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September 2023

Central-West Orana Renewable Energy Zone Transmission project

Technical paper 9 – Noise and vibration

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Central-West Orana Renewable Energy Zone Transmission project
Technical paper 9 – Noise and vibration

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WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Glossary

Project terms	
access roads	Permanent access roads to switching stations and energy hubs.
access tracks	Temporary and permanent access tracks along and to the transmission line easements.
brake/winch sites	A brake and winch site is a temporarily cleared area where plant and equipment is located for the purposes of spooling and winching a conductor into place on erected towers along a transmission line corridor. Dependent upon the angle of line deviation, the location of the brake and winch site at that angle may or may not be within the nominated transmission line easement. The brake and winch site is only required for the construction phase of the project. It does not need to be maintained for ongoing operation and/or maintenance of the transmission line.
Central-West Orana Renewable Energy Zone (CWO REZ)	A geographic area of approximately 20,000 square kilometres centred on the regional towns of Dubbo and Dunedoo and extending west to Narromine and east beyond Mudgee and to Wellington in the south and Gilgandra in the north, that will combine renewable energy generation, storage and HV transmission infrastructure to deliver energy to electricity consumers.
construction area	Refers to the area that would be directly impacted by the construction of the project, including (but not limited to) all project infrastructure elements (including the transmission lines and towers, energy hubs, switching stations, access roads to switching stations and energy hubs, access tracks, energy hubs, switching stations, communications infrastructure, workforce accommodation camps, construction compounds, brake and winch sites and laydown and staging areas.
construction compound	An area used as the base for construction activities, usually for the storage of plant, equipment and materials, and/or construction site offices and worker facilities. It can also comprise concrete batching plant, crushing, grinding and screening plant, testing laboratory and wastewater treatment plant.
construction routes	Roads used by construction vehicles (light and heavy).
double circuit transmission lines	A set of six conductors carried by a single tower set.
EnergyCo	The Energy Corporation of New South Wales constituted by section 7 of the *Energy and Utilities Administration Act 1987* as the NSW Government statutory authority responsible for the delivery of NSW's REZs.
Energy hub/s	An energy hub is a substation where energy exported from renewable energy generators or storage is aggregated, transformed to 500 kV (where required) and exported to the transmission network. For the project, this includes Merotherie Energy Hub and Elong Elong Energy Hub.
Essential Energy	The asset owner of multiple 66 kV and 132 kV transmission lines in the region that cross the project at multiple locations.
impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.

Project terms	
operation area	The area that would be occupied by permanent components of the project, including transmission line easements, transmission lines and towers, energy hubs, switching stations, communications infrastructure, access roads to the switching stations and energy hubs, maintenance facilities and permanent access tracks to the easements.
(the) proponent	EnergyCo
(the) project	The Central-West Orana REZ Transmission project as described in the Environmental Impact Statement.
Renewable Energy Zone (REZ)	A geographic area identified and declared by the NSW Government as a REZ..
renewable energy generators	A renewable energy provider to the CWO REZ.
renewable energy generation and storage projects	The various renewable energy generation and storage projects within the CWO REZ that would be delivered by others, such as wind farms and solar farms.
study area	Relates to the assessed area for potential noise and vibration impacts and includes an area within three kilometres of the extent of the construction area.
substation	A facility used to increase or decrease voltages between incoming and outgoing lines (for example 330 kV to 500 kV).
switching station	A facility used to connect two or more distinct transmission lines of the same designated voltage.
transmission line easement	An area surrounding and including the transmission lines which is a legal 'right of way' and allows for ongoing access and maintenance of the transmission lines. Landowners can typically continue to use most of the land within transmission line easements, subject to some restrictions for safety and operational reasons.
twin transmission line	A pair of single or double circuit transmission lines running parallel.
workforce accommodation camps	Areas that would be constructed and operated during construction to house the construction workforce.

Noise terms	
Acoustic barrier	Solid walls or partitions, solid fences, earth mounds, earth berms, buildings, etc used to reduce noise, without eliminating it.
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).
Corona noise	The ionization of air surrounding the high voltage transmission lines causing the conductors to glow and producing a hissing noise.

Noise terms	
Decibels (dB)	The level of noise is measured objectively using a sound level meter. The range of pressure variations associated with everyday living may span over a range of a million to one. Instead of expressing pressure in this enormous range of unit, it is convenient to condense this range to a logarithmic scale and give it the units of decibels. The following are examples of the decibel readings of every day steady or quasi-steady sounds: *0 dB the faintest sound we can hear under perfect conditions* *20 dB quiet bedroom at night or recording studio* *30 dB quiet library or quiet location in the country* *40 dB living room* *50 dB typical office space or ambience in the city at night* *60 dB normal conversational speech* *70 dB a car passing by* *80 dB kerbside of a busy road* *90 dB truck passing by* *100 dB nightclub* *110 dB rock band or 2 m from a jackhammer* *120 dB 70 m from a jet aircraft* *130 dB threshold of pain* *140 dB 25 m from a jet aircraft*
dBA: A-weighted decibels	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the ‘A’ filter. A sound level measured with this filter switched in is denoted as dB(A). Most environmental noise is measured using the ‘A’ filter.
dBC: C-weighted decibels	‘C’ weighted adjustments are relatively flat across lower frequencies, and as such are better suited for the assessment of low frequency noise.
Frequency	The time rate for each wave peak (of a sound wave) to pass a given point. Frequency is measured in hertz (Hz).
Loudness	A 3 dB increase represents a doubling of the sound pressure, however an increase of about 10db is required before the sound will subjectively appear to be twice as loud. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is four times as loud as a sound of 65 dB. The smallest change which can be readily heard is approximately 2 dB. An increase beyond 5 dB is considered to represent the level at which a change in loudness begins to be clearly perceived.
L_{90}	The level of noise exceeded for 90% of the time for which a given sound is measured. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	Equivalent sound pressure level (similar to average noise level) – the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring. The sound weighting of the noise measurement is commonly added, for example L_{Aeq} or L_{Ceq}.
L_{Max}	The maximum noise level during a specified period.

Noise terms	
Rating Background Level (RBL)	Defined by the NSW EPA as the median value of the (lower) tenth percentile of L_{90} ambient background noise levels for day, evening or night periods, measured over a number of days during the monitoring period.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level (SPL)	The level of sound pressure at a specific location, expressed in decibels.
Sound power level (SWL)	A measure of the acoustic energy emitted from a source of noise, expressed in decibels.

Vibration terms	
Acceleration	Indicates the rates of change in speed of a vibrating particle.
Displacement	A vector quantity that specifies the change of position of a body or particle.
Frequency	The time rate for each wave peak (of a vibration wave) to pass a given point. Frequency is measured in hertz (Hz).
Hertz (hz)	Units in which frequency is expressed. Synonymous with cycles per second.
Peak particle velocity	The maximum velocity of a particle during a given interval.
Velocity	A vector quantity that specifies the time derivative of displacement.

Abbreviations

Acronym	Definition
AC	Alternating current
ANL	Amenity Noise Level
ANZECC	Australian New Zealand Environment and Conservation Council
AS	Australian Standard
AVTG	Assessing Vibration: A Technical Guideline (NSW Department of Environment and Conservation, 2006)
BESS	Battery Energy Storage System
BoM	Bureau of Meteorology
BS	British Standard
CEMP	Construction Environmental Management Plan
CNVG	Construction Noise and Vibration Guideline (Transport for NSW, 2022)
CNVMP	Construction Noise and Vibration Management Plan
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DIN 4150	*German Standard DIN 4150-3: Structural vibration – Effects of vibration on structures*
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	*(NSW) Environmental Planning and Assessment Act 1979*
EP&A Regulation	(NSW) Environmental Planning and Assessment Regulation 2000
EPL	Environment Protection Licences
HV	High Voltage
ICNG	Interim Construction Noise Guideline
ISO	International Organization for Standardization
LGA	Local Government Area
L_{max}	Maximum noise level: maximum RMS noise level.
NCA	Noise Catchment Area
NEM	National Energy Market

Acronym	Definition
NML	Noise Management Level
NPfI	NSW Noise Policy for Industry (NSW Environment Protection Authority, 2017)
NSW	New South Wales
OOHW	Outside of hours work
PEC	Project Energy Connect
PPV	Peak particle velocity
PNTL	Project noise trigger level
RBL	Rating Background Level
SEPP	State Environmental Planning Policy

Executive summary

This technical paper assesses the potential impacts from noise and vibration during construction and operation of the Central-West Orana Renewable Energy Zone Transmission project (the project) and has been prepared to support and inform the Environmental Impact Statement (EIS) for the project.

The potential impacts to amenity have been assessed in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning and Environment (DPE) and against the relevant legislation and guidelines as they apply to noise and vibration.

Project overview

The NSW Government is leading the development of Renewable Energy Zones (REZ) across NSW to deliver renewable energy generation and storage, supported by high voltage transmission infrastructure. Energy Corporation of NSW (EnergyCo) is proposing the construction and operation of new electricity transmission infrastructure and new energy hubs and switching stations required to connect new energy generation and storage projects within the Central-West Orana REZ to the existing electricity network (the project).

The project is located within the Warrumbungle, Mid-Western Regional, Dubbo Regional and Upper Hunter local government areas (LGAs) and extends generally north to south from Cassilis to Wollar and east to west from Cassilis to Goolma.

The project would enable 4.5 gigawatts of new network capacity to be unlocked by the mid-2020s (noting the NSW Government's proposal to amend the Central-West Orana REZ declaration to allow for a transfer capacity of six gigawatts), and enable renewable energy generators within the Central-West Orana REZ who are successful in their bids to access the new transmission infrastructure to export electricity to the rest of the network. The development of renewable energy generation projects in the Central-West Orana REZ is the sole responsibility of private generators and subject to separate planning and environmental approvals.

Legislative and policy context

The proposal is Critical State significant infrastructure and is subject to approval by the NSW Minister for Planning and Public Spaces under the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

Planning Secretary's Environmental Assessment Requirements (SEARs) have been issued for the project. As relevant to noise and vibration, these require "*an assessment of the construction, operational and road noise, vibration and blasting impacts of the project, including any corona discharge noise*". This has been undertaken with reference to relevant standards and guidelines.

Impacts on noise and vibration from construction and operation of the project have been assessed in accordance with the relevant legislation and guidelines as they apply to these parameters. Key guidelines considered as part of this assessment included:

- *Interim Construction Noise Guideline* (ICNG) (DECCW, 2009)
- *NSW Road Noise Policy* (RNP) (DECCW, 2011)
- *Noise Policy for Industry* (NPfI) (EPA 2,017)
- *Assessing Vibration: A Technical Guideline* (AVTG) (DEC, 2006).

Existing environment

The project is located within a rural setting, primarily dominated by agricultural and rural residential land uses. The local noise environment is influenced by natural sounds including insect and cicada noise and local road traffic. Main roads in the vicinity of the project include the Golden Highway and the Castlereagh Highway. Several mines are located in the south east construction area, including Wilpinjong, Moolarben and Ulan Coal Mines.

Methodology

The assessment of noise and vibration arising from the project included the following key steps:

- defining the study area for noise and vibration based on the proposed activities, sensitive receivers within the surrounding environment, and the anticipated level of impact
- a baseline noise monitoring survey to determine the existing environment of the study area
- predictive modelling of noise levels at sensitive receivers to inform the assessment of the potential impacts to amenity from the construction and operation of the project
- calculation of safe working distances for plant and equipment for the management of ground borne vibration during construction activities
- estimation of the blasting parameters required to control potential airblast overpressure and blast vibration levels at nearby sensitive receivers
- an assessment of the potential cumulative impacts of noise and vibration from the project in combination with other known developments within the vicinity of the project has been provided in Appendix G of the EIS
- a summary of recommended mitigation and management measures to avoid, minimise and manage any potential impacts of noise and vibration from construction and/or operation of the project.

Potential construction impacts

The potential worst-case levels of noise and vibration generated by the construction works were assessed to inform the recommendation of measures that may be required to mitigate potential disturbance impacts.

The predicted construction noise levels are considered to be conservative, assuming all plant is operational at any one time. As such actual noise levels could generally be expected to be below these predicted noise levels at any identified noise-sensitive receiver. Further, as stated above, most construction works would be transitory (i.e. they would progress along transmission line corridor to build the transmission line and associated tower structures progressively), and as such these predictions would not be sustained through the entire construction period at each receiver. The noise and vibration assessment has identified that construction noise impacts would generally be minor during standard work hours. The exception to this is where drones or helicopters may be used during transmission line stringing activities. However these would be temporary and move progressively along the alignment, impacting each affected receivers for short periods. This work would also not be undertaken during night-time hours. Construction of access tracks may also impact a number of receivers.

Most exceedances are predicted to occur at isolated rural properties within NCA 4. Given the short duration of most impacts, these exceedances are not predicted to generally occur simultaneously or for extended periods, however ten receivers are predicted to be potentially highly impacted across all NCAs.

Where works are carried out outside of standard working hours, noise levels are predicted to be more noticeable and result in exceedances of criteria for some activities, including potential sleep disturbance impacts. Typically, foundations and/or earthworks are expected to be the loudest Out of hours work stage at most sites and this work should be avoided during night-time periods where reasonable and feasible.

Construction traffic on public roads has the potential to generate noise impacts at 32 residences along the identified approximate 27 traffic routes. Most of these impacts are predicted to occur during night-time hours. All other receivers exposed to traffic noise are predicted to remain within the criteria. These impacts would be temporary and noise management measures have been recommended to minimise noise impacts from construction traffic.

Potential vibration impacts during construction are considered minor and readily managed with standard construction vibration mitigation measures. Ground vibration has the potential to exceed heritage vibration criteria at the Pine Park Woolshed, potentially causing vibration damage. As such mitigation measures will be adopted to eliminate these impacts.

The condition and subsequent vibration sensitivity of grinding grooves and rock shelters is not detailed in the Technical paper 5 – Aboriginal cultural heritage assessment report, and as such, potential vibration impacts on Indigenous heritage items will be assessed as design progresses and within the Construction Noise and Vibration Management Plan.

Potential operational impacts

Operational noise impacts as a result of infrequent maintenance activities are expected to occur only once per year on average and as such do not represent a substantial noise impact. Corona noise impacts have been predicted to potentially affect up to two receivers.

Due to the remote locations of the energy hubs and switching stations, no operational L_{Aeq} noise impacts have been predicted, however potential L_{Amax} (awakening) impacts may be noted during the activation of circuit breaker switches at M4, M5 and M7. It is noted that at the time or writing of this assessment, limited information was available regarding the reference design and proposed equipment at each energy hub. The assessment of potential impacts has made conservative assumptions, however this assessment will need to be refined and/or reviewed as design of these facilities progresses.

Management measures

Construction noise and vibration mitigation and management measures have been recommended to reduce the extent and effect of the identified impacts. Construction impacts will primarily be managed by a detailed CNVMP to be prepared prior to commencement of construction. This would be a sub-plan to the CEMP and would be based on the confirmed construction methodology, locations of works sites activities, durations, equipment types and numbers.

This CNVMP would include consideration of the standard mitigation measures recommended in this assessment. Following the implementation of the standard ICNG mitigation measures, additional mitigation measures have been provided for consideration where residual noise impacts remain.

Vibration management measures will be adopted to eliminate potential vibration impacts on heritage locations.

Operational noise impacts are predicted to occur at properties in close proximity to the transmission line. Given the conservative assumptions used in this assessment infrequency of meteorological conditions potentially generating coronal noise, it is recommended that further noise modelling be undertaken during detailed design of the transmission line to confirm the extent of these noise impacts before mitigation is implemented.

Potential exceedances of L_{Amax} criteria have been noted at the M4, M5 and M7 switching stations and the suitability of mitigation to manage these impacts will require further assessment in consideration of the likely frequency and timing of these activations. This information is not available at the time this assessment has been prepared and will be assessed as detailed design progresses.

1 Introduction

1.1 Background

New South Wales (NSW) is currently undergoing an energy sector transformation that will change how we generate and use energy. The NSW Government is leading the development of Renewable Energy Zones (REZs) across NSW to deliver renewable energy generation and storage projects, supported by transmission infrastructure. A REZ connects renewable energy generation and energy storage systems to transmission infrastructure via energy hubs, requiring the coordination of power generation, power storage and transmission infrastructure. By doing so, REZs capitalise on economies of scale to deliver cheap, reliable and clean electricity for homes, businesses and industry in NSW.

The Central-West Orana REZ was formally declared on 5 November 2021 under the *Electricity Infrastructure Investment Act 2020.* As NSW's first REZ, the Central-West Orana REZ will play a pivotal role in underpinning NSW's transition to a clean, affordable and reliable energy sector.

The proposed amendment is consistent with the NSW Network Infrastructure Strategy (EnergyCo, 2023) which identifies options to increase network capacity to 4.5 gigawatts initially under Stage 1 (which would be based on the infrastructure proposed in this assessment) and up to six gigawatts by 2038 under Stage 2 (which would require additional infrastructure beyond the scope of this assessment, and subject to separate approval). The proposed amendment also supports recent modelling by the Consumer Trustee in the draft 2023 Infrastructure Investment Objectives Report (AEMO, 2023) showing more network capacity will be needed to meet NSW's future energy needs as coal-fired power stations progressively retire.

Energy Corporation of NSW (EnergyCo), a NSW Government statutory authority, has been appointed as the Infrastructure Planner under the *Electricity Infrastructure Investment Act* 2020, and is responsible for the development and delivery of Central-West Orana REZ. EnergyCo is responsible for coordinating REZ transmission, generation, firming and storage projects to deliver efficient, timely and coordinated investment.

EnergyCo is seeking approval for the construction and operation of new high voltage electricity transmission infrastructure, new energy hubs and switching stations that are required to connect energy generation and storage projects within the Central-West Orana REZ to the existing electricity network (the project).

1.2 Purpose of this paper

This technical paper assesses the potential impacts to noise and vibration from the construction and operation of the project and has been prepared to support and inform the Environmental Impact Statement (EIS).

This technical paper has been prepared to address the relevant Secretary's Environmental Assessment Requirements[1] (SEARs) for the project issued by the Secretary of the NSW Department of Planning and Environment (DPE) for the project on 7 October 2022 and the supplementary SEARs on 2 March 2023.

The SEARs detail the key matters that are to be addressed by the EIS, with noise and vibration emissions identified as a potential impact to environmental amenity. The assessment requirements, and where addressed in this report, are detailed in Table 1-1.

1 NSW Department of Planning and Environment, October 2022. Planning Secretary's Environmental Assessment Requirements, Application Number SSI-48323210.

Table 1-1 SEARs relevant to this paper – noise and vibration

Reference	Assessment requirement	Report section where addressed
Key issues: Amenity	an assessment of:	
	construction noise	Section 5.1
	operational noise	Section 6.1
	road noise	Section 5.4
	vibration	Section 5.2
	blasting impacts of the project	Section 5.3
	any corona discharge noise.	Section 6.1

1.2.1 Related technical papers

This technical paper is linked to the assessments completed in the following technical papers:

- Technical paper 5 – Aboriginal cultural heritage assessment report
- Technical paper 6 – Non-Aboriginal heritage (relevant to potential vibration impacts to items of non-Aboriginal heritage)
- Technical paper 13 – Traffic and transport (relevant to potential road traffic noise impacts).

1.3 Project overview

The project comprises the construction and operation of new electricity transmission infrastructure, energy hubs and switching stations within the Central-West Orana REZ. The project would enable at 4.5 gigawatts of new network capacity to be unlocked by the mid-2020s (noting the NSW Government's proposal to amend the Central-West Orana REZ declaration to allow for a transfer capacity of six gigawatts) and enable renewable energy generators within the Central-West Orana REZ, who are successful in their bids to access the new transmission infrastructure, to export electricity onto the National Electricity Market (NEM). A detailed description of the project, including a description of key project components, the construction methodology and how it would be operated is provided in Chapter 3 of the EIS.

1.3.1 Features

The project would comprise the following key features:

- a new 500 kV switching station (the New Wollar Switching Station), located at Wollar to connect the project to the existing 500 kV transmission network
- around 90 kilometres of twin double circuit 500 kV transmission lines and associated infrastructure to connect two energy hubs to the existing NSW transmission network via the New Wollar Switching Station
- energy hubs at Merotherie and Elong Elong (including potential battery storage at the Merotherie Energy Hub) to connect renewable energy generation and storage projects within the Central-West Orana REZ to the 500 kV network infrastructure
- around 150 kilometres of single circuit, double circuit and twin double circuit 330 kV transmission lines, supported on towers, to connect renewable energy generation projects within the Central-West Orana REZ to the two energy hubs
- thirteen switching stations along the 330 kV network infrastructure at Cassilis, Coolah, Leadville, Merotherie, Tallawang, Dunedoo, Cobbora and Goolma, to transfer the energy generated from the renewable energy generation projects within the Central-West Orana REZ onto the project's 330 kV network infrastructure
- underground fibre optic communication cables along the 330 kV and 500 kV transmission lines between the energy hubs and switching stations

- a maintenance facility within the Merotherie Energy Hub to support the operational requirements of the project
- microwave repeater sites at locations along the alignment, as well as outside of the alignment at Botobolar, to provide communications link between the project and the existing electricity transmission and distribution network. The Botobolar site would be subject to assessment at the submissions report stage
- establishment of new, and upgrade of existing access tracks for transmission lines, energy hubs, switching stations and other ancillary works areas within the construction area (such as temporary waterway crossings, laydown and staging areas, earthwork material sites with crushing, grinding and screening plants, concrete batching plants, brake/winch sites, site offices and workforce accommodation camps)
- property adjustment works to facilitate access to the transmission lines and switching stations. These works include the relocation of existing infrastructure on properties that are impacted by the project
- utility adjustments required for the construction of the transmission network infrastructure along with other adjustments to existing communications, water and wastewater utilities. This includes adjustments to Transgrid's 500 kV transmission lines 5A3 (Bayswater to Mount Piper) and 5A5 (Wollar to Mount Piper) to provide a connection to the existing NSW transmission network, including new transmission line towers along the Transgrid network along the frontage of the New Wollar Switching Station, and other locations where there is an interface with Transgrid's network.

1.3.2 Location

The project is located in central-west NSW within the Warrumbungle, Mid-Western Regional, Dubbo Regional and Upper Hunter Local Government Areas (LGAs). It extends north to south from Cassilis to Wollar and east to west from Cassilis to Goolma. The location of the project is shown in Figure 1-1.

1.3.3 Timing

Construction of the project would commence in the second half of 2024, subject to NSW Government and Commonwealth planning approvals, and is estimated to take about four years. The project is expected to be commissioned/energised (i.e. become operational) in late 2027.

1.3.4 Construction

Key construction activities for the project would occur in the following stages:

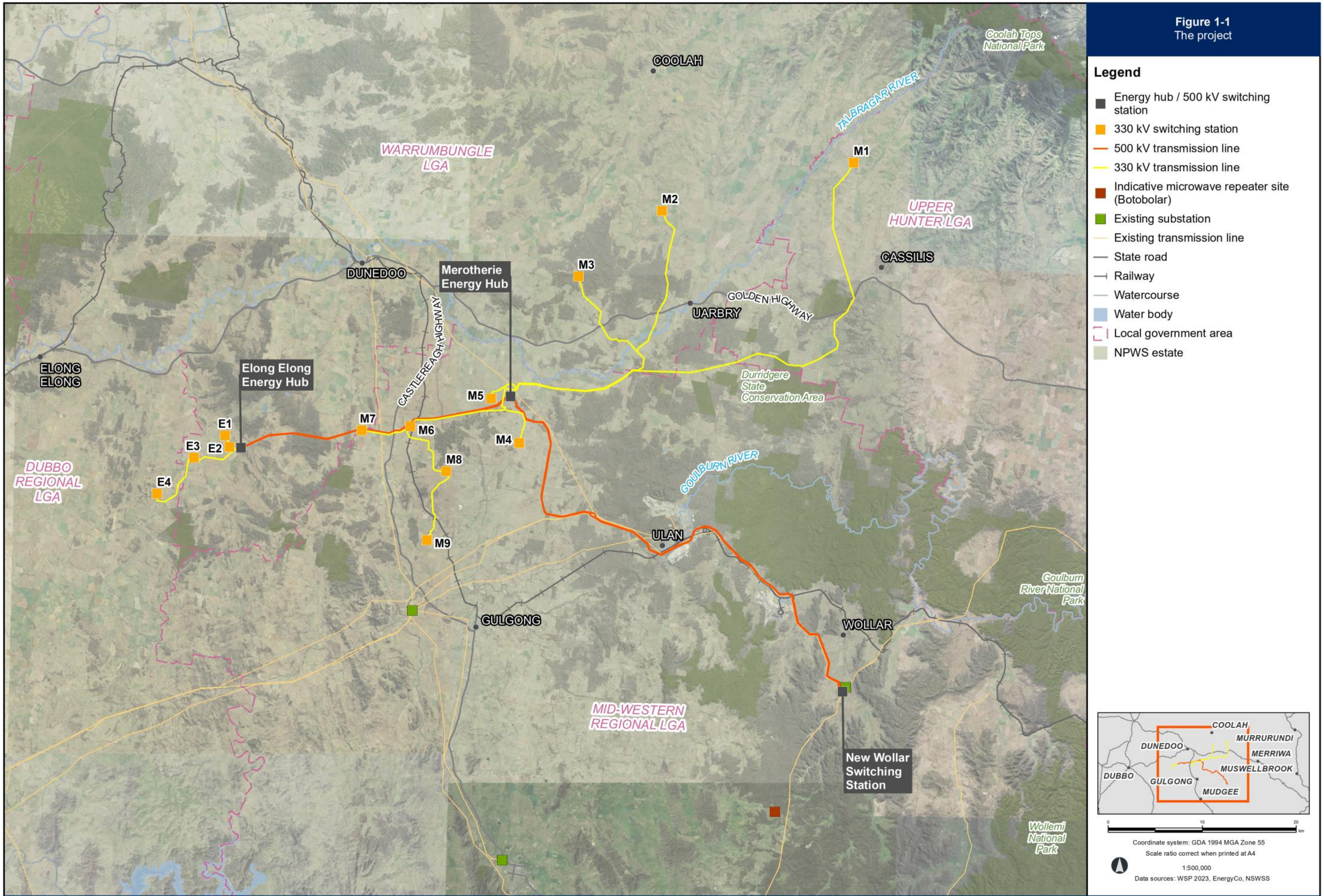
- enabling works
- construction works associated with the transmission lines
- construction works associated with energy hubs and switching stations
- pre-commissioning and commissioning of the project
- demobilisation and rehabilitation of areas disturbed by construction activities.

