TECHNICAL REPORT

8

Construction Noise and Vibration Impact

ILLABO TO STOCKINBINGAL ENVIRONMENTAL IMPACT STATEMENT

Technical and Approvals Consultancy Services: Illabo to Stockinbingal

Technical Paper 8 – Construction Noise and Vibration Impact Assessment

August 2022

2-0001-220-EAP-00-RP-0007

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Glossary

'A' Frequency Weighting	Frequency weighting applied to sound levels to approximate the relative loudness of different frequencies perceived by the human ear.
ARTC	Australian Rail Track Corporation
AS	Australian Standards
AVTG	Assessing Vibration Technical Guide
BS	British Standards
CEMP	Construction Environmental Management Plan
CNVF	ARTC Construction Noise and Vibration Framework
CNVMP	Construction Noise and Vibration Management Plan
CNVS	Construction Noise and Vibration Strategy
dB	Decibels
DEC	NSW Department of Environment and Conservation
DECCW	NSW Department of Environment Climate Change and Water
DEFRA	Department of Environment, Food and Rural Affairs
DIN	Deutsches Institut für Normung (German Institute for Standardisation)
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPL	Environment Protection Licence
Equivalent Continuous Sound Level, L_{Aeq}	Many sounds, such as rail noise, vary repeatedly in level over a period of time. The L_{Aeq} is the A weighted single figure noise level which represents the same amount of energy as the time varying signal over a period of time. The decibel scale is a logarithmic ratio, so the higher noise levels have far more sound energy, and therefore the L_{Aeq} level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closer to the L_{Aeq} noise level than any other descriptor.
'F' (Fast) Time Weighting	Standardised time averaging constant of 0.125 seconds.
I2S	Illabo to Stockinbingal
ICNG	Interim Construction Noise Guideline
IRDJV	Inland Rail Design Joint Venture – WSP Australia | Mott MacDonald Joint Venture legal entity
Maximum Noise Level, L_{AFmax}	The Root-Mean-Square maximum sound pressure level measured with sound level meter using the 'A' frequency weighting and the 'F' (Fast) time weighting.
Maximum Noise Level, L_{ASmax}	The Root-Mean-Square maximum sound pressure level measured with sound level meter using the 'A' frequency weighting and the 'S' (Slow) time weighting.

NATA	National Association of Testing Authorities
NML	Noise Management Levels
NPfI	Noise Policy for Industry
NSW	New South Wales
OEH	Office of Environment and Heritage
PPV	Peak Component Particle Velocity
Proposal site	The area that would be directly affected by construction and operation of the proposal. It includes the location of proposal infrastructure, the area that would be directly disturbed by the movement of construction plant and machinery, and the location of the storage areas/compounds sites etc., that would be used to construct that infrastructure. Also referred to as the 'construction footprint'.
RBL	Rating Background Level
RMS	Roads and Maritime Services
RNP	Road Noise Policy
'S' (Slow) Time Weighting	Standardised time averaging constant of 1 second.
SEARs	Secretary's Environmental Assessment Requirements
Sound Exposure Level, SEL	A parameter closely related to L_{Aeq} for assessment of events such as trains that have similar characteristics but are of different duration. The SEL value contains the same amount of acoustic energy over a 'normalised' 1-second period as the actual noise event under consideration.
Sound Pressure Level, SPL	The basic unit of sound measurement is the sound pressure level. The pressures are converted to a logarithmic scale and expressed in decibels (dB).
Sound Power Level, SWL	Sound power represents the inherent sound energy of a source. The sound power level is a logarithmic measure of the sound power in comparison to a specified reference level (dB).
Statistical Noise Levels, Ln	Noise which varies in level over a specific period of time 'T' (standard measurement times are 15 minute periods) may be quantified in terms of various statistical descriptors. The noise level, in decibels, exceeded for 1% of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as $L_{AF1, T}$. This may be used for describing short-term noise levels such as could cause sleep arousal during the night. The noise level, in decibels, exceeded for 10% of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as $L_{AF10, T}$. The noise level, in decibels, exceeded for 90% of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as $L_{AF90, T}$. It is used to describe the background noise level.
TfNSW	Transport for New South Wales
Vibration Dose Value, VDV	The VDV is given by the fourth root of the integral with respect to time of the fourth power of the acceleration after it has been weighted.

Executive summary

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. Inland Rail involves the design and construction of a new inland rail connection, about 1,700 kilometres (km) long, between Melbourne and Brisbane. Inland Rail is a major national proposal that will enhance Australia's existing national rail network and serve the interstate freight market.

Australian Rail Track Corporation Ltd (ARTC) is seeking approval to construct and operate the Illabo to Stockinbingal section of Inland Rail ('the proposal'), which consists of about 39km of new, greenfield single track standard gauge railway and associated infrastructure between Illabo and Stockinbingal.

This noise and vibration impact assessment

The Secretary's Environmental Assessment Requirements (SEARs) issued on 30 April 2021 by the (then) NSW Department of Planning, Industry and Environment (now the Department of Planning and Environment) requires a noise and vibration impact assessment to support the Environmental Impact Statement being prepared for the proposal. This technical paper addresses the relevant noise and vibration impact requirements in the SEARs. It provides an assessment of the airborne and ground-borne noise and vibration impacts generated by the construction of the project. Appropriate mitigation measures are identified, as required.

Potential construction impacts

Predictions indicate that airborne construction noise levels could significantly impact the closest receivers. These impacts include exceedance of noise management levels, highly noise affected receivers, and in some cases, sleep disturbance. The most affected clusters of receivers are located around Stockinbingal. Ground-borne construction noise is not predicted to exceed trigger levels.

Additionally, some heritage, residential, and non-residential and receivers located within and adjacent to the construction footprint may be at risk of exceeding cosmetic vibration damage and/or human comfort screening levels.

Potential noise impacts from construction traffic on public roads has been identified along Troy Street.

Exceedances of noise management levels, highly noise affected receivers, potential sleep disturbance and awakening, construction traffic noise management levels, ground-borne noise management levels, and cosmetic damage and human comfort vibration screening criteria will be managed according to the ARTC Construction Noise and Vibration Framework (CNVF).

Mitigation

Through the implementation of standard mitigation measures, as outlined in the ARTC Construction Noise and Vibration Framework (CNVF), and specific mitigation measures as outlined in Chapter 8 of this technical paper, the noise and vibration SEARs for the proposal can be achieved.

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. Inland Rail involves the design and construction of a new inland rail connection, about 1,700 kilometres (km) long, between Melbourne and Brisbane. Inland Rail is a major national proposal that will enhance Australia's existing national rail network and serve the interstate freight market.

Australian Rail Track Corporation Ltd (ARTC) is seeking approval to construct and operate the Illabo to Stockinbingal section of Inland Rail ('the proposal'), which has a total extent of about 42.5km, and consists of about 39km of new, greenfield single track standard gauge railway and associated infrastructure between Illabo and Stockinbingal.

The proposal requires approval from the NSW Minister for Planning under Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposal is also a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and requires approval from the Australian Government Minister for the Environment.

This report has been prepared by Inland Rail Design Joint Venture (WSP/Mott Macdonald) as part of the environmental impact statement (EIS) for the proposal. The EIS has been prepared to accompany the application for approval of the proposal and addresses the Secretary's Environmental Assessment Requirements (SEARs) from the Secretary of the (then) NSW Department of Planning, Industry and Environment (now the Department of Planning and Environment), issued on 30 April 2021.

1.2 The proposal

The proposal is located between Illabo and Stockinbingal within the Riverina region of NSW. The location of the proposal is shown in Figure 1.1.

1.2.1 Key features

The key features of the proposal (which would be confirmed during detailed design) are shown in Figure 1.2 and includes:

- a total extent of about 42.5km, including about 39km of new, greenfield single track standard gauge railway between Illabo and Stockinbingal, including:
  - a combination of track vertical alignments on existing ground level, on embankments and in cuttings
  - 8 new bridges at watercourses, two road overbridges and one grade separated (road over rail) at Burley Griffin Way
  - one crossing loop and associated maintenance siding
  - construction of new level crossings and alterations of existing level crossings (including public roads and private accesses)
  - stock underpasses and other vehicular crossings on private land to allow for the movement of livestock and vehicles across the rail line
  - installation and upgrade of about 88 new and existing cross drainage culverts below the rail formation and 27 longitudinal drainage culverts below level crossings
  - removal of redundant sections of track along the existing Stockinbingal to Parkes line and Lake Cargelligo line at Stockinbingal

- upgrades of about 3km of existing track for the tie-in works to the existing Main South rail line at Illabo, and tie ins to the Stockinbingal to Parkes rail line at Stockinbingal
- construction of about 1.7km of new track to maintain the existing connection of the Lake Cargelligo rail line either side of the proposal
- realignment of a 1.4km section of the Burley Griffin Way to provide a road over rail bridge at Stockinbingal
- realignment of Ironbong Road to allow for safe sight lines at the new active level crossing.

Associated infrastructure would include signalling and communications, signage, fencing and services and utilities. The construction of the proposal would also require the following works:

- construction access roads and access tracks
- watercourse crossings
- temporary changes to the road network
- construction compounds.

1.2.2 Timing and operation

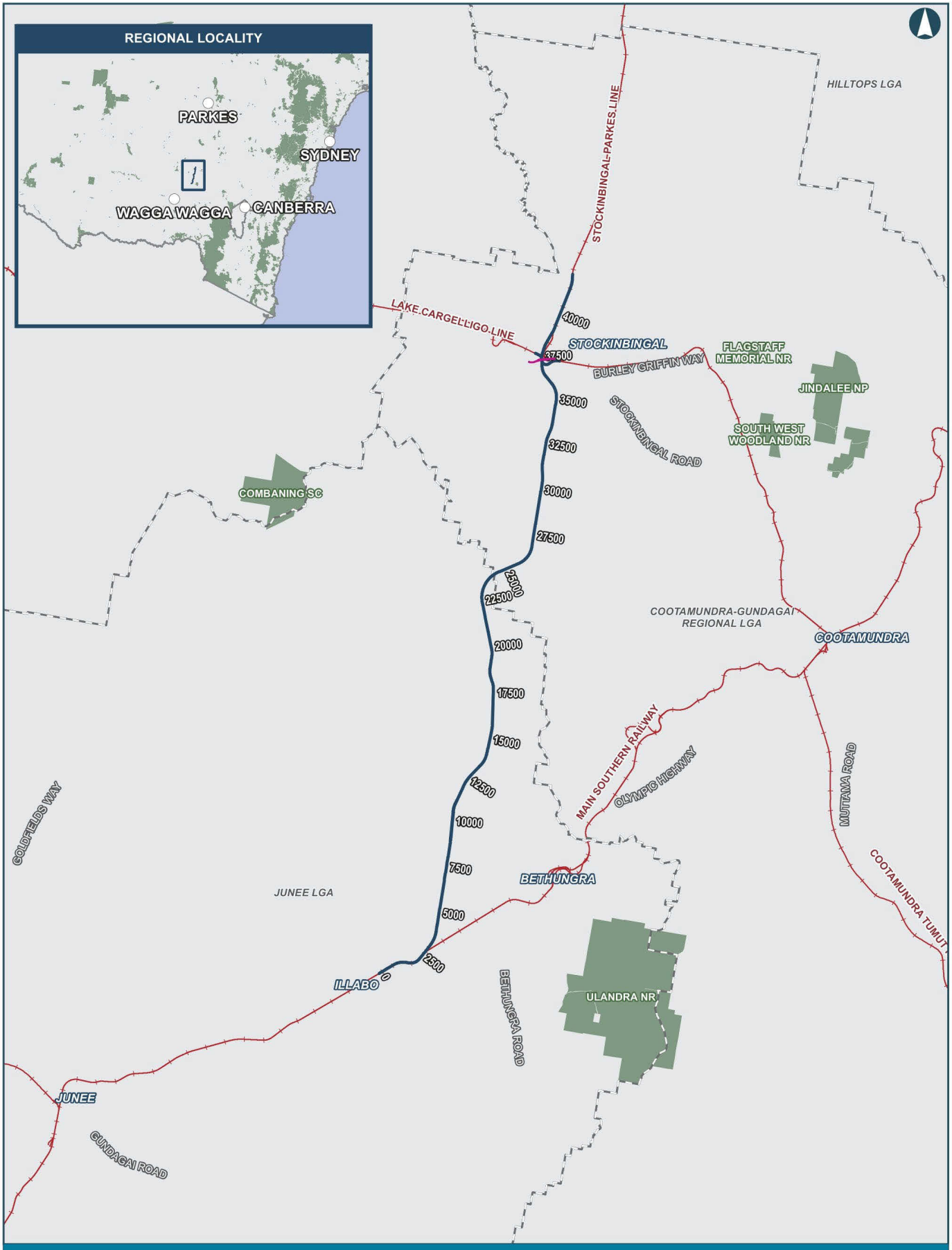
Subject to approval of the proposal, construction of the proposal is planned to start in mid-2024 and is expected to be completed mid-2026.

The proposal would form part of the rail network managed and maintained by ARTC. Train services would be provided by a variety of operators. It is estimated the Illabo to Stockinbingal section of Inland Rail would be trafficked by an average of 6 trains per day (both directions) from commencement of operations in late 2026, increasing to about 11 trains per day (both directions) in 2040.

The new rail line will be a faster, more efficient route that bypasses the Sydney rail network and will enable the use of double stacked trains (up to 6.5 metres high) along its entire length.

The trains would be diesel powered, and would be a mix of grain, intermodal (freight), and other general transport trains up to 1,800 metres in length.

The proposal is expected to be operational, as part of Inland Rail as a whole, once all 13 sections are complete, which is estimated to be in 2027. Prior to that, regional rail movements may occur on the Illabo to Stockinbingal section once complete.



ILLABO TO STOCKINBINGAL 1.1 Location of the proposal

0 2 4 6 km

Coordinate System: GDA 1994 MGA Zone 55

Date: 7/23/2021 Paper: A3

Author: IRDJV Scale: 1:200,000

Data Sources: ARTC, NSWSS, ESRI

Key features of proposal

- Key features of proposal
- 40950 Chainage (distance in metres from southern limit of the proposal)
- Burley Griffin Way realignment

Existing features

- Local Government area boundary
- Existing rail
- Parks and reserves
- Sub-arterial road
- Arterial road

INLAND RAIL ARTC

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

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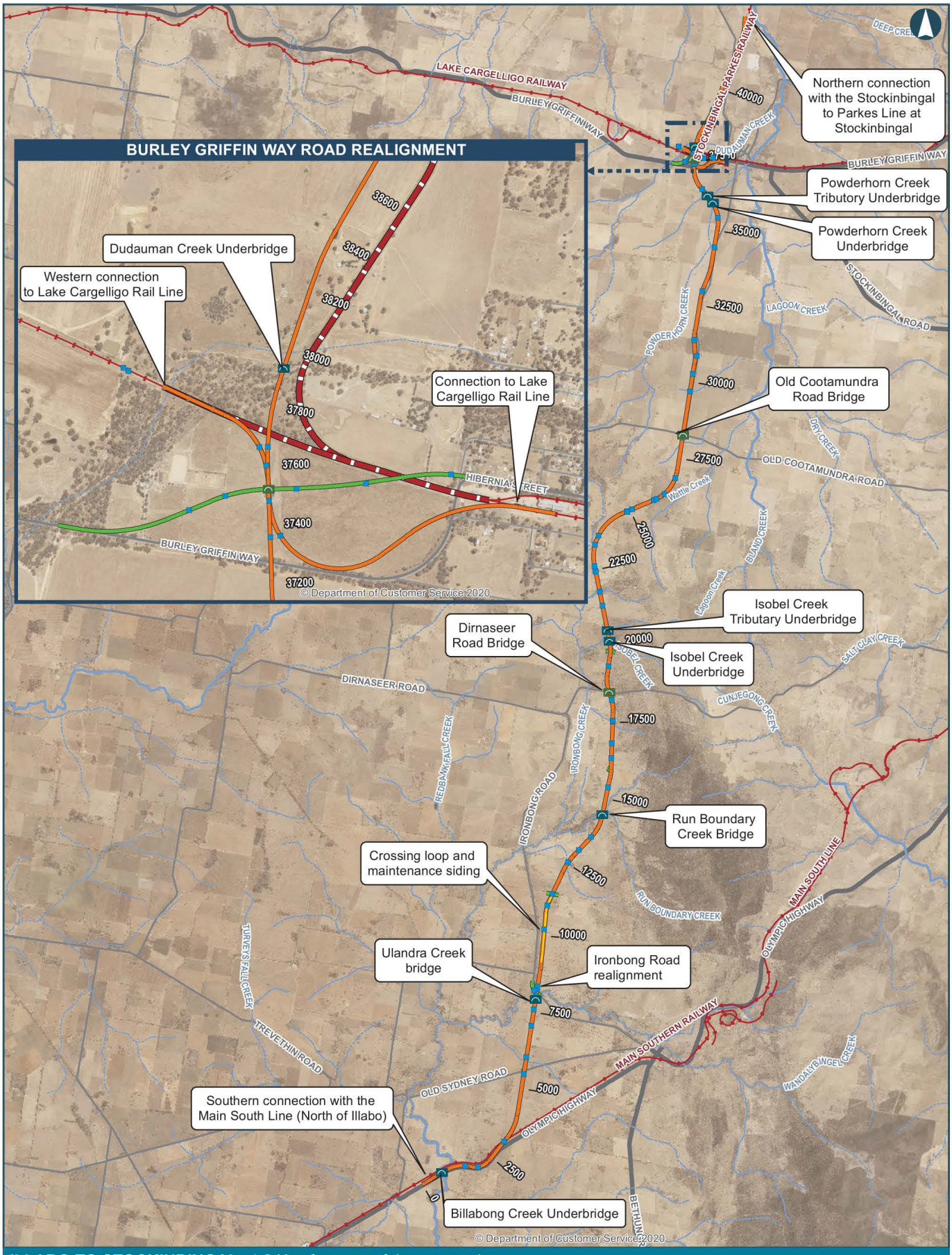

ILLABO TO STOCKINBINGAL 1.2 Key features of the proposal

0 1 2 3 km

Coordinate System: GDA 1994 MGA Zone 55

Date: 7/23/2021 Paper: A3

Author: IRDJV Scale: 1:120,000

Data Sources: ARTC, NSWSS, ESRI

Key features of proposal

- New track/track upgrade
- 40950 Chainage (distance in metres from southern limit of the proposal)
- Crossing Loop & Maintenance Siding
- Burley Griffin Way Road realignment
- Culvert
- Bridge (road crossing)
- Bridge (water crossing)

Existing features

- Sub-arterial road
- Arterial road
- Existing Rail
- Major Watercourse
- Minor Watercourse
- Redundant sections of rail to be decommissioned

INLAND RAIL ARTC

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

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1.3 Purpose and scope of this report

This report has been prepared by the Inland Rail Design Joint Venture (IRDJV), as part of the Environmental Impact Statement (EIS) for the proposal to:

- identify the noise and vibration assessment study area and associated sensitive properties
- describe the existing noise environment
- define the assessment criteria adopted to assess the proposal's noise and vibration impacts
- present predicted construction noise and vibration levels associated with building the proposal
- present the feasible and reasonable mitigation and management measures that should be considered for noise and vibration impacts when building the proposal.

This report has been prepared to specifically address the Secretary's Environmental Assessment Requirements (SEARs) issued by the (then) NSW Department of Planning, Industry and Environment on 30 April 2021. The SEARs relevant to construction noise and vibration, and references to sections where they have been addressed in the report is presented below in Table 1.1.

This report assesses noise and vibration impacts generated by the construction of the proposal. This report is one of three reports that address noise and vibration impacts from the proposal; operational rail noise and vibration is addressed in Technical Paper 9 and operational (non-rail) noise and vibration is addressed in Technical Paper 10.

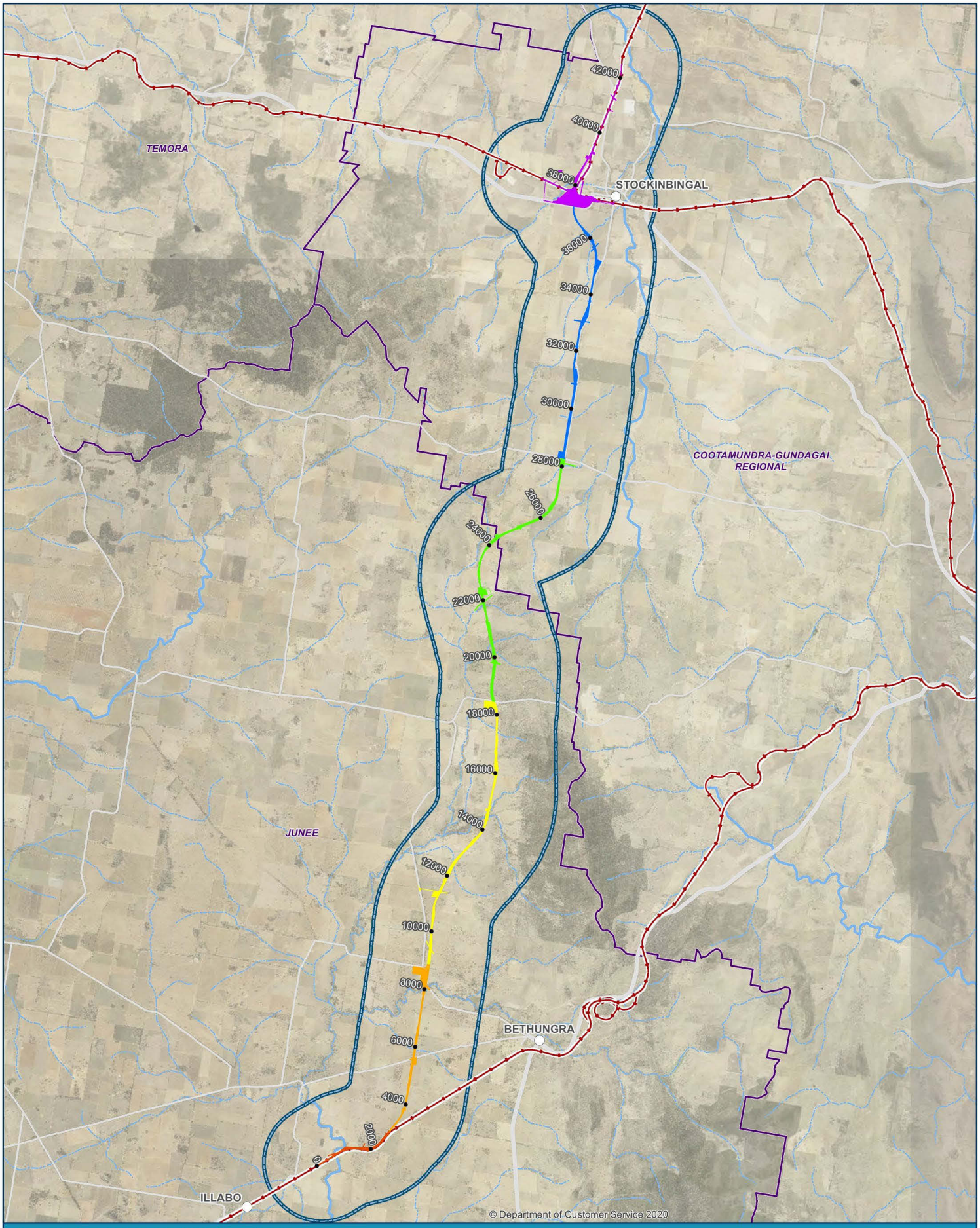
Table 1.1 Secretary's Environmental Assessment Requirements – Noise and vibration

Key issue	Assessment requirement	Report reference
9. Noise and vibration	1) Construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines.	Construction noise and vibration has been assessed in this report. Refer to Chapter 4 (noise) and Chapter 5 (vibration). Operational rail noise and vibration has been assessed in a separate report (Technical Paper 9). Operational road noise and vibration (due to the realignment of Burley Griffin Way) has been assessed in a separate report (Technical Paper 10).
	2) The assessment of construction noise and vibration must address:	
	a) the nature of construction activities and related noise characteristics;	Nature of construction activities presented in sections 4.2 to 4.4. Noise characteristics (e.g. annoying characteristics) addressed in section 4.4.
	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;	Addressed throughout Chapters 4 and 5, and section 5.
	c) the identification and nature of receivers, existing and proposed, during the construction period;	Identification of existing receivers is provided in section 3.1.3.
	d) the structural integrity and heritage significance of items (including Aboriginal places and items of environmental heritage).	Structural integrity and heritage significance of items discussed in Chapter 15 of the EIS and Technical Paper 7.

Key issue	Assessment requirement	Report reference
	e) the nature of the impact and the sensitivity of receivers, including but not limited to residential (permanent and short term), tourist and commercial uses, both existing and proposed, and level of impact including for out of hours works;	The nature of impact has been assessed based on the sensitivity of receivers in section 4.5.
	f) 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 8 outlines potential construction noise and vibration management measures to balance timely conclusion of construction works with periods of receiver respite.
	g) 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);	Out-of-hours works are defined in section 4.3, including justification of activities in terms of the ICNG. The duration of out-of-hours works is presented in section 4.4. Impacts from these works are addressed in sections 4.6 and 4.7
	h) sleep disturbance (including the number of noise-awakening events);	Sleep disturbance impacts are quantified in section 4.5.
	i) details and analysis of the predicted effectiveness of mitigation measures to adequately manage identified impacts, including impacts as identified in (h),	Details and quantitative analysis of the efficacy of mitigation is presented in section 8.2.
	j) any potential residual noise and vibration impacts following application of mitigation measures; and	Potential residual noise and vibration impacts are addressed in section 8.2.
	k) 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.	Description of how receiver feedback has been taken into account in design of mitigation is presented in section 8.1.1
	3) If blasting is required, demonstration that blast impacts can comply with current guidelines.	Demonstration of how blasting impacts can comply with current guidelines is presented in Chapter 6.

1.4 Study area

The study area for the construction noise and vibration assessment consists of a 2km buffer around the proposed rail alignment. The study area is presented in Figure 1.3, along with the proposed work sections over which construction is expected to take place. The 2km buffer has been chosen as it is the limit for which the noise prediction algorithm (CONCAWE) is valid. This extent 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.



ILLABO TO STOCKINBINGAL 1.3 Study area

0 2 4 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 7/23/2021 Paper: A3
Author: IRDJV Scale: 1:120,000
Data Sources: IRDJV, ARTC, LPI

Study area

Existing features

- Townships
- Existing Rail
- Local Government Area
- Major Watercourse
- Minor Watercourse
- Sub-arterial road
- Arterial road

Construction section

- Section 1 (0-2,900)
- Section 2 (2,901-8,840)
- Section 3 (8,841-18,500)
- Section 4 (18,501-28,300)
- Section 5 (28,301-37,300)
- Section 6 (37,300-42,600)

INLAND RAIL ARTC

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

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1.5 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 – Existing environment** – describes the existing noise environment of the assessment area and identifies sensitive receivers.
- **Chapter 4 – Construction noise assessment** – describes the methodology and predicted noise impacts generated by the construction of the proposal.
- **Chapter 5 – Construction vibration assessment** – describes the methodology and defines minimum working distances to meet cosmetic damage and human comfort targets.
- **Chapter 6 – Blasting assessment** – describes the methodology and maximum instantaneous charge size to meet overpressure and ground-borne noise targets.
- **Chapter 7 – Cumulative noise and vibration assessment** – describes the potential cumulative impacts of the proposal.
- **Chapter 8 – Construction noise and vibration mitigation and management** – details recommended mitigation and management 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

This chapter outlines legislation and guidelines relevant to the assessment and presents the applicable criteria and trigger levels.

2.1 Protection of the Environment Operations Act 1997

Under the *Protection of the Environment Operations Act 1997* (POEO Act) an environment protection licence (EPL) is required to undertake a scheduled activity or scheduled development work. The proposal requires an EPL as construction is a scheduled activity under 'Railway activities – railway infrastructure construction'. ARTC Inland Rail or the construction contractor would apply to the NSW Environment Protection Authority (EPA) for the construction licence. The application would include a construction noise and vibration management plan (CNVMP) that provides a description of how the proposal will meet the environmental noise and vibration criteria and approval conditions. The premises description in ARTC's existing EPL for the rail network (number 3142) would be modified to include the proposal once constructed (refer to Technical Paper 9).

2.2 Referenced documents

This report has been written in accordance with the SEARs. Table Note 1 of the SEARs states that *"It is the Proponents responsibility to identify, and justify, which guidelines have been applied to a specific project"*. In line with the SEARs, the assessment has been prepared with reference to the documents presented in Table 2.1. Where more recent versions of the documents are available (than those nominated in the SEARs), these have been nominated.

Table 2.1 Assessment guidelines

Acoustic aspect	Description	Assessment guidelines
Airborne noise	Construction noise	Interim Construction Noise Guideline (DECCW, 2009)
	Construction traffic noise	NSW Road Noise Policy (DECCW, 2011) Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime, 2016)
	Sleep disturbance from construction noise (for work lasting more than 2 consecutive nights)	Interim Construction Noise Guideline (DECCW, 2009) NSW Road Noise Policy (DECCW, 2011)
	Existing ambient and background noise levels	Interim Construction Noise Guideline (DECCW, 2009) Noise Policy for Industry (EPA, 2017) Australian Standard AS 1055 Description and measurement of environmental noise
Ground-borne noise	Construction noise transmitted through the ground into a structure	Interim Construction Noise Guideline (DECCW, 2009)
Vibration	Construction vibration amenity impacts	Assessing Vibration a technical guideline (DEC, 2006)
	Construction vibration effect on structures (structural or cosmetic damage)	German Standard DIN 4150-3: Structural Vibration - effects of vibration on structures Construction Noise and Vibration Strategy 2019 (TfNSW, 2019)

Acoustic aspect	Description	Assessment guidelines
Blasting	Blast overpressure and ground vibration amenity impacts	Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC, 1990) Australian Standard AS 2187: Part 2-2006 Explosives – Storage and Use Part 2: Use of Explosives
	Blast overpressure and ground vibration effect on structures (structural or cosmetic damage)	Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC, 1990) German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures
Management	Mitigation and management of noise and vibration issues	Interim Construction Noise Guideline (DECCW, 2009) Construction Noise and Vibration Management Framework 2017 (ARTC, 2017)

2.3 Construction Noise Management Levels

The *Interim Construction Noise Guideline* (ICNG) has been developed to focus on identifying and understanding the impact of construction noise on sensitive land uses, and the application of reasonable and feasible management measures to minimise construction noise impacts.

As outlined in the ICNG, a quantitative assessment requires the development of Noise Management Levels (NML) based on existing Rating Background Levels (RBLs), and a comparison of predicted construction noise levels with the developed NMLs. Where predicted noise levels are greater than NMLs, all feasible and reasonable work practices should be applied by the proponent to meet the noise affected level.

The recommended standard hours defined in the ICNG represent the times of the day when receivers are likely to be less sensitive to noise impacts. Where work is proposed outside of ICNG standard hours, justification is required and more stringent NMLs apply. For all other receiver types, the NMLs only apply when the receiver location is occupied/in use. Table 2.2 sets out the application of the management levels for noise at residences.

Representative RBLs for the study area have been derived from noise monitoring described in Chapter 3. Where rating background levels (with no exclusions due to weather or extraneous noise levels) have been measured as less than the minimum assumed rating background noise levels (outlined in Table 2.1 of the NPfI), background levels have been set to the minimum assumed levels.

Table 2.3 and Table 2.4 present the NMLs for representative residential receivers and nearest non-residential sensitive receivers. Feasible and reasonable mitigation and management measures, as defined in the ICNG, are to be implemented where NMLs are exceeded either during or outside of recommended ICNG standard hours for construction work.

Table 2.2 Application of the ICNG noise management levels for residential receivers

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

Table 2.3 Noise management levels at residential receivers

Time	RBL dBA[1]	Noise management level dBA $L_{eq,\ 15\ minute}$	Highly noise affected level dBA $L_{eq,\ 15\ minute}$
Standard hours[2]	35	45	75
Out of hours – Day[3]	35	40	N/A
Out of hours – Evening[3]	30	35	
Out of hours – Night[3]	30	35	

(1) Background levels are below the minimum assumed rating background noise levels outlined in the NPfI at all measurement locations along the proposed corridor, as such, they have been adjusted to 35dBA during the day period, and 30dBA during the evening and night periods in accordance with the NPfI (see Chapter 3 for detail on measurement of existing environment)

(2) Standard hours period defined as – Monday to Friday 7am to 6pm, Saturday 8am to 1pm, and no work on Sundays or public holidays

(3) Out-of-hours periods defined as – Day: Saturday 7am to 8am and 1pm to 6pm, Sunday 8am to 6pm; Evening: Monday to Sunday 6pm to 10pm; Night: Monday to Saturday 10pm to 7am, Sunday 10pm to 8am

Table 2.4 Noise management levels for non-residential sensitive receivers

Land use	Noise management level (external) dBA $L_{eq,\ 15\ minute}$
Educational	55[1]
Commercial (offices, retail outlets)	70
Commercial (industrial)	75
Active Recreation	65
Passive Recreation	60
Place of worship	(internal 45) 55[1]

(1) An internal to external correction of +10dB has been applied as per the ICNG

2.4 Sleep disturbance

Construction noise during the night (10pm to 7am Monday to Saturday, 10pm to 8am Sunday) has the potential to awaken residents from sleep. Guidance for the assessment of sleep disturbance is provided in the *Road Noise Policy* (RNP) (DECCW, 2011).

The RNP notes that a screening test of $L_{AF1,1min}$, aimed at limiting sleep disturbance due to environmental noise, should not exceed the ambient L_{A90} + 15dB. Section 5.4 of the RNP then goes on to state that:

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

The guidance within 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 indicated in the ICNG.

Therefore, sleep disturbance and awakening external noise level screening levels of RBL+15dB and L_{max} 65dBA, whichever is most conservative (lowest) within each NCA, has been adopted.

2.5 Construction traffic noise

The RNP provides guidance on the assessment of noise impacts from road traffic noise on sensitive receivers. As the RNP provides guidance with relation to operational noise impacts, and noise from construction traffic is non-permanent, further guidance has been taken from the *Construction Noise and Vibration Guideline* (CNVG) (Roads and Maritime, 2016).

The RNP provides guidance on the assessment of noise impacts on sensitive receivers from additional road traffic generated by the project operating on a public road network. Where vehicles operate within the boundaries of a construction site, noise impacts generated by these vehicles are included in the overall $L_{eq,15min}$ construction site noise emissions undertaken in line with the ICNG.

The RNP makes a distinction between the assessment of freeway/arterial/sub-arterial roads and local roads. Freeway/arterial/sub-arterial roads are assessed over day (7am to 10pm) and night (10pm to 7am) periods. Local roads are assessed against the peak hour noise impacts within both the day and night periods.

Table 2.5 presents a summary of the applicable road traffic criteria for residential receivers.

The CNVG states that 'an initial screening test should first be applied by evaluating whether noise levels will increase by more than 2dB due to construction traffic or a temporary reroute due to a road closure. Where increases are 2dB or less then no further assessment is required'.

Therefore, if the road traffic noise levels increase by more than 2dB as a result of the proposed construction traffic, and the criteria in Table 2.5 are exceeded, investigation of mitigation options would be required.

Table 2.5 Road traffic noise criteria for residential receivers on existing roads affected by additional traffic from land use developments

Road type	Road traffic noise criteria	
	Day (7am to 10pm)	Night (10pm to 7am)
Arterial/Sub-arterial/Collector	60 $L_{eq\ 15hr}$ dBA	55 $L_{eq\ 9hr}$ dBA
Local Roads	55 $L_{eq\ 1hr}$ dBA	50 $L_{eq\ 1hr}$ dBA

2.6 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 as follows:

- evening (6pm to 10pm) $L_{eq\ (15\ min)}$ 40dBA; and
- night-time (10pm to 7am) $L_{eq\ (15\ min)}$ 35dBA.

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 airborne noise levels. These levels are to be assessed at the centre of the most affected habitable room.

2.7 Vibration

Construction vibration can lead to:

- cosmetic and structural building damage
- loss of amenity due to perceptible vibration, termed human comfort.

Importantly, cosmetic damage is regarded as minor in nature; as it is readily repairable and does not affect a building's structural integrity. Damage of this nature is typically described as hairline cracks on drywall surfaces, hairline cracks in mortar joints and cement render, enlargement of existing cracks, and separation of partitions or intermediate walls from load bearing walls. If there is no significant risk of cosmetic damage, then structural damage is not considered a significant risk and is not further assessed.

The SEARs reference two documents for structural vibration that have different advice regarding vibration limits and impacts. As a result, the most stringent criteria between the guidance in both documents referenced in the SEARs has been applied; German Standard DIN 4150-3: 1999 *Structural Vibration – Part 3: Effects of vibration on structures* (DIN4150-3) for heritage structures, and *Construction Noise and Vibration Strategy* (TfNSW, 2018) (CNVS) for cosmetic damage and human comfort.

2.7.1 Cosmetic building damage

The CNVS presents minimum working distances based on the British Standard BS 7385-2: *Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration* (BS7385-2). The CNVS details general vibration screening criteria (Peak Particle Velocity) for intermittent vibration sources in Appendix A.3.4 based on BS 7385-2 as follows:

- reinforced or framed structures: 25.0mm/s
- unreinforced or light framed structures 7.5mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above, a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be required to determine the applicable safe vibration level.

2.7.2 Heritage structures

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 Peak Component Particle Velocity (PPV) (German Standard DIN 4150-3: 1999 *Structural Vibration – Part 3: Effects of vibration on structures* or equivalent) should be considered.

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 (based on DIN 4150) may be applicable.

2.7.3 Human comfort

The CNVS requires the assessment of vibration on human comfort in accordance with *Assessing Vibration – a technical guideline* (OEH, 2006) (AVTG). AVTG presents the limits (vibration dose values) above which there is considered to be a risk that the amenity and comfort of people occupying buildings would be adversely affected by construction work.

The applicable criteria for intermittent vibration are shown in Table 2.6 as vibration dose value ($m/s^{1.75}$).

The vibration guideline also specifies limits for continuous and impulsive vibration. These vibration limits are expressed in acceleration (m/s^2) and peak particle velocity (mm/s) as presented in Appendix C of the AVTG and reproduced in Table 2.7.

Table 2.6 Vibration limits for human exposure from intermittent vibration

Location	Assessment period[1]	Vibration dose value ($m/s^{1.75}$)	
		Preferred values	Maximum values
Critical areas[2]	Anytime	0.1	0.2
Residences	Daytime	0.2	0.4
	Night-time	0.13	0.26
Offices, schools, educational institutions, and places of worship	Anytime	0.4	0.8
Workshops	Anytime	0.8	1.6

(1) Daytime is 7.00am to 10.00pm and night-time is 10.00pm to 7.00am

(2) Examples include hospital operating theaters and precision laboratories where sensitive operations are occurring.

Table 2.7 Preferred and maximum values for continuous and impulsive vibration

Location	Assessment period	RMS acceleration m/s^2				Peak particle velocity mm/s	
		Preferred values		Maximum values		Preferred values	Maximum values
		Z-Axis	X and Y Axes	Z-Axis	X and Y Axes		
Continuous vibration							
Critical areas	Day or night- time	0.0050	0.0036	0.010	0.0072	0.14	0.28
Residences	Daytime	0.010	0.0071	0.020	0.017	0.28	0.56
	Night-time	0.007	0.005	0.014	0.010	0.20	0.40
Offices, schools, educational institutions, and places of worship	Day or night-time	0.020	0.014	0.040	0.028	0.56	1.1
Workshops	Day or night-time	0.04	0.029	0.080	0.058	1.1	2.2
Impulsive vibration							
Critical areas	Day or night-time	0.0050	0.0036	0.010	0.0072	0.14	0.28
Residences	Daytime	0.3	0.21	0.60	0.42	8.6	17.0
	Night-time	0.10	0.071	0.20	0.14	2.8	5.6
Offices, schools, educational institutions, and places of worship	Day or night-time	0.64	0.46	1.28	0.92	18.0	36.0
Workshops	Day or night-time	0.64	0.46	1.28	0.92	18.0	36.0

2.8 Blasting criteria

Ground vibration and overpressure generated by construction blasting are assessed according to the nominated Australian Standard for blasting criteria, AS 2187.2:2006 *"Explosives – Storage and use Part 2: Use of Explosives"* (AS 2187). Recommended standard hours for blasting activities are provided in the ICNG. The recommended limits provided in AS 2187, and DIN 4150 where AS 2187 does not provide a recommendation, have been summarised below. Standard hours for blasting activities are 7am to 6pm on Monday to Friday, 8am to 1pm on Saturday, and no work on Sundays or public holidays.

2.8.1 Human comfort limits

AS 2187 provides recommended human comfort limits for ground vibration and airblast overpressure.

The human comfort limits for airblast overpressure are summarised in Table 2.8. The AS 2187 human comfort and annoyance limits for blasting induced vibration are outlined in Table 2.9.

Table 2.8 Human comfort limits for airblast overpressure

Category	Type of blasting operations	Peak sound pressure level (dBL)	
		95% of blasts per year	Maximum values
Sensitive Site[1]	Operations lasting longer than 12 months or more than 20 blasts	115	120[2]
Sensitive Site[1]	Operations lasting for less than 12 months or less than 20 blasts	120	125[2]
Occupied non-sensitive sites, such as factories and commercial premises	All blasting	–	125[2,3]

(1) A sensitive site includes houses and low rise residential buildings, hospitals, theatres, schools, etc., occupied by people.

(2) Unless agreement is reached with occupier that a higher limit may apply.

(3) For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that can be shown to adversely affect the equipment operation.

Table 2.9 Human comfort limits for ground-borne vibration due to blasting

Category	Type of blasting operations	Peak component particle velocity (mm/s)	
		95% of blasts	Maximum values
Sensitive site[1]	Operations lasting longer than 12 months or more than 20 blasts	5	10[2]
Sensitive site[1]	Operations lasting for less than 12 months or less than 20 blasts	–	10[2]
Occupied non-sensitive sites, such as factories and commercial premises	All blasting	–	25[2,3]

(1) A sensitive site includes houses and low rise residential buildings, hospitals, theatres, schools, etc., occupied by people.

(2) Unless agreement is reached with occupier that a higher limit may apply.

(3) For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that can be shown to adversely affect the equipment operation.

2.8.2 Structural damage limits

In addition to the provided human comfort limits for blasting, AS 2187 provides the following structural damage limits due to blasting. The limits for airblast overpressure are shown in Table 2.10. The limits for cosmetic structural damage due to ground-borne vibration are as per Table 2.11. A damage limit of 100mm/s peak particle velocity has been adopted for unoccupied reinforced structures. Limits for other structures such as power lines above ground are dependent on their structural design methodology. For buried pipework, the limits within DIN 4150 have been adopted as per Table 2.12.

Table 2.10 Structural damage limits due to airblast overpressure from blasting

Category	Type of blasting operations	Peak sound pressure level (dBL)
Structures that include masonry, plaster and plasterboard in their construction and also unoccupied structures of reinforced concrete or steel construction	All blasting	133[1]
Service structures, such as pipelines, powerlines and cables located above the ground	All blasting	Limit to be determined by structural design methodology

(1) Unless agreement is reached with the owner that a higher limit may apply

Table 2.11 Ground-borne vibration limits for cosmetic damage from vibration due to blasting

Type of building	Peak component particle velocity in frequency range of predominant pulse[3]	
	4Hz to 15Hz	15Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings[1]	50mm/s at 4Hz and above	50mm/s at 4Hz and above
Unreinforced or light framed structure. Residential or light commercial type buildings[2]	15mm/s at 4Hz increasing to 20mm/s at 15Hz[4]	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above

(1) Refer to Line 1 in Figure 2.1

(2) Refer to Line 2 in Figure 2.1

(3) Values referred to are at the base of the building.

(4) For unreinforced or light framed structures, at frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) should not be exceeded.

Table 2.12 DIN 4150 guideline values for short-term vibration on buried pipework

Pipe material	Guideline values for velocity measured on the pipe in mm/s
Steel (including welded pipe)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

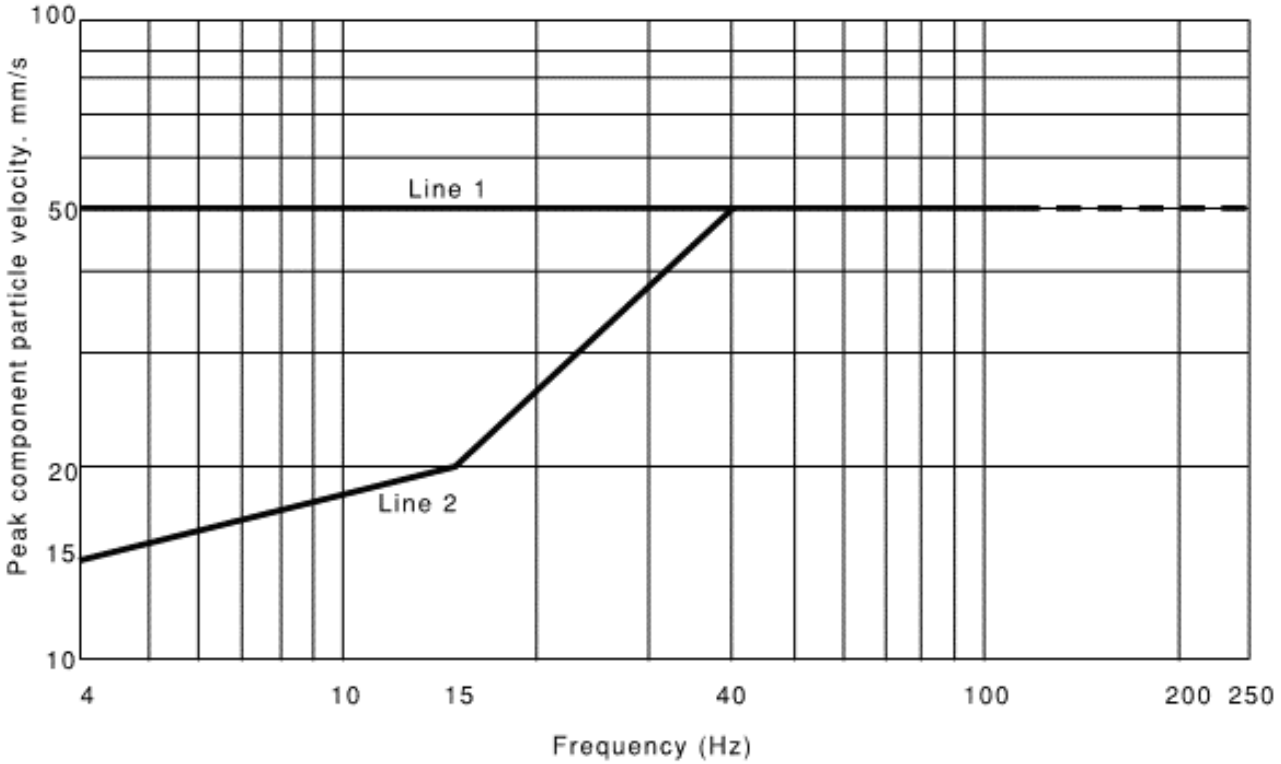


Figure 2.1 Reproduction of Figure J4.4.2.1 from AS 2187 for transient vibration guide values for cosmetic damage

3 Existing environment

The prevailing background and ambient noise levels surrounding the site were determined through a combination of unattended and operator attended noise surveys in accordance with the Australian Standard 1055: 2018 – *Acoustics – Description and Measurement of Environmental Noise* (AS 1055) and the NSW Noise Policy for Industry (EPA,2017) (NPfI).

3.1 Existing environment

3.1.1 Existing noise environment

The existing noise environment surrounding the proposal is characteristic of a rural landscape. The acoustical environment is controlled by natural sounds, with the majority of the study area having little or no road traffic noise, sparse settlement patterns, and generally characterised by low background noise levels. Burley Griffin Way and Olympic Highway are the main noise sources within the proposal study areas, with freight train lines at the northern and southern extent of the proposal intermittently contributing to the ambient noise environment. However, vehicle movements along the highways and freight lines are typically sparse and do not significantly impact the background noise levels of the surrounding environment.

3.1.2 Existing vibration environment

The most significant existing sources of vibration along the proposed alignment includes that generated by traffic on the local road network and existing rail operations at Illabo and Stockinbingal.

Vibration due to existing road and rail sources would be well below the structural damage and human comfort criteria for all vibration sensitive receivers in the study area, as demonstrated below. Therefore, direct measurement is not necessary.

The base curve for locomotive powered freight trains at 50mph (~80km/h) is provided in Figure 10-1 of the Federal Transit Administration (FTA) manual. It is reproduced in Figure 3.1 below (Source: United States of America Department of Transportation Federal Transit Administration – Transit Noise and Vibration Impact Assessment Manual, 2006).

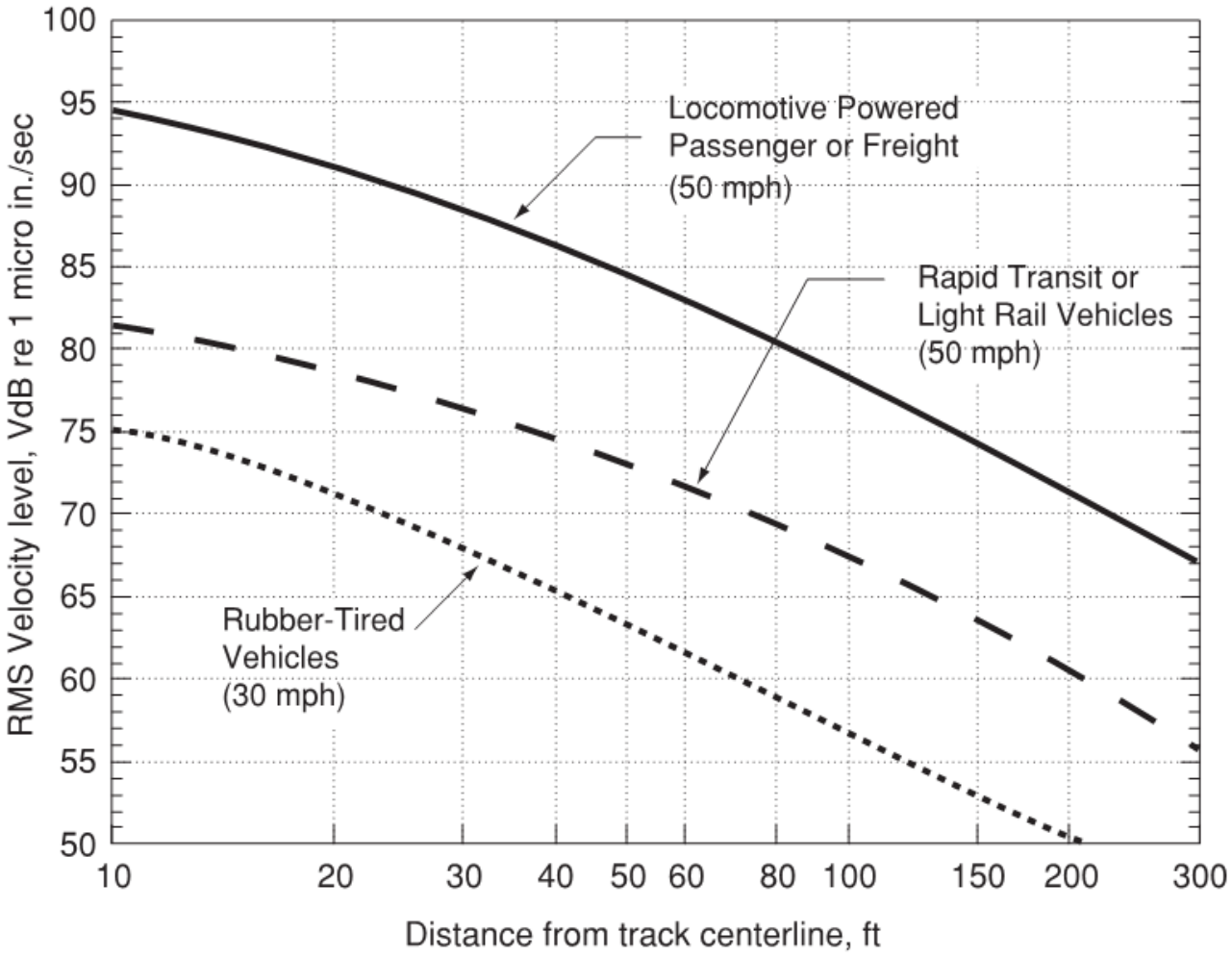


Figure 3.1 Generalised ground surface vibration curves

The following adjustments are made to the base curve in accordance with the FTA manual:

- +8VdB to account for stiff primary suspensions. Transit vehicles with stiff primary suspensions have been shown to create high vibration levels (as is the case for freight). This correction is usually included when the primary suspension has a vertical resonance frequency greater than 15Hz
- -5VdB to account for coupling to building foundation for timber framed buildings (note this is the most conservative value to apply; for 1–2 storey masonry the adjustment is -7VdB)
- 0VdB (i.e. no adjustment) assuming an existing train speed of no greater than 80km/h past existing houses in Stockinbingal and Illabo
- Crest factor of 5 has been used to convert from rms to PPV, which is common to adopt for ground-borne vibration from trains (usually 4 to 5).

The adjusted curve for locomotive powered freight trains at 80km/h and converted into metric units relevant for use in Australia is provided in Figure 3.2.

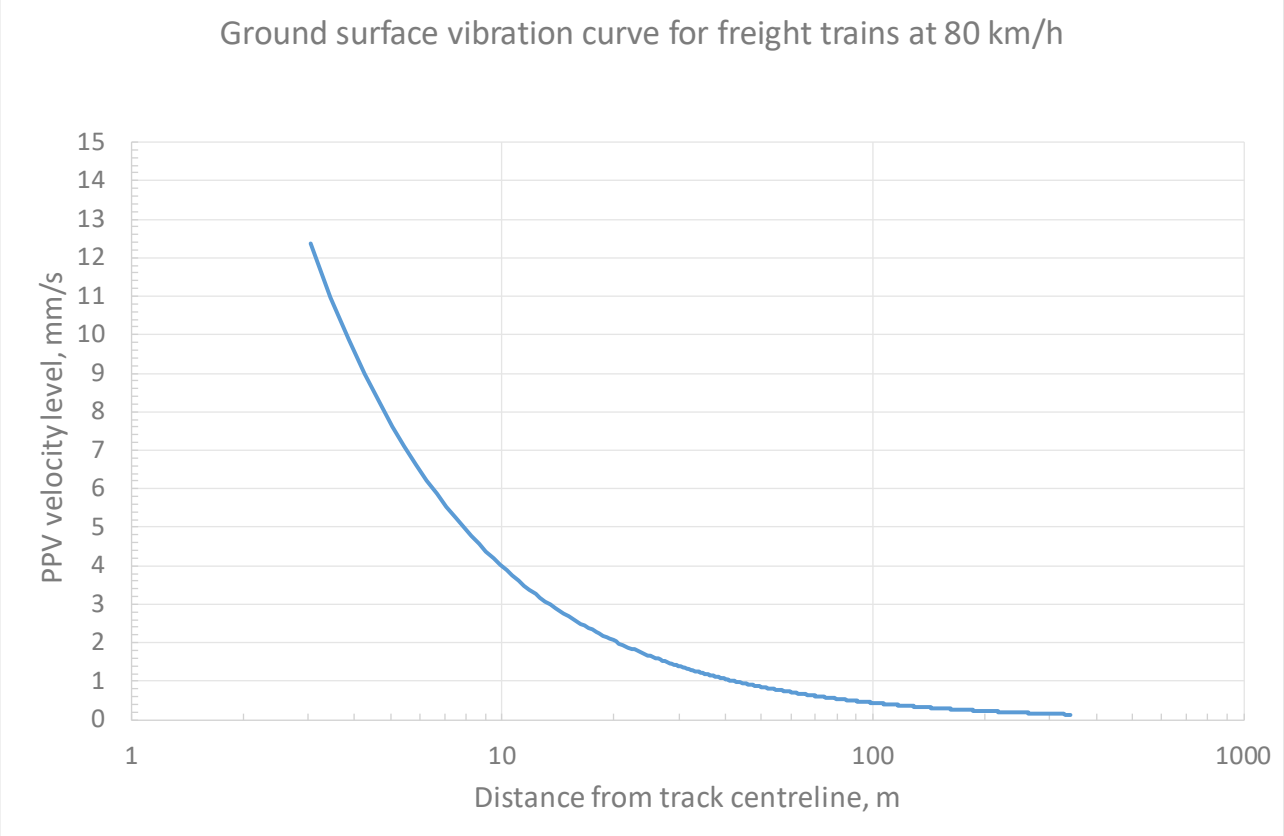


Figure 3.2 Ground surface vibration from existing freight trains

For Illabo and Stockinbingal, the closest houses are approximately 50m from the existing rail line, and as such the expected PPV is 1.2mm/s, which is well below the criteria for cosmetic/structural damage as outlined in sections 2.7.1 and 2.7.2.

Based on the existing freight traffic (up to 14 pass-bys per day, 1,000m train length, 80km/h), the Vibration Dose Value has been predicted to be 8.5 x 10^{-5}m/s$^{1.75}$. This is well below the vibration trigger levels for human comfort as outlined in section 2.7.2.

3.1.3 Sensitive receivers

The proposal has the potential to adversely impact nearby properties that are considered sensitive to noise and vibration, including both permanently occupied (i.e. residences) and temporarily occupied (such as shearing sheds) properties.

Receivers potentially sensitive to both noise and vibration in the following categories, as defined in the *Interim Construction Noise Guideline* (DECC, 2009) (ICNG), have been identified in the surrounding area.

Sensitive and non-sensitive receiver locations are identified in Figure 3.3.

3.1.3.1 Residential noise sensitive receivers

There are a total of 152 residential receivers located within the study area. Most residential receivers are located in Stockinbingal, east of the proposal footprint, in low-density residential dwellings. South of Stockinbingal, residential receivers are typically present as isolated rural residential dwellings within open farmland.

Residential dwellings located near the proposal are predominantly single storey. The minimum distance to the nearest residential properties is to receivers along Troy Street, adjacent to the nearest expected construction works.

3.1.3.2 Non-residential noise sensitive receivers

Non-residential noise sensitive receivers as described in the ICNG have also been identified in the project area. Table 3.1 presents a summary of these receivers and their respective distance from the proposal.

Table 3.1 Other noise sensitive receivers

Land use	Location	Approximate minimum distance from proposal footprint (m)
Passive Recreation	Stockinbingal Cemetery	300
Place of Worship	St Joseph's Catholic Church	500
Place of Worship	St James Anglican Church	550
Active Recreation	Britannia St Tennis Courts	250
Active Recreation	Stockinbingal Bowling Club	100
Active Recreation	Stockinbingal Racecourse	750
Active Recreation	Stockinbingal Public School	300
Education	Stockinbingal Public School	300

3.1.3.3 Commercial and industrial noise sensitive receivers

There is a total of 16 commercial and industrial buildings within the study area. Commercial and industrial areas close to the proposed alignment have been identified along Hibernia Street and Martin Street, towards the eastern end of Stockinbingal.

3.1.3.4 Vibration sensitive receivers

Vibration sensitive receivers include all occupied buildings. At sufficient vibration amplitudes, it can lead to cosmetic (and possibly structural) building damage as well as cause disturbance to occupants. Vibration can also affect sensitive structures, including certain heritage listed buildings. Heritage receivers, including non-aboriginal heritage receivers, Cohen's Trade Palace (CWA Rooms) and the Stockinbingal Railway Station (located within Stockinbingal), and the scarred trees identified as aboriginal heritage receivers (located near Ironbong Road and separately to the north-west of Stockinbingal), have been identified as having works potentially occur within minimum working distances.

The residential, non-residential, commercial and industrial receivers identified in the previous sections may be impacted by use of vibration generating equipment during construction of the proposal.

3.2 Noise monitoring locations

Several noise monitoring locations were used to characterise the existing noise environment in the areas surrounding the proposal and sensitive receivers potentially impacted by construction works. Noise monitoring locations were constrained to locations where access was possible on the day of deployment. The logger locations selected for the assessment were considered to be representative of the existing background and ambient noise environment in the study area. The weather conditions at the time of monitoring were recorded with weather stations located at NM04 and NM01. The locations of the deployed monitoring equipment are presented in Table 3.2 and shown in Figure 3.4. Instrumentation and quality control of the deployed monitoring equipment is provided in Appendix A.

It is noted that while two years have elapsed since initial noise monitoring, no major developments have occurred in the area, and measured levels represent minimum background levels (as outlined in the NPfI). As such, the noise monitoring is considered representative of the current acoustic environment.

Table 3.2 Noise monitoring locations

Noise monitoring location	Survey method[1]	Lot and DP	Description
NM01	LOG / AT / WM	Lot 77 DP751398	South of Olympic Highway
NM02	LOG / AT	Lot 20 DP1116265	Along Ironbong Road
NM03	LOG / AT	Lot 2 DP751401	Along Dudauman Road
NM04	LOG / AT / WM	Lot 12 DP758928	Along Burley Griffin Way, near Troy Street
NM05	LOG / AT	Lot 1 DP1093937	Near Grogan Road
NM06	LOG / AT	Lot 5 DP1045925	Along Burley Griffin Way, west of Temora Street

(1) LOG = unattended noise logging; AT = operator attended noise survey; WM = weather monitoring

3.3 Unattended noise survey

Unattended noise monitoring for background noise levels was carried out by IRDJV between 18 February 2019 and 26 February 2019.

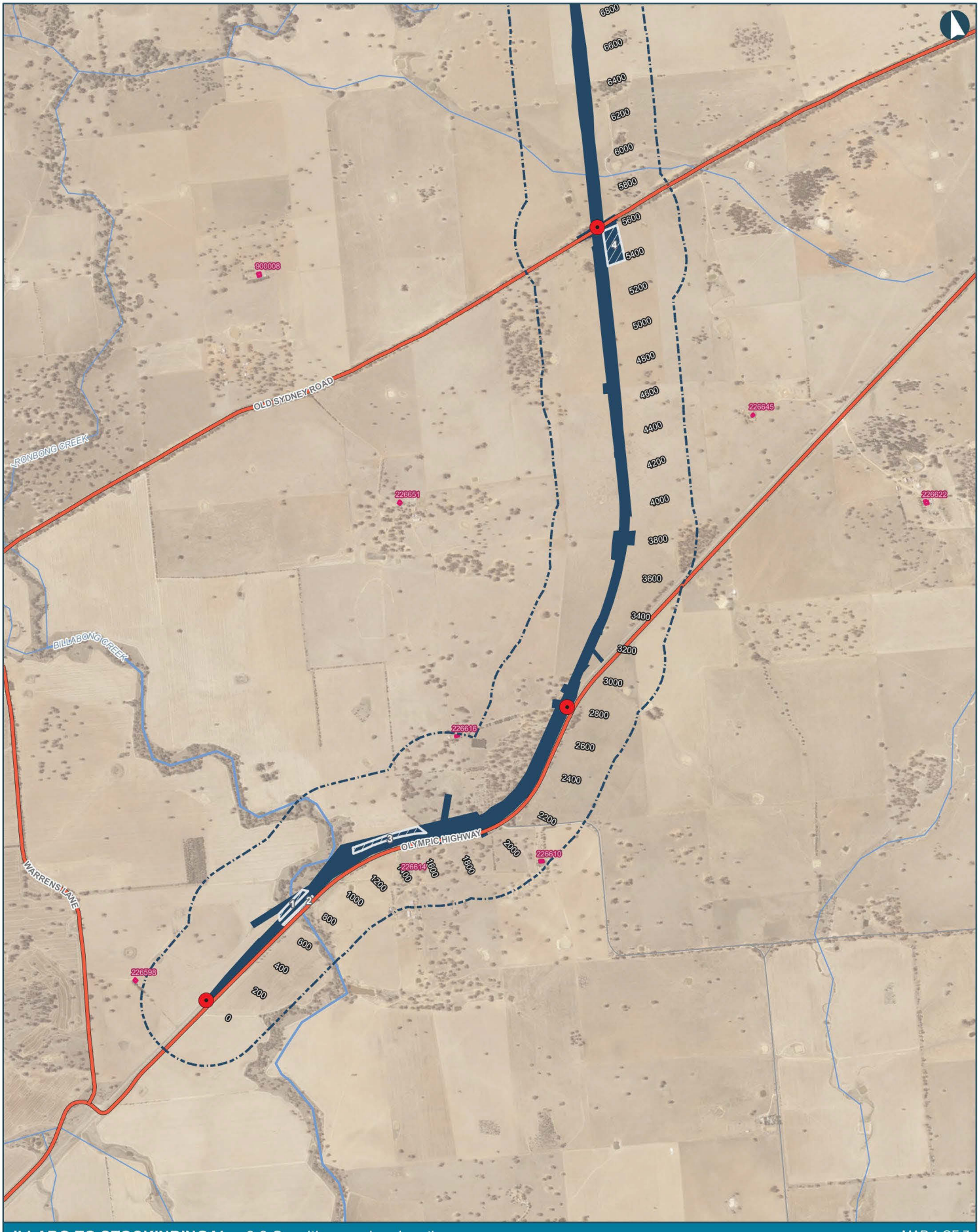
The results are summarised in Table 3.3 and detailed daily plot of data are presented in Appendix B. Where levels have been corrected to reflect minimum background noise levels defined in the NPfI, measured levels are presented in brackets.

Table 3.3 Summary of unattended noise monitoring results

Location	Rating background level (RBL) dBA			Ambient noise level dBA $L_{eq\ 15\ minute}$		
	Day[1]	Evening[1]	Night[1]	Day[1]	Evening[1]	Night[1]
NM01[2]	27 (35)	30	28 (30)	45	45	47
NM02[2]	28 (35)	28 (30)	29 (30)	46	49	45
NM03[2]	29 (35)	28 (30)	29 (30)	46	49	45
NM04[2]	30 (35)	26 (30)	22 (30)	60	58	53
NM05[2]	27 (35)	27 (30)	22 (30)	43	42	38
NM06[2]	27 (35)	22 (30)	19 (30)	57	57	52

(1) Time periods defined as – Day: 7am to 6pm Monday to Saturday, 8am to 6pm Sunday; Evening, 6pm to 10pm; Night 10pm to 7am Monday to Saturday, 10pm to 8am Sunday

(2) Background levels are below the minimum assumed rating background noise levels outlined in the NPfI and have been adjusted to the minimum assumed rating background noise levels (35dBA during the day period, and 30dBA during the evening and night periods in accordance with the NPfI)



ILLABO TO STOCKINBINGAL 3.3 Sensitive receiver locations

MAP 1 OF 7

0 0.25 0.5 0.75 1 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 11/11/2021
Author: IRDJV
Paper: A3
Scale: 1:20,000
Data Sources: ARTC, NSWSS, ESRI

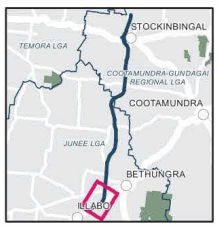
- Haulage Route
- Proposal site
- Within 350m of proposal site
- Construction Compounds
- Construction site access point

Receptor Type

- Active Recreation
- Commercial
- Educational
- Place of worship
- Residential

Existing features

- Arterial road
- Sub-arterial road
- Local road
- Major Watercourse
- Minor Watercourse



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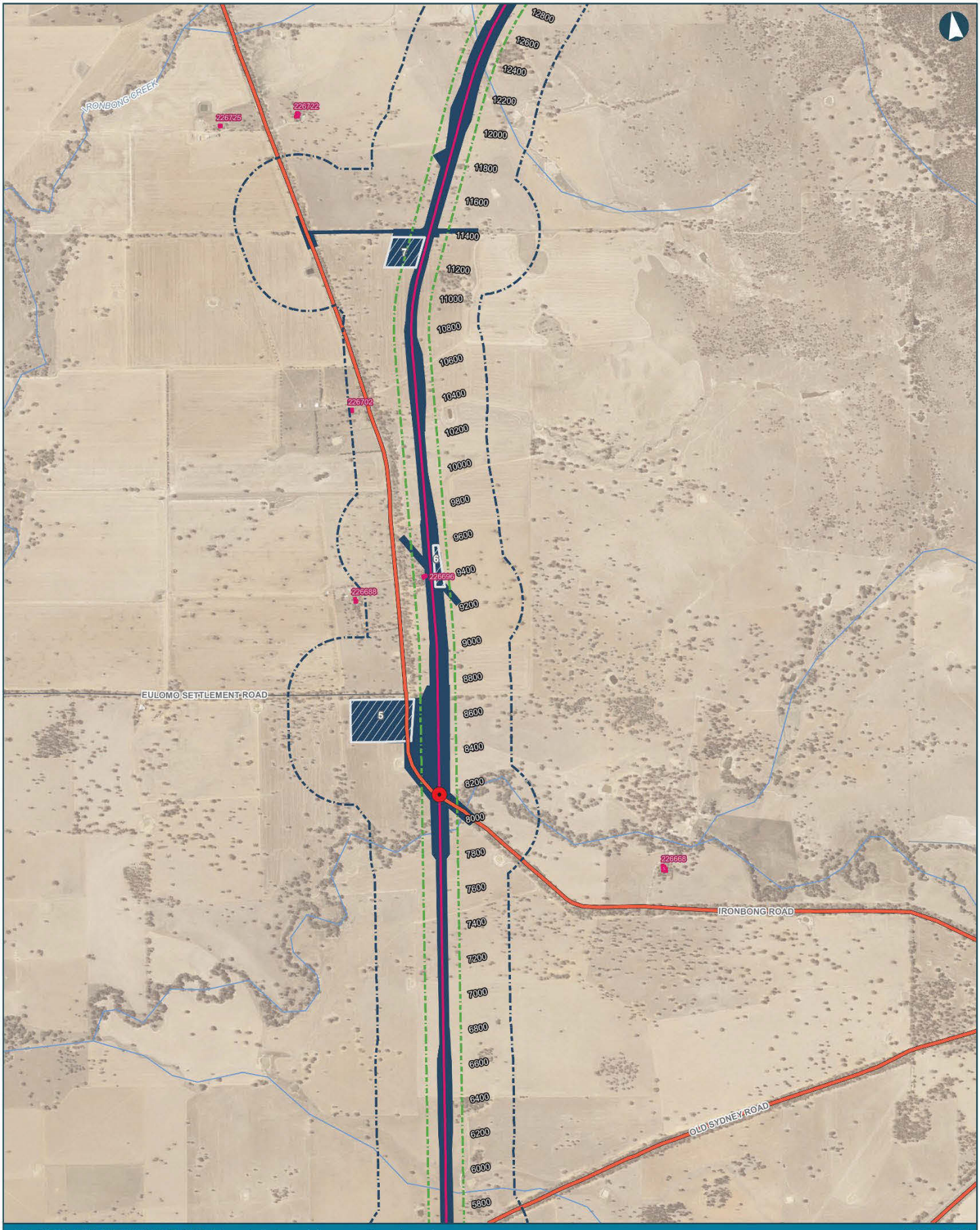

ILLABO TO STOCKINBINGAL 3.3 Sensitive receiver locations

MAP 2 OF 7

0 0.25 0.5 0.75 1 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 2/22/2022 Paper: A3
Author: IRDJV Scale: 1:20,000
Data Sources: ARTC, NSWSS, ESRI

- Alignment of proposal
- Haulage Route
- Proposal site
- Within 350m of proposal site
- Within 100m of alignment
- Construction Compounds
- Construction site access point

Receptor Type

- Active Recreation
- Commercial
- Educational
- Place of worship
- Residential

Existing features

- Arterial road
- Sub-arterial road
- Local road
- Minor Watercourse

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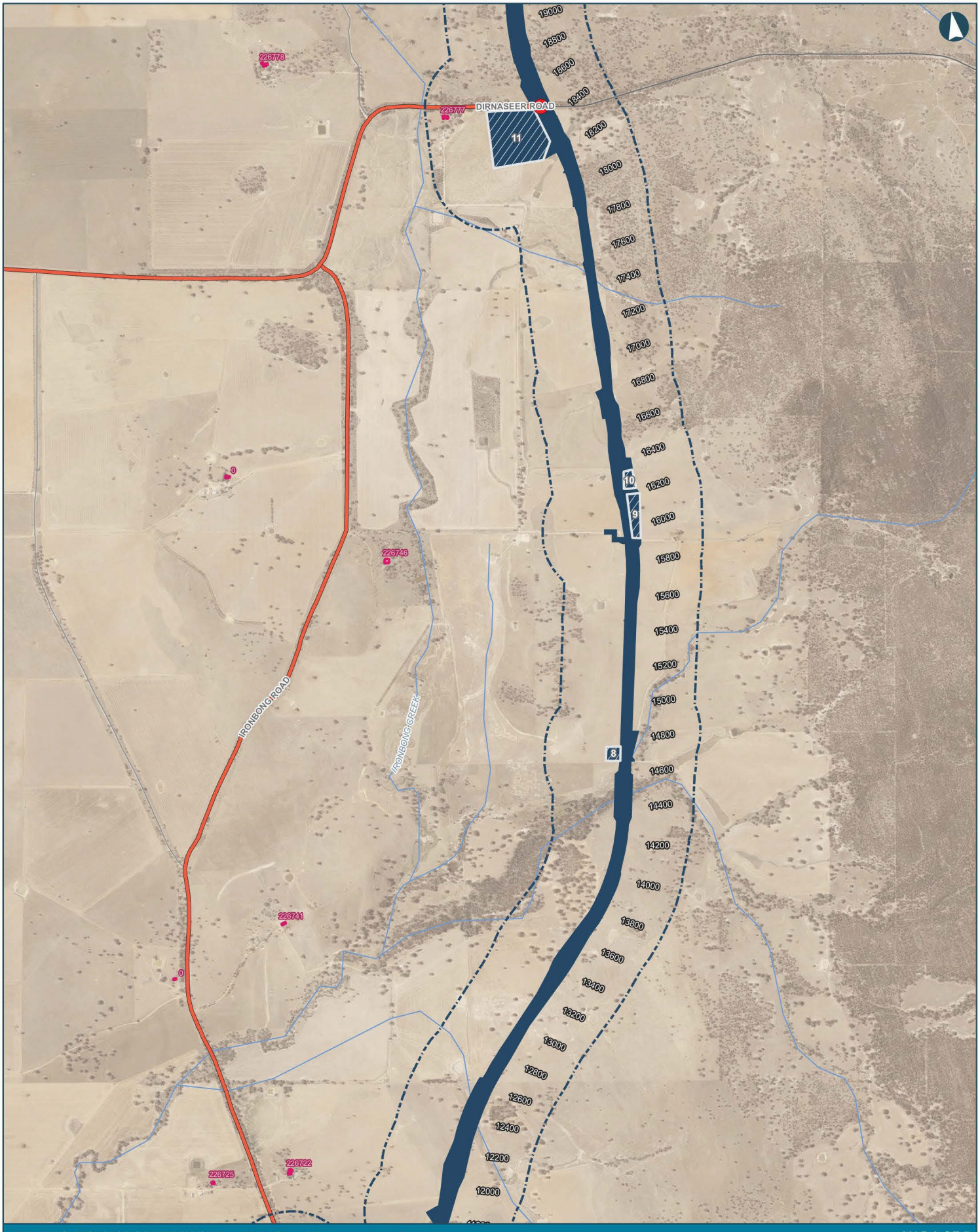


ILLABO TO STOCKINBINGAL 3.3 Sensitive receiver locations

MAP 3 OF 7

0 0.25 0.5 0.75 1 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 11/11/2021 Paper: A3
Author: IRDJV Scale: 1:20,000
Data Sources: ARTC, NSWSS, ESRI

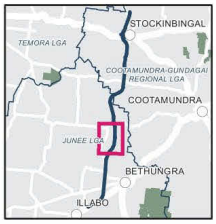
- Haulage Route
- Proposal site
- Within 350m of proposal site
- Construction Compounds
- Construction site access point

Receptor Type

- Active Recreation
- Commercial
- Educational
- Place of worship
- Residential

Existing features

- Sub-arterial road
- Local road
- Minor Watercourse



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ILLABO TO STOCKINBINGAL 3.3 Sensitive receiver locations

MAP 4 OF 7

0 0.25 0.5 0.75 1 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 11/11/2021 Paper: A3
Author: IRDJV Scale: 1:20,000
Data Sources: ARTC, NSWSS, ESRI

- Haulage Route
- Proposal site
- Within 350m of proposal site
- Construction Compounds
- Construction site access point

Receptor Type
- Active Recreation
- Commercial
- Educational
- Place of worship
- Residential

Existing features
- Sub-arterial road
- Local road
- Minor Watercourse

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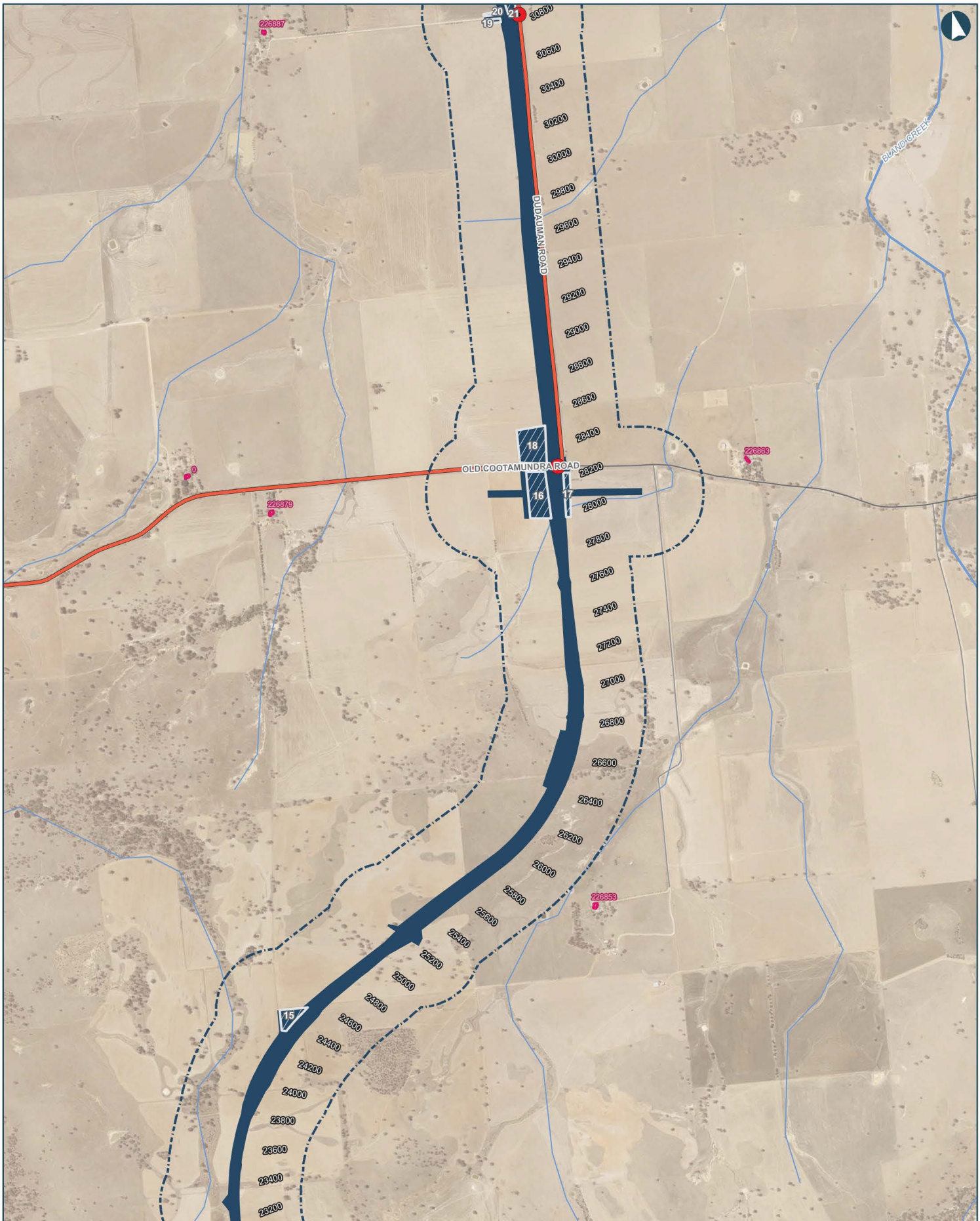

ILLABO TO STOCKINBINGAL 3.3 Sensitive receiver locations

MAP 5 OF 7

0 0.25 0.5 0.75 1 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 11/11/2021 Paper: A3
Author: IRDJV Scale: 1:20,000
Data Sources: ARTC, NSWSS, ESRI

- Haulage Route
- Proposal site
- Within 350m of proposal site
- Construction Compounds
- Construction site access point

Receptor Type

- Active Recreation
- Commercial
- Educational
- Place of worship
- Residential

Existing features

- Sub-arterial road
- Local road
- Major Watercourse
- Minor Watercourse

INLAND RAIL ARTC

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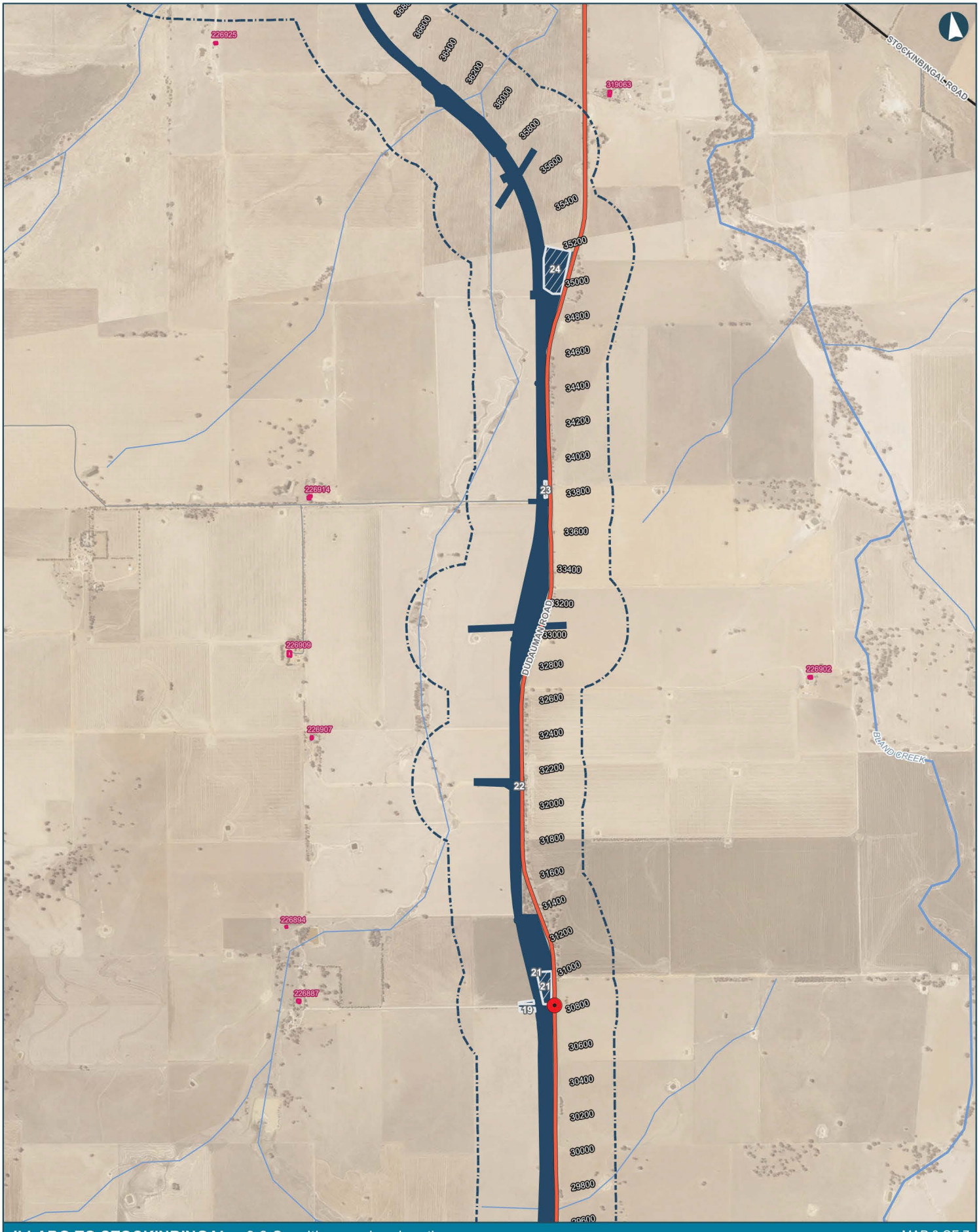


ILLABO TO STOCKINBINGAL 3.3 Sensitive receiver locations

MAP 6 OF 7

0 0.25 0.5 0.75 1 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 11/11/2021
Author: IRDJV
Paper: A3
Scale: 1:20,000
Data Sources: ARTC, NSWSS, ESRI

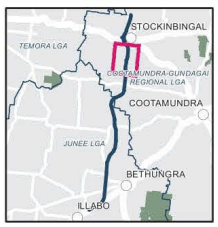
- Haulage Route
- Proposal site
- Within 350m of proposal site
- Construction Compounds
- Construction site access point

Receptor Type

- Active Recreation
- Commercial
- Educational
- Place of worship
- Residential

Existing features

- Arterial road
- Sub-arterial road
- Local road
- Major Watercourse
- Minor Watercourse



