

TECHNICAL PAPER

06

Noise and vibration (non-rail)

ALBURY TO ILLABO ENVIRONMENTAL IMPACT STATEMENT



ARTC INLAND RAIL

JUNE 2022

ALBURY TO ILLABO (A2I) PROJECT

2-0008-210-EAP-00-RP-0007

TECHNICAL PAPER 6 –
NOISE AND VIBRATION
(NON-RAIL)

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GLOSSARY

TERMINOLOGY	DESCRIPTION
Acceleration	A vector quantity that specifies the time derivative of velocity as relevant to ground vibration.
Accelerometer	A piezoelectric sensor that converts an input acceleration to an output (usually electrical) that is proportional to the input acceleration.
Acoustic barrier	Solid walls or partitions, solid fences, earth mounds, earth berms, buildings, etc. used to reduce noise, without eliminating it.
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Ambient vibration	The all-encompassing vibration associated with a given environment, usually a composite of vibration from many sources, far and near.
Amplitude	The maximum value of a vibratory wave.
Arterial road	Supports major regional and inter-regional traffic movement and carry traffic directly from one region to another. For noise assessment this term also includes freeways and motorways.
Assessment period	The period in a day over which assessments are made.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise environment, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Collector road	Connects the sub-arterial roads to the local road system in developed areas. May support sub-arterial roads during peak periods and may have been designed as local streets but can serve major traffic-generating developments or support non-local traffic.
Construction compound	An area used as the base for construction activities, usually for the storage of plant, equipment and materials and/or construction site offices and worker facilities.
Construction environmental management plan	A site-specific plan developed for the construction phase of a project, to ensure that all contractors and sub-contractors comply with the environmental conditions of approval for the project and manage environmental risks properly.
Decibels (dB)	<p>The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound is heard.</p> <p>The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping.</p>

TERMINOLOGY	DESCRIPTION
	<p>Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels. The following are examples of the decibel readings of every day steady or quasi-steady sounds.</p> <p>0dB the faintest sound we can hear under perfect conditions</p> <p>20dB quiet bedroom at night or recording studio</p> <p>30dB quiet library or quiet location in the country</p> <p>40dB living room</p> <p>50dB typical office space or ambience in the city at night</p> <p>60dB normal conversational speech</p> <p>70dB a car passing by</p> <p>80dB kerbside of a busy road</p> <p>90dB truck passing by</p> <p>100dB nightclub</p> <p>110dB rock band or 2m from a jackhammer</p> <p>120dB 70m from a jet aircraft</p> <p>130dB threshold of pain</p> <p>140dB 25m from a jet aircraft.</p>
dBA (A-weighted decibels)	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same sound pressure level are not heard as loud as high frequency sounds. The sound level meter attempts to replicate the human response of the ear by using an electronic filter which is called the “A” filter. A sound level measured with this filter switched in is denoted as dB(A). Most environmental noise is measured using the A filter.
Diffraction	The bending of sound waves around solid obstacles.
Enhancement site	Discrete sites within the A2I proposal area that are proposed for infrastructure enhancement.
Exceedance	An instance where one value is higher than another, typically relevant to criteria, trigger levels or noise management levels. This term should not be confused with non-compliance (refer this table).
Frequency	Of a periodic quantity: the time rate of repetition. The reciprocal of the period. Frequency is measured in hertz (Hz).
Ground borne noise	Noise heard within a building that is generated by vibration transmitted through the ground into the structure from construction works, sometimes referred to as ‘regenerated noise’ or ‘structure-borne noise’.
Hertz	Units in which frequency is expressed. Synonymous with cycles per second.
Highly noise affected	Represents the point above which there may be strong community reaction to noise..
Local road	Provide vehicular access to abutting property and surrounding streets. They are the subdivisional roads within a particular developed area.

TERMINOLOGY	DESCRIPTION
Loudness	A 3dB increase represents a doubling of the sound pressure; however, an increase of about 10dB is required before the sound will subjectively appear to be twice as loud. That is, a sound of 85dB is twice as loud as a sound of 75dB that is twice as loud as a sound of 65dB and so on. That is, the sound of 85dB is four times as loud as a sound of 65dB. The smallest change which can be readily heard is approximately 2dB. An increase beyond 5dB is considered to represent the level at which a change in loudness begins to be clearly perceived.
Noise management levels	An indication of the level at which construction proponents should apply all feasible and reasonable work practices to minimise construction noise.
Non compliance	Where a condition is exceeded or not met (as relevant) in a statutory context.
Precinct	Groupings of enhancement sites in line with the LGAs including Albury, Greater Hume–Lockhart, Wagga Wagga and Junee.
The proposal	Proposed enhancement works to structures and sections of track along 185 kilometres of the existing operational standard gauge railway between Albury and Illabo for the purpose of meeting Inland Rail specifications.
The proposal site	The areas that enhancement works are required to operate the Albury to Illabo section of Inland Rail. It includes the location of construction worksites, operational rail infrastructure, new bridge structures, level crossings and other ancillary infrastructure.
Recreation area (passive)	Areas characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion.
Recreation area (active)	Areas characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
Root Mean Square	Root Mean Square of the acceleration value of the vibration source. This measure allows for the magnitude of the vibration, regardless of its direction.
Study area	The wider area, including and surrounding the proposal site, with the potential to be directly or indirectly affected by the proposal. The extent of the study area varies according to the requirements of each assessment and the potential for impacts.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of sound pressure, expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Structure-borne noise	Vibration propagating through solid structures in the form of compression or bending waves, heard as sound.

TERMINOLOGY	DESCRIPTION
Sub arterial road	Connects arterials to regions of development and carries traffic from one part of a region to another. Provides connection between arterial roads and local roads. May support arterial roads during peak periods. A road that collects local traffic leaving a locality and connects to another local road, sub-arterial or arterial.
Transducer	A device that receives energy from one system and supplies energy, of either the same or a different kind, to another system in such a manner that the desired characteristics of the input energy appear at the output.
Velocity	A vector quantity that specifies the time derivative of displacement.
Wavelength	Of a periodic wave. The distance, measured perpendicular to the wave front in the direction of propagation, between two successive points on the wave that are separated by one period.

ABBREVIATIONS

TERM	DESCRIPTION
A2I	Albury to Illabo
ARTC	Australian Rail Track Corporation
AS	Australian Standard
BoM	Bureau of Meteorology
BS	British Standard
dB	Decibels
dBA	A-weighted decibels referenced to 20 µPa (micro pascals)
CEMP	Construction Environmental Management Plan
CNVG	Construction noise and vibration guideline
CNVMP	Construction Noise and Vibration Management Plan
CSSI	Critical State significant infrastructure
DEC	(former) Department of Environment and Conservation
DECC	(former) Department of Environment and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DIN	Deutsches Institut für Normung (German Institute for Standardisation)
ECRTN	Environmental Criteria for Road Traffic Noise
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
EPA	Environment Protection Authority
EPL	Environment protection licenses
Hz	Hertz
ICNG	Interim Construction Noise Guidelines
ISO	International Standards Organisation
km	Kilometre
km/h	Kilometres per hour
km ²	Square kilometres
L _{eq}	Equivalent sound pressure level – the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring. The sound weighting of the noise measurement is commonly added, for example L _{Aeq} or L _{Ceq} .

TERM	DESCRIPTION
L ₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L ₉₀ noise level expressed in units of dB(A).
m	Metres
mm	Millimetres
mm/s	Millimetres per second
m/s	Metres per second
NCA	Noise catchment area
NCG	Noise Criteria Guideline
NMG	Noise Management Guideline
NML	Noise management level
NPfI	Noise Policy for Industry
NSW	New South Wales
OEHS	(former) Office of Environment and Heritage
OOHW	Out-of-hours works
POEO Act	<i>Protection of the Environment Operations Act 1997 (NSW)</i>
PPV	Peak Particle Velocity
QLD	Queensland
RBL	Rating Background Level
RMS	Root Mean Square
RNP	Road Noise Policy
SEL	Sound Exposure Level
SEARs	Secretary's Environmental Assessment Requirements
SWLs	Sound power levels
TOA	Track Occupancy Authorisation
TfNSW	Transport for New South Wales
VDV	Vibration Dose Value

EXECUTIVE SUMMARY

THE PROPOSAL

The Australian Government has committed to delivering a significant piece of national transport infrastructure by constructing a high performance and direct interstate freight rail corridor between Melbourne and Brisbane, via central-west New South Wales (NSW) and Toowoomba in Queensland. Inland Rail is a major national program that would enhance Australia's existing national rail network and serve the interstate freight market.

Australian Rail Track Corporation Ltd (ARTC) ('the proponent') is seeking approval to construct and operate the Albury to Illabo section of Inland Rail ('the proposal'). The proposal is generally within the existing active rail corridor between the town of Albury on the Victorian-NSW border and around three kilometres to the north-east of Illabo. The alignment passes through two major regional towns, Albury and Wagga Wagga, NSW, and several smaller regional towns. Works are proposed at 24 locations along the 'Main South Line' corridor, described as 'enhancement sites'.

The proposal is Critical State Significant Infrastructure (CSSI) and is subject to approval by the NSW Minister for Planning under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

THIS REPORT

This report has been prepared as part of the Environmental Impact Statement (EIS) for the proposal. The EIS has been prepared to support the application for approval of the proposal, and address the environmental assessment requirements of the Secretary of the then NSW Department of Planning, Industry and Environment (now the Department of Planning and Environment), dated 14 October 2020.

The assessment includes a review of relevant policy, standards and guidelines to establish assessment criteria for sensitive receivers, baseline monitoring surveys to define the existing noise environment, a detailed assessment of potential impacts and recommendations for the feasible and reasonable control of noise and vibration.

An assessment of noise and vibration from railway operations on the Proposal is provided in Technical paper 7 – Operational noise and vibration (rail).

CONSTRUCTION NOISE AND VIBRATION

A noise prediction model was developed to calculate potential noise levels from the main sources of noise during the staged construction works at the 24 sites that make up the proposal. A modelling area of 2km either side of the construction sites and construction haul routes was adopted to assess noise over a total area comprised of 24,936 individual sensitive receivers.

The proposal involves enhancement works to an existing active rail line which, to minimise impact to existing freight and passenger rail services, needs to remain operational during construction. Work under rail possessions would be carried out during scheduled possession periods (that is, the times that the movement of trains along the rail corridor are stopped for maintenance), which are typically for 60-hour periods, twice a year—in March and September. During rail possessions, works may need to be carried out on a 24-hour basis. Track works (such as track realignment, track lowering, and connecting tracks) can only occur under rail possessions. Outside scheduled rail possessions, works would also occur within available five- to nine-hour windows when train services are not scheduled and when authorised by ARTC (called a track occupancy authorisation). Work may also be needed in areas adjacent to track work locations before and after these periods, to prepare for or complete construction. As such, construction is required to occur outside standard hours (as defined by the Interim Construction Noise Guideline) and has been assessed against more stringent noise trigger levels.

Proposal construction hours have been developed to balance worker safety and rail corridor access, to support efficiencies in the workforce utilisation and to reduce construction durations as far as practicable, and reduce community impacts, by minimising the overall duration of disruption and amenity impacts from construction activities and road diversions.

The modelling applied a database of noise emissions for various plant and equipment expected to be in-use during the construction works. Noise levels were modelled to represent the typical worst-case scenarios for noise emissions based on conservative assumption related to duration and intensity of construction activities and an assumption that works could be undertaken at the closest practicable location to sensitive receivers.

Noise levels for the proposed construction works during the proposal construction hours were predicted to generate noise levels above the calculated proposal noise management levels (NMLs) at most enhancement sites. Potentially highly noise affected receivers have been identified primarily occurring during the noisiest work stages comprised of demolition, piling, trackworks and earthworks. Where works occur during the night, sleep disturbance impacts have been identified as a potential risk.

The assessment identified construction plant such as rock breakers and concrete saws for demolition works would be the primary source of noise. Construction works are inherently noisy and, based on the local ambient noise environment adjacent to the enhancement sites, it is likely that construction works will be audible at nearby sensitive receivers.

The largest clusters of receivers predicted to experience exceedances of NMLs are located in larger regional centres including Junee, Wagga Wagga, and Albury. Junee is expected to experience the greatest number of exceedances during crane operation works associated with the Olympic Highway Bridge, with 1,007 receivers exceeding standard hours NMLs, and 1,103 receivers exceeding out of hours NMLs. This construction activity is expected to occur over 4 days. Wagga Wagga is expected to experience the greatest number of exceedances during earthworks associated with the Pearson Street Bridge, with 580 receivers exceeding standard hours NMLs, and 2,424 receivers exceeding out of hours NMLs. This construction activity is expected to occur over 5 days. Albury is expected to experience the greatest number of exceedances during demobilisation and rehabilitation associated with the Albury Yard clearances works, with 2,266 receivers exceeding standard hours NMLs, and 2,840 receivers exceeding out of hours NMLs. This construction activity is expected to occur over 10 days.

Smaller clusters of receivers predicted to experience exceedances of NMLs throughout the Greater Hume region including Culcairn (548 receivers exceeding out-of-hours NMLs), Henty (494 receivers exceeding out-of-hours NMLs), Yerong Creek (74 receivers exceeding out-of-hours NMLs), and The Rock (258 receivers exceeding out-of-hours NMLs).

Vibration-generating equipment is required for certain construction activities, such as compacting and piling, and vibration can also be emitted from other plant and machinery conducting standard construction work practices. An assessment of potential ground-borne vibration, and associated ground-borne noise, was undertaken to nominate safe working distances for vibration generating plant. The potential for vibration related impacts to human comfort and/or cosmetic damage to property and buildings is expected to be minimised where works are undertaken in line with the recommended safe working distances.

Considerate of the proposed construction works and the sensitivity of the existing environment, there can be potential for noise and vibration impacts. Consequently, a range of management and mitigation measures have been recommended for the reduction and control of noise and vibration to, where feasible and reasonable, meet the assessment criteria and minimise related impacts.

The management of construction noise and vibration is expected to include, and is not limited to, the following industry standard best practice measures:

- development and implementation of a Construction Noise and Vibration Management Plan to instruct on the management and mitigation of noise (and vibration) during construction works
- implementation of specific measures to control noise at its source, such as selection of construction plant and work activities that would generate the lowest reasonably practicable noise levels
- measures to screen noise from construction works, such as temporary construction site fencing and hoarding

- consideration of specific measures for individual property during works outside of standard daytime hours, such as alternative accommodation and respite offers, where noise impacts are unavoidable and all feasible and reasonable measures have been implemented
- monitoring and auditing of environmental performance during construction will include noise monitoring surveys to validate received noise levels and vibration trials to verify safe working distances for vibration generating plant.

Further refinement of noise and vibration levels shall be undertaken during detailed design and construction stage of the proposal as the work activities and site-specific plant and equipment is confirmed. Consultation with the local community and stakeholders will continue as the proposal progresses to the detailed design and construction stages.

ROAD TRAFFIC NOISE

There will be a requirement for light and heavy vehicle movements on the local road network to support the transfer of material and infrastructure during the proposed construction work activities. Construction road traffic is likely to predominantly remain on main roads, however some detours and end of journey stages will require limited use of local roads. Construction traffic is unlikely to generate substantial noise, although several minor impacts may be noted where heavy vehicles are required to use local roads in Wagga Wagga.

The proposal includes upgrades to facilitate the interface between the railway corridor and local road network, for example enactment of road over rail bridges. These changes include:

- minor changes to the horizontal and vertical alignments of Edmondson Street bridge at Wagga Wagga
- changes to the approaches and vertical alignment of Kemp Street bridge at Junee.

An assessment was carried out at each location to identify if these changes would trigger the investigation of management and mitigation measures to control future road traffic noise at sensitive receivers. The assessment was conducted against the Road Noise Policy and in accordance with the Noise Criteria Guidelines and Noise Mitigation Guidelines.

The results show that noise levels are predicted to reduce at properties immediately adjacent to Edmondson Street bridge and Kemp Street bridge as a result of the proposed bridge upgrades. Although the increase in bridge heights reduces the extent of noise absorbed by the ground for receivers close to the alignment, this loss is negligible due to the short distances to these receivers. The noise reduction predicted for these close receivers is primarily due to a result of acoustic screening that is provided by the bridge decks as the bridge is raised at these locations.

A small increase is predicted for receivers located at further distances from the bridges, including Kildare College. The increased height of the road alignment has reduced the level of noise screening provided by local buildings and structures, resulting in the increased transmission of road traffic noise. However, as all these increases are below the permissible 2.1dBA increase they are unlikely to be noticeable and do not require mitigation.

MITIGATION AND MANAGEMENT MEASURES

The key recommendations from the assessment are:

- confirm the predicted noise and vibration levels and statements of impact presented in this report during the detailed design and construction of the proposal
- during the detailed design and construction stages, review the feasible and reasonable management and mitigation measures in this report to confirm their ongoing eligibility
- at the commencement of vibration generating works, such as compacting and piling, conduct in-situ vibration monitoring trial to verify the appropriate safe working distances to manage potential ground-borne noise and vibration impacts
- document the requirements for the management of noise and vibration and mitigation of potential impacts in a Construction Noise and Vibration Management Plan.

1 INTRODUCTION

1.1 OVERVIEW

The Australian Government has committed to delivering a significant piece of national transport infrastructure by constructing a high performance and direct interstate freight rail corridor between Melbourne and Brisbane, via central-west New South Wales (NSW) and Toowoomba in Queensland. Inland Rail is a major national program that would enhance Australia's existing national rail network and serve the interstate freight market.

The Inland Rail route, which is about 1,700 kilometres long, would involve:

- using the existing interstate rail line through Victoria and southern NSW
- upgrading about 400 kilometres of existing track, mainly in western NSW
- providing about 600 kilometres of new track in northern NSW and south-east Queensland.

Inland Rail has been divided into 13 projects, seven of which are located in NSW. Each of these projects can be delivered and operated independently with tie-in points on the existing railway.

Australian Rail Track Corporation Ltd (ARTC) ('the proponent') is seeking approval to construct and operate the Albury to Illabo section of Inland Rail ('the proposal').

The proposal is Critical State Significant Infrastructure (CSSI) and is subject to approval by the NSW Minister for Planning under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This report has been prepared as part of the Environmental Impact Statement (EIS) for the proposal. The EIS has been prepared to support the application for approval of the proposal, and address the environmental assessment requirements of the Secretary (SEARs) of the then NSW Department of Planning, Industry and Environment (now the Department of Planning and Environment), dated 14 October 2020.

1.2 THE PROPOSAL

The proposal involves enhancement works to structures and sections of track along 185 kilometres of the existing operational standard gauge railway between Albury and Illabo. Enhancement works are required to provide the increased vertical and horizontal clearances required for double-stacked freight trains.

1.2.1 LOCATION

The proposal is generally within the existing active rail corridor between the town of Albury on the Victorian-NSW border and around three kilometres to the north-east of Illabo. The alignment passes through two major regional towns, Albury and Wagga Wagga, NSW, and several smaller regional towns. Works are proposed at 24 locations along the 'Main South Line' corridor, described as 'enhancement sites'.

The enhancement sites have been broken down into four precincts which align with the local government areas (LGA) of Albury, Greater Hume – Lockhart, Wagga Wagga and Junee, as identified in Table 1.1 and shown in Figure 1.1.

Table 1.1 Enhancement sites

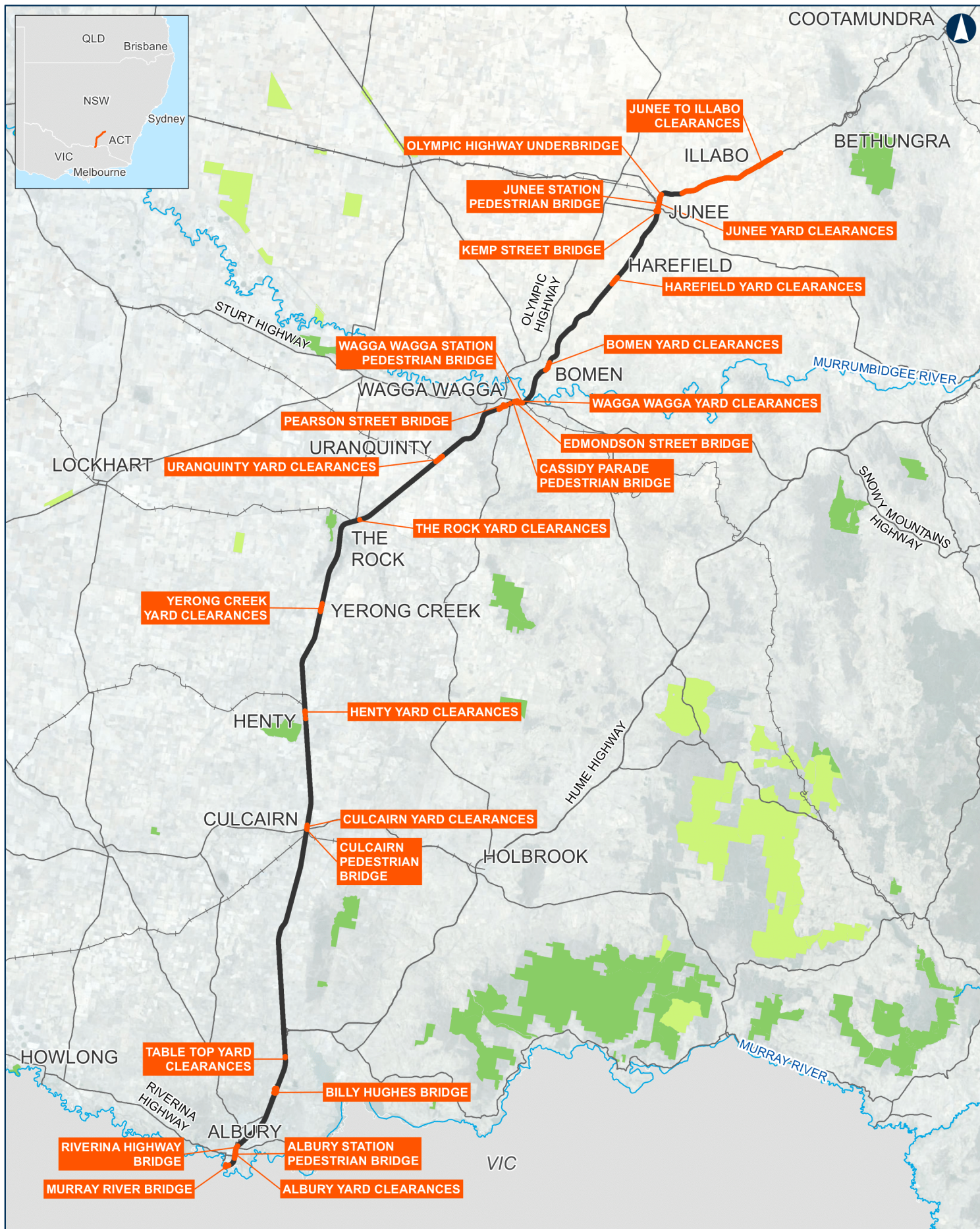
PRECINCT	ENHANCEMENT SITES
Albury	Murray River bridge
	Albury Station pedestrian bridge
	Albury Yard clearances
	Riverina Highway bridge
	Billy Hughes bridge
	Table Top Yard clearances
Greater Hume–Lockhart	Culcairn pedestrian bridge
	Culcairn Yard clearances
	Henty Yard clearances
	Yerong Creek Yard clearances
	The Rock Yard clearances
Wagga Wagga	Uranquinty Yard clearances
	Pearson Street bridge
	Cassidy Parade pedestrian bridge
	Edmondson Street bridge
	Wagga Wagga Station pedestrian bridge
	Wagga Wagga Yard clearances
	Bomen Yard clearances
Junee	Harefield Yard clearances
	Kemp Street bridge
	Junee Station pedestrian bridge
	Junee Yard clearances
	Olympic Highway underbridge
	Junee to Illabo clearances

1.2.2 KEY FEATURES

The key features of the proposal include:

- adjustments to approximately 44 kilometres of track across 14 enhancement sites to accommodate the vertical and horizontal clearances according to Inland Rail clearance specifications, comprising:
 - realignment of track within the rail corridor
 - lowering of track up to 1.6 metres at three enhancement sites
- changes to bridges and culverts at enhancement sites to accommodate vertical clearances and track realignment as follows:
 - replacement of two road bridges and adjustments to adjoining intersections
 - replacement of three pedestrian bridges
 - removal of two redundant pedestrian bridges
 - modifications to four rail bridges
- ancillary works, including adjustments to nine level crossings, modifications to drainage and road infrastructure, signalling infrastructure, fencing, signage, and services and utilities.

No additional works would be required outside the enhancement sites identified in Figure 1.1 as they meet the clearance requirement for the Inland Rail Program.



Albury to Illabo

Figure 1.1 Enhancement sites of the proposal

0 10 20 km

Coordinate System: GDA 1994 MGA Zone 55

ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 4/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3

Scale: 1:500,000

- Proposal site
- Track alignment
- Existing railway
- Main road
- River
- National Park
- State Forest

INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

1.2.3 TIMING

Subject to approval, further design and procurement, construction of the proposal is planned to start in early 2024 and is expected to take about 16 months. The proposal would be fully operational in 2025 with enhancement sites progressively commissioned on completion of construction. Inland Rail as a whole would be operational once all 13 sections are complete, which is estimated to be in 2027.

1.2.4 CONSTRUCTION

An indicative construction methodology has been developed based on the current design to be used as a basis for the environmental assessment process. Overall, the construction strategy is based on an approach of dividing the proposal into four construction packages which align with the precincts: Albury, Greater Hume – Lockhart, Wagga Wagga and Junee.

Construction of the proposal would require:

- construction compounds, laydown areas and other areas needed to facilitate construction works
- temporary changes to the road network, including road closures to undertake works on road bridges and level crossings
- other ancillary works.

Construction within each precinct would generally involve the site establishment and enabling works, main construction works as relevant to the enhancement site and finishing works as outlined in Table 1.2.

Further information on the construction of the proposal is provided in Chapter 8 of the EIS.

Table 1.2 Indicative construction activities

CONSTRUCTION STAGES	INDICATIVE ACTIVITIES
Site establishment and enabling works	<ul style="list-style-type: none">— Establishment of key construction infrastructure, work areas, access points and other construction facilities— Installation of environmental controls, fencing and site services— Preliminary activities including clearing/trimming of vegetation
Main construction works	<ul style="list-style-type: none">— Track works— Rail bridge works— Road bridge replacement— Pedestrian bridge works— Associated infrastructure works on level crossings, culverts and signalling
Finishing works	<ul style="list-style-type: none">— Testing and commissioning of the new and modified infrastructure— Demobilisation and removal of construction compounds and other construction infrastructure— Restoration of disturbed areas, as required, including revegetation and landscaping, where required

1.2.5 OPERATION

The proposal would form part of the rail network managed and maintained by ARTC. Train services would be provided by a variety of operators.

The proposal would enable the use of double stacked trains along its entire length. Inland Rail would operate 24 hours per day and would initially accommodate double-stacked freight trains up to 6.5 metres high and up to 1,800 metres in length. The possible future use of the railway between Albury and Illabo by freight trains up to 3,600 metres long would be subject to separate assessment. Freight train speeds would range from 60 to 115 kilometres per hour, which is consistent with current train speeds.

The average number of freight trains movements between Albury and Illabo would increase from a current average of up to 12 per day in 2021 to 18 per day in 2025, further increasing to about 20 per day in 2040.

ARTC would continue to maintain the Main South Line. This would typically involve minor maintenance works, such as bridge and culvert inspections, rail grinding and track tamping, through to major maintenance, such as reconditioning of track and topping up of ballast as required. Maintenance works and schedule are not proposed to change as a result of the proposal and would continue in accordance with the existing Environmental Protection Licence which applies to the rail corridor (EPL 3142).

Further information on the operation of the proposal is in Chapter 7 of the EIS.

1.3 PURPOSE OF THIS REPORT

An EIS has been prepared to support the application for approval of the proposal and to address the SEARs for the proposal from the Secretary of the NSW Department of Planning, Industry and Environment (now the Department of Planning and Environment).

This report has been prepared as part of the EIS to assess the potential noise and vibration impacts from the construction of the proposal and the road traffic associated with construction and operation of the proposed infrastructure. The primary purpose of the assessment is to address the relevant SEARs for the proposal. Specifically, this study has:

- location in this document where each SEAR has been addressed (refer Table 1.3)
- identified the noise and vibration assessment study area and associated sensitive receivers
- described the existing level and character of the acoustic environment surrounding the proposal
- defined the assessment criteria adopted to assess the proposal's noise and vibration impacts for the proposed construction and operational road traffic associated with the proposal
- calculated and predicted noise and vibration levels associated with the proposal
- feasible and reasonable management and mitigation measures that should be considered for the control of potential noise and vibration impacts.

This report is specific to construction and road traffic aspects of the proposal. The noise and vibration impact assessment for the railway operations associated with the proposal is detailed in Technical Paper 7—Operational noise and vibration (rail).

Table 1.3 SEARs Environmental assessment requirements

ENVIRONMENTAL ASSESSMENT REQUIREMENTS	WHERE ADDRESSED
5. Noise and vibration	N/A
1 Construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines.	Construction: refer below Operation: refer Technical paper 7 – Operational noise and vibration (rail)

ENVIRONMENTAL ASSESSMENT REQUIREMENTS	WHERE ADDRESSED
2 The assessment of construction noise and vibration must address:	N/A
a the nature of construction activities and related noise characteristics	Section 3.3
b the intensity and duration of noise (both air and ground borne) and vibration impacts. This must include consideration of extended construction impacts associated with ancillary facilities (and the like) and construction fatigue	Sections 3.3, 5, and 7 Appendix C
c the identification and nature of receivers, existing and proposed, during the construction period	Sections 4.1 and 4.2.1
d the structural integrity and heritage significance of items (including Aboriginal places and items of environmental heritage)	Sections 4.7, 5.6.2.2
e the impact of construction and rail traffic on nearby road infrastructure including roads, bridges, culverts and road side furnishings	Sections 2.6.3 and 5.6.2.5
f the nature of the impact and the sensitivity of receivers and level of impact including for out of hours works	Chapter 5
g the need to balance timely conclusion of noise and vibration-generating works with periods of receiver respite, and other factors that may influence the timing and duration of construction activities (such as traffic management)	Chapter 5 and Section 8.3.1
h noise impacts of out-of-hours works (including utility works and works associated with the SSI including those undertaken under another assessment pathway), possible locations where out-of-hours works would be undertaken, the activities that would be undertaken, the estimated duration of those activities and justification for these activities in terms of the Interim Construction Noise Guideline (DECC, 2009)	Chapter 5 and Section 8.3.1
i sleep disturbance (including the number of noise-awakening events)	Chapter 5 and Section 8.3.1
j a cumulative noise and vibration assessment inclusive of impacts from the proposal, including concurrent construction activities within the proposal and the construction of other relevant development in the vicinity of the proposal	Chapter 7
k details and analysis of the predicted effectiveness of mitigation measures to adequately manage identified impacts, including impacts as identified in (h)	Chapter 8.3
l any potential residual noise and vibration impacts following application of mitigation measures; and	Chapter 8.3.1
m a description of how receiver feedback received during the preparation of the EIS has been taken into account (and would be taken into account post exhibition of the EIS) in the design of mitigation measures, including any tailored mitigation, management and communication strategies for sensitive receivers.	EIS Chapter 5
3 If blasting is required, demonstration that blast impacts can comply with current guidelines.	Blasting is not proposed during construction or operation of the proposal and has not been considered further.

1.4 STRUCTURE OF THIS REPORT

The structure of the report is as follows:

- **Chapter 1 – Introduction** – introduces the report.
- **Chapter 2 – Legislation and policy context** – describes the legislative and policy context for the assessment and relevant guidelines.
- **Chapter 3 – Methodology** – describes the approach to assess potential noise and vibration impacts.
- **Chapter 4 – Existing environment** – describes the existing noise environment of the assessment area and identifies sensitive receivers.
- **Chapter 5 – Construction impact assessment** – describes the predicted noise and vibration impacts generated by the proposal.
- **Chapter 6 – Operational noise assessment** – describes the predicted noise and vibration impacts generated by operational (non-rail) aspects of the proposal.
- **Chapter 7 – Cumulative noise assessment** – describes the predicted cumulative noise and vibration impacts generated by the proposal in addition to other, nearby proposals.
- **Chapter 8 – Construction mitigation and management measures** – details recommended mitigation measures to minimise noise and vibration impacts
- **Chapter 9 – Conclusion** – overview of the key findings of the report.
- **Chapter 10 – References.**

2 LEGISLATION AND POLICY CONTEXT

The proposal will be required to meet the SEARs. The SEARs include Key Issue 5, which applies to construction and operation noise and vibration. The assessment presented in this report will satisfy the construction noise and vibration requirements of this SEARs Key Issue. This section provides assessment criteria in line with the most relevant guidelines.

2.1 COMMONWEALTH LEGISLATION

2.1.1 *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999*

The objective of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is to protect and manage prescribed Matters of National Environmental Significance (MNES). Under the EPBC Act, proposed ‘actions’ that have the potential to significantly impact on MNES, the environment of Commonwealth land, or that are being carried out by a Federal Government agency, must be referred to the Federal Minister for the Environment for assessment.

Controlled actions relevant to this assessment include potential for vibration impacts on a National Heritage place.

Preliminary environmental investigations identified threatened species under the EPBC Act which have the potential to be impacted by the proposal. As a result of the potential for impacts on protected matters, the proposal was referred to the (then) Australian Minister for the Environment on 2 June 2020 (EPBC Referral No 2020/8670). On 29 June 2020, the Australian Government Department of Agriculture, Water and the Environment notified that the proposal is a not controlled action.

2.2 NSW LEGISLATION

2.2.1 *ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979*

The EP&A Act and Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) establish a framework for the assessment and approval of developments in NSW. They also provide for the making of environmental planning instruments, including state environmental planning policies (SEPPs) and local environmental plans (LEPs), which determine the permissibility and approval pathway for development proposals and form a part of the environmental assessment process. In accordance with the provisions of the EP&A Act, the proposal is State significant infrastructure (SSI).

SSI may also be declared to be critical State significant infrastructure (CSSI) in accordance with section 5.13 of the EP&A Act, if it is of a category that, in the opinion of the Minister for Planning, is essential to the state for economic, environmental or social reasons. The proposal was declared as CSSI in 2021.

Under section 5.14 of the EP&A Act, the approval of the Minister for Planning is required for State significant infrastructure (including CSSI), and an EIS has been prepared under Division 5.2 of the EP&A Act.

Subject to section 5.23 of the EP&A Act, the requirement for certain approvals under other legislation does not apply where planning approval is granted for an SSI project. Also, under section 5.23, where a project is declared CSSI, a number of notices or orders, such as an environment protection notice under Chapter 4 of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) cannot be given so as to interfere with the carrying out of the approved proposal. In addition, under section 5.24, if planning approval under the EP&A Act has been given for an SSI

project, then approvals under certain other legislation, including an environment protection licence under the POEO Act, cannot be refused and must be granted on terms that are consistent with those of the EP&A Act approval.

Specifically, Part 4.3 Prevention notices of the POEO Act does not apply.

2.2.2 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

The POEO Act establishes, among other things, pollution management, pollution incident reporting and the procedures for issuing licences for environmental protection on aspects such as waste, air, water, and noise discharge control.

Environment protection licences (EPL) are required to undertake scheduled activities or scheduled development work. Scheduled activities in Schedule 1 of the POEO Act include: railway activities—railway infrastructure construction (clause 33) and railway activities—railway infrastructure operations (clause 33A). The proposal, therefore, would require an EPL.

ARTC currently holds a licence to carry out railway systems activities (licence number EPL3142) within the A2I rail corridor. This EPL will be amended to include the operation of the proposal. A separate EPL will be obtained by the construction contractor for the construction of the proposal. Licensing requirements for the proposal would be considered in consultation with the NSW Environment Protection Authority (EPA).

Rollingstock operators on ARTC's network in NSW are regulated by the NSW EPA and require a separate EPL.

2.3 RELEVANT POLICY AND GUIDELINES

In NSW, the POEO Act controls the permissible generation of noise from developments. The application of this act is controlled through the legislation and policies described in this chapter.

In addition, this report has been written in accordance with the SEARs. In line with the POEO Act, SEARs and the above ARTC documents, this report has referenced the documents presented in Table 2.1. The most relevant guideline has been selected for the proposal.

Table 2.1 Relevant guidelines and policies

ACOUSTIC ASSESSMENT ASPECT	DESCRIPTION	ASSESSMENT GUIDELINES
Airborne noise	Assessment of construction noise	<ul style="list-style-type: none">— <i>Interim Construction Noise Guideline</i> (DECCW, 2009) (ICNG)— <i>Draft Construction Noise Guideline</i> (EPA, 2020)⁽¹⁾ (DCNG)— <i>Construction Noise and Vibration Strategy 2019</i> (TfNSW, 2019) (CNVS)
	Assessment of construction traffic noise	<ul style="list-style-type: none">— <i>NSW Road Noise Policy</i> (DECCW, 2011) (RNP)— <i>Construction Noise and Vibration Guideline</i> (CNVG) (Roads and Maritime, 2016)
	Assessment of sleep disturbance from construction noise (for work lasting more than two consecutive nights)	<ul style="list-style-type: none">— <i>Interim Construction Noise Guideline</i> (DECCW, 2009)— <i>NSW Road Noise Policy</i> (DECCW, 2011)
	Assessment of existing ambient and background noise levels	<ul style="list-style-type: none">— <i>Interim Construction Noise Guideline</i> (DECCW, 2009)— <i>Noise Policy for Industry</i> (EPA, 2017) (NPfI)— <i>Australian Standard AS 1055 Description and measurement of environmental noise</i> (AS1055)

ACOUSTIC ASSESSMENT ASPECT	DESCRIPTION	ASSESSMENT GUIDELINES
	Assessment of construction noise transmitted through the ground into a structure	<ul style="list-style-type: none"> — <i>Interim Construction Noise Guideline</i> (DECCW, 2009) — <i>Draft Construction Noise Guideline</i> (EPA, 2020)⁽¹⁾ (DCNG)
Ground-borne noise	Assessment of construction vibration amenity impacts	<ul style="list-style-type: none"> — <i>Assessing Vibration: a Technical Guideline</i> (DEC, 2006) (AVaTG)
Vibration	Assessment of construction vibration effect on structures (structural or cosmetic damage)	<ul style="list-style-type: none"> — <i>British Standard BS 7358-2: Evaluation and measurement for vibration in buildings guide to damage levels from ground-borne vibration</i> (BS7358-2) — <i>German Standard DIN 4150-3 Structural Vibration – Part 3: Effects of vibration on structures</i> (2016) (DIN4150-3) — <i>Construction Noise and Vibration Strategy 2019</i> (TfNSW, 2019)
	Creation of mitigation and management of noise and vibration issues	<ul style="list-style-type: none"> — <i>Interim Construction Noise Guideline</i> (DECCW, 2009) — <i>Construction Noise and Vibration Management Framework</i> (ARTC, 2021) (CNVMF)
Management	Mitigation and management of noise and vibration issues	<ul style="list-style-type: none"> — <i>Interim Construction Noise Guideline</i> (DECCW, 2009) — <i>Draft Construction Noise Guideline</i> (EPA, 2020)⁽¹⁾ — <i>Construction Noise and Vibration Management Framework</i> (ARTC, 2021) (CNVMF)

(1) The Draft Construction Noise Guideline (EPA, 2020) is included for consideration only. The draft guideline has not been formally released, however, once it is finalised and released it will replace the ICNG. Refer to section 2.4.2 for further information.

2.4 CONSTRUCTION NOISE CRITERIA

2.4.1 INTERIM CONSTRUCTION NOISE GUIDELINE

The Interim Construction Noise Guideline (ICNG) is the primary instrument for assessment of construction noise and vibration in NSW. The ICNG provides thresholds (triggers) for the implementation of noise and vibration management measures, guidance on feasible and reasonable measures, and strategies to manage impacts within communities and the relevant aspects to be addressed in impact assessment reports.

The ICNG sets noise management levels (NMLs) for land use types based upon the day of week and time of day for which construction noise occurs. For residential land uses the ICNG defines Recommended Standard Hours, which represent the times of the day when receivers are likely to be less sensitive to noise impacts.

Where work is proposed outside of Recommended Standard Hours, justification is required and more stringent (lower) NMLs apply which reflect the greater sensitivity of the receiving environment to noise during the evening and night-time periods.

The NMLs are non-mandatory targets to guide the management of construction noise and mitigation of potential noise related impacts. ICNG requires the investigation and application of feasible and reasonable noise management and mitigation measures where measured or predicted construction noise levels are above the NMLs at sensitive receivers.

Construction noise is considered to adversely impact a receiver if the predicted noise level exceeds the NML, which is determined based on the measured RBLs. RBLs are the Rating Background noise Level (RBL), as defined in the NPfI, and relevant RBLs for the proposal are sourced from measurement data in section 4.3.

Table 2.2 summarises the ICNG NML approach for the residential receiver types. The NMLs for residences are external noise levels and typically apply at the property boundary that is most exposed to construction noise; the NMLs for residential properties are presented in section 4.5.

For construction of the proposal, works will be conducted during rail possession periods. As such, some works will be conducted outside of the ICNG defined standards hours at times. Any works required to be completed outside of standard working hours would be carried out in accordance with the conditions of the construction EPL.

Where NMLs are exceeded either during or outside of recommended standard hours for construction work, all feasible and reasonable noise mitigation and management measures should be implemented.

Table 2.2 Application of the ICNG residential noise management levels

TIME OF DAY	NML, $L_{eq,15min}$ dBA	HOW TO APPLY
Recommended standard hours: <ul style="list-style-type: none"> Monday to Friday 7am to 6pm Saturday 8am to 1pm Excludes Sundays or public holidays 	Noise affected RBL + 10dB	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <p>Where the predicted or measured $L_{eq,15min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>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.</p>
	Highly noise affected 75dBA	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <p>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:</p> <ul style="list-style-type: none"> times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5dB	<p>A strong justification would typically be required for works outside the recommended standard hours.</p> <p>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community.</p>

Noise management levels at non-residential receivers located within the study area (all enhancement sites) are presented in Table 2.3. The ICNG advises that if internal noise levels are not able to be measured, it is acceptable to establish an internal construction noise level by determining the external construction noise level and apply a conservative estimate of the difference between internal and external noise levels.

Table 2.3 Noise management levels for non-residential sensitive receivers

LAND USE	NOISE MANAGEMENT LEVEL (ICNG) dBA $L_{eq}(15 \text{ min})$	NOISE MANAGEMENT LEVEL (EXTERNAL) dBA $L_{eq}(15 \text{ min})$
Educational	45 ¹	55 ¹
Hospital wards and operating theatres	45 ¹	55 ¹
Commercial (offices, retail outlets)	70	70
Commercial (industrial)	75	75
Active recreation	65	65
Passive recreation	60	60
Place of worship	55 ¹	55 ¹

(1) An internal to external correction of +10dB has been applied as per the ICNG to be representative of the decrease through an open window

2.4.2 DRAFT CONSTRUCTION NOISE GUIDELINES

Although not in force at the time this assessment was prepared, the EPA is currently finalising the development of the Draft Construction Noise Guideline (at this stage the guideline is still within the consultation process). It aims to improve outcomes by simplifying the noise assessment process and providing flexibility for proponents to select appropriate work practices and mitigation measures while placing strong emphasis on community engagement to select measures that align with community preferences.

The underlying principles set out in the ICNG (that is to apply best practice to manage construction noise) have not changed. However, improvements have been made to enhance clarity and guidance to deliver the objectives of the draft Guideline to ensure noise impacts from construction and maintenance projects are kept to a minimum.

The document contains the following hierarchy of noise control which presents a reasonable approach to the scheduling of work which cannot be undertaken during standard working hours:

- Saturday afternoon periods between 1.00pm and 5.00pm
- Sundays between 8.00am and 6.00pm
- weekday evening periods between 6.00pm and 10.00pm
- weekday night periods between 10.00pm and 7.00am
- all other times outside the recommended standard hours.

The proponent should seek to minimise impacts by scheduling work during the above hierarchy of preferred working hours, as per community preferences or as approved by the relevant consent or regulatory authority.

2.4.3 SLEEP DISTURBANCE

Construction noise during the night-time periods (10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday) has the potential to result in sleep disturbance impacts, such as awakening, interrupted sleep and general loss of sleep quality over time.

The ICNG does not prescribe specific NMLs to manage the potential for sleep disturbance impacts and references the DECCW's *Environmental Criteria for Road Traffic Noise* (ECRTN) (RTA, 1999) as a source of guidance. Since the time of the ICNG the ECRTN has been superseded by more recent regulatory guidelines, construction NMLs for sleep disturbance in this assessment have been developed with reference to current guidance from the *Road Noise Policy* (RNP) (NSW EPA, 2011).

The RNP adopts a guidance noise level to limit sleep disturbance from environmental noise, noting that the $L_{AF1,1min}$ should not exceed the ambient L_{A90} plus 15dB.

Section 5.4 of the RNP further advises that:

- maximum internal noise levels below 50 to 55dBA L_{max} would be unlikely to awaken people from sleep
- one or two noise events per night, with maximum internal noise levels of 65 to 70dBA L_{max} , are not likely to affect health and wellbeing significantly.

The RNP indicates that internal noise levels of 50 to 55dBA L_{max} are unlikely to cause sleep awakenings. It follows that at levels above 55dBA L_{max} , sleep awakening would be considered likely. Assuming receivers may have windows partially open for ventilation, a +10dB inside to outside correction has been adopted as outlined in the ICNG.

Therefore, assessment of sleep disturbance and awakening has been conducted for residential receivers in each NCA by adopting the most conservative (lowest) of the external noise level screening levels of RBL+15dB and L_{max} 65dBA.

2.5 ROAD TRAFFIC NOISE

2.5.1 CONSTRUCTION ROAD TRAFFIC

During construction of the proposal, changes in vehicle movements will be required on local roads to facilitate the delivery and removal of materials to site, the delivery of equipment and construction staff and road detours during the temporary closure of public roads.

These road traffic movements have the potential to change local road traffic noise levels and require assessment against relevant road traffic noise policy and guidelines.

A screening assessment approach has been adopted from the CNVG. This guideline advises that ‘*an initial screening test should first be applied by evaluating whether noise levels will increase by more than 2dBA due to construction traffic or a temporary reroute due to a road closure. Where increases are less than 2.1dBA then no further assessment is required*’. A change in local road traffic noise of 2dBA or less is not expected to be a perceptible difference in road traffic noise and on this basis is unlikely to cause a noise-related impact.

Should the screening assessment determine road traffic noise levels could increase by more than 2dBA, an assessment of road traffic noise is undertaken with reference to road traffic noise criteria from the RNP, as detailed in Table 2.4.

Table 2.4 Road traffic noise assessment criteria (construction traffic)

ROAD CATEGORY	TYPE OF PROJECT / LAND USE	TRAFFIC NOISE ASSESSMENT CRITERIA	
		Day (7.00am to 10.00pm)	Night (10.00pm to 7.00am)
Collector/sub-arterial/arterial/freeway	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{eq(15 \text{ hr})}$ 60dBA	$L_{eq(9 \text{ hr})}$ 55dBA
Local roads	Existing residences affected by noise from the redevelopment of existing roads	$L_{eq(1 \text{ hr})}$ 55dBA	$L_{eq(1 \text{ hr})}$ 50dBA

2.5.2 OPERATIONAL ROAD TRAFFIC

At Wagga Wagga and Junee precincts, the proposal includes the modification to the existing road network at road and rail interfaces, such as road over rail bridges. These upgrade works will be permanent changes to the local road networks and require an assessment to determine the potential changes to local road traffic noise.

In NSW road traffic noise from the upgrade of road networks is managed in accordance with the *Noise Criteria Guideline* (NCG) (RMS, 2015) and RNP.

The NCG details the implementation of the RNP assessment criteria for sensitive receivers affected by road projects. The RNP provides the assessment criteria, methodology, and noise mitigation requirements for managing noise from roads in the design stage of a project.

The relevant road networks and proposed upgrade works (development) are defined in Table 2.5.

Table 2.5 Road traffic noise assessment criteria for residential land uses

ROAD UPGRADE LOCATION	TYPE OF ROAD	TYPE OF DEVELOPMENT
Wagga Wagga		
Edmondson Street bridge	Connector	Minor works (works are not considered redeveloped or new as they are not intended to increase the traffic carrying capacity of the overall road or accommodate a significant increase in heavy vehicle traffic)
Junee		
Kemp Street bridge	Connector	Minor works (works are not considered redeveloped or new as they are not intended to increase the traffic carrying capacity of the overall road or accommodate a significant increase in heavy vehicle traffic)

The NCG states that ‘where the minor works increase noise levels by more than 2.0dBA relative to the existing noise levels at the worst affected receiver’ the road criteria outlined within the RNP will be applied. The relevant road traffic noise assessment criteria from the RNP are detailed in Table 2.6.

Table 2.6 Road traffic noise assessment criteria (road upgrades)

ROAD CATEGORY	TYPE OF PROJECT / LAND USE	TRAFFIC NOISE ASSESSMENT CRITERIA	
		Day (7.00am to 10.00pm)	Night (10.00pm to 7.00am)
Collector/sub-arterial/arterial/freeway Olympic Highway underbridge (Junee)	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{eq} (15 hr) 60dBA	L _{eq} (9 hr) 55dBA
Local roads Edmonson Street Bridge (Wagga Wagga) Kemp Street bridge (Junee)	Existing residences affected by noise from the redevelopment of existing roads	L _{eq} (1 hr) 55dBA	L _{eq} (1 hr) 50dBA

Assessment has been conducted against these criteria at the nearest and most affected properties. Where compliance is shown at these sites, compliance at all other locations is inferred.

2.6 VIBRATION ASSESSMENT CRITERIA

During construction, the operation of plant and machinery can be a source of vibration emissions. The resultant vibration can be transmitted into adjacent buildings and structures via the intervening ground. If the levels of vibration are sufficiently high, it may result in adverse impacts to human comfort or the damage of physical structures such as dwellings.

The human comfort and structural damage impacts are assessed against different criteria, with the effects of vibration on human comfort having a lower threshold. The exception can be some scientific equipment, for example laboratories or medical scanning equipment, which can require more stringent design goals than those applicable to human comfort. A desktop survey of land uses adjacent to the proposal did not identify premises expected to have these types of equipment.

There is not a single point of reference for all ground-borne vibration assessment requirements, as such the SEARs nominates relevant local guidelines and international standards from which criteria and assessment approaches can be referenced. To determine reasonable criteria for the assessment of potential ground-borne vibration impacts the study adopted:

- *Assessing Vibration: A Technical Guideline* (AVaTG) to establish ground-borne assessment criteria to assess human comfort impacts
- *German Standard DIN 4150-3:2016-02* (DIN 4150) to establish ground-borne vibration assessment criteria to evaluate the effects of short-term vibration on structures (including residential buildings and vibration sensitive heritage structures).

2.6.1 HUMAN COMFORT (AMENITY)

To assess the potential impacts to human comfort from vibration the vibration dose value (VDV) metric is adopted. The VDV provides a cumulative measure of the vibration levels associated with the construction works over a defined time period, typically the daytime and night-time periods.

The VDV criteria for sensitive receivers in Table 2.7 were adopted from the AVaTG for sources of intermittent vibration, such as construction works. The vibration guideline advises that activities should be undertaken to meet the preferred values where an area is not already exposed to vibration. Where all feasible and reasonable measures have been applied to control vibration, the maximum values may be used if they can be justified.

Table 2.7 Human comfort (amenity) guideline vibration limits (intermittent work)

LOCATION	ASSESSMENT PERIOD	VIBRATION DOSE VALUE, m/s ^{1.75}	
		Preferred values	Maximum values
Critical areas	Anytime	0.10	0.20
Residences	Daytime	0.20	0.40
	Night-time	0.13	0.26
Offices, schools, educational institutions and places of worship	Anytime	0.40	0.80
Workshops	Anytime	0.80	1.60

Source: *Assessing Vibration: a technical guideline* (2006).

2.6.2 COSMETIC BUILDING DAMAGE AND STRUCTURAL INTEGRITY

Building structures classified as being of heritage significance are to be considered on a case-by-case basis, as a heritage-listed structure may not be assumed to be more sensitive to vibration unless it is structurally unsound, which is unlikely for a regularly maintained structure. Where a historic structure is deemed to be sensitive to damage from vibration following inspection by qualified structural and/or civil engineers, more conservative superficial cosmetic damage criterion based on DIN 4150 should be considered.

DIN 4150 provides the guideline values for vibration quantified using vibration velocity, which is a measure of the rate of displacement (change of position). It is commonly expressed in mm per second using Peak Particle Velocity (PPV), which is the maximum velocity during a time interval.

The structural damage criteria from the German Standard are detailed in Table 2.8. Vibration from construction occurs between 8 Hertz (Hz) to 100 Hz; to conservatively manage the risk of cosmetic damage, the assessment adopted the lowest level above which damage has been credibly demonstrated:

- 5mm/s assessment criteria for dwellings (residences)
- 3mm/s for sensitive structures of great intrinsic value, for example sites of heritage significance.

Cosmetic damage is regarded as minor in nature; it is readily repairable and does not affect a building's structural integrity. If there is no significant risk of cosmetic damage, then structural damage is not considered a risk.

Table 2.8 Guideline vibration limits for cosmetic damage

TYPE OF STRUCTURE	PEAK COMPONENT PARTICLE VELOCITY, mm/s (a)		
	1–10 Hz	10–50 Hz	50–100 Hz
Dwelling and buildings of similar design and/or occupancy	5	5–15	15–20
Structures that have great intrinsic value and not classified as residential, commercial or industrial buildings	3	3–8	8–10

Source: *German Standard DIN 4150-3:2016-02, Structural vibration Part 3: Effects of vibration on structures* (2016).

Buildings that are potentially at risk of threshold or cosmetic damage would be identified by the contractor prior to the commencement of construction works. A Construction Noise and Vibration Management Plan (CNVMP) should include management at these locations, including building condition surveys, before the commencement of construction activities and after construction is completed. Where a historic building is deemed to be sensitive to damage from vibration (structurally unsound), a conservative superficial cosmetic damage criterion of PPV 3mm/s peak component particle velocity may be applicable.

2.6.3 ROAD INFRASTRUCTURE

The applicable vibration standards for this assessment (DIN 4150-3 and BS 7358-2) do not contain vibration criteria or guidance for vibration effects on road infrastructure (such as roads, bridges and roadside furnishings). Further we are not aware of any guidelines or standards that do.

Road infrastructure is designed to carry passenger and heavy vehicles. It is therefore subject to very high loads and vibration forces on a daily basis (particularly around road surface discontinuities). Road infrastructure is also exposed to very high levels of vibration during its maintenance (such as direct contact with vibratory compactors, etc.). It is therefore unlikely that vibration from the construction of the rail infrastructure for the proposal would pose any risk of damage to road infrastructure.

Assessment of the vibration effects on items such as culverts and buried pipework is however assessed against the vibration criteria outlined in DIN 4150-3 for short-term effects on buried pipework. The applicable criteria are reproduced from DIN 4150-3 in Table 2.9. The criteria assume that the pipes have been manufactured and laid using current technology; if this is not the case, special considerations will have to be made through consultation with the asset owner.

Table 2.9 Guideline vibration limits for buried pipework (and culverts)

PIPE MATERIAL	GUIDELINE VALUES FOR VELOCITY MEASURED ON THE PIPE, mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

2.7 GROUND-BORNE NOISE

Ground-borne noise is generated by vibration transmitted through the ground into a building, which can be reradiated as an audible low frequency rumble. The ground-borne noise criteria are generally implemented only where the ground-borne noise is a higher level than the airborne noise level and can be perceptible (audible) in habitable rooms.

The ICNG provides ground borne NMLs for residences that indicate when management actions should be implemented as follows:

- evening (6.00pm to 10.00pm): 40dBA $L_{Aeq,15min}$
- night-time (10.00pm to 7.00am) 35dBA $L_{Aeq,15min}$.

The ground-borne noise levels are only considered during evening and night-time periods, as the objectives are to protect the amenity and sleep of the building occupants. The ground-borne noise levels are to be assessed at the centre of the habitable room most affected by ground-borne noise.

3 METHODOLOGY

This section describes the methodology used to assess the potential noise and vibration impacts from the construction works and both construction and operational road traffic associated with the proposal.

3.1 STUDY AREA

Receivers potentially sensitive to noise and vibration were identified for an area approximately 2km either side of the proposal site. The 2km radius has been chosen as it is the limit for which the noise prediction algorithm (CONCAWE) is valid. The extent of the study area is controlled by the noise assessment area, as potential vibration impacts will occur at distances much closer to the source than potential noise impacts. As mitigation measures are formulated based on the most impacted sensitive receivers, this extent is considered to be sufficient.

To identify the sensitive receivers, all buildings over 9m² within the 2km radius were identified from a national geospatial dataset of buildings from 2018.

3.2 NOISE MONITORING

The existing acoustic environment was characterised by a combination of long-term (unattended) and short-term (attended) noise measurements in accordance with the *Australian Standard 1055:1997 – Acoustics – Description and Measurement of Environmental Noise (AS 1055)* and the NPfI.

Unattended and attended noise monitoring was carried out between 2 March and 11 May 2021 (specific monitoring dates and logger specifications for each location are provided in Appendix A). Short-term measurements were undertaken over 15-minute intervals with a Type 1 sound level meter to characterise the noise environment and identify the contributors to the acoustic environment. Attended monitoring was carried out with a combination of ARL Ngara and NTI noise loggers.

Field calibration to be checked before and after each measurement occasion with no drift ($\pm 0.0\text{dB}$) observed. Monitoring was completed in accordance with *AS1055.1 Part 1: General procedures*.

3.2.1 NOISE MONITORING LOCATIONS

A total of 15 noise monitoring locations were used to characterise the existing noise environment for each noise catchment area (NCA) (refer to section 4.1) in the areas surrounding the proposal and sensitive receivers potentially impacted by construction works. Noise monitoring was undertaken at locations where site access was granted by the resident/occupant. The noise monitoring locations selected for the assessment were considered to be representative of the existing background noise environment in each NCA across the wider study area (i.e. generally located at or near the closest sensitive receivers to the proposal within each NCA). Locations were nominated by WSP and approved by ARTC as suitable for use.

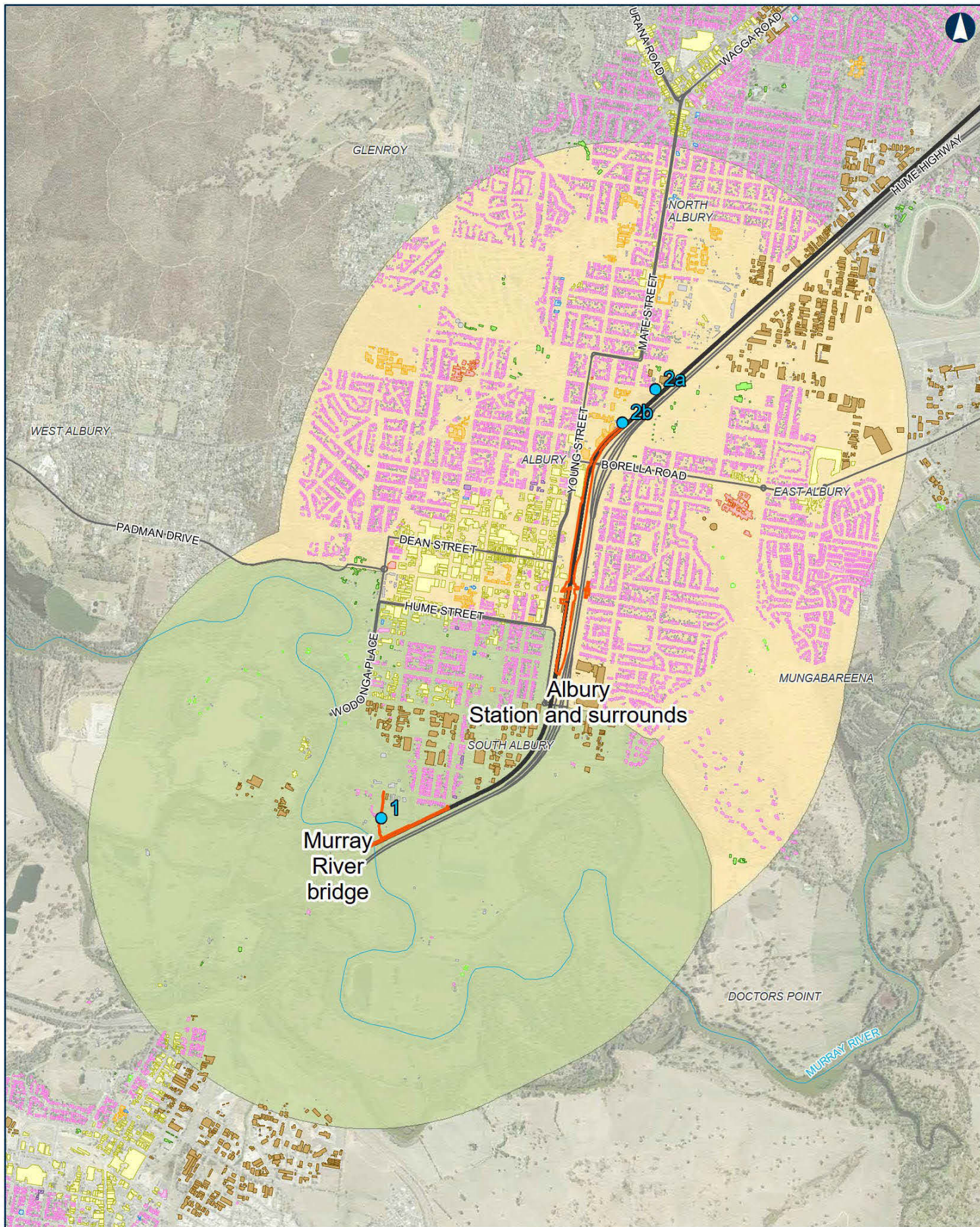
The weather conditions at the time of monitoring were sourced from Bureau of Meteorology (BoM) stations representative of conditions near the noise monitoring locations. The local weather conditions at the time of monitoring were correlated with the relevant BoM station and periods containing any rainfall or wind speeds of more than 5m/s were removed in accordance with NPfI methodology. These periods are shown on the detailed result charts in Appendix A.

The locations of the deployed monitoring equipment are presented in Table 3.1 and shown in Figure 3.1. Both attended and unattended noise monitoring was carried out at each location.

The results of noise monitoring is summarised in section 4.3 and detailed results are presented in Appendix A.

Table 3.1 Noise monitoring locations

NOISE MONITORING LOCATION	LOT AND DP	DESCRIPTION	BOM STATION
Albury			
1	587 Townsend St, C DP 157210, Albury	North of the Hume Highway	Albury Airport AWS 72160
2	Wood Street (Scots School), 1 DP 354753, Albury	West of the Hume Highway	Albury Airport AWS 72160
3	Ettamogah, Sanctuary Lane, 609 DP1163923, Albury	West of the Hume Highway	Albury Airport AWS 72160
4	430 Perryman Ln, 541 DP1144695, Table Top	West of the Hume Highway	Albury Airport AWS 72160
Greater Hume–Lockhart			
5	58 Balfour St, 1 DP 2211, Culcairn	North of Balfour Street	Wagga Wagga AMO 72150
6	Fire station, 19 Ivor St, Henty	East of Ivor Street	Wagga Wagga AMO 72150
7	4 Finlayson Street (post office rear), Yerong Ck	West of Cox Street	Wagga Wagga AMO 72150
8	89 Firth St, 1 DP 1074465, The Rock	North of the Olympic Highway	Wagga Wagga AMO 72150
Wagga Wagga			
9	6066 Olympic Hwy, 150 DP 880904, Uranquinty	South of the Olympic Highway	Wagga Wagga AMO 72150
10	1 DP 534820, North of Uranquinty	North of the Olympic Highway	Wagga Wagga AMO 72150
11	Cnr Peacock Dr, Wagga Wagga	South of Urana Street	Wagga Wagga AMO 72150
12	Turvey Park, 2 DP 543801, Wagga Wagga	South of Railway Street	Wagga Wagga AMO 72150
13	1912 Byrnes Rd, 14 DP 1193255, Harefield	East of Byrnes Road	Wagga Wagga AMO 72150
Junee			
14	21 Illabo Rd, Junee	West of Byrnes Road	Wagga Wagga AMO 72150
15	12 Morris St, 1 DP1099405, Illabo	East of Olympic Highway	Wagga Wagga AMO 72150



Albury to Illabo

Figure 3.1 Noise sensitive receivers

MAP 1 OF 12

0 250 500
m

Coordinate System: GDA 1994 MGA Zone 55

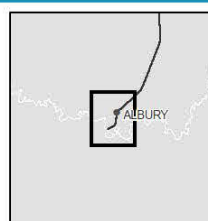
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Author: WSP
Data Sources: ARTC, NSWSS

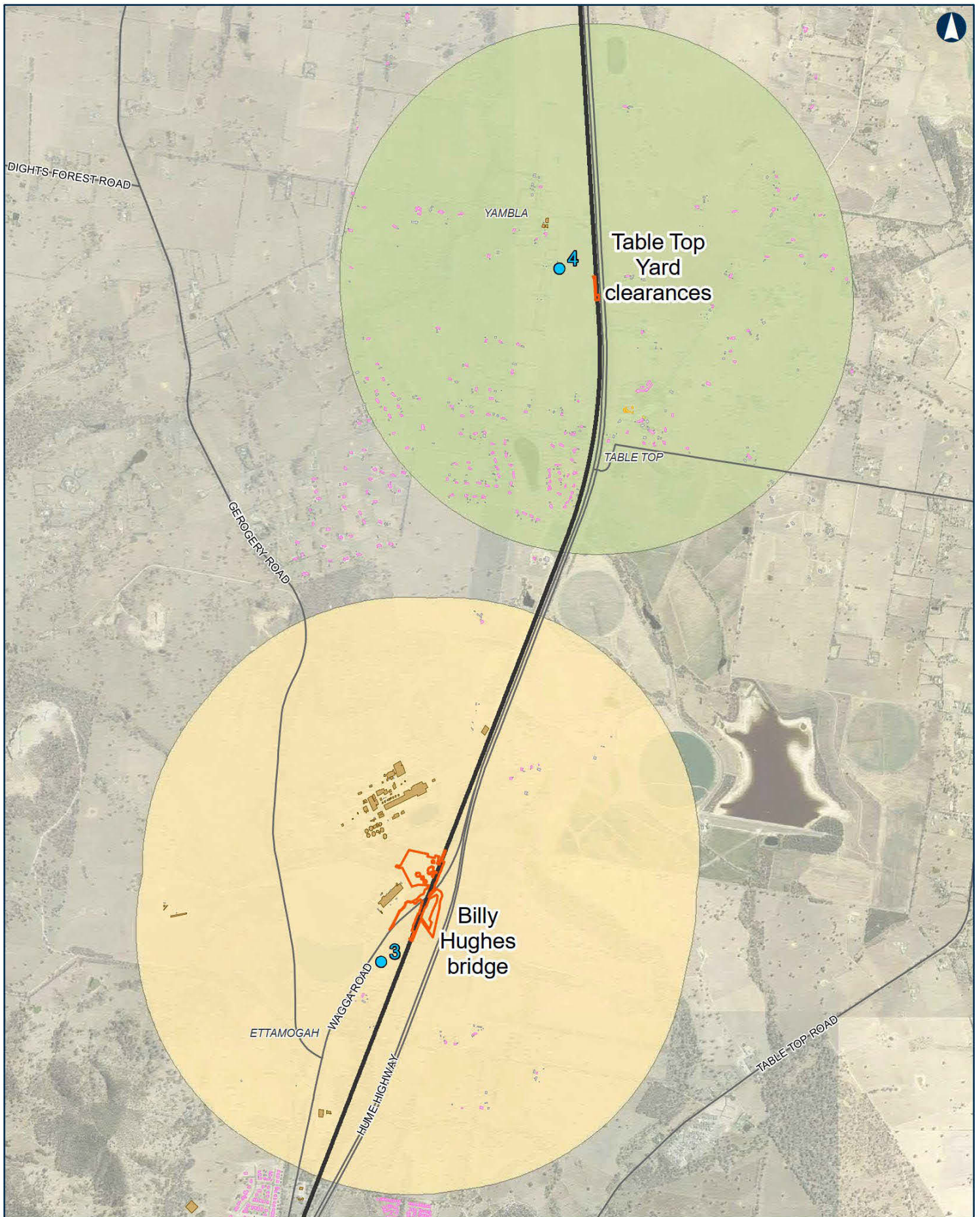
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- Noise monitoring locations
- Proposal site
- Existing railway
- Main road
- River
- Noise sensitive receivers
- Active recreation
- Commercial
- Educational
- Industrial
- Medical
- Mixed
- Place of Worship
- Passive recreation
- Residential
- Shed
- Noise catchment areas
- Albury Yard clearances
- Murray River bridge



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Albury to Illabo

Figure 3.1 Noise sensitive receivers

MAP 2 OF 12

0 250 500
m

Coordinate System: GDA 1994 MGA Zone 55

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Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:27,500

Noise monitoring locations

Proposal site

Existing railway

Main road

Noise sensitive receivers

Commercial

Educational

Industrial

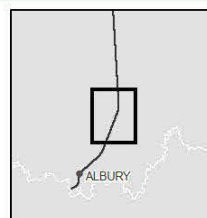
Residential

Shed

Noise catchment areas

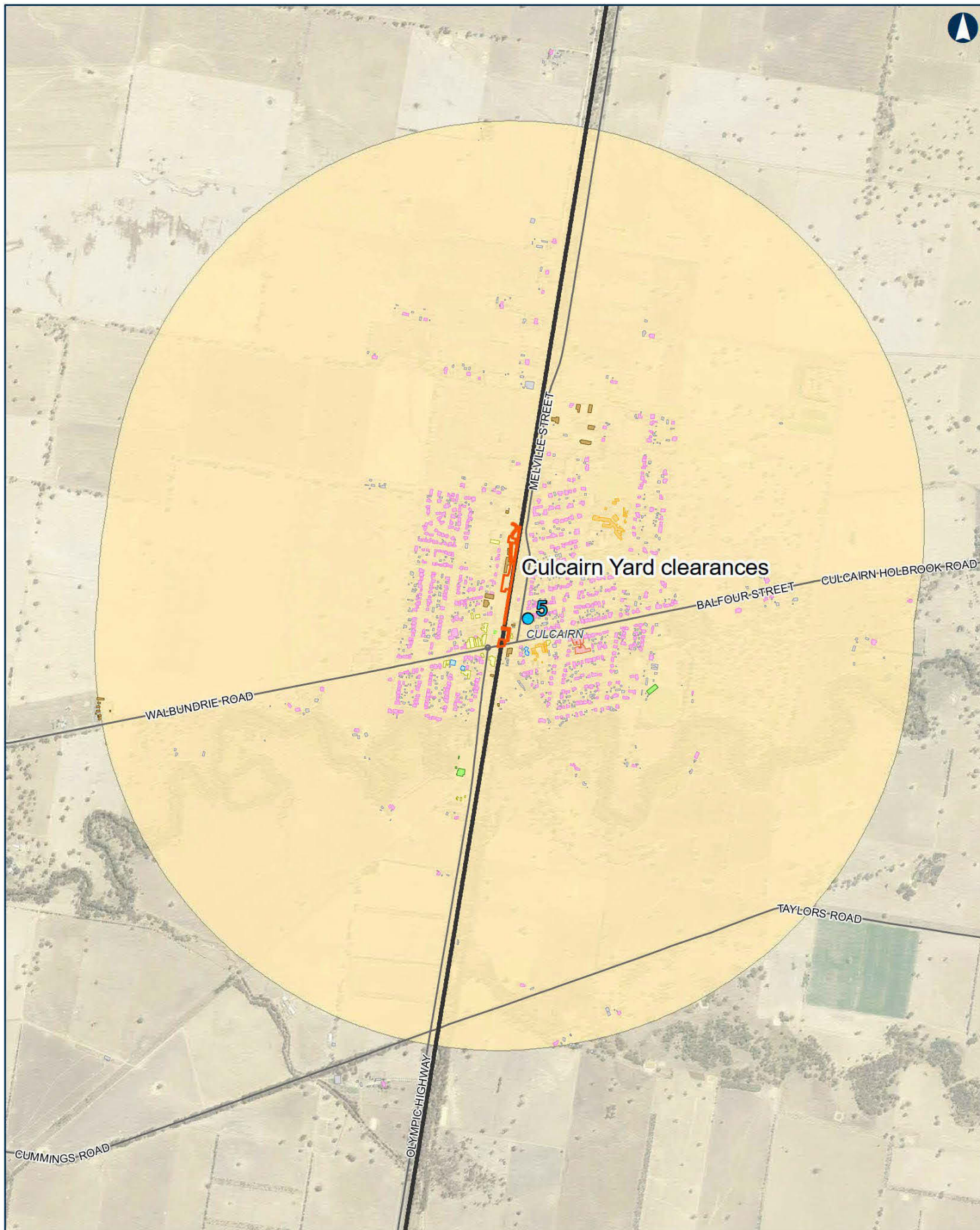
Billy Hughes bridge

Table Top Yard clearances



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Albury to Illabo

Figure 3.1 Noise sensitive receivers

MAP 3 OF 12

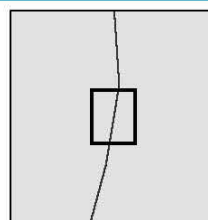
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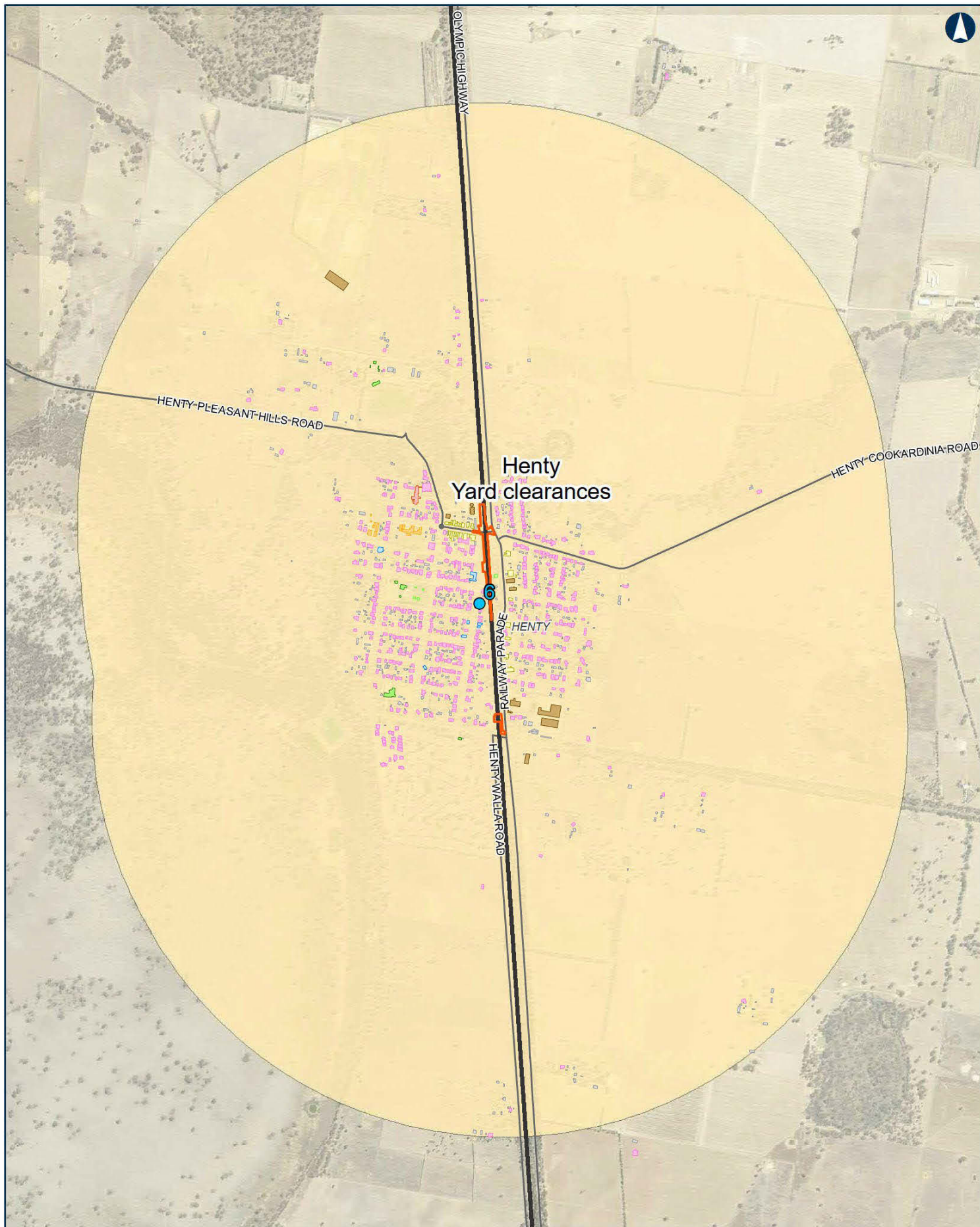
Date: 18/02/2022
Author: WSP
Data Sources: ARTC, NSWSS

- Noise monitoring locations
- Proposal site
- Existing railway
- Main road
- Noise sensitive receivers
- Active recreation
- Commercial
- Educational
- Industrial
- Medical
- Place of Worship
- Passive recreation
- Residential
- Shed
- Noise catchment areas
- Culcairn Yard clearances



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Albury to Illabo

Figure 3.1 Noise sensitive receivers

MAP 4 OF 12

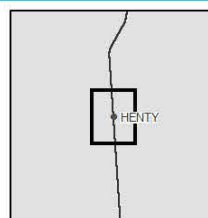
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Coordinate System: GDA 1994 MGA Zone 55

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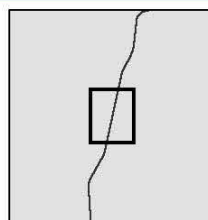
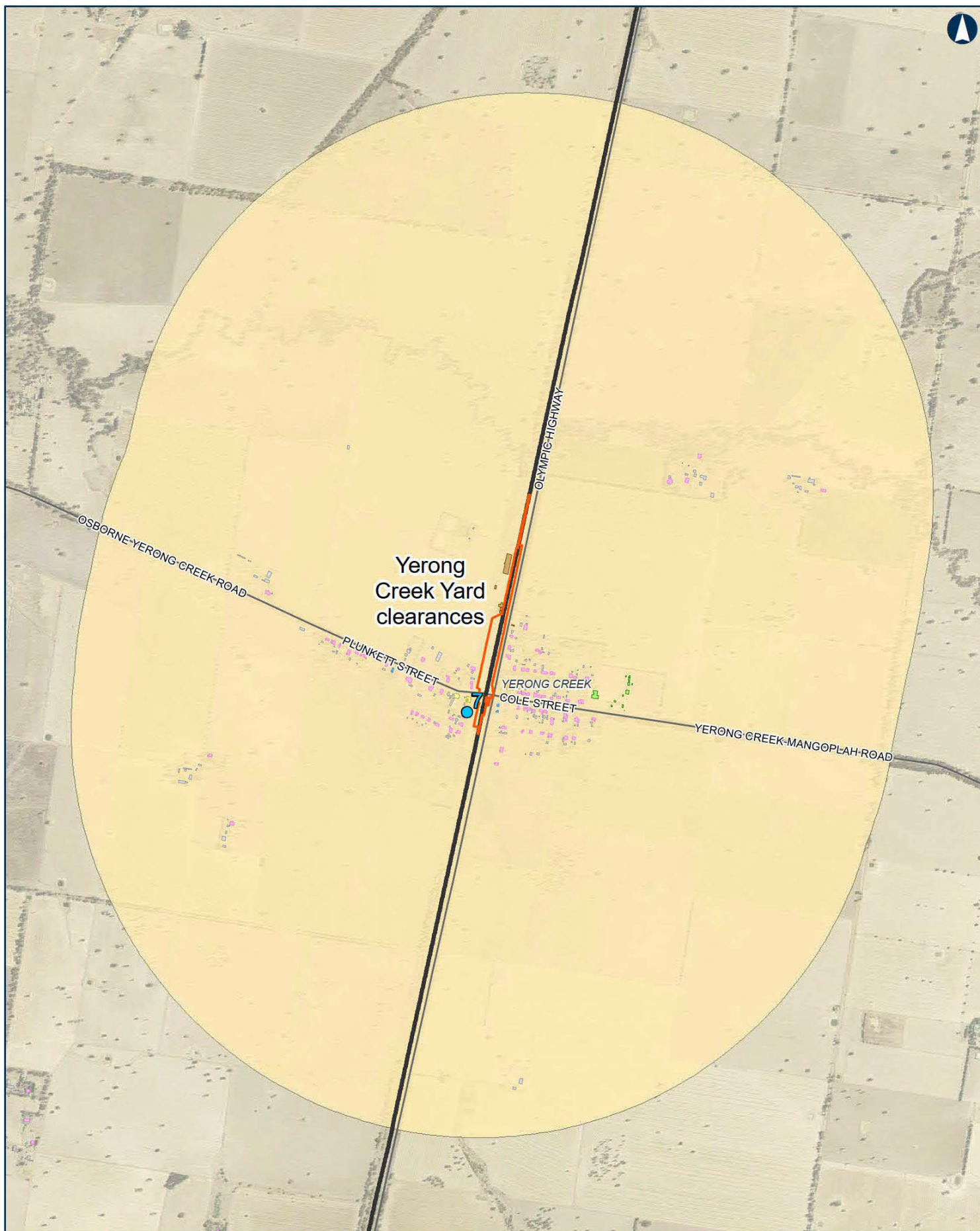
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Author: WSP Scale: 1:17,500
Data Sources: ARTC, NSWSS

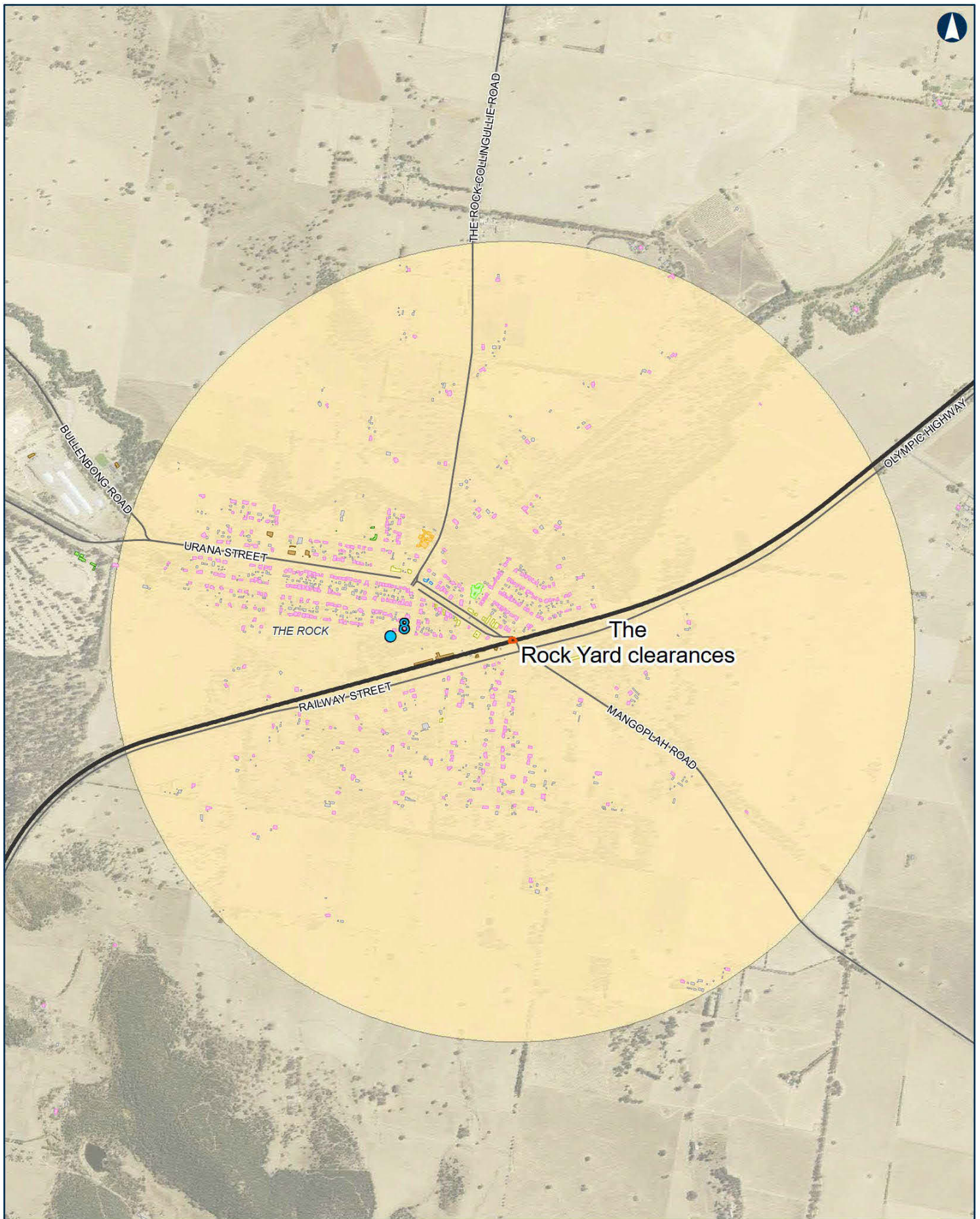
- Noise monitoring locations
- Proposal site
- Existing railway
- Main road
- Noise sensitive receivers**
 - Active recreation
 - Commercial
 - Educational
 - Industrial
 - Medical
- Noise catchment areas**
 - Place of Worship
 - Passive recreation
 - Residential
 - Shed
 - Henty Yard clearances



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Albury to Illabo

Figure 3.1 Noise sensitive receivers

MAP 6 OF 12

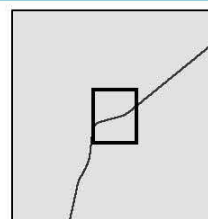
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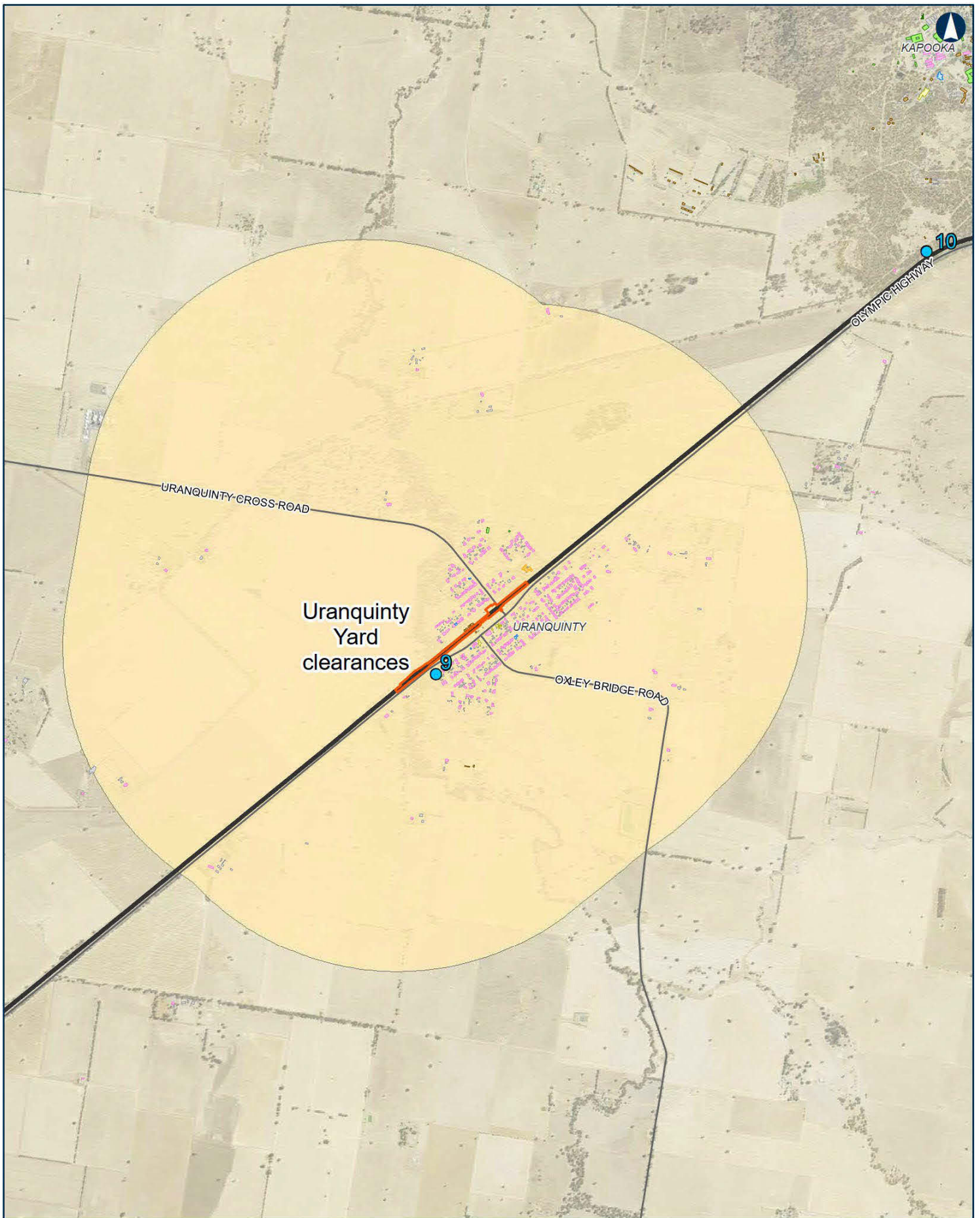
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Author: WSP Scale: 1:17,500
Data Sources: ARTC, NSWSS

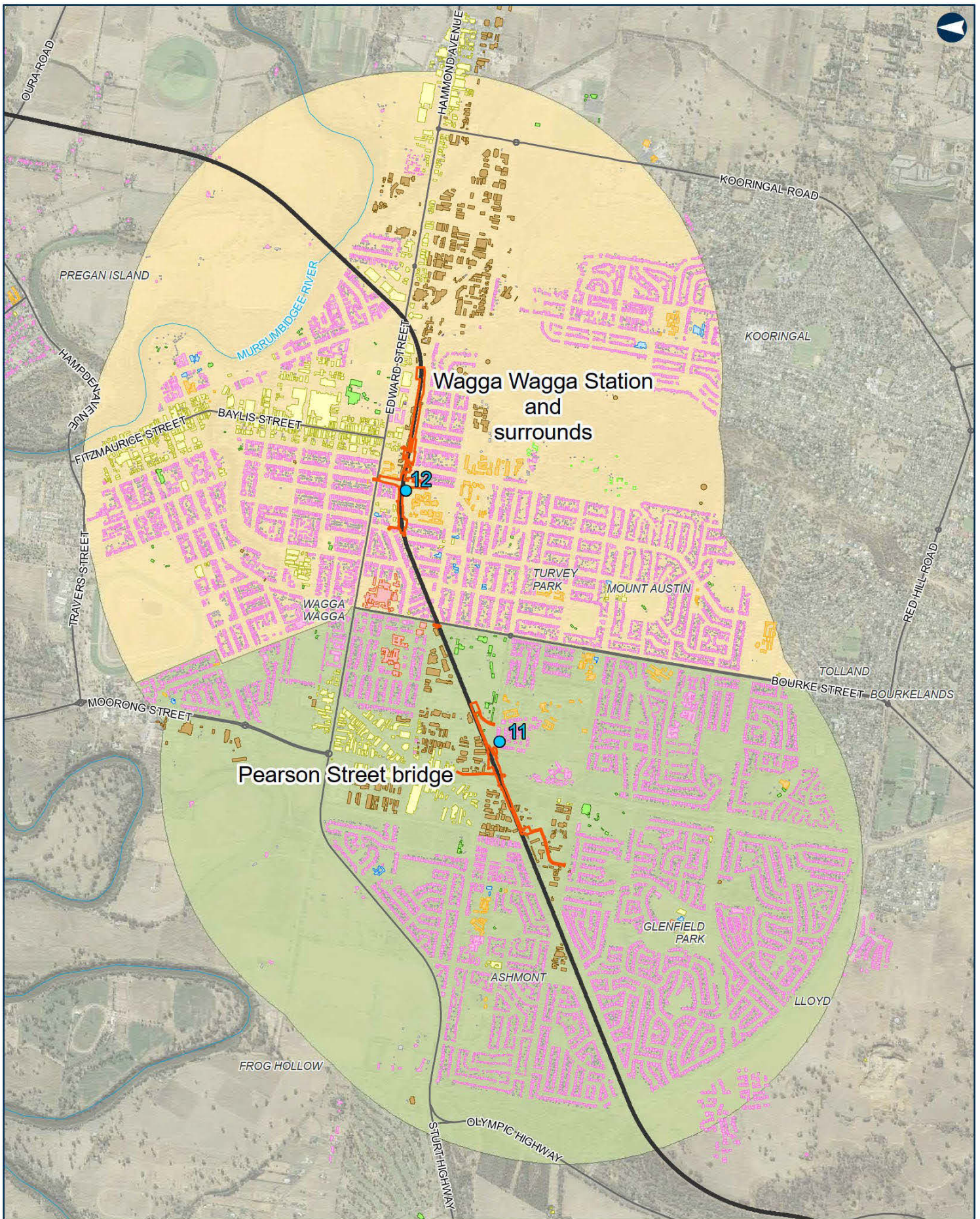
- Noise monitoring locations
- Proposal site
- Existing railway
- Main road
- Noise sensitive receivers**
 - Active recreation
 - Commercial
 - Educational
 - Industrial
 - Place of Worship
 - Passive recreation
 - Residential
 - Shed
- Noise catchment areas**
 - The Rock Yard clearances



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Albury to Illabo

Figure 3.1 Noise sensitive receivers

MAP 8 OF 12

0 250 500 m

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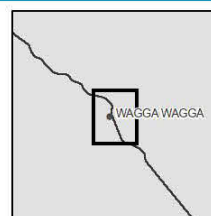
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Data Sources: ARTC, NSWSS

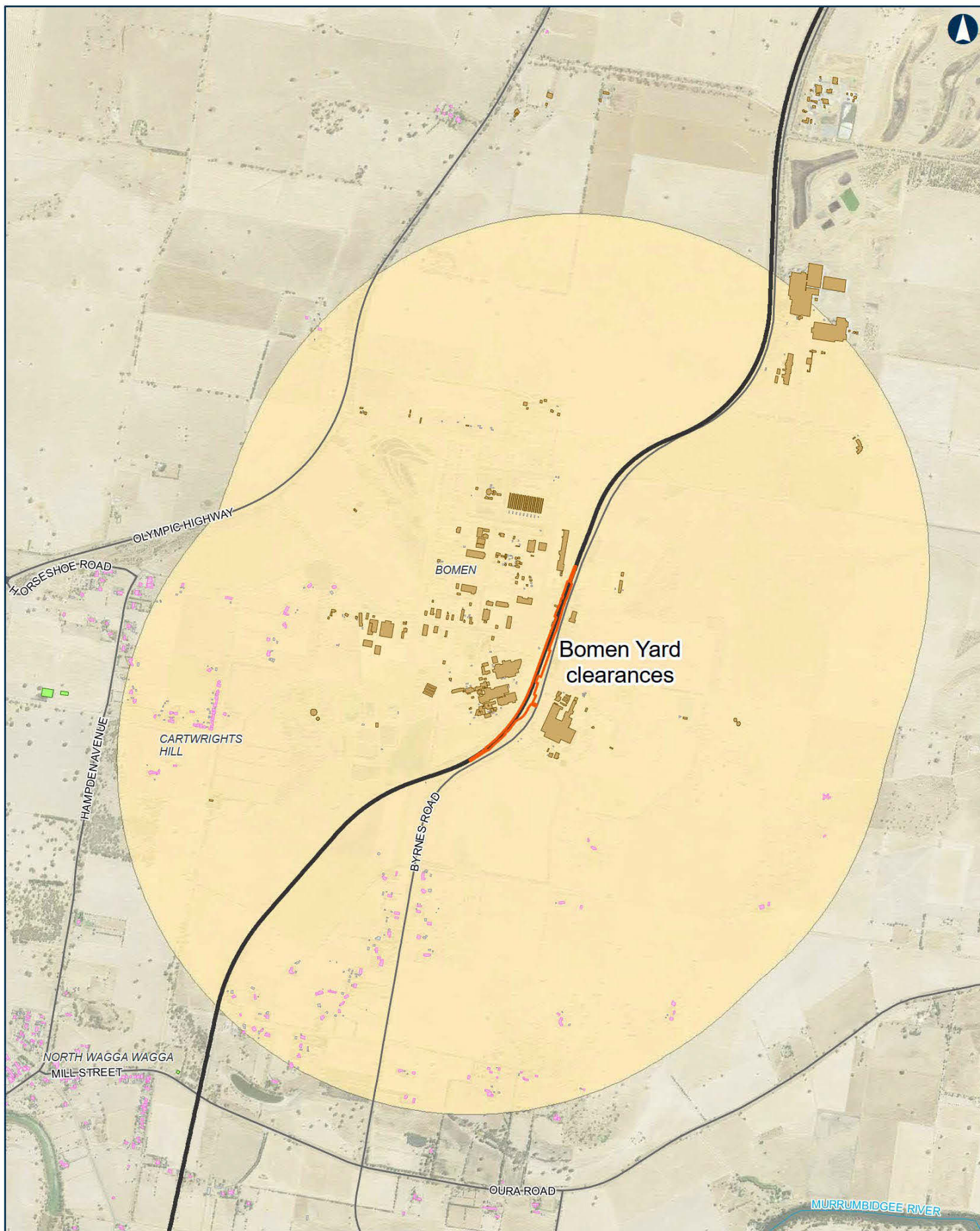
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- Noise monitoring locations
- Proposal site
- Existing railway
- Main road
- River
- Noise sensitive receivers**
 - Active recreation
 - Commercial
 - Educational
 - Industrial
 - Medical
 - Mixed
 - Place of Worship
 - Passive recreation
 - Residential
 - Shed
- Noise catchment areas**
 - Bomen Yard clearances
 - Pearson Street bridge
- Wagga Wagga Station Precinct



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Albury to Illabo

Figure 3.1 Noise sensitive receivers

MAP 9 OF 12

0 250 500
m

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Author: WSP
Data Sources: ARTC, NSWSS

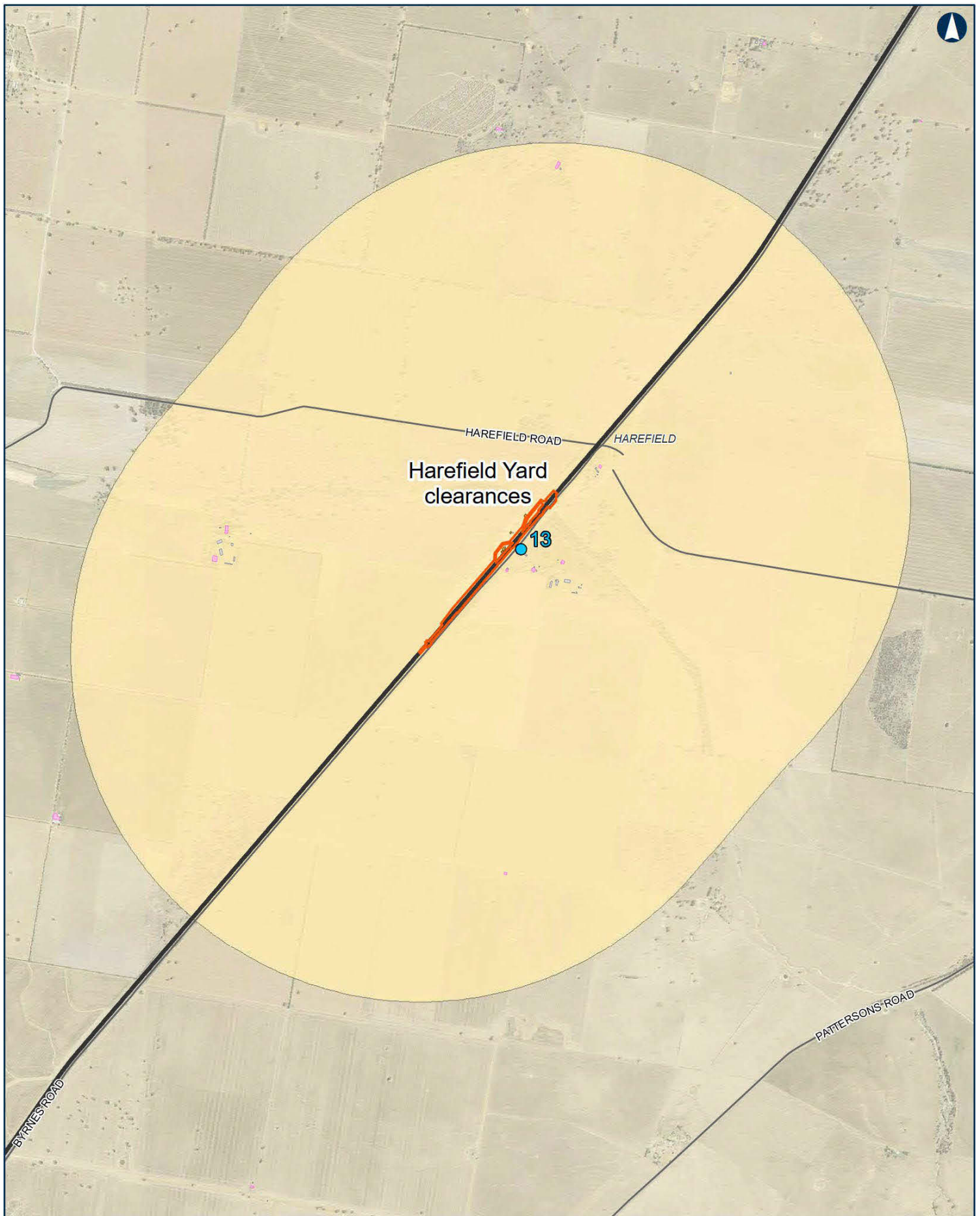
Paper: A3
Scale: 1:20,000

- Proposal site
- Existing railway
- Main road
- River
- Noise sensitive receivers**
 - Active recreation
 - Industrial
 - Residential
 - Shed
- Noise catchment areas**
 - Bomen Yard clearances



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0 250 500
m

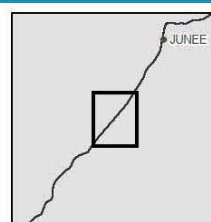
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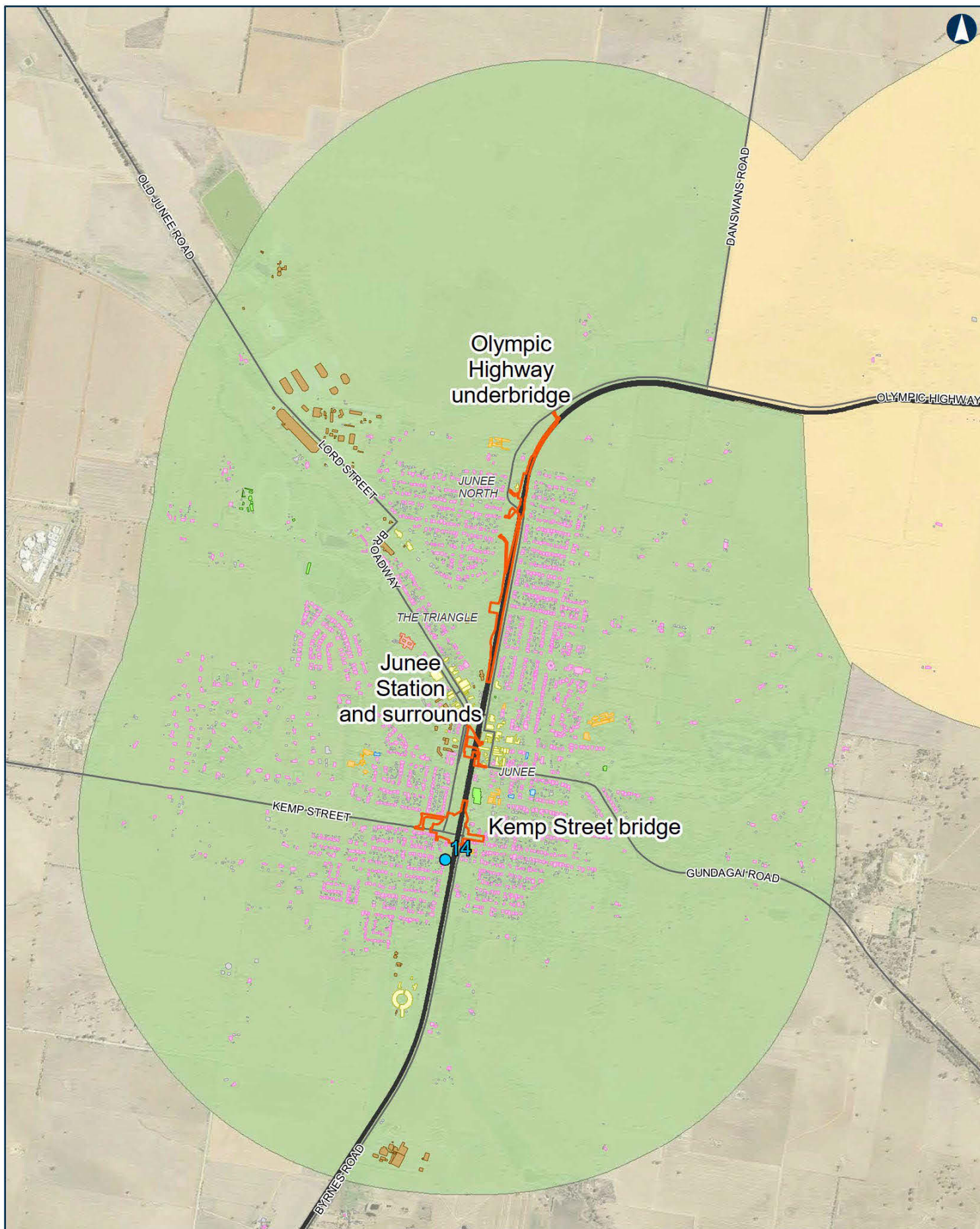
Paper: A3
Scale: 1:20,000

- Noise monitoring locations
- Proposal site
- Existing railway
- Main road
- Noise sensitive receivers**
 - Industrial
 - Residential
 - Shed
- Noise catchment areas**
 - Harefield Yard clearances



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Albury to Illabo

Figure 3.1 Noise sensitive receivers

MAP 11 OF 12

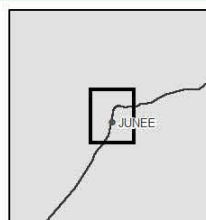
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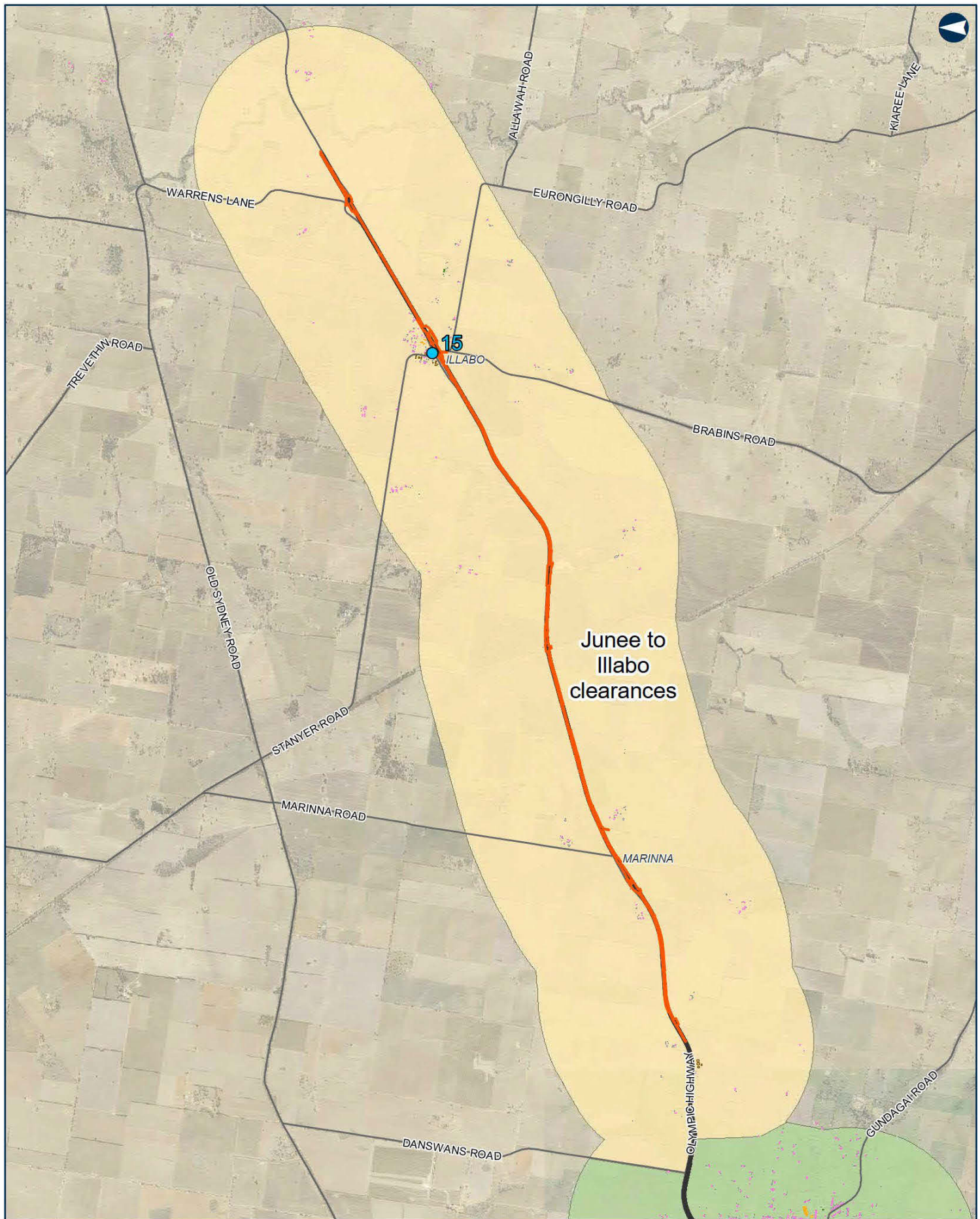
Date: 18/02/2022
Author: WSP
Data Sources: ARTC, NSWSS

- Noise monitoring locations
- Proposal site
- Existing railway
- Main road
- Noise sensitive receivers**
 - Active recreation
 - Commercial
 - Educational
 - Industrial
 - Medical
- Place of Worship
- Residential
- Shed
- Noise catchment areas**
 - Junee Precinct
 - Junee to Illabo clearances



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Albury to Illabo

Figure 3.1 Noise sensitive receivers

MAP 12 OF 12

0 250 500
m

Coordinate System: GDA 1994 MGA Zone 55

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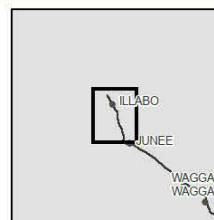
Author: WSP

Data Sources: ARTC, NSWSS

Paper: A3

Scale: 1:55,000

- Noise monitoring locations
- Proposal site
- Existing railway
- Main road
- Noise sensitive receivers
 - Active recreation
 - Commercial
 - Educational
 - Industrial
 - Residential
- Shed
- Noise catchment areas
 - Junee Precinct
 - Junee to Illabo clearances



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3.3 CONSTRUCTION

3.3.1 NOISE

This section describes the methodology and inputs used in the assessment of potential construction noise impacts. The assessment of these impacts is provided in Chapter 5.

3.3.1.1 ASSESSMENT LOCATIONS AND SCHEDULE

As discussed in Chapter 1, the proposal has been divided into four precincts, containing 24 enhancement sites.

The activities required for construction of the proposal are identified in Table 3.2 and discussed in the following locations.

Table 3.2 Construction stages

ENHANCEMENT SITE	DATE OF COMMENCEMENT	DATE OF COMPLETION	DURATION MONTHS (TOTAL)	DURATION DESCRIPTION
Albury precinct				
Murray River bridge	January 2024	December 2024	12	Bridge works would generally be undertaken during 2 x 5-hour windows each week (2 days per week).
Albury Station pedestrian bridge	February 2024	July 2024	6	Some work would require possessions such as 2 x 5-hour possession windows to undertake lifting of the structures into place. An extra possession may be required for the piling works. Ramps and stair works can be completed during proposed standard hours.
Albury Yard clearances and gantry removal	January 2024	March 2024	3	Works are focused around possessions. There is a requirement to utilise one full possession along with several of the standard weekly possessions for widenings/drainage modifications.
Riverina Highway bridge	January 2024	April 2025	16	Works assumed to utilise 60 hour possessions for direct main line track along with some of the standard weekly possessions for widenings/drainage modifications.
Billy Hughes bridge	January 2024	April 2025	16	Works are focused around possessions. The main work periods around the possessions are around four months, with a 3-month gap between. A one-month work period around a third rail possession is also proposed.
Table Top Yard clearances and gantry removal	February 2024	February 2024	0.5	Works are focused around possessions..
Greater Hume–Lockhart precinct				
Culcairn Yard clearances Culcairn pedestrian bridge	January 2024	March 2024	3	Works are focused around possessions. There is a requirement to utilise one full possession along with several of the standard weekly possessions for widenings/drainage modifications. Removal of the pedestrian bridge would be completed under possession.
Henty Yard clearances and gantry modification	January 2024	April 2024	3	Works are focused around possessions. There is a requirement to utilise one full possession along with several of the standard weekly possessions for widenings/drainage modifications.

ENHANCEMENT SITE	DATE OF COMMENCEMENT	DATE OF COMPLETION	DURATION MONTHS (TOTAL)	DURATION DESCRIPTION
Yerong Creek Yard clearances	January 2024	April 2024	3	Works are focused around possessions. There is a requirement to utilise one full possession along with several of the standard weekly possessions for widenings/drainage modifications.
The Rock Yard clearances and gantry modification	January 2024	January 2024	1	The works are planned to be undertaken during the daily possessions that are available.
Wagga Wagga precinct				
Uranquinty Yard clearances	July 2024	September 2024	2	Works are focused around possessions. There is a requirement to utilise one full possession along with several of the standard weekly possessions for widenings/drainage modifications.
Pearson Street bridge	January 2024	July 2025	16	Works are focused around 3 60 hour possessions. The main work periods are around three to four months with a three-to-four month gap between each. Standard weekly possessions (5-to-6 hour Track Occupancy Authorisation (TOA) possessions) would also be required to complete piling and collision wall works.
Cassidy Parade pedestrian bridge	February 2024	July 2024	6	Works are planned to be undertaken under TOA or look-out safe working. 2 x 5 to 7 hour possession windows to undertake lifting of the structures into place. An extra TOA possession may be required for the piling works. Ramps and stair works can be completed during proposed primary hours.
Wagga Wagga Station pedestrian bridge	January 2025	July 2025	6	The works directly impacting or over the mainline are planned to be undertaken under TOA (9 hour) safe working. A majority of work can be completed during proposed standard hours (road works and demolition).
Edmondson Street bridge	February 2024	December 2024	11	Works are planned to be undertaken under TOA or look-out safe working. 2 x 5-to-7 hour possession windows to undertake lifting of the structures into place. An extra TOA possession may be required for the piling works. Ramps and stair works can be completed during proposed standard hours.
Wagga Wagga Yard clearances	February 2024	April 2024	3	Works are focused around possessions. There is a requirement to utilise one full possession along with several of the standard weekly possessions for widenings/drainage modifications.

ENHANCEMENT SITE	DATE OF COMMENCEMENT	DATE OF COMPLETION	DURATION MONTHS (TOTAL)	DURATION DESCRIPTION
Bomen Yard clearances	July 2024	September 2024	2	Short-term duration proposed during possession.
Junee precinct				
Harefield Yard clearances	February 2024	April 2024	2	There is a requirement to utilise one full possession along with some of the standard weekly possessions for widenings/drainage modifications.
Kemp Street bridge	February 2024	November 2024	10	The works directly impacting or over the mainline are planned to be undertaken under TOA (9 hour) safe working. A majority of work can be completed during proposed standard hours (road works and demolition).
Junee Station pedestrian bridge	February 2024	March 2024	1	The works are planned to be undertaken to utilise the daily rail possessions that are available. This is if the demolition and disposal option is selected. If a full removal is required, then a specific 12-hour possession would be needed including the sidings to facilitate this.
Junee Yard clearances	February 2024	April 2024	2	There is a requirement to utilise one full possession along with some of the standard weekly possessions for widenings/drainage modifications.
Olympic Highway underbridge	January 2024	April 2024	3	The works are planned to be undertaken prior to and then under a full 60-hour rail possession arrangement. Some work can be done under a TOA.
Junee to Illabo clearances	January 2024	November 2024	10	The works are planned to utilise the possessions that are available. There is a requirement to utilise two full 60-hour possessions along with some of the standard weekly possessions for widenings/drainage modifications and tamping.

3.3.1.2 PROPOSAL CONSTRUCTION HOURS

The proposal involves enhancement works that are on or immediately adjoin active rail lines that need to remain operational throughout construction with minimal disruption. Such work is subject to safe working arrangements to ensure worker safety. Additionally, there are proposed works that do not occur in close proximity to high-risk locations (such as road bridges).

Work on operational track can occur under two types of safe working arrangements – being rail possessions (sometimes referred to as closures) and temporary track occupancy authorisations (when there are suitable five-to-nine-hour gaps between scheduled trains that can allow certain work to be carried out). Work may also be needed in areas adjacent to track work locations before and after these periods, to prepare for or complete construction.

As a result, the proposed construction hours (as shown in Table 3.3) have been developed to:

- balance worker safety and rail corridor access, to support efficiencies in the workforce utilisation and to reduce construction durations as far as practicable
- community impacts, by minimising the overall duration of disruption and amenity impacts from construction activities and road diversions.

Specific construction stages assumed to require out-of-hours work (OOHW) have been noted in Appendix B.

Table 3.3 Construction hours

CONSTRUCTION TYPE	CONSTRUCTION HOURS	COMMENTS OR EXCEPTIONS
<p>Work not subject to rail possessions or track work authorisation.</p> <p>This can include site establishment, finishing works and main construction activities such as bridge works.</p>	<p>Primary construction hours:</p> <ul style="list-style-type: none"> — Monday to Friday: 6am to 6pm — Saturday: 6am to 6pm — Sundays and public holidays: 6am to 6pm. 	<p>These hours would apply at all enhancement sites.</p> <p>Where a sensitive receiver (such as a residence, school or hospital) is predicted to be noise affected for more than three months:</p> <ul style="list-style-type: none"> — primary construction hours would only apply for a maximum three-month period at that enhancement site, and — no work would be undertaken every alternative week between the hours of 6pm on Saturday and 7am Monday. <p>Noise affected is defined as an exceedance of the applicable noise management level as specified in the Interim Construction Noise Guideline (DECC, 2009) for residential and non-residential sensitive receivers.</p>
	<p>Alternative construction hours:</p> <ul style="list-style-type: none"> — Monday to Friday: 7am to 6pm — Saturday: 8am to 1pm — Sundays and public holidays: No works or public holidays. 	<p>These hours would apply to an enhancement site where the requirements for the application of primary construction hours detailed above are not able to be achieved.</p> <p>These hours are consistent with standard construction hours in the Interim Construction Noise Guideline (ICNG) (DECC, 2009).</p>

CONSTRUCTION TYPE	CONSTRUCTION HOURS	COMMENTS OR EXCEPTIONS
Work subject to rail possessions or track work authorisations, and any necessary ancillary works	24 hours per day during rail possessions and track work authorisations (typically up to 60 hour periods).	<p>Rail possessions are typically for 60-hour periods, twice a year—in March and September. During rail possessions, works may need to be carried out on a 24-hour basis.</p> <p>Outside scheduled rail possessions, works would also occur within available five- to nine-hour windows when train services are not scheduled and when authorised by ARTC (called a track occupancy authorisation). These periods are determined in consultation with operators of freight and passenger train services, and may occur outside the primary construction hours</p>
Highly noise intensive work	<ul style="list-style-type: none"> — 8am to 6pm Monday to Friday — 8am to 1pm Saturday, and — in continuous blocks not exceeding three hours each with a minimum respite from those activities and work of not less than one hour between each block 	<p>Except where permitted by an EPL, highly noise intensive works would be restricted to these hours when these works result in an exceedance of the applicable noise management level at the same receiver.</p> <p>Highly noise intensive works are defined as works that result in noise levels $\geq 75\text{dB}$ at a sensitive receiver.</p>

3.3.1.3 CONSTRUCTION NOISE MODELLING

Construction noise levels have been predicted through a computer noise model. This model used SoundPLAN 8.2, implemented the CONCAWE calculation method and was prepared with reference to the ARTC Inland Rail technical specifications for noise and vibration assessments.

A three-dimensional representation of the physical environment within the proposal site was produced utilising the SoundPLAN noise prediction software. The use of SoundPLAN and the CONCAWE prediction methodology are widely applied in Australia for the prediction of noise from construction works.

Modelling inputs for each scenario included ground contours, locations of sensitive receivers and noise-generating equipment as well as any other inputs affecting the noise environment, such as the buildings surrounding the proposal. The model considered noise sources, receivers and the effect of distance, ground topography, atmospheric attenuation and obstacles such as barriers and buildings. The following additional assumptions were used in the modelling:

- all noise sources modelled at 2m above ground level
- topography for the area has been provided at 0.5m contours up to 300m from the alignment, and 1m intervals between 300m and 2km from the alignment
- receiver heights 1.5m above ground level, or at the most affected story
- a ground absorption factor of 0.75 to be representative of mixed land types and grassed areas.

The buildings that were clearly identified from aerial imagery as non-sensitive, such as hoppers, sheds and warehouses, were retained in the assessment as they could provide screening of noise levels at nearby sensitive receivers. Detailed review of building usage has been undertaken; however, the final land use for each structure may require ongoing refining throughout the planning and construction periods.

The noise modelling assumes the loudest equipment in each work stage operating at their closest point within the work area to the receivers operating constantly over the 15-minute assessment period under neutral meteorological conditions.

In practice, the actual construction noise levels at individual receivers would be expected to be lower for most of the construction period as noise-generating activities are undertaken at increasing distance from the receivers.

3.3.1.4 PROPOSED SENSITIVE RECEIVERS

It is a requirement of the SEARs to also consider the impacts on noise sensitive receivers that are proposed to be developed either before or during the construction period.

In order to identify future receivers potentially impacted by noise or vibration, the following sources were considered:

- Aerial imagery
- The Department of Planning and Environment's Major Projects register
- The NSW Independent Planning Commission project registers for the Albury City, Great Hume, Lockhart, Wagga Wagga City and Junee local government areas
- The NSW Southern Regional Planning Panel planning register
- Proponent websites
- Local council websites/DA tracking databases.

It is understood that the Locomotive Hotel at Junee is intending to construct 8 accommodation units prior to the completion of construction works. These facilities have been included in the assessment at Kemp Street Bridge. No other proposed sensitive receivers were identified within the affectation area of the proposal.

3.3.1.5 NOISE SOURCE LEVELS

The indicative activities that have been assessed for each enhancement site are provided in Table 3.4. Additional detail with sound power levels (SWLs) adopted for acoustic modelling of noise-generating construction plant is outlined in Appendix B.

Table 3.4 Modelled construction activities

ENHANCEMENT SITE / WORK AREA	WORK STAGE
All sites	Site establishment/preparatory works
	Demobilisation and rehabilitation
	Compound operation
Albury precinct	
Murray River bridge	Installation and removal of scaffolding and bracing
	Bridge works
Albury Yard clearances	Offline widenings
	Track realignment
	Rebuild track
Albury Yard gantry removal	Install cabling/conduits
	Signalling works
	Cut gantry bolts
	Remove gantry
	Remove footings
	Backfill footings

ENHANCEMENT SITE / WORK AREA	WORK STAGE
Albury Station pedestrian bridge	Demolition
	Piling
	Concreting works
	Installation of fittings
	Lifting of truss and deck
Albury Station pedestrian bridge (eastern section)	Demolition
	Piling
	Concreting works
	Installation of fittings
	Lifting of truss and deck
Riverina Highway bridge	Earthworks
	Piling
	Drainage
	Track works
Billy Hughes bridge	Track re-alignment
	Piling
	Drainage
	Track works
Table Top Yard clearances	Install footings/cabling/conduits
	Signalling works
	Cut gantry bolts
	Remove gantry
Greater Hume–Lockhart precinct	
Culcairn pedestrian bridge and Culcairn, Henty and Yerong Creek Yard clearances	Offline widenings
	Remove gantry
	Drainage works and service relocations
	Track realignment
	Rebuild track
	Level Crossing (Henty and Yerong Creek)
The Rock Yard clearances	Install footings/cabling/conduits
	Signalling works
	Cut gantry bolts
	Modify gantry

ENHANCEMENT SITE / WORK AREA	WORK STAGE
Wagga Wagga precinct	
Uranquinty Yard clearances, Wagga Wagga Yard clearances and Bomen Yard clearances	Offline widening
	Track realignment
	Rebuild track
	Level crossing (Uranquinty Yard clearances)
Pearson Street bridge	Earthworks
	Piling
	Protection walls and drainage
	Track removal
	Rebuild track
Cassidy Parade pedestrian bridge and Wagga Wagga Station pedestrian bridge	Demolition
	Piling
	Concreting works
	Installation of screens
	Lifting of truss and deck
Edmondson Street bridge	Service relocations
	Demolition
	Crane and piling pads
	Piling
	Wall and abutments
	Install deck, slab and planks
	Install fittings
	Asphalting
Wagga Wagga Yard gantry replacement	Install cabling / conduits
	Signalling works
	Cut gantry bolts
	Replace gantry
	Remove footings
	Backfill footings
Sandy Creek Bridge (Uranquinty yard clearances)	Crane pads
	Remove/install track
	Remove/install girders and blocks
	Cut piers and abutments

ENHANCEMENT SITE / WORK AREA	WORK STAGE
Junee precinct	
Harefield Yard clearances and Junee to Illabo clearances	Offline widenings
	Track realignment
	Rebuild track
Kemp Street bridge	Demolition and earthworks
	Piling
	Concreting
	Lifting of truss and deck
	Installation of services and screens
	Asphalting
Junee Station pedestrian bridge and Harefield Yard gantry replacement	Install cabling/conduits
	Signalling works
	Cut Gantry bolts
	Remove gantry
	Remove footings
	Backfill footings
Olympic Highway underbridge	Trackworks
	Earthworks
	Structure works
	Concreting works
	Installation of services and screens
	Level crossing
	Culverts

Corrections have been applied for anticipated usage and for the assessment of maximum $L_{1(1min)}$ noise level events. Sound power levels have been presented for standard hours and OOHW as indicated.

The noise emission levels for the construction plant and equipment were sourced from standard industry accepted databases:

- *AS 2436:2010 – Guide to noise and vibration control on construction, demolition and maintenance sites*
- The Department for Environment, Food and Rural Affairs (United Kingdom), Update of noise database for prediction of noise on construction and open sites – Phase 3: Noise measurement data for construction plant used on quarries (DEFRA noise database)
- TfNSW *Construction Noise and Vibration Strategy 2018* (CNVS).

3.3.2 GROUND-BORNE NOISE

Ground-borne noise is generated by vibration transmitted through the ground into a structure. The ICNG provides ground-borne noise management levels for residences, which indicate when management actions should be implemented.

The ground-borne noise levels are only considered during evening and night-time periods, as the objectives are to protect the amenity and sleep of people when they're at home. These levels are only applicable when ground-borne noise levels are higher than air-borne noise levels. These levels are to be assessed at the centre of the most affected habitable room.

During construction activities, ground-borne noise is typically significantly lower than airborne noise, even in close proximity to vibration-intensive plant. Indicative ground-borne and air-borne noise levels for vibration-generating plant at nominated distances and assessment against the ICNG guidelines are provided for Albury, Lockhart, Wagga and Junee in section 5.6.2.

3.3.3 VIBRATION

This section describes the methodology and inputs used in the assessment of potential construction vibration impacts on buildings and structures (including heritage structures) and their occupants. The assessment of these impacts is provided in section 5.5.

Construction vibration can lead to:

- cosmetic building damage (and structural damage in extreme cases)
- loss of amenity due to perceptible vibration, termed human comfort
- impacts on the condition and structural integrity of key infrastructure.

Where vibration-intensive plant such as vibratory rollers, hydraulic hammers, bored piling rigs or jackhammers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures, including heritage structures.

TfNSW has outlined recommended minimum separation distances between vibration-generating construction equipment and residential buildings and vibration-sensitive heritage structures, which are commonly used for a wide variety of vibration impact assessments and are accepted by regulatory authorities. These guidelines will be used to consider the likely acceptability of ground vibration likely to be generated during construction.

3.3.4 CONSTRUCTION TRAFFIC

This section describes the methodology and inputs used in the assessment of potential construction road noise impacts from construction traffic. The assessment of these construction impacts is provided in Table 3.8.

Construction traffic volumes and haulage routes have been assessed for key haulage routes to the nearest potentially affected residential receivers. A number of assumptions have been made for the purposes of assessing construction traffic noise impacts, with reference to the Technical Paper 1—Transport and traffic.

During the construction phase of the proposal, heavy vehicles would be required for materials and equipment delivery while light vehicles will transport workers to and from each enhancement site. Noise generated by this additional road traffic along the proposed haulage routes may impact nearby sensitive receivers. It is noted that deliveries may occur during the night period; however, these activities fall under the 'delivery of oversized plant or structures' category of works allowed outside standard hours in line with the ICNG.

The likely routes for these vehicles and proposal traffic numbers have been taken from Technical Paper 1—Transport and traffic are shown for each site in Table 3.5. For each route, a conservative assumption of all vehicles travelling on that route has been made. During short-term intense periods of work, vehicle numbers may increase; however, the following section is indicative of typical maximum numbers within each enhancement site.

Quantitative increases in road traffic noise as a result of additional construction traffic have been calculated using a spreadsheet *Calculation of Road traffic Noise* (UK Department of Transport, 1988) (CoRTN) road noise calculation method. Traffic numbers have been taken from the traffic and transport assessment. Predictions assume that residences are 20m from the corridor, which is representative of typical separation distances along the primary urban routes and is a conservative assumption for rural routes. Vehicle speeds of 40 km per hour (km/hr) on local, collector and arterial roads and 90km/hr on highways and country roads have been assumed to be representative of typical heavy vehicle speeds on these routes.

Table 3.5 Predicted construction haulage routes and numbers (single direction)

ENHANCEMENT SITE / HAULAGE ROUTE	EXISTING TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)		CONSTRUCTION TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)	
	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Albury Precinct				
Murray River bridge				
East Street	1,231	62	29	2
Atkins Street	310	43	29	2
Hume Highway	620	12	31	2
Macauley Street	31	4	29	2
Panmure Street	31	4	29	2
Abercorn Street	31	4	29	2
Kiewa Street	93	13	29	2
Townsend Street	31	4	29	2
Olive Street	93	13	29	2
Albury Station, Albury Yard and Riverina Highway Bridge				
Young Street	658	20	50	31
Smollet Street (Railway Place)	41	1	50	31
Borella Road	1,202	36	60	37
Hume Highway Northbound Off Ramps	620	31	60	37
Schubach Street	310	43	50	31
Billy Hughes bridge				
Wagga Road	385	8	57	12
Hume Highway	906	290	67	14
Table Top Yard clearances				
Perryman Lane	32	10	9	3
Tynan Road	41	1	9	3
Hume Highway	906	290	11	3

ENHANCEMENT SITE / HAULAGE ROUTE	EXISTING TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)		CONSTRUCTION TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)	
	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Greater Hume, Lockhart				
Culcairn Yard clearances				
Olympic Highway/Melville Street	231	65	56	11
Balfour Street	418	8	48	10
Railway Parade South	309	6	48	10
Railway Parade North	77	2	48	10
Henty Yard clearances				
Railway Parade (Olympic Highway)	231	65	56	11
Sladen Street	51	6	48	10
Rosler Parade/Yankee Crossing Road	10	1	48	10
Allan Street	36	10	48	10
Ivor Street	36	10	48	10
Yerong Creek Clearances				
Olympic Highway / Cox Street	275	50	56	11
Plunkett Street	51	6	48	10
Finlayson Lane	13	2	48	10
The Rock Yard clearances				
Olympic Highway/Melville Street	275	50	9	1
Urana Street	51	6	8	1
Wagga Wagga Precinct				
Uranquinty Yard clearances				
Olympic Highway	323	55	43	13
Uranquinty Street	27	2	35	10
Yarragundry Street	31	2	35	10
Hanging Rock Road	4	0	35	10
Pearson Street bridge				
Edward Street (Sturt Highway)	1,013	122	36	3
Moorong Street (Olympic Highway)	1,003	50	39	4
Pearson Street	954	48	36	3

ENHANCEMENT SITE / HAULAGE ROUTE	EXISTING TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)		CONSTRUCTION TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)	
	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Urana Street	518	10	36	3
Cheshire Street	48	2	36	3
Alan Turner Depot Access Road	101	2	36	3
Fernleigh Road	665	13	36	3
Wagga Wagga Station, Yard, Edmondson Street Bridge and Cassidy Parade Bridge				
Edward Street (Sturt Highway)	1,096	88	100	25
Fox Street	895	27	100	25
Mitchelmore Street	38	0	100	25
Edmondson Street	563	11	100	25
Norman Street	795	24	100	25
Coleman Street	38	1	100	25
Cassidy Parade	382	11	100	25
Erin Street	76	2	100	25
Station Place	52	2	100	25
Brookong Avenue	182	15	100	25
Bomen Yard clearances				
Olympic Highway	323	55	43	13
Byrnes Road	137	42	35	10
Merino Drive – between Olympic and Dorsett	54	18	35	10
Merino Drive – between Byrnes and Dorsett	123	46	35	10
East Bomen Road	31	1	35	10
Junee Precinct				
Harefield Yard clearances				
Harefield Road	9	3	28	5
Byrnes Road	146	48	28	5
Harefield Railway Access Road	135	3	28	5

ENHANCEMENT SITE / HAULAGE ROUTE	EXISTING TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)		CONSTRUCTION TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)	
	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Junee Station, Junee Yard and Kemp Street Bridge				
Olympic Highway (west of Seignior Street)	212	6	45	16
Seignior Street	235	9	36	13
Broadway Street	291	6	36	13
Olympic Highway Level Crossing	198	8	36	13
Humphrys Street	99	4	36	13
Main Street (Olympic Highway)	99	3	36	13
Lorne Street	136	11	36	13
Hill Street	54	4	36	13
Joffre Street	24	2	36	13
Harold Street	68	5	36	13
Thomas Street	18	1	36	13
Railway Lane	24	1	36	13
Railway Parade	24	1	36	13
William Street	37	3	36	13
Edgar Street	79	6	36	13
Byrnes Road	140	11	36	13
Pretoria Avenue	18	1	36	13
Olympic Highway underbridge				
Main Street (Olympic Highway)	113	18	71	11
Illabo Road	35	2	61	9
Junee to Illabo clearances				
Olympic Highway	113	18	90	12
Brabins Road	2	0	85	11
Waterworks Road	15	0	85	11
Marinna Station Cross Road	2	0	85	11

3.3.5 CONSTRUCTION ROAD DIVERSIONS

In addition to direct noise impacts from construction traffic, potential noise impacts associated with changes in the distribution of traffic due to diversions implemented during construction have been considered. Traffic volumes and detour routes have been assessed to predict potential noise impacts at the nearest potentially affected residential receivers. A number of assumptions have been made for the purposes of assessing construction traffic noise impacts, with reference to Technical Paper 1—Transport and traffic noise management levels.

The likely routes for these vehicles and predicted traffic numbers are shown in Table 3.6 and have been taken from the Technical Paper 1—Transport and traffic noise management levels.

Quantitative increases in road traffic noise as a result of additional construction traffic have been calculated for daytime hours using a spreadsheet *Calculation of Road traffic Noise* (UK Department of Transport, 1988) (CoRTN) road noise calculation method. It is noted that deliveries may occur during the night period; however, these activities fall under the ‘delivery of oversized plant or structures’ category of works allowed outside standard hours in line with the ICNG. At all other sites, a qualitative discussion is presented, in the absence of site-specific information.

Table 3.6 Predicted traffic diversion routes and numbers

ENHANCEMENT SITE/HAULAGE ROUTE	EXISTING TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)		CONSTRUCTION TRAFFIC NUMBERS (PEAK PER HOUR PER DIRECTION)	
	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Henty diversion				
Rosler Parade/Yankee Crossing Road	10	1	102	12
Allan Street	36	10	102	29
Edmondson Street bridge diversion				
Edward Street (Sturt Highway)	1,096	88	1,034	83
Docker Street/Bourke Street	895	18	1,034	21
Urana Street	518	5	1,034	10
Macleay Street	182	16	1,094	98
Railway Street	182	16	1,094	98
Lake Albert Road	815	41	1,094	55
Kemp Street bridge diversion				
Seignior Street	235	9	400	16
Olympic Highway Level Crossing	198	8	400	16
Humphrys Street	99	4	400	16
Lorne Street	136	11	54	4
Joffre Street	24	2	400	32
Harold Street	68	5	82	7
Thomas Street	18	1	82	7
William Street	37	3	212	17
Pretoria Avenue	18	1	400	32

3.3.6 RESIDUAL IMPACTS

Where exceedances of construction noise criteria were identified, standard noise management measures, as outlined in Chapter 8, were applied and the noise impacts from the ‘mitigated’ construction activities were predicted. Following the application of the standard noise management measures there are anticipated to be residual noise impacts, where the construction noise criteria are still not met. These residual noise impacts would be addressed through a combination of site-specific noise mitigation and/or appropriate management of those construction activities and key plant items responsible for the exceedances.

Specific noise mitigation measures will be determined by the construction contractor during detailed construction planning. Additional mitigation and management measures to be implemented for each receiver depending on the magnitude of residual exceedance. These are discussed further in section 8.2.

3.3.7 CUMULATIVE IMPACTS

There is potential for construction work activities at the enhancement sites to be undertaken at the same time and the construction noise at sensitive receivers to be a cumulative level from works occurring on adjacent enhancement sites. There is also the potential for concurrent construction work activities from other projects not associated with the proposal to occur, resulting in cumulative noise impacts.

The assessment of potential cumulative impacts is provided in Chapter 7 has been undertaken in accordance with the SEARs and considers the potential for impacts, taking into account worst-case cumulative impacts from concurrent construction activities within the proposal (combined noise from multiple enhancement sites) and concurrent construction associated with other projects in the study area.

Potential concurrent activities identified within the proposal were identified from detailed construction schedules provided by ARTC and modelled together in accordance with the methodology outlined in section 3.3.1.

The following tasks were undertaken to assess the potential for cumulative impacts with other projects:

- identifying potentially relevant projects in the study area (either proposed or approved) based on information available in the public domain. Projects with the potential for cumulative impacts with the proposal were identified through a review of publicly available information and environmental impact assessments from the following databases:
 - NSW Major Projects website
 - relevant council websites
- Australian Government – Department of Climate Change, Energy, the Environment and Water EPBC Public notices list screening identified projects for their potential to interact with the proposal — identifying and assessing the significance of potential cumulative impacts.

3.4 OPERATIONAL

3.4.1 ROAD TRAFFIC NOISE

This section describes the methodology and inputs used in the assessment of potential operational road noise impacts potentially associated with road upgrades associated with the proposal.

In addition to road noise impacts due to changes to the road alignment at Edmondson Street and Kemp Street bridges, operational traffic generated by the proposal was considered. Road traffic numbers are not expected to change as a direct result of the proposal and, as such, this aspect of operational road noise has not been discussed further.

The NCG states that where a minor works project is identified to likely increase road traffic noise levels by more than 2dB, road traffic noise levels should be further assessed against the existing target noise abatement levels for roads not subject to redevelopment.

For residential receivers, the criteria apply at 1m from the façade of buildings and are assessed for each façade. For assessment locations without buildings, such as open space or outdoor play areas, the assessment location is at 1.5m above ground at the worst affected location that is regularly used. Criteria are derived for each receiver based on the contribution from existing and proposed road noise sources and the type of road project.

The SoundPLAN noise prediction model for the proposal was used to calculate road traffic noise, applying the CoRTN method for predicting noise levels from road traffic. The noise models predict the road traffic noise levels by considering inputs of traffic volumes and composition, vehicle speed, road gradient, pavement surface, ground absorption, reflections and shielding from topography, buildings and barriers.

Models were created for no-build and build scenarios for daytime periods to quantify the potential change in road traffic noise levels with the introduction of the proposal. As traffic number remain unchanged, any change in noise would be only as a result of the alignment changes and would be the same for day and night-time periods.

Traffic speeds modelled were based on existing signposted speeds and the future design speeds provided by the proposal team. The traffic flows input into the model for these roads are shown in Table 3.7. Safety barriers were not included on either bridge, however as these will provide additional screening of road traffic noise, this represents a conservative approach.

The NMG outlines Roads and Maritime's approach to the evaluation, selection and design of feasible and reasonable noise mitigation measures for operational road traffic noise.

Given the minor nature of the proposed road upgrades, no mitigation of road noise is expected to be required and as such further detail on noise mitigation is not included in this report.

Table 3.7 Traffic flows used in noise models

ROAD	VEHICLE SPEED (km/hr)	ANNUAL AVERAGE DAILY TRAFFIC (AADT) (PER DIRECTION)			
		Total	Light vehicles	Heavy vehicles	HV%
Wagga Wagga					
Edmondson Street bridge	50	5,224 ¹	5,114	110	2.1
Junee					
Kemp Street bridge	50	1,514 ³	1,481	33	2.2

(1) Taken from Technical Paper 1—Traffic and transport

Predicted noise levels were calculated for the nearest noise sensitive buildings as defined by the RNP. Level predictions are made for locations 1.5m above ground height, in the centre of the most affected building façade. Noise levels are predicted at a perpendicular distance of 1m from the building façade.

Other inputs and parameters utilised in noise modelling for the assessment are provided in Table 3.8.

Table 3.8 Road noise model inputs

PARAMETER	DETAILS
CoRTN methodology	SoundPLAN implementation of CoRTN NSW road modelling requirements Three source height model as required by RNP and NMVG: — light vehicle traffic flow modelled at 0.5m above road level — heavy vehicles traffic flow split across 0.5m above road level (29%), 1.5m above road level (57%) and at 3.6m above road level (14%)
Ground topography	Ground terrain contours at 0.5m to 1m intervals
Pavement surfaces	Existing and proposed future pavement surfaces are modelled as Dense Grade Asphalt (DGA)/no correction
Existing structures and barriers	Refer Construction noise modelling parameters (section 3.3.1.3)
Road gradient	Gradient calculated from supplied road design model
Ground absorption	Ground absorption coefficient 0.75
Façade reflection correction	+2.5dB for locations at 1m from the façade of a building
ARRB correction	-1.7dB for façade noise levels
L ₁₀ to L _{eq} correction	$L_{eq} = L_{10} - 3\text{dB}$

3.4.2 RAIL

Operational noise and vibration impacts from rail are covered in Technical Paper 7—Operational noise and vibration (rail).

4 EXISTING ENVIRONMENT

4.1 NOISE CATCHMENT AREAS

Noise catchment areas (NCA) have been defined to classify groups of sensitive receivers that are likely to have a similar existing noise environment and experience similar impacts from the proposal. The NCAs are delineated by landmark features, such as roads, to encompass groupings of sensitive receivers with similar background noise environments. This was determined through reference to aerial imagery and land-use maps and verified during the noise monitoring program.

The noise environments at most rural sites are relatively simple with little spatial variation. Higher density populations are located in the town centre, in particular within Albury, Wagga Wagga and Junee.

Table 4.1 summarises the general noise environment of each NCA within each precinct.

Table 4.1 Noise catchment areas (NCAs)

ENHANCEMENT SITE	NCA ID	DESCRIPTION OF NOISE CATCHMENT
Albury precinct		
Murray River bridge Albury Station pedestrian bridge Albury Yard clearances	NCA01	Semi-rural area in south Albury. Urban and light industrial areas located to the north. Noise sources in this area include the Hume Highway, Main South Line and industrial areas of Albury.
Albury Station pedestrian bridge Albury Yard clearances Riverina Highway bridge	NCA02	Covers most urban areas of Albury. Noise sources include industrial land uses, the rail line, Hume Highway and traffic on local roads.
Billy Hughes bridge	NCA03	Industrial area to the north of Albury, adjacent to the Hume Highway and Wagga Road.
Table Top Yard clearances	NCA04	Semi-rural township of Table Top. Noise sources include the rail line, Hume Highway and road traffic on Table Top/Tynan Road.
Greater Hume–Lockhart precinct		
Culcairn pedestrian bridge Culcairn Yard clearances	NCA05	The township of Culcairn. This is suburban in nature and affected by noise sources including the rail line, Olympic Highway and local road traffic.
Henty Yard clearances	NCA06	The township of Henty. This is suburban in nature and affected by noise sources including the rail line, Olympic Highway and local road traffic.
Yerong Creek Yard clearances	NCA07	The village of Yerong. This is semi-rural in nature and affected by noise sources including the rail line, Olympic Highway and local road traffic.
The Rock Yard clearances	NCA08	The township of The Rock. This is predominately suburban in nature and affected by noise sources including the rail line, Olympic Highway and local road traffic.

ENHANCEMENT SITE	NCA ID	DESCRIPTION OF NOISE CATCHMENT
Wagga Wagga precinct		
Uranquinty Yard clearances	NCA 09	The township of Uranquinty. This is predominately suburban in nature and affected by noise sources including the rail line, Olympic Highway and local road traffic.
Pearson Street bridge Cassidy Parade pedestrian bridge Edmondson Street bridge	NCA10	Urban areas of western Wagga Wagga. Industrial land uses are located in the vicinity of the work areas, with residential properties further from the rail line and in the west. Noise sources in this area include the Hume Hwy, rail line and industrial areas of Wagga.
Wagga Wagga Station pedestrian bridge Wagga Wagga Yard clearances, Bomen Yard clearances	NCA11/12	Urban areas of eastern Wagga Wagga. Industrial land uses are located directly to the north and east of the work area; however, numerous residential properties are adjacent to the southern side of the rail line. Residential properties extend to the north and south at greater distance. Noise sources in this area include the Hume Hwy, rail line and industrial areas of Wagga.
Junee precinct		
Harefield Yard clearances	NCA13	The area around Harefield Yard is rural with scattered farming properties in the vicinity. The area is affected by the Harefield Terminal located adjacent to the rail corridor.
Kemp Street bridge Junee Station pedestrian bridge Junee Yard clearances Olympic Highway underbridge	NCA14	This is predominately suburban in nature and affected by noise sources including the junction of the main south and western lines, Olympic Highway and local road traffic.
Junee to Illabo clearances	NCA15	This NCA covers the township of Illabo and the rural areas surrounding it. This is affected by noise sources including the rail line and the Olympic Highway.

4.2 SENSITIVE RECEIVERS

Consistent with the adopted standards and guidelines, sensitive receivers include residential dwellings, schools and education institutions, places of worship, childcare centres, medical facilities, commercial property and industrial premises.

A total of 24,936 noise sensitive receivers were identified within the study area and each receiver was assigned a unique identification number for the purpose of the assessment. A breakdown of the number of sensitive receivers by precinct and NCA is provided in Table 4.2.

Table 4.2 Summary of noise sensitive receivers by precinct and NCA

PRECINCT / NCA	RESIDENTIAL	EDUCATION	MEDICAL	COMMERCIAL	INDUSTRIAL	ACTIVE RECREATION	PASSIVE RECREATION	PLACE OF WORSHIP	TOTAL NOISE SENSITIVE
Albury precinct	7045	89	9	575	481	73	32	13	8306
NCA01	622	2	0	103	172	25	22	3	946
NCA02	6,267	82	9	471	249	48	10	10	7,138
NCA03	13	0	0	0	57	0	0	0	70
NCA04	143	5	0	1	3	0	0	0	152
Greater Hume–Lockhart precinct	1,601	40	5	73	56	29	7	16	1,827
NCA05	571	21	4	22	23	4	1	3	649
NCA06	511	9	1	31	14	10	5	7	588
NCA07	78	1	0	2	6	12	0	3	102
NCA08	441	9	0	18	13	3	1	3	488
Wagga Wagga precinct	11,062	116	21	750	631	79	16	27	12,702
NCA09	326	8	0	5	8	2	0	6	355
NCA10	5,675	45	9	161	205	40	0	6	6,141
NCA11	4,950	63	12	584	245	37	16	15	5922
NCA12	111	0	0	0	173	0	0	0	284
Junee precinct	1,871	27	1	70	113	17	0	4	2,103
NCA13	9	0	0	0	5	0	0	0	14
NCA14	1,741	17	1	69	88	15	0	4	1,935
NCA15	121	10	0	1	20	2	0	0	154
Total Receivers	21,579	272	36	1,468	1,281	198	55	60	24,936

The nearest streets and areas containing noise-sensitive receivers within each enhancement site where identified and are outlined in Table 4.3. These areas will be used for general discussions of potential impacts resulting from the proposal.

Table 4.3 Identified noise sensitive areas

PLAN NUMBER OR LOCATION	RECEIVER TYPE	DIRECTION FROM ENHANCEMENT SITE	DISTANCE FROM ENHANCEMENT SITE (m)
Albury precinct			
Murray River bridge			
Abercorn Street, Klewa St, Plumer Street and Olive Street	Residential	North	24
S&K Francis Engineering	Industrial	North	240
Albury Station pedestrian bridge			
Kenilworth Street and Hanel Street	Residential	East	80
Centenary Street and Schubach Street	Residential	East	110
Officeworks Albury	Commercial	West	130
Windsor Park Motor Inn	Residential	West	100
Albury Yard clearances			
Schubach, Wilson, Rau, Wilson, Kenilworth, Centenary Streets, Aurora Way and Woodstock Circuit	Residential	East	110
Hume, Macauley, Fleming, Hovell, Thomas and Charles Streets	Residential	South-west	120
Porters' Cottages	Residential	West	85
Riverina Highway bridge			
Albury Manor House	Residential	West	125
Broad and Wilson Streets	Residential	East	130
The Scots School, Albury	Educational	North	50
Billy Hughes bridge			
Sanctuary Lane	Residential	South-west	290
Table Top Yard clearances			
Hume Highway	Residential	East	240
Perryman Lane	Residential	West	285
Table Top Public School	Educational	South	870
Greater Hume–Lockhart precinct			
Culcairn pedestrian bridge			
Station House	Passive Recreation	East	30
Culcairn Uniting Church	Place of Worship	East	100

PLAN NUMBER OR LOCATION	RECEIVER TYPE	DIRECTION FROM ENHANCEMENT SITE	DISTANCE FROM ENHANCEMENT SITE (m)
Railway Parade	Residential	South-west	90
Melville Street	Residential	East	80
Henty Street	Residential	North-east	160
Culcairn Yard clearances			
Melrose, Princes, Queen, Victoria and Henty Streets, and Olympic Highway	Residential	East	45
Railway Parade	Residential	West	35
Culcairn Motor Inn	Residential	North-east	90
Billabong High School	Educational	East	360
Henty Yard clearances			
Riverlife Church	Place of Worship	West	30
Henty Uniting Church	Place of Worship	West	45
Ivor, Keightley, Hayes, Day, Lyne and Allan Streets	Residential	West	15
Headlie Taylor Header Museum	Passive Recreation	East	20
Rosler Pde, South Street and Ivor Street	Residential	West	30
97 Railway Parade	Residential	East	40
Yerong Creek Yard clearances			
Yerong Creek Public School	Educational	East	70
Olympic Highway	Residential	East	60
Waratah and Plunkett Street	Residential	West	25
Hay and Cole Street	Residential	East	85
The Rock Yard clearances			
Draper, Smissen, Urana, Davidson and Railway Street	Residential	North	40
Scott and Railway Streets and Olympic Highway	Residential	South	110
Wagga Wagga precinct			
Uranquinty Yard clearances			
Seventh Day Adventist Reform Church	Place of Worship	North	80
Pearson, Best, Ryan and Yarragundry Streets	Residential	North	75

PLAN NUMBER OR LOCATION	RECEIVER TYPE	DIRECTION FROM ENHANCEMENT SITE	DISTANCE FROM ENHANCEMENT SITE (m)
Uranquinty Public School	Educational	North	70
Olympic Highway, Moisa Lane, Morgan, Ben, Ryan and Yaragundry Streets	Residential	South	75
Uranquinty and Guttler Streets	Residential	East	60
Pearson Street bridge			
Peacock Drive, Gallop Avenue and Wade Street	Residential	South-east	60
Wagga Show Campground and Wagga & District Greyhound Club	Active Recreation	East	10
Bulolo Street	Residential	West	55
Cassidy Parade pedestrian bridge			
Kildare Catholic College	Educational	South	35
Kildare and Norman Streets and Cassidy Parade	Residential	South	5
Brookong Avenue	Residential	North-west	10
Edmondson Street bridge			
Kildare Catholic College	Educational	South-west	30
Edmondson, Erin, Railway and Macleay Streets	Residential	South-east	10
South Wagga Public School	Educational	North-east	5
Little Best Street and Donnelly Avenue	Residential	North-west	10
Wagga Wagga Station pedestrian bridge			
Railway, Macleay and Collins Streets	Residential	South	20
South Wagga Public School	Educational	North-west	70
Wagga Wagga Yard clearances			
The Penthouse	Residential	North	95
Railway, MacLeay, Collins, Flinders, Richard and Young Streets	Residential	South	35
Bomen Yard clearances			
Bavin Road	Residential	South	800
Junee precinct			
Harefield Yard clearances			
Byrnes Road	Residential	South-east	40

PLAN NUMBER OR LOCATION	RECEIVER TYPE	DIRECTION FROM ENHANCEMENT SITE	DISTANCE FROM ENHANCEMENT SITE (m)
Kemp Street bridge			
Olympic Hwy, Railway Lane, Railway Parade and Thomas Street	Residential	South-west	10
Good Start Early Learning Junee	Educational	South-east	50
Olympic Hwy, Signior Street and Pretoria Avenue	Residential	North-west	15
Edgar, George, Ducker, Kemp and Hill Streets	Residential	East	10
Junee Public School	Educational	North-east	130
Junee Yard clearances			
Olympic Highway	Residential	West	30
Lorne Street	Residential	East	40
Edgar Street	Residential	East	60
Junee Station pedestrian bridge			
Olympic Highway	Residential	West	30
The Crossing	Residential	West	45
Lorne Street	Residential	South	50
Olympic Highway and Anzac Avenue	Residential	South-west	130
Olympic Highway underbridge			
Junee North Public School	Educational	North-west	135
Olympic Hwy and Ridge, Main, Lillian, Cedric, Cross, Florence, Elizabeth, Pirr and Orr Streets	Residential	East	35
Olympic Hwy, Illabo Road and Knight, Prince, Marquis, Regent, Gloucester, Lord and Castle Streets	Residential	West	20
Junee to Illabo clearances			
Olympic Highway	Residential	North	30
Illabo Public School	Educational	North	50

4.2.1 PROPOSED SENSITIVE RECEIVERS

It is understood that the Locomotive Hotel at Junee is intending to construct 8 accommodation units prior to the completion of construction works. These facilities have been included in the assessment at Kemp Street Bridge. No other proposed sensitive receivers were identified within the affectation area of the proposal.

4.3 NOISE MONITORING

A baseline noise monitoring survey was undertaken between March and May 2021 to quantify and characterise the existing noise environment in the areas surrounding each proposal site and nearby sensitive receivers.

Environmental noise levels were continuously monitored for a minimum period of seven days at the 15 locations detailed in section Table 4.4 and presented in Figure 3.1.

4.4 MONITORED DAILY NOISE LEVELS

The monitored noise levels were analysed in accordance with NPfI to quantify the daytime, evening and night-time period noise levels in terms of the L_{Aeq} and Rating Background Level noise metrics. The L_{Aeq} noise metric provides quantification of the total ambient noise and the Rating Background Level, defined from the measured L_{A90} noise levels, is a single figure that represents the background noise level for assessment purposes. The L_{A90} noise metrics is less sensitive to short-lived noise events than the L_{Aeq} metric and is commonly applied as a measure of the steady background noise environment.

The monitored noise levels were influenced by the principle sources of noise local to each monitoring location, being the existing road traffic noise from the local road network and the intermittent railway noise from passenger and freight passby events on the Main South Line as well as other industrial noises.

The results are summarised in Table 4.4 and detailed daily plots of data are presented in Appendix A. Where required, background noise levels have been adjusted for evening and night periods in accordance with methodologies outlined in the NPfI. Noise monitoring parameters are discussed further in section 2.4.1.

Table 4.4 Summary of the monitored daily noise levels

NCA	LOCATION	AMBIENT NOISE LEVEL dBA L _{eq} (15 minute)			RATING BACKGROUND LEVEL (RBL) dBA		
		Day ¹	Evening ¹	Night ¹	Day ¹	Evening ¹	Night ¹
Albury Precinct							
NCA01	1	53	53	50	45	47	41
NCA02(a)	2(a)	39	46	47	35 (27 ²)	33	36
NCA02(b)	2(b)	43	47	47	35 (34 ²)	40	34
NCA03	3	52	49	49	37	41	38
NCA04	4	54	57	57	42	51	46
Greater Hume–Lockhart Precinct							
NCA05	5	59	58	55	36	35	30
NCA06	6	51	48	40	37	36	30 (29 ²)
NCA07/08	7	49	59	46	39	41	30 (27 ²)
Wagga Wagga Precinct							
NCA 9	7	49	59	46	39	41	30 (27 ²)
NCA10	10	52	51	45	46	45	38
NCA11/12	11	52	54	46	48	47	37

NCA	LOCATION	AMBIENT NOISE LEVEL dBA L _{eq} (15 minute)			RATING BACKGROUND LEVEL (RBL) dBA		
		Day ¹	Evening ¹	Night ¹	Day ¹	Evening ¹	Night ¹
Junee Precinct							
NCA13	13	60	56	53	41	39	37
NCA14	14	52	53	47	42	45	35
NCA15	15	53	53	47	41	46	33

(1) Time periods defined as – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening, 6.00pm to 10.00pm; Night 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday

(2) RBL data has been adjusted to reflect the minimum RBL as per NPfI standard (bracketed figure indicates measured value)

4.5 CONSTRUCTION NOISE MANAGEMENT LEVELS (RESIDENTIAL RECEIVERS)

The NMLs for residential receivers are presented in Table 4.5. The NMLs are derived from the measured existing background noise levels (refer section 4.3) and are applied to the NCA (refer section 4.1). The nearest applicable enhancement sites to each NCA is also listed, noting that some NCAs will experience construction noise from more than one enhancement site.

Table 4.5 Noise management levels at residential receivers

ASSESSMENT PERIOD	RBL dBA	NOISE MANAGEMENT LEVEL dBA L _{eq} (15 min)	HIGHLY NOISE AFFECTED LEVEL dBA L _{eq} (15 min)
Albury precinct			
NCA 1 (Murray River bridge, Albury Station pedestrian bridge, Albury Yard clearances)			
Standard hours ¹	45	55	75
Out of hours – Day ²	45	50	–
Out of hours – Evening ³	47	50	–
Out of hours – Night ⁴	41	50	–
NCA 2 (Albury Station pedestrian bridge, Albury Yard clearances, Riverina Highway bridge)			
Standard hours ¹	35	45	75
Out of hours – Day ²	30	35	–
Out of hours – Evening ³	33	35	–
Out of hours – Night ⁴	36	35	–
NCA 3 (Billy Hughes bridge)			
Standard hours ¹	37	47	75
Out of hours – Day ²	37	42	–
Out of hours – Evening ³	41	42	–
Out of hours – Night ⁴	38	42	–

ASSESSMENT PERIOD	RBL dBA	NOISE MANAGEMENT LEVEL dBA $L_{eq}(15 \text{ min})$	HIGHLY NOISE AFFECTED LEVEL dBA $L_{eq}(15 \text{ min})$
NCA 4 (Table Top Yard clearances)			
Standard hours ¹	42	52	75
Out of hours – Day ²	42	47	–
Out of hours – Evening ³	51	47	–
Out of hours – Night ⁴	46	47	–
Greater Hume–Lockhart precinct			
NCA 5 (Culcairn Yard clearances and pedestrian bridge)			
Standard hours ¹	36	46	75
Out of hours – Day ²	36	41	–
Out of hours – Evening ³	35	40	–
Out of hours – Night ⁴	30	35	–
NCA 6 (Henty Yard clearances)			
Standard hours ¹	37	47	75
Out of hours – Day ²	37	42	–
Out of hours – Evening ³	36	41	–
Out of hours – Night ⁴	30	35	–
NCA 7 / 8 (Yerong Creek Yard clearances, The Rock Yard clearances)			
Standard hours ¹	39	49	75
Out of hours – Day ²	39	44	–
Out of hours – Evening ³	41	44	–
Out of hours – Night ⁴	30	35	–
Wagga Wagga precinct			
NCA 9 (Uranquinty Yard clearances)			
Standard hours ¹	39	49	75
Out of hours – Day ²	39	44	–
Out of hours – Evening ³	41	44	–
Out of hours – Night ⁴	30	35	–
NCA 10 (Pearson Street bridge)			
Standard hours ¹	46	56	75
Out of hours – Day ²	46	51	–
Out of hours – Evening ³	45	50	–
Out of hours – Night ⁴	38	43	–

ASSESSMENT PERIOD	RBL dBA	NOISE MANAGEMENT LEVEL dBA $L_{eq}(15 \text{ min})$	HIGHLY NOISE AFFECTED LEVEL dBA $L_{eq}(15 \text{ min})$
NCA 11 / 12 (Cassidy Parade pedestrian bridge, Edmondson Street bridge, Wagga Wagga Station pedestrian bridge, Wagga Wagga Yard clearances, Bomen Yard clearances)			
Standard hours ¹	48	58	75
Out of hours – Day ²	48	53	–
Out of hours – Evening ³	47	52	–
Out of hours – Night ⁴	37	42	–
Junee precinct			
NCA 13 (Harefield Yard clearances)			
Standard hours ¹	41	51	75
Out of hours – Day ²	41	46	–
Out of hours – Evening ³	39	44	–
Out of hours – Night ⁴	37	42	–
NCA 14 (Kemp Street bridge, Junee Yard clearances and pedestrian bridge, Olympic Highway underbridge)			
Standard hours ¹	42	52	75
Out of hours – Day ²	42	57	–
Out of hours – Evening ³	45	50	–
Out of hours – Night ⁴	35	40	–
NCA 15 (Junee to Illabo clearances)			
Standard hours ¹	41	51	75
Out of hours – Day ²	41	46	–
Out of hours – Evening ³	46	46	–
Out of hours – Night ⁴	43	46	–

(1) Standard hours – Monday to Friday 7.00am to 6.00pm, Saturday 8.00am to 1.00pm, Excludes on Sundays or public holidays

(2) Out of hours – Day Saturday 7.00am to 8.00am and 1.00pm to 6.00pm, Sunday 8.00am to 6.00pm

(3) Out of hours – Evening All days 6.00pm to 10.00pm

(4) Out of hours – Night Monday to Saturday 10.00pm to 7.00am, Sunday 10.00pm to 8.00am

4.6 EXISTING VIBRATION ENVIRONMENT

The most significant existing sources of vibration within the study area is heavy vehicle traffic on the local road network and existing train movements.

Cosmetic building damage as a result of vibration due to train movements is generally not a concern at distances exceeding approximately 5m. For human comfort, this distance is more likely to be in the order of 10 to 15m, and as such, in consideration of the separation distances outlined in Table 4.3, existing ground vibration levels may be higher than the recommended human comfort levels at some locations. Existing ground vibration levels from intermittent road and rail traffic are expected to be low in the mainly rural environment.

4.7 VIBRATION SENSITIVE RECEIVERS

Ground vibration from construction and rail sources will generally not propagate further than approximately 150m. The types of receivers potentially impacted by vibration is discussed in section 2.6. Approximately 5,355 receivers have been identified within a conservative 500m of the nearest enhancement site as potentially affected by vibration. These properties have been assessed for potential vibration impacts in section 5.6.

Further, the non-Indigenous cultural heritage studies for the EIS identified 288 sites of potential heritage significance, as detailed in Technical Paper 3—Non-Aboriginal heritage. The number of heritage receivers in each precinct is presented in Table 4.6. However, as discussed in section 2.6.2, all these heritage receivers are not necessarily vibration sensitive.

Table 4.6 Vibration sensitive heritage receivers

PRECINCT	NUMBER OF HERITAGE RECEIVERS	NUMBER OF VIBRATION SENSITIVE RECEIVERS
Albury	25	1,227
Greater Hume–Lockhart	38	526
Wagga Wagga	219	2,343
Junee	6	1,259

5 CONSTRUCTION IMPACT ASSESSMENT

The following section discusses the assessment of construction noise, including where works are likely to trigger feasible and reasonable measures to manage construction noise and mitigation related impacts.

In accordance with the ICNG and based on the proposed construction period of more than 3 months, a quantitative assessment is required.

Detailed construction noise modelling results are presented in Appendix C. A summary of the results is presented in the following sections.

5.1 ALBURY PRECINCT

5.1.1 CONSTRUCTION NOISE ASSESSMENT

The activities required for construction of the proposal within the Albury precinct are identified and discussed for each enhancement site:

- Murray River bridge
- Albury Station pedestrian bridge
- Albury Yard clearances
- Riverina Highway bridge
- Billy Hughes bridge
- Table-Top Yard clearances.

Detailed noise level statistics are presented for the Albury precinct enhancement sites in Appendix C-1. A summary of these findings relevant to each enhancement site is discussed in the following sections.

5.1.1.1 MURRAY RIVER BRIDGE

The construction activities considered for this enhancement site include site establishment, installation and removal of scaffolding and bracing, bridge works, demobilisation/rehabilitation and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.1 summarises the identified noise impacts.

Table 5.1 Maximum predicted noise impacts – Murray River bridge enhancement site

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Site establishment	88	150	150	150	4	76	26 days
Number of predicted non-residential exceedances							
Site establishment	Industrial					N/A	26 days
	1						
Maximum predicted noise level (at worst impacted receiver)							
Site establishment	84dB (L _{Aeq} (15 MINUTES))					97dB (L _{A1} (1 minutes))	26 days

During the upgrade of Murray River bridge, the work stage with the greatest impact is predicted to be the establishment of the site compound. Noise impacts from night-time bridge works are expected to impact up to 150 residential receivers and generate sleep disturbance at approximately 76 properties. Four properties may be highly noise affected ($>75\text{dB } L_{Aeq}(15 \text{ minute})$).

5.1.1.2 ALBURY STATION PEDESTRIAN BRIDGE

The construction activities considered for this enhancement site include preliminary works; demolition; piling; concreting works; installation of screens, handrails, etc.; lifting of truss and deck; demobilisation and rehabilitation; compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.2 summarises the identified noise impacts.

Table 5.2 Maximum predicted noise impacts—Albury Station pedestrian bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Demolition	1,099	2,245	2,245	2,245	2	2,294	5 days
Number of predicted non-residential exceedances							
Demolition	Education	Commercial	Industrial	Place of worship	N/A		5 days
	12	3	4	1			
Maximum predicted noise level (at worst impacted receiver)							
Demolition	83dB (L _{Aeq} (15 minutes))					85dB (L _{A1} (1 minutes))	5 days

During the upgrade of the Albury Station pedestrian bridge, the work stage with the greatest impact is predicted to be during demolition of the existing structure. Due to safety considerations, this work will need to be carried out during a possession and, as such, will entail night works. Night-time noise impacts from this stage are expected to impact up to 2,245 residential receivers during night-time hours and generate sleep disturbance at approximately 2,294 properties. Two properties may be highly noise affected ($>75\text{dB } L_{Aeq}(15 \text{ minute})$).

5.1.1.3 ALBURY STATION PEDESTRIAN BRIDGE (EASTERN WORKS)

The construction activities considered for this enhancement site include preliminary works, demolition, concreting works, installation of fittings, demobilisation and rehabilitation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.2 summarises the identified noise impacts.

Table 5.3 Maximum predicted noise impacts—Albury Station pedestrian bridge (eastern works)

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Demolition	327	1,049	1,049	1,049	10	1,015	5 days
Number of predicted non-residential exceedances							
Demolition	Education					N/A	5 days
	6						
Maximum predicted noise level (at worst impacted receiver)							
Demolition	103dB (L _{Aeq} (15 minutes))					105dB (L _{A1} (1 minutes))	5 days

During the upgrade of the Albury Station pedestrian bridge (eastern works), the work stage with the greatest impact is predicted to be during demolition of the existing structure. Night-time noise impacts from this stage are expected to impact up to 1,049 residential receivers during night-time hours and generate sleep disturbance at approximately 1,015 properties. 10 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)). Due to its proximity to numerous residential receivers, this works stage results in the highest impacts within the Albury area.

5.1.1.4 ALBURY YARD CLEARANCES (TRACK RE-ALIGNMENT)

The construction activities considered for this enhancement site include preliminary works, offline widenings, track re-alignment, re-build track, demobilisation and rehabilitation and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.4 summarises the identified noise impacts.

Table 5.4 Maximum predicted noise impacts—Albury Station track re-alignment

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION	
Number of predicted residential exceedances								
Demobilisation and rehabilitation	2,266	2,840	2,840	2,840	1	397	10 days	
Number of predicted non-residential exceedances								
Demobilisation and rehabilitation	Education		Commercial		Industrial		N/A	10 days
	12		3		4			
Maximum predicted noise level (at worst impacted receiver)								
Demobilisation and rehabilitation	68dB (L _{Aeq} (15 minutes))					68dB (L _{A1} (1 minutes))	10 days	

During the Albury Station track slew works, the work stage with the greatest impact is predicted to be demobilisation and rehabilitation, with some receivers experiencing greatest impacts during track works. Noise impacts from night-time demobilisation works are expected to impact up to residential 2,840 receivers and generate sleep disturbance at approximately 397 properties. A single property may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.1.1.5 ALBURY YARD CLEARANCES (GANTRY REMOVAL)

The construction activities considered for this enhancement site include gantry replacement preliminary works; install new cabling/conduits; signalling works; cut gantry bolts; remove gantry; remove footings; backfill footings; demobilisation and rehabilitation; and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.5 summarises the identified noise impacts.

Table 5.5 Maximum predicted noise impacts—Albury Station gantry replacement

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Cabling and conduits	386	866	866	866	0	218	3 days
Number of predicted non-residential exceedances							
Demolition	Education					N/A	3 days
	1						
Maximum predicted noise level (at worst impacted receiver)							
Cabling and conduits	64dB (LAeq (15 minutes))					65dB (LA1 (1 minutes))	3 days

During the Albury Station gantry replacement, the work stage with the greatest impact is predicted to be the installation of cabling and conduits. Night-time noise impacts from these works are expected to impact up to 866 residential receivers and generate sleep disturbance at approximately 218 properties. No properties are predicted to be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.1.1.6 RIVERINA HIGHWAY BRIDGE

The construction activities considered for this enhancement site include preliminary works, earthworks, large-scale piling, small-scale piling, drainage works, track works, demobilisation and rehabilitation, and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.6 summarises the identified noise impacts.

Table 5.6 Maximum predicted noise impacts—Riverina Highway bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Preliminary works	1,860	2,387	2,387	2,387	0	234	27 days
Number of predicted non-residential exceedances							
Preliminary works	Education		Commercial			N/A	27 days
	4		2				
Maximum predicted noise level (at worst impacted receiver)							
Preliminary works	76dB (L _{Aeq} (15 minutes))					76dB (L _{A1} (1 minutes))	27 days

During the upgrade of the Riverina Highway bridge, the work stage with the greatest impact is predicted to be preliminary works. Night-time noise impacts from these works are expected to impact up to 2,387 residential receivers and generate sleep disturbance at approximately 234 properties. No properties are expected to be highly noise affected ($>75\text{dB } L_{Aeq}(15 \text{ minute})$).

5.1.1.7 BILLY HUGHES BRIDGE

The construction activities considered for this enhancement site include preliminary works, earthworks, track re-alignment, large scale piling, small scale piling, drainage works, track works, demobilisation and rehabilitation, and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.7 summarises the identified noise impacts.

Table 5.7 Maximum predicted noise impacts—Billy Hughes bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted residential exceedances							
Preliminary works	7	7	7	7	0	2	27 days
Maximum predicted noise level (at worst impacted receiver)							
Preliminary works	54dB (L_{Aeq} (15 minutes))					58dB (L_{A1} (1 minutes))	27 days

During the upgrade of the Billy Hughes bridge, the work stage with the greatest impact is predicted to be establishment of the site and preliminary works. Night-time noise impacts from these works are expected to impact up to seven receivers and generate sleep disturbance at approximately two properties. No properties are expected to be highly noise affected. No non-residential receivers are predicted to experience exceedances of NMLs.

5.1.1.8 TABLE TOP YARD CLEARANCES

The construction activities considered for this enhancement site has assessed a worst-case scenario and include preliminary works; install new footings; cabling/ conduits; signalling works; cut gantry bolts; remove gantry; remove footings; backfill footings; demobilisation and rehabilitation; and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.8 summarises the identified noise impacts.

Table 5.8 Maximum predicted noise impacts—Table Top Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted residential exceedances							
Installation of footings and cables	6	18	18	18	0	0	< 4 days
Maximum predicted noise level (at worst impacted receiver)							
Installation of footings and cables	59dB (L_{Aeq} (15 minutes))					61dB (L_{A1} (1 minutes))	< 4 days

During the Table Top Yard clearances work, the stage with the greatest impact is predicted to be the installation of footings and cables. Night-time noise impacts from these works are expected to impact up to 18 residential receivers. No properties are expected to be highly noise affected ($>75\text{dB } L_{Aeq}(15 \text{ minute})$) or experience sleep disturbance impacts. No non-residential receivers are predicted to experience exceedances of NMLs.

5.1.2 CONSTRUCTION TRAFFIC ASSESSMENT

5.1.2.1 CONSTRUCTION VEHICLES

During the construction phase of the proposal, heavy vehicles would be required for materials and equipment delivery while light vehicles would transport workers to and from the site. This additional road traffic may impact receivers along the proposed transport routes.

No traffic detours are proposed for construction of the proposal in Albury precinct.

The likely routes for these vehicles and proposal traffic numbers are shown for each site are shown in Table 5.9.

Section 2.5.1 outlines that an increase in road traffic noise during construction of less than 2dB would generally be considered acceptable. This corresponds to an approximate increase in traffic of 60 per cent.

These calculations show that construction traffic associated with the Albury work stages on public roads is likely to comply with the road traffic noise goals at all sites.

Noise management measures have been recommended in Chapter 8 to assist in minimising the potential for noise disturbance from construction traffic.

Table 5.9 Predicted construction traffic routes and numbers

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Albury Precinct						
Murray River bridge						
East Street	Sub-arterial	58.9	59.2	No	No	No
Atkins Street	Sub-arterial	56.1	57.0	No	No	No
Hume Highway	Arterial	65.2	65.4	Yes	No	No
Macauley Street	Local	46.2	48.9	No	Yes	No
Panmure Street	Local	46.2	48.9	No	Yes	No
Abercorn Street	Local	46.2	48.9	No	Yes	No
Kiewa Street	Local	56.2	57.3	Yes	No	No
Townsend Street	Local	46.2	48.9	No	Yes	No
Olive Street	Local	56.2	57.3	Yes	No	No

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Albury Station, Albury Yard and Riverina Highway Bridge						
Young Street	Arterial	56.7	57.4	No	No	No
Smollet Street (Railway Place)	Local	46.8	50.1	No	Yes	No
Borella Road	Arterial	63.6	64.2	Yes	No	No
Hume Highway Northbound Off Ramps	Arterial	58.5	60.2	Yes	No	No
Schubach Street	Sub-arterial	56.1	57.6	No	No	No
Billy Hughes bridge						
Wagga Road	Sub-arterial	59.6	60.7	Yes	No	No
Hume Highway	Arterial	66.5	67.1	Yes	No	No
Table Top Yard						
Perryman Lane	Local	51.8	52.8	No	No	No
Tynan Road	Local	51.0	51.9	No	No	No
Hume Highway	Arterial	66.5	66.6	Yes	No	No

5.1.3 ALBURY PRECINCT CONSTRUCTION NOISE SUMMARY

Construction work within the Albury precinct is likely to generate substantial impacts, particularly during night-time works. Loudest activities include earthworks, demolition, trackworks and piling. Up to 10 properties are predicted to be highly affected (>75dB) during activities at the Albury Station pedestrian bridge. Sleep disturbance impacts have been predicted to occur during all night-time work stages, with up to 2,294 properties may experience sleep disturbance impacts, mainly during works at the Albury Station pedestrian bridge.

Works at the eastern side of the Albury Station pedestrian bridge are predicted to result in the highest noise levels for receivers and the highest number of affected properties.

It is noted that noise levels in construction areas may be higher than OHS (SafeWork) noise limits in close proximity to noisy equipment. It is assumed that access to these affected areas will be limited to approved personnel and that appropriate hearing protection will be worn. Construction noise may also exceed NMLs in these areas and potential impacts to non-construction staff and the public will need to be considered. It is assumed that public will be affected for short durations whilst passing construction areas, however impacts to staff exposed for longer periods will need to be managed in accordance with the NSW SafeWork [Code of Practice for managing noise and preventing hearing loss at work](#). All construction noise impacts are temporary and confined to discrete periods. Generally, the longer duration works are undertaken during standard hours only and do not require track possessions, these works are typically quieter and less intrusive. Works undertaken during possessions are very short term, typically undertaken during standard and out of hours work periods and are usually louder and more intrusive; however, there is usually a long respite period between these more intrusive works.

Noise impacts are predicted at a number of locations across several stages of construction, during standard (daytime) hours and OOH works periods. Noise management and mitigation measures would therefore be required to be implemented during construction of the proposal within the extent that is reasonable and feasible. Details of such noise mitigation are included in Chapter 8.

5.2 GREATER HUME–LOCKHART PRECINCT

5.2.1 CONSTRUCTION NOISE ASSESSMENT

The activities required for construction of the proposal within the Greater Hume–Lockhart precinct are identified and discussed for each enhancement site:

- Culcairn pedestrian bridge and Culcairn Yard clearances
- Henty Yard clearances
- Yerong Creek Yard clearances
- The Rock Yard clearances.

Detailed noise level statistics are presented for the Great Hume–Lockhart precinct enhancement sites in Appendix C-3. A brief summary of these findings is discussed in the following sections.

5.2.1.1 CULCAIRN PEDESTRIAN BRIDGE AND CULCAIRN YARD CLEARANCES

The construction activities considered for these enhancement sites include preliminary works, offline widenings, remove gantry, drainage works and service relocation, track re-alignment, re-build track, demobilisation and rehabilitation, compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.10 summarises the identified noise impacts.

Table 5.10 Maximum predicted noise impacts—Culcairn pedestrian bridge and yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION	
Number of predicted residential exceedances								
Drainage works/service relocations	536	548	548	548	3	548	5 days	
Number of predicted non-residential exceedances								
Drainage works/service relocations	Education	Medical	Commertial	Industrial	Passive recreation	Place of worship	N/A	5 days
	10	2	5	4	1	2		
Maximum predicted noise level (at worst impacted receiver)								
Drainage work /service relocations	80dB (L _{Aeq} (15 minutes))					80dB (L _{A1} (1 minutes))	5 days	

During work at Culcairn Yard, the stage with the greatest impact is predicted to during drainage works and service relocations. Night-time noise impacts from these works are expected to impact up to 548 residential receivers and generate sleep disturbance at approximately 548 properties. 3 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.2.1.2 HENTY YARD CLEARANCES AND LEVEL CROSSING MODIFICATION

The construction activities considered for this enhancement site include preliminary works, offline widenings, remove gantry, drainage works and service relocation, track re-alignment, re-build track, demobilisation and rehabilitation, compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.11 summarises the identified noise impacts.

Table 5.11 Maximum predicted noise impacts—Henty Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION	
Number of predicted residential exceedances								
Offline widenings	486	494	494	494	9	494	24 days	
Number of predicted non-residential exceedances								
Offline widenings	Education	Medical	Commercial	Industrial	Passive recreation	Place of worship	N/A	24 days
	5	1	7	3	1	6		
Maximum predicted noise level (at worst impacted receiver)								
Offline widenings	88dB (L _{Aeq} (15 minutes))					89dB (L _{A1} (1 minutes))	24 days	

During the Henty Yard clearances work, the stage with the greatest impact is predicted to be during offline widening works. Night-time noise impacts from these works are expected to impact up to 494 residential receivers and generate sleep disturbance at approximately 494 properties. Nine properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.2.1.3 YERONG CREEK YARD CLEARANCES

The construction activities considered for this enhancement site include preliminary works, offline widenings, remove gantry, drainage works and service relocation, track re-alignment, re-build track, demobilisation and rehabilitation, compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.12 summarises the identified noise impacts.

Table 5.12 Maximum predicted noise impacts—Yerong Creek Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION	
Number of predicted residential exceedances								
Demobilisation and rehabilitation	70	74	74	74	4	74	10 days	
Number of predicted non-residential exceedances								
Demobilisation and rehabilitation	Education		Commercial		Place of worship		N/A	10 days
	1		1		2			
Maximum predicted noise level (at worst impacted receiver)								
Demobilisation and rehabilitation	81dB (L _{Aeq} (15 minutes))					81dB (L _{A1} (1 minutes))	10 days	

During the Yerong Creek Yard clearances work, the stage with the greatest impact is predicted to be demobilisation and rehabilitation activities. Night-time noise impacts from these works are expected to impact up to 74 residential receivers and generate sleep disturbance at approximately 74 properties. Four properties may be highly noise affected ($>75\text{dB } L_{Aeq}(15 \text{ minute})$).