Excavation and land forming works within the construction area would be required for transmission line tower construction, site preparation works at the energy hubs and switching station sites to provide level surfaces, to create trenches for drainage, earthing, communications infrastructure and electrical conduits, local road upgrades and to construct and upgrade access tracks.

Construction vehicle movements would comprise heavy and light vehicles transporting equipment and plant, construction materials, spoil and waste from construction facilities and workforce accommodation camp sites. There would also be additional vehicle movements associated with construction workers travelling to and from construction areas and accommodation camp sites. These movements would occur daily for the duration of construction.

To support the construction of the project a number of construction compounds would be required including staging and laydown facilities, concrete batching plants, workforce accommodation camps and construction support facilities.
The main construction compounds would be established as enabling work and demobilised at the completion of construction. The size of the construction workforce would vary depending on the stage of construction and associated activities. During the peak construction period, an estimated workforce of up to around 1,800 people would be required.

Figure 1-1
The project



1.3.5 Operation

Permanent project infrastructure would be inspected and maintained by field staff and contractors on a regular basis, with other operational activities occurring in the event of an emergency (as required). Regular inspection and maintenance activities are expected to include:

- regular inspection (ground and aerial) and maintenance of electrical equipment and easements
- fault and emergency response (unplanned maintenance)
- general building, asset protection zone and landscaping maintenance
- fire detection system inspection and maintenance
- stormwater maintenance
- remote asset condition monitoring
- network infrastructure performance monitoring.

Operation of the project would require the establishment of transmission line easements. These easements would be around 60 metres for each 330 kV transmission line and 70 metres for each 500 kV transmission lines. Where network infrastructure is collocated, easement widths would increase accordingly (for example, a twin double circuit 500 kV transmission line would have an easement about 140 metres wide). Vegetation clearing would be required to some extent for the full width of the transmission line easement, depending on the vegetation types present.

1.4 Structure of the paper

The structure and content of this technical paper is as follows:

- Chapter 1 – provides an introduction to this technical paper (this chapter)
- Chapter 2 – outlines the methodology adopted for this noise and vibration impact assessment
- Chapter 3 – describes the existing environment of the study area as it relates to noise and vibration
- Chapter 4 – provides an overview of the regulatory context for the assessment, including an overview of the legislation, policy and guidelines that apply to the project
- Chapter 5 – describes the potential impacts to noise and vibration from construction of the project
- Chapter 6 – describes the potential impacts to noise and vibration from operation of the project
- Chapter 7 – provides recommended mitigation and management measures to avoid, minimise and manage any potential impacts of noise and vibration from construction and/or operation of the project
- Chapter 8 – identifies the key reports and documents used to prepare this paper.

Appendices to this report includes:

- Appendix A – Existing environment appendices
- Appendix B – Construction noise appendices
- Appendix C – Operational noise appendices.

2 Methodology

2.1 Overview

The assessment has adopted regulatory guidelines and standards to establish noise and vibration criteria and limits to define where impacts may be experienced and to quantify the performance of recommended noise and vibration management measures. This section outlines the methodology adopted for assessing the project's potential to generate noise and vibration impacts. The assessment has been completed in accordance with relevant SEARs, policies and guidelines outlined in Table 4-1. Figure 1-1 presented the locations of the project components discussed in this section.

The key steps of the methodology for undertaking the project noise and vibration impact assessment included:

- defining the study area for noise and vibration based on the proposed activities, sensitive receivers within the surrounding environment, and the anticipated level of impact
- a baseline noise monitoring survey to determine the existing environment of the study area
- reference to regulatory guidelines and standards to establish noise and vibration criteria and limits to define where impacts maybe experienced and to quantify the performance of recommended noise and vibration management measures
- predictive modelling of noise levels at sensitive receivers to inform the assessment of the potential impacts to amenity from the construction and operation of the project
- calculation of safe working distances for plant and equipment for the management of ground borne vibration during construction activities
- estimation of the blasting parameters required to control potential airblast overpressure and blast vibration levels at nearby sensitive receivers
- an assessment of the potential cumulative impacts of noise and vibration from the project in combination with other known developments within the vicinity of the project
- a summary of recommended mitigation and management measures to avoid, minimise and manage any potential impacts of noise and vibration from construction and/or operation of the project.

2.2 Study area

The distance in which noise and vibration sensitive receivers may experience noise and vibration impacts from the project were used to determine the study area.

To define an appropriate size for the study area for this assessment, preliminary calculations were undertaken to determine this likely maximum extent of construction and operational noise impacts. These calculations considered the likely maximum noise levels of construction and operational plant and equipment, as well as the distance between the construction and operational areas to sensitive receivers. This was used to determine the likely distance at which compliance with noise criteria and limits would be achieved. This area was defined as the study area and includes all noise and vibration sensitive receivers within a three kilometre radius of the construction area.

2.2.1 Permanent access tracks

The project may include some permanent access tracks between the existing public road network to the project operational area to support ongoing maintenance operations for the project and for access and egress of emergency vehicles.

These permanent access tracks would only be used occasionally and would carry a very low volume of vehicles. The potential for use of these access tracks to result in an operational noise impact is therefore expected to be minimal and as a result, these have not been assessed further.

2.2.2 Noise Catchment Areas

Noise Catchment Areas (NCAs) have been defined to classify groups of sensitive receivers that are likely to have a similar existing noise environment and experience similar impacts from the project. NCAs were determined through reference to aerial imagery and land-use maps and verified during the noise monitoring program.

All NCAs defined for the study area were found to be highly rural in nature and are described in Table 2-1 and shown in Figure 3-1.

Table 2-1 Noise catchment areas

NCA	Representative monitoring location	Region/description of noise environment	Approximate number of receivers
NCA 1	1	Goolma region, sparsely populated farmland.	12
NCA 2	2	Elong Elong region, open farmland and bushland of Tuckland State Forest. Road noise from Spring Ridge Road.	3
NCA 3	3	Orana region, sparsely populated farmland dominated by Castlereagh Highway.	17
NCA 4	4	Very low density rural areas throughout project, consisting of either farmland or state conservation areas.	79
NCA 5	5	Merotherie region, very low density rural area/farmland.	10
NCA 6	6	Uarbry region, sparsely populated farmland dominated by Golden Highway (west).	15
NCA 7	7	Township and surrounding area of Ulan, dominated by mining and rail operations.	26
NCA 8	–	Township and surrounding area of Wollar, dominated by mining and rail operations.	4
NCA 9	9	Cassilis region, sparsely populated farmland dominated by Golden Highway (east).	10
NCA 10	10	Very low density rural area north of Golden Highway, with Coolah township on northern border.	12
NCA 11	11	Wollar/Tichular region, very low density rural area/farmland, and existing substation.	2

2.2.3 Noise and vibration sensitive receivers

Sensitive receivers with the potential to be impacted by noise and vibration during construction and operation of the project were identified by reviewing recent aerial imagery and observations made during environmental noise surveys.

2.2.3.1 Noise sensitive receivers

Studies have shown that there are direct links between noise and health. Problems related to noise include stress related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity. Noise sensitive receivers are defined in relevant NSW legislation and guidelines, and generally include land uses potentially affected by noise impacts such as residential, educational, medical or recreational areas. 184 residential noise sensitive receivers have been identified within the study area including one receiver (ID 1483) with an approved development application (DA) for a house. These are presented graphically with unique identifiers in Appendix A-2. In addition to residential receivers, Ulan Public School is located within NCA 7, approximately 750 m from the construction area which consists of six structures.

It is noted that at the time of finalising the noise assessment, it became known there was a newly constructed dwelling at 121 Cliffdale Road, Uarbry in proximity to the construction area. As this was identified in the final stages of the preparation of this technical paper, it has not been included. To address this issue a revised impact assessment will be carried out and the results presented in the submissions report. This will include conducting a search to confirm if any there are any newly approved DA's for dwellings in the study area that need to be included in the assessment.

2.2.3.2 Vibration sensitive receivers

Vibration sensitive receivers include all regularly occupied buildings and sensitive structures within the study area. At sufficient levels, vibration can lead to cosmetic (and possibly structural) building damage as well as disturbance to occupants (human comfort). All identified noise sensitive receivers are also considered potentially vibration sensitive and have been assessed for possible vibration impacts during construction of the project.

Vibration can also affect sensitive structures, which can include heritage listed buildings. Given the proposed construction methodology, vibration impacts have the potential to affect vibration sensitive heritage structures up to a distance of 54 m from the construction area.

From a review of the Technical paper 6 – Non-Aboriginal heritage for this project, two historic heritage items have been identified with the potential to be damaged by ground vibration within this range.

The Technical paper 5 – Aboriginal cultural heritage assessment report identifies a range of Indigenous heritage items, however many, such as scattered artifacts or tree scars are not considered vibration sensitive. This assessment has considered items such as grinding grooves and rock shelters as potentially vibration sensitive. However the specific vibration sensitivity of each item will require further consideration as design progresses and will be subject to further assessment within the Construction Noise and Vibration Management Plan (CNVMP).

These items have been considered for more detailed analysis in Section 5.2.

2.3 Noise monitoring methodology

Determining the existing noise environment of the study area involved quantifying and characterising the existing noise environment through noise monitoring, determining the assessment study area, identifying sensitive receivers, and identification of the existing meteorological conditions of the study area.

The baseline environmental noise surveys involved a combination of unattended and attended noise monitoring to quantify the pre-construction noise environment at locations representative of the sensitive receivers along the project. The monitoring was carried out in accordance with the *Australian Standard 1055:1997 – Acoustics – Description and Measurement of Environmental Noise (AS 1055)* and *Approved Methods for the Measurement and Analysis of Environmental Noise in NSW* (EPA, 2022).

Unattended noise monitoring was carried out between 1 and 18 November 2022 using a combination of Ngara and Rion NL-42 noise logging devices. Attended noise monitoring, by WSP's acoustic consultants, was undertaken over 15-minute intervals with a Type 1 sound level meter (NTi Audio XL2-TA, S.N. A2A-12627-E0) on 1, 2, 3, 16 and 17 November 2022. Field calibration was checked before and after each measurement with no drift (±0.0 dB) observed. Monitoring was completed in accordance with *AS1055.1 Part 1: General procedures.*

Existing meteorological conditions for the study area were identified to provide appropriate noise modelling inputs for temperature and humidity. The likelihood of weather conditions which may increase noise levels at sensitive receivers in the study area were also considered with reference to Bureau of Meteorology (BoM) Station 94727 at Mudgee, NSW.

2.3.1 Noise monitoring locations

Noise monitoring locations were selected to be representative of the existing background noise environments in the vicinity of the project and to establish construction and operational noise goals. Table 2-2 outlines the noise monitoring locations selected for the project which are presented graphically in Figure 3-1. Land access agreements for unattended noise monitoring was unable to be obtained at suitable locations in NCAs 5 and 11 and as such the minimum background noise levels as outlined in the NPfI have been applied as a conservative measure. This is discussed further in Section 4.2.

Table 2-2 Noise monitoring locations

ID	Lot/DP	Locality	NCA
1	Lot 109/DP754305 (Tooloon)	Goolma	1
2	Lot 21/DP754289	Elong Elong	2
3	Lot 5/DP1088464	Castlereagh Highway	3
4	Lot 1/DP332044	Highly rural areas across the entire project area	4
6	Lot 53/DP750740	Golden Highway (west)	6
7	Lot 25/DP750773	Ulan	7
9	Lot 13/DP1073728	Golden Highway (east)	9
10	Lot 89/DP750749 (Tangaratta)	Coolah	10

2.4 Construction noise assessment methodology

2.4.1 Construction approach

2.4.1.1 Indicative construction program

The indicative timeframe for the project is for construction to commence in the second half of 2024 and be completed (including commissioning) by late 2027, subject to NSW Government and Commonwealth planning approvals.

The enabling works would take approximately 20 months. The construction phase would take approximately 52 months.

Site decommissioning and rehabilitation is expected to extend until the first half of 2028.

The indicative timing for the work stages for the project is shown in Figure 2-1.

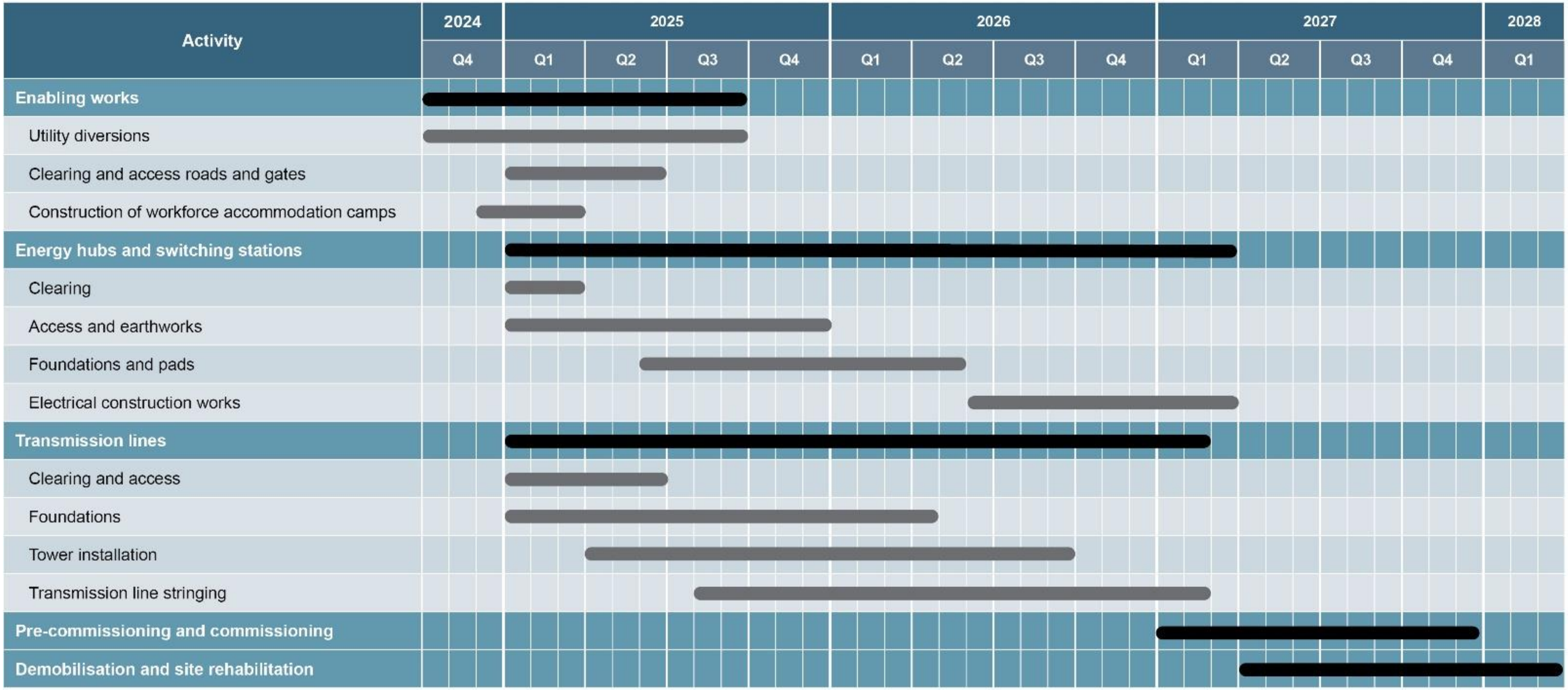


Figure 2-1 Indicative construction program

2.4.1.2 Construction compounds and workforce accommodation camps

A number of new construction compounds and workforce accommodation camps are proposed to be established to allow for the construction of the project.

The main construction compounds would be located at:

- New Wollar Switching Station
- Merotherie Energy Hub
- Elong Elong Energy Hub.

The main workforce accommodation camp sites would be located at:

- Merotherie Road, Merotherie
- Neeleys Lane, Cassilis.

2.4.1.3 Construction activities

Key construction activities for the project would occur in the following stages:

- enabling works
- construction works associated with the energy hubs and switching station sites
- construction works associated with the transmission lines
- pre-commissioning and commissioning of the project
- demobilisation and rehabilitation of areas disturbed by construction activities.

For the purposes of this assessment, and to facilitate the clear geographical description of potential noise and vibration impacts, a number of scenarios comprising typical plant and equipment have been developed based on the indicative staging of the project outlined above. Details of the individual construction activities assessed are presented in the following sections and plant items are presented in Appendix B-1, including assumptions on utilisation, maximum noise level and the number of plant items per works stage.

Transmission line construction works

Table 2-3 summarises the proposed work stages and key activities required to construct the proposed transmission lines.

Table 2-3 Work stage and key construction activities – transmission lines

Work stage	Key construction activities
Utility adjustment (enabling works)	Site surveys (for example locating services/utilities) Minor utility adjustments/relocation
Site access (enabling works)	Install environmental controls Erection of safety barriers around work sites (where applicable)
Vegetation clearance (enabling works)	Vegetation clearing/tree trimming
Foundations	Excavation of pole and tower foundations at various sites along the easements Installation of pole butts and tower foundations Blasting may be required at some locations
Erection of towers	Assembly and erection of towers
Stringing of the transmission lines	Stringing of transmission lines Clipping of conductors

Work stage	Key construction activities
Stringing of the transmission lines (brake and winch)	Stringing of transmission lines Clipping of conductors
Commissioning	Testing and commissioning works
Demobilisation and rehabilitation	Removal of site facilities, environmental controls and landscaping

Energy hubs and switching stations

Table 2-4 lists the proposed work stages and key activities required to construct the proposed Merotherie and Elong Elong energy hubs, Wollar switching station and the 330 kV switching stations.

Table 2-4 Energy hub work stages and key construction activities

Work stage	Key construction activities
Utility adjustment (enabling works)	Site surveys (for example locating services/utilities) Minor utility adjustments/relocation
Site access (enabling works)	Install environmental controls Erection of safety barriers around work site
Vegetation clearance (enabling works)	Vegetation clearing/tree trimming
Access and earthworks	Removal of topsoil Excavation and screening of fill material (may include blasting at some locations)
Foundations and pads	Construction of substation bench Construction of stormwater drainage system Earth grid installation Construction of footings including main transformer compound
Equipment installation	Construction of spill oil drainage system including oil containment tank Construction of substation fencing Construction of conduits and pits Construction of buildings Structure and HV equipment erection Transformer installation Cabling and termination Installation of gravel around the site
Commissioning	Point to Point testing HV testing HV equipment operational check Protection, control, and metering system testing Transmission line cutover Protection, control, and metering checks HV equipment operation

Work stage	Key construction activities
Demobilisation and rehabilitation	Removal of temporary construction facilities Rehabilitating and landscaping work sites and the affected area (as required/ proposed) Removing environmental controls once areas are established

Establishment of access tracks and connection points

Some construction work would be required to upgrade or establish minor access tracks and access roads, this would include tie in works for road connections. Table 2-5 lists the proposed work stages and key activities considered during this work stage.

Table 2-5 Work stage and key construction activities – Access tracks and connection points

Work stage	Key construction activities
Earthworks and upgrades	Establishment of access tracks and access roads tie in works for road connections
Vegetation clearing	Vegetation clearing/tree trimming

Main construction compounds and workforce accommodation camps

Table 2-6 lists the proposed work stages and key activities associated with the construction compounds and workforce accommodation camps.

Table 2-6 Work stage and key construction activities for the construction compounds and workforce accommodation camps

Work stage	Key construction activities
Vegetation clearance	Vegetation clearing/tree trimming
Construction	Earthworks to establish hardstand Installation of utilities infrastructure (drainage, conduit runs, sewerage) Installation of site/accommodation sheds Installation of roofs and walkways Spray seals, line marking and delineation installation Installation of workshops, containers, canopies Furnishing and utilities connections
Operation (construction compounds – with helicopter)	Office works Staff/worker meetings/briefings Material handling Logistics (loading/unloading trucks) Taking deliveries De-stuffing/re-distribution of materials Staff training Helicopter landing and take off Maintenance

Work stage	Key construction activities
Operation (construction compounds – without helicopter)	As above without helicopter landing and take off
Operation (workforce accommodation camp)	Workforce accommodation facility operations including heating, cooling, lighting, operation of cooking, ablution/hygiene facilities etc.

Construction blasting

Blasting may be required at the following locations along the project alignment.

- **Energy hubs and switching stations**:

  Blasting may be used to excavate areas where hard rock is encountered. Where possible, the excavated material from the blasting would be used to construct the pad for the energy hubs and switching stations, minimising the volume of fill material to be imported onto the site.

- **Areas along the transmission line**:

  Blasting would be used to facilitate the construction of the transmission towers and stringing of the conductors where hard rock is encountered. This would most likely include the Cassilis connection, Coolah connection and Leadville connection in the north eastern section of the project, along with Merotherie Energy Hub—Elong Elong Energy Hub connection.

Notwithstanding the above, there may be other areas along the alignment where blasting is required. These areas will be confirmed during detailed design, once further geotechnical investigations are complete. As the precise locations for blasting are not known at this stage of the project, the assessment presented in Section 5.3 has calculated the maximum permissible Maximum Instantaneous Charge (MIC) to ensure compliance with the relevant blast limits at sensitive receiver locations (refer Section 4.2.1.6).

2.4.1.4 Construction hours

Construction of the project would be carried out during recommended standard hours as defined by the Interim Construction Noise Guidelines (DECC, 2009) (ICNG):

- Monday to Friday between 7 am and 6 pm
- Saturday between 8 am and 1 pm
- no work on Sundays or public holidays.

Construction of the project would also be undertaken outside of the recommended standard hours (out of hours work), as detailed below.

Out of hours work

Due to the remote nature of the work, and the requirement to accommodate a rostered fly-in fly-out (FIFO) and drive-in drive-out (DIDO) workforce, construction hours would be extended across a seven-day work week between 7 am and 7 pm.

To support construction activities during these extended hours, operation of the main construction compounds would also be required.

Where sensitive receivers are noise affected during extended construction hours (that is, where construction noise is above the noise management level), and the works cannot be undertaken during standard work hours, additional mitigation or management measures would be implemented through an out of hours work protocol.

The workforce accommodation camps would be operational 24 hours a day, seven days a week.

In addition, the following out of hours work would be required at certain locations within the construction area to satisfy third party or safety requirements, or to accommodate specific long lead items:

- stringing of transmission lines across a main road or railway
- transmission line construction within areas currently forming part of mining operations, to coordinate works with 24/7 mining operations
- where road occupancy licences are required
- transmission line cutover or commissioning
- the delivery of equipment or materials as requested by police or other authorities for safety reasons (such as the delivery of transformer units)
- oil filling of the transformers at energy hubs
- emergency work to avoid the loss of lives and/or property and/or to prevent environmental harm
- work timed to correlate with system planning outages (likely 24-hour operations when required to minimise impact to electrical supply services)
- situations where agreement is reached with affected receivers
- potential utilities adjustment works (in consultation with the requirements of asset operators)
- large concrete pours (including concrete batching plant operation which may require commencement before 7 am for early pours)
- any works that do not exceed the applicable noise management levels in accordance with the ICNG.

During detailed construction planning, a program would be developed to identify the required night work periods (including dates and durations). Except for emergencies, construction works would be carried out in accordance with the out of hours work protocol and would not take place outside construction hours without prior notification in line with that protocol.

2.4.1.5 Vehicle generation

Construction vehicle movements would comprise vehicles transporting compound and workforce accommodation camp infrastructure, energy hub, switching station and transmission line infrastructure, equipment and plant, materials, spoil and waste, as well as mini-buses and light vehicles associated with construction workers travelling to and from workforce accommodation camps and construction areas.

These movements would occur daily across the whole of the project. Non-standard or oversized loads would also be required for construction of the energy hubs (such as delivery of transformer units), switching stations and transportation of transmission line tower materials.

Indicative peak hour vehicle movements for the project are outlined in Table 2-7. These vehicle movements are based on the expected typical and peak construction period for the project and would be confirmed during detailed design and construction planning.

Table 2-7 Indicative peak hour construction vehicle movements two combined

Site name	Light vehicles	Heavy vehicles	Total vehicles
Merotherie Energy Hub and Camp (Main camp site)	40	30	70
Neeleys Lane (Satellite camp site)	32	24	56
New Wollar Switching Station	10	4	14
Elong Elong Energy Hub	4	20	24
Switching Stations (each, typical)	12	1	13
Access gate (typical)	12	20	32

In general, vehicle movements would be scheduled outside peak periods where practicable. However, there would be a need for some vehicle movements during these periods. Worker vehicle movements would also be required during both the morning and afternoon peak hour periods.