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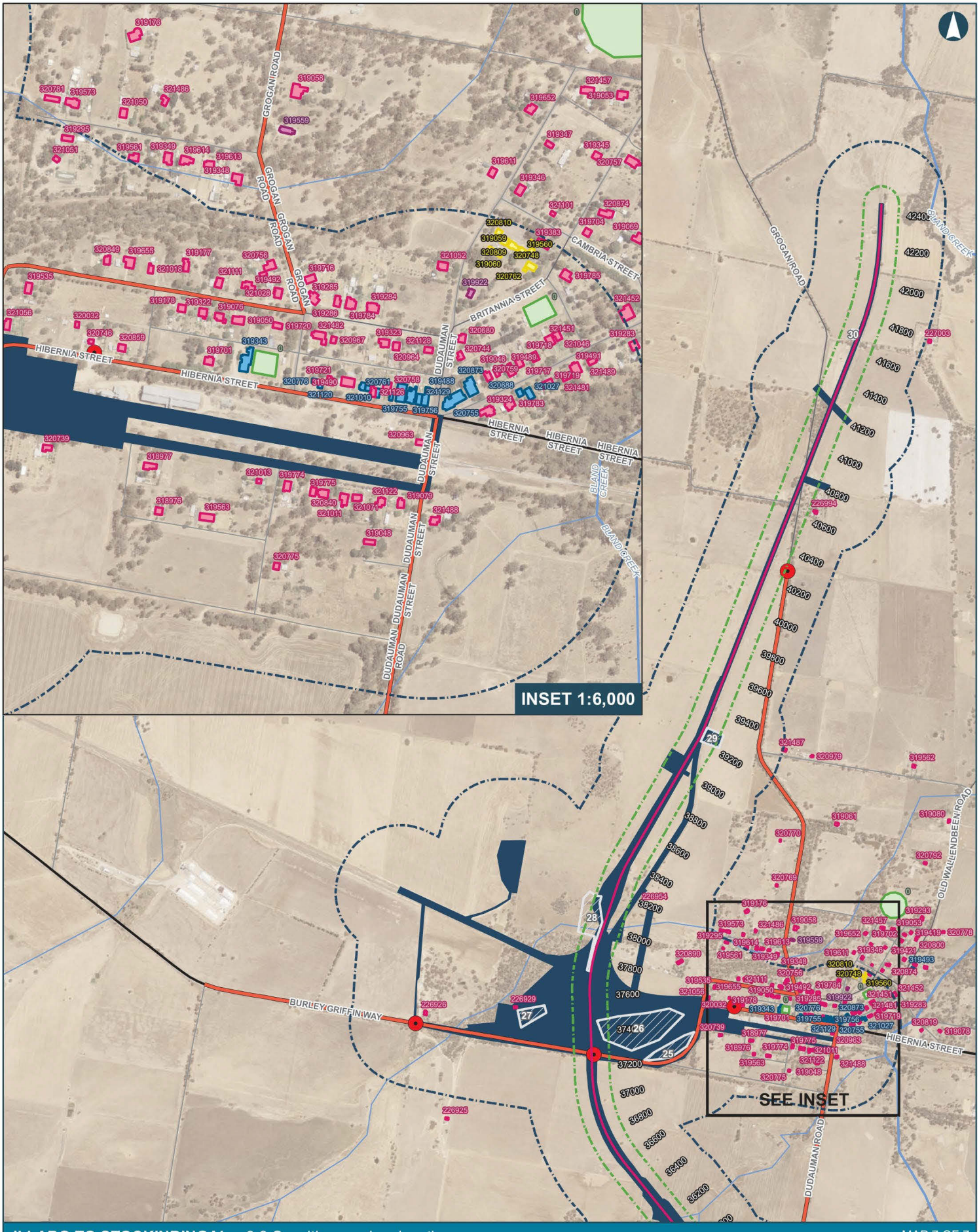


ILLABO TO STOCKINBINGAL 3.3 Sensitive receiver locations

MAP 7 OF 7

0 0.25 0.5 0.75 1 Km

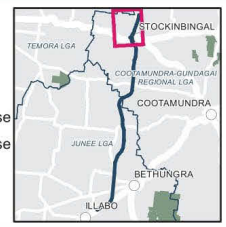
Coordinate System: GDA 1994 MGA Zone 55

Date: 11/11/2021 Paper: A3
Author: IRDJV Scale: 1:20,000
Data Sources: ARTC, NSWSS, ESRI

- Alignment of proposal
- Haulage Route
- Proposal site
- Within 100m of alignment
- Within 350m of proposal site
- Construction Compounds
- Construction site access point

Receptor Type
- Active Recreation
- Commercial
- Educational
- Place of worship
- Residential

Existing features
- Arterial road
- Sub-arterial road
- Local road
- Major Watercourse
- Minor Watercourse



INLAND RAIL ARTC

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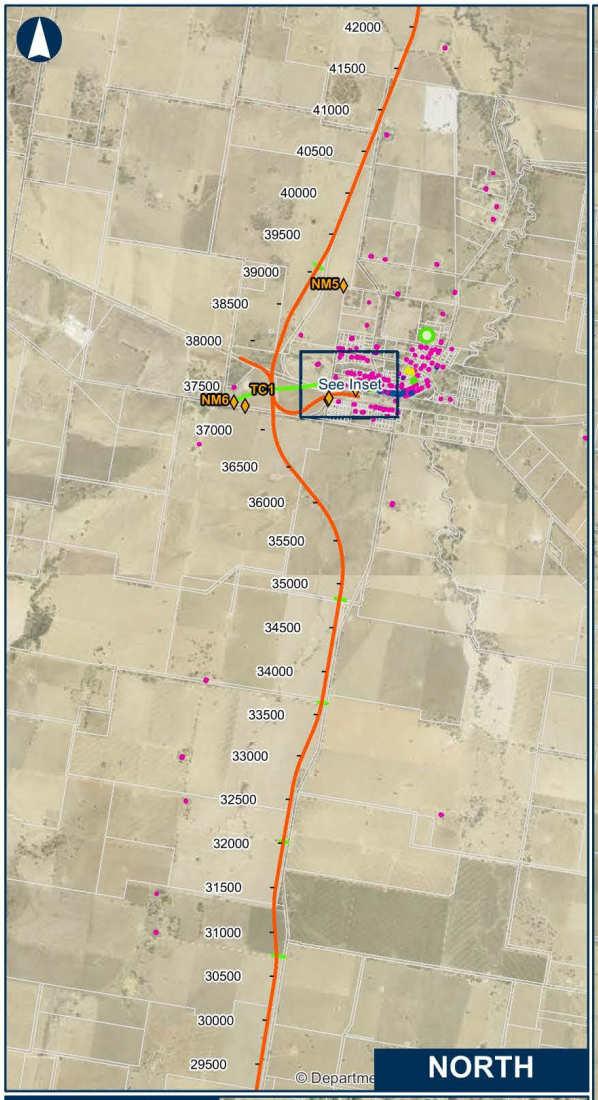

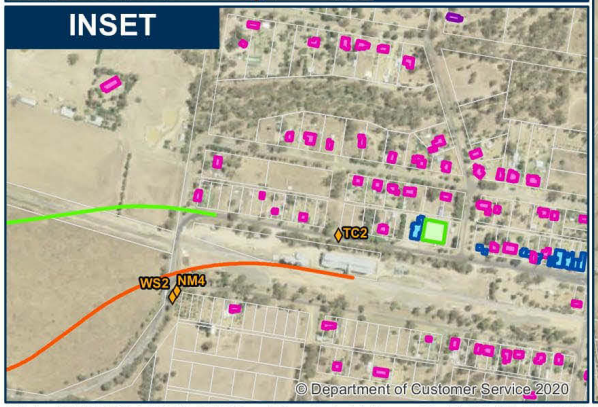

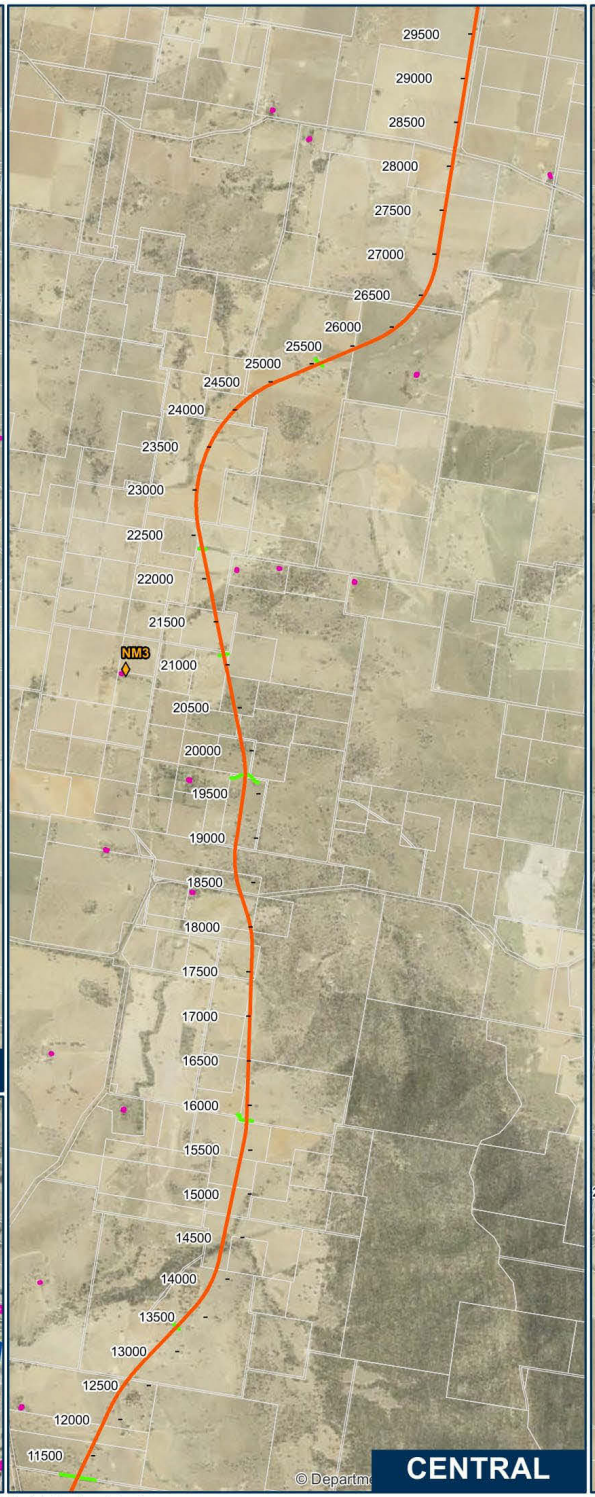

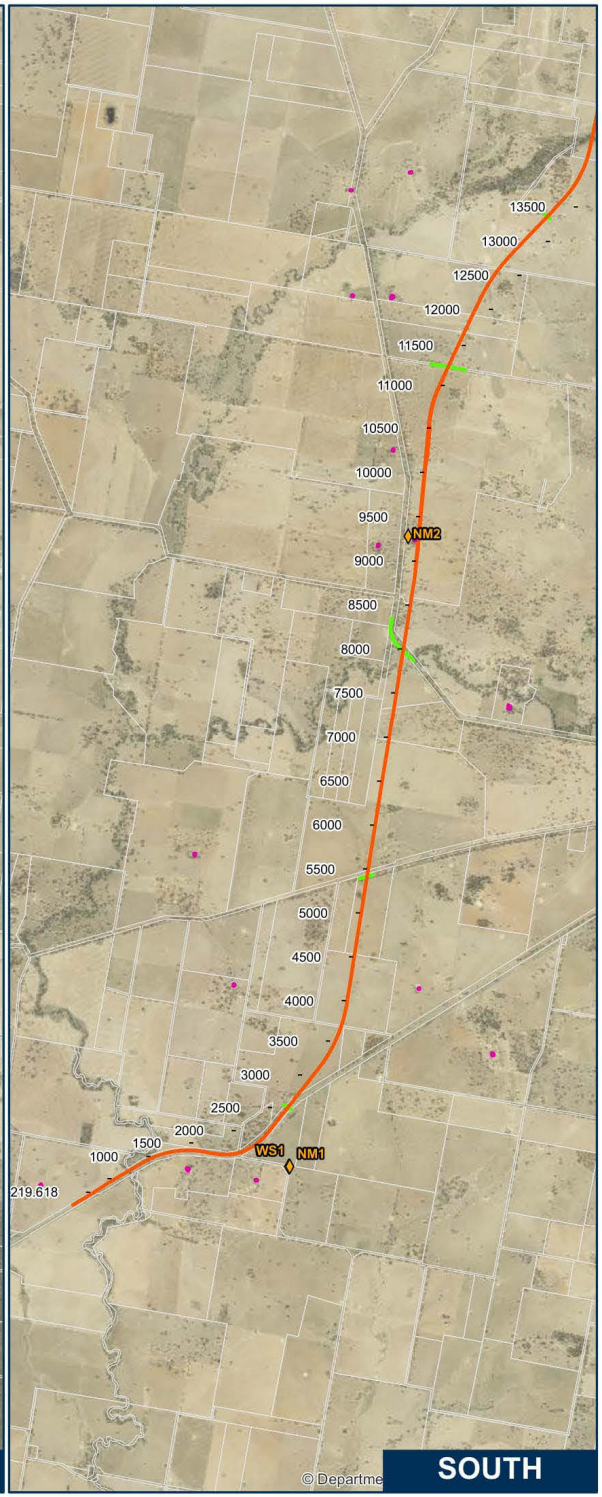

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ILLABO TO STOCKINBINGAL

3.4 Noise monitoring locations

Key features of proposal

- Noise Monitoring Locations
- Key features of proposal
- Future Road Design

Existing features

- Cadastre

Sensitive Receptor Type

- Active Recreation
- Commercial
- Educational
- Place of worship
- Residential

0 1 2 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021
Author: IRDJV
Data Sources: IRDJV, ARTC, LPI

Paper: A3
Scale: 1:60,000

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3.4 Operator attended noise survey

IRDJV carried out operator attended noise surveys to characterise the noise environment and identify the contributors to the acoustic environment. The results of the attended noise surveys show good agreement with the unattended monitoring and observations are detailed in Table 3.4. Based on the attended and unattended monitoring results, the background noise at all locations is best described as a quiet rural environment with intermittent noise from vehicle pass-by and wind noise through the surrounding vegetation.

Table 3.4 Summary of attended noise measurement results

Location	Date	Time	dBA $L_{eq(15min)}$	dBA $L_{90(15min)}$	Observations
NM01	20/02/19	11:51AM	36	25	Background noise environment dominated by wind through vegetation. Freight train passby noted before measurement start. Noise from truck passby from Olympic Hwy ~37dBA. Plane flyover during measurement ~65dBA.
NM02	19/02/19	2:30PM	36	27	Background noise environment dominated by wind through vegetation.
NM03	19/02/19	1:15PM	40	25	Background noise environment dominated by wind through vegetation.
NM04	19/02/19	11:02AM	55	40	Background noise environment dominated by wind through vegetation. Vehicle passbys along Burley Griffin Way over measured 15-minute period: • Light: 5 passbys (55–63dBA) • Heavy: 3 passbys (62–76dBA).
NM05	19/02/19	10:00AM	52	35	Background noise environment dominated by wind through vegetation. Infrequent road traffic passby noise from Burley Griffin Way – truck around 45dBA – 1 passby in 15 minute measurement period.
NM06	19/02/19	12:03PM	60	40	Background noise environment dominated by wind through vegetation. Vehicle passbys along Burley Griffin Way over measured 15-minute period: • Light: 11 passbys (63–68dBA) • Heavy: 4 passbys (76–78dBA).

4 Construction noise assessment

4.1 Noise modelling methodology

A noise model was prepared using SoundPLAN 8.2 implementing the CONCAWE calculation method. The noise model has also been 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 simulated. Modelling inputs for each scenario included topography, ground and air absorption, locations of sensitive receivers, noise-generating equipment and buildings surrounding the proposal.

The following 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 storey
- a ground absorption factor of 0.75
- CONCAWE Category 6 meteorological conditions.

The noise modelling is considered to be representative of the highest construction noise levels, as it assumes the noisiest plant item at the closest point within the work area to the receivers operating constantly over the 15-minute assessment period, for meteorological conditions that are conducive to the propagation of noise from the source to the receiver. Actual measured noise levels would be expected to be lower for most of the construction period, as outlined in section 4.6.

4.2 Construction stage locations

The proposal has been divided into six work sections based on high-level staging options for construction of the proposal. The actual staging of the works will be developed by the contractor. The breakdown of the proposal into sections, for the purpose of this assessment, is to group receivers expected to be impacted by each stage of the construction works, and to provide an indication of representative impacts at these receivers.

Table 4.1 describes the location and indicative period of works for each work section extending from south to north (the construction work sections are also shown in Figure 1.3).

Table 4.1 Staging for the construction of the proposal

Indicative stages	Chainage	Indicative period of works	Indicative duration (work days)
Section 1	0–2900	Mid-2024 – early 2025 (approximately 5 months)	108
Section 2	2900–8840	Late-2024 – early 2025 (approximately 5 months)	109
Section 3	8840–18500	Late 2024 – mid-2025 (approximately 7 months)	157
Section 4	18500–28300	Late 2024 – mid-2025 (approximately 9 months)	196
Section 5	28300–37300	Late 2024 – mid-2025 (approximately 8 months)	171
Section 6	37300–42600	Late 2024 – early-2026 (approximately 16 months)	331

4.3 Construction hours and duration

The following construction scenarios outlined in Table 4.2 have been considered as part of the quantitative assessment. These works are expected to take place over 24 months from mid-2024 to mid-2026. If approved, proposal construction hours will be from 6am to 6pm, Monday to Sunday. The ICNG recommended standard hours (defined in Table 2.2) differ from the proposal construction hours, resulting in some works occurring outside ICNG standard hours. These works would predominantly occur during the out-of-hours day period on Saturdays and Sundays. Works would also occur in the early morning from 6am to 7am, which is defined by the ICNG as out-of-hours night works. Figure 4.1 outlines the crossover between ICNG standard hours and proposal construction hours.

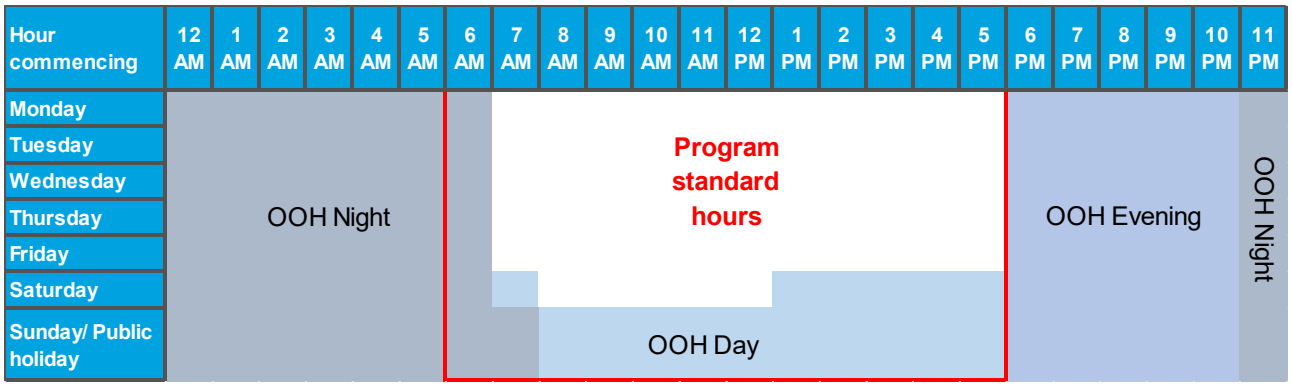


Figure 4.1 ICNG standard hours and proposal construction hours

These construction hours are proposed for the following reasons:

- to accommodate the remote location of worksites, the proposal construction hours enable efficient use of the workforce
- to minimise disruption to commuters and freight operators using existing operational rail lines
- to minimise interactions with seasonal agricultural activities
- to accommodate the above constraints whilst minimising the extent of work undertaken during sensitive periods
- to reduce construction timeframe, resulting in shorter overall duration of impact to sensitive receivers
- time efficiencies for delivery of individual work activities (e.g. less mobilise/demobilise, higher work continuity), resulting in a shortened duration of impact on sensitive receivers
- to reduce the overall time of interaction with public interfaces (i.e. for bridge and level crossing works).

Works occurring outside the program construction hours will be restricted to planned possessions where continuous work is required. This is to avoid impacts to employee safety or the safe and reliable operation of the rail network. Works specifically required to be undertaken outside of the proposal construction hours include:

- tie-in to the existing Main South Line at Illabo
- tie-in to the existing Lake Cargelligo Line and Stockinbingal-Parkes Line at Stockinbingal
- installation of precast bridge beams over existing public highways
- installation of level crossings where road closures are not approved during normal hours
- utility relocations that are required to be undertaken out of hours to avoid impact to local residents and businesses.

Due to the proposed 6am daily start, and works on alternate weekends, all scenarios are expected to include works outside ICNG standard hours, as noted in Table 4.2.

Table 4.2 Assessed construction scenarios

Scenario ID	Scenario	Activities	Timing	Duration per section (depending on section size)[1]
SC01	Site establishment	• Consulting landowners/occupants where required • Installation of environmental mitigation measures in accordance with the CEMP, including erosion and sedimentation control, temporary exclusion fencing for sensitive areas • Traffic controls in accordance with the CEMP • Establishing ancillary facilities and construction sites • Vegetation removal • Erect temporary fencing • Establishing site access roads where required • Deliver and stockpile materials including rail, sleepers, ballast, culverts and structural fill.	Programme standard hours (ICNG standard hours and works outside ICNG standard hours)	~1 month
SC02	Utility relocations and property adjustments	• Utility relocations as required • Property access modifications along the alignment, including the relocation of existing facilities • Demolition of buildings and other structures.	Programme standard hours (ICNG standard hours and works outside ICNG standard hours) 24-hr possessions	~1 month
SC03a	Earthworks	• New track: Excavate for the placement of ballast and earth formation • Track widening: Excavating and remove existing track and formation • Culverts: Excavating to the required depth • Crossing loops: Excavate beside the new track for the length of the crossing loop • Level crossings: Earthworks to the road to suit the new rail level height • Road modifications and new bridges: Earthworks as required • Import and placement of general and structural fill • Excavate water storage dams.	Programme standard hours (ICNG standard hours and works outside ICNG standard hours)	~2 months
SC03b	Earthworks – crushing	• Processing of excavated material for reuse on site as fill.	Programme standard hours (ICNG standard hours and works outside ICNG standard hours)	~3 months

Scenario ID	Scenario	Activities	Timing	Duration per section (depending on section size)[1]
SC04	Drainage	• Prepare survey control points for planned excavation of cess drains • Excavate earth material from the side of the existing track formation, and trim and compact base and sides of the drain • Form spoil mounds.	Programme standard hours (ICNG standard hours and works outside ICNG standard hours)	~1 month
SC05	Track works	• The installation of: – new track – track widening – culverts – crossing loops – turn outs – level crossings – new bridges as outlined in Section 8.2.2 of the EIS.	Programme standard hours (ICNG standard hours and works outside ICNG standard hours) 24-hr possessions	~2 months
SC06	Road overbridges, underbridges and pavement works	• Relocation of existing services • Installation of bridges and culverts • Installation of level crossings • Road pavement • Installation of road signage • Installation of lights and booms at active level crossings.	Programme standard hours (ICNG standard hours and works outside ICNG standard hours) 24-hr possessions	~2 months
SC07	Finishing and landscaping	• Demobilise site compounds and facilities • Remove all materials, waste and redundant structures from the works sites • Forming, and stabilising of spoil mounds • Decommission all temporary work site signs • Remove temporary fencing • Establish permanent fencing • Decommission site access roads that are no longer required • Restoration of disturbed areas as required, including revegetation where required.	Programme standard hours (ICNG standard hours and works outside ICNG standard hours)	~3 months
SC08	Concrete batching and construction compounds	• Delivery of aggregates and raw materials • Mixing and delivery of concrete to construction sites • Use of the construction compounds.	Programme standard hours (ICNG standard hours and works outside ICNG standard hours)	~1 year for concrete batching Construction compounds will be used for the duration of construction

(1) The duration of works per section is an estimate. The duration of impact on individual receivers within each section is likely to be less than the duration per section as works move along the alignment.

4.4 Modelled scenarios and noise source levels

Scenarios have been developed, based on each construction stage listed in Table 4.2, for the purpose of assessing the worst-case noise impacts generated by the construction works within each stage.

Sound Power Levels (SWL) have been sourced from:

- 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)
- The TfNSW Construction Noise and Vibration Strategy 2018 (CNVS); and
- IRDJV database sourced from similar projects.

The nominated equipment for the construction work scenarios and the Sound Power Level (SWL) of each item are detailed in Table 4.3. The activities modelled noisiest plant item has been highlighted in green. Activities associated with construction compounds (generators and light vehicle movements) have been included in all scenarios.

Table 4.3 Construction activity and plant equipment

Scenario ID	Construction phase	Plant	SWL
1	Site establishment	14H Grader	107
		30T Articulated dump truck (ADT)	107
		30T Excavator	108
		Smoothdrum Roller	107
		Padfoot Roller	109
		Water Cart	107
2	Utility relocations and property adjustments	20T Excavator	107
		30T Excavator	109
		30T ADT	107
		Franna	98
		Road Crane (Varying Lift Capacity)	104
		Positrack	95
		Smoothdrum Roller	107
3a	Earthworks	30T Excavator	108
		30t ADT	107
		40t ADT	107
		627 Scrapers	113
		14H Grader	115
		D8 Dozer	107
		D10 Dozer	121
		Water Carts	107

Scenario ID	Construction phase	Plant	SWL
		Truck and Dogs (in Haulage Numbers)	108
		Stabiliser	113
		Spreader	106
		825 Compactors	111
		Smoothdrum Roller	107
		Padfoot Roller	109
3b	Earthworks – crushing (occurs at blasting locations outlined in Appendix F)	30t ADT	107
		20T Excavator	103
		Jaw Crusher	112
		Cone Crusher	112
		D8 Dozer	107
		980 Loader	110
		Blast Hole Drill Rig	112
		Water Cart	107
4	Drainage	20T Excavator	103
		30t ADT	107
		Water Cart	107
		Smoothdrum Roller	107
		Padfoot Roller	109
5	Track works	Front End Loader	110
		14t Hi-Rail Excavator with Octopus Attachment	111
		5t Excavator	102
		25t–30t ADT	107
		14t Hydreema Dumper	104
		Drott or Ballast Box	113
		Tamper	115
		Rail Saw	117
		Regulator	114
		Dynamic Track Stabiliser	115
		Flashbutt Welder	110
6	Road overbridges, underbridges and pavement works	Piling Rig (bored)	112
		Concrete Pump Truck	103
		Concrete Truck	107
		Road Crane (Varying Lift Capacity)	104
		Frannas	98

Scenario ID	Construction phase	Plant	SWL
7	Finishing and landscaping	30t ADT	107
		20T Excavator	103
		5t Excavator	102
		14M Grader	107
		D8 Dozer	107
		Hydro Seed Truck	106
		Water Cart	107
8	Concrete batching and construction compounds	Batching plant[2]	110
		Generator	102
		Light vehicles	103
		Franna crane	98
		Road truck[2]	108
		Water cart	107

(1) Sections shaded green indicate the noisiest plant item assessed for the activity

(2) Batching plant are modelled at batching locations, road trucks are modelled at construction compounds

4.5 Predicted noise levels

The predicted noise levels for each scenario are presented in Appendix C. Table 4.4 outlines the number of sensitive receivers exceeding the NMLs within each Section. Predicted noise level contours along the proposal are presented in Appendix D.

No exceedances of NMLs are predicted for commercial, educational, active and passive recreation receivers.

The maximum noise level assessment (sleep disturbance) is presented in Table 4.5, outlining the number of sensitive receivers exceeding the maximum noise level criteria within each Section. It is noted that works assessed under sleep disturbance would only occur in the early morning (6am to 7am on weekdays, 6am to 8am on every second weekend) or during scheduled track possessions required for safety.

The magnitude of night time out of hours NMLs exceedances, predicted within each Section, are presented in Table 4.6. As night time out of hours NMLs are the most stringent management levels, and exceedances of these criteria require consideration of the most involved mitigation measures, night time out of hours NMLs are the criteria considered. The increments of predicted noise above the NMLs have been selected in line with the additional mitigation measures.

Most out of hours works are expected to occur within daylight hours as part of the proposal construction hours. Works occurring outside the proposal construction hours will be restricted to planned possessions where continuous work is required to avoid impacts to employee safety or the safe and reliable operation of the rail network.

The calculations are representative of the highest expected noise levels as they include the noisiest plant item operating at their closest point to the receiver over a 15-minute period. Actual noise levels from the construction site would be expected to be lower.

Table 4.4 Predicted noise level assessment

Section ID	Timing[1]	NML	Number of residential receivers exceeding NMLs									Number of residential receivers highly noise affected								
			Scenario 1	Scenario 2	Scenario 3a	Scenario 3b	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 1	Scenario 2	Scenario 3a	Scenario 3b	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Section 1	Standard Hours	45	2	2	4	0	2	4	0	1	1	0	0	0	0	0	0	0	0	0
	Out of Hours – Day	40	4	4	4	0	4	4	2	4	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Out of Hours – Evening & Night	35	4	4	4	0	4	4	4	4	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Section 2	Standard Hours	45	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Out of Hours – Day	40	0	0	5	0	0	3	1	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Out of Hours – Evening & Night	35	3	1	5	0	3	5	3	2	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Section 3	Standard Hours	45	2	1	8	1	2	4	1	0	2	0	0	0	0	0	0	0	0	0
	Out of Hours – Day	40	4	3	8	1	4	8	4	3	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Out of Hours – Evening & Night	35	6	6	8	5	6	8	8	5	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Section 4	Standard Hours	45	0	0	5	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0
	Out of Hours – Day	40	2	1	6	3	2	5	2	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Out of Hours – Evening & Night	35	4	3	6	4	4	6	5	2	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Section 5	Standard Hours	45	0	0	8	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
	Out of Hours – Day	40	2	2	8	0	1	7	5	1	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Out of Hours – Evening & Night	35	6	4	8	2	6	8	8	4	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Section 6	Standard Hours	45	79	2	119	4	50	95	49	69	10	5	0	0	0	0	0	0	2	0
	Out of Hours – Day	40	109	31	120	34	84	115	92	105	49	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Out of Hours – Evening & Night	35	115	75	120	102	114	120	116	113	95	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(1) ICNG standard hours includes Monday to Friday 7am to 6pm and Saturday 8 am to 1pm, Out of Hours Day any time within 1pm to 6pm Saturday and 8am to 6pm Sunday, and outside standard hours, Out of Hours – Evening & Night at all other times

Table 4.5 Maximum noise level assessment (sleep disturbance)

Section ID	Timing[1]	Maximum noise level criteria		Number of sensitive receivers exceeding maximum noise levels								
		RBL + 15 (dBA)	L_{max} (dBA)	Scenario 1	Scenario 2	Scenario 3a	Scenario 3b	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Section 1	Out of hours – Night	45	65	4	4	4	0	4	4	4	4	4
Section 2	Out of hours – Night	45	65	2	0	5	0	2	4	1	1	0
Section 3	Out of hours – Night	45	65	4	4	7	2	4	7	6	4	4
Section 4	Out of hours – Night	45	65	2	2	6	4	2	6	5	2	1
Section 5	Out of hours – Night	45	65	4	3	8	0	4	8	5	2	2
Section 6	Out of hours – Night	45	65	113	59	120	72	105	120	112	111	71

(1) Out of hours Night = 10pm to 7am Monday to Friday, 10pm to 8am Saturday and Sunday

Table 4.6 Number of receivers exceeding OOHW Night NMLs by magnitude

Section ID	Number of residential receivers exceeding OOHW Night NML[1,2]																															
	Scenario 1				Scenario 2				Scenario 3a				Scenario 3b				Scenario 4				Scenario 5				Scenario 6				Scenario 7				Scenario 8			
	<5 dB	5 to 15 dB	15 to 25 dB	>25 dB	>5 dB	5 to 15 dB	15 to 25 dB	>25 dB	>5 dB	5 to 15 dB	15 to 25 dB	>25 dB	>5 dB	5 to 15 dB	15 to 25 dB	>25 dB	>5 dB	5 to 15 dB	15 to 25 dB	>25 dB	>5 dB	5 to 15 dB	15 to 25 dB	>25 dB	>5 dB	5 to 15 dB	15 to 25 dB	>25 dB	>5 dB	5 to 15 dB	15 to 25 dB	>25 dB	>5 dB	5 to 15 dB	15 to 25 dB	>25 dB
Section 1	0	2	2	0	0	2	2	0	0	0	0	4	0	0	0	0	0	2	2	0	0	0	0	4	2	2	0	0	0	3	1	0	2	1	0	1
Section 2	3	0	0	0	1	0	0	0	0	2	2	1	0	0	0	0	3	0	0	0	2	2	1	0	2	1	0	0	2	0	0	0	0	0	0	0
Section 3	2	2	2	0	3	2	1	0	0	0	3	5	4	0	1	0	2	2	2	0	0	4	1	3	4	3	1	0	2	3	0	0	2	1	1	1
Section 4	2	2	0	0	2	1	0	0	0	1	3	2	1	1	1	0	2	2	0	0	1	3	1	1	3	1	1	0	1	1	0	0	1	1	0	0
Section 5	4	2	0	0	2	2	0	0	0	0	4	4	2	0	0	0	5	1	0	0	1	6	1	0	3	4	1	0	3	1	0	0	4	0	0	0
Section 6	6	30	26	53	44	29	1	1	0	1	16	102	67	30	3	1	28	34	32	18	5	18	37	58	24	41	34	15	8	36	31	38	46	38	9	1

(1) Exceedance categories correlate to trigger ranges for additional mitigation measures in section 8.3

(2) Works occurring outside the program construction hours will be restricted to planned possessions where continuous work is required to avoid impacts to employee safety or the safe and reliable operation of the rail network

4.6 Assessment of predicted noise levels

During construction activities, the predictions indicate that construction noise levels could significantly impact the closest receivers. This is expected to occur during the worst case 15 minute periods. These impacts include exceedance of noise management levels, highly noise affected receivers, and in some cases, sleep disturbance. However, works are expected to progress along the alignment within each section, so these predicted noise levels would not be expected to occur continuously over the duration of construction of the proposal. The exception is concrete batching and construction compounds (Scenario 8) which would occur at fixed locations.

Most out of hours works are expected to occur during daylight hours as part of the proposal construction hours, as outlined in section 4.3. Sleep disturbance would only be experienced during the early morning (6am and 7am Monday to Saturday, 6am to 8pm Sunday).

Exceedances have been predicted at residential receivers for almost all scenarios, during both standard and out-of-hours works. Most exceedances are predicted within Section 5 (Stockinbingal), where there is a greater density of sensitive receivers in close proximity to the works site. Exceedances of sleep disturbance trigger levels (section 2.4) are noted in all sections during most scenarios.

The results indicate that earthworks (Scenario 3a) generally affects the greatest number of receivers, with concrete batching and construction compounds (Scenario 8) affecting the least.

No exceedances of NMLs are predicted for commercial, educational, active and passive recreation receivers.

Sensitive receivers may experience construction fatigue due to prolonged exposure to construction noise impacts over the duration of the proposal (to occur over 14 months). It is noted that this is less likely to occur in Sections 1 to 4 as construction works will progress along the alignment, resulting in shorter periods of exposure.

Commentary on the key features from the construction noise assessment results are provided below.

4.6.1 SC01 – Site establishment

Exceedances for NMLS are shown at most Sections at each time of the day, with the exception of Sections 2, 4 and 5 during ICNG standard hours, and Section 2 during out of hours – day. Five receivers along Section 5 are highly affected by noise as per the criteria. Sleep disturbance criteria is exceeded along all Sections. OOHW Night NMLs are exceeded at varying levels at each location, with 53 receivers experiencing an exceedance of >25dB at Section 6.

4.6.2 SC02 – Utility relocation and property adjustments

Exceedances for NMLS are shown at most Sections at each time of the day, with the exception of Sections 2, 4 and 5 during ICNG standard hours, and Section 2 during out of hours – day. No receivers are highly affected by noise as per the criteria. Sleep disturbance criteria is exceeded along all Sections. OOHW Night NMLs are exceeded at varying levels at each location, with 1 receiver experiencing an exceedance of >25dB at Section 6.

4.6.3 SC03a – Earthworks

Exceedances for NMLS are shown at all Sections at each time of the day. No receivers are highly affected by noise as per the criteria. Sleep disturbance criteria is exceeded along all Sections. OOHW Night NMLs are exceeded at varying levels at each location, with 102 receivers experiencing an exceedance of >25dB at Section 6.

4.6.4 SC03b – Earthworks – crushing

Exceedances for NMLS are shown in Sections 3, 4, 5 and 6, with exceedances in Section 5 only occurring during out of hours works. No receivers are highly affected by noise as per the criteria. Sleep disturbance criteria is exceeded in Sections 3, 4 and 6. OOHW Night NMLs are exceeded at varying levels at each location, with only 1 receiver experiencing an exceedance of >25dB at Section 6.

4.6.5 SC04 – Drainage

Exceedances for NMLS are shown at most Sections at each time of the day, with the exception of Sections 2, 4 and 5 during ICNG standard hours, and Section 2 during out of hours – day. No receivers are highly affected by noise as per the criteria. Sleep disturbance criteria is exceeded along all Sections. OOHW Night NMLs are exceeded at varying levels at each location, with 18 receivers experiencing an exceedance of >25dB at Section 6.

4.6.6 SC05 – Track works

Exceedances for NMLS are shown at all Sections at each time of the day. No receivers are highly affected by noise as per the criteria. Sleep disturbance criteria is exceeded for all Sections. OOHW Night NMLs are exceeded at varying levels at each location, with 58 receivers experiencing an exceedance of >25dB at Section 6.

4.6.7 SC06 – Road overbridges, underbridges and pavement works

Exceedances for NMLS are shown at all Sections at each time of the day, except at Sections 1 and 2 (ICNG standard hours). No receivers are highly affected by noise as per the criteria. Sleep disturbance criteria is exceeded along all Sections. OOHW Night NMLs are exceeded at varying levels at each location, with 15 receivers experiencing an exceedance of >25dB at Section 6.

4.6.8 SC07 – Finishing and landscaping

Exceedances for NMLS are shown at most Sections at each time of the day, with the exception of Sections 2, 4 and 5 during ICNG standard hours, and Section 2 during out of hours – day. Two receivers along Section 6 are highly affected by noise as per the criteria. Sleep disturbance criteria is exceeded along all Sections. OOHW Night NMLs are exceeded at varying levels at each location, with 38 receivers experiencing an exceedance of >25dB at Section 6.

4.6.9 SC08 – Concrete batching and construction compounds

Exceedances for NMLS are shown at Sections 1 and 6 during ICNG standard hours, and all Sections except Section 2 during out of hours works. Sleep disturbance criteria is exceeded at all Sections except Section 2. OOHW Night NMLs are exceeded at varying levels at each location, with one receiver in Section 1, 3, and 6 experiencing an exceedance of >25dB.

4.6.10 Summary

Maximum noise level exceedances are predicted at residential receivers, occurring during most ICNG standard and out-of-hours work scenarios at each section. Residential receivers located within Section 6 are expected to experience the greatest maximum noise level exceedances, with sleep disturbance criteria predicted to be exceeded at 120 locations and OOHW Night NMLs exceeded at 102 locations by >25dB during Scenario 3 (Earthworks and drainage).

As a result of the predicted exceedances of the NMLs and sleep disturbance goals, mitigation and management measures have been recommended in Chapter 8.

4.7 Construction noise impacts over proposal duration

The predicted construction noise generated by the proposal at receivers are a conservative assessment of the noise impacts, which are used to inform the implementation of reasonable and feasible mitigation measures. In reality, predicted noise impacts during construction are predominantly expected to fluctuate over the duration of works, due to the construction works progressing along the alignment rather than operating at the closest point to the receiver for the duration of the works. Cumulative impacts of works taking place simultaneously along the alignment would also contribute to the fluctuation of noise impacts over the duration of the works. It is acknowledged that there will be some stationary noise sources (e.g. batching plant and compounds), however the major noise sources along the greater portion of the alignment are transient.

An indicative spreadsheet-based assessment has been undertaken to provide an idea of how noise levels are expected to change over time at the worst affected receivers within each Section. The assessment assumes the loudest plant item for each Scenario operating at discretised points along the alignment based on an indication of construction staging in relation to the chainage. Noise emissions from each Scenario are assessed cumulatively. Only distance attenuation has been considered. This assessment only provides an indication of how noise levels are expected to change over the construction duration, the exact prediction of worst case impacts expected to be experienced during each scenario is presented in section 4.5.

Utility relocation, construction compounds and concrete batching (Scenarios 2 and 8) are also not considered as they are a stationary noise source and not expected to fluctuate significantly over time.

Figure 4.2 provides an understanding of which of the sensitive receivers presented in Figure 3.3 have been assessed, and their distance to the alignment. Figure 4.3 to Figure 4.8 outline the predicted noise levels at the worst affected receivers over the duration of the proposal works.

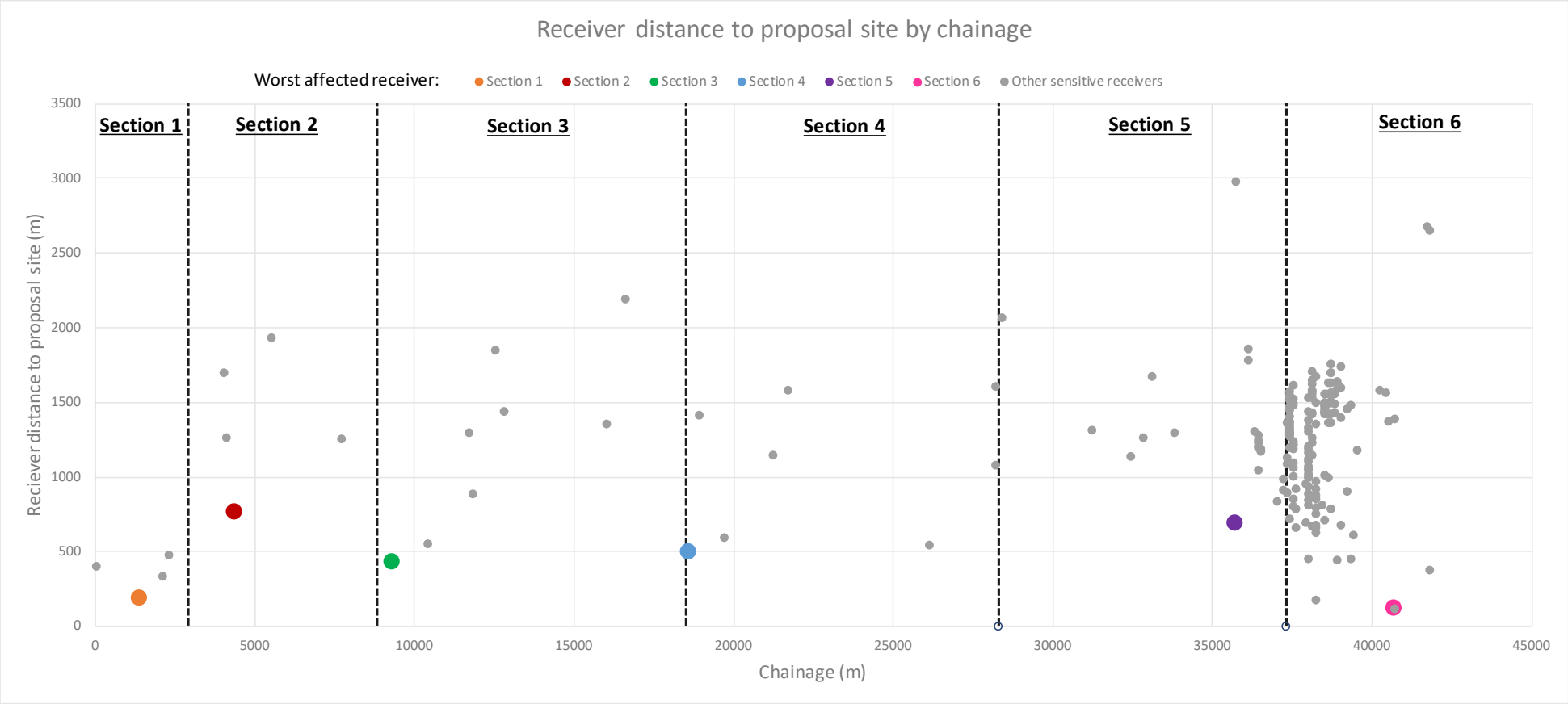


Figure 4.2 Receiver distances to the rail proposal site by chainage

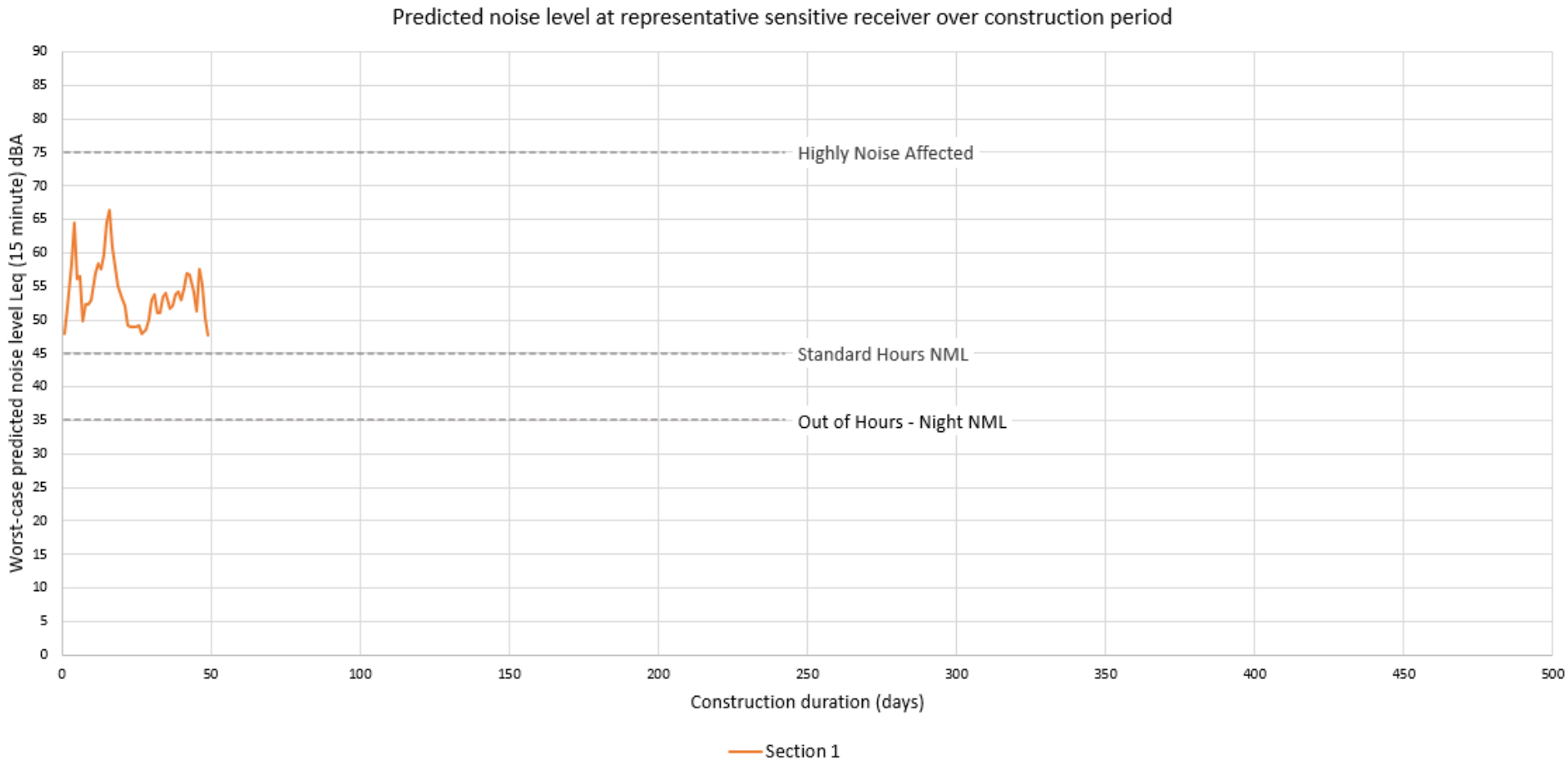


Figure 4.3 Predicted noise level at representative sensitive receiver over construction period – Section 1

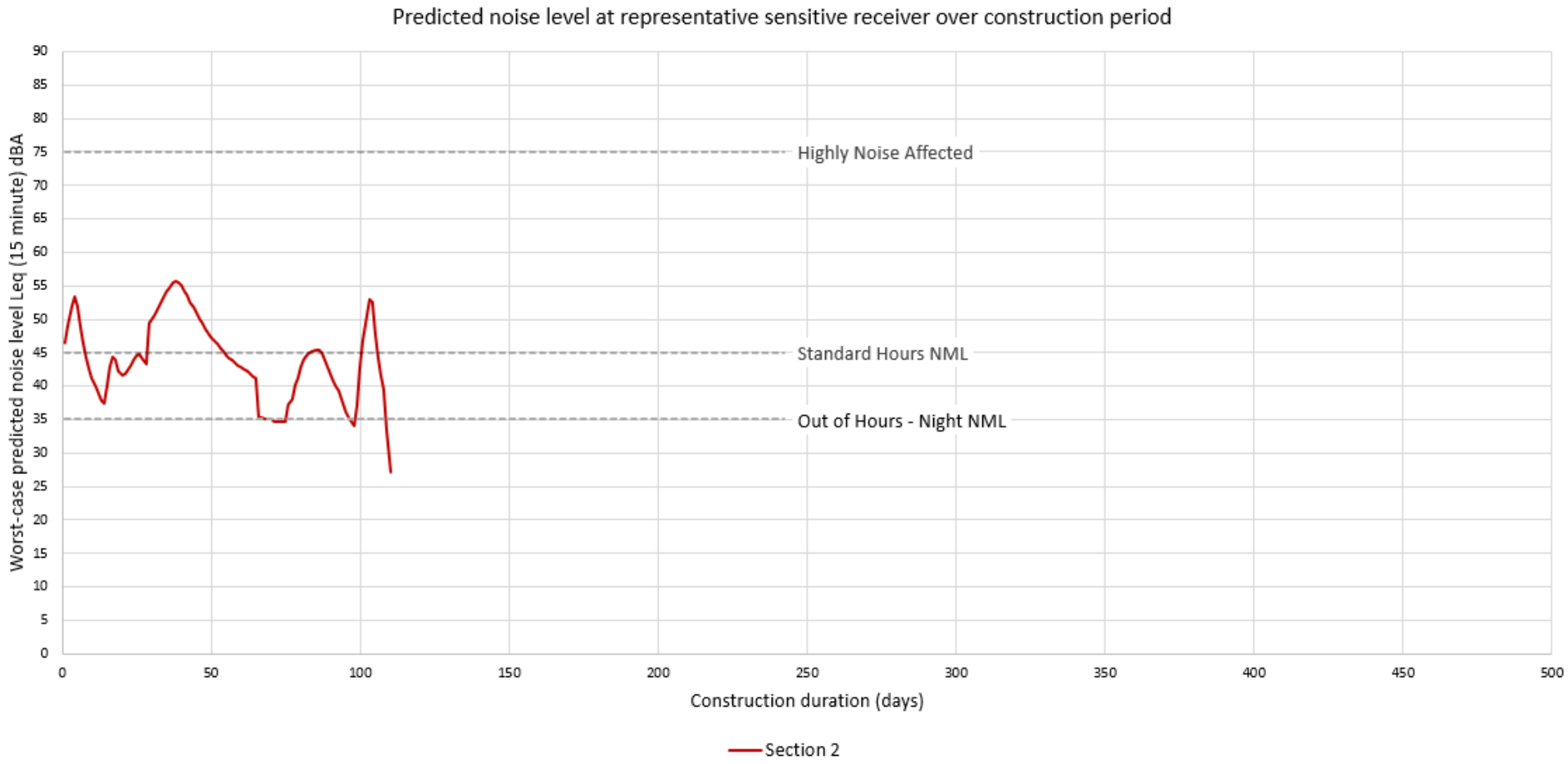


Figure 4.4 Predicted noise level at representative sensitive receiver over construction period – Section 2

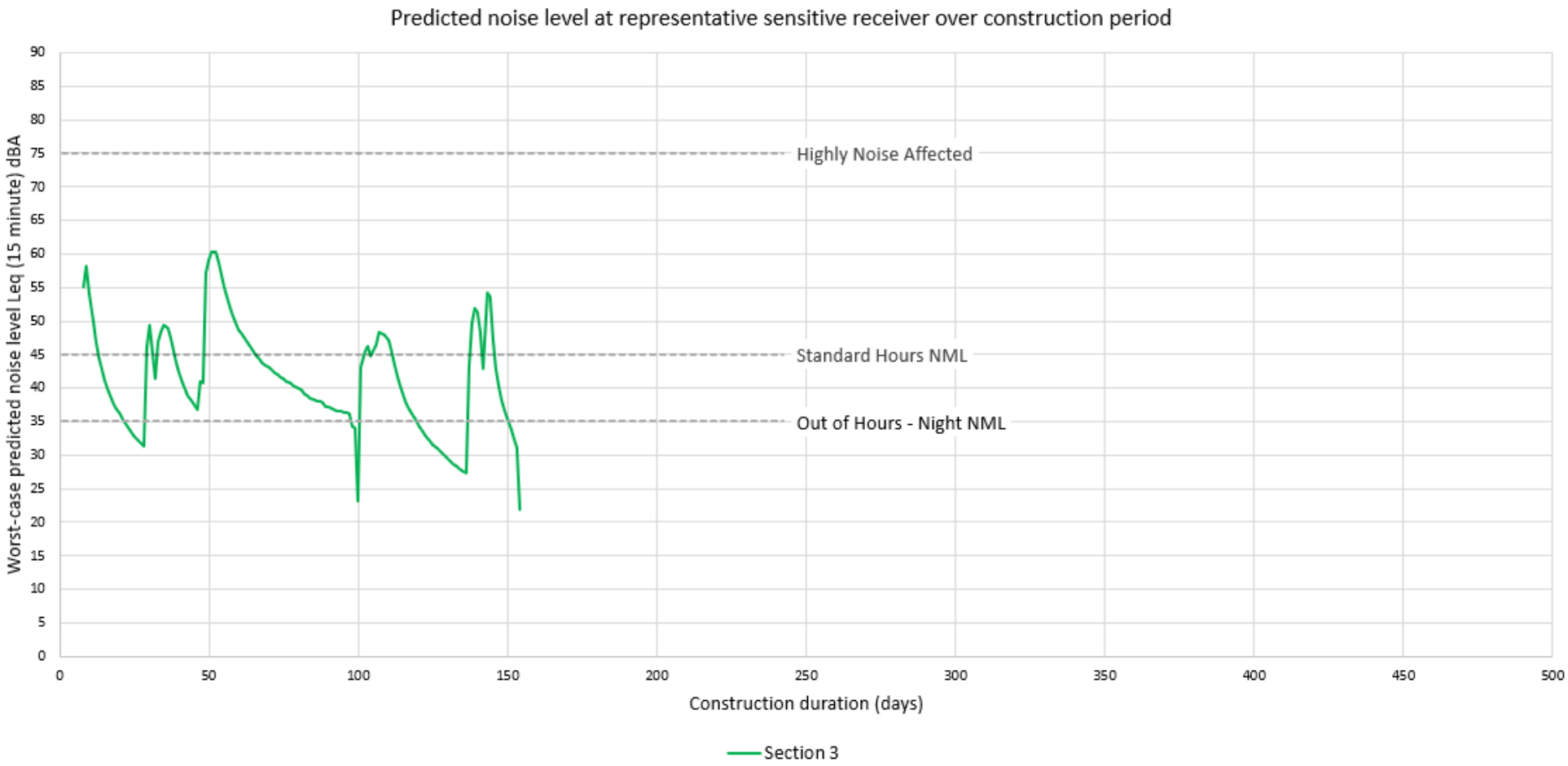


Figure 4.5 Predicted noise level at representative sensitive receiver over construction period – Section 3

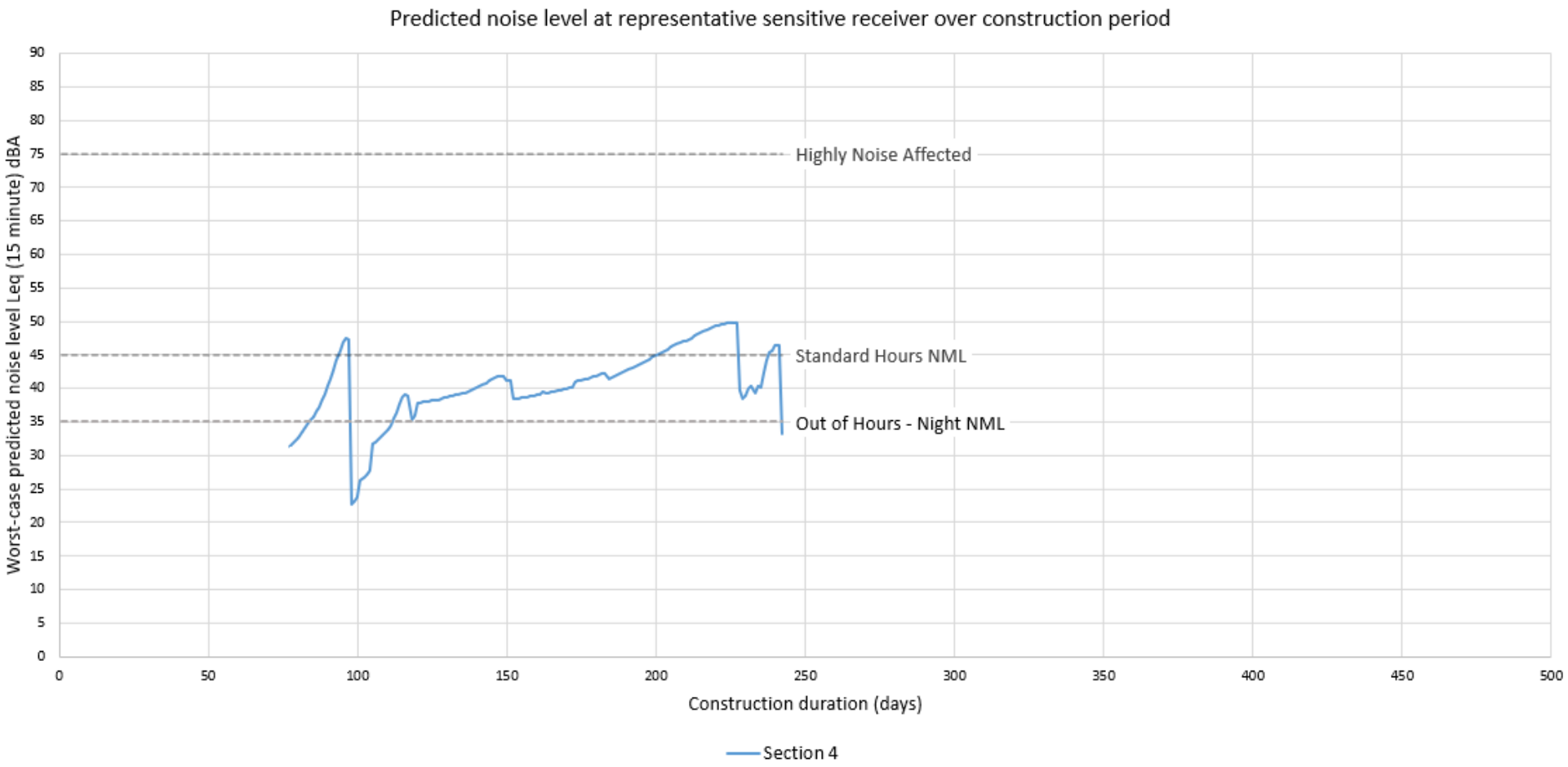


Figure 4.6 Predicted noise level at representative sensitive receiver over construction period – Section 4

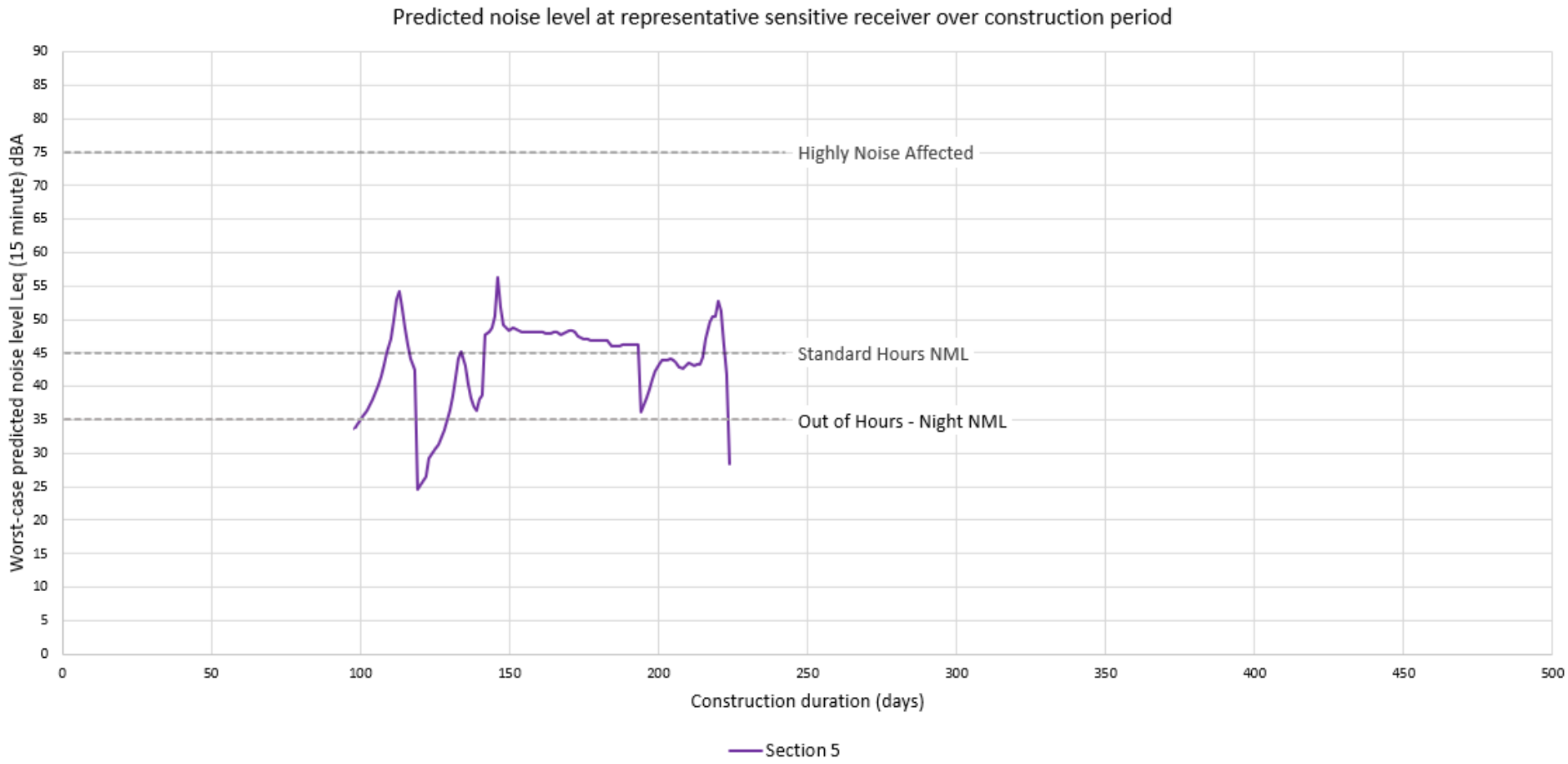


Figure 4.7 Predicted noise level at representative sensitive receiver over construction period – Section 5

Figure 4.8 Predicted noise level at representative sensitive receiver over construction period – Section 6

Figure 4.2 illustrates how receivers are distributed along the alignment, and the respective sideline distance to the proposed future rail (not the construction footprint). This provides context to the assessment as it identifies locations in which construction works will impact a greater density of sensitive receivers. In Section 6, we can see a high density of receivers around 38,000m which correlates to the increased density of receivers within Stockinbingal. However, outside Stockinbingal, receivers are much more sparsely distributed and typically further from the alignment.

Therefore, when works occur outside Stockinbingal, construction noise impacts will typically only affect a small number of receivers. However, when works occur in the vicinity of Stockinbingal, a proportionally greater number of receivers will be impacted by construction noise.

As seen in Figure 4.3, the worst case receiver in Section 6 is expected to be highly noise affected. However, these highly noise affected periods are intermittent and would only occur for approximately 1 to 2 days at a time, occurring when noisy works take place at the nearest location from the alignment to the receiver, and decreasing as the works continue along the alignment. For the rest of the works, the worst-case receiver within Section 6 shows levels typically <10dB above ICNG standard hours NMLs.

No highly noise affected receivers are predicted in any other Section. The worst-case receiver within Section 1 shows levels <10dB above ICNG standard hours NMLs for the majority of the works within that cell (~2 months). The worst-case receiver within Sections 2, 3, and 4 show levels typically below ICNG standard hours NMLs with periods of exceedance (<15dB above the NML) lasting for around 10 days for Sections 2 and 3, and around 25 days for Section 4.

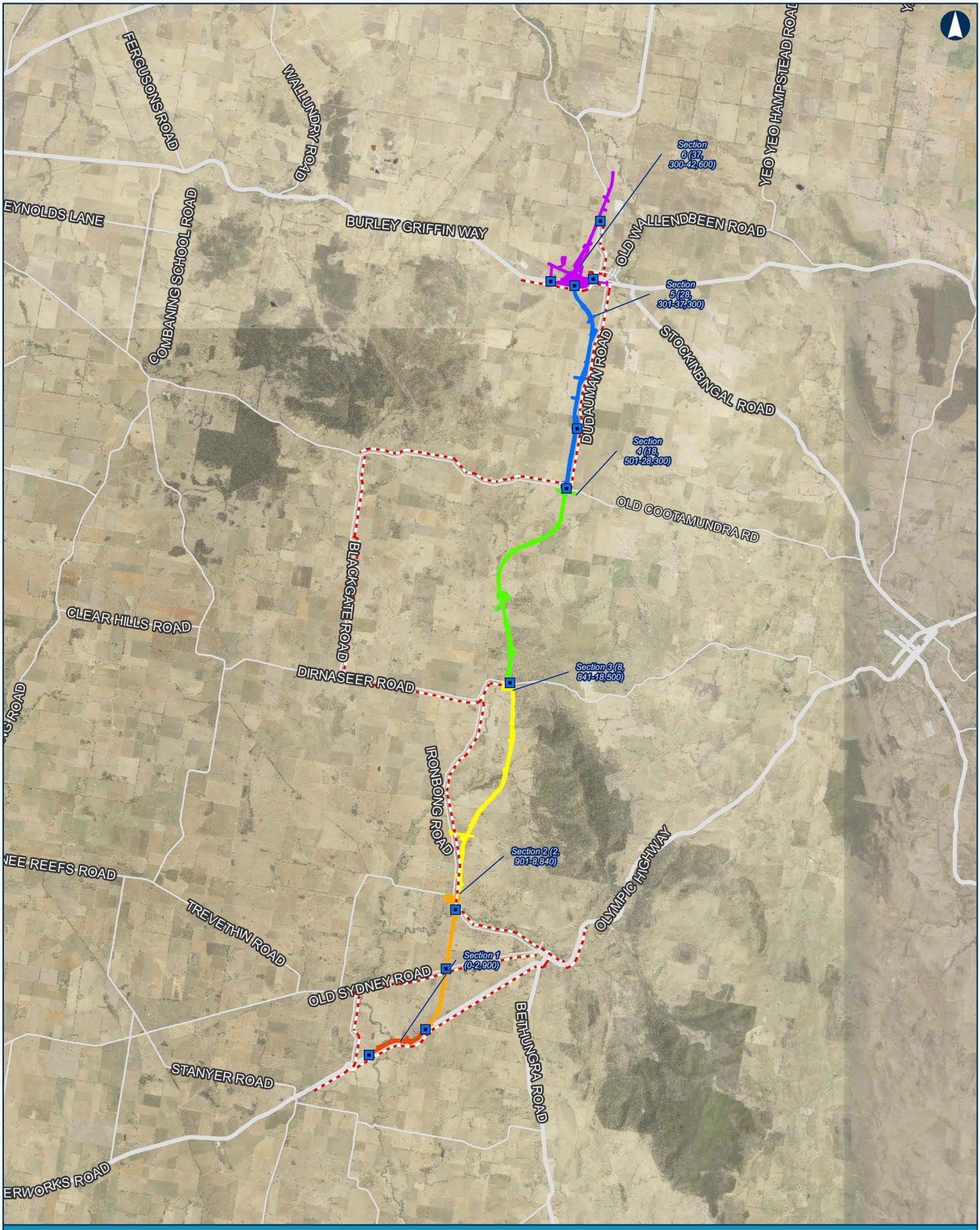
The worst-case receiver within Section 5 shows levels typically below ICNG standard hours NMLs, with a period of exceedance (<5dB above the NML) lasting for around 2 months.

Most works will be confined to the proposal construction hours. It is important to note, as outlined in section 4.3, works occurring outside of the proposal construction hours are expected to occur during planned possessions, where continuous work is required. This is to avoid impacts to employee safety or the safe and reliable operation of the rail network.

In conclusion, impacts are expected to be transient due to the progressive nature of the construction works. Due to the small number of impacted properties in Sections 1 to 4 (and Section 5 where receivers are located out of Stockinbingal), landowner agreement may be a feasible pathway to undertaking out of hours works where not directly required to for safety reasons or other factors, provided that appropriate consultation is undertaken with the impacted receivers, noise impacts are expected to be minimal, and reasonable respite is provided.

4.8 Construction traffic noise

Additional road traffic generated on existing roads due to the construction phase of the proposal has the potential to cause adverse road noise impacts at receivers. Figure 4.9 shows assumed construction routes to the proposal that will be undertaken by workforce and construction vehicles during the construction period. The additional road traffic generated by vehicles accessing the construction site locations along public roads, including the transportation of waste, has been assessed in accordance with the Road Noise Policy (RNP). Some construction haulage is expected to occur within the rail corridor. Where construction haulage occurs outside the public road network, the noise generated by vehicle movements are assessed under the ICNG and are considered in the assessment detailed in section 4.5.



ILLABO TO STOCKINBINGAL 4.9 Construction haulage routes

0 2 4 6 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 8/26/2021 Paper: A3
Author: IRDJV Scale: 1:150,000
Data Sources: ARTC, NSWSS, ESRI

Key features of proposal

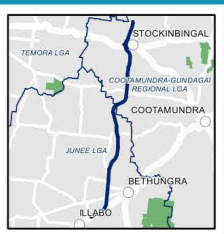
- Access point
- Haulage Route

Existing features

- Sub-arterial road
- Arterial road

Construction Section

- Section 1 (0-2,900)
- Section 2 (2,901-8,840)
- Section 3 (8,841-18,500)
- Section 4 (18,501-28,300)
- Section 5 (28,301-37,300)
- Section 6 (37,300-42,600)



INLAND RAIL ARTC

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

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Traffic movements during the night period (10pm to 7am) that are associated with the construction of the proposal are assumed to only occur between 6am and 7am as a result of workers arriving to site. No heavy vehicle movements are expected to occur during this period. Traffic numbers include vehicle movements associated with the transport of waste.

A summary of existing traffic volumes and forecasted traffic volumes during construction based on survey data (see Technical Paper 3 – Traffic, Transport and Access Impact Assessment) is outlined in Table 4.7. The predicted construction traffic noise levels, based on the existing and forecasted construction traffic volumes for 2026, are presented in Table 4.8. Troy Street is predicted to exceed trigger levels by 3dB during the day period (7am to 10pm). Therefore, reasonable and feasible mitigation measures should be considered. Proposed mitigation measures are provided in Chapter 8. All other roads comply with construction traffic noise trigger levels.

Table 4.7 Summary of traffic volumes with and without predicted construction traffic

Location	Average daily traffic volume (no construction)			Predicted traffic volumes including construction traffic (two-way)			
	Day	Night	% of heavy vehicles	Day		Night	
				Total	% of heavy vehicles	Total	% of heavy vehicles
Burley Griffin Way (East of Stockinbingal)	773	86	37%	1034	45%	126	25%
Burley Griffin Way (West of Stockinbingal)	991	110	32%	1237	40%	150	23%
Grogan Road	77	9	34%	430	70%	49	6%
Hibernia Street	1106	123	26%	1668	41%	163	20%
Troy street	26	3	26%	723	75%	43	2%
Dudauman Road	77	9	34%	566	77%	49	6%
Corbys Lane	26	3	26%	26	27%	43	2%
Old Cootamundra Road	249	28	26%	810	58%	67	10%
Dirnaseer Road (East of Ironbong Road)	62	7	15%	323	57%	47	2%
Ironbong Road	23	3	26%	600	83%	43	2%
Old Sydney Road	15	2	12%	308	81%	41	0%
Olympic Highway (West of Bethungra)	1597	177	21%	2173	38%	217	17%
Retreat Road	41	5	14%	410	65%	45	2%
Junee Reefs Road	36	4	16%	404	66%	44	2%
Goldfields Way	1597	177	21%	1964	30%	217	17%
Stockinbingal Road	249	28	26%	510	47%	67	10%

Table 4.8 Construction road traffic noise assessment

Road	Distance to closest receiver (m)	RNP classification	RNP management levels		Predicted noise level of base traffic		Predicted noise level of base traffic with construction traffic		Increase in noise level generated by construction traffic		Comply with management level?	
			Day[1] $L_{eq,15hr}$ (dBA)	Night[1] $L_{eq,9hr}$ (dBA)	Day[1] $L_{eq,15hr}$ (dBA)	Night[1] $L_{eq,9hr}$ (dBA)	Day[1] $L_{eq,15hr}$ (dBA)	Night[1] $L_{eq,9hr}$ (dBA)	Day[1]	Night[1]	Day[1] $L_{eq,15hr}$ (dBA)	Night[1] $L_{eq,9hr}$ (dBA)
Burley Griffin Way (East of Stockinbingal)	70	Arterial	60	55	50	43	52	44	1.6	0.7	YES	YES
Burley Griffin Way (West of Stockinbingal)	50	Arterial	60	55	52	46	54	46	1.4	0.6	YES	YES
Grogan Road	15	Sub-arterial	60	55	46	39	55	42	9.3	3.1	YES	YES
Hibernia Street	15	Arterial	60	55	56	49	59	49	3.0	0.4	YES	YES
Troy Street[2]	15	Local	55	50	41	25	58	32	16.9	6.9	NO	YES
Dudauman Road	20	Sub-arterial	60	55	47	40	57	44	10.5	4.0	YES	YES
Corbys Lane[2]	30	Local	55	50	38	22	38	28	0.1	6.9	YES	YES
Old Cootamundra Road	100	Sub-arterial	60	55	43	36	50	38	7.0	2.0	YES	YES
Dirnaseer Road (East of Ironbong Road)	50	Sub-arterial	60	55	39	33	49	39	10.0	5.8	YES	YES
Ironbong Road	190	Sub-arterial	60	55	28	22	45	29	16.8	7.4	YES	YES
Old Sydney Road[2]	700	Local	55	50	18	14	35	24	17.4	10.0	YES	YES
Olympic Highway (West of Bethungra)	45	Arterial	60	55	47	47	50	48	2.7	0.5	YES	YES
Retreat Road	30	Sub-arterial	60	55	33	33	46	39	13.4	6.9	YES	YES
Junee Reefs Road[2]	50	Local	55	50	33	22	46	29	13.4	7.8	YES	YES
Goldfields Way	20	Arterial	60	55	45	51	46	52	1.7	0.5	YES	YES
Stockinbingal Road	40	Sub-arterial	60	55	51	41	55	43	4.5	2.0	YES	YES

(1) AM = 7am to 10pm, PM = 10pm to 7am

Local roads are assessed against and predicted for Leq, 1hr peak trigger levels

4.9 Traffic diversions

The construction of the level crossings and bridges associated with the proposal may require temporary road closures in the vicinity of the construction area. It is expected that side-tracking during construction works will be implemented to maintain vehicle flow through the construction site, with this being managed under a Traffic Management Plan. However, should this not be possible, temporary diversionary routes as discussed below have been identified to mitigate any potential road closures.

These temporary diversions may result in additional road traffic generated on existing roads, which has the potential to cause adverse road noise impacts at receivers. An assessment in line with the RNP has been undertaken to investigate potential noise impacts at nearby sensitive receivers.

4.9.1 Burley Griffin Way diversion

In order to manage traffic travelling through Stockinbingal, a traffic diversion would be required to detour traffic along Troy Street and Dudauman Street, to re-join Burley Griffin Way at the eastern end of Stockinbingal. This can be achieved under combined road and rail traffic control.

The temporary diversionary route considered as part of this assessment is shown in Figure 4.10.

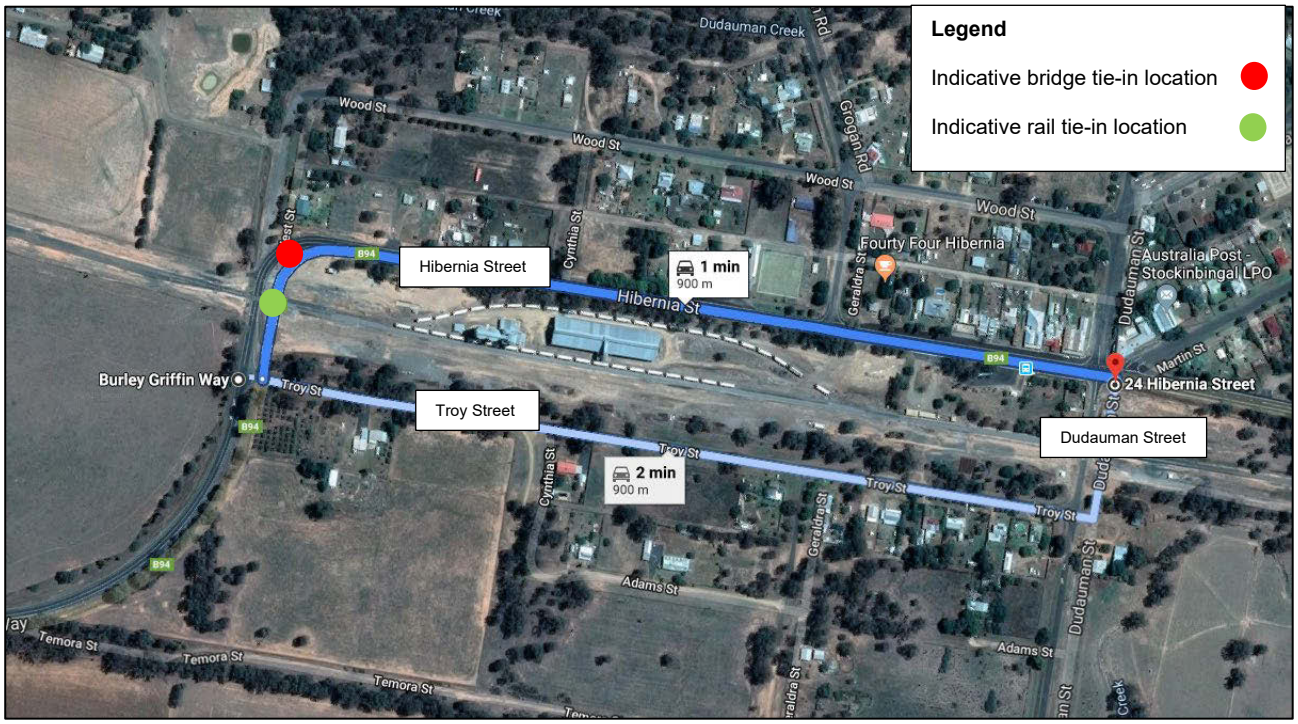

Figure 4.10 Temporary diversionary routes – Eastern tie-in

4.9.2 Old Sydney Road diversion

To manage traffic along Old Sydney Road during the construction of a level crossing east of Bethungra, a detour has been proposed to direct traffic along Warrens Lane and the Olympic Highway, bypassing the construction works. The existing and diversionary routes are illustrated in Figure 4.11 and Figure 4.12.

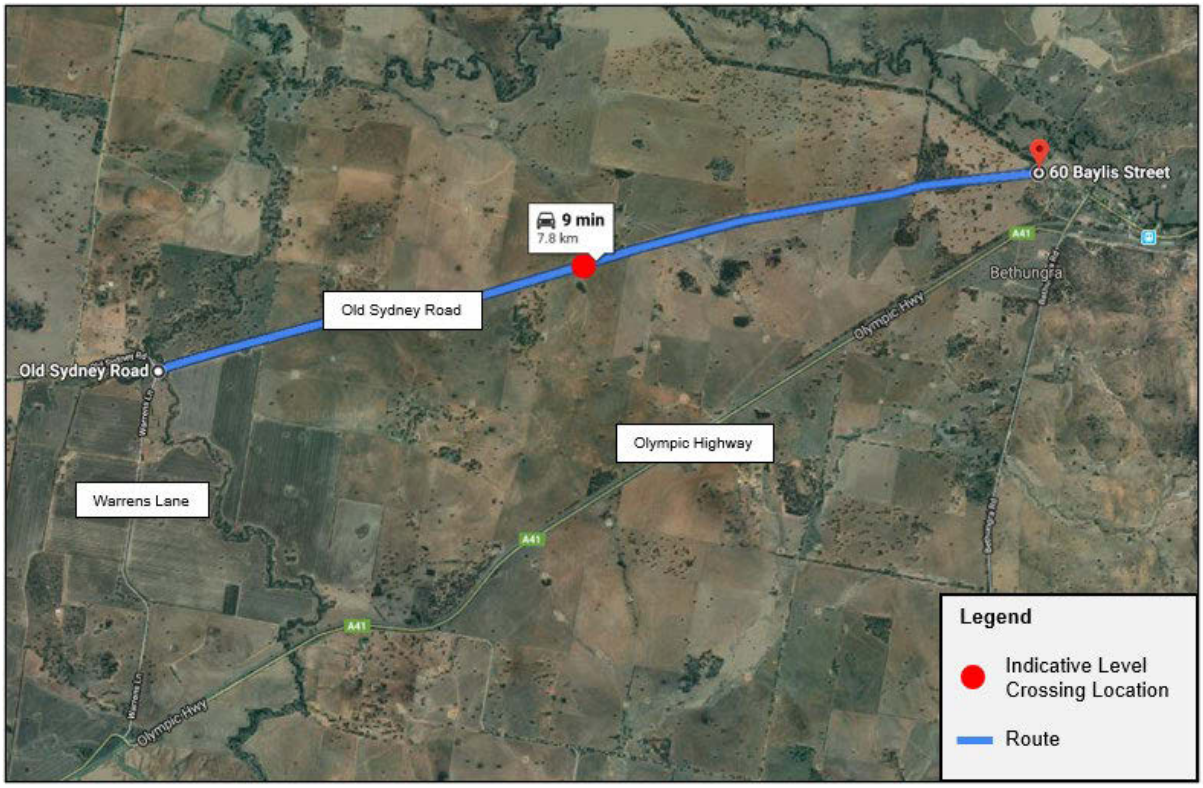

Figure 4.11 Existing route – Old Sydney Road

Figure 4.12 Diversionary route – Old Sydney Road

4.9.3 Ironbong Road diversion

The proposed Level Crossing construction along Ironbong Road will directly impact traffic specifically travelling into and out of Bethungra. In order to manage traffic entering and leaving Bethungra through the northwest of the town, a traffic diversion would be required, directing traffic along Old Sydney Road and Eulomo Settlement Rd, re-joining Ironbong Road north of Ulandra Creek. Figure 4.13 and Figure 4.14 outline the pathways of the existing route and the temporary diversion route, which would remain for the duration of the level crossing construction work.

