	N	Y	37.4	N	N	N	49.9	N	Y	Y	37.4	N	N	N	44.4	N	Y	Y
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	GF	36	N	N	N	40.8	N	N	Y	37	N	N	N	50.9	N	Y	Y	37	N	N	N	44.7	N	Y	Y
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	F 1	36.4	N	N	N	41.3	N	N	Y	37.3	N	N	N	51.3	N	Y	Y	37.3	N	N	N	44.7	N	Y	Y
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	GF	35.1	N	N	N	40.2	N	N	Y	33.3	N	N	N	46.5	N	Y	Y	33.3	N	N	N	39.7	N	N	Y
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	F 1	35.7	N	N	N	40.7	N	N	Y	33.4	N	N	N	46.4	N	Y	Y	33.4	N	N	N	39.8	N	N	Y
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	GF	36.6	N	N	N	41.6	N	N	Y	33.6	N	N	N	46.8	N	Y	Y	33.6	N	N	N	40.2	N	N	Y
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	F 1	37.1	N	N	N	42.3	N	N	Y	34.2	N	N	N	46.8	N	Y	Y	34.2	N	N	N	40.8	N	N	Y
2 GARRETT ST, MOSS VALE NSW 2577 (EAST)	66	4	GF	43	N	N	Y	46.8	N	Y	Y	30.6	N	N	N	45.5	N	Y	Y	30.6	N	N	N	39.9	N	N	Y
240 Argyle St, Moss Vale	121	4	GF	33.2	N	N	N	38.3	N	N	Y	37.7	N	N	N	52.1	N	Y	Y	37.7	N	N	N	44.5	N	Y	Y
374 Argyle St, Moss Vale	127	4	GF	28.3	N	N	N	33.5	N	N	N	26.8	N	N	N	30	N	N	N	26.8	N	N	N	33.4	N	N	N
245 ARGYLE ST, MOSS VALE NSW 2577	148	4	GF	35.8	N	N	N	40.7	N	N	Y	33.9	N	N	N	46.4	N	Y	Y	33.9	N	N	N	41.4	N	N	Y
243 ARGYLE ST, MOSS VALE NSW 2577	149	4	GF	37.3	N	N	N	42	N	N	Y	34.7	N	N	N	45.7	N	Y	Y	34.7	N	N	N	42.1	N	N	Y
262-266 ARGYLE ST, MOSS VALE NSW 2577	153	4	GF	33.2	N	N	N	38	N	N	N	33.6	N	N	N	47.9	N	Y	Y	33.6	N	N	N	42.5	N	N	Y
262-266 ARGYLE ST, MOSS VALE NSW 2577	153	4	F 1	33.6	N	N	N	38.6	N	N	Y	34.2	N	N	N	48.3	N	Y	Y	34.2	N	N	N	42.7	N	N	Y
262-266 ARGYLE ST, MOSS VALE NSW 2577	154	4	GF	33.3	N	N	N	38.2	N	N	Y	34.2	N	N	N	47.3	N	Y	Y	34.2	N	N	N	42.6	N	N	Y
262-266 ARGYLE ST, MOSS VALE NSW 2577	154	4	F 1	33.6	N	N	N	38.6	N	N	Y	34.5	N	N	N	47.6	N	Y	Y	34.5	N	N	N	42.9	N	N	Y

Appendix Table 6: Predicted Noise Levels for Operational Scenarios - Residential Receivers – Industrial Interface – PDR Noise Wall (Exceedances highlighted with a Y)

Receiver	No.	NCA	Scenario 1								Scenario 2								Scenario 3							
			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet			Predicted Noise Level (dBA)	Existing Fleet			Predicted Noise Level (dBA)	New Fleet		
				Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)		Day (58)	Evening (48)	Night (43)
133 LACKEY RD, MOSS VALE NSW 2577	1	1	38.7	N	N	N	41.9	N	N	N	40.9	N	N	N	49.8	N	Y	Y	40.9	N	N	N	51.9	N	Y	Y
131 LACKEY RD, MOSS VALE NSW 2577	2	1	37.9	N	N	N	40.8	N	N	N	41.8	N	N	N	49.6	N	Y	Y	41.8	N	N	N	52.1	N	Y	Y
129 LACKEY RD, MOSS VALE NSW 2577	3	1	37.5	N	N	N	40.2	N	N	N	42	N	N	N	49.5	N	Y	Y	42	N	N	N	52.2	N	Y	Y
127 LACKEY RD, MOSS VALE NSW 2577	6	1	37.8	N	N	N	40.4	N	N	N	42.3	N	N	N	50	N	Y	Y	42.3	N	N	N	52.4	N	Y	Y
125 LACKEY RD, MOSS VALE NSW 2577	7	1	37.8	N	N	N	39.9	N	N	N	43.7	N	N	Y	50.9	N	Y	Y	43.7	N	N	Y	52.9	N	Y	Y
123 LACKEY RD, MOSS VALE NSW 2577	8	1	37.2	N	N	N	39	N	N	N	42.7	N	N	N	49.8	N	Y	Y	42.7	N	N	N	51.8	N	Y	Y
121 LACKEY RD, MOSS VALE NSW 2577	9	1	37.5	N	N	N	39.4	N	N	N	42.3	N	N	N	49.4	N	Y	Y	42.3	N	N	N	51.4	N	Y	Y
117-119 LACKEY RD, MOSS VALE NSW 2577	10	1	37.2	N	N	N	39.2	N	N	N	41.9	N	N	N	49	N	Y	Y	41.9	N	N	N	51	N	Y	Y
161 LACKEY RD, MOSS VALE NSW 2577	73	2	42.8	N	N	N	46.7	N	N	Y	33.5	N	N	N	46.1	N	N	Y	33.5	N	N	N	42.5	N	N	N
159 LACKEY RD, MOSS VALE NSW 2577	74	2	42.7	N	N	N	46.8	N	N	Y	34.1	N	N	N	47	N	N	Y	34.1	N	N	N	43.4	N	N	Y
3 GARRETT ST, MOSS VALE NSW 2577	75	2	36	N	N	N	40	N	N	N	14.6	N	N	N	28.2	N	N	N	14.6	N	N	N	21.2	N	N	N
1A INNES RD, MOSS VALE NSW 2577 (EAST)	76	2	31.7	N	N	N	34.8	N	N	N	17.9	N	N	N	29.8	N	N	N	17.9	N	N	N	26.4	N	N	N
1A INNES RD, MOSS VALE NSW 2577 (NORTH)	76	2	29.3	N	N	N	33	N	N	N	16.9	N	N	N	28.7	N	N	N	16.9	N	N	N	25.1	N	N	N
173 LACKEY RD, MOSS VALE NSW 2577	77	2	42.5	N	N	N	45.3	N	N	Y	26	N	N	N	42.7	N	N	N	26	N	N	N	35.1	N	N	N
175 LACKEY RD, MOSS VALE NSW 2577	78	2	43.1	N	N	Y	45.6	N	N	Y	28.5	N	N	N	43.3	N	N	Y	28.5	N	N	N	37.4	N	N	N
177 LACKEY RD, MOSS VALE NSW 2577	79	2	42.9	N	N	N	45.4	N	N	Y	28.3	N	N	N	43	N	N	N	28.3	N	N	N	37.2	N	N	N
179 LACKEY RD, MOSS VALE NSW 2577	80	2	42.7	N	N	N	45.3	N	N	Y	28.2	N	N	N	42.8	N	N	N	28.2	N	N	N	37	N	N	N
181 LACKEY RD, MOSS VALE NSW 2577	81	2	42.9	N	N	N	45.6	N	N	Y	30.8	N	N	N	44.8	N	N	Y	30.8	N	N	N	39.2	N	N	N
183 LACKEY RD, MOSS VALE NSW 2577	82	2	43.1	N	N	N	45.5	N	N	Y	29	N	N	N	42.4	N	N	N	29	N	N	N	36.6	N	N	N
185 LACKEY RD, MOSS VALE NSW 2577	84	2	42	N	N	N	44.3	N	N	Y	20.4	N	N	N	36.3	N	N	N	20.4	N	N	N	25.5	N	N	N
187 LACKEY RD, MOSS VALE NSW 2577	85	2	41.6	N	N	N	44	N	N	Y	26.8	N	N	N	41.4	N	N	N	26.8	N	N	N	34.2	N	N	N
189 LACKEY RD, MOSS VALE NSW 2577	86	2	39.8	N	N	N	42.6	N	N	N	28	N	N	N	41.4	N	N	N	28	N	N	N	35.4	N	N	N
191 LACKEY RD, MOSS VALE NSW 2577	87	2	37.3	N	N	N	40.7	N	N	N	27.7	N	N	N	41	N	N	N	27.7	N	N	N	35.1	N	N	N

Appendix Table 7: Predicted Noise Levels for Sleep Disturbance Scenarios – PDR Noise Wall (Exceedances highlighted with a red)

Receiver	Obj.-No.	NCA	Type	Fl	Predicted Noise Levels (dBA Lmax)											
					Scenario 4 Existing Fleet		Scenario 4 New Fleet		Scenario 6b (Country Horn)				Scenario 6b (Town Horn)			
					Location 1	Location 2	Location 1	Location 2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2
133 LACKEY RD, MOSS VALE NSW 2577	1	1	Resi	GF	51	55.6	62.7	68.8	73.7	80.8	84.9	80.8	63.7	70.8	79.9	86.2
131 LACKEY RD, MOSS VALE NSW 2577	2	1	Resi	GF	51.2	56	63.6	68.8	74.5	81.6	84.2	81.6	64.5	71.6	79.2	84.5
129 LACKEY RD, MOSS VALE NSW 2577	3	1	Resi	GF	51.6	56.1	62.4	68.9	75.2	80.3	86	80.3	65.2	70.3	81	81.4
127 LACKEY RD, MOSS VALE NSW 2577	6	1	Resi	GF	49.3	56.3	62.1	69.4	68.2	79.5	86.8	79.5	58.2	69.5	81.8	80.8
125 LACKEY RD, MOSS VALE NSW 2577	7	1	Resi	GF	53.4	56.3	65.1	69.6	77.4	78.9	87.7	78.9	67.4	68.9	82.7	81.1
123 LACKEY RD, MOSS VALE NSW 2577	8	1	Resi	GF	54	54.5	65.9	67.8	77.2	76.9	89.1	76.9	67.2	66.9	84.1	79.2
121 LACKEY RD, MOSS VALE NSW 2577	9	1	Resi	GF	54.8	54	66.9	67.3	78.2	77.1	90.4	77.1	68.2	67.1	85.4	78.9
117-119 LACKEY RD, MOSS VALE NSW 2577	10	1	Resi	GF	55.7	52.7	68.6	65.8	80.5	75.3	92.7	75.3	70.5	65.3	87.7	78.1
6 PARKES RD, MOSS VALE NSW 2577 (EAST)	14	1	Resi	GF	40.4	37.1	53.8	50.2	65.3	60.4	73	60.4	55.3	50.4	68	65.5
6 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	14	1	Resi	GF	42.2	39.2	56.6	52.4	67.7	62.2	73.3	62.2	57.7	52.2	68.3	65.3
6 PARKES RD, MOSS VALE NSW 2577 (NORTH)	15	1	Resi	GF	39.5	35.1	53.6	48.6	64.7	61.1	72.4	61.1	54.7	51.1	67.4	64.2
12 PARKES RD, MOSS VALE NSW 2577	18	1	Resi	GF	38.5	36	51.8	48.9	65	60.4	73.2	60.4	55	50.4	68.2	63.7
14 PARKES RD, MOSS VALE NSW 2577	19	1	Resi	GF	38.2	32.8	50.7	46.1	62.1	57.9	71.6	57.9	52.1	47.9	66.6	61.2
8 PARKES RD, MOSS VALE NSW 2577 (NORHT)	20	1	Resi	GF	41.3	34.2	53.6	47.2	68.7	61.2	76.5	61.2	58.7	51.2	71.5	62
8 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	20	1	Resi	GF	42.3	37.2	55.7	50	65.4	59.6	74.7	59.6	55.4	49.6	69.7	62.8
10 PARKES RD, MOSS VALE NSW 2577	21	1	Resi	GF	37.8	33.4	51.3	46.7	66.9	58.4	70.7	58.4	56.9	48.4	65.7	61.7
5 PARKES RD, MOSS VALE NSW 2577 (EAST)	22	1	Resi	GF	54.9	48.5	68.5	61.5	77.1	72.8	82	72.8	67.1	62.8	77	76.1
5 PARKES RD, MOSS VALE NSW 2577 (SOUTH)	22	1	Resi	GF	55.8	47.6	65	60.3	88.6	70.2	82.9	70.2	78.6	60.2	77.9	73.6
7 PARKES RD, MOSS VALE NSW 2577	23	1	Resi	GF	54.8	45.4	66.5	57.8	85.2	68.8	81.4	68.8	75.2	58.8	76.4	67.8
9 PARKES RD, MOSS VALE NSW 2577	25	1	Resi	GF	53.8	42.2	67.2	53.2	84.1	62	78.8	62	74.1	52	73.8	64.2
11-13 PARKES RD, MOSS VALE NSW 2577 (E)	27	1	Resi	GF	50.6	38.2	65.2	50.6	74.1	59.6	77.7	59.6	64.1	49.6	72.7	62.6
11-13 PARKES RD, MOSS VALE NSW 2577 (S)	27	1	Resi	GF	50.4	36.8	62.4	49.7	71.9	59.2	77.5	59.2	61.9	49.2	72.5	62.4
105 LACKEY RD, MOSS VALE NSW 2577	28	1	Resi	GF	40.3	36.3	50.5	48.5	61.9	58.6	67.9	58.6	51.9	48.6	62.9	62.6
105 LACKEY RD, MOSS VALE NSW 2577	28	1	Resi	F 1	41.8	36.7	52.5	48.8	62.1	58.9	72.6	58.9	52.1	48.9	67.6	62.9
105 LACKEY RD, MOSS VALE NSW 2577 (EAST)	28	1	Resi	GF	57.9	49.3	71.2	60.6	76	69.7	85.5	69.7	66	59.7	80.5	77.7
105 LACKEY RD, MOSS VALE NSW 2577 (SOUT)	28	1	Resi	GF	54.5	44.5	69.5	59.5	73.3	70.5	79.2	70.5	63.3	60.5	74.2	73.9
101 LACKEY RD, MOSS VALE NSW 2577	29	1	Resi	GF	55.6	49.8	68.9	63.3	80.3	74.3	88.2	74.3	70.3	64.3	83.2	72.9
103 Lackey Rd (New building)	111	1	Resi	GF	52.4	48.5	65.5	62.5	75.4	72.6	86.4	72.6	73.3	61	86.1	74.3
171 LACKEY RD, MOSS VALE NSW 2577	67	2	Resi	GF	52.7	49.5	65.8	62.8	75.8	72.9	86.5	72.9	50.3	57.6	63.3	78.2
2 GARRETT ST, MOSS VALE NSW 2577 (NORTH)	68	2	Resi	GF	53.1	46.6	66.1	60.2	75.9	67.5	86.8	67.5	48.7	57	62.4	76.8
4 GARRETT ST, MOSS VALE NSW 2577	69	2	Resi	GF	53.8	50.5	66.9	63.8	76.3	74	87.3	74	49.3	50.6	63.3	65.3
6 GARRETT ST, MOSS VALE NSW 2577	70	2	Resi	GF	59.6	55.6	72.7	68.9	83.1	81.5	93.4	81.5	45.5	50.3	59.8	65.2
1 INNES RD, MOSS VALE NSW 2577	71	2	Resi	GF	59.4	55.3	72.9	68.7	82.9	80.4	93.2	80.4	42.3	45.4	56.8	60.2
8A GARRETT ST, MOSS VALE NSW 2577 (EAST)	71	2	Resi	GF	54.4	52.6	67.7	66.7	81.4	76.8	91.8	76.8	42.6	45.9	57.2	61.2
8A GARRETT ST, MOSS VALE NSW 2577 (NORTH	71	2	Resi	GF	57.1	51.7	70.2	65.8	80.1	75.9	90.6	75.9	43.5	46.2	58.3	61.1
1 GARRETT ST, MOSS VALE NSW 2577	72	2	Resi	GF	59.1	54.1	72.4	68.3	84.9	74.9	94.8	74.9	61.4	64.8	73	83.5