2.5 Noise assessment inputs

2.5.1 General modelling assumptions

A detailed 3-dimensional noise model has been prepared for the project to assess potential noise impacts during construction and operation of each project component. Noise levels for construction were modelled for typical activities under calm meteorological conditions (as required and detailed in Section 2.5.3.1) to estimate noise impacts at the nearest receivers. Operational impacts have been assessed for both calm and worst case meteorological conditions.

A noise model was created with SoundPLAN 8.2 modelling software and the CONCAWE algorithm was adopted to assess the noise levels from key noise sources.

Key modelling parameters and assumptions are shown in Table 2-8.

Table 2-8 Operational noise modelling inputs and assumptions

Parameter	Modelling input
Ground absorption	Ground absorption factors are set to 0.75 which is indicative of mixed grass/open vegetation located throughout the study area.
Terrain data	Terrain data have been provided by NSW Six Maps.
Meteorological conditions	Neutral conditions only: Stability category D, 0 m/s wind from source to receiver (refer Section 2.5.3.1).
Buildings	Sensitive receivers are modelled as point receivers only (free-field levels).
Receiver height	The receiver heights are set at 1.5 m above ground level.
Location of noise sources	Due to the preliminary nature of detailed site layouts, noise sources have generally been placed at the nearest site boundary to each receiver for the assessment of worst-case potential impacts.
Modelled sound power levels	As described in Section 2.5.3. Noise sources were typically modelled at 2.5 m height above ground level.
Assessment parameter/ duration	$L_{Aeq\ (15\ minutes)}$ (construction sources and operational energy hubs). Instantaneous L_{Amax} (switching stations operations).
Assumed hours	Operational noise may occur at any time of day (day, evening, night).
Attention-drawing characteristics	The application of annoyance penalties to noise sources have been considered as described in Section 4.2.2.

2.5.2 Construction

Construction fleet and staging was sourced from indicative information within the project description. Sound power level profiles associated with the construction fleet were developed outlining the equipment used at each construction stage, utilisation and number of plant. Sound power levels (SWLs) for individual plant items were generally sourced from the (former) Roads and Maritime Services' Construction Noise Estimator (part of the CNVG), which provides regulator-accepted sound power information for construction equipment. Where additional SWLs were required, these were sourced from similar industry standard databases. All equipment was conservatively assumed to be operating simultaneously within each work stage. These SWLs are provided in detail in Appendix B-1.

2.5.2.1 Construction noise assessment

Prediction of construction noise levels from the construction activities has been conservatively calculated in accordance with the general modelling assumptions in Section 2.5.1, taking into account likely reductions in noise due to air absorption, topographical screening and ground absorption. A maximum potential impact has been predicted, based on the nearest extents of the construction area to noise sensitive receivers.

2.5.2.2 Construction vibration assessment

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

The *Construction Noise and Vibration Guideline (for Road and Maritime Works)* (Transport for NSW, 2022) (CNVG) summarises the relevant minimum working distances for certain vibration generating activities with regard to cosmetic damage and human comfort impacts. These distances have been calculated according to the AVTG and BS7385.

Table 2-9 indicates the minimum working distances for typical items of vibration intensive plant applicable to this project that must be complied with unless addition mitigation is employed.

Table 2-9 Minimum working distances for vibration intensive plant

Plant item	Rating/description	Minimum working distance (metres)		
		Cosmetic damage (BS 7385)[1]	Heritage (DIN 4150-3)[1]	Human response (AVTG)
Small hydraulic hammer	300 kg – 5 to 12 tonne excavator	2	5	7
Medium hydraulic hammer	900 kg – 12 to 18 tonne excavator	7	15	23
Large hydraulic hammer	1600 kg – 18 to 34 tonne excavator	22	44	73
Pile boring	≤800 mm diameter	2	5	n/a
Vibratory roller	< 100 kN (typically 2–4 tonnes)	6	16	20
	> 300 kN (typically 13–18 tonnes)	20	54	100

(1) Source: adapted from CNVG, TfNSW, 2022

The minimum working distances presented are indicative and would vary depending on the item of plant and local geotechnical conditions. The cosmetic damage thresholds apply to typical buildings under typical geotechnical conditions and vibration monitoring is recommended at specific sites, including heritage items deemed vibration sensitive and located within 100 m of any vibration intensive work.

In relation to human response, the nominated minimum working distances relate to continuous vibration. For most construction activities, vibration emissions are intermittent and higher vibration levels over shorter periods are acceptable. Additional assessment should be undertaken where the human response criteria are exceeded.

The relevant minimum safe working distance for each work stage was determined in reference to the proposed equipment and buffer zones were created to geographically capture all receivers within these distances.

2.5.2.3 Construction blasting assessment

During construction, there is the potential for blasting to be required to enable construction of some transmission line tower footings, switching stations and energy hubs. The final locations of blasting activities are yet to be confirmed pending further geotechnical investigations.

For this type of activity there is the potential for airblast overpressure and groundborne vibration at the nearest noise sensitive receivers, which can result in impacts on human amenity or structural impacts to buildings and infrastructure.

Where required, impacts from blasting would require assessment in accordance with the Australian and New Zealand Environment Conservation Council's (ANZECC*) Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990) and the AS 2187.2 *Explosives – Storage, Transport and use Part 2: Use of Explosives*. High level predictions based on methods within AS2187 have been provided in Section 5.3.

Specific blasting and seismic details would need to be assessed on a site- and blast- specific basis, once a detailed construction methodology is available. It is important that the actual buffer zone distances, associated specifically with this project, be identified and appropriate measures taken to limit overpressure and vibration to acceptable levels at critical locations.

The distance limits relating to vibration and airblast overpressure set out in Table 4-10 have been determined using formula as outlined in Australian Standard 2187.2-1993, applicable to free-face blasting in 'average field conditions' which states:

Vibration Formula:

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

and

Overpressure Formula:

$$OP = 165 - 24 * (LogR - 0.33LogQ)$$

Where:

V = ground vibration as peak particle velocity in mm/s
R = distance between charge and point of measurement in metres
Q = effective charge mass per delay or maximum instantaneous charge in kilograms

The distance limits per nominated MIC may vary significantly depending on the geological conditions, local shielding and meteorological factors at the site.

2.5.2.4 Construction traffic noise assessment

Construction traffic volumes have been assessed for all identified construction routes to the nearest potentially affected residential receivers. The likely routes for these vehicles and project traffic numbers have been adapted from *Technical paper 11 – Traffic and transport impact assessment*.

Quantitative increases in road traffic noise as a result of additional construction traffic have been modelled using this Calculation of Road Traffic Noise (UK Department of Transport, 1988) (CoRTN) calculation method within the construction noise model to confirm compliance with RNP NMLs. Base noise modelling assumptions are presented in Section 2.5.1 and specific road traffic modelling assumptions are provided in Table 2-10.

Table 2-10 Road noise modelling assumptions

Parameter	Modelling input
Vehicle numbers and speeds	Calculated from data contained within Technical paper 13 – Traffic and transport
Surface corrections	0 for sealed roads, +7 for unsealed roads
Delivery hours	All construction traffic has been assumed to operate during daytime hours only

It is noted that deliveries may occur during the night period, however these activities fall under the ‘delivery of oversized plant or structures’ category of works allowed outside standard hours in line with the ICNG.

In order to assess the construction traffic noise impact on nearby receivers, existing traffic levels in each direction and predicted construction traffic volumes on key construction routes were considered.

The modelled traffic volumes for key construction routes that were assessed are presented in Appendix B-2.

2.5.3 Operation

2.5.3.1 Meteorology

Certain meteorological conditions can enhance the propagation of noise, and their influence is required to be accounted for where they are found to be a feature of the environment in the vicinity of the project. These are described in the NPfI and summarised in Table 2-11.

Table 2-11 Standard and noise enhancing meteorological conditions

Meteorological conditions	Parameters
Neutral meteorological conditions	Day/evening/night: Stability categories A-D with wind speed up to 0.5 m/s at 10 m above ground level.
Noise-enhancing meteorological conditions	Night: Stability categories A-D with light winds (up to 3 m/s at 10 m above ground level) and/or stability category F with winds up to 2 m/s at 10 m above ground level.

Where the occurrence of noise-enhancing conditions is ‘significant’ (i.e. occurs for more than 30% of the time), noise levels from the project must also be assessed under these conditions as defined in the NPfI.

In accordance with the ICNG, standard meteorological conditions were considered for the construction noise assessment. For the purposes of operational noise components in this assessment, the frequency of occurrence of these noise-enhancing meteorological conditions was considered at Mudgee Airport Meteorological Station (62101). The results of this study are presented in Appendix A-3, and in summary found that adverse conditions are not a feature of the study area and as such have not been considered in this assessment.

2.5.3.2 Transmission line maintenance

Regular maintenance activities would be required for the transmission lines during operation of the project. Likely maintenance activities would include:

- regular inspection and maintenance of transmission lines, towers and poles including:
  - an annual fly over as part of seasonal bushfire prevention surveys
  - routine infrastructure inspection on an average six-yearly cycle for transmission line towers. This would typically involve maintenance crews driving a light vehicle along the easement (accessed from public roads and access tracks), inspecting each transmission line tower from the ground and by personnel climbing the tower
  - routine/planned line maintenance using a light vehicle(s), an elevated work platform and a medium sized truck with personnel to rectify any defects found from routine inspections. Generally, this would occur within the same regular maintenance cycles as the routine infrastructure inspection
- ad hoc fault and emergency fly over(s) to assess infrastructure condition should an unplanned outage occur (for example through a weather event or other failure of infrastructure). This maintenance would occur as required. The amount of maintenance and/or crews required for repair of any damaged infrastructure would depend on the extent of repairs required

- vegetation removal to maintain appropriate distances between ground vegetation and transmission lines. Vegetation below the transmission lines would require ongoing maintenance throughout the operation of the project to ensure electrical safety clearances and protection zones are maintained.

These maintenance activities are expected to be infrequent (up to once per year). If and when required, these activities are also expected to be either transient/of short duration (for example flyover, drive-by) or local to a specific section/ transmission line structure. Possible risk of noise impacts associated with these activities is therefore expected to be minimal and has not been assessed further.

2.5.3.3 Transmission line corona noise

Operation of high voltage transmission lines carry the risk of generating audible noise during certain meteorological conditions, for example during wet weather.

Audible noise associated with the operation of high voltage transmission line is primarily due to corona discharges on transmission lines. Such phenomena are driven by the conductor's Surface Voltage Gradient (SVG) and accumulation of pollution and water droplets on the transmission line's conductor surface. Corona discharge noise is therefore more prominent during weather conditions with rain, mist or fog.

Such audible noise is understood to be typically characterised by a broadband crackling noise with a possible, more prominent, tonal component at 100 Hz.

The extent and level of noise associated with corona discharges are primarily influenced by the following factors:

- maximum surface voltage gradient
- meteorological/air pollution conditions (including mist, dust or light rain).

Although coronal noise may occur under misty conditions, advice from the BoM indicates that as mist is a qualitative descriptor, it cannot be reliably measured or reported. The BoM has advised that mist will generally be recorded as fine rainfall and as such the number of rainfall days per year will include most mist days. Air quality in the region of the project is generally good as described in the Technical paper 16 – Air quality, and it is not expected that air pollution would significantly contribute to corona discharge.

An audible noise assessment to determine the potential operational noise impacts of the project's transmission lines on surrounding noise sensitive receivers has been completed.

For the purpose of assessing the noise risk associated with the transmission lines, the following transmission lines (occurring during wet weather conditions only) have been described:

- 500 kV transmission lines:
  - New Wollar to Merotherie
  - Merotherie to Elong Elong
- 330 kV transmission lines:
  - Merotherie to Uarbry East
  - Merotherie to Uarbry West
  - Renewable Energy Generator connection lines:
    - Merotherie South
    - Merotherie West
    - Tallawang South
    - Tallawang West
    - Cobbora West
    - Goolma.

Calculated corona noise levels

As part of the Project Energy Connect (PEC) EIS, an Audible Noise Assessment (*Project EnergyConnect Audible Noise and Radio Frequency Interference Study,* Beca, September 2020) was prepared, which outlined likely noise levels associated with the proposed high voltage transmission lines. Due to the similar scale and nature of the two projects, the methodology and identified noise levels in this report were considered for adoption in this assessment. A comparison of the primary parameters influencing corona noise discharge between the two projects is provided in Table 2-12.

Table 2-12 Comparison of corona noise discharge factors (PEC to project)

Parameter	Value (PEC)	Value (this project)
Average maximum Surface Voltage Gradient (SVG) (kV/cm)	15.5 – 18.3	< 13.6 – 14.9
Typical number of rainfall days (average across alignment)	82	72

The comparison in Table 2-12 shows that the primary factors influencing corona noise are largely the same across the two projects. It is considered that this information is suitable for adoption in this assessment, as noise levels assessed in the PEC audible noise assessment would comprise a conservative assessment of likely corona noise levels for the project. The approach is considered conservative and considers the potential impacts of maximum corona noise levels based on the centreline of the proposed transmission lines.

It should be noted that an allowance of a one per cent increase in SVG has been allowed for. This increase may be caused by a 0.5 metre reduction in phase and circuit spacings, which may occur during ongoing refinement of the project infrastructure along the identified transmission line easement.

These calculations assume that transmission lines are carrying a full load, which represents the worst case scenario.

The PEC Audible Noise Assessment outlined noise predictions at fixed distances for a range of transmission line configurations. These levels were predicted using the US semi-empirical Electric Power Research Institute (EPRI) methodology and the 100 Hz sound pressure level and rainfall rate correction factors were calculated for this assessment using the method prescribed in the EPRI Transmission Line Reference Book. The predicted noise levels at these fixed distances were used to calculate the Sound Power Levels (SWLs) outlined in Table 2-13.

Table 2-13 Modelled transmission line Corona Sound Power Levels

Transmission line configuration	Modelled Sound Power Level (SWL) dB(A)
Standalone Single-circuit 300 kV Transmission line	83
Standalone Double-circuit 330 kV Transmission line	86
Twin Double-circuit 330 kV Transmission line	89
Standalone Double-circuit 500 kV Transmission line	85
Twin Double-circuit 500 kV Transmission line	88

Based on a high-level analysis of transmission line noise data, a zone of potential impact spanning 500 m from the project transmission line alignment was created. The SWLs in Table 2-13 were then used to calculate the potential noise levels at all sensitive receivers within the zone and assessed in accordance with the NPfI. As discussed above, it is important to consider that coronal noise only occurs under conditions of high dust, mist or rain. During rain, noise form the rainfall will typically mask most coronal noise. As such, these impacts are anticipated to occur infrequently.

Meteorological impacts

Table 2-14 presents an extract of historical weather conditions for the study area (BoM, 2022).

Table 2-14 Rainfall statistics (BoM, 2022)

Location	BoM[1] Station	Rain days (per year)		Annual percentage of days with wet conditions
		Mean	STD[2]	
Coolah (Binnia St)	64025	74	22	20%
Nandoura	62022	63	20	17%
Leadville (Moreton Bay)	62035	69	15	19%
Coolah (Coolah Creek)	62057	65	20	18%
Cassilis (Dalkeith)	62009	81	23	22%
Wollar (Maree)	62056	69	25	19%
Ulan Water	62036	68	22	19%
Gulgong Post Office	62013	78	19	21%
Cobbora (Kundiawa)	64026	57	23	16%
Goolma (Booklyn)	62028	70	17	19%
Wellington Research Centre	65035	86	17	24%
Mumnil (Burrendong Dam)	62003	87	21	24%

(1) Bureau of Meteorology

(2) Standard deviation

Audible corona discharge noise is not expected to be a constant occurrence but is only present during mild, wet and misty conditions. Based on the meteorological conditions identified for the area, the expected annual frequency of these conditions is between 16–24 per cent of the time. During heavier rain events, general ambient noise levels in the environment would likely be higher and therefore potentially have a masking effect over any possible corona discharge noise. Noise disturbance under such circumstances is therefore likely to be low risk. It is noted that misty conditions typically occur for only short durations.

As corona noise is primarily produced due to interactions under wet conditions, during fair weather conditions this noise would not occur and all sensitive receivers are expected to be compliant with the PNTL. This assumes that all sensitive receivers would be located outside of the easement which is an operational requirement (that is, all sensitive receivers would be greater than 40 metres from the transmission line).

2.5.3.4 Switching stations

It is understood that the only operational noise sources at switching stations are associated with the potential activation of circuit breaker switches. These triggers occur infrequently and are required for the safe and stable operation of the power network.

As such, these noise events do not typically affect the background noise environment and the assessment has therefore only been considered against the L_{Amax} noise criteria (refer Section 4.2.2.5). Activation of the switches results in short term impulsive noise events which generate noise levels in the order of 115 dB $L_{Amax.}$ This noise level is based on the results of attended noise monitoring at a number of large NSW substation sites.

2.5.3.5 Energy hubs

The following noise sources are understood to be proposed for each energy hub:

- circuit breaker switches
- 200 MW/400 MWh battery units (x 350)
- up to 1500 MVA transformers (x 5)
- 250 kV synchronous condensers (Merotherie) (x 1)/250 kV synchronous condensers at Elong Elong (x 3).

In addition, a maintenance facility has been proposed at Merotherie Energy Hub. Precise activities at this site would vary, and use of this facility will be intermittent.

As site layouts for the energy hubs at Merotherie and Elong Elong have not been finalised , these units have been modelled at the boundary of each energy hub and as such provide a conservative assessment.

Transformers and synchronous condensers have been modelled as L_{Aeq} noise sources and circuit breaker switches have been assessed against L_{Amax} noise criteria as outlined in Section 4.2.1.3. The assessments are presented in Sections 6.3 and 6.4.

The equipment and estimated SWLs in Table 2-15 have been modelled for each energy hub. It is noted that synchronous condensers would operate at the energy hub sites and these would be housed within sound insulated buildings. Although other equipment such as synchronous condensers would be present at these sites, cumulative noise emissions from the Battery Energy Storage System (BESS) are expected to form the loudest components of plant and would dominate the noise environment.

Table 2-15 Primary noise generating equipment at the proposed energy hubs

Equipment	Number of plant (indicative)	Sound Power Level dB per unit $L_{Aeq(15\ minutes)}$	Sound Power Level dB per unit $L_{Amax\ (15\ minutes)}$
BESS units	350	89	–
Power transformers	5	90	–
Synchronous condenser	3	93	–
Circuit breaker switches	–	–	115
Maintenance facility (Merotherie only)	1	110	-
TOTAL		**114**	**115**

As the site layout is not finalised, the total noise level has been placed at the nearest boundary location to each receiver to represent a conservative prediction of noise impacts.

Daily traffic movements would also occur, however these are expected to be as low as 10 vehicle movements during the morning and afternoon peaks respectively, with sporadic movements throughout the day. And as such, road traffic noise impacts during operation are not expected and have not been considered further in this assessment.

2.6 Noise and vibration impact mitigation and management measures

2.6.1 General mitigation measures

Noise and vibration impact mitigation and management measures have been developed to reduce the effects of noise and vibration impacts that have been predicted for operational and construction components of the project. Where impacts have been predicted, all reasonable and feasible mitigation measures should be considered.

A feasible mitigation measure can be engineered and is practical to build and/or implement, given project constraints such as safety, maintenance and reliability requirements. It may also include options such as amending operational practices (for example, changing a noisy operation to a less-sensitive period or location) to achieve noise reduction.

Selecting reasonable measures from those that are feasible involves judging whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the mitigation measure. It considers the extent of exceedance, the cost benefit of mitigation and community views.

2.6.2 Operational noise mitigation

With regards to mitigation investigation, NPfI states that:

> "*Where the project noise trigger level is exceeded, assess the feasible and reasonable mitigation measures that could be implemented to reduce noise down towards the relevant project noise trigger level. If it is reasonable to achieve these levels, the proponents should do so. If not, then achievable noise levels should be identified. It is not mandatory to achieve the trigger levels but the assessment should provide justification if they cannot be met. An assessment of the acceptability of residual impacts should also be provided.*"

Guidance is provided in NPfI in regard to definition of 'feasible' and 'reasonable' mitigation as well as a generic list of mitigation measures.

From an acoustic perspective, possible strategies to mitigate noise are typically investigated in the following order (decreasing preference):

1. land use planning and provision of appropriate buffer distances
2. noise control at the noise source
3. noise control along the noise transfer path
4. noise control at the receiver.

2.6.3 Land use planning and provision of appropriate buffer distances

From an acoustic perspective, consideration to provide greater buffer distances between noise-generating developments where possible is recommended. This can have its limitations and should be considered with factors other than acoustics.

2.6.4 Noise control at the noise source

Generally, noise control at the source is considered as most effective in improving the overall acoustic outcomes at sensitive receivers. This may include sourcing equipment with lower acoustic specifications or providing localised noise shielding or housing equipment within sound insulated enclosures.

2.6.5 Noise control along the noise transfer path

This typically involves the investigation and implementation of noise barriers (in the form of walls or earth mound) to block the direct line of sight between noise sources and receivers. Noise barriers are most effective when closer to the noise source or receiver. Implementation of noise barrier is considered more feasible and reasonable to provide protection for groups of closely spaced receivers and not considered cost-effective for isolated receivers.

2.6.6 Noise control at the receiver

Following consideration of all feasible and reasonable source and pathway noise mitigation measures, the NPfI allows for receiver property treatment to be considered for any residual noise impacts. The NPfI stated that receiver-based treatment is typically only applicable for isolated residences in rural areas and may include upgrade of various construction elements of the dwellings and voluntary property acquisition.

In accordance with NPfI, receivers with a residual noise impact are defined as receivers with exceedances of the project noise trigger levels under the best-achievable acoustic outcome from a development. Residual noise impacts are identified after all feasible and reasonable source and pathway noise mitigation measures have been considered.

The significance of project-related residual noise impacts experienced by receivers determined in accordance with NPfI, is summarised in Table 2-16 and the correlating levels of receiver-based treatment are summarised in Table 2-17.

Table 2-16 Significance of residual noise impacts (source: NPfI)

If the predicted noise level minus the project noise trigger level is:	And the total cumulative industrial noise level is:	Then the significance of residual noise level is:
≤ 2 dB	Not applicable	Negligible
≥ 3 but ≤ 5 dB	< recommended amenity noise level or > recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1 dB	Marginal
≥ 3 but ≤ 5 dB	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1 dB	Moderate
> 5 dB	≤ recommended amenity noise level	Moderate
> 5 dB	> recommended amenity noise level	Significant

Table 2-17 Examples of receiver-based treatments to mitigate residual noise impacts (source: NPfI)

Significance of residual noise level	Example of potential treatment
Negligible	The exceedances would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls.
Marginal	Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity.
Moderate	As for ‘marginal’, but also upgraded façade elements, such as windows, doors or roof insulation, to further increase the ability of the building façade to reduce noise levels.
Significant	May include suitable commercial agreements where considered feasible and reasonable.

To provide an appropriate indoor acoustic amenity for residential dwellings, appropriate internal ambient noise level targets are typically established per *AS/NZS 2107:2016 Acoustics—Recommended design sound levels and reverberation times for building interiors*. The recommended internal design targets for residential buildings in rural areas is provided in Table 2-18.

Table 2-18 AS 2107: Internal noise and reverberation criteria (residential buildings)

Type of occupancy/activity	Recommended design sound level L_{eq}, dBA
Houses in rural areas with negligible transportation	
Sleeping areas	25–30

For the receivers with a higher category of noise impact significance, an overall noise reduction of approximately 25 dB is required to be achieved through the building envelope to meet the appropriate internal noise target. For example, based on outdoor noise levels of 50 dBA L_{eq} during the worst-case condition, this assumes that the affected rooms are sleeping areas. Where the noise affected rooms are less noise sensitive, lower noise reductions may be appropriate. AS2107:2016 does not provide specific guidance for less sensitive spaces such as living areas for “houses in rural areas with negligible transportation”, however it would be reasonable that these noise targets are 5 dB lower. This should be confirmed following an inspection of each potentially impacted receiver building, which would help optimize the required level of treatment in each internal space of the dwellings.

The following overall noise reductions can generally be expected through the following scenarios:

- reduction of 5 to 10 dB with a building façade with an opened window or door that is not greater than 20 per cent of the overall wall area. Due to the elevated nature of the contributing noise source, consideration of property treatment would likely be required for most of the building envelope on all facades and the roof. The only possible exception would be a façade on the far side of a dwelling that does not have a line of sight to the transmission line
- reduction of ≥20 dB is typically achievable through a closed and well-sealed building envelope of standard timber-framed construction with external and internal claddings.

A discussion of recommended operational noise mitigation is presented in Chapter 7.

3 Existing environment

The existing noise environment varies over the study area, however land uses within the study area are generally characterised as rural, primarily dominated by agricultural and rural residential land uses. The primary activities which dominate the existing noise levels include a combination of natural noises (for example cicadas and other insects) and local traffic influences. Main arterial roads in the construction area include the Golden Highway and the Castlereagh Highway. Several mines are located in the south east construction area, including Wilpinjong, Moolarben and Ulan Coal Mines.

3.1 Noise monitoring

3.1.1 Unattended monitoring

Unattended monitoring results are summarised in Table 3-1 with daily logger charts presented in Appendix A-1.

Weather conditions during the monitoring period were obtained from the BoM weather station at Mudgee (Station ID 94727). Periods of adverse weather have been processed in accordance with the procedures outlined in Fact Sheet D of the NPfI, which includes the removal of any periods of rainfall and periods where wind was recorded at levels greater than 5 m/s. Following the removal of this data, a general minimum of 7 days of valid data was obtained for each site.