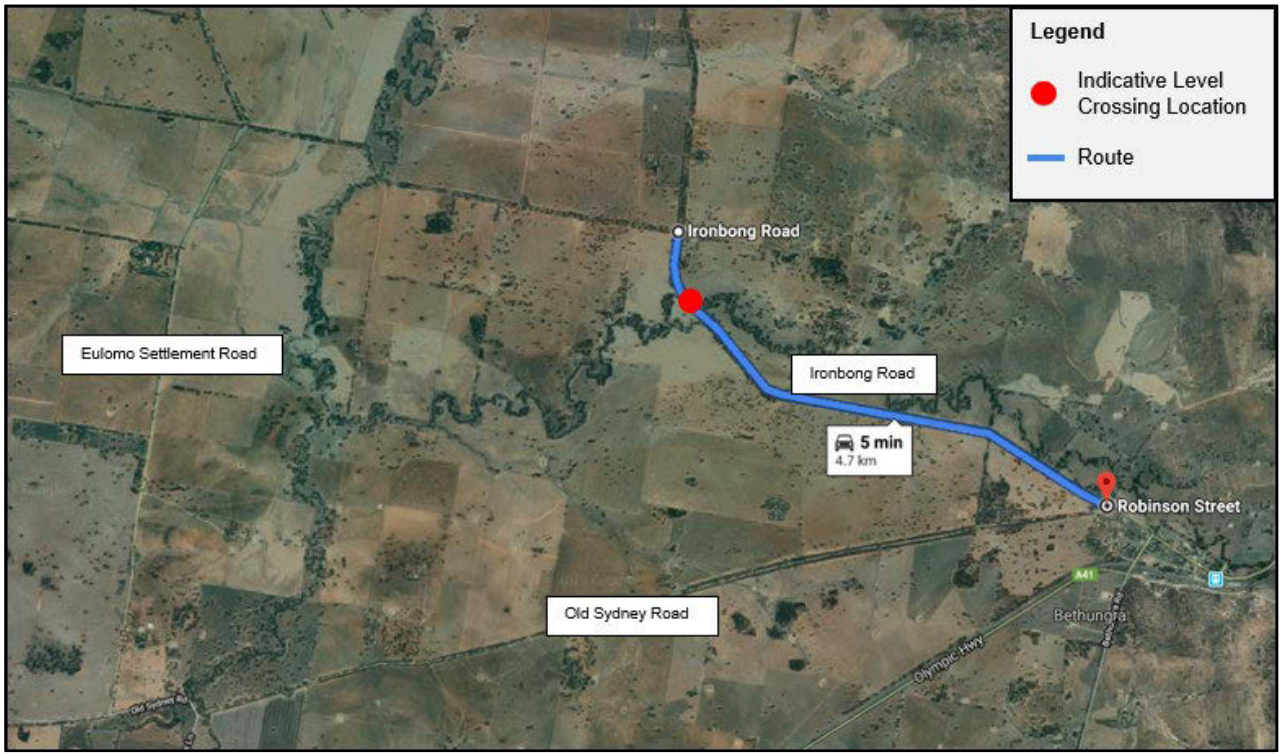

Figure 4.13 Existing route and indicative location of level crossing – Ironbong Rd

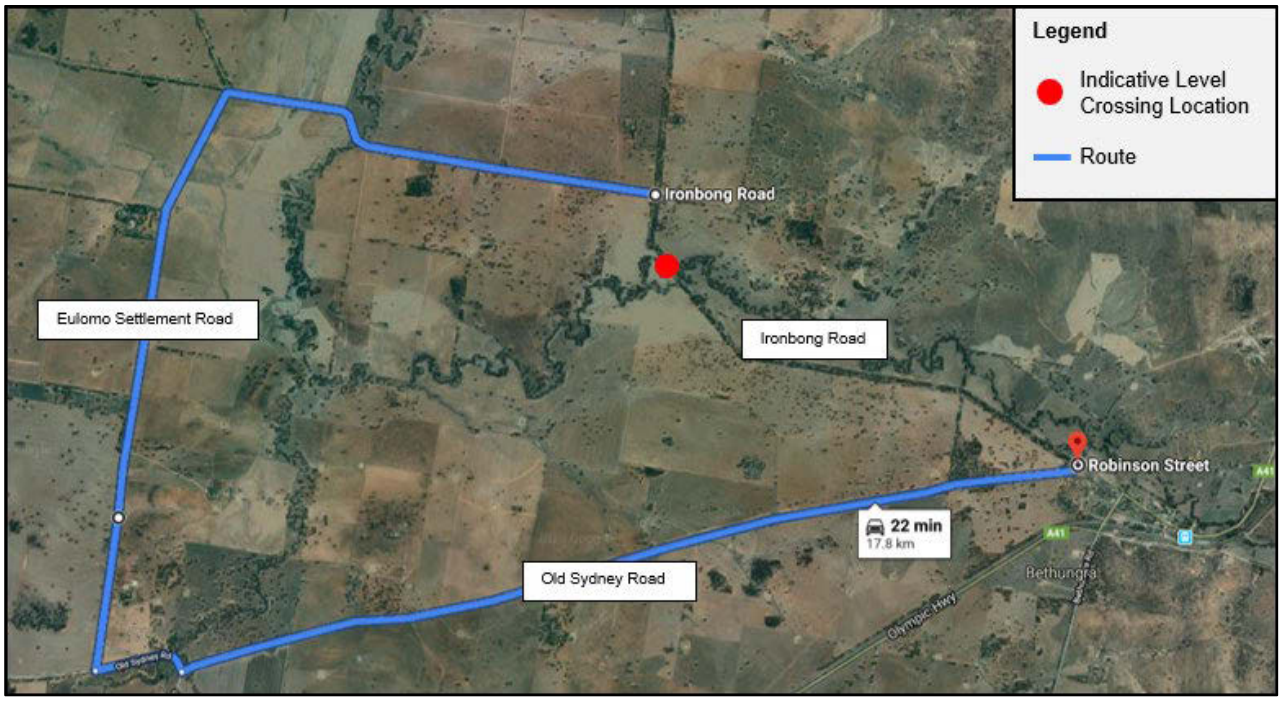

Figure 4.14 Diversionary route – Ironbong Road

4.9.4 Dirnaseer Road diversion

Dirnaseer Road is a sub-arterial road which will see the construction of an underbridge, impacting traffic travelling between the intersection with Blackgate Road, and the section of the Olympic Highway located southwest of Cootamundra. To manage traffic displaced by construction works, a traffic diversion would be required to redirect traffic along Suttons Lane, Old Cootamundra Road and Blackgate Road, re-joining Dirnaseer Rd 22km west of the detour's start. The existing and detour paths are shown in Figure 4.15 and Figure 4.16.

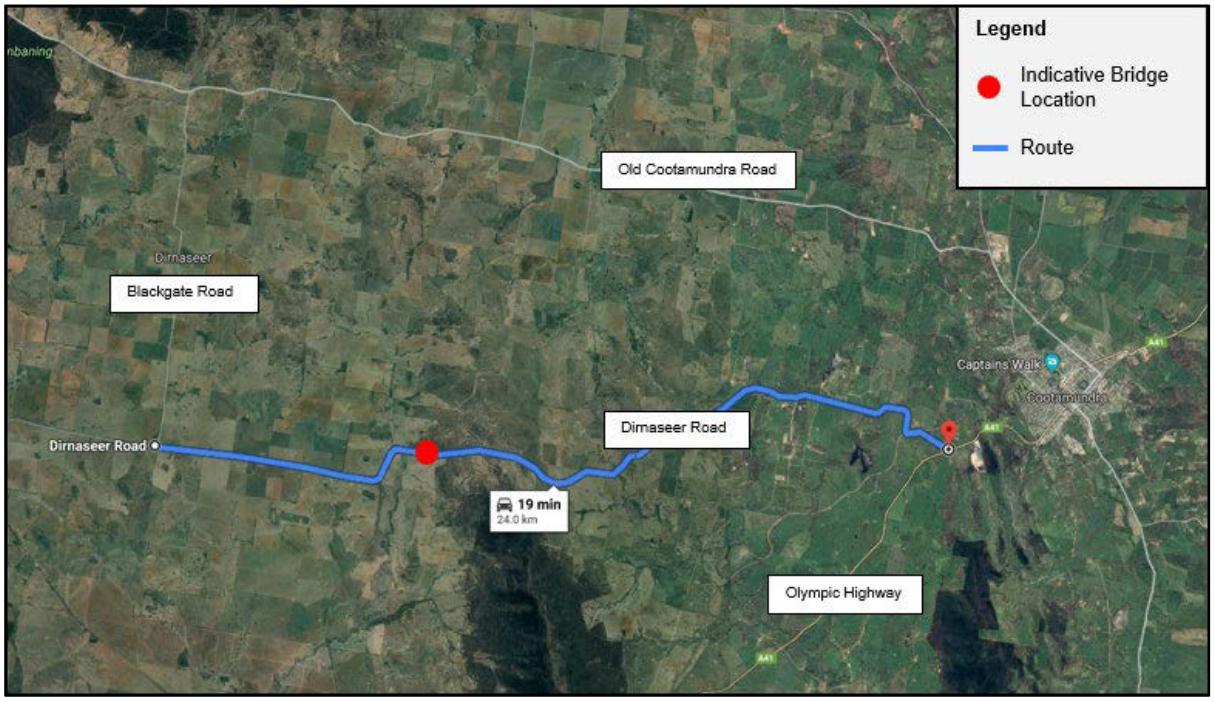

Figure 4.15 Existing route and indicative location of underbridge construction site – Dirnaseer Road

Figure 4.16 Diversionary route and location of underbridge construction site – Dirnaseer Road

4.9.5 Old Cootamundra Road diversion

Construction along Old Cootamundra Road will require the management of traffic between Blackgate Road-Old Cootamundra Road intersection and 79 Old Cootamundra Road. This traffic management would involve diverting traffic along Blackgate Road, Dirnaseer Road and Suttons Lane, to re-join Old Cootamundra Road approximately 1.5km west of Stockinbingal Road, which then flows into Cootamundra. Figure 4.17 and Figure 4.18 illustrate the current and diversionary routes respectively.

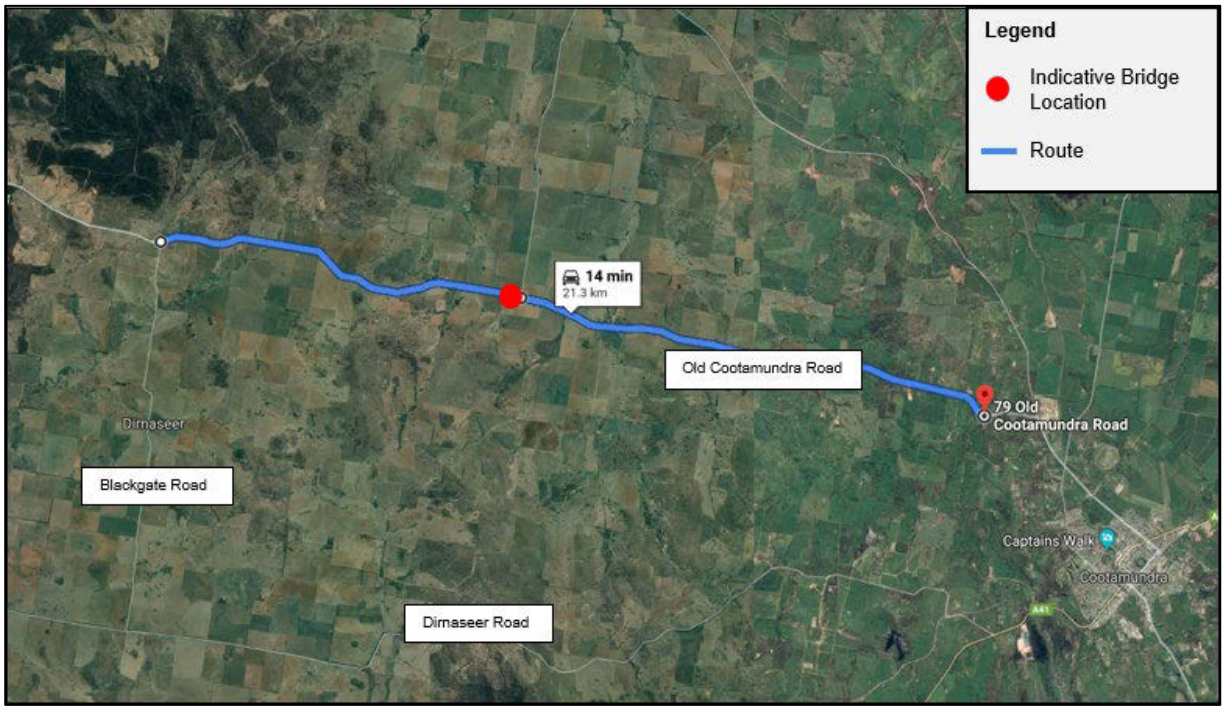

Figure 4.17 Existing route and indicative location of underbridge construction works – Old Cootamundra Road

Figure 4.18 Diversionary route and indicative location of underbridge construction works – Old Cootamundra Road

The predicted construction traffic noise levels, based on the existing and forecasted construction traffic volumes, are presented in Table 4.9. An exceedance of 4dB along Troy Street is predicted during the day period (7am to 10pm). Therefore, reasonable and feasible mitigation measures should be considered. Proposed mitigation measures are provided in Chapter 8.

4.10 Ground-borne noise

Ground-borne noise is generated by vibration transmitted through the ground into a structure and may impact sensitive receivers in close proximity to vibration generating construction equipment. As per the ICNG, ground-borne noise criteria are only applicable when ground-borne noise levels are higher than airborne noise levels.

A worst-case assessment of the sensitive receiver closest potentially most affected by ground-borne noise (located 15m away from the construction footprint) has been undertaken to determine whether ground-borne noise may exceed airborne noise levels. The highest vibration generating item of construction equipment (and thus highest ground-borne noise inducing) is a pad-foot roller. At 15m, a pad-foot roller produces an airborne noise level of 80dBA, which would reduce to approximately 55dBA inside at the rear of a residential building with windows closed. The vibration level at the same distance is 7.5mm/s PPV which would translate to approximately 42dBA inside a residential building.

As the distance attenuation for ground-borne noise is greater than that of airborne noise, receivers further away from the construction footprint are expected to experience lower ground-borne noise levels comparative to airborne noise levels.

Therefore, construction airborne noise levels for evening and night-time works are expected to be greater than the resultant ground-borne noise levels at all receivers.

Table 4.9 Temporary diversion road traffic noise assessment

Diversion location	Road name	Road type	Distance from road to nearest residential receiver (m)	Criteria		Predicted noise level of base traffic		Traffic noise level with diversion		Complies?	
				Day[1] $L_{eq,15hr}$ (dBA)	Day[1] $L_{eq,15hr}$ (dBA)	Day[1] $L_{eq,15hr}$ (dBA)	Night[1] $L_{eq,9hr}$ (dBA)	Day[1] $L_{eq,15hr}$ (dBA)	Night[1] $L_{eq,9hr}$ (dBA)	Day[1]	Night[1]
Eastern tie-in	Troy Street[2]	Local	15	55	50	40	33	59	49	No	Yes
	Dudauman Road	Sub-arterial	20	60	55	46	39	60	50	Yes	Yes
Old Sydney Road Realignment	Warrens Lane[2]	Local	700	55	50	18	12	38	25	Yes	Yes
	Olympic Highway	Arterial	45	60	55	47	47	51	48	Yes	Yes
Ironbong Road Realignment	Old Sydney Road[2]	Local	700	55	50	18	12	40	25	Yes	Yes
	Eulomo Settlement Road[2]	Local	700	55	50	15	10	38	23	Yes	Yes
Dirnaseer Road Realignment	Suttons Lane	Sub-arterial	190	60	55	28	22	46	32	Yes	Yes
	Old Cootamundra Rd	Sub-arterial	100	60	55	42	36	51	39	Yes	Yes
	Blackgate Rd	Sub-arterial	190	60	55	28	22	46	32	Yes	Yes
Old Cootamundra Road Realignment	Suttons Lane	Sub-arterial	190	60	55	28	22	47	34	Yes	Yes
	Dirnaseer Road	Sub-arterial	50	60	55	39	33	55	43	Yes	Yes
	Blackgate Road	Sub-arterial	190	60	55	28	22	47	34	Yes	Yes

(1) Day = 7am to 10pm, Night = 10pm to 7am

(2) Local roads are assessed against and predicted for Leq, 1hr peak trigger levels

5 Construction vibration assessment

Certain construction activities would require the use of vibration intensive equipment that may affect the nearest sensitive receivers. The most vibration intensive plant nominated as part of the work is the use of smooth and pad-foot vibratory rollers (Scenarios 1 establishment, 2 utility relocations, 3 earthworks and 4 drainage).

Table 5.1 presents the indicative minimum working distances for the nominated construction plant to minimise the risk of structural damage and human comfort for sensitive receivers, based on the data provided in the CNVS and IRDJV database.

The minimum working distances are based on the typical distance from receivers' to work permitted to be carried out to meet the limits set out in Chapter 2. The distances are indicative only and results may vary depending on the activity, equipment, local ground, and receiver conditions.

The minimum working distances reported in Table 5.1 indicate the largest distances for compliance with the residential human comfort and cosmetic damage guidelines are 100m and 15m, respectively, for typical construction equipment associated with the proposal. It is noted that some of the potentially impacted properties may adjacent to some construction works, occurring around the tie-in to the existing rail line at the eastern end of Stockinbingal. The non-aboriginal heritage receivers, Cohen's Trade Palace (CWA Rooms) and the Stockinbingal Railway Station (located within Stockinbingal), and the scarred trees identified as aboriginal heritage receivers (located near Ironbong Road and separately to the north-west of Stockinbingal), have been identified as having works potentially occur within minimum working distances. Table 5.2 summarises the number of receivers within the minimum safe working distances in relation to the construction footprint boundary. It should be noted that vibration intensive works are mostly expected to take place set back from the construction footprint boundary, and hence the provided number of receivers within the minimum working distances is conservative.

If works occur within minimum working distances, the size or power of the vibration generating equipment can be controlled to minimise impacts. The following equipment size/power ratings would allow for the risk of impacts to be minimised and compliant with the minimum working distance in Table 5.2, vibratory rollers (pad foot and smooth drum) < 100kN (typically 2–4 tonnes).

By selecting a lower powered/smaller machine and restricting when the machine is used, particularly when near the minimum working distances of the nominated sensitive receivers, the vibration impacts can be reduced.

Where works occur within minimum working distances, reasonable and feasible mitigation including dilapidation surveys and vibration monitoring, would be considered as outlined in Chapter 8.

Table 5.1 Recommended minimum working distances for vibration intensive plant

Plant item	Rating/description	Minimum working distance		
		Cosmetic damage		Human response
		Sensitive	Non-sensitive	Sensitive
Excavator		2m	1m	15m
Smooth drum roller	7–13 tonne	15m	7m	100m
Dozer		3m	2m	10m
Pad foot roller	7–13 tonne	15m	7m	100m
Tamper and Dynamic Track Stabiliser		3m	2m	10m
Piling Rig – bored	≤ 800mm	2m (nominal)	1m	N/A

Table 5.2 Receivers within minimum working distances

Receiver type	Number of receivers within cosmetic damage minimum working distance	Number of receivers within human response minimum working distance
Residential	9	46
Non-sensitive	33	105[1]
Aboriginal Heritage	2	N/A
Heritage	2	N/A

(1) Non-sensitive receivers have been conservatively assessed as similar land-use and construction as residential properties. Actual usage should be confirmed as part of the inspection process required under the mitigation measures in Chapter 8

5.1 Impacts to 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.). It is therefore 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.

Guideline values for setback distances from identified vibratory plant to achieve the most stringent criteria of 50mm/s PPV, as outlined in Section 2.8.2, are provided as follows:

- Vibratory compaction (smooth-drum and pad-foot): 5 to 7m
- All other items of vibratory plant identified in Table 5.1: Avoid contact with structure.

Should the vibration-intensive works noted above occur within minimum working distances from buried utilities, further consultation with the asset owner will need to be undertaken before construction commences to determine if there will be an actual impact, and if so the appropriate management of the construction activity shall be determined as part of the Construction Noise and Vibration Management Plan (CNVMP).

6 Blasting assessment

It is proposed to use blasting at multiple locations along the alignment to remove rock for a cut within the alignment. A preliminary blasting assessment has been undertaken. The assessment has calculated the highest mass of explosive that would be able to be used and still meet the blasting overpressure or vibration limits at different ranges to the nearest sensitive receiver.

6.1 Ground-borne vibration assessment

Calculations have been carried out in accordance with AS 2187 in order to determine the likely levels of ground-borne vibration and airblast overpressures from the proposed blasting as follows:

$$V = K_g \left(\frac{R}{Q^{1/2}} \right)^{-B}$$

Where

- V = ground vibration as vector peak particle velocity, in mm/s
- R = distance between charge and point of measurement, in m
- Q = maximum instantaneous charge (MIC) (effective charge mass per delay), in kg
- K_g, B = constants related to site and rock properties for estimation purposes.

As site specific information is not available, average conditions under AS 2187 have been assumed. In the case of a free face in average field conditions, it is assumed that K_g = 1140, B = 1.6, which result in:

$$V = 1140 \left(\frac{R}{Q^{1/2}} \right)^{-1.6}$$

The calculated maximum charge in order to meet the ground-borne vibration limits at receivers at varying distances from the proposal has been provided in Table 6.1.

Table 6.1 Ground-borne vibration maximum MIC for varying distances

Distance to nearest receiver	Maximum PPV (mm/s)	Maximum instantaneous charge (kg) for sensitive receivers
100	5	11
200		45
300		102
400		181
500		282
600		406
700		553
800		722
900		914
1000		1129
1100		1366
1200		1625
1300		1908
1400		2212
1500		2540

6.2 Overpressure assessment

Airblast overpressure resulting from blasting was calculated according to the method in AS 2187 as follows:

$$P = K_a \left(\frac{R}{Q^{1/3}} \right)^{-a}$$

Where:

- P = pressure, in kPa
- R = distance between charge and point of measurement, in m
- Q = explosives charge mass, in kg
- K_a, a = site constants.

Recommended confined blast hole constants per AS 2187 of a = -1.45, K_a = 100 have been used for the assessment.

The calculated maximum charge in order to meet the airblast limits at receivers at varying distances from the proposal has been provided in Table 6.2.

Table 6.2 Airblast overpressure maximum MIC for varying distances

Distance to nearest receiver	Maximum peak sound pressure level for occupied receivers (dBL)	Maximum peak sound pressure level for unoccupied receivers (dBL)	Maximum instantaneous charge (kg) for sensitive receivers	Maximum instantaneous charge (kg) for non-sensitive receivers
100	115	133	0.007	0.49
200			0.05	4
300			0.18	13
400			0.43	31
500			0.84	61
600			1.5	106
700			2.3	169
800			3.5	252
900			4.9	359
1000			6.8	492
1100			9.0	655
1200			11.7	850
1300			14.8	1080
1400			18.5	1349
1500			22.8	1660

The limiting maximum explosive mass for airblast overpressure is substantially lower than the maximum explosive mass ground-borne vibration. Therefore, when designing charge mass, it is recommended that the airblast overpressure limits be used to limit the explosive mass to avoid exceedance of criteria outlined in section 2.8.

Based on preliminary cut location information, maximum charge sizes have been provided for each proposed cut in Appendix F. The calculations are considered conservative, with the use of typical blasting factors and do not account for any topographical shielding or other blast controls.

Maximum instantaneous charge sizes should not be exceeded so to prevent any exceedance of criteria outlined in section 2.8 and minimise impacts of blasting. It is noted that based on conservative assumptions, no maximum instantaneous charge size Cut 40 using the conservative assumptions in Appendix F.

It is recommended that further blast design and assessment, including refinement for local site conditions is carried out when further details relevant to the blasting program is known.

7 Cumulative construction noise and vibration assessment

Sensitive receivers may be potentially impacted by cumulative noise levels associated with separate construction scenarios occurring simultaneously at adjacent worksites.

Table 7.1 outlines projects that could potentially result in cumulative impacts in the vicinity of the proposal. Other projects in the vicinity were not included as no cumulative impacts are anticipated.

Table 7.1 Projects potentially affecting cumulative noise impacts

Proposal	Description	Location	Comments
Illabo to Stockinbingal (Inland Rail)	Cumulative construction impacts between sections	Sections 1 through to 6	Construction activities may occur simultaneously across Sections of the proposal. Where sensitive receivers are located adjacent to two sections, some cumulative impacts may be perceived.
Albury to Illabo (Inland Rail)	Track infrastructure upgrades	South of the proposal (near Section 1)	Impacts due to A2I construction would depend on the final construction schedule for that project, specifically if works at the southern extent of this proposal would occur while works are underway on the northern extent of the A2I 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.
Stockinbingal to Parkes (Inland Rail)	Track infrastructure upgrades	North of the proposal (near Section 6)	No works are expected to occur within 2km of the proposal, and hence no cumulative impacts are expected.

In most cases the cumulative noise impact experienced at receivers potentially impacted by multiple projects 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.

Cumulative construction vibration impacts between sections of the proposal are expected to minimal, as the nature of construction progressing along the alignment would make it unlikely that vibration generating plant from separate Sections would be used in close proximity. Any potential cumulative impacts would be managed in line with the vibration mitigation and management measures outlined in Chapter 8.

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

8 Construction noise and vibration mitigation and management

8.1 Standard construction noise and vibration mitigation

Environmental management for the proposal would be carried out in accordance with the environmental management approach as detailed in Chapter 27 of the EIS (Approach to environmental management and mitigation).

Prior to commencement of works, a Construction Environmental Management Plan (CEMP) would be prepared, which describes the approach to environmental management, monitoring and reporting during construction. Specifically, it lists the requirements to be addressed by the construction contractor in developing the CEMP, sub-plans, and other supporting documentation for each specific environmental aspect.

The Construction Noise and Vibration Management Plan (CNVMP) is a specific sub plan required by the CEMP. Preparation of the CNVMP would be undertaken in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework (CNVMF). The CNVMF provides a consistent approach to managing construction noise and vibration impacts across Inland Rail in NSW in line with the requirements of the ICNG.

Specifically, the CNVMF identifies the requirements and methodology to develop construction noise and vibration impact statements. These would be prepared prior to specific construction activities and based on a more detailed understanding of the construction methods, including the size and type of construction equipment, duration and timing of works, and detailed reviews of local receivers if required.

Standard mitigation measures outlined in Appendix E would be implemented where reasonable and feasible to reduce the noise and vibration levels at sensitive receivers. The potential risk of construction fatigue would be reduced through the implementation of standard mitigation measures by reducing both the magnitude and duration of exposure to construction noise and vibration.

It is noted that construction noise assessment trigger levels have been developed in line with the ICNG which ‘aims to protect the majority of sensitive land uses from noise pollution most of the time’. The trigger levels have been designed with the understanding that construction noise is temporary by nature, variable in times of occurrence, and may move as construction progresses. Because of these considerations, construction noise sources are typically not amenable to purpose-built noise control measures applied to industrial processes. Therefore, the intent of the trigger levels is to focus on the application of a range of work practices most suited to minimising construction noise impacts, rather than focusing on only achieving numeric noise levels.

8.1.1 Out-of-hours work protocol

As described in section 4.3, an alteration to working hours beyond the ICNG recommended standard hours is proposed to reduce the construction duration as far as practicable. The intent of the longer working hours is to minimise the overall time of associated disruptions to the community from construction activity, construction traffic and road diversions.

The ICNG proposes standard work hours as 07:00–18:00 Mondays to Fridays and 07:00–13:00 Saturdays, with all other times termed Out-of-hours-work (OOHW).

ARTC’s construction contractor will establish a working roster consistent with the EIS approval and the construction EPL, in association with the following working hours.

Ordinarily, construction is proposed to occur 06:00–18:00 each day, provided that:

- construction noise levels during OOHW periods under the ICNG do not exceed the rating background level by more than 5dB(A) at residential receivers and no more than the noise management levels specified in Table 3 of the ICNG would be experienced at non-residential sensitive receivers. This measure ensures that works do not result in sleep disturbance or impacts in the “night” period of 06:00–07:00; and
- longer duration respite periods are provided by limiting work hours to the ICNG standard hours for a three (3) month period following each three (3) month period of extended hours construction in the work areas between the southernmost creek crossing on 1/DP546133 (at chainage 35900) and the boundary between 1/DP1093937 and 188/DP1120849 (approximately at chainage 40290).

Where this cannot be achieved the ICNG standard hours would be adopted on a case by case basis (in relation to securing written agreements as outlined below).

Notwithstanding the above provisions, where potentially affected sensitive receivers provide written agreement to extend construction hours beyond ICNG standard hours, works will be undertaken in line with the written agreement.

Construction activities may also be undertaken outside the proposal construction hours as follows:

- where potentially affected sensitive receivers provide written agreement to extend construction hours beyond the proposal construction hours
- where noise levels generated by construction work are predicted to be less than the out-of-hours NMLs (RBL+5) and outside minimal working distances for vibration
- work during rail corridor possessions for tie into the existing rail network, which may need to be carried out on a 24-hour basis
- installing precast bridge beams over existing public roads
- installing level crossings where road closures are not approved during program construction hours
- relocating utilities that are required to be undertaken out of hours to avoid impact to local residents and businesses
- delivering oversized plant or structures that police or other authorities for safety reasons
- facilitating emergency work to avoid the loss of life or damage to property or to prevent environmental harm
- implementing utility works (such as connections) to minimise disruption to customers.

ARTC’s community consultation has included discussion with landholder and community members regarding construction noise impacts and the proposed extension of working hours beyond the ICNG standard hours. The proposal construction hours are sought to balance feedback of impacts on amenity with a reduced construction duration and community specific management measures. The noise management measures applied through the limitations on hours provides an effective control to impacts.

Work outside the ICNG recommended standard hours would be undertaken with appropriate noise management controls and management measures, in accordance with the conditions of approval and the proposed mitigation measures, implemented through the CEMP Construction Noise and Vibration Sub-Plan. The Sub-plan will include preparation of an out-of-hours work protocol to define the process for considering, and managing out-of-hours work, along with measures to manage impacts on receivers very close to the construction area, including implementation of feasible and reasonable measures and communication requirements. Potential impacts from specific construction activities would be managed in accordance with location and activity-specific construction noise and vibration impact statements.

8.2 Residual construction noise impacts

Typical noise reductions from a selection of standard noise management measures based on guidance in AS2436 and experience on similar projects are presented in Table 8.1. Table 8.2 outlines potential noise reductions during each work stage based on the assumption that all relevant standard mitigation measures have been adopted. Actual implementation of mitigation will be determined by the construction contractor during detailed construction planning. Where these management measures are not implemented, actual noise levels are predicted to be somewhat higher.

Where vibration impacts are managed in line with the standard construction vibration mitigation measured presented in section 8.1, no residual vibration impacts are expected. Where the standard construction vibration mitigation measures are not reasonable or feasible, section 8.4 provides guidance on additional mitigation measures to be implemented for each receiver. These will be considered in detail during preparation of the Construction Noise and Vibration Management Plan (CNVMP) for the proposal.

The management of any residual impacts is also considered in Chapter 27 (Approach to environmental management and mitigation) of the EIS for the construction phase.

Table 8.1 Indicative noise reduction from construction controls

Ref	Engineering controls	Possible noise benefit, 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

Table 8.2 Predicted achievable noise reductions

Work stage	Assumed noise management measures(1)	Potential noise reduction dBA	Receivers exceeding OOH Night NMLs before mitigation	Receivers exceeding OOH Night NMLs after mitigation
Site establishment	3, 6, 7	12	138	70
Utility relocation and property adjustment	–	–	93	92
Earthworks	4, 7	10	151	146
Earthworks – crushing	2, 3, 5	20	113	0
Drainage	–	–	137	136
Track works	–	–	144	143
Road overbridges, underbridges, and pavement works	4, 6, 7	12	130	60
Finishing and landscaping	6, 7	8	130	83
Concrete batching and construction compounds	2, 3, 5, 8	20	110	0

(1) Refer Table 8.1.

8.3 Additional construction noise management for residual impacts

Where all reasonable and feasible standard mitigation measures have been applied and exceedances are still predicted to occur, this section provides guidance on additional mitigation measures to be implemented for each receiver depending on how far the predicted noise level is above the NML. These will be considered in detail during preparation of the Construction Noise and Vibration Management Plan (CNVMP) for the proposal. Additional mitigation measures and their associated acronyms are outlined in Table 8.3. Table 8.4 outlines when to implement the additional noise management measures.

Table 8.3 Additional mitigation measures

Measure	Description	Abbreviation
Communication Category 1 or 2	Accurate and timely 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 proposal and detailed in the proposal's communication and engagement strategy: • 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 personalized (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 work is required to be undertaken outside of the proposal 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 and after-hours number and Programme website.	CO1, CO2
Respite Period	Residential receivers subject to lengthy periods of noise or vibration may be eligible for a respite offer. 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.	RO
Alternate Accommodation	Alternate accommodation options (i.e. accommodation in motels away from the worksite) may be provided for residents living in close proximity to construction sites. Acceptable accommodation measures will be developed with the affected community and project team.	AA

Table 8.4 Implementation of additional management measures

Construction hours	Receiver perception	dBA above NML	Duration	Additional management measures
OOHW Day/Evening Monday–Sunday (6pm–10pm)	Noticeable	< 5	Any	CO1
	Clearly audible	5 to 15	Any	CO1
	Moderately intrusive	> 15 to 25	Any	CO1, CO2
			>2 consecutive periods	CO1, CO2
	Highly intrusive	> 25	Any	CO1, CO2
			>2 consecutive periods	CO1, CO2, RO
OOHW Night Monday–Sunday (10pm–6am)	Noticeable	< 5	Any	CO1
	Clearly audible	5 to 15	Any	CO1
	Moderately intrusive	> 15 to 25	Any	CO1, CO2
			>2 consecutive periods	CO1, CO2, RO
	Highly intrusive	> 25	Any	CO1, CO2
			>2 consecutive periods	CO1, CO2, RO, AA

CO1 = communication category 1, CO2 = communication category 2, RO = respite period, AA = alternate accommodation

8.4 Additional construction vibration management for residual impacts

Where vibration intensive activities occur within the human comfort vibration minimum working distances, all reasonable and feasible standard mitigation measures have been applied, and exceedances of vibration management levels are expected, this section provides guidance on additional mitigation measures to be implemented for each receiver. These will be considered in detail during preparation of the Construction Noise and Vibration Management Plan (CNVMP) for the proposal. Additional mitigation measures and the associated acronyms are outlined in Table 8.3. Table 8.5 outlines how to implement the additional noise management measures.

Table 8.5 Implementation of additional vibration management measures

Construction hours	Duration	Exceedance of 'preferred' value	Exceedance of 'maximum' value
OOHW Day/Evening Monday–Sunday (6pm–10pm)	Any	CO1, CO2	CO1, CO2, RO
OOHW Night Monday–Sunday (10pm–6am)	Any	CO1, CO2, RO	CO1, CO2, RO, AA

8.5 Summary of mitigation and management measures

The mitigation measures to manage noise and vibration impacts from the proposal during detailed design / pre-construction, and construction are outlined in Table 8.6.

Table 8.6 Proposal-specific mitigation measures for construction noise and vibration

Impact type	Mitigation and management measure	Project phase
Managing the potential for construction noise and vibration impacts	Location and activity-specific construction noise and vibration impact statements would be prepared based on a more detailed understanding of the construction methods, including the size and type of construction equipment, duration and timing of works, construction traffic associated with the proposal, and detailed reviews of local receivers as required.	Detailed design/ pre-construction
Minimising the potential for construction vibration (structural) impacts	Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and vibration monitoring would be carried out in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework, to ensure vibration levels remain below appropriate limits for that structure.	Detailed design/ pre-construction
Blasting management	A blast management strategy would be prepared in accordance with relevant guidelines and in consultation with the NSW Environment Protection Authority and would include: ▸ sequencing and review of trial blasting to inform blasting ▸ regularity of blasting ▸ intensity of blasting ▸ periods of relief ▸ blasting program. Monitoring of airblast and ground vibration caused by blasting would be conducted in line with *AS 2187.2:2006: Storage and use Part 2: Explosives* (Standards Australia, 2006). Monitoring would be conducted at the nearest sensitive receiver and non-sensitive receiver (if closer to the blasting zone than the closest sensitive receiver) and assessed in accordance with the criteria outlined in this document.	Detailed design/ pre-construction
Impacts of out-of-hours work	An out-of-hours work protocol would be developed to define the process for considering, approving and managing out-of-hours work, including implementation of feasible and reasonable measures and communication requirements to separately address the following situations: • works that routinely occur within the construction hours generally proposed for the project but outside Interim Construction Noise Guideline standard hours • works (such as evening and night works during rail possessions) that would occur outside the construction hours proposed for the project. Measures would be aimed at pro-active communication and engagement with potentially affected receivers, provision of respite periods and/or alternative accommodation for defined exceedance levels. All work outside the proposal construction hours would be undertaken in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework and in accordance with the out-of-hours work protocol. The protocol would provide guidance for the preparation of out-of-hours work plans for each construction work location and for key works, and guidance around mitigating impacts to receivers at Stockinbingal. Out-of-hours work plans would be prepared in consultation with key stakeholders (including the NSW Environment Protection Authority) and the community and incorporated into the construction noise and vibration management plan.	Construction

Impact type	Mitigation and management measure	Project phase
Managing the potential for noise and vibration impacts during construction	A construction noise and vibration management plan would be prepared and implemented in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework. The plan would include measures, processes and responsibilities to manage and monitor noise and vibration, and minimise the potential for impacts during construction.	Construction
Minimising the potential for construction vibration (structural) impacts	If vibration-generating activities are conducted within minimum working distances of a sensitive receiver, attended vibration measurements would be undertaken at the commencement of vibration generating activities to confirm that structural vibration limits are within the acceptable range. Where vibration levels are found to be unacceptable, alternative work methods would be implemented so the vibration impacts are reduced to acceptable levels.	Construction
Minimising the potential for construction vibration (structural) impacts	Dilapidation surveys: Property condition surveys would be completed prior to any vibration intensive work being carried out at or within the minimum distances that may cause cosmetic damage. Where a receiver is determined to be structurally unsound, a reassessment of the minimum working distances would be required. Minimum working distances would be confirmed prior to carrying out any vibration intensive work on site.	Construction
Impacts on heritage items as a result of construction vibration	Prior to the commencement of vibration intensive works within the minimum working distances for cosmetic damage for heritage items, the potential for damage to the item would be assessed. Where there is potential for damage, alternative methods that generate less vibration would be investigated and substituted where practicable. Where residual cosmetic damage risks remain, condition surveys would be carried out and vibration monitoring with real-time notification of exceedance would occur during the activity. Site activities would be modified where practicable to avoid exceeding the cosmetic damage criteria. Any identified vibration-related damage to the items would be rectified.	Construction
Minimising potential for impacts of blasting	Blasting would be undertaken during the recommended standard hours for blasting. Management measures defined by the blasting management strategy would be implemented.	Construction

9 Conclusion

IRDJV has undertaken a noise and vibration assessment for the Inland Rail – Illabo to Stockinbingal.

Nine construction scenarios have been assessed over six work sections encompassing the proposal. The key findings of this assessment include:

- NMLs were derived for residential and non-residential sensitive land uses using the ICNG and based on background noise monitoring as defined in the NPfI.
- No exceedances of NMLs are predicted for commercial, educational, active and passive recreation receivers.
- NML exceedances for residential receivers are expected for all scenarios in all Sections during out-of-hours works. Where highly noise affected receivers and exceedances of out of hours NMLs by >25dB are identified as occurring within a scenario, they are predominantly located along the western extent of Hibernia Street, Stockinbingal, in Section 5.
- Construction traffic noise has been assessed in accordance with the RNP, with exceedance of trigger levels predicted along Troy Street in Stockinbingal.
  - potential exceedance of road noise trigger levels is predicted to potentially occur along the Troy Street diversion during the Burley Griffin Way realignment.
- Minimum working distances for vibration intensive equipment to nearby receivers has been identified based on the CNVS. If minimum working distances are maintained, then adverse impacts in terms of human comfort or cosmetic damage are not expected.
- Maximum instantaneous charge sizes for blasting have been provided to comply with airblast and ground vibration criteria at sensitive and non-sensitive receivers.
- The standard construction noise and vibration management measures and additional mitigation measures are recommended for the receivers with predicted exceedances of the NMLs or within minimum working distances for vibration.
- Additional noise and vibration management measures have been presented for the management of residual impacts after the implementation of reasonable and feasible mitigation.

10 References

- *Assessing Vibration a technical guideline*, Department of Environment and Conservation, Sydney, 2006.
- Australian Standard 1055: 2018 – Acoustics – Description and Measurement of Environmental Noise, Standards Australia, 2018.
- Australian Standard AS 2187: Part 2-2006 Explosives – Storage and Use Part 2: Use of Explosives, Standard Australia, 2006.
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- *Interim Construction Noise Guideline*, Department of Environment & Climate Change, Sydney, 2009.
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- *Transit Noise and Vibration Impact Assessment Manual*, United States of America Department of Transportation Federal Transit Administration, Washington, 2006.

TECHNICAL REPORT

8

Construction Noise and Vibration Impact

Appendix A Noise monitoring instrumentation and quality control

A.1 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 (± 0.5dB) 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 construction noise and vibration impact 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. Copies of the calibration certificates can be provided upon request.

Table A.1 Noise monitoring equipment

Location	Survey method	Manufacturer and model	Serial No.
NM01	Unattended measurement	ARL Ngara	203865
NM02	Unattended measurement	ARL Ngara	203867
NM03	Unattended measurement	ARL Ngara	203866
NM04	Unattended measurement	Rion NL-42	00785234
NM05	Unattended measurement	ARL Ngara	878043
NM06	Unattended measurement	Rion NL-42	00785237
WS01	Weather monitoring	Davis Instruments Vantage VUE	MR190108044
WS02	Weather monitoring	Davis Instruments Vantage VUE	MR190108059
All locations	Attended measurement	Norsonic 140	1406502
All locations	Attended measurement & unattended measurement	Rion NC 73 (calibrator)	11248294

TECHNICAL REPORT 8

Construction Noise and Vibration Impact

Appendix B Noise monitoring graphs

Site Details	NM01	**Microphone Position**	1.5m above ground
Start Date	Mon 18 February 2019		
End Date	Tue 26 February 2019		

Measurement Summary

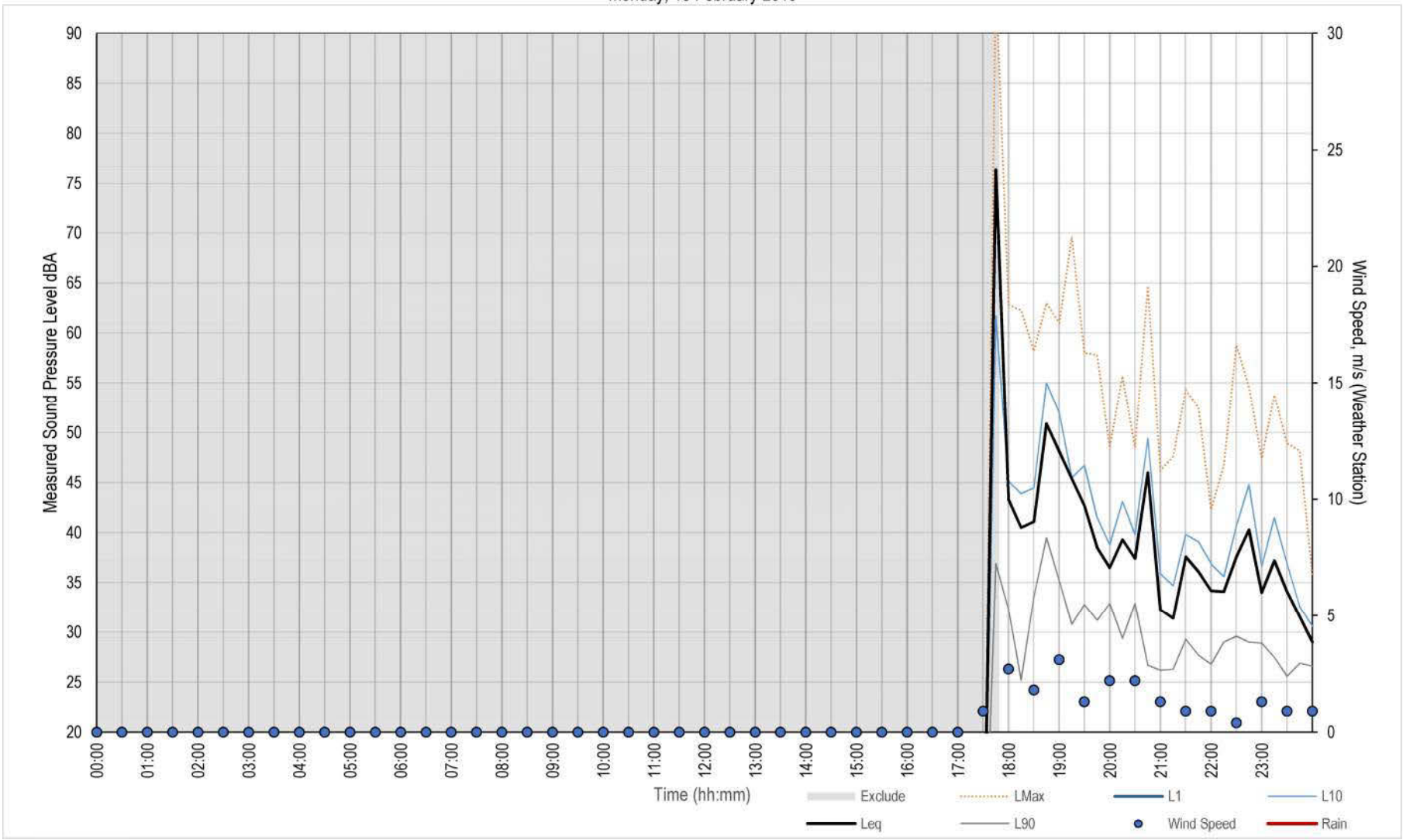
Date	18-02	19-02	20-02	21-02	22-02	23-02	24-02	25-02
$Leq_{, Day}$, dBA		47	45	43	46	41	49	48
$Leq_{, Evening}$, dBA	44	42	42	41	49	51	50	41
$Leq_{, Night}$, dBA	39	37	36	56	53	54	51	37
$RBL_{, Day}$, dBA		32	26	25	25	24	34	26
$RBL_{, Evening}$, dBA	26	28	25	26	32	34	39	23
$RBL_{, Night}$, dBA	27	19	19	41	35	28	27	26

	RBL			Leq,15 minute		
Date	Day	Evening	Night	Day	Evening	Night
Average	27	30	28	45	45	47

Site Photo

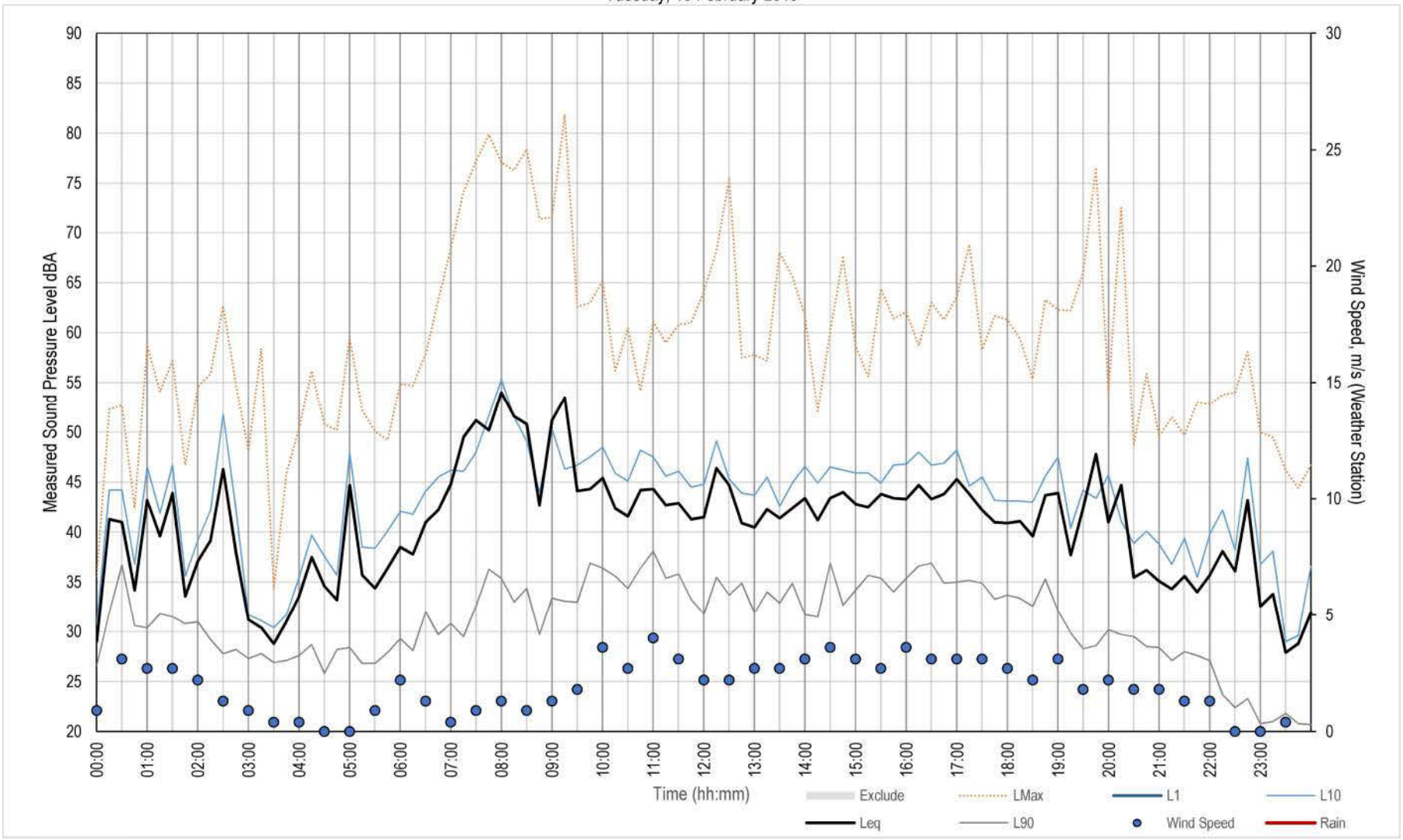
Measured Noise Levels - NM01

Monday, 18 February 2019



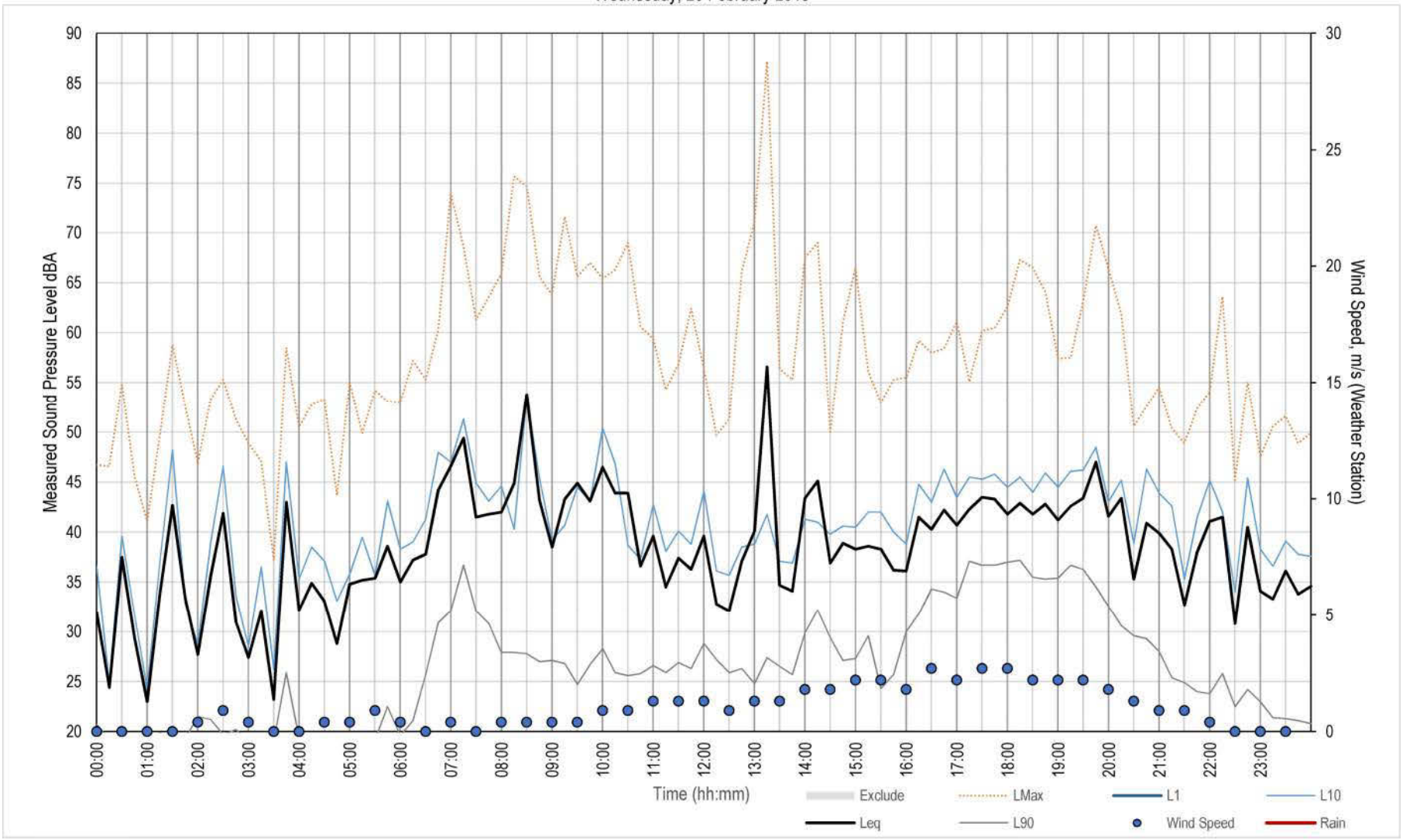
Measured Noise Levels - NM01

Tuesday, 19 February 2019



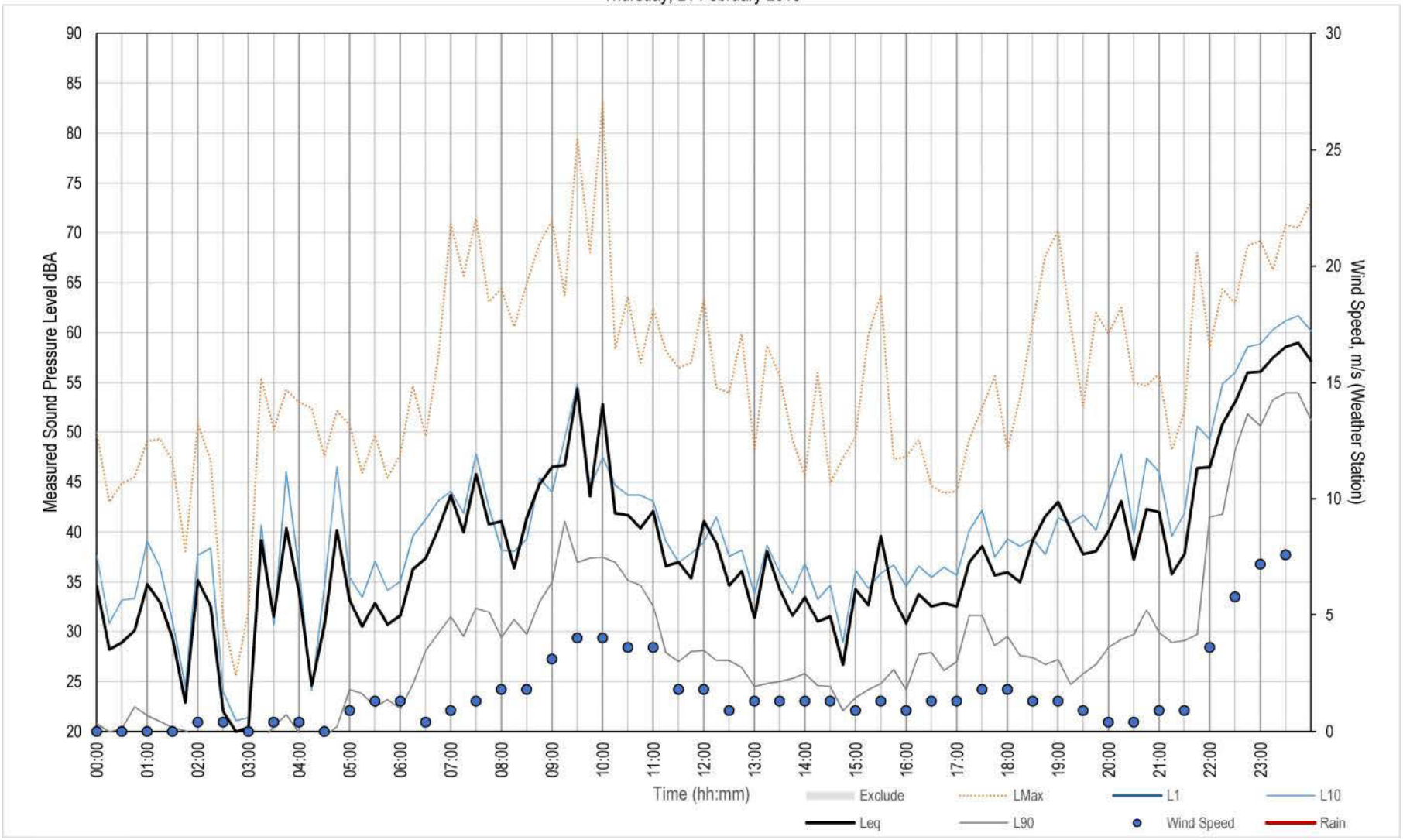
Measured Noise Levels - NM01

Wednesday, 20 February 2019



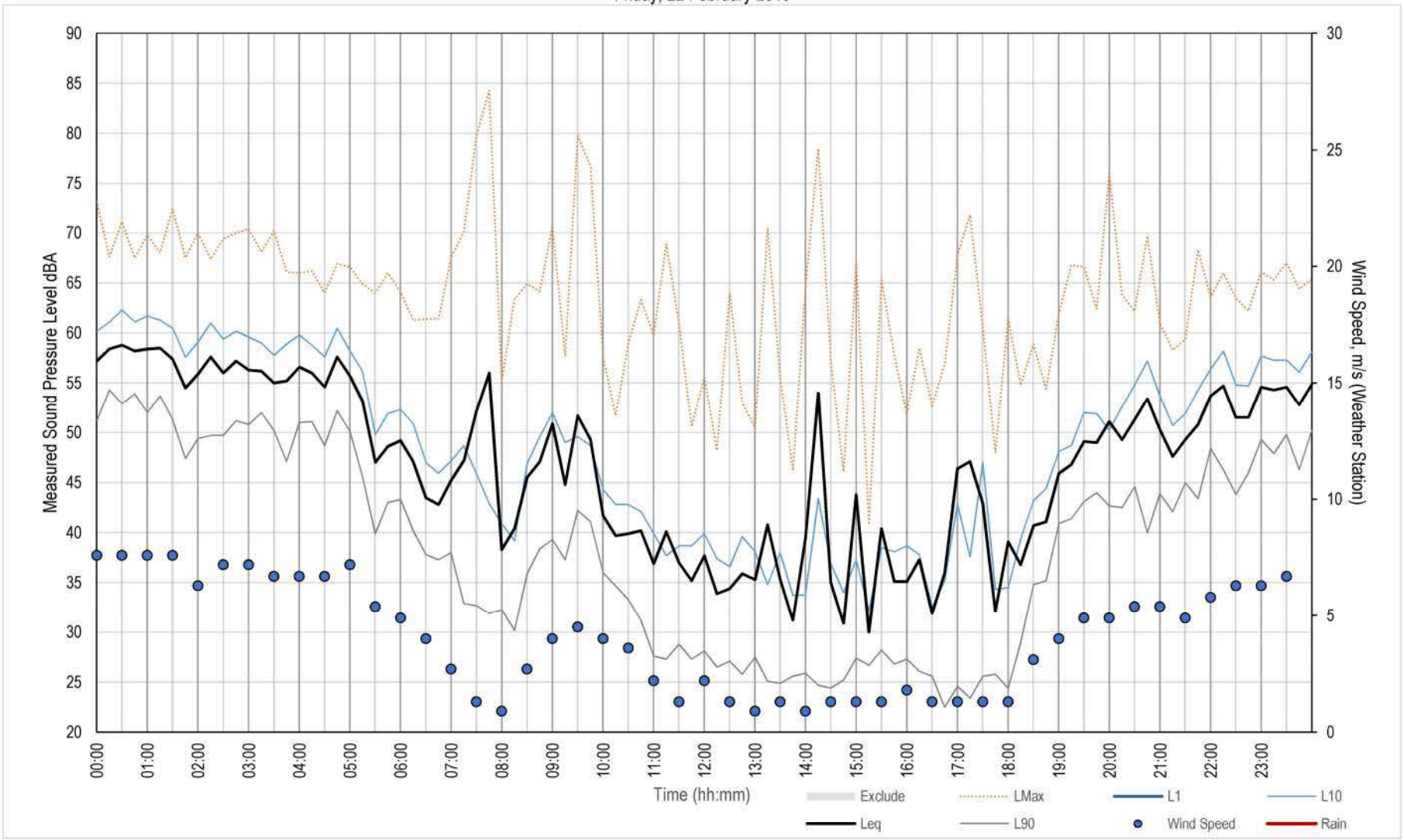
Measured Noise Levels - NM01

Thursday, 21 February 2019



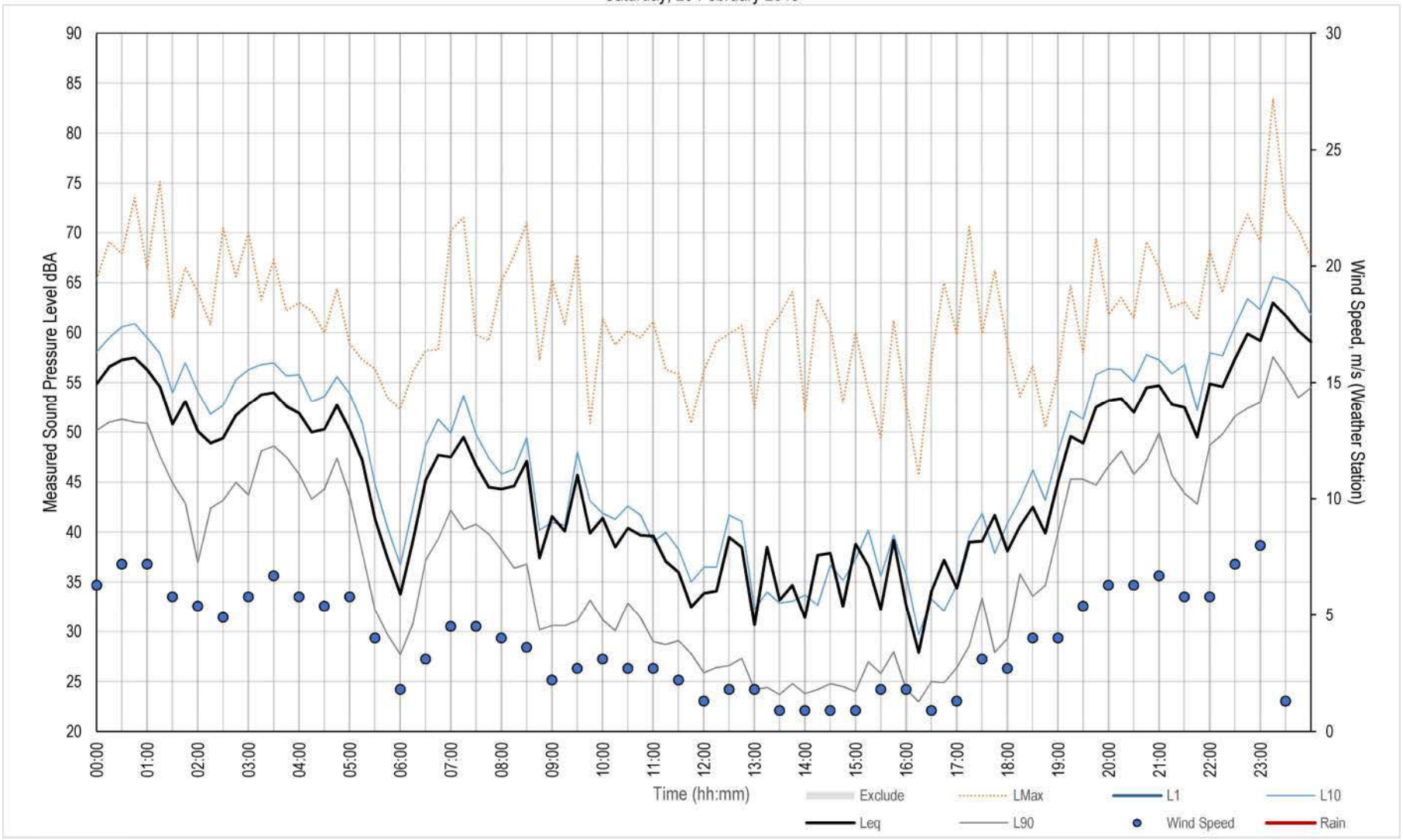
Measured Noise Levels - NM01

Friday, 22 February 2019



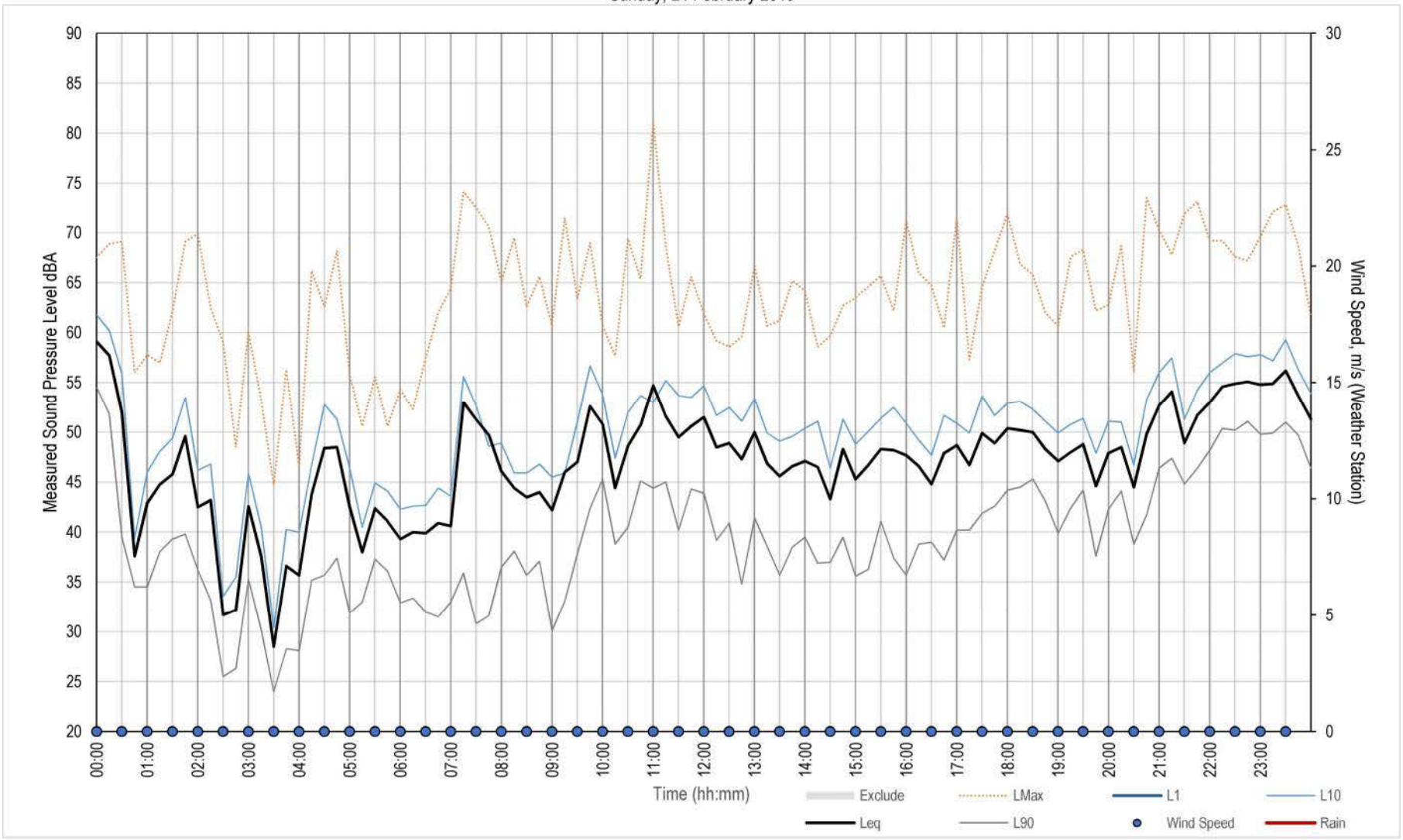
Measured Noise Levels - NM01

Saturday, 23 February 2019



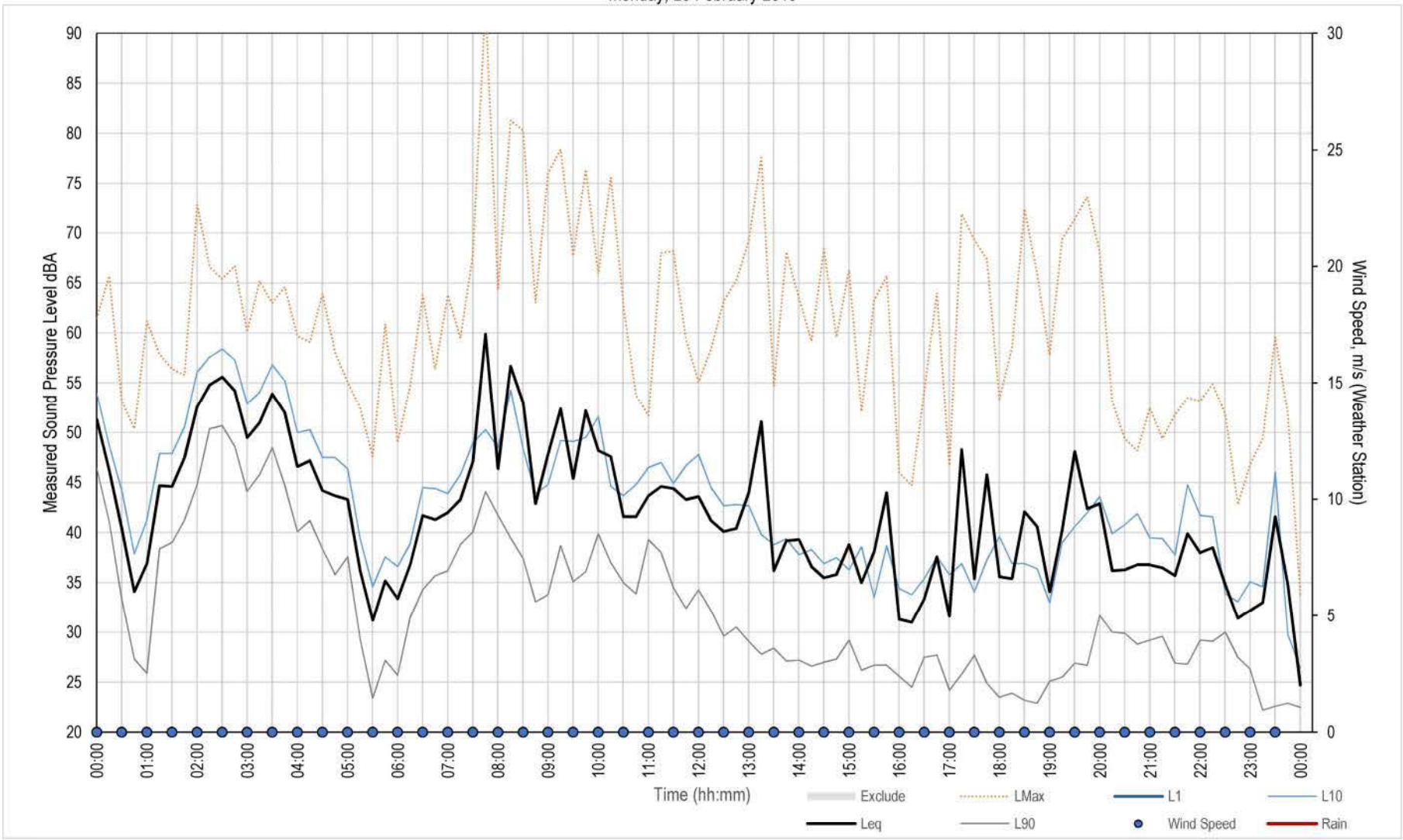
Measured Noise Levels - NM01

Sunday, 24 February 2019



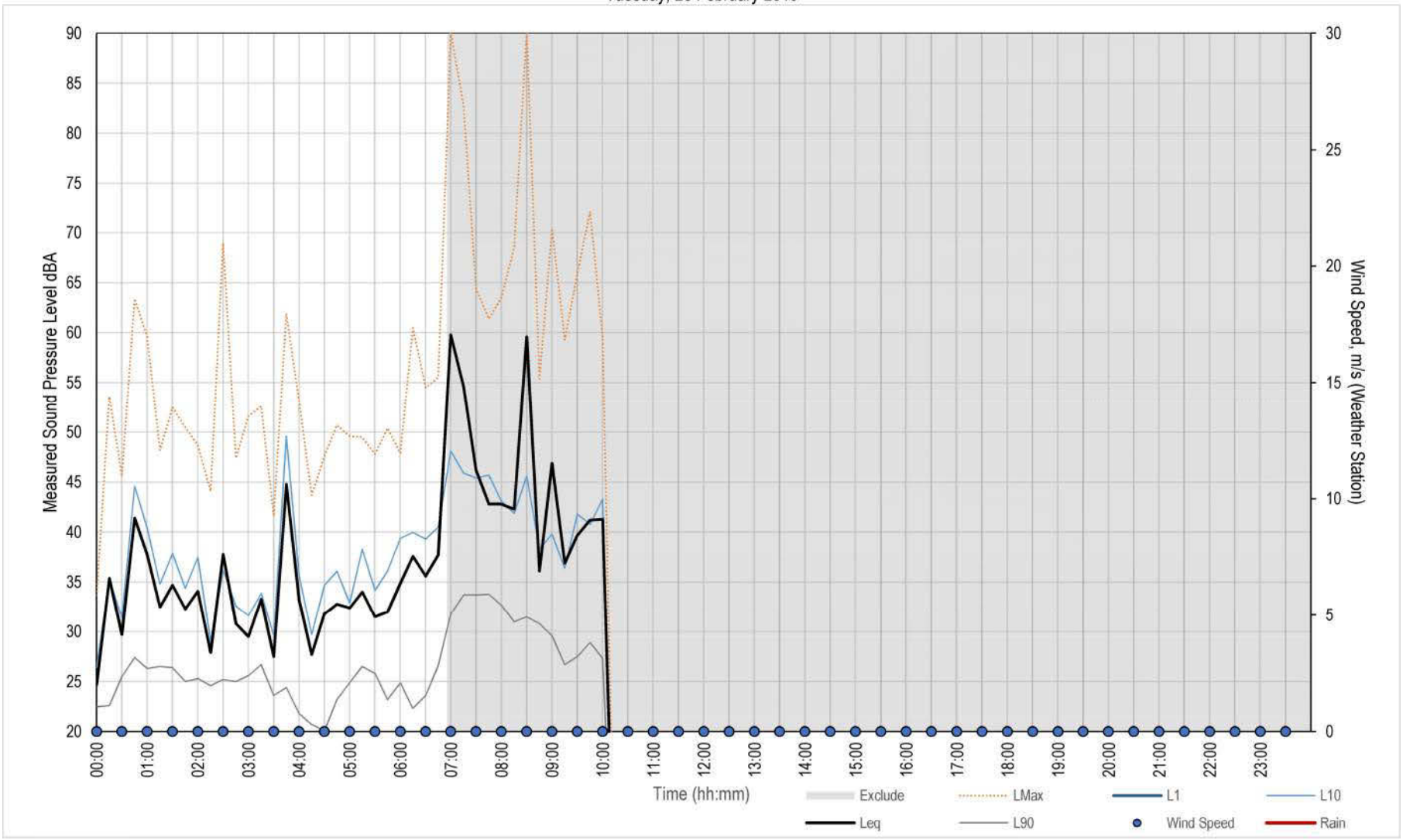
Measured Noise Levels - NM01

Monday, 25 February 2019



Measured Noise Levels - NM01

Tuesday, 26 February 2019



Site Details	NM02	**Microphone Position**	1.5m from ground
Start Date	Mon 18 February 2019		
End Date	Tue 26 February 2019		

Measurement Summary

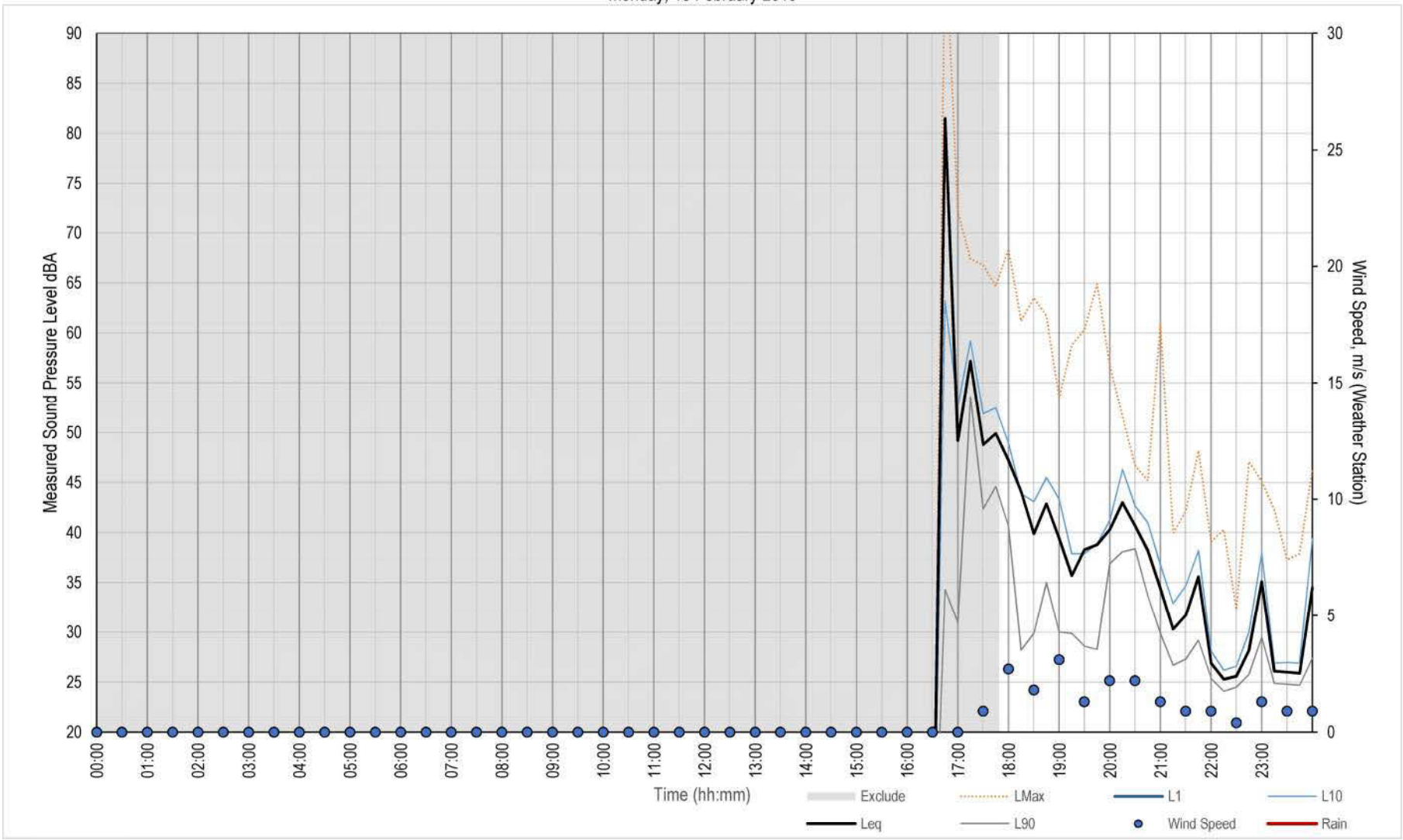
Date	18-02	19-02	20-02	21-02	22-02	23-02	24-02	25-02
$Leq_{, Day}$, dBA		51	42	43	46	44	53	46
$Leq_{, Evening}$, dBA	41	46	48	39	51	59	57	36
$Leq_{, Night}$, dBA	35	31	32	55	52	59	52	25
$RBL_{, Day}$, dBA		30	24	25	27	26	36	25
$RBL_{, Evening}$, dBA	28	22	21	21	29	33	40	21
$RBL_{, Night}$, dBA	21	20	20	47	37	31	29	21

	RBL			Leq, 15 minute		
Date	Day	Evening	Night	Day	Evening	Night
Average	28	28	29	46	49	45