Receiver	Obj.-No.	NCA	Type	Fl	Predicted Noise Levels (dBA Lmax)											
					Scenario 4 Existing Fleet		Scenario 4 New Fleet		Scenario 6b (Country Horn)				Scenario 6b (Town Horn)			
					Location 1	Location 2	Location 1	Location 2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2
161 LACKEY RD, MOSS VALE NSW 2577	73	2	Resi	GF	48.6	37.2	66.3	51	71.3	60.7	74.9	60.7	64.1	64.5	75.7	81.1
159 LACKEY RD, MOSS VALE NSW 2577	74	2	Resi	GF	49	35.4	64.4	48.6	72.8	59.2	71.7	59.2	64.4	65.9	76.5	81.9
3 GARRETT ST, MOSS VALE NSW 2577	75	2	Resi	GF	58	56.5	71.1	69.8	84.1	81.8	92.7	81.8	50.2	48.3	64.2	63.3
1A INNES RD, MOSS VALE NSW 2577 (EAST)	76	2	Resi	GF	59.5	40.8	72.2	54.1	85.6	64.6	92.5	64.6	44.5	47.4	59.1	62.2
1A INNES RD, MOSS VALE NSW 2577 (NORTH)	76	2	Resi	GF	52	44.1	65.7	59.8	69.3	75.8	77.6	75.8	43.1	45	57.8	60
173 LACKEY RD, MOSS VALE NSW 2577	77	2	Resi	GF	59.1	35.2	71.6	48.4	84.7	60.7	90.9	60.7	51.2	54.7	63.9	79.6
175 LACKEY RD, MOSS VALE NSW 2577	78	2	Resi	GF	56.7	56	70.3	69.2	82.8	82.9	91.7	82.9	59.4	61.5	72.2	79.1
177 LACKEY RD, MOSS VALE NSW 2577	79	2	Resi	GF	42	55.5	57.4	69.1	66.8	80.8	82.4	80.8	59.2	61.3	72.1	78.6
179 LACKEY RD, MOSS VALE NSW 2577	80	2	Resi	GF	58.5	56	70.6	69.2	85.2	81.3	84.5	81.3	61.3	65.6	74.5	80.3
181 LACKEY RD, MOSS VALE NSW 2577	81	2	Resi	GF	56.4	56.3	70.2	69.6	82.6	81.8	91.6	81.8	61.2	65.5	74.6	80.2
183 LACKEY RD, MOSS VALE NSW 2577	82	2	Resi	GF	56.9	56.5	70.1	69.8	82.7	82	92	82	58.6	62.8	72.5	77.5
185 LACKEY RD, MOSS VALE NSW 2577	84	2	Resi	GF	54.2	41.8	66.5	62.6	81.7	63.3	87	63.3	44.1	54.9	58.3	69.3
187 LACKEY RD, MOSS VALE NSW 2577	85	2	Resi	GF	46	44.1	59.2	57	70.8	68	85.8	68	45.5	62	59.6	76.6
189 LACKEY RD, MOSS VALE NSW 2577	86	2	Resi	GF	56	55.6	69.2	69.3	81.9	81.2	92.3	81.2	57.8	61.6	71.8	76.1
191 LACKEY RD, MOSS VALE NSW 2577	87	2	Resi	GF	56.2	55.9	69.5	69.5	82.5	81.4	92.6	81.4	57.6	61.2	71.6	75.7
11 GARRETT ST, MOSS VALE NSW 2577	94	2	Resi	GF	54.8	55.5	68.4	68.8	81.3	81.1	90	81.1	47.1	50.4	60.7	65.6
9 GARRETT ST, MOSS VALE NSW 2577	96	2	Resi	GF	55	55.8	68.6	69.1	82.4	81.3	90.7	81.3	46.7	50.7	65.3	69
7 GARRETT ST, MOSS VALE NSW 2577	97	2	Resi	GF	46	44.3	57.7	57.8	71.6	68.4	73.6	68.4	46.6	55	60.1	68.4
5 GARRETT ST, MOSS VALE NSW 2577	99	2	Resi	GF	55.9	56.2	69.1	69.4	80.9	81.7	91.1	81.7	44.9	52.3	59.6	67
8 GARRETT ST, MOSS VALE NSW 2577 (GARR)	100	2	Resi	GF	44	53.4	57.2	66.8	71	81.2	80.6	81.2	43.9	47.7	58.5	62.6
8 GARRETT ST, MOSS VALE NSW 2577 (INNES)	100	2	Resi	GF	52.6	54.1	65.7	67.4	79	79.7	88.2	79.7	43.6	47.3	58.2	62.2
10 GARRETT ST, MOSS VALE NSW 2577	101	2	Resi	GF	53.7	54.7	66.6	68	79.4	80.3	88.7	80.3	44.1	48	58.7	62.9
12 GARRETT ST, MOSS VALE NSW 2577	102	2	Resi	GF	54	55.3	66.9	68.6	79.8	81	89.1	81	44.4	48.1	59.1	63.1
14 GARRETT ST, MOSS VALE NSW 2577	103	2	Resi	GF	53.7	56.2	67.4	68.9	80	84.3	89.5	84.3	46.6	49.9	61.1	64.7
16 GARRETT ST, MOSS VALE NSW 2577	104	2	Resi	GF	53.4	56.6	66.8	69.8	80	82.4	89.5	82.4	46.8	48.5	61.4	64.9
4 INNES RD, MOSS VALE NSW 2577	106	2	Resi	GF	54.3	55.6	67.2	68.9	80	81.3	89.4	81.3	41.9	44.9	56.5	59.6
2 INNES RD, MOSS VALE NSW 2577	107	2	Resi	GF	50.7	55.5	64.6	68.7	76.3	82.7	88.4	82.7	46.6	45.8	61.3	60.6
8 GARRETT ST, MOSS VALE NSW 2577	144	2	Resi	GF	50.9	55.7	64.7	69.1	76.5	82.8	88.6	82.8	45.1	49.2	59.7	63.2
35 KOYONG CL, MOSS VALE NSW 2577	30	3	Resi	GF	50.9	55.9	64.8	69.4	76.7	83	88.7	83	65.4	62.6	81.4	76.2
33 KOYONG CL, MOSS VALE NSW 2577	32	3	Resi	GF	46.8	50.5	59.9	64.1	72.3	78	82.4	78	65.8	62.9	81.5	76.4
31 KOYONG CL, MOSS VALE NSW 2577	33	3	Resi	GF	46.9	50.7	60.1	64.2	72.4	78.2	83.2	78.2	65.9	57.5	81.8	70.7
29 KOYONG CL	34	3	Resi	GF	46.9	50.8	60.2	64.3	75	78.2	85	78.2	66.3	64	82.3	77.4
45 HOSKINS ST, MOSS VALE NSW 2577 (SOUT)	35	3	Resi	GF	47.8	51.5	61.1	65	75.8	78.5	86.1	78.5	73.1	71.5	88.4	85.5
45 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	35	3	Resi	GF	46.8	49.4	58.9	62.3	70.8	75	78	75	72.9	70.4	88.2	83.5
8 BAKER RD (SOUTH)	36	3	Resi	GF	38.5	45.3	50.4	56.3	60.3	67.6	68.3	67.6	71.4	66.8	86.8	80
8 BAKER RD (WEST)	36	3	Resi	GF	35.6	41.4	48.1	55.9	58.7	67	67.4	67	70.1	65.9	85.6	79.1
38 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	37	3	Resi	GF	36.8	36.8	49.2	50.1	59.3	60.6	68.3	60.6	74.9	64.9	89.8	82.9
38 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	38	3	Resi	GF	33.1	37.1	46	50.3	55.5	60.3	64.8	60.3	61.3	50.7	69.9	63.9
34 HOSKINS ST, MOSS VALE NSW 2577 (NORTH	40	3	Resi	GF	28.8	30.9	41.8	44.2	52.3	55.4	61.8	55.4	62.8	49.2	66.7	60.2
34A HOSKINS ST, MOSS VALE NSW 2577 (WEST	41	3	Resi	GF	28.3	31.3	41.4	44.5	52.6	55.9	62.2	55.9	74.1	71.8	87.7	85

Receiver	Obj.-No.	NCA	Type	Fl	Predicted Noise Levels (dBA Lmax)											
					Scenario 4 Existing Fleet		Scenario 4 New Fleet		Scenario 6b (Country Horn)				Scenario 6b (Town Horn)			
					Location 1	Location 2	Location 1	Location 2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2	Existing Fleet - L1	Existing Fleet - L2	New Fleet - L1	New Fleet - L2
34A HOSKINS ST, MOSS VALE NSW 2577 (NORT	42	3	Resi	GF	31.4	33.3	44.1	46.4	53.5	56.2	63.3	56.2	75.6	54.6	87.5	67.4
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	43	3	Resi	GF	47.4	50.4	59.6	62.9	71.4	74.8	78	74.8	59.3	65.8	72.6	79.9
5/8 HAWKINS ST, MOSS VALE NSW 2577 (N)	44	3	Resi	GF	50	50.5	62.1	63	74.1	74.5	80.7	74.5	74.7	50.7	85.9	61.6
5/8 HAWKINS ST, MOSS VALE NSW 2577 (W)	45	3	Resi	GF	50.4	52.7	62.4	65.2	74.4	75.9	81.5	75.9	72.8	72.9	86.7	87.1
2/8 HAWKINS ST, MOSS VALE NSW 2577	46	3	Resi	GF	28.3	31.8	41.6	45.1	60.2	58.3	69.2	58.3	56.8	70.8	77.4	84.3
5/8 HAWKINS ST, MOSS VALE NSW 2577 (S)	47	3	Resi	GF	32.3	34.2	45.1	47.3	54.5	57.4	64.1	57.4	75.2	71.3	79.5	84.8
12/6 HAWKINS ST, MOSS VALE NSW 2577 (N)	48	3	Resi	GF	31.3	32.2	43.7	45.2	53.1	55	62.8	55	72.6	71.8	86.6	85.3
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	49	3	Resi	GF	39.6	46.5	51.2	59	61.2	64.7	68.9	64.7	72.7	72	87	85.5
4/6 HAWKINS ST, MOSS VALE NSW 2577	50	3	Resi	GF	44.6	47.4	57.5	61.3	69.4	71.5	77.2	71.5	71.7	53.3	82	83.2
9/6 HAWKINS ST, MOSS VALE NSW 2577	51	3	Resi	GF	45.1	47.1	57.2	60.9	69.2	71.3	77.1	71.3	60.8	58	80.8	73
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	Resi	GF	44.9	46.8	57.2	60.6	71.3	75.6	79.5	75.6	71.9	71.2	87.3	84.9
6 HAWKINS ST, MOSS VALE NSW 2577 (N)	52	3	Resi	F 1	47.1	49	59.5	62.8	71.2	75.5	79.6	75.5	72.5	71.4	87.6	85.1
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	Resi	GF	44.5	46.5	57	60.2	68.6	72.8	77.5	72.8	71.3	71.1	85	85.1
6 HAWKINS ST, MOSS VALE NSW 2577 (W)	53	3	Resi	F 1	32.5	37.7	45	52.9	54.1	64.9	63.3	64.9	72.4	71.3	85.7	85.5
10/6 HAWKINS ST, MOSS VALE NSW 2577	54	3	Resi	GF	39.4	45.8	46.4	59.5	55.5	72	64.6	72	61.6	58.4	68.6	82.9
12/6 HAWKINS ST, MOSS VALE NSW 2577 (W)	55	3	Resi	GF	43.1	45.5	56.1	59.2	67.8	71.6	76.8	71.6	70.9	71.7	86.1	85.3
34 HOSKINS ST, MOSS VALE NSW 2577 (WEST)	109	3	Resi	GF	42.9	45.2	55.8	58.8	67.6	71.2	76.6	71.2	72.3	72.2	85.9	83.2
36 Hoskins St NSW 2577	112	3	Resi	GF	42.4	44.3	54.8	57.7	66.7	69.7	76	69.7	65.1	52.8	74.2	63.5
27 Koyong Cl, Moss Vale NSW 2577	113	3	Resi	GF	35.6	41.1	47.1	54.8	56.4	68.2	64.6	68.2	67.5	64.5	83.4	77
25 Koyong Cl, Moss Vale NSW 2577 (W)	114	3	Resi	GF	42.2	44.1	55	57.4	68.8	71.6	78.2	71.6	69.8	65.8	85.7	80.1
25 Koyong Cl, Moss Vale NSW 2577 (S)	115	3	Resi	GF	41.9	43.8	54.8	57	66.4	68.9	76.1	68.9	72.1	66.9	85.6	80
31 Hoskins St	117	3	Resi	GF	41.7	43.5	54.7	56.8	66.1	68.7	75.8	68.7	69.6	66.1	83.1	78
33 Hoskins St	118	3	Resi	GF	30.3	34.3	43.4	47.7	57.1	60.4	65.7	60.4	70.6	67.3	84.1	77.8
29 Hoskins St Moss Vake 2577	119	3	Resi	GF	31	34.2	44.1	48.4	56.7	60.7	70.3	60.7	69.8	61.6	82	72.3
215 ARGYLE ST, MOSS VALE NSW 2577	57	4	Resi	GF	30.9	34.2	44	47.5	56.6	65	65.1	65	69	69.7	83.2	83.6
217 ARGYLE ST, MOSS VALE NSW 2577	58	4	Resi	GF	29.8	33.1	42.8	46.3	54.9	62.3	64.6	62.3	69.4	70.3	83.7	84.3
219 ARGYLE ST, MOSS VALE NSW 2577	59	4	Resi	GF	31.1	32.9	43.9	46.1	53.9	57.7	63.5	57.7	69.8	71	84.1	86.9
223 ARGYLE ST, MOSS VALE NSW 2577	60	4	Resi	GF	28	31.2	41.3	44.6	53.6	57.3	63.2	57.3	70	74.3	84.5	85.3
225 ARGYLE ST, MOSS VALE NSW 2577	60	4	Resi	GF	31.1	33	43.8	46.4	54.1	58	63.7	58	70	72.4	84.5	86.6
221 ARGYLE ST, MOSS VALE NSW 2577	61	4	Resi	GF	30.8	33.3	43.6	46.4	54.4	58.1	64.1	58.1	70	71.3	84.4	85.3
239A ARGYLE ST, MOSS VALE NSW 2577	62	4	Resi	GF	32.4	34.8	45.3	48	56.6	59.9	66.1	59.9	66.3	72.7	83.4	86.3
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	Resi	GF	32.3	33.3	45.1	46.8	56.8	58.5	66.4	58.5	66.5	72.8	83.6	87.6
239 ARGYLE ST, MOSS VALE NSW 2577	63	4	Resi	F 1	26.6	29	39.8	42.7	51.9	54.9	61.5	54.9	66.7	73	83.7	87.9
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	Resi	GF	28.9	29.8	41.6	43.2	56.6	55.8	66.3	55.8	62.3	68	77.4	82.8
247 ARGYLE ST, MOSS VALE NSW 2577 (WEST)	64	4	Resi	F 1	56.6	55.7	69	68.6	82.3	82.2	90.9	82.2	62.4	68.2	78.2	82.9
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	Resi	GF	58.9	51.6	71.9	64.9	83.3	71	91.1	71	65	68.2	80	83.1
247 ARGYLE ST, MOSS VALE NSW 2577 (NORTH	65	4	Resi	F 1	50.8	40.4	67	54.1	75.1	62.8	79.2	62.8	65.8	68.5	81.1	83.5
2 GARRETT ST, MOSS VALE NSW 2577 (EAST)	66	4	Resi	GF	53.4	51	67	64.3	77.5	74.5	88.4	74.5	60.8	65	73	81.9
240 Argyle St, Moss Vale	121	4	Resi	GF	54.6	53.5	68.1	66.9	79.8	75.8	90.7	75.8	68.2	72.9	82.7	88.2
374 Argyle St, Moss Vale	127	4	Resi	GF	55.6	52.6	69	66.1	82.1	76.9	90.6	76.9	53.9	62.2	69.4	74.3

D

Operational noise contours

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
$Leq_{(15mins)}$ in dB(A)

= 35
= 40
= 45
= 50
= 55
= 60
= 65
= 70

Operational Scenario 1 - Existing Fleet

Existing Fleet arriving and departing the stabling yard.

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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Operational Scenario 1 - New Fleet

New Fleet trains arriving and departing the stabling yard.

Source: Aurecon

1:4,500

0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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aurecon

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
$Leq_{(15mins)}$ in dB(A)

= 45
= 50
= 55
= 60
= 65
= 70
= 75
= 85

Operational Scenario 2 - Existing Fleet

Trains idling at the yard (Service and Storage Roads)

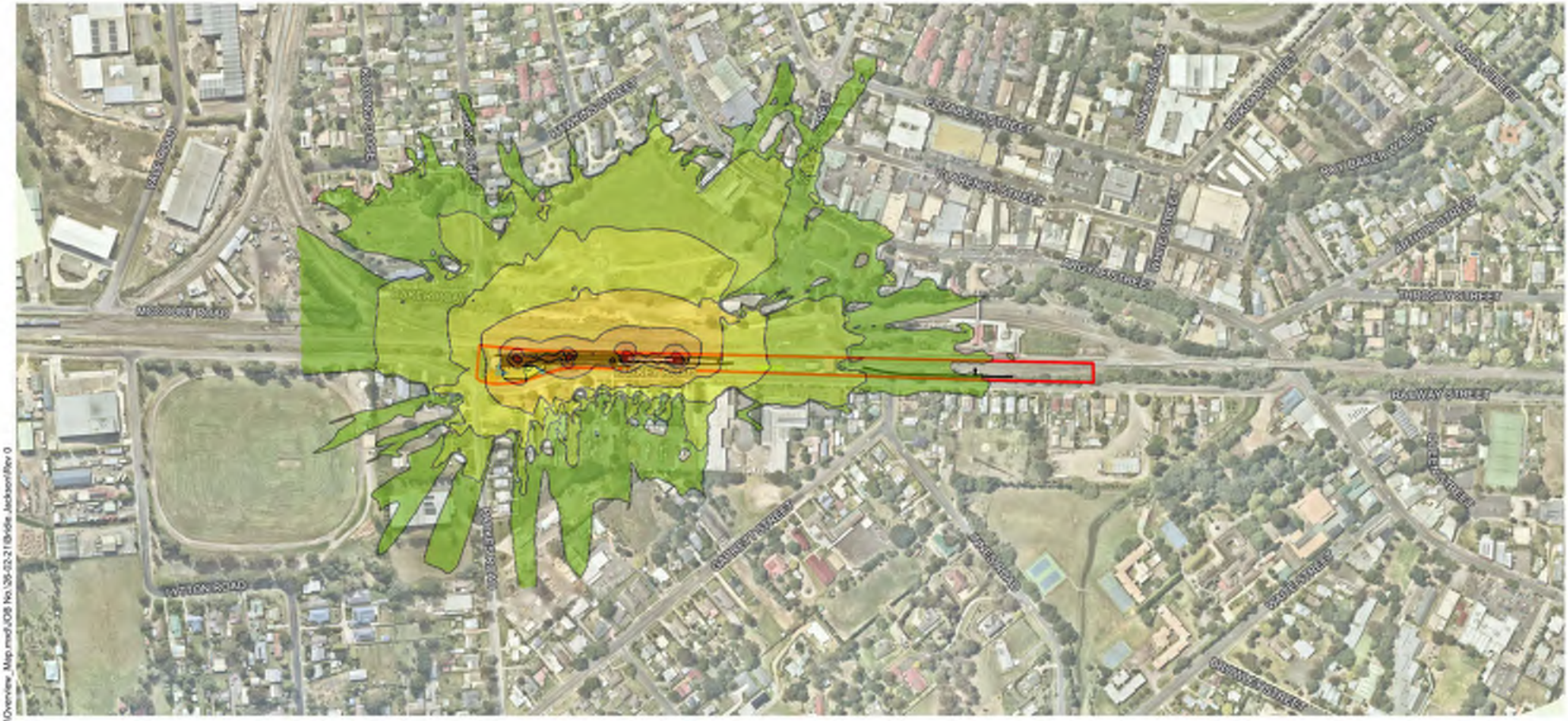
Source: Aurecon

1:4,500
0 50 100m

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56

aurecon



Operational Scenario 2 - New Fleet

Trains idling at the yard (Service and Storage Roads)