Table 3-1 Unattended noise measurement results

ID	Rating background level, (RBL) dBA			Ambient noise level dBA $L_{eq,15\ min}$		
	Day [1]	Evening [1]	Night [1]	Day [1]	Evening [1]	Night [1]
1	27	28	29	50	45	46
2	26	26	27	43	43	44
3	26	27	26	50	47	45
4	25	29	26	48	45	45
6	32	33	32	50	49	44
7	29	40	37	51	52	50
9	32	31	28	63	61	57
10	29	31	24	48	44	39

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

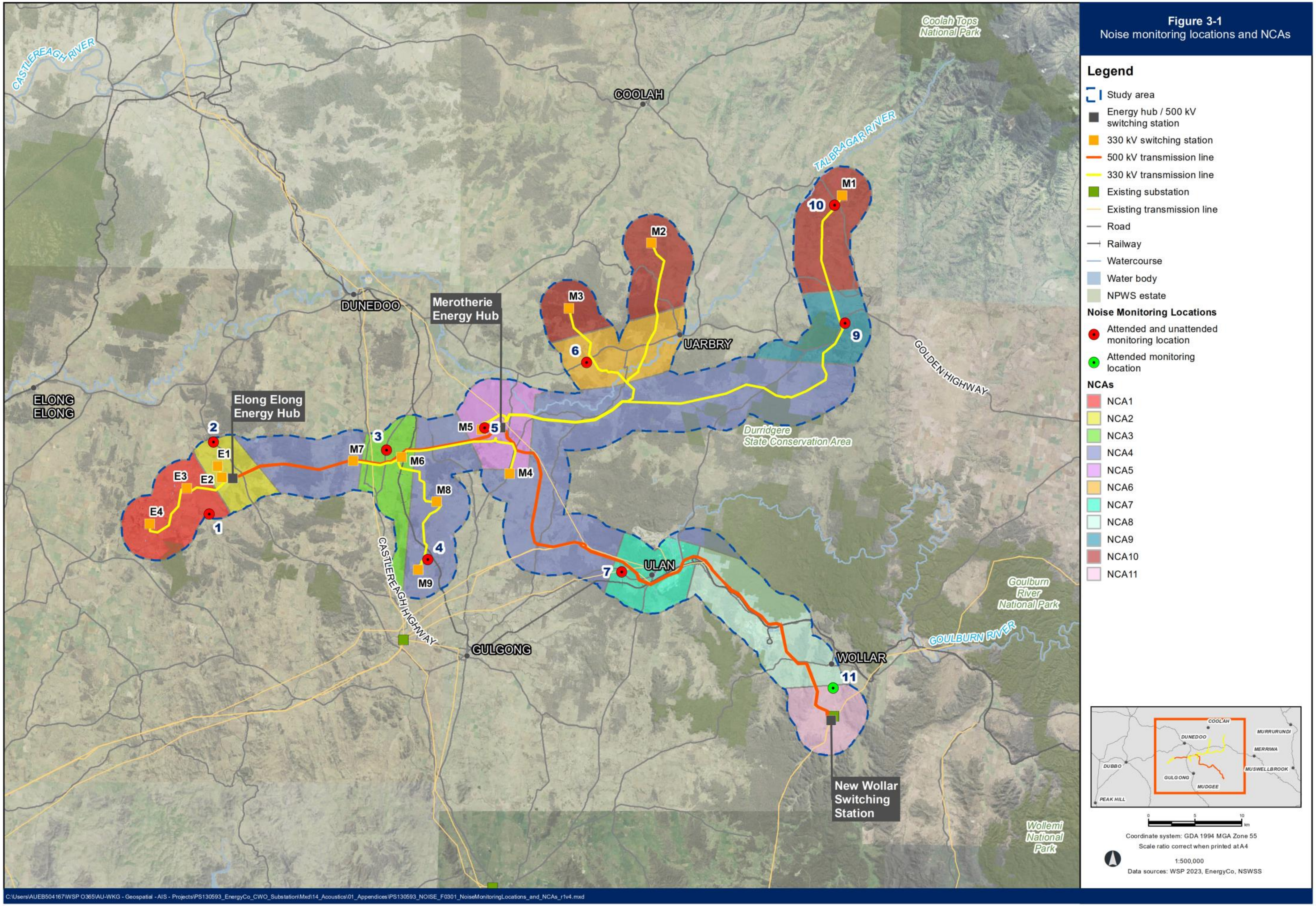


Figure 3-1
Noise monitoring locations and NCAs

3.1.2 Attended monitoring

To characterise the existing noise environment, short term (attended) noise measurements were undertaken at representative locations as summarised in Table 3-2. Weather conditions during monitoring were observed by site staff to be suitable for monitoring, with 2.5 to 3 m/s southerly winds and light cloud cover observed.

Background noise levels were generally observed to be low during the daytime period and dominated by rural and natural sounds, typical of a rural land use area. Low background noise levels of approximately 30 to 40 dBA were generally observed, which is consistent with the findings of the unattended noise monitoring program.

Table 3-2 Attended noise measurement results

ID	Date and time	Measured noise level dB			Comments
		$L_{A90,15min}$	$L_{Aeq,15min}$	$L_{Amax,15min}$	
1	3 November 2022 16:50 – 17:05	34.7	39.8	54.3	Rural noises: Livestock and wind
2	4 November 2022 10:20 – 10:35	35.0	51.1	72.0	Rural noises: Birds, wind and the occasional vehicle passing on Spring Ridge Road
3	3 November 2022 13:50 – 14:05	40.0	48.4	51.1	Road traffic noise: Mainly vehicle traffic, and in absence of traffic wind noise from vegetation
4	3 November 2022 12:25 – 12:40	36.9	44.5	62.6	Rural noises: Livestock, birds, insects and wind
5	2 November 2022 18:50 – 19:05	27.0	38.4	66.0	Rural noises: Livestock and wind, distant road traffic on Castlereagh Highway in absence of other sources
6	16 November 2022 13:00 – 13:15	45.2	56.0	69.7	Dominated by wind noise and traffic on the Golden Highway
7	4 November 2022 12:15 – 12:30	32.6	47.5	67.5	Quiet rural area, occasional road traffic on Cope Road, wind in vegetation
9	16 November 2022 12:00 – 12:15	41.5	64.1	81.9	Frequent road traffic noise and wind in vegetation
10	16 November 2022 10:45 – 11:00	33.6	41.2	62.3	Rural noises: Livestock and wind
11	4 November 2022 13:05 – 13:20	30.8	52.5	80.7	Rural noises: Livestock and wind

4 Legislative and policy context

Environmental planning approval for the project is required in accordance with the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The project is also a controlled action and therefore requires Commonwealth assessment and approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Sections 5.12 and 5.13 of the EP&A Act provide for the declaration of State significant infrastructure (SSI) and Critical State Significant Infrastructure (CSSI). On 23 November 2020, the Minister for Planning made the *Environmental Planning and Assessment Amendment (Central-West Orana Renewable Energy Zone Transmission Order) 2020*. The Order declares the whole Central-West Orana REZ Transmission Project to be CSSI.

This section describes the Commonwealth and State legislation and policy relevant to the assessment of noise and vibration impacts.

4.1 Policy, standards and guidelines

The acceptability of noise and vibration impacts in NSW is governed by the *Protection of the Environment Operations (Noise Control) Regulation* (NSW Government, 2017) under the *Protection of the Environment Operations Act No 156* (NSW Government, 1997). These documents set the framework to define noise amenity as required by the SEARs.

A summary of the relevant legislations and policy that apply to this project is provided in Table 4-1. A full description of how these policies and assessment guidelines have been applied to the assessment of project noise and vibration impacts is included in Section 4.2.

Table 4-1 Relevant legislation and policy

Acoustic aspect	Description	Relevant assessment guidelines
Airborne noise	Construction noise	— Interim Construction Noise Guideline (ICNG) (DECCW, 2009)
	Construction traffic noise	— NSW Road Noise Policy (RNP) (DECCW, 2011)
	Sleep disturbance from construction noise	— Interim Construction Noise Guideline (DECCW, 2009) — NSW Road Noise Policy (DECCW, 2011)
	Operational industrial noise	Noise Policy for Industry (NPfI) (EPA 2017)
	Sleep disturbance from operational noise	Noise Policy for Industry (EPA 2017)
	Existing ambient, background and industrial noise levels	— Noise Policy for Industry (EPA, 2017) — *Australian Standard AS 1055: Description and measurement of environmental noise* — *ISO 8297 – Determination of Sound Power Levels of Multisource Industrial Plants for Evaluation of Sound Pressure Levels in the Environment (Engineering Method)*

Acoustic aspect	Description	Relevant assessment guidelines
Vibration	Human comfort	— Assessing Vibration: A Technical Guideline (AVTG) (DEC, 2006)
	Construction vibration effect on structures (structural or cosmetic damage)	— *German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures* — *Australian Standard AS2187.2-2006 Explosives – Storage, Transport and Use provides guidance for the assessment of cosmetic damage to buildings caused by vibration* — *British Standard BS 7385-2:1993 – Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration (1993)*
Blasting	Blasting overpressure and ground vibration	— ANZECC Technical Basis for Guidelines to Minimise Annoyance Due to Blast Overpressure and Ground Vibration — *AS 2187.2 Explosives – Storage, Transport and use Part 2: Use of Explosives*
Management	Mitigation and management of construction noise and vibration issues	— Interim Construction Noise Guideline (DECCW, 2009) — Noise Policy for Industry (EPA, 2017)
Cumulative impacts	Project-level cumulative impacts related to State significant projects	Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2022)

4.2 Noise and vibration criteria

Construction and operational noise and vibration criteria have been established after review of relevant noise and vibration legislation, policy and guidance. A high-level review of blasting criteria has been presented. Criteria have been developed with reference to the results of monitoring outlined in Section 3.1.

4.2.1 Construction criteria

4.2.1.1 Interim construction noise guideline

The ICNG is used to assess and manage potential impacts from construction noise on residents and 'other' sensitive land uses. The ICNG uses Noise Management Levels (NMLs) to determine the noise level at which the project is expected to impact noise sensitive receivers and require the implementation of reasonable and feasible noise management and mitigation to minimise these impacts. These management levels are presented in Section 4.2.1.2.

Table 4-2 defines how the NMLs are applied for residential receivers, based on existing Rating Background Levels (RBL) of noise in the study area. Residential receivers are deemed likely to be affected by noise where predicted construction noise levels exceed the NML. If the predicted noise levels exceed 75 dBA at a residential receiver, the receiver is deemed to be 'highly noise affected' and require additional targeted mitigation measures to minimise potential noise impacts during construction.

Table 4-2 Construction noise management levels for residential receivers and working hours (Source: Table 2 of the NSW ICNG)

Working Hours	NML dBA $L_{eq(15\ min)}$[1,2]	How NML are applied
Recommended standard hours (SH)[3]: — Monday – Friday: 7 am – 6 pm — Saturday: 8 am – 1 pm — No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured dBA $L_{eq(15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: — times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) — if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times
Periods outside recommended standard hours of work (OOHW)	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB above the noise affected level, the proponent of any development works project should negotiate with the community.

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

(2) The RBL is the overall background noise level representing each assessment period (day/evening/night) over the whole monitoring period. The term RBL is described in detail in the NSW NPfI.

(3) Recommended standard hours for normal construction work, excluding blasting, as per ICNG Table 1.

Source: ICNG

4.2.1.2 Construction noise management levels

As discussed in Section 4.2.1.1, construction NMLs are derived using RBLs in accordance with the ICNG.

Table 4-3 provides a summary of the applicable NMLs based on the background noise monitoring (refer Section 3.1).

Table 4-3 Construction NMLs for residential receivers

NCA	Description	RBLs dBA			NMLs, $L_{eq(15min)}$ dBA[1]			
		Day	Evening	Night	Day (SH)	Day (OOH)	Evening (OOH)	Night (OOH)
1	Goolma	35[2]	30[2]	30[2]	45	35	35	35
2	Elong Elong	35[2]	30[2]	30[2]	45	35	35	35
3	Castlereagh Hwy	35[2]	30[2]	30[2]	45	35	35	35
4	Highly rural areas	35[2]	30[2]	30[2]	45	35	35	35
5[4]	Merotherie	35[2]	30[2]	30[2]	45	35	35	35
6	Golden Hwy (west)	35[2]	32[3]	32	45	37	37	37
7	Ulan	37[3]	37[3]	37	47	42	42	42
8[4]	Wilpinjong	35[2]	30[2]	30[2]	45	35	35	35
9	Golden Hwy (east)	35[2]	30[2]	30[2]	45	35	35	35
10	Coolah	35[2]	30[2]	30[2]	45	35	35	35
11[4]	Wollar	35[2]	30[2]	30[2]	45	35	35	35

(1) SH = recommended standard working hours, OOHW = outside of recommended standard hours work as defined in Section 4.2.1.1.

(2) Section 2.3 of the NPfI states that minimum RBLs should be applied to the noise monitoring results. As such, where background levels (Section 3.1) are below 35 dBA during the day period, and 30 dBA during the evening and night periods, levels have been set to these minimum intrusiveness levels.

(3) In accordance with the NPfI, it is recommended that evening criteria is set no higher than the day criteria and the night criteria should not be set any higher than the evening criteria. This reflects community expectations that night-time noise goals are more conservative than daytime.

(4) Where monitoring was not able to be undertaken, the most conservative, minimum background noise levels have been assumed.

Table 4-4 lists the NMLs that have been adopted for non-residential sensitive receivers, such as commercial, industrial or education land uses. The NMLs apply when the premises are in use during any assessment period. One non-residential sensitive receiver, a school, was identified within the study area.

Table 4-4 Construction NML for non-residential receivers

Land use	NMLs ($L_{eq(15 min)}$ dBA)
Classrooms at schools and other educational institutions (Ulan Public School)	Internal noise level – 45 (external – 55) [1]

(1) As the acoustic performance of the building envelopes of these receivers is not known accurately, an external to internal correction of 10 dB has been applied. This is generally accepted as the minimum noise reduction that is typically provided by standard building facades, allowing for windows being open for ventilation.

4.2.1.3 Sleep disturbance

The ICNG provides for some types of work to be undertaken outside of recommended standard hours. These include:

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

Where work outside of standard hours is required, the potential for impacts to sensitive receivers from transient maximum noise level events and sleep disturbance impacts due to construction activities during the night-time period is detailed in the NPfI. Maximum noise impacts may cause awakening events, while maintained elevated levels of noise may reduce the quality of sleep. As such, the sleep disturbance criteria for construction noise are presented in two forms and are presented as:

- $L_{eq(15min)}$ 40 dBA or the rating background level plus 5 dB, whichever is the greater, and/or
- L_{Fmax} 52 dBA or the rating background level plus 15 dB, whichever is the greater.

Based on the measurements detailed in Section 3.1, external maximum noise level event criteria are presented in Table 4-5.

Table 4-5 Sleep disturbance criteria (residential receivers only)

Location	Night-time RBL dBA	$L_{Aeq(15min)}$ criteria dB	L_{AFmax} criteria dB
NCA 1, 2, 3, 4, 5, 8, 9, 10 and 11	30	40	52
NCA 6	32	40	52
NCA 7	37	42	52

4.2.1.4 Construction road traffic noise criteria

Potential impacts from construction traffic noise associated with the project has been assessed using guidance from the RNP. The assessment compares the predicted construction traffic volumes from the project against existing traffic volumes on the road network to determine potential changes in noise levels. The assessment only considers construction traffic volumes on the road network. Construction traffic movements within the construction area were assessed as part of the overall construction noise assessment conducted in accordance with the ICNG.

The RNP makes a distinction between the assessment of road traffic noise from freeway/arterial/sub-arterial roads and local roads. Freeway/arterial/sub-arterial roads are assessed over day (7 am to 10 pm) and night (10 pm to 7 am) periods, while local roads are assessed during the maximum 1 hour time period.

Table 4-6 presents a summary of applicable road traffic criteria for residential receivers.

The application notes from the RNP detail the requirements for operation-generated traffic noise as follows:

> *For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies where the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.*

Therefore, if the road traffic noise levels increase by more than 2 dBA as a result of the proposed construction traffic, and the criteria outlined in Table 4-6 are exceeded, mitigation options should be investigated.

Table 4-6 Road traffic noise criteria for receivers on existing roads affected by the additional traffic from land use developments

Road type	**External road traffic noise criteria**[1]	
	Day 7 am – 10 pm	**Night 10 pm – 7 am**
Freeway/arterial/sub-arterial roads	60 dBA $L_{Aeq\ (15hr)}$ and increase >2 dB	55 dBA $L_{Aeq(9hr)}$ and increase >2 dB
Local roads	55 dB $L_{Aeq\ 1hr}$ and increase >2 dB	50 dB $L_{Aeq\ 1hr}$ and increase >2 dB

(1) Façade corrected noise levels.

4.2.1.5 Construction vibration criteria

Construction vibration can lead to:

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

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

Cosmetic damage

Australian Standard AS2187.2-2006 Explosives – Storage, Transport and Use provides guidance for the assessment of cosmetic damage to buildings caused by vibration. This section of the standard is based on the *British Standard BS 7385-2:1993 – Evaluation and measurement for vibration in buildings* and is used as a guide to assess the likelihood of building damage from ground vibration including piling, compaction, construction equipment and road and rail traffic.

Table 4-7 presents the guideline limits for cosmetic damage for short term vibration.

Table 4-7 Transient vibration guide values for cosmetic damage (BS 7385)

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

Note: values referred to are at the base of the building

The guidance values in Table 4-7 relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table 4-7 may need to be reduced by up to 50 per cent.

Heritage receivers

Guidance for more sensitive structures or vibration sensitive activities is outlined in the *German Guideline, DIN 4150-3 Structural Vibration Part 3: Effects of Vibration on Structures* (DIN 4150-3:1999-02). Structural damage within such structures may reasonably be expected to be avoided where vibration velocities within the structure do not exceed three millimetres per second (mm/s) for vibration frequencies between 1 to 10 Hz.

DIN 4150-3 has been used to assess potential vibration impacts on Aboriginal heritage items in this assessment, however this criterion is more stringent than relevant criteria designed to protect against structural damage for most structures. Item specific vibration criteria would be developed following conditions inspection of each heritage item and incorporated into the Construction Noise and Vibration Management Plan when developed.

Human comfort

Potential human comfort impacts from vibration are considered using a vibration dose value (VDVs) above which it is considered there is a risk that the amenity and comfort of people occupying buildings would be affected by vibration from construction works. These limits are taken from AVTG.

The AVTG also specifies limits for continuous and impulsive vibration. The vibration limits are expressed in acceleration (m/s^2) and peak particle velocity (mm/s) in Appendix C of AVTG.

Table 4-8 presents the limits (vibration dose values, VDVs).

Table 4-8 Vibration limits (human exposure) for intermittent vibration

Location	VDV day (7 am – 10 pm)		VDV night (10 pm – 7 am)	
	Preferred	Maximum	Preferred	Maximum
Residences	0.20	0.40	0.13	0.26
Schools, educational institution	0.40	0.80	0.40	0.80

The vibration guideline also specifies limits for continuous and impulsive vibration. The vibration limits are presented in Table 2-2 and Appendix C of AVTG and are reproduced in Table 4-9 for relevant receiver types.

Table 4-9 Preferred and maximum values for continuous and impulsive vibration

Location	Assessment period	RMS acceleration m/s^2				Peak particle velocity (mm/s)	
		Preferred values		Maximum values		Pref. values	Max. values
		z-axis	x and y axes	z-axis	x and y axes		
Continuous vibration							
Residences	Day 7 am – 10 pm	0.010	0.0071	0.020	0.014	0.28	0.56
	Night 10 pm – 7 am	0.007	0.005	0.014	0.010	0.20	0.40
Schools, educational institutions	All	0.020	0.014	0.040	0.028	0.56	1.1

Location	Assessment period	RMS acceleration m/s^2				Peak particle velocity (mm/s)	
		Preferred values		Maximum values		Pref. values	Max. values
		z-axis	x and y axes	z-axis	x and y axes		
Impulsive vibration							
Residences	Day 7 am – 10 pm	0.3	0.21	0.60	0.42	8.6	17.0
	Night 10 pm – 7 am	0.10	0.071	0.20	0.14	2.8	5.6
Schools, educational institutions	All	0.64	0.46	1.28	0.92	18.0	36.0

4.2.1.6 Blasting criteria

Where required, impacts from blasting would require assessment with regard to the Australian and New Zealand Environment Conservation Council's (ANZECC) *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990) and *AS 2187.2 Explosives – Storage, Transport and use Part 2: Use of Explosives* (AS2187.2).

The criteria outlined in *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990) are applicable to this project and are presented in Table 4-10.

Table 4-10 ANZECC recommended vibration and air blast criteria

Issue	Measure	Criterion for 95% of blasts	Criterion for 100% of blasts
Vibration	mm/s PPV	5	10
Air blast	dBL Peak	115	120

The guidelines also provide a long-term goal of two millimetres per second for peak particle vibration velocity.

The criterion for ground vibration is designed to preserve amenity and is more stringent than relevant criteria designed to protect against structural damage for most structures. However, for 'structures which may be particularly susceptible to ground vibration', AS2187.2 recommends a criterion of five millimetres per second peak particle velocity. The vibration susceptibility of items, including non-Aboriginal and Aboriginal heritage items will be confirmed as design progresses.

Where blasting is to occur in the vicinity of vibration sensitive Aboriginal and non-Aboriginal heritage structures (including the Pine Park Woolshed and Laheys Creek Cemetery), relevant ground vibration criteria would be based on German Standard DIN 4150-3 (refer to Section 4.2.1.5). Item specific vibration criteria would be developed following conditions inspection of each heritage item and incorporated into the Construction Noise and Vibration Management Plan (CNVMP) when developed.

4.2.2 *Operational noise criteria*

Assessment of on-site operational noise sources is guided by NPfI, which is applicable to all industrial noise sources from activities such as the project.

The assessment procedure for industrial noise sources outlines two components:

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

In assessing the noise impact of industrial sources, both components must be taken into account for residential receivers. As the project is expected to operate 24 hours a day, the night-time criteria are likely to be the controlling time criteria and have been used as the basis of the assessment.

4.2.2.1 Project intrusiveness noise level

The project intrusiveness noise level for residential receivers prescribed in the NSW NPfI is summarised as:

$L_{eq\ (15\ minute)} \leq$ Rating Background Level (L_{90}) + 5 dBA

The project intrusiveness noise levels have been established for the project based on the RBLs as outlined in Section 3.1 in accordance with the NSW NPfI and are presented in Table 4-11.

Table 4-11 Established project intrusiveness noise level (dB $L_{Aeq\ 15\ min}$)

NCA	Time period[1]	RBL dBA	Project intrusiveness noise level (RBL + 5 dB)
NCA 1	Day	35[2]	40
	Evening	30[2]	35
	Night	30[2]	35
NCA 2	Day	35[2]	40
	Evening	30[2]	35
	Night	30[2]	35
NCA 3	Day	35[2]	40
	Evening	30[2]	35
	Night	30[2]	35
NCA 4	Day	35[2]	40
	Evening	30[2]	35
	Night	30[2]	35
NCA 5	Day	35[2]	40
	Evening	30[2]	35
	Night	30[2]	35
NCA 6	Day	35[2]	40
	Evening	32[2]	37
	Night	32[2]	37
NCA 7	Day	37[2]	42
	Evening	37[2]	42
	Night	37[2]	42

NCA	Time period[1]	RBL dBA	Project intrusiveness noise level (RBL + 5 dB)
NCA 8	Day	35[2]	40
	Evening	30[2]	35
	Night	30[2]	35
NCA 9	Day	35[2]	40
	Evening	30[2]	35
	Night	30[2]	35
NCA 10	Day	35[2]	40
	Evening	30[2]	35
	Night	30[2]	35
NCA 11	Day	35[2]	40
	Evening	30[2]	35
	Night	30[2]	35

(1) Day: the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and public holidays; evening: the period from 6 pm to 10 pm; night: the remaining periods.

(2) In accordance with NPfI, where the measured rating background level is less than 30 dBA for the evening and night periods, it is set to 30 dBA. When it is found to be less than 35 dBA for the day period, it is set to 35 dBA.

(3) In accordance with the NPfI, it is recommended that evening criteria is set no higher than the day criteria and the night criteria should not be set any higher than the evening criteria.

4.2.2.2 Project amenity noise levels

To limit continuing increases in ambient noise levels (i.e. background noise level creep), the maximum amenity noise level within an area from industrial noise sources should not normally exceed the amenity noise levels prescribed in the NSW NPfI.

The recommended amenity noise levels represent the objective for total industrial noise from all sources at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location, defined as the recommended noise levels listed below (Table 2.2 of NPI) minus 5 dBA.

The amenity criteria have been established at the identified receivers based on their typical designation of ‘rural residential’ land use at receivers. The established amenity criteria applicable to the project are presented in Table 4-12.

Table 4-12 Established project amenity noise level

Location	Type of receiver	Recommended amenity noise level (ANL) dB $L_{Aeq,period}$[3]	Project amenity noise level (ANL –5 dB) dB $L_{Aeq,period}$[1,2,3]	Project adjusted ANL dB $L_{Aeq, period}$		
				Day	Evening	Night
All residences	Residential – rural	Day: 50 Evening: 45 Night: 40	Day: 45 Evening: 40 Night: 35	45	40	35
NCA 7 Ulan Public School	School classroom – internal	When in use	35	35	–	–

(1) A -5 dB factor is applied to project amenity noise levels to ensure that industrial noise levels at noise sensitive receivers (existing plus new) remain within the recommended amenity noise levels within the NPfI

(2) Amenity levels for non-residential receivers only apply when the premises are in use

(3) Day: the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and public holidays; evening: the period from 6 pm to 10 pm; night: the remaining periods.

