



Daunia West Infrastructure Project

Noise and Vibration Impact Assessment

Whitehaven Coal Limited

Level 31, 12 Creek Street, Brisbane QLD 4001

Prepared by:

SLR Consulting Australia Pty Ltd

SLR Project No.: 620.042120.00001

20 March 2026

Revision: 1.1

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.0	18 August 2025	SH	GC/ SE	SH
1.1	20 March 2026	SH	GC/ SE	SH
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Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Whitehaven Coal Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Executive Summary

Introduction

Whitehaven Daunia Pty Ltd (WHC) owns and operates the Daunia Mine (DNM), located approximately 25 kilometres (km) southeast of Moranbah in Central Queensland, on Mining Leases (ML) 1781, ML70115 and ML70116. WHC proposes the construction and operation of an out of pit dump (OOPD) to the west of, and adjacent to, ML1781, off-lease from DNM (the Project).

The Project is required to support ongoing open-cut mining in the Pandora Pit, which contains the 'Pandora' resource, one of the remaining undeveloped resources within the DNM. WHC will lodge a mining lease application (MLA) to secure tenure for the OOPD supporting the operations within the existing ML1781.

This technical assessment has considered noise and vibration impacts from the Project operations on the surrounding sensitive receptors. The assessment has been prepared to support an application for an Environmental Authority (EA) Amendment for the Project.

Existing Environment

To assist with defining the pre-Project acoustic environment, unattended and operator attended noise monitoring was completed at the closest receptor to the project site between September and October 2021 (refer to **Table E-1**).

Table E-1 Existing Acoustic Environment

Monitoring Location	RBLs (dBA)			LAeq Noise Levels (dBA)		
	Day	Evening	Night	Day	Evening	Night
R1 Olive Downs Homestead	33	29	29	44	49 ¹	43

Note 1: Evening period LAeq noise level primarily attributed to insect noise.

It is important to note that the results presented in **Table E-1** have not been filtered for insect noise because the evening and night-time period RBLs were below the Department of Environment, Tourism, Science and Innovation's (DETSI) Model Mining Conditions (MMC) guideline threshold background noise level of 30 dBA.

Noise and Vibration Assessment Criteria

In relation to noise and vibration, DNM's EA (EPML00561913) Conditions C1 and C5 (noise and vibration nuisance) requires DNM not to cause an environmental nuisance at any sensitive place or commercial place. Condition C4 requires noise monitoring when requested by the Administering Authority (EA Condition A14). Conditions C2, C6 and C8 specify the noise levels and vibration/airblast overpressure nuisance levels that are not to be exceeded when monitored in accordance with Condition A11.

Potential noise impacts from the Project have been assessed against the noise limits prescribed in the current DNM EA, which are outlined in **Table E-2**.



Table E-2 DNM EA Schedule C Table C1 (Noise Limits)

Noise Level (dBA)	Monday to Sunday (including public holidays)		
	Day 7 am – 6 pm	Evening 6 pm – 10 pm	Night 10 pm – 7 am
Sensitive Place			
LAeq, adj,10mins	38	35 ¹	33 ¹
LA MAX, adj,10mins	43	40 ¹	38 ¹
Commercial Place			
LAeq, adj,10mins	43	40 ¹	35 ¹
LA MAX, adj,10mins	48	45 ¹	40 ¹

Note 1: Based on the MMC threshold background noise level of 30 dBA.

No resource extraction and therefore blasting will be undertaken within the proposed MLA area. Other potential sources of vibration such as dumping of waste material and heavy vehicle movement on haul roads is not anticipated to result in vibration impacts to sensitive receptors. Nonetheless, a qualitative assessment of vibration has been provided in this study.

An assessment of the potential for cumulative noise impacts from DNM and other surrounding mines has been completed with regard to the Acoustic Quality Objectives (AQO) contained within the *Environmental Protection (Noise) Policy 2019* ((EPP(Noise))).

Mine Operation

The technical assessment has modelled DNM with the Project noise emission levels from two (2) operational mining scenarios coinciding with FY2028 and FY2031 (summarised in **Table E-3**). Through a review of the Project information supplied by WHC as part of the assessment, these two (2) modelled scenarios were selected to represent various stages of the Project and operational intensity including the maximum fleet size, as well as targeting proximity of mining operations to noise sensitive receptors surrounding the Project.

Project noise emission levels predicted at the receptors surrounding DNM are presented in **Table E-3**.



Table E-3 Predicted DNM Operational Noise Levels – Neutral and Adverse Weather

ID	Description	Predicted DNM Noise Level (adj, 10 mins dBA)			
		FY2028		FY2031	
		LAeq	LAmx	LAeq	LAmx
Neutral Weather: 10 °C temperature, 70% humidity, 'D' Pasquill stability class, 0 m/s wind speed					
EPML00561913 noise limits ¹		33	38	33	38
R1	Olive Downs Homestead ²	45	48	41	44
R2	Daunia Homestead	25	28	25	28
R3	Devlin Creek Homestead	16	19	15	18
R4	Mavis Downs Homestead	21	24	20	23
R5	Winchester Downs Homestead	15	18	11	14
R6	Moorvale Works Accommodation	13	16	13	16
R7	Moorvale Residence	13	16	12	15
R8	Annadale Residence	12	15	11	14
R9	Tarkari Residence	15	18	15	18
R10	Wotonga Residence	13	16	10	13
Adverse Weather: 10 °C temperature, 90% humidity, 'F' Pasquill stability class, 0 m/s wind speed					
R1	Olive Downs Homestead ²	51	54	46	49
R2	Daunia Homestead	30	33	30	33
R3	Devlin Creek Homestead	21	24	19	22
R4	Mavis Downs Homestead	26	29	25	28
R5	Winchester Downs Homestead	19	22	15	18
R6	Moorvale Works Accommodation	18	21	17	20
R7	Moorvale Residence	16	19	16	19
R8	Annadale Residence	16	19	15	18
R9	Tarkari Residence	19	22	19	22
R10	Wotonga Residence	16	19	14	17

Note 1: Noting 24 hour operations at DNM, the limits are based on the most stringent noise limit corresponding to the night-time period

Note 2: Impacts to the Olive Downs Homestead is expected to be managed through a non-residency agreement (i.e. similar to the Winchester South Mine agreement) which WHC are currently negotiating with the landowner.

The assessment identified the following in relation to the potential for noise impacts from DNM with the Project:

- Under neutral weather conditions, the predicted noise levels for the FY2028 and FY2031 modelled scenarios comply with the EA noise limits at all sensitive receptors. The highest noise levels of 25 dBA LAeq,adj,10mins and 28 dBA LAmx,adj,10mins were predicted at sensitive receptor R2 (Daunia Homestead).
- Likewise, under adverse weather conditions, the predicted noise levels for the FY2028 and FY2031 modelled scenarios comply with the EA noise limits at all



sensitive receptors. The highest noise levels of 30 dBA $L_{Aeq,adj,10mins}$ and 33 dBA $L_{Amax,adj,10mins}$ were predicted at sensitive receptor R2 (Daunia Homestead).

- For sensitive receptors located east and north of DNM, predicted DNM noise levels are generally consistent between the two (2) assessed mine plans of FY2028 and FY2031. Further to this, DNM noise emission levels are dominated by mining activities associated with mobile equipment (i.e. haul trucks, dozers, water trucks etc.) occurring within the ML areas and not the proposed MLA area to the south-west of the mine.
- Although DNM noise levels at the Olive Downs Homestead (R1) are predicted to exceed the EA noise limits, impacts to this receptor are expected to be managed through a non-residency agreement which is currently being negotiated between WHC and the landowner.

The technical assessment has also completed an analysis of the potential for low frequency noise impacts as defined in former and current Queensland guidelines. Neither the 48 dBC L_{eq} or 48 dBL L_{eq} predicted noise levels exceed the respective overall 60 dBC or 55 dBL L_{eq} external criteria at any sensitive receptor. Accordingly, low frequency noise is not predicted to be an issue for the Project.

Cumulative Noise

As part of the assessment of cumulative noise impacts, the following mines in vicinity to the Project and nearest sensitive receptors have been identified:

- Millennium Mine/ Mavis Mine
- Moorvale Mine
- Moorvale South Mine
- Poitrel Mine
- Winchester South Mine which is also WHC owned (noting mining operations are yet to commence however is anticipated to be operating prior to DNM closing)

It is noteworthy that there are several other mines in the region (both existing and approved for development) such as Olive Downs Mine, Eagle Downs Mine, Isaac Downs Mine, Peak Downs Mine and Caval Ridge Mine, however these mines are located a significant distance from the sensitive receptors most exposed to DNM.

The cumulative noise assessment is summarised in **Table E-4**.



Table E-4 Cumulative Mine Noise Under Adverse Weather Conditions

Receptor	Predicted LAeq (dBA) Noise Level from:						Predicted Cumulative Noise Level (LAeq dBA)
	DNM	Millennium Mine	Moorvale Mine	Moorvale South Mine	Poitrel Mine	Winchester South Mine	
Environmental Protection (Noise) Policy 2019 Acoustic Quality Objectives (night-time internal level of 30 dBA LAeq + 7 dB facade reduction) = 37 dBA LAeq,adj (external)							
R2 Daunia	30	<20 ¹	26 ²	27 ³	24 ⁴	25 ⁵	34
R3 Devlin	21	<20 ¹	27 ²	21 ³	18 ⁴	20 ⁵	30
R4 Mavis	26	21 ¹	33 ²	<20 ³	20 ⁴	<20 ⁵	34

Note 1: Predicted noise levels interpolated from the *Millennium Expansion Project Environmental Impact Statement Chapter 12: Noise and Vibration 2011* noise contour mapping.

Note 2: Based on achieving the night-time period noise limit from the existing EA EPML00802813 dated 8 August 2023 at the closest sensitive receptor (i.e. R4 Mavis Downs Homestead).

Note 3: Based on achieving the night-time period noise limit from the existing EA EPML00380113 dated 21 August 2023 at the closest sensitive receptor (i.e. R2 Daunia Homestead).

Note 4: Based on the DNM predicted noise levels in Table E-3, noting that Poitrel Mine and DNM are similarly aligned (geographically) and similar in mining intensity, and the separation distance between Poitrel Mine and the sensitive receptors.

Note 5: Predicted noise levels extrapolated from the Winchester South Project Environmental Impact Statement Attachment 14: Noise and Vibration Assessment 15 June 2022 noise contour mapping.

Cumulative mine noise levels from DNM and surrounding mines are predicted to comply with the 37 dBA LAeq EPP(Noise) AQO. It is therefore anticipated that, with the introduction of the proposed MLA area activities, cumulative noise impacts at surrounding sensitive receptors would be avoided.

Vibration

Vibration impacts resulting from activities proposed to occur within the MLA area are not expected to occur given the following:

- The nature of these works would be limited to heavy vehicle movements on maintained haul roads and dumping of waste material on the OOPD.
- The closest sensitive receptor to the proposed MLA area is the Daunia Homestead (R2) which is approximately 6.4 km to north-east. At this distance, vibration from the proposed activities would be indiscernible, that is below the threshold of perception being typically in the range of 0.14 mm/s to 0.3 mm/s (British Standard BS 5228-2:2009) and expected to be well below blasting vibration levels resulting from existing operations in ML1781 and ML70115.



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Appendix A	Acoustic Terminology
Appendix B	Baseline Noise Monitoring Results



Appendix C Wind Roses

Appendix D Predicted DNM Operational Noise Level Contour Maps



Acronyms and Abbreviations

Acronym	Definition
AQO	Acoustic Quality Objectives
AS	Australian Standards
B&K	Brüel and Kjær
BoM	Bureau of Meteorology
CHPP	Coal handling and preparation plant
CONCAWE	<i>Conservation of Clean Air and Water Europe</i>
dB	Decibel
dBA	A-weighted decibel (referenced 20 µPa)
dB(C)	C-weighted decibel
dB(L)	Unweighted decibel
DETSI	Queensland Department of Environment, Tourism, Science and Innovation
DNM	Daunia Mine
EA	Environmental Authority
EP Act	<i>Environmental Protection Act 1994</i>
EPP(Noise)	<i>Environmental Protection (Noise) Policy 2019 (Qld)</i>
FY	Financial year
Hz	Hertz
kHz	Kilohertz
Km	Kilometre
Km/hr	Kilometres per hour
LA1	The A-weighted noise level exceeded for 1% during any given measurement period
LA90	The A-weighted noise level exceeded for 90% during any given measurement period
LAeq	The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
LAeq, adj, 10mins	A-weighted equivalent sound level measured in decibels over any 10 minute period and adjusted for tonal or impulsive characteristics
LAm _{ax}	A-weighted maximum sound level during the measurement or assessment period. The LAF _{max} or Fast is averaged over 0.125 of a second
LAm _{ax} , adj, 10mins	A-weighted average maximum sound pressure level (adjusted for noise character) measured over any 10 minute period
m	Metres
MIA	Mine infrastructure area
ML	Mining Lease
MLA	Mining Lease Application
MMC	Model Mining Conditions – ESR/2016/1936, Version 6.03, Reviewed: 19 February 2024
mm/s	Millimetres per second



Mtpa	million tonnes per annum
NMM	<i>Noise Measurement Manual 2020</i>
OOPD	Out of pit dump
PGT	Pasquill-Gifford-Turner
PNC	<i>Planning for Noise Control 2004</i>
PPV	Peak Particle Velocity
QLD	Queensland
RBL	Rating Background Levels - is the overall single-figure background level representing each work period and is derived from determining the background noise level for each work period using the tenth percentile method of measured LA90,1 hour. Noise levels measured in each work period of each day are ranked from the lowest to highest with the lowest tenth percentile position taken by multiplying the number of samples within each work period by 0.1. Taking the median of background levels over all days for each work period as the RBL.
RoM	Run-of-Mine
SWL	Sound Power Level
TLF	Train loadout facility
WHC	Whitehaven Daunia Pty Ltd



1.0 Introduction

1.1 Overview

Whitehaven Daunia Pty Ltd (WHC) owns and operates the Daunia Mine (DNM), located approximately 25 kilometres (km) southeast of Moranbah in Central Queensland, on Mining Leases (ML) 1781, ML70115 and ML70116. The DNM operates under Environmental Authority (EA) EPML00561913 and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2008/4418 on ML1781, ML70115 and part of ML70116, which are illustrated on **Figure 1-1**.

The DNM is an open-cut mining operation that utilises a truck and shovel fleet, producing a hard coking coal product for the export market. It produces up to 6.1 million tonnes per annum (Mtpa) of Run-of-Mine (ROM) coal and has a production capacity of 4.9 Mtpa of product metallurgical coal. The DNM is approved for a 30-year mine plan covering defined multi-seam extents commencing in 2013 and scheduled to end in FY2041.

WHC proposes the construction and operation of an out of pit dump (OOPD) which is located to the west of and adjacent to ML1781 (the Project). The Project is required to support ongoing open-cut mining in the Pandora Pit, which contains the 'Pandora' resource, one of the remaining undeveloped resources within the DNM. WHC will lodge a mining lease application (MLA) to secure tenure for the OOPD to support continued operations within ML1781.

1.2 Purpose and Structure

This Noise and Vibration Impact Assessment Technical Report (the Report) has been prepared by SLR Consulting Australia Pty Ltd (SLR) on behalf of WHC to provide supporting information to the EA Amendment Application under Section 226 of the Environmental Protection Act 1994 (EP Act).

The structure of the Report is outlined in **Table 1-1**.

Table 1-1 Report Structure

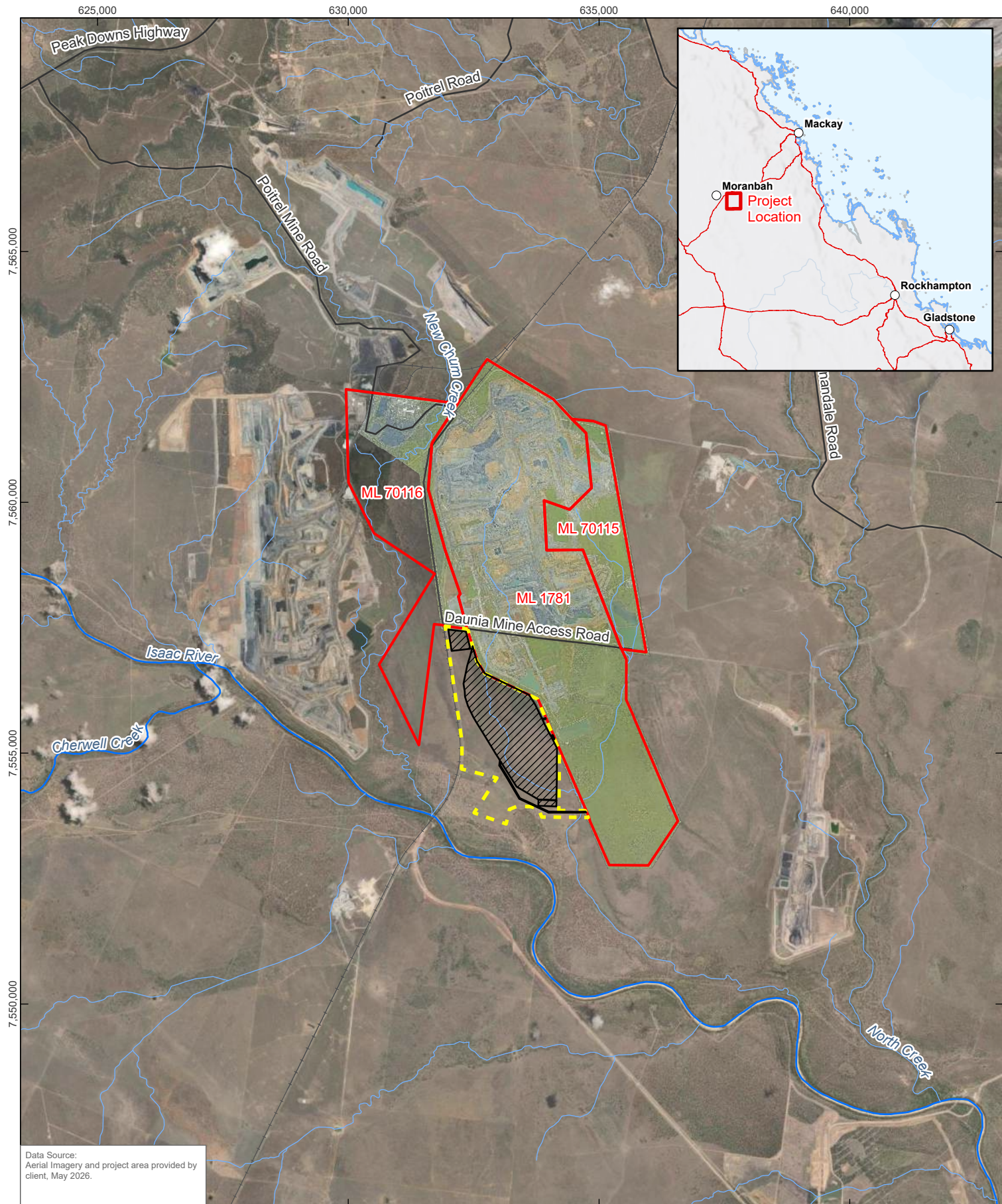
Section	Description
1.0: Introduction	Provides an overview of the purpose of the Report and outlines the structure and supporting documentation.
2.0: Project Description	Provides an overview of the Project, including site description and key noise and vibration generating Project activities.
3.0: Existing Environment	Provides an overview of the assessed sensitive receptors (noise and vibration), and a summary of baseline noise monitoring completed.
4.0: Assessment Criteria	Provides an overview of the noise and vibration assessment criteria that have been prepared for the Report based on the existing EA.
5.0: Assessment Methodology	Presents the impact assessment methodology including assumptions and inputs for the operational noise modelling and vibration assessment approach.
6.0: Noise and Vibration Impact Assessment	Presents the results from the operational noise modelling and assessment against the criteria. A qualitative discussion of vibration emission from the project has also been included.



Section	Description
7.0: Recommendations	Provides noise and vibration management recommendations for the Project based on the outcomes of the noise and vibration impact assessment.
8.0: Conclusion	Summarises the key findings of the Report.

Acoustic terminology used through this Report is explained in further detail in **Appendix A**.





Data Source:
Aerial Imagery and project area provided by
client, May 2026.

 0 1 2 km

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:100,000 at A4

Project Number: 620.042120.00001

Date Drawn: 14-May-2026

Drawn by: RB

- LEGEND**
-  Road
 -  Railway
 -  Major Watercourse
 -  Minor Watercourse
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Disturbance Footprint

DAUNIA WEST INFRASTRUCTURE PROJECT

SITE LOCATION



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FIGURE 1-1

2.0 Description of the Project

The Project Area is shown in **Figure 2-1**. The proposed construction and operation of the Project (i.e., OOPD to the west of ML1781), is required to support ongoing open-cut mining in the Pandora Pit. The Pandora resource is located within ML1781 at the southern extent of the ML. The proximity of this resource to the ML boundary, along with limited available space within the existing MLs, necessitates the development of supporting infrastructure outside the current MLs. Considering this, the Project will also require the construction of additional haul roads to transport material from the Pandora pit to the short haul OOPD.