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56

aurecon

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels Leq$_{(15mins)}$ in dB(A)

= 45
= 50
= 55
= 60
= 65
= 70
= 75
= 85

Operational Scenario 3 - Existing Fleet

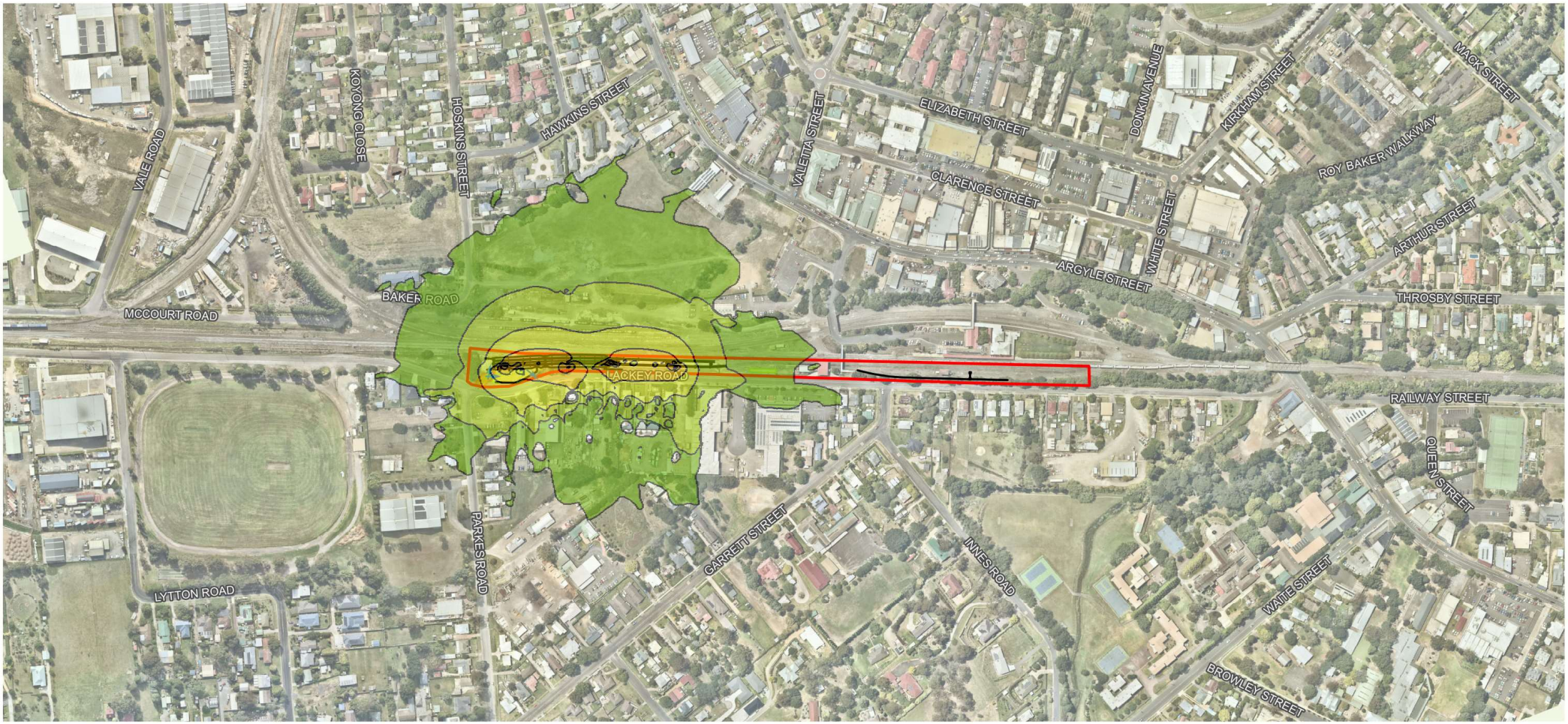
Trains preparation at the yard (Service and Storage Roads)

Source: Aurecon

1:4,500
0 50 100m

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56



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- Access gates
- Proposed design
- Proposal area
- Main access road
- Compounds

Predicted noise levels Leq(15mins) in dB(A)

- = 45
- = 50
- = 55
- = 60
- = 65
- = 70
- = 75
- = 85

Operational Scenario 3 - New Fleet

Trains preparation at the yard (Service and Storage Roads)

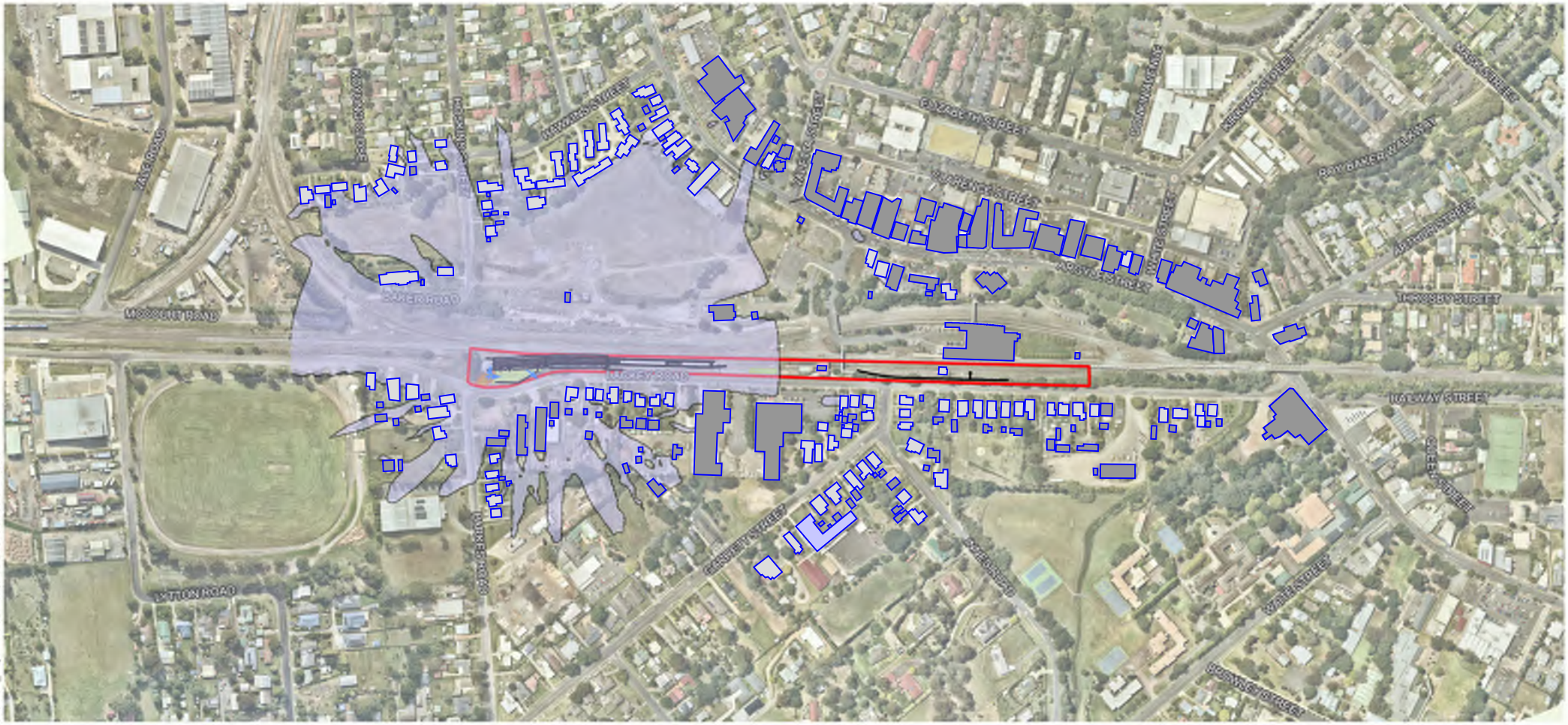
Source: Aurecon

1:4,500

0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works



Access gates
Proposed design
Proposal area
Main access road
Compounds

Area
Main building
Auxiliary building
School

Predicted Operational Noise Impacts
Lmax in dB(A)
New Fleet, Scenario 4 Location 1
Existing Retained Noise Wall

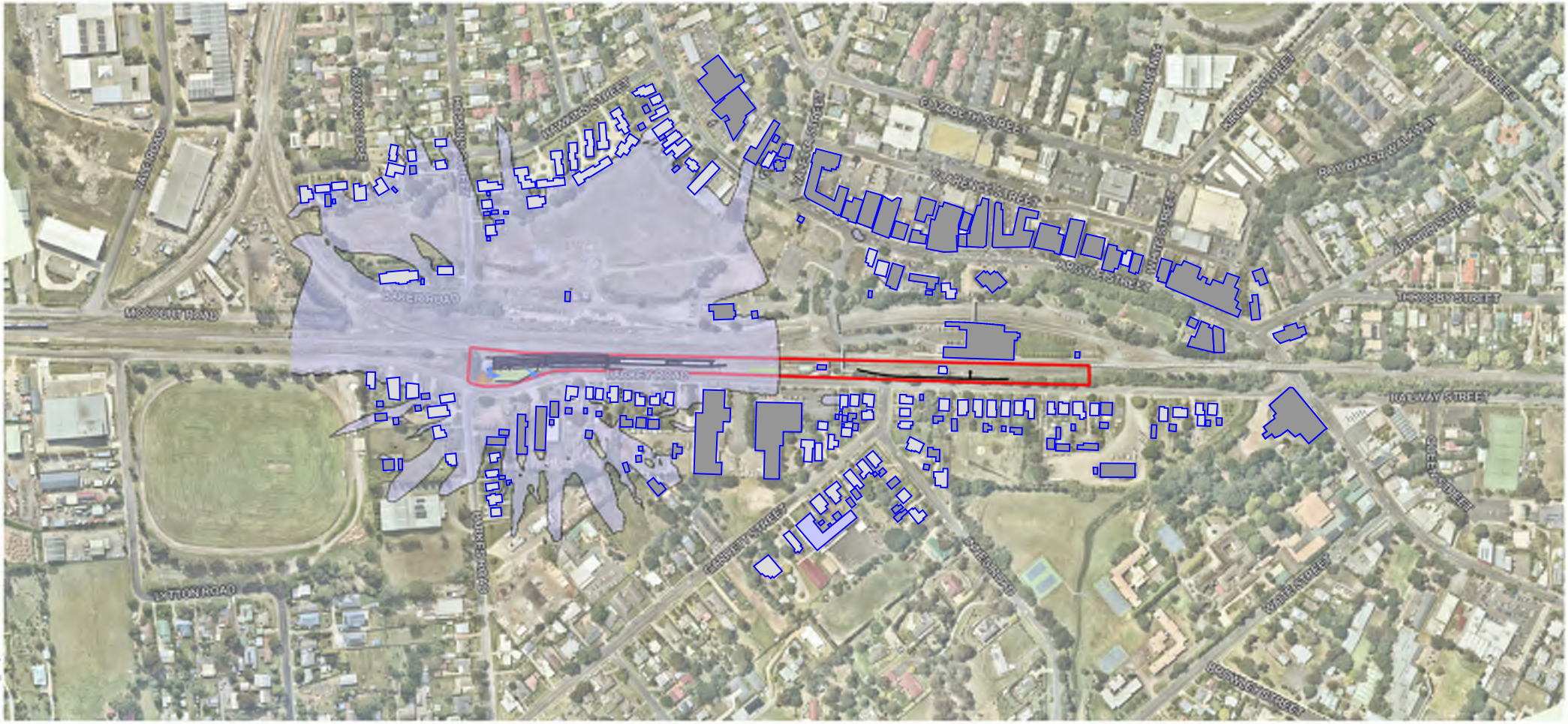
<= 65
> 65

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works



Access gates
Proposed design
Proposal area
Main access road
Compounds

Area
Main building
Auxiliary building
School

Predicted Operational Noise Impacts
Lmax in dB(A)
New Fleet, Scenario 4 Location 2
Existing Retained Noise Wall

<= 65
> 65

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 4 - Existing Fleet

Brake Release from Existing Fleet - Location 1

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 4 - Existing Fleet

Brake Release from Existing Fleet - Location 2

Source: Aurecon

1:4,500
0 50 100m

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56

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- Access gates
- Proposed design
- Proposal area
- Main access road
- Compounds

Predicted Maximum Operational Noise Impacts LAeq - Carpark

- <35
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- >70

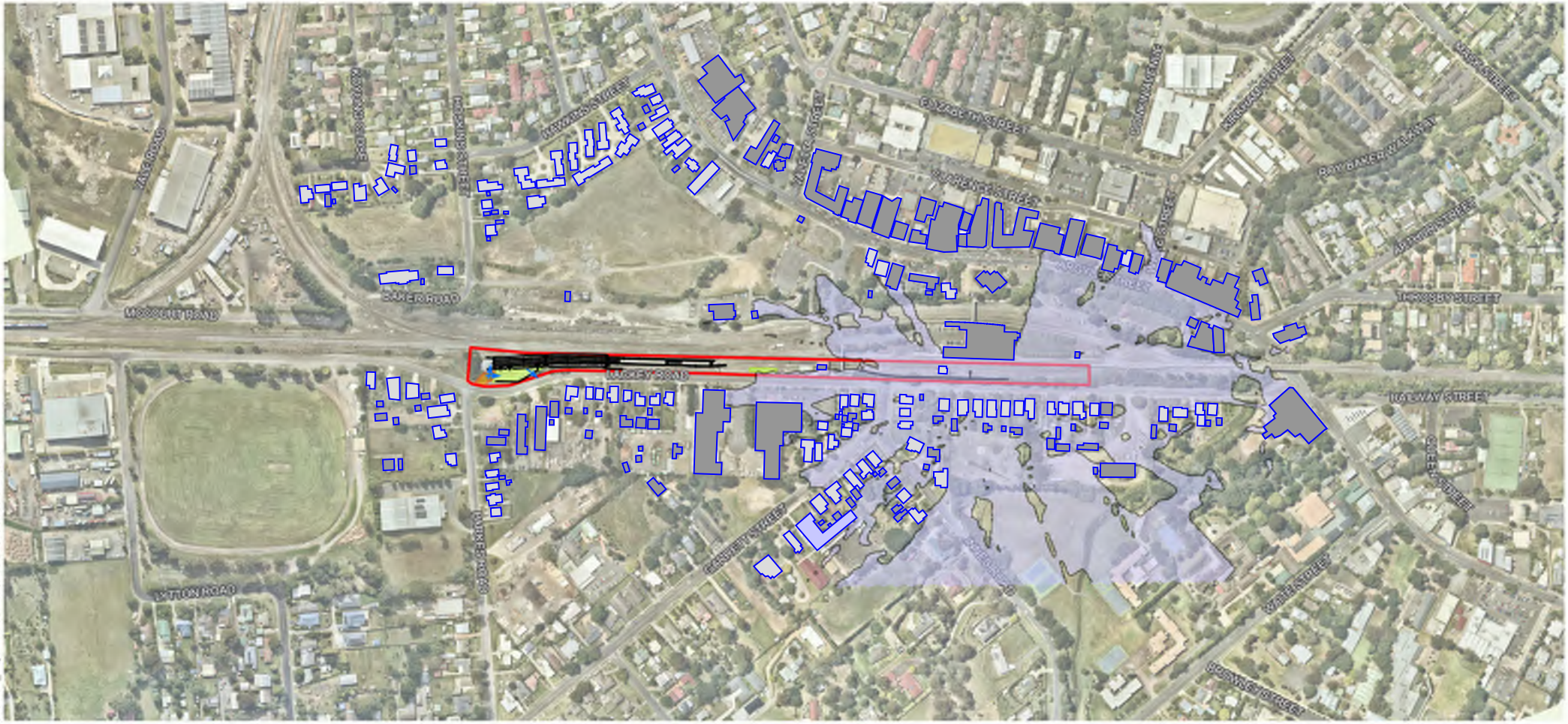
Source: Aurecon

1:3,500

0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works



Access gates
Proposed design
Proposal area
Main access road
Compounds

Area
Main building
Auxiliary building
School

Predicted Operational Noise Impacts
Lmax in dB(A)

Scenario 6a - Existing Fleet - Town Horn
Location 1 - Departing the Stabling Yard

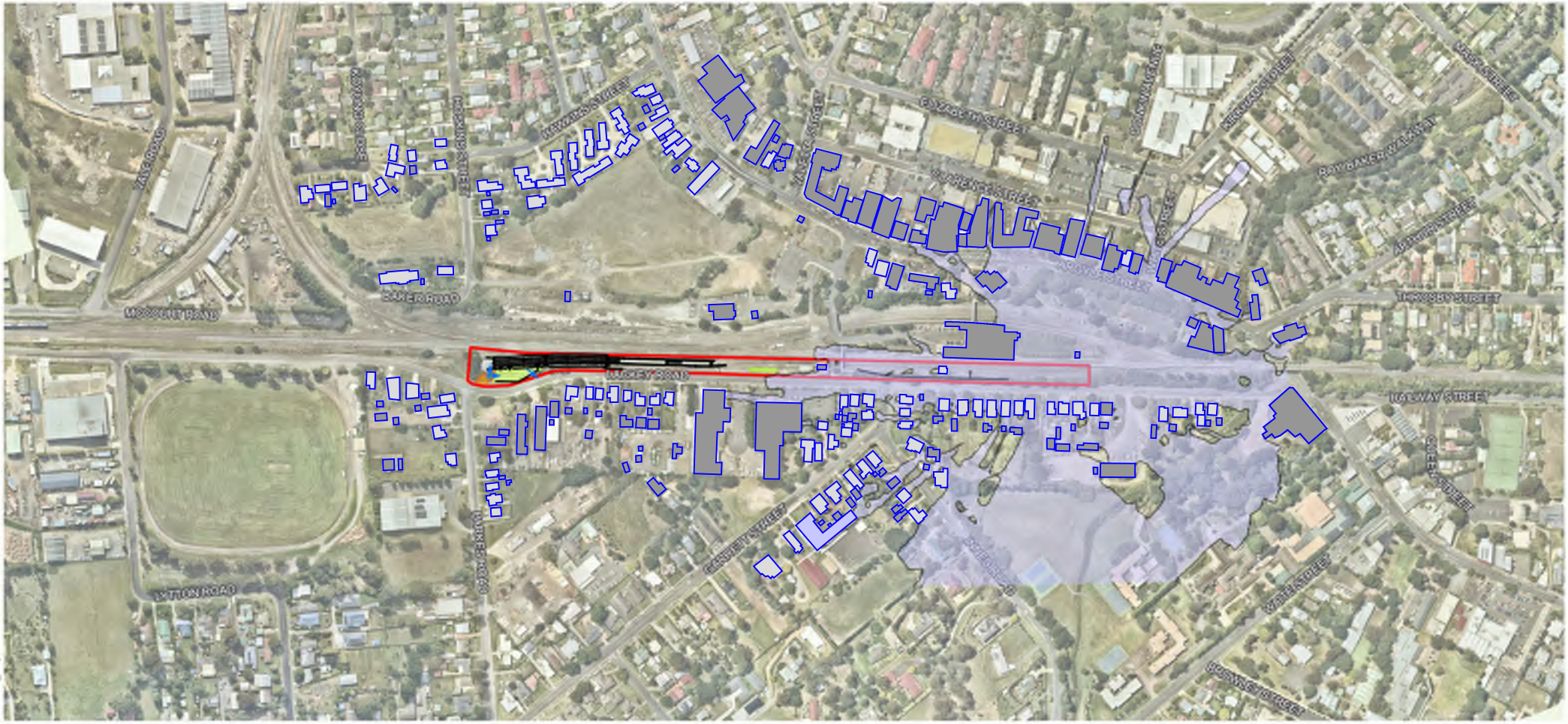
<= 65
> 65

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works



Access gates
Proposed design
Proposal area
Main access road
Compounds

Area
Main building
Auxiliary building
School

Predicted Operational Noise Impacts
Lmax in dB(A)