4.2.2.3 Project noise trigger levels

In assessing the operational noise impact of the project on surrounding residential receivers, both the intrusiveness and amenity criterion must be considered. In most cases, only one criterion will become the limiting criterion and form the project noise trigger levels (PNTL) for the industrial source under assessment.

To standardise the time periods for the intrusiveness and amenity noise levels, the following conversion between L_{eq} period and $L_{Aeq\ 15\ min}$ have been applied (as per Section 2.2 of the NSW NPfI):

$$L_{Aeq(15\ min)} = L_{Aeq(period)} + 3\ dB$$

In accordance with Section 2.2 of the NSW NPfI, all project noise trigger levels and limits are expressed as $L_{eq(15min)}$, unless otherwise expressed. A summary of all relevant criteria is presented in Table 4-13. A single non-residential receiver (Ulan Public School) has been identified within the project area.

Table 4-13 Summary of project noise trigger levels (PNTL)

Receiver location	Assessment/ receiver type	Project noise trigger levels dBA $L_{eq(15\ min)}$[2,3]		
		Day[1]	Evening[1]	Night[1]
NCA 1, 2, 3, 4, 5, 8, 9, 10 and 11	Intrusiveness	40	35	35
	Amenity	48	43	38
	PNTL – Residential	**40**	**35**	**35**
NCA 6	Intrusiveness	40	37	37
	Amenity	48	43	38
	PNTL – Residential	**40**	**37**	**37**
NCA 7	Intrusiveness	42	42	42
	Amenity	48	43	38
	PNTL – Residential	**42**	**42**	**38**

(1) Day: the period from 7:00 am to 6.00 pm Monday to Saturday; or 8.00 am to 6.00 pm on Sundays and public holidays; evening: the period from 6.00 pm to 10.00 pm; night: the remaining periods.

(2) L_{eq}, 15min = L_{eq}, period + 3 dB

(3) Existing background noise levels measured as discussed in Section 3.1.

Operation of circuit breaker switches would be short term, and these have been assessed as L_{Amax} noise sources against the relevant criteria. Although other equipment may fluctuate due to load in the electricity network, for conservative assessment purposes, all equipment is assumed to operate concurrently at any time. The noise assessment has focused on night-time operations as the most stringent period for compliance. Where noise levels comply with the night-time criteria the less stringent daytime and evening criteria would also be achieved.

4.2.2.4 Modifying factors for annoying characteristics

Certain noise characteristics have a higher potential to cause annoyance, generally requiring additional considerations during assessment. Tonality, low frequency emphasis and intermittency are generally considered to be attention-drawing noise characteristics and can cause greater disturbance. On the other hand, short-term single noise events, such as steady engine noise are likely to be less disturbing and may warrant some relaxation in the applicable noise criteria.

Transmission line corona noise is generated by arcing of electricity across the surface of transmission lines and is characterised by a broadband crackling noise, while analysis of electrical equipment proposed for use at the energy hubs (such as synchronous condensers and transformers) do not exhibit a dominant low frequency or tonal characteristic and as such, no modifying factors summarised in Fact Sheet C of the NPfI (EPA, 2017) have been applied.

4.2.2.5 Maximum noise level assessment and sleep disturbance

The potential for operational noise impacts resulting from transient maximum noise level events and sleep disturbance during the night-time period is detailed in the NPfI. Maximum noise impacts may cause awakening events, while maintained elevated levels of noise may reduce the quality of sleep. As such, the sleep disturbance criteria for construction noise are presented in two forms and are presented as:

- $L_{eq(15min)}$ 40 dBA or the rating background level plus 5 dB, whichever is the greater, and/or
- L_{Fmax} 52 dBA or the rating background level plus 15 dB, whichever is the greater.

Where maximum noise levels at a residential location exceed the criteria, a detailed maximum noise level event assessment should be undertaken. Based on the measurements detailed in Section 3.1, external maximum noise level event criteria are presented in Table 4-14.

Table 4-14 Sleep disturbance criteria

Location	Night-time RBL dBA	$L_{Aeq(15min)}$ criteria dB (Sleep disturbance)	L_{AFmax} criteria dB (Awakening)
NCA 1, 2, 3, 4, 5, 8, 9, 10 and 11	30	40	52
NCA 6	32	40	52
NCA 7	37	42	52

Where exceedances are predicted, additional assessment may be required. The NPfI refers to the RNP for further guidance on sleep disturbance impacts, which states that maximum internal noise levels below 50–55 dBA are unlikely to awaken people from sleep, and 1–2 noise events per night, with maximum internal noise levels of 65–70 dBA not likely to affect health and wellbeing.

5 Construction assessment

This section presents the assessment of construction noise, construction vibration and construction traffic noise associated with the project.

This section has considered the impacts of construction activities within the identified areas associated with the project. This includes the transmission line, energy hubs, switching station, construction compounds and workforce accommodation camps.

5.1 Construction noise assessment

The following sections present a summary and discussion of the results of the construction noise assessment for each construction activity. Detailed results are presented in relevant appendices as follows:

- Appendix B-3: Full results tables of predicted construction noise level exceedances for all assessed residential receivers for all scenarios.
- Appendix B-4: Mapping of sensitive receivers predicted to exceed ICNG NMLs for the worst-case construction scenario.

5.1.1 Transmission lines

5.1.1.1 Transmission line works impacting on residential receivers

Given the linear nature of the construction works for the project transmission lines, noise levels have been calculated assuming all construction activities within each work stage occur simultaneously, anywhere within the construction area. Actual construction noise levels are expected to vary based on the final tower location design along the defined alignment and the actual setback distances of receivers from these areas. Therefore construction noise predictions have been presented as a worst case, conservative scenario to represent the potential construction noise impact.

Detailed results of the construction noise assessment associated with the transmission lines works are presented in Appendix B-3, and a summary of total exceedances is presented in Table 5-1.

The assessment shows that construction noise levels are predicted to be the highest during the construction of foundations for the towers. Noise levels during this stage have been predicted to exceed NMLs at up to 74 properties located along the transmission alignment during standard working hours. A majority of these exceedances are considered minor (50 of these exceedances are <10 dB above NMLs). One of these receivers is predicted to be highly noise affected (>75 dBA) during multiple work stages. Most exceedances are predicted to occur in NCA 4, which represents isolated rural properties across the alignment.

It is understood that drone or helicopter stringing may be required and would progress along the alignment. Where required, this activity may result in noise levels of approximately 4dB greater than those assessed here for the loudest scenario (foundations) and result in an addition 30 receivers exceeding NMLs during daytime hours. However these impacts would be short term and this activity would not be undertaken during evening or night-time hours.

Impacts during out of hours work are generally higher due to the lower background noise levels during the evening and night time periods. Where the foundations work stage is undertaken outside of standard hours (including the daytime periods of Saturday afternoons and Sundays), exceedances may occur at up to 144 properties.

Table 5-1 Summary of total exceedances for transmission lines work stages

Work stage	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Standard hours											
Utility adjustment	4	0	1	14	3	2	2	2	3	1	0
Site access	5	0	1	21	3	4	3	2	4	3	0
Vegetation Clearing and access	5	0	1	22	3	4	3	2	4	3	0
Foundations	6	0	4	30	4	5	14	2	4	4	1
Tower erection	5	0	1	21	3	4	3	2	4	3	0
Conductor stringing	4	0	1	14	3	2	2	2	3	1	0
Conductor brake & winch	2	0	0	3	2	0	1	2	1	1	0
Commissioning	4	0	1	13	3	2	2	2	2	2	0
Demobilisation and rehabilitation	5	0	1	27	4	4	9	2	4	4	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	8	2	8	37	7	6	13	2	4	5	2
Site access	8	3	8	44	7	8	17	2	4	7	2
Vegetation Clearing and access	8	3	10	46	7	7	17	2	4	7	2
Foundations	12	3	13	58	8	9	18	4	7	10	2
Tower erection	8	3	8	44	7	8	17	2	4	7	2
Conductor stringing[1]	8	2	8	37	7	6	13	2	4	5	2
Conductor brake & winch	5	0	1	20	3	2	1	2	4	3	0
Commissioning	7	2	8	35	7	5	9	2	4	5	1
Demobilisation and rehabilitation	10	3	11	51	8	9	18	3	5	6	2

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

(1) Out of hours conductor stringing activities indicated to only take place during the day time if required (Saturday and Sunday, day time)

Where foundations works take place outside of standard hours, up to 144 properties are predicted to exceed NMLs. One of these receivers may be highly noise affected (>75 dBA). Sleep disturbance impacts during the worst case night time foundations work stage are predicted at over 113 receivers, with potential sleep awakening impacts predicted at up to 38 receivers. As these levels are external predictions, a nominal 10 dB can be conservatively subtracted from these external noise predictions to provide an indication of internal noise levels (in accordance with guidance within the ICNG). This assumes windows are open and that the worst affected façade is a sleep space.

Where the predicted levels are adjusted for internal noise levels, they are predicted to potentially result in sleep disturbance at approximately 52 receivers, and cause awakening at 12 properties.

It is noted that these exceedances would be short term and would not occur simultaneously at all properties. Mitigation and management measures are considered in Chapter 7.

5.1.1.2 Transmission line works impacting on non-residential receivers

No exceedances of NMLs have been predicted for non-residential receivers.

5.1.2 New Wollar switching station

The predicted number of noise-sensitive residential receivers with exceedances of the NMLs due to new Wollar switching station construction activities are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-2. Due to the large separation distances between the construction area and the nearest noise sensitive receivers, construction noise impacts from the New Wollar switching station works of up to 10 dB are predicted to occur at up to two properties during standard working hours. These receivers are located 800 m south-east and 1500 m north-west of the switching station respectively. No properties are predicted to be highly noise affected during standard hours and/or out of hours works.

Where out of hours works are proposed, exceedances may be experienced at these properties, with potential sleep disturbance impacts also predicted.

All exceedances are contained within NCA 11 and mitigation and management measures are considered in Chapter 7.

Table 5-2 Summary of total exceedances for New Wollar switching station work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	0	2
Foundations and pads	0	0	0	0	0	0	0	0	0	0	1
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	1
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	2
Site access	0	0	0	0	0	0	0	0	0	0	2
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	2
Access and earthworks	0	0	0	0	0	0	0	0	0	0	2
Foundations and pads	0	0	0	0	0	0	0	0	0	0	2
Equipment installation	0	0	0	0	0	0	0	0	0	0	2
Commissioning	0	0	0	0	0	0	0	0	0	0	2
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	2

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.3 Merotherie energy hub

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Merotherie energy hub are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-3. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts from construction of the Merotherie energy hub are only predicted to occur at two properties during standard working hours. These receivers are located approximately 1080 m west of the construction boundary. No properties are predicted to be highly noise affected by any construction activity during standard or out of hours construction works.

Where out of hours work are proposed, exceedances may be experienced at up to five properties, with potential sleep disturbance impacts also predicted.

All impacts are constrained to NCA 5. Mitigation and management measures are considered in Chapter 7.

Table 5-3 Summary of total exceedances for Merotherie energy hub work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	2	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	3	0	0	0	0	0	0
Site access	0	0	0	0	1	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	4	0	0	0	0	0	0
Access and earthworks	0	0	0	0	5	0	0	0	0	0	0
Foundations and pads	0	0	0	0	4	0	0	0	0	0	0
Equipment installation	0	0	0	0	4	0	0	0	0	0	0
Commissioning	0	0	0	0	2	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	4	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.4 Elong Elong energy hub

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Elong Elong Energy Hub are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-4. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts from construction of the Elong Elong Energy Hub are generally expected to be minor with no exceedances predicted during standard working hours. No properties are predicted to be highly noise affected.

Where out of hours work are proposed, exceedances may be experienced at up to four properties, with potential sleep disturbance impacts also predicted. These properties are located within NCAs 1 and 2 only.

Mitigation and management measures are considered in Chapter 7.

Table 5-4 Summary of total exceedances for Elong Elong energy hub work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	2	0	0	0	0	0	0	0	0	0
Site access	0	2	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	2	0	0	0	0	0	0	0	0	0
Access and earthworks	1	3	0	0	0	0	0	0	0	0	0
Foundations and pads	1	2	0	0	0	0	0	0	0	0	0
Equipment installation	0	2	0	0	0	0	0	0	0	0	0
Commissioning	0	2	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	1	2	0	0	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.5 Cassilis switching station (M1)

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Cassilis switching station (M1) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-5. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts from construction of the Cassilis switching station are generally expected to be minor with no exceedances predicted during standard working hours. No properties are predicted to be highly noise affected.

Where out of hours works are proposed, exceedances may be experienced at up to three properties, with potential sleep disturbance impacts also predicted during multiple work stages. These exceedances are contained within NCA 10 only.

Mitigation and management measures are considered in Chapter 7.

Table 5-5 Summary of total exceedances for Cassilis switching station (M1) work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	1	0
Site access	0	0	0	0	0	0	0	0	0	1	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	1	0
Access and earthworks	0	0	0	0	0	0	0	0	0	3	0
Foundations and pads	0	0	0	0	0	0	0	0	0	1	0
Equipment installation	0	0	0	0	0	0	0	0	0	1	0
Commissioning	0	0	0	0	0	0	0	0	0	1	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	1	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.6 Coolah switching station (M2)

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Coolah switching station (M2) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-6. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with no exceedances predicted during standard working hours. No properties are predicted to be highly noise affected.

Where out of hours work are proposed, exceedances may be experienced at two properties within NCA 10, with no potential sleep disturbance impacts predicted.

Mitigation and management measures are considered in Chapter 7.

Table 5-6 Summary of total exceedances for Coolah switching station (M2) work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	2	0
Foundations and pads	0	0	0	0	0	0	0	0	0	1	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	1	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.7 Leadville switching station (M3)

No exceedances of the NMLs due to construction activities during each work stage at the Leadville switching station (M3) were predicted during daytime or out of hours work.

5.1.8 Merotherie switching station (M4)

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Merotherie switching station (M4) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-7. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with exceedances predicted at two properties during standard working hours, located 560 m north-west and 670 m south-west of the switching station. No properties are predicted to be highly noise affected.

Where out of hours work are proposed, exceedances may be experienced at up to three properties, with potential sleep disturbance impacts also predicted.

All exceedances are predicted to occur within NCAs 4 and 5 only, and mitigation and management measures are considered in Chapter 7.

Table 5-7 Summary of total exceedances for Merotherie switching station (M4) work stages

Work stage	NCA										
Standard hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	0	0	0	0	1	0	0	0	0	0	0
Site access	0	0	0	1	1	0	0	0	0	0	0
Vegetation Clearing	0	0	0	1	1	0	0	0	0	0	0
Access and earthworks	0	0	0	1	1	0	0	0	0	0	0
Foundations and pads	0	0	0	1	1	0	0	0	0	0	0
Equipment installation	0	0	0	1	1	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	1	1	0	0	0	0	0	0
Out of hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	0	0	0	2	1	0	0	0	0	0	0
Site access	0	0	0	2	1	0	0	0	0	0	0
Vegetation Clearing	0	0	0	2	1	0	0	0	0	0	0
Access and earthworks	0	0	0	2	1	0	0	0	0	0	0
Foundations and pads	0	0	0	2	1	0	0	0	0	0	0
Equipment installation	0	0	0	2	1	0	0	0	0	0	0
Commissioning	0	0	0	1	1	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	2	1	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.9 *Merotherie switching station (M5)*

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Merotherie switching station (M5) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-8. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with exceedances predicted at two properties during standard working hours located approximately 250 m north-east of the switching station in NCA 5. No properties are predicted to be highly impacted.

If out of hours work is conducted, exceedances may be experienced at up to five properties, with potential sleep disturbance impacts predicted at three receivers.

Mitigation and management measures are therefore required to be considered per discussed in Chapter 7.

Table 5-8 Summary of total exceedances for Merotherie switching station (M5) work stages

Work stage	NCA										
Standard hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	0	0	0	0	1	0	0	0	0	0	0
Site access	0	0	0	0	2	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	2	0	0	0	0	0	0
Access and earthworks	0	0	0	0	2	0	0	0	0	0	0
Foundations and pads	0	0	0	0	2	0	0	0	0	0	0
Equipment installation	0	0	0	0	2	0	0	0	0	0	0
Commissioning	0	0	0	0	2	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	2	0	0	0	0	0	0
Out of hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	0	0	0	0	2	0	0	0	0	0	0
Site access	0	0	0	0	2	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	2	0	0	0	0	0	0
Access and earthworks	0	0	0	2	3	0	0	0	0	0	0
Foundations and pads	0	0	0	0	2	0	0	0	0	0	0
Equipment installation	0	0	0	0	2	0	0	0	0	0	0
Commissioning	0	0	0	0	2	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	2	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.10 Tallawang switching station (M6)

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Tallawang Switching Station (M6) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-9. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with no exceedances predicted during standard working hours. No properties are predicted to be highly noise affected.

Where out of hours work are proposed, exceedances may be experienced at seven properties, with potential sleep disturbance impacts predicted at three properties located approximately 1600 m west of the site in NCA 3.

Mitigation and management measures are considered in Chapter 7.

Table 5-9 Summary of total exceedances for Tallawang switching station (M6) work stages

Work stage	NCA										
Standard hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	2	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	3	0	0	0	0	0	0	0	0
Access and earthworks	0	0	7	0	0	0	0	0	0	0	0
Foundations and pads	0	0	3	0	0	0	0	0	0	0	0
Equipment installation	0	0	3	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	3	0	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.11 *Dunedoo switching station (M7)*

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Dunedoo Switching Station (M7) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-10. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with exceedances predicted at two properties during standard working hours. No properties are predicted to be highly impacted.

If out of hours work is conducted, exceedances may be experienced at up to eight properties, with the potential for sleep disturbance impacts at four receivers. These properties are located within NCAs 3 and 4.

Mitigation and management measures are discussed in Chapter 7.

Table 5-10 Summary of total exceedances for Dunedoo switching station (M7) work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	1	0	0	0	0	0	0	0
Site access	0	0	0	1	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	1	0	0	0	0	0	0	0
Access and earthworks	0	0	0	2	0	0	0	0	0	0	0
Foundations and pads	0	0	0	1	0	0	0	0	0	0	0
Equipment installation	0	0	0	1	0	0	0	0	0	0	0
Commissioning	0	0	0	1	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	1	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	3	0	0	0	0	0	0	0
Site access	0	0	0	3	0	0	0	0	0	0	0
Vegetation Clearing	0	0	1	3	0	0	0	0	0	0	0
Access and earthworks	0	0	2	6	0	0	0	0	0	0	0
Foundations and pads	0	0	1	3	0	0	0	0	0	0	0
Equipment installation	0	0	1	3	0	0	0	0	0	0	0
Commissioning	0	0	0	2	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	1	3	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.12 Tallawang switching station (M8)

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Tallawang Switching Station (M8) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-11. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with no exceedances predicted during standard working hours. No properties are predicted to be highly impacted.

If out of hours work is conducted, exceedances may be experienced at one property located in NCA 4. No sleep disturbance impacts are predicted.

Mitigation and management measures are discussed in Chapter 7.

Table 5-11 Summary of total exceedances for Tallawang switching station (M8) work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	1	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.13 *Tallawang switching station (M9)*

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Tallawang Switching Station (M9) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-12. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with no exceedances predicted during standard working hours. No properties are predicted to be highly noise affected.

Where out of hours work are proposed, exceedances may be experienced at four properties, with potential sleep disturbance impacts predicted at a single property located 1500 m north-east of the site. These exceedances are contained within NCA 4.

Mitigation and management measures are considered in Chapter 7.

Table 5-12 Summary of total exceedances for Tallawang switching station (M9) work stages

Work stage	NCA										
Standard hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	0	0	0	1	0	0	0	0	0	0	0
Site access	0	0	0	1	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	1	0	0	0	0	0	0	0
Access and earthworks	0	0	0	4	0	0	0	0	0	0	0
Foundations and pads	0	0	0	2	0	0	0	0	0	0	0
Equipment installation	0	0	0	1	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	2	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.14 Cobbora switching station (E1)

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Cobbora Switching Station (E1) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-13. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with minor exceedances predicted at one property during standard working hours located 1060 m east of the site. No properties are predicted to be highly impacted.

If out of hours work is conducted, exceedances may be experienced at up to three properties, with the potential for sleep disturbance impacts at one of these receivers. These receivers are located within NCAs 1 and 2.

Mitigation and management measures are discussed in Chapter 7.

Table 5-13 Summary of total exceedances for Cobbora switching station (E1) work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	1	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	1	0	0	0	0	0	0	0	0	0
Site access	0	1	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	1	0	0	0	0	0	0	0	0	0
Access and earthworks	2	1	0	0	0	0	0	0	0	0	0
Foundations and pads	0	1	0	0	0	0	0	0	0	0	0
Equipment installation	0	1	0	0	0	0	0	0	0	0	0
Commissioning	0	1	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	1	0	0	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.15 Cobbora switching station (E2)

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Cobbora Switching Station (E2) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-14. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with no exceedances predicted during standard working hours.

If out of hours work is conducted, exceedances may be experienced at up to two properties, with the potential for sleep disturbance impacts at two of these receivers during earthworks only. These exceedances are located in NCAs 1 and 2 only.

Mitigation and management measures are discussed in Chapter 7.

Table 5-14 Summary of total exceedances for Cobbora switching station (E2) work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	1	0	0	0	0	0	0	0	0	0
Site access	1	1	0	0	0	0	0	0	0	0	0
Vegetation Clearing	1	1	0	0	0	0	0	0	0	0	0
Access and earthworks	1	1	0	0	0	0	0	0	0	0	0
Foundations and pads	1	1	0	0	0	0	0	0	0	0	0
Equipment installation	1	1	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	1	1	0	0	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.16 Goolma switching station (E3)

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Goolma Switching Station (E3) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-15. Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with one minor exceedance predicted at three properties during standard working hours. No properties are predicted to be highly impacted.

If out of hours work is conducted, exceedances may be experienced at up to six properties, with the potential for sleep disturbance impacts at all of the six receivers.

All exceedances are located within NCA 1 and mitigation and management measures are discussed in Chapter 7.

Table 5-15 Summary of total exceedances for Goolma switching station (E3) work stages

Work stage	NCA										
Standard hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	3	0	0	0	0	0	0	0	0	0	0
Foundations and pads	3	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	3	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Utility adjustment	3	0	0	0	0	0	0	0	0	0	0
Site access	6	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	6	0	0	0	0	0	0	0	0	0	0
Access and earthworks	6	0	0	0	0	0	0	0	0	0	0
Foundations and pads	6	0	0	0	0	0	0	0	0	0	0
Equipment installation	6	0	0	0	0	0	0	0	0	0	0
Commissioning	3	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	6	0	0	0	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.17 Goolma switching station (E4)

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Goolma Switching Station (E4) are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-16.

Due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with no exceedances predicted during standard working hours.

If out of hours work is conducted, minor exceedances may be experienced at one property located 1,900 m south of the site in NCA 1 during the access and earthworks stage, with no potential sleep disturbance impacts predicted.

Mitigation and management measures are discussed in Chapter 7.

Table 5-16 Summary of total exceedances for Goolma switching station (E4) work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	0	0	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Utility adjustment	0	0	0	0	0	0	0	0	0	0	0
Site access	0	0	0	0	0	0	0	0	0	0	0
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Access and earthworks	1	0	0	0	0	0	0	0	0	0	0
Foundations and pads	0	0	0	0	0	0	0	0	0	0	0
Equipment installation	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0
Demobilisation and rehabilitation	0	0	0	0	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.18 *Access track construction – Transmission line*

5.1.18.1 Access road works impacting residential receivers

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage for access tracks construction are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-17.

These results show that noise impacts during the construction of access tracks may impact up to 62 properties during standard hours. Seven of these properties may be highly impacted. Of these impacted properties, 39 exceed NMLs by 10 dB or less, and are considered minor impacts. It is noted that these exceedances would be short term and will not occur simultaneously at all properties.

If this work is conducted out of standard hours, exceedances may be experienced at up to 131 properties, with the potential for sleep disturbance impacts at up to 104 of these receivers and the potential for sleep awakening impacts at up to 32 receivers. It is noted that the exceedances of 5 dB or less make up approximately 36% of these out of hours impacts. Where the predicted levels are adjusted for internal noise levels, they are predicted to potentially result in sleep disturbance at approximately 32 receivers, and cause awakening at 23 properties.

These impacts would be short term and occur at the commencement of construction. Mitigation and management measures are discussed in Chapter 7.

Table 5-17 Summary of total exceedances for Access tracks work stages

Work stage	**NCA**										
Standard hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Earthworks and upgrades	5	0	1	29	4	4	9	2	4	4	0
Vegetation Clearing	3	0	1	14	3	4	5	2	3	3	0
Out of hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Earthworks and upgrades	10	3	13	53	8	9	18	4	4	7	2
Vegetation Clearing	9	2	11	49	8	7	16	2	4	7	2

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.18.2 Access road works impacting on non-residential receivers

In addition to residential properties, Ulan Public School (receiver ID 210, 211, 212, 214, 215, and 218) is not predicted to exceed NMLs during the construction of access roads.

5.1.19 Construction compound at Merotherie Energy Hub

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Merotherie Energy Hub are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-18.

These results show that due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with no exceedances predicted during standard working hours.

As outlined in section 5.1.1, aerial stringing of transmission lines via helicopters may be required. It is proposed that where this method is adopted, helipads would operate from the construction compounds, representing a potential new noise source. Whilst the aerial stringing method (e.g. drones or helicopters) is to be confirmed, if it is conducted via helicopters it may result in noise levels of approximately 6 dB greater than those assessed here, resulting in a potential exceedance of daytime NMLs at 2 receiver locations. However, these impacts would not be undertaken during evening or night-time hours.