The Project will be constructed off-lease on EPC27334 and will utilise existing infrastructure while continuing current operations at DNM. No resource extraction will be undertaken within the proposed MLA area and no additional coal extraction is proposed as part of the Project. Current and future mining is approved under the existing EA and contained within existing ML1781 and ML70115. The Project relates specifically to a new specific purpose ML (infrastructure) that is to be used for supporting infrastructure only (i.e., OOPD). Current activities undertaken within ML1781 and ML70115 will continue in accordance with existing environmental approvals.

The proposed OOPD comprising 282 ha on the MLA and a maximum height of 250 m AHD will provide a dedicated area for the overburden material to accommodate the open-cut mining in Pandora Pit, in line with the proposed 6.5 Mtpa ROM production capacity. There is insufficient existing short haul dump capacity at DNM to efficiently manage this volume of waste rock, without the Project coal extraction being significantly constrained.

Site preparation will include vegetation clearing and formalising of access tracks and haul roads. The OOPD footprint is proposed to disturb 363 ha, a portion of which (61 ha) will be located on the existing and authorised ML1781. Overburden will be used for construction material.

The life of the OOPD is approximately seven (7) years (up to and including rehabilitation). The preparation for development of the OOPD is estimated to commence in approximately FY2028.

The potential for noise emissions to be generated by the Project is anticipated to be limited to:

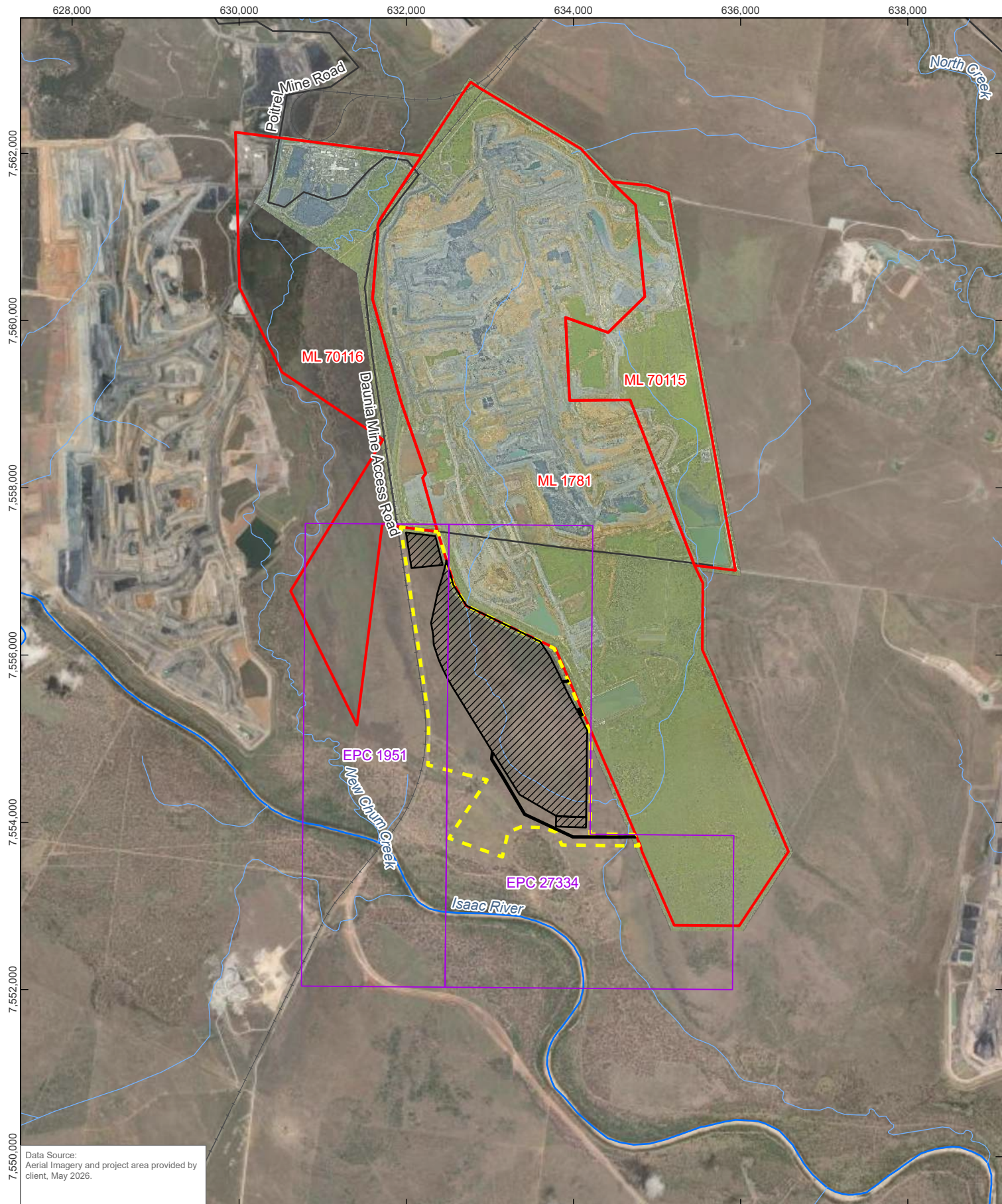
- Site preparation including vegetation clearing and development of access tracks and haul roads using mobile equipment.
- Mobile mining equipment operating on the new haul roads between the existing ML1781 and OOPD.
- Mobile mining equipment operating on the OOPD.

Potential impacts associated with cumulative mine noise emissions from DNM and surrounding existing and development-approved mines have also been considered in the assessment.

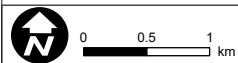
As noted above, no resource extraction will be undertaken within the proposed MLA area and therefore blasting is not proposed as part of the Project. Notwithstanding this, blasting methods will continue at DNM (i.e. within the ML1781) as currently employed with no change in intensity (i.e. frequency and/or size of blasts).

Other sources of potential vibration, such as dumping of overburden and general movement of heavy vehicles is expected to generate vibration levels that would be indiscernible at all sensitive receptor locations.





Data Source:
Aerial Imagery and project area provided by
client, May 2026.



Coordinate System: GDA2020 MGA Zone 55

Scale: 1:60,000 at A4

Project Number: 620.042120.00001

Date Drawn: 14-May-2026

Drawn by: RB

LEGEND

- Road
- Railway
- Major Watercourse
- Minor Watercourse
- Mining Lease
- Mining Lease Application Area / Project Area
- Disturbance Footprint
- Exploration Permit for Coal

DAUNIA WEST INFRASTRUCTURE PROJECT

PROJECT OVERVIEW



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FIGURE 1-3

3.0 Existing Environment

3.1 Existing Receptors

The DNM EA provides the following definitions regarding sensitive places and not sensitive places:

- a. *A sensitive place means any of the following:*
 - i. *a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or*
 - ii. *a motel, hotel or hostel; or*
 - iii. *an educational institution; or*
 - iv. *a medical centre or hospital; or*
 - v. *a protected area; or*
 - vi. *a public park or gardens.*
- b. *Despite paragraph (a), the following places are not sensitive places:*
 - i. *subject to paragraph (c), a place that is the subject of an alternative arrangement; or*
 - ii. *a mining camp (i.e., accommodation and ancillary facilities for mine employees or contractors or both, associated with the mine the subject of the environmental authority), whether or not the mining camp is located within a mining tenement that is part of the mining project the subject of the environmental authority. For example, the mining camp might be located on neighbouring land owned or leased by the same company as one of the environmental authority holders for the mining project, or a related company; or*
 - iii. *a property owned or leased by one or more of the environmental authority holders, or a related company, whether or not it is subject to an alternative arrangement.*
- c. *A place that is the subject of a current alternative arrangement in relation to a particular type(s) of environmental nuisance, is not a sensitive place for the purposes of that type(s) of environmental nuisance, however remains a sensitive place for the purpose of other types of environmental nuisances.*

The DNM EA also provides the following definitions regarding commercial places:

- a. *A work place that is used as:*
 - i. *an office; or*
 - ii. *a place of business; or*
 - iii. *a place used for commercial purposes.*
- b. *Despite paragraph (a), the following places are not commercial places:*
 - i. *subject to paragraph (c), a place that is the subject of an alternative arrangement; or*
 - ii. *places that are part of the mining activity; or*
 - iii. *employees accommodation or public roads; or*



- iv. *a property owned or leased by one or more of the environmental authority holders, or a related company, whether or not it is subject to an alternative arrangement.*
- c. *A place that is the subject of a current alternative arrangement in relation to a particular type(s) of environmental nuisance, is not a commercial place for the purposes of that type(s) of environmental nuisance, however remains a commercial place for the purpose of other types of environmental nuisances.*

Based on the above definitions, noise and vibration receptors (sensitive and not sensitive) surrounding and potentially impacted by the Project are listed in **Table 3-1** and identified on **Figure 3-1**.

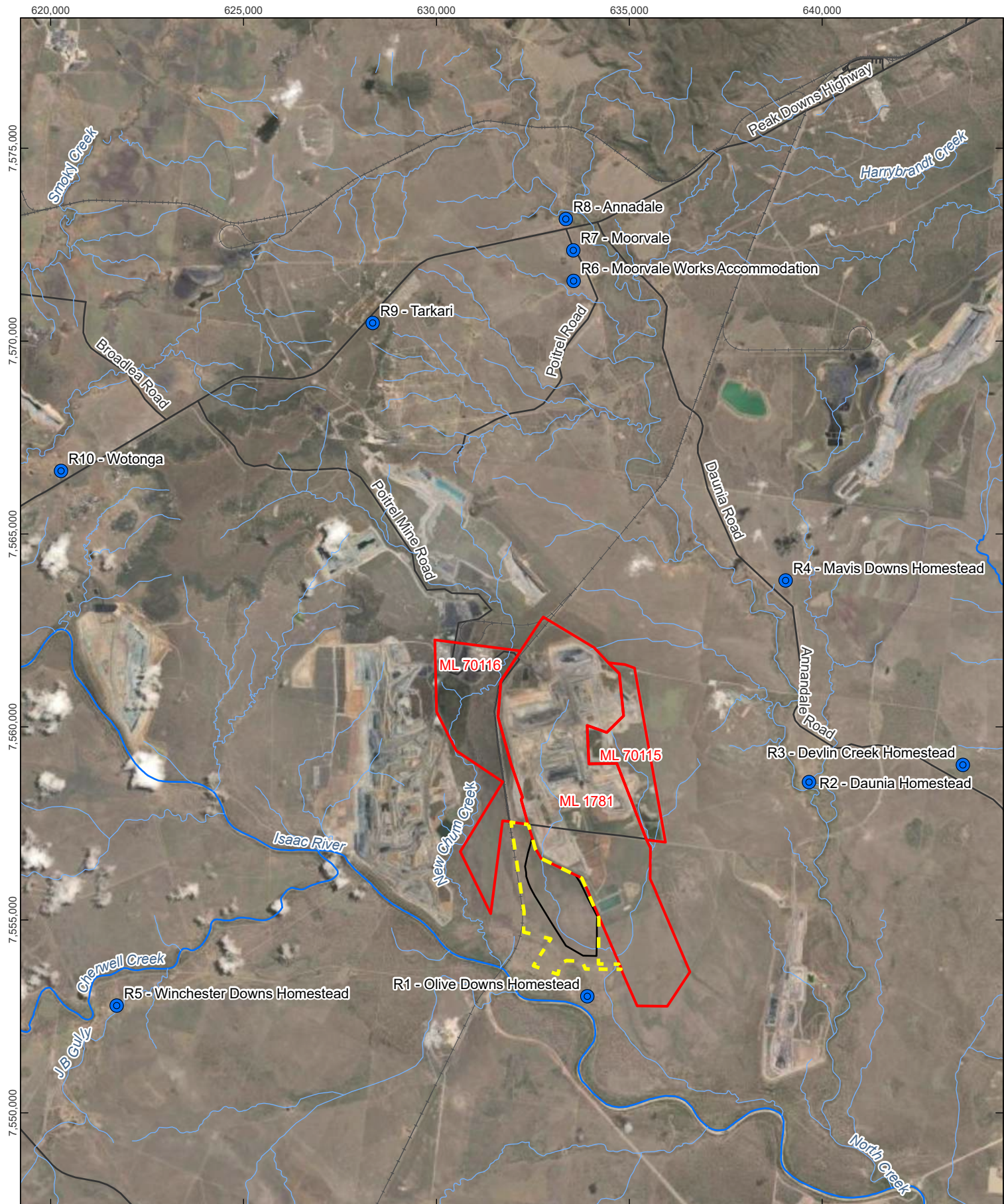
Table 3-1 Noise and Vibration Receptors

ID	Easting (m) ¹	Northing (m) ¹	Description
R1	633,911	7,553,020	Olive Downs Homestead
R2	639,658	7,558,572	Daunia Homestead
R3	643,647	7,559,016	Devlin Creek Homestead
R4	639,052	7,563,796	Mavis Downs Homestead
R5	621,710	7,552,779	Winchester Downs Homestead
R6	633,556	7,571,559	Moorvale Works Accommodation
R7	633,548	7,572,351	Moorvale Residence
R8	633,354	7,573,162	Annadale Residence
R9	628,347	7,570,470	Tarkari Residence
R10	620,268	7,566,636	Wotonga Residence

Note 1: Based on GDA 2020 MGA Zone 55 coordinate reference.

Regarding the Olive Downs Homestead (R1), whilst this receptor is a sensitive receptor, WHC are currently negotiating with the landowner to establish a non-residency agreement (i.e. similar to the Winchester South Mine agreement) requiring the homestead to remain unoccupied for the period covering the life of the DNM. Therefore, this receptor is not considered “sensitive” for the purpose of this assessment but retained for information purposes.





Coordinate System: GDA2020 MGA Zone 55

Scale: 1:130,000 at A4

Project Number: 620.042120.00001

Date Drawn: 27-May-2026

Drawn by: RB

LEGEND

- Receptor
- Road
- +— Railway
- Major Watercourse
- Minor Watercourse

- Mining Lease
- - - Mining Lease Application Area / Project Area
- - - Proposed Operational Out-of-Pit Dump (DWIP)

DAUNIA WEST INFRASTRUCTURE PROJECT

RECEPTOR LOCATIONS



DISCLAIMER: All information within this document may be based on external sources. SLR Consulting Pty Ltd makes no warranty regarding the data's accuracy or reliability for any purpose.

FIGURE 3-1

3.2 Baseline Noise Levels

3.2.1 Background and Methodology

Between 14 and 23 September 2021, SLR conducted baseline unattended noise monitoring at the closest receptor surrounding the DNM Project (i.e. R1 Olive Downs Homestead) to quantify and characterise the existing noise environment. Short-term operator attended noise measurements were also undertaken at the Olive Downs Homestead during the unattended noise monitoring campaign as well as during an additional site visit on 7 and 8 October 2021.

The baseline noise monitoring surveys were conducted in general accordance with the requirements of:

- The Department of Environment and Science's (DES) Noise Measurement Manual 2020 (NMM).
- Australian Standards (AS) 1055-2018 Acoustics – Description and Measurement of Environmental Noise.

The noise monitoring location is detailed in **Table 3-2**.

Table 3-2 Noise Monitoring Location

Location	Coordinates	Description	Photo
Olive Downs Homestead (Lot 3 on GV90)	Easting: 633,898 Northing: 7,552,926	Olive Downs Homestead (Lot 3 on GV90), logger located approximately 80 m south of the homestead and approximately 1.1 km from the OOPD.	

The noise levels were continuously monitored with a NGARA Sound Level Meter configured as noise logger. To quantify the contribution of the existing sources of noise in the local environment the noise logging was supplemented by short-term noise measurements undertaken by SLR. A Brüel and Kjær (B&K) Type 2250 Sound Level Meter was used for the short-term attended surveys. A summary of the noise monitoring equipment is provided in **Table 3-3**.

Each noise logger and the sound level meter were checked for calibration before and after the survey with a sound level calibrator. No significant drift in signal (± 0.5 dB) was detected.

All items of acoustic instrumentation employed during the noise monitoring were set to A-weighted and Fast response in accordance with the relevant Australian Standards and the NMM. All acoustic instrumentation employed throughout the noise monitoring survey was designed to comply with the requirements of AS/NZS IEC 61672.1-2019 *Electroacoustics - Sound Level Meters - Specifications* and carried current manufacturer calibration certificates.



Table 3-3 Noise Monitoring Equipment Summary

Location	Task	Dates	Description
R1: Olive Downs Homestead	Unattended noise logging	14 – 23 September 2021	NGARA SN:8781C7
	Operator attended measurements – 1 st visit	14 September 2021	B&K Type 2250 SN: 3004710
	Operator attended measurements – 2 nd visit	7 & 8 October 2021	B&K Type 2250 SN: 3004710

Meteorological data during the noise monitoring period was obtained from the Bureau of Meteorology weather station located at Moranbah Airport (station ID 34035). The meteorological data from the weather station was analysed to identify periods of rainfall and/or wind speeds in excess of 5.0 m/s (18 km/h). These periods were subsequently excluded from the noise monitoring data analysis in accordance with the NMM.

The meteorological data is plotted in 30 minute intervals on the noise monitoring results charts presented in **Appendix B** with the periods of excluded data (i.e. due to rain and/or wind exceeding 5 m/s) shaded grey.

3.2.2 Noise Monitoring Results

The following section documents the attended and unattended noise monitoring results obtained from baseline noise monitoring survey.

3.2.2.1 Unattended Noise Measurement Results

The unattended noise measurement data from Olive Downs Homestead was used to determine the 'Rating Background Level' (RBL) for daytime (7:00 am to 6:00 pm), evening (6:00 pm to 10:00 pm) and night-time (10:00 pm to 7:00 am) periods. The RBL is the median of the 10th percentile of the daily background (LA90) noise levels in each assessment period (day, evening and night) over the duration of the monitoring.

Table 3-4 contains the determined RBL from the Olive Downs Homestead noise monitoring data. The daily statistical noise levels for the baseline noise survey are presented graphically in **Appendix B**.

The ambient noise levels are the average monitored (LAeq) noise levels for each period, which account for all sources of noise within the local environment and are also presented in **Table 3-4**.

Table 3-4 Summary of Unattended Noise Monitoring Results

Monitoring Location	RBLs (dBA)			LAeq Noise Levels (dBA)		
	Day	Evening	Night	Day	Evening	Night
R1 Olive Downs Homestead	33	29	29	44	49 ¹	43

Note 1: Evening period LAeq noise level primarily attributed to insect noise.

It is important to note that the results presented in **Table 3-4** have not been filtered for insect noise because the evening and night-time period RBLs were below the DETSI's Model Mining Conditions (MMC) guideline threshold background noise level of 30 dBA. Notwithstanding this, the measured noise levels were typical of those of a rural environment with natural noise sources, such as birds, trees (wind-induced), insects, but also likely included periods of mine noise from DNM and Poitrel Mine.



3.2.2.2 Attended Noise Measurement Results

The operator attended noise measurements are summarised in **Table 3-5**.

Table 3-5 Summary of Operator Attended Noise Monitoring Results

Start Date and Time	Measured Noise Levels (10min, dBA)				Comments
	LA90	LAeq	LA10	LA1	
14 Sept 21 13:03	35	40 (39) ¹	42	46	Intermittent bird noise Insect noise Light wind, tree leaves rustling Train horn from DNM direction No audible mine noise
14 Sept 21 13:17	38	41 (35) ¹	43	46	Intermittent bird noise Insect noise Intermittent noise from tree leaves rustling with light winds No audible mine noise
14 Sept 21 13:30	33	39 (37) ¹	41	48	Intermittent bird noise Intermittent insect noise Intermittent noise from tree leaves rustling with light winds No audible mine noise
7 Oct 21 21:40	47	51 (41) ¹	53	54	Continuous insect noise Intermittent bird noise Audible mine noise likely from DNM and/ or Poitrel Mine Intermittent wind induced noise
7 Oct 21 21:50	52	54 (40) ¹	55	56	Continuous insect noise Continuous mine noise (frequencies 80 Hz to 160 Hz dominant) from DNM and/ or Poitrel Mine Intermittent bird noise Mostly calm conditions with occasional light wind
8 Oct 21 03:30	33	38	39	48	Intermittent bird noise Continuous mine noise (frequencies 80 Hz to 160 Hz dominant) from DNM and/ or Poitrel Mine Mostly calm conditions with occasional light wind
8 Oct 21 03:50	34	38	41	47	Intermittent bird noise Continuous audible mine noise (frequencies from 80 Hz to 160 Hz dominant) and appears to be from DNM/ and Poitrel mines Horn audible (from DNM direction) Mostly calm conditions with occasional light wind

Note 1: Where practicable, noise levels (shown in brackets) have been filtered to remove insect noise contribution.