Scenario 6a - Existing Fleet - Town Horn
Location 1 - Entering the Stabling Yard

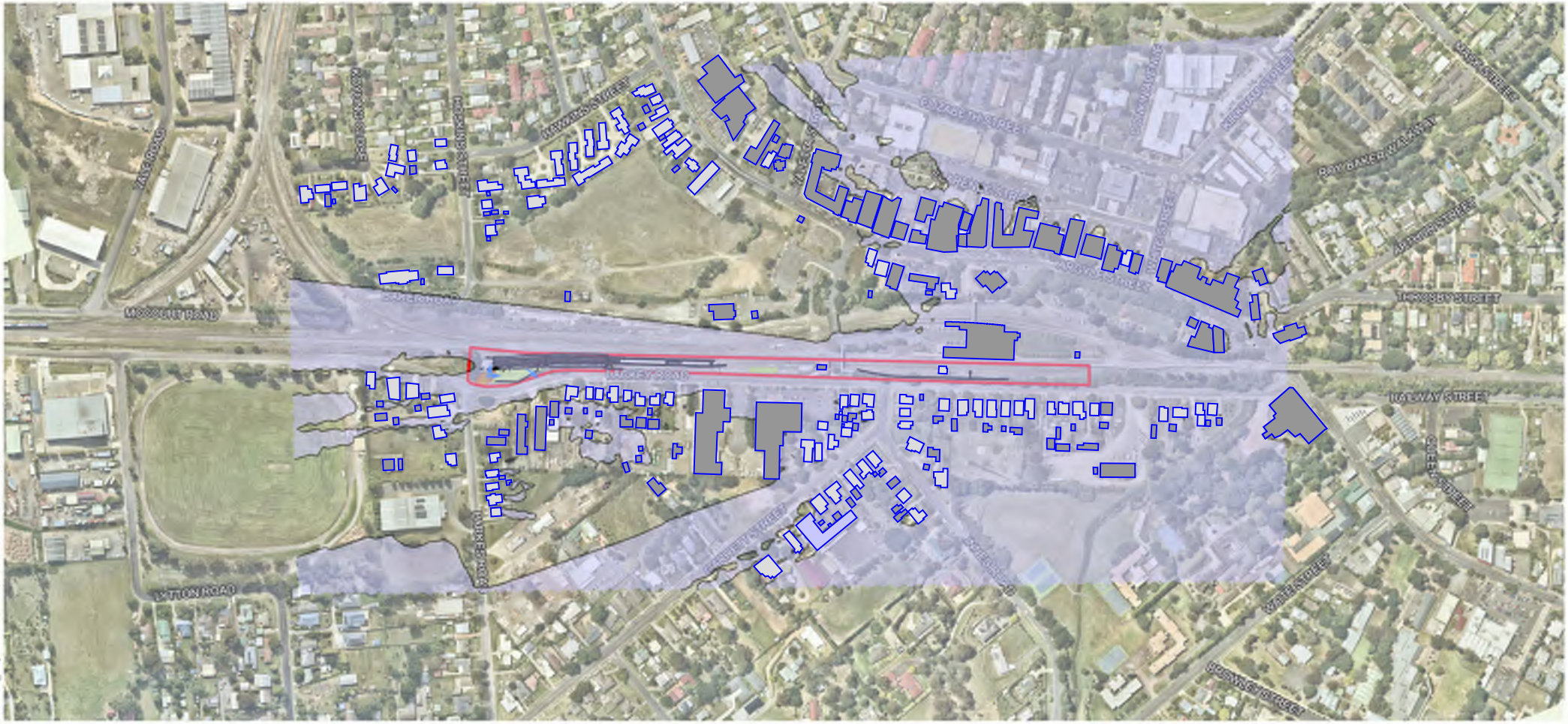
<= 65
> 65

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works



Predicted Operational Noise Impacts
Lmax in dB(A)

Scenario 6a - New Fleet Fleet - Town Horn
Location 1 - Entering the Stabling Yard

<= 65
> 65

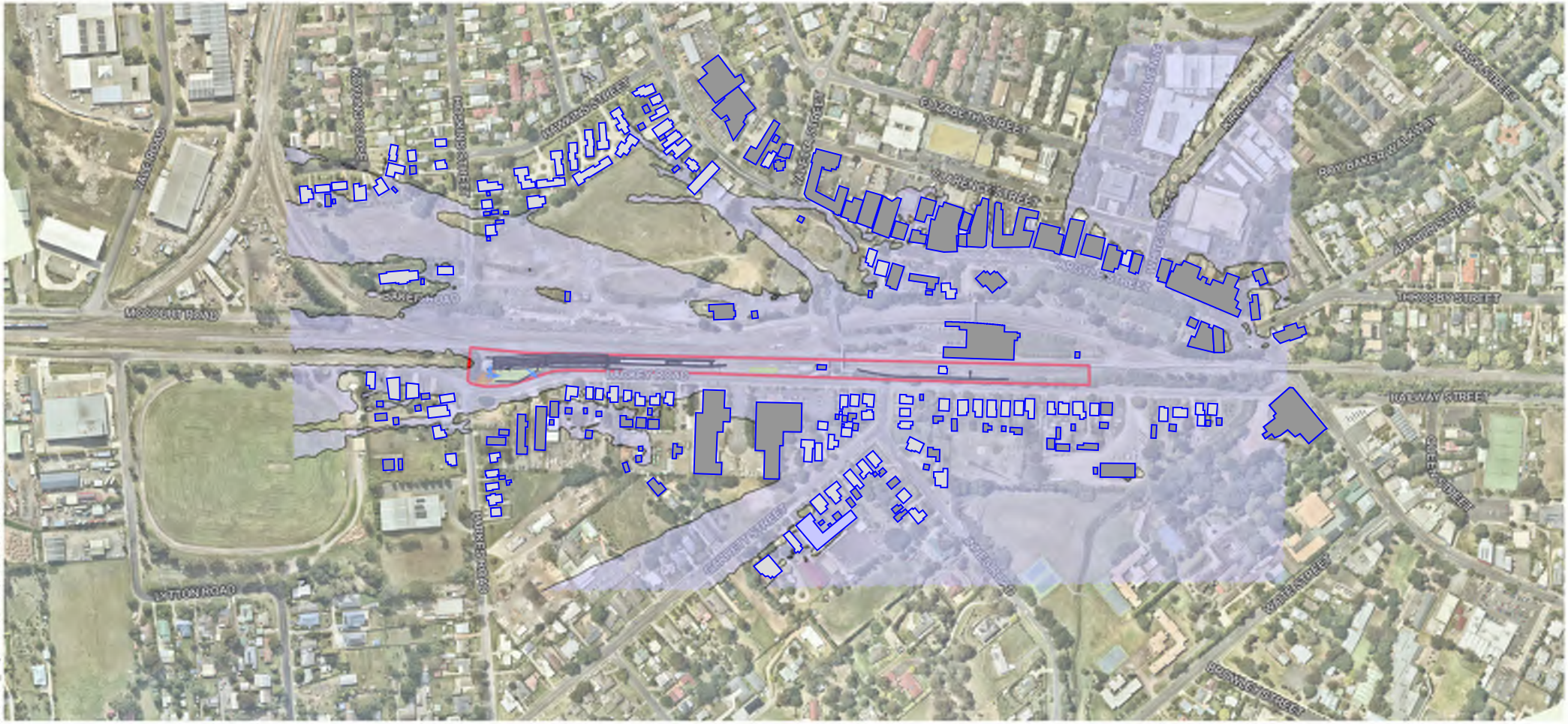
Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

aurecon



Access gates
Proposed design
Proposal area
Main access road
Compounds

Area
Main building
Auxiliary building
School

Predicted Operational Noise Impacts
Lmax in dB(A)

Scenario 6a - New Fleet Fleet - Town Horn
Location 2 - Departing the Stabling Yard

<= 65
> 65

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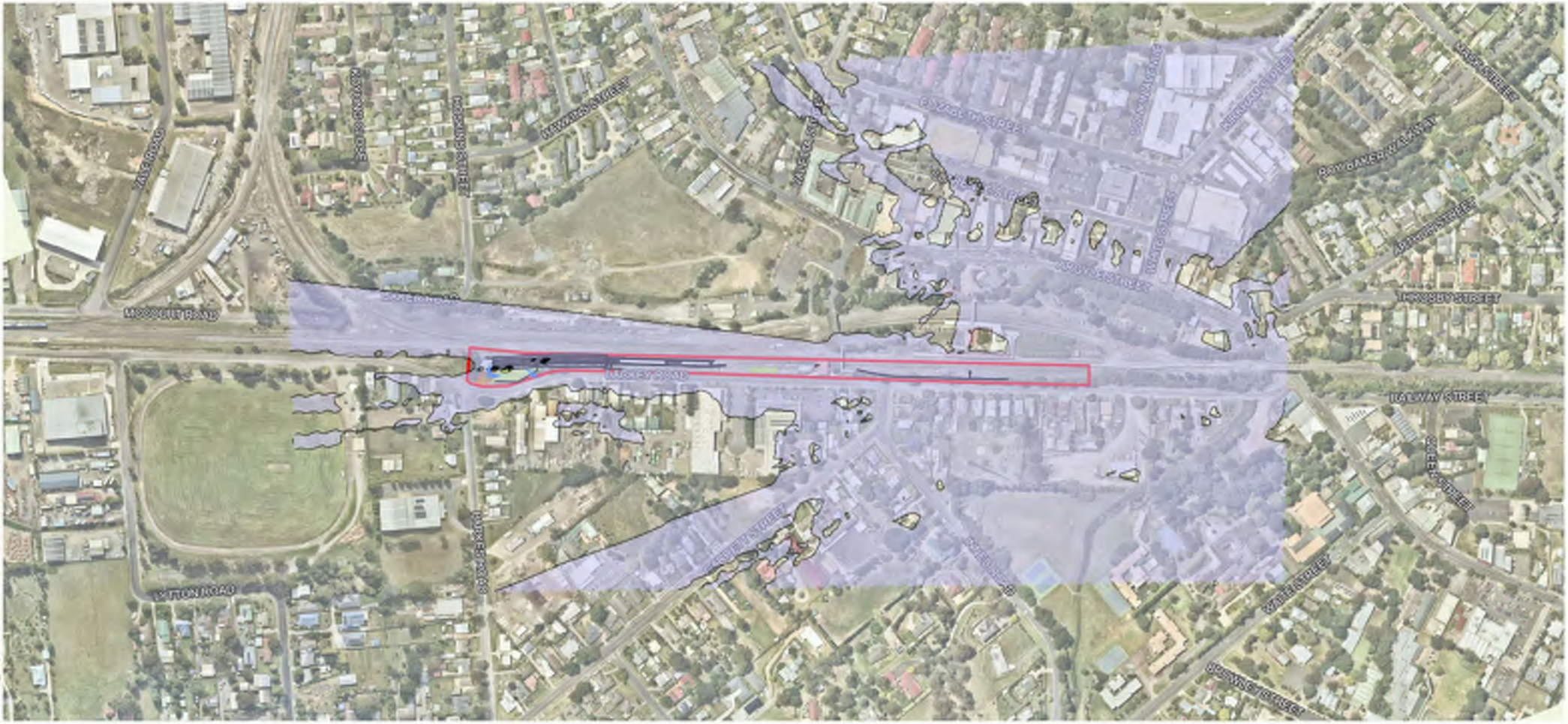
Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works



Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6a - Existing Fleet
Country Horn - Location 1

Horn testing undertaken at Location 1 - Entering Stabling Yard

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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Operational Scenario 6a - Existing Fleet
Country Horn - Location 2

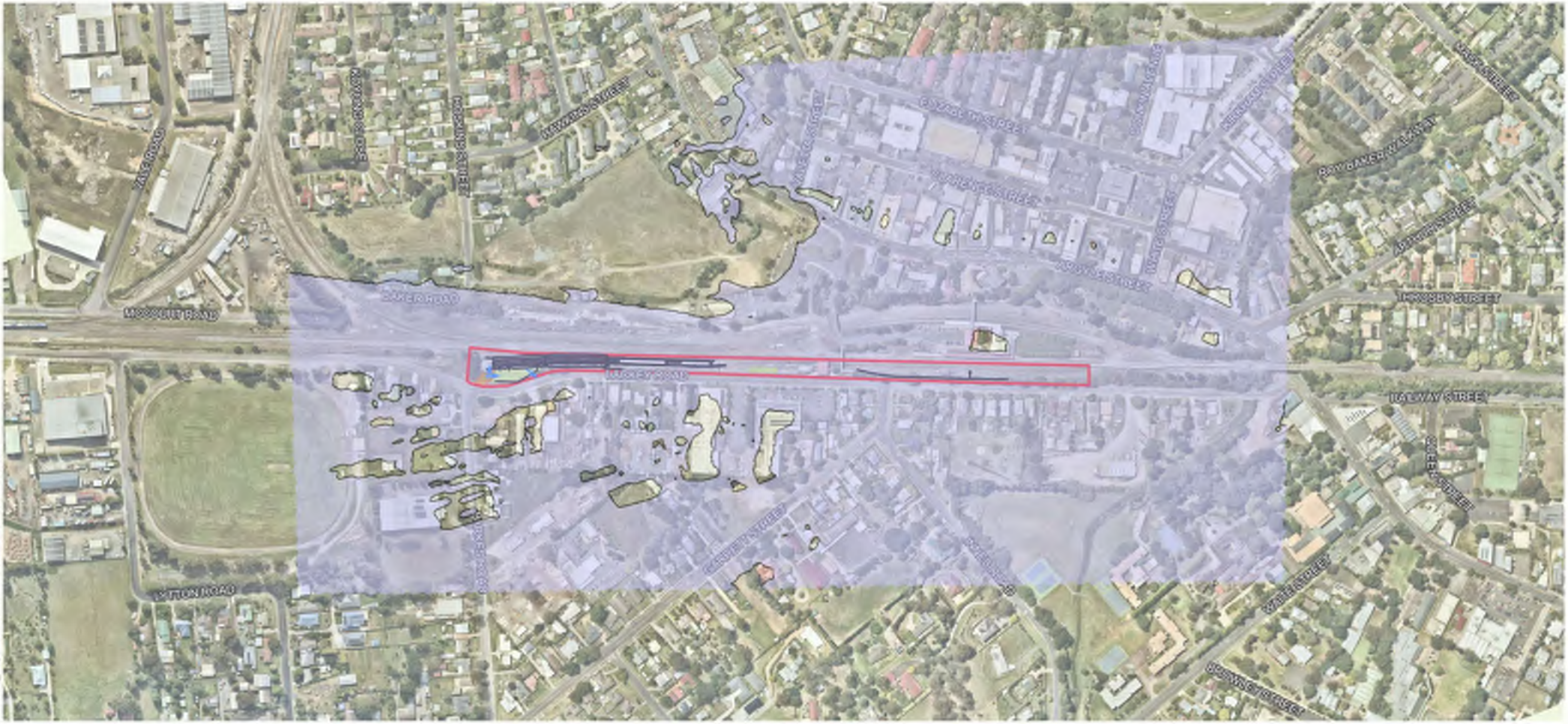
Horn testing undertaken at Location 2 - Departing Stabling Yard

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works



Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6a - New Fleet
Country Horn - Location 1

Horn testing undertaken at Location 1 - Entering Stabling Yard

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6a - New Fleet
Country Horn - Location 2

Horn testing undertaken at Location 2 - Departing Stabling Yard

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6b - Existing Fleet
Country Horn - Location 1

Horn testing undertaken at Location 1

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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Operational Scenario 6b - Existing Fleet
Country Horn - Location 2

Horn testing undertaken at Location 2

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6b - New Fleet Country Horn - Location 1

Horn testing undertaken at Location 1

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6b - New Fleet Country Horn - Location 2

