# Appendix L

## Mine development noise and vibration impact assessment

REGIS RESOURCES LTD

# Noise and Vibration Impact Assessment

McPhillamys Gold Project
Blayney, NSW.

Prepared for: EMM Consulting Pty Limited
August 2019
MAC170434RP1V3

Muller Acoustic Consulting

# *Document Information*

## Noise and Vibration Impact Assessment

## McPhillamys Gold Project

## Blayney, NSW

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CONTENTS


1 INTRODUCTION ..... 7

1.1 PURPOSE ..... 7

1.2 OBJECTIVES ..... 8

2 PROJECT DESCRIPTION ..... 11

2.1 RECEIVER REVIEW ..... 13

3 NOISE POLICY AND GUIDELINES ..... 19

3.1 ASSESSMENT REQUIREMENTS ..... 20

3.2 CONSTRUCTION NOISE GUIDELINE ..... 21

3.2.1 CONSTRUCTION NOISE MANAGEMENT LEVELS ..... 23

3.2.2 CONSTRUCTION SLEEP DISTURBANCE ..... 24

3.3 CONSTRUCTION VIBRATION ..... 24

3.4 NOISE POLICY FOR INDUSTRY ..... 25

3.4.1 PROJECT NOISE TRIGGER LEVELS (PNTL) ..... 26

3.4.2 RATING BACKGROUND LEVEL (RBL) ..... 26

3.4.3 PROJECT INTRUSIVENESS NOISE LEVEL (PINL) ..... 26

3.4.4 PROJECT AMENITY NOISE LEVEL (PANL) ..... 27

3.4.5 MAXIMUM NOISE LEVEL ASSESSMENT ..... 28

3.4.6 LOW FREQUENCY NOISE ..... 28

3.5 VOLUNTARY LAND ACQUISITION AND MITIGATION POLICY ..... 29

3.6 ROAD NOISE POLICY ..... 29

3.7 BLASTING GUIDELINE ..... 29

4 EXISTING ENVIRONMENT ..... 31

4.1 NOISE MONITORING METHODOLOGY ..... 31

4.2 NOISE MONITORING RESULTS ..... 31

5 ASSESSMENT CRITERIA ..... 35

5.1 CONSTRUCTION NOISE MANAGEMENT LEVELS ..... 35

5.1.1 CONSTRUCTION - MAXIMUM NOISE LEVEL SCREENING CRITERION ..... 36

5.2 OPERATIONAL NOISE CRITERIA ..... 36
5.2.1 PROJECT INTRUSIVENESS NOISE LEVELS ..... 36
5.2.2 AMENITY NOISE LEVELS AND PROJECT AMENITY NOISE LEVELS ..... 37
5.2.3 PROJECT NOISE TRIGGER LEVELS ..... 37
5.2.4 MAXIMUM NOISE LEVEL SCREENING CRITERIA ..... 38
5.2.5 VOLUNTARY LAND ACQUISITION AND MITIGATION POLICY ..... 38
5.3 ROAD TRAFFIC NOISE CRITERIA ..... 41
5.3.1 RELATIVE INCREASE CRITERIA ..... 42
5.4 BLASTING CRITERIA ..... 42
5.4.1 COSMETIC DAMAGE CRITERIA ..... 43
5.4.2 OTHER BLASTING CRITERIA ..... 44
6 ASSESSMENT METHODOLOGY ..... 45
6.1 MITIGATION MEASURES INCLUDED IN THE PROJECT DESIGN ..... 45
6.1.1 PLANT AND EQUIPMENT SOUND POWER LEVELS ..... 46
6.2 NOISE ASSESSMENT SCENARIOS ..... 48
6.2.1 CONSTRUCTION ASSESSMENT SCENARIOS ..... 49
6.2.2 OPERATIONAL NOISE MODELLING SCENARIOS ..... 49
6.3 OPERATIONAL NOISE MODELLING PARAMETERS ..... 52
6.3.1 METEOROLOGICAL ANALYSIS ..... 52
6.3.2 MODELLED METEOROLOGICAL PARAMETERS ..... 54
6.3.3 MODIFYING FACTORS ..... 54
6.3.4 LOW FREQUENCY NOISE ..... 54
6.4 ROAD TRAFFIC NOISE ASSESSMENT METHODOLOGY ..... 55
6.5 BLASTING ASSESSMENT METHODOLOGY ..... 56
6.5.1 AIR-BLAST OVERPRESSURE ..... 56
6.5.2 GROUND-BORNE VIBRATION ..... 56
7 RESULTS ..... 57
7.1 PREDICTED NOISE LEVELS – CONSTRUCTION ..... 57
7.1.1 TYPICAL CONSTRUCTION ACTIVITIES ..... 57
7.2 PREDICTED NOISE LEVELS – MINE OPERATIONS ..... 59

7.2.1 PROJECT YEAR 1 ..... 59
7.2.2 PROJECT YEAR 2 ..... 60
7.2.3 PROJECT YEAR 4 ..... 60
7.2.4 PROJECT YEAR 8 ..... 60
7.2.5 DISCUSSION ..... 61
7.2.6 MAXIMUM NOISE LEVEL ASSESSMENT – MINE OPERATIONS ..... 76
7.2.7 LOW FREQUENCY NOISE - MINE OPERATIONS ..... 76
7.2.8 VLAMP ASSESSMENT – MINE OPERATIONS ..... 78
7.3 ROAD TRAFFIC NOISE RESULTS ..... 80
7.4 BLASTING– MINE OPERATIONS ..... 82
7.4.1 BLASTING - EFFECTS OF VIBRATION ON HERITAGE STRUCTURES ..... 82
7.4.2 EFFECTS OF VIBRATION ON INFRASTRUCTURE FROM BLASTING ..... 82
7.4.3 EFFECTS OF BLASTING ON ANIMALS AND LIVESTOCK ..... 83
8 MITIGATION ..... 87
8.1 MINE DESIGN OPTIMISATION ..... 87
8.2 NEGOTIATED AGREEMENTS AND ACQUISITIONS ..... 87
8.3 NOISE MONITORING AND MANAGEMENT ..... 87
8.3.1 NOISE MONITORING TERMINALS ..... 88
8.3.2 OPERATOR ATTENDED NOISE MONITORING ..... 88
8.3.3 DATA PRESENTATION AND REPORTING ..... 89
8.4 COMPLAINTS HANDLING ..... 90
8.5 CONSTRUCTION NOISE ..... 91
8.6 BLASTING ..... 93
8.6.1 BLAST DESIGN ..... 93
8.6.2 BLAST MONITORING ..... 94
9 CONCLUSION ..... 97
APPENDIX A – GLOSSARY OF TERMS
APPENDIX B – NOISE MONITORING CHARTS
APPENDIX C – NEWA ANALYSIS
APPENDIX D – TABULATED RESULTS

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# 1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by EMM Consulting Pty Limited on behalf of LFB Resources NL to prepare a Noise and Vibration Impact Assessment (NVIA) for the construction and operation of the proposed McPhillamys Mine Development project (the 'Mine Development'). The Mine Development is a component of the McPhillamys Gold Project which consists of a water supply pipeline and a greenfield open cut gold mine, approximately 8km north-east of Blayney in Central West New South Wales (NSW). The Mine Development project area is illustrated at a regional scale in **Figure 1**. LFB Resources NL is a 100% owned subsidiary of Regis Resources Ltd (herein referred to as Regis).

This report assesses the potential noise and vibration impacts associated with the mine development component of the McPhillamys Gold Project. References to 'the project' throughout this report are therefore referring to the Mine Development only. The potential impacts associated with the pipeline development component are addressed in a separate assessment (MAC 2019).

The Mine Development is within the Blayney and Cabonne Local Government Areas (LGAs) which has a long history of alluvial and hard rock mining, with exploration for gold and base metals occurring since the mid to late 19th century. The Mine Development project boundary (herein referred to as the project area) is illustrated in **Figure 2** and covers the Mining Lease (ML) application area for the project as well the parts of the project that do not require a ML.

This NVIA documents the assessment methods, results and the initiatives incorporated into the project design to avoid and minimise noise and blasting (overpressure and ground vibration) impacts during construction and operational phases and includes additional mitigation and management measures proposed to address any residual impacts.

## 1.1 Purpose

The NVIA has been completed as part of the Environmental Impact Statement (EIS) for the project which has been prepared to address Secretary's Environmental Assessment Requirements (EARs) from the Department of Planning and Environment, Industry and Planning NSW (DPIE) (ref: SSD18_9505). The project includes the development of an open cut mine and associated infrastructure (site access, water and power supply, tailings management, water management, ore stockpiles and processing) and the establishment of a water supply pipeline between the mine site and the Western Coalfields near Lithgow, NSW.

The EARs applicable to the construction and operational NVIA for the Mine Development are described in Section 3.1, along with where each requirement is addressed in this report.

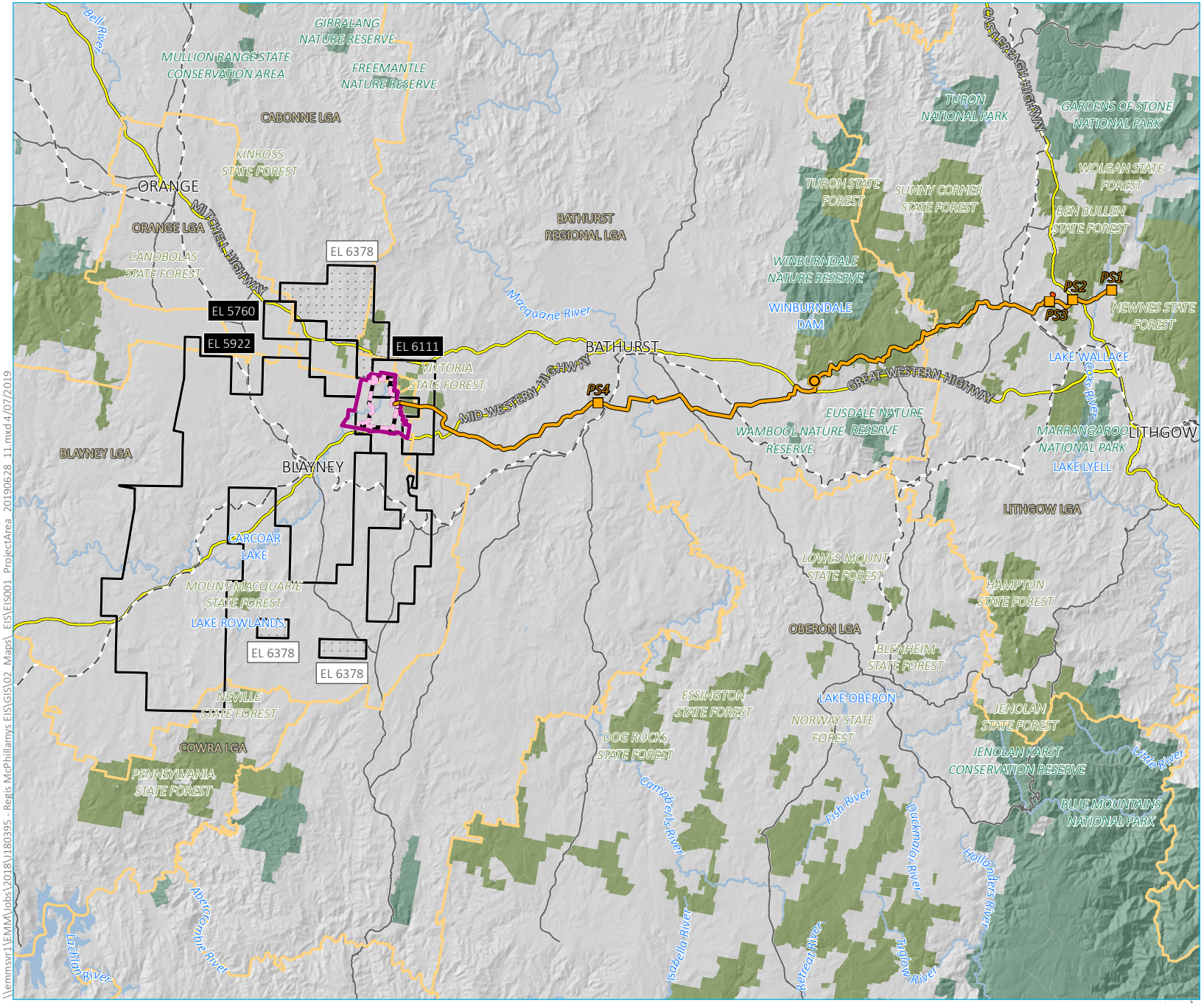
## 1.2 Objectives

This NVIA describes the predicted construction and operational noise and vibration impacts associated with the project, and the mitigation and management measures that may be implemented to effectively manage noise emissions at off-site receivers.

The objectives of the NVIA are as follows:

- identify the closest and/or potentially most affected receivers situated within the area of influence to the project;
- review construction activities to identify noise generating plant, equipment, machinery or activities proposed to be undertaken that have the potential to exceed construction Noise Management Levels (NMLs) during standard construction hours and out of hours periods;
- assess the potential noise impacts associated with construction of the project and provide a comparison of predicted noise levels against the project construction NMLs and relevant vibration criteria;
- review operating activities to identify noise generating plant, equipment, machinery or activities proposed to be undertaken that have the potential to exceed Project Noise Trigger Levels (PNTL) for all operating periods;
- utilise 3D noise modelling to predict noise levels that may occur as a result of the construction and operation of the project at the closest and/or potentially most affected receptors;
- provide feasible and reasonable noise mitigation and management measures, and monitoring options, where NMLs may be exceeded;
- assess the potential noise impacts associated with operation of the Mine Development and provide a comparison of predicted noise levels against the PNTLs; and
- assess the potential for blasting impacts from the operation of the Mine Development and provide a comparison with the relevant blasting emissions criteria.

A glossary of terms, definitions and abbreviations used in this report is provided in Appendix A.





KEY

- Mine development project area (2,513.47 ha)
- Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)
- Pressure reducing system
- Pumping station facility
- Pipeline corridor
- Pipeline corridor (Blowdown Pond)

Existing environment

- Rail line
- Primary road
- Arterial road
- River
- Waterbody
- NPWS reserve
- State forest
- Local government area

Exploration lease boundaries (of interest)

- Held by LFB Resources NL (Regis)
- Held by others

Source: EMM (2019); Regis Resources (2019); DPE (2018); DFSI (2017); GA (2011)

0 10 20 km

GDA 1994 NSW Lambert

N

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# Regional setting - project application area

McPhillamys Gold Project

Figure 1

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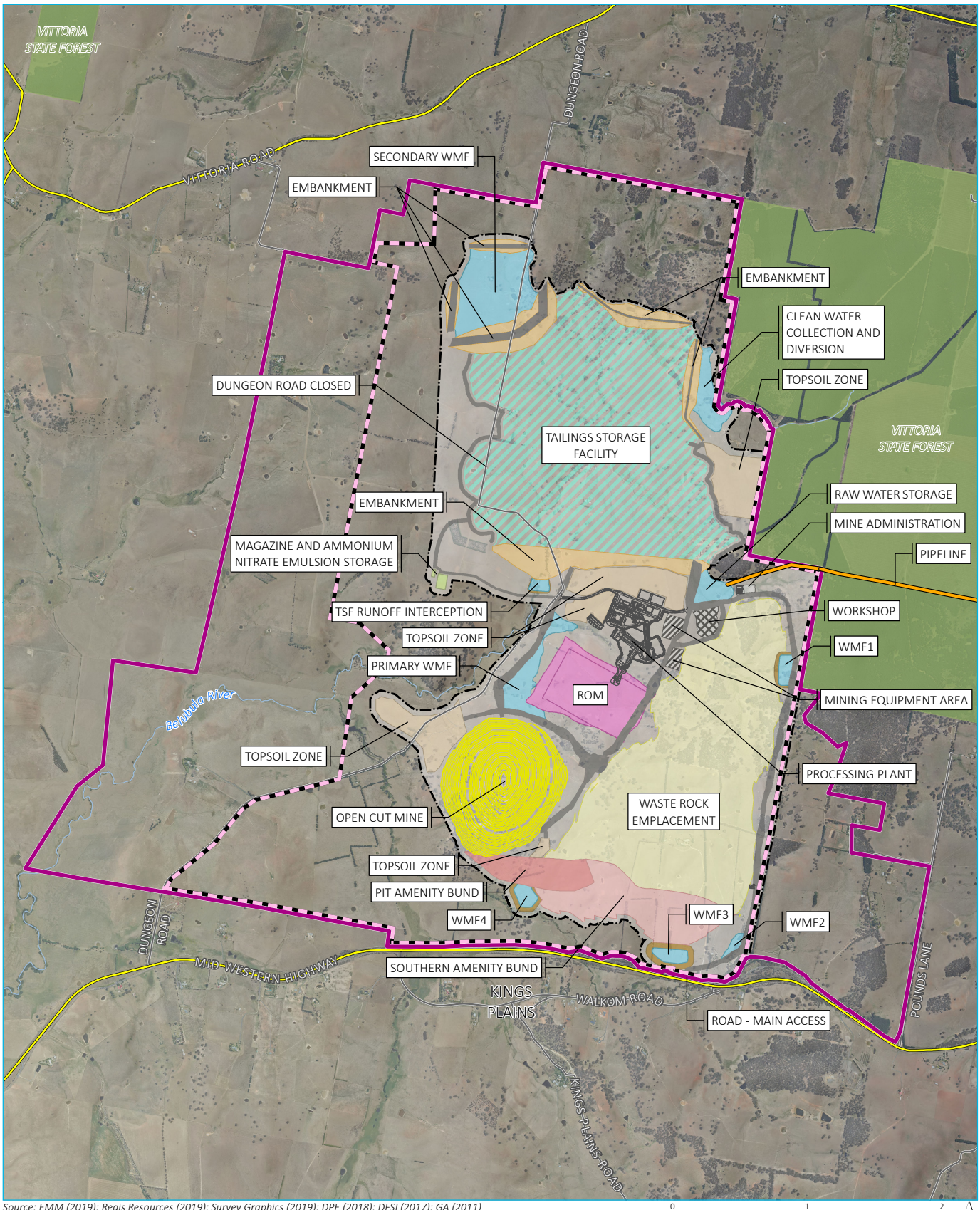
EMM creating opportunities




*Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DPE (2018); DFSI (2017); GA (2011)*

0 1 2 km

GDA 1994 MGA Zone 55

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## KEY

Project application area

Mine development project area (2,513.47 ha)

Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)

Disturbance footprint

Pipeline corridor

Project general arrangement

Plant layout

Road

Water management facility (WMF)

Sediment basin structure

Existing environment

Main road

Local road

Belubula River

State forest

# Mine development general arrangement

McPhillamys Gold Project

Figure 2

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EMM creating opportunities

# 2 Project Description

A full project description is provided in Chapter 2 of the EIS (EMM 2019). The key components of the Mine Development project are as follows:

- Development and operation of an open-cut gold mine, comprising approximately one to two years of construction, approximately 10 years of mining and processing, and a closure period (including the final rehabilitation phase) of approximately three to four years, noting there may be some overlap of these phases. The total project life for which approval is sought is 15 years;
- Development and operation of a single circular open-cut mine with a diameter of approximately 1,050 metres (m) and a final depth of approximately 460 m, developed by conventional open-cut mining methods encompassing drill, blast, load and haul operations. Up to 8.5 million tonnes per annum (Mtpa) of ore will be extracted during the project life;
- Construction and use of a conventional carbon-in-leach processing facility with an approximate processing rate of 7 Mtpa to produce approximately 200,000 ounces, and up to 250,000 ounces, per annum of product gold. The processing facility will comprise a run-of-mine (ROM) pad and crushing, grinding, gravity, leaching, gold recovery, tailings thickening, cyanide destruction and tailings management circuits. Product gold will be taken off-site to customers via road transport;
- A waste rock emplacement will be developed in the south-eastern portion of the mine project area up to an approximate height of 1,060 m AHD to accommodate overburden material from the open cut mine. The emplacement has also been designed to encapsulate potentially acid forming material (PAF) from the open cut;
- The southern portion of the waste rock emplacement (southern amenity bund) and the pit amenity bund will be constructed and rehabilitated in the early years of the mine development to provide noise and visual bunds for the remainder of operations.
- Construction and use of an engineered tailings storage facility to store tailings material;
- Construction and operation of associated mine infrastructure, including:
  - administration buildings and ablutions;
  - workshop and stores facilities, including associated plant parking, laydown and hardstand areas, vehicle washdown facilities, and fuel and lubricant storage;
  - internal road network;

- explosives magazine and ammonium nitrate emulsion (ANE) storage;
- topsoil, subsoil and capping stockpiles;
- ancillary facilities, including fences, access roads, car parking areas and communications infrastructure; and
- on-site laboratory.

- Establishment and use of a site access road, and an intersection with the Mid Western Highway;
- The project area will be accessed via a new intersection off the Mid-Western Highway, which will be constructed during the initial construction phase of the project. Existing property access from Dungeon Road will also be used until construction of the new access road is completed;
- Operation of water management infrastructure, including a raw water storage dam, clean water and process water diversions and storages, and sediment control infrastructure;
- A peak construction workforce of approximately 710 full-time equivalent (FTE) workers. During operations, an average workforce of around 260 FTE employees will be required, peaking at approximately 320 FTEs in around years four and five of the project;
- Construction and operation of a water supply pipeline (approximately 90 km long) from Centennial Coal's Angus Place and SCSO and EA's MPPS operations near Lithgow to the mine project area. The pipeline development will include approximately four pumping station facilities, a pressure-reducing system and a communication system. Approximately 13 megalitres per day (ML/day), up to a maximum of 15.6 ML/day, will be transferred for mining and processing operations;
- Installation and use of environmental management and monitoring equipment; and
- Progressive rehabilitation throughout the mine life. At the end of mining, the mine infrastructure will be decommissioned, and disturbed areas will be rehabilitated to integrate with natural landforms as far as practicable. The final landform, apart from the final void, will support land uses similar to current land uses, or land uses which are consistent with the land use strategies of the relevant LGAs.

This EIS refers to project years (PY) rather than calendar years, with PY1 being the first year of construction and Mine Development activities.

## 2.1 Receiver Review

From observations on site, existing noise levels, review of aerial photos and other project information, MAC has identified the following potentially noise sensitive receivers (ie privately owned residences) and allocated the following catchment classifications:

**Distant Rural** – rural receivers that are typically rural in nature with low background noise levels and are generally more than 2km from the project area boundary;

**Sturgeon Hill** – receivers to the south west of the Mine Development;

**Walkom Road** – receivers in the Kings Plains locale that are not influenced by road traffic noise from the Mid Western Highway; and

**Kings Plains** – receivers situated in the Kings Plains locale that are in closer proximity to the Mid Western Highway.

**Table 1** presents a summary of receiver identification, type and coordinates. These are produced graphically in **Figure 3**.

**Table 1 Assessed Noise Sensitive Receivers**

| Receiver ID | Catchment | Coordinates (MGA 55), metres | |
|---|---|---|---|
| | | Easting | Northing |
| R01[1] | Distant Rural | 716348 | 6297846 |
| R02 | Distant Rural | 716792 | 6298310 |
| R03 | Distant Rural | 717952 | 6298177 |
| R04 | Distant Rural | 718739 | 6298128 |
| R05 | Distant Rural | 719288 | 6297828 |
| R06 | Distant Rural | 719366 | 6292570 |
| R07 | Distant Rural | 719898 | 6293850 |
| R08 | Distant Rural | 720175 | 6290492 |
| R09 | Distant Rural | 719854 | 6290003 |
| R10 | Distant Rural | 719793 | 6290405 |
| R11 | Distant Rural | 719609 | 6290265 |
| R12 | Distant Rural | 719147 | 6290295 |
| R13 | Distant Rural | 718837 | 6288912 |
| R14 | Distant Rural | 718823 | 6290061 |
| R15 | Kings Plains | 718065 | 6290538 |
| R16 | Kings Plains | 717636 | 6290749 |
| R17 | Kings Plains | 717238 | 6290803 |

| Table 1 Assessed Noise Sensitive Receivers | | | |
|---|---|---|---|
| Receiver ID | Catchment | Coordinates (MGA 55), metres | |
| | | Easting | Northing |
| R18 | Walkom Road | 716920 | 6290390 |
| R19 | Walkom Road | 716623 | 6290659 |
| R20 | Walkom Road | 716560 | 6290490 |
| R21 | Walkom Road | 716537 | 6290612 |
| R22 | Walkom Road | 716299 | 6290200 |
| R23 | Walkom Road | 716324 | 6290562 |
| R24 | Walkom Road | 716354 | 6290635 |
| R25 | Kings Plains | 716409 | 6290712 |
| R26 | Kings Plains | 716385 | 6290760 |
| R27 | Kings Plains | 716321 | 6290770 |
| R28 | Kings Plains | 716331 | 6290835 |
| R29 | Kings Plains | 716189 | 6290744 |
| R30 | Kings Plains | 716196 | 6290885 |
| R31 | Kings Plains | 716118 | 6290768 |
| R32 | Kings Plains | 715655 | 6290652 |
| R33 | Kings Plains | 715467 | 6290816 |
| R34 | Sturgeon Hill | 714856 | 6290821 |
| R35 | Sturgeon Hill | 714566 | 6290941 |
| R36 | Sturgeon Hill | 714467 | 6290779 |
| R37 | Sturgeon Hill | 714332 | 6290853 |
| R38[1] | Sturgeon Hill | 714435 | 6291193 |
| R39 | Sturgeon Hill | 714142 | 6290386 |
| R40 | Sturgeon Hill | 714134 | 6290835 |
| R41 | Sturgeon Hill | 713891 | 6290416 |
| R42 | Sturgeon Hill | 713793 | 6290933 |
| R43 | Sturgeon Hill | 713785 | 6291222 |
| R44 | Sturgeon Hill | 713466 | 6290491 |
| R45 | Sturgeon Hill | 713516 | 6290684 |
| R46 | Sturgeon Hill | 713504 | 6290879 |
| R47 | Sturgeon Hill | 713412 | 6291327 |
| R48 | Sturgeon Hill | 713439 | 6291427 |
| R49 | Sturgeon Hill | 713032 | 6290869 |
| R50 | Sturgeon Hill | 712510 | 6290313 |
| R51 | Sturgeon Hill | 711195 | 6289940 |
| R52 | Distant Rural | 710805 | 6290115 |
| R53 | Distant Rural | 710822 | 6290218 |
| R54 | Distant Rural | 711159 | 6290258 |

| Table 1 Assessed Noise Sensitive Receivers | | | |
|---|---|---|---|
| Receiver ID | Catchment | Coordinates (MGA 55), metres | |
| | | Easting | Northing |
| R55 | Distant Rural | 710711 | 6290277 |
| R56 | Distant Rural | 710824 | 6290311 |
| R57 | Distant Rural | 710774 | 6290450 |
| R58 | Distant Rural | 711457 | 6290635 |
| R59 | Distant Rural | 711365 | 6290898 |
| R60 | Distant Rural | 711229 | 6291435 |
| R61 | Distant Rural | 711087 | 6292011 |
| R62 | Distant Rural | 711141 | 6292012 |
| R63 | Distant Rural | 711370 | 6292057 |
| R64 | Distant Rural | 711111 | 6292250 |
| R65 | Distant Rural | 710773 | 6292278 |
| R66 | Distant Rural | 711308 | 6292437 |
| R67 | Distant Rural | 711455 | 6292457 |
| R68 | Distant Rural | 711164 | 6292868 |
| R69 | Distant Rural | 710866 | 6292894 |
| R70 | Distant Rural | 711641 | 6292962 |
| R71 | Distant Rural | 711671 | 6293059 |
| R72 | Distant Rural | 711324 | 6293089 |
| R73 | Distant Rural | 711288 | 6293167 |
| R74 | Distant Rural | 711481 | 6293491 |
| R75 | Distant Rural | 712857 | 6293911 |
| R76 | Distant Rural | 713548 | 6294259 |
| R77 | Distant Rural | 711533 | 6294724 |
| R78 | Distant Rural | 712198 | 6295202 |
| R79 | Distant Rural | 711342 | 6295417 |
| R80 | Distant Rural | 712226 | 6296709 |
| R81 | Distant Rural | 712527 | 6296713 |
| R82 | Distant Rural | 712925 | 6296570 |
| R83 | Distant Rural | 713066 | 6296599 |
| R84 | Distant Rural | 713182 | 6296059 |
| R85 | Distant Rural | 713818 | 6296881 |
| R86 | Distant Rural | 714076 | 6296950 |
| R87 | Distant Rural | 714168 | 6297004 |
| R88 | Distant Rural | 714321 | 6296680 |

Note 1: This receiver is currently under option of purchase pending project approval.

Several heritage related receivers have also been identified in the vicinity of the project area, as listed in Table 2. The potential for these receivers to be impacted by blasting emissions from the Mine Development has been assessed in this report.

**Table 2 Heritage Receivers**

| Heritage ID & Receiver ID | Description | Coordinates (MGA 55), metres | |
|---|---|---|---|
| | | Easting | Northing |
| I200/R23 | Kings Plains Mining Area ('Last Chance Mine') | 716143 | 6290604 |
| I201/R26 | Anglican Church | 716393 | 6290777 |
| I202/R32 | 'Iralee', homestead, gardens and outbuildings | 715663 | 6290656 |
| I203/R49 | 'Lynfern', homestead, garden, stables and woolshed | 713044 | 6290876 |
| I204/R51 | 'Springfield', woolshed | 711200 | 6289939 |
| I205/R06 | Woolshed | 719194 | 6292706 |
| I206/R33 | 'Kareela', homestead and garden | 715450 | 6290820 |
| I208/R28 | Public school and teacher's residence (former) | 716324 | 6290841 |

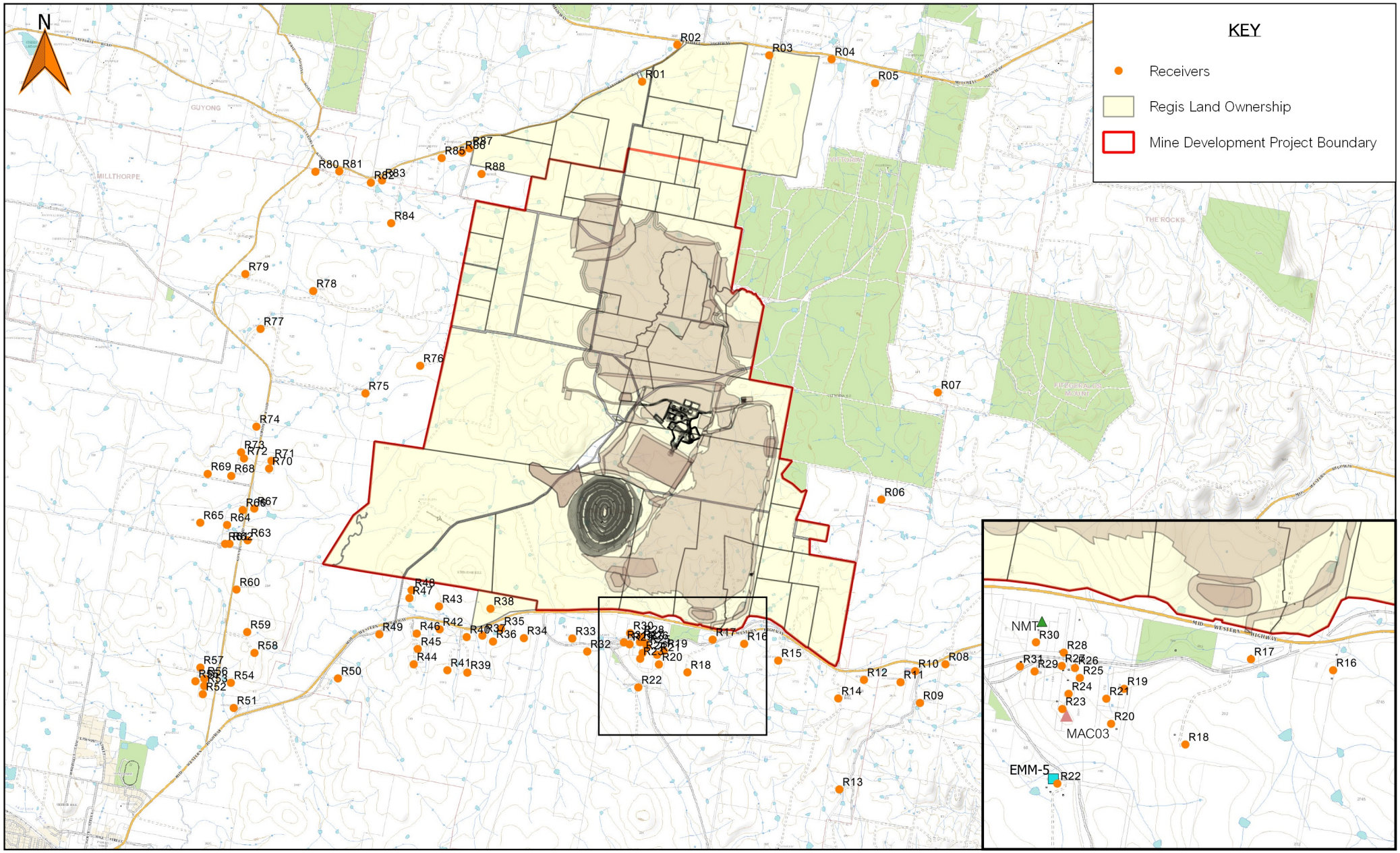


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**Figure 3**
**Receiver Locations**

**REF: MAC170434**

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# 3 Noise Policy and Guidelines

This NVIA has been prepared in consideration of the following relevant policies and standards, providing a framework for monitoring, communication, management, reporting and auditing.

- Environment Protection Authority (EPA) 2017, NSW Noise Policy for *Industry* (NPI);
- Department of Environment and Climate Change (DECC) 2009, *Interim Construction Noise Guideline* (ICNG);
- NSW Government, *Voluntary Land Acquisition and Mitigation Policy* (VLAMP), 2018;
- Transport for NSW 2018, *Construction Noise and Vibration Strategy*; and
- Department of Environment and Conservation (DEC) 2006, *Assessing Vibration: A Technical Guideline*.

This NVIA has also considered and applied the following additional policy, guidelines and standards where relevant:

- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures;
- Australian Standard AS 2187.2-2006 (AS2187.2) – Explosives—Storage and Use Part 2: Use of Explosives;
- Australian Standard AS 2436-2010 (R2016) Guide to Noise Control on Construction, Maintenance and Demolition Sites;
- ISO 9613-1 Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere;
- ISO 9613-2 Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation;
- Australia and New Zealand Environment Conservation Council (ANZECC) Guideline – Technical Basis For Guidelines To Minimise Annoyance Due To Blasting Overpressure And Ground Vibration (ANZECC Guideline), September 1990;

- German Institute for Standardisation – DIN 4150 (2015) Part 3 (DIN4150-3) –Vibration in Buildings – Part 3: Effects of Vibration on Structures; and
- British Standards Institution BS 7385: Part 2-1993 (BS7385.2:1993) - Evaluation and Measurement for Vibration in Buildings — Part 2 – Guide to Damage Levels from Ground-borne Vibration, 1993.

## 3.1 Assessment Requirements

This assessment has been prepared in accordance with requirements of the NSW DPIE's EARs for the project, issued on 24 July 2018 and revised on 19 December 2018. The EARs identify matters which must be addressed in the EIS and essentially form the Mine Development's terms of reference. **Table 3** lists individual requirements relevant to this NVIA and where they are addressed in this report.

**Table 3 Technical Assessment – Noise Related EARs and Agency Requirements**

| EAR | Section |
|---|---|
| An assessment of the likely operational noise impacts of the development (including construction noise) in accordance with the Noise Policy for Industry NSW | 7.2 |
| If a claim is made for specific construction noise criteria for certain activities, then this claim must be justified and accompanied by an assessment of the likely construction noise impacts of these activities in accordance with the Interim Construction Noise Guideline | 7.1 |
| An assessment of the likely road noise impacts of the development in accordance with the NSW Road Noise Policy | 7.3 |
| An assessment of the likely blasting impacts of the development on people, animals, buildings and infrastructure, and significant natural features, having regard to the relevant ANZECC guidelines | 7.4 |
| **Agency Advice (EPA) and Specific Requirements** | **Section** |
| Potential impacts on the noise amenity of the surrounding area should be assessed in accordance with the NSW Government's Industrial Noise Policy (INP)[1] and other relevant guidelines mentioned below, accounting for all noise sources associated with the project. In particular, seasonality assessments are to be undertaken to assess the impact of temperature inversions and wind conditions. | 7.2 |
| The noise assessment must include (but not be limited to) an assessment of the C-weighted noise (low frequency) as well as A-weighted noise. | 7.2.7 |
| Construction Noise associated with the proposed development should be assesses using the Interim Construction Noise Guideline (DECC, 2009); | 7.1 |
| Detailed proposed hours of operation for each major noise source activity and the monitoring program and justification process that will be used to alter mining activities from day to afternoon to 24 hour; | 8.1 |
| Vibration from all activities (including construction and operation) to be undertaken on the premises should be assessed using the guidelines contained in the Assessing Vibration: a technical guideline (DEC, 2006); | 3.3 |

| Table 3 Technical Assessment – Noise Related EARs and Agency Requirements | |
|---|---|
| If blasting is required for any reasons during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying with the guidelines contained in the Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC, 1990); | 7.4 |
| Undertake a road traffic noise assessment in accordance with the requirements of the NSW Road Noise Policy | 7.3 |

Note 1: Industrial Noise Policy (INP) has been superseded by the Noise Policy for Industry (NPI), 2017.

## 3.2 Construction Noise Guideline

The ICNG sets out procedures to identify and address the impacts of construction noise on residences and other sensitive land uses. This section provides a summary of noise objectives that are applicable to the assessment. The ICNG provides two methodologies for the assessment of construction noise emissions:

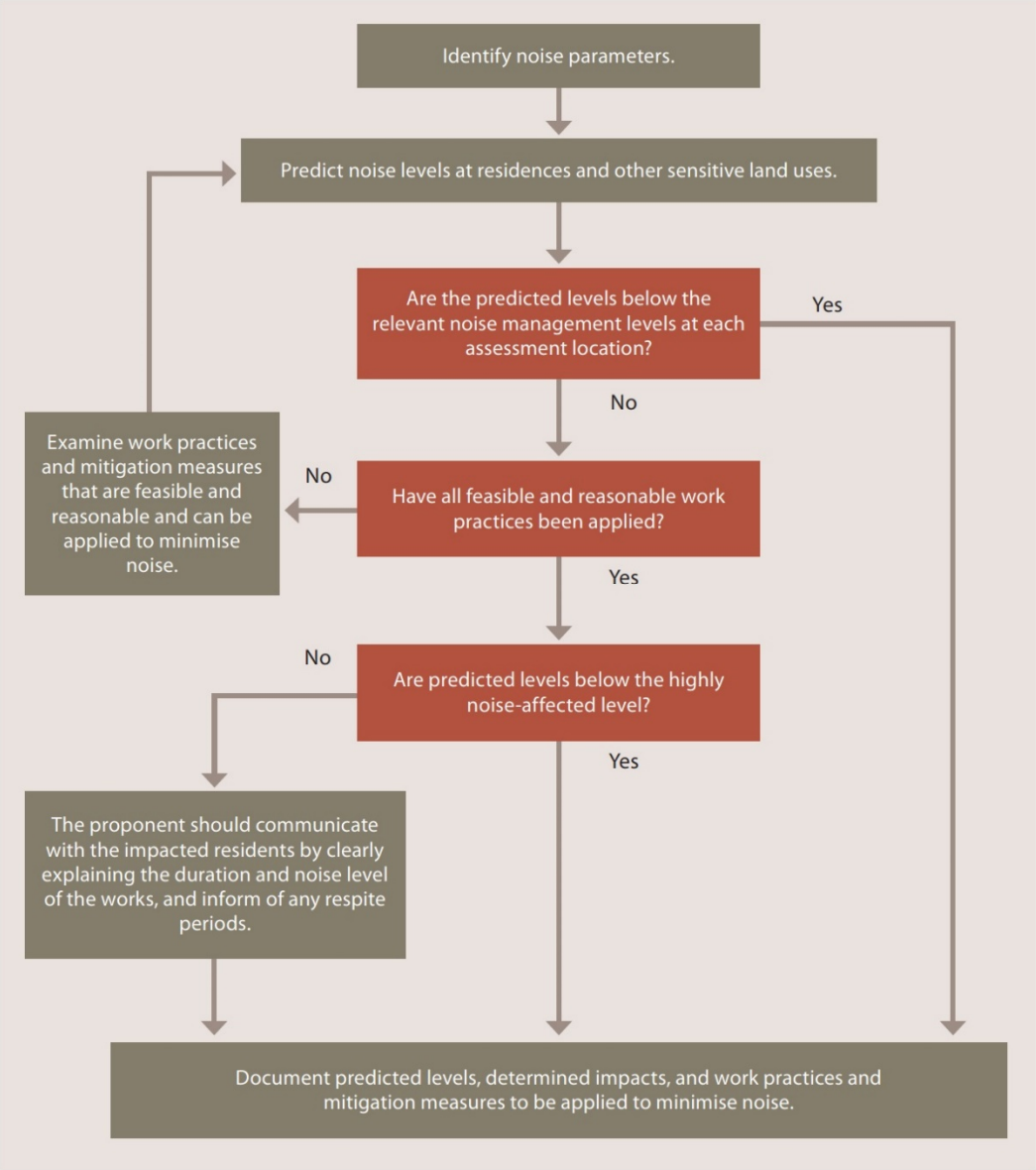
- Quantitative, which is suited to major construction projects with typical durations of more than three weeks; and
- Qualitative, which is suited to short term infrastructure maintenance (< three weeks).

The methodology for a quantitative assessment requires a more complex approach, involving noise predictions from construction activities to the nearest relevant assessment locations.

The qualitative assessment methodology is a more simplified approach that relies on noise management strategies. This study has adopted a quantitative assessment approach. Steps of the quantitative approach are summarised in **Figure 4.**

The quantitative approach includes identification of potentially affected receivers, description of activities involved in the proposal, derivation of the construction noise management levels, quantification of potential noise impact at receivers and, provides management and mitigation recommendations.

Figure 4 Quantitative Assessment Processes for Assessing and Managing Construction Noise




Source: Department of Environment and Climate Change, 2009.

### 3.2.1 Construction Noise Management Levels

Section 4 of the ICNG (DECC, 2009) details the quantitative assessment method involving predicting noise levels and comparing them with the Noise Management Level (NML) and are important indicators of the potential level of construction noise impact. **Table 4** provides the ICNG recommended $LA_{eq(15min)}$ NMLs and how they are to be applied.

**Table 4 Noise Management Levels**

| Time of Day | Management Level $LA_{eq(15min)}$[1] | How to Apply |
|---|---|---|
| Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays. | Noise affected RBL + 10dB | The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq,15min is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details. |
| | Highly noise affected 75dBA | The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account times identified by the community when they are less sensitive to noise (such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences; and if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. |
| Outside recommended standard hours. | Noise affected RBL + 5dB | A strong justification would typically be required for work outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2. |

Note 1: The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the construction noise management levels for noise assessment purposes and is the median of the ABL's.

### 3.2.2 Construction Sleep Disturbance

Section 4.3 of the ICNG states that a sleep disturbance assessment is required where construction activities are planned to occur for more than two consecutive nights. Construction activities from midway through PY1 to PY2 will overlap with mining operations for which a maximum level screening assessment has been completed.

Table 5 summaries the recommended standard and out of hours periods for construction. Note, although not mandatory, strong justification is required to work outside of normal construction hours.

**Table 5 Recommended Hours for Construction**

| Period | Preferred Construction Hours |
|---|---|
| Standard construction hours | Monday to Friday - 7am to 6pm<br>Saturdays - 8am to 1pm<br>Sundays or Public Holidays - No construction |
| Out of Hours Period 1 | Monday to Friday - 6pm to 10pm<br>Saturdays - 7am to 8am and 1pm to 10pm<br>Sundays or Public Holidays - 8am to 6pm |
| Out of Hours Period 2 | Monday to Friday - 10pm to 7am<br>Saturdays - 10pm to 8am<br>Sundays or Public Holidays - 6pm to 7am |

These recommended hours do not apply in the event of direction from police, or other relevant authorities, for safety reasons or where required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

## 3.3 Construction Vibration

Department of Environment and Conservation (DEC) 2006, *Assessing Vibration: A Technical Guideline* (the 'Guideline') provides guidance on determining effects of vibration on buildings occupants. The guideline does not address vibration induced damage to structures, blast induced vibration effects or structure borne noise effects.

A qualitative assessment of potential vibration impacts has been completed. Due to the nature of the works proposed and distances to potential vibration sensitive receivers, vibration impacts from the Mine Development would be negligible.

*The Construction Noise Strategy* (Transport for NSW, 2018) sets out safe working distances to achieve the human response criteria for vibration. The key vibration generating source proposed to be used is a vibratory roller used for road construction. For a large vibratory roller, the *Construction Noise Strategy* sets a safe working distance of 25m to achieve the residential human response criteria for continuous vibration. Therefore, as the nearest receivers to the Mine Development are greater than 25m, human exposure to vibration is anticipated to be minimal. Furthermore, where the human response criteria are satisfied, the structural or cosmetic criteria for sensitive receivers will be achieved. Therefore, vibration impacts are not considered to be a significant issue and have not been considered further in this assessment.

## 3.4 Noise Policy for Industry

The EPA released the *Noise Policy for Industry* (NPI) in October 2017 which provides a process for establishing noise criteria for consents and licenses enabling the EPA to regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997.

The objectives of the NPI are to:

- provide noise criteria that is used to assess the change in both short term and long term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management involving the following key steps:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels (criteria), above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.

2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.

3. Compare the predicted or measured noise level with the PNTL, assessing impacts and the need for noise mitigation and management measures.

4. Consider residual noise impacts - that is, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.

5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.

6. Monitor and report environmental noise levels from the development.

### 3.4.1 Project Noise Trigger Levels (PNTL)

The policy sets out the procedure to determine the PNTLs relevant to an industrial development. The PNTL is the lower (ie, the more stringent) of the **Project Intrusiveness Noise Level** (PINL) and **Project Amenity Noise Level** (PANL) determined in accordance with Section 2.3 and Section 2.4 of the NPI.

### 3.4.2 Rating Background Level (RBL)

The Rating Background Level (RBL) is a determined parameter from noise monitoring and is used for assessment purposes. As per the NPI, the RBL is an overall single figure background level representing each assessment period (day, evening and night) over the noise monitoring period.

The measured RBLs relevant to the project are contained in **Section 4.2**.

### 3.4.3 Project Intrusiveness Noise Level (PINL)

The PINL ($LA_{eq(15min)}$) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. Hence, when assessing intrusiveness, background noise levels need to be measured.

### 3.4.4 Project Amenity Noise Level (PANL)

The PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended amenity noise levels specified in Table 2.2 (of the NPI). The NPI defines two categories of amenity noise levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area; and
- **Project Amenity Noise Level (PANL)** – is the recommended level for a receiver area, specifically focusing the project being assessed.

Additionally, Section 2.4 of the NPI states: "*to ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows*":

**PANL** for new industrial developments = recommended **ANL** minus 5dBA.

The recommended amenity noise levels as per Table 2.2 of the NPI reproduced in **Table 6**.

**Table 6 Amenity Criteria**

| Receiver Type | Noise Amenity Area | Time of day | Recommended amenity noise level dB $LA_{eq(period)}$ |
|---|---|---|---|
| Residential | Rural | Day | 50 |
| | | Evening | 45 |
| | | Night | 40 |
| School Classroom | All | Noisiest 1 Hour when in use | 35 (internal) 45 (external) |
| Passive Recreation | All | When in use | 50 |
| Active Recreation | All | When in use | 55 |
| Commercial premises | All | When in use | 65 |
| Industrial | All | When in use | 70 |

Notes: The recommended amenity noise levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7 of the NPI.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

### 3.4.5 Maximum Noise Level Assessment

The potential for sleep disturbance from maximum noise level events during the night-time period needs to be considered. The NPI considers sleep disturbance to be both awakenings and disturbance to sleep stages.

Where night-time noise levels from a development/premises at a residential location exceed the following criteria, a detailed maximum noise level event assessment should be undertaken:

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

A detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

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

- how often the events would occur;
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the development;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current understanding of effects of maximum noise level events at night.

### 3.4.6 Low Frequency Noise

Fact Sheet C of the NPI provides guidance for applying 'modifying factor' adjustments to account for low frequency noise emissions. The NPI states that where there is a difference of 15dB or more between the measured 'C' weighted (dBC) and measured 'A' weighted (dBA) levels there is potential for an unbalanced spectrum. A correction factor of +2dB or +5dB is applied depending on the difference between the measured Z weighted spectra levels in comparison to those presented in **Table 7**.

**Table 7 Low Frequency One Third Octave Threshold Levels**

| Frequency (Hz) | 10 | 12.5 | 16 | 20 | 25 | 31.5 | 40 | 50 | 63 | 80 | 100 | 125 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| dB $L_{Zeq(15min)}$ | 92 | 89 | 86 | 77 | 69 | 61 | 54 | 50 | 50 | 48 | 48 | 46 | 44 |

## 3.5 Voluntary Land Acquisition and Mitigation Policy

The *Voluntary Land Acquisition and Mitigation Policy* (VLAMP, November 2018) describes the NSW Government's policy for voluntary mitigation and land acquisition actions undertaken to address noise impacts from State significant mining, petroleum and extractive industry developments. It aims to provide a balance between economic development and protecting the health, preserve amenity and control intrusive noise where potential impacts are identified.

The VLAMP provides guidance for consent authorities as to when voluntary mitigation or voluntary acquisition rights are to be applied to reduce operational noise impacts from a development on privately owned land. The policy does not apply to construction noise impacts, impacts from the public road or rail network or modifications to existing developments with legacy noise issues.

An assessment has been undertaken of potential impacts on vacant privately owned land and residences surrounding the project. The relevant criteria are outlined in Section 5.2.5 and the assessment is presented in Section 7.2.8.

## 3.6 Road Noise Policy

The road traffic noise criteria are provided in the Department of Environment, Climate Change and Water NSW (DECCW), *Road Noise Policy* (RNP), 2011. The policy sets out noise criteria applicable to different road classifications for the purpose of quantifying traffic noise impacts.

Road noise criteria relevant to this assessment are presented in detail in Section 5.3 and the (construction and operational) road traffic assessment results are presented in Section 7.3.

## 3.7 Blasting Guideline

The limits adopted by EPA for blasting are provided in the *Australian and New Zealand Environment Conservation Council (ANZECC) - Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration*. Blasting criteria relevant to this assessment are presented in detail in Section 5.4 and the assessment is presented in Section 7.4.

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# 4 Existing Environment

## 4.1 Noise Monitoring Methodology

In accordance with NSW noise guidelines, background noise levels are measured to develop PNTLs for residential receivers. To quantify existing noise levels, historic long-term unattended noise monitoring results (Background Noise Monitoring Report - EMM, 2013) were reviewed and additional monitoring was undertaken in July 2018 by MAC to capture any change in the existing environment since 2013. Additionally, Regis had deployed a noise monitoring terminal in the area, from which the data was used for comparison and validation where required. All available data were analysed to determine receiver noise catchment areas and their respective RBLs.

## 4.2 Noise Monitoring Results

From observations whilst on site, the noise environment at existing residential receivers is best described as 'rural' in accordance with the NPI. A rural area, as described in the NPI, is one that has an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. It is noted for assessment purposes, unattended monitoring locations have been separated into discreet noise catchments areas for this assessment. Table 8 and Table 9 presents the noise catchments and receiver details together with the derived RBLs. Noise monitoring charts are presented graphically in Appendix B. Figure 5 provides a visual representation of the catchments and monitoring locations.

| Table 8 Historic (2013) and 2018 Unattended Noise Monitoring Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Source | Catchment | Measurement Location | RBL, dB LA90 | | | LAeq(period) | | |
| | | | Day | Evening | Night | Day | Evening | Night |
| EMM | Distant Rural | Location 1 (AF) | 26 | 24 | 19 | 47 | 45 | 36 |
| EMM | | Location 2 (R35) | 29 | 23 | 20 | 52 | 49 | 38 |
| EMM | | Location 5 | 30 | 30 | 24 | 47 | 47 | 45 |
| EMM | | Location 6 | 29 | 23 | 21 | 50 | 43 | 38 |
| MAC | | MAC06 155 Dungeon Road | 29 | 25 | 24 | 53 | 47 | 47 |
| Resulting RBLs[1] | | | 29 | 25 | 22 | - | - | - |
| EMM | Kings Plains | Location 7 | 36 | 29 | 24 | 53 | 44 | 44 |
| Regis/ MAC | | SV200 NMT | 36 | 32 | 28 | 51 | 50 | 48 |
| Resulting RBLs[1] | | | 35 | 31 | 24 | - | - | - |
| MAC | Walkom | MAC03 158 Walkom Road | 35 | 30 | 24 | 47 | 43 | 43 |
| Resulting RBLs | | | 35 | 30 | 24 | - | - | - |
| EMM | Sturgeon Hill | Location 4 | 35 | 32 | 25 | 51 | 46 | 44 |
| MAC | | MAC01 30 Walkom Road | 34 | 36[2] | 27 | 46 | 45 | 42 |
| EMM | | Location 3 | 33 | 38 | 25 | 55 | 52 | 49 |
| MAC | | MAC04 3211 Mid West Hwy | 40[3] | 31 | 26 | 54 | 52 | 51 |
| Resulting RBLs[1] | | | 34 | 33 | 26 | - | - | - |

Note 1: Average of values.

Note 2: Evening > day due to wind, use 2013 data.

Note 3: Wind affected.

**Table 9 Assessment RBLs**

| Catchment | Period | Measured Rating Background Level (RBL) dB $LA_{90}$ | Adopted RBL dB $LA_{90}$ | Measured Ambient Noise Level dB $LA_{eq(period)}$ |
|---|---|---|---|---|
| Distant Rural R01-R14, R52-R88 | Day | 29 | 35 | 53 |
| | Evening | 25 | 30 | 47 |
| | Night | 22 | 30 | 47 |
| Kings Plains R15-R17, R25-R33 | Day | 36 | 36 | 51 |
| | Evening | 31 | 31 | 50 |
| | Night | 24 | 30 | 48 |
| Walkom Road R18-R24 | Day | 35 | 35 | 47 |
| | Evening | 30 | 30 | 43 |
| | Night | 24 | 30 | 43 |
| Sturgeon Hill R34-R51 | Day | 34 | 35 | 52 |
| | Evening | 33 | 33 | 50 |
| | Night | 26 | 30 | 48 |

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Where this level is less than 35dBA for the day period, the rating background noise level is set to 35dBA; where the noise level is less than 30dBA for the evening and night periods, the rating background noise level is set to 30dBA.

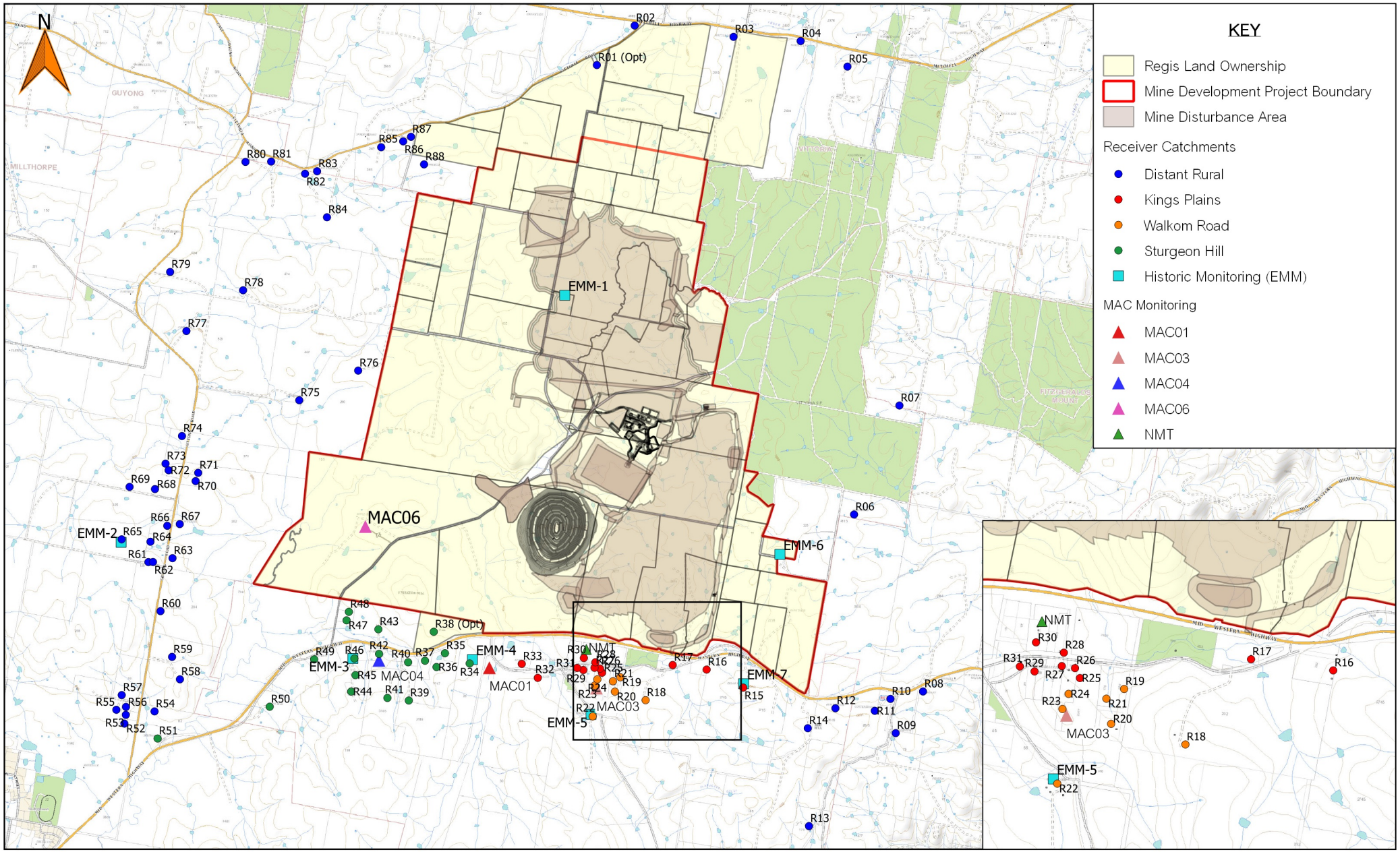



Figure 5
Receiver Catchments & Historic Noise Monitoring Locations
REF: MAC170434

# 5 Assessment Criteria

## 5.1 Construction Noise Management Levels

The relevant Noise Management Levels (NMLs) for standard construction hours and out of hours periods are presented in **Table 10**.