If out of hours work is conducted, exceedances may be experienced at up to five properties located within NCA 5, with the potential for sleep disturbance impacts at up to two of the receivers in NCA 5. It is noted that if required, out of hours drone or helicopter operations would be restricted to daytime out of hours only, as such no sleep disturbance impacts would occur.

Mitigation and management measures are discussed in Chapter 7.

Table 5-18 Summary of total exceedances for the construction compound at Merotherie energy hub work stages

Work stage	NCA										
Standard hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	0	0	0	0	0	0	0	0
Operation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Vegetation Clearing	0	0	0	0	4	0	0	0	0	0	0
Construction	0	0	0	0	4	0	0	0	0	0	0
Operation	0	0	0	0	5	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.20 Construction compound at Elong Elong Energy Hub

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Elong Elong Energy Hub are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-19.

These results show that due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with up to no exceedances predicted during standard working hours.

As outlined in Section 5.1.1, aerial stringing of transmission lines via helicopters may be required. It is proposed that where this method is adopted, helipads would operate from the construction compounds, representing a potential new noise source. Whilst the aerial stringing method is to be confirmed, if it is conducted via helicopters it may result in noise levels of approximately 6dB greater than those assessed here, resulting in a potential exceedance of daytime NLMs at 2 receivers. However these impacts would not be undertaken during evening or night-time hours.

If out of hours work is conducted, exceedances may be experienced at up to two properties in NCA 2, with the potential for sleep disturbance impacts at both of these receivers. It is noted if required, out of hours helicopter operations would be restricted to daytime out of hours only, as such no sleep disturbance impacts would occur.

Mitigation and management measures are discussed in Chapter 7.

Table 5-19 Summary of total exceedances for the construction compound at Elong Elong energy hub work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	0	0	0	0	0	0	0	0
Operation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Vegetation Clearing	0	2	0	0	0	0	0	0	0	0	0
Construction	0	2	0	0	0	0	0	0	0	0	0
Operation	0	2	0	0	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.21 Construction compound at New Wollar Switching Station

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the New Wollar Switching Station construction compound are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-20.

These results show that due to the large separation distances between the project and the nearest noise sensitive receivers, construction noise impacts are generally expected to be minor with a single exceedance predicted during standard working hours.

As outlined in Section 5.1.1, aerial stringing via helicopters of transmission lines may be required. It is proposed that where this method is adopted, helipads would operate from the construction compounds, representing a potential new noise source. Whilst the aerial stringing method is to be confirmed, if it is conducted via helicopters it may result in noise levels of approximately 6dB greater than those assessed here. However these impacts would not be undertaken during evening or night-time hours.

If out of hours work is conducted, exceedances may be experienced at up to two properties, with the potential for sleep disturbance impacts at these receivers. These receivers are located within NCA 11. If required, out of hours helicopter operations will be restricted to daytime out of hours only, as such no sleep disturbance impacts will occur.

Mitigation and management measures are discussed in Chapter 7.

Table 5-20 Summary of total exceedances for the construction compound at New Wollar switching station work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	0	0	0	0	0	0	0	1
Operation	0	0	0	0	0	0	0	0	0	0	1
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	2
Construction	0	0	0	0	0	0	0	0	0	0	2
Operation	0	0	0	0	0	0	0	0	0	0	2

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.22 *Merotherie workforce accommodation camp*

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Merotherie accommodation camp are summarised in Appendix B-3 and a summary of total exceedances is presented in Table 5-21.

These results show that construction noise impacts are generally expected to be minor with two exceedances predicted during standard working hours.

If out of hours work is conducted, exceedances may be experienced at up to four properties located within NCA 5. No sleep disturbance impacts are predicted.

Mitigation and management measures are discussed in Chapter 7.

Table 5-21 Summary of total exceedances for Merotherie workforce accommodation camp work stages

Work stage	NCA										
Standard hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	0	1	0	0	0	0	0	0
Operation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	**NCA 2**	**NCA 3**	**NCA 4**	**NCA 5**	**NCA 6**	**NCA 7**	**NCA 8**	**NCA 9**	**NCA 10**	**NCA 11**
Vegetation Clearing	0	0	0	0	4	0	0	0	0	0	0
Construction	0	0	0	0	4	0	0	0	0	0	0
Operation	0	0	0	0	1	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.23 Neeleys Lane workforce accommodation camp

The predicted number of properties with exceedances of the NMLs due to construction activities during each work stage at the Neeleys Lane workforce accommodation camp are summarised in Appendix B-3 and a of total exceedances is presented in Table 5-22. These results show that one property is predicted to exceed NMLs during standard hours, whilst if out of hours work is conducted, exceedances may be experienced at up to three properties. Sleep disturbance impacts are predicted at two properties. These receivers are located within NCAs 4 and 9.

Mitigation and management measures are discussed in Chapter 7.

Table 5-22 Summary of total exceedances for Neeleys Lane workforce accommodation camp work stages

Work stage	NCA										
Standard hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Vegetation Clearing	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	1	0	0	0	0	0	0	0
Operation	0	0	0	0	0	0	0	0	0	0	0
Out of hours											
	NCA 1	NCA 2	NCA 3	NCA 4	NCA 5	NCA 6	NCA 7	NCA 8	NCA 9	NCA 10	NCA 11
Vegetation Clearing	0	0	0	2	0	0	0	0	1	0	0
Construction	0	0	0	2	0	0	0	0	1	0	0
Operation	0	0	0	1	0	0	0	0	0	0	0

Where: 0 total exceedances, 1 – 5 total exceedances, 6 – 20 total exceedances, >20 total exceedances

5.1.24 Potential risk from concurrent construction activities

There is the potential for concurrent construction activities occurring in proximity to noise sensitive receivers located within approximately 2 km of simultaneous construction activities from more than one work stage. This is considered most likely to occur at isolated rural properties in NCAs 4 and 5, where transmission line construction may coincide with work at the Merotherie Energy Hub.

Concurrent impacts are not predicted to occur as a result of access track or compound construction activities, as these works are scheduled for the start of construction and are expected to be complete before major works at the infrastructure sites commences.

Based on the generally low number of predicted impacts outlined above, the risk of notable concurrent construction impacts is considered low and where these do occur, concurrent noise levels would not exceed 3 dB above the highest predicted noise levels from individual construction activities.

Mitigation and management measures are considered in Chapter 7.

5.1.25 Discussion of construction noise impact

The noise and vibration assessment has identified that construction noise impacts would generally be minor during standard work hours. The exception to this is where drone or helicopters are required to be used during transmission line stringing activities. However these would be temporary and move progressively along the alignment, impacting each affected receivers for short periods. This work would also not be undertaken during night-time hours. Construction of access tracks may also impact a number of receivers.

Most exceedances are predicted to occur at isolated rural properties within NCA 4. Given the short duration of most impacts, these exceedances are not predicted to generally occur simultaneously or for extended periods, however two receivers are predicted to be potentially highly impacted, each located in NCAs 1 and 4.

Where works are carried out outside of standard working hours, noise levels are predicted to be more noticeable and result in exceedances of criteria for some activities. Typically, foundations and/or earthworks are expected to be the loudest out of hours work stage at most sites and this work should be avoided during night-time periods where reasonable and feasible.

The predicted construction noise levels are considered to be conservative, assuming all plant identified in Appendix B-1 is operational at any one time. As such actual noise levels could generally be expected to be below these predicted noise levels at any identified noise-sensitive receiver. Further, as stated above, most construction works would be transitory (i.e. they would progress along transmission line corridor to build the transmission line and associated tower structures progressively), and as such these predictions would not be sustained through the entire construction period at each receiver. Management and mitigation recommendations have been made to address the identified impacts and are presented in Chapter 7.

Detailed modelling predictions for each receiver are provided in Appendix B-3.

5.2 Construction vibration

5.2.1 Predicted vibration impacts

Based on the potential vibration generating plant identified for construction (refer to Section 5.1), the minimum working distances from the construction area were identified. Works stages where sensitive receivers were identified within the minimum working distances are presented Table 5-23.

Table 5-23 Predicted vibration impacts

NCA	Predicted number of sensitive receivers within minimum working distances		
	Cosmetic damage	Heritage (Aboriginal/Non-Aboriginal)	Human response
	(BS 7385)	(DIN 4150-3)	(AVTG)
Transmission lines			
NCA 1	0	0/0	1
NCA 4	1	0/0	1
NCA 8	4	0/1	0
All other NCAs	0	0/0	0
New Wollar switching station			
All NCAs	0	0/0	0

NCA	Predicted number of sensitive receivers within minimum working distances		
	Cosmetic damage	Heritage (Aboriginal/Non-Aboriginal)	Human response
	(BS 7385)	(DIN 4150-3)	(AVTG)
Merotherie energy hub			
All NCAs	0	0/0	0
Elong Elong energy hub			
All NCAs	0	0/0	0
Cassilis switching station (M1)			
All NCAs	0	0/0	0
Coolah switching station (M2)			
All NCAs	0	0/0	0
Leadville switching station (M3)			
All NCAs	0	0/0	0
Merotherie switching station (M4)			
All NCAs	0	0/0	0
Merotherie switching station (M5)			
All NCAs	0	0/0	0
Tallawang switching station (M6)			
All NCAs	0	0/0	0
Dunedoo switching station (M7)			
All NCAs	0	0/0	0
Tallawang switching station (M8)			
All NCAs	0	0/0	0
Tallawang switching station (M9)			
All NCAs	0	0/0	0
Cobbora switching station (E1)			
All NCAs	0	0/0	0
Cobbora switching station (E2)			
All NCAs	0	0/0	0
Goolma switching station (E3)			
All NCAs	0	0/0	0
Goolma switching station (E4)			
All NCAs	0	0/0	0

NCA	Predicted number of sensitive receivers within minimum working distances		
	Cosmetic damage	Heritage (Aboriginal/Non-Aboriginal)	Human response
	(BS 7385)	(DIN 4150-3)	(AVTG)
Access tracks			
NCA 4	2	0/0	2
NCA 8	6	0/0	0
All other NCAs	0	0/0	0
Merotherie construction compound			
All NCAs	0	0/0	0
Elong Elong construction compound			
All NCAs	0	0/0	0
New Wollar construction compound			
All NCAs	0	0/0	0

(1) As discussed in Section 2.2.3.2, at the time this assessment was prepared, the Technical paper 5 – Aboriginal cultural heritage assessment report does not contain adequate detail to determine the vibration sensitivity of Indigenous items and as such this assessment has considered grinding groove and shelter locations only. These items will be assessed further as design progresses and within the Construction Noise and Vibration Management Plan (CNVMP).

5.2.2 Discussion

For the transmission line works, it was found that human comfort impacts may potentially be experienced at two residential buildings located in close proximity to the construction area. These impacts are predicted at the nearest receivers to the transmission line corridor and likely to be highest during earthworks where vibratory rollers are proposed (namely site access works and transmission line tower foundations). Potential human comfort impacts were also identified during works at the access tracks.

Up to nine structures have been identified within the recommended minimum safe working distances for potential cosmetic damage. All identified buildings are unoccupied structures such as sheds and unoccupied dwellings, and as such are not expected to generate impacts to human comfort. Five structures are located in close proximity to the transmission line alignment and 8 structures are located close to access track works. Of these structures, four are within close proximity to both the transmission line alignment and the access track works.

One non-Aboriginal heritage item has been identified within the recommended minimum safe working distances. Although two items are identified as potentially vibration sensitive, only Pine Park Woolshed is located within the safe working distances. The other heritage item (Lahey's Creek Cemetery) is located outside the minimum working distances for heritage items, however due to the condition of some items within the cemetery, this site has been identified as potentially highly vibration sensitive and as such mitigation measures have been provided in Technical paper 6 – Non-Aboriginal heritage to minimise the risk of vibration impacts.

As discussed in Section 2.2.3.2, at the time this assessment was prepared, the Technical paper 5 – Aboriginal cultural heritage assessment report did not contain adequate detail to determine the vibration sensitivity of specific Indigenous items, however, rock shelters and grinding grooves have been identified as potentially vibration sensitive. No items are likely to be located within the minimum safe working distance for transmission line construction. The specific vibration sensitivity of Aboriginal heritage sites will be assessed as design progresses and within the Construction Noise and Vibration Management Plan (CNVMP).

Where cosmetic damage minimum distances are complied with, damage to utilities, pipelines and infrastructure is considered highly unlikely. If the final power rating or proposed equipment changes from that indicated in Appendix B-1, further reviews are required to review the findings of this assessment.

Vibration mitigation measures have been recommended in Section 7.1.2.2.

5.3 Construction blasting

Based on the method outlined in Section 2.5.2.3, the estimated maximum instantaneous charges (MICs) to comply with the objectives outlined in Table 4-10 have been provided in Figure 5-1 to provide some indication of acceptable blast sizes. Further assessment should be undertaken and incorporated into site specific blast management plans to ensure that the vibration and overpressure objectives can be achieved.

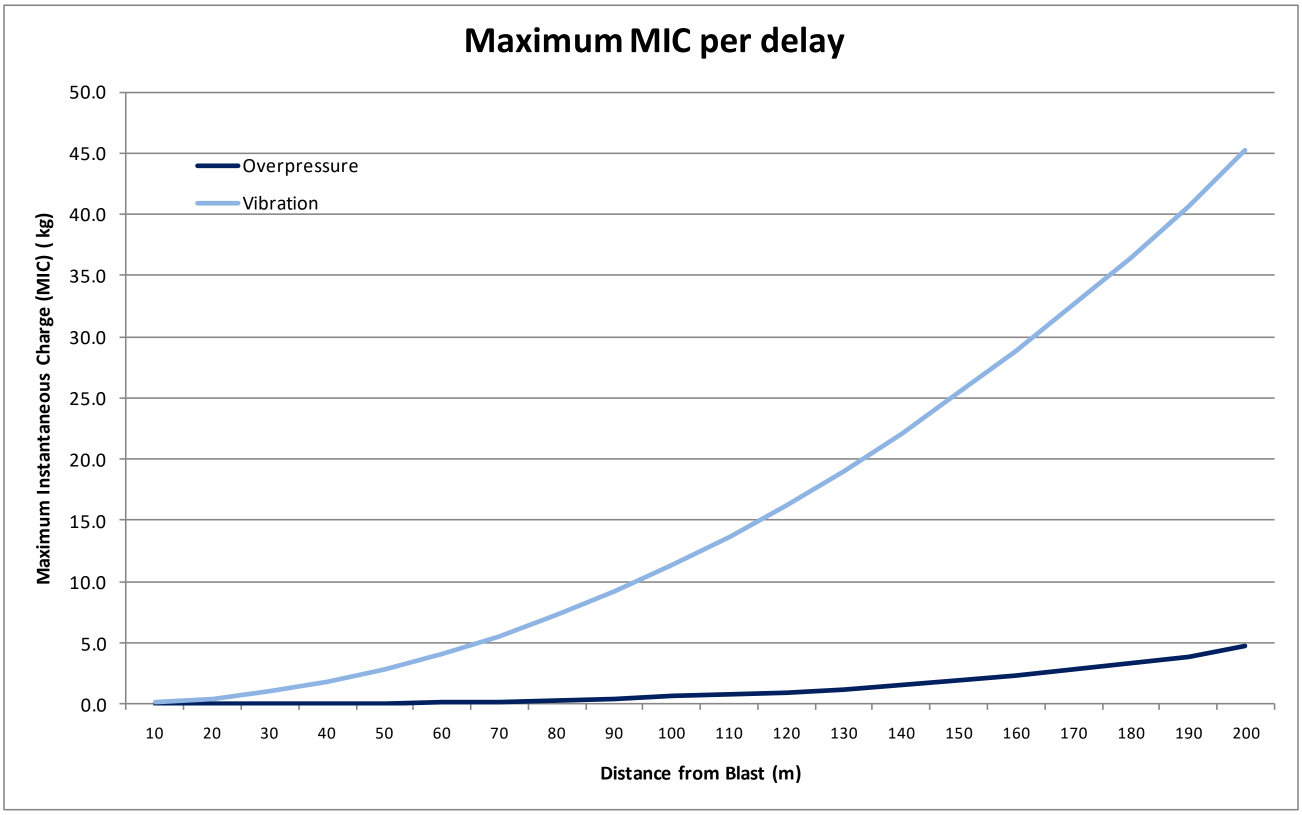


Figure 5-1 Estimated effective mass charges to minimise annoyance

In view of the proximity of some buildings to blasting for the project, it is important that blasting be monitored at the initial stages at locations identified as at risk of blasting impacts to confirm predicted over-pressure and vibration levels and modify the blast design and buffer zones accordingly around the site.

Based on the outcomes of this assessment, the need for management and mitigation is dependent upon the maximum MIC proposed for use and the separation distance to the nearest affected sensitive receivers. The nearest receiver to the proposed transmission line alignment is receiver 539, which is located 87 m from the 330 kV line just west of the Elong Elong Energy Hub. For this property, the maximum MIC to comply with the project airblast overpressure criteria would be approximately 0.5 kg. This prediction assumes that blasting is proposed at the nearest point to this property and as such represents a worst case scenario.

Refer to Section 7.1.2.3 for more information regarding blasting mitigation and management measures.

It should be noted that the assessment conducted is preliminary in nature and would be confirmed once tower locations and blasting methodology are finalised as part of detailed design.

A blasting vibration and overpressure assessment would be required as part of any potential blast design. This assessment would determine the Maximum Instantaneous Charge to achieve the recommended ground vibration and overpressure limits. In addition, a Blast Management Strategy would be prepared in accordance with Section 4 of AS 2187.2-2006 for inclusion in the CNVMP. This strategy would be developed to demonstrate that blasting and associated activities would not generate unacceptable noise and vibration impacts at residences or other sensitive receivers.

5.4 Construction road traffic noise

Additional road traffic generated on existing roads due to construction of the project has the potential to cause adverse road noise impacts at nearby sensitive receivers. The daytime and night time predicted construction traffic noise level of the worst-impacted receivers along each major construction route, as well as a qualitative assessment of the impacts to sensitive receivers exceeding base noise criteria, are presented in Table 5-24 and mapped in Appendix B-4.

Overall, 32 receivers are predicted to exceed criteria, with 1 exceeding day and night local road noise exceedance, two exceeding night time local road noise exceedance only and 29 exceeding the base main road noise criteria and experiencing an increase of more than 2 dB during night time hours (as outlined in Table 4-6). No receivers are predicted to exceed the base main road noise criteria during daytime hours.

Noise management measures have been recommended in Section 7.1.1.2 to assist in minimising the potential for noise disturbance from construction road traffic noise, in particular during night-time hours.

Table 5-24 Predicted impacts of construction traffic noise along key construction routes

Construction route section	Road type	Worst impacted receiver noise level *(increase on existing)* (dBA)		Qualitative discussion
		Day	Night	
Golden Highway west of Merotherie Rd	Arterial	59 *(+3)*	57 *(+3)*	12 receivers in the township of Dunedoo are predicted to exceed the night-time base road noise criteria. The exceedances in Dunedoo are limited to properties directly along the Golden Highway, with the rest of the township receiving noise levels compliant with base road noise criteria. No other exceedances were predicted on the Golden Highway west of Merotherie Road.
Merotherie Rd, Blue Springs Rd (north section), and Golden Highway from Merotherie Rd to Blue Springs Rd	Local (Merotherie Rd/ Blue Springs Rd) and arterial (Golden Hwy)	51 *(+13)*	52 *(+9)*	One receiver (Receiver 979 at 2460 Blue Springs Road) is predicted to exceed night time local road noise criteria. No other exceedances were predicted along Merotherie Road, Blue Springs Road or on the Golden Highway between these two roads.
Golden Highway (Blue Spring Rd to Cassilis)	Arterial	56 *(+1)*	55 *(+1)*	No exceedances were predicted along the Golden Highway between Blue Springs Road and Cassilis.
Wollar township and surrounding area	Sub-arterial	54 *(+8)*	55 *(+16)*	No exceedances were predicted in the Wollar township or surrounding area.

Construction route section	Road type	Worst impacted receiver noise level *(increase on existing)* (dBA)		Qualitative discussion
		Day	Night	
Cope Rd and Blue Springs Road	Sub-arterial (Cope Rd) and local (Blue Springs Rd)	55 *(+1)*	56 *(+2)*	2 receivers, are predicted to exceed their respective road noise criteria during night time hours; 1976 Cope Road, predicted to exceed base road noise criteria, and 305 Blue Springs Road, predicted to exceed local road noise criteria.
Ulan Rd (Mudhut Creek Rd to Main St, Ulan) and Main St, Ulan	Sub-arterial	58 *(+2)*	57 *(+2)*	2 receivers directly adjacent to Ulan Road (2778 and 3216 Ulan Road) are predicted to exceed the base road noise criteria during night time hours.
Ulan Rd (Main St, Ulan to Golden Highway)	Sub-arterial	60 *(+3)*	58 *(+4)*	3 receivers are predicted to exceed the base road noise criteria during night time hours, all of which are directly adjacent to Ulan Road. The most heavily-impacted receiver is 6161 Ulan Road, predicted to experience 58 dBA at night. No other exceedances were predicted in this area.
Castlereagh Highway (Golden Highway to Birriwa Rd, Birriwa)	Arterial	58 *(+2)*	56 *(+5)*	10 receivers are predicted to exceed base road noise criteria during night time. Exceedances are limited to the receivers directly adjacent to the highway in township of Birriwa. No other exceedances were predicted in this area.
Castlereagh Highway (Birriwa Rd, Birriwa to Tucklan Rd, Orana)	Arterial	54 *(+2)*	52 *(+5)*	No exceedances were predicted on the Castlereagh Highway between Birriwa Road to Tucklan Road.
Tucklan Road and Castlereagh Highway (Tucklan Rd, Orana to Laheys Creek Rd, Beryl)	Local (Tucklan Rd) and arterial (Castlereagh Hwy)	59 *(+3)*	56 *(+2)*	Receiver 258 located on 1223 Castlereagh Highway was predicted to exceed night time base road noise criteria, and receiver 604 located on 7 Corishs Lane was predicted to exceed day and night local road noise criteria. No other exceedances were predicted in this area.
Laheys Creek Road and Spring Ridge Rd	Local	51 *(+8)*	50 *(+18)*	No exceedances were predicted along Spring Ridge Road or Laheys Creek Road.

6 Operational assessment

This section presents the assessment of operational noise, including traffic noise associated with the project. Relevant noise goals are outlined in the NPfI and RNP. Impacts have considered the operational noise levels associated with the proposed transmission line, the energy hubs and switching stations. In consideration of the separation distances between receivers and potential vibration sources, the risk of vibration impacts is considered negligible, and is not discussed further in this operational assessment.

6.1 Transmission line corona noise

Noise levels associated with corona noise have been modelled under neutral (non-noise enhancing) meteorological conditions and the number of potentially impacted residential receivers have been calculated.

The number of properties exceeding PNTL levels under neutral meteorological conditions are summarised in Table 6-1 and grouped by magnitude of exceedance per NCA. Detailed noise predictions for each receiver are presented in Appendix C-1, and Appendix C-2 provides a graphical representation of the exceedances along each section of the transmission line.

Table 6-1 Transmission line corona noise – predicted number of exceedances (neutral meteorological conditions)

NCA	PNTL	Number of properties exceeding PNTL, grouped by magnitude of exceedance category[1]			Sleep disturbance	
		Negligible	Moderate	Significant	PNTL	Predicted exceedances
Out of Hours						
1	35	0	1	0	40	0
4	35	1	0	0	40	0

(1) With reference to definitions in Table 2-16

The assessment findings show that a maximum of two properties may be impacted by coronal noise during night time hours. During standard hours, none of these receivers are predicted to be impacted by coronal noise. The two exceeding properties would likely require operational noise mitigation in accordance with the mitigation measures presented in Section 7.2.

It should be noted that the identification of exceeding residential properties has been undertaken incorporating a number of conservative factors. It is understood that as part of final design process, further modelling of audible noise and assessable meteorological conditions would be conducted by the appointed Network Operator. The final audible noise impact is therefore subject to this further modelling and further feasible and reasonable assessment of mitigation (further to the discussion in Section 7.2).

6.2 Switching stations

As presented in Section 2.5.3.4, the only proposed noise-generating items located at the switching station sites would be circuit breaker switches. These have been modelled under standard conditions.

Table 6-2 outlines the four receivers where exceedances of the L_{Amax} awakening trigger levels have been predicted. Compliance with these trigger levels is predicted to occur at all other properties.

Table 6-2 All switching stations – predicted exceedances at surrounding receivers

Switching station	Awakening noise trigger level L_{Amax} dB	Receiver ID	Predicted noise levels (exceeding only) dBA L_{Amax} dB
Dunedoo switching station (M7)	52	717	54
Switching station (M4)		703	0
Switching station (M5)		876	60
		880	59

The activation of circuit breaker switches is an emergency response which is essential to protecting the integrity of the transmission system. As these levels are external predictions, a nominal 10 dB can be conservatively subtracted from these external noise predictions to provide an indication of internal noise levels (in accordance with guidance within the ICNG). This assumes windows are open and that the worst affected façade is a sleep space.

Where additional assessment is required, the NPfI refers to the RNP for further guidance on sleep disturbance impacts, which states that maximum internal noise levels below 50–55 dBA are unlikely to awaken people from sleep, and 1–2 noise events per night, with maximum internal noise levels of 65–70 dBA not likely to affect health and wellbeing.

Where the results presented in Table 6-2 are adjusted for internal noise levels, they are unlikely to exceed the RNP additional guidance of 50-55dB at these receivers and considering the switches would be triggered infrequently, these levels are not expected to result in sleep disturbance impacts.