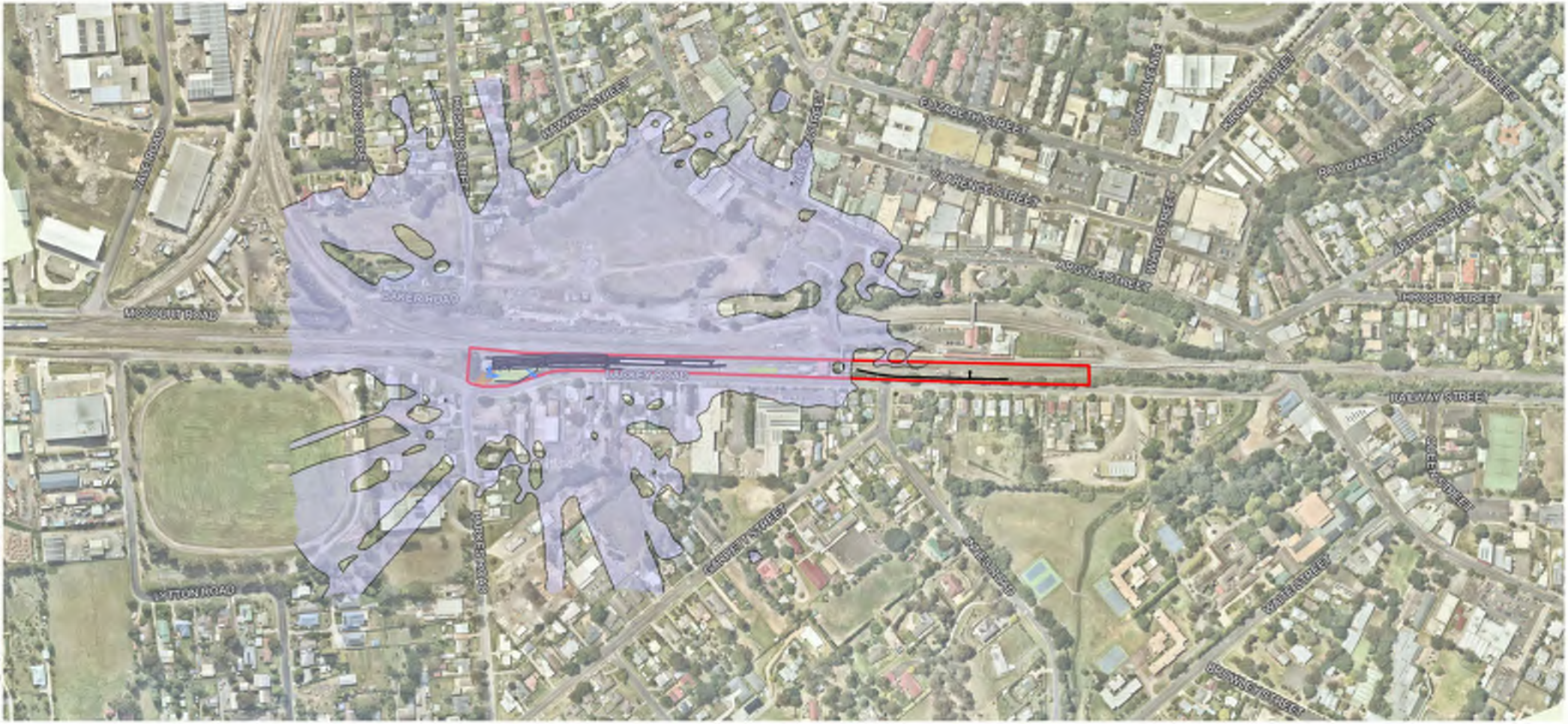
Horn testing undertaken at Location 2

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works



Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6b - Existing Fleet
Town Horn - Location 1

Horn testing undertaken at Location 1

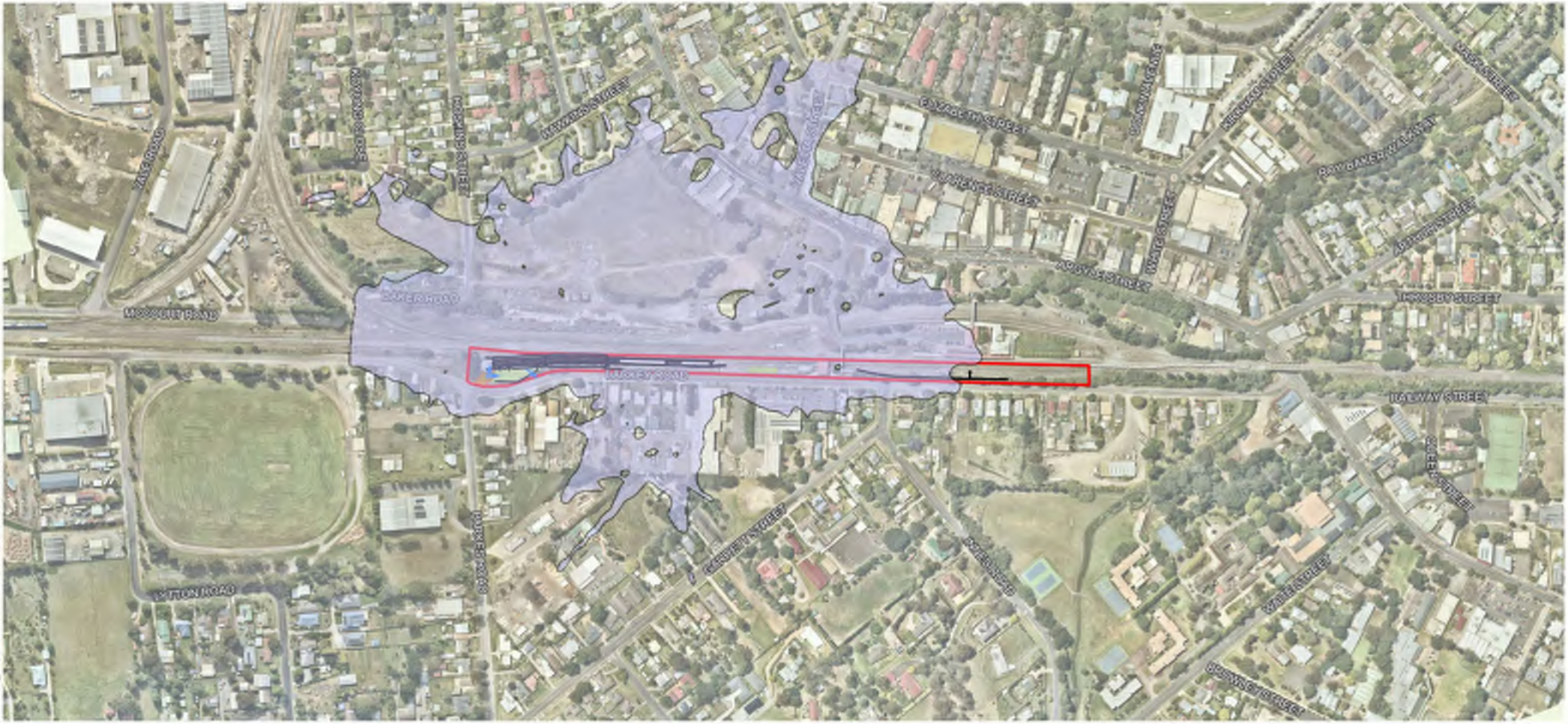
Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

P:\GIS\Project-4 project\599729_RegionalRailOverview_Map.mxd\JOB No.\26-03-21\Bridie Jackson\Rev 0



Operational Scenario 6b - Existing Fleet
Town Horn - Location 2

Horn testing undertaken at Location 2

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6b - New Fleet
Town Horn - Location 1

Horn testing undertaken at Location 1

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6b - New Fleet
Town Horn - Location 2

Horn testing undertaken at Location 2

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
$Leq_{(15mins)}$ in dB(A)

= 35
= 40
= 45
= 50
= 55
= 60
= 65
= 70

Operational Scenario 1 - Existing Fleet - PDR Noise Wall

Trains arriving and departing the stabling yard.

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels Leq(15mins) in dB(A)

= 45
= 50
= 55
= 60
= 65
= 70
= 75
= 85

Operational Scenario 1 - New Fleet - PDR Noise Wall

Trains arriving and departing the stabling yard.

Source: Aurecon

1:4,500
0 50 100m

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56

Operational Scenario 2 - Existing Fleet - PDR Noise Wall

Trains idling at the yard (Service and Storage Roads)

Regional Rail Enabling Works

Projection: GDA 1994 MGA Zone 56

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- Access gates
- Proposed design
- Proposal area
- Main access road
- Compounds

Predicted noise levels Leq$_{(15mins)}$ in dB(A)

- = 45
- = 50
- = 55
- = 60
- = 65
- = 70
- = 75
- = 85

Operational Scenario 2 - New Fleet - PDR Noise Wall

Trains idling at the yard (Service and Storage Roads)

Source: Aurecon

1:4,500

0 50 100m

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Projection: GDA 1994 MGA Zone 56

Operational Scenario 3 - Existing Fleet - PDR Noise Wall

Trains preparation at the yard (Service and Storage Roads)

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Projection: GDA 1994 MGA Zone 56

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- Access gates
- Proposed design
- Proposal area
- Main access road
- Compounds

Predicted noise levels
$Leq_{(15mins)}$ in dB(A)

- = 45
- = 50
- = 55
- = 60
- = 65
- = 70
- = 75
- = 85

Operational Scenario 3 - New Fleet - PDR Noise Wall

Trains preparation at the yard (Service and Storage Roads)

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels LAmax- in dB(A)

<= 65
> 65

Operational Scenario 4 - Existing Fleet - PDR Noise Wall Location 1

Brake release test before train departs at Location 1.

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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- Access gates
- Proposed design
- Proposal area
- Main access road
- Compounds

Predicted noise levels Leq(15mins) in dB(A)

- <= 65
- > 65

Operational Scenario 4 - Existing Fleet - PDR Noise Wall Location 2

Brake release test before train departs at Location 2.

Source: Aurecon

1:4,500

0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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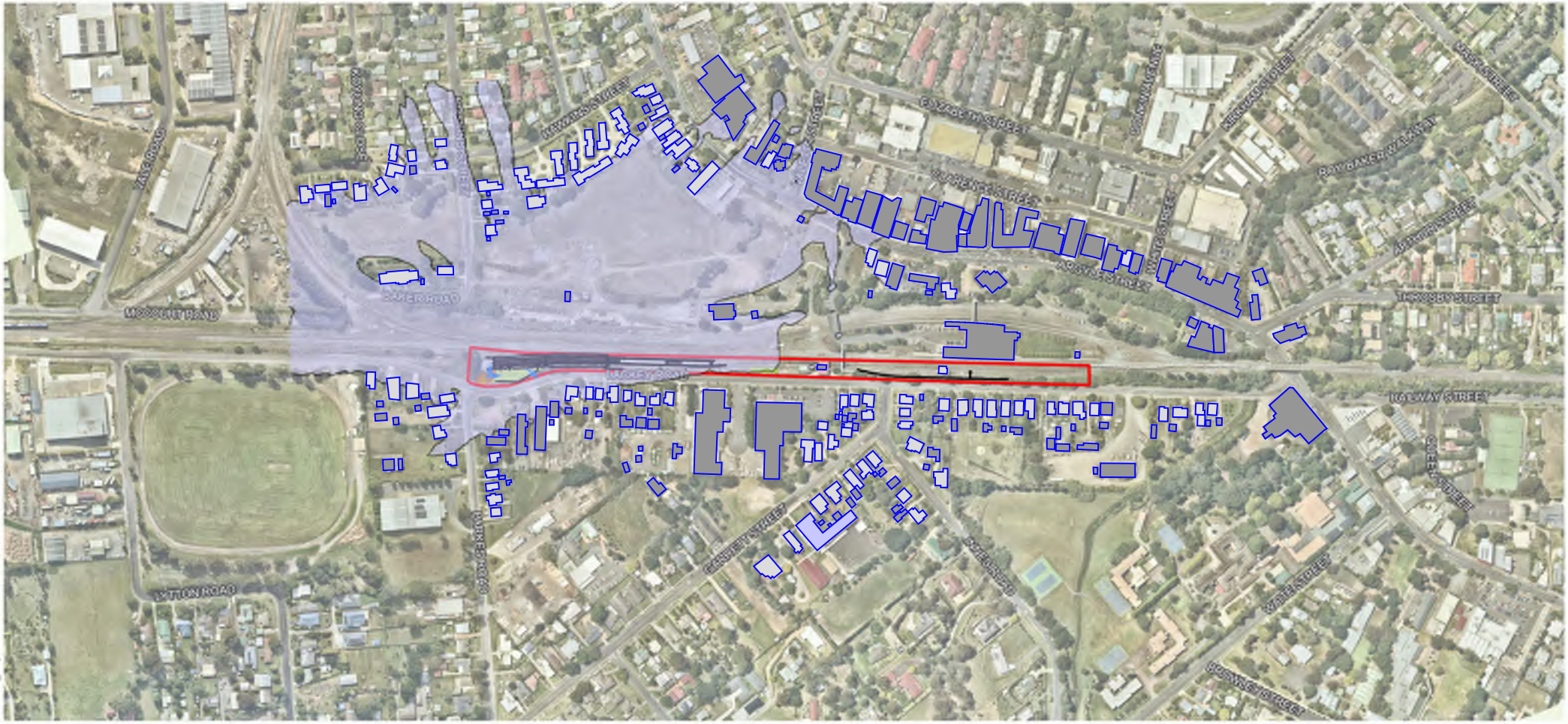


Access gates
Proposed design
Proposal area
Main access road
Compounds

Area
Main building
Auxiliary building
School

Predicted Operational Noise Impacts
Lmax in dB(A)
New Fleet, Scenario 4 Location 1
PDR Noise Wall

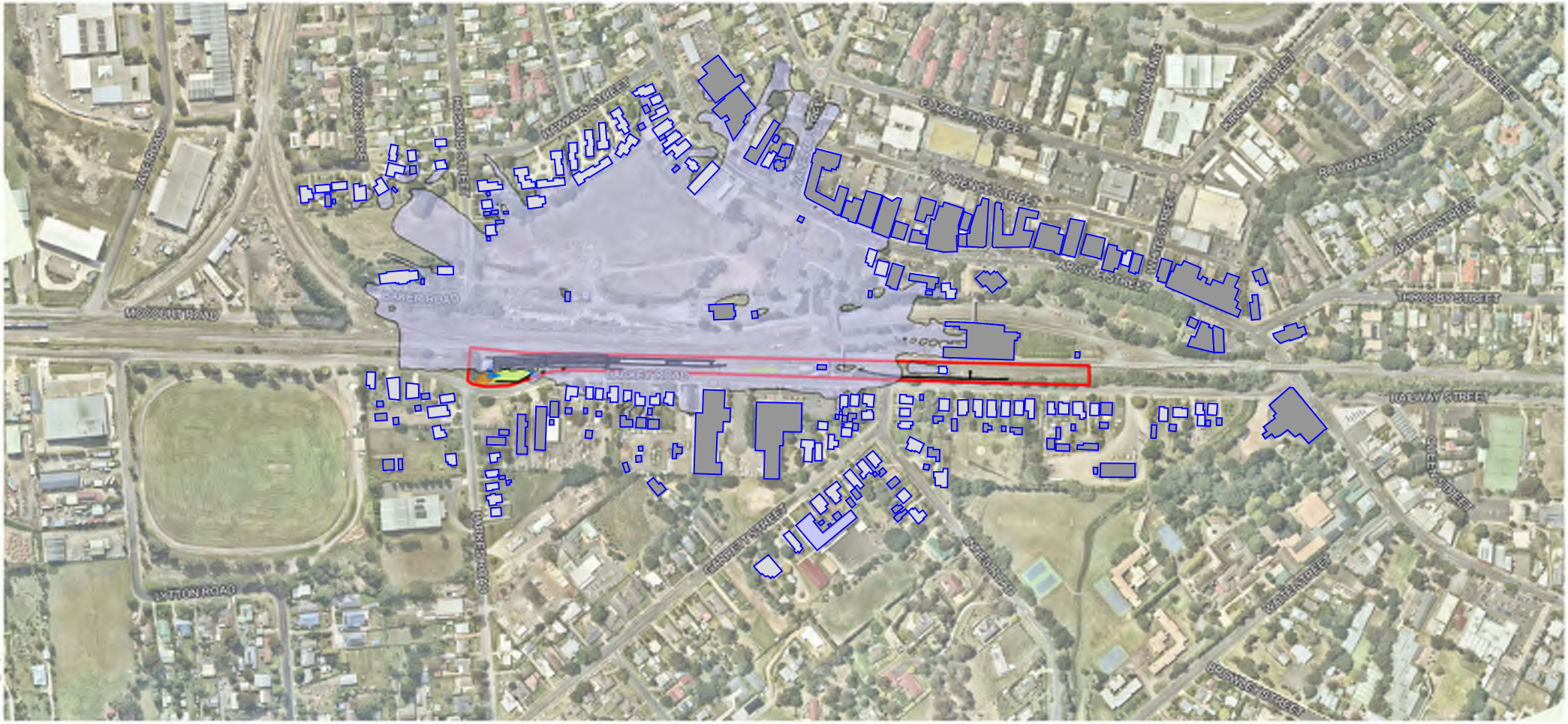
<= 65
> 65

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works



Access gates
Proposed design
Proposal area
Main access road
Compounds

Area
Main building
Auxiliary building
School

Predicted Operational Noise Impacts
Lmax in dB(A)
New Fleet, Scenario 4 Location 2
PDR Noise Wall

<= 65
> 65

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6b - Existing Fleet - PDR Noise Wall Country Horn - Location 1

Horn testing undertaken at Location 1.