**Table 10 Construction Noise Management Levels**

| Catchment (No)[1] Receiver ID | Assessment Period[2] | RBL dB $L_{A90}$ | NML dB $L_{Aeq(15min)}$ |
|---|---|---|---|
| Distant Rural (51) R01-R14, R52-R88 | Day | 35 | 45 (RBL+10dBA) |
| | OOH P1 | 30 | 35 (RBL+5dBA) |
| | OOH P2 | 30 | 35 (RBL+5dBA) |
| Kings Plains (12) R15-R17, R25-R33 | Day | 36 | 46 (RBL+10dBA) |
| | OOH P1 | 31 | 36 (RBL+5dBA) |
| | OOH P2 | 30 | 35 (RBL+5dBA) |
| Walkom Road (7) R18-R24 | Day | 35 | 45 (RBL+10dBA) |
| | OOH P1 | 30 | 35 (RBL+5dBA) |
| | OOH P2 | 30 | 35 (RBL+5dBA) |
| Sturgeon Hill (18) R34-R51 | Day | 35 | 45 (RBL+10dBA) |
| | OOH P1 | 33 | 38 (RBL+5dBA) |
| | OOH P2 | 30 | 35 (RBL+5dBA) |

Note 1: Bracketed numbers are the number of receivers in the catchment.

Note 2: Recommended Hours for Construction are shown in Table 5.

### 5.1.1 Construction - Maximum Noise Level Screening Criterion

The maximum noise level screening criterion shown in **Table 11** is based on night time RBLs and trigger values as per Section 2.5 of the NPI.

**Table 11 Maximum Noise Assessment Trigger Levels**

| All Residential Receivers | | | |
|---|---|---|---|
| $L_{Aeq(15min)}$ | | $L_{Amax}$ | |
| 40dB $L_{Aeq(15min)}$ or RBL + 5dB | | 52dB $L_{Amax}$ or RBL + 15dB | |
| Trigger | 40 | Trigger | 52 |
| RBL +5dB (30+5) | 35 | RBL +15dB (30+15) | 45 |
| **Highest** | **40** | **Highest** | **52** |

Note 1: As per Section 2.5 of the NPI, the highest of the two criteria are adopted as the screening criteria.

## 5.2 Operational Noise Criteria

### 5.2.1 Project Intrusiveness Noise Levels

The Project Intrusiveness Noise Levels (PINLs) for the Mine Development are presented in **Table 12**.

**Table 12 Project Intrusiveness Noise Levels**

| Catchment | Period[1] | Measured RBL dB $L_{A90}$ | Adopted RBL[2] dB $L_{A90}$ | Intrusiveness Noise Level dB $L_{Aeq(15min)}$ |
|---|---|---|---|---|
| Distant Rural R01-R14, R52-R88 | Day | 29 | 35 | 40 |
| | Evening | 25 | 30 | 35 |
| | Night | 24 | 30 | 35 |
| Kings Plains R15-R17, R25-R33 | Day | 36 | 36 | 41 |
| | Evening | 31 | 31 | 36 |
| | Night | 24 | 30 | 35 |
| Walkom Road R18-R24 | Day | 35 | 35 | 40 |
| | Evening | 30 | 30 | 35 |
| | Night | 24 | 30 | 35 |
| Sturgeon Hill R34-R51 | Day | 34 | 35 | 40 |
| | Evening | 33 | 33 | 38 |
| | Night | 25 | 30 | 35 |

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Where this level is less than 35dBA for the day period, the rating background noise level is set to 35dBA; where the noise level is less than 30dBA for the evening and night periods, the rating background noise level is set to 30dBA.

### 5.2.2 Amenity Noise Levels and Project Amenity Noise Levels

The recommended Amenity Noise Levels and Project Amenity Noise Levels (PANLs) for residential receivers potentially affected by operational noise are presented in **Table 13.**

**Table 13 Amenity Noise Levels and Project Amenity Levels**

| Receiver Type | Noise Amenity Area | Assessment Period[1] | Recommended Amenity Noise Level dB $L_{Aeq(period)}$ | Amenity Noise Level dB $L_{Aeq(period)}$[2] | Project Amenity Noise Level dB $L_{Aeq(15min)}$[3] |
|---|---|---|---|---|---|
| All Residential Receivers | Rural | Day | 50 | 50 | 53 |
| | | Evening | 45 | 45 | 48 |
| | | Night | 40 | 40 | 43 |

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Project Amenity Noise Level equals the amenity noise level as there is no other industry in the area.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a fifteen-minute assessment period as per Section 2.2 of the NPI.

### 5.2.3 Project Noise Trigger Levels

The Project Noise Trigger Levels (PNTLs) is the lower of either the intrusiveness noise level and the Project Amenity Noise Level. **Table 14** presents the derivation of the PNTLs in accordance with the methodologies outlined in the NPI.

**Table 14 Project Noise Trigger Levels**

| Catchment | Assessment Period[1] | PINL dB $L_{Aeq(15min)}$ | PANL dB $L_{Aeq(15min)}$ | PNTL dB $L_{Aeq(15min)}$ |
|---|---|---|---|---|
| Distant Rural R01-R14, R52-R88 | Day | 40 | 53 | 40 |
| | Evening | 35 | 48 | 35 |
| | Night | 35 | 43 | 35 |
| Kings Plains R15-R17, R25-R33 | Day | 41 | 53 | 41 |
| | Evening | 36 | 48 | 36 |
| | Night | 35 | 43 | 35 |
| Walkom Road R18-R24 | Day | 40 | 53 | 40 |
| | Evening | 35 | 48 | 35 |
| | Night | 35 | 43 | 35 |
| Sturgeon Hill R34-R51 | Day | 40 | 53 | 40 |
| | Evening | 38 | 48 | 38 |
| | Night | 35 | 43 | 35 |

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

### 5.2.4 Maximum Noise Level Screening Criteria

The maximum noise level screening criterion shown in **Table 15** is based on night time RBLs and trigger values as per Section 2.5 of the NPI.

**Table 15 Maximum Noise Assessment Screening Criteria**

| All Residential Receivers | | | |
|---|---|---|---|
| $L_{Aeq(15min)}$ | | $L_{Amax}$ | |
| 40dB $L_{Aeq(15min)}$ or RBL + 5dB | | 52dB $L_{Amax}$ or RBL + 15dB | |
| Trigger | 40 | Trigger | 52 |
| RBL +5dB (30+5) | 35 | RBL +15dB (30+15) | 45 |
| **Highest** | **40** | **Highest** | **52** |

Note 1: As per Section 2.5 of the NPI, the highest of the two criteria are adopted as the screening criteria.

### 5.2.5 Voluntary Land Acquisition and Mitigation Policy

The Voluntary Land Acquisition and Mitigation Policy (VLAMP, 2018) outlines methods to determine the significance of potential exceedances of relevant noise assessment criteria and identifies potential treatments for those exceedances (VLAMP Table 1) and is reproduced in **Table 16**.

#### Voluntary Mitigation Rights

A consent authority should only apply voluntary land mitigation rights where, even with the implementation of best practice management at the mine site:

- the noise generated by the development would meet the requirements of Table 1 (VLAMP) such that the impacts would be characterised marginal, moderate or significant at any residence or privately owned land; or
- the development would increase the total industrial noise level at any residence on privately owned land by more than 1dBA and noise levels at the residence are already above the recommended amenity noise levels in Table 2.2 of the NPI; or
- the development includes a private rail line and the use of that private rail line would cause exceedances of the recommended acceptable levels in Table 6 of Appendix 3 of the RING by greater than or equal to 3dBA at any residences on privately owned land.

| Table 16 Characterisation of Noise Impacts and Potential Treatments (VLAMP Table 1) | | | |
|---|---|---|---|
| If the predicted noise level minus the project noise trigger level is: | And the total cumulative industrial noise level is: | Characterisation of impacts: | Potential treatment: |
| All time periods<br>0-2dBA | Not applicable | Impacts are considered to be **negligible** | The exceedances would not be discernible by the average listener and therefore would not warrant receiver based treatments or controls |
| All time periods<br>3-5dBA | < recommended amenity noise level in Table 2.2 of the NPI; or<br>> recommended amenity noise level in Table 2.2 of the NPI, but the increase in total cumulative industrial noise level resulting from the development is >1dB | Impacts are considered to be **marginal** | Provide mechanical ventilation / comfort condition systems to enable windows to be closed without compromising internal air quality / amenity. |
| All time periods<br>3-5dBA | > recommended amenity noise level in Table 2.2 of the NPI, and the increase in total cumulative industrial noise level resulting from the development is >1dB | Impacts are considered to be **moderate** | As for marginal impacts but also upgraded facade elements like windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels. |
| Day and evening<br>>5dBA | < recommended amenity noise levels in Table 2.2 of the NPI | Impacts are considered to be **moderate** | As for marginal impacts but also upgraded facade elements like windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels. |
| Day and evening<br>>5dBA | > recommended amenity noise levels in Table 2.2 of the NPI | Impacts are considered to be **significant** | Provide mitigation as for moderate impacts and see voluntary land acquisition provisions above. |
| Night<br>>5dBA | Not applicable | Impacts are considered to be **significant** | Provide mitigation as for moderate impacts and see voluntary land acquisition provisions above. |

### Voluntary Acquisition Rights

A consent authority should only apply voluntary land acquisition rights where, even with the implementation of best practice management at the mine site:

- the noise generated by the development would be characterised as significant, according to Table 1 (VLAMP), at any residence on privately owned land; or
- the noise generated by the development would contribute to exceedances of the acceptable noise levels plus 5dB in Table 2.2 of the NPI on more than 25% of any privately owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls; or
- the development includes a private rail line and the use of that private rail line would cause exceedances of the recommended maximum criteria outlined in Table 6 of Appendix 3 of the RING by greater than or equal to 3dBA at any residences on privately owned land.

Impacts would be classified as significant where:

- During the **daytime** and **evening** periods, noise levels from the project are >5dBA above the PNTLs and the total cumulative industrial noise level is greater than the recommended amenity noise levels in Table 2.2 of the NPI; or
- During the **night time** period, noise levels from the project are >5dBA above the PNTLs.

The resulting VLAMP significance criteria (where impacts would be classified as significant as above) applicable to the project are presented in **Table 17**. The criteria are based on the assumption that the total cumulative industrial noise level is attributable to the project as there is no other significant industrial noise source in the area.

**Table 17 VLAMP Project Specific Significance Criteria**

| Catchment | Period | PNTL dB $LA_{eq(15min)}$ | VLAMP Significant Impact Thresholds | | |
|---|---|---|---|---|---|
| | | | Voluntary Acquisition[1] | | Vacant Lands Acquisition[2] |
| | | | PANL dB $LA_{eq(period)}$ | PNTL +5dB | PANL +5dB |
| Distant Rural R01-R14, R52-R88 | Day | 40 | 50 | 45 | 55 |
| | Evening | 35 | 45 | 40 | 50 |
| | Night | 35 | 40 | 40 | 45 |
| Kings Plains R15-R17, R25-R33 | Day | 41 | 50 | 46 | 55 |
| | Evening | 36 | 45 | 41 | 50 |
| | Night | 35 | 40 | 40 | 45 |
| Walkom Road R18-R24 | Day | 40 | 50 | 45 | 55 |
| | Evening | 35 | 45 | 40 | 50 |
| | Night | 35 | 40 | 40 | 45 |
| Sturgeon Hill R34-R51 | Day | 40 | 50 | 45 | 55 |
| | Evening | 38 | 45 | 43 | 50 |
| | Night | 35 | 40 | 40 | 45 |

Note 1: Voluntary acquisition rights where the Project Noise Level (PNL) exceeds the PNTL by more than 5dB.

Note 2: Project Noise Levels (PNL) exceed the relevant criteria on more than 25% for any privately-owned land parcels.

## 5.3 Road Traffic Noise Criteria

The RNP road traffic noise criteria relevant to this assessment are presented in **Table 18** for residential receivers.

**Table 18 Road Traffic Noise Assessment Criteria for Residential Land Uses**

| Road category | Road Name | Type of Project/Development | Assessment Criteria | |
|---|---|---|---|---|
| | | | Day (7am to 10pm) | Night (10pm to 7am) |
| Freeway/arterial/ sub-arterial road | Mid Western Highway | Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments | 60dB $LA_{eq(15hr)}$ external | 55dB $LA_{eq(9hr)}$ external |
| Local Roads | Dungeon Road | Existing residences affected by additional traffic on existing local roads generated by land use developments | 55dB $LA_{eq(1hr)}$ external | 50dB $LA_{eq(1hr)}$ external |

Note: For road noise assessments, the day period is from 7am to 10pm (ie there is no evening assessment period as there is with operational noise). Night is from 10pm to 7am.

Additionally, the RNP states where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2dB, which is generally accepted as the threshold of perceptibility to a change in noise level.

### 5.3.1 Relative Increase Criteria

In addition to meeting the assessment criteria, any significant increase in total traffic noise at receivers must be considered. Receivers experiencing increases in total traffic noise levels above those presented in **Table 19** due to the addition of Mine Development road traffic should be considered for mitigation.

**Table 19 Increase Criteria for Residential Land Uses**

| Road Category | Type of Project/Development | Total Traffic Noise Level Increase, dBA | |
|---|---|---|---|
| | | Day (7am to 10pm) | Night (10pm to 7am) |
| Freeway/arterial/sub-arterial roads and transitways | New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road. | Existing traffic $LA_{eq,15hr}$ +12dB (external) | Existing traffic $LA_{eq,9hr}$ +12dB (external) |

## 5.4 Blasting Criteria

The project would be expected to operate within the overpressure and ground vibration limits stipulated in ANZECC guidelines which are reproduced in **Table 20**.

**Table 20 Blasting Emissions Criteria**

| Receiver | Airblast Overpressure (dBZ Peak) | Ground Vibration (mm/s) | Allowable Exceedance |
|---|---|---|---|
| Any Residences on privately owned land | 120 | 10 | 0% |
| | 115 | 5 | 5% of the total number of blasts over a period of 12 months |

### 5.4.1 Cosmetic Damage Criteria

The DIN 4150-3 provides safe limit values (maximum levels measured in any direction at the foundation, or maximum levels measured in (x) or (y) horizontal directions, in the plane of the uppermost floor) are summarised in **Table 21**.

**Table 21 Structural Damage Safe Limit Values (DIN 4150-3)**

| Line | Type of Structure | Vibration Velocity in mm/s | | | |
|---|---|---|---|---|---|
| | | Vibration at foundation at a Frequency of: | | | Plane of Floor of Uppermost Storey at all Frequencies |
| | | Less than 10Hz | 10Hz to 50Hz | 50Hz to 100Hz1 | |
| 1 | Buildings used for commercial purposes, industrial buildings, and buildings of similar design | 20 | 20 to 40 | 40 to 50 | 40 |
| 2 | Dwellings and buildings of similar design and/or occupancy | 5 | 5 to 15 | 15 to 20 | |
| 3 | Sensitive Buildings: Structures that because of their particular sensitivity to vibration do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order) | 3 | 3 to 8 | 8 to 10 | 8 |

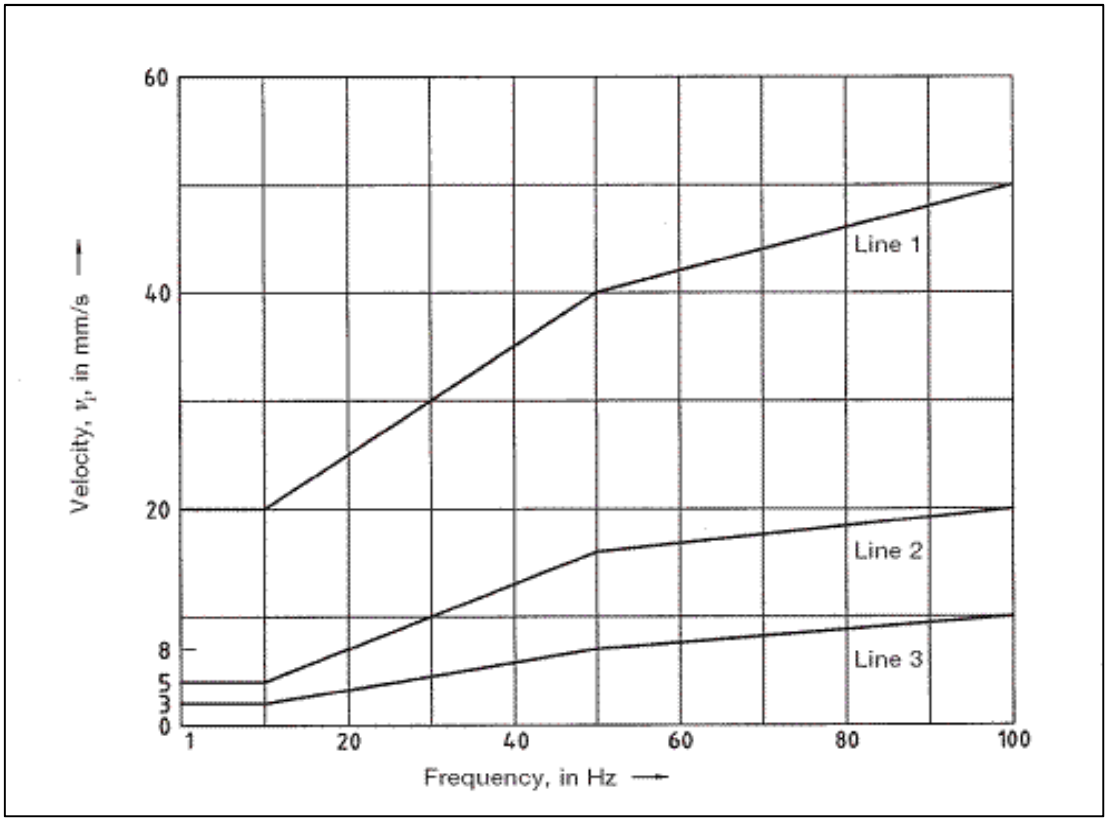
At frequencies above 100Hz, the values given in this column may be used as a minimum.

*Guidance Note*

These levels are safe limits, for which damage due to vibration is unlikely to occur. Damage is defined in DIN 4150 to include minor non-structural effects such as superficial cracking in cement render, the enlargement of cracks already present, and the separation of partitions or intermediate walls from load bearing walls. Should such damage be observed without vibration levels exceeding the safe limits then it is likely to be attributable to other causes. DIN 4150 also states that when vibration levels higher than the safe limits are present, it does not necessarily follow that damage will occur.

As indicated by the criteria from DIN 4150 high frequency vibration has less potential to cause damage than that from lower frequencies. DIN 4150 safe limit curves are presented in **Figure 6**.

Figure 6 – DIN-4150-3 Structural Damage Safe Limits for a variety of building types




### 5.4.2 Other Blasting Criteria

Typically, infrastructure such as pipelines, power transmission lines, railways and roads are less sensitive to vibration than residential buildings due to the nature of their construction and purpose. Vibration criteria for these infrastructure range from 50mm/s to 100mm/s depending on the item and purpose as shown for pipelines in **Table 22**.

**Table 22 Blasting Emissions Criteria**

| Line | Pipe Material | Guideline Values for the velocity measured on the pipe |
|---|---|---|
| 1 | Steel (including welded pipes) | 100 |
| 2 | Clay, concrete, reinforced concrete, pre stressed concrete, metal (with or without flange) | 80 |
| 3 | Masonry, plastic | 50 |

# 6 Assessment Methodology

A computer model was developed to determine the impact of project noise emissions to neighbouring receivers for construction and operational modes. DGMR's iNoise (Version 2019) noise modelling software was used to assess potential noise impacts associated with the project in accordance with ISO 9613-1 and ISO 9613-2. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process. Additionally, the model uses relevant noise source data representative of each construction and operational activity, ground type, shielding such as barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Plant and equipment were modelled at various locations and heights, representative of realistic construction and operational conditions for assessed scenarios.

## 6.1 Mitigation Measures Included in the Project Design

Preliminary noise modelling of the Mine Development included standard equipment, typical mine design and scheduling to determine the potential noise emissions during the construction and operational phases. Preliminary modelling identified that noise emissions had the potential to significantly exceed the likely noise criteria (PNTLs) in the Kings Plains, Sturgeon Hill and Walkom Road noise catchments.

As a result, several mitigation measures were evaluated to achieve a feasible and effective noise reduction from the Mine Development, particularly during the early operational phases (PY1 to PY2) where the pit is relatively shallow and there is limited opportunity for shielding on the waste rock emplacement.

The key mitigation and management measures implemented into the Mine Development design are:

- noise suppression will be applied to key mobile equipment (ie trucks, excavators and drills) so that the noise envelope remains consistent with that presented in this assessment;
- enclosure of significant noise generating processing plant (crushers, screens, ball mill);
- construction of two noise barriers – the 'pit amenity bund' and the 'southern amenity bund' of the waste rock emplacement. Following their construction, the bunds will serve as noise and visual barriers between mining operations and receivers in Kings Plains;
- reduced operations during PY1 to PY4 for the evening and night time periods during the construction of the 'pit amenity bund' and the 'southern amenity bund' as follows:

- a reduced in pit fleet (2 x Excavators; 1 x Drill; 1 x wheel dozer) until the pit reaches a depth of approximately 100m (850m RL);
- reduced haulage fleet (approximately 60% of daytime fleet) from pit to Run of Mine (ROM) and pit to WRE until the completion of the amenity bunds; and
- tracked dozers only to operate during the daytime period, wheeled dozers to be used during the evening and night time periods.

- waste rock to be always dumped behind a barrier (except for bund lifts). Mine scheduling will create protected dump locations for night time dump locations to minimise noise emissions during the more sensitive night time period.
- development of a Noise Management Plan (NMP) incorporating commissioning and operational, regular plant and equipment audits and compliance noise monitoring.

In addition to the mitigation measures described, Regis intend to install a noise monitoring system that will report operational noise levels in real time to provide feedback to the operation allowing operations to be managed within the relevant noise limits. The system will utilise several noise monitors primarily in the Kings Plains, Walkom Road and Sturgeon Hill noise catchments together with meteorological monitoring and prediction of noise enhancing conditions such as source to receiver winds and temperature inversions to provide pro active mine scheduling and minimise noise emissions.

### 6.1.1 Plant and Equipment Sound Power Levels

The noise emission levels for fixed plant and mobile equipment used in modelling for construction and operations are summarised in **Table 23**. Preliminary modelling identified that mitigation would be required for the mining mobile equipment fleet, nominally haul trucks, excavators, dozers and drills. Achievable mitigated sound power levels have been sourced from suppliers of noise suppression packages for similar equipment.

| Table 23 Equipment Sound Power Levels (dBA ref $10^{-12}$W) | | | | | | |
|---|---|---|---|---|---|---|
| Noise Source/Item | Model | Quantity/ Scenario | | | | |
| | | PY1 | PY2 | PY4 | PY8 | Plant Lw dBA |
| Prestrip/Rehabilitation fleet | | | | | | |
| Tracked Dozer[1] | CAT D10T (average Rev+Push) | 1 | | | | 117 |
| Excavator[1] | Liebherr 9150 or Komatsu PC1250 | 1 | | | | 115 |
| Water Cart | Komatsu HD1500-8WC | 1 | | | | 114 |
| Haul Truck[1] | CAT 777D | 3 | 3 | 3 | 3 | 114 |
| Roller | Caterpillar 825 | 1 | | | | 110 |
| Mining Fleet | | | | | | |
| Primary Excavator[1] | Hitachi EX2600/3600 or Liebherr 9250/9400 | 3 | 3 | 3 | 1 | 118 |
| Secondary Excavator[1] | Liebherr 9150 or Komatsu PC1250 | 1 | 1 | 1 | 1 | 115 |
| Primary Haul Truck[1] | Hitachi EH3500AC / CAT 789D | 17 | 20 | 26 | 7 | 114 |
| Secondary Haul Truck[1] | Komatsu HD1500 or CAT 769C | 3 | 3 | 3 | 1 | 113 |
| Water Cart | Komatsu HD1500 | 2 | 2 | 2 | 2 | 114 |
| Tracked Dozer[1] | CAT D10T | 3 | 3 | 3 | 1 | 117 |
| Wheel Dozer[1] | CAT 854K | 2 | 2 | 2 | 2 | 109 |
| Grader[1] | CAT 16M | 2 | 2 | 2 | 1 | 102 |
| Production Drill[1] | CAT MD6250 | 4 | 4 | 4 | 2 | 113 |
| Ancillary Drill[1] | Epiroc D65 | 2 | 2 | 2 | 1 | 112 |
| Processing Plant | | | | | | |
| ROM, Primary Crushing, Screening, Grinding[2] | | -- | 1 | 1 | 1 | 119 |
| Secondary Processing (Leach, Detoxification, Elution Circuit)[2] | | -- | 1 | 1 | 1 | 110 |
| Front End Loader | CAT 992K | 1 | 1 | 1 | 1 | 114 |
| Construction | | | | | | |
| Tracked Dozer[1] | CAT D10T | 1 | -- | -- | -- | 117 |
| Grader[1] | CAT 24M | 1 | 2 | 2 | 1 | 102 |
| Vibrating Roller | 25t | 1 | -- | -- | -- | 110 |
| Concrete Batch Plant | -- | 1 | 1 | -- | -- | 113 |
| Road Truck | Semi Trailer or B-double | 2/hr | -- | -- | -- | 102 |
| Maximum Level Assessment | | | | | | |
| Haul Truck tipping (engine noise and rock fall) | | -- | -- | -- | -- | 121 |

Note 1: Mitigated equipment.

Note 2: Enclosed Plant.

## 6.2 Noise Assessment Scenarios

Construction activities will occur during standard construction hours until **PY1 (Month 6)** when they will transition to 24hr/7 day construction. Therefore, the scope of the (ICNG) construction noise assessment is for **PY1 (Month 1 to Month 6)**. From **PY1 (Month 7)** onwards, construction activities are included as operational noise as the evening and night construction and NMLs are the same as the operational PNTLs.

For the period up to **PY1 (Month 6)** some out of hours works during OOH P1 will be carried out such as low intensity construction activities, environmental management (eg dust control), delivery of oversized equipment, and equipment servicing. In these circumstances, works will be undertaken in accordance with the noise criteria for out of hours works as per the ICNG.

For clarity, low intensity construction activities would generally consist of:

- Use of hand tools
- Electrical and telecommunications wiring, installation and connections
- Equipment relocation
- Installation and commissioning of plant and equipment
- Use of small mobile equipment (backhoe, bobcat, truck, small mobile crane) for the following activities:
  - steel fixing,
  - concreting,
  - erection of building structures and steel work,
  - small lifts and movement of materials on site; and
  - trenching and drainage.

### 6.2.1 Construction Assessment Scenarios

The construction noise assessment addresses the activities undertaken during **PY1 (Month 1 to Month 6)** and include the development of the temporary site access via Dungeon Road, the initial construction of the permanent site access from the Mid Western Highway, clearing and grubbing of the open cut mine area and ROM. For low intensity works during OOH P1, a sound power level of 119 dBA located in the processing area has been used to represent the activities and equipment teams.

Construction of other mine infrastructure such as the tailings storage facility, dams and water storage, processing, crushing and screening plant, administration, maintenance areas, haul roads, bunds and hard standings will progress and are included as part of the operational noise assessment.

### 6.2.2 Operational Noise Modelling Scenarios

Operational stages of the Mine Development were assessed for the following scenarios:

**PY1 (Month 7 to Month 12)** - activities include the ongoing construction of the main access road from the Mid Western Highway on the eastern boundary of the Mine Development area, removing topsoil and initial development of the pit (approx. 925m RL), amenity bunds, haul roads and the WRE.

**PY2 to PY3** – Commissioning of the processing plant and other infrastructure should be completed by PY1.5 and operational. Open cut mining operations to approximate 875m RL and the southern face or 'front' of the waste rock emplacement is completed allowing rehabilitation to continue to enable restoration of the grassed and treed hillside.

Construction of the southern amenity bund and the pit amenity bund are planned to be completed as quickly as possible between PY1 and PY4 to provide noise and visual amenity for the remainder of mining operations. The period to complete the southern amenity bund and the pit amenity bund is dependent on the occurrence of non-noise enhancing meteorological conditions which would allow for its construction during the evening and night time periods. Preliminary noise modelling has shown that there is potential for significant exceedances of the PNTLs during the construction of the bunds during noise enhancing meteorological periods. However, with a reduced in pit fleet, shielded day and night dump locations, reduced haulage and real time noise monitoring (refer **Section 6.1**), operations will be managed to maintain compliance with the relevant PNTLs. A comparison of the daytime and night time (indicative) equipment numbers and operating times are presented in **Table 24** and visually in **Figure 7**. Depending on these factors, the southern amenity bund and the pit amenity bund could be completed as early as PY2.5 or as late the end of PY4. After this time the WRE will be developed to the north, and plant would be operational behind the southern amenity bund.

**PY4 to PY7** – continued open cut mining operations to approximate 755m RL and progression of the waste rock emplacement to the north and expansion of the tailings storage facility.

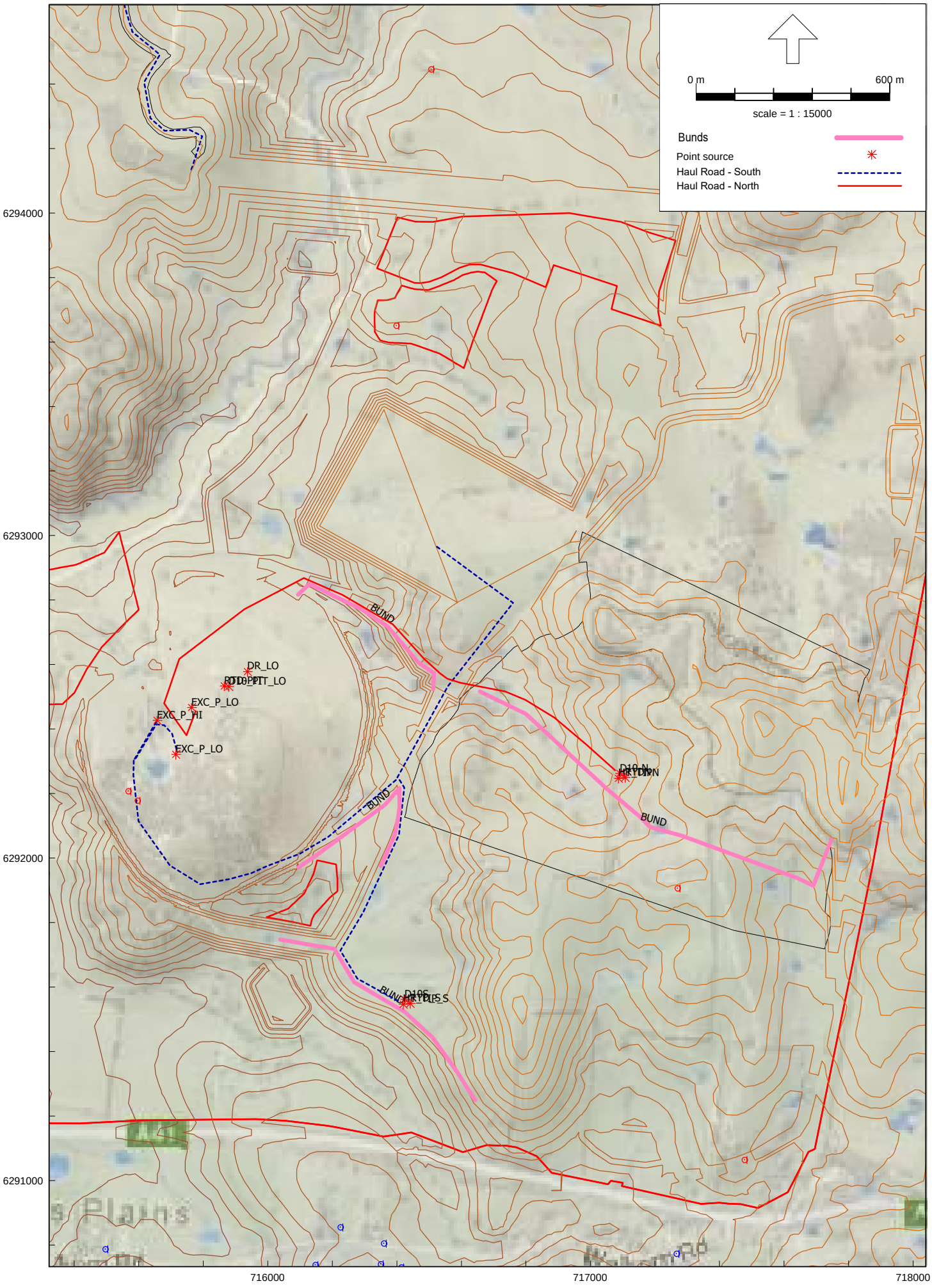
**PY8 to PY10** - continued open cut mining operations to approximate 460m RL, finalisation and rehabilitation of the waste rock emplacement, expansion and final capping of tailings storage facility.

**Table 24 Daytime, Evening and Night time Mining Fleet PY1 to PY3**

| Equipment/ Fleet | Daytime | Evening and Night time |
|---|---|---|
| Prestrip/Rehabilitation fleet | 7am to 6pm | Not Operating |
| Mining Fleet | | |
| Primary Excavator | 3 | 2 |
| Secondary Excavator | 1 | Not Operating |
| Primary & Secondary Haul Trucks | 75 movements per hour | 48 movements per hour |
| Water Cart | 2 | Not Operating |
| Tracked Dozer | 3 (2 pit, 1 WRE) | Not Operating |
| Wheel Dozer | 2 (1 pit, 1 WRE) | 2 (1 pit, 1 WRE) |
| Grader | 2 | Not Operating |
| Production Drill | 4 | 1 |
| Ancillary Drill | 2 | Not Operating |

Figure 7 - Indicative Bunds, Haul Roads and Dump Locatons for Evening and Night PY1- PY3





## 6.3 Operational Noise Modelling Parameters

The model incorporated three-dimensional digitised ground contours for the fixed plant and surrounding area, as derived from proposed project site plans and the surrounding land base topography, superimposed on each other. Where relevant, modifying factors in accordance with NPI Fact Sheet C have been applied to calculations.

### 6.3.1 Meteorological Analysis

Meteorological conditions that enhance received noise levels include source to receiver winds and the presence of temperature inversions. To account for the potential for enhancements, the NPI specifies that the source to the receiver wind component speeds up to 3m/s for 30% or more of the time in any seasonal period (i.e. day, evening or night), is a feature wind and predictions must incorporate these conditions.

**Temperature Inversions**

Temperature inversions, when they occur, can increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30% of the total time during winter, or about two nights per week.

An analysis of meteorological data from the on site weather station was conducted. The results presented in **Table 25** show that F and G Class temperature inversions do not occur more than 30% of the time during winter evenings and nights and are not considered a feature of the area.

**Table 25 Frequency of Occurrence of Atmospheric Stability Class**

| Stability Class | Frequency of Occurrence % |
|---|---|
| A | 0% |
| B | 0% |
| C | 0% |
| D | 55.9% |
| E | 24.4% |
| F | 14.3% |
| G | 5.4% |
| **Total F + G** | **19.7%** |

### Prevailing Winds

To determine the prevailing conditions for the Mine Development, weather data during the period December 2017 to December 2018 was obtained from the Regis on-site weather station. The data was analysed using the EPA's Noise Enhancement Wind Analysis (NEWA) program in order to determine the frequency of occurrence of winds speeds up to 3m/s in each seasonal period.

The results of the NEWA wind analysis and the dominant wind direction and percentage occurrence during each season for each assessment period are summarised in **Table 26**. A detailed analysis of wind and meteorological data is presented in **Appendix C**.

**Table 26 Seasonal Frequency of Occurrence Wind Speed Intervals**

| Season | Period[1] | Wind Direction ±(45°) | % Wind Speeds (m/s) |
|---|---|---|---|
| | | | 0.5 to 3 m/s |
| Summer | Day | 225 SW | 7 |
| | Evening | 225 SW | 7 |
| | Night | 67.5 ENE | 16 |
| Autumn | Day | 90 E | 7 |
| | Evening | 225 SW | 11 |
| | Night | 67.5 ENE | 19 |
| Winter | Day | 225 SW | 6 |
| | Evening | 247.5 WSW | 11 |
| | Night | 90 E | 13 |
| Spring | Day | 270 W | 7 |
| | Evening | 247.5 WSW | 9 |
| | Night | 67.5 ENE | 18 |

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

The results presented in **Table 26** show that prevailing winds are not a feature of the area and hence, are not considered further in the assessment.

### 6.3.2 Modelled Meteorological Parameters

Based on the results of this analysis the relevant meteorological conditions adopted in the noise modelling assessment are summarised in **Table 27**.

**Table 27 Modelled Site Specific Meteorological Parameters**

| Assessment Period[1] | Temperature | Wind Speed / Direction | Relative Humidity | Stability Class |
|---|---|---|---|---|
| Daytime[1] | 20°C | n/a | 60% | A |
| Evening | 14°C | n/a | 60% | D |
| Night | 10°C | n/a | 60% | D |

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

### 6.3.3 Modifying Factors

Fact Sheet C of the NPI provides guidelines for applying 'modifying factors' adjustments to account for annoying noise characteristics such as low frequency, tonality, intermittent noise, irregular or noise of short duration. Typically mining noise emissions are relatively steady and continuous and considering that the mobile equipment, in particular haul trucks will be suppressed, tonality was not considered to be applicable and no additional modifying factors have been applied with the exception for low frequency noise penalties (refer **Section 6.3.4**).

### 6.3.4 Low Frequency Noise

Fact Sheet C of the NPI provides guidelines for applying 'modifying factor' adjustments to account for low frequency noise emissions. The NPI states that where there is a difference of 15dB or more between the measured 'C' weighted (dBC) and measured 'A' weighted (dBA) levels indicates the potential for an unbalanced spectrum. Fact Sheet C of the NPI applies a correction factor of +2dB or +5dB depending on the difference between the (measured or calculated) Z weighted spectra levels in comparison with those presented in **Table 28**.

**Table 28 Low Frequency One Third Octave Threshold Levels**

| Frequency (Hz) | 10 | 12.5 | 16 | 20 | 25 | 31.5 | 40 | 50 | 63 | 80 | 100 | 125 | 160 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| dB $L_{Zeq(15min)}$ | 92 | 89 | 86 | 77 | 69 | 61 | 54 | 50 | 50 | 48 | 48 | 46 | 44 |

*Technical Note*

*The guidance provided in Fact Sheet C is primarily aimed at measured levels from industrial noise sources. Also, the criteria is less effective as distance increases (ie greater than 3km[1]) due to atmospheric absorption of higher frequencies. The octave thresholds are derived from the DEFRA (UK) procedure for the assessment of low frequency noise complaints within an occupied room with an adjustment for application to external level. Where levels exceed the thresholds, this indicates the potential for low frequency noise to be subjectively classed as a nuisance.*

Additionally, Broner[2] provides absolute level criteria for low frequency noise and recommends a criterion of 60dB $LC_{eq(5min)}$ to a maximum of 65dB $LC_{eq(5min)}$ for sensitive receivers:

The assessment of low frequency noise by calculation is indicative as ISO9613 as inclusion of one third octaves and frequencies below 63Hz are not 100% compliant with the scope of ISO9613.

Therefore, for the purposes of assessment, a review of the difference between the calculated A weighted and C weighted noise levels has been conducted to provide an indication of the potential for low frequency noise effects for receivers within 3km of the major noise sources (pit, waste rock emplacement and processing area) within the Mine Development area. Where the difference is greater than 15dB, there is potential for an unbalanced spectrum, however, where differences are below 20dB this potential would be marginal, particularly where the absolute C weighted noise levels are below the 60dB $LC_{eq(5min)}$ to a maximum of 65dB $LC_{eq(5min)}$ as suggested by Broner. Notwithstanding, the +2dB penalty has been applied to those for those receivers where the C-A is greater than 15dB as a conservative approach. (refer **Section 7.2.7**).

## 6.4 Road Traffic Noise Assessment Methodology

Delivery of chemicals, reagents and other materials would be transported to the mine using a range of truck types but would typically involve semi trailer size vehicles. Most deliveries would be to the Processing and Stockpile Area via the main access road from the Mid Western Highway.

The United States (US) Environmental Protection Agency's road traffic calculation method was used to predict the $LA_{eq}$ noise levels from construction vehicles travelling past receivers along public roads. This method is an internationally accepted theoretical traffic noise prediction model and is ideal for calculating road traffic noise where relatively small traffic flows are encountered.

[1] Low Frequency Noise and Environmental Assessment – Najah Ishac (Acoustics 2015).

[2] Broner, N. "A simple outdoor criterion for assessment of low frequency noise emission", Acoustics Australia, 39(1), 7-14, (2011).

## 6.5 Blasting Assessment Methodology

An estimation of air-blast overpressure and ground-borne vibration levels has been conducted in accordance with methods in AS2187.2. The estimation adopted a MIC of 300kg with blasting locations assumed to be at the extremities of the extraction areas, which is a worst case scenario.

### 6.5.1 Air-Blast Overpressure

Calculations of overpressure have been completed using the following AS2187.2 equation:

Where:

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

P = Pressure, in kilopascals;

Q = Effective explosives charge mass, in kilograms (MIC);

R = Distance from charge, in metres;

Ka = Site constant, a value of 20 was adopted; and

a = Site exponent, a value of -1.45 was adopted.

The conversion of 'P' to unweighted decibels (dBZ) is completed using the following formula:

$$\mathrm{SPL} = 10\, x \log \left( \frac{P}{P_0} \right)^2$$

### 6.5.2 Ground-Borne Vibration

Preliminary estimations for vibration have been completed using the following AS2187.2 equation:

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

Where:

V = ground vibration as vector peak particle velocity, in mm/s;

R = distance between charge and point of measurement, in m;

Q = maximum instantaneous charge (effective charge mass per delay, MIC), in kg;

Kg = a constant related to site and rock properties, a value of 1140 was adopted; and

B = a constant related to site and rock properties for estimation purposes, a value of 1.6 was adopted.

# 7 Results

## 7.1 Predicted Noise Levels – Construction

### 7.1.1 Typical Construction Activities

Predicted noise levels from construction activities at assessed receiver locations for standard hours without additional noise mitigation or management measures are presented as a range for each catchment in **Table 29.** Results are presented for the early phase of construction when the access road is being built, to the latter part of the construction phase where most works are being undertaken on the mine site. Detailed predicted noise levels for all receivers are presented as noise contours in **Figure 8** and as tabulated results in **Appendix D.**

**Table 29 Project Construction Noise Levels – Daytime PY1 (Month 1 to Month 6)**

| Catchment (No)[1] Receiver ID | NML dB $LA_{eq(15min)}$ | Project Noise Level (PNL) Range dB $LA_{eq(15min)}$[2] | Receivers > NML |
|---|---|---|---|
| Distant Rural (51) R01-R14, R52-R88 | 45 | 21-34 | Nil |
| Kings Plains (12) R15-R17, R25-R33 | 46 | 36-51 | R17 (51dBA) |
| Walkom Road (7) R18-R24 | 45 | 36-44 | Nil |
| Sturgeon Hill (18) R34-R51 | 45 | 22-42 | Nil |

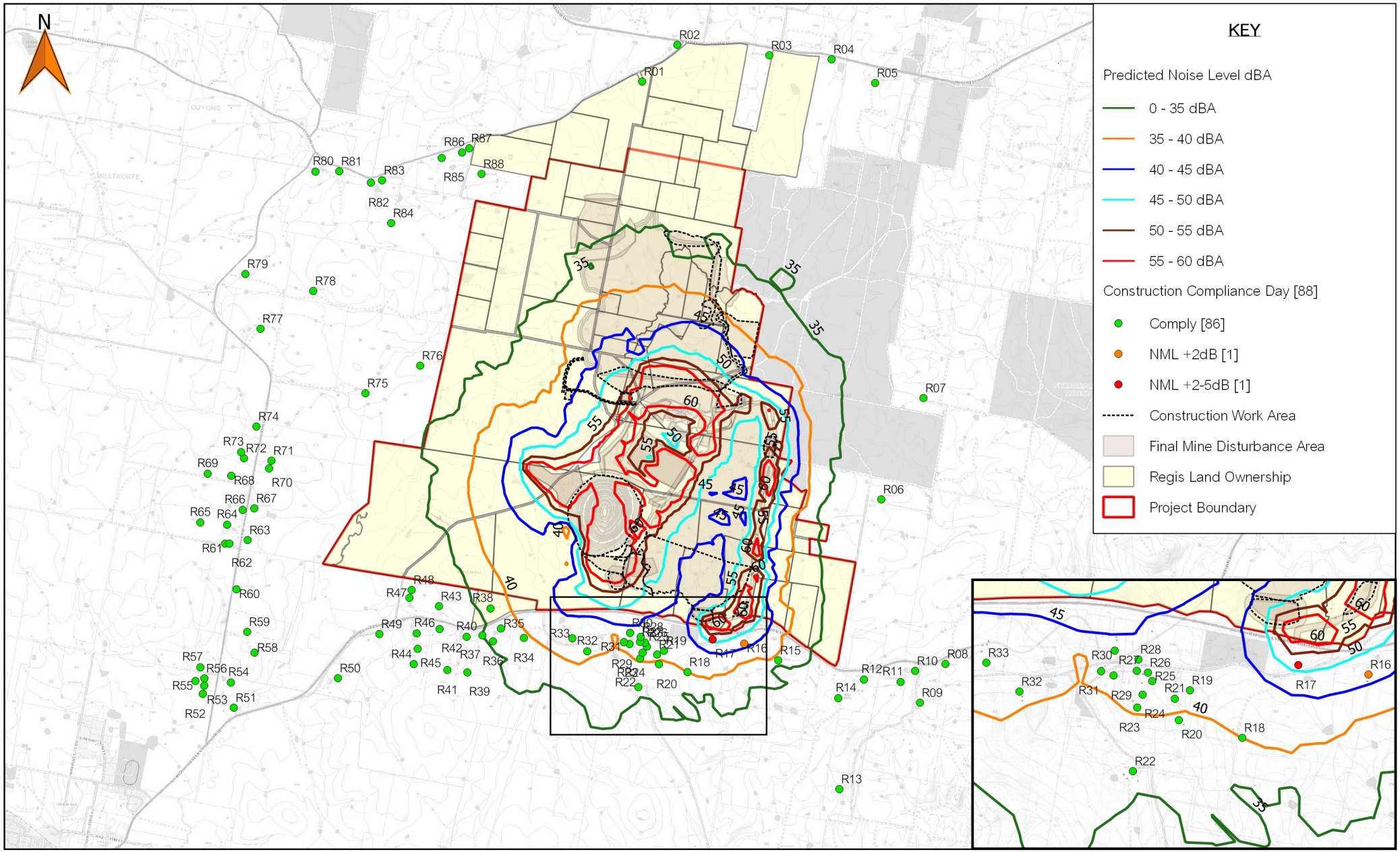
Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Bracketed numbers are the number of receivers in the catchment.

Note 3: Receiver height 1.5m above ground level.

For the construction period, daytime noise levels are expected to comply with NMLs at all receivers with the exception of R17, where predicted levels may exceed the NML by up to 5dB. The exceedance at R17, is expected to be temporary and is directly attributable to the initial construction of the access road from the Mid Western Highway.

For the proposed works during OOH P1, predicted noise levels are less than 35dB $LA_{eq(15min)}$ at all receivers, satisfying the relevant NMLs.




Muller Acoustic Consulting

**Figure 8**
**Predicted Noise Levels dB LAeq(15min)**
**Construction Daytime**
**REF: MAC170434**

## 7.2 Predicted Noise Levels – Mine Operations

Noise levels from typical operations have been calculated at assessed receiver locations at a height of 1.5 m above ground level for all operating periods including the noise mitigation and management measures described in **Section 6.1**. Results are presented as a range for each catchment in **Table 30** together with the number of receivers that exceed the PNTLs by up to 2dB and up to 5dB, whereas **Table 31** and **Table 32** present the results identifying those receivers where exceedances are expected. All results include a low frequency noise penalty (+2dBA) for those receivers where applicable (refer **Section 7.2.7**).

Detailed tabulated results for all receivers are presented in **Appendix D** and are presented graphically in **Figure 9**, **Figure 10**, **Figure 11** and **Figure 12**.

### 7.2.1 Project Year 1

During PY1 noise levels are expected to exceed the PNTLs by up to 2dB at:

- two (2) receivers in the Kings Plains catchment during the daytime;
- nine (9) receivers in the Kings Plains catchment during the evening;
- two (2) receivers in the Kings Plains catchment during the night time;
- two (2) receivers in the Walkom Road catchment during the daytime, evening and night time;
- two (2) receivers in the Sturgeon Hill catchment during the daytime; and
- one (1) receiver in the Sturgeon Hill catchment during the night time.

During PY1 noise levels are expected to exceed the PNTLs by 2dB - 5dB at:

- nine (9) receivers in the Kings Plains catchment and three (3) receivers in the Walkom Road catchment during the daytime;
- one (1) receiver in the Kings Plains catchment and four (4) receivers in the Walkom Road catchment during the evening; and
- nine (9) receivers in the Kings Plains catchment, four (4) receivers in the Walkom Road catchment and two (2) receivers in the Sturgeon Hill catchment during the night time.

### 7.2.2 Project Year 2

During PY2 noise levels are expected to exceed the PNTLs by up to 2dB at:

- seven (7) receivers in the Kings Plains catchment during the evening;
- three (3) receivers in the Kings Plains catchment during the night time;
- four (4) receivers in the Walkom Road catchment during the evening and night time; and
- two (2) receiver in the Sturgeon Hill catchment during the night time.

During PY2 noise levels are expected to exceed the PNTLs by 2dB - 5dB at:

- six (6) receivers in the Kings Plains catchment during the night time; and
- one (1) receiver in the Sturgeon Hill catchment during the night time.

### 7.2.3 Project Year 4

During PY4 noise levels are expected to exceed the PNTLs by up to 2dB at six (6) receivers in the Kings Plains catchment during the night time. Noise levels are not expected to exceed the PNTLs more than 2dB at any receiver during any period.

### 7.2.4 Project Year 8

During PY8 noise levels are not expected to exceed the PNTLs at any receiver.

### 7.2.5 Discussion

Predicted daytime noise levels during PY1 and PY2 are expected to exceed the PNTLs by up to 5dB. For the same period, predicted noise levels for evening and night time operations are generally below PNTL +2dB, but do not exceed the PNTLs by more than 5dB.

Hence, the noise impacts during PY1 to PY4 would be considered negligible[3] as they are:

- generally of a minor magnitude;
- are of a temporary nature (PY1 to PY4);
- decrease over time; and
- can be managed accordingly in conjunction with the appropriate monitoring system and management controls as described in **Section 6.1** and **Section 8.1**.

Decommissioning and final rehabilitation activities are expected to require a significantly reduced mobile equipment fleet, similar to the Prestrip/Rehabilitation fleet and would only work during the daytime period. Whilst noise levels have not been calculated for this stage of the Mine Development, review of source contributions in operational scenarios shows that the Prestrip/Rehabilitation fleet contribution is generally less than 35dB $LA_{eq(15min)}$ at receivers in the Kings Plains catchment.

[3] VLAMP Significance assessment.

## Table 30 Operational Noise Levels PY1 to PY8

| Catchment (No)[1] Receiver ID | Period[1] | PNTL dB $LA_{eq(15min)}$ | Project Noise Level (PNL) Range dB $LA_{eq(15min)}$ | | | | No. of Receivers PNTL < PNL <PNTL+2dB[2] | | | | No. of Receivers PNTL+2dB < PNL <PNTL+5dB[3] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PY1 | PY2 | PY4 | PY8 | PY1 | PY2 | PY4 | PY8 | PY1 | PY2 | PY4 | PY8 |
| Distant Rural (51) R01-R14, R52-R88 | Day | 40 | 26-34 | 24-33 | 19-32 | 18-30 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| | Evening | 35 | 19-31 | 21-33 | 20-32 | 19-33 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| | Night | 35 | 21-31 | 21-33 | 20-32 | 19-31 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| Kings Plains (12) R15-R17, R25-R33 | Day | 41 | 36-45 | 37-41 | 33-38 | 31-34 | 2 | Nil | Nil | Nil | 9 | Nil | Nil | Nil |
| | Evening | 36 | 32-37 | 32-37 | 32-36 | 32-35 | 9 | 7 | Nil | Nil | 1 | Nil | Nil | Nil |
| | Night | 35 | 32-37 | 32-37 | 32-36 | 31-35 | 2 | 3 | 6 | Nil | 9 | 6 | Nil | Nil |
| Walkom Road (7) R18-R24 | Day | 40 | 38-44 | 35-40 | 30-35 | 29-34 | 2 | Nil | Nil | Nil | 3 | Nil | Nil | Nil |
| | Evening | 35 | 30-36 | 32-36 | 30-35 | 30-35 | 2 | 4 | Nil | Nil | 4 | Nil | Nil | Nil |
| | Night | 35 | 30-36 | 32-36 | 30-35 | 23-34 | 2 | 4 | Nil | Nil | 4 | Nil | Nil | Nil |
| Sturgeon Hill (18) R34-R51 | Day | 40 | 27-42 | 26-37 | 23-31 | 19-30 | 2 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| | Evening | 38 | 23-36 | 25-36 | 25-34 | 21-33 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| | Night | 35 | 23-36 | 25-36 | 25-34 | 22-33 | 1 | 2 | Nil | Nil | 2 | 1 | Nil | Nil |

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Exceedance of the PNTL by less than 2dB is considered Negligible as per VLAMP significance assessment.

Note 3: These receivers are in the noise management zone but do not exceed the PNTL by more than 5dB.

| Table 31 Receivers where Project Noise Levels Exceed PNTL by up to 2dB | | | | | |
|---|---|---|---|---|---|
| Catchment (No)[1] Receiver ID | Period | PY1 | PY2 | PY4 | PY8 |
| Kings Plains (12) R15-R17, R25-R33 | Day | R16, R32 (2) | Nil | Nil | Nil |
| | Evening | R17, R25, R26, R27, R28, R29, R31, R32, R33 (9) | R27-R33 (7) | Nil | Nil |
| | Night | R16-R17 (2) | R25, R26, R30, (3) | R26, R27, R28, R29, R30, R31, (6) | Nil |
| Walkom Road (7) R18-R24 | Day | R20, R21 (2) | Nil | Nil | Nil |
| | Evening | R18, R20 (2) | R19, R21, R23, R24 (4) | Nil | Nil |
| | Night | R18, R20 (2) | R19, R21, R23, R24 (4) | Nil | Nil |
| Sturgeon Hill (18) R34-R51 | Day | R34, R38 (2) | Nil | Nil | Nil |
| | Evening | Nil | Nil | Nil | Nil |
| | Night | R36 (1) | R34, R36 (2) | Nil | Nil |

Note: Regis has the option to purchase R38 on receipt of project approval.

| Table 32 Receivers where Project Noise Levels Exceed PNTL by more than 2dB | | | | | |
|---|---|---|---|---|---|
| Catchment (No)[1] Receiver ID | Period | PY1 | PY2 | PY4 | PY8 |
| Kings Plains (12) R15-R17, R25-R33 | Day | R17, R25, R26, R27, R28, R29, R30, R31, R33 (9) | Nil | Nil | Nil |
| | Evening | R30 (1) | Nil | Nil | Nil |
| | Night | R25-R33 (9) | R27, R28, R29, R31, R32, R33 (6) | Nil | Nil |
| Walkom Road (7) R18-R24 | Day | R19, R23, R24 (3) | Nil | Nil | Nil |
| | Evening | R19, R21, R23, R24 (4) | Nil | Nil | Nil |
| | Night | R19, R21, R23, R24 (4) | Nil | Nil | Nil |
| Sturgeon Hill (18) R34-R51 | Day | Nil | Nil | Nil | Nil |
| | Evening | Nil | Nil | Nil | Nil |
| | Night | R34, R38 (2) | R38 (1) | Nil | Nil |

Note: Receivers are in the noise management zone but do not exceed the PNTL by more than 5dB.

Note: Regis has the option to purchase R38 on receipt of project approval.