5.2.1.4 THE ROCK YARD CLEARANCES

The construction activities considered for this enhancement site has assessed a worst-case scenario and include preliminary works, install new cabling/conduits, signalling works, cut gantry bolts, remove gantry, remove footings, backfill footings, demobilisation and rehabilitation, compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.13 summarises the identified noise impacts.

Table 5.13 Maximum predicted noise impacts—The Rock Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted residential exceedances							
Installation of cabling/conduits	160	258	258	258	0	258	1 day
Maximum predicted noise level (at worst impacted receiver)							
Installation of cabling/conduits	74dB (L_{Aeq} (15 minutes))					76dB (L_{A1} (1 minutes))	1 day

During The Rock Yard clearances work, the stage with the greatest impact is predicted to be the installation of cabling and conduits. Night-time noise impacts from these works are expected to impact up to 258 residential receivers and generate sleep disturbance at approximately 258 properties. No properties are predicted to be highly noise affected ($>75\text{dB } L_{Aeq}(15 \text{ minute})$). No non-residential receivers are predicted to experience exceedances of NMLs.

5.2.2 CONSTRUCTION TRAFFIC ASSESSMENT

During the construction phase of the proposal, heavy vehicles would be required for materials and equipment delivery, while light vehicles will transport workers to and from the site. This additional road traffic may impact receivers along the proposed transport routes.

The likely routes for these vehicles and proposal traffic numbers for each site are shown in Table 5.14.

Section 2.4.3 outlines that an increase in road traffic noise during construction of less than 2dB would generally be considered acceptable. This corresponds to an approximate increase in traffic of 60 per cent.

These calculations show that construction traffic associated with the Greater Hume –Lockhart work stages on public roads is likely to comply with the road traffic noise goals at most sites, with potential minor exceedances of ~1dB on the Olympic highway.

Noise management measures have been recommended in Chapter 8 to assist in minimising the potential for noise disturbance from construction traffic.

Table 5.14 Predicted construction traffic routes and numbers

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Greater Hume–Lockhart						
Culcairn Yard Clearance and pedestrian bridge						
Olympic Highway/Melville Street	Sub-arterial	58.8	61.0	Yes	Yes	Yes
Balfour Street	Sub-arterial	55.1	56.0	No	No	No
Railway Parade South	Arterial	53.4	54.7	No	No	No
Railway Parade North	Local	52.0	54.0	No	No	No
Henty Yard clearances						
Railway Parade (Olympic Highway)	Arterial	58.8	61.0	Yes	Yes	Yes
Sladen Street	Sub-arterial	42.1	46.4	No	Yes	No
Rosler Parade/Yankee Crossing Road	Local	39.0	46.2	No	Yes	No
Allan Street	Local	50.1	53.6	No	Yes	No
Ivor Street	Local	50.1	53.6	No	Yes	No
Yerong Creek clearances						
Olympic Highway/Cox Street	Arterial	59.5	61.3	Yes	No	No
Plunkett Street	Sub-arterial	42.1	46.4	No	Yes	No
Finlayson Lane	Local	40.1	46.5	No	Yes	No
The Rock Yard clearances						
Olympic Highway/Melville Street	Arterial	59.5	59.8	No	No	No
Urana Street	Sub-arterial	45.6	46.7	No	No	No

5.2.3 ROAD DETOURS

During work at the Sladen Street Level Crossing (Henty Yard clearances enhancement site), traffic will be diverted along Yankee Crossing Road and Allan Street.

Section 2.5.1 outlines that an increase in road traffic noise during construction of less than 2dB would generally be considered acceptable. This corresponds to an approximate increase in traffic of 60 per cent.

Quantitative increases in road traffic noise as a result of additional construction traffic have been calculated using spreadsheet CoRTN road noise calculations and presented in Table 5.15. Predictions assume residences are 20m from the corridor. Vehicle speeds of 40 km/hr on local, collector and arterial roads and 90 km/hr on highways and country roads have been assumed.

These calculations show that construction traffic associated with the diversion at this site is likely to comply with the road traffic noise goals at all sites.

Noise management measures have been recommended in Chapter 8 to assist in minimising the potential for noise disturbance from construction traffic.

Table 5.15 Predicted construction traffic routes and numbers

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Greater Hume/Lockhart						
Henty Diversion						
Rosler Parade/Yankee Crossing Road	Sub-arterial	27.3	34.7	No	Yes	No
Allan Street	Local	50.1	53.7	No	Yes	No

5.2.4 GREATER HUME–LOCKHART PRECINCT CONSTRUCTION NOISE SUMMARY

Construction work in this region is likely to generate moderate noise impacts, primarily in Culcairn, Henty and The Rock. Loudest activities are associated with cabling/conduit installation and drainage works. Up to nine properties are predicted to be highly noise affected (>75dB LAeq(15 minute)) at Henty. Sleep disturbance impacts have been predicted to occur during most night-time work stages, with up to 551 properties potentially experiencing sleep disturbance impacts, at Culcairn.

It is noted that noise levels within the work sites may be higher than OHS (Workcover) noise limits in close proximity to noisy equipment. It is assumed that access to these affected areas will be limited to approved personnel and that appropriate hearing protection will be worn. Construction noise may also exceed NMLs within these areas and potential impacts to non-construction staff and the public will need to be considered. It is assumed that public will be affected for short durations whilst passing construction areas, however impacts to staff exposed for longer periods will need to be managed in accordance with the NSW SafeWork [Code of Practice for managing noise and preventing hearing loss at work](#).

All construction noise impacts are temporary and confined to discrete periods. Generally, the longer duration works are undertaken during standard hours only and do not require track possessions; these works are typically quieter and less intrusive. Works undertaken during possessions are very short term, typically undertaken during standard and OOH work periods and are usually louder and more intrusive; however, there is usually a long respite period between these more intrusive works.

The identified impacts during site establishment and demobilisation are short term and, as such, are considered minor.

Noise impacts are predicted at a number of locations across several stages of construction, during standard (daytime) hours and OOH works periods. Noise management and mitigation measures would therefore be required to be implemented during construction of the proposal within the extent that is reasonable and feasible. Details of such noise mitigation are included in Chapter 8.

5.3 WAGGA WAGGA PRECINCT

5.3.1 CONSTRUCTION NOISE ASSESSMENT

The activities required for construction of the proposal within the Wagga Wagga precinct are identified and discussed for each enhancement site:

- Uranquinty Yard clearances
- Pearson Street bridge
- Cassidy Parade pedestrian bridge
- Edmonson Street Bridge
- Wagga Wagga Station pedestrian bridge
- Wagga Wagga Yard clearances
- Bomen Yard clearances.

Detailed noise level statistics are presented for the Wagga Wagga precinct enhancement sites in Appendix C-5. A brief summary of these findings is discussed in the following sections.

5.3.1.1 URANQUINTY YARD CLEARANCES

A range of activities is proposed for this enhancement site. The construction activities considered for this enhancement site include:

- track re-alignment preliminary works; offline widenings; drainage works and service relocation; track re-alignment; re-build track; demobilisation and rehabilitation; compound operation
- level crossing upgrade preliminary works; road diversions; signalling works; strip level crossing panels and remove track; install troughs; re-build rail; install level crossing panels; compound operation
- Sandy creek bridge preliminary works; crane pads; remove/install track; remove/install main line girders; blocks; cut abutment piers; compound operation.

The duration and schedule of work at this enhancement site is presented in Table 3.2.

TRACK RE-ALIGNMENT

Table 5.16 summarises the identified noise impacts.

Table 5.16 Maximum predicted noise impacts—Uranquinty Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Offline widenings	310	312	312	312	7	312	20 days
Number of predicted non-residential exceedances							
Offline widenings	Education	Commercial	Industrial	Place of worship	N/A	20 days	
	7	5	2	6			
Maximum predicted noise level (at worst impacted receiver)							
Offline widenings	76dB (LAeq (15 minutes))					76dB (LA1 (1 minutes))	20 days

During the Uranquinty Yard clearances work, the stage with the greatest impact is predicted to be offline widenings. Noise impacts from night-time works are expected to impact up to 312 residential receivers and generate sleep disturbance at approximately 312 properties. Seven properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

LEVEL CROSSING UPGRADE

Table 5.17 summarises the identified noise impacts.

Table 5.17 Maximum predicted noise impacts—Level crossing upgrade

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Preliminary works	235	281	281	281	0	281	5 days
Number of predicted non-residential exceedances							
Preliminary works	Education		Place of worship			N/A	5 days
	4		5				
Maximum predicted noise level (at worst impacted receiver)							
Preliminary works	71dB (L _{Aeq} (15 minutes))					73dB (L _{A1} (1 minutes))	5 days

During the level crossing upgrade, the stage with the greatest impact is predicted to be during preliminary activities. Night-time noise impacts from these works are expected to impact up to 281 residential receivers and generate sleep disturbance at approximately 281 properties. No properties are expected to be highly noise affected (>75dB L_{Aeq}(15 minute)).

SANDY CREEK BRIDGE

Table 5.18 summarises the identified noise and vibration impacts.

Table 5.18 Maximum predicted noise impacts—Sandy Creek Bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Trackworks	186	211	211	234	0	221	3 days
Number of predicted non-residential exceedances							
Trackworks	Place of worship					N/A	3 days
	2						
Maximum predicted noise level (at worst impacted receiver)							
Trackworks	68dB (L _{Aeq} (15 minutes))					71dB (L _{A1} (1 minutes))	3 days

During the Sandy Creek Bridge upgrade, the stage with the greatest impact is predicted to be trackworks. Night-time noise impacts from trackworks are expected to impact up to 211 residential receivers and generate sleep disturbance at approximately 221 properties. No properties are predicted to be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.3.1.2 PEARSON STREET BRIDGE

The construction activities considered for this enhancement site include preliminary works; earthworks; large scale piling; small scale piling; protection walls and drainage; track removal; re-build track; demobilisation and rehabilitation; compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.19 summarises the identified noise impacts.

Table 5.19 Maximum predicted noise impacts—Pearson Street bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Earthworks	580	1,798	1,925	2,424	8	1,798	5 days
Number of predicted non-residential exceedances							
Earthworks	Education	Medical	Commercial	Industrial	Active recreation	Place of worship	N/A 5 days
	18	4	5	40	9	2	
Maximum predicted noise level (at worst impacted receiver)							
Earthworks	82dB (L _{Aeq} (15 minutes))					84dB (L _{A1} (1 minutes))	5 days

During the Pearson Street bridge upgrade, the stage with the greatest impact is predicted to be during earthworks. Noise impacts from night-time earth works are expected to impact up to 2,424 residential receivers and generate sleep disturbance at approximately 1,798 properties. 8 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.3.1.3 CASSIDY PARADE PEDESTRIAN BRIDGE

The construction activities considered for this enhancement site include preliminary works; demolition; piling; concreting works; installation of screens, handrails, etc.; lifting of truss and deck; demobilisation and rehabilitation; compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.20 summarises the identified noise impacts.

Table 5.20 Maximum predicted noise impacts—Cassidy Parade pedestrian bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Demolition	366	1,769	1,846	1,959	16	1,408	5 days
Number of predicted non-residential exceedances							
Demolition	Education	Medical	Commercial	Place of worship	N/A	5 days	
	30	12	2	7			
Maximum predicted noise level (at worst impacted receiver)							
Demolition	100dB (L _{Aeq} (15 minutes))					100dB (L _{A1} (1 minutes))	5 days

During the Cassidy Parade pedestrian bridge upgrade, the stage with the greatest impact is predicted to be demolition activities. Noise impacts from night-time demolition works are expected to impact up to 1,959 residential receivers and generate sleep disturbance at approximately 1,408 properties. 16 properties are predicted to be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.3.1.4 EDMONDSON STREET BRIDGE

The construction activities considered for this enhancement site include preliminary works; service relocations; demolition; crane/piling pads; piling; retaining wall and abutments; install deck, slabs and planks; install furniture; infrastructure; asphaltting; compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.21 summarises the identified noise impacts.

Table 5.21 Maximum predicted noise impacts—Edmondson Street bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION	
Number of predicted residential exceedances								
Preliminary works	243	1,517	1,620	1,758	34	632	10 days	
Number of predicted non-residential exceedances								
Preliminary works	Education		Industrial		Place of worship		N/A	10 days
	27		7		2			
Maximum predicted noise level (at worst impacted receiver)								
Installation of decks	115dB (L _{Aeq} (15 minutes))					119dB (L _{A1} (1 minutes))	10 days	

During construction of the Edmondson Street bridge, the stage with the greatest impact is predicted to be preliminary works; however, demolition and installation of decks are also likely to be significant contributors to noise. Noise impacts from night-time preliminary works are expected to impact up to 1,758 residential receivers and generate sleep disturbance at approximately 632 properties. 34 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)), with noise levels up to 115dB predicted.

5.3.1.5 WAGGA WAGGA STATION PEDESTRIAN BRIDGE

The construction activities considered for this enhancement site include preliminary works; demolition; piling; concreting works; installation of screens, handrails, etc.; lifting of truss and deck; demobilisation and rehabilitation; compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.22 summarises the identified noise impacts.

Table 5.22 Maximum predicted noise impacts—Wagga Wagga Station pedestrian bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Demolition	177	1,219	1,298	1,368	8	324	5 days
Number of predicted non-residential exceedances							
Demolition	Education	Commercial	Industrial	Place of worship	N/A	5 days	
	20	10	5	1			
Maximum predicted noise level (at worst impacted receiver)							
Demolition	86dB (L _{Aeq} (15 minutes))					88dB (L _{A1} (1 minutes))	5 days

During the Wagga Wagga Station pedestrian bridge upgrade, the stage with the greatest impact is predicted to be demolition activities. Noise impacts from night-time demolition are expected to impact up to 1,368 residential receivers and generate sleep disturbance at approximately 324 properties. 8 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.3.1.6 WAGGA WAGGA YARD CLEARANCES

The construction activities considered for this enhancement site include preliminary works, offline widenings, drainage works and service relocation, track re-alignment, re-build track, demobilisation and rehabilitation, compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.23 summarises the identified noise impacts.

Table 5.23 Maximum predicted noise impacts—Wagga Wagga Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Offline widenings	349	682	791	1,635	31	791	20 days
Number of predicted non-residential exceedances							
Offline widenings	Education	Medical	Commercial	Industrial	Place of worship	N/A	20 days
	33	1	13	15	1		
Maximum predicted noise level (at worst impacted receiver)							
Offline widenings	86dB (LAeq (15 minutes))					86dB (LA1 (1 minutes))	20 days

During the Wagga Wagga Yard clearances work, the stage with the greatest impact is predicted to be offline widenings. Night-time noise impacts from these works are expected to impact up to 1,635 residential receivers and generate sleep disturbance at approximately 791 properties. 31 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

WAGGA WAGGA GANTRY WORKS

The construction activities considered for this enhancement site has assessed a worst-case scenario and include preliminary works; installation of cabling/ conduits; signalling works; removal of the gantry and footings; demobilisation; and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.22 summarises the identified noise impacts.

Table 5.24 Maximum predicted noise impacts—Wagga Wagga gantry removal

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Installation of cabling and conduits	90	177	198	666	2	228	5 days
Number of predicted non-residential exceedances							
Installation of cabling and conduits	Education		Commercial	Industrial		N/A	5 days
	5		3	5			
Maximum predicted noise level (at worst impacted receiver)							
Installation of cabling and conduits	77dB (L _{Aeq} (15 minutes))					79dB (L _{A1} (1 minutes))	5 days

During the Wagga Wagga gantry removal, the stage with the greatest impact is predicted to be the installation of cabling and conduits. Noise impacts from night-time installation of these conduits are expected to impact up to 666 residential receivers and generate sleep disturbance at approximately 228 properties. Two properties are expected to be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.3.1.7 BOMEN YARD CLEARANCES

The construction activities considered for this enhancement site include preliminary works; offline widenings; drainage works and service relocation; track re-alignment; re-build track; demobilisation and rehabilitation; and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.25 summarises the identified noise impacts.

Table 5.25 Maximum predicted noise impacts—Bomen Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Offline widenings	0	0	0	13	0	0	20 days
Number of predicted non-residential exceedances							
Offline widenings	Industrial					N/A	20 days
	3						
Maximum predicted noise level (at worst impacted receiver)							
Offline widenings	51dB (L _{Aeq} (15 minutes))					52dB (L _{A1} (1 minutes))	20 days

During the Bomen Yard clearances work, the stage with the greatest impact is predicted to be offline widenings. Noise impacts from night-time widening works are expected to impact up to 13 residential receivers. No properties are predicted to be highly noise affected (>75dB L_{Aeq}(15 minute)) or experience sleep disturbance impacts.

5.3.2 CONSTRUCTION TRAFFIC ASSESSMENT

During the construction phase of the proposal, heavy vehicles would be required for materials and equipment delivery, while light vehicles will transport workers to and from the site. This additional road traffic may impact receivers along the proposed transport routes. The likely routes for these vehicles and proposal traffic numbers for each site are shown in Table 5.26.

Section 2.5.1 outlines that an increase in road traffic noise during construction of less than 2dB would generally be considered acceptable. This corresponds to an approximate increase in traffic of 60 per cent. These calculations show that construction traffic associated with the Wagga Wagga work stages on public roads is likely to comply with the road traffic noise goals at all sites. Noise management measures have been recommended in Chapter 8 to assist in minimising the potential for noise disturbance from construction traffic.

Table 5.26 Predicted construction traffic routes and numbers

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Wagga Wagga Precinct						
Uranquinty Yard clearances						
Olympic Highway	Arterial	60.2	61.4	Yes	No	No
Uranquinty Street	Sub-arterial	39.2	44.2	No	Yes	No
Yarragundry Street	Sub-arterial	39.6	44.1	No	Yes	No
Hanging Rock Road	Local	37.1	46.4	No	Yes	No
Pearson Street bridge						
Edward Street (Sturt Highway)	Arterial	58.9	59.4	No	No	No
Moorong Street (Olympic Highway)	Arterial	63.6	64.0	Yes	No	No
Pearson Street	Sub-arterial	58.5	58.9	No	No	No
Urana Street	Sub-arterial	54.5	55.4	No	No	No
Cheshire Street	Local	49.2	51.5	No	Yes	No
Alan Turner Depot Access Road	Local	53.4	54.6	No	No	No
Fernleigh Road	Local	61.0	61.3	Yes	No	No
Wagga Wagga Station, Yard, Edmondson Street Bridge and Cassidy Parade Bridge						
Edward Street (Sturt Highway)	Arterial	60.2	61.1	Yes	No	No
Fox Street	Local	62.6	63.1	Yes	No	No
Mitchelmore Street	Sub-arterial	56.2	57.4	No	No	No
Edmondson Street	Sub-arterial	57.7	58.8	No	No	No
Norman Street	Local	62.2	62.6	Yes	No	No
Coleman Street	Sub-arterial	53.3	55.9	No	Yes	No
Cassidy Parade	Local	59.1	60.1	Yes	No	No
Erin Street	Local	51.9	55.4	Yes	Yes	Yes
Station Place	Local	49.3	53.7	No	Yes	No
Brookong Avenue	Local	57.6	59.4	Yes	No	No

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Bomen Yard clearances						
Olympic Highway	Arterial	60.2	61.4	Yes	No	No
Byrnes Road	Arterial	56.6	58.0	No	No	No
Merino Drive – between Olympic and Dorsett	Sub-arterial	45.9	49.0	No	Yes	No
Merino Drive – between Byrnes and Dorsett	Sub-arterial	55.7	57.3	No	No	No
East Bomen Road	Local	43.0	46.1	No	Yes	No

5.3.3 ROAD DETOURS

During work at the Edmondson Street bridge, traffic will be diverted along other local routes while the road is closed.

Section 2.5.1 outlines that an increase in road traffic noise during construction of less than 2dB would generally be considered acceptable. This corresponds to an approximate increase in traffic of 60 per cent.

Quantitative increases in road traffic noise as a result of additional construction traffic have been calculated using spreadsheet CoRTN road noise calculations and presented in Table 5.27. Predictions assume residences are 20 m from the centre of the road corridor. Vehicle speeds of 40km/hr on local, collector and arterial roads and 90 km/hr on highways and country roads have been assumed.

These calculations show that construction traffic associated with the diversion at this site is likely to generate road traffic noise greater than the targets for receivers within 20m of the affected roads along all routes.

Noise management measures have been recommended in Chapter 8 to assist in minimising the potential for noise disturbance from construction traffic.

Table 5.27 Predicted construction traffic routes and numbers

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Wagga Wagga						
Edmondson Street diversion						
Edward Street (Sturt Highway)	Arterial	60.2	63.6	Yes	Yes	Yes
Docker Street/Bourke Street	Sub-arterial	57.1	61.2	Yes	Yes	Yes
Urana Street	Sub-arterial	54.1	60.0	No	Yes	No
Macleay Street	Local	57.9	63.6	Yes	Yes	Yes
Railway Street	Local	57.9	63.6	Yes	Yes	Yes
Lake Albert Road	Sub-arterial	60.1	63.2	Yes	Yes	Yes

5.3.4 WAGGA WAGGA PRECINCT CONSTRUCTION NOISE SUMMARY

Construction noise levels are predicted to exceed relevant construction NMLs at residential receivers at all locations and during most work stages. Sleep disturbance impacts have been predicted to occur during most night-time work stages, with up to 2,890 properties potentially experiencing sleep disturbance impacts at the Pearson Street bridge. Up to 33 properties may be highly noise affected. All activities within the Wagga urban area are predicted to affect numerous properties.

All construction noise impacts are temporary and confined to discrete periods. Generally, the longer duration works are undertaken during standard hours only and do not require track possessions; these works are typically quieter and less intrusive. Works undertaken during possessions are very short term, typically undertaken during standard and OOH work periods and are usually louder and more intrusive; however, there is usually a long respite period between these more intrusive works.

It is noted that noise levels within the worksites may be higher than OHS (Workcover) noise limits in close proximity to noisy equipment. It is assumed that access to these affected areas will be limited to approved personnel and that appropriate hearing protection will be worn. Construction noise may also exceed NMLs within these areas and potential impacts to staff and the public will need to be considered. It is assumed that public will be affected for short durations whilst passing construction areas, however impacts to staff exposed for longer periods will need to be managed in accordance with the NSW SafeWork [Code of Practice for managing noise and preventing hearing loss at work](#).

Road diversions as a result of works at the Edmondson Street bridge would generate noise impacts along most roads within the diversion route.

Noise management and mitigation measures would be required to be implemented during construction of the proposal within the extent that is reasonable and feasible. Details of such noise mitigation are included in Chapter 8.

5.4 JUNEE PRECINCT

5.4.1 CONSTRUCTION NOISE ASSESSMENT

The activities required for construction of the proposal within the Wagga Wagga precinct are identified and discussed for each enhancement site:

- Harefield Yard clearances
- Kemp Street bridge
- Junee Station pedestrian bridge
- Junee Yard clearances
- Olympic Highway underbridge
- Junee to Illabo clearances
- Kemp Street bridge diversion roadworks.

Detailed noise level statistics are presented for the Junee precinct enhancement sites in Appendix C-7. A brief summary of these findings is discussed in the following sections.

5.4.1.1 HAREFIELD YARD CLEARANCES

The construction activities considered for this enhancement site include preliminary works; offline widenings; track re-alignment; re-build track; demobilisation and rehabilitation; and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.28 summarises the identified noise impacts.

Table 5.28 Maximum predicted noise impacts—Harefield Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Trackworks	5	5	5	5	2	5	60 hrs
Number of predicted non-residential exceedances							
Trackworks	Industrial					N/A	60 hrs
	3						
Maximum predicted noise level (at worst impacted receiver)							
Trackworks	79dB (L _{Aeq} (15 minutes))					82dB (L _{A1} (1 minutes))	60 hrs

During the Harefield Yard clearances work, the stage with the greatest impact is predicted to be trackworks. Noise impacts from night-time track works are expected to impact up to five residential receivers and generate sleep disturbance at approximately five properties. Two properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.4.1.2 KEMP STREET BRIDGE

The construction activities considered for this enhancement site include preliminary works; demolition and earthworks; piling; concreting works; lifting of truss and deck; installation of services, screens, etc.; asphaltting, demobilisation and rehabilitation; and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.29 summarises the identified noise impacts.

Table 5.29 Maximum predicted noise impacts—Kemp Street bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Demolition and earthworks	477	477	573	812	11	653	10 days
Number of predicted non-residential exceedances							
Preliminary works	Education		Place of worship			N/A	30 days
	7		2				
Maximum predicted noise level (at worst impacted receiver)							
Demolition and earthworks	105dB (LAeq (15 minutes))					110dB (LA1 (1 minutes))	10 days

During the Kemp Street bridge upgrade, the stage with the greatest impact is predicted to be earthworks. Noise impacts from night-time earthworks are expected to impact up to 812 residential receivers and generate sleep disturbance at approximately 653 properties. 11 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

KEMP STREET BRIDGE DIVERSION ROADWORKS

The construction activities considered for the Kemp Street bridge enhancement site diversion roadworks include preliminary works, earthworks, drainage and kerbs, asphaltting, line marking and demobilisation/rehabilitation. Table 5.30 summarises the identified noise impacts.

Table 5.30 Maximum predicted noise impacts—Kemp Street bridge diversion roadworks

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION	
Number of predicted residential exceedances								
Earthworks	446	446	566	863	12	210	20 days	
Number of predicted non-residential exceedances								
Earthworks	Education		Active recreation		Place of worship		N/A	20 days
	5		1		1			
Maximum predicted noise level (at worst impacted receiver)								
Earthworks	101dB (L _{Aeq} (15 minutes))					104dB (L _{A1} (1 minutes))	20 days	

During the Kemp Street bridge diversion roadworks, the stage with the greatest impact is predicted to be earthworks. Noise impacts from night-time earthworks are expected to impact up to 863 residential receivers and generate sleep disturbance at approximately 210 properties. 12 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.4.1.3 JUNEE STATION PEDESTRIAN BRIDGE/HAREFIELD GANTRY REPLACEMENT

The construction activities considered for this enhancement site include preliminary works, installing new cabling/conduits, signalling works, cut gantry bolts, remove gantry, remove footings, backfill footings, demobilisation and rehabilitation, compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.31 summarises the identified noise impacts.

Table 5.31 Maximum predicted noise impacts—Junee Station pedestrian bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION	
Number of predicted residential exceedances								
Installation of cabling and conduits	364	364	482	857	0	549	1 day	
Number of predicted non-residential exceedances								
Installation of cabling and conduits	Education		Active recreation		Place of worship		N/A	1 day
	5		1		1			
Maximum predicted noise level (at worst impacted receiver)								
Installation of cabling and conduits	74dB (L _{Aeq} (15 minutes))					77dB (L _{A1} (1 minutes))	1 day	

During the Junee Station pedestrian bridge upgrade, the stage with the greatest impact is predicted to be the installation of cabling and conduits. Night-time noise impacts from these works are expected to impact up to 857 residential receivers and generate sleep disturbance at approximately 549 properties. No properties are predicted to be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.4.1.4 JUNEE YARD CLEARANCES

The construction activities considered for this enhancement site include preliminary works; offline widenings; track re-alignment; re-build track; demobilisation and rehabilitation; and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.32 summarises the identified noise impacts.

Table 5.32 Maximum predicted noise impacts—Junee Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION	
Number of predicted residential exceedances								
Offline widenings	482	482	613	885	1	161	20 days	
Number of predicted non-residential exceedances								
Offline widenings	Education		Active recreation		Place of worship		N/A	20 days
	6		1		3			
Maximum predicted noise level (at worst impacted receiver)								
Offline widenings	77 dB (L _{Aeq} (15 minutes))					78dB (L _{A1} (1 minutes))	20 days	

During the Junee Yard clearances work, the stage with the greatest impact is predicted to be during offline widening activities. Noise impacts from this activity are expected to impact up to 885 residential receivers and generate sleep disturbance at approximately 161 properties. One property may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.4.1.5 OLYMPIC HIGHWAY UNDERBRIDGE

The construction activities considered for this enhancement site include preliminary works; track works; earthworks; structure works; concreting works; installation of screens, handrails, etc.; demobilisation and rehabilitation; and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.33 summarises the identified noise impacts.

Table 5.33 Maximum predicted noise impacts—Olympic Highway under-bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION	
Number of predicted residential exceedances								
Crane operations	1,007	1,007	1,023	1,103	68	1,075	4 days	
Number of predicted non-residential exceedances								
Crane operations	Education	Medical	Commercial	Industrial	Active recreation	Place of worship	N/A	4 days
	9	1	3	1	1	4		
Maximum predicted noise level (at worst impacted receiver)								
Crane operations	88dB (LAeq (15 minutes))					93dB (LA1 (1 minutes))	4 days	

During the Olympic Highway underbridge works, the stage with the greatest impact is predicted to be crane operations. Night-time noise impacts from these works are expected to impact up to 1,103 residential receivers and generate sleep disturbance at approximately 1,075 properties. 68 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.4.1.6 JUNEE TO ILLABO CLEARANCES

The construction activities considered for this enhancement site include preliminary works; offline widenings; track re-alignment; re-build track; demobilisation and rehabilitation; and compound operation. The duration and schedule of work at this enhancement site is presented in Table 3.2. Table 5.34 summarises the identified noise impacts.

Table 5.34 Maximum predicted noise impacts—Junee to Illabo clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted residential exceedances							
Preliminary works	54	54	54	54	53	54	15 days
Number of predicted non-residential exceedances							
Preliminary works	Education	Commercial	Industrial	Active recreation	N/A	15 days	
	9	1	15	2			
Maximum predicted noise level (at worst impacted receiver)							
Preliminary works	105dB (LAeq (15 minutes))					105dB (LA1 (1 minutes))	15 days

During the Junee to Illabo clearances work, the stage with the greatest impact is predicted to be during preliminary works. Night-time noise impacts from these works are expected to impact up to 54 residential receivers and generate sleep disturbance at approximately 54 properties. 53 properties may be highly noise affected (>75dB L_{Aeq}(15 minute)).

5.4.2 CONSTRUCTION TRAFFIC ASSESSMENT

During the construction phase of the proposal, heavy vehicles would be required for materials and equipment delivery while light vehicles will transport workers to and from the enhancement sites. This additional road traffic may impact receivers along the proposed transport routes.

The likely routes for these vehicles and proposal traffic numbers for each site are shown in Table 5.35.

Section 2.5.1 outlines that an increase in road traffic noise during construction of less than 2dB would generally be considered acceptable. This corresponds to an approximate increase in traffic of 60 per cent.

These calculations show that construction traffic associated with the Junee work stages on public roads is likely to comply with the road traffic noise goals at all sites.

Noise management measures have been recommended in Chapter 8 to assist in minimising the potential for noise disturbance from construction traffic.

Table 5.35 Predicted construction traffic routes and numbers

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Junee Precinct						
Harefield Yard clearances						
Harefield Road	Local	44.7	50.4	No	Yes	No
Byrnes Road	Arterial	59.7	60.9	Yes	No	No
Harefield Railway Access Road	Sub-arterial	35.6	44.8	No	Yes	No
Junee Station, Junee Yard and Kemp Street Bridge						
Olympic Highway (west of Seignior Street)	Arterial	57.6	59.0	No	No	No
Seignior Street	Sub-arterial	52.7	54.0	No	No	No
Broadway Street	Arterial	53.0	54.1	No	No	No
Olympic Highway Level Crossing	Sub-arterial	50.9	52.5	No	No	No
Humphrys Street	Sub-arterial	43.1	45.8	No	Yes	No
Main Street (Olympic Highway)	Sub-arterial	42.8	45.5	No	Yes	No
Lorne Street	Local	56.4	57.5	Yes	No	No
Hill Street	Local	51.1	53.3	No	Yes	No
Joffre Street	Local	41.7	45.4	No	Yes	No
Harold Street	Local	53.0	54.8	No	No	No

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Thomas Street	Local	40.5	45.0	No	Yes	No
Railway Lane	Local	40.2	43.9	No	Yes	No
Railway Parade	Local	40.2	43.9	No	Yes	No
William Street	Sub-arterial	39.6	44.2	No	Yes	No
Edgar Street	Arterial	47.3	49.5	No	Yes	No
Byrnes Road	Local	56.6	57.5	Yes	No	No
Pretoria Avenue	Local	40.5	45.0	No	Yes	No
Olympic Highway underbridge						
Main Street (Olympic Highway)	Arterial	54.3	57.6	No	Yes	No
Illabo Road	Local	46.0	50.0	No	Yes	No
Junee to Illabo clearances						
Olympic Highway	Arterial	54.3	58.1	No	Yes	No
Brabins Road	Local	34.2	49.7	No	Yes	No
Waterworks Road	Local	42.5	50.2	No	Yes	No
Marinna Station Cross Road	Local	34.2	49.7	No	Yes	No

5.4.3 ROAD DETOURS

During work at the Kemp Street bridge, traffic will be diverted along other local routes while the road is closed.

Section 2.5.1 outlines that an increase in road traffic noise during construction of less than 2dB would generally be considered acceptable. This corresponds to an approximate increase in traffic of 60 per cent.

These calculations show that construction traffic associated with the diversion at this site is not predicted to generate road traffic noise greater than the targets along most routes.

Noise management measures have been recommended in Chapter 8 to assist in minimising the potential for noise disturbance from construction traffic.

Table 5.36 Predicted construction traffic routes and numbers

TRAFFIC ROUTE	ROAD TYPE	PREDICTED CONSTRUCTION TRAFFIC NOISE (BOTH DIRECTIONS) LAeq (PERIOD)		EXCEED BASE CRITERION? 60dB LAeq (15 HOUR) *- ARTERIAL/SUB-ARTERIAL 55dB LAeq (9 HOUR) *- LOCAL YES / NO?	POTENTIAL INCREASE > 2dB YES/NO?	POTENTIAL NOISE IMPACT YES / NO?
		Existing	Existing and proposal			
Junee						
Kemp Street bridge						
Seignior Street	Arterial	52.7	57.3	No	Yes	No
Olympic Highway Level Crossing	Arterial	50.9	56.2	No	Yes	No
Humphrys Street	Sub-arterial	43.1	50.5	No	Yes	No
Lorne Street	Sub-arterial	36.9	37.7	No	No	No
Joffre Street	Local	41.7	50.8	No	Yes	No
Harold Street	Local	53.0	55.0	No	No	No
Thomas Street	Local	40.5	45.3	No	Yes	No
William Street	Sub-arterial	39.6	47.7	No	Yes	No
Pretoria Avenue	Local	40.5	50.7	No	Yes	No

5.4.4 JUNEE PRECINCT CONSTRUCTION NOISE SUMMARY

Construction noise levels are predicted to affect substantial areas of Junee through most construction stages. The loudest activities are associated with works at the Olympic Highway underbridge where up to 1,171 properties may be affected during night-time hours. Up to 68 properties are predicted to be highly noise affected (>75dB LAeq(15 minute)). Several receivers along the Junee to Illabo and Kemp Street bridge sites are located in very close proximity to the proposed work area and may be exposed to noise levels in excess of 100dB.

It is noted that noise levels within the station and yards may be higher than OHS (Workcover) noise limits in close proximity to noisy equipment. It is assumed that access to these affected areas will be limited to approved personnel and that appropriate hearing protection will be worn. Construction noise may also exceed NMLs within these areas and potential impacts to staff and the public will need to be considered. It is assumed that public will be affected for short durations whilst passing construction areas, however impacts to staff exposed for longer periods will need to be managed in accordance with the NSW SafeWork [Code of Practice for managing noise and preventing hearing loss at work](#).

All construction noise impacts are temporary and confined to discrete periods. Generally, the longer duration works are undertaken during standard hours only and do not require track possessions, these works are typically quieter and less intrusive. Works undertaken during possessions are very short term, typically undertaken during standard and OOH work periods, and are usually louder and more intrusive; however, there is usually a long respite period between these more intrusive works.

The identified impacts during site establishment and demobilisation are short term and, as such, are considered minor.

Road diversions as a result of works at the Kemp Street bridge may generate noise impacts along most roads within the diversion route. The relevant construction NMLs are predicted to be exceeded at a number of locations across several stages of construction, during standard (daytime) hours and OOH works periods. Noise management and mitigation measures would therefore be required to be implemented during construction of the proposal within the extent that is reasonable and feasible. Details of such noise mitigation are included in Chapter 8.

5.5 PROPOSED SENSITIVE RECEIVERS

It is understood that the Locomotive Hotel at Junee is intending to construct 8 accommodation units prior to the completion of construction works. These facilities have been included in the assessment at Kemp Street Bridge. No other proposed sensitive receivers were identified within the affectation area of the proposal.

5.6 VIBRATION

5.6.1 OVERVIEW

Vibration-generating equipment is required for certain construction activities, such as compacting and piling, and vibration can also be emitted from other plant and machinery conducting standard construction work practices. The resultant level of vibration that could be experienced at a sensitive receiver is dependent on the complex interaction of the level of vibration emission; the dominant frequencies of vibration; the propagation of vibration within the surrounding ground conditions; and the transmission of vibration within the receiving buildings and structures.

To inform this study, a screening assessment of ground-borne vibration has been undertaken to identify the likely sources of vibration and the likely levels of ground-borne vibration at the sensitive receivers. To advise on the management of potential vibration impacts, safe working distances are nominated for construction plant to identify the minimum distances between sources of vibration and nearby sensitive receivers to reduce the risk of vibration-induced impacts.

The CNVG provides safe working distances for vibration-intensive plant that is commonly used for the construction of transport infrastructure projects. The recommended safe working distances from the CNVG are detailed in Table 5.37.

Table 5.37 Recommended safe working distances—construction vibration

PLANT ITEM	RATING / DESCRIPTION	MINIMUM SAFE WORKING DISTANCE (m) ^a	
		Cosmetic damage	Human response
Vibrator roller	<50kN (Typically 1–2 tonnes)	5m	15m to 20m
	<100kN (Typically 2–4 tonnes)	6m	20m
	<200kN (Typically 4–6 tonnes)	12m	40m
	<300kN (Typically 7–13 tonnes)	15m	100m
	>300kN (> 18 tonnes)	25m	100m
Small hydraulic hammer	300kg (5–12 tonne excavator)	2m	7m
Medium hydraulic hammer	900kg (12–18 tonnes excavator)	7m	23m
Large hydraulic hammer	1,600kg (18–34 tonne excavator)	22m	73m
Vibratory pile driver	Sheet piles	2m to 20m	20m
Pile boring	≤ 800mm	2m	4m
Jackhammer	Handheld	1m	2m

Source: Roads and Maritime Services, *Construction Noise and Vibration Guideline*, 2016.

The CNVG safe working distances in Table 5.37 are nominated to meet the human comfort management levels based on criteria for continuous sources of vibration. The construction works for the proposal are expected to require the intermittent use of piling equipment and vibratory compacting (rolling) plant, both of which can be vibration-intensive sources.

To supplement the CNVG recommendations, vibration levels were calculated using theoretical and empirical relationships to refine the recommended safe working distances for key sources of vibration. Referencing British Standard BS 5228-2:2009, vibration levels were calculated based on:

- a conservative approach to vibration emissions, e.g. selecting the upper threshold of elements such as:
 - maximum amplitude of drum vibration and the size (width) of the roller drum (vibratory compaction)
- single figure vibration levels based on direct distance between the source and receivers
- a crest factor of four when determining root mean square (rms) vibration levels from peak vibration levels
- no allowance for a reduction to forecast vibration levels for coupling loss at the receiver buildings—this is a conservative approach.

The calculated vibration levels were assessed as the PPV level for assessment of structural damage impacts and the PPV levels were also used to estimate VDV levels to evaluate the potential for human comfort impacts (disturbance). Most of the proposed construction works are expected to occur outside of the standard construction hours. The night-time period, when vibration management levels are lowest (most stringent), has determined the recommended safe working distances and other vibration management measures.

5.6.2 ASSESSMENT OF VIBRATION

5.6.2.1 IMPACTS TO HUMAN COMFORT

The VDV levels were estimated based on the calculated vibration emissions for the piling and compacting plant. The VDV level includes the duration of vibration generating events, in lieu of the known durations it was assumed that works could occur for 10 hours out of the 12-hour 6.00am to 6.00pm daytime period and six hours during the out of hours 10.00pm to 7.00am night-time period. The assumption makes reasonable allowance for respite periods in vibration intensive works or the works to be undertaken at increasing distance from individual sensitive receivers.

The estimated VDV results are detailed in Table 5.38 as the minimum recommended off-set distance required to meet the vibration management levels at sensitive residential dwellings.

Table 5.38 Screening assessment of ground-borne vibration levels

CONSTRUCTION PLANT	ESTIMATED SAFE WORKING DISTANCE FOR HUMAN COMFORT	
	Daytime 0.2m/s ^{1.75}	Night-time 0.13m/s ^{1.75}
Vibratory piling	115m	150m
Vibratory compaction	100m	120m
Vibratory compaction (start-up/shut down)	180m	230m

The empirical relationships are primarily for vibration levels within approximately 100m of the source and the nominated safe working distances for vibratory piling, for example, are large due to conservatism in the relationships. The recommended safe working distances will need to be validated during detailed design and construction.

The vibration generating construction works at the enhancement site shall be temporary and the level of vibration, and any potential impact, shall only occur for a relatively short period of time. Furthermore, as works progress along the proposal the vibration intensive activities shall be undertaken at increasing distance from individual receivers and the level of vibration and potential for impact would decrease.

Whilst the assessment has ascertained the level of impact in relation to individual sensitive receivers, it is expected that construction vibration management would be developed to ameliorate impacts at groups of receivers adjacent to the works. Mitigation measures would remain in place until the works were completed or until the vibration intensive works were undertaken at a distance from sensitive receivers that would be sufficient to minimise potential impacts.

Where ground-borne vibration levels meet the vibration management criteria there can still be potential for construction works to result in perceptible levels of ground-borne vibration at sensitive receivers. The recommended construction noise and vibration management measures in Chapter 8 include approaches to manage the potential for impacts beyond achieving the assessment criteria.

5.6.2.2 IMPACTS TO BUILDINGS AND STRUCTURES

The PPV vibration levels have been applied to nominate safe working distances based on the stringent criteria adopted for managing potential cosmetic structural damage impacts to buildings and structures. Consistent with the assessment of impacts to human comfort, safe working distances have been calculated for the vibration intensive activities with safe working distances for other construction plant adopted from the CNVG.

The estimated safe working distances to manage potential ground-borne vibration impacts to residential property and sites of heritage significance are detailed in Table 5.39. People are more sensitive to vibration than structures—the safe working distances to manage potential structural damage impacts are lower than the safe working distances to manage human comfort impacts.

Table 5.39 Estimated safe working distances for structural damage

CONSTRUCTION PLANT	ESTIMATED SAFE WORKING DISTANCE FOR COSMETIC STRUCTURAL DAMAGE	
	Sensitive receivers 5mm/s	Heritage sites 3mm/s
Vibratory piling	10	15
Vibratory compaction	10	15
Vibratory compaction (start-up/ shut down)	15	20

5.6.2.3 VIBRATION ASSESSMENT

Applying the safe working distances, the number of identified sensitive receiver buildings and sites of heritage significance within the recommended off-set distance are detailed in Table 5.40. These sites are presented graphically in Appendix E. It is noted that some of these items are scheduled for demolition as part of the proposal, as such the number of vibration sensitive structures that may be impacted is marginally lower than these predictions.

Table 5.40 Receivers within safe working distances for ground vibration (human comfort and cosmetic damage)

CONSTRUCTION PLANT	NUMBER OF RECEIVERS WITHIN THE ESTIMATED SAFE WORKING DISTANCES			APPROXIMATE DURATION (DAYS)	
	Structural cosmetic damage		Human comfort		
	Sensitive receivers (>5mm/s)	Heritage (>3mm/s)	Residences	Day	Night
Albury precinct					
Murray River bridge					
Vibratory compaction	0	1	28	5	–
Vibratory compaction (start-up)	0	1	74	Short term (Daily)	
Albury Station pedestrian bridge					
Vibratory compaction	0	5	21	5	–
Vibratory compaction (start-up)	0	5	196	Short term (daily)	
Albury Station pedestrian bridge (eastern bridge)					
Vibratory compaction	3	1	37	5	–
Vibratory compaction (start-up)	4	1	107	Short term (daily)	
Albury Yard clearances (track re-alignment)					
Vibratory compaction	0	15	6	17	1
Vibratory compaction (start-up)	0	16	232	Short term (daily)	
Albury Yard clearances (gantry works)					
Vibratory compaction	0	15	0	-	1
Vibratory compaction (start-up)	0	16	56	Short term (Daily)	
Riverina Highway bridge					
Vibratory compaction	0	0	6	20	1
Vibratory compaction (start-up)	0	0	93	Short term (Daily)	
Billy Hughes bridge					
Vibratory compaction	0	0	0	20	2
Vibratory compaction (start-up)	0	0	0	Short term (Daily)	
Table Top Yard clearances					
Vibratory compaction	0	0	0	<15 ¹	<15 ¹
Vibratory compaction (start-up)	0	0	0	Short term (Daily)	

CONSTRUCTION PLANT	NUMBER OF RECEIVERS WITHIN THE ESTIMATED SAFE WORKING DISTANCES			APPROXIMATE DURATION (DAYS)	
	Structural cosmetic damage		Human comfort		
	Sensitive receivers (>5mm/s)	Heritage (>3mm/s)	Residences	Day	Night
Greater Hume–Lockhart precinct					
Culcairn Yard clearances					
Vibratory compaction	0	11	37	20	-
Vibratory compaction (start-up)	0	12	133	Short term (Daily)	
Culcairn Yard clearances (level crossing)					
Vibratory compaction	0	11	6	1	1
Vibratory compaction (start-up)	0	12	41	Short term (Daily)	
Henty Yard clearances					
Vibratory compaction	0	5	47	15	1
Vibratory compaction (start-up)	1	5	176	Short term (Daily)	
Henty Yard clearances (level crossing)					
Vibratory compaction	0	5	15	1	1
Vibratory compaction (start-up)	0	5	62	Short term (Daily)	
Yerong Creek Yard clearances					
Vibratory compaction	0	0	15	15	1
Vibratory compaction (start-up)	0	0	35	Short term (Daily)	
Yerong Creek Yard clearances (level crossing)					
Vibratory compaction	0	0	3	1	1
Vibratory compaction (start-up)	0	0	26	Short term (Daily)	
The Rock Yard clearances					
Vibratory compaction	0	1	9	1	–
Vibratory compaction (start-up)	0	1	38	Short term (Daily)	
Wagga Wagga					
Uranquinty Yard clearances					
Vibratory compaction	0	4	48	15	1
Vibratory compaction (start-up)	0	5	153	Short term (Daily)	

CONSTRUCTION PLANT	NUMBER OF RECEIVERS WITHIN THE ESTIMATED SAFE WORKING DISTANCES			APPROXIMATE DURATION (DAYS)	
	Structural cosmetic damage		Human comfort		
	Sensitive receivers (>5mm/s)	Heritage (>3mm/s)	Residences	Day	Night
Pearson Street bridge					
Vibratory compaction	0	3	53	12	12
Vibratory compaction (start-up)	0	3	174	Short term (Daily)	
Cassidy Parade pedestrian bridge					
Vibratory compaction	1	10	58	5	–
Vibratory compaction (start-up)	1	14	178	Short term (Daily)	
Edmondson Street bridge					
Vibratory compaction	9	21	93	25	1
Vibratory compaction (start-up)	11	32	192	Short term (Daily)	
Wagga Wagga Station pedestrian bridge					
Vibratory compaction	0	9	46	5	–
Vibratory compaction (start-up)	0	17	135	Short term (Daily)	
Wagga Wagga Yard clearances (gantry removal)					
Vibratory compaction	0	18	47	20	1
Vibratory compaction (start-up)	0	28	138	Short term (Daily)	
Wagga Wagga Yard clearances (track re-alignment)					
Vibratory compaction	0	18	113	15	1
Vibratory compaction (start-up)	0	28	296	Short term (Daily)	
Wagga Gantry Removal (Western)					
Vibratory compaction	0	0	24	-	1
Vibratory compaction (start-up)	0	0	95	Short term (Daily)	
Bomen Yard clearances (track re-alignment)					
Vibratory compaction	0	0	0	20	1
Vibratory compaction (start-up)	0	0	0	Short term (Daily)	
Junee					
Harefield Yard clearances (track re-alignment)					
Vibratory compaction	0	0	2	5	1
Vibratory compaction (start-up)	0	0	3	Short term (Daily)	

CONSTRUCTION PLANT	NUMBER OF RECEIVERS WITHIN THE ESTIMATED SAFE WORKING DISTANCES			APPROXIMATE DURATION (DAYS)	
	Structural cosmetic damage		Human comfort		
	Sensitive receivers (>5mm/s)	Heritage (>3mm/s)	Residences	Day	Night
Harefield Yard clearances (gantry removal)					
Vibratory compaction	0	0	0	–	1
Vibratory compaction (start-up)	0	0	0	Short term (Daily)	
Kemp Street bridge					
Vibratory compaction	21	1	90	20	5
Vibratory compaction (start-up)	25	1	193	Short term (Daily)	
Junee Station pedestrian bridge					
Vibratory compaction	0	4	15	5	–
Vibratory compaction (start-up)	0	5	52	Short term (Daily)	
Junee Yard clearances					
Vibratory compaction	0	4	26	3	2
Vibratory compaction (start-up)	0	5	103	Short term (Daily)	
Olympic Highway underbridge					
Vibratory compaction	0	0	125	10	–
Vibratory compaction (start-up)	15	0	280	Short term (Daily)	
Junee to Illabo clearances					
Vibratory compaction	0	0	12	23	2
Vibratory compaction (start-up)	0	0	26	Short term (Daily)	

(1) Detailed scheduling was not available for this enhancement site at the time this document was prepared

5.6.2.4 IMPACTS TO HERITAGE STRUCTURES

BS 7385 states that ‘a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive’ and, therefore, items should not be assumed to be sensitive to vibration on the basis of being classified a heritage item alone.

The assessment above identifies approximately 300 heritage structures in total that have been identified adjacent to the enhancement sites across the proposal. A summary of the results by precinct are provided below:

- Albury precinct: up to 16 heritage structures have been identified that could be exposed to vibration levels in excess of 3mm/s PPV during vibratory work at the highest impact enhancement site. The highest number of potentially affected receivers are adjacent to the Albury Station pedestrian bridge and Albury Yard clearances, where vibration resulting from vibratory piling and vibratory compaction could result in potential exceedances of criteria; however, many of these items are light industrial or rail infrastructure (such as signal sheds or station buildings) and would

typically be exposed and resilient to, high vibration levels on a daily basis. Further consideration of the vibration sensitivity of identified items would be required as part of the development of a CNVMP.

- Greater Hume–Lockhart precinct: up to 12 heritage structures have been identified that could be exposed to vibration levels in excess of 3 mm/s PPV during vibratory work at the highest impact enhancement site. The highest number of potentially affected receivers are adjacent to the Culcairn Yard clearances, where vibration resulting from vibratory compaction could result in potential exceedances of criteria at the station building and platform. It is noted that these items are subject to existing, regular vibration from passing trains and are likely to be vibration insensitive. In addition, Station House may be impacted and further consideration of the vibration sensitivity of identified items would be required as part of the development of a CNVMP.
- Wagga Wagga precinct: up to 32 heritage structures have been identified that could be exposed to vibration levels in excess of 3mm/s PPV during vibratory work at the highest impact enhancement site. The highest number of potentially affected receivers are adjacent to the Edmondson Street bridge, where impacts may be noted at private residences and the South Wagga public school. Properties have also been identified within the safe working distances at the Cassidy Parade pedestrian bridge and Wagga Wagga Yard clearances, where vibration resulting from vibratory piling and vibratory compaction could result in potential exceedances of criteria. Identified ground vibration impacts within Wagga are located within the Wagga Wagga conservation area—this area ensures that development proceeds in a manner that complements the existing heritage nature of the area and does not necessarily imply that all items are old or susceptible to vibration. Further consideration of the vibration sensitivity of identified items would be required as part of the development of a CNVMP.
- Junee precinct: up to five heritage structures have been identified that could be exposed to vibration levels in excess of 3mm/s PPV during vibratory work at the highest impacted enhancement site. The highest number of potentially affected receivers are adjacent to the Junee Station pedestrian bridge and Junee Yard clearances and include the train station buildings and the Junee Tennis Club, where vibration resulting from vibratory compaction could result in potential exceedances of criteria.

Figures and tables that indicate the location of the heritage receivers that are potentially impacted by vibration intensive works are provided in Appendix E. Reference was made to the Technical paper 3 – Non-Aboriginal heritage, however at the time this assessment was prepared, the actual vibration sensitivity of each heritage item was unable to be determined. Management measures to minimise any vibration risks have been provided in Chapter 8. These include the requirement for additional study to determine the vibration sensitivity of each item identified within these minimum safe working distances.

5.6.2.5 IMPACTS TO ROAD INFRASTRUCTURE AND UTILITIES

Several enhancement sites involve work near existing road infrastructure and utilities. Road infrastructure is designed to carry passenger and heavy vehicles and is subject to very high loads and vibration forces (particularly around road surface discontinuities) on a daily basis from its use. The infrastructure itself was most likely exposed to very high levels of vibration during its own construction (such as from piling, vibratory compactors, etc.). Except for track lowering works, it is unlikely that vibration from the construction of the rail infrastructure for the proposal, which uses similar construction equipment, would pose any further risk to damage of the road infrastructure, than the construction, maintenance and use of the road infrastructure would pose. Vibratory piling and compaction is proposed as part of track lowering works with potential for vibration impacts to the road bridges at the Riverina Highway bridge, Billy Hughes bridge and Pearson Street bridge as outlined in Table 5.41.

Table 5.41 Road infrastructure near track lowering enhancement sites

ENHANCEMENT SITE	ROAD
Riverina Highway bridge	Riverina Highway bridge over the track lowering.
Billy Hughes bridge	Wagga Road (Billy Hughes bridge) over the track lowering.
Pearson Street bridge	Pearson Street bridge over the track lowering.

Guideline values for setback distances from vibratory piling and vibratory compaction to achieve the most stringent criteria of 50mm/s PPV at vibration sensitive structures and utilities, as outlined in section 2.6.3, are provided as follows:

- Vibratory piling: 5 to 7m
- Vibratory compaction: avoid contact with structure

Should the vibration-intensive works noted above occur within the distances noted from road related infrastructure or utilities, further consultation with the asset owner will need to be undertaken to determine if there will be an actual impact, and if so the appropriate management of the construction activity shall be determined. This may include the conducting of Building Conditions Assessments and/or real time vibration monitoring. Where potential impacts are identified, the adoption of alternative construction methods may be required.

5.6.3 GROUND-BORNE NOISE

Vibration from construction activities can cause secondary ground-borne noise related impacts within nearby properties. Ground-borne noise is usually only an issue where the ground-borne noise level is sufficiently high to be clearly audible above the airborne construction noise or other ambient sound within the room; this typically occurs for underground tunnelling works or where works are significantly shielded from airborne noise (such as within a deep cutting).

To assess the potential for ground-borne noise impacts, the vibration levels for the piling and compacting plant were referenced to calculate potential internal ground-borne noise levels within property. The calculation adopted:

- a vibration to sound pressure conversion factor of -32dB¹
- example reference spectra² for vibration-intensive plant to determine an A-weighted ground-borne noise level
- a geometric attenuation coefficient of 0.5 for the radiation of surface waves and a damping ratio of 0.05 (5%) for the damping effect of the surrounding ground conditions upon the vibration energy
- no coupling loss between the ground the receiver building structure was allowed for. This is a conservative approach
- no floor amplification effects or floor to floor losses within the receiver buildings.

Based solely on the ground-borne noise levels, safe working distances have been nominated to meet the adopted night-time ground-borne noise management levels. Further assessment was then undertaken by comparing the potential airborne construction noise levels and the internal ground-borne noise levels to ascertain whether the construction noise experienced within properties would mask the ground-borne noise component. These calculations considered a 15dB reduction from the external predicted noise level to the potentially most affected point in each building. This accounts for a 5dB reduction from the front façade to rear façade of each building and a 10dB reduction from external to internal areas of the building (in accordance with the ICNG methodology). Where the predicted internal airborne noise level is below 45dB, ground borne noise may be audible and generate impacts at that residential receiver.

Based on the calculated ground-borne noise levels for piling and compaction works, the safe working distances for ground-borne noise for these vibration-intensive works are detailed in Figure 5.1.

¹ Acoustics and Noise Consultants, Guideline “Measurement & Assessment of Groundborne Noise & Vibration”, 2nd Edition 2012.

² Measurement and prediction of construction vibration affecting sensitive laboratories. Burgemeister, Fisher & Franklin, Proceedings of Acoustics 2011.

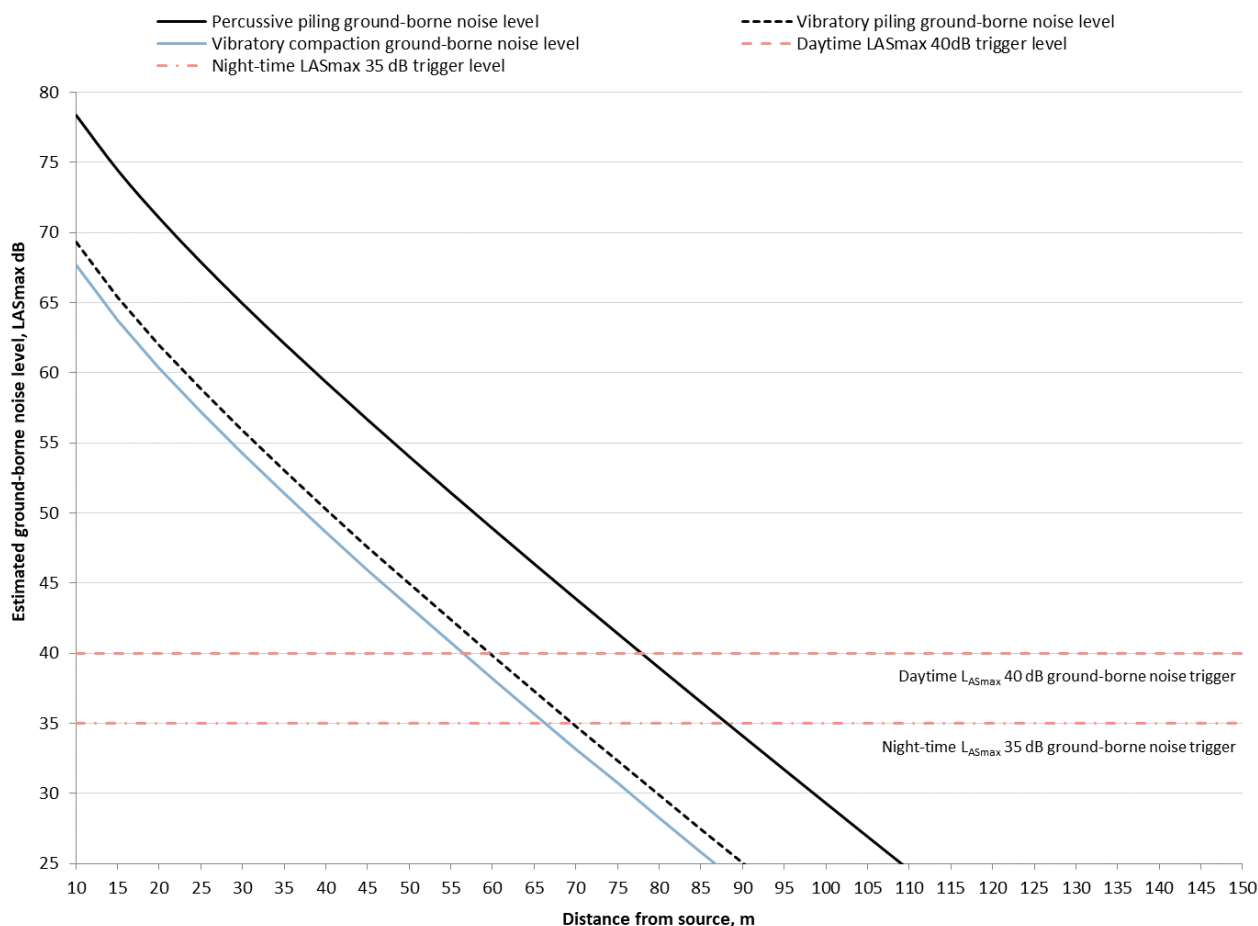


Figure 5.1 Calculated ground-borne noise levels from construction

Applying the safe working distances, the number of identified sensitive receivers within the recommended off-set distances for ground-borne noise are detailed in Table 5.42.

Table 5.42 Receivers within safe working distances for ground borne noise

PLANT	AMENITY – RESIDENCES			
	Night-time safe working distance (m)	Number of receivers within safe working distance	Distance to nearest receiver (m)	Internal air-borne noise level at worst impacted receiver <45dB (Yes/No)
Albury precinct				
Murray River bridge				
Vibratory compaction	65	8	16	No (complies)
Albury Station pedestrian bridge				
Vibratory compaction	65	0	N/A	N/A
Albury Yard clearances (track re-alignment)				
Vibratory compaction	65	0	N/A	N/A
Albury Yard clearances (gantry)				
Vibratory compaction	65	0	N/A	N/A

PLANT	AMENITY – RESIDENCES			
	Night-time safe working distance (m)	Number of receivers within safe working distance	Distance to nearest receiver (m)	Internal air-borne noise level at worst impacted receiver <45dB (Yes/No)
Riverina Highway bridge				
Vibratory compaction	65	3	77	No (complies)
Billy Hughes bridge				
Vibratory compaction	65	0	N/A	N/A
Table Top Yard clearances				
Vibratory compaction	65	0	N/A	N/A
Greater Hume–Lockhart precinct				
Culcairn Yard clearances (track re-alignment)				
Vibratory compaction	65	10	73	No (complies)
Culcairn Yard clearances (level crossing)				
Vibratory compaction	65	0	N/A	N/A
Henty Yard clearances (track re-alignment)				
Vibratory compaction	65	19	21	No (complies)
Henty Yard clearances (level crossing)				
Vibratory compaction	65	4	41	No (complies)
Yerong Creek Yard clearances (track re-alignment)				
Vibratory compaction	65	8	51	No (complies)
Yerong Creek Yard clearances (level crossing)				
Vibratory compaction	65	2	36	No (complies)
The Rock Yard clearances				
Vibratory compaction	65	2	40	No (complies)
Wagga Wagga precinct				
Uranquinty Yard clearances				
Vibratory compaction	65	8	66	No (complies)
Uranquinty Yard clearances (Sandy Creek Bridge)				
Vibratory compaction	65	0	N/A	N/A
Uranquinty Yard clearances (level crossing)				
Vibratory compaction	65	1	55	No (complies)
Pearson Street bridge				
Vibratory compaction	65	22	60	No (complies)

PLANT	AMENITY – RESIDENCES			
	Night-time safe working distance (m)	Number of receivers within safe working distance	Distance to nearest receiver (m)	Internal air-borne noise level at worst impacted receiver <45dB (Yes/No)
Cassidy Parade pedestrian bridge				
Vibratory compaction	65	21	9	No (complies)
Edmondson Street bridge				
Vibratory compaction	65	48	3	No (complies)
Wagga Wagga Station pedestrian bridge				
Vibratory compaction	65	20	18	No (complies)
Wagga Wagga Yard clearances				
Vibratory compaction	65	52	36	No (complies)
Bomen Yard clearances (level crossing)				
Vibratory compaction	65	0	N/A	N/A
Bomen Yard clearances				
Vibratory compaction	65	0	N/A	N/A
June				
Harefield Yard clearances (track re-alignment)				
Vibratory compaction	65	2	41	No (complies)
Harefield Yard clearances (gantry)				
Vibratory compaction	65	0	N/A	N/A
Kemp Street bridge				
Vibratory compaction	65	43	10	No (complies)
June Station pedestrian bridge				
Vibratory compaction	65	8	32	No (complies)
June Yard clearances				
Vibratory compaction	65	5	33	No (complies)
Olympic Highway underbridge				
Vibratory compaction	65	58	32	No (complies)
June to Illabo clearances				
Vibratory compaction	65	6	46	No (complies)

The predicted airborne construction noise levels are expected to be the primary contribution to noise levels at the nearest facades and rooms of sensitive receivers' buildings, particularly where windows are open for ventilation. Table 5.42 indicates that numerous properties may experience ground-borne noise levels in excess of 65dB; however, in all cases, this would not be audible due to masking by higher levels of air-borne noise.

This does not preclude the potential for impacts where air-borne noise is reduced by a substantial margin. This may occur in properties with substantial noise mitigation or in other rooms well screened from air-borne noise. As such, there is potential for perceptible ground-borne noise even where the assessment criteria for ground-borne noise are met.

It is expected that a combination of the safe working distances and the vibration management and mitigation measures discussed in Chapter 8 would support the feasible and reasonable control of ground-borne noise and associated impacts.

6 OPERATIONAL NOISE ASSESSMENT

6.1 RAIL TRAFFIC NOISE

Assessment of operational rail traffic noise and vibration is not part of the scope of this report. For information on operational noise and vibration refer to Technical Paper 7—Operational noise and vibration (rail).

6.2 ROAD TRAFFIC NOISE

6.2.1 ASSESSMENT OF PREDICTED OPERATIONAL NOISE LEVELS

Changes to the road network have been proposed for several locations. These changes include realignment and modification at the Edmondson Street bridge site in Wagga Wagga and the Kemp Street bridge site in Junee.

Changes to the operational road traffic noise emissions as a result of road bridge upgrades at the Edmondson Street bridge and Kemp Street bridge enhancement sites were quantitatively assessed. The results of noise modelling, without noise mitigation, are summarised for the most impacted properties (i.e. the properties with the highest predicted road traffic noise levels) in Table 6.1.

The results show that noise levels are predicted to reduce at properties immediately adjacent to Edmondson Street bridge and Kemp Street bridge as a result of the proposed bridge upgrades. Although the increase in bridge heights reduces the extent of noise absorbed by the ground for receivers close to the alignment, this loss is negligible due to the short distances to these receivers. The noise reduction predicted for these close receivers is primarily due to a result of acoustic screening that is provided by the bridge decks as the bridge is raised at these locations.

A small increase is predicted for receivers located at further distances from the bridges, including Kildare College. The increased height of the road alignment has reduced the level of noise screening provided by local buildings and structures, resulting in the increased transmission of road traffic noise. However, as all these increases are below the permissible 2.1dBA increase they are unlikely to be noticeable and do not require mitigation.

Noise levels at all road upgrade locations are predicted to be reduced or increase by less than 2.1dB at all noise sensitive receiver locations and, as such, noise impacts are unlikely to be noticeable. It is also noted that safety barriers were not included on either bridge, however these would provide additional screening of road traffic noise. No further assessment or consideration of noise mitigation as part of the road upgrades is therefore required.

Table 6.1 Summary of operational road noise modelling results

ADDRESS	RECEIVER ID	PREDICTED PROPOSAL TRAFFIC NOISE LEVEL DBA				PREDICTED INCREASE IN ROAD TRAFFIC NOISE DBA	
		No proposal Day L _{Aeq} (15 hour)	No proposal Night L _{Aeq} (9 hour)	Proposal Day L _{Aeq} (15 hour)	Proposal Night L _{Aeq} (9 hour)	Day L _{Aeq} (15 hour)	Night L _{Aeq} (9 hour)
Wagga Wagga Precinct							
Edmondson Street bridge							
1 Edmondson Street	26637	64.6	61.1	64.3	60.9	-0.3	-0.2
2 Donnelly Avenue	35891	61.7	58.6	58.3	56	-3.4	-2.6
11 Erin Street	33821	62.1	59.4	61.2	58.9	-0.9	-0.5
Kildare College (East façade)	17254	56.1	51.9	56.4	52.3	0.3	-
Kildare College (North façade)	17254	54.4	50.2	56.4	52.3	2	-
South Wagga PS (South facade)	17115	57	55	53.4	52.4	-3.6	-
South Wagga PS (West facade)	17115	63.8	60.7	55.3	54.8	-8.5	-
Junee Precinct							
Kemp Street bridge							
1 George Street	3476	48.6	44.0	46.5	42.0	-2.1	-2
8 Kemp Street	5101	59.2	53.6	58.1	52.4	-1.1	-1.2
3 Pretoria Avenue	4648	47.6	43.2	47.7	43.2	0.1	0
7 Railway Parade	2208	50.0	45.6	47.8	43.3	-2.2	-2.3

7 CUMULATIVE NOISE ASSESSMENT

7.1 OVERVIEW

Cumulative impacts may occur as a result of concurrent activities within the proposal or from external construction projects. Projects identified with sufficient information to undertake assessment of potential cumulative impacts from the proposal are shown on Figure 7.1 and their anticipated schedules are presented in Table 7.1. These sites include:

- Adjacent sections of Inland Rail, including:
 - Tottenham to Albury (Victoria)
 - Illabo to Stockinbingal.
- Other projects, including:
 - Thurgoona Link Road
 - Nexus Industrial Precinct
 - Jindera Solar Farm
 - Glenellen Solar Farm
 - Walla Walla Solar Farm
 - Culcairn Solar Farm
 - Uranquinty Solar Farm
 - Sandy Creek Solar Farm
 - Gregadoo Solar Farm
 - Solar farm (5 megawatts) at Uranquinty
 - Solar farm (5 megawatts) at Bomen
 - Wagga Wagga Special Activation Precinct
 - Riverina Intermodal Freight and Logistics Hub
 - Olympic Highway intersection upgrades
 - Project EnergyConnect (NSW – Eastern Section)
 - HumeLink
 - Junee Station Upgrade
 - Junee to Griffith Line Upgrade
 - Illabo Solar Farm
 - A grade separation road interface proposal.

Internal construction stages with the potential to run concurrently are discussed in section 7.2 and other projects, external to the proposal are discussed in section 7.3. Projects that do not have published construction timeframe (as of May 2022) have not been included in Table 7.1.

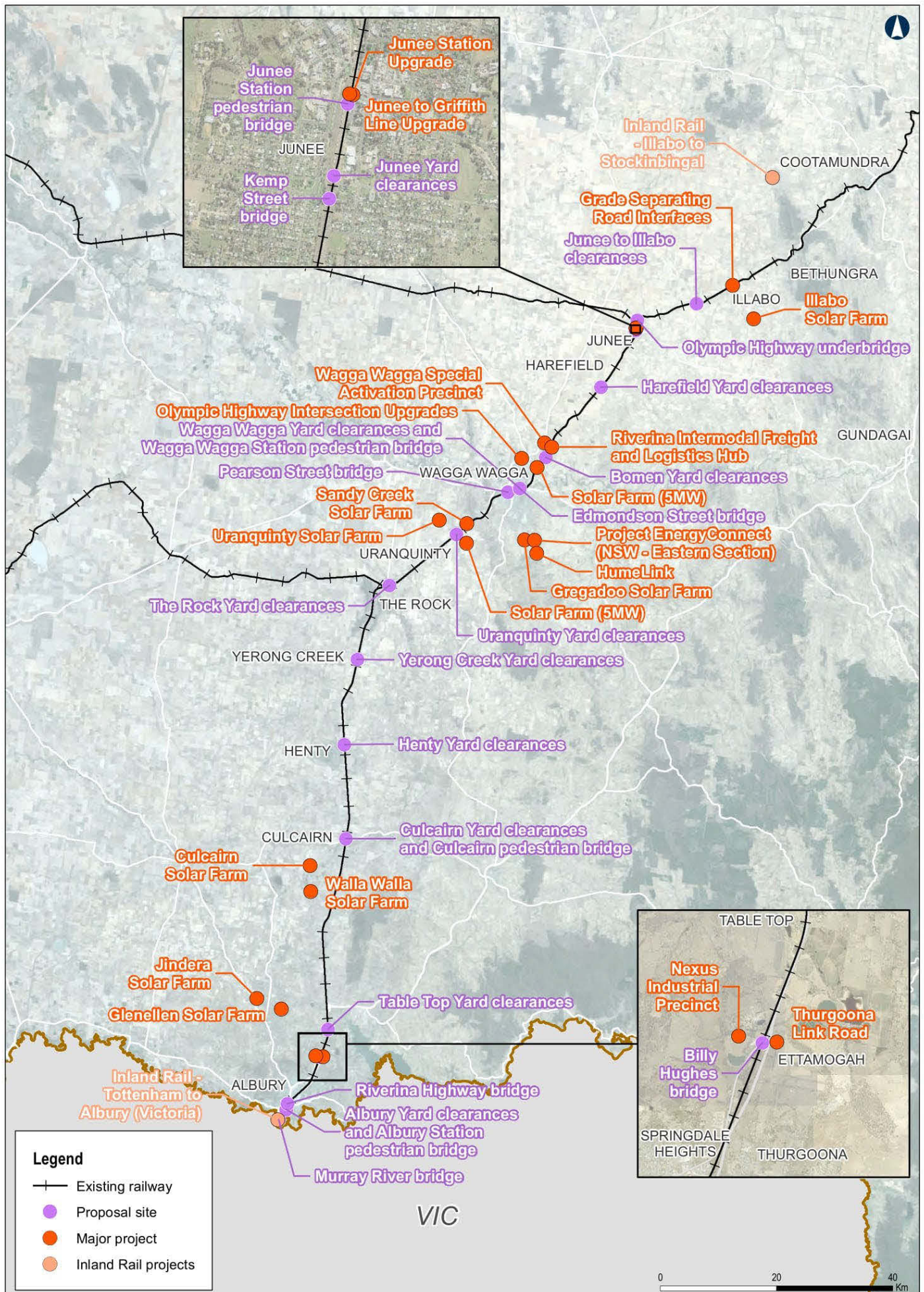


Figure 7.1 Major projects in the vicinity of the proposal

Data Sources: ARTC, NSWSS

Table 7.1 Anticipated schedule overlapping with nearby projects

PROJECT	DURATION OF CONSTRUCTION																			
	2021				2022				2023				2024				2025			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
The Proposal																				
Albury Precinct																				
Greater Hume – Lockhart Precinct																				
Wagga Wagga Precinct																				
Junee Precinct																				
Other Projects																				
Inland Rail—Tottenham to Albury (Victoria)																				
Thurgoona Link Road																				
Nexus Industrial Precinct																				
Jindera Solar Farm																				
Glenellen Solar Farm																				
Walla Walla Solar Farm																				
Culcairn Solar Farm																				
Uranquinty Solar Farm																				
Wagga Wagga Special Activation Precinct																				
Olympic Highway Intersection Upgrades																				
Riverina Intermodal Freight and Logistics Hub																				
Project EnergyConnect (NSW Eastern Section)																				
Junee Station Upgrade																				
Junee to Griffith Line Upgrade																				
Inland Rail—Illabo to Stockinbingal																				
HumeLink																				

7.2 CONCURRENT CONSTRUCTION ACTIVITIES WITHIN THE PROPOSAL

This section describes the potential cumulative noise impacts from concurrent works being undertaken at different enhancement sites.

7.2.1 ALBURY PRECINCT

Sensitive receivers may be potentially impacted by cumulative noise associated with separate construction scenarios occurring simultaneously at adjacent enhancement sites. For the Albury precinct, periods of high activity concurrent work may occur for five days in March 2024 during a possession period and include:

- Albury Yard clearances (track re-alignment and tie-ins / earthworks)
- Albury pedestrian bridge replacement (piling)
- Riverina Highway bridge (piling and concrete pumping / trucks)
- no cumulative impacts are expected to be associated with work at the Murray River bridge.

Table 7.2 outlines potential cumulative noise impacts at properties affected by these works.

Table 7.2 Projects potentially affecting cumulative noise impacts

WORK STAGE	NML L _{EQ(15 MIN)} FOR EACH NCA	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Cumulative Impacts – NCA 01/02							
Standard hours							
Albury Yard clearances	55/45	352	798	603	15	0	0
Albury pedestrian bridge replacement	55/45	59	8	0	0	0	0
Riverina Highway bridge	55/45	724	454	172	1	0	0
Cumulative impacts	55/45	604	840	961	27	0	0
Out of Hours – Day							
Albury Yard clearances	50/35	293	285	1,043	595	15	0
Albury pedestrian bridge replacement	50/35	337	59	8	0	0	0
Riverina Highway bridge	50/35	229	383	1,178	172	1	0
Cumulative impacts	50/35	262	369	1,323	950	27	0
Out of Hours – Evening							
Albury Yard clearances	50/35	293	285	1,043	595	15	0
Albury pedestrian bridge replacement	50/35	337	59	8	0	0	0
Riverina Highway bridge	50/35	229	383	1,178	172	1	0
Cumulative impacts	50/35	262	369	1,323	950	27	0

WORK STAGE	NML L _{EQ(15 MIN)} FOR EACH NCA	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Out of Hours—Night							
Albury Yard clearances	50/35	293	285	1,043	595	15	0
Albury Station pedestrian bridge	50/35	337	59	8	0	0	0
Riverina Highway bridge	50/35	229	383	1,178	172	1	0
Cumulative impacts	50/35	262	369	1,323	950	27	0

Where the works are carried out simultaneously, increases in the total number of properties exceeding the proposal NMLs and the extent of exceedance are predicted to occur. The following increases have been predicted:

- Riverina Highway bridge: Daytime increase of 7 per cent/night-time increase of 14 per cent in NCA02
- Albury Yard clearances: No increase
- Albury Station pedestrian bridge: Daytime increase of 2 per cent/night-time increase of 13 per cent in NCA01 and increase of 17 per cent/night-time increase of 18 per cent in NCA02.

In most cases, the cumulative noise impact experienced at the identified sensitive receivers will be equivalent to the highest construction noise level or, in worst case scenarios, up to 3dBA higher than the highest noise level. These cumulative impacts would be experienced for limited periods of time when the highest noise-generating construction activities in each area are occurring simultaneously. Mitigation in this instance would include appropriate construction planning to avoid cumulative impacts where possible.

7.2.2 GREATER HUME–LOCKHART PRECINCT

No concurrent construction works have been identified in this work area. No cumulative impacts are expected as the work areas are separated by sufficient distance to not warrant further cumulative impact assessment (i.e. even if concurrent works at different enhancement sites were to be undertaken).

7.2.3 WAGGA WAGGA PRECINCT

Sensitive receivers may be potentially impacted by cumulative noise associated with separate construction scenarios occurring simultaneously at adjacent enhancement sites. For the Wagga Wagga precinct, periods of high activity concurrent work may occur for eight days in March 2024 during a possession period and include:

- Wagga Track Re-alignment (installing formation widening—earthworks)
- Cassidy Parade pedestrian bridge replacement (piling)
- Edmondson Street bridge (service relocations).

Works at the Pearson Street bridge enhancement site are too far from adjacent enhancement sites to result in cumulative impacts and works on the Albury shred user bridge will not be occurring concurrently with any other works.

Table 7.3 Projects potentially affecting cumulative noise impacts

WORK STAGE	NML LEQ(15 MIN) FOR EACH NCA	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Cumulative Impacts—NCA 11							
Standard hours							
Wagga track re-alignment	58	190	85	51	23	0	31
Cassidy Parade pedestrian bridge replacement	58	46	20	14	3	0	6
Edmondson St Bridge	58	25	17	13	5	3	11
Cumulative impact	58	288	116	79	30	3	47
Out of Hours—Day							
Wagga track re-alignment	53	333	190	122	30	7	31
Cassidy Parade pedestrian bridge replacement	53	309	46	30	6	1	6
Edmondson St Bridge	53	36	25	26	7	5	11
Cumulative impact	53	570	288	168	46	14	47
Out of Hours—Evening							
Wagga track re-alignment	52	399	201	148	35	8	31
Cassidy Parade pedestrian bridge replacement	52	400	74	28	8	1	6
Edmondson St Bridge	52	57	22	33	7	6	11
Cumulative impact	52	605	349	208	51	17	47
Out of Hours—Night							
Wagga track re-alignment	42	345	499	600	148	43	31
Cassidy Parade pedestrian bridge replacement	42	421	660	474	28	9	6
Edmondson St Bridge	42	638	255	79	33	13	11
Cumulative impact	42	237	498	954	208	68	47

Where the works are carried out simultaneously, increases in the total number of properties exceeding the proposal NMLs and the extent of exceedance are predicted to occur. The following increases have been predicted:

- Wagga Wagga track re-alignment: Daytime increase of 6 per cent/night-time increase of 10 per cent
- Cassidy Parade footbridge: Daytime increase of 3 per cent/night-time increase of 5 per cent
- Edmondson Street bridge: Daytime increase of 3 per cent/night-time increase of 7 per cent.

In most cases, the cumulative noise impact experienced at the identified sensitive receivers will be equivalent to the highest construction noise level or, in worst case scenarios, up to 3dBA higher than the highest noise level. These cumulative impacts would be experienced for limited periods of time when the highest noise-generating construction activities in each area are occurring simultaneously. Mitigation in this instance would include appropriate construction planning to avoid cumulative impacts where possible.

7.2.4 JUNE Precinct

Sensitive receivers may be potentially impacted by cumulative noise associated with separate construction scenarios occurring simultaneously at adjacent enhancement sites. For the June Precinct, concurrent works may occur for three days during March 2024 and include:

- Kemp Street bridge (demolition)
- June Station pedestrian bridge (demolition)
- June Yard clearances (track slew works).

Works at the Olympic Highway underbridge enhancement site are too far from adjacent enhancement sites to result in cumulative impacts.

Table 7.4 outlines potential cumulative noise impacts at properties affected by these works.

Table 7.4 Projects potentially affecting cumulative noise impacts

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Cumulative Impacts—NCA 14							
Standard hours							
Kemp Street bridge	52	247	124	38	14	18	28
Junee Station pedestrian bridge	52	192	40	18	1	0	0
Junee Yard clearances	52	284	151	43	4	0	1
Cumulative impact	52	274	244	138	13	6	14
Out of Hours—Day							
Kemp Street bridge	52	267	149	46	9	6	0
Junee Station pedestrian bridge	52	192	40	18	1	0	0
Junee Yard clearances	52	284	151	43	4	0	0
Cumulative impact	52	244	111	34	11	1	0
Out of Hours—Evening							
Kemp Street bridge	50	266	197	91	13	6	0
Junee Station pedestrian bridge	50	251	79	33	1	0	0
Junee Yard clearances	50	311	218	78	6	0	0
Cumulative impact	50	229	293	215	18	6	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Out of Hours—Night							
Kemp Street bridge	40	86	153	463	91	19	0
Junee Station pedestrian bridge	40	136	310	330	33	1	0
Junee Yard clearances	40	95	177	529	78	6	0
Cumulative impact	40	69	112	522	215	24	0

Where the works are carried out simultaneously, increases in the total number of properties exceeding the proposal NMLs are predicted to occur. The following increases have been predicted:

- Kemp Street bridge: Daytime increase of 11 per cent/night-time increase of 2 per cent
- Junee Station pedestrian bridge: Daytime increase of 17 per cent/night-time increase of 5 per cent
- Junee Yard clearances: Daytime increase of 11 per cent/night-time increase of 2 per cent.

In most cases, the cumulative noise impact experienced at the identified sensitive receivers will be equivalent to the highest construction noise level or, in worst case scenarios, up to 3dBA higher than the highest noise level. These cumulative impacts would be experienced for limited periods of time when the highest noise-generating construction activities in each area are occurring simultaneously.

In order to quantify specific cumulative impacts, it is essential to understand the scheduling for each local project and further assessment on cumulative noise impacts should be undertaken during preparation of the CNVMP when additional information is available.

7.2.5 UTILITY ADJUSTMENTS

Utility adjustments may be required at some sites. These will form part of early works associated with the proposal however may be subject to separate approvals.

Depending upon the precise location of these works, cumulative impacts may be noted as increases of up to 3dBA higher than the highest noise level from each site. Utility adjustments are typically minor and of short duration and as such, these cumulative increases are expected to be minor.

7.3 CONCURRENT PROJECTS EXTERNAL TO THE PROPOSAL

Additional cumulative noise impacts may be generated by projects not related to the A2I proposal.

Construction works for Inland Rail—Tottenham to Albury, Thurgoona Link Road, Wagga Wagga special activation precinct, Olympic Highway intersection upgrades, Project EnergyConnect and HumeLink are scheduled to overlap with construction of the proposal (refer Table 7.1) and hence may contribute to cumulative noise impacts. The cumulative noise impact assessment for construction is summarised in Table 7.5. Where projects are located more than 1 km from the edge of an enhancement site, cumulative impacts are considered highly unlikely.

Specific noise impacts during construction will depend entirely on construction methodology and detailed scheduling for both projects. In general, noise levels will equal the contribution of the loudest construction site; however, in worst case scenarios, may be up to 3dB louder than the maximum predicted impacts for either project.

No cumulative impacts are predicted to occur during operation of the proposal.

Table 7.5 Cumulative impact assessment

PROJECT NAME	POTENTIAL CUMULATIVE IMPACT DURING CONSTRUCTION	DISTANCE FROM NEAREST ENHANCEMENT SITE
Inland Rail—Tottenham to Albury	No impacts are considered likely due to the distance from the proposal site.	16km from the Murray River bridge enhancement site
Thurgoona Link Road	Potential minor noise impacts where construction works occur simultaneously close to the proposal extents.	Adjacent to Billy Hughes bridge
Wagga Wagga special activation precinct	Potential noise impacts where noisy works occur simultaneously close to the Project extents.	Surrounding Bomen Yard clearances
Olympic Highway intersection upgrades	No impacts are considered likely due to the distance from the proposal site.	About 3km to the west of Bomen Yard clearances. About 4km north of Wagga Wagga Station and Yard clearances
Project EnergyConnect (NSW—Eastern section)	No impacts considered likely due to the distance from the proposal site.	About 7km south of Wagga Wagga station and yard clearances. About 3km to the south west of Uranquinty Yard clearances.
HumeLink	No impacts are considered likely due to the distance from the proposal site.	About 14km south of Wagga Wagga Station and Yard clearances About 18km to the south west of Uranquinty Yard clearances.
Inland Rail – Illabo to Stockinbingal	Impacts due to I2S construction would depend on the final construction schedule for that project, specifically if works at the northern extent of this proposal would occur while works are underway on the southern extent of the I2S section of Inland Rail. In general, noise levels would equal the contribution of the loudest construction site; however, in worst case scenarios, the noise levels may be up to 3dB louder than the maximum predicted impacts for either project. A coordinated response to cumulative impacts from this proposal and other Inland Rail projects would be managed collectively by ARTC (refer to Chapter 26 of the EIS). This would involve a range of coordination and scheduling measures to minimise the potential cumulative impacts to sensitive receivers and maximise employment opportunities in local communities.	Adjacent to Junee to Illabo clearance

8 MITIGATION AND MANAGEMENT MEASURES

8.1 APPROACH TO NOISE AND VIBRATION MANAGEMENT

Where predicted or measured noise and/or vibration levels are above the criteria at sensitive receivers, feasible and reasonable management and mitigation measures will be investigated and implemented with the objective of meeting the criteria and minimising potential impacts.

The recommendations are based on the worst-case predicted noise and vibration levels discussed in this report. These levels shall not be experienced at all sensitive receivers and would not occur throughout the duration of the construction program. Consequently, not all of the management and mitigation measures may be required for all of the construction works at each enhancement site.

In addition to the noise and vibration levels, the determination of feasible and reasonable mitigation shall include a range of considerations for safety, engineering constraints, environmental management, and community and stakeholder engagement.

Environmental management for the proposal would be carried out in accordance with the environmental management approach as detailed in Chapter 27 of the EIS (Synthesis of the environmental impact statement). Relevant management measures that are provided in this document and would be implemented during construction and operation of the proposal are provided in section 8.2.

Construction noise and vibration would be managed in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework. This document is provided as Appendix F for reference. Relevant management measures that would be implemented during construction and operation of the proposal are provided in Chapter 8.

Prior to the commencement of construction, ARTC and its contractors shall develop a Construction Environmental Management Plan (CEMP) to provide guidance on how the proposed works shall be avoid, minimise or mitigate effects on the environment and sensitive receivers. It is expected that a Construction Noise and Vibration Management Plan (CNVMP) shall be prepared as part of the CEMP. The CVMP would detail how construction activities would be managed to minimise the potential for noise and vibration impacts at sensitive receivers. It would include:

- construction noise and vibration criteria for the proposal
- an updated assessment of noise and vibration that captures any changes to the proposed works, proposal designs and the local environment that may have occurred since the time of the EIS
- details of all feasible and reasonable mitigation and management measures adopted to minimise disruption from noise and vibration during construction. This would include enhancement of site-specific measures, as identified in Table 8.1
- OOH work protocol to identify the additional measures that need to be implemented during work outside the primary proposal hours
- procedures for monitoring noise and vibration levels as part of auditing environmental performance and responding to adverse comments or complaints on noise and vibration
- community and stakeholder engagement measures in accordance with the communication management plan, to inform sensitive receivers on the upcoming construction works, road diversions and potential impacts that could be experienced.

The following sections have considered the results of construction noise modelling outlined in Chapter 5 and detail any specific recommended noise and vibration management and mitigation measures. The recommendations include conventional best practice measures that are applied on major transport infrastructure projects.

The approach for the recommendation of noise and vibration management measures has been:

- 1 the consideration of base noise and vibration impacts with no management measures in place (refer Chapter 5)
- 2 the consideration of standard noise and vibration mitigation measures for each enhancement site and any residual impacts (refer section 8.3.1)
- 3 the recommendation of further, site-specific noise and vibration management measures where residual impacts are still predicted
- 4 the suitability of all management measures will be considered further in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework (refer Appendix F) during the preparation of a construction Noise and Vibration Management Plan (CNVMP) as a component of the overall Construction Environmental Management Plan (CEMP) for the proposal. This would be finalised before the commencement of construction.

8.2 SUMMARY OF ENVIRONMENTAL MANAGEMENT MEASURES

The mitigation measures to manage impacts to noise and vibration from the proposal during detailed design / pre-construction, construction and operation are outlined in Table 8.1.

Table 8.1 Summary of mitigation and management measures

PROJECT PHASE	IMPACT TYPE	MITIGATION MANAGEMENT MEASURE
Detailed design/pre-construction	Managing the potential for construction noise and vibration impacts	<p>Location and activity-specific construction noise and vibration review will be prepared based on a more detailed understanding of the construction methods, including the size and type of construction equipment, construction traffic, duration and timing of works, and detailed reviews of local receivers as required.</p> <p>The plan will confirm predicted impacts at relevant receivers to assist with the selection of feasible and reasonable management measures. The statements will also confirm noise and vibration auditing and monitoring requirements.</p>
Detailed design/pre-construction	Minimising the potential for construction vibration (structural) impacts	Condition surveys will be completed before and after construction works where buildings or structures, utilities or road infrastructure are within the minimum vibration working distances.
Pre-construction/construction	Managing the potential for noise and vibration impacts during construction	<p>A construction noise and vibration management plan (CNVMP) will be prepared and implemented as part of the CEMP in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework. The plan will include outline measures, processes and responsibilities to manage and monitor noise and vibration, and minimise the potential for impacts during construction. This plan will include:</p> <ul style="list-style-type: none"> — construction noise and vibration criteria for the proposal — the location of sensitive receivers — specific management measures for activities that could exceed the construction noise and vibration criteria — OOH protocol — procedures for monitoring noise and vibration levels during construction — community and stakeholder engagement measures in accordance with the communication management plan.

PROJECT PHASE	IMPACT TYPE	MITIGATION MANAGEMENT MEASURE
Pre-construction/ construction	Managing the potential for noise and vibration impacts during construction	<p>The proposal will be constructed, with the aim of achieving the applicable construction noise management levels and vibration criteria.</p> <p>All feasible and reasonable noise and vibration measures will be implemented.</p> <p>Any activities that could exceed the construction noise management levels and vibration criteria will be identified and managed in accordance with the framework, the CNVMP, and the construction noise and vibration impact statements.</p> <p>Notification of impacts will be undertaken in accordance with the communication management plan for the proposal.</p>
Pre-construction/ construction	Managing the potential for noise and vibration impacts during construction	<p>In consultation with contractors and suppliers, aim to source plant and equipment with the lowest available noise and vibration emissions that can practically complete the works. This will include consideration of minimising the use of equipment that generates impulsive, tonal or irregular noise.</p>
Pre-construction/ construction	Impacts of OOH work	<p>An OOH work protocol will be developed as part of the CNVMP to define the process for considering, approving and managing out-of-hours work, including implementation of feasible and reasonable measures and communication requirements. Measures will be aimed at proactive communication and engagement with potentially affected receivers, provision of respite periods and/or alternative accommodation for defined exceedance levels.</p> <p>All work outside the primary proposal construction hours will be undertaken in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework and in accordance with the OOH work protocol.</p> <p>The protocol will provide guidance for the preparation of OOH work plans for each construction work location and for key works. OOH work plans will be prepared in consultation with key stakeholders (including the NSW EPA) and the community, and incorporated into the CNVMP.</p> <p>Respite shall be considered in accordance with Section 3.2.2. of the Inland Rail NSW Construction Noise and Vibration Management Framework.</p>
Pre-construction/ construction	Impacts of OOH work	<p>Where reasonable and feasible, deliveries should be undertaken only during standard daytime construction hours.</p>
Pre-construction/ construction	Minimising the potential for construction vibration (structural) impacts	<p>Where vibration levels are predicted to exceed the screening criteria and following the condition survey, the potential for damage to the item will be assessed. Where there is potential for damage, alternative methods that generate less vibration will be investigated and substituted, where practicable.</p> <p>Where residual damage risks remain, attended vibration measurements will be undertaken at the commencement of vibration-generating activities to confirm that structural vibration limits are within the acceptable range.</p>

PROJECT PHASE	IMPACT TYPE	MITIGATION MANAGEMENT MEASURE
		Site activities will be modified where practicable to avoid exceeding the applicable criteria. Any identified vibration-related damage to the items will be rectified.
Operation	Operational noise and vibration	The proposal will be operated with the aim of achieving the operational noise and vibration criteria identified by the operational noise and vibration review, the requirements of the conditions of approval and the EPL.
Operation	Operational noise and vibration	<p>Operational noise and vibration compliance monitoring will be undertaken, once Inland Rail has commenced operation, at representative locations to compare actual noise performance against that predicted by the operational noise and vibration review.</p> <p>Compliance monitoring requirements will be defined by the operational noise and vibration review.</p> <p>The results of monitoring will be included in an operational noise and vibration compliance report, prepared in accordance with the conditions of approval. The need for any additional feasible and reasonable mitigation measures will be identified as an outcome of the monitoring.</p>

8.3 PREDICTED EFFECTIVENESS OF THE MITIGATION AND MANAGEMENT MEASURES PROPOSED

The impact of these works is relative to the noise and vibration levels at each receiver, the temporary and transient nature of the works and an individual's response to noise and vibration. Where there remains potential for impacts after all feasible and reasonable mitigation have been applied further management measures can be adopted.

8.3.1 APPLICATION OF STANDARD MITIGATION MEASURES AND RESIDUAL NOISE IMPACTS

Construction noise levels have been predicted that include the implementation of standard noise management and mitigation measure such as residential class mufflers and locating surface level work areas away from sensitive receivers or the use of temporary screens. Where these mitigations are considered, residual impacts are substantially reduced with impacts being lower than the project NMLs at most locations.

Residual noise impacts have been predicted for each work location in consideration of the likely reductions due to the adoption of the standard noise management measures outlined in Chapter 8. Details of residual noise impacts are presented in Appendix C and graphically in Appendix D, and the results of these residual noise impacts are summarised in the following sections.

Table 8.2 presents typical noise reductions from a selection of standard noise management measures.

Table 8.2 Indicative noise reduction from construction controls

REFERENCE	STANDARD MITIGATION MEASURE	ESTIMATED NOISE REDUCTION (dBA)
1	Portable temporary screens.	5–10
2	Screen or enclosure for stationary equipment.	10–15
3	Maximising the offset distance between noisy plant items and sensitive receivers.	3–6
4	Avoiding using noisy plant simultaneously and/or close together, adjacent to sensitive receivers.	2–5
5	Orienting equipment away from sensitive receivers.	3–5
6	Carrying out loading and unloading away from sensitive receivers.	3–5
7	Using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks.	5–10
8	Selecting site access points and roads as far as possible away from sensitive receivers.	3–6

8.3.1.1 ALBURY PRECINCT

The construction noise results that include the standard noise mitigation measures are presented in Appendix C-2. The standard, feasible noise management measures adopted for this precinct are presented in Table 8.3.

Table 8.3 Adopted standard noise management measures

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
All sites		
Site establishment	6, 7	15
Demobilisation and rehabilitation	6, 7	15
Site compounds	2, 3, 5, 6	19
Murray River bridge		
Installation and removal of scaffolding and bracing	7	8
Bridge works	1, 8	15
Albury Yard clearances		
Offline widenings	4, 7	12
Track re-alignment (<300mm)	7	8
Track realignment (>300mm)	4, 7	10
Rebuild track	7	8

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
Albury Station and Table Top Yard clearances (Gantry Removal)		
Install cabling/conduits	7	10
Signalling works	–	–
Cut gantry bolts	–	–
Remove gantry	7	8
Remove footings	1, 7	12
Backfill footings	1, 7	12
Albury Station pedestrian bridge		
Demolition	1, 7	12
Piling	1	5
Concreting works	7	10
Installation of fittings	–	–
Lifting of truss and deck	1, 7	8
Riverina Highway and Billy Hughes bridge		
Earthworks	1, 7	12
Large scale piling	1, 7	10
Small scale piling	1	5
Drainage	1, 7	12
Track works	7	8

(1) Refer Table 8.2

The residual impacts are presented graphically as maps of predicted noise levels for the noisiest construction stage in Appendix D-1 for both daytime and night-time hours. This map provides an indication of the impacted areas and the extent of the maximum noise impacts at each work location.

While the implementation of standard mitigation measures will reduce the extent of noise impacts in the Albury precinct, large numbers of receivers will remain noise affected in some areas. This includes potential sleep disturbance impacts.

MURRAY RIVER BRIDGE

Predictions of likely reduction in noise due the implantation of standard mitigation measures have been calculated and presented in Table 8.4 for the loudest work stage.

Table 8.4 Maximum residual noise impacts—Murray River bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Site establishment (unmitigated)	88	150	150	150	4	76	26 days
Site establishment (mitigated)	7	22	22	22	0	5	
Maximum predicted noise level (at worst impacted receiver)							
Site establishment (unmitigated)	84dB (L _{Aeq} (15 minutes))					97dB (L _{A1} (1 minutes))	26 days
Site establishment (mitigated)	69dB (L _{Aeq} (15 minutes))					69dB (L _{A1} (1 minutes))	

The implementation of standard mitigation measures shows a large reduction in potentially noise impacted receivers. Night-time impacts are reduced by 85 per cent and sleep disturbance impacts are reduced by 95 per cent. No receivers are expected to be highly affected (>75dB L_{Aeq}(15 minute)).

ALBURY STATION PEDESTRIAN BRIDGE

Predictions of likely reduction in noise due the implantation of standard mitigation measures have been calculated and presented in Table 8.5 for the loudest work stage.

Table 8.5 Maximum residual noise impacts—Albury Station pedestrian bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Demolition (unmitigated)	1,099	2,245	2,245	2,245	2	2,294	5 days
Demolition (mitigated)	8	139	139	139	0	4	
Maximum predicted noise level (at worst impacted receiver)							
Demolition (unmitigated)	83dB (L _{Aeq} (15 minutes))					85dB (L _{A1} (1 minutes))	5 days
Demolition (mitigated)	71dB (L _{Aeq} (15 minutes))					73dB (L _{A1} (1 minutes))	

The implementation of standard mitigation measures shows a large reduction in potentially noise impacted receivers. Night-time impacts are reduced by 95 per cent and sleep disturbance impacts are almost eliminated. No receivers are expected to be highly affected (>75dB L_{Aeq}(15 minute)).

ALBURY STATION PEDESTRIAN BRIDGE (EASTERN WORKS)

Predictions of likely reduction in noise due the implantation of standard mitigation measures have been calculated and Table 8.6 summarises the identified noise impacts.

Table 8.6 Maximum residual noise impacts—Albury Station pedestrian bridge (eastern works)

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Demolition (unmitigated)	327	1,049	1,049	1,049	10	1,015	5 days
Demolition (mitigated)	27	63	63	63	5	69	
Maximum predicted noise level (at worst impacted receiver)							
Demolition (unmitigated)	103dB (L _{Aeq} (15 minutes))					105dB (L _{A1} (1 minutes))	5 days
Demolition (mitigated)	91dB (L _{Aeq} (15 minutes))					93dB (L _{A1} (1 minutes))	

The implementation of standard mitigation measures shows a large reduction in potentially noise-impacted receivers. Night-time impacts are reduced by 95 per cent and sleep disturbance impacts show a similar reduction. Highly noise-affected receivers are halved (>75dB L_{Aeq}(15 minute)).

ALBURY YARD CLEARANCES (TRACK RE-ALIGNMENT)

The construction activities considered for this enhancement site include track re-alignment preliminary works; offline widenings; track re-alignment; re-build track; demobilisation and rehabilitation; and compound operation.

Table 8.7 summarises the identified noise impacts.

Table 8.7 Maximum residual noise impacts—Albury Station track re-alignment

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOUR - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Demobilisation and rehabilitation (unmitigated)	2,266	2,840	2,840	2,840	1	397	10 days
Offline widenings (mitigated)	334	1,553	1,553	1,553	0	2	20 days
Maximum predicted noise level (at worst impacted receiver)							
Demobilisation and rehabilitation (unmitigated)	68dB (L _{Aeq} (15 minutes))					68dB (L _{A1} (1 minutes))	10 days
Offline widenings (mitigated)	59dB (L _{Aeq} (15 minutes))					59dB (L _{A1} (1 minutes))	20 days

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to offline widenings. The impacts still show a large reduction in potentially noise impacted receivers. Night-time impacts are reduced by 55 per cent and sleep-disturbance impacts are almost eliminated. Highly noise affected receivers are eliminated (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

ALBURY YARD CLEARANCES (GANTRY REPLACEMENT)

The construction activities considered for this enhancement site include gantry replacement preliminary works; install new cabling/conduits; signalling works; cut gantry bolts; remove gantry; remove footings; backfill footings; demobilisation and rehabilitation; and compound operation.

Table 8.8 summarises the identified noise impacts.

Table 8.8 Maximum residual noise impacts—Albury Station gantry replacement

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Cabling and conduits (unmitigated)	386	866	866	866	0	218	3 days
Cabling and conduits (mitigated)	34	354	354	354	0	0	3 days
Maximum predicted noise level (at worst impacted receiver)							
Cabling and conduits (unmitigated)	64dB (L _{Aeq} (15 minutes))					65dB (L _{A1} (1 minutes))	3 days
Cabling and conduits (mitigated)	44dB (L _{Aeq} (15 minutes))					44dB (L _{A1} (1 minutes))	3 days

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to offline widenings. The impacts still show a large reduction in potentially noise-impacted receivers. Night-time impacts are reduced by 90 per cent and sleep disturbance impacts are eliminated; however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

RIVERINA HIGHWAY BRIDGE

Table 8.9 summarises the identified noise impacts.

Table 8.9 Maximum residual noise impacts—Riverina Highway bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Preliminary works (unmitigated)	1,860	2,387	2,387	2,387	0	234	27 days
Drainage works (mitigated)	192	423	423	423	0	94	
Maximum predicted noise level (at worst impacted receiver)							
Preliminary works (unmitigated)	76dB (L _{Aeq} (15 minutes))					76dB (L _{A1} (1 minutes))	27 days
Drainage works (mitigated)	63dB (L _{Aeq} (15 minutes))					66dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to drainage works. The impacts still show a large reduction in potentially noise-impacted receivers. Night-time impacts are reduced by 33 per cent and sleep disturbance impacts are halved. Highly noise affected receivers are eliminated (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

BILLY HUGHES BRIDGE

Table 8.10 summarises the identified noise impacts.

Table 8.10 Maximum residual noise impacts—Billy Hughes bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Preliminary works (unmitigated)	7	7	7	7	0	2	27 days
Small scale piling (mitigated)	0	2	2	2	0	0	80 days
Maximum predicted noise level (at worst impacted receiver)							
Preliminary works (unmitigated)	54dB (L _{Aeq} (15 minutes))					58dB (L _{A1} (1 minutes))	27 days
Small scale piling (mitigated)	46dB (L _{Aeq} (15 minutes))					51dB (L _{A1} (1 minutes))	80 days

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to small-scale piling and noise impacts are almost eliminated, with potential impacts only predicted at two properties during night-time hours.

TABLE TOP YARD CLEARANCES

Table 8.11 summarises the identified noise impacts.

Table 8.11 Maximum residual noise impacts—Table Top Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Installation of footings and cables (unmitigated)	6	18	18	18	0	0	< 4 days
Cut gantry bolts (mitigated)	0	6	6	6	0	0	< 4 days
Maximum predicted noise level (at worst impacted receiver)							
Installation of footings and cables (unmitigated)	59dB (L _{Aeq} (15 minutes))					61dB (L _{A1} (1 minutes))	< 4 days
Cut gantry bolts (mitigated)	54dB (L _{Aeq} (15 minutes))					54dB (L _{A1} (1 minutes))	< 4 days

Following the implementation of standard mitigation measures, noise impacts are almost eliminated, with potential impacts only predicted at two properties during night-time hours.

ALBURY PRECINCT CONSTRUCTION RESIDUAL NOISE SUMMARY

The implementation of standard mitigation measures is expected to reduce potential noise levels by a substantial margin at all enhancement sites; however, noise impacts are still predicted to generate substantial impacts, particularly during night-time works. Loudest activities generally include earthworks during site establishment and demolition works, in addition to all works during possessions where OOH work is required. Up to five properties may be highly impacted at the worst affected enhancement site (Albury Station pedestrian bridge). This is a reduction from 10 properties. Sleep disturbance impacts have been predicted to occur at up to 94 properties during works at the Riverina Highway bridge, reduced from 234.

Noise impacts are predicted at a number of locations across several stages of construction, during standard (daytime) hours and OOH works periods. Further noise management and mitigation measures would therefore be required to be implemented during construction of the proposal within the extent that is reasonable and feasible. Details of such noise mitigation are included in section 8.2.

8.3.1.2 GREATER HUME–LOCKHART PRECINCT

The construction noise results that include the standard noise mitigation measures (mitigated predictions) are presented in Appendix C-4. The standard, feasible noise management measures adopted for this precinct are presented in Table 8.12.

Table 8.12 Adopted standard noise management measures

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
All sites		
Site establishment	6, 7	15
Demobilisation and rehabilitation	6, 7	15
Site compounds	2, 3, 5, 6	19
Culcairn, Henty and Yerong Track Re-alignment		
Offline widenings	4, 7	12
Remove gantry	7	8
Drainage works and service relocation	1, 7	12
Track re-alignment (<300mm)	7	8
Track realignment (>300mm)	4, 7	10
Rebuild track	7	8
The Rock Gantry Removal		
Install cabling/conduits	7	10
Signalling works	–	–
Cut gantry bolts	–	–
Remove gantry	7	8
Remove footings	1, 7	12
Backfill footings	1, 7	12

(1) Refer Table 8.2

The residual impacts are presented graphically as maps of predicted noise levels for the noisiest construction stage in Chapter 8, for both daytime and night-time hours. This map provides an indication of the impacted areas and the extent of the maximum noise impacts at each work location.

Whilst the implementation of standard mitigation measures will reduce the extent of noise impacts within the Hume/Lockhart precinct, large numbers of receivers will remain noise affected in some areas. This includes potential sleep disturbance impacts.

CULCAIRN PEDESTRIAN BRIDGE AND CULCAIRN YARD CLEARANCES

Table 8.13 summarises the identified noise impacts.

Table 8.13 Maximum residual noise impacts—Culcairn pedestrian bridge and yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Drainage works / service relocations (unmitigated)	536	548	548	548	3	548	5 days
Remove gantry (unmitigated)	316	506	520	541	0	426	9 days
Maximum predicted noise level (at worst impacted receiver)							
Drainage works / service relocations (unmitigated)	80dB (L _{Aeq} (15 minutes))					80dB (L _{A1} (1 minutes))	5 days
Remove gantry (unmitigated)	71dB (L _{Aeq} (15 minutes))					71dB (L _{A1} (1 minutes))	9 days

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to removal of the gantry. The impacts still show a moderate reduction in potentially noise impacted receivers. Night-time impacts are reduced by 42 per cent and sleep disturbance impacts are reduced. Highly noise-affected receivers are eliminated (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

HENTY YARD CLEARANCES

Table 8.14 summarises the identified noise impacts.

Table 8.14 Maximum residual noise impacts—Henty Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Offline widenings (unmitigated)	486	494	494	494	9	494	24 days
Offline widenings (mitigated)	179	395	431	486	1	456	
Maximum predicted noise level (at worst impacted receiver)							
Offline widenings (unmitigated)	88dB (L _{Aeq} (15 minutes))					89dB (L _{A1} (1 minutes))	24 days
Offline widenings (mitigated)	76dB (L _{Aeq} (15 minutes))					76dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show a reduction in potentially noise impacted receivers. In addition, offline widenings, removal of the gantry, track realignment and demobilisation now all show similar noise impacts. Night-time impacts and sleep disturbance impacts are both reduced by a small margin. Highly noise-affected receivers are reduced from 9 to 1 (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

YERONG CREEK YARD CLEARANCES

Table 8.15 summarises the identified noise impacts.

Table 8.15 Maximum residual noise impacts—Yerong Creek Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Demobilisation and rehabilitation (unmitigated)	70	74	74	74	4	74	10 days
Offline widenings (mitigated)	27	56	56	56	0	51	31 days
Maximum predicted noise level (at worst impacted receiver)							
Demobilisation and rehabilitation (unmitigated)	81dB (L _{Aeq} (15 minutes))					81dB (L _{A1} (1 minutes))	10 days
Offline widenings (mitigated)	63dB (L _{Aeq} (15 minutes))					63dB (L _{A1} (1 minutes))	31 days

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to offline widenings. The impacts show a moderate reduction in potentially noise impacted receivers. Night-time impacts are reduced by 30 per cent and sleep disturbance impacts are reduced by a similar margin. Highly noise-affected receivers are eliminated (>75dB L_{Aeq}(15 minute)); however, it is noted that a moderate number of sensitive receivers remain affected, particularly during night-time hours.

THE ROCK YARD CLEARANCES

Table 8.16 summarises the identified noise impacts.

Table 8.16 Maximum residual noise impacts—The Rock Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Installation of cabling / conduits (unmitigated)	160	258	258	258	0	258	1 day
Remove gantry (mitigated)	24	55	55	249	0	249	1 day
Maximum predicted noise level (at worst impacted receiver)							
Installation of cabling / conduits (unmitigated)	74dB (L _{Aeq} (15 minutes))					76dB (L _{A1} (1 minutes))	1 day
Remove gantry (mitigated)	64dB (L _{Aeq} (15 minutes))					74dB (L _{A1} (1 minutes))	1 day

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to the removal of the gantry. The impacts show a moderate reduction in potentially noise impacted receivers during most periods, however night-time and sleep disturbance impacts are barely reduced. It is noted that a moderate number of sensitive receivers remain affected, particularly during night-time hours.

GREATER HUME–LOCKHART PRECINCT RESIDUAL CONSTRUCTION NOISE SUMMARY

The implantation of standard mitigation measures is expected to reduce potential noise levels by a substantial margin at all enhancement sites; however, noise impacts are still predicted to generate substantial impacts, particularly during night-time works. Loudest activities include earthworks in addition to works during possessions where OOH work is required. Up to one property may be highly impacted at the worst affected enhancement site (Henty Rail Yard), down from 9 properties. Sleep disturbance impacts have been predicted to occur at up to 456 properties during works at the Henty Rail Yard, which is reduced from 494 properties.

Noise impacts are predicted at a number of locations across several stages of construction, during standard (daytime) hours and OOH works periods. Further noise management and mitigation measures would therefore be required to be implemented during construction of the proposal within the extent that is reasonable and feasible. Details of such noise mitigation are included in section 8.2.

8.3.1.3 WAGGA WAGGA PRECINCT

The construction noise results that include the standard noise mitigation measures (mitigated predictions) are presented in Appendix C-6. The standard, feasible noise management measures adopted for this precinct are presented in Table 8.17.

Table 8.17 Adopted standard noise management measures

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
All sites		
Site establishment	6, 7	15
Demobilisation and rehabilitation	6, 7	15
Site compounds	2, 3, 5, 6	19
Level crossings		
Road diversions	4, 7	12
Signalling works	–	–
Strip level crossing panels and remove track	1, 7	8
Install troughs	1, 7	8
Rebuild rail	4, 7	10
Install level crossing panels	1, 7	8
Uranquinty, Wagga Wagga Yards, Bomen Yard clearances		
Offline widenings	4, 7	12
Drainage and earthworks	1, 7	12
Track re-alignment (<300mm)	7	8
Track realignment (>300mm)	4, 7	10
Rebuild track	7	8

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
Cassidy Parade and Wagga Station shared user bridges		
Demolition	1, 7	12
Piling	1	5
Concreting works	7	10
Installation of fittings	–	–
Lifting of truss and deck	1, 7	8
Pearson Street bridge		
Earthworks	1, 7	12
Large scale piling	1, 7	10
Small scale piling	1	5
Protection walls and drainage	1, 7	12
Track removal	7	8
Rebuild track	7	8
Edmondson Street bridge		
Service Relocations		
Demolition	1, 7	12
Crane/piling pads	7	10
Piling	1	5
RE Wall and abutments	1, 7	8
Install deck, slabs and planks	1, 7	8
Install fittings	7	10
Asphalting	1, 7	12
Wagga Wagga Yard clearances (gantry removals)		
Install cabling/conduits	7	10
Signalling works	–	–
Cut gantry bolts	–	–
Remove gantry	7	8
Remove footings	1, 7	12
Backfill footings	1, 7	12

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
Sandy Creek Bridge		
Crane pads	7	10
Track removal/installation	7	8
Remove/install girders and blocks	7	10
Cut piers and abutments	1, 7	12

(1) Refer Table 8.2

The residual impacts are presented graphically as maps of predicted noise levels for the noisiest construction stage in Appendix D-3 for both daytime and night-time hours. This map provides an indication of the impacted areas and the extent of the maximum noise impacts at each work location.

Whilst the implementation of standard mitigation measures will reduce the extent of noise impacts within the Hume/Lockhart precinct, large numbers of receivers will remain noise affected in some areas. This includes potential sleep disturbance impacts.

URANQUINTY YARD CLEARANCES

TRACK RE-ALIGNMENT

Table 8.18 summarises the identified noise impacts.

Table 8.18 Maximum residual noise impacts—Uranquinty Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Offline widenings (unmitigated)	310	312	312	312	7	312	20 days
Offline widenings (mitigated)	188	281	281	312	0	267	
Maximum predicted noise level (at worst impacted receiver)							
Offline widenings (unmitigated)	76dB (L _{Aeq} (15 minutes))					76dB (L _{A1} (1 minutes))	20 days
Offline widenings (mitigated)	64dB (L _{Aeq} (15 minutes))					64dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show a reduction in potentially noise impacted receivers. Night-time impacts and sleep disturbance impacts are both reduced by a small margin. Highly noise-affected receivers are eliminated (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

LEVEL CROSSING UPGRADE

Table 8.19 summarises the identified noise impacts.

Table 8.19 Maximum residual noise impacts—Level crossing upgrade

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Preliminary works (unmitigated)	235	281	281	281	0	281	5 days
Strip level crossing panels (mitigated)	34	106	106	275	0	223	1 day
Maximum predicted noise level (at worst impacted receiver)							
Preliminary works (unmitigated)	71dB (L _{Aeq} (15 minutes))					73dB (L _{A1} (1 minutes))	5 days
Strip level crossing panels (mitigated)	61dB (L _{Aeq} (15 minutes))					64dB (L _{A1} (1 minutes))	1 day

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to the removal of the level crossing panels. The impacts show a moderate reduction in potentially noise-impacted receivers during most periods; however, night-time impacts are barely reduced. It is noted that a moderate number of sensitive receivers remain affected, particularly during night-time hours.

SANDY CREEK BRIDGE

Table 8.20 summarises the identified noise impacts.

Table 8.20 Maximum residual noise impacts—Sandy Creek Bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Trackworks (unmitigated)	186	211	211	234	0	221	3 days
Trackworks (mitigated)	44	129	129	234	0	221	
Maximum predicted noise level (at worst-impacted receiver)							
Trackworks (unmitigated)	68dB (L _{Aeq} (15 minutes))					71dB (L _{A1} (1 minutes))	3 days
Trackworks (mitigated)	68dB (L _{Aeq} (15 minutes))					71dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show a reduction in potentially noise impacted receivers during daytime and some out of hours work, however no reduction in night-time impacts and sleep disturbance impacts are noted. It is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

PEARSON STREET BRIDGE

Table 8.21 summarises the identified noise impacts.

Table 8.21 Maximum residual noise impacts—Pearson Street bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Earthworks (unmitigated)	580	1,798	1,925	2,424	8	1,798	5 days
Earthworks (mitigated)	28	82	100	770	0	82	
Maximum predicted noise level (at worst impacted receiver)							
Earthworks (unmitigated)	82dB (L _{Aeq} (15 minutes))					84dB (L _{A1} (1 minutes))	5 days
Earthworks (mitigated)	70dB (L _{Aeq} (15 minutes))					72dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show a large reduction in potentially noise impacted receivers. Night-time impacts are reduced by 75 per cent and sleep disturbance impacts are reduced by 95 per cent. Highly noise-affected receivers are eliminated (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

CASSIDY PARADE PEDESTRIAN BRIDGE

Table 8.22 summarises the identified noise impacts.

Table 8.22 Maximum residual noise impacts—Cassidy Parade pedestrian bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Demolition (unmitigated)	366	1,769	1,846	1,959	16	1,408	5 days
Piling (mitigated)	40	618	869	1,228	40	163	10 days
Maximum predicted noise level (at worst impacted receiver)							
Demolition (unmitigated)	100dB (L _{Aeq} (15 minutes))					100dB (L _{A1} (1 minutes))	5 days
Piling (mitigated)	80dB (L _{Aeq} (15 minutes))					81dB (L _{A1} (1 minutes))	10 days

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to piling. The impacts show a moderate reduction in potentially noise impacted receivers during most periods, and a large reduction in sleep disturbance impacts (90 per cent). Highly noise-affected receivers are reduced from 16 to 2 receivers (>75dB L_{Aeq}(15 minute)). It is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

EDMONDSON STREET BRIDGE

Table 8.23 summarises the identified noise impacts.

Table 8.23 Maximum residual noise impacts—Edmondson Street bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Preliminary works (unmitigated)	243	1,517	1,620	1,758	34	632	10 days
Service relocations (mitigated)	74	480	743	1,028	11	125	20 days
Maximum predicted noise level (at worst impacted receiver)							
Installation of decks (unmitigated)	115dB (L _{Aeq} (15 minutes))					119dB (L _{A1} (1 minutes))	10 days
Service relocations (mitigated)	109dB (L _{Aeq} (15 minutes))					110dB (L _{A1} (1 minutes))	20 days

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to service relocations. The impacts show a moderate reduction in potentially noise-impacted receivers during most periods, and a large reduction in sleep disturbance impacts (80 per cent). Highly noise-affected receivers are reduced by 66 per cent (>75dB L_{Aeq}(15 minute)). It is noted that a large number of sensitive receivers remain affected, particularly during night-time hours and that the nearest receivers may experience noise levels approaching 110dB.

WAGGA WAGGA STATION PEDESTRIAN BRIDGE

Table 8.24 summarises the identified noise impacts.

Table 8.24 Maximum residual noise impacts—Wagga Wagga Station pedestrian bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Demolition (unmitigated)	177	1,219	1,298	1,368	8	324	5 days
Demolition (mitigated)	15	170	170	420	0	19	
Maximum predicted noise level (at worst impacted receiver)							
Demolition (unmitigated)	86dB (L _{Aeq} (15 minutes))					88dB (L _{A1} (1 minutes))	5 days
Demolition (mitigated)	74dB (L _{Aeq} (15 minutes))					76dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show a large reduction in potentially noise-impacted receivers. Night-time impacts are reduced by 75 per cent and sleep disturbance impacts are reduced by 95 per cent; however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

WAGGA WAGGA GANTRY REMOVAL

Table 8.25 summarises the identified noise impacts.

Table 8.25 Maximum residual noise impacts—Wagga Wagga gantry removal

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Installation of cabling and conduits (unmitigated)	90	177	198	666	2	228	5 days
Installation of cabling and conduits (mitigated)	12	33	40	196	0	50	5 days
Maximum predicted noise level (at worst impacted receiver)							
Installation of cabling and conduits (unmitigated)	77dB (L _{Aeq} (15 minutes))					79dB (L _{A1} (1 minutes))	5 days
Installation of cabling and conduits (mitigated)	68dB (L _{Aeq} (15 minutes))					70dB (L _{A1} (1 minutes))	5 days

Following the implementation of standard mitigation measures, predicted impacts show a large reduction in potentially noise impacted receivers. Night-time impacts are reduced by 70 per cent and sleep disturbance impacts are reduced by 80 per cent. Highly noise-affected receivers are eliminated (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

WAGGA WAGGA YARD CLEARANCES

Table 8.26 summarises the identified noise impacts.

Table 8.26 Maximum residual noise impacts—Wagga Wagga Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Offline widenings (unmitigated)	349	682	791	1,635	31	791	20 days
Offline widenings (mitigated)	60	115	128	599	0	128	
Maximum predicted noise level (at worst impacted receiver)							
Offline widenings (unmitigated)	86dB (L _{Aeq} (15 minutes))					86dB (L _{A1} (1 minutes))	20 days
Offline widenings (mitigated)	74dB (L _{Aeq} (15 minutes))					74dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show a large reduction in potentially noise impacted receivers. Night-time impacts are reduced by 70 per cent and sleep disturbance impacts are reduced by 80 per cent. Highly noise-affected receivers are eliminated (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

BOMEN YARD CLEARANCES

Table 8.27 summarises the identified noise impacts.

Table 8.27 Maximum residual noise impacts—Bomen Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Offline widenings (unmitigated)	0	0	0	13	0	0	20 days
Offline widenings (mitigated)	0	0	0	0	0	0	
Maximum predicted noise level (at worst impacted receiver)							
Offline widenings (unmitigated)	51dB (L _{Aeq} (15 minutes))					52dB (L _{A1} (1 minutes))	20 days
Offline widenings (mitigated)	27dB (L _{Aeq} (15 minutes))					28dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts are eliminated.

WAGGA WAGGA PRECINCT RESIDUAL CONSTRUCTION NOISE SUMMARY

The implantation of standard mitigation measures is expected to reduce potential noise levels by a substantial margin at all enhancement sites; however, noise impacts are still predicted to generate substantial impacts, particularly during night-time works. Loudest activities include earthworks during site establishment and demolition works, in addition to works during possessions where OOH work is required. Following the adoption of standard mitigation measures, the loudest daytime work stage at the worst impacted location (Cassidy Parade) changes from demolition to piling works. No reduction in sleep disturbance impacts have been predicted to occur at the worst affected Sandy Creek Bridge location due to the nature of trackworks during a possession.

Noise impacts are predicted at a number of locations across several stages of construction, during standard (daytime) hours and OOH works periods. Further noise management and mitigation measures would therefore be required to be implemented during construction of the proposal within the extent that is reasonable and feasible. Details of such noise mitigation are included in section 8.2.

8.3.1.4 JUNE PRECINCT

The construction noise results that include the standard noise mitigation measures (mitigated predictions) are presented in Appendix C-8. The standard, feasible noise management measures adopted for this precinct are presented in Table 8.28.

Table 8.28 Adopted standard noise management measures

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
All sites		
Site establishment	6, 7	15
Demobilisation and rehabilitation	6, 7	15
Site compounds	2, 3, 5, 6	19

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
Harefield Yard and Junee to Illabo track re-alignment		
Offline widenings	4, 7	12
Track re-alignment (<300mm)	7	8
Track realignment (>300mm)	4, 7	10
Rebuild track	7	8
Junee bridge, Harefield gantry removal		
Install cabling/conduits	7	10
Signalling works	–	–
Cut gantry bolts	–	–
Remove gantry	7	8
Remove footings	1, 7	12
Backfill footings	1, 7	12
Olympic Highway Bridge		
Track works	4, 7	10
Earthworks	1, 7	12
Structure works	1, 8	15
Concreting works	7	10
Crane operations	–	–
Installation of fittings	–	–
Lifting of truss and deck	1, 7	8
Kemp Street bridge		
Demolition and earthworks	1, 7	12
Piling	1	5
Concreting works	7	10
Lifting of truss and deck	1, 7	8
Install fittings	7	10
Asphalting	1, 7	12

(1) Refer Table 8.2.

The residual impacts are presented graphically as maps of predicted noise levels for the noisiest construction stage in Appendix D-4 for both daytime and night-time hours. This map provides an indication of the impacted areas and the extent of the maximum noise impacts at each work location.

Whilst the implementation of standard mitigation measures will reduce the extent of noise impacts within the Hume/Lockhart precinct, large numbers of receivers will remain noise affected in some areas. This includes potential sleep disturbance impacts.

HAREFIELD YARD CLEARANCES

Table 8.29 summarises the identified noise impacts.

Table 8.29 Maximum residual noise impacts—Harefield Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Trackworks (unmitigated)	5	5	5	5	2	5	60 hrs
Trackworks (mitigated)	5	5	5	5	0	5	
Maximum predicted noise level (at worst impacted receiver)							
Trackworks (unmitigated)	79dB (L _{Aeq} (15 minutes))					82dB (L _{A1} (1 minutes))	60 hrs
Trackworks (mitigated)	69dB (L _{Aeq} (15 minutes))					72dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show no reduction in the number of potentially noise-impacted receivers during all time periods. Highly noise-affected receivers are eliminated (>75dB L_{Aeq}(15 minute)).

KEMP STREET BRIDGE

Table 8.30 summarises the identified noise impacts.

Table 8.30 Maximum residual noise impacts—Kemp Street bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Demolition and earthworks (unmitigated)	477	477	573	812	11	653	10 days
Piling (mitigated)	81	81	143	622	5	176	10 days
Maximum predicted noise level (at worst impacted receiver)							
Demolition and earthworks (unmitigated)	105dB (L _{Aeq} (15 minutes))					110dB (L _{A1} (1 minutes))	10 days
Piling (mitigated)	89dB (L _{Aeq} (15 minutes))					90dB (L _{A1} (1 minutes))	10 days

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to piling. The impacts show a moderate reduction in potentially noise impacted receivers during most periods, and a large reduction in sleep disturbance impacts (75 per cent). Highly noise-affected receivers are reduced from 11 to 5 (>75dB L_{Aeq}(15 minute)). It is noted that a large number of sensitive receivers remain affected, particularly during night-time hours and that the nearest receivers may experience noise levels in the order of 90dB.

JUNEE STATION PEDESTRIAN BRIDGE/HAREFIELD GANTRY REPLACEMENT

Table 8.31 summarises the identified noise impacts.

Table 8.31 Maximum residual noise impacts—Junee Station pedestrian bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Installation of cabling and conduits (unmitigated)	364	364	482	857	0	549	1 day
Installation of cabling and conduits (mitigated)	0	0	0	0	0	0	1 day
Maximum predicted noise level (at worst impacted receiver)							
Installation of cabling and conduits (unmitigated)	74dB (L _{Aeq} (15 minutes))					77dB (L _{A1} (1 minutes))	1 day
Installation of cabling and conduits (mitigated)	58dB (L _{Aeq} (15 minutes))					61dB (L _{A1} (1 minutes))	1 day

Following the implementation of standard mitigation measures, predicted impacts are eliminated.

JUNEE YARD CLEARANCES

Table 8.32 summarises the identified noise impacts.

Table 8.32 Maximum residual noise impacts—Junee Yard clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Offline widenings (unmitigated)	482	482	613	885	1	161	20 days
Offline widenings (mitigated)	34	34	47	482	0	6	
Maximum predicted noise level (at worst impacted receiver)							
Offline widenings (unmitigated)	77dB (L _{Aeq} (15 minutes))					78dB (L _{A1} (1 minutes))	20 days
Offline widenings (mitigated)	65dB (L _{Aeq} (15 minutes))					66dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show a large reduction in potentially noise-impacted receivers. Night-time impacts are reduced by 55 per cent and sleep disturbance impacts are reduced by 97 per cent. Highly noise-affected receivers are eliminated (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours.

OLYMPIC HIGHWAY UNDERBRIDGE

Table 8.33 summarises the identified noise impacts.

Table 8.33 Maximum residual noise impacts—Olympic Highway under-bridge

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Crane operations (unmitigated)	1,007	1,007	1,023	1,103	68	1,075	4 days
Crane operations (mitigated)	655	655	786	1,042	31	990	
Maximum predicted noise level (at worst impacted receiver)							
Crane operations (unmitigated)	88dB (L _{Aeq} (15 minutes))					93dB (L _{A1} (1 minutes))	4 days
Crane operations (mitigated)	80dB (L _{Aeq} (15 minutes))					85dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show a minor reduction in potentially noise impacted receivers. Night-time impacts are reduced by 9 per cent and sleep disturbance impacts are reduced by a similar margin. Highly noise affected receivers are more than halved (>75dB L_{Aeq}(15 minute)); however, it is noted that a large number of sensitive receivers remain affected, particularly during night-time hours and that sleep disturbance risk remains high.

JUNEE TO ILLABO CLEARANCES

Table 8.34 summarises the identified noise impacts.

Table 8.34 Maximum residual noise impacts—Junee to Illabo clearances

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURB-ANCE	APPROX-IMATE DURATION
Number of predicted exceedances							
Preliminary works (unmitigated)	54	54	54	54	53	54	15 days
Preliminary works (mitigated)	54	54	54	54	40	53	
Maximum predicted noise level (at worst impacted receiver)							
Preliminary works (unmitigated)	105dB (L _{Aeq} (15 minutes))					105dB (L _{A1} (1 minutes))	15 days
Preliminary works (mitigated)	90dB (L _{Aeq} (15 minutes))					90dB (L _{A1} (1 minutes))	

Following the implementation of standard mitigation measures, predicted impacts show no reduction in the number of potentially noise impacted receivers. Highly noise-affected receivers are reduced by 25 per cent (>75dB L_{Aeq}(15 minute)). It is noted that a large number of sensitive receivers remain affected, particularly during night-time hours and that some receivers may be exposed to noise in the order of 90dB. Sleep disturbance risk remains high.

KEMP STREET BRIDGE DIVERSION ROADWORKS

Table 8.35 summarises the identified noise impacts.

Table 8.35 Maximum residual noise impacts—Kemp Street bridge diversion roadworks

WORST CASE SCENARIO	STANDARD HOURS	OUT OF HOURS - DAY	OUT OF HOURS - EVENING	OUT OF HOURS - NIGHT	HIGHLY NOISE AFFECTED	SLEEP DISTURBANCE	APPROXIMATE DURATION
Number of predicted exceedances							
Earthworks (unmitigated)	446	446	566	863	12	210	15 days
Furniture installation / line marking (mitigated)	133	133	184	703	6	100	1 day
Maximum predicted noise level (at worst impacted receiver)							
Earthworks (unmitigated)	101dB (L _{Aeq} (15 minutes))					104dB (L _{A1} (1 minutes))	15 days
Furniture installation / line marking (mitigated)	95dB (L _{Aeq} (15 minutes))					100dB (L _{A1} (1 minutes))	1 day

Following the implementation of standard mitigation measures, the loudest work stage is likely to change to the installation of road furniture and line marking. The impacts show a moderate reduction in potentially noise-impacted receivers during most periods, and a reduction in sleep disturbance impacts of approximately 50 per cent. Highly noise affected receivers are also halved (>75dB L_{Aeq}(15 minute)). It is noted that a large number of sensitive receivers remain affected, particularly during night-time hours and that the nearest receivers may experience noise levels in the order of 95dB.

JUNEE PRECINCT RESIDUAL CONSTRUCTION NOISE SUMMARY

The implementation of standard mitigation measures is expected to reduce potential noise levels by a substantial margin at all enhancement sites; however, noise impacts are still predicted to generate substantial impacts, particularly during night-time works. Loudest activities include truss works and the installation of road furniture, in addition to works during possessions where OOH work is required. Up to 40 properties may be highly impacted at the worst affected enhancement site (Junee to Illabo). This is a reduction from 53 without mitigation. Sleep disturbance impacts have been predicted to occur at up to 990 properties (a reduction from 1,053) during works at the Olympic Highway under-bridge.

Noise impacts are predicted at a number of locations across several stages of construction, during standard (daytime) hours and OOH works periods. Further noise management and mitigation measures would therefore be required to be implemented during construction of the proposal within the extent that is reasonable and feasible. Details of such noise mitigation are included in section 8.2.

The mitigation measures specified above are anticipated to reduce the likelihood and/or consequence of the identified risks. Where an identified issues/risk is reduced but not eliminated, it would be assessed further through all project stages to determine if further action is required.

This plan would identify the requirements for noise and vibration management based on a review of the relevant information, including the predicted noise levels, safe working distances and identified affected sensitive receivers.

The mitigation measures specified above are anticipated to reduce the likelihood and/or consequence of the identified risks, however, are not likely to eliminate the risk of construction noise impacts. Where an identified issues/risk is reduced but not eliminated, it would be assessed further through all project stages to determine if further action is required.

8.3.2 SUMMARY OF MITIGATION AND MANAGEMENT MEASURES

Construction works can be inherently noisy and create localised ground-borne noise and vibration. The feasible and reasonable management and mitigation measures considered in this section will reduce noise and vibration emissions. Nonetheless, even where management levels are met, there can be potential for impacts and complaints.

The design and development of the construction works shall continue beyond the EIS stage of the proposal. The proposal will implement the management measures detailed in section 8.2 prior to the commencement of noise and/or vibration generating works to reduce the extent of any identified impacts.

9 CONCLUSION

The construction of the proposal has the potential to be a source of noise, ground-borne noise and ground-borne vibration at sensitive receivers adjacent to the enhancement sites.

9.1 NOISE

This assessment has determined there shall be works that are inherently noisy, such as demolition, piling, trackworks and earthworks. A range of feasible and reasonable management measures are likely to be needed to reduce noise levels at sensitive receivers and mitigate the potential for associated impacts, including sleep disturbance during night-time working.

The implementation of measures such as temporary screening and the use of equipment noise controls, such as residential class mufflers or smaller equipment, has been assessed to reduce noise levels at the most sensitive receivers and limit the potential for works to cause impacts. Mitigation measures identified are predicted to reduce the magnitude of impacts but will not significantly reduce the number of affected properties, particularly during possessions and night work. Further mitigation and management measures will be required as part of the detailed assessment prior to construction to define all possible measures to further reduce impacts and, where possible, achieve compliance with NMLs.

In all cases, the works associated with the construction of the proposal are temporary and, due to the transient nature of the works, the typical worst-case noise levels presented in this report are not expected to be experienced at all sensitive receivers throughout all of the works. Nonetheless, there remains potential for noise-related impacts even where mitigation is implemented.

9.2 GROUND-BORNE VIBRATION

An assessment of ground-borne vibration determined the vibration management levels can be met at all sensitive receivers where works are undertaken within recommended safe working distances.

9.3 CONSTRUCTION ROAD TRAFFIC

Construction road traffic is likely to remain on main roads and, as such, is unlikely to generate substantial noise, although several minor impacts may be noted where heavy vehicles are required to use local roads in Wagga Wagga.

The noise and vibration from road traffic due to the construction works shall continue to be assessed during the detailed design and construction of the proposal. This will include further calculation and modelling to confirm the outcomes of this assessment and verify the requirements for environmental management.

9.4 CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN

It is recommended a Construction Noise and Vibration Management Plan is prepared as part of the environmental management implemented during the construction phase. This plan will detail all sensitive receivers, required noise and vibration management measures, procedures for complaint investigation and corrective actions.

9.5 OPERATIONAL NOISE (NON-RAIL)

The proposal includes upgrades to facilitate the interface between the railway corridor and local road network.

The assessment found that noise levels at all road upgrade locations are predicted to be reduced or increase by less than 2dB at all noise sensitive receiver locations and, as such, noise impacts are unlikely to be noticeable. This assessment found that road traffic noise would not exceed RNP guidelines and as such no further assessment or consideration of noise mitigation as part of the road upgrades is therefore required.

9.6 SUMMARY

Where the proposal remains consistent with this assessment and allowing for the implementation of the recommended noise and vibration mitigation measures, the proposal is expected to achieve the objectives of the SEARS for the management of noise and vibration from road traffic and construction works.

10 REFERENCES

- Australian and New Zealand Environment Council. (1990). *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration*.
- Australian Standard. (1997). *1055:1997 – Acoustics – Description and Measurement of Environmental Noise*.
- British Standards. (1993). *7358-2: Evaluation and measurement for vibration in buildings. Guide to damage levels from ground-borne vibration*.
- Department of Environment & Climate Change (DECC). (2009). *Interim Construction Noise Guideline*.
- Department of Environment and Conservation. (2006). *Assessing Vibration: a technical guideline*.
- German Standards. (2016). *DIN 4150-3: Structural Vibration – effects of vibration on structures*.
- Department of Climate Change and Water (DECCW). (2011). *Road Noise Policy*.
- NSW EPA. (2017). *Noise Policy for Industry*.
- NSW EPA. (2020). *Draft Construction Noise Guideline*.
- Roads and Maritime. (2016). *Construction Noise and Vibration Guideline*.
- Transport for NSW. (2019). *Construction Noise and Vibration Strategy*.
- United States of America Department of Transportation Federal Transit Administration. (2006). *Transit Noise and Vibration Impact Assessment Manual*.

TECHNICAL PAPER 06

Noise and vibration (non-rail)

Appendix A Detailed noise monitoring results

ALBURY TO ILLABO ENVIRONMENTAL IMPACT STATEMENT



APPENDIX A-1

NOISE MONITORING INSTRUMENTATION AND QUALITY CONTROL

NOISE MONITORING INSTRUMENTATION AND QUALITY CONTROL

All the monitoring equipment was fitted with windshields and were checked with a field calibrator before and after monitoring. No significant drift in calibration ($\pm 0.5\text{dB}$) was noted for any of the equipment.

Monitoring data has been excluded during periods of adverse weather, where wind speeds (measured at approximately 1.5m above ground level) were greater than 5m per second or during significant rainfall. Based on the recorded weather data, the monitoring undertaken is adequate to define rating background noise levels necessary for the assessment.

All of the noise monitoring equipment used has a current calibration certificate (National Association of Testing Authorities, NATA) at the time of use. Details of all equipment used to conduct the noise survey are presented in the table below.

Table A.1 Noise monitoring equipment

LOCATION	SURVEY METHOD	MANUFACTURER AND MODEL	SERIAL NO.	CALIBRATION DATE
NM01	Unattended measurement	ARL Ngara	203865	Hired (certificate not able to be provided)
NM02	Unattended measurement	ARL Ngara	203867	22/02/21
NM03	Unattended measurement	ARL Ngara	203866	Hired (certificate not able to be provided)
NM04	Unattended measurement	Rion NL-42	785234	30/10/20
NM05	Unattended measurement	ARL Ngara	878043	10/02/21
NM06	Unattended measurement	Rion NL-42	785237	22/10/20
NM07	Unattended measurement	Rion NL-42	709596	02/02/21
NM08	Unattended measurement	Rion NL-42	785234 / 509281	02/02/21 & 05/01/21
NM09	Unattended measurement	Rion NL-42	609516 / 709627	02/02/21 & 05/01/21
NM11	Unattended measurement	Rion NL-42*	269509	11/06/19
NM12	Unattended measurement	Rion NL-42	709623	02/02/21
NM13	Unattended measurement	Rion NL-42	709627	05/01/21
NM14	Unattended measurement	Rion NL-42	709581	02/02/21
NM15	Unattended measurement	Rion NL-42*	296507	12/06/19
All locations	Attended measurement	Norsonic 140	1406502	04/02/21
All locations	Attended measurement & unattended measurement	Rion NC 73 (calibrator)*	11248294	19/07/19

APPENDIX A-2

SUMMARY OF ATTENDED NOISE MEASUREMENT RESULTS

SUMMARY OF ATTENDED NOISE MEASUREMENT RESULTS

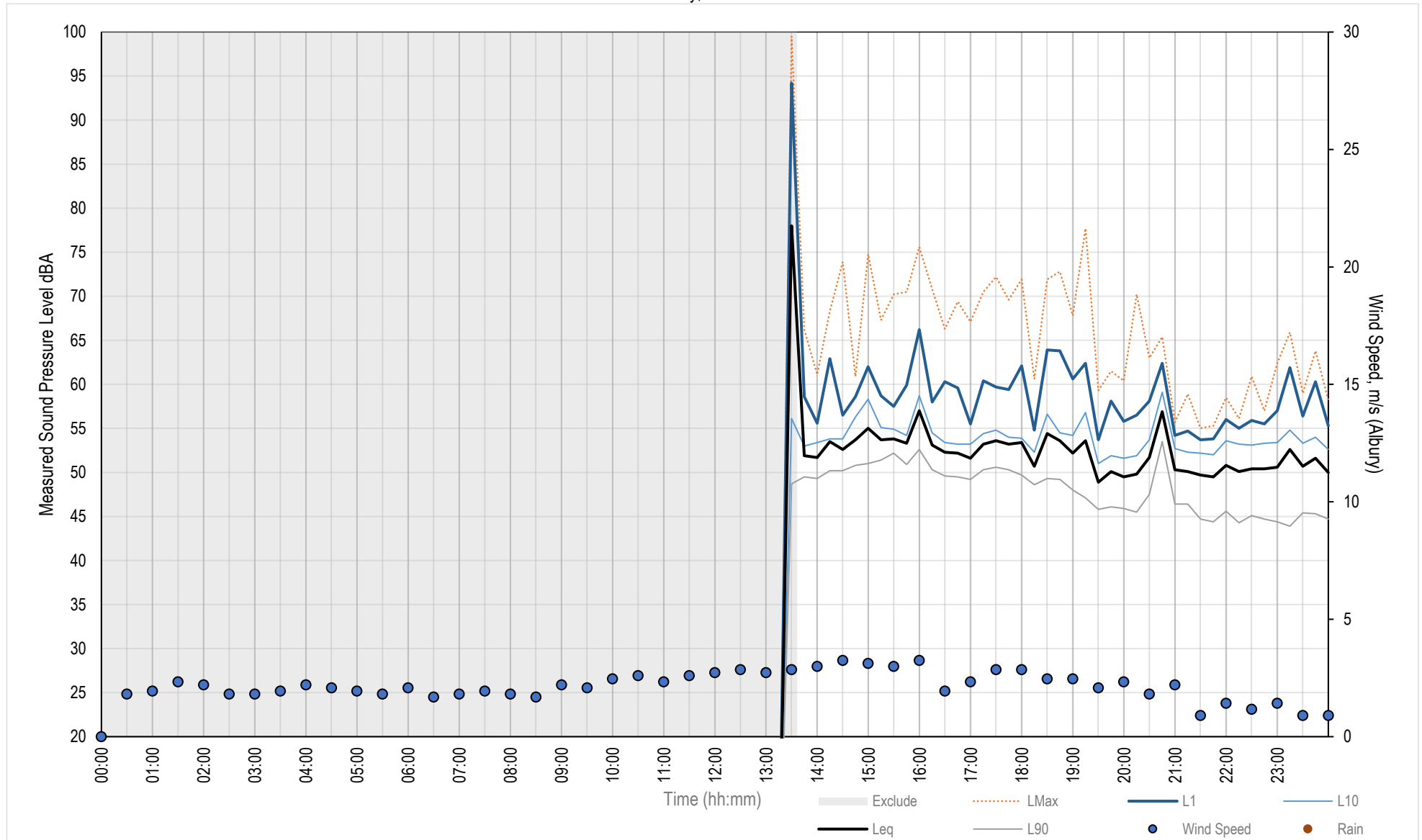
ID	ADDRESS	dBA L _{eq} (15 min)	dBA L ₉₀ (15 min)	OBSERVATIONS
1	587 Abercorn Street, Albury	51	49	Background noise environment characterized by insects, with infrequent vehicle movements nearby. Noise events from vehicle passbys along Abercorn Street were noted during the attended period.
2a	The Scotts School, Albury	55	51	Background noise environment characterized by faint distant traffic noise from Hume Highway and general footfall of students moving between classes in the distance. Site is located adjacent to the rail line however no passbys were noted during the attended period.
2b	322 Tribune Street, North Albury	51	47	Background noise environment characterized by constant traffic along the Hume Freeway. A noise barrier is separating the measurement location from the freeway.
3	19 Sanctuary Lane, Ettamogah	53	46	Background noise environment characterized by insects, with infrequent vehicle movements nearby. Closures on Wagga Road meant that minimal road traffic noise was noted during the attended period.
4	398 Perryman Lane, Table Top	51	46	Background noise environment characterized by constant traffic along the Hume Freeway.
5	16 Melville Street, Culcairn	61	53	Background noise environment characterized by constant traffic along the Olympic Highway. Site is located adjacent to the rail line however no passbys were noted during the attended period.
6	23 Ivor Street, Henty	51	45	Background noise environment characterized by constant traffic along the Olympic Highway. Site is located adjacent to the rail line however no passbys were noted during the attended period.
7	1-3 Plunkett Street, Yerong Creek	48	41	Background noise environment characterized by constant traffic along the Plunkett Street. Site is located adjacent to the rail line however no passbys were noted during the attended period.
8	89 Nicholas Street, The Rock	52	42	Background noise environment characterized by constant traffic along Nicholas Street. Site is located adjacent to the rail line however no passbys were noted during the attended period.
9	2 Morgan Street, Uranquinty	55	47	Background noise environment characterized by constant traffic along the Olympic Highway. Site is located adjacent to the rail line however no passbys were noted during the attended period.
10	Olympic Hwy	71	45	Background noise environment characterized by constant traffic along the Olympic Highway. Site is located adjacent to the rail line however no passbys were noted during the attended period.
11	8 Peacocke Drive, Turvey	56	51	Background noise environment characterized by constant traffic along Urana Street. Site is located adjacent to the rail line however no passbys were noted during the attended period.

ID	ADDRESS	dBA L _{eq} (15 min)	dBA L ₉₀ (15 min)	OBSERVATIONS
12	Kildare Catholic College	52	50	Background noise environment characterized by constant traffic along the Edmondson Street. Site is located adjacent to the rail line however no passbys were noted during the attended period.
13	1296 Byrne Rd	65	51	Background noise environment characterized by consistent traffic along Byrnes Road. Noise events at Harefield station including freight passbys and unloading of shipping containers were noted during the attended period.
14	19 Railway Parade, Junee	47	41	Background noise environment characterized by insects, faint distant traffic. Noise events from sporadic vehicle passbys along Edgar Street were noted during the attended period.
15	18 Turland Street	65	46	Background noise environment characterized by sporadic traffic along the Olympic Highway. Freight train passbys were noted during the attended period.

APPENDIX A-3 UNATTENDED NOISE MONITORING RESULTS

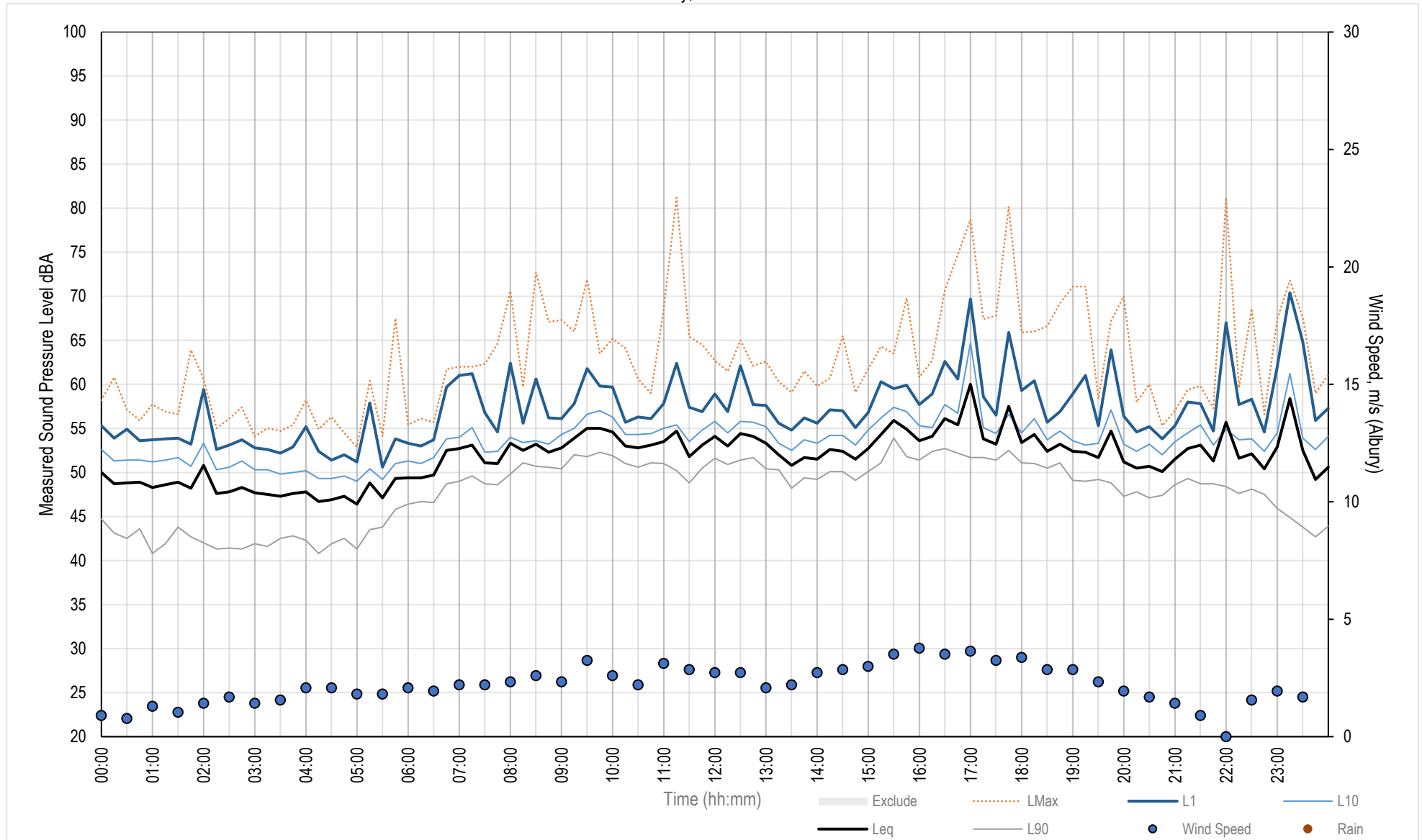
Measured Noise Levels - 587 Abercorn St, South Albury

Wednesday, 24 March 2021



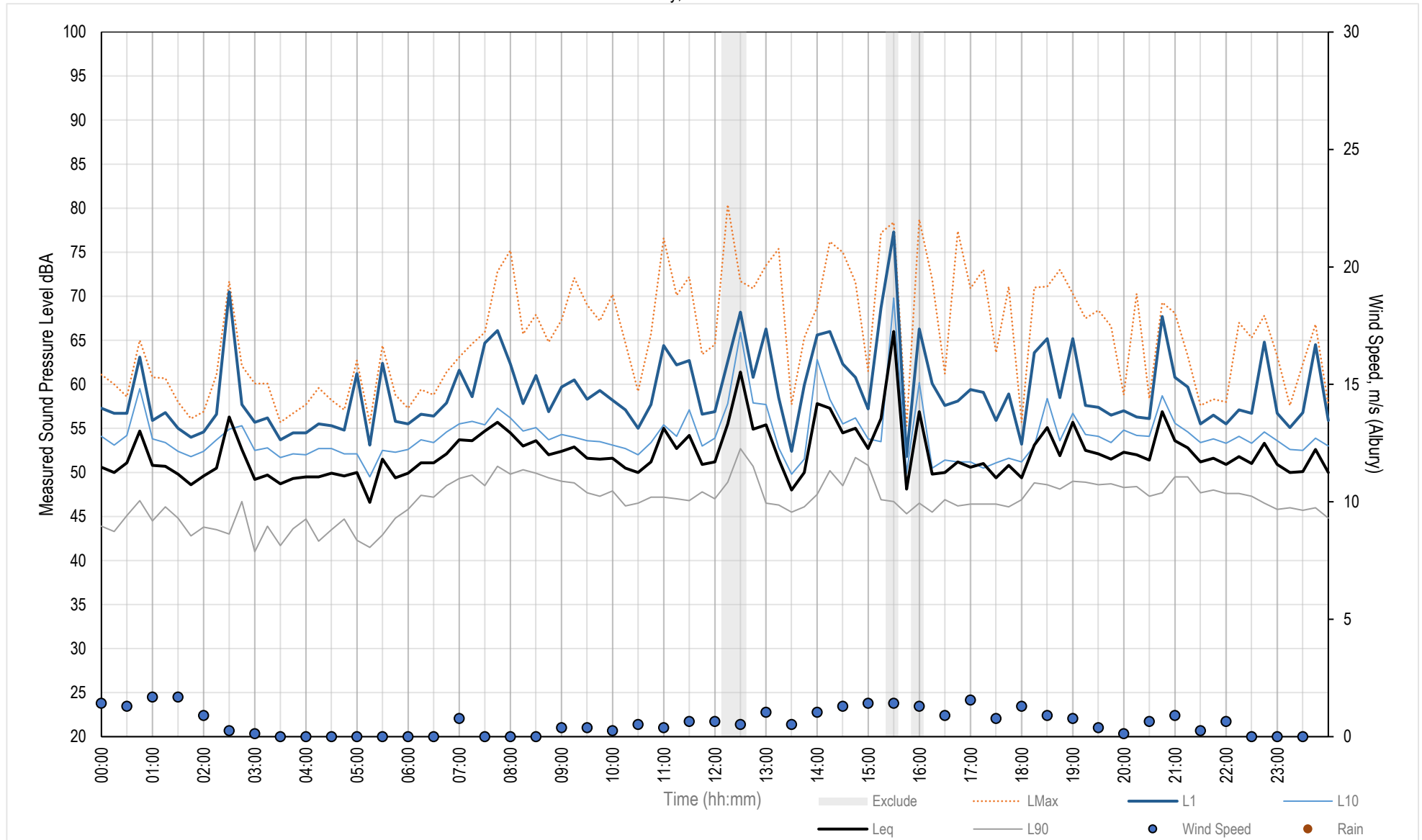
Measured Noise Levels - 587 Abercorn St, South Albury

Thursday, 25 March 2021



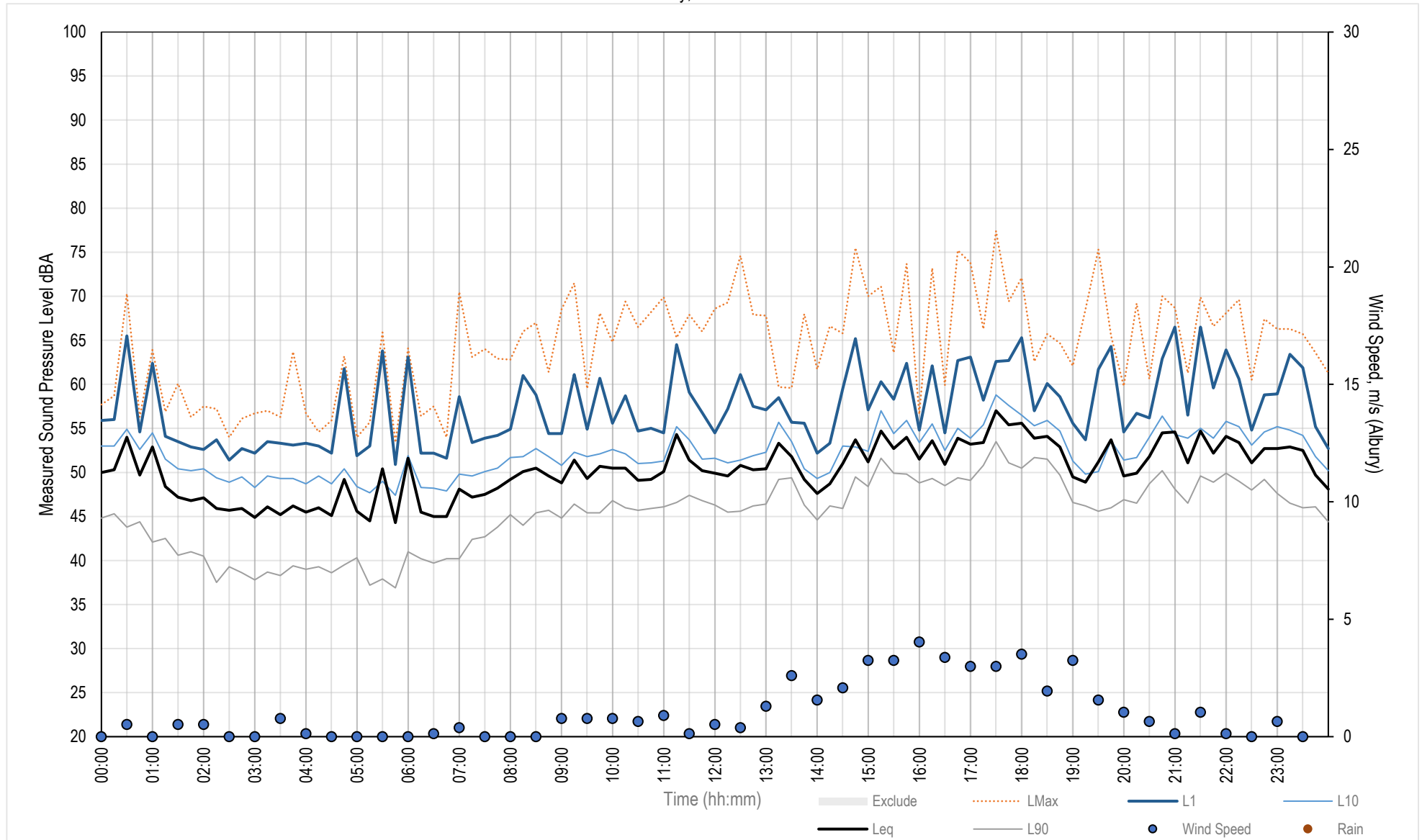
Measured Noise Levels - 587 Abercorn St, South Albury

Friday, 26 March 2021



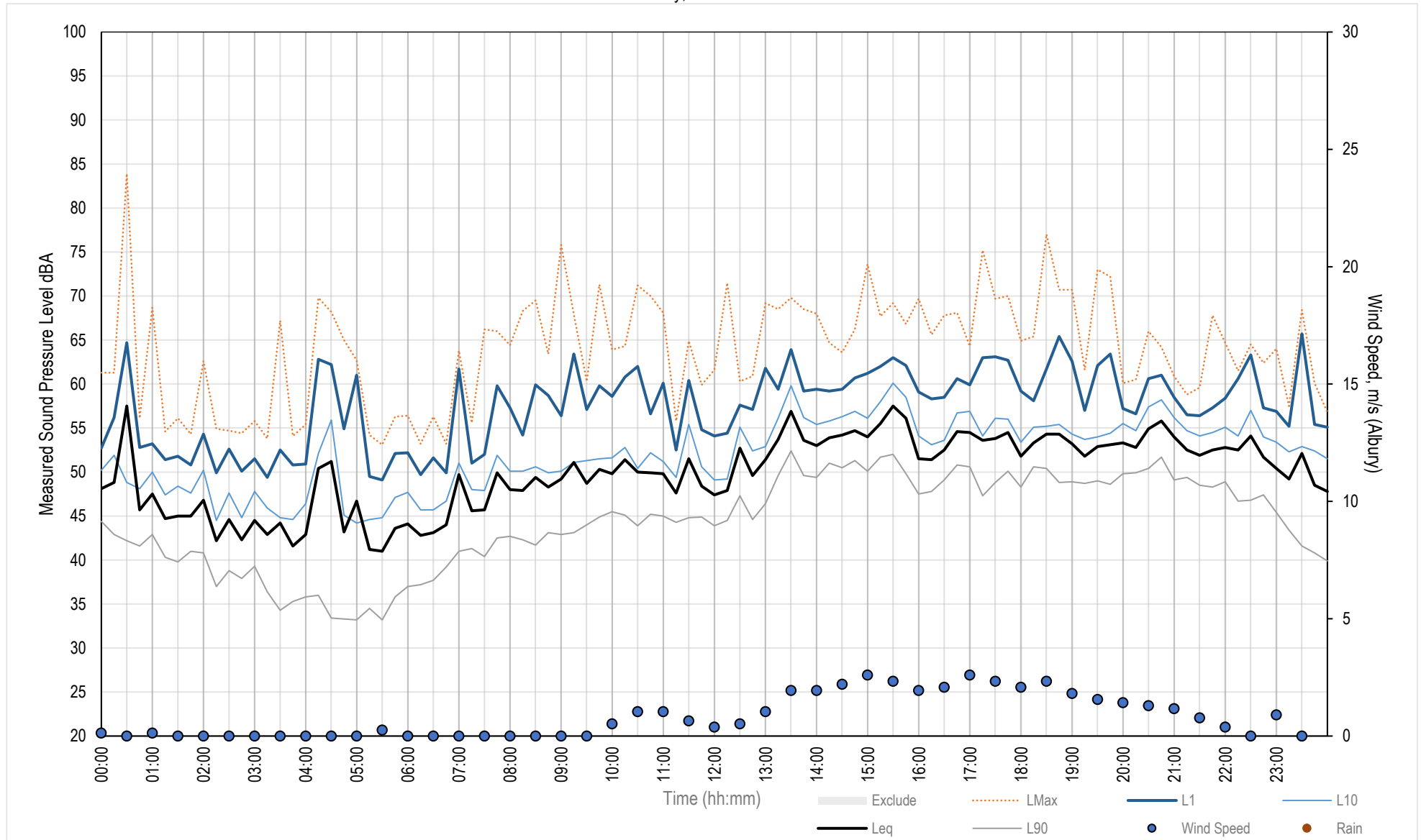
Measured Noise Levels - 587 Abercorn St, South Albury

Saturday, 27 March 2021



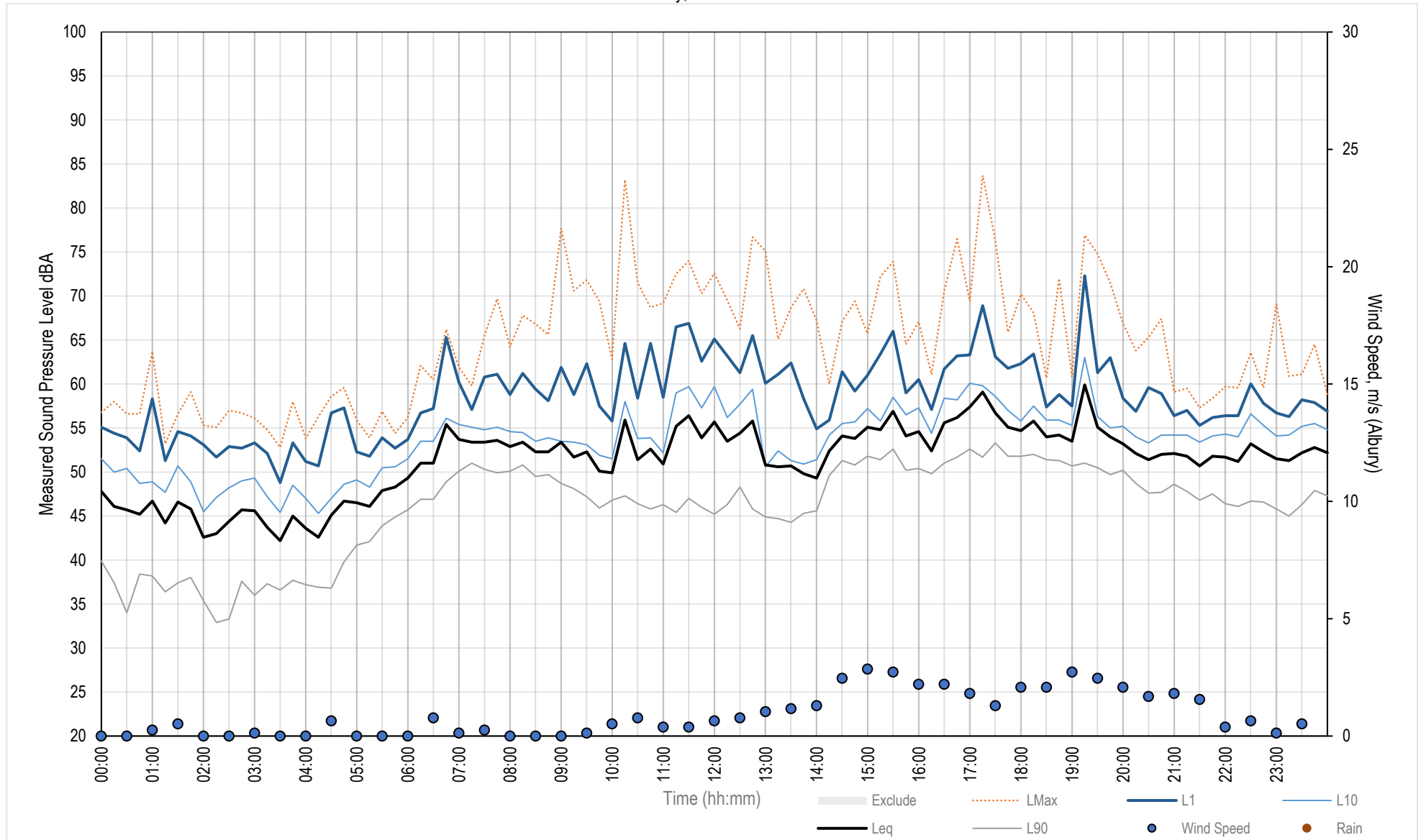
Measured Noise Levels - 587 Abercorn St, South Albury

Sunday, 28 March 2021



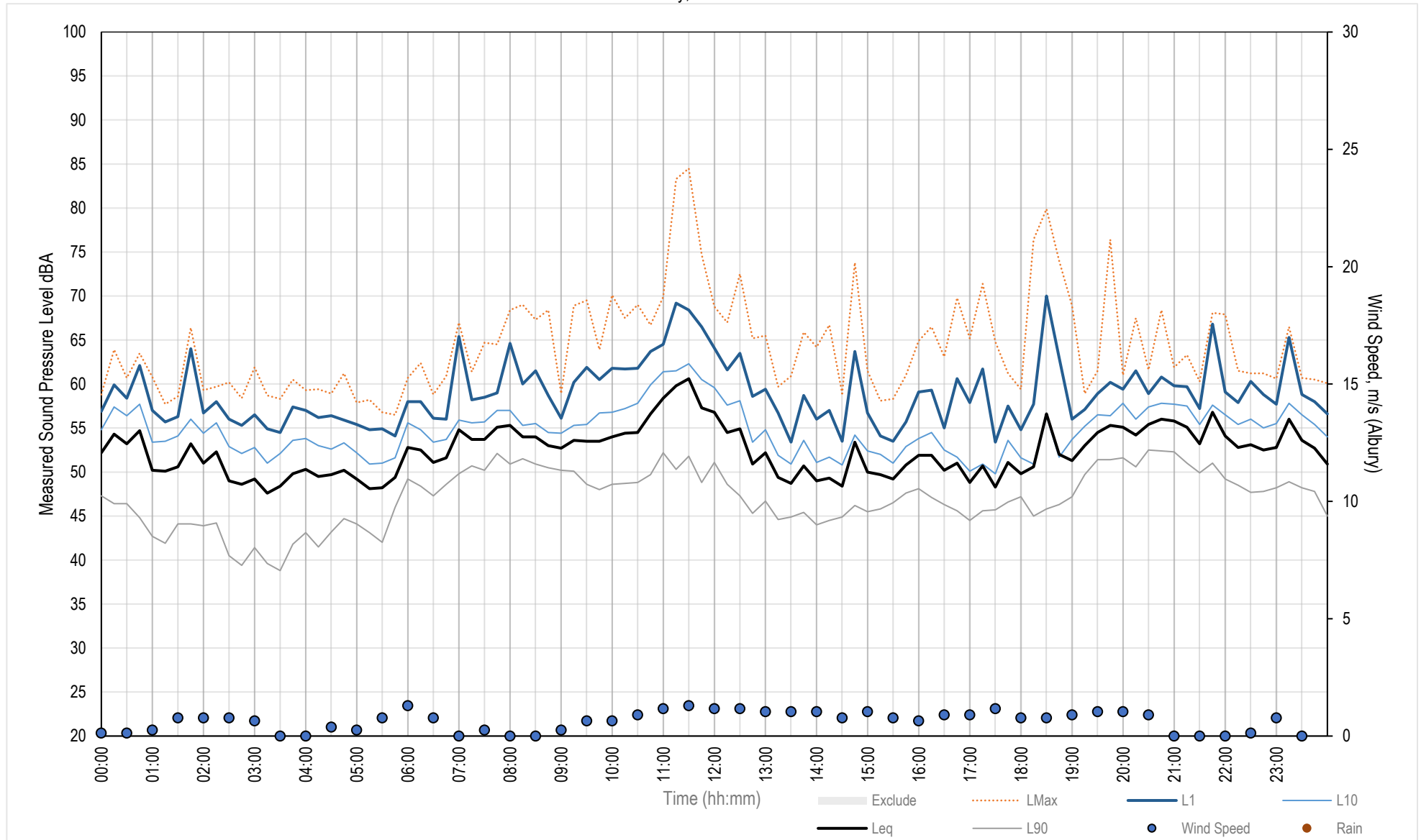
Measured Noise Levels - 587 Abercorn St, South Albury

Monday, 29 March 2021



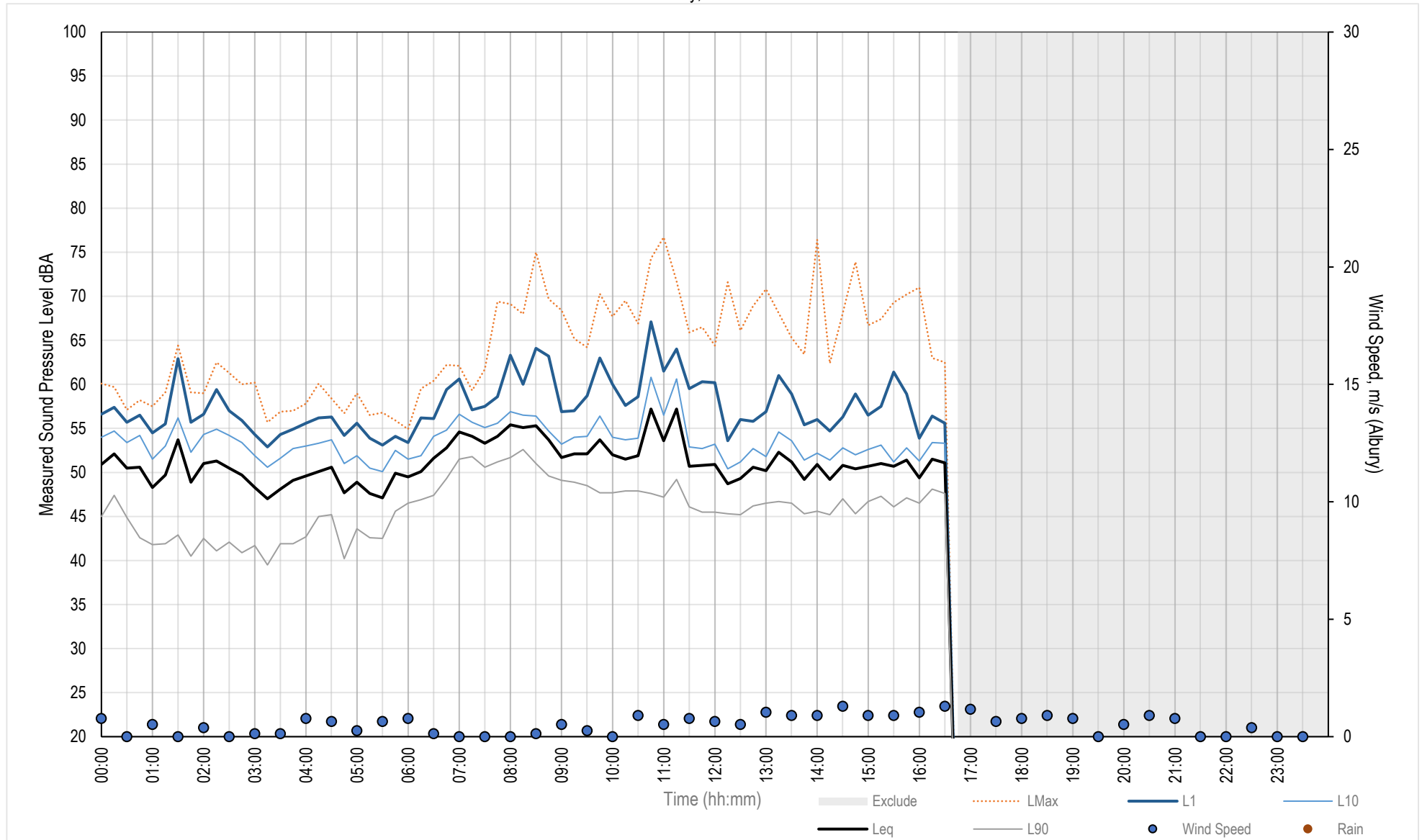
Measured Noise Levels - 587 Abercorn St, South Albury

Tuesday, 30 March 2021



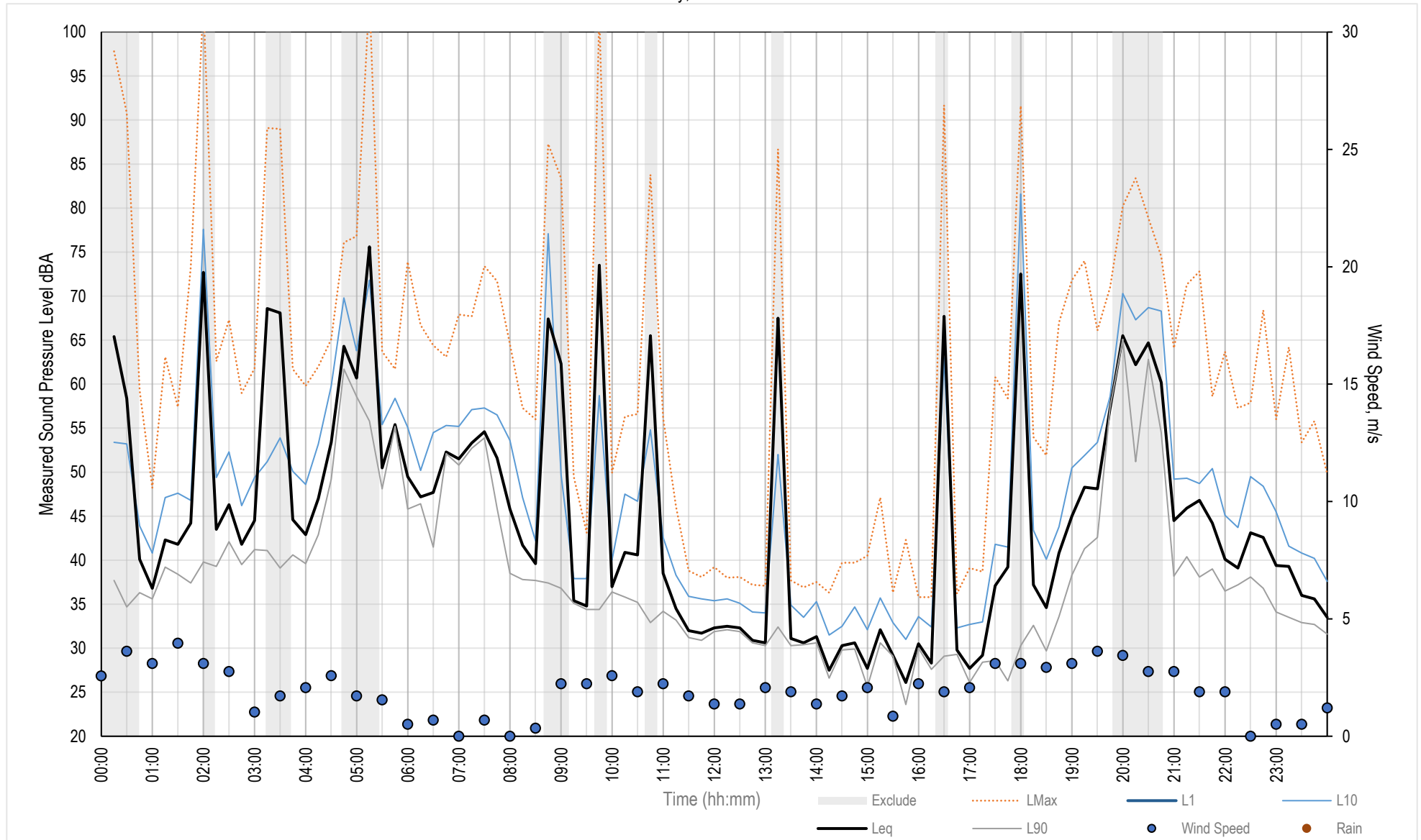
Measured Noise Levels - 587 Abercorn St, South Albury

Wednesday, 31 March 2021



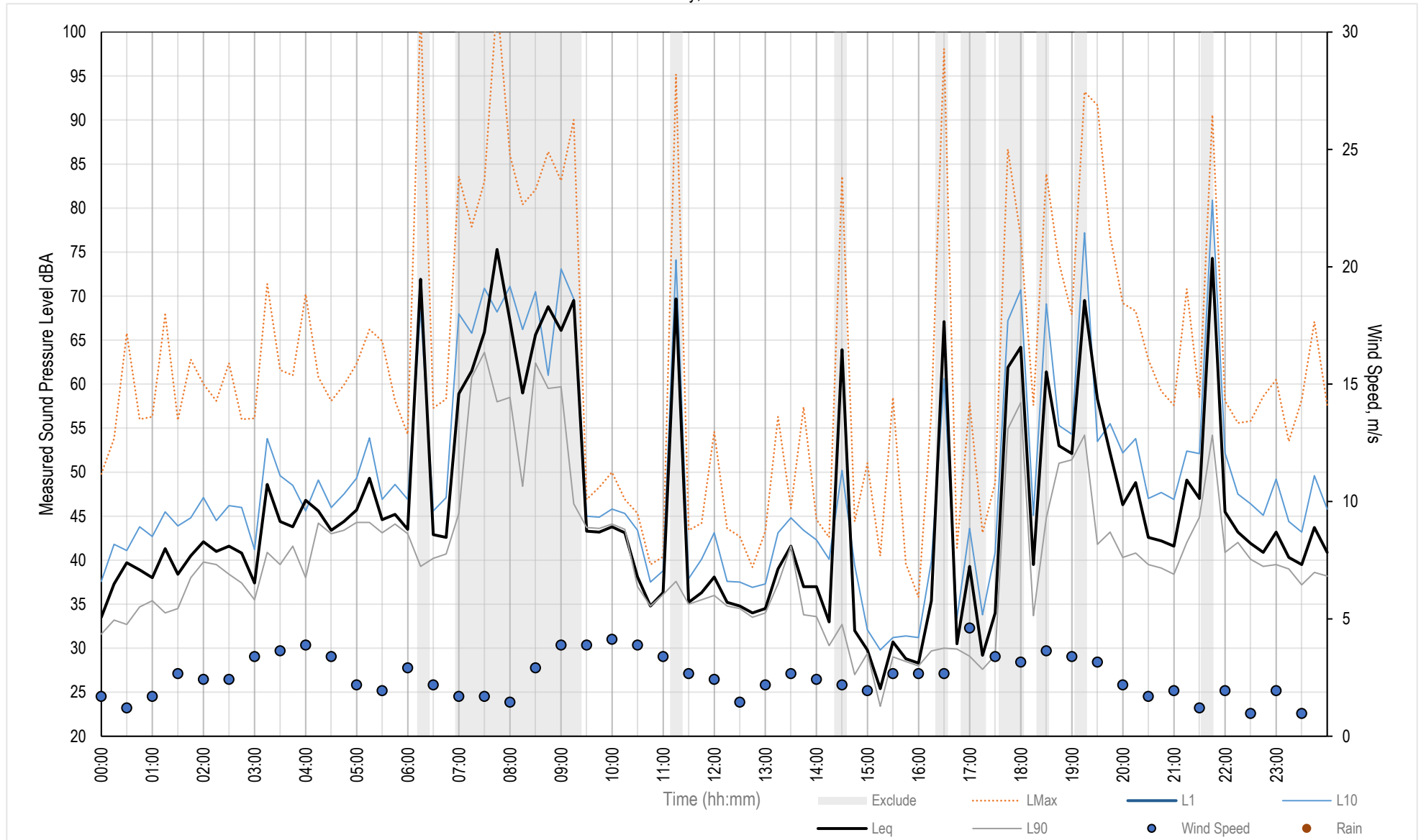
Measured Noise Levels - 322 Tribune St, Albury