From the operator attended noise monitoring results summarised in **Table 3-5**, the following is noted:

- During the attended periods, Olive Downs Homestead experienced extraneous noise (i.e. from non-DNM sources), that dominated the measured LAeq and LA1 noise levels.



Consequently, the L_{Aeq} and L_{A1} noise levels summarised in **Table 3-5** cannot be used for direct comparison (i.e. compliance assessment) against the noise limits for DNM.

- It's often practicable to isolate mine noise from insect and bird dominated noise levels due to the difference in frequency characteristic with mine noise being typically dominated by sound frequencies below 1 kHz, particularly at receptors located kilometres away from the mine noise sources. Unfortunately, wind-induced noise (e.g. tree rustling) tends to affect a larger range of sound frequencies making it very difficult to filter this extraneous noise during some measurements (particularly during the day and evening). It can be seen in **Table 3-5**, periods experiencing wind noise (i.e. both day and evening periods) typically resulted in existing mine noise being inaudible or difficult to detect and accurately quantify.
- Mine noise was audible, particularly at night and understood to have been attributable to DNM and/ or Poitrel Mine due to the direction the noise was approaching from, however quantifying the individual contribution from either mine was not possible.

4.0 Assessment Criteria

Under the current DNM EA (EPML00561913), DNM is required to operate in accordance with Schedule C Noise and Vibration Conditions C1 to C10. The current EA conditions have been used for the purpose of setting assessment criteria for the Project.

4.1 Noise – DNM EA Noise Limits

Conditions relevant to noise are contained within Conditions C1 to C4, with numerical noise limits prescribed in Table C1 (Noise Limits) of the EA. Conditions C1 and C2 (which relate to noise nuisance) and Table C1 are reproduced below and in **Table 4-1**.

C1 **Noise nuisance** – Noise from the mining activity must not cause a noise nuisance, at any noise-sensitive place or commercial place.

C2 Noise is not considered an environmental nuisance under condition C1 if monitoring shows that noise does not exceed the limits in **Table C1 (Noise Limits) [Table 4-1]**, at any sensitive place or commercial place.

Table 4-1 DNM EA Schedule C Table C1 (Noise Limits)

Noise Level (dBA)	Monday to Sunday (including public holidays)		
	Day 7 am – 6 pm	Evening 6 pm – 10 pm	Night 10 pm – 7 am
Sensitive Place			
L_{Aeq} , adj, 10mins	B/g + 5	B/g + 5	B/g + 3
$L_{A MAX}$, adj, 10mins	B/g + 10	B/g + 10	B/g + 8
Commercial Place			
L_{Aeq} , adj, 10mins	B/g + 10	B/g + 10	B/g + 5
$L_{A MAX}$, adj, 10mins	B/g + 15	B/g + 15	B/g + 10

With reference to the criteria in **Table 4-1** and RBLs summarised in **Table 3-4** (interpreted as “B/g” in **Table 4-1**), **Table 4-2** outlines the operational mining noise criteria for sensitive and



commercial receptors surrounding DNM. In accordance with Schedule D – Noise of the MMC, it states that where the measured background noise level is less than 30 dBA, which was the case for the Olive Downs Homestead during the evening and night-time period (see **Table 3-4**), then 30 dBA can be substituted for the measured background level.

Table 4-2 DNM Noise Limits

Noise Level (dBA)	Monday to Sunday (including public holidays)		
	Daytime 7 am – 6 pm	Evening 6 pm – 10 pm	Night-time 10 pm – 7 am
Sensitive Place			
LAeq, adj, 10mins	38	35 ¹	33 ¹
LA MAX, adj, 10mins	43	40 ¹	38 ¹
Commercial Place			
LAeq, adj, 10mins	43	40 ¹	35 ¹
LA MAX, adj, 10mins	48	45 ¹	40 ¹

Note 1: Based on the MMC threshold background noise level of 30 dBA.

4.2 Blasting – DNM EA Airblast and Vibration Limits

As noted in **Section 2.0**, no resource extraction and therefore blasting will be undertaken within the proposed MLA area. However, for completeness, the blasting criteria from the DNM EA has been reproduced below.

Conditions relevant to vibration and airblast overpressure (from blasting) are contained within Conditions C5 to C10, with numerical blasting vibration and airblast overpressure limits stated in Tables C2 and C3 respectively. Conditions C5 to C8 (which relate to vibration and airblast overpressure nuisance) and Tables C2 and C3 are listed below and provided in **Table 4-3**.

C5 **Vibration nuisance** – *Vibration from the mining activities must not cause an environmental nuisance, at any sensitive place or commercial place.*

C6 *Vibration is not considered an environmental nuisance under condition C5 if monitoring shows that vibration does not exceed the limits specified in Table C2 (Vibration Limits) [Table 4-3].*

C7 **Airblast overpressure nuisance** – *The airblast overpressure level from blasting operations on the mining leases must not cause an environmental nuisance, at any sensitive place or commercial place.*

C8 *Airblast overpressure is not considered an environmental nuisance under condition C7 if monitoring shows that airblast overpressure does not exceed the levels specified in Table C3 (Airblast Overpressure Level) [Table 4-3].*

Table 4-3 EA Table C2 and C3 - Blasting Vibration and Airblast Overpressure Limits

Parameter	Sensitive or Commercial Place Blasting Limits
Ground vibration peak particle velocity	5 mm/s peak particle velocity for nine (9) out of ten (10) consecutive blasts and not greater than 10 mm/s peak particle velocity at any time.
Airblast overpressure level	115 dB (Linear peak) for nine (9) out of ten (10) consecutive blasts and not greater than 120 dB (Linear peak) at any time.



4.3 Cumulative Noise Impacts

The *Environmental Protection (Noise) Policy 2019* (EPP(Noise)) is subordinate legislation under the *Environmental Protection Act 1994* (EP Act) and the environmental values to be enhanced or protected under the EPP(Noise) are:

- The qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems.
- The qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following: sleep, study or learn or be involved in recreation, including relaxation and conversation.
- The qualities of the acoustic environment which are conducive to protecting the amenity of the community.

The EPP(Noise) contains Acoustic Quality Objectives (AQO) for receptors potentially sensitive to noise. Where the overall level of noise at the receptors, from all sources but excluding road and rail transport noise, are within the AQO, the environmental values are considered to be achieved. The AQO for the noise sensitive receptors and land use surrounding the Project are presented in **Table 4-4**. Project operations require continuous operation of plant and equipment, as such this assessment has referenced the 1-hour L_{Aeq} and L_{A1} AQO to assess the noise emissions from cumulative noise sources.

Table 4-4 EPP(Noise) Acoustic Quality Objectives

Receptor Type	Time of Day	Acoustic Quality Objective (dBA)		
		$L_{Aeq,adj,1hr}$	$L_{A10adj,1hr}$	$L_{A1,adj,1hr}$
Residential dwelling (outdoors)	Day time and evening	50	55	65
Residential dwelling (indoors)	Daytime and evening	35	40	45
	Night-time	30	35	40

For the cumulative assessment, while it focuses on mobile mining equipment which are inherently varying noise sources, it has been assumed that mining operations are steady whereby noise emission levels would be consistent whether the assessment period is over 10-minutes (as per the EA noise limits) or 1-hour (as per the AQOs). Accordingly, a 10-minute assessment period has been applied to the cumulative noise assessment for simplicity.

Further to the above, to assess noise levels to the internal (indoor) AQO at residential dwellings, the external noise levels predicted by the noise modelling are adjusted by a façade correction, which accounts for the reduction of noise achieved by the building (with windows open). For this cumulative assessment, a conservative 7 dB facade noise reduction has been applied in line with the DETSI guideline titled '*Noise and Vibration EIS Information Guideline*', which states:

When assessing outdoor to indoor noise attenuation at sensitive receptors ... use an outdoor to indoor attenuation value of 7dB, which is appropriate for typical Queensland buildings with open windows.

Accordingly, internal residential noise levels would be expected to be within the indoor AQO where external noise levels are not more than:

- $L_{Aeq,adj,10min}$ 42 dB during the daytime and evening.



- LAeq,adj,10min 37 dB during the night-time.
- LA1,adj,10min 52 dB during the daytime and evening.
- LA1,adj,10min 47 dB during the night-time.

5.0 Assessment Methodology

5.1 Assessed Mining Activities and Assumptions

The selection of noise modelling/assessment scenarios for the Project, which included all DNM noise sources and not just activities occurring within the proposed MLA area, was based on activities with the greatest potential to result in noise at the identified sensitive receptors. This included consideration of the commencement of activities within the proposed MLA area as well as when plant and equipment (noise sources) would be at the closest proximity to receptors, and where there would be limited screening of noise from on-site structures or topography.

The assessment scenarios in **Table 5-1** were developed to assess potential 'typical worse case' noise levels with consideration of the following:

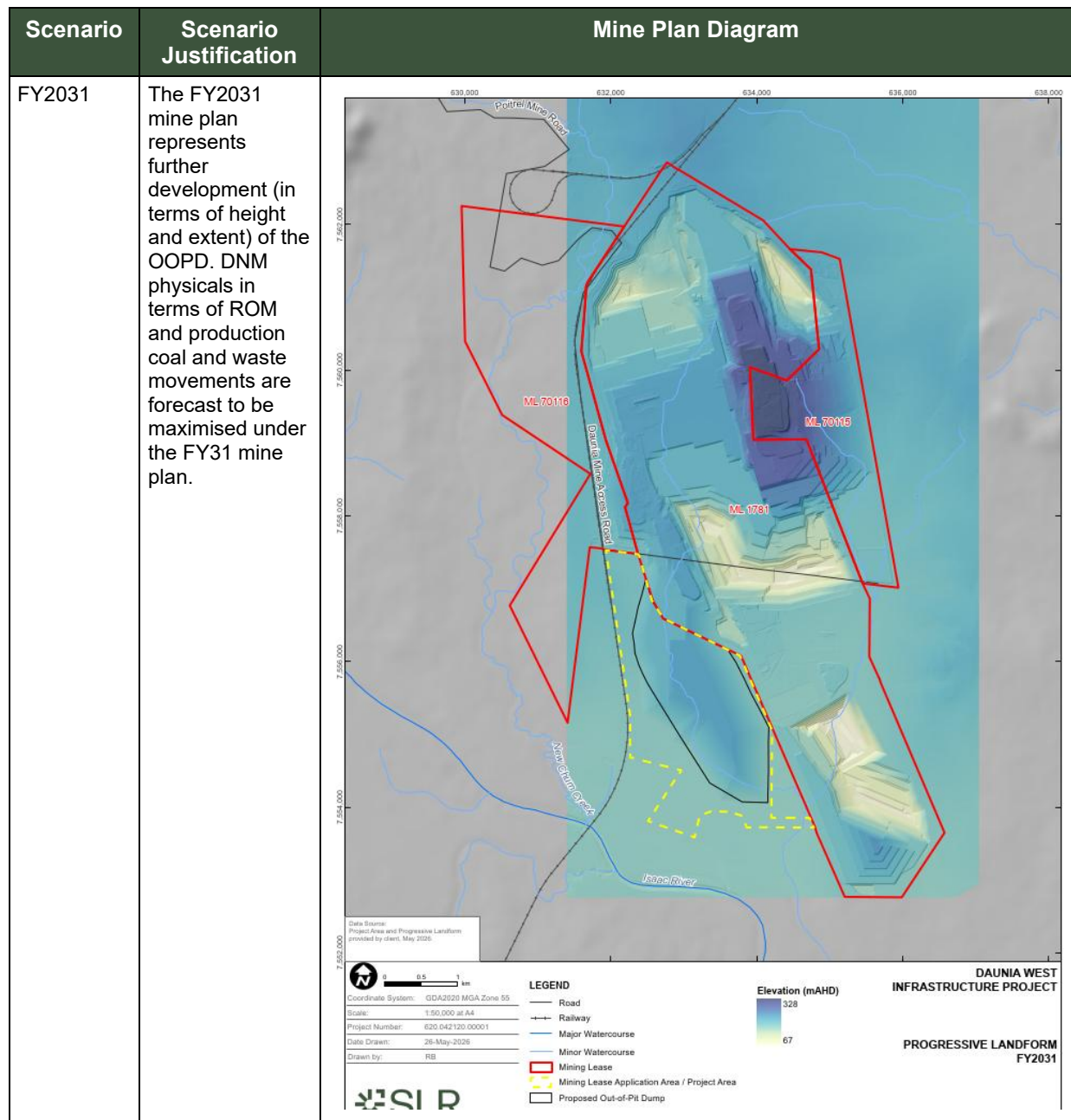
- The commencement of activities within the proposed MLA area including development of the haul roads and OOPD, noting the life of the OOPD is approximately 7 years (up to and including rehabilitation). The preparation for development of the OOPD is estimated to commence in approximately FY2028.
- The most exposed areas of the MLA OOPD relative to sensitive receptors.
- ML1781 extraction activities occurring close to the identified sensitive receptors.
- Consideration of peak extraction years for both coal and waste (which occur at different times), and peak mobile mining equipment numbers.



Table 5-1 Assessed Operational Scenarios and Associated Mining Activities

Scenario	Scenario Justification	Mine Plan Diagram
FY2028	The FY2028 mine plan coincides with the commencement of OOPD activities in the proposed MLA area. Mining activities in ML1781 also align with the closest sensitive receptors to the east of DNM.	





The noise assessment was based on the key assumptions and exclusions outlined below:

- New or relocation of existing infrastructure will be required for the Project, such as development of haul roads within the proposed MLA area, however they are not considered acoustically significant sources of noise and therefore have not been included in this assessment. However, movement of mining equipment on the new haul roads, including waste haul and water trucks, has been included in the modelled scenarios.
- For both modelled scenarios, the noise assessment involved the modelling of noise sources associated with:
 - All acoustically significant mine equipment proposed to be operated at the DNM including within the proposed MLA area.



loadout facility (TLF) etc, as well as associated mobile mining equipment assigned to this area.

- 3-D mine plans for DNM were provided by WHC for the FY2028 and FY2031 modelled scenarios.

With regard to mobile mining equipment, WHC advised the type and quantity of equipment proposed to be operated at the DNM for the modelled scenarios (further details provided in **Table 5-4**).

- Haul trucks (coal and waste), graders, water trucks have been modelled as line sources to reflect the mobile nature of these sources. Line sources contain all acoustic energy spread across the line source representing a path each source would travel over a representative 10 minute assessment period. To calculate the path travelled over the assessment period, the following average speeds have been assumed:
 - For haul trucks, approximately:
 - 35 to 40 km/hr for flat haul roads.
 - 10 km/hr for pit ramps (i.e. loaded ascents and unloaded descents).
 - Water trucks – 15 km/hr.
 - Graders – 5 km/hr.
- To account for the total number of waste and coal haulage trucks proposed for each pit/activity, an assumption has been made that one idle haul truck would be located next to the active loader (with relatively insignificant noise emission levels) and the remaining number of trucks are considered in calculating a total line source to simulate the haulage circuit.
- All remaining equipment (i.e. excavators, shovels, loaders, dozers, drills) have been modelled as point sources in a typically worst-case location for the pit/activity. For example, waste dozers were modelled towards the more exposed end of the push journey.
- All operations will be continuous 24-hours a day and seven days a week. As such, no allowance to the modelled noise emission was made for periods when plant would be temporarily idle or not in use.
- As per the definition in the EA, the $L_{Amax,adj,10mins}$ is the average maximum A-weighted sound pressure level (adjusted for character, such as tonality or impulsivity) measured over any 10 minute period. In SLR's experience with noise from mine operations, the average maximum noise level is typically equivalent to the LA_{10} noise descriptor (i.e. the noise level exceeded for 10% of the 10 minute measurement period), and therefore, to assess $L_{Amax,adj,10mins}$ noise levels, a +3 dB relationship between the LA_{eq} and $L_{Amax,adj,10mins}$ has been applied where mobile mining equipment was identified as the dominant noise source.
- The Project would not require any material change to existing fixed plant operating at DNM. As such, modelling of these sources has been based on typical noise source data for the acoustically significant fixed plant items.
- Rail noise has been excluded from this assessment as rail operations are not proposed to change as a result of the Project. Further, given it's an existing noise source, sensitive receptors are unlikely to associate future rail noise as part of the Project.



- Progressive rehabilitation activities are inherently assessed through the reported assessment of mining operations. Assessment of final rehabilitation activities (i.e. post mine closure) has not been considered. Noise emissions during this final rehabilitation would be minor in comparison to predicted noise levels from coal mining operations.

5.2 Noise Prediction Modelling

5.2.1 Modelling Software and Algorithm

A SoundPLAN (version 8.2) computer noise model was developed to predict mine noise levels at the nominated noise sensitive receptors. SoundPLAN is a computer model software package enabling calculation of environmental noise by combining a digitised ground map (topography), the location and acoustic sound power levels of potentially critical noise sources on site and the location of receivers for assessment purposes.

The model can calculate noise levels taking into account such factors as the sound power levels and locations of noise sources, distance attenuation, ground absorption, air absorption and shielding attenuation, as well as meteorological conditions, including wind effects.

The *Conservation of Clean Air and Water Europe* (CONCAWE 1981) prediction methodology was utilised within SoundPLAN. The CONCAWE prediction method is specifically designed for large industrial facilities and incorporates the influence of wind effects and the stability of the atmosphere.

The statistical accuracy of environmental noise predictions using CONCAWE was investigated by Marsh (Applied Acoustics 15 – 1982). Marsh concluded that CONCAWE was accurate to ± 2 dBA in any one octave band between 63 hertz (Hz) and 4 kHz and ± 1 dBA overall.

In relation to the modelling of atmospheric conditions, DETSI's (former) *Ecoaccess Guideline Planning for Noise Control* (PNC) provides guidance with respect to assessing the potential for noise enhancements due to prevailing atmospheric conditions. This is discussed in **Section 5.2.2**.



5.2.2 Modelled Weather Parameters

5.2.2.1 Wind

In accordance with PNC, meteorological data for the 2023 calendar year was analysed for the following wind parameters to confirm whether a 'prevailing' wind component was a feature of the area:

- 30% occurrence in any assessment period (day, evening or night) in any season.
- 3 m/s or less source to receptor component.
- 10 m height for wind speed.

The wind analysis, presented as wind roses in **Appendix C**, indicated that for the analysed 12-month period of meteorological data, there were no prevailing periods of wind of up to 3 m/s (from a particular direction) occurring at least 30 per cent of the time in any one season.

The wind data indicated that the region experienced light to moderate winds (between 1.5 metres per second (m/s) and 8 m/s), predominantly from the eastern and southeastern quadrants. Calm wind conditions (wind speeds less than 0.5 m/s) were predicted to occur 3.3% of the time.

The seasonal wind roses indicate slight variations between the seasons. In summer and autumn, winds are light to moderate (1.5 to 8 m/s) and predominantly from the eastern quadrant. In winter, there is a slight shift towards the southeast, while in spring, there is an opposite shift towards the northeast.

Therefore, on the basis of the above, a prevailing wind component has not been considered a feature of the DNM area and has not been included as an assessable weather condition scenario for this assessment.

5.2.2.2 Atmospheric Stability

Atmospheric stability refers to the tendency of the atmosphere to resist or enhance vertical motion. The Pasquill-Gifford-Turner (PGT) assignment scheme identifies six Stability Classes, A to F, to categorise the degree of atmospheric stability as follows:

- A = Extremely unstable conditions
- B = Moderately unstable conditions
- C = Slightly unstable conditions
- D = Neutral conditions
- E = Slightly stable conditions
- F = Moderately stable conditions.

The meteorological conditions defining each PGT stability class are shown **Table 5-2**.