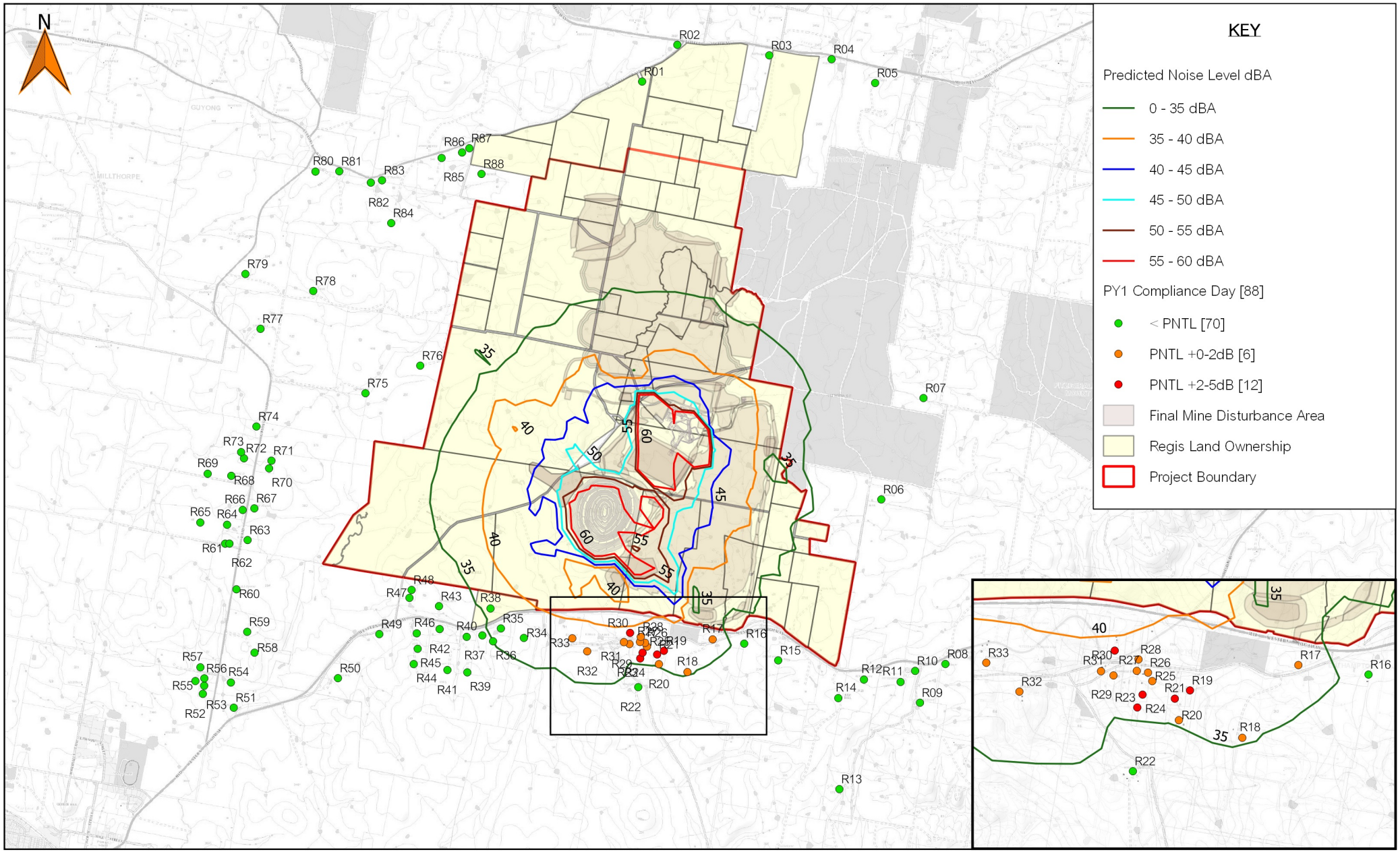



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**Figure 9A**
**Predicted Noise Levels dB LAeq(15min)**
**PY1 Daytime Operations**
**REF: MAC170434**

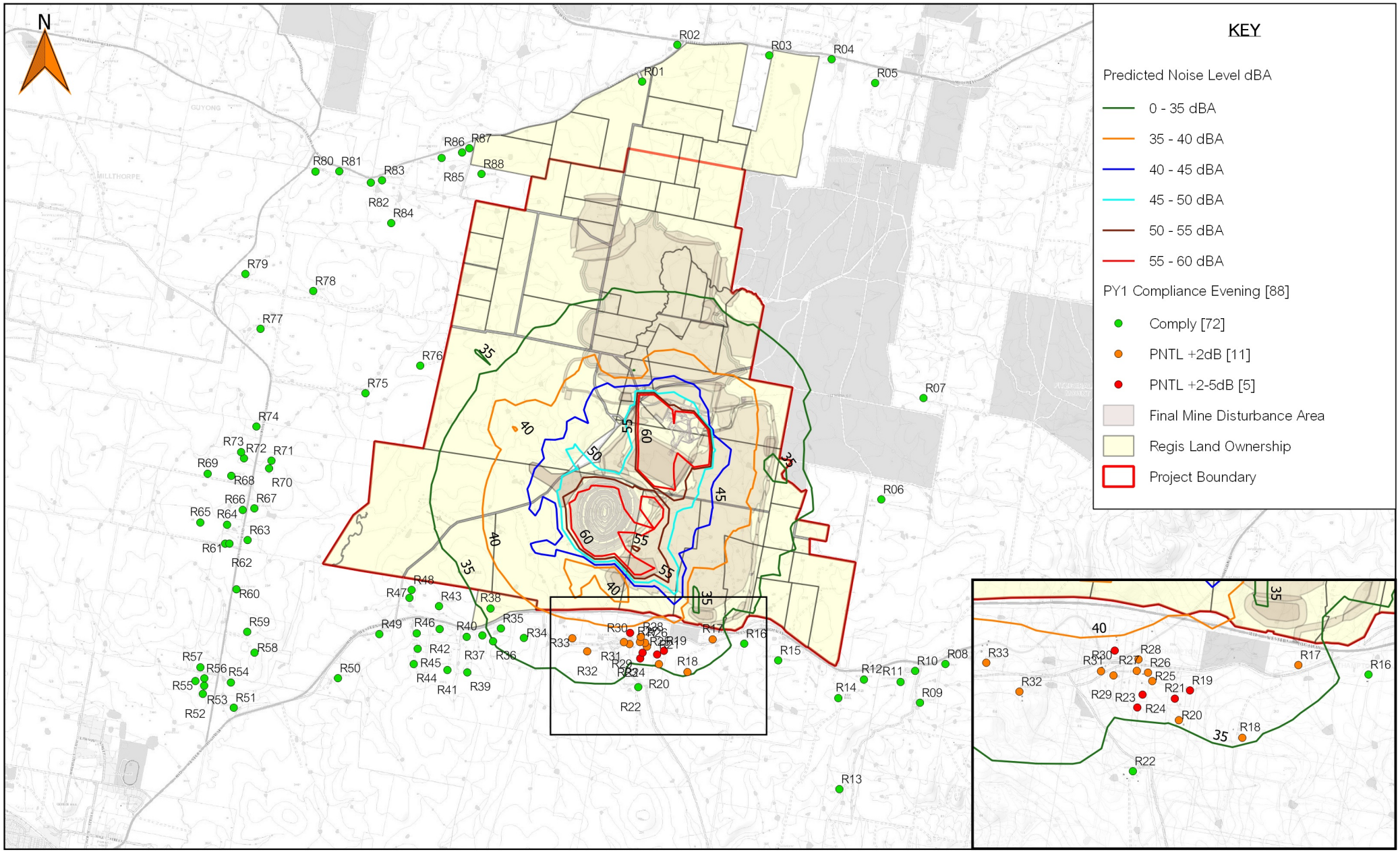


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**Figure 9B**
**Predicted Noise Levels dB LAeq(15min)**
**PY1 Evening Operations**
**REF: MAC170434**

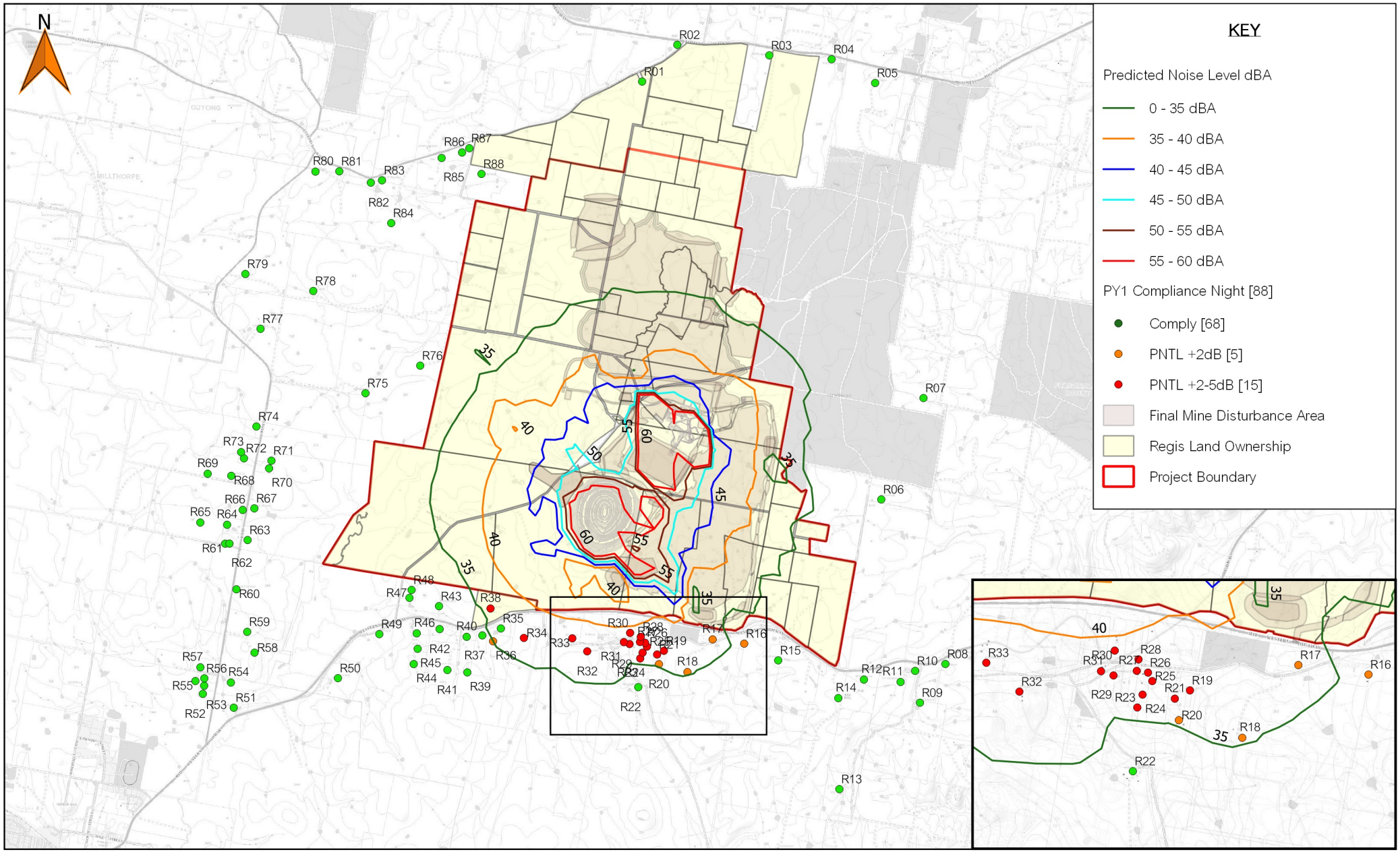


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**Figure 9C**
**Predicted Noise Levels dB LAeq(15min)**
**PY1 Night Operations**
**REF: MAC170434**

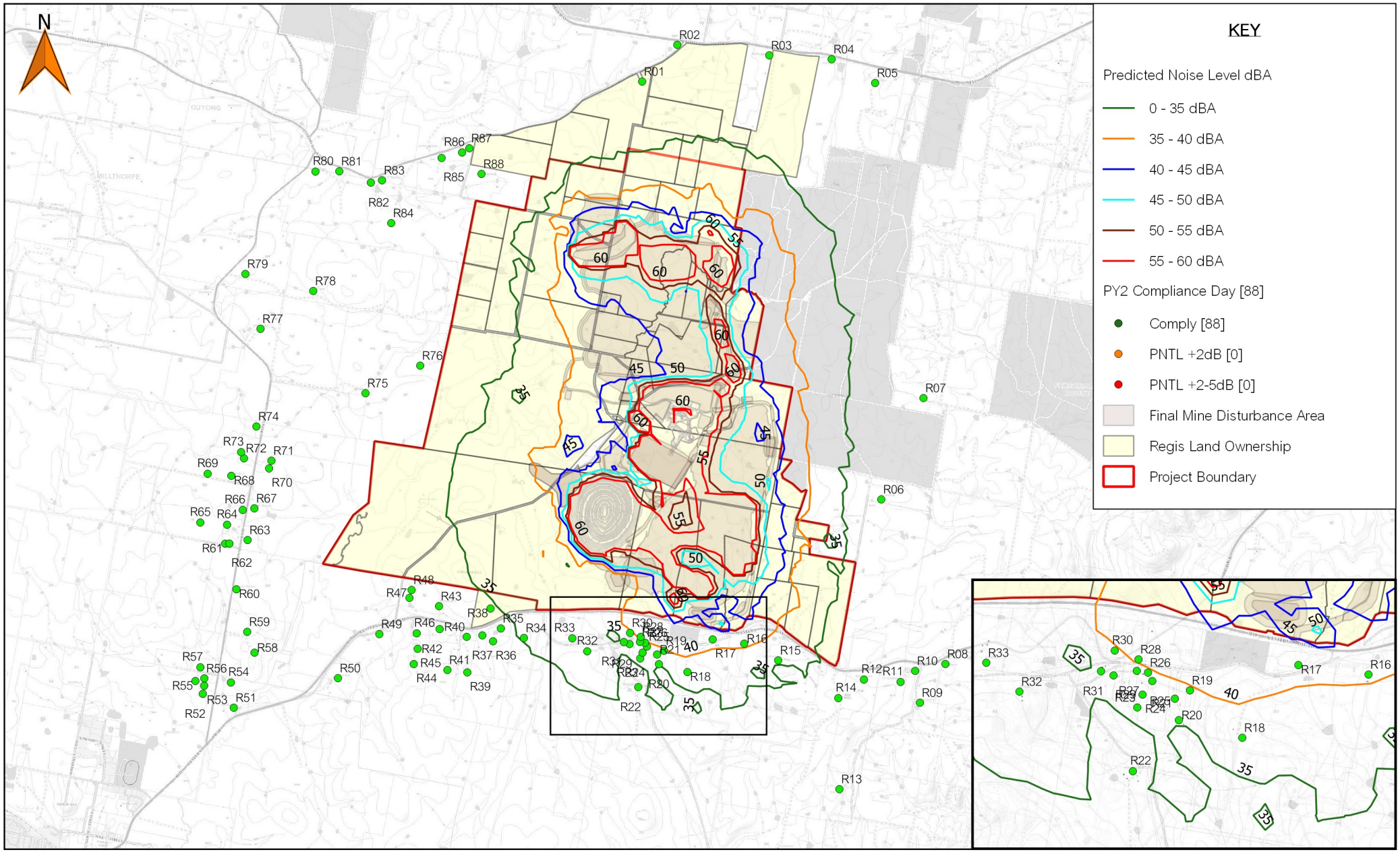


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**Figure 10A**
**Predicted Noise Levels dB LAeq(15min)**
**PY2 Daytime Operations**
**REF: MAC170434**

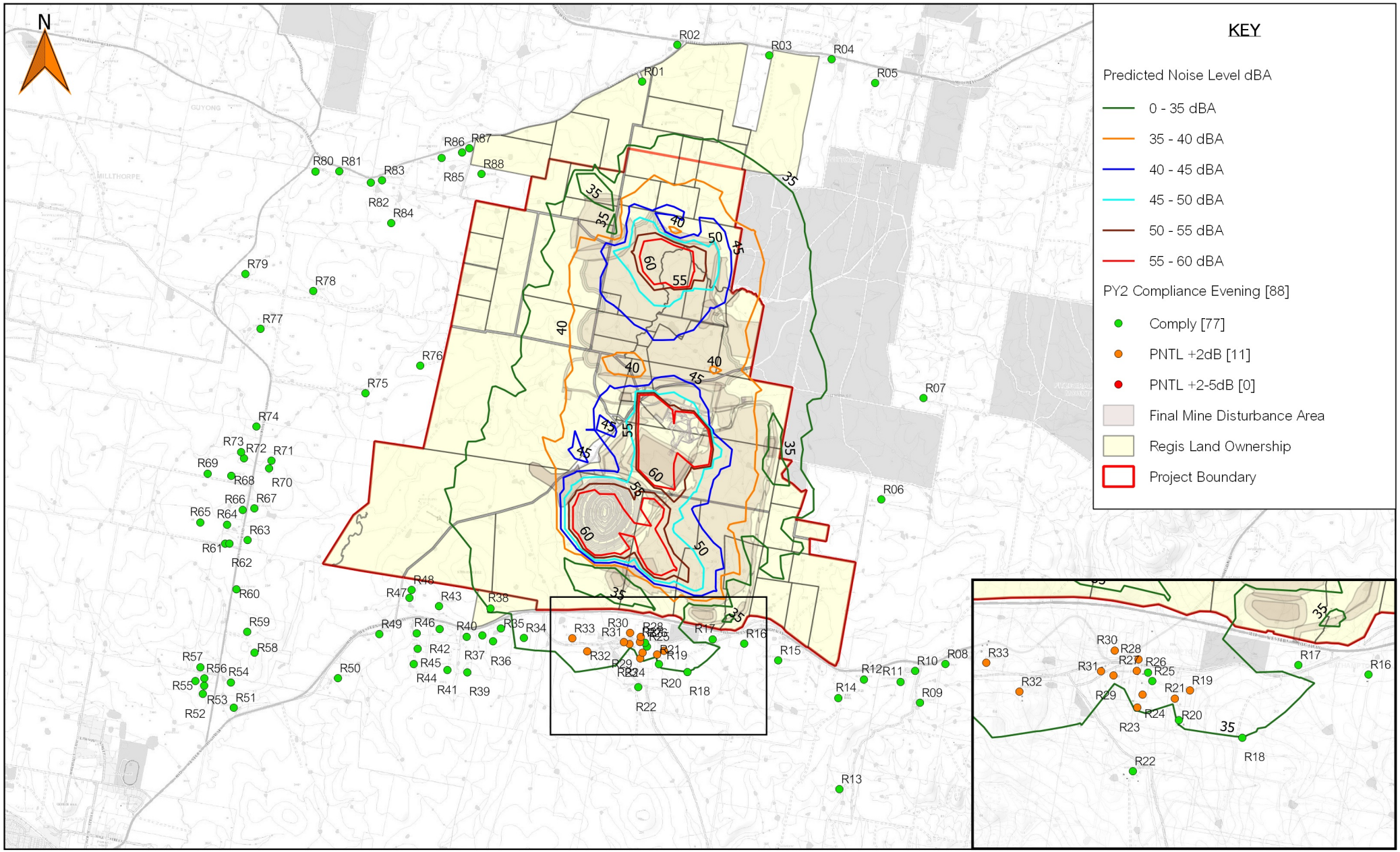


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**Figure 10B**
**Predicted Noise Levels dB LAeq(15min)**
**PY2 Evening Operations**
**REF: MAC170434**

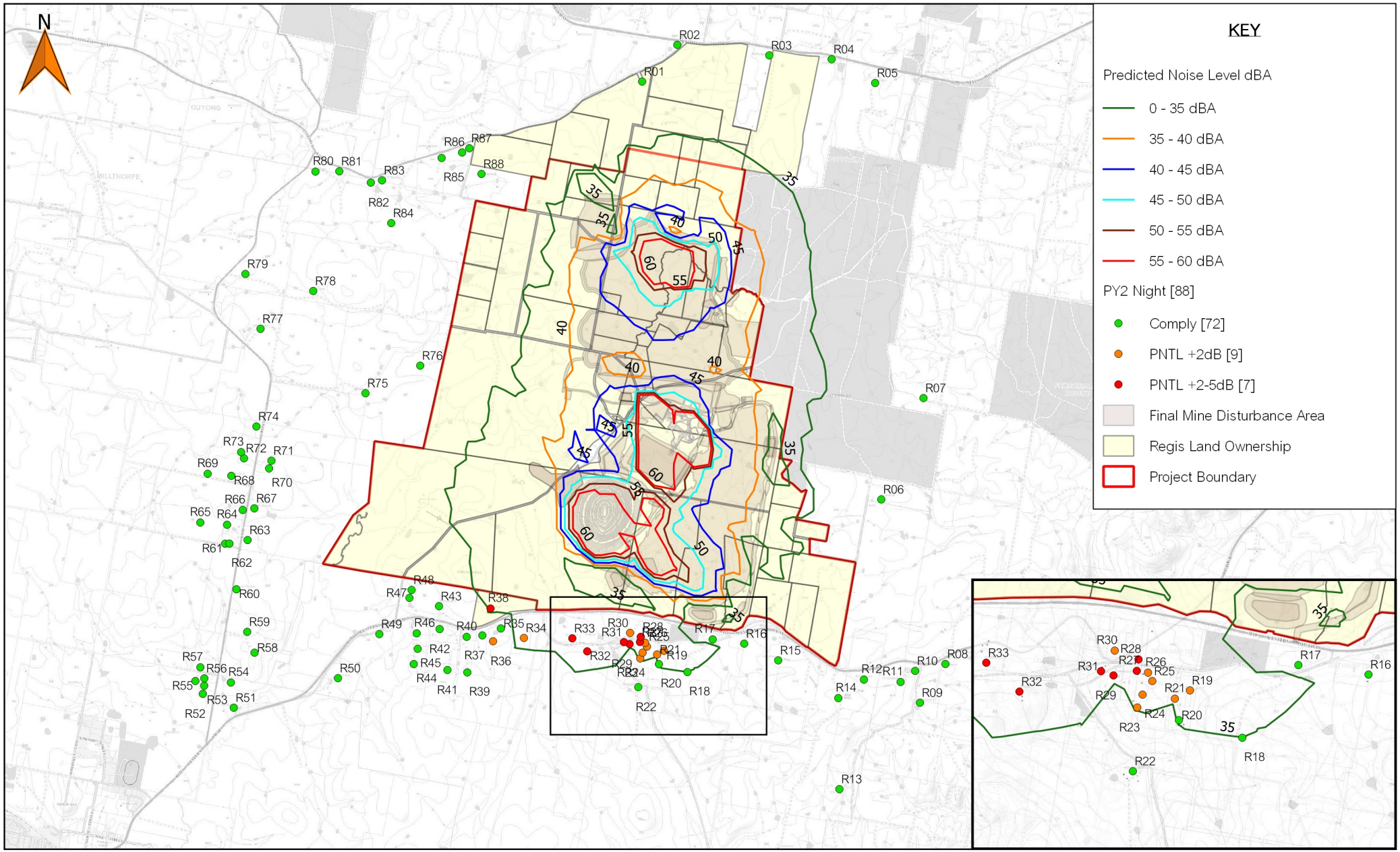


Figure 10C
Predicted Noise Levels dB LAeq(15min)
PY2 Night Operations
REF: MAC170434

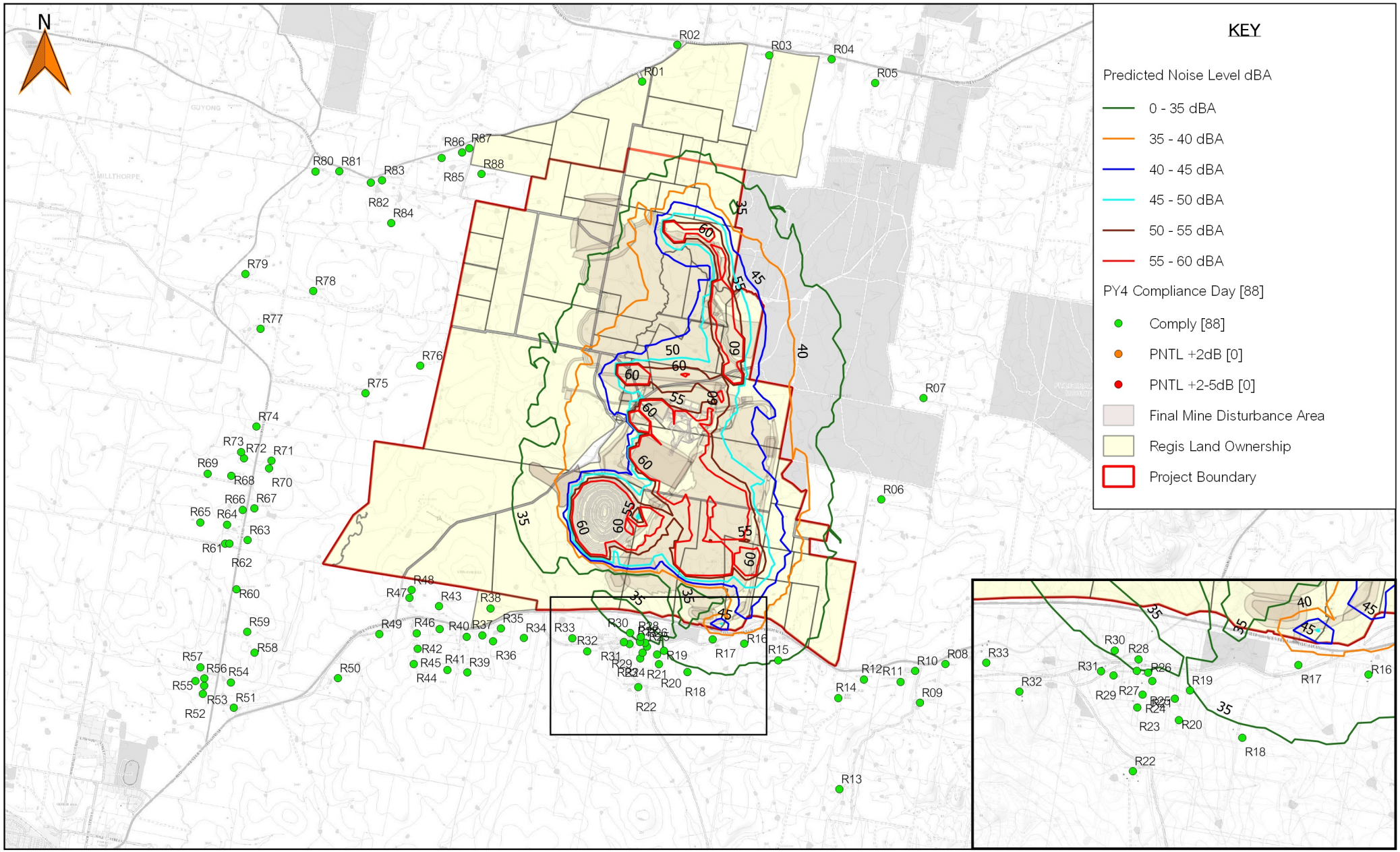


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**Figure 11A**
**Predicted Noise Levels dB LAeq(15min)**
**PY4 Daytime Operations**
**REF: MAC170434**

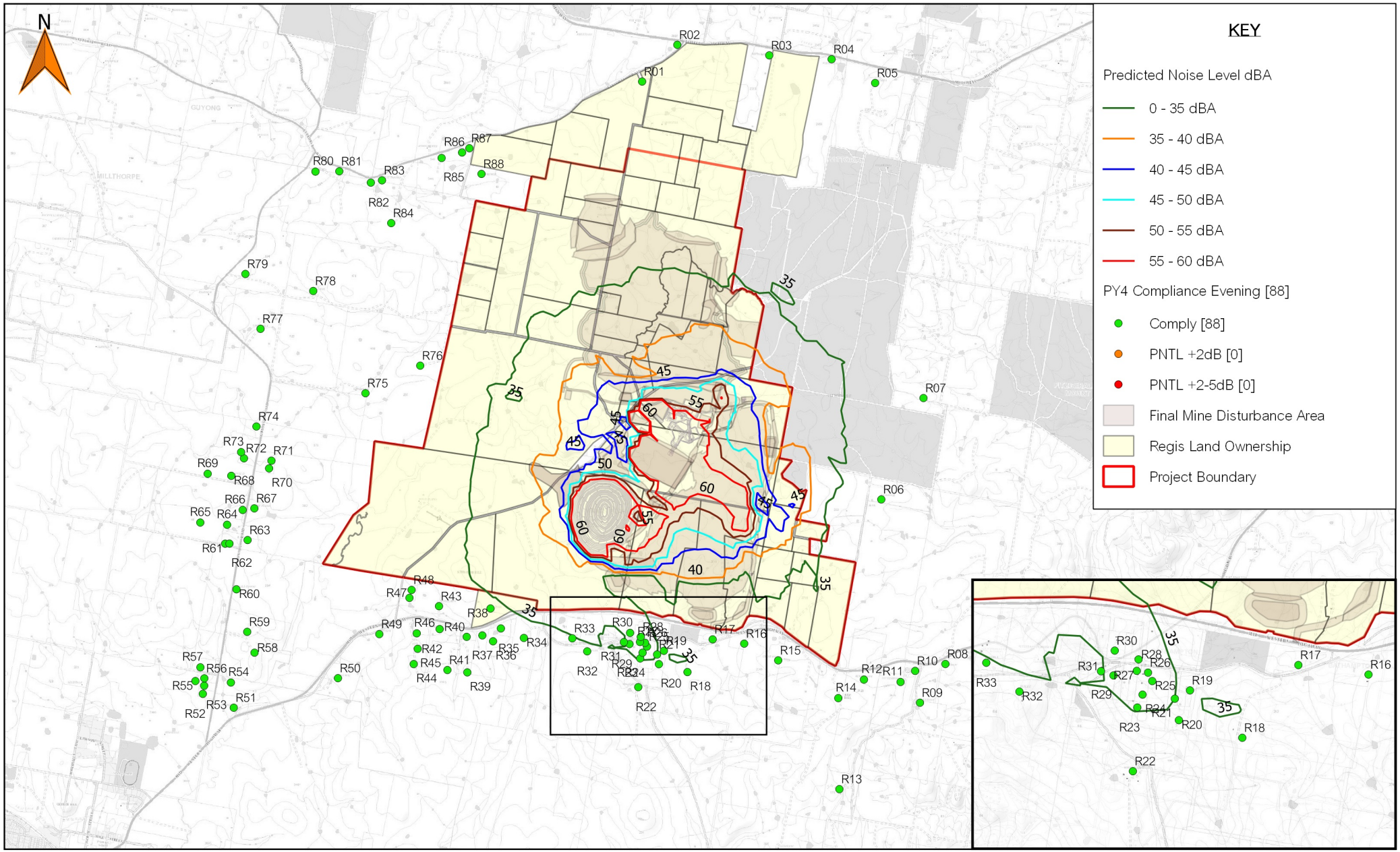


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**Figure 11B**
**Predicted Noise Levels dB LAeq(15min)**
**PY4 Evening Operations**
**REF: MAC170434**

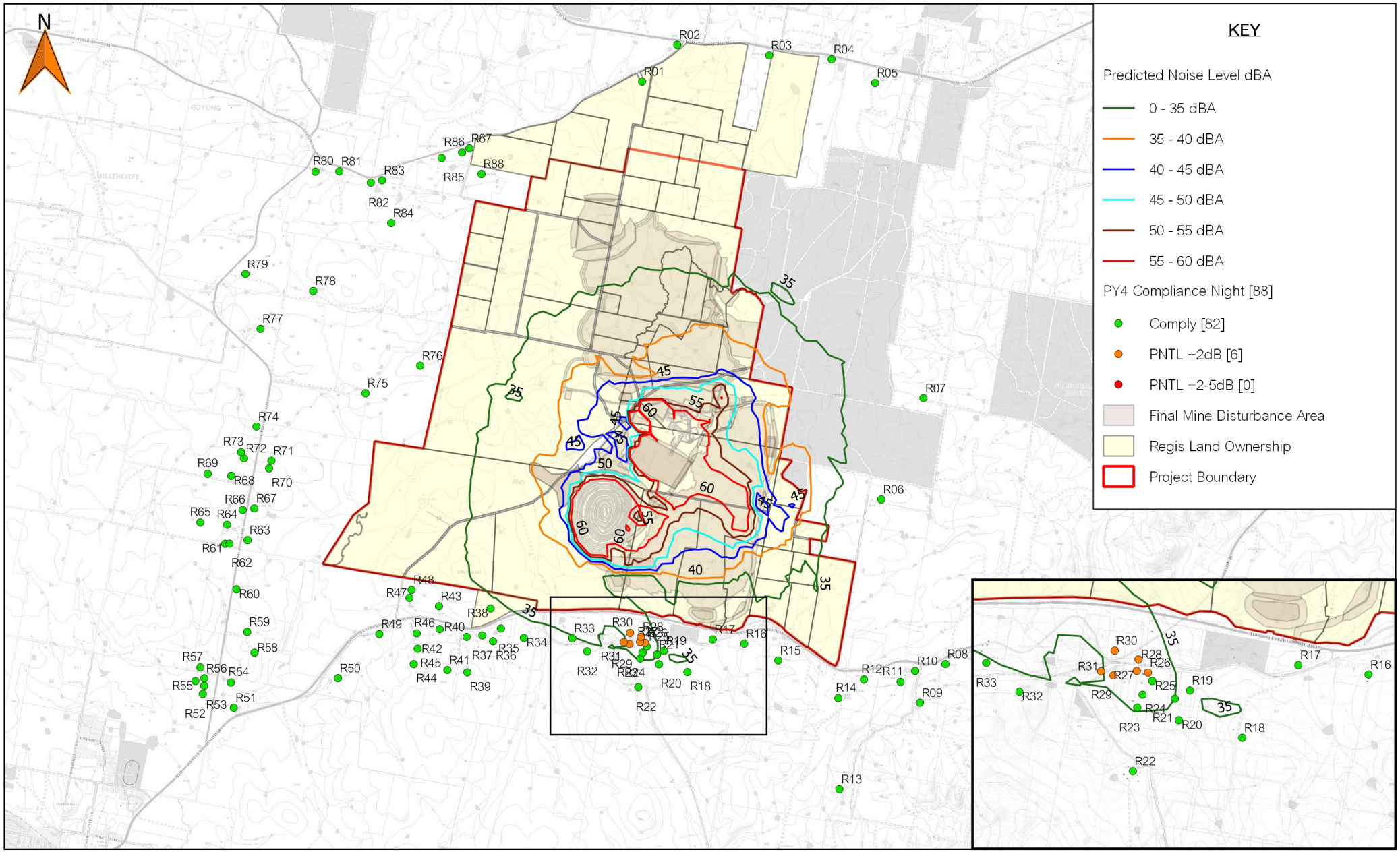


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**Figure 11C**
**Predicted Noise Levels dB LAeq(15min)**
**PY4 Night Operations**
**REF: MAC170434**

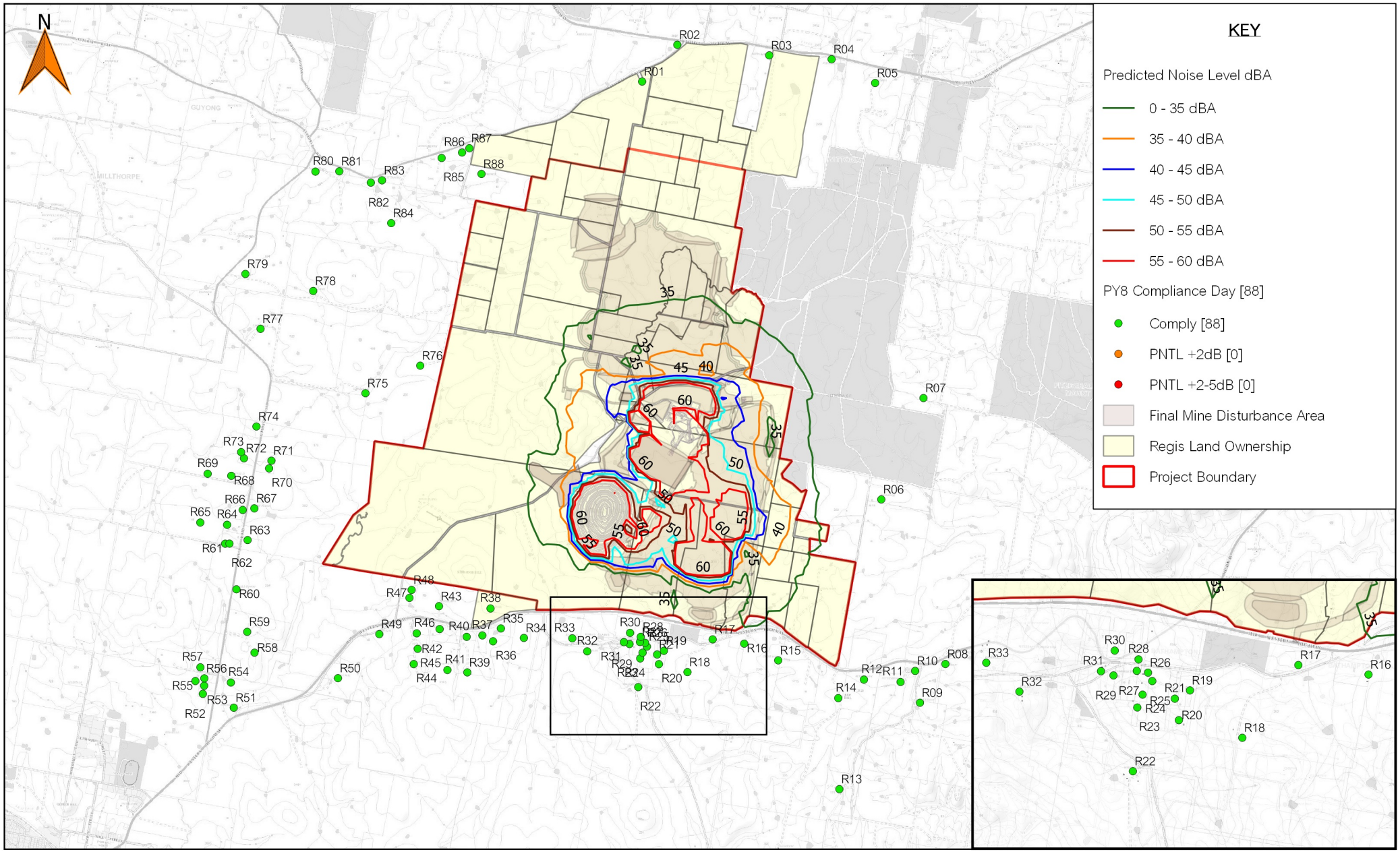


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**Figure 12A**
**Predicted Noise Levels dB LAeq(15min)**
**PY8 Daytime Operations**
**REF: MAC170434**

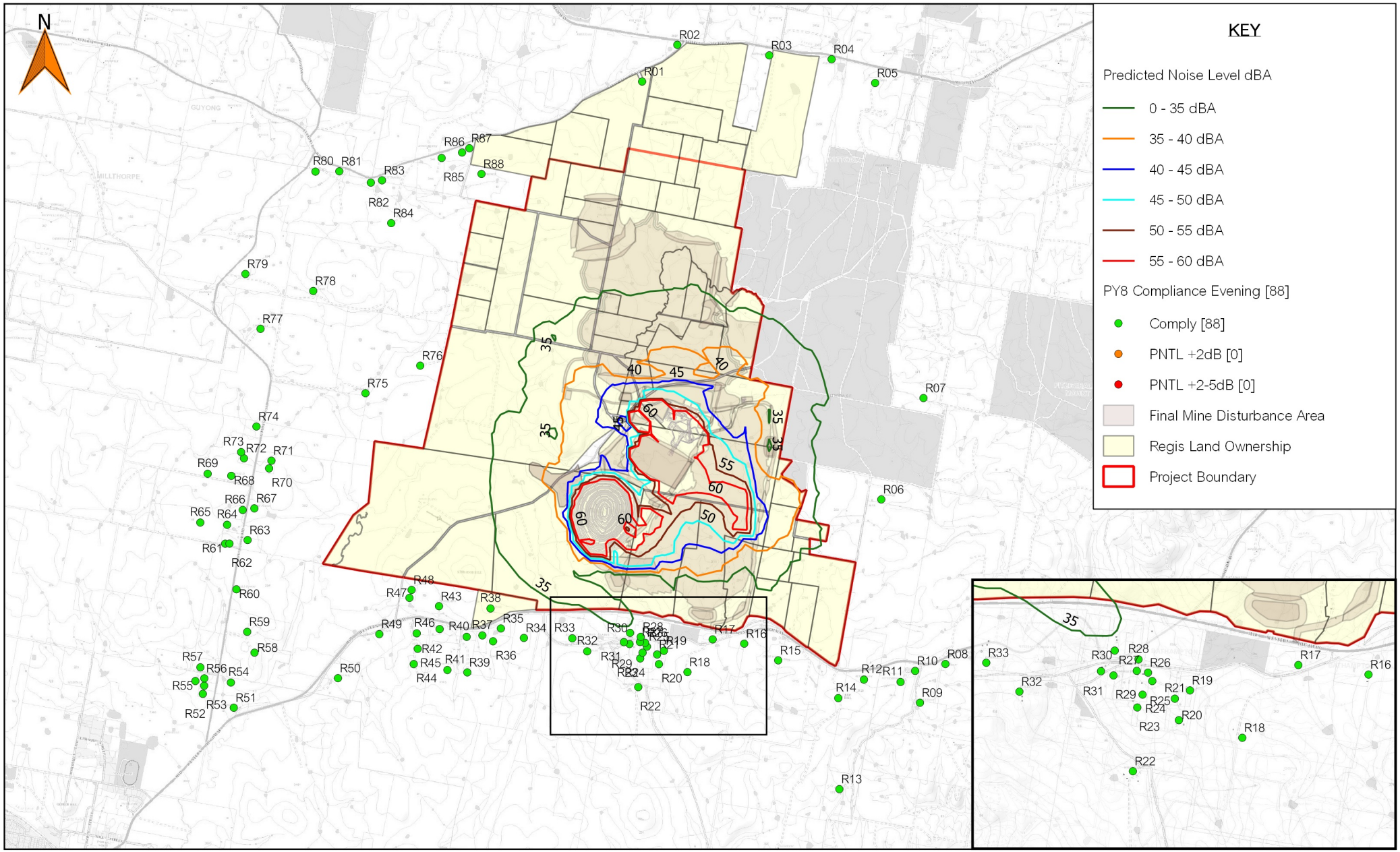


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**Figure 12B**
**Predicted Noise Levels dB LAeq(15min)**
**PY8 Evening Operations**
**REF: MAC170434**

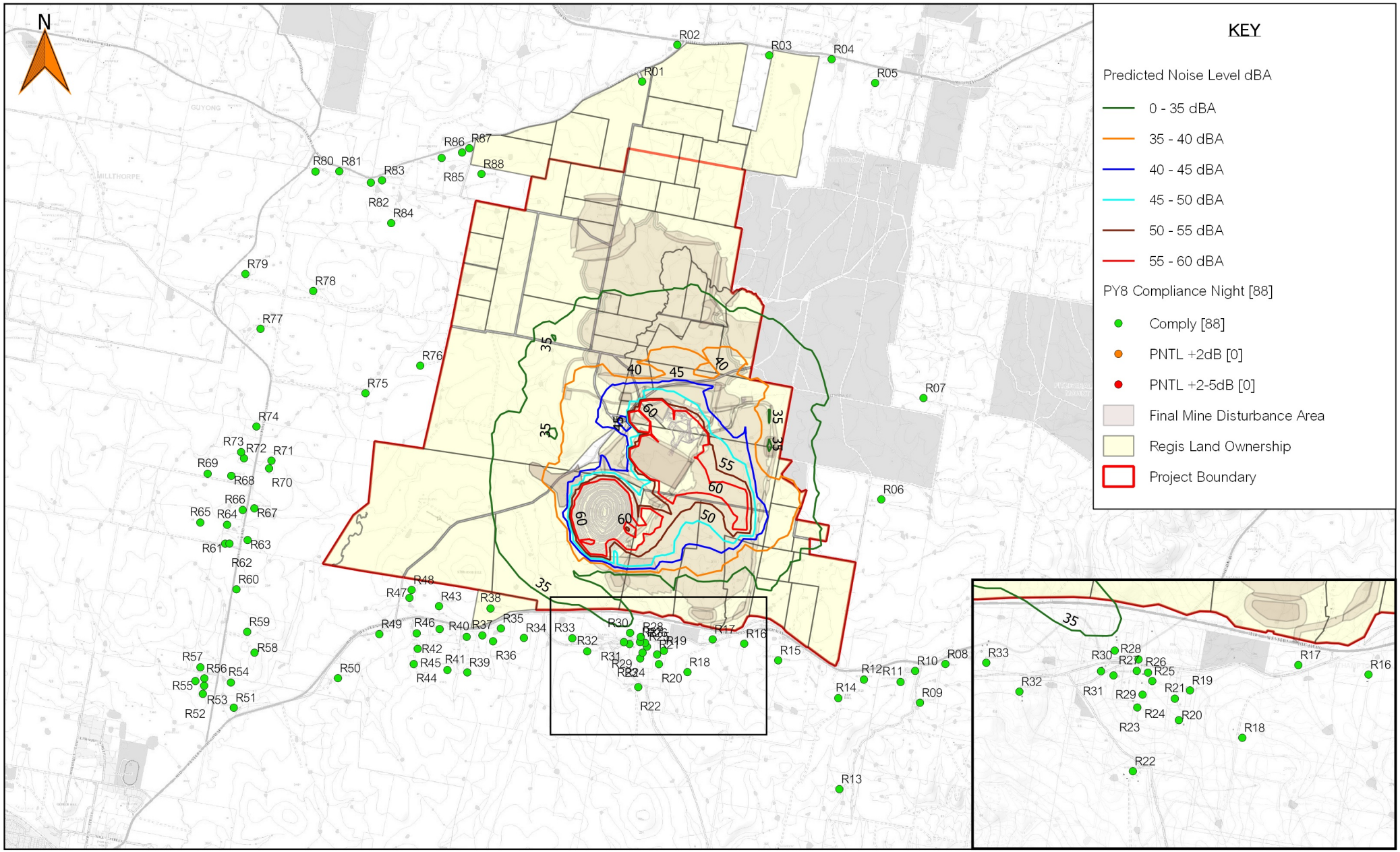


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**Figure 12C**
**Predicted Noise Levels dB LAeq(15min)**
**PY8 Night Operations**
**REF: MAC170434**

### 7.2.6 Maximum Noise Level Assessment – Mine Operations

The predicted noise level ranges from $LA_{eq(15min)}$ and $LA_{max}$ (refer to **Table 23** for sound power level) events for each catchment are presented in **Table 33.** Results identify that the maximum noise level screening criteria are satisfied at all receivers and a detailed maximum noise level assessment is not required.

**Table 33 Maximum Noise Level Assessment (Night)[1]**

| Catchment (No)[1] Receiver ID | Screening Criterion[2], dBA | | Project Noise Level Range dB $LA_{eq(15min)}$ dB $LA_{max}$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | PY1 | | PY2 | | PY4 | | PY8 | |
| | $LA_{eq}$ | $LA_{max}$ | $LA_{eq}$ | $LA_{max}$ | $LA_{eq}$ | $LA_{max}$ | $LA_{eq}$ | $LA_{max}$ | $LA_{eq}$ | $LA_{max}$ |
| Distant Rural R01-R14, R52-R88 | 40 | 52 | 21-31 | 34 | 21-33 | 34 | 20-32 | 34 | 19-31 | 34 |
| Kings Plains R15-R17, R25-R33 | 40 | 52 | 32-37 | 42 | 32-37 | 43 | 32-36 | 41 | 31-35 | 41 |
| Walkom Road R18-R24 | 40 | 52 | 30-36 | 39 | 32-36 | 41 | 30-35 | 39 | 29-34 | 39 |
| Sturgeon Hill R34-R51 | 40 | 52 | 23-36 | 31 | 25-36 | 32 | 25-34 | 30 | 22-33 | 29 |

Note 1: Monday – Saturday Night 10pm to 7am. On Sundays and Public Holidays Night 10pm to 8am.

Note 2: Predicted $LA_{eq(15min)}$ and LAmax is the maximum level during the period 10am to 7am.

### 7.2.7 Low Frequency Noise - Mine Operations

The predicted noise level ranges for dB $LA_{eq(15min)}$ and dB $LC_{eq(15min)}$ for each catchment are presented in **Table 34. Table 35** presents an analysis of C weighted minus A weighted values. Detailed A weighted and C weighted noise levels for all receivers are presented in **Appendix D** with receivers where the +2dB penalty is applicable are outlined in red.

Results show that calculated C weighted noise levels are below 60dB $LC_{eq(15min)}$ at all receivers for all assessed scenarios and the difference between C weighted and A weighted noise levels are generally less than 15dB for receivers within 2 km, except for 12 receivers in the Kings Plains catchment, seven (7) receivers in the Walkom Road catchment and up to 18 receivers in the Sturgeon Hill catchment where the difference is up to 22dB. The C weighted minus A weighted values exceeds the 15dB threshold for approximately half of the Distant Rural receivers. The C minus A values during PY1 are higher than subsequent years, which is due to the combination of construction and operational activities.

This calculated difference would be considered as a negligible[4] impact and is likely to be imperceptible, as the absolute C weighted noise level is below 60dB $LC_{eq(15min)}$ and is predominantly during the daytime during PY1. Similarly, at other receivers during various project years are within 1dB to 2dB of the 15dB C weighted minus A weighted criteria and would be negligible.

For receivers in the Distant Rural catchment, the difference between the A weighted and C weighted noise levels are generally greater than 15dB but are no greater than 17dB. Similarly, the calculated difference would be considered as a negligible impact and is likely to be imperceptible, and the absolute C weighted noise level is below 60dB $LC_{eq(15min)}$.

Notwithstanding, the +2dB penalty has been applied to all receivers where the difference is greater than 15dB for completeness, although the potential for low frequency noise impacts are considered unlikely.

**Table 34 Low Frequency Noise Assessment dBA and dBC Noise Levels**

| Catchment Receiver ID | Period[1] | Project Noise Level Range[2] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | PY1 | | PY2 | | PY4 | | PY8 | |
| | | LAeq | LCeq | LAeq | LCeq | LAeq | LCeq | LAeq | LCeq |
| Distant Rural R01-R14, R52-R88 | Day | 27-45 | 42-55 | 24-33 | 39-46 | 19-32 | 33-43 | 18-30 | 33-40 |
| | Evening | 23-37 | 43-57 | 21-33 | 40-48 | 20-32 | 34-44 | 19-33 | 34-43 |
| | Night | 23-37 | 43-57 | 21-33 | 40-48 | 20-32 | 34-44 | 19-31 | 34-43 |
| Kings Plains R15-R17, R25-R33 | Day | 27-30 | 42-45 | 37-41 | 49-51 | 33-38 | 44-52 | 31-34 | 41-43 |
| | Evening | 19-25 | 43-47 | 32-37 | 49-52 | 32-36 | 44-48 | 32-35 | 44-46 |
| | Night | 21-25 | 43-46 | 32-37 | 49-52 | 32-36 | 44-48 | 31-35 | 43-46 |
| Walkom Road R18-R24 | Day | 28-30 | 44-45 | 35-40 | 45-49 | 30-35 | 41-46 | 29-34 | 40-43 |
| | Evening | 23-25 | 46-47 | 32-36 | 48-51 | 30-35 | 42-47 | 30-35 | 42-45 |
| | Night | 23-25 | 46-46 | 32-36 | 47-51 | 30-35 | 42-47 | 29-34 | 42-45 |
| Sturgeon Hill R34-R51 | Day | 26-34 | 43-48 | 26-37 | 40-49 | 23-31 | 37-44 | 19-30 | 34-42 |
| | Evening | 23-31 | 44-50 | 25-36 | 42-52 | 25-34 | 39-47 | 21-33 | 36-45 |
| | Night | 23-31 | 43-49 | 25-36 | 42-52 | 25-34 | 39-47 | 22-33 | 36-45 |

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Predicted $LA_{eq(15min)}$ and $LC_{eq(15min)}$.

[4]VLAMP Significant Impact Thresholds and Section 4 NPI Determining the significance of residual impacts.

| Table 35 Project Operations Noise Levels Difference dBC – dBA Noise Levels | | | | | |
|---|---|---|---|---|---|
| Catchment (No)[1] Receiver ID | Period[1] | Noise Level Range dBC-dBA[2,3] | | | |
| | | PY1 | PY2 | PY4 | PY8 |
| Distant Rural (51) R01-R14, R52-R88 | Day | 9-16 (1) | 6-15 | 10-15 | 8-15 |
| | Evening | 14-24 (50) | 14-17 (28) | 11-15 | 10-15 |
| | Night | 14-23 (50) | 14-17 (28) | 11-15 | 11-15 |
| Kings Plains (12) R15-R17, R25-R33 | Day | 14-15 | 14-15 | 14-15 | 14-15 |
| | Evening | 21-25 (12) | 18-19 (12) | 13-15 | 14-15 |
| | Night | 21-23 (12) | 18-19 (12) | 13-15 | 14-15 |
| Walkom Road (7) R18-R24 | Day | 15-16 (3) | 14-16 (1) | 13-15 | 14-15 |
| | Evening | 22-24 (7) | 17-20 (7) | 13-15 | 14-16 (1) |
| | Night | 21-23 (7) | 17-19 (7) | 13-15 | 14-15 |
| Sturgeon Hill (18) R34-R51 | Day | 14-18 (11) | 13-15 | 12-15 | 12-15 |
| | Evening | 17-22 (18) | 14-18 (13) | 12-15 | 13-15 |
| | Night | 17-22 (18) | 14-18 (13) | 12-15 | 13-15 |

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Predicted LAeq(15min) and LCeq(15min)

Note 3: Bracketed numbers are the number of receivers in the catchment exceeding a difference (dBC-dBA) greater than 15dB.

### 7.2.8 VLAMP Assessment – Mine Operations

**Table 36** presents the findings of noise predictions for the VLAMP assessment presenting the predicted level range for each noise catchment and the number of receivers in each VLAMP assessment category. Detailed tabulated results of the VLAMP assessment are contained in **Appendix D**.

Results of the VLAMP assessment shows that ten (10) receivers (R17, R25, R26, R27, R28, R29, R30, R31, R32, R33) in the Kings Plains catchment, four (4) receivers (R19, R21, R23, R24) in the Walkom Road catchment and one receiver (R34) in the Sturgeon Hill catchment would experience Marginal impacts (as per VLAMP definitions).

It is recommended that the appropriate mitigation rights be made available to the fifteen (15) receivers identified.

Predicted noise levels do not exceed the acceptable noise level by more than 5dB on any privately owned vacant lands.

| Table 36 Project Operations Noise Levels VLAMP Assessment | | | | | | | |
|---|---|---|---|---|---|---|---|
| Catchment (No) Receiver ID | Period[1] | Significance Criteria | | Project Noise Level (PNL) Range dB $LA_{eq(15min)}$[2] | | | |
| | | Acquisition | Vacant Land | PY1 | PY2 | PY4 | PY8 |
| Distant Rural (51) R01-R14, R52-R88 | Day | 45 | 55 | 26-34 | 24-33 | 19-32 | 18-30 |
| | Evening | 40 | 50 | 19-31 | 21-33 | 20-32 | 19-33 |
| | Night | 40 | 45 | 21-31 | 21-33 | 20-32 | 19-31 |
| Negligible[1] | < PNTL and 0-2dB over PNTL | | | 51 | 51 | 51 | 51 |
| Marginal/Moderate[1] | >2-5dB over PNTL | | | Nil | Nil | Nil | Nil |
| Moderate/Significant[1] | >5dB over PNTL | | | Nil | Nil | Nil | Nil |
| Kings Plains (12) R15-R17, R25-R33 | Day | 45 | 55 | 36-45 | 37-41 | 33-38 | 31-34 |
| | Evening | 43 | 50 | 32-37 | 32-37 | 32-36 | 32-35 |
| | Night | 40 | 45 | 32-37 | 32-37 | 32-36 | 31-35 |
| Negligible[1] | < PNTL and 0-2dB over PNTL | | | 3 | 12 | 12 | 12 |
| Marginal/Moderate[1] | >2-5dB over PNTL | | | 9 | Nil | Nil | Nil |
| Moderate/Significant[1] | >5dB over PNTL | | | Nil | Nil | Nil | Nil |
| Walkom Road (7) R18-R24 | Day | 45 | 55 | 38-44 | 35-40 | 30-35 | 29-34 |
| | Evening | 40 | 50 | 30-36 | 32-36 | 30-35 | 30-35 |
| | Night | 40 | 45 | 30-36 | 32-36 | 30-35 | 23-34 |
| Negligible[1] | < PNTL and 0-2dB over PNTL | | | 4 | 7 | 7 | 7 |
| Marginal/Moderate[1] | >2-5dB over PNTL | | | 3 | Nil | Nil | Nil |
| Moderate/Significant[1] | >5dB over PNTL | | | Nil | Nil | Nil | Nil |
| Sturgeon Hill (18) R34-R51 | Day | 46 | 55 | 27-42 | 26-37 | 23-31 | 19-30 |
| | Evening | 41 | 50 | 23-36 | 25-36 | 25-34 | 21-33 |
| | Night | 40 | 45 | 23-36 | 25-36 | 25-34 | 22-33 |
| Negligible[1] | < PNTL and 0-2dB over PNTL | | | 18 | 18 | 18 | 18 |
| Marginal/Moderate[1] | >2-5dB over PNTL | | | Nil | Nil | Nil | Nil |
| Moderate/Significant[1] | >5dB over PNTL | | | Nil | Nil | Nil | Nil |

Note 1: Negligible, Marginal/Moderate and Significant impact categories are defined in Table 17.

## 7.3 Road Traffic Noise Results

Construction traffic will initially access the mine project area via Dungeon Road during PY1 (Month1 to Month 6). Dungeon Road is an unsealed local road with very little traffic mainly from local residents accessing their properties. Once the new site access is complete the Dungeon Road access will be closed to the public. The closest and potentially most affected residential receiver from construction related road traffic during this period is 60 m from Dungeon Road.

Therefore, the construction road traffic assessment addresses potential road traffic noise generated by construction related traffic on Dungeon Road for PY (Month 1 to Month 6) and the Mid Western Highway from PY1 (Month 7) to PY2 (Month 16). The results presented in **Table 37** show that construction related road traffic noise on Dungeon Road is expected to meet the relevant criteria.

**Table 37 Road Traffic Noise Levels at Nearest Receiver (60m) Dungeon Road**

| Project Stage | Traffic Volume | Predicted Noise Level Daytime dB $LA_{eq(period)}$ | Assessment Criteria Daytime dB $LA_{eq(1hr)}$ |
|---|---|---|---|
| Construction | 25 light vehicles/hour<br>20 heavy vehicles/hour | 49.5 | 55 |

Whilst in the context of this NIA, construction has been assessed for the first half of PY1, as the noise management levels for 24hr/7 day construction are the same as for operations. However, in the context of road traffic, construction related traffic will be present through to PY1.5 (approx. Month 16) in combination with operational traffic, after which there is only operations related road traffic.

The closest and potentially most affected residential receiver from operations related road traffic noise is 80 m from the Mid Western Highway. There are other receivers at a similar offset and this distance has been used to assess potential road traffic noise impacts during the construction and operational phases of the project.

Existing road traffic noise levels have been calculated from 2006 Roads and Maritime Services traffic data, annualised 2% for each year to 2019 and flows were sourced from the Mine Developments Road Traffic Impact Assessment.

The results of the traffic noise calculations at this receiver are presented in **Table 38.** Calculated noise levels are predicted to remain below the relevant criteria for both the daytime and night time assessment periods. For PY1 road traffic noise increases by more than 2dB, although the overall level is within the criteria and the relative increase criteria. This increase is due to the combination of operational and construction road traffic. Notwithstanding, the project related road traffic noise levels satisfy the relevant RNP criteria.

**Table 38 Road Traffic Noise Levels at Nearest Receiver (80 m) Mid Western Highway**

| | Predicted Noise Level dB $LA_{eq(period)}$ | | Change, dB | | Assessment Criteria[1] | |
|---|---|---|---|---|---|---|
| Project Stage | Day | Night | Day | Night | Day dB $LA_{eq(15hr)}$ | Night dB $LA_{eq(9hr)}$ |
| Existing Road Traffic[2] | 46.0 | 43.4 | N/A | N/A | 60 | 55 |
| Construction | 46.6 | 44.4 | 0.6 | 1.0 | | |
| PY1 (Month7) to PY2 (incl construction) | 46.7 | 48.8 | 0.7 | 5.5 | | |
| PY2-PY8 | 46.6 | 44.4 | 0.6 | 1.0 | | |

Note 1: Day 7am to 10pm. Night 10am to 7am.

Note 2: EIS Noise 2014 – Table 6.1.

Note 3: Predicted noise levels shown to decimal places to demonstrate the minor change otherwise not presented when rounded.

## 7.4 Blasting– Mine Operations

Airblast overpressure and vibration levels are predicted to meet the criteria at all assessed receivers for blasts up to 300kg MIC. Detailed airblast overpressure and vibration results are presented in **Table 39** for the nearest potentially affected receivers and graphically in **Figure 13** and **Figure 14**.

**Table 39 Blasting Emissions**

| Receiver ID | Distance to Charge, m | Airblast Overpressure dBZ Peak | Ground Vibration mm/s |
|---|---|---|---|
| I205/R06 | 3572 | 101 | 0.2 |
| R16 | 2204 | 107 | 0.5 |
| R17 | 1858 | 109 | 0.6 |
| I201/R26 | 1365 | 113 | 1.1 |
| I208/R28 | 1288 | 114 | 1.2 |
| R29 | 1327 | 113 | 1.1 |
| R30 | 1194 | 115 | 1.3 |
| R31 | 1287 | 114 | 1.2 |
| I202/R32 | 1383 | 113 | 1.0 |
| I206/R33 | 1263 | 114 | 1.2 |
| R34 | 1552 | 111 | 0.9 |
| R35 | 1670 | 110 | 0.8 |
| R38 | 1630 | 111 | 0.8 |
| I203/R49 | 3020 | 103 | 0.3 |
| I204/R51 | 5084 | 96 | 0.1 |
| R75 | 3529 | 101 | 0.2 |
| R76 | 3202 | 102 | 0.3 |

Note: Receiver ID prefix "I" denotes a heritage receiver

### 7.4.1 Blasting - Effects of Vibration on Heritage Structures

Airblast overpressure and vibration levels are predicted to meet the criteria at all assessed heritage receivers outside the Mine development Area (refer to **Table 39** Receivers with Prefix "I") outside the Mine Development area for blasts up to 300kg MIC.