Site Photo

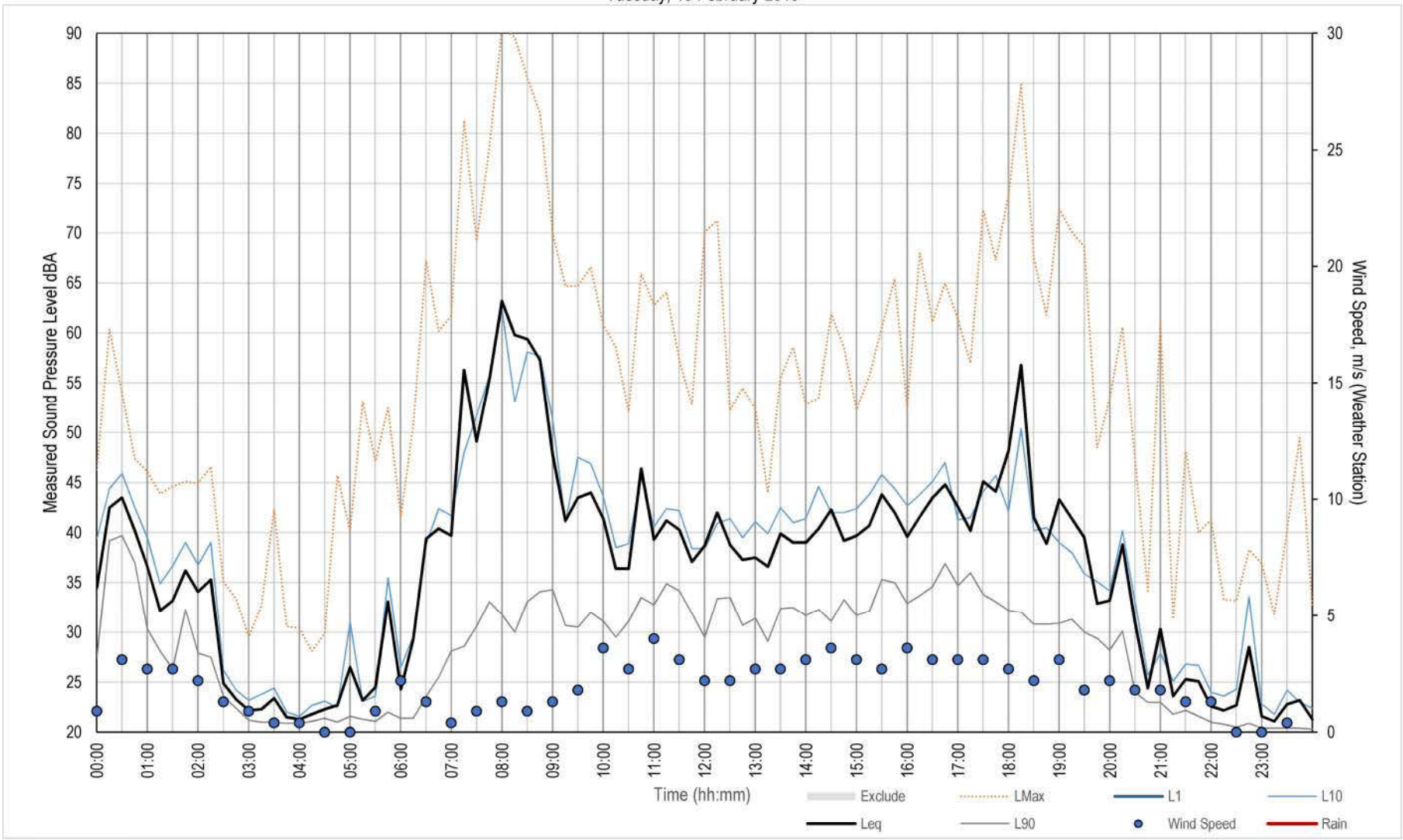
Measured Noise Levels - NM02

Monday, 18 February 2019



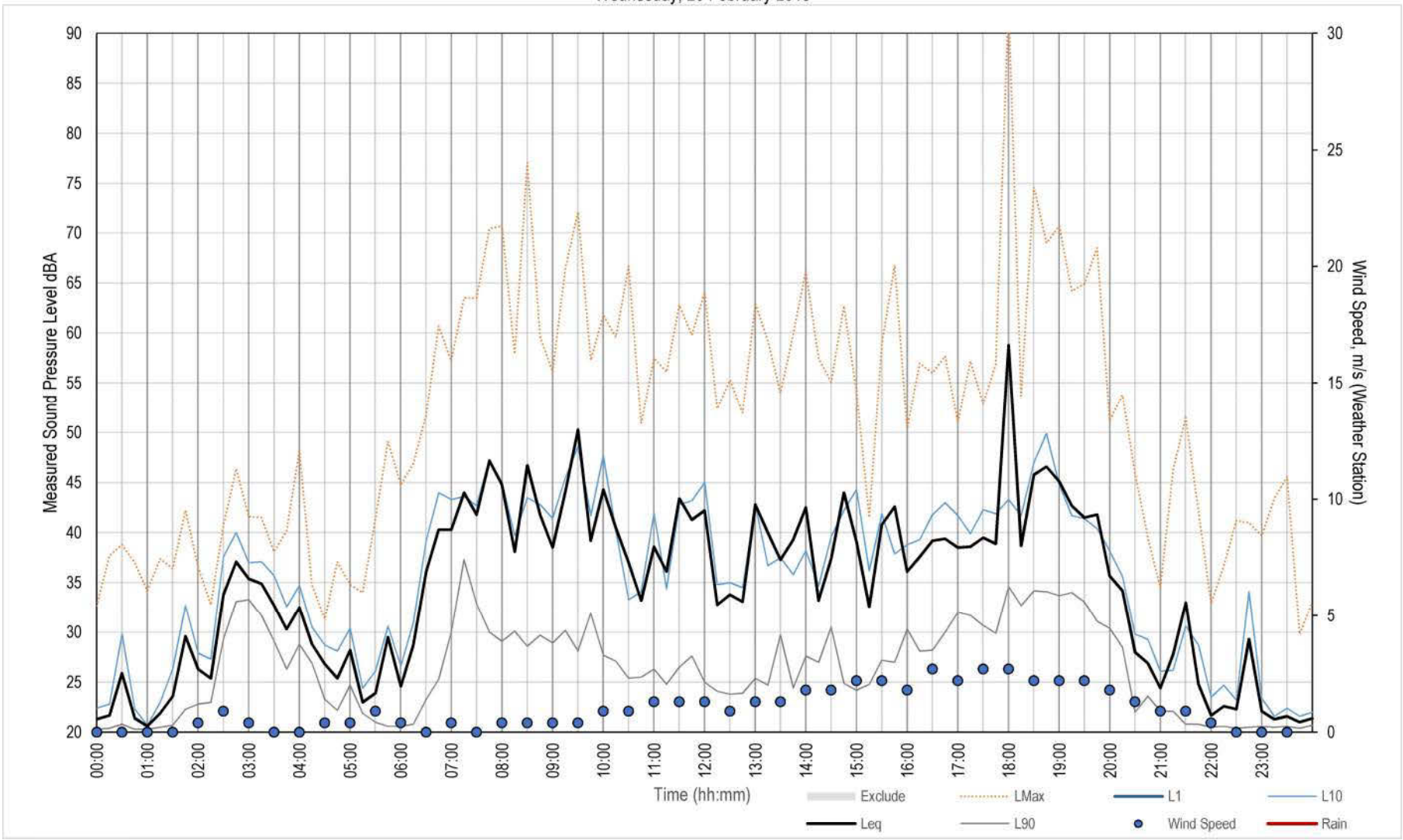
Measured Noise Levels - NM02

Tuesday, 19 February 2019



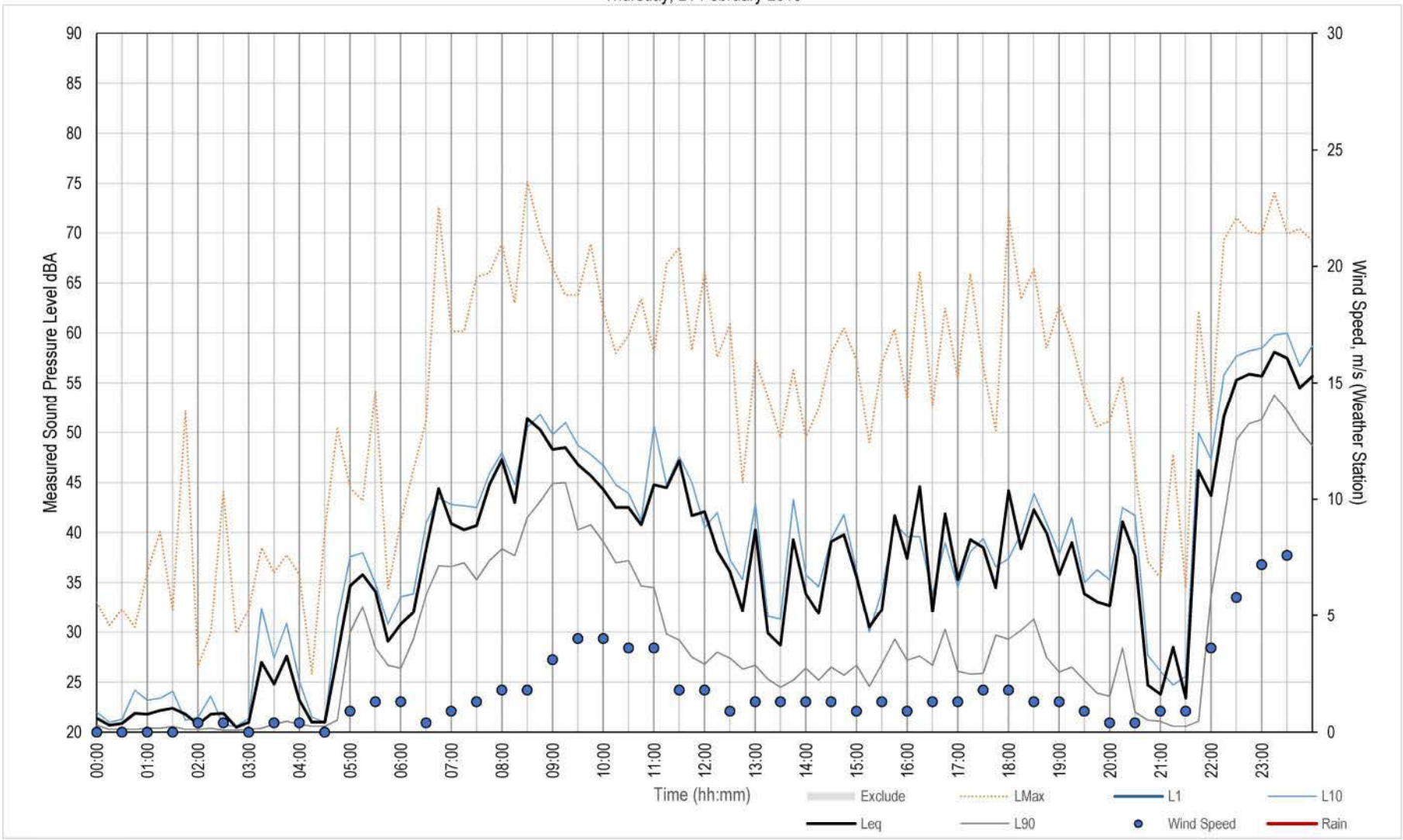
Measured Noise Levels - NM02

Wednesday, 20 February 2019



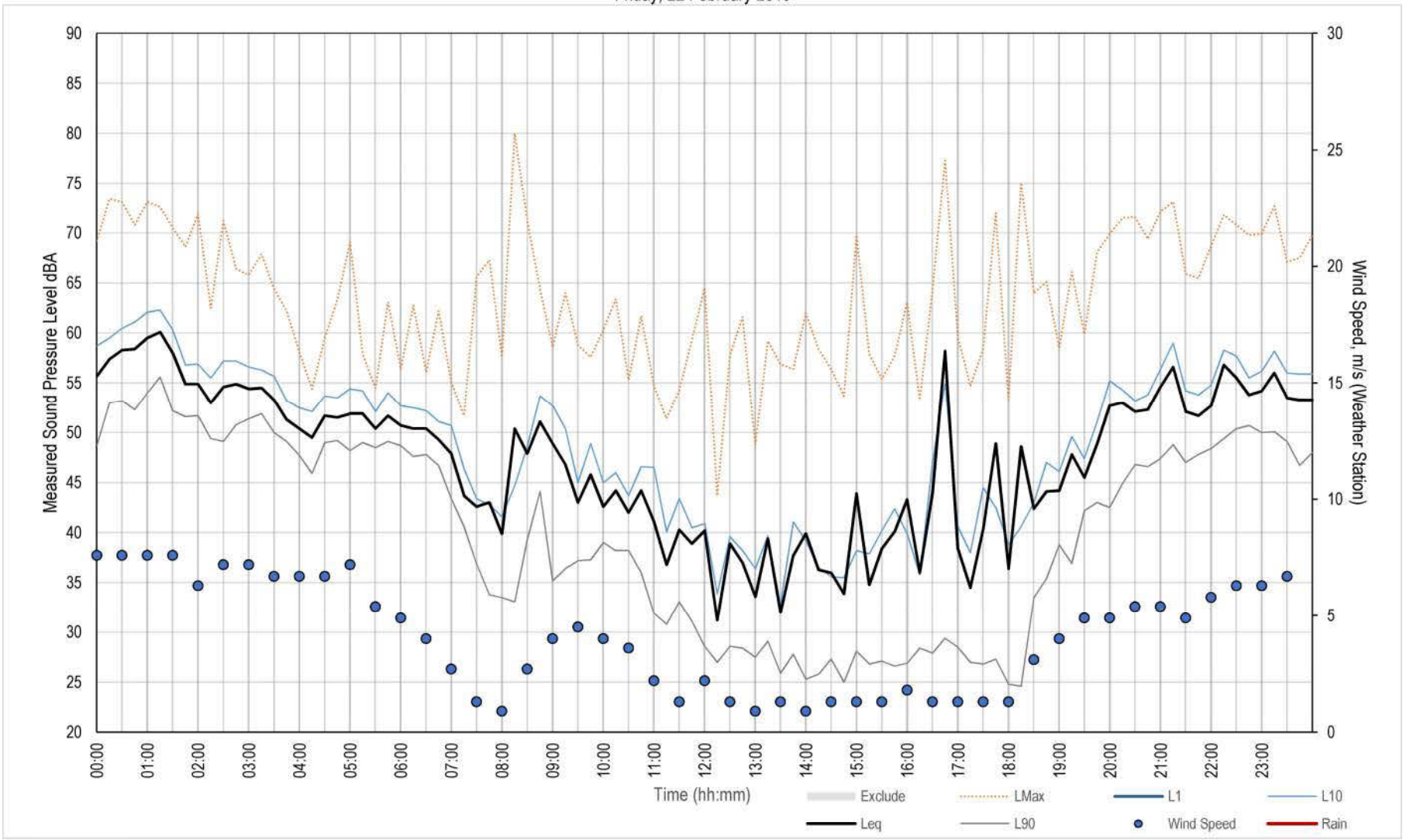
Measured Noise Levels - NM02

Thursday, 21 February 2019



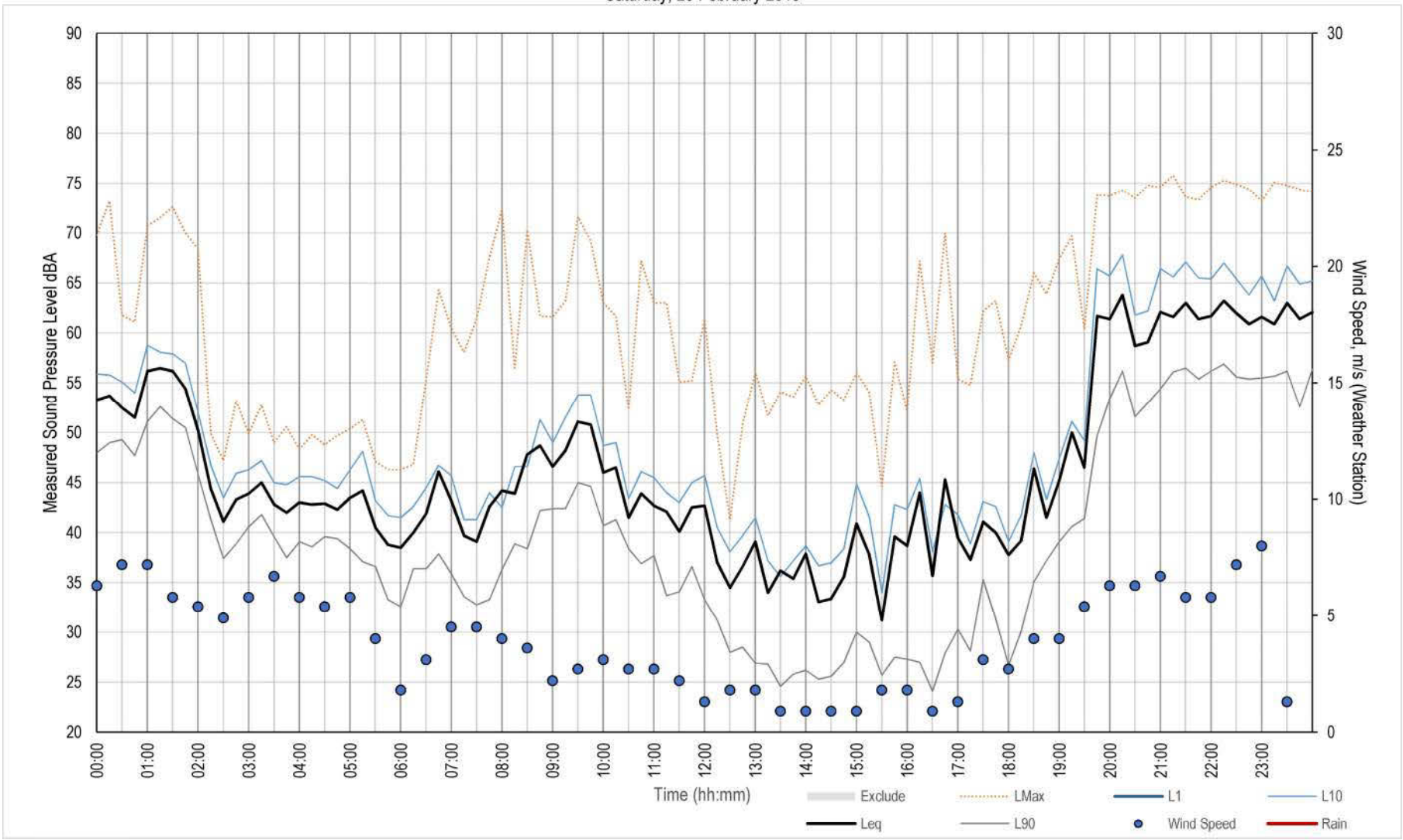
Measured Noise Levels - NM02

Friday, 22 February 2019



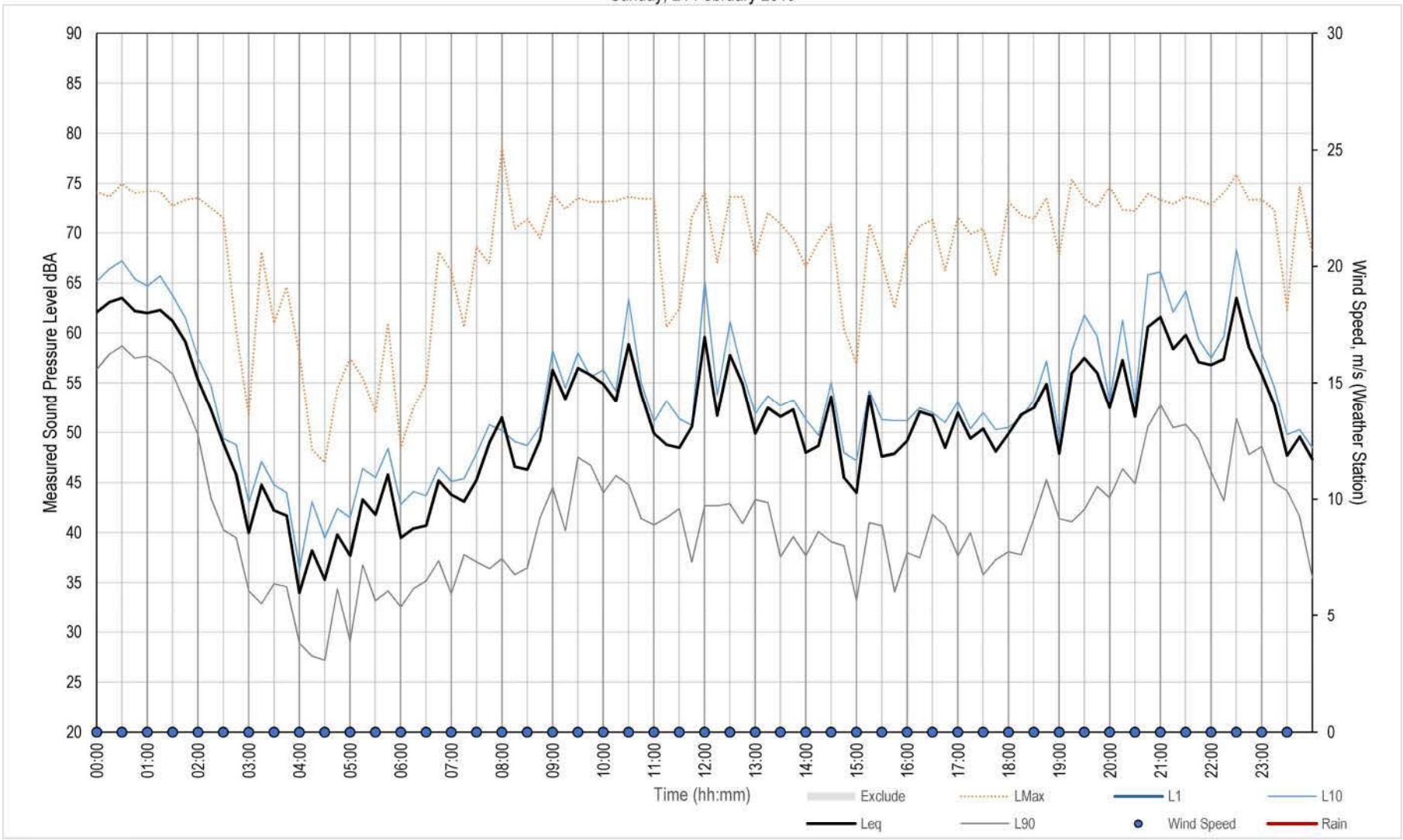
Measured Noise Levels - NM02

Saturday, 23 February 2019



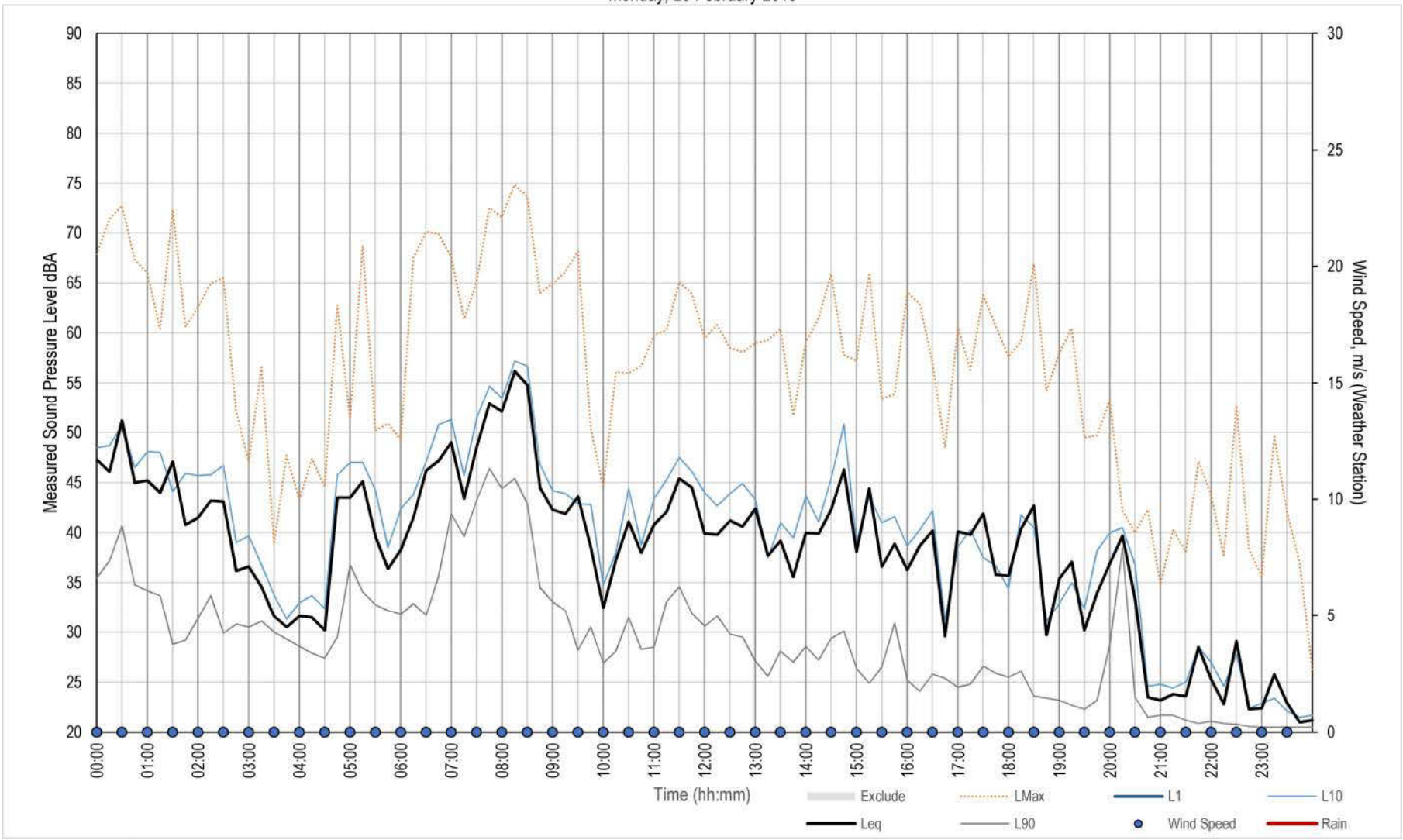
Measured Noise Levels - NM02

Sunday, 24 February 2019



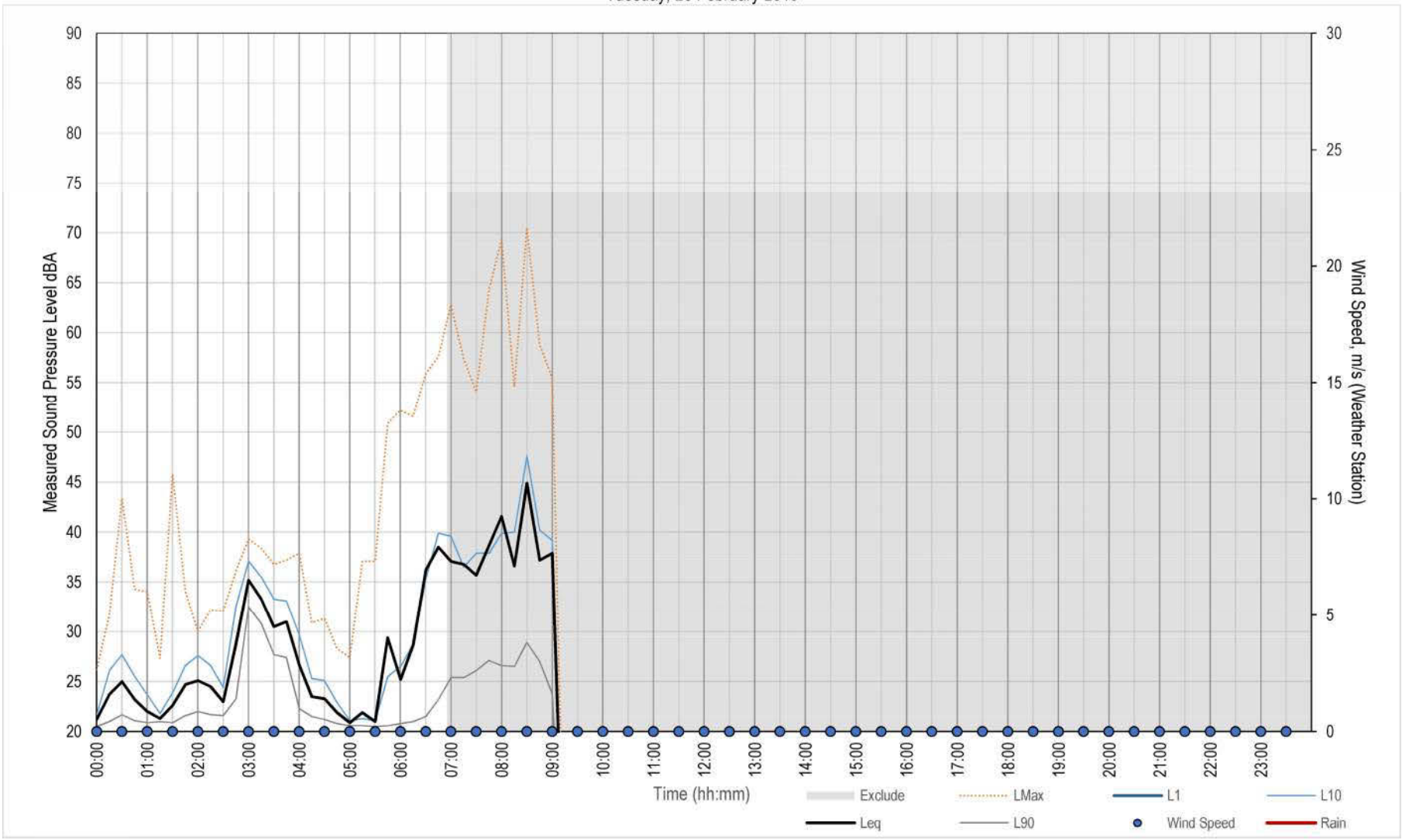
Measured Noise Levels - NM02

Monday, 25 February 2019



Measured Noise Levels - NM02

Tuesday, 26 February 2019



Site Details	NM03	**Microphone Position**	1.5m from ground
Start Date	Mon 18 February 2019		
End Date	Tue 26 February 2019		

Measurement Summary

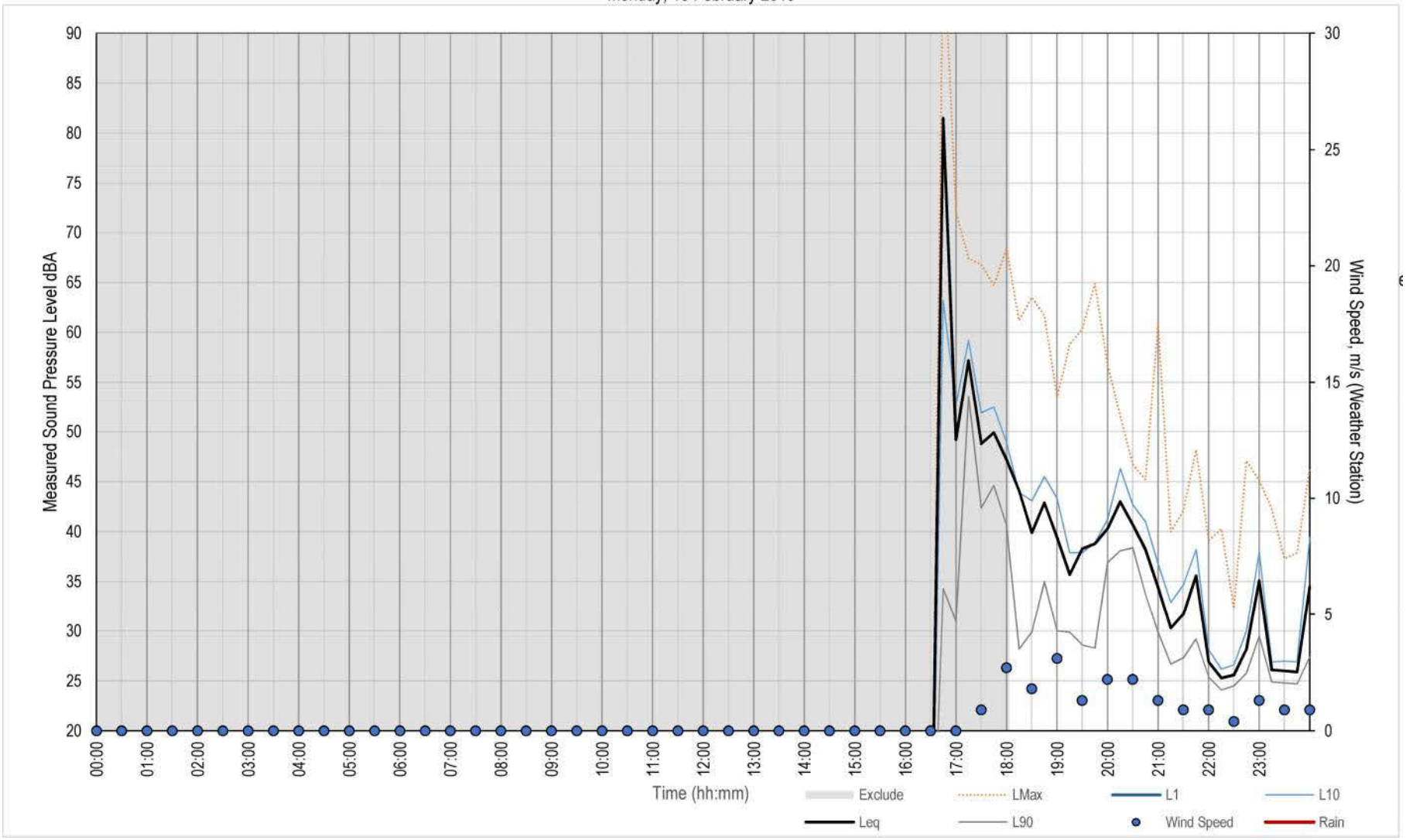
Date	18-02	19-02	20-02	21-02	22-02	23-02	24-02	25-02
$Leq_{, Day}$, dBA		51	42	43	46	44	53	46
$Leq_{, Evening}$, dBA	41	46	48	39	51	59	57	36
$Leq_{, Night}$, dBA	35	31	32	55	52	59	52	25
$RBL_{, Day}$, dBA	32	30	24	25	27	26	36	25
$RBL_{, Evening}$, dBA	28	22	21	21	29	33	40	21
$RBL_{, Night}$, dBA	21	20	20	47	37	31	29	21

	RBL			Leq		
Date	Day	Evening	Night	Day	Evening	Night
Average	29	28	29	46	49	45

Site Photo

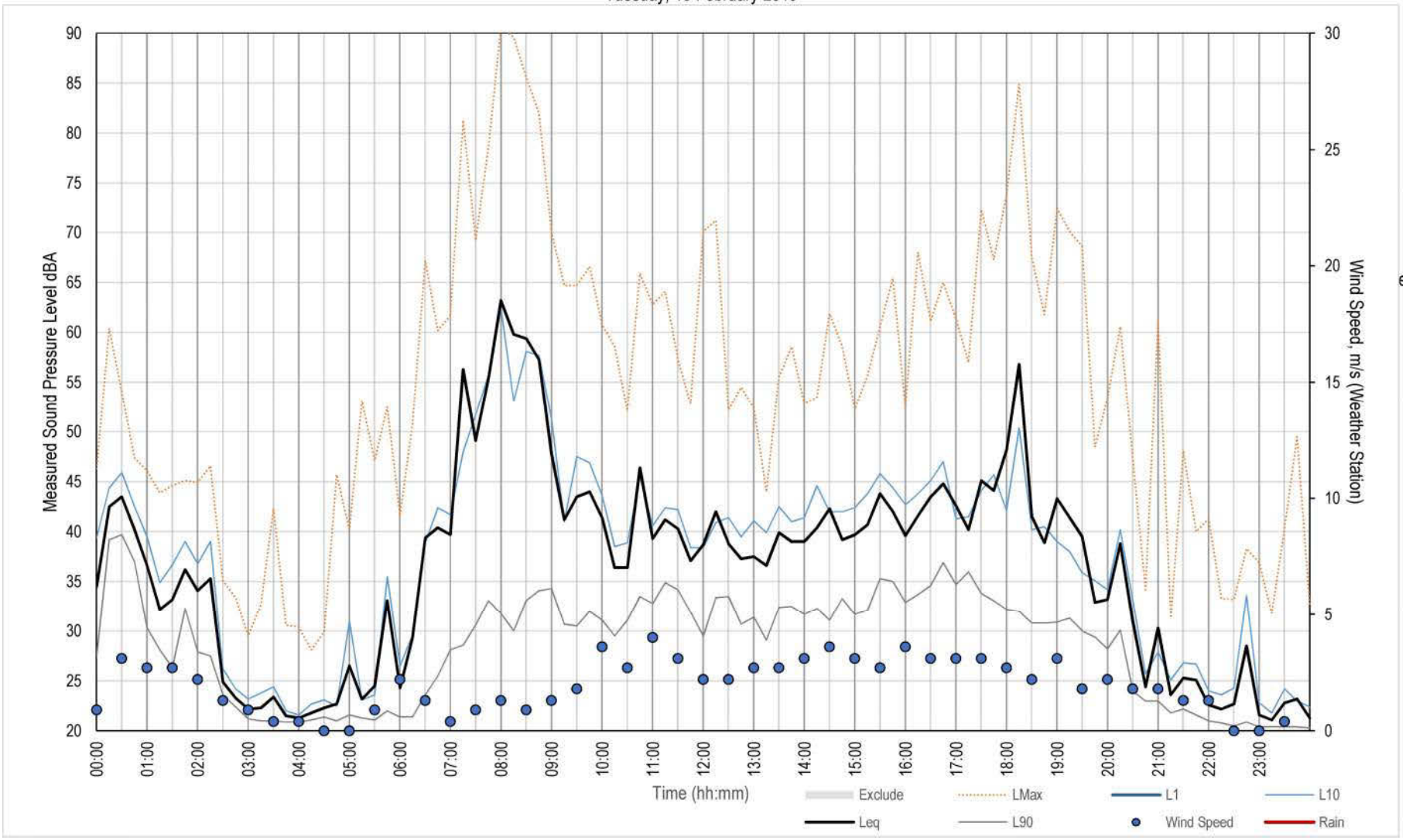
Measured Noise Levels - NM03

Monday, 18 February 2019



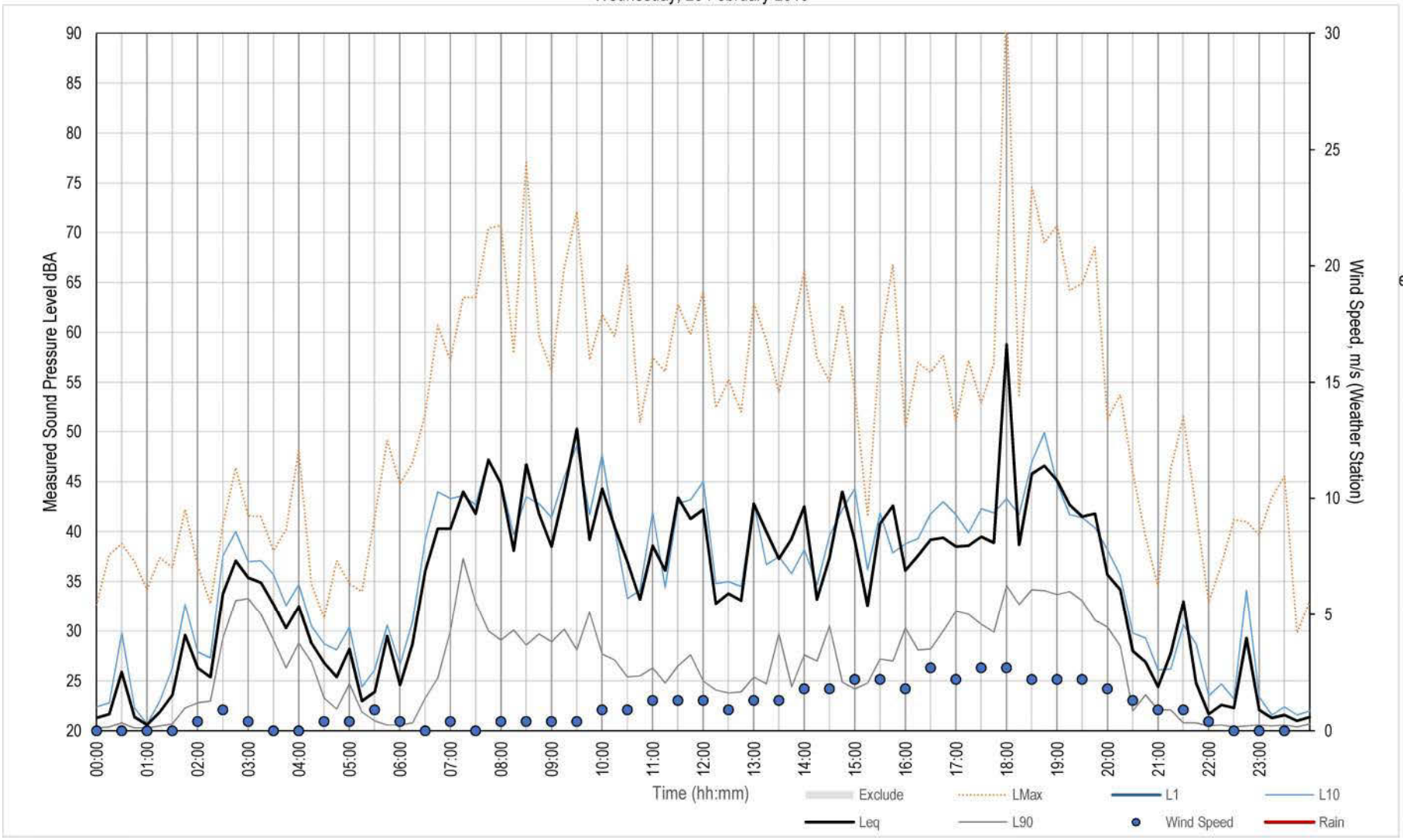
Measured Noise Levels - NM03

Tuesday, 19 February 2019



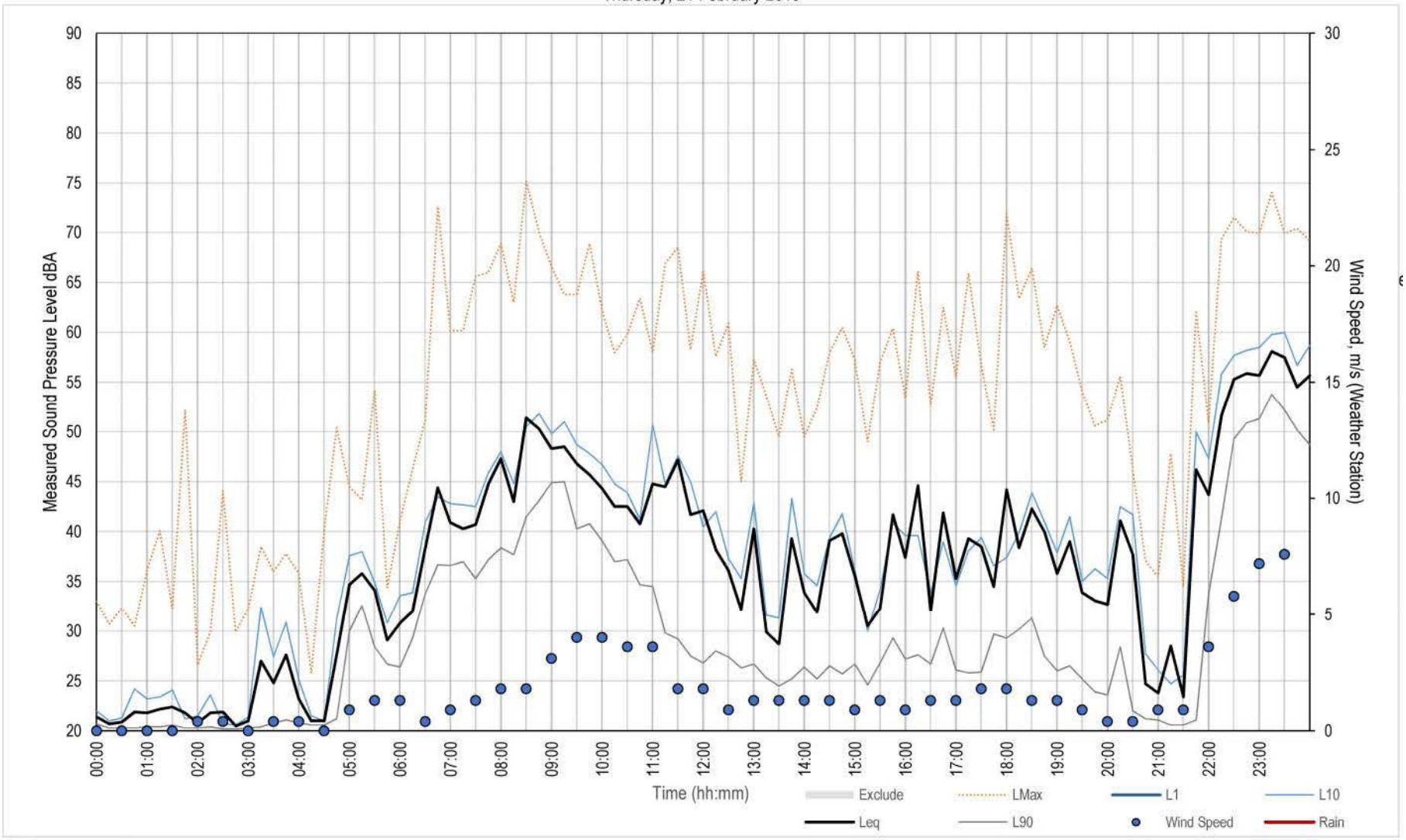
Measured Noise Levels - NM03

Wednesday, 20 February 2019



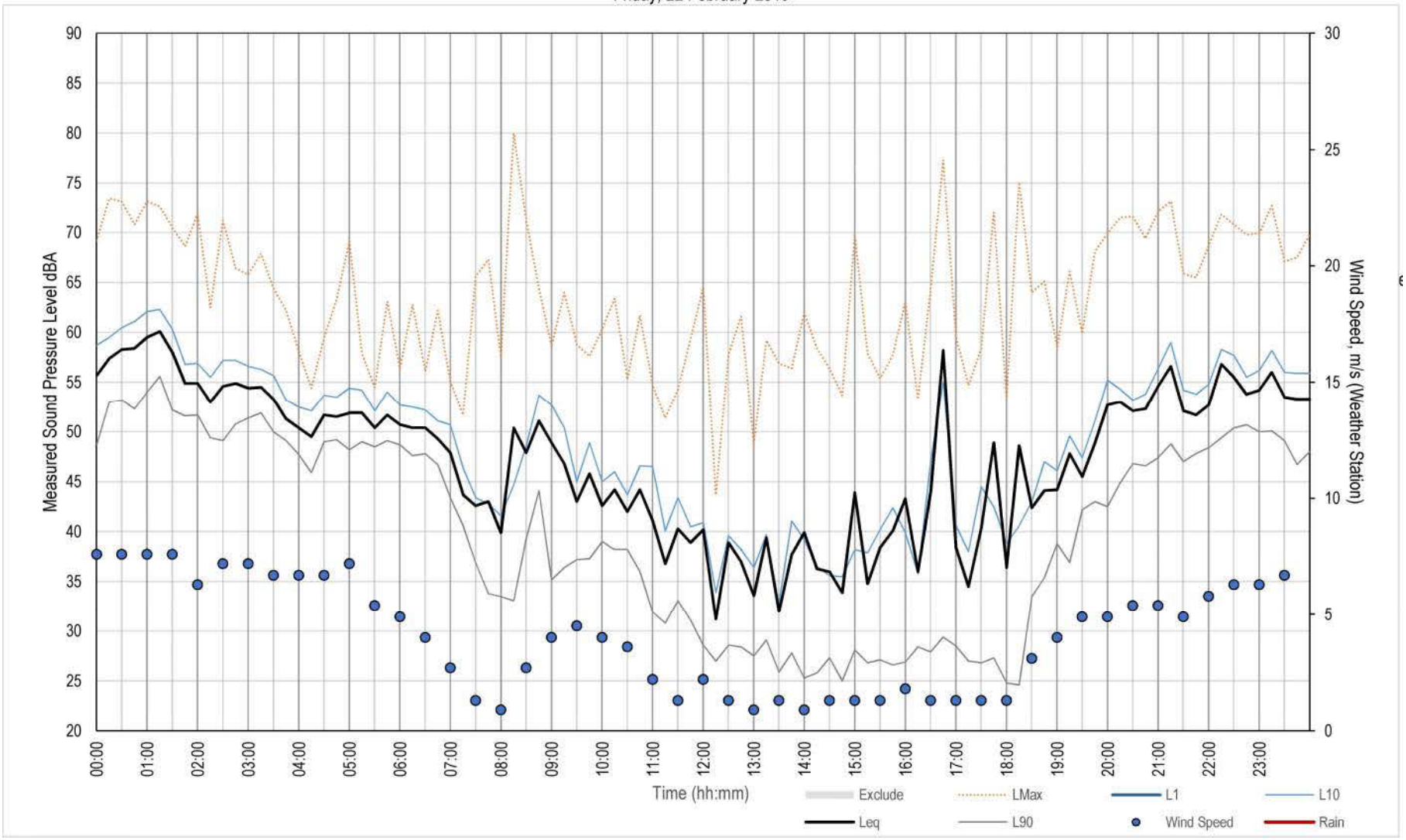
Measured Noise Levels - NM03

Thursday, 21 February 2019



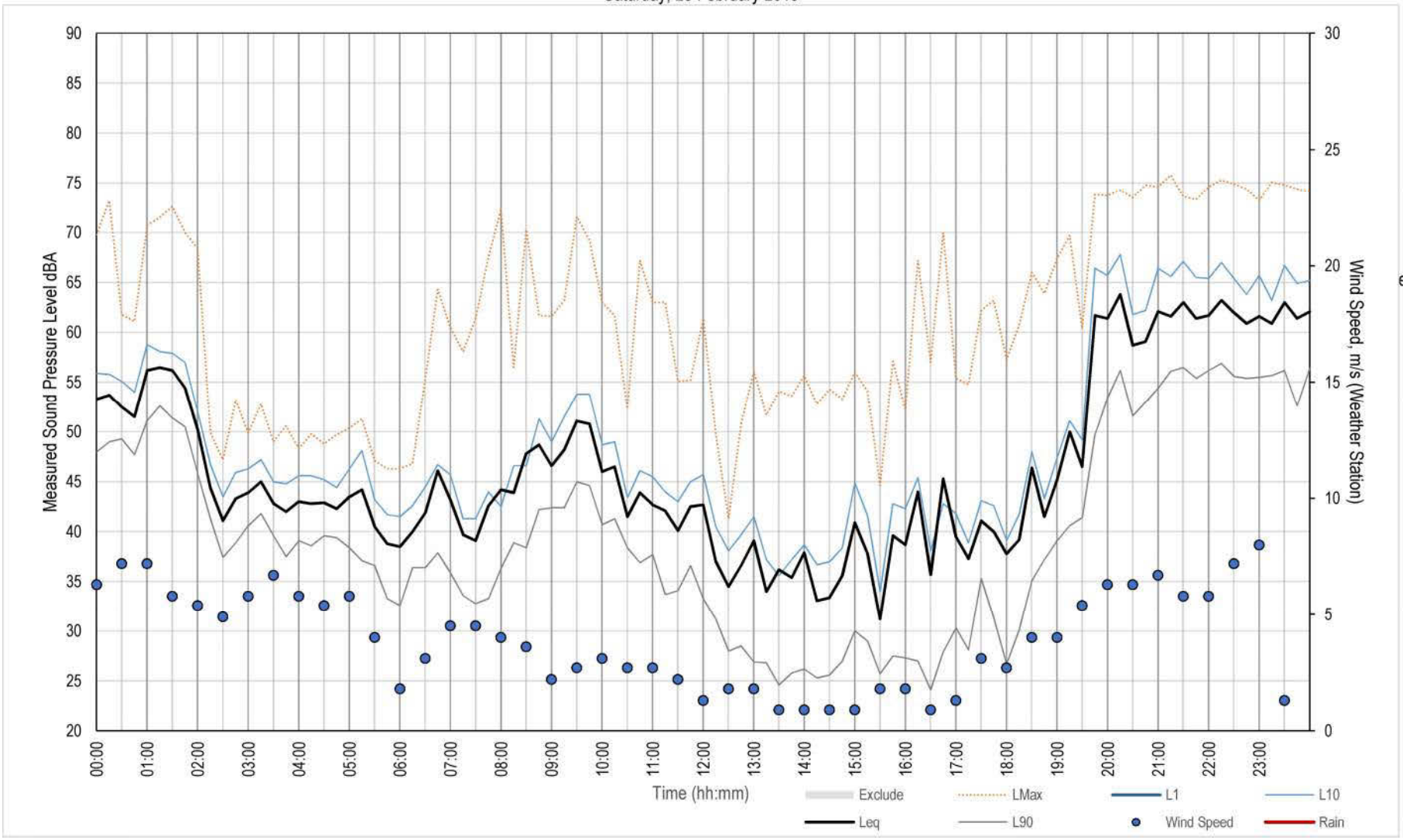
Measured Noise Levels - NM03

Friday, 22 February 2019



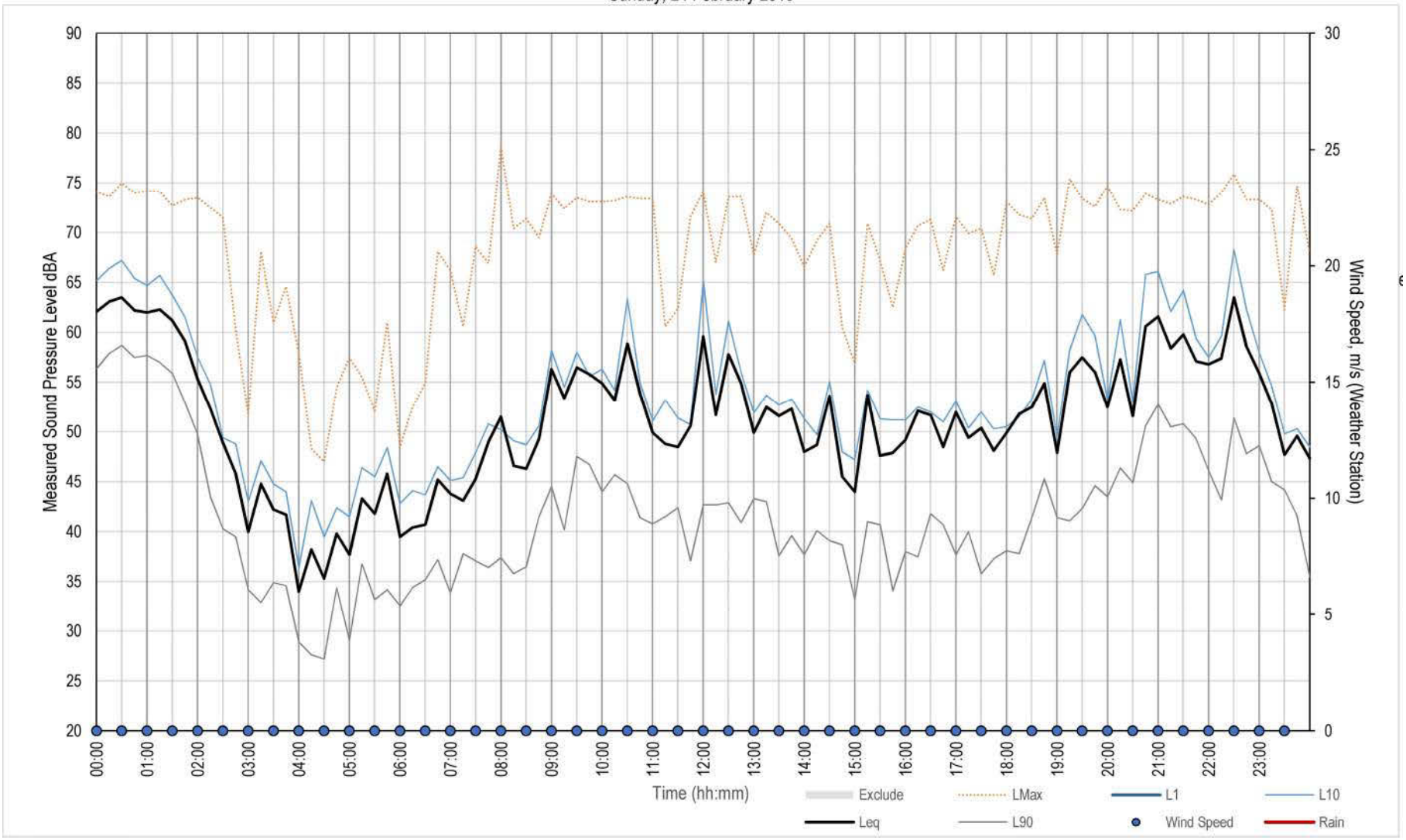
Measured Noise Levels - NM03

Saturday, 23 February 2019



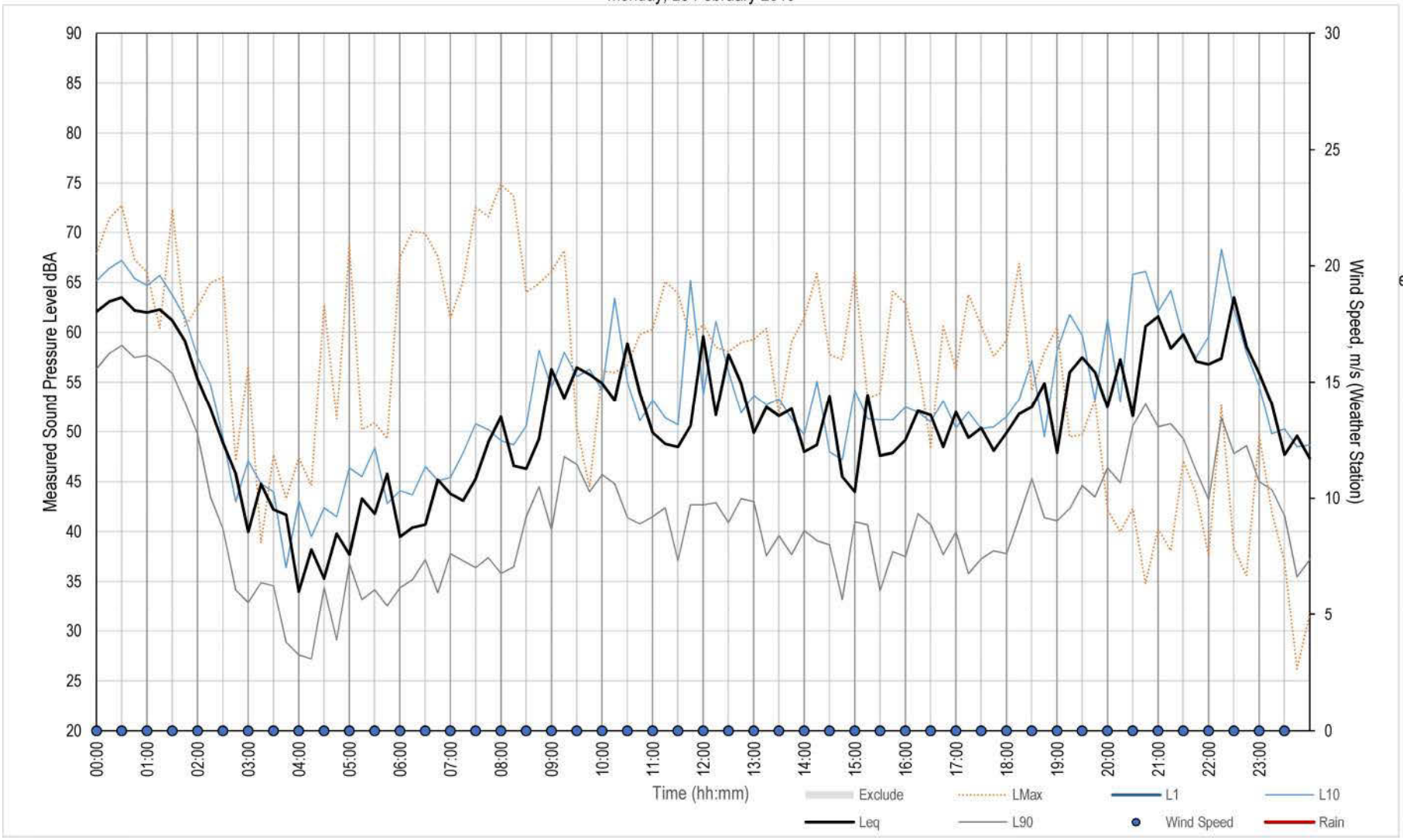
Measured Noise Levels - NM03

Sunday, 24 February 2019



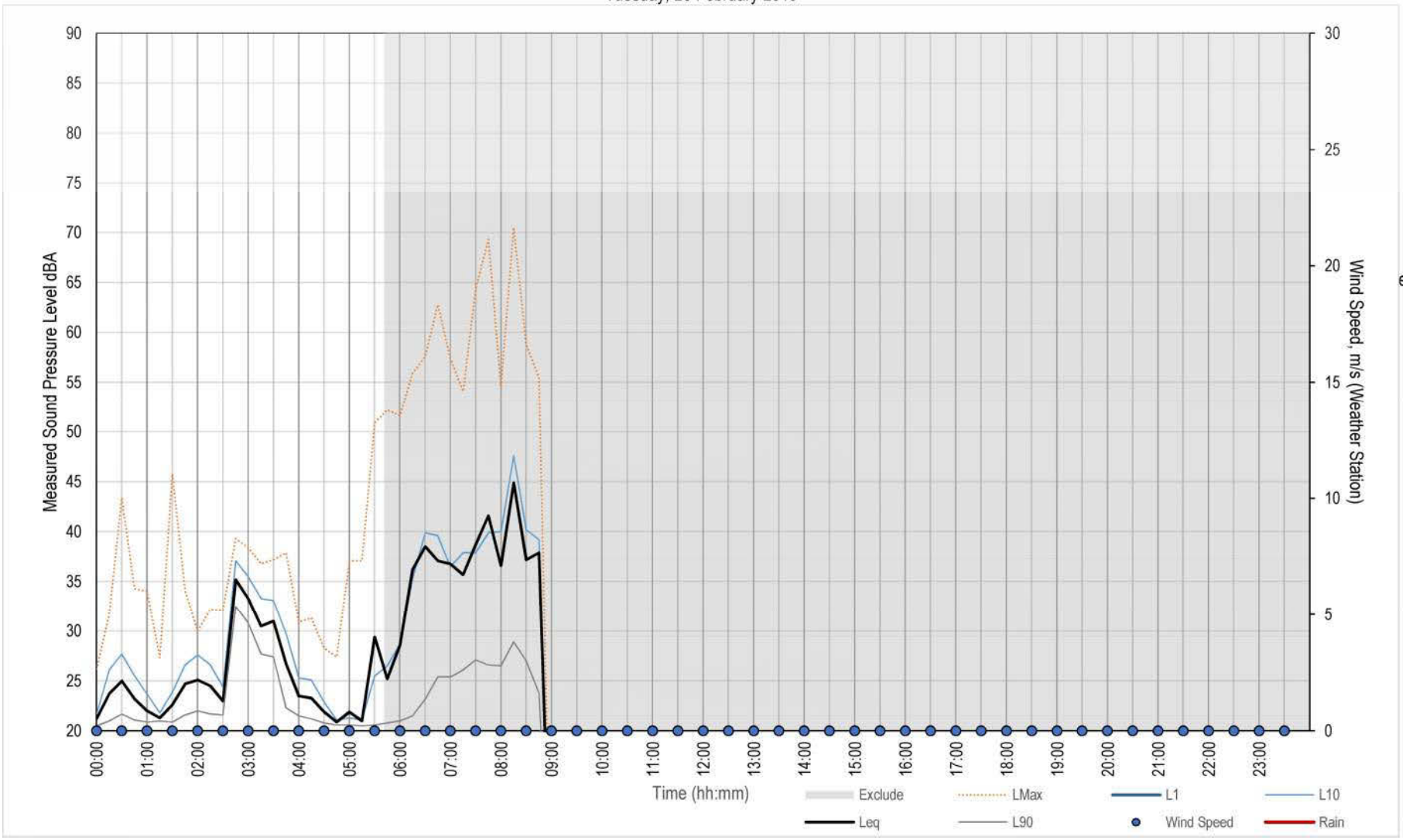
Measured Noise Levels - NM03

Monday, 25 February 2019



Measured Noise Levels - NM03

Tuesday, 26 February 2019



Site Details	NM04	**Microphone Position**	1.5m above the ground
Start Date	Tue 19 February 2019		
End Date	Tue 05 March 2019		

Measurement Summary

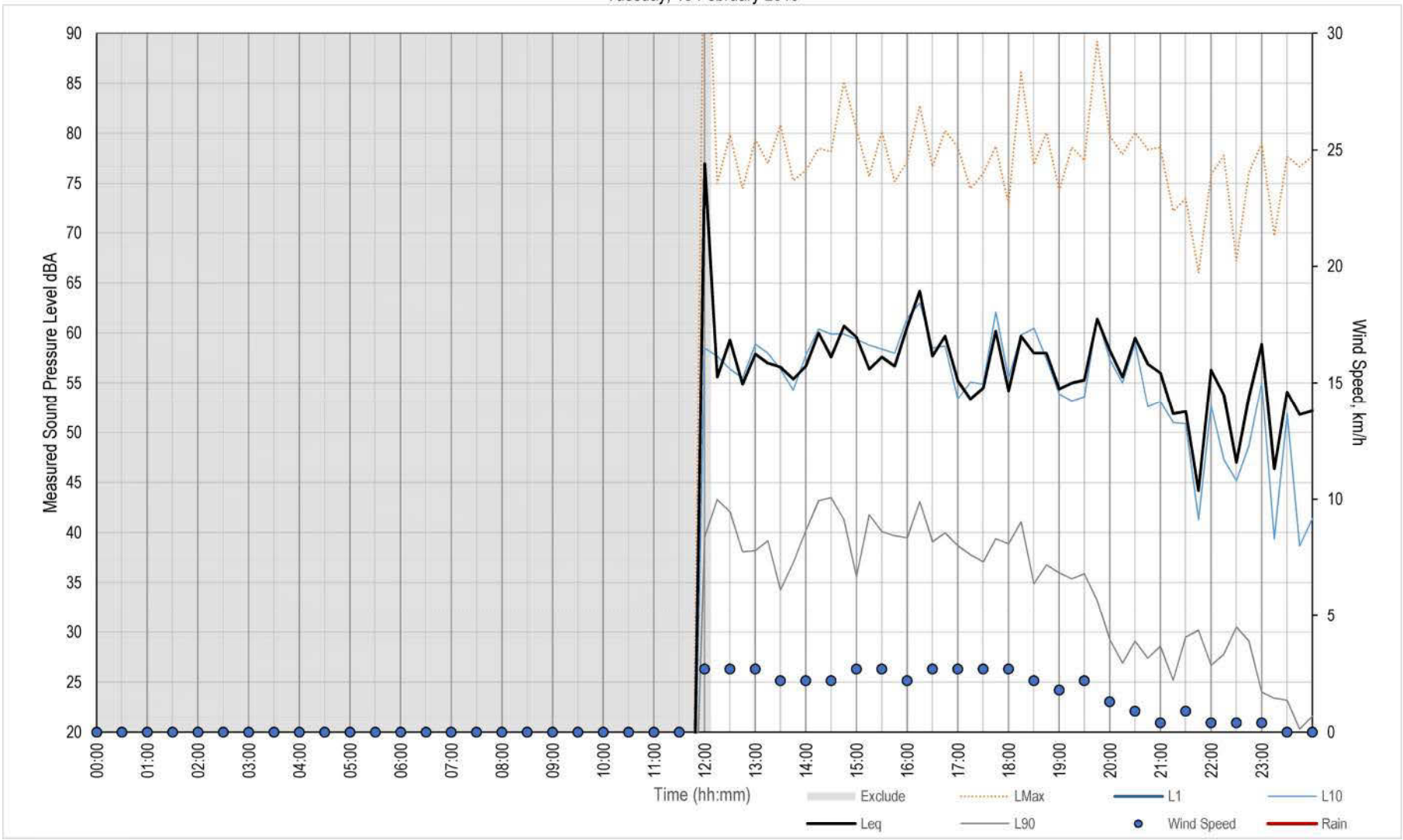
Date	19-02	20-02	21-02	22-02	23-02	24-02	25-02	26-02
$L_{eq, Day}$, dBA	58	58	58	57	54	56	57	58
$L_{eq, Evening}$, dBA	52	52	52	49	48	50	51	51
$L_{eq, Night}$, dBA	61	62	60	59	56	59	59	60
$RBL_{, Day}$, dBA	37	36	30	30	30	37	28	24
$RBL_{, Evening}$, dBA	27	26	24	30	35	39	22	22
$RBL_{, Night}$, dBA	18	17	29	25	29	23	17	20

Date	27-02	28-02	01-03	02-03	03-03	04-03	05-03	
$L_{eq, Day}$, dBA	57	57	57	54	55	57	59	
$L_{eq, Evening}$, dBA	50	53	51	47	51	51	51	
$L_{eq, Night}$, dBA	59	60	59	57	58	60	66	
$RBL_{, Day}$, dBA	30	27	29	25	24	26	29	
$RBL_{, Evening}$, dBA	29	24	25	22	22	22	27	
$RBL_{, Night}$, dBA	23	18	22	19	17	20	24	