Mitigation and management measures are considered in Chapter 7.

6.3 Merotherie Energy Hub

The noise sources presented in Section 2.5.3.5 have been modelled at the Merotherie Energy Hub under neutral conditions. No exceedance of PNTLs have been predicted, nor have any exceedances been predicted for sleep disturbance L_{Aeq} PNTLs.

Noise levels from these sources would be expected to be steady, however circuit breaker switches may be present and have been assessed as for the switching stations. No exceedances of the awakening L_{Amax} PNTL have been predicted.

Mitigation and management measures are considered in Chapter 7.

6.4 Elong Elong Energy Hub

The noise sources presented in Section 2.5.3.5 have been modelled at the Elong Elong Energy Hub under neutral conditions. No exceedance of PNTLs have been predicted, nor have any exceedances been predicted for sleep disturbance L_{Aeq} PNTLs.

Noise levels from these sources would be expected to be steady, however circuit breaker switches may be present and have been assessed as for the switching stations. No exceedances of awakening L_{Amax} PNTLs have been predicted.

6.5 Energy hub and switching station maintenance activities

The new energy hubs and switching stations would not accommodate any full-time staff or contractors. Maintenance activities at these sites would typically include:

- routine infrastructure inspection (such as transformers and other electrical plant and equipment) throughout the year
- routine/planned maintenance of equipment, property and switchyard areas on a scheduled basis. This would typically be monthly
- ad hoc fault and emergency works for repair of any damaged infrastructure (for example through a weather event or other failure of infrastructure). This maintenance would occur as required. The amount of maintenance and/or crew required to access for repair of any damaged infrastructure would depend on the extent of repairs required.

These activities are likely to require access via light vehicles or small to medium sized plant. Any waste generated during operation would be minimal and disposed of on an 'as need' basis to a licensed waste facility by the attending maintenance personnel.

Equipment is expected to have a service life of around 50 years. Maintenance would be regularly undertaken for the different infrastructure components and plant items such as transformers. These components would be replaced/ refurbished towards the end of their serviceable life, allowing the service life of the sites to be extended.

Based on these factors, noise impact risk associated with ongoing operation and maintenance of the substation is expected to be minor.

7 Management and mitigation measures

7.1 Construction

7.1.1 Construction environmental management framework

Although noise impacts during these works are considered to be relatively minor, this assessment indicates that there is the potential for noise impacts at nearby sensitive receivers during construction, particularly from foundations/ earthworks and during helicopter use. The construction schedule and equipment and worksite locations are subject to further specification as detailed planning progresses, however a Construction Noise and Vibration Management Plan (CNVMP) is to be prepared as part of the Construction Environmental Management Plan (CEMP), which would identify measures to reduce the potential for noise impacts.

7.1.1.1 Construction noise

Construction noise would be managed by a detailed CNVMP to be prepared prior to commencement of construction. This would be a sub-plan to the CEMP and would be based on the confirmed construction methodology, locations of works sites activities, durations, equipment types and numbers.

The CNVMP would address the following as a minimum:

- confirm nearby residences and other sensitive land uses
- assess the potential impacts from the proposed construction methods and staging, including road traffic noise
- where management levels would be exceeded examine feasible and reasonable noise mitigation and develop associated noise and vibration monitoring programs, as required
- develop reactive and proactive strategies for dealing with noise and vibration complaints
- develop an out of hours work protocol
- assign roles and responsibilities for the management of noise and vibration complaints.

7.1.1.2 Construction traffic noise

Construction traffic noise management measures would be included as part of the CNVMP and Traffic Management Plan (TMP) to mitigate predicted road noise impacts at locations where exceedances are predicted.

These would address the following as a minimum:

- development of a traffic noise management plan to manage noise impacts to be included in the CNVMP. This traffic management plan would consider:
  - designation of dedicated traffic routes
  - limiting traffic movements to daytime periods as far as reasonable and feasible
  - minimising traffic movements by ensuring full loads
  - restriction of heavy vehicle movements to standard (daytime) hours where feasible.

Given the minor extent of impacts and the temporary nature of construction activities, these mitigation measures are considered appropriate, however are subject to review during design development, as construction traffic volumes and routes are finalised.

7.1.2 Construction mitigation measures

7.1.2.1 Standard construction noise mitigation

Although noise impacts during these works are considered to be relatively minor, this assessment has identified the potential for noise impacts at the nearest sensitive receivers under worst case construction noise predictions. These exceedances are primarily temporary and confined to isolated rural properties during construction of foundations and access track construction.

Where impacts are predicted, reasonable and feasible mitigation measures to minimise noise levels from construction work have been proposed. The construction schedule and equipment and worksite locations would be subject to further refinement as part of the detailed design process, however as detailed above, a CNVMP is to be prepared as part of the CEMP and would identify measures to schedule these activities appropriately to reduce potential for noise impacts where practicable.

Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Similarly, high noise generating works and works which are likely to affect sensitive receivers should be scheduled during standard hours where reasonable and feasible.

The measures outlined in Table 7-1 are recommended to mitigate and manage the potential for noise impacts during construction of the project. These measures are derived with reference to the ICNG and the impacts identified in this assessment.

Table 7-1 Proposed construction noise mitigation measures

Reference	Impact	Mitigation measures	Timing	Applicable location(s)
NV1	Construction noise (source controls)	As part of development of the detailed design and construction methodology, all reasonable and feasible mitigation measures will be considered, confirmed and implemented to minimise construction noise impacts and to avoid exceedances of the applicable noise goals at adjacent sensitive receivers where practicable. Measures that may achieve this outcome may include, but not limited to the following: — Portable temporary noise screens will be erected adjacent to stationary or long term static noise sources, or noise generating items, where reasonable and feasible. — Spotters, “smart” reversing alarms, or broadband reversing alarms will be used in place of traditional tonal beeper reversing alarms, particularly on equipment where reversing alarms are frequently in use such as rollers, loaders or compactors. — Noise source controls, such as the use of residential class mufflers, will be used reduce noise from all plant including cranes, excavators and trucks. — The offset distance between noisy plant items and sensitive receivers will be maximised, where reasonable and feasible. — Machinery will be operated in a manner which reduces maximum noise level events such as shaking excavator buckets, dropping materials into trucks from a, height or steel on steel contact. — Construction plant and equipment will be turned off when not in use. — Helicopters will not be operated during evening and night-time periods. Where the use of drones is proposed during evening and/or night-time periods, an additional assessment(s) will be undertaken to identify appropriate operational limits to ensure that noise impacts to nearby sensitive receivers are acceptable.	Detailed design/ pre-construction/ construction	All locations where exceedances of the applicable construction noise criteria are predicted at nearby sensitive receivers

Reference	Impact	Mitigation measures	Timing	Applicable location(s)
NV2	Construction noise (administrative controls)	Opportunities to reduce exceedances of the applicable construction noise goals through the implementation of administrative controls will be examined, confirmed and implemented where reasonable and feasible. Controls to be considered will include, but not limited to the following: — Environmental awareness training and inductions for site personnel will include noise mitigation techniques/measures to be implemented when on site and accessing the site. — The avoidance of simultaneous construction activities during transmission line construction in the vicinity of the Energy Hubs will be investigated to minimise potential cumulative noise impacts — Plant and equipment will be selected based on noise emission levels. This will include the consideration of alternative stringing methods, such as the use of drones instead of helicopters. — Noise-intensive works will be limited to less sensitive construction hours (i.e. away from early morning and late afternoon periods) as far as practicable, when working in the vicinity of sensitive receivers. — Plant and equipment will be well maintained to ensure that excessive noise is not generated. — The provision of respite periods for helicopter take off / landing will be considered at the construction compounds. — A blasting vibration and overpressure assessment will be required as part of any potential blast design. This assessment will determine the Maximum Instantaneous Charge to achieve the recommended ground vibration and overpressure limits. In addition, a Blast Management Strategy will be prepared in accordance with Section 4 of AS 2187.2-2006 for inclusion in the CNVMP. — Any works undertaken outside standard working hours will be further assessed in accordance with the ICNG and the CNVG during detailed design and an Out of hours works protocol will be developed to mitigate any identified impacts.	Detailed design/ pre-construction/ construction	All locations where exceedances of the applicable construction noise criteria are predicted at nearby sensitive receivers

Reference	Impact	Mitigation measures	Timing	Applicable location(s)
NV3	Construction noise	Opportunities to reduce the impacts associated with construction noise levels through the implementation of proactive community consultation will be examined, confirmed and implemented where reasonable and feasible. Controls to be considered will include, but not limited to the following: — Sensitive receivers potentially affected by the works will be notified of the commencement of construction activities at least five days prior to works starting. The notification will inform potentially impacted sensitive receivers of the nature of and duration of works, expected noise levels and contact details of where sensitive receivers can contact can project representatives. — The community will be kept regularly informed of noise intensive activities in the immediate area. — If noise complaints are received, the complainant will be offered the opportunity for noise monitoring to be carried out to confirm the noise level at the receiver. Where the noise monitoring confirms that the applicable noise predictions are being exceeded, the construction methodology will be reviewed and changes implemented to reduce construction noise levels to be compliant with noise predictions where reasonable and feasible. Additional mitigation measures such as respite periods have been outlined in Section 7.1.2.4.	Pre-construction	All locations where exceedances of the applicable construction noise criteria are predicted at nearby sensitive receivers

7.1.2.2 Construction vibration mitigation

Potential vibration impacts have been identified during construction works.

Management and mitigation measures are proposed as a matter of best practice to minimise the potential for any risk. Aboriginal and Non Aboriginal Heritage items that are potentially at risk of structural damage or cosmetic damage should be identified and impacts confirmed by the contractor prior to the commencement of construction works. The CNVMP should confirm the impacts at these locations before the commencement of construction activities and after construction is completed.

AVTG provides general guidance for limiting vibration impacts during construction. Relevant recommendations have been reproduced in Table 7-2, and should be considered as appropriate where the potential for vibration impacts has been identified in this report.

Table 7-2 Construction vibration mitigation

Reference	Impact	Mitigation measures	Timing	Applicable location(s)
NV4	Construction vibration	Where construction is likely to result in vibration levels that exceed relevant criteria at sensitive receivers, mitigation and management will be implemented where practicable and appropriate. This will include (but is not limited to) the following measures: — avoid the use of vibration-intensive plant at distances where human discomfort will result — substitute lower vibration-intensive plant and methods (for example use a smaller machine, lower power settings or alternative equipment) — sequence operations to avoid or minimise concurrent vibration intensive activities — schedule the use of vibration-sensitive equipment during the least sensitive times of the day — confirm any vibration-sensitive heritage structures that could be impacted by the proposal works — inform and consult with potentially affected receivers about upcoming vibration-intensive activities.	Detailed design/ pre-construction	All locations where exceedances of the applicable construction vibration criteria are predicted at sensitive receivers
NV5	Heritage vibration impacts	Vibration sensitive Aboriginal and non-Aboriginal heritage items which have potential to be impacted by the project works will be confirmed prior to the commencement of vibration generating works in proximity to relevant structures. Suitable, item specific criteria will be developed for heritage items and vibration impacts at these locations will be managed before commencement of construction. This may include the use of alternative construction methods which generate lower levels of ground vibration and the installation of vibration monitors while vibration intensive activities are conducted.	Detailed design	All heritage items where exceedances of the applicable construction vibration criteria are predicted

7.1.2.3 Construction blasting mitigation

Where required, impacts from blasting would require assessment with regard to ANZECC's *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* and AS 2187.2.

Detailed assessment would be required to identify the impacts of blasting on nearest sensitive receivers. At this stage, limited details of proposed blasting locations are available. Each blast will be designed and executed by a specialist blasting contractor. It is recommended that trial blast events are undertaken at the start of construction works to verify the airblast overpressure and blast vibration levels to appropriately design blasts to not trigger the criteria.

7.1.2.4 Additional construction noise mitigation

Following the implementation of the standard ICNG mitigation measures outlined in Section 7.1.2.1, additional mitigation measures outlined in Table 7-3 should be considered where residual noise impacts remain.

This table presents various measures that should be implemented if residual noise levels still exceed NMLs after basic noise mitigation measures are implemented. Where NMLs cannot be complied with outside of standard hours, construction activities should not be undertaken.

Table 7-3 Additional noise mitigation measures

Predicted airborne $L_{Aeq(15min)}$ noise level at receiver		Additional mitigation measures	
Perception[1]	**dB(A) above NML**	**Type[2]**	**Mitigation level[3]**
All hours			
75 dB(A) or greater	–	N, V, PC, RO	HA
Standard Hours: Mon-Fri (7 am–6 pm), Sat (8 am–1 pm), Sun/Pub Holidays (Nil)			
Noticeable	0	–	NML
Clearly audible	< 10	–	NML
Moderately intrusive	10 to 20	N, V	NML + 10
Highly intrusive	> 20	N, V	NML + 20
Outside of standard hours (other hours)			
Noticeable	0 to 5	N	NML
Clearly audible	5 to 15	N, V, RO	NML + 5
Moderately intrusive	15 to 25	N, V, PC, SN, RO	NML + 15
Highly intrusive	> 25		NML + 25

(1) Perception relates to the level above the RBL

(2) V = Verification, N = Notification, PC = Phone Calls, RO = Respite offers, IB = Individual Briefings, SN = Specific notifications,

(3) NML = Noise Management Level (refer to section 4.2.1.2), HA = Highly Affected (>75 dB(A) – applies to residences only)

Definitions of the additional construction noise mitigation measures outlined in Table 7-3 are detailed below:

- Notification (letterbox drop or equivalent): Advanced warning of works and potential disruptions can assist in reducing the impact on the community. The notification may consist of a letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. Notification should be a minimum of seven calendar days prior to the start of works. The approval conditions for projects may also specify requirements for notification to the community about works that may impact on them.

- Specific notifications (SN): Specific notifications are letterbox dropped (or equivalent) to identified receivers no later than a week ahead of construction activities that are likely to exceed the applicable noise objectives. The specific notification provides additional information when relevant and informative to more highly-affected receivers than covered in general letterbox drops. This form of communication is used to support periodic notifications, or to advise of unscheduled works.
- Phone calls (PC): Phone calls detailing relevant information made to identified receivers within seven calendar days of the commencement of applicable construction activities. Phone calls provide affected receivers with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs. Where the receiver cannot be telephoned then an alternative form of engagement should be used.
- Respite offers (RO): Respite offers should be considered where there are high-noise and vibration-generating activities near identified receivers. As a guide, work should be carried out in continuous blocks that do not exceed three hours each with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of, and amenity at, nearby receivers. The purpose is to provide receivers with respite from an ongoing impact.
- Verification (V): Verification of noise and vibration levels should be undertaken as part of regular checks of noise levels or following complaints. This verification should include measurement of the background noise level and construction noise.

7.2 Operation

7.2.1 Operational environmental management

7.2.1.1 Transmission line – Corona noise

Due to the potential predicted exceedances of the PNTL during operation of the transmission lines, mitigation strategies to reduce the likely noise impact have been considered.

From an acoustic perspective, possible strategies to mitigate noise are typically investigated in the following order (decreasing preference):

1. Land use planning and provision of appropriate buffer distances
   - It is understood that the current alignment is fixed and not expected to be altered in any significant manner. As such, this does not present a feasible noise mitigation measure.
2. Noise control at the noise source
   - Noise control options for transmission lines are, however, expected to be limited. It is understood that the implementation of specific types of transmission line conductors (larger conductors) can in some circumstances reduce noise impacts, however for the project these options are not currently identified as feasible and reasonable.
3. Noise control along the noise transfer path
   - Noise barriers are not considered feasible and reasonable for the proposed transmission lines for the following reasons:
     - all identified exceeding receivers are generally isolated in nature
     - the transmission line is an elevated noise source with long horizontal extent.

4 Noise control at the receiver.

- Due to the rural nature of the study area and generally isolated nature of receivers, receiver-based noise treatment is considered feasible and reasonable to manage operational noise exceedances from transmission lines.

The predicted impacts have been determined under neutral meteorological conditions in accordance with NPfI methodology discussed in Section 2.6. The significance of the predicted impacts is summarised in Table 7-4.

Table 7-4 Properties requiring mitigation (night-time, neutral meteorological conditions)

NCA	NPfI extent of impact[1]	Number of impacted receivers	Receiver(s) ID (predicted worst case noise level L_{Aeq})
1	Moderate	1	539 (39 dB)
4	Negligible	1	531 (36 dB)

(1) With reference to definitions in Table 2-16

Based on these predicted potential exceedances, operational noise mitigation options to reduce potential noise impacts should be investigated at 1 receiver which has been identified as potentially moderately impacted. This may include monitoring after the commissioning of the project at each residence where potential operational noise levels are predicted to exceed project trigger levels. In accordance with NPfI methodology outlined in Section 2.6, negligible exceedances do not typically require any mitigation.

Following the finalisation of properties and facades that may require treatment, various guideline documents are available in NSW to advise on appropriate construction methods to facilitate property treatment (for example DPIE's *Development Near Rail Corridors and Busy Roads – Interim Guideline*, TfNSW's *At-Receiver Treatment Guideline*). Typical considerations include:

- fresh air ventilation systems that meet Building Code of Australia requirements with the windows and doors shut
- upgraded windows, glazing and solid core doors
- upgrading window and door seals
- the sealing of wall vents
- upgrading mass of building envelope by installing additional internal wall/ ceiling lining
- the sealing of the underfloor below the bearers and appropriately treating sub-floors ventilation
- the sealing of eaves or any sound insulation weaknesses.

Where required, at-property treatments would need to be determined in consultation with the landholder and informed by a detailed building condition survey and final predicted noise levels. Building condition surveys would determine if the internal noise target is met based on current building conditions or if treatment is required. For example, in older or light weight buildings, the provision of reasonable and feasible noise treatment may not provide any meaningful reduction in internal noise levels.

If treatment is determined to be required, effective treatment would likely consist of the sealing of sound insultation weaknesses in the structure, and/or provision of alternative means of air ventilation (should compliance require doors and windows to remain closed). This may require the provision of active ventilation systems or air conditioning.

7.2.1.2 Transmission line – maintenance

As discussed in Section 5.1.1, most predicted noise impacts during transmission line maintenance are related to the use of a helicopter during aerial surveys of the transmission lines.

Given the limited mitigation options for noise from this source, the infrequency of maintenance events and the importance of seasonal bushfire prevention surveys, it would not be considered reasonable or feasible to mitigate noise from this source. However, where reasonable and feasible, these works should be undertaken during standard operational hours to minimise noise impacts.

7.2.1.3 Energy hubs and switching stations

At the time or writing of this assessment, limited information was available regarding the reference design and proposed equipment at each energy hub. The assessment of potential impacts has made conservative assumptions, however will need to be refined and/or reviewed as design of these facilities progresses.

The requirement for noise mitigation at the M4, M5 and M7 switching stations may be required to reduce potential short term L_{Amax} sleep disturbance impacts during night-time hours. Under the NPfI, any consideration of mitigation as a result of sleep disturbance noise impacts should consider the potential frequency and distribution of these events during the night-time period. The reference design will be updated during the detailed design process, and noise impacts would be further assessed and managed through standard planning approval processes as the design of these sites progresses.

Where the operational equipment is consistent with the modelled scenarios outlined in Section 2.5.3, mitigation is not expected to be required at Merotherie or Elong Elong Energy Hubs or other switching stations.

7.3 Operational mitigation measures

A summary of the proposed mitigation measures for the project is presented in Table 7-5.

Table 7-5 Summary of operational noise and vibration mitigation measures

Mitigation ID	Impact	Mitigation measure	Timing	Applicable Location(s)
NV6	Operational noise	An Operational Noise Review will be prepared to confirm the predicted noise impacts from the project (based on the final infrastructure locations). Where necessary, the operational mitigation measures to be implemented below will be revised so operational noise impacts are compliant with the project noise trigger levels, where feasible and reasonable. Where exceedances of the project specific noise trigger levels are predicted (i.e. transmission lines audible noise), feasible and reasonable operational noise and vibration mitigation measures will be further investigated prior to construction, in consultation with the affected receivers. This will include: Transmission lines — Scheduling of maintenance activities during less sensitive times of day. — Noise control at the receiver, such as ‘at property’ treatment to upgrade aspects of the dwellings including the façade or ventilation systems.	Pre-construction	All locations

Mitigation ID	Impact	Mitigation measure	Timing	Applicable Location(s)
		— Monitoring after the commissioning of the project to be conducted at each residence where potential operational noise levels are predicted to exceed project trigger levels. — If additional measures are found to be required during the compliance monitoring, these will be implemented as soon as practicable. Energy hubs and switching stations — Adoption of lower generating noise equipment (where practicable). — Site layout designed to minimise noise impacts. — Restriction of operational parameters such as cooling fans where meteorological conditions are favourable. — Noise control at the receiver, such as 'at property' treatment to upgrade aspects of the dwellings including the façade or ventilation systems. — Monitoring after the commissioning of the project to be conducted at each residence where potential operational noise levels are predicted to exceed project trigger levels. — If additional measures are found to be required during the compliance monitoring, these will be implemented as soon as practicable.		

7.4 Effectiveness of mitigation measures

7.4.1 Construction

The adoption of the recommended standard noise mitigation measures during construction activities will reduce the severity and impact of the predicted noise levels.

Land use planning measures such as locating high noise activities such as stockpiles or haul routes away from receivers is the most preferable form of noise mitigation and will provide the most benefit.

The implementation of noise controls on equipment, including regular maintenance, the use of broadband reversing beepers (or alternatives), lower noise plant or temporary screening will reduce the generation and transmission of noise to potentially affected receivers.

Planning and scheduling measures, including the provision of respite periods, particularly during drone or helicopter operations (if required) and high quality communication and complaints investigation will reduce the severity of impacts and annoyance during high noise periods.

The implementation of the recommended construction vibration mitigation measures is expected to eliminate all predicted construction vibration impacts.

7.4.2 Operation

During periods of wet weather, noise impacts have been predicted to occur as a result of coronal noise. The implementation of at receiver acoustic treatments is expected to be the only feasible noise mitigation method to reduce these impacts. Where these are effectively installed, internal noise levels are expected to be acceptable. It is noted that these mitigation measures will not provide any reduction in noise levels at outdoor areas, however given the source is most likely to occur during periods of rain, this is unlikely to be generate complaints.

Sleep disturbance impacts have also been predicted to potentially occur at three switching stations. Although the requirement for noise mitigation is yet to be determined, if found to be required, it is recommended that circuit breaker switches are screened or housed within sound insulated enclosures. Where this mitigation measure is effectively adopted, noise impacts would no longer occur.

8 References

- *Australian Standard AS 1055: Description and measurement of environmental noise*.
- *Australian Standard AS 2187.2 Explosives – Storage, Transport and use Part 2: Use of Explosives*.
- *British Standard BS 7385-2:1993 – Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration* (1993).
- Department of Environment and Conservation, 2006, *Assessing Vibration: A Technical Guideline* (AVaTG).
- Department of Planning and Environment, 2022, *Cumulative Impact Assessment Guidelines for State Significant Projects*.
- Environmental Protection Agency, 2022, *Approved Methods for the Measurement and Analysis of Environmental Noise in NSW.*
- *German Standard DIN 4150-3: Structural Vibration - effects of vibration on structures.*
- *ISO 8297 – Determination of Sound Power Levels of Multisource Industrial Plants for Evaluation of Sound Pressure Levels in the Environment (Engineering Method).*
- Transport for NSW, 2022, *Construction Noise and Vibration Guideline (for Roads and Maritime Works)* (CNVG).
- Roads and Maritime, 2016, *Construction Noise and Vibration Guideline*
- Roads and Traffic Authority, 2001, *Environmental Noise Management Manual* (ENMM).
- Department of Environment and Climate Change, 2009, *Interim Construction Noise Guideline* (ICNG).
- NSW Environmental Protection Authority, 2017, *Noise Policy for Industry* (NPfI).
- Department of Climate Change and Water, 2011, *Road Noise Policy* (RNP).
- Australian and New Zealand Environment and Conservation Council (ANZECC), 1990, *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration*.

9 Limitations

This report is provided by WSP Australia Pty Limited (*WSP*) for EnergyCo (*Client*) in response to specific instructions from the Client and in accordance with WSP's project and agreement with the Client (*Agreement*).

9.1 Permitted purpose

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (*Permitted Purpose*).

9.2 Qualifications and assumptions

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WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the report.