### 7.4.2 Effects of Vibration on Infrastructure from Blasting

The nearest infrastructure to blasting is the Mid Western Highway, where vibration levels are calculated to be below 5mm/s. Hence there are no significant vibration effects from blasting on infrastructure which are typically less sensitive to vibration than residential receivers.

### 7.4.3 Effects of Blasting on Animals and Livestock

Blast effects resulting from the Mine Development are predicted to be, at worst for overpressure up to 115dBZ, and for vibration between 0.1 mm/s and 1.3 mm/s. These levels are well below the regulatory criteria and considerably lower than other sources of overpressure that horses or livestock are likely to be already subjected to such as lightning strikes which are typically between 120dBZ and 130dBZ[5].

[5] Equine Health Impact Statement – Drayton South Coal Project (2015)

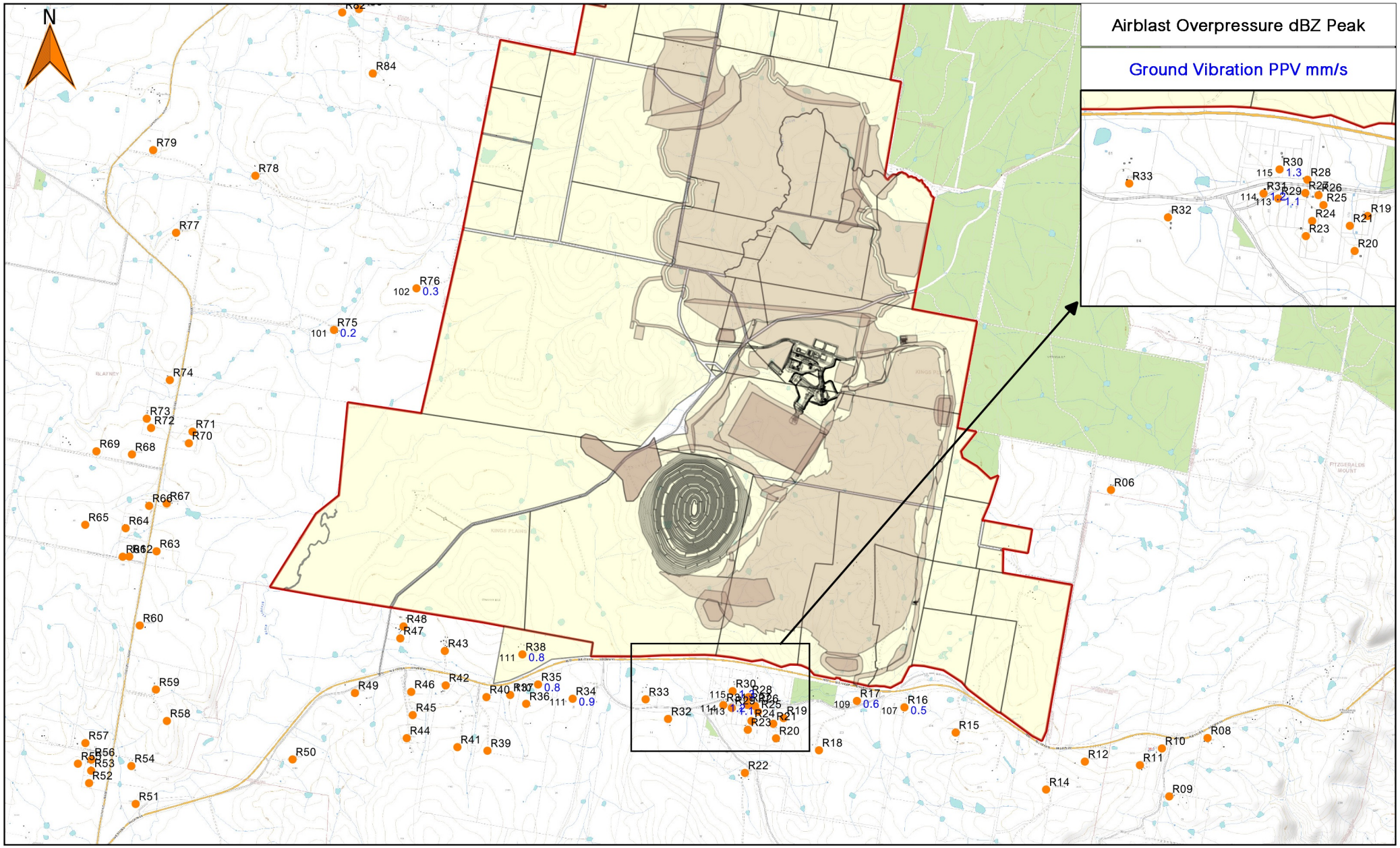


Figure 13 Blast Emissions to Residential Receivers
AS2187 Assessment - 300kg MIC

REF: MAC170434

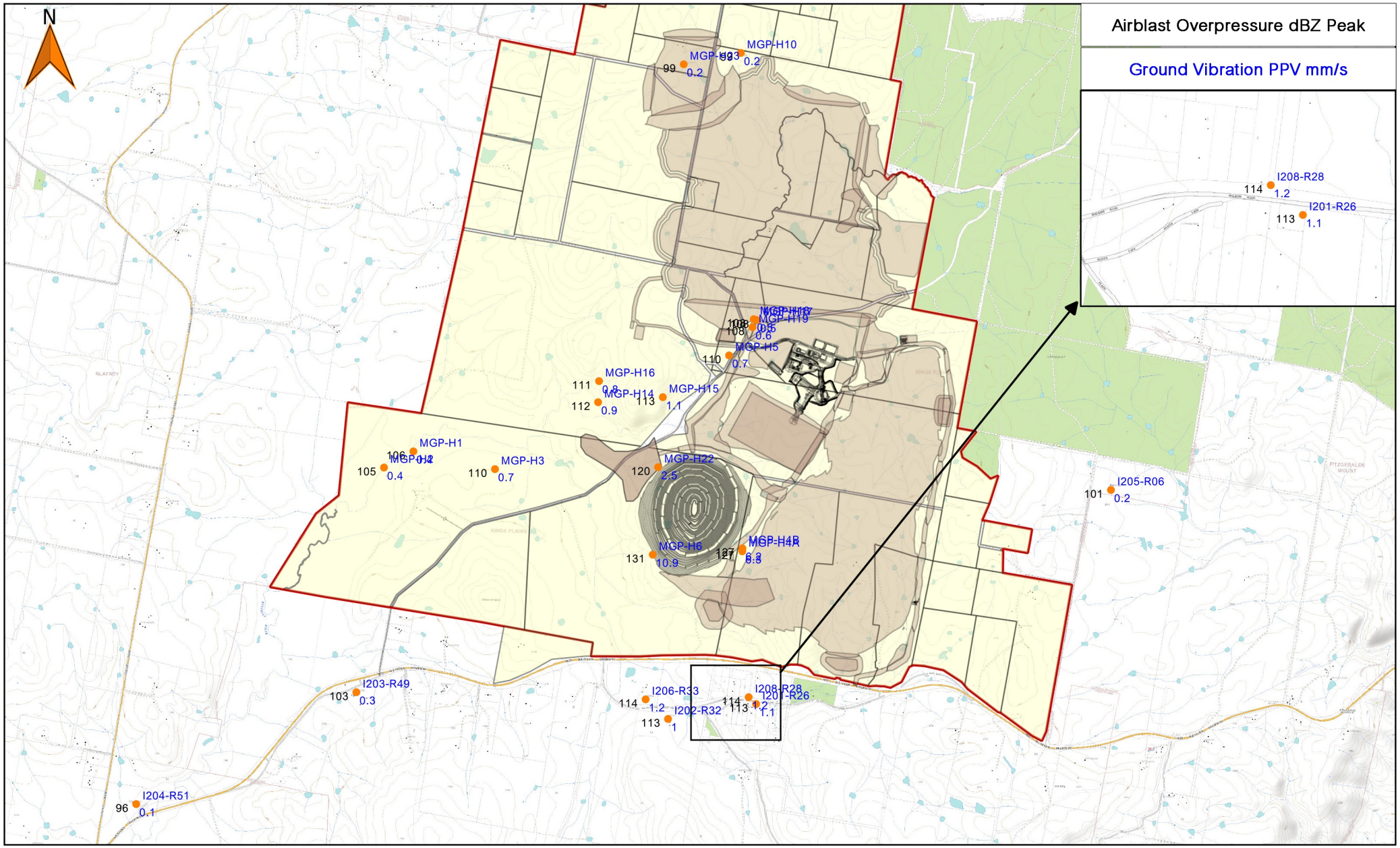


Figure 14 Blast Emissions - Heritage Receivers
AS2187 Assessment - 200kg MIC

REF: MAC170434

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# 8 Mitigation

## 8.1 Mine Design Optimisation

During the detail design phase of the project, further design options will be evaluated to minimise noise emissions, optimise equipment utilisation and noise mitigation measures to comply with the PTNLs.

Further potential design options that may be considered are:

- alternative equipment selection;
- additional haul road barriers and pit ramp locations;
- locations of night and daytime dumps;
- scheduling of noise intensive works (ie bund construction) at times when there is less likelihood of noise enhancing conditions; and
- enclosure of fixed plant.

## 8.2 Negotiated Agreements and Acquisitions

Regis are currently working with relevant landholders to develop negotiated agreements where possible. When agreements are in place there is potential to alter the noise affectation zone which could allow for more operational flexibility.

## 8.3 Noise Monitoring and Management

The noise measurement procedures employed throughout the monitoring program shall be guided by the requirements of AS 1055:2018 “Acoustics - Description and Measurement of Environmental Noise” and the EPA’s Noise Policy for Industry (NPI), 2017. Noise monitoring will be undertaken by a suitably qualified acoustic specialist or suitably qualified and trained environment officer.

A noise monitoring program will be developed by Regis as part of the overall site Noise Management Plan (NMP) to guide, manage, quantify and control noise emissions from the project. It is envisaged that the NMP will require a combination of (unattended) real time noise monitoring terminals (NMT), meteorological data and operator attended monitoring.

The objectives of the noise monitoring program are as follows:

- measure noise levels from the project operations providing real time data to a central location (such as the control centre) and warnings to operators when noise levels are approaching PNTLs and/or exceeding them;
- the noise monitoring system will need to assess project noise levels and non-site related ambient and background noise;
- identify potential noise sources and their relative contribution to noise impacts;
- specify appropriate intervals for noise monitoring to evaluate, assess and report the noise contribution due to construction;
- outline the methodologies to be adopted for monitoring construction and operations noise, including justification for monitoring intervals or triggers, weather conditions, monitoring location selection and timing; and
- incorporate noise management and mitigation strategies to be outlined in the NMP.

### 8.3.1 Noise Monitoring Terminals

It is envisaged that the NMT would require the following technical specifications:

- measure A, C and Z weighting filters, 1/3 octaves, $LA_{eq}$, $LA_{min}$, $LA_{max}$ and statistical parameters ($LA_1$ - $LA_{99}$);
- capable of recording and storing audio files that can be used to identify noise sources;
- connectivity to the existing mine control centre control to enables access to real time noise metrics and audio; and
- be capable of sending alarms/alerts to relevant personnel when noise levels exceed warning/trigger levels, when noise levels are approaching the PNTLs or indicating exceedances such that additional mitigation measures and controls can be implemented to minimise impacts to nearby sensitive receivers.

### 8.3.2 Operator Attended Noise Monitoring

Operator attended noise measurements and recordings shall be conducted to quantify the intrusive noise emissions from the project noise sources as well as the overall level of ambient noise. Attended noise monitoring would typically be conducted for regular compliance monitoring and in response to complaints, or other investigations.

When required, the operator shall quantify and characterise the maximum ($LA_{max}$) and the energy equivalent ($LA_{eq}$) intrusive noise level from construction over a 15-minute measurement period. In addition, the operator shall quantify and characterise the overall levels of ambient noise over the 15-minute measurement interval. It is recommended that instrumentation used during the monitoring is to be equivalent to a Type 1 meter with 1/3 octave band analysis and have audio recording functionality for post processing source identification. It is noted that 1/3 octave band analysis is required to establish whether modification factors in accordance with the NPI are to be applied.

All acoustic instrumentation used as part of the attended monitoring program must been designed to comply with the requirements of AS IEC 61672.1-2019, Electroacoustics - Sound level meters - Specifications and shall have current calibration certificates. All instrumentation shall be programmed to record statistical noise level indices in 15-minute intervals including $LA_{max}$, $LA_{min}$ and $LA_{eq}$.

Instrument calibration shall be checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA. The measurement position(s) should be selected considering:

- weather conditions such as rain and wind, insect noise;
- the location and direction of any noise source/s;
- the most sensitive position at the affected receiver; and
- the need to avoid reflecting surfaces (where possible).

### 8.3.3 Data Presentation and Reporting

The measured $LA_{eq(15min)}$ noise level contributions from construction operations as well as the overall ambient noise levels together with the weather and operations at the time of the measurement shall be reported.

In the event of an exceedance of the relevant PNTLs, the relevant environmental personnel shall be informed of the location, the margin of exceedance and the source of emission (where possible). The noise level, meteorological conditions at the time of the survey and plant operating data shall be documented and forwarded to the relevant environmental personnel so that an appropriate response can be made with respect to conformance.

Reporting of monitoring will include the following:

- monitoring location(s);
- list of operating plant and equipment;
- measured noise and/or vibration levels from construction;
- overall ambient noise levels;
- comparison of results with relevant PNTLs;
- monitoring equipment details;
- weather conditions; and
- comments specific to each site.

Compliance reports, discussing compliance against the PNTLs, will be prepared and submitted to the relevant environmental personnel as required. Compliance reports will include a summary of the information listed in the preceding sections, specifically issues or non-compliances and the response or management of the issues and non-compliances. Exceedances and outcomes of incident investigations are expected to be reported to the relevant regulators and stakeholders.

## 8.4 Complaints Handling

- Provide a readily accessible contact point, for example, through a toll-free information and complaints line and give complaints a fair hearing.
- Have a documented complaints process, including an escalation procedure so that if a complainant is not satisfied there is a clear path to follow.
- Records of all community complaints will be maintained on an up-to-date complaints register. The records will include:
    - date and time of the complaint;
    - the means by which the complaint was made (telephone, mail or email);
    - any personal details of the complainant that were provided, or if no details are provided, a note to that effect;
    - the nature of the complaint;
    - any actions taken by the site supervisor in relation to the complaint, including any follow up contact with the complainant and the timing for implementing action; and
    - if no action was taken by site supervisor/construction contractor in relation to the complaint, the reason why no action was taken.
- Community complaints will be allocated to the relevant company representative immediately to facilitate the implementation of corrective actions. The details of the complaint will also be circulated to the applicable operations personnel for action, where required.

- Procedures, roles and responsibilities will be outlined in the Noise Management Plan.

## 8.5 Construction Noise

The results of the assessment indicate that noise levels during construction have potential to exceed the NMLs at several surrounding noise sensitive receivers, albeit for a short period. However, construction noise levels are predicted to satisfy the highly noise affected criteria of 75dB $LA_{eq(15min)}$ for all activities.

The primary objective of the noise assessment is to minimise noise impacts on surrounding receivers. Given that construction activities (other than bund construction) are to occur 24hr/7 day, the project construction manager may adopt the following hierarchical strategy to minimise noise emissions from construction and operations:

- ensure that construction activities meet construction noise management levels within the allowable hours of operation as far as practicable;
- where feasible, avoid undertaking construction activities adjacent to residential receivers between 6pm to 7am;
- where noise levels are above relevant noise management levels, implement reasonable and feasible best practice noise controls to minimise noise emissions and/or exposure duration at affected receivers; and
- where the use of best practice noise controls does not adequately address exceedance of noise management levels, adopt alternative measures to minimise impacts on the community.

Australian Standard AS 2436-2010 "*Guide to Noise Control on Construction, Maintenance and Demolition Sites"* sets out numerous practical recommendations to assist in mitigating construction noise emissions. These recommendations include operational strategies, source noise control strategies, noise barrier control strategies, and community consultation.

Standard, Level 1 and Level 2 mitigation measures are described in **Table 40**.

| Table 40 Construction Noise Mitigation Measures | |
|---|---|
| Mitigation Level | Mitigation Measures |
| Standard Mitigation | ▪ Toolbox and induction of personnel prior to shift to discuss noise control measures that may be implemented to reduce noise emissions to surrounding receivers;<br>▪ Training (of employees to conduct quieter work practices);<br>▪ Equipment which is used intermittently is to be shut down when not in use;<br>▪ Where possible, machinery will be located/orientated to direct noise away from the closest sensitive receivers;<br>▪ Undertake regular maintenance of machinery to minimise noise emissions. Maintenance will be confined to standard daytime construction hours and where possible, away from noise sensitive receivers;<br>▪ The quietest suitable machinery reasonably available will be selected for each work activity;<br>▪ Where feasible substitute noisy plant items for a quieter alternatives should be considered;<br>▪ Avoid queuing of vehicles adjacent to any receivers;<br>▪ Where practicable, ensure noisy plant/machinery are not working simultaneously in close proximity to receivers;<br>▪ Where possible, all plant are to utilise a broad band reverse alarm in lieu of the traditional hi-frequency type reverse alarm; and<br>▪ Minimising the need for reversing or movement alarms. |
| Level 1 Mitigation (Including Standard Mitigation Level) | ▪ Scheduling of construction activities to minimise the number of work areas and simultaneous activities occurring in those areas to minimise noise levels;<br>▪ Wherever possible, subject to feasibility and reasonability, the quietest plant and equipment should be utilised in combination with management measures to minimise noise impacts;<br>▪ Where vehicle queuing is required, for example due to safety reasons, engines are to be switched off to reduce their overall noise impacts on receivers;<br>▪ Notification of OOH works; and<br>▪ Conduct noise monitoring to validate noise emissions are within NMLs. |
| Level 2 Mitigation (Including Mitigation Level 1) | ▪ Use mobile noise screens (which can achieve noise reductions of up to 8dBA), optimise the positioning of plant and equipment to minimise line of site to receivers or substitute noisy equipment to reduce the noise level at nearby receivers for these activities;<br>▪ Conduct noise monitoring to validate noise emissions are within NMLs;<br>▪ Respite periods; and<br>▪ Potential temporary alternative accommodation. |

Employing these strategies could potentially result in noise level reductions ranging:

- Standard Mitigation – up to 10dBA in instances where space requirements place limitations on the attenuation options available;
- Level 1 Mitigation – potentially up to 20dBA depending on mixture of measures and noise sources in operation, location and proximity to receivers;
- Level 2 Mitigation – potentially over 20 dBA where the use of enclosures, silencers, etc) can be combined with noise barriers and management techniques (eg avoidance of clustering).

Should compliance noise monitoring (see **Section 8.2**) indicate exceedances of the noise criteria, a combination of comprehensive noise mitigation treatments (i.e. noise barriers, equipment enclosures, silencers, regular equipment maintenance, etc) and consultation with the local community will be considered on a case by case basis to manage exceedances. Further descriptions of management measures and mitigation options are provided for specific construction activities and work areas in the following sections.

## 8.6 Blasting

Some general blast management practices may reduce overpressure are discussed below.

### 8.6.1 Blast Design

The most effective method of reducing the airblast level is to stem all blastholes with an appropriate packing material in order to contain the explosives gases as it is understood that exploding this unconfined explosive product would increase the airblast levels significantly. This also results in a much more efficient blast and better fragmentation of the rock.

The Maximum Instantaneous Charge (MIC) is the maximum mass of explosive detonated in any 8ms period throughout the blast. A reduction in the MIC would correspondingly result in a reduction of the airblast level. The MIC may easily be reduced by reducing the number of holes fired at any one time. Halving the MIC would typically reduce the airblast level by 1dB to 3dB.

### 8.6.2 Blast Monitoring

It is recommended that test blasts be conducted prior to production blasting to collect data to validate calculated blast emissions in the NVIA to develop preliminary blast emission site laws for airblast overpressure and vibration.

It is recommended that all blasts be monitored. Monitors should be located at various distances from the open pit, representative of the emissions received at residential receptor, occupied buildings, and infrastructure.

Each blast monitor should be configured as follows:

- Ideally, the blast monitor microphone should be in a free field environment so that the microphone should be orientated so that it is facing the blast.
- The geophone (or vibration monitoring unit) should be orientated so that the longitudinal axis is directed towards the blast.
- The date and time on each blast monitor should be synchronised with the download computer after each blast (or at least once a week as the clock speed varies between the units).
- The ground vibration arrives at the monitor before the airblast. Therefore, if the geophone is triggered both the ground vibration levels and the airblast levels would be recorded.

#### Blast Monitoring Log

Blast design records should be maintained for all individual blast events. The purpose of the record is to assist in the design and optimisation of future events, planning and control of blasting emissions and to provide a traceable system of documentation in case of incident or complaint.

For the purposes of blast emission monitoring, the mine should be guided by the requirements of AS 2187.2 2006, “Explosive Storage, Transport and Use - Appendix J” to maintain a Blast Design and Emissions Record for each blast event. To maximise the benefits of the blast monitoring process, the significant design parameters, emission levels and meteorological data should be collated on a concise Blast Emissions Summary Record, with the following data recorded for each blast:

- Blast Number;
- Block or Area ID;
- Date and Time of blast;
- Shot Type;
- Centroid of Blast (X,Y,Z coordinates in a referenced mapping system);

- Distance from the blast to the monitoring locations;
- MIC (kg);
- Peak Airblast Level; and
- Peak Vibration Level, ie Peak Vector Sum (PVS).

Blast records would form the basis for developing and continually updating the blast emission site laws for vibration and airblast for the site and would provide the ability to provide more accurate blast predictions as data from each blast is collected.

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# 9 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has been engaged by EMM Consulting Pty Limited on behalf of Regis Resources Ltd (Regis) to prepare a Noise and Vibration Impact Assessment (NVIA) for the proposed McPhillamys Mine Development.

This NVIA has identified the closest and/or potentially most affected receivers situated within the area of influence to the project and determined noise (and blasting) emissions over the project life. Predicted noise levels from construction, operation and road traffic have been used to determine potential noise impacts associated with Mine Development through comparison with impact assessment noise criteria taking into account modifying factors in accordance with the NPI and EARs for the project. Where required, noise mitigation and management measures have been identified that may be implemented to effectively manage noise emissions at off-site receivers.

Predicted noise levels from construction activities during standard hours are expected to comply with NMLs at all receivers except at one receiver where noise levels may exceed the NMLs by up to 5dB during the initial construction of the access road from the Mid Western Highway. Furthermore, the highly affected noise management level of 75dB $LA_{eq(15min)}$ is expected to be satisfied at all receivers. Predicted noise levels from construction activities during out of hours Period 1 hours are expected to comply with NMLs at all receivers.

Noise levels from typical operations are expected exceed the PNTLs by up to 2dB at several receivers in the nearest catchments to the project over the first four years of the project life. Exceedances of the PNTLs of up to 2dB are considered negligible[6] and would not be discernible by most receivers to compliant emission level of 35dB $LA_{eq(15min)}$.

Noise levels from typical operations are expected to exceed the PNTLs by up to 5dB at several receivers in the nearest catchments to the project are predominantly during the daytime period over the first year of the project life.

The project has adopted several mitigation and management measures into the project design such as noise suppression for mobile equipment, in particular haul trucks, excavators and drills. In addition, significant noise generating processing plant (crushers, screens, ball mill) will be enclosed and two noise bunds on the southern extent of the open pit and waste rock emplacement will be constructed.

[6]VLAMP Significance assessment.

These mitigation measures combined with pro active noise management via a real time noise monitoring and notification systems will minimise the potential for the exceedances as the operation will have the ability to manage noise levels within criteria.

Therefore, whilst there is potential for exceedance of the relevant criteria, Regis is committed to implement the relevant noise mitigation and management measures described in this NVIA to minimise noise impacts and to remain within the relevant noise impact criteria.

Predicted maximum noise levels from the project are expected to satisfy the maximum noise level screening criteria at all receivers and a detailed maximum noise level assessment is not required.

The low frequency noise assessment shows that there is potential for low frequency noise emissions from the project, however, in consideration of the magnitude of the C weighted noise levels and mitigation measures to be implemented, it is unlikely that noise frequency noise impacts would occur.

Results of the VLAMP assessment shows that ten (10) receivers in the Kings Plains catchment, four (4) receivers in the Walkom Road catchment and one receiver in the Sturgeon Hill catchment would experience Marginal impacts as per VLAMP definitions; and hence, it is recommended that the appropriate mitigation rights be made available to these receivers.

The road traffic noise assessment shows that there will be a temporary noticeable increase in road traffic noise during the overlap of construction and operations during PY1, although the calculated noise level would be within the relevant road RNP criteria.

Airblast overpressure and vibration levels are predicted to meet the relevant ANZECC criteria at all assessed receivers for blasts up to 300kg MIC.

# Appendix A – Glossary of Terms

A number of technical terms have been used in this report and are explained in **Table A1**.

**Table A1 Glossary of Terms**

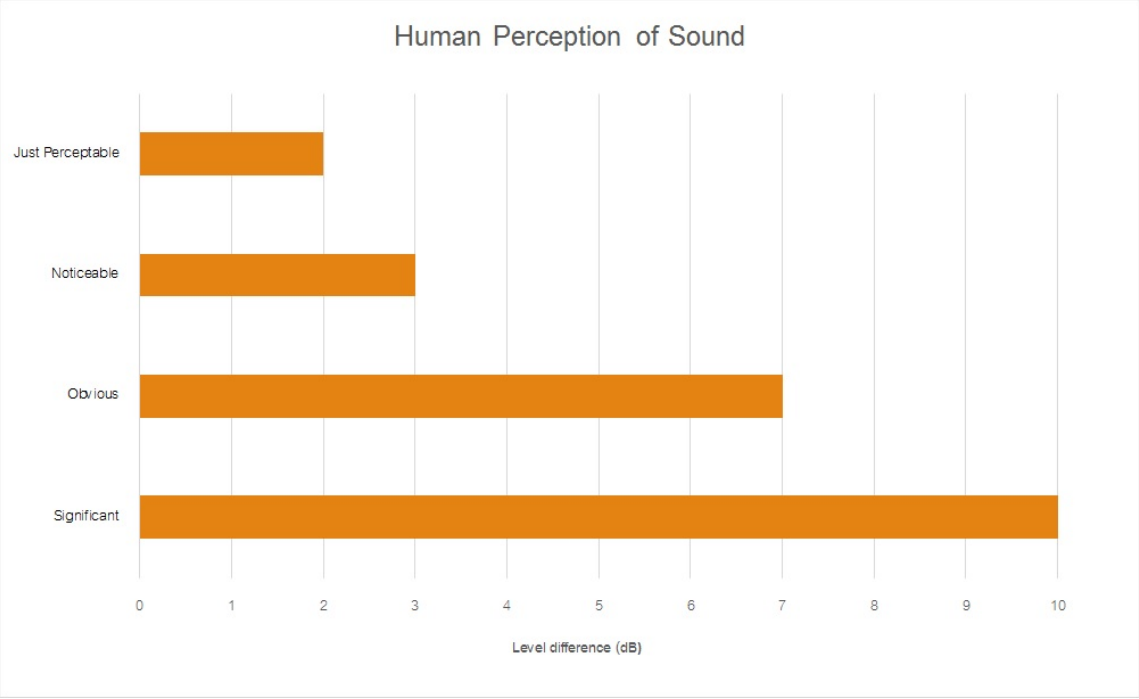
| Term | Description |
|---|---|
| 1/3 Octave | Single octave bands divided into three parts |
| Octave | A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit. |
| ABL | Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels. |
| Ambient Noise | The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant. |
| A Weighting | A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise. |
| dBA | Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear. |
| dB(Z), dB(L) | Decibels Linear or decibels Z-weighted. |
| Hertz (Hz) | The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz. |
| LA10 | A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels. |
| LA90 | Commonly referred to as the background noise, this is the level exceeded 90 % of the time. |
| LAeq | The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period. |
| LAmax | The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval. |
| RBL | The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's. |
| Sound power level (LW) | This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by :<br>= 10.log10 (W/Wo)<br>Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts. |

**Table A2** provides a list of common noise sources and their typical sound level.

**Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA**

| Source | Typical Sound Level |
|---|---|
| Threshold of pain | 140 |
| Jet engine | 130 |
| Hydraulic hammer | 120 |
| Chainsaw | 110 |
| Industrial workshop | 100 |
| Lawn-mower (operator position) | 90 |
| Heavy traffic (footpath) | 80 |
| Elevated speech | 70 |
| Typical conversation | 60 |
| Ambient suburban environment | 40 |
| Ambient rural environment | 30 |
| Bedroom (night with windows closed) | 20 |
| Threshold of hearing | 0 |

**Figure A1** – Human Perception of Sound



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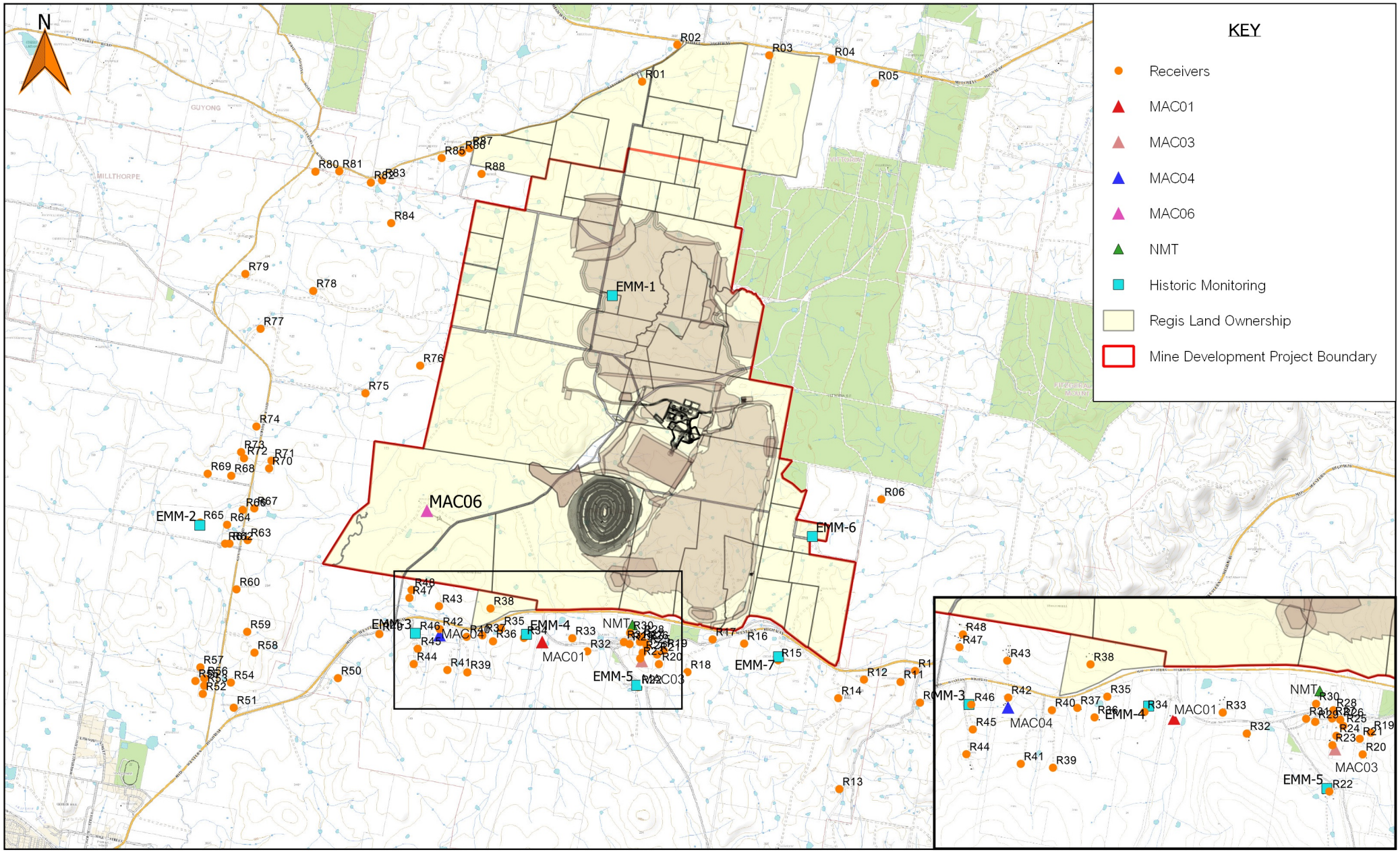
# Appendix B – Noise Monitoring Charts



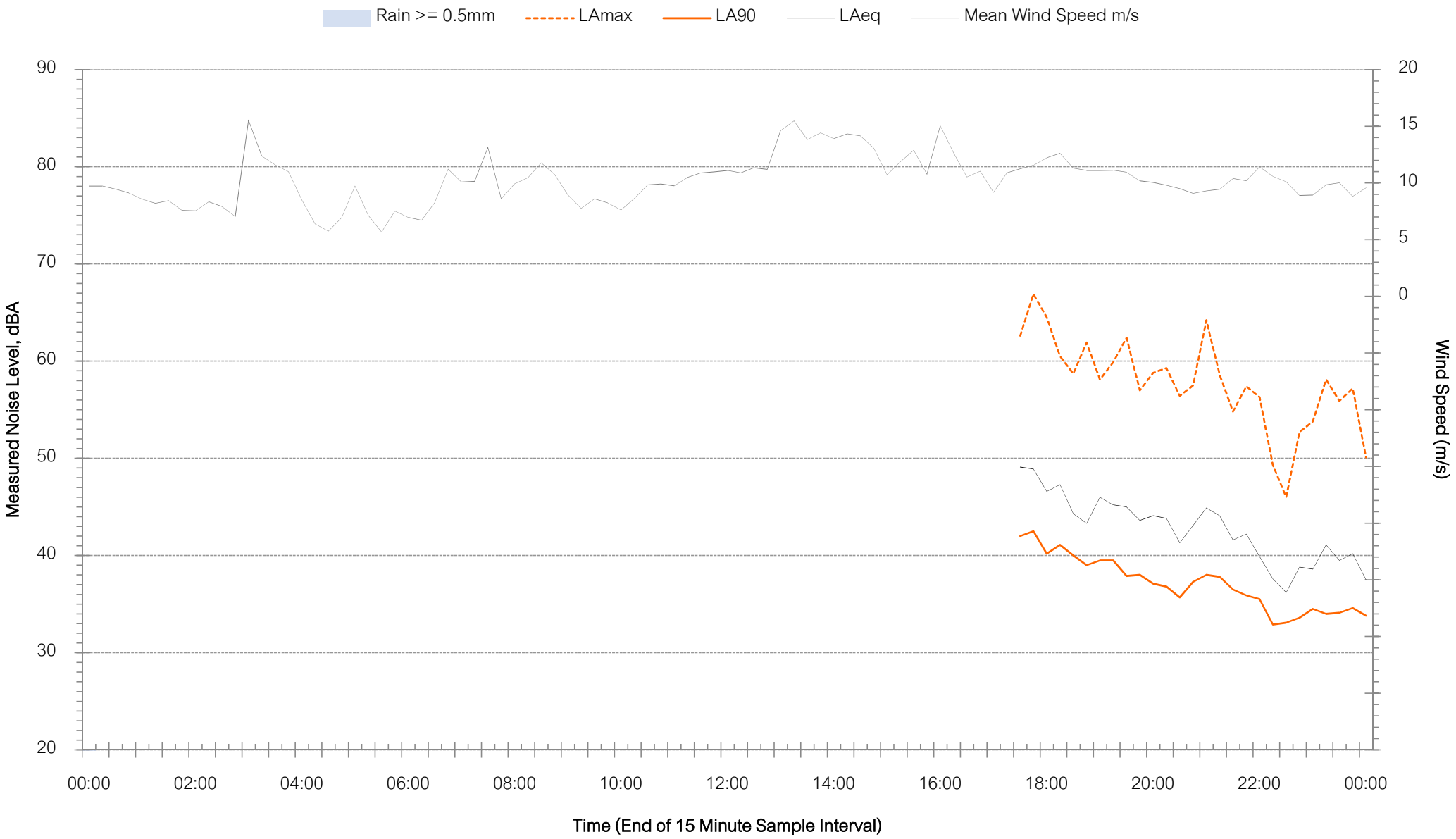

Muller Acoustic Consulting

**Figure B1**
**Background Monitoring Locations**

REF: MAC170434

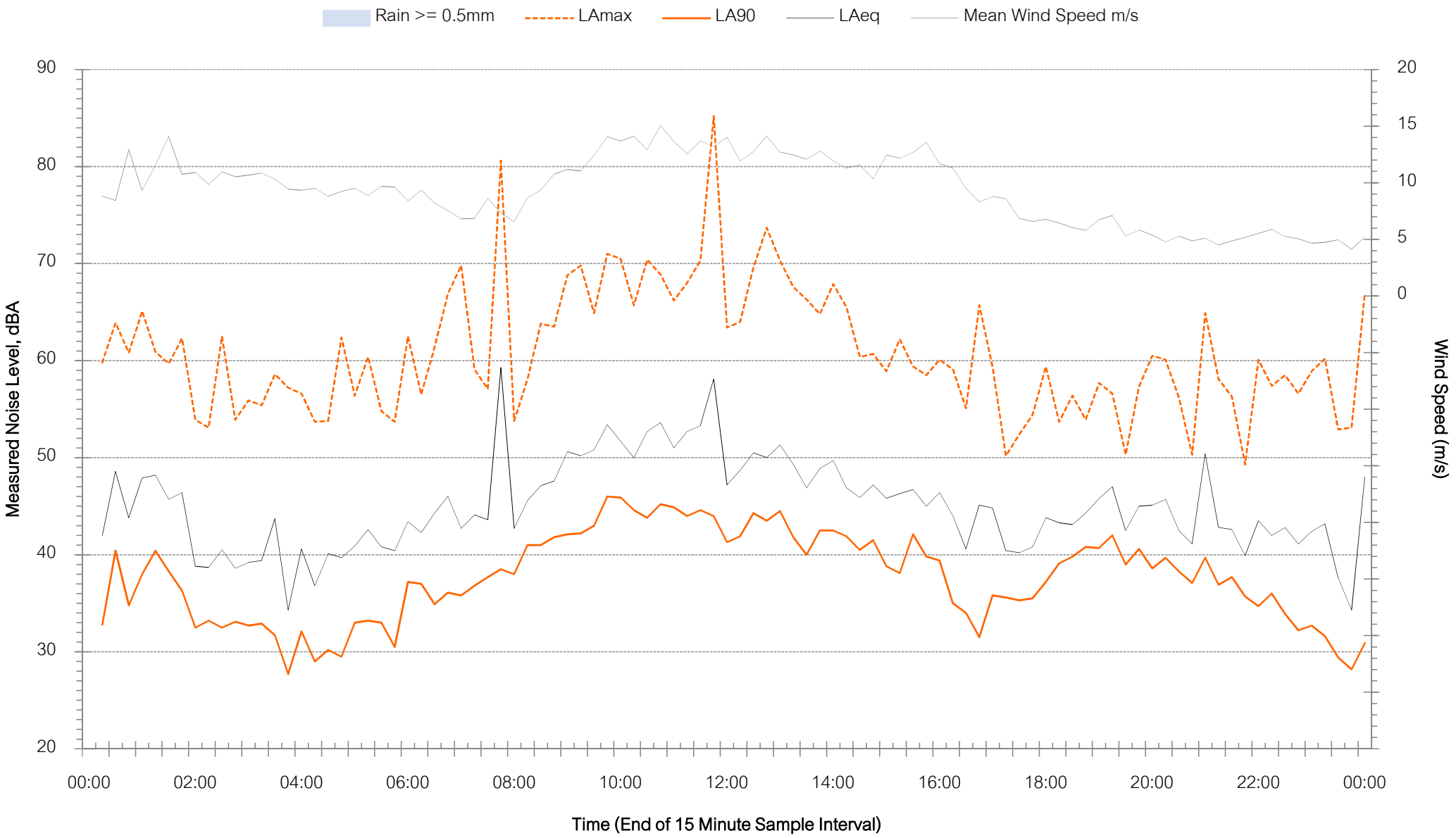
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Monday 6 August 2018



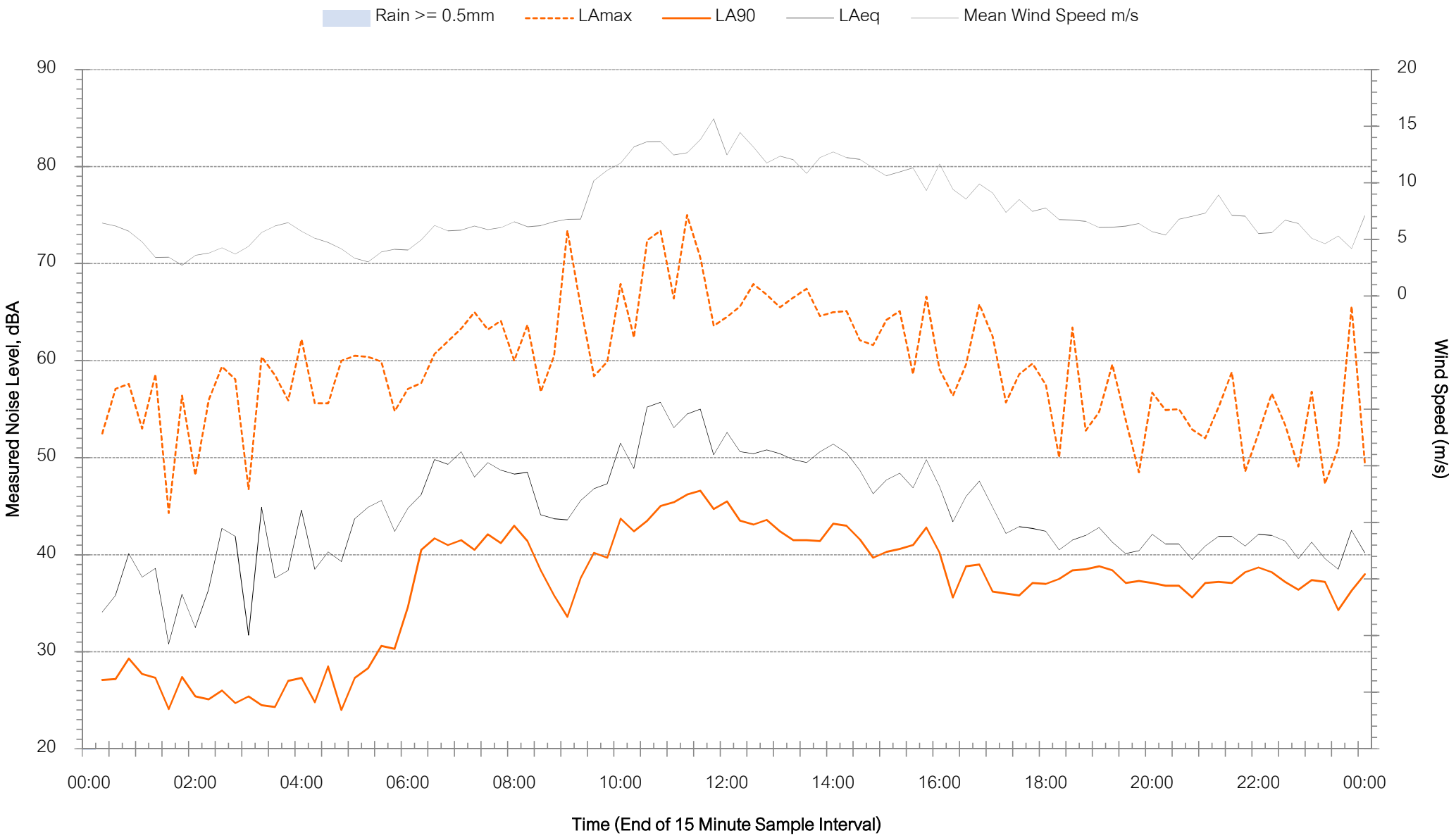
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Tuesday 7 August 2018



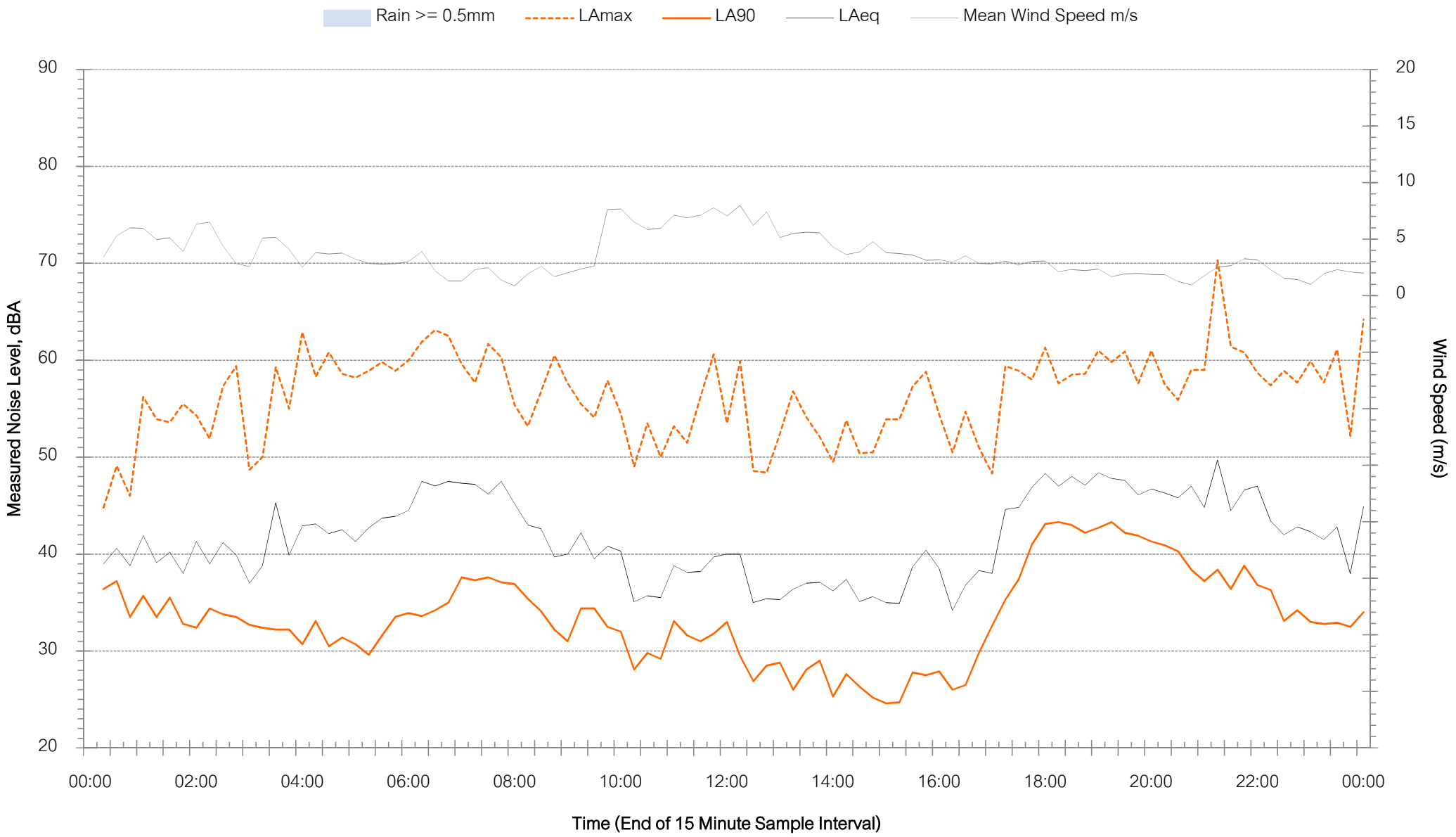
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Wednesday 8 August 2018



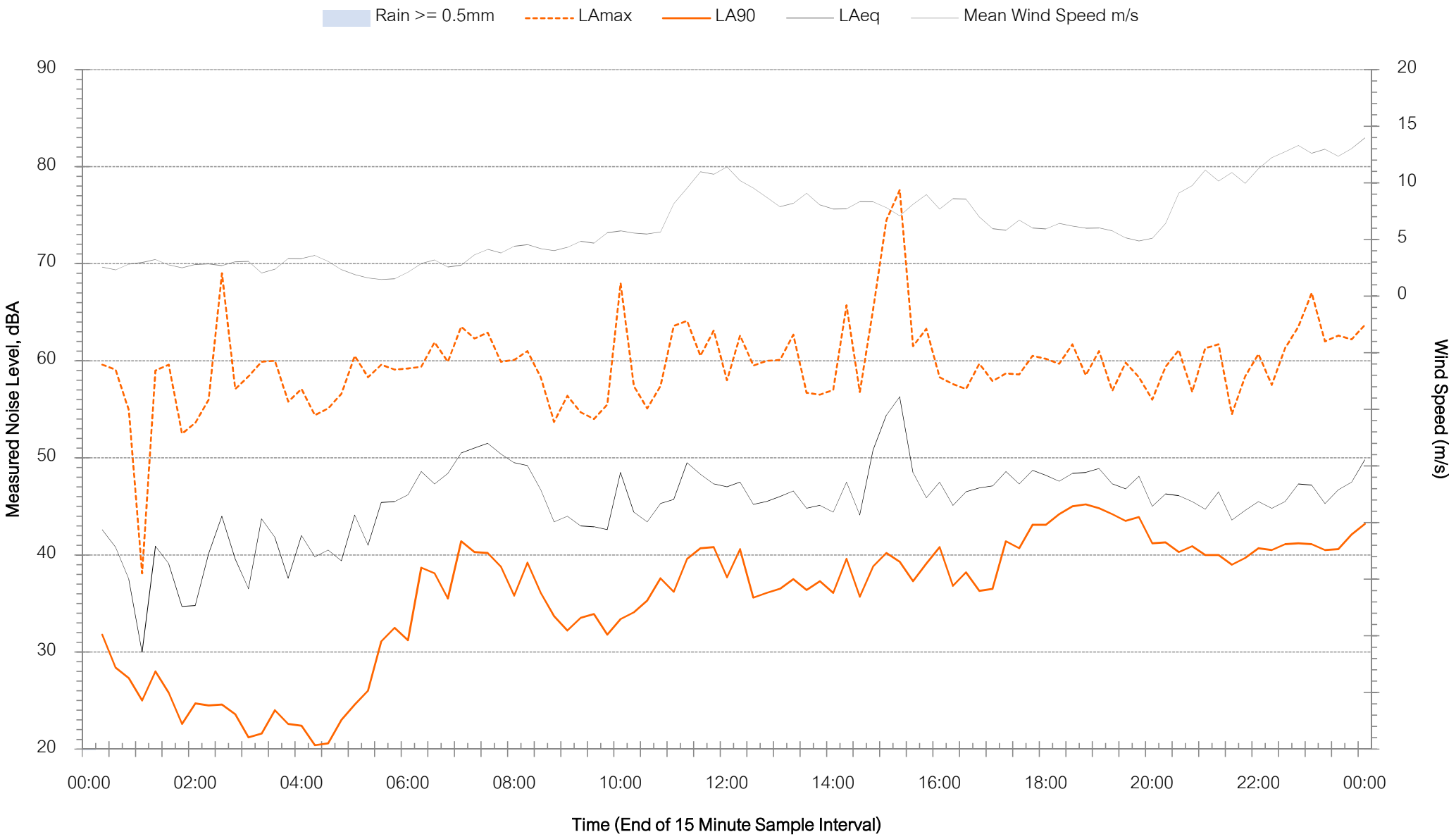
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Thursday 9 August 2018



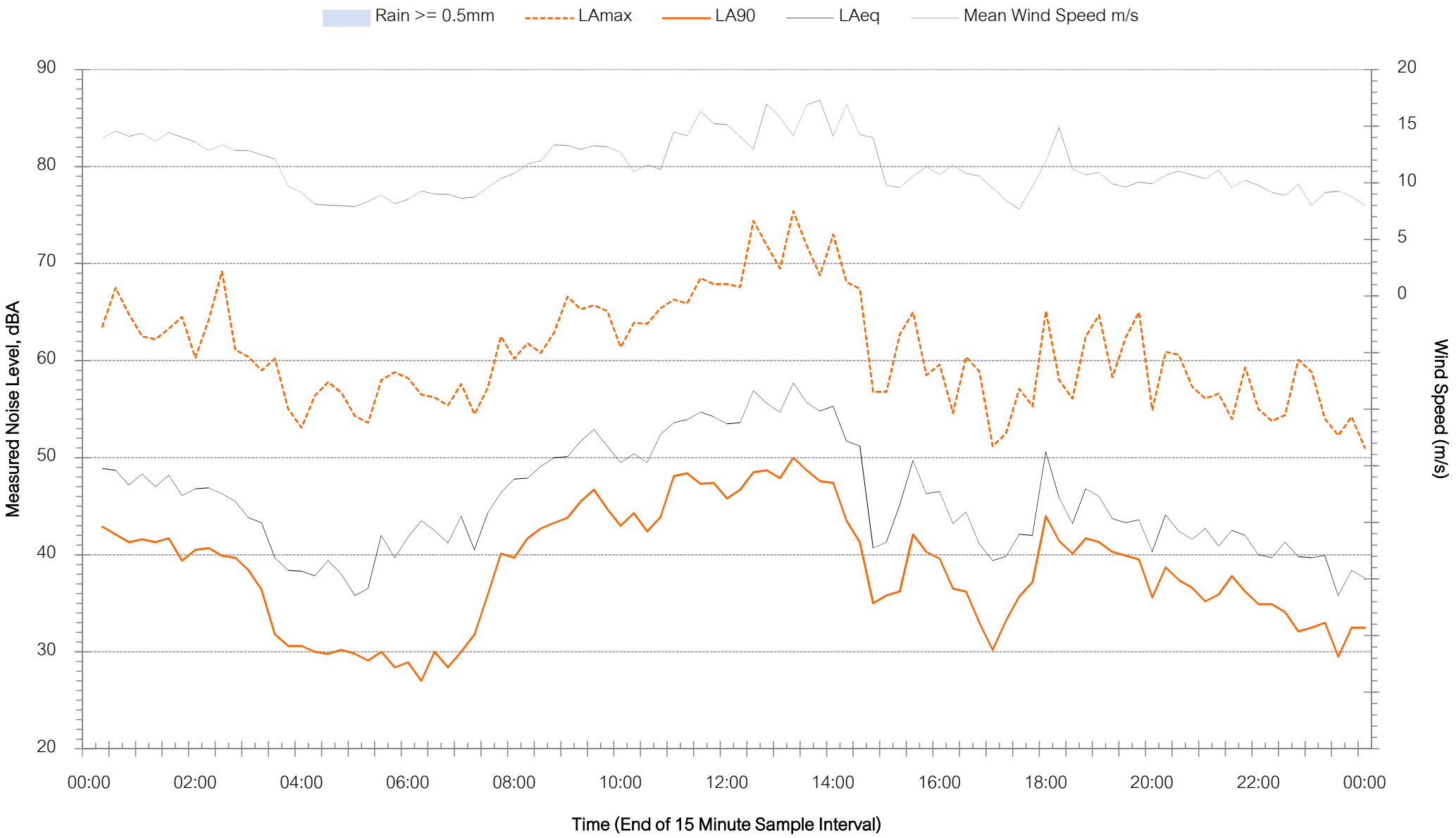
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Friday 10 August 2018



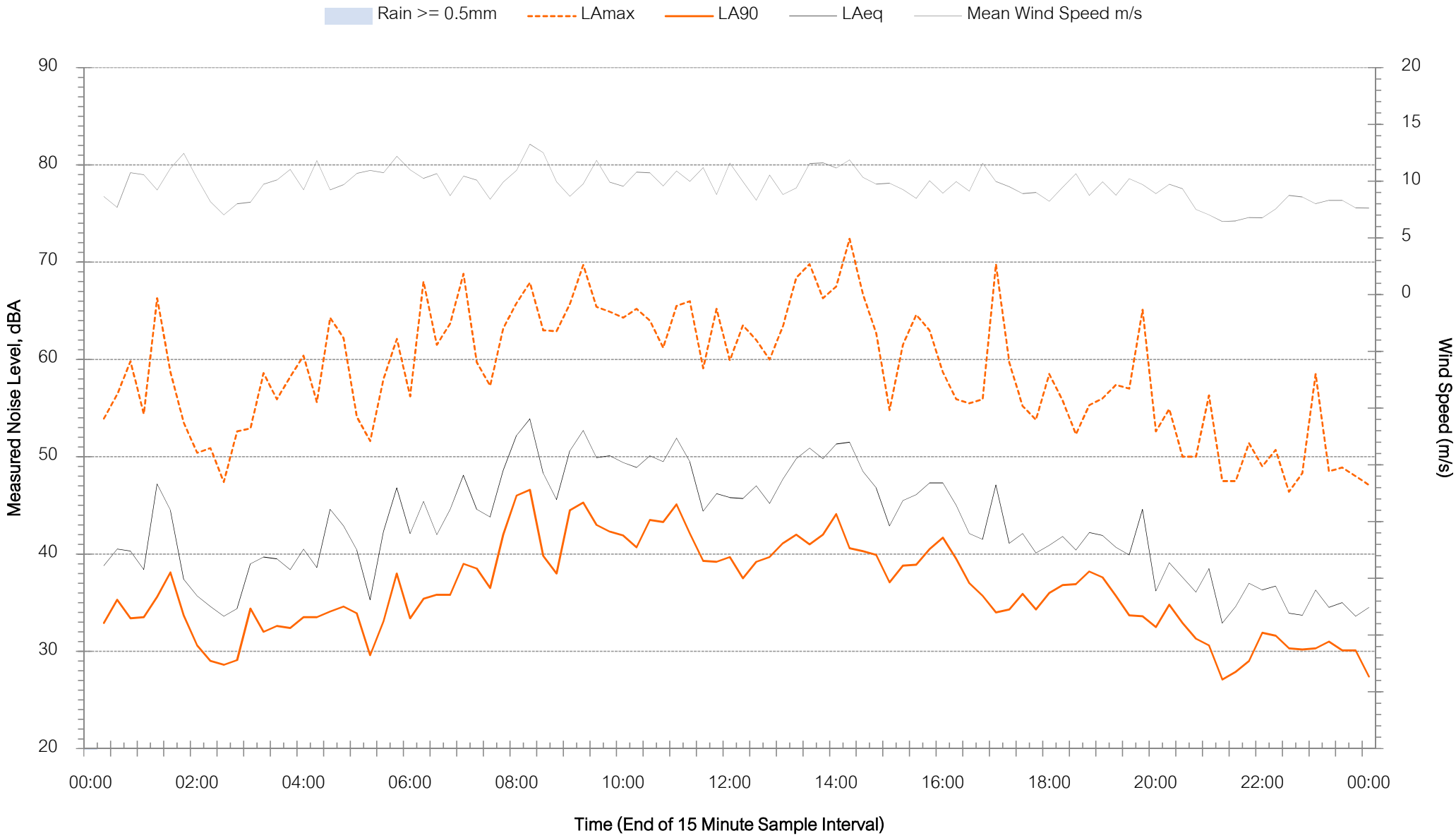
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Saturday 11 August 2018