Tuesday, 02 March 2021



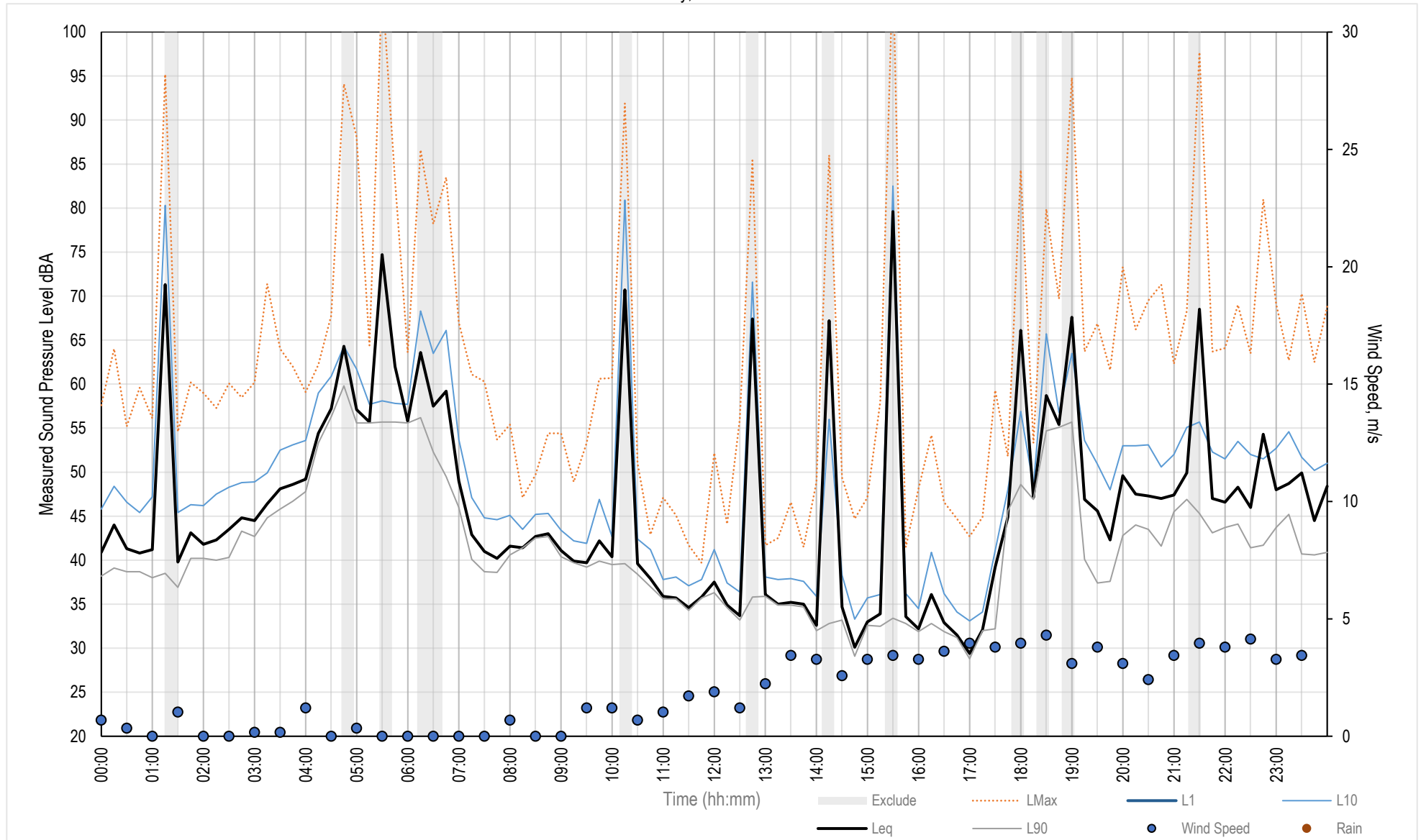
Measured Noise Levels - 322 Tribune St, Albury

Wednesday, 03 March 2021



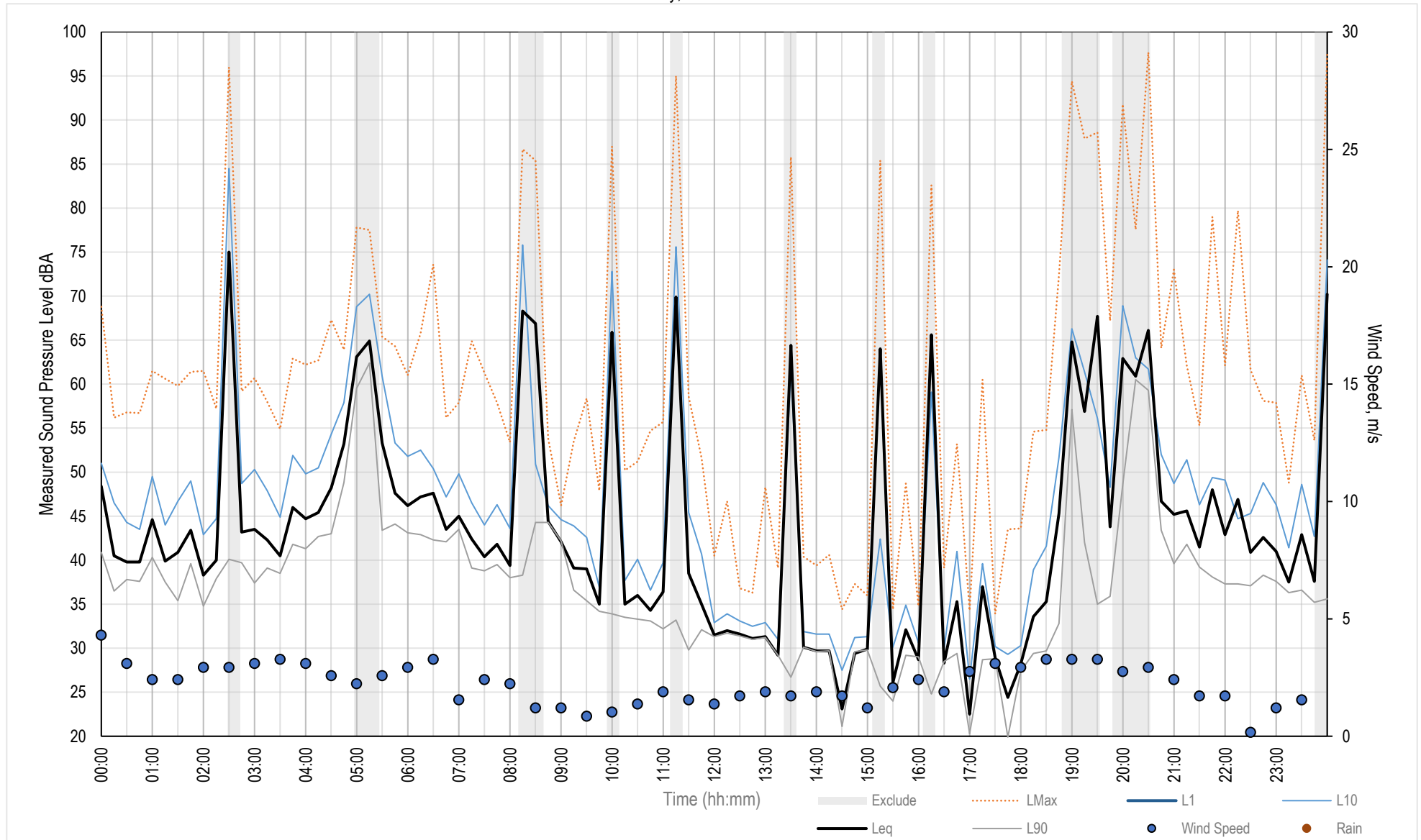
Measured Noise Levels - 322 Tribune St, Albury

Thursday, 04 March 2021



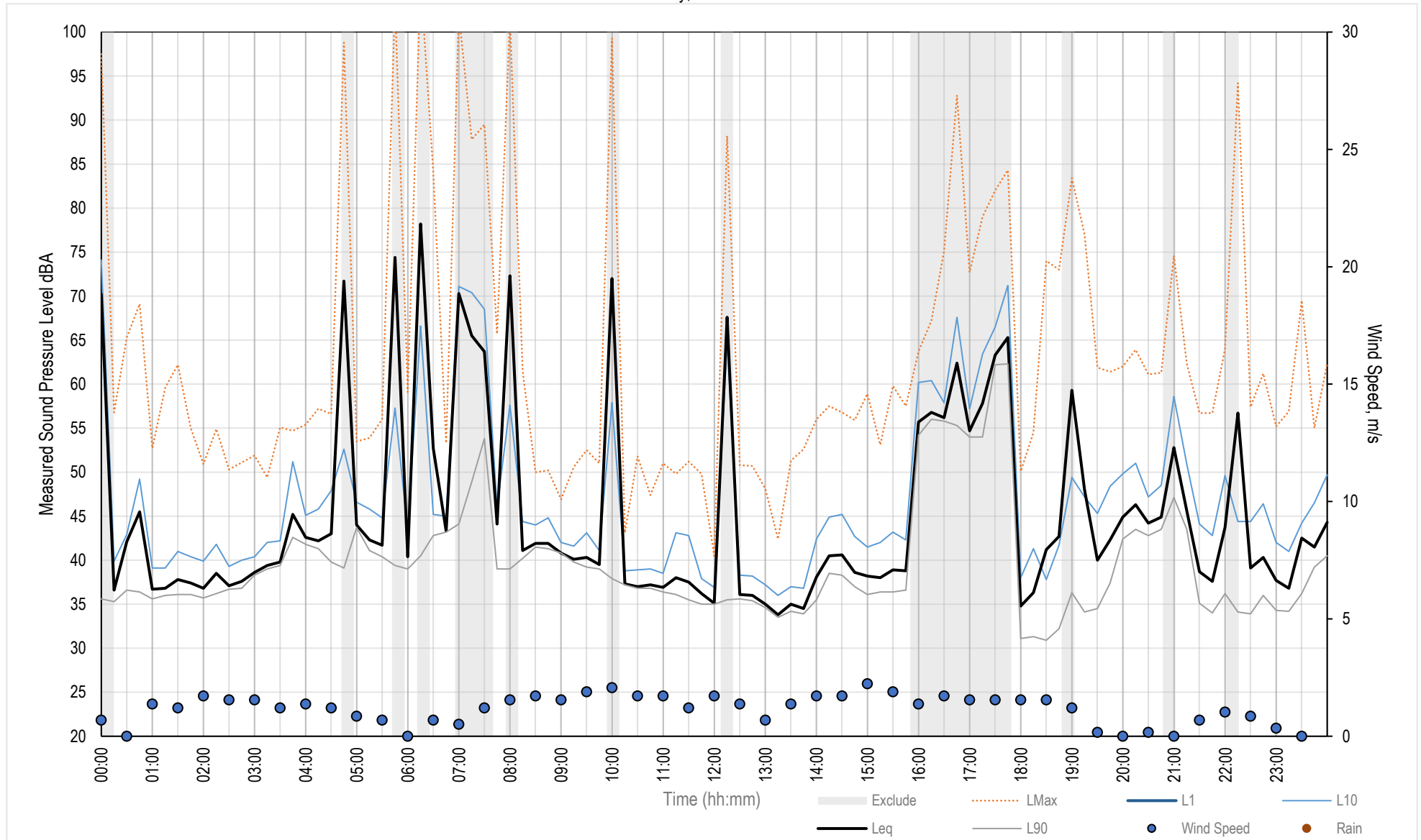
Measured Noise Levels - 322 Tribune St, Albury

Friday, 05 March 2021



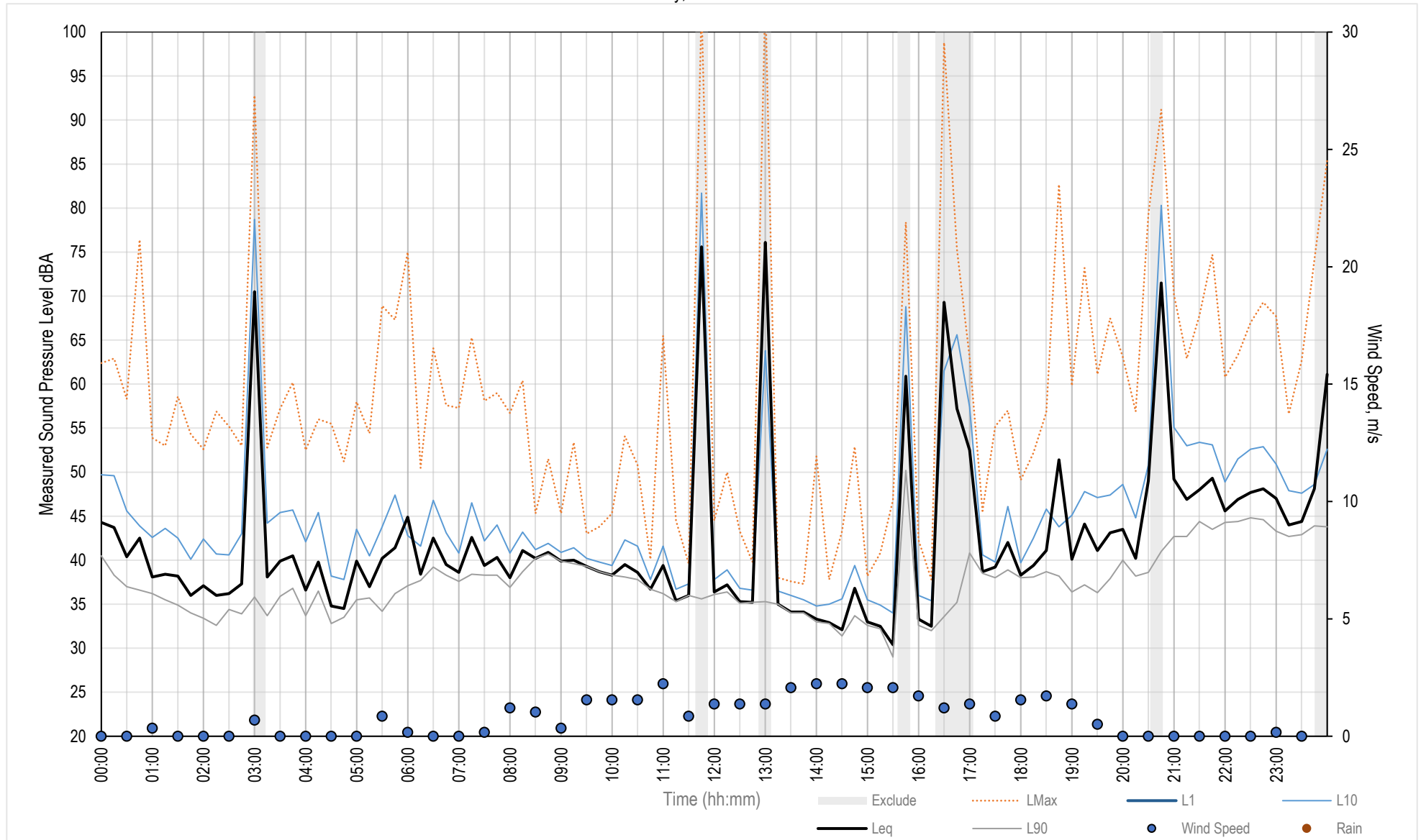
Measured Noise Levels - 322 Tribune St, Albury

Saturday, 06 March 2021



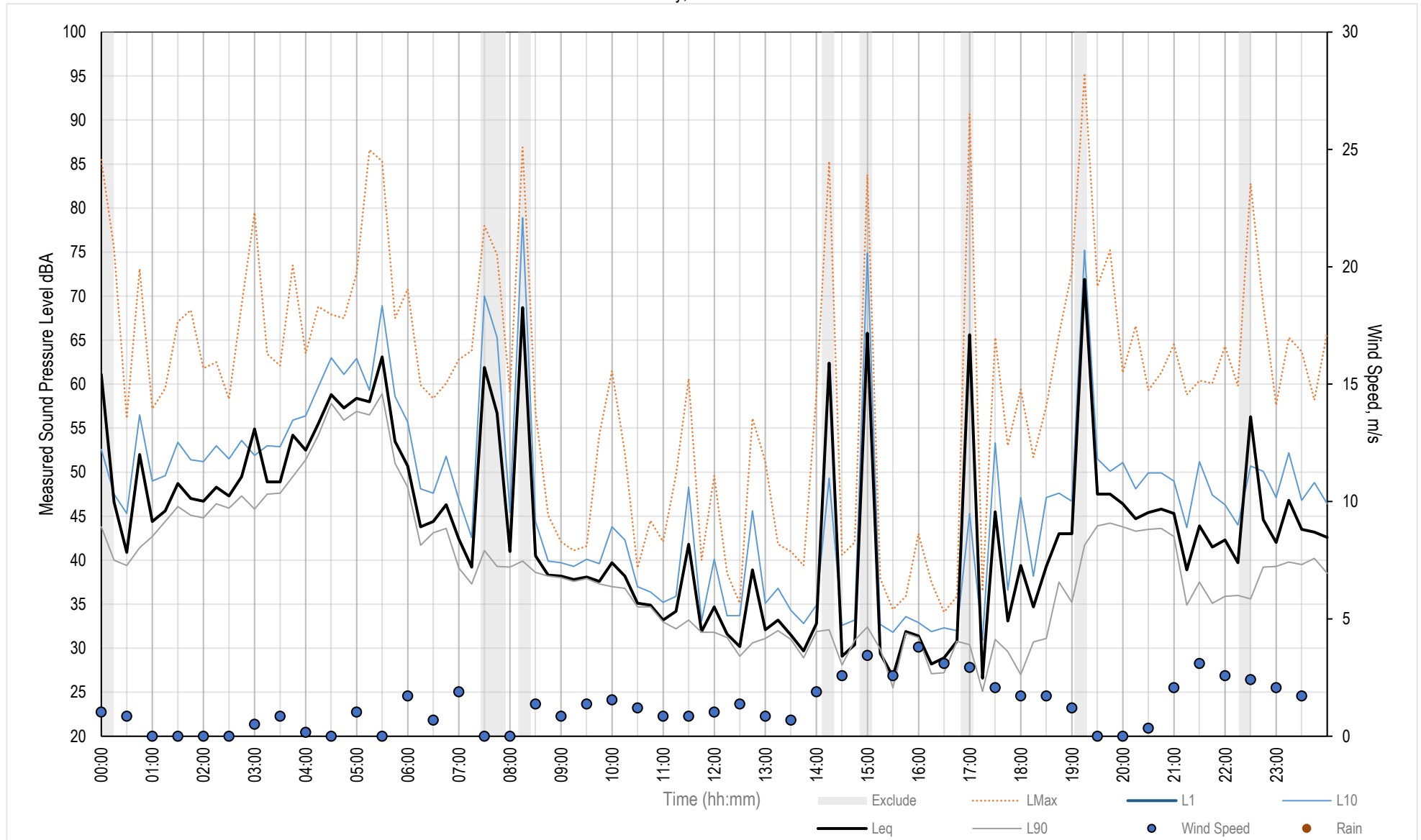
Measured Noise Levels - 322 Tribune St, Albury

Sunday, 07 March 2021



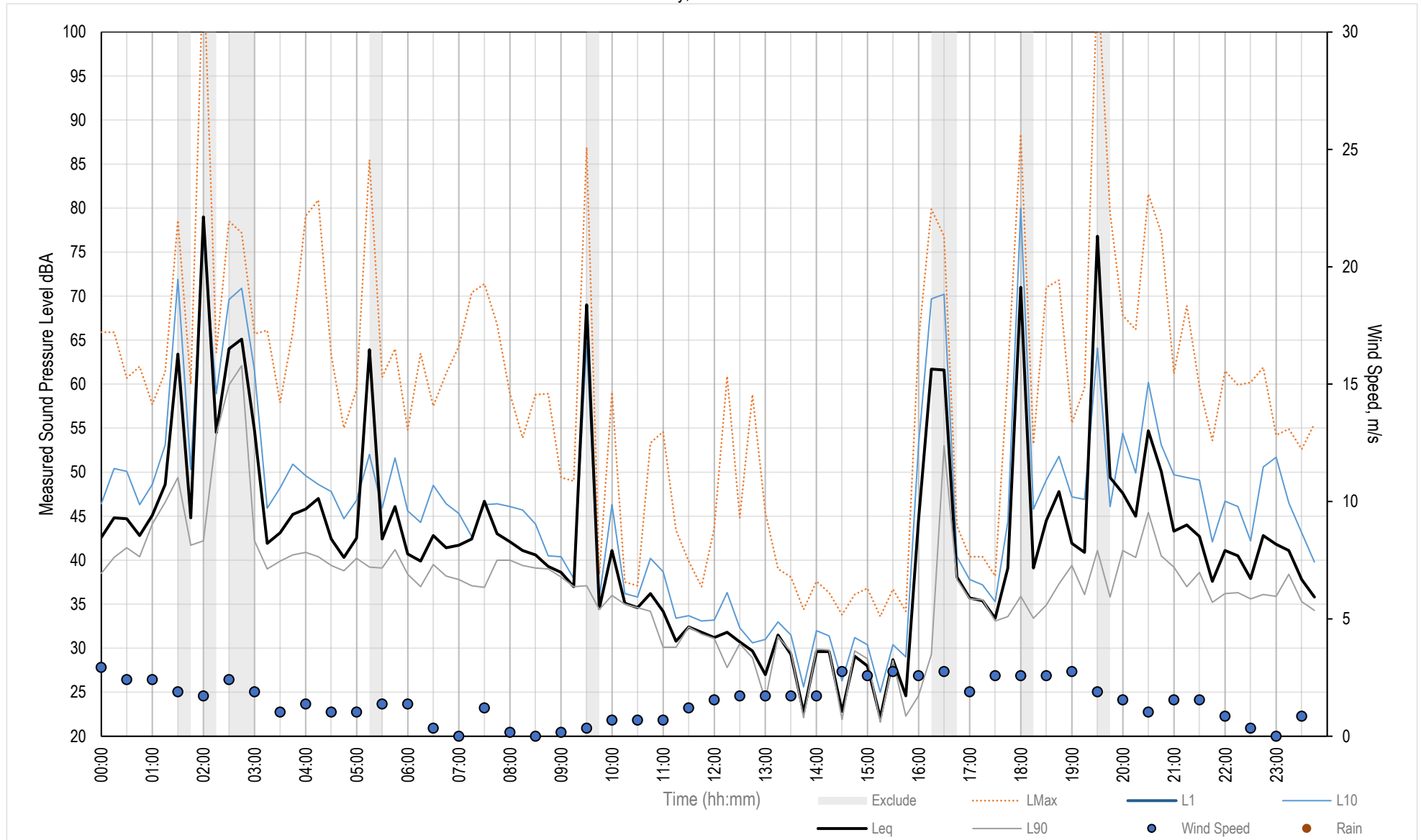
Measured Noise Levels - 322 Tribune St, Albury

Monday, 08 March 2021



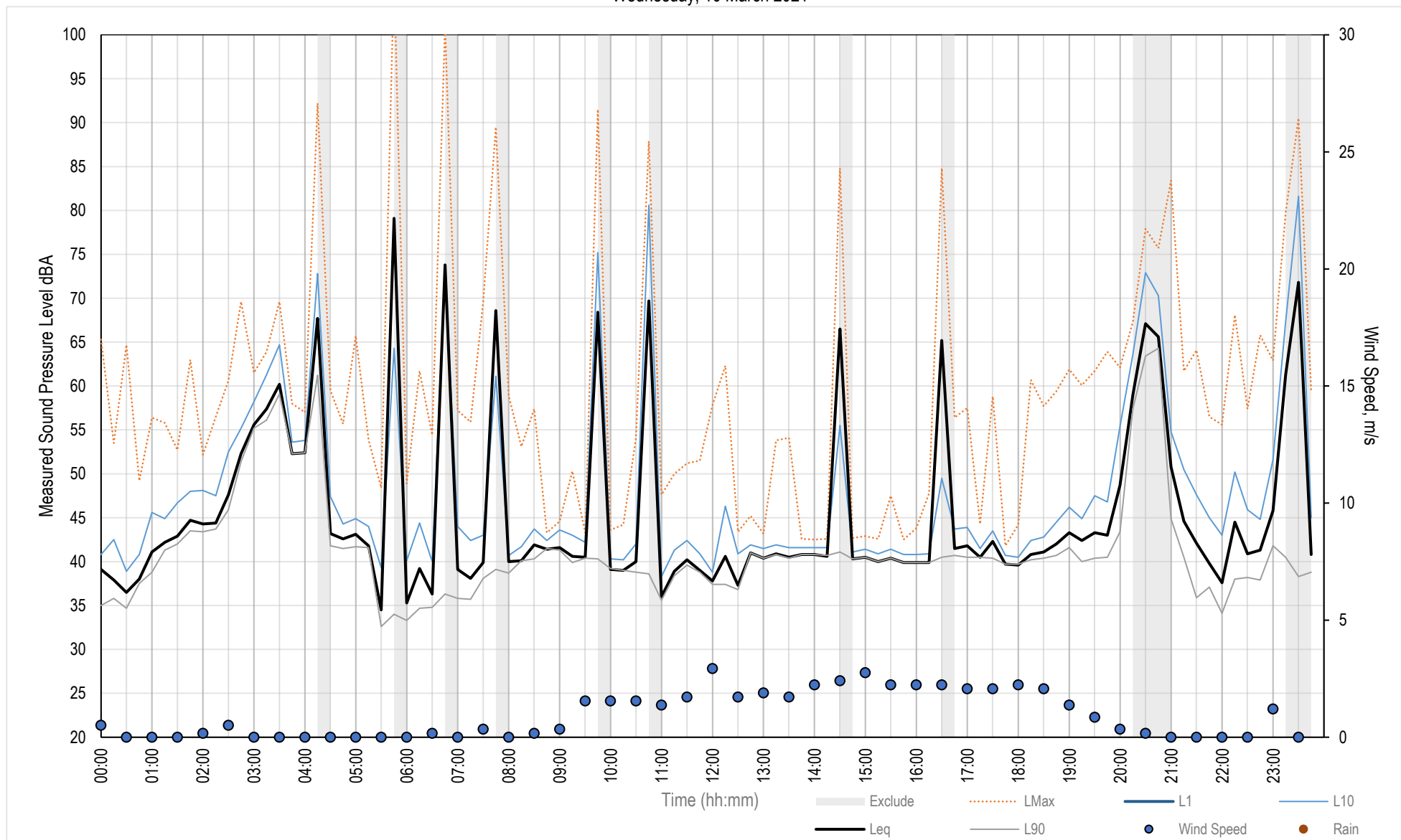
Measured Noise Levels - 322 Tribune St, Albury

Tuesday, 09 March 2021



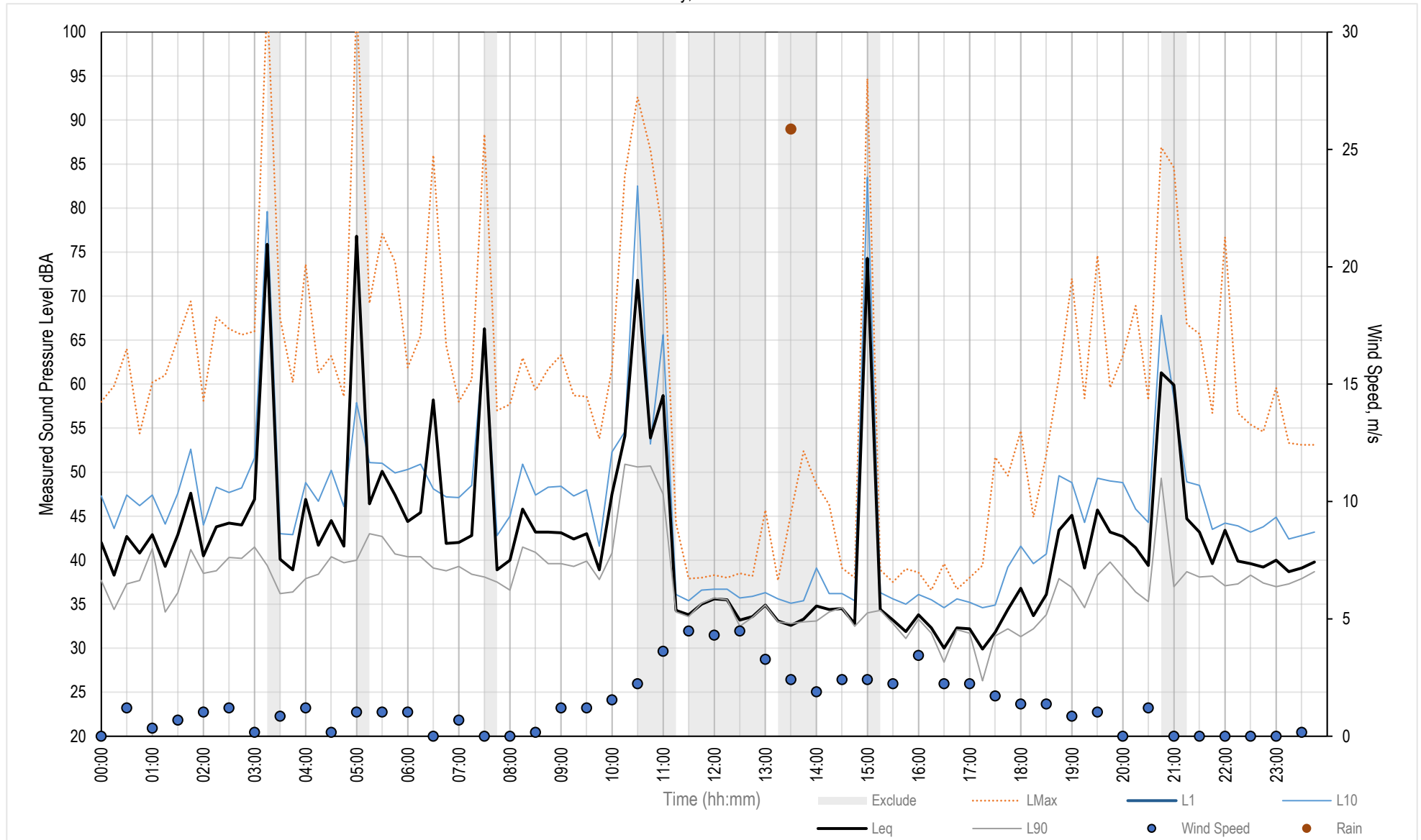
Measured Noise Levels - 322 Tribune St, Albury

Wednesday, 10 March 2021



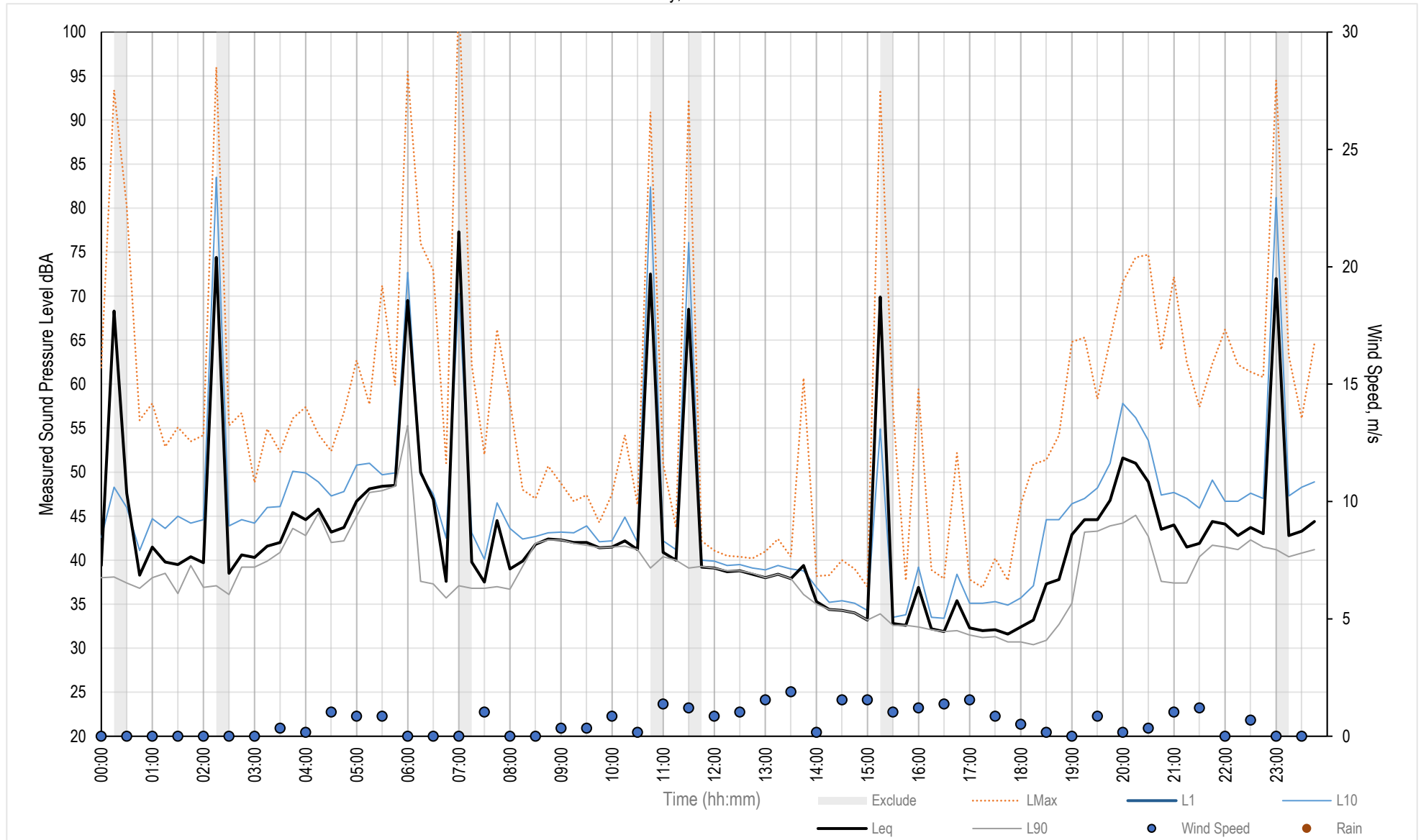
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Thursday, 11 March 2021



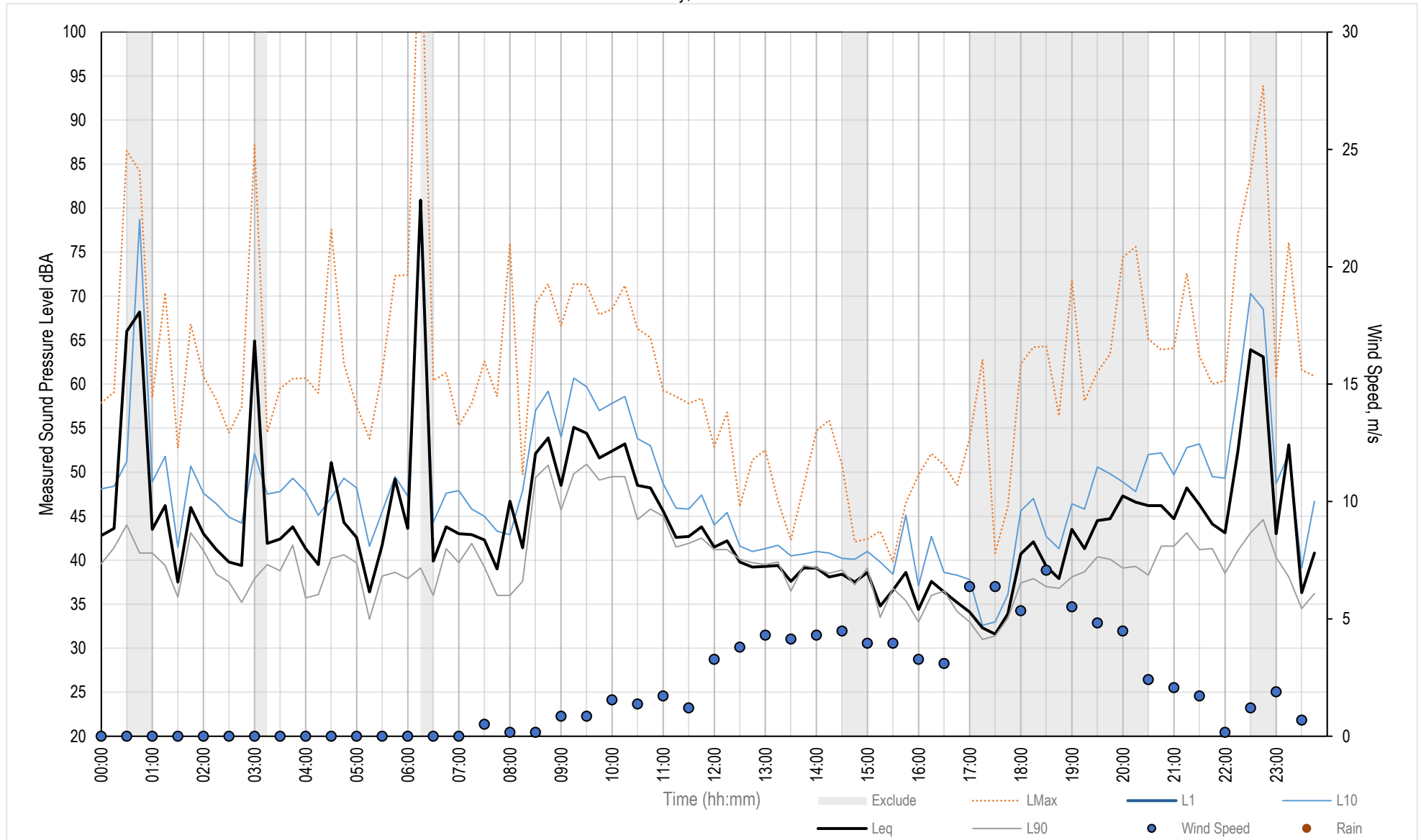
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Friday, 12 March 2021



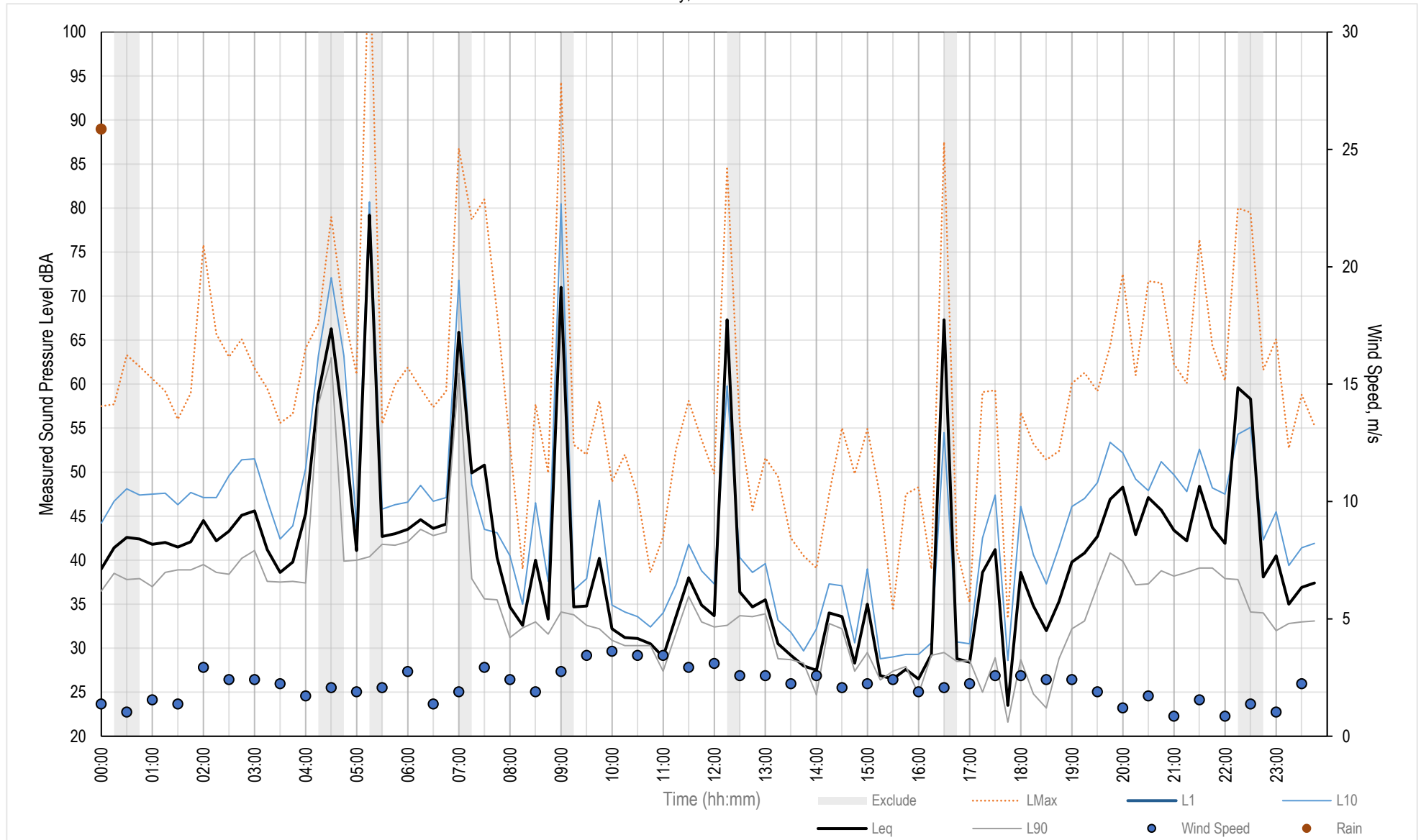
Measured Noise Levels - 322 Tribune St, Albury

Saturday, 13 March 2021



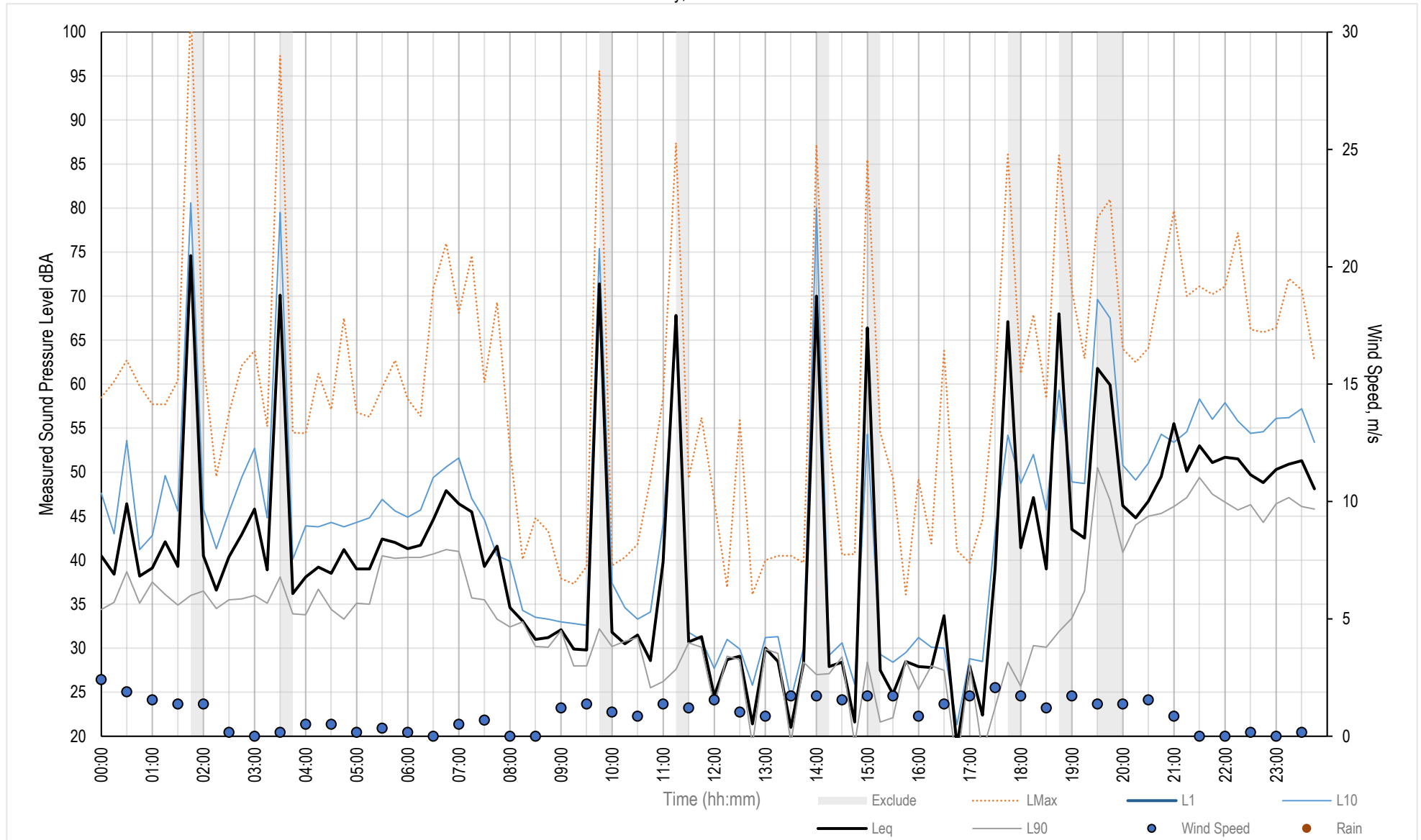
Measured Noise Levels - 322 Tribune St, Albury

Saturday, 13 March 2021



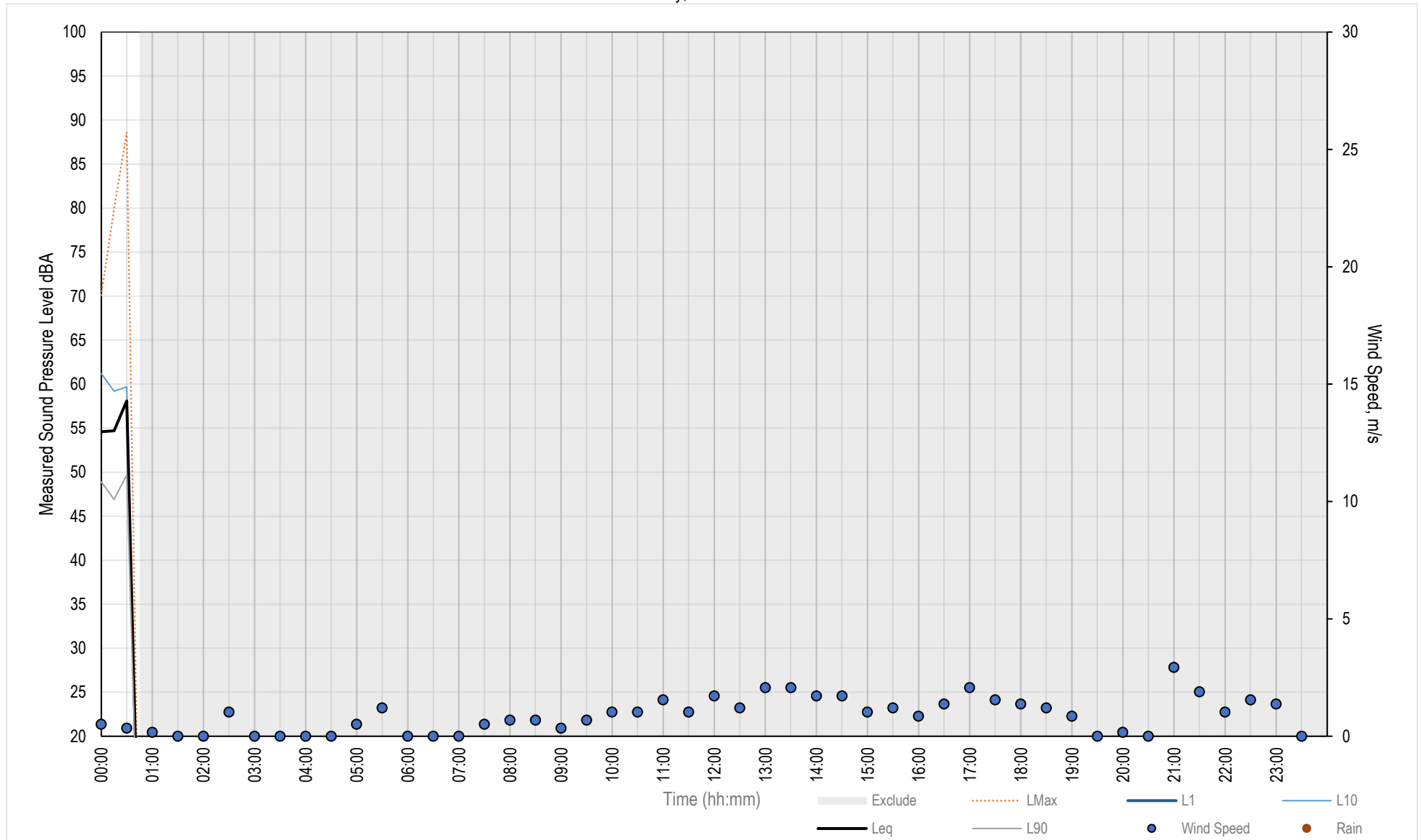
Measured Noise Levels - 322 Tribune St, Albury

Sunday, 14 March 2021



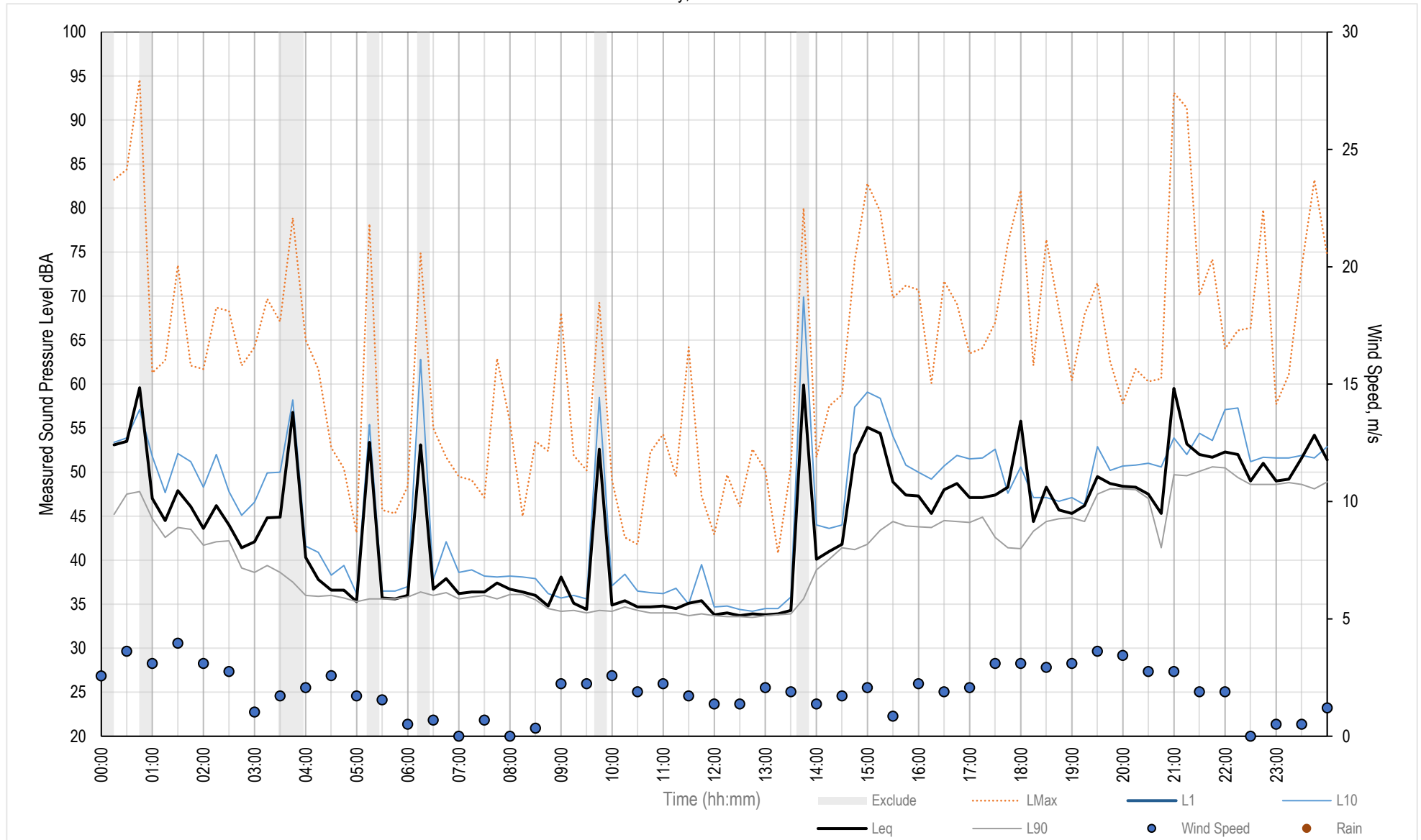
Measured Noise Levels - 322 Tribune St, Albury

Monday, 15 March 2021



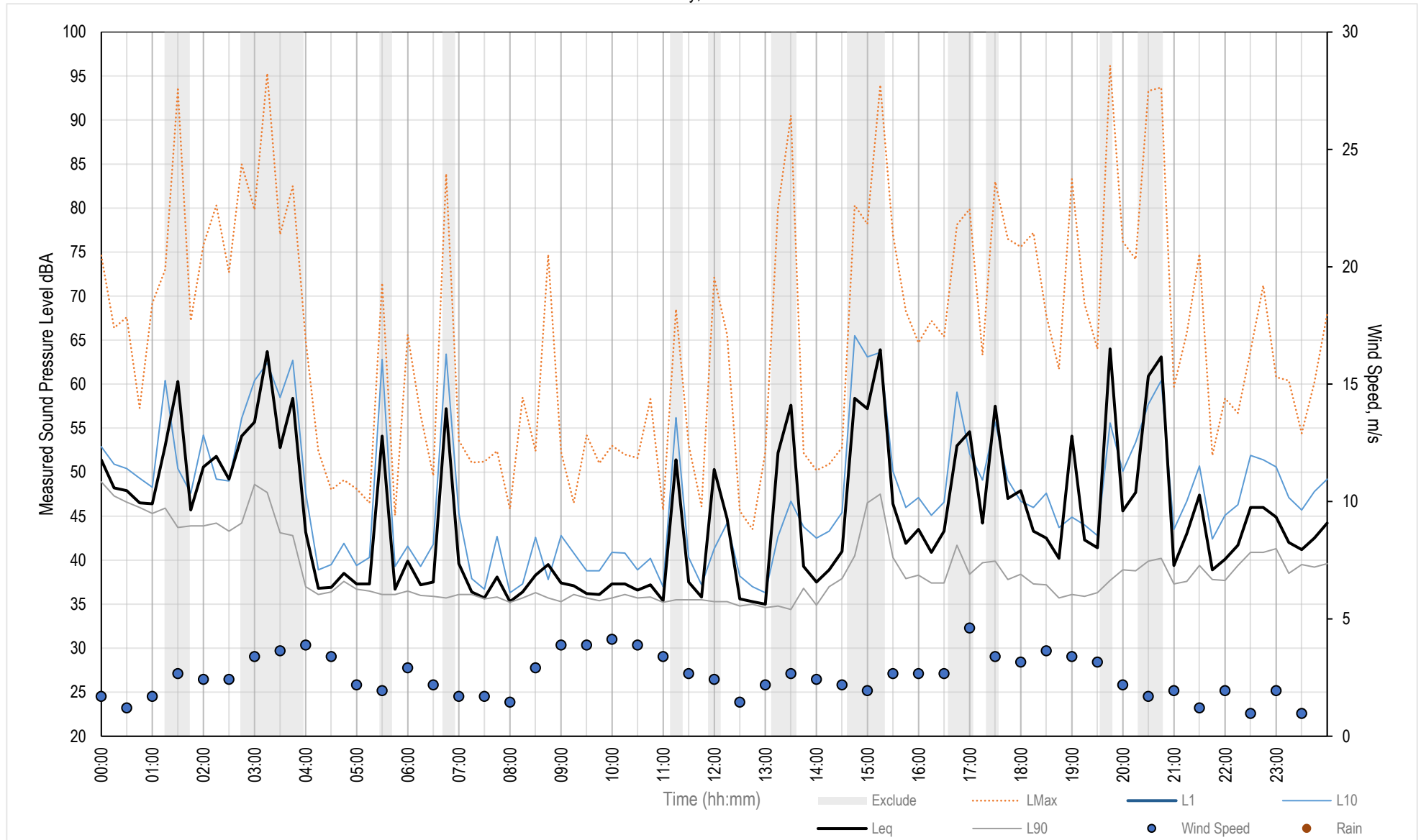
Measured Noise Levels - Scotts School

Tuesday, 02 March 2021



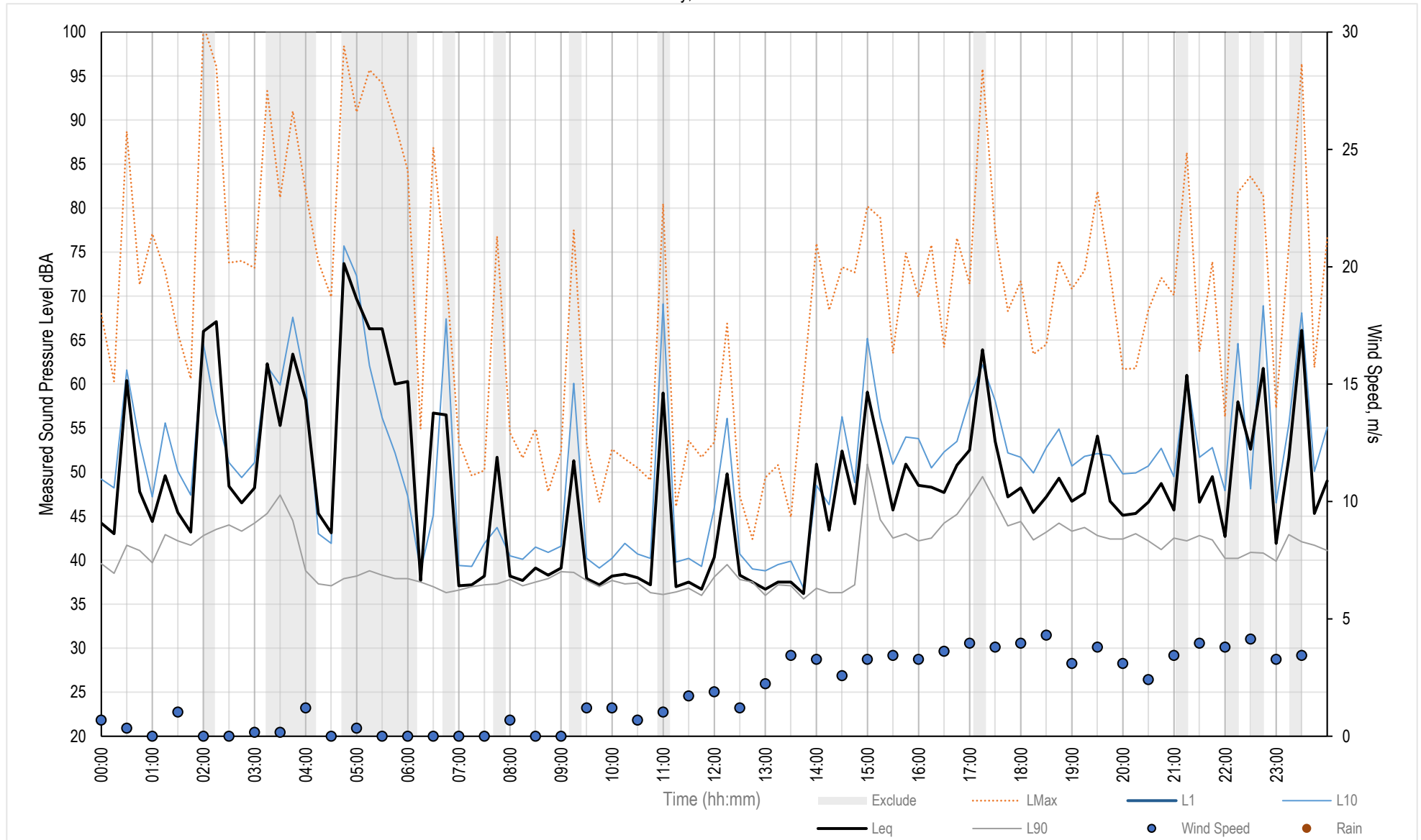
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Wednesday, 03 March 2021



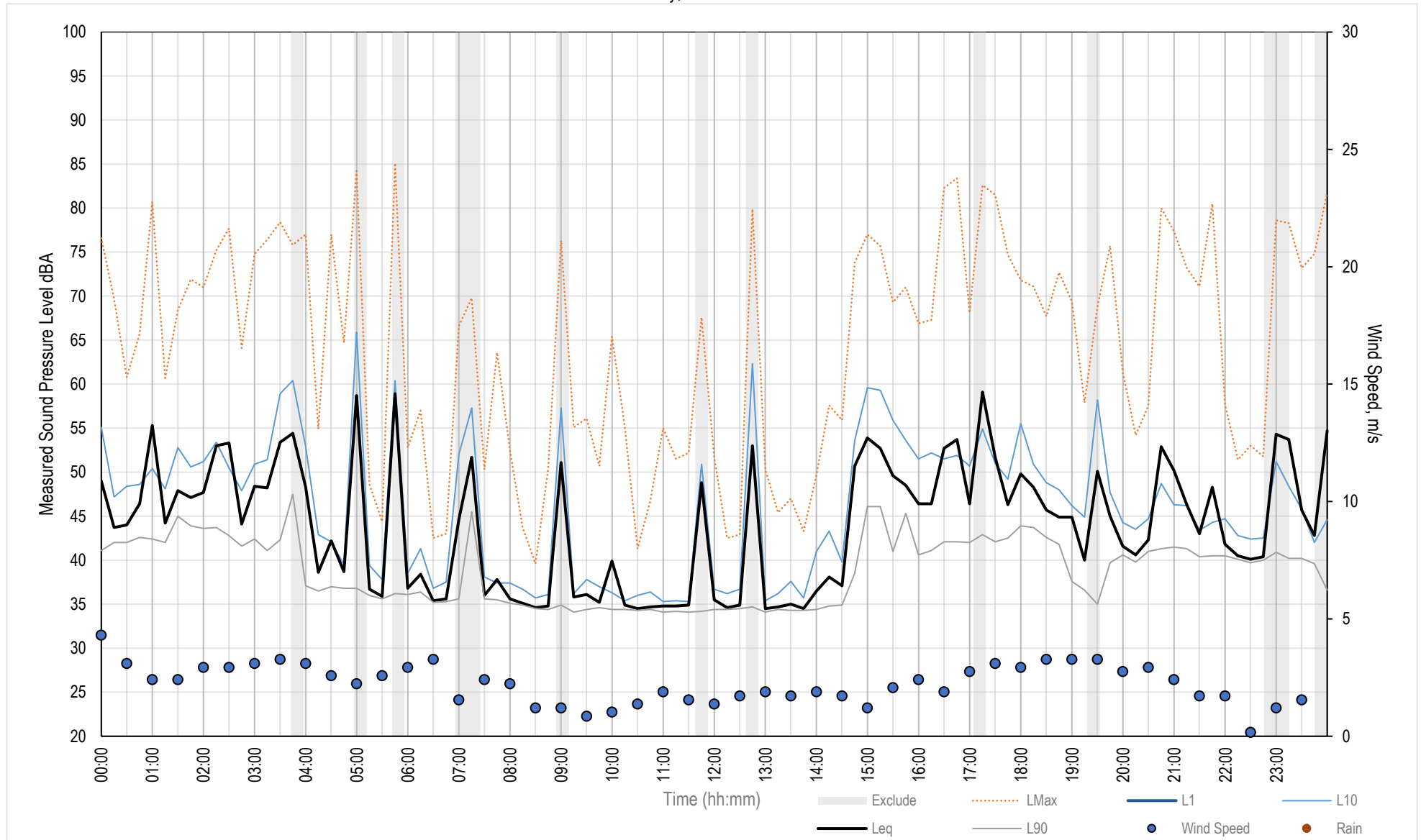
Measured Noise Levels - Scotts School

Thursday, 04 March 2021



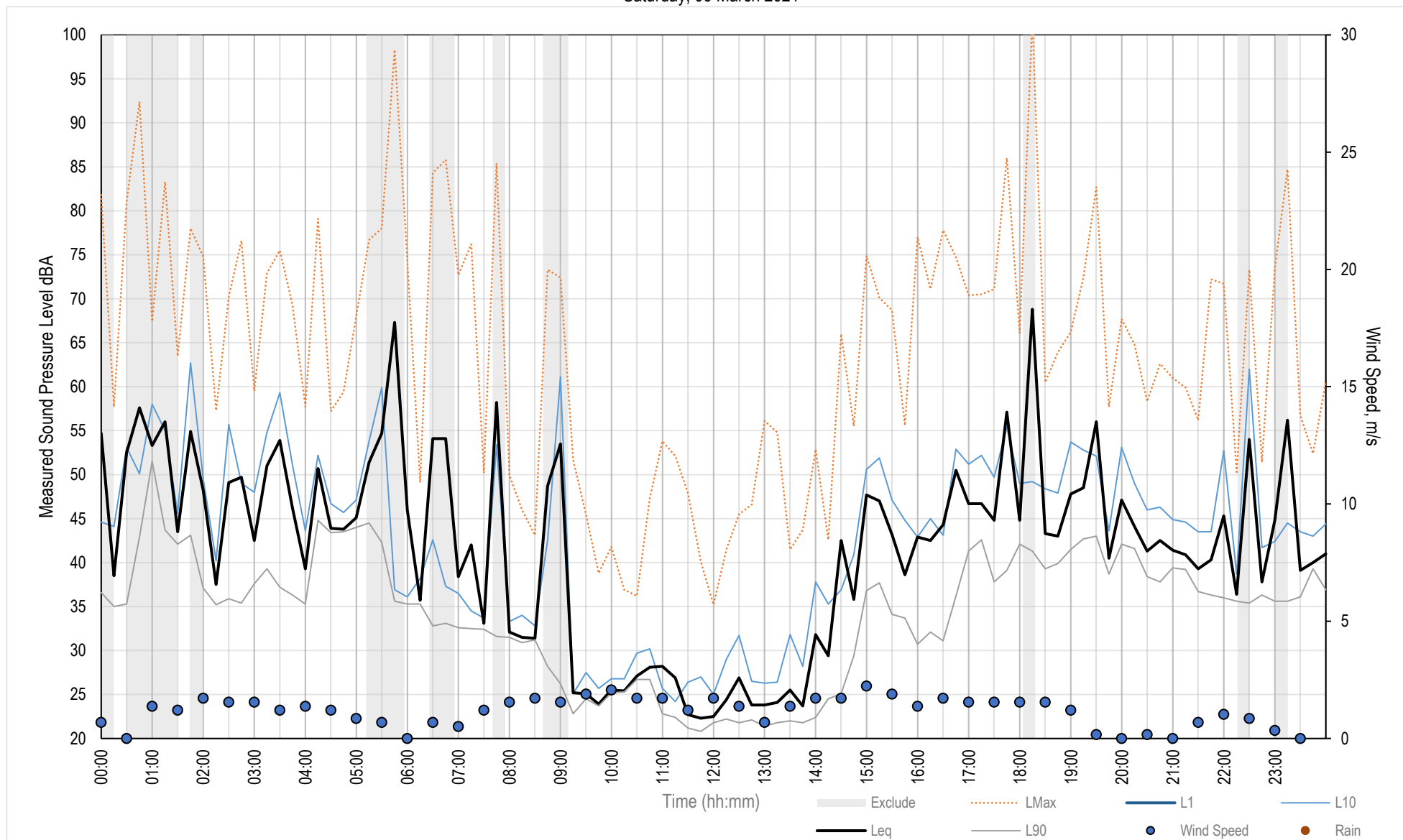
Measured Noise Levels - Scotts School

Friday, 05 March 2021



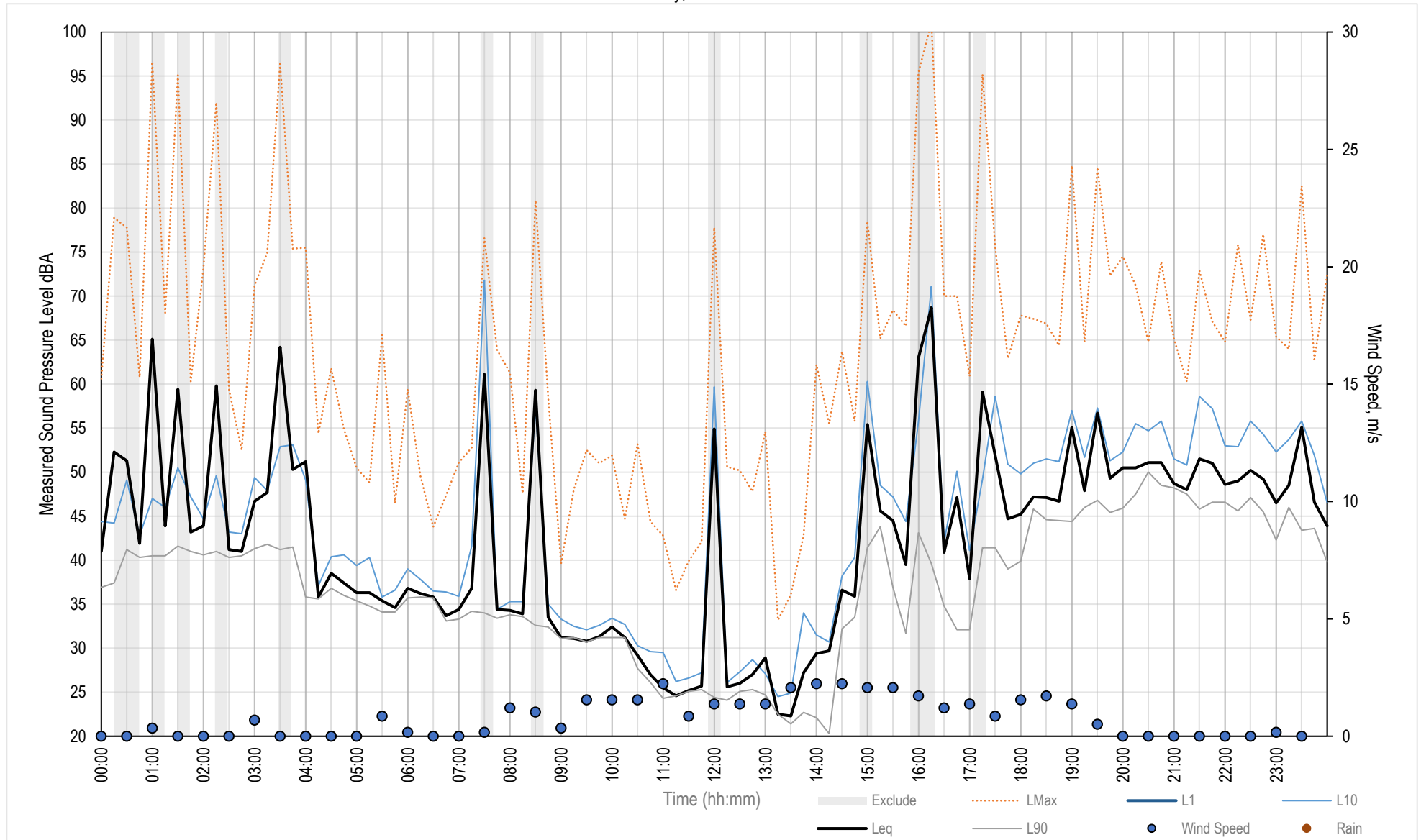
Measured Noise Levels - Scotts School

Saturday, 06 March 2021



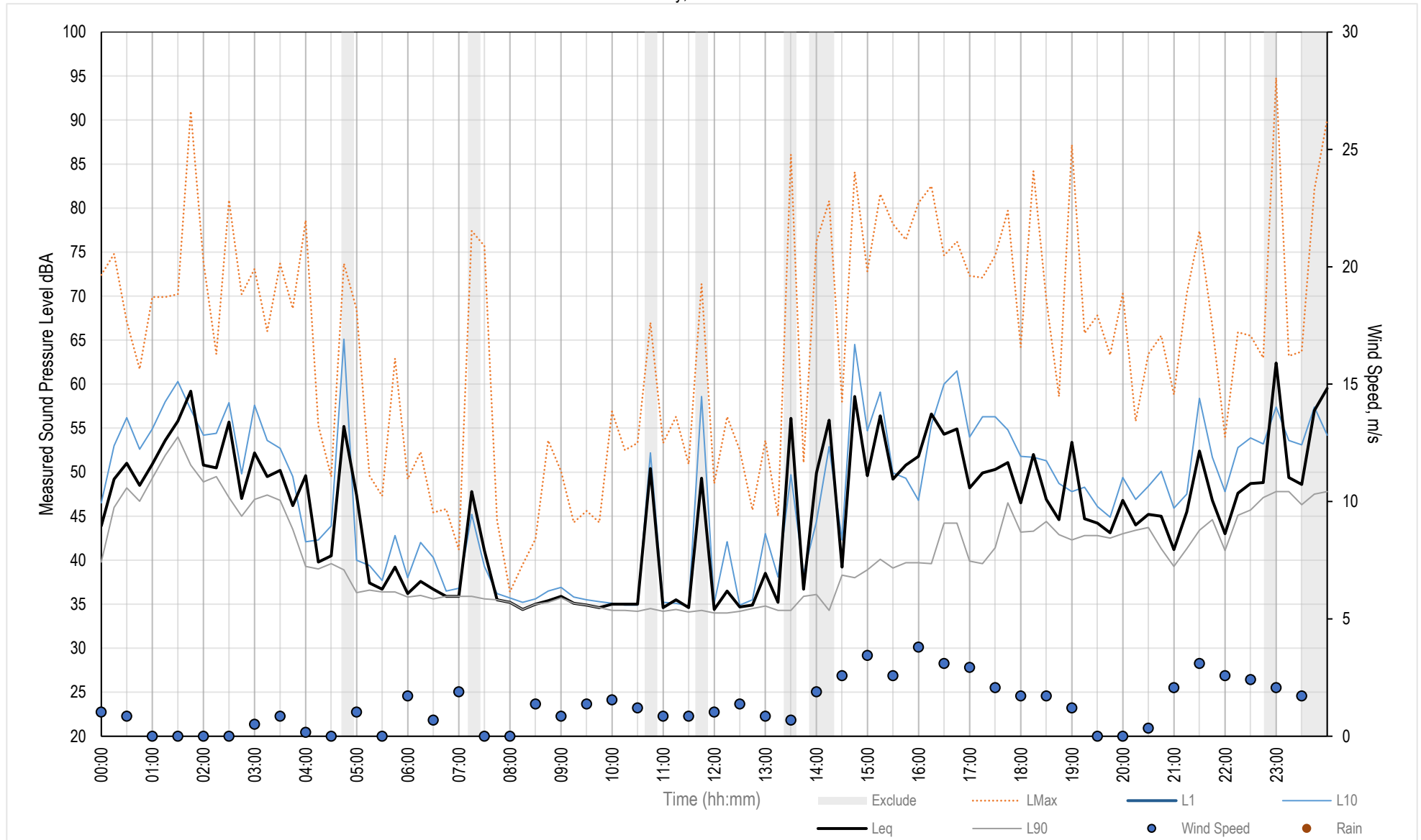
Measured Noise Levels - Scotts School

Sunday, 07 March 2021



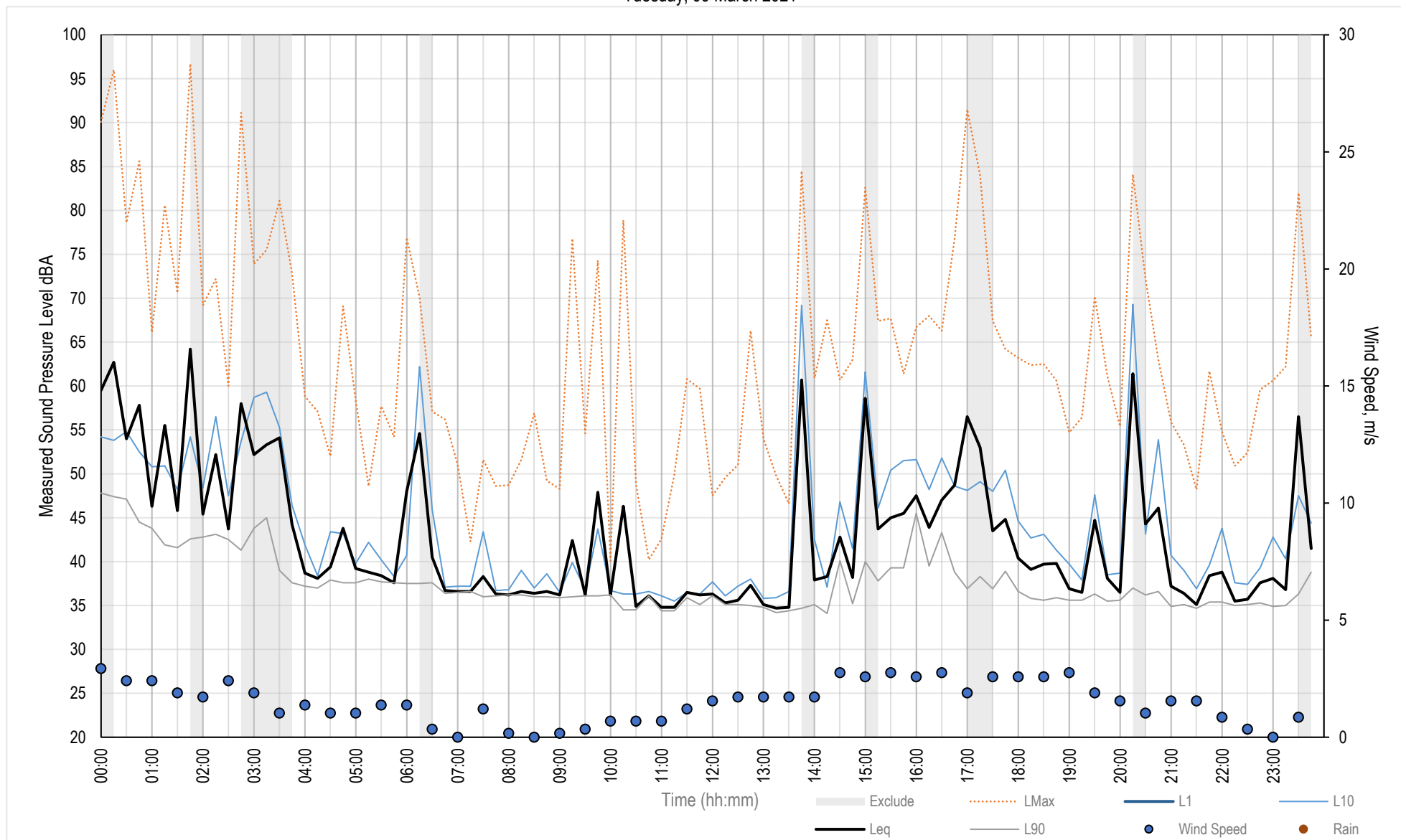
Measured Noise Levels - Scotts School

Monday, 08 March 2021



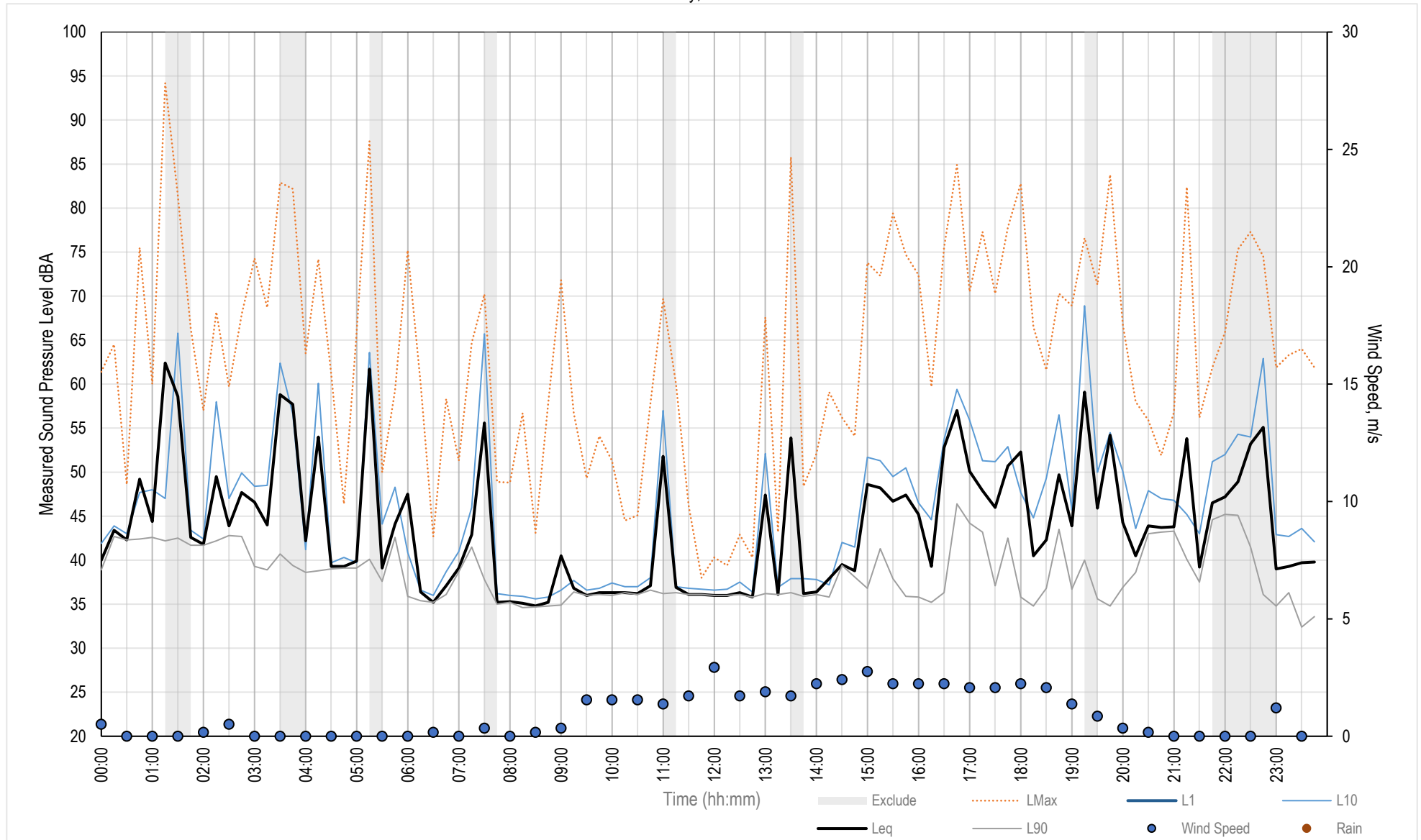
Measured Noise Levels - Scotts School

Tuesday, 09 March 2021



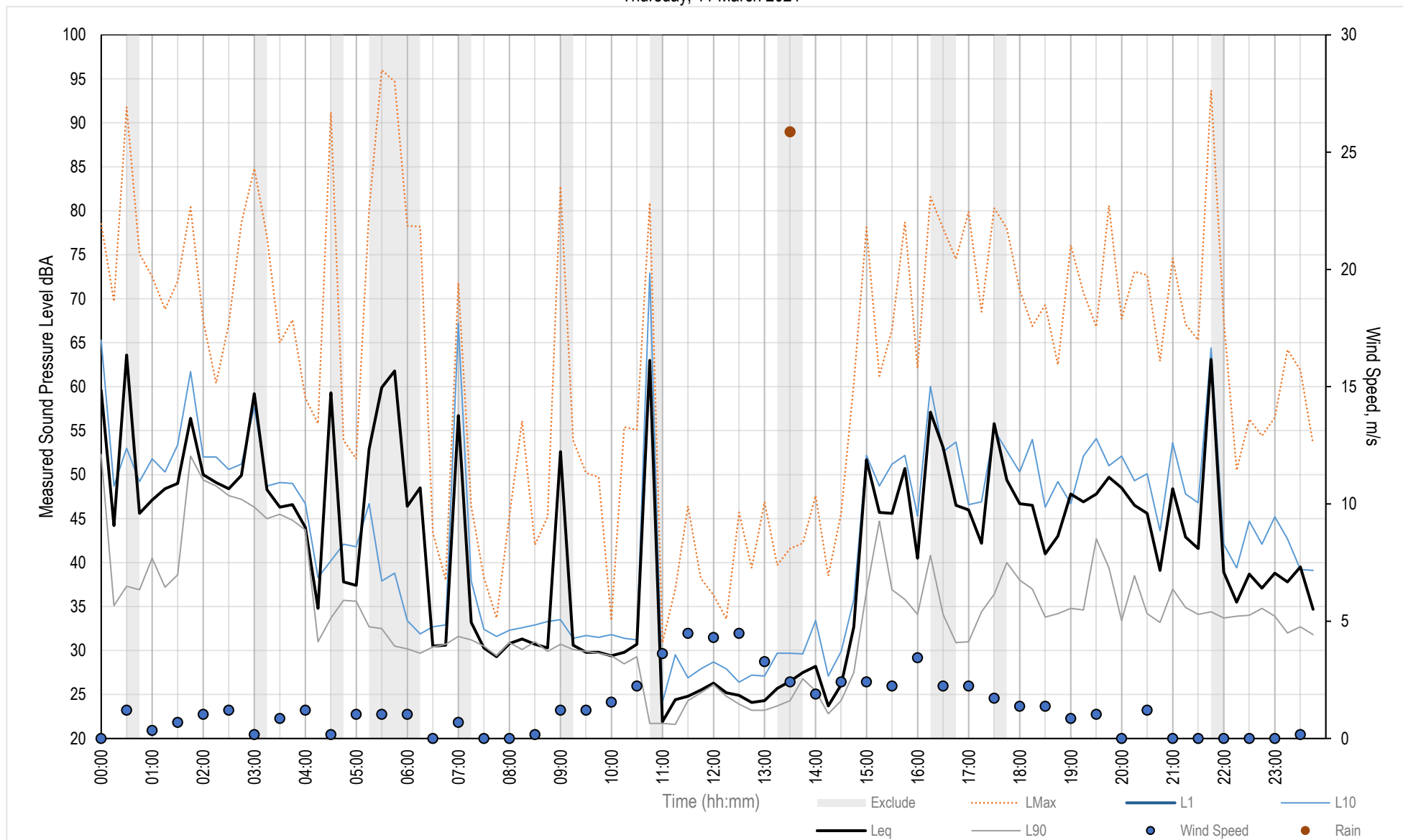
Measured Noise Levels - Scotts School

Wednesday, 10 March 2021



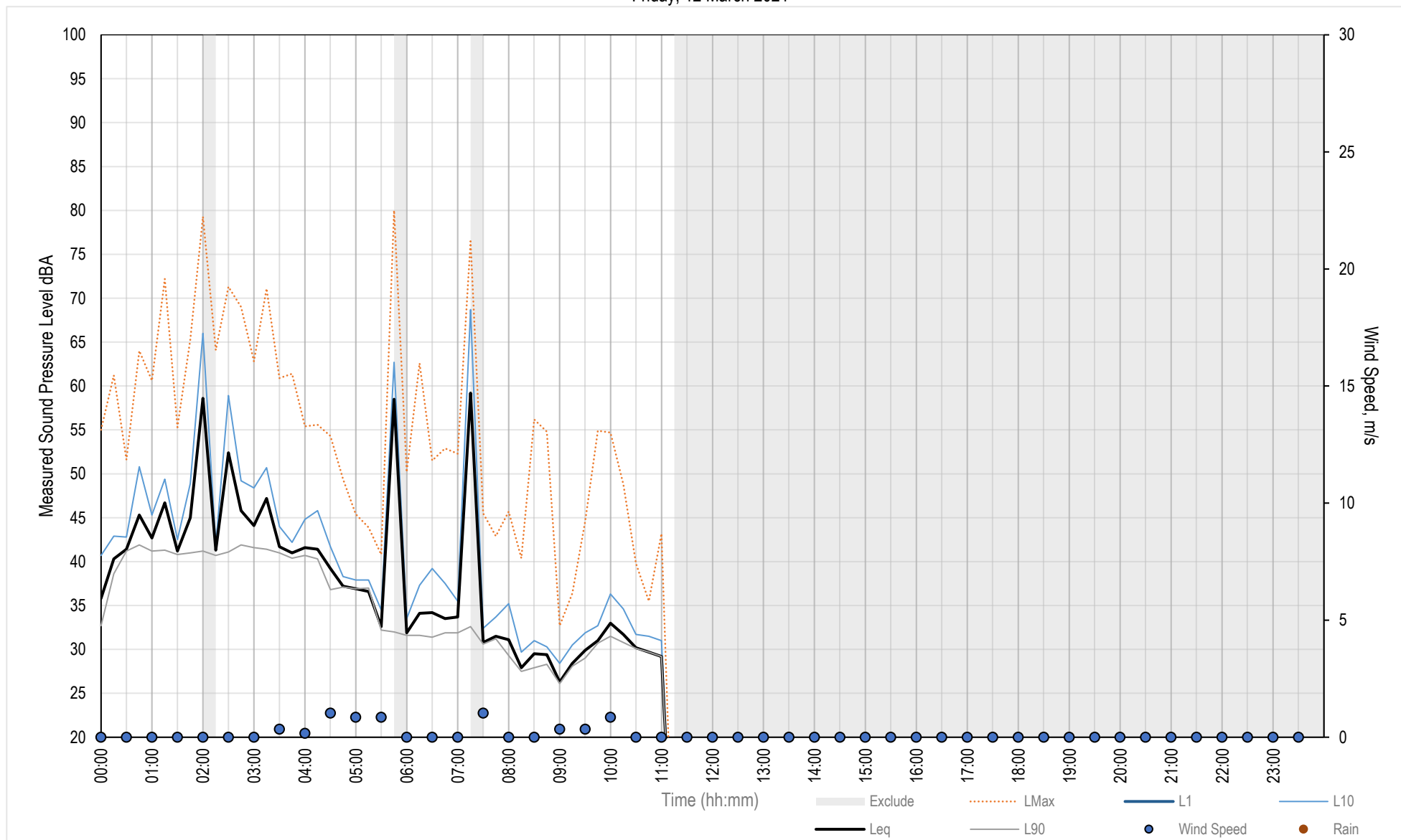
Measured Noise Levels - Scotts School

Thursday, 11 March 2021



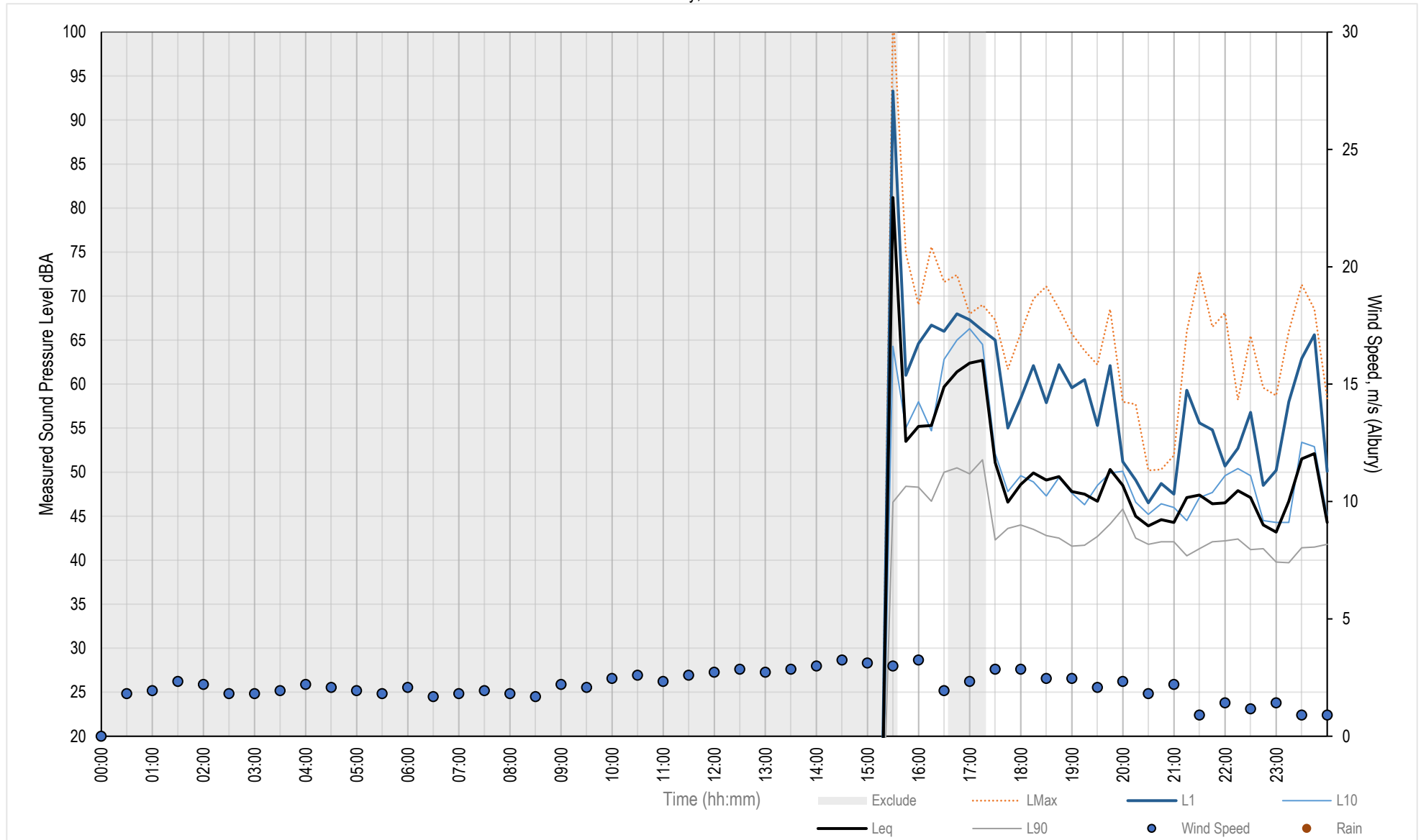
Measured Noise Levels - Scotts School

Friday, 12 March 2021



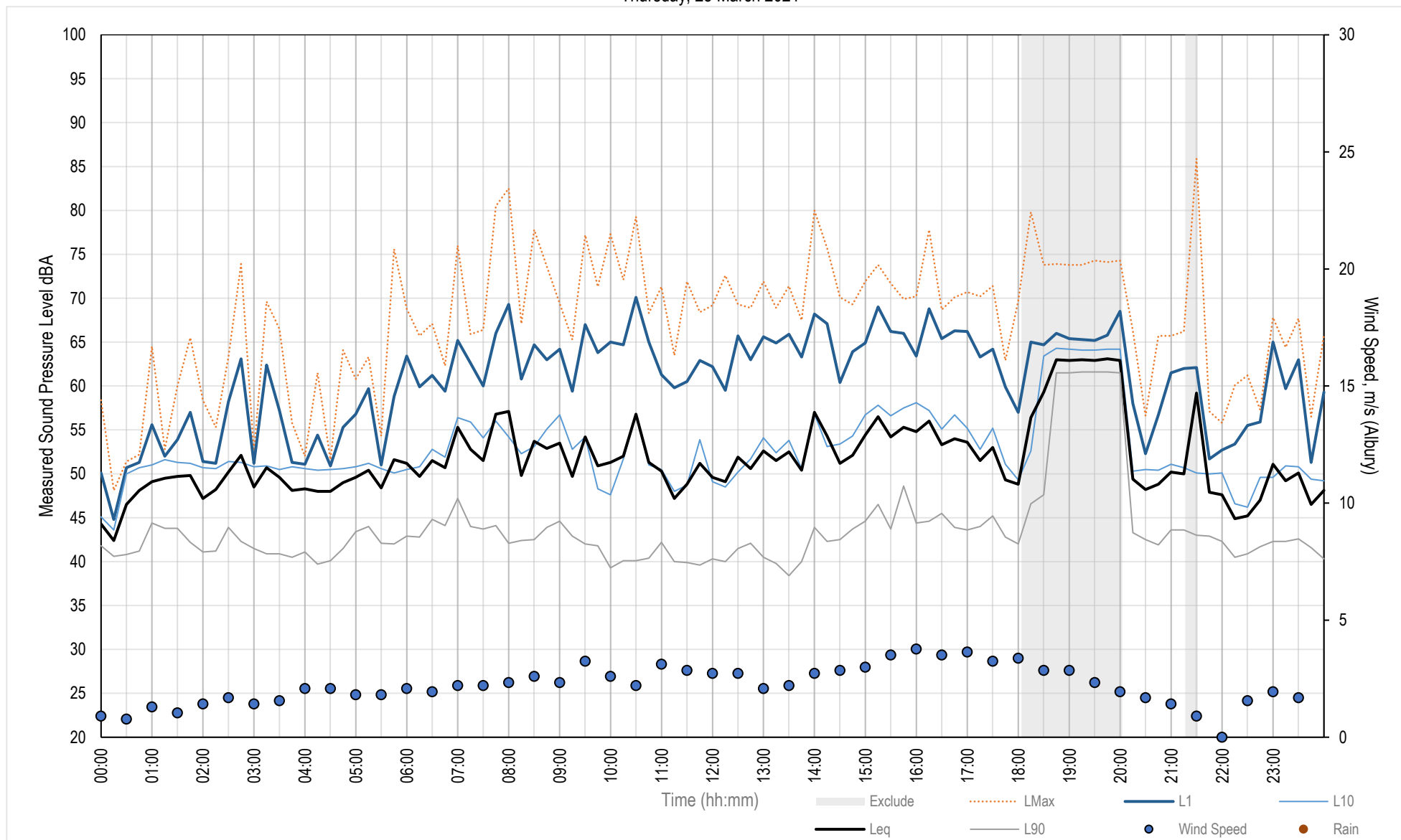
Measured Noise Levels - 19 Sanctuary Lane, Ettagomah

Wednesday, 24 March 2021



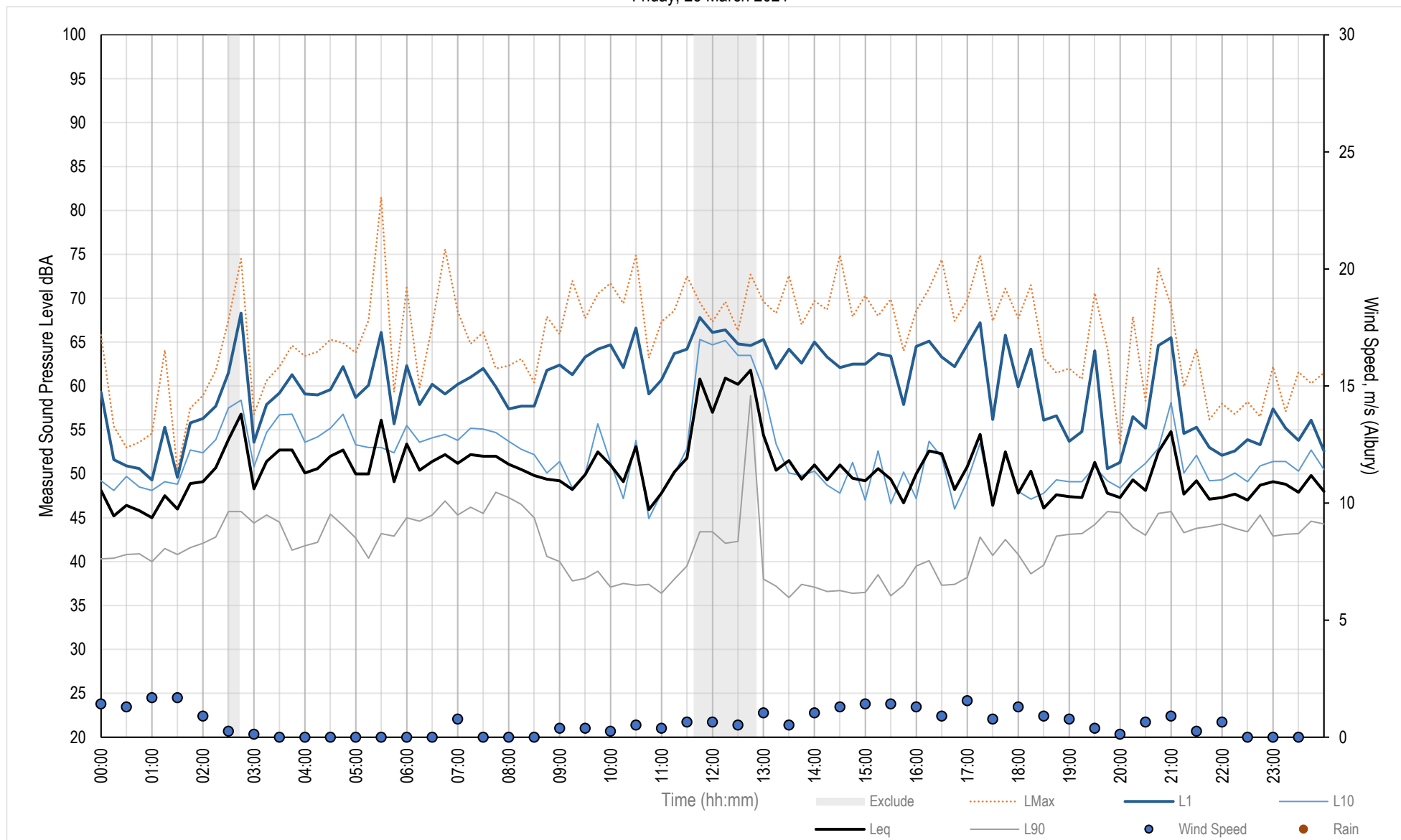
Measured Noise Levels - 19 Sanctuary Lane, Ettagomah

Thursday, 25 March 2021



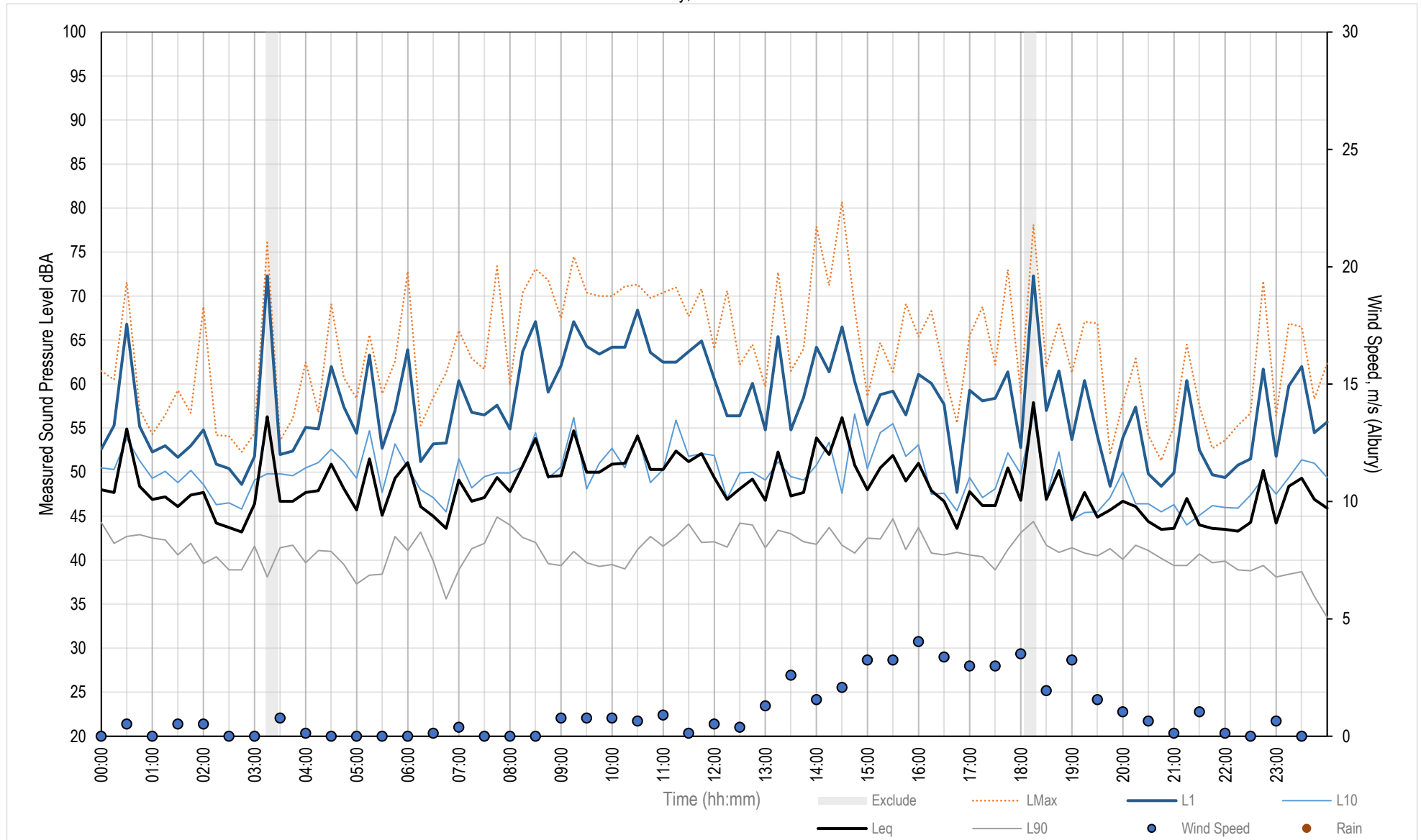
Measured Noise Levels - 19 Sanctuary Lane, Ettagomah

Friday, 26 March 2021



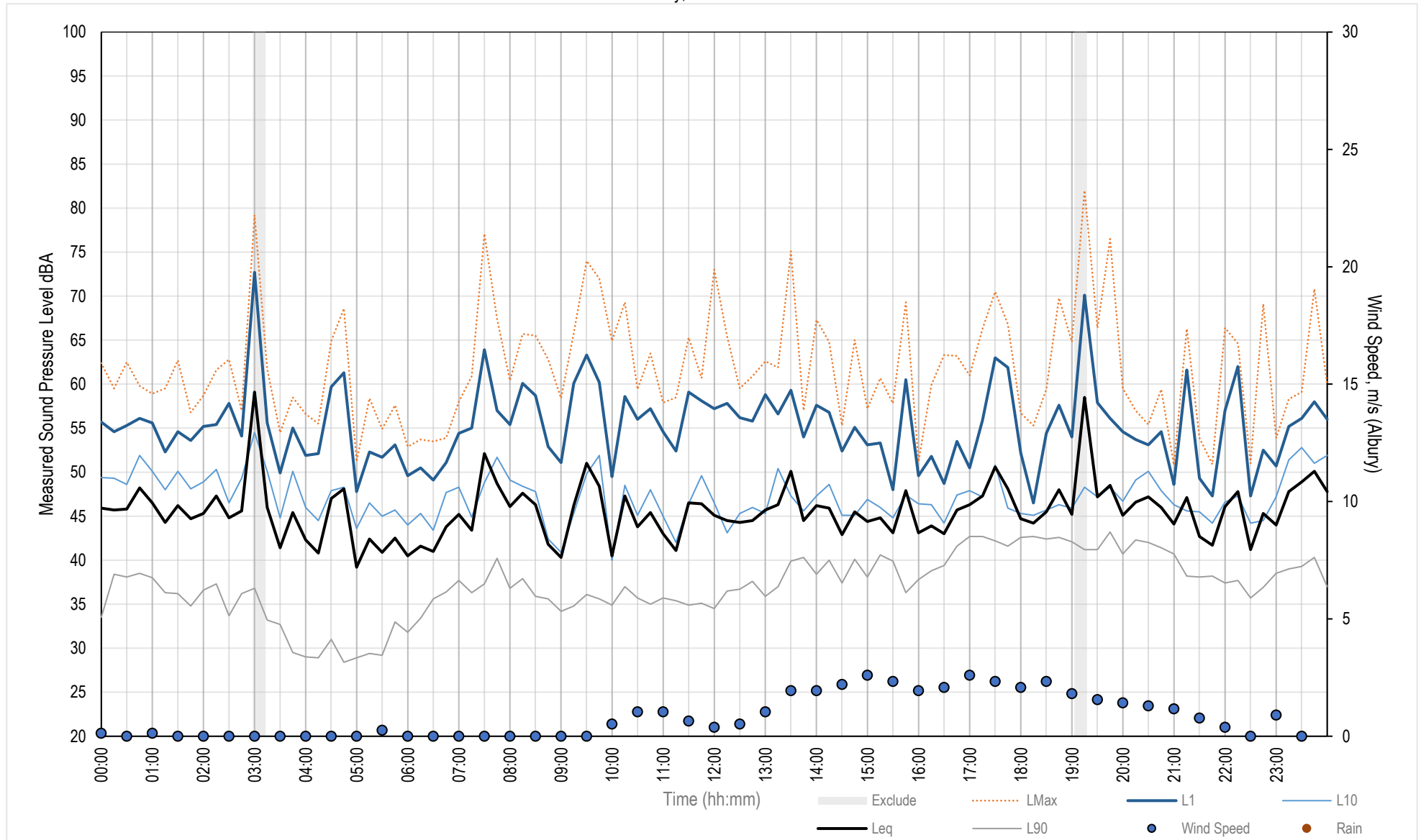
Measured Noise Levels - 19 Sanctuary Lane, Ettamogah

Saturday, 27 March 2021



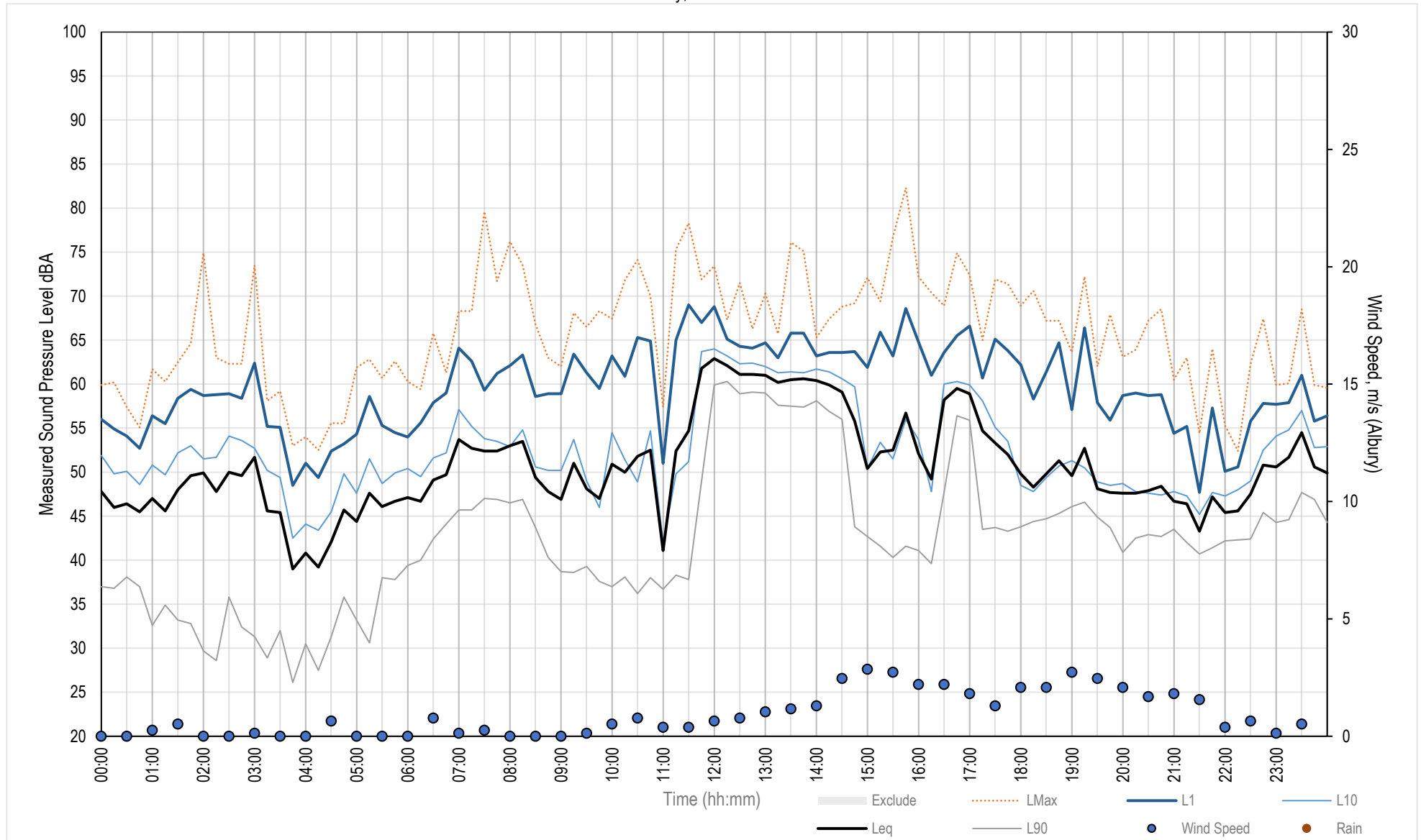
Measured Noise Levels - 19 Sanctuary Lane, Ettagomah

Sunday, 28 March 2021



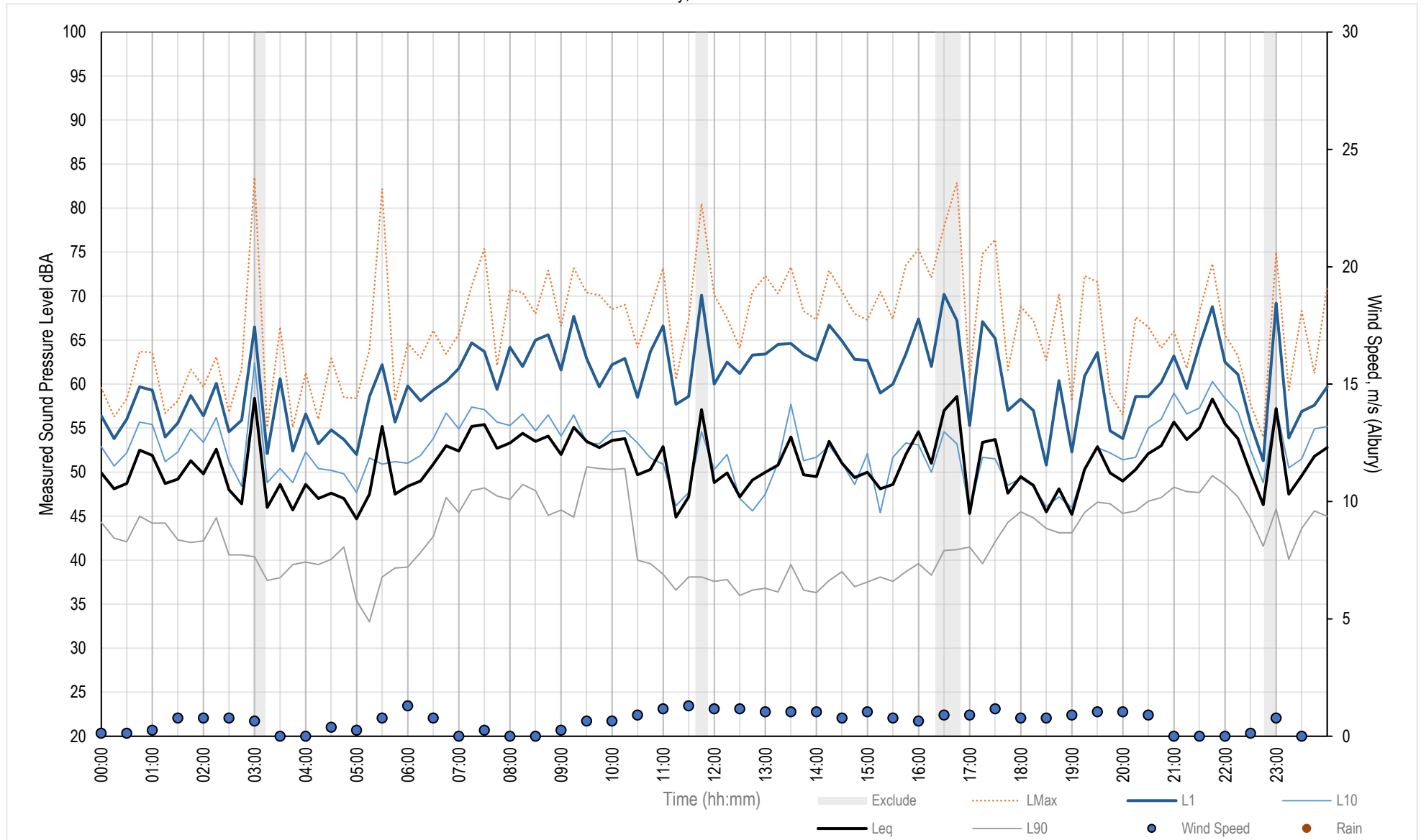
Measured Noise Levels - 19 Sanctuary Lane, Ettagomah

Monday, 29 March 2021



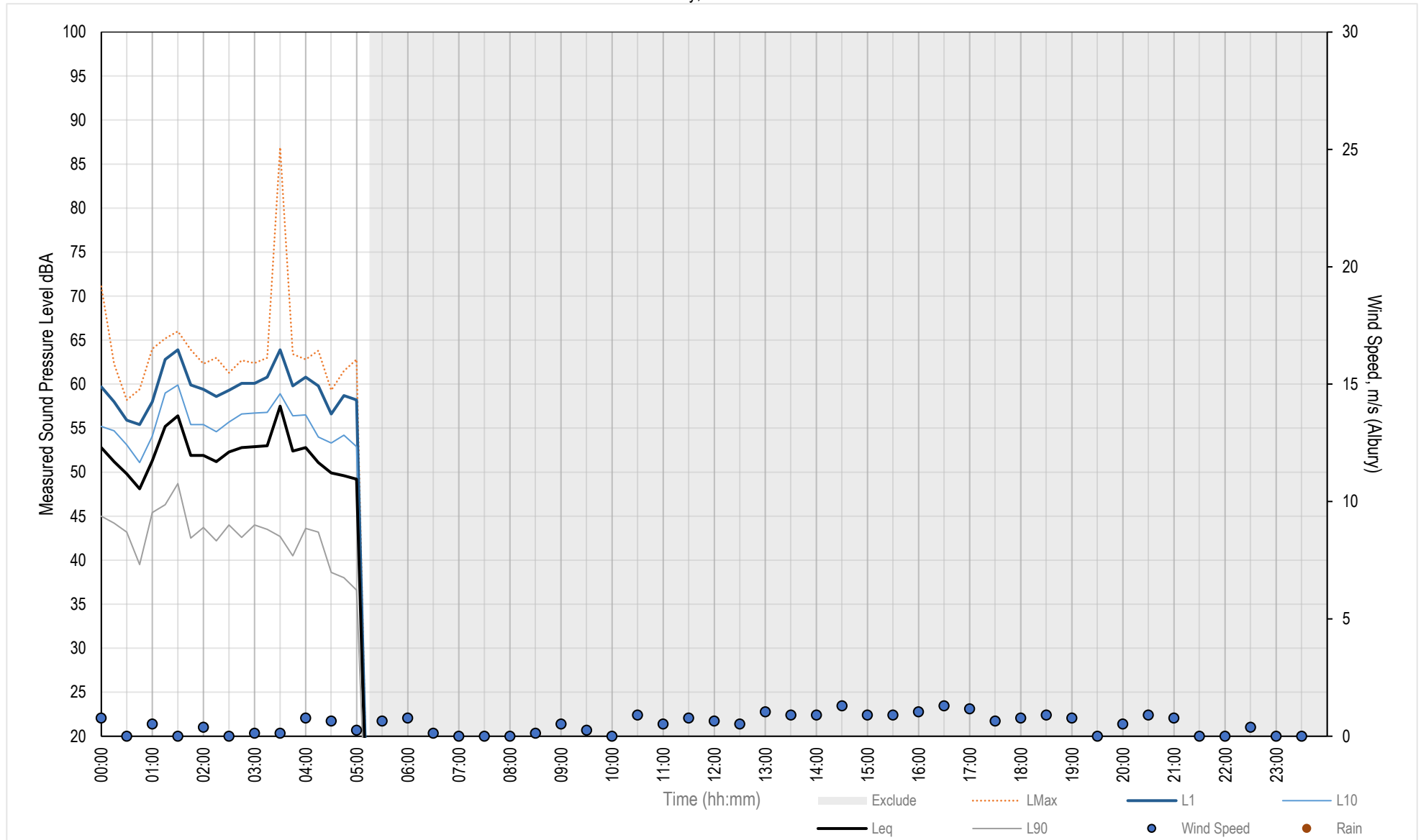
Measured Noise Levels - 19 Sanctuary Lane, Ettagomah

Tuesday, 30 March 2021



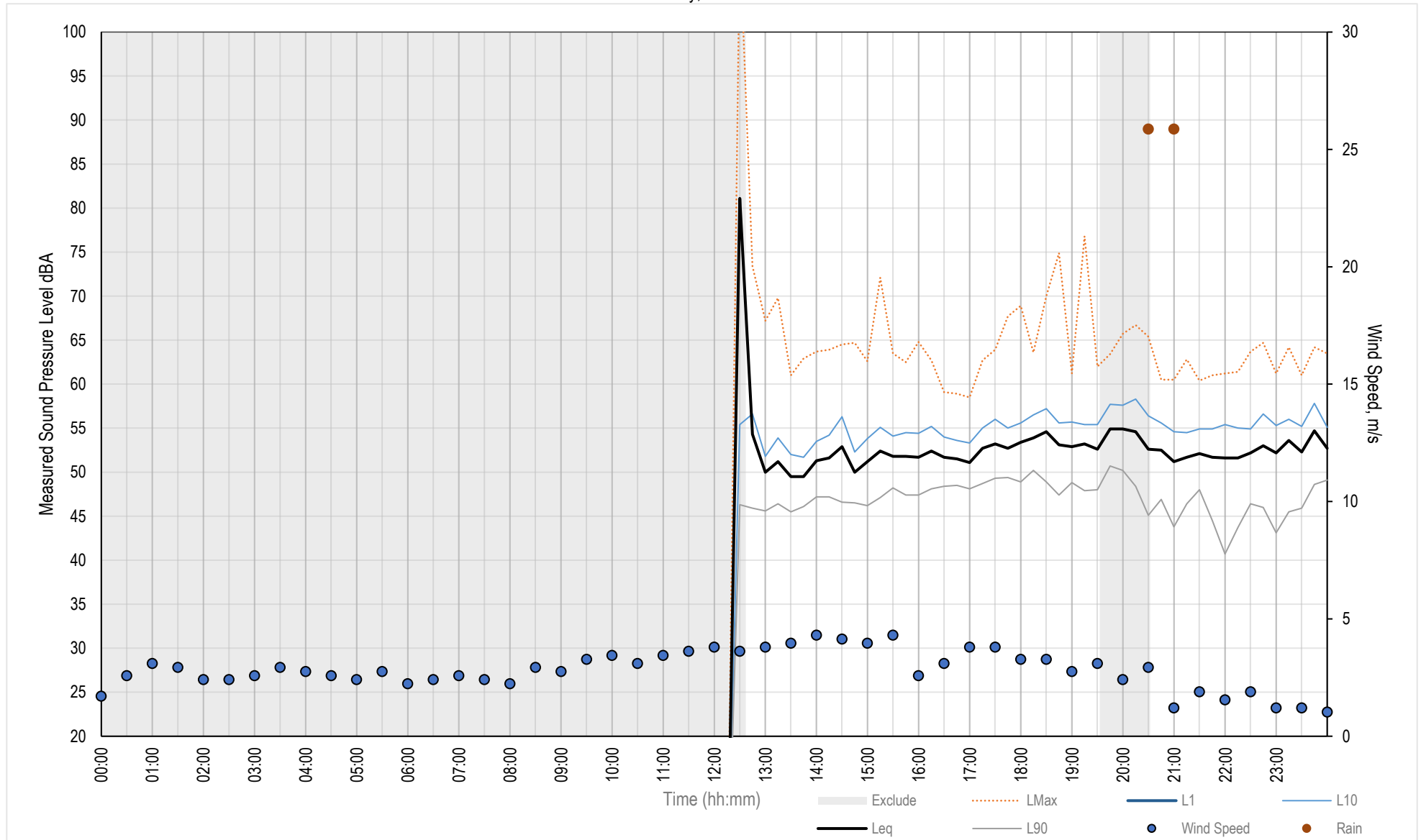
Measured Noise Levels - 19 Sanctuary Lane, Ettagomah

Wednesday, 31 March 2021



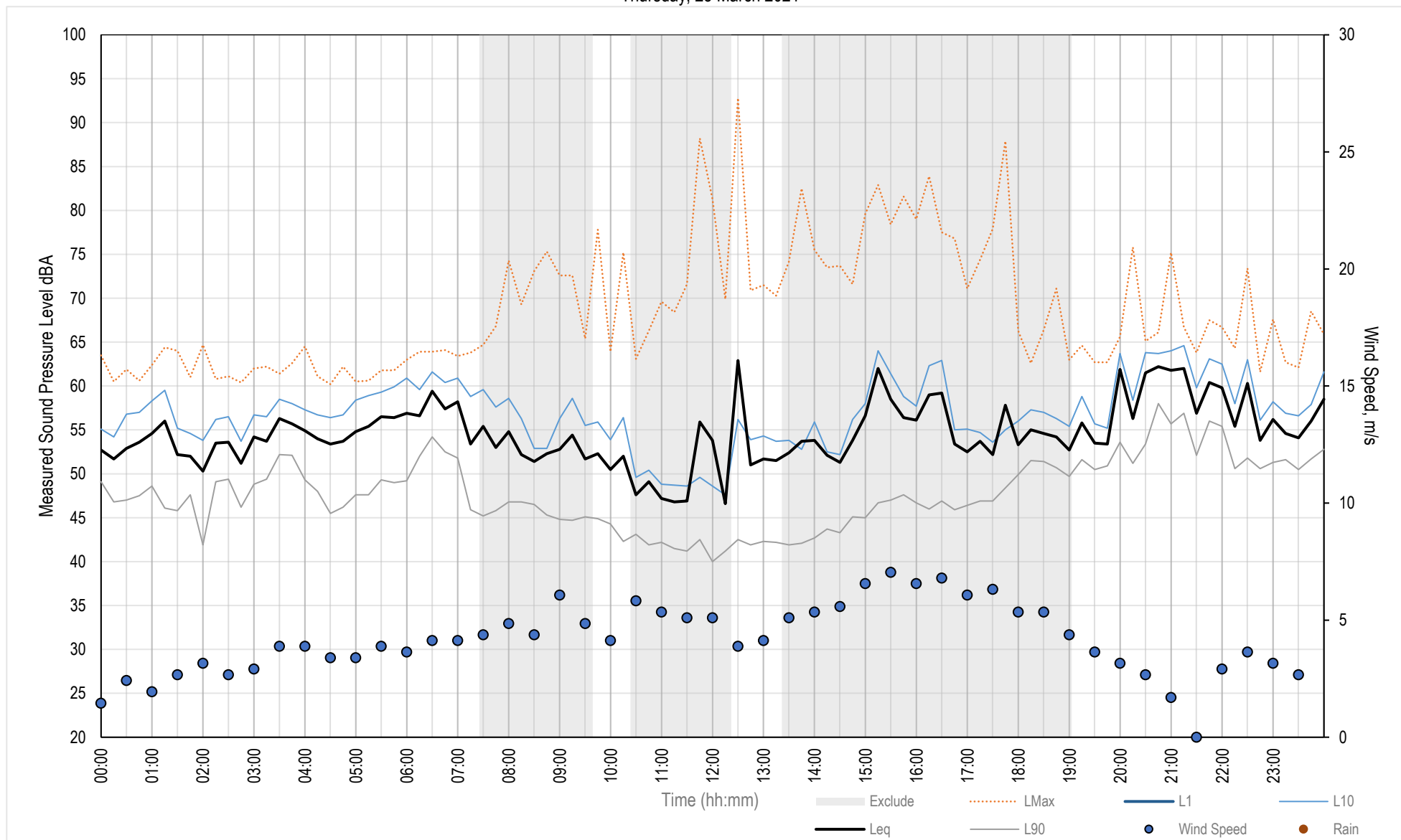
Measured Noise Levels - 398 Perryman Lane, Table Top

Wednesday, 24 March 2021



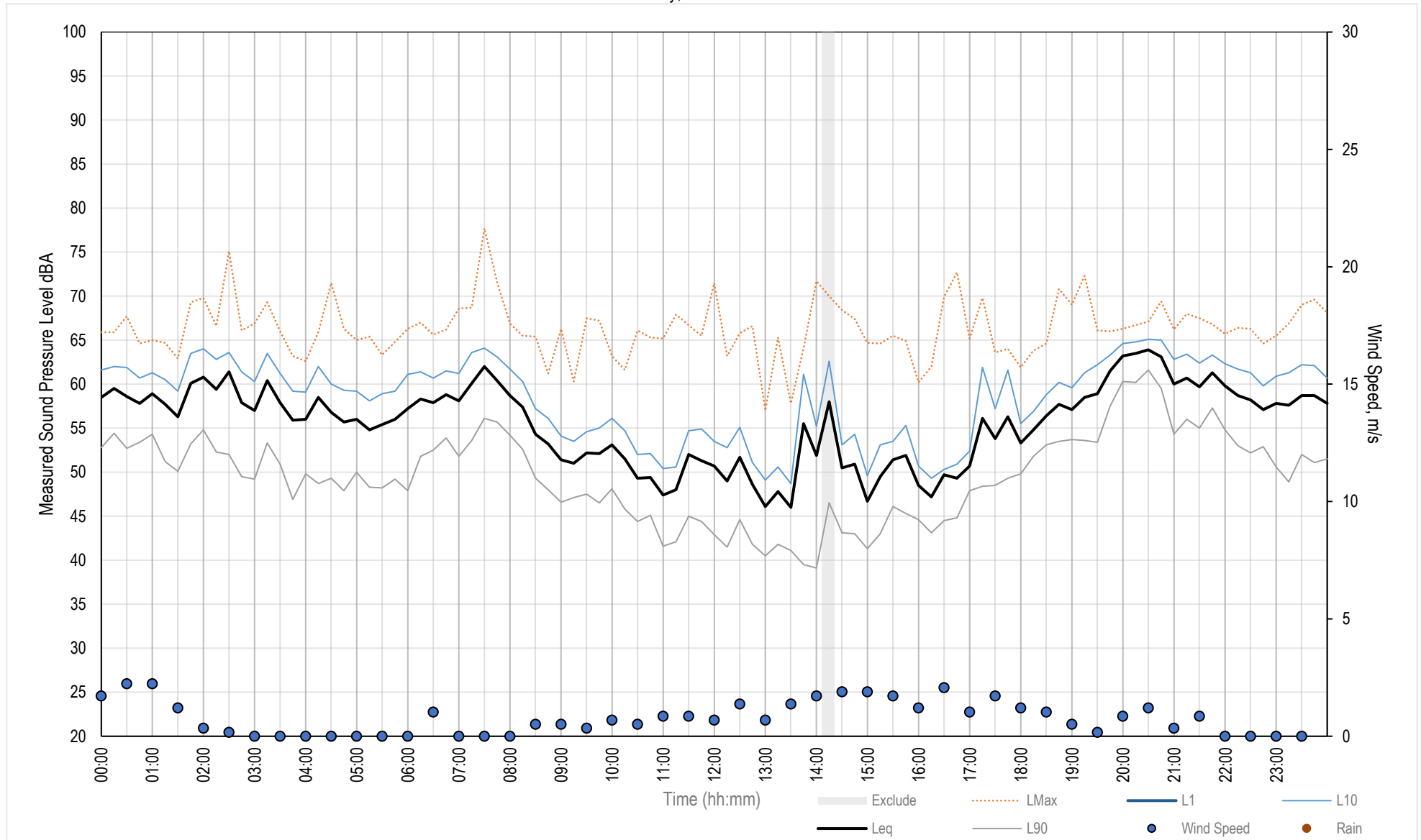
Measured Noise Levels - 398 Perryman Lane, Table Top

Thursday, 25 March 2021



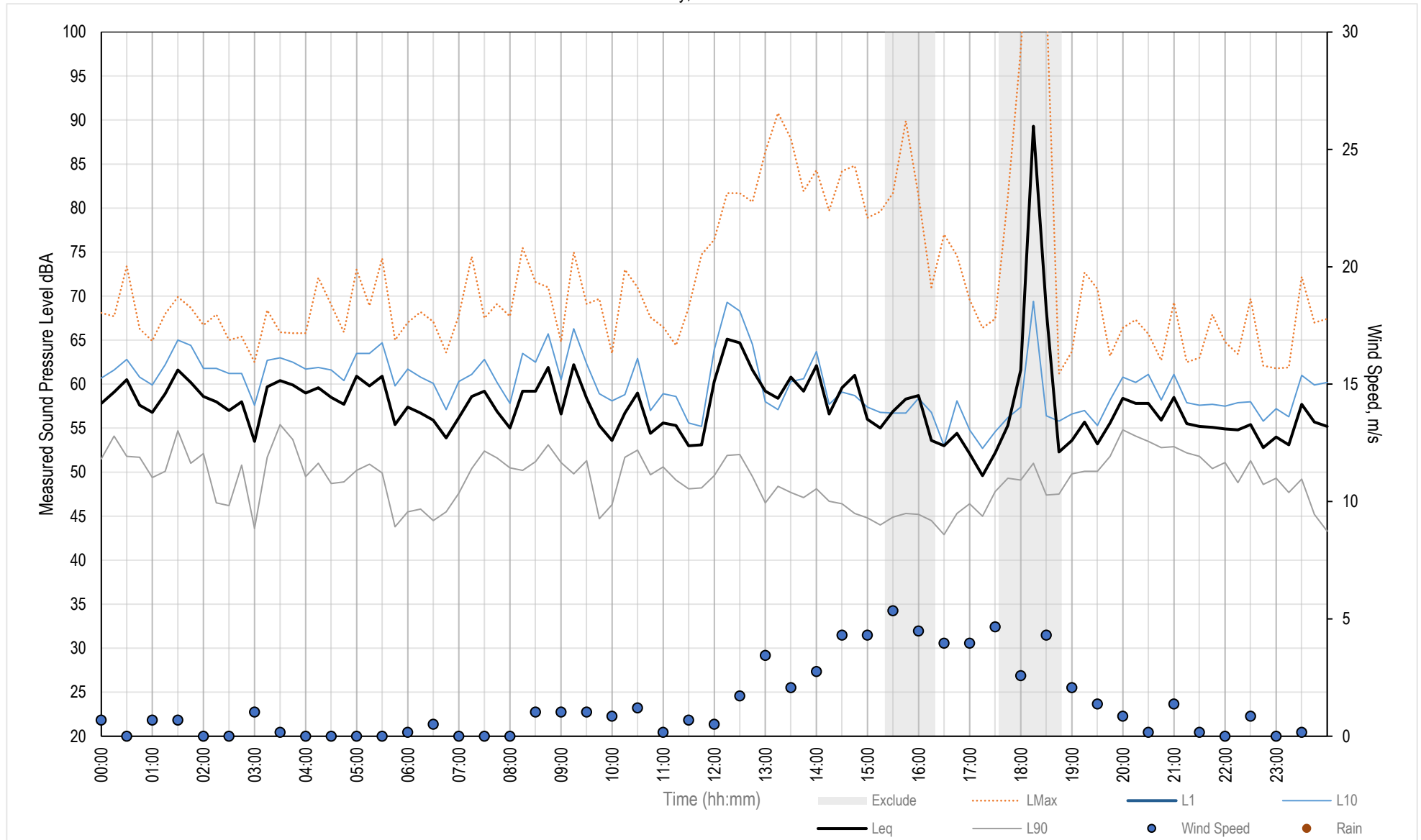
Measured Noise Levels - 398 Perryman Lane, Table Top

Friday, 26 March 2021



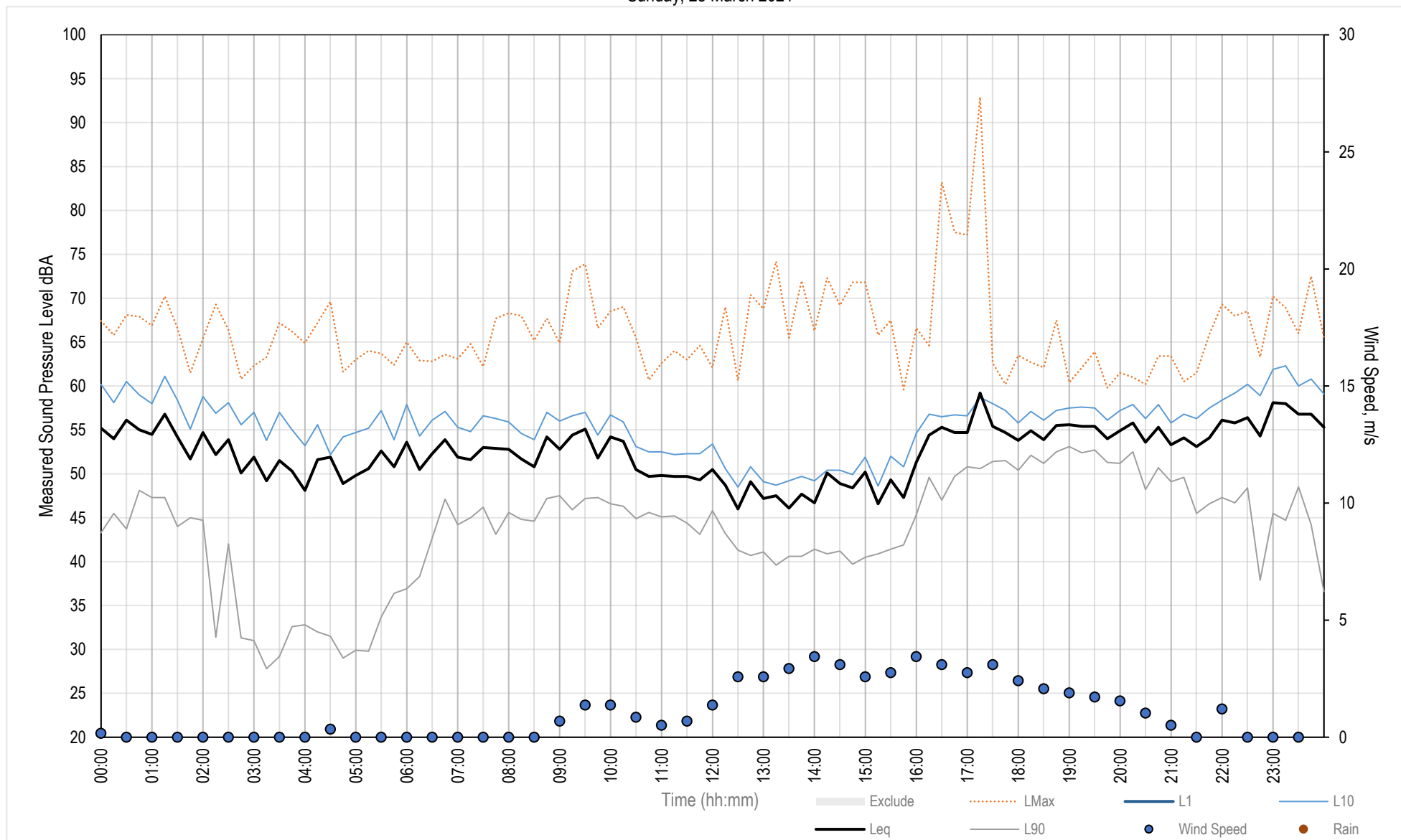
Measured Noise Levels - 398 Perryman Lane, Table Top

Saturday, 27 March 2021



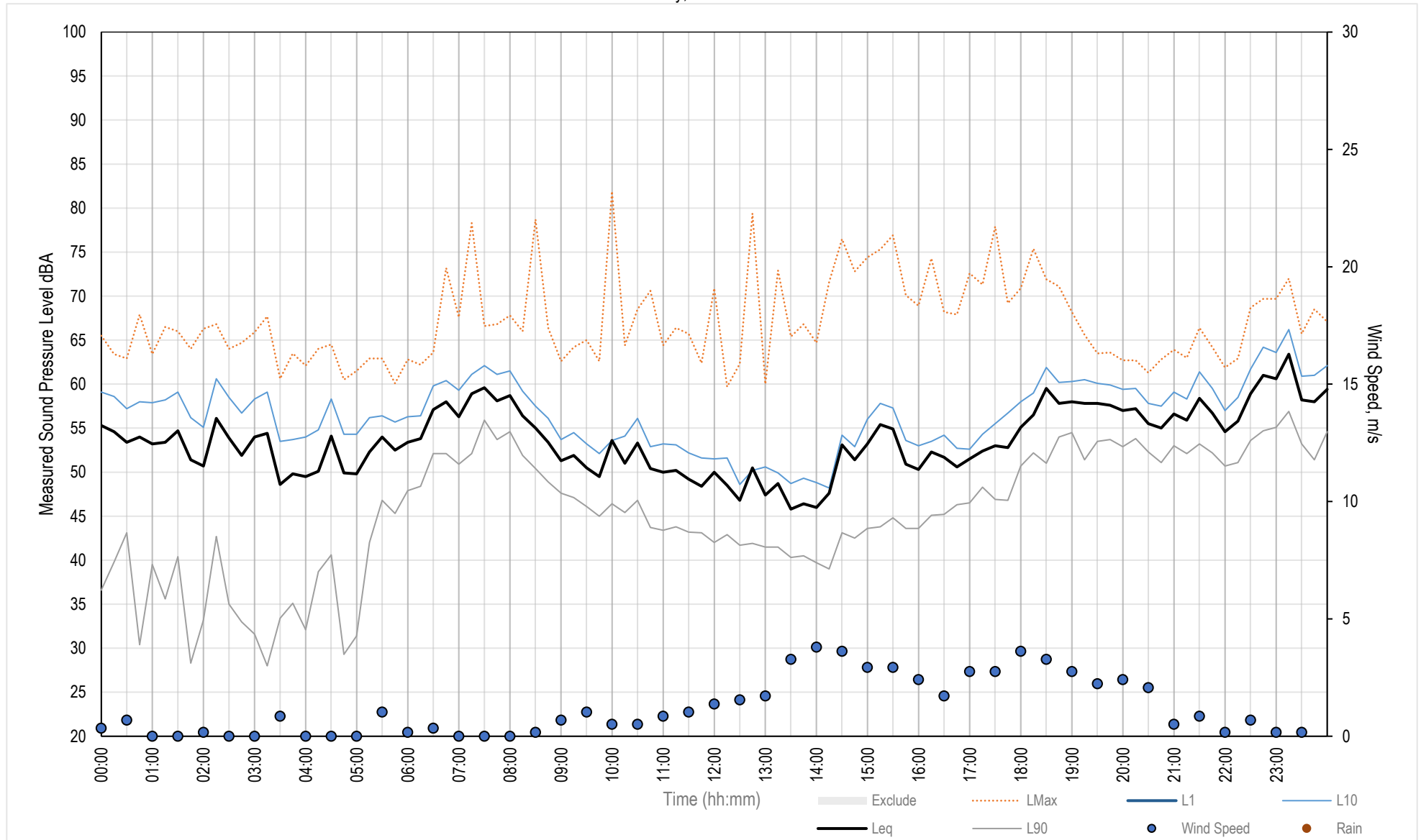
Measured Noise Levels - 398 Perryman Lane, Table Top

Sunday, 28 March 2021



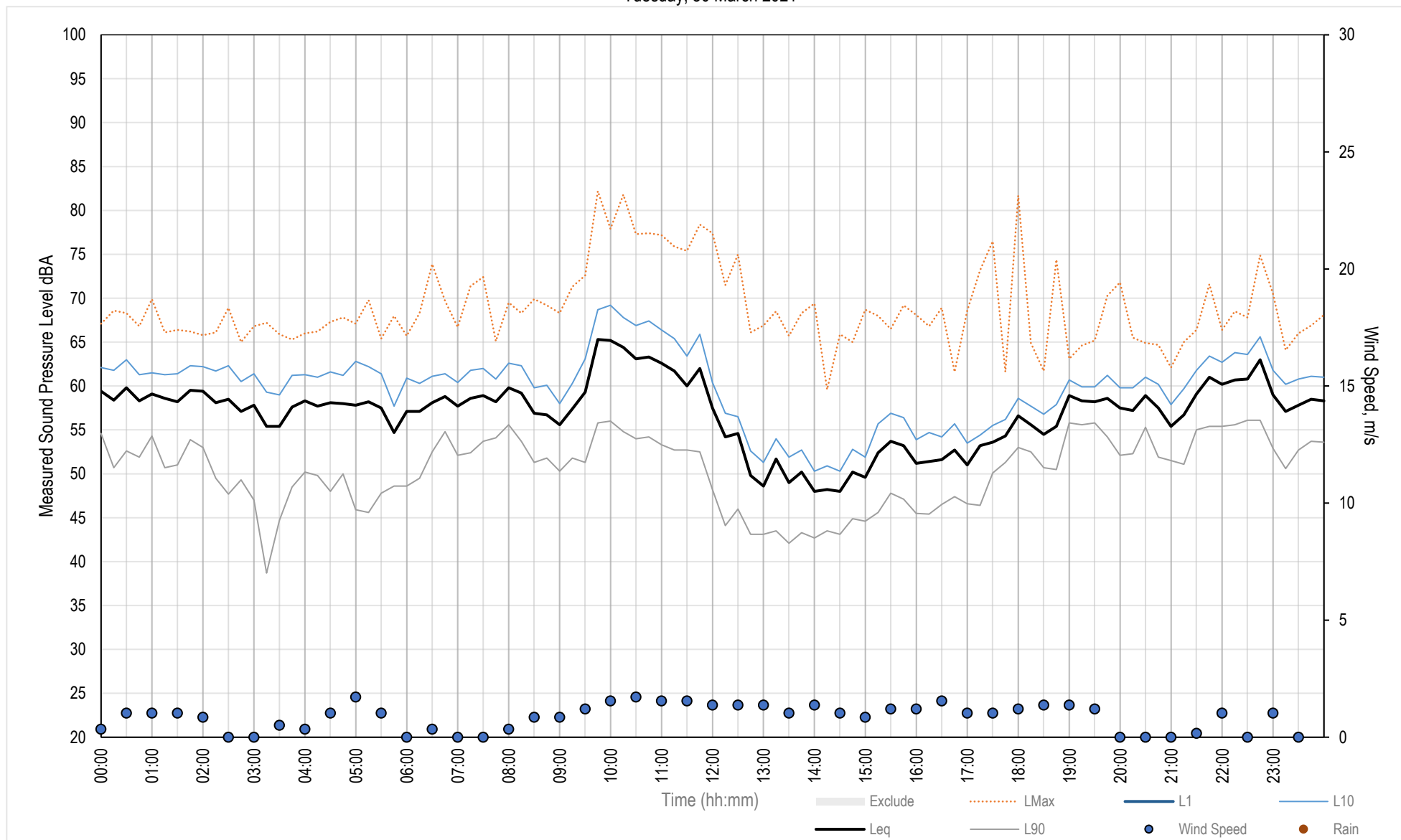
Measured Noise Levels - 398 Perryman Lane, Table Top

Monday, 29 March 2021



Measured Noise Levels - 398 Perryman Lane, Table Top

Tuesday, 30 March 2021

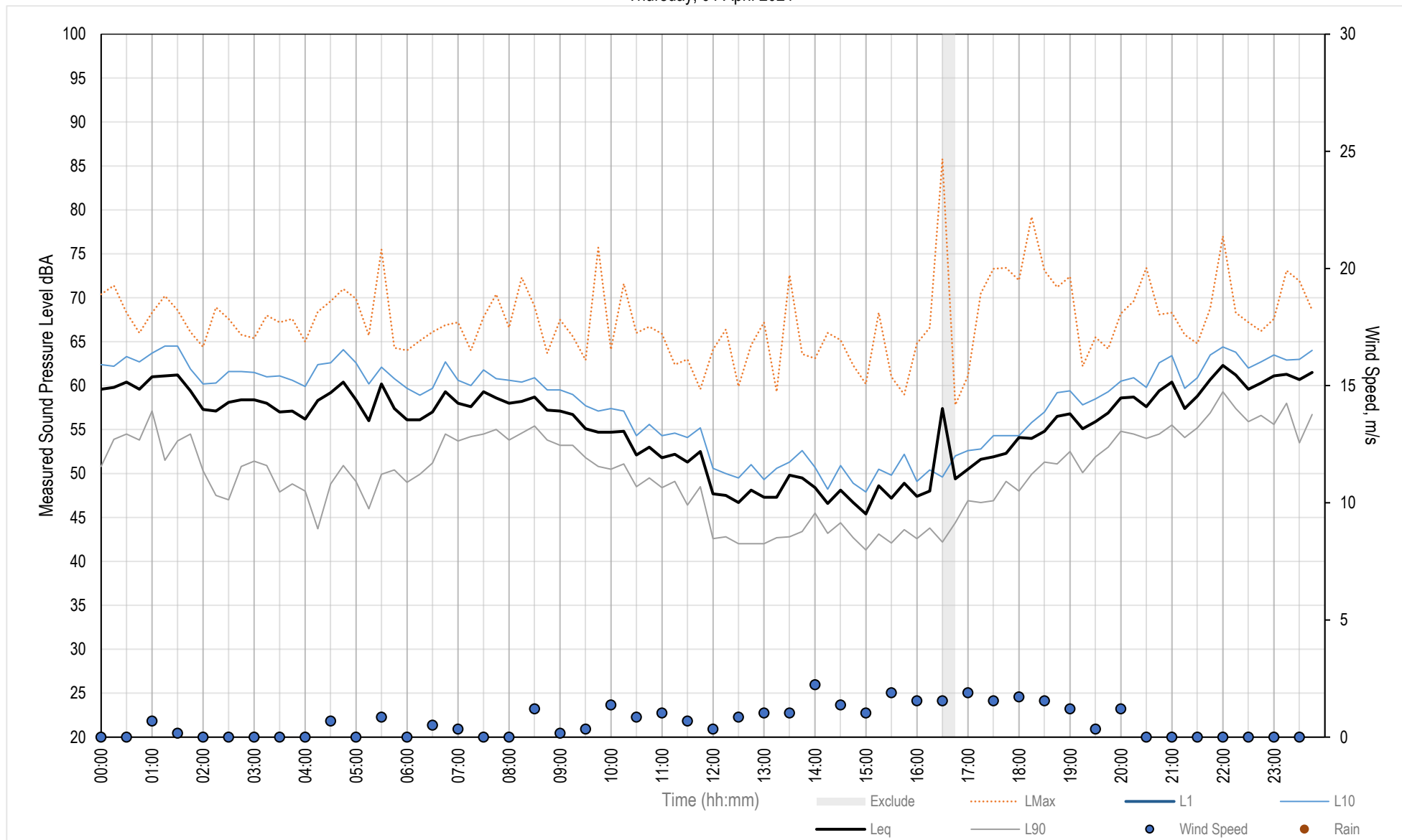


Wednesday, 31 March 2021



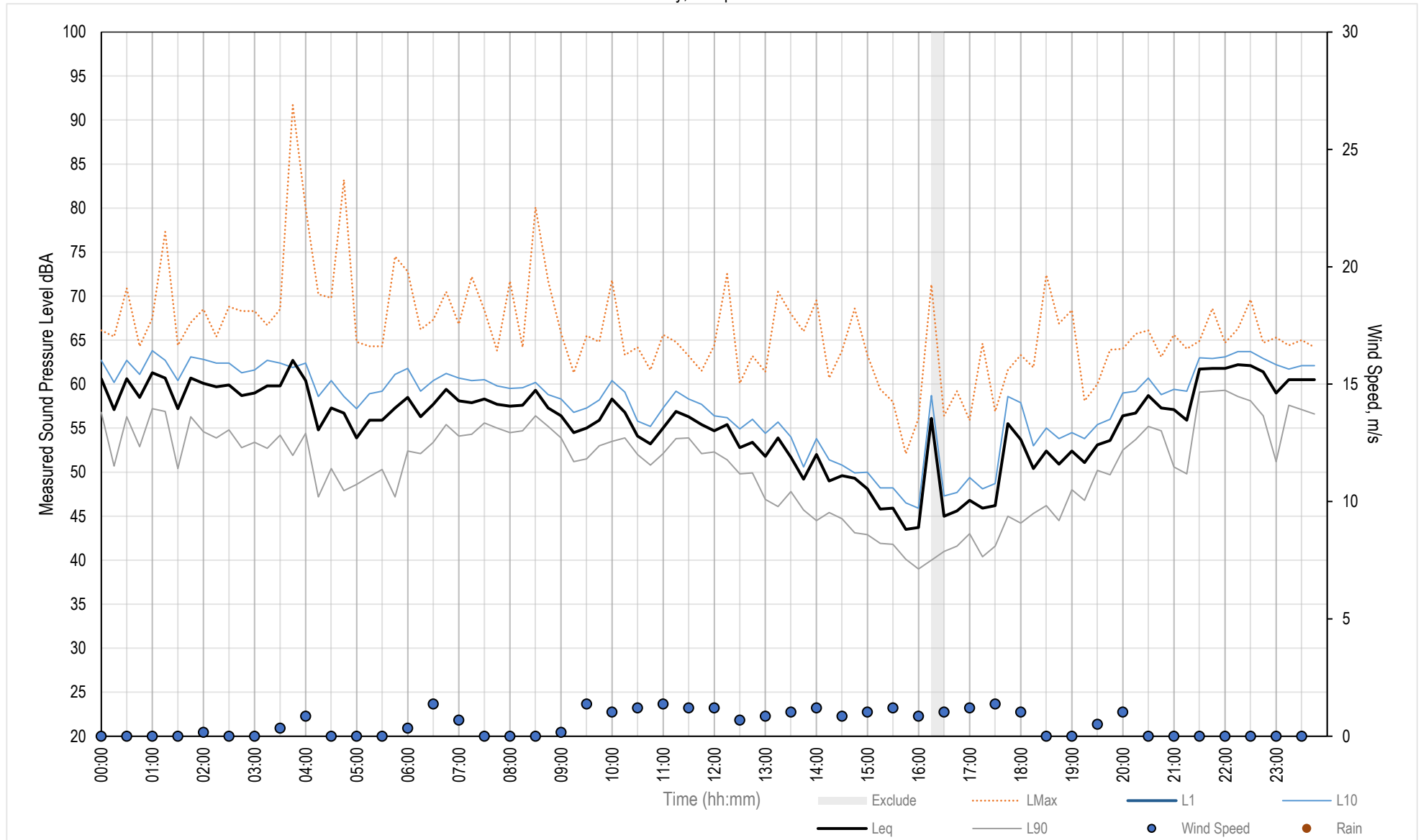
Measured Noise Levels - 398 Perryman Lane, Table Top

Thursday, 01 April 2021



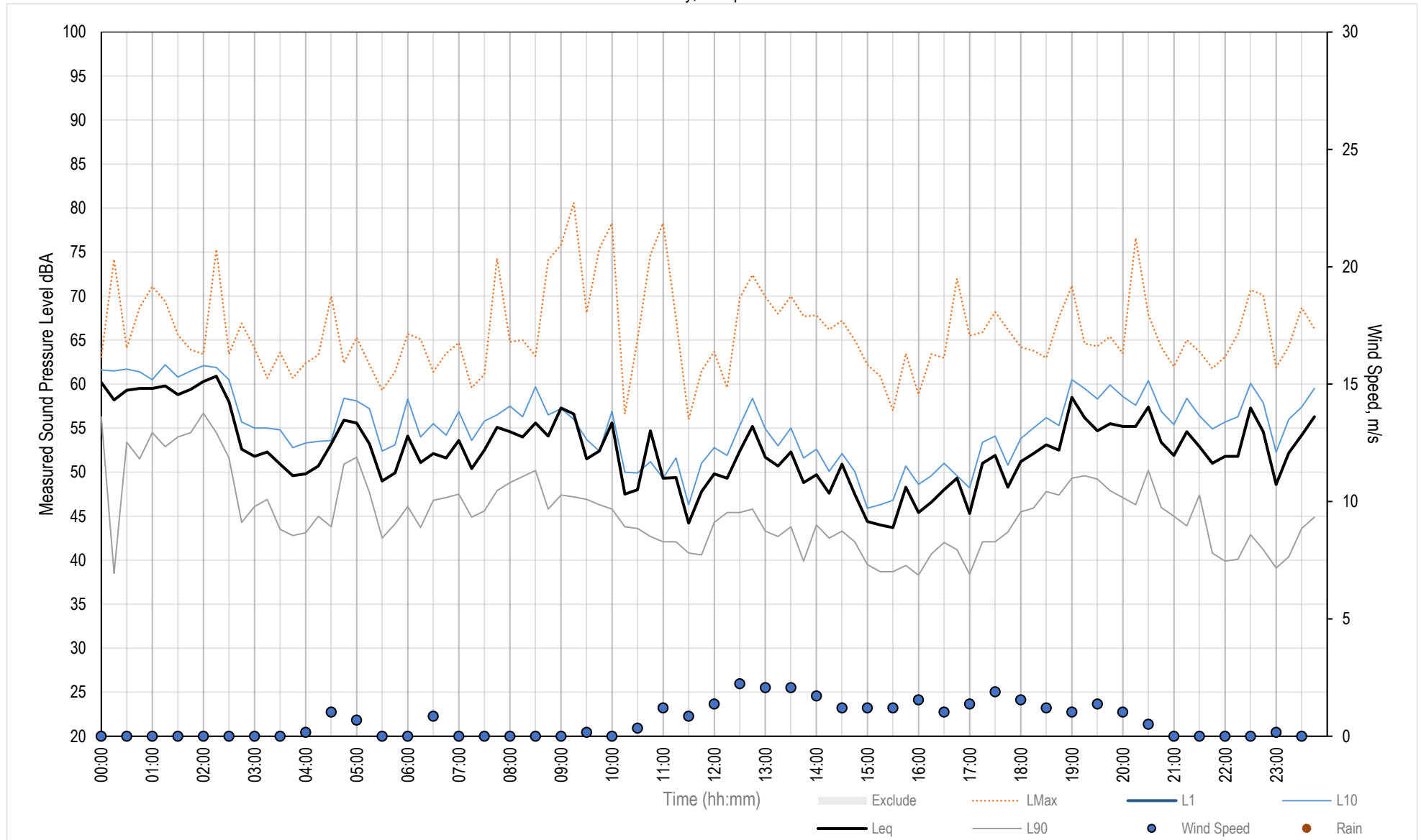
Measured Noise Levels - 398 Perryman Lane, Table Top

Friday, 02 April 2021



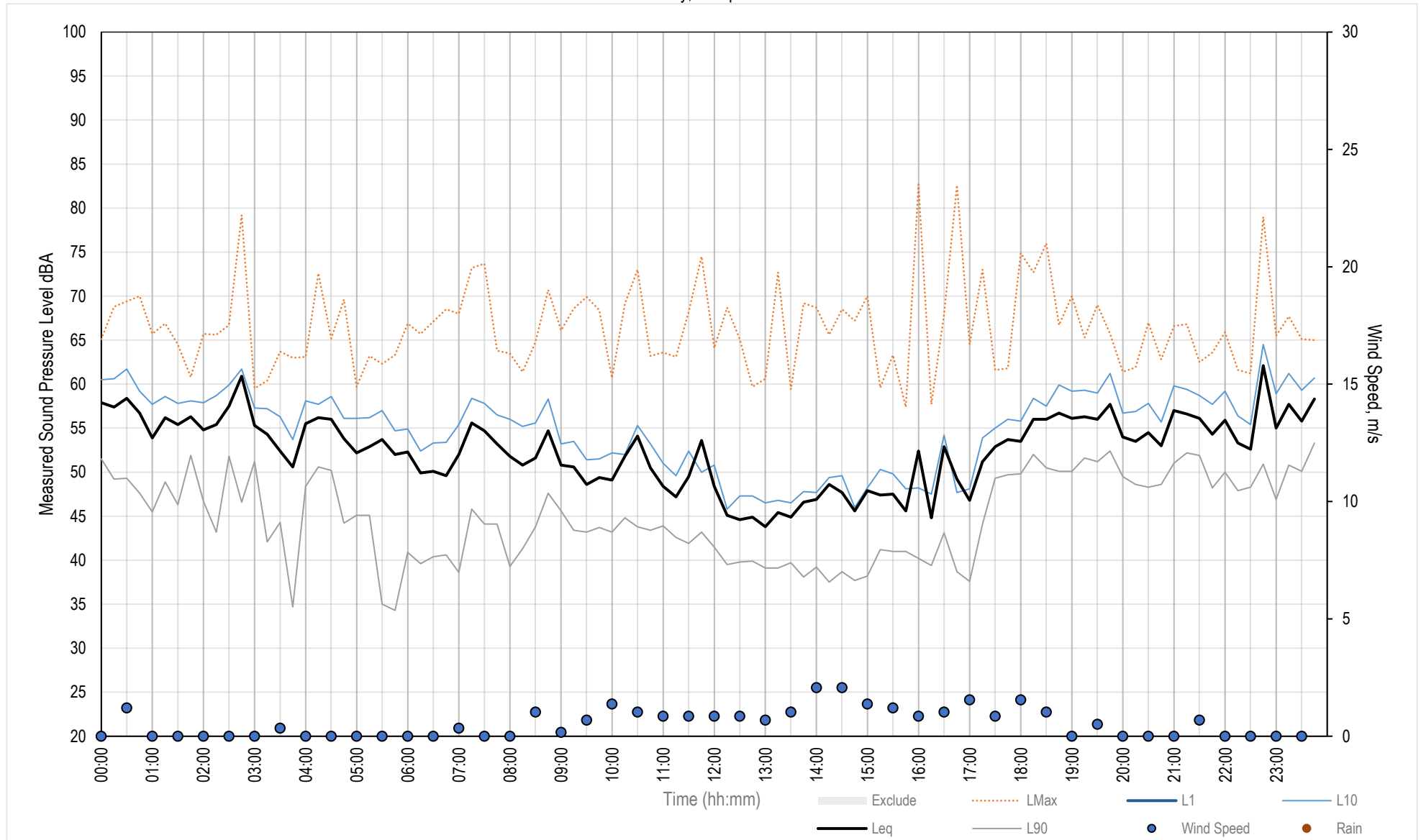
Measured Noise Levels - 398 Perryman Lane, Table Top

Saturday, 03 April 2021



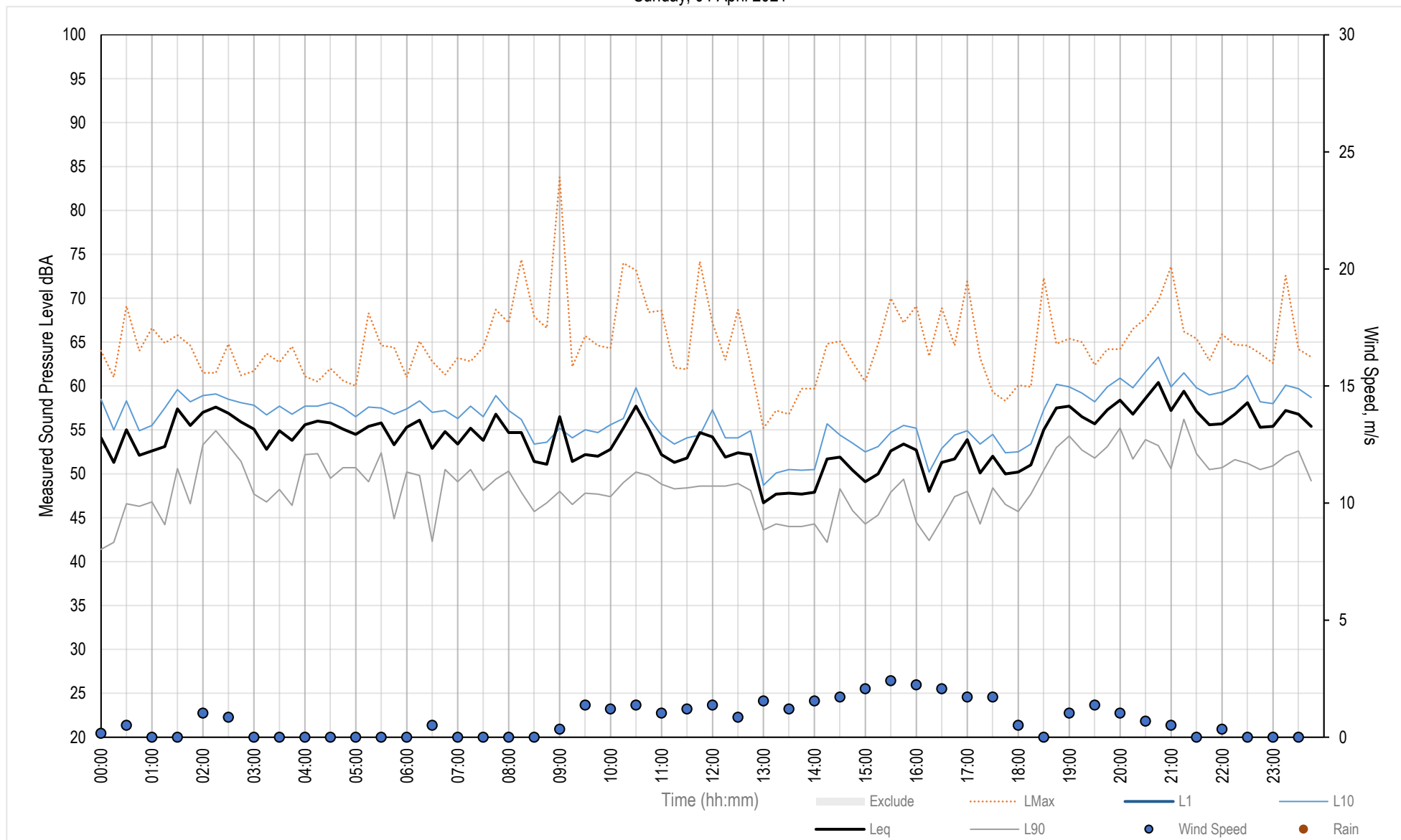
Measured Noise Levels - 398 Perryman Lane, Table Top

Sunday, 04 April 2021



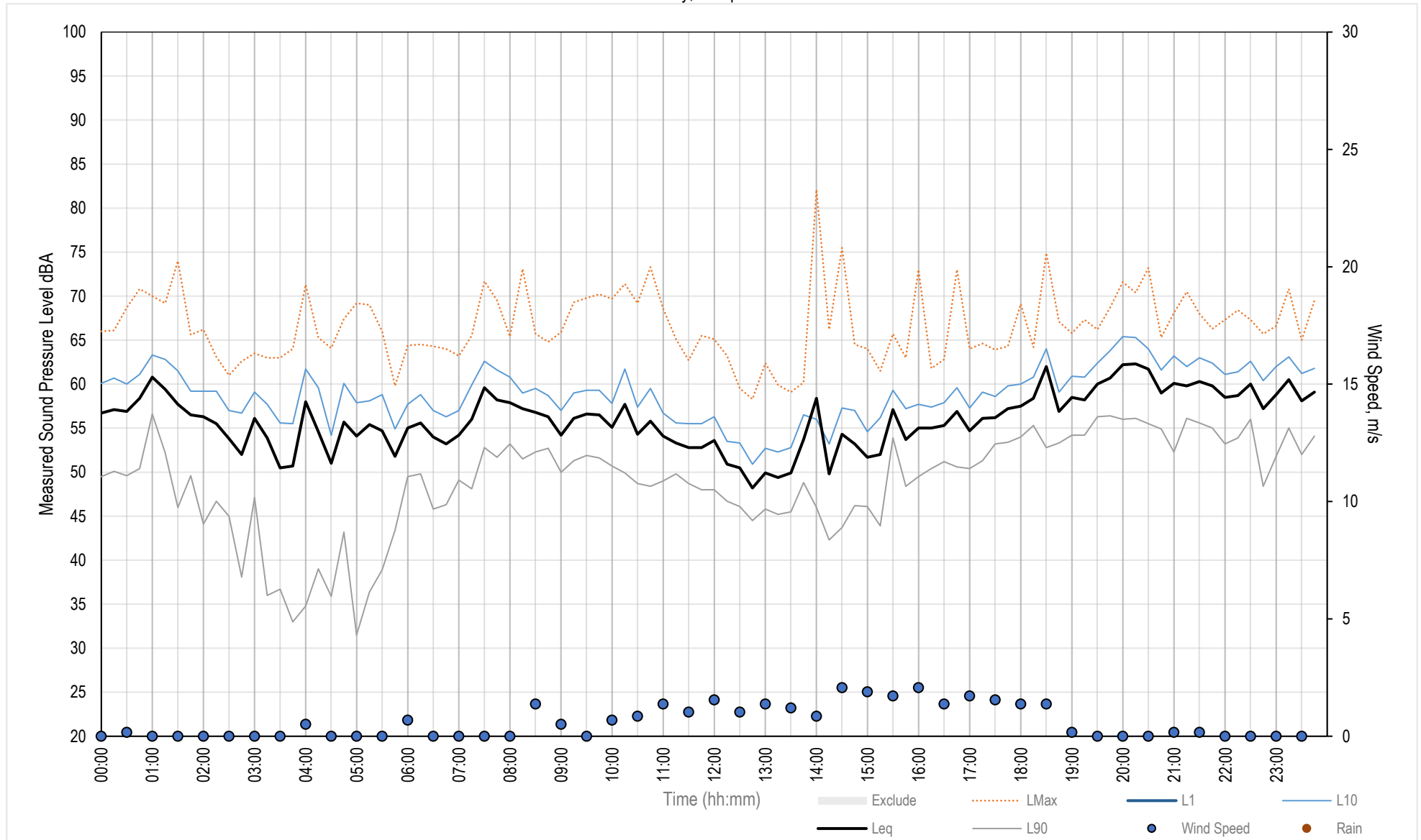
Measured Noise Levels - 398 Perryman Lane, Table Top

Sunday, 04 April 2021



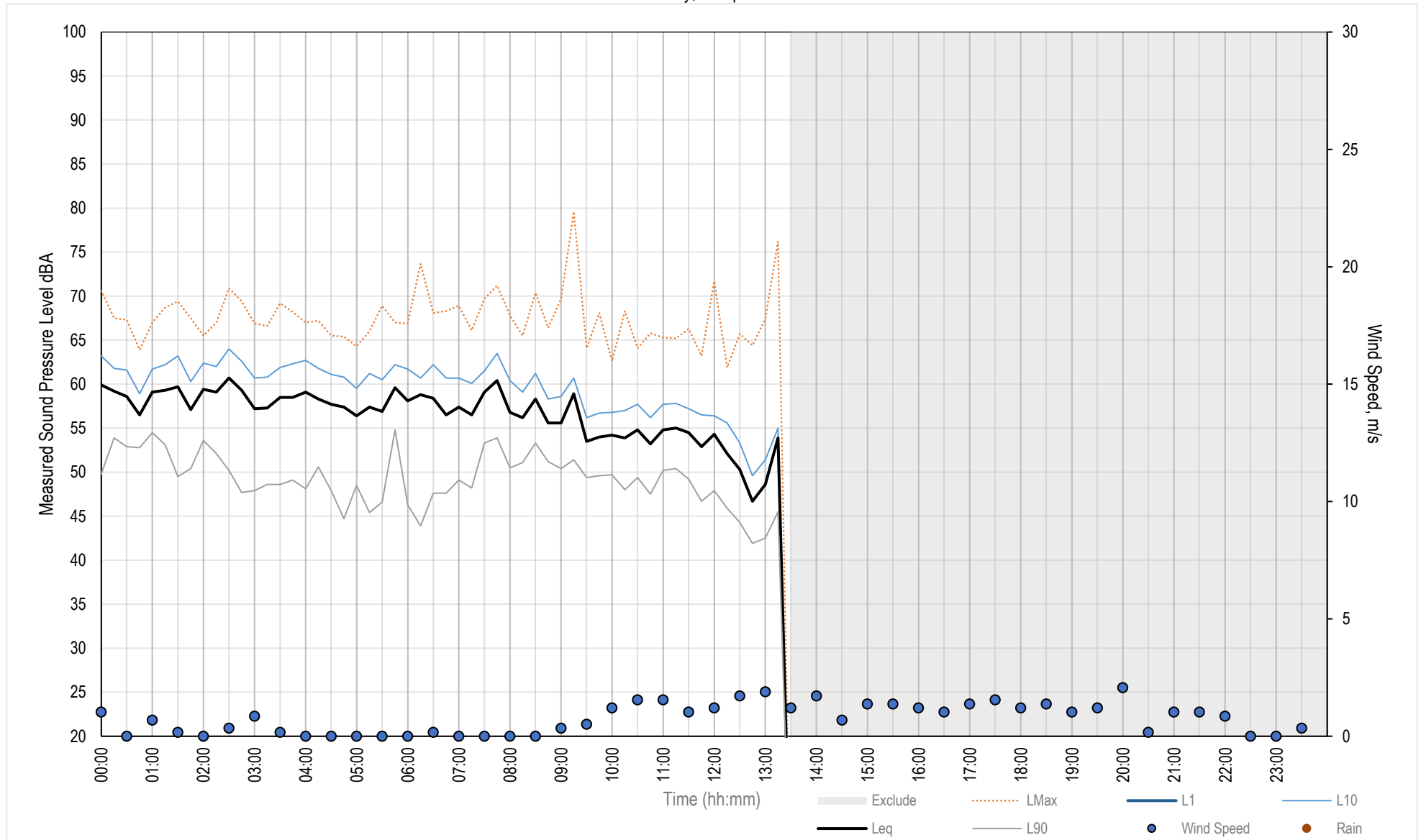
Measured Noise Levels - 398 Perryman Lane, Table Top

Monday, 05 April 2021



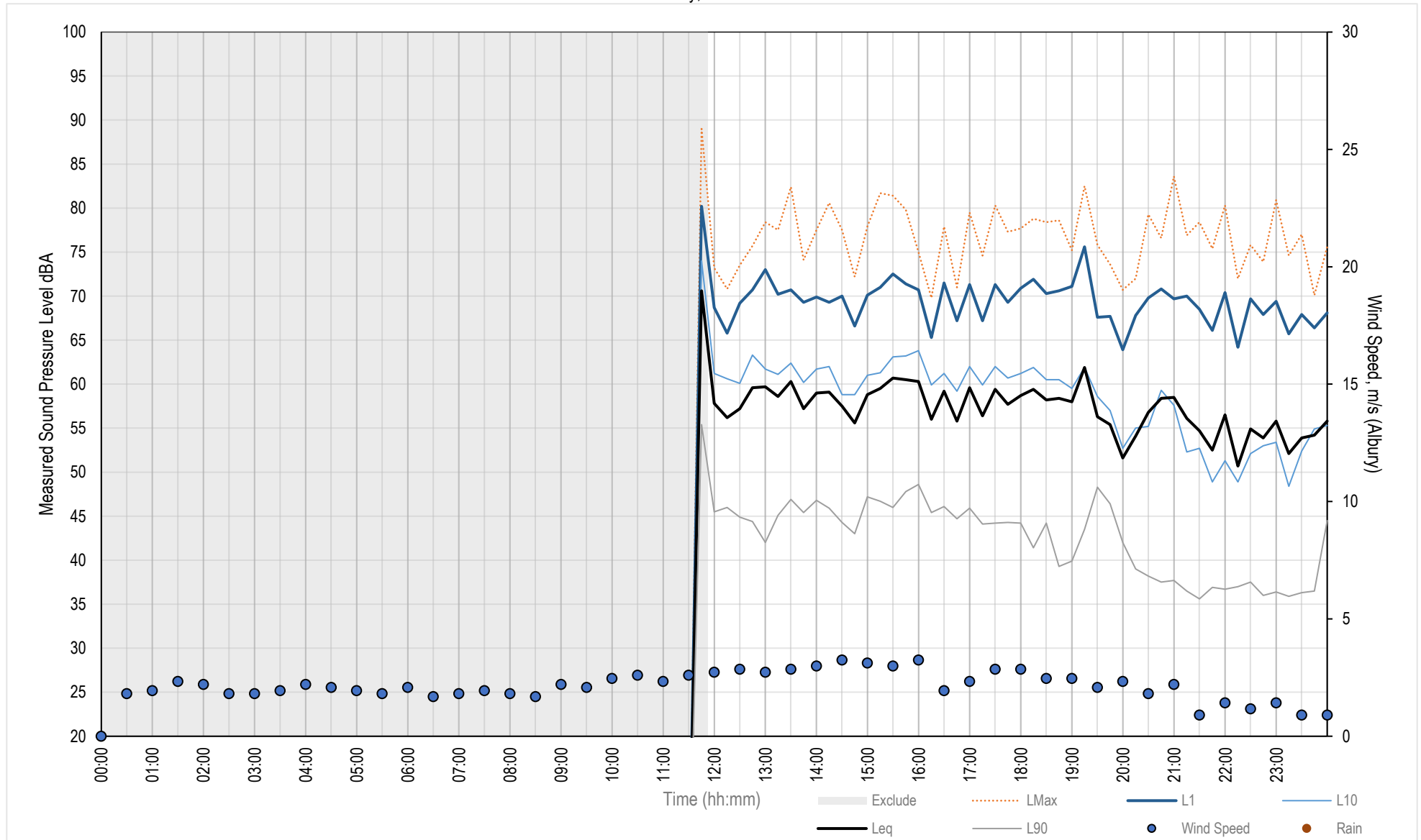
Measured Noise Levels - 398 Perryman Lane, Table Top

Tuesday, 06 April 2021



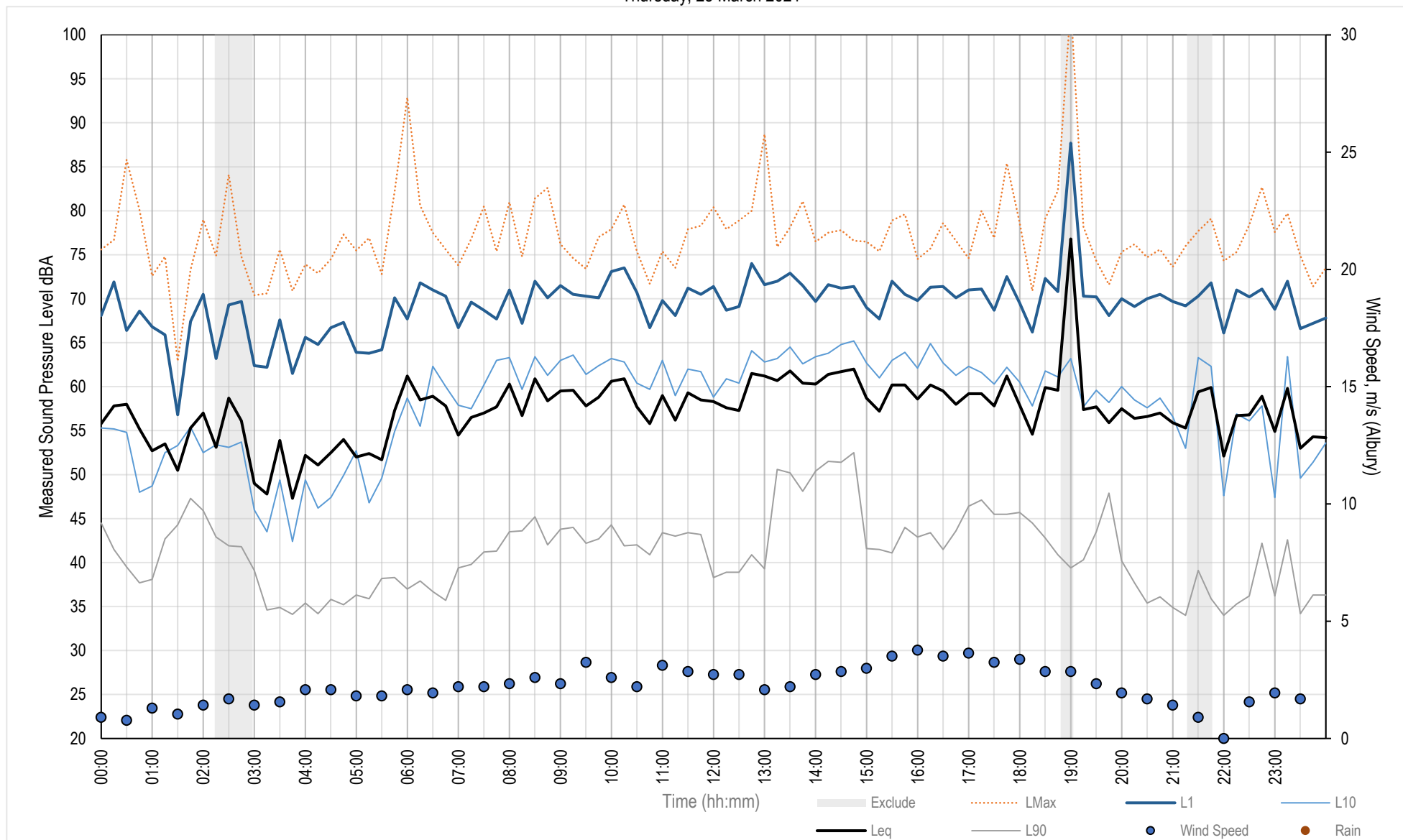
Measured Noise Levels - 16 Melville St, Culcairn