Table 5-2 Meteorological Conditions Defining PGT Stability Classes

Surface wind speed (m/s)	Daytime insolation			Night-time conditions	
	Strong	Moderate	Slight	Thin overcast or > 4/8 low cloud	<= 4/8 cloudiness
< 2	A	A - B	B	E	F
2 - 3	A - B	B	C	E	F
3 - 5	B	B - C	C	D	E
5 - 6	C	C - D	D	D	D
> 6	C	D	D	D	D

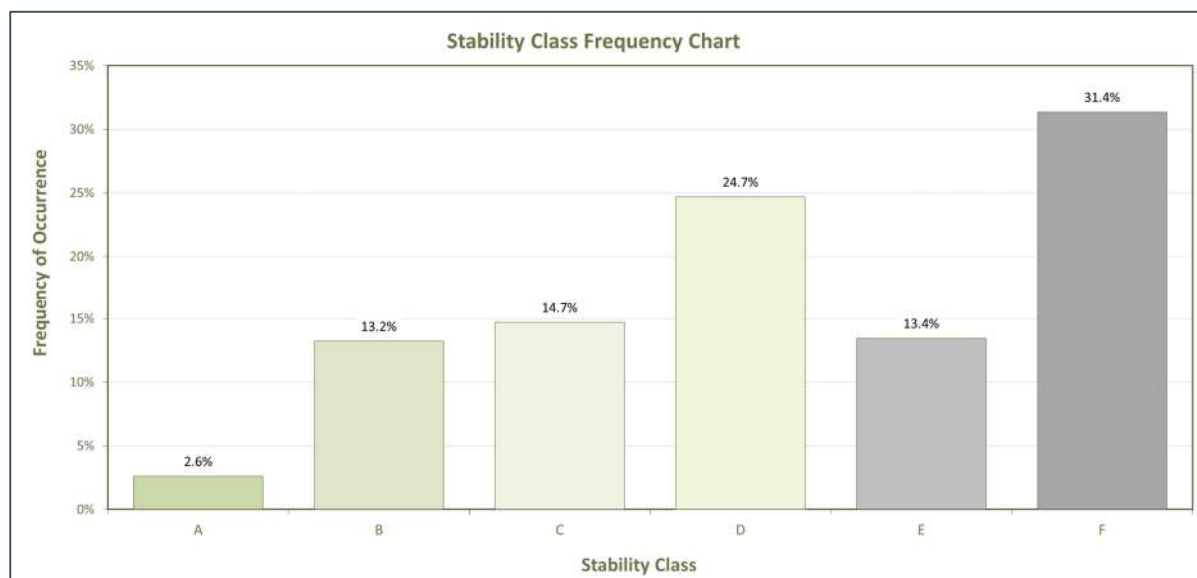
Notes:

- Strong insolation corresponds to sunny midday in midsummer in England; slight insolation to similar conditions in midwinter.
- Night refers to the period from 1 hour before sunset to 1 hour after sunrise.
- The neutral category D should also be used, regardless of wind speed, for overcast conditions during day or night and for any sky conditions during the hour preceding or following night as defined above.

Source: NOAA, 2018.

Figure 5-1 shows the frequency distribution of the atmospheric stability classes calculated for the area. The results indicate that stable conditions (Stability Class F) occurred most frequently at the site and the surrounding area. A significant number of neutral conditions (Stability Class D) were also calculated.

Figure 5-1 Stability Class Distribution (CALMET)



In accordance with PNC, >30% occurrence of the Stability Class F indicates that temperature inversions are considered to be a characteristic of the DNM area and therefore have been considered as part of this assessment.



5.2.2.3 Modelled Weather Parameters

Based on the meteorological analysis presented in **Sections 5.2.2.1** and **5.2.2.2**, the default weather parameters recommended by PNC have been referenced to determine the effects of meteorology on noise emissions from DNM. The weather parameters applied to this assessment are summarised **Table 5-3**.

Table 5-3 Modelled Meteorological Conditions – Neutral and Adverse Scenarios

Parameter	Neutral Weather	Adverse Weather – Temperature Inversion
Temperature	10 °C	10 °C
Humidity	70%	90%
Pasquill stability class	D	F (representative of temperature inversion)
Wind speed	0 m/s	0 m/s

5.2.3 Noise Sources, Sound Power Levels and Location

With reference to the modelled mine scenarios (refer to **Table 5-1**), **Table 5-4** and **Table 5-5** summarise the following model inputs:

- Mine equipment makes, models and numbers relevant to the assessed operational scenarios as provided by WHC.
- Assumed overall sound power level (SWL) data and source emission heights for each equipment item developed by SLR based on details from similar recently assessed coal mining projects.



Table 5-4 DNM Equipment and Sound Power Levels

Equipment type	Make and Model	SWL (dBA, LAeq)	Source Height (m) ¹	Quantity per Scenario Year	
				FY2028	FY2031
Waste shovel (800t)	CAT 7495 HD	123	15	1	1
Excavator (600t)	CAT 6060	125	4	1	1
	Hitachi EX5600	125	4	2	2
Excavator (400t)	CAT 6040	118	4	4	4
Excavators (clean up)	Hitachi 870LCH	111	3	1	1
	Hitachi EX1200	113	3	1	1
Waste haul trucks	CAT 797F	120	3	7	7
Coal haul trucks	CAT 793	119	3	31	31
Dozers	CAT D10	116	3	10	10
	CAT D11	119	3	11	11
Wheel dozer	CAT 854	112	3	2	2
Loaders (clean up)	CAT 992	112	3	1	1
	CAT 994	116	3	2	2
Graders	CAT 16M	113	3	2	2
	CAT 18M	113	3	3	3
	CAT 24M	116	3	1	1
Water trucks	CAT 777	115	3	3	3
	CAT 785	117	3	4	4
Scrapers	CAT 637K	111	3	2	2
Drill rigs	Pit Viper 235	118	1.5	3	3
	CAT MD6310	118	1.5	1	1
	CAT MD6420	118	1.5	2	2
Excavator (clean up)	Komatsu 50t	107	2	2	2
CHPP	6.5 Mtpa	117	15	1	1
Train loadout facility	-	112	8	1	1
Stacker reclaimer	-	115	10	2	2
Conveyor drives	-	95	2	5	5
Conveyors (per 50 m)	-	99	Various	4	4

Note 1: Based on acoustic centre of equipment as distinct from the maximum height of the equipment.



Table 5-5 Octave Band SWL for Modelled Noise Sources

Source	SWL, dBA LAeq									
	Overall	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
CAT 7495	123	86	94	112	116	117	117	115	111	99
CAT 6060	125	86	94	113	117	119	119	117	112	99
Hitachi EX5600	125	86	94	113	117	119	119	117	112	99
CAT 6040	118	78	86	106	109	112	111	111	105	97
Hitachi EX3600	117	78	86	106	109	111	111	111	105	97
Hitachi 870LCH	111	72	80	99	103	105	105	103	98	91
Hitachi EX1200	113	74	82	101	105	107	107	105	100	93
CAT 797F	120	77	98	100	110	114	114	114	108	97
CAT 793	119	77	98	100	108	113	113	113	107	97
CAT D10	116	78	89	104	106	110	113	107	101	97
CAT D11	119	84	98	99	109	114	112	111	109	103
CAT 854	112	80	89	104	97	106	107	107	92	80
CAT 992	112	77	93	100	100	108	106	103	100	93
CAT 994	116	78	86	105	108	110	110	109	104	97
CAT 16M	113	71	94	100	106	103	109	106	102	90
CAT 18M	113	71	94	100	106	103	109	106	102	90
CAT 24M	116	74	97	103	109	106	112	109	105	93
CAT 777	115	70	87	102	104	109	108	110	103	96
CAT 785	117	60	75	90	100	102	107	112	114	107
CAT 637K	111	70	80	100	100	103	106	106	97	87
Pit Viper 235	118	83	97	102	110	113	113	110	105	94
CAT MD6310	118	83	97	102	110	113	113	110	105	94
CAT MD6420	118	83	97	102	110	113	113	110	105	94
Komatsu 50t	107	78	84	95	98	102	102	99	95	81
CHPP	117	83	92	99	103	109	114	110	105	94
Train loadout facility	112	74	89	98	102	108	108	103	96	87
Stacker reclaimer	115	78	94	105	108	108	108	108	102	92
Conveyor drives	95	50	61	70	85	91	90	86	81	84
Conveyors (per 50 m)	99	66	79	84	89	93	94	91	83	71



5.3 Cumulative Noise Impact Assessment

As part of the assessment of cumulative noise impacts, the following mines in vicinity to the Project and nearest sensitive receptors have been identified (also shown in **Figure 5-2**):

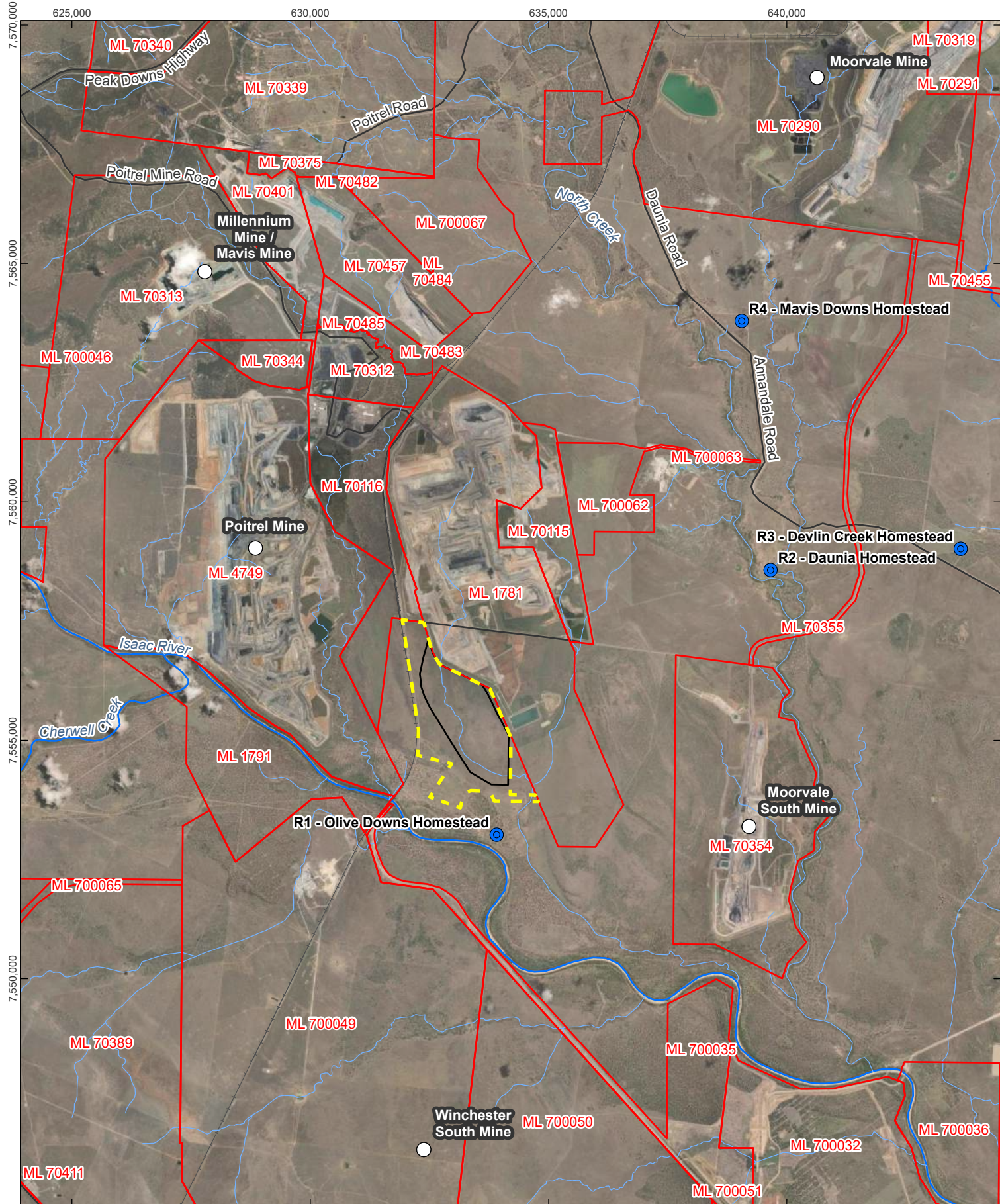
- Millennium Mine/ Mavis Mine
- Moorvale Mine
- Moorvale South Mine
- Poitrel Mine
- Winchester South Mine

It is noteworthy that there are several other mines in the region (both existing and approved for development) such as Olive Downs Mine, Eagle Downs Mine, Isaac Downs Mine, Peak Downs Mine and Caval Ridge Mine, however these mines are located a significant distance from the sensitive receptors most exposed to DNM. Therefore, the potential for cumulative noise impacts, which has been assessed against the EPP(Noise) AQO (detailed in **Section 4.3**), was limited to the mines listed above.

5.4 Vibration Impact Assessment

Noting that blasting is not required within the proposed MLA area, other potential sources of vibration such as dumping of waste material and heavy vehicle movement on haul roads is not anticipated to result in vibration impacts to sensitive receptors. Nonetheless, a qualitative assessment of vibration has been provided in **Section 6.3**.





 0 1 2 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:105,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 27-May-2026
 Drawn by: RB

- LEGEND**
-  Receptor
 -  Surrounding Mine
 -  Road
 -  Railway
 -  Major Watercourse
 -  Minor Watercourse

-  Mining Lease
-  Mining Lease Application Area / Project Area
-  Proposed Operational Out-of-Pit Dump (DWIP)

DAUNIA WEST INFRASTRUCTURE PROJECT

LOCATION OF DNM AND SURROUNDING MINES



DISCLAIMER: All information within this document may be based on external sources. SLR Consulting Pty Ltd makes no warranty regarding the data's accuracy or reliability for any purpose.

FIGURE 5-2

6.0 Noise and Vibration Impact Assessment

6.1 Mine Operational Noise

6.1.1 Predicted Operational Noise Levels

Predicted DNM noise levels from the modelled operational scenarios (i.e. FY2028 and FY2031) are summarised in **Table 6-1** for neutral weather conditions and **Table 6-2** for adverse weather conditions, with noise level contour maps presented in **Appendix D**. As noted in **Section 5.1** the predicted noise levels include all acoustically significant equipment operating at DNM including the proposed MLA area.

Table 6-1 Predicted DNM Operational Noise Levels – Neutral Weather

ID	Description	Predicted DNM Noise Level (dBA)			
		FY2028		FY2031	
		L _{Aeq,adj} , 10mins	L _{Amax,adj} , 10mins	L _{Aeq,adj} , 10mins	L _{Amax,adj} , 10mins
EPML00561913 noise limits ¹		33	38	33	38
R1	Olive Downs Homestead ²	45	48	41	44
R2	Daunia Homestead	25	28	25	28
R3	Devlin Creek Homestead	16	19	15	18
R4	Mavis Downs Homestead	21	24	20	23
R5	Winchester Downs Homestead	15	18	11	14
R6	Moorvale Works Accommodation	13	16	13	16
R7	Moorvale Residence	13	16	12	15
R8	Annadale Residence	12	15	11	14
R9	Tarkari Residence	15	18	15	18
R10	Wotonga Residence	13	16	10	13

Note 1: Noting 24 hour operations at DNM, the limits are based on the most stringent noise limit corresponding to the night-time period

Note 2: Impacts to the Olive Downs Homestead is expected to be managed through a non-residency agreement (i.e. similar to the Winchester South Mine agreement) which WHC are currently negotiating with the landowner.



Table 6-2 Predicted DNM Operational Noise Levels – Adverse Weather

ID	Description	Predicted DNM Noise Level (dBA)			
		FY2028		FY2031	
		L _{Aeq,adj} , 10mins	L _{Amax,adj} , 10mins	L _{Aeq,adj} , 10mins	L _{Amax,adj} , 10mins
EPML00561913 noise limits ¹		33	38	33	38
R1	Olive Downs Homestead ²	51	54	46	49
R2	Daunia Homestead	30	33	30	33
R3	Devlin Creek Homestead	21	24	19	22
R4	Mavis Downs Homestead	26	29	25	28
R5	Winchester Downs Homestead	19	22	15	18
R6	Moorvale Works Accommodation	18	21	17	20
R7	Moorvale Residence	16	19	16	19
R8	Annadale Residence	16	19	15	18
R9	Tarkari Residence	19	22	19	22
R10	Wotonga Residence	16	19	14	17

Note 1: Noting 24 hour operations at DNM, the limits are based on the most stringent noise limit corresponding to the night-time period

Note 2: Impacts to the Olive Downs Homestead is expected to be managed through a non-residency agreement (i.e. similar to the Winchester South Mine agreement) which WHC are currently negotiating with the landowner.

From the noise prediction modelling results presented in **Table 6-1** (neutral weather) and **Table 6-2** (adverse weather), the following is noted:

- Under neutral weather conditions, the predicted noise levels for the FY2028 and FY2031 modelled scenarios comply with the EA noise limits at all sensitive receptors. The highest noise levels of 25 dBA LAeq,adj,10mins and 28 dBA LAmx,adj,10mins were predicted at sensitive receptor R2 (Daunia Homestead).
- Likewise, under adverse weather conditions, the predicted noise levels for the FY2028 and FY2031 modelled scenarios comply with the EA noise limits at all sensitive receptors. The highest noise levels of 30 dBA LAeq,adj,10mins and 33 dBA LAmx,adj,10mins were predicted at sensitive receptor R2 (Daunia Homestead).
- For sensitive receptors located east and north of DNM, predicted DNM noise levels are generally consistent between the two (2) assessed mine plans of FY2028 and FY2031. Further to this, DNM noise emission levels are dominated by mining activities associated with mobile equipment (i.e. haul trucks, dozers, water trucks etc.) occurring within the ML areas and not the proposed MLA area to the south-west of the mine.
- Although DNM noise levels at the Olive Downs Homestead (R1) are predicted to exceed the EA noise limits, impacts to this receptor are expected to be managed through a non-residency agreement (i.e. similar to the agreement with Winchester South Mine) which is currently being negotiated between WHC and the landowner.



6.1.2 Assessment of Noise Characteristics

The potential impacts from mine noise experienced at the sensitive receptors are not solely a function of the overall level of noise but also the characteristics of the noise. Consideration for the potential presence of tonal, impulsive and/or low frequency noise characteristics was investigated.

6.1.2.1 Tonality

To complete a true tonal assessment, the inclusion of one-third octave data is required. As per **Table 5-5**, the spectrum data used for this assessment has been simplified to octave band data (which is widely accepted for an assessment of this nature).

Consistent with the description of tonal noise in the PNC guideline and SLR's experience of noise from mine sites, there may be a distinguishable (non-tonal) "hum" associated with diesel powered equipment however the presence of tonal characteristics can often be attributed to mining plant with mechanical faults. For this assessment, no specific tonal correction has been considered on the assumption that all mining plant would be operated in good working order and that (broadband) "buzzer", not (tonal) "beeper", reversing alarms would likely be utilised on mobile equipment particularly if working in exposed areas of DNM.

6.1.2.2 Low Frequency Noise

In the absence of specific low frequency noise criteria in the DNM EA, the following two (2) documents and associated criteria are referenced to provide consideration to potential low frequency noise impact from the Project onto the assessed noise sensitive receptors:

- The former *Ecoaccess Assessment of Low Frequency Noise* Guideline, which contains an initial screening test at noise sensitive receptors whereby the overall noise level should not exceed 50 dBL L_{eq} (internal) and the difference between the overall dBL and dBA L_{eq} (internal) noise levels should not exceed 15 dB. For this assessment, a (conservative) 5 dB facade reduction has been applied to convert the 50 dBL internal level to an external level (i.e. 55 dBL L_{eq} external) given that building facades generally do not attenuate low frequency noise as well as broader spectrum noise.
- The DETSI *Streamlined Model Conditions for Petroleum Activities* Guideline, which is relevant to operations of industrial noise sources operating in rural Queensland, contains the following external and internal criteria that must not be exceeded (L_{eq} unless noted otherwise). It is noted the internal criteria are generally consistent with the former Ecoaccess Assessment of Low Frequency Noise Guideline noted above.
 - 60 dBC measured outside the sensitive receptor
 - the difference between the external A-weighted and C-weighted noise levels is no greater than 20 dB, or
 - 50 dBZ measured inside the sensitive receptor
 - the difference between the internal A-weighted and Z-weighted (Max L_{pZ} , 15 min) noise levels is no greater than 15 dB.

Consistent with the overall A-weighted predicted noise levels (presented in **Table 6-1** and



Table 6-2), the highest predicted dBC and dBL external noise levels at a sensitive receptor are predicted to occur at R2 under adverse conditions. Predicted levels are 43 dBC and 43 dBL L_{Aeq} and as expected, higher than the 30 dBA L_{Aeq} due to the 'A' frequency weighting deemphasising the lower frequencies. Neither the dBC or dBL predicted noise levels exceed the respective overall 60 dBC or 55 dBL L_{Aeq} external criteria. Accordingly, low frequency noise is not predicted to be an issue for the DNM with the Project.

6.1.2.3 Impulsive Noise

There is potential for impulsive noise from track slap associated with the dozers. Measures to mitigate such noise events from the operation of the dozer, and mitigate impulsive noise, are provided in **Section 7.1**. If these mitigation measures are required and implemented effectively, impulsive noise characteristics can be managed.