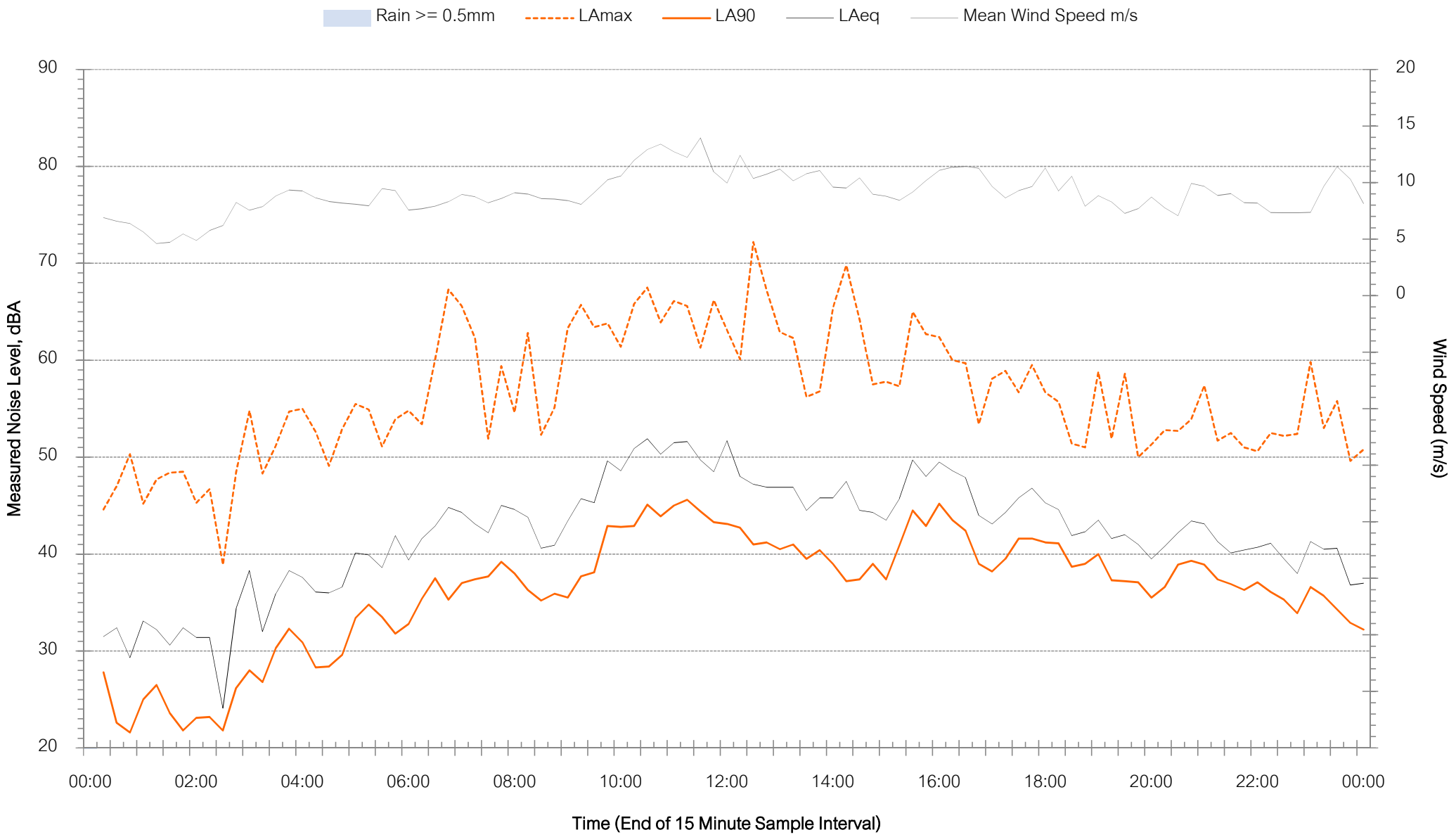
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Sunday 12 August 2018



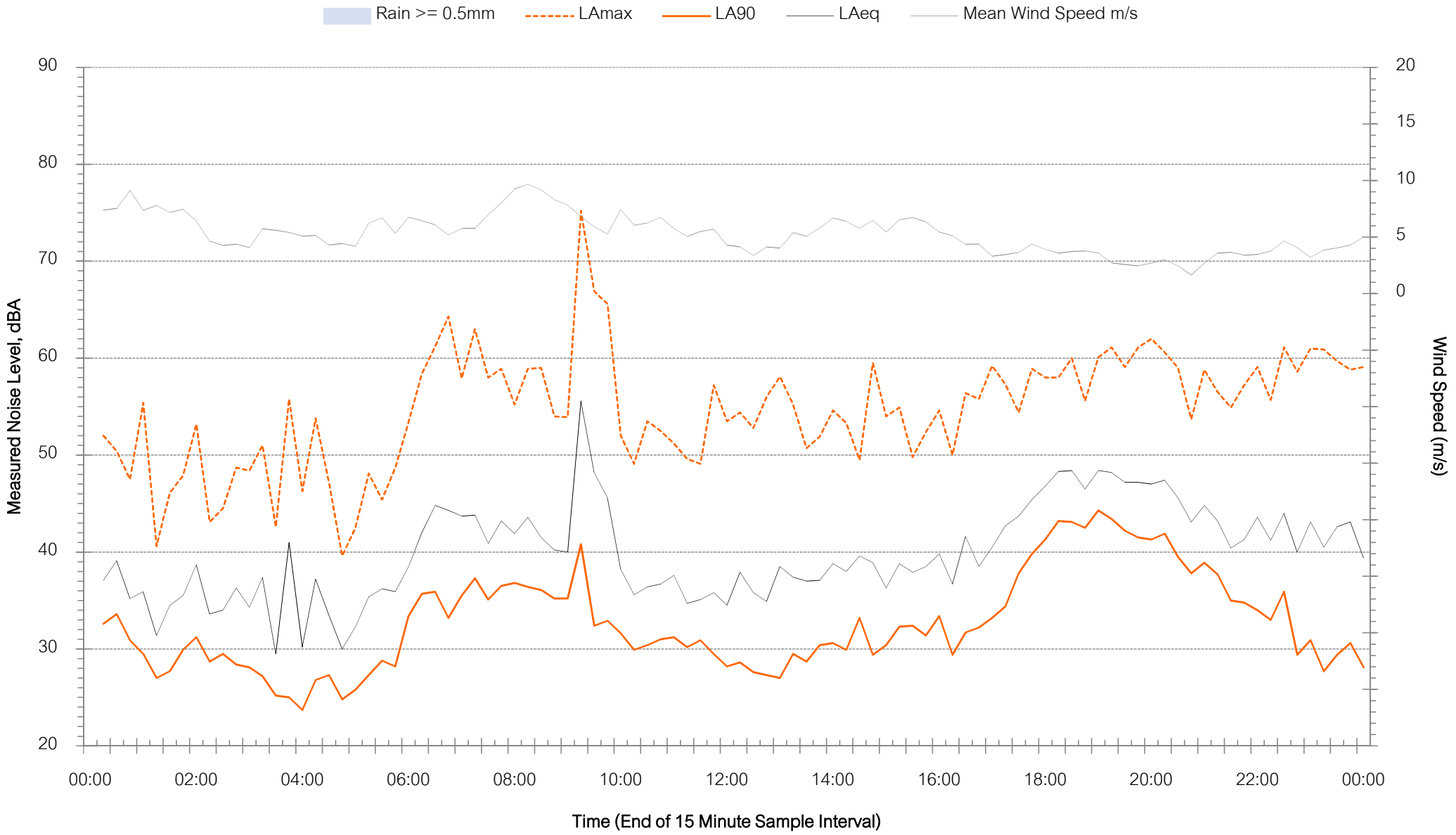
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Monday 13 August 2018



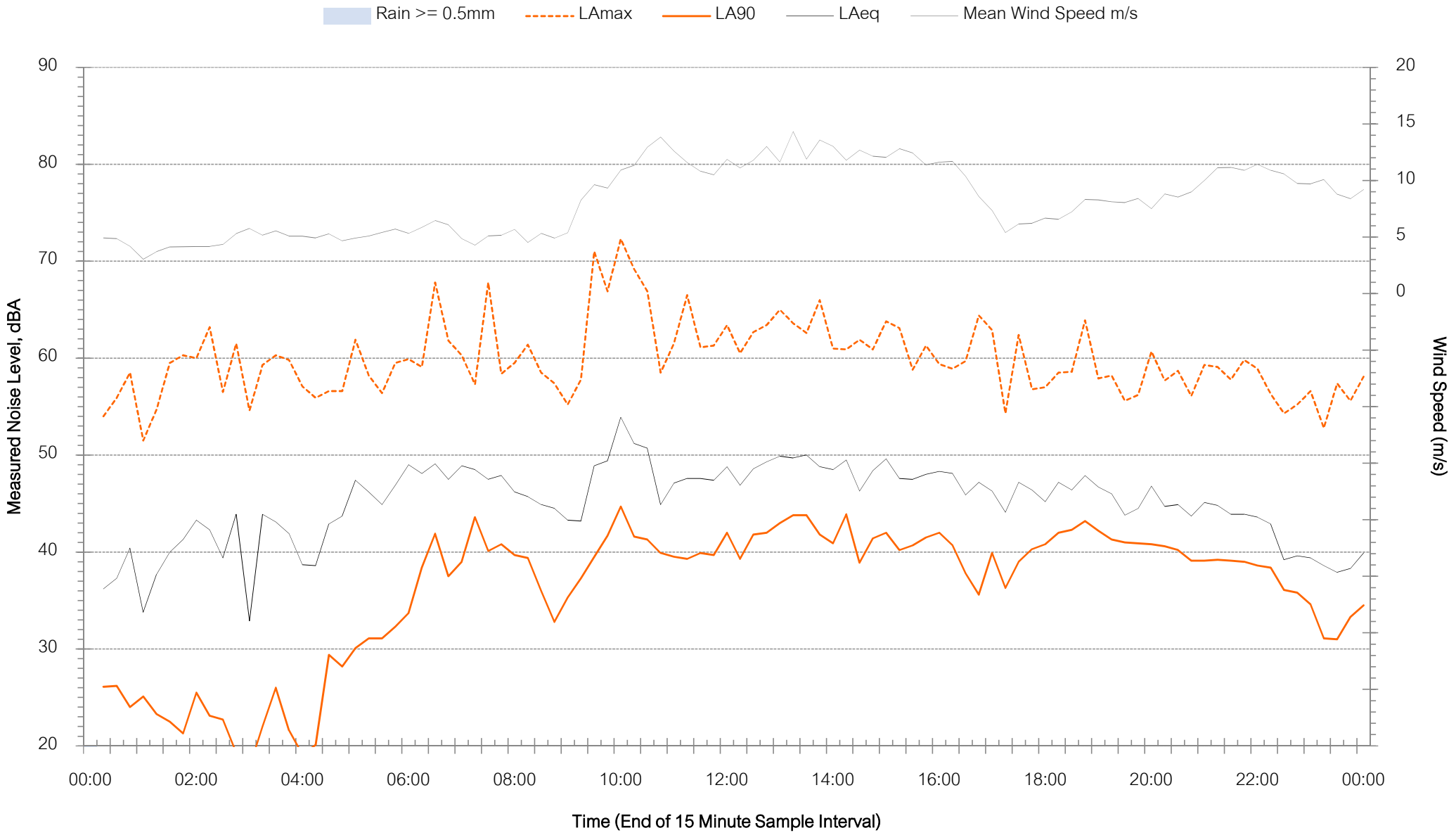
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Tuesday 14 August 2018



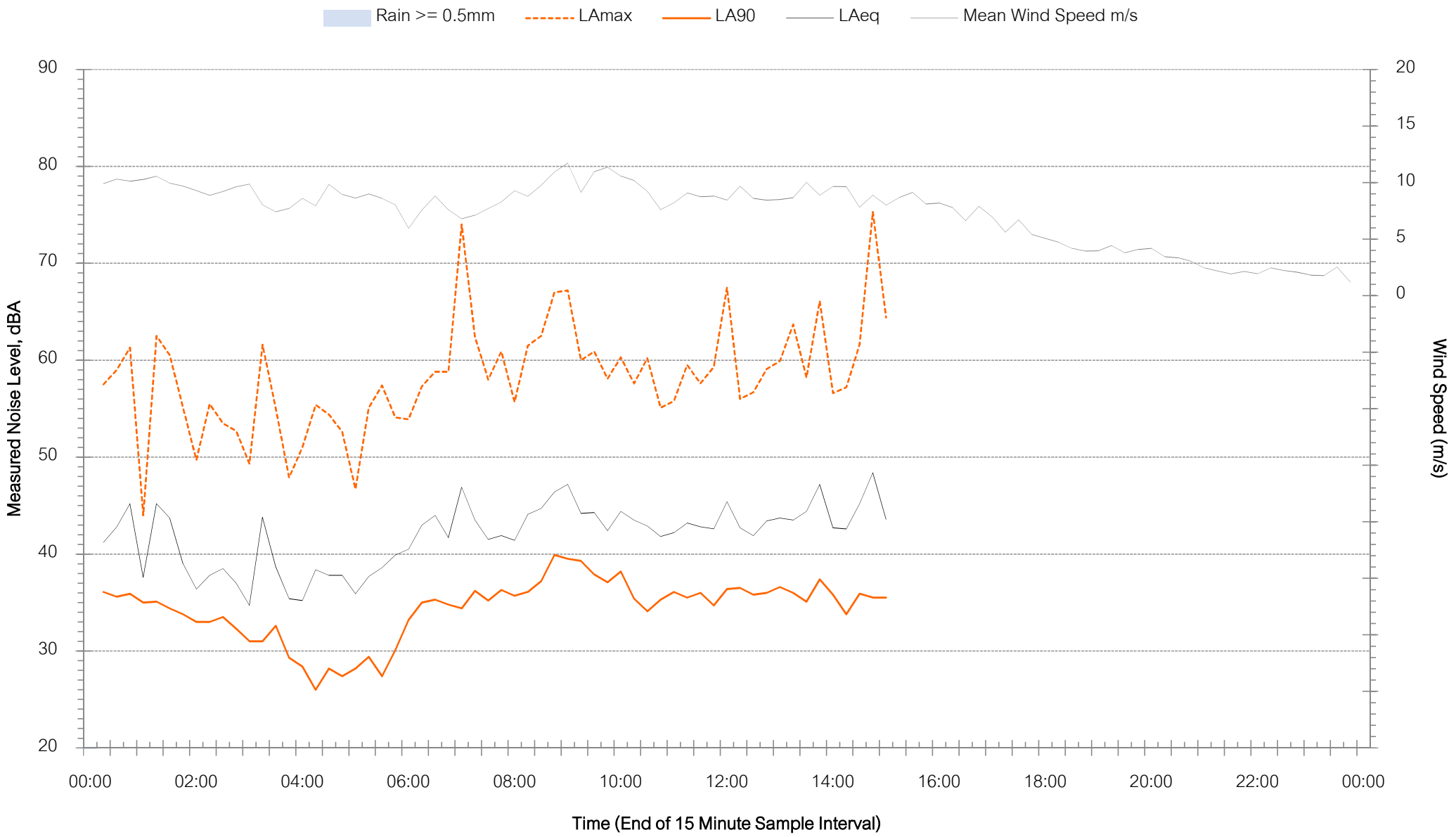
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Wednesday 15 August 2018



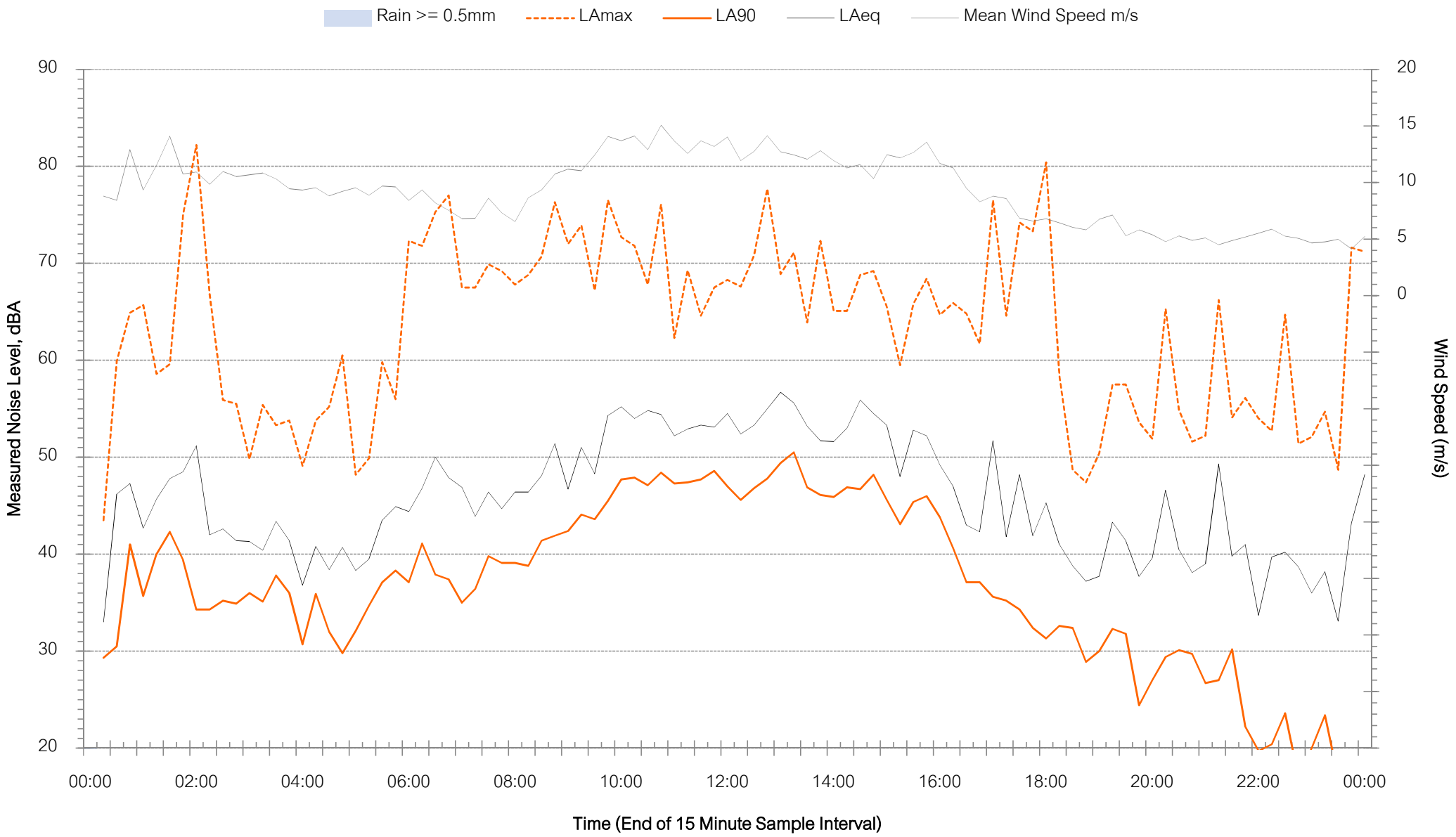
# Background Noise Levels

## MAC01 Walkom Road, Kings Plains - Thursday 16 August 2018



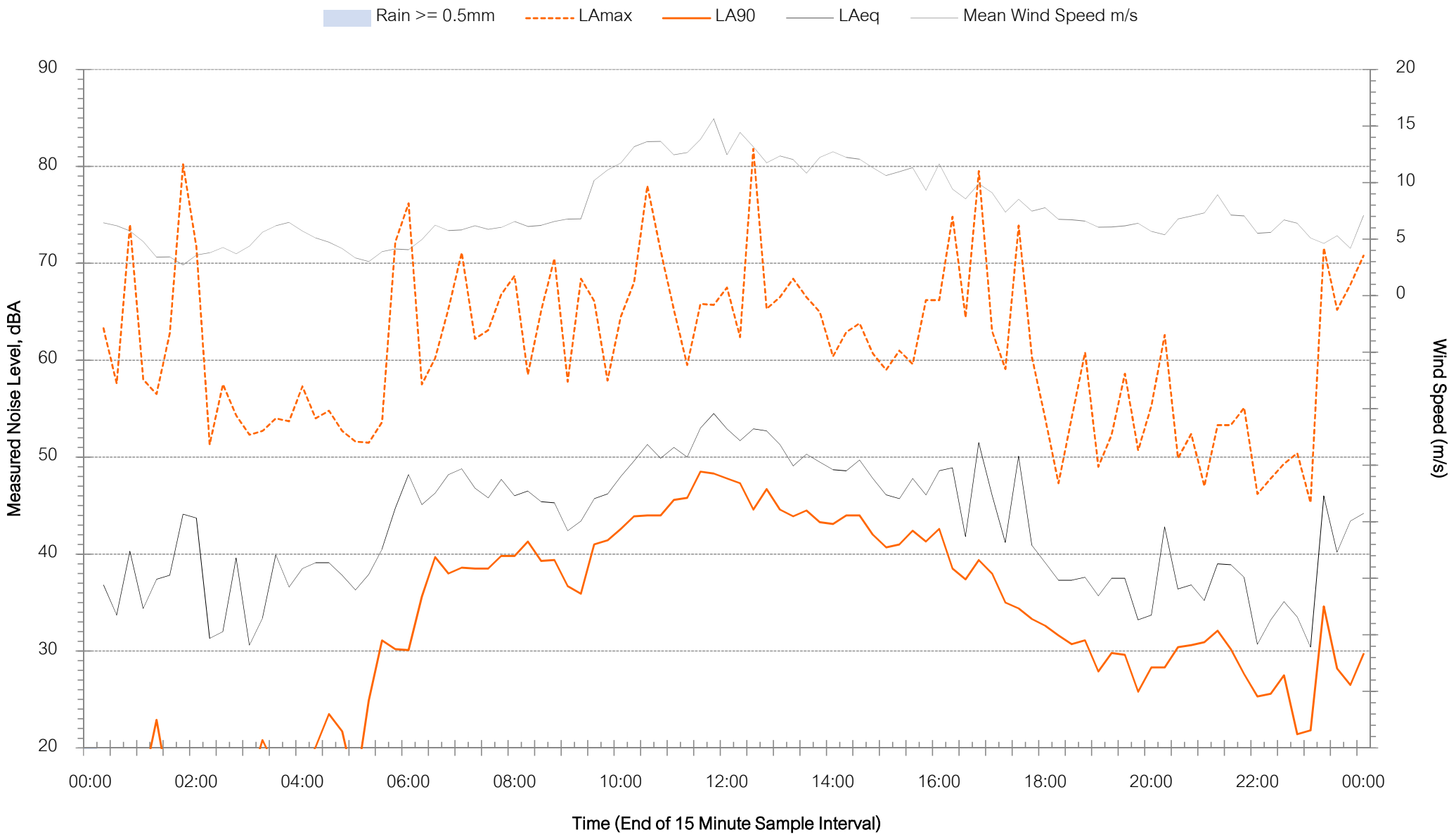
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Tuesday 7 August 2018



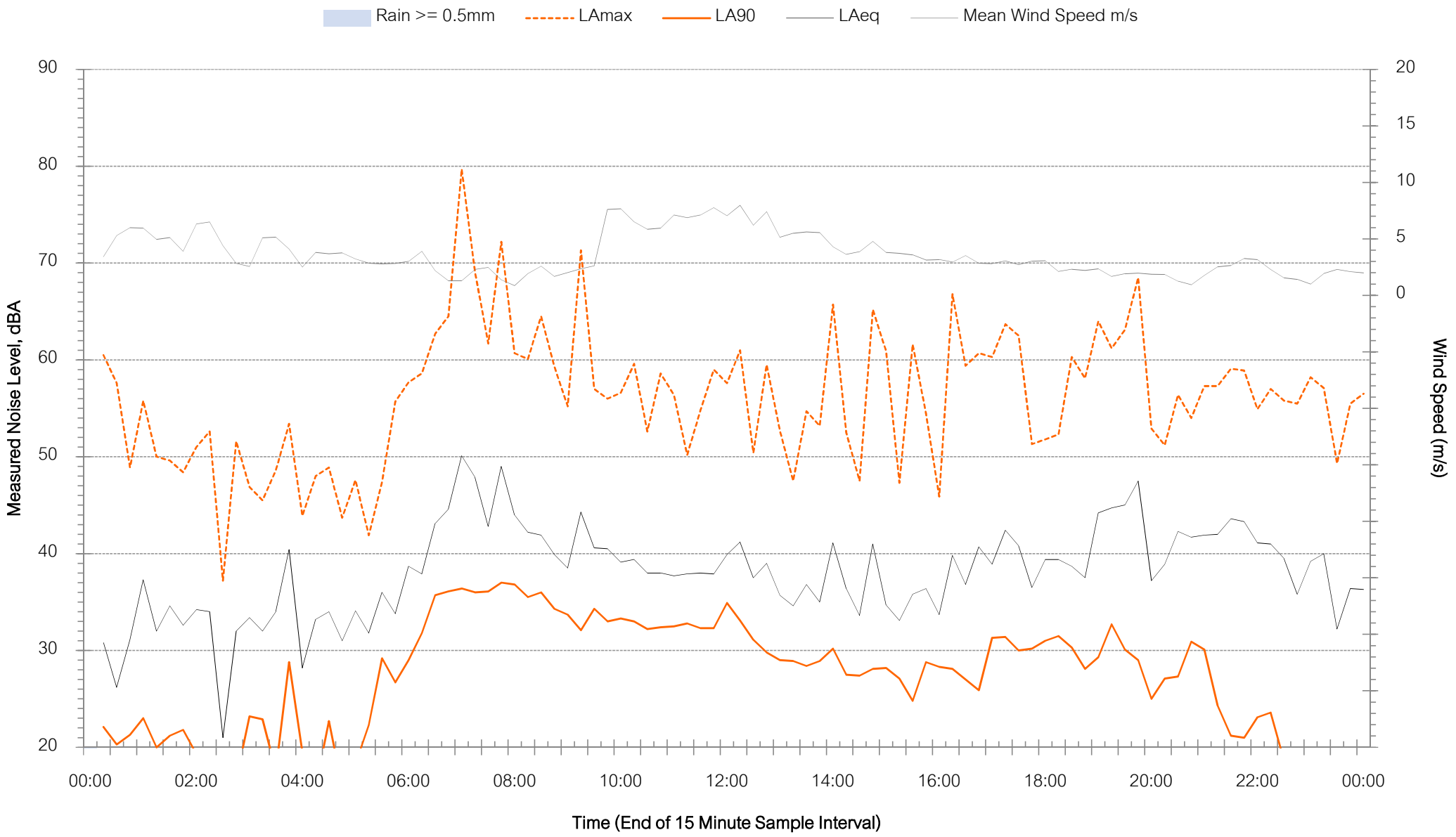
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Wednesday 8 August 2018



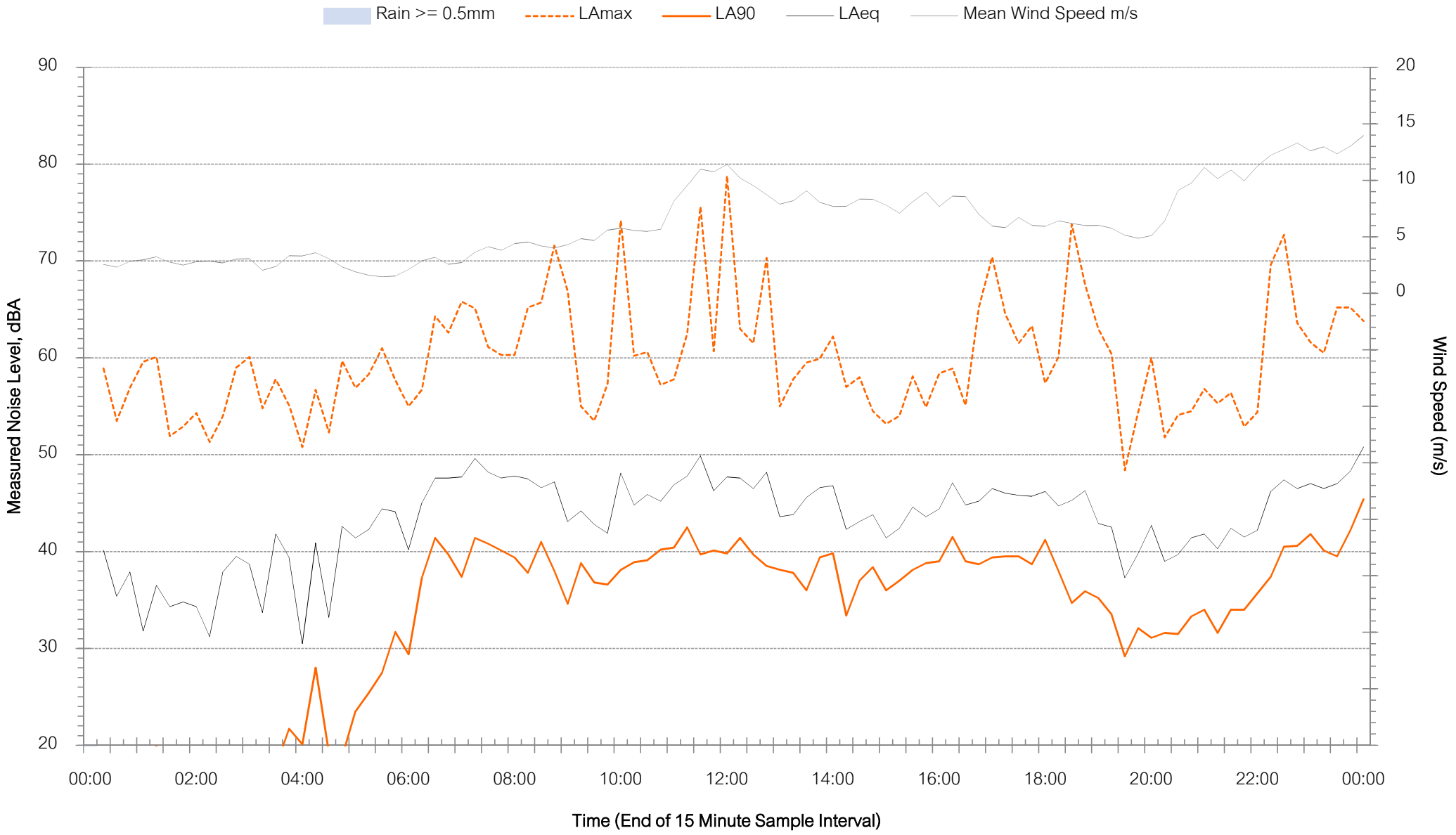
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Thursday 9 August 2018



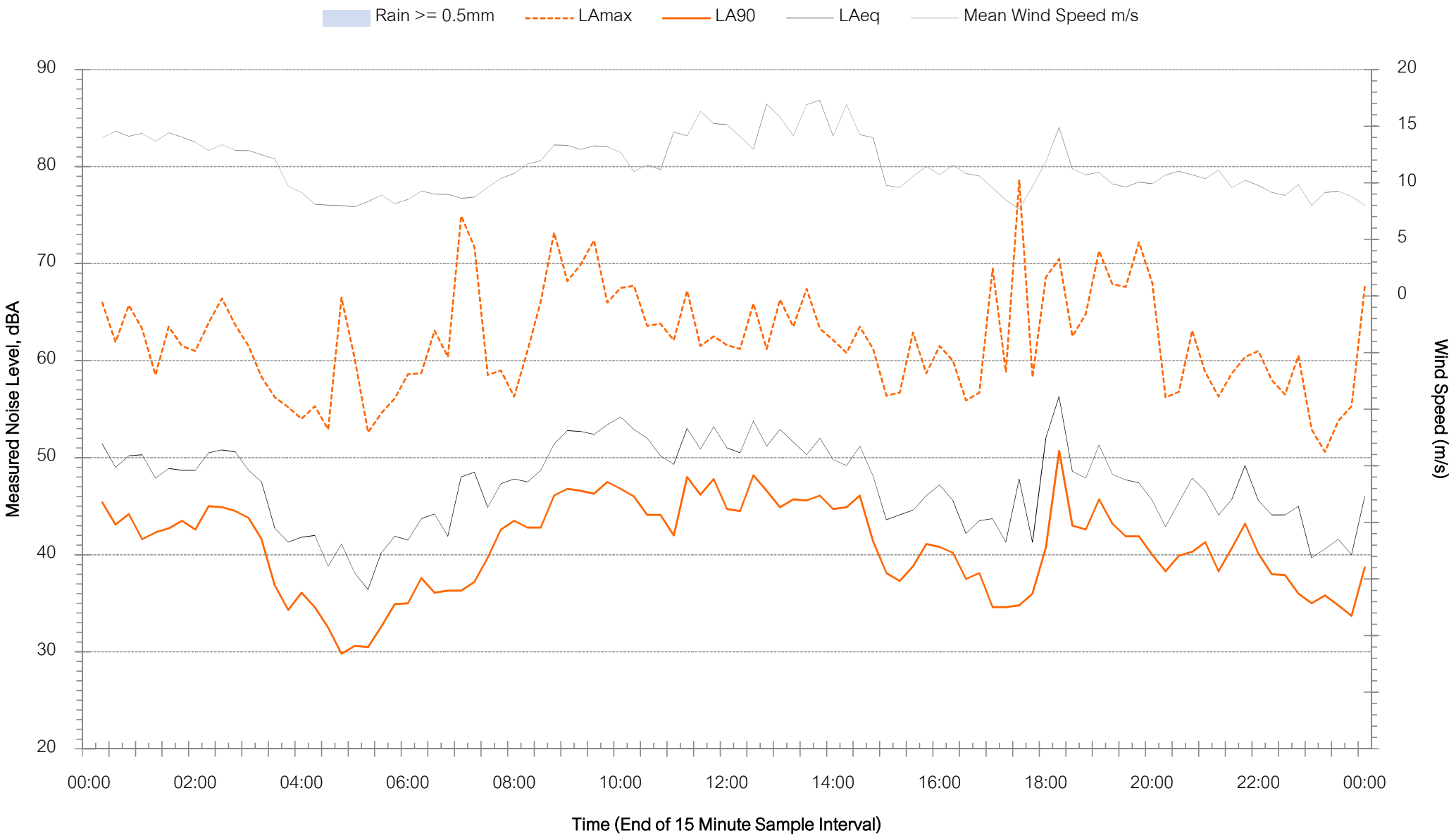
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Friday 10 August 2018



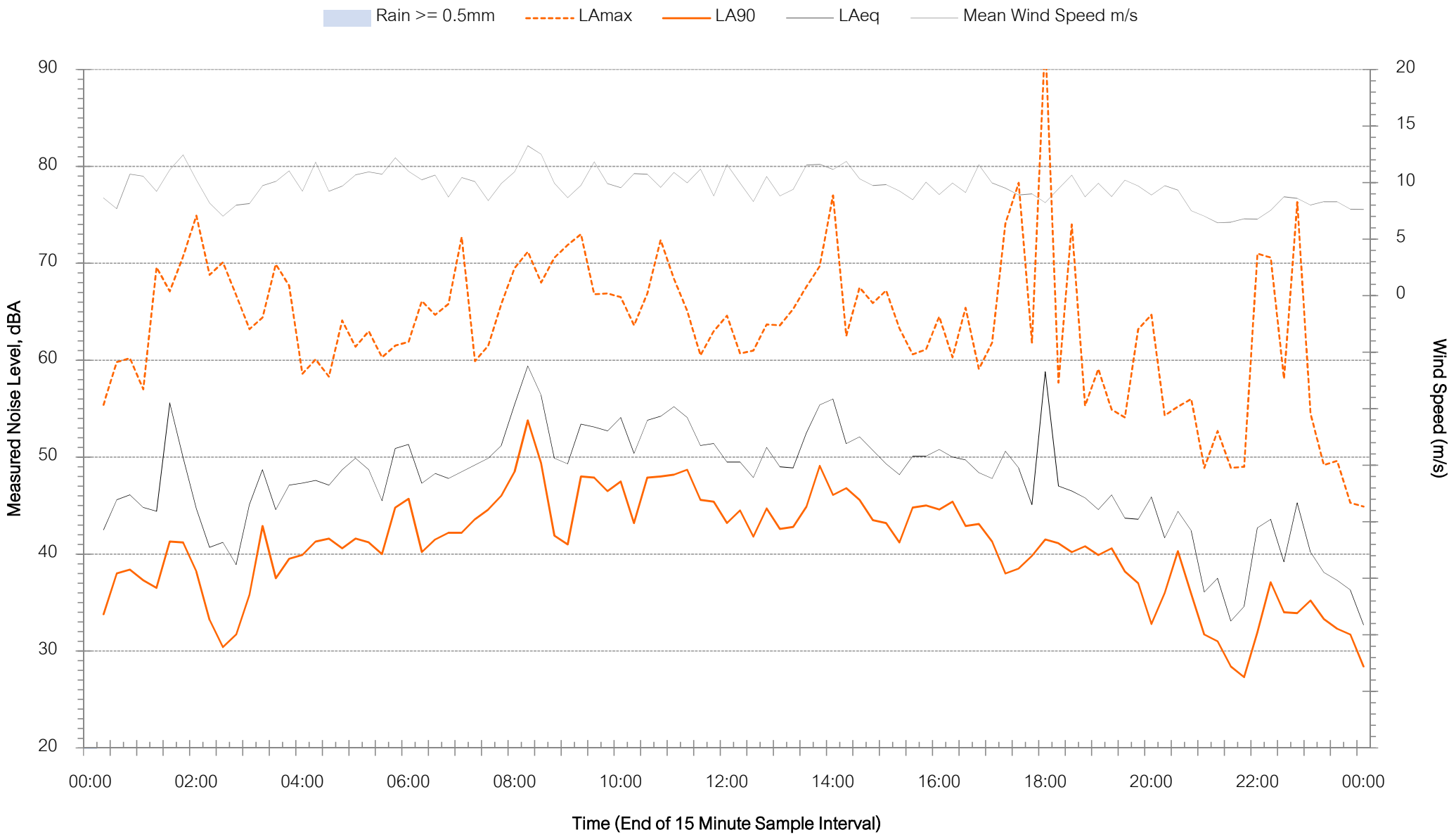
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Saturday 11 August 2018



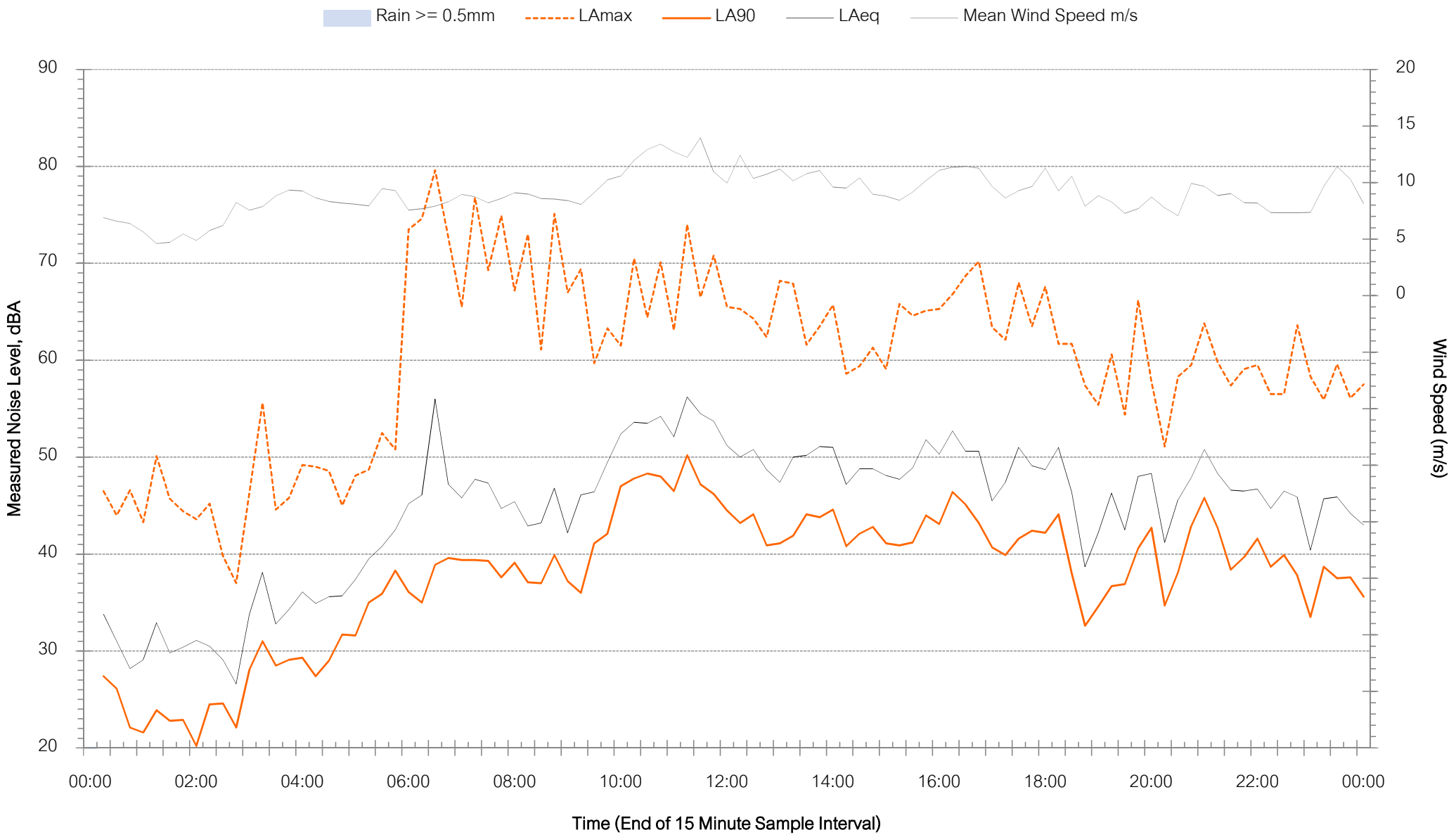
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Sunday 12 August 2018



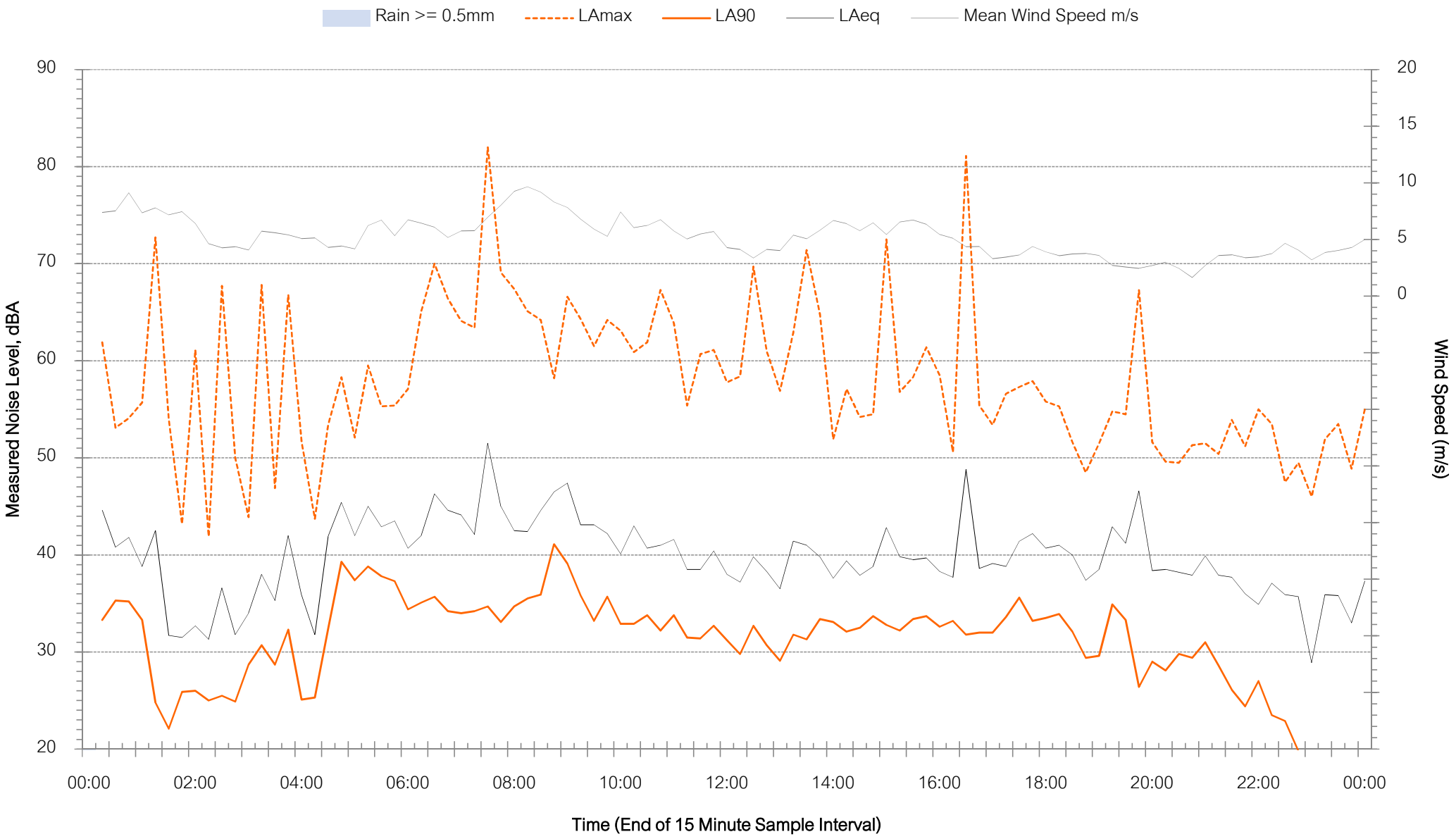
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Monday 13 August 2018



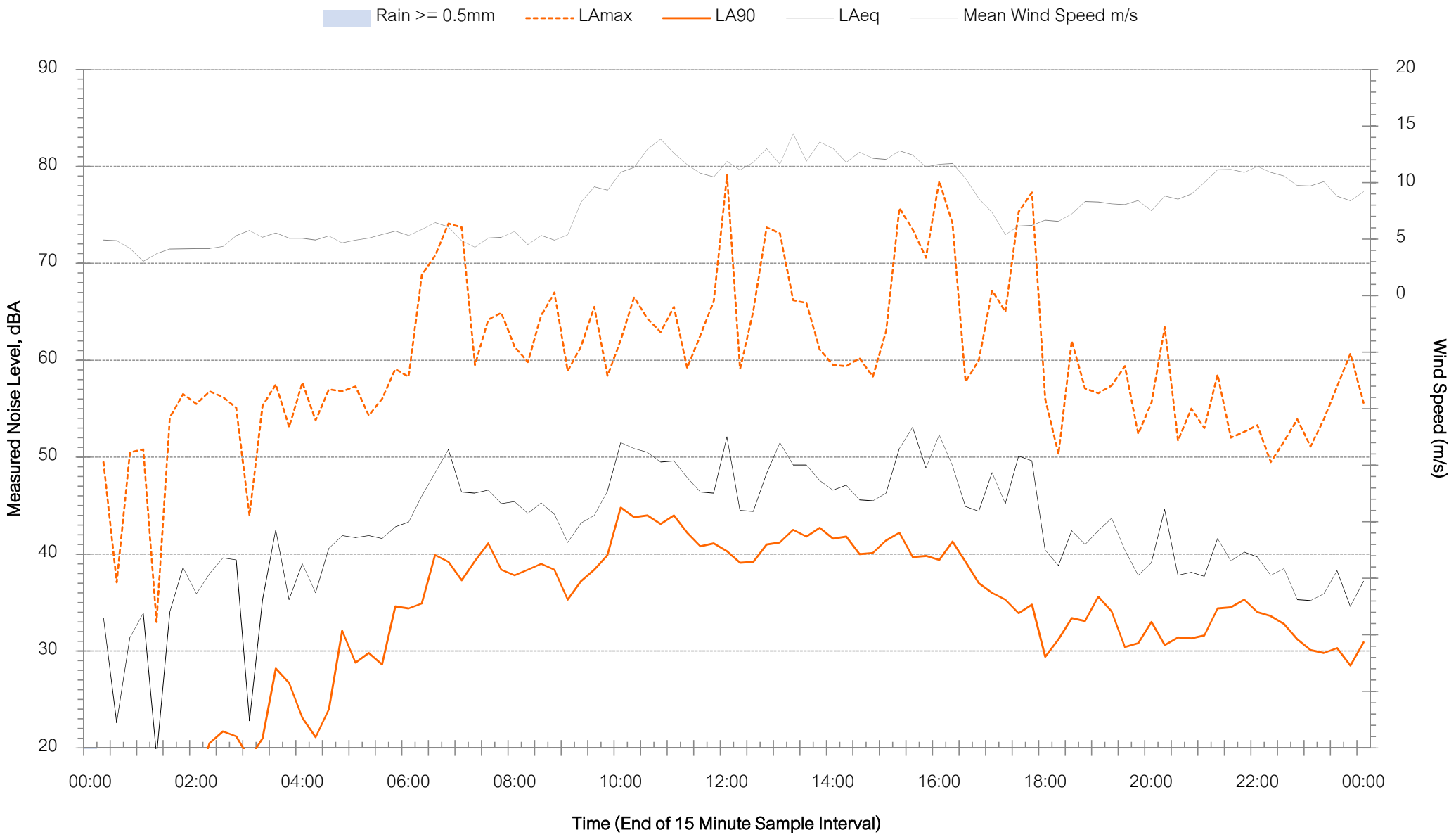
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Tuesday 14 August 2018



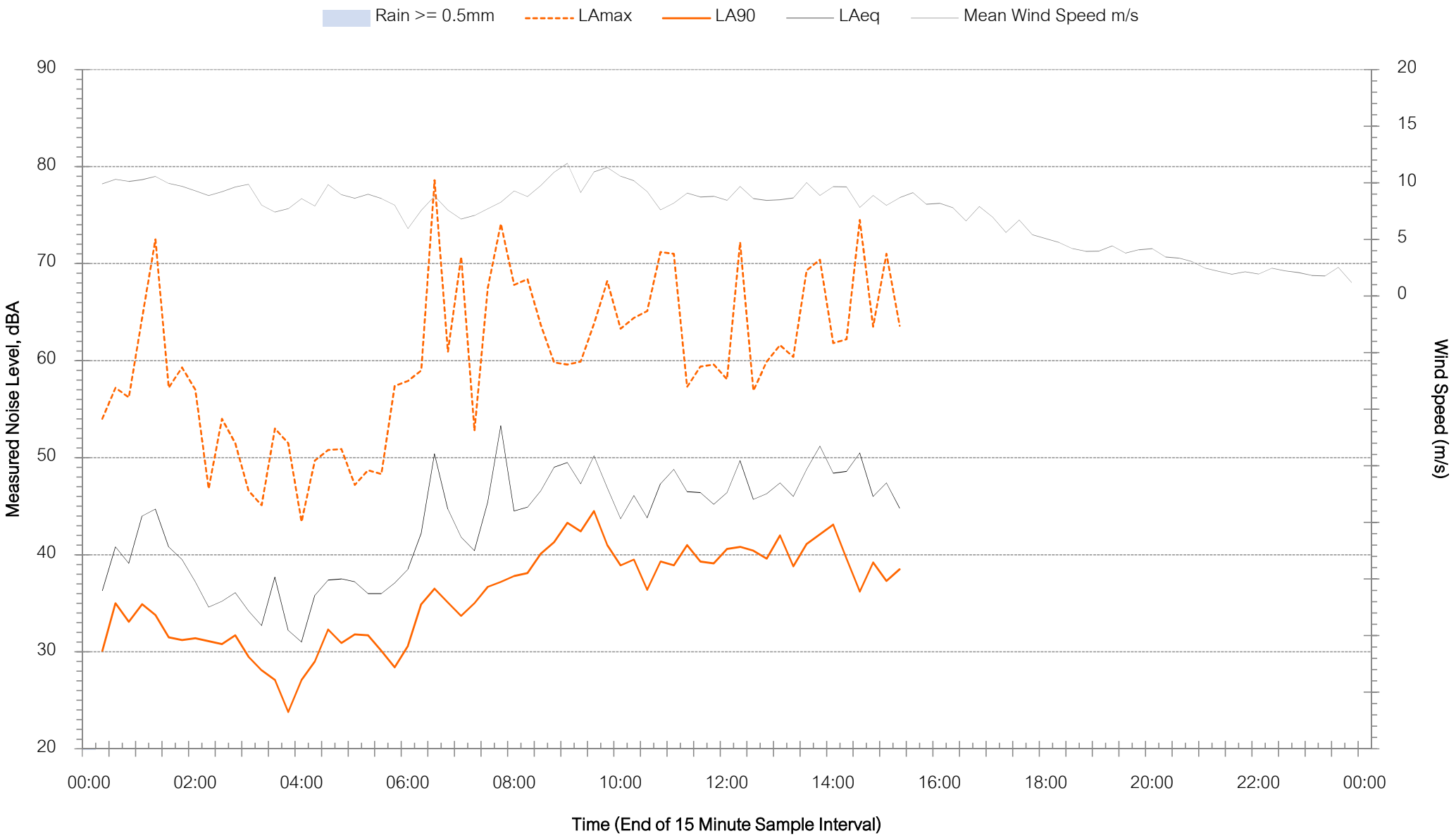
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Wednesday 15 August 2018



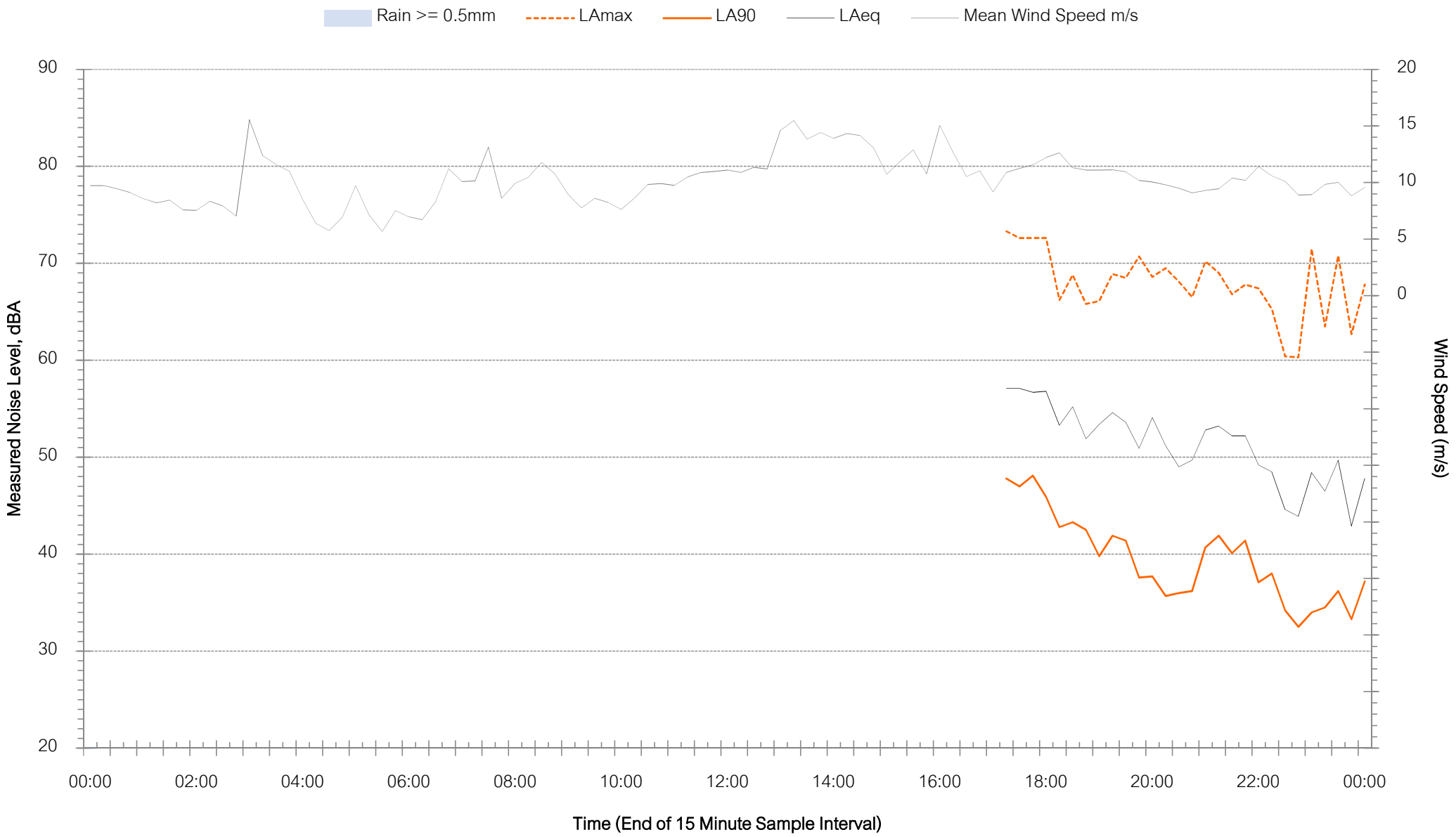
# Background Noise Levels

## MAC03 Walkom Road, Kings Plains - Thursday 16 August 2018



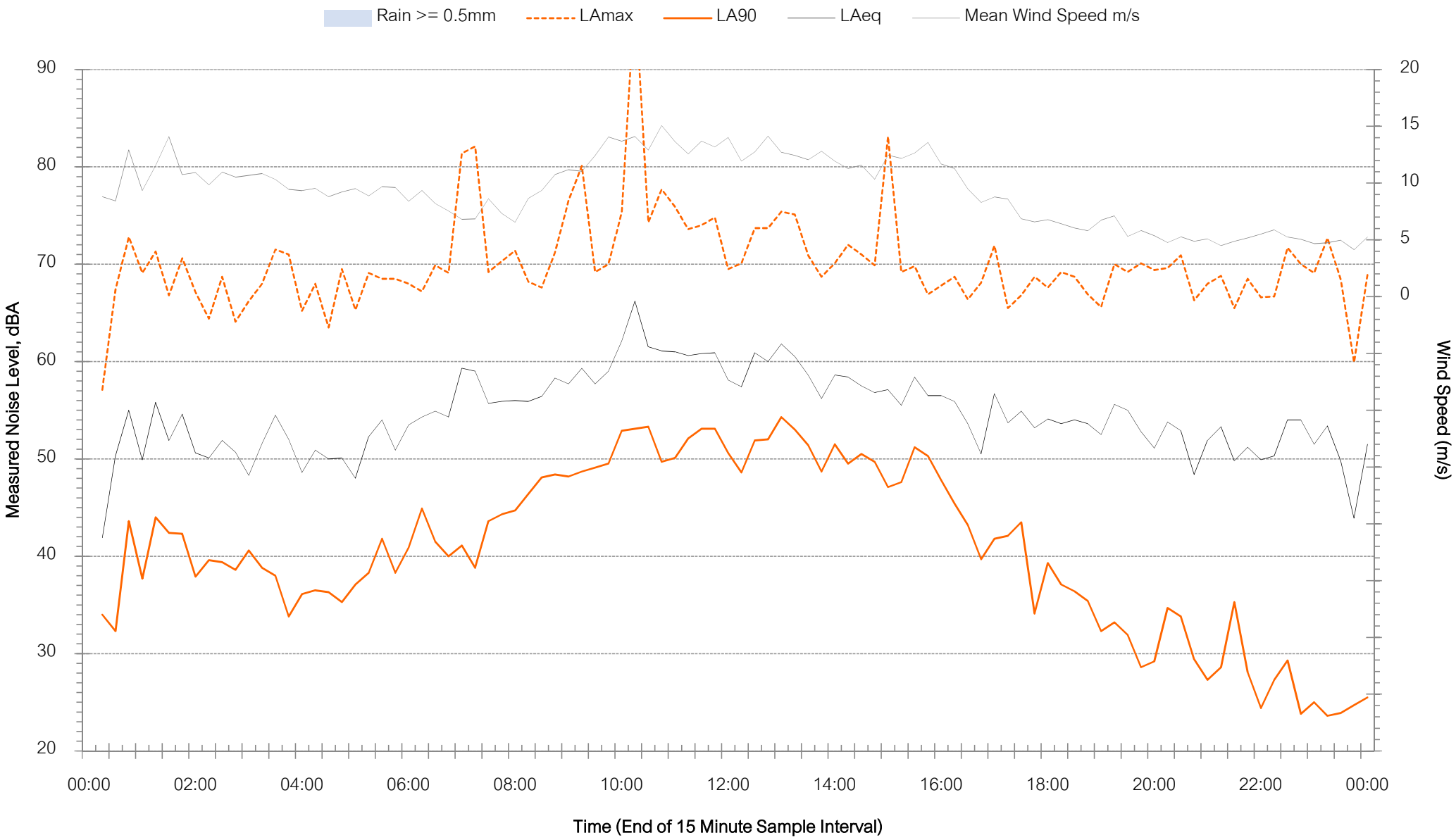
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Monday 6 August 2018