Wednesday, 24 March 2021



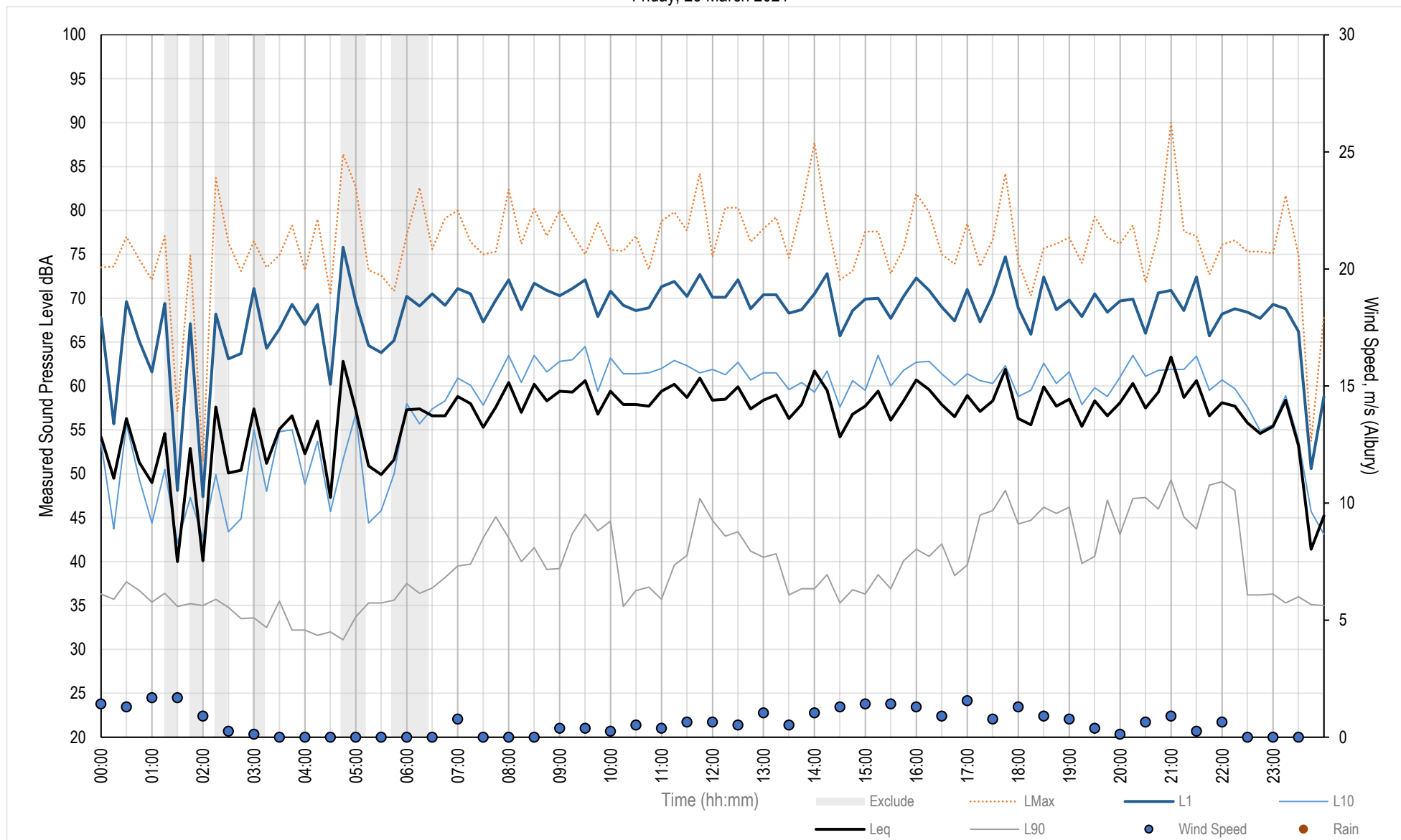
Measured Noise Levels - 16 Melville St, Culcairn

Thursday, 25 March 2021



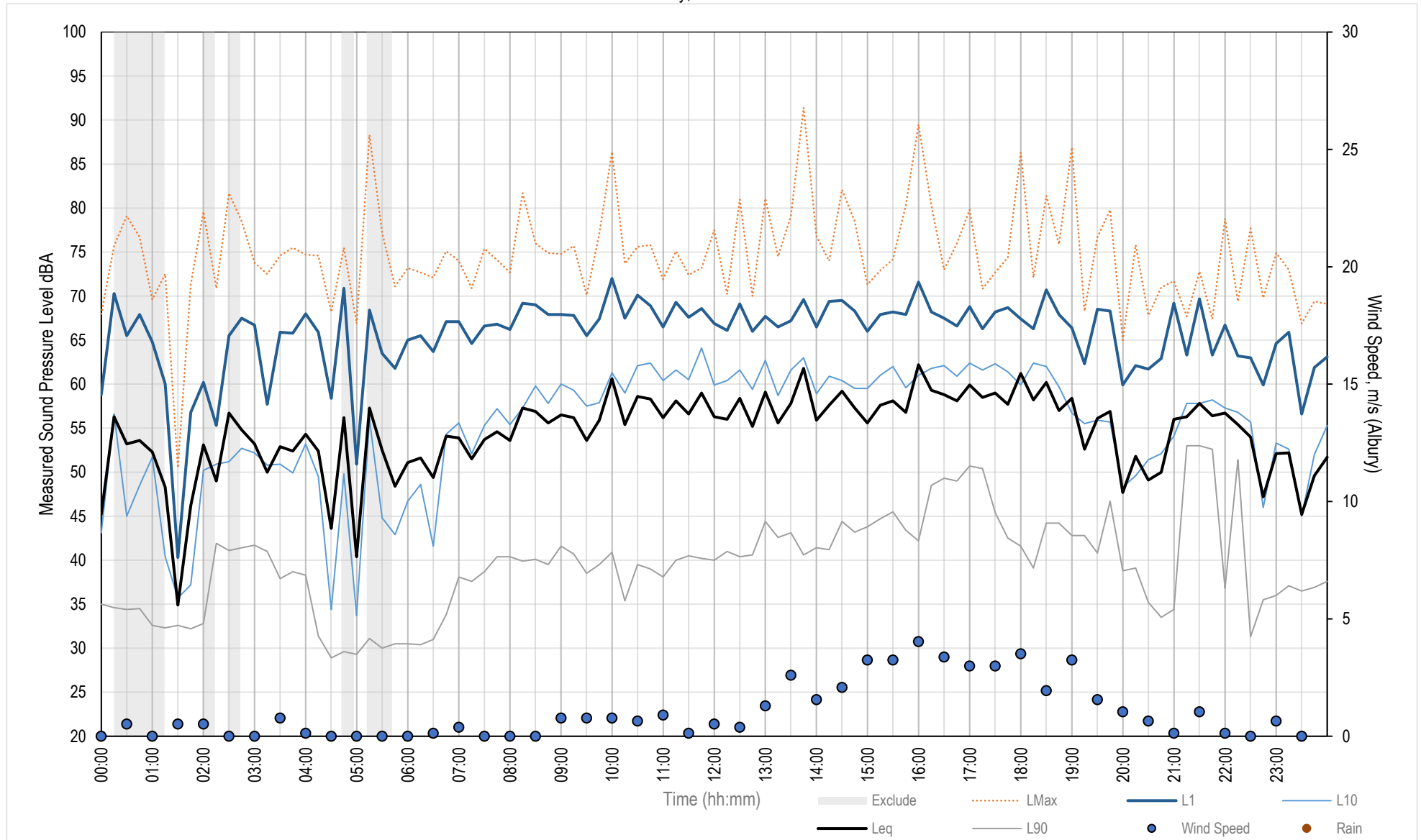
Measured Noise Levels - 16 Melville St, Culcairn

Friday, 26 March 2021



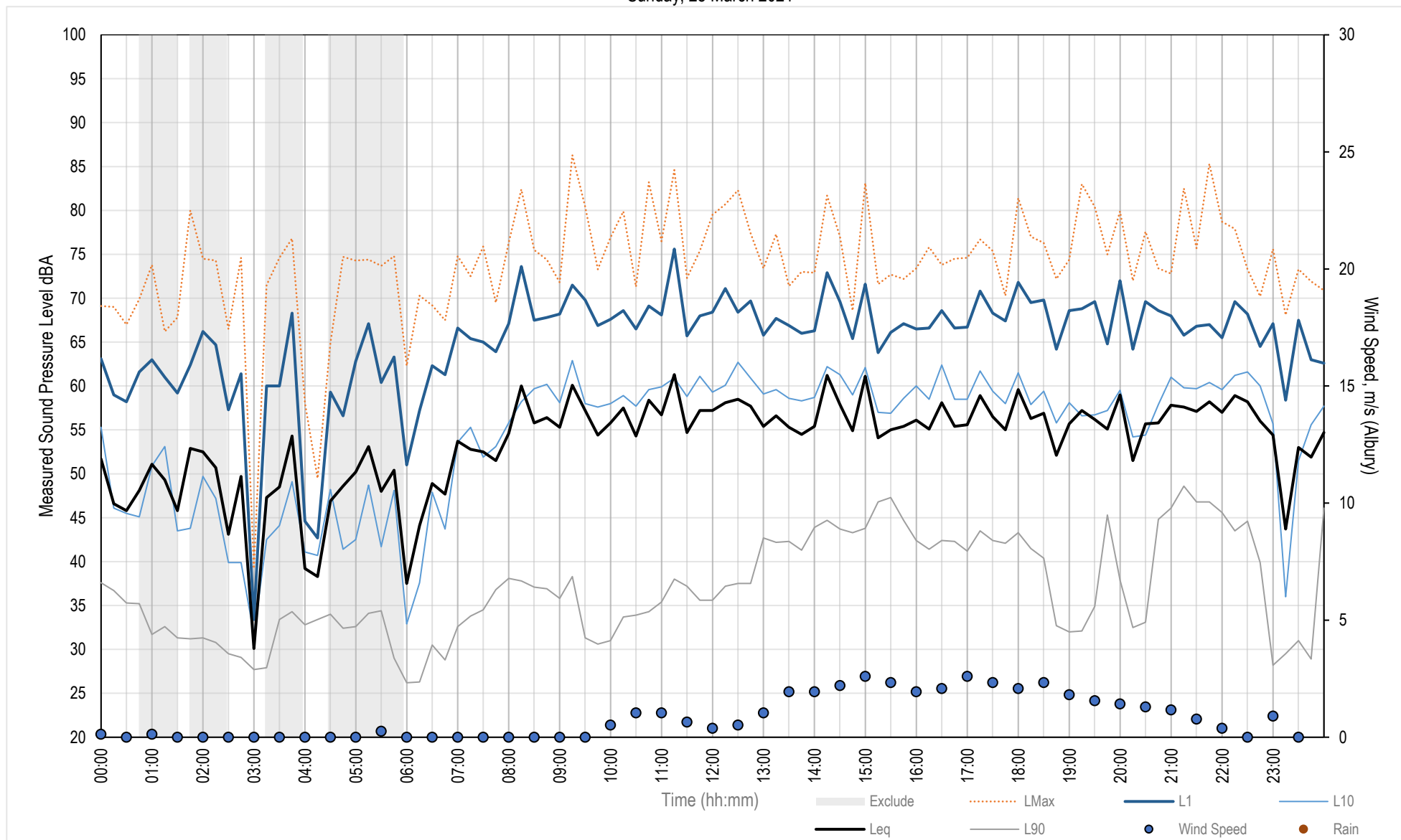
Measured Noise Levels - 16 Melville St, Culcairn

Saturday, 27 March 2021



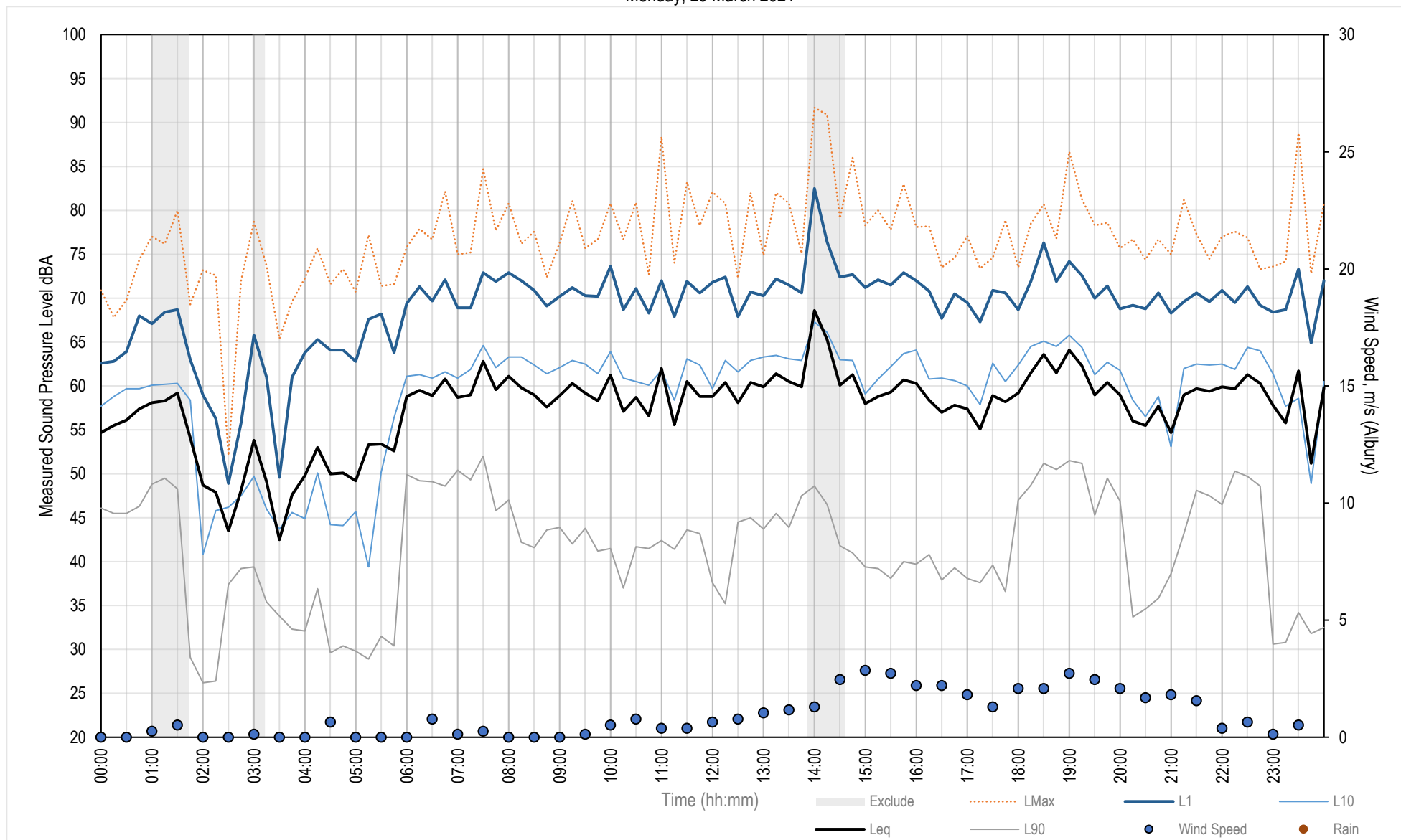
Measured Noise Levels - 16 Melville St, Culcairn

Sunday, 28 March 2021



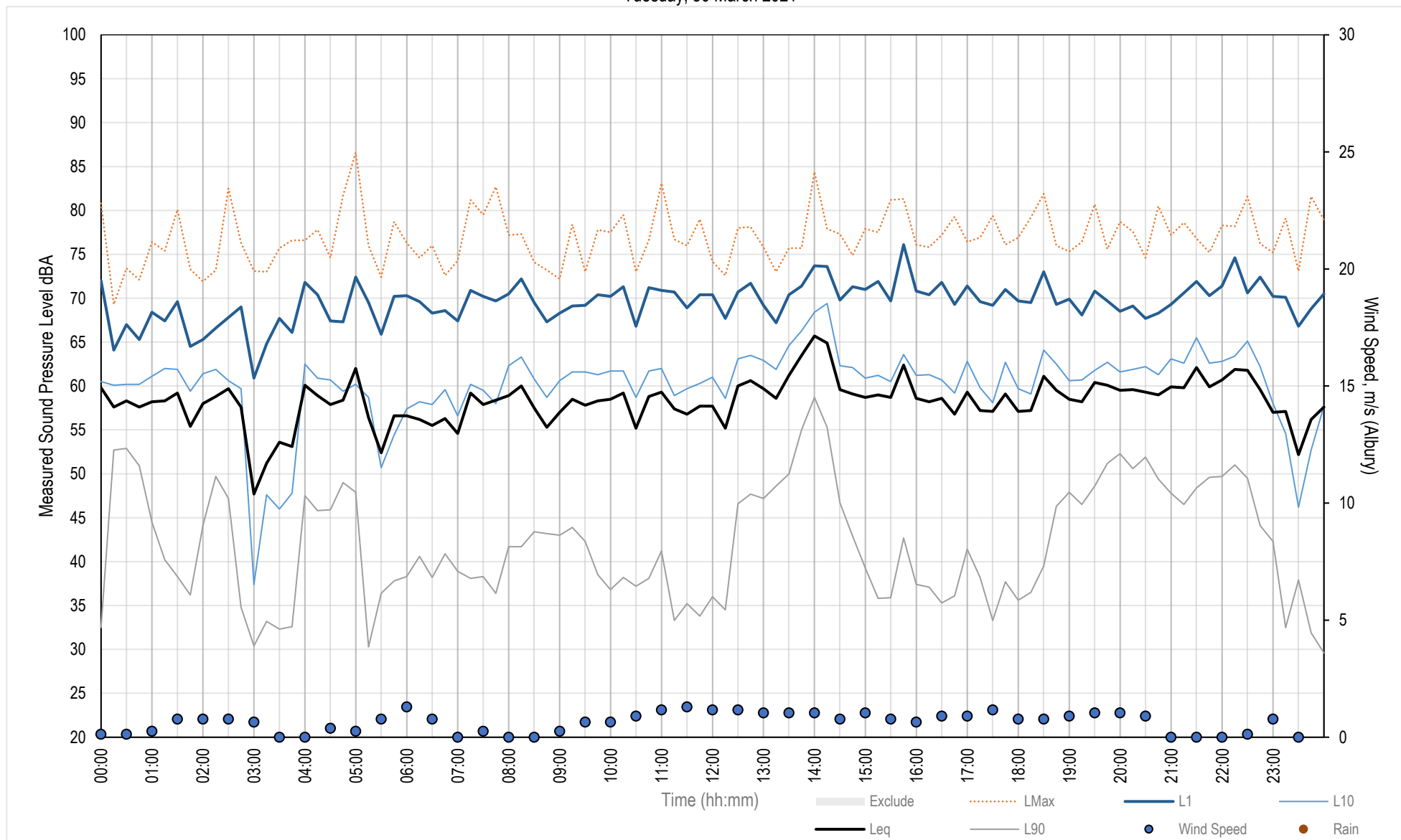
Measured Noise Levels - 16 Melville St, Culcairn

Monday, 29 March 2021



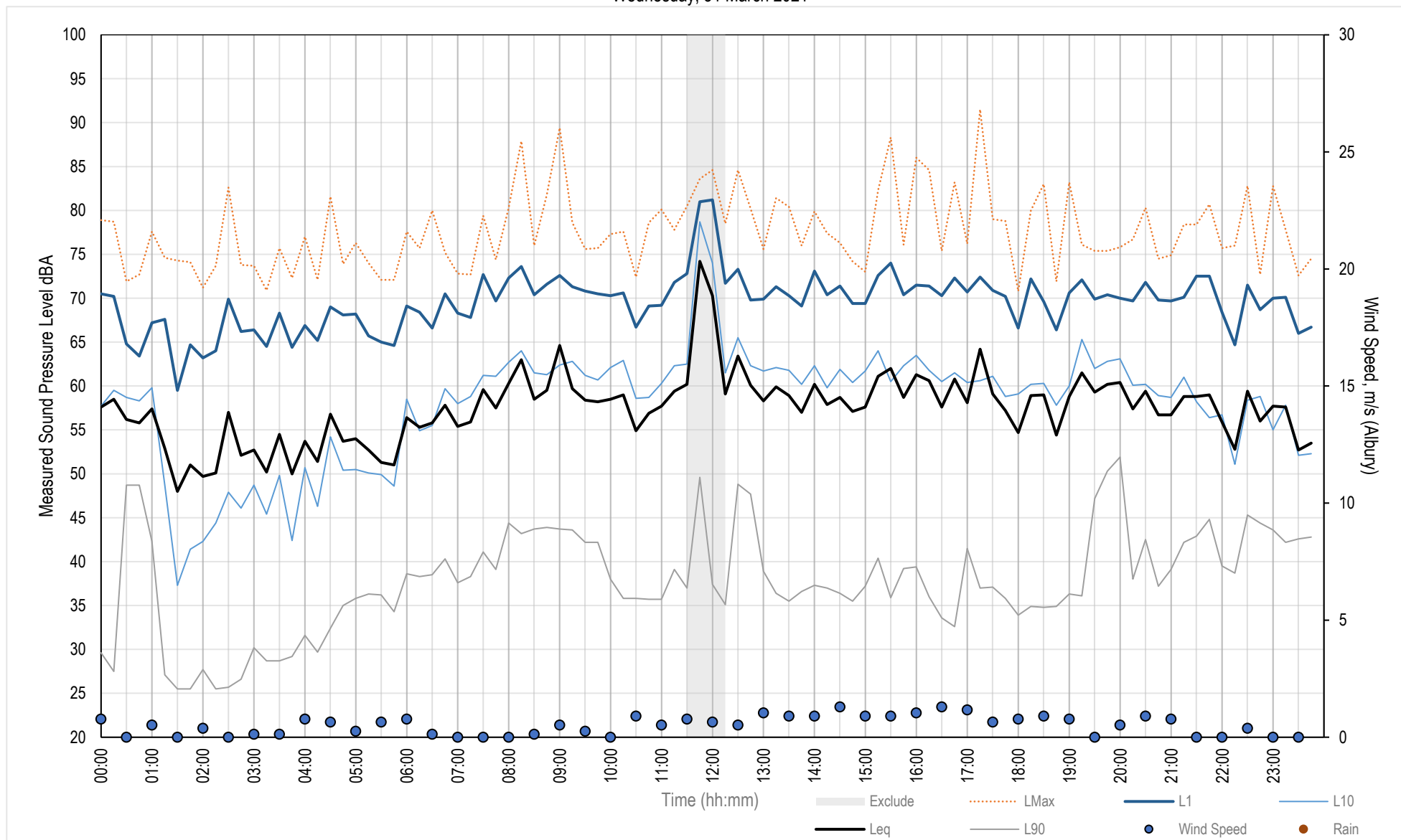
Measured Noise Levels - 16 Melville St, Culcairn

Tuesday, 30 March 2021



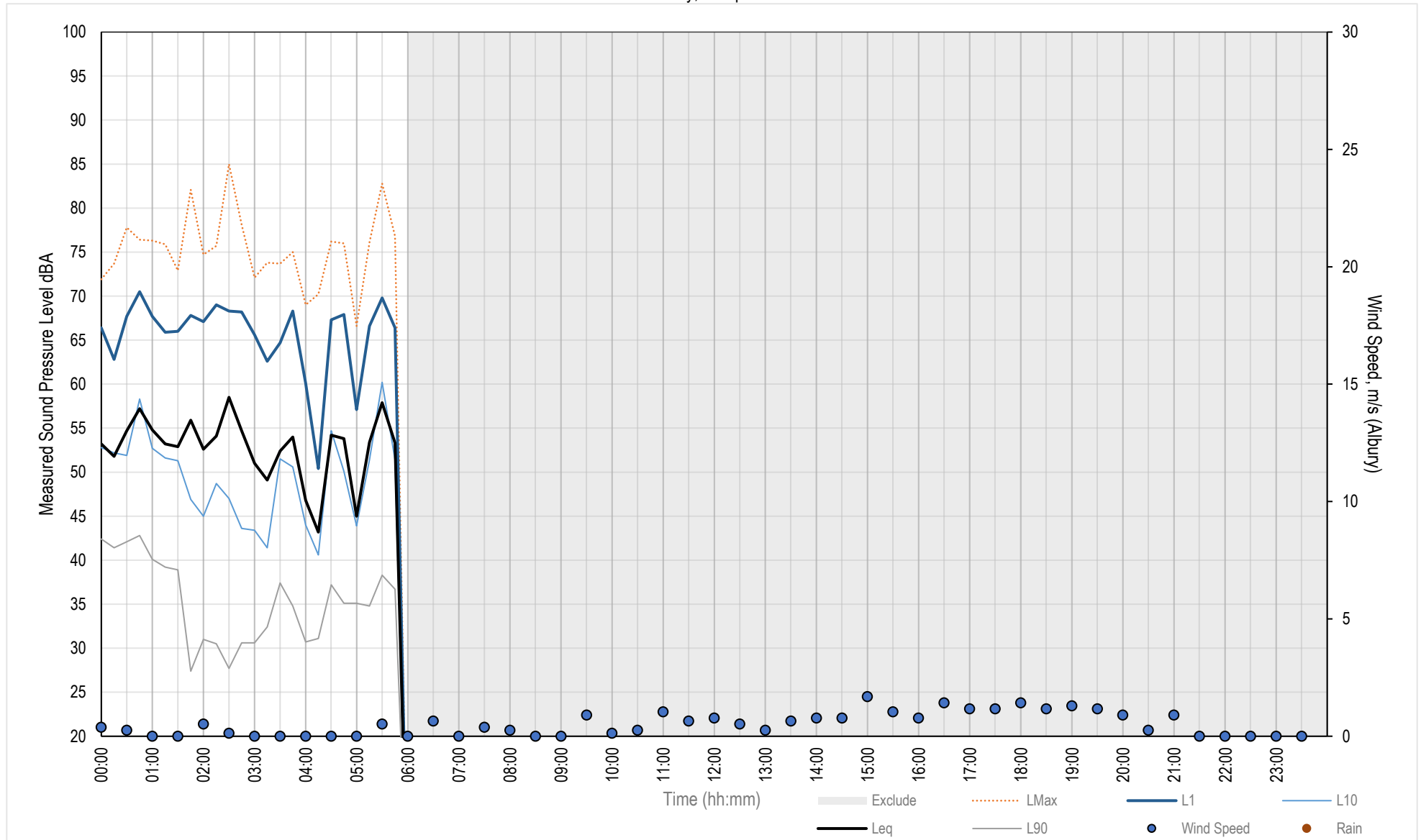
Measured Noise Levels - 16 Melville St, Culcairn

Wednesday, 31 March 2021



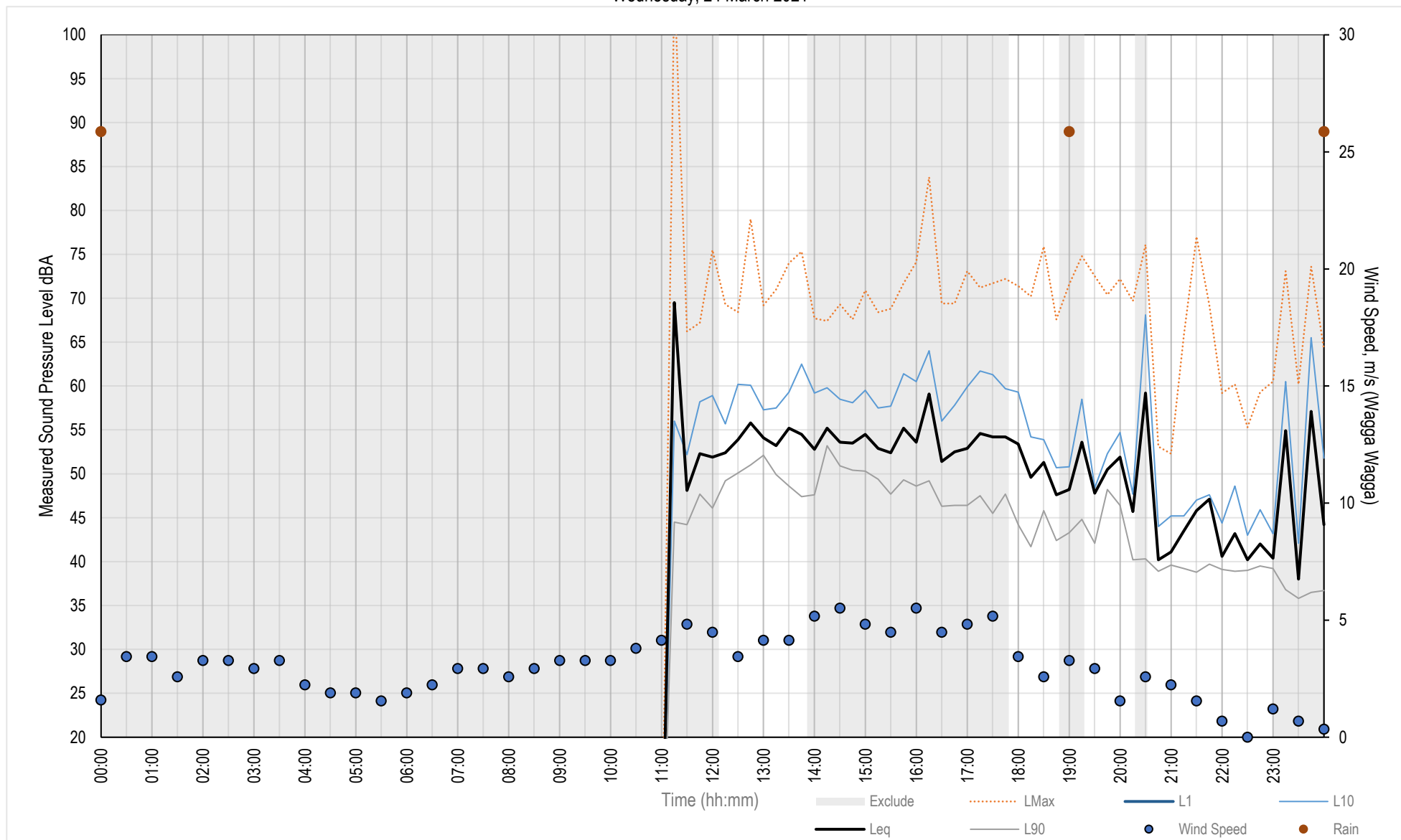
Measured Noise Levels - 16 Melville St, Culcairn

Thursday, 01 April 2021



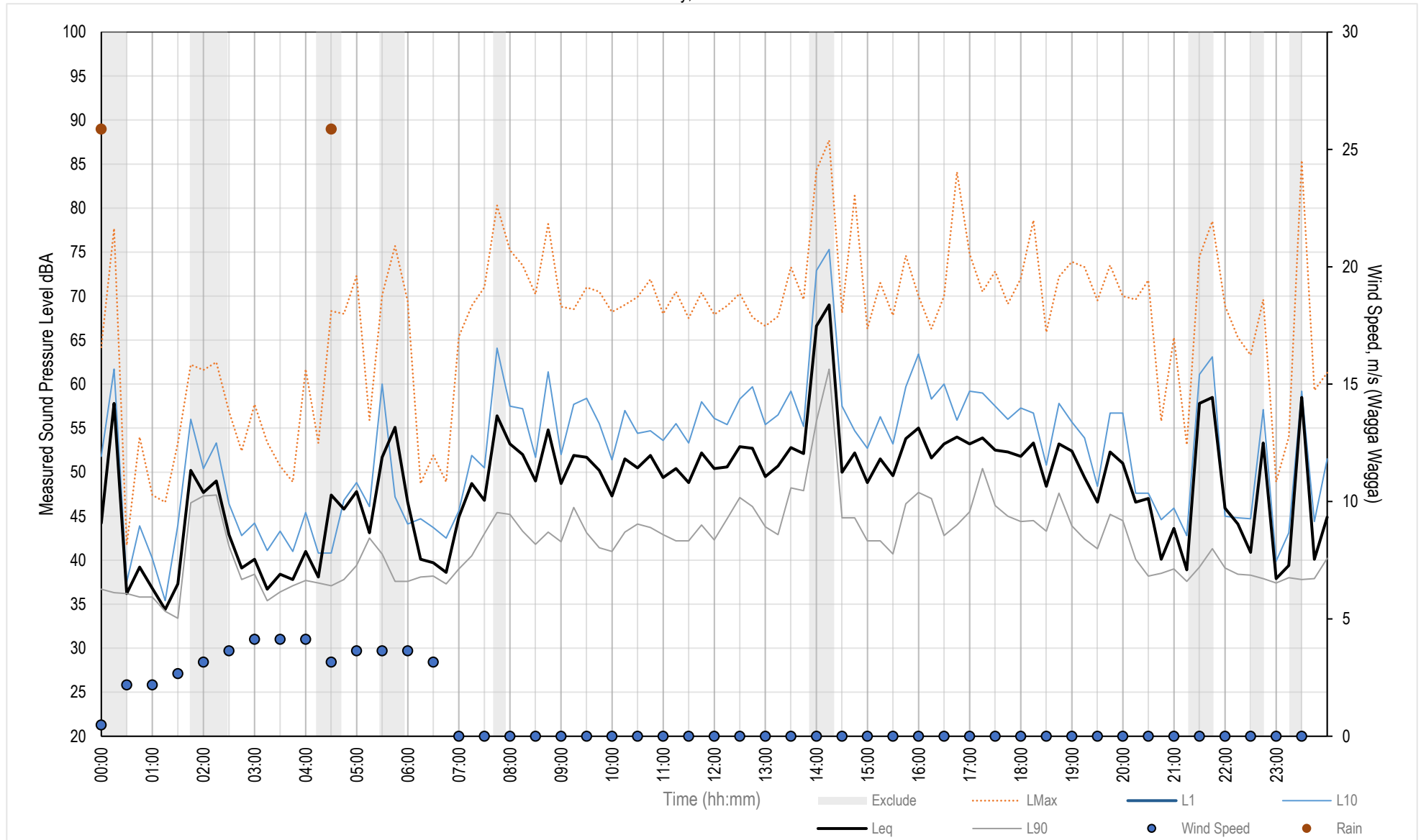
Measured Noise Levels - 23 Ivor St, Henty

Wednesday, 24 March 2021



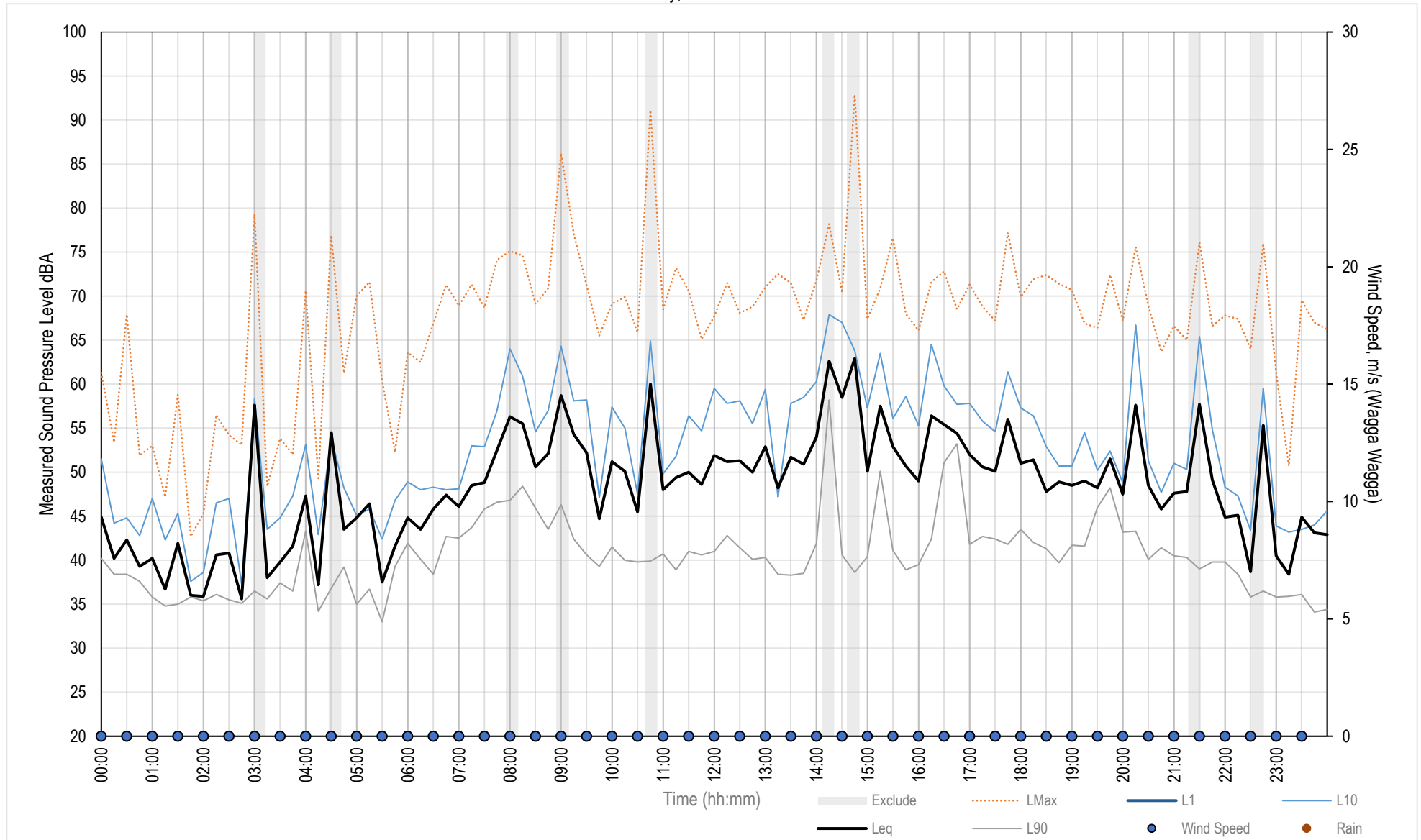
Measured Noise Levels - 23 Ivor St, Henty

Thursday, 25 March 2021



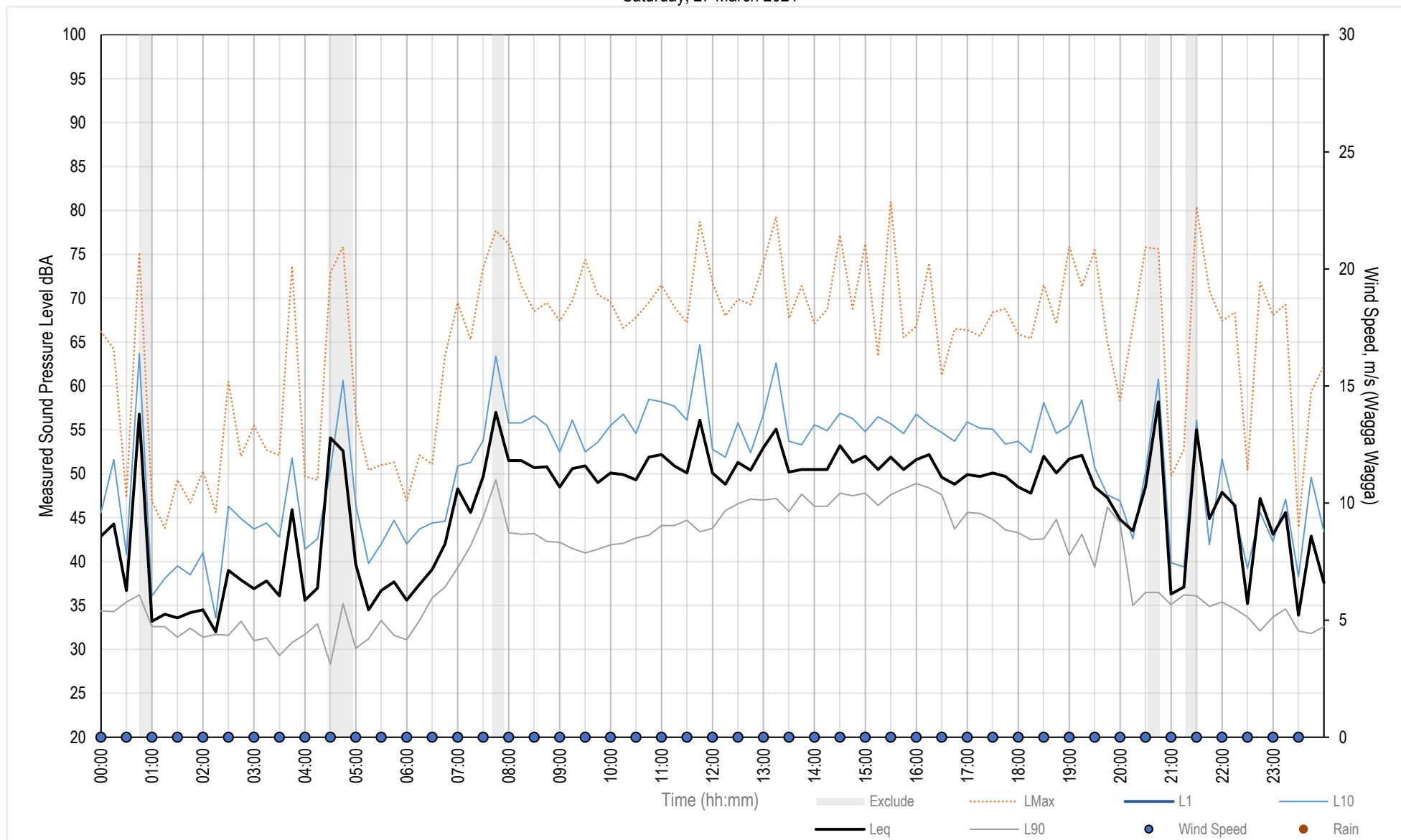
Measured Noise Levels - 23 Ivor St, Henty

Friday, 26 March 2021



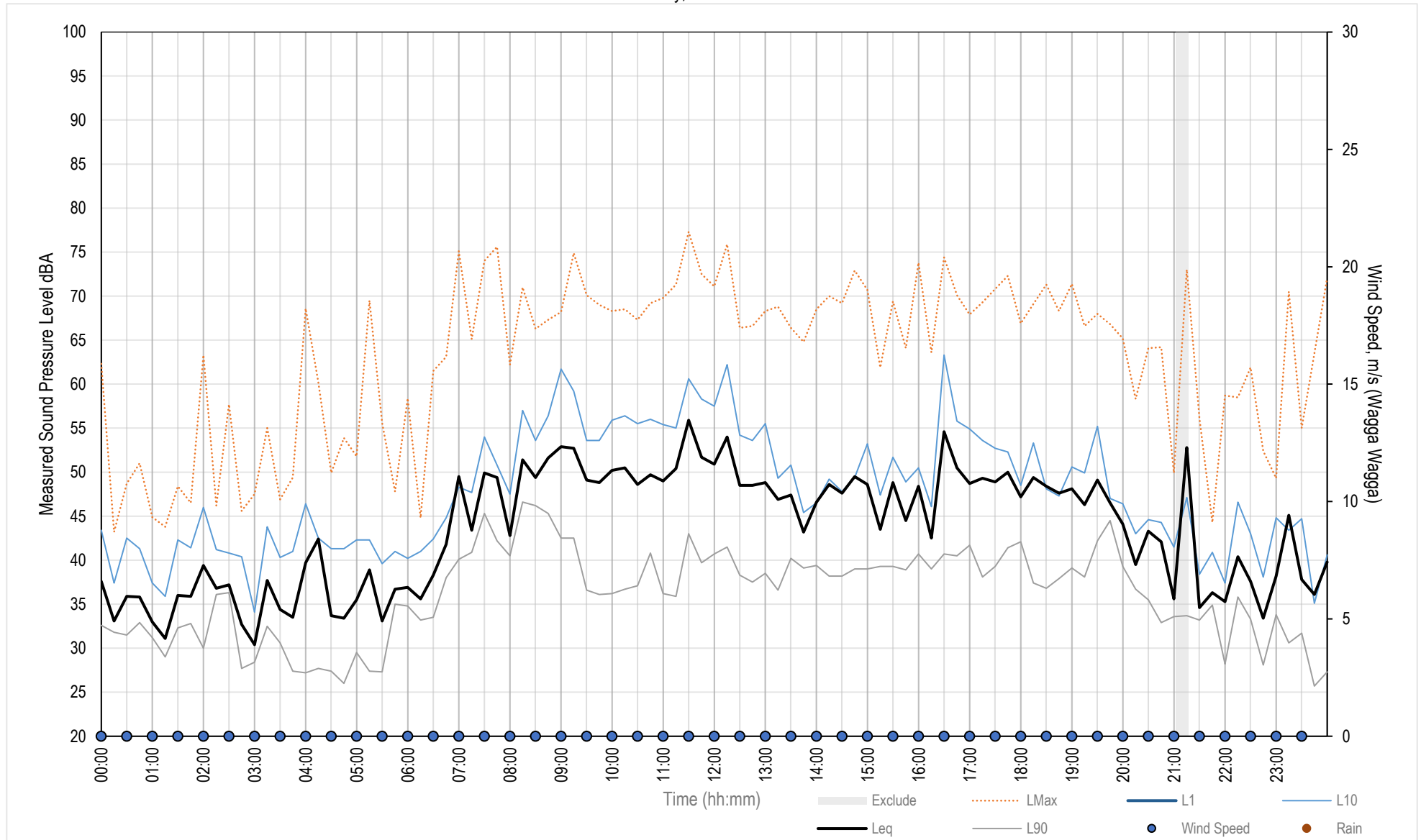
Measured Noise Levels - 23 Ivor St, Henty

Saturday, 27 March 2021



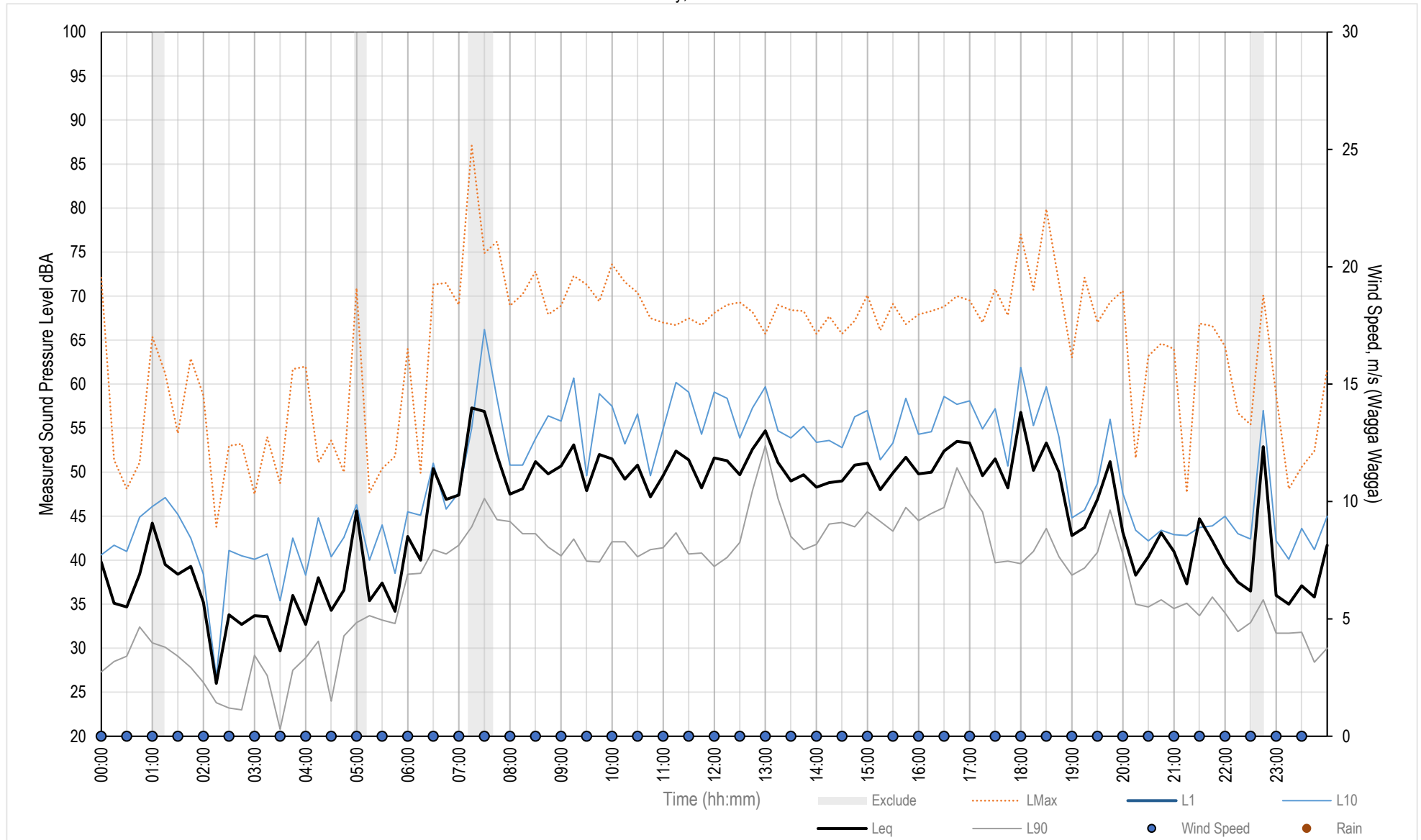
Measured Noise Levels - 23 Ivor St, Henty

Sunday, 28 March 2021



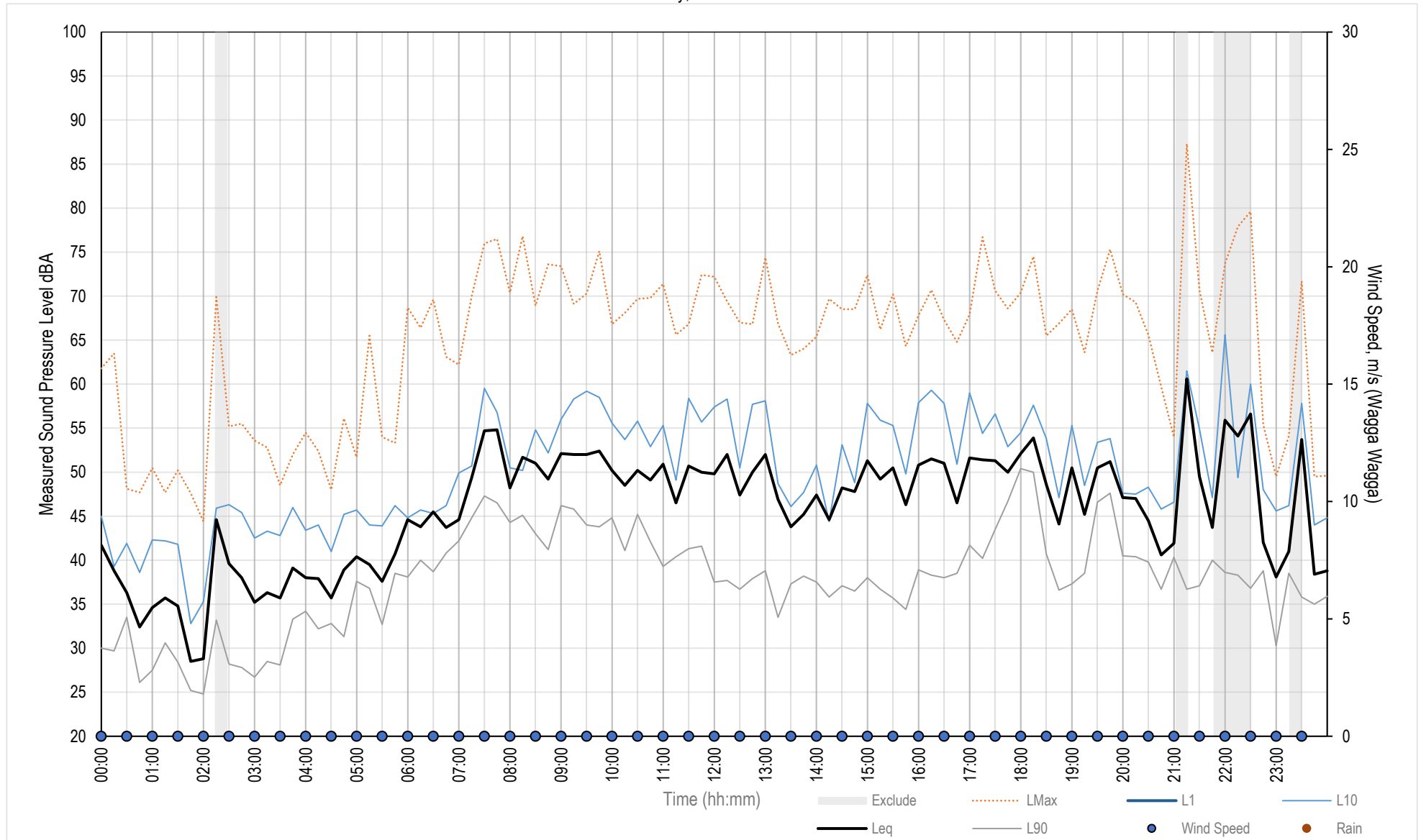
Measured Noise Levels - 23 Ivor St, Henty

Monday, 29 March 2021



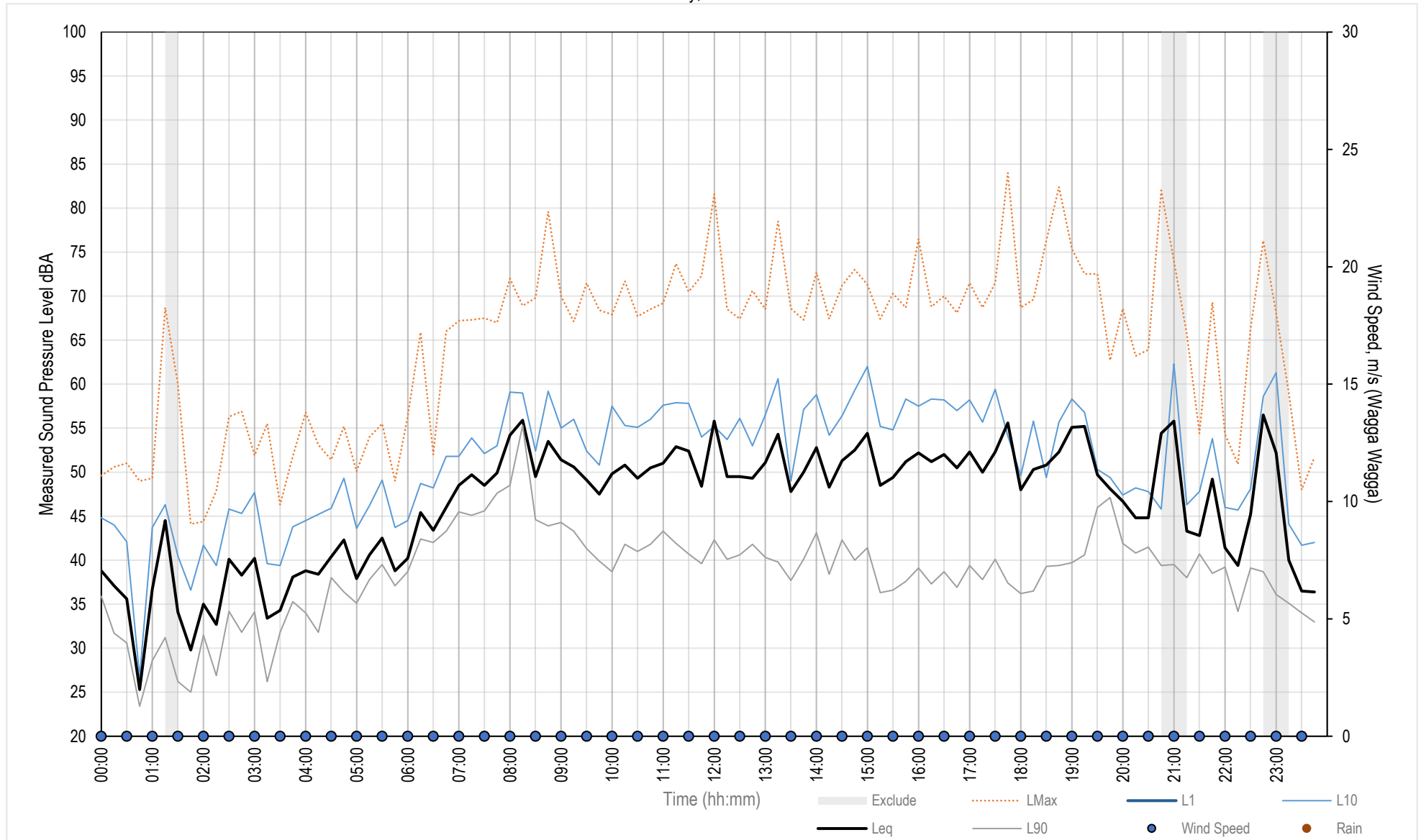
Measured Noise Levels - 23 Ivor St, Henty

Tuesday, 30 March 2021



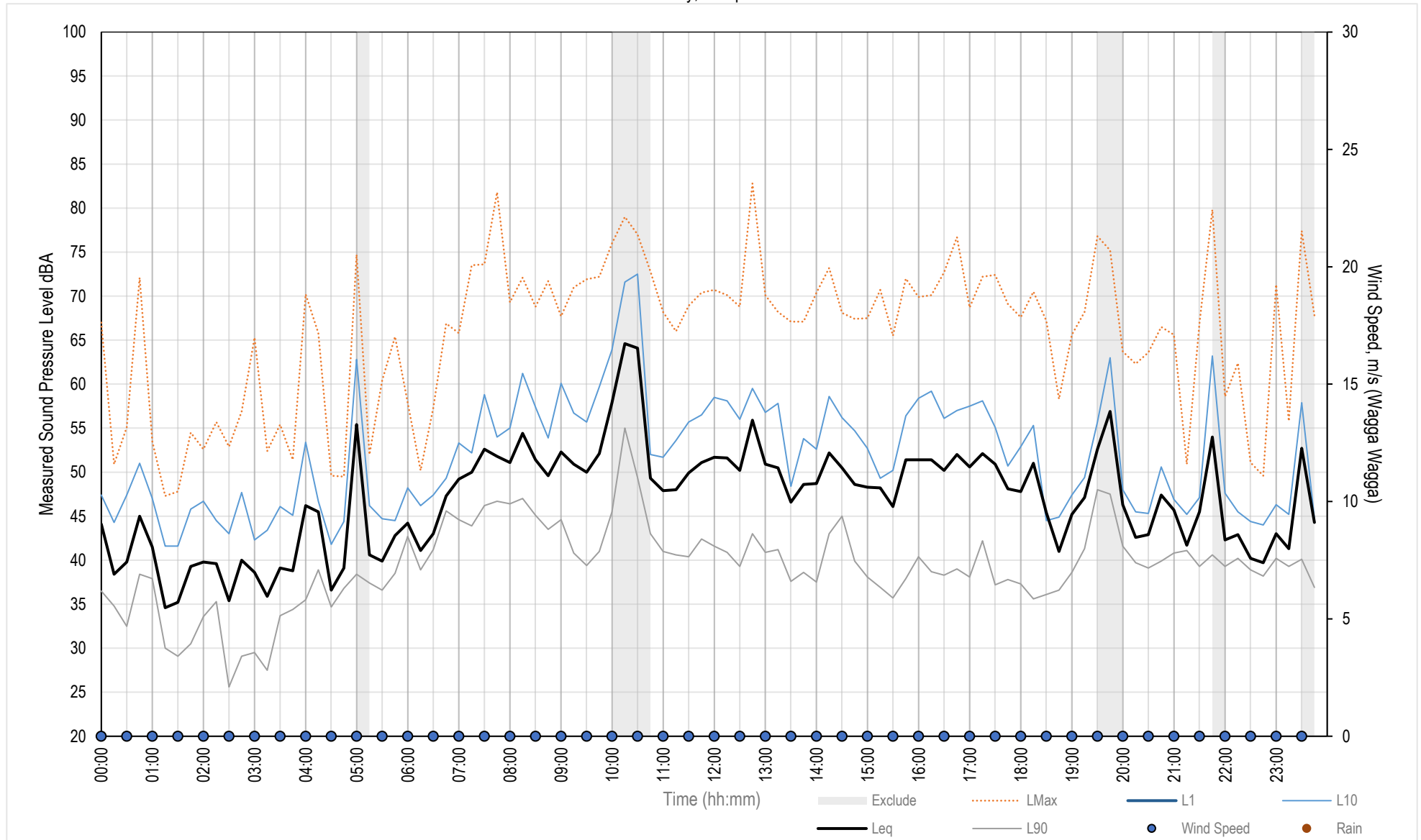
Measured Noise Levels - 23 Ivor St, Henty

Wednesday, 31 March 2021



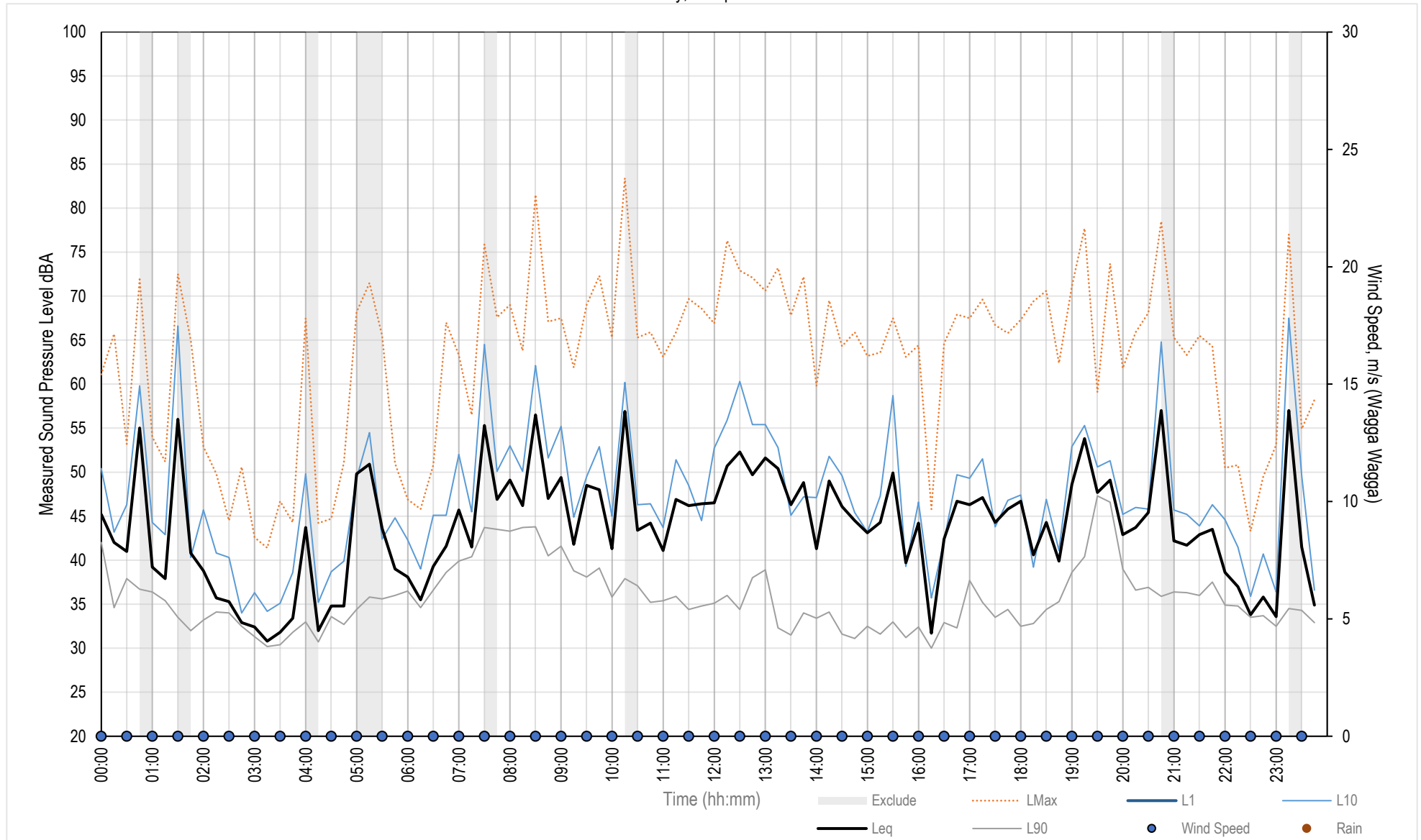
Measured Noise Levels - 23 Ivor St, Henty

Thursday, 01 April 2021



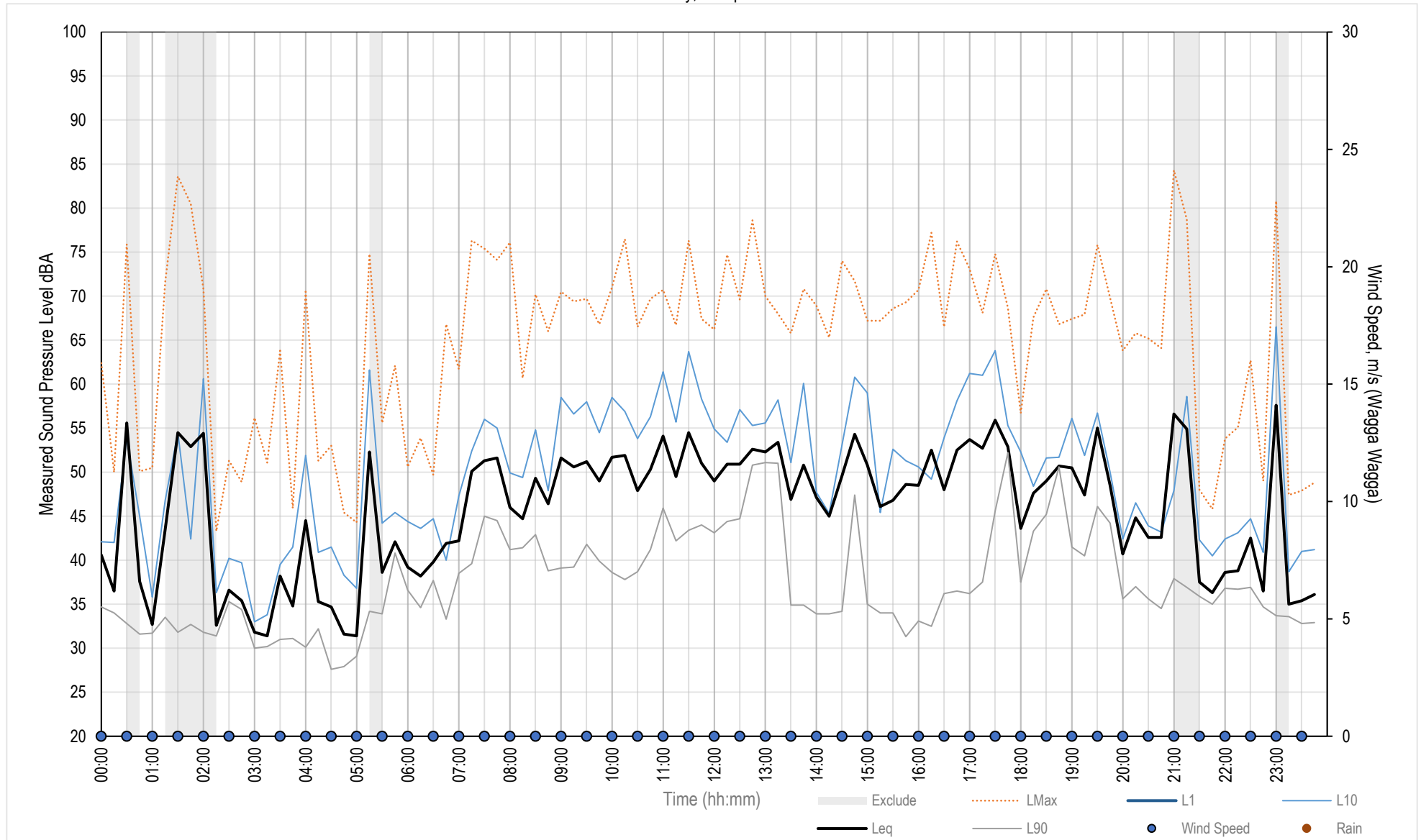
Measured Noise Levels - 23 Ivor St, Henty

Friday, 02 April 2021



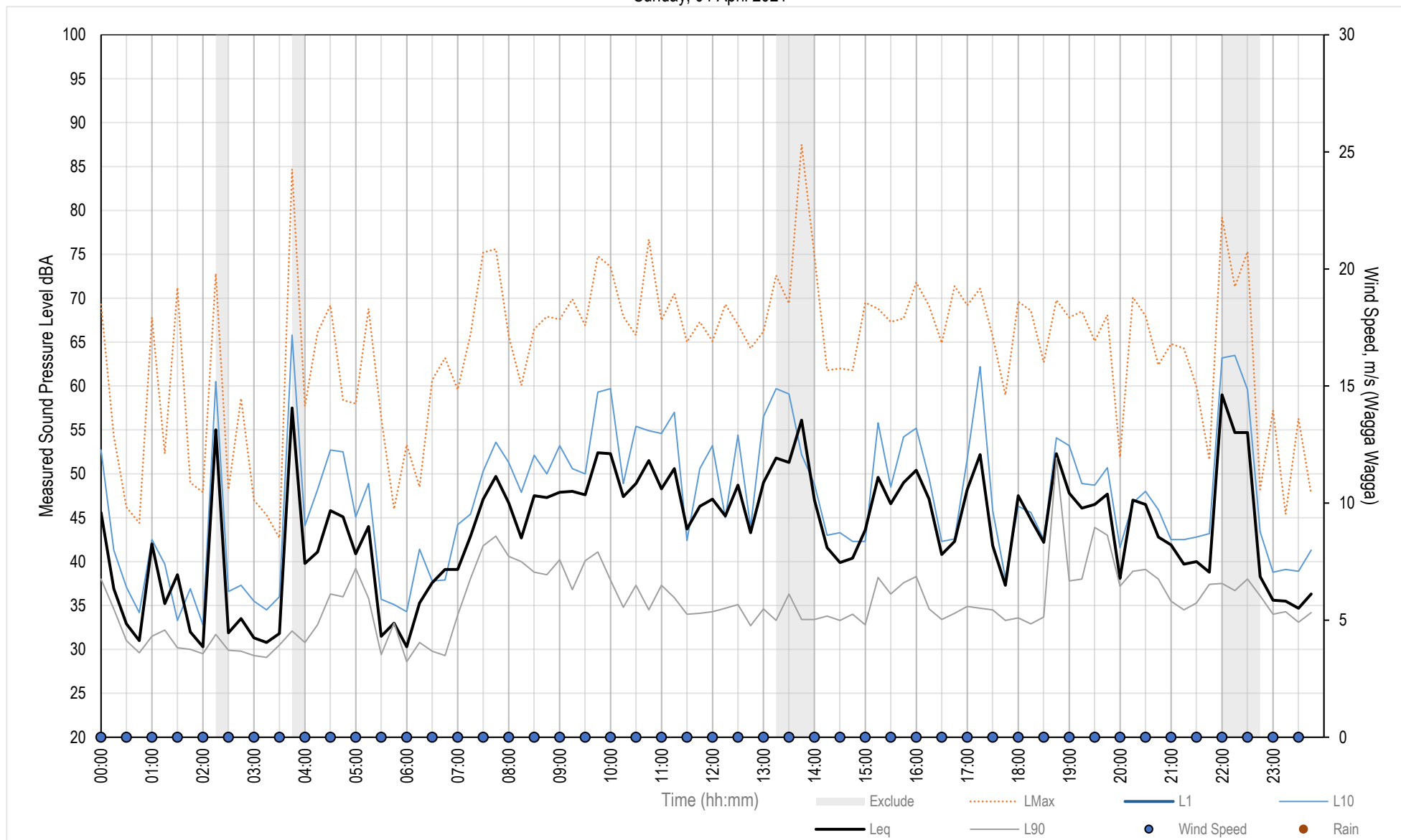
Measured Noise Levels - 23 Ivor St, Henty

Saturday, 03 April 2021



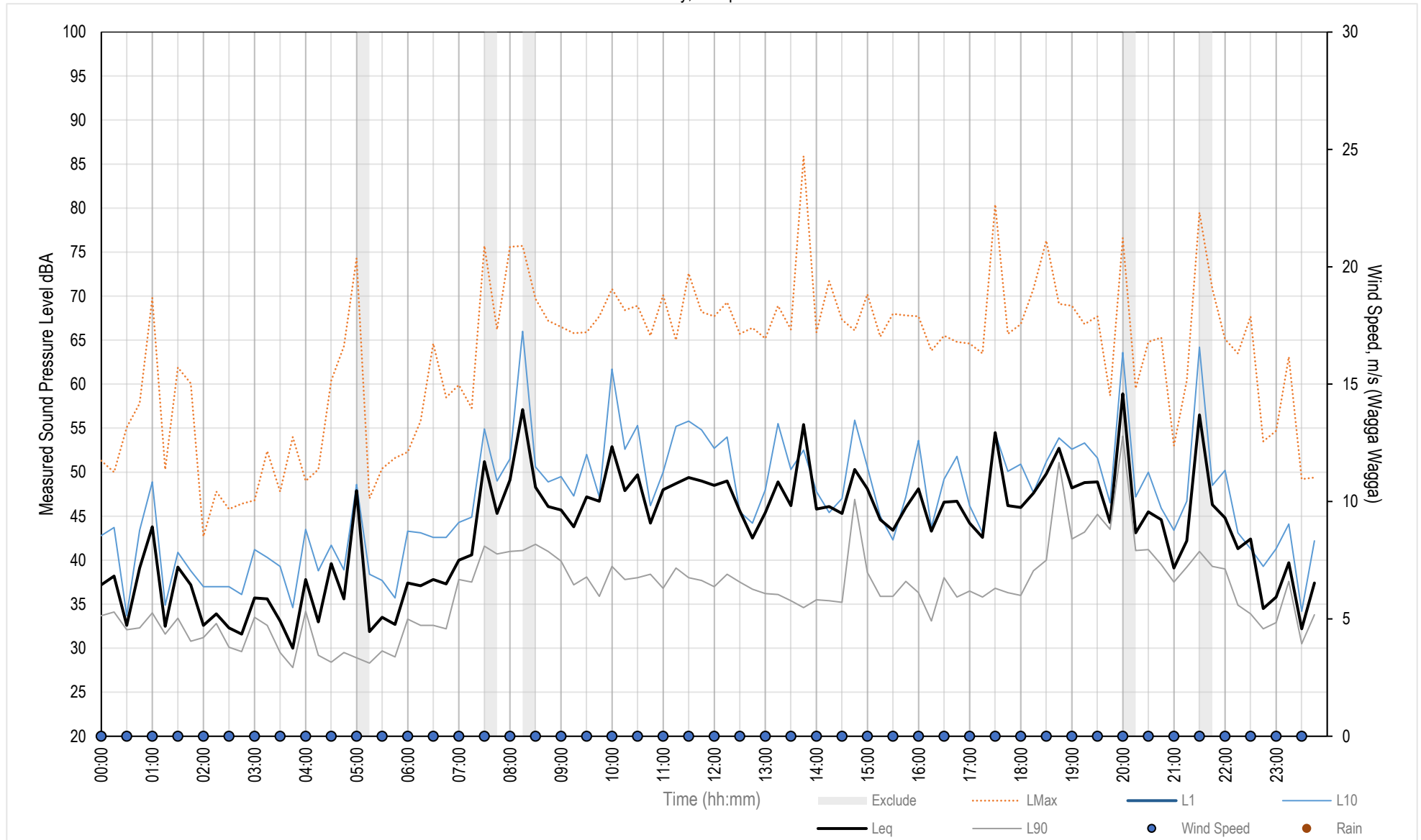
Measured Noise Levels - 23 Ivor St, Henty

Sunday, 04 April 2021



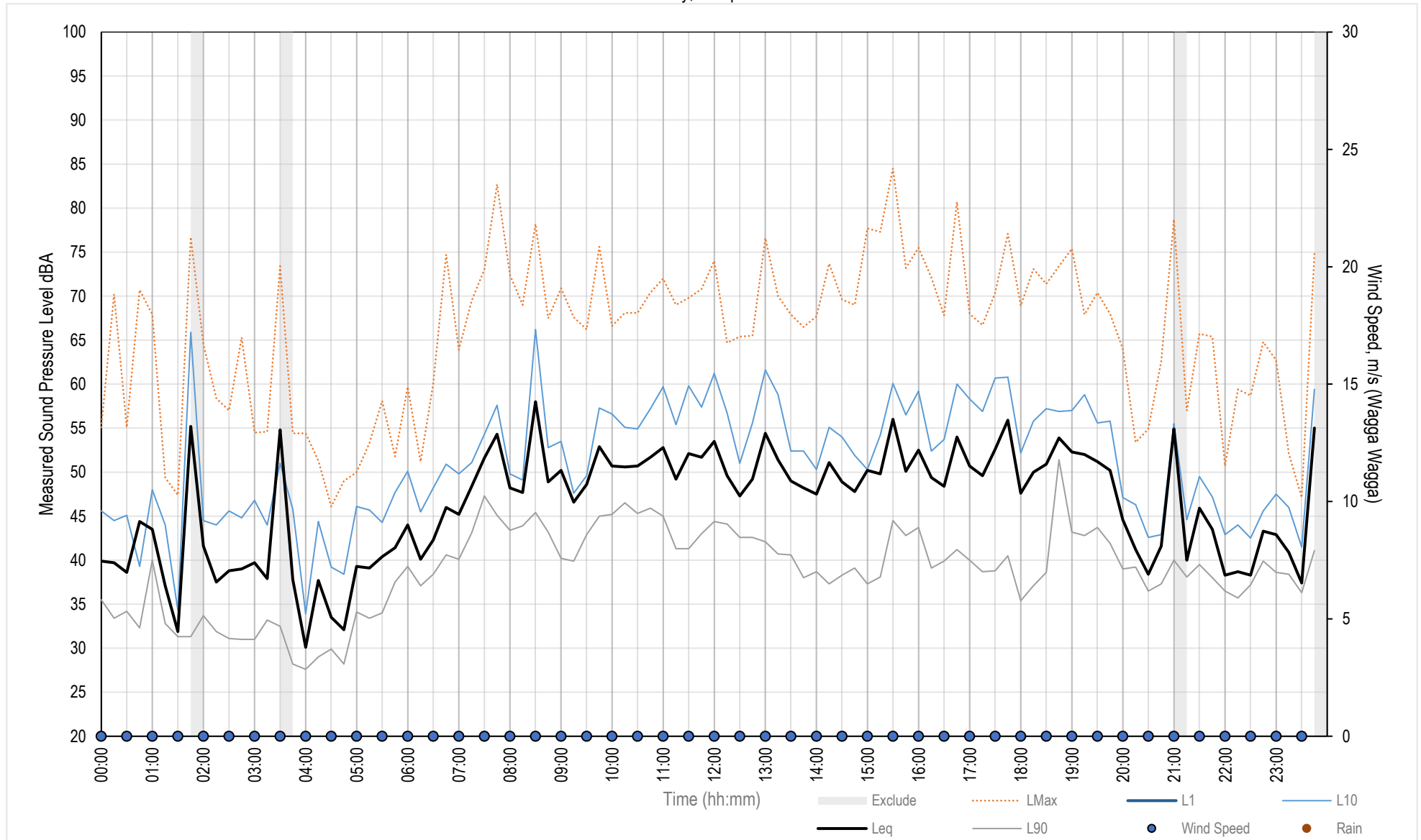
Measured Noise Levels - 23 Ivor St, Henty

Sunday, 04 April 2021



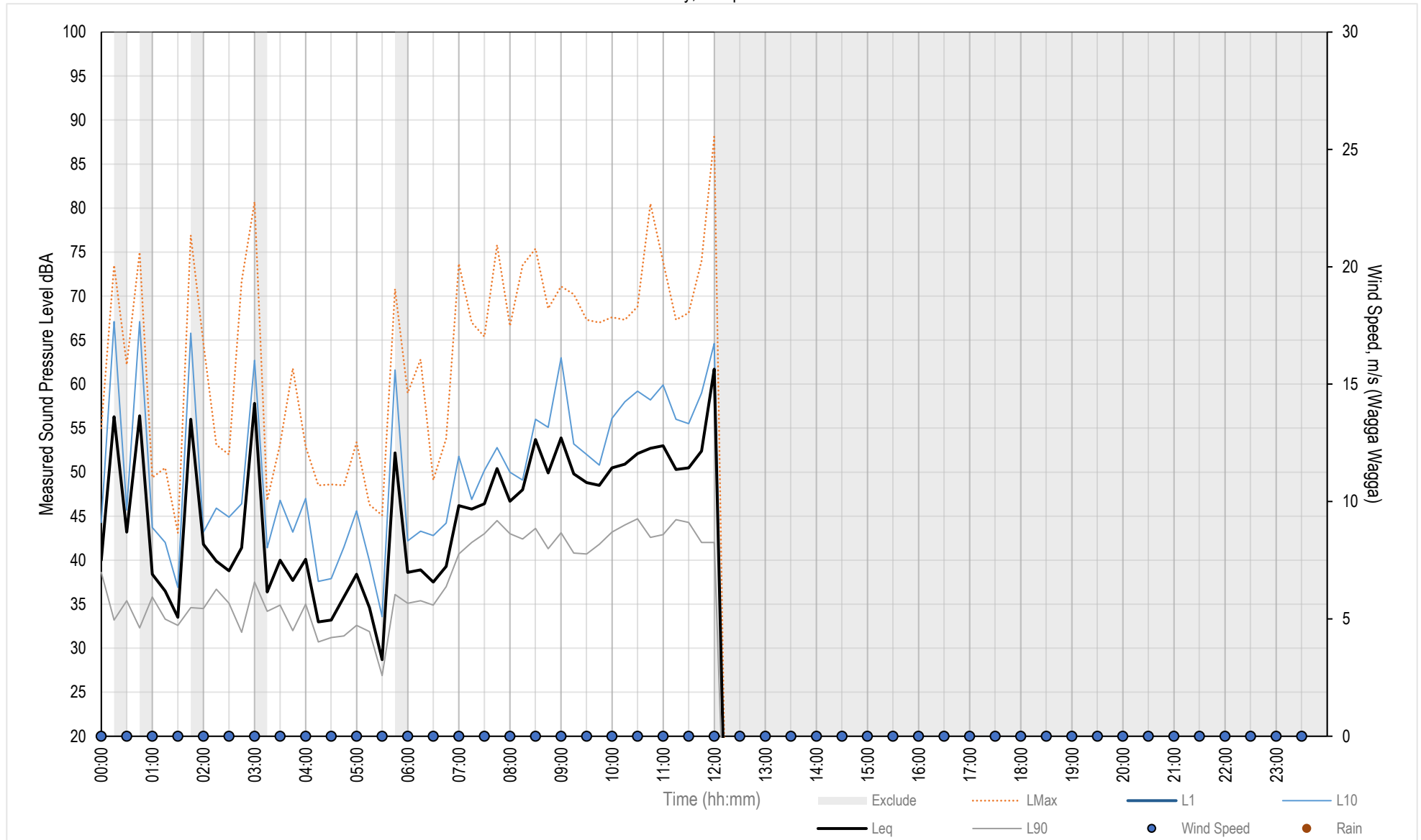
Measured Noise Levels - 23 Ivor St, Henty

Monday, 05 April 2021



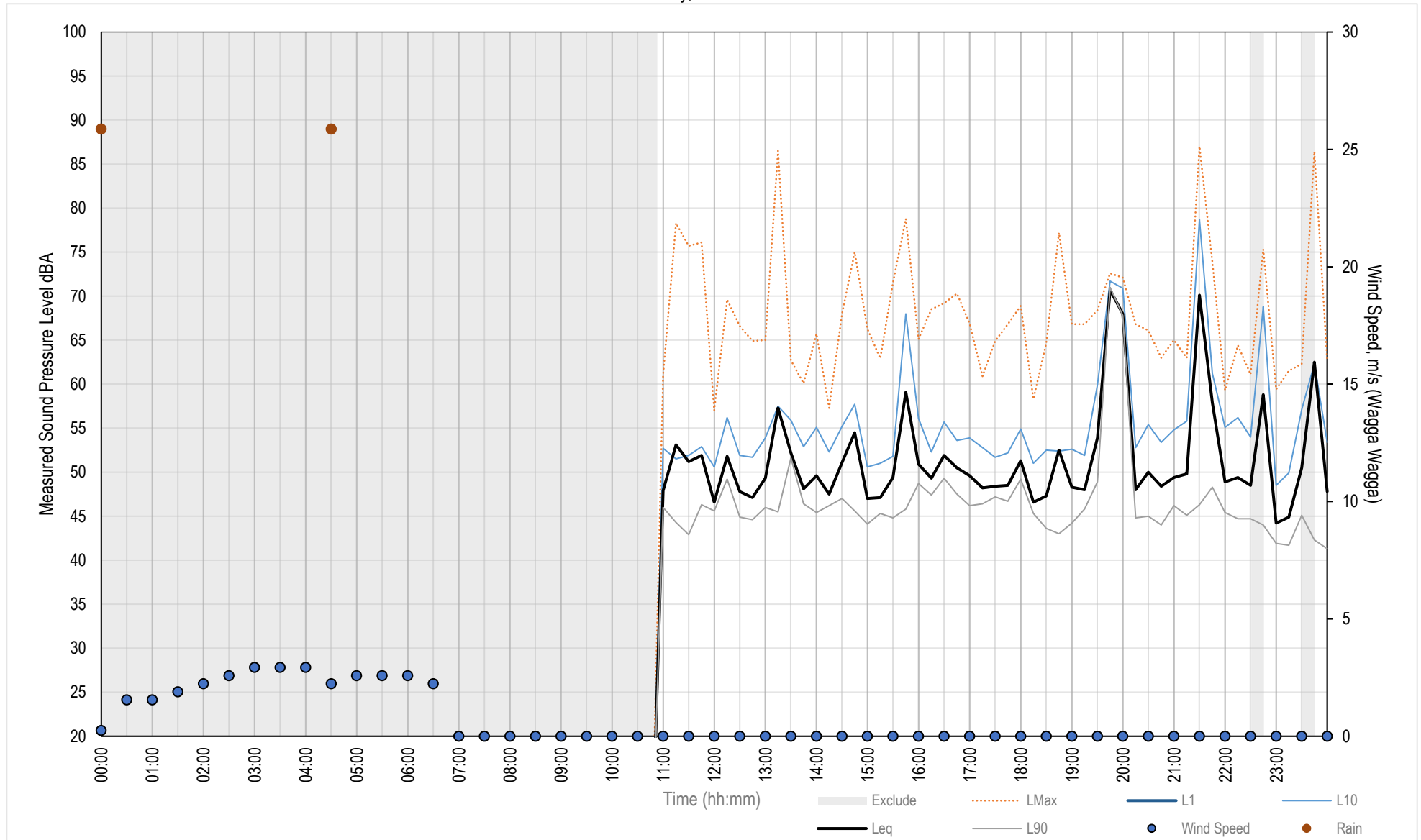
Measured Noise Levels - 23 Ivor St, Henty

Tuesday, 06 April 2021



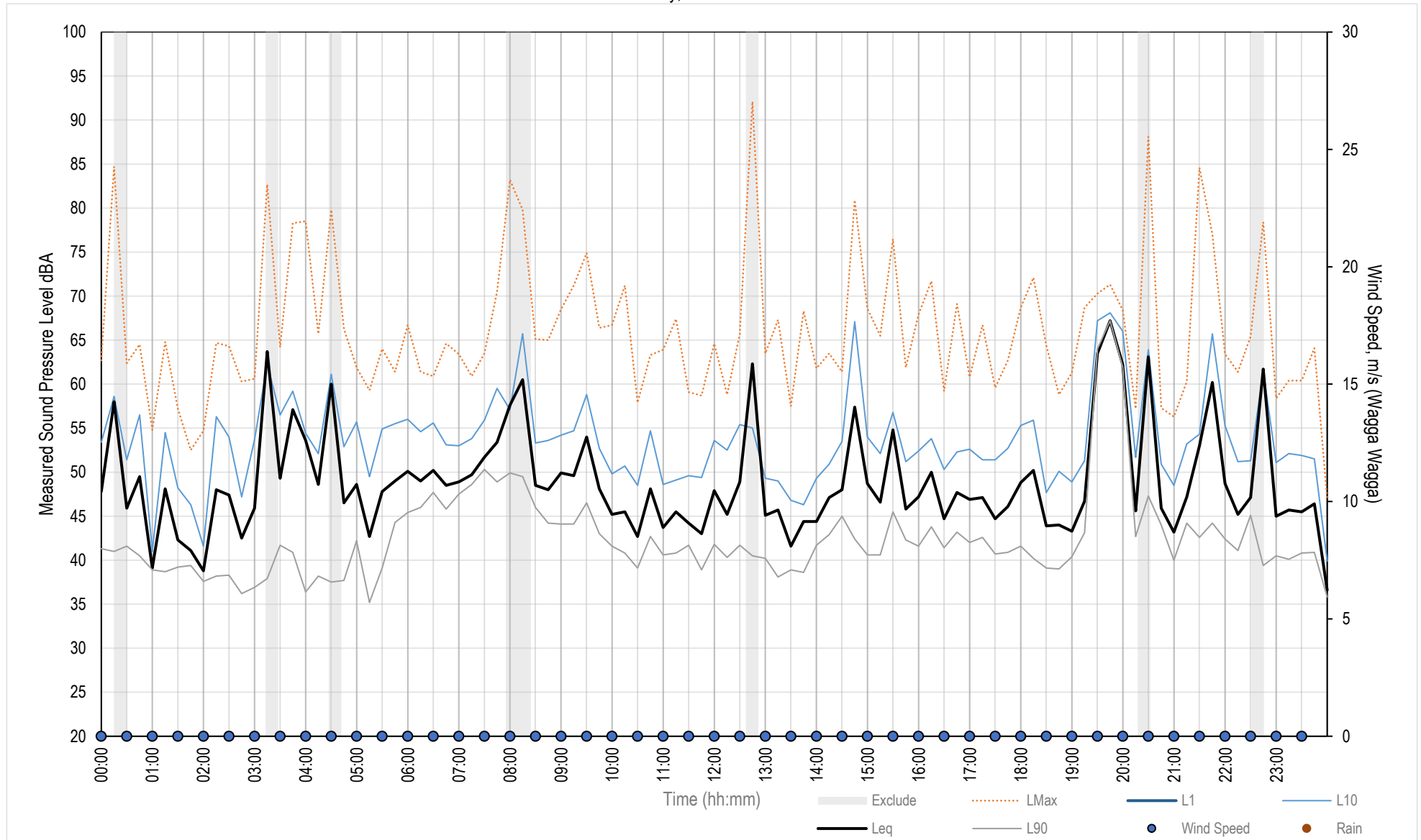
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Thursday, 25 March 2021



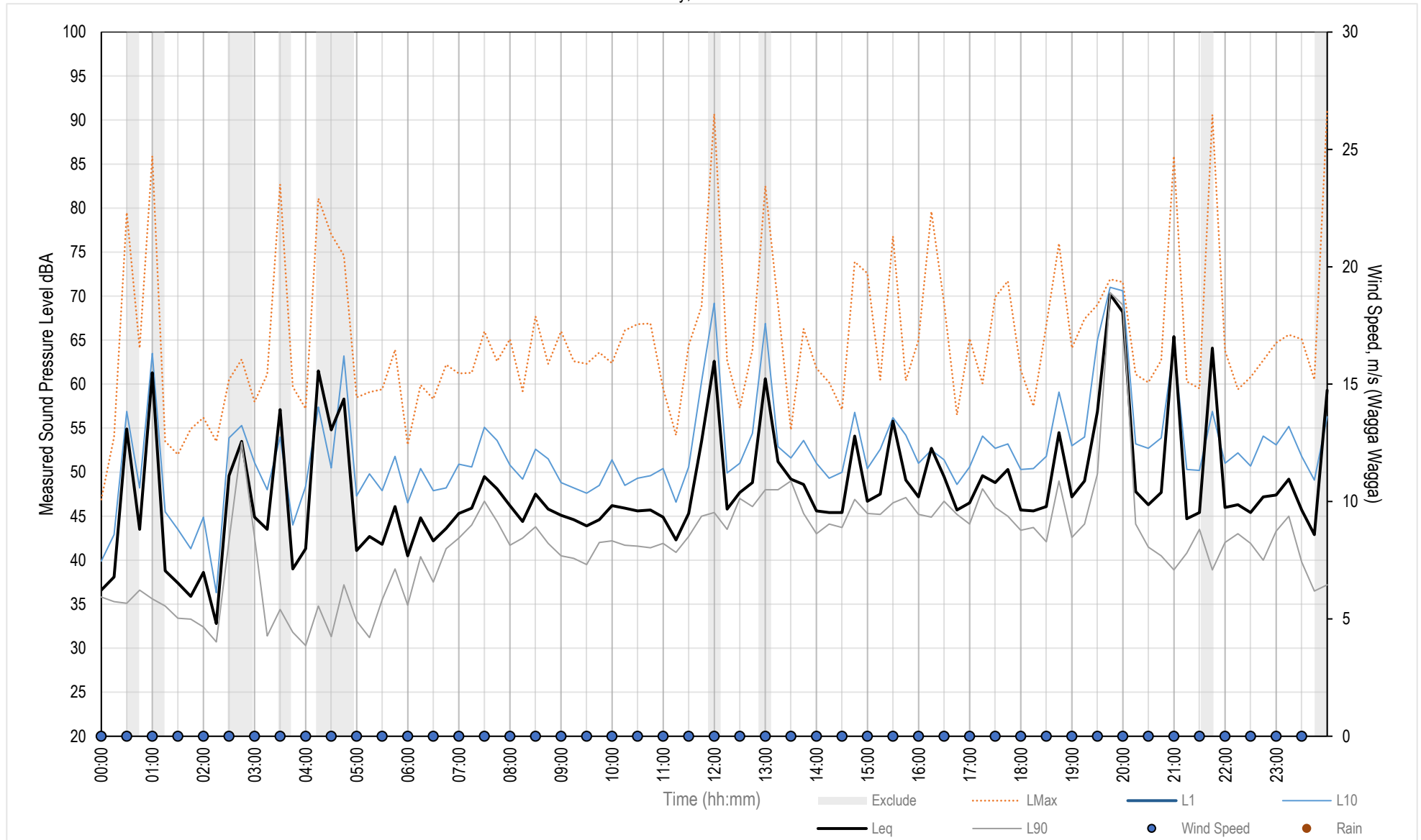
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Friday, 26 March 2021



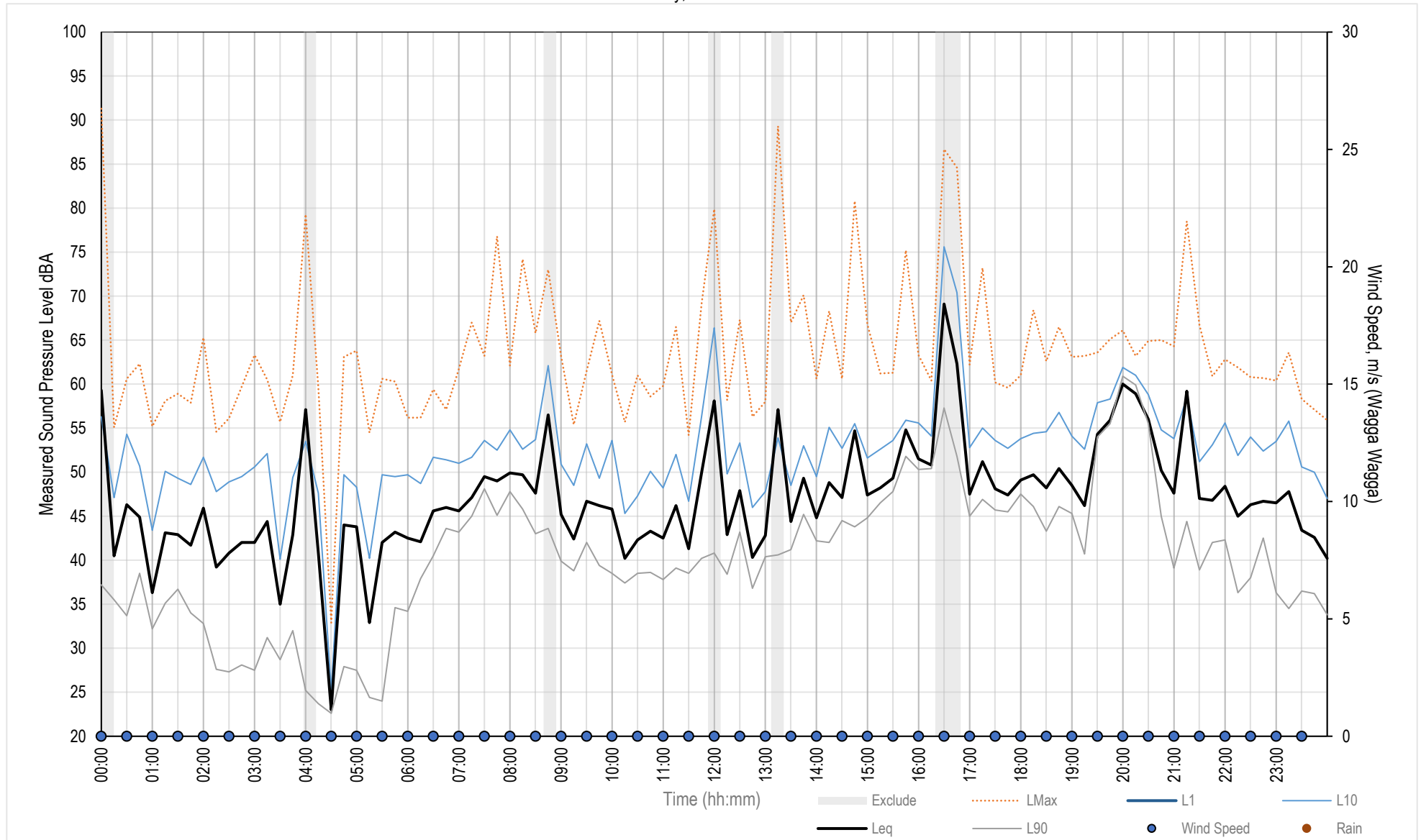
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Saturday, 27 March 2021



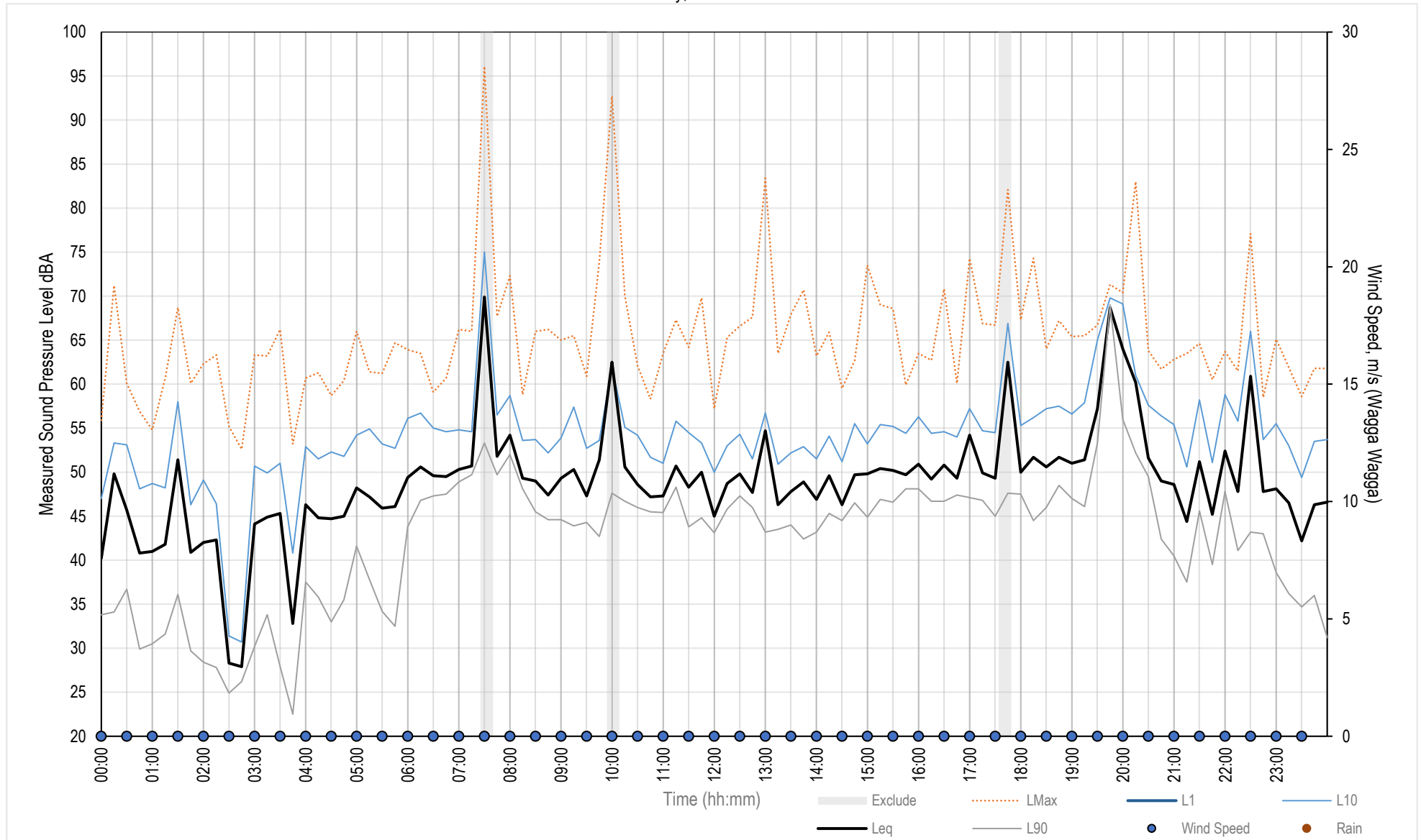
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Sunday, 28 March 2021



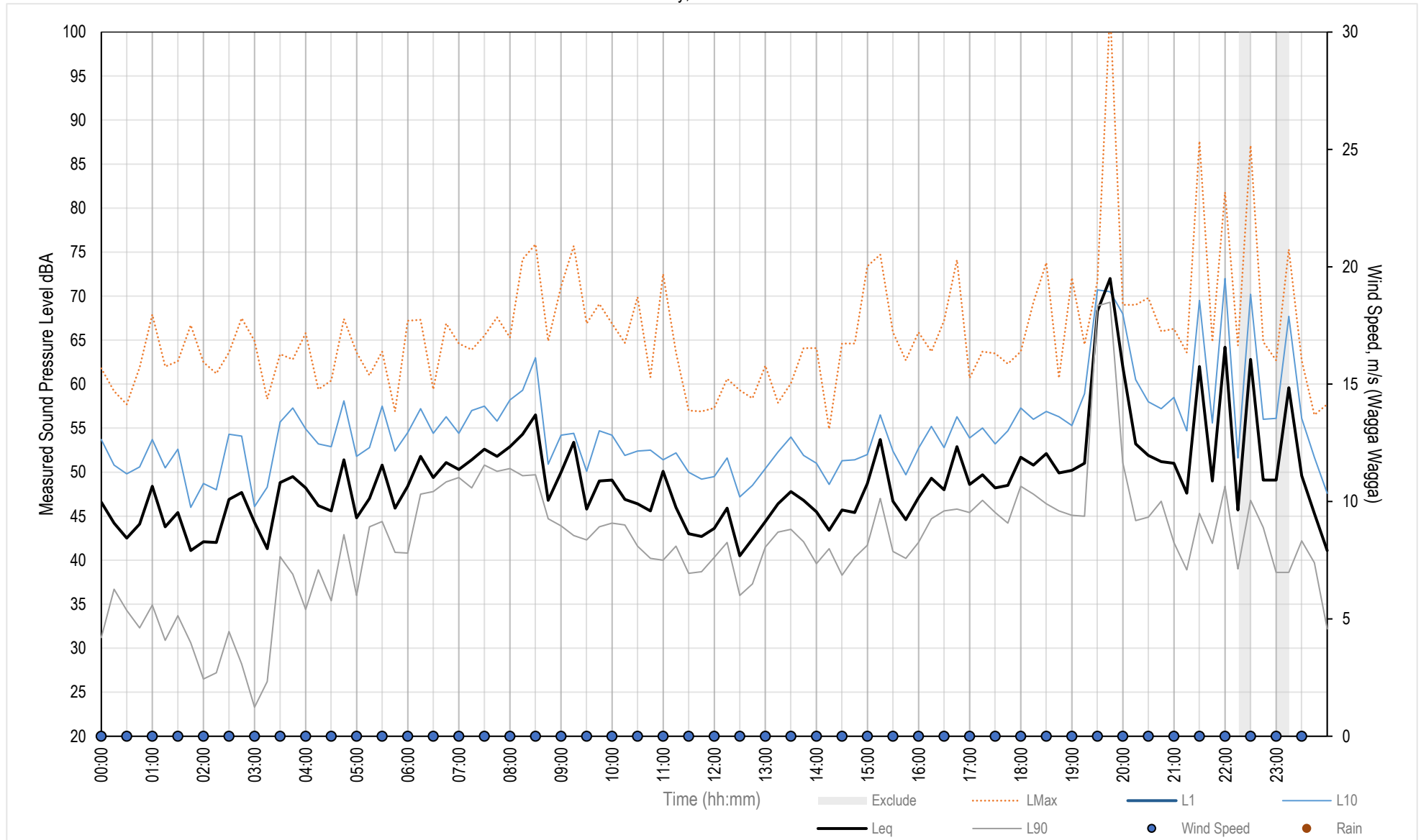
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Monday, 29 March 2021



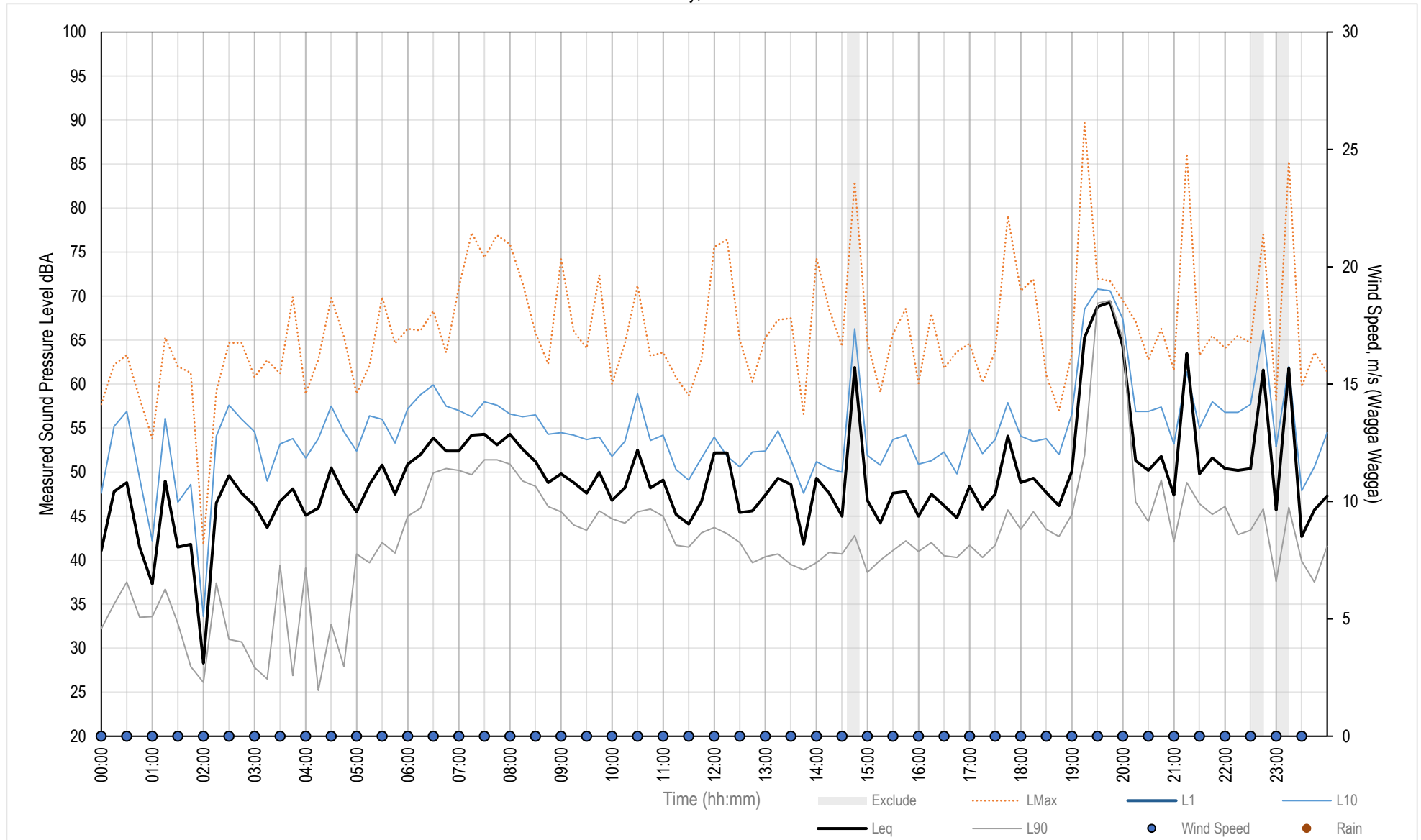
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Tuesday, 30 March 2021



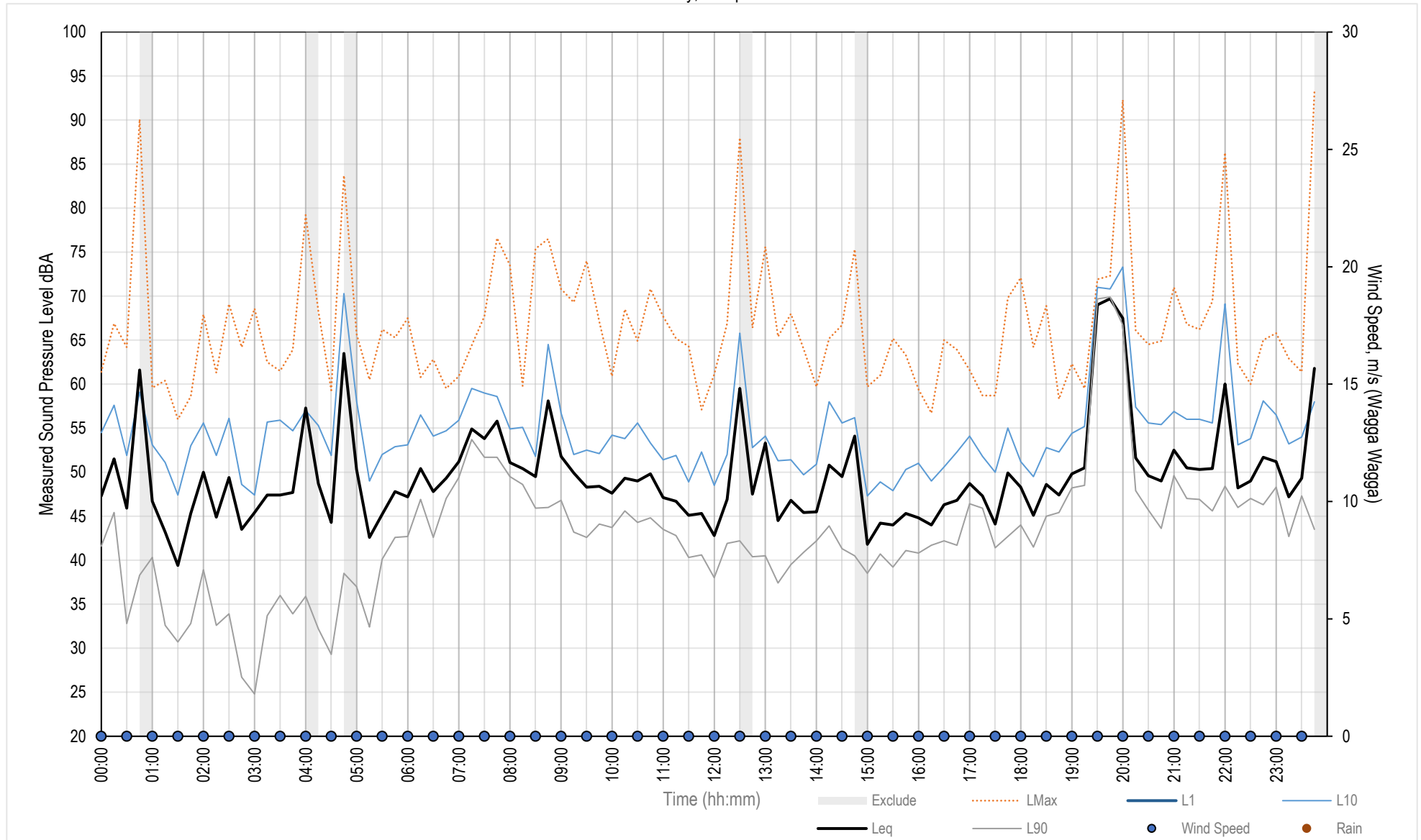
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Wednesday, 31 March 2021



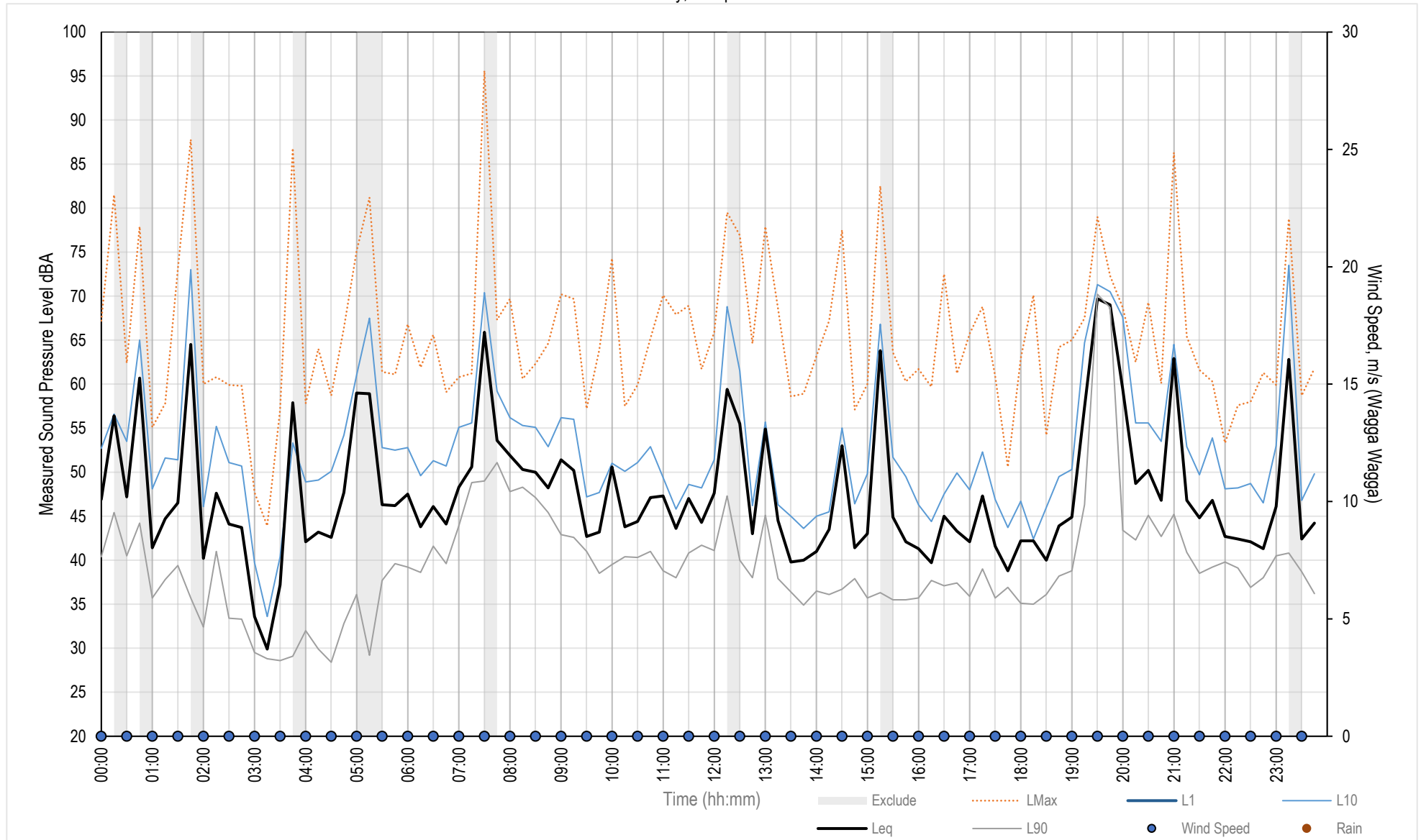
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Thursday, 01 April 2021



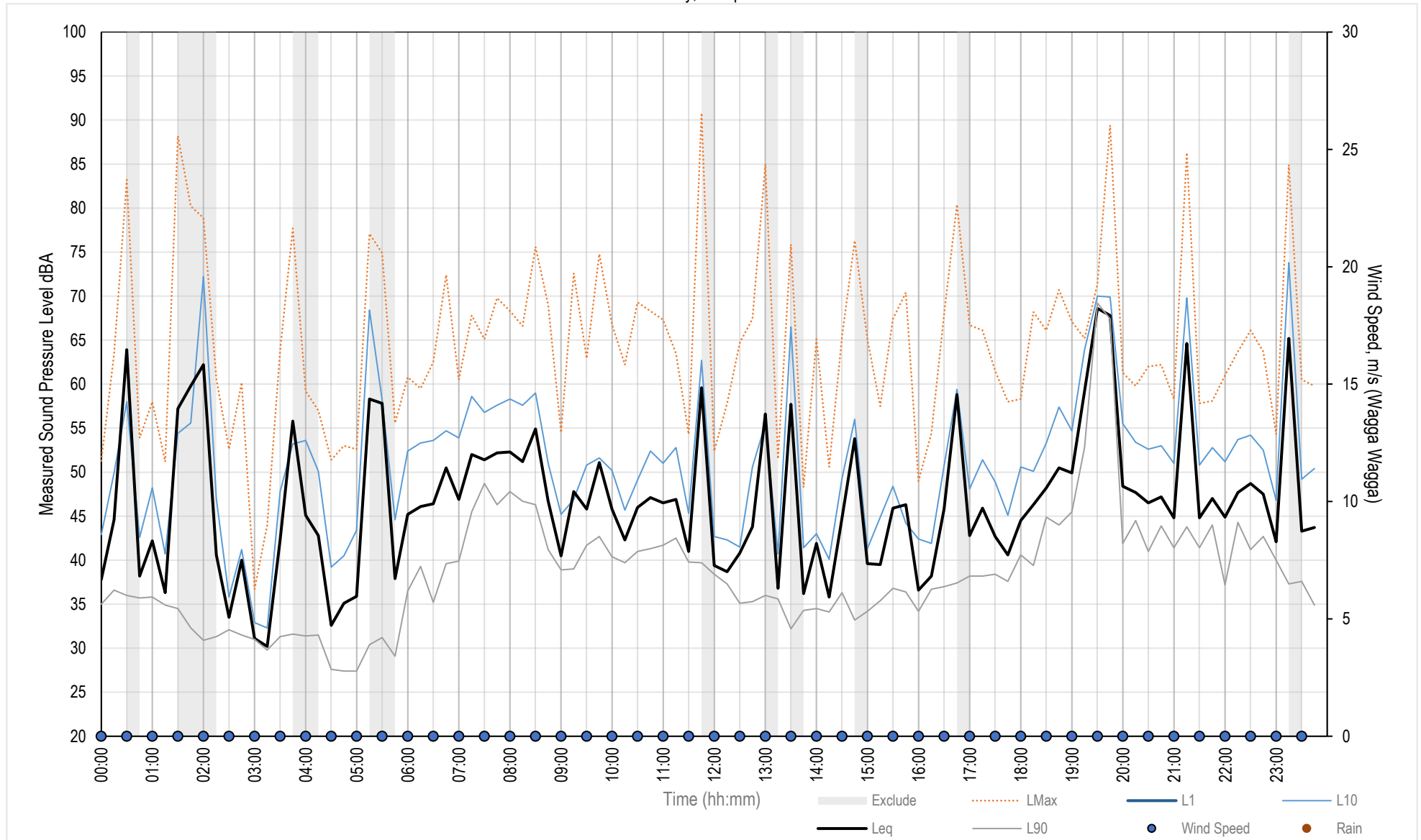
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Friday, 02 April 2021



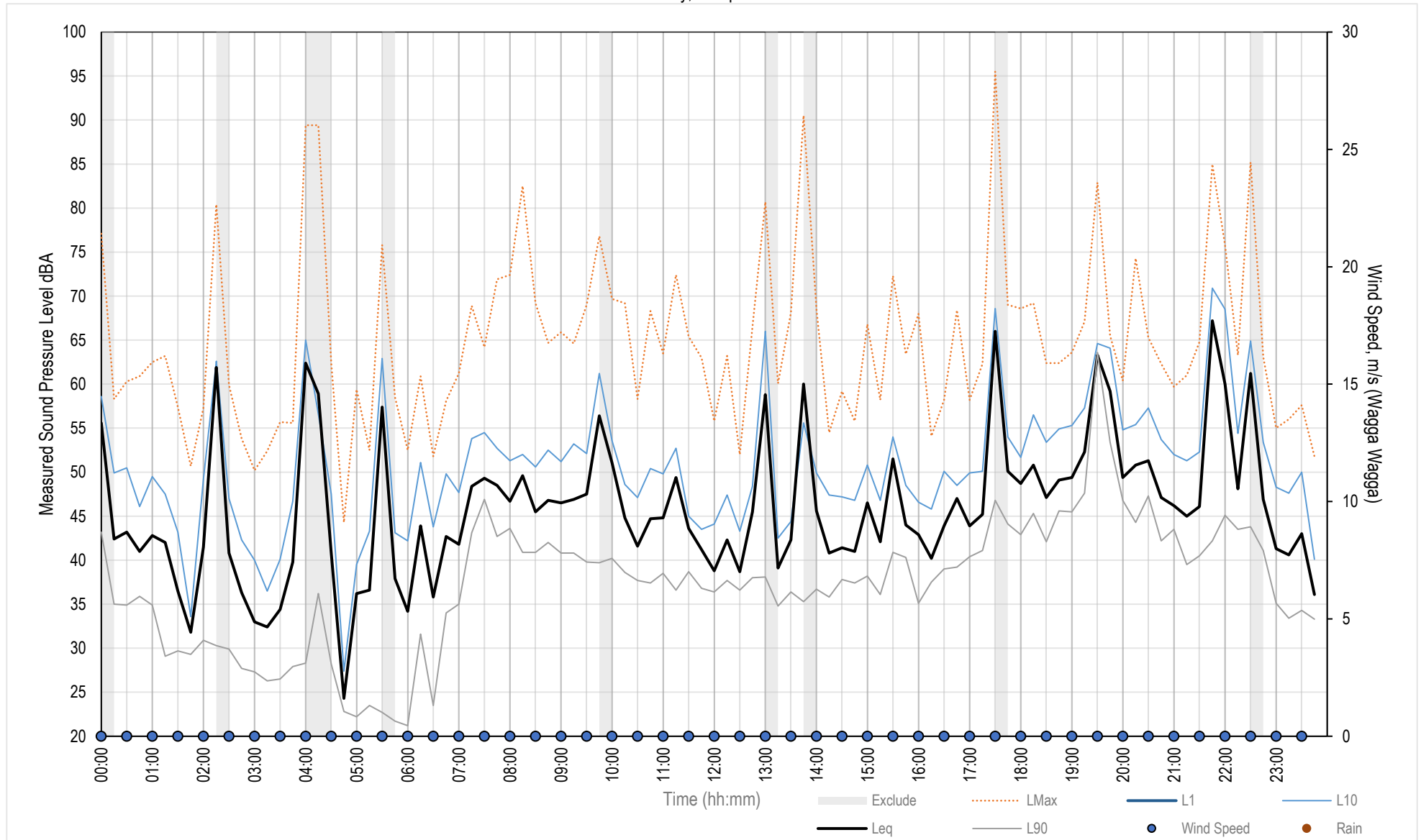
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Saturday, 03 April 2021



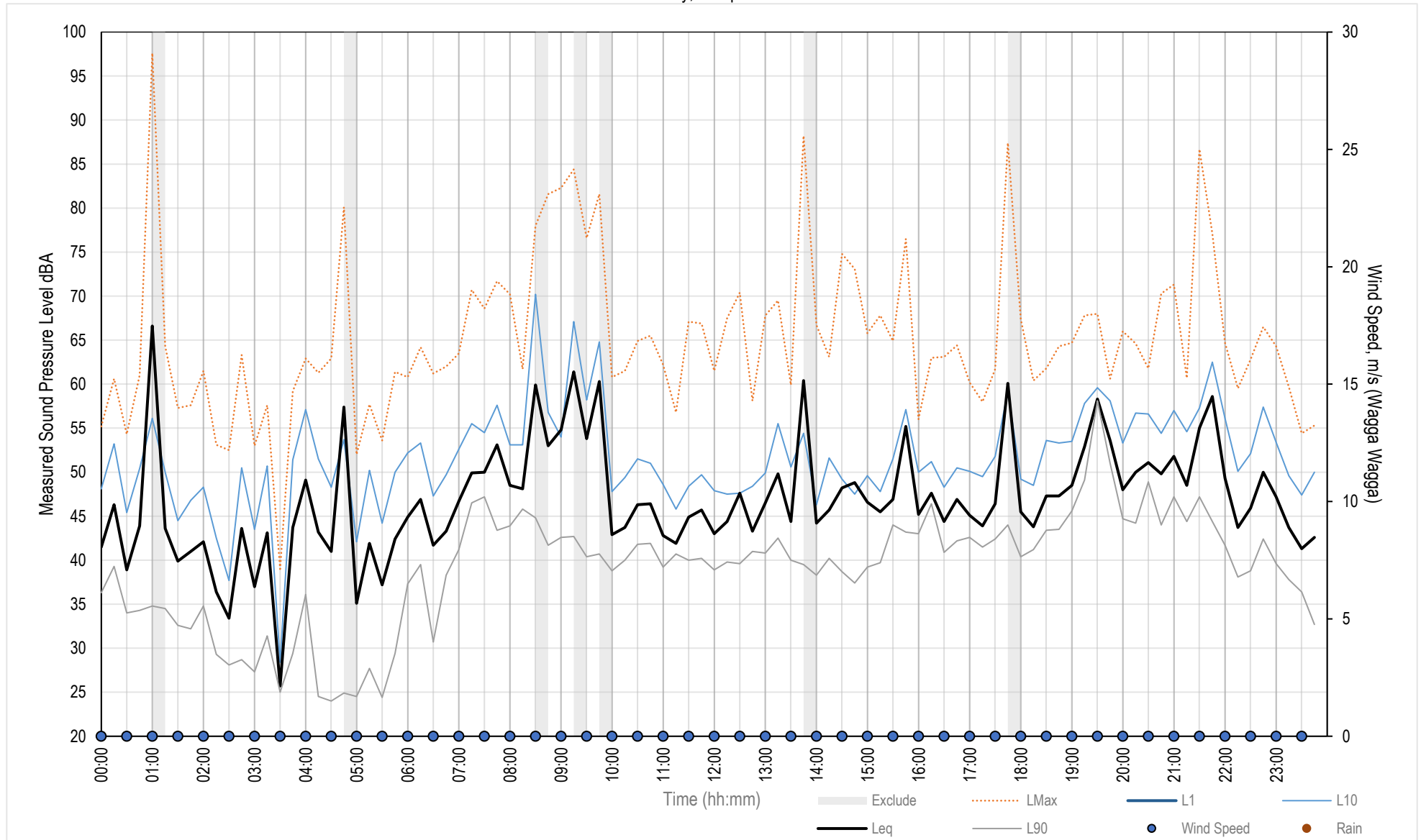
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Sunday, 04 April 2021



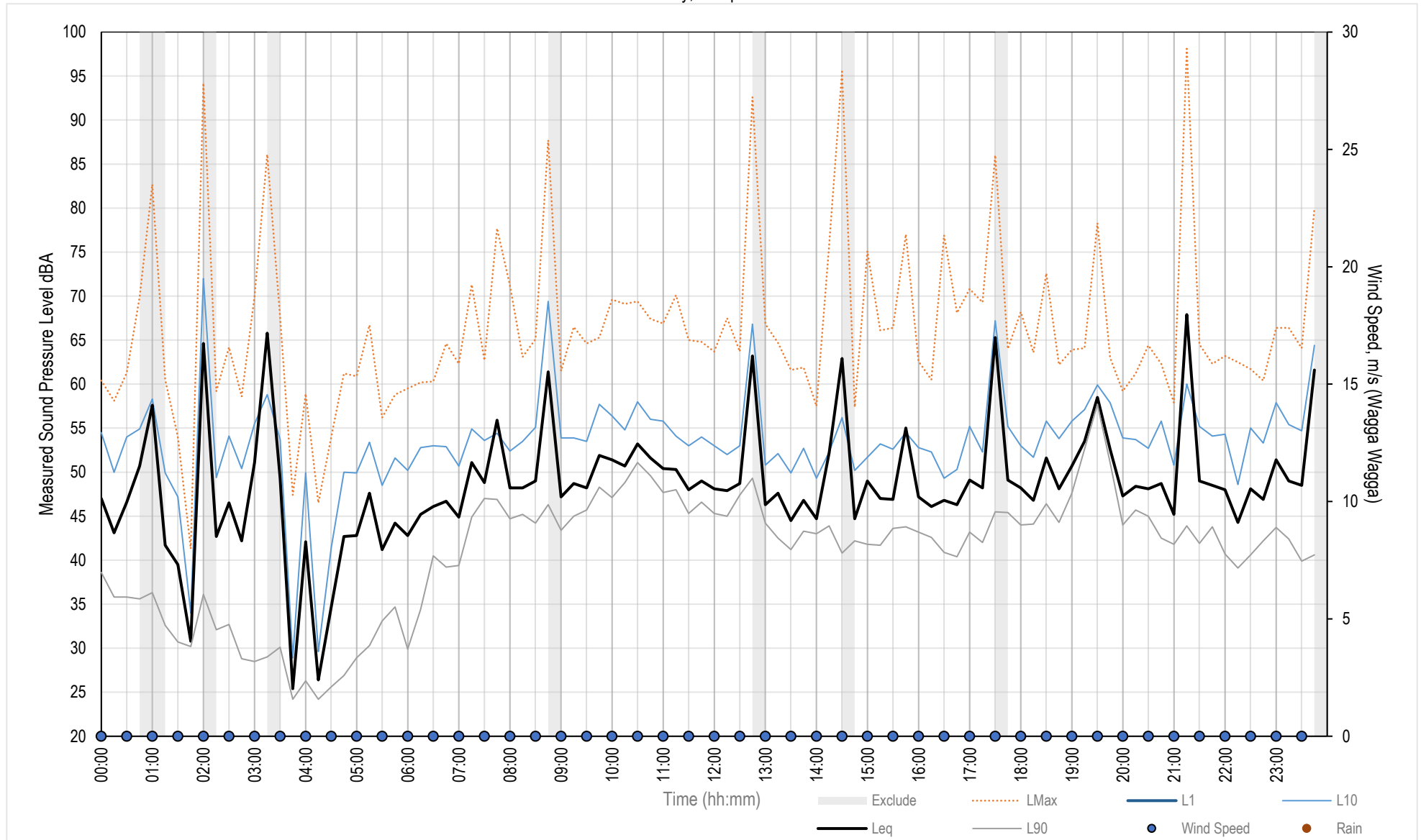
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Monday, 05 April 2021



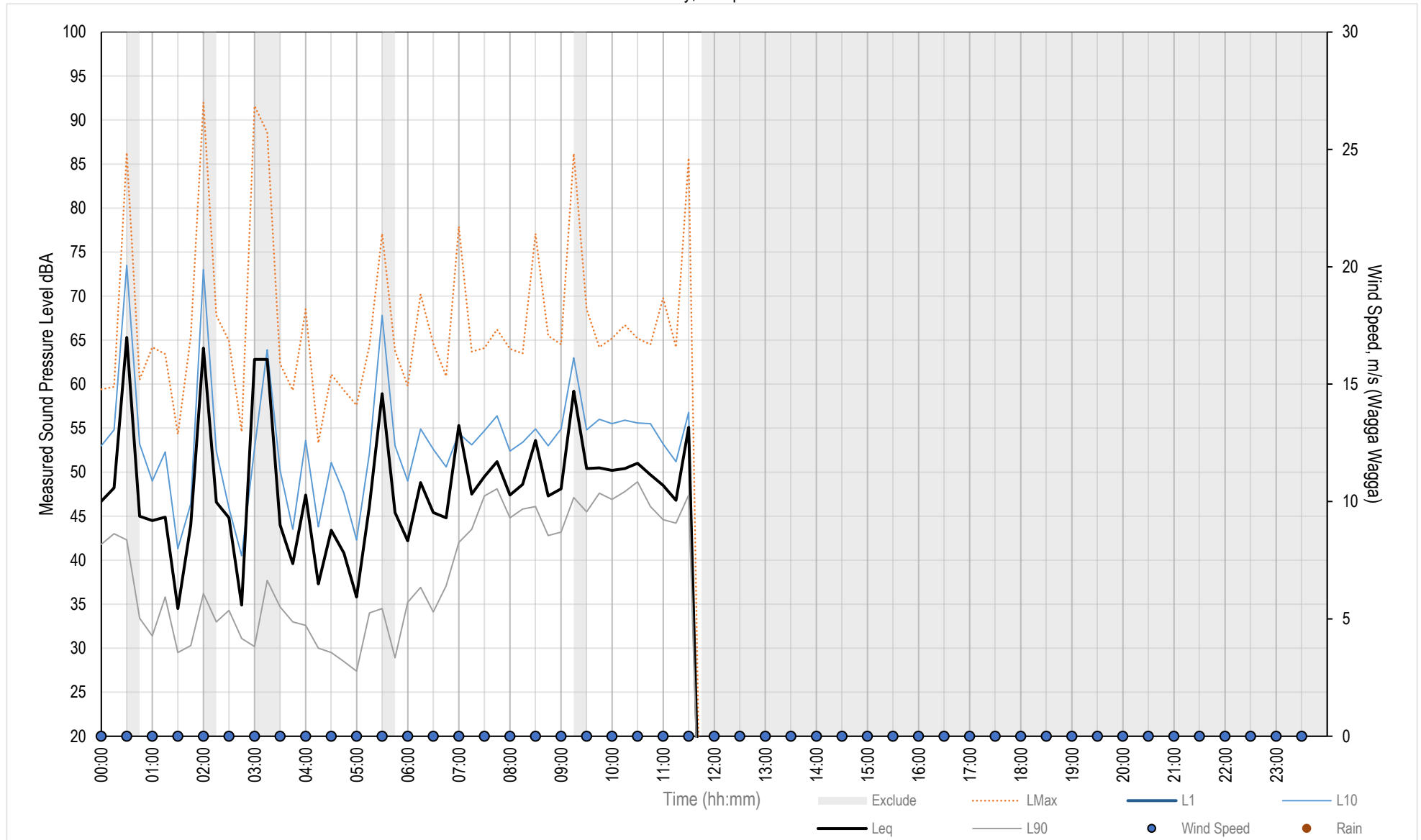
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Monday, 05 April 2021



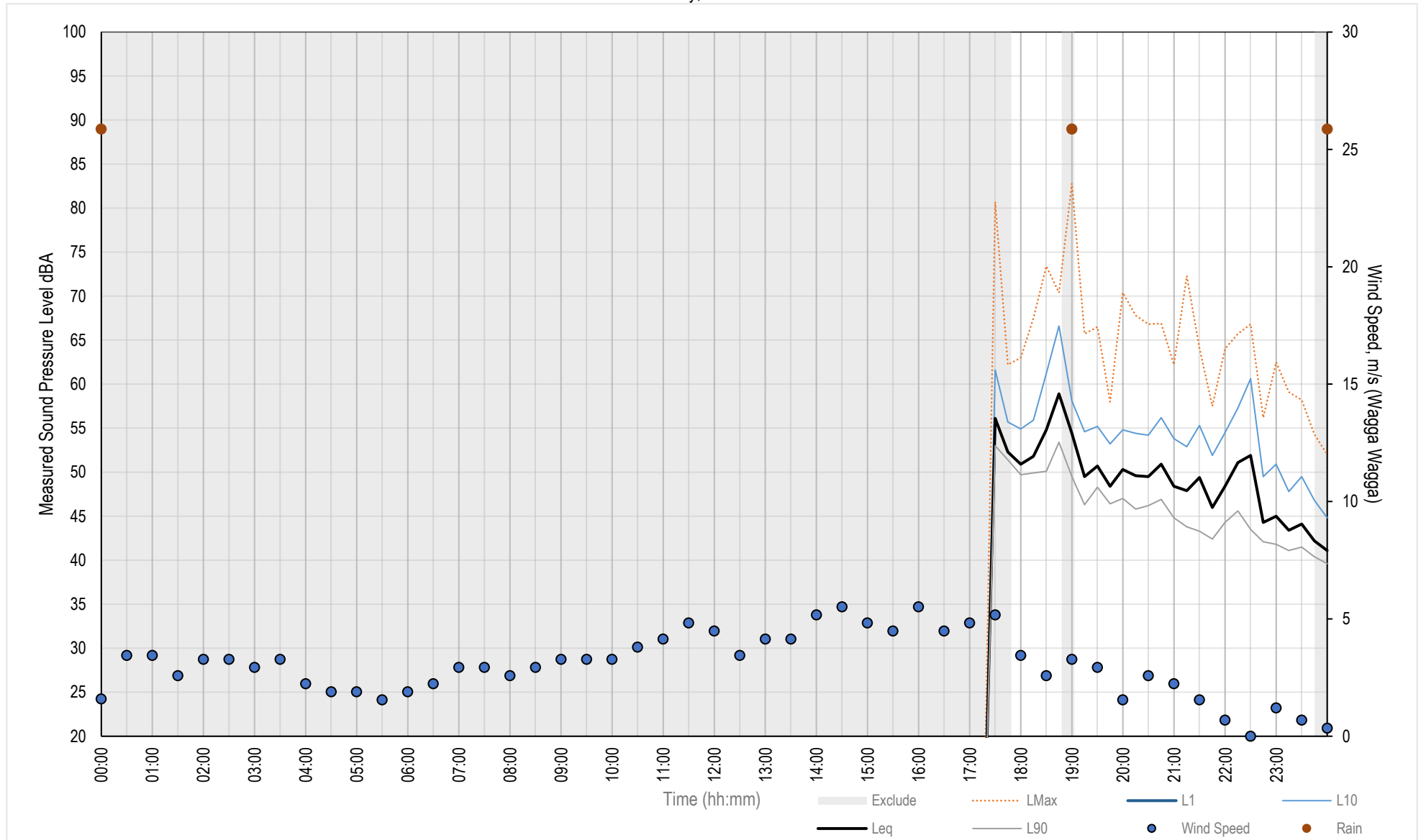
Measured Noise Levels - 1-3 Plunkett St, Yerong Creek

Tuesday, 06 April 2021



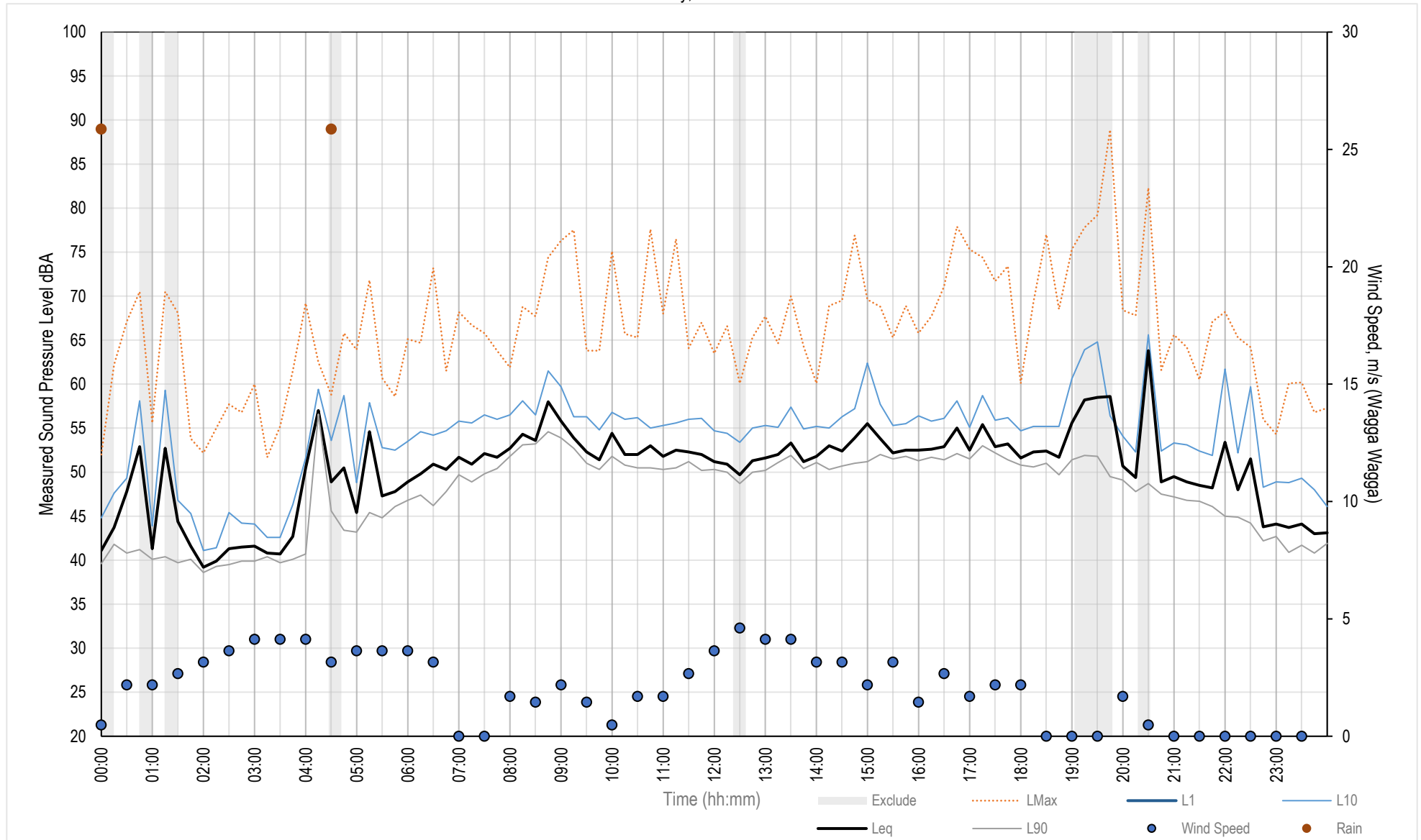
Measured Noise Levels - 8 Peacock Drive, Turvey, Wagga Wagga

Wednesday, 24 March 2021



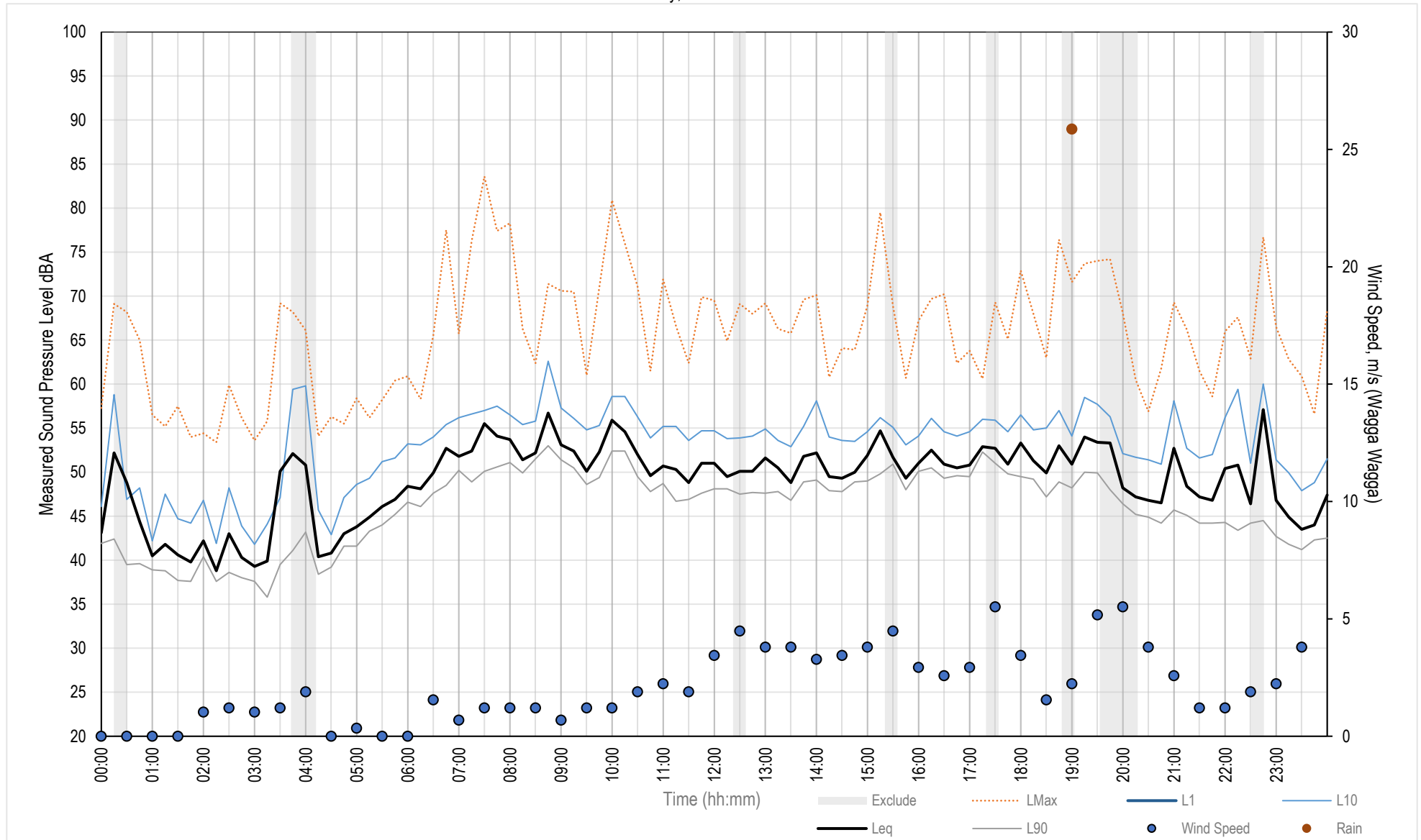
Measured Noise Levels - 8 Peacock Drive, Turvey, Wagga Wagga

Thursday, 25 March 2021



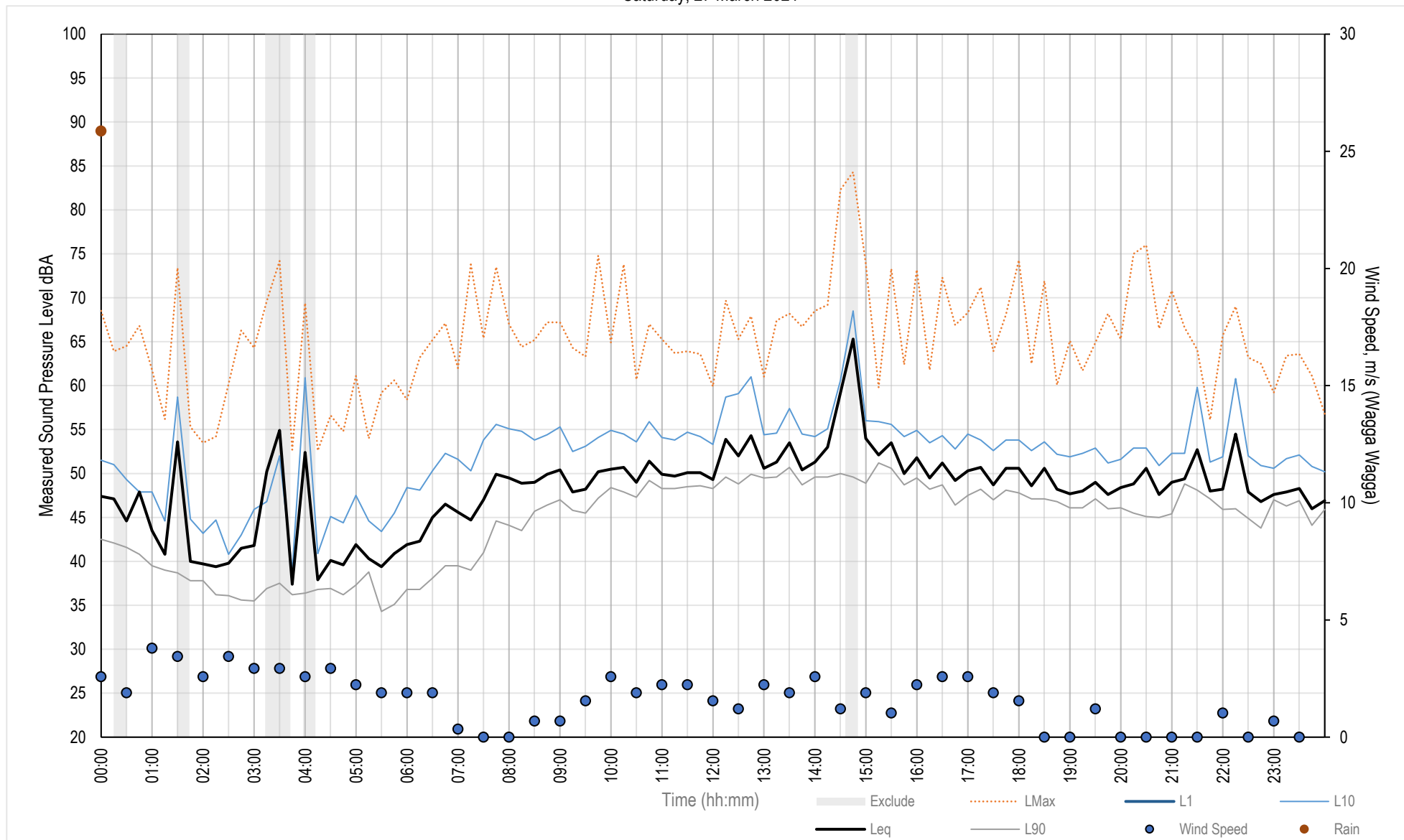
Measured Noise Levels - 8 Peacock Drive, Turvey, Wagga Wagga

Friday, 26 March 2021



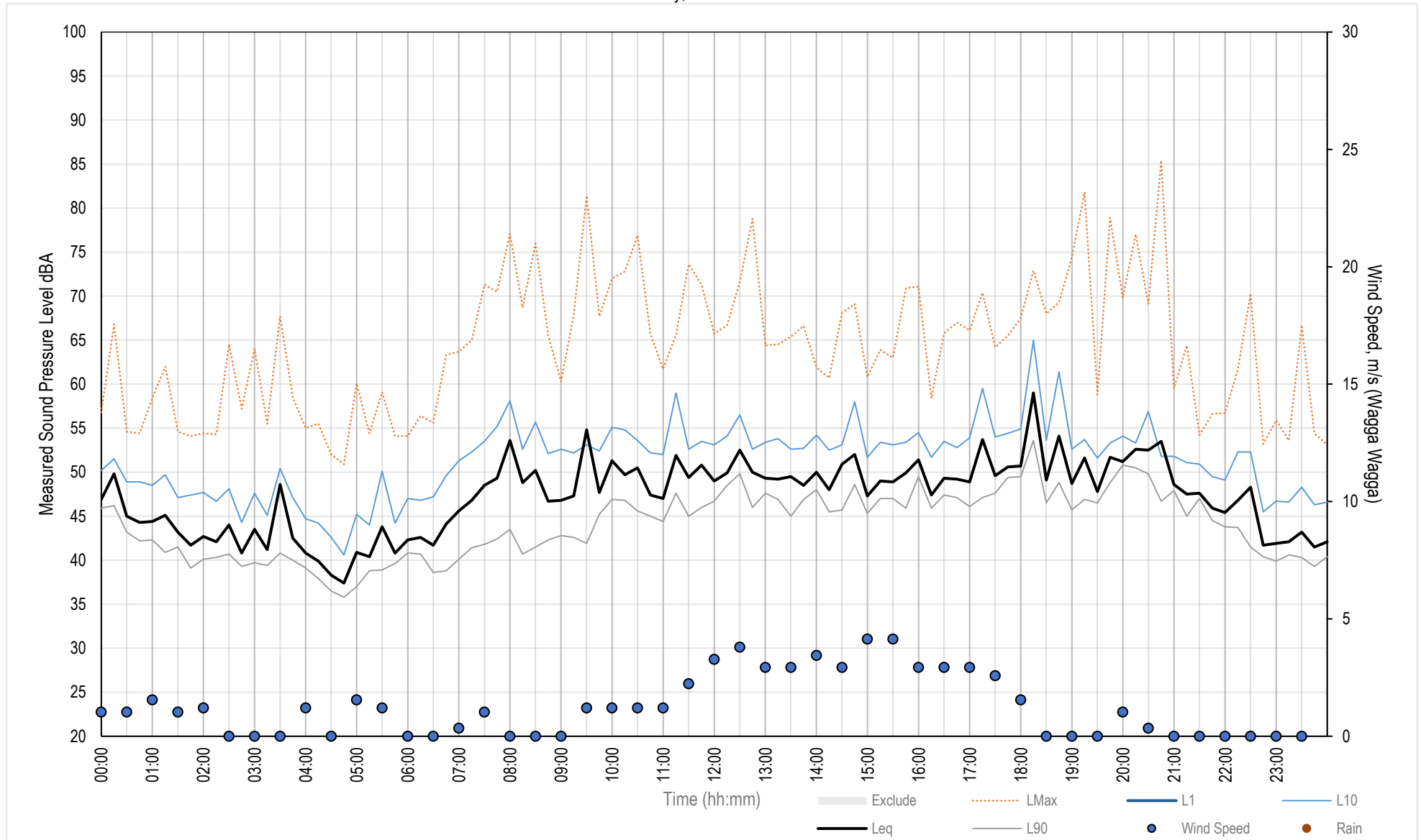
Measured Noise Levels - 8 Peacock Drive, Turvey, Wagga Wagga

Saturday, 27 March 2021



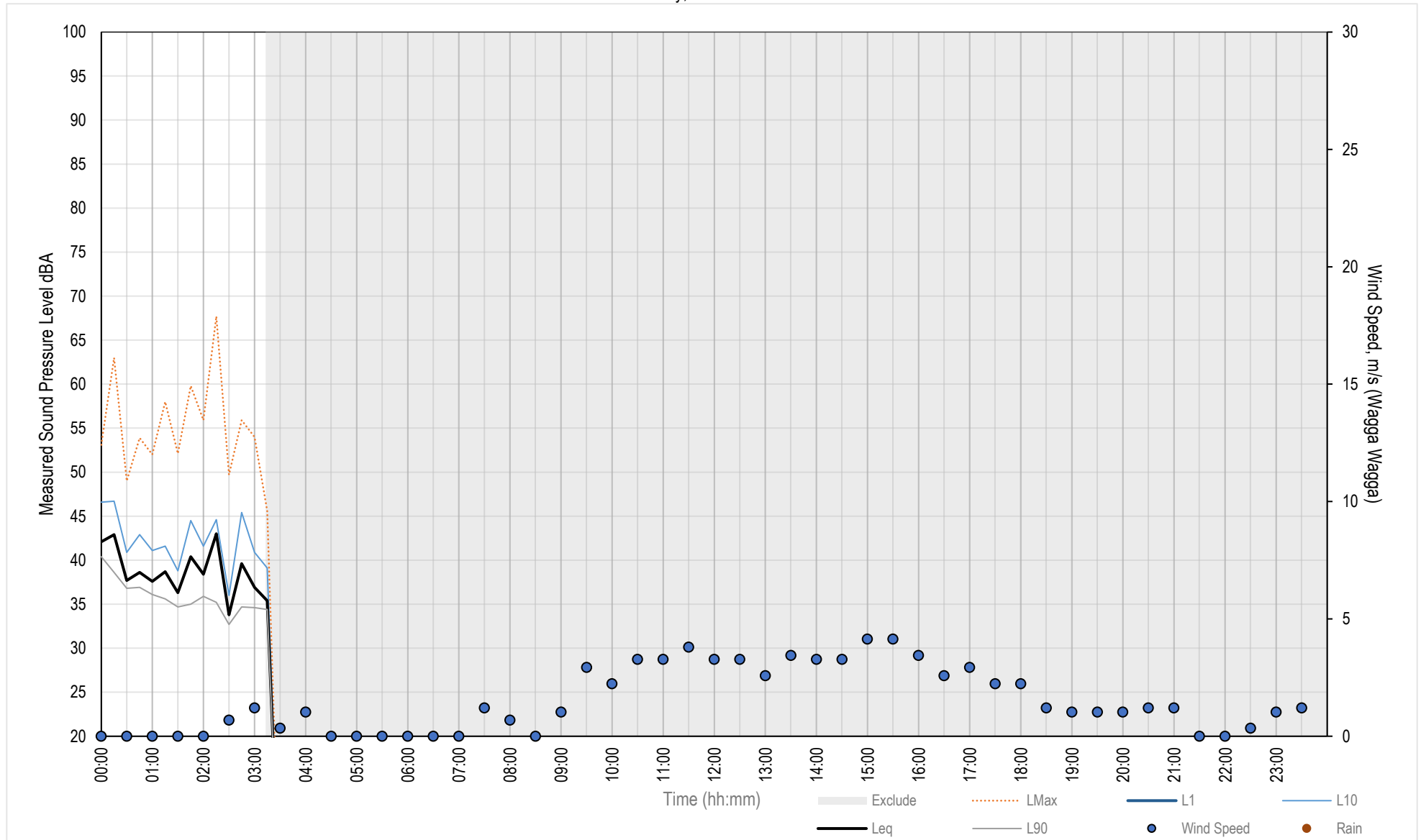
Measured Noise Levels - 8 Peacock Drive, Turvey, Wagga Wagga

Sunday, 28 March 2021



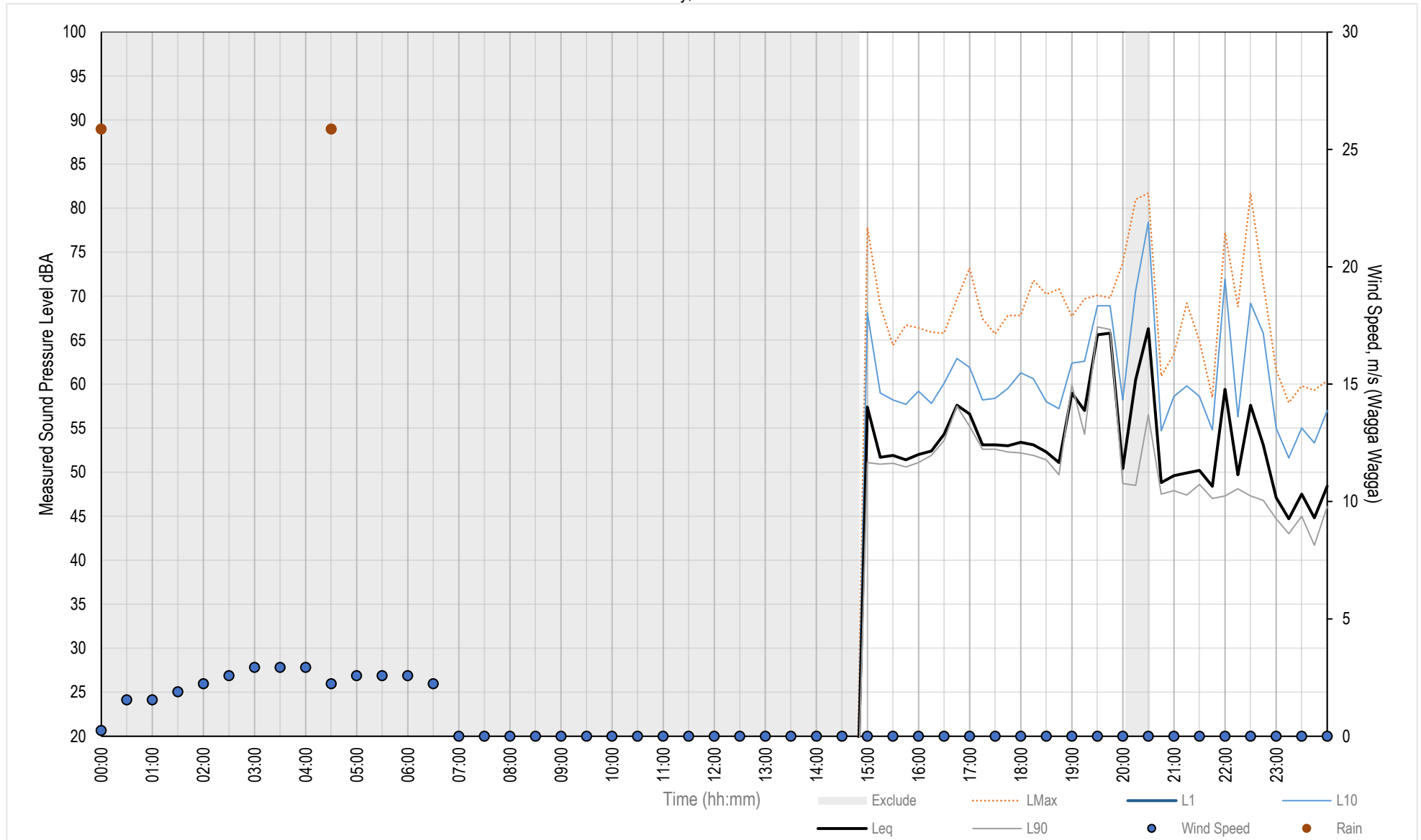
Measured Noise Levels - 8 Peacock Drive, Turvey, Wagga Wagga

Monday, 29 March 2021



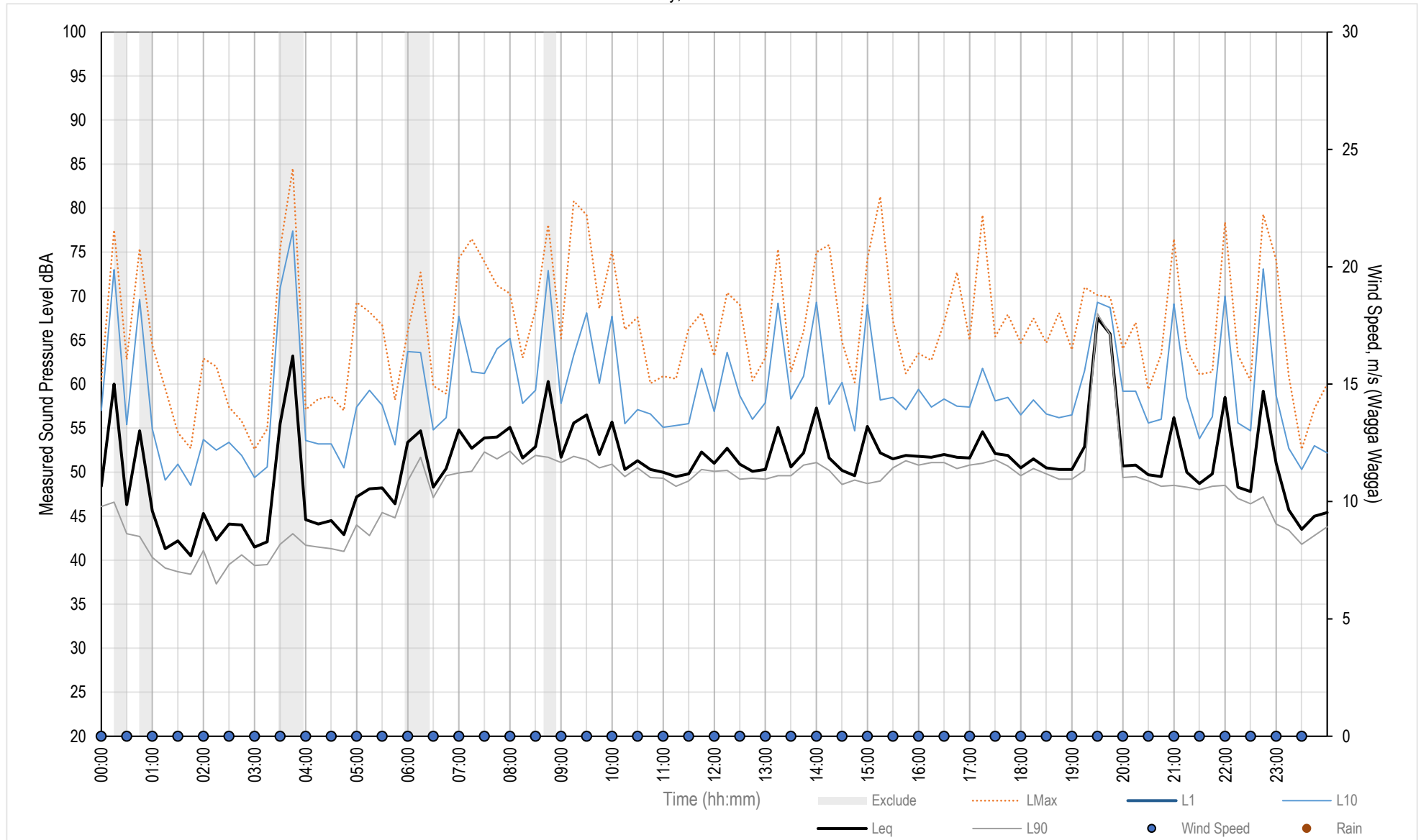
Measured Noise Levels - Kildare Catholic College

Thursday, 25 March 2021



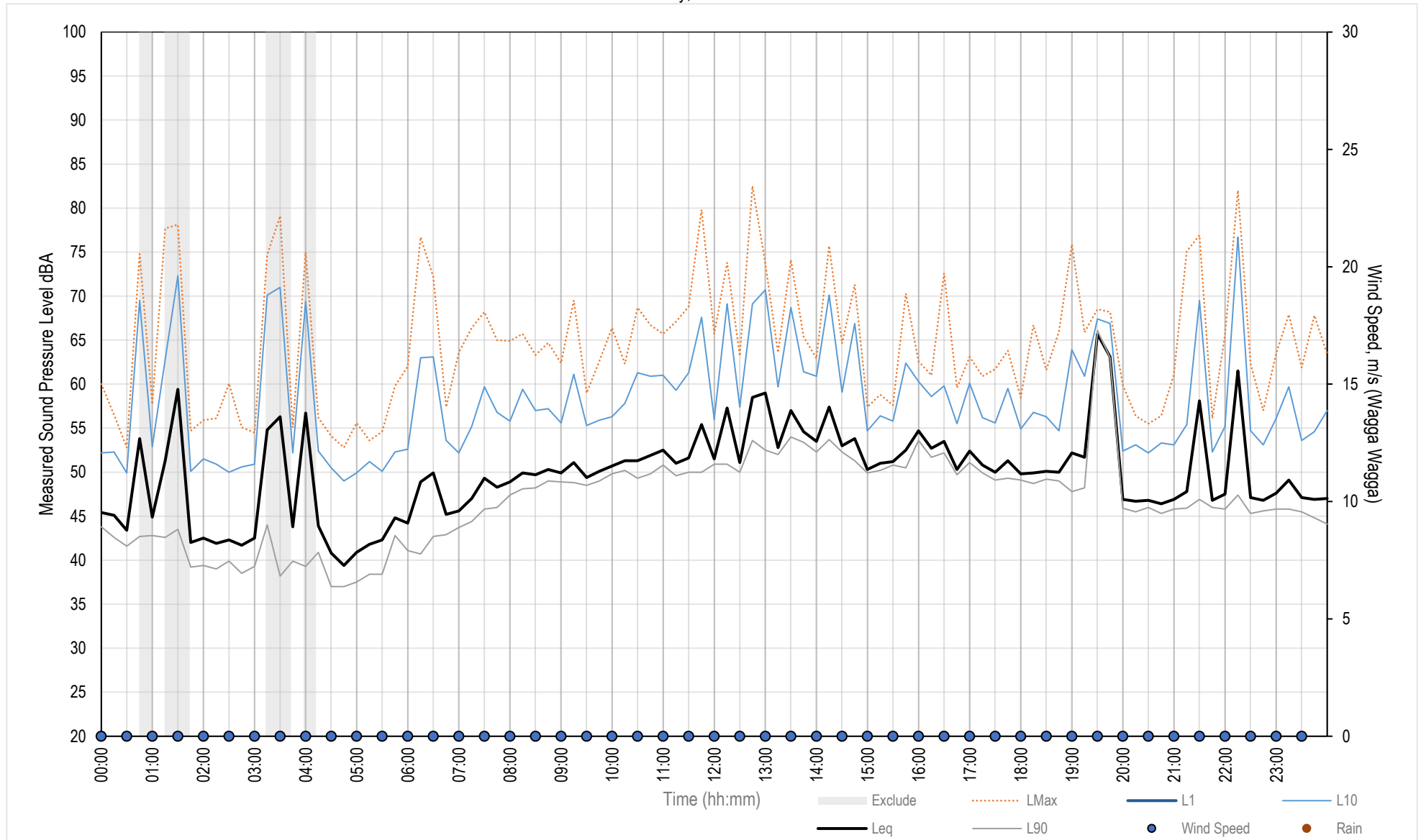
Measured Noise Levels - Kildare Catholic College

Friday, 26 March 2021



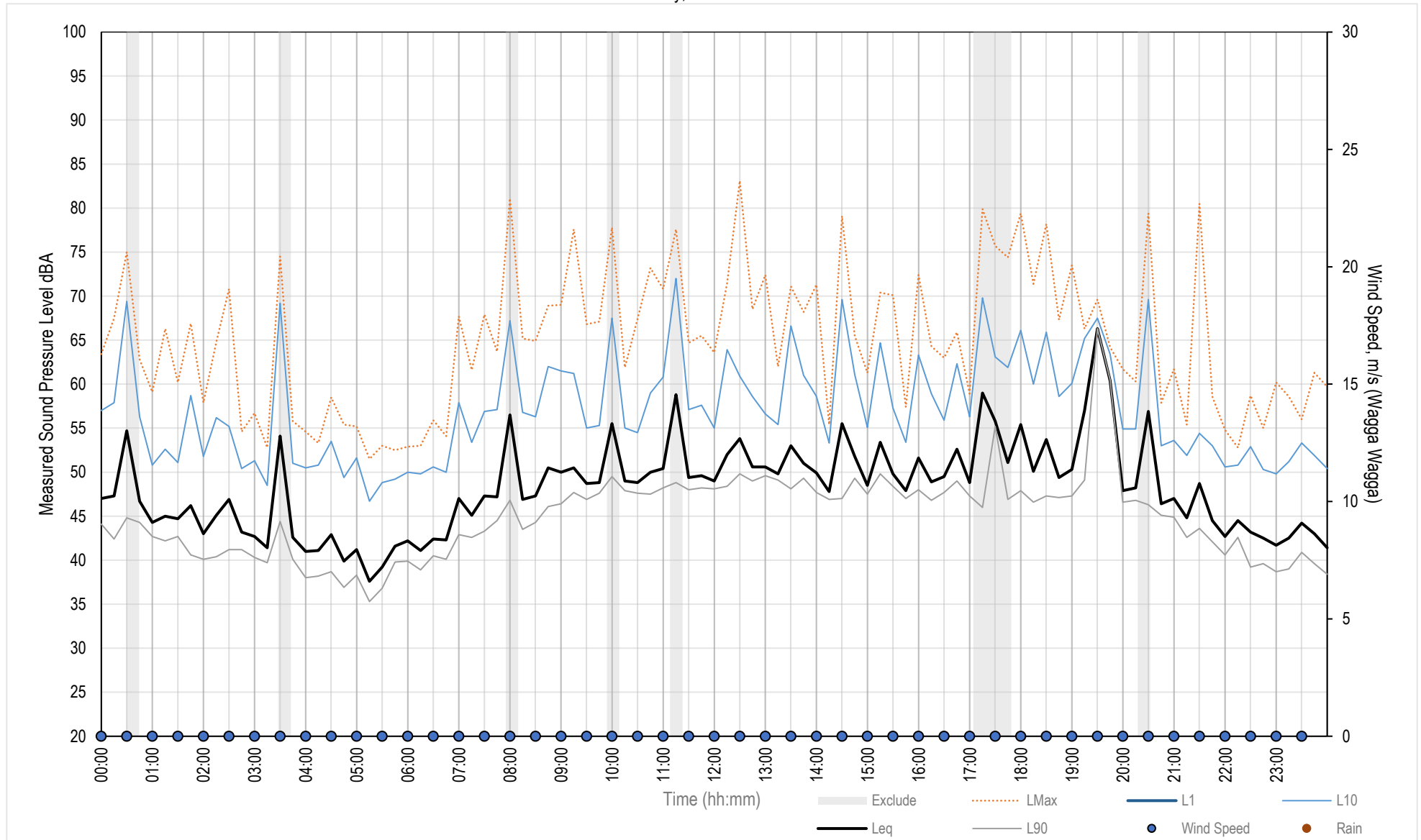
Measured Noise Levels - Kildare Catholic College

Saturday, 27 March 2021



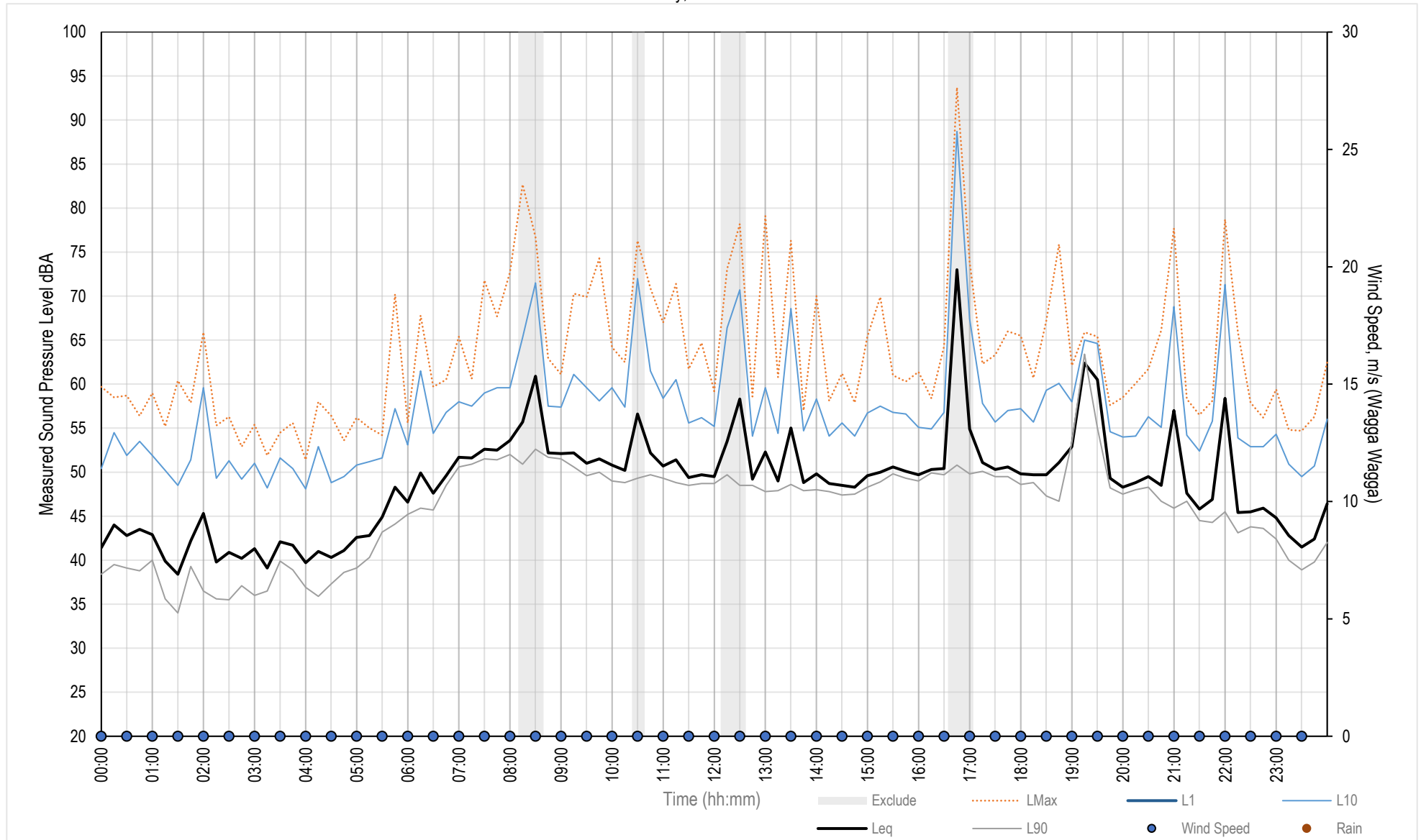
Measured Noise Levels - Kildare Catholic College

Sunday, 28 March 2021



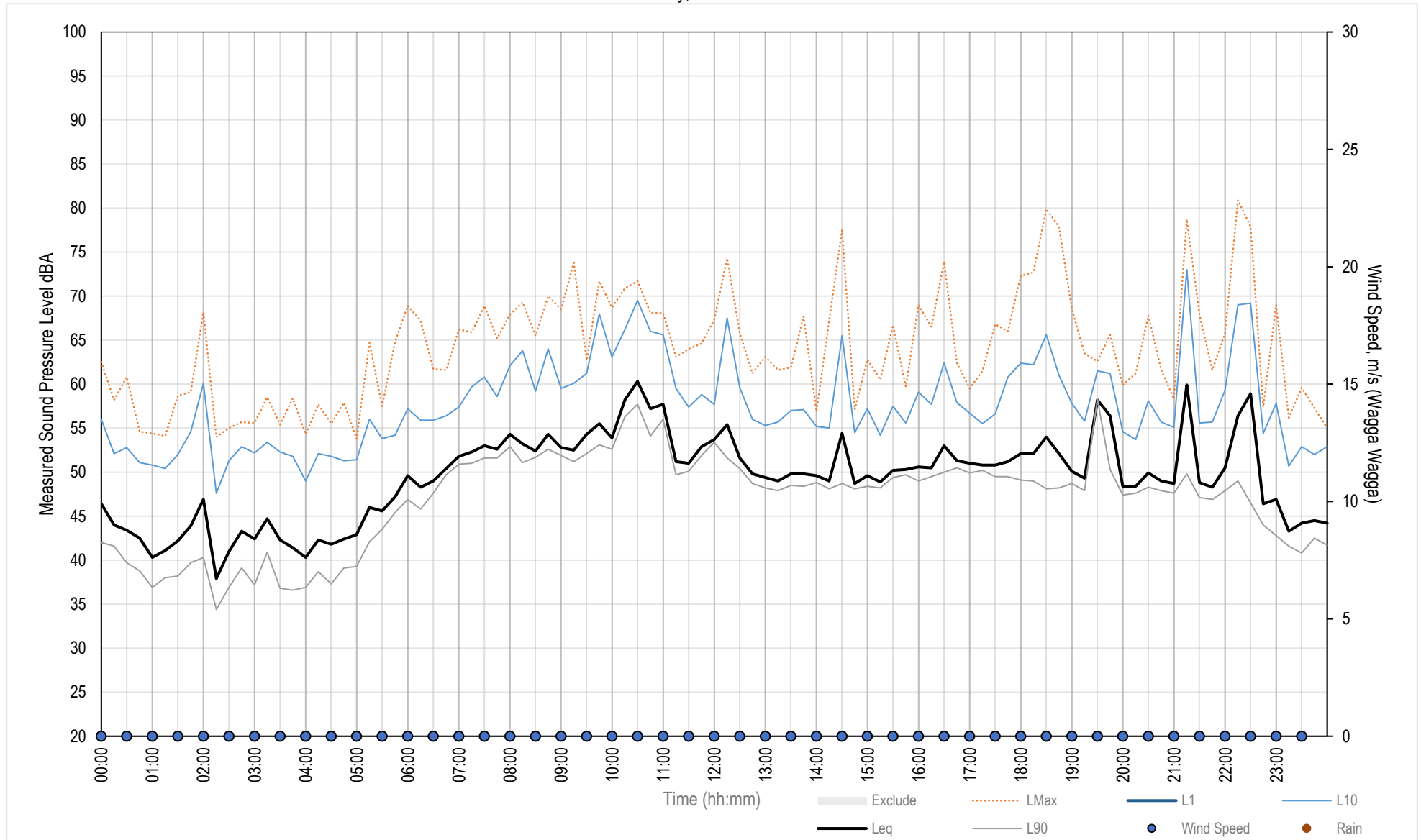
Measured Noise Levels - Kildare Catholic College

Monday, 29 March 2021



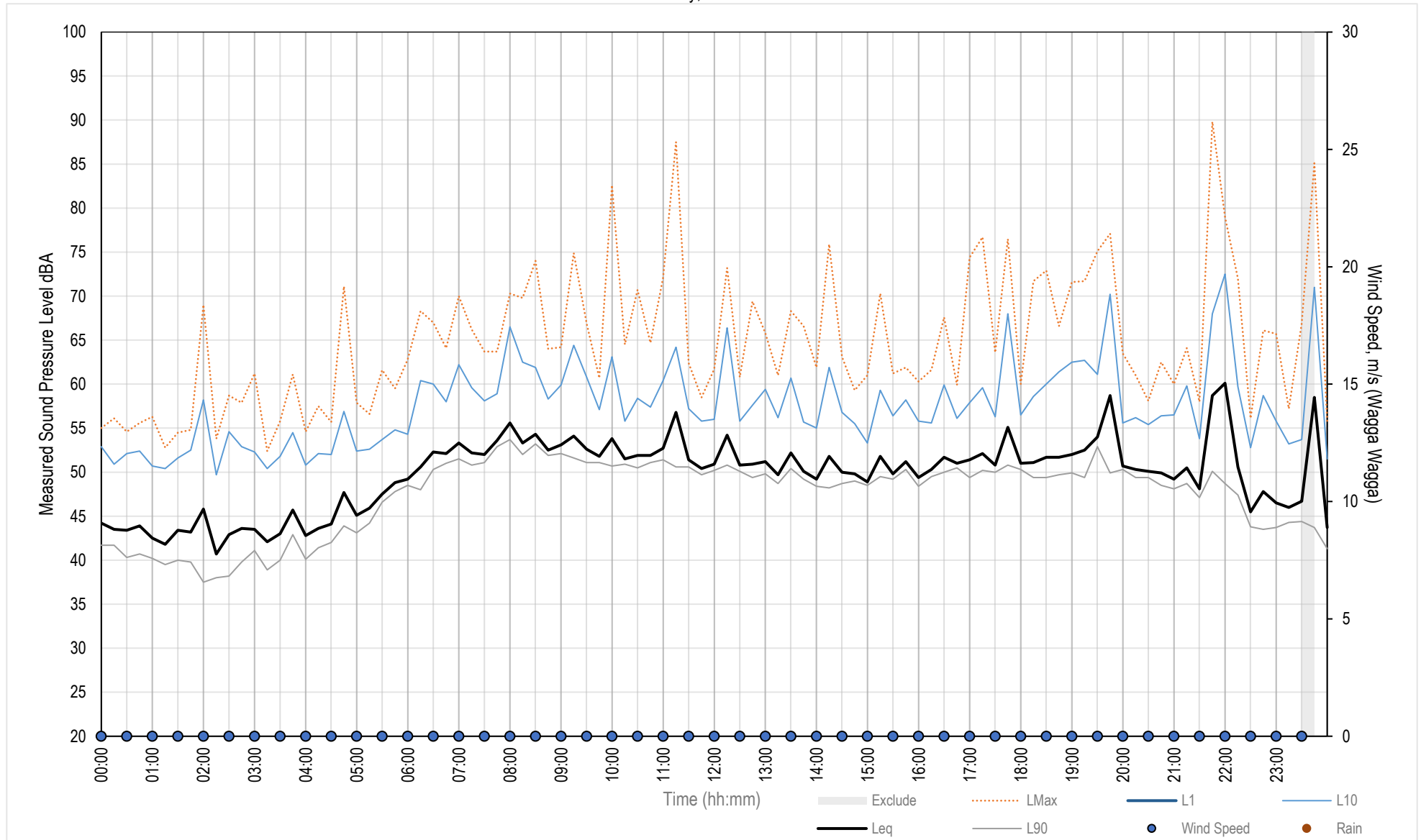
Measured Noise Levels - Kildare Catholic College