Site Photo

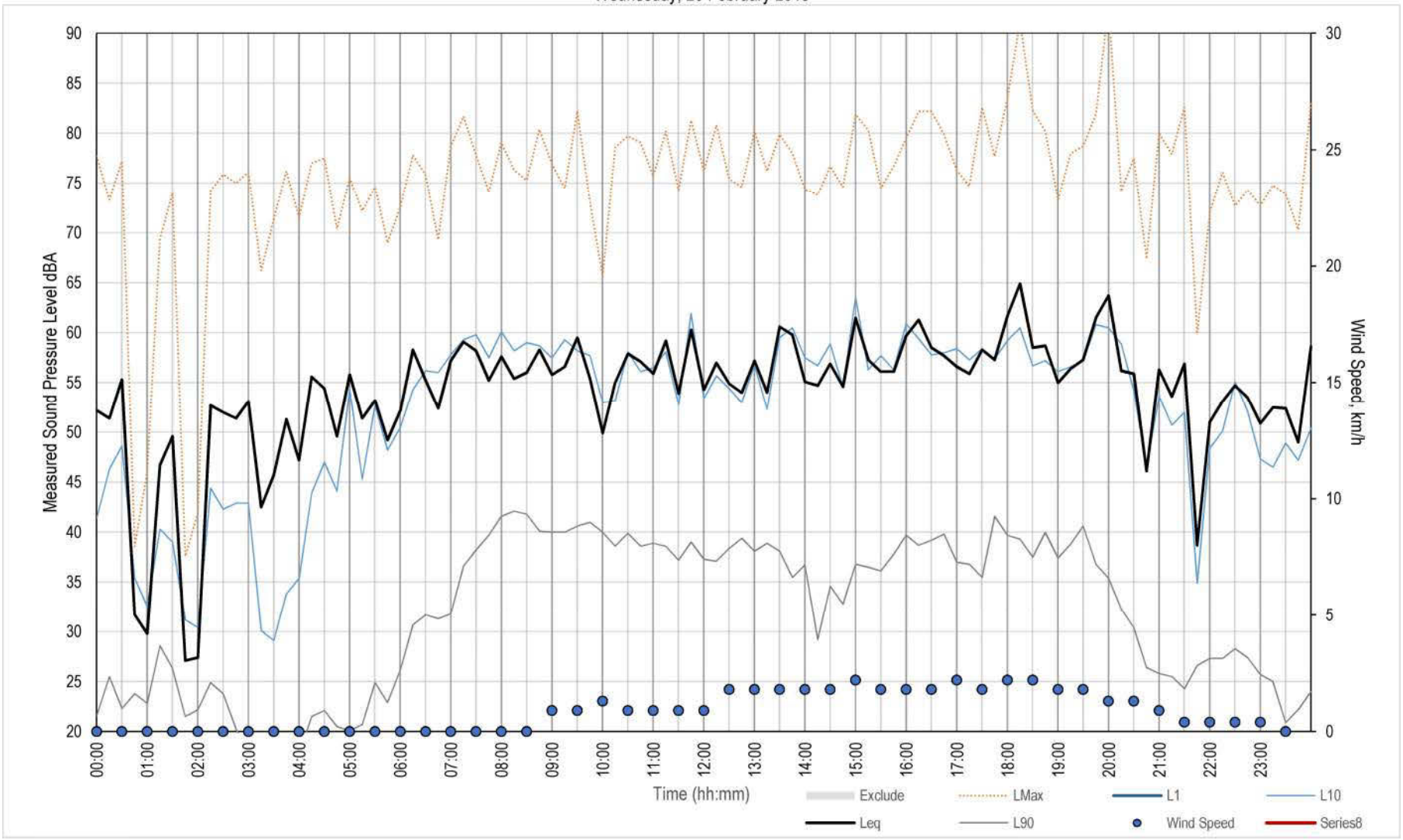
Measured Noise Levels - NM04

Tuesday, 19 February 2019



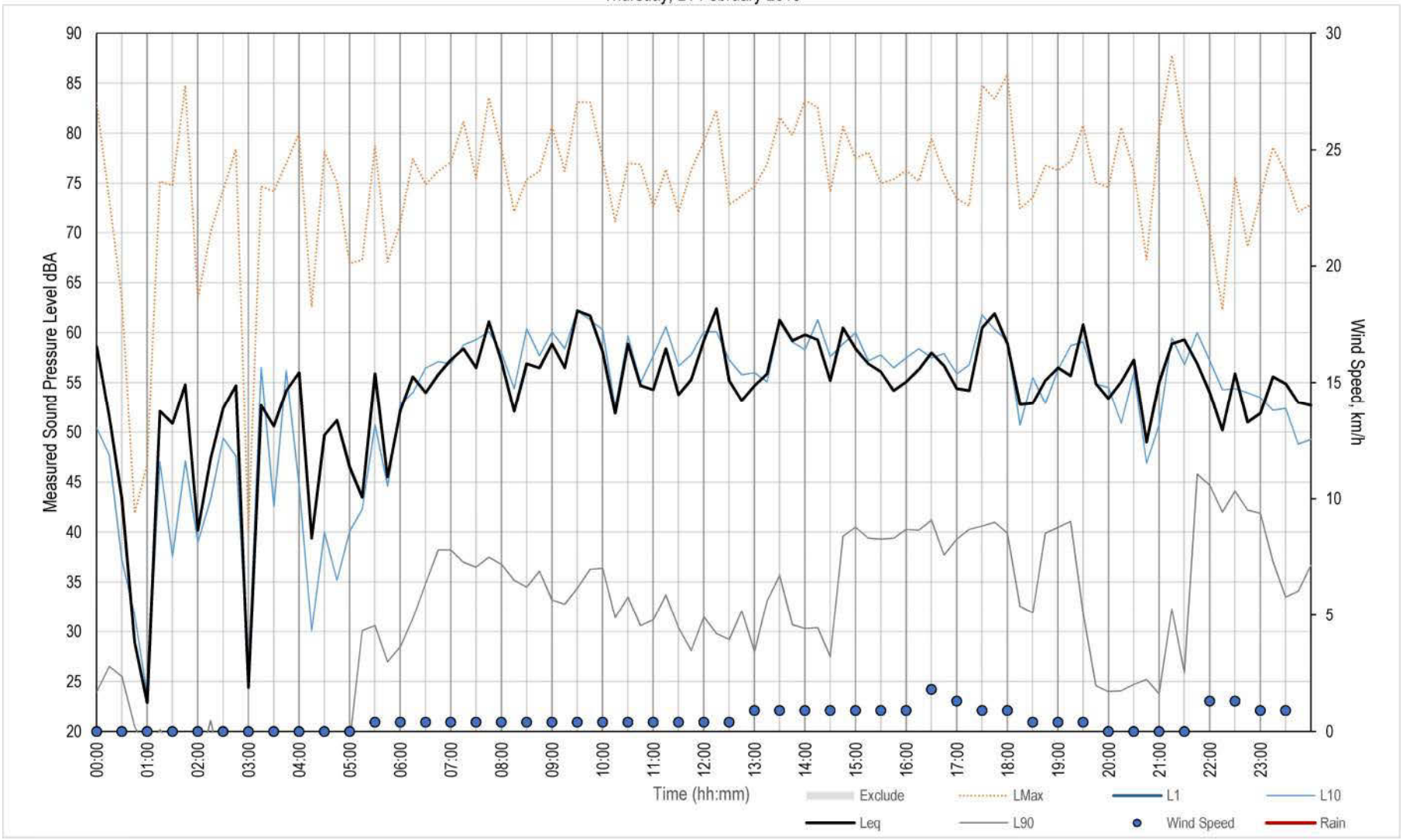
Measured Noise Levels - NM04

Wednesday, 20 February 2019



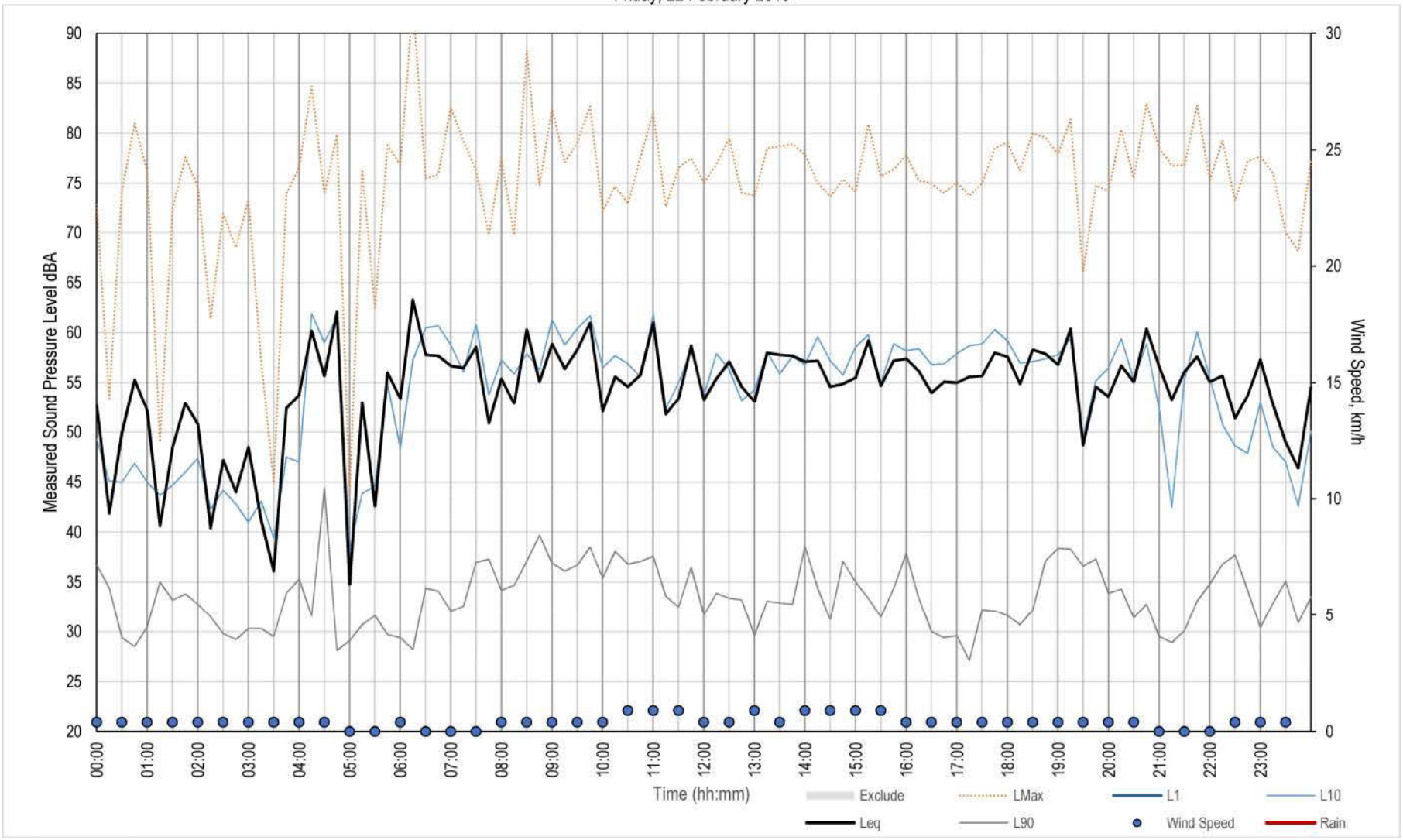
Measured Noise Levels - NM04

Thursday, 21 February 2019



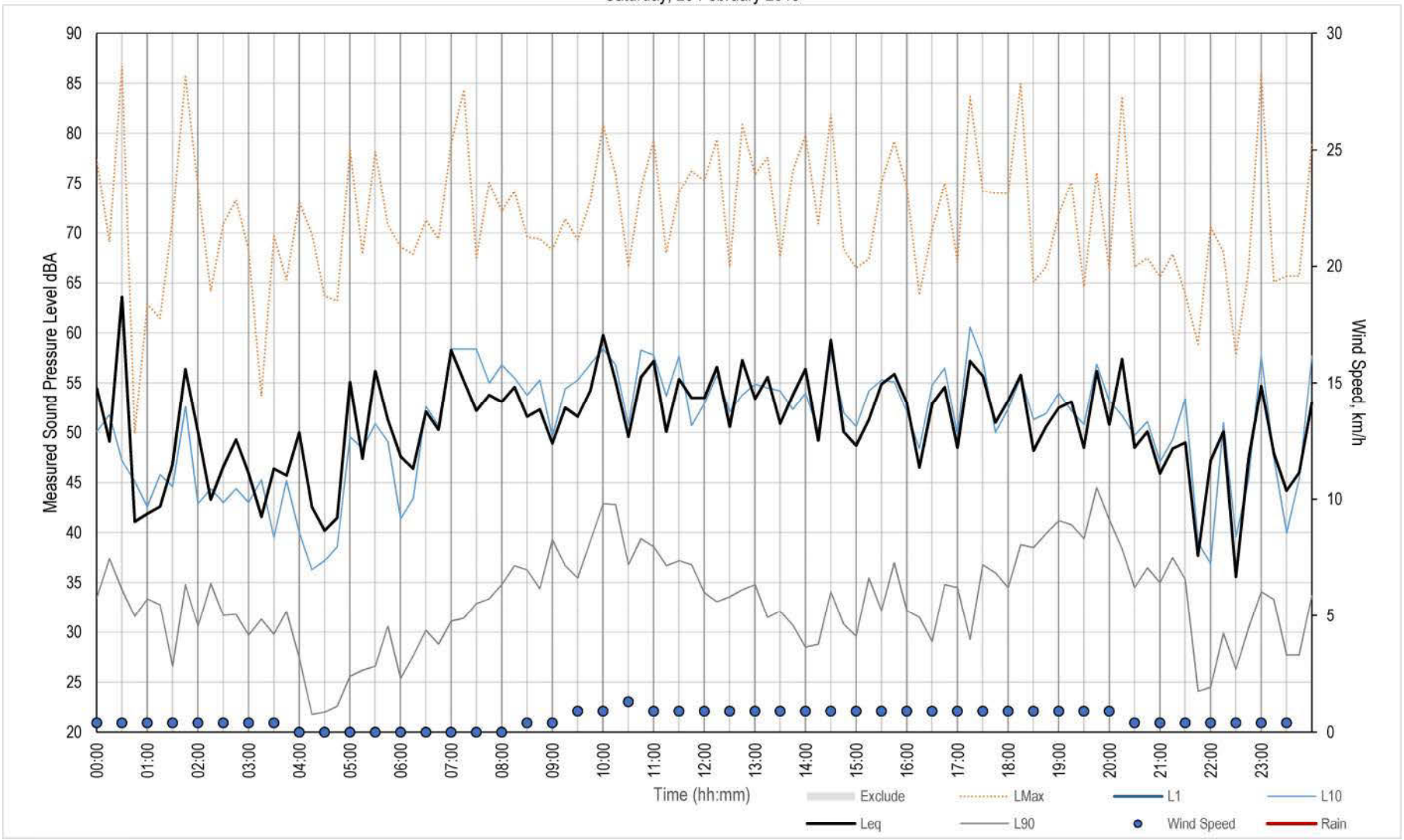
Measured Noise Levels - NM04

Friday, 22 February 2019



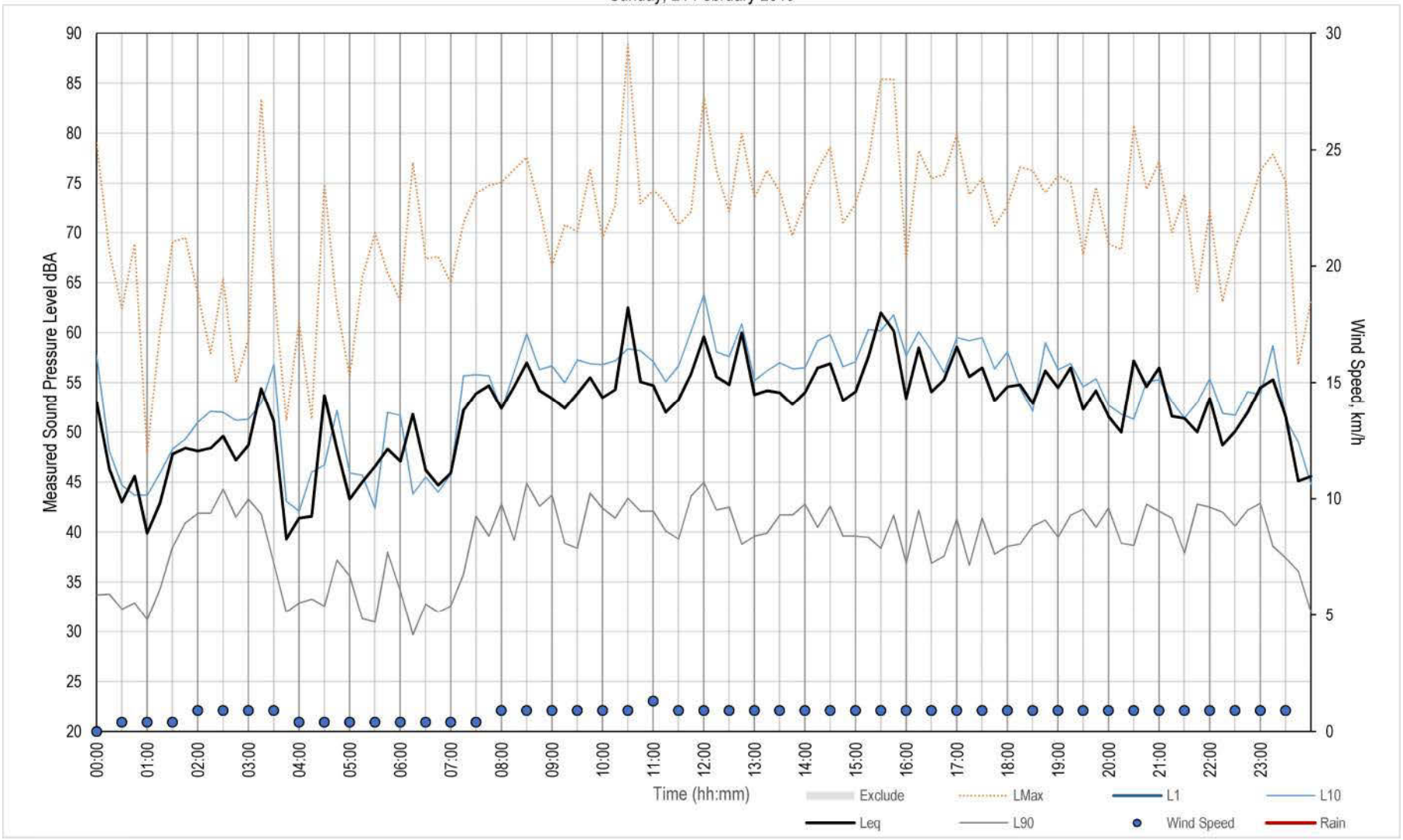
Measured Noise Levels - NM04

Saturday, 23 February 2019



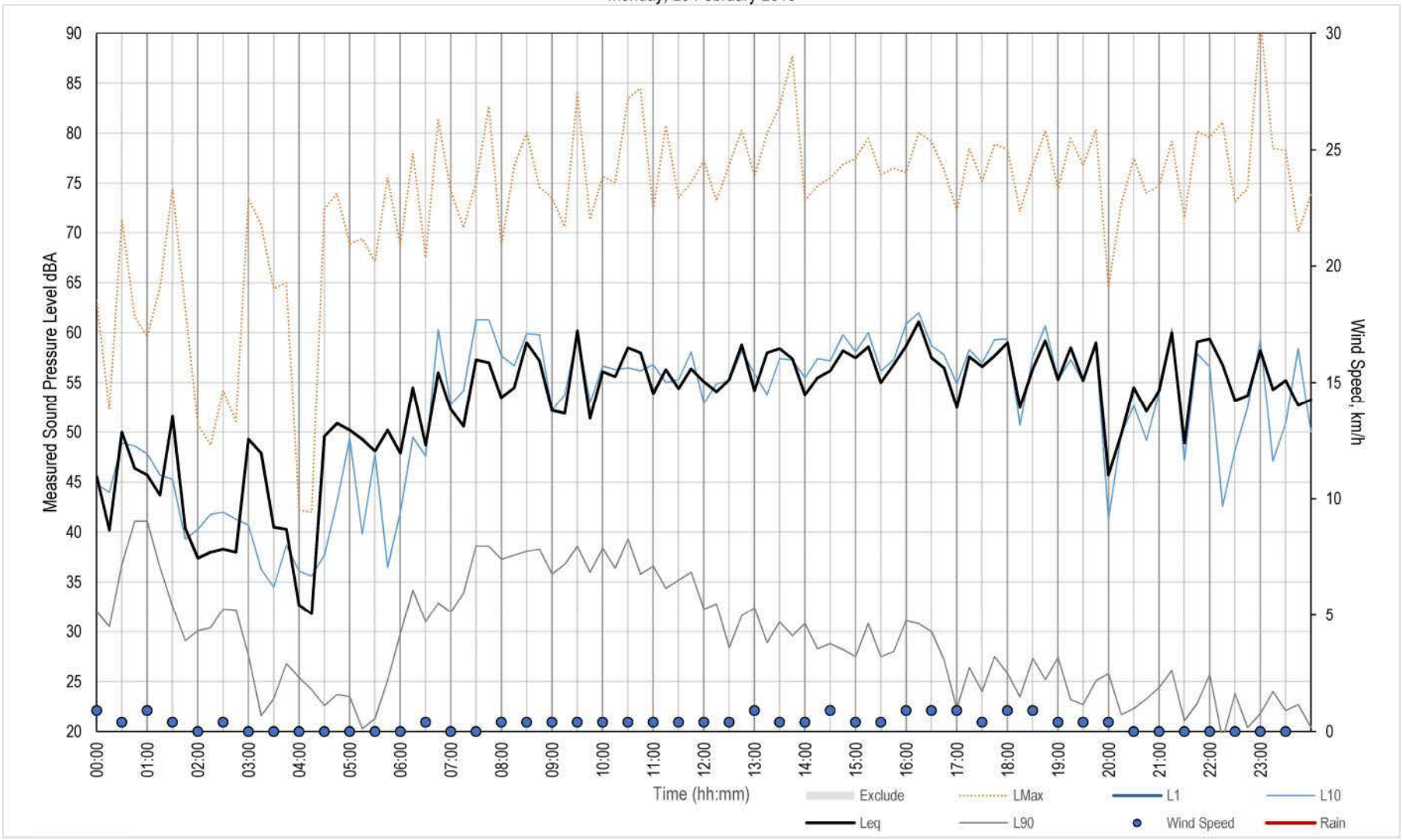
Measured Noise Levels - NM04

Sunday, 24 February 2019



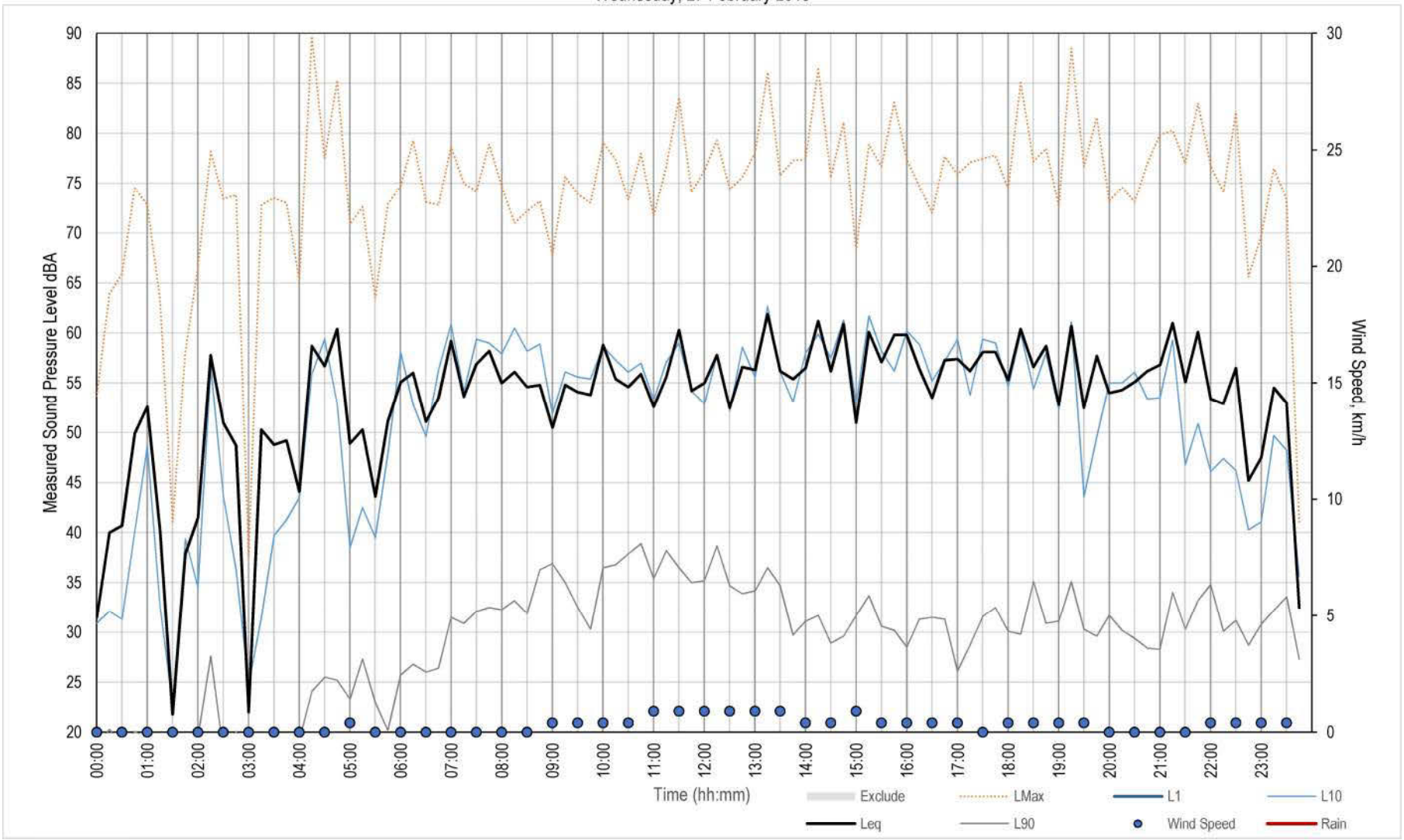
Measured Noise Levels - NM04

Monday, 25 February 2019



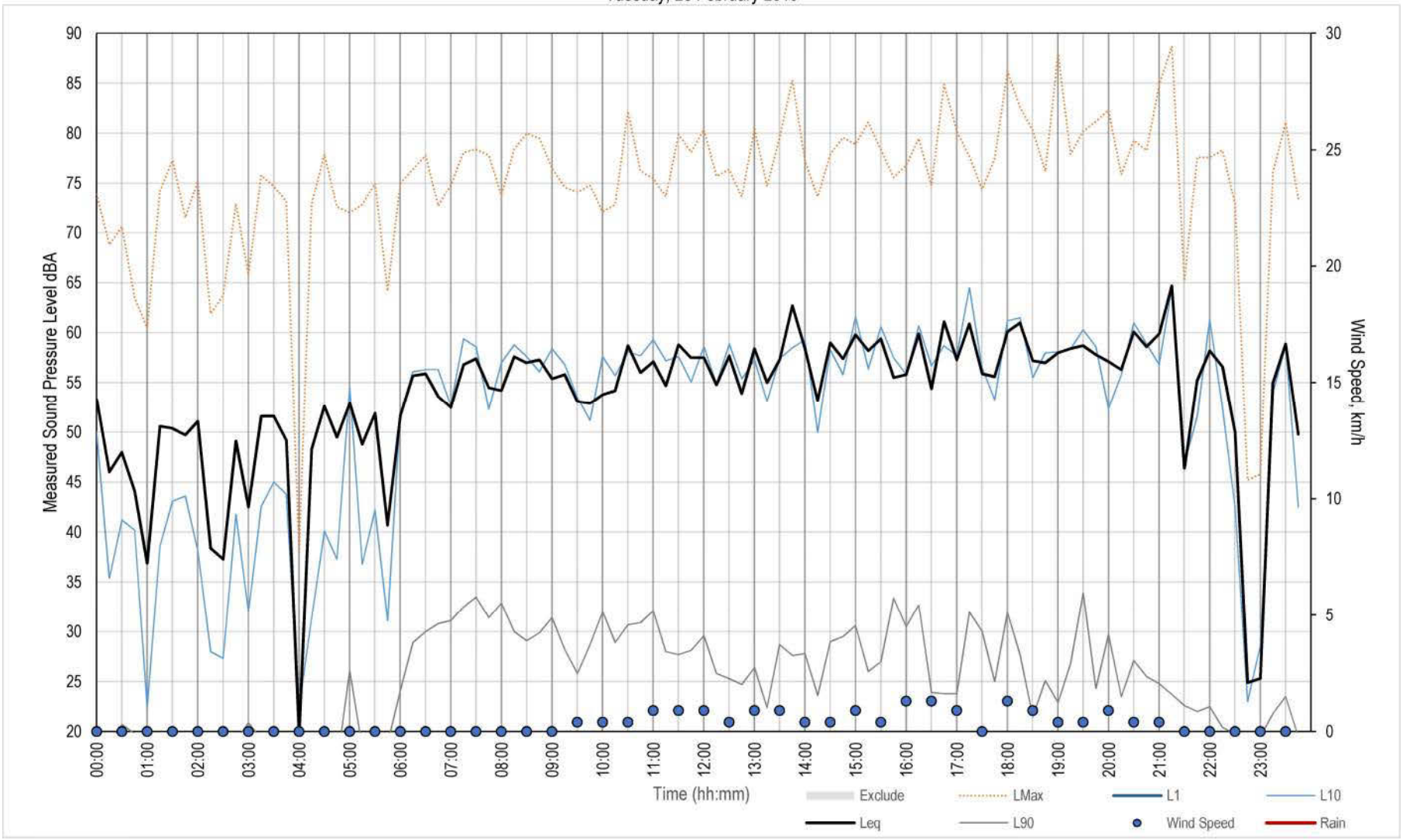
Measured Noise Levels - NM04

Wednesday, 27 February 2019



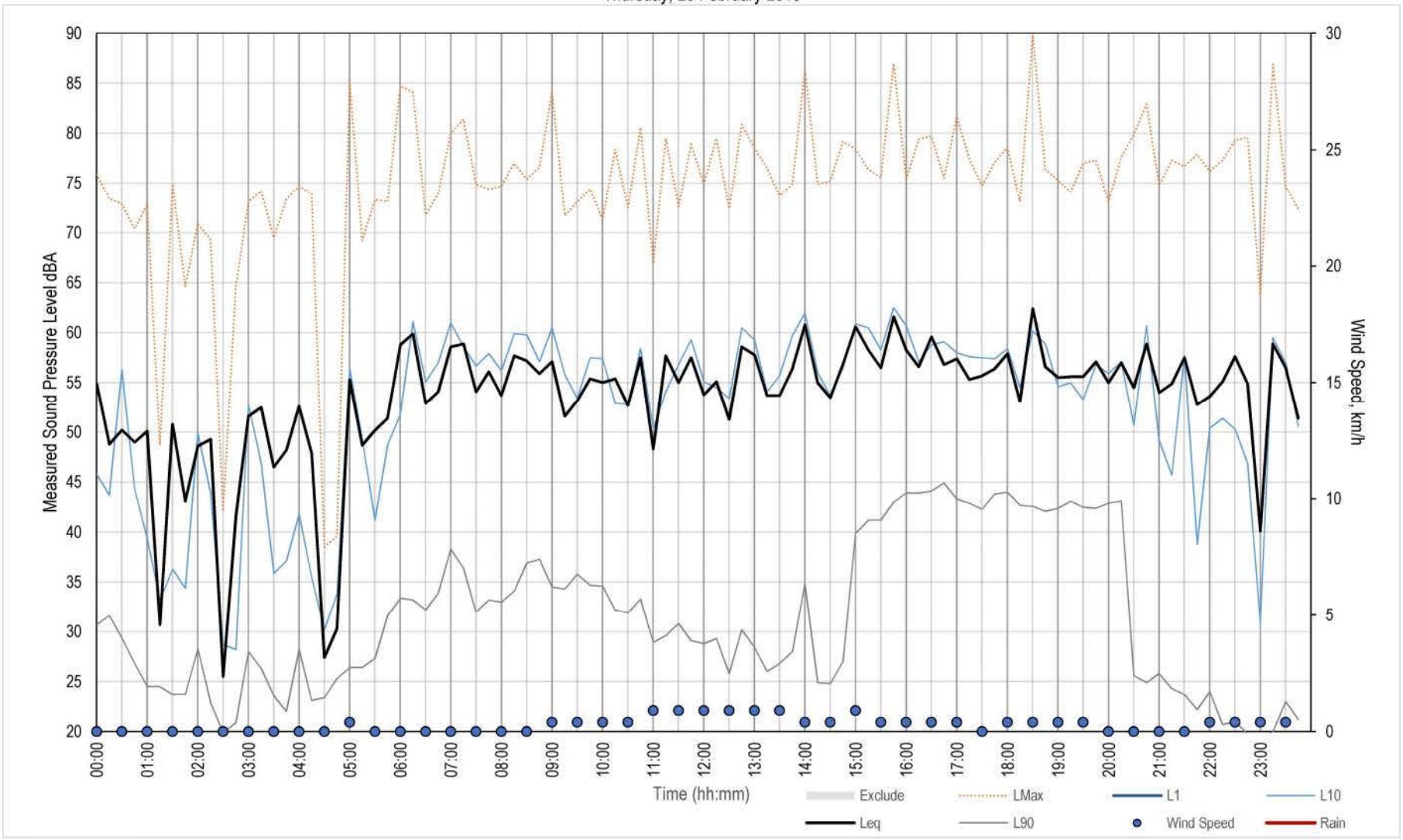
Measured Noise Levels - NM04

Tuesday, 26 February 2019



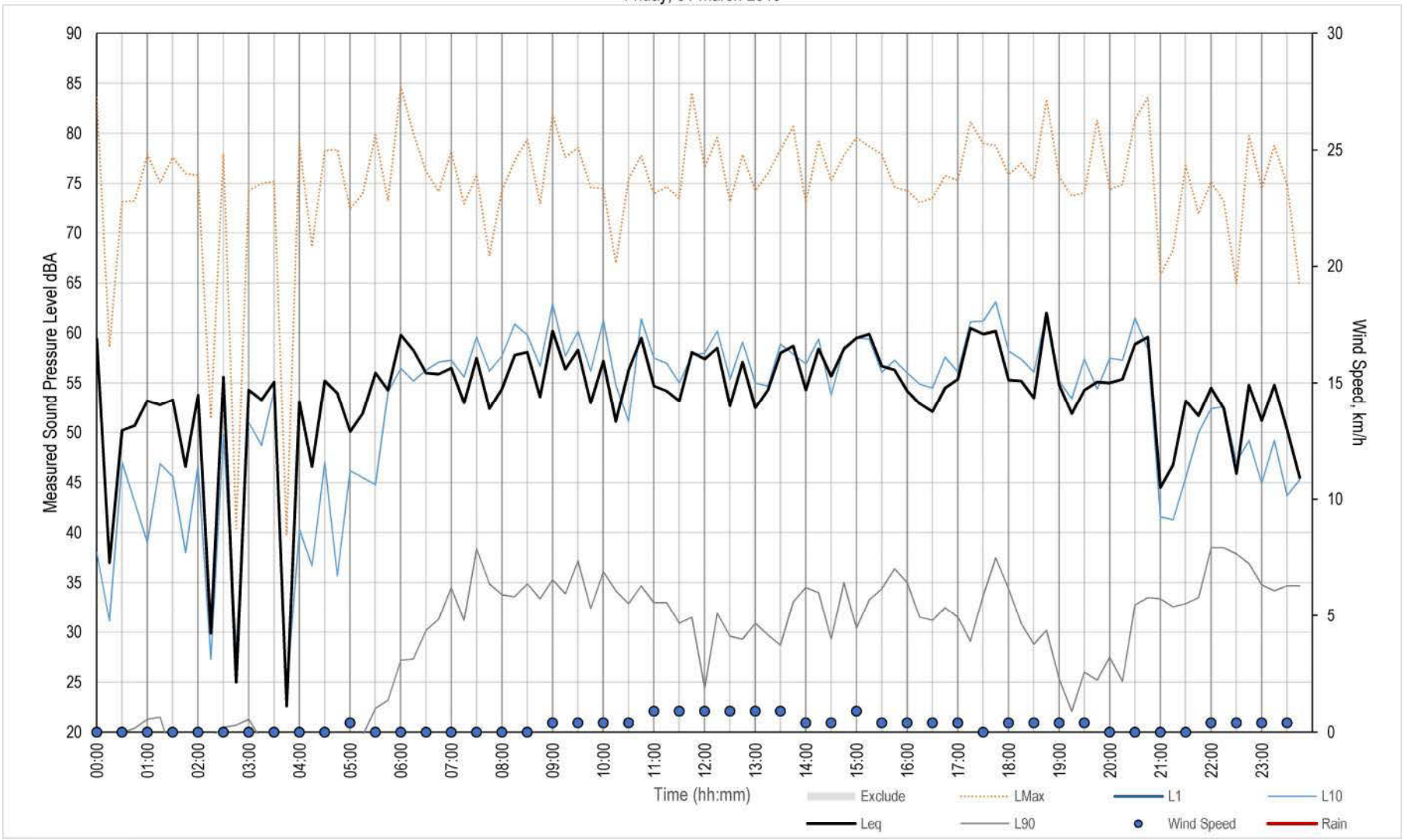
Measured Noise Levels - NM04

Thursday, 28 February 2019



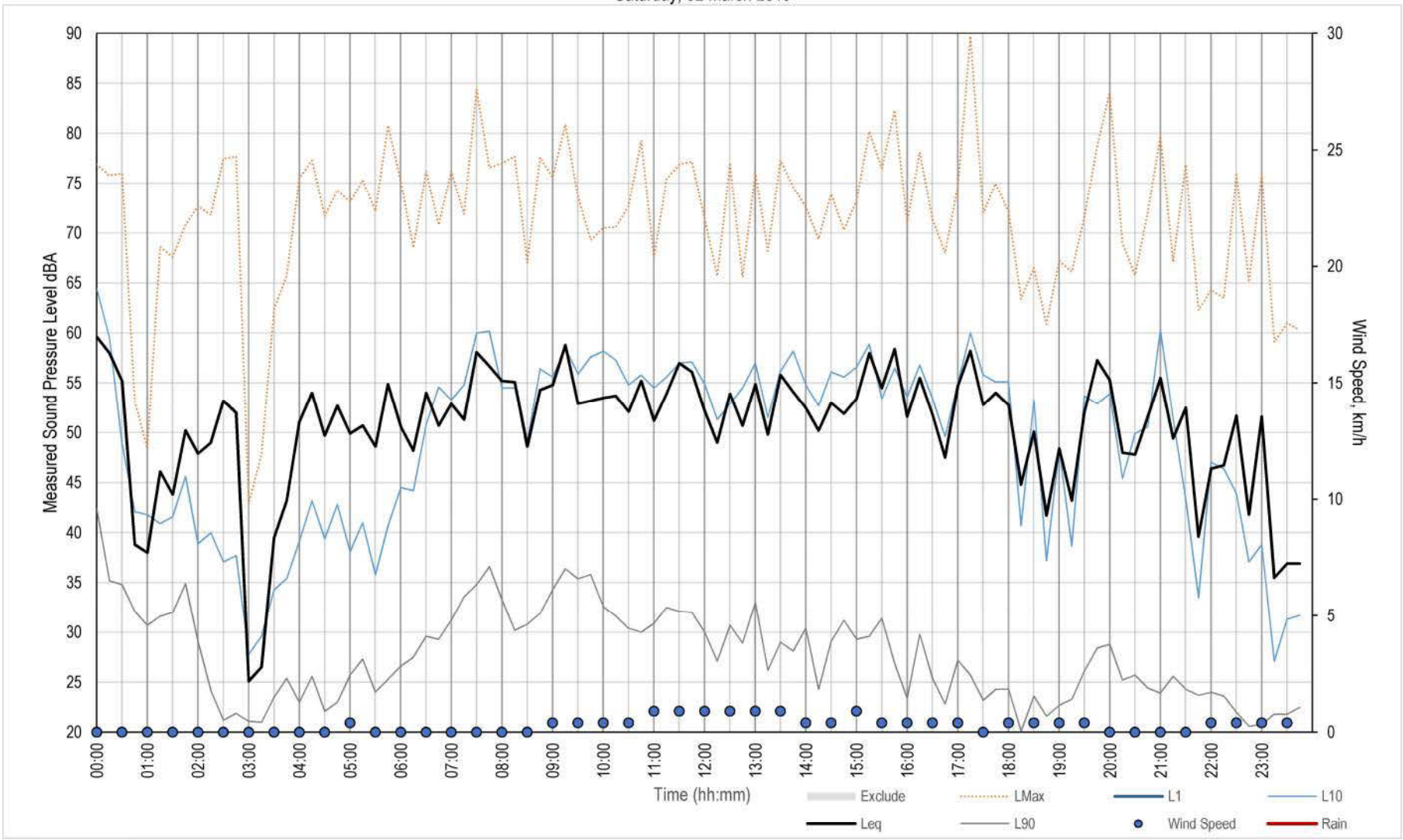
Measured Noise Levels - NM04

Friday, 01 March 2019



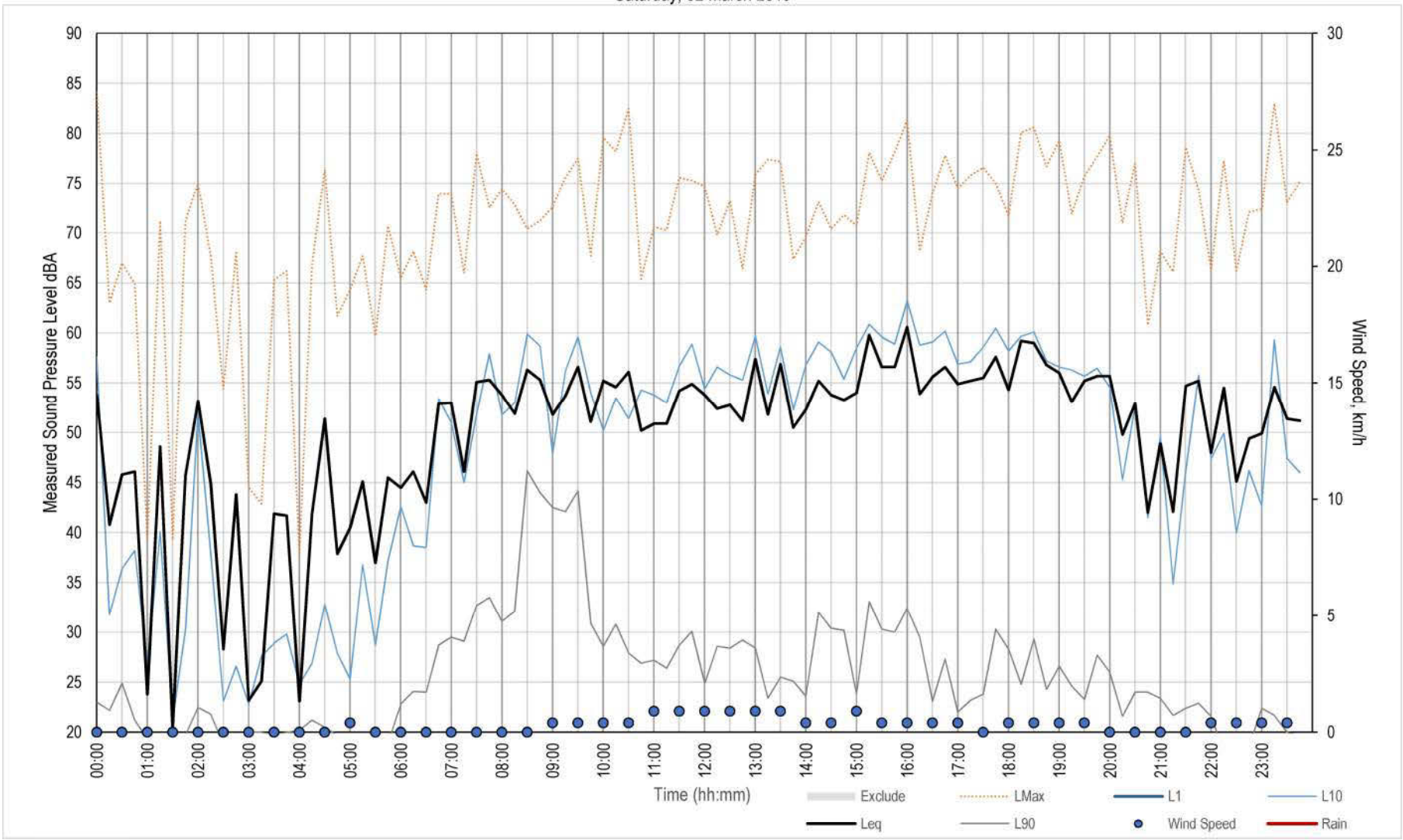
Measured Noise Levels - NM04

Saturday, 02 March 2019



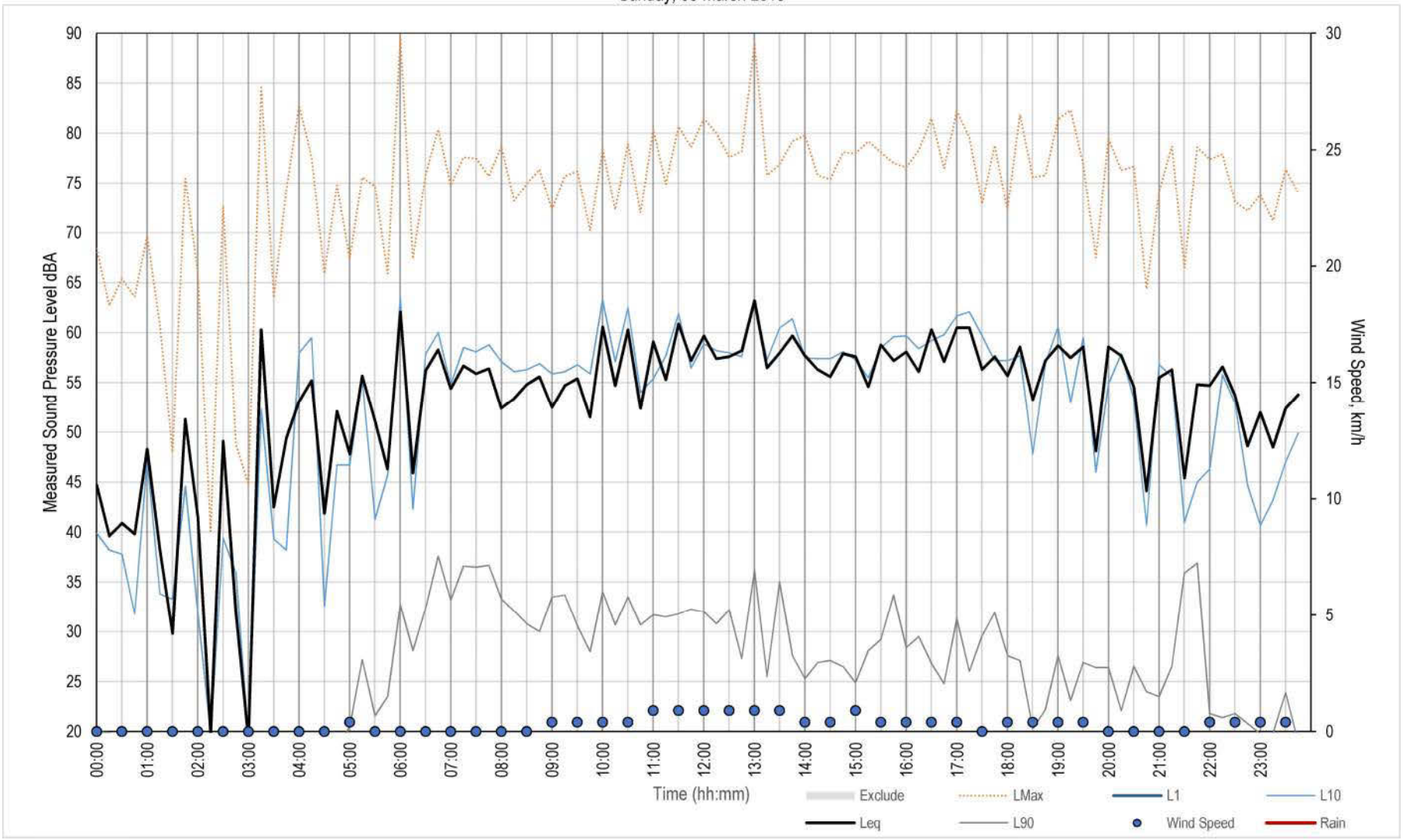
Measured Noise Levels - NM04

Saturday, 02 March 2019



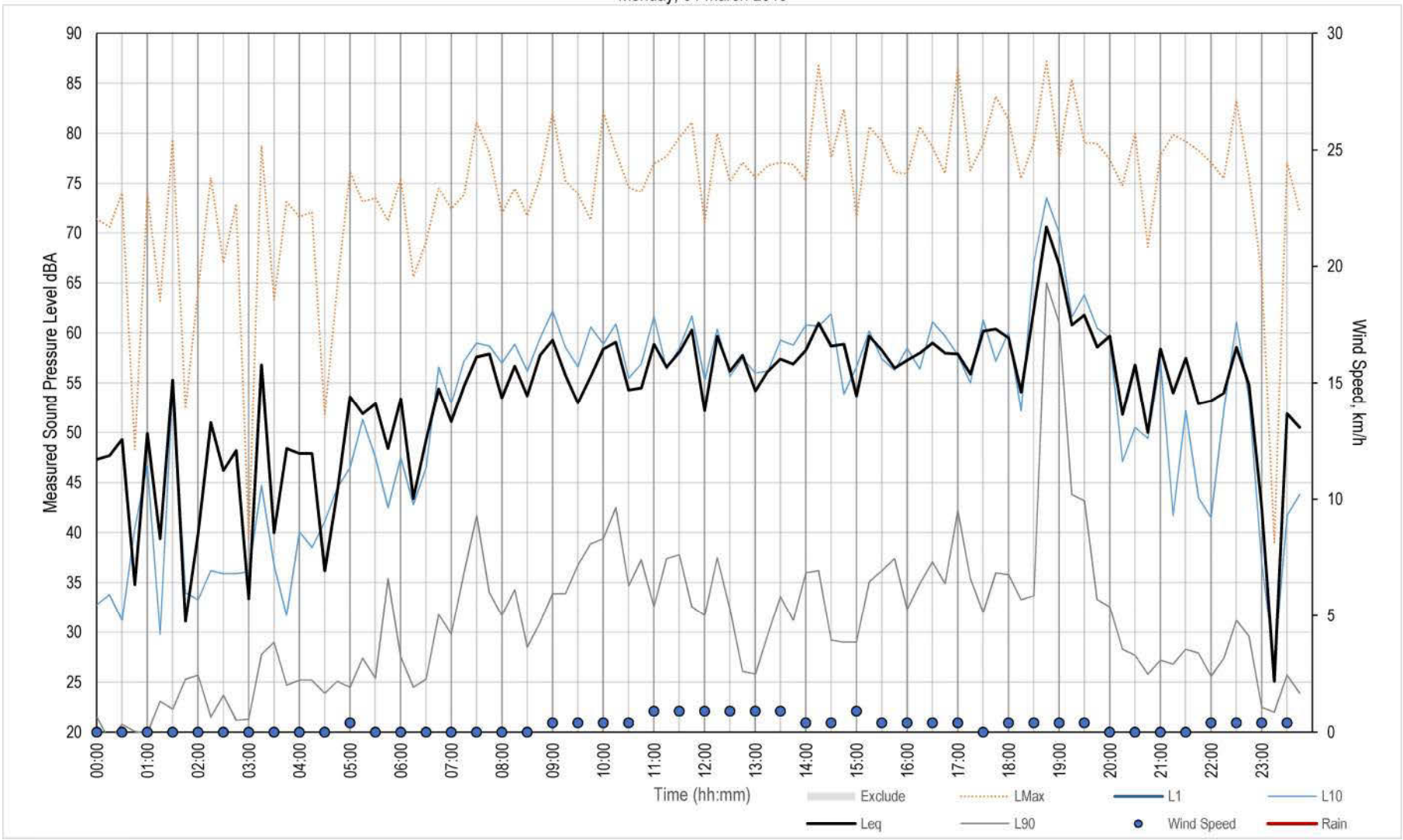
Measured Noise Levels - NM04

Sunday, 03 March 2019



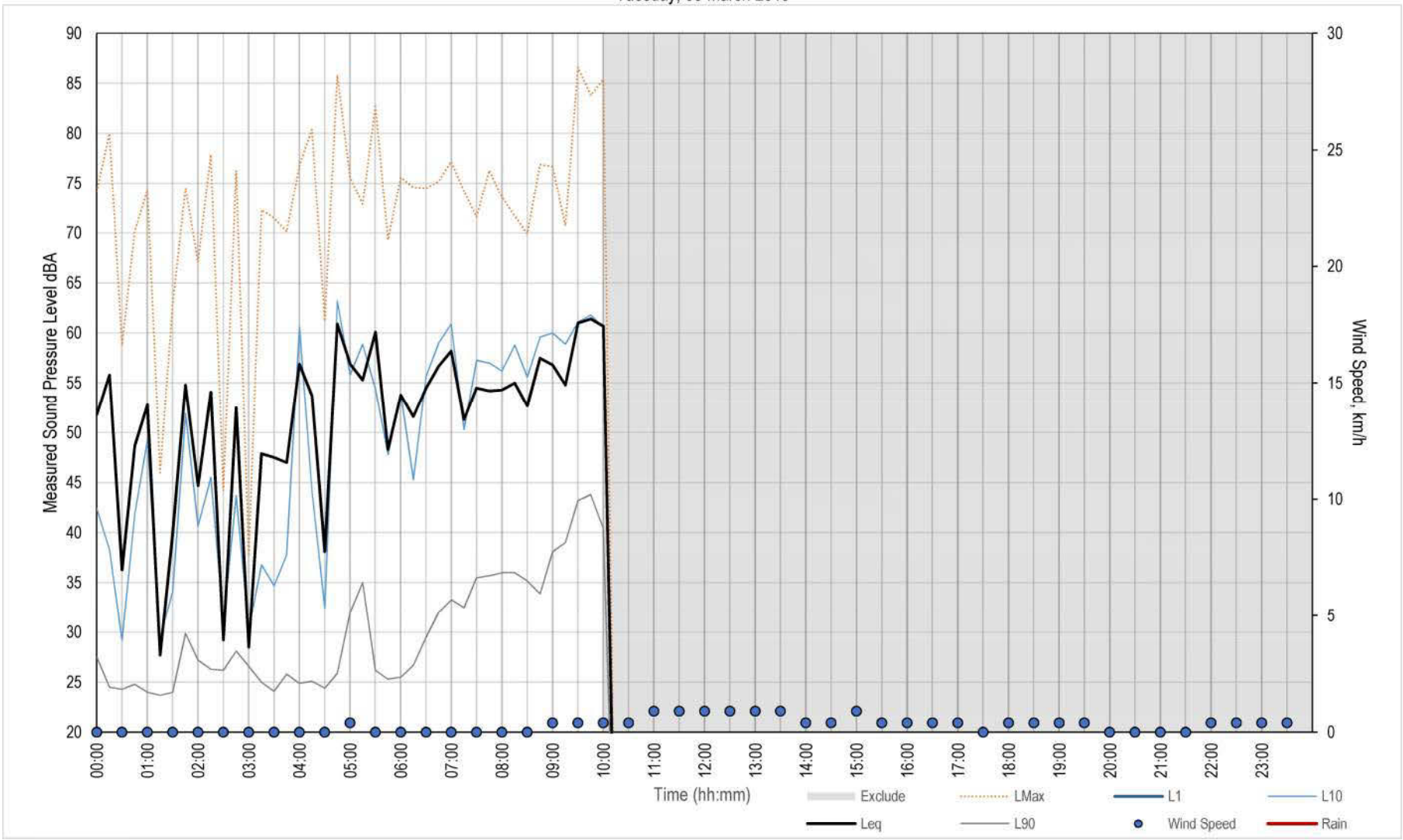
Measured Noise Levels - NM04

Monday, 04 March 2019



Measured Noise Levels - NM04

Tuesday, 05 March 2019



Site Details	NM05	**Microphone Position**	1.5 m from ground
Start Date	Tue 19 February 2019		
End Date	Tue 26 February 2019		

Measurement Summary

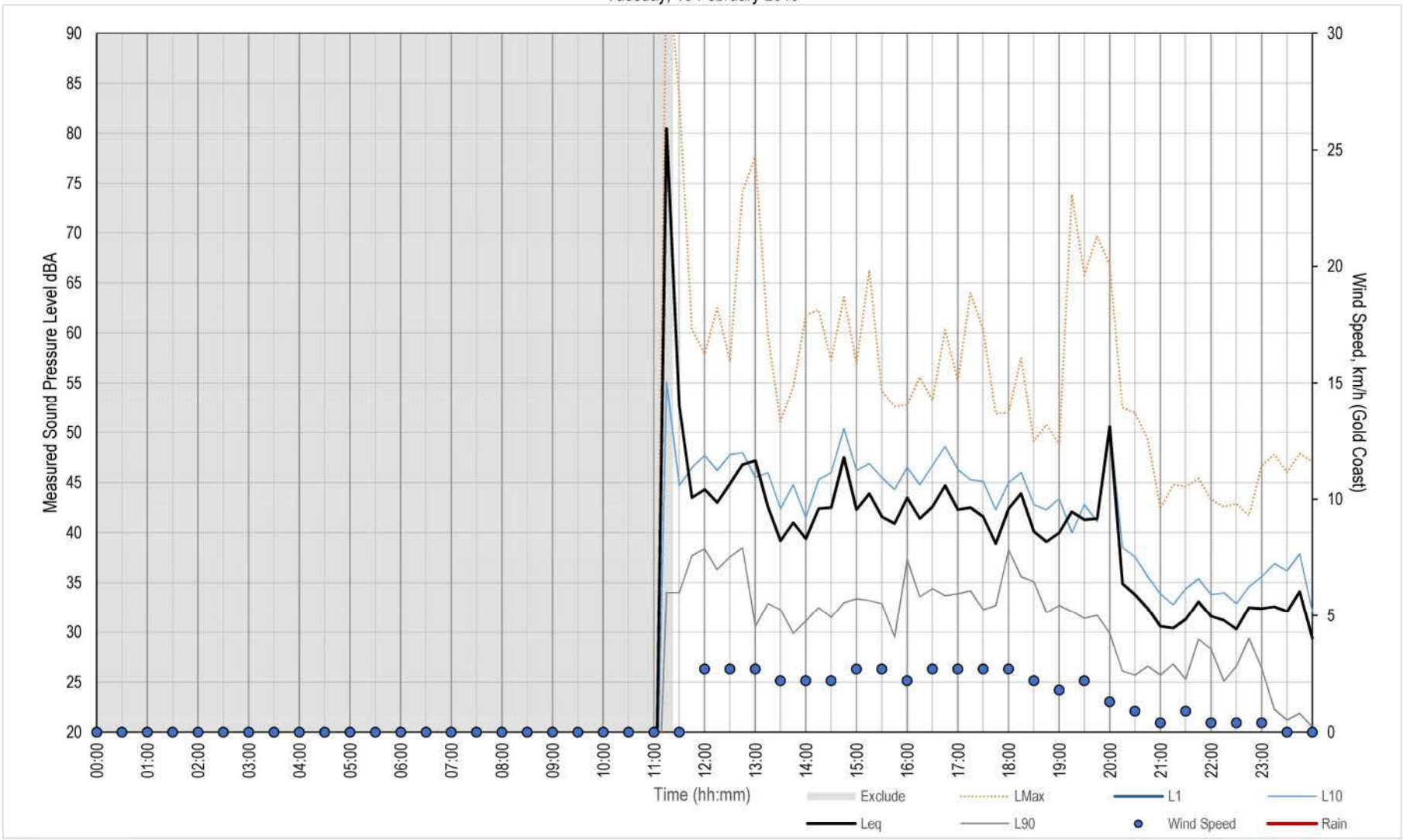
Date	19-02	20-02	21-02	22-02	23-02	24-02	25-02	26-02
$Leq_{, Day}$, dBA		44	41	43	40	46	41	39
$Leq_{, Evening}$, dBA	42	43	41	43	48	42	35	39
$Leq_{, Night}$, dBA	33	39	39	36	40	38	42	34
$RBL_{, Day}$, dBA		26	25	25	26	34	23	23
$RBL_{, Evening}$, dBA	26	25	23	25	33	34	21	24
$RBL_{, Night}$, dBA	20	20	25	21	28	21	20	25

	RBL			Leq, 15 minute		
Date	Day	Evening	Night	Day	Evening	Night
Average	27	27	22	43	42	38

Site Photo

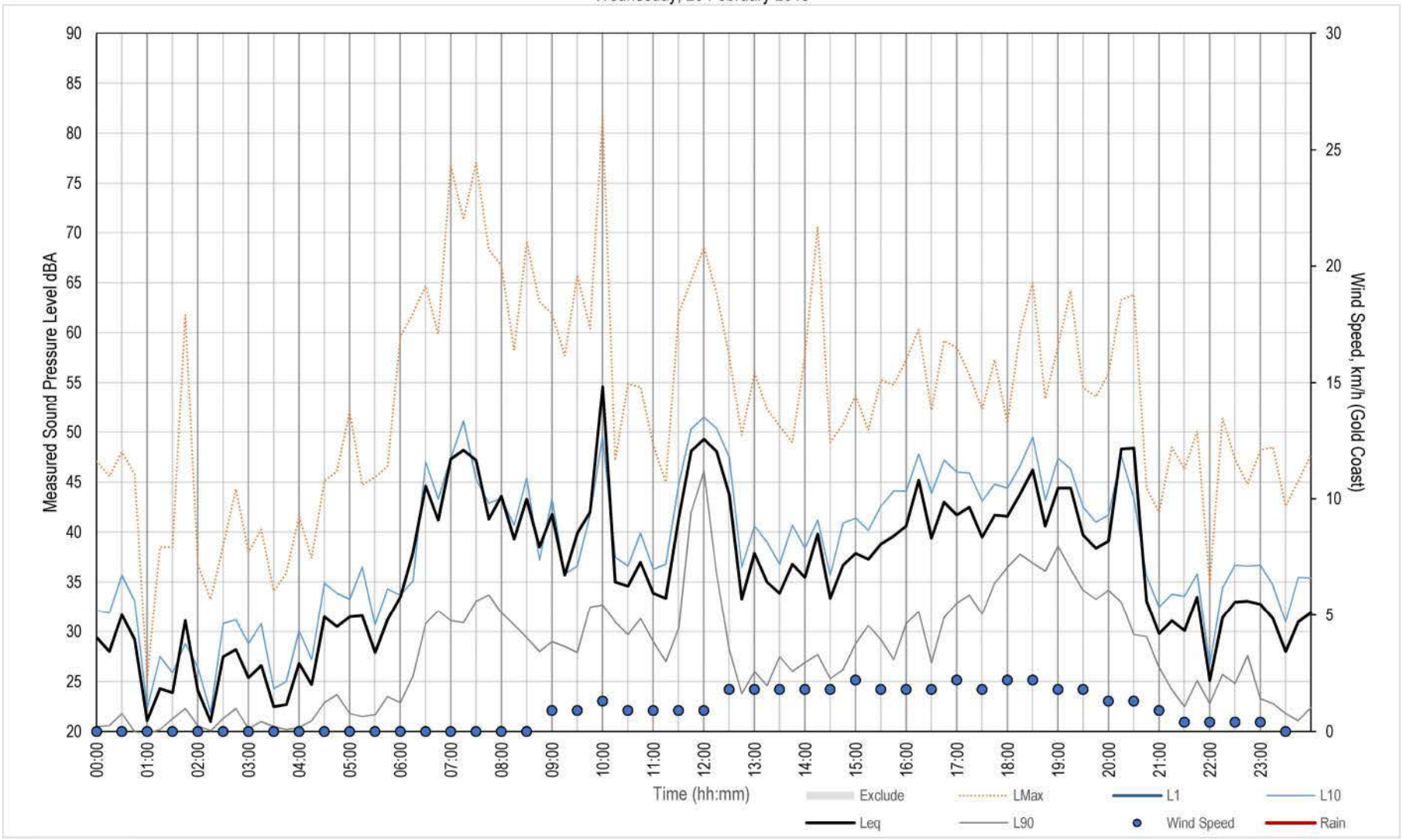
Measured Noise Levels - NM05

Tuesday, 19 February 2019



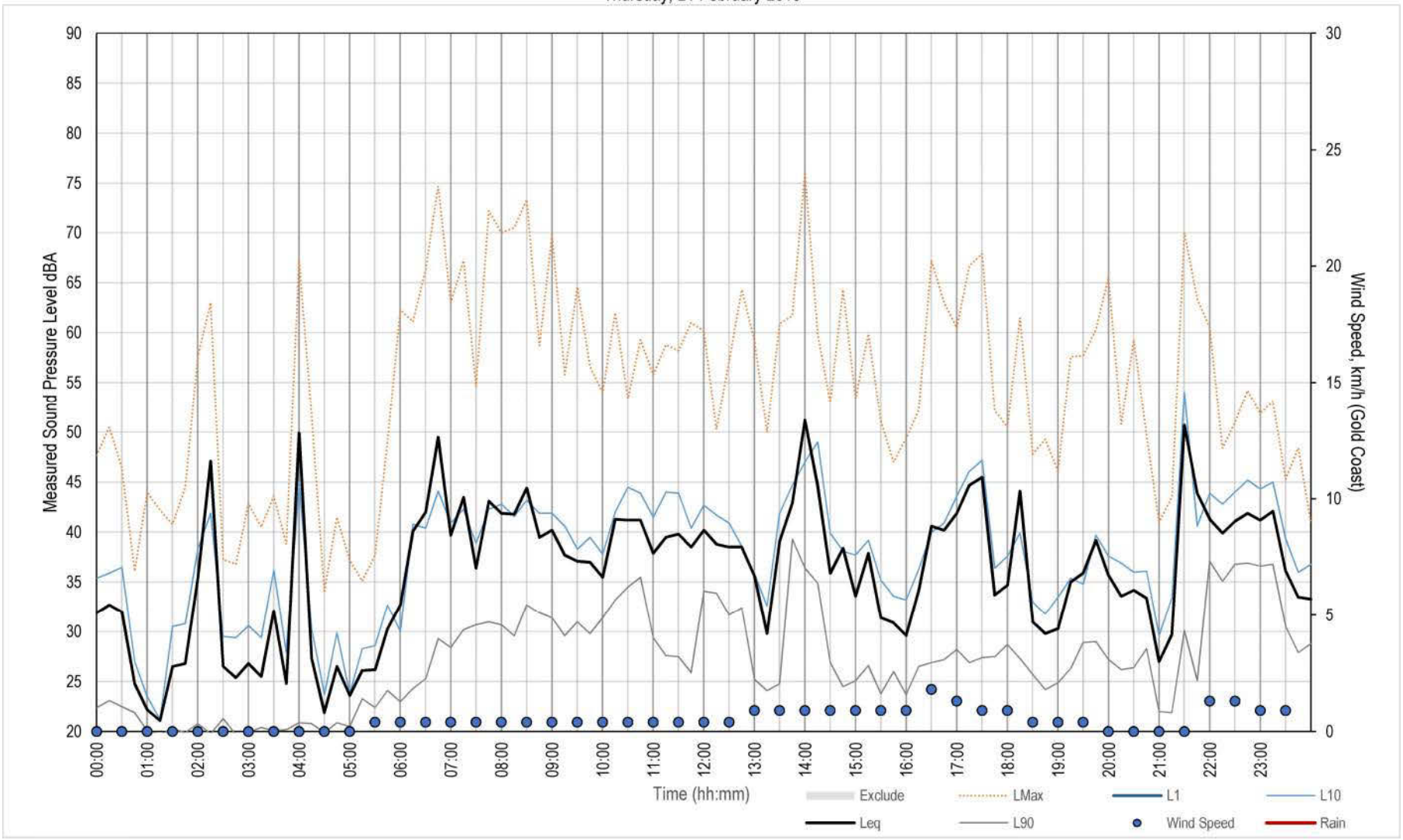
Measured Noise Levels - NM05

Wednesday, 20 February 2019



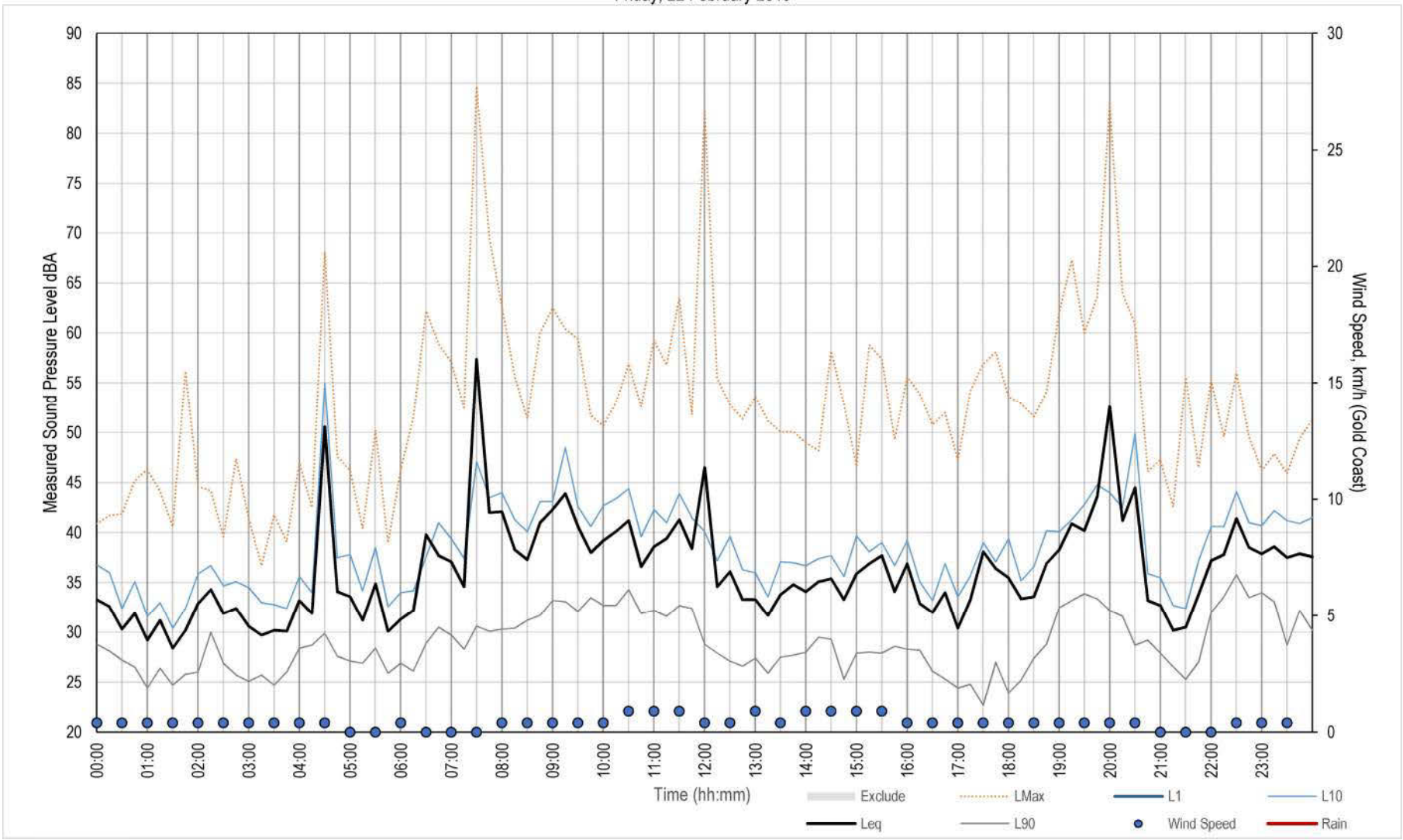
Measured Noise Levels - NM05

Thursday, 21 February 2019



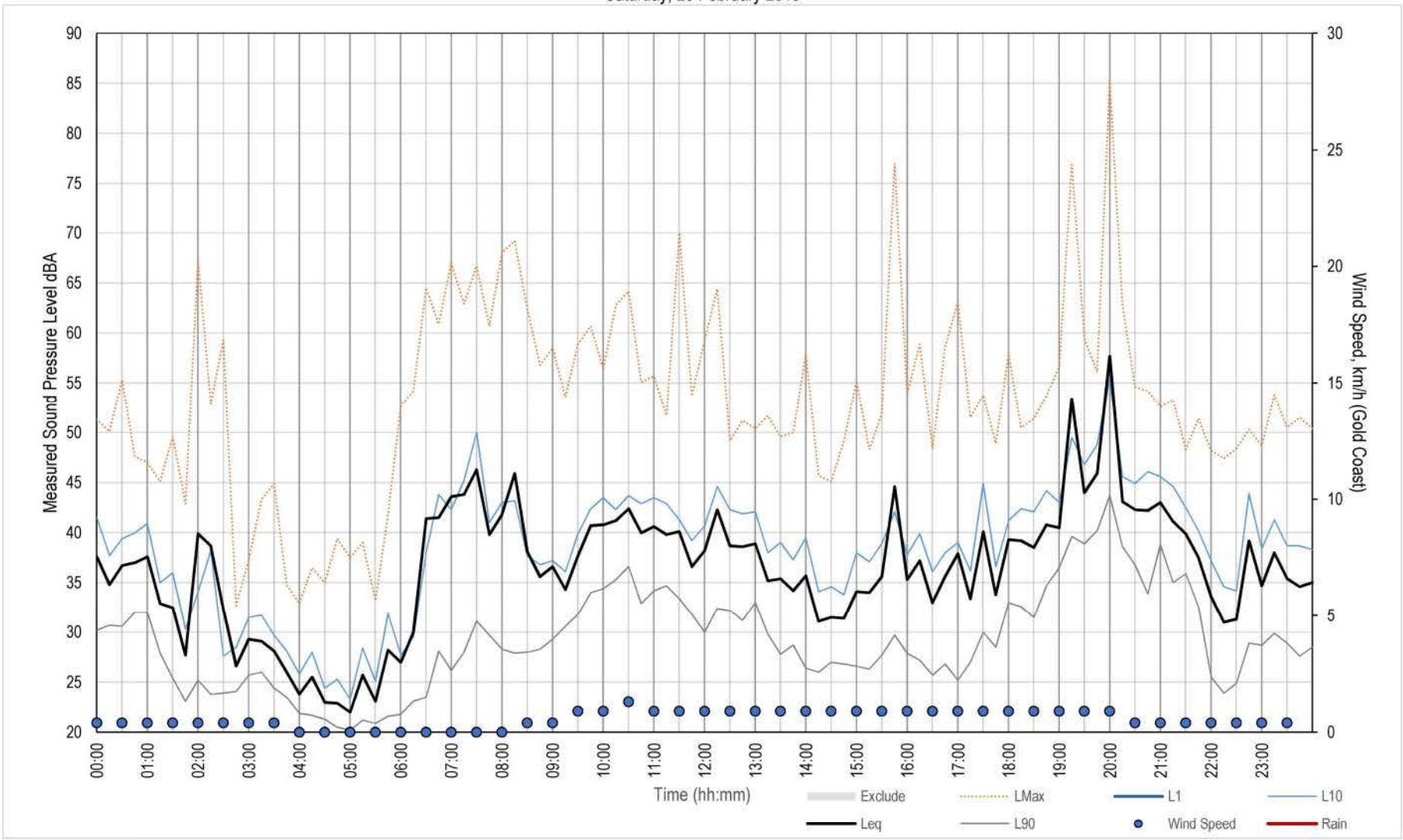
Measured Noise Levels - NM05

Friday, 22 February 2019



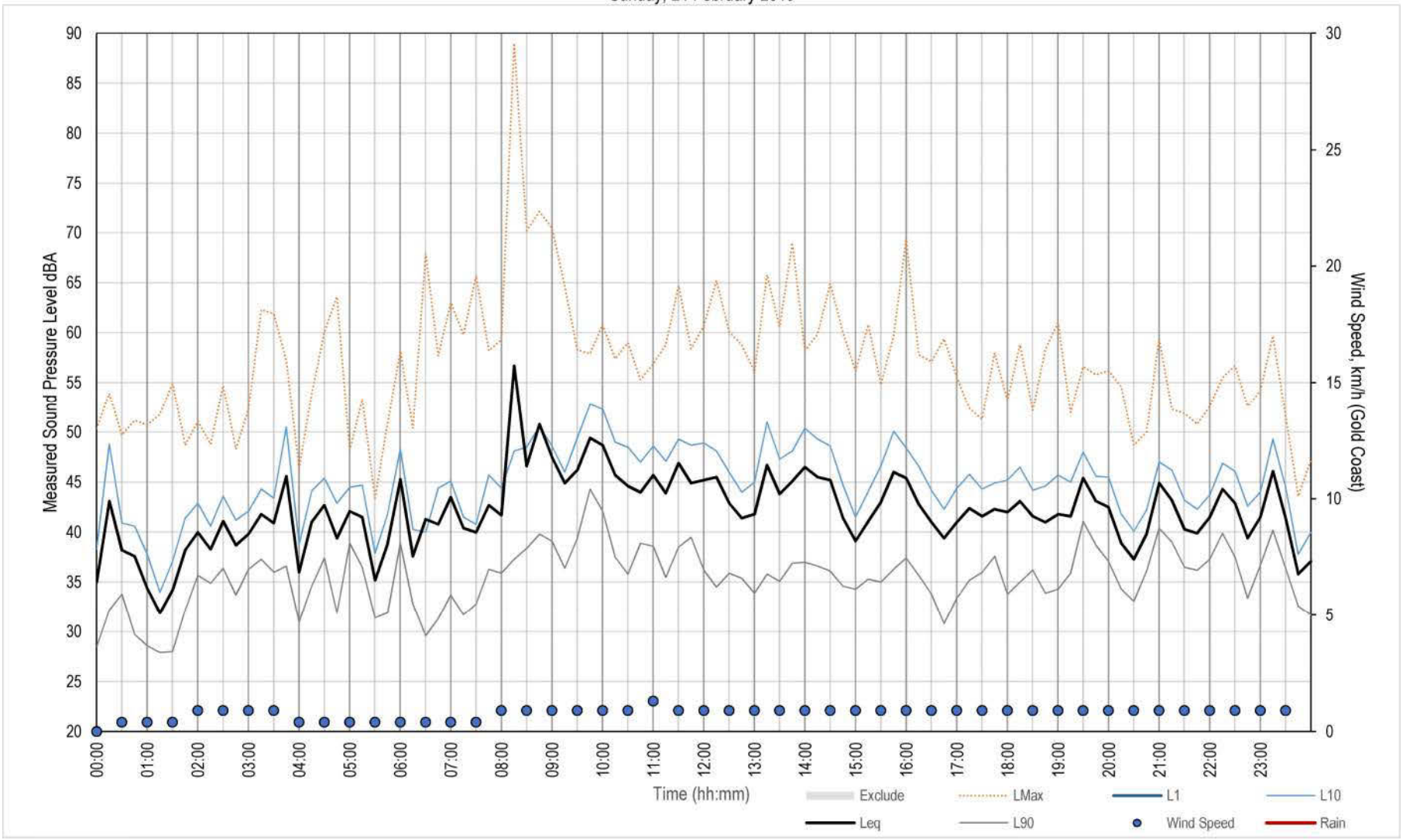
Measured Noise Levels - NM05

Saturday, 23 February 2019



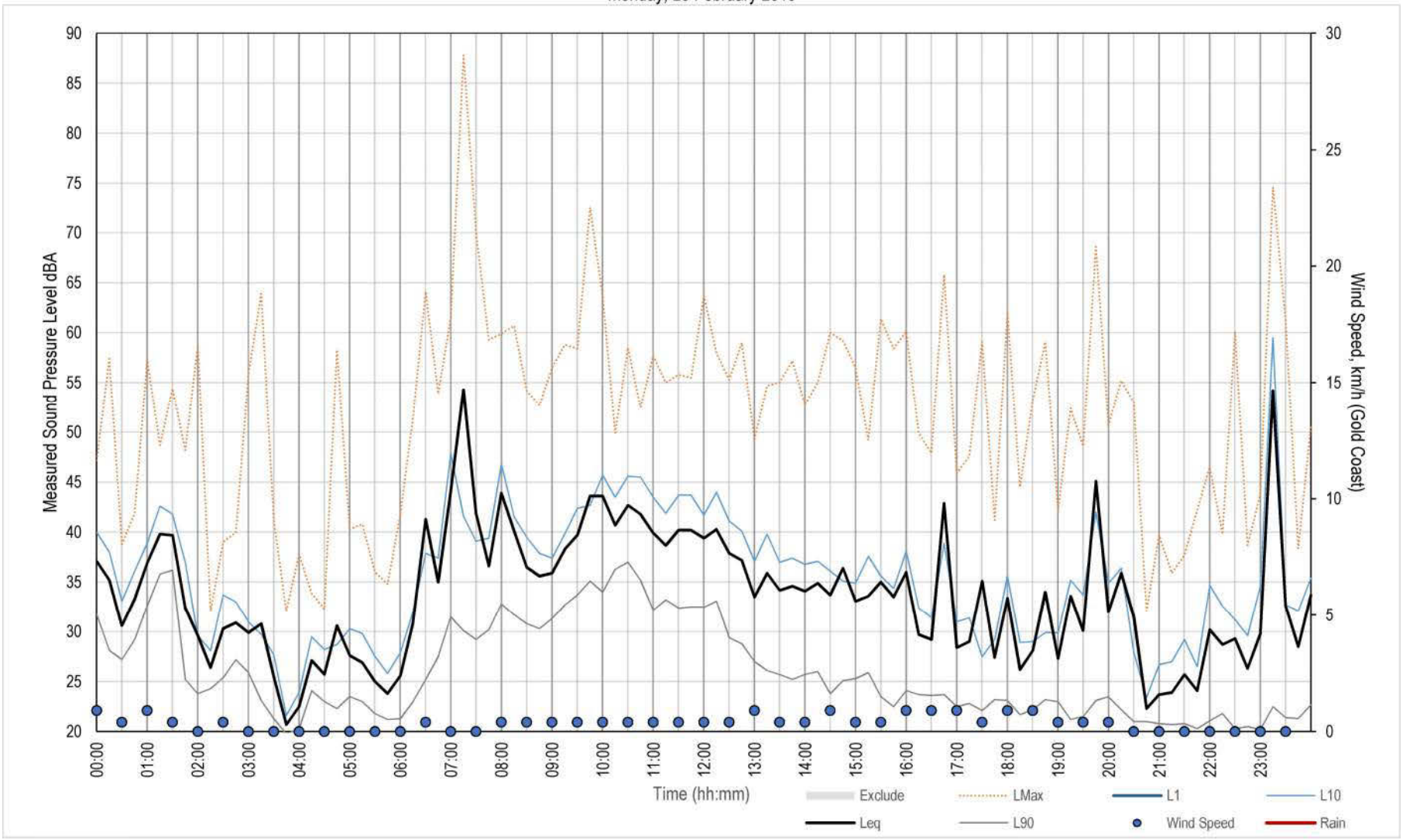
Measured Noise Levels - NM05

Sunday, 24 February 2019



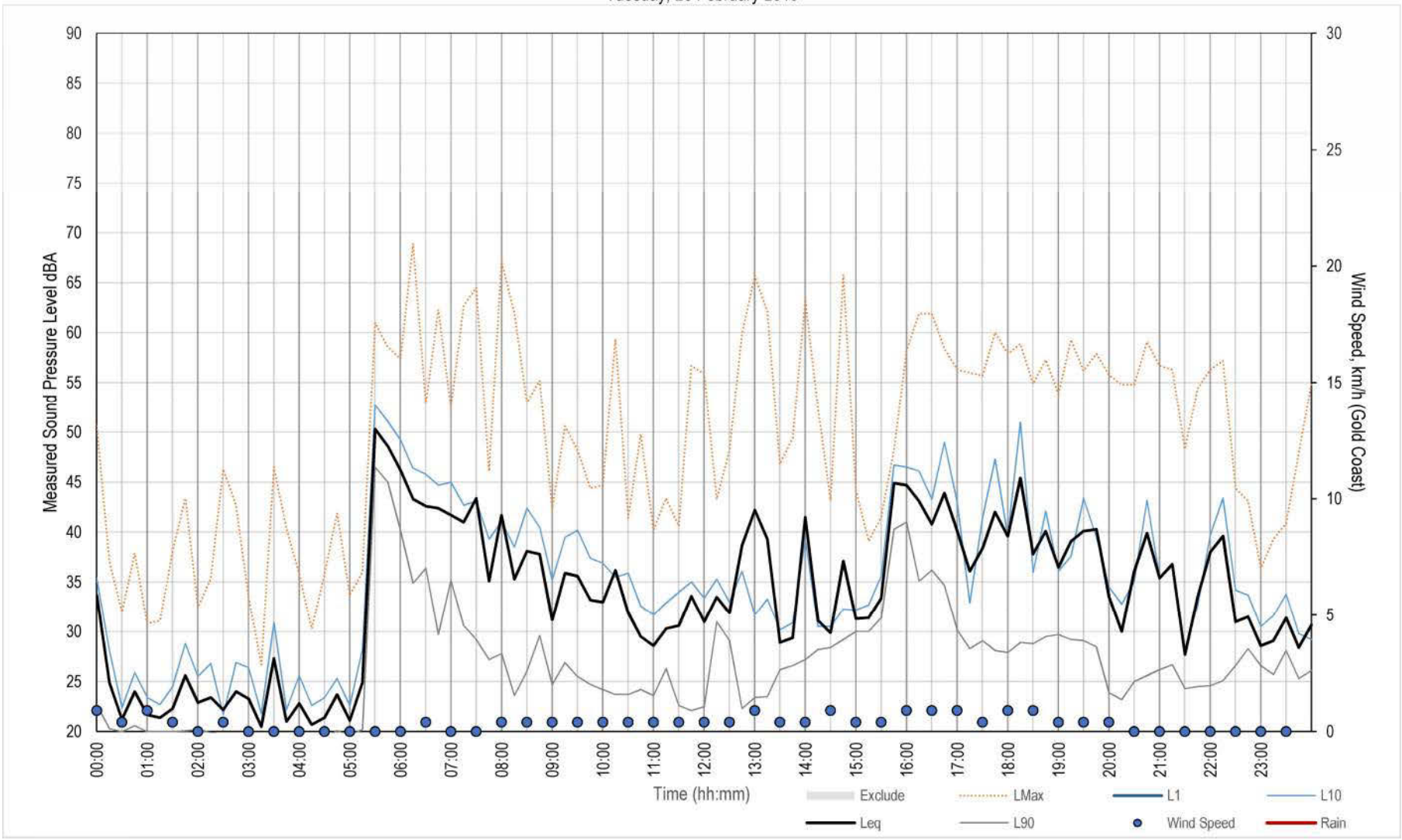
Measured Noise Levels - NM05

Monday, 25 February 2019



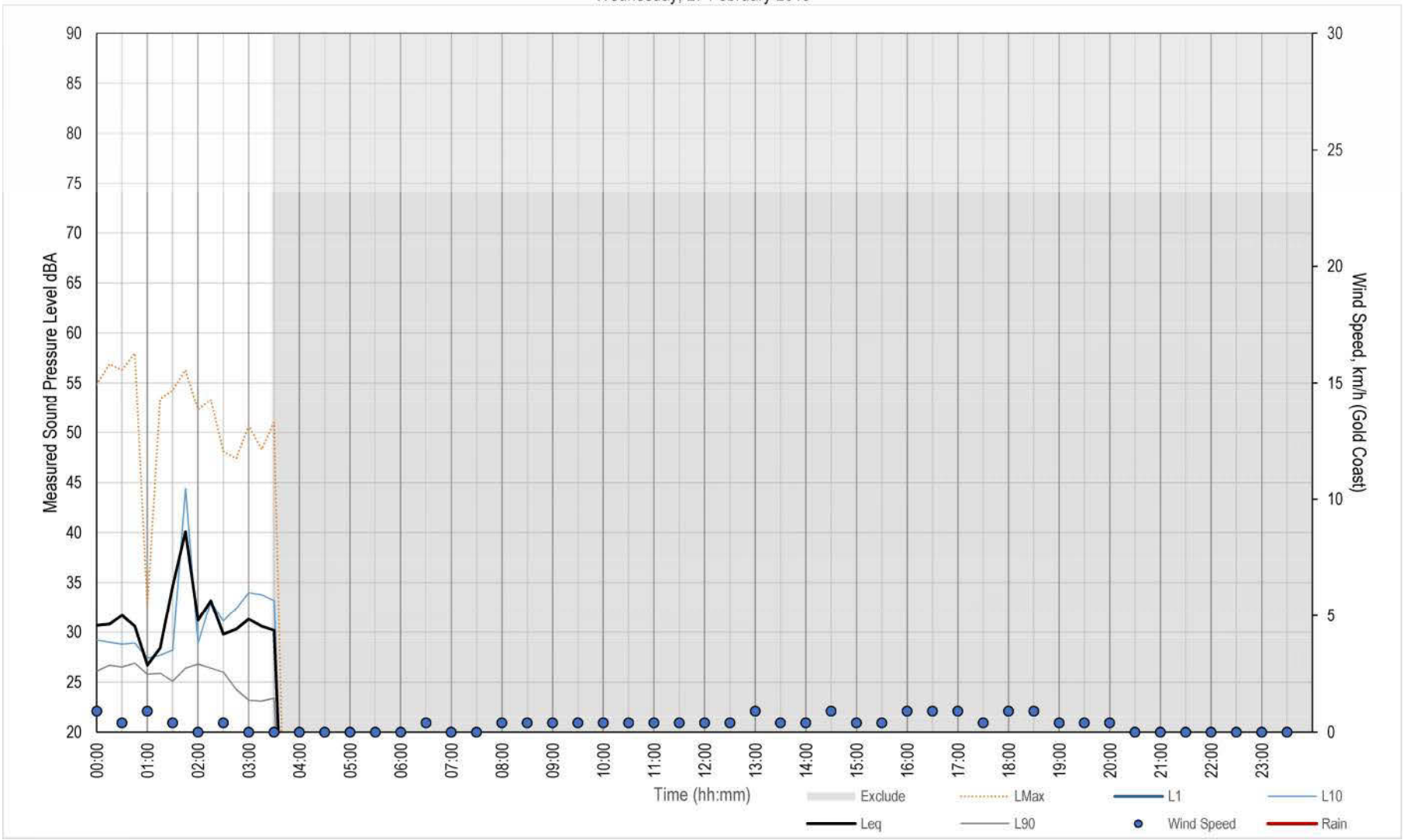
Measured Noise Levels - NM05

Tuesday, 26 February 2019



Measured Noise Levels - NM05

Wednesday, 27 February 2019



Site Details	NM06	**Microphone Position**	1.5m above ground
Start Date	Tue 19 February 2019		
End Date	Tue 05 March 2019		

Measurement Summary

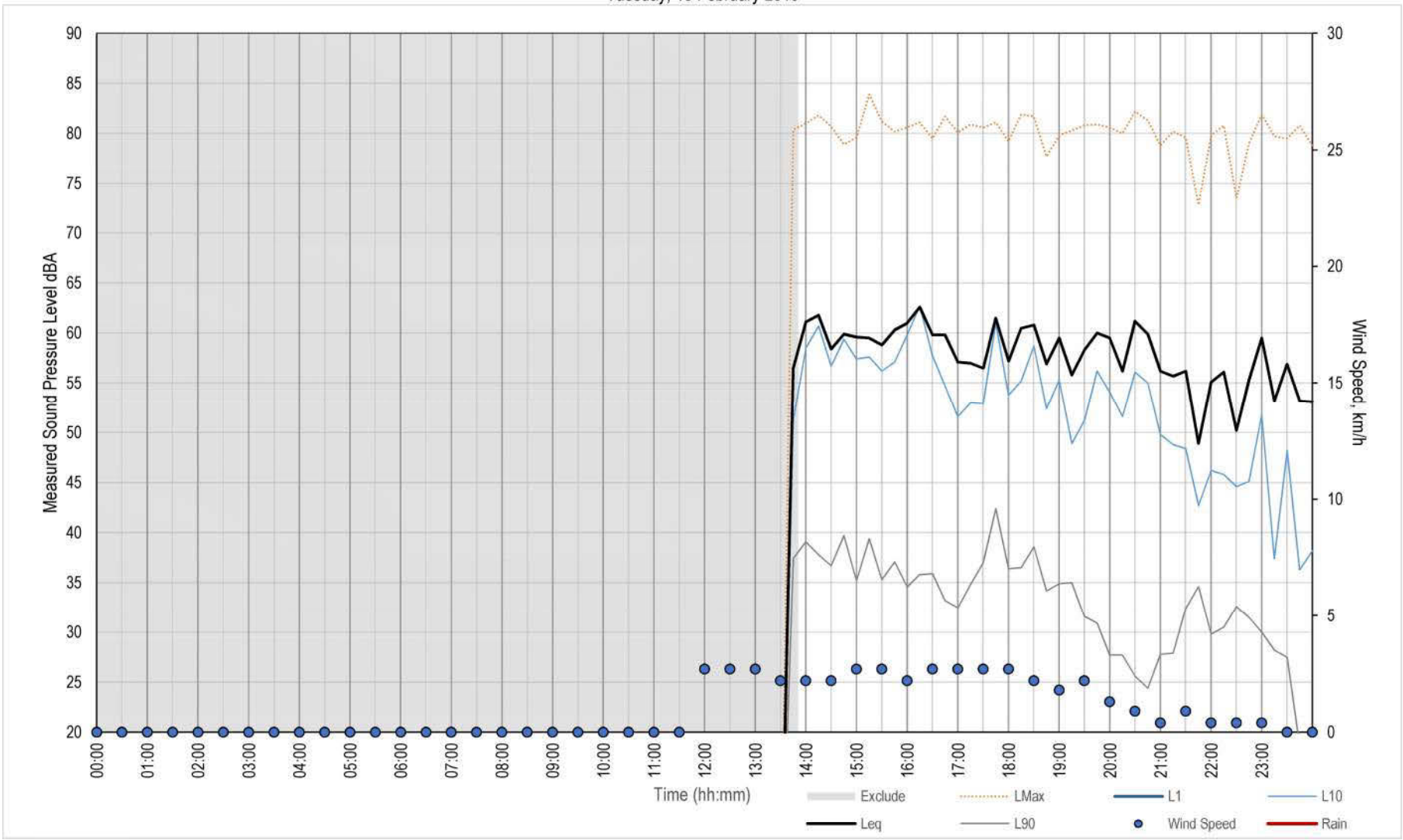
Date	19-02	20-02	21-02	22-02	23-02	24-02	25-02	26-02
$Leq_{, Day}$, dBA	59	59	59	59	56	58	58	59
$Leq_{, Evening}$, dBA	54	55	55	53	51	52	54	54
$Leq_{, Night}$, dBA	61	61	61	60	58	60	61	61
$RBL_{, Day}$, dBA	34	27	27	30	30	38	25	24
$RBL_{, Evening}$, dBA	27	27	23	31	37	41	18	17
$RBL_{, Night}$, dBA	17	19	28	26	29	22	15	15

Date	27-02	28-02	01-03	02-03	03-03	04-03	05-03	
$Leq_{, Day}$, dBA	60	58	59	56	57	59	60	
$Leq_{, Evening}$, dBA	54	55	53	48	53	53	54	
$Leq_{, Night}$, dBA	62	60	61	57	60	61	63	
$RBL_{, Day}$, dBA	27	28	29	25	25	26	29	
$RBL_{, Evening}$, dBA	27	18	22	17	17	20	23	
$RBL_{, Night}$, dBA	21	15	20	15	15	17	17	