6.2 Cumulative Noise

Further to the discussion in **Section 5.3** regarding proximity of existing and approved mines relative to DNM and sensitive receptors, the potential for cumulative noise impact is likely to be limited to the three (3) sensitive receptors to the east of DNM, namely R2 Daunia Homestead, R3 Devlin Creek Homestead and R4 Mavis Downs Homestead. As noted above, it is expected that noise impacting the Olive Downs Homestead (R1) will be managed through a non-residency agreement and therefore has been excluded from the cumulative noise assessment.

Sensitive receptors to the north and west of DNM are located at significant distances from DNM (i.e. as indicated by the predicted DNM noise levels in **Table 6-1** and **Table 6-2**) and are all located closer to existing or approved mines that likely to be more dominant than DNM.

The cumulative noise impact assessment for noise sensitive receptors to the east of DNM is detailed in **Table 6-3**. It is noted that no publicly available noise assessment/predictions were sourced for Moorvale Mine, Moorvale South Mine and Poitrel Mine. Consequently, the assessment has been based on noise limits prescribed within the respective EAs or inferred from the DNM modelling where similarities in mining methods and noise emission was identified as part of this study.

It should also be noted that, the cumulative noise assessment has considered only adverse weather conditions, that is temperature inversion with negligible wind (i.e. the highest predicted noise level).

Table 6-3 Cumulative Mine Noise Under Adverse Weather Conditions

Receptor	Predicted LAeq,adj,10min (dBA) Noise Level from:						Predicted Cumulative Noise Level (LAeq dBA)
	DNM	Millennium	Moorvale	Moorvale South	Poitrel	Winchester South	
EPP(Noise) AQO = 37 dBA LAeq,adj							
R2 Daunia	30	<20 ¹	26 ²	27 ³	24 ⁴	25 ⁵	34
R3 Devlin	21	<20 ¹	27 ²	21 ³	18 ⁴	20 ⁵	30
R4 Mavis	26	21 ¹	33 ²	<20 ³	20 ⁴	<20 ⁵	34

Note 1: Predicted noise levels interpolated from the *Millennium Expansion Project Environmental Impact Statement Chapter 12: Noise and Vibration 2011* noise contour mapping.



Note 2: Based on achieving the night-time period noise limit from the existing EA EPML00802813 dated 8 August 2023 at the closest sensitive receptor (i.e. R4 Mavis Downs Homestead).

Note 3: Based on achieving the night-time period noise limit from the existing EA EPML00380113 dated 21 August 2023 at the closest sensitive receptor (i.e. R2 Daunia Homestead).

Note 4: Based on the DNM predicted noise levels in **Table 6-2**, noting that Poitrel Mine and DNM are similarly aligned (geographically) and similar in mining intensity, and the separation distance between Poitrel Mine and the sensitive receptors.

Note 5: Predicted noise levels extrapolated from the *Winchester South Project Environmental Impact Statement Attachment 14: Noise and Vibration Assessment 15 June 2022* noise contour mapping.

Based on the cumulative noise impact assessment detailed in **Table 6-3**, cumulative mine noise levels from DNM and surrounding mines are predicted to comply with the 37 dBA LAeq EPP(Noise) AQO. It is therefore anticipated that, with the introduction of the proposed MLA area activities, cumulative noise impacts at surrounding sensitive receptors would be avoided.

6.3 Vibration

Vibration impacts resulting from activities proposed to occur within the MLA area are not expected to occur given the following:

- The nature of these works would be limited to heavy vehicle movements on maintained haul roads and dumping of waste material on the OOPD.
- Excluding the Olive Downs Homestead (i.e. due to vibration amenity impacts being managed through the non-residency agreement), the closest sensitive receptor to the proposed MLA area is the Daunia Homestead (R2) which is approximately 6.4 km to north-east. At this distance, vibration from the proposed activities would be indiscernible, that is below the threshold of perception being typically in the range of 0.14 mm/s to 0.3 mm/s (British Standard BS 5228-2:2009) and expected to be below blasting vibration levels resulting from existing operations in ML1781 and ML70115.

6.4 Risk Assessment

A summary of the noise and vibration impact assessment findings and significance (i.e. qualitative risk assessment) is presented in **Table 6-4**. The likelihood and consequence criteria are consistent with the intent of AS ISO 31000:2018 Risk Management - Guidelines.



Table 6-4 Qualitative Risk Assessment of Potential Noise and Vibration Impacts

Potential impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Increased noise and/or vibration levels at sensitive receptors during the construction phase of the Project	Probability of the impact	Low (1)	5	Low	Given the relatively minor nature of the construction works required for the Project and separation distance to sensitive receptors, noise and/or vibration impacts during the construction phase are not anticipated. Notwithstanding this, construction noise and/or vibration levels will be managed through measures routinely applied at DNM.
	Duration of the impact	Low (1)			
	Magnitude/intensity of the impact	Low (1)			
	Receiving environment sensitivity	Medium (2)			
Increased mine noise emission at sensitive receptors because of the operation of the Project	Probability of the impact	Low (1)	5	Low	Given the nature of the approved DNM operations (i.e. more intensive than activities occurring in the Project area), and separation distance to sensitive receptors, noise impacts are not anticipated. Notwithstanding this, mine noise levels will be managed through measures routinely applied at DNM.
	Duration of the impact	Low (1)			
	Magnitude/intensity of the impact	Low (1)			
	Receiving environment sensitivity	Medium (2)			
Increased or introduction of annoying noise characteristics (e.g. low frequency noise, tonality, impulsive noise etc) at sensitive receptors	Probability of the impact	Low (1)	5	Low	Given the nature of the mining activities associated with the Project and separation distance to sensitive receptors, noise characteristics such as low frequency noise, tonality or impulsive noise are not anticipated. Notwithstanding this, Project noise will be managed through measures routinely applied at DNM such as ensuring all equipment is in good working order and fit for purpose.
	Duration of the impact	Low (1)			
	Magnitude/intensity of the impact	Low (1)			
	Receiving environment sensitivity	Medium (2)			
Increased cumulative noise at sensitive receptors because of the introduction of the Project	Probability of the impact	Low (1)	5	Low	Given the nature of the approved DNM operations (i.e. more intensive than activities occurring in the Project area), and separation distance to sensitive receptors, cumulative noise impacts because of the Project are not anticipated. Notwithstanding this, mine noise levels will be managed through measures routinely applied at DNM.
	Duration of the impact	Low (1)			
	Magnitude/intensity of the impact	Low (1)			
	Receiving environment sensitivity	Medium (2)			
Increased vibration levels at sensitive receptors because of the Project	Probability of the impact	Low (1)	5	Low	Noting that blasting is not required within the Project area and other potential sources of vibration are anticipated to be insignificant at sensitive receptors, vibration impacts would be avoided.
	Duration of the impact	Low (1)			
	Magnitude/intensity of the impact	Low (1)			
	Receiving environment sensitivity	Medium (2)			



7.0 Recommendations

The following sub-sections detail proven and/or leading practice noise and vibration recommendations for the Project.

7.1 Operational Mine Noise

The assessment of predicted noise levels presented in **Section 6.1** indicates that the DNM with the introduction of the proposed MLA area will comply with the noise limits prescribed in the existing EA. On this basis, specific noise mitigation measures beyond the measures routinely applied at DNM are not warranted. Notwithstanding this, the following proven noise management advice is outlined for consideration during mine planning and operations over the life of the Project to minimise off-site noise emission levels:

- All equipment should be operated in accordance with the manufacturer's instruction and regularly maintained to minimise noise emission levels.
- Avoid clustering of mobile equipment on haul roads, OOPD areas and other exposed/elevated areas, such as during shift changeovers. Haul truck arrival and departures from go lines should be staggered where possible.
- Dumping of material can include engineering controls to minimise the distance the material falls and lining bins and chutes with rubber to dampen the impact.
- Equipment should be shut down when not in use.
- Broadband "buzzer", not tonal "beeper", reversing alarms should be utilised on all mobile plant.
- To eliminate potentially impulsive noise, dozer track slap can be minimised through idle wheel modification, use of track slides and grousers, and management controls such as gear limitation.

It should be noted that the noise management options discussed above are preliminary in nature. Any actual noise mitigation measures implemented on site, if required based on actual mine noise emissions, will be subject to further detailed analysis in the future in accordance with the DNM Noise and Vibration Management Plan.

7.2 Cumulative Noise

No additional noise mitigation measures with respect to cumulative noise are warranted for the Project for the reasons noted in **Section 6.2**. In stating this, implementation of the Project should consider recommendations made in **Section 7.1** to ensure noise level contributions to cumulative noise are minimised to meet the EPP(Noise) AQO external derived criterion of 37 dBA LAeq at all sensitive receptors.

7.3 Vibration

No specific vibration mitigation measures with respect to proposed operations in the MLA area are warranted for the reasons outlined in the assessment in **Section 6.3**.

8.0 Conclusion

This technical assessment has modelled DNM noise emission levels with the proposed Project from two (2) operational mining scenarios/mine plans representing the FY2028 and FY2031. Through a review of Project information supplied by WHC as part of the



assessment, these two (2) modelled scenarios were selected to represent various stages of the Project and operational intensity.

The assessment identified the following in relation to the potential for noise impacts:

- Under neutral weather conditions, the predicted noise levels for the FY2028 and FY2031 modelled scenarios comply with the EA noise limits at all sensitive receptors. The highest noise levels of 25 dBA $L_{Aeq,adj,10mins}$ and 28 dBA $L_{Amax,adj,10mins}$ were predicted at sensitive receptor R2 (Daunia Homestead).
- Likewise, under adverse weather conditions, the predicted noise levels for the FY2028 and FY2031 modelled scenarios comply with the EA noise limits at all sensitive receptors. The highest noise levels of 30 dBA $L_{Aeq,adj,10mins}$ and 33 dBA $L_{Amax,adj,10mins}$ were predicted at sensitive receptor R2 (Daunia Homestead).
- For sensitive receptors located east and north of DNM, predicted DNM noise levels are generally consistent between the two (2) assessed mine plans of FY2028 and FY2031. Further to this, DNM noise emission levels are dominated by mining activities associated with mobile equipment (i.e. haul trucks, dozers, water trucks etc.) occurring within the ML areas and not the proposed MLA area to the south-west of the mine.
- Although DNM noise levels at the Olive Downs Homestead (R1) are predicted to exceed the EA noise limits, impacts to this receptor are expected to be managed through a non-residency agreement (i.e. similar to the agreement with Winchester South Mine) which is currently being negotiated between WHC and the landowner.

The technical assessment has also completed an analysis of the potential for low frequency noise. Neither the 48 dBC L_{eq} or 48 dBL L_{eq} predicted noise levels exceed the respective overall 60 dBC or 55 dBL L_{eq} external criteria at any sensitive receptor. Accordingly, low frequency noise is not predicted to be an issue for the Project.

Based on an assessment of the potential for cumulative noise impact assessment, the combined effect of noise from DNM inclusive of the Project and surrounding mines is predicted to comply with the 37 dBA L_{Aeq} EPP(Noise) AQO. It is therefore anticipated that, with the introduction of the proposed MLA area activities, cumulative noise impacts at surrounding sensitive receptors would be avoided.

Vibration impacts resulting from activities proposed to occur within the MLA area are not expected to occur given the nature of these works would be limited to heavy vehicle movements on maintained haul roads and dumping of waste material on the OOPD, and the significant separation distances to the closest sensitive receptors.

9.0 References

Legislation (Queensland)

Environmental Protection Act 1994

Environmental Protection (Noise) Policy 2019

Environmental Protection Regulation 2019

Guidelines, Standards, EAs etc

British Standard: BS 5228-2:2009: *Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration*. British Standards Institution, London, England.

Conservation of Clean Air and Water Europe (CONCAWE 1981)



Environmental Authority EPML00561913 dated 29 June 2023

Queensland Department of Environment and Science's Model Mining Conditions Guideline 2017

Queensland Environmental Protection Agency's Noise guideline: assessment of low frequency noise 2005 (Draft). Unpublished.

Queensland Department of Environment and Science's Noise Measurement Manual 2020

Queensland Environmental Protection Agency's Planning for Noise Control Guideline 2004 (under review by DES – not currently an approved DES guideline)

Queensland Department of Environment and Science's Streamlined Model Conditions for Petroleum Activities Guideline 2016

Environmental Authority EPML00643713 dated 1 August 2022

Environmental Authority EA EPML00802813 dated 8 August 2023

Environmental Authority EA EPML00380113 dated 21 August 2023

Standards Association of Australia, 2004. Electroacoustics-Sound level meters– Part 1: Specifications AS/NZS IEC 61672.1-2019.

Standards Association of Australia, 2018. Acoustics – Description and measurement of environmental noise AS 1055-2018.

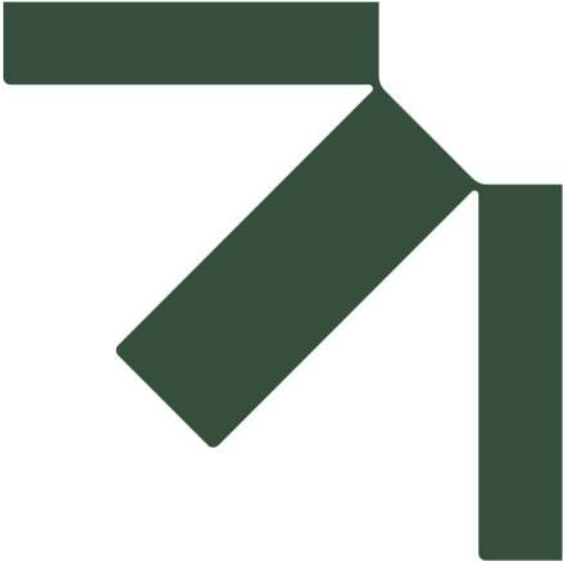
Standards Association of Australia, 2018. Risk Management – Guidelines AS ISO 31000:2018.

Reports

Millennium Expansion Project Environmental Impact Statement Chapter 12: Noise and Vibration 2011

Winchester South Project Environmental Impact Statement Attachment 14: Noise and Vibration Assessment 15 June 2022





Appendix A Acoustic Terminology

Daunia West Infrastructure Project

Noise and Vibration Impact Assessment

Whitehaven Coal Limited

SLR Project No.: 620.042120.00001

20 March 2026

Sound Level (or Noise Level)

The terms sound and noise are almost interchangeable, except that in common usage noise is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear (and those of other species) responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (dB or dBL) scale reduces this ratio to a more manageable size by the use of logarithms.

A-weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to human hearing.

Sound Power Level

The sound power of a source is the rate at which it emits acoustic energy. As with sound pressure, sound power levels (SWL) are expressed in dB units, but are identified by the symbols SWL.

The relationship between sound power and sound pressure may be likened to an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

Change in Sound Pressure Levels

For human perception, a change of 1 dBA or 2 dBA in the level of a sound is considered to be indiscernible, while a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness.

Typical Sound Pressure Levels

The table below lists examples of typical sound pressure levels.

Table A-1 Examples of Typical Sound Pressure Levels

Sound pressure level (dBA)	Typical example	Subjective (human) evaluation
130	Threshold of pain	Intolerable
120	Metal hammering	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 metres (m)	Very noisy
90	Dog bark at 1 m	
80	Cicadas at 1 m	Loud
70	Noise level directly adjacent to a busy main road	
60	Ambient noise level in urban area close to main roads	Moderate to quiet
50	Typical rural environment with high insect noise or close to a main road	



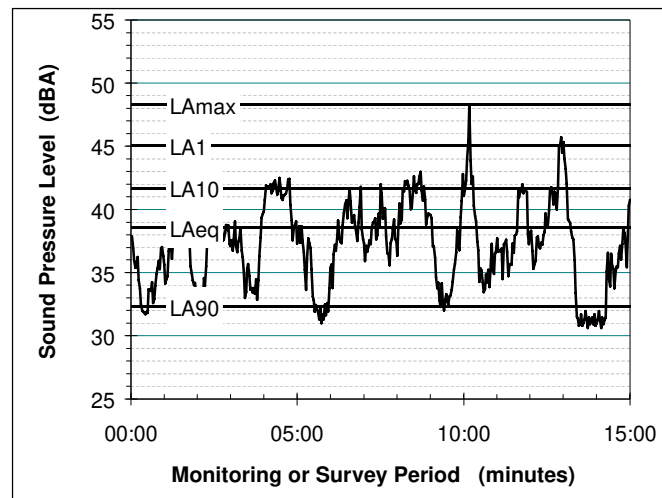
Sound pressure level (dBA)	Typical example	Subjective (human) evaluation
40	Ambient noise level in a rural environment with light breezes and some noise from insects, birds and distant traffic	Quiet to very quiet
30	Ambient noise level in a typical rural noise environment in the absence of insect noise and wind	
20	Ambient noise level in remote and quiet rural environment away from main roads with no wind and no insect noise	Almost silent

Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels (LAN), where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time and LA10 the noise exceeded for 10% of the time.

The Figure below presents a hypothetical 15-minute noise measurement, illustrating various common statistical indices of interest.

Figure A-1 Hypothetical 15 Minute Noise Measurement



Of particular relevance to this study, are:

- LAeq,adj,10min - means the A-weighted sound pressure level of a continuous steady sound (adjusted for tonal character) that within a 10 minute period has the same mean square sound pressure of a sound that varies with time.
- LAmax,adj,10min - means the average maximum A-weighted sound pressure level (adjusted for noise character) measured over any 10 minute period typically equivalent to the LA10 noise descriptor (as shown in **Figure A-1**).



Noise Propagation

Provided the receptor is in the far-field of the noise source, noise levels will reduce as a receptor moves further away from the source. This is due to spreading of the noise source energy over distance. For a simple point source (for example, a motor) the theoretical reduction in noise levels is 6 dBA per doubling of distance. For a line source (for example, a busy road) the theoretical reduction is 3 dBA per doubling of distance. In reality however other factors affect noise propagation. These include ground absorption, air absorption, acoustic screening and meteorological effects.

Meteorological Effects

At distances over 500 m, meteorological affects (for example, local weather and atmospheric conditions) can substantially enhance or impair noise propagation. The most influential meteorological conditions on noise propagation are wind speed and direction and the occurrence of temperature inversions. Ambient air temperature and humidity and atmospheric pressure also affect noise propagation although to a lesser extent than wind and temperature inversions.

Wind Conditions

Wind conditions enhance noise propagation when the wind is blowing from a noise source towards a receptor and therefore noise levels at the receptor will be higher under these conditions. The wind can be thought to carry the noise in the direction it is heading. Where winds blow from the receptor towards the source, the propagation of noise is impaired and therefore lower noise levels will be experienced at the receptor.

It is important to consider the effect of prevailing wind conditions when assessing noise propagation over larger distances. Wind roses, which graph long term variations in wind speed and direction, are a useful tool for analysing prevailing wind conditions where available.

Temperature Inversions

Temperature inversions are a meteorological phenomenon where a layer of cold air is trapped at the ground surface under a layer of warmer air. Temperature inversions enhance noise propagation because sound travelling away from the ground is reflected back down from where the colder air meets the warmer air due to the change in pressure between the two layers.

Conditions that favour the development of a strong surface inversion are nights with calm winds and clear skies. Calm winds prevent warmer air above the surface from mixing down to the ground, and clear skies increase the rate of cooling at the Earth's surface. It is therefore important to consider the effect of temperature inversions when assessing noise propagation over larger distances and during night-time periods.

Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of “peak” velocity or “rms” velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as “peak particle velocity”, or PPV. The latter incorporates “root mean squared” averaging over some defined time period.



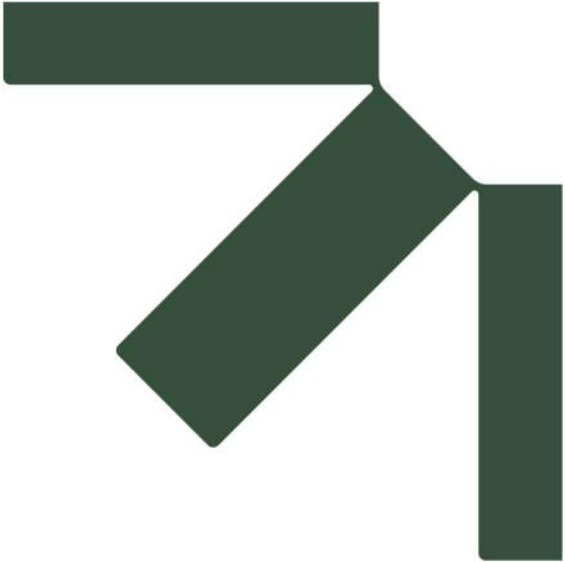
Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V , expressed in mm/s can be converted to decibels by the formula $20 \log (V/V_0)$, where V_0 is the reference level (1E-6 mm/s). Care is required in this regard, as other reference levels are used by some organizations.

Over-Pressure

The term “over-pressure” is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (i.e. unweighted), at frequencies both in and below the audible range.