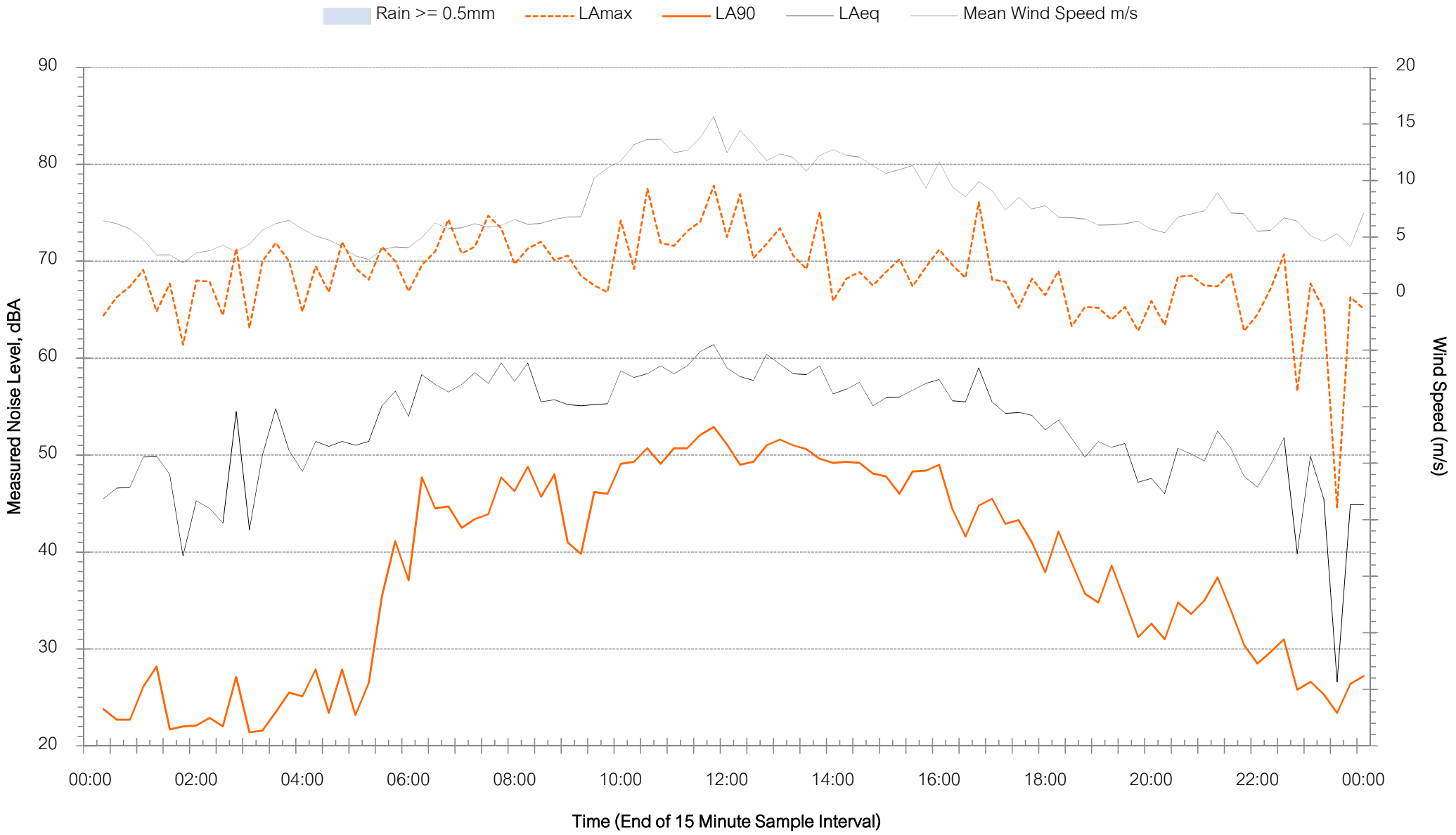
Background Noise Levels

MAC04 Mid Western Highway, Kings Plains - Tuesday 7 August 2018



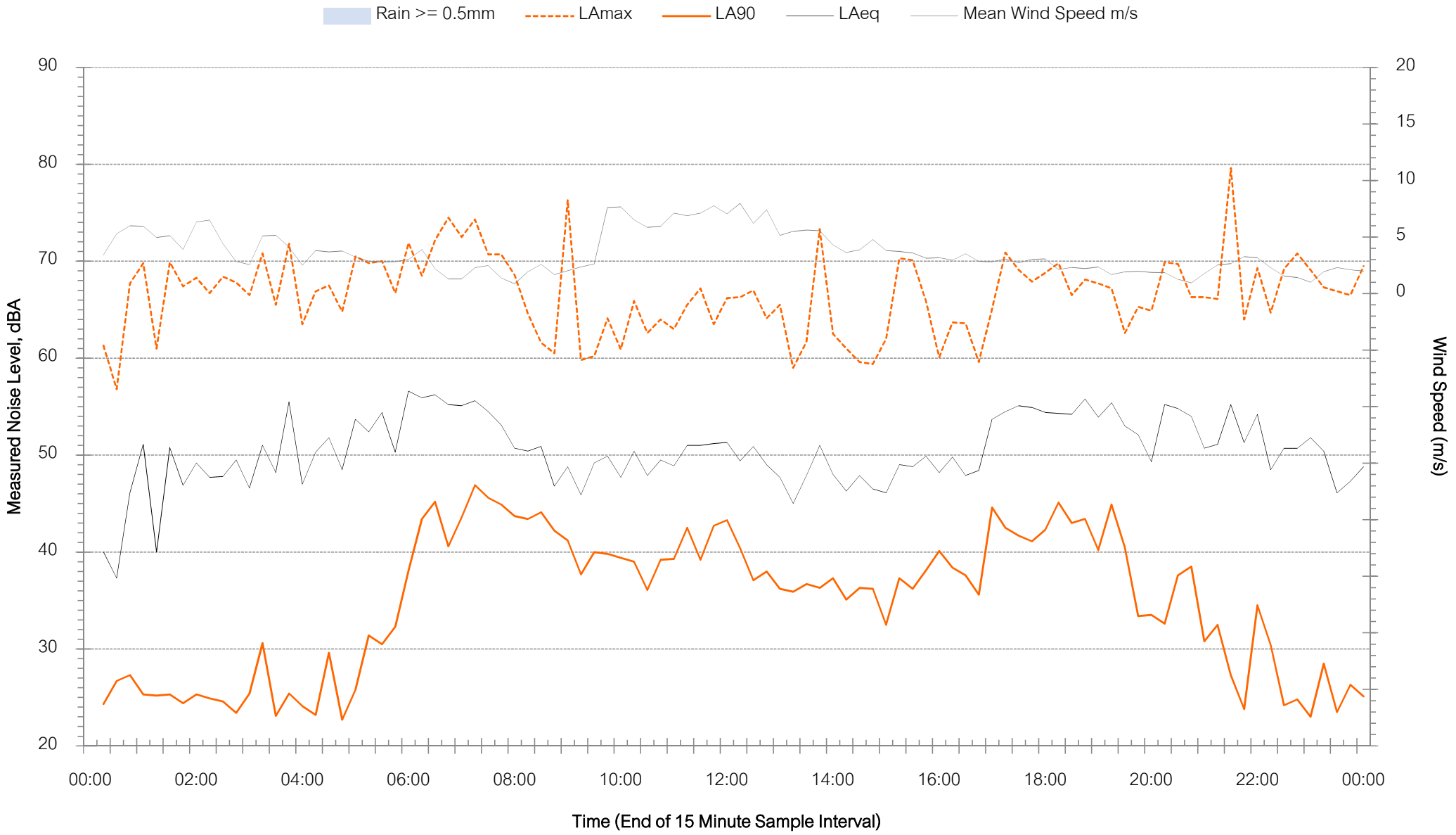
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Wednesday 8 August 2018



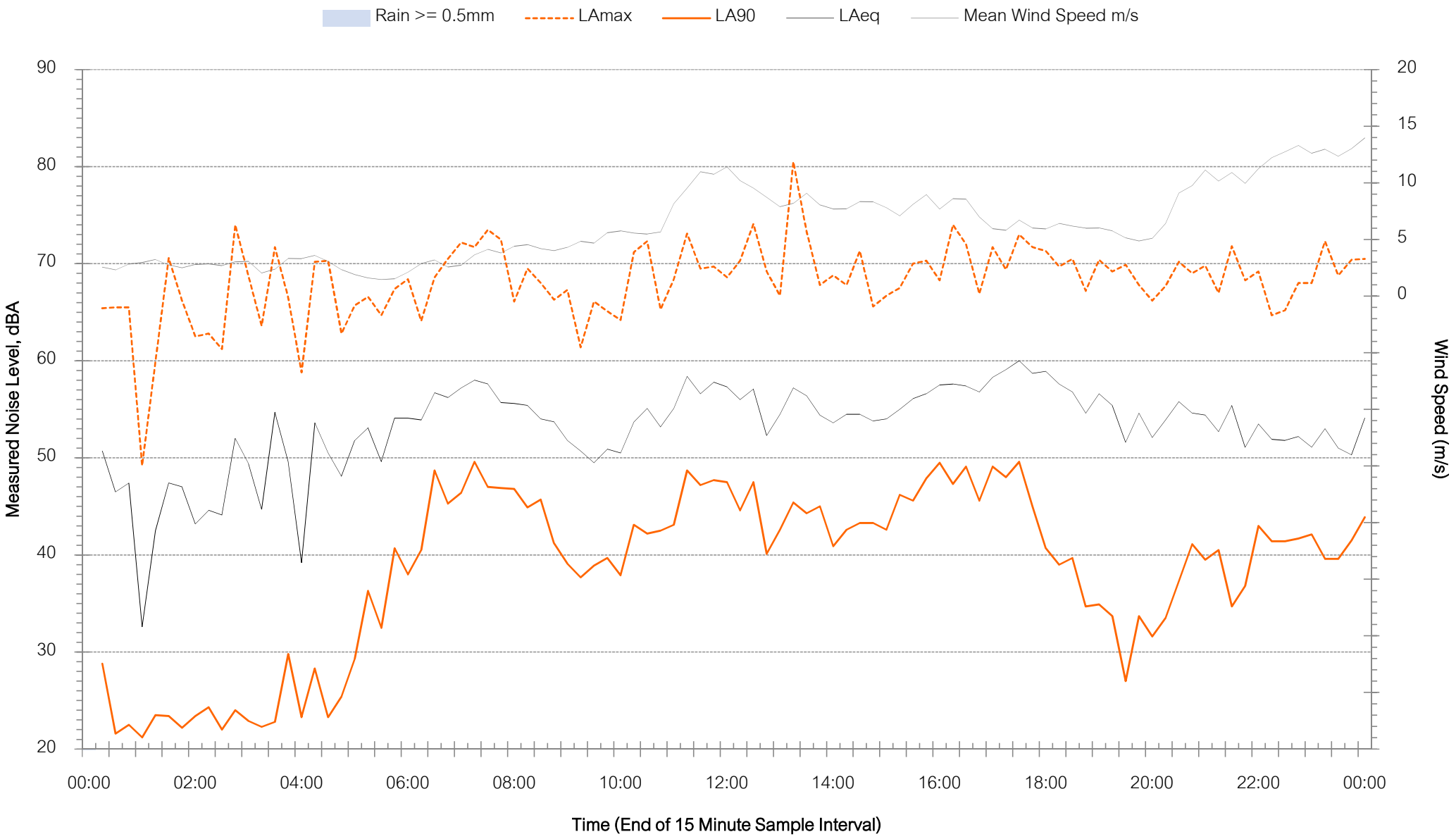
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Thursday 9 August 2018



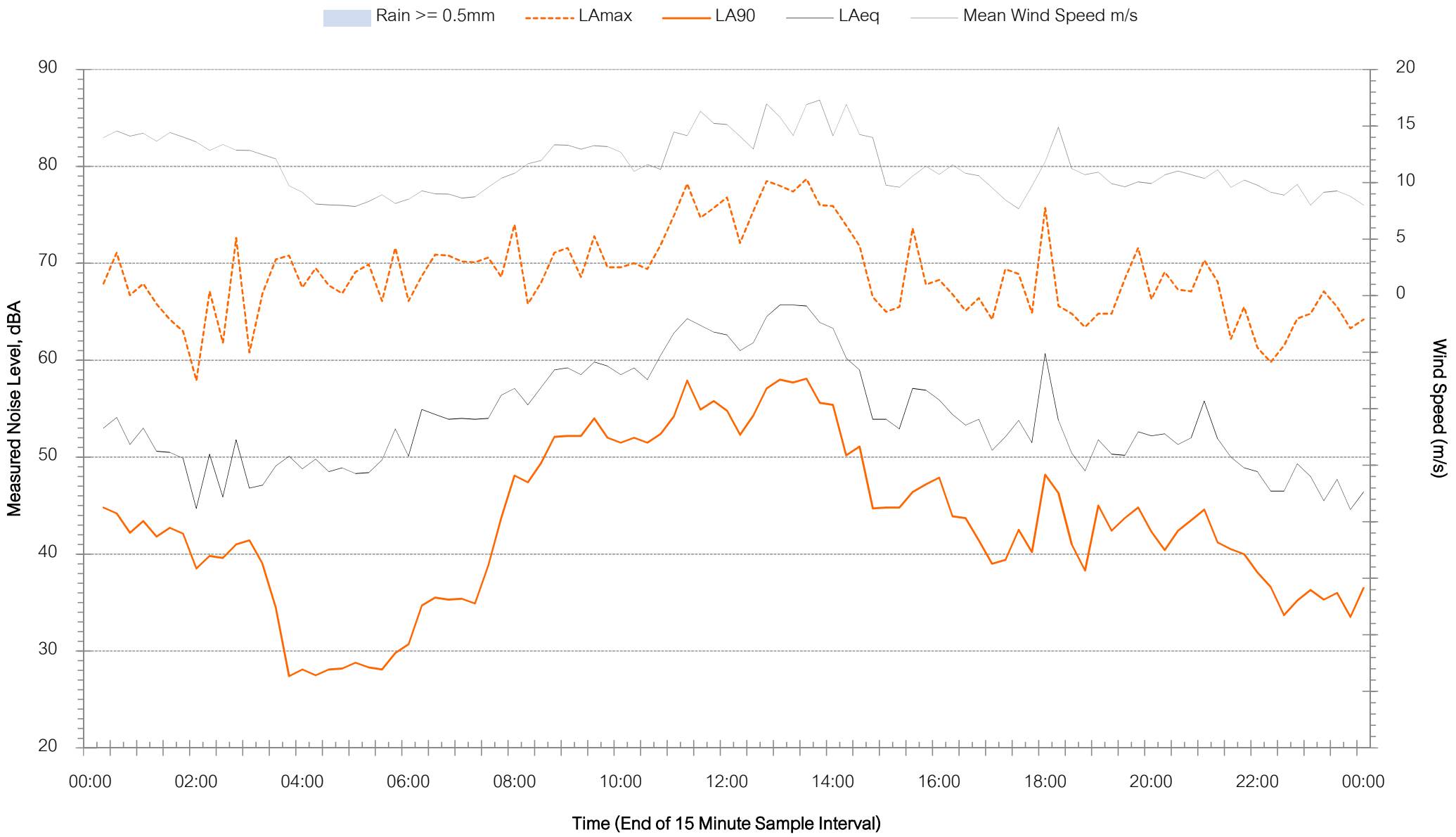
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Friday 10 August 2018



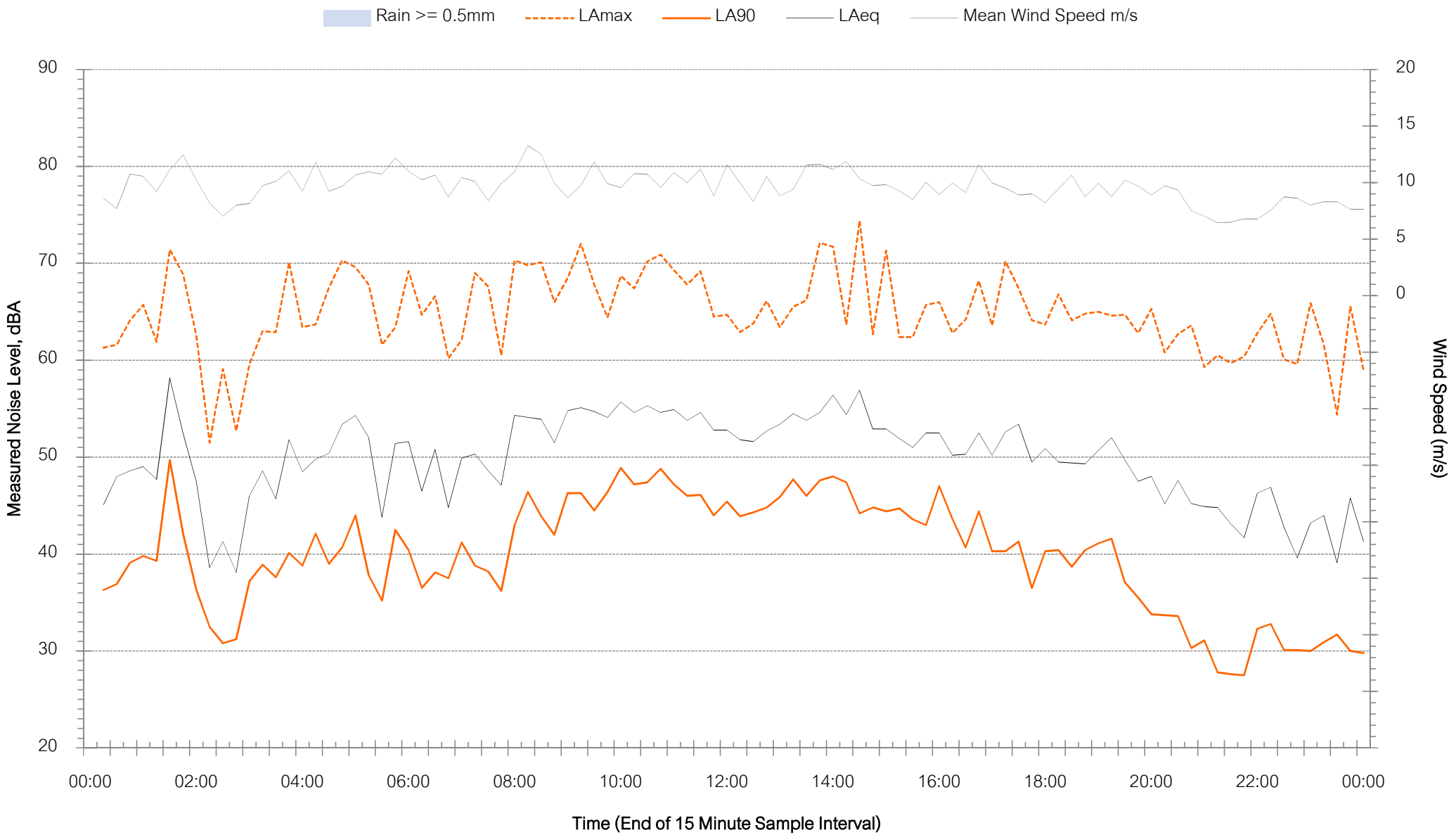
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Saturday 11 August 2018



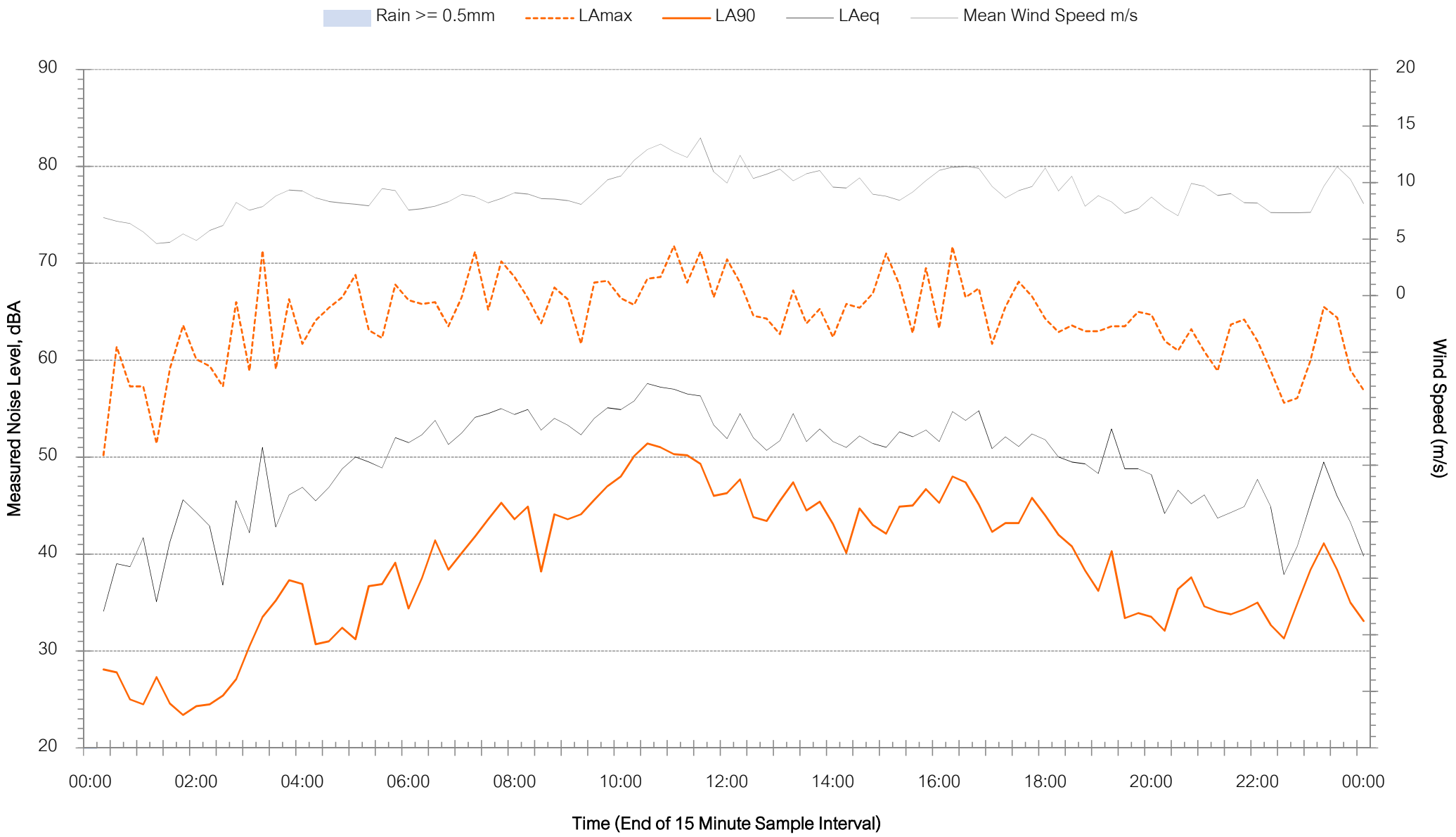
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Sunday 12 August 2018



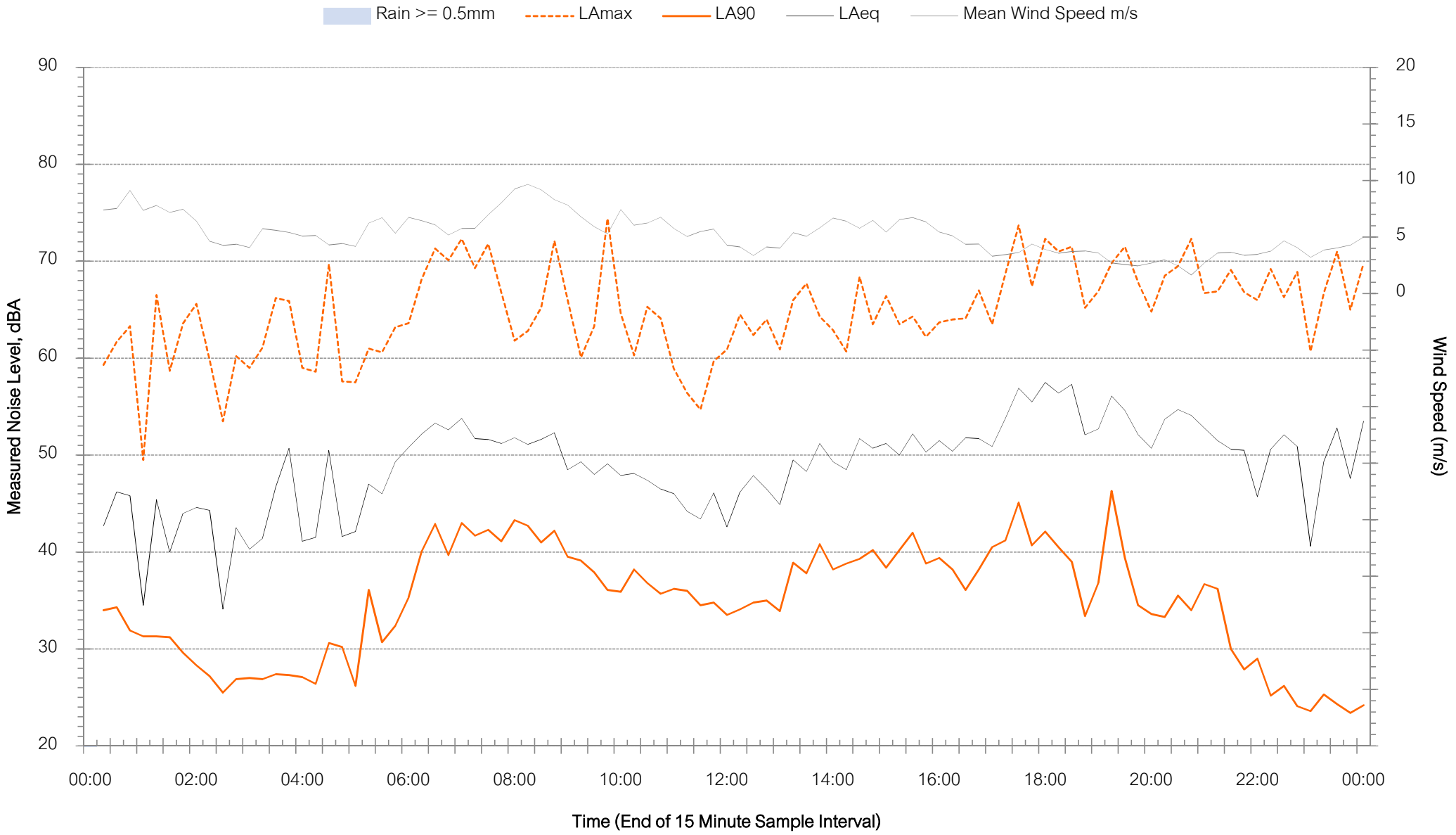
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Monday 13 August 2018



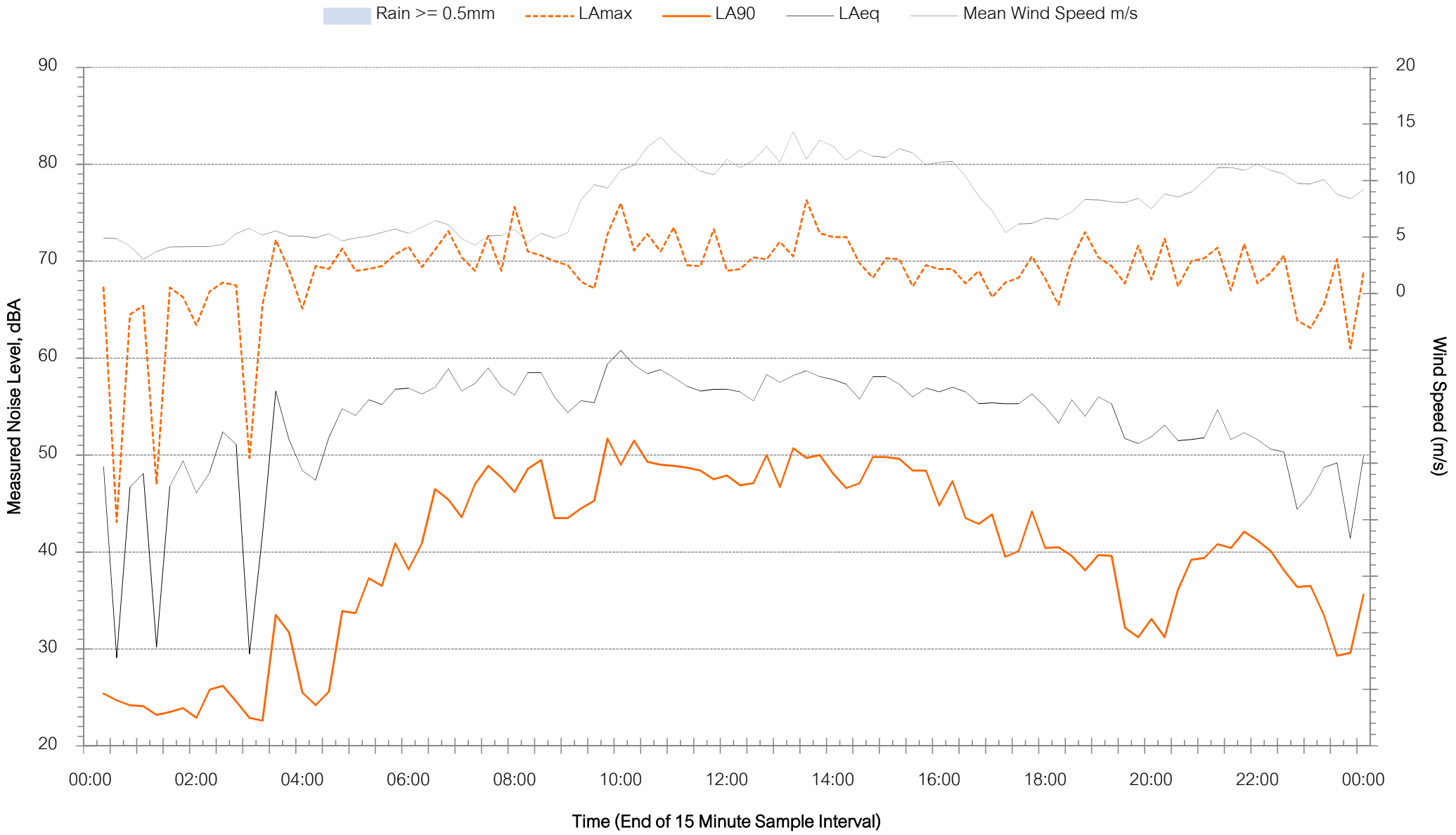
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Tuesday 14 August 2018



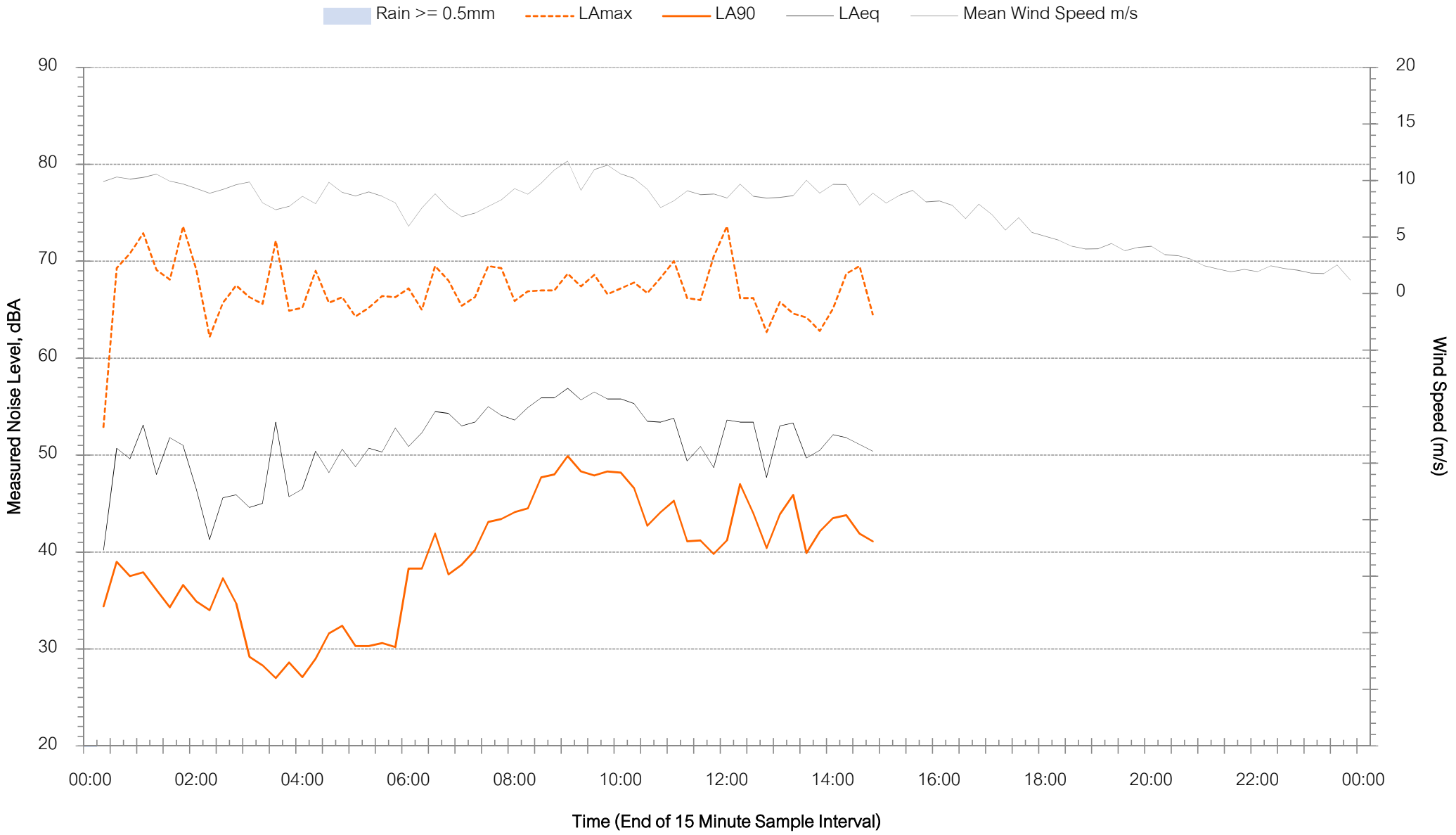
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Wednesday 15 August 2018



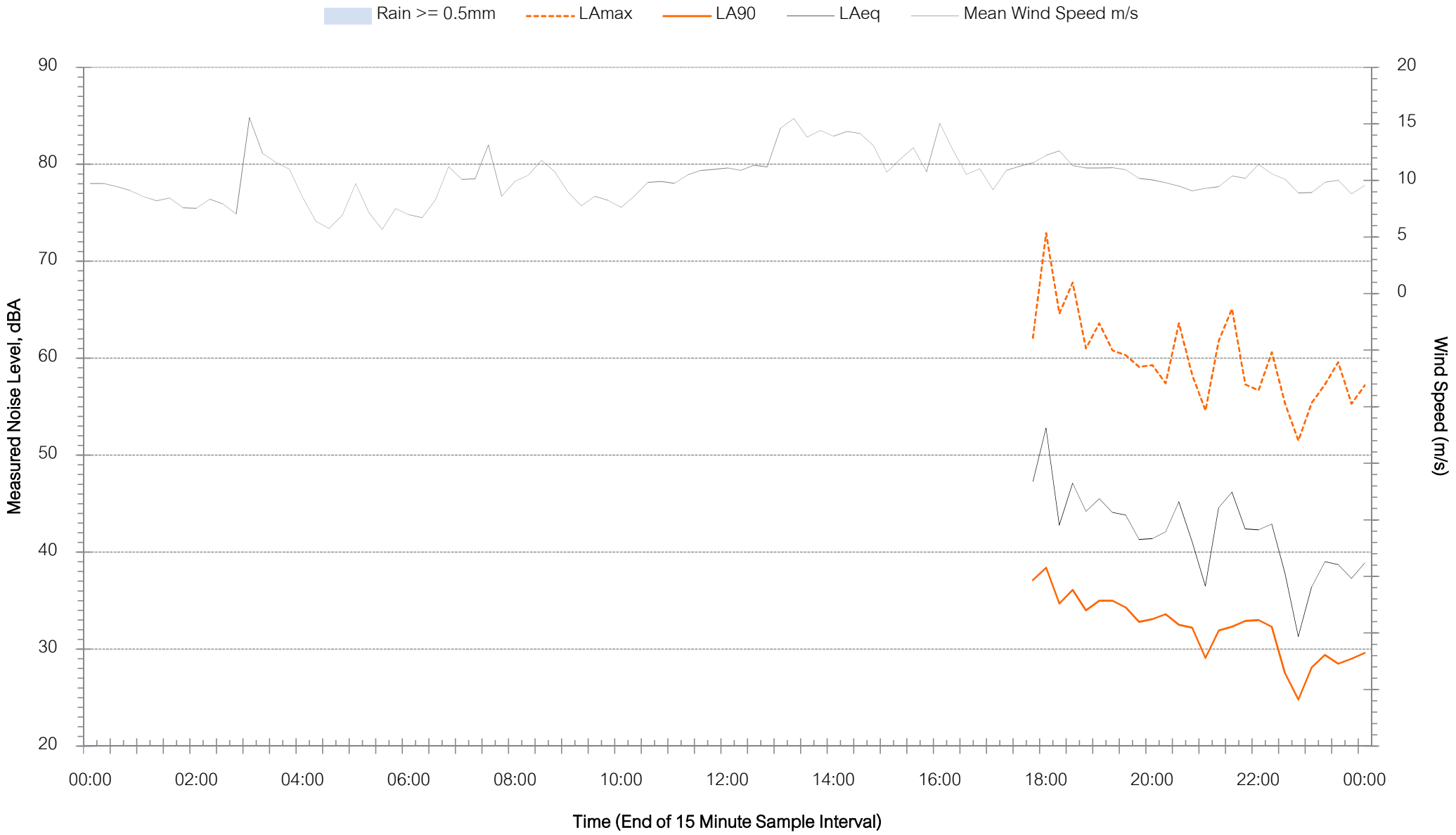
# Background Noise Levels

## MAC04 Mid Western Highway, Kings Plains - Thursday 16 August 2018



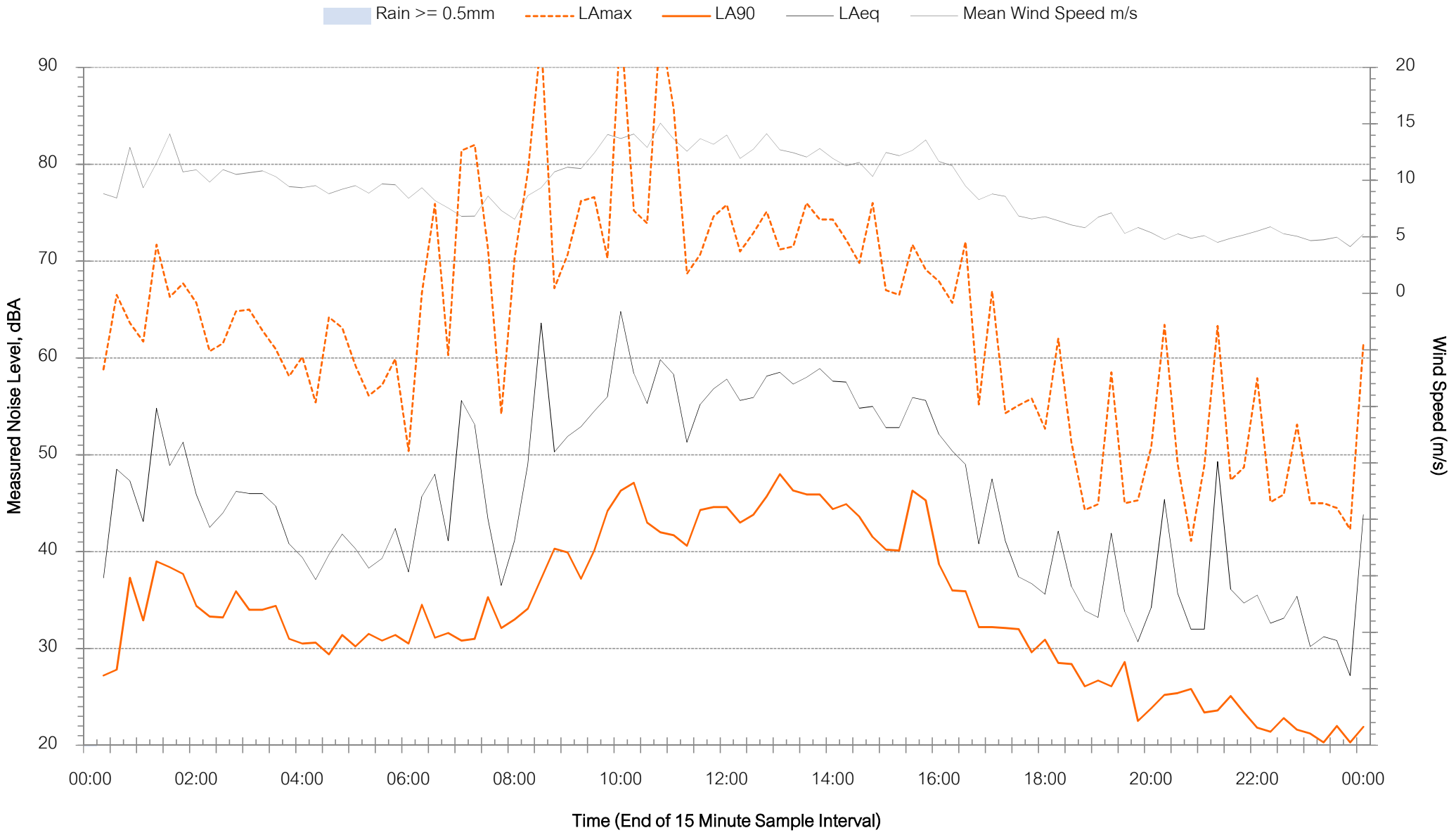
# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Monday 6 August 2018



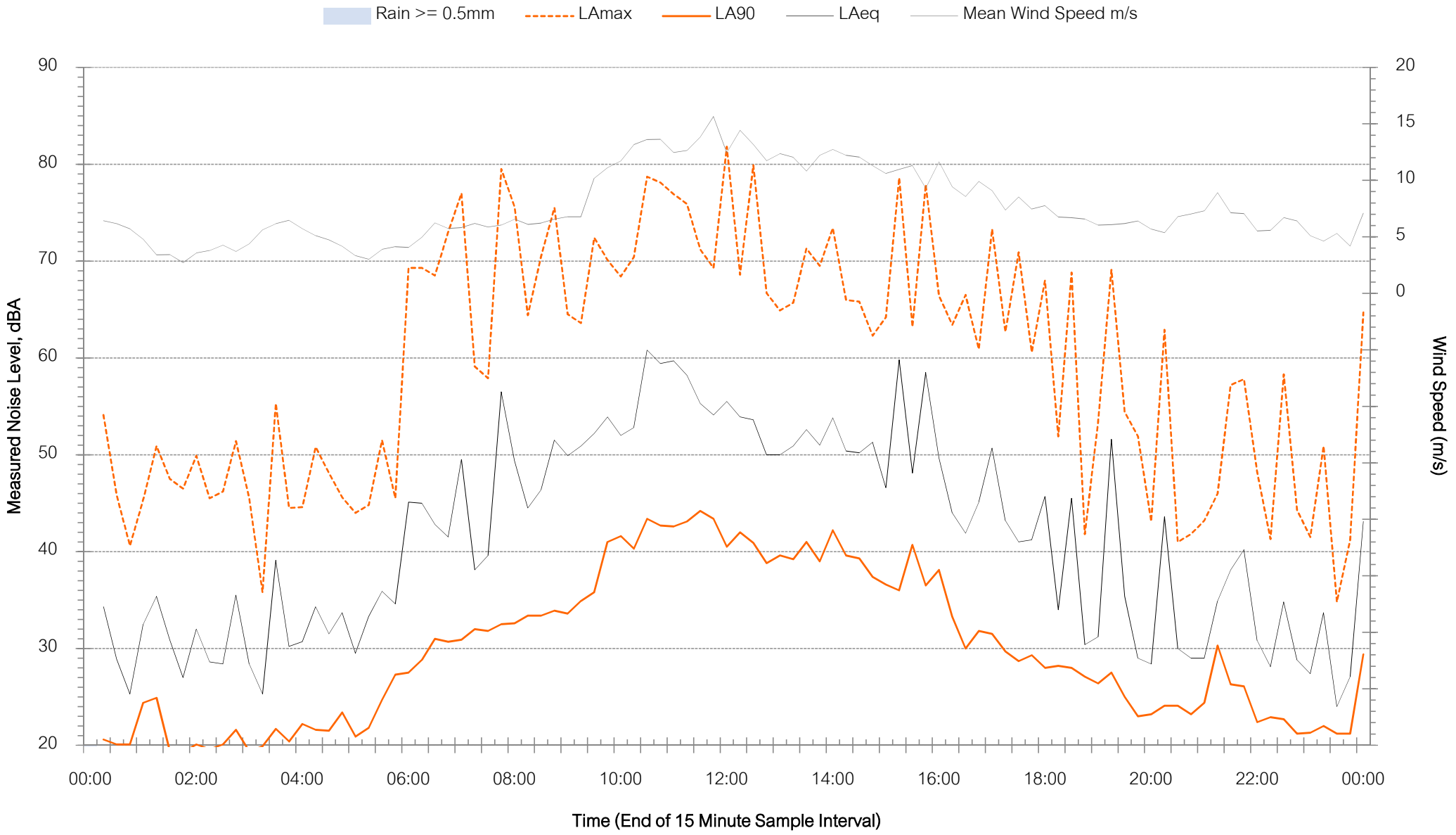
# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Tuesday 7 August 2018



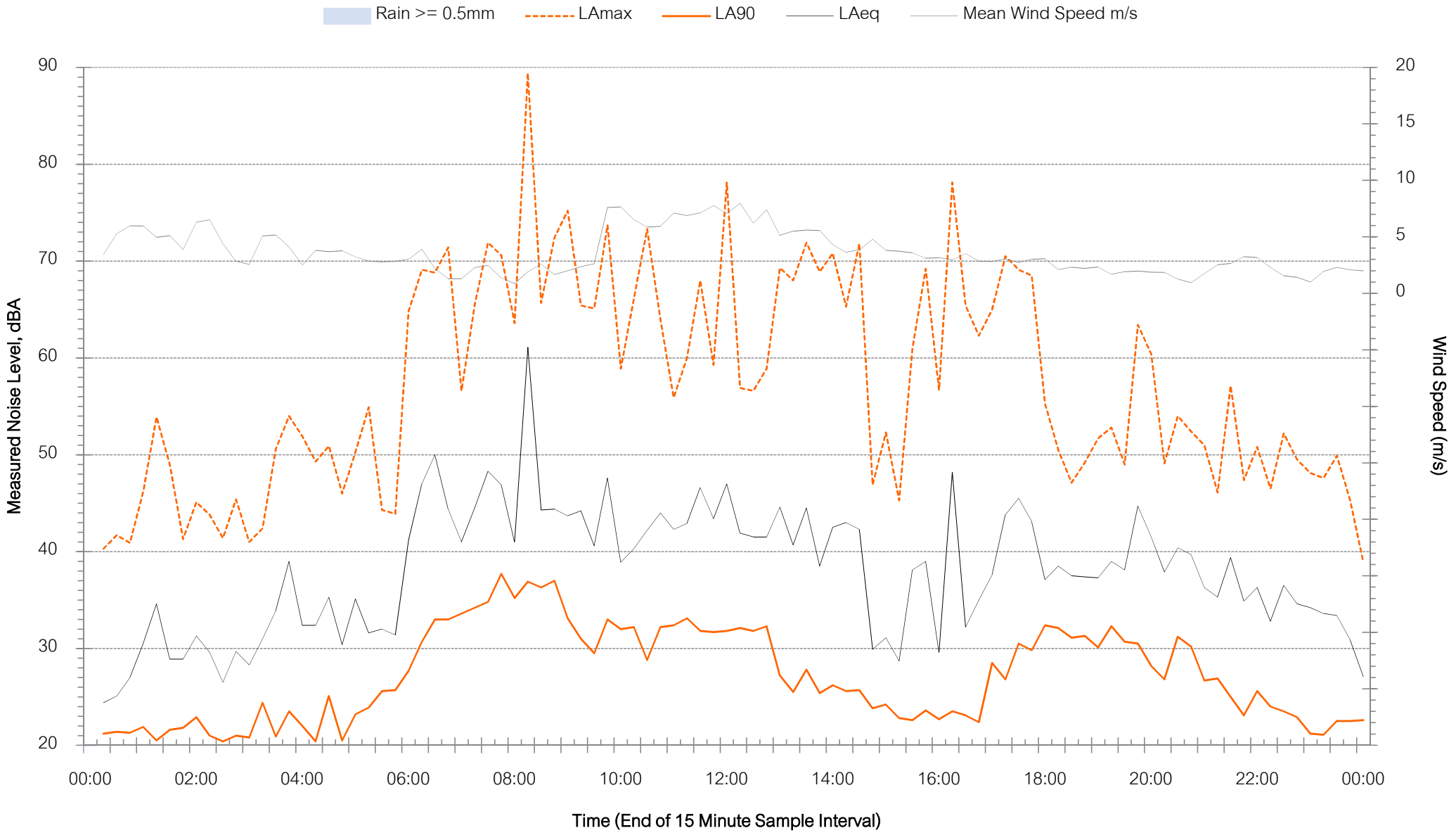
# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Wednesday 8 August 2018



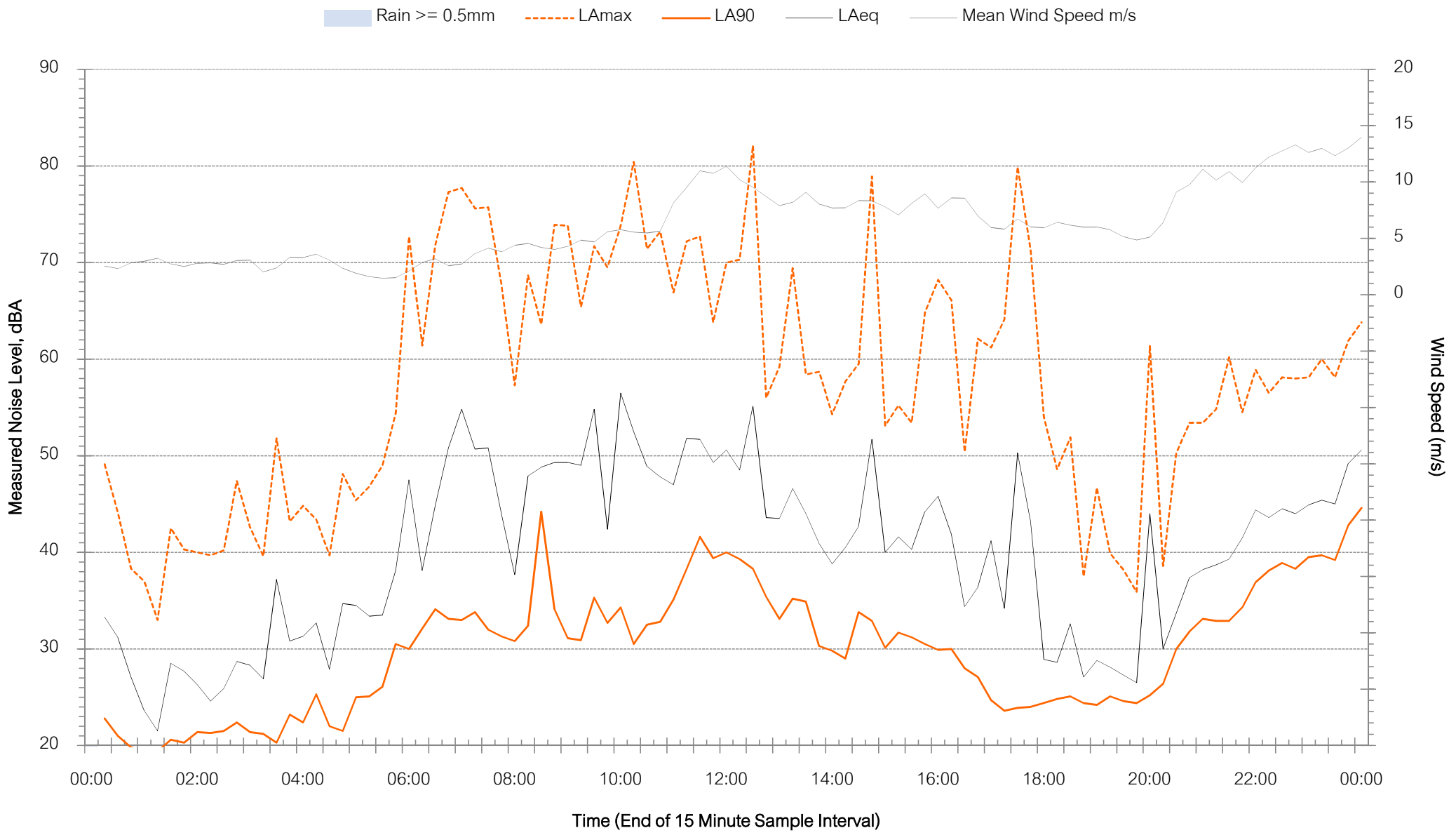
# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Thursday 9 August 2018



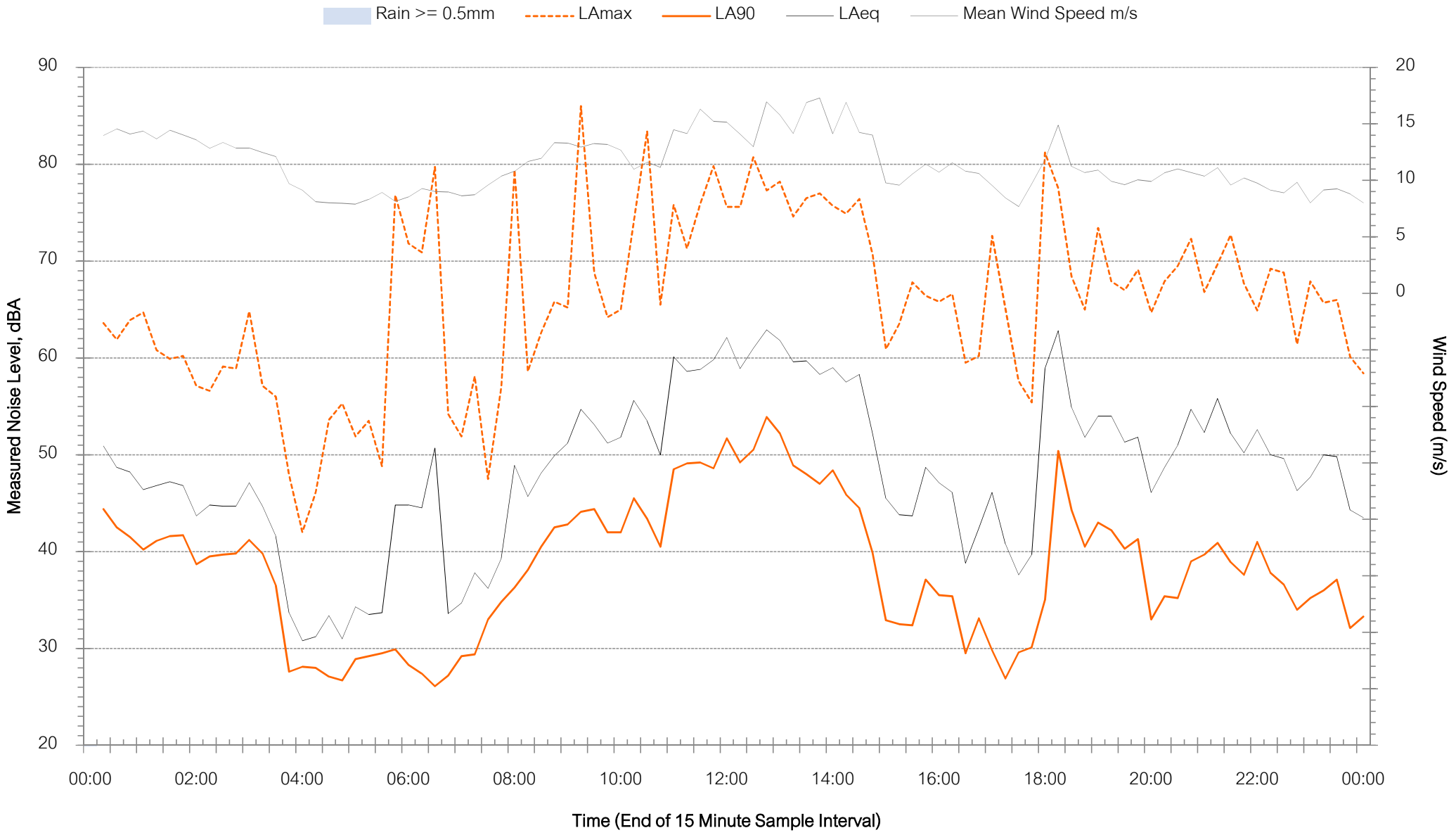
# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Friday 10 August 2018