Site Photo

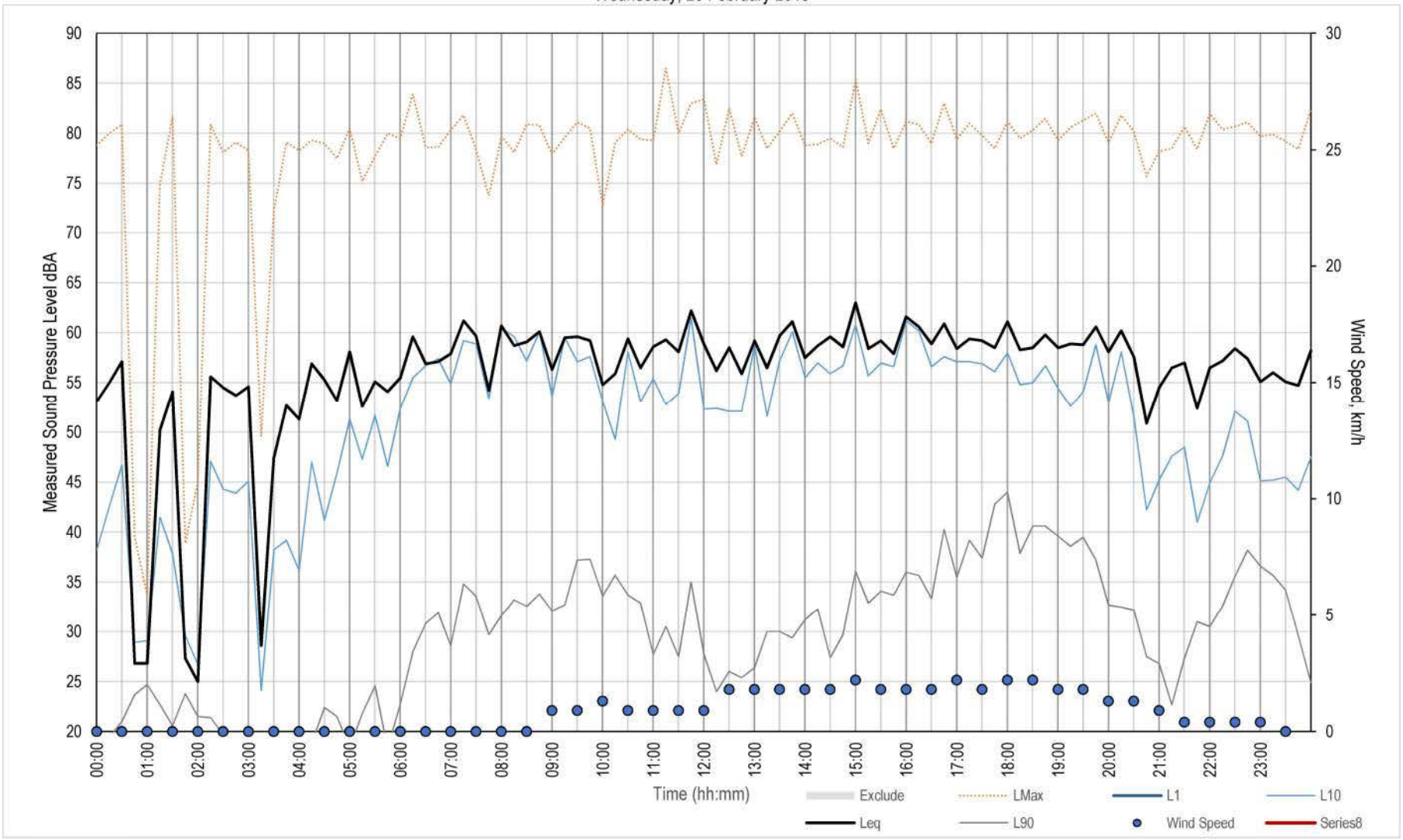
Measured Noise Levels - NM06

Tuesday, 19 February 2019



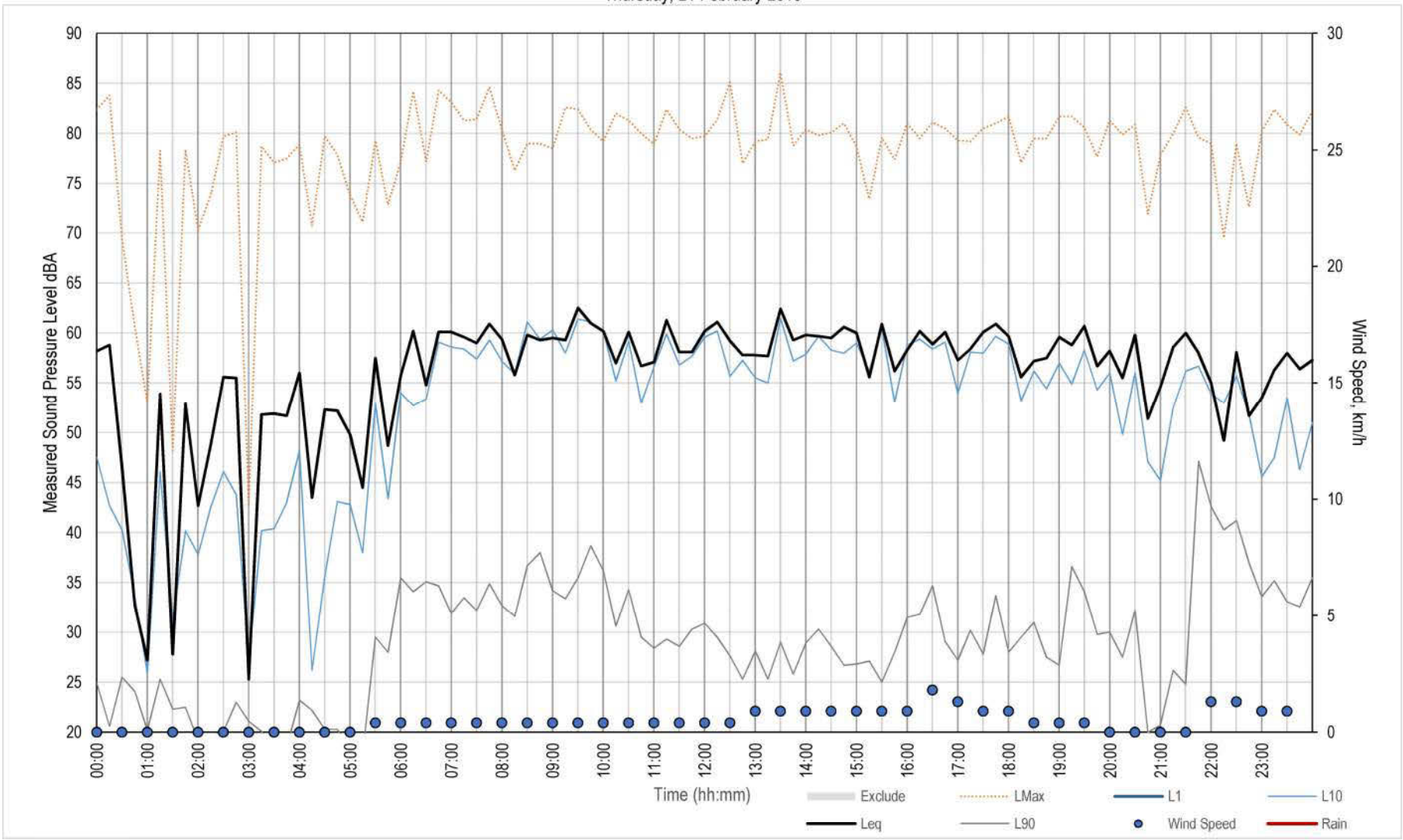
Measured Noise Levels - NM06

Wednesday, 20 February 2019



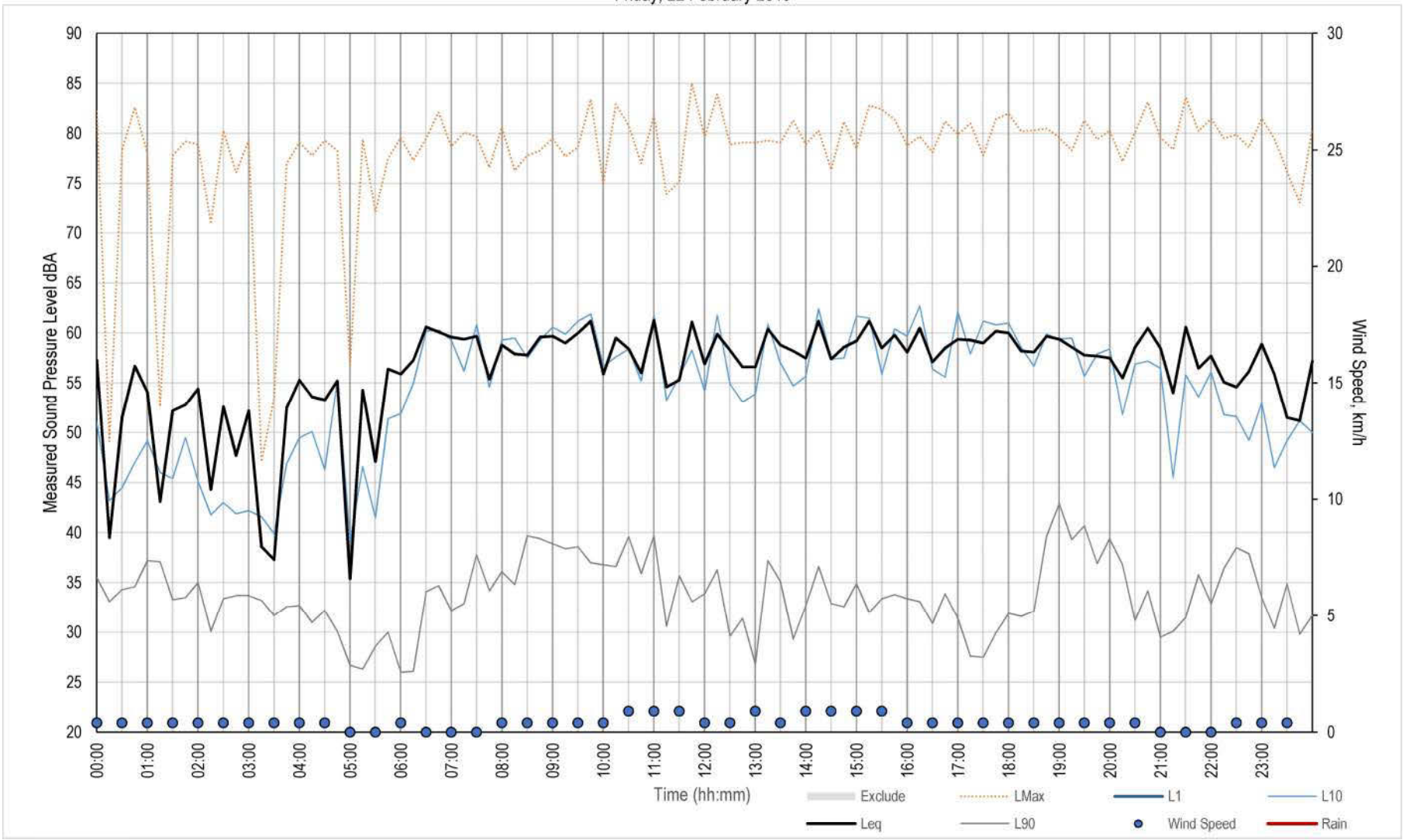
Measured Noise Levels - NM06

Thursday, 21 February 2019



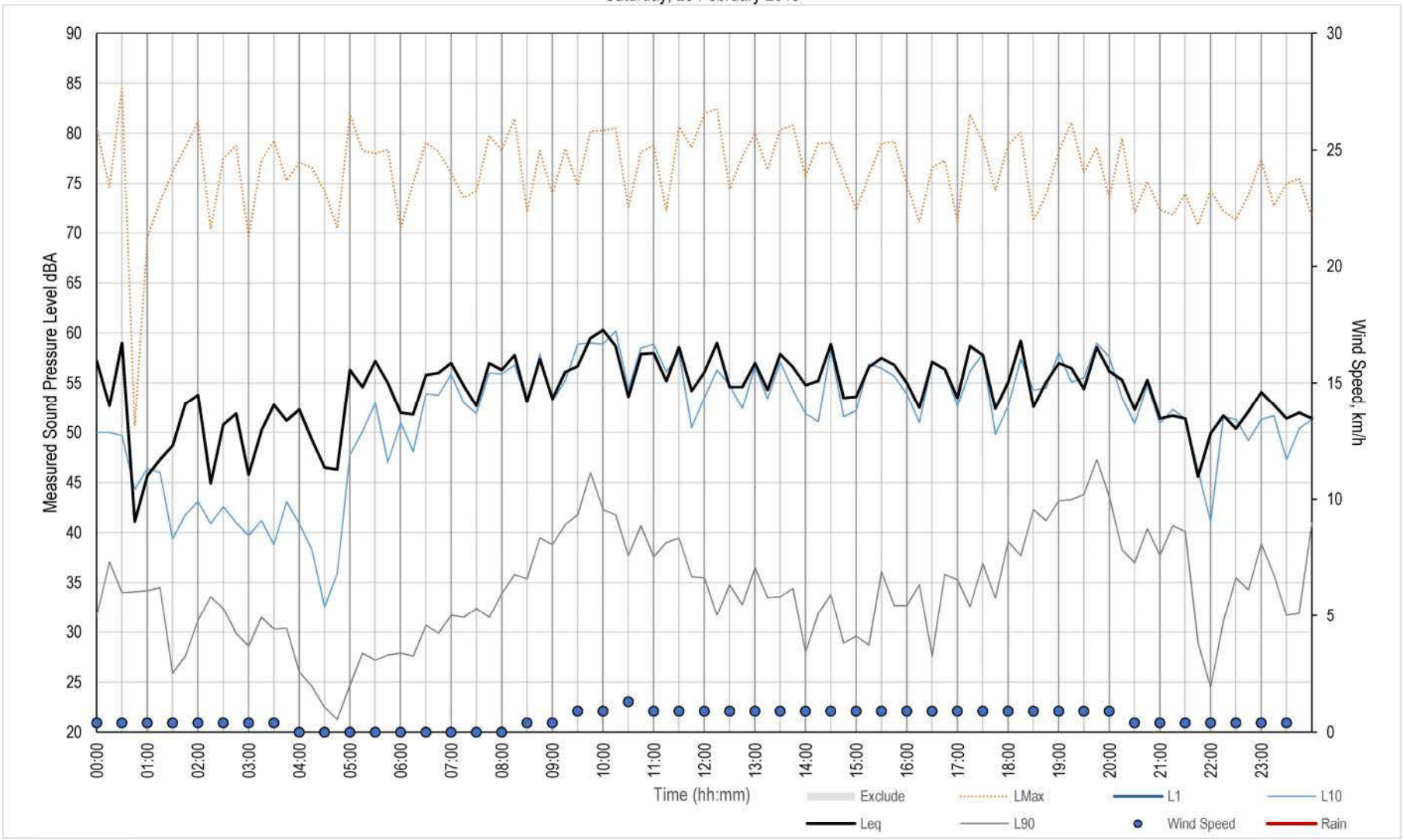
Measured Noise Levels - NM06

Friday, 22 February 2019



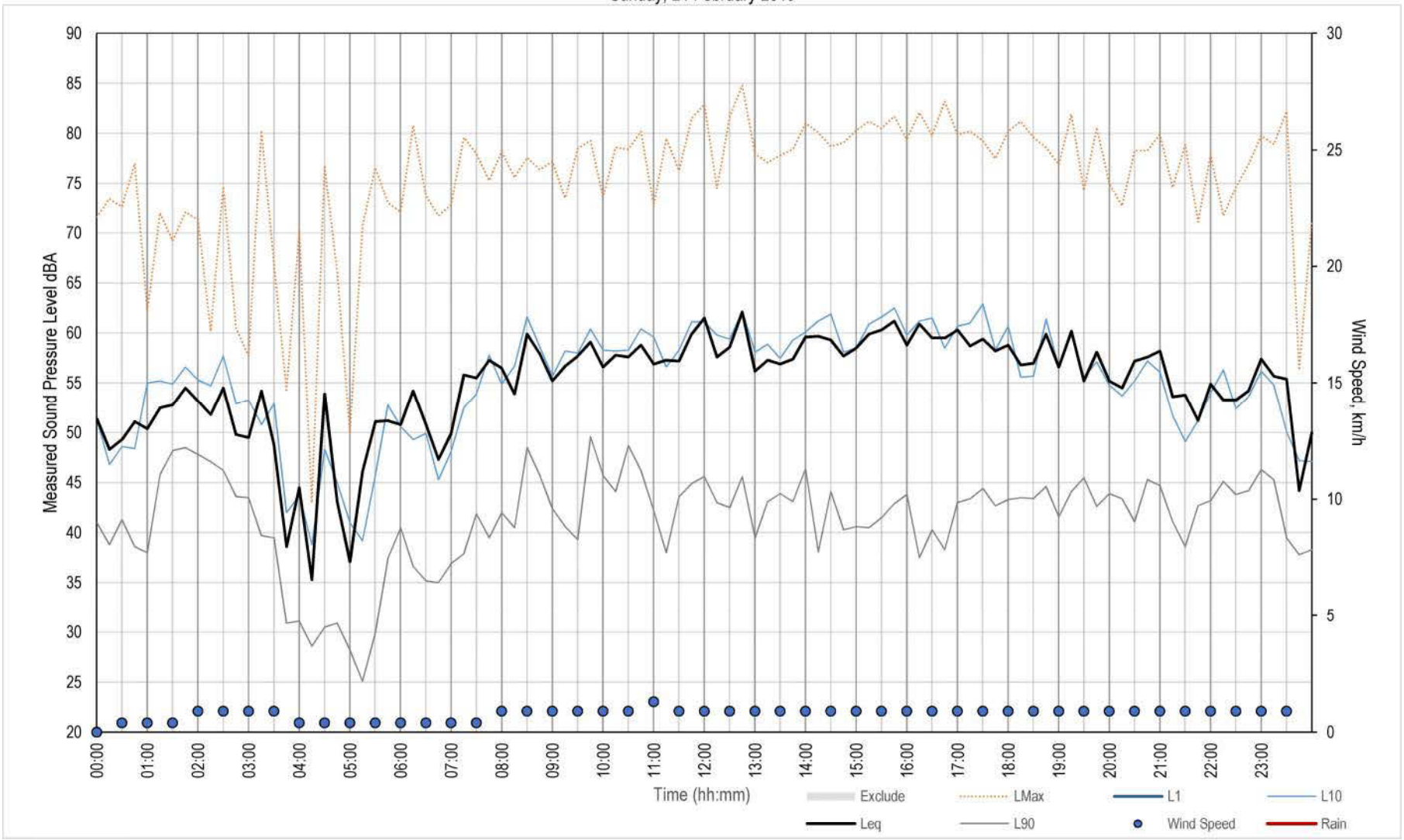
Measured Noise Levels - NM06

Saturday, 23 February 2019



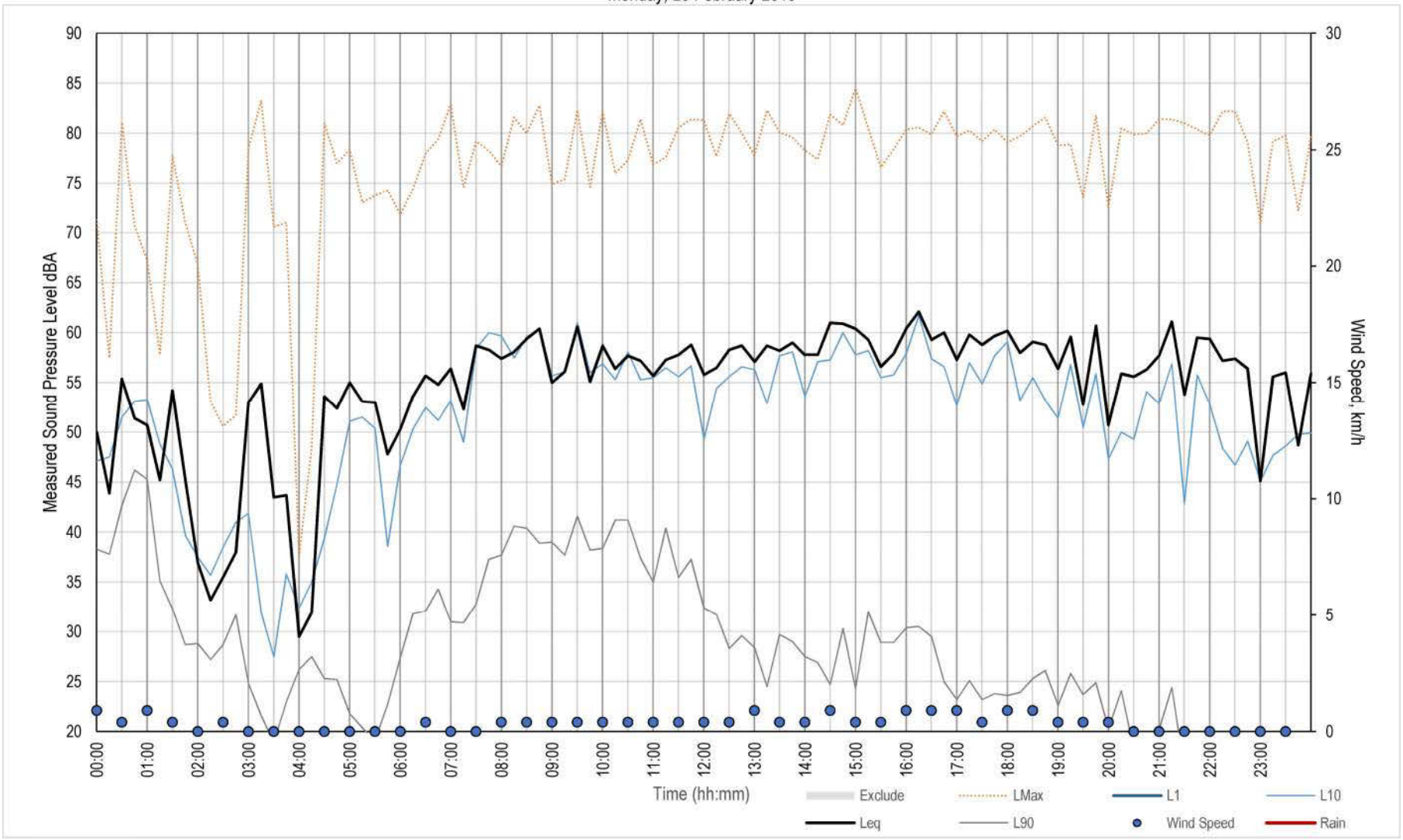
Measured Noise Levels - NM06

Sunday, 24 February 2019



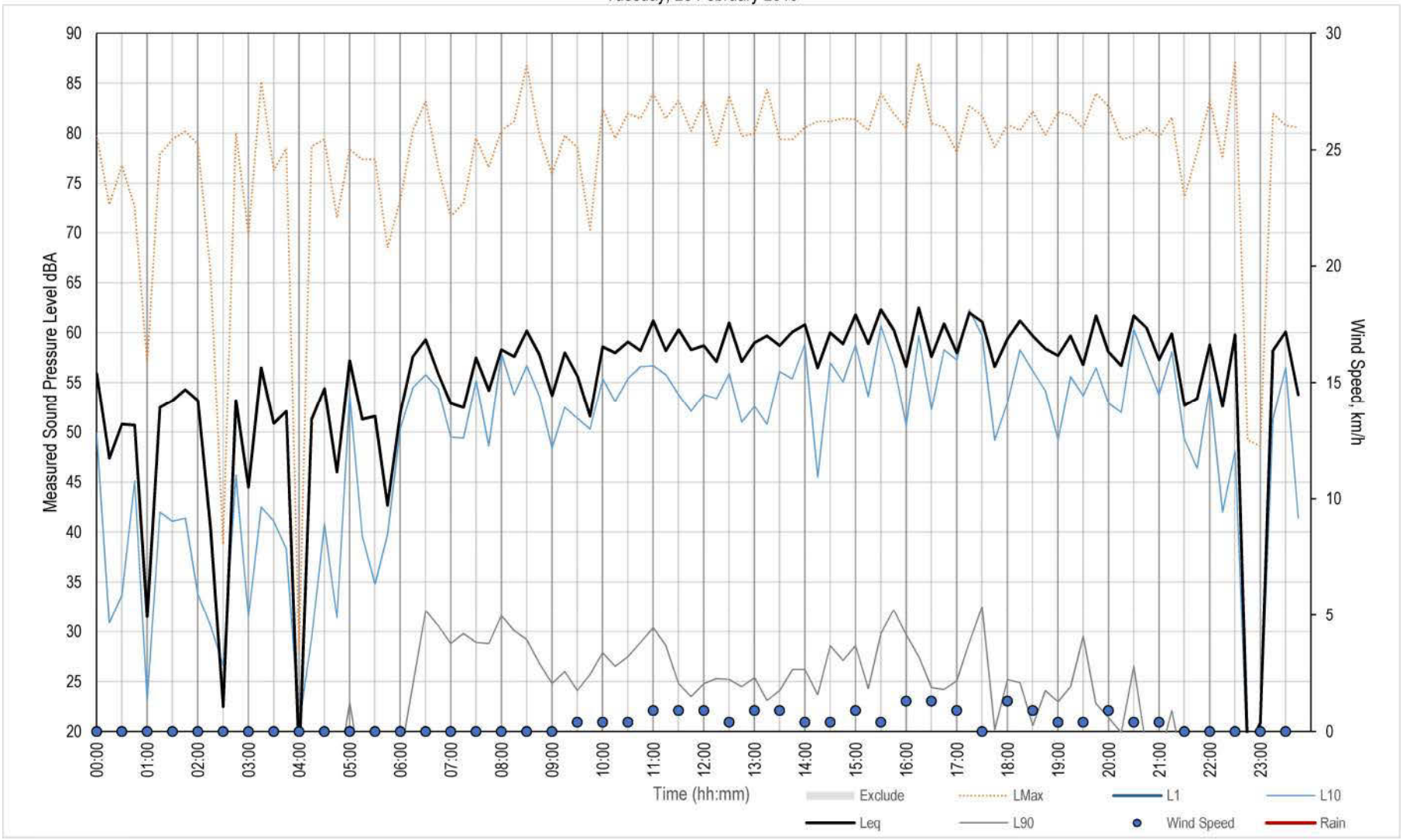
Measured Noise Levels - NM06

Monday, 25 February 2019



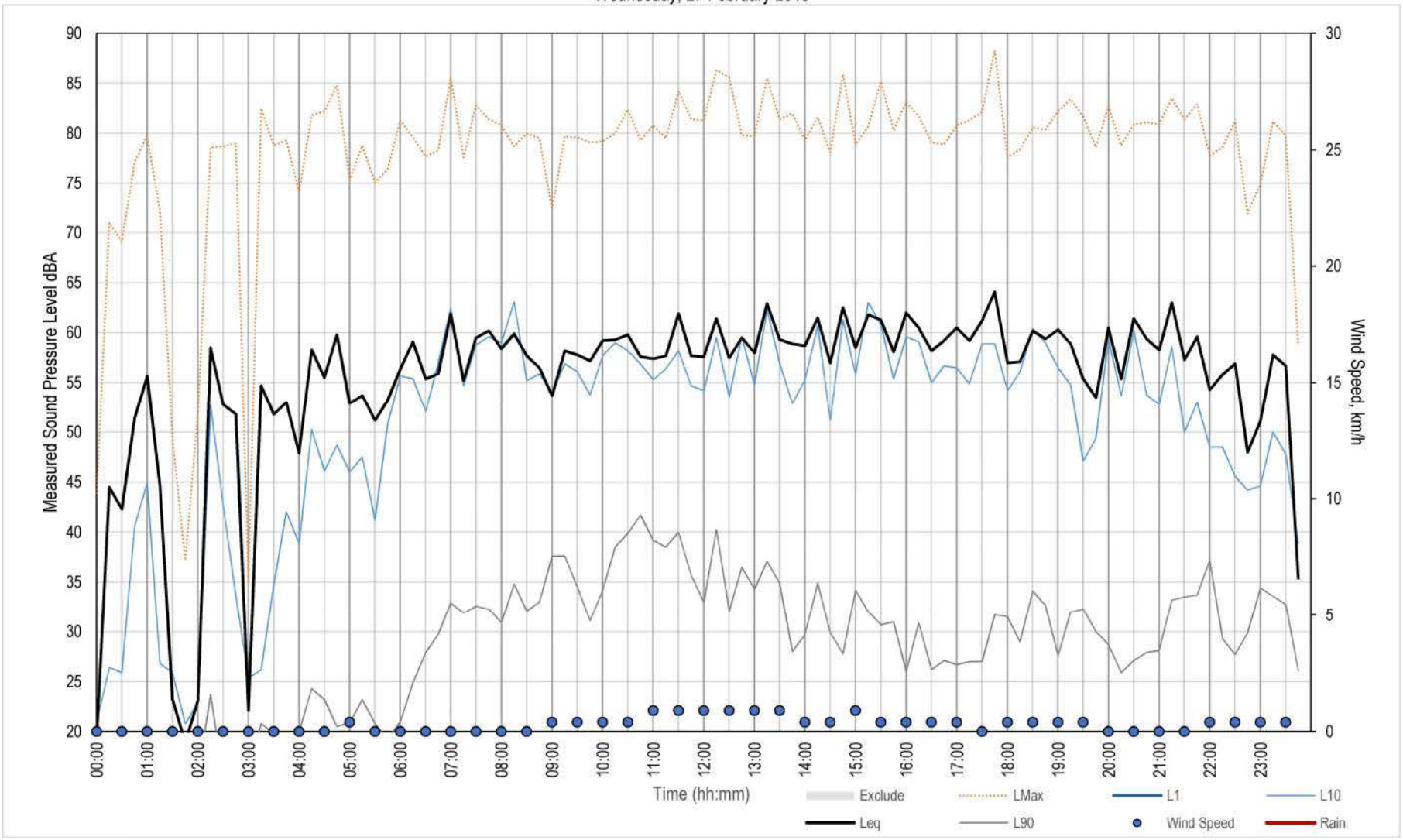
Measured Noise Levels - NM06

Tuesday, 26 February 2019



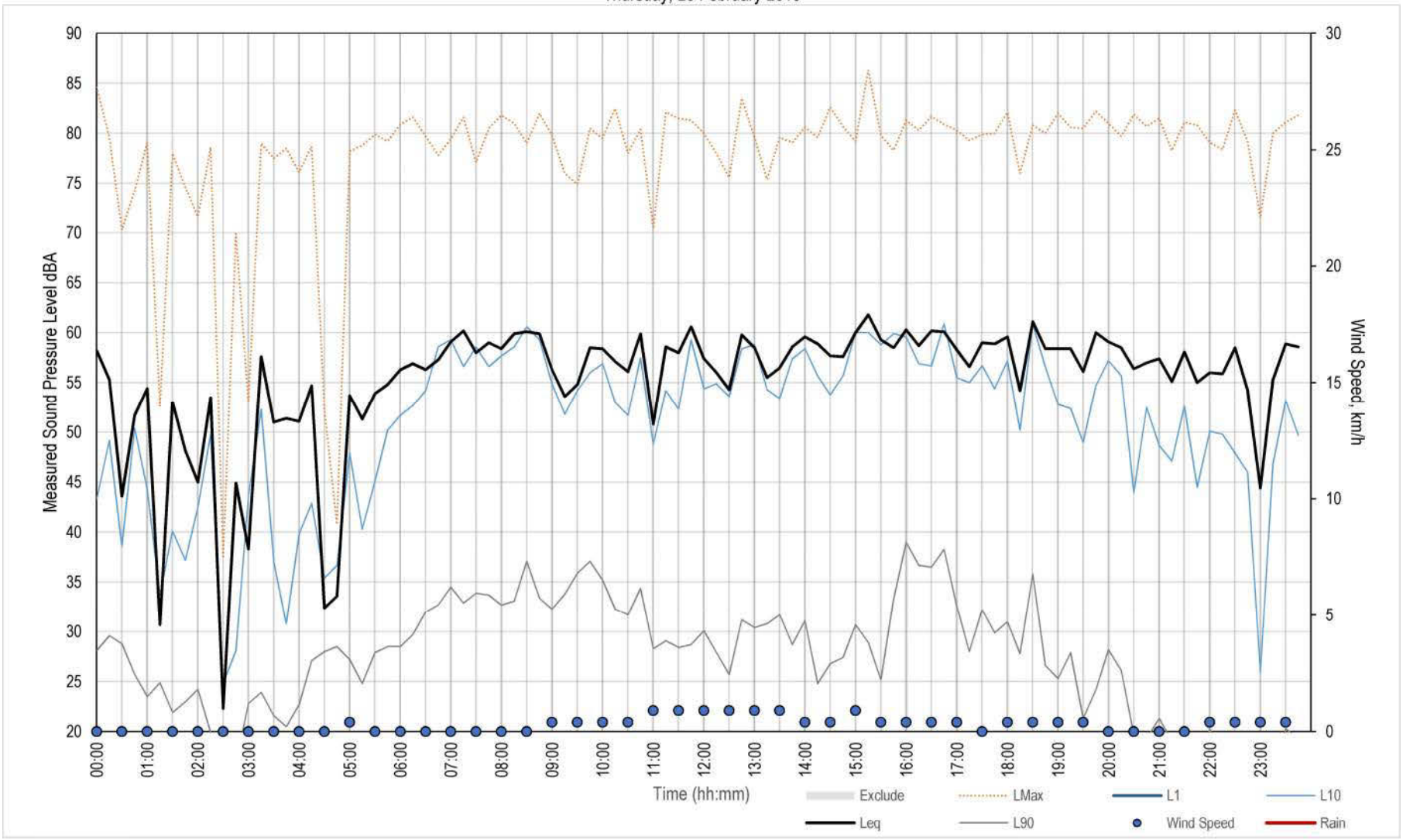
Measured Noise Levels - NM06

Wednesday, 27 February 2019



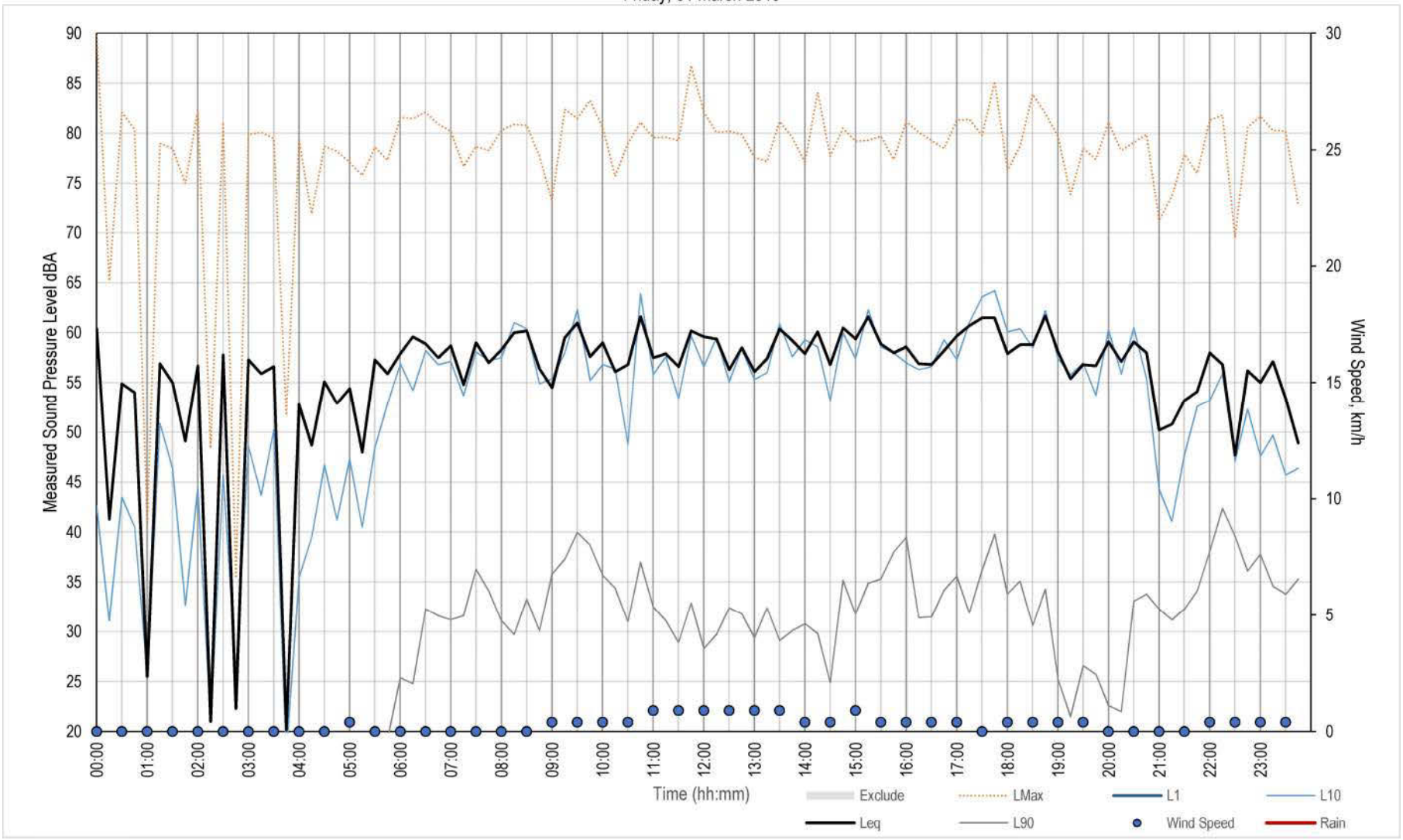
Measured Noise Levels - NM06

Thursday, 28 February 2019



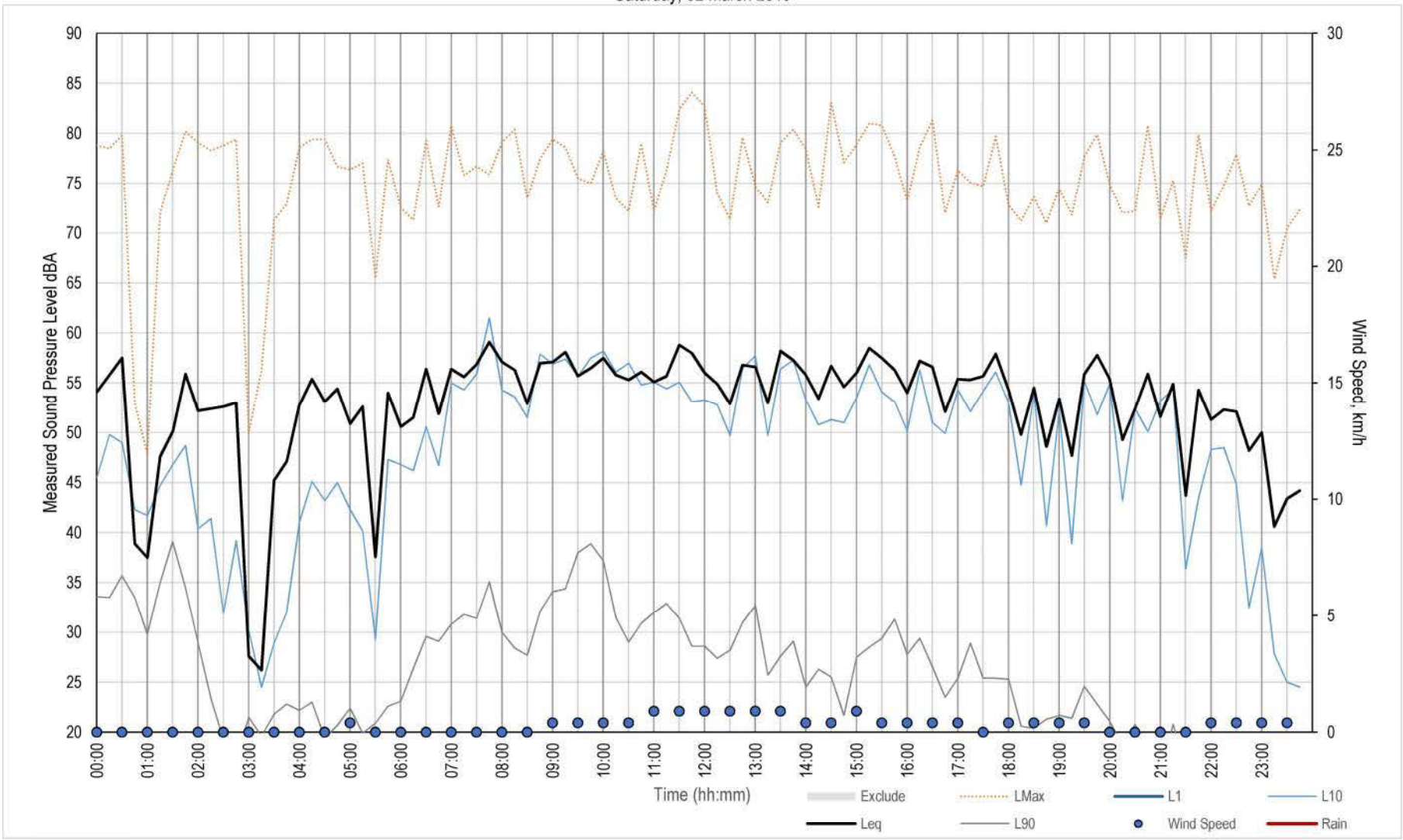
Measured Noise Levels - NM06

Friday, 01 March 2019



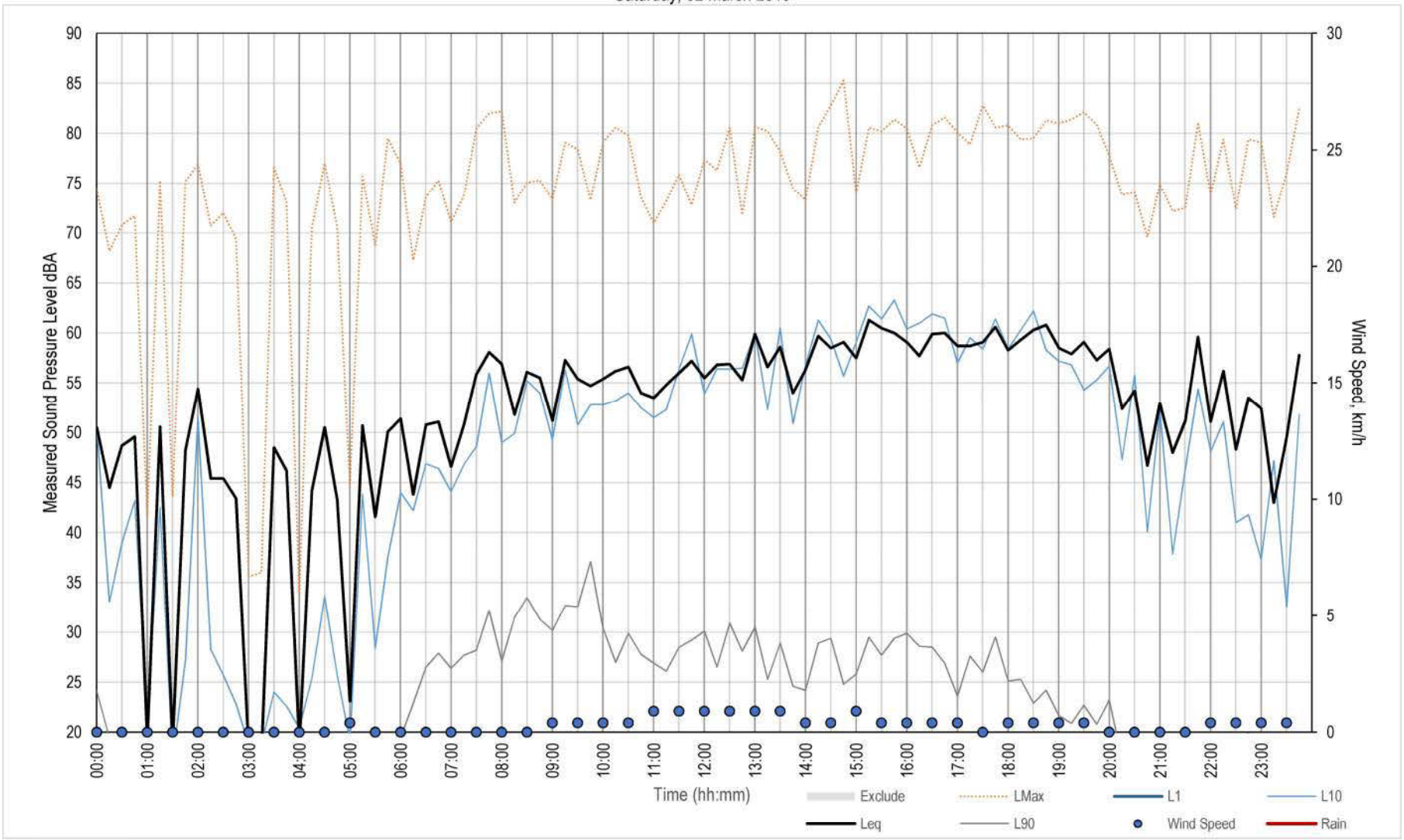
Measured Noise Levels - NM06

Saturday, 02 March 2019



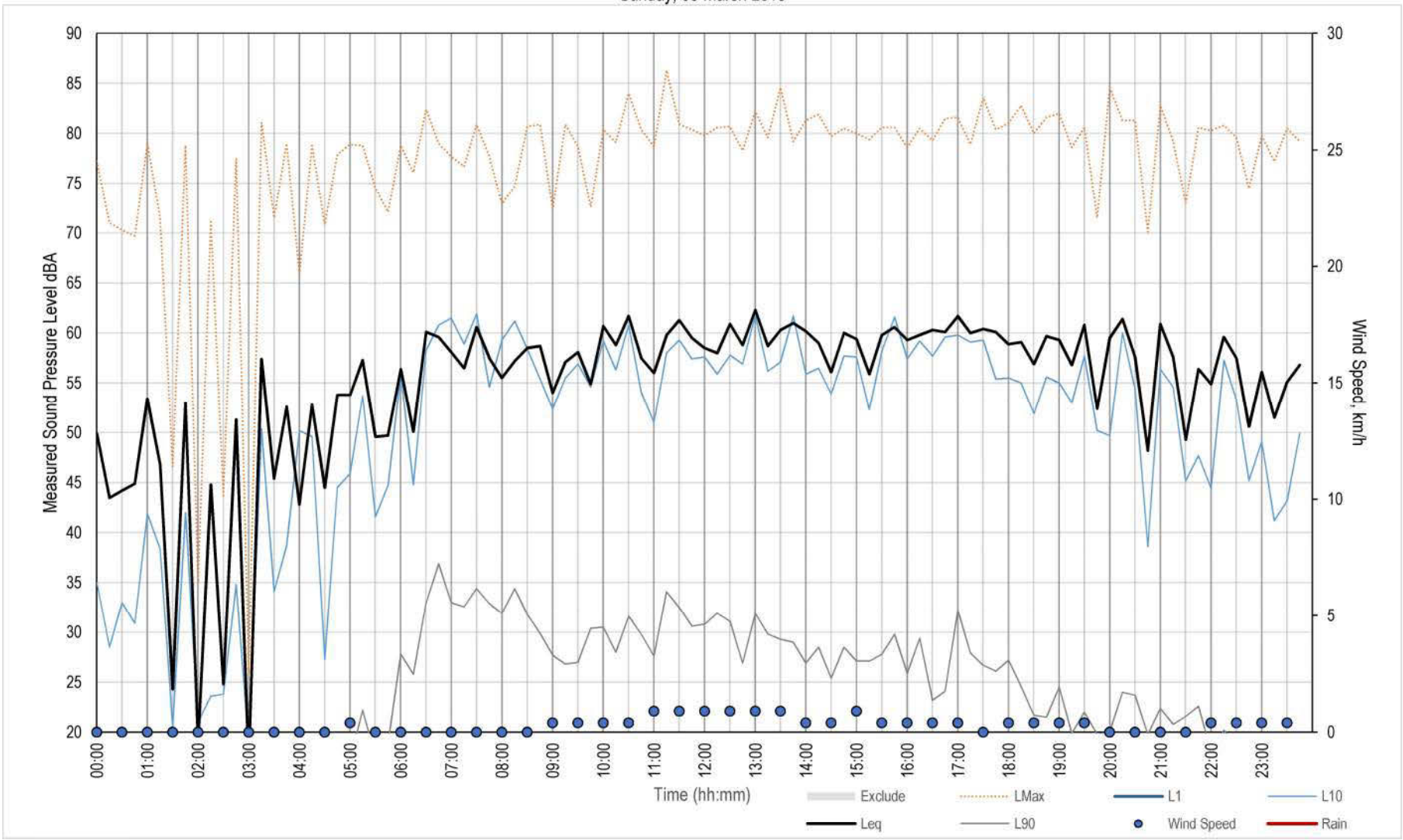
Measured Noise Levels - NM06

Saturday, 02 March 2019



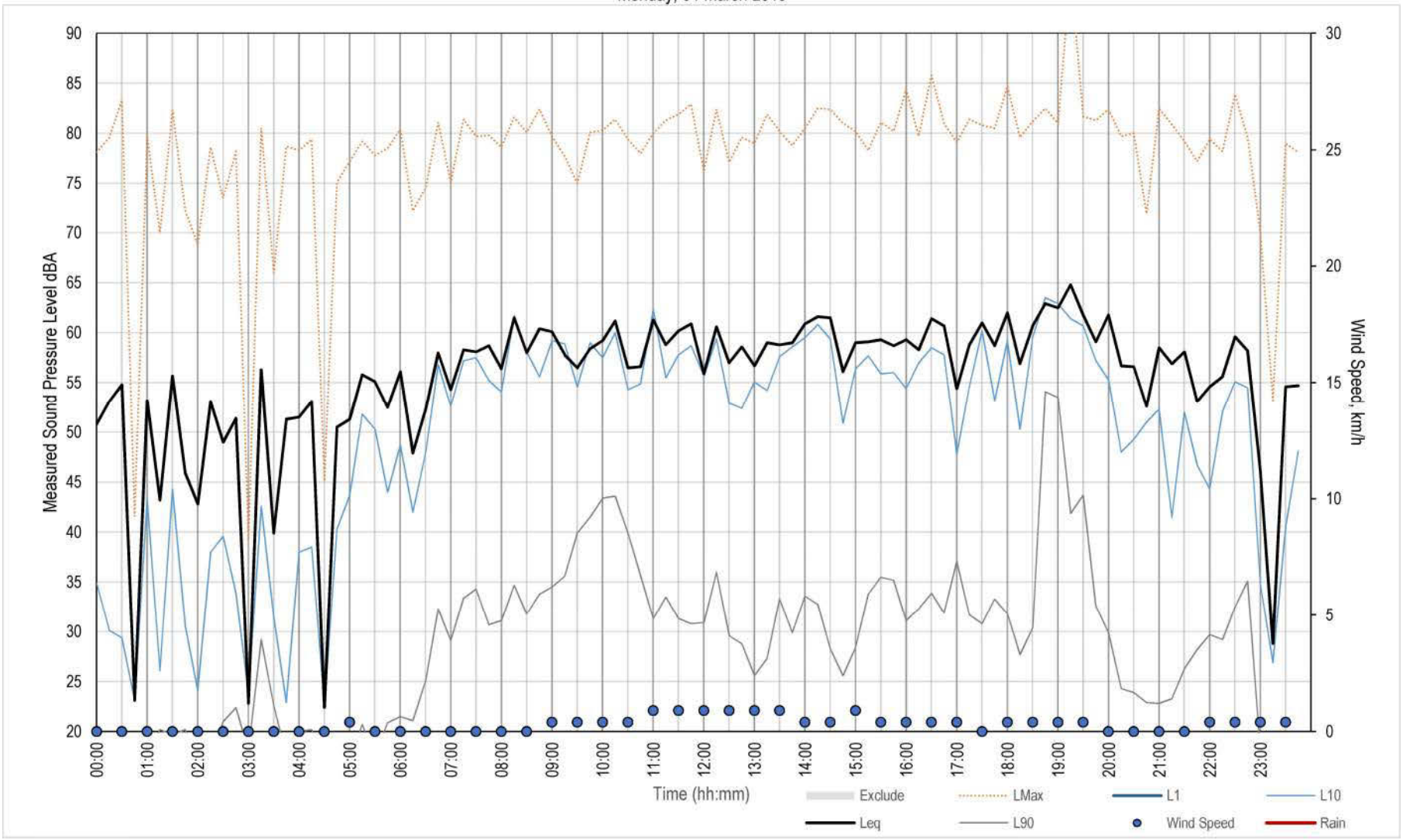
Measured Noise Levels - NM06

Sunday, 03 March 2019



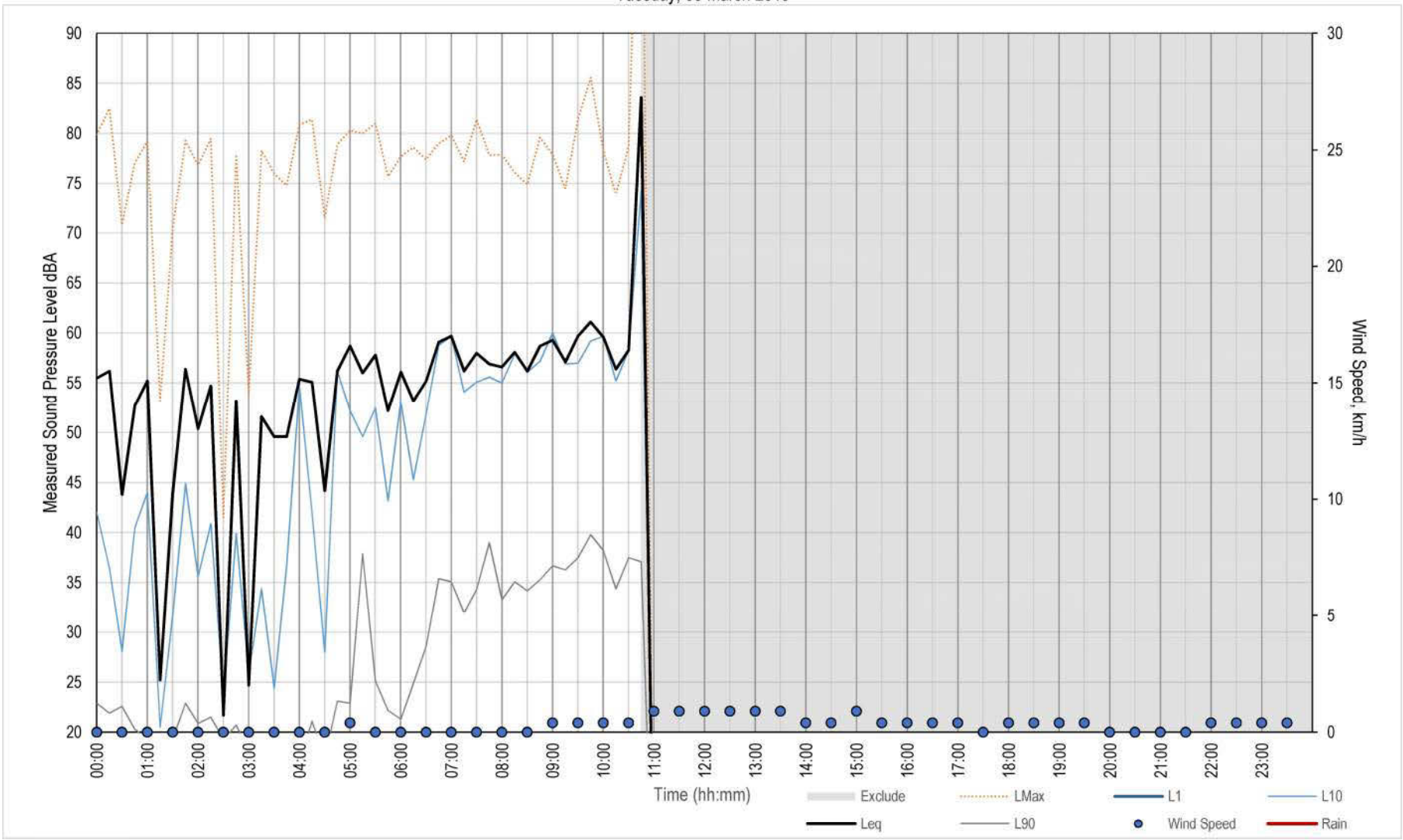
Measured Noise Levels - NM06

Monday, 04 March 2019



Measured Noise Levels - NM06

Tuesday, 05 March 2019



TECHNICAL REPORT

8

Construction Noise and Vibration Impact

Appendix C Predicted construction noise levels

The formatting within the construction noise assessment table indicates the following:

- The orange shaded sections show exceedances of the standard-hours day period.
- The yellow shaded sections show exceedances of the out-of-hours day period.
- The green shaded sections show exceedances of the out-of-hours evening and night period.
- The sections with red text show exceedances of highly noise affected noise management levels.

The formatting within the maximum noise level table indicates the following.

- The blue shaded sections show exceedances of the RBL + 15 criteria.

			Noise management levels - Leq, 15 minute (dBA)			Sleep disturbance - Lmax (dBA)		Predicted construction noise levels - Leq, 15 minute (dBA)								Maximum noise levels - Lmax (dBA)							
Section	Lot and DP number	Receiver type	Standard Hours	Out-of-hours - day	Out-of-hours - evening and night	RBL + 15	Lmax	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Section 1	87DP751398	RES	45	40	35	45	65	44	44	56	<30	44	50	45	42	52	52	64	<30	52	58	53	50
Section 1	10DP1048423	RES	45	40	35	45	65	50	50	62	<30	50	56	39	48	58	58	70	<30	58	64	47	56
Section 1	1DP620958	RES	45	40	35	45	65	46	46	58	<30	46	52	41	44	54	54	66	<30	54	60	49	52
Section 1	1DP939264	RES	45	40	35	45	65	44	42	56	<30	44	50	38	42	52	50	64	<30	52	58	46	50
Section 2	132DP751398	RES	45	40	35	45	65	31	<30	43	<30	31	37	<30	<30	39	<30	51	<30	39	45	<30	37
Section 2	1DP622895	RES	45	40	35	45	65	39	34	51	<30	39	45	37	37	47	42	59	<30	47	53	45	45
Section 2	781DP1179747	RES	45	40	35	45	65	<30	<30	42	<30	<30	36	33	<30	38	38	50	<30	38	44	41	36
Section 2	32DP751398	RES	45	40	35	45	65	37	33	49	<30	37	43	36	35	45	41	57	<30	45	51	44	43
Section 2	1DP421409	RES	45	40	35	45	65	37	37	50	<30	37	43	41	35	45	45	58	<30	45	51	49	43
Section 3	54DP751396	RES	45	40	35	45	65	42	42	54	<30	42	48	39	40	50	50	62	<30	50	56	47	48
Section 3	2DP610833	RES	45	40	35	45	65	47	47	59	<30	47	53	42	45	55	55	67	<30	55	61	50	53
Section 3	3DP591854	RES	45	40	35	45	65	33	32	45	36	33	39	35	31	41	40	53	44	41	47	43	39
Section 3	1DP567950	RES	45	40	35	45	65	36	36	48	36	36	42	37	34	44	44	56	44	44	50	45	42
Section 3	187DP751396	RES	45	40	35	45	65	34	34	47	34	34	40	38	32	42	42	55	42	42	48	46	40
Section 3	303DP751401	RES	45	40	35	45	65	45	42	57	49	45	51	48	43	53	50	65	57	53	59	56	51
Section 3	184DP751396	RES	45	40	35	45	65	40	39	52	39	40	46	43	38	48	47	60	47	48	54	51	46
Section 4	275DP750598	RES	45	40	35	45	65	32	32	44	35	32	38	35	<30	40	40	52	43	40	46	43	38
Section 4	25DP751401	RES	45	40	35	45	65	41	42	56	45	41	47	47	39	49	50	64	53	49	55	55	47
Section 4	2DP751401	RES	45	40	35	45	65	36	36	48	41	36	42	39	34	44	44	56	49	44	50	47	42
Section 4	22DP750598	RES	45	40	35	45	65	44	35	56	46	44	50	42	42	52	43	64	54	52	58	50	50
Section 4	298DP751401	RES	45	40	35	45	65	36	33	48	39	36	42	38	34	44	41	56	47	44	50	46	42
Section 4	168DP750598	RES	45	40	35	45	65	34	37	46	<30	34	40	37	32	42	45	54	<30	42	48	45	40
Section 5	275DP750619	RES	45	40	35	45	65	35	32	47	<30	35	41	36	33	43	40	55	<30	43	49	44	41
Section 5	22DP618553	RES	45	40	35	45	65	38	32	50	<30	38	44	41	36	46	40	58	<30	46	52	49	44
Section 5	CDP32837	RES	45	40	35	45	65	39	43	51	36	39	45	42	37	47	51	59	44	47	53	50	45
Section 5	273DP750619	RES	45	40	35	45	65	36	34	48	<30	36	42	37	34	44	42	56	<30	44	50	45	42
Section 5	2DP869982	RES	45	40	35	45	65	34	31	46	<30	34	40	36	32	42	39	54	<30	42	48	44	40
Section 5	2DP789254	RES	45	40	35	45	65	44	39	55	36	39	45	46	42	52	47	63	44	47	53	54	50
Section 5	BDP172780	RES	45	40	35	45	65	37	37	49	<30	37	43	40	35	45	45	57	<30	45	51	48	43
Section 5	1DP581864	RES	45	40	35	45	65	40	41	52	<30	40	46	43	38	48	49	60	<30	48	54	51	46
Section 6	11DP758928	RES	45	40	35	45	65	44	33	51	36	39	45	39	42	52	41	59	44	47	53	47	50
Section 6	14DP758928	RES	45	40	35	45	65	54	42	65	40	53	59	52	52	62	50	73	48	61	67	60	60
Section 6	274DP750636	RES	45	40	35	45	65	44	35	51	<30	39	45	40	42	52	43	59	<30	47	53	48	50
Section 6	2DP758928	RES	45	40	35	45	65	79	38	57	36	45	51	43	77	87	46	65	44	53	59	51	85
Section 6	234DP750619	RES	45	40	35	45	65	34	<30	45	36	33	39	36	32	42	38	53	44	41	47	44	40
Section 6	247DP750619	RES	45	40	35	45	65	43	40	54	43	41	47	45	41	51	48	62	51	49	55	53	49
Section 6	226DP750619	RES	45	40	35	45	65	51	40	62	41	50	56	50	49	59	48	70	49	58	64	58	57
Section 6	12DP758928	RES	45	40	35	45	65	52	40	63	40	51	57	51	50	60	48	71	48	59	65	59	58
Section 6	88DP750619	RES	45	40	35	45	65	46	34	51	34	39	45	40	44	54	42	59	42	47	53	48	52
Section 6	158DP750619	RES	45	40	35	45	65	49	37	57	38	45	51	45	47	57	45	65	46	53	59	53	55
Section 6	2DP321060	RES	45	40	35	45	65	51	41	61	41	49	55	49	49	59	49	69	49	57	63	57	57
Section 6	2DP321060	RES	45	40	35	45	65	49	38	58	38	46	52	45	47	57	46	66	46	54	60	53	55
Section 6	264DP750619	RES	45	40	35	45	65	39	31	48	35	36	42	38	37	47	39	56	43	44	50	46	45
Section 6	213DP750619	RES	45	40	35	45	65	46	41	57	46	44	50	48	44	54	49	65	54	52	58	56	52
Section 6	13DP758928	RES	45	40	35	45	65	55	43	65	40	53	59	52	53	63	51	73	48	61	67	60	61
Section 6	15DP758928	RES	45	40	35	45	65	52	40	60	37	48	54	47	50	60	48	68	45	56	62	55	58
Section 6	131DP750619	RES	45	40	35	45	65	64	36	55	34	43	49	39	62	72	44	63	42	51	57	47	70
Section 6	5DP758928	RES	45	40	35	45	65	45	33	51	36	39	45	40	43	53	41	59	44	47	53	48	51
Section 6	1DP758928	RES	45	40	35	45	65	45	35	52	36	40	46	41	43	53	43	60	44	48	54	49	51
Section 6	3DP758928	RES	45	40	35	45	65	43	34	51	36	39	45	40	41	51	42	59	44	47	53	48	49
Section 6	221DP750619	RES	45	40	35	45	65	48	41	59	40	47	53	49	46	56	49	67	48	55	61	57	54
Section 6	218DP750619	RES	45	40	35	45	65	48	41	59	42	47	53	50	46	56	49	67	50	55	61	58	54
Section 6	5DP758928	RES	45	40	35	45	65	46	33	49	38	37	43	37	44	54	41	57	46	45	51	45	52
Section 6	1DP387157	RES	45	40	35	45	65	43	32	48	38	36	42	38	41	51	40	56	46	44	50	46	49
Section 6	6DP758928	RES	45	40	35	45	65	42	33	50	35	38	44	39	40	50	41	58	43	46	52	47	48
Section 6	ADP326032	RES	45	40	35	45	65	53	35	53	37	41	47	42	51	61	43	61	45	49	55	50	59
Section 6	1DP231593	RES	45	40	35	45	65	57	38	59	37	47	53	41	55	65	46	67	45	55	61	49	63

			Noise management levels - Leq, 15 minute (dBA)			Sleep disturbance - Lmax (dBA)		Predicted construction noise levels - Leq, 15 minute (dBA)								Maximum noise levels - Lmax (dBA)							
Section	Lot and DP number	Receiver type	Standard Hours	Out-of-hours - day	Out-of-hours - evening and night	RBL + 15	Lmax	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Section 6	126DP750619	RES	45	40	35	45	65	51	35	52	35	40	46	41	49	59	43	60	43	48	54	49	57
Section 6	229DP750619	RES	45	40	35	45	65	52	39	62	42	50	56	48	50	60	47	70	50	58	64	56	58
Section 6	64DP1172415	RES	45	40	35	45	65	60	43	67	43	52	58	58	58	68	51	75	51	60	66	66	66
Section 6	217DP750619	RES	45	40	35	45	65	46	42	57	45	44	50	48	44	54	50	65	53	52	58	56	52
Section 6	205DP750619	RES	45	40	35	45	65	35	<30	48	37	35	41	39	33	43	38	56	45	43	49	47	41
Section 6	15DP758928	RES	45	40	35	45	65	55	42	63	38	51	57	47	53	63	50	71	46	59	65	55	61
Section 6	255DP750619	RES	45	40	35	45	65	45	41	56	43	43	49	47	43	53	49	64	51	51	57	55	51
Section 6	280DP750619	RES	45	40	35	45	65	42	32	49	34	37	43	38	40	50	40	57	42	45	51	46	48
Section 6	125DP750619	RES	45	40	35	45	65	44	35	52	37	40	46	41	42	52	43	60	45	48	54	49	50
Section 6	220DP750619	RES	45	40	35	45	65	45	41	56	43	44	50	47	43	53	49	64	51	52	58	55	51
Section 6	218DP750619	RES	45	40	35	45	65	47	39	59	41	47	53	47	45	55	47	67	49	55	61	55	53
Section 6	124DP750619	RES	45	40	35	45	65	42	34	51	39	39	45	40	40	50	42	59	47	47	53	48	48
Section 6	224DP750619	RES	45	40	35	45	65	54	43	64	42	51	57	55	52	62	51	72	50	59	65	63	60
Section 6	7DP758928	RES	45	40	35	45	65	58	41	67	42	55	61	50	56	66	49	75	50	63	69	58	64
Section 6	1DP1107210	RES	45	40	35	45	65	44	35	52	38	40	46	41	42	52	43	60	46	48	54	49	50
Section 6	2DP1107210	RES	45	40	35	45	65	43	35	52	38	40	46	41	41	51	43	60	46	48	54	49	49
Section 6	1DP758928	RES	45	40	35	45	65	45	34	51	35	39	45	40	43	53	42	59	43	47	53	48	51
Section 6	1DP321060	RES	45	40	35	45	65	48	38	58	39	46	52	46	46	56	46	66	47	54	60	54	54
Section 6	ADP326032	RES	45	40	35	45	65	49	35	54	35	42	48	42	47	57	43	62	43	50	56	50	55
Section 6	5DP758928	RES	45	40	35	45	65	50	35	53	35	41	47	41	48	58	43	61	43	49	55	49	56
Section 6	128DP750619	RES	45	40	35	45	65	48	35	53	35	41	47	41	46	56	43	61	43	49	55	49	54
Section 6	16DP758928	RES	45	40	35	45	65	52	39	61	39	49	55	47	50	60	47	69	47	57	63	55	58
Section 6	9DP758928	RES	45	40	35	45	65	57	36	55	38	43	49	46	55	65	44	63	46	51	57	54	63
Section 6	11DP758928	RES	45	40	35	45	65	74	40	61	37	49	55	46	72	82	48	69	45	57	63	54	80
Section 6	8DP758928	RES	45	40	35	45	65	74	39	60	37	48	54	45	72	82	47	68	45	56	62	53	80
Section 6	131DP750619	RES	45	40	35	45	65	55	36	54	35	42	48	42	53	63	44	62	43	50	56	50	61
Section 6	1DP321059	RES	45	40	35	45	65	49	38	58	38	46	52	45	47	57	46	66	46	54	60	53	55
Section 6	5DP758928	RES	45	40	35	45	65	46	34	52	35	40	46	41	44	54	42	60	43	48	54	49	52
Section 6	6DP758928	RES	45	40	35	45	65	67	43	68	42	54	60	59	65	75	51	76	50	62	68	67	73
Section 6	6DP758928	RES	45	40	35	45	65	53	36	55	39	43	49	43	51	61	44	63	47	51	57	51	59
Section 6	7DP758928	RES	45	40	35	45	65	72	41	70	41	58	64	54	70	80	49	78	49	66	72	62	78
Section 6	6DP758928	RES	45	40	35	45	65	55	39	58	39	46	52	45	53	63	47	66	47	54	60	53	61
Section 6	5DP758928	RES	45	40	35	45	65	77	43	68	41	56	62	58	75	85	51	76	49	64	70	66	83
Section 6	231DP750619	RES	45	40	35	45	65	51	39	59	42	46	52	50	49	59	47	67	50	54	60	58	57
Section 6	4DP758928	RES	45	40	35	45	65	42	33	50	35	38	44	39	40	50	41	58	43	46	52	47	48
Section 6	5DP758928	RES	45	40	35	45	65	57	37	55	40	43	49	44	55	65	45	63	48	51	57	52	63
Section 6	12DP971277	RES	45	40	35	45	65	53	36	54	36	42	48	42	51	61	44	62	44	50	56	50	59
Section 6	266DP750619	RES	45	40	35	45	65	34	<30	46	<30	34	40	35	32	42	<30	54	<30	42	48	43	40
Section 6	1DP826752	RES	45	40	35	45	65	42	38	53	42	39	45	44	40	50	46	61	50	47	53	52	48
Section 6	2DP826752	RES	45	40	35	45	65	40	37	52	43	40	46	41	38	48	45	60	51	48	54	49	46
Section 6	6DP758928	RES	45	40	35	45	65	52	40	59	37	47	53	45	50	60	48	67	45	55	61	53	58
Section 6	1DP247142	RES	45	40	35	45	65	39	31	47	36	35	41	37	37	47	39	55	44	43	49	45	45
Section 6	4DP758928	RES	45	40	35	45	65	39	32	49	35	37	43	38	37	47	40	57	43	45	51	46	45
Section 6	256DP750619	RES	45	40	35	45	65	45	41	56	44	43	49	47	43	53	49	64	52	51	57	55	51
Section 6	279DP750619	RES	45	40	35	45	65	36	31	48	36	36	42	38	34	44	39	56	44	44	50	46	42
Section 6	5DP758928	RES	45	40	35	45	65	41	34	49	37	37	43	38	39	49	42	57	45	45	51	46	47
Section 6	194DP750636	RES	45	40	35	45	65	44	33	50	33	38	44	38	42	52	41	58	41	46	52	46	50
Section 6	10DP758928	RES	45	40	35	45	65	75	39	60	37	48	54	45	73	83	47	68	45	56	62	53	81
Section 6	223DP750619	RES	45	40	35	45	65	52	41	62	42	49	55	53	50	60	49	70	50	57	63	61	58
Section 6	2DP758928	RES	45	40	35	45	65	64	42	69	41	57	63	54	62	72	50	77	49	65	71	62	70
Section 6	1DP758928	RES	45	40	35	45	65	44	34	51	38	39	45	40	42	52	42	59	46	47	53	48	50
Section 6	1DP537977	RES	45	40	35	45	65	53	46	64	47	49	55	55	51	61	54	72	55	57	63	63	59
Section 6	ADP314753	RES	45	40	35	45	65	51	37	57	37	45	51	44	49	59	45	65	45	53	59	52	57
Section 6	12DP758928	RES	45	40	35	45	65	52	38	59	38	47	53	40	50	60	46	67	46	55	61	48	58
Section 6	132DP750619	RES	45	40	35	45	65	44	33	56	43	44	50	47	42	52	41	64	51	52	58	55	50
Section 6	1DP816933	RES	45	40	35	45	65	73	41	58	38	46	52	44	71	81	49	66	46	54	60	52	79
Section 6	2DP758928	RES	45	40	35	45	65	75	40	63	38	51	57	47	73	83	48	71	46	59	65	55	81

			Noise management levels - Leq, 15 minute (dBA)			Sleep disturbance - Lmax (dBA)		Predicted construction noise levels - Leq, 15 minute (dBA)								Maximum noise levels - Lmax (dBA)							
Section	Lot and DP number	Receiver type	Standard Hours	Out-of-hours - day	Out-of-hours - evening and night	RBL + 15	Lmax	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Section 6	225DP750619	RES	45	40	35	45	65	51	41	61	41	49	55	51	49	59	49	69	49	57	63	59	57
Section 6	230DP750619	RES	45	40	35	45	65	49	41	60	42	48	54	49	47	57	49	68	50	56	62	57	55
Section 6	2DP667929	RES	45	40	35	45	65	47	35	51	35	39	45	38	45	55	43	59	43	47	53	46	53
Section 6	254DP750619	RES	45	40	35	45	65	45	40	56	43	43	49	47	43	53	48	64	51	51	57	55	51
Section 6	213DP750619	RES	45	40	35	45	65	50	42	61	44	48	54	52	48	58	50	69	52	56	62	60	56
Section 6	201DP750619	RES	45	40	35	45	65	48	38	55	37	43	49	45	46	56	46	63	45	51	57	53	54
Section 6	1DP816933	RES	45	40	35	45	65	76	34	58	37	46	52	44	74	84	42	66	45	54	60	52	82
Section 6	282DP750619	RES	45	40	35	45	65	35	<30	47	35	35	41	37	33	43	<30	55	43	43	49	45	41
Section 6	8DP758928	RES	45	40	35	45	65	45	34	52	36	40	46	41	43	53	42	60	44	48	54	49	51
Section 6	228DP750619	RES	45	40	35	45	65	50	40	61	40	49	55	49	48	58	48	69	48	57	63	57	56
Section 6	4DP758928	RES	45	40	35	45	65	75	38	57	39	45	51	44	73	83	46	65	47	53	59	52	81
Section 6	6DP758928	RES	45	40	35	45	65	60	40	58	37	46	52	45	58	68	48	66	45	54	60	53	66
Section 6	1DP522494	RES	45	40	35	45	65	54	37	56	37	44	50	43	52	62	45	64	45	52	58	51	60
Section 6	2DP415006	RES	45	40	35	45	65	48	35	53	36	41	47	41	46	56	43	61	44	49	55	49	54
Section 6	1DP758928	RES	45	40	35	45	65	46	36	54	35	42	48	42	44	54	44	62	43	50	56	50	52
Section 6	1DP758928	RES	45	40	35	45	65	44	35	52	38	40	46	40	42	52	43	60	46	48	54	48	50
Section 6	126DP750619	RES	45	40	35	45	65	48	35	53	35	41	47	41	46	56	43	61	43	49	55	49	54
Section 6	12DP758928	RES	45	40	35	45	65	54	38	60	38	48	54	47	52	62	46	68	46	56	62	55	60
Section 6	252DP750619	RES	45	40	35	45	65	46	42	58	44	45	51	49	44	54	50	66	52	53	59	57	52
Section 6	132DP750619	RES	45	40	35	45	65	46	34	58	45	46	52	49	44	54	42	66	53	54	60	57	52
Section 6	239DP750619	RES	45	40	35	45	65	68	37	58	38	46	52	45	66	76	45	66	46	54	60	53	74
Section 6	118DP750619	RES	45	40	35	45	65	46	34	52	35	40	46	40	44	54	42	60	43	48	54	48	52
Section 6	281DP750619	RES	45	40	35	45	65	33	<30	45	<30	33	39	34	31	41	<30	53	<30	41	47	42	39
Section 6	1DP813819	RES	45	40	35	45	65	45	<30	57	<30	45	51	<30	43	53	<30	65	<30	53	59	<30	51
Section 6	1DP1093937	RES	45	40	35	45	65	50	51	62	55	50	56	50	48	58	59	70	63	58	64	58	56
Section 6	278DP750619	RES	45	40	35	45	65	34	<30	46	<30	34	40	34	32	42	<30	54	<30	42	48	42	40
Section 6	12DP758928	RES	45	40	35	45	65	55	43	63	39	51	57	48	53	63	51	71	47	59	65	56	61
Section 6	11DP758928	RES	45	40	35	45	65	69	43	70	39	58	64	50	67	77	51	78	47	66	72	58	75
Section 6	12DP971277	RES	45	40	35	45	65	53	32	51	35	39	45	39	51	61	40	59	43	47	53	47	59
Section 6	15DP758928	RES	45	40	35	45	65	56	38	57	36	45	51	44	54	64	46	65	44	53	59	52	62
Section 6	15DP758928	RES	45	40	35	45	65	52	40	62	39	50	56	48	50	60	48	70	47	58	64	56	58
Section 6	7300DP1130493	RES	45	40	35	45	65	45	35	52	37	40	46	41	43	53	43	60	45	48	54	49	51
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Section 6	1DP504837	RES	45	40	35	45	65	45	37	54	40	42	48	44	43	53	45	62	48	50	56	52	51
Section 6	233DP750619	RES	45	40	35	45	65	39	34	51	41	39	45	41	37	47	42	59	49	47	53	49	45
Section 6	3DP727946	RES	45	40	35	45	65	52	<30	64	38	52	58	42	50	60	<30	72	46	60	66	50	58
Section 6	Stockinbingal Cemetary	PREC	60	60	35	45	65	43	38	55	46	43	49	42	41	51	46	63	54	51	57	50	49
Section 6	2DP504837	POW	55	55	35	45	65	43	39	55	42	43	49	45	41	51	47	63	50	51	57	53	49
Section 6	1DP758928	POW	55	55	35	45	65	49	36	54	36	42	48	42	47	57	44	62	44	50	56	50	55
Section 6	284DP821011	EDU	55	55	35	45	65	46	35	53	36	41	47	41	44	54	43	61	44	49	55	49	52
Section 6	5DP758928	EDU	55	55	35	45	65	46	33	48	36	36	42	38	44	54	41	56	44	44	50	46	52
Section 6	6DP758928	EDU	55	55	35	45	65	47	35	53	36	41	47	41	45	55	43	61	44	49	55	49	53
Section 6	6DP758928	EDU	55	55	35	45	65	47	35	53	36	41	47	41	45	55	43	61	44	49	55	49	53
Section 6	3DP758928	EDU	55	55	35	45	65	46	35	53	36	41	47	42	44	54	43	61	44	49	55	50	52
Section 6	3DP758928	EDU	55	55	35	45	65	46	35	53	36	41	47	42	44	54	43	61	44	49	55	50	52
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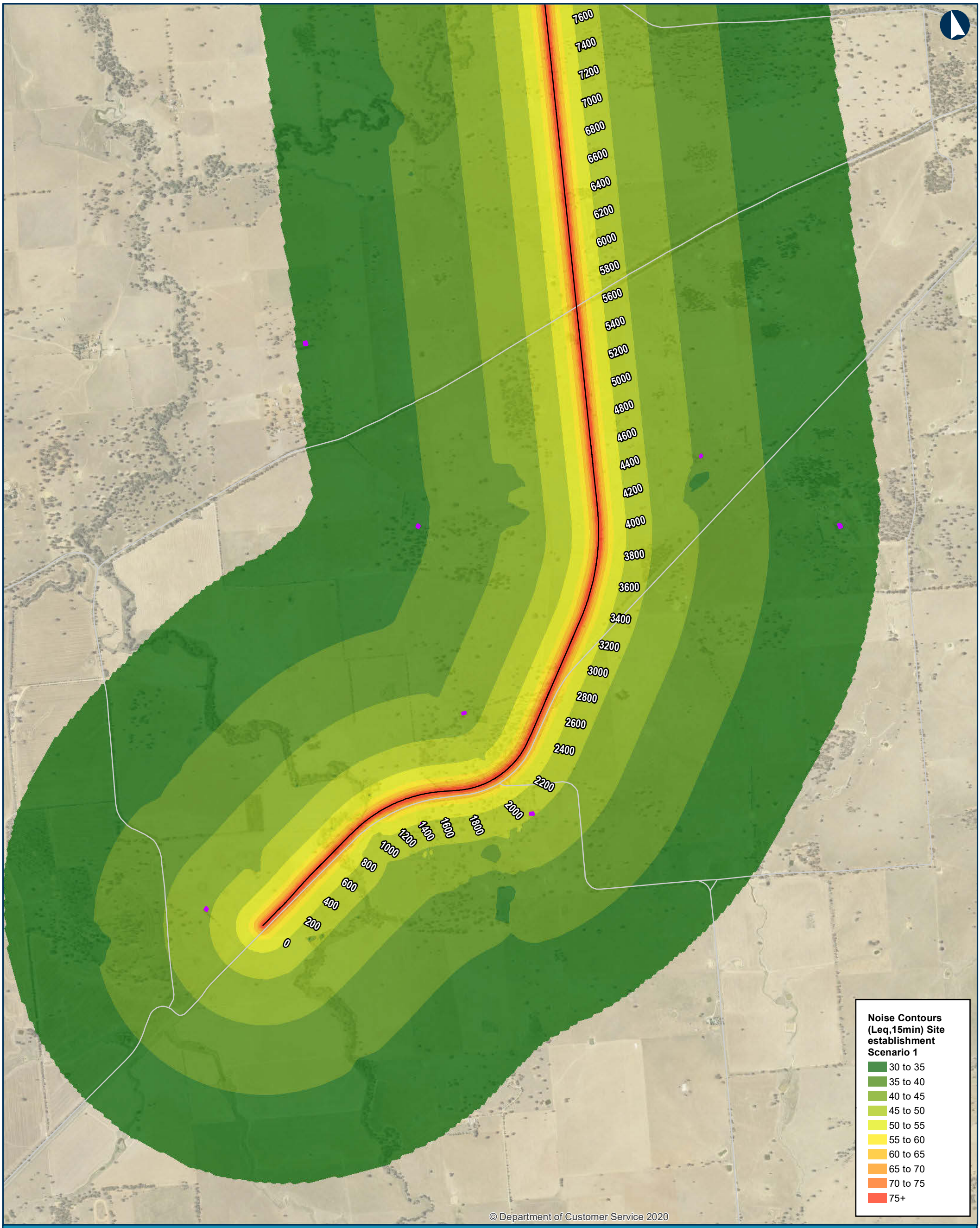
Section 6	6DP758928	EDU	55	55	35	45	65	46	<30	53	36	41	47	35	44	54	38	61	44	49	55	43	52
Section 6	3DP758928	EDU	55	55	35	45	65	46	34	52	36	40	46	40	44	54	42	60	44	48	54	48	52
Section 6	2DP758928	EDU	55	55	35	45	65	47	35	53	36	41	47	42	45	55	43	61	44	49	55	50	53
Section 6	5DP758928	COM	70	70	35	45	65	58	42	67	42	55	61	51	56	66	50	75	50	63	69	59	64
Section 6	2DP335659	COM	70	70	35	45	65	79	37	56	38	44	50	41	77	87	45	64	46	52	58	49	85
Section 6	280DP750619	COM	70	70	35	45	65	43	33	50	34	38	44	39	41	51	41	58	42	46	52	47	49
Section 6	1DP110542	COM	70	70	35	45	65	63	37	57	36	45	51	42	61	71	45	65	44	53	59	50	69
Section 6	1DP335659	COM	70	70	35	45	65	68	37	57	35	45	51	42	66	76	45	65	43	53	59	50	74
Section 6	130DP750619	COM	70	70	35	45	65	53	35	54	35	42	48	41	51	61	43	62	43	50	56	49	59
Section 6	1DP558728	COM	70	70	35	45	65	82	37	56	39	44	50	43	80	90	45	64	47	52	58	51	88
Section 6	6DP758928	COM	70	70	35	45	65	60	38	58	37	46	52	43	58	68	46	66	45	54	60	51	66

Section	Lot and DP number	Receiver type	Noise management levels - Leq, 15 minute (dBA)			Sleep disturbance - Lmax (dBA)		Predicted construction noise levels - Leq, 15 minute (dBA)								Maximum noise levels - Lmax (dBA)							
			Standard Hours	Out-of-hours - day	Out-of-hours - evening and night	RBL + 15	Lmax	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Section 6	2DP1096788	COM	70	70	35	45	65	58	39	61	38	49	55	46	56	66	47	69	46	57	63	54	64
Section 6	2DP231593	COM	70	70	35	45	65	57	40	61	39	49	55	47	55	65	48	69	47	57	63	55	63
Section 6	2DP558728	COM	70	70	35	45	65	61	38	57	39	45	51	45	59	69	46	65	47	53	59	53	67
Section 6	2DP231593	COM	70	70	35	45	65	57	40	61	36	49	55	45	55	65	48	69	44	57	63	53	63
Section 6	129DP750619	COM	70	70	35	45	65	50	32	50	35	34	40	41	48	58	40	58	43	42	48	49	56
Section 6	2DP1096788	COM	70	70	35	45	65	59	41	60	36	48	54	46	57	67	49	68	44	56	62	54	65
Section 6	1DP1080025	COM	70	70	35	45	65	60	37	57	<30	45	51	44	58	68	45	65	38	53	59	52	66
Section 6	2DP335659	COM	70	70	35	45	65	75	37	56	36	44	50	41	73	83	45	64	44	52	58	49	81
Section 6	Stockinbingal Tennis Courts	AREC	65	65	35	45	65	48	35	53	35	41	47	41	46	56	43	61	43	49	55	49	54
Section 6	Stockinbingal Race Course	AREC	65	65	35	45	65	39	32	49	36	37	43	38	37	47	40	57	44	45	51	46	45
Section 6	Stockinbingal Bowling Club	AREC	65	65	35	45	65	56	39	63	39	51	57	47	54	64	47	71	47	59	65	55	62

TECHNICAL REPORT 8

Construction Noise and Vibration Impact

Appendix D Predicted construction noise maps



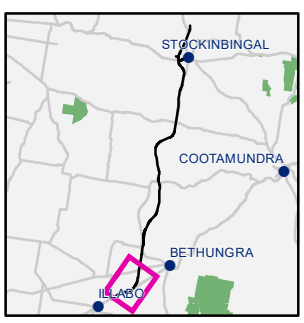
ILLABO TO STOCKINBINGAL Noise contours - Site establishment (Scenario 1)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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

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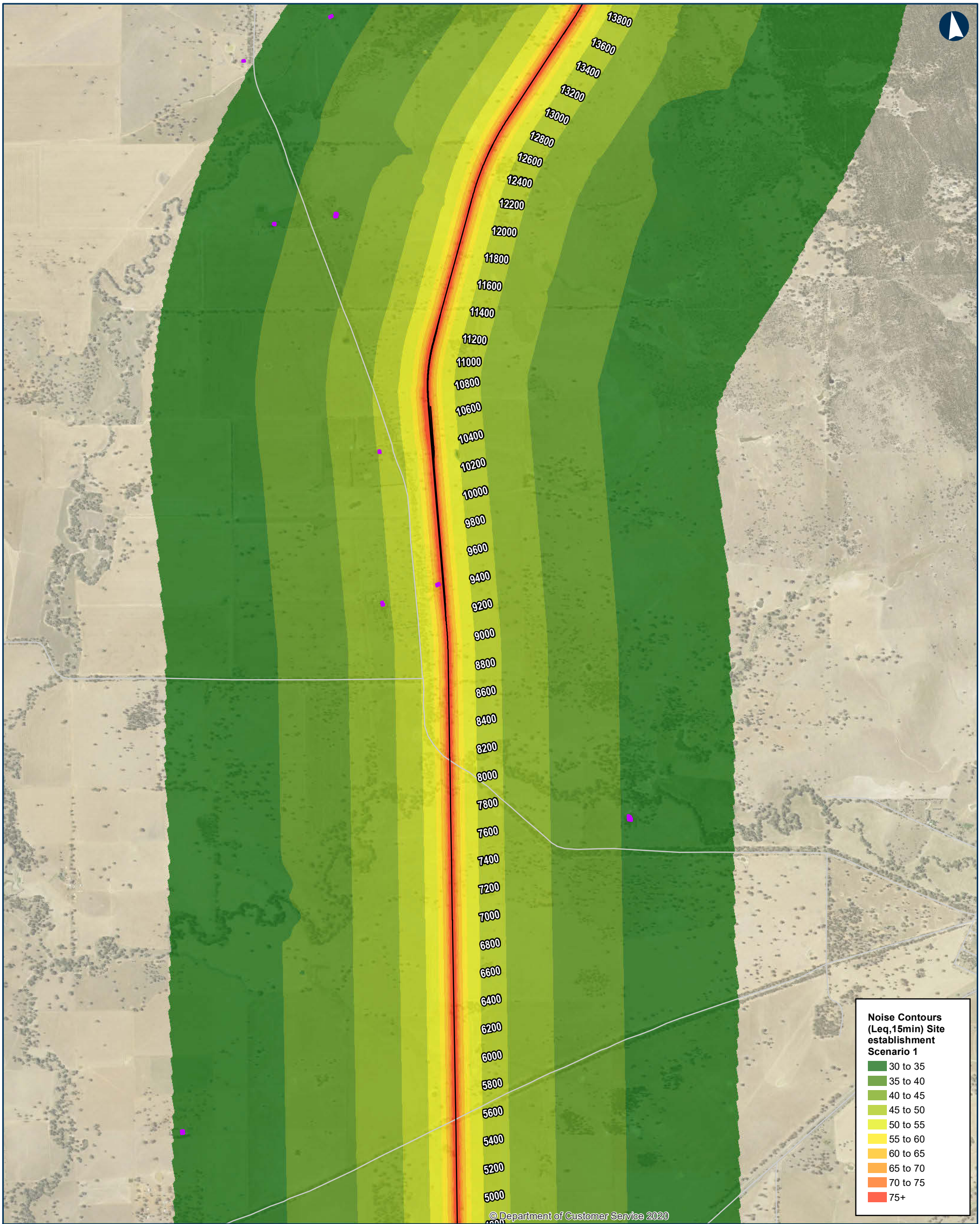


ILLABO TO STOCKINBINGAL

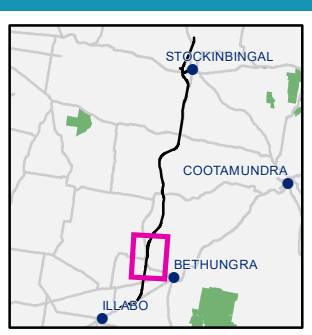
Noise contours - Site establishment (Scenario 1)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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

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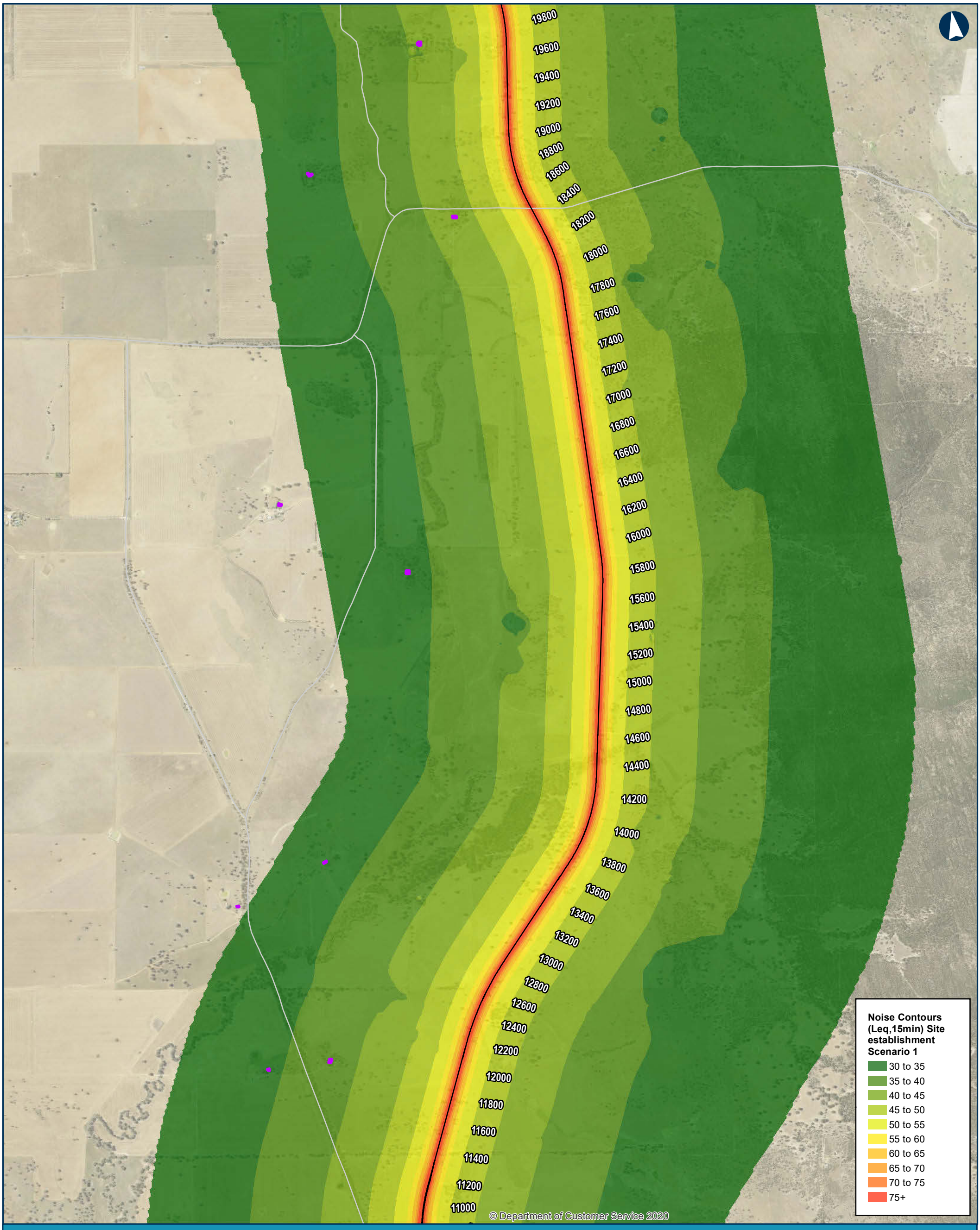


ILLABO TO STOCKINBINGAL

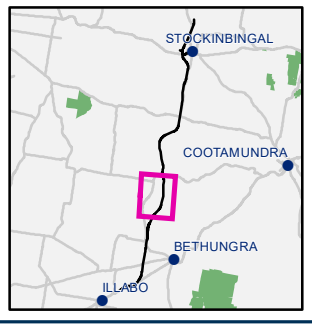
Noise contours - Site establishment (Scenario 1)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

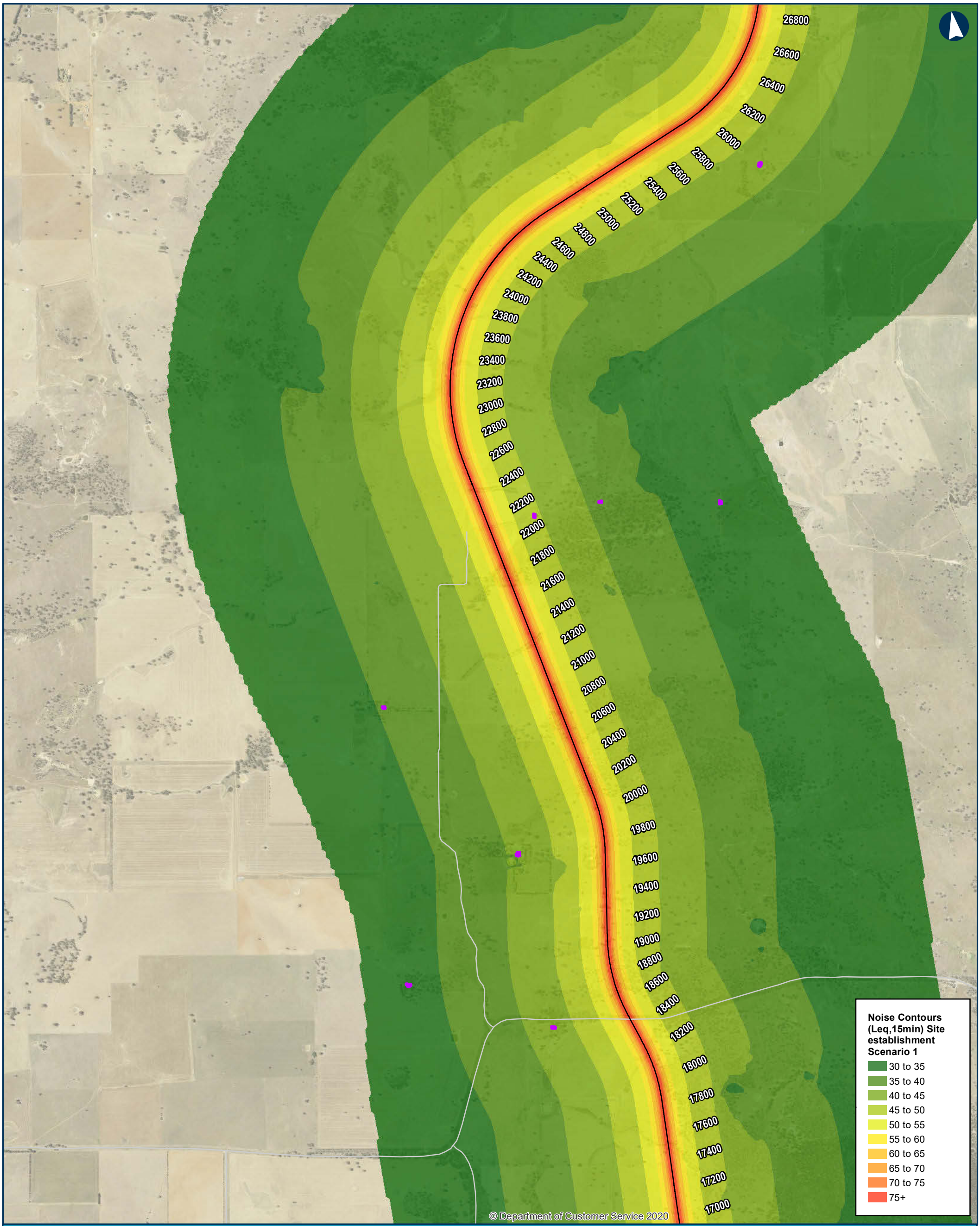
Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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