Appendix B Baseline Noise Monitoring Results

Daunia West Infrastructure Project

Noise and Vibration Impact Assessment

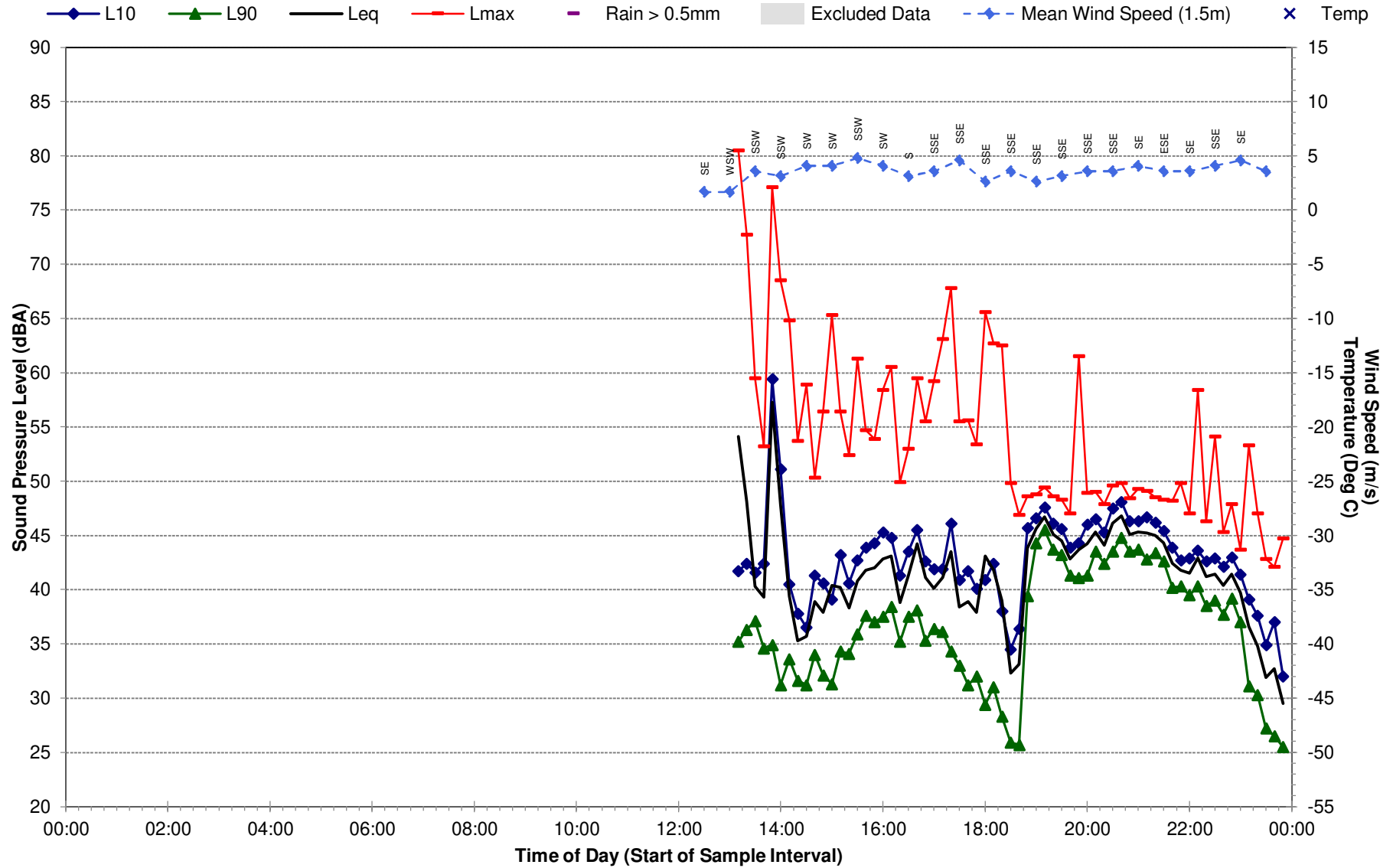
Whitehaven Coal Limited

SLR Project No.: 620.042120.00001

20 March 2026

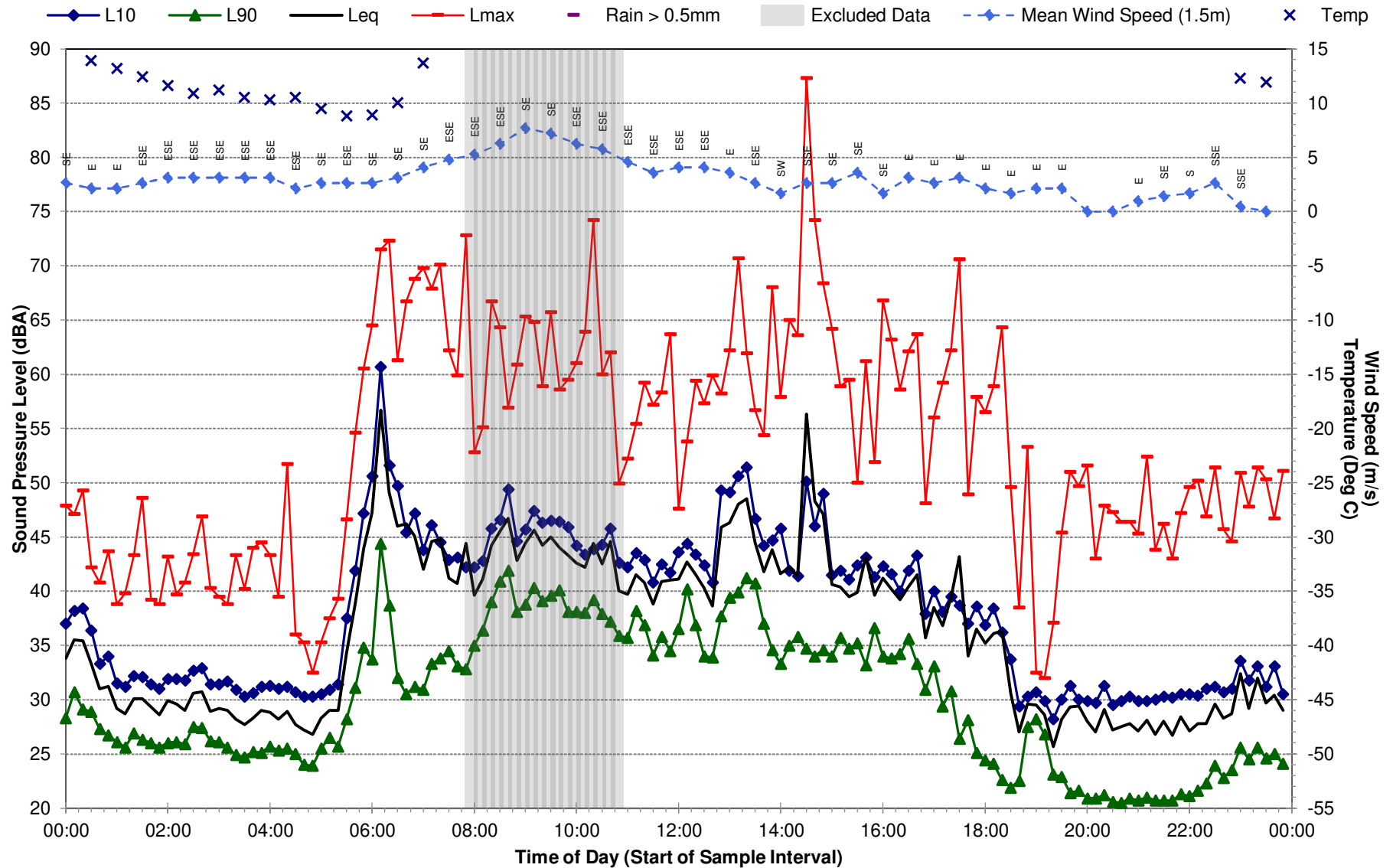
Statistical Ambient Noise Levels

Location One - Olive Downs Homestead DMS- Tuesday, 14 September 2021



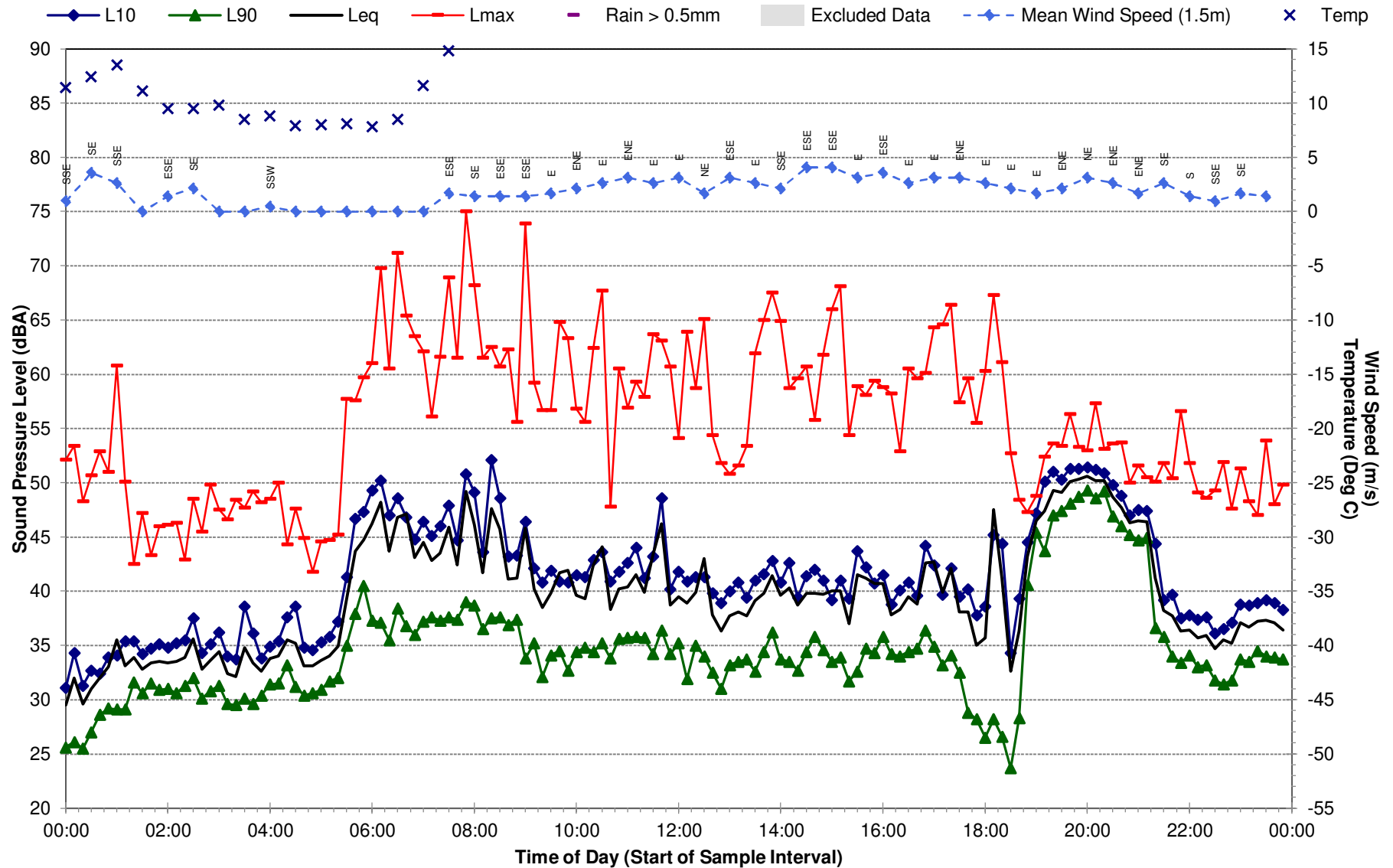
Statistical Ambient Noise Levels

Location One - Olive Downs Homestead DMS- Wednesday, 15 September 2021



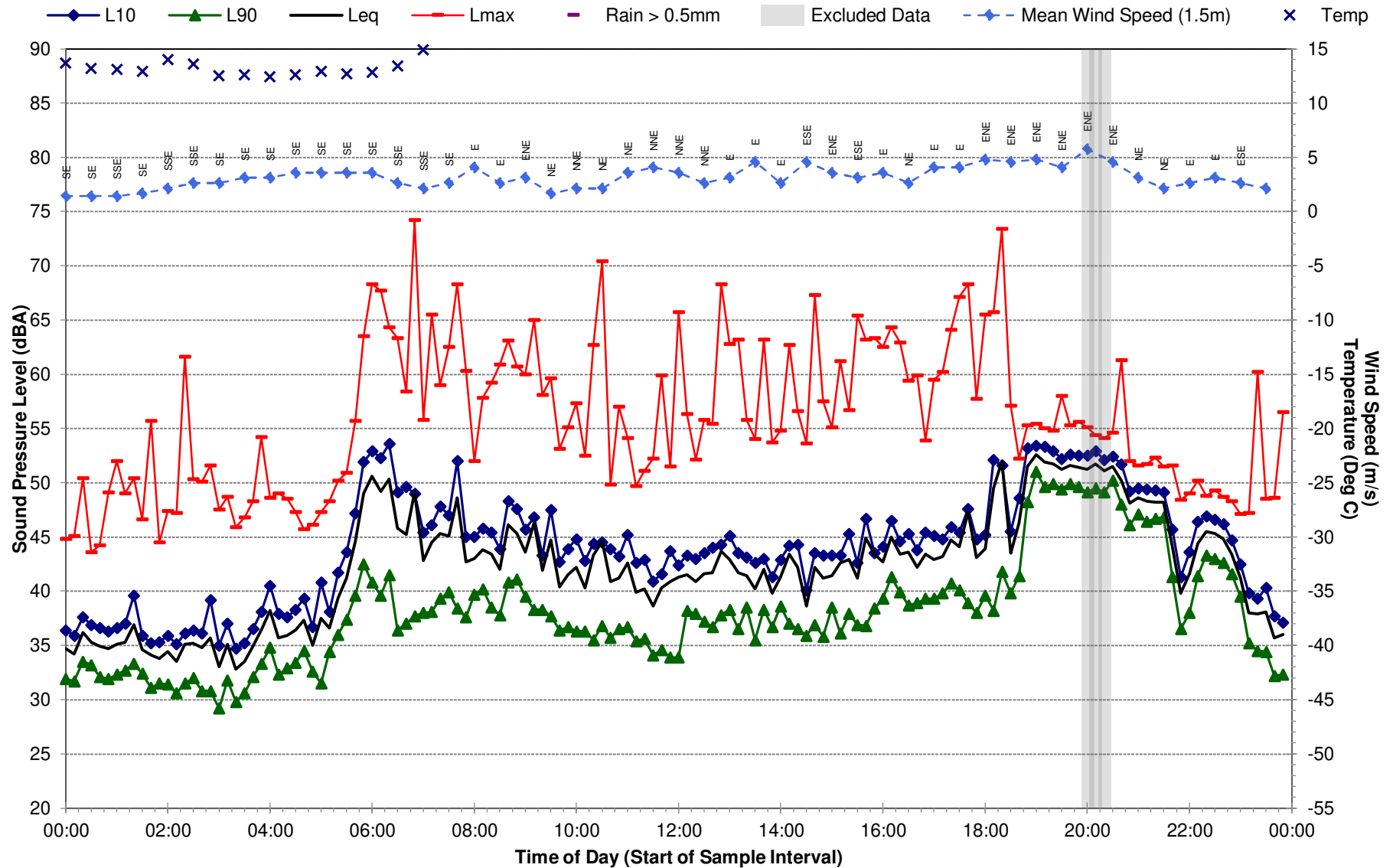
Statistical Ambient Noise Levels

Location One - Olive Downs Homestead DMS- Thursday, 16 September 2021



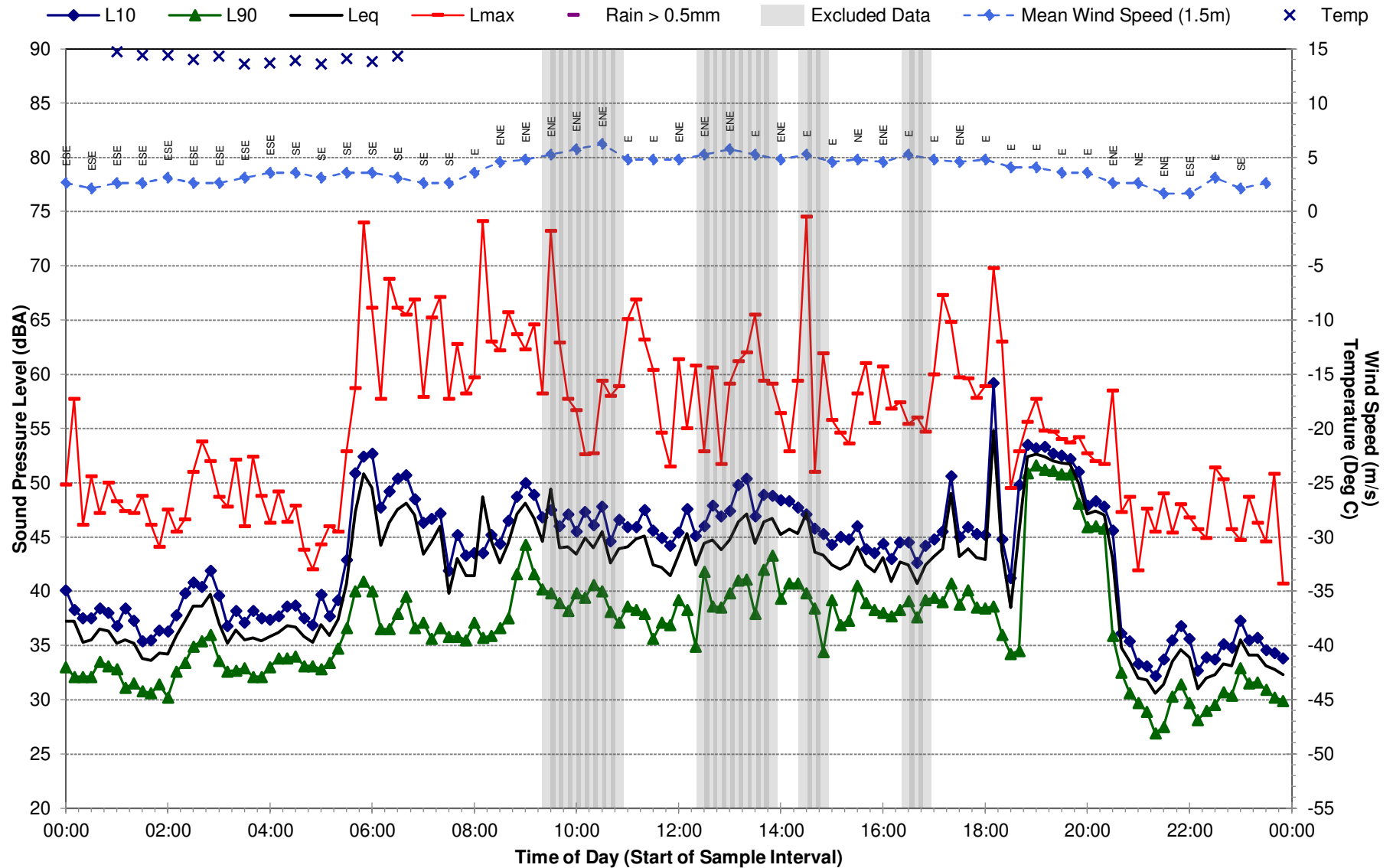
Statistical Ambient Noise Levels