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

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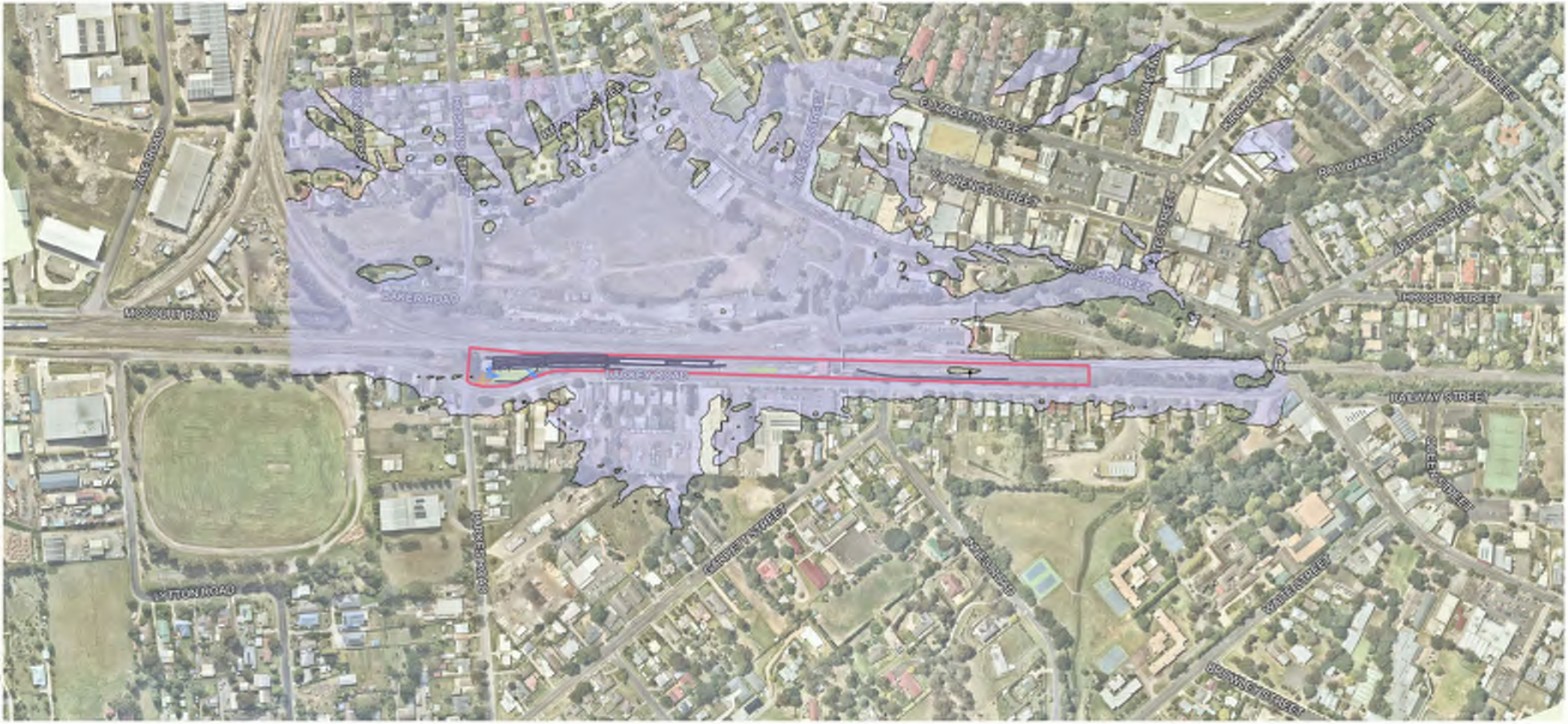


Operational Scenario 6b - Existing Fleet - PDR Noise Wall Country Horn - Location 2

Horn testing undertaken at Location 2.

Source: Aurecon

1:4,500

0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels Lmaxl- in dB(A)

<= 65
> 65

Operational Scenario 6b - New Fleet - PDR Noise Wall Country Horn - Location 1

Horn testing undertaken at Location 1.

Source: Aurecon

1:4,500
0 50 100m

Projection: GDA 1994 MGA Zone 56

Regional Rail Enabling Works

Access gates
Proposed design
Proposal area
Main access road
Compounds

Predicted noise levels
Lmax- in dB(A)

<= 65
> 65

Operational Scenario 6b - New Fleet - PDR Noise Wall Country Horn - Location 2

Horn testing undertaken at Location 2.