Tuesday, 30 March 2021



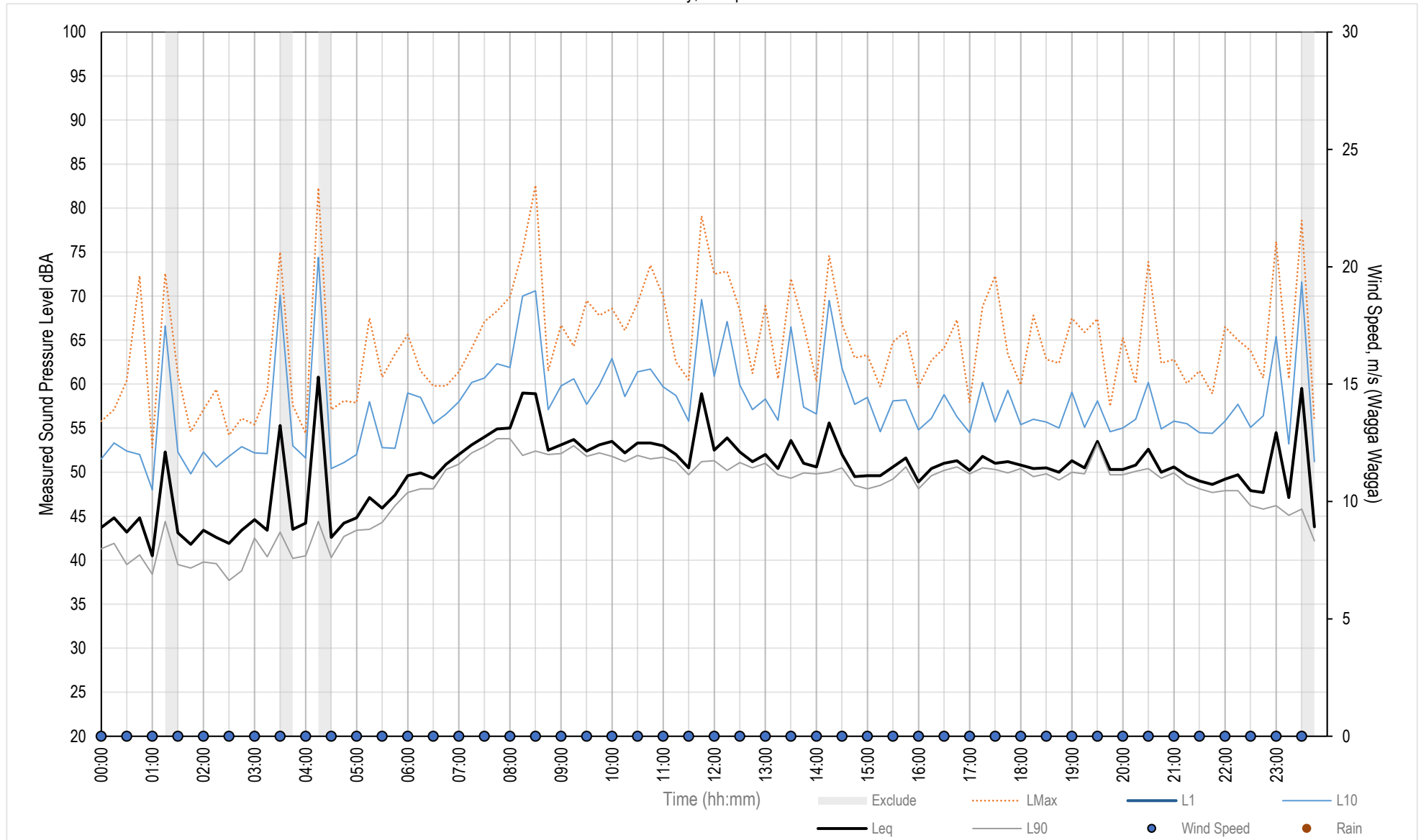
Measured Noise Levels - Kildare Catholic College

Wednesday, 31 March 2021



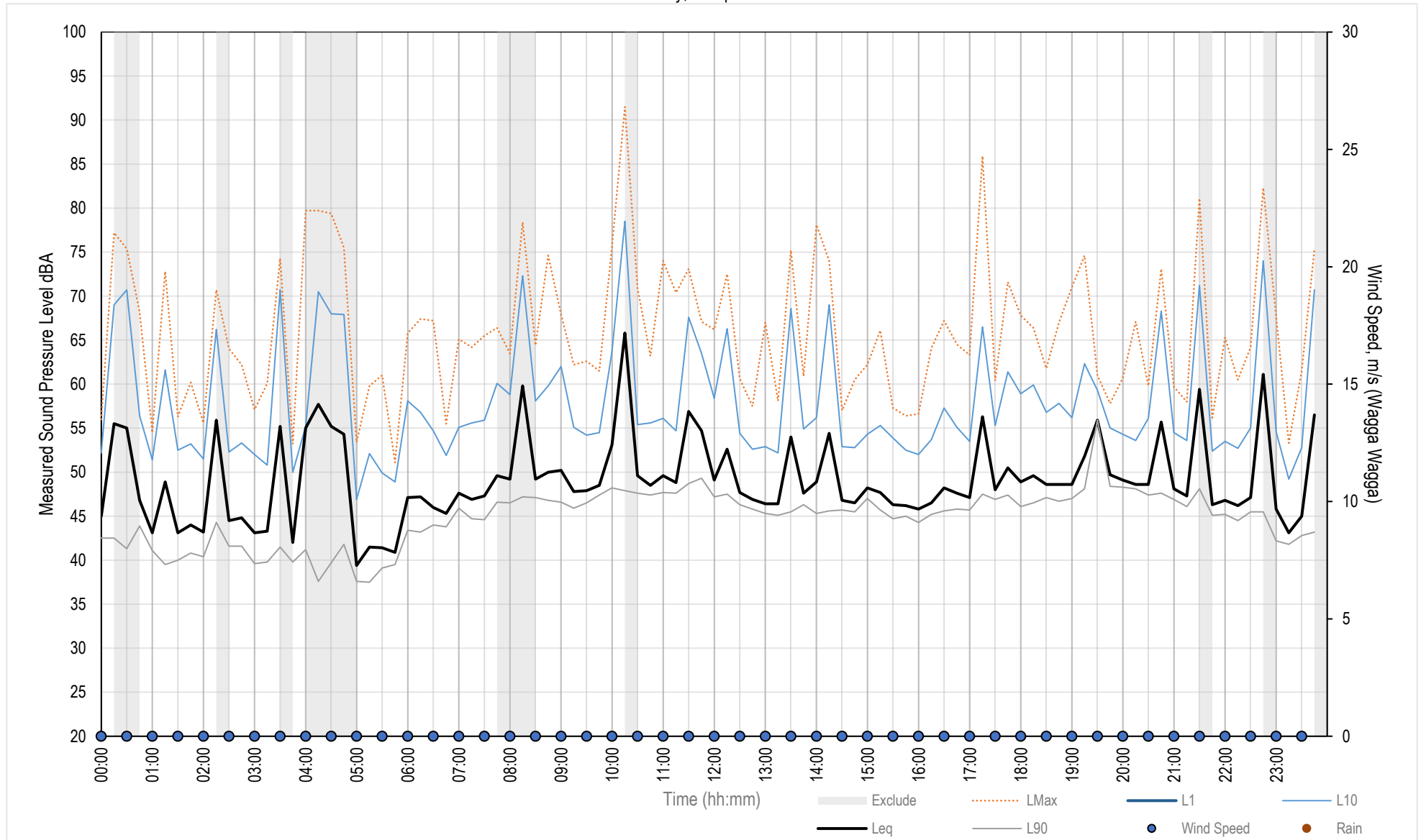
Measured Noise Levels - Kildare Catholic College

Thursday, 01 April 2021



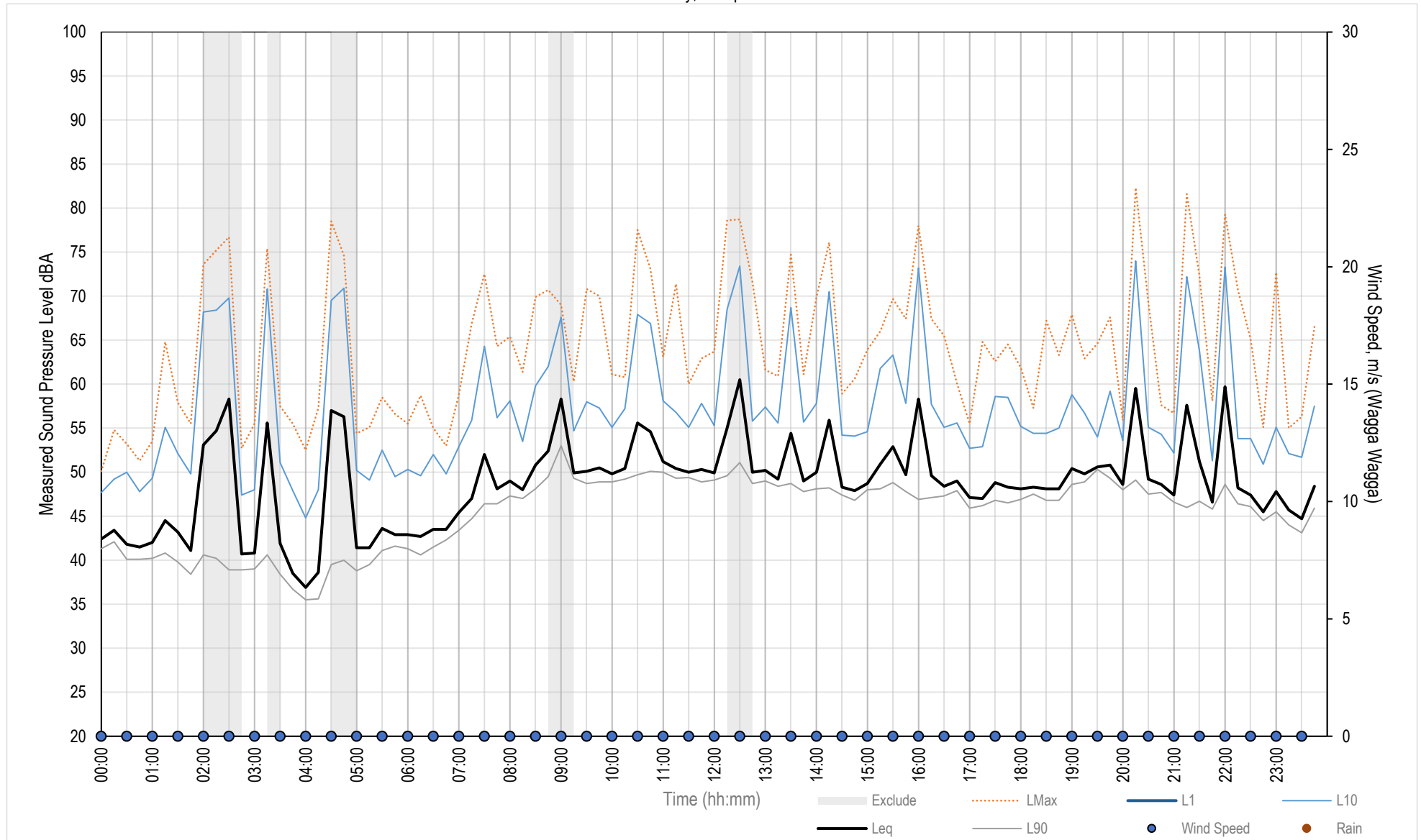
Measured Noise Levels - Kildare Catholic College

Friday, 02 April 2021



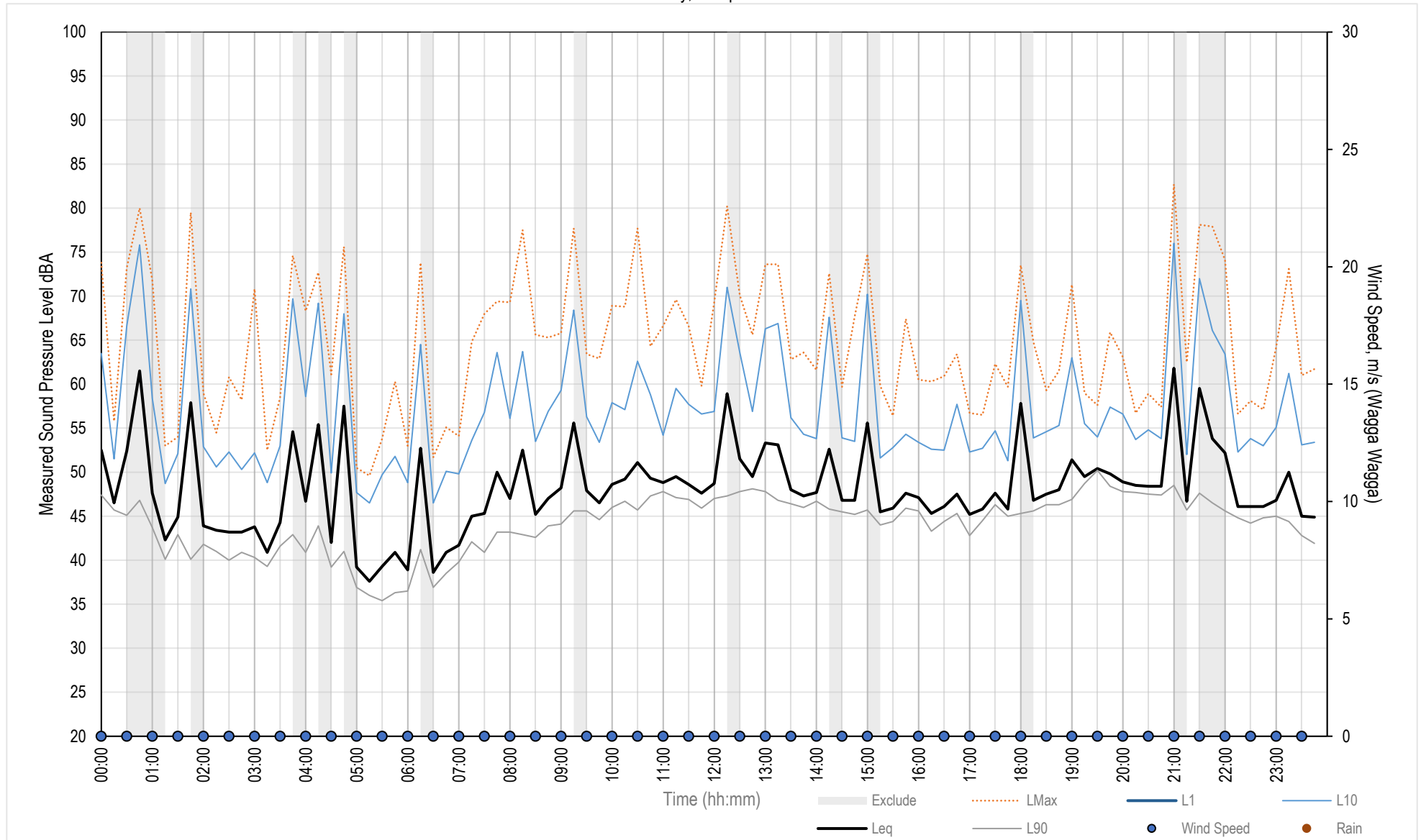
Measured Noise Levels - Kildare Catholic College

Saturday, 03 April 2021



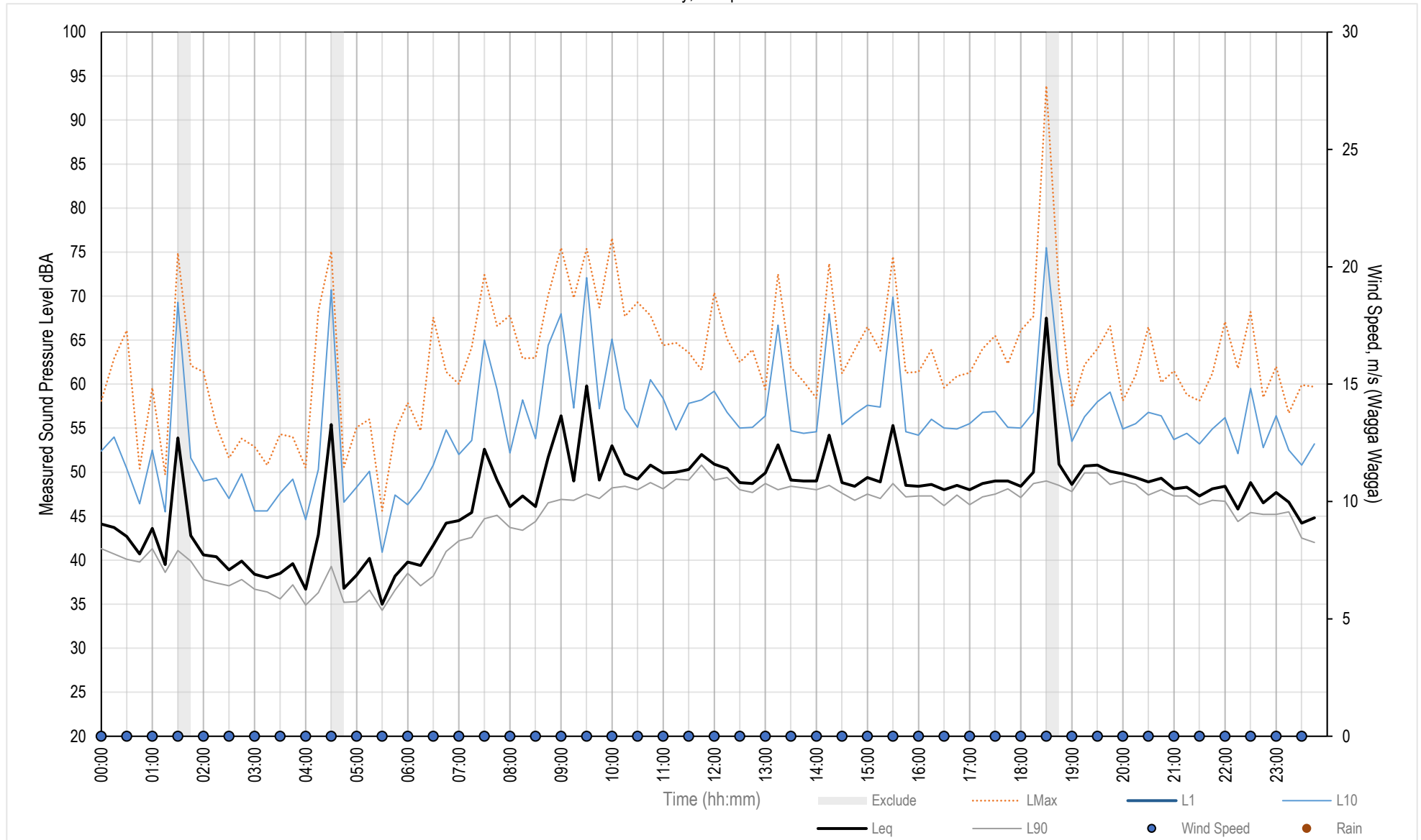
Measured Noise Levels - Kildare Catholic College

Sunday, 04 April 2021



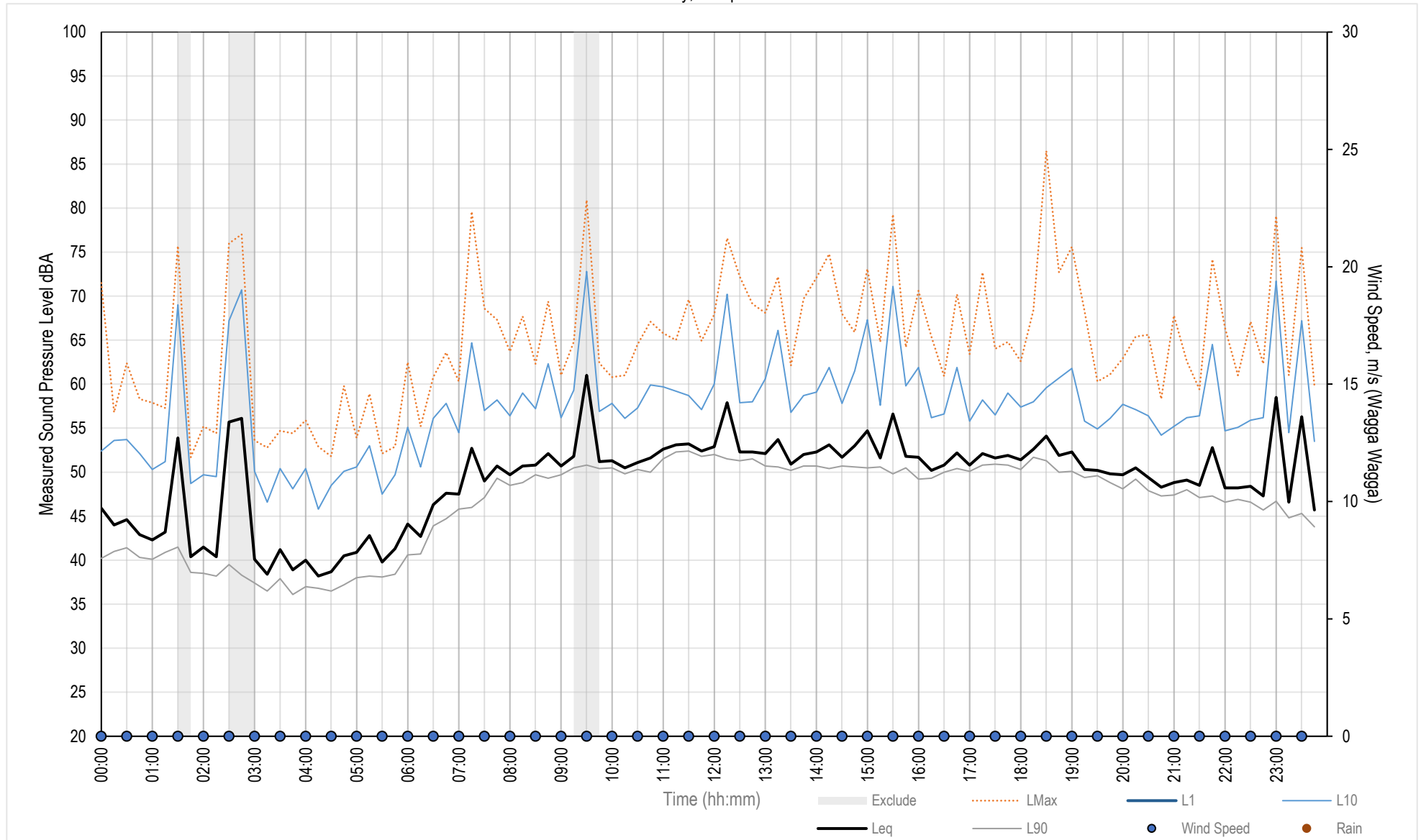
Measured Noise Levels - Kildare Catholic College

Monday, 05 April 2021



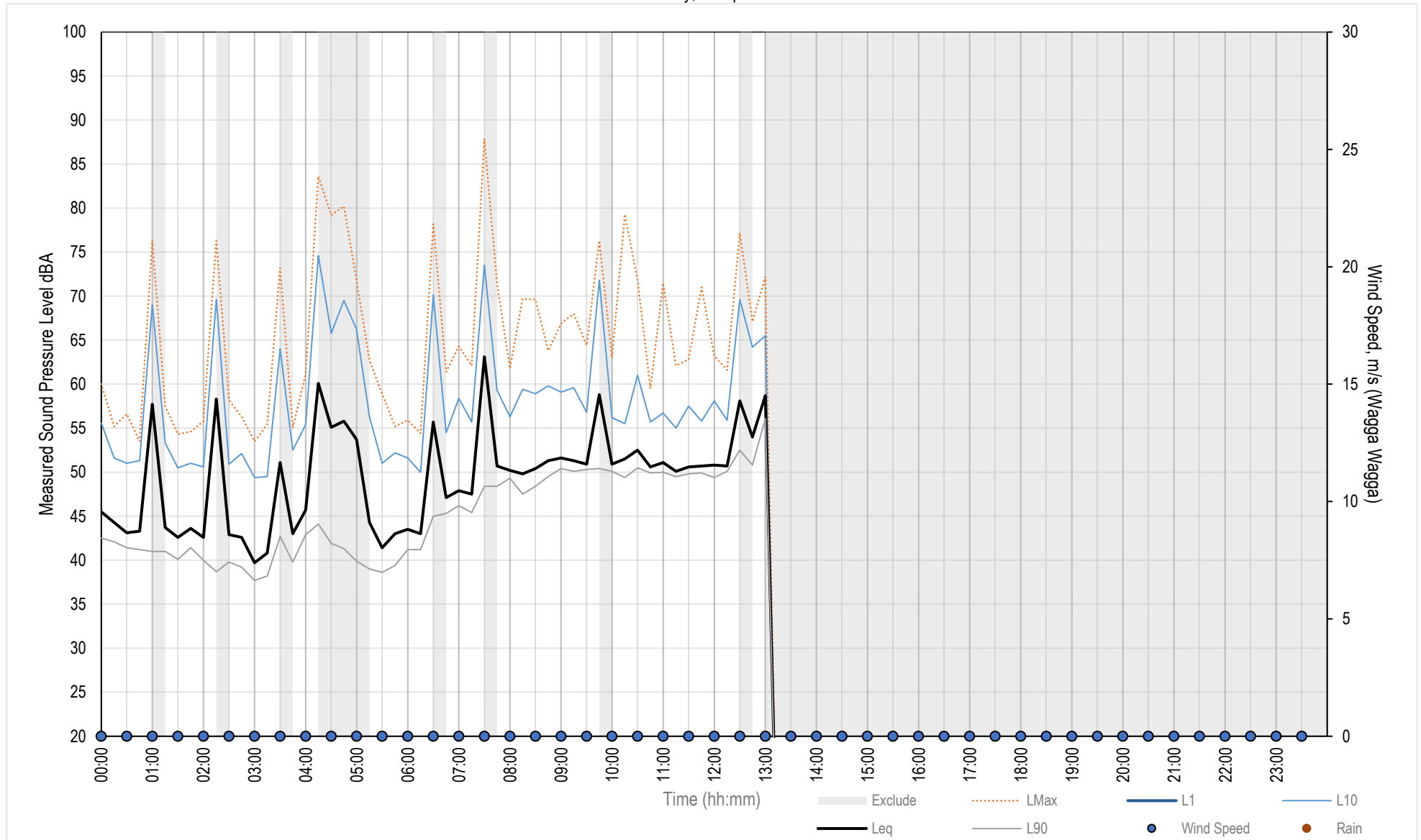
Measured Noise Levels - Kildare Catholic College

Monday, 05 April 2021



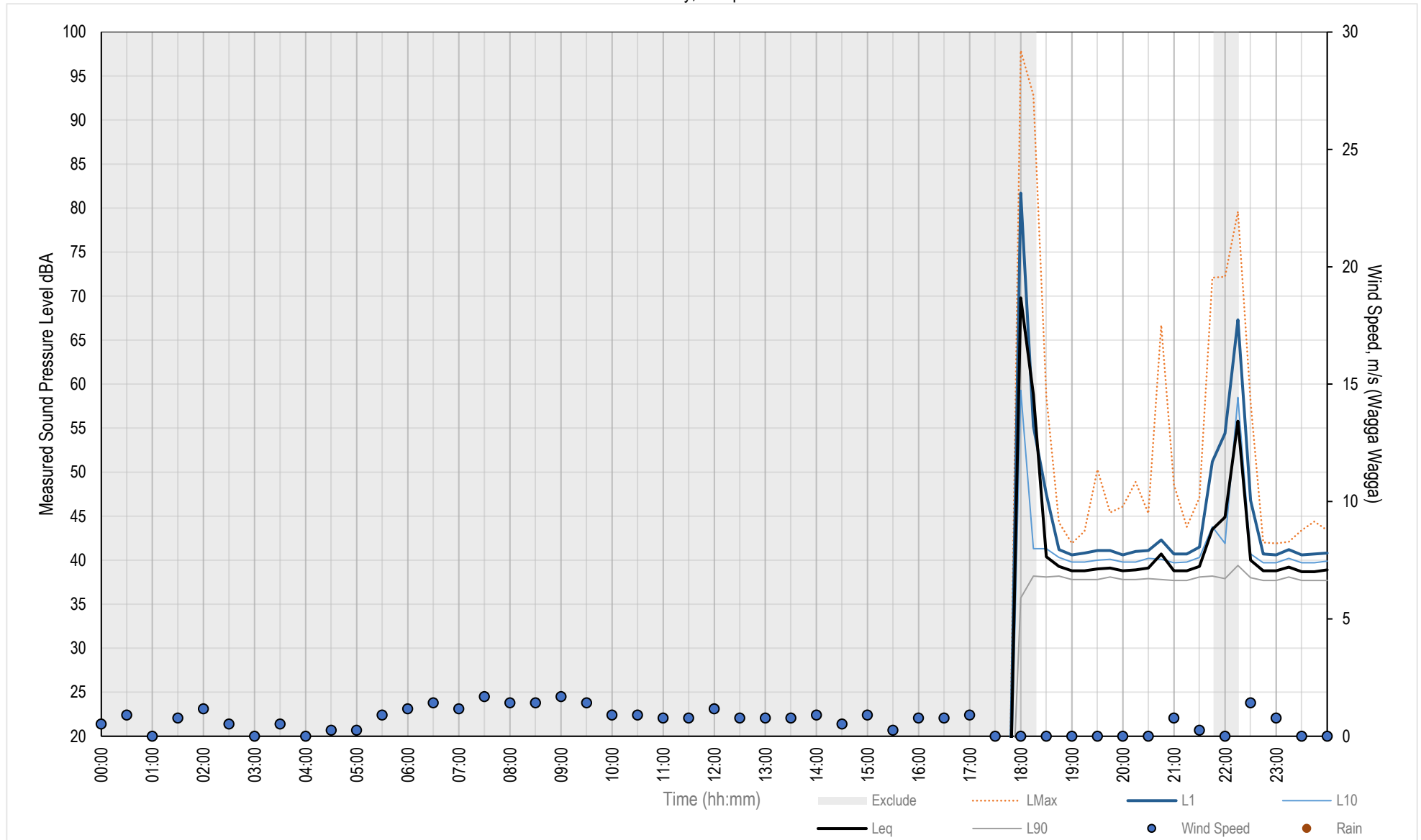
Measured Noise Levels - Kildare Catholic College

Tuesday, 06 April 2021



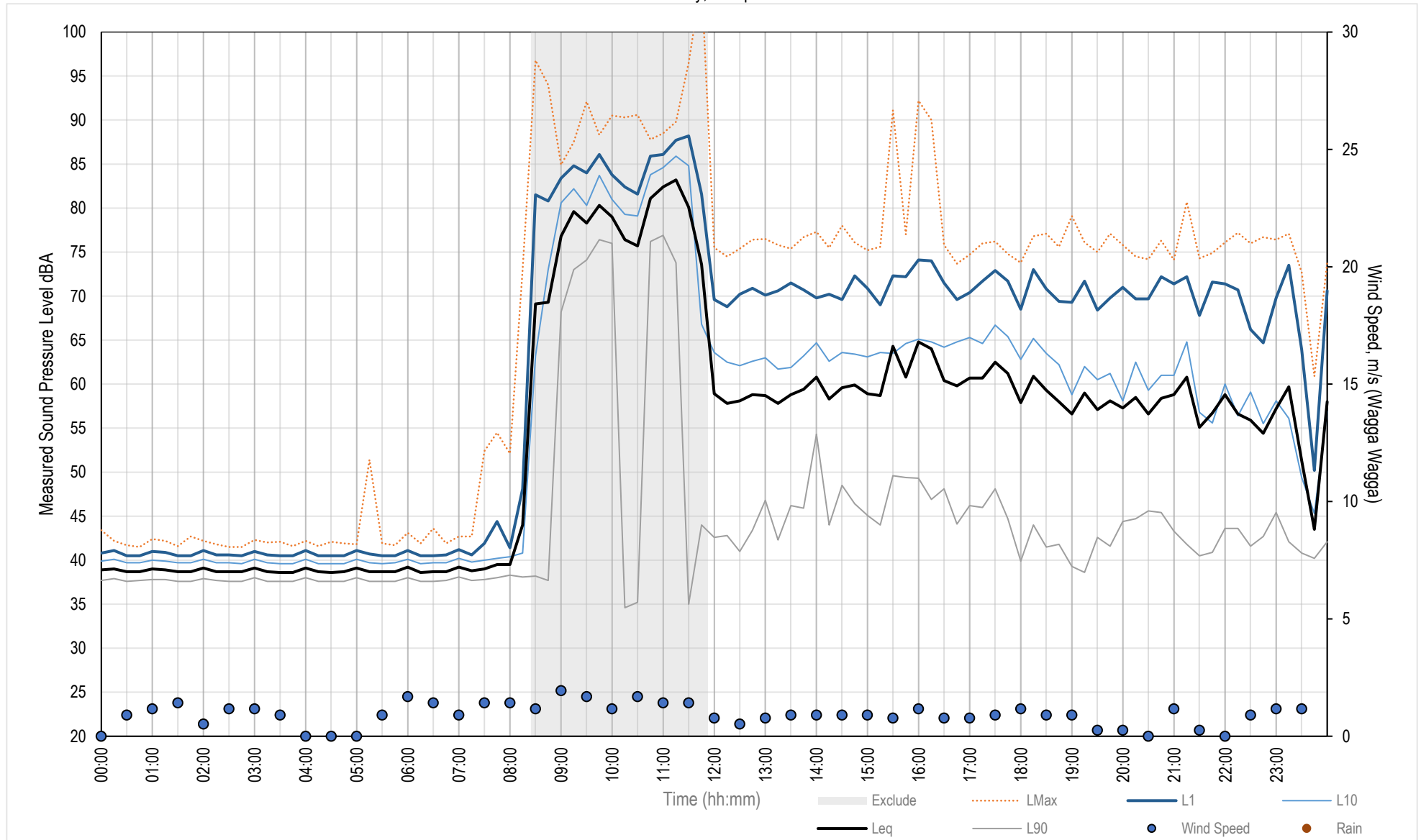
Measured Noise Levels - 1296 Byrne Rd, Harefield

Tuesday, 27 April 2021



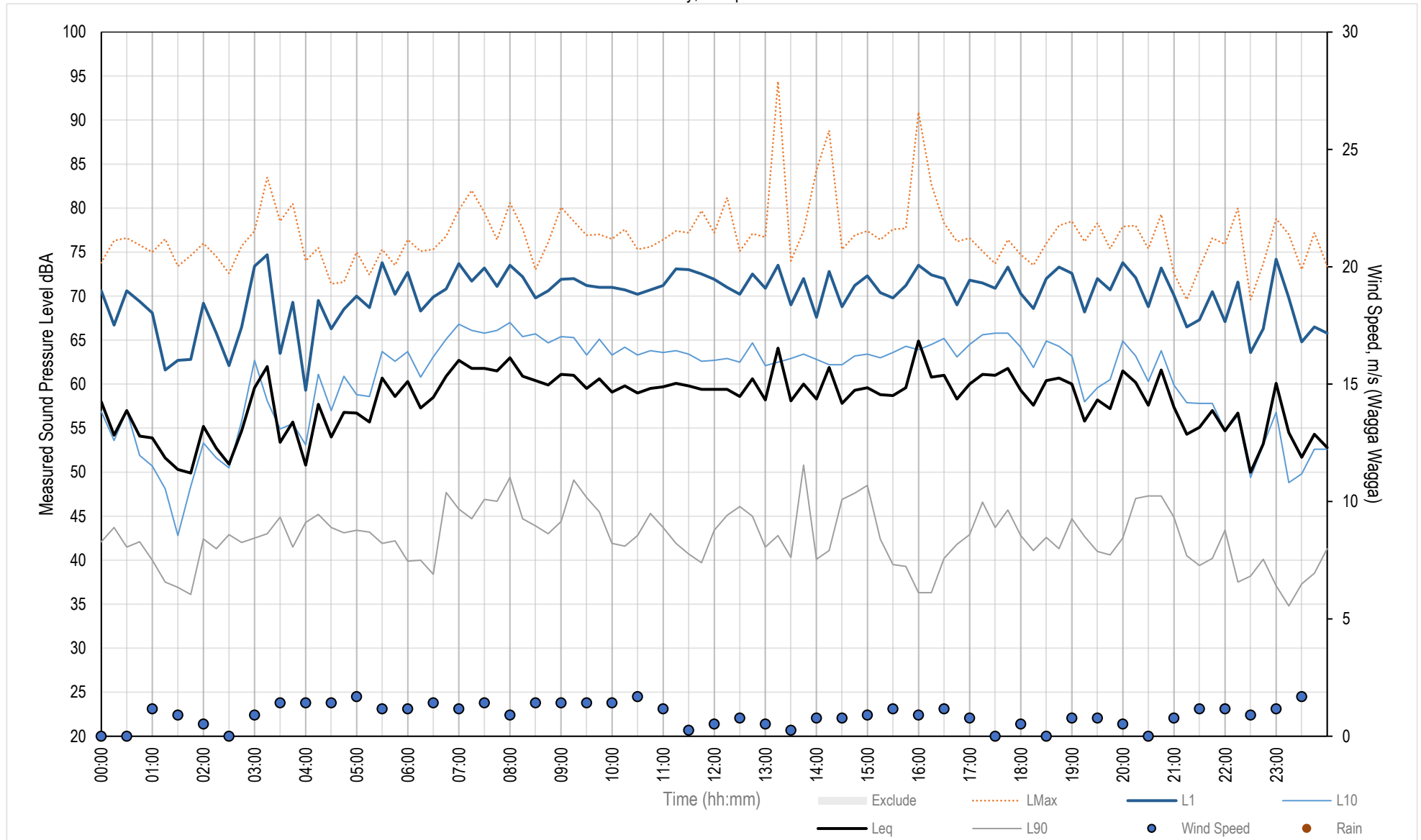
Measured Noise Levels - 1296 Byrne Rd, Harefield

Wednesday, 28 April 2021



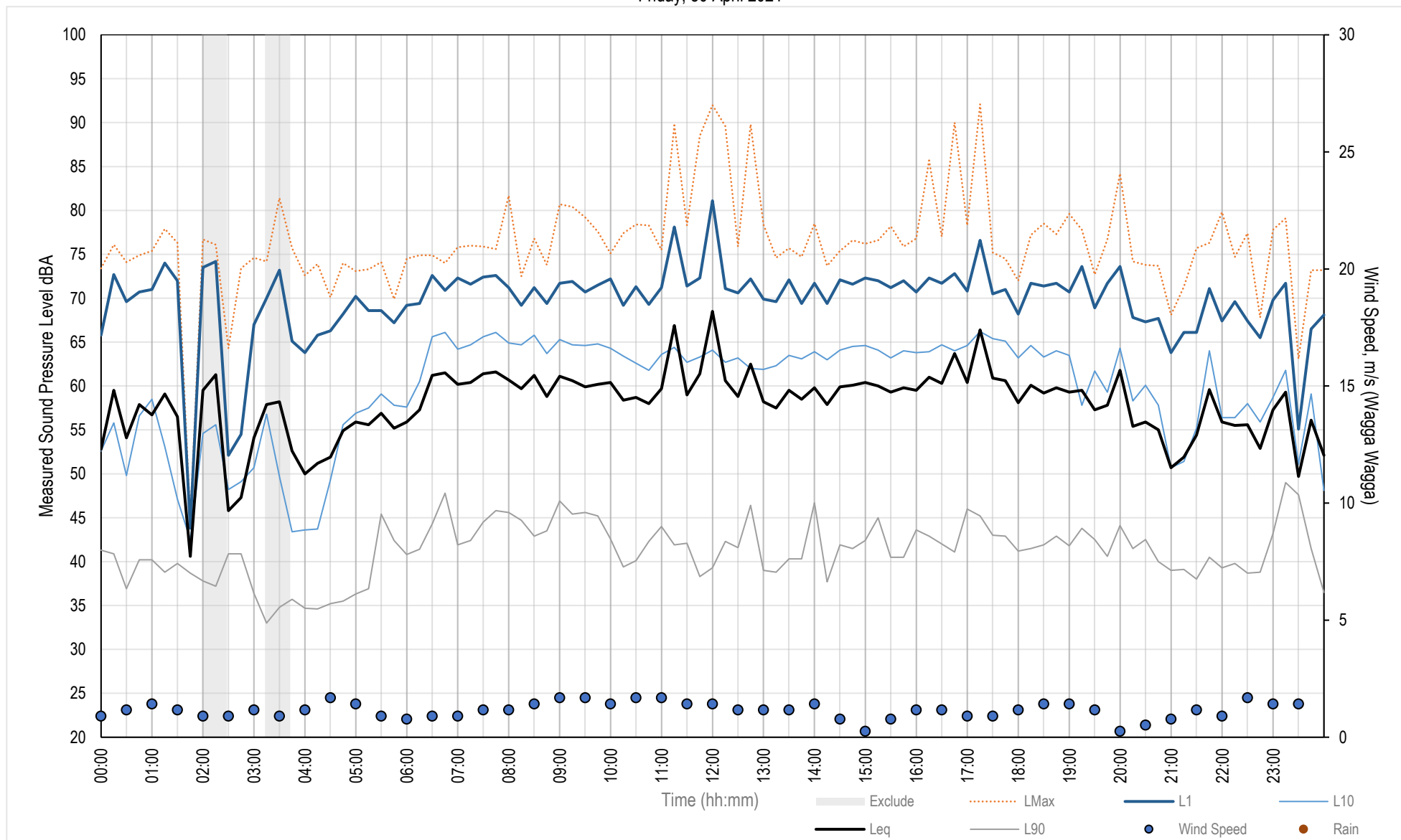
Measured Noise Levels - 1296 Byrne Rd, Harefield

Thursday, 29 April 2021



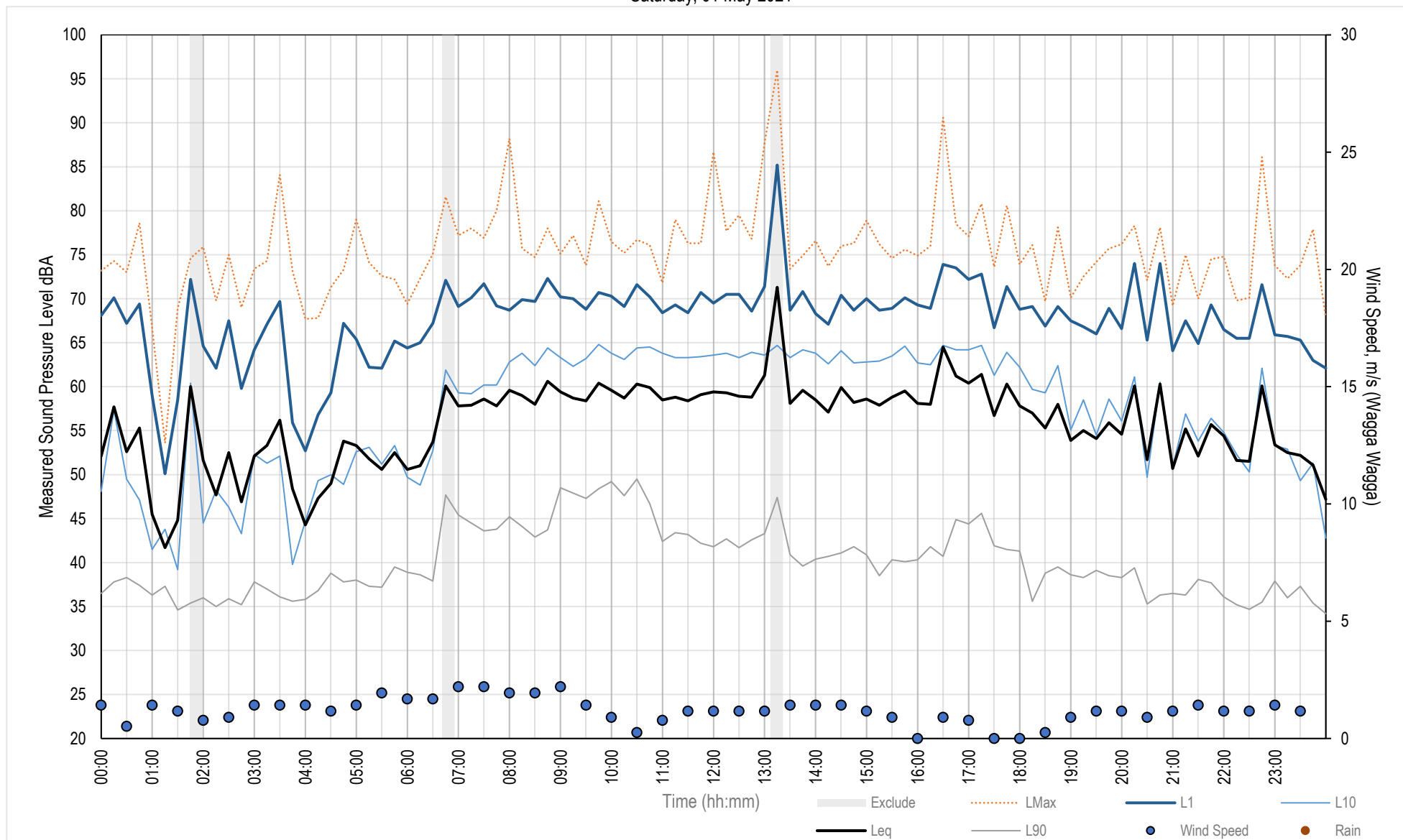
Measured Noise Levels - 1296 Byrne Rd, Harefield

Friday, 30 April 2021



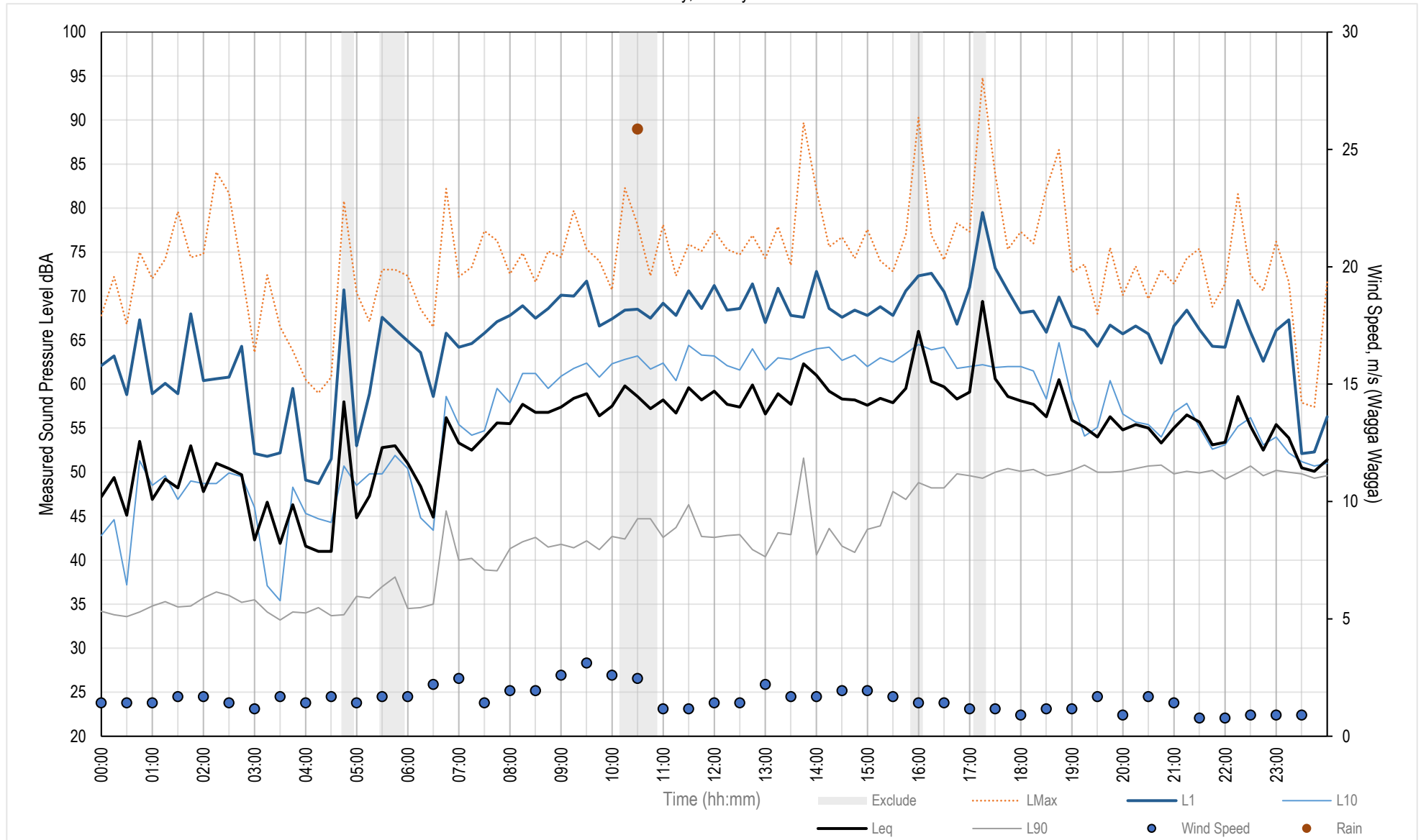
Measured Noise Levels - 1296 Byrne Rd, Harefield

Saturday, 01 May 2021



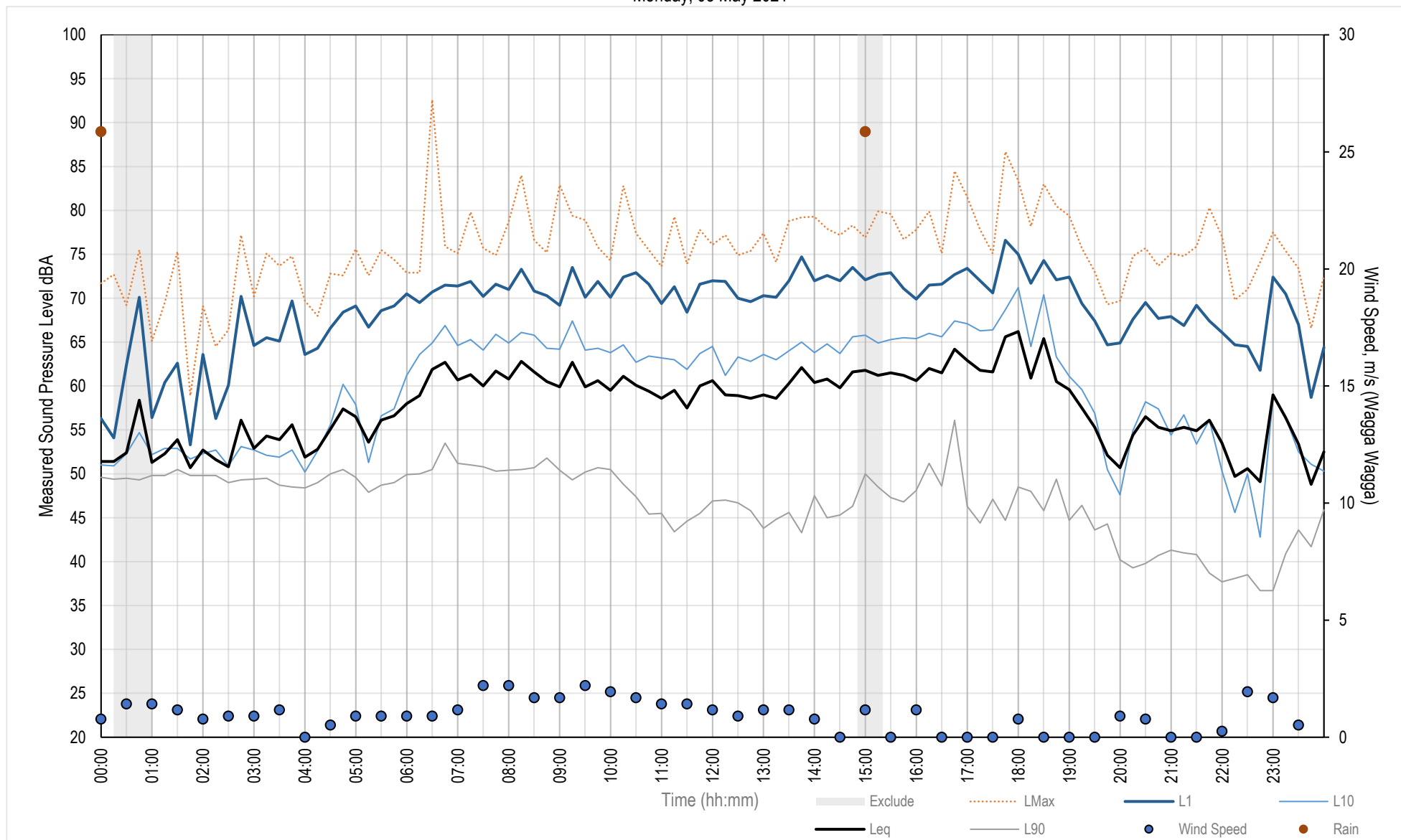
Measured Noise Levels - 1296 Byrne Rd, Harefield

Sunday, 02 May 2021



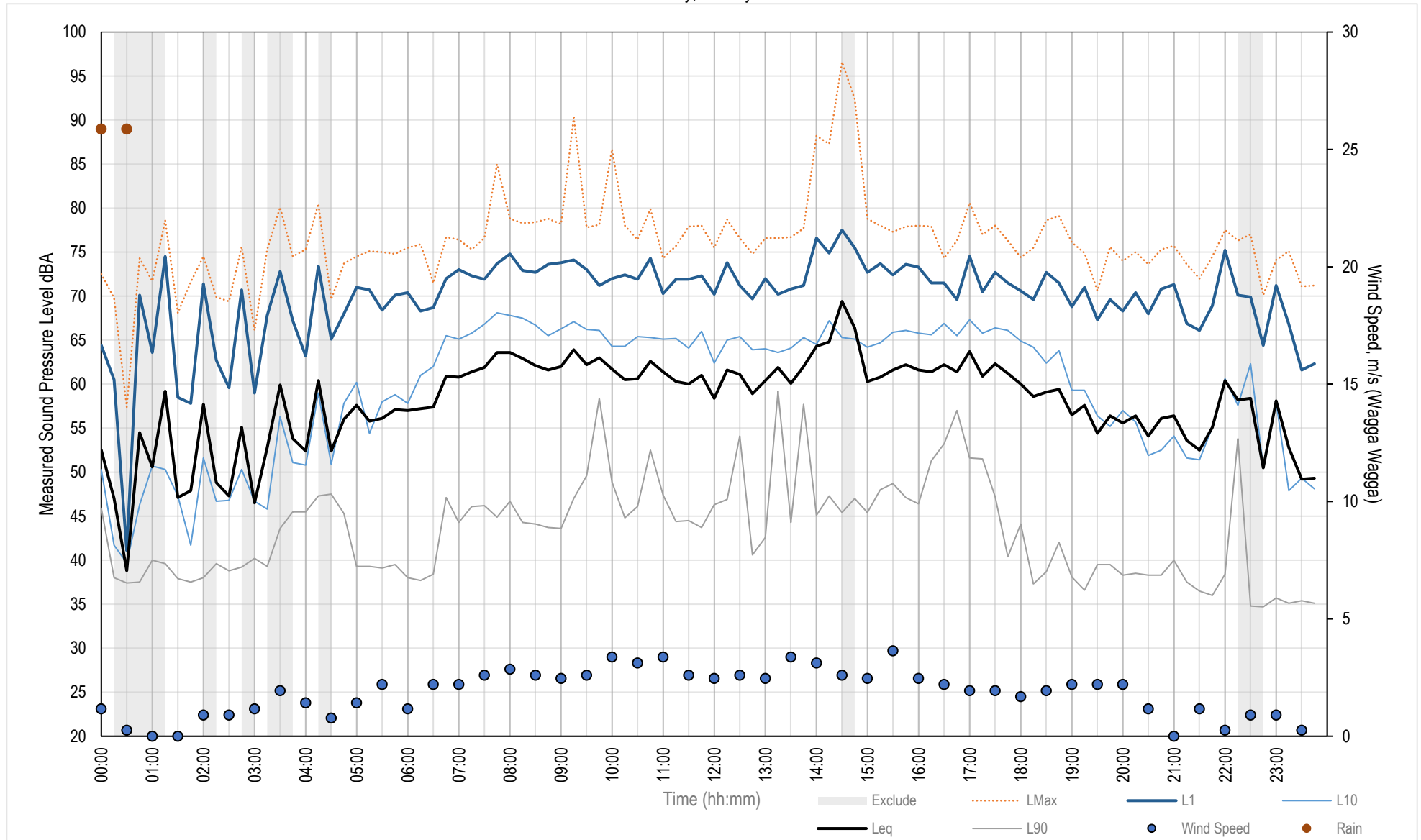
Measured Noise Levels - 1296 Byrne Rd, Harefield

Monday, 03 May 2021



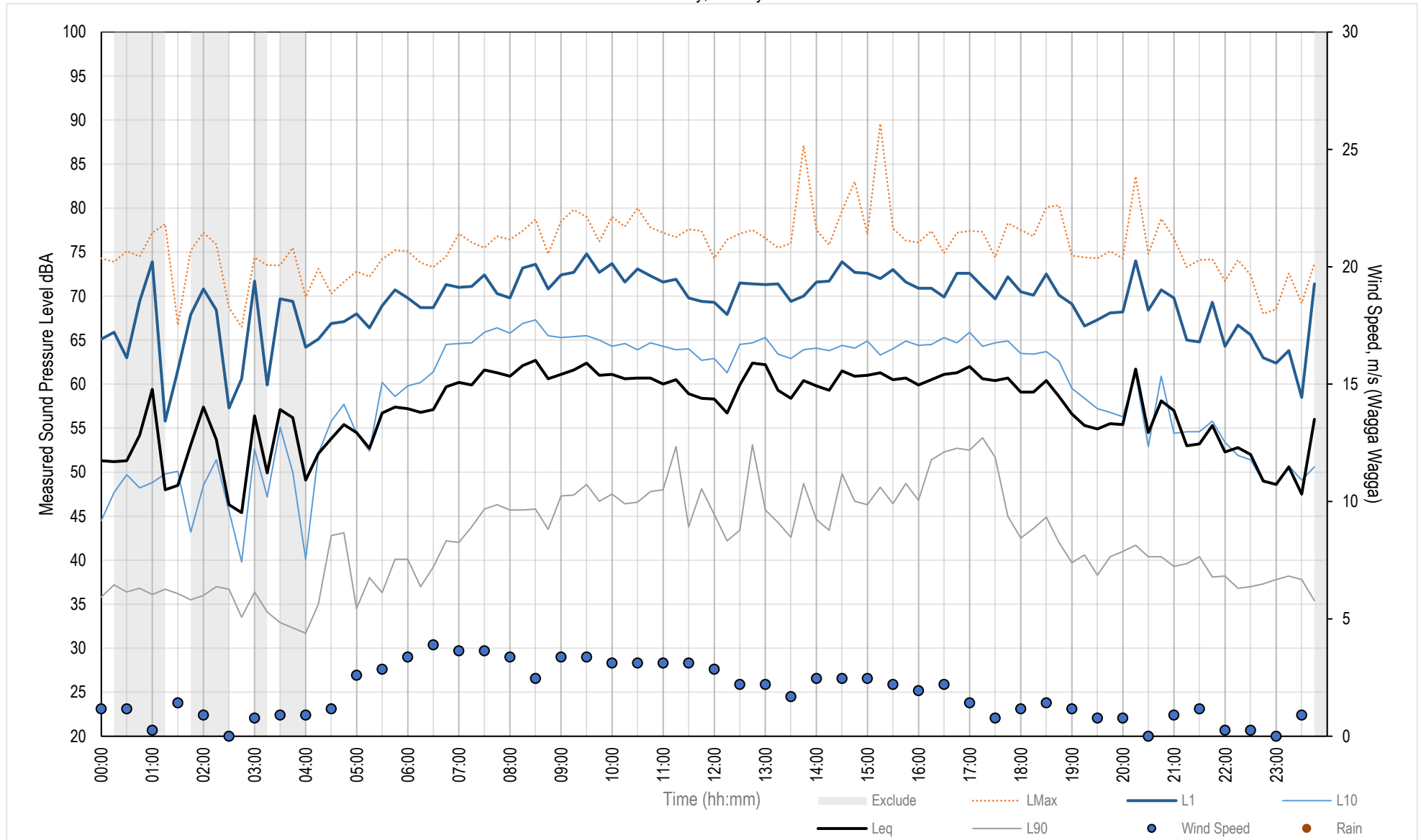
Measured Noise Levels - 1296 Byrne Rd, Harefield

Tuesday, 04 May 2021



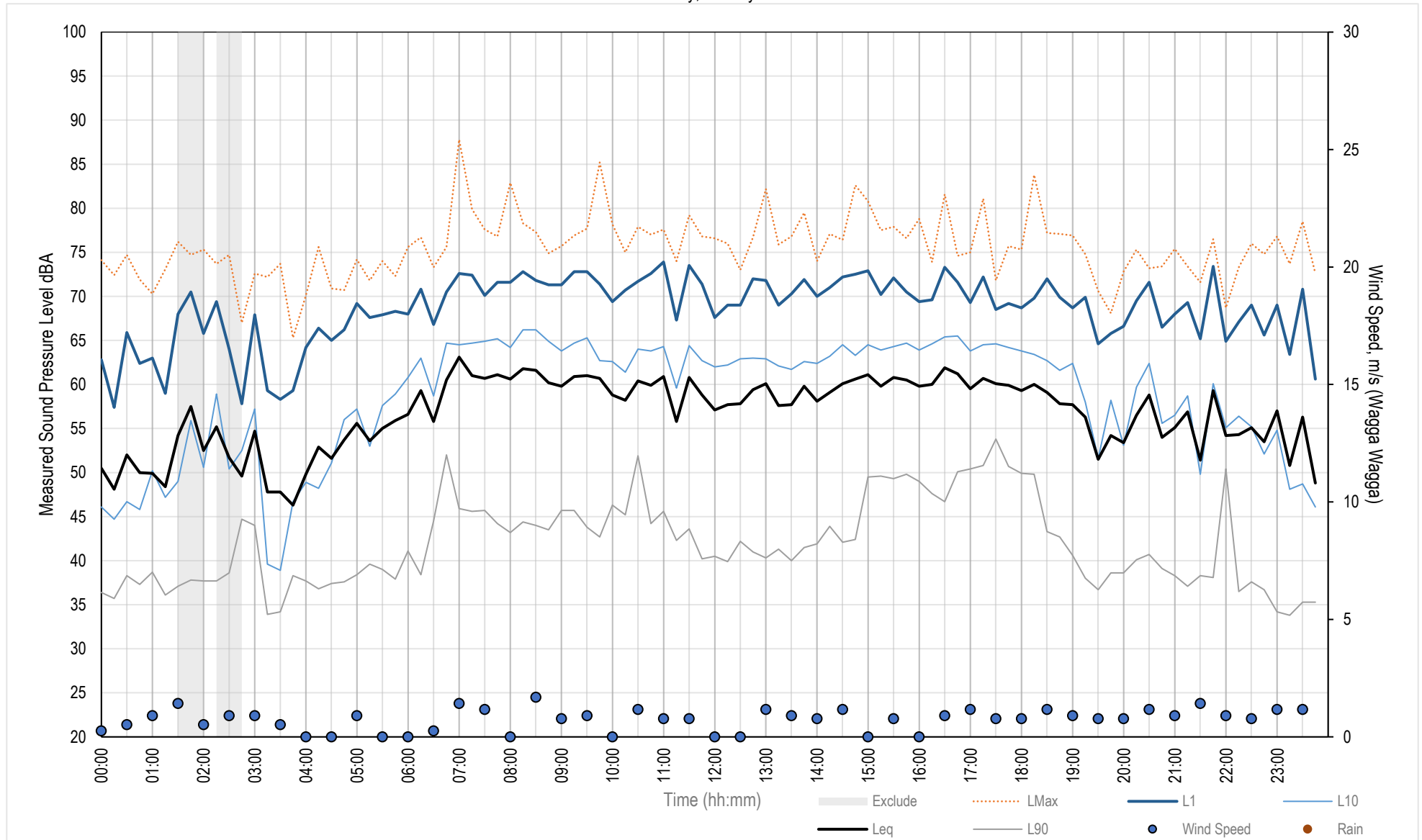
Measured Noise Levels - 1296 Byrne Rd, Harefield

Wednesday, 05 May 2021



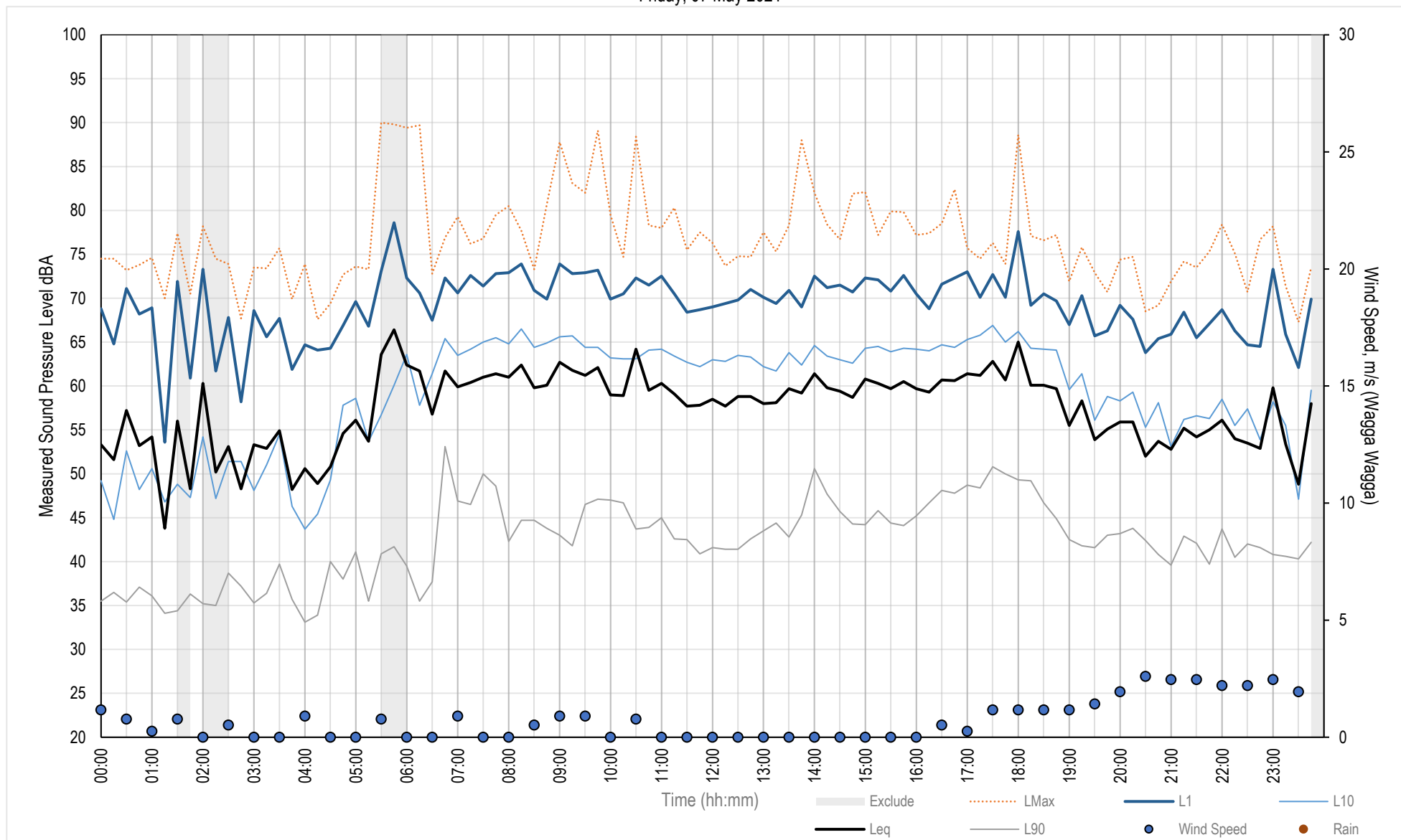
Measured Noise Levels - 1296 Byrne Rd, Harefield

Thursday, 06 May 2021



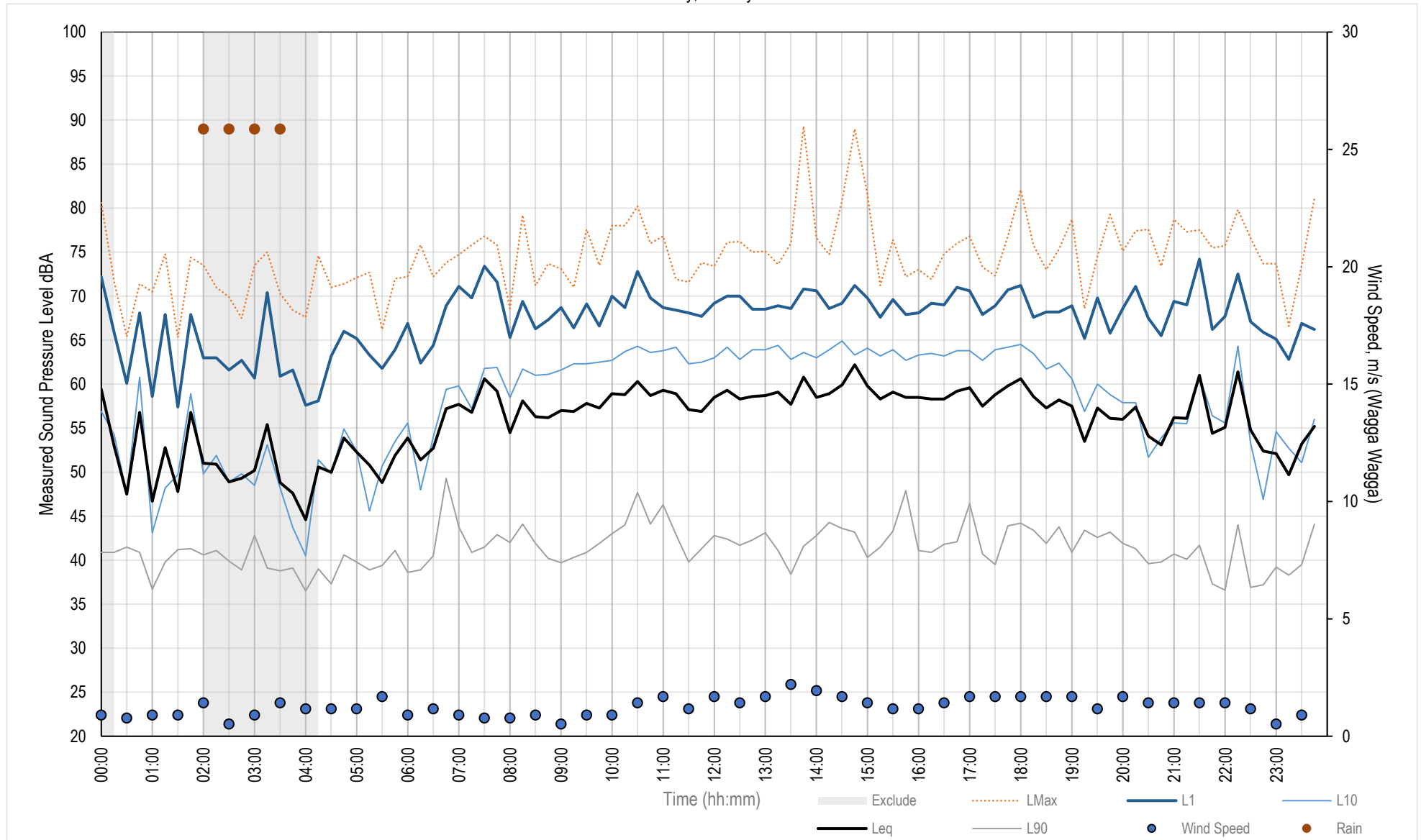
Measured Noise Levels - 1296 Byrne Rd, Harefield

Friday, 07 May 2021



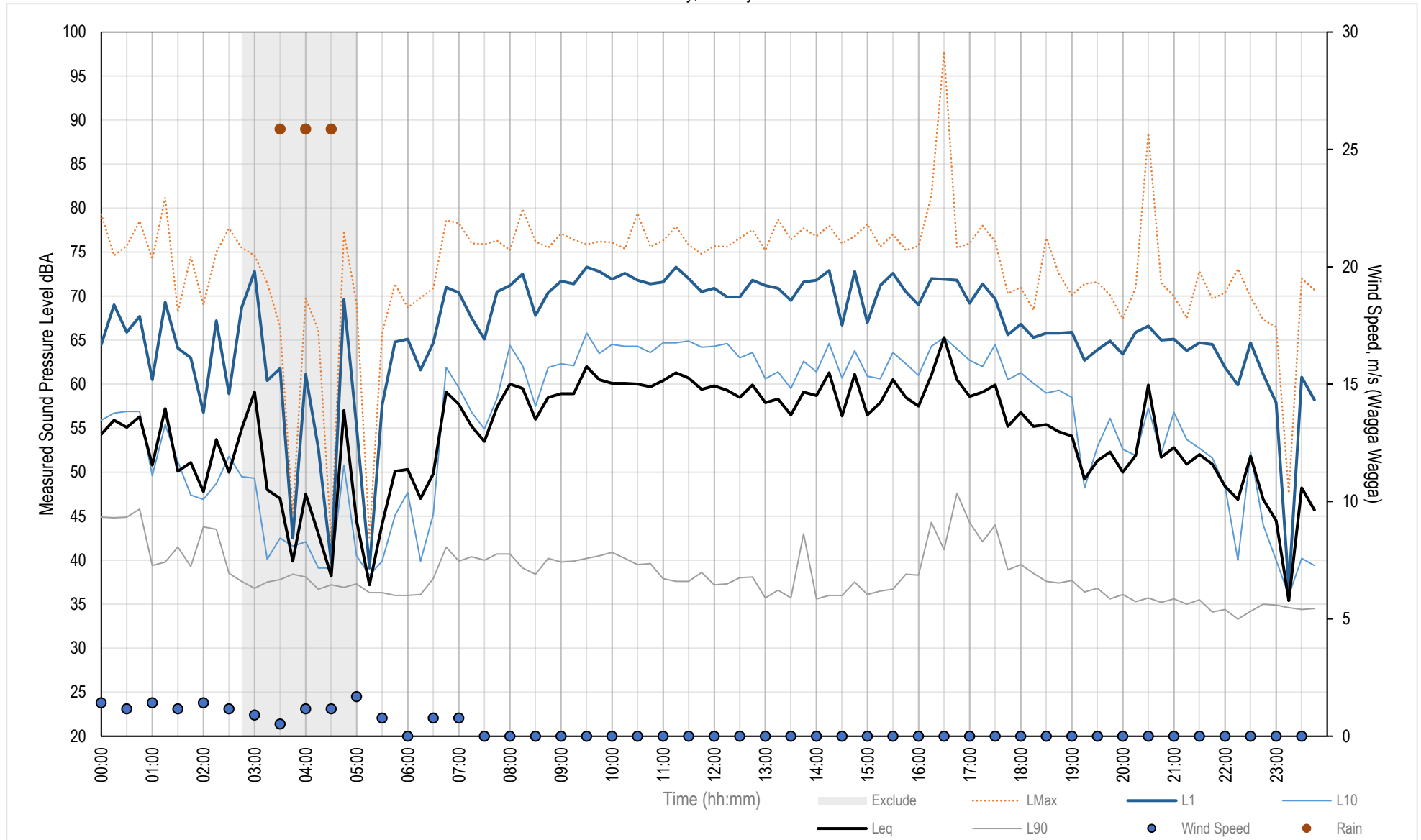
Measured Noise Levels - 1296 Byrne Rd, Harefield

Saturday, 08 May 2021



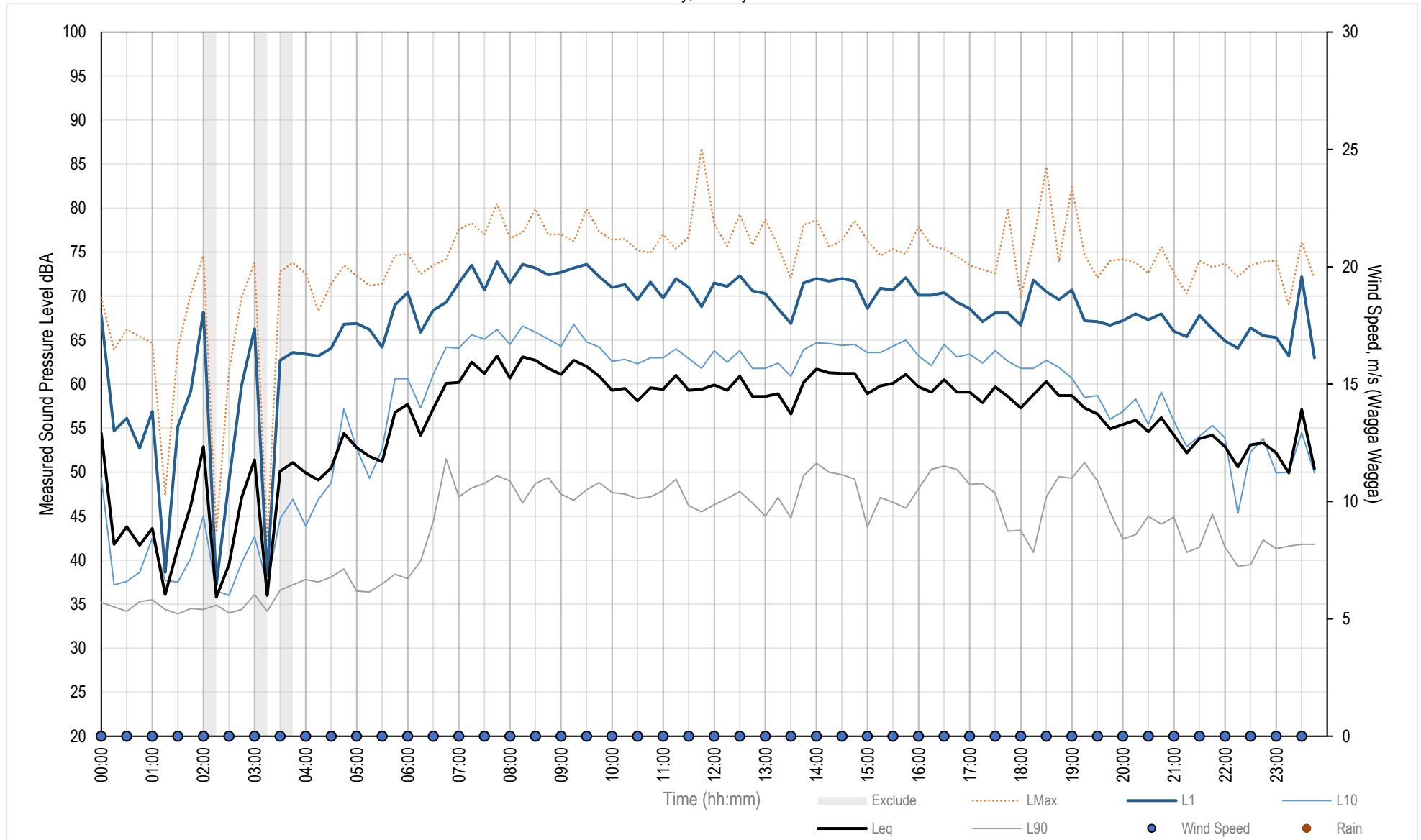
Measured Noise Levels - 1296 Byrne Rd, Harefield

Saturday, 08 May 2021



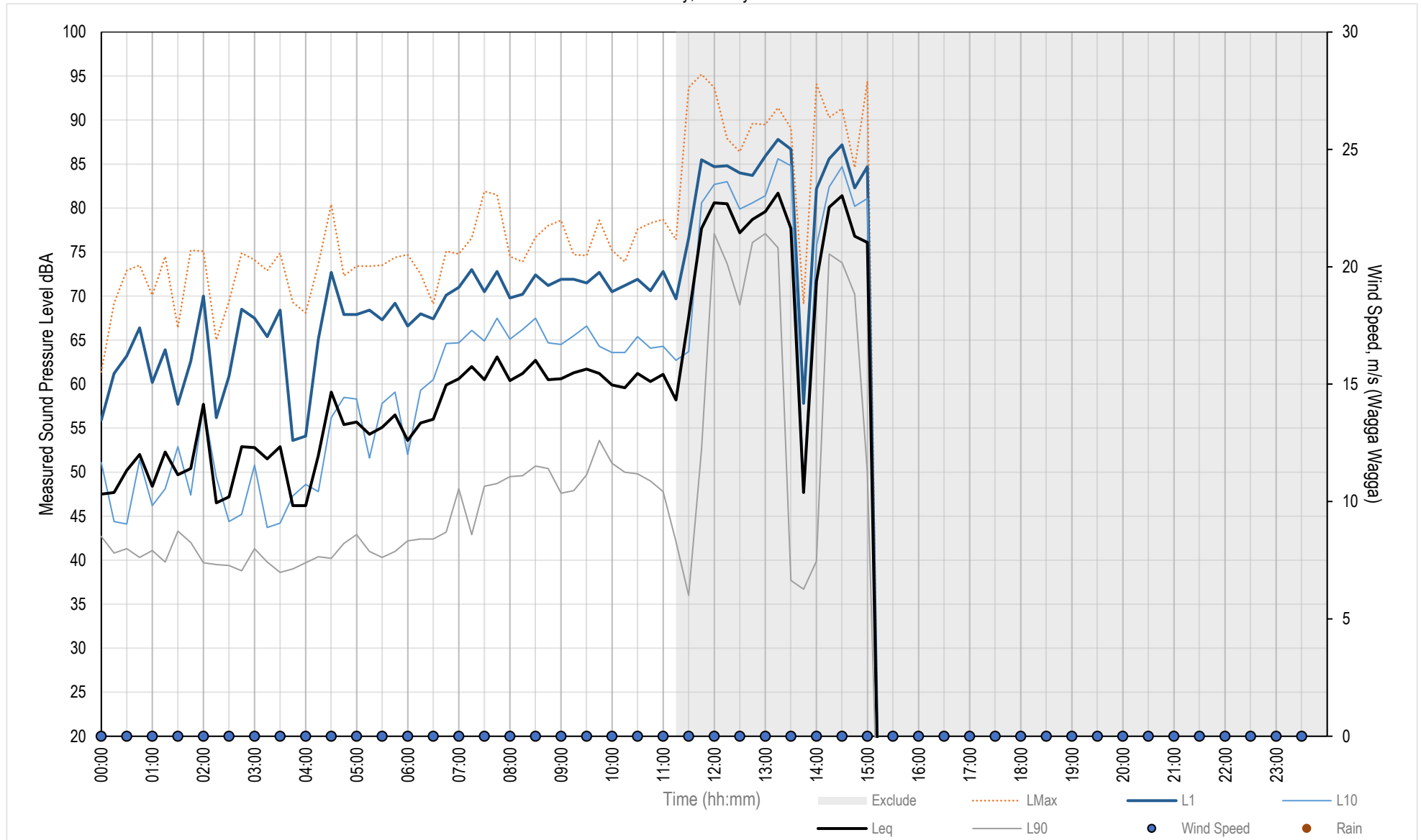
Measured Noise Levels - 1296 Byrne Rd, Harefield

Sunday, 09 May 2021



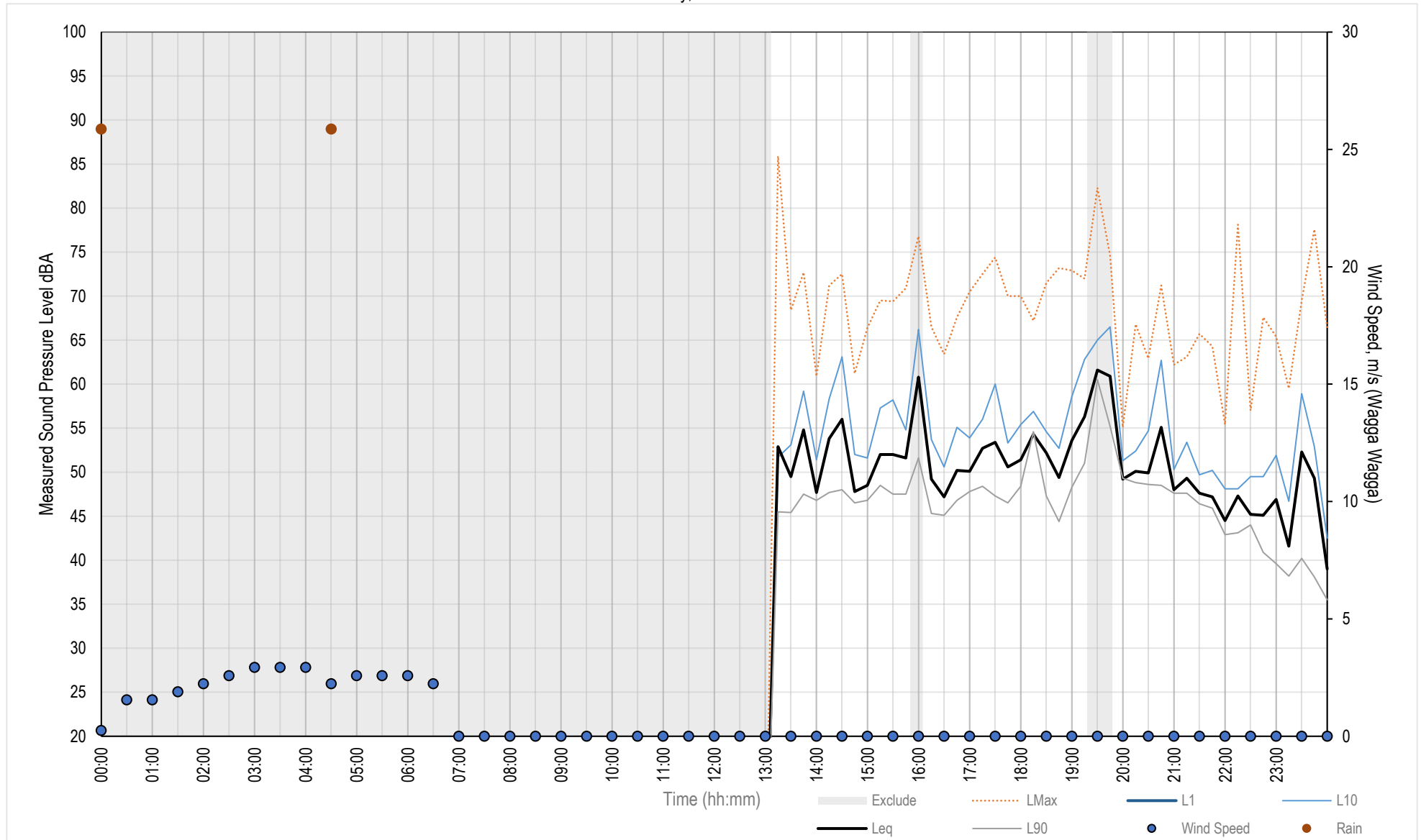
Measured Noise Levels - 1296 Byrne Rd, Harefield

Monday, 10 May 2021



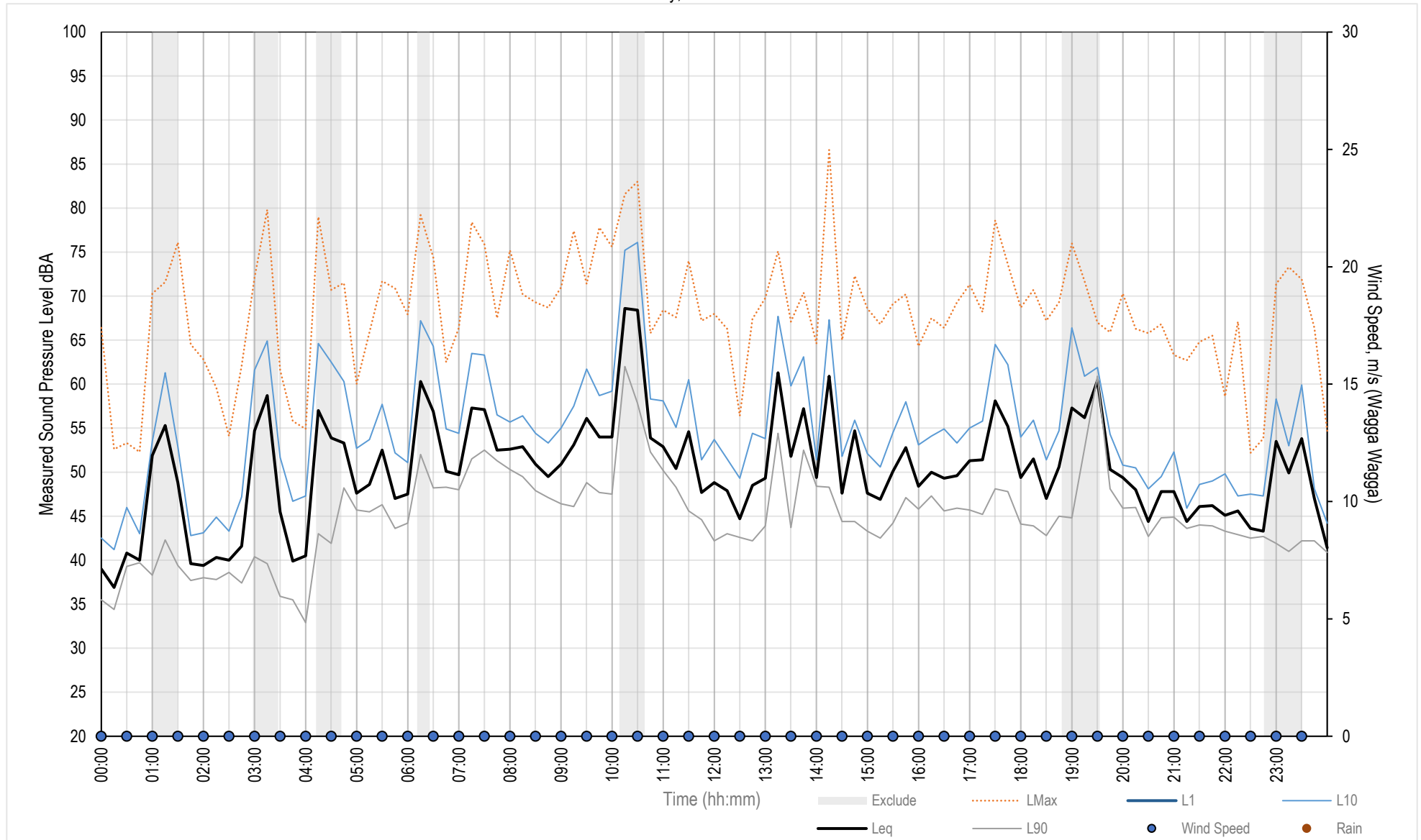
Measured Noise Levels - 19 Railway Parade, Junee

Thursday, 25 March 2021



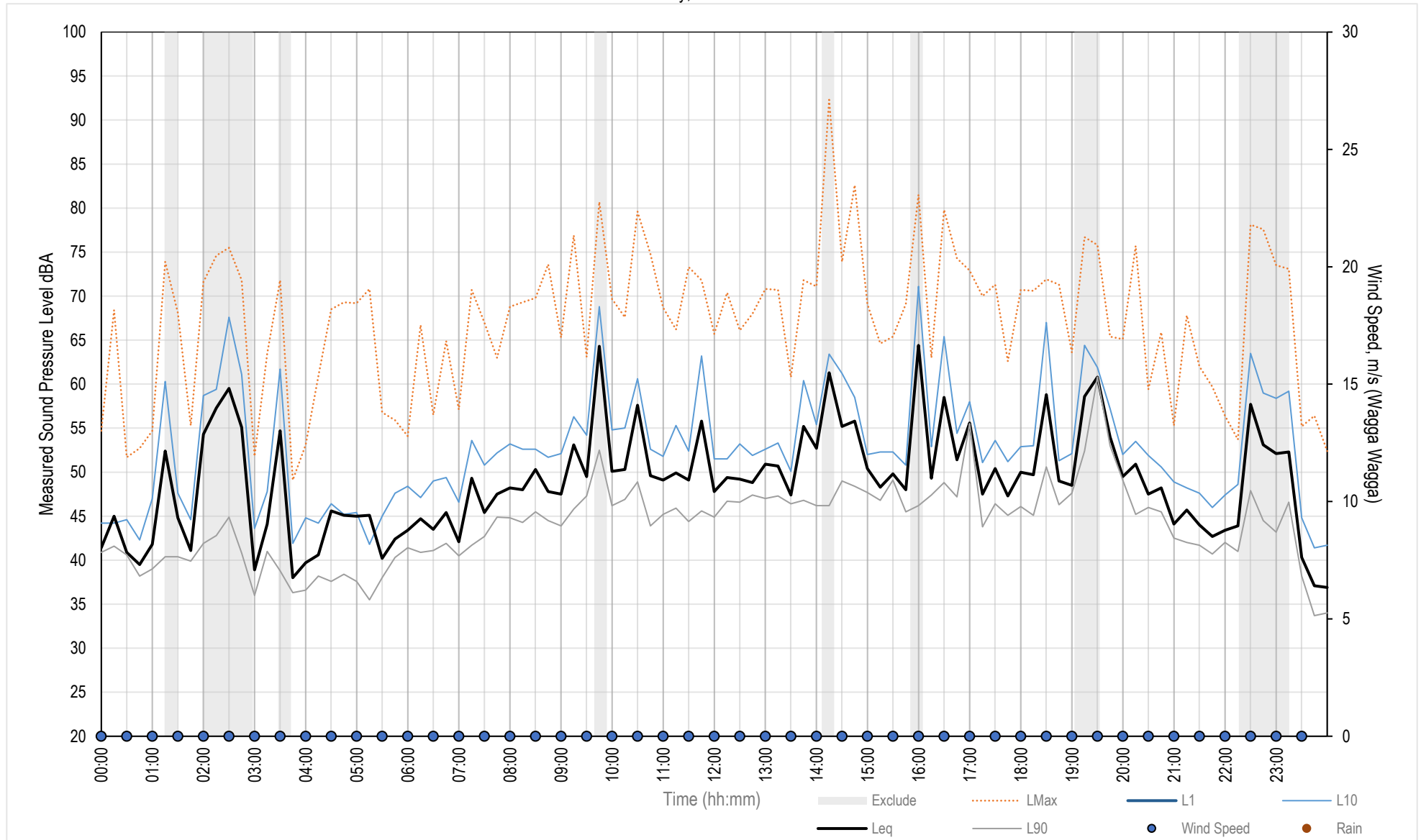
Measured Noise Levels - 19 Railway Parade, Junee

Friday, 26 March 2021



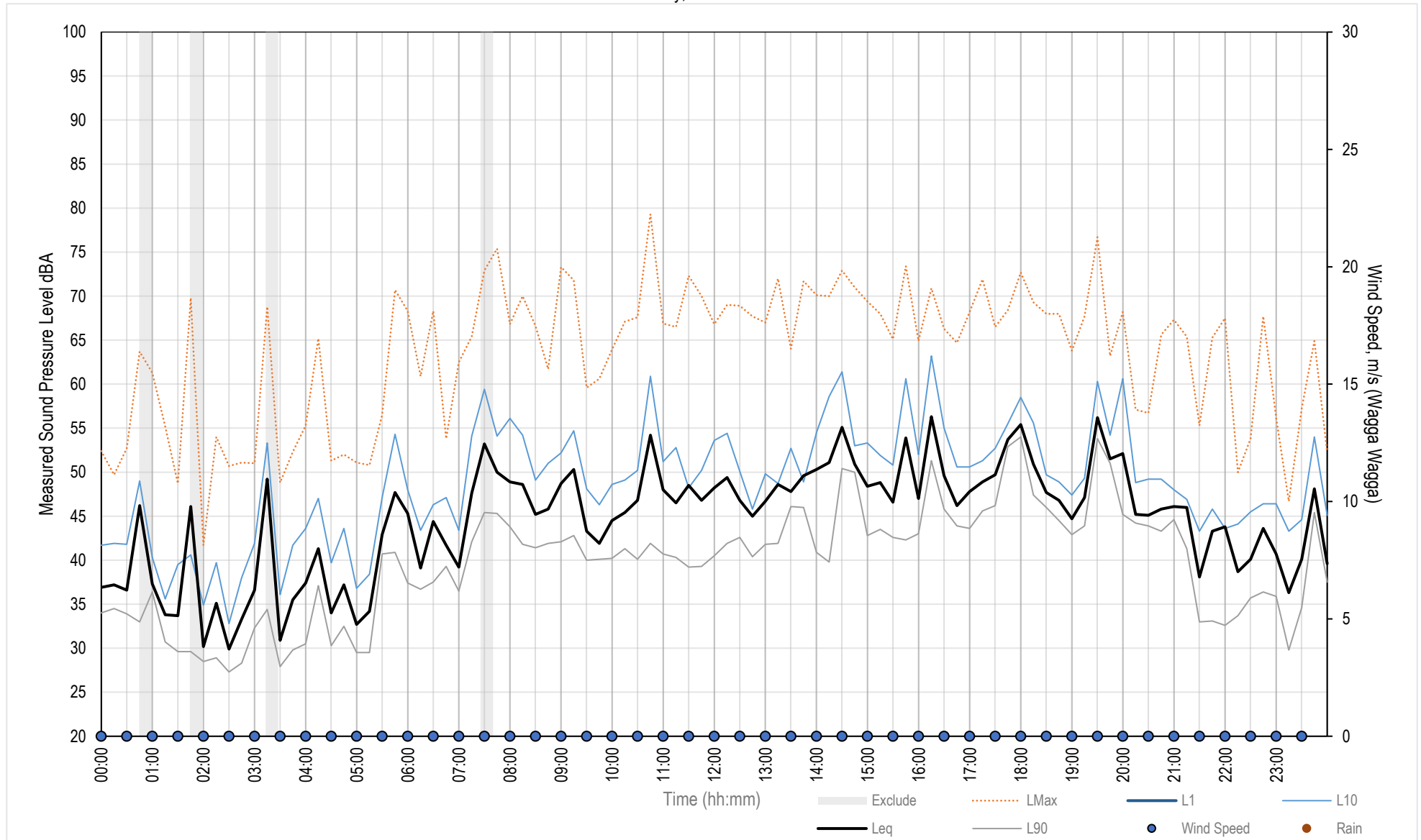
Measured Noise Levels - 19 Railway Parade, Junee

Saturday, 27 March 2021



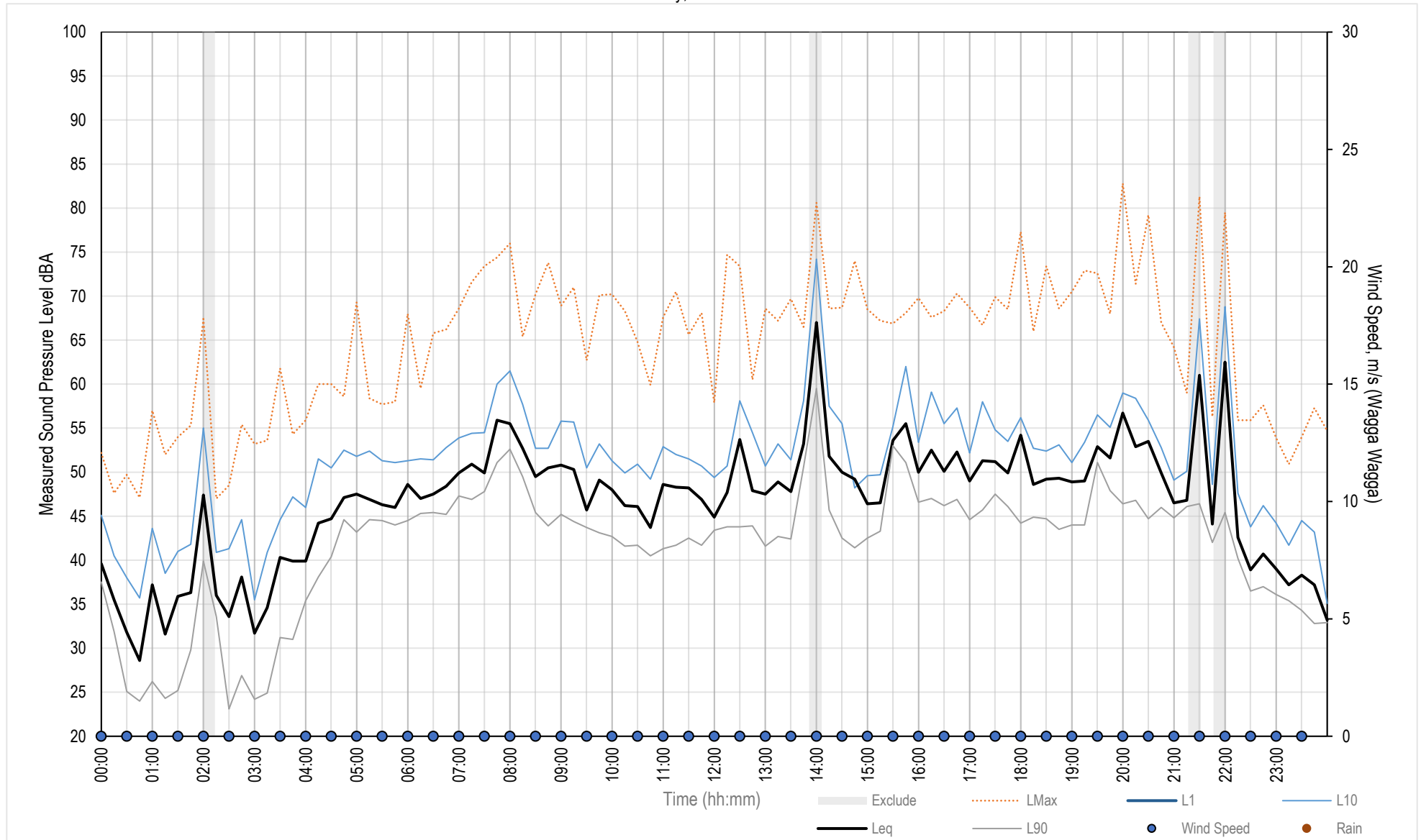
Measured Noise Levels - 19 Railway Parade, Junee

Sunday, 28 March 2021



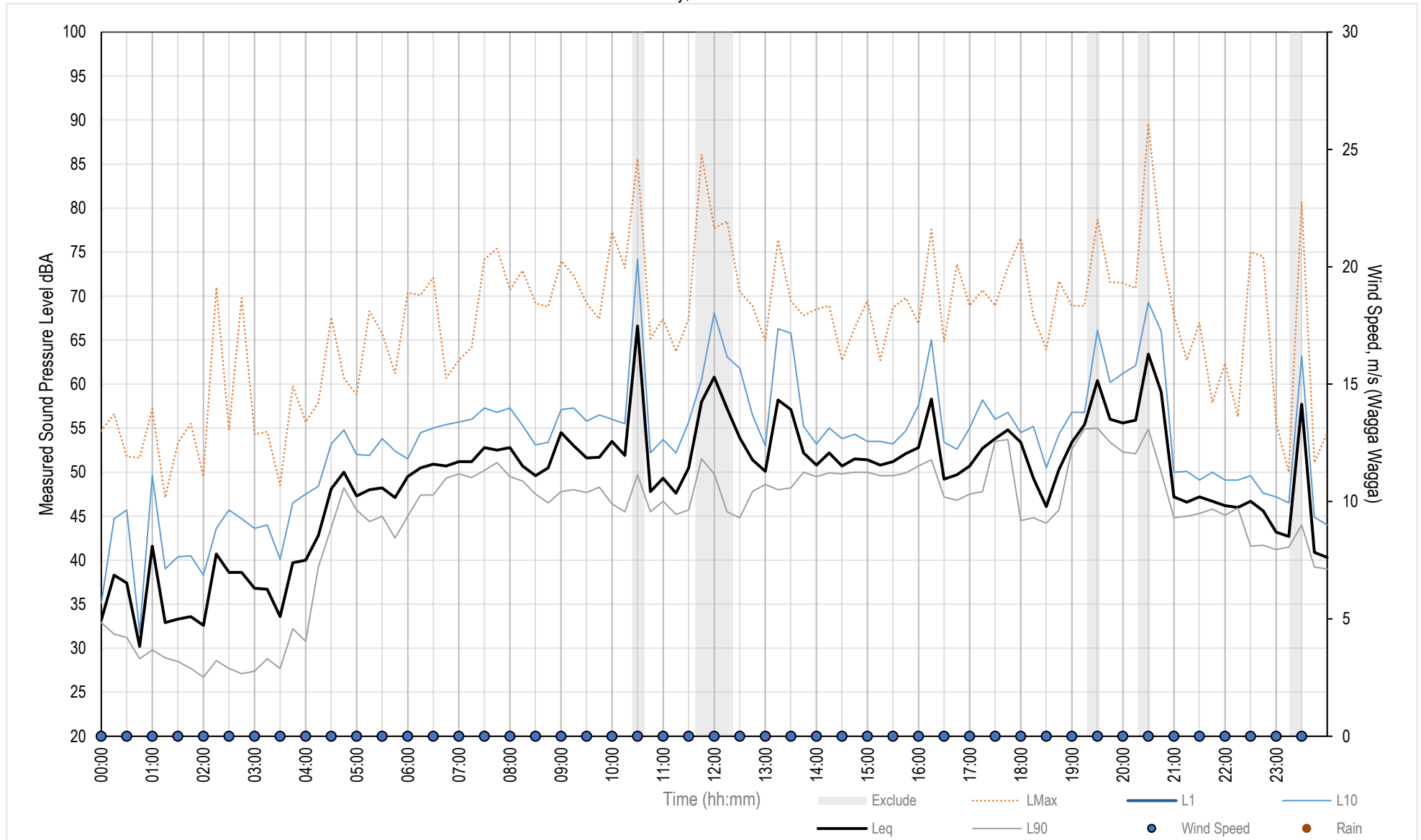
Measured Noise Levels - 19 Railway Parade, Junee

Monday, 29 March 2021



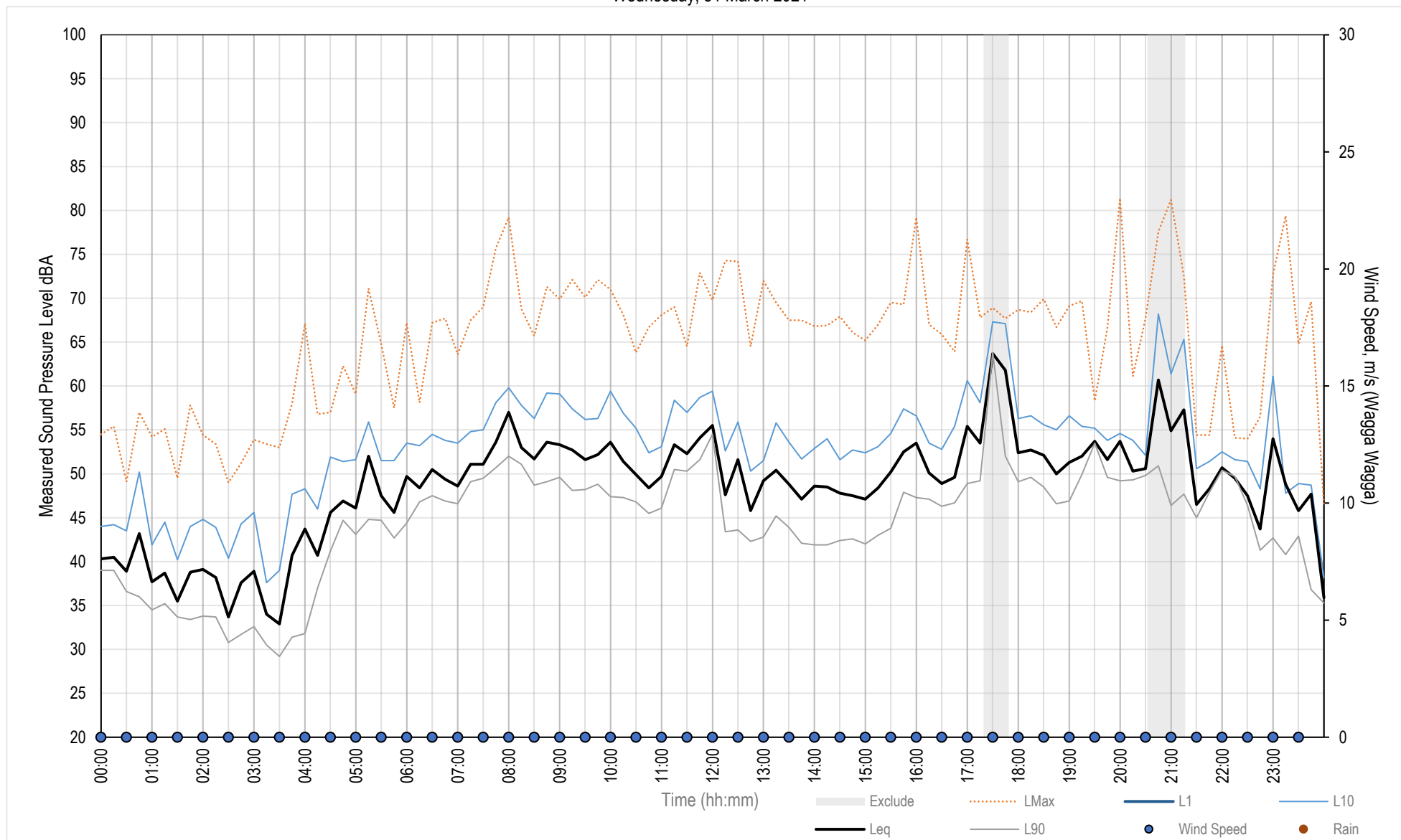
Measured Noise Levels - 19 Railway Parade, Junee

Tuesday, 30 March 2021



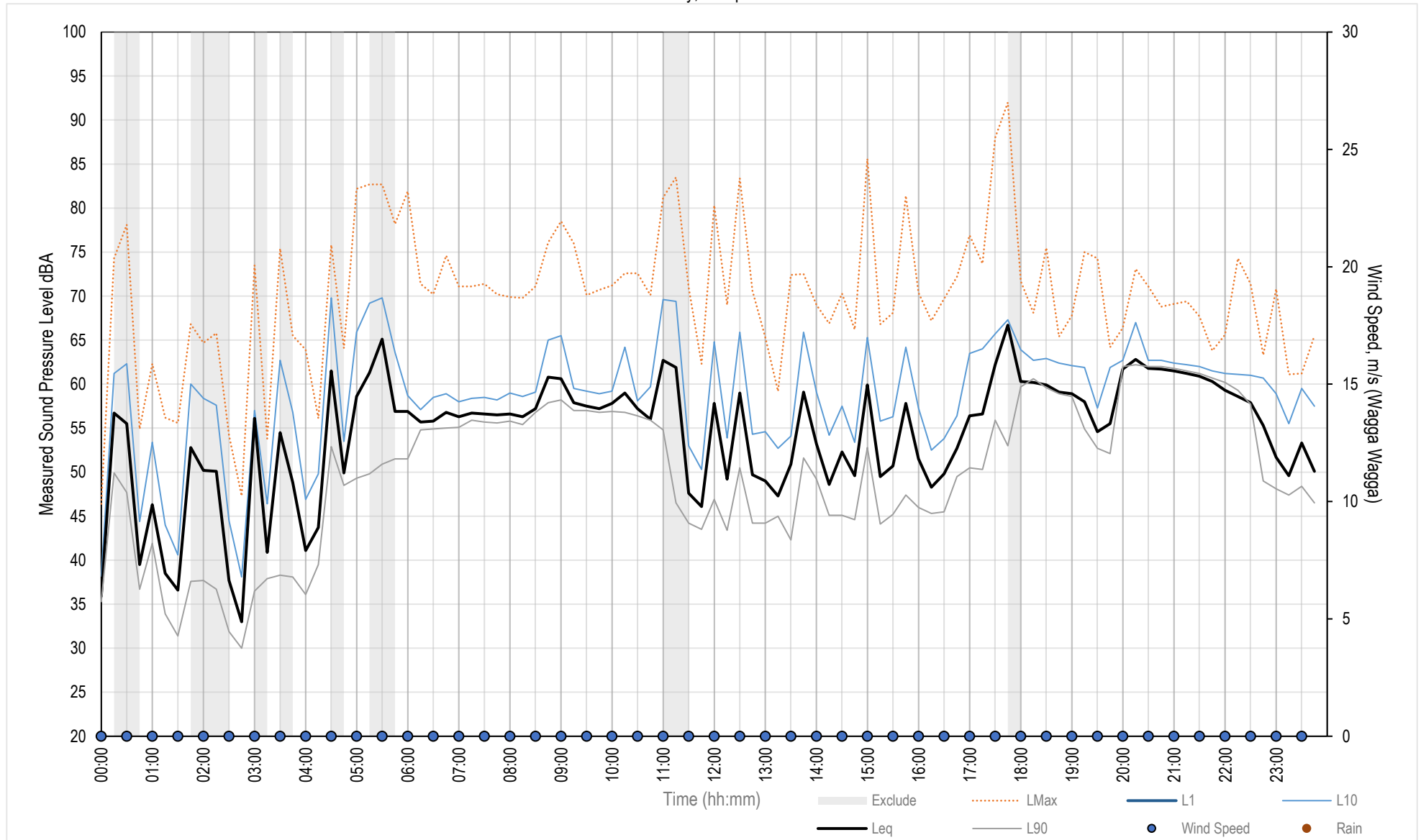
Measured Noise Levels - 19 Railway Parade, Junee

Wednesday, 31 March 2021



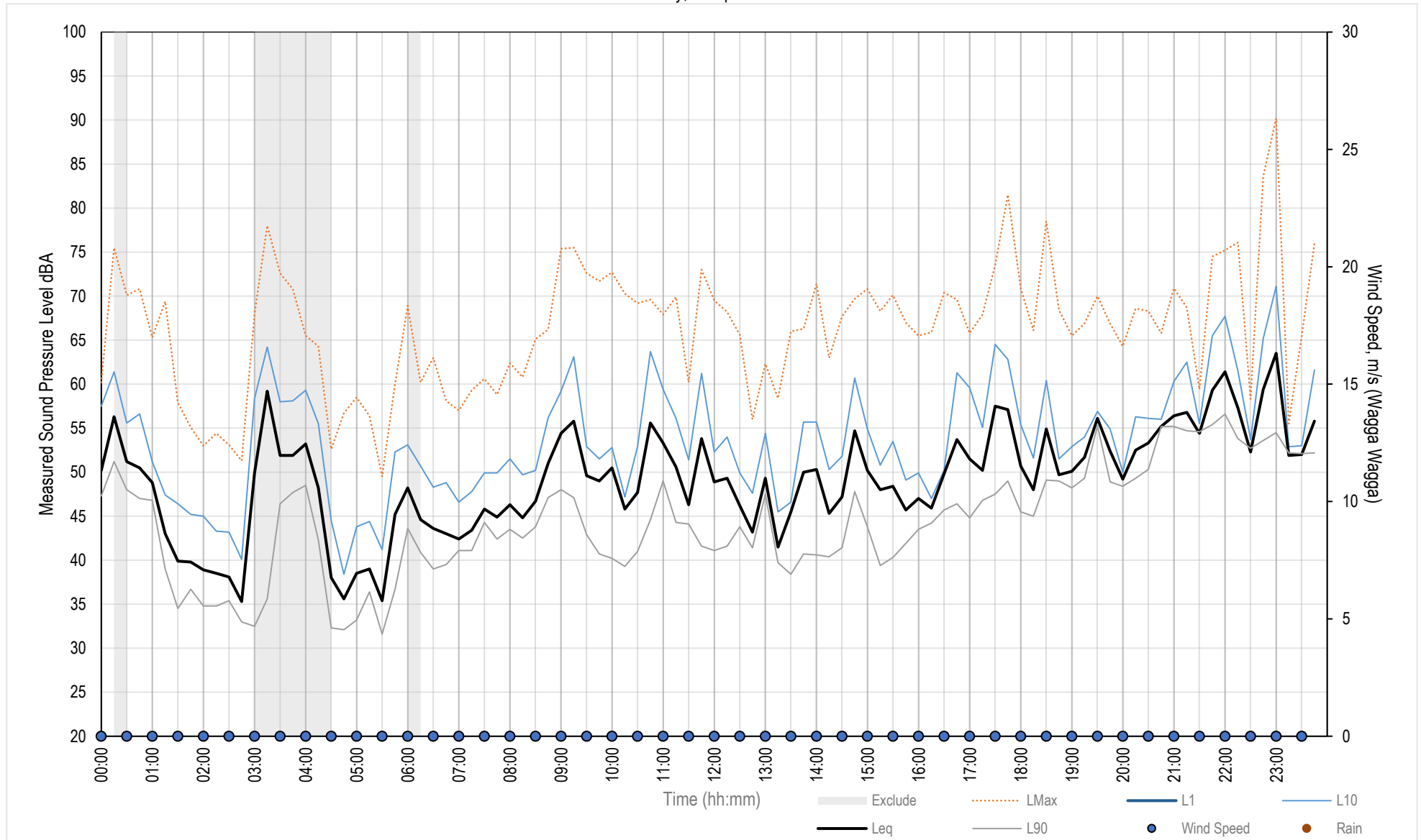
Measured Noise Levels - 19 Railway Parade, Junee

Thursday, 01 April 2021



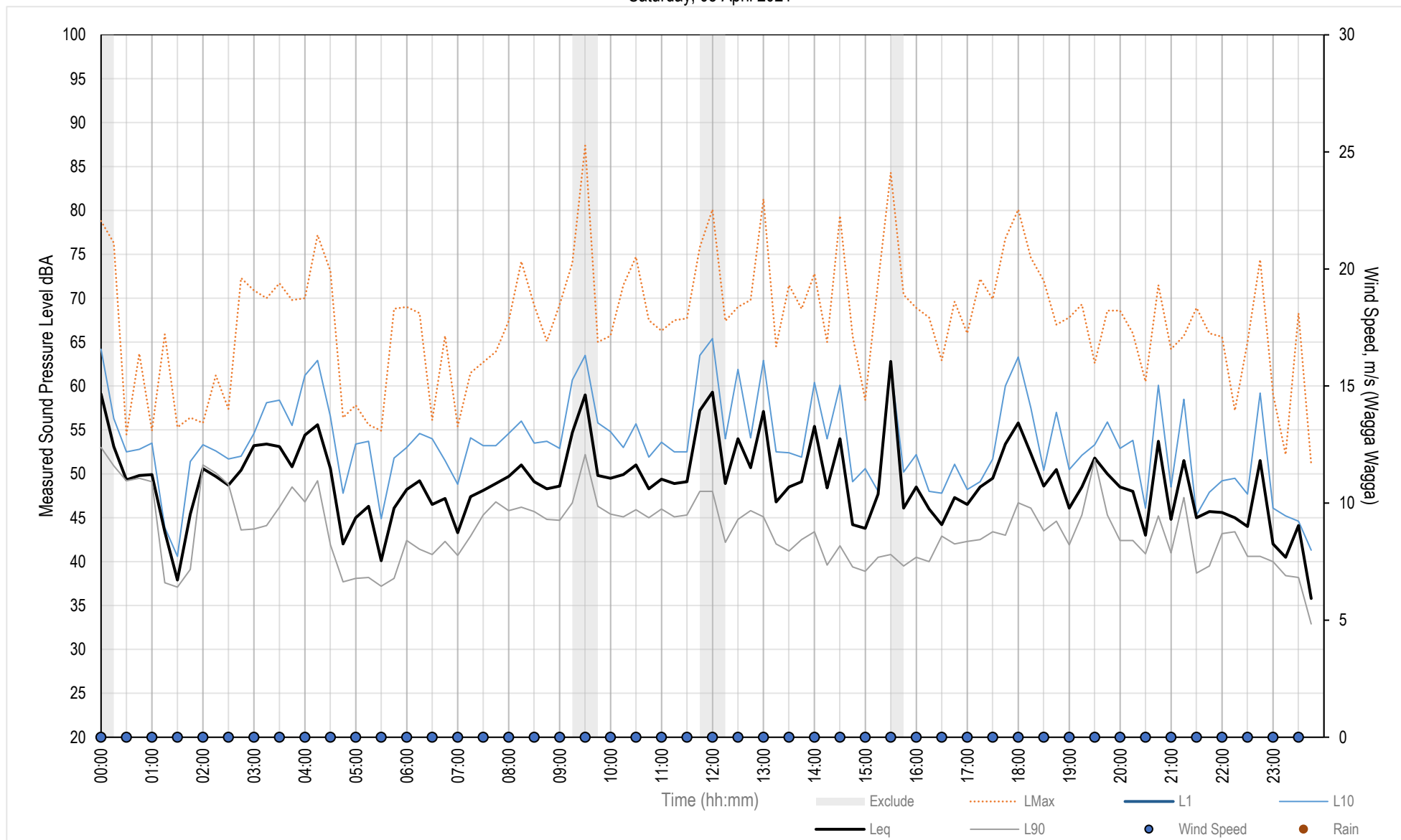
Measured Noise Levels - 19 Railway Parade, Junee

Friday, 02 April 2021



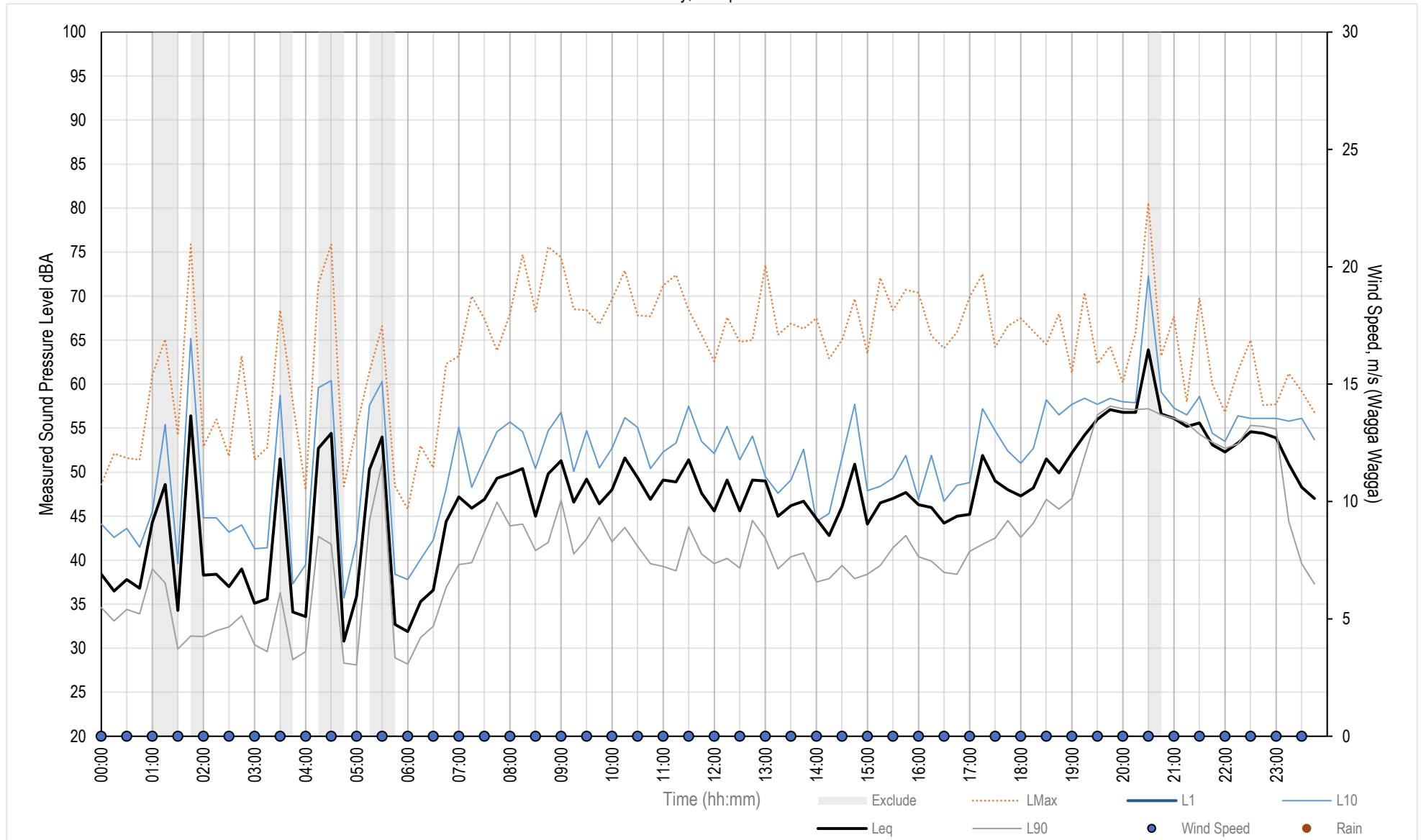
Measured Noise Levels - 19 Railway Parade, Junee

Saturday, 03 April 2021



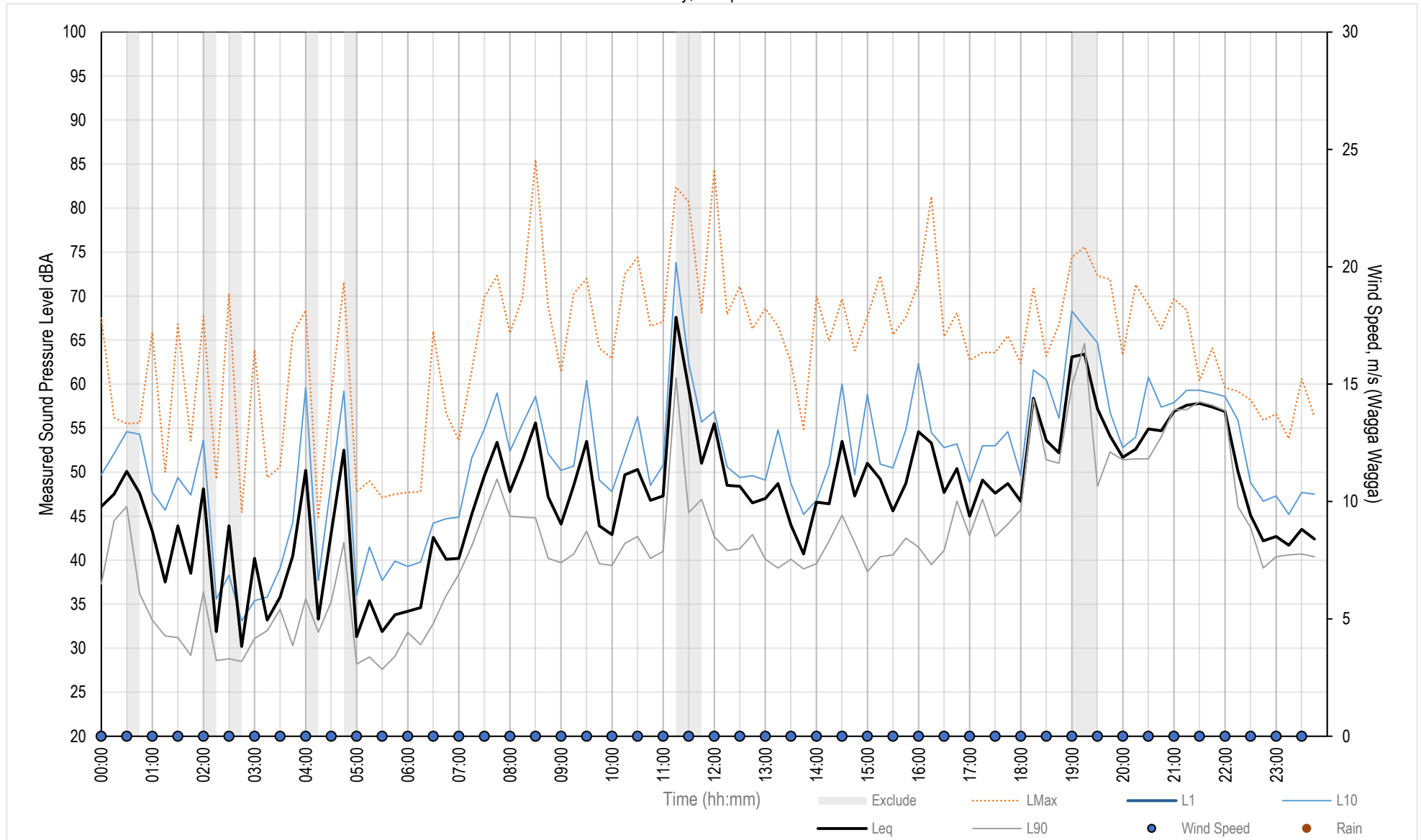
Measured Noise Levels - 19 Railway Parade, Junee

Sunday, 04 April 2021



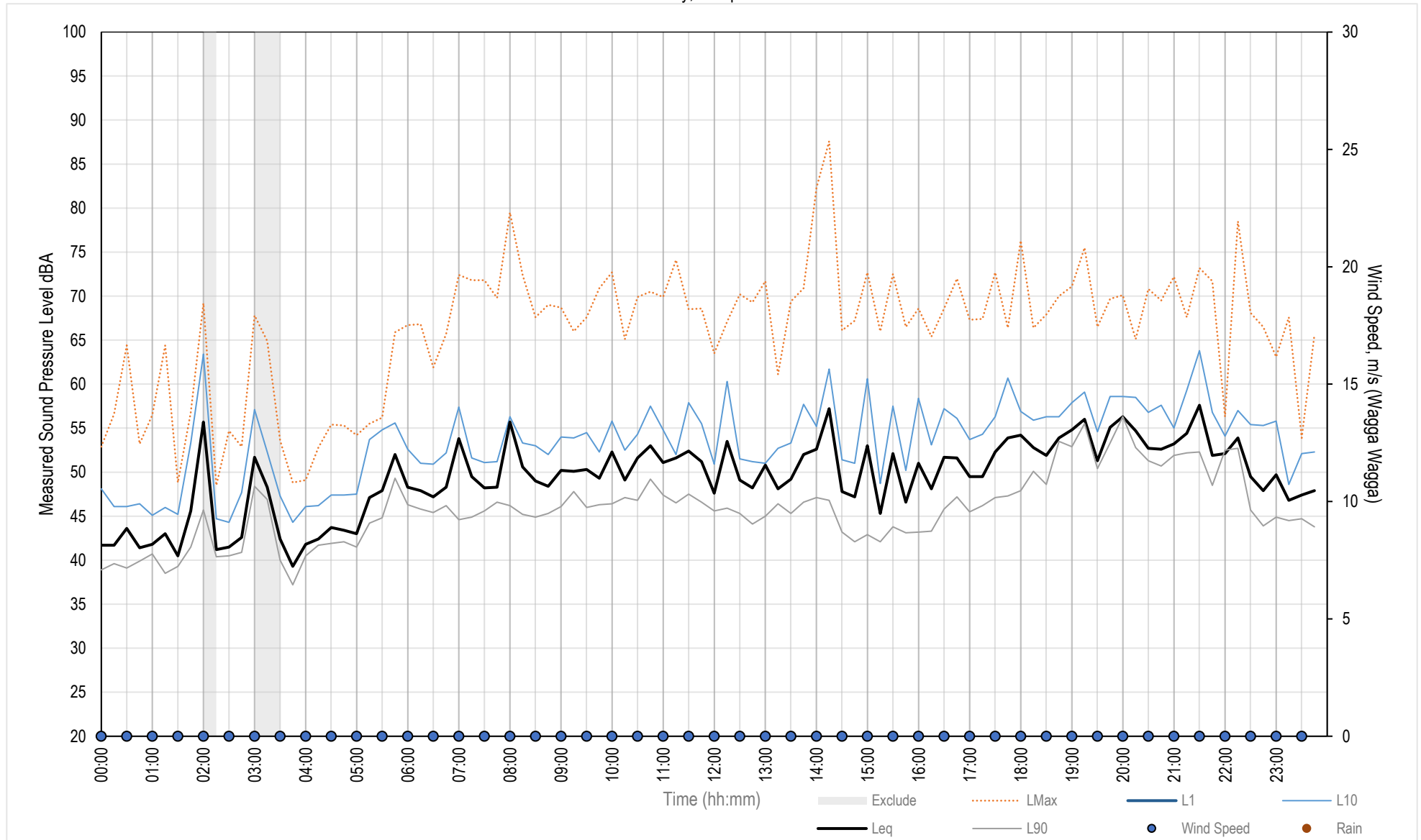
Measured Noise Levels - 19 Railway Parade, Junee

Monday, 05 April 2021



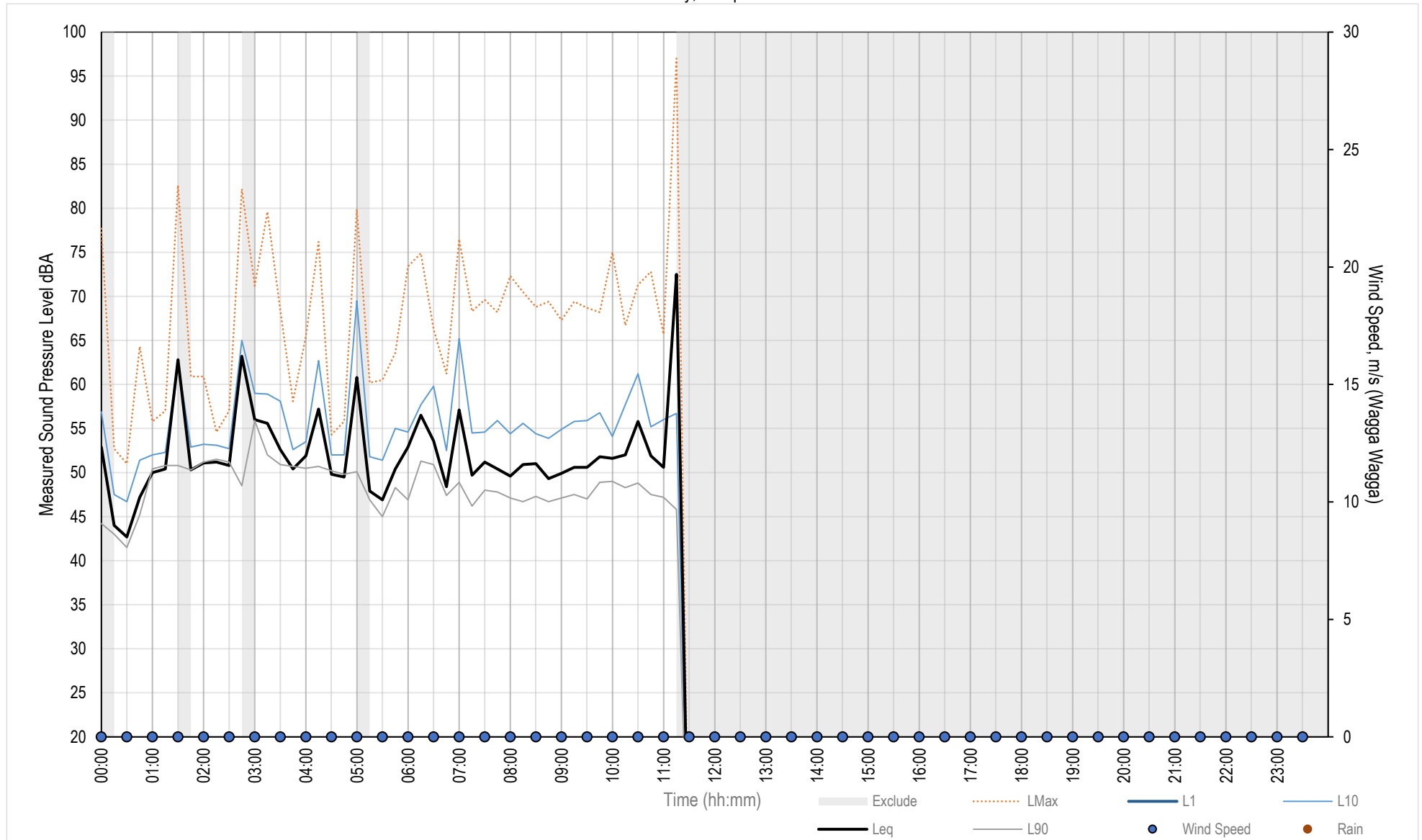
Measured Noise Levels - 19 Railway Parade, Junee

Monday, 05 April 2021



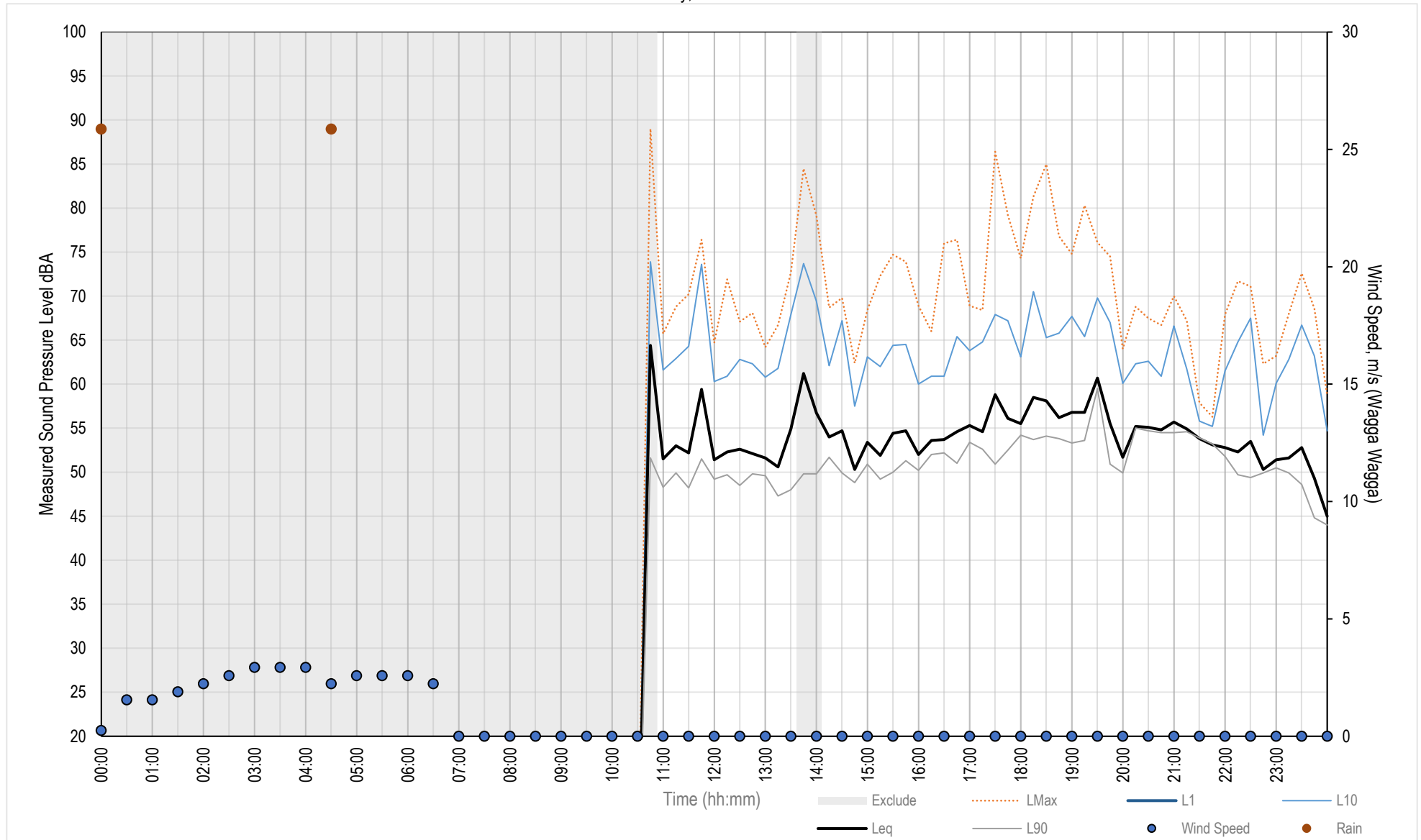
Measured Noise Levels - 19 Railway Parade, Junee

Tuesday, 06 April 2021



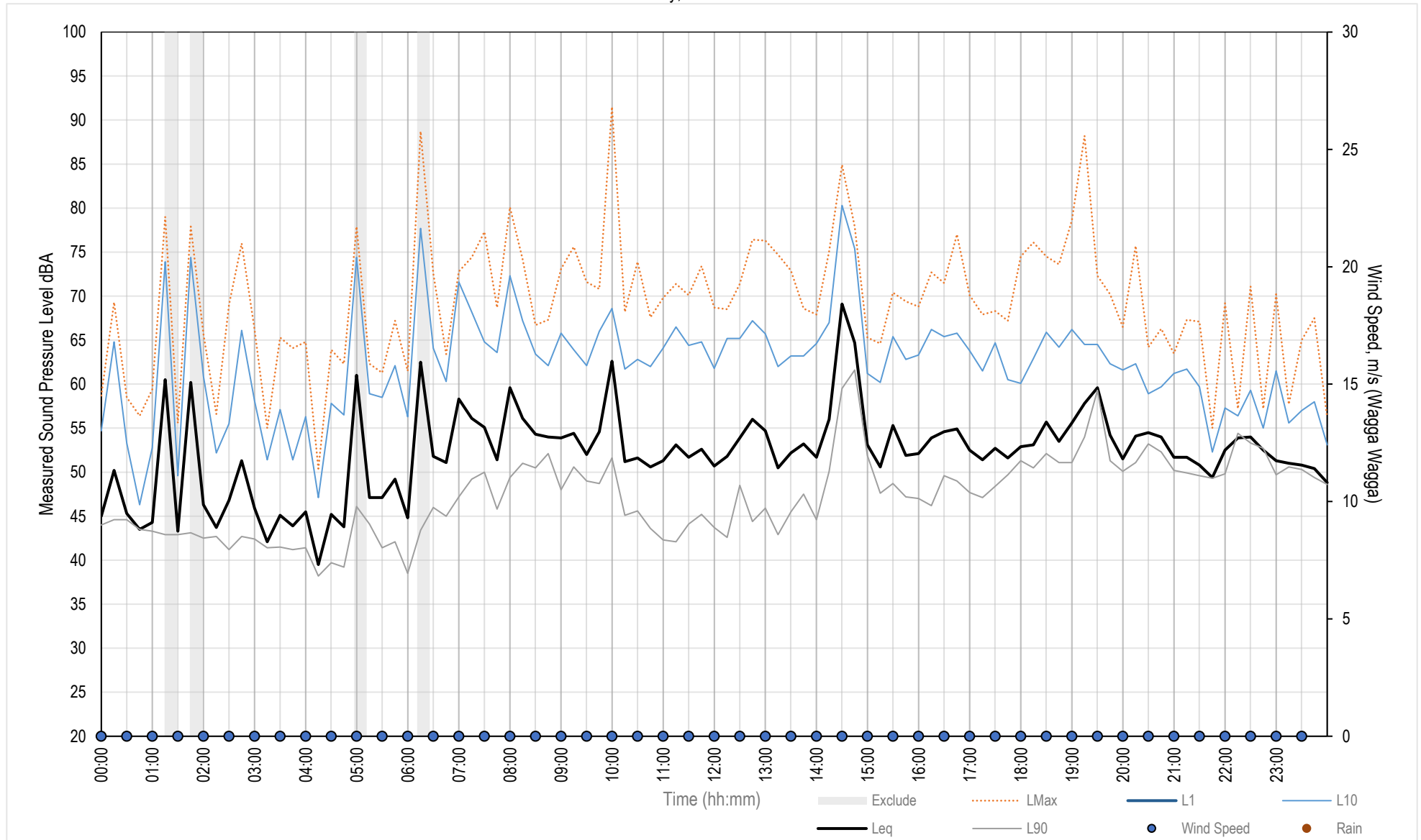
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Thursday, 25 March 2021



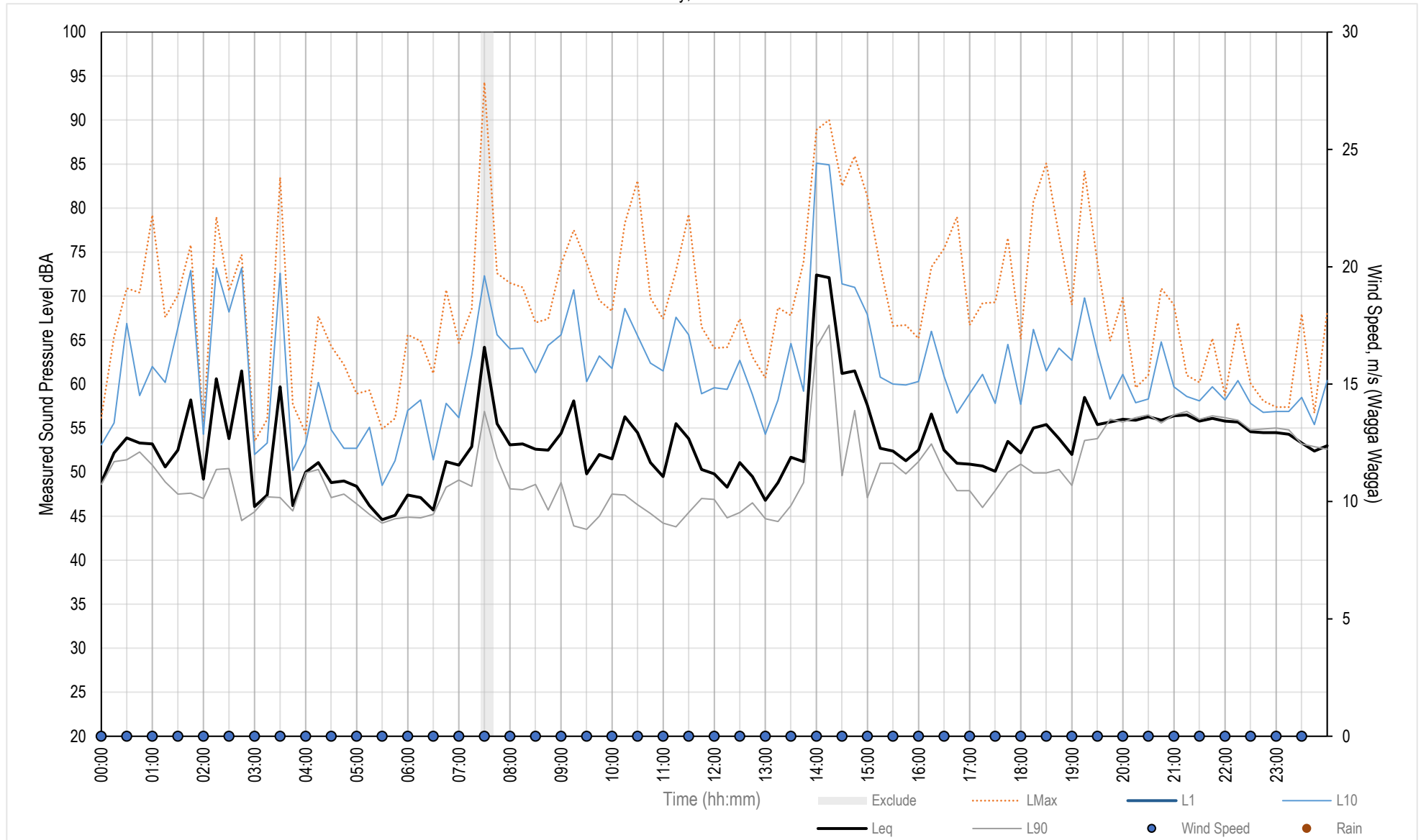
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Friday, 26 March 2021



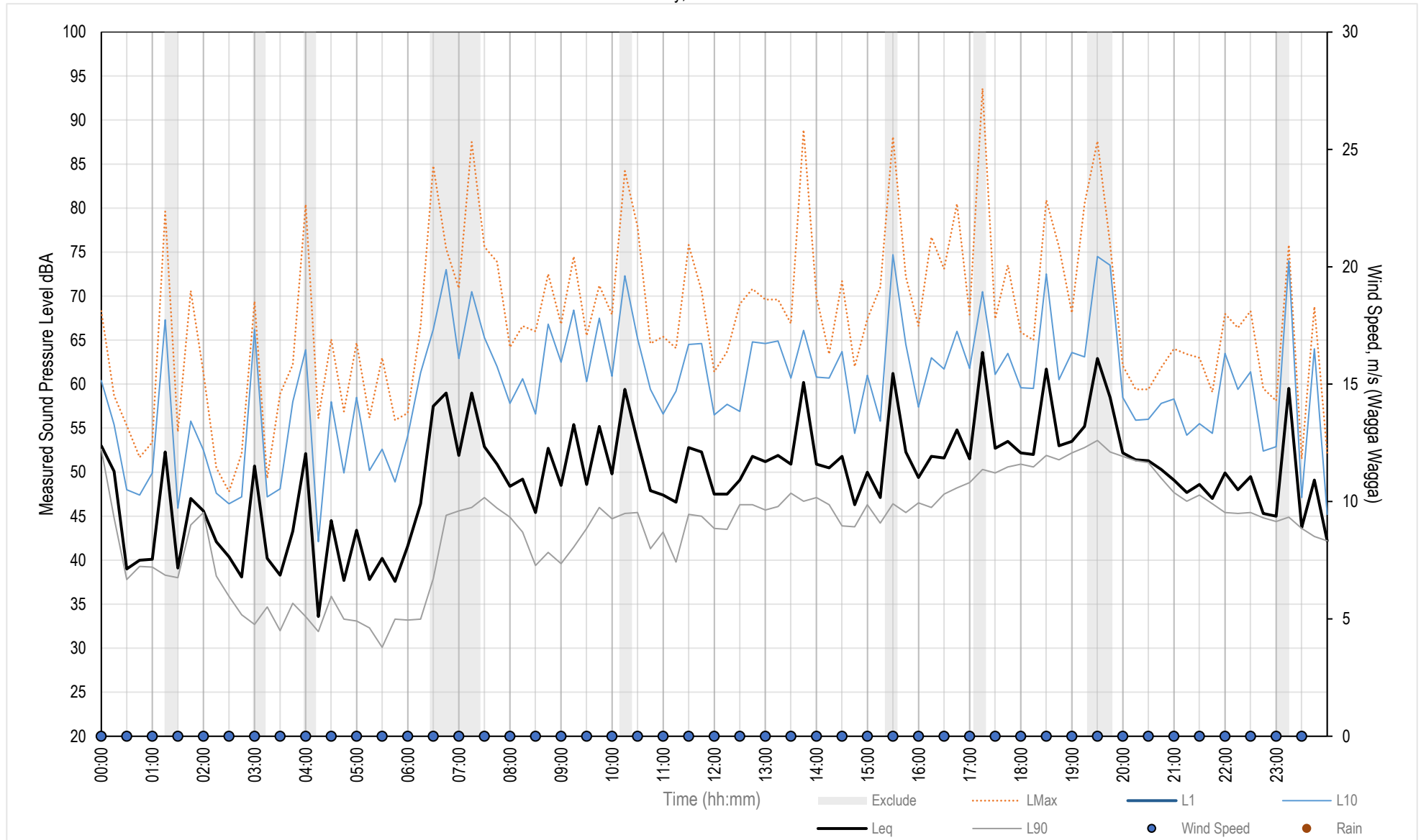
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Saturday, 27 March 2021



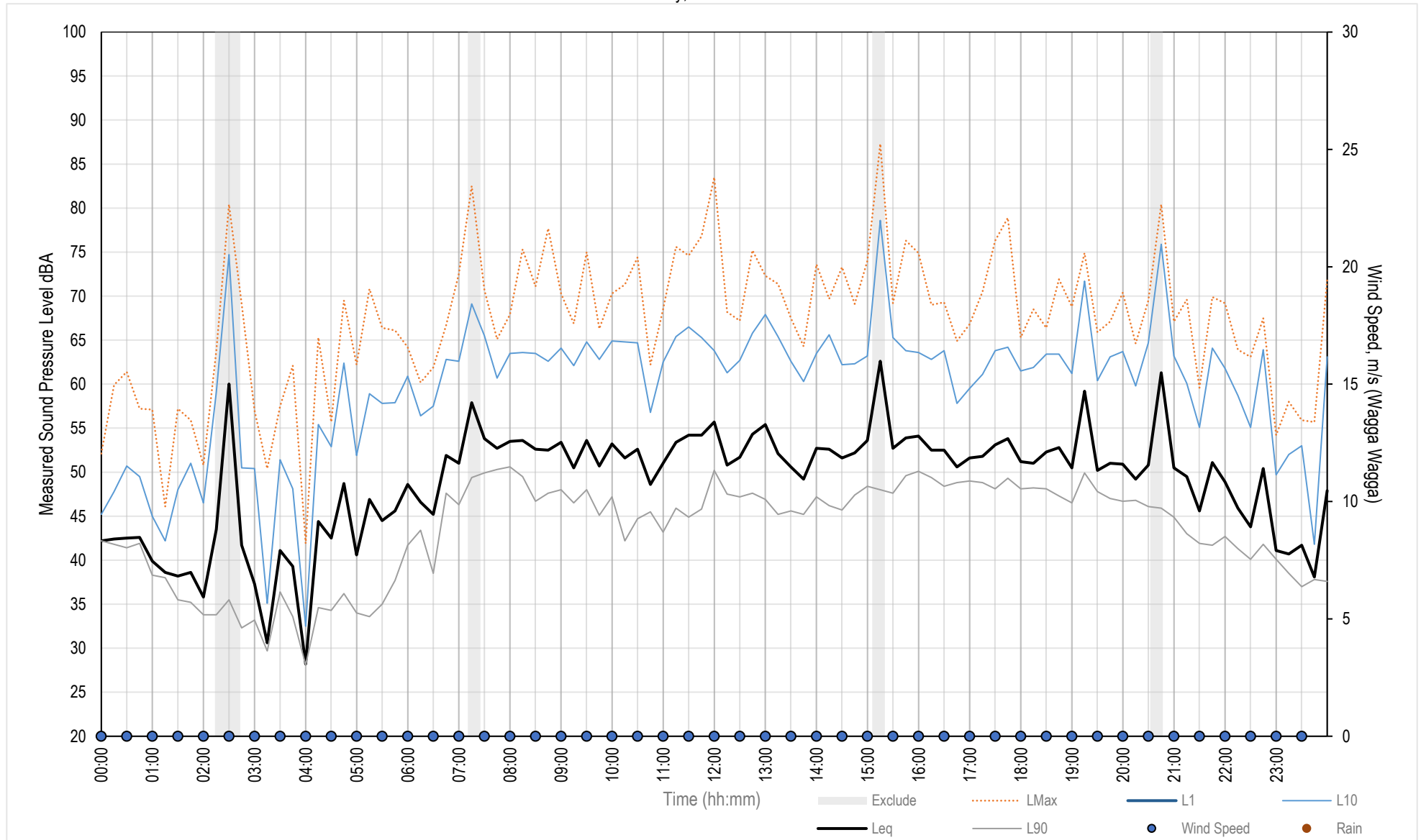
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Sunday, 28 March 2021



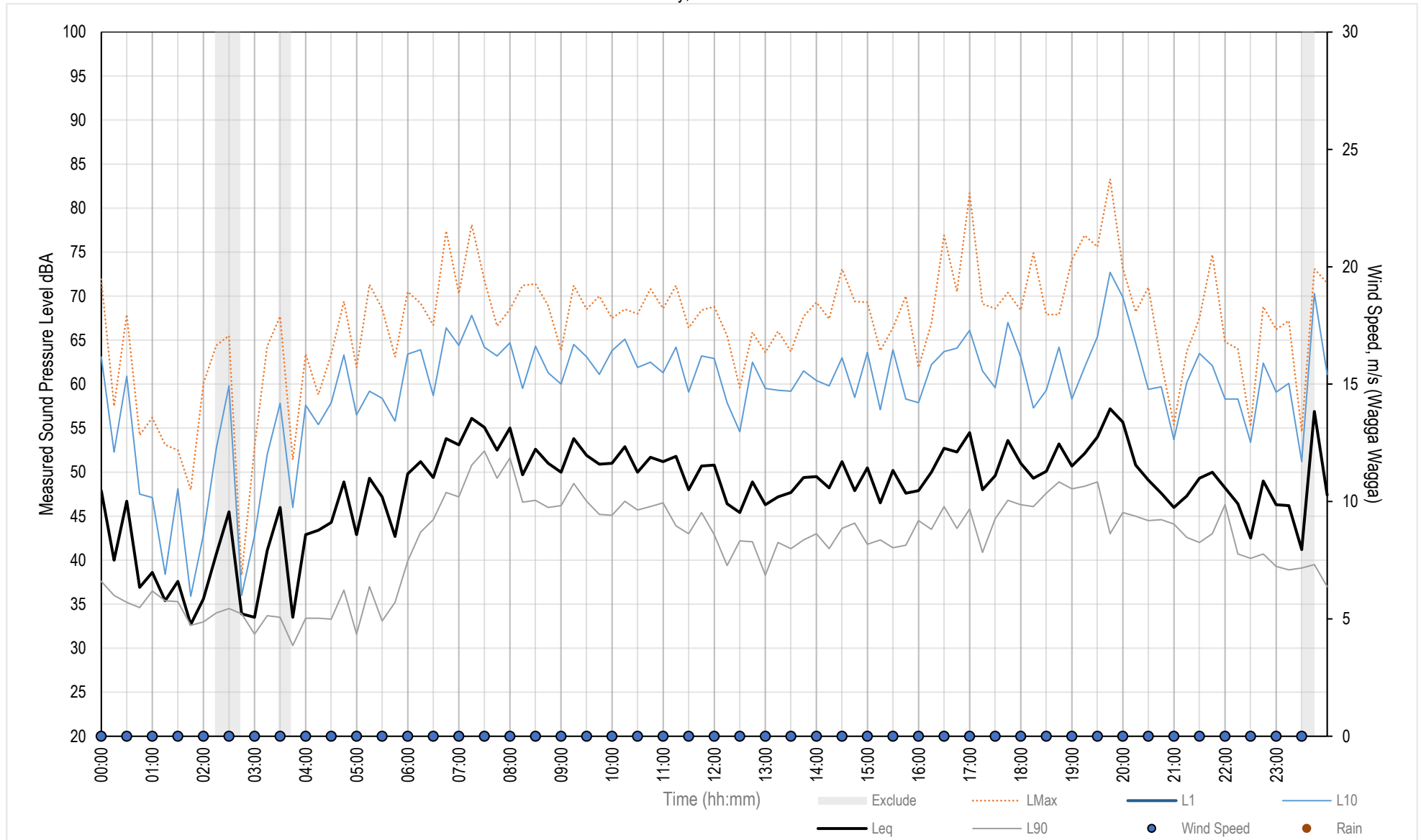
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Monday, 29 March 2021



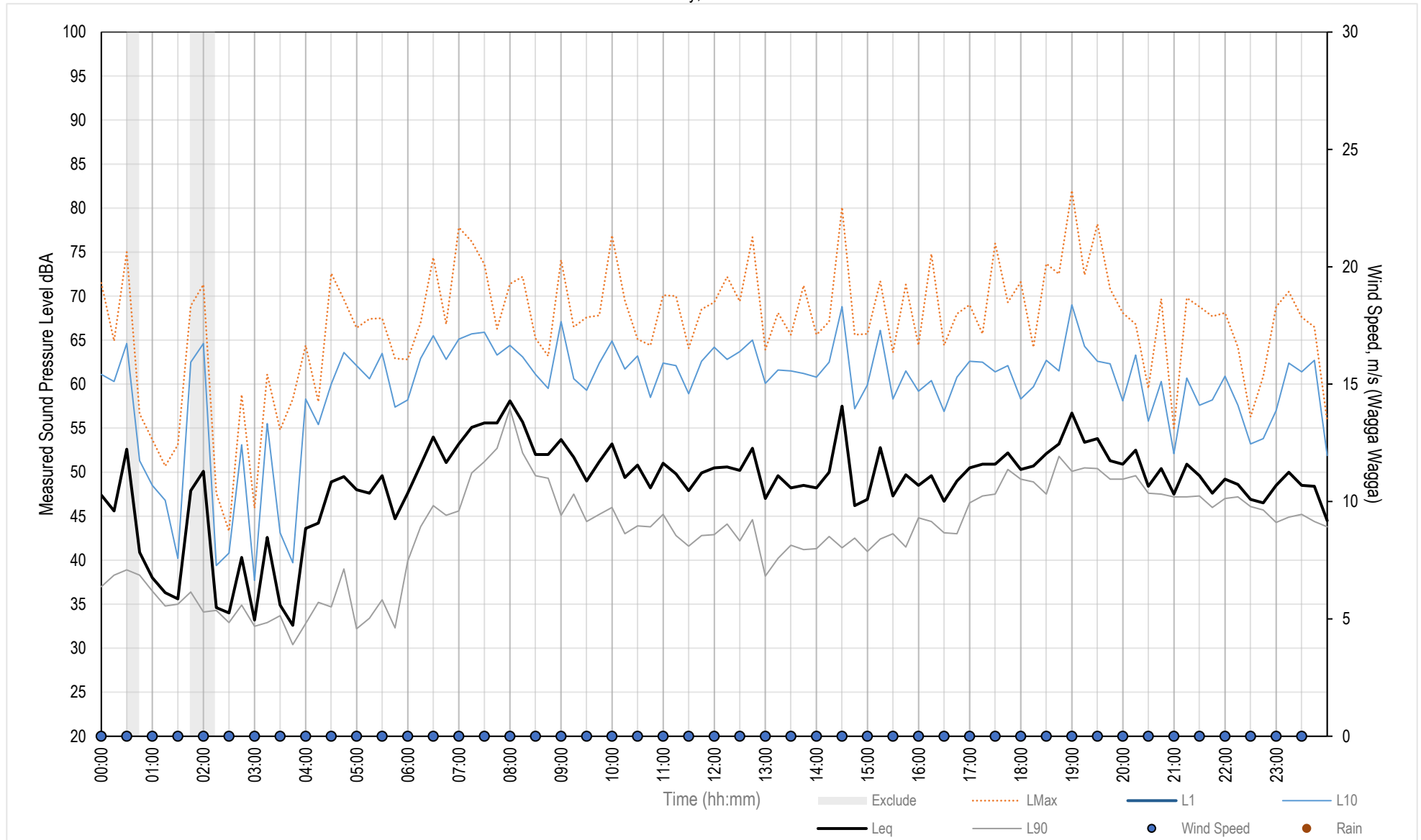
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Tuesday, 30 March 2021



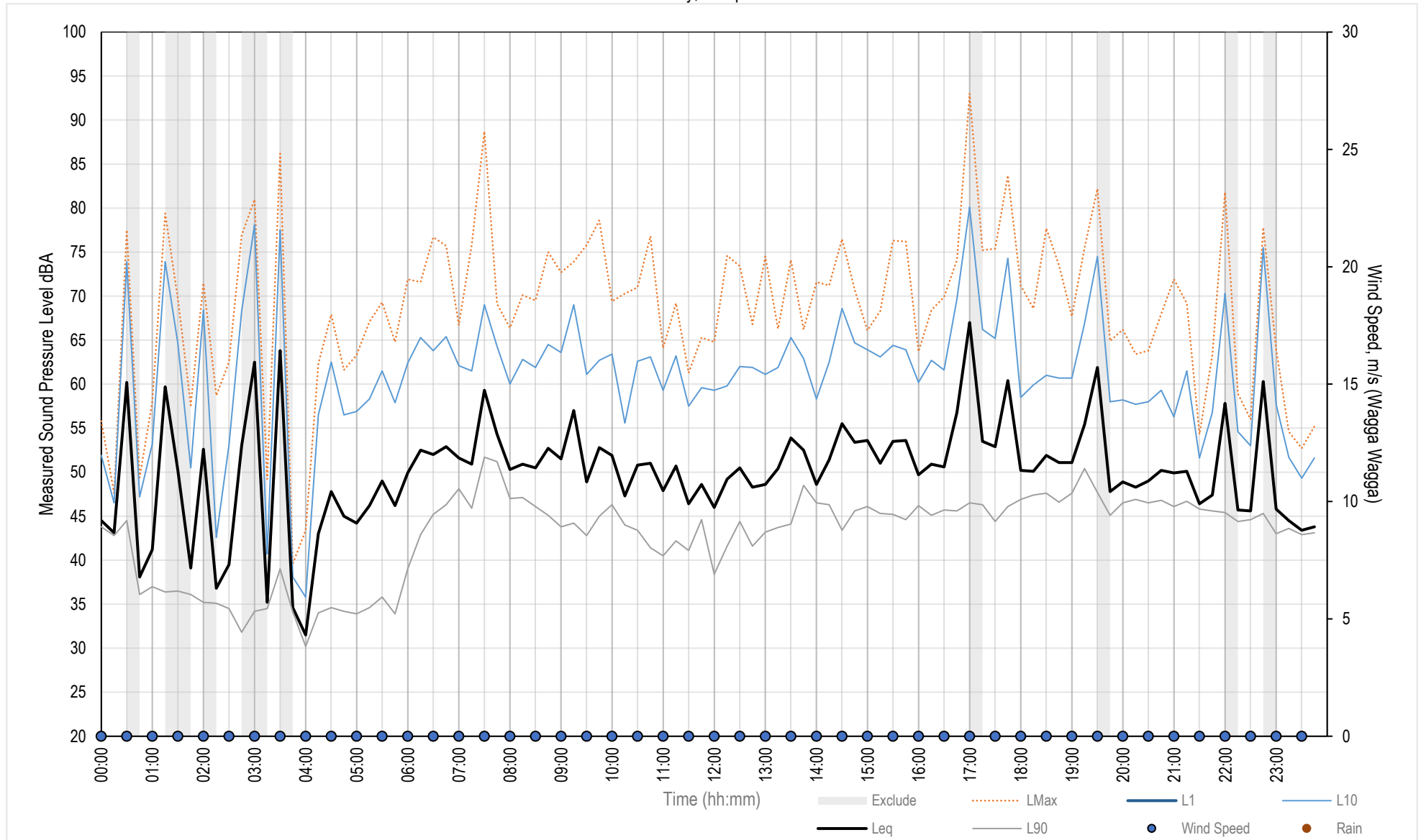
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Wednesday, 31 March 2021



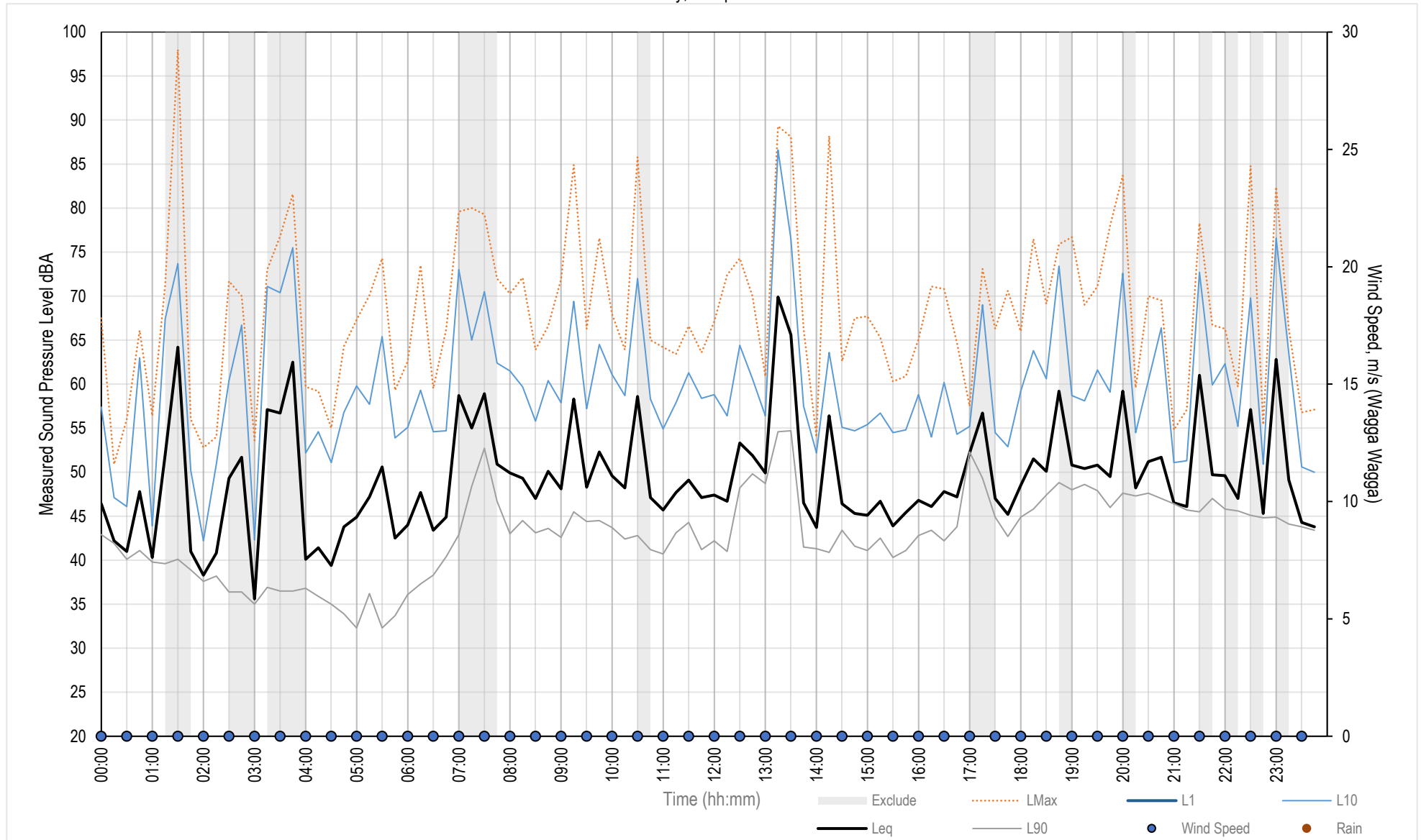
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Thursday, 01 April 2021



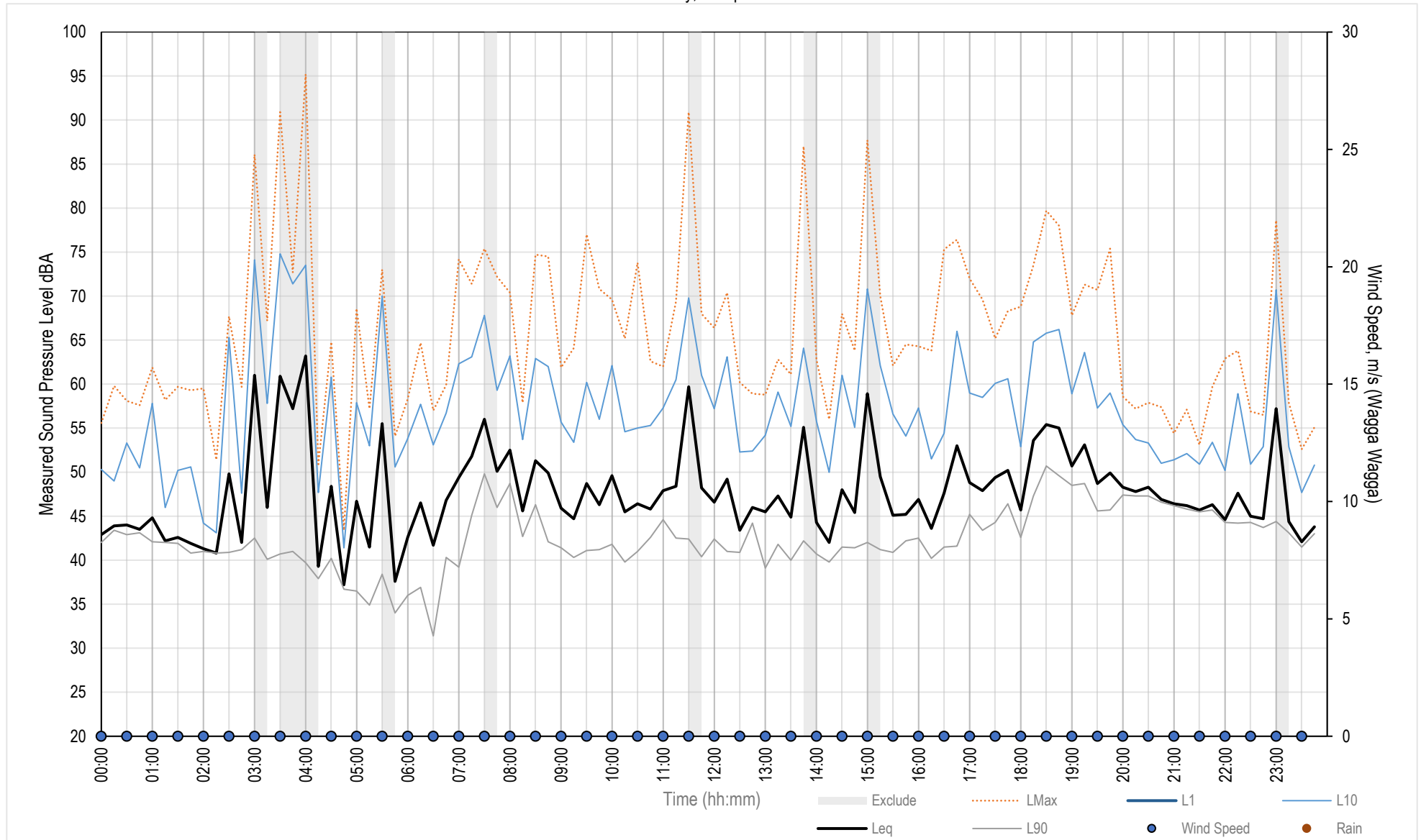
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Friday, 02 April 2021



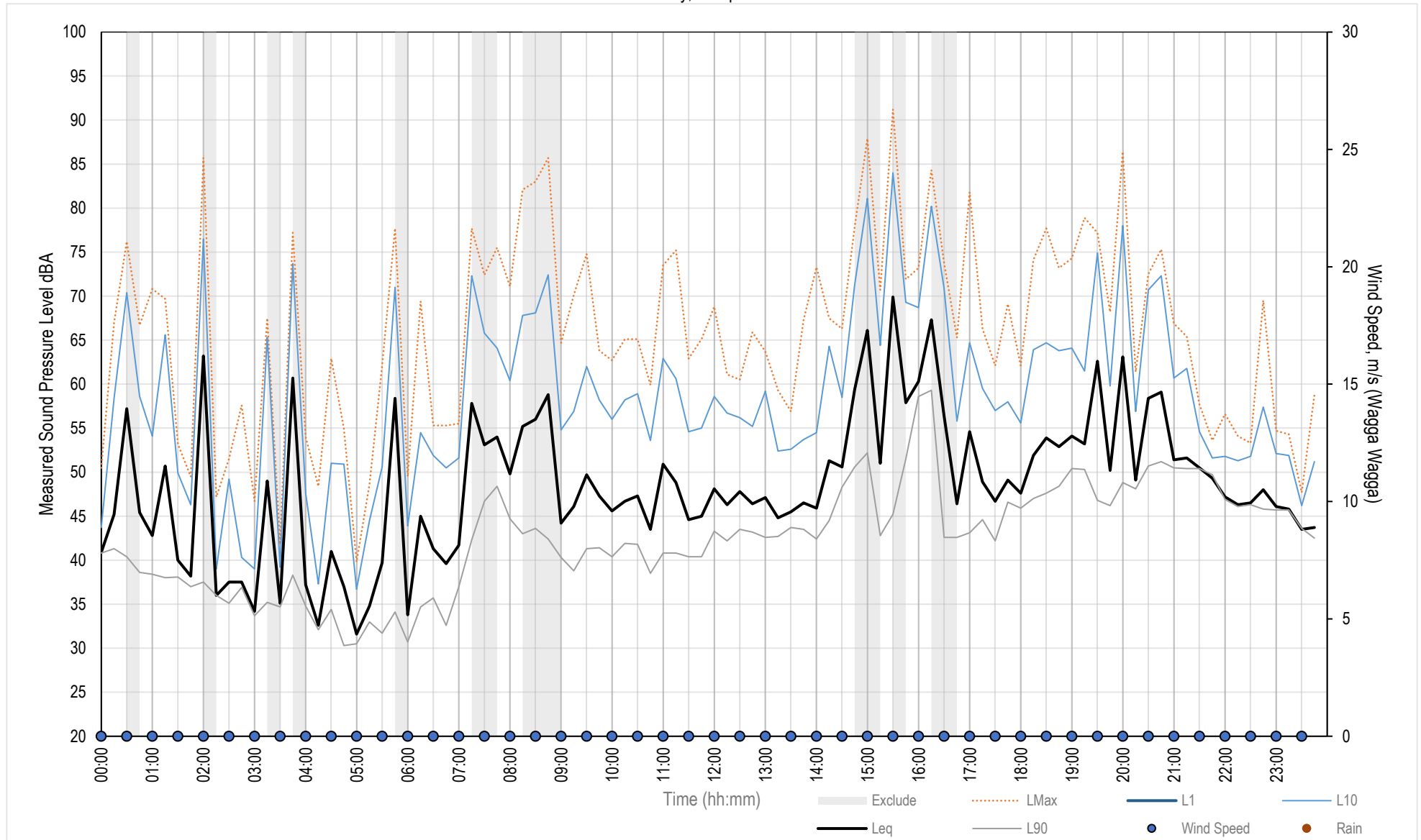
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Saturday, 03 April 2021



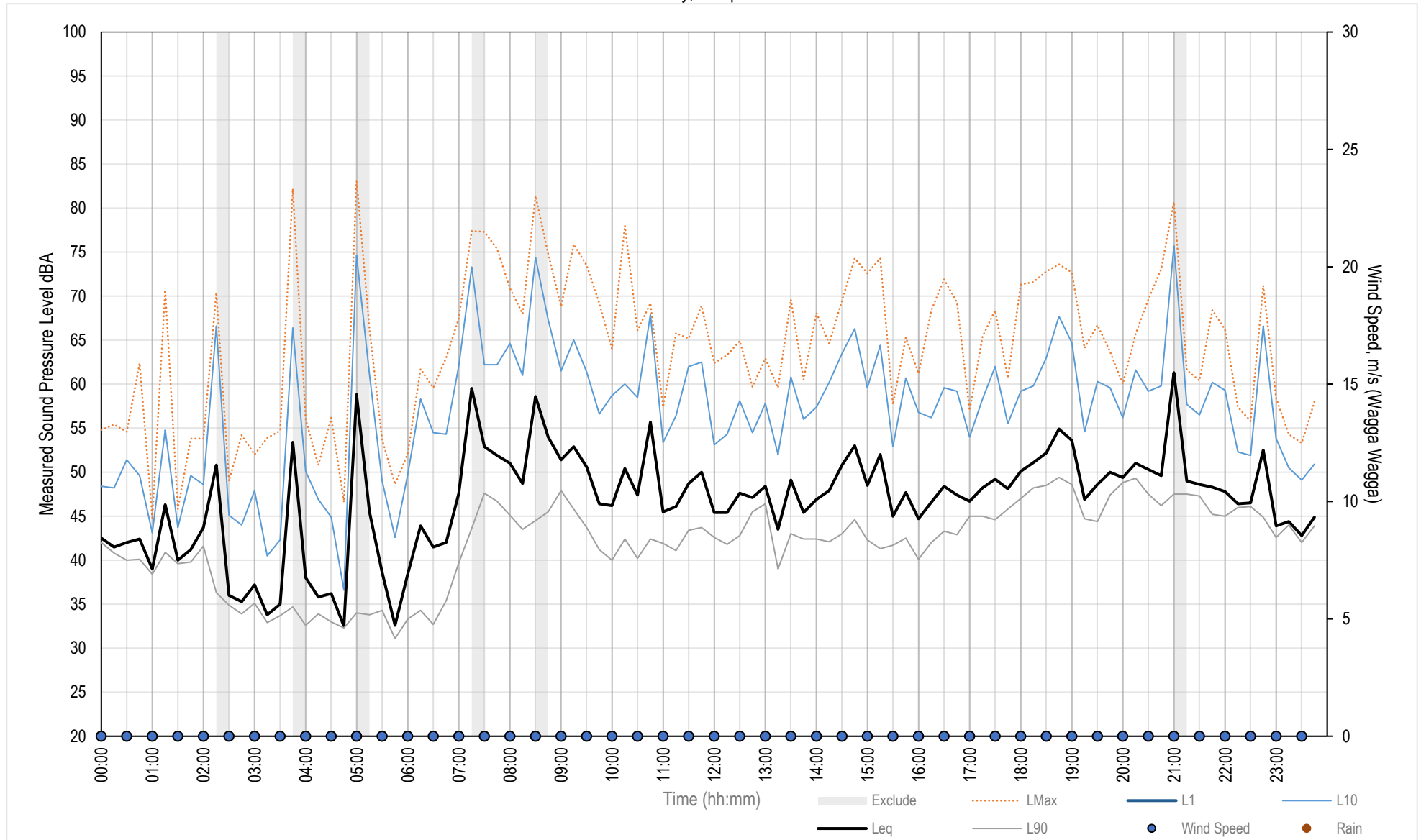
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Sunday, 04 April 2021