Location One - Olive Downs Homestead DMS- Friday, 17 September 2021

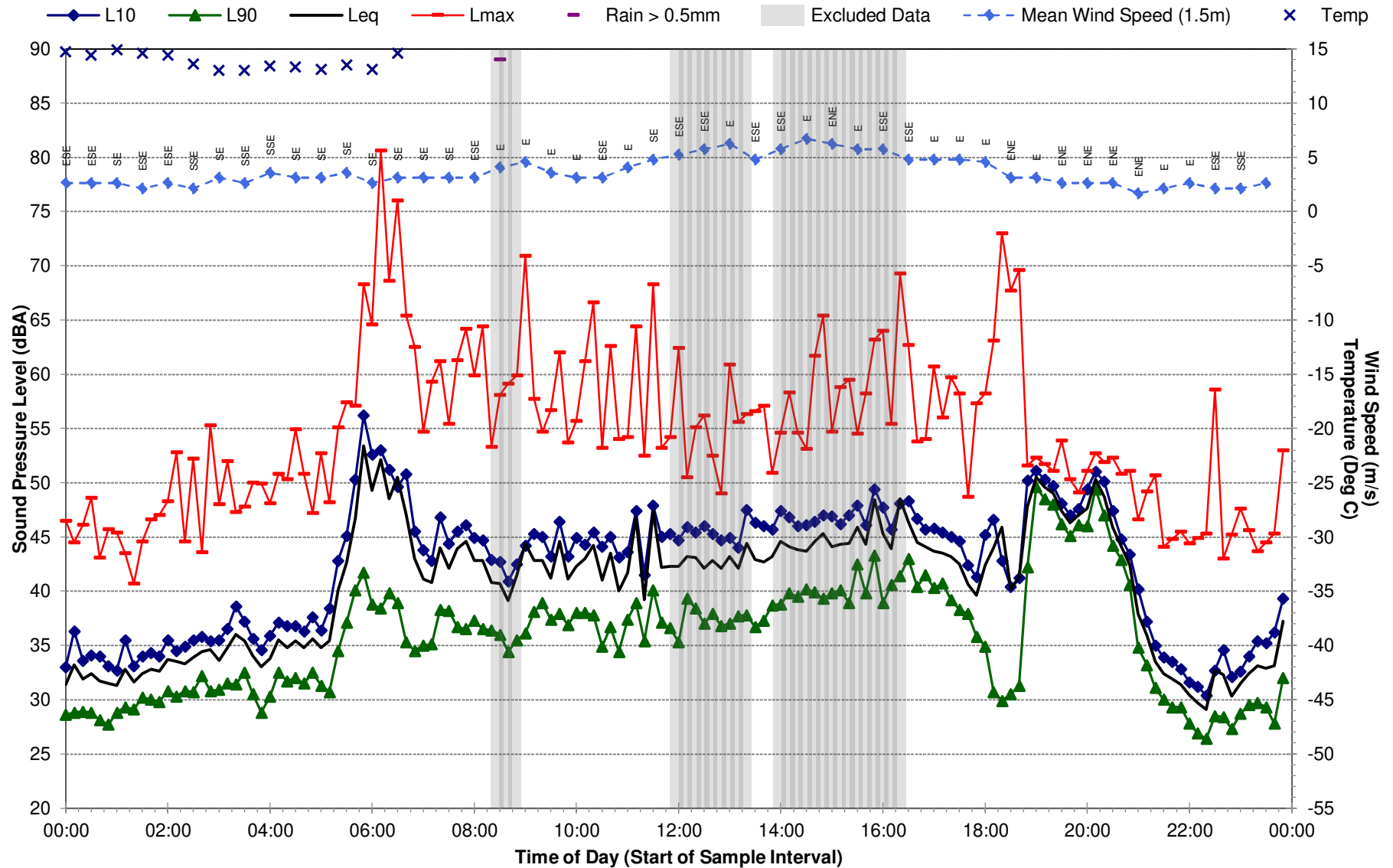


Statistical Ambient Noise Levels

Location One - Olive Downs Homestead DMS- Saturday, 18 September 2021

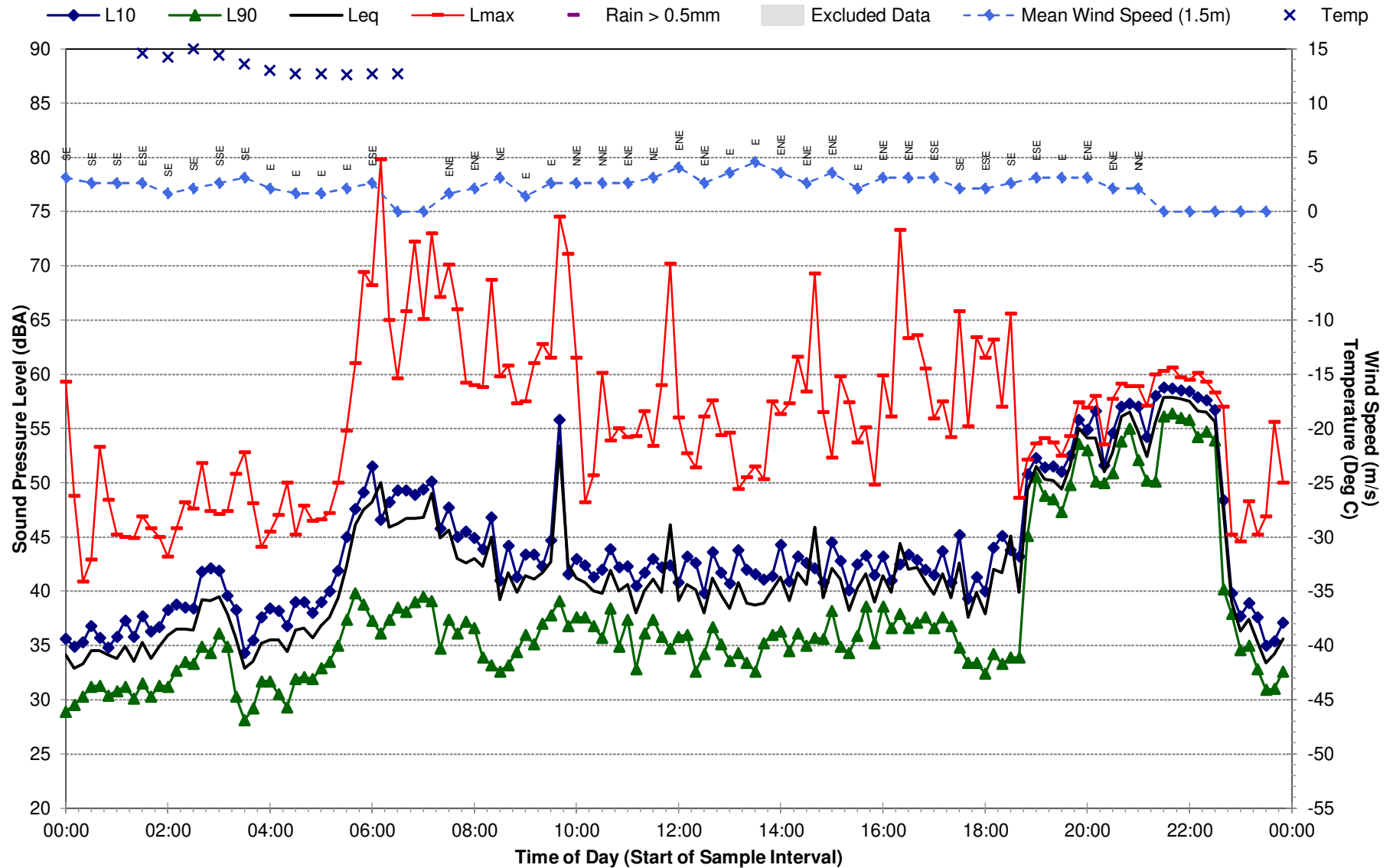


Location One - Olive Downs Homestead DMS- Sunday, 19 September 2021



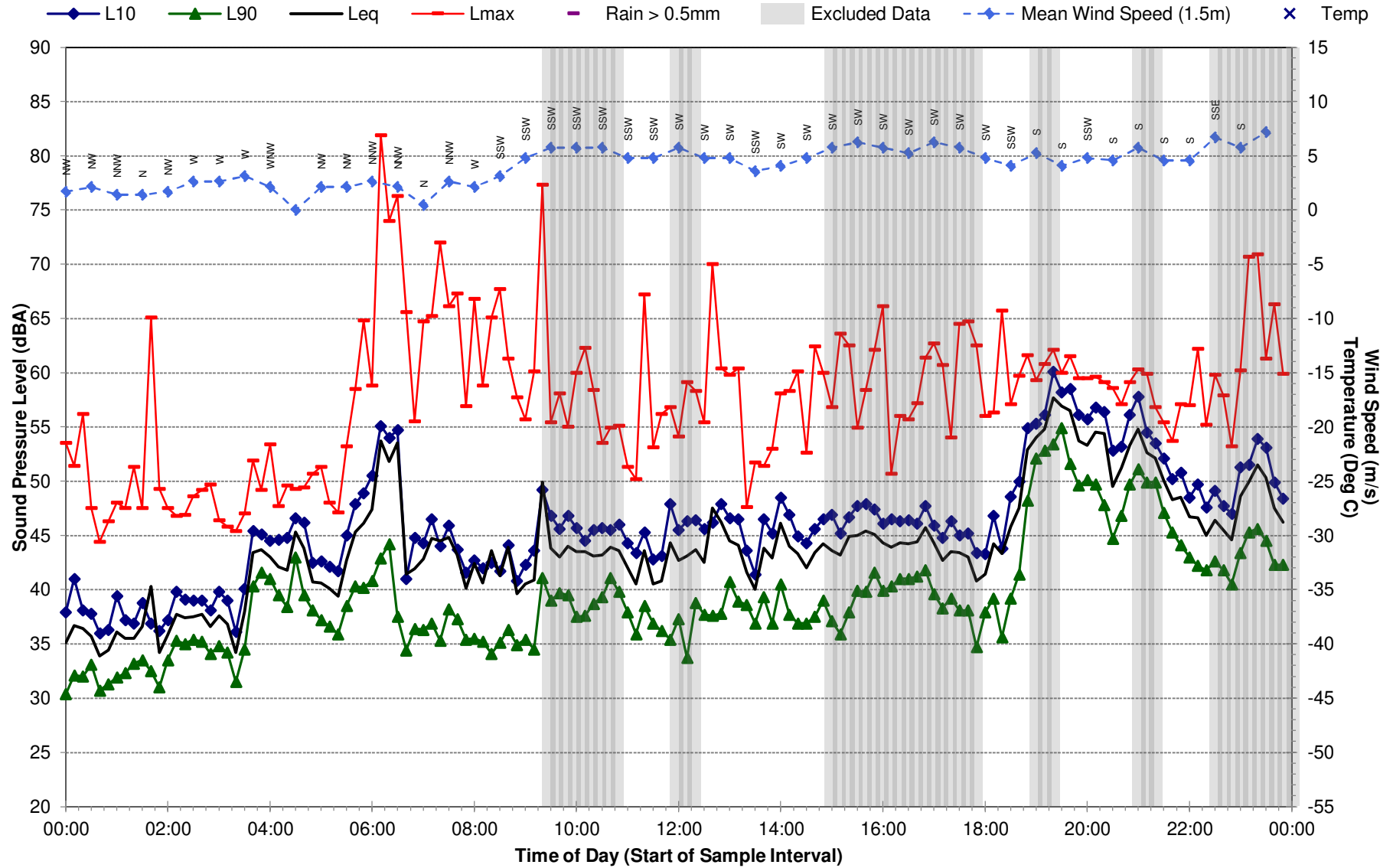
Statistical Ambient Noise Levels

Location One - Olive Downs Homestead DMS- Monday, 20 September 2021



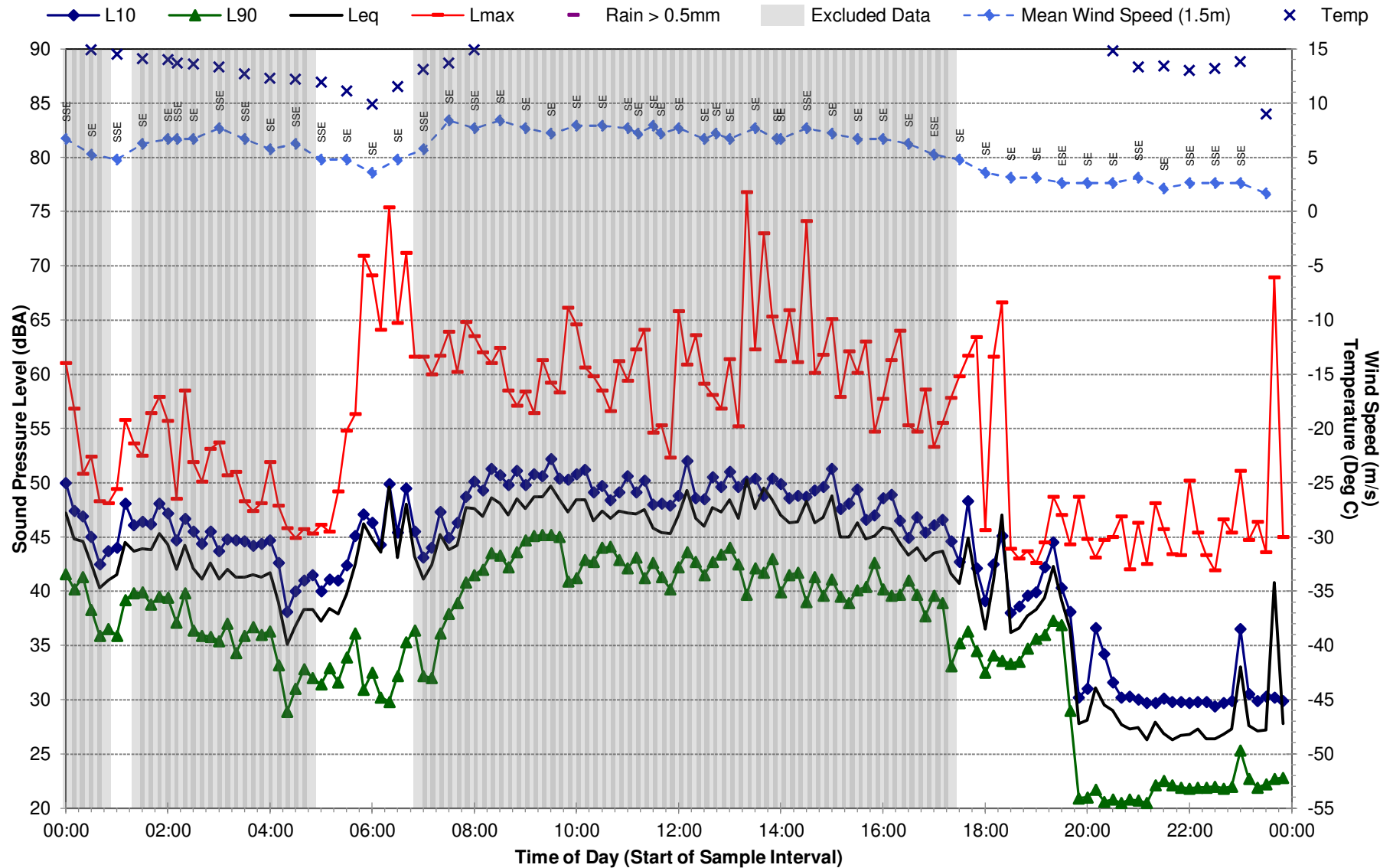
Statistical Ambient Noise Levels

Location One - Olive Downs Homestead DMS- Tuesday, 21 September 2021



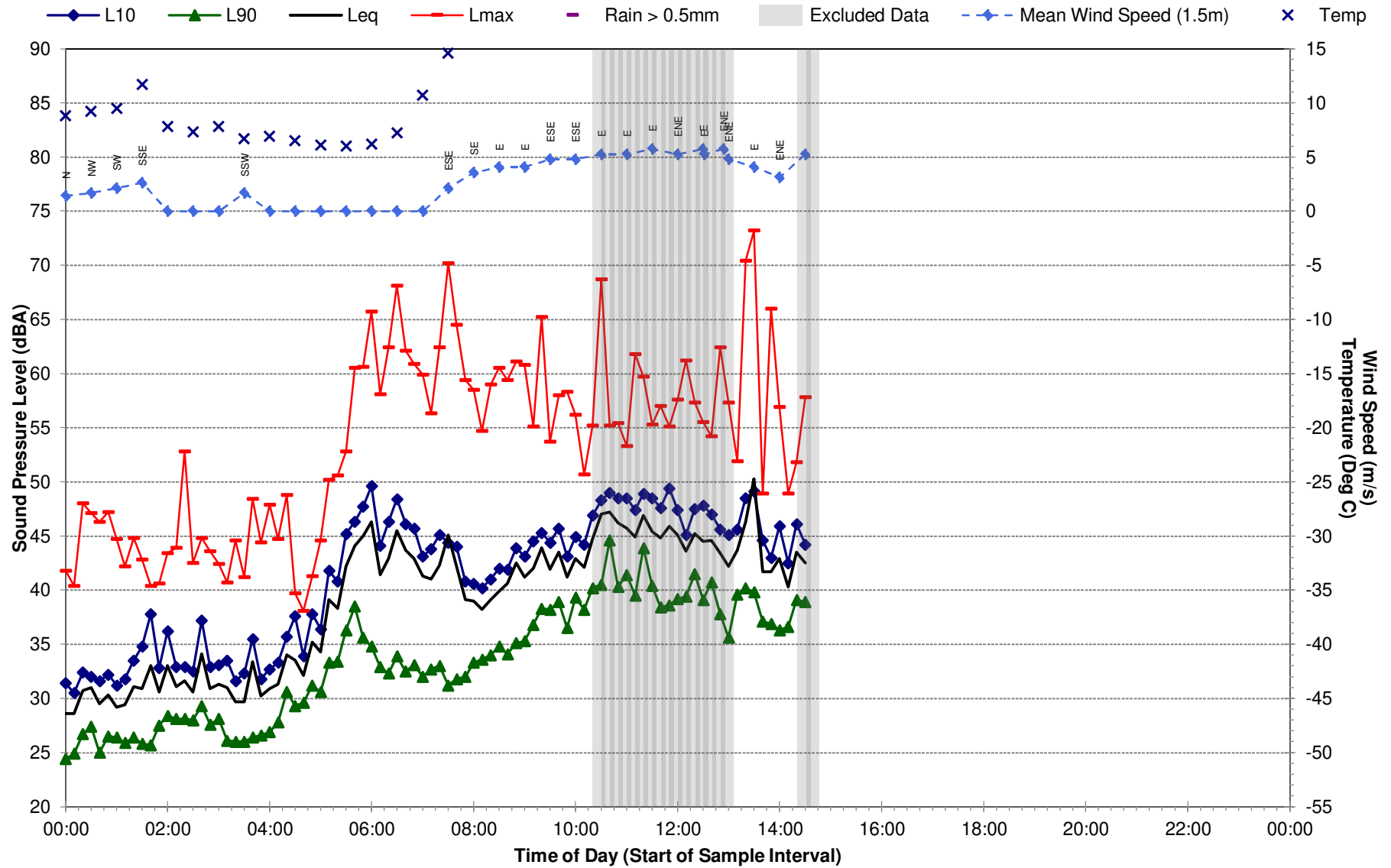
Statistical Ambient Noise Levels

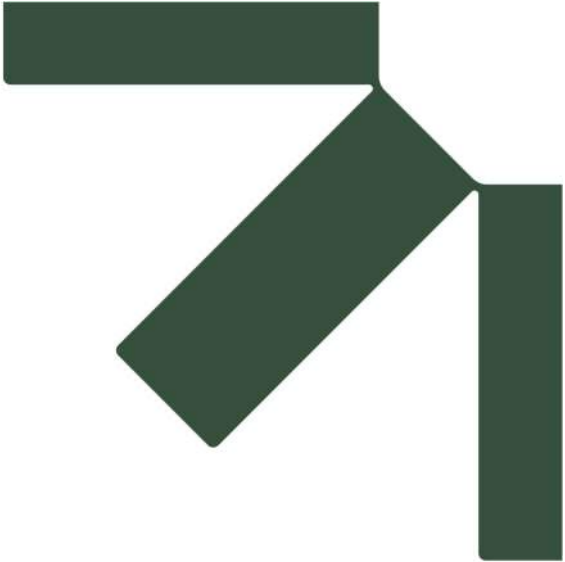
Location One - Olive Downs Homestead DMS- Wednesday, 22 September 2021