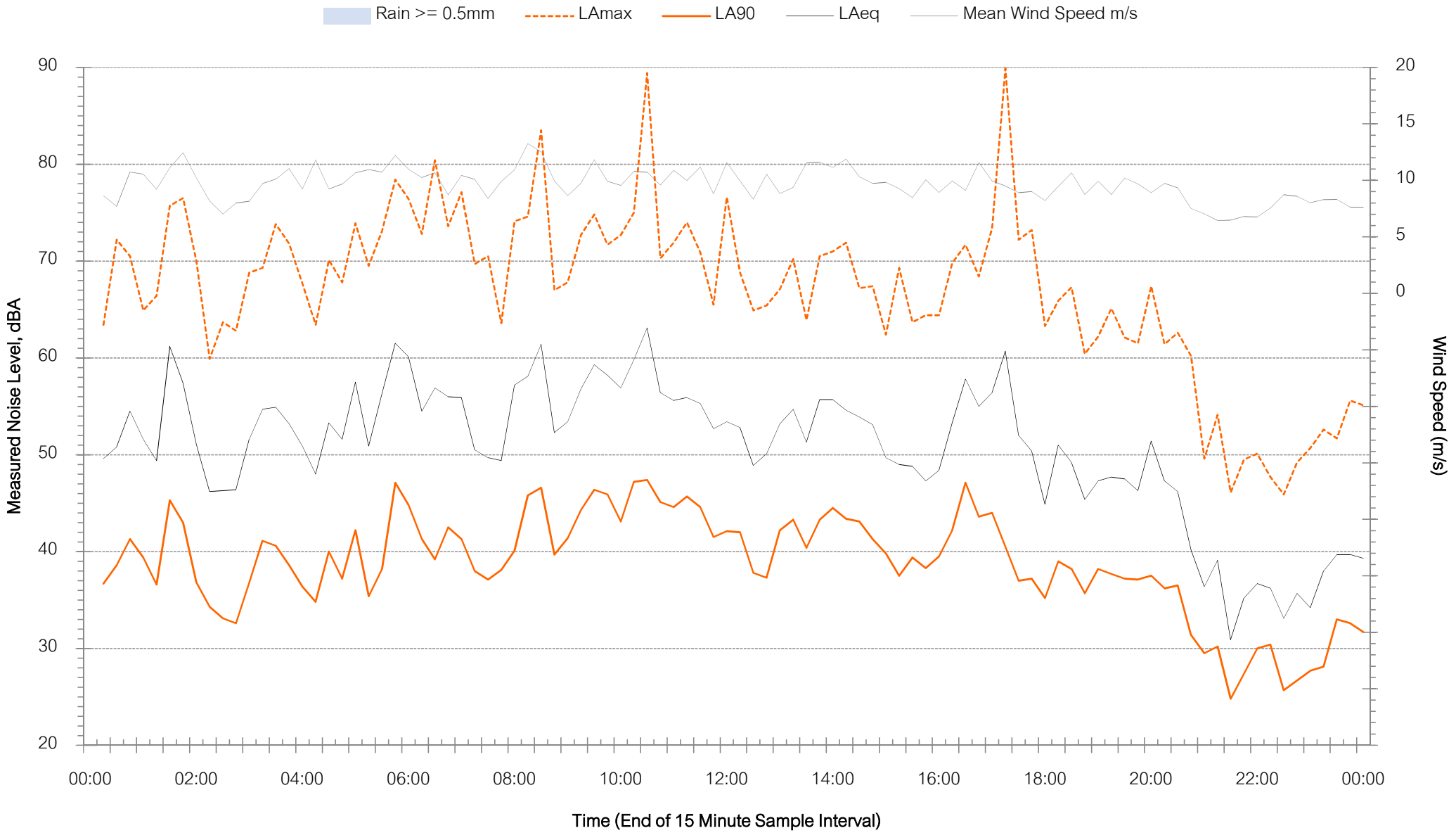
# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Saturday 11 August 2018



# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Sunday 12 August 2018

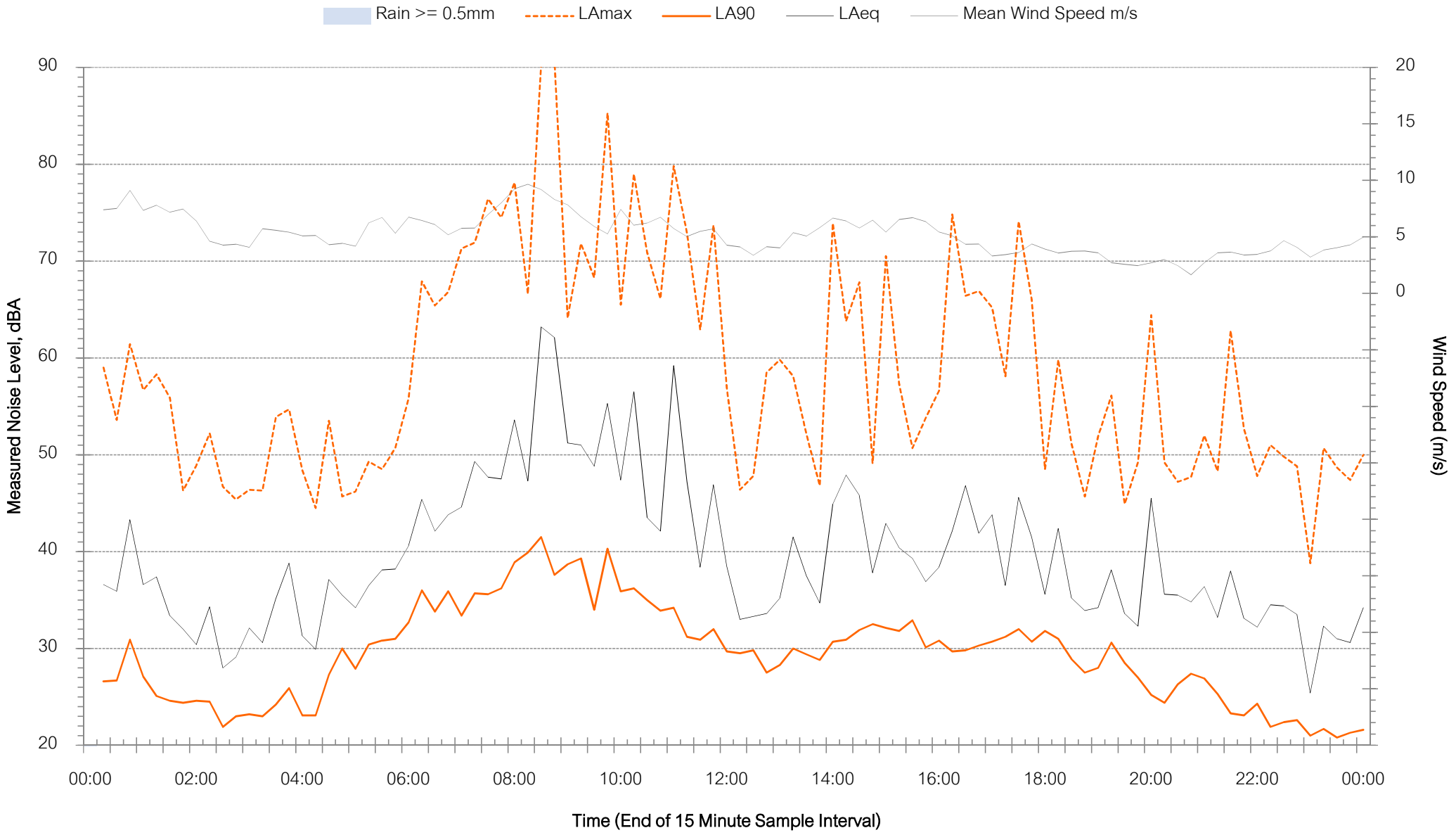


# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Monday 13 August 2018

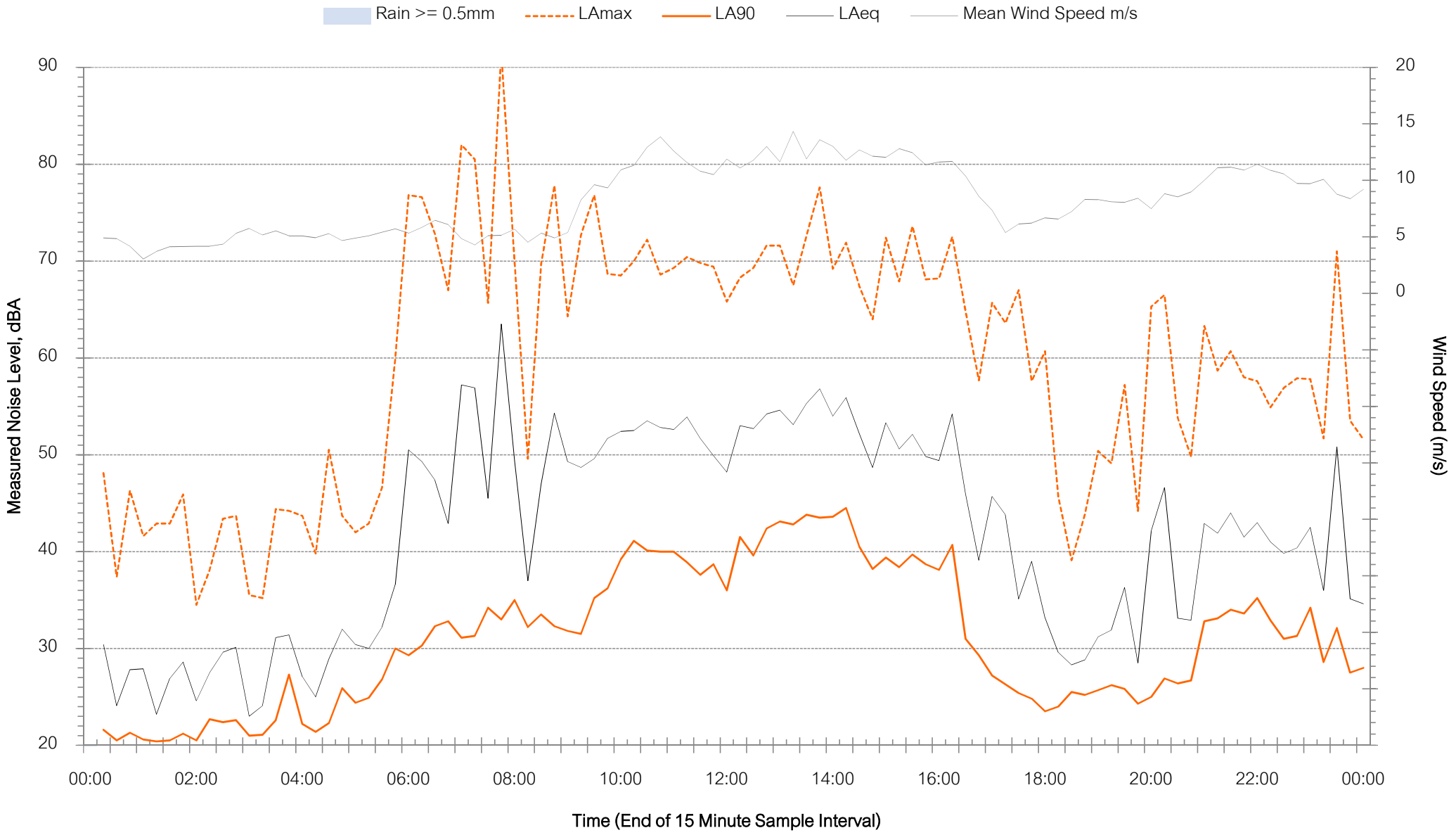
# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Tuesday 14 August 2018



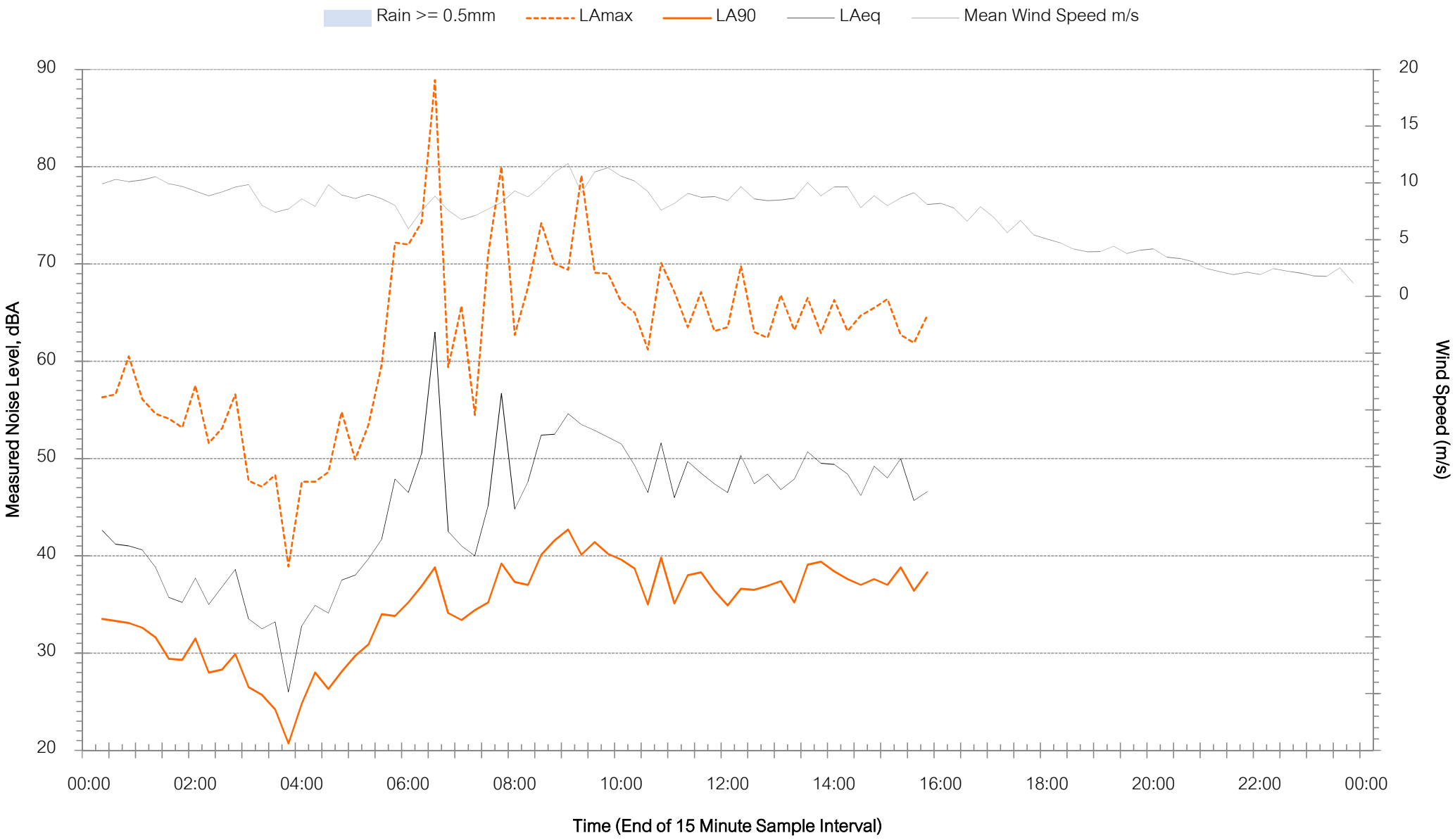
# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Wednesday 15 August 2018



# Background Noise Levels

## MAC06 Dungeon Road, Kings Plains - Thursday 16 August 2018



| EMM Loc 1 | | | | | | |
|---|---|---|---|---|---|---|
| **Date** | **ABL Day** | **ABL Evening** | **ABL Night** | **Leq 11hr Day** | **Leq 4hr Evening** | **Leq 9hr Night** |
| Thursday, 20-06-13 | -- | 18.3 | 16 | -- | 32.6 | 31.8 |
| Friday, 21-06-13 | 19.4 | 16 | 16.3 | 48.6 | 38.1 | 34.1 |
| Saturday, 22-06-13 | 24.5 | 20.7 | 16.4 | 39.6 | 33.8 | 33.5 |
| Sunday, 23-06-13 | 28.2 | 21.8 | 16.9 | 43.9 | 36.2 | 33.6 |
| Monday, 24-06-13 | -- | -- | -- | -- | -- | 0 |
| Tuesday, 25-06-13 | -- | 31.5 | 29 | -- | 45.9 | 43 |
| Wednesday, 26-06-13 | 29 | 23.8 | 23.8 | 49.3 | 43.3 | 37.1 |
| Thursday, 27-06-13 | 27.1 | 28 | 25.2 | 46.1 | 42.3 | 34 |
| Friday, 28-06-13 | 25.9 | 28.9 | 23.3 | 41.1 | 50.4 | 31.9 |
| Saturday, 29-06-13 | 25.9 | 33.5 | 19.1 | 48.4 | 51.4 | 33 |
| Sunday, 30-06-13 | 22.3 | 24.3 | 18.3 | 46 | 39 | 32 |
| Monday, 01-07-13 | -- | -- | -- | -- | -- | 0 |
| **RBL and Leq(D,E,N)** | **26** | **24** | **19** | **47** | **45** | **36** |

| EMM Loc 2 | | | | | | |
|---|---|---|---|---|---|---|
| **Date** | **ABL Day** | **ABL Evening** | **ABL Night** | **Leq 11hr Day** | **Leq 4hr Evening** | **Leq 9hr Night** |
| Thursday, 20-06-13 | -- | 21.4 | 17.8 | -- | 35.5 | 34.4 |
| Friday, 21-06-13 | 24.4 | 25.9 | 18.2 | 56.9 | 46 | 38.2 |
| Saturday, 22-06-13 | 27.2 | 19.5 | 17.5 | 46.9 | 36.2 | 34.3 |
| Sunday, 23-06-13 | 29 | 22.6 | 19.8 | 46.8 | 37.1 | 36.4 |
| Monday, 24-06-13 | -- | -- | -- | -- | -- | 0 |
| Tuesday, 25-06-13 | -- | 31.3 | 29.4 | -- | 55.8 | 41.7 |
| Wednesday, 26-06-13 | 30.2 | 23.3 | 21.5 | 49.7 | 38.8 | 36.8 |
| Thursday, 27-06-13 | 29.7 | 24.7 | 22.3 | 47.3 | 48.6 | 35.6 |
| Friday, 28-06-13 | -- | -- | -- | -- | -- | 0 |
| **RBL and Leq(D,E,N)** | **29** | **23.3** | **19.8** | **51.7** | **48.6** | **37.5** |

| EMM Loc 3 | | | | | | |
|---|---|---|---|---|---|---|
| **Date** | **ABL Day** | **ABL Evening** | **ABL Night** | **Leq 11hr Day** | **Leq 4hr Evening** | **Leq 9hr Night** |
| Thursday, 25-07-13 | -- | 33.1 | 21.9 | -- | 53 | 48.2 |
| Friday, 26-07-13 | 32.8 | 34.1 | 18.8 | 52.8 | 52.7 | 47 |
| Saturday, 27-07-13 | 34.6 | 30.8 | 19.5 | 52 | 51 | 44.7 |
| Sunday, 28-07-13 | 33.3 | 39.6 | -- | 52.3 | 51.9 | 0 |
| Monday, 29-07-13 | -- | 38.7 | 31.6 | -- | 53.1 | 48.4 |
| Tuesday, 30-07-13 | 32.7 | 38.7 | 24.7 | 50 | 51.2 | 49.3 |
| Wednesday, 31-07-13 | 36.7 | 43.3 | 28.1 | 61.2 | 52.9 | 50.3 |
| Thursday, 01-08-13 | 32.4 | 40.9 | 31.9 | 54.4 | 53.8 | 49.7 |
| Friday, 02-08-13 | -- | 38.2 | -- | -- | 51.2 | 0 |
| Saturday, 03-08-13 | 34.2 | 34.3 | -- | 51 | 44.8 | 0 |
| Sunday, 04-08-13 | -- | 32.3 | 22.8 | -- | 48.7 | 48.7 |
| Monday, 05-08-13 | -- | 37.6 | 27.6 | -- | 53 | 51.1 |
| Tuesday, 06-08-13 | -- | 39.6 | -- | -- | 49.7 | 0 |
| Wednesday, 07-08-13 | -- | -- | -- | -- | -- | 0 |
| **RBL and Leq(D,E,N)** | **33** | **38** | **25** | **55** | **52** | **49** |

| EMM Loc 4 | | | | | | |
|---|---|---|---|---|---|---|
| **Date** | **ABL Day** | **ABL Evening** | **ABL Night** | **Leq 11hr Day** | **Leq 4hr Evening** | **Leq 9hr Night** |
| Thursday, 20-06-13 | -- | 26.1 | 17.8 | -- | 45.9 | 44.2 |
| Friday, 21-06-13 | 31.2 | 28.1 | 16.3 | 48.8 | 47.6 | 45.4 |
| Saturday, 22-06-13 | 30.1 | 20 | 19.8 | 55.8 | 43.8 | 41.2 |
| Sunday, 23-06-13 | 35.4 | 23.3 | 17.9 | 49.7 | 45.1 | 41.4 |
| Monday, 24-06-13 | -- | -- | -- | -- | -- | 0 |
| Tuesday, 25-06-13 | -- | 31 | 27.2 | -- | 42.7 | 44.5 |
| Wednesday, 26-06-13 | 35.5 | 32.4 | 31.3 | 50.3 | 45.4 | 43.1 |
| Thursday, 27-06-13 | 36.9 | 37.6 | 36.6 | 48.5 | 46 | 45 |
| Friday, 28-06-13 | 37 | 39.2 | 36.4 | 48.9 | 46.7 | 43.5 |
| Saturday, 29-06-13 | 35.1 | 38.5 | 29.3 | 47.8 | 47.1 | 43 |
| Sunday, 30-06-13 | 31.9 | 34.5 | 22.8 | 47 | 43.9 | 45 |
| Monday, 01-07-13 | -- | -- | -- | -- | -- | 0 |
| **RBL and Leq(D,E,N)** | **35** | **32** | **25** | **51** | **46** | **44** |

| EMM Loc 5 | | | | | | |
|---|---|---|---|---|---|---|
| **Date** | **ABL Day** | **ABL Evening** | **ABL Night** | **Leq 11hr Day** | **Leq 4hr Evening** | **Leq 9hr Night** |
| Thursday, 20-06-13 | -- | 21.9 | 18.5 | -- | 42.2 | 42.8 |
| Friday, 21-06-13 | 24.6 | 21 | 18.8 | 43.8 | 43.3 | 44.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Saturday, 22-06-13 | 28.9 | 19.9 | 19.5 | 43.9 | 37.4 | 42 |
| Sunday, 23-06-13 | 33 | 21.7 | 19.8 | 53.6 | 41.5 | 42 |
| Monday, 24-06-13 | -- | -- | -- | -- | -- | 0 |
| Tuesday, 25-06-13 | -- | 28.9 | 26 | -- | 39.7 | 44.8 |
| Wednesday, 26-06-13 | 31.4 | 30.1 | 26.2 | 44.6 | 43 | 43.7 |
| Thursday, 27-06-13 | 31.6 | 33.8 | 30.4 | 44.6 | 46.9 | 46.2 |
| Friday, 28-06-13 | 30.3 | 35.6 | 29.5 | 45.1 | 49.3 | 48 |
| Saturday, 29-06-13 | 29.5 | 36.7 | 27.5 | 46.1 | 50 | 48.2 |
| Sunday, 30-06-13 | 26.1 | 33.1 | 22.5 | 45.3 | 51.4 | 46.4 |
| Monday, 01-07-13 | -- | -- | -- | -- | -- | 0 |
| **RBL and Leq(D,E,N)** | **30** | **30** | **24** | **47** | **47** | **45** |

**EMM Loc 6**

| **Date** | **ABL Day** | **ABL Evening** | **ABL Night** | **Leq 11hr Day** | **Leq 4hr Evening** | **Leq 9hr Night** |
|---|---|---|---|---|---|---|
| Thursday, 20-06-13 | -- | 20.4 | 20.4 | -- | 39.2 | 34.7 |
| Friday, 21-06-13 | 25.4 | 20.8 | 21.1 | 43.2 | 46.9 | 34.4 |
| Saturday, 22-06-13 | 25.9 | 22 | 21.4 | 52.3 | 37.5 | 38.8 |
| Sunday, 23-06-13 | 29 | 23.1 | 19 | 52.6 | 38.4 | 36.3 |
| Monday, 24-06-13 | -- | -- | -- | -- | -- | 0 |
| Tuesday, 25-06-13 | -- | 28.9 | 28.9 | -- | 40.8 | 38.7 |
| Wednesday, 26-06-13 | 30.7 | 30.9 | 27.6 | 48.1 | 42.2 | 41.6 |
| Thursday, 27-06-13 | 31.7 | 30.8 | 29.5 | 49.5 | 46.8 | 36.1 |
| Friday, 28-06-13 | -- | -- | -- | -- | -- | 0 |
| **RBL and Leq(D,E,N)** | **29** | **23** | **21** | **50** | **43** | **38** |

**EMM Loc 7**

| **Date** | **ABL Day** | **ABL Evening** | **ABL Night** | **Leq 11hr Day** | **Leq 4hr Evening** | **Leq 9hr Night** |
|---|---|---|---|---|---|---|
| Thursday, 20-06-13 | -- | 25.1 | 21.6 | -- | 43.7 | 51 |
| Friday, 21-06-13 | 36.5 | 24.5 | 22.8 | 49.6 | 47.6 | 42.3 |
| Saturday, 22-06-13 | 35 | 23.6 | 22.4 | 48.9 | 41.6 | 38.5 |
| Sunday, 23-06-13 | 35.9 | 23.3 | 20.9 | 50.1 | 44 | 40 |
| Monday, 24-06-13 | -- | -- | -- | -- | -- | 0 |
| Tuesday, 25-06-13 | -- | 29.5 | 25.4 | -- | 41.2 | 42.2 |
| Wednesday, 26-06-13 | 37.1 | 28.8 | 31.2 | 55.5 | 44.5 | 46.4 |
| Thursday, 27-06-13 | 38.7 | 33.4 | 31.7 | 51.9 | 44.7 | 42.5 |
| Friday, 28-06-13 | 38.6 | 34.5 | 28.2 | 55.8 | 44.4 | 41.2 |
| Saturday, 29-06-13 | 34.6 | 35.1 | 24.7 | 52.1 | 43.4 | 39.9 |
| Sunday, 30-06-13 | 34.4 | 33.2 | 23.5 | 49.9 | 41.6 | 39.9 |
| Monday, 01-07-13 | -- | -- | -- | -- | -- | 0 |
| **RBL and Leq(D,E,N)** | **36** | **29** | **24** | **53** | **44** | **44** |

**MAC06 155 Dungeon Road**

| Date | ABL Day L90 | ABL Evening L90 | ABL Night L90 | Leq Day | Leq Evening | Leq Night |
|---|---|---|---|---|---|---|
| Monday-6-Aug-18 | -- | 30.2 | 27.9 | 0.0 | 42.8 | 44.8 |
| Tuesday-7-Aug-18 | 30.9 | 23.0 | 19.8 | 53.3 | 40.6 | 38.7 |
| Wednesday-8-Aug-18 | 29.1 | 23.1 | 20.7 | 50.4 | 41.7 | 38.8 |
| Thursday-9-Aug-18 | 23.2 | 25.3 | 20.3 | 47.0 | 39.2 | 42.0 |
| Friday-10-Aug-18 | 24.7 | 24.4 | 26.8 | 48.5 | 36.5 | 42.1 |
| Saturday-11-Aug-18 | 28.7 | 35.4 | 33.1 | 42.4 | 51.9 | 50.5 |
| Sunday-12-Aug-18 | 37.3 | 28.0 | 25.2 | 54.7 | 46.2 | 45.5 |
| Monday-13-Aug-18 | 37.1 | 30.7 | 23.1 | 50.9 | 44.4 | 39.4 |
| Tuesday-14-Aug-18 | 29.6 | 23.8 | 20.6 | 51.8 | 37.9 | 43.6 |
| Wednesday-15-Aug-18 | 25.2 | 24.4 | 25.5 | 53.3 | 39.0 | 49.3 |
| Thursday-16-Aug-18 | 35.1 | | | 49.4 | | |
| **RBL and Leq Overall** | **29.1** | **24.9** | **24.2** | **50.8** | **44.7** | **45.3** |

**MAC04 3211 Mid West Hwy**

| Date | ABL Day L90 | ABL Evening L90 | ABL Night L90 | Leq Day | Leq Evening | Leq Night |
|---|---|---|---|---|---|---|
| Monday-6-Aug-18 | -- | 35.8 | 33.5 | 0.0 | 51.5 | 51.9 |
| Tuesday-7-Aug-18 | 38.9 | 27.7 | 22.0 | 55.5 | 52.8 | 52.6 |
| Wednesday-8-Aug-18 | 40.6 | 30.7 | 23.4 | 56.7 | 50.3 | 51.2 |
| Thursday-9-Aug-18 | 36.1 | 29.1 | 22.3 | 50.8 | 53.8 | 51.3 |
| Friday-10-Aug-18 | 39.6 | 31.8 | 27.7 | 56.0 | 55.0 | 51.6 |
| Saturday-11-Aug-18 | 37.6 | 39.1 | 32.6 | 53.0 | 50.4 | 47.5 |
| Sunday-12-Aug-18 | 40.3 | 27.7 | 24.6 | 52.9 | 47.7 | 47.6 |
| Monday-13-Aug-18 | 41.8 | 33.4 | 26.9 | 52.9 | 48.0 | 47.4 |
| Tuesday-14-Aug-18 | 34.8 | 29.5 | 23.3 | 50.9 | 53.6 | 52.9 |
| Wednesday-15-Aug-18 | 40.3 | 31.3 | 28.5 | 56.8 | 53.4 | 50.0 |
| Thursday-16-Aug-18 | 40.6 | | | 53.1 | | |
| **RBL and Leq Overall** | **39.6** | **31.0** | **25.7** | **53.9** | **52.2** | **50.8** |

**MAC03 158 Walkom Road**

| Date | ABL Day L90 | ABL Evening L90 | ABL Night L90 | Leq Day | Leq Evening | Leq Night |
|---|---|---|---|---|---|---|
| Monday-6-Aug-18 | 39.5 | 33.8 | 30.3 | 47.0 | 42.3 | 43.4 |
| Tuesday-7-Aug-18 | 32.8 | 23.3 | 14.9 | 46.4 | 42.1 | 42.2 |
| Wednesday-8-Aug-18 | 34.1 | 26.7 | 17.2 | 46.4 | 37.5 | 39.6 |
| Thursday-9-Aug-18 | 27.4 | 22.2 | 16.7 | 40.7 | 42.7 | 41.2 |
| Friday-10-Aug-18 | 36.5 | 31.1 | 30.5 | 45.9 | 42.7 | 42.4 |
| Saturday-11-Aug-18 | 34.6 | 40.0 | 33.3 | 45.1 | 46.7 | 45.9 |
| Sunday-12-Aug-18 | 40.2 | 29.2 | 22.5 | 51.7 | 43.5 | 43.1 |
| Monday-13-Aug-18 | 37.1 | 34.6 | 25.0 | 47.7 | 47.1 | 42.3 |
| Tuesday-14-Aug-18 | 31.3 | 26.3 | 17.3 | 42.6 | 40.2 | 41.4 |
| Wednesday-15-Aug-18 | 34.4 | 30.6 | 27.9 | 46.0 | 41.0 | 40.0 |
| Thursday-16-Aug-18 | 36.6 | | | 47.7 | | |
| **RBL and Leq Overall** | **34.6** | **29.9** | **23.7** | **46.9** | **43.4** | **42.5** |

**MAC01 30 Walkom Road**

| Date | ABL Day L90 | ABL Evening L90 | ABL Night L90 | Leq Day | Leq Evening | Leq Night |
|---|---|---|---|---|---|---|
| Monday-6-Aug-18 | -- | 36.1 | 29.7 | -- | 43.6 | 42.5 |
| Tuesday-7-Aug-18 | 34.3 | 36.3 | 24.6 | 49.4 | 44.8 | 43.5 |
| Wednesday-8-Aug-18 | 35.7 | 36.8 | 31.1 | 46.4 | 41.3 | 42.7 |
| Thursday-9-Aug-18 | 26.0 | 37.0 | 22.0 | 41.5 | 47.1 | 43.5 |
| Friday-10-Aug-18 | 33.7 | 40.4 | 28.4 | 48.4 | 47.1 | 40.6 |
| Saturday-11-Aug-18 | 31.3 | 35.2 | 29.1 | 42.3 | 42.2 | 42.0 |
| Sunday-12-Aug-18 | 34.8 | 28.2 | 22.9 | 47.5 | 39.7 | 37.9 |
| Monday-13-Aug-18 | 35.9 | 36.4 | 25.4 | 45.8 | 42.0 | 38.7 |
| Tuesday-14-Aug-18 | 28.6 | 34.9 | 20.7 | 43.1 | 46.3 | 44.0 |
| Wednesday-15-Aug-18 | 35.5 | 39.2 | 28.0 | 46.6 | 45.8 | 40.4 |
| Thursday-16-Aug-18 | 34.9 | | | 43.9 | | |
| **RBL and Leq Overall** | **34.3** | **36.4** | **26.7** | **45.8** | **44.7** | **42.0** |

| MAC SV200 NMT | | | | | | |
|---|---|---|---|---|---|---|
| **Date** | **ABL Day L90** | **ABL Evening L90** | **ABL Night L90** | **Leq Day** | **Leq Evening** | **Leq Night** |
| Friday-18-Nov-16 | 30 | 30 | 34 | 47 | 52 | 47 |
| Saturday-19-Nov-16 | 31 | 30 | 36 | 43 | 56 | 57 |
| Sunday-20-Nov-16 | 31 | 32 | 38 | 49 | 53 | 55 |
| Monday-21-Nov-16 | 38 | 35 | 33 | 47 | 50 | 49 |
| Tuesday-22-Nov-16 | 35 | 35 | 32 | 57 | 50 | 48 |
| Wednesday-23-Nov-16 | 40 | 28 | 22 | 50 | 45 | 41 |
| Thursday-24-Nov-16 | 36 | 33 | 21 | 46 | 49 | 48 |
| Friday-25-Nov-16 | 36 | 28 | 20 | 47 | 44 | 44 |
| Saturday-26-Nov-16 | 33 | 28 | 19 | 49 | 48 | 43 |
| Sunday-27-Nov-16 | 34 | 34 | 25 | 47 | 49 | 42 |
| Monday-28-Nov-16 | -- | -- | 64 | -- | -- | -- |
| Tuesday-29-Nov-16 | 36 | 29 | 25 | 44 | 47 | 43 |
| Wednesday-30-Nov-16 | 38 | 36 | -- | 55 | 47 | -- |
| Thursday-1-Dec-16 | -- | 39 | 28 | -- | 58 | 46 |
| Friday-2-Dec-16 | 37 | 38 | -- | 51 | 45 | -- |
| Saturday-3-Dec-16 | 35 | 33 | 29 | 49 | 49 | 43 |
| Sunday-4-Dec-16 | 36 | 36 | 32 | 51 | 48 | 46 |
| Monday-5-Dec-16 | 39 | -- | -- | 50 | -- | -- |
| Tuesday-6-Dec-16 | -- | 30 | -- | -- | 41 | -- |
| Wednesday-7-Dec-16 | 36 | 35 | 27 | 47 | 44 | 45 |
| Thursday-8-Dec-16 | -- | 41 | 32 | -- | 47 | 45 |
| Friday-9-Dec-16 | 42 | -- |  | 48 | -- | -- |
| Saturday-10-Dec-16 | 33 | 29 | 20 | 45 | 45 | 41 |
| Sunday-11-Dec-16 | 33 | 35 | 40 | 47 | 48 | 46 |
| Monday-12-Dec-16 | -- | -- | -- | -- | -- | -- |
| Tuesday-13-Dec-16 | 39 | 34 | 31 | 55 | 53 | 48 |
| Wednesday-14-Dec-16 | 41 | 31 | 28 | 53 | 43 | 43 |
| Thursday-15-Dec-16 | 39 | 40 | 34 | 51 | 48 | 48 |
| Friday-16-Dec-16 | 38 | 37 | 32 | 51 | 50 | 47 |
| Saturday-17-Dec-16 | 42 | 32 | 23 | 51 | 44 | 45 |
| Sunday-18-Dec-16 | 31 | 45 | 28 | 44 | 52 | 47 |
| Monday-19-Dec-16 | 37 | -- | 30 | 49 | -- | 45 |
| Tuesday-20-Dec-16 | -- | 35 | 28 | -- | 45 | 46 |
| Wednesday-21-Dec-16 | -- | -- | 29 | -- | -- | 44 |
| Thursday-22-Dec-16 | 34 | 39 | 29 | 46 | 49 | 45 |
| Friday-23-Dec-16 | 34 | -- | 32 | 52 | -- | 43 |
| Saturday-24-Dec-16 | 36 | 37 | 27 | 47 | 45 | 43 |
| Sunday-25-Dec-16 | 35 | 34 | 29 | 47 | 50 | 37 |
| Monday-26-Dec-16 | 38 | 33 | 29 | 48 | 46 | 45 |
| Tuesday-27-Dec-16 | 40 | -- | 30 | 48 | -- | 46 |
| Wednesday-28-Dec-16 | 40 | 31 | 30 | 49 | 46 | 44 |
| Thursday-29-Dec-16 | 38 | 32 | 29 | 48 | 52 | 41 |
| Friday-30-Dec-16 | 36 | -- | 28 | 46 | -- | 49 |
| Saturday-31-Dec-16 | 35 | 33 | 29 | 48 | 50 | 44 |
| Sunday-1-Jan-17 | 31 | 28 | 25 | 45 | 44 | 41 |
| Monday-2-Jan-17 | 33 | -- | 35 | 46 | -- | 61 |
| Tuesday-3-Jan-17 | 38 | 41 | 29 | 60 | 52 | 44 |
| Wednesday-4-Jan-17 | 39 | 34 | -- | 57 | 49 | 43 |
| Thursday-5-Jan-17 | -- | -- | 29 | -- | -- | 42 |
| Friday-6-Jan-17 | 37 | 40 | 25 | 48 | 51 | 46 |
| Saturday-7-Jan-17 | 34 | 31 | 25 | 46 | 46 | 42 |
| Sunday-8-Jan-17 | 40 | 32 | 28 | 46 | 43 | 48 |
| Monday-9-Jan-17 | 33 | 36 | 34 | 46 | 48 | 48 |
| Tuesday-10-Jan-17 | 37 | 33 | 32 | 46 | 45 | 41 |
| Wednesday-11-Jan-17 | -- | -- | 21 | -- | -- | 48 |
| Thursday-12-Jan-17 | 34 | 32 | 26 | 45 | 48 | 44 |
| Friday-13-Jan-17 | 43 | 36 | 33 | 55 | 50 | 39 |
| Saturday-14-Jan-17 | -- | -- | 19 | -- | -- | 46 |
| Sunday-15-Jan-17 | 35 | 35 | 23 | 51 | 44 | 45 |
| Monday-16-Jan-17 | 33 | 27 | 25 | 50 | 51 | 46 |
| Tuesday-17-Jan-17 | 38 | 35 | 38 | 50 | 48 | 48 |
| Wednesday-18-Jan-17 | 43 | 29 | 33 | 53 | 47 | 45 |
| Thursday-19-Jan-17 | 38 | 38 | -- | 48 | 50 | -- |
| Friday-20-Jan-17 | -- | -- | -- | -- | -- | -- |
| Saturday-21-Jan-17 | -- | -- | -- | -- | -- | -- |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sunday-22-Jan-17 | -- | -- | -- | -- | -- | -- |
| Monday-23-Jan-17 | -- | -- | -- | -- | -- | -- |
| Tuesday-24-Jan-17 | 38 | 32 | 31 | 49 | 51 | 47 |
| Wednesday-25-Jan-17 | 39 | 29 | 24 | 50 | 52 | 48 |
| Thursday-26-Jan-17 | 34 | 32 | 25 | 48 | 52 | 45 |
| Friday-27-Jan-17 | 39 | 35 | 23 | 49 | 47 | 44 |
| Saturday-28-Jan-17 | 36 | 33 | 28 | 52 | 54 | 45 |
| Sunday-29-Jan-17 | -- | 34 | 27 | -- | 52 | 47 |
| Monday-30-Jan-17 | -- | -- | 31 | -- | -- | 39 |
| Tuesday-31-Jan-17 | -- | 35 | 30 | -- | 52 | 42 |
| Wednesday-1-Feb-17 | -- | -- | 23 | -- | -- | 41 |
| Thursday-2-Feb-17 | 36 | 32 | -- | 48 | 52 | -- |
| Friday-3-Feb-17 | -- | -- | -- | -- | -- | -- |
| Saturday-4-Feb-17 | -- | -- | -- | -- | -- | -- |
| Sunday-5-Feb-17 | -- | 30 | 32 | -- | 45 | 42 |
| Monday-6-Feb-17 | -- | -- | -- | -- | -- | -- |
| Tuesday-7-Feb-17 | -- | -- | -- | -- | -- | -- |
| Wednesday-8-Feb-17 | -- | 30 | 25 | 53 | 47 | 42 |
| Thursday-9-Feb-17 | 34 | 28 | 25 | 47 | 50 | 46 |
| Friday-10-Feb-17 | -- | -- | -- | -- | -- | -- |
| Saturday-11-Feb-17 | -- | -- | -- | -- | -- | -- |
| Sunday-12-Feb-17 | -- | -- | 25 | 55 | -- | 45 |
| Monday-13-Feb-17 | 33 | 21 | 18 | 44 | 50 | 43 |
| Tuesday-14-Feb-17 | 35 | 44 | 27 | 46 | 51 | 45 |
| Wednesday-15-Feb-17 | 37 | 28 | 14 | 54 | 47 | -- |
| Thursday-16-Feb-17 | -- | -- | 14 | -- | -- | -- |
| Friday-17-Feb-17 | 41 | 27 | -- | 50 | 56 | -- |
| **RBL and Leq Overall** | **36** | **32** | **28** | **51** | **50** | **48** |

# Appendix C – NEWA Analysis

| Table C1 NEWA Analysed Meteorological Conditions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Direction ± 45° | Season | Day | Evening | Night | Direction | Season | Day | Evening | Night |
| | | Percentage Occurrence % | | | | | Percentage Occurrence % | | |
| 0 | Summer | 2.1 | 4.0 | 5.1 | 180 | Summer | 5.6 | 3.3 | 4.1 |
| 0 | Autumn | 2.4 | 4.4 | 8.8 | 180 | Autumn | 6.0 | 10.1 | 5.6 |
| 0 | Winter | 2.0 | 4.8 | 4.7 | 180 | Winter | 4.0 | 8.8 | 5.6 |
| 0 | Spring | 1.9 | 6.2 | 6.6 | 180 | Spring | 4.4 | 7.8 | 7.1 |
| 22.5 | Summer | 2.5 | 3.7 | 7.9 | 202.5 | Summer | 6.4 | 5.5 | 4.4 |
| 22.5 | Autumn | 3.2 | 5.8 | 11.3 | 202.5 | Autumn | 6.4 | 10.9 | 4.7 |
| 22.5 | Winter | 2.1 | 4.8 | 6.7 | 202.5 | Winter | 4.7 | 10.2 | 5.0 |
| 22.5 | Spring | 1.9 | 6.5 | 9.5 | 202.5 | Spring | 5.3 | 9.1 | 7.3 |
| 45 | Summer | 3.4 | 3.8 | 12.7 | 225 | Summer | 6.9 | 7.1 | 5.1 |
| 45 | Autumn | 4.2 | 7.2 | 16.2 | 225 | Autumn | 6.0 | 11.2 | 4.1 |
| 45 | Winter | 2.6 | 5.2 | 8.0 | 225 | Winter | 5.5 | 10.2 | 5.2 |
| 45 | Spring | 2.3 | 6.7 | 12.4 | 225 | Spring | 6.5 | 8.8 | 6.9 |
| 67.5 | Summer | 5.1 | 4.7 | 16.0 | 247.5 | Summer | 6.2 | 7.0 | 4.1 |
| 67.5 | Autumn | 5.6 | 11.0 | 19.2 | 247.5 | Autumn | 5.0 | 9.3 | 3.9 |
| 67.5 | Winter | 4.4 | 5.9 | 11.0 | 247.5 | Winter | 5.3 | 10.5 | 5.1 |
| 67.5 | Spring | 3.2 | 7.1 | 17.5 | 247.5 | Spring | 5.9 | 9.1 | 5.5 |
| 90 | Summer | 5.6 | 4.4 | 14.6 | 270 | Summer | 6.1 | 7.1 | 3.8 |
| 90 | Autumn | 6.7 | 10.0 | 16.8 | 270 | Autumn | 4.6 | 8.2 | 3.7 |
| 90 | Winter | 4.8 | 5.4 | 12.5 | 270 | Winter | 5.4 | 8.2 | 5.9 |
| 90 | Spring | 3.6 | 5.8 | 15.8 | 270 | Spring | 6.6 | 8.9 | 5.0 |
| 112.5 | Summer | 5.4 | 3.5 | 13.0 | 292.5 | Summer | 5.1 | 6.4 | 3.8 |
| 112.5 | Autumn | 6.6 | 9.3 | 14.2 | 292.5 | Autumn | 4.0 | 5.3 | 3.8 |
| 112.5 | Winter | 4.7 | 4.2 | 10.2 | 292.5 | Winter | 5.2 | 6.1 | 5.3 |
| 112.5 | Spring | 3.4 | 5.4 | 12.6 | 292.5 | Spring | 5.6 | 7.4 | 3.9 |
| 135 | Summer | 6.0 | 3.3 | 9.7 | 315 | Summer | 3.4 | 4.1 | 3.3 |
| 135 | Autumn | 6.4 | 9.2 | 12.4 | 315 | Autumn | 2.6 | 2.3 | 3.7 |
| 135 | Winter | 5.0 | 4.8 | 9.4 | 315 | Winter | 3.2 | 4.6 | 4.3 |
| 135 | Spring | 3.5 | 5.9 | 10.9 | 315 | Spring | 3.6 | 4.7 | 3.8 |
| 157.5 | Summer | 3.5 | 2.2 | 4.1 | 337.5 | Summer | 2.6 | 3.1 | 3.1 |
| 157.5 | Autumn | 4.4 | 5.3 | 6.9 | 337.5 | Autumn | 2.4 | 2.1 | 4.6 |
| 157.5 | Winter | 2.9 | 3.7 | 6.6 | 337.5 | Winter | 2.4 | 4.8 | 3.9 |
| 157.5 | Spring | 2.3 | 4.9 | 5.2 | 337.5 | Spring | 2.5 | 4.2 | 3.9 |

# Appendix D – Tabulated Results

| Construction | | NML dB LAeq(15min) | Operations | | | Operation - including LFN Penalty | | | PNTL dB LAeq(15min) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Day | | | | | | | Day | | | Evening | | Night |
| Comply | | <45dBA | PNL < PNTL (Comply) | | | Distant Rural/ Walkom Road | | | 40 | | | 35 | | 35 |
| Management Zone | | 45-50dBA | PNTL-PNL <2dB | | | Sturgeon Hill | | | 40 | | | 38 | | 35 |
| Additonal Mitigation & Management Measures (AMMM | | >50dBA | 2dB < PNTL-PNL <5dB | | | Kings Plains | | | 41 | | | 36 | | 35 |
| Catchment | Receiver | Construction | Year1 | | | Year2 | | | Year4 | | | Year8 | | |
| | | Day | Day | Evening | Night | Day | Evening | Night | Day | Evening | Night | Day | Evening | Night |
| Distant Rural | R01 | 25-31 | 31 | 31 | 31 | 32 | 31 | 31 | 27 | 25 | 25 | 22 | 24 | 24 |
| Distant Rural | R02 | 23-29 | 29 | 30 | 30 | 29 | 30 | 30 | 25 | 23 | 23 | 21 | 22 | 22 |
| Distant Rural | R03 | 23-29 | 29 | 30 | 30 | 28 | 30 | 30 | 25 | 23 | 23 | 21 | 22 | 22 |
| Distant Rural | R04 | 22-27 | 29 | 27 | 27 | 26 | 27 | 27 | 23 | 22 | 22 | 20 | 22 | 21 |
| Distant Rural | R05 | 22-26 | 28 | 26 | 26 | 25 | 28 | 26 | 22 | 22 | 22 | 20 | 22 | 21 |
| Distant Rural | R06 | 32-34 | 34 | 32 | 32 | 33 | 32 | 32 | 32 | 32 | 32 | 30 | 33 | 31 |
| Distant Rural | R07 | 31-33 | 33 | 31 | 31 | 32 | 31 | 31 | 31 | 31 | 31 | 29 | 32 | 30 |
| Distant Rural | R08 | 26-28 | 30 | 28 | 28 | 28 | 28 | 28 | 26 | 27 | 27 | 24 | 26 | 26 |
| Distant Rural | R09 | 25-28 | 30 | 26 | 26 | 27 | 28 | 28 | 25 | 25 | 25 | 23 | 25 | 23 |
| Distant Rural | R10 | 26-28 | 30 | 25 | 25 | 28 | 27 | 27 | 26 | 25 | 25 | 24 | 25 | 23 |
| Distant Rural | R11 | 28-29 | 31 | 29 | 29 | 28 | 29 | 29 | 28 | 28 | 28 | 26 | 28 | 27 |
| Distant Rural | R12 | 30-31 | 31 | 29 | 29 | 30 | 29 | 29 | 28 | 28 | 28 | 26 | 28 | 27 |
| Distant Rural | R13 | 25-28 | 30 | 26 | 26 | 26 | 28 | 28 | 24 | 24 | 24 | 22 | 24 | 23 |
| Distant Rural | R14 | 30-31 | 33 | 30 | 30 | 32 | 32 | 32 | 31 | 31 | 31 | 28 | 30 | 29 |
| Distant Rural | R52 | 21-25 | 27 | 23 | 23 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| Distant Rural | R53 | 21-25 | 27 | 23 | 23 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| Distant Rural | R54 | 22-25 | 27 | 21 | 23 | 25 | 23 | 23 | 19 | 20 | 20 | 18 | 21 | 19 |
| Distant Rural | R55 | 21-25 | 27 | 23 | 23 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| Distant Rural | R56 | 21-25 | 27 | 23 | 23 | 24 | 25 | 25 | 19 | 20 | 20 | 19 | 21 | 19 |
| Distant Rural | R57 | 21-25 | 27 | 23 | 23 | 24 | 25 | 25 | 19 | 20 | 20 | 19 | 21 | 19 |
| Distant Rural | R58 | 24-27 | 29 | 26 | 26 | 27 | 28 | 28 | 24 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R59 | 23-27 | 29 | 24 | 24 | 25 | 26 | 26 | 20 | 22 | 22 | 19 | 21 | 21 |
| Distant Rural | R60 | 25-28 | 30 | 26 | 26 | 28 | 28 | 28 | 25 | 27 | 27 | 23 | 25 | 25 |
| Distant Rural | R61 | 25-28 | 30 | 26 | 26 | 28 | 28 | 28 | 26 | 28 | 28 | 23 | 25 | 25 |
| Distant Rural | R62 | 25-28 | 30 | 26 | 26 | 28 | 28 | 28 | 26 | 28 | 28 | 23 | 25 | 25 |
| Distant Rural | R63 | 25-28 | 30 | 27 | 27 | 28 | 29 | 29 | 26 | 28 | 28 | 23 | 25 | 25 |
| Distant Rural | R64 | 25-27 | 31 | 26 | 26 | 28 | 28 | 28 | 26 | 28 | 28 | 23 | 25 | 25 |
| Distant Rural | R65 | 24-27 | 31 | 25 | 25 | 29 | 27 | 27 | 25 | 27 | 27 | 22 | 26 | 24 |
| Distant Rural | R66 | 25-28 | 30 | 27 | 27 | 28 | 29 | 29 | 26 | 28 | 28 | 21 | 25 | 25 |
| Distant Rural | R67 | 25-28 | 30 | 25 | 25 | 28 | 27 | 27 | 23 | 25 | 25 | 21 | 23 | 23 |
| Distant Rural | R68 | 25-28 | 30 | 27 | 27 | 28 | 29 | 29 | 26 | 28 | 28 | 21 | 23 | 23 |
| Distant Rural | R69 | 24-27 | 29 | 26 | 26 | 27 | 28 | 28 | 25 | 27 | 27 | 22 | 24 | 24 |
| Distant Rural | R70 | 25-28 | 30 | 26 | 26 | 27 | 28 | 28 | 22 | 24 | 24 | 21 | 23 | 23 |
| Distant Rural | R71 | 25-28 | 30 | 26 | 26 | 27 | 28 | 28 | 22 | 24 | 24 | 21 | 23 | 23 |
| Distant Rural | R72 | 24-27 | 29 | 26 | 26 | 26 | 28 | 28 | 21 | 23 | 23 | 20 | 22 | 22 |
| Distant Rural | R73 | 24-27 | 29 | 26 | 26 | 26 | 28 | 28 | 21 | 23 | 23 | 20 | 22 | 22 |
| Distant Rural | R74 | 26-28 | 30 | 27 | 27 | 28 | 29 | 29 | 26 | 28 | 28 | 21 | 23 | 23 |
| Distant Rural | R75 | 30-32 | 32 | 31 | 31 | 30 | 33 | 33 | 27 | 29 | 29 | 25 | 27 | 27 |
| Distant Rural | R76 | 32-34 | 34 | 33 | 33 | 32 | 33 | 33 | 28 | 30 | 30 | 27 | 29 | 29 |
| Distant Rural | R77 | 25-27 | 31 | 29 | 29 | 28 | 29 | 29 | 25 | 27 | 27 | 21 | 23 | 23 |
| Distant Rural | R78 | 25-28 | 30 | 26 | 26 | 26 | 28 | 28 | 22 | 24 | 24 | 21 | 23 | 23 |
| Distant Rural | R79 | 23-26 | 30 | 25 | 25 | 27 | 27 | 27 | 24 | 26 | 26 | 20 | 22 | 22 |
| Distant Rural | R80 | 22-26 | 28 | 26 | 26 | 26 | 28 | 28 | 22 | 25 | 25 | 19 | 21 | 21 |
| Distant Rural | R81 | 23-26 | 28 | 26 | 26 | 26 | 28 | 28 | 22 | 23 | 23 | 20 | 22 | 21 |