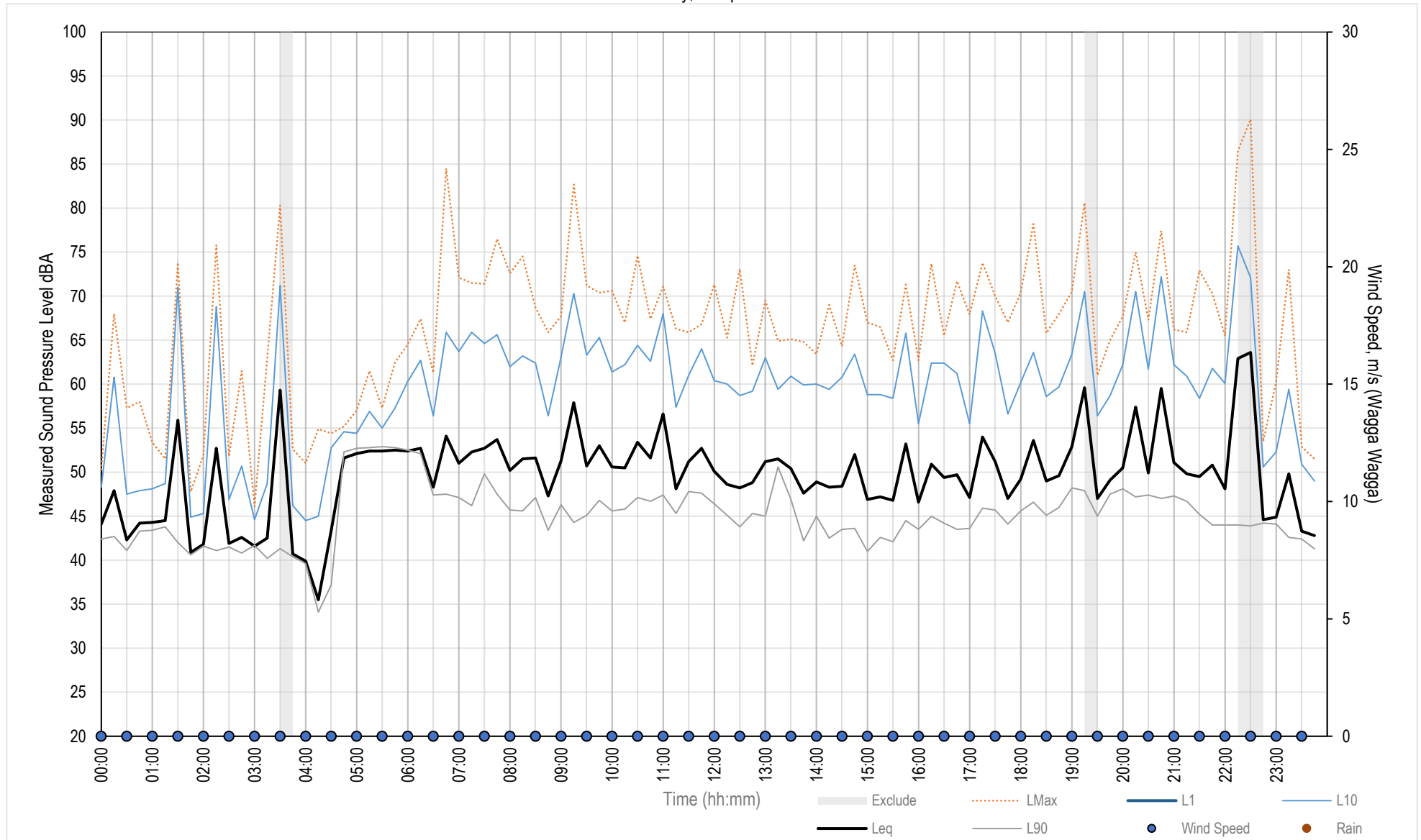
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Monday, 05 April 2021



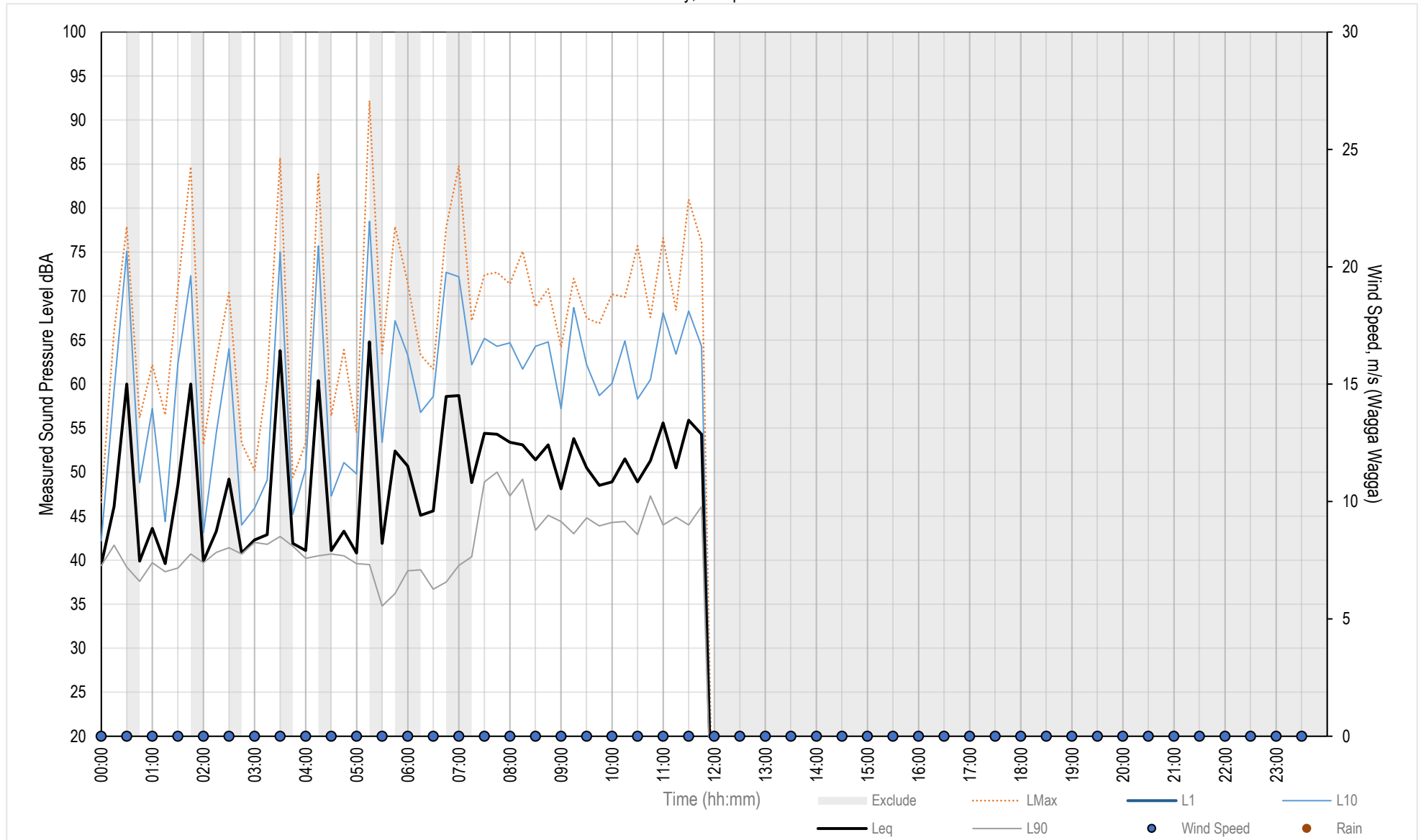
Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Monday, 05 April 2021



Measured Noise Levels - Illabo Hotel, 14/18 Turland St, Illabo

Tuesday, 06 April 2021



TECHNICAL PAPER 06

Noise and vibration (non-rail)

Appendix B Modelled construction equipment and sound power levels (SWLs)

ALBURY TO ILLABO ENVIRONMENTAL IMPACT STATEMENT



ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
All enhancement sites					
1	Site establishment/preparatory works	14H Grader	115	—	—
		30T Articulated dump truck (ADT)	107	3	3
		30T Excavator	108	3	4
		Smooth drum roller ²	107	—	—
		Padfoot roller ²	109	—	—
		Water cart	107	3	3
		TOTAL SH ³ L _{eq}	117		
—	Demobilisation and rehabilitation	5T excavator	105	3	4
		14H Grader	115	—	—
		Water Carts	107	3	3
		Hydro seed truck	107	3	3
		TOTAL SH ³ L _{eq}	116		
		TOTAL OOHW ³ L ₁ (1 minute)	117		
—	Compound operation	Light vehicles	88	12	3
		Generator	103	—	—
		Delivery trucks ²	108	6	3
		Franna	98	6	3
		TOTAL SH ³ L _{eq}	106		
		TOTAL OOHW ³ L ₁ (1 minute)	107		
Level crossing upgrades					
2	Road diversions	Light vehicles	88	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	102		
3	Signalling works	Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	102		
		TOTAL OOHW ³ L ₁ (1 minute)	102		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L_{eq}(15 min) dBA	USAGE dBA	L₁(1 min) dBA
4	Strip level crossing panels	Rail saw / grinder ²	118	6	–
		Loader / drott ²	114	3	6
		50T mobile crane	104	6	3
		Hand tools	108	6	–
		TOTAL SH³ L_{eq}	115		
		TOTAL OOHW³ L₁(1 minute)	117		
5	Install troughs	30T Excavator	108	3	3
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		TOTAL SH³ L_{eq}	107		
		TOTAL OOHW³ L₁(1 minute)	110		
6	Re-build rail	30T Excavator	108	3	3
		Rail welder (FBW) ²	101	6	6
		Rail saw / grinder ²	112	6	–
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Loader / drott	114	3	6
		Rail saw ²	118	6	–
		TOTAL SH³ L_{eq}	116		
		TOTAL OOHW³ L₁(1 minute)	118		
7	Install level crossing panels	30T Excavator	108	3	3
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Loader / drott	114	3	6
		Hand tools	108	6	–
		TOTAL SH³ L_{eq}	113		
		TOTAL OOHW³ L₁(1 minute)	118		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
Culvert replacements					
2	Construct crane pads	30T Articulated dump truck (ADT)	107	6	3
		Concrete truck + pump	105	3	3
		10T excavator	105	3	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	108		
3	Offline extensions	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller	109	—	—
		30t excavator	110	3	3
		Water cart	107	3	—
		Backhoe	110	6	—
		Hydraulic rockbreaker ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	119		
4/5/6/7/9	Track replacement	30T Articulated dump truck (ADT)	107	6	3
		D6-D7 Dozer	107	—	3
		Padfoot roller	109	—	—
		30t excavator	110	3	3
		Water cart	107	3	—
		Loader / drott	114	3	6
		Rail saw ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	117		
TOTAL OOHW ³ L ₁ (1 minute)		120			
8	Install culverts	Rail saw / grinder ²	118	6	—
		Loader / drott	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	115		
		TOTAL OOHW ³ L ₁ (1 minute)	118		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
Albury precinct					
Murray River bridge					
3 / 7	Installation and removal of scaffolding and bracing	Hand tools	105	6	3
		Elevated work platform ²	98	12	—
		Crane	98	6	3
		Delivery trucks	108	6	3
		TOTAL SH ³ L _{eq}	104		
		TOTAL OOHW ³ L ₁ (1 minute)	107		
4,5,6	Bridge works	Hand tools	105	6	3
		Elevated work platform ²	105	12	3
		Crane	98	6	3
		Abrasive blaster / rattle gun ²	108	—	—
		Concrete saw ²	118	6	—
		TOTAL SH ³ L _{eq}	114		
		TOTAL OOHW ³ L ₁ (1 minute)	114		
Albury Yard clearances (track re-alignment)					
2	Offline widenings	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30t excavator	110	3	3
		Water cart	107	3	—
		Backhoe	110	6	—
		Hydraulic rockbreaker ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	119		
3	Track re-alignment (<300mm)	Loader / drott	114	3	6
		30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		TOTAL SH ³ L _{eq}	111		
		TOTAL OOHW ³ L ₁ (1 minute)	113		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
4	Track realignment (>300mm)	30T Articulated dump truck (ADT)	107	6	3
		D6-D7 Dozer	107	—	3
		Padfoot roller ²	109	—	—
		30t excavator	110	3	3
		Water cart	107	3	—
		Loader / drott	114	3	6
		Rail saw ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	117		
		TOTAL OOHW ³ L ₁ (1 minute)	120		
5	Rebuild track	30T Excavator	108	3	3
		Flash butt welder ²	101	6	6
		Rail grinder ²	112	6	—
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		TOTAL SH ³ L _{eq}	117		
		TOTAL OOHW ³ L ₁ (1 minute)	120		
Albury Yard clearances (gantry removal)					
2	Install cabling / conduits	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	3
		Water carts	107	3	—
		Backhoe	110	6	6
		TOTAL SH ³ L _{eq}	117		
2a / 3	Signalling works	Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	102		
		TOTAL OOHW ³ L ₁ (1 minute)	102		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
4	Cut gantry bolts	Concrete / steel saw / grinder ²	118	6	—
		Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	112		
		TOTAL OOHW ³ L ₁ (1 minute)	112		
5	Remove gantry	Rail saw / grinder ²	118	6	—
		Loader / drott	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	115		
		TOTAL OOHW ³ L ₁ (1 minute)	118		
6	Remove footings	30T Articulated dump truck (ADT)	107	6	3
		Hydraulic rockbreaker ²	118	6	6
		30T Excavator	108	3	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	113		
		TOTAL OOHW ³ L ₁ (1 minute)	119		
7	Backfill footings	30T Articulated dump truck (ADT)	107	6	3
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	3
		Water carts	107	3	—
		TOTAL SH ³ L _{eq}	114		
Albury Station pedestrian bridge					
3	Demolition	Concrete / steel saw / grinder ²	118	—	—
		Light vehicles	88	12	3
		Hand tools	108	6	—
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Hydraulic rockbreaker ²	118	6	6
		30T Excavator	108	3	3
		TOTAL SH ³ L _{eq}	119		
		TOTAL OOHW ³ L ₁ (1 minute)	121		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
4	Piling	Piling rig ²	118	6	—
		Mobile crane	115	6	3
		Franna	114	6	3
		TOTAL SH ³ L _{eq}	115		
5/6/7	Concreting works	30T Articulated dump truck (ADT)	107	6	3
		Concrete truck + pump	105	3	3
		10T excavator	105	3	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	108		
8/11	Installation of fittings	Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	102		
9/10	Lifting of truss and deck	Franna	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	112		
		TOTAL OOHW ³ L _I (1 minute)	117		
Riverina Highway bridge					
2/5	Earthworks	30T Articulated dump truck (ADT)	107	3	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30t excavator	110	—	—
		Water cart	107	3	3
		Backhoe	110	3	3
		Concrete Saw ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	119		
3	Large scale piling	Piling rig ²	118	3	—
		Loader and pozitrack	114	3	6
		TOTAL SH ³ L _{eq}	116		
		TOTAL OOHW ³ L _I (1 minute)	119		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
4	Small scale piling	Micro piling rig ²	114	6	—
		Loader and pozitrack	114	3	6
		TOTAL SH ³ L _{eq}	113		
		TOTAL OOHW ³ L ₁ (1 minute)	118		
6	Drainage	30T Articulated dump truck (ADT)	107	3	3
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	4
		Water carts	107	3	3
		Backhoe	110	3	3
		TOTAL SH ³ L _{eq}	113		
		TOTAL OOHW ³ L ₁ (1 minute)	116		
7	Track works	30T Excavator	108	3	4
		Rail welder (FBW) ²	101	6	6
		Loader / drott	114	3	6
		50T mobile crane	104	—	—
		30T Articulated dump truck (ADT)	107	3	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		TOTAL SH ³ L _{eq}	114		
		TOTAL OOHW ³ L ₁ (1 minute)	118		
Billy Hughes bridge					
2a	Track re-alignment	30T Articulated dump truck (ADT)	107	3	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30t excavator	110	—	—
		Water cart	107	3	3
		Backhoe	110	3	3
		Concrete Saw ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	105		
		TOTAL OOHW ³ L ₁ (1 minute)	107		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
3	Large scale piling	Piling rig ²	118	3	—
		Loader and pozitrack	114	3	6
		TOTAL SH ³ L _{eq}	116		
		TOTAL OOHW ³ L _I (1 minute)	119		
4	Small scale piling	Micro piling rig ²	114	6	—
		Loader and pozitrack	114	3	6
		TOTAL SH ³ L _{eq}	113		
		TOTAL OOHW ³ L _I (1 minute)	118		
6	Drainage works	30T Articulated dump truck (ADT)	107	3	3
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	4
		Water carts	107	3	3
		Backhoe	110	3	3
		TOTAL SH ³ L _{eq}	113		
		TOTAL OOHW ³ L _I (1 minute)	116		
7	Track works	30T Excavator	108	3	4
		Rail welder (FBW) ²	101	6	6
		50T mobile crane	104	—	—
		Loader / drott	114	3	6
		30T Articulated dump truck (ADT)	107	3	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		TOTAL SH ³ L _{eq}	114		
		TOTAL OOHW ³ L _I (1 minute)	118		
Table Top Yard clearances					
2	Install footings, cabling, conduits	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	3
		Water carts	107	3	—
		Backhoe	110	6	6
		TOTAL SH ³ L _{eq}	117		
		TOTAL OOHW ³ L _I (1 minute)	118		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
3	Signalling works	Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH³ L_{eq}	102		
		TOTAL OOHW³ L₁(1 minute)	102		
4	Cut gantry bolts	Concrete / steel saw / grinder ²	118	6	—
		Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH³ L_{eq}	112		
		TOTAL OOHW³ L₁(1 minute)	112		
5	Remove gantry	Rail saw / grinder ²	118	6	—
		Loader / drott	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	—
		TOTAL SH³ L_{eq}	115		
		TOTAL OOHW³ L₁(1 minute)	118		
6	Remove footings	30T Articulated dump truck (ADT)	107	6	3
		Hydraulic rockbreaker ²	118	6	6
		30T Excavator	108	3	3
		Hand tools	108	6	—
		TOTAL SH³ L_{eq}	113		
		TOTAL OOHW³ L₁(1 minute)	119		
7	Backfill footings	30T Articulated dump truck (ADT)	107	6	3
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	3
		Water carts	107	3	0
		TOTAL SH³ L_{eq}	114		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
Greater Hume–Lockhart					
Culcairn, Henty and Yerong Creek Yard clearances					
2	Offline widenings	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	–	–
		Padfoot roller ²	109	–	–
		30t excavator	110	3	3
		Water cart	107	3	0
		Backhoe	110	6	–
		Hydraulic rockbreaker ²	118	6	–
		Smooth drum roller ²	107	–	–
		TOTAL SH ³ L _{eq}	119		
3	Remove gantry	Rail saw / grinder ²	118	6	–
		Loader / drott	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	–
		TOTAL SH ³ L _{eq}	116		
		TOTAL OOHW ³ L ₁ (1 minute)	122		
3a	Drainage works and service relocation	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	–	–
		Padfoot roller ²	109	–	–
		30T Excavator	108	3	3
		Water carts	107	3	–
		Backhoe	110	6	–
		TOTAL SH ³ L _{eq}	117		
4a	Track re-alignment (<300mm)	Loader / drott	114	3	6
		30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	–	–
		Ballast regulator	101	–	–
		TOTAL SH ³ L _{eq}	111		
		TOTAL OOHW ³ L ₁ (1 minute)	113		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
4b	Track re-alignment (>300mm)	30T Articulated dump truck (ADT)	107	6	3
		D6-D7 Dozer	107	—	3
		Padfoot roller ²	109	—	—
		30t excavator	110	3	3
		Water cart	107	3	—
		Loader / drott	114	3	6
		Rail saw ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	117		
		TOTAL OOHW ³ L ₁ (1 minute)	120		
5	Re-build track	30T Excavator	108	3	3
		Flash butt welder ²	101	6	6
		Rail grinder ²	112	6	—
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		TOTAL SH ³ L _{eq}	111		
		TOTAL OOHW ³ L ₁ (1 minute)	112		
The Rock Yard clearances					
2	Install cabling / conduits	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	3
		Water carts	107	3	—
		Backhoe	110	6	6
		TOTAL SH ³ L _{eq}	117		
3	Signalling works	Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	102		
		TOTAL OOHW ³ L ₁ (1 minute)	102		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
4	Cut gantry bolts	Concrete / steel saw / grinder ²	118	6	–
		Light vehicles	88	12	3
		Hand tools	108	6	–
		TOTAL SH³ L_{eq}	112		
		TOTAL OOHW³ L₁(1 minute)	112		
5	Remove gantry	Rail saw / grinder ²	118	6	–
		Loader / drott	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	–
		TOTAL SH³ L_{eq}	115		
		TOTAL OOHW³ L₁(1 minute)	117		
6	Remove footings	30T Articulated dump truck (ADT)	107	6	3
		Hydraulic rockbreaker ²	118	6	6
		30T Excavator	108	3	3
		Hand tools	108	6	–
		TOTAL SH³ L_{eq}	113		
		TOTAL OOHW³ L₁(1 minute)	119		
7	Backfill footings	30T Articulated dump truck (ADT)	107	6	3
		Padfoot roller ²	109	–	–
		30T Excavator	108	3	3
		Water carts	107	3	–
		TOTAL SH³ L_{eq}	114		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
Junee					
Harefield Yard clearances and Junee to Illabo clearances					
2	Offline widenings	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	–	–
		Padfoot roller ²	109	–	–
		30t excavator	110	3	3
		Water cart	107	3	–
		Backhoe	110	6	–
		Hydraulic rockbreaker ²	118	6	–
		Smooth drum roller ²	107	–	–
		TOTAL SH ³ L _{eq}	119		
3	Track re-alignment (<300mm)	Loader / drott	114	3	6
		30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	–	–
		Ballast regulator	101	–	–
		TOTAL SH ³ L _{eq}	111		
		TOTAL OOHW ³ L ₁ (1 minute)	113		
4	Track re-alignment (>300m m)	30T Articulated dump truck (ADT)	107	6	3
		D6-D7 Dozer	107	–	3
		Padfoot roller ²	109	–	–
		30t excavator	110	3	3
		Water cart	107	3	–
		Loader / drott	114	3	6
		Rail saw ²	118	6	–
		Smooth drum roller ²	107	–	–
		TOTAL SH ³ L _{eq}	117		
		TOTAL OOHW ³ L ₁ (1 minute)	120		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
5	Re-build track	30T Excavator	108	3	3
		Flash butt welder ²	101	6	6
		Rail grinder ²	112	6	—
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		TOTAL SH ³ L _{eq}	111		
		TOTAL OOHW ³ L ₁ (1 minute)	112		
Kemp Street bridge					
3/4/6/8	Demolition and earthworks	Concrete / steel saw / grinder ²	118	—	—
		Light vehicles	88	12	3
		Hand tools	108	6	—
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Hydraulic rockbreaker ²	118	6	6
		30T Excavator	108	3	3
		TOTAL SH ³ L _{eq}	119		
		TOTAL OOHW ³ L ₁ (1 minute)	121		
5/7	Piling	Piling rig ²	118	6	—
		Mobile crane	115	6	3
		Franna	114	6	3
		TOTAL SH ³ L _{eq}	115		
9/10/11/ 18	Concreting	30T Articulated dump truck (ADT)	107	6	3
		Concrete truck + pump	105	3	3
		10T excavator	105	3	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	108		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
12/13/14 /15	Lifting of truss and deck	Franna	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	112		
		TOTAL OOHW ³ L ₁ (1 minute)	117		
16/19	Installation of services and screens	Franna	114	3	6
		Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	112		
17	Asphalting	Truck and dog	108	9	3
		Asphalting machine	105	3	3
		Vibratory roller ²	107	—	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	111		
Junee Station pedestrian bridge, Harefield Yard clearances					
2	Install cabling / conduits	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	3
		Water carts	107	3	—
		Backhoe	110	6	6
		TOTAL SH ³ L _{eq}	117		
3	Signalling works	Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	102		
		TOTAL OOHW ³ L ₁ (1 minute)	102		
4	Cut gantry bolts	Concrete / steel saw / grinder ²	118	6	—
		Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	112		
		TOTAL OOHW ³ L ₁ (1 minute)	112		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
5	Remove gantry	Rail saw / grinder ²	118	6	—
		Loader / drott	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	115		
		TOTAL OOHW ³ L ₁ (1 minute)	117		
6	Remove footings	30T Articulated dump truck (ADT)	107	6	3
		Hydraulic rockbreaker ²	118	6	6
		30T Excavator	108	3	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	113		
		TOTAL OOHW ³ L ₁ (1 minute)	119		
7	Backfill footings	30T Articulated dump truck (ADT)	107	6	3
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	3
		Water carts	107	3	—
		TOTAL SH ³ L _{eq}	114		
Olympic Highway underbridge					
3/8/10	Trackworks	30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		30t excavator	110	3	3
		Loader / drott	114	3	6
		Rail saw ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	116		
		TOTAL OOHW ³ L ₁ (1 minute)	119		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
4/6	Earthworks	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30t excavator	110	3	3
		Water cart	107	3	—
		Backhoe	110	6	—
		Hydraulic rockbreaker ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH³ L_{eq}	119		
7	Structure works	Concrete / steel saw / grinder ²	118	—	—
		Light vehicles	88	12	3
		Hand tools	108	6	—
		50T mobile crane	104	6	3
		TOTAL SH³ L_{eq}	119		
		TOTAL OOHW³ L₁(1 minute)	121		
4	Concreting works	30T Articulated dump truck (ADT)	107		
		Concrete truck + pump	105		
		10T excavator	105		
		Hand tools	108		
		TOTAL SH³ L_{eq}	108		
5	Installation of services and screens	Franna	114		
		Light vehicles	88		
		Hand tools	108		
		TOTAL SH³ L_{eq}	112		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
Wagga Wagga					
Uranquinty Yard, Wagga Wagga Station Yard, Bomen Yard clearances					
2	Offline widenings	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30t excavator	110	3	3
		Water cart	107	3	—
		Backhoe	110	6	—
		Hydraulic rockbreaker ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	119		
3	Track re-alignment (<300mm)	Loader / drott	114	3	6
		30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		TOTAL SH ³ L _{eq}	111		
		TOTAL OOHW ³ L ₁ (1 minute)	113		
4	Track re-alignment (>300m m)	30T Articulated dump truck (ADT)	107	6	3
		D6–D7 Dozer	107	—	3
		Padfoot roller ²	109	—	—
		30t excavator	110	3	3
		Water cart	107	3	—
		Loader / drott	114	3	6
		Rail saw ²	118	6	—
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	117		
		TOTAL OOHW ³ L ₁ (1 minute)	120		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
5	Re-build track	30T Excavator	108	3	3
		Flash butt welder ²	101	6	6
		Rail grinder ²	112	6	—
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		TOTAL SH ³ L _{eq}	111		
		TOTAL OOHW ³ L ₁ (1 minute)	112		
Pearson Street bridge					
2/7b	Earthworks	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30t excavator	110	3	3
		Water cart	107	3	—
		Backhoe	110	6	6
		Hydraulic rockbreaker ²	118	6	6
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	119		
3	Large scale piling	Piling rig ²	118	3	—
		Loader and pozitrack	114	3	6
		TOTAL SH ³ L _{eq}	116		
		TOTAL OOHW ³ L ₁ (1 minute)	119		
4	Small scale piling	Micro piling rig ²	114	6	—
		Loader and pozitrack	114	3	6
		TOTAL SH ³ L _{eq}	113		
		TOTAL OOHW ³ L ₁ (1 minute)	118		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
5/6	Protection walls and drainage	30T Articulated dump truck (ADT)	107	6	3
		Loader / drott	114	3	6
		30T Excavator	108	3	3
		Water carts	107	3	—
		Backhoe	110	6	6
		TOTAL SH ³ L _{eq}	113		
		TOTAL OOHW ³ L ₁ (1 minute)	119		
7a	Track removal	Rail grinder / saw ²	118	6	—
		Loader / drott	114	3	6
		50T mobile crane	104	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	115		
		TOTAL OOHW ³ L ₁ (1 minute)	117		
7c	Re-build track	30T Excavator	108	3	3
		Flash butt welder ²	101	6	6
		Rail grinder / saw ²	112	—	—
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Rail tamper	100	—	—
		Ballast regulator	101	—	—
		TOTAL SH ³ L _{eq}	114		
		TOTAL OOHW ³ L ₁ (1 minute)	115		
Cassidy Parade and Wagga Station shared user bridges					
3	Demolition	Concrete / steel saw / grinder ²	118	—	—
		Light vehicles	88	12	3
		Hand tools	108	6	—
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Hydraulic rockbreaker ²	118	6	6
		30T Excavator	108	3	3
		TOTAL SH ³ L _{eq}	119		
		TOTAL OOHW ³ L ₁ (1 minute)	119		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
4	Piling	Piling rig ²	118	6	—
		Mobile crane	115	6	3
		Franna	114	6	3
		TOTAL SH ³ L _{eq}	115		
5/6/7	Concreting	30T Articulated dump truck (ADT)	107	6	3
		Concrete truck + pump	105	3	3
		10T excavator	105	3	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	108		
8/11	Installation of screens	Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	102		
9/10	Lifting of truss and deck	Franna	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	112		
		TOTAL OOHW ³ L ₁ (1 minute)	117		
Edmondson Street bridge					
3a	Service relocations	30T Articulated dump truck (ADT)	107	6	3
		10T excavator	105	3	3
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	109		
3b	Demolition	Concrete / steel saw / grinder ²	118	6	—
		Light vehicles	88	12	3
		Hand tools	108	6	3
		50T mobile crane	104	6	3
		30T Articulated dump truck (ADT)	107	6	3
		Hydraulic rockbreaker ²	118	6	6
		30T Excavator	108	3	3
		TOTAL SH ³ L _{eq}	116		
		TOTAL OOHW3 L1(1 minute)	120		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
4/5/6	Crane/piling pads	30T Articulated dump truck (ADT)	107	6	3
		Concrete truck + pump	105	3	3
		10T excavator	105	3	3
		Smooth drum roller ²	107	–	–
		TOTAL SH³ L_{eq}	110		
6/7	Piling	Piling rig ²	118	3	–
		Loader / drott	114	3	6
		TOTAL SH³ L_{eq}	116		
8/9/10/ 11	RE wall and abutments	30T Articulated dump truck (ADT)	107	6	3
		Loader / drott	114	3	6
		30T Excavator	108	3	3
		Water carts	107	3	–
		50T mobile crane	104	6	3
		TOTAL SH³ L_{eq}	113		
12/13/14 /15	Install deck, slabs and planks	Rail saw / grinder ²	118	6	–
		Loader / drott	114	3	6
		300T mobile crane	110	6	3
		Hand tools	108	6	–
		TOTAL SH³ L_{eq}	115		
		TOTAL OOHW³ L₁(1 minute)	119		
16/17/18	Install fittings	Loader / drott	114	3	6
		Franna	114	3	6
		Hand tools	108	6	–
		TOTAL SH³ L_{eq}	114		
18	Asphalting	Truck and dog	108	9	3
		Asphalting machine	105	3	3
		Vibratory roller ²	107	–	–
		Smooth drum roller ²	107	–	–
		TOTAL SH³ L_{eq}	111		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
Wagga Wagga Yard clearances					
2	Install cabling / conduits	30T Articulated dump truck (ADT)	107	6	3
		14H Grader	115	—	—
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	3
		Water carts	107	3	—
		Backhoe	110	6	6
		TOTAL SH ³ L _{eq}	117		
3	Signalling works	Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	102		
		TOTAL OOHW ³ L ₁ (1 minute)	102		
4	Cut gantry bolts	Concrete / steel saw / grinder ²	118	6	—
		Light vehicles	88	12	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	112		
		TOTAL OOHW ³ L ₁ (1 minute)	112		
5	Remove gantry	Rail saw / grinder ²	118	6	—
		Loader / drott	114	3	6
		150T mobile crane	108	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	115		
		TOTAL OOHW ³ L ₁ (1 minute)	117		
6	Remove footings	30T Articulated dump truck (ADT)	107	6	3
		Hydraulic rockbreaker ²	118	6	6
		30T Excavator	108	3	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	113		
		TOTAL OOHW ³ L ₁ (1 minute)	119		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L _{eq} (15 min) dBA	USAGE dBA	L ₁ (1 min) dBA
7	Backfill footings	30T Articulated dump truck (ADT)	107	6	3
		Padfoot roller ²	109	—	—
		30T Excavator	108	3	3
		Water carts	107	3	—
		TOTAL SH ³ L _{eq}	114		
Sandy Creek Bridge (Uranquinty)					
2	Crane pads	30T Articulated dump truck (ADT)	107	6	3
		Concrete truck + pump	105	3	3
		10T excavator	105	3	3
		Smooth drum roller ²	107	—	—
		TOTAL SH ³ L _{eq}	110		
4/9	Remove/install track	Rail saw / grinder ²	118	6	—
		Loader / drott	114	3	6
		50T mobile crane	104	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	115		
		TOTAL OOHW ³ L ₁ (1 minute)	118		
5/6a/7/8	Remove/install girders / blocks	Rail saw / grinder ²	118	6	—
		Loader / drott	114	3	6
		300T mobile crane	110	6	3
		Hand tools	108	6	—
		TOTAL SH ³ L _{eq}	115		
		TOTAL OOHW ³ L ₁ (1 minute)	119		

ID4	CONSTRUCTION ACTIVITY	EQUIPMENT REQUIRED	SWL	CORRECTIONS ¹	
			L_{eq}(15 min) dBA	USAGE dBA	L₁(1 min) dBA
6	Cut piers and abutments	30T Articulated dump truck (ADT)	107	6	3
		Loader / drott	114	3	6
		Padfoot roller ²	109	–	–
		30T Excavator	108	3	3
		Water carts	107	3	–
		Backhoe	110	6	–
		TOTAL SH³ L_{eq}	115		
		TOTAL OOHW³ L₁(1 minute)	119		

- (1) Estimated, assuming typical working conditions
- (2) Total noise level includes 5dB penalty for annoyance in accordance with ICNG methodology
- (3) SH – Standard Hours / OOHW – Out of Hours Work
- (4) Corresponding to constructability reports for each site

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Noise and vibration (non-rail)

Appendix C Predicted construction noise levels

ALBURY TO ILLABO ENVIRONMENTAL IMPACT STATEMENT



**APPENDIX C-1
ALBURY (UNMITIGATED)
CONSTRUCTION NOISE LEVELS**

PREDICTED CONSTRUCTION NOISE LEVELS AT RESIDENTIAL RECEIVERS

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Murray River bridge – NCA 01 (Total number of residential receivers 622)							
Standard hours							
Site establishment	55	50	17	17	4	0	4
Installation and removal of scaffolding and bracing	55	0	0	0	0	0	0
Bridge works	55	2	0	0	0	0	0
Demobilisation and rehabilitation	55	2	0	0	0	0	0
Compound operation	55	6	2	2	0	0	0
Outside standard hours – Daytime							
Site establishment	50	62	50	31	6	1	0
Installation and removal of scaffolding and bracing	50	0	0	0	0	0	0
Bridge works	50	18	2	0	0	0	0
Demobilisation and rehabilitation	50	30	2	0	0	0	0
Compound operation	50	16	6	3	1	0	0
Outside standard hours – Evening							
Site establishment	50	62	50	31	6	1	0
Installation and removal of scaffolding and bracing	50	0	0	0	0	0	0
Bridge works	50	18	2	0	0	0	0
Demobilisation and rehabilitation	50	30	2	0	0	0	0
Compound operation	50	16	6	3	1	0	0
Outside standard hours – Night							
Site establishment	50	62	50	31	6	1	0
Installation and removal of scaffolding and bracing	50	0	0	0	0	0	0
Bridge works	50	18	2	0	0	0	0
Demobilisation and rehabilitation	50	30	2	0	0	0	0
Compound operation	50	16	6	3	1	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Albury Station pedestrian bridge – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary works	55/45	310	96	4	0	0	0
Demolition	55/45	783	283	31	2	0	2
Piling	55/45	59	8	0	0	0	0
Concreting works	55/45	5	0	0	0	0	0
Installation of screens, handrails, etc	55/45	0	0	0	0	0	0
Lifting of truss and deck	55/45	30	2	0	0	0	0
Demobilisation and rehabilitation	55/45	245	61	0	0	0	0
Compound operation	55/45	3	1	1	0	0	0
Outside standard hours – Day time							
Preliminary works	50/35	797	310	100	0	0	0
Demolition	50/35	1146	783	313	2	1	0
Piling	50/35	337	59	8	0	0	0
Concreting works	50/35	40	5	0	0	0	0
Installation of screens, handrails, etc	50/35	2	0	0	0	0	0
Lifting of truss and deck	50/35	116	30	2	0	0	0
Demobilisation and rehabilitation	50/35	633	245	61	0	0	0
Compound operation	50/35	51	3	2	0	0	0
Outside standard hours – Evening							
Preliminary works	50/35	797	310	100	0	0	0
Demolition	50/35	1146	783	313	2	1	0
Piling	50/35	337	59	8	0	0	0
Concreting works	50/35	40	5	0	0	0	0
Installation of screens, handrails, etc	50/35	2	0	0	0	0	0
Lifting of truss and deck	50/35	116	30	2	0	0	0
Demobilisation and rehabilitation	50/35	633	245	61	0	0	0
Compound operation	50/35	51	3	2	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary works	50/35	797	310	100	0	0	0
Demolition	50/35	1146	783	313	2	1	0
Piling	50/35	337	59	8	0	0	0
Concreting works	50/35	40	5	0	0	0	0
Installation of screens, handrails, etc	50/35	2	0	0	0	0	0
Lifting of truss and deck	50/35	116	30	2	0	0	0
Demobilisation and rehabilitation	50/35	633	245	61	0	0	0
Compound operation	50/35	51	3	2	0	0	0
Albury Station pedestrian bridge (eastern ramps) – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary works	55/45	73	34	13	5	4	9
Demolition	55/45	241	45	31	4	6	10
Concreting works	55/45	14	4	4	4	1	5
Installation of fittings	55/45	1	2	6	0	1	1
Demobilisation and rehabilitation	55/45	55	27	13	5	3	8
Outside standard hours – Day time							
Preliminary works	50/35	418	73	46	3	7	0
Demolition	50/35	722	241	69	9	8	0
Concreting works	50/35	36	14	6	5	2	0
Installation of fittings	50/35	12	1	5	3	1	0
Demobilisation and rehabilitation	50/35	315	55	38	3	7	0
Outside standard hours – Evening							
Preliminary works	50/35	418	73	46	3	7	0
Demolition	50/35	722	241	69	9	8	0
Concreting works	50/35	36	14	6	5	2	0
Installation of fittings	50/35	12	1	5	3	1	0
Demobilisation and rehabilitation	50/35	315	55	38	3	7	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary works	50/35	418	73	46	3	7	0
Demolition	50/35	722	241	69	9	8	0
Concreting works	50/35	36	14	6	5	2	0
Installation of fittings	50/35	12	1	5	3	1	0
Demobilisation and rehabilitation	50/35	315	55	38	3	7	0
Albury Yard clearances – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary works	55/45	835	999	563	8	1	0
Offline widenings	55/45	352	798	603	15	0	0
Track re-alignment (< 300mm)	55/45	783	311	72	0	0	0
Track re-alignment (> 300mm)	55/45	559	783	380	3	0	0
Re-build track	55/45	918	365	56	0	0	0
Demobilisation and rehabilitation	55/45	931	918	418	3	0	0
Compound operation	55/45	300	34	4	1	0	0
Outside standard hours – Day time							
Preliminary works	50/35	273	340	1,739	563	9	0
Offline widenings	50/35	293	285	1,043	595	15	0
Track re-alignment (< 300mm)	50/35	324	501	1,059	72	0	0
Track re-alignment (> 300mm)	50/35	365	324	1,249	380	3	0
Re-build track	50/35	352	872	1,260	56	0	0
Demobilisation and rehabilitation	50/35	305	352	1,767	418	3	0
Compound operation	50/35	982	783	334	4	1	0
Outside standard hours –Evening							
Preliminary works	50/35	273	340	1,739	563	9	0
Offline widenings	50/35	293	285	1,043	595	15	0
Track re-alignment (< 300mm)	50/35	324	501	1,059	72	0	0
Track re-alignment (> 300mm)	50/35	365	324	1,249	380	3	0
Re-build track	50/35	352	872	1,260	56	0	0
Demobilisation and rehabilitation	50/35	305	352	1,767	418	3	0
Compound operation	50/35	982	783	334	4	1	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary works	50/35	273	340	1,739	563	9	0
Offline widenings	50/35	293	285	1,043	595	15	0
Track re-alignment (< 300mm)	50/35	324	501	1,059	72	0	0
Track re-alignment (> 300mm)	50/35	365	324	1,249	380	3	0
Re-build track	50/35	352	872	1,260	56	0	0
Demobilisation and rehabilitation	50/35	305	352	1,767	418	3	0
Compound operation	50/35	982	783	334	4	1	0
Albury Yard clearances (Gantry removal) – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary works	55/45	200	152	34	0	0	0
Install new cabling / conduits	55/45	200	152	34	0	0	0
Signalling works	55/45	4	0	0	0	0	0
Cut gantry bolts	55/45	152	30	4	0	0	0
Remove gantry	55/45	192	102	11	0	0	0
Remove footings	55/45	162	46	5	0	0	0
Backfill footings	55/45	152	30	4	0	0	0
Demobilisation and rehabilitation	55/45	207	120	26	0	0	0
Compound operation	55/45	7	4	0	0	0	0
Outside standard hours – Day time							
Preliminary works	50/35	309	203	320	34	0	0
Install new cabling / conduits	50/35	309	203	320	34	0	0
Signalling works	50/35	144	30	4	0	0	0
Cut gantry bolts	50/35	203	176	174	4	0	0
Remove gantry	50/35	273	178	276	11	0	0
Remove footings	50/35	221	193	195	5	0	0
Backfill footings	50/35	203	176	174	4	0	0
Demobilisation and rehabilitation	50/35	298	187	299	26	0	0
Compound operation	50/35	176	100	11	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	50/35	309	203	320	34	0	0
Install new cabling / conduits	50/35	309	203	320	34	0	0
Signalling works	50/35	144	30	4	0	0	0
Cut gantry bolts	50/35	203	176	174	4	0	0
Remove gantry	50/35	273	178	276	11	0	0
Remove footings	50/35	221	193	195	5	0	0
Backfill footings	50/35	203	176	174	4	0	0
Demobilisation and rehabilitation	50/35	298	187	299	26	0	0
Compound operation	50/35	176	100	11	0	0	0
Outside standard hours – Night							
Preliminary works	50/35	309	203	320	34	0	0
Install new cabling / conduits	50/35	309	203	320	34	0	0
Signalling works	50/35	144	30	4	0	0	0
Cut gantry bolts	50/35	203	176	174	4	0	0
Remove gantry	50/35	273	178	276	11	0	0
Remove footings	50/35	221	193	195	5	0	0
Backfill footings	50/35	203	176	174	4	0	0
Demobilisation and rehabilitation	50/35	298	187	299	26	0	0
Compound operation	50/35	176	100	11	0	0	0
Riverina Highway bridge – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary	55/45	872	672	313	3	0	0
Earthworks and drainage	55/45	499	607	318	3	0	0
Large scale piling	55/45	724	454	172	1	0	0
Small scale piling	55/45	568	266	53	0	0	0
Drainage works	55/45	512	202	39	0	0	0
Track works	55/45	650	290	78	0	0	0
Demobilisation and rehabilitation	55/45	701	359	146	1	0	0
Compound operation	55/45	226	48	4	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Daytime							
Preliminary	50/35	183	344	1,544	313	3	0
Earthworks and drainage	50/35	181	344	1,106	318	3	0
Large scale piling	50/35	229	383	1,178	172	1	0
Small scale piling	50/35	323	636	834	53	0	0
Drainage works	50/35	345	506	714	39	0	0
Track works	50/35	334	556	940	78	0	0
Demobilisation and rehabilitation	50/35	297	509	1,060	146	1	0
Compound operation	50/35	532	655	274	4	0	0
Outside standard hours – Evening							
Preliminary	50/35	183	344	1,544	313	3	0
Earthworks and drainage	50/35	181	344	1,106	318	3	0
Large scale piling	50/35	229	383	1,178	172	1	0
Small scale piling	50/35	323	636	834	53	0	0
Drainage works	50/35	345	506	714	39	0	0
Track works	50/35	334	556	940	78	0	0
Demobilisation and rehabilitation	50/35	297	509	1,060	146	1	0
Compound operation	50/35	532	655	274	4	0	0
Outside standard hours – Night							
Preliminary	50/35	183	344	1,544	313	3	0
Earthworks and drainage	50/35	181	344	1,106	318	3	0
Large scale piling	50/35	229	383	1,178	172	1	0
Small scale piling	50/35	323	636	834	53	0	0
Drainage works	50/35	345	506	714	39	0	0
Track works	50/35	334	556	940	78	0	0
Demobilisation and rehabilitation	50/35	297	509	1,060	146	1	0
Compound operation	50/35	532	655	274	4	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Billy Hughes bridge – NCA 03 (Total number of residential receivers 13)							
Standard hours							
Preliminary	47	6	1	0	0	0	0
Earthworks and drainage	47	3	2	0	0	0	0
Track re-alignment	47	0	0	0	0	0	0
Large scale piling	47	2	1	0	0	0	0
Small scale piling	47	2	0	0	0	0	0
Drainage works	47	1	0	0	0	0	0
Track works	47	2	0	0	0	0	0
Demobilisation and rehabilitation	47	2	1	0	0	0	0
Compound operation	47	0	0	0	0	0	0
Outside standard hours – Daytime							
Preliminary	42	0	6	1	0	0	0
Earthworks and drainage	42	0	3	2	0	0	0
Track re-alignment	42	1	0	0	0	0	0
Large scale piling	42	0	2	1	0	0	0
Small scale piling	42	1	2	0	0	0	0
Drainage works	42	6	1	0	0	0	0
Track works	42	5	2	0	0	0	0
Demobilisation and rehabilitation	42	4	2	1	0	0	0
Compound operation	42	2	0	0	0	0	0
Outside standard hours – Evening							
Preliminary	42	0	6	1	0	0	0
Earthworks and drainage	42	0	3	2	0	0	0
Track re-alignment	42	1	0	0	0	0	0
Large scale piling	42	0	2	1	0	0	0
Small scale piling	42	1	2	0	0	0	0
Drainage works	42	6	1	0	0	0	0
Track works	42	5	2	0	0	0	0
Demobilisation and rehabilitation	42	4	2	1	0	0	0
Compound operation	42	2	0	0	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary	42	0	6	1	0	0	0
Earthworks and drainage	42	0	3	2	0	0	0
Track re-alignment	42	1	0	0	0	0	0
Large scale piling	42	0	2	1	0	0	0
Small scale piling	42	1	2	0	0	0	0
Drainage works	42	6	1	0	0	0	0
Track works	42	5	2	0	0	0	0
Demobilisation and rehabilitation	42	4	2	1	0	0	0
Compound operation	42	2	0	0	0	0	0
Table Top Yard clearances – NCA 04 (Total number of residential receivers 143)							
Standard hours							
Preliminary works	52	4	2	0	0	0	0
Install new footings, cabling / conduits	52	4	2	0	0	0	0
Signalling works	52	0	0	0	0	0	0
Cut gantry bolts	52	2	0	0	0	0	0
Remove gantry	52	1	2	0	0	0	0
Remove footings	52	2	0	0	0	0	0
Backfill footings	52	2	0	0	0	0	0
Demobilisation and rehabilitation	52	1	2	0	0	0	0
Compound operation	52	0	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	47	12	4	2	0	0	0
Install new footings, cabling / conduits	47	12	4	2	0	0	0
Signalling works	47	0	0	0	0	0	0
Cut gantry bolts	47	4	2	0	0	0	0
Remove gantry	47	11	1	2	0	0	0
Remove footings	47	6	2	0	0	0	0
Backfill footings	47	4	2	0	0	0	0
Demobilisation and rehabilitation	47	14	1	2	0	0	0
Compound operation	47	2	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	47	12	4	2	0	0	0
Install new footings, cabling / conduits	47	12	4	2	0	0	0
Signalling works	47	0	0	0	0	0	0
Cut gantry bolts	47	4	2	0	0	0	0
Remove gantry	47	11	1	2	0	0	0
Remove footings	47	6	2	0	0	0	0
Backfill footings	47	4	2	0	0	0	0
Demobilisation and rehabilitation	47	14	1	2	0	0	0
Compound operation	47	2	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	47	12	4	2	0	0	0
Install new footings, cabling / conduits	47	12	4	2	0	0	0
Signalling works	47	0	0	0	0	0	0
Cut gantry bolts	47	4	2	0	0	0	0
Remove gantry	47	11	1	2	0	0	0
Remove footings	47	6	2	0	0	0	0
Backfill footings	47	4	2	0	0	0	0
Demobilisation and rehabilitation	47	14	1	2	0	0	0
Compound operation	47	2	0	0	0	0	0

* Refer Table 2.2 for a description of hours

MAXIMUM PREDICTED NOISE LEVELS (SLEEP DISTURBANCE)

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Murray River bridge – NCA 01 (Total number of residential receivers 622)							
Site establishment	56	65	43	17	13	3	0
Installation and removal of scaffolding and bracing			72	21	21	4	1
Bridge works			106	108	60	13	1
Demobilisation and rehabilitation			77	80	93	21	5
Compound operation			50	17	17	4	0
Albury Station pedestrian bridge – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Preliminary works	56/51	65	261	61	1	0	0
Demolition			898	364	53	2	0
Piling			59	8	0	0	0
Concreting works			7	1	0	0	0
Installation of screens, handrails, etc			0	0	0	0	0
Lifting of truss and deck			2	0	0	0	0
Demobilisation and rehabilitation			195	42	0	0	0
Compound operation			3	1	1	0	0
Albury Station pedestrian bridge (eastern ramps) – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Preliminary works	56/51	65	55	27	13	5	3
Demolition			315	55	38	3	7
Concreting works			18	4	4	4	1
Installation of fittings			2	1	6	1	0
Demobilisation and rehabilitation			45	24	9	5	3
Albury Yard clearances – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Preliminary works	56	65	464	79	5	1	0
Offline widenings			488	125	13	0	0
Track re-alignment (< 300mm)			327	69	1	0	0
Track re-alignment (> 300mm)			612	213	23	0	0
Re-build track			76	3	0	0	0
Demobilisation and rehabilitation			348	51	2	0	0
Compound operation			0	1	1	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Albury Yard clearances (Gantry removal) – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Preliminary works	56/51	65	50	8	0	0	0
Install new cabling / conduits			62	12	0	0	0
Signalling works			0	0	0	0	0
Cut gantry bolts			8	0	0	0	0
Remove gantry			62	12	0	0	0
Remove footings			91	18	0	0	0
Backfill footings			12	0	0	0	0
Demobilisation and rehabilitation			25	6	0	0	0
Compound operation			0	0	0	0	0
Riverina Highway bridge – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Preliminary	56/51	65	208	25	1	0	0
Earthworks and drainage			253	65	3	0	0
Large scale piling			266	51	2	0	0
Small scale piling			208	30	2	0	0
Drainage works			91	7	1	0	0
Track works			181	25	1	0	0
Demobilisation and rehabilitation			98	10	1	0	0
Compound operation			12	0	0	0	0
Billy Hughes bridge – NCA 03 (Total number of residential receivers 13)							
Preliminary	53	65	1	0	0	0	0
Earthworks and drainage			2	0	0	0	0
Track re-alignment			0	0	0	0	0
Large scale piling			2	0	0	0	0
Small scale piling			1	0	0	0	0
Drainage works			1	0	0	0	0
Track works			1	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Table Top Yard clearances – NCA 04 (Total number of residential receivers 143)							
Preliminary works	61	65	0	0	0	0	0
Install new footings, cabling / conduits			0	0	0	0	0
Signalling works			0	0	0	0	0
Cut gantry bolts			0	0	0	0	0
Remove gantry			0	0	0	0	0
Remove footings			2	0	0	0	0
Backfill footings			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0

(1) Sleep disturbance applicable at residential receivers only, during period of 10pm to 7am.

PREDICTED CONSTRUCTION NOISE LEVELS AT NON-RESIDENTIAL RECEIVERS

MURRAY RIVER BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML					
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	55
Site establishment	0	0	0	1	0	0
Installation and removal of scaffolding and bracing	0	0	0	0	0	0
Bridge works	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0

ALBURY YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	23	0	19	4	0	0	1
Offline widenings	18	0	7	4	0	0	1
Track re-alignment (< 300mm)	4	0	3	4	0	0	0
Track re-alignment (> 300mm)	1	0	2	4	0	0	0
Re-build track	6	0	3	4	0	0	0
Demobilisation and rehabilitation	12	0	3	4	0	0	0
Compound operation	15	0	6	4	0	0	0

ALBURY YARD CLEARANCES (GANTRY REMOVAL)	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	1	0	0	1	0	0	0
Install new cabling / conduits	1	0	0	1	0	0	0
Signalling works	0	0	0	0	0	0	0
Cut gantry bolts	0	0	0	0	0	0	0
Remove gantry	0	0	0	0	0	0	0
Remove footings	0	0	0	0	0	0	0
Backfill footings	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

ALBURY STATION PEDESTRIAN BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	10	0	6	4	0	0	1
Demolition	28	0	24	4	0	0	1
Piling	1	0	2	1	0	0	0
Concreting works	0	0	3	1	0	0	0
Installation of screens, handrails, etc	0	0	1	0	0	0	0
Lifting of truss and deck	0	0	3	1	0	0	0
Demobilisation and rehabilitation	9	0	4	4	0	0	0
Compound operation	4	0	4	4	0	0	0

ALBURY STATION PEDESTRIAN BRIDGE (EASTERN RAMPS)	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Demolition	6	0	0	0	0	0	0
Piling	0	0	0	0	0	0	0
Concreting works	0	0	0	0	0	0	0
Installation of screens, handrails, etc	0	0	0	0	0	0	0
Lifting of truss and deck	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

RIVERINA HIGHWAY BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary	4	0	2	0	0	0	0
Earthworks and drainage	3	0	2	0	0	0	0
Large scale piling	4	0	2	0	0	0	0
Small scale piling	4	0	2	0	0	0	0
Drainage works	1	0	2	0	0	0	0
Track works	4	0	2	0	0	0	0
Demobilisation and rehabilitation	4	0	2	0	0	0	0
Compound operation	0	0	0	0	0	0	0

BILLY HUGHES BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary	0	0	0	0	0	0	0
Earthworks and drainage	0	0	0	0	0	0	0
Track re-alignment	0	0	0	0	0	0	0
Large scale piling	0	0	0	0	0	0	0
Small scale piling	0	0	0	0	0	0	0
Drainage works	0	0	0	0	0	0	0
Track works	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

TABLE TOP YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Install new footings, cabling / conduits	0	0	0	0	0	0	0
Signalling works	0	0	0	0	0	0	0
Cut gantry bolts	0	0	0	0	0	0	0
Remove gantry	0	0	0	0	0	0	0
Remove footings	0	0	0	0	0	0	0
Backfill footings	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

APPENDIX C-2 ALBURY RESIDUAL (MITIGATED) CONSTRUCTION NOISE LEVELS

ASSUMED MITIGATION MEASURES – POTENTIAL NOISE REDUCTIONS

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
All sites		
Site establishment	6, 7	15
Demobilisation and rehabilitation	6, 7	15
Site compounds	2, 3, 5, 6	19
Murray River bridge		
Installation and removal of scaffolding and bracing	7	8
Bridge works	1, 8	15
Albury Yard clearances		
Offline widenings	4, 7	12
Track re-alignment (<300mm)	7	8
Track realignment (>300mm)	4, 7	10
Rebuild track	7	8
Albury Station and Table Top Yard clearances (Gantry Removal)		
Install cabling / conduits	7	10
Signalling works	-	-
Cut gantry bolts	-	-
Remove gantry	7	8
Remove footings	1, 7	12
Backfill footings	1, 7	12
Albury Station pedestrian bridge		
Demolition	1, 7	12
Piling	1	5
Concreting works	7	10
Installation of fittings	-	-
Lifting of truss and deck	1, 7	8
Riverina Highway and Billy Hughes bridge		
Earthworks	1, 7	12
Large scale piling	1, 7	10
Small scale piling	1	5
Drainage	1, 7	12
Track works	7	8

(1) Refer to Chapter 8

PREDICTED CONSTRUCTION NOISE LEVELS AT RESIDENTIAL RECEIVERS

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Murray River bridge – NCA 01 (Total number of residential receivers 622)							
Standard hours							
Site establishment	55	3	3	1	0	0	0
Installation and removal of scaffolding and bracing	55	0	0	0	0	0	0
Bridge works	55	0	0	0	0	0	0
Demobilisation and rehabilitation	55	0	0	0	0	0	0
Compound operation	55	0	0	0	0	0	0
Outside standard hours – Daytime							
Site establishment	50	15	3	4	0	0	0
Installation and removal of scaffolding and bracing	50	0	0	0	0	0	0
Bridge works	50	0	0	0	0	0	0
Demobilisation and rehabilitation	50	0	0	0	0	0	0
Compound operation	50	1	0	0	0	0	0
Outside standard hours – Evening							
Site establishment	50	15	3	4	0	0	0
Installation and removal of scaffolding and bracing	50	0	0	0	0	0	0
Bridge works	50	0	0	0	0	0	0
Demobilisation and rehabilitation	50	0	0	0	0	0	0
Compound operation	50	1	0	0	0	0	0
Outside standard hours – Night							
Site establishment	50	15	3	4	0	0	0
Installation and removal of scaffolding and bracing	50	0	0	0	0	0	0
Bridge works	50	0	0	0	0	0	0
Demobilisation and rehabilitation	50	0	0	0	0	0	0
Compound operation	50	1	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Albury Station pedestrian bridge – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary works	55/45	0	0	0	0	0	0
Demolition	55/45	7	1	1	0	0	0
Piling	55/45	8	0	0	0	0	0
Concreting works	55/45	0	0	0	0	0	0
Installation of screens, handrails, etc	55/45	0	0	0	0	0	0
Lifting of truss and deck	55/45	1	0	0	0	0	0
Demobilisation and rehabilitation	55/45	0	0	0	0	0	0
Compound operation	55/45	0	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	50/35	4	0	0	0	0	0
Demolition	50/35	136	7	1	1	0	0
Piling	50/35	59	8	0	0	0	0
Concreting works	50/35	0	0	0	0	0	0
Installation of screens, handrails, etc	50/35	2	0	0	0	0	0
Lifting of truss and deck	50/35	7	1	0	0	0	0
Demobilisation and rehabilitation	50/35	0	0	0	0	0	0
Compound operation	50/35	1	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	50/35	4	0	0	0	0	0
Demolition	50/35	136	7	1	1	0	0
Piling	50/35	59	8	0	0	0	0
Concreting works	50/35	0	0	0	0	0	0
Installation of screens, handrails, etc	50/35	2	0	0	0	0	0
Lifting of truss and deck	50/35	7	1	0	0	0	0
Demobilisation and rehabilitation	50/35	0	0	0	0	0	0
Compound operation	50/35	1	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary works	50/35	4	0	0	0	0	0
Demolition	50/35	136	7	1	1	0	0
Piling	50/35	59	8	0	0	0	0
Concreting works	50/35	0	0	0	0	0	0
Installation of screens, handrails, etc	50/35	2	0	0	0	0	0
Lifting of truss and deck	50/35	7	1	0	0	0	0
Demobilisation and rehabilitation	50/35	0	0	0	0	0	0
Compound operation	50/35	1	0	0	0	0	0
Albury Station pedestrian bridge (eastern ramps) – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary works	55/45	1	2	6	0	1	1
Demolition	55/45	14	4	4	4	1	5
Concreting works	55/45	2	2	4	1	0	1
Installation of fittings	55/45	1	2	6	0	1	1
Demobilisation and rehabilitation	55/45	2	1	6	1	0	1
Outside standard hours – Day time							
Preliminary works	50/35	12	1	5	3	1	0
Demolition	50/35	36	14	6	5	2	0
Concreting works	50/35	4	2	5	1	1	0
Installation of fittings	50/35	12	1	5	3	1	0
Demobilisation and rehabilitation	50/35	11	2	5	2	1	0
Outside standard hours – Evening							
Preliminary works	50/35	12	1	5	3	1	0
Demolition	50/35	36	14	6	5	2	0
Concreting works	50/35	4	2	5	1	1	0
Installation of fittings	50/35	12	1	5	3	1	0
Demobilisation and rehabilitation	50/35	11	2	5	2	1	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary works	50/35	12	1	5	3	1	0
Demolition	50/35	36	14	6	5	2	0
Concreting works	50/35	4	2	5	1	1	0
Installation of fittings	50/35	12	1	5	3	1	0
Demobilisation and rehabilitation	50/35	11	2	5	2	1	0
Albury Yard clearances – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary works	55/45	103	7	1	1	0	0
Offline widenings	55/45	270	60	4	0	0	0
Track re-alignment (< 300mm)	55/45	69	3	0	0	0	0
Track re-alignment (> 300mm)	55/45	508	150	16	0	0	0
Re-build track	55/45	3	0	0	0	0	0
Demobilisation and rehabilitation	55/45	5	0	0	0	0	0
Compound operation	55/45	300	36	4	1	0	0
Outside standard hours – Day time							
Preliminary works	50/35	964	462	110	1	1	0
Offline widenings	50/35	458	767	330	4	0	0
Track re-alignment (< 300mm)	50/35	749	311	72	0	0	0
Track re-alignment (> 300mm)	50/35	353	728	651	16	0	0
Re-build track	50/35	365	55	3	0	0	0
Demobilisation and rehabilitation	50/35	452	95	5	0	0	0
Compound operation	50/35	983	783	336	4	1	0
Outside standard hours – Evening							
Preliminary works	50/35	964	462	110	1	1	0
Offline widenings	50/35	458	767	330	4	0	0
Track re-alignment (< 300mm)	50/35	749	311	72	0	0	0
Track re-alignment (> 300mm)	50/35	353	728	651	16	0	0
Re-build track	50/35	365	55	3	0	0	0
Demobilisation and rehabilitation	50/35	452	95	5	0	0	0
Compound operation	50/35	983	783	336	4	1	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary works	50/35	964	462	110	1	1	0
Offline widenings	50/35	458	767	330	4	0	0
Track re-alignment (< 300mm)	50/35	749	311	72	0	0	0
Track re-alignment (> 300mm)	50/35	353	728	651	16	0	0
Re-build track	50/35	365	55	3	0	0	0
Demobilisation and rehabilitation	50/35	452	95	5	0	0	0
Compound operation	50/35	983	783	336	4	1	0
Albury Yard clearances (Gantry removal) – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary works	55/45	4	0	0	0	0	0
Install new cabling / conduits	55/45	30	4	0	0	0	0
Signalling works	55/45	4	0	0	0	0	0
Cut gantry bolts	55/45	152	30	4	0	0	0
Remove gantry	55/45	30	4	0	0	0	0
Remove footings	55/45	4	0	0	0	0	0
Backfill footings	55/45	4	0	0	0	0	0
Demobilisation and rehabilitation	55/45	4	0	0	0	0	0
Compound operation	55/45	0	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	50/35	144	30	4	0	0	0
Install new cabling / conduits	50/35	176	144	34	0	0	0
Signalling works	50/35	144	30	4	0	0	0
Cut gantry bolts	50/35	203	176	174	4	0	0
Remove gantry	50/35	176	144	34	0	0	0
Remove footings	50/35	116	22	4	0	0	0
Backfill footings	50/35	100	7	4	0	0	0
Demobilisation and rehabilitation	50/35	116	22	4	0	0	0
Compound operation	50/35	0	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	50/35	144	30	4	0	0	0
Install new cabling / conduits	50/35	176	144	34	0	0	0
Signalling works	50/35	144	30	4	0	0	0
Cut gantry bolts	50/35	203	176	174	4	0	0
Remove gantry	50/35	176	144	34	0	0	0
Remove footings	50/35	116	22	4	0	0	0
Backfill footings	50/35	100	7	4	0	0	0
Demobilisation and rehabilitation	50/35	116	22	4	0	0	0
Compound operation	50/35	0	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	50/35	144	30	4	0	0	0
Install new cabling / conduits	50/35	176	144	34	0	0	0
Signalling works	50/35	144	30	4	0	0	0
Cut gantry bolts	50/35	203	176	174	4	0	0
Remove gantry	50/35	176	144	34	0	0	0
Remove footings	50/35	116	22	4	0	0	0
Backfill footings	50/35	100	7	4	0	0	0
Demobilisation and rehabilitation	50/35	116	22	4	0	0	0
Compound operation	50/35	0	0	0	0	0	0
Riverina Highway bridge – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Standard hours							
Preliminary	55/45	13	2	0	0	0	0
Earthworks and drainage	55/45	32	2	1	0	0	0
Small scale piling	55/45	110	37	5	0	0	0
Large scale piling	55/45	12	1	0	0	0	0
Drainage works	55/45	138	50	4	0	0	0
Track works	55/45	29	2	1	0	0	0
Demobilisation and rehabilitation	55/45	3	1	0	0	0	0
Compound operation	55/45	0	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Daytime							
Preliminary	50/35	177	57	15	0	0	0
Earthworks and drainage	50/35	177	126	34	1	0	0
Small scale piling	50/35	111	190	147	5	0	0
Large scale piling	50/35	153	56	13	0	0	0
Drainage works	50/35	99	132	188	4	0	0
Track works	50/35	197	104	31	1	0	0
Demobilisation and rehabilitation	50/35	89	29	4	0	0	0
Compound operation	50/35	2	0	0	0	0	0
Outside standard hours – Evening							
Preliminary	50/35	177	57	15	0	0	0
Earthworks and drainage	50/35	177	126	34	1	0	0
Small scale piling	50/35	111	190	147	5	0	0
Large scale piling	50/35	153	56	13	0	0	0
Drainage works	50/35	99	132	188	4	0	0
Track works	50/35	197	104	31	1	0	0
Demobilisation and rehabilitation	50/35	89	29	4	0	0	0
Compound operation	50/35	2	0	0	0	0	0
Outside standard hours – Night							
Preliminary	50/35	177	57	15	0	0	0
Earthworks and drainage	50/35	177	126	34	1	0	0
Small scale piling	50/35	111	190	147	5	0	0
Large scale piling	50/35	153	56	13	0	0	0
Drainage works	50/35	99	132	188	4	0	0
Track works	50/35	197	104	31	1	0	0
Demobilisation and rehabilitation	50/35	89	29	4	0	0	0
Compound operation	50/35	2	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Billy Hughes bridge – NCA 03 (Total number of residential receivers 13)							
Standard hours							
Preliminary	47	0	0	0	0	0	0
Earthworks and drainage	47	0	0	0	0	0	0
Track re-alignment	47	0	0	0	0	0	0
Large scale piling	47	0	0	0	0	0	0
Small scale piling	47	0	0	0	0	0	0
Drainage works	47	0	0	0	0	0	0
Track works	47	0	0	0	0	0	0
Demobilisation and rehabilitation	47	0	0	0	0	0	0
Compound operation	47	0	0	0	0	0	0
Outside standard hours – Daytime							
Preliminary	42	0	0	0	0	0	0
Earthworks and drainage	42	1	0	0	0	0	0
Track re-alignment	42	1	0	0	0	0	0
Large scale piling	42	1	0	0	0	0	0
Small scale piling	42	2	0	0	0	0	0
Drainage works	42	0	0	0	0	0	0
Track works	42	1	0	0	0	0	0
Demobilisation and rehabilitation	42	0	0	0	0	0	0
Compound operation	42	0	0	0	0	0	0
Outside standard hours – Evening							
Preliminary	42	0	0	0	0	0	0
Earthworks and drainage	42	1	0	0	0	0	0
Track re-alignment	42	1	0	0	0	0	0
Large scale piling	42	1	0	0	0	0	0
Small scale piling	42	2	0	0	0	0	0
Drainage works	42	0	0	0	0	0	0
Track works	42	1	0	0	0	0	0
Demobilisation and rehabilitation	42	0	0	0	0	0	0
Compound operation	42	0	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary	42	0	0	0	0	0	0
Earthworks and drainage	42	1	0	0	0	0	0
Track re-alignment	42	1	0	0	0	0	0
Large scale piling	42	1	0	0	0	0	0
Small scale piling	42	2	0	0	0	0	0
Drainage works	42	0	0	0	0	0	0
Track works	42	1	0	0	0	0	0
Demobilisation and rehabilitation	42	0	0	0	0	0	0
Compound operation	42	0	0	0	0	0	0
Table Top Yard clearances – NCA 04 (Total number of residential receivers 143)							
Standard hours							
Preliminary works	52	0	0	0	0	0	0
Install new footings, cabling / conduits	52	0	0	0	0	0	0
Signalling works	52	0	0	0	0	0	0
Cut gantry bolts	52	2	0	0	0	0	0
Remove gantry	52	0	0	0	0	0	0
Remove footings	52	0	0	0	0	0	0
Backfill footings	52	0	0	0	0	0	0
Demobilisation and rehabilitation	52	0	0	0	0	0	0
Compound operation	52	0	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	47	0	0	0	0	0	0
Install new footings, cabling / conduits	47	2	0	0	0	0	0
Signalling works	47	0	0	0	0	0	0
Cut gantry bolts	47	4	2	0	0	0	0
Remove gantry	47	2	0	0	0	0	0
Remove footings	47	0	0	0	0	0	0
Backfill footings	47	0	0	0	0	0	0
Demobilisation and rehabilitation	47	0	0	0	0	0	0
Compound operation	47	0	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	47	0	0	0	0	0	0
Install new footings, cabling / conduits	47	2	0	0	0	0	0
Signalling works	47	0	0	0	0	0	0
Cut gantry bolts	47	4	2	0	0	0	0
Remove gantry	47	2	0	0	0	0	0
Remove footings	47	0	0	0	0	0	0
Backfill footings	47	0	0	0	0	0	0
Demobilisation and rehabilitation	47	0	0	0	0	0	0
Compound operation	47	0	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	47	0	0	0	0	0	0
Install new footings, cabling / conduits	47	2	0	0	0	0	0
Signalling works	47	0	0	0	0	0	0
Cut gantry bolts	47	4	2	0	0	0	0
Remove gantry	47	2	0	0	0	0	0
Remove footings	47	0	0	0	0	0	0
Backfill footings	47	0	0	0	0	0	0
Demobilisation and rehabilitation	47	0	0	0	0	0	0
Compound operation	47	0	0	0	0	0	0

* Refer Table 2.2 for a description of hours

MAXIMUM PREDICTED NOISE LEVELS (SLEEP DISTURBANCE)

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Murray River bridge – NCA 01 (Total number of residential receivers 622)							
Site Establishment	56	65	5	0	0	0	0
Installation and removal of scaffolding and bracing			0	0	0	0	0
Bridge works			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0
Albury Station pedestrian bridge – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Lifting of truss and deck	56/51	65	1	0	0	0	0
Demolition			161	12	2	1	0
Piling			54	8	0	0	0
Concreting works			1	0	0	0	0
Installation of screens, handrails, etc			2	0	0	0	0
Lifting of truss and deck			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0
Albury Yard clearances – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Preliminary works	56/51	65	1	1	0	0	0
Offline widenings			2	0	0	0	0
Track re-alignment (< 300mm)			0	0	0	0	0
Track re-alignment (> 300mm)			12	0	0	0	0
Re-build track			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Albury Station Yard clearances (Gantry removal) – NCA 01/02 (Total number of residential receivers 622 / 6,267)							
Preliminary works	56/51	65	0	0	0	0	0
Install new cabling / conduits			4	0	0	0	0
Signalling works			0	0	0	0	0
Cut gantry bolts			26	4	0	0	0
Remove gantry			7	2	0	0	0
Remove footings			4	0	0	0	0
Backfill footings			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Riverina Highway bridge – NCA01/02 (Total number of residential receivers 622 / 6,267)							
Preliminary	56/51	65	1	0	0	0	0
Earthworks and drainage			2	1	0	0	0
Large scale piling			56	12	1	0	0
Small scale piling			11	1	0	0	0
Drainage works			80	13	1	0	0
Track works			16	2	0	0	0
Demobilisation and rehabilitation			1	0	0	0	0
Compound operation			0	0	0	0	0
Billy Hughes bridge – NCA 03 (Total number of residential receivers 13)							
Preliminary	53	65	0	0	0	0	0
Earthworks and drainage			0	0	0	0	0
Track re-alignment			0	0	0	0	0
Large scale piling			0	0	0	0	0
Small scale piling			0	0	0	0	0
Drainage works			0	0	0	0	0
Track works			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Table Top Yard clearances – NCA 04 (Total number of residential receivers 143)							
Preliminary works	61	65	0	0	0	0	0
Install new footings, cabling / conduits			0	0	0	0	0
Signalling works			0	0	0	0	0
Cut gantry bolts			0	0	0	0	0
Remove gantry			0	0	0	0	0
Remove footings			0	0	0	0	0
Backfill footings			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0

(1) Sleep disturbance applicable at residential receivers only, during period of 10pm to 7am.

PREDICTED CONSTRUCTION NOISE LEVELS AT NON RESIDENTIAL RECEIVERS

MURRAY RIVER BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Site establishment	0	0	0	0	0	0	0
Installation and removal of scaffolding and bracing	0	0	0	0	0	0	0
Bridge works	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

ALBURY YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	4	0	4	4	0	0	0
Offline widenings	6	0	5	4	0	0	0
Track re-alignment (< 300mm)	3	0	0	3	0	0	0
Track re-alignment (> 300mm)	4	0	4	4	0	0	0
Re-build track	12	0	7	4	0	0	0
Demobilisation and rehabilitation	3	0	0	3	0	0	0
Compound operation	3	0	0	3	0	0	0

ALBURY YARD CLEARANCES (GANTRY REMOVAL)	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	4	0	4	4	0	0	0
Install new cabling / conduits	9	0	6	4	0	0	0
Signalling works	4	0	4	4	0	0	0
Cut gantry bolts	15	0	11	4	0	0	0
Remove gantry	9	0	6	4	0	0	0
Remove footings	3	0	4	4	0	0	0
Backfill footings	3	0	4	3	0	0	0
Demobilisation and rehabilitation	3	0	4	4	0	0	0
Compound operation	2	0	1	2	0	0	0

ALBURY STATION PEDESTRIAN BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	4	0	4	4	0	0	0
Demolition	6	0	5	4	0	0	0
Piling	15	0	11	4	0	0	0
Concreting works	9	0	6	4	0	0	0
Installation of screens, handrails, etc	13	0	11	4	0	0	0
Lifting of truss and deck	19	0	13	4	0	0	0
Demobilisation and rehabilitation	0	0	1	4	0	0	0
Compound operation	42	3	417	111	29	0	7

RIVERINA HIGHWAY BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary	4	0	4	4	0	0	0
Earthworks and drainage	6	0	5	4	0	0	0
Large scale piling	5	0	2	0	0	0	0
Small scale piling	8	0	2	0	0	0	0
Drainage works	6	0	5	4	0	0	0
Track works	12	0	7	4	0	0	0
Demobilisation and rehabilitation	4	0	4	4	0	0	0
Compound operation	3	0	3	3	0	0	0

BILLY HUGHES BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary	0	0	0	0	0	0	0
Earthworks and drainage	0	0	0	0	0	0	0
Track re-alignment	0	0	0	0	0	0	0
Large scale piling	0	0	0	0	0	0	0
Small scale piling	0	0	0	0	0	0	0
Drainage works	0	0	0	0	0	0	0
Track works	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

TABLE TOP YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L _{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Install new footings, cabling / conduits	0	0	0	0	0	0	0
Signalling works	0	0	0	0	0	0	0
Cut gantry bolts	0	0	0	0	0	0	0
Remove gantry	0	0	0	0	0	0	0
Remove footings	0	0	0	0	0	0	0
Backfill footings	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

**APPENDIX C-3
GREATER HUME–LOCKHART
(UNMITIGATED) CONSTRUCTION
NOISE LEVELS**

PREDICTED CONSTRUCTION NOISE LEVELS AT RESIDENTIAL RECEIVERS

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Culcairn Yard clearances – NCA 05 (Total number of residential receivers 571)							
Standard hours							
Preliminary works	46	85	254	174	18	2	2
Offline widenings	46	41	202	250	32	0	1
Remove gantry	46	69	243	199	20	2	2
Drainage works and service relocation	46	49	226	230	29	2	3
Track re-alignment <300mm	46	247	126	54	4	0	0
Track re-alignment >300mm	46	86	247	168	16	0	0
Re-build track	46	246	95	45	2	0	0
Demobilisation and rehabilitation	46	69	243	199	20	2	2
Compound operation	46	51	13	6	1	0	0
Outside standard hours – Day							
Preliminary works	41	14	85	386	55	7	0
Offline widenings	41	18	41	395	82	7	0
Remove gantry	41	14	69	392	62	10	0
Drainage works and service relocation	41	12	49	404	72	11	0
Track re-alignment <300mm	41	86	247	168	16	0	0
Track re-alignment >300mm	41	18	86	373	54	4	0
Re-build track	41	123	246	131	11	0	0
Demobilisation and rehabilitation	41	14	69	392	62	10	0
Compound operation	41	147	51	17	3	0	0
Outside standard hours – Evening							
Preliminary works	40	10	59	405	66	8	0
Offline widenings	40	16	27	389	105	7	0
Remove gantry	40	12	49	404	72	11	0
Drainage works and service relocation	40	9	33	405	88	13	0
Track re-alignment <300mm	40	66	235	195	26	0	0
Track re-alignment >300mm	40	19	66	386	65	5	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Re-build track	40	86	247	168	16	0	0
Demobilisation and rehabilitation	40	12	49	404	72	11	0
Compound operation	40	188	63	25	3	0	0
Outside standard hours – Night							
Preliminary works	35	1	10	304	211	23	0
Offline widenings	35	4	16	186	302	40	0
Remove gantry	35	2	12	275	230	31	0
Drainage works and service relocation	35	2	9	223	279	37	0
Track re-alignment <300mm	35	19	66	386	65	5	0
Track re-alignment >300mm	35	7	19	301	195	26	0
Re-build track	35	18	86	373	54	4	0
Demobilisation and rehabilitation	35	2	12	275	230	31	0
Compound operation	35	188	188	80	10	1	0
Henty Yard clearances – NCA 06 (Total number of residential receivers 511)							
Standard hours							
Preliminary works	47	135	215	100	15	0	0
Offline widenings	47	30	201	217	34	4	9
Remove gantry	47	154	183	111	16	3	3
Drainage works and service relocation	47	154	183	111	16	3	3
Track re-alignment <300mm	47	154	183	111	16	3	3
Track re-alignment >300mm	47	154	183	111	16	3	3
Re-build track	47	154	183	111	16	3	3
Demobilisation and rehabilitation	47	122	197	135	18	3	3
Compound operation	47	35	9	6	0	0	0
Outside standard hours – Day							
Preliminary works	42	23	135	296	30	4	0
Offline widenings	42	8	30	348	92	16	0
Remove gantry	42	19	154	269	37	7	0
Drainage works and service relocation	42	19	154	269	37	7	0
Track re-alignment <300mm	42	19	154	269	37	7	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Track re-alignment >300mm	42	19	154	269	37	7	0
Re-build track	42	19	154	269	37	7	0
Demobilisation and rehabilitation	42	13	122	298	46	9	0
Compound operation	42	72	35	15	0	0	0
Outside standard hours – Evening							
Preliminary works	41	18	101	330	38	4	0
Offline widenings	41	8	19	337	111	19	0
Remove gantry	41	13	122	298	46	9	0
Drainage works and service relocation	41	13	122	298	46	9	0
Track re-alignment <300mm	41	13	122	298	46	9	0
Track re-alignment >300mm	41	13	122	298	46	9	0
Re-build track	41	13	122	298	46	9	0
Demobilisation and rehabilitation	41	5	89	327	55	13	0
Compound operation	41	97	41	19	1	0	0
Outside standard hours – Night							
Preliminary works	35	2	12	309	153	19	0
Offline widenings	35	1	6	135	298	55	0
Remove gantry	35	5	5	305	150	29	0
Drainage works and service relocation	35	5	5	305	150	29	0
Track re-alignment <300mm	35	5	5	305	150	29	0
Track re-alignment >300mm	35	5	5	305	150	29	0
Re-build track	35	5	5	305	150	29	0
Demobilisation and rehabilitation	35	3	5	273	180	33	0
Compound operation	35	168	116	66	9	0	0
Yerong Creek Yard clearances – NCA 07 (Total number of residential receivers 78)							
Standard hours							
Preliminary works	49	12	28	25	5	0	2
Offline widenings	49	6	26	34	5	0	0
Remove gantry	49	17	30	16	2	0	0
Drainage works and service relocation	49	6	26	34	5	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Track re-alignment <300mm	49	30	19	12	0	0	0
Track re-alignment >300mm	49	28	20	15	0	0	0
Re-build track	49	30	18	11	0	0	0
Demobilisation and rehabilitation	49	9	30	23	6	2	4
Compound operation	49	16	8	10	1	0	0
Outside standard hours - Day							
Preliminary works	44	1	12	48	8	2	0
Offline widenings	44	0	6	52	12	1	0
Remove gantry	44	5	17	46	1	1	0
Drainage works and service relocation	44	0	6	52	12	1	0
Track re-alignment <300mm	44	12	30	27	4	0	0
Track re-alignment >300mm	44	11	28	27	8	0	0
Re-build track	44	11	30	26	3	0	0
Demobilisation and rehabilitation	44	4	9	47	8	6	0
Compound operation	44	24	16	13	6	0	0
Outside standard hours – Evening							
Preliminary works	44	1	12	48	8	2	0
Offline widenings	44	0	6	52	12	1	0
Remove gantry	44	5	17	46	1	1	0
Drainage works and service relocation	44	0	6	52	12	1	0
Track re-alignment <300mm	44	12	30	27	4	0	0
Track re-alignment >300mm	44	11	28	27	8	0	0
Re-build track	44	11	30	26	3	0	0
Demobilisation and rehabilitation	44	4	9	47	8	6	0
Compound operation	44	24	16	13	6	0	0
Outside standard hours – Night							
Preliminary works	35	0	0	14	48	9	0
Offline widenings	35	0	0	9	52	10	0
Remove gantry	35	0	2	30	37	2	0
Drainage works and service relocation	35	0	0	9	52	10	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Track re-alignment <300mm	35	0	4	41	26	3	0
Track re-alignment >300mm	35	0	1	42	27	4	0
Re-build track	35	0	6	45	20	3	0
Demobilisation and rehabilitation	35	0	0	18	44	12	0
Compound operation	35	5	13	39	11	6	0
The Rock Yard clearances – NCA 08 (Total number of residential receivers 441)							
Standard hours							
Preliminary works	49	105	31	22	2	0	0
Install new cabling/conduits	49	105	31	22	2	0	0
Signalling works	49	6	2	0	0	0	0
Cut gantry bolts	49	31	16	8	0	0	0
Remove gantry	49	58	28	12	2	0	0
Remove footings	49	41	18	9	1	0	0
Backfill footings	49	31	16	8	0	0	0
Demobilisation and rehabilitation	49	74	32	15	2	0	0
Compound operation	49	8	4	2	0	0	0
Outside standard hours – Day							
Preliminary works	44	98	105	47	8	0	0
Install new cabling/conduits	44	98	105	47	8	0	0
Signalling works	44	16	6	2	0	0	0
Cut gantry bolts	44	105	31	22	2	0	0
Remove gantry	44	139	58	36	6	0	0
Remove footings	44	125	41	25	3	0	0
Backfill footings	44	105	31	22	2	0	0
Demobilisation and rehabilitation	44	126	74	43	6	0	0
Compound operation	44	28	8	6	0	0	0
Outside standard hours – Evening							
Preliminary works	44	98	105	47	8	0	0
Install new cabling/conduits	44	98	105	47	8	0	0
Signalling works	44	16	6	2	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Cut gantry bolts	44	105	31	22	2	0	0
Remove gantry	44	139	58	36	6	0	0
Remove footings	44	125	41	25	3	0	0
Backfill footings	44	105	31	22	2	0	0
Demobilisation and rehabilitation	44	126	74	43	6	0	0
Compound operation	44	28	8	6	0	0	0
Outside standard hours – Night							
Preliminary works	35	17	35	200	43	6	0
Install new cabling/conduits	35	17	35	200	43	6	0
Signalling works	35	74	32	15	2	0	0
Cut gantry bolts	35	35	126	106	15	2	0
Remove gantry	35	26	53	187	29	3	0
Remove footings	35	31	98	136	22	2	0
Backfill footings	35	35	126	106	15	2	0
Demobilisation and rehabilitation	35	22	39	197	36	6	0
Compound operation	35	135	52	29	3	0	0

* Refer Table 2.2 for a description of hours

MAXIMUM PREDICTED NOISE LEVELS (SLEEP DISTURBANCE)

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Culcairn Yard clearances – NCA05 (Total number of residential receivers 571)							
Preliminary works	40	65	59	245	211	21	2
Offline widenings			27	159	302	39	1
Remove gantry			190	215	88	13	0
Drainage works and service relocation			33	190	279	34	3
Track re-alignment <300mm			66	235	195	26	0
Track re-alignment >300mm			20	123	341	45	2
Re-build track			235	151	65	5	0
Demobilisation and rehabilitation			49	226	230	29	2
Compound operation			86	23	10	2	0
Henty Yard clearances – NCA 06 (Total number of residential receivers 511)							
Preliminary works	40	65	12	71	346	60	4
Offline widenings			6	13	319	135	21
Remove gantry			8	19	337	111	19
Drainage works and service relocation			8	30	348	92	16
Track re-alignment <300mm			8	30	348	92	16
Track re-alignment >300mm			5	5	305	150	29
Re-build track			30	201	217	34	4
Demobilisation and rehabilitation			5	55	345	72	14
Compound operation			143	58	28	2	0
Yerong Creek Yard clearances – NCA 07 (Total number of residential receivers 78)							
Preliminary works	45	65	58	11	48	7	2
Offline widenings			0	9	52	10	0
Remove gantry			1	5	47	16	2
Drainage works and service relocation			0	5	50	14	2
Track re-alignment <300mm			4	11	48	11	0
Track re-alignment >300mm			30	18	11	0	0
Re-build track			11	30	26	3	0
Demobilisation and rehabilitation			4	14	44	8	4
Compound operation			20	9	11	3	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
The Rock Yard clearances– NCA 08 (Total number of residential receivers 441)							
Preliminary works	45	65	126	74	43	6	0
Install new cabling/conduits			98	105	47	8	0
Signalling works			11	4	2	0	0
Cut gantry bolts			74	32	15	2	0
Remove gantry			126	74	43	6	0
Remove footings			69	125	59	9	1
Backfill footings			105	31	22	2	0
Demobilisation and rehabilitation			139	58	36	6	0
Compound operation			28	8	6	0	0

(1) Sleep disturbance applicable at residential receivers only, during period of 10 pm to 7am.

PREDICTED CONSTRUCTION NOISE LEVELS AT NON RESIDENTIAL RECEIVERS

CULCAIRN YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	10	2	5	4	0	1	2
Offline widenings	11	3	1	4	0	1	2
Remove gantry	9	2	4	5	0	1	2
Drainage works and service relocation	10	2	5	5	0	1	2
Track re-alignment <300mm	2	0	0	2	0	1	1
Track re-alignment >300mm	7	2	1	4	0	1	1
Re-build track	1	0	0	2	0	1	1
Demobilisation and rehabilitation	9	2	4	5	0	1	2
Compound operation	0	0	0	1	0	0	0

HENTY YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	2	1	3	2	0	1	5
Offline widenings	5	1	7	3	0	1	6
Remove gantry	2	0	2	1	0	1	4
Drainage works and service relocation	2	0	2	1	0	1	4
Track re-alignment <300mm	2	0	2	1	0	1	4
Track re-alignment >300mm	2	0	2	1	0	1	4
Re-build track	2	0	2	1	0	1	4
Demobilisation and rehabilitation	2	1	2	1	0	1	5
Compound operation	0	0	0	0	0	1	1

YERONG CREEK YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	1	0	1	0	0	0	2
Offline widenings	1	0	1	0	0	0	3
Remove gantry	1	0	1	0	0	0	2
Drainage works and service relocation	1	0	1	0	0	0	3
Track re-alignment <300mm	1	0	0	2	0	0	2
Track re-alignment >300mm	1	0	0	2	0	0	2
Re-build track	1	0	0	2	0	0	2
Demobilisation and rehabilitation	1	0	1	3	0	0	2
Compound operation	1	0	0	1	0	0	2

THE ROCK YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Install new cabling/conduits	0	0	0	0	0	0	0
Signalling works	0	0	0	0	0	0	0
Cut gantry bolts	0	0	0	0	0	0	0
Remove gantry	0	0	0	0	0	0	0
Remove footings	0	0	0	0	0	0	0
Backfill footings	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

LEVEL CROSSING SITES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML $L_{Aeq} 15 \text{ MIN}$	55	55	70	75	65	60	55
Preliminary works	3	0	5	0	0	1	3
Road diversions	0	0	0	0	0	0	1
Signalling works	0	0	0	0	0	0	1
Strip level crossing panels and remove track	1	0	3	0	0	0	3
Install troughs	1	0	3	4	11	0	3
Rebuild rail	2	0	4	0	0	1	3
Install level crossing panels	1	0	2	0	0	0	3
Compound operation	1	0	0	0	0	0	2

**APPENDIX C-4
GREATER HUME–LOCKHART
RESIDUAL (MITIGATED)
CONSTRUCTION NOISE LEVELS**

ASSUMED MITIGATION MEASURES – POTENTIAL NOISE REDUCTIONS

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
All sites		
Site establishment	6, 7	15
Demobilisation and rehabilitation	6, 7	15
Site compounds	2, 3, 5, 6	19
Culcairn, Henty and Yerong Track Re-alignment		
Offline widenings	4, 7	12
Remove gantry	7	8
Drainage works and service relocation	1, 7	12
Track re-alignment (<300mm)	7	8
Track realignment (>300mm)	4, 7	10
Rebuild track	7	8
The Rock Gantry Removal		
Install cabling / conduits	7	10
Signalling works	–	–
Cut gantry bolts	–	–
Remove gantry	7	8
Remove footings	1, 7	12
Backfill footings	1, 7	12

(1) Refer to Chapter 8

PREDICTED CONSTRUCTION NOISE LEVELS AT RESIDENTIAL RECEIVERS

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Culcairn Yard clearances – NCA05 (Total number of residential receivers 571)							
Standard hours							
Preliminary works	46	42	13	7	0	0	0
Offline widenings	46	126	42	16	0	0	0
Remove gantry	46	215	64	34	3	0	0
Drainage works and service relocation	46	112	42	15	2	0	0
Track re-alignment <300mm	46	57	25	7	0	0	0
Track re-alignment >300mm	46	126	42	16	0	0	0
Re-build track	46	44	21	5	0	0	0
Demobilisation and rehabilitation	46	50	12	10	0	0	0
Compound operation	46	1	0	0	0	0	0
Outside standard hours – Day							
Preliminary works	41	132	42	18	2	0	0
Offline widenings	41	247	126	54	4	0	0
Remove gantry	41	190	215	88	13	0	0
Drainage works and service relocation	41	255	112	53	6	0	0
Track re-alignment <300mm	41	193	57	32	0	0	0
Track re-alignment >300mm	41	247	126	54	4	0	0
Re-build track	41	151	44	26	0	0	0
Demobilisation and rehabilitation	41	149	50	20	2	0	0
Compound operation	41	2	1	0	0	0	0
Outside standard hours – Evening							
Preliminary works	40	160	51	21	2	0	0
Offline widenings	40	235	151	65	5	0	0
Remove gantry	40	143	249	115	11	2	0
Drainage works and service relocation	40	243	149	62	10	0	0
Track re-alignment <300mm	40	230	72	39	1	0	0
Track re-alignment >300mm	40	235	151	65	5	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Re-build track	40	193	57	32	0	0	0
Demobilisation and rehabilitation	40	178	52	29	2	0	0
Compound operation	40	3	2	0	0	0	0
Outside standard hours – Night							
Preliminary works	35	245	160	66	8	0	0
Offline widenings	35	66	235	195	26	0	0
Remove gantry	35	21	143	331	42	4	0
Drainage works and service relocation	35	69	243	199	20	2	0
Track re-alignment <300mm	35	159	230	105	7	0	0
Track re-alignment >300mm	35	66	235	195	26	0	0
Re-build track	35	202	193	82	7	0	0
Demobilisation and rehabilitation	35	226	178	72	11	0	0
Compound operation	35	7	3	2	0	0	0
Henty Yard clearances – NCA 06 (Total number of residential receivers 511)							
Standard hours							
Preliminary works	47	19	11	4	0	0	0
Offline widenings	47	111	39	26	3	0	1
Remove gantry	47	111	39	26	3	0	1
Drainage works and service relocation	47	53	19	12	2	0	0
Track re-alignment <300mm	47	111	39	26	3	0	1
Track re-alignment >300mm	47	86	25	16	3	0	0
Re-build track	47	111	39	26	3	0	1
Demobilisation and rehabilitation	47	34	12	8	1	0	0
Compound operation	47	0	0	0	0	0	0
Outside standard hours – Day							
Preliminary works	42	81	19	15	0	0	0
Offline widenings	42	216	111	55	12	1	0
Remove gantry	42	216	111	55	12	1	0
Drainage works and service relocation	42	127	53	30	3	0	0
Track re-alignment <300mm	42	216	111	55	12	1	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Track re-alignment >300mm	42	183	86	37	6	1	0
Re-build track	42	216	111	55	12	1	0
Demobilisation and rehabilitation	42	101	34	18	3	0	0
Compound operation	42	1	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	41	98	25	17	0	0	0
Offline widenings	41	218	127	72	12	2	0
Remove gantry	41	218	127	72	12	2	0
Drainage works and service relocation	41	147	70	34	3	1	0
Track re-alignment <300mm	41	218	127	72	12	2	0
Track re-alignment >300mm	41	197	101	46	8	1	0
Re-build track	41	218	127	72	12	2	0
Demobilisation and rehabilitation	41	111	39	26	3	0	0
Compound operation	41	2	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	35	238	108	60	4	0	0
Offline widenings	35	30	201	217	34	4	0
Remove gantry	35	30	201	217	34	4	0
Drainage works and service relocation	35	154	183	111	16	3	0
Track re-alignment <300mm	35	30	201	217	34	4	0
Track re-alignment >300mm	35	89	216	150	26	3	0
Re-build track	35	30	201	217	34	4	0
Demobilisation and rehabilitation	35	218	127	72	12	2	0
Compound operation	35	7	2	0	0	0	0
Yerong Creek Yard clearances – NCA 07 (Total number of residential receivers 78)							
Standard hours							
Preliminary works	49	5	3	2	0	0	0
Offline widenings	49	18	6	3	0	0	0
Remove gantry	49	20	3	2	0	0	0
Drainage works and service relocation	49	18	6	3	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Track re-alignment <300mm	49	11	7	1	0	0	0
Track re-alignment >300mm	49	7	8	0	0	0	0
Re-build track	49	7	8	0	0	0	0
Demobilisation and rehabilitation	49	6	2	6	0	0	0
Compound operation	49	2	0	0	0	0	0
Outside standard hours - Day							
Preliminary works	44	20	5	5	0	0	0
Offline widenings	44	29	18	9	0	0	0
Remove gantry	44	31	20	4	1	0	0
Drainage works and service relocation	44	29	18	9	0	0	0
Track re-alignment <300mm	44	24	11	8	0	0	0
Track re-alignment >300mm	44	20	7	8	0	0	0
Re-build track	44	20	7	8	0	0	0
Demobilisation and rehabilitation	44	17	6	6	2	0	0
Compound operation	44	4	2	0	0	0	0
Outside standard hours - Evening							
Preliminary works	44	20	5	5	0	0	0
Offline widenings	44	29	18	9	0	0	0
Remove gantry	44	31	20	4	1	0	0
Drainage works and service relocation	44	29	18	9	0	0	0
Track re-alignment <300mm	44	24	11	8	0	0	0
Track re-alignment >300mm	44	20	7	8	0	0	0
Re-build track	44	20	7	8	0	0	0
Demobilisation and rehabilitation	44	17	6	6	2	0	0
Compound operation	44	4	2	0	0	0	0
Outside standard hours – Night							
Preliminary works	35	11	33	19	5	0	0
Offline widenings	35	4	16	45	6	0	0
Remove gantry	35	2	17	47	3	1	0
Drainage works and service relocation	35	4	16	45	6	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Track re-alignment <300mm	35	11	28	27	8	0	0
Track re-alignment >300mm	35	12	30	27	4	0	0
Re-build track	35	12	30	27	4	0	0
Demobilisation and rehabilitation	35	14	28	20	7	1	0
Compound operation	35	8	5	6	0	0	0
The Rock Yard clearances– NCA 08 (Total number of residential receivers 441)							
Standard hours							
Preliminary works	49	6	2	0	0	0	0
Install new cabling/conduits	49	8	4	2	0	0	0
Signalling works	49	1	0	0	0	0	0
Cut gantry bolts	49	4	2	0	0	0	0
Remove gantry	49	16	6	2	0	0	0
Remove footings	49	7	2	1	0	0	0
Backfill footings	49	8	2	1	0	0	0
Demobilisation and rehabilitation	49	4	2	0	0	0	0
Compound operation	49	0	0	0	0	0	0
Outside standard hours – Day							
Preliminary works	44	16	6	2	0	0	0
Install new cabling/conduits	44	28	8	6	0	0	0
Signalling works	44	2	1	0	0	0	0
Cut gantry bolts	44	8	4	2	0	0	0
Remove gantry	44	31	16	8	0	0	0
Remove footings	44	18	7	3	0	0	0
Backfill footings	44	21	8	3	0	0	0
Demobilisation and rehabilitation	44	11	4	2	0	0	0
Compound operation	44	0	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	44	16	6	2	0	0	0
Install new cabling/conduits	44	28	8	6	0	0	0
Signalling works	44	2	1	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Cut gantry bolts	44	8	4	2	0	0	0
Remove gantry	44	31	16	8	0	0	0
Remove footings	44	18	7	3	0	0	0
Backfill footings	44	21	8	3	0	0	0
Demobilisation and rehabilitation	44	11	4	2	0	0	0
Compound operation	44	0	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	35	74	32	15	2	0	0
Install new cabling/conduits	35	135	52	29	3	0	0
Signalling works	35	18	7	3	0	0	0
Cut gantry bolts	35	52	21	10	1	0	0
Remove gantry	35	126	74	43	6	0	0
Remove footings	35	105	31	22	2	0	0
Backfill footings	35	125	41	25	3	0	0
Demobilisation and rehabilitation	35	58	28	12	2	0	0
Compound operation	35	4	2	0	0	0	0

* Refer Table 2.2 for a description of hours

MAXIMUM PREDICTED NOISE LEVELS (SLEEP DISTURBANCE)

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Culcairn Yard clearances – NCA 05 (Total number of residential receivers 571)							
Preliminary works	40	65	160	51	21	2	0
Offline widenings			235	151	65	5	0
Remove gantry			255	112	53	6	0
Drainage works and service relocation			243	149	62	10	0
Track re-alignment <300mm			159	230	105	7	0
Track re-alignment >300mm			123	246	131	11	0
Re-build track			230	72	39	1	0
Demobilisation and rehabilitation			178	52	29	2	0
Compound operation			3	2	0	0	0
Henty Yard clearances – NCA 06 (Total number of residential receivers 511)							
Preliminary works	40	65	108	45	19	0	0
Offline widenings			201	147	92	14	2
Remove gantry			89	216	150	26	3
Drainage works and service relocation			216	111	55	12	1
Track re-alignment <300mm			122	197	135	18	3
Track re-alignment >300mm			89	216	150	26	3
Re-build track			108	101	46	8	1
Demobilisation and rehabilitation			108	53	30	3	0
Compound operation			108	0	0	0	0
Yerong Creek Yard clearances – NCA 07 (Total number of residential receivers 78)							
Preliminary works	45	65	15	4	5	0	0
Offline widenings			26	19	6	0	0
Remove gantry			12	31	23	2	0
Drainage works and service relocation			32	20	10	0	0
Track re-alignment <300mm			28	20	15	0	0
Track re-alignment >300mm			8	3	0	0	0
Re-build track			20	7	8	0	0
Demobilisation and rehabilitation			16	4	7	1	0
Compound operation			4	0	0	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
The Rock Yard clearances– NCA 08 (Total number of residential receivers 441)							
Preliminary works	45	65	11	4	2	0	0
Install new cabling/conduits			28	8	6	0	0
Signalling works			11	4	2	0	0
Cut gantry bolts			74	32	15	2	0
Remove gantry			126	74	43	6	0
Remove footings			69	125	59	9	1
Backfill footings			0	0	0	0	0
Demobilisation and rehabilitation			8	4	2	0	0
Compound operation			0	0	0	0	0

PREDICTED CONSTRUCTION NOISE LEVELS AT NON RESIDENTIAL RECEIVERS

CULCAIRN YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver type	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	1	2	0	1	0
Offline widenings	0	0	0	2	0	1	0
Remove gantry	2	0	1	4	0	1	1
Drainage works and service relocation	0	0	1	3	0	1	0
Track re-alignment <300mm	0	0	0	2	0	0	0
Track re-alignment >300mm	0	0	0	2	0	1	0
Re-build track	0	0	0	2	0	0	0
Demobilisation and rehabilitation	0	0	1	3	0	1	0
Compound operation	0	0	0	0	0	0	0

HENTY YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	1
Offline widenings	0	0	0	0	0	1	3
Remove gantry	0	0	0	0	0	1	3
Drainage works and service relocation	0	0	0	0	0	1	3
Track re-alignment <300mm	0	0	0	0	0	1	3
Track re-alignment >300mm	0	0	0	0	0	1	3
Re-build track	0	0	0	0	0	1	3
Demobilisation and rehabilitation	0	0	0	0	0	1	2
Compound operation	0	0	0	0	0	0	0

YERONG CREEK YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Offline widenings	1	0	0	0	0	0	2
Remove gantry	1	0	0	0	0	0	2
Drainage works and service relocation	1	0	0	0	0	0	2
Track re-alignment <300mm	0	0	0	1	0	0	2
Track re-alignment >300mm	0	0	0	1	0	0	1
Re-build track	0	0	0	1	0	0	1
Demobilisation and rehabilitation	0	0	0	1	0	0	1
Compound operation	0	0	0	0	0	0	0

THE ROCK YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Install new cabling/conduits	0	0	0	0	0	0	0
Signalling works	0	0	0	0	0	0	0
Cut gantry bolts	0	0	0	0	0	0	0
Remove gantry	0	0	0	0	0	0	0
Remove footings	0	0	0	0	0	0	0
Backfill footings	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

LEVEL CROSSING SITES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML $L_{Aeq} 15 \text{ MIN}$	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	1
Road diversions	0	0	0	0	0	0	0
Signalling works	0	0	0	0	0	0	1
Strip level crossing panels and remove track	1	0	1	0	0	0	2
Install troughs	1	0	2	4	11	0	3
Rebuild rail	1	0	0	0	0	0	2
Install level crossing panels	1	0	0	0	0	0	2
Compound operation	0	0	0	0	0	0	0

APPENDIX C-5
WAGGA WAGGA (UNMITIGATED)
CONSTRUCTION NOISE LEVELS

PREDICTED CONSTRUCTION NOISE LEVELS AT RESIDENTIAL RECEIVERS

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Level crossing upgrades (Uranquinty) – NCA09 (Total number of residential receivers 326)							
Standard Hours							
Preliminary works	49	129	72	33	1	0	0
Road diversions	49	10	1	0	0	0	0
Signalling works	49	10	1	0	0	0	0
Strip level crossing panels and remove track	49	130	40	22	0	0	0
Install troughs	49	23	10	1	0	0	0
Rebuild rail	49	140	52	25	1	0	0
Install level crossing panels	49	93	25	14	0	0	0
Compound operation	49	14	8	0	0	0	0
Outside standard hours – Day time							
Preliminary works	44	46	129	95	11	0	0
Road diversions	44	23	10	1	0	0	0
Signalling works	44	23	10	1	0	0	0
Strip level crossing panels and remove track	44	76	130	54	8	0	0
Install troughs	44	72	23	11	0	0	0
Rebuild rail	44	57	140	70	8	0	0
Install level crossing panels	44	119	93	37	2	0	0
Compound operation	44	40	14	8	0	0	0
Outside standard hours – Evening							
Preliminary works	44	46	129	95	11	0	0
Road diversions	44	23	10	1	0	0	0
Signalling works	44	23	10	1	0	0	0
Strip level crossing panels and remove track	44	76	130	54	8	0	0
Install troughs	44	72	23	11	0	0	0
Rebuild rail	44	57	140	70	8	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Install level crossing panels	44	119	93	37	2	0	0
Compound operation	44	40	14	8	0	0	0
Outside standard hours – Night							
Preliminary works	35	7	25	197	70	8	0
Road diversions	35	140	52	25	1	0	0
Signalling works	35	140	52	25	1	0	0
Strip level crossing panels and remove track	35	14	34	209	43	6	0
Install troughs	35	57	140	70	8	0	0
Rebuild rail	35	11	28	206	54	8	0
Install level crossing panels	35	24	46	201	33	1	0
Compound operation	35	95	114	43	6	0	0
Sandy Creek Bridge (Uranquinty) – NCA09 (Total number of residential receivers 326)							
Standard hours							
Preliminary works	49	80	47	17	0	0	0
Crane pads	49	20	11	0	0	0	0
Remove/install track	49	84	76	26	0	0	0
Remove/install main line girders, blocks	49	85	20	11	0	0	0
Cut abutments and piers	49	85	20	11	0	0	0
Compound operation	49	11	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	44	61	80	59	5	0	0
Crane pads	44	85	20	11	0	0	0
Remove/install track	44	25	84	92	10	0	0
Remove/install main line girders, blocks	44	82	85	31	0	0	0
Cut abutments and piers	44	82	85	31	0	0	0
Compound operation	44	20	11	0	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	44	61	80	59	5	0	0
Crane pads	44	85	20	11	0	0	0
Remove/install track	44	25	84	92	10	0	0
Remove/install main line girders, blocks	44	82	85	31	0	0	0
Cut abutments and piers	44	82	85	31	0	0	0
Compound operation	44	20	11	0	0	0	0
Outside standard hours – Night							
Preliminary works	35	12	16	161	41	3	0
Crane pads	35	25	84	92	10	0	0
Remove/install track	35	6	20	128	73	7	0
Remove/install main line girders, blocks	35	18	25	160	26	0	0
Cut abutments and piers	35	18	25	160	26	0	0
Compound operation	35	84	76	26	0	0	0
Uranquinty Yard clearances – NCA09 (Total number of residential receivers 326)							
Standard hours							
Preliminary works	49	67	95	105	34	0	3
Offline widenings	49	11	63	188	48	0	7
Drainage works and service relocation	49	27	93	147	41	0	0
Track re-alignment <300mm	49	52	39	0	0	0	0
Track re-alignment >300mm	49	28	131	141	6	0	0
Re-build track	49	138	82	43	0	0	0
Demobilisation and rehabilitation	49	43	138	122	3	0	0
Compound operation	49	44	11	3	0	0	0
Outside standard hours – Day time							
Preliminary works	44	8	67	167	63	4	0
Offline widenings	44	2	11	186	96	17	0
Drainage works and service relocation	44	4	27	199	82	0	0
Track re-alignment (< 300mm)	44	152	52	39	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Track re-alignment (> 300mm)	44	6	28	229	49	0	0
Re-build track	44	43	138	122	3	0	0
Demobilisation and rehabilitation	44	6	43	220	43	0	0
Compound operation	44	120	44	14	0	0	0
Outside standard hours – Evening							
Preliminary works	44	8	67	167	63	4	0
Offline widenings	44	2	11	186	96	17	0
Drainage works and service relocation	44	4	27	199	82	0	0
Track re-alignment (< 300mm)	44	152	52	39	0	0	0
Track re-alignment (> 300mm)	44	6	28	229	49	0	0
Re-build track	44	43	138	122	3	0	0
Demobilisation and rehabilitation	44	6	43	220	43	0	0
Compound operation	44	120	44	14	0	0	0
Outside standard hours – Night							
Preliminary works	35	0	4	87	165	55	0
Offline widenings	35	0	0	20	191	101	0
Drainage works and service relocation	35	0	0	45	198	69	0
Track re-alignment (< 300mm)	35	11	82	189	28	0	0
Track re-alignment (> 300mm)	35	0	0	49	220	43	0
Re-build track	35	2	6	213	91	0	0
Demobilisation and rehabilitation	35	0	2	67	204	39	0
Compound operation	35	37	125	131	11	0	0
Pearson Street bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Standard hours							
Preliminary works	56/58	240	53	26	2	0	2
Earthworks	56/58	446	94	35	5	0	8
Large scale piling	56/58	86	11	3	0	0	0
Small scale piling	56/58	30	4	1	0	0	0
Protection walls and drainage	56/58	30	4	1	0	0	0
Track removal	56/58	61	15	13	0	0	0
Re-build track	56/58	53	13	11	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Demobilisation and rehabilitation	56/58	78	20	17	0	0	0
Compound operation	56/58	17	12	2	0	0	0
Outside standard hours – Day time							
Preliminary works	51/46	971	240	70	11	0	0
Earthworks	51/46	1218	446	113	19	2	0
Large scale piling	51/46	316	86	14	0	0	0
Small scale piling	51/46	144	30	5	0	0	0
Protection walls and drainage	51/46	144	30	5	0	0	0
Track removal	51/46	247	61	25	3	0	0
Re-build track	51/46	176	53	24	0	0	0
Demobilisation and rehabilitation	51/46	339	78	33	4	0	0
Compound operation	51/46	42	17	14	0	0	0
Outside standard hours – Evening							
Preliminary works	50/44	1103	347	86	15	0	0
Earthworks	50/44	1155	586	160	22	2	0
Large scale piling	50/44	427	107	21	0	0	0
Small scale piling	50/44	181	48	6	0	0	0
Protection walls and drainage	50/44	181	48	6	0	0	0
Track removal	50/44	339	78	33	4	0	0
Re-build track	50/44	247	61	25	3	0	0
Demobilisation and rehabilitation	50/44	468	97	41	7	0	0
Compound operation	50/44	51	20	18	0	0	0
Outside standard hours – Night							
Preliminary works	43/42	464	1151	725	39	7	0
Earthworks	43/42	185	945	1212	70	12	0
Large scale piling	43/42	594	747	229	6	0	0
Small scale piling	43/42	998	316	97	3	0	0
Protection walls and drainage	43/42	998	316	97	3	0	0
Track removal	43/42	779	644	175	22	0	0
Re-build track	43/42	981	468	125	20	0	0
Demobilisation and rehabilitation	43/42	553	834	229	24	0	0
Compound operation	43/42	365	81	43	6	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Cassidy Parade pedestrian bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Standard hours							
Preliminary works	56/58	187	22	32	8	1	12
Demolition	56/58	260	42	37	8	3	16
Piling	56/58	46	20	14	3	0	6
Concreting works	56/58	17	7	6	0	0	1
Installation of screens, handrails, etc	56/58	4	5	3	0	0	0
Lifting of truss and deck	56/58	21	19	9	3	0	6
Demobilisation and rehabilitation	56/58	92	26	14	6	2	14
Compound operation	56/58	9	12	6	2	1	4
Outside standard hours – Day time							
Preliminary works	51/46	549	703	370	35	11	0
Demolition	51/46	475	713	523	44	14	0
Piling	51/46	683	455	135	21	6	0
Concreting works	51/46	309	46	30	6	1	0
Installation of screens, handrails, etc	51/46	40	17	15	5	0	0
Lifting of truss and deck	51/46	580	248	57	15	5	0
Demobilisation and rehabilitation	51/46	661	669	253	23	12	0
Compound operation	51/46	158	33	19	14	3	0
Outside standard hours – Evening							
Preliminary works	50/44	363	762	607	40	15	0
Demolition	50/44	351	656	760	60	19	0
Piling	50/44	618	570	266	26	6	0
Concreting works	50/44	455	119	33	9	1	0
Installation of screens, handrails, etc	50/44	89	15	22	6	0	0
Lifting of truss and deck	50/44	707	399	104	22	6	0
Demobilisation and rehabilitation	50/44	444	792	465	29	14	0
Compound operation	50/44	338	42	30	15	4	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night(a)							
Preliminary works	43/42	230	699	909	59	19	0
Demolition	43/42	193	566	1075	98	27	0
Piling	43/42	517	716	474	28	9	0
Concreting works	43/42	585	238	44	13	3	0
Installation of screens, handrails, etc	43/42	192	27	26	7	1	0
Lifting of truss and deck	43/42	743	532	219	26	8	0
Demobilisation and rehabilitation	43/42	299	830	740	43	15	0
Compound operation	43/42	526	103	39	17	6	0
Edmondson Street bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Standard hours							
Preliminary works	56/58	117	24	43	18	7	34
Service relocations	56/58	16	7	5	6	1	7
Demolition	56/58	25	17	14	5	3	11
Crane / piling pads	56/58	65	16	19	5	2	12
Piling	56/58	15	6	6	3	0	4
RE Wall and abutments	56/58	42	13	11	1	0	2
Install deck, slabs and planks	56/58	29	8	10	4	0	6
Install furniture, infrastructure	56/58	52	25	20	15	7	31
Asphalting	56/58	37	29	22	9	5	20
Compound operation	56/58	32	15	24	2	3	10
Outside standard hours – Daytime							
Preliminary works	51/46	609	588	245	43	32	0
Service relocations	51/46	31	12	29	6	7	0
Demolition	51/46	337	72	44	18	10	0
Crane / piling pads	51/46	600	410	150	20	10	0
Piling	51/46	334	85	26	10	3	0
RE Wall and abutments	51/46	579	327	93	16	1	0
Install deck, slabs and planks	51/46	566	201	63	10	5	0
Install furniture, infrastructure	51/46	708	475	140	19	28	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Asphalting	51/46	678	330	102	31	16	0
Compound operation	51/46	524	167	64	24	8	0
Outside standard hours – Evening							
Preliminary works	50/44	411	705	419	48	37	0
Service relocations	50/44	38	16	30	9	8	0
Demolition	50/44	504	153	51	24	12	0
Crane / piling pads	50/44	432	583	247	22	16	0
Piling	50/44	475	162	48	9	5	0
RE Wall and abutments	50/44	451	476	178	19	2	0
Install deck, slabs and planks	50/44	615	334	105	13	6	0
Install furniture, infrastructure	50/44	595	653	250	28	34	0
Asphalting	50/44	624	512	169	38	24	0
Compound operation	50/44	657	303	90	27	13	0
Outside standard hours – Night							
Preliminary works	43/42	295	700	661	58	44	0
Service relocations	43/42	53	26	32	13	8	0
Demolition	43/42	648	255	79	34	13	0
Crane / piling pads	43/42	343	625	428	25	19	0
Piling	43/42	632	268	76	12	6	0
RE Wall and abutments	43/42	356	570	312	24	5	0
Install deck, slabs and planks	43/42	573	475	199	17	8	0
Install furniture, infrastructure	43/42	483	749	456	40	35	0
Asphalting	43/42	517	663	311	41	26	0
Compound operation	43/42	731	454	146	34	20	0
Wagga Wagga Station pedestrian bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Standard hours							
Preliminary works	56/58	101	25	22	9	0	12
Demolition	56/58	124	28	12	5	0	8
Piling	56/58	30	7	11	1	0	3
Concreting works	56/58	16	8	8	0	0	3

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Installation of screens, handrails, etc	56/58	4	3	5	0	0	0
Lifting of truss and deck	56/58	32	14	7	5	0	7
Demobilisation and rehabilitation	56/58	111	34	28	6	0	14
Compound operation	56/58	31	22	8	0	0	0
Outside standard hours – Day							
Preliminary works	51/46	521	446	211	31	10	0
Demolition	51/46	456	496	247	16	7	0
Piling	51/46	501	239	71	11	3	0
Concreting works	51/46	216	51	36	9	0	0
Installation of screens, handrails, etc	51/46	46	17	13	6	0	0
Lifting of truss and deck	51/46	495	169	63	13	6	0
Demobilisation and rehabilitation	51/46	630	227	205	38	13	0
Compound operation	51/46	148	65	66	13	0	0
Outside standard hours – Evening							
Preliminary works	50/44	366	601	321	35	14	0
Demolition	50/44	292	587	385	24	10	0
Piling	50/44	598	312	141	12	5	0
Concreting works	50/44	356	87	46	7	5	0
Installation of screens, handrails, etc	50/44	72	27	16	7	0	0
Lifting of truss and deck	50/44	640	271	99	16	7	0
Demobilisation and rehabilitation	50/44	540	410	257	47	16	0
Compound operation	50/44	166	100	71	26	0	0
Outside standard hours – Night							
Preliminary works	43/42	286	553	505	46	21	0
Demolition	43/42	197	535	582	41	13	0
Piling	43/42	432	467	233	16	6	0
Concreting works	43/42	495	169	63	13	6	0
Installation of screens, handrails, etc	43/42	123	38	24	8	0	0
Lifting of truss and deck	43/42	582	425	161	24	8	0
Demobilisation and rehabilitation	43/42	393	575	330	60	22	0
Compound operation	43/42	204	141	89	33	3	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Wagga Wagga Yard clearances – NCA11/12 (Total number of residential receivers 5,061)							
Standard hours							
Preliminary works	58	171	54	46	14	0	24
Offline widenings	58	190	85	51	23	0	31
Drainage works and service relocation	58	131	53	40	0	0	4
Track re-alignment <300mm	58	32	0	0	0	0	0
Track re-alignment >300mm	58	37	32	0	0	0	0
Re-build track	58	44	26	26	3	0	10
Demobilisation and rehabilitation	58	129	44	40	15	0	23
Compound operation	58	9	6	1	0	0	0
Outside standard hours – Day time							
Preliminary works	53	236	171	83	25	6	0
Offline widenings	53	333	190	122	30	7	0
Drainage works and service relocation	53	152	131	80	13	0	0
Track re-alignment <300mm	53	37	32	0	0	0	0
Track re-alignment >300mm	53	104	37	32	0	0	0
Re-build track	53	129	44	40	15	0	0
Demobilisation and rehabilitation	53	209	129	70	26	3	0
Compound operation	53	18	9	7	0	0	0
Outside standard hours –Evening							
Preliminary works	52	282	186	93	29	6	0
Offline widenings	52	399	201	148	35	8	0
Drainage works and service relocation	52	187	142	86	23	0	0
Track re-alignment <300mm	52	44	32	7	0	0	0
Track re-alignment >300mm	52	139	44	39	0	0	0
Re-build track	52	162	51	45	16	0	0
Demobilisation and rehabilitation	52	246	162	81	26	5	0
Compound operation	52	22	8	10	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night(a)							
Preliminary works	42	394	519	468	93	35	0
Offline widenings	42	345	499	600	148	43	0
Drainage works and service relocation	42	380	366	329	86	23	0
Track re-alignment <300mm	42	191	139	76	7	0	0
Track re-alignment >300mm	42	453	191	183	39	0	0
Re-build track	42	504	246	213	45	16	0
Demobilisation and rehabilitation	42	413	504	408	81	31	0
Compound operation	42	104	46	30	10	0	0
Bomen Yard clearances – NCA11/12 (Total number of residential receivers 5,061)							
Standard hours							
Preliminary works	58	0	0	0	0	0	0
Offline widenings	58	0	0	0	0	0	0
Drainage works and service relocation	58	0	0	0	0	0	0
Track re-alignment <300mm	58	0	0	0	0	0	0
Track re-alignment >300mm	58	0	0	0	0	0	0
Re-build track	58	0	0	0	0	0	0
Demobilisation and rehabilitation	58	0	0	0	0	0	0
Compound operation	58	0	0	0	0	0	0
Outside standard hours - Daytime							
Preliminary works	53	0	0	0	0	0	0
Offline widenings	53	0	0	0	0	0	0
Drainage works and service relocation	53	0	0	0	0	0	0
Track re-alignment <300mm	53	0	0	0	0	0	0
Track re-alignment >300mm	53	0	0	0	0	0	0
Re-build track	53	0	0	0	0	0	0
Demobilisation and rehabilitation	53	0	0	0	0	0	0
Compound operation	53	0	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours - Evening							
Preliminary works	52	0	0	0	0	0	0
Offline widenings	52	0	0	0	0	0	0
Drainage works and service relocation	52	0	0	0	0	0	0
Track re-alignment <300mm	52	0	0	0	0	0	0
Track re-alignment >300mm	52	0	0	0	0	0	0
Re-build track	52	0	0	0	0	0	0
Demobilisation and rehabilitation	52	0	0	0	0	0	0
Compound operation	52	0	0	0	0	0	0
Outside standard hours - Night							
Preliminary works	42	0	2	0	0	0	0
Offline widenings	42	0	13	0	0	0	0
Drainage works and service relocation	42	1	12	0	0	0	0
Track re-alignment <300mm	42	12	0	0	0	0	0
Track re-alignment >300mm	42	1	12	0	0	0	0
Re-build track	42	6	0	0	0	0	0
Demobilisation and rehabilitation	42	7	6	0	0	0	0
Compound operation	42	0	0	0	0	0	0

* Refer Table 2.2 for a description of hours

MAXIMUM PREDICTED NOISE LEVELS (SLEEP DISTURBANCE)

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Level crossings – NCA09 (Total number of residential receivers 326)							
Preliminary works	45	65	46	129	95	11	0
Road diversions			18	7	1	0	0
Signalling works			18	7	1	0	0
Strip level crossing panels and remove track			46	129	95	11	0
Install troughs			114	32	17	0	0
Rebuild rail			36	119	118	14	0
Install level crossing panels			46	129	95	11	0
Compound operation			40	14	8	0	0
Sandy Creek Bridge – NCA09 (Total number of residential receivers 326)							
Preliminary works	45	65	76	85	41	3	0
Crane pads			85	20	11	0	0
Remove/install track			16	76	114	15	0
Remove/install main line girders, blocks			44	84	73	7	0
Cut abutments and piers			44	84	73	7	0
Compound operation			20	11	0	0	0
Uranquinty Yard clearances – NCA09 (Total number of residential receivers 326)							
Preliminary works	45	65	15	72	165	52	3
Offline widenings			4	16	191	94	7
Drainage works and service relocation			6	39	198	69	0
Track re-alignment (< 300mm)			138	82	43	0	0
Track re-alignment (> 300mm)			2	11	226	73	0
Re-build track			43	138	122	3	0
Demobilisation and rehabilitation			6	61	204	39	0
Compound operation			120	44	14	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Pearson Street bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Preliminary works	NCA10 (53) NCA11 (52)	65	629	138	39	7	0
Earthworks			1479	459	113	19	2
Large scale piling			427	107	21	0	0
Small scale piling			316	86	14	0	0
Protection walls and drainage			427	107	21	0	0
Track removal			339	78	33	4	0
Re-build track			137	38	22	0	0
Demobilisation and rehabilitation			176	53	24	0	0
Compound operation			33	16	11	0	0
Cassidy Parade pedestrian bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Preliminary works	NCA10 (53) NCA11 (52)	65	570	187	45	15	3
Demolition			824	426	125	24	9
Piling			400	74	28	8	1
Concreting works			46	20	14	3	0
Installation of screens, handrails, etc			19	4	7	1	0
Lifting of truss and deck			480	131	40	9	3
Demobilisation and rehabilitation			516	92	33	10	5
Compound operation			28	11	17	4	2
Edmondson Street bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Preliminary works	NCA10 (53) NCA11 (52)	65	423	117	52	27	13
Service relocations (airborne)			36	25	27	7	5
Service relocations			57	22	34	7	6
Demolition			583	196	67	16	6
Crane / piling pads			60	16	12	6	0
Piling			395	107	30	11	0
RE Wall and abutments			398	128	37	10	4
Install deck, slabs and planks			653	217	57	22	16
Install furniture, infrastructure			653	257	79	27	15
Asphalting			118	28	34	17	3
Compound operation			25	18	14	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Wagga Wagga Station pedestrian bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Preliminary works	NCA10 (53) NCA11 (52)	65	535	245	81	10	5
Demolition			239	61	17	6	1
Piling			72	27	16	7	0
Concreting works			16	8	8	0	0
Installation of screens, handrails, etc			425	123	54	11	5
Lifting of truss and deck			200	130	60	21	1
Demobilisation and rehabilitation			65	36	38	5	0
Compound operation			0	0	0	0	0
Wagga Wagga Yard clearances – NCA11/12 (Total number of residential receivers 5,061)							
Preliminary works	NCA10 (53) NCA11 (52)	65	282	186	93	29	6
Offline widenings			399	201	148	35	8
Drainage works and service relocation			187	142	86	23	0
Track re-alignment <300mm			139	44	39	0	0
Track re-alignment >300mm			189	88	59	0	0
Re-build track			193	63	42	22	0
Demobilisation and rehabilitation			246	162	81	26	5
Compound operation			21	10	11	0	0
Bomen Yard clearances –NCA11/12 (Total number of residential receivers 5,061)							
Preliminary works	52	65	0	0	0	0	0
Offline widenings			0	0	0	0	0
Drainage works and service relocation			0	0	0	0	0
Track re-alignment <300mm			0	0	0	0	0
Track re-alignment >300mm			3	0	0	0	0
Re-build track			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0

PREDICTED CONSTRUCTION NOISE LEVELS AT NON-RESIDENTIAL RECEIVERS

URANQUINTY YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	4	0	5	2	0	0	6
Offline widenings	7	0	5	2	0	0	6
Drainage works and service relocation	7	0	5	2	0	0	6
Track re-alignment (< 300mm)	8	0	5	5	2	0	6
Track re-alignment (> 300mm)	7	0	0	2	0	0	6
Re-build track	4	0	0	2	0	0	2
Demobilisation and rehabilitation	7	0	0	2	0	0	6
Compound operation	0	0	0	0	0	0	0

PEARSON STREET LOWERING	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	10	2	2	35	6	0	2
Earthworks	18	4	5	40	9	0	2
Large scale piling	0	0	0	10	0	0	1
Small scale piling	0	0	0	10	0	0	0
Protection walls and drainage	0	0	0	10	0	0	0
Track removal	3	0	0	17	1	0	0
Re-build track	1	0	0	17	1	0	0
Demobilisation and rehabilitation	5	0	0	18	1	0	1
Compound operation	1	0	0	10	3	0	0

CASSIDY PARADE PEDESTRIAN BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	23	3	3	0	0	0	5
Demolition	30	12	2	0	0	0	7
Piling	14	0	2	0	0	0	3
Concreting works	7	0	0	0	0	0	0
Installation of screens, handrails, etc	5	0	0	0	0	0	0
Lifting of truss and deck	10	0	1	0	0	0	2
Demobilisation and rehabilitation	22	1	2	0	0	0	5
Compound operation	5	0	2	0	0	0	0

WAGGA WAGGA STATION PEDESTRIAN BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	16	0	8	9	0	0	1
Demolition	20	0	10	5	0	0	1
Piling	8	0	3	3	0	0	0
Concreting works	5	0	3	6	0	0	0
Installation of screens, handrails, etc	2	0	1	5	0	0	0
Lifting of truss and deck	7	0	3	10	0	0	0
Demobilisation and rehabilitation	11	0	7	9	0	0	0
Compound operation	3	0	2	9	0	0	0

EDMONDSON STREET BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	27	0	0	7	0	0	2
Service relocations	8	0	0	2	0	0	0
Demolition	19	0	0	3	0	0	0
Crane / piling pads	8	0	0	2	0	0	0
Piling	12	0	0	3	0	0	0
Re wall and abutments	9	0	0	2	0	0	0
Install deck, slabs and planks	20	0	1	7	0	0	1
Install furniture, infrastructure	12	0	0	2	0	0	1
Asphalting	14	0	1	2	0	0	1
Compound operation	3	0	0	1	0	0	0

WAGGA WAGGA STATION YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	25	0	12	15	0	0	1
Offline widenings	33	1	13	15	0	0	1
Drainage works and service relocation	20	0	7	15	0	0	1
Track re-alignment <300mm	3	0	0	10	0	0	0
Track re-alignment >300mm	8	0	1	13	0	0	0
Re-build track	8	0	5	14	0	0	0
Demobilisation and rehabilitation	17	0	10	15	0	0	1
Compound operation	1	0	0	1	0	0	0

WAGGA WAGGA STATION YARD CLEARANCES (GANTRY REMOVAL)	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	5	0	3	5	0	0	0
Install new cabling/conduits	5	0	3	5	0	0	0
Signalling works	0	0	0	1	0	0	0
Cut gantry bolts	1	0	0	4	0	0	0
Remove gantry	2	0	1	4	0	0	0
Remove footings	1	0	0	4	0	0	0
Backfill footings	1	0	0	4	0	0	0
Demobilisation and rehabilitation	4	0	2	4	0	0	0
Compound operation	0	0	0	4	0	0	0

SANDY CREEK BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	2
Crane pads	0	0	0	0	0	0	0
Remove/install track	0	0	0	0	0	0	2
Remove/install main line girders, blocks	0	0	0	0	0	0	1
Cut abutments and piers	0	0	0	0	0	0	1
Compound operation	0	0	0	0	0	0	0

LEVEL CROSSING SITES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	4	0	0	0	0	0	5
Road diversions	0	0	0	0	0	0	0
Signalling works	0	0	0	0	0	0	0
Strip level crossing panels and remove track	1	0	0	0	0	0	3
Install troughs	0	0	0	0	0	0	0
Rebuild rail	2	0	0	0	0	0	3
Install level crossing panels	0	0	0	0	0	0	1
Compound operation	0	0	0	0	0	0	0

BOWEN YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	1	0	0	0
Offline widenings	0	0	0	3	0	0	0
Drainage works and service relocation	0	0	0	2	0	0	0
Track re-alignment <300mm	0	0	0	2	0	0	0
Track re-alignment >300mm	0	0	0	3	0	0	0
Re-build track	0	0	0	2	0	0	0
Demobilisation and rehabilitation	0	0	0	2	0	0	0
Compound operation	0	0	0	0	0	0	0

APPENDIX C-6
WAGGA WAGGA RESIDUAL (MITIGATED)
CONSTRUCTION NOISE LEVELS

ASSUMED MITIGATION MEASURES – POTENTIAL NOISE REDUCTIONS

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
All sites		
Site establishment	6, 7	15
Demobilisation and rehabilitation	6, 7	15
Site compounds	2, 3, 5, 6	19
Level crossings		
Road diversions	4, 7	12
Signalling works	–	–
Strip level crossing panels and remove track	1, 7	8
Install troughs	1, 7	8
Rebuild rail	4, 7	10
Install level crossing panels	1, 7	8
Uranquinty, Wagga Wagga Yards, Bomen Yard clearances		
Offline widenings	4, 7	12
Drainage and earthworks	1, 7	12
Track re-alignment (<300mm)	7	8
Track realignment (>300mm)	4, 7	10
Rebuild track	7	8
Cassidy Parade and Wagga Station shared user bridges		
Demolition	1, 7	12
Piling	1	5
Concreting works	7	10
Installation of fittings	–	–
Lifting of truss and deck	1, 7	8
Pearson Street bridge		
Earthworks	1, 7	12
Large scale piling	1, 7	10
Small scale piling	1	5
Protection walls and drainage	1, 7	12
Track removal	7	8
Rebuild track	7	8

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
Edmondson Street bridge		
Service Relocations		
Demolition	1, 7	12
Crane / piling pads	7	10
Piling	1	5
RE Wall and abutments	1, 7	8
Install deck, slabs and planks	1, 7	8
Install fittings	7	10
Asphalting	1, 7	12
Wagga Wagga Yard clearances (gantry removals)		
Install cabling / conduits	7	10
Signalling works	–	–
Cut gantry bolts	–	–
Remove gantry	7	8
Remove footings	1, 7	12
Backfill footings	1, 7	12
Sandy Creek Bridge		
Crane pads	7	10
Track removal / installation	7	8
Remove / install girders and blocks	7	10
Cut piers and abutments	1, 7	12

(1) Refer to Chapter 8

PREDICTED CONSTRUCTION NOISE LEVELS AT RESIDENTIAL RECEIVERS

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Level crossing upgrades – NCA09 (Total number of residential receivers 326)							
Standard Hours							
Preliminary works	49	10	1	0	0	0	0
Road diversions	49	0	0	0	0	0	0
Signalling works	49	10	1	0	0	0	0
Strip level crossing panels and remove track	49	23	10	1	0	0	0
Install troughs	49	6	0	0	0	0	0
Rebuild rail	49	18	7	1	0	0	0
Install level crossing panels	49	14	8	0	0	0	0
Compound operation	49	0	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	44	23	10	1	0	0	0
Road diversions	44	0	0	0	0	0	0
Signalling works	44	23	10	1	0	0	0
Strip level crossing panels and remove track	44	72	23	11	0	0	0
Install troughs	44	11	6	0	0	0	0
Rebuild rail	44	52	18	8	0	0	0
Install level crossing panels	44	40	14	8	0	0	0
Compound operation	44	0	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	44	23	10	1	0	0	0
Road diversions	44	0	0	0	0	0	0
Signalling works	44	23	10	1	0	0	0
Strip level crossing panels and remove track	44	72	23	11	0	0	0
Install troughs	44	11	6	0	0	0	0
Rebuild rail	44	52	18	8	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Install level crossing panels	44	40	14	8	0	0	0
Compound operation	44	0	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	35	140	52	25	1	0	0
Road diversions	35	11	6	0	0	0	0
Signalling works	35	140	52	25	1	0	0
Strip level crossing panels and remove track	35	57	140	70	8	0	0
Install troughs	35	93	25	14	0	0	0
Rebuild rail	35	76	130	54	8	0	0
Install level crossing panels	35	95	114	43	6	0	0
Compound operation	35	8	0	0	0	0	0
Sandy Creek Bridge – NCA09 (Total number of residential receivers 326)							
Standard hours							
Preliminary works	49	5	0	0	0	0	0
Crane pads	49	0	0	0	0	0	0
Remove/install track	49	29	12	3	0	0	0
Remove/install main line girders, blocks	49	11	0	0	0	0	0
Cut abutments and piers	49	7	0	0	0	0	0
Compound operation	49	0	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	44	12	5	0	0	0	0
Crane pads	44	11	0	0	0	0	0
Remove/install track	44	85	29	15	0	0	0
Remove/install main line girders, blocks	44	20	11	0	0	0	0
Cut abutments and piers	44	12	7	0	0	0	0
Compound operation	44	0	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	44	12	5	0	0	0	0
Crane pads	44	11	0	0	0	0	0
Remove/install track	44	85	29	15	0	0	0
Remove/install main line girders, blocks	44	20	11	0	0	0	0
Cut abutments and piers	44	12	7	0	0	0	0
Compound operation	44	0	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	35	85	29	15	0	0	0
Crane pads	35	76	16	10	0	0	0
Remove/install track	35	15	82	105	11	0	0
Remove/install main line girders, blocks	35	84	76	26	0	0	0
Cut abutments and piers	35	80	47	17	0	0	0
Compound operation	35	0	0	0	0	0	0
Uranquinty Yard clearances – NCA09 (Total number of residential receivers 326)							
Standard hours							
Preliminary works	49	33	30	4	0	0	0
Offline widenings	49	106	41	41	0	0	0
Drainage works and service relocation	49	78	28	27	0	0	0
Track re-alignment <300mm	49	6	0	0	0	0	0
Track re-alignment >300mm	49	98	43	6	0	0	0
Re-build track	49	45	17	0	0	0	0
Demobilisation and rehabilitation	49	40	3	0	0	0	0
Compound operation	49	0	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	44	72	33	34	0	0	0
Offline widenings	44	93	106	82	0	0	0
Drainage works and service relocation	44	120	78	55	0	0	0
Track re-alignment (< 300mm)	44	43	6	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Track re-alignment (> 300mm)	44	131	98	49	0	0	0
Re-build track	44	122	45	17	0	0	0
Demobilisation and rehabilitation	44	82	40	3	0	0	0
Compound operation	44	1	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	44	72	33	34	0	0	0
Offline widenings	44	93	106	82	0	0	0
Drainage works and service relocation	44	120	78	55	0	0	0
Track re-alignment (< 300mm)	44	43	6	0	0	0	0
Track re-alignment (> 300mm)	44	131	98	49	0	0	0
Re-build track	44	122	45	17	0	0	0
Demobilisation and rehabilitation	44	82	40	3	0	0	0
Compound operation	44	1	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	35	72	96	97	27	0	0
Offline widenings	35	6	39	198	69	0	0
Drainage works and service relocation	35	11	63	188	48	0	0
Track re-alignment (< 300mm)	35	138	82	43	0	0	0
Track re-alignment (> 300mm)	35	6	43	220	43	0	0
Re-build track	35	28	131	141	6	0	0
Demobilisation and rehabilitation	35	61	152	91	0	0	0
Compound operation	35	11	3	0	0	0	0
Pearson Street bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Standard hours							
Preliminary works	56/58	9	2	0	0	0	0
Earthworks	56/58	16	10	2	0	0	0
Large scale piling	56/58	3	0	0	0	0	0
Small scale piling	56/58	4	1	0	0	0	0
Protection walls and drainage	56/58	0	0	0	0	0	0
Track removal	56/58	13	7	0	0	0	0
Re-build track	56/58	13	4	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Demobilisation and rehabilitation	56/58	4	0	0	0	0	0
Compound operation	56/58	0	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	51/46	17	9	2	0	0	0
Earthworks	51/46	54	16	12	0	0	0
Large scale piling	51/46	11	3	0	0	0	0
Small scale piling	51/46	30	4	1	0	0	0
Protection walls and drainage	51/46	3	0	0	0	0	0
Track removal	51/46	28	13	7	0	0	0
Re-build track	51/46	20	13	4	0	0	0
Demobilisation and rehabilitation	51/46	13	4	0	0	0	0
Compound operation	51/46	0	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	50/44	19	13	2	0	0	0
Earthworks	50/44	78	20	15	0	0	0
Large scale piling	50/44	17	4	0	0	0	0
Small scale piling	50/44	48	4	2	0	0	0
Protection walls and drainage	50/44	4	0	0	0	0	0
Track removal	50/44	38	13	9	0	0	0
Re-build track	50/44	28	13	7	0	0	0
Demobilisation and rehabilitation	50/44	13	7	0	0	0	0
Compound operation	50/44	0	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	43/42	138	22	22	2	0	0
Earthworks	43/42	665	137	39	8	0	0
Large scale piling	43/42	181	48	6	0	0	0
Small scale piling	43/42	316	86	14	0	0	0
Protection walls and drainage	43/42	48	4	2	0	0	0
Track removal	43/42	247	61	25	3	0	0
Re-build track	43/42	176	53	24	0	0	0
Demobilisation and rehabilitation	43/42	53	13	11	0	0	0
Compound operation	43/42	9	2	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Cassidy Parade pedestrian bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Standard hours							
Preliminary works	56/58	9	6	2	1	0	1
Demolition	56/58	23	6	9	0	1	4
Piling	56/58	20	11	6	1	0	2
Concreting works	56/58	4	2	0	0	0	0
Installation of screens, handrails, etc	56/58	4	5	3	0	0	0
Lifting of truss and deck	56/58	12	3	5	0	0	1
Demobilisation and rehabilitation	56/58	7	3	4	1	0	2
Compound operation	56/58	1	1	1	0	0	0
Outside standard hours – Day time							
Preliminary works	51/46	51	20	22	4	1	0
Demolition	51/46	257	42	38	8	3	0
Piling	51/46	455	119	34	9	1	0
Concreting works	51/46	20	11	6	1	0	0
Installation of screens, handrails, etc	51/46	40	17	16	5	0	0
Lifting of truss and deck	51/46	89	15	23	6	0	0
Demobilisation and rehabilitation	51/46	29	21	9	4	2	0
Compound operation	51/46	9	4	2	2	0	0
Outside standard hours – Evening							
Preliminary works	50/44	120	19	30	6	1	0
Demolition	50/44	423	100	45	10	4	0
Piling	50/44	570	238	45	13	3	0
Concreting works	50/44	16	18	9	1	0	0
Installation of screens, handrails, etc	50/44	89	15	23	6	0	0
Lifting of truss and deck	50/44	192	27	27	7	1	0
Demobilisation and rehabilitation	50/44	52	26	11	5	2	0
Compound operation	50/44	12	4	3	2	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night(a)							
Preliminary works	43/42	250	34	36	8	1	0
Demolition	43/42	579	199	61	14	5	0
Piling	43/42	716	400	89	17	6	0
Concreting works	43/42	28	17	13	3	0	0
Installation of screens, handrails, etc	43/42	192	27	27	7	1	0
Lifting of truss and deck	43/42	317	63	30	10	1	0
Demobilisation and rehabilitation	43/42	141	33	16	8	2	0
Compound operation	43/42	7	9	6	1	1	0
Edmondson Street bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Standard hours							
Preliminary works	56/58	15	11	8	3	2	7
Service relocations	56/58	25	17	13	5	3	11
Demolition	56/58	9	5	4	1	1	2
Crane / piling pads	56/58	4	2	3	0	0	0
Piling	56/58	13	7	4	0	0	0
RE Wall and abutments	56/58	5	4	5	0	0	1
Install deck, slabs and planks	56/58	12	7	20	4	3	11
Install furniture, infrastructure	56/58	11	10	9	3	2	7
Asphalting	56/58	13	7	1	1	1	3
Compound operation	56/58	0	0	0	0	0	0
Outside standard hours – Daytime							
Preliminary works	51/46	48	28	31	9	6	0
Service relocations	51/46	337	72	44	17	10	0
Demolition	51/46	65	16	18	5	2	0
Crane / piling pads	51/46	20	6	9	3	0	0
Piling	51/46	327	77	23	9	0	0
RE Wall and abutments	51/46	85	20	12	6	0	0
Install deck, slabs and planks	51/46	217	33	28	25	8	0
Install furniture, infrastructure	51/46	78	24	30	9	7	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Asphalting	51/46	32	15	23	2	3	0
Compound operation	51/46	9	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	50/44	91	23	41	13	7	0
Service relocations	50/44	504	153	51	23	12	0
Demolition	50/44	122	28	20	7	2	0
Crane / piling pads	50/44	37	11	8	5	0	0
Piling	50/44	476	149	38	11	0	0
RE Wall and abutments	50/44	162	37	16	6	2	0
Install deck, slabs and planks	50/44	379	77	40	22	12	0
Install furniture, infrastructure	50/44	141	28	38	16	7	0
Asphalting	50/44	36	28	23	5	3	0
Compound operation	50/44	12	1	0	0	0	0
Outside standard hours – Night							
Preliminary works	43/42	152	31	42	20	8	0
Service relocations	43/42	648	255	79	33	13	0
Demolition	43/42	196	51	22	12	3	0
Crane / piling pads	43/42	60	16	11	6	0	0
Piling	43/42	570	258	68	13	1	0
RE Wall and abutments	43/42	268	60	24	6	3	0
Install deck, slabs and planks	43/42	586	149	51	21	14	0
Install furniture, infrastructure	43/42	257	54	41	15	10	0
Asphalting	43/42	61	29	26	10	3	0
Compound operation	43/42	11	7	0	0	0	0
Wagga Wagga Station pedestrian bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Standard hours							
Preliminary works	56/58	9	3	6	0	0	0
Demolition	56/58	7	3	5	0	0	0
Piling	56/58	5	2	1	0	0	0
Concreting works	56/58	2	7	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Installation of screens, handrails, etc	56/58	5	0	0	0	0	0
Lifting of truss and deck	56/58	10	3	6	0	0	0
Demobilisation and rehabilitation	56/58	12	5	1	0	0	0
Compound operation	56/58	0	0	0	0	0	0
Outside standard hours – Day							
Preliminary works	51/46	45	19	15	7	0	0
Demolition	51/46	125	28	12	5	0	0
Piling	51/46	31	7	11	1	0	0
Concreting works	51/46	33	14	7	5	0	0
Installation of screens, handrails, etc	51/46	10	3	6	0	0	0
Lifting of truss and deck	51/46	72	28	16	7	0	0
Demobilisation and rehabilitation	51/46	48	27	23	1	0	0
Compound operation	51/46	16	5	0	0	0	0
Outside standard hours – Evening							
Preliminary works	50/44	78	21	20	9	0	0
Demolition	50/44	202	46	16	6	1	0
Piling	50/44	62	10	11	3	0	0
Concreting works	50/44	47	17	13	6	0	0
Installation of screens, handrails, etc	50/44	12	4	7	0	0	0
Lifting of truss and deck	50/44	123	39	24	8	0	0
Demobilisation and rehabilitation	50/44	84	30	29	4	0	0
Compound operation	50/44	22	8	0	0	0	0
Outside standard hours – Night							
Preliminary works	43/42	128	34	25	9	0	0
Demolition	43/42	286	100	24	9	1	0
Piling	43/42	120	22	12	5	0	0
Concreting works	43/42	72	28	16	7	0	0
Installation of screens, handrails, etc	43/42	16	8	8	0	0	0
Lifting of truss and deck	43/42	216	51	37	9	0	0
Demobilisation and rehabilitation	43/42	131	37	37	8	0	0
Compound operation	43/42	30	8	5	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Wagga Wagga Yard clearances – NCA11/12 (Total number of residential receivers 5,061)							
Standard hours							
Preliminary works	58	17	8	6	0	0	0
Offline widenings	58	30	17	14	0	0	0
Drainage works and service relocation	58	25	4	0	0	0	0
Track re-alignment <300mm	58	0	0	0	0	0	0
Track re-alignment >300mm	58	0	0	0	0	0	0
Re-build track	58	13	17	5	0	0	0
Demobilisation and rehabilitation	58	14	12	3	0	0	0
Compound operation	58	0	0	0	0	0	0
Outside standard hours – Day time							
Preliminary works	53	30	17	14	0	0	0
Offline widenings	53	55	30	25	6	0	0
Drainage works and service relocation	53	36	25	4	0	0	0
Track re-alignment <300mm	53	8	0	0	0	0	0
Track re-alignment >300mm	53	32	0	0	0	0	0
Re-build track	53	30	13	22	0	0	0
Demobilisation and rehabilitation	53	27	14	15	0	0	0
Compound operation	53	0	0	0	0	0	0
Outside standard hours –Evening							
Preliminary works	52	30	15	20	0	0	0
Offline widenings	52	64	30	29	6	0	0
Drainage works and service relocation	52	46	25	9	0	0	0
Track re-alignment <300mm	52	12	0	0	0	0	0
Track re-alignment >300mm	52	33	7	0	0	0	0
Re-build track	52	38	14	23	0	0	0
Demobilisation and rehabilitation	52	31	15	16	0	0	0
Compound operation	52	0	0	0	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night(a)							
Preliminary works	42	186	64	45	20	0	0
Offline widenings	42	286	185	94	29	6	0
Drainage works and service relocation	42	133	113	71	9	0	0
Track re-alignment <300mm	42	63	41	12	0	0	0
Track re-alignment >300mm	42	139	44	40	0	0	0
Re-build track	42	196	82	52	23	0	0
Demobilisation and rehabilitation	42	162	51	46	16	0	0
Compound operation	42	5	6	0	0	0	0
Bomen Yard clearances – NCA11/12 (Total number of residential receivers 5,061)							
Standard hours							
Preliminary works	58	0	0	0	0	0	0
Offline widenings	58	0	0	0	0	0	0
Drainage works and service relocation	58	0	0	0	0	0	0
Track re-alignment <300mm	58	0	0	0	0	0	0
Track re-alignment >300mm	58	0	0	0	0	0	0
Re-build track	58	0	0	0	0	0	0
Demobilisation and rehabilitation	58	0	0	0	0	0	0
Compound operation	58	0	0	0	0	0	0
Outside standard hours - Daytime							
Preliminary works	53	0	0	0	0	0	0
Offline widenings	53	0	0	0	0	0	0
Drainage works and service relocation	53	0	0	0	0	0	0
Track re-alignment <300mm	53	0	0	0	0	0	0
Track re-alignment >300mm	53	0	0	0	0	0	0
Re-build track	53	0	0	0	0	0	0
Demobilisation and rehabilitation	53	0	0	0	0	0	0
Compound operation	53	0	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours - Evening							
Preliminary works	52	0	0	0	0	0	0
Offline widenings	52	0	0	0	0	0	0
Drainage works and service relocation	52	0	0	0	0	0	0
Track re-alignment <300mm	52	0	0	0	0	0	0
Track re-alignment >300mm	52	0	0	0	0	0	0
Re-build track	52	0	0	0	0	0	0
Demobilisation and rehabilitation	52	0	0	0	0	0	0
Compound operation	52	0	0	0	0	0	0
Outside standard hours - Night							
Preliminary works	42	0	0	0	0	0	0
Offline widenings	42	0	0	0	0	0	0
Drainage works and service relocation	42	0	0	0	0	0	0
Track re-alignment <300mm	42	0	0	0	0	0	0
Track re-alignment >300mm	42	0	0	0	0	0	0
Re-build track	42	0	0	0	0	0	0
Demobilisation and rehabilitation	42	0	0	0	0	0	0
Compound operation	42	0	0	0	0	0	0

* Refer Table 2.2 for a description of hours

MAXIMUM PREDICTED NOISE LEVELS (SLEEP DISTURBANCE)

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Level crossings – NCA09 (Total number of residential receivers 326)							
Preliminary works	45	65	23	10	1	0	0
Road diversions			0	0	0	0	0
Signalling works			18	7	1	0	0
Strip level crossing panels and remove track			114	32	17	0	0
Install troughs			18	7	1	0	0
Rebuild rail			93	25	14	0	0
Install level crossing panels			114	32	17	0	0
Compound operation			0	0	0	0	0
Sandy Creek Bridge – NCA09 (Total number of residential receivers 326)							
Preliminary works	45	65	12	3	0	0	0
Crane pads			11	0	0	0	0
Remove/install track			84	61	19	0	0
Remove/install main line girders, blocks			61	12	7	0	0
Cut abutments and piers			29	12	3	0	0
Compound operation			0	0	0	0	0
Uranquinty Yard clearances – NCA09 (Total number of residential receivers 326)							
Preliminary works	45	65	69	28	27	0	0
Offline widenings			109	89	69	0	0
Drainage works and service relocation			123	65	48	0	0
Track re-alignment (< 300mm)			45	17	0	0	0
Track re-alignment (> 300mm)			82	144	73	0	0
Re-build track			122	45	17	0	0
Demobilisation and rehabilitation			52	39	0	0	0
Compound operation			1	0	0	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Pearson Street bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Preliminary works	NCA10 (53) NCA11 (52)	65	17	5	2	0	0
Earthworks			54	16	12	0	0
Large scale piling			17	4	0	0	0
Small scale piling			86	11	3	0	0
Protection walls and drainage			7	3	0	0	0
Track removal			38	13	9	0	0
Re-build track			15	10	3	0	0
Demobilisation and rehabilitation			11	0	0	0	0
Compound operation			0	0	0	0	0
Cassidy Parade pedestrian bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Preliminary works	NCA10 (53) NCA11 (52)	65	25	11	8	0	1
Demolition			73	25	23	4	1
Piling			119	16	22	6	0
Concreting works			14	3	6	0	0
Installation of screens, handrails, etc			21	6	7	1	0
Lifting of truss and deck			63	17	18	6	0
Demobilisation and rehabilitation			11	5	8	1	1
Compound operation			4	1	2	1	0
Edmondson Street bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Preliminary works	NCA10 (53) NCA11 (52)	65	28	15	17	4	3
Service relocations			57	22	33	7	6
Demolition			28	10	13	4	2
Crane / piling pads			8	3	6	0	0
Piling			107	23	15	2	0
RE Wall and abutments			48	15	9	5	0
Install deck, slabs and planks			77	30	21	16	7
Install furniture, infrastructure			54	25	26	9	6
Asphalting			13	13	10	1	2
Compound operation			0	0	0	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Wagga Wagga Station pedestrian bridge – NCA10 and 11/12 (Total number of residential receivers 5,675/5,061)							
Preliminary works	NCA10 (53) NCA11 (52)	65	35	7	11	2	0
Demolition			7	7	5	0	0
Piling			16	8	8	0	0
Concreting works			3	5	0	0	0
Installation of screens, handrails, etc			51	24	15	7	0
Lifting of truss and deck			23	14	8	0	0
Demobilisation and rehabilitation			5	0	0	0	0
Compound operation			0	0	0	0	0
Wagga Wagga Yard clearances – NCA11/12 (Total number of residential receivers 5,061)							
Preliminary works	52	65	30	15	20	0	0
Offline widenings			64	30	29	6	0
Drainage works and service relocation			46	25	9	0	0
Track re-alignment <300mm			41	12	0	0	0
Track re-alignment >300mm			38	22	0	0	0
Re-build track			39	21	24	0	0
Demobilisation and rehabilitation			31	15	16	0	0
Compound operation			0	0	0	0	0
Bomen Yard clearances – NCA11/12 (Total number of residential receivers 5,061)							
Preliminary works	52	65	0	0	0	0	0
Offline widenings			0	0	0	0	0
Drainage works and service relocation			0	0	0	0	0
Track re-alignment <300mm			0	0	0	0	0
Track re-alignment >300mm			0	0	0	0	0
Re-build track			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0

PREDICTED CONSTRUCTION NOISE LEVELS AT NON-RESIDENTIAL RECEIVERS

URANQUINTY YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	1
Offline widenings	4	0	0	1	0	0	2
Drainage works and service relocation	4	0	0	1	0	0	2
Track re-alignment (< 300mm)	8	0	5	5	2	0	6
Track re-alignment (> 300mm)	3	0	0	1	0	0	2
Re-build track	0	0	0	1	0	0	0
Demobilisation and rehabilitation	0	0	0	1	0	0	0
Compound operation	0	0	0	0	0	0	0

PEARSON STREET BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	6	3	0	0
Earthworks	1	0	1	15	4	0	0
Large scale piling	0	0	0	2	0	0	0
Small scale piling	0	0	0	4	0	0	0
Protection walls and drainage	0	0	0	0	0	0	0
Track removal	0	0	0	6	0	0	0
Re-build track	0	0	0	1	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	1	0	0

CASSIDY PARADE PEDESTRIAN BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	5	0	2	0	0	0	0
Demolition	9	0	0	0	0	0	0
Piling	9	0	1	0	0	0	0
Concreting works	1	0	0	0	0	0	0
Installation of screens, handrails, etc	5	0	0	0	0	0	0
Lifting of truss and deck	5	0	0	0	0	0	0
Demobilisation and rehabilitation	2	0	2	0	0	0	0
Compound operation	0	0	1	0	0	0	0

WAGGA STATION SHARED USER BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	1	0	1	3	0	0	0
Demolition	1	0	3	2	0	0	0
Piling	3	0	0	1	0	0	0
Concreting works	1	0	0	1	0	0	0
Installation of screens, handrails, etc	2	0	1	5	0	0	0
Lifting of truss and deck	3	0	1	5	0	0	0
Demobilisation and rehabilitation	0	0	0	1	0	0	0
Compound operation	0	0	0	1	0	0	0

EDMONDSON STREET BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	6	0	0	4	0	0	0
Service relocations	8	0	0	2	0	0	0
Demolition	5	0	0	2	0	0	0
Crane / piling pads	4	0	0	2	0	0	0
Piling	7	0	0	2	0	0	0
Re wall and abutments	5	0	0	2	0	0	0
Install deck, slabs and planks	8	0	1	5	0	0	0
Install furniture, infrastructure	6	0	0	2	0	0	0
Asphalting	4	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

WAGGA WAGGA YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	2	0	1	12	0	0	0
Offline widenings	7	0	4	14	0	0	0
Drainage works and service relocation	2	0	0	9	0	0	0
Track re-alignment <300mm	0	0	0	3	0	0	0
Track re-alignment >300mm	1	0	0	5	0	0	0
Re-build track	2	0	1	12	0	0	0
Demobilisation and rehabilitation	1	0	1	9	0	0	0
Compound operation	0	0	0	0	0	0	0

SANDY CREEK BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Crane pads	0	0	0	0	0	0	0
Remove/install track	0	0	0	0	0	0	0
Remove/install main line girders, blocks	0	0	0	0	0	0	0
Cut abutments and piers	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

LEVEL CROSSING SITES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Road diversions	0	0	0	0	0	0	0
Signalling works	0	0	0	0	0	0	0
Strip level crossing panels and remove track	0	0	0	0	0	0	0
Install troughs	0	0	0	0	0	0	0
Rebuild rail	0	0	0	0	0	0	0
Install level crossing panels	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

BOWEN YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Offline widenings	0	0	0	2	0	0	0
Drainage works and service relocation	0	0	0	1	0	0	0
Track re-alignment <300mm	0	0	0	1	0	0	0
Track re-alignment >300mm	0	0	0	2	0	0	0
Re-build track	0	0	0	1	0	0	0
Demobilisation and rehabilitation	0	0	0	1	0	0	0
Compound operation	0	0	0	0	0	0	0

**APPENDIX C-7
JUNEE (UNMITIGATED)
CONSTRUCTION NOISE LEVELS**

PREDICTED CONSTRUCTION NOISE LEVELS AT RESIDENTIAL RECEIVERS

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Harefield Yard clearances – NCA13 (Total number of residential receivers 9)							
Standard hours							
Preliminary works	51	2	3	0	0	0	0
Offline Widenings	51	0	2	1	2	0	0
Track re-alignment	51	0	2	1	2	0	0
Track re-alignment	51	0	0	3	2	0	0
Re-build track	51	1	1	2	0	0	0
Demobilisation and rehabilitation	51	0	2	1	2	0	0
Compound operation	51	0	0	0	0	0	0
Outside standard hours – Day							
Preliminary works	46	0	2	3	0	0	0
Offline Widenings	46	0	0	3	1	1	0
Track re-alignment	46	0	0	3	2	0	0
Track re-alignment	46	0	0	2	1	2	0
Re-build track	46	1	1	2	1	0	0
Demobilisation and rehabilitation	46	0	0	3	2	0	0
Compound operation	46	0	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	44	0	0	5	0	0	0
Offline Widenings	44	0	0	2	2	1	0
Track re-alignment	44	0	0	3	2	0	0
Track re-alignment	44	0	0	1	2	2	0
Re-build track	44	0	2	1	2	0	0
Demobilisation and rehabilitation	44	0	0	3	2	0	0
Compound operation	44	3	0	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary works	42	0	0	5	0	0	0
Offline Widenings	42	0	0	2	1	2	0
Track re-alignment	42	0	0	2	2	1	0
Track re-alignment	42	0	0	0	3	2	0
Re-build track	42	0	1	2	2	0	0
Demobilisation and rehabilitation	42	0	0	3	1	1	0
Compound operation	42	4	0	0	0	0	0
Kemp Street bridge – NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	247	124	38	14	18	28
Demolition and earthworks	52	267	149	46	9	6	11
Piling	52	174	52	18	7	4	6
Concreting works	52	26	8	11	5	1	6
Lifting of truss and deck	52	107	20	13	5	5	7
Installation of services, screens, etc.	52	229	85	37	9	28	32
Asphalting	52	196	75	29	6	1	6
Demobilisation and rehabilitation	52	231	100	35	12	28	36
Compound operation	52	14	7	12	0	4	4
Outside standard hours – Day							
Preliminary works	52	247	124	38	14	18	0
Demolition and earthworks	52	267	149	46	9	6	0
Piling	52	174	52	18	7	4	0
Concreting works	52	26	8	11	5	1	0
Lifting of truss and deck	52	107	20	13	5	5	0
Installation of services, screens, etc.	52	229	85	37	9	28	0
Asphalting	52	196	75	29	6	1	0
Demobilisation and rehabilitation	52	231	100	35	12	28	0
Compound operation	52	14	7	12	0	4	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	50	309	175	60	13	23	0
Demolition and earthworks	50	266	197	91	13	6	0
Piling	50	225	102	29	7	5	0
Concreting works	50	59	14	12	4	4	0
Lifting of truss and deck	50	160	37	17	6	5	0
Installation of services, screens, etc.	50	298	144	50	12	28	0
Asphalting	50	247	132	37	8	2	0
Demobilisation and rehabilitation	50	314	166	56	14	28	0
Compound operation	50	21	10	13	1	4	0
Outside standard hours – Night							
Preliminary works	40	99	183	484	60	36	0
Demolition and earthworks	40	86	153	463	91	19	0
Piling	40	121	254	327	29	12	0
Concreting works	40	268	172	73	12	8	0
Lifting of truss and deck	40	223	242	197	17	11	0
Installation of services, screens, etc.	40	92	217	442	50	40	0
Asphalting	40	111	227	379	37	10	0
Demobilisation and rehabilitation	40	90	224	480	56	42	0
Compound operation	40	221	84	31	13	5	0
Kemp Street bridge – Road diversions - NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	191	78	37	8	4	10
Earthworks	52	256	112	49	11	6	12
Install drainage and kerbs	52	112	36	20	7	3	8
Asphalting	52	60	20	12	5	3	4
Furniture, line marking, etc.	52	78	25	16	5	3	6
Demobilisation and rehabilitation	52	154	60	28	9	3	8

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours - Day							
Preliminary works	52	191	78	37	8	4	10
Earthworks	52	256	112	49	11	6	12
Install drainage and kerbs	52	112	36	20	7	3	8
Asphalting	52	60	20	12	5	3	4
Furniture, line marking, etc.	52	78	25	16	5	3	6
Demobilisation and rehabilitation	52	154	60	28	9	3	8
Outside standard hours - Evening							
Preliminary works	50	256	112	49	11	6	10
Earthworks	50	300	154	80	12	8	12
Install drainage and kerbs	50	154	60	28	9	3	8
Asphalting	50	96	34	17	5	3	4
Furniture, line marking, etc.	50	112	36	20	7	3	6
Demobilisation and rehabilitation	50	221	96	45	10	4	8
Outside standard hours - Night							
Preliminary works	40	114	263	368	49	17	10
Earthworks	40	113	184	454	80	20	12
Install drainage and kerbs	40	184	300	214	28	12	8
Asphalting	40	288	221	130	17	8	4
Furniture, line marking, etc.	40	263	256	148	20	10	6
Demobilisation and rehabilitation	40	124	288	317	45	14	8
Junee Station pedestrian bridge – NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	251	79	33	1	0	0
Installing new cabling / conduits	52	251	79	33	1	0	0
Signalling works	52	5	1	0	0	0	0
Cut gantry bolts	52	79	28	6	0	0	0
Remove gantry	52	192	40	18	1	0	0
Remove footings	52	120	34	7	0	0	0
Backfill footings	52	79	28	6	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Demobilisation and rehabilitation	52	218	60	23	1	0	0
Compound operation	52	14	4	1	0	0	0
Outside standard hours – Day time							
Preliminary works	52	251	79	33	1	0	0
Installing new cabling / conduits	52	251	79	33	1	0	0
Signalling works	52	5	1	0	0	0	0
Cut gantry bolts	52	79	28	6	0	0	0
Remove gantry	52	192	40	18	1	0	0
Remove footings	52	120	34	7	0	0	0
Backfill footings	52	79	28	6	0	0	0
Demobilisation and rehabilitation	52	218	60	23	1	0	0
Compound operation	52	14	4	1	0	0	0
Outside standard hours – Evening							
Preliminary works	50	284	151	43	4	0	0
Installing new cabling / conduits	50	284	151	43	4	0	0
Signalling works	50	10	4	0	0	0	0
Cut gantry bolts	50	151	33	14	0	0	0
Remove gantry	50	251	79	33	1	0	0
Remove footings	50	192	40	18	1	0	0
Backfill footings	50	151	33	14	0	0	0
Demobilisation and rehabilitation	50	260	120	38	3	0	0
Compound operation	50	28	5	1	0	0	0
Outside standard hours – Night							
Preliminary works	40	121	254	435	43	4	0
Installing new cabling / conduits	40	121	254	435	43	4	0
Signalling works	40	151	33	14	0	0	0
Cut gantry bolts	40	254	284	184	14	0	0
Remove gantry	40	136	310	330	33	1	0
Remove footings	40	216	298	232	18	1	0
Backfill footings	40	254	284	184	14	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Demobilisation and rehabilitation	40	125	288	380	38	3	0
Compound operation	40	251	79	33	1	0	0
Junee Yard clearances – NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	251	79	33	1	0	0
Offline Widenings	52	284	151	43	4	0	1
Track re-alignment (< 300mm)	52	79	28	6	0	0	0
Track re-alignment (> 300mm)	52	251	79	33	1	0	0
Re-build track	52	60	18	6	0	0	0
Demobilisation and rehabilitation	52	218	60	23	1	0	0
Compound operation	52	14	4	1	0	0	0
Outside standard hours – Day							
Preliminary works	52	251	79	33	1	0	0
Offline Widenings	52	284	151	43	4	0	0
Track re-alignment (< 300mm)	52	79	28	6	0	0	0
Track re-alignment (> 300mm)	52	251	79	33	1	0	0
Re-build track	52	60	18	6	0	0	0
Demobilisation and rehabilitation	52	218	60	23	1	0	0
Compound operation	52	14	4	1	0	0	0
Outside standard hours – Evening							
Preliminary works	50	284	151	43	4	0	0
Offline Widenings	50	311	218	78	6	0	0
Track re-alignment (< 300mm)	50	151	33	14	0	0	0
Track re-alignment (> 300mm)	50	284	151	43	4	0	0
Re-build track	50	120	34	7	0	0	0
Demobilisation and rehabilitation	50	260	120	38	3	0	0
Compound operation	50	28	5	1	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary works	40	121	254	435	43	4	0
Offline Widenings	40	95	177	529	78	6	0
Track re-alignment (< 300mm)	40	254	284	184	14	0	0
Track re-alignment (> 300mm)	40	121	254	435	43	4	0
Re-build track	40	288	260	154	7	0	0
Demobilisation and rehabilitation	40	125	288	380	38	3	0
Compound operation	40	251	79	33	1	0	0
Olympic Highway underbridge – NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	252	202	108	47	1	6
Trackworks	52	272	165	81	44	0	6
Earthworks	52	258	252	161	54	1	44
Structure works	52	258	252	161	54	1	44
Concreting works	52	107	25	52	1	0	0
Installation of furniture.	52	275	165	79	41	0	5
Crane operations	52	155	292	440	79	41	68
Demobilisation and rehabilitation	52	279	162	81	44	0	6
Compound operation	52	19	4	0	0	0	0
Outside standard hours – Day							
Preliminary works	52	252	202	108	47	1	0
Trackworks	52	272	165	81	44	0	0
Earthworks	52	258	252	161	54	1	0
Structure works	52	258	252	161	54	1	0
Concreting works	52	107	25	52	1	0	0
Installation of furniture.	52	275	165	79	41	0	0
Crane operations	52	155	292	440	79	41	0
Demobilisation and rehabilitation	52	279	162	81	44	0	0
Compound operation	52	19	4	0	0	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	50	260	251	162	53	1	0
Trackworks	50	234	239	132	52	1	0
Earthworks	50	291	272	228	60	2	0
Structure works	50	291	272	228	60	2	0
Concreting works	50	149	44	58	1	0	0
Installation of furniture.	50	232	246	129	48	0	0
Crane operations	50	61	307	478	129	48	0
Demobilisation and rehabilitation	50	236	238	131	52	1	0
Compound operation	50	38	7	1	0	0	0
Outside standard hours – Night							
Preliminary works	40	63	251	511	162	54	0
Trackworks	40	62	306	473	132	53	0
Earthworks	40	52	156	563	228	62	0
Structure works	40	52	156	563	228	62	0
Concreting works	40	272	265	193	58	1	0
Installation of furniture.	40	61	307	478	129	48	0
Crane operations	40	28	52	368	478	177	0
Demobilisation and rehabilitation	40	65	306	474	131	53	0
Compound operation	40	234	112	45	1	0	0
June to Illabo clearances – NCA15 (Total number of residential receivers 121)							
Standard hours							
Preliminary works	51	0	0	1	2	51	53
Offline Widenings	51	7	17	23	6	0	1
Track re-alignment (< 300mm)	51	9	19	20	5	0	0
Track re-alignment (> 300mm)	51	4	9	36	7	1	1
Re-build track	51	21	8	6	1	0	6
Demobilisation and rehabilitation	51	13	21	13	2	0	0
Compound operation	51	4	2	0	0	0	1

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Day time							
Preliminary works	46	0	0	0	1	53	0
Offline Widenings	46	4	7	36	9	1	0
Track re-alignment (< 300mm)	46	13	21	13	2	0	0
Track re-alignment (< 300mm)	46	4	9	36	7	1	0
Track re-alignment (> 300mm)	46	0	4	28	20	5	0
Re-build track	46	13	21	13	2	0	0
Demobilisation and rehabilitation	46	7	13	29	6	1	0
Compound operation	46	17	4	2	0	0	0
Outside standard hours – Evening							
Preliminary works	46	0	0	0	1	53	0
Offline Widenings	46	4	7	36	9	1	0
Track re-alignment (< 300mm)	46	13	21	13	2	0	0
Track re-alignment (< 300mm)	46	4	9	36	7	1	0
Track re-alignment (> 300mm)	46	0	4	28	20	5	0
Re-build track	46	13	21	13	2	0	0
Demobilisation and rehabilitation	46	7	13	29	6	1	0
Compound operation	46	17	4	2	0	0	0
Outside standard hours – Night							
Preliminary works	46	0	0	0	1	53	0
Offline Widenings	46	4	7	36	9	1	0
Track re-alignment (< 300mm)	46	13	21	13	2	0	0
Track re-alignment (< 300mm)	46	4	9	36	7	1	0
Track re-alignment (> 300mm)	46	0	4	28	20	5	0
Re-build track	46	13	21	13	2	0	0
Demobilisation and rehabilitation	46	7	13	29	6	1	0
Compound operation	46	17	4	2	0	0	0

* Refer Table 2.2 for a description of hours

MAXIMUM PREDICTED NOISE LEVELS (SLEEP DISTURBANCE)

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Harefield Yard clearances – NCA13 (Total number of residential receivers 9)							
Preliminary works	52	65	3	2	0	0	0
Offline Widenings			0	2	1	2	0
Track re-alignment			0	0	3	2	0
Track re-alignment			0	0	3	2	0
Re-build track			1	1	2	0	0
Demobilisation and rehabilitation			1	2	1	1	0
Compound operation			0	0	0	0	0
Kemp Street bridge – NCA14 (Total number of residential receivers 1,749)							
Preliminary works	50	65	309	175	60	13	23
Demolition and earthworks			227	250	153	17	6
Piling			250	127	36	8	5
Concreting works			107	20	13	5	5
Lifting of truss and deck			242	160	45	13	7
Installation of services, screens, etc.			304	181	64	12	30
Asphalting			269	151	49	11	2
Demobilisation and rehabilitation			314	166	56	14	28
Compound operation			21	10	13	1	4
Kemp Street bridge Road diversions – NCA14 (total number of residential receivers 1,749)							
Preliminary works	50	65	60	20	12	5	3
Earthworks			128	48	22	9	3
Install drainage and kerbs			112	36	20	7	3
Asphalting			20	8	9	2	1
Furniture, line marking, etc.			60	20	12	5	3
Demobilisation and rehabilitation			48	16	12	3	3

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Junee Station pedestrian bridge – NCA14 (Total number of residential receivers 1,749)							
Preliminary works	50	65	284	151	43	4	0
Installing new cabling / conduits			298	192	54	5	0
Signalling works			10	4	0	0	0
Cut gantry bolts			151	33	14	0	0
Remove gantry			298	192	54	5	0
Remove footings			311	218	78	6	0
Backfill footings			192	40	18	1	0
Demobilisation and rehabilitation			260	120	38	3	0
Compound operation			34	4	3	0	0
Junee Yard clearances – NCA14 (Total number of residential receivers 1,749)							
Preliminary works	50	65	60	18	6	0	0
Offline Widenings			120	34	7	0	0
Track re-alignment (< 300mm)			60	18	6	0	0
Track re-alignment (> 300mm)			151	33	14	0	0
Re-build track			18	5	1	0	0
Demobilisation and rehabilitation			40	14	5	0	0
Compound operation			4	1	0	0	0
Olympic Highway underbridge – NCA14 (Total number of residential receivers 1,749)							
Preliminary works	50	65	260	251	162	53	1
Trackworks			291	272	228	60	2
Earthworks			291	272	228	60	2
Structure works			306	234	346	72	6
Piling			234	239	132	52	1
Concreting works			205	87	64	4	0
Installation of screens, handrails etc.			232	246	129	48	0
Lifting of truss and deck			52	61	539	355	68
Demobilisation and rehabilitation			236	238	131	52	1
Compound operation			38	7	1	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Junee to Illabo clearances – NCA15 (Total number of residential receivers 121)							
Preliminary works	58	65	0	0	2	10	42
Offline Widenings			21	10	7	1	0
Track re-alignment			13	21	13	2	0
Track re-alignment			7	17	23	6	0
Re-build track			6	6	1	0	0
Demobilisation and rehabilitation			19	4	6	0	0
Compound operation			2	0	0	0	0

PREDICTED CONSTRUCTION NOISE LEVELS AT NON-RESIDENTIAL RECEIVERS

HAREFIELD YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Offline widenings	0	0	0	3	0	0	0
Track re-alignment	0	0	0	1	0	0	0
Track re-alignment	0	0	0	3	0	0	0
Re-build track	0	0	0	1	0	0	0
Demobilisation and rehabilitation	0	0	0	1	0	0	0
Compound operation	0	0	0	0	0	0	0

KEMP STREET BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	7	0	0	0	0	0	2
Demolition and earthworks	5	0	0	0	0	0	2
Piling	4	0	0	0	0	0	1
Concreting works	1	0	0	0	0	0	0
Lifting of truss and deck	2	0	0	0	0	0	0
Installation of services, screens, etc.	6	0	0	0	0	0	2
Asphalting	5	0	0	0	0	0	1
Demobilisation and rehabilitation	6	0	0	0	1	0	2
Compound operation	0	0	0	0	0	0	0

KEMP STREET DIVERSION WORKS	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	5	0	0	0	0	0	0
Earthworks	5	0	0	0	1	0	1
Install drainage and kerbs	3	0	0	0	0	0	0
Asphalting	0	0	0	0	0	0	0
Furniture, line marking, etc	1	0	0	0	0	0	0
Demobilisation and rehabilitation	4	0	0	0	0	0	0

JUNEE YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	5	0	0	0	1	0	1
Offline widenings	6	0	0	0	1	0	3
Track re-alignment (< 300mm)	3	0	0	0	1	0	0
Track re-alignment (> 300mm)	5	0	0	0	1	0	1
Re-build track	3	0	0	0	1	0	0
Demobilisation and rehabilitation	5	0	0	0	1	0	1

JUNEE STATION PEDESTRIAN BRIDGE AND HAREFIELD YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	5	0	0	0	1	0	1
Installing new cabling / conduits	5	0	0	0	1	0	1
Signalling works	0	0	0	0	0	0	0
Cut gantry bolts	3	0	0	0	1	0	0
Remove gantry	4	0	0	0	1	0	1
Remove footings	3	0	0	0	1	0	0
Backfill footings	3	0	0	0	1	0	0
Demobilisation and rehabilitation	5	0	0	0	1	0	1
Compound operation	0	0	0	0	0	0	0

OLYMPIC HIGHWAY BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	3	0	1	1	0	0	0
Trackworks	3	0	1	0	0	0	0
Earthworks	3	1	2	1	0	0	0
Structure works	3	1	2	1	0	0	0
Concreting works	0	0	1	0	0	0	0
Installation of furniture.	3	0	1	0	0	0	0
Crane operations	9	1	3	1	1	0	4
Demobilisation and rehabilitation	3	0	1	0	0	0	0
Compound operation	0	0	0	0	0	0	0

JUNEE TO ILLABO CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	9	0	1	15	2	0	0
Offline widenings	9	0	1	2	0	0	0
Track re-alignment (< 300mm)	9	0	1	2	0	0	0
Track re-alignment (> 300mm)	9	0	1	4	0	0	0
Re-build track	9	0	0	2	0	0	0
Demobilisation and rehabilitation	9	0	0	2	0	0	0
Compound operation	1	0	0	1	0	0	0

LEVEL CROSSING SITES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	9	0	1	2	0	0	0
Signalling works	0	0	0	1	0	0	0
Road diversions	0	0	0	1	0	0	0
Strip / install level crossing panels and track	8	0	0	2	0	0	0
Install troughs	6	0	0	1	0	0	0
Rebuild rail	9	0	0	2	0	0	0
Install level crossing panels	8	0	0	2	0	0	0
Compound operation	3	0	0	1	0	0	0

CULVERTS	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	9	0	0	3	0	0	0
Construct crane pads	7	0	0	3	0	0	0
Offline extensions	9	0	1	3	0	0	0
Track removal and replacement	9	0	1	15	2	0	0
Install culverts	9	0	0	3	0	0	0
Compound operation	9	0	1	15	2	0	0

APPENDIX C-8 JUNEE RESIDUAL (MITIGATED) CONSTRUCTION NOISE LEVELS

ASSUMED MITIGATION MEASURES – POTENTIAL NOISE REDUCTIONS

WORK STAGE	ASSUMED NOISE MANAGEMENT MEASURES ¹	POTENTIAL NOISE REDUCTION dBA
All sites		
Site establishment	6, 7	15
Demobilisation and rehabilitation	6, 7	15
Site compounds	2, 3, 5, 6	19
Harefield Yard and Junee to Illabo track re-alignment		
Offline widenings	4, 7	12
Track re-alignment (<300mm)	7	8
Track realignment (>300mm)	4, 7	10
Rebuild track	7	8
Junee bridge, Harefield gantry removal		
Install cabling / conduits	7	10
Signalling works	-	-
Cut gantry bolts	-	-
Remove gantry	7	8
Remove footings	1, 7	12
Backfill footings	1, 7	12
Olympic Highway Bridge		
Track works	4, 7	10
Earthworks	1, 7	12
Structure works	1, 8	15
Concreting works	7	10
Crane operations		
Installation of fittings	-	-
Lifting of truss and deck	1, 7	8
Kemp Street bridge		
Demolition and earthworks	1, 7	12
Piling	1	5
Concreting works	7	10
Lifting of truss and deck	1, 7	8
Install fittings	7	10
Asphalting	1, 7	12

(1) Refer to Chapter 8

PREDICTED CONSTRUCTION NOISE LEVELS AT RESIDENTIAL RECEIVERS

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Harefield Yard clearances – NCA13 (Total number of residential receivers 9)							
Standard hours							
Preliminary works	51	0	0	0	0	0	0
Offline Widenings	51	1	0	2	0	0	0
Track re-alignment	51	2	0	2	0	0	0
Track re-alignment	51	2	1	2	0	0	0
Re-build track	51	0	2	0	0	0	0
Demobilisation and rehabilitation	51	0	2	0	0	0	0
Compound operation	51	0	0	0	0	0	0
Outside standard hours – Day time (a)							
Preliminary works	46	0	0	0	0	0	0
Offline Widenings	46	2	1	2	0	0	0
Track re-alignment	46	1	2	2	0	0	0
Track re-alignment	46	0	2	1	2	0	0
Re-build track	46	1	0	2	0	0	0
Demobilisation and rehabilitation	46	1	0	2	0	0	0
Compound operation	46	0	0	0	0	0	0
Outside standard hours –Evening(a)							
Preliminary works	44	0	0	0	0	0	0
Offline Widenings	44	2	1	1	1	0	0
Track re-alignment	44	0	2	2	1	0	0
Track re-alignment	44	0	1	2	2	0	0
Re-build track	44	2	0	2	0	0	0
Demobilisation and rehabilitation	44	1	0	2	0	0	0
Compound operation	44	0	0	0	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night(a)							
Preliminary works	42	2	0	0	0	0	0
Offline Widenings	42	1	1	2	1	0	0
Track re-alignment	42	0	2	1	2	0	0
Track re-alignment	42	0	0	3	2	0	0
Re-build track	42	2	1	2	0	0	0
Demobilisation and rehabilitation	42	2	0	2	0	0	0
Compound operation	42	0	0	0	0	0	0
Kemp Street bridge – NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	11	5	14	8	5	11
Demolition and earthworks	52	9	6	5	1	0	1
Piling	52	52	11	12	5	1	5
Concreting works	52	7	4	5	0	1	1
Lifting of truss and deck	52	8	9	6	4	1	5
Installation of services, screens, etc.	52	24	13	9	11	17	24
Asphalting	52	10	7	5	1	0	1
Demobilisation and rehabilitation	52	11	5	13	9	13	19
Compound operation	52	1	0	4	0	0	0
Outside standard hours – Day							
Preliminary works	52	11	5	14	8	5	0
Demolition and earthworks	52	9	6	5	1	0	0
Piling	52	52	11	12	5	1	0
Concreting works	52	7	4	5	0	1	0
Lifting of truss and deck	52	8	9	6	4	1	0
Installation of services, screens, etc.	52	24	13	9	11	17	0
Asphalting	52	10	7	5	1	0	0
Demobilisation and rehabilitation	52	11	5	13	9	13	0
Compound operation	52	1	0	4	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	50	13	8	14	7	7	0
Demolition and earthworks	50	9	5	9	0	1	0
Piling	50	102	20	15	5	1	0
Concreting works	50	8	4	4	3	1	0
Lifting of truss and deck	50	16	10	6	5	1	0
Installation of services, screens, etc.	50	37	13	12	9	19	0
Asphalting	50	18	11	6	1	0	0
Demobilisation and rehabilitation	50	14	6	12	8	16	0
Compound operation	50	5	0	4	0	0	0
Outside standard hours – Night							
Preliminary works	40	175	47	21	14	14	0
Demolition and earthworks	40	149	37	14	9	1	0
Piling	40	254	225	122	15	6	0
Concreting works	40	59	14	12	4	4	0
Lifting of truss and deck	40	199	80	26	6	6	0
Installation of services, screens, etc.	40	298	144	50	12	28	0
Asphalting	40	196	75	29	6	1	0
Demobilisation and rehabilitation	40	166	42	20	12	24	0
Compound operation	40	3	7	5	4	0	0
Kemp Street bridge road diversions – NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	12	12	5	2	1	1
Earthworks	52	25	15	13	3	1	3
Install drainage and kerbs	52	15	9	5	2	1	1
Asphalting	52	15	4	5	1	0	1
Furniture, line marking, etc.	52	78	25	16	5	3	6
Demobilisation and rehabilitation	52	8	12	5	2	1	1