Source: Aurecon

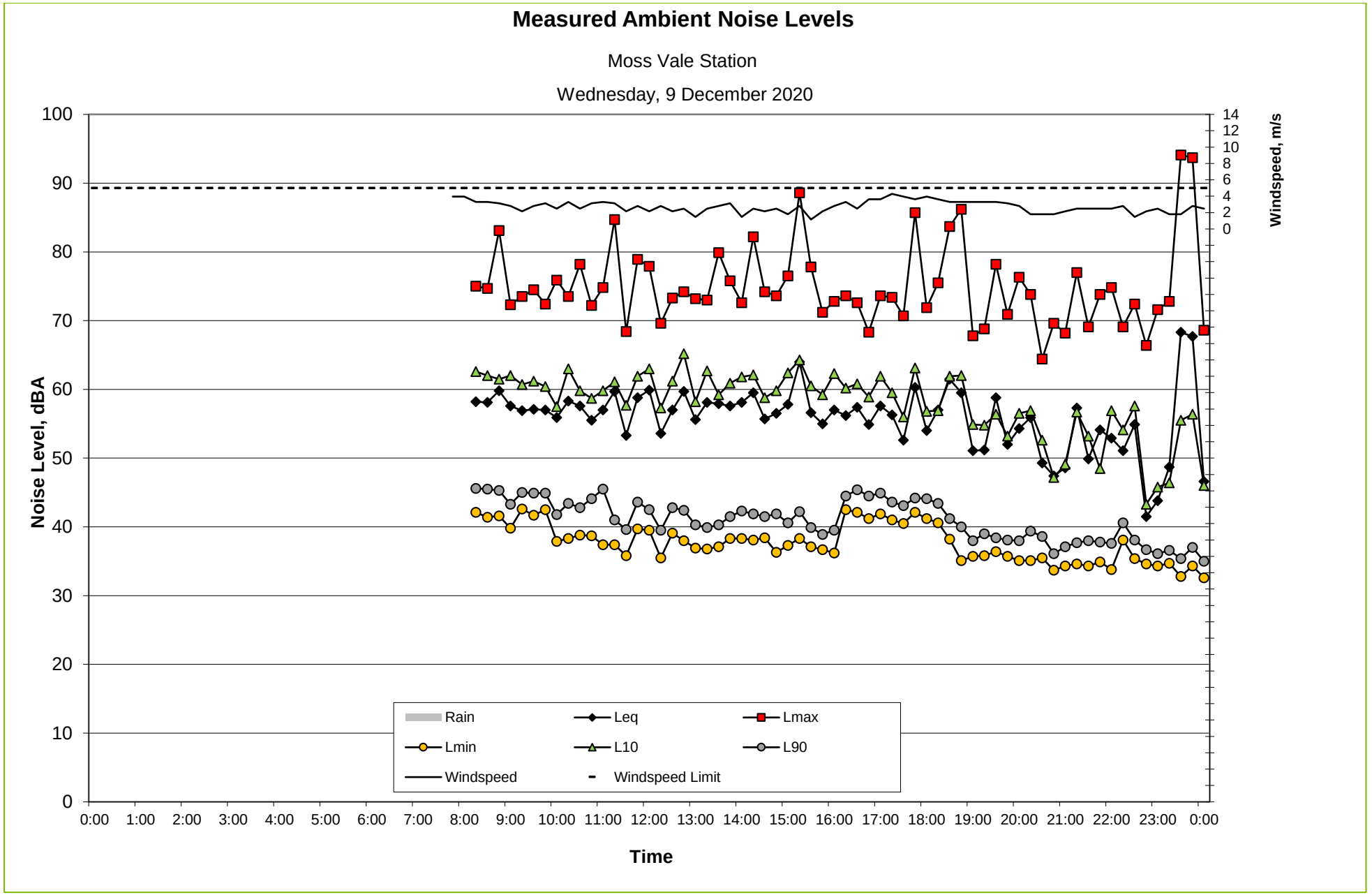
1:4,500
0 50 100m

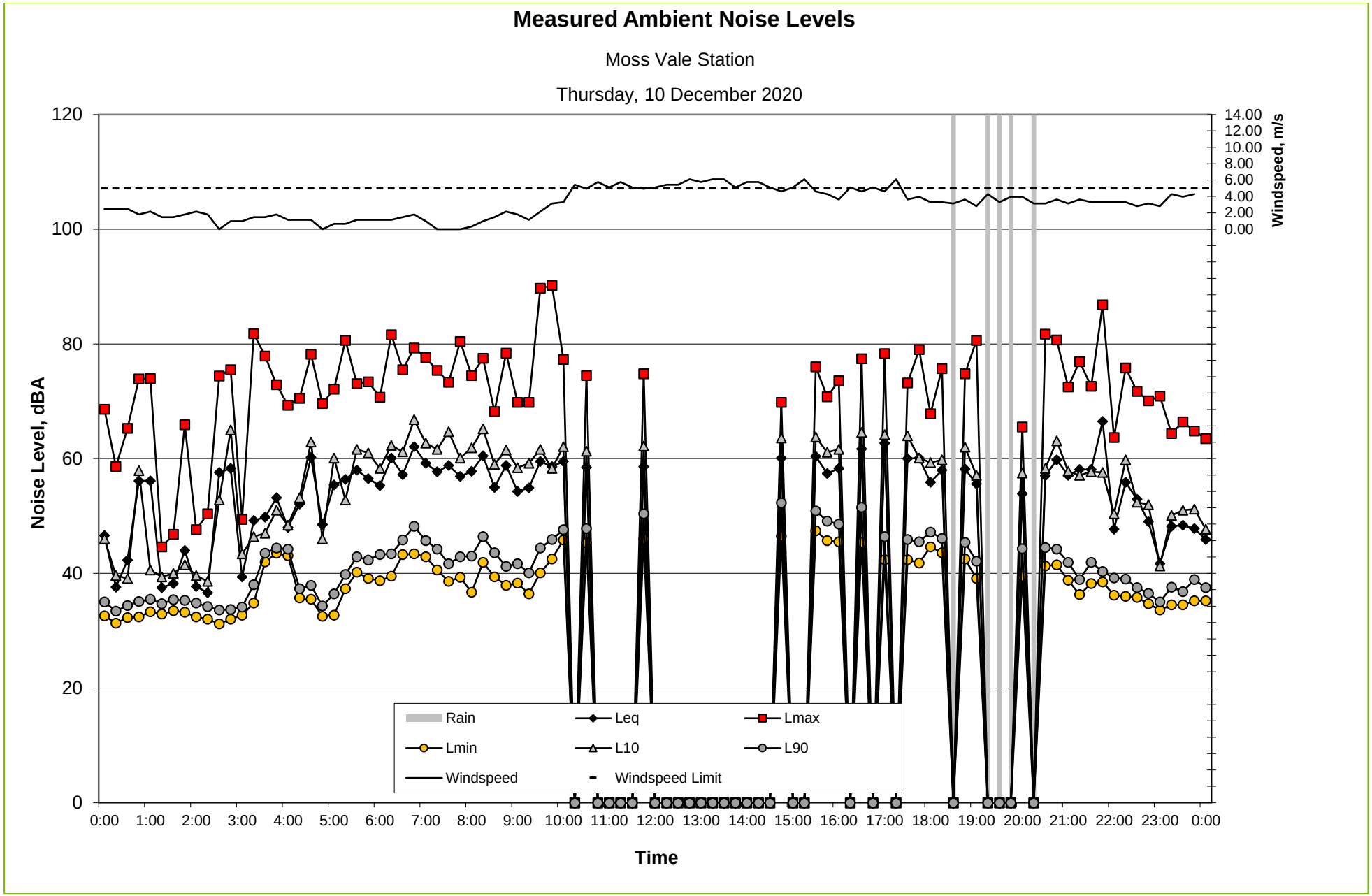
Projection: GDA 1994 MGA Zone 56

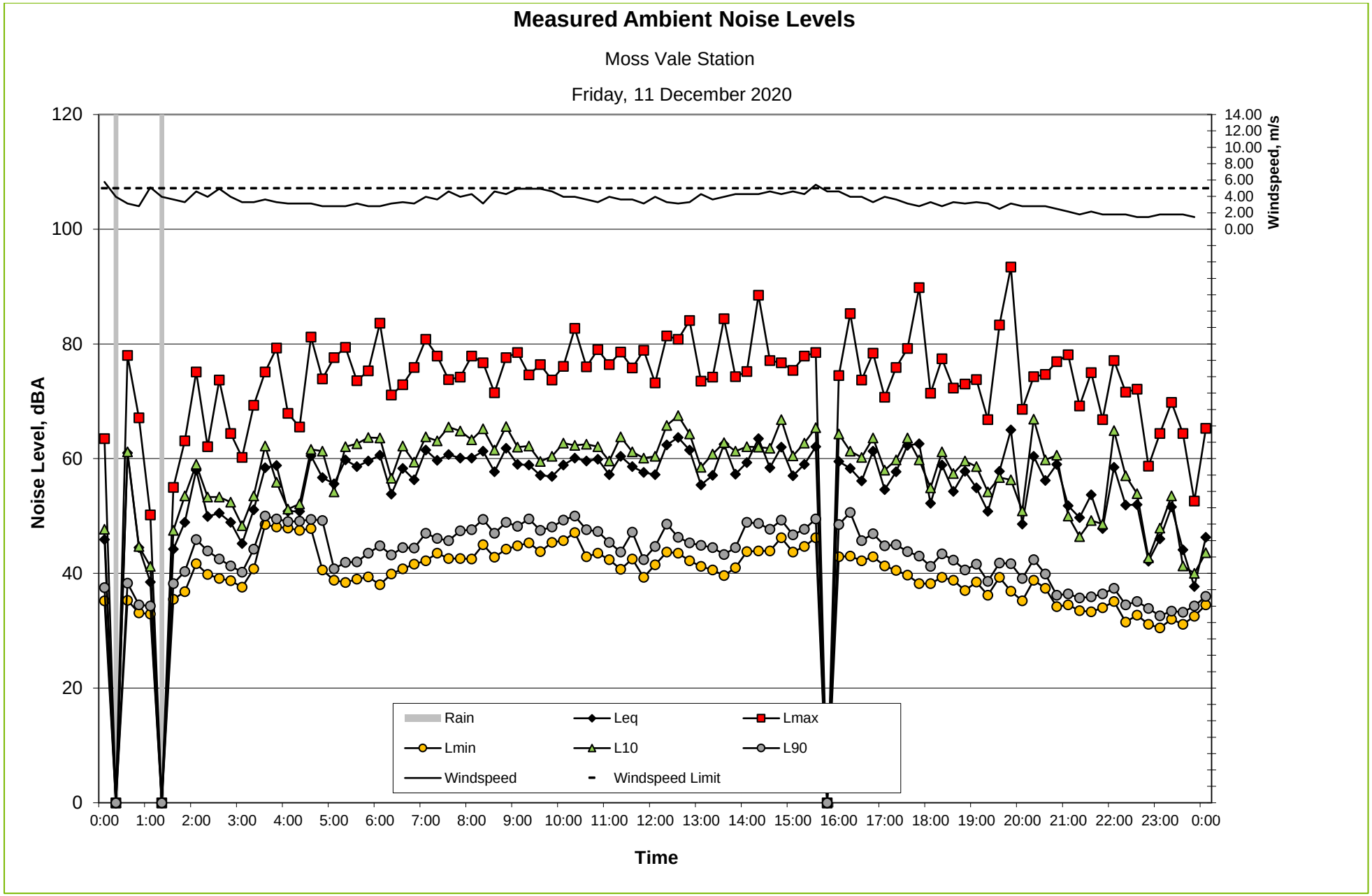
Regional Rail Enabling Works

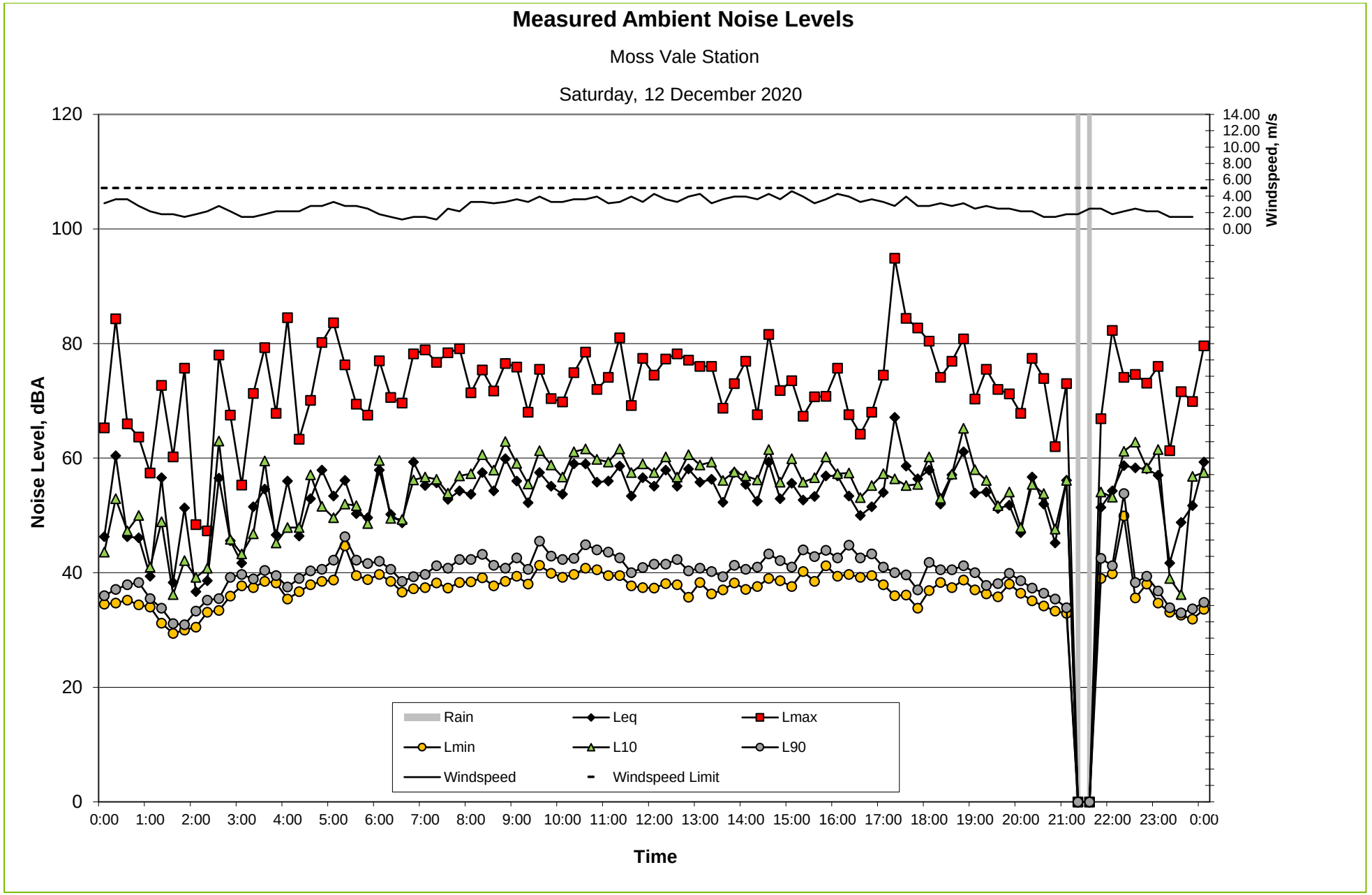
E

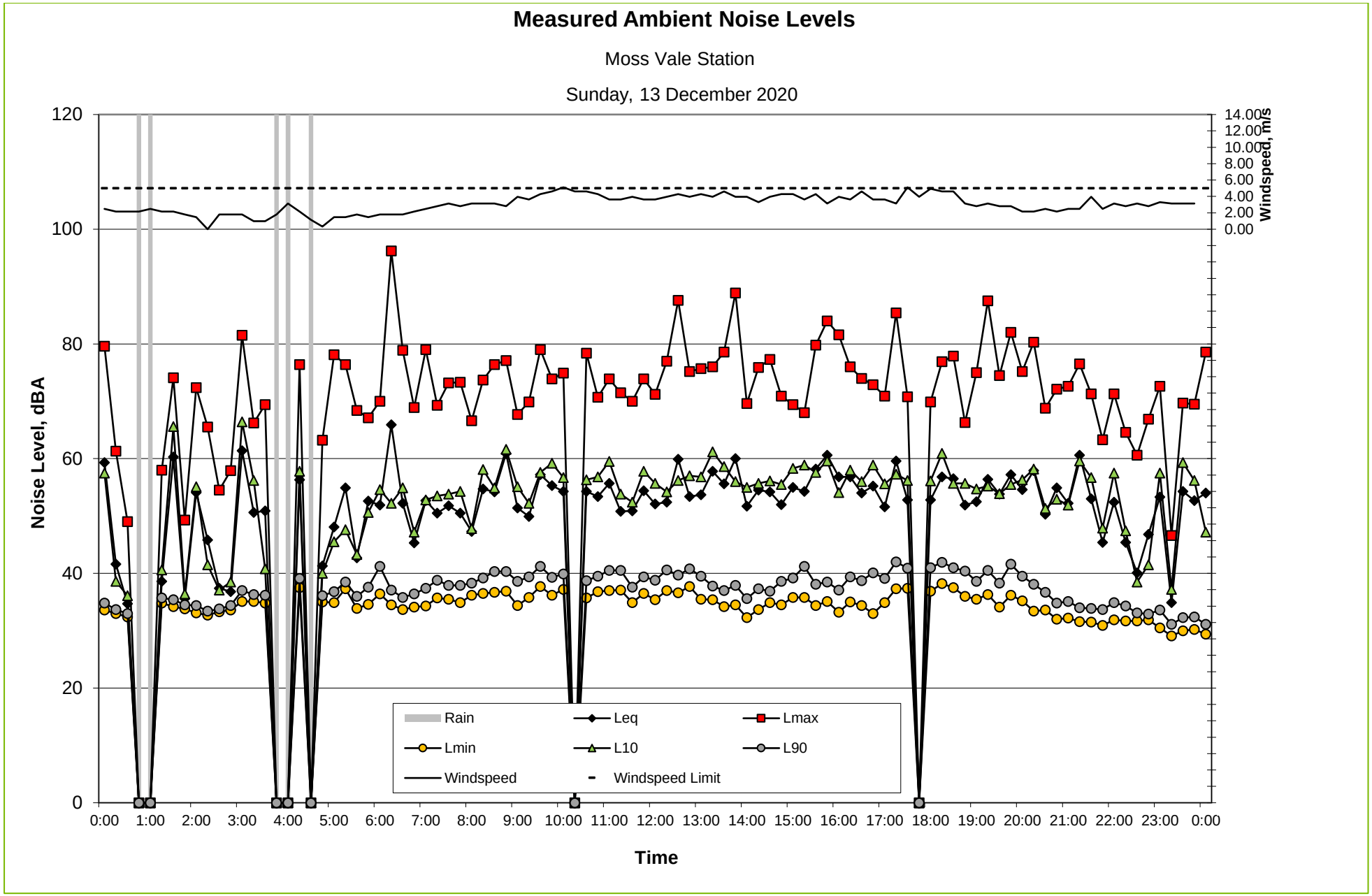
Noise Monitoring Data


Measured Ambient Noise Levels
Moss Vale Station
Wednesday, 9 December 2020
Noise Level, dBA
Windspeed, m/s
Time
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit
0
10
20
30
40
50
60
70
80
90
100
0
2
4
6
8
10
12
14
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00


Measured Ambient Noise Levels
Moss Vale Station
Thursday, 10 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit


Measured Ambient Noise Levels
Moss Vale Station
Friday, 11 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit


Measured Ambient Noise Levels
Moss Vale Station
Saturday, 12 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit


Measured Ambient Noise Levels
Moss Vale Station
Sunday, 13 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
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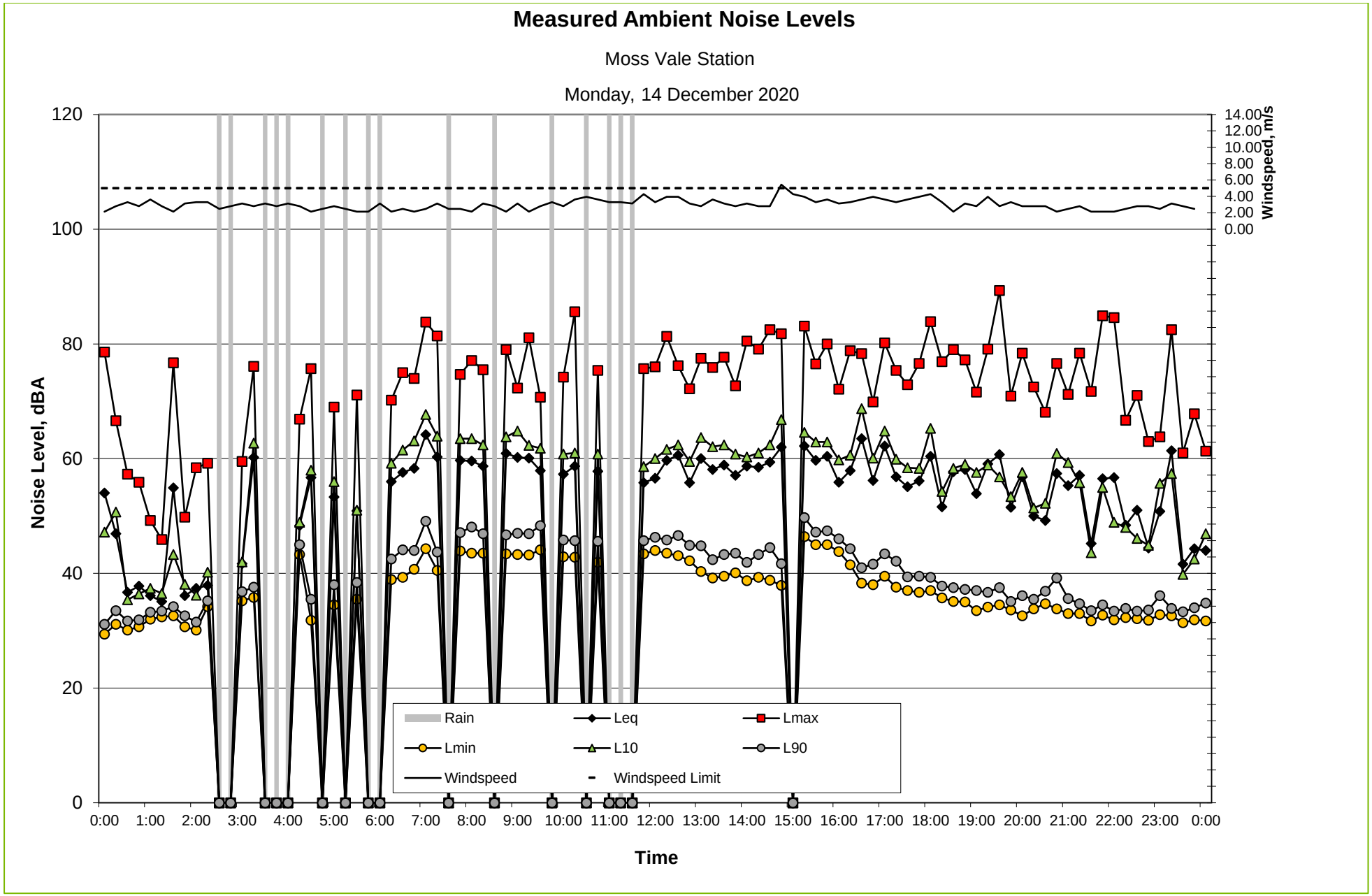
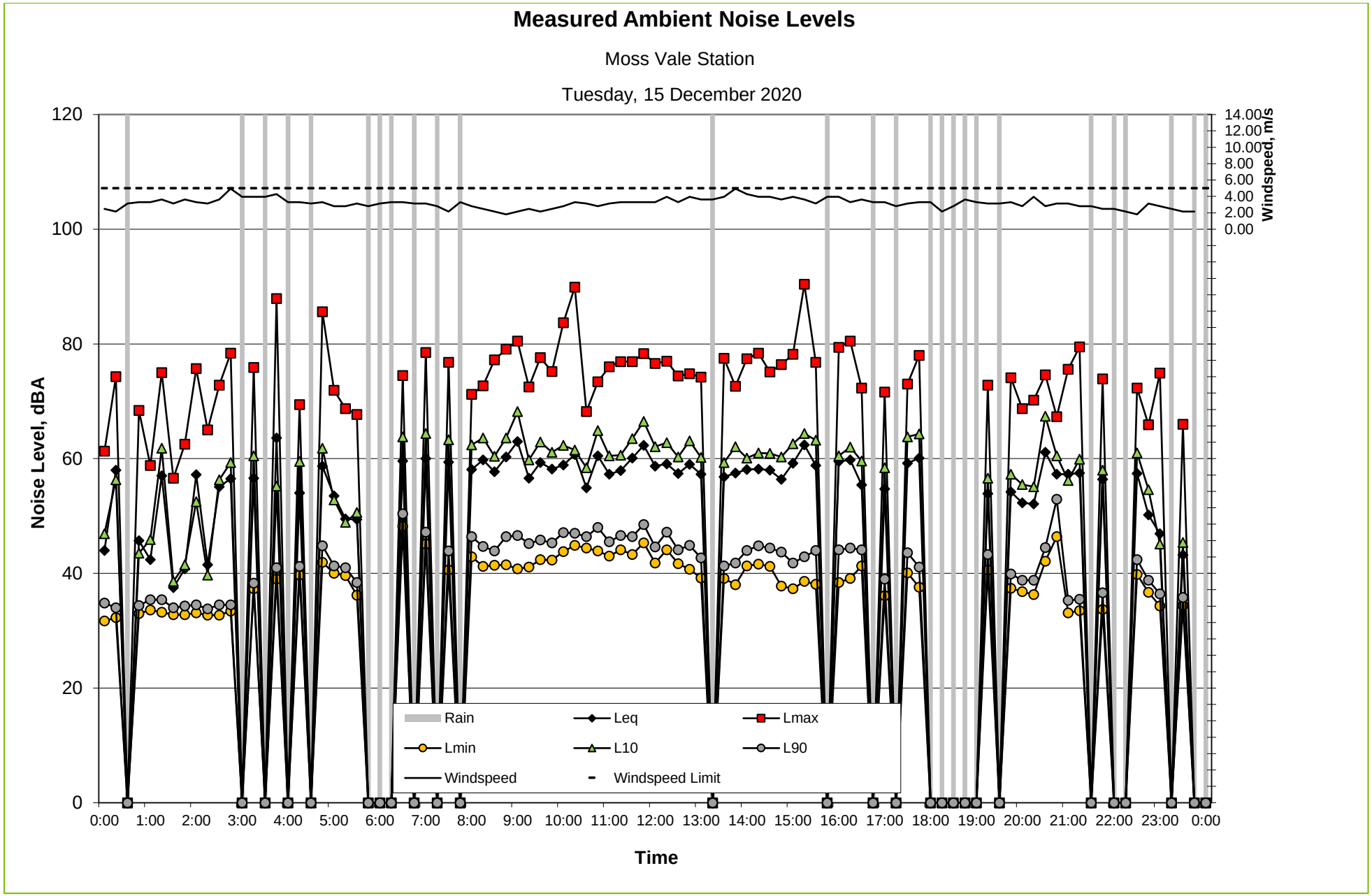
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit


Measured Ambient Noise Levels
Moss Vale Station
Monday, 14 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit


Measured Ambient Noise Levels
Moss Vale Station
Tuesday, 15 December 2020
Noise Level, dBA
Windspeed, m/s
Time
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit
0
20
40
60
80
100
120
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
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8:00
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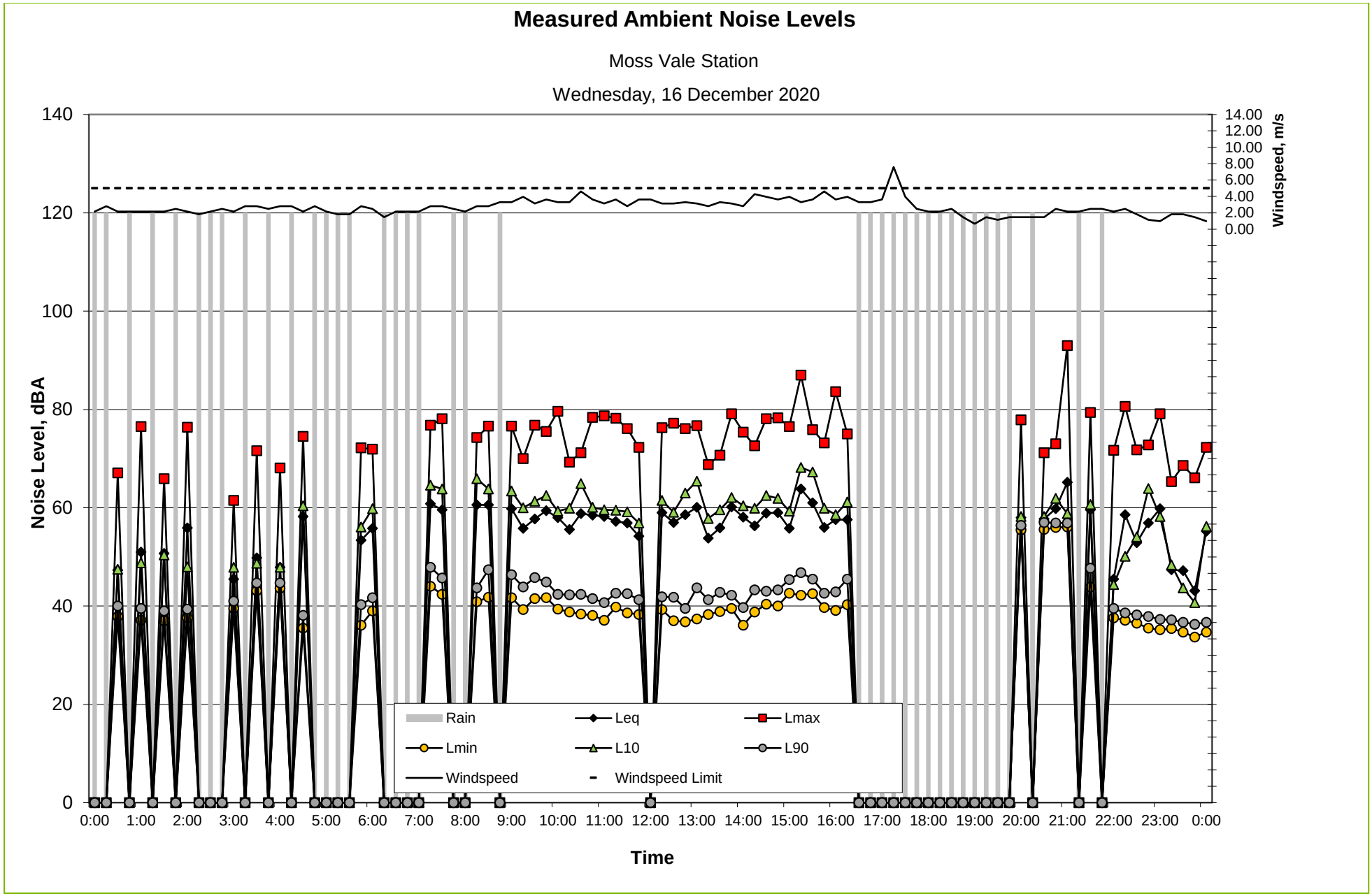
Measured Ambient Noise Levels
Moss Vale Station
Wednesday, 16 December 2020
Noise Level, dBA
Windspeed, m/s
Time
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit
0
20
40
60
80
100
120
140
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
0:00
1:00
2:00
3:00
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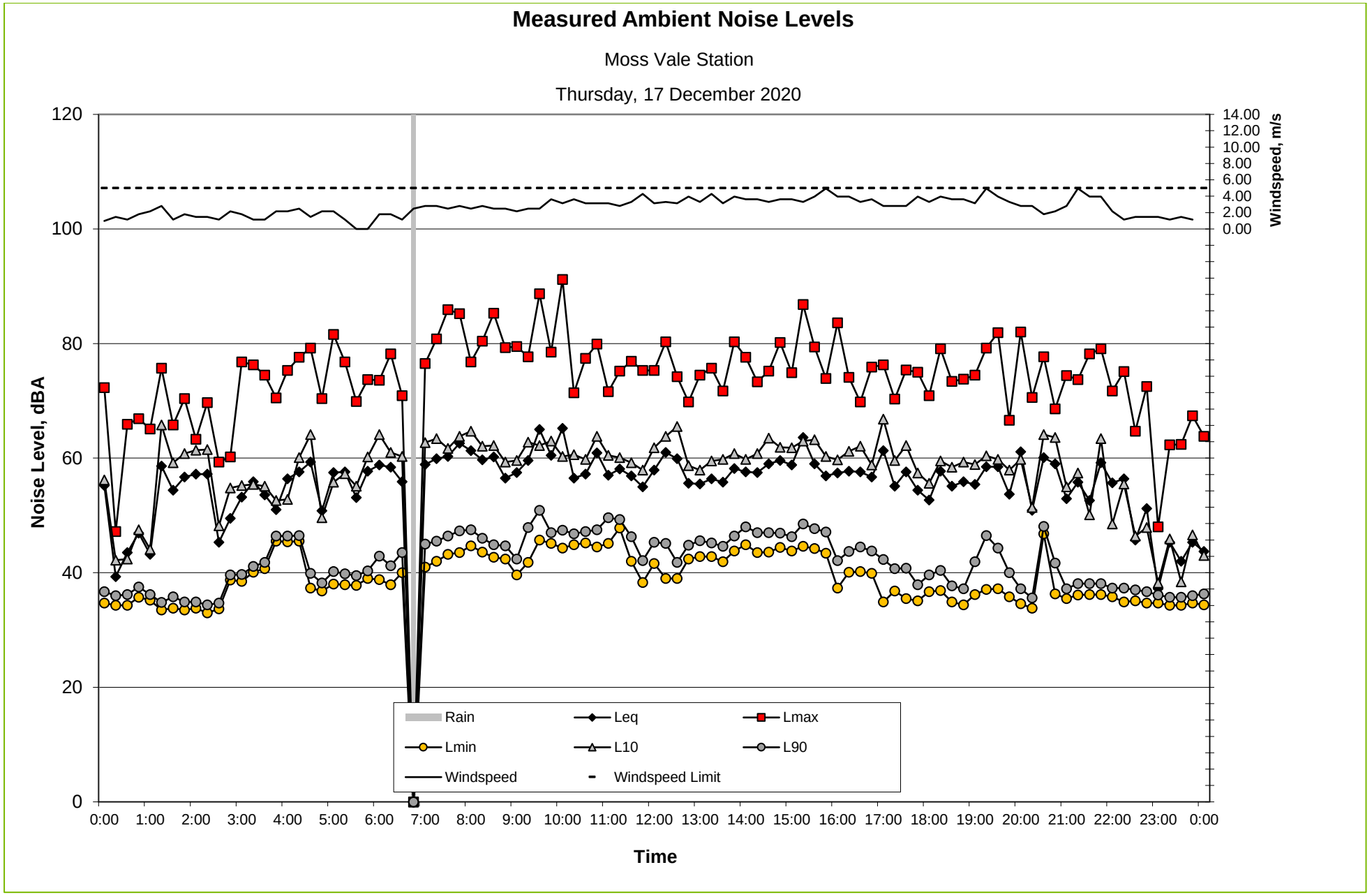
23:00
0:00