| Construction | | NML dB LAeq(15min) | Operations | | | Operation - including LFN Penalty | | | PNTL dB LAeq(15min) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Day | | | | | | | Day | | | Evening | | Night |
| Comply | | <45dBA | PNL < PNTL (Comply) | | | Distant Rural/ Walkom Road | | | 40 | | | 35 | | 35 |
| Management Zone | | 45-50dBA | PNTL-PNL <2dB | | | Sturgeon Hill | | | 40 | | | 38 | | 35 |
| Additonal Mitigation & Management Measures (AMMM | | >50dBA | 2dB < PNTL-PNL <5dB | | | Kings Plains | | | 41 | | | 36 | | 35 |
| Catchment | Receiver | Construction | Year1 | | | Year2 | | | Year4 | | | Year8 | | |
| | | Day | Day | Evening | Night | Day | Evening | Night | Day | Evening | Night | Day | Evening | Night |
| Distant Rural | R82 | 24-27 | 29 | 27 | 27 | 28 | 29 | 29 | 22 | 23 | 23 | 21 | 23 | 23 |
| Distant Rural | R83 | 24-28 | 30 | 28 | 28 | 28 | 30 | 30 | 23 | 24 | 24 | 21 | 23 | 23 |
| Distant Rural | R84 | 26-30 | 30 | 29 | 29 | 29 | 31 | 31 | 24 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R85 | 25-29 | 31 | 30 | 30 | 30 | 30 | 30 | 25 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R86 | 25-29 | 31 | 30 | 30 | 30 | 30 | 30 | 25 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R87 | 25-29 | 31 | 30 | 30 | 30 | 30 | 30 | 25 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R88 | 27-30 | 32 | 31 | 31 | 31 | 31 | 31 | 25 | 26 | 26 | 23 | 25 | 25 |
| Kings Plains | R15 | 36-39 | 36 | 34 | 34 | 37 | 34 | 34 | 35 | 33 | 33 | 32 | 33 | 32 |
| Kings Plains | R16 | 41-46 | 43 | 36 | 36 | 38 | 34 | 34 | 38 | 34 | 34 | 34 | 34 | 32 |
| Kings Plains | R17 | 45-51 | 45 | 37 | 37 | 40 | 35 | 35 | 38 | 32 | 32 | 34 | 32 | 31 |
| Kings Plains | R25 | 42-44 | 44 | 38 | 38 | 40 | 36 | 36 | 35 | 35 | 35 | 34 | 35 | 34 |
| Kings Plains | R26 | 42-44 | 44 | 38 | 38 | 41 | 36 | 36 | 35 | 36 | 36 | 34 | 35 | 34 |
| Kings Plains | R27 | 43-45 | 45 | 38 | 38 | 41 | 38 | 38 | 35 | 36 | 36 | 34 | 35 | 34 |
| Kings Plains | R28 | 42-45 | 45 | 38 | 38 | 41 | 38 | 38 | 35 | 36 | 36 | 34 | 35 | 34 |
| Kings Plains | R29 | 42-44 | 44 | 38 | 38 | 40 | 38 | 38 | 35 | 36 | 36 | 33 | 35 | 34 |
| Kings Plains | R30 | 43-45 | 45 | 39 | 39 | 41 | 37 | 37 | 35 | 36 | 36 | 34 | 35 | 35 |
| Kings Plains | R31 | 41-44 | 44 | 38 | 38 | 40 | 38 | 38 | 34 | 36 | 36 | 33 | 35 | 34 |
| Kings Plains | R32 | 41-43 | 43 | 38 | 38 | 38 | 38 | 38 | 33 | 35 | 35 | 31 | 34 | 33 |
| Kings Plains | R33 | 42-44 | 44 | 38 | 38 | 39 | 38 | 38 | 33 | 35 | 35 | 32 | 34 | 33 |
| Walkom Road | R18 | 39-40 | 40 | 37 | 37 | 40 | 35 | 35 | 35 | 35 | 35 | 33 | 34 | 33 |
| Walkom Road | R19 | 42-43 | 43 | 38 | 38 | 38 | 36 | 36 | 35 | 35 | 35 | 34 | 34 | 33 |
| Walkom Road | R20 | 40-42 | 42 | 37 | 37 | 39 | 35 | 35 | 34 | 35 | 35 | 33 | 34 | 33 |
| Walkom Road | R21 | 40-42 | 42 | 38 | 38 | 35 | 36 | 36 | 35 | 35 | 35 | 33 | 34 | 33 |
| Walkom Road | R22 | 36-38 | 38 | 32 | 32 | 39 | 34 | 32 | 30 | 30 | 30 | 29 | 30 | 29 |
| Walkom Road | R23 | 41-43 | 43 | 38 | 38 | 40 | 36 | 36 | 34 | 35 | 35 | 33 | 34 | 34 |
| Walkom Road | R24 | 42-44 | 44 | 38 | 38 | 38 | 36 | 36 | 35 | 35 | 35 | 33 | 35 | 34 |
| Sturgeon Hill | R34 | 39-42 | 42 | 38 | 38 | 37 | 36 | 36 | 31 | 34 | 34 | 30 | 33 | 32 |
| Sturgeon Hill | R35 | 36-39 | 39 | 32 | 32 | 34 | 34 | 34 | 29 | 31 | 31 | 28 | 31 | 30 |
| Sturgeon Hill | R36 | 36-39 | 39 | 36 | 36 | 35 | 36 | 36 | 30 | 33 | 33 | 29 | 31 | 31 |
| Sturgeon Hill | R37 | 35-38 | 38 | 33 | 33 | 34 | 33 | 33 | 29 | 31 | 31 | 28 | 30 | 30 |
| Sturgeon Hill | R38 | 38-41 | 41 | 38 | 38 | 36 | 38 | 38 | 31 | 34 | 34 | 30 | 33 | 33 |
| Sturgeon Hill | R39 | 33-36 | 36 | 34 | 34 | 33 | 34 | 34 | 29 | 31 | 31 | 27 | 29 | 29 |
| Sturgeon Hill | R40 | 34-36 | 36 | 33 | 33 | 33 | 33 | 33 | 28 | 30 | 30 | 27 | 29 | 29 |
| Sturgeon Hill | R41 | 33-35 | 35 | 33 | 33 | 32 | 35 | 35 | 28 | 31 | 31 | 26 | 29 | 29 |
| Sturgeon Hill | R42 | 32-35 | 35 | 32 | 32 | 32 | 32 | 32 | 27 | 29 | 29 | 26 | 28 | 28 |
| Sturgeon Hill | R43 | 32-35 | 35 | 29 | 31 | 31 | 31 | 31 | 27 | 29 | 29 | 26 | 28 | 28 |
| Sturgeon Hill | R44 | 31-34 | 34 | 32 | 32 | 31 | 34 | 34 | 27 | 29 | 29 | 25 | 27 | 27 |
| Sturgeon Hill | R45 | 31-34 | 34 | 32 | 32 | 31 | 32 | 32 | 26 | 29 | 29 | 25 | 27 | 27 |
| Sturgeon Hill | R46 | 31-33 | 33 | 31 | 31 | 31 | 33 | 33 | 26 | 28 | 28 | 25 | 27 | 27 |
| Sturgeon Hill | R47 | 31-33 | 33 | 29 | 29 | 30 | 31 | 31 | 26 | 28 | 28 | 25 | 28 | 27 |
| Sturgeon Hill | R48 | 31-34 | 34 | 29 | 29 | 31 | 31 | 31 | 26 | 29 | 29 | 25 | 28 | 27 |
| Sturgeon Hill | R49 | 29-32 | 32 | 30 | 30 | 30 | 32 | 32 | 25 | 27 | 27 | 24 | 26 | 26 |
| Sturgeon Hill | R50 | 26-29 | 31 | 28 | 28 | 27 | 30 | 30 | 23 | 25 | 25 | 21 | 24 | 23 |
| Sturgeon Hill | R51 | 22-25 | 27 | 25 | 25 | 26 | 27 | 27 | 23 | 25 | 25 | 19 | 21 | 22 |

| Catchment | dBA | Year 1 | | | Year 2 | | | Year 4 | | | Year 8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Receiver | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night |
| Distant Rural | R01 | 31 | 31 | 31 | 32 | 31 | 31 | 27 | 25 | 25 | 22 | 24 | 24 |
| Distant Rural | R02 | 29 | 30 | 30 | 29 | 30 | 30 | 25 | 23 | 23 | 21 | 22 | 22 |
| Distant Rural | R03 | 29 | 30 | 30 | 28 | 30 | 30 | 25 | 23 | 23 | 21 | 22 | 22 |
| Distant Rural | R04 | 29 | 27 | 27 | 26 | 27 | 27 | 23 | 22 | 22 | 20 | 22 | 21 |
| Distant Rural | R05 | 28 | 26 | 26 | 25 | 28 | 26 | 22 | 22 | 22 | 20 | 22 | 21 |
| Distant Rural | R06 | 34 | 32 | 32 | 33 | 32 | 32 | 32 | 32 | 32 | 30 | 33 | 31 |
| Distant Rural | R07 | 33 | 31 | 31 | 32 | 31 | 31 | 31 | 31 | 31 | 29 | 32 | 30 |
| Distant Rural | R08 | 30 | 28 | 28 | 28 | 28 | 28 | 26 | 27 | 27 | 24 | 26 | 26 |
| Distant Rural | R09 | 30 | 26 | 26 | 27 | 28 | 28 | 25 | 25 | 25 | 23 | 25 | 23 |
| Distant Rural | R10 | 30 | 25 | 25 | 28 | 27 | 27 | 26 | 25 | 25 | 24 | 25 | 23 |
| Distant Rural | R11 | 31 | 29 | 29 | 28 | 29 | 29 | 28 | 28 | 28 | 26 | 28 | 27 |
| Distant Rural | R12 | 31 | 29 | 29 | 30 | 29 | 29 | 28 | 28 | 28 | 26 | 28 | 27 |
| Distant Rural | R13 | 30 | 26 | 26 | 26 | 28 | 28 | 24 | 24 | 24 | 22 | 24 | 23 |
| Distant Rural | R14 | 33 | 30 | 30 | 32 | 32 | 32 | 31 | 31 | 31 | 28 | 30 | 29 |
| Distant Rural | R52 | 36 | 34 | 34 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| Distant Rural | R53 | 43 | 36 | 36 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| Distant Rural | R54 | 45 | 37 | 37 | 25 | 23 | 23 | 19 | 20 | 20 | 18 | 21 | 19 |
| Distant Rural | R55 | 40 | 37 | 37 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| Distant Rural | R56 | 43 | 38 | 38 | 24 | 25 | 25 | 19 | 20 | 20 | 19 | 21 | 19 |
| Distant Rural | R57 | 42 | 37 | 37 | 24 | 25 | 25 | 19 | 20 | 20 | 19 | 21 | 19 |
| Distant Rural | R58 | 42 | 38 | 38 | 27 | 28 | 28 | 24 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R59 | 38 | 32 | 32 | 25 | 26 | 26 | 20 | 22 | 22 | 19 | 21 | 21 |
| Distant Rural | R60 | 43 | 38 | 38 | 28 | 28 | 28 | 25 | 27 | 27 | 23 | 25 | 25 |
| Distant Rural | R61 | 44 | 38 | 38 | 28 | 28 | 28 | 26 | 28 | 28 | 23 | 25 | 25 |
| Distant Rural | R62 | 44 | 38 | 38 | 28 | 28 | 28 | 26 | 28 | 28 | 23 | 25 | 25 |
| Distant Rural | R63 | 44 | 38 | 38 | 28 | 29 | 29 | 26 | 28 | 28 | 23 | 25 | 25 |
| Distant Rural | R64 | 45 | 38 | 38 | 28 | 28 | 28 | 26 | 28 | 28 | 23 | 25 | 25 |
| Distant Rural | R65 | 45 | 38 | 38 | 29 | 27 | 27 | 25 | 27 | 27 | 22 | 26 | 24 |
| Distant Rural | R66 | 44 | 38 | 38 | 28 | 29 | 29 | 26 | 28 | 28 | 21 | 25 | 25 |
| Distant Rural | R67 | 45 | 39 | 39 | 28 | 27 | 27 | 23 | 25 | 25 | 21 | 23 | 23 |
| Distant Rural | R68 | 44 | 38 | 38 | 28 | 29 | 29 | 26 | 28 | 28 | 21 | 23 | 23 |
| Distant Rural | R69 | 43 | 38 | 38 | 27 | 28 | 28 | 25 | 27 | 27 | 22 | 24 | 24 |
| Distant Rural | R70 | 44 | 38 | 38 | 27 | 28 | 28 | 22 | 24 | 24 | 21 | 23 | 23 |
| Distant Rural | R71 | 42 | 38 | 38 | 27 | 28 | 28 | 22 | 24 | 24 | 21 | 23 | 23 |
| Distant Rural | R72 | 39 | 32 | 32 | 26 | 28 | 28 | 21 | 23 | 23 | 20 | 22 | 22 |
| Distant Rural | R73 | 39 | 36 | 36 | 26 | 28 | 28 | 21 | 23 | 23 | 20 | 22 | 22 |
| Distant Rural | R74 | 38 | 33 | 33 | 28 | 29 | 29 | 26 | 28 | 28 | 21 | 23 | 23 |
| Distant Rural | R75 | 41 | 38 | 38 | 30 | 33 | 33 | 27 | 29 | 29 | 25 | 27 | 27 |
| Distant Rural | R76 | 36 | 34 | 34 | 32 | 33 | 33 | 28 | 30 | 30 | 27 | 29 | 29 |
| Distant Rural | R77 | 36 | 33 | 33 | 28 | 29 | 29 | 25 | 27 | 27 | 21 | 23 | 23 |
| Distant Rural | R78 | 35 | 33 | 33 | 26 | 28 | 28 | 22 | 24 | 24 | 21 | 23 | 23 |
| Distant Rural | R79 | 35 | 32 | 32 | 27 | 27 | 27 | 24 | 26 | 26 | 20 | 22 | 22 |
| Distant Rural | R80 | 35 | 29 | 31 | 26 | 28 | 28 | 22 | 25 | 25 | 19 | 21 | 21 |
| Distant Rural | R81 | 34 | 32 | 32 | 26 | 28 | 28 | 22 | 23 | 23 | 20 | 22 | 21 |
| Distant Rural | R82 | 34 | 32 | 32 | 28 | 29 | 29 | 22 | 23 | 23 | 21 | 23 | 23 |
| Distant Rural | R83 | 33 | 31 | 31 | 28 | 30 | 30 | 23 | 24 | 24 | 21 | 23 | 23 |
| Distant Rural | R84 | 33 | 29 | 29 | 29 | 31 | 31 | 24 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R85 | 34 | 29 | 29 | 30 | 30 | 30 | 25 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R86 | 32 | 30 | 30 | 30 | 30 | 30 | 25 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R87 | 31 | 28 | 28 | 30 | 30 | 30 | 25 | 26 | 26 | 22 | 24 | 24 |
| Distant Rural | R88 | 27 | 25 | 25 | 31 | 31 | 31 | 25 | 26 | 26 | 23 | 25 | 25 |
| Kings Plains | R15 | 27 | 23 | 23 | 37 | 34 | 34 | 35 | 33 | 33 | 32 | 33 | 32 |
| Kings Plains | R16 | 27 | 23 | 23 | 38 | 34 | 34 | 38 | 34 | 34 | 34 | 34 | 32 |
| Kings Plains | R17 | 27 | 21 | 23 | 40 | 35 | 35 | 38 | 32 | 32 | 34 | 32 | 31 |
| Kings Plains | R25 | 27 | 23 | 23 | 40 | 36 | 36 | 35 | 35 | 35 | 34 | 35 | 34 |
| Kings Plains | R26 | 27 | 23 | 23 | 41 | 36 | 36 | 35 | 36 | 36 | 34 | 35 | 34 |
| Kings Plains | R27 | 27 | 23 | 23 | 41 | 38 | 38 | 35 | 36 | 36 | 34 | 35 | 34 |
| Kings Plains | R28 | 29 | 26 | 26 | 41 | 38 | 38 | 35 | 36 | 36 | 34 | 35 | 34 |
| Kings Plains | R29 | 29 | 24 | 24 | 40 | 38 | 38 | 35 | 36 | 36 | 33 | 35 | 34 |
| Kings Plains | R30 | 30 | 26 | 26 | 41 | 37 | 37 | 35 | 36 | 36 | 34 | 35 | 35 |
| Kings Plains | R31 | 30 | 26 | 26 | 40 | 38 | 38 | 34 | 36 | 36 | 33 | 35 | 34 |
| Kings Plains | R32 | 30 | 26 | 26 | 38 | 38 | 38 | 33 | 35 | 35 | 31 | 34 | 33 |
| Kings Plains | R33 | 30 | 27 | 27 | 39 | 38 | 38 | 33 | 35 | 35 | 32 | 34 | 33 |
| Walkom Road | R18 | 31 | 26 | 26 | 40 | 35 | 35 | 35 | 35 | 35 | 33 | 34 | 33 |
| Walkom Road | R19 | 31 | 25 | 25 | 38 | 36 | 36 | 35 | 35 | 35 | 34 | 34 | 33 |
| Walkom Road | R20 | 30 | 27 | 27 | 39 | 35 | 35 | 34 | 35 | 35 | 33 | 34 | 33 |
| Walkom Road | R21 | 30 | 25 | 25 | 35 | 36 | 36 | 35 | 35 | 35 | 33 | 34 | 33 |
| Walkom Road | R22 | 30 | 27 | 27 | 39 | 34 | 32 | 30 | 30 | 30 | 29 | 30 | 29 |
| Walkom Road | R23 | 29 | 26 | 26 | 40 | 36 | 36 | 34 | 35 | 35 | 33 | 34 | 34 |
| Walkom Road | R24 | 30 | 26 | 26 | 38 | 36 | 36 | 35 | 35 | 35 | 33 | 35 | 34 |

| Catchment | dBA | Year 1 | | | Year 2 | | | Year 4 | | | Year 8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Receiver | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night |
| Sturgeon Hill | R34 | 30 | 26 | 26 | 37 | 36 | 36 | 31 | 34 | 34 | 30 | 33 | 32 |
| Sturgeon Hill | R35 | 29 | 26 | 26 | 34 | 34 | 34 | 29 | 31 | 31 | 28 | 31 | 30 |
| Sturgeon Hill | R36 | 29 | 26 | 26 | 35 | 36 | 36 | 30 | 33 | 33 | 29 | 31 | 31 |
| Sturgeon Hill | R37 | 30 | 27 | 27 | 34 | 33 | 33 | 29 | 31 | 31 | 28 | 30 | 30 |
| Sturgeon Hill | R38 | 32 | 31 | 31 | 36 | 38 | 38 | 31 | 34 | 34 | 30 | 33 | 33 |
| Sturgeon Hill | R39 | 34 | 33 | 33 | 33 | 34 | 34 | 29 | 31 | 31 | 27 | 29 | 29 |
| Sturgeon Hill | R40 | 31 | 29 | 29 | 33 | 33 | 33 | 28 | 30 | 30 | 27 | 29 | 29 |
| Sturgeon Hill | R41 | 30 | 26 | 26 | 32 | 35 | 35 | 28 | 31 | 31 | 26 | 29 | 29 |
| Sturgeon Hill | R42 | 30 | 25 | 25 | 32 | 32 | 32 | 27 | 29 | 29 | 26 | 28 | 28 |
| Sturgeon Hill | R43 | 28 | 26 | 26 | 31 | 31 | 31 | 27 | 29 | 29 | 26 | 28 | 28 |
| Sturgeon Hill | R44 | 28 | 26 | 26 | 31 | 34 | 34 | 27 | 29 | 29 | 25 | 27 | 27 |
| Sturgeon Hill | R45 | 29 | 27 | 27 | 31 | 32 | 32 | 26 | 29 | 29 | 25 | 27 | 27 |
| Sturgeon Hill | R46 | 30 | 28 | 28 | 31 | 33 | 33 | 26 | 28 | 28 | 25 | 27 | 27 |
| Sturgeon Hill | R47 | 30 | 29 | 29 | 30 | 31 | 31 | 26 | 28 | 28 | 25 | 28 | 27 |
| Sturgeon Hill | R48 | 31 | 30 | 30 | 31 | 31 | 31 | 26 | 29 | 29 | 25 | 28 | 27 |
| Sturgeon Hill | R49 | 31 | 30 | 30 | 30 | 32 | 32 | 25 | 27 | 27 | 24 | 26 | 26 |
| Sturgeon Hill | R50 | 31 | 30 | 30 | 27 | 30 | 30 | 23 | 25 | 25 | 21 | 24 | 23 |
| Sturgeon Hill | R51 | 32 | 31 | 31 | 26 | 27 | 27 | 23 | 25 | 25 | 19 | 21 | 22 |

| Catchment | dBC | Year 1 | | | Year 2 | | | Year 4 | | | Year 8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Receiver | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night |
| Distant Rural | R01 | 46 | 45 | 45 | 44 | 45 | 45 | 39 | 40 | 40 | 36 | 38 | 38 |
| Distant Rural | R02 | 44 | 44 | 44 | 42 | 44 | 44 | 36 | 37 | 37 | 35 | 37 | 37 |
| Distant Rural | R03 | 44 | 44 | 44 | 42 | 44 | 44 | 37 | 37 | 37 | 35 | 37 | 37 |
| Distant Rural | R04 | 43 | 43 | 43 | 41 | 42 | 42 | 35 | 36 | 36 | 34 | 36 | 36 |
| Distant Rural | R05 | 43 | 43 | 43 | 40 | 42 | 41 | 35 | 35 | 35 | 34 | 36 | 36 |
| Distant Rural | R06 | 48 | 49 | 48 | 45 | 47 | 46 | 42 | 44 | 44 | 40 | 43 | 43 |
| Distant Rural | R07 | 47 | 48 | 47 | 44 | 46 | 45 | 41 | 43 | 43 | 39 | 42 | 42 |
| Distant Rural | R08 | 45 | 46 | 46 | 42 | 43 | 43 | 39 | 41 | 41 | 37 | 39 | 39 |
| Distant Rural | R09 | 44 | 45 | 45 | 41 | 42 | 42 | 37 | 37 | 37 | 35 | 38 | 37 |
| Distant Rural | R10 | 44 | 45 | 45 | 41 | 42 | 41 | 37 | 38 | 38 | 35 | 37 | 37 |
| Distant Rural | R11 | 45 | 47 | 46 | 42 | 44 | 44 | 40 | 42 | 42 | 38 | 40 | 40 |
| Distant Rural | R12 | 46 | 48 | 47 | 43 | 44 | 44 | 39 | 40 | 40 | 38 | 40 | 40 |
| Distant Rural | R13 | 44 | 45 | 45 | 40 | 42 | 42 | 36 | 37 | 37 | 35 | 37 | 37 |
| Distant Rural | R14 | 47 | 48 | 48 | 46 | 46 | 46 | 43 | 44 | 44 | 40 | 42 | 42 |
| Distant Rural | R52 | 50 | 51 | 51 | 39 | 41 | 41 | 34 | 35 | 35 | 33 | 34 | 34 |
| Distant Rural | R53 | 53 | 53 | 52 | 39 | 41 | 41 | 34 | 35 | 35 | 33 | 34 | 34 |
| Distant Rural | R54 | 54 | 54 | 53 | 39 | 40 | 40 | 33 | 34 | 34 | 33 | 35 | 34 |
| Distant Rural | R55 | 52 | 54 | 53 | 39 | 41 | 41 | 34 | 35 | 35 | 33 | 34 | 34 |
| Distant Rural | R56 | 53 | 56 | 55 | 39 | 41 | 41 | 34 | 35 | 35 | 33 | 35 | 34 |
| Distant Rural | R57 | 53 | 55 | 54 | 39 | 41 | 41 | 34 | 35 | 35 | 33 | 35 | 34 |
| Distant Rural | R58 | 53 | 56 | 55 | 42 | 44 | 44 | 38 | 40 | 40 | 37 | 39 | 38 |
| Distant Rural | R59 | 50 | 53 | 52 | 40 | 42 | 42 | 34 | 35 | 35 | 34 | 36 | 36 |
| Distant Rural | R60 | 53 | 56 | 55 | 43 | 45 | 45 | 39 | 41 | 41 | 37 | 39 | 39 |
| Distant Rural | R61 | 54 | 56 | 55 | 43 | 45 | 45 | 40 | 42 | 42 | 37 | 39 | 39 |
| Distant Rural | R62 | 54 | 56 | 55 | 43 | 45 | 45 | 40 | 42 | 42 | 37 | 39 | 39 |
| Distant Rural | R63 | 54 | 57 | 56 | 43 | 45 | 45 | 40 | 42 | 42 | 37 | 39 | 39 |
| Distant Rural | R64 | 54 | 57 | 56 | 43 | 45 | 45 | 40 | 42 | 42 | 37 | 39 | 39 |
| Distant Rural | R65 | 55 | 57 | 56 | 43 | 45 | 44 | 39 | 42 | 42 | 37 | 40 | 39 |
| Distant Rural | R66 | 54 | 57 | 56 | 43 | 45 | 45 | 40 | 42 | 42 | 36 | 39 | 39 |
| Distant Rural | R67 | 55 | 57 | 57 | 42 | 44 | 44 | 38 | 40 | 40 | 35 | 37 | 37 |
| Distant Rural | R68 | 53 | 56 | 56 | 43 | 45 | 44 | 40 | 42 | 42 | 36 | 38 | 38 |
| Distant Rural | R69 | 52 | 56 | 55 | 42 | 44 | 44 | 39 | 41 | 41 | 36 | 38 | 38 |
| Distant Rural | R70 | 53 | 56 | 56 | 41 | 43 | 43 | 35 | 37 | 37 | 35 | 37 | 37 |
| Distant Rural | R71 | 52 | 55 | 54 | 41 | 43 | 43 | 35 | 37 | 37 | 35 | 37 | 37 |
| Distant Rural | R72 | 50 | 53 | 53 | 41 | 43 | 43 | 35 | 37 | 37 | 35 | 37 | 37 |
| Distant Rural | R73 | 50 | 53 | 53 | 41 | 43 | 43 | 36 | 37 | 37 | 35 | 37 | 37 |
| Distant Rural | R74 | 50 | 52 | 52 | 43 | 45 | 45 | 40 | 42 | 42 | 36 | 38 | 38 |
| Distant Rural | R75 | 51 | 54 | 54 | 45 | 47 | 47 | 41 | 44 | 44 | 38 | 41 | 41 |
| Distant Rural | R76 | 49 | 52 | 51 | 45 | 48 | 48 | 40 | 42 | 42 | 39 | 42 | 42 |
| Distant Rural | R77 | 49 | 52 | 52 | 42 | 44 | 44 | 39 | 42 | 42 | 36 | 38 | 38 |
| Distant Rural | R78 | 49 | 51 | 51 | 41 | 43 | 43 | 35 | 37 | 37 | 35 | 37 | 37 |
| Distant Rural | R79 | 48 | 51 | 51 | 42 | 43 | 43 | 39 | 41 | 41 | 35 | 37 | 37 |
| Distant Rural | R80 | 48 | 51 | 51 | 41 | 43 | 43 | 37 | 39 | 39 | 34 | 36 | 36 |
| Distant Rural | R81 | 48 | 50 | 50 | 41 | 43 | 43 | 35 | 37 | 37 | 34 | 36 | 36 |
| Distant Rural | R82 | 48 | 50 | 50 | 42 | 43 | 43 | 36 | 37 | 37 | 35 | 37 | 37 |
| Distant Rural | R83 | 47 | 50 | 50 | 42 | 44 | 44 | 36 | 38 | 38 | 35 | 37 | 37 |
| Distant Rural | R84 | 47 | 50 | 50 | 43 | 45 | 45 | 38 | 40 | 40 | 36 | 38 | 38 |
| Distant Rural | R85 | 48 | 50 | 50 | 43 | 45 | 45 | 39 | 41 | 41 | 36 | 38 | 38 |
| Distant Rural | R86 | 46 | 49 | 48 | 43 | 45 | 45 | 39 | 41 | 41 | 36 | 38 | 38 |
| Distant Rural | R87 | 45 | 47 | 47 | 43 | 45 | 45 | 39 | 40 | 40 | 36 | 38 | 38 |
| Distant Rural | R88 | 42 | 44 | 44 | 44 | 45 | 45 | 37 | 38 | 38 | 37 | 39 | 39 |
| Kings Plains | R15 | 42 | 43 | 43 | 49 | 49 | 49 | 47 | 45 | 45 | 41 | 44 | 43 |
| Kings Plains | R16 | 42 | 44 | 43 | 50 | 49 | 49 | 51 | 45 | 45 | 42 | 44 | 44 |
| Kings Plains | R17 | 42 | 44 | 44 | 51 | 49 | 49 | 52 | 44 | 44 | 42 | 44 | 43 |
| Kings Plains | R25 | 42 | 43 | 43 | 49 | 51 | 51 | 45 | 47 | 47 | 43 | 45 | 45 |
| Kings Plains | R26 | 42 | 44 | 43 | 49 | 51 | 51 | 45 | 47 | 47 | 43 | 46 | 45 |
| Kings Plains | R27 | 42 | 44 | 43 | 49 | 52 | 52 | 45 | 47 | 47 | 43 | 46 | 45 |
| Kings Plains | R28 | 44 | 45 | 45 | 50 | 52 | 52 | 45 | 47 | 47 | 43 | 46 | 45 |
| Kings Plains | R29 | 43 | 45 | 45 | 49 | 52 | 52 | 45 | 47 | 47 | 43 | 46 | 45 |
| Kings Plains | R30 | 44 | 46 | 46 | 50 | 52 | 52 | 46 | 48 | 48 | 43 | 46 | 46 |
| Kings Plains | R31 | 45 | 46 | 46 | 49 | 52 | 52 | 45 | 47 | 47 | 43 | 46 | 45 |
| Kings Plains | R32 | 45 | 47 | 46 | 49 | 52 | 52 | 44 | 47 | 47 | 42 | 45 | 44 |
| Kings Plains | R33 | 45 | 47 | 46 | 49 | 52 | 52 | 44 | 47 | 47 | 42 | 45 | 45 |
| Walkom Road | R18 | 45 | 46 | 46 | 48 | 50 | 50 | 46 | 47 | 47 | 42 | 45 | 44 |
| Walkom Road | R19 | 45 | 46 | 46 | 49 | 51 | 51 | 46 | 46 | 46 | 43 | 45 | 45 |
| Walkom Road | R20 | 45 | 47 | 46 | 48 | 50 | 50 | 45 | 47 | 47 | 42 | 45 | 44 |
| Walkom Road | R21 | 45 | 47 | 46 | 49 | 51 | 51 | 45 | 46 | 46 | 42 | 45 | 45 |
| Walkom Road | R22 | 45 | 47 | 46 | 45 | 48 | 47 | 41 | 42 | 42 | 40 | 42 | 42 |
| Walkom Road | R23 | 44 | 46 | 46 | 49 | 51 | 51 | 45 | 47 | 47 | 42 | 45 | 45 |
| Walkom Road | R24 | 44 | 46 | 46 | 49 | 51 | 51 | 45 | 47 | 47 | 43 | 45 | 45 |

| Catchment | dBC | Year 1 | | | Year 2 | | | Year 4 | | | Year 8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Receiver | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night |
| Sturgeon Hill | R34 | 44 | 46 | 46 | 48 | 51 | 51 | 44 | 47 | 47 | 41 | 44 | 44 |
| Sturgeon Hill | R35 | 44 | 45 | 45 | 45 | 48 | 48 | 40 | 42 | 42 | 40 | 42 | 42 |
| Sturgeon Hill | R36 | 44 | 45 | 45 | 47 | 50 | 50 | 43 | 46 | 46 | 41 | 43 | 43 |
| Sturgeon Hill | R37 | 45 | 47 | 46 | 46 | 48 | 48 | 40 | 43 | 43 | 39 | 42 | 42 |
| Sturgeon Hill | R38 | 47 | 49 | 49 | 49 | 52 | 52 | 44 | 47 | 47 | 42 | 45 | 45 |
| Sturgeon Hill | R39 | 48 | 50 | 49 | 46 | 49 | 49 | 43 | 45 | 45 | 40 | 43 | 43 |
| Sturgeon Hill | R40 | 47 | 49 | 48 | 45 | 48 | 48 | 39 | 42 | 42 | 39 | 42 | 41 |
| Sturgeon Hill | R41 | 44 | 45 | 45 | 46 | 49 | 49 | 43 | 45 | 45 | 40 | 43 | 43 |
| Sturgeon Hill | R42 | 44 | 45 | 45 | 45 | 47 | 47 | 39 | 41 | 41 | 38 | 41 | 41 |
| Sturgeon Hill | R43 | 43 | 44 | 43 | 44 | 46 | 46 | 39 | 41 | 41 | 38 | 41 | 41 |
| Sturgeon Hill | R44 | 43 | 44 | 44 | 45 | 48 | 48 | 41 | 44 | 44 | 39 | 42 | 42 |
| Sturgeon Hill | R45 | 44 | 45 | 45 | 45 | 47 | 47 | 39 | 42 | 42 | 38 | 40 | 40 |
| Sturgeon Hill | R46 | 44 | 45 | 45 | 44 | 47 | 47 | 39 | 41 | 41 | 38 | 40 | 40 |
| Sturgeon Hill | R47 | 45 | 46 | 46 | 43 | 46 | 46 | 38 | 41 | 41 | 38 | 40 | 40 |
| Sturgeon Hill | R48 | 45 | 46 | 45 | 44 | 46 | 46 | 38 | 41 | 41 | 38 | 41 | 40 |
| Sturgeon Hill | R49 | 45 | 46 | 45 | 43 | 46 | 46 | 38 | 41 | 41 | 37 | 39 | 39 |
| Sturgeon Hill | R50 | 46 | 46 | 45 | 42 | 44 | 44 | 37 | 39 | 39 | 35 | 38 | 37 |
| Sturgeon Hill | R51 | 46 | 46 | 46 | 40 | 42 | 42 | 38 | 40 | 40 | 34 | 36 | 36 |

| Cwt -Awt | | | | | dB LCeq(15min) - dB LAeq(15min) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catchment | Receiver | Year1 | | | Year 2 | | | Year 4 | | | Year8 | | |
| | | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night |
| Distant Rural | R01 | 15 | 14 | 14 | 12 | 14 | 14 | 12 | 15 | 15 | 14 | 14 | 14 |
| Distant Rural | R02 | 15 | 14 | 14 | 13 | 14 | 14 | 11 | 14 | 14 | 14 | 15 | 15 |
| Distant Rural | R03 | 15 | 14 | 14 | 14 | 14 | 14 | 12 | 14 | 14 | 14 | 15 | 15 |
| Distant Rural | R04 | 14 | 16 | 16 | 15 | 15 | 15 | 12 | 14 | 14 | 14 | 14 | 15 |
| Distant Rural | R05 | 15 | 17 | 17 | 15 | 14 | 15 | 13 | 13 | 13 | 14 | 14 | 15 |
| Distant Rural | R06 | 14 | 17 | 16 | 12 | 15 | 14 | 10 | 12 | 12 | 10 | 10 | 12 |
| Distant Rural | R07 | 14 | 17 | 16 | 12 | 15 | 14 | 10 | 12 | 12 | 10 | 10 | 12 |
| Distant Rural | R08 | 15 | 18 | 18 | 14 | 15 | 15 | 13 | 14 | 14 | 13 | 13 | 13 |
| Distant Rural | R09 | 14 | 19 | 19 | 14 | 14 | 14 | 12 | 12 | 12 | 12 | 13 | 14 |
| Distant Rural | R10 | 14 | 20 | 20 | 13 | 15 | 14 | 11 | 13 | 13 | 11 | 12 | 14 |
| Distant Rural | R11 | 14 | 18 | 17 | 14 | 15 | 15 | 12 | 14 | 14 | 12 | 12 | 13 |
| Distant Rural | R12 | 15 | 19 | 18 | 13 | 15 | 15 | 11 | 12 | 12 | 12 | 12 | 13 |
| Distant Rural | R13 | 14 | 19 | 19 | 14 | 14 | 14 | 12 | 13 | 13 | 13 | 13 | 14 |
| Distant Rural | R14 | 14 | 18 | 18 | 14 | 14 | 14 | 12 | 13 | 13 | 12 | 12 | 13 |
| Distant Rural | R15 | 14 | 17 | 17 | 12 | 15 | 15 | 12 | 12 | 12 | 9 | 11 | 11 |
| Distant Rural | R16 | 10 | 17 | 16 | 12 | 15 | 15 | 13 | 11 | 11 | 8 | 10 | 12 |
| Distant Rural | R17 | 9 | 17 | 16 | 11 | 14 | 14 | 14 | 12 | 12 | 8 | 12 | 12 |
| Distant Rural | R18 | 12 | 17 | 16 | 8 | 15 | 15 | 11 | 12 | 12 | 9 | 11 | 11 |
| Distant Rural | R19 | 10 | 18 | 17 | 11 | 15 | 15 | 11 | 11 | 11 | 9 | 11 | 12 |
| Distant Rural | R20 | 11 | 18 | 17 | 9 | 15 | 15 | 11 | 12 | 12 | 9 | 11 | 11 |
| Distant Rural | R21 | 11 | 18 | 17 | 14 | 15 | 15 | 10 | 11 | 11 | 9 | 11 | 12 |
| Distant Rural | R22 | 12 | 21 | 20 | 6 | 14 | 15 | 11 | 12 | 12 | 11 | 12 | 13 |
| Distant Rural | R23 | 10 | 18 | 17 | 9 | 15 | 15 | 11 | 12 | 12 | 9 | 11 | 11 |
| Distant Rural | R24 | 10 | 18 | 17 | 11 | 15 | 15 | 10 | 12 | 12 | 10 | 10 | 11 |
| Distant Rural | R25 | 10 | 18 | 17 | 9 | 15 | 15 | 10 | 12 | 12 | 9 | 10 | 11 |
| Distant Rural | R26 | 10 | 19 | 18 | 8 | 15 | 15 | 10 | 11 | 11 | 9 | 11 | 11 |
| Distant Rural | R27 | 9 | 19 | 18 | 8 | 14 | 14 | 10 | 11 | 11 | 9 | 11 | 11 |
| Distant Rural | R28 | 10 | 19 | 18 | 9 | 14 | 14 | 10 | 11 | 11 | 9 | 11 | 11 |
| Distant Rural | R29 | 10 | 19 | 18 | 9 | 14 | 14 | 10 | 11 | 11 | 10 | 11 | 11 |
| Distant Rural | R30 | 10 | 18 | 18 | 9 | 15 | 15 | 11 | 12 | 12 | 9 | 11 | 11 |
| Distant Rural | R31 | 9 | 18 | 18 | 9 | 14 | 14 | 11 | 11 | 11 | 10 | 11 | 11 |
| Distant Rural | R32 | 9 | 18 | 17 | 11 | 14 | 14 | 11 | 12 | 12 | 11 | 11 | 11 |
| Distant Rural | R33 | 9 | 18 | 18 | 10 | 14 | 14 | 11 | 12 | 12 | 10 | 11 | 12 |
| Distant Rural | R34 | 10 | 17 | 16 | 11 | 15 | 15 | 13 | 13 | 13 | 11 | 11 | 12 |
| Distant Rural | R35 | 11 | 21 | 21 | 11 | 14 | 14 | 11 | 11 | 11 | 12 | 11 | 12 |
| Distant Rural | R36 | 11 | 17 | 17 | 12 | 14 | 14 | 13 | 13 | 13 | 12 | 12 | 12 |
| Distant Rural | R37 | 12 | 19 | 19 | 12 | 15 | 15 | 11 | 12 | 12 | 11 | 12 | 12 |
| Distant Rural | R38 | 10 | 16 | 16 | 13 | 14 | 14 | 13 | 13 | 13 | 12 | 12 | 12 |
| Distant Rural | R39 | 13 | 18 | 17 | 13 | 15 | 15 | 14 | 14 | 14 | 13 | 14 | 14 |
| Distant Rural | R40 | 13 | 19 | 19 | 12 | 15 | 15 | 11 | 12 | 12 | 12 | 13 | 12 |
| Distant Rural | R41 | 14 | 18 | 18 | 14 | 14 | 14 | 15 | 14 | 14 | 14 | 14 | 14 |
| Distant Rural | R42 | 13 | 19 | 19 | 13 | 15 | 15 | 12 | 12 | 12 | 12 | 13 | 13 |
| Distant Rural | R43 | 13 | 22 | 20 | 13 | 15 | 15 | 12 | 12 | 12 | 12 | 13 | 13 |
| Distant Rural | R44 | 14 | 18 | 18 | 14 | 14 | 14 | 14 | 15 | 15 | 14 | 15 | 15 |
| Distant Rural | R45 | 14 | 18 | 18 | 14 | 15 | 15 | 13 | 13 | 13 | 13 | 13 | 13 |
| Distant Rural | R46 | 14 | 19 | 19 | 13 | 14 | 14 | 13 | 13 | 13 | 13 | 13 | 13 |
| Distant Rural | R47 | 14 | 21 | 21 | 13 | 15 | 15 | 12 | 13 | 13 | 13 | 12 | 13 |
| Distant Rural | R48 | 14 | 21 | 21 | 13 | 15 | 15 | 12 | 12 | 12 | 13 | 13 | 13 |
| Distant Rural | R49 | 14 | 19 | 18 | 13 | 14 | 14 | 13 | 14 | 14 | 13 | 13 | 13 |
| Distant Rural | R50 | 14 | 19 | 19 | 15 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| Distant Rural | R51 | 15 | 19 | 19 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 14 |
| Kings Plains | R52 | 15 | 20 | 20 | 14 | 16 | 16 | 15 | 15 | 15 | 14 | 15 | 15 |
| Kings Plains | R53 | 15 | 21 | 20 | 14 | 16 | 16 | 15 | 15 | 15 | 14 | 15 | 15 |
| Kings Plains | R54 | 15 | 23 | 21 | 14 | 17 | 17 | 14 | 14 | 14 | 15 | 14 | 15 |
| Kings Plains | R55 | 15 | 20 | 20 | 14 | 16 | 16 | 15 | 15 | 15 | 14 | 15 | 15 |
| Kings Plains | R56 | 15 | 21 | 20 | 15 | 16 | 16 | 15 | 15 | 15 | 14 | 14 | 15 |
| Kings Plains | R57 | 15 | 21 | 20 | 15 | 16 | 16 | 15 | 15 | 15 | 14 | 14 | 15 |
| Kings Plains | R58 | 15 | 19 | 19 | 15 | 16 | 16 | 14 | 14 | 14 | 15 | 15 | 14 |
| Kings Plains | R59 | 14 | 21 | 21 | 15 | 16 | 16 | 14 | 13 | 13 | 15 | 15 | 15 |
| Kings Plains | R60 | 14 | 20 | 20 | 15 | 17 | 17 | 14 | 14 | 14 | 14 | 14 | 14 |
| Kings Plains | R61 | 15 | 20 | 20 | 15 | 17 | 17 | 14 | 14 | 14 | 14 | 14 | 14 |
| Kings Plains | R62 | 15 | 21 | 20 | 15 | 17 | 17 | 14 | 14 | 14 | 14 | 14 | 14 |
| Kings Plains | R63 | 15 | 20 | 19 | 15 | 16 | 16 | 14 | 14 | 14 | 14 | 14 | 14 |
| Walkom Road | R64 | 14 | 20 | 20 | 15 | 17 | 17 | 14 | 14 | 14 | 14 | 14 | 14 |
| Walkom Road | R65 | 14 | 21 | 21 | 14 | 18 | 17 | 14 | 15 | 15 | 15 | 14 | 15 |
| Walkom Road | R66 | 15 | 20 | 19 | 15 | 16 | 16 | 14 | 14 | 14 | 15 | 14 | 14 |
| Walkom Road | R67 | 15 | 22 | 21 | 14 | 17 | 17 | 15 | 15 | 15 | 14 | 14 | 14 |
| Walkom Road | R68 | 15 | 20 | 19 | 15 | 16 | 15 | 14 | 14 | 14 | 15 | 15 | 15 |
| Walkom Road | R69 | 15 | 20 | 20 | 15 | 16 | 16 | 14 | 14 | 14 | 14 | 14 | 14 |
| Walkom Road | R70 | 14 | 20 | 20 | 14 | 15 | 15 | 13 | 13 | 13 | 14 | 14 | 14 |

| Cwt -Awt | | dB LCeq(15min) - dB LAeq(15min) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catchment | Receiver | Year1 | | | Year 2 | | | Year 4 | | | Year8 | | |
| | | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night |
| Sturgeon Hill | R71 | 14 | 20 | 20 | 14 | 15 | 15 | 13 | 13 | 13 | 14 | 14 | 14 |
| Sturgeon Hill | R72 | 15 | 19 | 19 | 15 | 15 | 15 | 14 | 14 | 14 | 15 | 15 | 15 |
| Sturgeon Hill | R73 | 15 | 19 | 19 | 15 | 15 | 15 | 15 | 14 | 14 | 15 | 15 | 15 |
| Sturgeon Hill | R74 | 15 | 20 | 19 | 15 | 16 | 16 | 14 | 14 | 14 | 15 | 15 | 15 |
| Sturgeon Hill | R75 | 15 | 18 | 18 | 15 | 14 | 14 | 14 | 15 | 15 | 13 | 14 | 14 |
| Sturgeon Hill | R76 | 14 | 17 | 16 | 13 | 15 | 15 | 12 | 12 | 12 | 12 | 13 | 13 |
| Sturgeon Hill | R77 | 16 | 20 | 19 | 14 | 15 | 15 | 14 | 15 | 15 | 15 | 15 | 15 |
| Sturgeon Hill | R78 | 14 | 19 | 19 | 15 | 15 | 15 | 13 | 13 | 13 | 14 | 14 | 14 |
| Sturgeon Hill | R79 | 14 | 20 | 20 | 15 | 16 | 16 | 15 | 15 | 15 | 15 | 15 | 15 |
| Sturgeon Hill | R80 | 15 | 18 | 17 | 15 | 15 | 15 | 15 | 14 | 14 | 15 | 15 | 15 |
| Sturgeon Hill | R81 | 15 | 18 | 18 | 15 | 15 | 15 | 13 | 14 | 14 | 14 | 14 | 15 |
| Sturgeon Hill | R82 | 15 | 18 | 18 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| Sturgeon Hill | R83 | 14 | 17 | 17 | 14 | 14 | 14 | 13 | 14 | 14 | 14 | 14 | 14 |
| Sturgeon Hill | R84 | 15 | 17 | 17 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| Sturgeon Hill | R85 | 14 | 16 | 15 | 13 | 15 | 15 | 14 | 15 | 15 | 14 | 14 | 14 |
| Sturgeon Hill | R86 | 14 | 16 | 15 | 13 | 15 | 15 | 14 | 15 | 15 | 14 | 14 | 14 |
| Sturgeon Hill | R87 | 15 | 16 | 15 | 13 | 15 | 15 | 14 | 14 | 14 | 14 | 14 | 14 |
| Sturgeon Hill | R88 | 14 | 15 | 15 | 13 | 14 | 14 | 12 | 12 | 12 | 14 | 14 | 14 |

**VLAMP Significance**

Exceeds ANL+5dB | Exceeds PNTL+5dB

| RBL | | | LAeq | | | ANL | | | PTNL | | | Catchment | Receiver | Year 1 | | | Year 2 | | | Year4 | | | Year8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | E | N | D | E | N | D | E | N | D | E | N | | | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night |
| | | | | | | | | | | | | | R01 | 31 | 31 | 31 | 32 | 31 | 31 | 27 | 25 | 25 | 22 | 24 | 24 |
| | | | | | | | | | | | | | R02 | 29 | 30 | 30 | 29 | 30 | 30 | 25 | 23 | 23 | 21 | 22 | 22 |
| | | | | | | | | | | | | | R03 | 29 | 30 | 30 | 28 | 30 | 30 | 25 | 23 | 23 | 21 | 22 | 22 |
| | | | | | | | | | | | | | R04 | 29 | 27 | 27 | 26 | 27 | 27 | 23 | 22 | 22 | 20 | 22 | 21 |
| | | | | | | | | | | | | | R05 | 28 | 26 | 26 | 25 | 28 | 26 | 22 | 22 | 22 | 20 | 22 | 21 |
| | | | | | | | | | | | | | R06 | 34 | 32 | 32 | 33 | 32 | 32 | 32 | 32 | 32 | 30 | 33 | 31 |
| | | | | | | | | | | | | | R07 | 33 | 31 | 31 | 32 | 31 | 31 | 31 | 31 | 31 | 29 | 32 | 30 |
| | | | | | | | | | | | | | R08 | 30 | 29 | 29 | 28 | 29 | 29 | 28 | 28 | 28 | 26 | 28 | 27 |
| | | | | | | | | | | | | | R09 | 30 | 26 | 26 | 26 | 28 | 28 | 24 | 24 | 24 | 22 | 24 | 23 |
| | | | | | | | | | | | | | R10 | 30 | 23 | 23 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| | | | | | | | | | | | | | R11 | 31 | 29 | 29 | 28 | 29 | 29 | 28 | 28 | 28 | 26 | 28 | 27 |
| | | | | | | | | | | | | | R12 | 31 | 29 | 29 | 30 | 29 | 29 | 28 | 28 | 28 | 26 | 28 | 27 |
| | | | | | | | | | | | | | R13 | 30 | 26 | 26 | 26 | 28 | 28 | 24 | 24 | 24 | 22 | 24 | 23 |
| | | | | | | | | | | | | | R14 | 33 | 30 | 30 | 32 | 32 | 32 | 31 | 31 | 31 | 28 | 30 | 29 |
| | | | | | | | | | | | | | R52 | 27 | 23 | 23 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| | | | | | | | | | | | | | R53 | 27 | 23 | 23 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| | | | | | | | | | | | | | R54 | 27 | 21 | 23 | 25 | 23 | 23 | 19 | 20 | 20 | 18 | 21 | 19 |
| | | | | | | | | | | | | | R55 | 27 | 23 | 23 | 25 | 25 | 25 | 19 | 20 | 20 | 19 | 19 | 19 |
| | | | | | | | | | | | | | R56 | 27 | 23 | 23 | 24 | 25 | 25 | 19 | 20 | 20 | 19 | 21 | 19 |
| | | | | | | | | | | | | | R57 | 27 | 23 | 23 | 24 | 25 | 25 | 19 | 20 | 20 | 19 | 21 | 19 |
| | | | | | | | | | | | | | R58 | 29 | 26 | 26 | 27 | 28 | 28 | 24 | 26 | 26 | 22 | 24 | 24 |
| | | | | | | | | | | | | | R59 | 29 | 24 | 24 | 25 | 26 | 26 | 20 | 22 | 22 | 19 | 21 | 21 |
| | | | | | | | | | | | | | R60 | 30 | 26 | 26 | 28 | 28 | 28 | 25 | 27 | 27 | 23 | 25 | 25 |
| | | | | | | | | | | | | | R61 | 30 | 26 | 26 | 28 | 28 | 28 | 26 | 28 | 28 | 23 | 25 | 25 |
| | | | | | | | | | | | | | R62 | 30 | 26 | 26 | 28 | 28 | 28 | 26 | 28 | 28 | 23 | 25 | 25 |
| 29 | 25 | 22 | 53 | 47 | 47 | 50 | 45 | 40 | 40 | 35 | 35 | Distant Rural | R63 | 30 | 27 | 27 | 28 | 29 | 29 | 26 | 28 | 28 | 23 | 25 | 25 |
| | | | | | | | | | | | | | R64 | 31 | 26 | 26 | 28 | 28 | 28 | 26 | 28 | 28 | 23 | 25 | 25 |
| | | | | | | | | | | | | | R65 | 31 | 25 | 25 | 29 | 27 | 27 | 25 | 27 | 27 | 22 | 26 | 24 |
| | | | | | | | | | | | | | R66 | 30 | 27 | 27 | 28 | 29 | 29 | 26 | 28 | 28 | 21 | 25 | 25 |
| | | | | | | | | | | | | | R67 | 30 | 25 | 25 | 28 | 27 | 27 | 23 | 25 | 25 | 21 | 23 | 23 |
| | | | | | | | | | | | | | R68 | 30 | 27 | 27 | 28 | 29 | 29 | 26 | 28 | 28 | 21 | 23 | 23 |
| | | | | | | | | | | | | | R69 | 29 | 26 | 26 | 27 | 28 | 28 | 25 | 27 | 27 | 22 | 24 | 24 |
| | | | | | | | | | | | | | R70 | 30 | 26 | 26 | 27 | 28 | 28 | 22 | 24 | 24 | 21 | 23 | 23 |
| | | | | | | | | | | | | | R71 | 30 | 26 | 26 | 27 | 28 | 28 | 22 | 24 | 24 | 21 | 23 | 23 |
| | | | | | | | | | | | | | R72 | 29 | 26 | 26 | 26 | 28 | 28 | 21 | 23 | 23 | 20 | 22 | 22 |
| | | | | | | | | | | | | | R73 | 29 | 26 | 26 | 26 | 28 | 28 | 21 | 23 | 23 | 20 | 22 | 22 |
| | | | | | | | | | | | | | R74 | 30 | 27 | 27 | 28 | 29 | 29 | 26 | 28 | 28 | 21 | 23 | 23 |
| | | | | | | | | | | | | | R75 | 32 | 31 | 31 | 30 | 33 | 33 | 27 | 29 | 29 | 25 | 27 | 27 |
| | | | | | | | | | | | | | R76 | 34 | 33 | 33 | 32 | 33 | 33 | 28 | 30 | 30 | 27 | 29 | 29 |
| | | | | | | | | | | | | | R77 | 31 | 29 | 29 | 28 | 29 | 29 | 25 | 27 | 27 | 21 | 23 | 23 |
| | | | | | | | | | | | | | R78 | 30 | 26 | 26 | 26 | 28 | 28 | 22 | 24 | 24 | 21 | 23 | 23 |
| | | | | | | | | | | | | | R79 | 30 | 25 | 25 | 27 | 27 | 27 | 24 | 26 | 26 | 20 | 22 | 22 |
| | | | | | | | | | | | | | R80 | 28 | 26 | 26 | 26 | 28 | 28 | 22 | 25 | 25 | 19 | 21 | 21 |
| | | | | | | | | | | | | | R81 | 28 | 26 | 26 | 26 | 28 | 28 | 22 | 23 | 23 | 20 | 22 | 21 |
| | | | | | | | | | | | | | R82 | 29 | 27 | 27 | 28 | 29 | 29 | 22 | 23 | 23 | 21 | 23 | 23 |
| | | | | | | | | | | | | | R83 | 30 | 28 | 28 | 28 | 30 | 30 | 23 | 24 | 24 | 21 | 23 | 23 |
| | | | | | | | | | | | | | R84 | 30 | 29 | 29 | 29 | 31 | 31 | 24 | 26 | 26 | 22 | 24 | 24 |
| | | | | | | | | | | | | | R85 | 31 | 30 | 30 | 30 | 30 | 30 | 25 | 26 | 26 | 22 | 24 | 24 |
| | | | | | | | | | | | | | R86 | 31 | 30 | 30 | 30 | 30 | 30 | 25 | 26 | 26 | 22 | 24 | 24 |
| | | | | | | | | | | | | | R87 | 31 | 30 | 30 | 30 | 30 | 30 | 25 | 26 | 26 | 22 | 24 | 24 |
| | | | | | | | | | | | | | R88 | 32 | 31 | 31 | 31 | 31 | 31 | 25 | 26 | 26 | 23 | 25 | 25 |
| | | | | | | | | | | | | Negligible | up to +2dB over criteria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | Marginal/Moderate | >2-5dB over criteria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | Moderate/Significant | >5dB over criteria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**VLAMP Significance**

Exceeds ANL+5dB | Exceeds PNTL+5dB

| RBL | | | LAeq | | | ANL | | | PTNL | | | Catchment | Receiver | Year 1 | | | Year 2 | | | Year4 | | | Year8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | E | N | D | E | N | D | E | N | D | E | N | | | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night | Day | Eve | Night |
| | | | | | | | | | | | | | R15 | 36 | 34 | 34 | 37 | 34 | 34 | 35 | 33 | 33 | 32 | 33 | 32 |
| | | | | | | | | | | | | | R16 | 43 | 36 | 36 | 38 | 34 | 34 | 38 | 34 | 34 | 34 | 34 | 32 |
| | | | | | | | | | | | | | R17 | 45 | 37 | 37 | 40 | 35 | 35 | 38 | 32 | 32 | 34 | 32 | 31 |
| | | | | | | | | | | | | | R25 | 44 | 38 | 38 | 40 | 36 | 36 | 35 | 35 | 35 | 34 | 35 | 34 |
| | | | | | | | | | | | | | R26 | 44 | 38 | 38 | 41 | 36 | 36 | 35 | 36 | 36 | 34 | 35 | 34 |
| 36 | 331 | 30 | 51 | 50 | 48 | 50 | 45 | 40 | 41 | 36 | 35 | Kings Plains | R27 | 45 | 38 | 38 | 41 | 38 | 38 | 35 | 36 | 36 | 34 | 35 | 34 |
| | | | | | | | | | | | | | R28 | 45 | 38 | 38 | 41 | 38 | 38 | 35 | 36 | 36 | 34 | 35 | 34 |
| | | | | | | | | | | | | | R29 | 44 | 38 | 38 | 40 | 38 | 38 | 35 | 36 | 36 | 33 | 35 | 34 |
| | | | | | | | | | | | | | R30 | 45 | 39 | 39 | 41 | 37 | 37 | 35 | 36 | 36 | 34 | 35 | 35 |
| | | | | | | | | | | | | | R31 | 44 | 38 | 38 | 40 | 38 | 38 | 34 | 36 | 36 | 33 | 35 | 34 |
| | | | | | | | | | | | | | R32 | 43 | 38 | 38 | 38 | 38 | 38 | 33 | 35 | 35 | 31 | 34 | 33 |
| | | | | | | | | | | | | | R33 | 44 | 38 | 38 | 39 | 38 | 38 | 33 | 35 | 35 | 32 | 34 | 33 |
| | | | | | | | | | | | | Negligible | up to +2dB over criteria | 2 | 9 | 2 | 0 | 7 | 3 | 0 | 0 | 6 | 0 | 0 | 0 |
| | | | | | | | | | | | | Marginal/Moderate | >2-5dB over criteria | 9 | 1 | 9 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | Moderate/Significant | >5dB over criteria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | R18 | 40 | 37 | 37 | 40 | 35 | 35 | 35 | 35 | 35 | 33 | 34 | 33 |
| | | | | | | | | | | | | | R19 | 43 | 38 | 38 | 38 | 36 | 36 | 35 | 35 | 35 | 34 | 34 | 33 |
| | | | | | | | | | | | | | R20 | 42 | 37 | 37 | 39 | 35 | 35 | 34 | 35 | 35 | 33 | 34 | 33 |
| 35 | 30 | 30 | 47 | 43 | 43 | 50 | 45 | 40 | 40 | 35 | 35 | Walkom Road | R21 | 42 | 38 | 38 | 35 | 36 | 36 | 35 | 35 | 35 | 33 | 34 | 33 |
| | | | | | | | | | | | | | R22 | 38 | 32 | 32 | 39 | 34 | 32 | 30 | 30 | 30 | 29 | 30 | 29 |
| | | | | | | | | | | | | | R23 | 43 | 38 | 38 | 40 | 36 | 36 | 34 | 35 | 35 | 33 | 34 | 34 |
| | | | | | | | | | | | | | R24 | 44 | 38 | 38 | 38 | 36 | 36 | 35 | 35 | 35 | 33 | 35 | 34 |
| | | | | | | | | | | | | Negligible | up to +2dB over criteria | 2 | 2 | 2 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | Marginal/Moderate | >2-5dB over criteria | 3 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | Moderate/Significant | >5dB over criteria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | R34 | 42 | 38 | 38 | 37 | 36 | 36 | 31 | 34 | 34 | 30 | 33 | 32 |
| | | | | | | | | | | | | | R35 | 39 | 32 | 32 | 34 | 34 | 34 | 29 | 31 | 31 | 28 | 31 | 30 |
| | | | | | | | | | | | | | R36 | 39 | 36 | 36 | 35 | 36 | 36 | 30 | 33 | 33 | 29 | 31 | 31 |
| | | | | | | | | | | | | | R37 | 38 | 33 | 33 | 34 | 33 | 33 | 29 | 31 | 31 | 28 | 30 | 30 |
| | | | | | | | | | | | | | R38 (Option) | 41 | 38 | 38 | 36 | 38 | 38 | 31 | 34 | 34 | 30 | 33 | 33 |
| | | | | | | | | | | | | | R39 | 36 | 34 | 34 | 33 | 34 | 34 | 29 | 31 | 31 | 27 | 29 | 29 |
| | | | | | | | | | | | | | R40 | 36 | 33 | 33 | 33 | 33 | 33 | 28 | 30 | 30 | 27 | 29 | 29 |
| | | | | | | | | | | | | | R41 | 35 | 33 | 33 | 32 | 35 | 35 | 28 | 31 | 31 | 26 | 29 | 29 |
| | | | | | | | | | | | | | R42 | 35 | 32 | 32 | 32 | 32 | 32 | 27 | 29 | 29 | 26 | 28 | 28 |
| 35 | 33 | 30 | 52 | 50 | 48 | 50 | 45 | 40 | 40 | 38 | 35 | Sturgeon Hill | R43 | 35 | 29 | 31 | 31 | 31 | 31 | 27 | 29 | 29 | 26 | 28 | 28 |
| | | | | | | | | | | | | | R44 | 34 | 32 | 32 | 31 | 34 | 34 | 27 | 29 | 29 | 25 | 27 | 27 |
| | | | | | | | | | | | | | R45 | 34 | 32 | 32 | 31 | 32 | 32 | 26 | 29 | 29 | 25 | 27 | 27 |
| | | | | | | | | | | | | | R46 | 33 | 31 | 31 | 31 | 33 | 33 | 26 | 28 | 28 | 25 | 27 | 27 |
| | | | | | | | | | | | | | R47 | 33 | 29 | 29 | 30 | 31 | 31 | 26 | 28 | 28 | 25 | 28 | 27 |
| | | | | | | | | | | | | | R48 | 34 | 29 | 29 | 31 | 31 | 31 | 26 | 29 | 29 | 25 | 28 | 27 |
| | | | | | | | | | | | | | R49 | 32 | 30 | 30 | 30 | 32 | 32 | 25 | 27 | 27 | 24 | 26 | 26 |
| | | | | | | | | | | | | | R50 | 31 | 28 | 28 | 27 | 30 | 30 | 23 | 25 | 25 | 21 | 24 | 23 |
| | | | | | | | | | | | | | R51 | 27 | 25 | 25 | 26 | 27 | 27 | 23 | 25 | 25 | 19 | 21 | 22 |
| | | | | | | | | | | | | Negligible | up to +2dB over criteria | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | Marginal/Moderate | >2-5dB over criteria | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | Moderate/Significant | >5dB over criteria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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