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours - Day							
Preliminary works	52	12	12	5	2	1	1
Earthworks	52	25	15	13	3	1	3
Install drainage and kerbs	52	15	9	5	2	1	1
Asphalting	52	15	4	5	1	0	1
Furniture, line marking, etc.	52	78	25	16	5	3	6
Demobilisation and rehabilitation	52	8	12	5	2	1	1
Outside standard hours - Evening							
Preliminary works	50	13	10	12	2	1	1
Earthworks	50	31	13	19	5	1	3
Install drainage and kerbs	50	13	15	7	2	1	1
Asphalting	50	12	8	5	2	1	1
Furniture, line marking, etc	50	112	36	20	7	3	6
Demobilisation and rehabilitation	50	11	10	9	2	1	1
Outside standard hours - Night							
Preliminary works	40	109	31	23	12	3	1
Earthworks	40	256	109	44	19	6	3
Install drainage and kerbs	40	109	31	28	7	3	1
Asphalting	40	52	20	20	5	3	1
Furniture, line marking, etc	40	263	256	148	20	10	6
Demobilisation and rehabilitation	40	92	30	21	9	3	1
June Station pedestrian bridge – NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	0	0	0	0	0	0
Installing new cabling / conduits	52	0	0	0	0	0	0
Signalling works	52	0	0	0	0	0	0
Cut gantry bolts	52	0	0	0	0	0	0
Remove gantry	52	0	0	0	0	0	0
Remove footings	52	0	0	0	0	0	0
Backfill footings	52	0	0	0	0	0	0
Demobilisation and rehabilitation	52	0	0	0	0	0	0
Compound operation	52	0	0	0	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Day							
Preliminary works	52	0	0	0	0	0	0
Installing new cabling / conduits	52	0	0	0	0	0	0
Signalling works	52	0	0	0	0	0	0
Cut gantry bolts	52	0	0	0	0	0	0
Remove gantry	52	0	0	0	0	0	0
Remove footings	52	0	0	0	0	0	0
Backfill footings	52	0	0	0	0	0	0
Demobilisation and rehabilitation	52	0	0	0	0	0	0
Compound operation	52	0	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	50	0	0	0	0	0	0
Installing new cabling / conduits	50	0	0	0	0	0	0
Signalling works	50	0	0	0	0	0	0
Cut gantry bolts	50	0	0	0	0	0	0
Remove gantry	50	0	0	0	0	0	0
Remove footings	50	0	0	0	0	0	0
Backfill footings	50	0	0	0	0	0	0
Demobilisation and rehabilitation	50	0	0	0	0	0	0
Compound operation	50	0	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	40	0	0	0	0	0	0
Installing new cabling / conduits	40	0	0	0	0	0	0
Signalling works	40	0	0	0	0	0	0
Cut gantry bolts	40	0	0	0	0	0	0
Remove gantry	40	0	0	0	0	0	0
Remove footings	40	0	0	0	0	0	0
Backfill footings	40	0	0	0	0	0	0
Demobilisation and rehabilitation	40	0	0	0	0	0	0
Compound operation	40	0	0	0	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Junee Yard clearances – NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	5	1	0	0	0	0
Offline Widenings	52	28	5	1	0	0	0
Track re-alignment (< 300mm)	52	10	4	0	0	0	0
Track re-alignment (> 300mm)	52	28	5	1	0	0	0
Re-build track	52	4	3	0	0	0	0
Demobilisation and rehabilitation	52	5	1	0	0	0	0
Compound operation	52	0	0	0	0	0	0
Outside standard hours - Day							
Preliminary works	52	5	1	0	0	0	0
Offline Widenings	52	28	5	1	0	0	0
Track re-alignment (< 300mm)	52	10	4	0	0	0	0
Track re-alignment (> 300mm)	52	28	5	1	0	0	0
Re-build track	52	4	3	0	0	0	0
Demobilisation and rehabilitation	52	5	1	0	0	0	0
Compound operation	52	0	0	0	0	0	0
Outside standard hours – Evening							
Preliminary works	50	10	4	0	0	0	0
Offline Widenings	50	33	10	4	0	0	0
Track re-alignment (< 300mm)	50	18	5	1	0	0	0
Track re-alignment (> 300mm)	50	33	10	4	0	0	0
Re-build track	50	14	4	1	0	0	0
Demobilisation and rehabilitation	50	4	3	0	0	0	0
Compound operation	50	0	0	0	0	0	0
Outside standard hours – Night							
Preliminary works	40	151	33	14	0	0	0
Offline Widenings	40	284	151	43	4	0	0
Track re-alignment (< 300mm)	40	218	60	23	1	0	0
Track re-alignment (> 300mm)	40	284	151	43	4	0	0

WORK STAGE	NML L _{eq} (15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	
Re-build track	40	192	40	18	1	0	0
Demobilisation and rehabilitation	40	120	34	7	0	0	0
Compound operation	40	3	0	0	0	0	0
Olympic Highway underbridge – NCA14 (Total number of residential receivers 1,749)							
Standard hours							
Preliminary works	52	20	44	4	0	0	0
Trackworks	52	63	18	44	0	0	0
Earthworks	52	87	20	47	1	0	0
Structure works	52	33	49	6	0	0	0
Concreting works	52	47	5	1	0	0	0
Installation of fittings etc.	52	275	165	79	41	0	5
Crane operations	52	232	246	129	48	0	31
Demobilisation and rehabilitation	52	18	42	2	0	0	0
Outside standard hours – Day							
Preliminary works	52	20	44	4	0	0	0
Trackworks	52	63	18	44	0	0	0
Earthworks	52	87	20	47	1	0	0
Structure works	52	33	49	6	0	0	0
Concreting works	52	47	5	1	0	0	0
Installation of fittings	52	275	165	79	41	0	0
Crane operations	52	232	246	129	48	0	0
Demobilisation and rehabilitation	52	18	42	2	0	0	0
Outside standard hours – Evening							
Preliminary works	50	34	48	6	0	0	0
Trackworks	50	107	25	52	1	0	0
Earthworks	50	128	33	54	1	0	0
Structure works	50	63	18	44	0	0	0
Concreting works	50	26	32	1	0	0	0
Installation of fittings	50	232	246	129	48	0	0
Crane operations	50	274	266	195	51	0	0
Demobilisation and rehabilitation	50	25	47	6	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Night							
Preliminary works	40	251	128	82	6	0	0
Trackworks	40	234	239	132	52	1	0
Earthworks	40	258	252	161	54	1	0
Structure works	40	272	165	81	44	0	0
Concreting works	40	149	44	58	1	0	0
Installation of fittings	40	61	307	478	129	48	0
Crane operations	40	52	204	540	195	51	0
Demobilisation and rehabilitation	40	238	106	72	6	0	0
June to Illabo clearances – NCA15 (Total number of residential receivers 121)							
Standard hours							
Preliminary works	51	1	0	7	27	19	40
Offline Widenings	51	10	4	4	0	0	0
Track re-alignment (< 300mm)	51	3	4	1	0	0	0
Track re-alignment (< 300mm)	51	21	6	7	0	0	0
Track re-alignment (> 300mm)	51	19	17	7	1	0	0
Re-build track	51	3	4	1	0	0	0
Demobilisation and rehabilitation	51	5	1	1	0	0	0
Outside standard hours – Day							
Preliminary works	46	0	1	2	15	36	0
Offline Widenings	46	21	10	7	1	0	0
Track re-alignment (< 300mm)	46	17	3	5	0	0	0
Track re-alignment (< 300mm)	46	14	21	12	1	0	0
Track re-alignment (> 300mm)	46	9	19	20	5	0	0
Re-build track	46	17	3	5	0	0	0
Demobilisation and rehabilitation	46	8	5	2	0	0	0

WORK STAGE	NML Leq(15 min)	NUMBER OF PROPERTIES EXCEEDING NML, GROUPED BY MAGNITUDE OF EXCEEDANCE					HIGHLY NOISE AFFECTED
		0–5dB	5–10dB	10–20dB	20–30dB	> 30dB	> 75dB
Outside standard hours – Evening							
Preliminary works	46	0	1	2	15	36	0
Offline Widenings	46	21	10	7	1	0	0
Track re-alignment (< 300mm)	46	17	3	5	0	0	0
Track re-alignment (< 300mm)	46	14	21	12	1	0	0
Track re-alignment (> 300mm)	46	9	19	20	5	0	0
Re-build track	46	17	3	5	0	0	0
Demobilisation and rehabilitation	46	8	5	2	0	0	0
Outside standard hours – Night							
Preliminary works	46	0	1	2	15	36	0
Offline Widenings	46	21	10	7	1	0	0
Track re-alignment (< 300mm)	46	17	3	5	0	0	0
Track re-alignment (< 300mm)	46	14	21	12	1	0	0
Track re-alignment (> 300mm)	46	9	19	20	5	0	0
Re-build track	46	17	3	5	0	0	0
Demobilisation and rehabilitation	46	8	5	2	0	0	0

* Refer Table 2.2 for a description of hours

MAXIMUM PREDICTED NOISE LEVELS (SLEEP DISTURBANCE)

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Harefield Yard clearances – NCA13 (Total number of residential receivers 9)							
Preliminary works	52	65	0	0	0	0	0
Offline Widenings			1	1	1	0	0
Track re-alignment			2	1	2	0	0
Track re-alignment			1	2	2	0	0
Re-build track			0	2	0	0	0
Demobilisation and rehabilitation			1	1	0	0	0
Compound operation			0	0	0	0	0
Kemp Street bridge – NCA14 (Total number of residential receivers 1,749)							
Preliminary works	50	65	13	8	14	7	7
Demolition and earthworks			18	8	6	4	1
Piling			127	26	17	5	1
Concreting works			9	4	5	4	1
Lifting of truss and deck			80	16	14	3	5
Installation of services, screens, etc.			48	16	12	9	21
Asphalting			20	12	7	0	1
Demobilisation and rehabilitation			14	6	12	8	16
Compound operation			5	0	4	0	0
Kemp Street bridge road diversions – NCA14 (Total number of residential receivers 1,749)							
Preliminary works	50	65	12	5	2	1	0
Earthworks			12	13	5	2	1
Install drainage and kerbs			15	9	5	2	1
Asphalting			4	3	2	1	0
Furniture, line marking, etc			60	20	12	5	3
Demobilisation and rehabilitation			13	3	2	1	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
Junee Station pedestrian bridge – NCA14 (Total number of residential receivers 1,749)							
Preliminary works	50	65	4	0	0	0	0
Installing new cabling / conduits			4	3	0	0	0
Signalling works			10	4	0	0	0
Cut gantry bolts			151	33	14	0	0
Remove gantry			79	28	6	0	0
Remove footings			33	10	4	0	0
Backfill footings			4	3	0	0	0
Demobilisation and rehabilitation			4	3	0	0	0
Compound operation			0	0	0	0	0
Junee Yard clearances – NCA14 (Total number of residential receivers 1,749)							
Preliminary works	50	65	0	0	0	0	0
Offline Widenings			1	0	0	0	0
Track re-alignment (< 300mm)			3	0	0	0	0
Track re-alignment (> 300mm)			4	0	0	0	0
Re-build track			0	0	0	0	0
Demobilisation and rehabilitation			0	0	0	0	0
Compound operation			0	0	0	0	0
Olympic Highway underbridge – NCA14 (Total number of residential receivers 1,749)							
Preliminary works	50	65	34	48	6	0	0
Trackworks			165	63	60	2	0
Earthworks			128	33	54	1	0
Structure works			107	25	52	1	0
Piling			239	107	72	6	0
Concreting works			20	44	4	0	0
Installation of screens, handrails etc.			232	246	129	48	0
Lifting of truss and deck			204	274	414	67	31
Demobilisation and rehabilitation			25	47	6	0	0
Compound operation			0	0	0	0	0

WORK STAGE	MAXIMUM NOISE LEVEL		NUMBER OF RECEIVERS EXCEEDING SLEEP DISTURBANCE LEVELS ¹				
	RBL + 15 (dBA)	L _{max} (dBA)	0–5dB	5–10dB	10–20dB	20–30dB	> 30dB
June to Illabo clearances – NCA15 (Total number of residential receivers 121)							
Preliminary works	58	65	1	2	18	31	1
Offline Widenings			6	1	0	0	0
Track re-alignment			17	3	5	0	0
Track re-alignment			21	8	6	1	0
Re-build track			1	0	0	0	0
Demobilisation and rehabilitation			5	1	1	0	0
Compound operation			0	0	0	0	0

PREDICTED CONSTRUCTION NOISE LEVELS AT NON-RESIDENTIAL RECEIVERS

HAREFIELD YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Offline widenings	0	0	0	3	0	0	0
Track re-alignment	0	0	0	1	0	0	0
Track re-alignment	0	0	0	3	0	0	0
Re-build track	0	0	0	1	0	0	0
Demobilisation and rehabilitation	0	0	0	1	0	0	0
Compound operation	0	0	0	0	0	0	0

KEMP STREET BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{Aeq} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	1
Demolition and earthworks	0	0	0	0	0	0	1
Piling	0	0	0	0	0	0	1
Concreting works	0	0	0	0	0	0	0
Lifting of truss and deck	0	0	0	0	0	0	1
Installation of services, screens, etc.	0	0	0	0	0	0	1
Asphalting	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	1
Compound operation	0	0	0	0	0	0	0

JUNEE YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Offline widenings	0	0	0	0	0	0	1
Track re-alignment (< 300mm)	0	0	0	0	0	0	0
Track re-alignment (> 300mm)	0	0	0	0	0	0	1
Re-build track	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0

JUNEE STATION PEDESTRIAN BRIDGE AND HAREFIELD YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	0	0	0	0
Installing new cabling / conduits	0	0	0	0	0	0	0
Signalling works	0	0	0	0	0	0	0
Cut gantry bolts	0	0	0	0	0	0	0
Remove gantry	0	0	0	0	0	0	0
Remove footings	0	0	0	0	0	0	0
Backfill footings	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0
Compound operation	0	0	0	0	0	0	0

OLYMPIC HIGHWAY BRIDGE	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	1	0	0	0	0
Trackworks	0	0	1	0	0	0	0
Earthworks	0	0	1	0	0	0	0
Structure works	0	0	1	0	0	0	0
Concreting works	0	0	1	0	0	0	0
Crane operations							
Installation of furniture	3	0	1	0	0	0	0
Demobilisation and rehabilitation	0	0	1	0	0	0	0
Compound operation	0	0	0	0	0	0	0

JUNEE TO ILLABO YARD CLEARANCES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	9	0	1	13	2	0	0
Offline widenings	6	0	0	2	0	0	0
Track re-alignment (< 300mm)	7	0	0	2	0	0	0
Track re-alignment (> 300mm)	9	0	0	2	0	0	0
Re-build track	0	0	0	1	0	0	0
Demobilisation and rehabilitation	0	0	0	1	0	0	0
Compound operation	0	0	0	0	0	0	0

LEVEL CROSSING SITES	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	0	0	0	1	0	0	0
Signalling works	0	0	0	1	0	0	0
Road diversions	0	0	0	1	0	0	0
Strip / install level crossing panels and track	6	0	0	1	0	0	0
Install troughs	0	0	0	1	0	0	0
Rebuild rail	5	0	0	1	0	0	0
Install level crossing panels	3	0	0	1	0	0	0
Compound operation	0	0	0	1	0	0	0

CULVERTS	NUMBER OF PROPERTIES EXCEEDING NML						
Receiver types	Education	Medical	Commercial	Industrial	Active recreation	Passive recreation	Place of worship
NML L_{AEQ} 15 MIN	55	55	70	75	65	60	55
Preliminary works	2	0	6	9	3	9	2
Construct crane pads	0	0	0	0	0	0	0
Offline extensions	0	0	0	1	0	1	0
Track removal and replacement	3	3	3	15	3	15	3
Install culverts	0	0	0	2	0	2	0
Compound operation	0	0	0	0	0	0	0

TECHNICAL PAPER 06

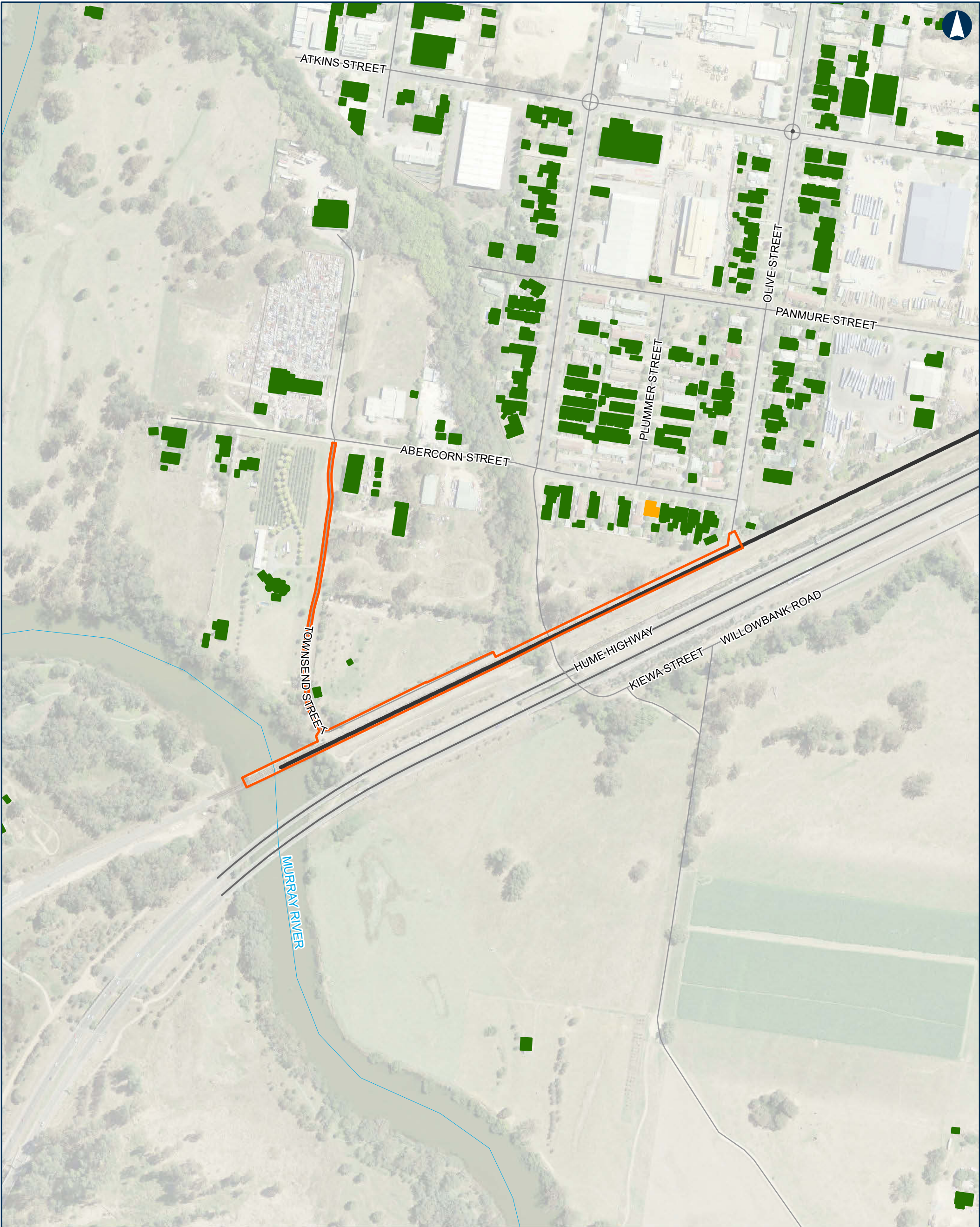
Noise and vibration (non-rail)

Appendix D Construction façade noise maps

ALBURY TO ILLABO ENVIRONMENTAL IMPACT STATEMENT



APPENDIX D-1 ALBURY



Albury to Illabo

Figure A.1.1 Albury - Murray River Bridge - Day Time (Site Establishment)

0 100 200 m

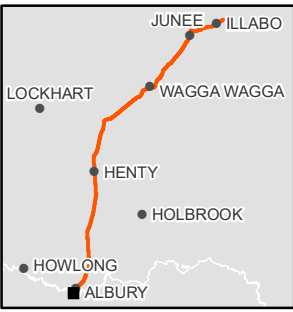
Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:4,000

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
- >75dB (Residences only)
- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse



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Albury to Illabo

Figure A.1.2 Albury - Murray River Bridge - Night Time (Compound Operation)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

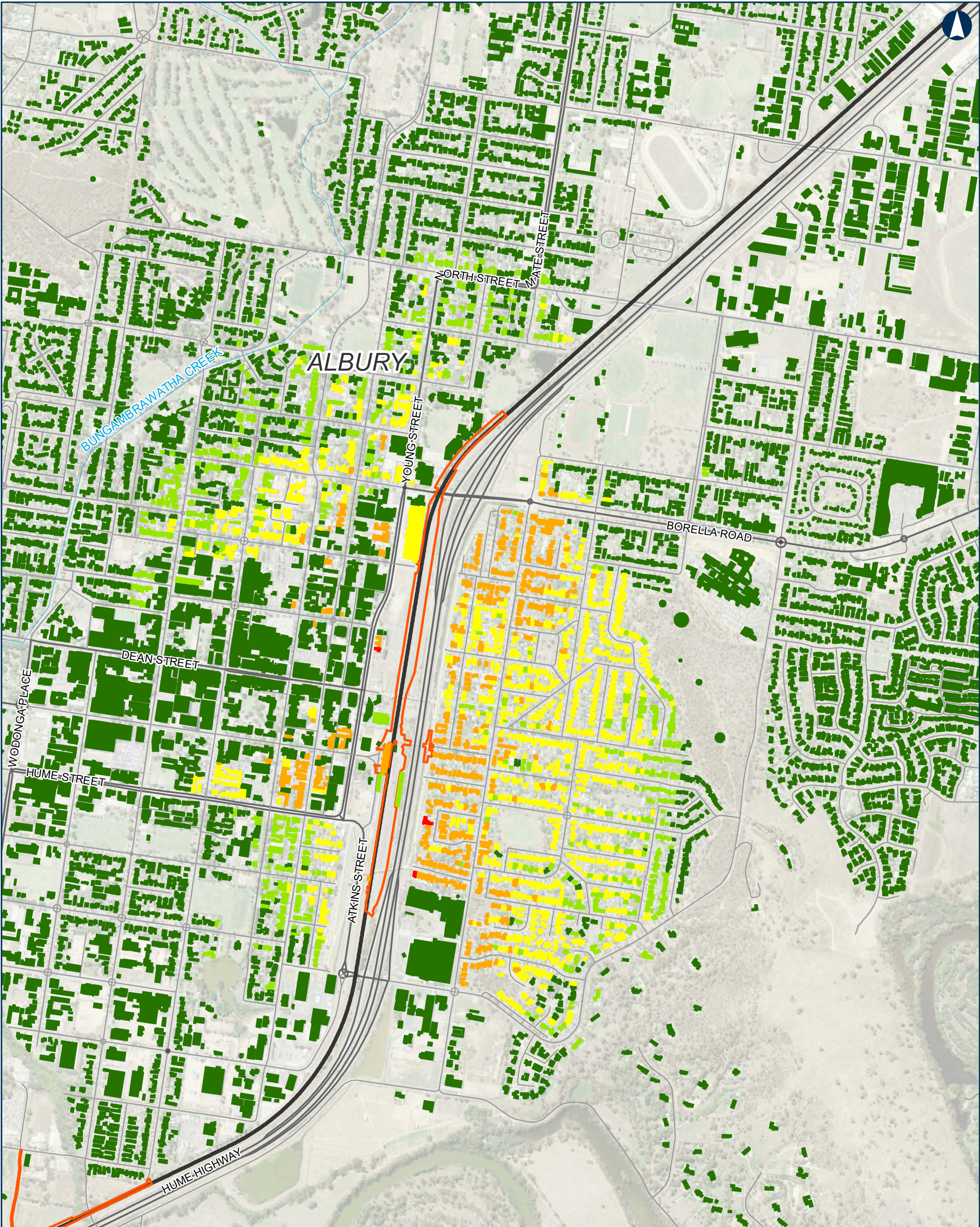
Paper: A3
Scale: 1:4,000

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
- >75dB (Residences only)**
- Existing railway
 - Main road
 - Local road
 - Watercourse



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Albury to Illabo

Figure A.1.3 Albury - Albury Yard Track - Day Time (Re-build Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 15/12/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site

— Existing railway

— Main road

— Local road

— Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**

■ <NML

■ NML + 5dB

■ NML + 10dB

■ NML + 20dB

■ NML + 30dB

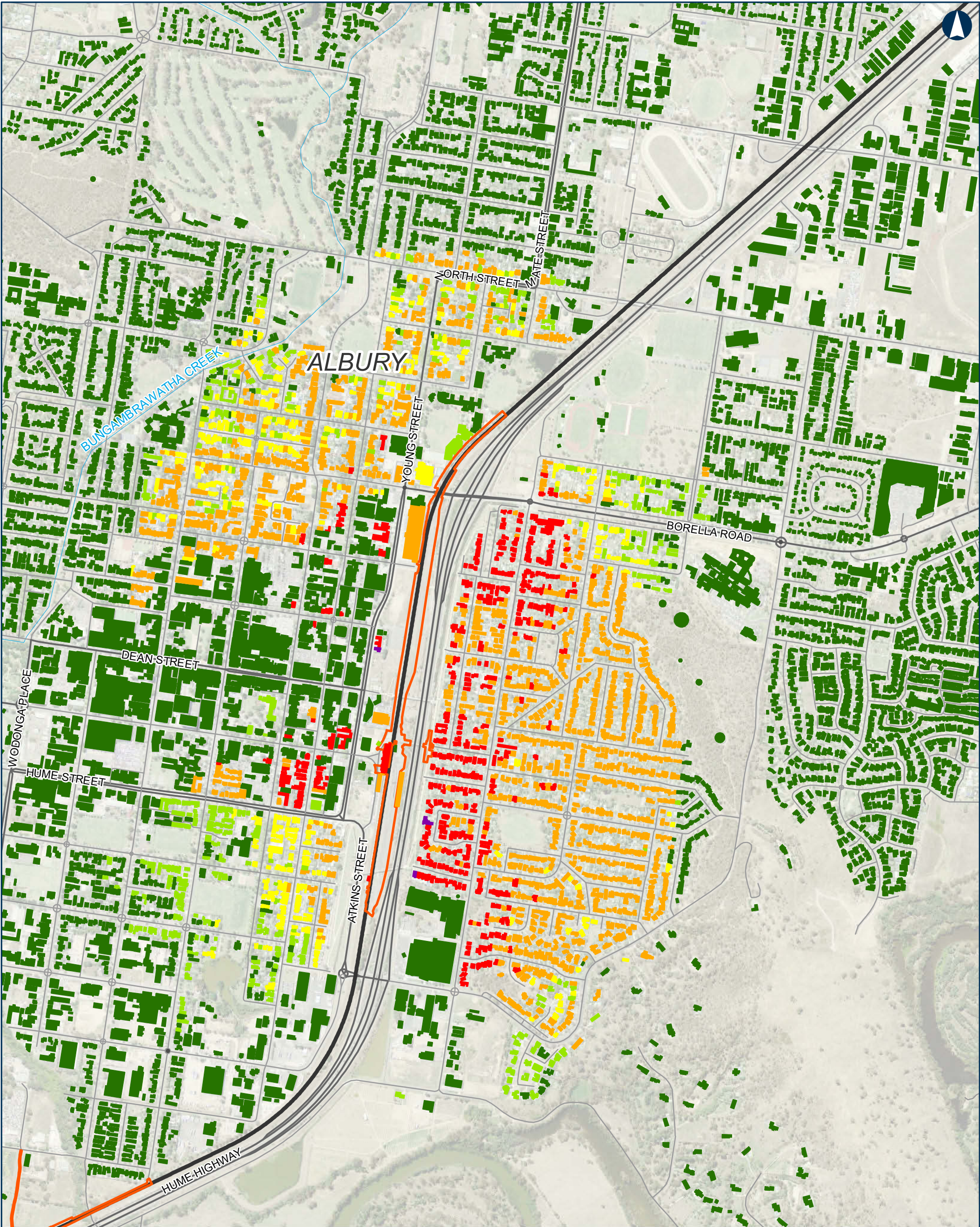
■ >30dB

■ >75dB (Residences only)



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Albury to Illabo

Figure A.1.4 Albury - Albury Yard Track - Night Time (Compound Operation)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 12/11/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site

Existing railway

Main road

Local road

Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)

<NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

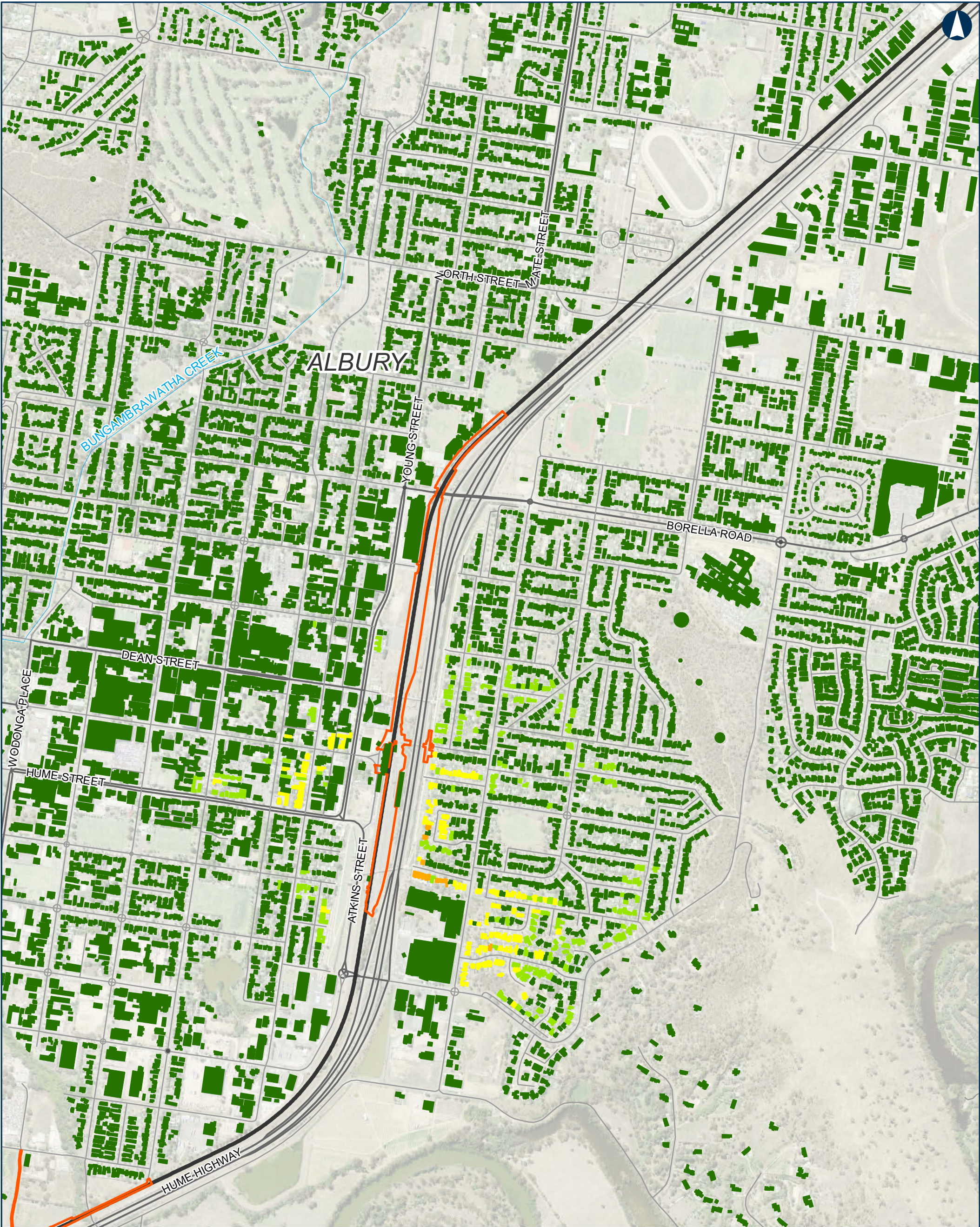
>30dB

>75dB (Residences only)



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Albury to Illabo

Figure A.1.5 Albury - Albury Gantry - Day Time (Cut Gantry Bolts)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 15/12/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse

<NML

NML + 5dB

NML + 10dB

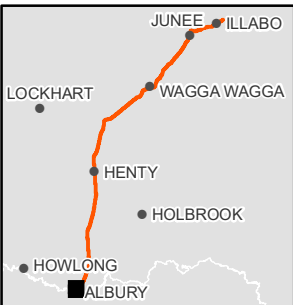
NML + 20dB

NML + 30dB

>30dB

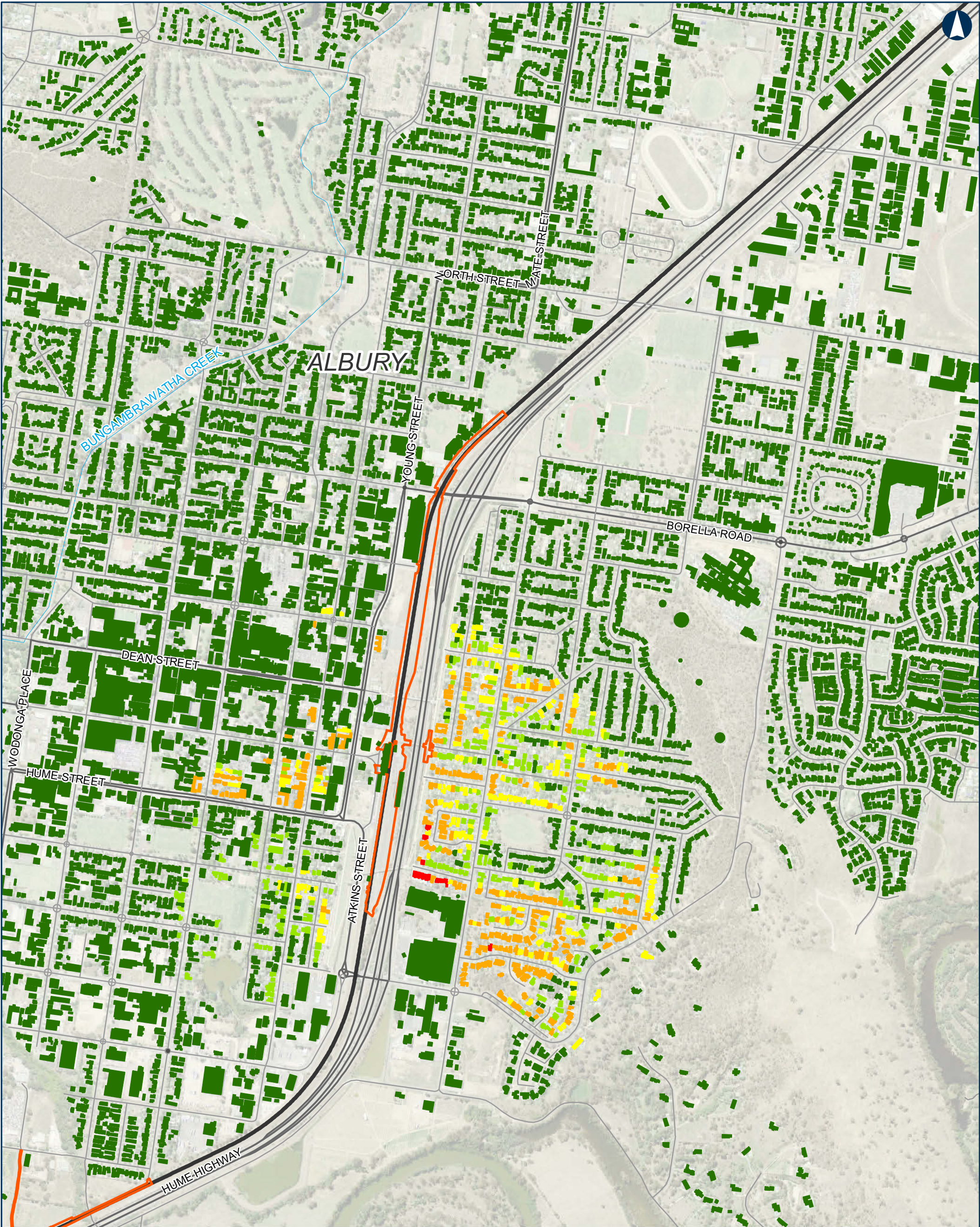
Exceedance of project construction noise criteria LAeq(15 minutes)

>75dB (Residences only)



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Albury to Illabo

Figure A.1.6 Albury - Albury Gantry - Night Time (Cut Gantry Bolts)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 12/11/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse

Exceedance of project construction noise criteria LAeq(15 minutes)

■

 <NML

■

 NML + 5dB

■

 NML + 10dB

■

 NML + 20dB

■

 NML + 30dB

■

 >30dB

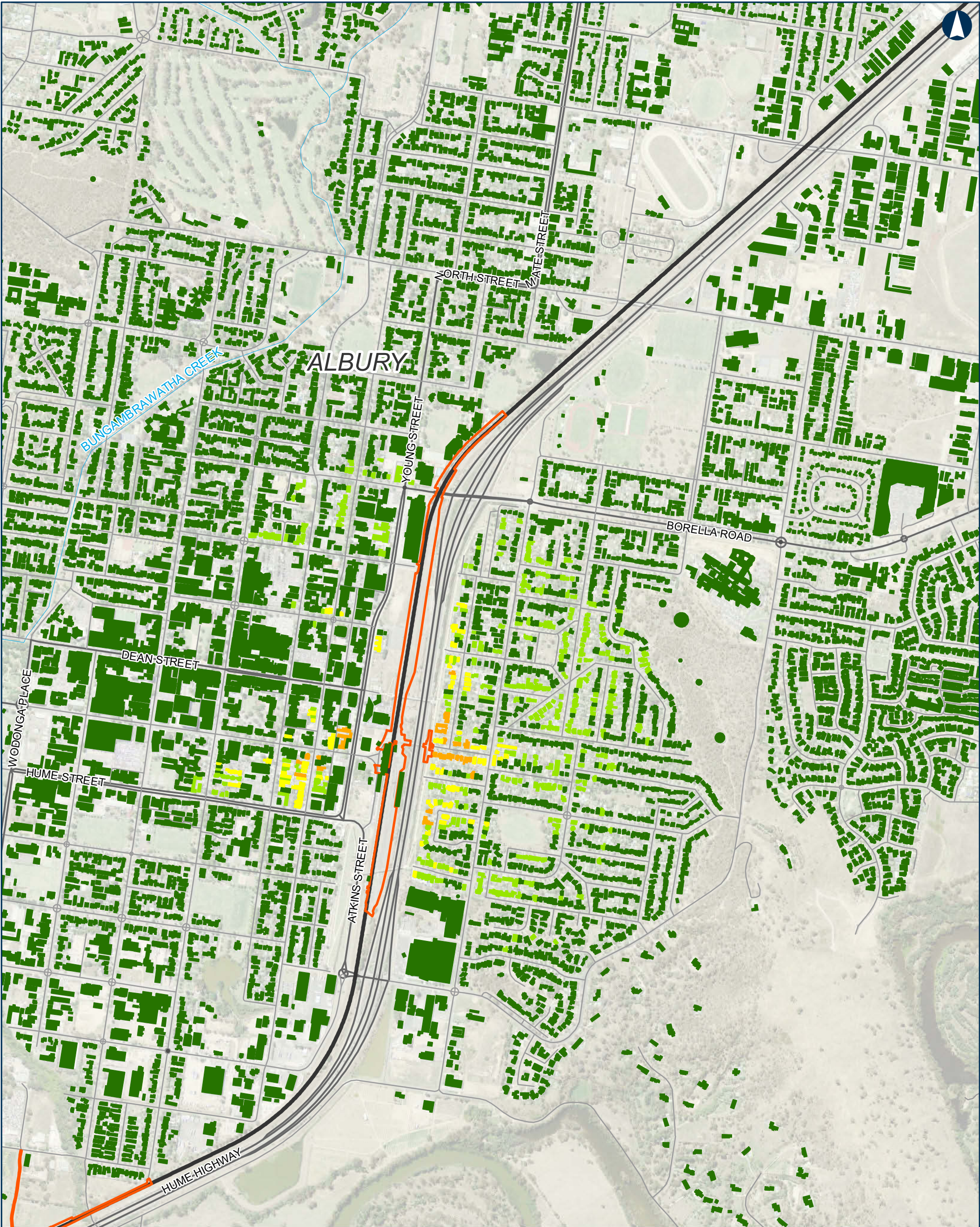
■

 >75dB (Residences only)



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Albury to Illabo

Figure A.1.7 Albury - Albury Bridge - Day Time (Lifting of Truss and Deck)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse

Exceedance of project construction noise criteria LAeq(15 minutes)

■

 <NML

■

 NML + 5dB

■

 NML + 10dB

■

 NML + 20dB

■

 NML + 30dB

■

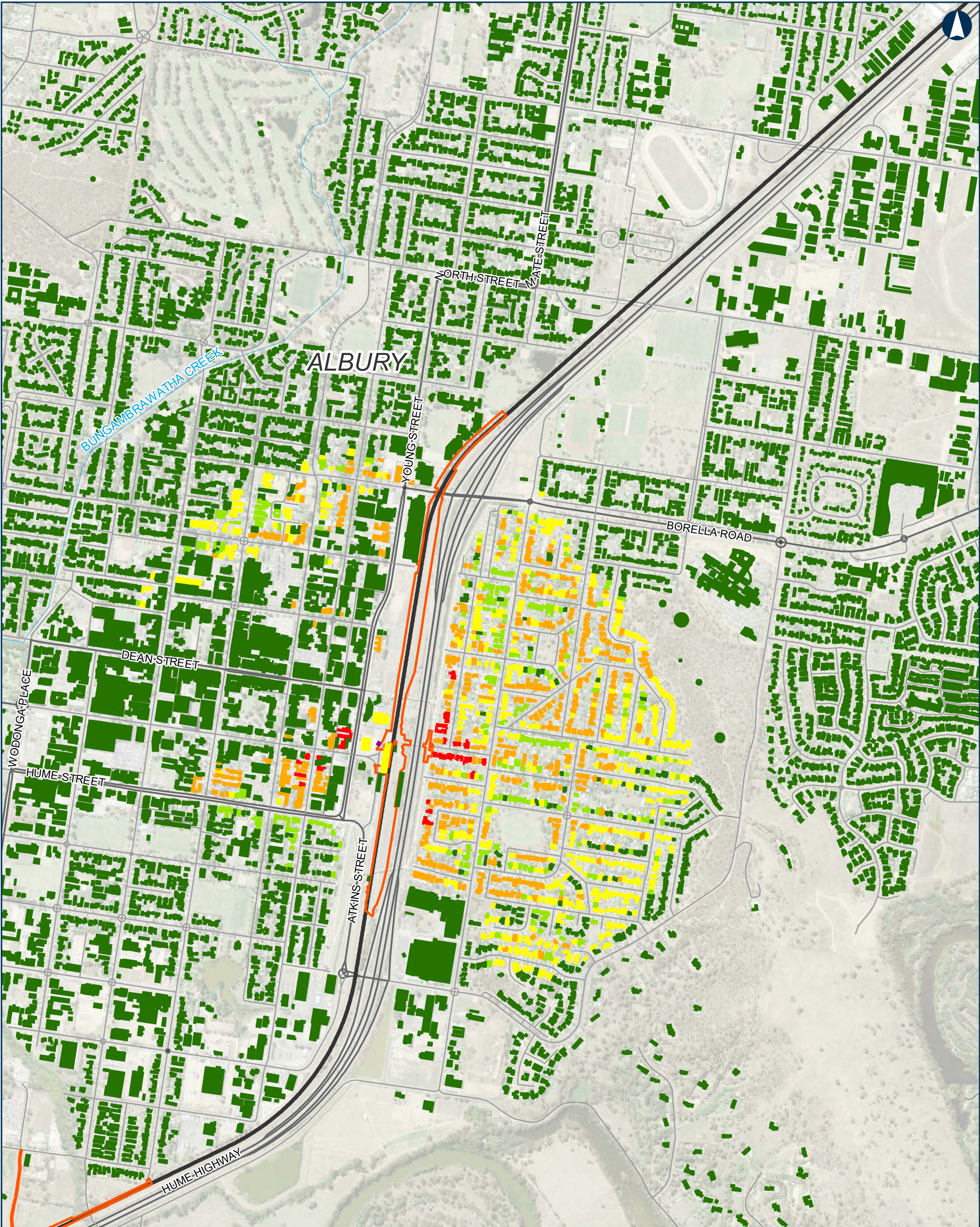
 >30dB

■

 >75dB (Residences only)

INLAND RAIL = ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.1.8 Albury - Albury Bridge - Night Time (Lifting of Truss and Deck)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 12/11/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse

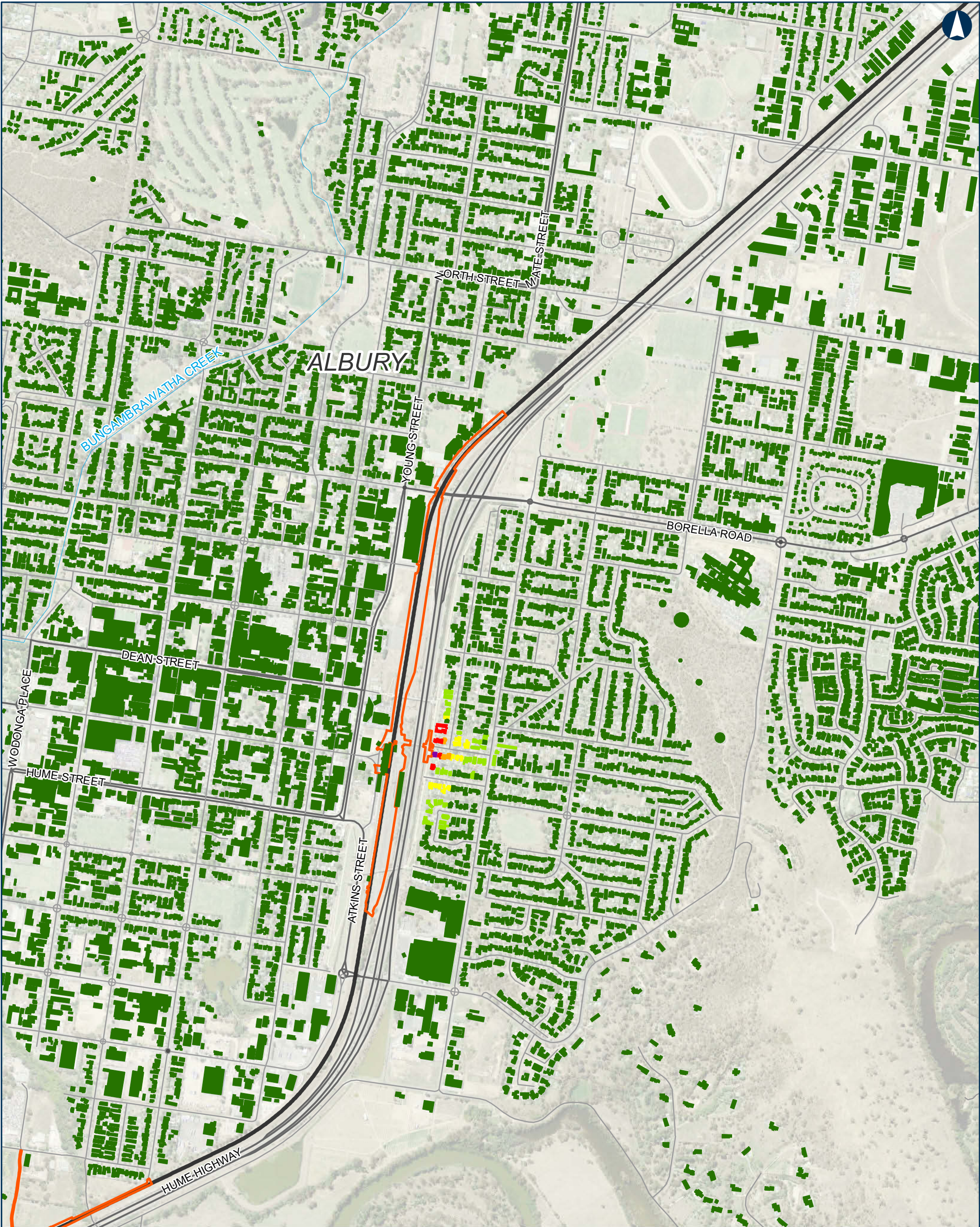
Exceedance of project construction noise criteria LAeq(15 minutes)

■	<NML	■	>75dB (Residences only)
■	NML + 5dB		
■	NML + 10dB		
■	NML + 20dB		
■	NML + 30dB		
■	>30dB		



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.1.9 Albury - Albury Bridge (Eastern ramp) - Day Time (Compound operations)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 15/12/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

Proposal site

Existing railway

Main road

Local road

Watercourse

Exceedance of project construction noise criteria LAeq(15 minutes)

<NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

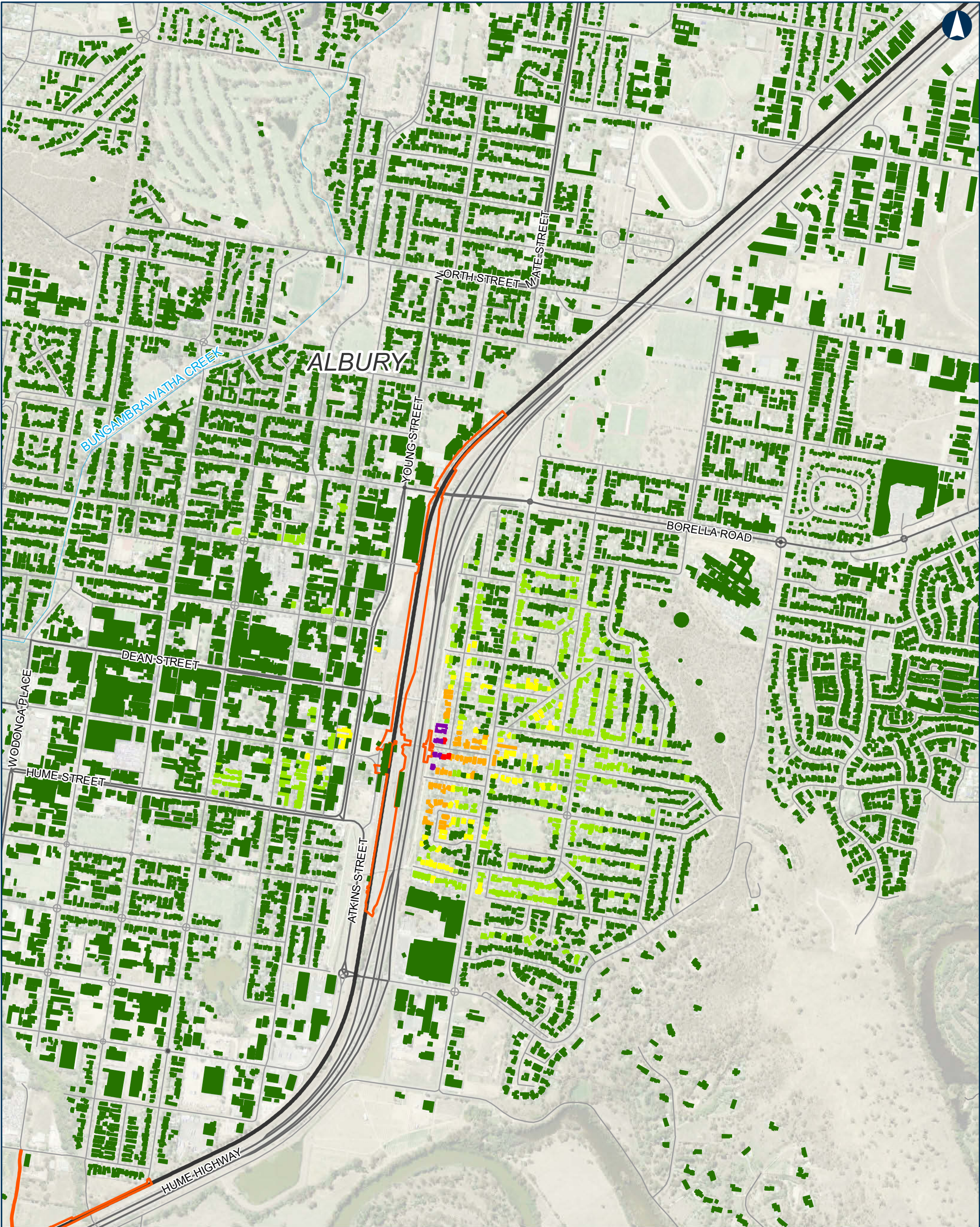
>30dB

>75dB (Residences only)



INLAND RAIL = ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.1.10 Albury - Albury Bridge (Eastern ramp) - Night Time (Compound Operation)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 12/11/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse

<NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

>30dB

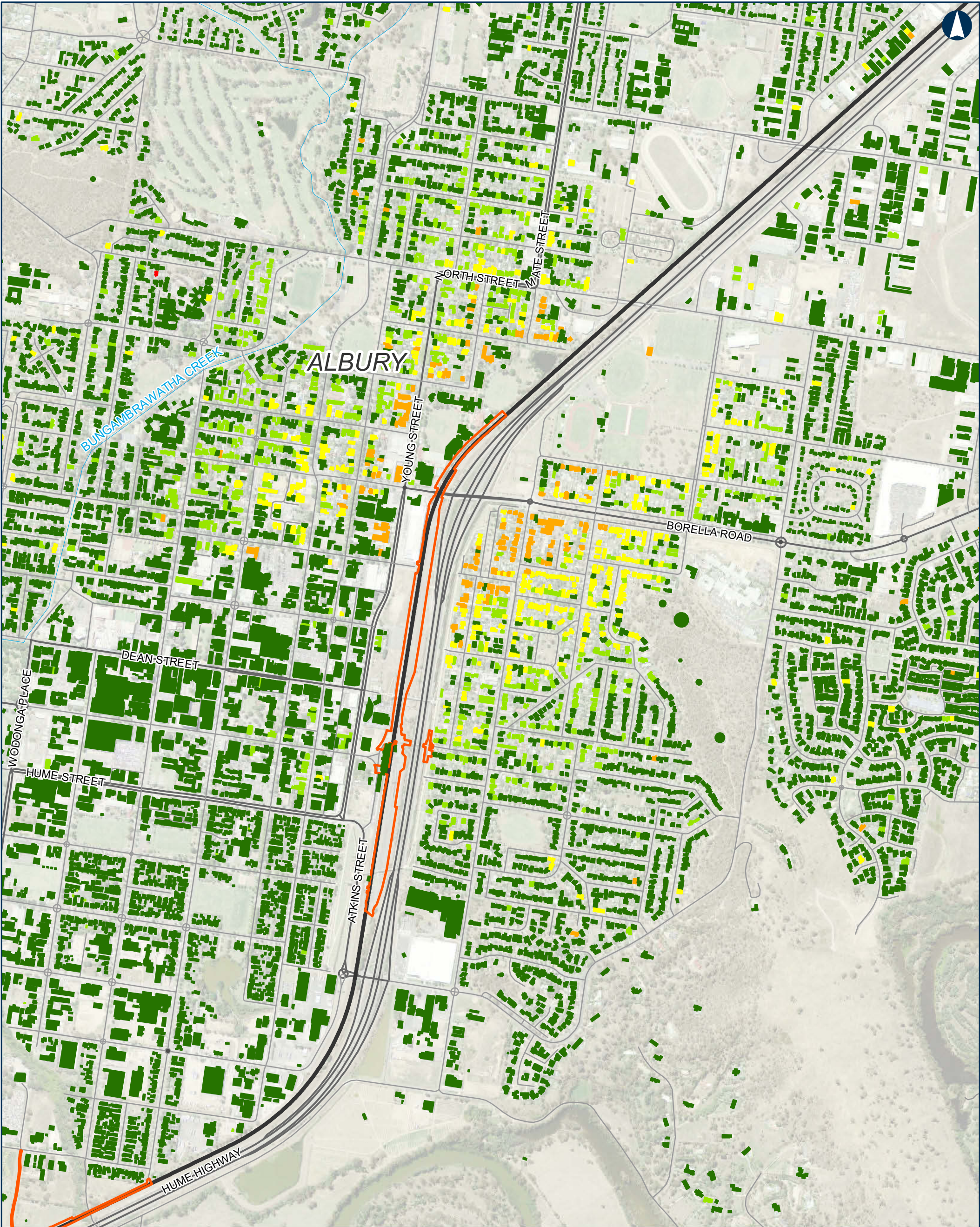
■

 >75dB (Residences only)



INLAND RAIL = ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.1.11 Albury - Riverina Highway - Day Time (Track Works)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
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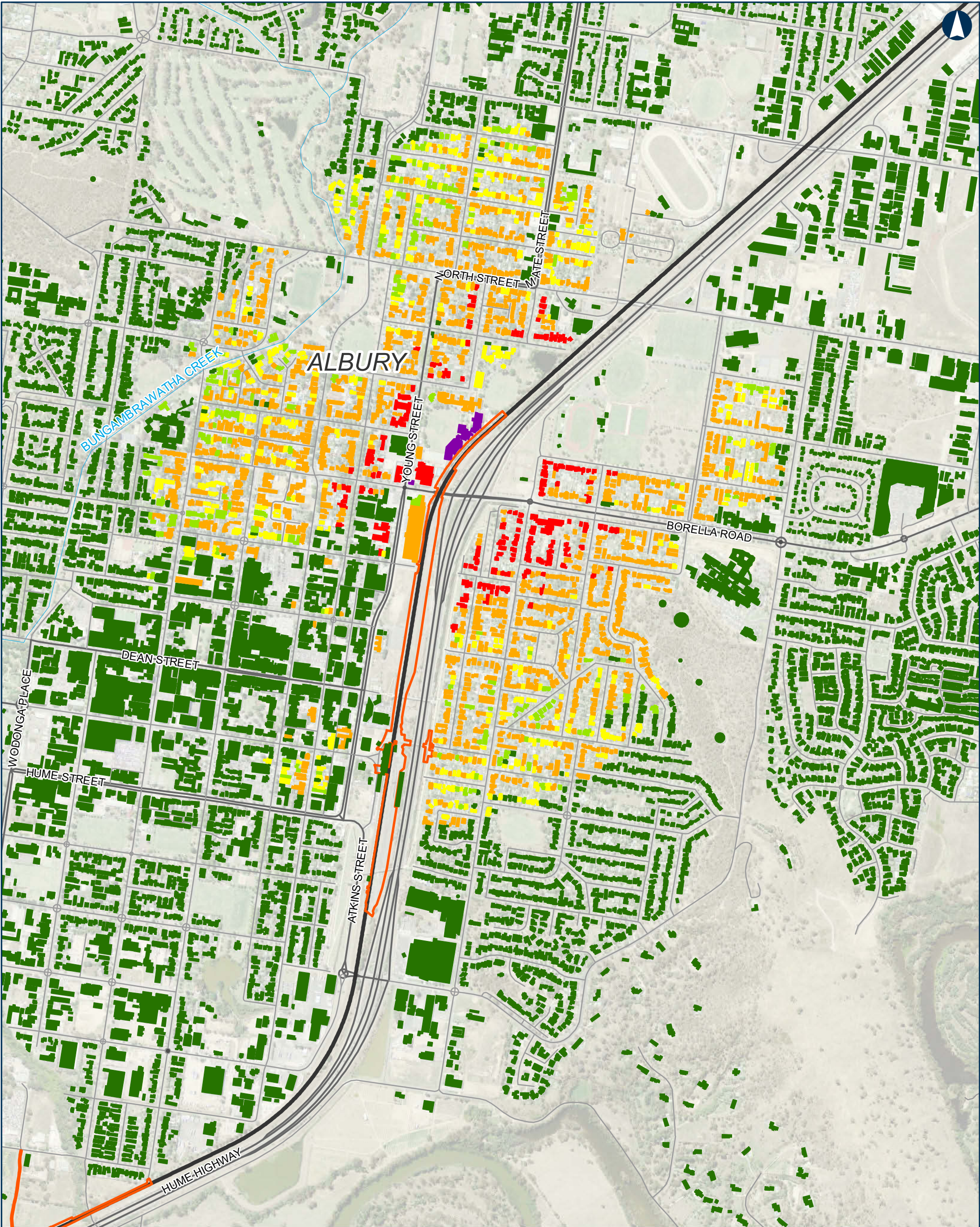
Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL = ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.1.12 Albury - Riverina Highway - Night Time (Track Works)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 12/11/2021 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site

— Existing railway

— Main road

— Local road

— Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**

■ <NML

■ NML + 5dB

■ NML + 10dB

■ NML + 20dB

■ NML + 30dB

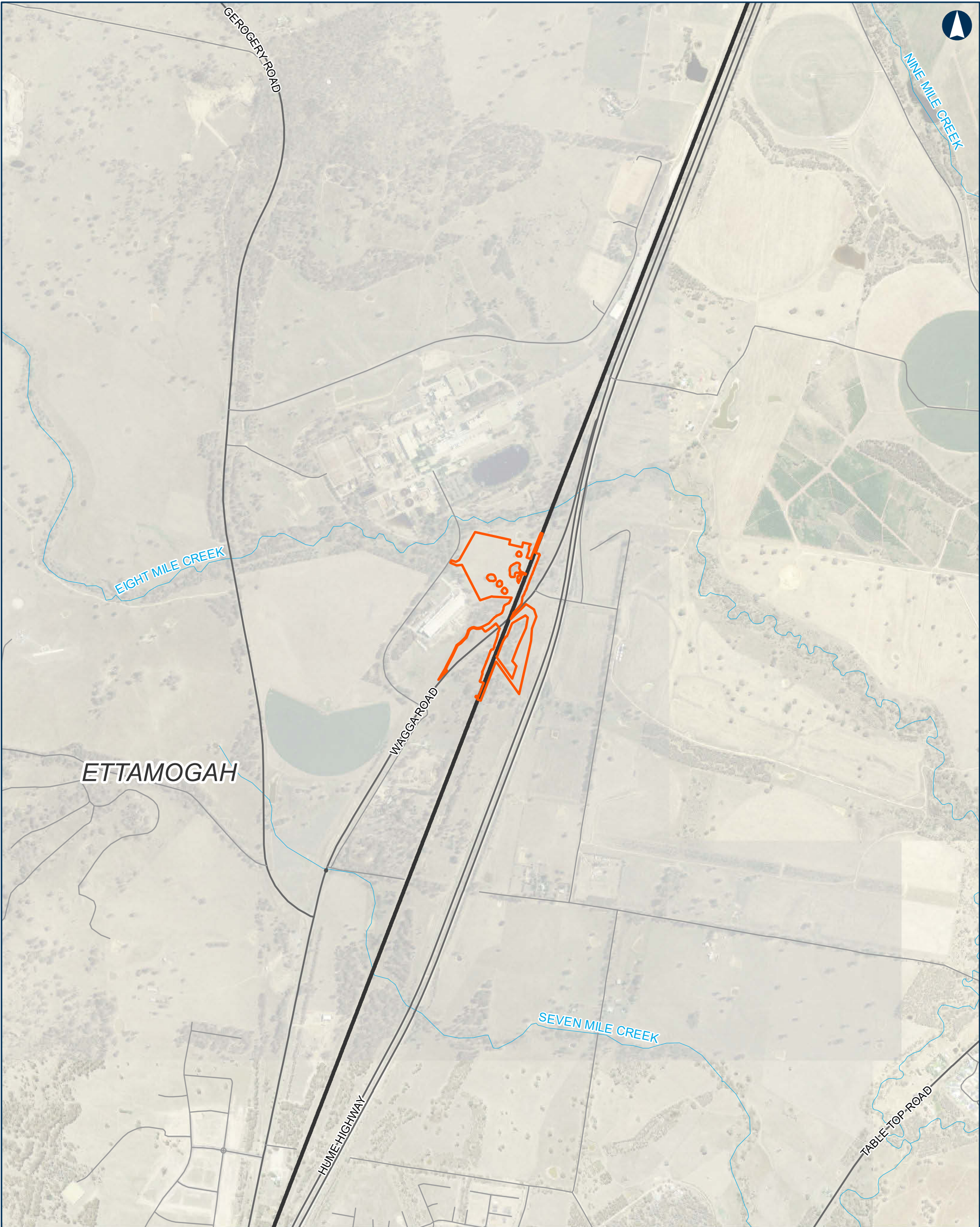
■ >30dB

■ >75dB (Residences only)



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.1.13 Albury - Billy Hughes Bridge - Day Time (Track Works)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

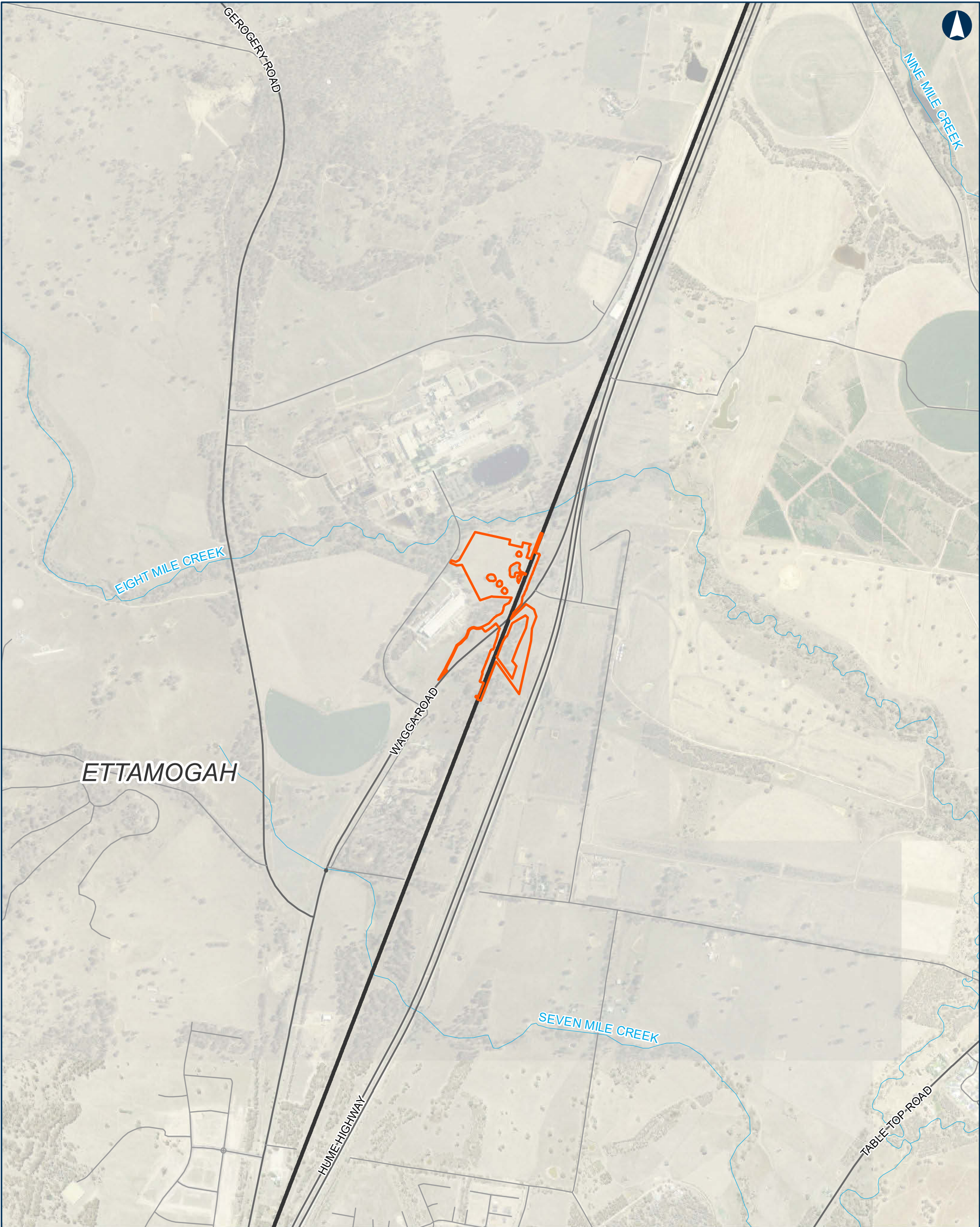
Paper: A3
Scale: 1:15,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.1.14 Albury - Billy Hughes Bridge - Night Time (Small Scale Piling)

0 100 200 m

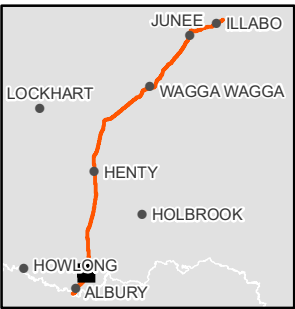
Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:15,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.1.15 Albury - Table Top Gantry - Day Time (Cut Gantry Bolts)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:15,000

Proposal site

Existing railway

Main road

Local road

Watercourse

Exceedance of project construction noise criteria LAeq(15 minutes)

- <NML
- NML + 5dB
- NML + 10dB
- NML + 20dB
- NML + 30dB
- >30dB
- >75dB (Residences only)



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.1.16 Albury - Table Top Gantry - Night Time (Cut Gantry Bolts)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:15,000

- Proposal site

Existing railway

Main road

Local road

Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)

<NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

>30dB
- >75dB (Residences only)

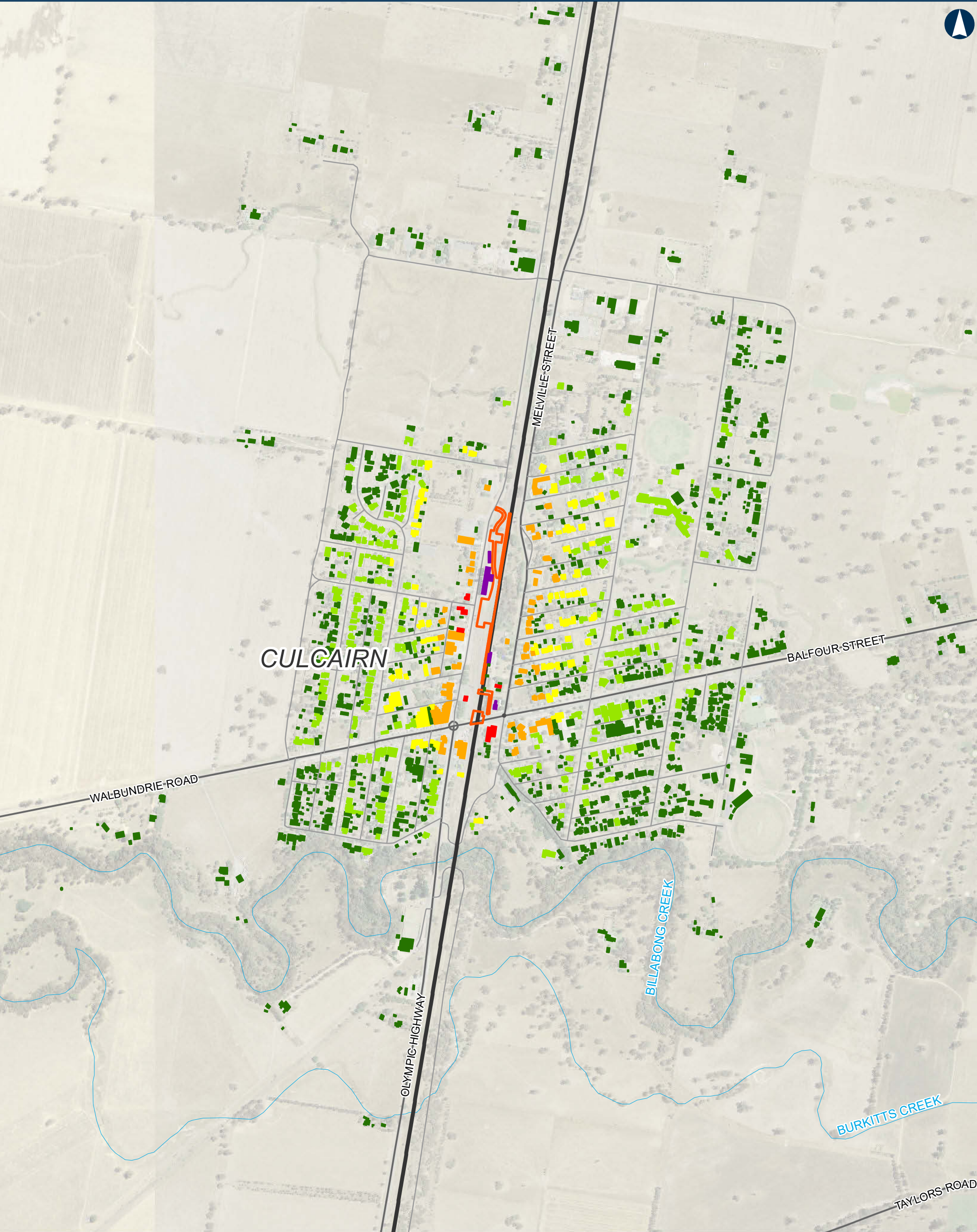


INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

APPENDIX D-2

GREATER HUME–LOCKHART



Albury to Illabo

Figure A.2.1 Lockhart - Culcairn Track Slews - Day Time (Remove Gantry)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

Existing railway

Main road

Local road

Watercourse
- <NML

■

NML + 5dB

■

NML + 10dB

■

NML + 20dB

■

NML + 30dB

■

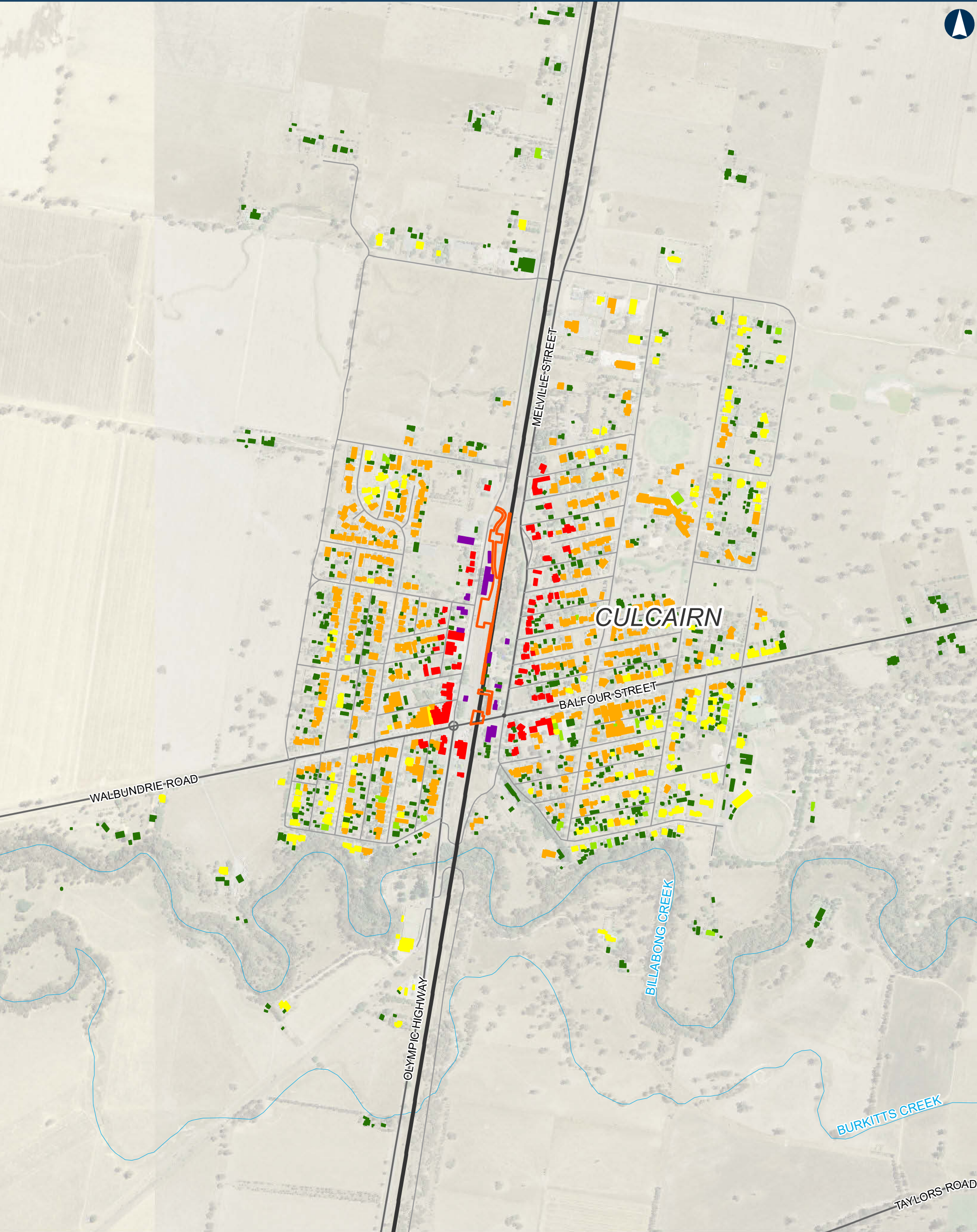
>30dB
- >75dB (Residences only)



INLAND RAIL

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.2 Lockhart - Culcairn Track Slews - Night Time (Track Realignment (>300mm))

0 100 200 m

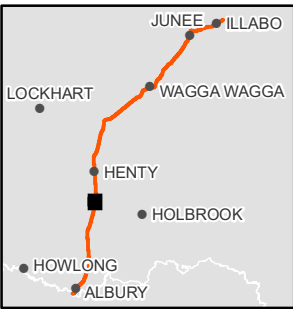
Coordinate System: GDA 1994 MGA Zone 55

ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

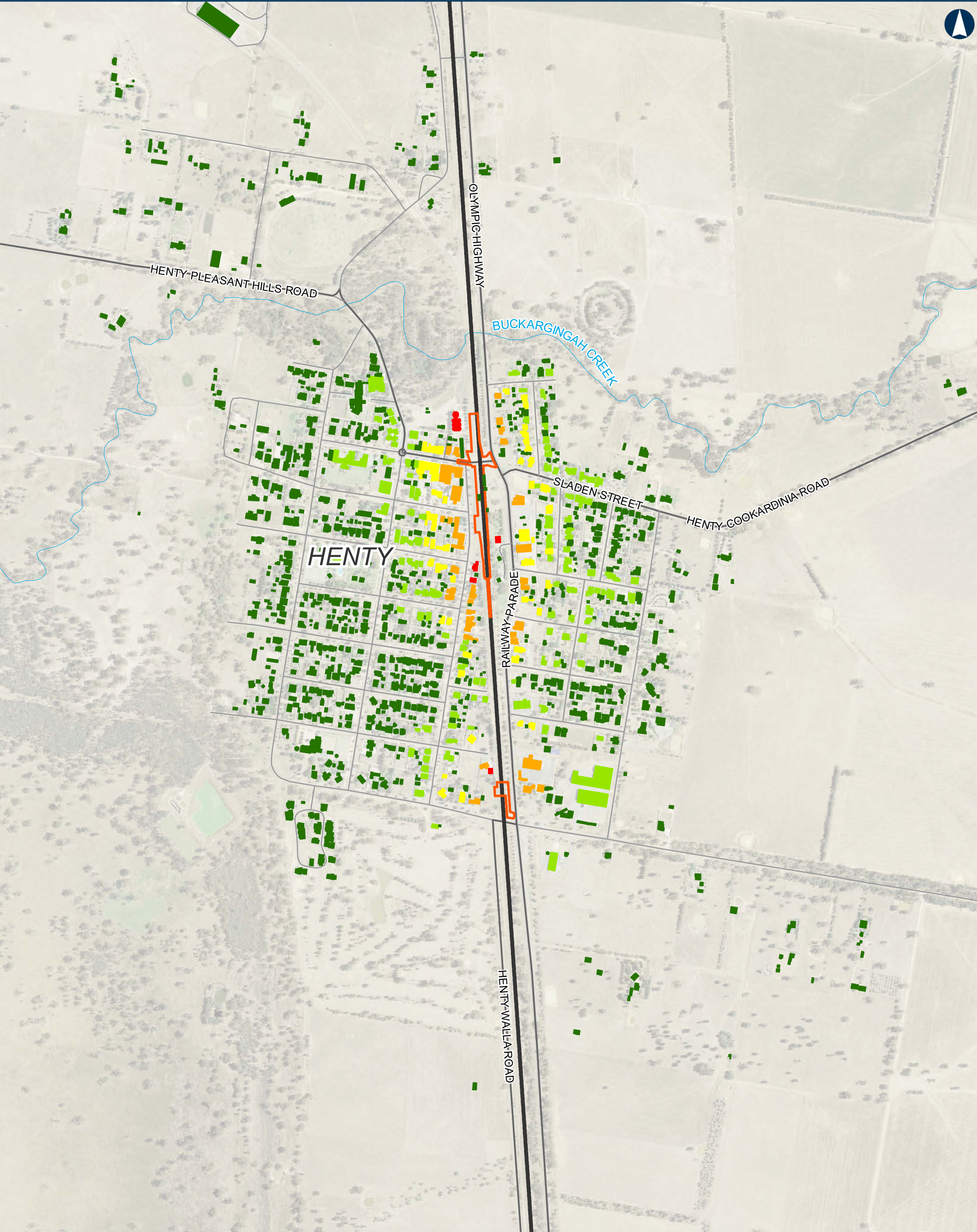
Paper: A3
Scale: 1:10,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.3 Lockhart - Henty Track Slews - Day Time (Offline Widening, Remove Gantry and Rebuild Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

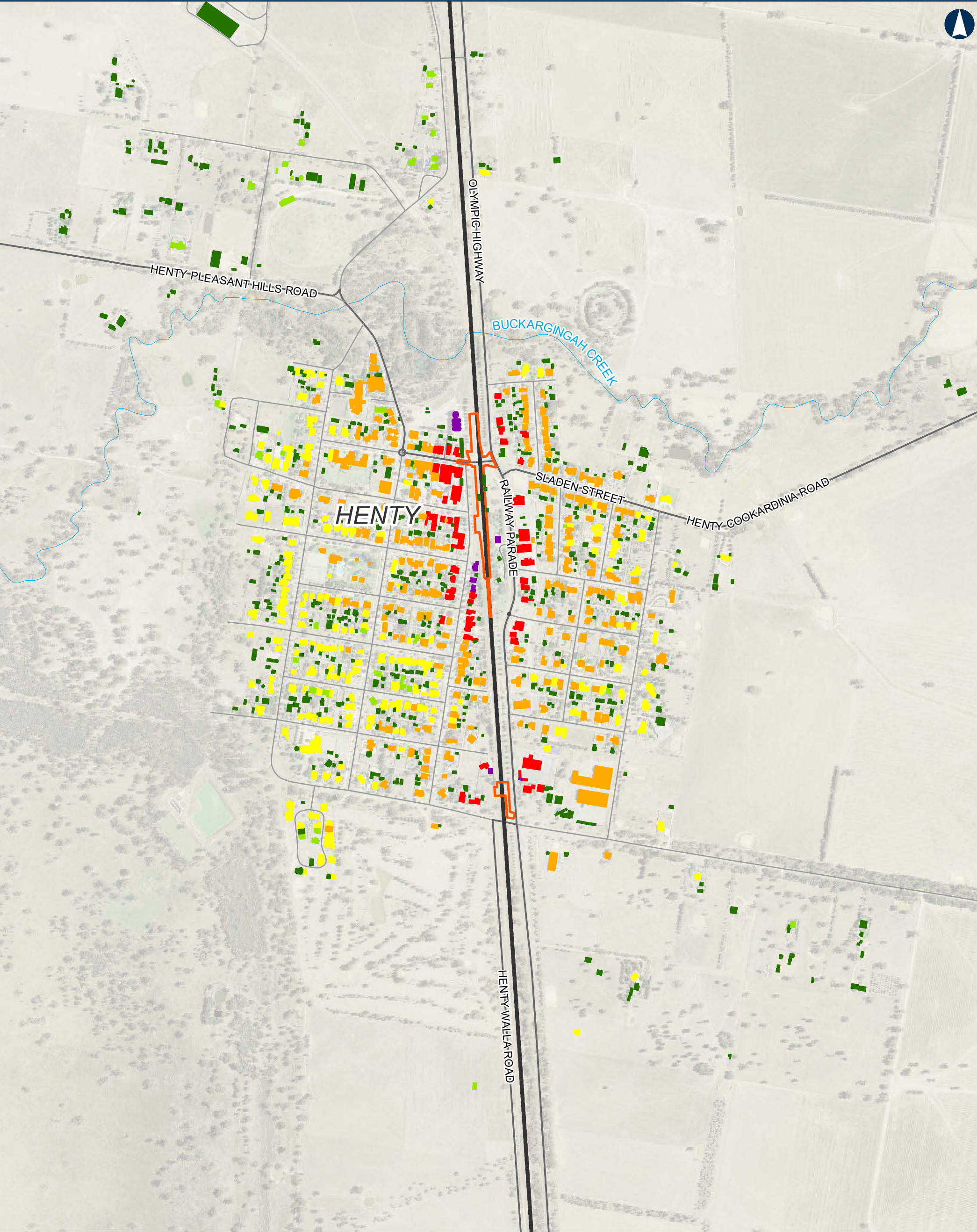
Paper: A3
Scale: 1:10,000

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- <NML**
- NML + 5dB**
- NML + 10dB**
- NML + 20dB**
- NML + 30dB**
- >30dB**
- >75dB (Residences only)**



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.4 Lockhart - Henty Track Slews - Night Time (Offline Widening, Remove Gantry and Rebuild Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:10,000
Data Sources: ARTC, NSWSS

- Proposal site

Existing railway

Main road

Local road

Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)

<NML

NML + 5dB

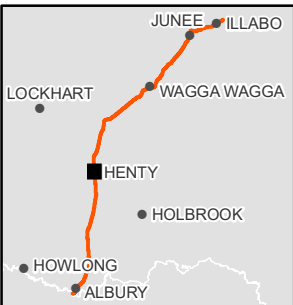
NML + 10dB

NML + 20dB

NML + 30dB

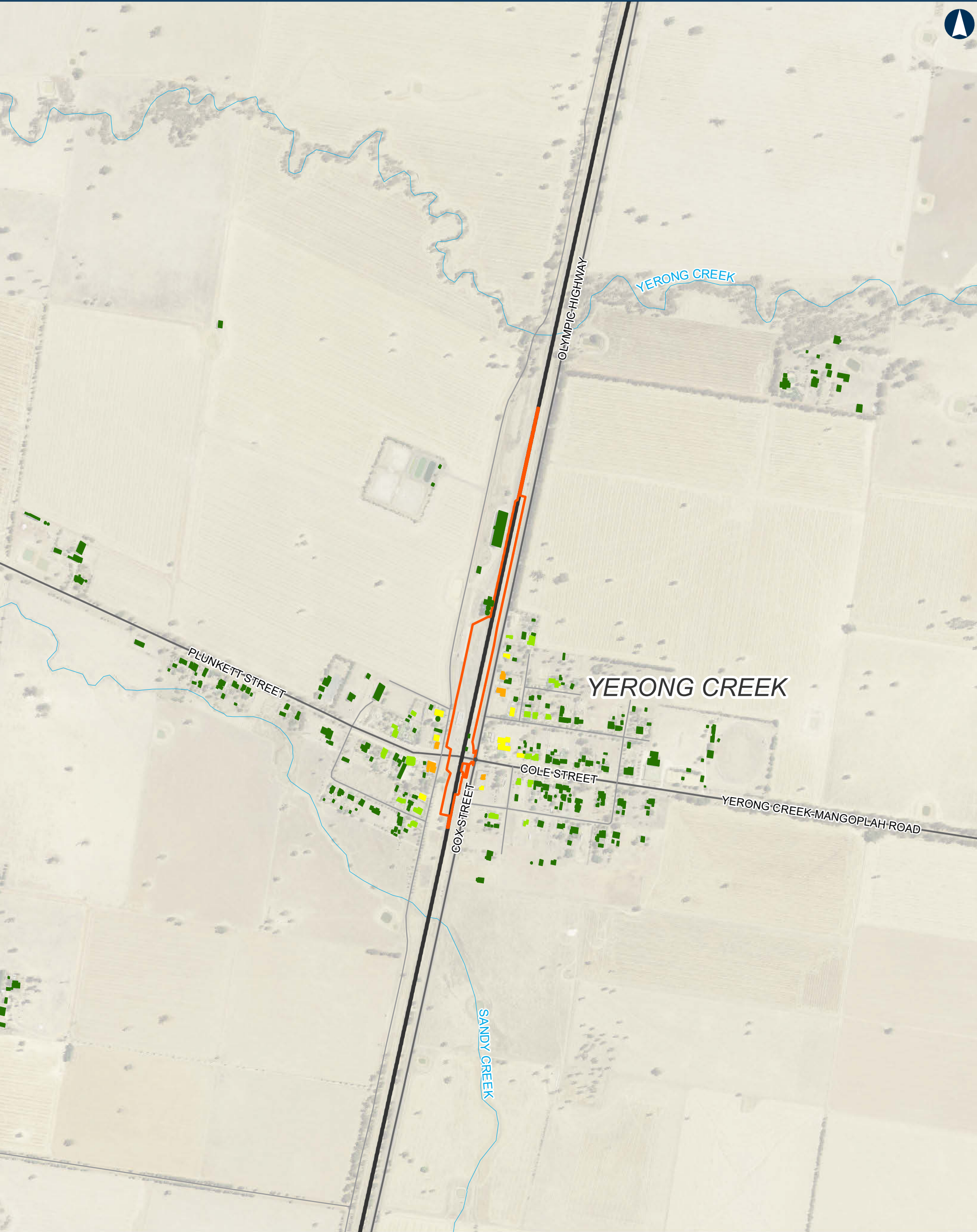
>30dB

>75dB (Residences only)



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.5 Lockhart - Yerong Creek Track Slews - Day Time (Offline Widenings, Drainage Works and Service Relocation)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

Existing railway

Main road

Local road

Watercourse
- <NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

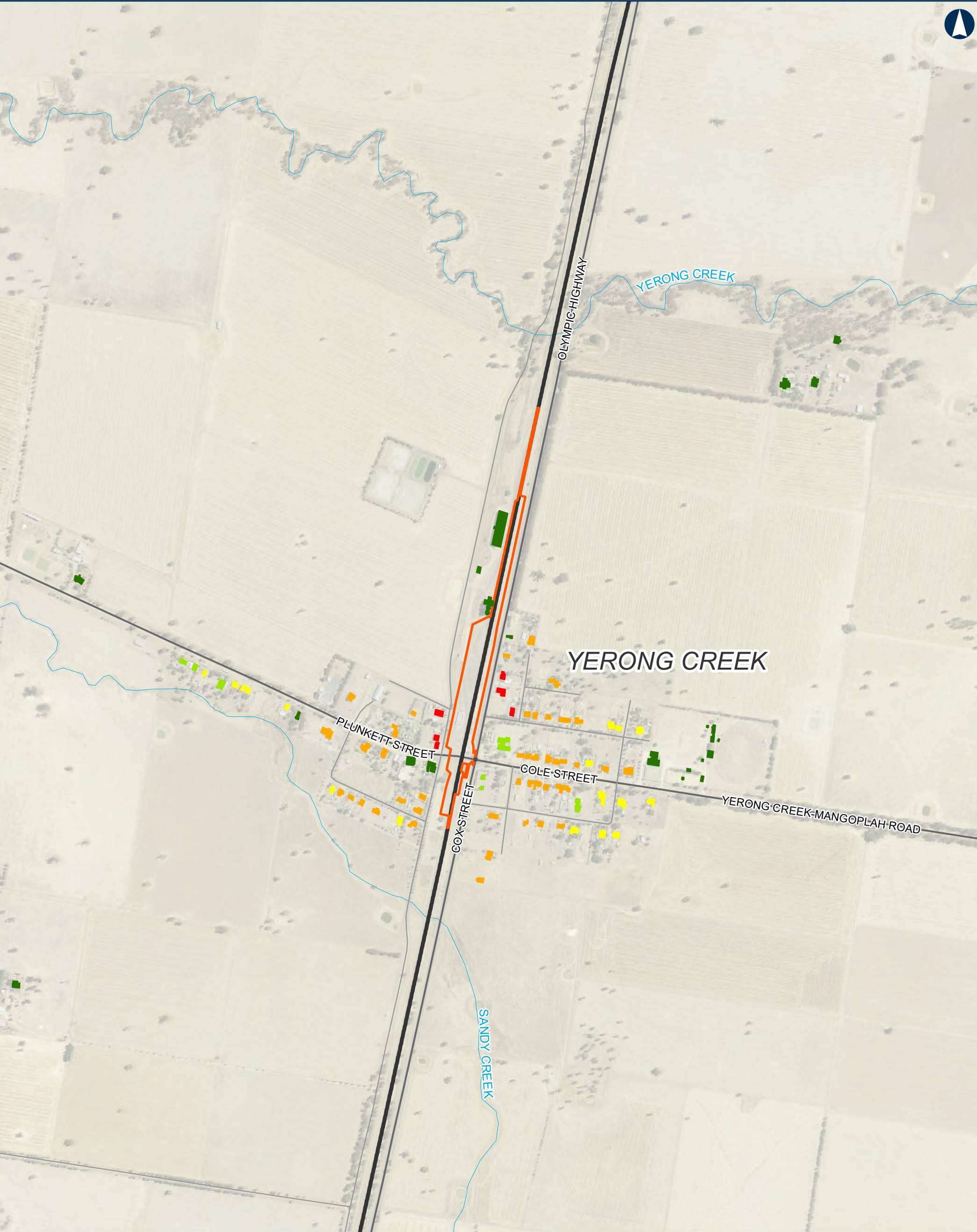
>30dB
- >75dB (Residences only)



INLAND RAIL

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.6 Lockhart - Yerong Creek Track Slews - Night Time (Track Realignment (>300mm))

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

Existing railway

Main road

Local road

Watercourse
- <NML

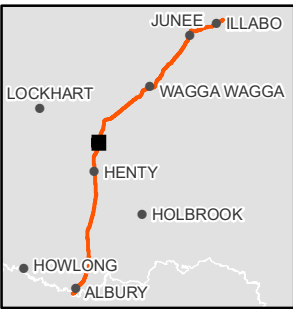
NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

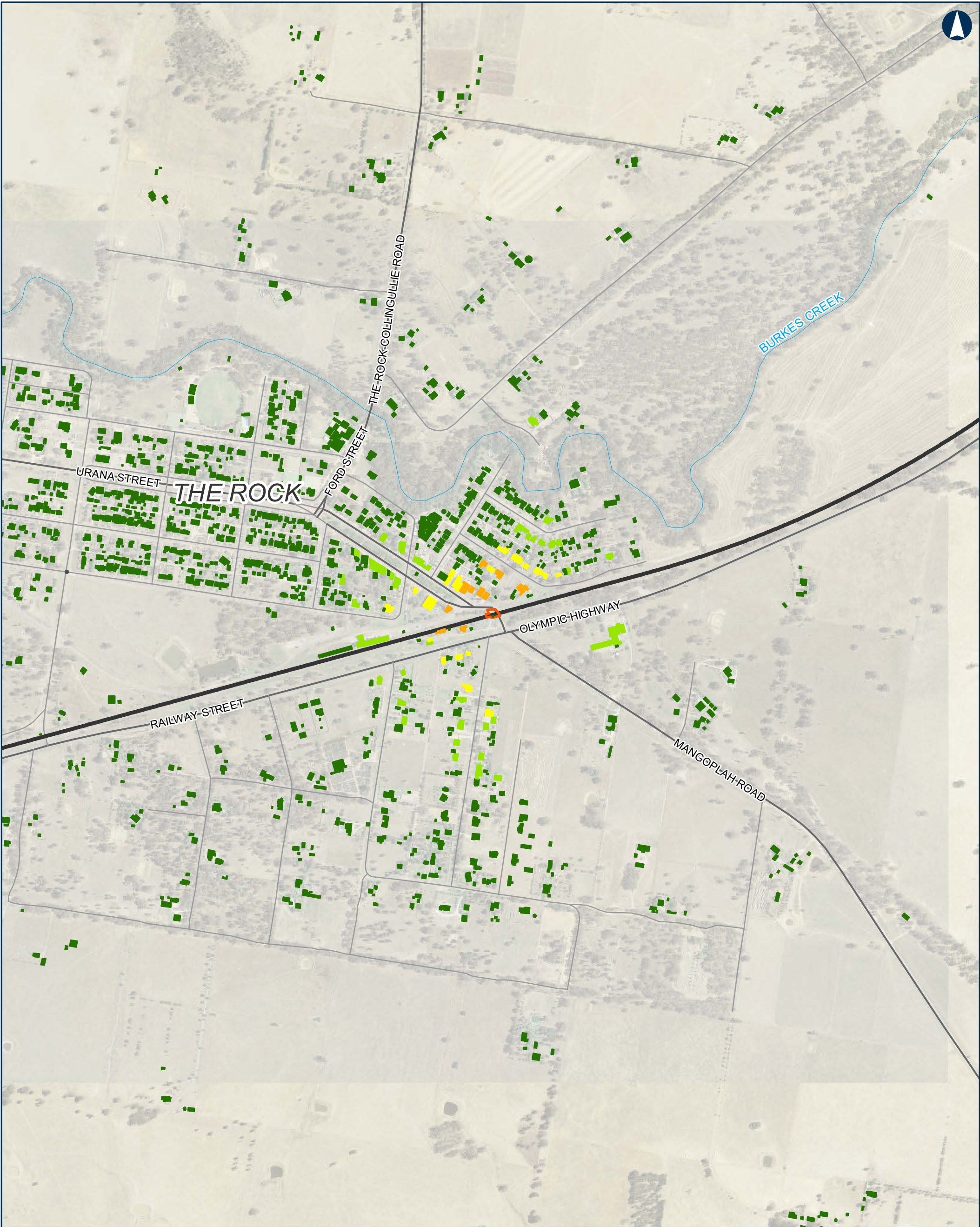
>30dB
- >75dB (Residences only)



INLAND RAIL

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.7 Lockhart - The Rock Gantry Replacement - Day Time (Cut Gantry Bolts)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

— Existing railway

— Main road

— Local road

— Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**

■ <NML

■ NML + 5dB

■ NML + 10dB

■ NML + 20dB

■ NML + 30dB

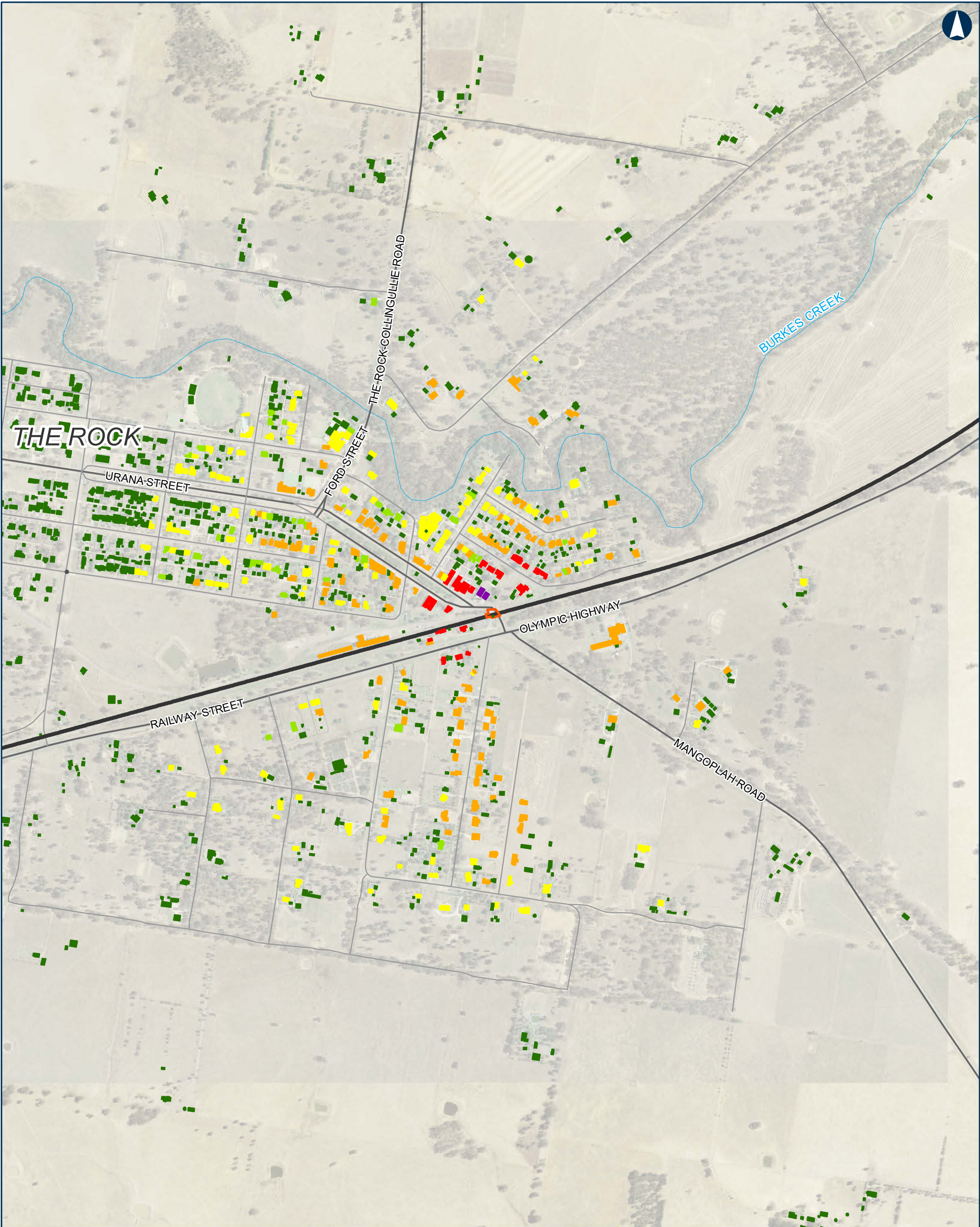
■ >30dB

■ >75dB (Residences only)



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.8 Lockhart - The Rock Gantry Replacement - Night Time (Cut Gantry Bolts)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:10,000
Data Sources: ARTC, NSWSS

- Proposal site

— Existing railway

— Main road

— Local road

— Watercourse
- <NML

■ NML + 5dB

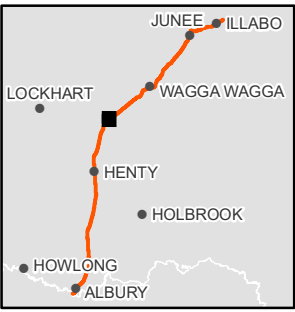
■ NML + 10dB

■ NML + 20dB

■ NML + 30dB

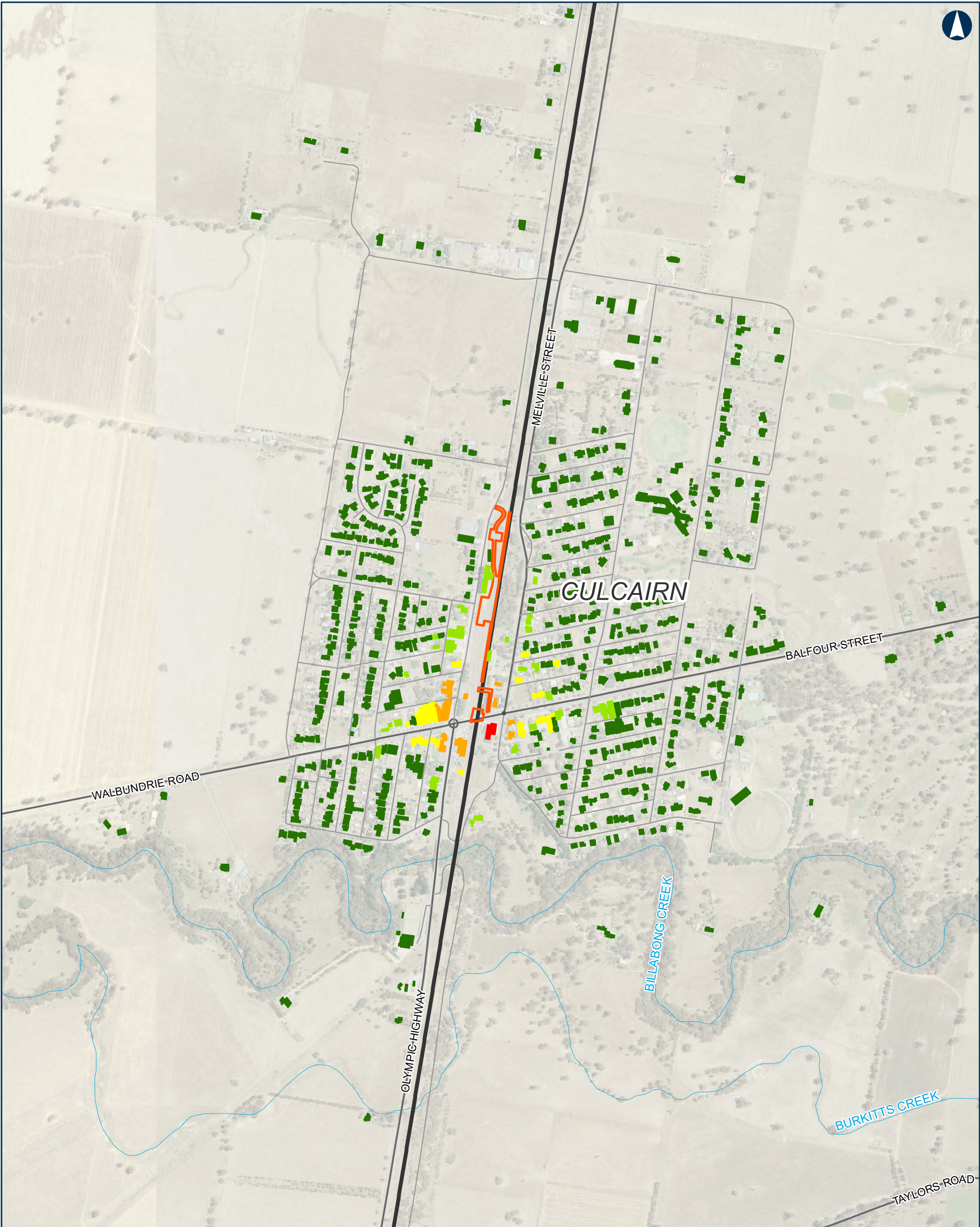
■ >30dB
- Exceedance of project construction noise criteria LAeq(15 minutes)

■ >75dB (Residences only)



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.9 Lockhart - Level Crossings - Day Time (Strip Level Crossing Panels and Remove Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

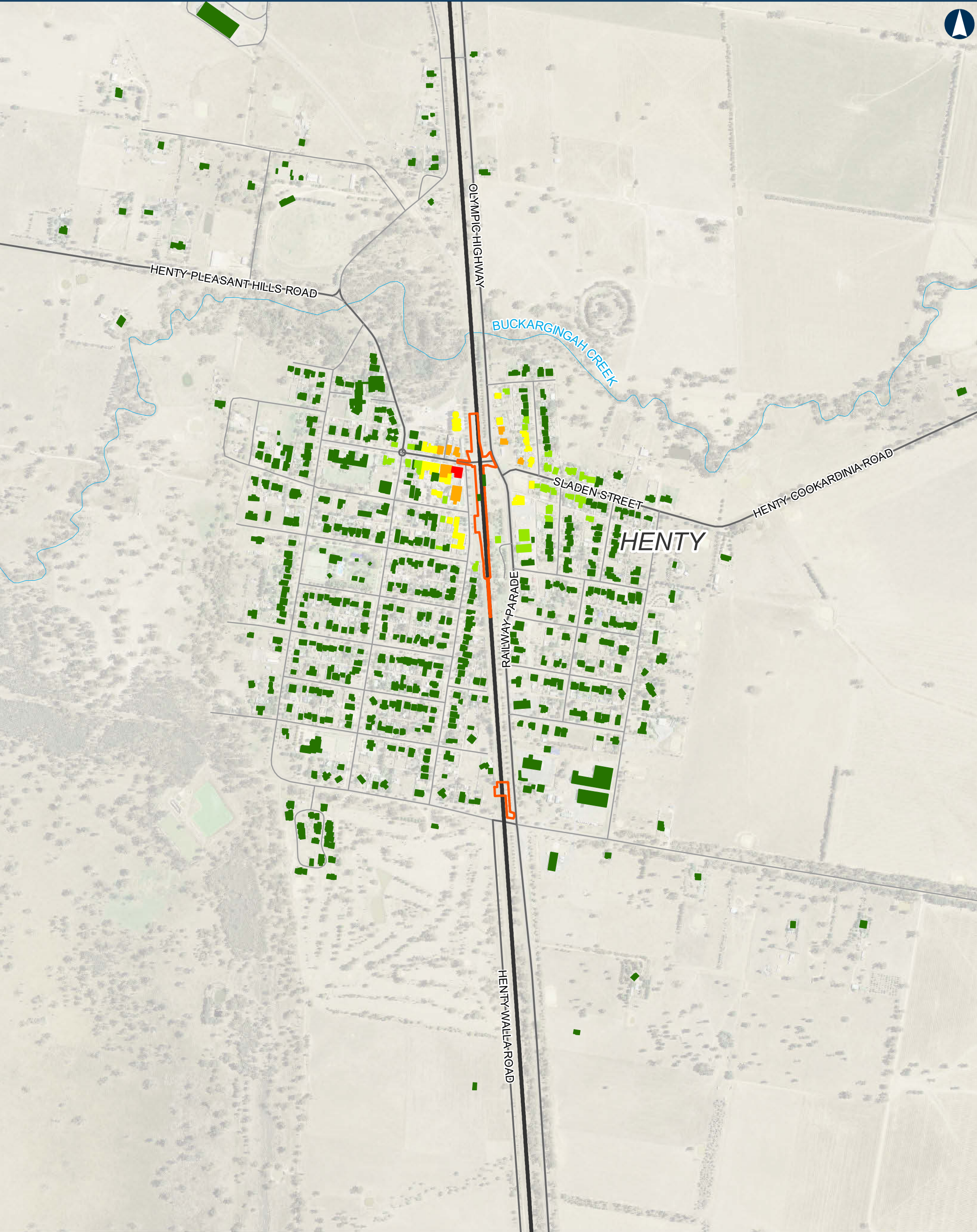
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.9 Lockhart - Level Crossings - Day Time (Strip Level Crossing Panels and Remove Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

Existing railway

Main road

Local road

Watercourse
- <NML

NML + 5dB

NML + 10dB

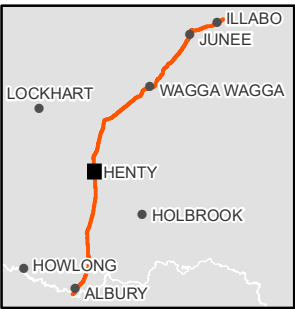
NML + 20dB

NML + 30dB

>30dB

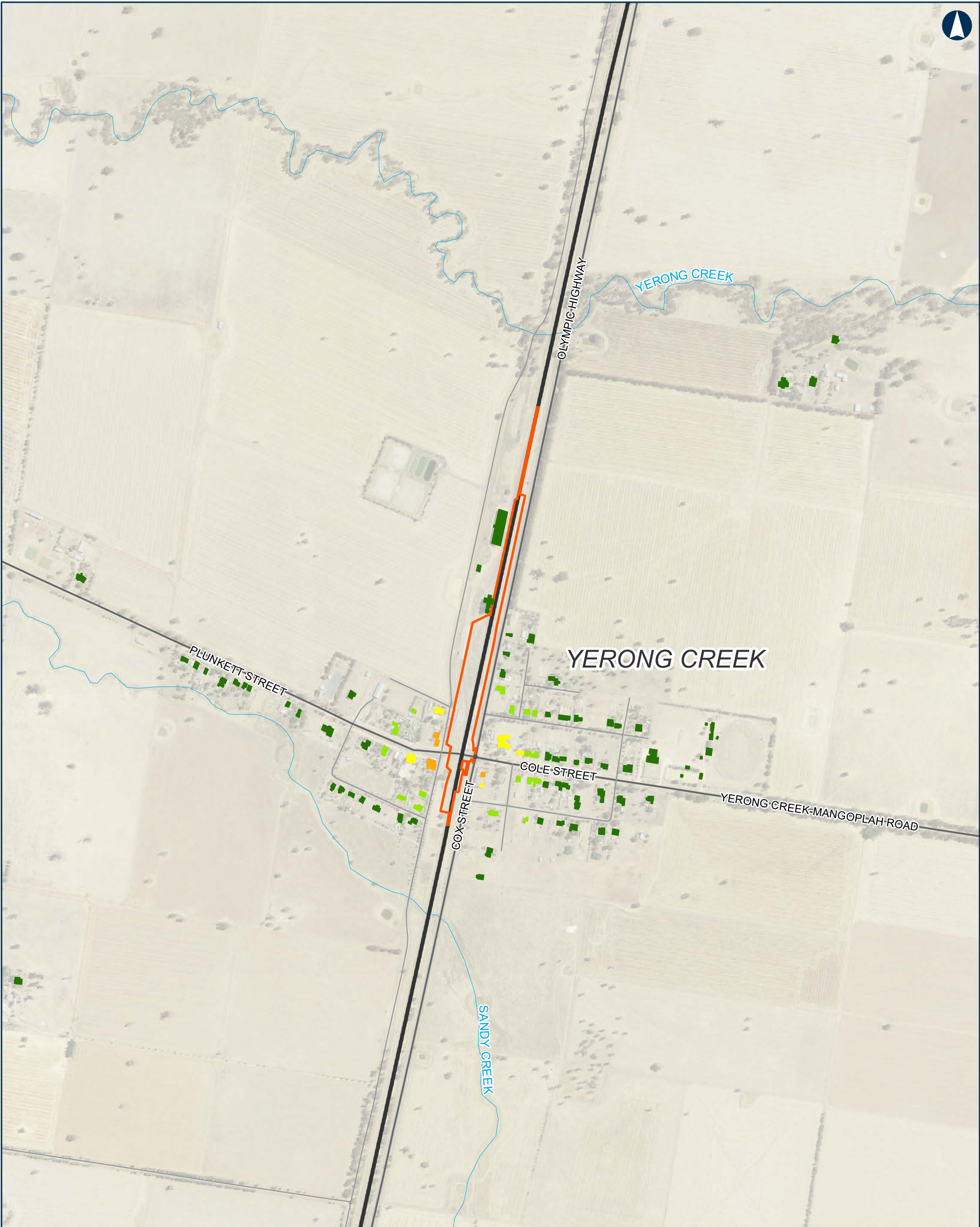
Exceedance of project construction noise criteria LAeq(15 minutes)

>75dB (Residences only)



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.2.9 Lockhart - Level Crossings - Day Time (Strip Level Crossing Panels and Remove Track)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

Existing railway

Main road

Local road

Watercourse
- <NML

■

NML + 5dB

■

NML + 10dB

■

NML + 20dB

■

NML + 30dB

■

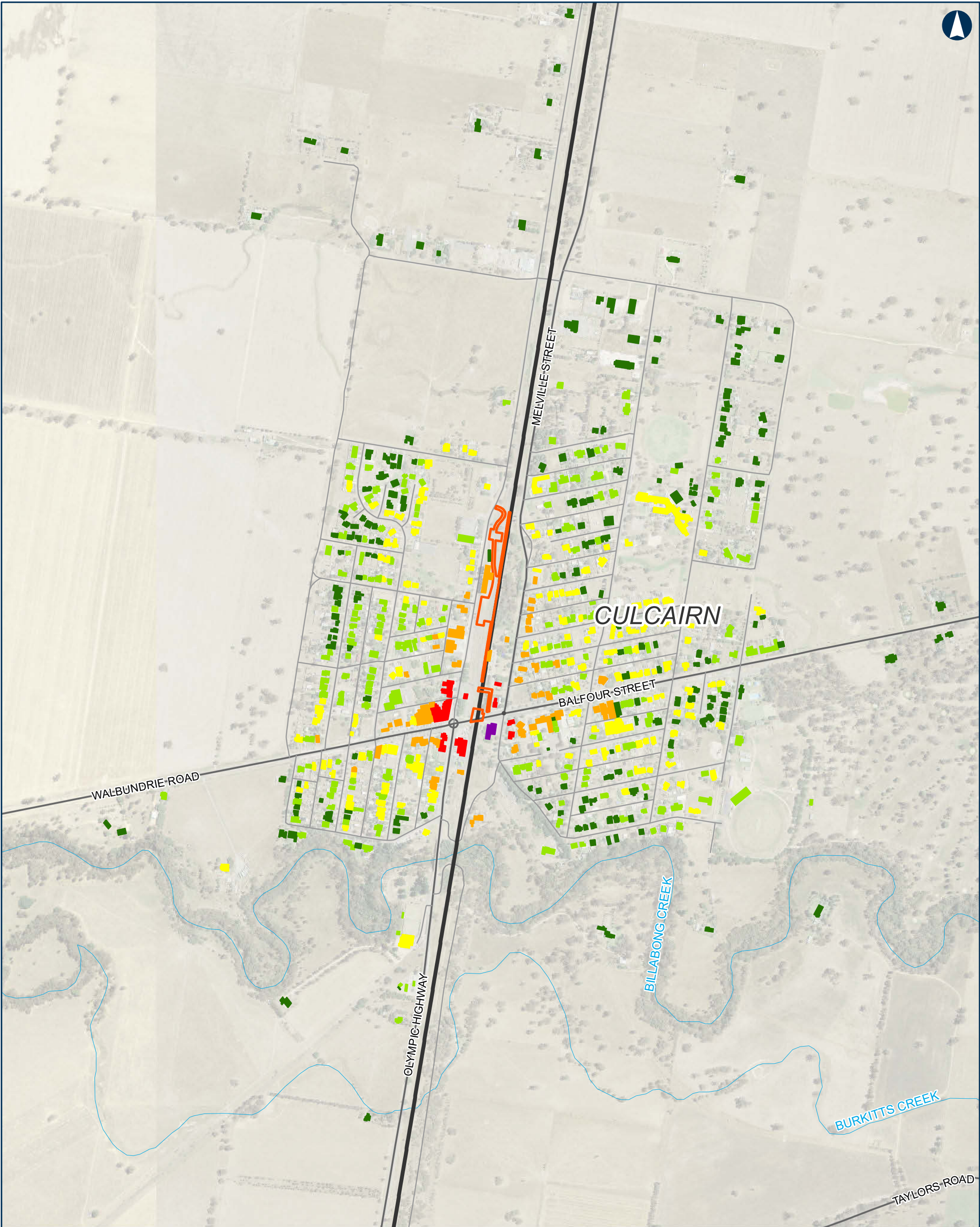
>30dB
- >75dB (Residences only)
- Exceedance of project construction noise criteria LAeq(15 minutes)



INLAND RAIL

ARTC

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Albury to Illabo

Figure A.2.10 Lockhart - Level Crossings - Night Time (Strip Level Crossing Panels and Remove Track)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

Existing railway

Main road

Local road

Watercourse

<NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

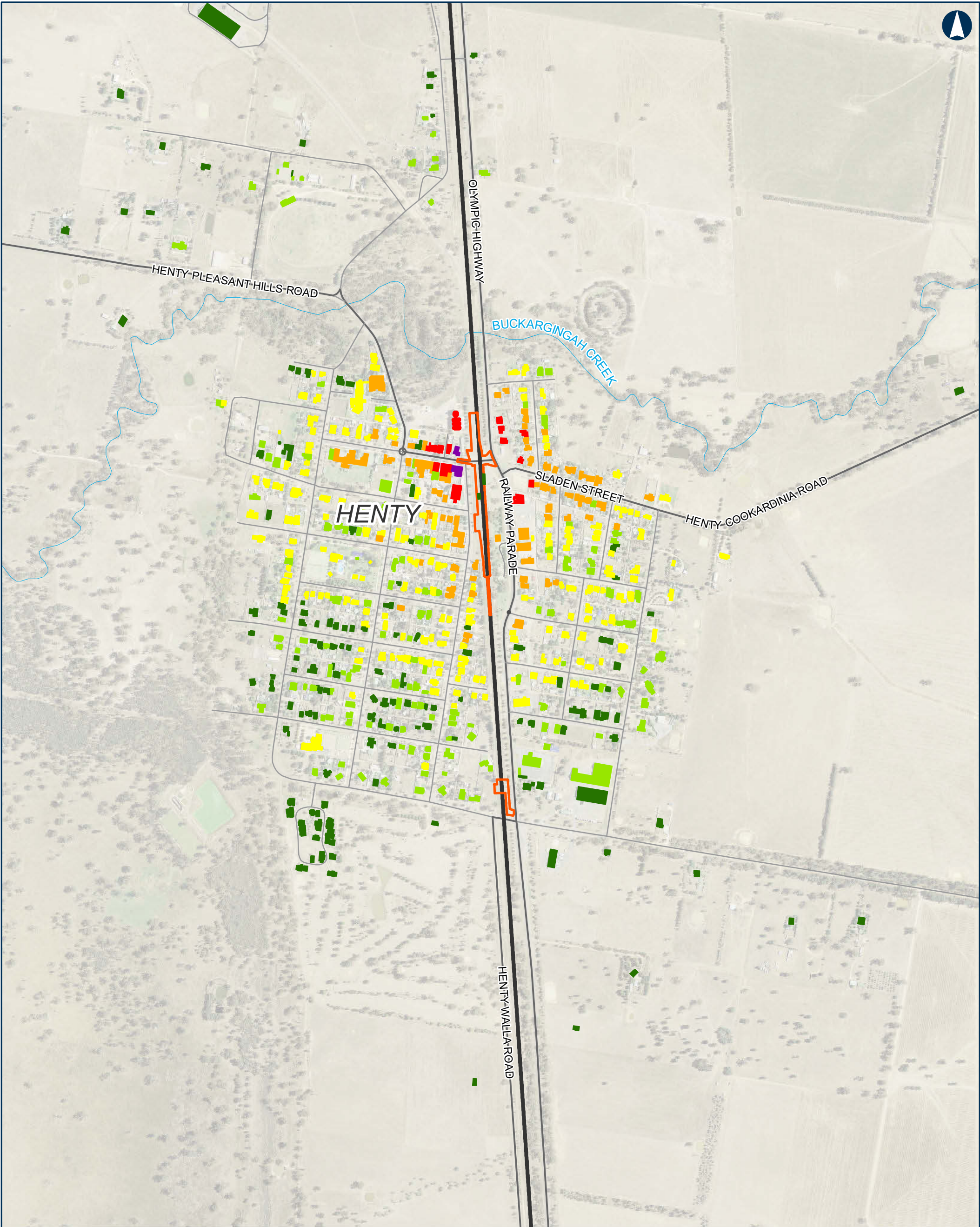
>30dB

>75dB (Residences only)



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Albury to Illabo

Figure A.2.10 Lockhart - Level Crossings - Night Time (Strip Level Crossing Panels and Remove Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

Existing railway

Main road

Local road

Watercourse
- <NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

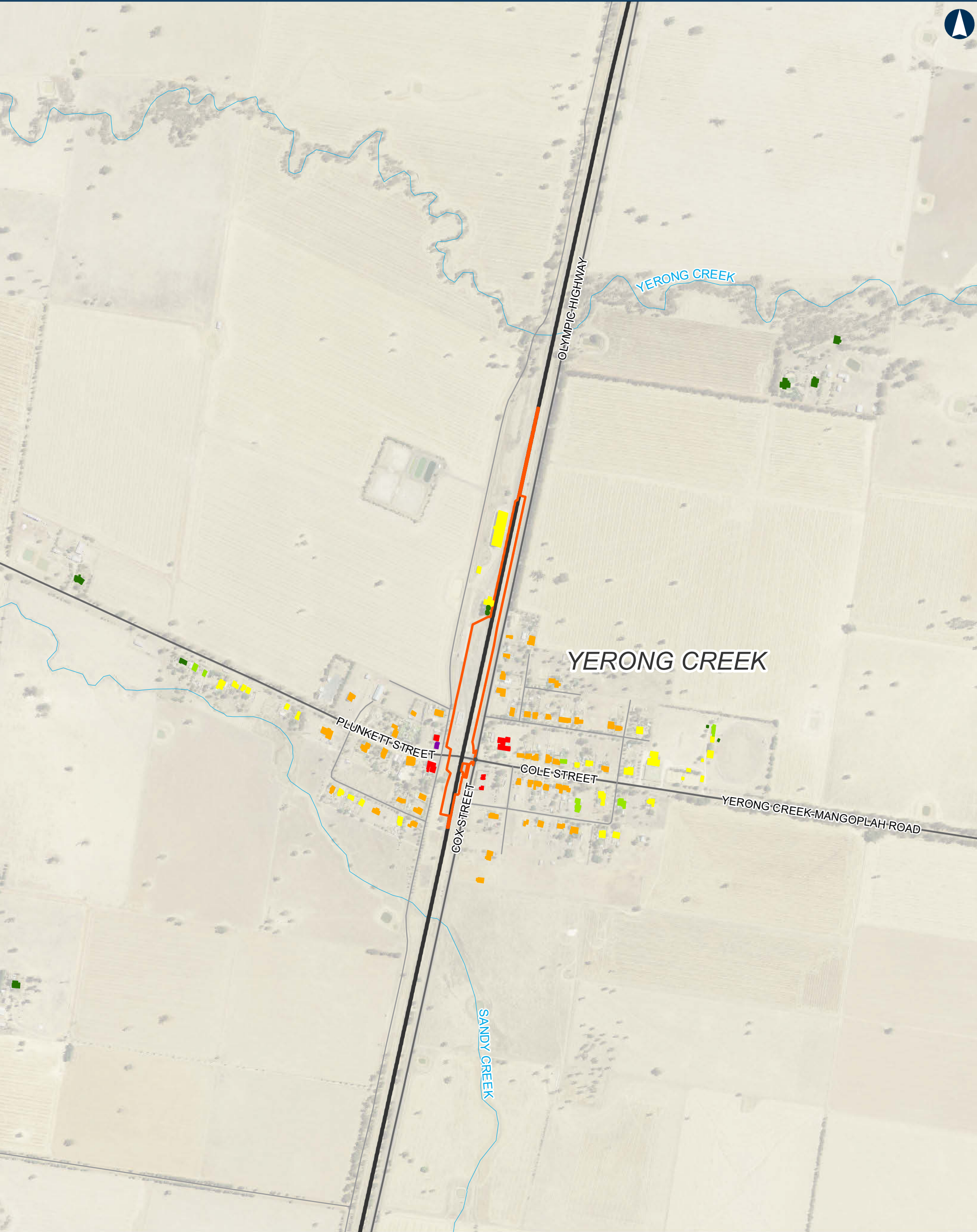
>30dB

>75dB (Residences only)



INLAND RAIL ARTC

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Albury to Illabo

Figure A.2.10 Lockhart - Level Crossings - Night Time (Strip Level Crossing Panels and Remove Track)

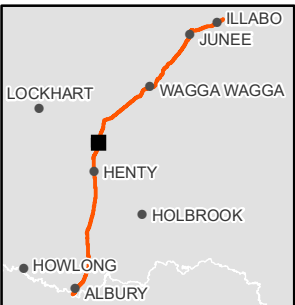
0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- <NML**
- NML + 5dB**
- NML + 10dB**
- NML + 20dB**
- NML + 30dB**
- >30dB**
- >75dB (Residences only)**

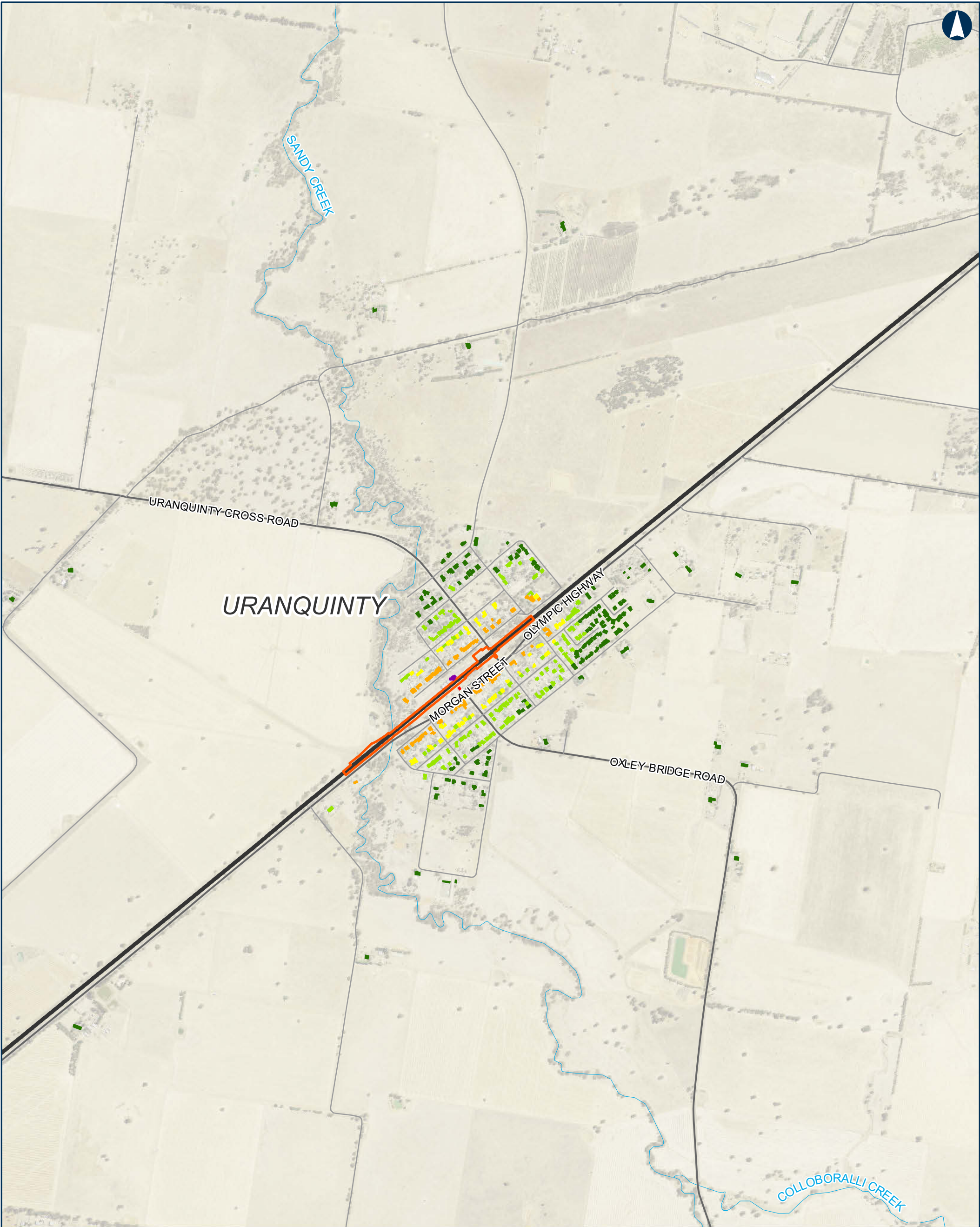


INLAND RAIL **ARTC**

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APPENDIX D-3

WAGGA WAGGA



Albury to Illabo

Figure A.3.1 Wagga Wagga - Uranquinty Track SLEWS - Day Time (Offline Widenings)

0 100 200
m

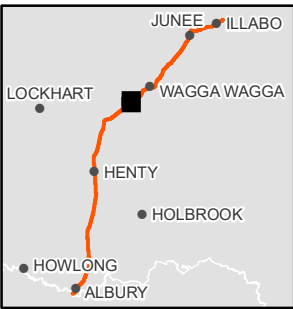
Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

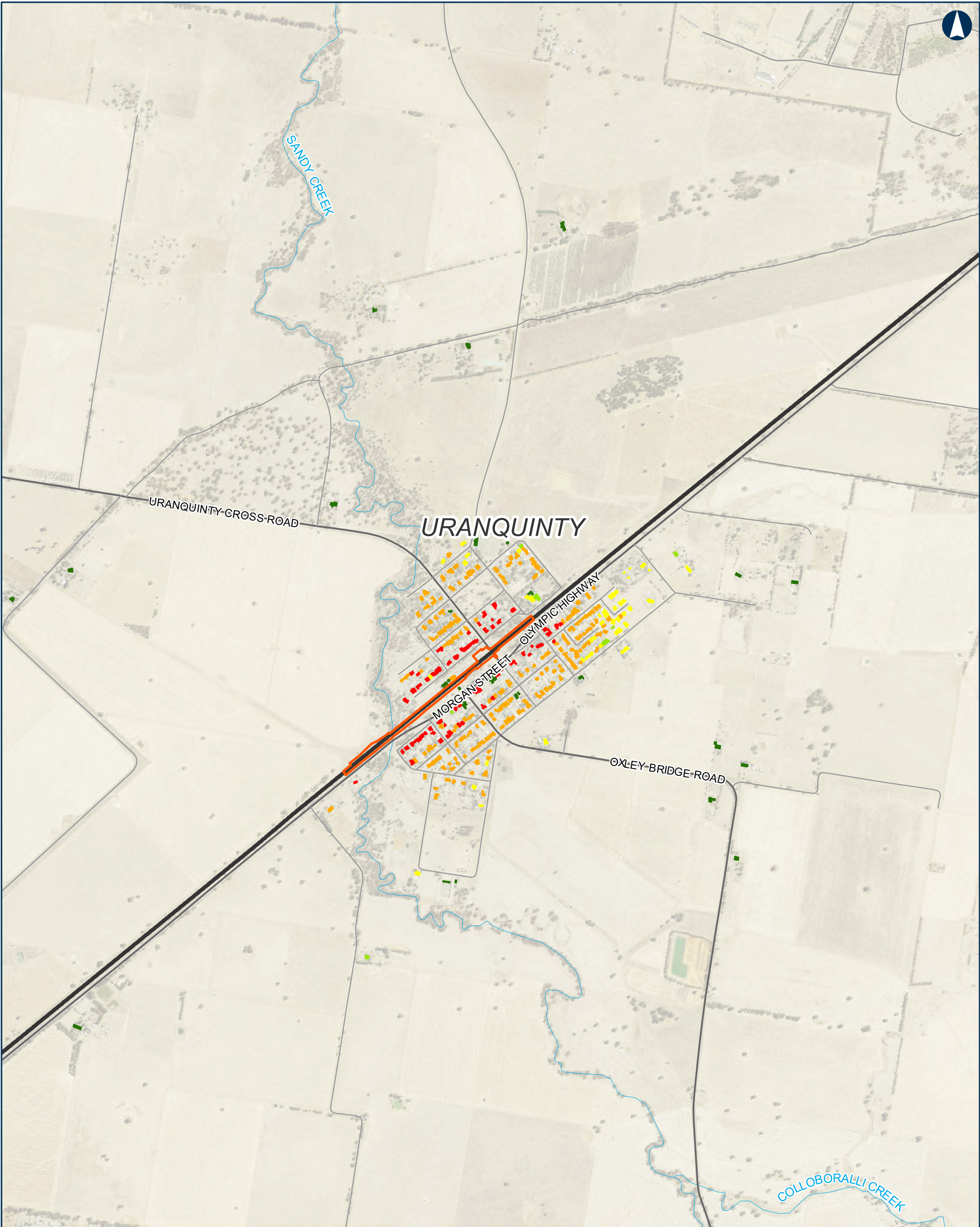
Paper: A3
Scale: 1:17,500

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- <NML**
- NML + 5dB**
- NML + 10dB**
- NML + 20dB**
- NML + 30dB**
- >30dB**
- >75dB (Residences only)**



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Albury to Illabo

Figure A.3.2 Wagga Wagga - Uranquinty Track Slews - Night Time (Track Realignment (>300mm))

0 100 200
m

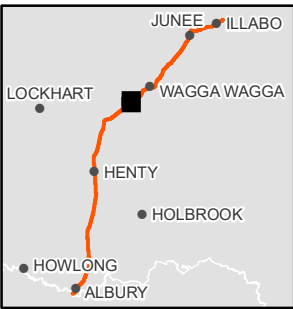
Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

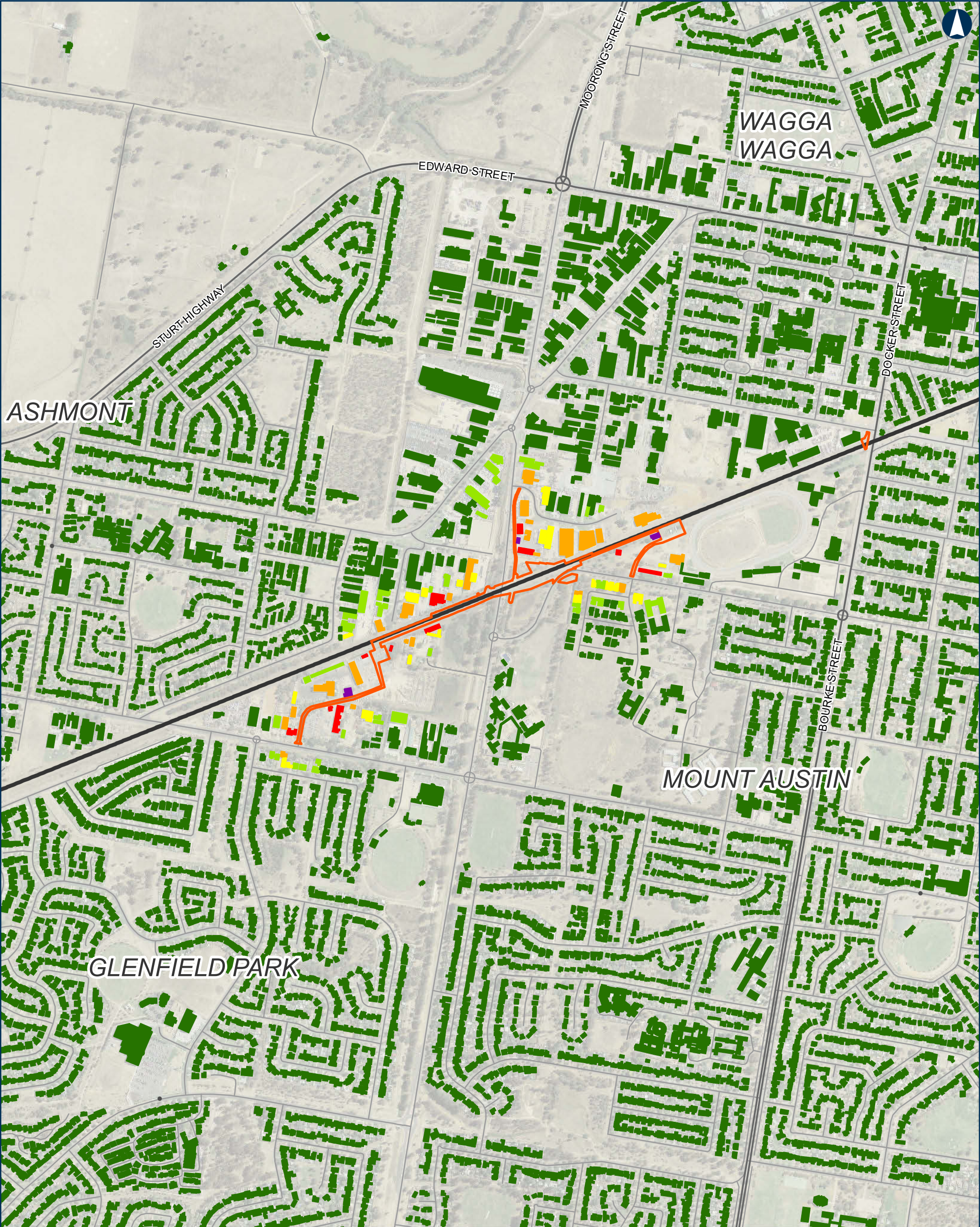
Paper: A3
Scale: 1:17,500

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



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0100200m

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Proposal site

Existing railway

Main road

Local road

Exceedance of project construction noise criteria LAeq(15 minutes)

<NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

>30dB

>75dB (Residences only)

JUNEE

WAGGA WAGGA

HENTY

HOLBROOK

ALBURY

LOCKHART

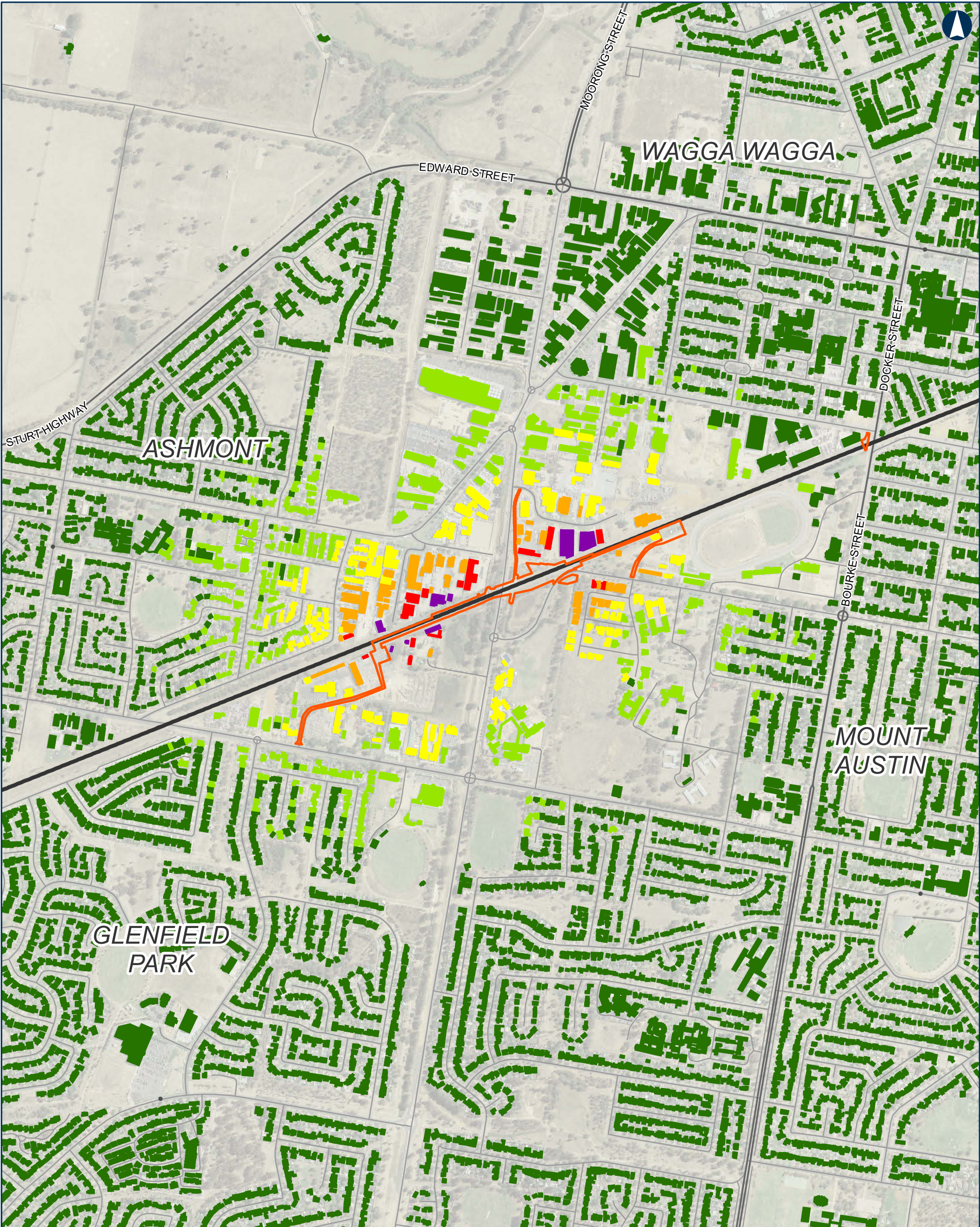
HOWLONG

INLAND RAIL

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D:\WSP\O365\AU-WKG - Geospatial - AIS - Projects\PS122419_Albury_to_Illabo\Tasks\210_0010_EAP_EISReportFigures\Documents\Noise\210_EAP_A101_NoiseResults_r1v5.mxd



Albury to Illabo

Figure A.3.4 Wagga Wagga - Pearson Street Lowering - Night Time (Small Scale Piling)

0 100 200
m

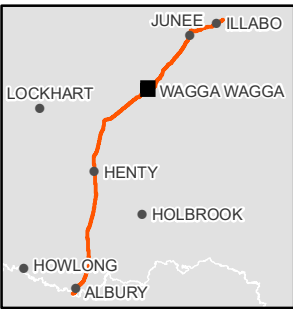
Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

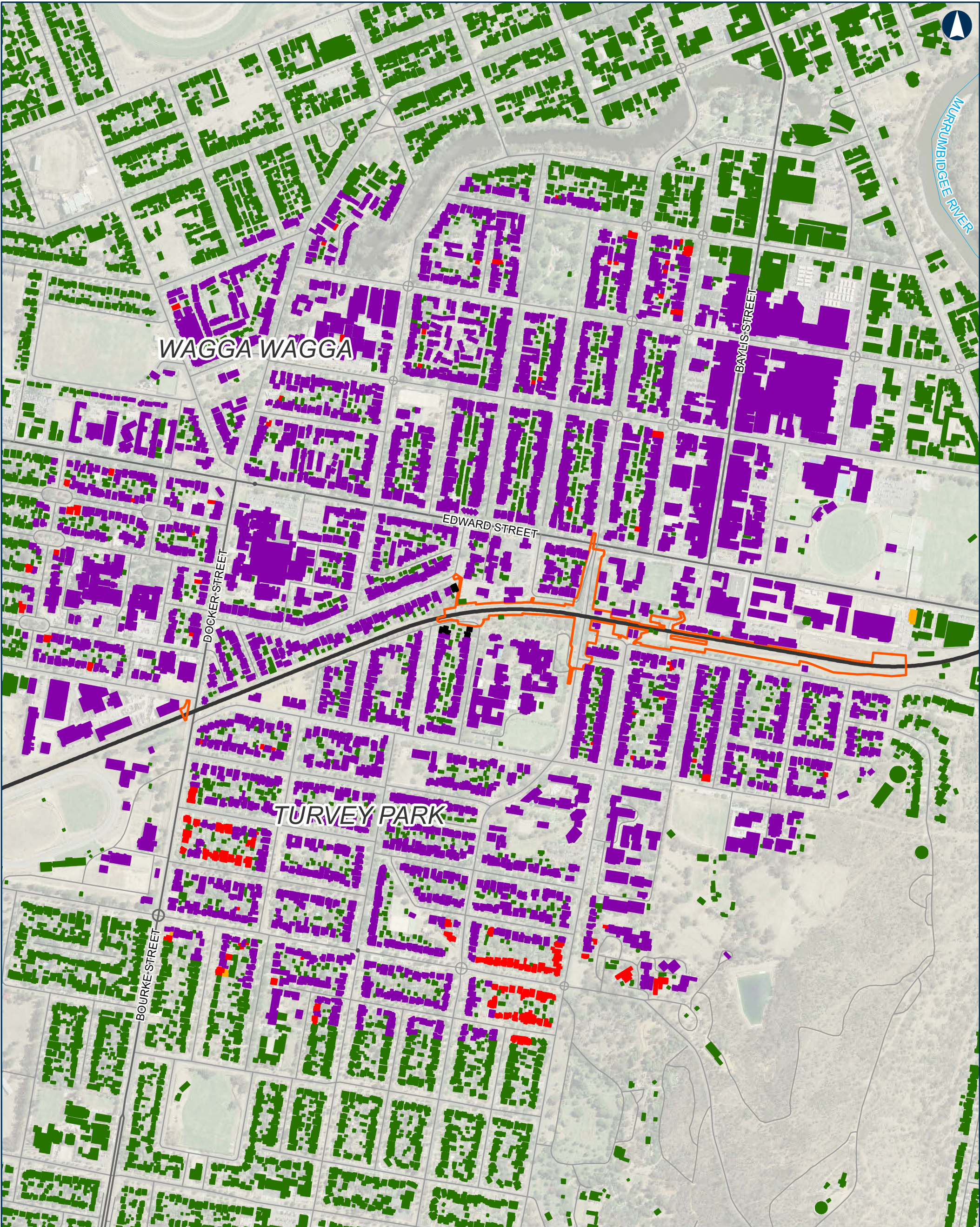
Paper: A3
Scale: 1:10,000

- Proposal site
- Existing railway
- Main road
- Local road
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



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Albury to Illabo

Figure A.3.5 Wagga Wagga - Cassidy Parade Bridge - Day Time (Demolition)

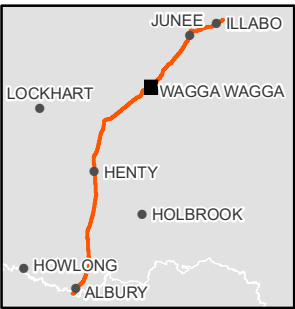
0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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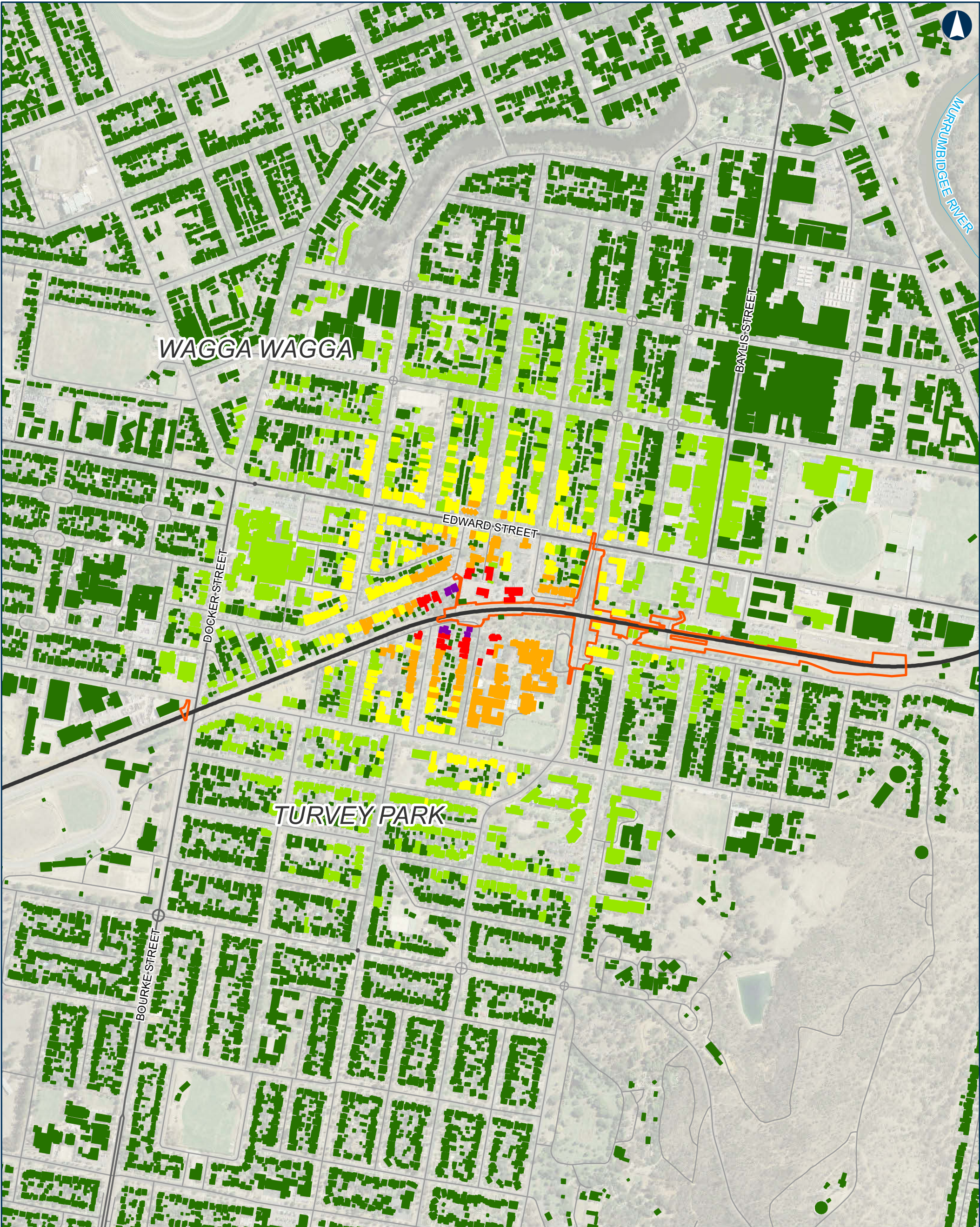
Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:8,500
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- | | |
|---|---|
| <NML | >75dB (Residences only) |
| NML + 5dB | |
| NML + 10dB | |
| NML + 20dB | |
| NML + 30dB | |
| >30dB | |



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Albury to Illabo

Figure A.3.6 Wagga Wagga - Cassidy Parade Bridge - Night Time (Lifting of Truss and Deck)

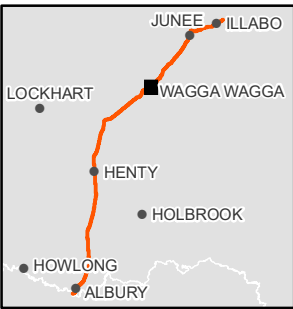
0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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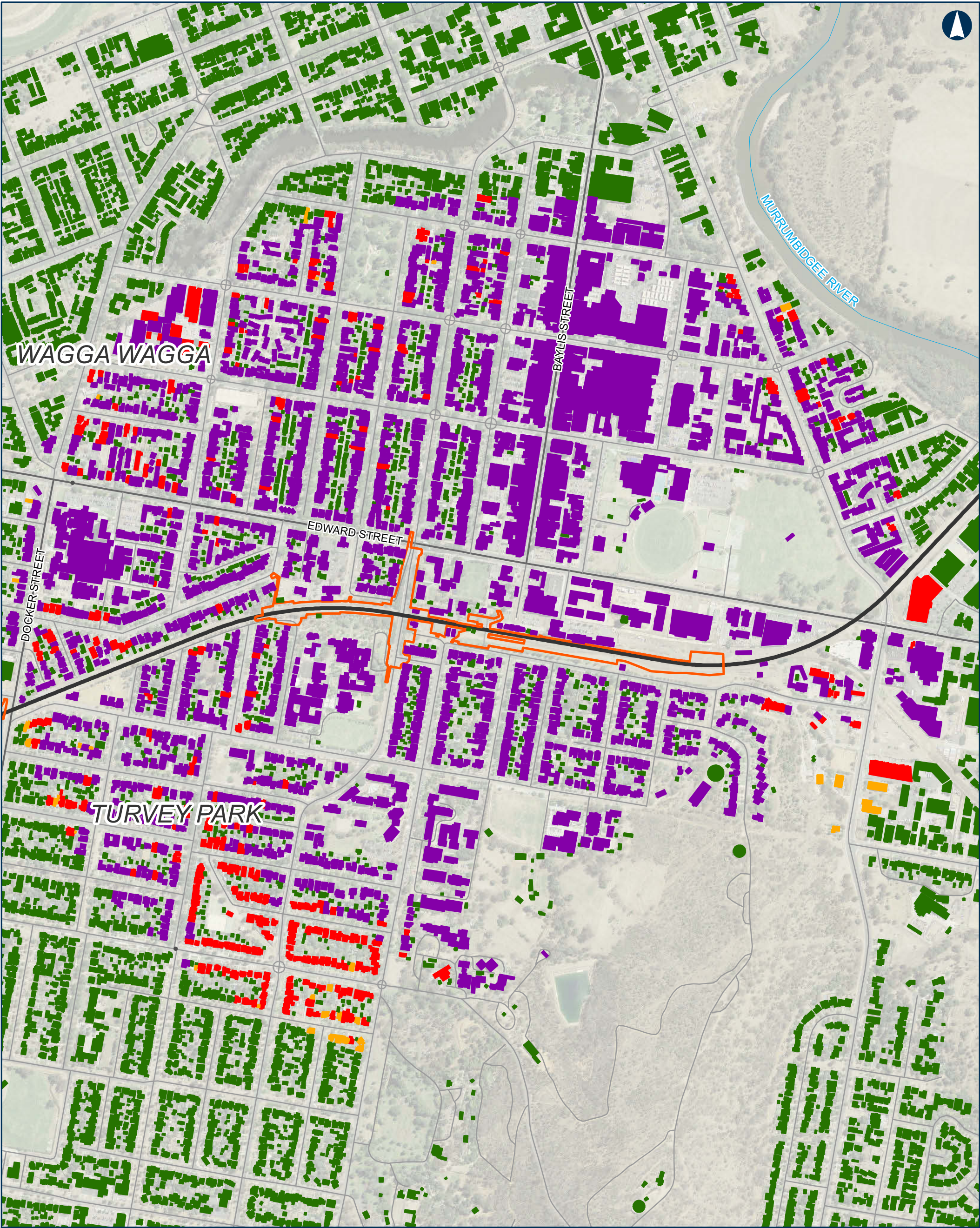
Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:8,500
Data Sources: ARTC, NSWSS

- Proposal site**
- Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL **ARTC**

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Albury to Illabo

Figure A.3.7 Wagga Wagga - Wagga Station Bridge - Day Time (Lifting of Truss and Deck)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:8,500
Data Sources: ARTC, NSWSS

- Proposal site

— Existing railway

— Main road

— Local road

— Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**

■ <NML

■ NML + 5dB

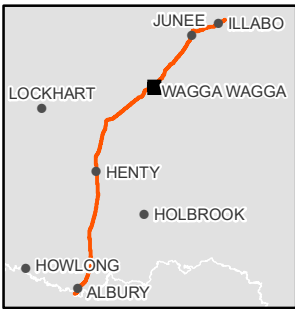
■ NML + 10dB

■ NML + 20dB

■ NML + 30dB

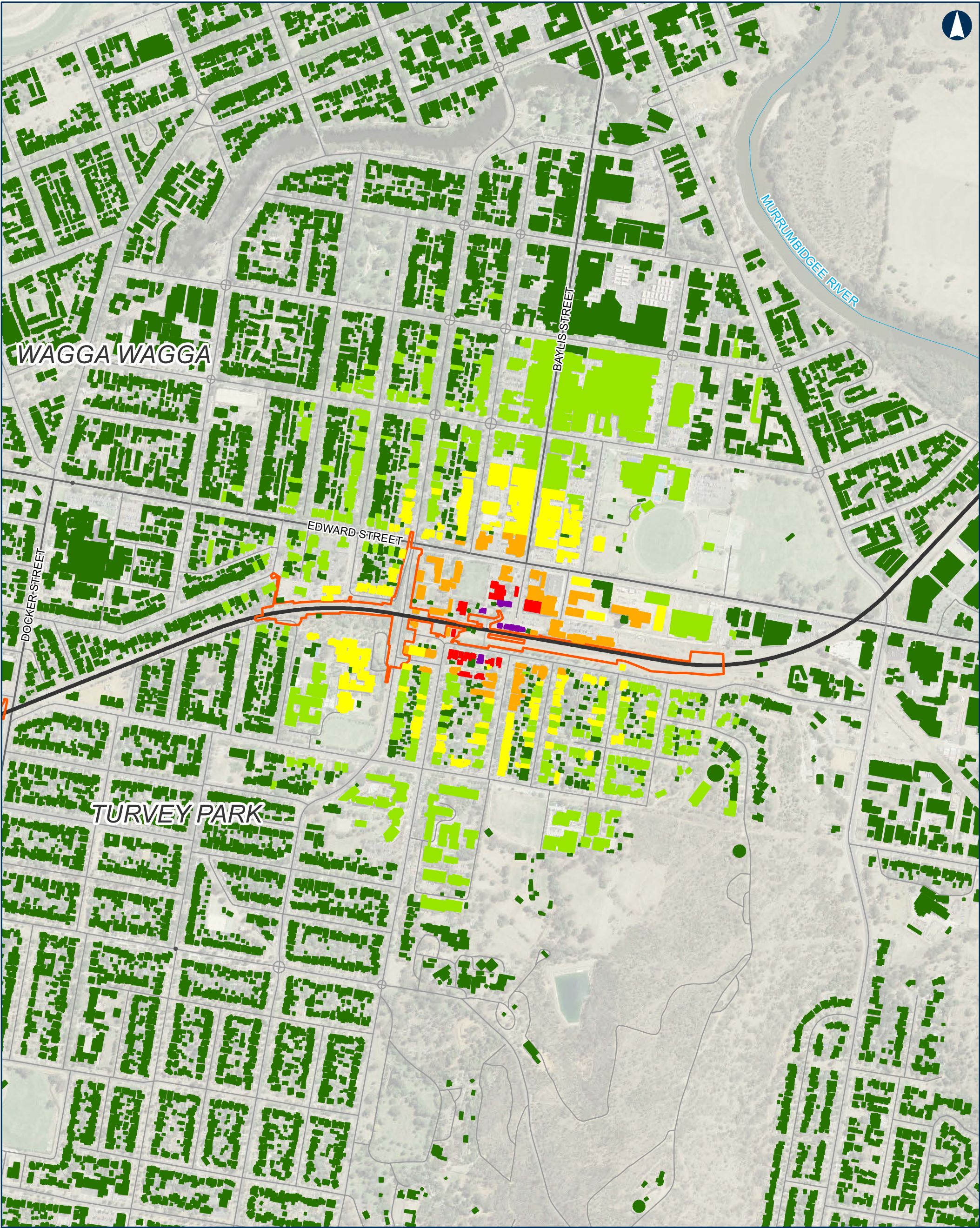
■ >30dB

■ >75dB (Residences only)



INLAND RAIL **ARTC**

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Albury to Illabo Figure A.3.8 Wagga Wagga - Wagga Station Bridge - Night Time (Demolition)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:8,500
Data Sources: ARTC, NSWSS

Proposal site

Existing railway

Main road

Local road

Watercourse

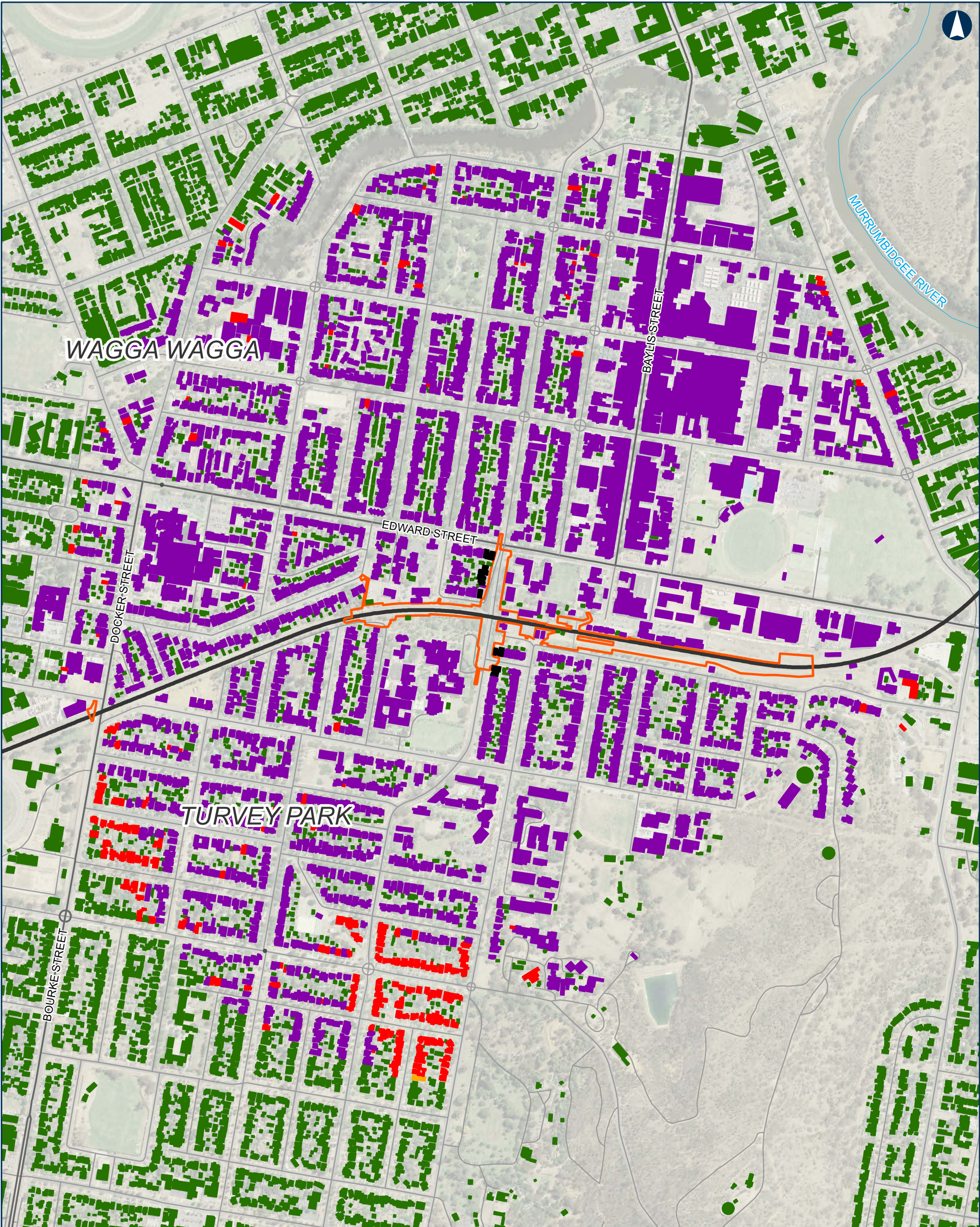
Exceedance of project construction noise criteria LAeq(15 minutes)

<NML	>75dB (Residences only)
NML + 5dB	
NML + 10dB	
NML + 20dB	
NML + 30dB	
>30dB	

INLAND RAIL

ARTC

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Albury to Illabo

Figure A.3.9 Wagga Wagga - Edmondson Street Bridge - Day Time (Service Relocations)

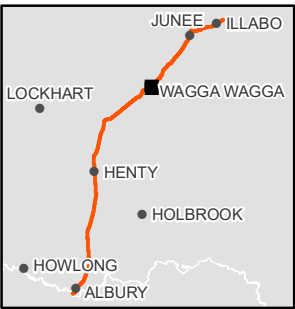
0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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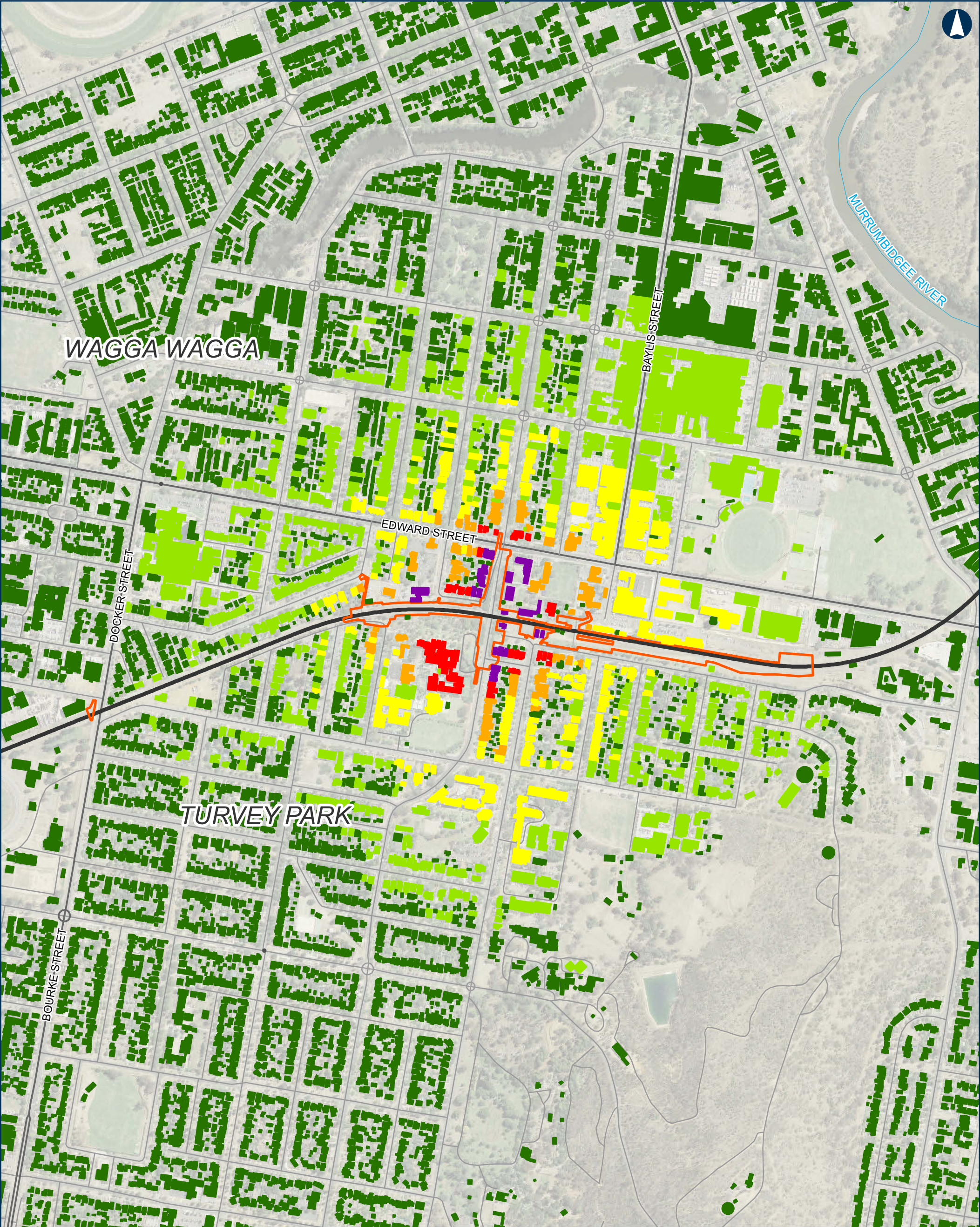
Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:8,500
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL **ARTC**

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Albury to Illabo

Figure A.3.10 Wagga Wagga - Edmondson Street Bridge - Night Time (Install Deck, Slabs and Planks)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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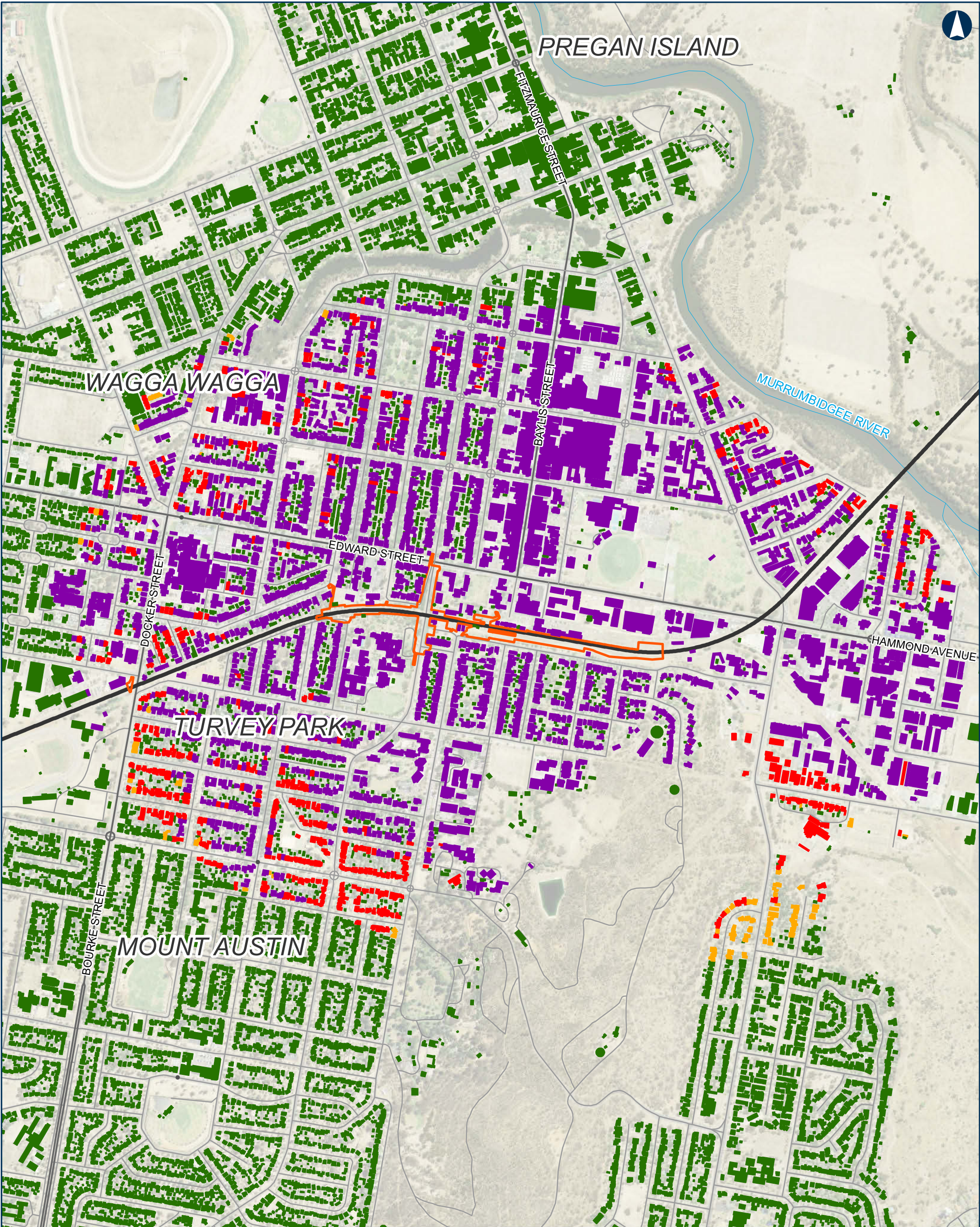
Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:8,500
Data Sources: ARTC, NSWSS

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL **ARTC**

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Albury to Illabo

Figure A.3.11 Wagga Wagga - Wagga Track Slews - Day Time (Offline Widenings)

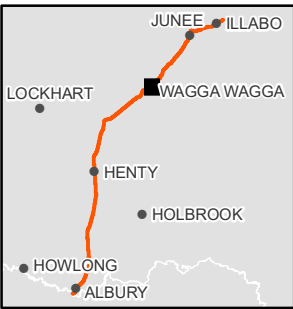
0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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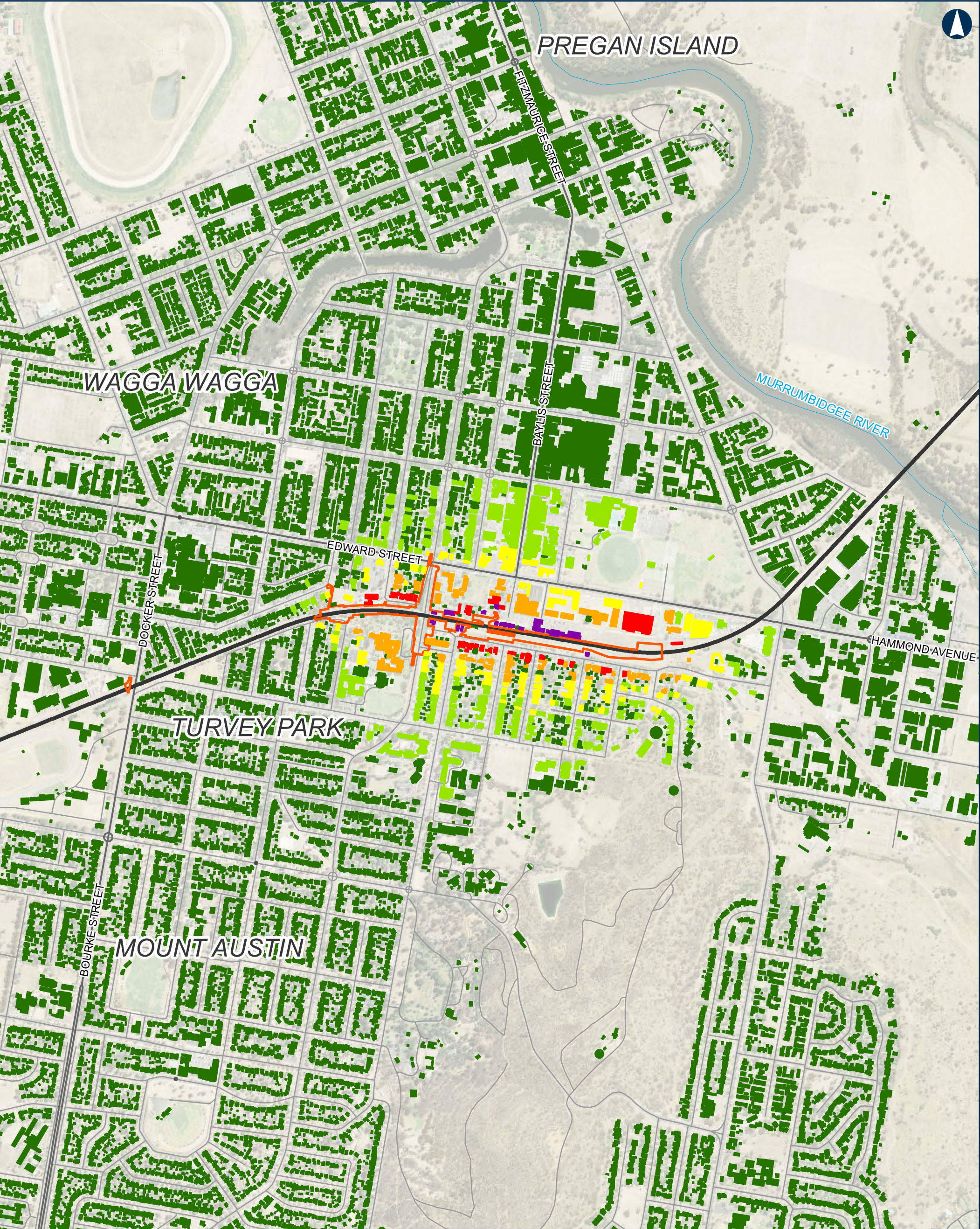
Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:11,500
Data Sources: ARTC, NSWSS

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- <NML**
- NML + 5dB**
- NML + 10dB**
- NML + 20dB**
- NML + 30dB**
- >30dB**
- >75dB (Residences only)**



INLAND RAIL **ARTC**

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Albury to Illabo

Figure A.3.12 Wagga Wagga - Wagga Track SLEWS - Night Time (Rebuild Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021 Paper: A3
Author: WSP Scale: 1:11,500
Data Sources: ARTC, NSWSS

- Proposal site

— Existing railway

— Main road

— Local road

— Watercourse
- <NML

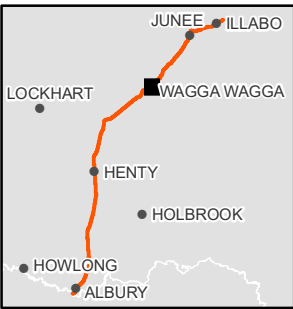
■ NML + 5dB

■ NML + 10dB

■ NML + 20dB

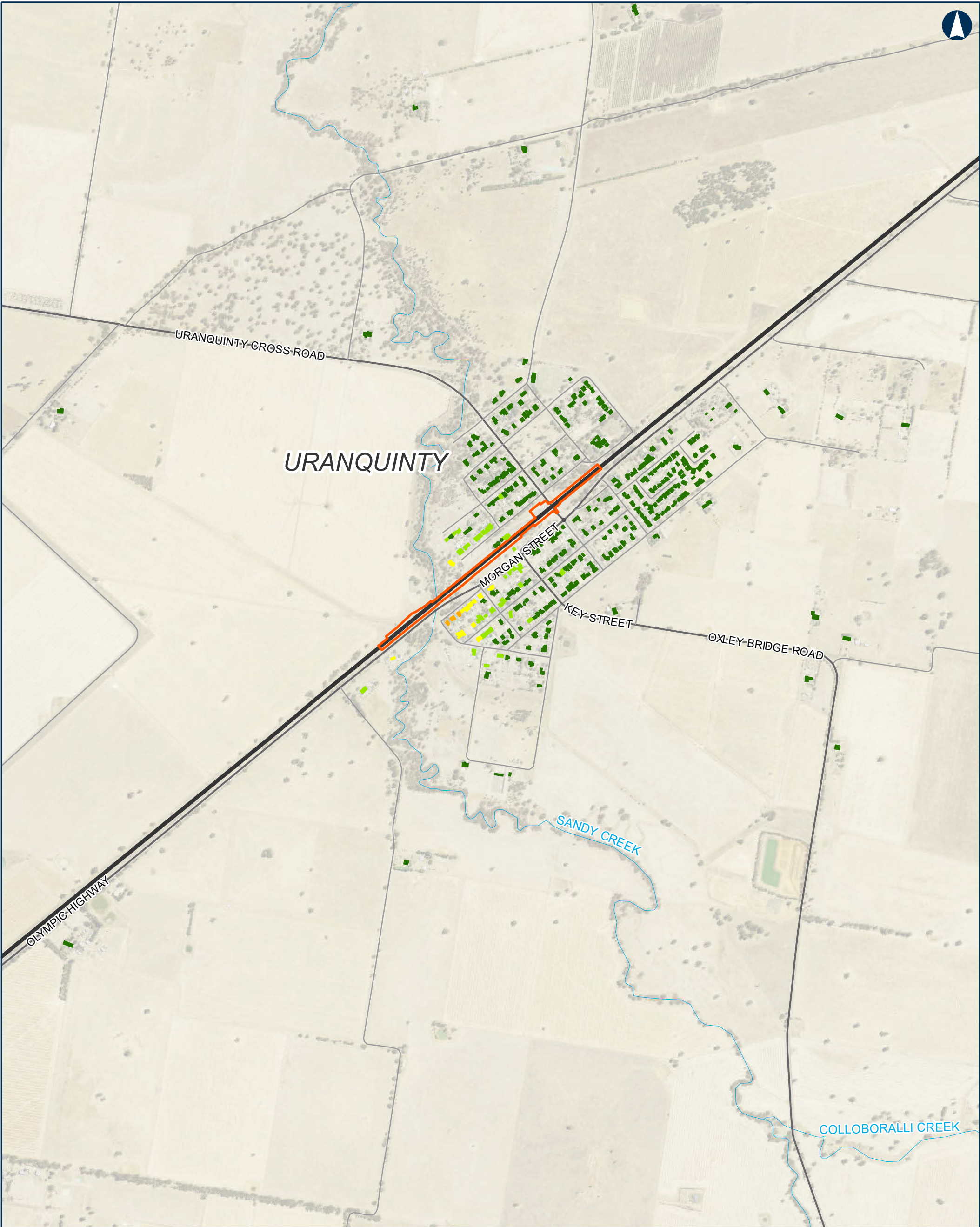
■ NML + 30dB

■ >30dB
- >75dB (Residences only)