G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario1_r1v1.mxd



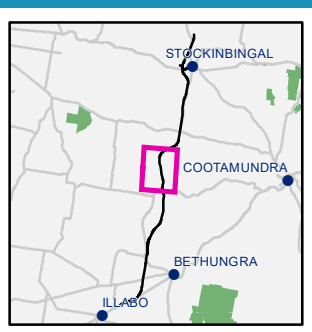
ILLABO TO STOCKINBINGAL Noise contours - Site establishment (Scenario 1)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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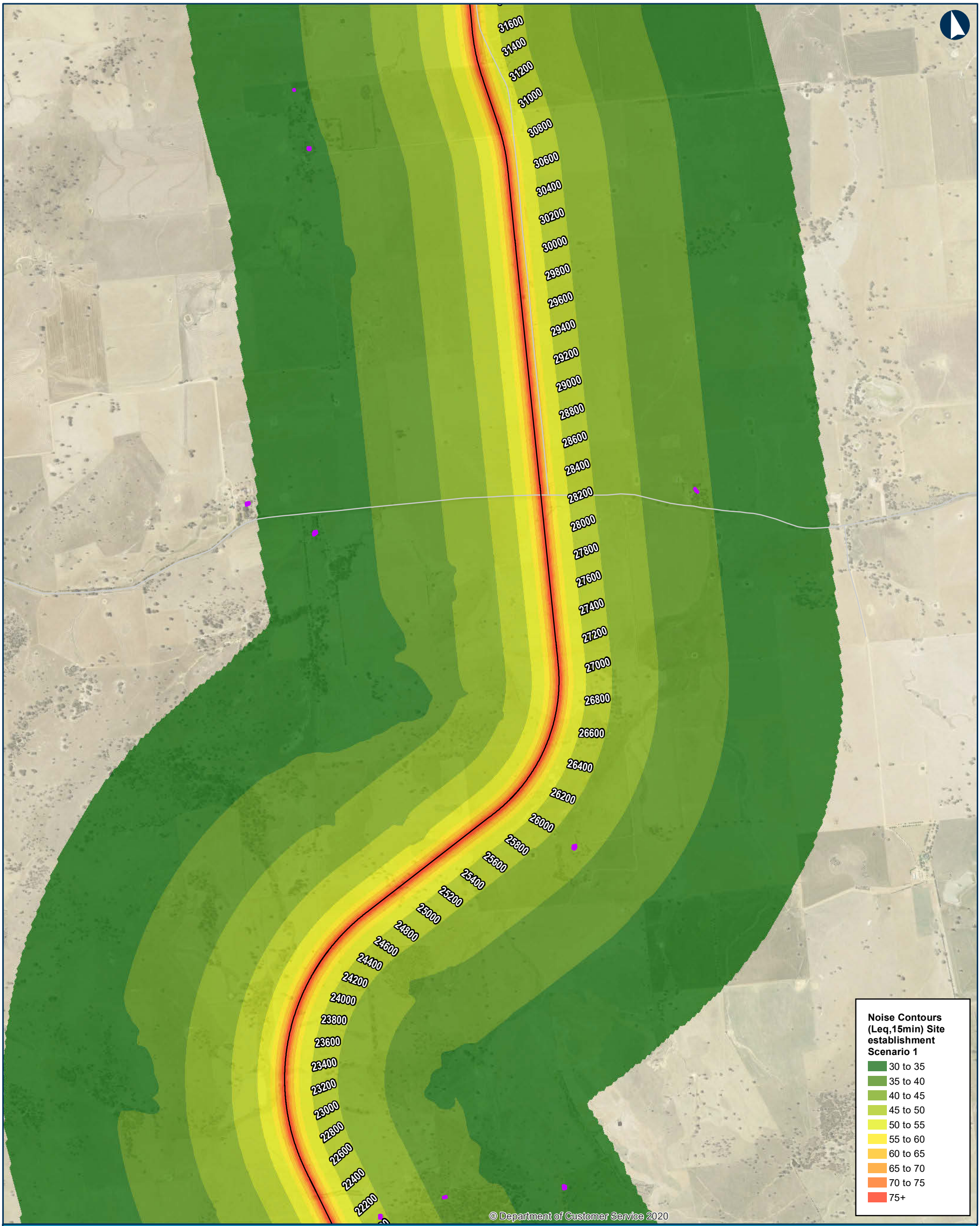
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario1_r1v1.mxd



ILLABO TO STOCKINBINGAL

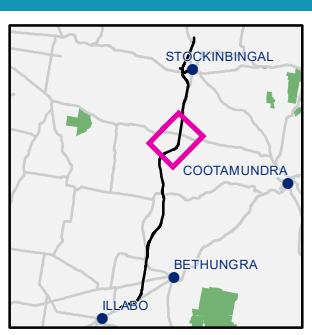
Noise contours - Site establishment (Scenario 1)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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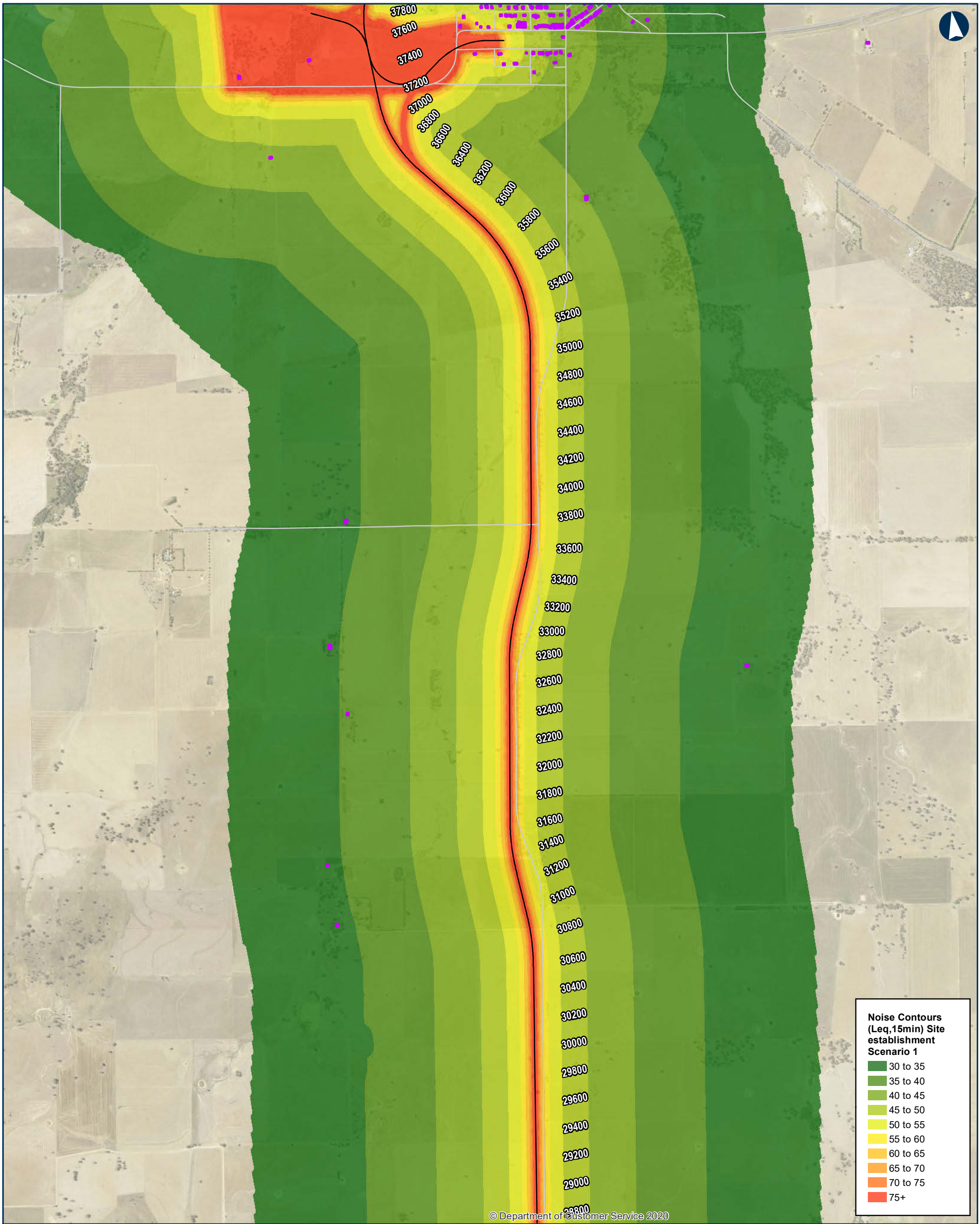
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario1_r1v1.mxd



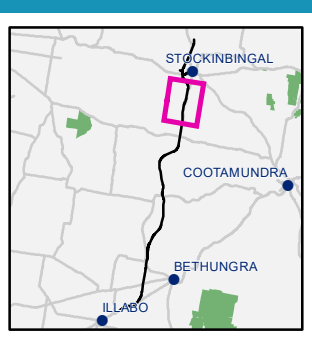
ILLABO TO STOCKINBINGAL Noise contours - Site establishment (Scenario 1)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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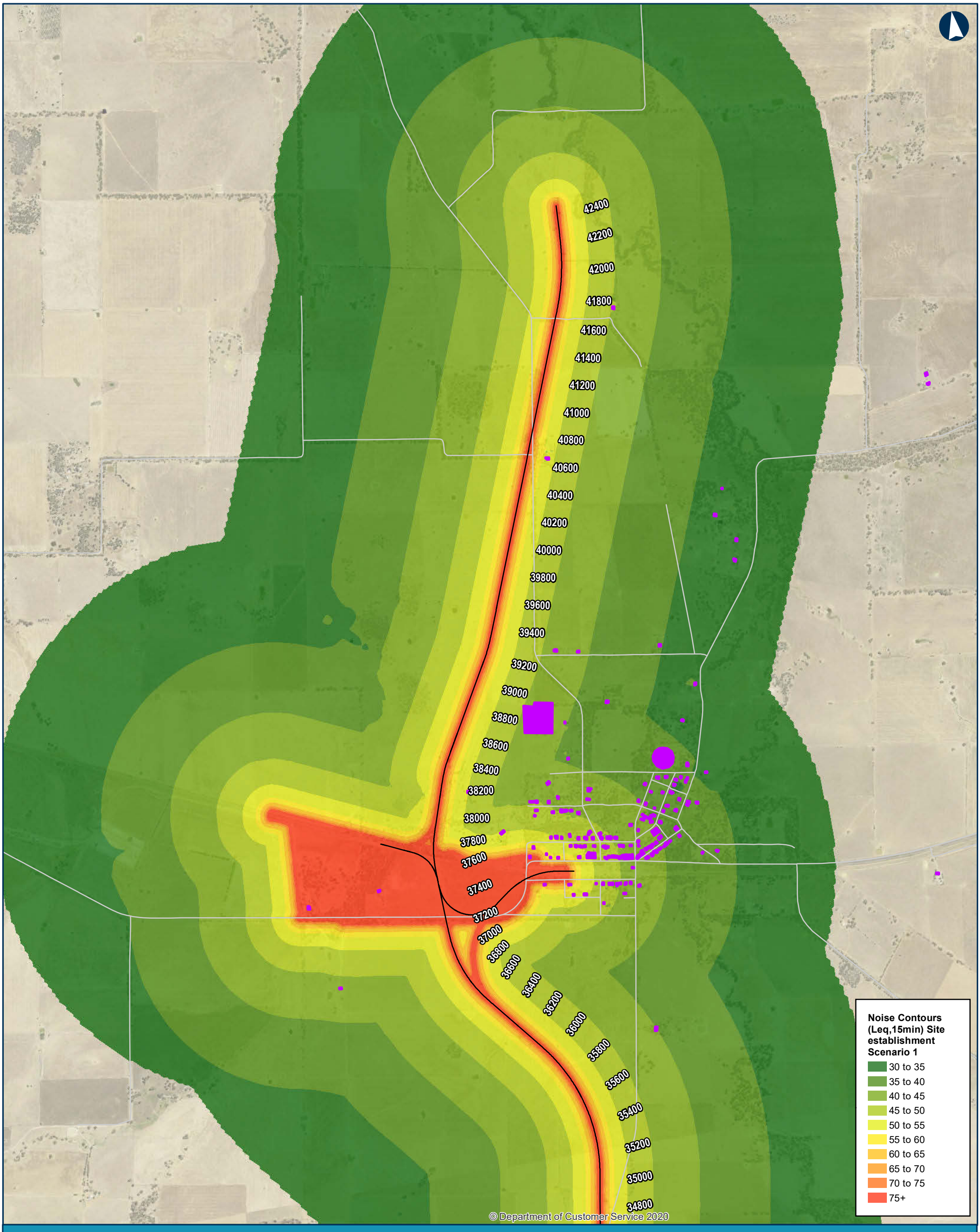
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario1_r1v1.mxd



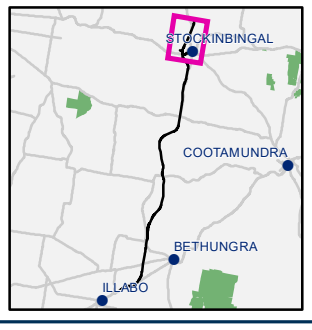
ILLABO TO STOCKINBINGAL Noise contours - Site establishment (Scenario 1)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario1_r1v1.mxd

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38000
37800
37600
37400
37200
37000

Noise Contours (Leq,15min) Site establishment Scenario 1

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

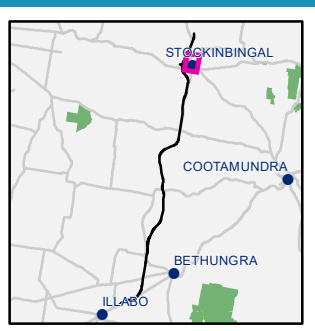
ILLABO TO STOCKINBINGAL Noise contours - Site establishment (Scenario 1)

0 0.09 0.18 0.27 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:7,500
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0

Noise Contours (Leq,15min) Utility relocation and property adjustments Scenario 2

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

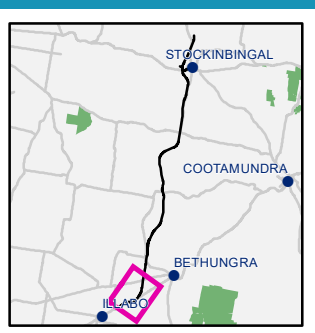
Noise contours - Utility relocation and property adjustments (Scenario 2)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario2_r1v1.mxd

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Noise Contours (Leq,15min) Utility relocation and property adjustments Scenario 2

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

Noise contours - Utility relocation and property adjustments (Scenario 2)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers

INLAND RAIL ARTC

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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario2_r1v1.mxd

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12800
12600
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12200
12000
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11600
11400
11200
11000

Noise Contours (Leq,15min) Utility relocation and property adjustments Scenario 2

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

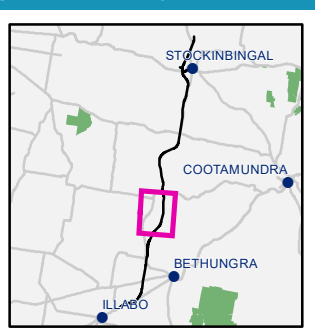
Noise contours - Utility relocation and property adjustments (Scenario 2)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



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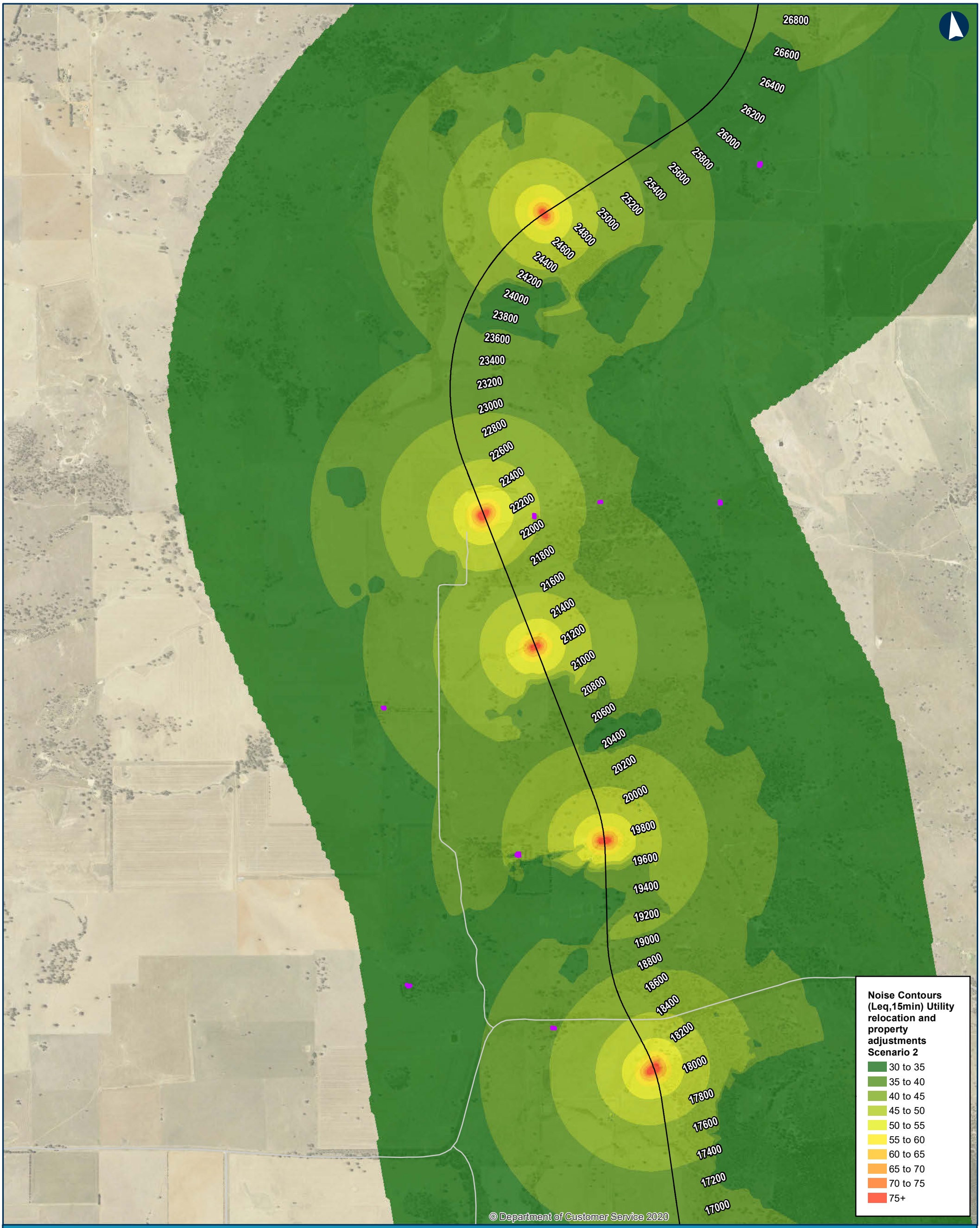
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario2_r1v1.mxd



ILLABO TO STOCKINBINGAL

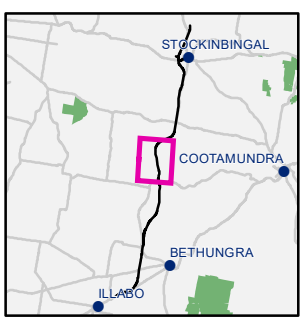
Noise contours - Utility relocation and property adjustments (Scenario 2)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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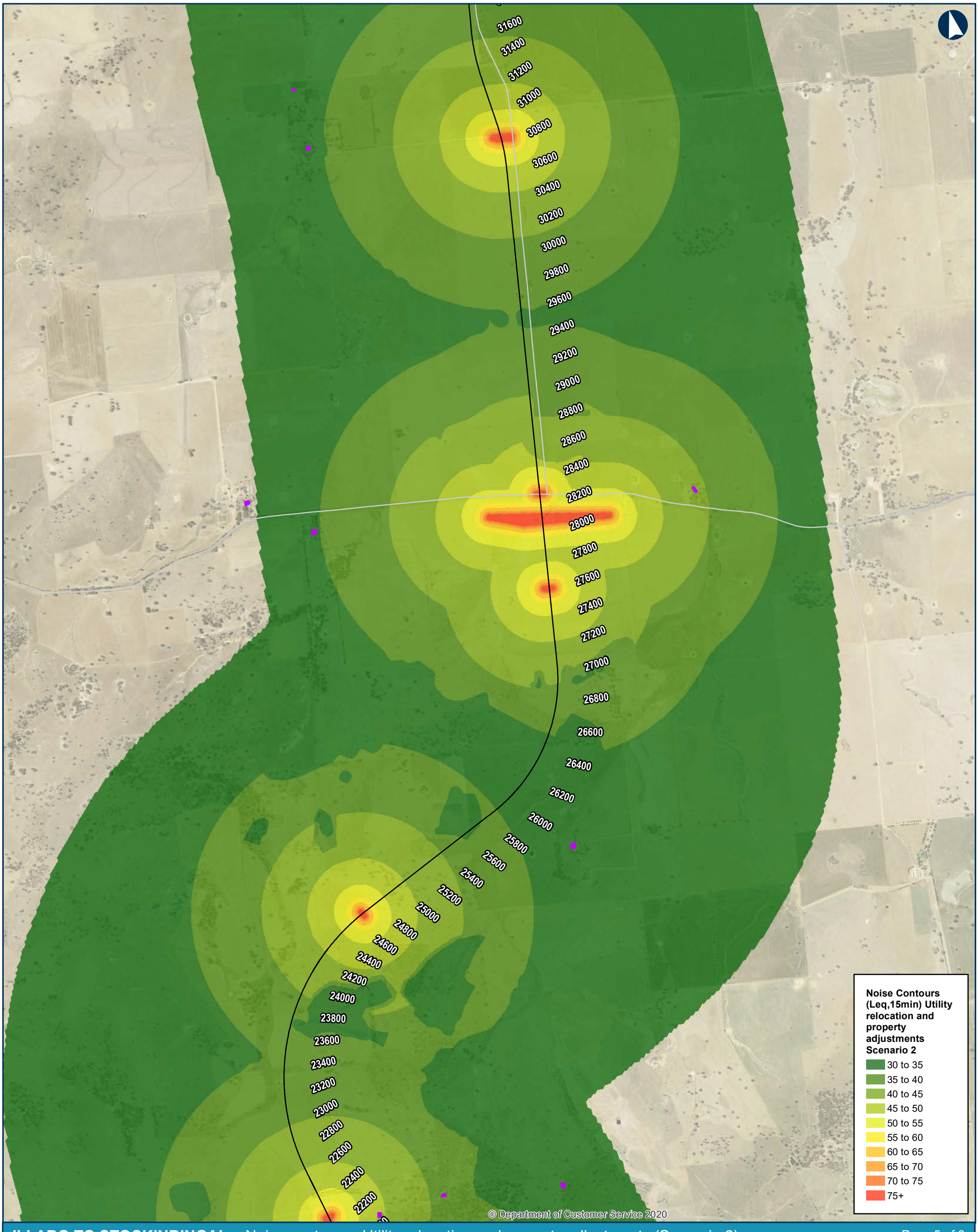


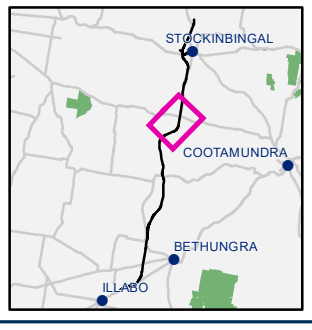
ILLABO TO STOCKINBINGAL Noise contours - Utility relocation and property adjustments (Scenario 2)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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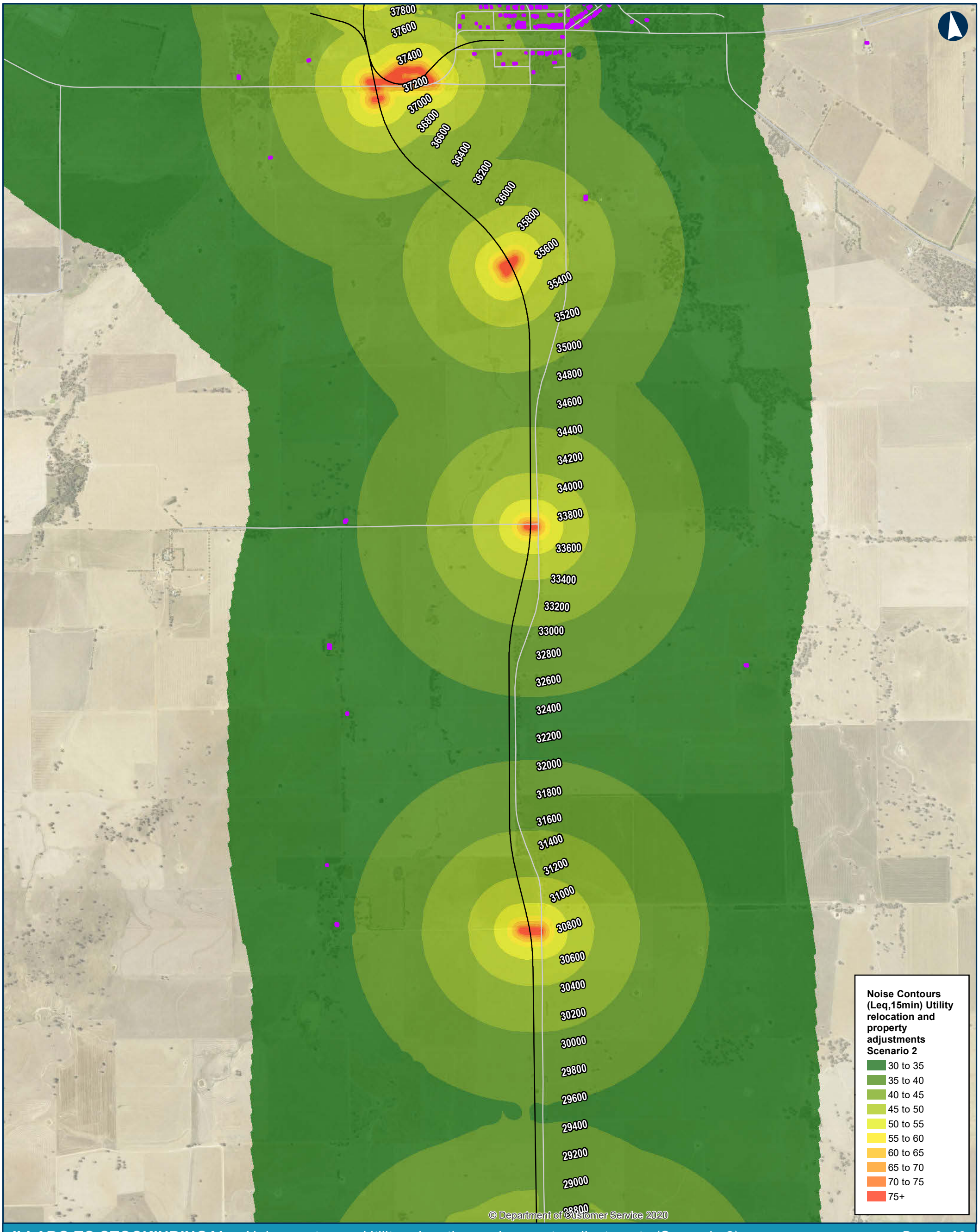
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario2_r1v1.mxd



ILLABO TO STOCKINBINGAL

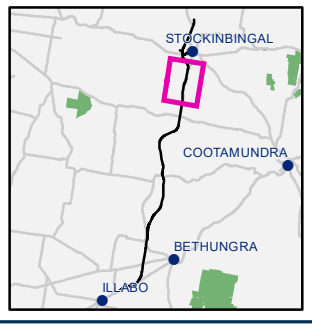
Noise contours - Utility relocation and property adjustments (Scenario 2)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario2_r1v1.mxd

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35400
35200
35000
34800

Noise Contours (Leq,15min) Utility relocation and property adjustments Scenario 2

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL Noise contours - Utility relocation and property adjustments (Scenario 2)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
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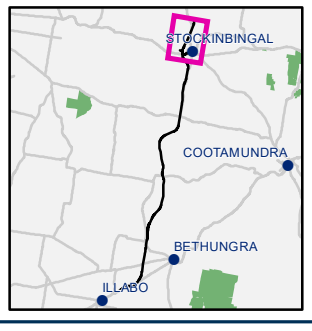
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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39600
39400
39200
39000
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38200
38000
37800
37600
37400
37200
37000

Noise Contours (Leq,15min) Utility relocation and property adjustments Scenario 2
30 to 35
35 to 40
40 to 45
45 to 50
50 to 55
55 to 60
60 to 65
65 to 70
70 to 75
75+

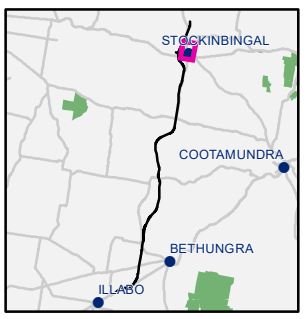
ILLABO TO STOCKINBINGAL

Noise contours - Utility relocation and property adjustments (Scenario 2)

0 0.09 0.18 0.27 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Roads
New track/track upgrades
Sensitive Receivers



Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:7,500
Data Sources: IRDJV, ARTC, LPI

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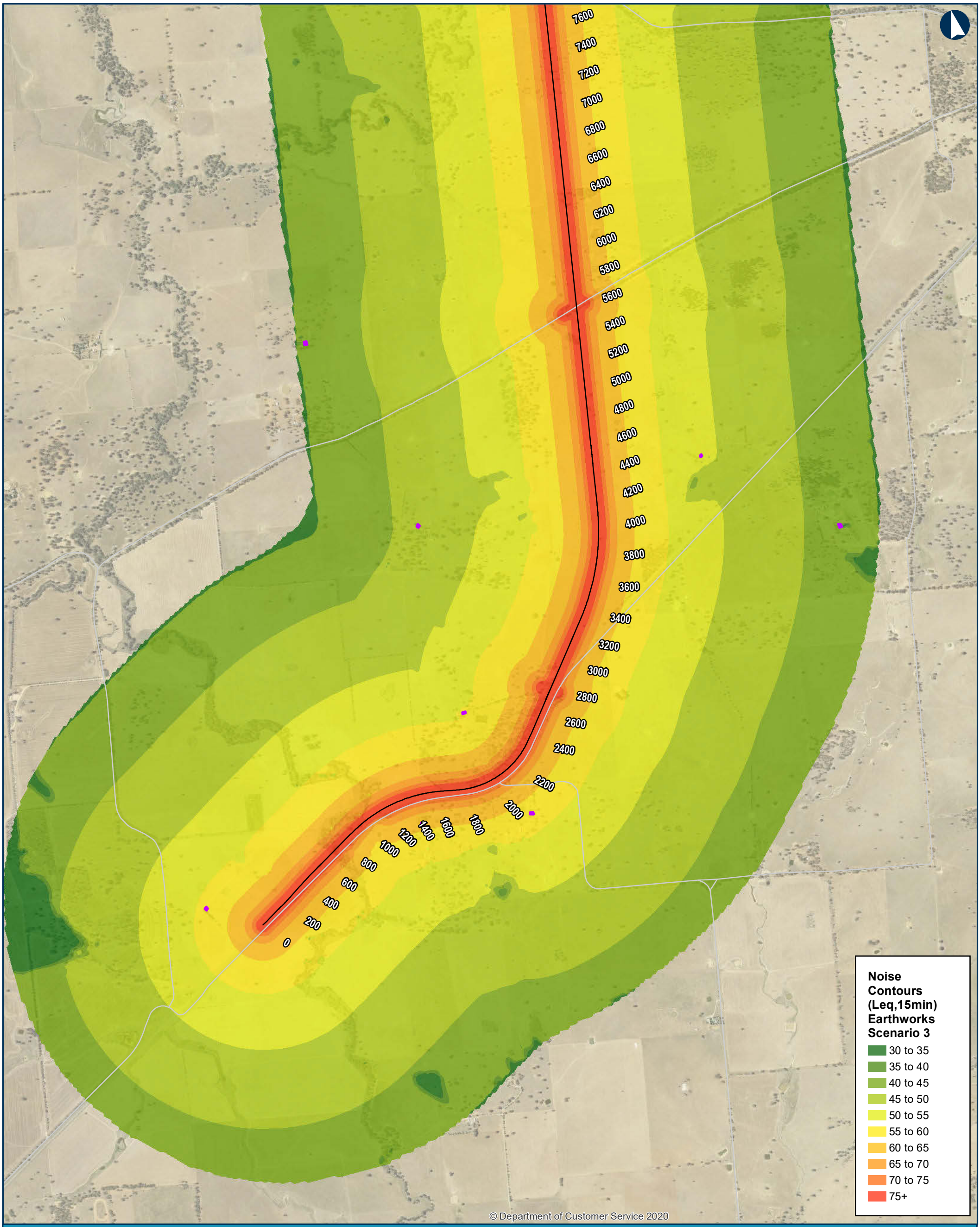
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario2_r1v1.mxd



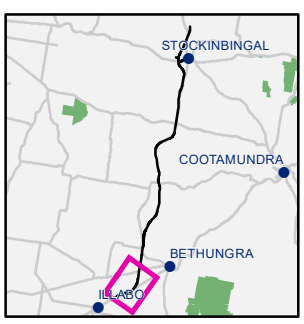
ILLABO TO STOCKINBINGAL Noise contours - Earthworks (Scenario 3)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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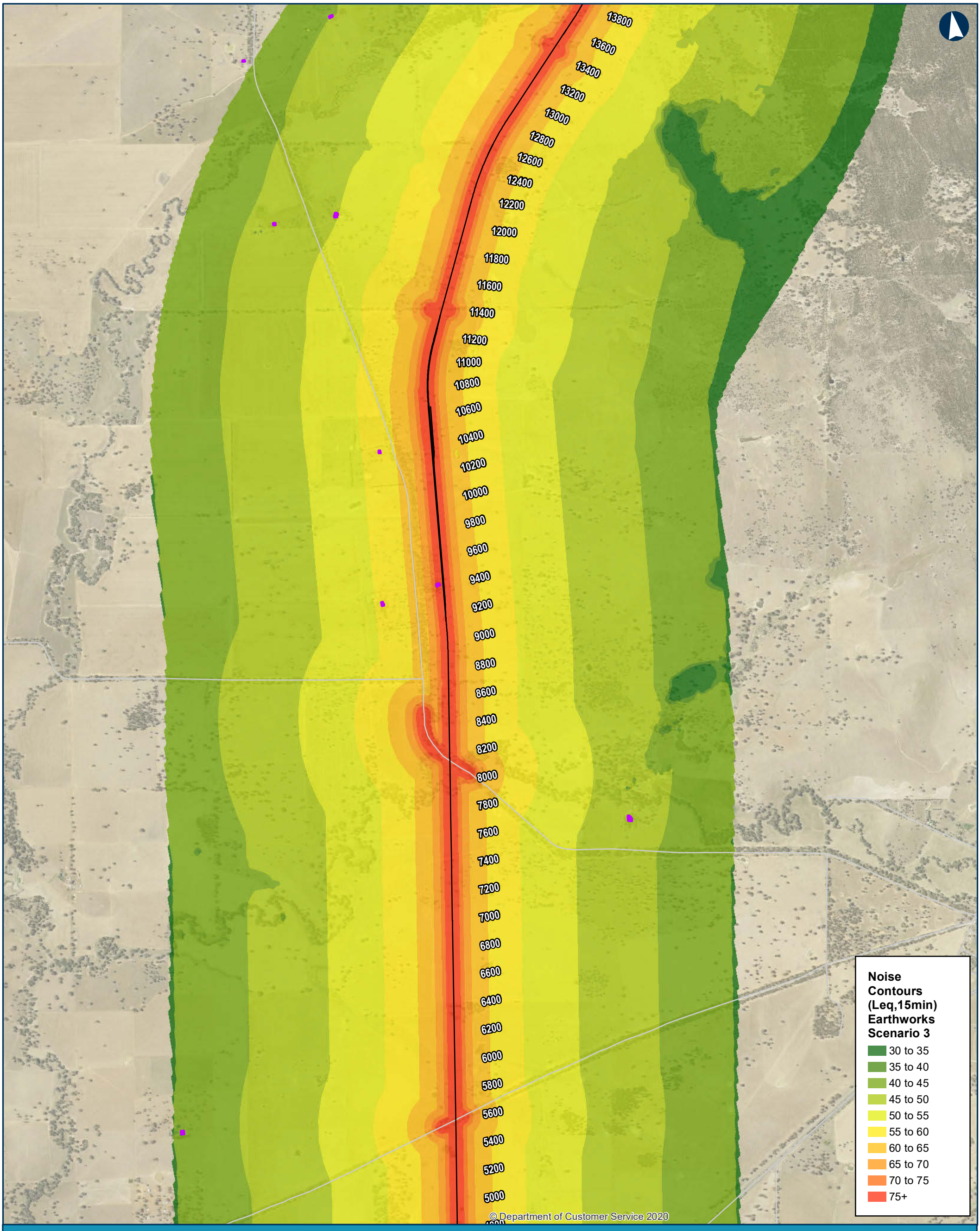
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario3_r1v1.mxd



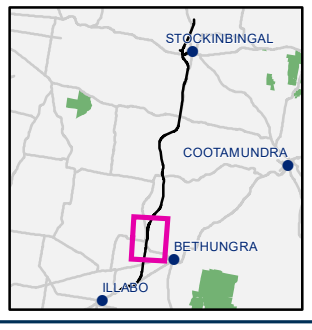
ILLABO TO STOCKINBINGAL Noise contours - Earthworks (Scenario 3)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario3_r1v1.mxd

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11800
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11200
11000

Noise Contours (Leq,15min) Earthworks Scenario 3

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL Noise contours - Earthworks (Scenario 3)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers

INLAND RAIL ARTC

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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario3_r1v1.mxd

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Noise Contours (Leq,15min) Earthworks Scenario 3

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

Noise contours - Earthworks (Scenario 3)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

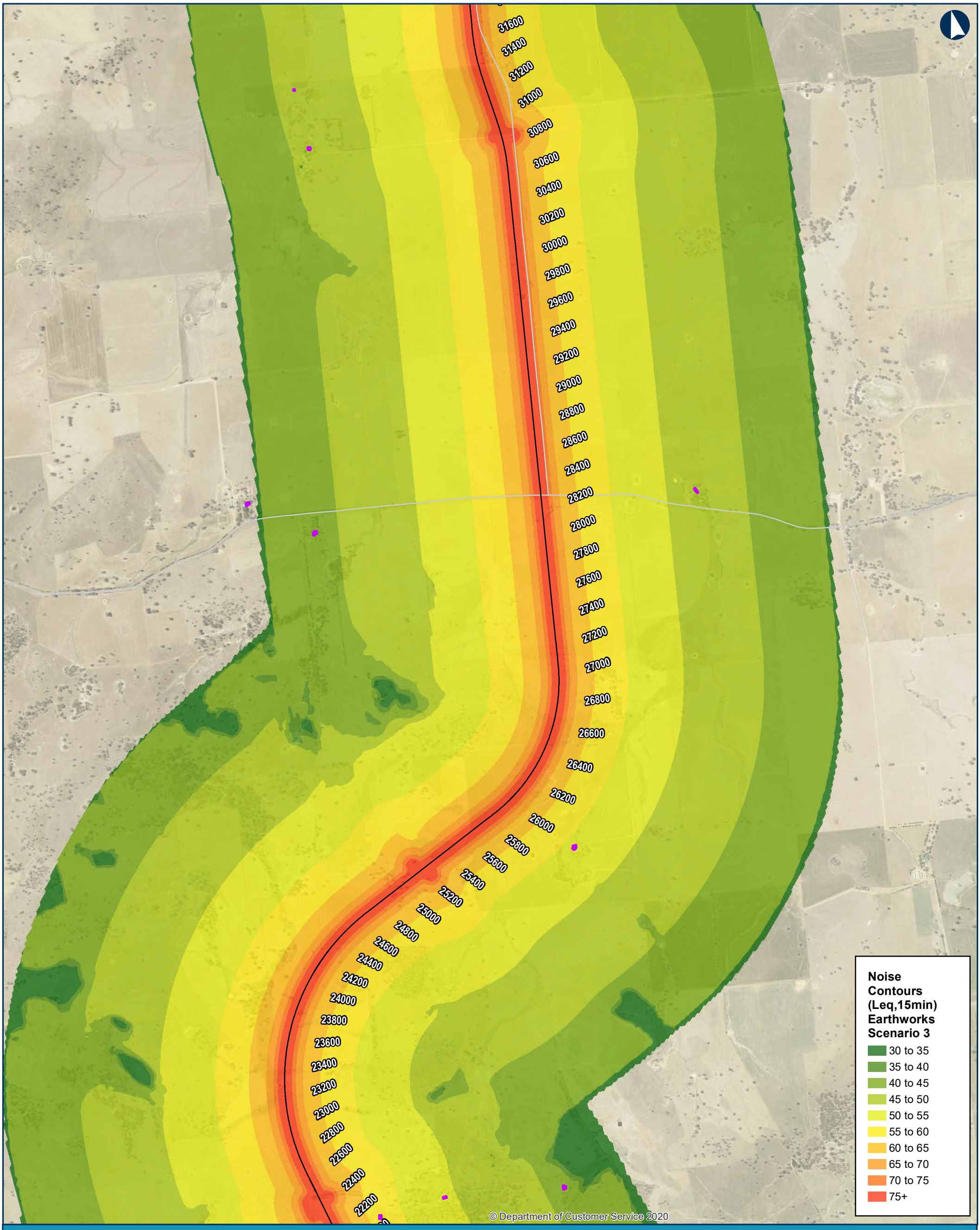
Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers

INLAND RAIL ARTC

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

G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario3_r1v1.mxd



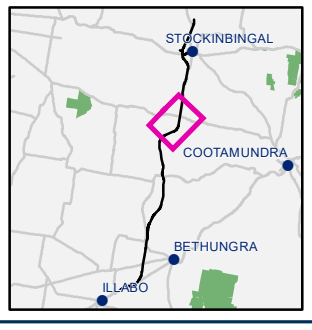
ILLABO TO STOCKINBINGAL Noise contours - Earthworks (Scenario 3)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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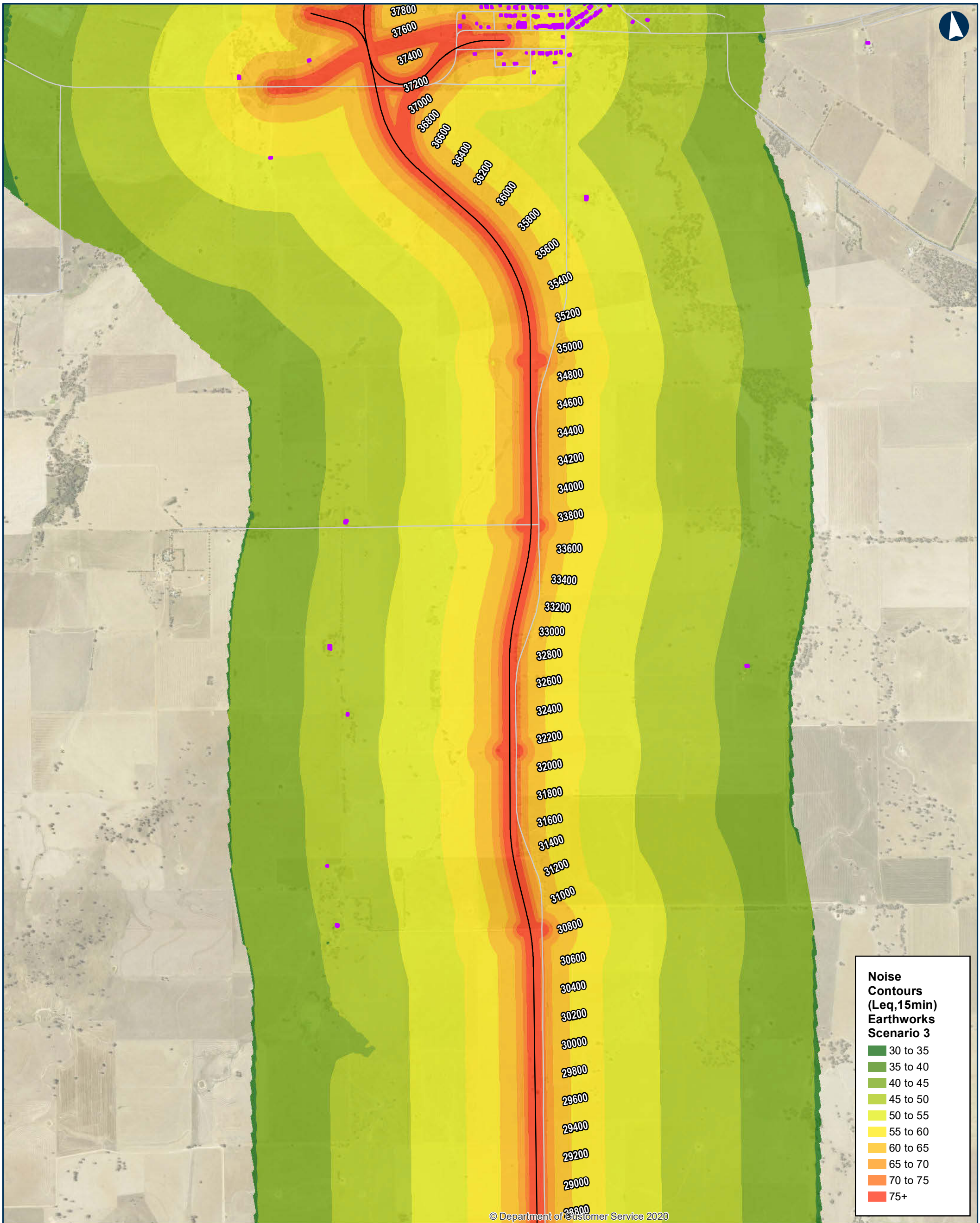


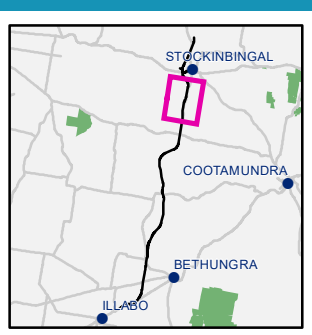
ILLABO TO STOCKINBINGAL Noise contours - Earthworks (Scenario 3)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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35600
35400
35200
35000
34800

Noise Contours (Leq,15min) Earthworks Scenario 3

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

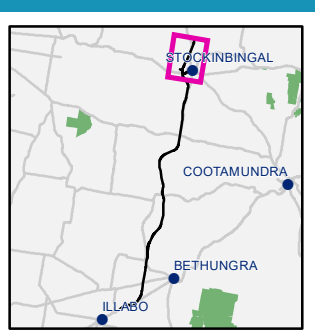
ILLABO TO STOCKINBINGAL Noise contours - Earthworks (Scenario 3)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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

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39400
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38200
38000
7800
37600
37400
37200
37000

Noise Contours (Leq,15min) Earthworks Scenario 3

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

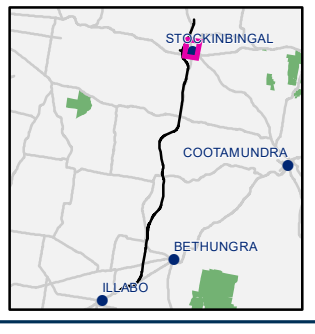
ILLABO TO STOCKINBINGAL Noise contours - Earthworks (Scenario 3)

0 0.09 0.18 0.27 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:7,500
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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4800
4600
4400
4200
4000
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0

Noise Contours (Leq,15min) Earthworks crushing Scenario 3b

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

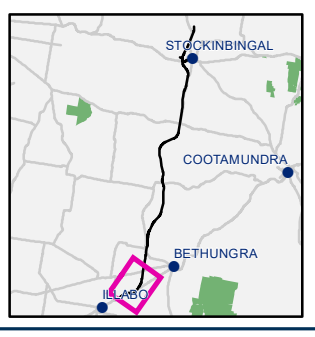
Noise contours - Earthworks crushing (Scenario 3b)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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

G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario3b_r1v1.mxd

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8400
8200
8000
7800
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7400
7200
7000
6800
6600
6400
6200
6000
5800
5600
5400
5200
5000

Noise Contours (Leq,15min) Earthworks crushing Scenario 3b

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

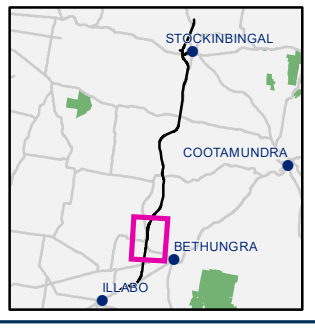
ILLABO TO STOCKINBINGAL Noise contours - Earthworks crushing (Scenario 3b)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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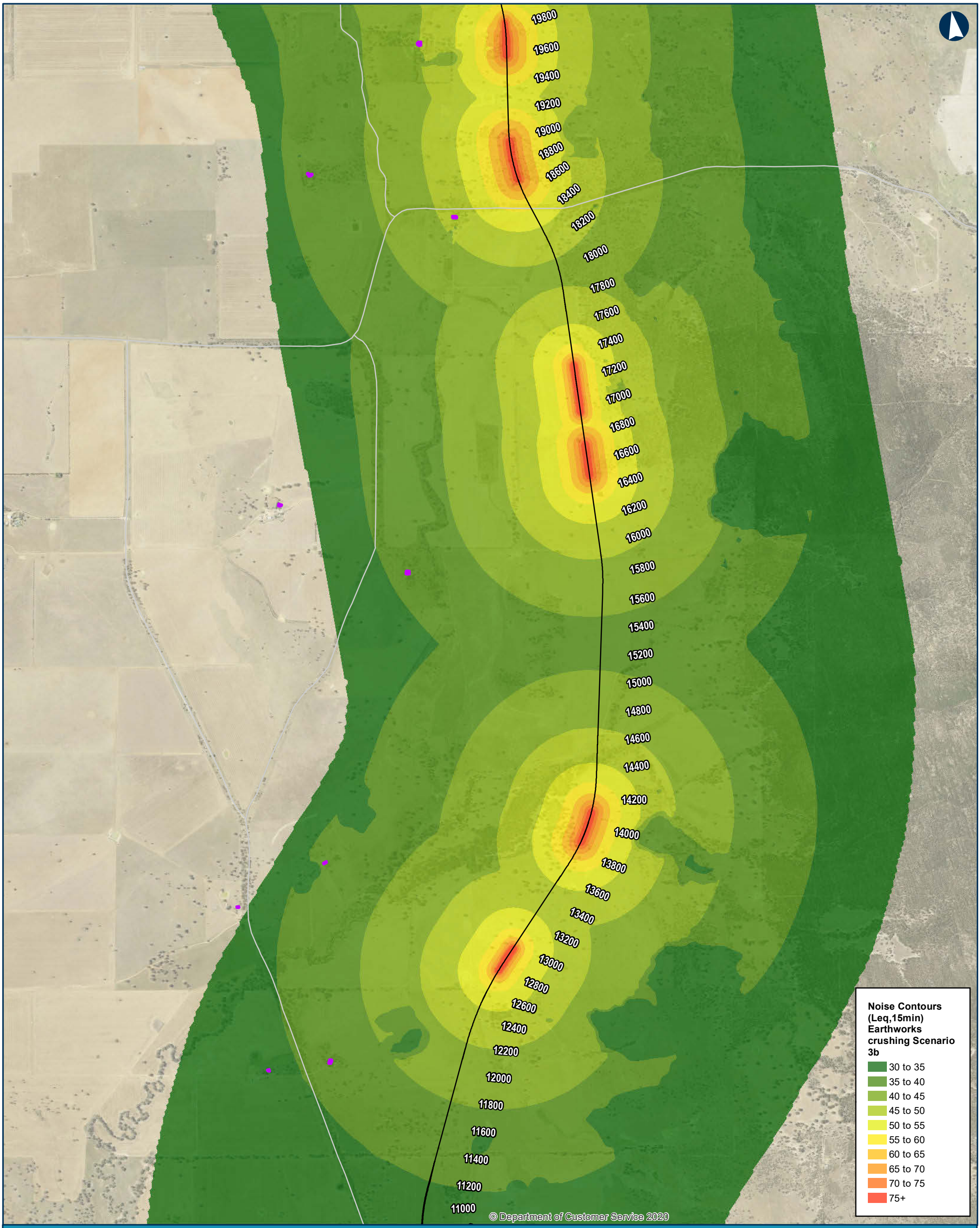


ILLABO TO STOCKINBINGAL

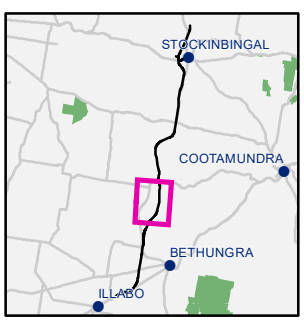
Noise contours - Earthworks crushing (Scenario 3b)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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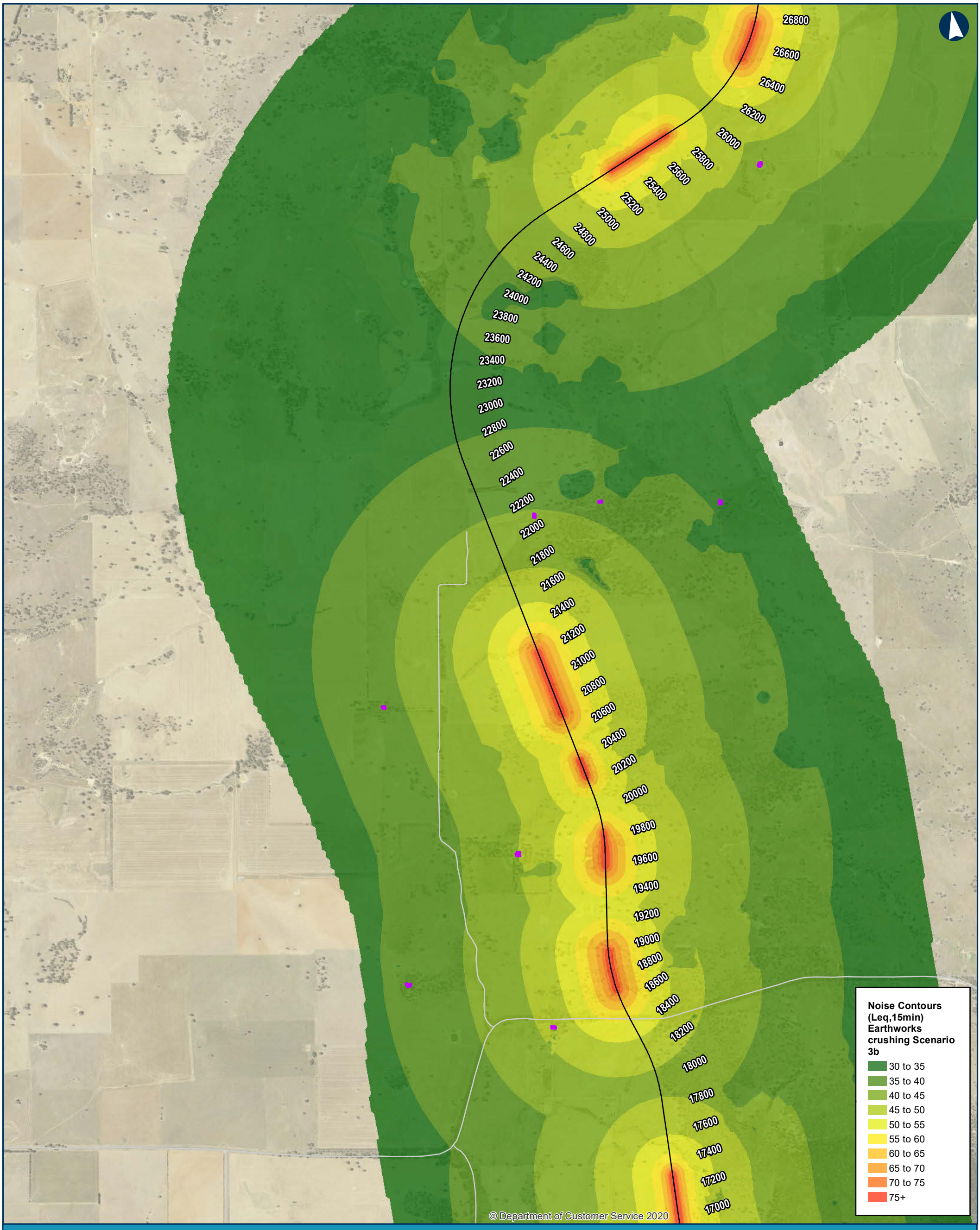


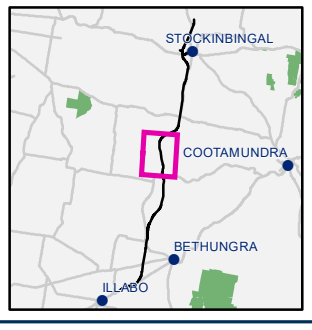
ILLABO TO STOCKINBINGAL Noise contours - Earthworks crushing (Scenario 3b)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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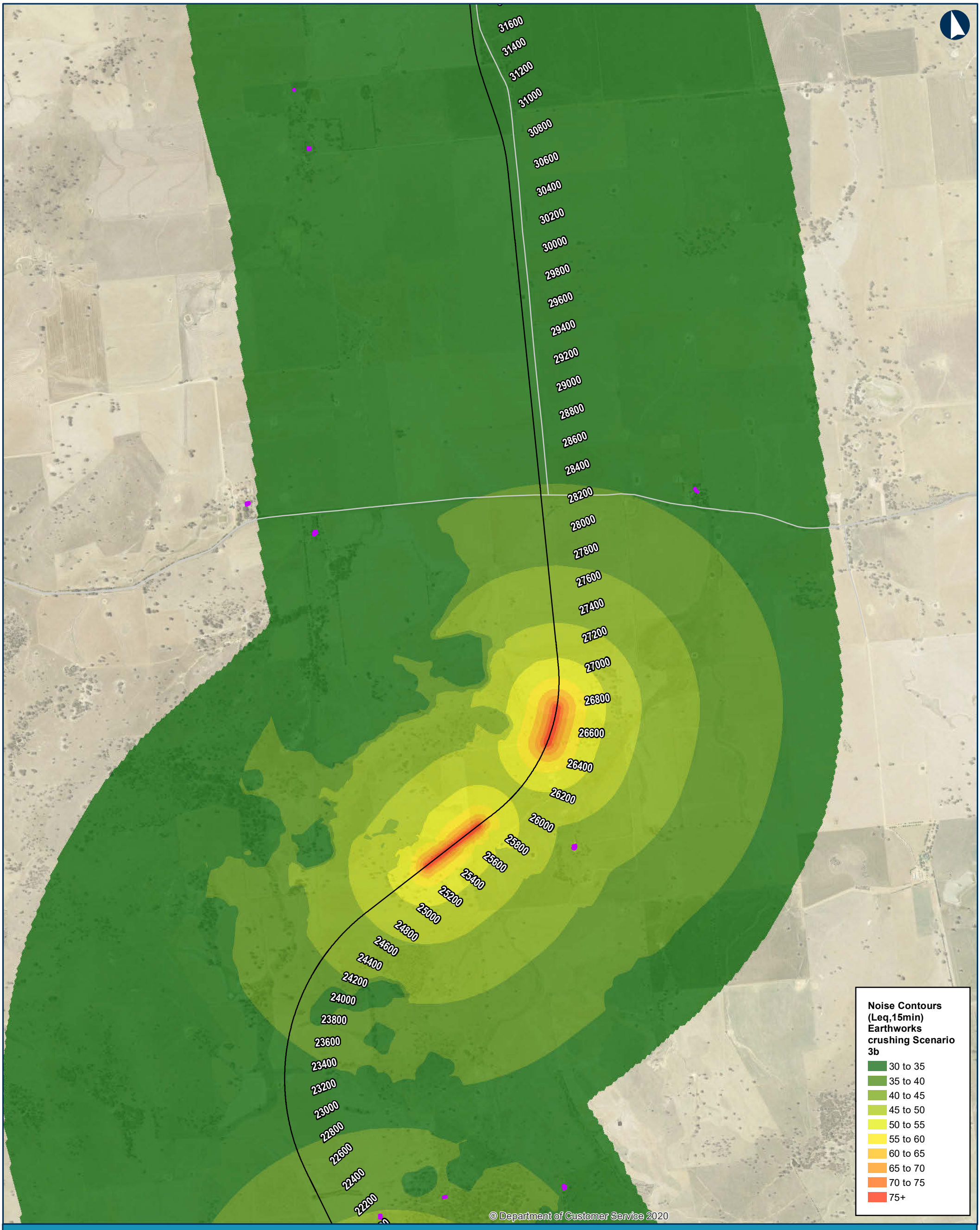


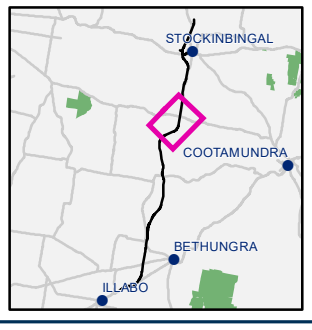
ILLABO TO STOCKINBINGAL Noise contours - Earthworks crushing (Scenario 3b)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario3b_r1v1.mxd

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31800
31600
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31200
31000
30800
30600
30400
30200
30000
29800
29600
29400
29200
29000
28800

Noise Contours (Leq,15min) Earthworks crushing Scenario 3b

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

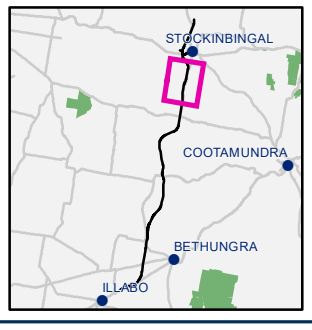
ILLABO TO STOCKINBINGAL Noise contours - Earthworks crushing (Scenario 3b)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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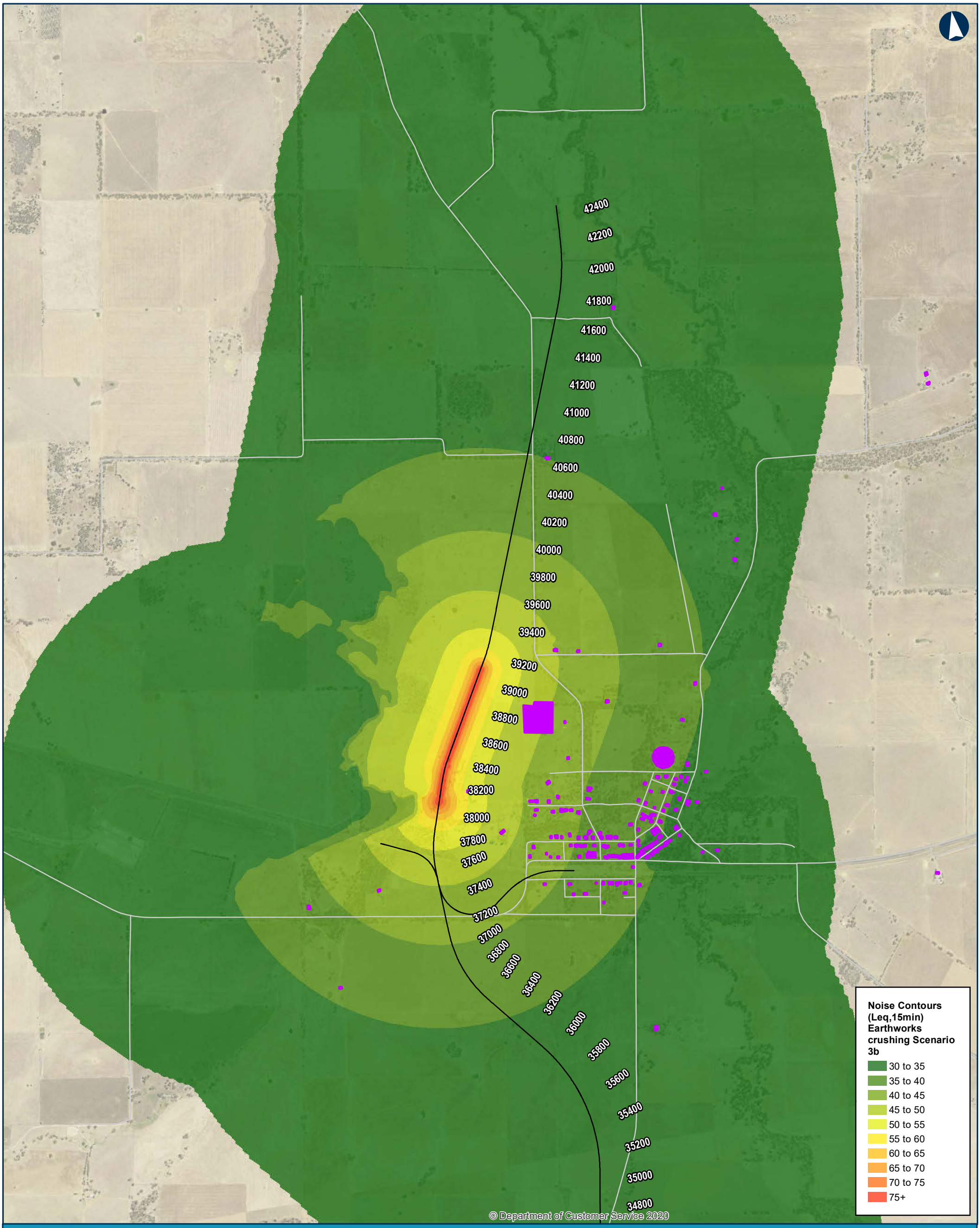


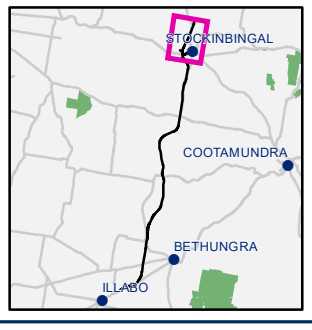
ILLABO TO STOCKINBINGAL Noise contours - Earthworks crushing (Scenario 3b)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario3b_r1v1.mxd

39600
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38200
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37200
37000

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Noise Contours (Leq,15min) Earthworks crushing Scenario 3b

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

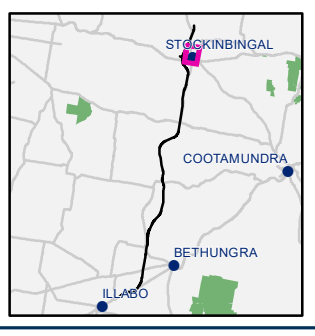
ILLABO TO STOCKINBINGAL Noise contours - Earthworks crushing (Scenario 3b)

0 0.09 0.18 0.27 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:7,500
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



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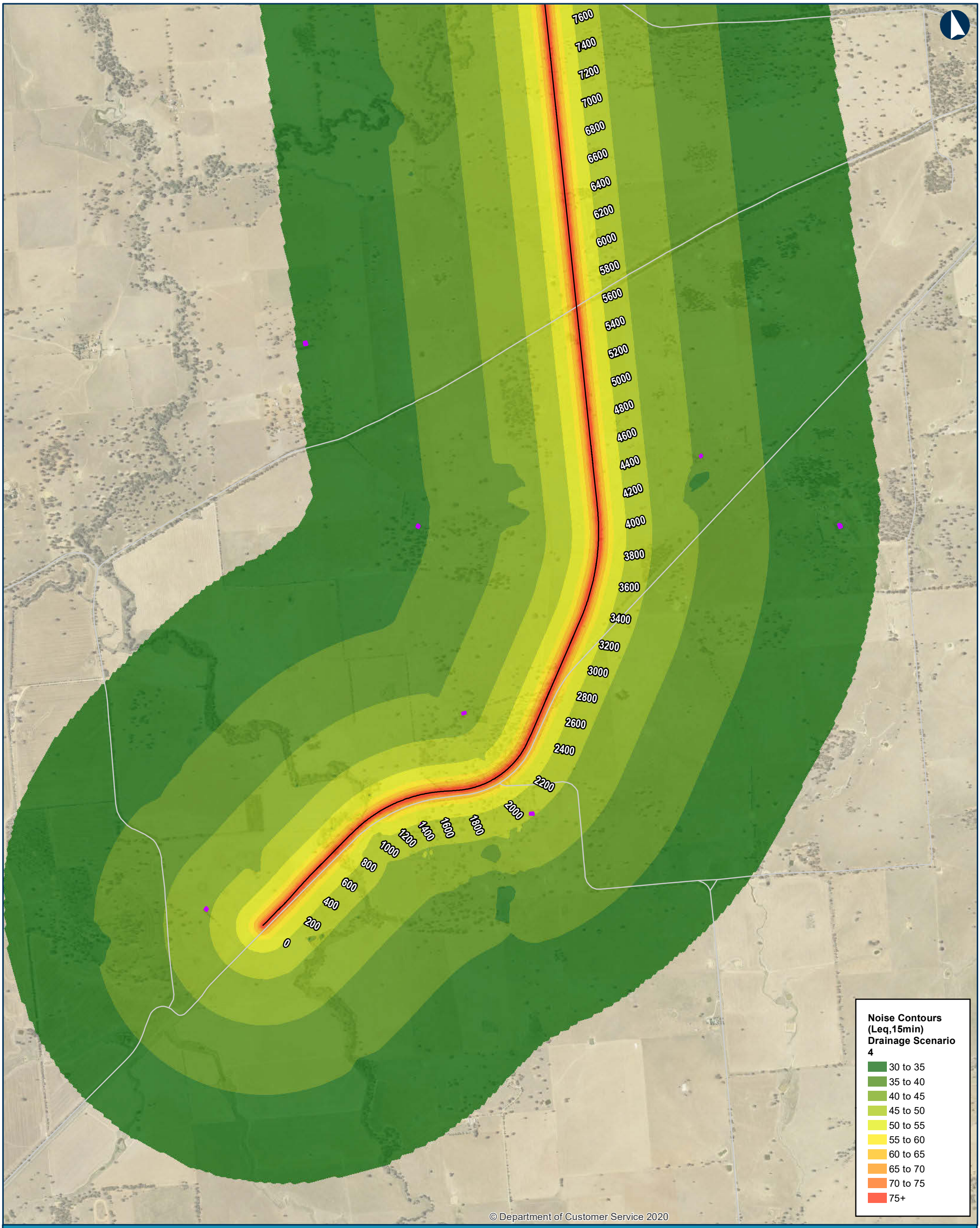


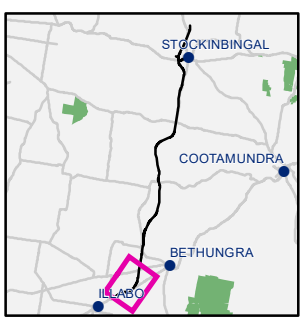
ILLABO TO STOCKINBINGAL Noise contours - Drainage (Scenario 4)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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7200
7000
6800
6600
6400
6200
6000
5800
5600
5400
5200
5000

Noise Contours (Leq,15min) Drainage Scenario 4

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

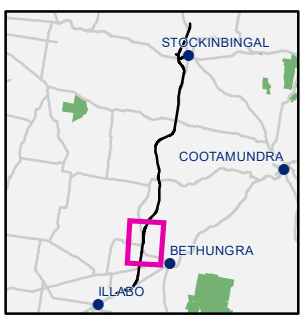
Noise contours - Drainage (Scenario 4)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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13400
13200
13000
12800
12600
12400
12200
12000
11800
11600
11400
11200
11000

Noise Contours (Leq,15min) Drainage Scenario 4

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL Noise contours - Drainage (Scenario 4)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers

INLAND RAIL ARTC

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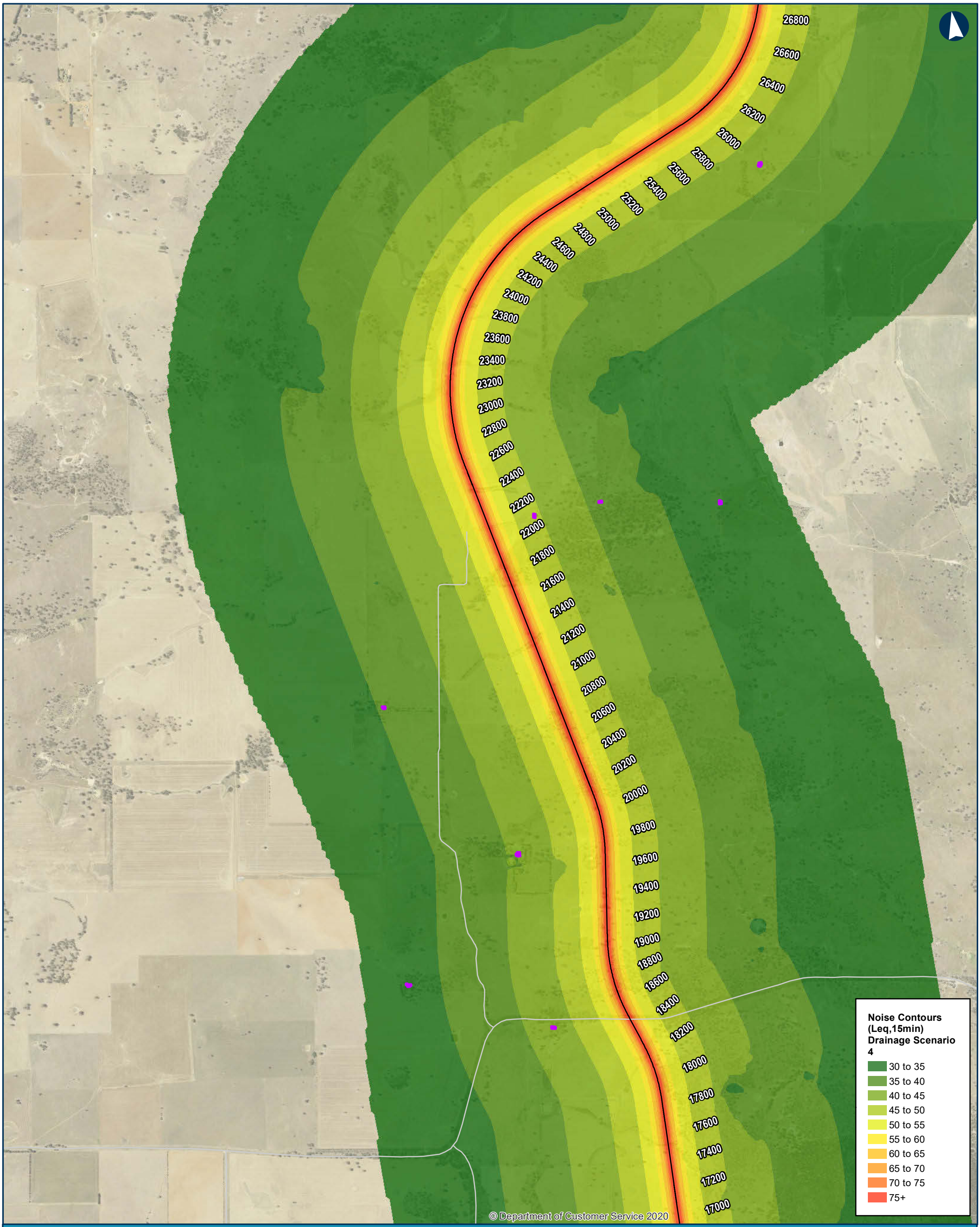


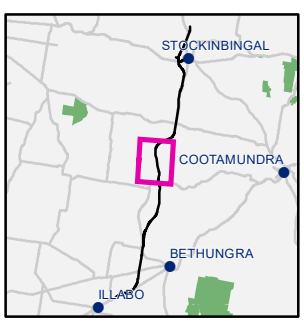
ILLABO TO STOCKINBINGAL Noise contours - Drainage (Scenario 4)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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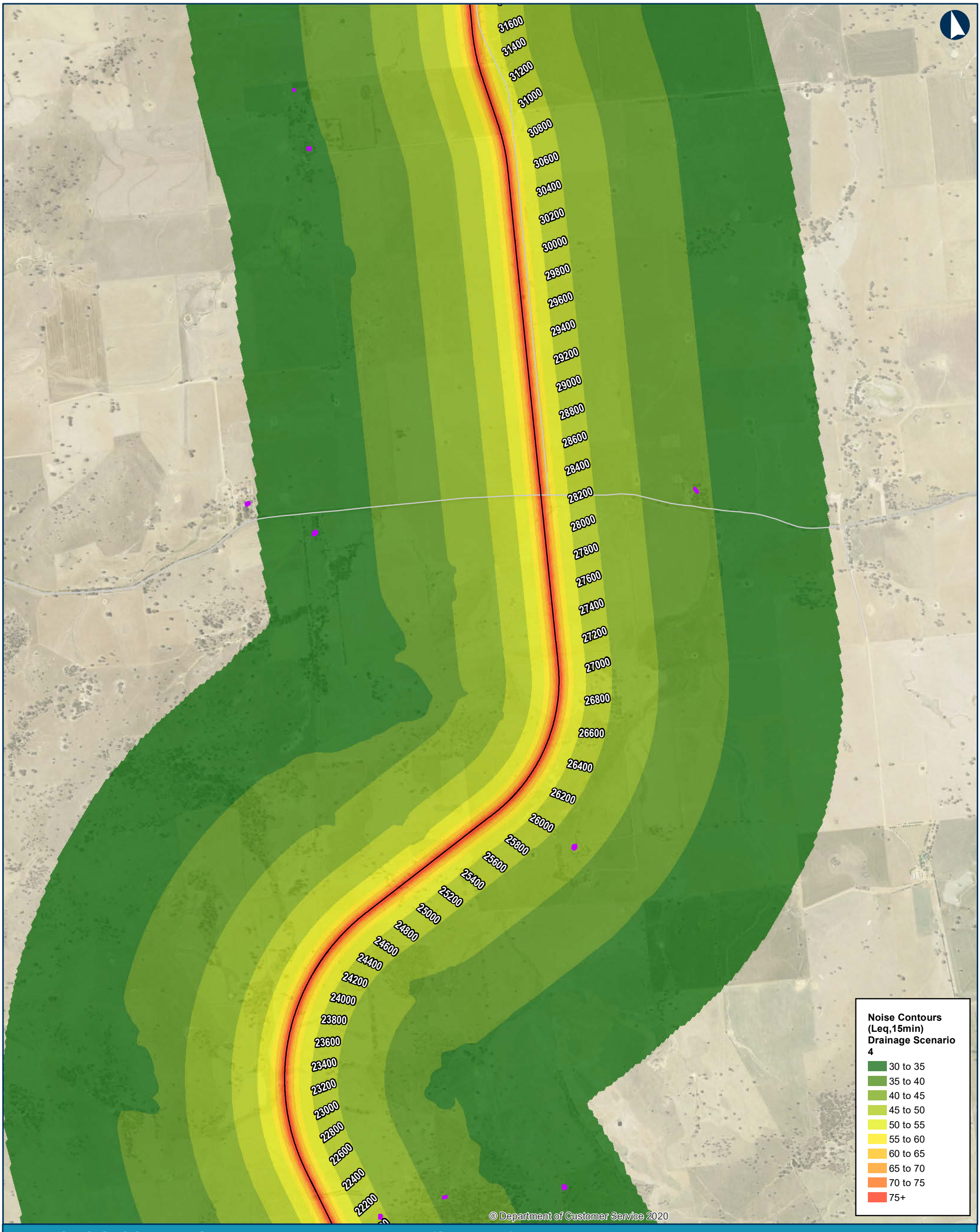


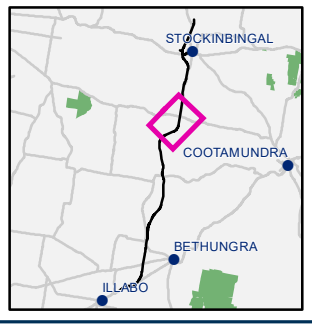
ILLABO TO STOCKINBINGAL Noise contours - Drainage (Scenario 4)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

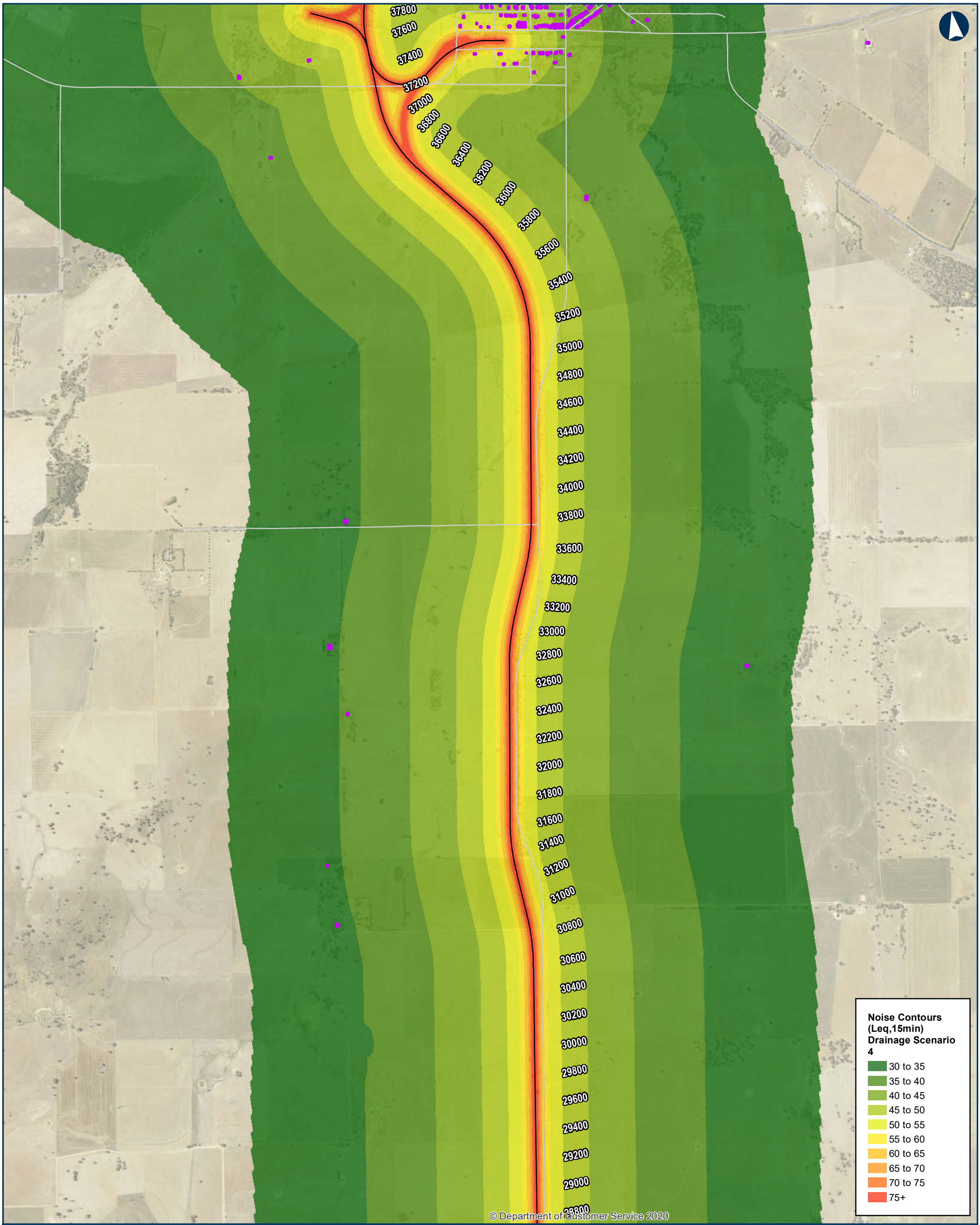
Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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

G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario4_r1v1.mxd



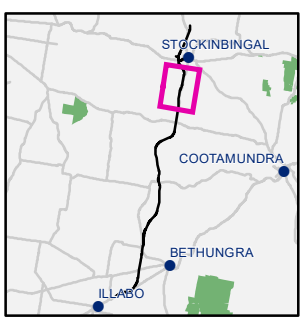
ILLABO TO STOCKINBINGAL Noise contours - Drainage (Scenario 4)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario4_r1v1.mxd

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41600
41400
41200
41000
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40600
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40200
40000
39800
39600
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38000
37800
37600
37400
37200
37000
36800
36600
36400
36200
36000
35800
35600
35400
35200
35000
34800

Noise Contours (Leq,15min) Drainage Scenario 4

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

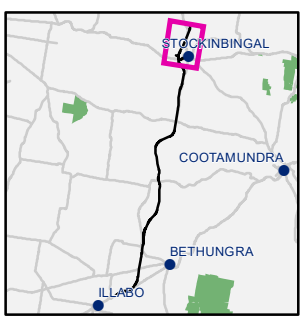
ILLABO TO STOCKINBINGAL Noise contours - Drainage (Scenario 4)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario4_r1v1.mxd

39600
39400
39200
39000
38800
38600
38400
38200
38000
7800
37600
37400
37200
37000

Noise Contours (Leq,15min) Drainage Scenario 4
30 to 35
35 to 40
40 to 45
45 to 50
50 to 55
55 to 60
60 to 65
65 to 70
70 to 75
75+

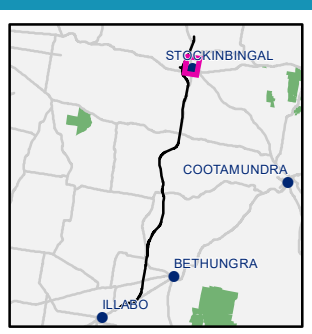
ILLABO TO STOCKINBINGAL Noise contours - Drainage (Scenario 4)

0 0.09 0.18 0.27 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:7,500
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario4_r1v1.mxd

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6200
6000
5800
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5200
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4600
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4200
4000
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0

Noise Contours (Leq,15min) Trackworks Scenario 5

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

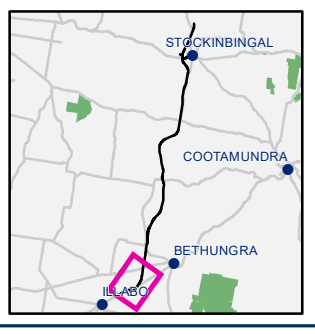
ILLABO TO STOCKINBINGAL Noise contours - Trackworks (Scenario 5)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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8400
8200
8000
7800
7600
7400
7200
7000
6800
6600
6400
6200
6000
5800
5600
5400
5200
5000