Statistical Ambient Noise Levels

Location One - Olive Downs Homestead DMS- Thursday, 23 September 2021





Appendix C Wind Roses

Daunia West Infrastructure Project

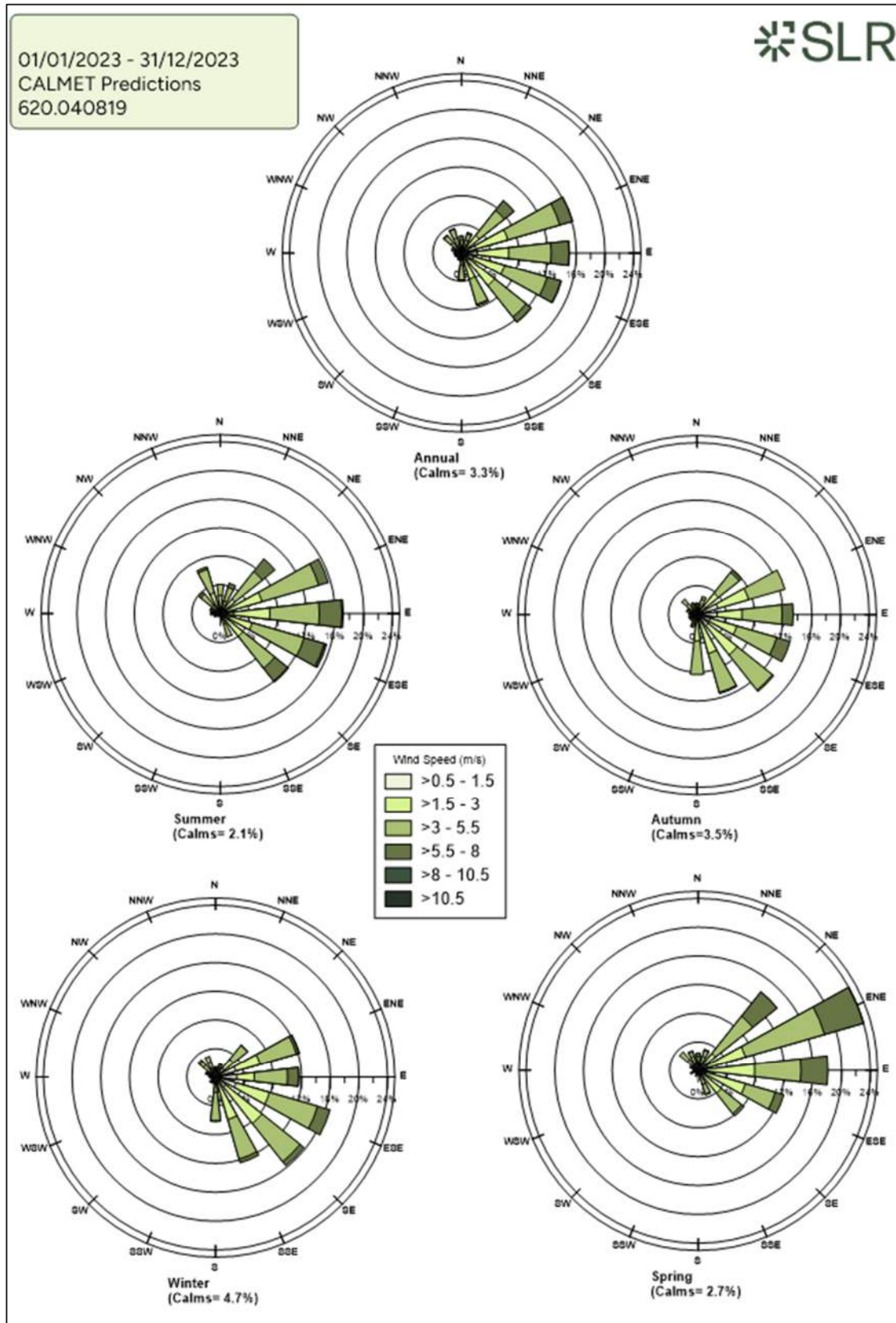
Noise and Vibration Impact Assessment

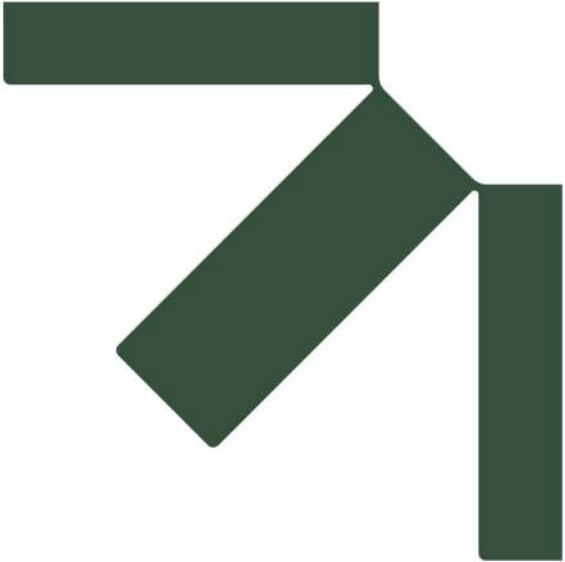
Whitehaven Coal Limited

SLR Project No.: 620.042120.00001

20 March 2026

Figure C-1 Wind Roses





Appendix D Predicted DNM Operational Noise Level Contour Maps

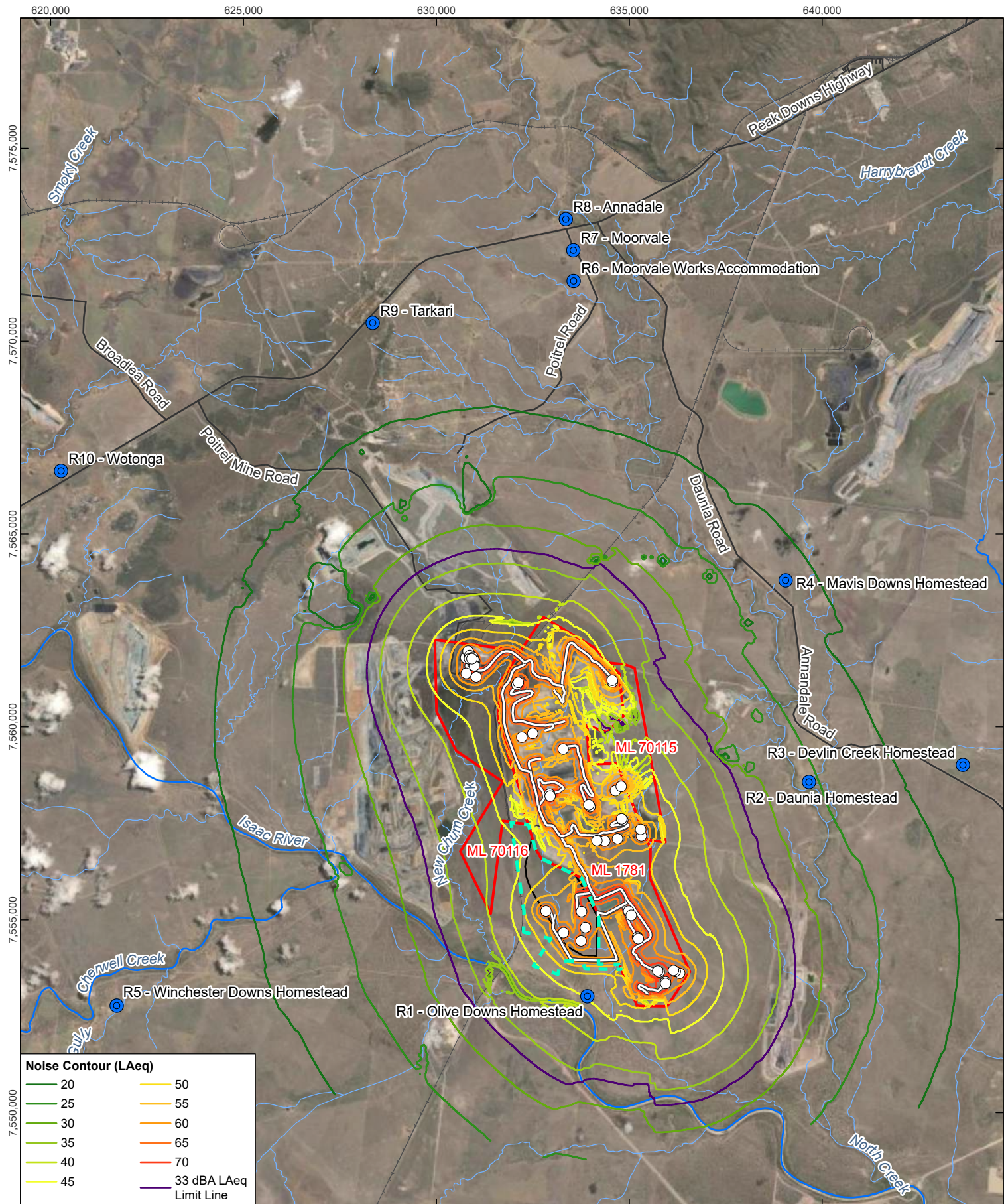
Daunia West Infrastructure Project

Noise and Vibration Impact Assessment

Whitehaven Coal Limited

SLR Project No.: 620.042120.00001

20 March 2026



Coordinate System: GDA2020 MGA Zone 55

Scale: 1:130,000 at A4

Project Number: 620.042120.00001

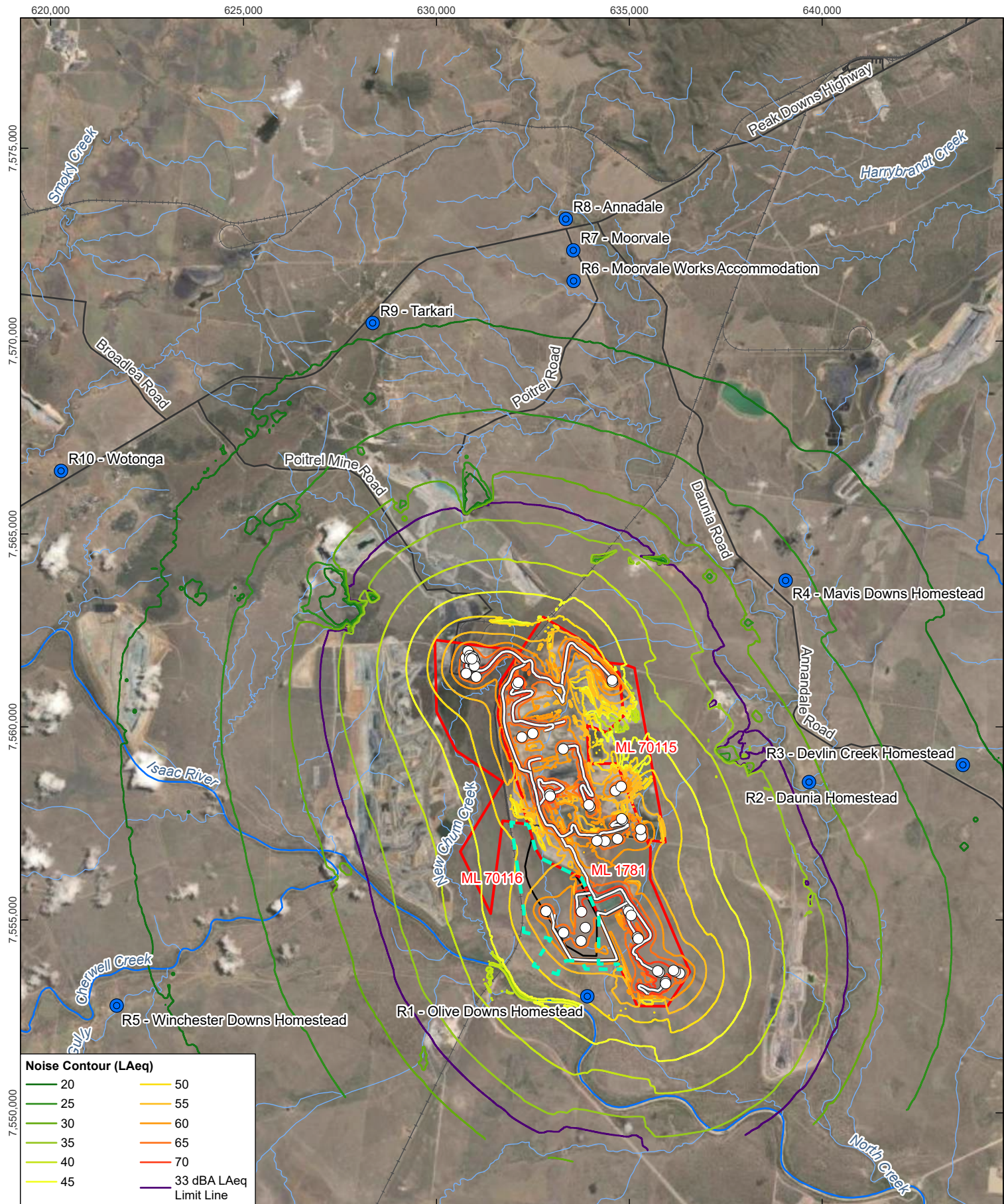
Date Drawn: 27-May-2026

Drawn by: RB



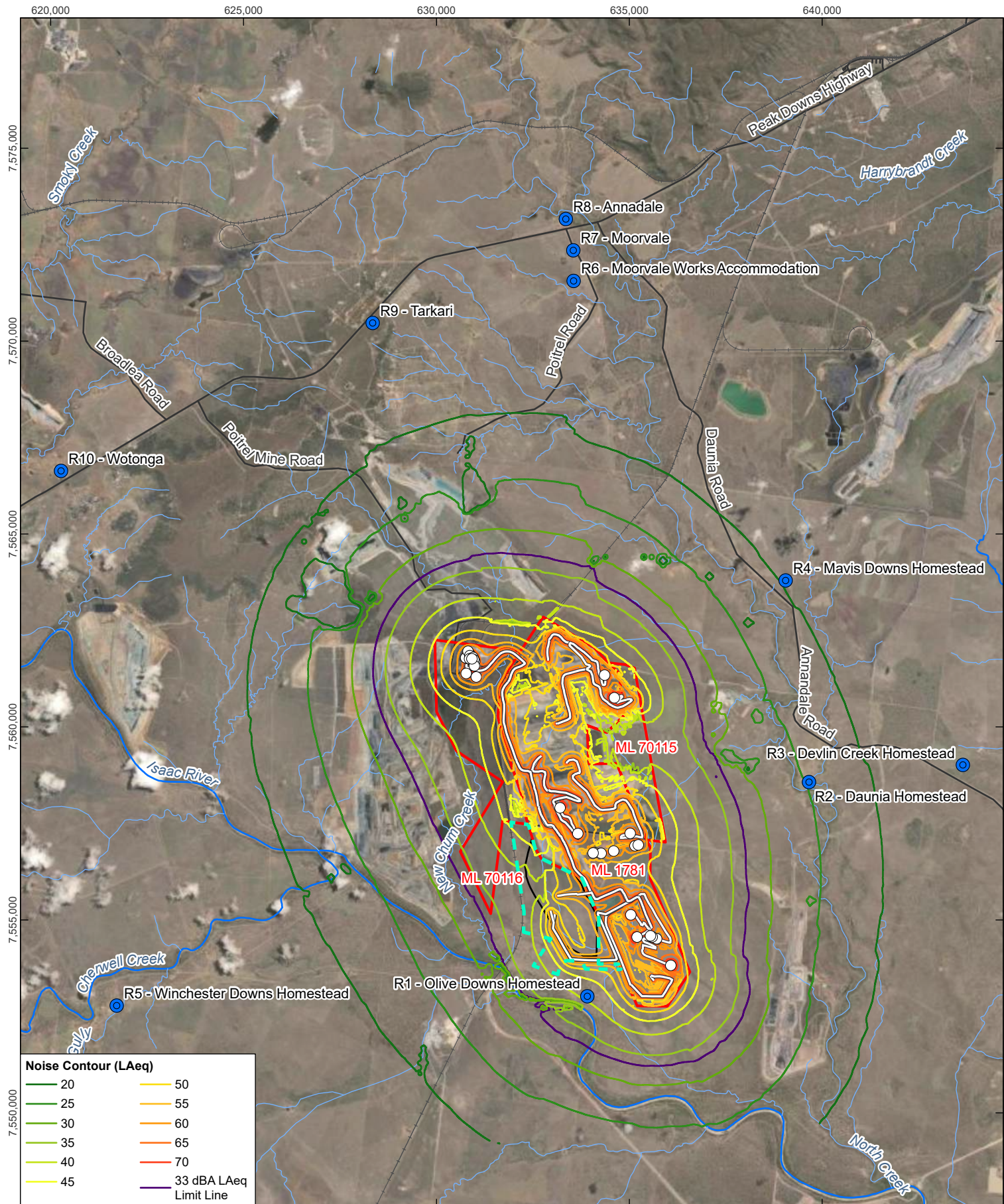
DISCLAIMER: All information within this document may be based on external sources. SLR Consulting Pty Ltd makes no warranty regarding the data's accuracy or reliability for any purpose.

APPENDIX D - Map 1



DAUNIA WEST INFRASTRUCTURE PROJECT

FY28 MINE PLAN ADVERSE WEATHER LAeq NOISE CONTOURS



0 1 2 km

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:130,000 at A4

Project Number: 620.042120.00001

Date Drawn: 27-May-2026

Drawn by: RB

LEGEND

- Receptor
- Noise Source (Point)
- Noise Source (Line)
- Road
- Railway
- Major Watercourse
- Minor Watercourse

- Mining Lease Application Area / Project Area
- ▭ Mining Lease
- ▭ Proposed Operational Out-of-Pit Dump (DWIP)

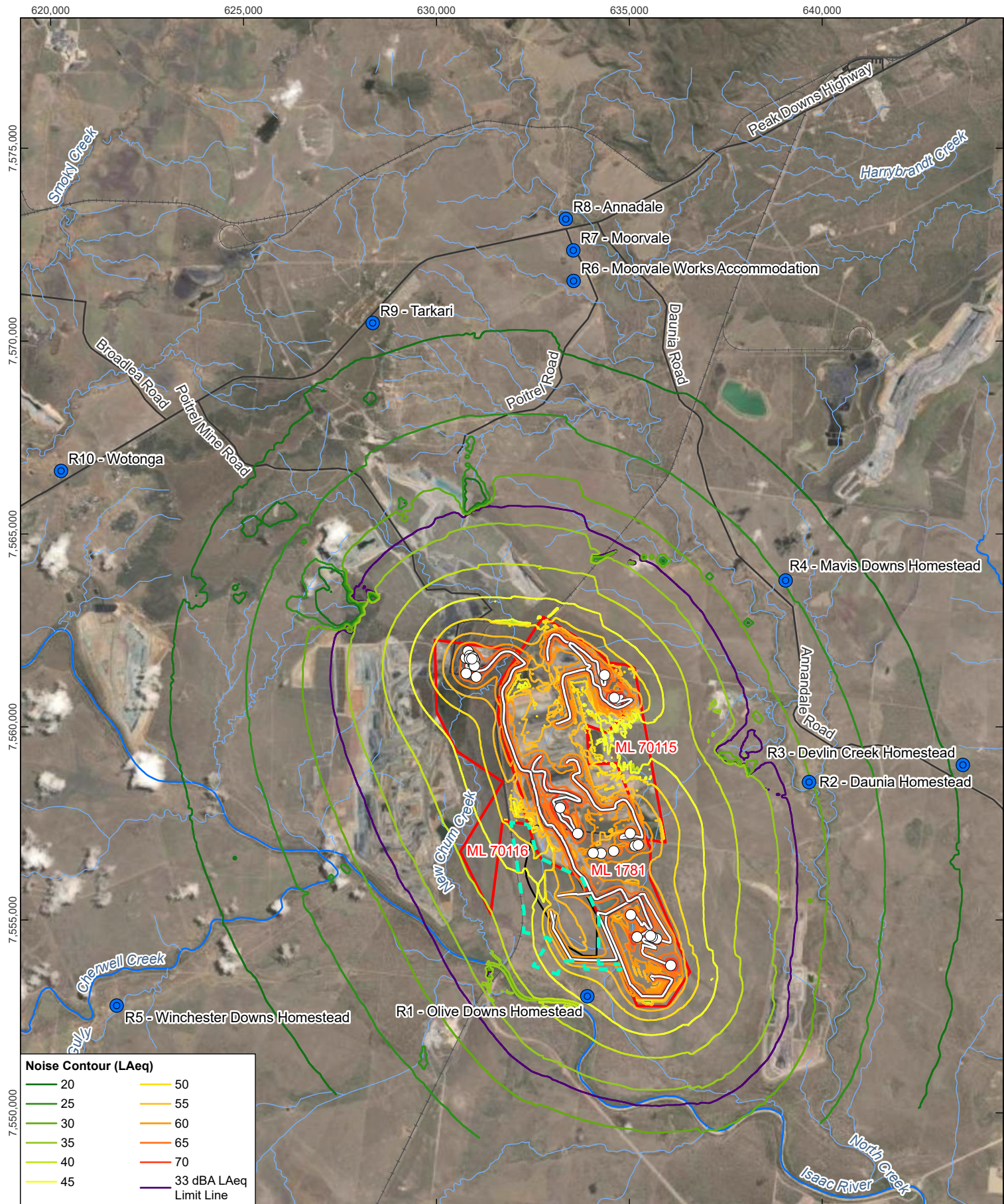
DAUNIA WEST INFRASTRUCTURE PROJECT

FY31 MINE PLAN NEUTRAL WEATHER LAeq NOISE CONTOURS



DISCLAIMER: All information within this document may be based on external sources. SLR Consulting Pty Ltd makes no warranty regarding the data's accuracy or reliability for any purpose.

APPENDIX D - Map 3



0 1 2 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:130,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 27-May-2026
 Drawn by: RB

LEGEND

- Receptor
- Noise Source (Point)
- Noise Source (Line)
- Road
- Railway
- Major Watercourse
- Minor Watercourse

- Mining Lease Application Area / Project Area
- Mining Lease
- Proposed Operational Out-of-Pit Dump (DWIP)

DAUNIA WEST INFRASTRUCTURE PROJECT

FY31 MINE PLAN ADVERSE WEATHER LAeq NOISE CONTOURS



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