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Albury to Illabo

Figure A.3.13 Wagga Wagga - Wagga Sandy Creek Bridge - Day Time (Remove/Install Track)

0 100 200
m

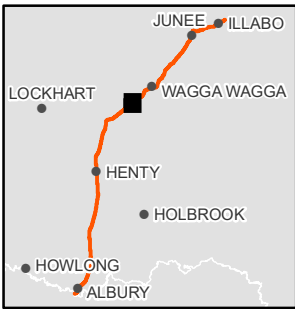
Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

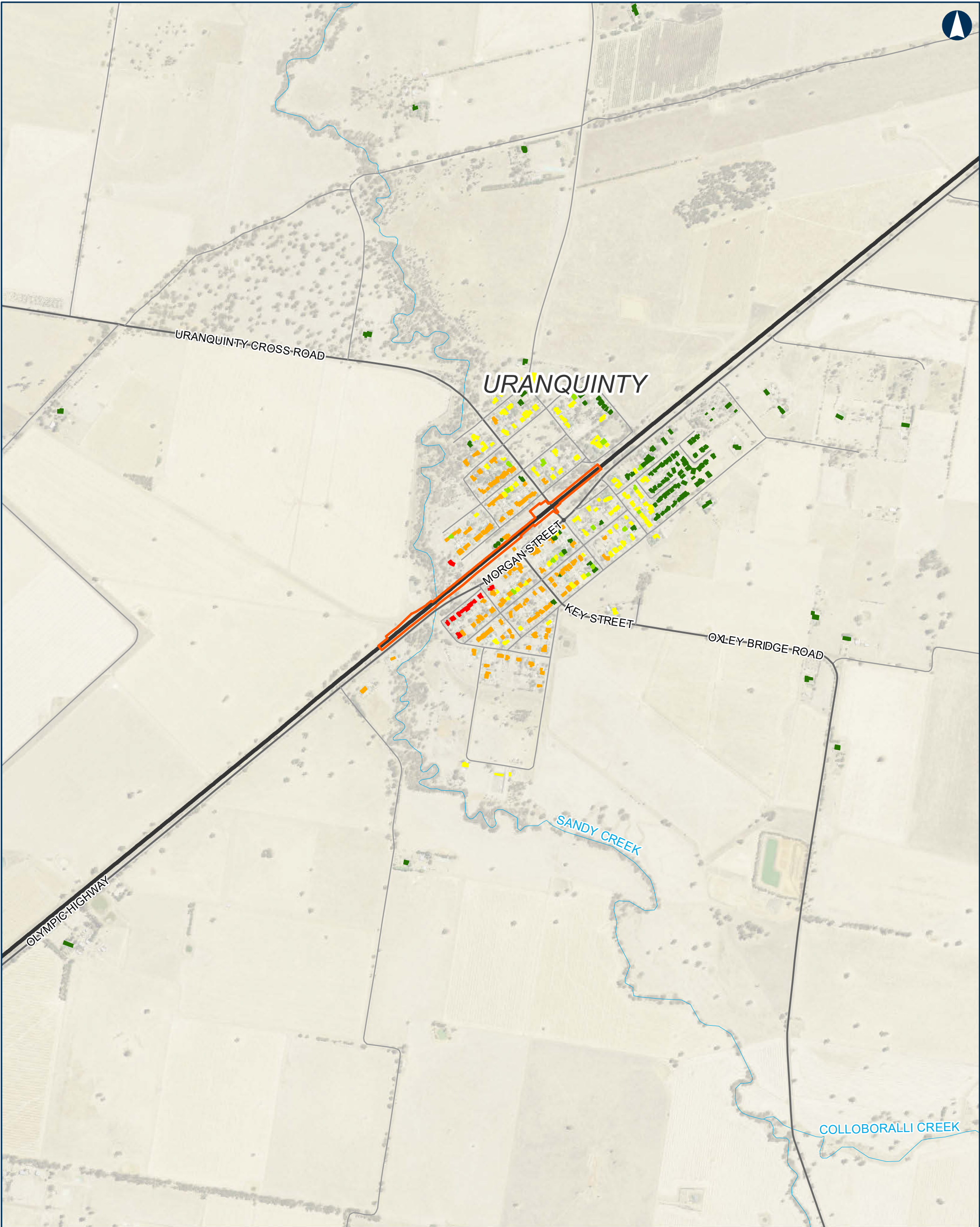
Paper: A3
Scale: 1:15,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL **ARTC**

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Albury to Illabo

Figure A.3.14 Wagga Wagga - Wagga Sandy Creek Bridge - Night Time (Remove/Install Track)

0 100 200
m

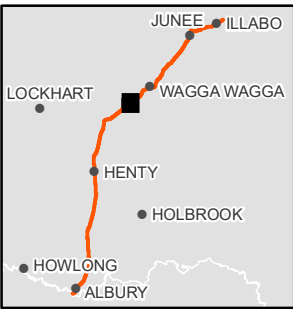
Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

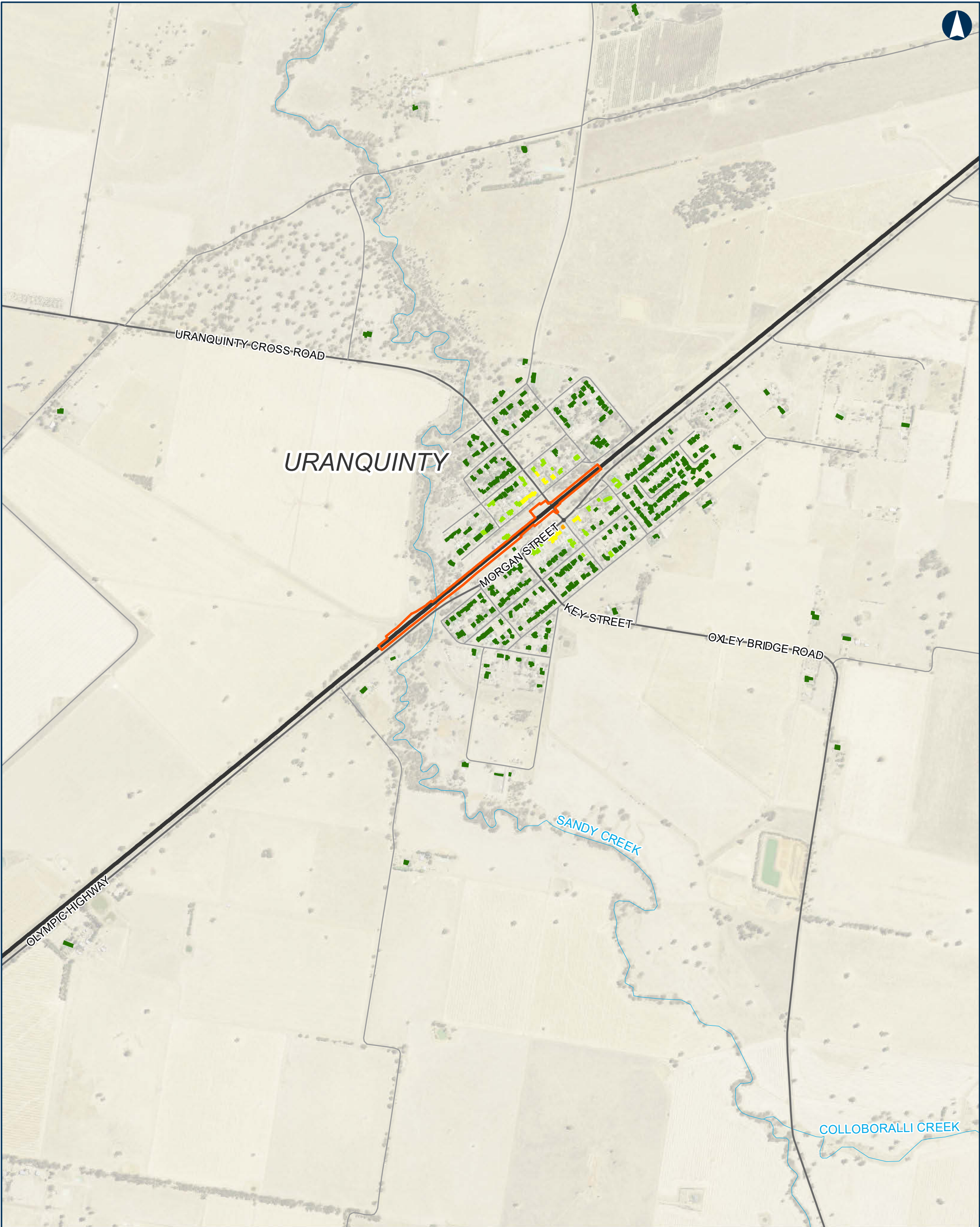
Paper: A3
Scale: 1:15,000

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- <NML**
- NML + 5dB**
- NML + 10dB**
- NML + 20dB**
- NML + 30dB**
- >30dB**
- >75dB (Residences only)**



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.3.15 Wagga Wagga - Wagga Level Crossings - Day Time (Strip Level Crossing Panels and Remove Track) MAP 1 OF 2

0 100 200
m

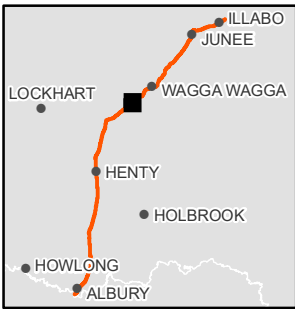
Coordinate System: GDA 1994 MGA Zone 55

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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

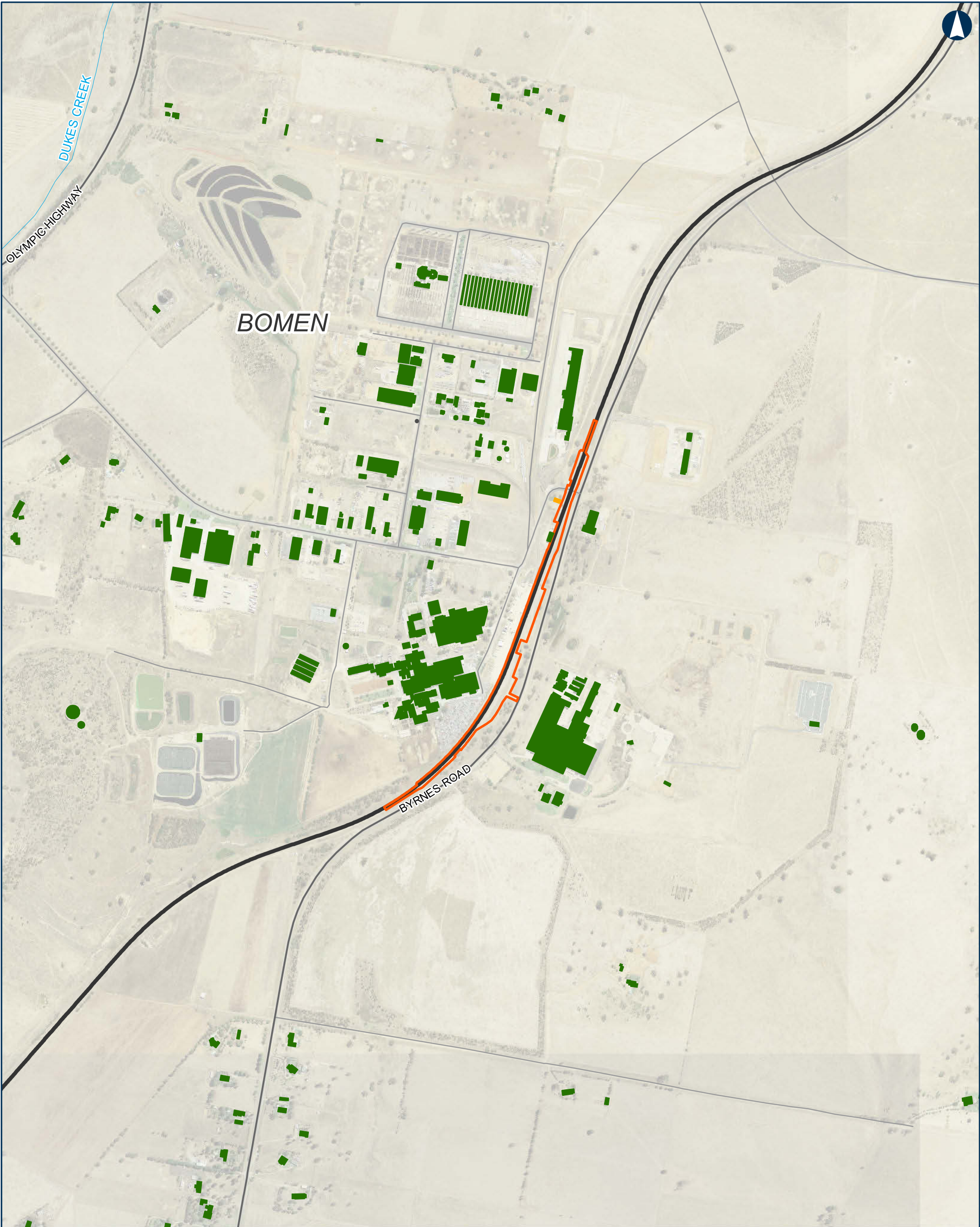
Paper: A3
Scale: 1:15,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.3.15 Wagga Wagga - Wagga Level Crossings - Day Time (Strip Level Crossing Panels and Remove Track) MAP 2 OF 2

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

Existing railway

Main road

Local road

Watercourse
- <NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

>30dB
- Exceedance of project construction noise criteria LAeq(15 minutes)

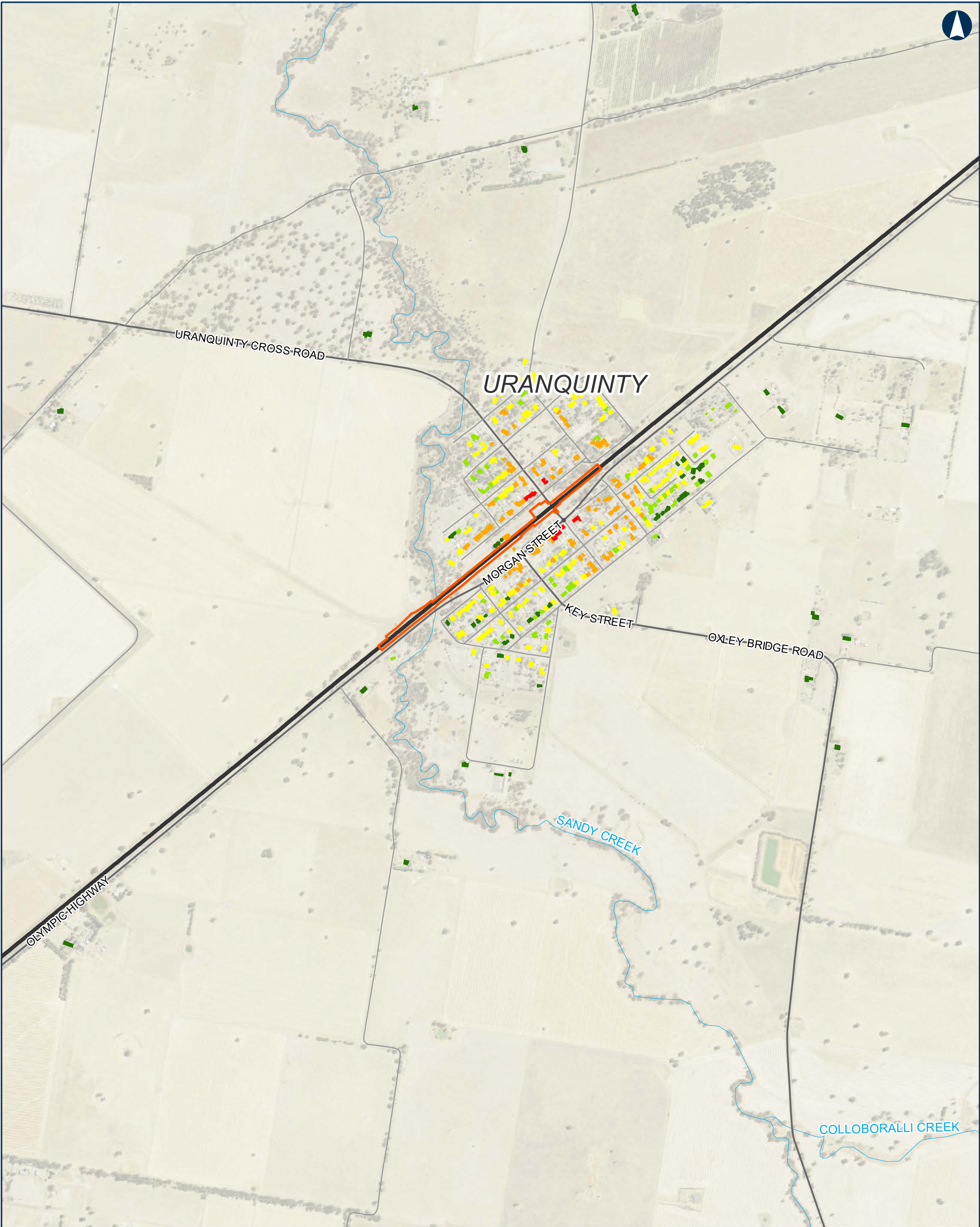
>75dB (Residences only)



INLAND RAIL

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.3.16 Wagga Wagga - Wagga Level Crossings - Night Time (Strip Level Crossing Panels and Remove Track) MAP 1 OF 2

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 2/11/2021 Paper: A3
Author: WSP Scale: 1:15,000
Data Sources: ARTC, NSWSS

- Proposal site

Existing railway

Main road

Local road

Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)

<NML

NML + 5dB

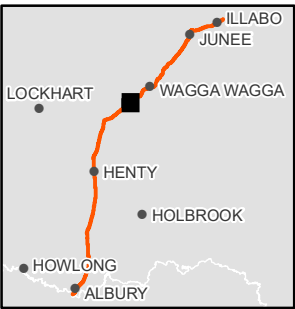
NML + 10dB

NML + 20dB

NML + 30dB

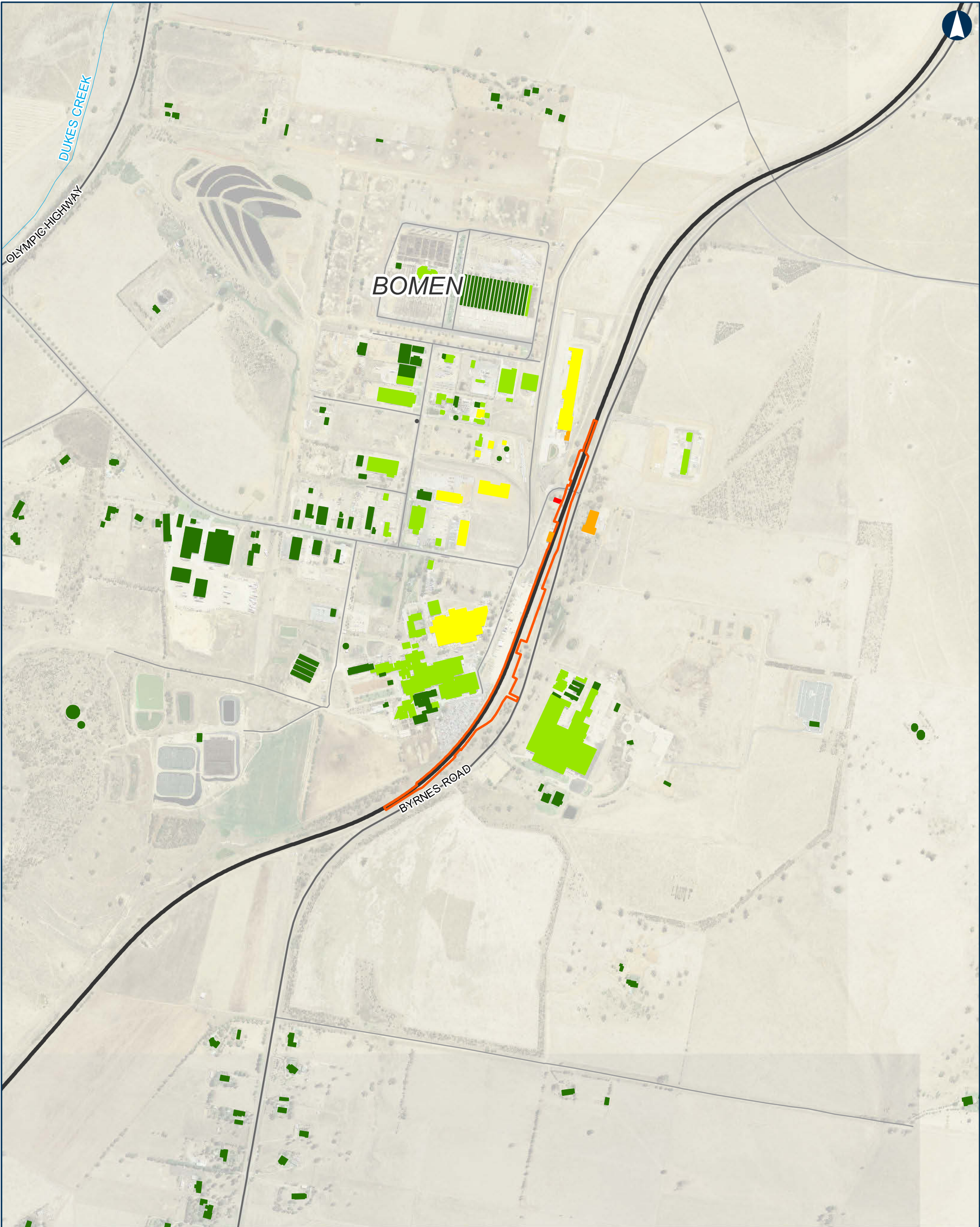
>30dB

>75dB (Residences only)



INLAND RAIL  ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.3.16 Wagga Wagga - Wagga Level Crossings - Night Time (Strip Level Crossing Panels and Remove Track) MAP 2 OF 2

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Proposal site

Existing railway

Main road

Local road

Watercourse
- <NML

■

NML + 5dB

■

NML + 10dB

■

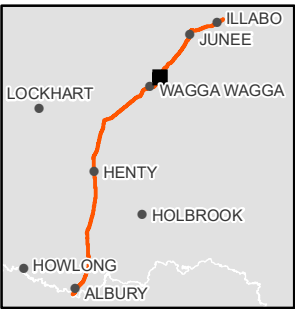
NML + 20dB

■

NML + 30dB

■

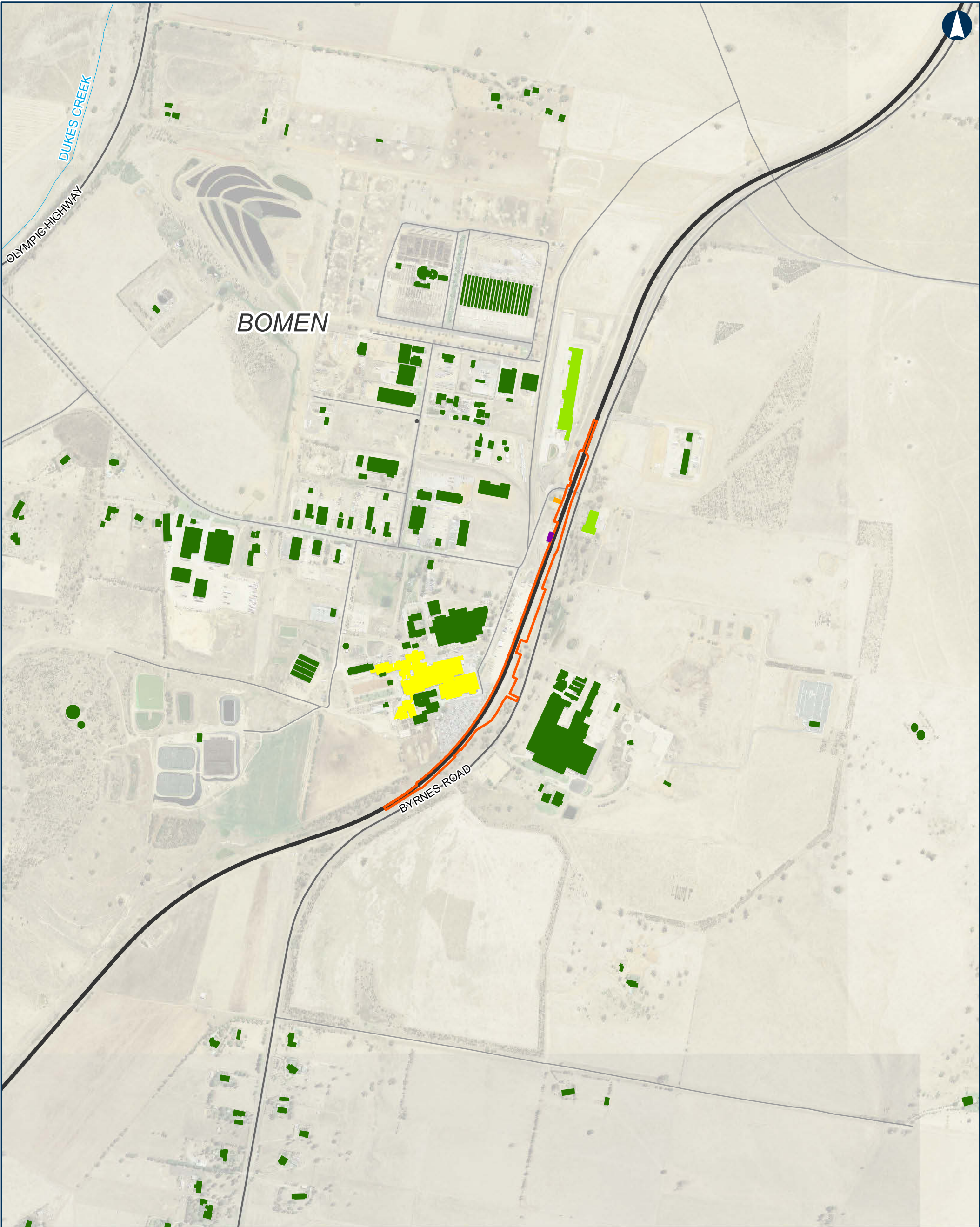
>30dB
- >75dB (Residences only)



INLAND RAIL

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.3.17 Wagga Wagga - Bomen Track Slews - Day Time (Track Realignment (>300mm))

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

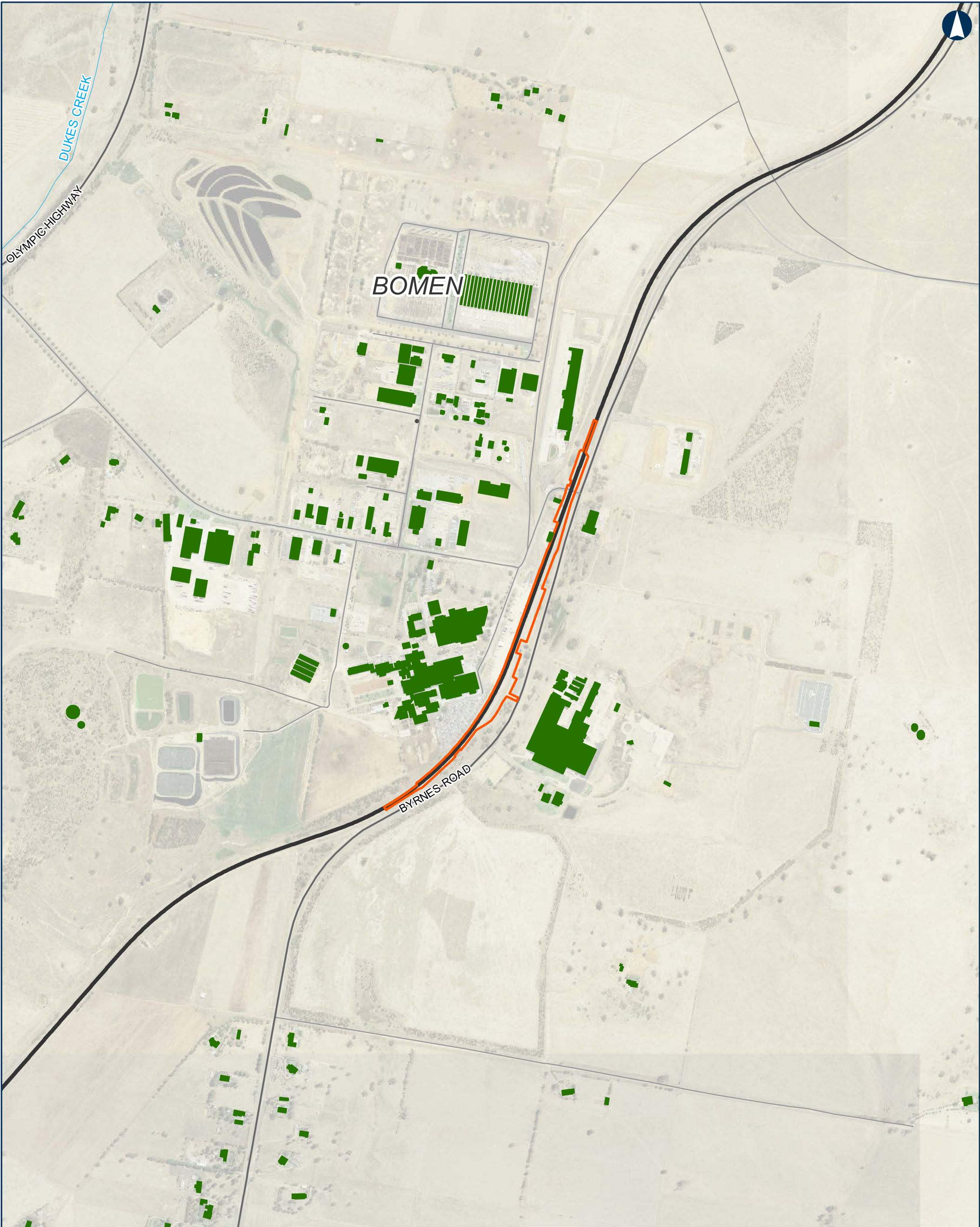
Paper: A3
Scale: 1:10,000

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL **ARTC**

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Albury to Illabo

Figure A.3.18 Wagga Wagga - Bomen Track Slews - Night Time (Track Realignment (>300mm))

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:10,000

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
 - >75dB (Residences only)

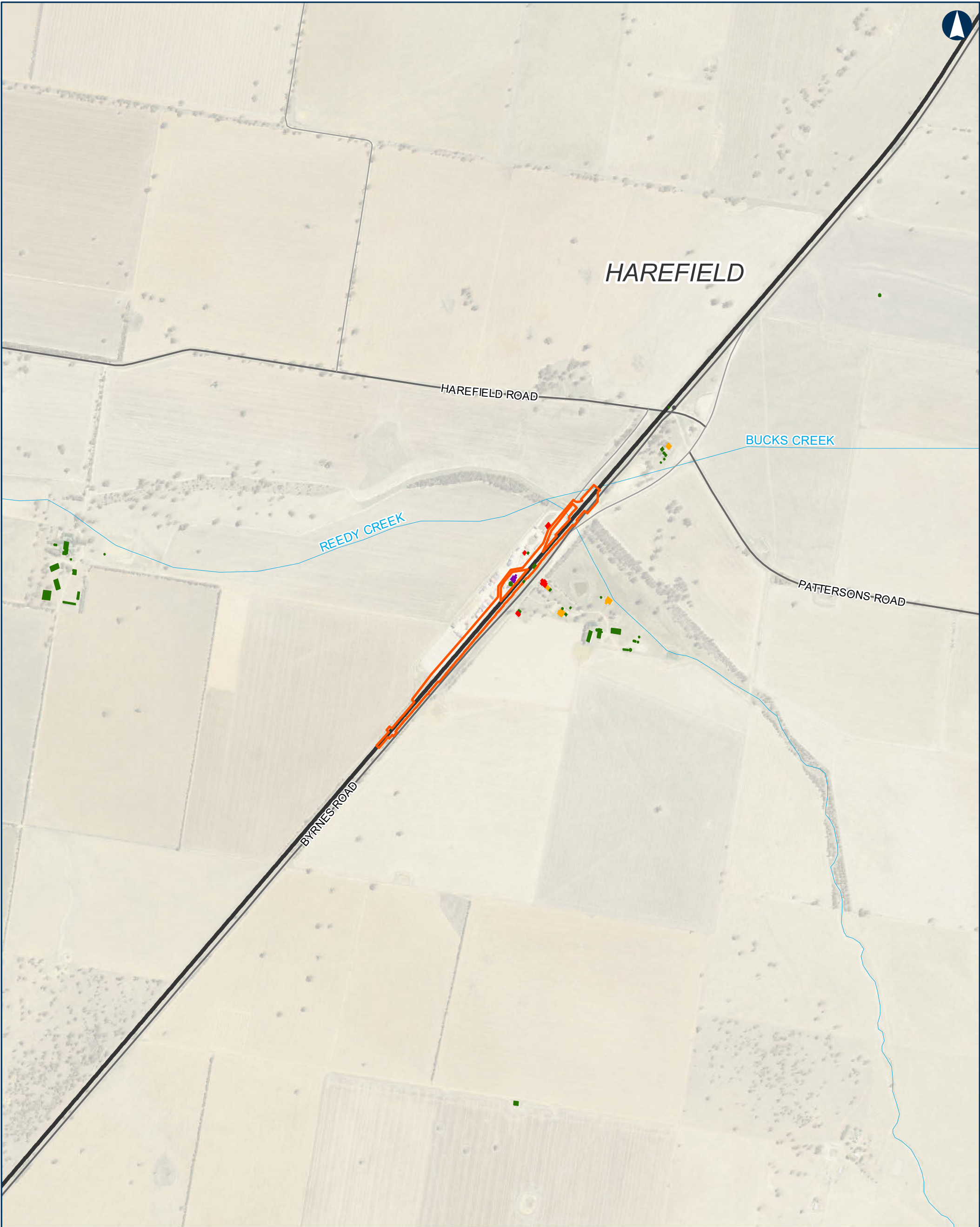


INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

APPENDIX D-4

JUNEE



Albury to Illabo

Figure A.4.1 Junee - Harefield Yard - Day Time (Track Realignment)

0100200m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 3/11/2021

Paper: A3

Author: WSP

Scale: 1:12,500

Data Sources: ARTC, NSWSS

Proposal site

Existing railway

Main road

Local road

Watercourse

Exceedance of project construction noise criteria LAeq(15 minutes)

<NML

NML + 5dB

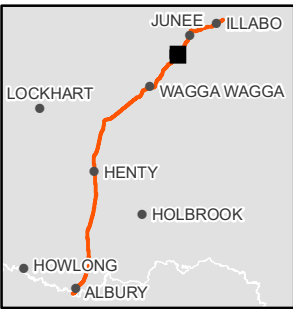
NML + 10dB

NML + 20dB

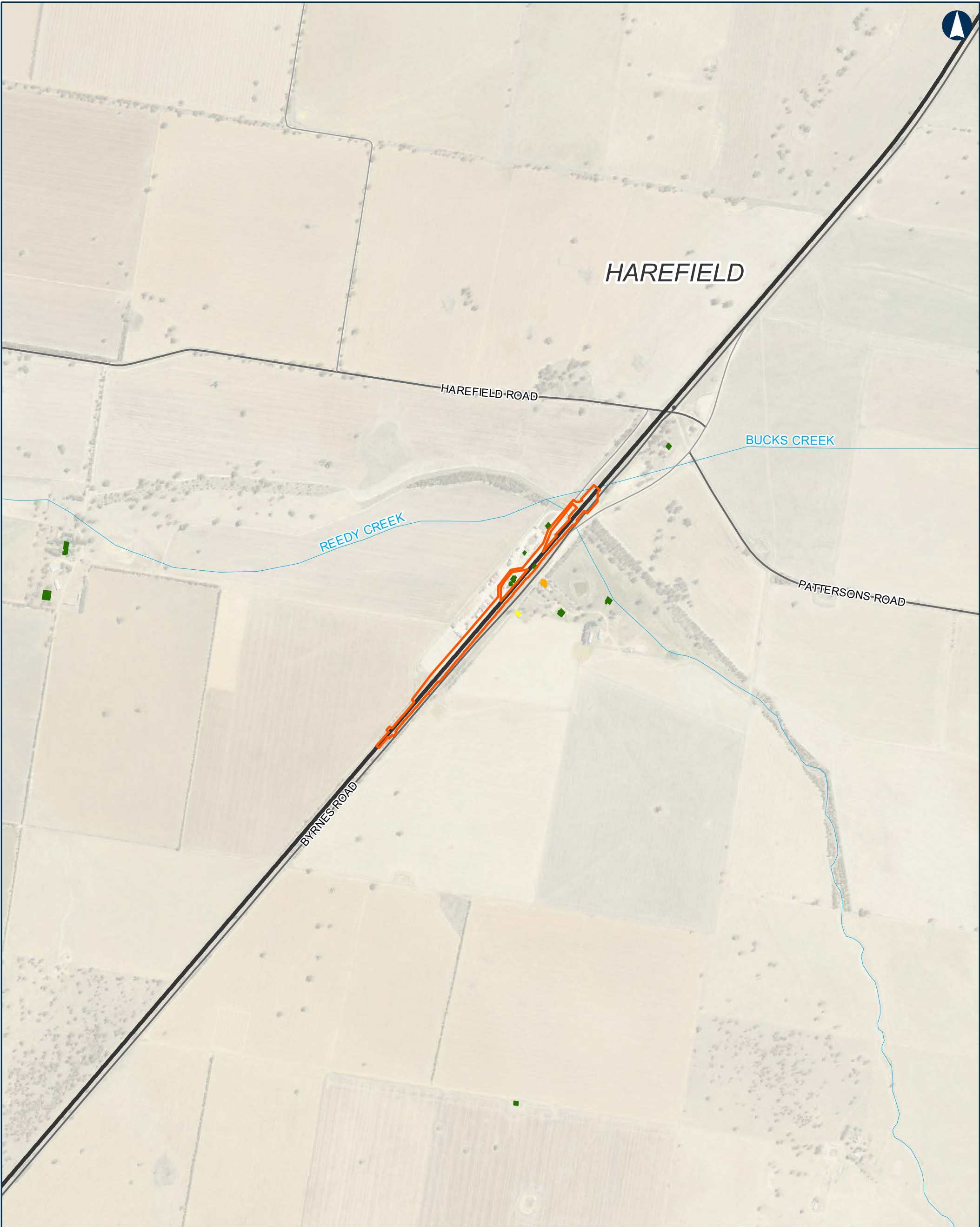
NML + 30dB

>30dB

>75dB (Residences only)



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Albury to Illabo

Figure A.4.2 Junee - Harefield Yard - Night Time (Track Realignment)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 3/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

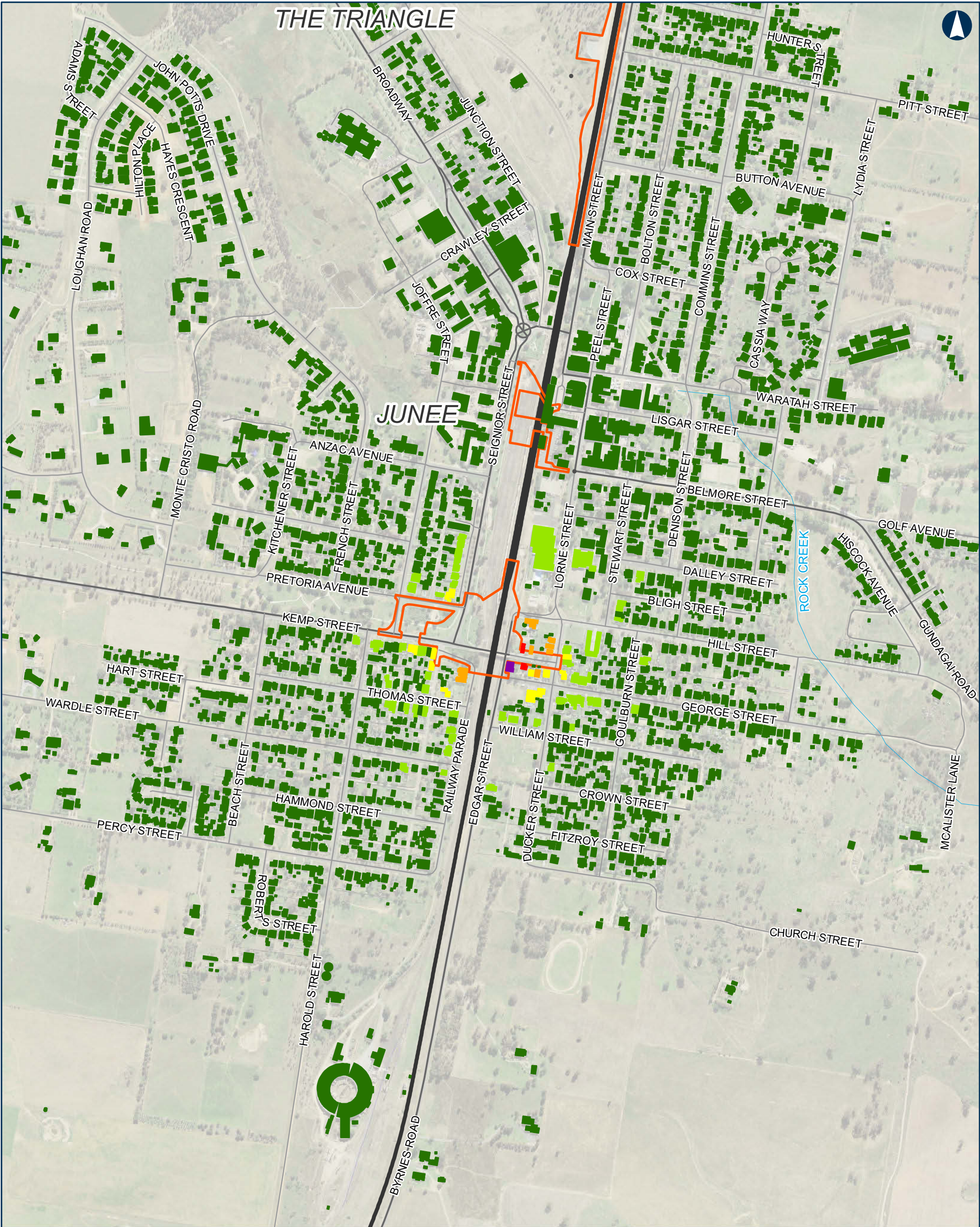
Paper: A3
Scale: 1:12,500

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- <NML**
- NML + 5dB**
- NML + 10dB**
- NML + 20dB**
- NML + 30dB**
- >30dB**
- >75dB (Residences only)**



INLAND RAIL **ARTC**

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Albury to Illabo

Figure A.4.3 Junee - Kemp Street Bridge - Day Time (Piling)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

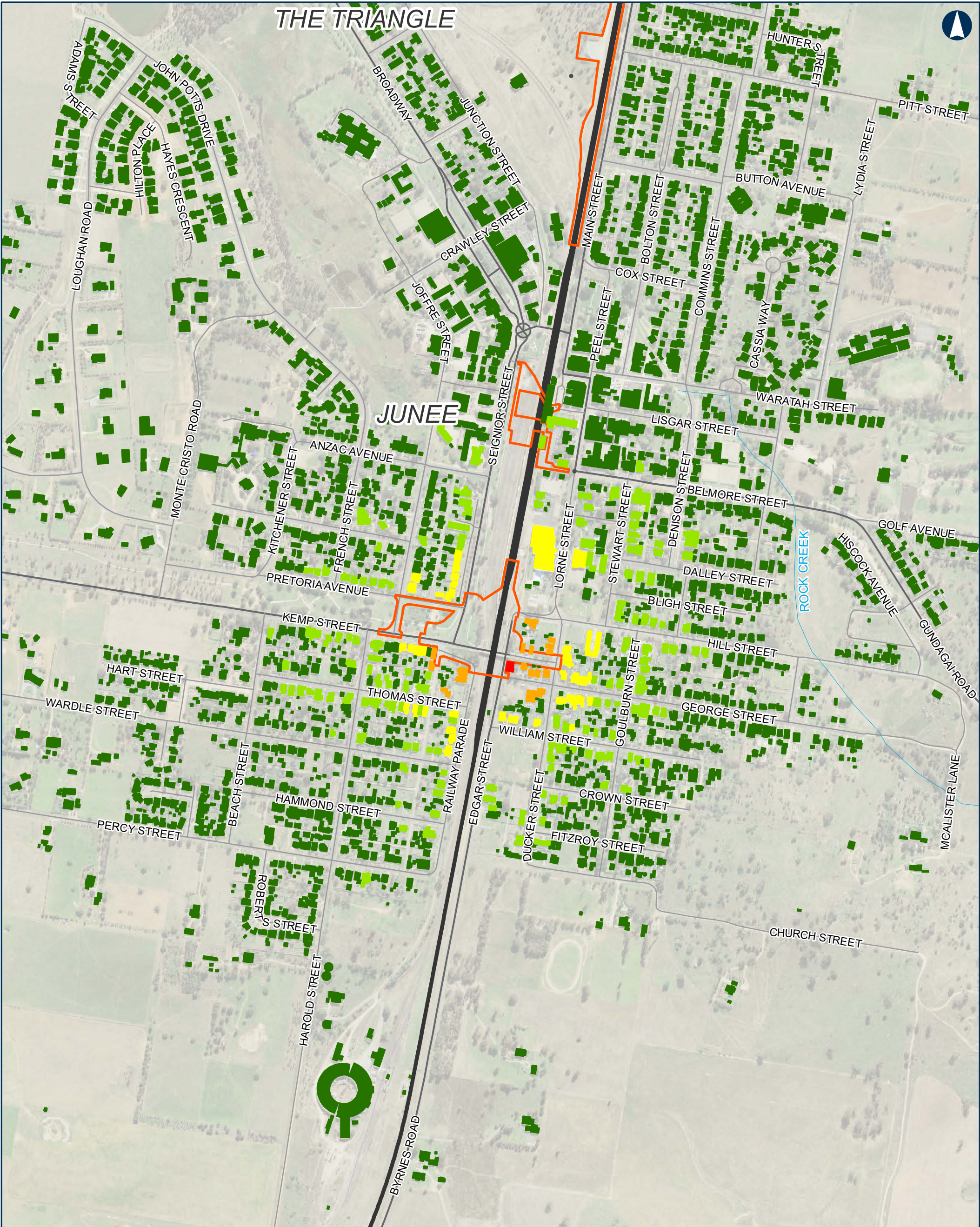
ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 21/02/2022 Paper: A3
Author: WSP Scale: 1:7,500
Data Sources: ARTC, NSWSS

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- < NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - > 30dB
 - > 75dB (Residences only)



The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.4 Junee - Kemp Street Bridge - Night Time (Demolition and Earthworks)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 21/02/2022 Paper: A3
Author: WSP Scale: 1:7,500
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- | | | | |
|--|------------|--|--------------------------|
| | < NML | | > 75dB (Residences only) |
| | NML + 5dB | | |
| | NML + 10dB | | |
| | NML + 20dB | | |
| | NML + 30dB | | |
| | > 30dB | | |



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.5 Junee - Junee Yard - Day Time (Track Realignment (>300mm) and Offline Widening)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:7,500
Data Sources: ARTC, NSWSS

Proposal site

Existing railway

Main road

Local road

Watercourse

Exceedance of project construction noise
criteria LAeq(15 minutes)

< NML

NML + 5dB

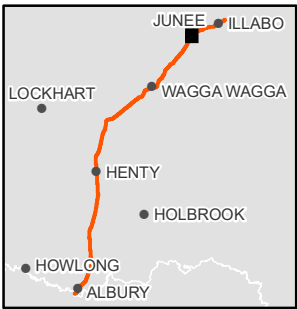
NML + 10dB

NML + 20dB

NML + 30dB

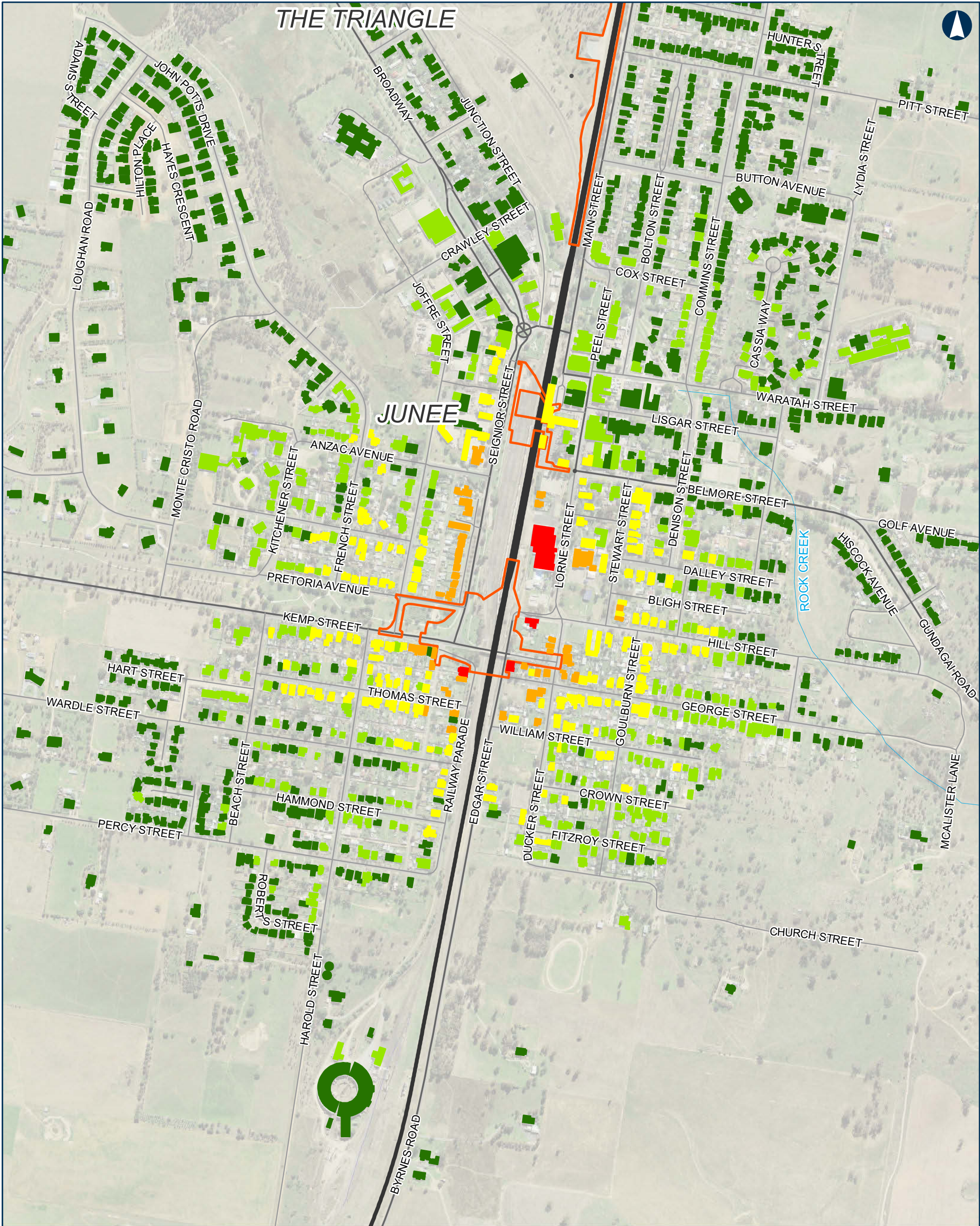
> 30dB

> 75dB (Residences only)



INLAND
RAIL = ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.6 Junee - Junee Yard - Night Time (Track Realignment (>300mm))

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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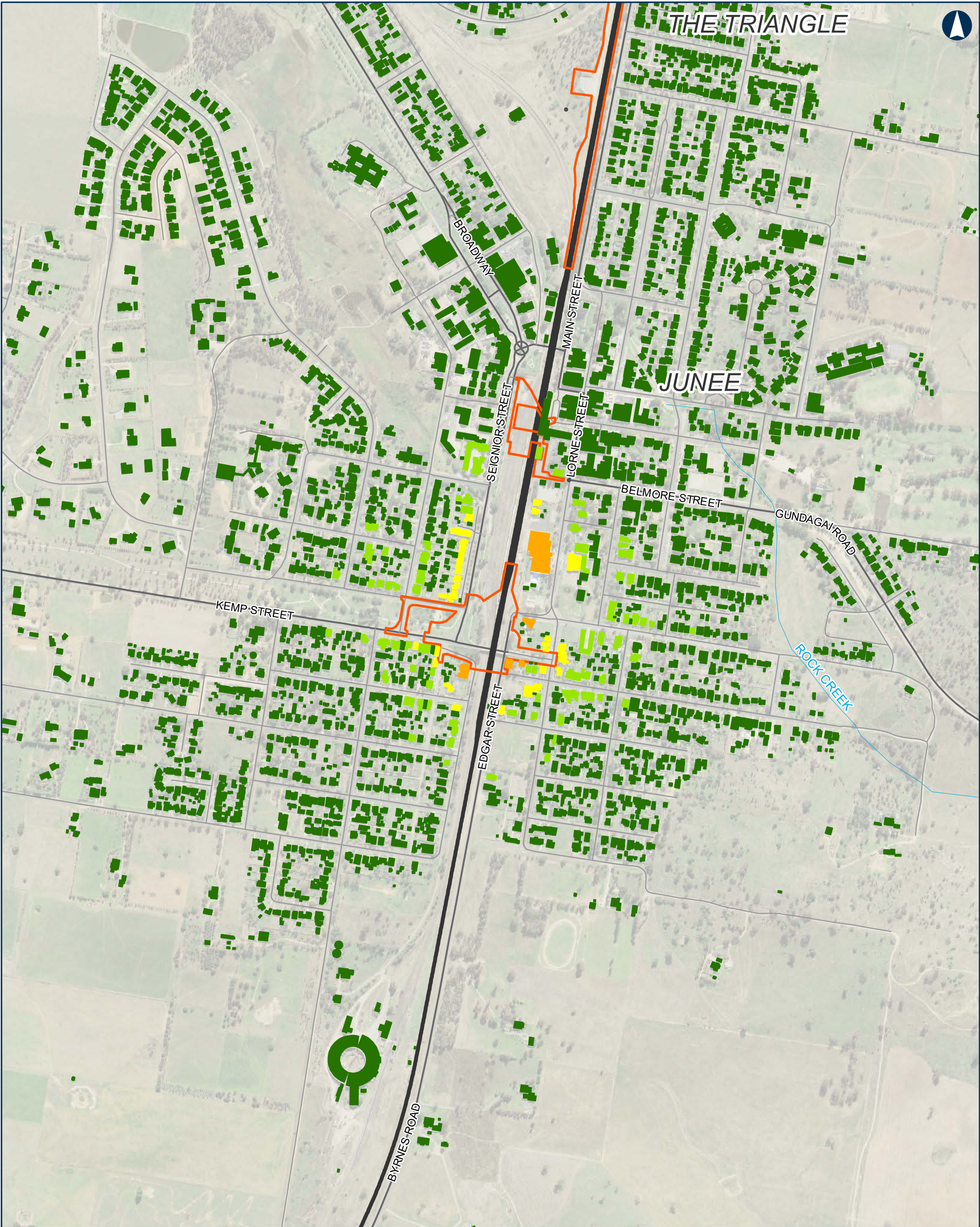
Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:7,500
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- < NML
- NML + 5dB
- NML + 10dB
- NML + 20dB
- NML + 30dB
- > 30dB
- > 75dB (Residences only)



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.7 Junee - Junee Footbridge - Day Time (Cut Gantry Bolts)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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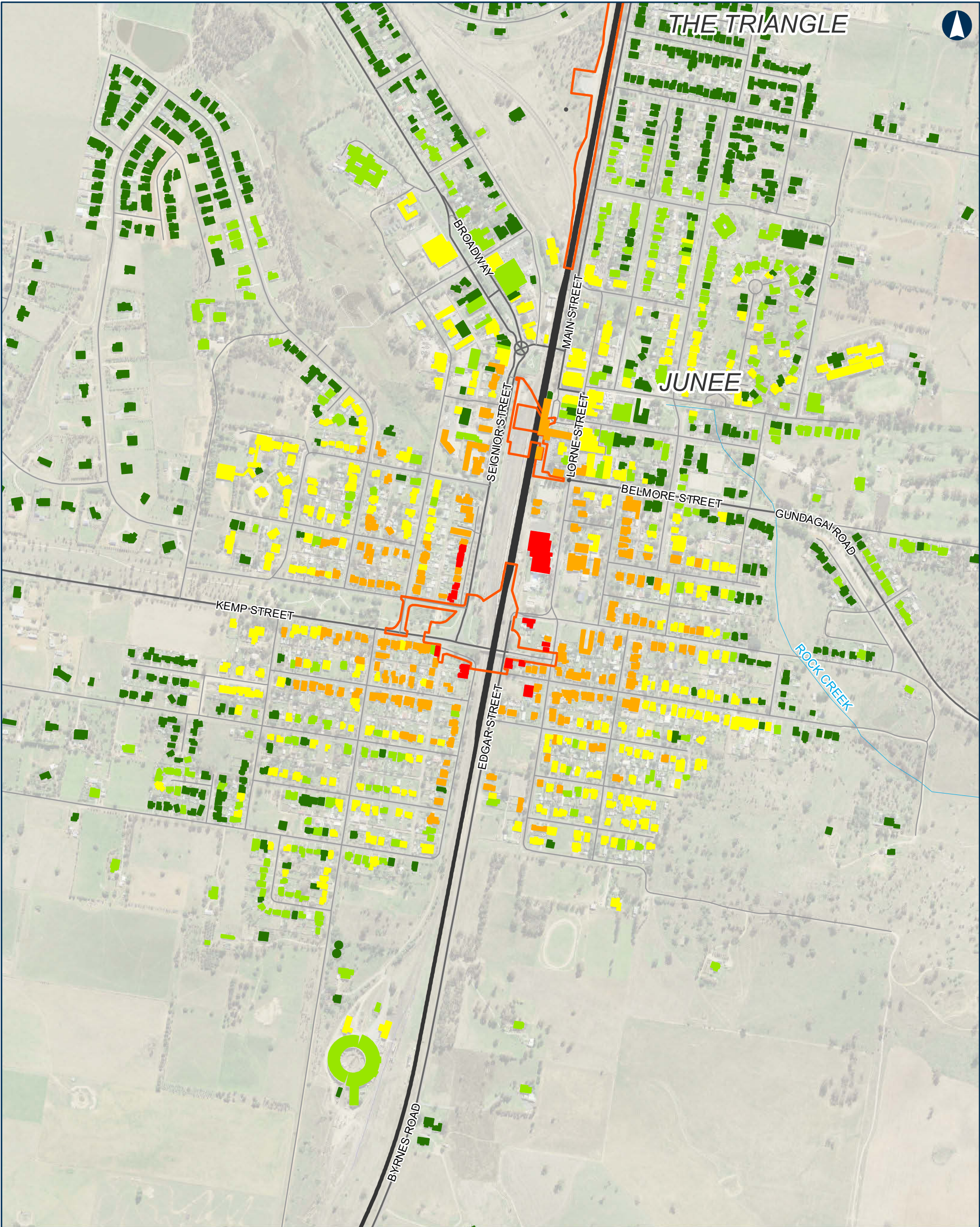
Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:8,000
Data Sources: ARTC, NSWSS

- Exceedance of project construction noise criteria LAeq(15 minutes)**
- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- < NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - > 30dB
 - > 75dB (Residences only)



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.8 Junee - Junee Footbridge - Night Time (Cut Gantry Bolts)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:8,000
Data Sources: ARTC, NSWSS

- Proposal site

Existing railway

Main road

Local road

Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)

< NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

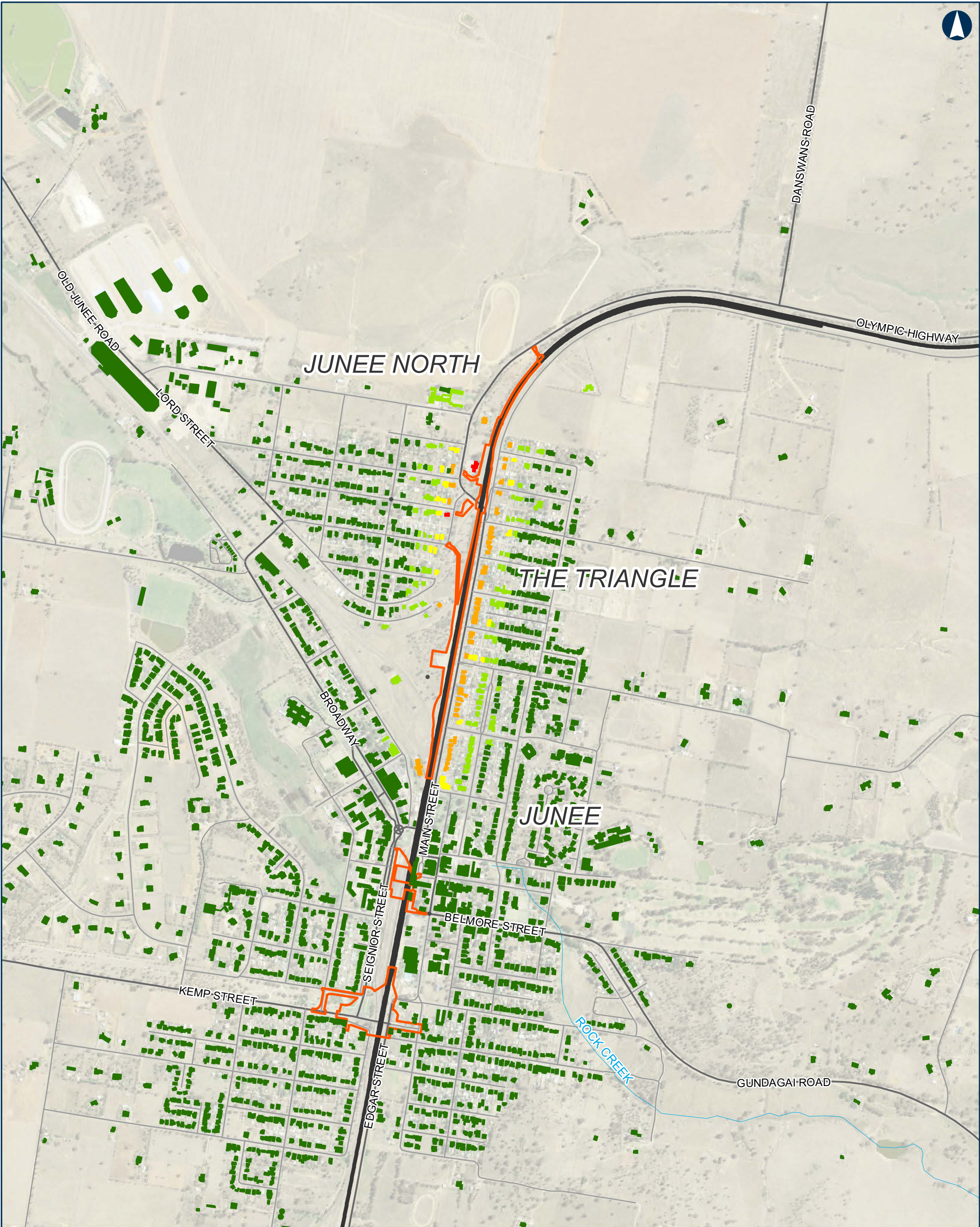
> 30dB

> 75dB (Residences only)



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.9 Junee - Olympic Highway Bridge - Day Time (Earthworks)

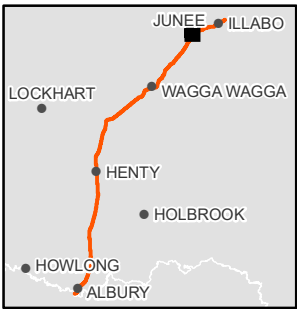
0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

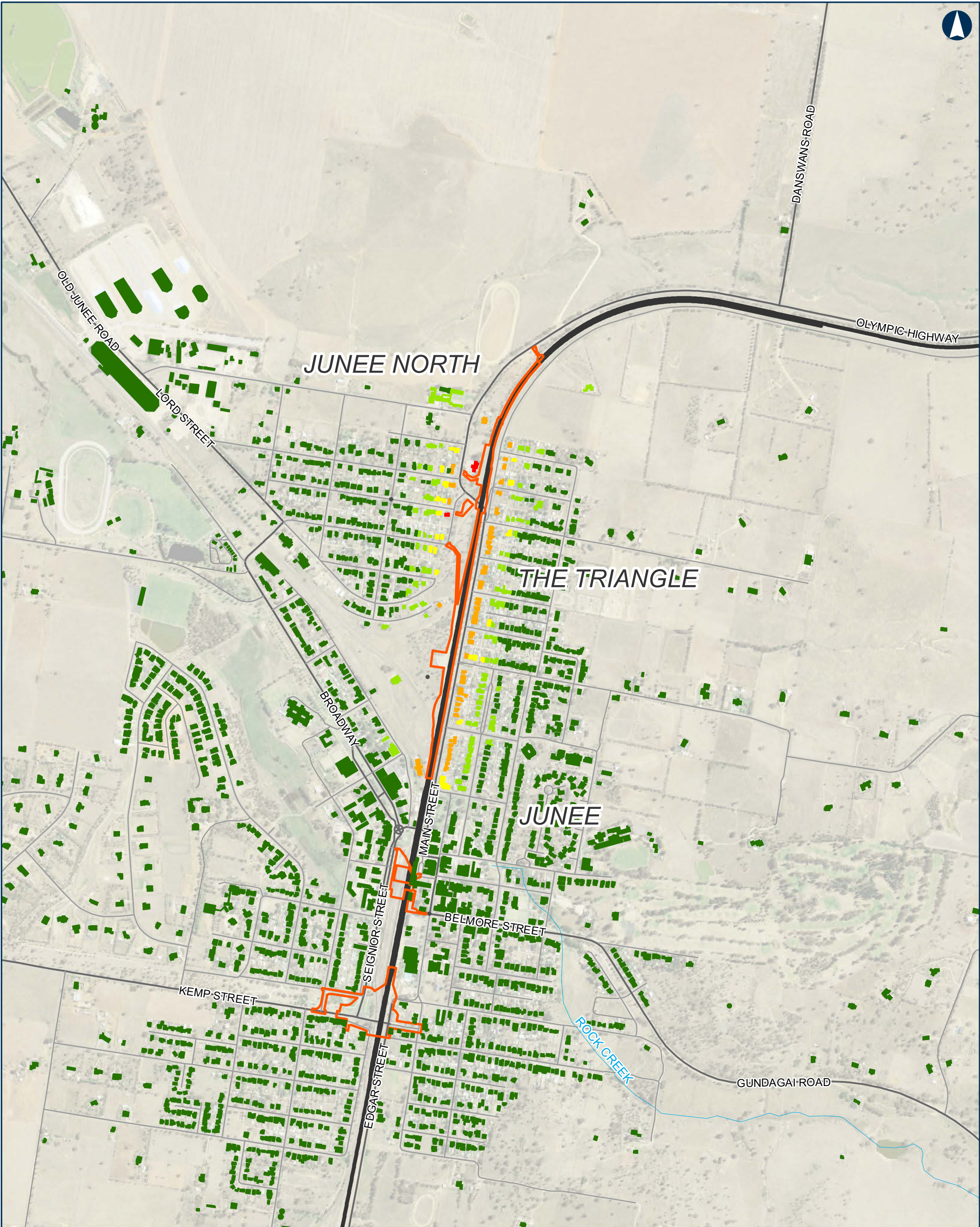
- Proposal site
- Existing railway
- Main road
- Local road
- Watercourse

- Exceedance of project construction noise criteria LAeq(15 minutes)
- < NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - > 30dB
 - > 75dB (Residences only)



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.10 Junee - Olympic Highway Bridge - Night Time (Trackworks)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:12,500
Data Sources: ARTC, NSWSS

- Proposal site

— Existing railway

— Main road

— Local road

— Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**

< NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

> 30dB

> 75dB (Residences only)



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.11 Junee - Junee to Illabo Track Slews - Day Time (Track Realignment (>300mm))

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 26/05/2022 Paper: A3
Author: WSP Scale: 1:20,000
Data Sources: ARTC, NSWSS

- Proposal site

— Existing railway

— Main road

— Local road

Exceedance of project construction noise criteria LAeq(15 minutes)

■ < NML

■ NML + 5dB

■ NML + 10dB

■ NML + 20dB

■ NML + 30dB

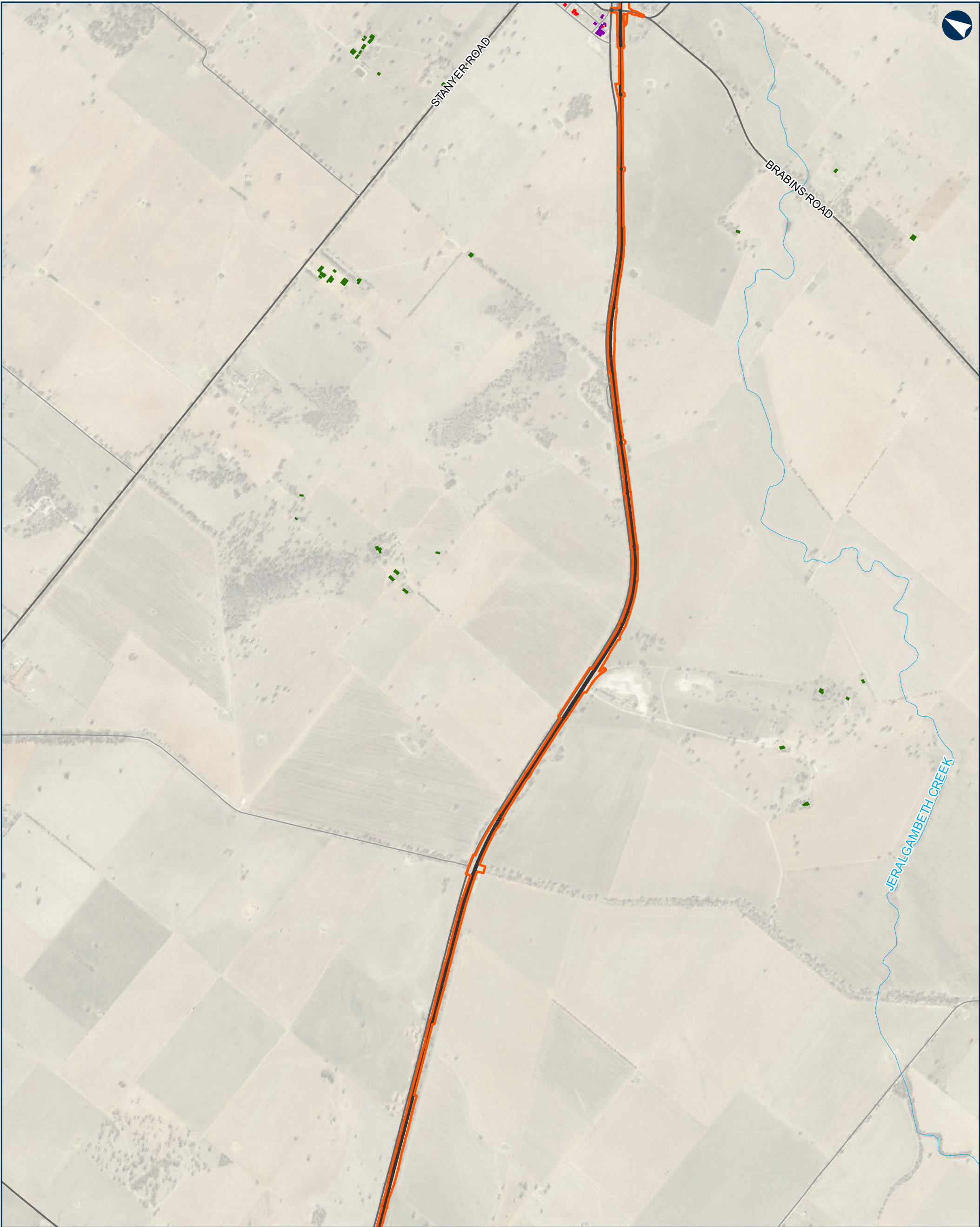
■ > 30dB

■ > 75dB (Residences only)



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.11 Junee - Junee to Illabo Track Slews - Day Time (Track Realignment (>300mm))

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 26/05/2022 Paper: A3
Author: WSP Scale: 1:20,000
Data Sources: ARTC, NSWSS

- Proposal site

—

 Existing railway

—

 Main road

—

 Local road

—

 Watercourse
- < NML

■

 NML + 5dB

■

 NML + 10dB

■

 NML + 20dB

■

 NML + 30dB

■

 > 30dB
- Exceedance of project construction noise criteria LAeq(15 minutes)

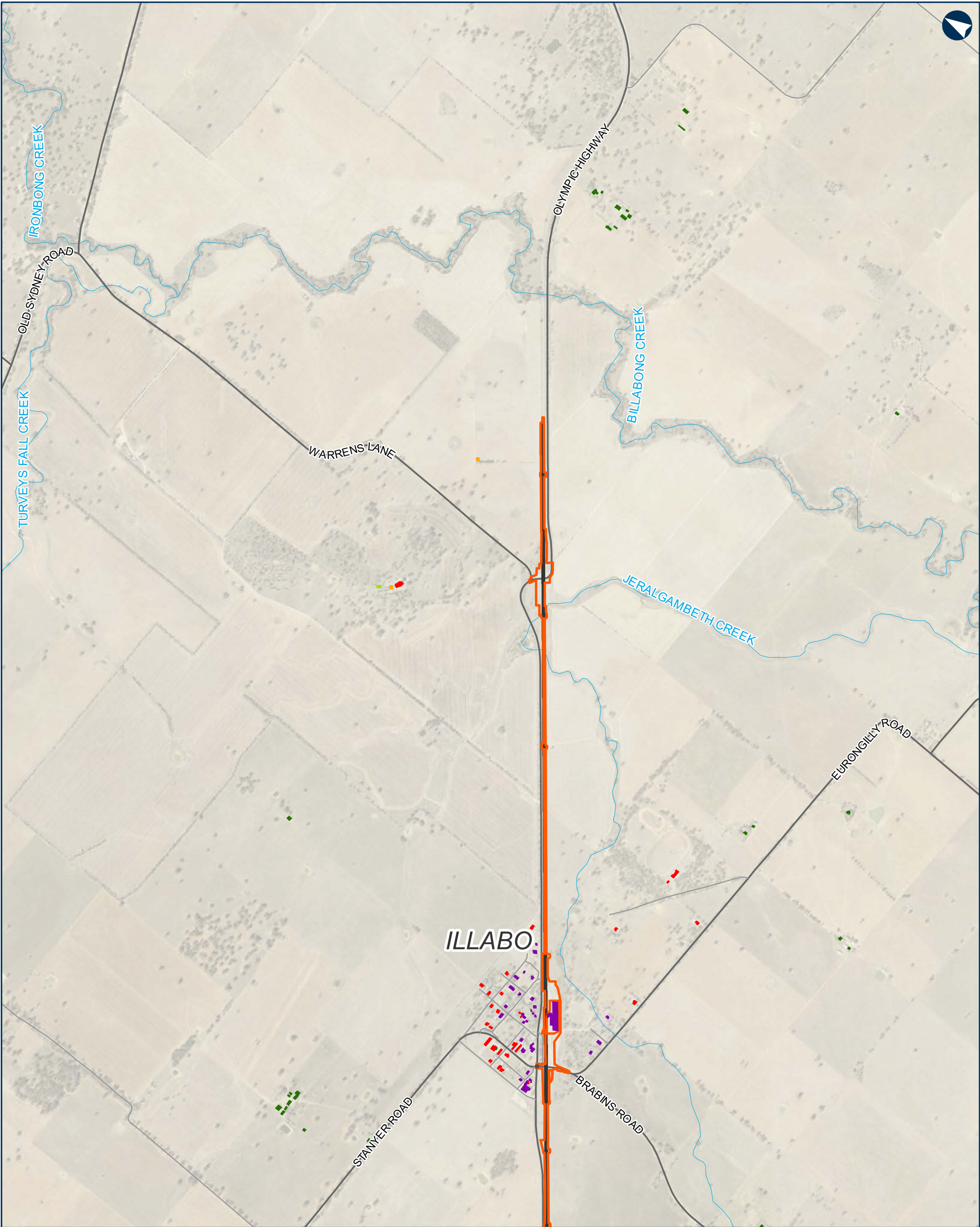
■

 > 75dB (Residences only)



INLAND RAIL = ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.11 Junee - Junee to Illabo Track Slews - Day Time (Track Realignment (>300mm))

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 26/05/2022
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:20,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- < NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - > 30dB
- > 75dB (Residences only)



INLAND RAIL **ARTC**

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Albury to Illabo

Figure A.4.12 Junee - Junee to Illabo Track Slews - Night Time (Rebuild Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 26/05/2022 Paper: A3
Author: WSP Scale: 1:20,000
Data Sources: ARTC, NSWSS

- Proposal site

Existing railway

Main road

Local road
- Exceedance of project construction noise criteria LAeq(15 minutes)**

< NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

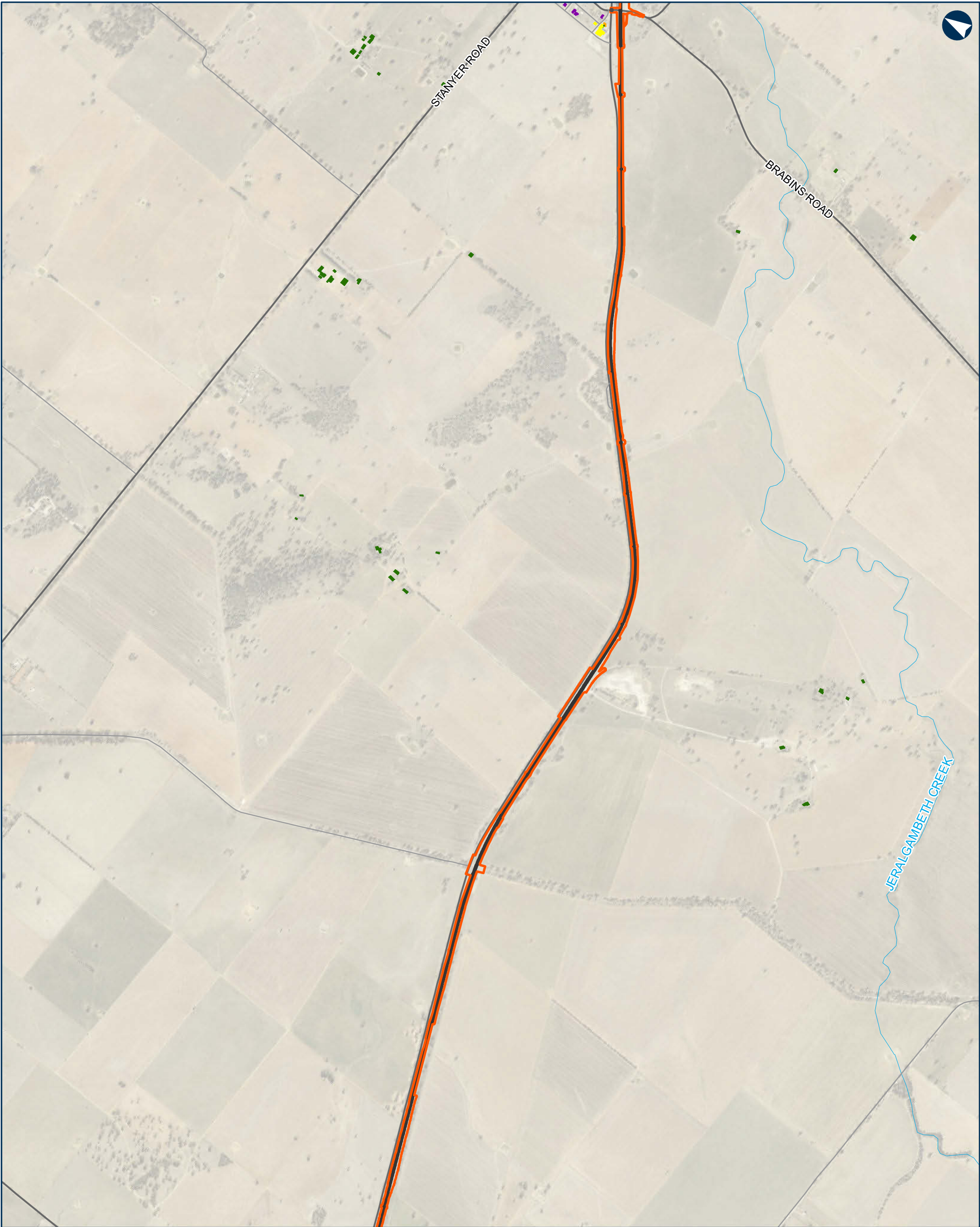
> 30dB

> 75dB (Residences only)



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Albury to Illabo

Figure A.4.12 Junee - Junee to Illabo Track Slews - Night Time (Rebuild Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:20,000

Proposal site

Existing railway

Main road

Local road

Watercourse

Exceedance of project construction noise criteria LAeq(15 minutes)

< NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

> 30dB

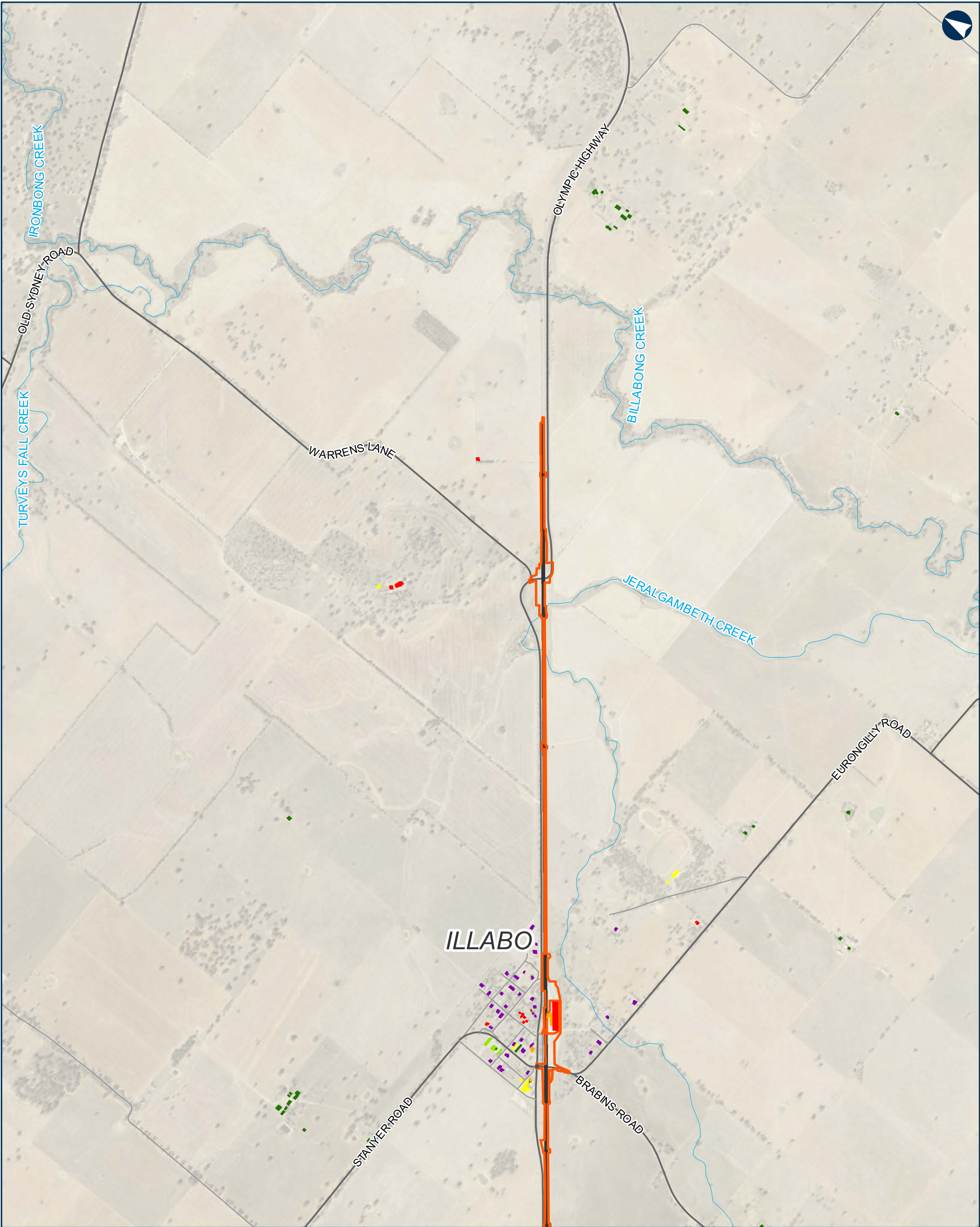
> 75dB (Residences only)

INLAND RAIL

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

C:\Users\Emily.Mitchell\WSP 0365\AU-WKG - Geospatial - AIS - Projects\PS122419_Albury_to_Illabo\Tasks\210_0010_EAP_EIS\Report\Figures\Documents\Noise\210_EAP_A209_NoiseResults_r1v5.mxd



Albury to Illabo

Figure A.4.12 Junee - Junee to Illabo Track Slews - Night Time (Rebuild Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Data Sources: ARTC, NSWSS

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- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- < NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - > 30dB
- > 75dB (Residences only)



INLAND RAIL

ARTC

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Albury to Illabo

Figure A.4.13 Junee - Junee Level Crossings - Day Time (Strip/Install Level Crossing Panels and Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:20,000

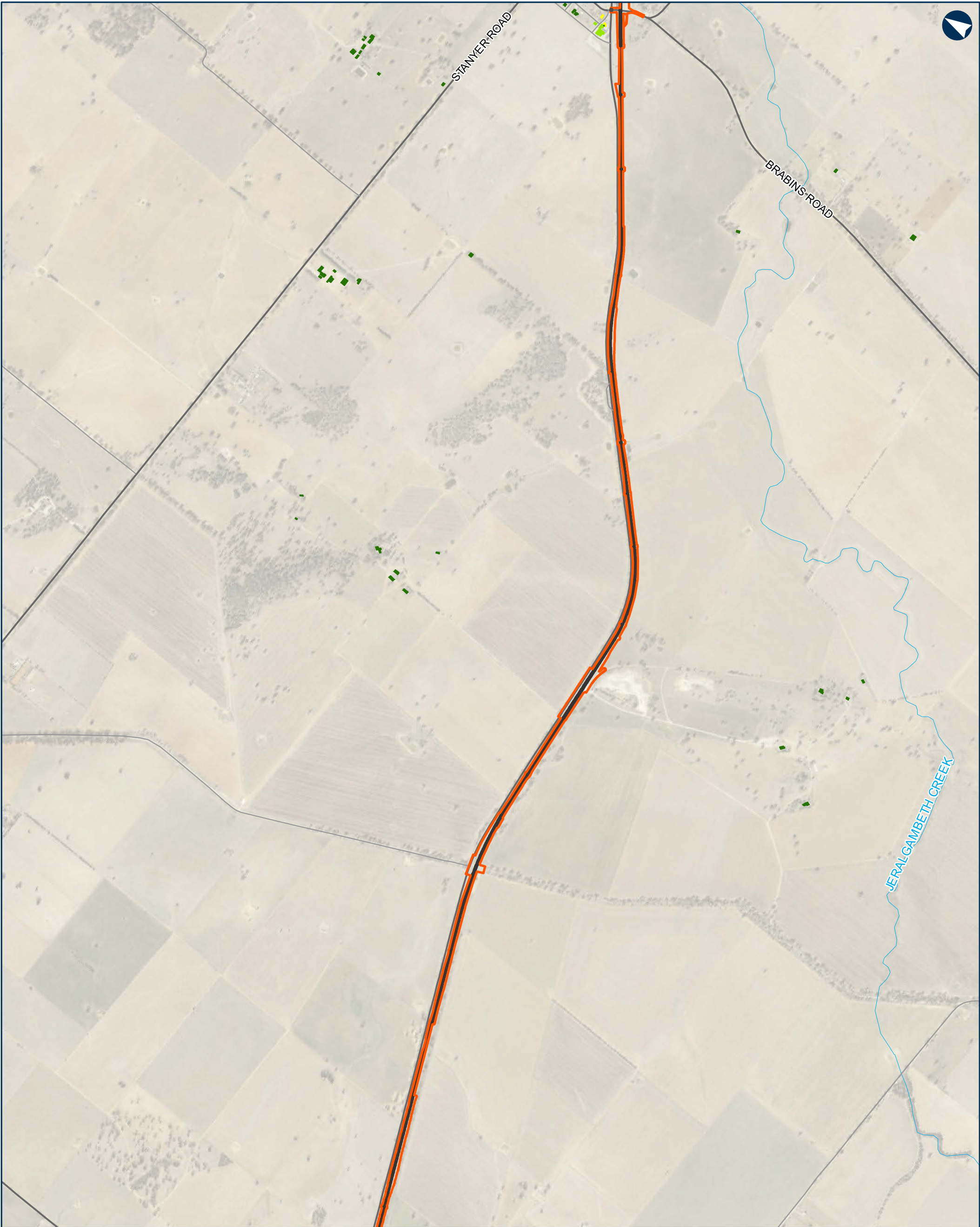
- Proposal site
 - Existing railway
 - Main road
 - Local road
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
 - NML + 10dB
 - NML + 20dB
 - NML + 30dB
 - >30dB
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Albury to Illabo

Figure A.4.13 Junee - Junee Level Crossings - Day Time (Strip/Install Level Crossing Panels and Track)

0 100 200
m

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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

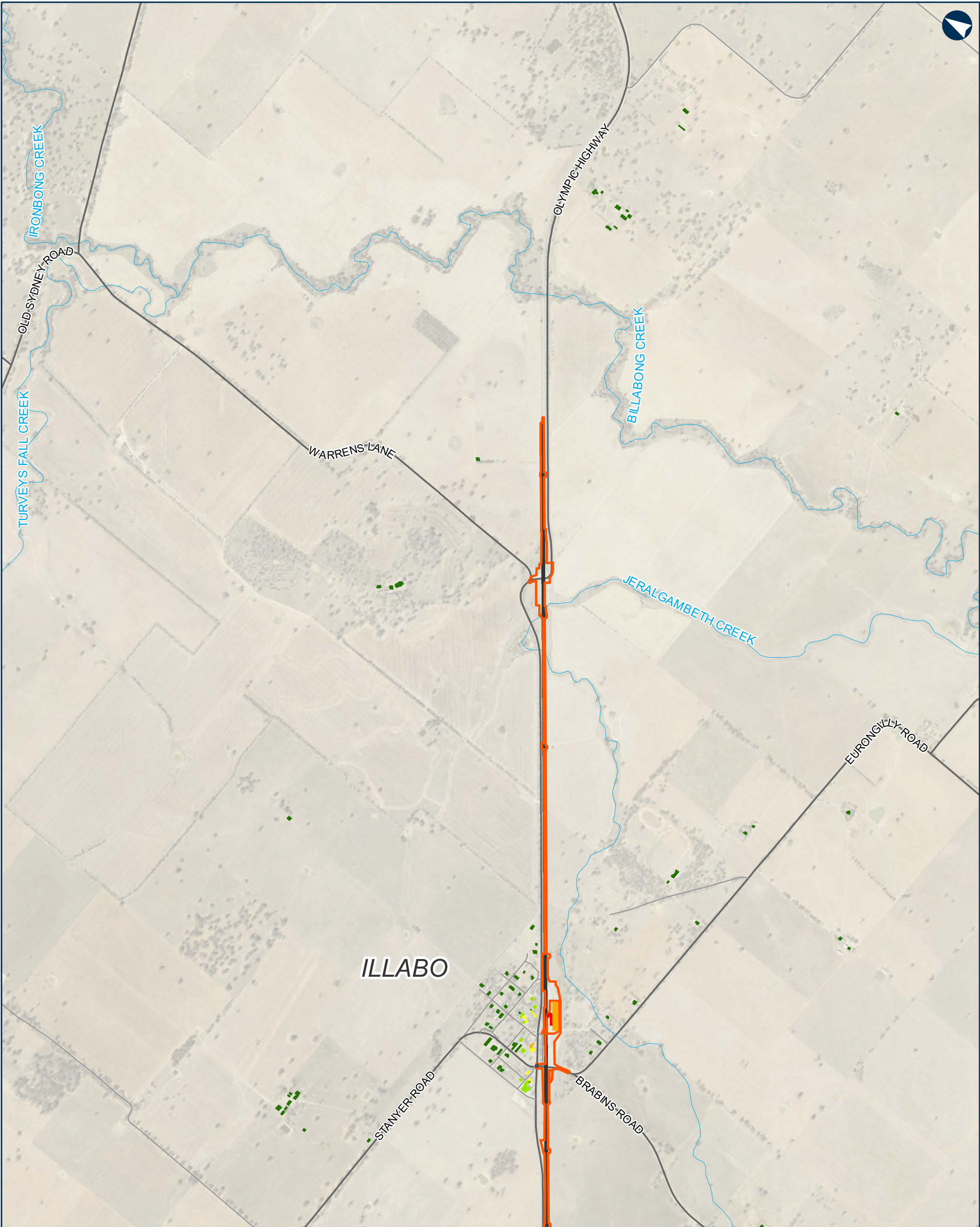
Paper: A3
Scale: 1:20,000

- Proposal site
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 - Main road
 - Local road
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Albury to Illabo

Figure A.4.13 Junee - Junee Level Crossings - Day Time (Strip/Install Level Crossing Panels and Track)

0 100 200
m

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Albury to Illabo

Figure A.4.14 Junee - Junee Level Crossings - Night Time (Strip/Install Level Crossing Panels and Track)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:20,000

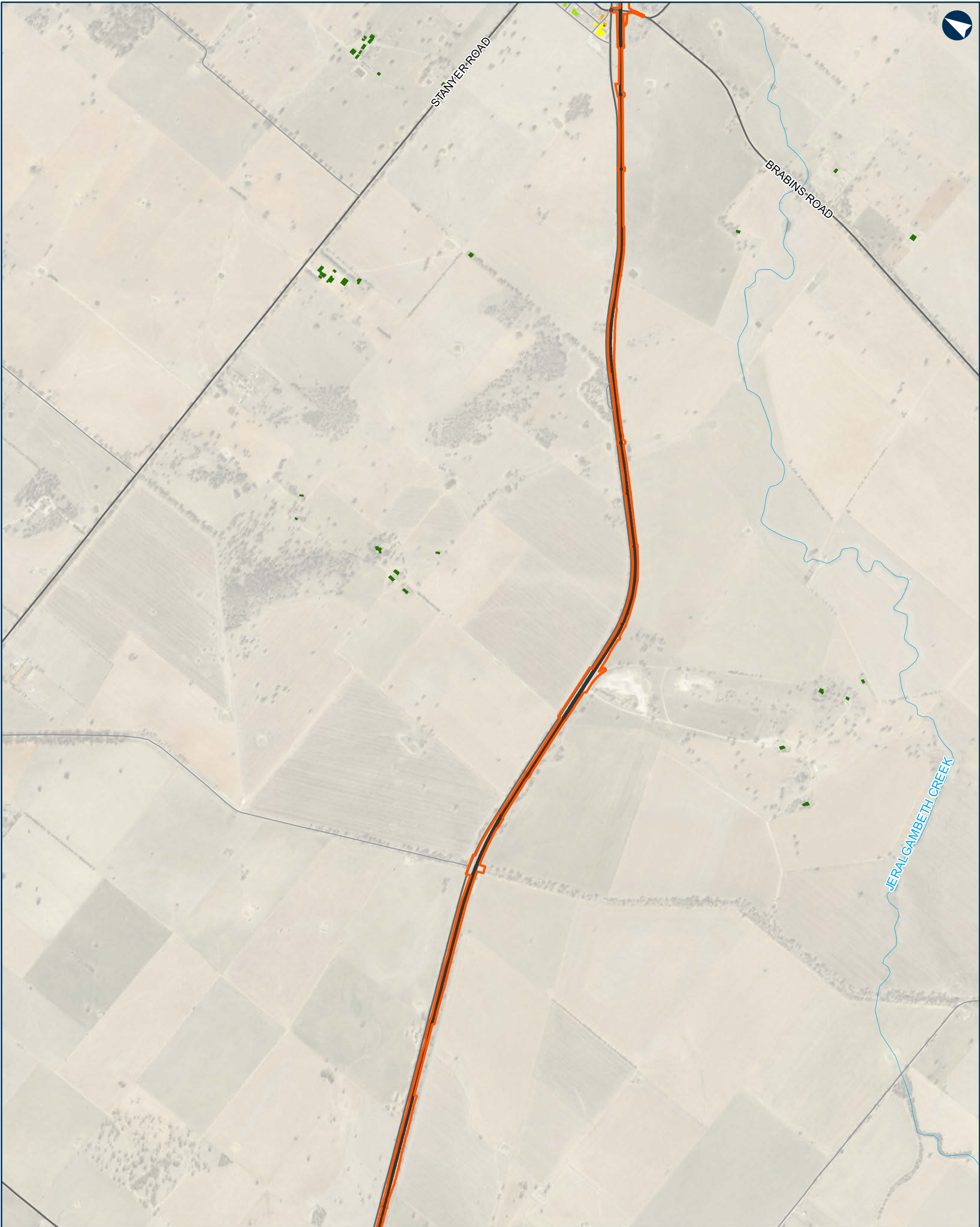
- Proposal site
 - Existing railway
 - Main road
 - Local road
- Exceedance of project construction noise criteria LAeq(15 minutes)**
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Albury to Illabo

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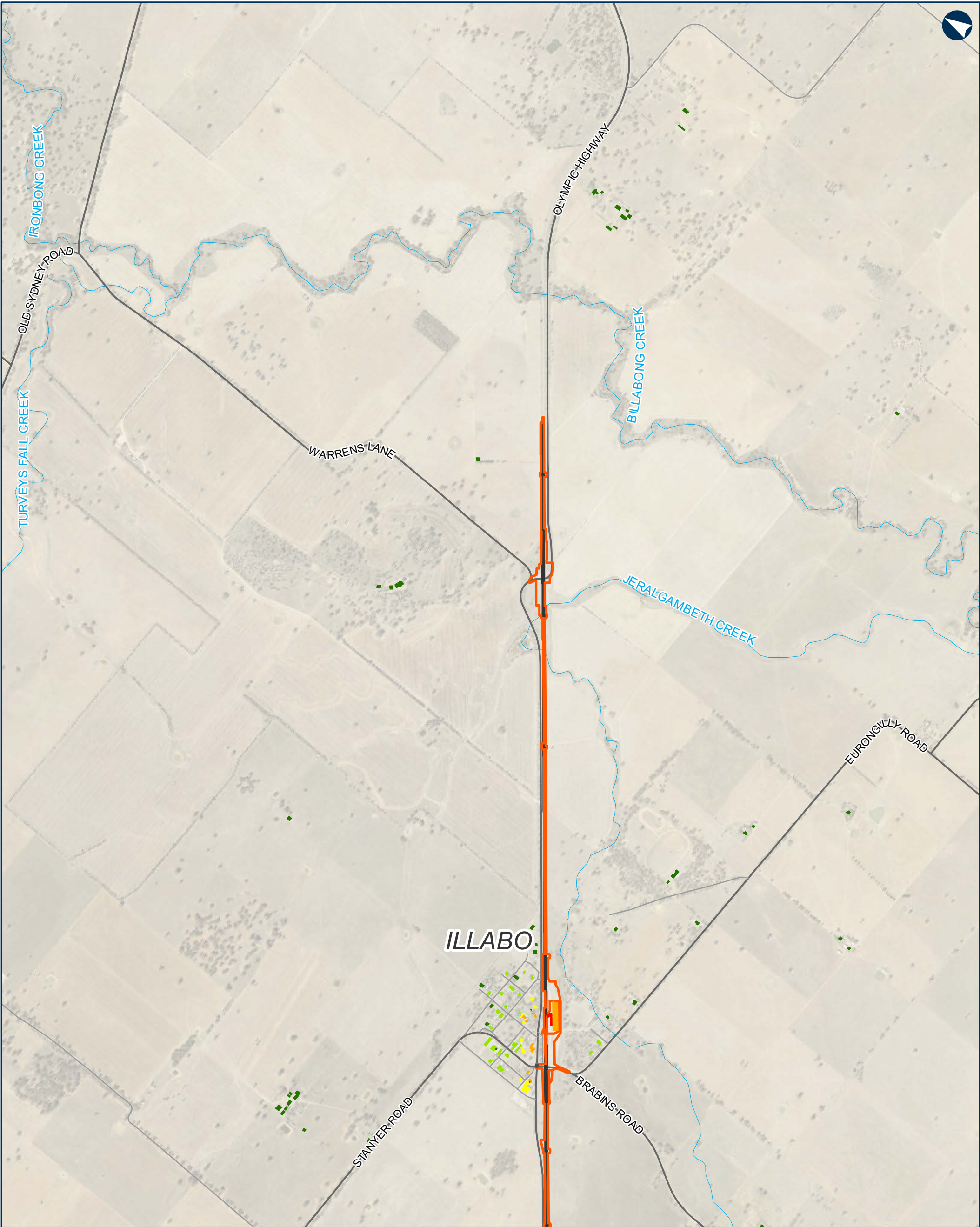
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Albury to Illabo

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Albury to Illabo

Figure A.4.15 Junee - Junee Culverts - Day Time (Track Removal and Replacement)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Albury to Illabo

Figure A.4.15 Junee - Junee Culverts - Day Time (Track Removal and Replacement)

0 100 200
m

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Author: WSP
Data Sources: ARTC, NSWSS

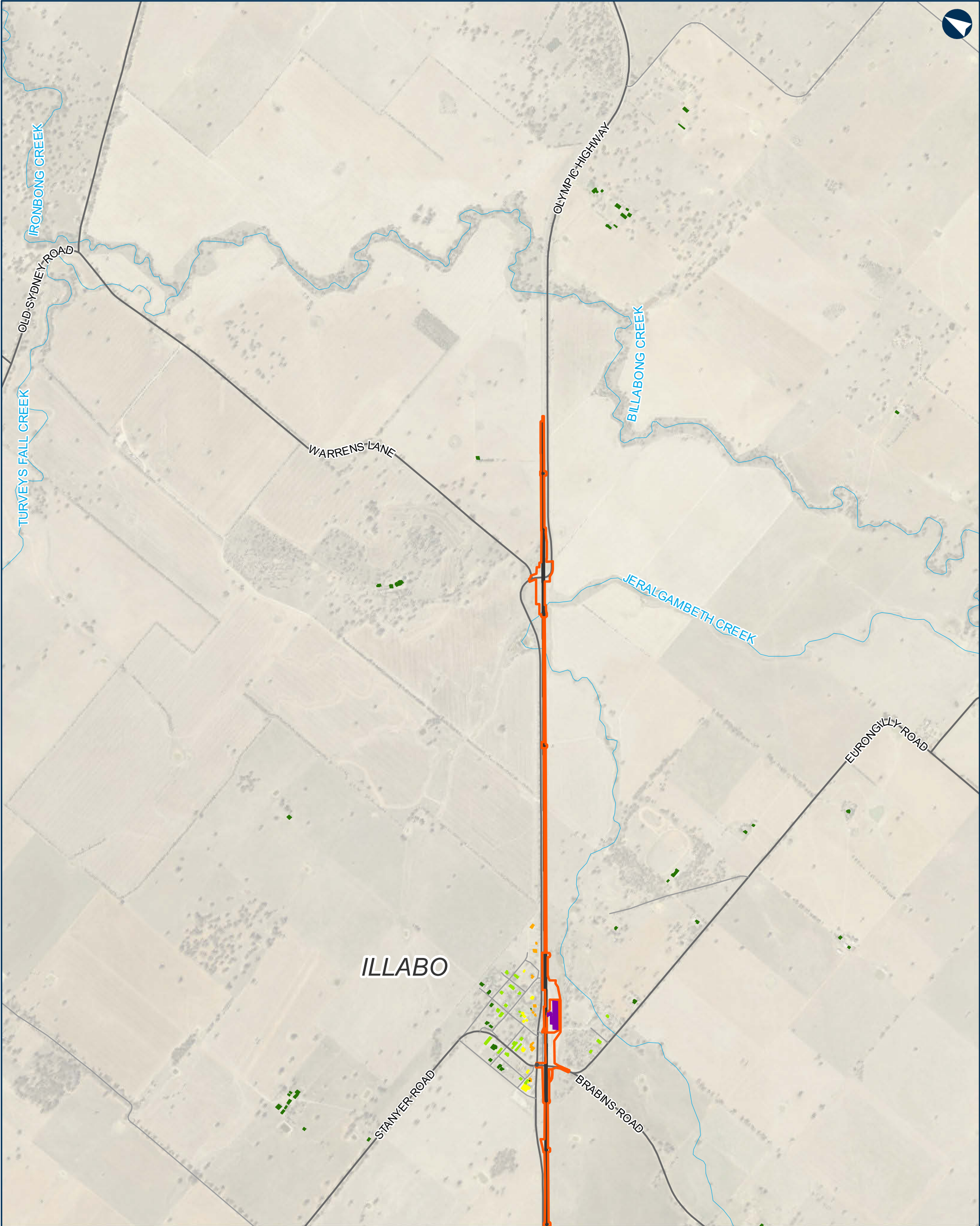
Paper: A3
Scale: 1:20,000

- Proposal site
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Albury to Illabo

Figure A.4.15 Junee - Junee Culverts - Day Time (Track Removal and Replacement)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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 - >30dB
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INLAND RAIL

ARTC

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Albury to Illabo

Figure A.4.16 Junee - Junee Culverts - Night Time (Track Removal and Replacement)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 2/11/2021
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:20,000

- Proposal site

—

 Existing railway

—

 Main road

—

 Local road
- <NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

>30dB
- >75dB (Residences only)

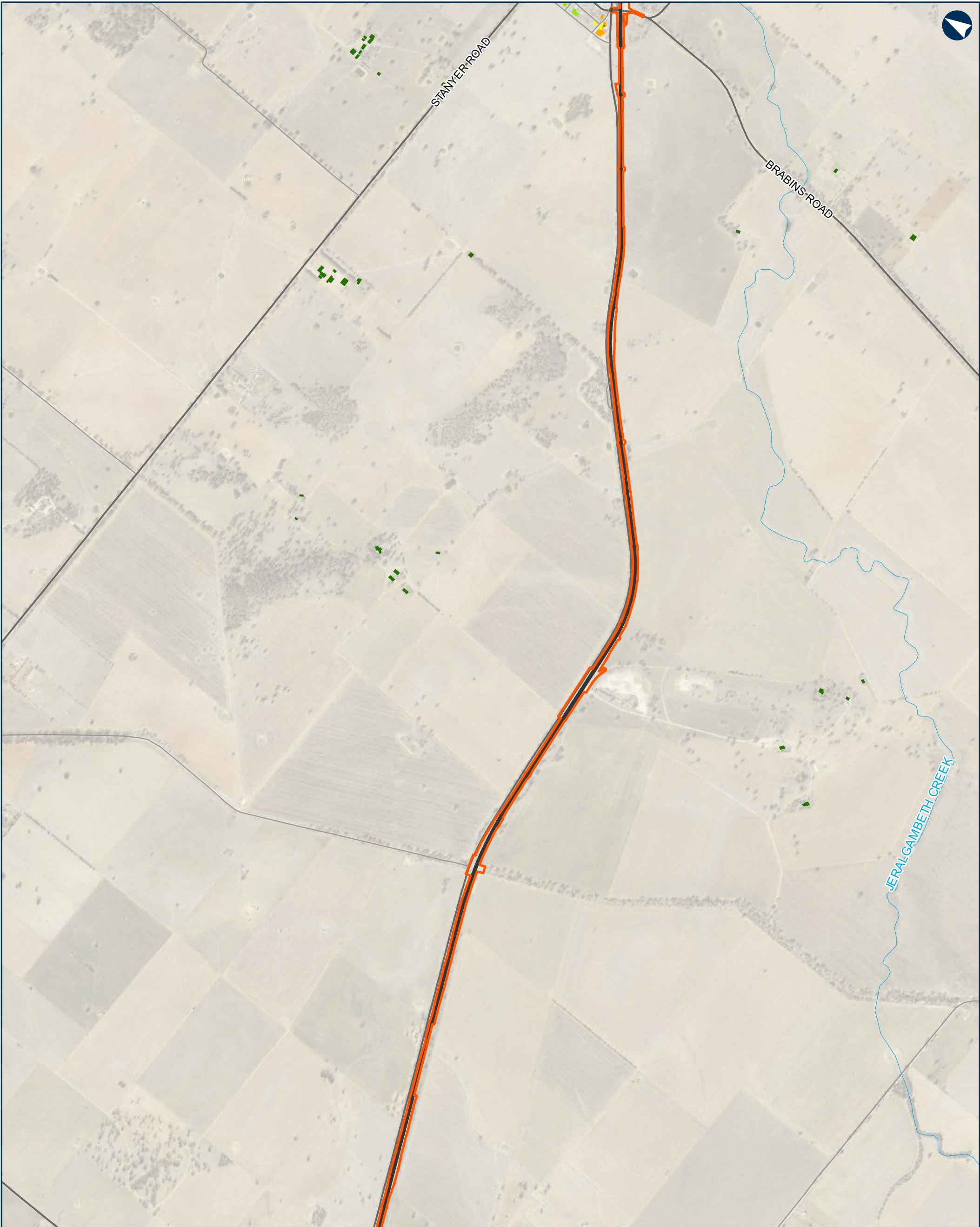
Exceedance of project construction noise criteria LAeq(15 minutes)



INLAND RAIL

ARTC

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Albury to Illabo

Figure A.4.16 Junee - Junee Culverts - Night Time (Track Removal and Replacement)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 2/11/2021
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Data Sources: ARTC, NSWSS

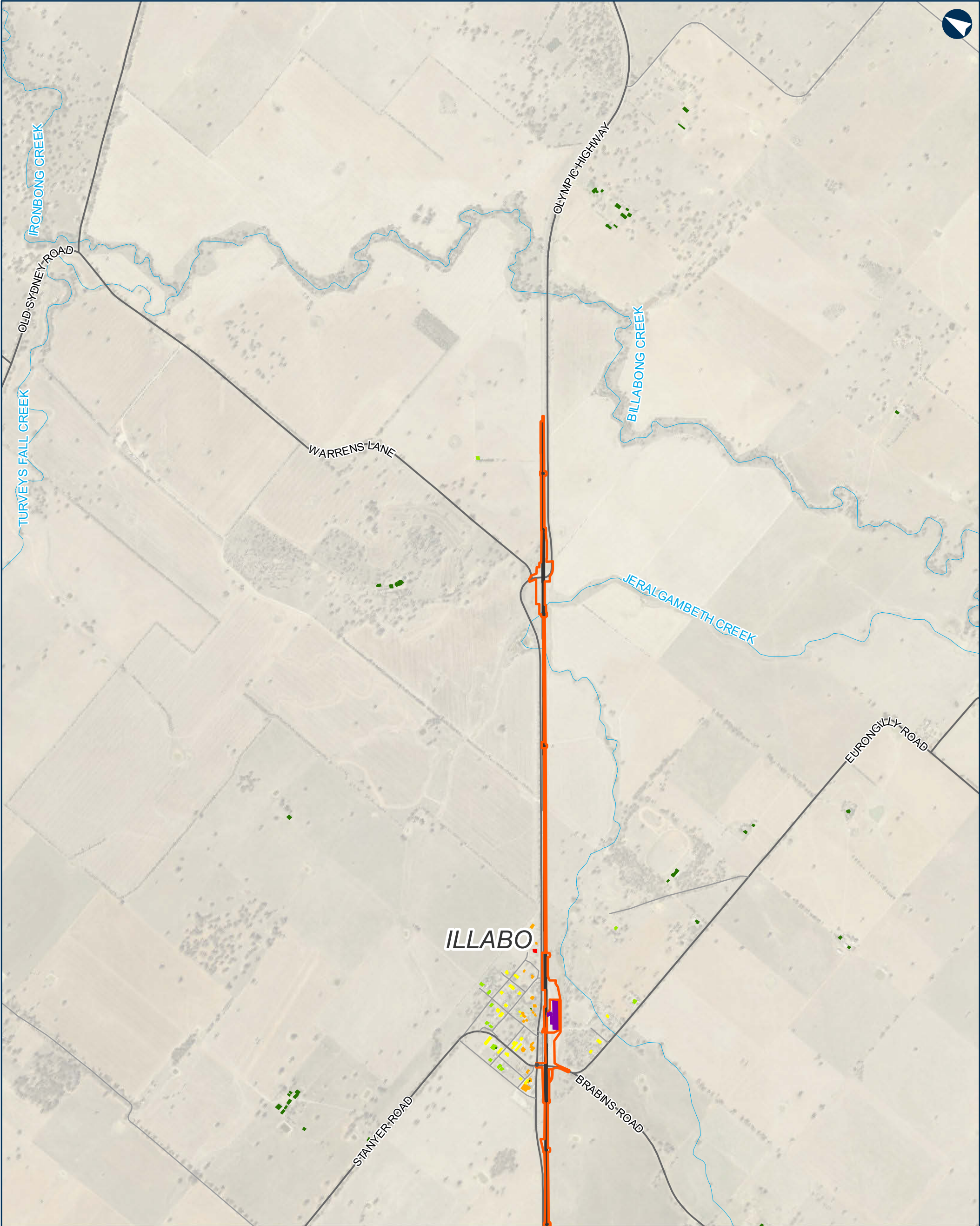
Paper: A3
Scale: 1:20,000

- Proposal site
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 - Main road
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Albury to Illabo

Figure A.4.16 Junee - Junee Culverts - Night Time (Track Removal and Replacement)

0 100 200
m

Coordinate System: GDA 1994 MGA Zone 55

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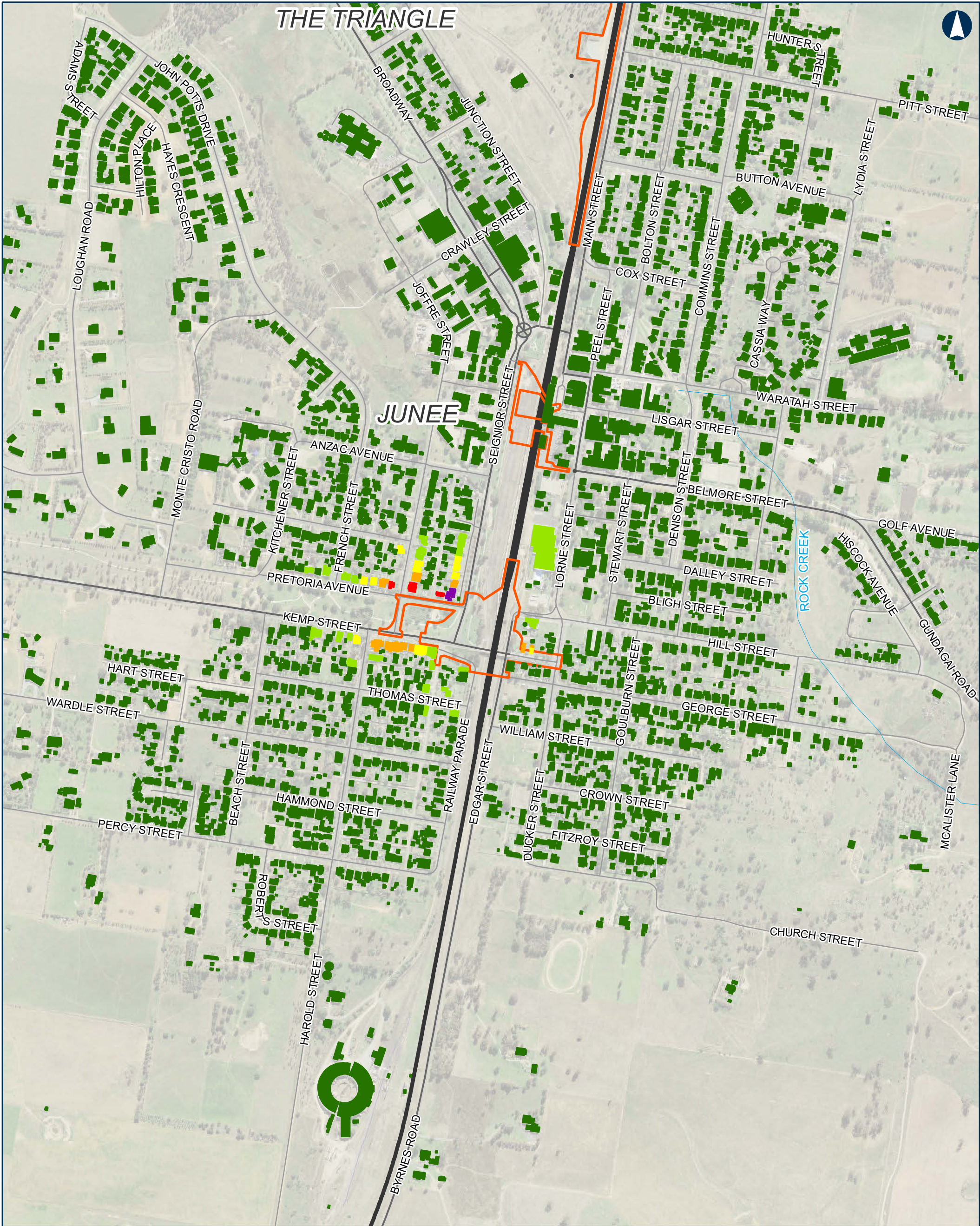
Paper: A3
Scale: 1:20,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Exceedance of project construction noise criteria LAeq(15 minutes)**
- <NML
 - NML + 5dB
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 - NML + 30dB
 - >30dB
 - >75dB (Residences only)



INLAND RAIL **ARTC**

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



Albury to Illabo

Figure A.4.17 Junee - Kemp Street Diversion Roadworks - Day Time (Earthworks)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 21/02/2022 Paper: A3
Author: WSP Scale: 1:7,500
Data Sources: ARTC, NSWSS

Proposal site

Existing railway

Main road

Local road

Watercourse

Exceedance of project construction noise criteria LAeq(15 minutes)

< NML

NML + 5dB

NML + 10dB

NML + 20dB

NML + 30dB

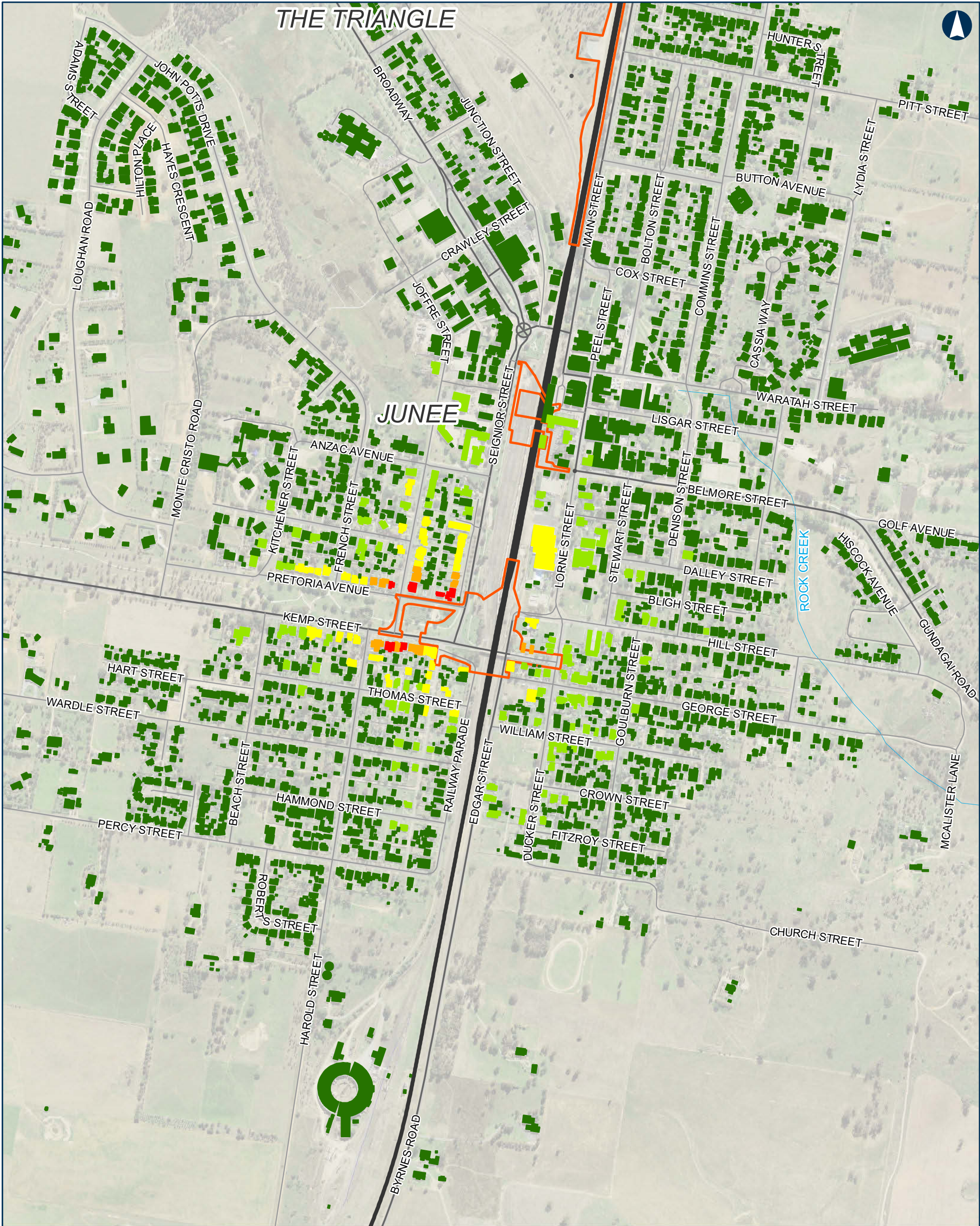
> 30dB

> 75dB (Residences only)



INLAND RAIL ARTC

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Albury to Illabo

Figure A.4.18 Junee - Kemp Street Diversion Roadworks - Night Time (Earthworks)

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 21/02/2022 Paper: A3
Author: WSP Scale: 1:7,500
Data Sources: ARTC, NSWSS

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
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- < NML
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TECHNICAL PAPER

06

Noise and vibration (non-rail)

Appendix E Potentially vibration sensitive heritage items

ALBURY TO ILLABO ENVIRONMENTAL IMPACT STATEMENT



APPENDIX E-1

VIBRATION SENSITIVE HERITAGE ITEMS

VIBRATION SENSITIVE HERITAGE ITEMS

NAME	LISTING	ID	VIBRATION RISK	WITHIN CIZ
Albury Murray River bridge	SHR	1073	TBC	YES
Signal Box 4			TBC	NO
Signal Box 2			TBC	NO
Signal Box 3			TBC	NO
Signal Box 1			TBC	YES
Albury Station Building	SHR	1073	TBC	YES
Albury Station Platform	SHR	1073	TBC	NO
Barracks	SHR	1073	TBC	NO
South Signal Box	SHR	1073	TBC	NO
North Signal Box	SHR	1073	TBC	YES
Footbridge	SHR	1073	TBC	YES
Turntable	SHR	1073	TBC	NO
Transshipment Shed	SHR	1073	TBC	NO
Gantry Cranes	SHR	1073	TBC	YES
Gantry Cranes	SHR	1073	TBC	NO
Culcairn Hotel	Greater Hume LEP	I43	TBC	NO
Scholz's Corner	Greater Hume LEP	I51	TBC	NO
Post Office	Greater Hume LEP	I50	TBC	NO
London Bank	Greater Hume LEP	I46	TBC	NO
London Bank	Greater Hume LEP	I46	TBC	NO
London Bank	Greater Hume LEP	I46	TBC	NO
Street Trees	Greater Hume LEP	I54	Unlikely	NO
Street Trees	Greater Hume LEP	I54	Unlikely	NO
Street Trees	Greater Hume LEP	I54	Unlikely	NO
Street Trees	Greater Hume LEP	I54	Unlikely	YES
Street Trees	Greater Hume LEP	I54	Unlikely	NO
Street Trees	Greater Hume LEP	I54	Unlikely	NO
Street Trees	Greater Hume LEP	I54	Unlikely	NO
Street Trees	Greater Hume LEP	I54	Unlikely	NO
Street Trees	Greater Hume LEP	I54	Unlikely	NO

NAME	LISTING	ID	VIBRATION RISK	WITHIN CIZ
Station Building	SHR	1126	TBC	NO
Station Master's Residence	SHR	1126	TBC	NO
Station Building	SHR	1126	TBC	NO
Station Building	SHR	1126	TBC	NO
Platform	SHR	1126	TBC	NO
Pedestrian Footbridge	SHR	1126	TBC	YES
Gantry Crane	SHR	1126	TBC	NO
Station Building	SHR	1169	TBC	YES
Station Building	SHR	1169	TBC	YES
Station Building	SHR	1169	TBC	YES
Goods Shed	SHR	1169	TBC	YES
Platform Face	SHR	1169	TBC	YES
The Rock Gantry Crane	SHR	1268	TBC	NO
Signal Hut	SHR	1268	TBC	YES
Uranquinty Silos	Wagga Wagga LEP	I296	TBC	NO
Uranquinty Silos	Wagga Wagga LEP	I296	TBC	NO
Uranquinty Silos	Wagga Wagga LEP	I296	TBC	NO
Uranquinty Silos	Wagga Wagga LEP	I296	TBC	NO
Uranquinty Silos	Wagga Wagga LEP	I296	TBC	NO
Wagga Wagga Showground Building	Wagga Wagga LEP	I246	TBC	NO
Wagga Wagga Showground Building	Wagga Wagga LEP	I246	TBC	YES
Wagga Wagga Showground Building	Wagga Wagga LEP	I246	TBC	NO
Mount Erin Convent, Chapel, High School and Grounds	Wagga Wagga LEP	I260	TBC	NO
Mount Erin Convent, Chapel, High School and Grounds	Wagga Wagga LEP	I260	TBC	NO
Mount Erin Convent, Chapel, High School and Grounds	Wagga Wagga LEP	I260	TBC	NO
Mount Erin Convent, Chapel, High School and Grounds	Wagga Wagga LEP	I260	TBC	NO
Mount Erin Convent, Chapel, High School and Grounds	Wagga Wagga LEP	I260	TBC	NO
Edmondson Street bridge			TBC	YES
Cassidy Pde pedestrian bridge			TBC	YES
Former Stationmaster's House	Wagga Wagga LEP	I99	TBC	NO
Former Stationmaster's House	Wagga Wagga LEP	I99	TBC	NO
South Wagga Primary School	Wagga Wagga LEP	I97	TBC	NO

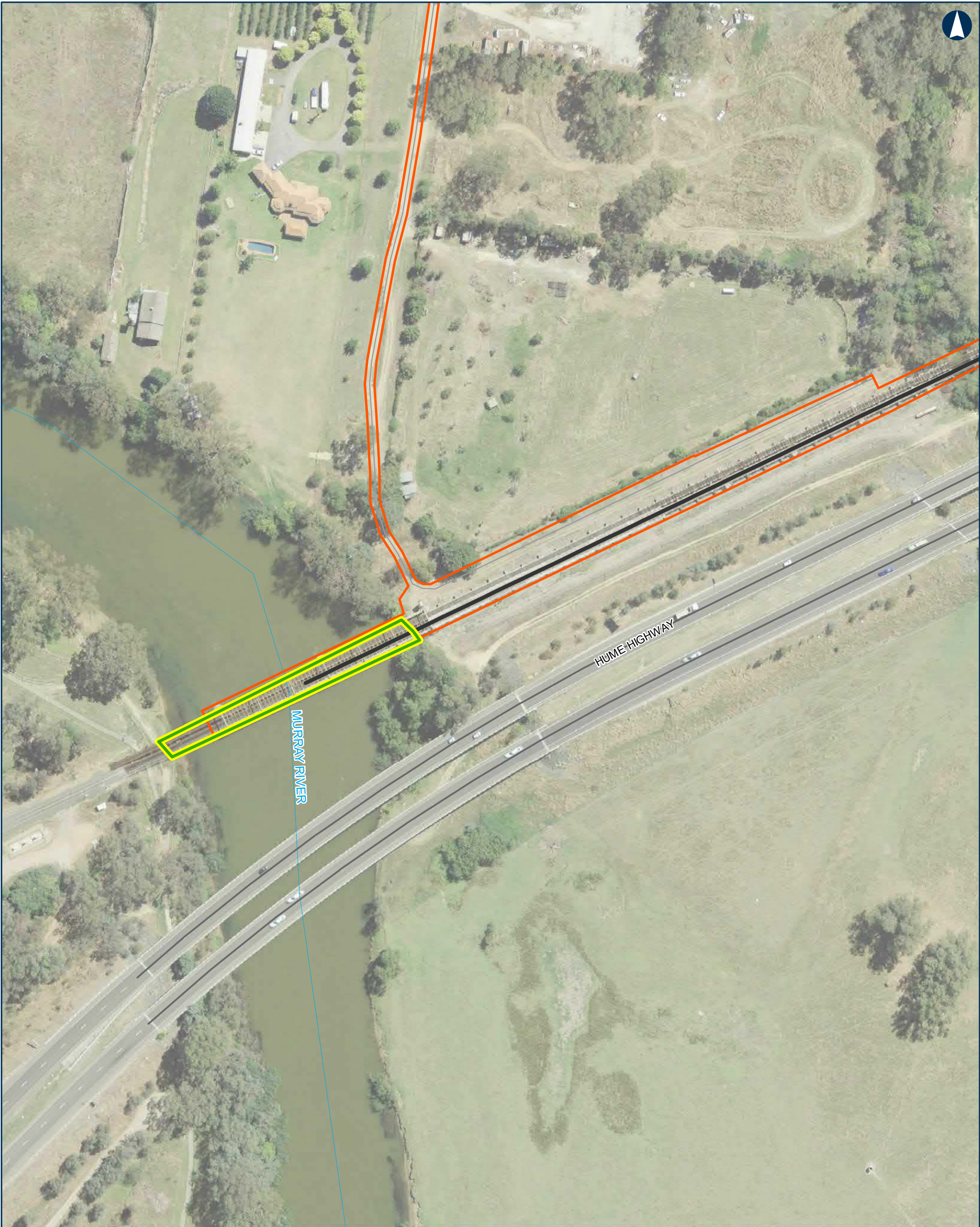
NAME	LISTING	ID	VIBRATION RISK	WITHIN CIZ
South Wagga Primary School	Wagga Wagga LEP	I97	TBC	NO
South Wagga Primary School	Wagga Wagga LEP	I97	TBC	NO
South Wagga Primary School	Wagga Wagga LEP	I97	TBC	NO
South Wagga Primary School	Wagga Wagga LEP	I97	TBC	NO
South Wagga Primary School	Wagga Wagga LEP	I97	TBC	NO
Station Building	SHR	1279	TBC	NO
Station Building	SHR	1279	TBC	NO
Station Building	SHR	1279	TBC	NO
Station Building	SHR	1279	TBC	NO
Platform Face	SHR	1279	TBC	YES
Footbridge	SHR	1279	TBC	YES
Station Building	SHR	1093	TBC	NO
Toilet Block and Lamp Room	SHR	1093	TBC	NO
Signal Box	SHR	1093	TBC	NO
Platform Face	SHR	1093	TBC	YES
Bomen Stationmaster's House	Wagga Wagga LEP	I9	TBC	NO
Bomen Stationmaster's House	Wagga Wagga LEP	I9	TBC	YES
Kemp Street bridge			TBC	YES
Station	SHR	1172	TBC	NO
Refreshment Rooms	SHR	1172	TBC	YES
Greyhound Bus stop Albury	Conservation Area	C13	Unlikely	NO
Railway Conservation Area	Conservation Area	C13	Unlikely	YES
Railway Conservation Area	Conservation Area	C13	Unlikely	NO
Railway Conservation Area	Conservation Area	C13	Unlikely	NO
Railway Conservation Area	Conservation Area	C13	Unlikely	NO
Car Dealership	Conservation Area	C13	Unlikely	NO
Car Dealership	Conservation Area	C13	Unlikely	NO
Kenilworth Street Conservation Area	Conservation Area	C9	Unlikely	NO
Kenilworth Street Conservation Area	Conservation Area	C9	Unlikely	NO
Kenilworth Street Conservation Area	Conservation Area	C9	Unlikely	NO
Yerong Creek Urban Conservation Area	Conservation Area	C3	Unlikely	NO
Yerong Creek Urban Conservation Area	Conservation Area	C3	Unlikely	NO

NAME	LISTING	ID	VIBRATION RISK	WITHIN CIZ
Yerong Creek Urban Conservation Area	Conservation Area	C3	Unlikely	NO
Yerong Creek Urban Conservation Area	Conservation Area	C3	Unlikely	NO
Yerong Creek Urban Conservation Area	Conservation Area	C3	Unlikely	NO
Yerong Creek Urban Conservation Area	Conservation Area	C3	Unlikely	NO
Yerong Creek Urban Conservation Area	Conservation Area	C3	Unlikely	NO
Yerong Creek LPO	Conservation Area	C3	TBC	NO
Church	Conservation Area	C3	Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	YES
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Conservation Area			Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Wagga Wagga Conservation Area	Conservation Area		Unlikely	NO
Cafe	Conservation Area		Unlikely	NO

NAME	LISTING	ID	VIBRATION RISK	WITHIN CIZ
Memorial Avenue	Wagga Wagga LEP	I304	Unlikely	NO
Memorial Avenue	Wagga Wagga LEP	I304	Unlikely	NO
Memorial Avenue	Wagga Wagga LEP	I304	Unlikely	NO
Memorial Avenue	Wagga Wagga LEP	I304	Unlikely	NO
Memorial Avenue	Wagga Wagga LEP	I304	Unlikely	NO
Memorial Avenue	Wagga Wagga LEP	I304	Unlikely	NO
Memorial Avenue	Wagga Wagga LEP	I304	Unlikely	NO
Wagga Wagga Showground Building	Wagga Wagga LEP	I246	TBC	NO

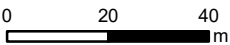
APPENDIX E-2

VIBRATION



Albury to Illabo

Appendix E Heritage receivers within estimated safe working distances - Murray River bridge



Coordinate System: GDA 1994 MGA Zone 55
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Date: 18/02/2022
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:1,500

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Vibration intensive activity**
- Vibratory compaction (start-up)
 - Vibratory compaction



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Albury to Illabo

Appendix E Heritage receivers within estimated safe working distances - Albury Station sites

0 20 40
m

Coordinate System: GDA 1994 MGA Zone 55

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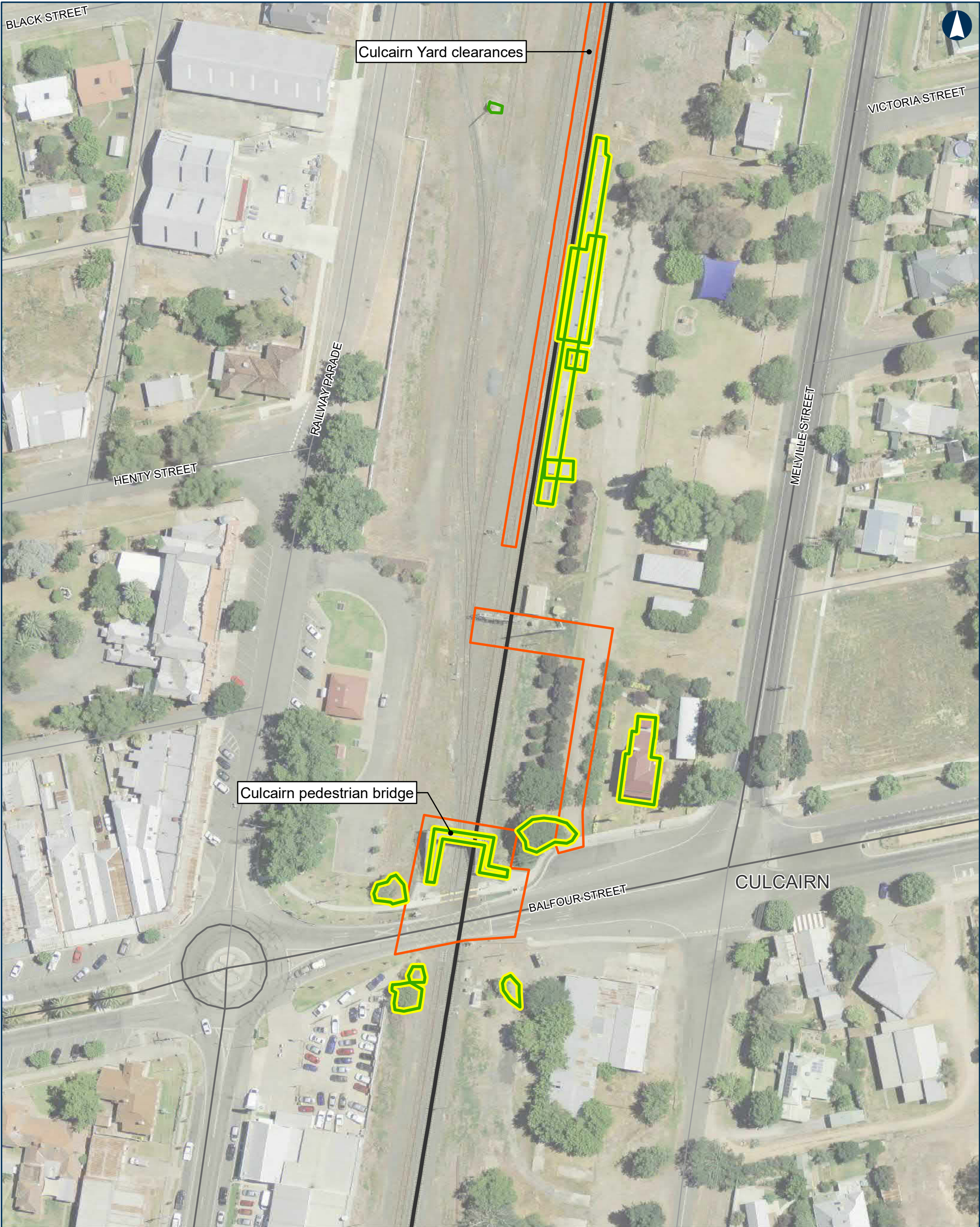
Date: 18/02/2022
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:3,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
- Vibration intensive activity**
- Vibratory compaction (start-up)
 - Vibratory compaction

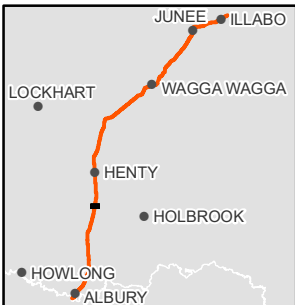


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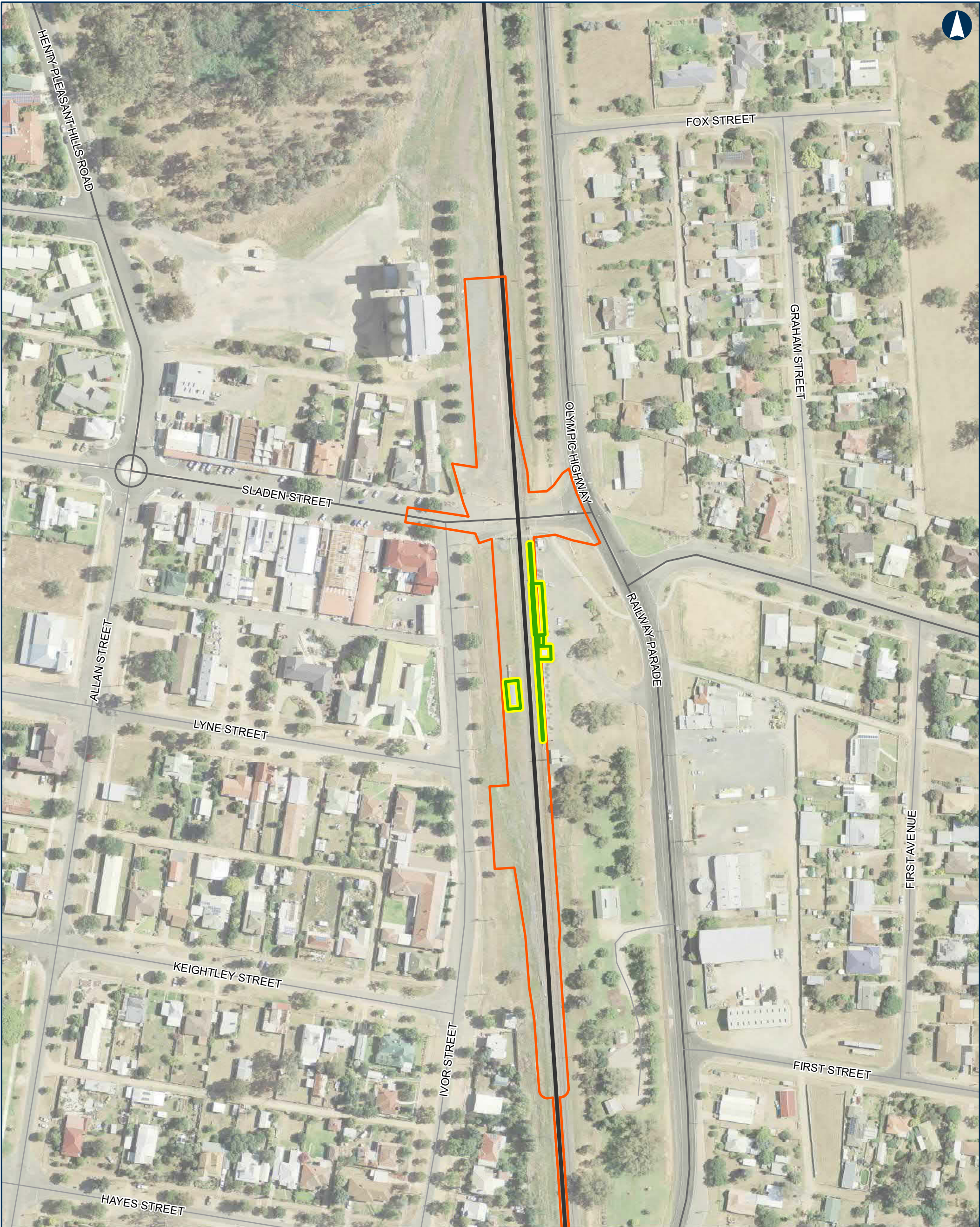


0 20 40 m
Coordinate System: GDA 1994 MGA Zone 55
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Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:1,000
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Main road
- Local road
- Vibration intensive activity
 - Vibratory compaction (start-up)
 - Vibratory compaction

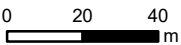


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Albury to Illabo

Appendix E Heritage receivers within estimated safe working distances - Henty Yard clearances



Coordinate System: GDA 1994 MGA Zone 55

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Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:2,000
Data Sources: ARTC, NSWSS

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Vibration intensive activity**
- Vibratory compaction (start-up)
 - Vibratory compaction



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Albury to Illabo

Appendix E Heritage receivers within estimated safe working distances - The Rock Yard clearances

0 20 40 m

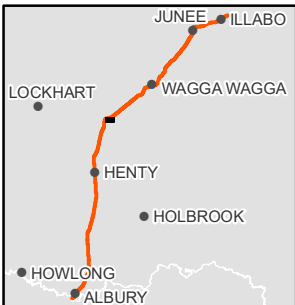
Coordinate System: GDA 1994 MGA Zone 55

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Date: 18/02/2022
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:1,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
- Vibration intensive activity**
- Vibratory compaction (start-up)
 - Vibratory compaction



The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.



0 20 40
m

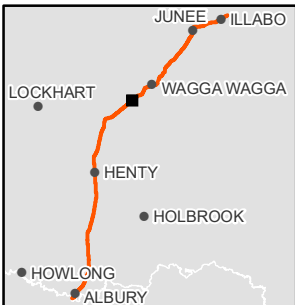
Coordinate System: GDA 1994 MGA Zone 55

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Date: 18/02/2022
Author: WSP
Data Sources: ARTC, NSWSS

Paper: A3
Scale: 1:4,000

- Proposal site
 - Existing railway
 - Main road
 - Local road
 - Watercourse
- Vibration intensive activity**
- Vibratory compaction (start-up)
 - Vibratory compaction



INLAND RAIL **ARTC**

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Albury to Illabo

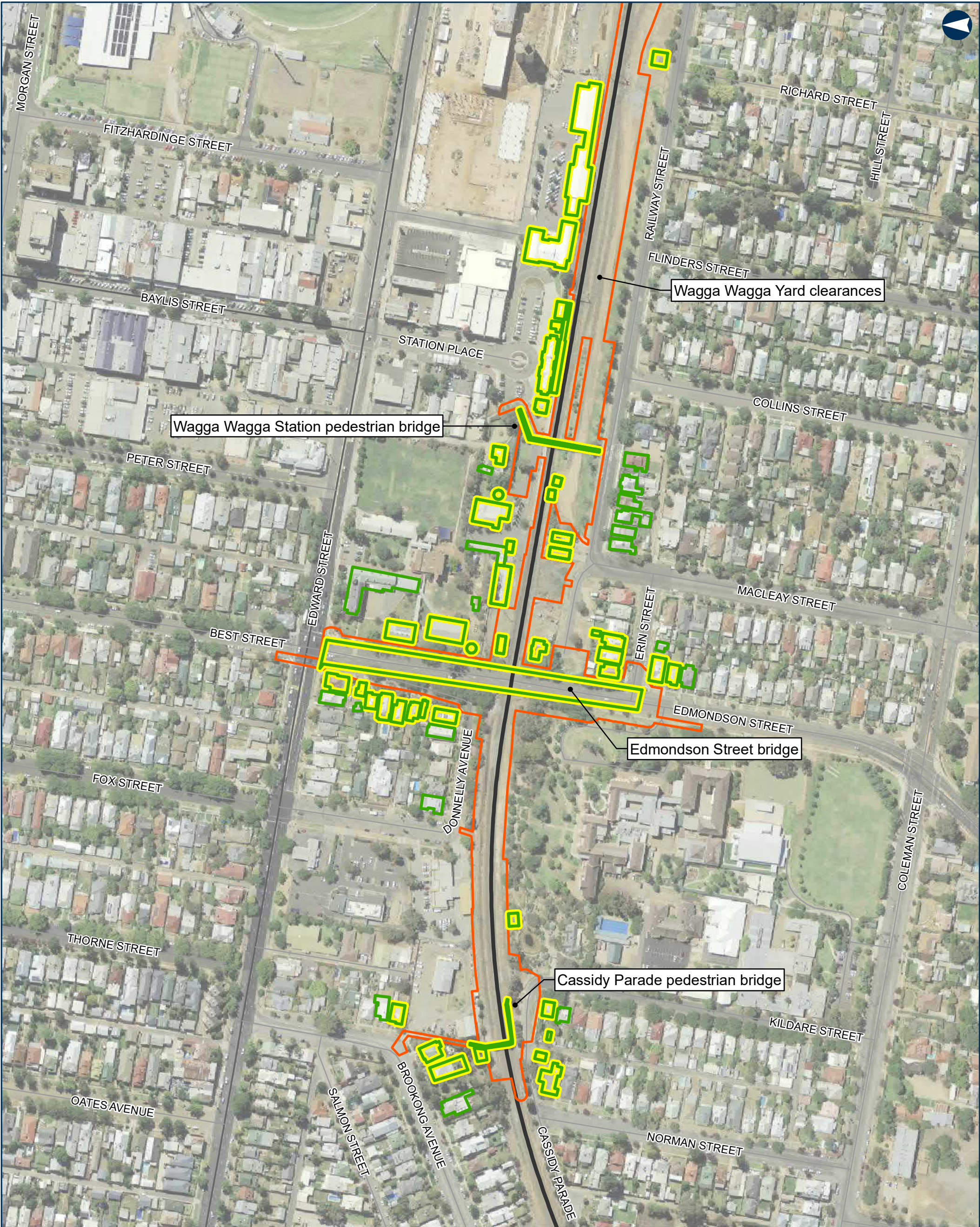
Appendix E Heritage receivers within estimated safe working distances - Pearson Street bridge

0 20 40 m
Coordinate System: GDA 1994 MGA Zone 55
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Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:1,000
Data Sources: ARTC, NSWSS

- Proposal site
- Existing railway
- Local road
- Vibration intensive activity
 - Vibratory compaction (start-up)
 - Vibratory compaction



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Albury to Illabo

Appendix E Heritage receivers within estimated safe working distances - Wagga Wagga Station and surrounds sites

0 20 40
m

Coordinate System: GDA 1994 MGA Zone 55

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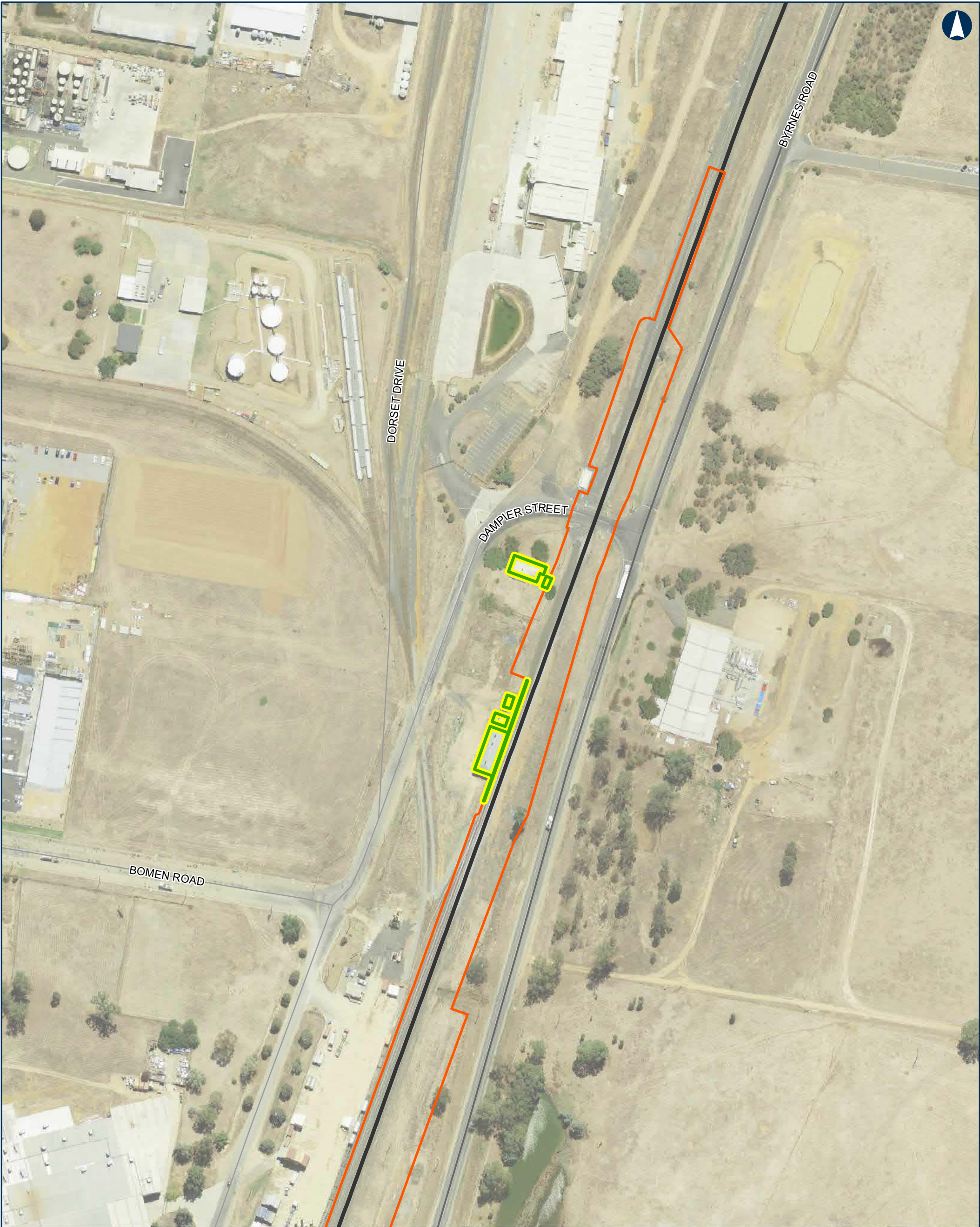
Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:3,000
Data Sources: ARTC, NSWSS

- Proposal site
 - Existing railway
 - Main road
 - Local road
- Vibration intensive activity**
- Vibratory compaction (start-up)
 - Vibratory compaction



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02040m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 18/02/2022

Paper: A3

Author: WSP

Scale: 1:2,000

Data Sources: ARTC, NSWSS

- Proposal site

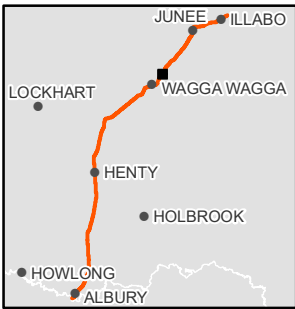
— Existing railway

— Main road

— Local road
- Vibration intensive activity

■ Vibratory compaction (start-up)

■ Vibratory compaction

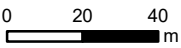


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Albury to Illabo

Appendix E Heritage receivers within estimated safe working distances - Kemp Street bridge and Junee Station sites



Coordinate System: GDA 1994 MGA Zone 55

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Date: 18/02/2022 Paper: A3
Author: WSP Scale: 1:2,000
Data Sources: ARTC, NSWSS

- Proposal site
 - Existing railway
 - Main road
 - Local road
- Vibration intensive activity**
- Vibratory compaction (start-up)
 - Vibratory compaction



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TECHNICAL PAPER 06

Noise and vibration (non-rail)

Appendix F NSW construction noise and vibration management framework

ALBURY TO ILLABO ENVIRONMENTAL IMPACT STATEMENT





Specification

NSW Construction Noise and Vibration Framework



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Glossary

TERM	ACRONYM	DEFINITION
Alternative Accommodation	AA	Alternate accommodation. Refer to additional mitigation measures
Communication	CO	Communication. Refer to additional mitigation measures
Communication Category 1	CO1	Communication to inform (newsletter, email, letterbox drop, advertisements, website and media). Refer to additional mitigation measures
Communication Category 2	CO2	Personalised communication (door knock, meeting, telephone call). Refer to additional mitigation measures
Conditions of Approval	CoA	Conditions of approval will be issued upon the approval of the EIS by DPIE, or the REF approval by ARTC.
Construction Environmental Management Framework		Prepared by ARTC to direct the Contractor in environmental management requirements on the Inland Rail Program. This document will form the basis of the contractor's CNVMP.
Construction Noise and Vibration Impact Statement.	CNVIS	Informs the development of the CNVMP (see table 2)
Construction Noise and Vibration Management Plan.	CNVMP	Details how construction noise and vibration impacts will be minimised and managed. The CNVMP is based on the Project Environmental Management Plan.
Critical State Significant Infrastructure	CSSI	State significant infrastructure which has been declared by the Minister as being essential for the State for economic, environmental or social reasons. Refer to the <i>Environmental Planning and Assessment Act 1979</i> .
Department of Planning, Industry and the Environment	DPIE	
Draft guideline for construction noise		The NSW EPA has issued a Draft Guideline for Construction Noise (2020) to replace the ICNG. The public consultation on the new Draft construction noise guideline closed on 30 April 2021. The final guideline may replace the ICNG in force during the Inland Rail construction period.
Enhancement Works		Enhancement works involve bridge works, and/ or track lowering, and may also include ancillary works such as gantry works, signalling and communications.
Environmental impact assessment		A broad term that covers a range of assessments required under the <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act) and any related amendments to the Act.
Environmental Impact Statement	EIS	An Environmental Impact Statement is a document prepared to describe the effect of proposed activities on the environment. An EIS is determined by NSW Planning and Environment and is developed in response to the Secretary's Environmental Assessment Requirements (SEARs).
Environmental Protection License	EPL 3142	ARTC holds an Environmental Protection License (3142) for operation and maintenance of the existing ARTC network which defines requirements for maintenance and operational activities. Some minor works associated with the Inland Rail Proposals (for example amendments to grain hoppers, station canopies, etc within the existing rail corridor) maybe undertaken and governed in accordance with this Environmental Protection license rather than and REF or EIS approval. Where this is the case the Contractor will be required to undertake those works in accordance with ARTC's EPL 3142.

TERM	ACRONYM	DEFINITION
Feasible		Relates to engineering considerations, what can practically be built (e.g. safety, access, and site constraints).
Greenfield		This involves construction within an entirely new corridor.
Inland Rail Program (Inland Rail)		The Inland Rail program encompasses the design and construction of a new inland rail connection between Melbourne and Brisbane, via Wagga Wagga, Parkes, Moree, and Toowoomba. The route for Inland Rail is approximately 1,700 km in length. Inland Rail will involve a combination of track upgrades, enhancement of existing rail track and the provision of new track in greenfield areas.
Inland Rail Proposal		Specific works subject to an environmental impact assessment and confined to a particular geographic area within the Program alignment, for example Parkes to Narromine.
Interim Construction Noise Guideline	ICNG	Interim Construction Noise Guideline (DECC 2009)
Noise Management Levels	NML	Airborne noise levels that apply to works.
Out of hours work.	OOHW	Works conducted outside of the Standard ICNG, or otherwise updated guidelines as and when in force, Construction Hours.
Preconstruction Activities		This includes enabling or early works such as geotechnical investigations, the movement of machinery, and other activities that may be undertaken via an Ancillary Works Agreement prior to formal commencement of the Works
Reasonable		Selecting reasonable measures from those that are feasible involves judging whether the overall noise benefits outweigh adverse social, economic and environmental effects including the cost of the measure. Further advice on determining reasonable measures can be found in the Interim Construction Noise Guideline.
Receiver		<p>A premises that is subject to construction noise or vibration.</p> <ul style="list-style-type: none"> ▶ Noise sensitive receivers are properties where the occupants can be adversely impacted by noise or vibration including dwellings, hospitals, places of worship, childcare centres etc. ▶ Impacted receivers are those exposed to noise and vibration above the relevant management levels. <p>Residential receivers are properties where people reside on a permanent basis.</p>
Respite Offer	RO	Refer to additional mitigation measures.
Review of Environmental Factors	REF	Review of Environmental Factors is a document prepared to describe the effect of proposed activities on the environment. A REF will be prepared for Projects where an EIS is not triggered. The need for a REF shall be determined by ARTC.
Secretary's Environmental Assessment Requirements	SEARs	Secretary's Environmental Assessment Requirements are the requirements that must be addressed as part of the EIS.
Standard construction hours		<p>The standard hours for construction recommended under the ICNG:</p> <ul style="list-style-type: none"> ▶ 7:00am to 6:00pm Monday to Friday ▶ 8:00am to 1:00pm Saturday ▶ At no time on Sunday or Public Holidays
Standard Program Construction Hours		<p>Hours of work for Contractors on Site Contractor Activities undertaken as part of a Project on the Inland Rail Program shall comply with:</p> <ul style="list-style-type: none"> ▶ ICNG standard hours, unless otherwise amended by Environmental Approvals and conditions on the Proposal which will take precedents
Standard Project Blasting Hours		<p>Hours of work for Contractors on Site Contractor Activities for blasting undertaken as part of a Project on the Inland Rail Program:</p> <ul style="list-style-type: none"> ▶ Monday – Friday 9am – 5pm;

TERM	ACRONYM	DEFINITION
		<ul style="list-style-type: none">▶ Saturday 9am -1pm; and▶ No blasting is to be undertaken on Sundays or public holidays.
State Significant Infrastructure	SSI	
The former Department of Environment and Climate Change	DECC	
Upgrade works		Can involve any or all of the following: upgrading the track, formation, culverts, curve easing, construction of passing loops and/ or ancillary works to level crossings, signalling and communications, signage, fencing, services and utilities.
Weekend work		Work occurring 1pm – 6pm on Saturday and 6am - 6pm on Sunday.

1 Introduction

1.1 Purpose

The Framework is applicable to all NSW Inland Rail proposals and fulfils the recommendations in the *Interim Construction Noise Guideline, DECC 2009* (ICNG) for organisations to detail best practice, project-specific approaches to minimise noise impacts from pre-construction activities and construction and provide the public with transparency. The Framework also establishes the requirements for the management of construction vibration.

This Framework applies to all Project stages, from the environmental impact assessment through to construction and is most relevant to:

- ▶ Project managers
- ▶ Acoustic consultants
- ▶ Environmental officers
- ▶ Contractors.

This Framework does not take precedence over proposal specific Approval or licence conditions. This Framework will be reviewed as ARTC progresses to incorporate learnings from Inland Rail activities and in response to release or update of relevant guidelines, Standards and policies.

Any reference to 'construction noise' in this Framework should also be taken to include noise generated by 'pre-construction activities'. Similarly, a reference to vibration also includes vibration generated as part of pre-construction activities. Within NSW there are seven Inland Rail Program Project areas, these are described in Table 1.

Table 1 NSW Inland Rail Proposals

PROPOSAL	DESCRIPTION	PROJECT TYPE	ASSESSMENT TYPE
ALBURY TO ILLABO	Providing double-stack capability for 185km of existing track.	Enhancement	SSI EIS
ILLABO TO STOCKINBINGAL	New 37km standard gauge rail line that eliminates a twisty section of track known as the Bethungra Spiral.	Greenfield	SSI EIS
STOCKINBINGAL TO PARKES	Providing double-stack capability and passing loops on 173km of existing track.	Enhancement	REF
PARKES TO NARROMINE	Upgrade of the existing 107km section of track, with passing loops, ancillary works and new 5.3km connection to the Broken Hill line.	Upgrade	SSI EIS
NARROMINE TO NARRABRI	307km of new track constructed between Narromine and Narrabri.	Greenfield	SSI EIS
NARRABRI TO NORTH STAR	188km of existing track upgraded to take heavier axle loads and double stacked trains	Upgrade	SSI EIS
NORTH STAR TO NSW/QLD BORDER	52 km of new track.	Greenfield	SSI EIS

1.2 Objectives

The objectives of this Framework are to:

- ▶ Ensure neighbours and people living in close proximity to where the Works are being undertaken are not unduly impacted and also address the requirements of relevant NSW guidelines, Standards and policies;
- ▶ Provide a consistent approach to the evaluation, selection and delivery of feasible and reasonable noise and vibration controls during construction; and
- ▶ Balance the needs of adjacent communities, rail commuters and train operators by facilitating efficient Project delivery.

2 Construction noise and vibration assessment

The level of detail available on the construction methodology and Project design increases as the planning and approval process progresses. Noise and vibration assessments are undertaken to quantify the impact of construction activities on receivers. The results of the assessment are then used to develop management measures to mitigate the impact of construction activities on receivers. Assessments should:

- ▶ Be based on the best information available at the time;
- ▶ Assess a realistic, worst-case scenario; and
- ▶ Provide sufficient detail to identify Project specific noise and vibration mitigation measures.

Assessments and plans incorporating different levels of detail shall be required pre and post project approval. Table 2 identifies the document and information required at each stage.

Each aspect of construction noise and vibration is to be assessed in accordance with NSW state guidelines, Australian or international standards (Table 3), and the SEARs and relevant conditions of approval. Assessments should be quantitative and where possible estimate the duration of impact on receivers, noting that works will move along the alignment and are unlikely to affect a single receiver for the entire project construction period. Note that the ICNG is scheduled for replacement, and the appropriate replacement guideline must be followed.

Table 2 Construction Noise and Vibration Assessment Documents

PROJECT STAGE	DOCUMENT	DESCRIPTION	CONTENT
Pre-approval	Environmental impact assessment (EIS or REF) – Noise and Vibration Study (and any subsequent revisions prepared during the approval phase)	Describes all noise and vibration effects of the Project on the environment and advises how best to manage the impacts.	<ul style="list-style-type: none"> ▶ Description of works, expected duration and proposed working hours and noise management levels ▶ Identification of noise sensitive receivers including impacted commercial receivers ▶ Identification of vibration sensitive structures including heritage buildings, and other vibration sensitive receivers (including sensitive scientific and medical equipment) ▶ Assessment of likely noise impacts, including sleep disturbance arising from proposed working hours ▶ Assessment of construction methods with the potential to cause discomfort, cosmetic or structural damage ▶ Conceptual description of feasible and reasonable work practices to minimise noise and vibration impacts ▶ Quantification of residual impacts following implementation of recommended mitigation measures ▶ Cumulative noise assessment taking account of adjacent IR Proposals and any other identified Major development in the vicinity of the Proposal

			<ul style="list-style-type: none"> ▶ Changes made to the proposal in response to submissions
Approval(s)	SSI or REF approval Environment Protection Licence (EPL)	Sets project CoA and reporting requirements	<ul style="list-style-type: none"> ▶ Sets working hours, noise management criteria ▶ Establishes reporting and complaint obligations
Post-approval	Construction Environmental Management Plan	Prepared by the Contractor to collate the environmental management requirements for each proposal and inform the development of the contractor's CNVMP. Based on detailed design incorporating a Construction Noise and Vibration Impact Statement (CNVIS).	<ul style="list-style-type: none"> ▶ Collates the CoA and licence conditions, the EIS commitments and mitigation measures ▶ Description of works, duration, working hours and noise management levels ▶ Detailed assessment of likely noise impacts, including sleep disturbance based on detailed design ▶ Assessment of construction methods with the potential to cause vibration generated discomfort, cosmetic or structural damage, based on detailed design ▶ Assessment and identification of all reasonable and feasible mitigation measures to minimise noise and vibration at impacted sensitive receivers ▶ Quantification of residual impacts following implementation of reasonable and feasible mitigation measures ▶ Identification of management measures to be implemented for residual impacts and general community management ▶ Defines the requirements for pre-construction dilapidation surveys ▶ Identification of monitoring, training and auditing requirements
	Construction Noise and Vibration Management Plan (CNVMP)	Details how construction noise and vibration impacts will be minimised and managed. Incorporates proposal specific approval or licence conditions. Prepared prior to the commencement of the Works by the Contractor.	<ul style="list-style-type: none"> ▶ Description of works, duration and working hours and noise management levels ▶ Identification of noise sensitive receivers including impacted commercial receivers ▶ Identification of vibration sensitive structures and receivers, and requirements for dilapidation surveys and/or monitoring during construction ▶ Details of construction including and indicative schedule for key construction scenarios ▶ Feasible and reasonable work practices to minimise noise and vibration impacts based on the CNVIS and updated with any changes in construction that may occur through the delivery of the Proposal ▶ Monitoring and auditing procedures ▶ Blast Management Plan (if applicable) considering methods contained in AS2187.2-2006

Table 3 Construction Noise and Vibration Guidelines and Standards

ASPECT	DESCRIPTION	FRAMEWORK
Airborne noise	Construction noise	Interim Construction Noise Guideline (Department of Environment and Climate Change, NSW, 2009)
	Construction traffic noise	NSW Road Noise Policy (NSW EPA, 2011)
	Sleep disturbance (for works extending over more than two consecutive nights)	Interim Construction Noise Guideline (Department of Environment and Climate Change, NSW, 2009) NSW Road Noise Policy (NSW EPA, 2011)
Ground-borne noise	Sound transmitted through the ground into a structure, for example by underground works such as tunnelling.	Interim Construction Noise Guideline (Department of Environment and Climate Change, NSW, 2009)
Vibration	Human responses to vibration.	Assessing Vibration: a technical guideline (Department of Environment and Conservation, NSW, 2006)
	Effect of vibration on structures (cosmetic and/ or structural damage)	German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures.
Blasting	Overpressure and vibration from blasting, potential to cause annoyance/ discomfort, cosmetic or structural damage	Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration (ANZECC 1990) or other limit set by conditions of consent ¹ AS 2187: Part 2-2006 'Explosives - Storage and Use - Part 2: Use of Explosives'

2.1 Construction hours

2.1.1 Standard construction hours

Assessment of noise and vibration should be undertaken with reference to the Standard ICNG Construction Hours:

- ▶ 7:00am to 6:00pm Monday to Friday
- ▶ 8:00am to 1:00pm Saturday
- ▶ At no time on Sunday or Public Holidays

Construction works may only be undertaken outside of Standard Construction Hours:

- ▶ As defined in Section 2.3, or
- ▶ When Program Environmental Approvals and conditions for the Construction Works permit alternative hours.

2.1.2 Standard program blasting hours

The Standard Program Blasting Hours are below. These are consistent with the ICNG.

- ▶ Monday – Friday 9am – 5pm;
- ▶ Saturday 9am -1pm; and
- ▶ No blasting is to be undertaken on Sundays or public holidays.

¹ Recent NSW infrastructure project approvals have recognised that levels presented in Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration are restrictive and have applied these upper limits: vibration (PPV): 25mm/s, overpressure: 125dBL at the nearest receiver. More conservative limits apply to heritage structures and buildings.

2.2 Works outside of standard construction hours

Works may be conducted outside of the standard program construction hours if one or more of the following applies:

- ▶ The delivery of oversized plant or structures that police or other authorities have determined requires special arrangements to transport along public roads;
- ▶ Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm;
- ▶ Works that do not exceed the noise management level adopted in the Construction Noise and Vibration Management Plan (CNVMP) at the nearest receiver;
- ▶ Works that do not exceed the 'preferred' human exposure vibration level adopted in the Construction Noise and Vibration Management Plan (CNVMP) at the nearest receiver;
- ▶ Where agreement is reached between the Contractor and/or ARTC and potentially affected sensitive receivers. Agreements must be made in writing (refer to Section 7.2.2 of the ICNG for further guidance);
- ▶ Works to ensure construction personnel, road user or public safety;
- ▶ Works that cannot be undertaken during the day due to ambient daytime temperatures that may be carried out during the night;
- ▶ Rail tamping where the stress-free temperature of the rail cannot be achieved during the Standard Program Working Hours; and
- ▶ Works required to be conducted during a track possession.

2.3 Track possessions

Track possessions shall be required by the Contractor to undertake the Works on operational rail lines as part of the Inland Rail Program. Track possessions are undertaken when safety or construction requirements mean that construction cannot be completed during standard program construction hours.

Noise and vibration impacts from track possessions shall be assessed by the Contractor in the environmental impact assessment, noting that the number of possessions required by a proposal or the scale of the possession may not be defined. A further detailed assessment should be undertaken by the Contractor as part of the CNVIS to address Site specific mitigation measures.

3 Management measures

3.1 Standard management measures

The measures below shall be applied to all Works conducted by the Contractor during Standard Program Construction Hours to minimise potential noise and vibration impacts at surrounding noise sensitive receivers. ARTC considers that the measures in Table 4 are feasible and reasonable for all Inland Rail proposals in most circumstances.

Table 4 Standard Management Measures

STANDARD MANAGEMENT MEASURES
Site inductions for all employees and contractors will address: <ul style="list-style-type: none"> ▶ Environmental aspects and impacts; ▶ Proposal specific and standard noise management measures; ▶ Licence and approval conditions; ▶ Hours of work; ▶ Environmental incident reporting and management procedures; and ▶ Complaint management.
Daily site-specific briefings for all employees and contractors will include:

- ▶ Site specific noise management measures;
- ▶ Location of nearest noise sensitive receivers;
- ▶ Construction employee parking areas;
- ▶ Behavioural practices (e.g. avoid swearing, shouting, dropping materials from heights); and
- ▶ Designated loading/unloading areas and procedures.

Work compounds, storage areas, parking areas, unloading/loading areas and other semi-permanent construction sites should be located away from noise sensitive receivers. Where this is not possible, the orientation and layout of the work site shall consider noise impacts, and opportunities to shield receivers from noise through the use of site buildings and stockpiles should be considered.

Static plant should be located as far as possible from sensitive receivers, be located to take advantage of natural acoustic screening such as terrain, site buildings, etc and where necessary for reduction of noise impacts, provided with an acoustic enclosure.

When working adjacent to schools, medical centres, childcare centres or places of worship, particularly noisy activities will be scheduled outside of operating or service hours where possible.

Equipment that is used intermittently is to be shut down when not in use.

The offset distance between noisy plant and noise sensitive receivers will be maximised.

The number of vehicle trips to and from site will be optimised.

Regularly inspect and maintain equipment to ensure it is operating correctly.

Avoid the simultaneous operation of noisy plant within discernible range of noise sensitive receivers where possible.

Use of non-tonal reversing alarms for all permanent mobile plant².

Where available, equipment selection will favour the use of quieter and less vibration emitting construction methods.

A telephone, email and web-based community information service shall be established to allow the community to obtain additional information on construction activities, provide feedback or make a complaint.

Regular communications on the activities and progress of the proposal shall be provided to the community (e.g. via newsletter, email and/or website).

Noise or vibration monitoring in response to complaints shall be undertaken where the results or the process assist in resolving or understanding the receiver's issue.

Where possible, construction compounds should be located a minimum of 1km from the nearest resident or noise sensitive receiver.

Where vibration levels are predicted to approach the criteria for cosmetic building damage or limits for critical or sensitive areas, attended vibration measurements shall be undertaken at the commencement of vibration generating activities to confirm that vibration limits are within the acceptable range.

Where vibration and overpressure from blasting or construction activities are predicted to approach the relevant limits, dilapidation surveys on potentially affected buildings shall be undertaken.

A respite period shall be provided for receivers impacted by weekend work (see Definitions). The respite period will ensure that no single receiver is impacted for two consecutive periods of weekend work. Respite will be provided every second weekend commencing at 1pm on Saturday and concluding at 7am on Monday.

3.2 Additional management measures

Where Works are conducted outside of Standard Program Construction Hours and noise and vibration result are in exceedance of noise management levels, the Contractor shall implement the measures described above as well as additional measures dependent upon the impacts described below. Due to the number of proposals and the variety of locations that make up the Inland Rail Program in NSW, these measures may need to be adapted to suit individual proposals and community expectations.

² Excludes light vehicles

3.2.1 Communication (CO)

The level of noise and vibration impact and duration shall guide communication with receivers by the Contractor and/or ARTC. Accurate and timely communication is essential to manage and understand community expectations for out of hours works (OOHW).

Two categories of communication have been developed commensurate with the scale of the impact. The purpose of the communication is described below, but the method of communication will be at the discretion of the Contractor and detailed in the Contractor's Communications and Stakeholder Management Plan. It is intended that this Framework will compliment, and be referred to, in all relevant Communications and Stakeholder Management Plans to achieve the engagement outcomes described below.

- ▶ Category 1 CO1: Communication to provide information on the proposal via letter box drop, email, newsletter, media advertisements and/or website a minimum of 5 days prior to the works commencing.
- ▶ Category 2 CO2: Communication should be personalised (e.g. door knock, meeting, telephone call). Contact with these residents should commence early to enable feedback to be considered by the proposal.

At minimum the information provided to Stakeholders (CO1 or CO2) will include:

- ▶ The reason the Works are required to be undertaken outside of the standard program construction hours
- ▶ A diagram that identifies the location of the proposed works in relation to nearby cross streets and local landmarks
- ▶ The nature, scope and duration of the works, including start and finish times
- ▶ The expected noise impacts on receivers
- ▶ Information on how to obtain further information or make a complaint, including an after-hours number and Inland Rail Program website

3.2.2 Respite offer (RO)

Residential receivers subject to lengthy periods of noise or vibration may be eligible for a respite offer in accordance with tables 6, 7 and 8. The purpose of such an offer is to provide residents with respite from an ongoing impact and may comprise of pre-purchased movie tickets, dinner vouchers or similar.

Respite offers are not applicable to non-residential receivers.

Respite can also be provided by limiting high noise generating works and allowing at least a one-hour respite period between blocks of work. Where possible, the timing of this respite should be discussed with the impacted community.

3.2.3 Alternate accommodation (AA)

Alternate accommodation options (i.e. accommodation in motels away from the worksite) may be provided for residents living in close proximity to construction sites in accordance with Tables 6 – 8 below.

Acceptable accommodation measures shall be developed by the Contractor and ARTC for the affected community and be approved by the ARTC Representative prior to discussion with the resident.

3.2.4 Assigning additional management measures

Tables 5-7 identify appropriate additional management measures for noise sensitive receivers by matching the predicted exceedance of the relevant management level to the appropriate management measures which serve to counter or mitigate that exceedance. The management levels are derived from the assessment process outlined in the relevant guideline or Standard (see Table 3).

Out of Hours Work (OOHW) has been divided into two periods (rest and sleep) in Tables 5-7 to recognise the different impact Works can have at those times.

Management measures for works within the Standard Program Construction Hours are listed in Table 5, and therefore only Works outside of this period are considered in Tables 5-7.

Table 5 Additional Management Measures – Airborne Noise

TIME PERIOD		EXCEEDANCE OF NML	PERCEPTION	DURATION	COMMUNICATION CATEGORY/ MANAGEMENT MEASURE
OOHW Rest Period Evenings	Monday – Sunday 6pm – 10pm (including public holidays)	<5	Noticeable	Any	CO1
		5-15	Clearly audible	Any	CO1
		15-25	Moderately intrusive	Any	CO1, CO2
		>25	Highly intrusive	Any	CO1, CO2
				>2 consecutive rest periods	CO1, CO2, RO
OOHW Sleep Period Night	Monday – Sunday 10pm – 6am (including public holidays)	<5	Noticeable	Any	CO1
		5-15	Clearly audible	Any	CO1
		15	Moderately intrusive	Any	CO1, CO2
				>2 consecutive sleep periods	CO1, CO2, RO
		>25	Highly intrusive	Any	CO1, CO2, RO
				>2 consecutive sleep periods	CO1, CO2, RO, AA

Table 6 relates to exceedances of ground-borne construction noise at noise sensitive receivers.

Table 6 Additional Management Measures – Ground- borne Noise

TIME PERIOD		EXCEEDANCE OF NML	PERCEPTION	DURATION	COMMUNICATION CATEGORY/ MANAGEMENT MEASURE
OOHW Rest Period Evenings	Monday – Sunday 6pm – 10pm (including public holidays)	<5	Noticeable	Any	CO1
		5-15	Clearly audible	Any	CO1
		15-25	Moderately intrusive	Any	CO1, CO2
		>25	Highly intrusive	Any	CO1, CO2
				>2 consecutive rest periods	CO1, CO2, RO
OOHW Sleep Period	Monday – Sunday 10pm – 6am (including public holidays)	<5	Noticeable	Any	CO1
		5-15	Clearly audible	Any	CO1

TIME PERIOD		EXCEEDANCE OF NML	PERCEPTION	DURATION	COMMUNICATION CATEGORY/ MANAGEMENT MEASURE
Night		15	Moderately intrusive	Any	CO1, CO2
				>2 consecutive sleep periods	CO1, CO2, RO, AA
		>25	Highly intrusive	Any	CO1, CO2, RO
				>2 consecutive sleep periods	CO1, CO2, RO, AA

Table 7 relates to exceedances of the human comfort vibration values for continuous, impulsive and intermittent vibration at noise sensitive receivers. Potential exceedances of the cosmetic or structural damage criteria are to be addressed via the Standard Management Measures in Table 4.

Table 7 Additional Management Measures – Vibration

TIME PERIOD		DURATION	EXCEEDENCE OF 'PREFERRED' VALUE	EXCEEDENCE OF 'MAXIMUM' VALUE
OOHW Rest Period Evenings	Monday – Sunday 6pm – 10pm (including public holidays)	Any	CO1, CO2	CO1, CO2, RO
OOHW Sleep Period Night	Monday – Sunday 10pm-6am (including public holidays)	Any	CO1, CO2, RO	CO1, CO2, RO, AA

4 Complaint handling and community engagement

Complaints will be handled in accordance with ARTC's complaints management system and processes required under the CoA. Community engagement processes shall be developed in the Contractor Communications and Stakeholder Engagement Plan for each proposal incorporating the management measures set out within this Framework.

5 Monitoring and auditing

5.1 Noise and vibration monitoring

Compliance noise and vibration monitoring shall be undertaken by the Contractor in accordance this Framework. Noise measurements shall be undertaken by the Contractor consistent *AS1055.1-1997 Acoustics – Description and Measurement of Environmental Noise – General Procedures*. Vibration measurements shall be undertaken in accordance with *Assessing Vibration: a technical guideline* and *BS7385 Part 2-1993 Evaluation and measurement of vibration in buildings*, as recommended in *AS 2187: Part 2-2006 'Explosives - Storage and Use - Part 2: Use of Explosives'*.

5.1.1 Track possession monitoring program

If there is the potential to impact sensitive receivers, during a track possession, a monitoring program shall be initiated by the Contractor to confirm predicted noise and vibration levels and identify any additional feasible and reasonable measures to reduce impact on receivers. The monitoring program (for either noise, vibration

or both) shall be risk based, and shall not need to occur if there are no impacted receivers within the vicinity of the Works. Design of the monitoring program will be included in the Contractors CNVMP.

5.1.2 Dilapidation surveys

If construction activities by the Contractor have potential to cause cosmetic or structural damage through vibration or overpressure to public utilities, structures, buildings or their contents an existing condition report of buildings and structures shall be undertaken by the Contractor in accordance with *AS 4349.0 Inspection of buildings – General requirements*. Where a heritage structure is assessed as potentially susceptible to vibration damage, a more conservative cosmetic damage criterion shall be adopted by the Contractor.

5.2 Auditing

Periodic audits by the Contractor shall be undertaken of construction activities in relation to the content within this Framework along with the Contractor's appropriate implementation of the CNVMP to ensure that noise and vibration predictions are accurate and the required management measures are in place. ARTC may elect to join such audits. The Contractor's Construction Environmental Management Plan and CNVMP shall prescribe the auditing regime for each proposal.