Noise Contours (Leq,15min) Trackworks Scenario 5

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

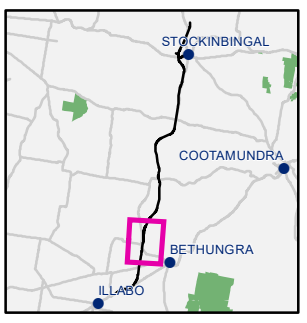
Noise contours - Trackworks (Scenario 5)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario5_r1v1.mxd

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13000
12800
12600
12400
12200
12000
11800
11600
11400
11200
11000

Noise Contours (Leq,15min) Trackworks Scenario 5

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

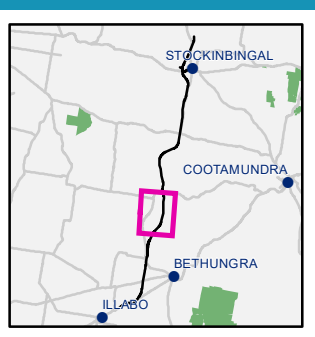
Noise contours - Trackworks (Scenario 5)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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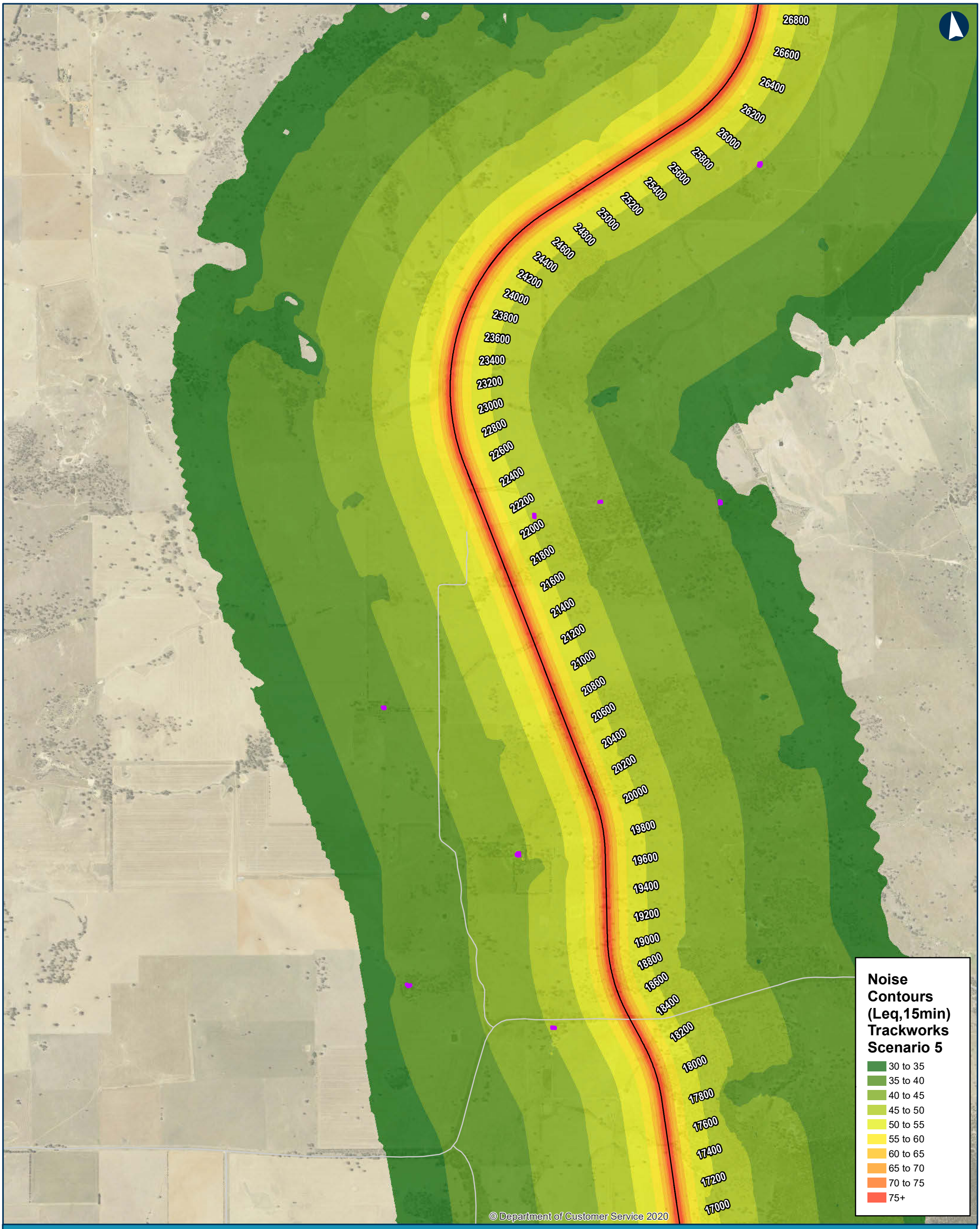


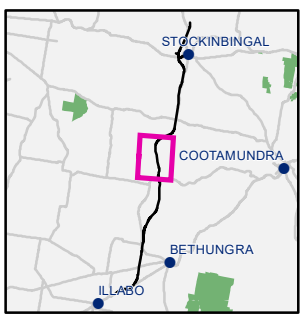
ILLABO TO STOCKINBINGAL Noise contours - Trackworks (Scenario 5)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

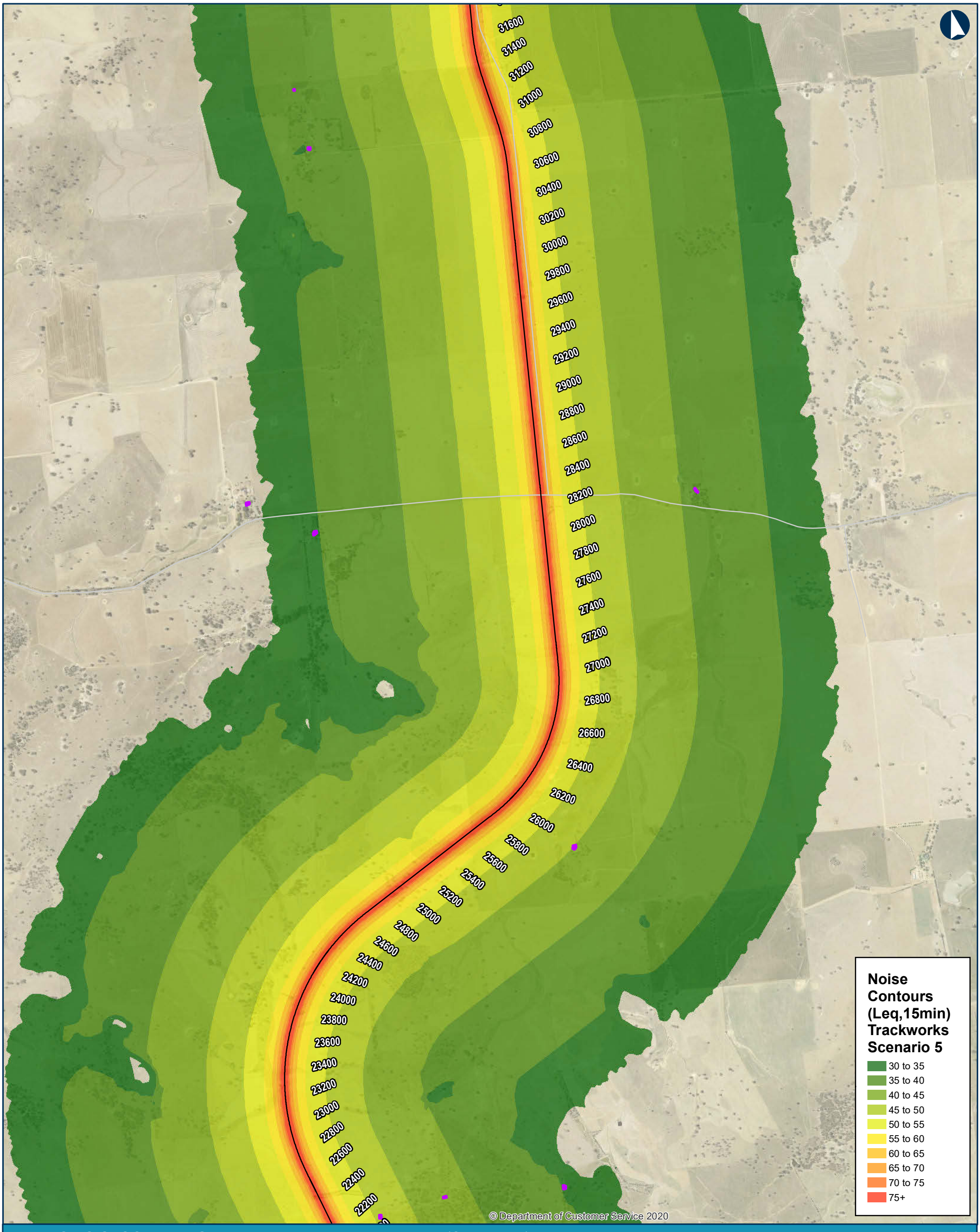
Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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

G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario5_r1v1.mxd



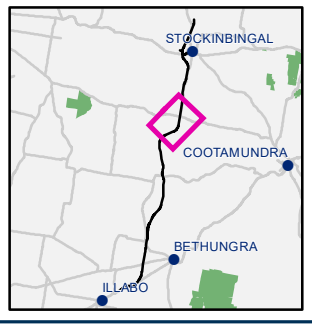
ILLABO TO STOCKINBINGAL Noise contours - Trackworks (Scenario 5)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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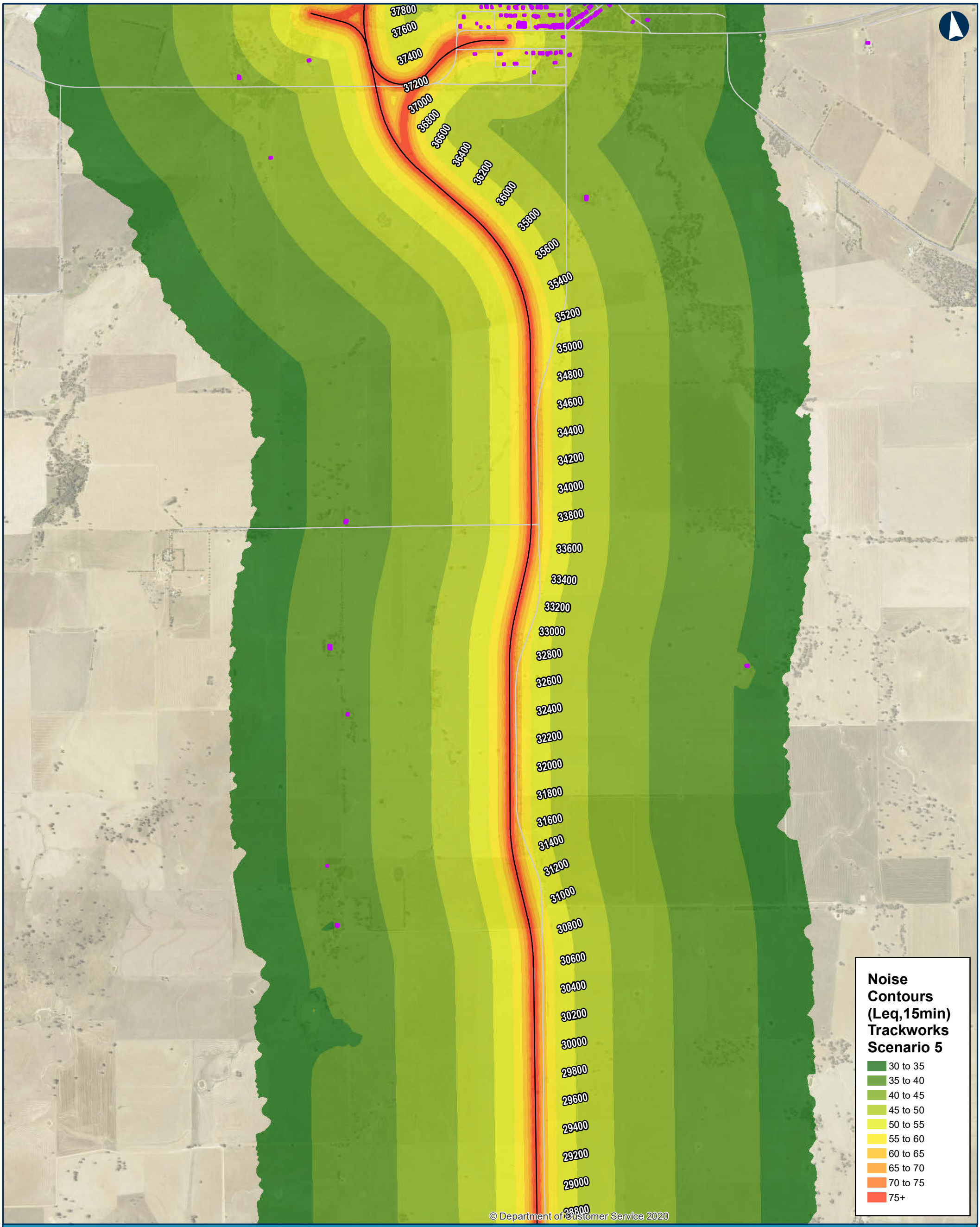
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario5_r1v1.mxd



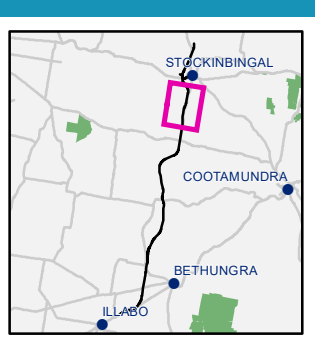
ILLABO TO STOCKINBINGAL Noise contours - Trackworks (Scenario 5)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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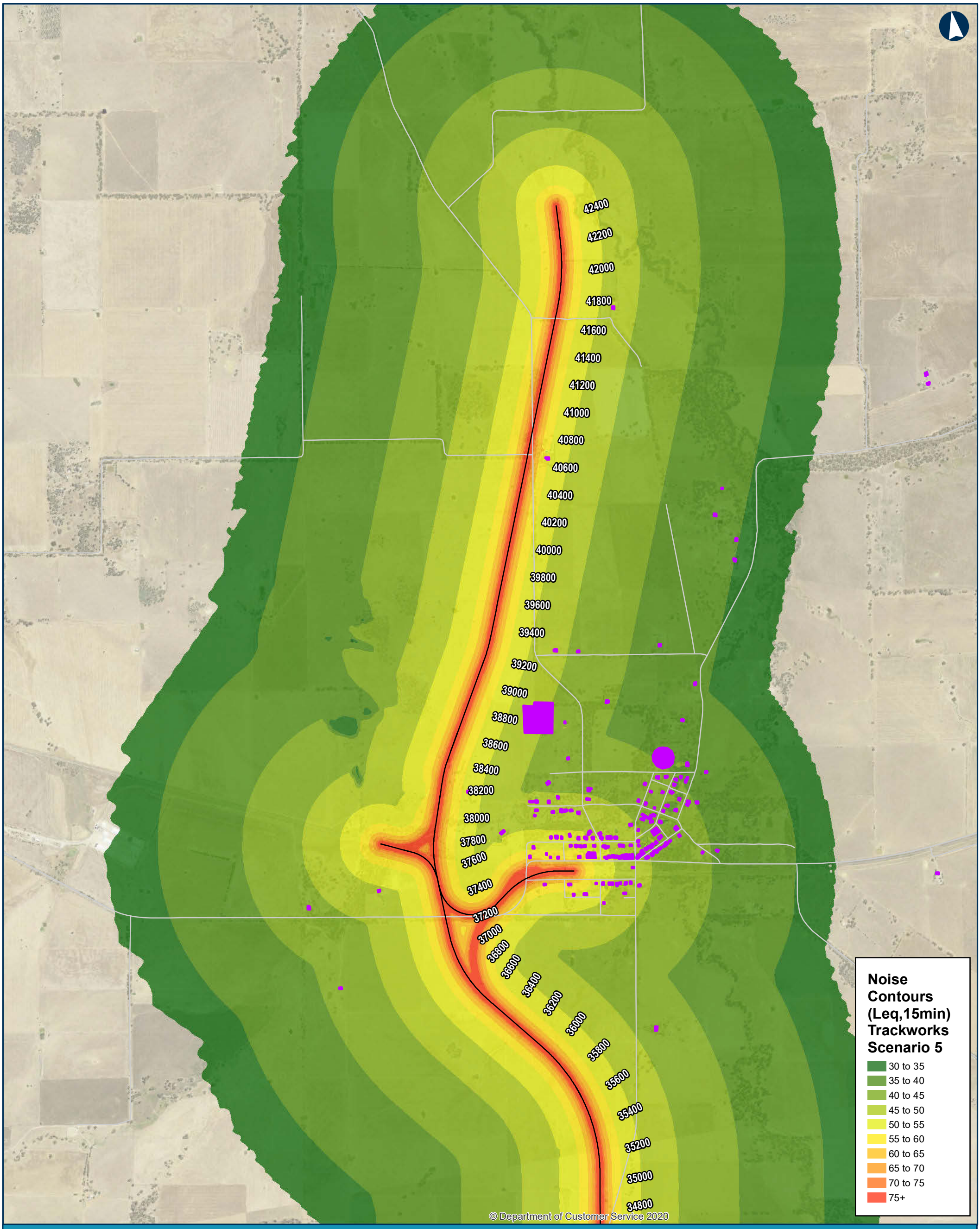
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario5_r1v1.mxd



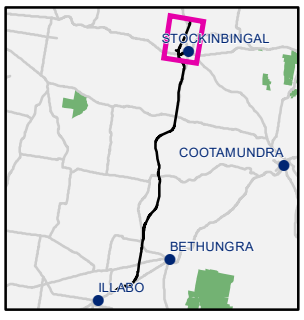
ILLABO TO STOCKINBINGAL Noise contours - Trackworks (Scenario 5)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario5_r1v1.mxd

39600
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38400
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37800
37600
37400
37200
37000

Noise Contours (Leq,15min) Trackworks Scenario 5

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

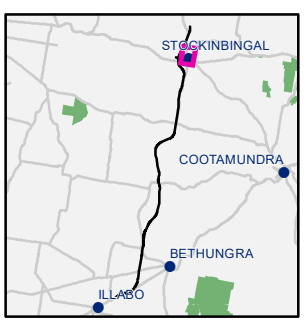
ILLABO TO STOCKINBINGAL Noise contours - Trackworks (Scenario 5)

0 0.09 0.18 0.27 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:7,500
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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4000
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3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0

Noise Contours (Leq,15min) Road overbridges, underbridges and pavement works Scenario 6

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

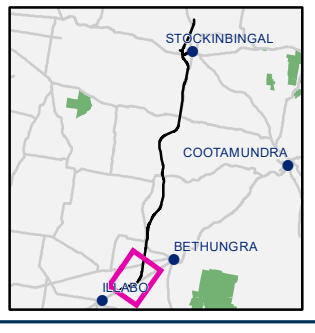
Noise contours - Road overbridges, underbridges and pavement works (Scenario 6)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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8400
8200
8000
7800
7600
7400
7200
7000
6800
6600
6400
6200
6000
5800
5600
5400
5200
5000

Noise Contours (Leq,15min) Road overbridges, underbridges and pavement works Scenario 6

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

Noise contours - Road overbridges, underbridges and pavement works (Scenario 6)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers

INLAND RAIL ARTC

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19800
19600
19400
19200
19000
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18000
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13800
13600
13400
13200
13000
12800
12600
12400
12200
12000
11800
11600
11400
11200
11000

Noise Contours (Leq,15min) Road overbridges, underbridges and pavement works Scenario 6

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

ILLABO TO STOCKINBINGAL

Noise contours - Road overbridges, underbridges and pavement works (Scenario 6)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers

INLAND RAIL ARTC

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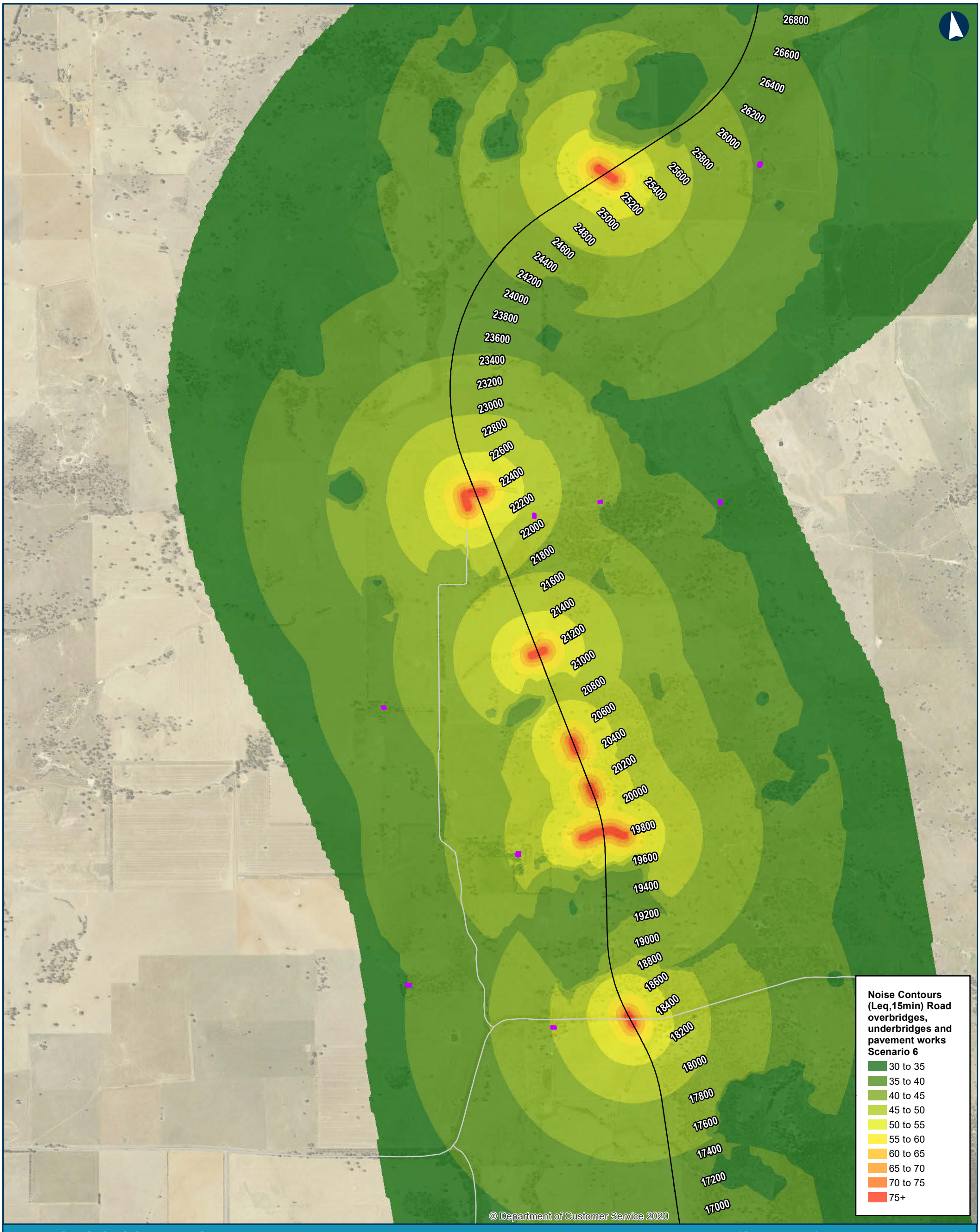


ILLABO TO STOCKINBINGAL

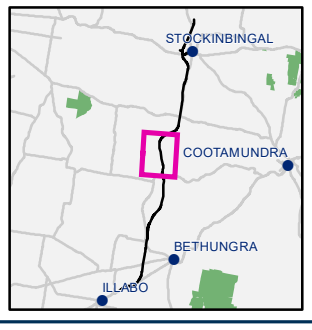
Noise contours - Road overbridges, underbridges and pavement works (Scenario 6)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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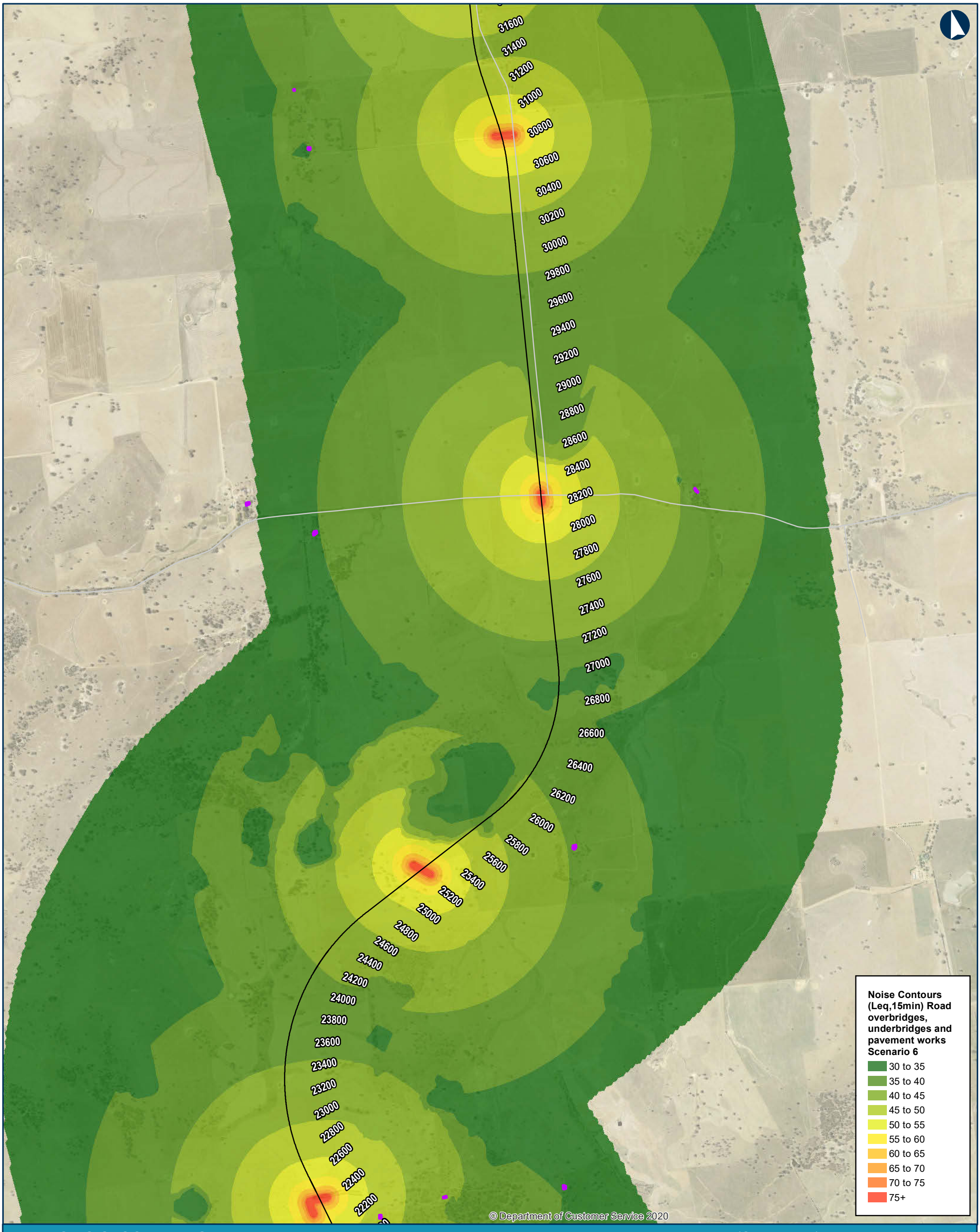
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario6_r1v1.mxd



ILLABO TO STOCKINBINGAL

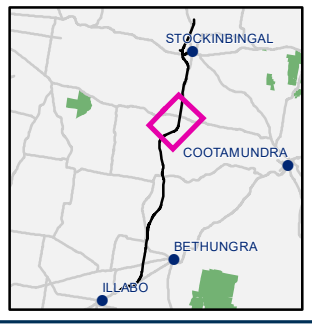
Noise contours - Road overbridges, underbridges and pavement works (Scenario 6)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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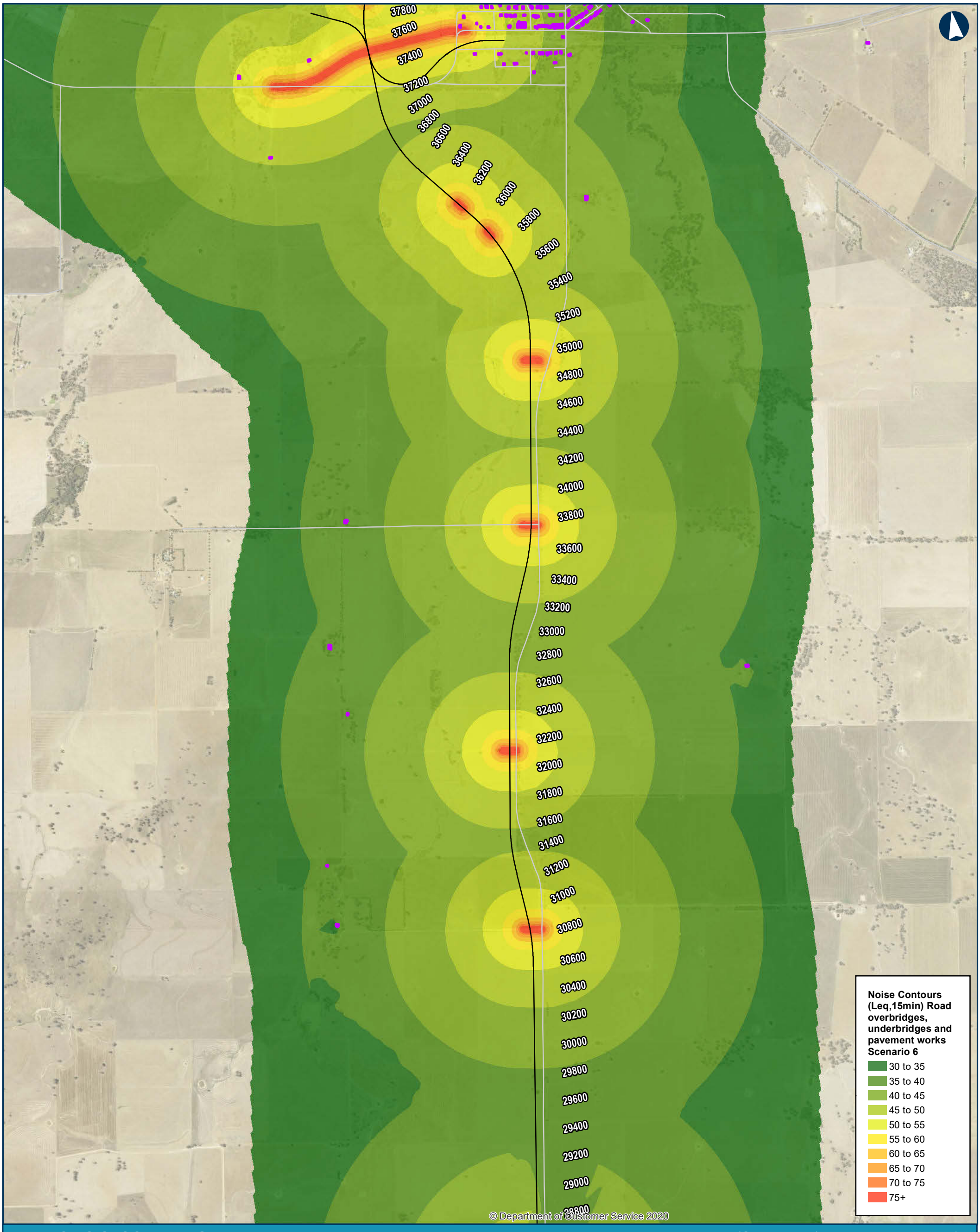
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario6_r1v1.mxd



ILLABO TO STOCKINBINGAL

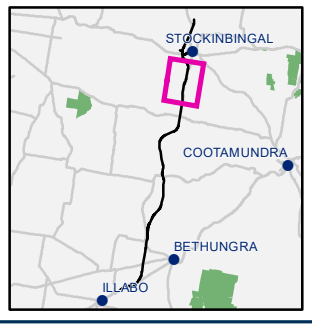
Noise contours - Road overbridges, underbridges and pavement works (Scenario 6)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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

G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario6_r1v1.mxd

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Noise Contours (Leq,15min) Road overbridges, underbridges and pavement works Scenario 6

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- 70 to 75
- 75+

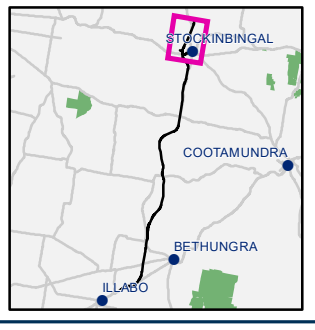
ILLABO TO STOCKINBINGAL Noise contours - Road overbridges, underbridges and pavement works (Scenario 6)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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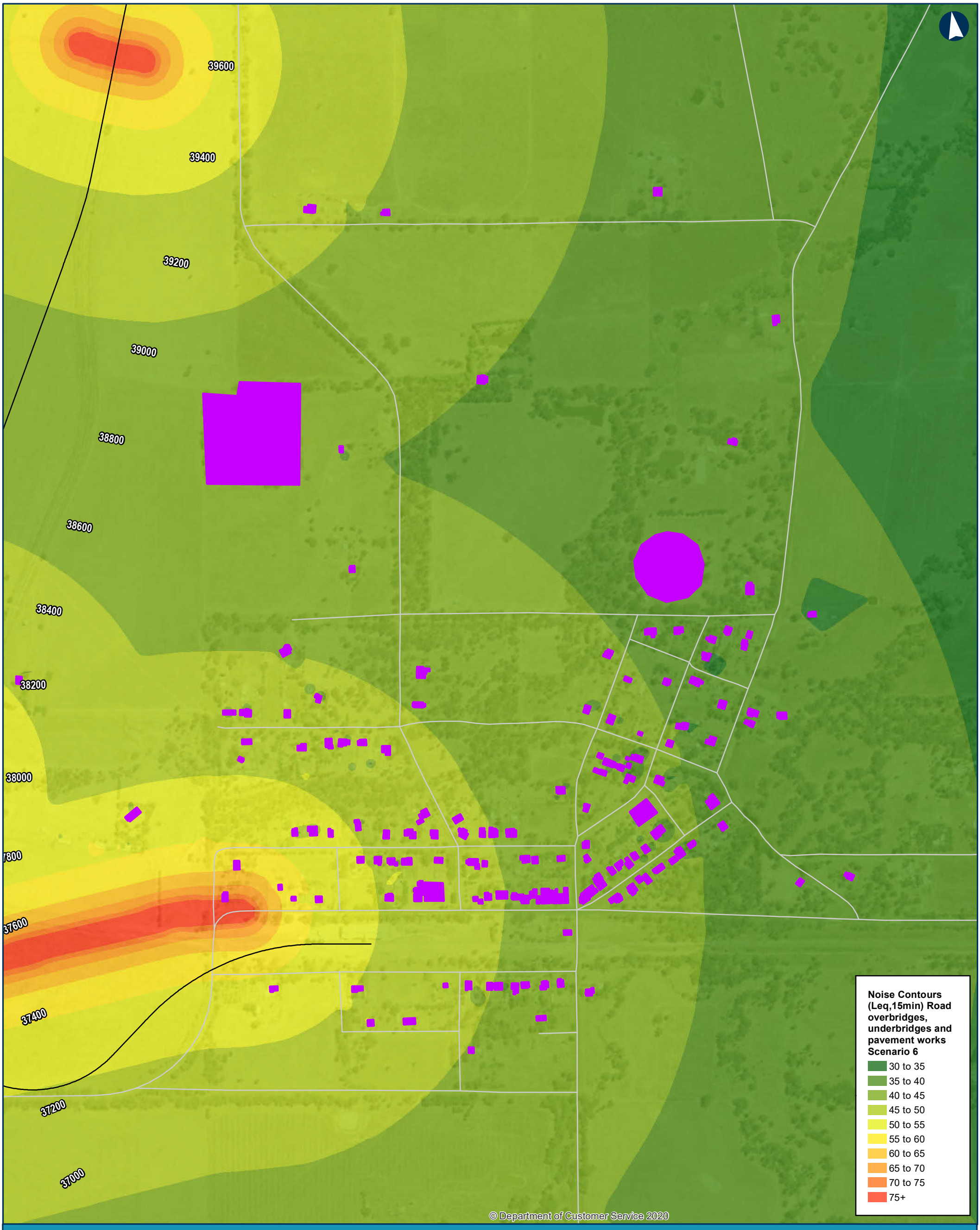


ILLABO TO STOCKINBINGAL

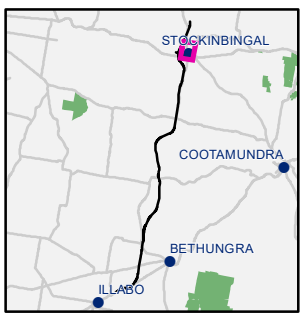
Noise contours - Road overbridges, underbridges and pavement works (Scenario 6)

0 0.09 0.18 0.27 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:7,500
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL

ARTC

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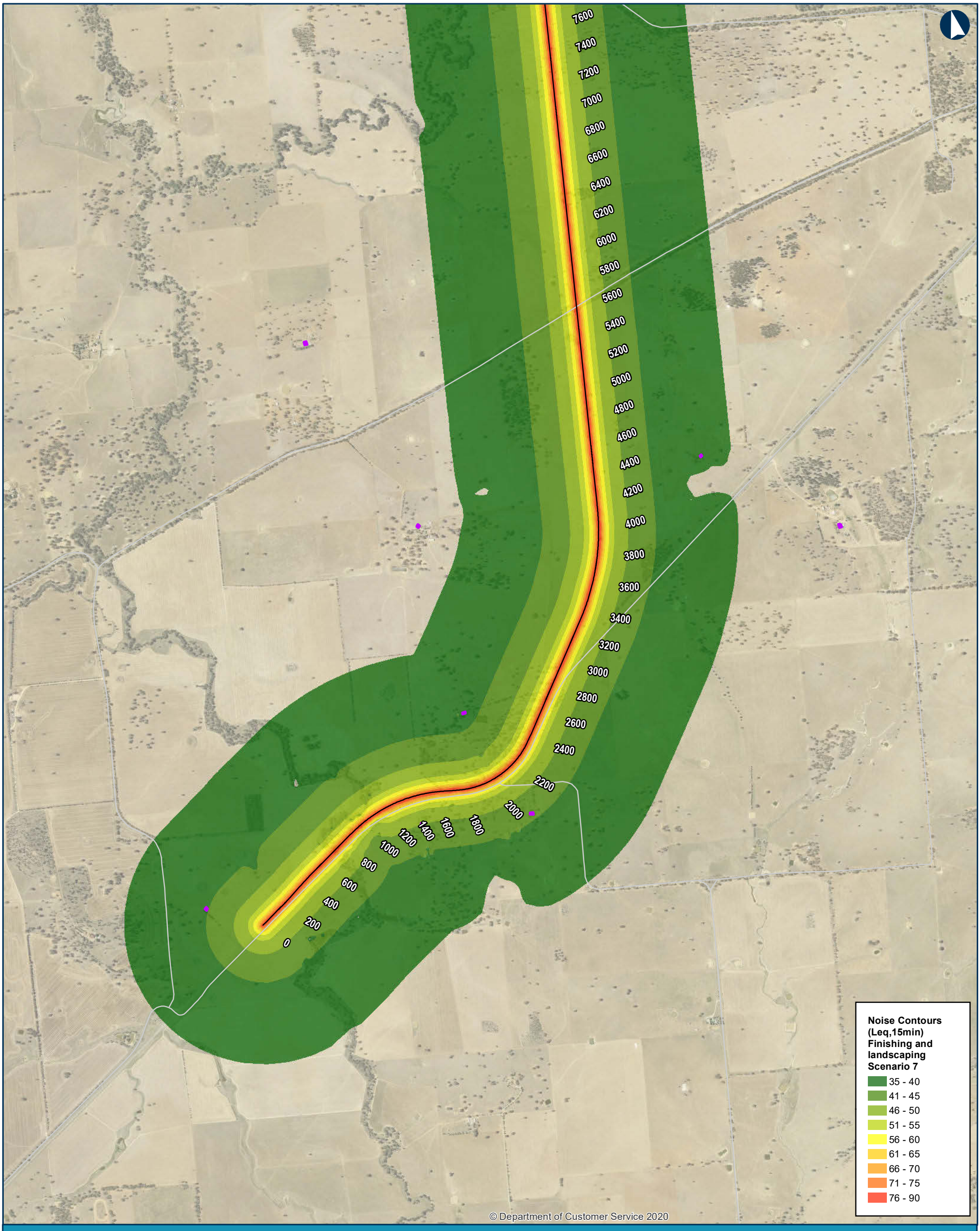


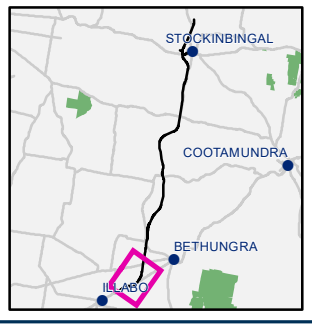
ILLABO TO STOCKINBINGAL Noise contours - Finishing and landscaping (Scenario 7)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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7000
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5000

Noise Contours (Leq,15min) Finishing and landscaping Scenario 7

- 35 - 40
- 41 - 45
- 46 - 50
- 51 - 55
- 56 - 60
- 61 - 65
- 66 - 70
- 71 - 75
- 76 - 90

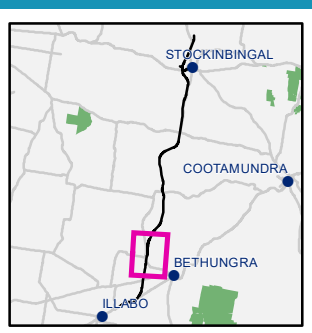
ILLABO TO STOCKINBINGAL Noise contours - Finishing and landscaping (Scenario 7)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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

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Noise Contours (Leq,15min) Finishing and landscaping Scenario 7

- 35 - 40
- 41 - 45
- 46 - 50
- 51 - 55
- 56 - 60
- 61 - 65
- 66 - 70
- 71 - 75
- 76 - 90

ILLABO TO STOCKINBINGAL

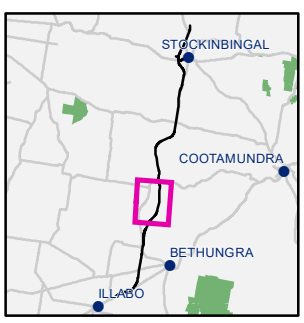
Noise contours - Finishing and landscaping (Scenario 7)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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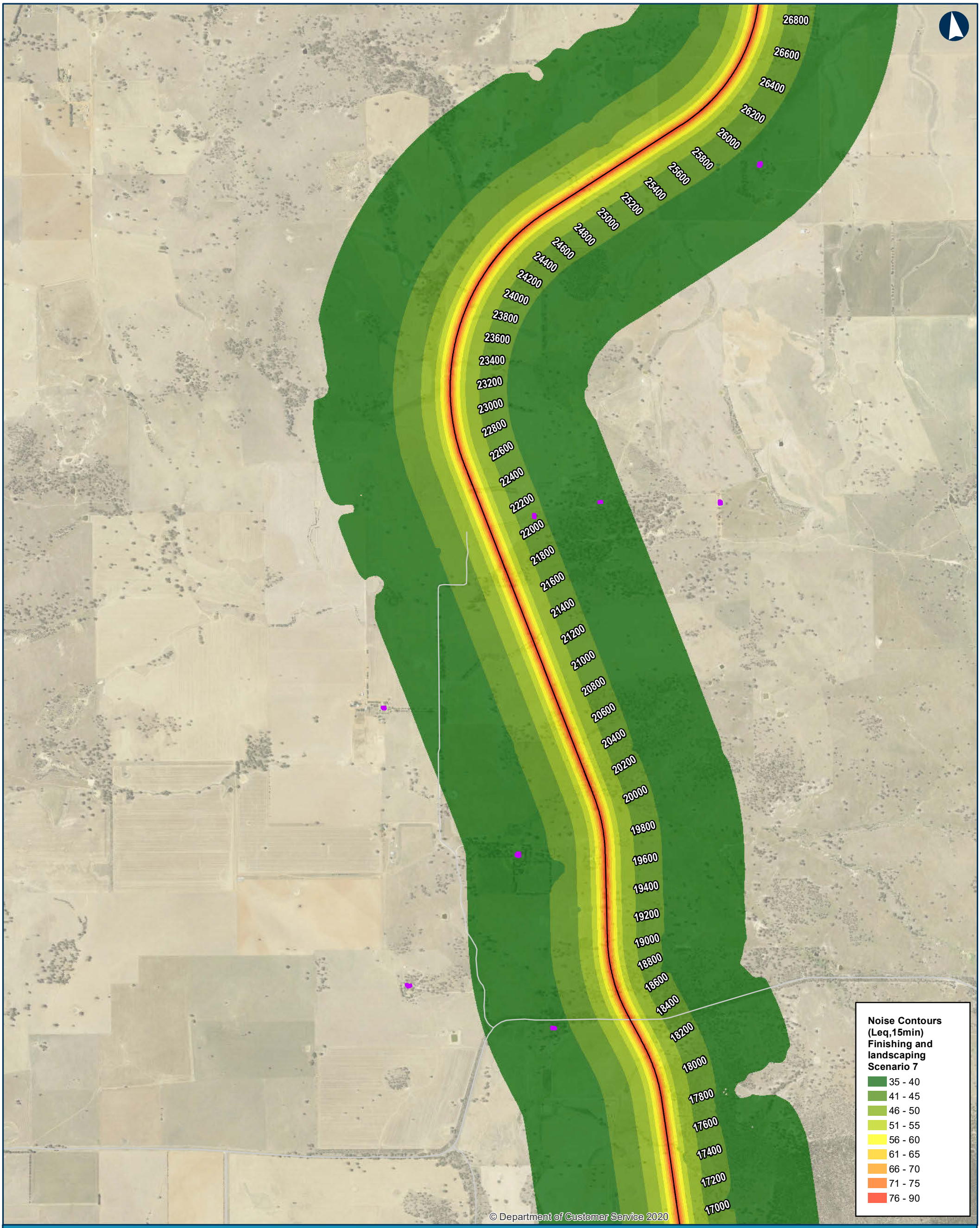


ILLABO TO STOCKINBINGAL

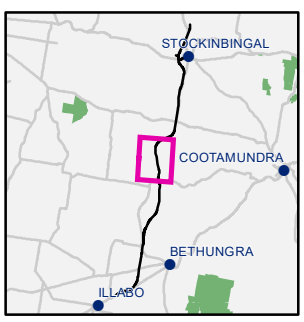
Noise contours - Finishing and landscaping (Scenario 7)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

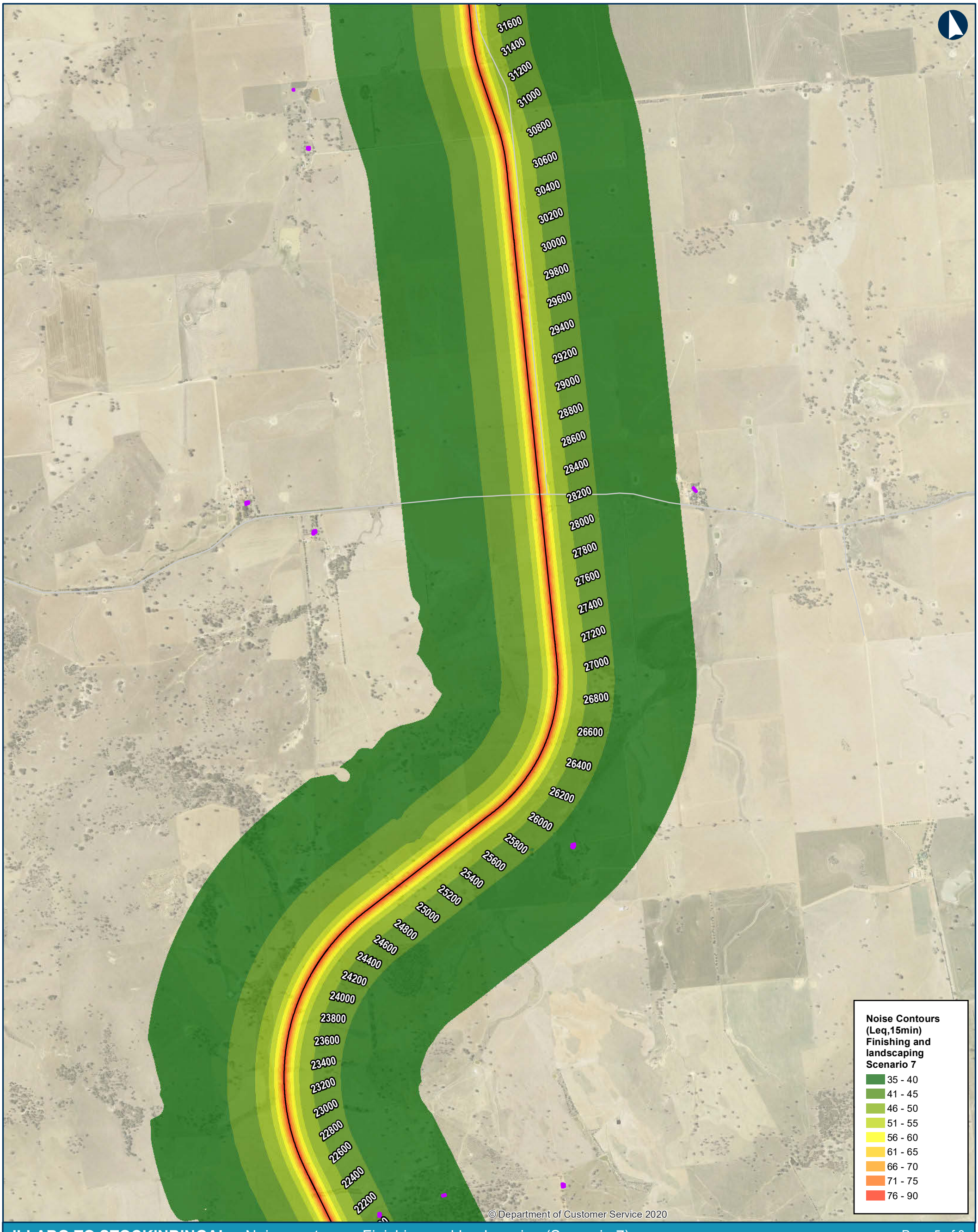
Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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



ILLABO TO STOCKINBINGAL Noise contours - Finishing and landscaping (Scenario 7)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers

INLAND RAIL ARTC

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

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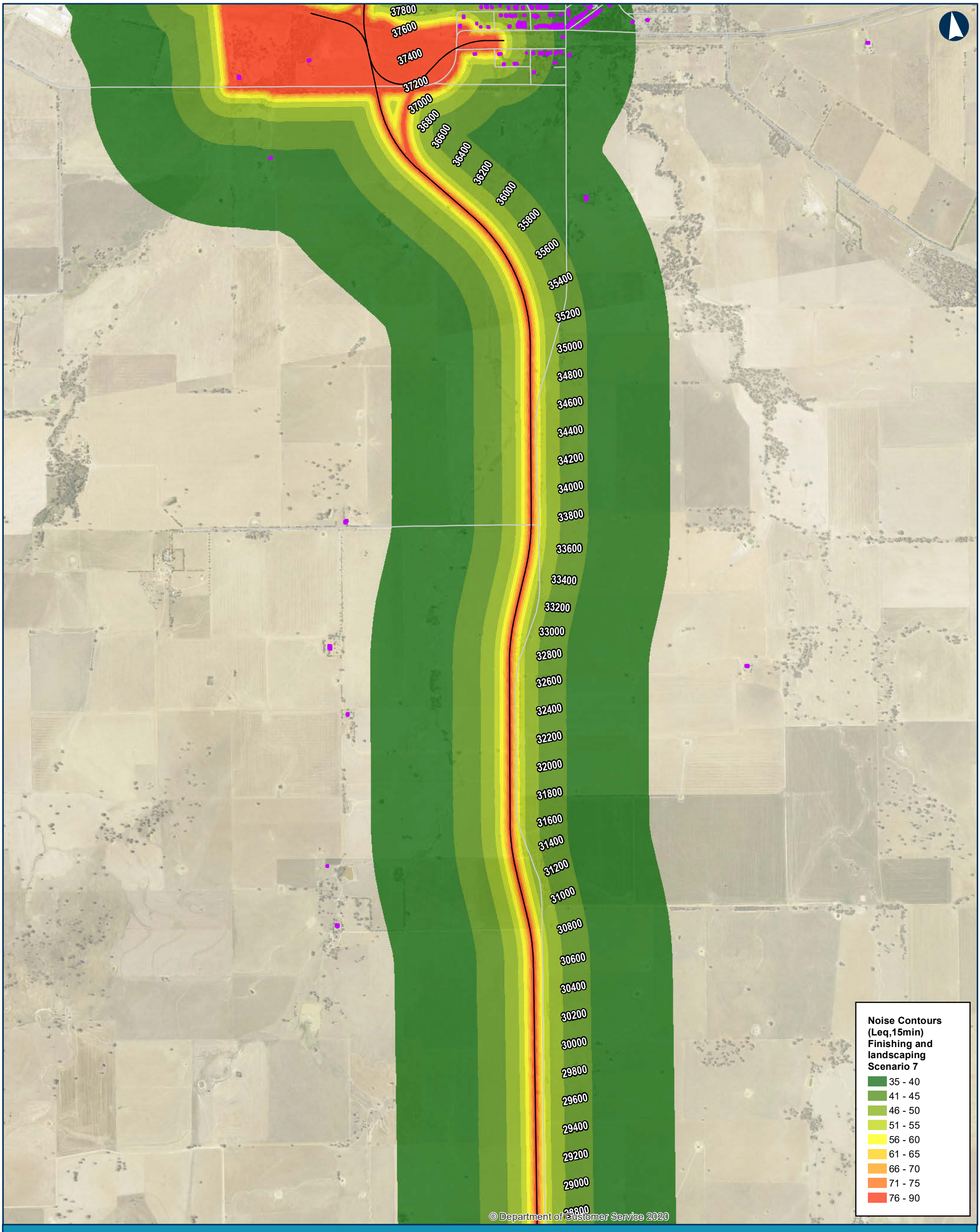


ILLABO TO STOCKINBINGAL

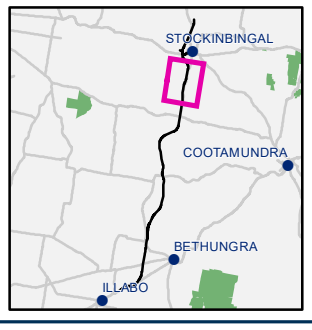
Noise contours - Finishing and landscaping (Scenario 7)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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Noise Contours (Leq,15min) Finishing and landscaping Scenario 7

- 35 - 40
- 41 - 45
- 46 - 50
- 51 - 55
- 56 - 60
- 61 - 65
- 66 - 70
- 71 - 75
- 76 - 90

ILLABO TO STOCKINBINGAL

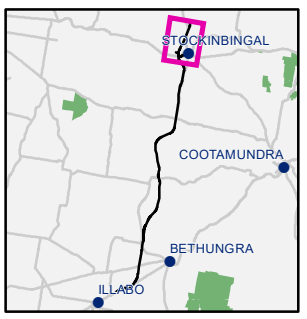
Noise contours - Finishing and landscaping (Scenario 7)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario7_r1v1.mxd

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Noise Contours (Leq,15min) Finishing and landscaping Scenario 7

- 35 - 40
- 41 - 45
- 46 - 50
- 51 - 55
- 56 - 60
- 61 - 65
- 66 - 70
- 71 - 75
- 76 - 90

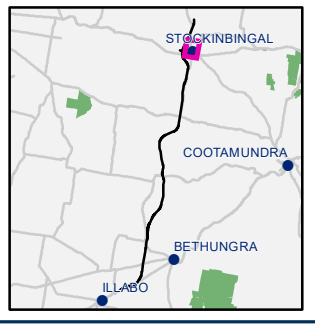
ILLABO TO STOCKINBINGAL Noise contours - Finishing and landscaping (Scenario 7)

0 0.09 0.18 0.27 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:7,500
Data Sources: IRDJV, ARTC, LPI

- Roads
- New track/track upgrades
- Sensitive Receivers



INLAND RAIL ARTC

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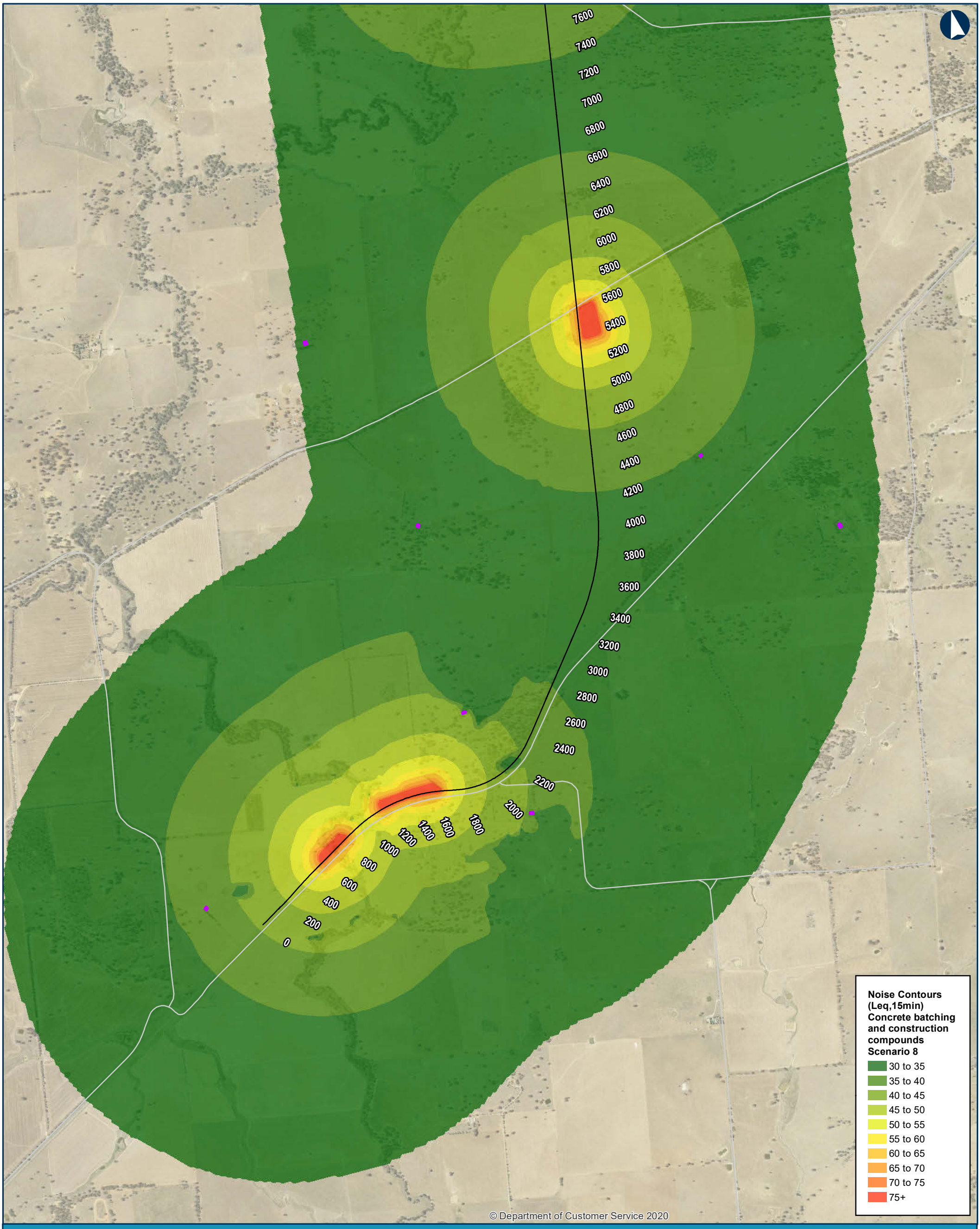


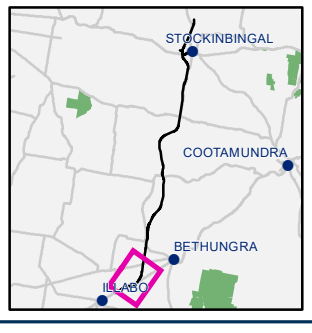
ILLABO TO STOCKINBINGAL Noise contours - Concrete batching and construction compounds (Scenario 8)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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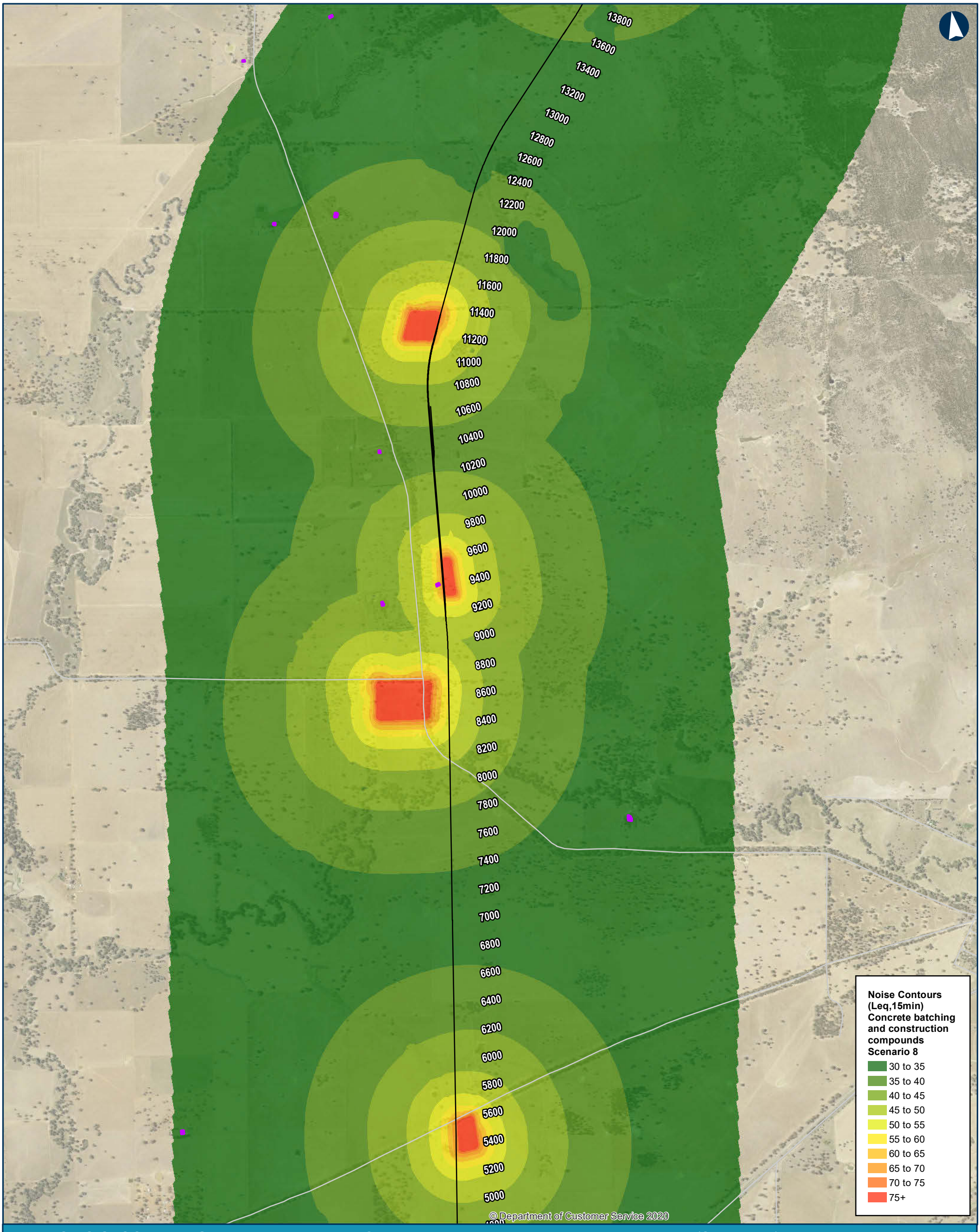
G:\Projects\PS108286_I2S\Tasks\220_0116_ENV_EISReport100PercentResubmission\Documents\Specialists\Noise\220_0116_NOI_Scenario8_r1v1.mxd



ILLABO TO STOCKINBINGAL

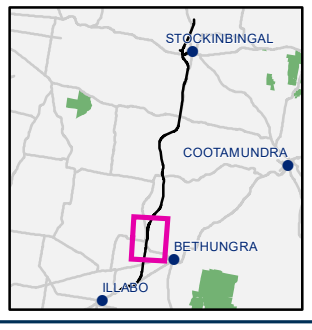
Noise contours - Concrete batching and construction compounds (Scenario 8)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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Noise Contours (Leq,15min)
Concrete batching and construction compounds
Scenario 8
30 to 35
35 to 40
40 to 45
45 to 50
50 to 55
55 to 60
60 to 65
65 to 70
70 to 75
75+

ILLABO TO STOCKINBINGAL

Noise contours - Concrete batching and construction compounds (Scenario 8)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers

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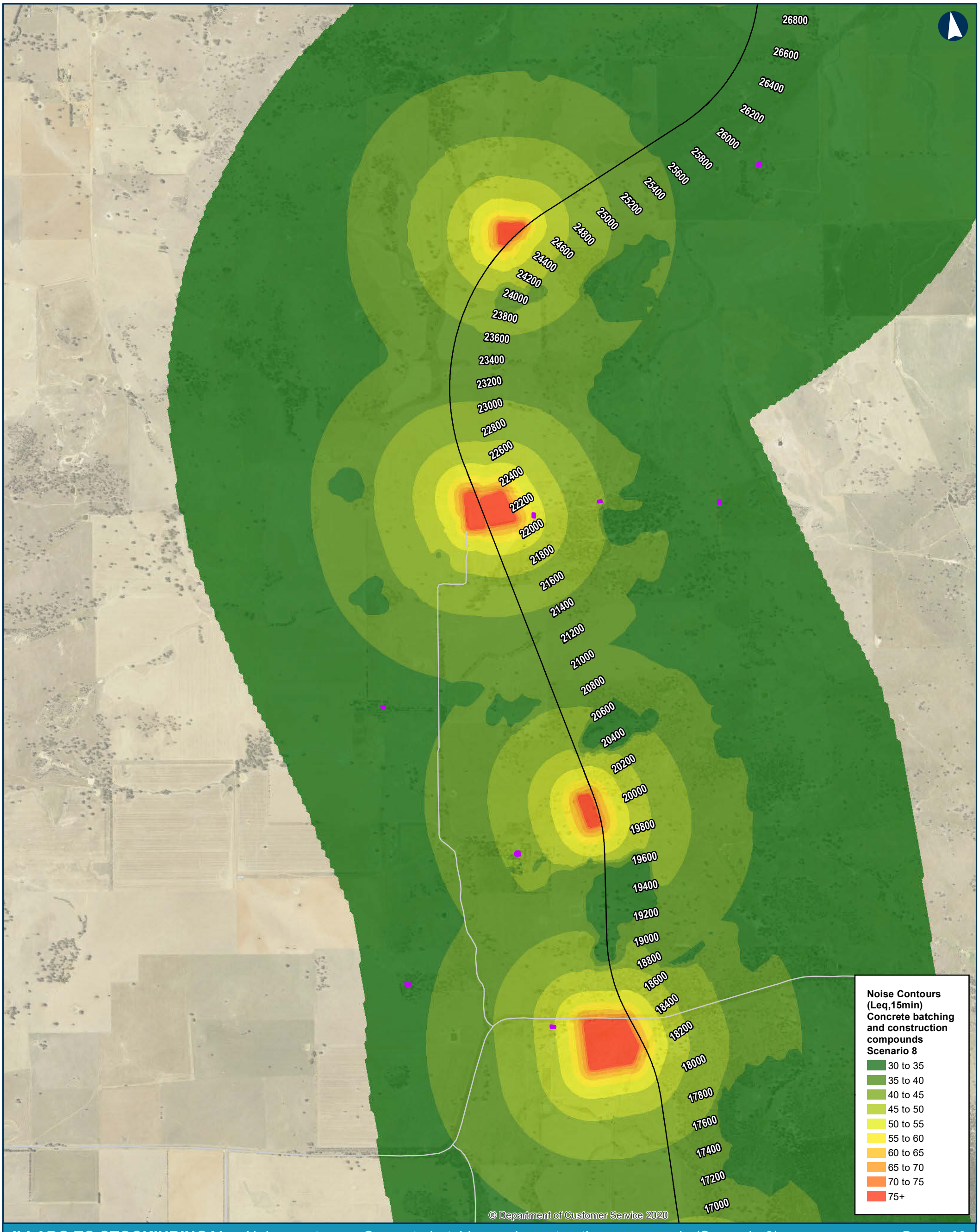


ILLABO TO STOCKINBINGAL

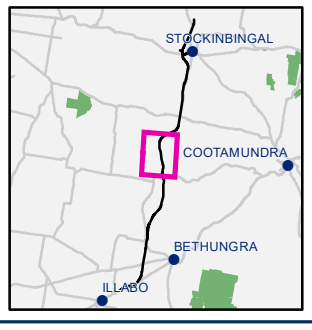
Noise contours - Concrete batching and construction compounds (Scenario 8)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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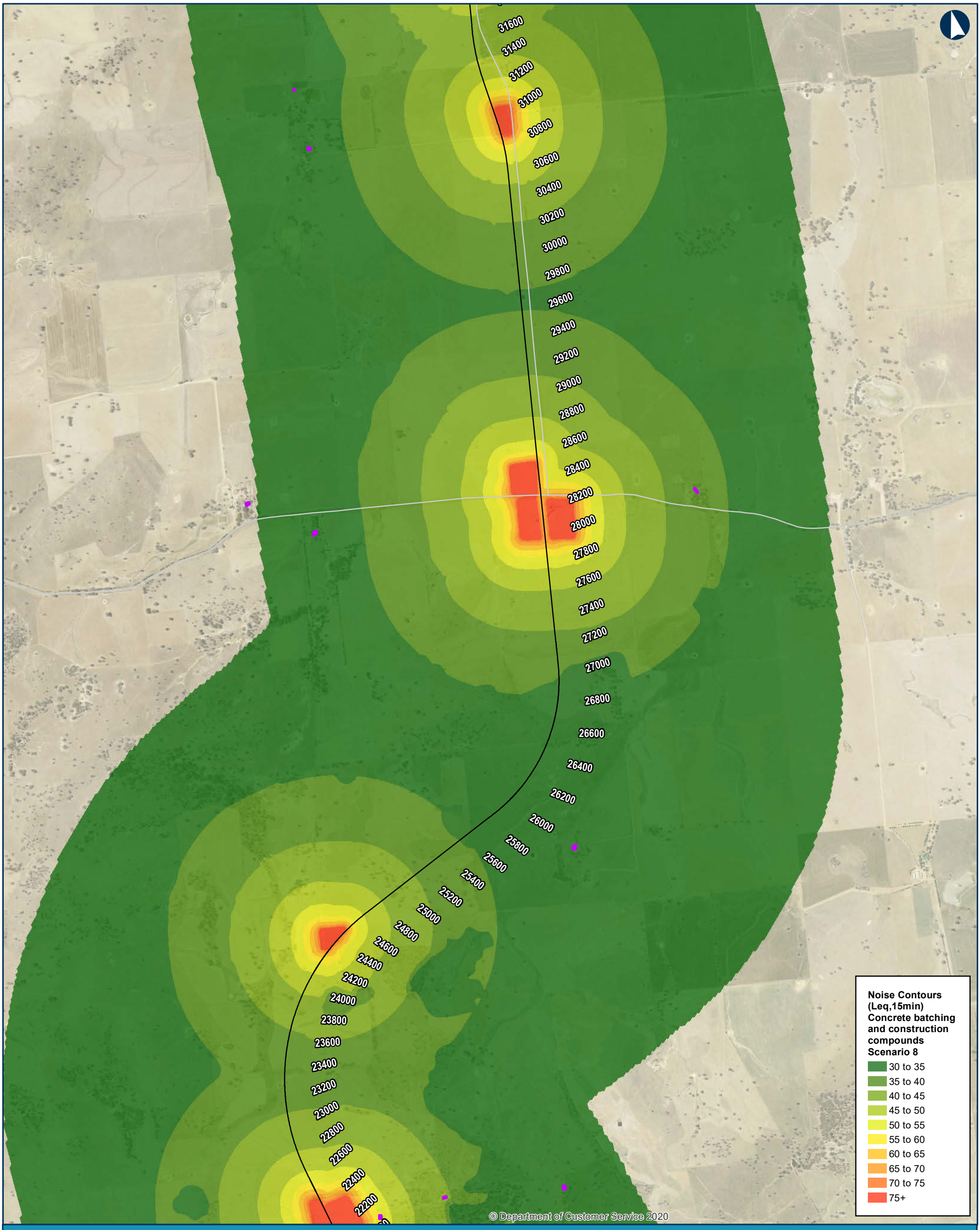


ILLABO TO STOCKINBINGAL

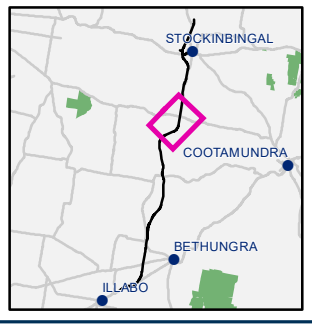
Noise contours - Concrete batching and construction compounds (Scenario 8)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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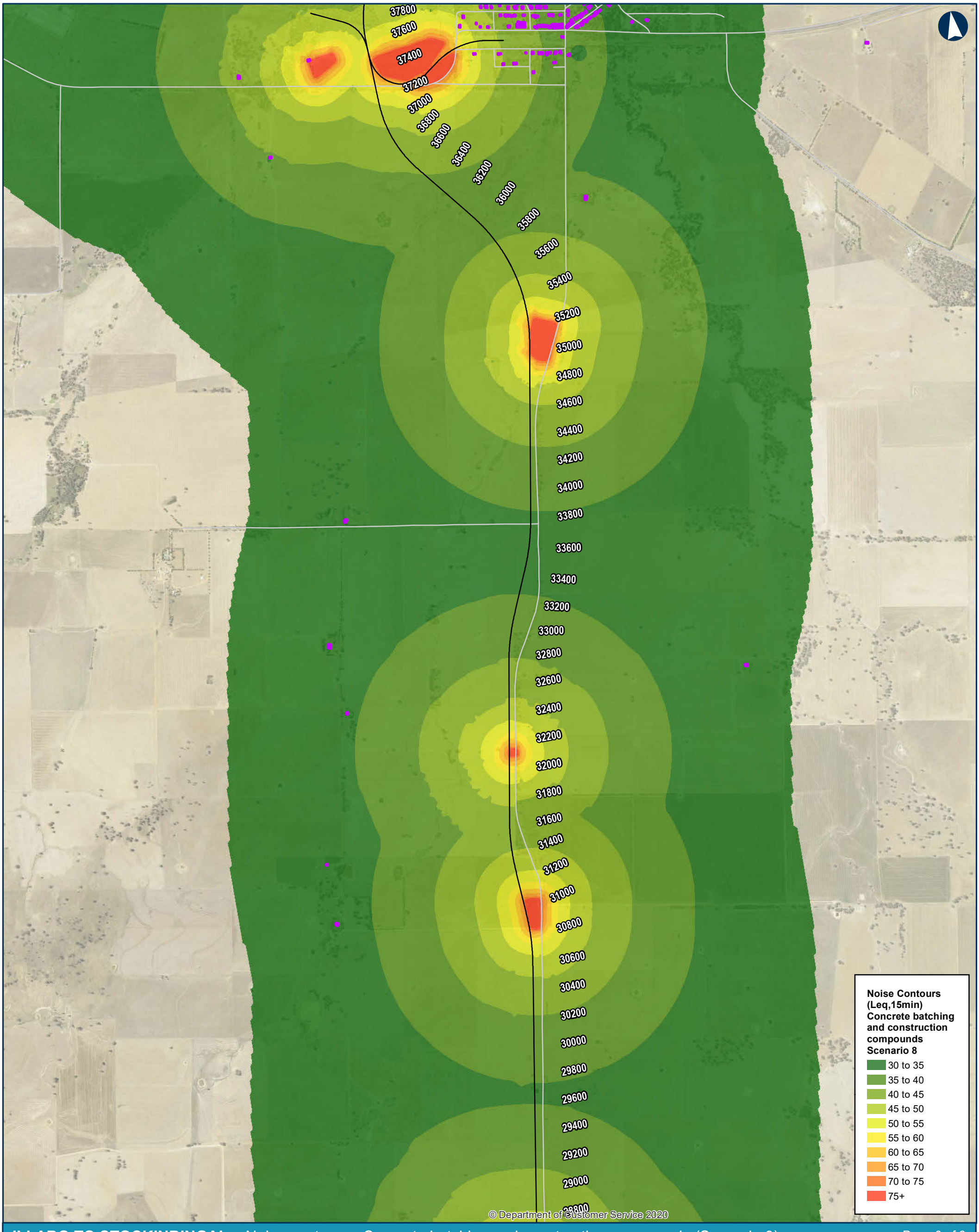


ILLABO TO STOCKINBINGAL

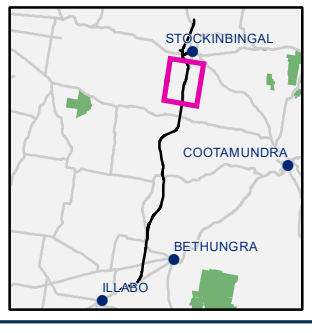
Noise contours - Concrete batching and construction compounds (Scenario 8)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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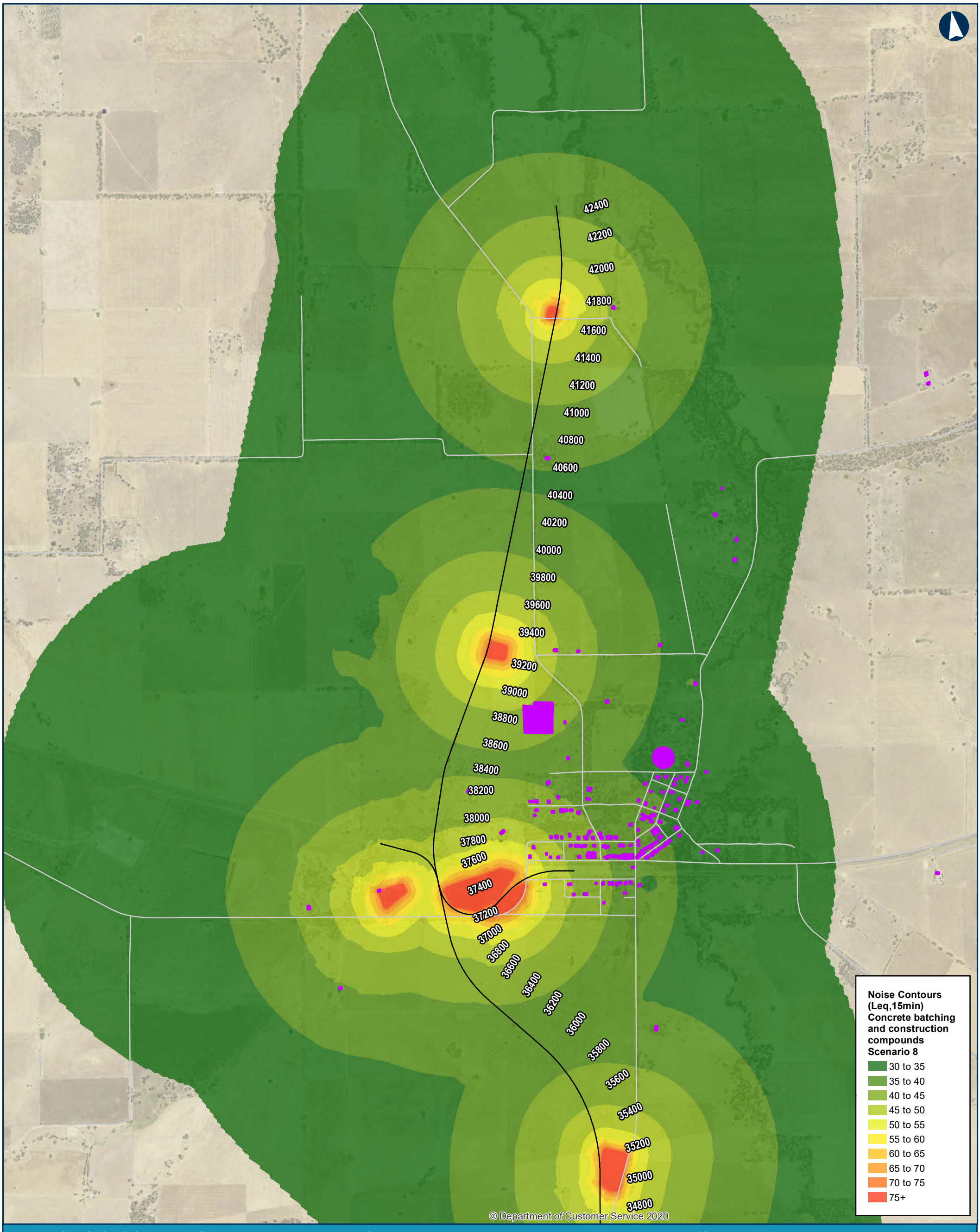


ILLABO TO STOCKINBINGAL

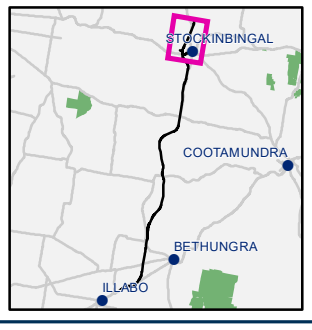
Noise contours - Concrete batching and construction compounds (Scenario 8)

0 0.3 0.6 0.9 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:25,000
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



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38600
38400
38200
38000
37800
37600
37400
37200
37000

Noise Contours (Leq,15min)
Concrete batching and construction compounds
Scenario 8
30 to 35
35 to 40
40 to 45
45 to 50
50 to 55
55 to 60
60 to 65
65 to 70
70 to 75
75+

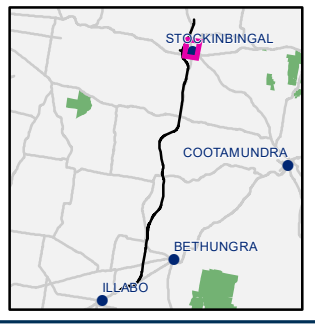
ILLABO TO STOCKINBINGAL Noise contours - Concrete batching and construction compounds (Scenario 8)

0 0.09 0.18 0.27 Kilometers

Coordinate System: GDA 1994 MGA Zone 55

Date: 10/27/2021 Paper: A3
Author: IRDJV Scale: 1:7,500
Data Sources: IRDJV, ARTC, LPI

Roads
New track/track upgrades
Sensitive Receivers



INLAND RAIL ARTC

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

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TECHNICAL REPORT

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Construction Noise and Vibration Impact

Appendix E Standard noise and vibration mitigation measures

ILLABO TO STOCKINBINGAL ENVIRONMENTAL IMPACT STATEMENT

E.1 Standard mitigation measures

Standard management measures
Site inductions for all employees and contractors will address: • environmental aspects and impacts • proposal specific and standard noise management measures • licence and approval conditions • hours of work • environmental incident reporting and management procedures • 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) • 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 will consider noise impacts, and opportunities to shield receivers from noise through the use of site buildings and stockpiles should be considered.
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 off-set distance between noisy plant and noise sensitive receivers will be maximized.
The number of vehicle trips to and from site will be optimized.
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 plant (excluding light vehicles).
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 will 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 will be provided to the community (e.g. via newsletter, email and/or website).
Noise or vibration monitoring in response to complaints will be undertaken where the results or the process assist in resolving or understanding the receiver's issue.
Where vibration levels are predicted to approach the criteria for cosmetic building damage or limits for critical or sensitive areas, attended vibration measurements should 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 will be undertake.

TECHNICAL REPORT

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Construction Noise and Vibration Impact

Appendix F Blasting charge sizing

F.1 Blasting charge sizing

ID	Start chainage (m)	End chainage (m)	Nearest receiver	Building type	Distance (m)	Overpressure		Ground-borne vibration
						Maximum instantaneous charge (kg) for sensitive receivers	Maximum instantaneous charge (kg) for non-sensitive receivers	Maximum instantaneous charge (kg) for sensitive receivers
Cut 13	12745	13040	184DP751396	Residential	1350	16.6	1210.0	2057
Cut 15	13875	14165	3DP591854	Residential	1820	40.7	2964.8	3739
Cut 18	16525	16825	1DP567950	Residential	1450	20.6	1499.3	2373
Cut 19	16950	17380	303DP751401	Residential	1330	15.9	1157.0	1997
Cut 20	18731	19170	303DP751401	Residential	510	0.9	65.2	294
Cut 22	19585	19905	25DP751401	Residential	610	1.5	111.6	420
Cut 23	20260	20450	25DP751401	Residential	720	2.5	183.6	585
Cut 24	20740	21295	25DP751401	Residential	1030	7.4	537.4	1197
Cut 29	25210	25740	22DP750598	Residential	690	2.2	161.6	537
Cut 30	26475	26725	22DP750598	Residential	750	2.9	207.5	635
Cut 40	38085	42518	1DP1093937	Residential	190	0.05	3.4	41