Measured Ambient Noise Levels
Moss Vale Station
Thursday, 17 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
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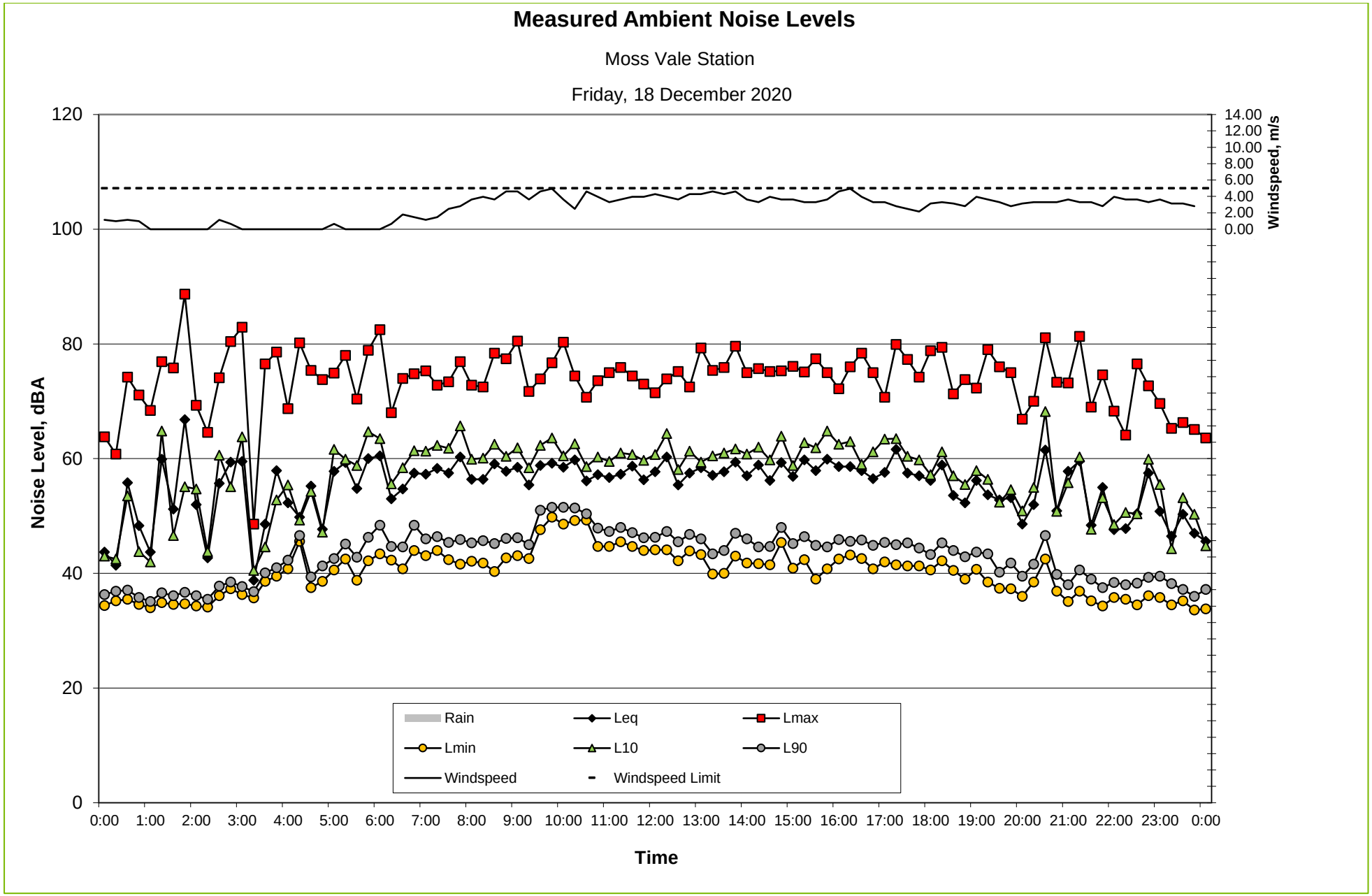
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit


Measured Ambient Noise Levels
Moss Vale Station
Friday, 18 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
2:00
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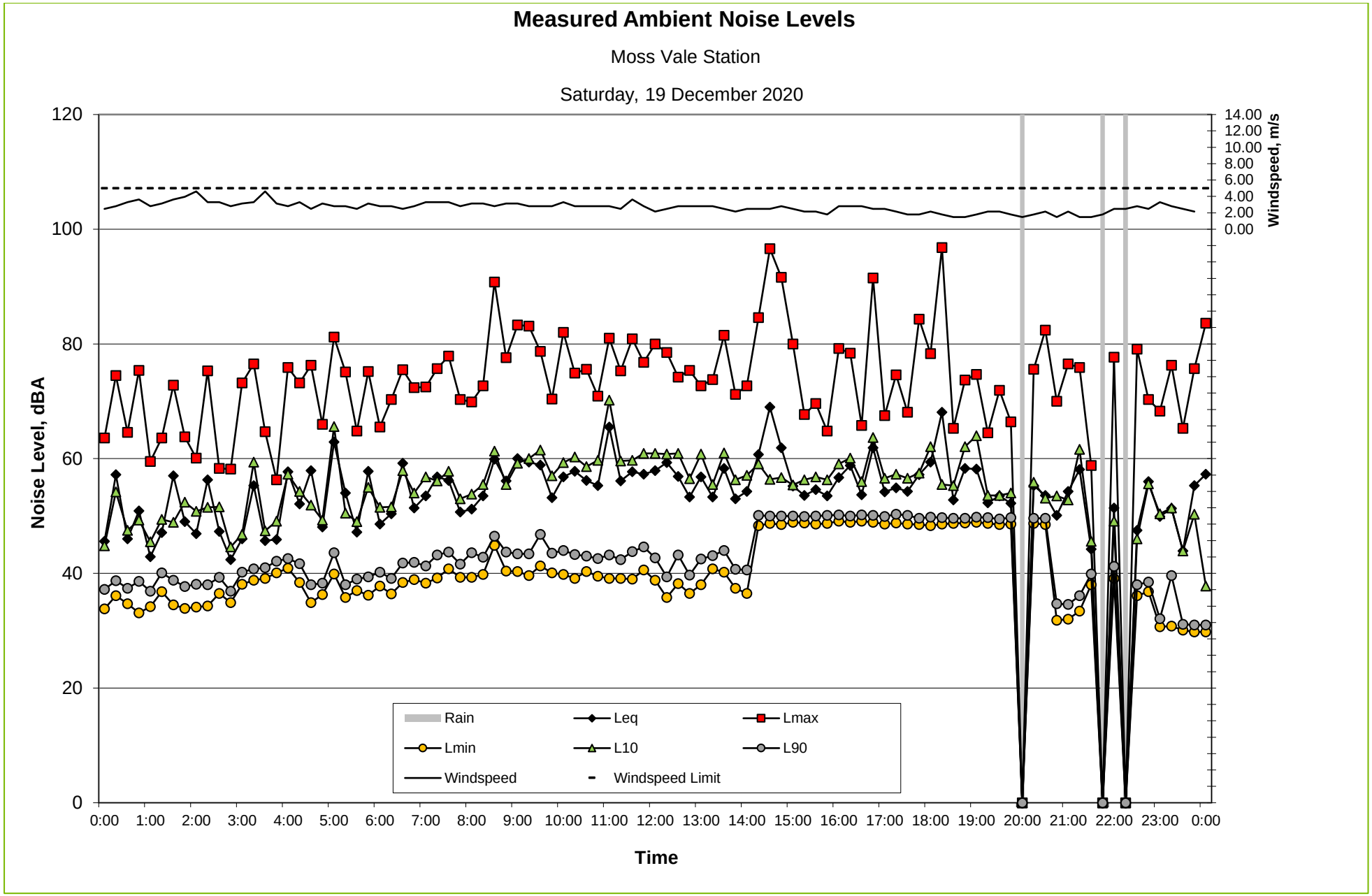
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit


Measured Ambient Noise Levels
Moss Vale Station
Saturday, 19 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
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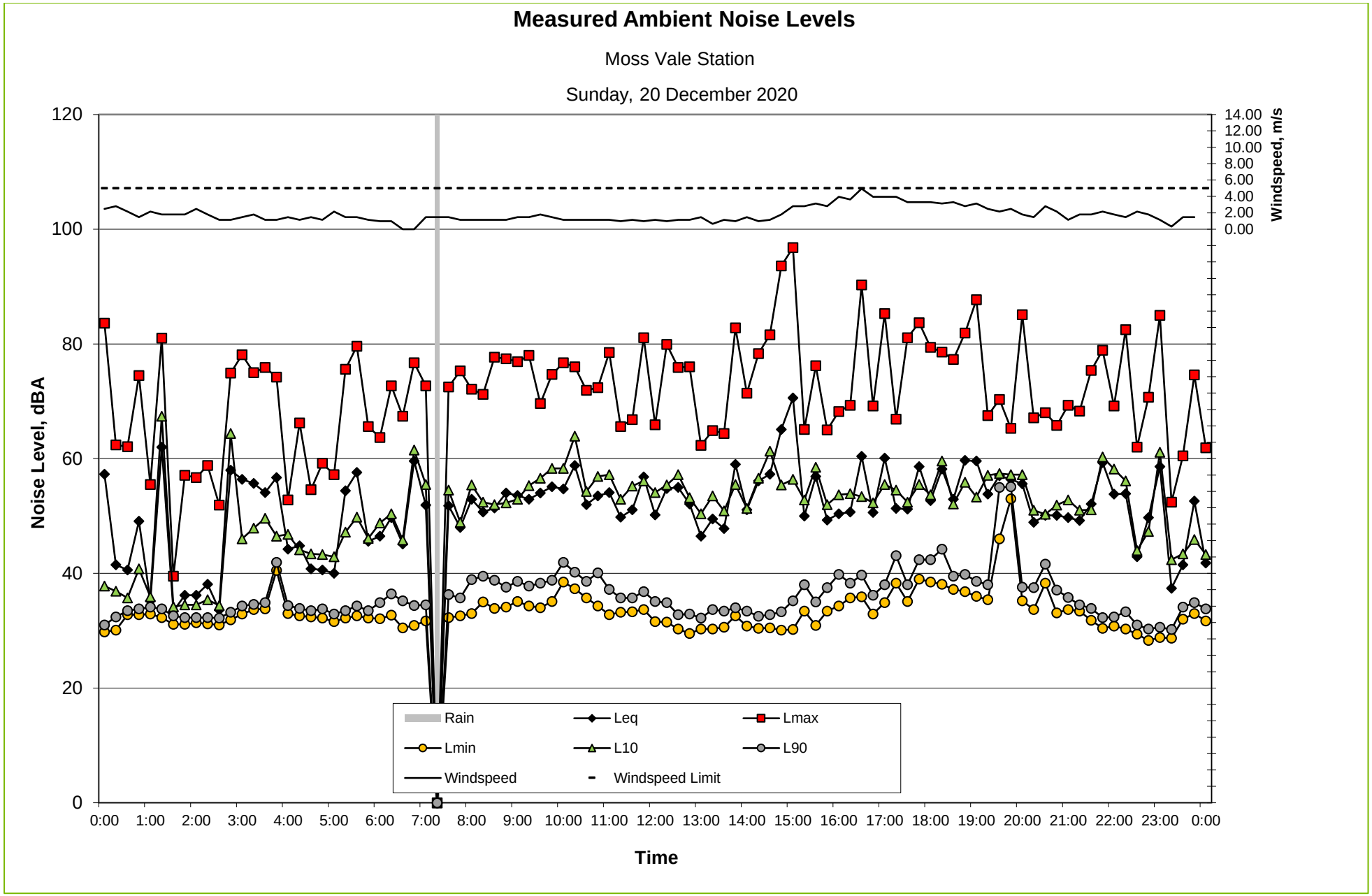
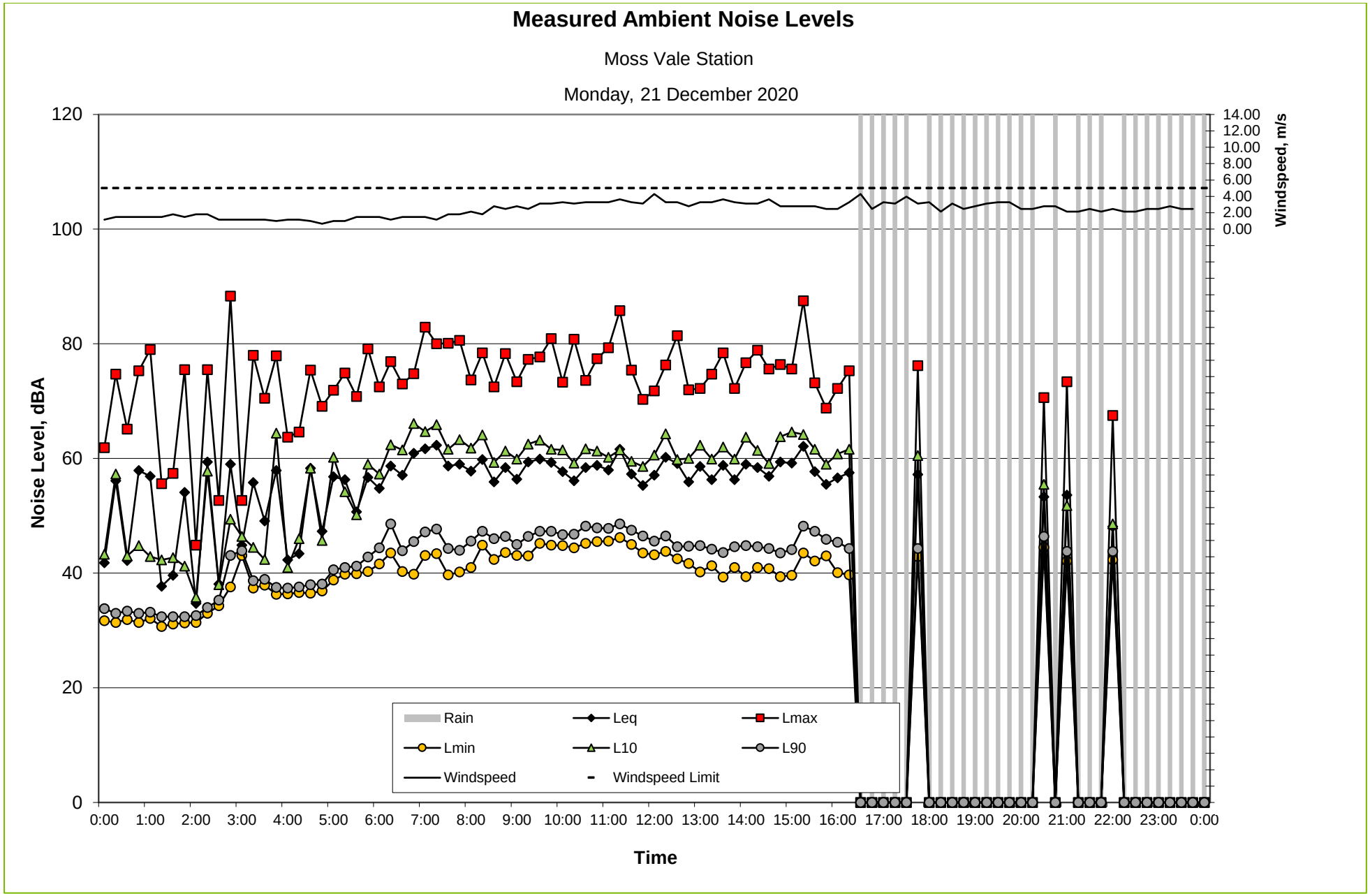
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit


Measured Ambient Noise Levels
Moss Vale Station
Sunday, 20 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit


Measured Ambient Noise Levels
Moss Vale Station
Monday, 21 December 2020
Noise Level, dBA
Windspeed, m/s
Time
120
100
80
60
40
20
0
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Rain
Leq
Lmax
Lmin
L10
L90
Windspeed
Windspeed Limit

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