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WSP is not (and will not be) obliged to provide an update of this Report to include any event, circumstance, revised Information or any matter coming to WSP's attention after the date of this Report. Data reported and Conclusions drawn are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

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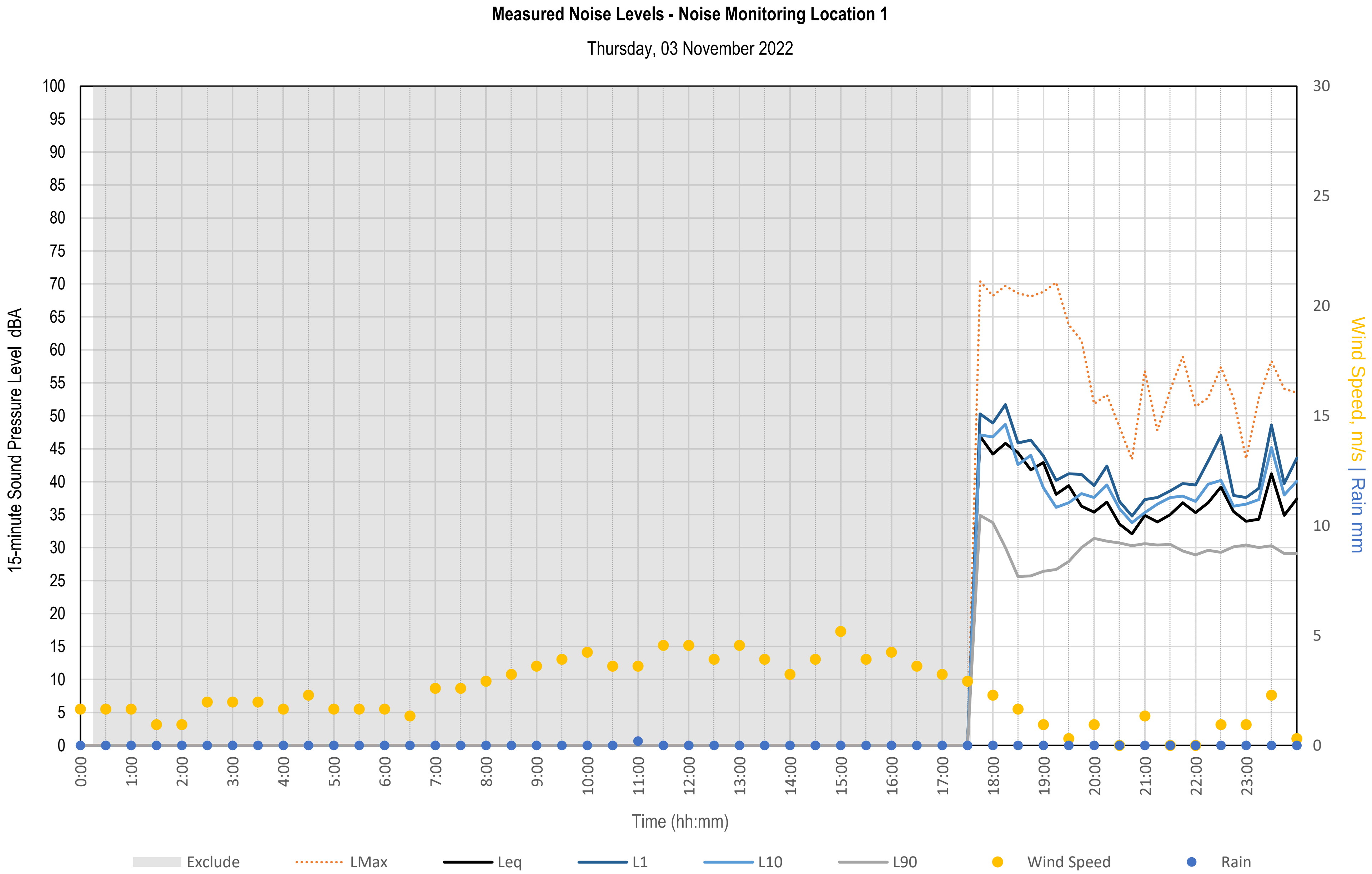
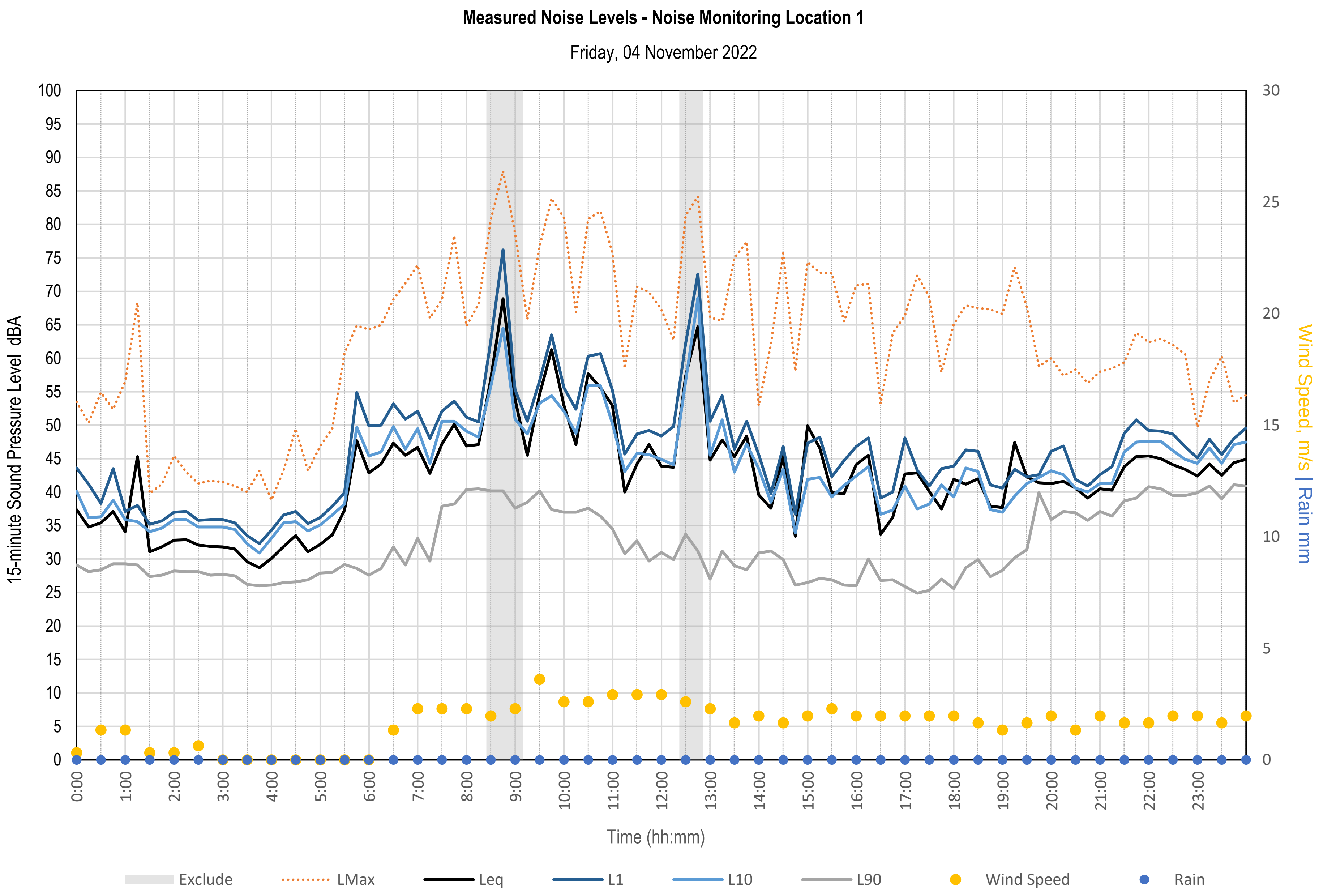
Appendix A

Existing environment – Additional information

APPENDIX A-1
Detailed noise monitoring results


Measured Noise Levels - Noise Monitoring Location 1
Thursday, 03 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 1
Friday, 04 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
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23:00
Exclude
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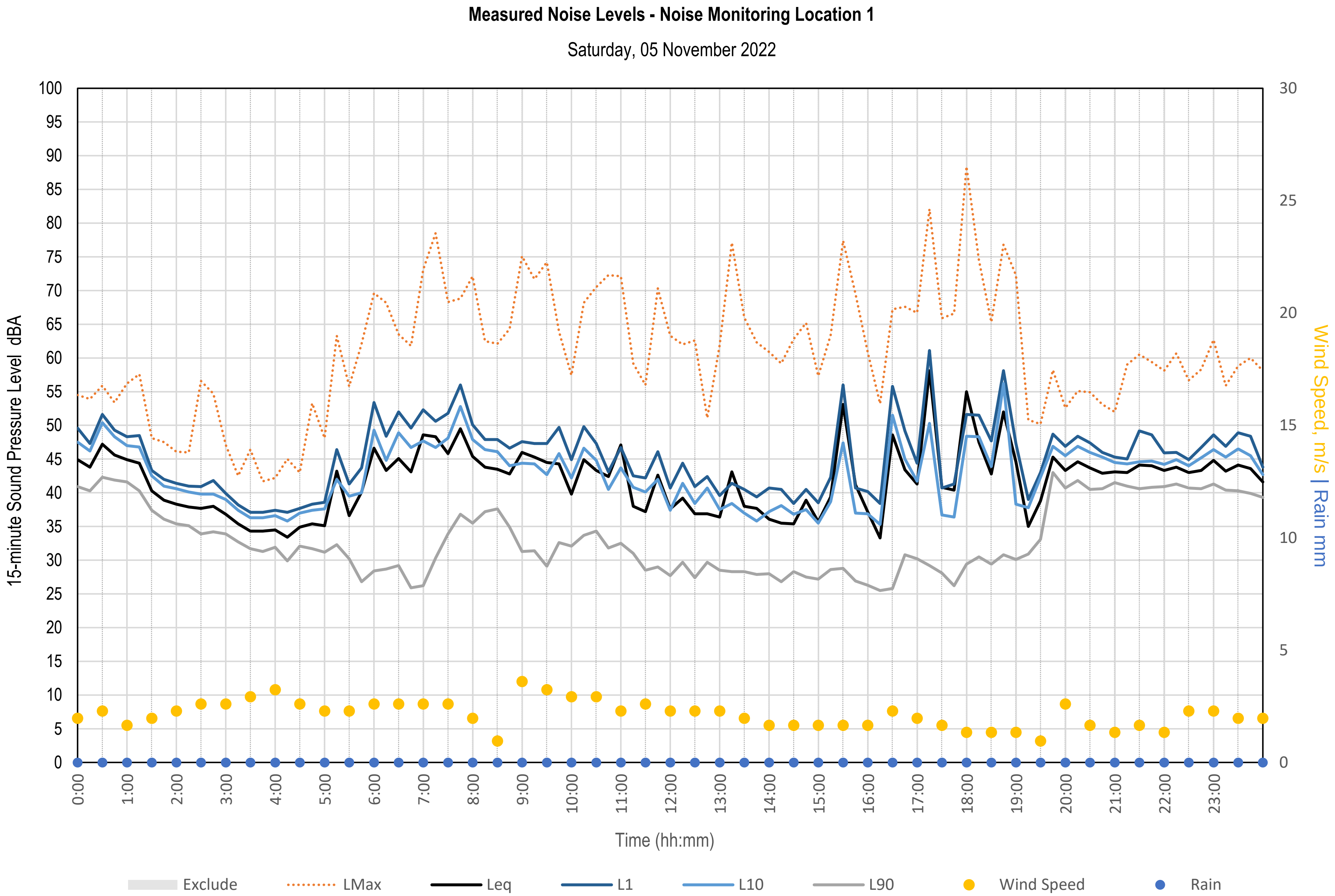
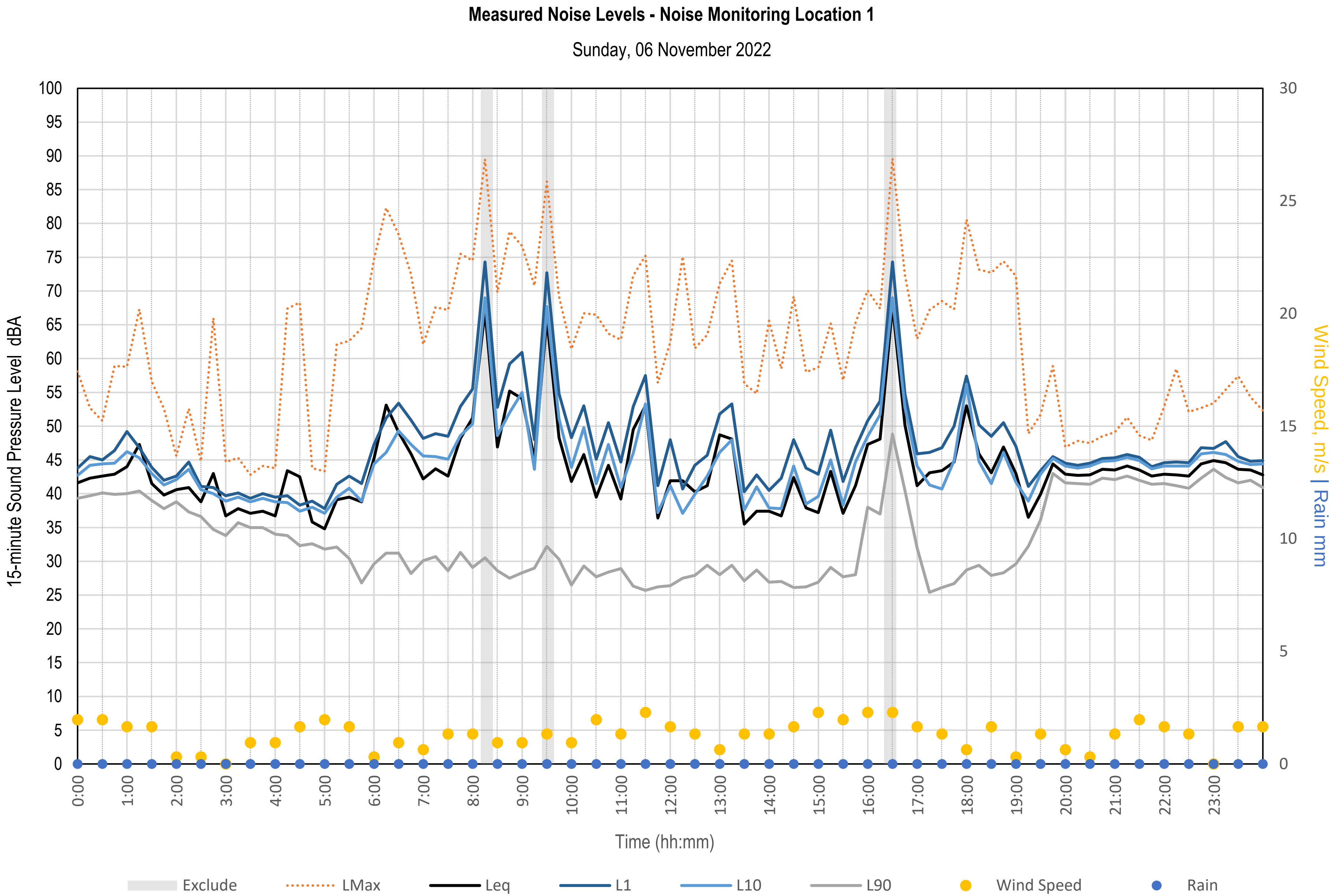
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 1
Saturday, 05 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 1
Sunday, 06 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
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12:00
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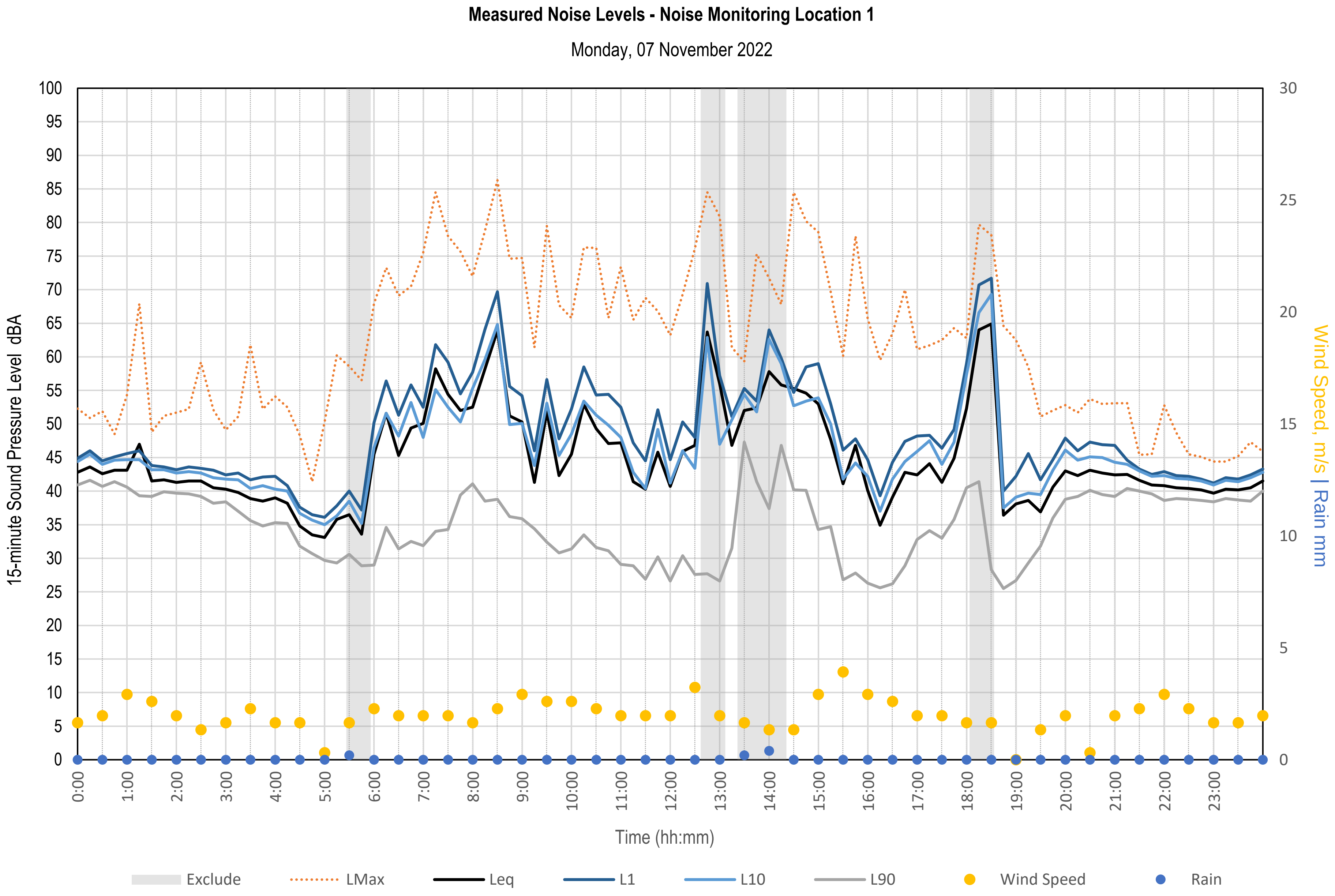
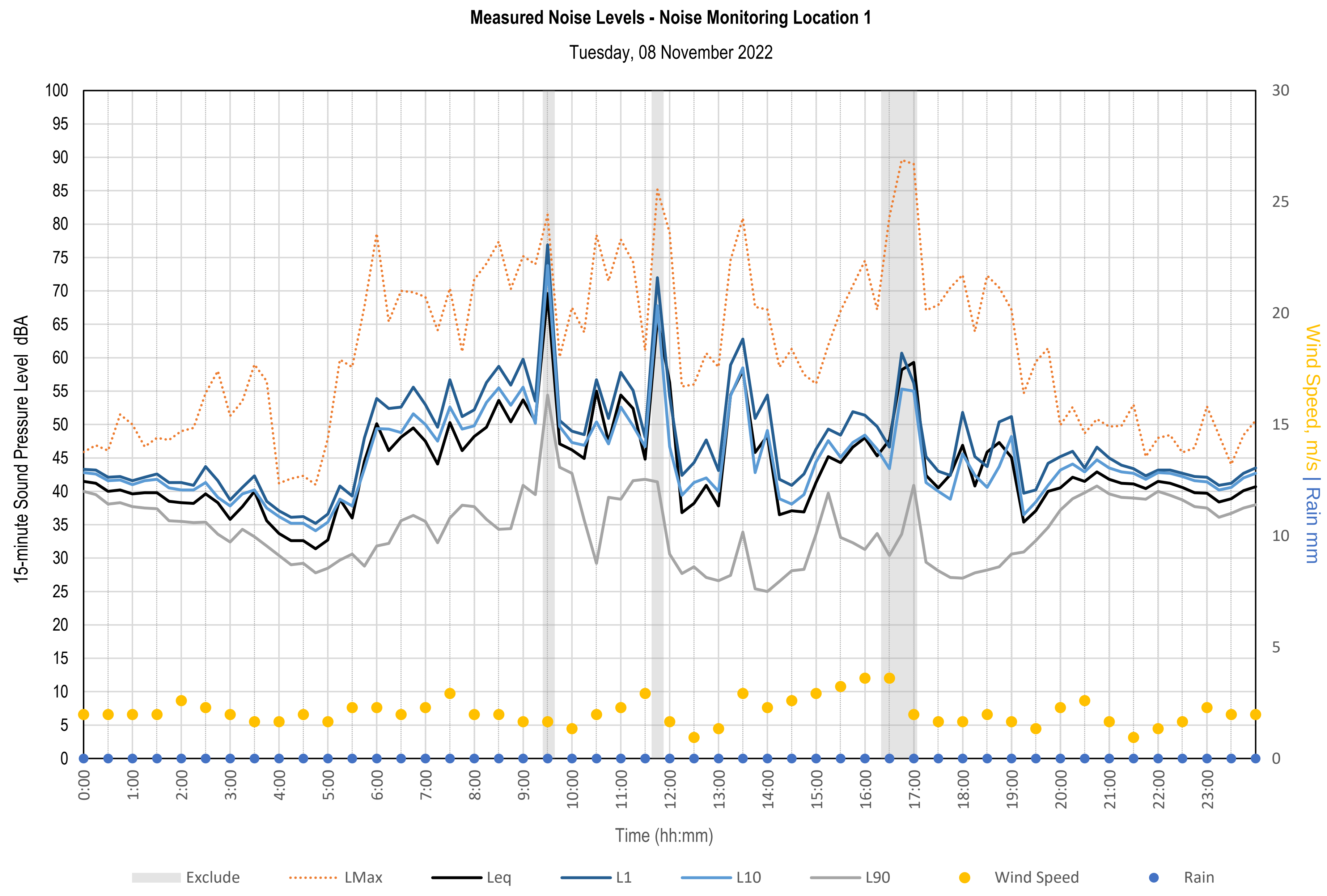
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 1
Monday, 07 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 1
Tuesday, 08 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
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1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
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15:00
16:00
17:00
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19:00
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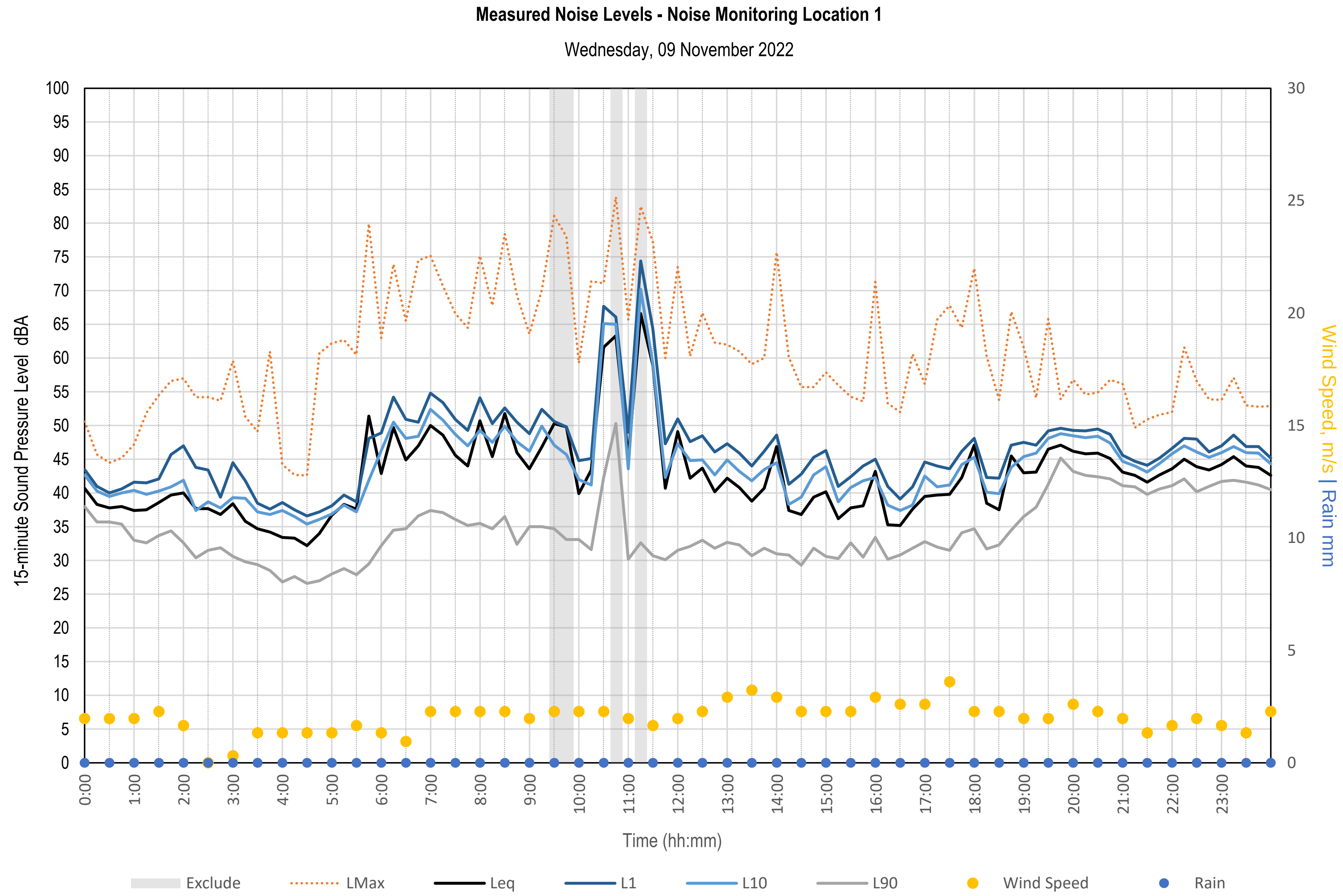
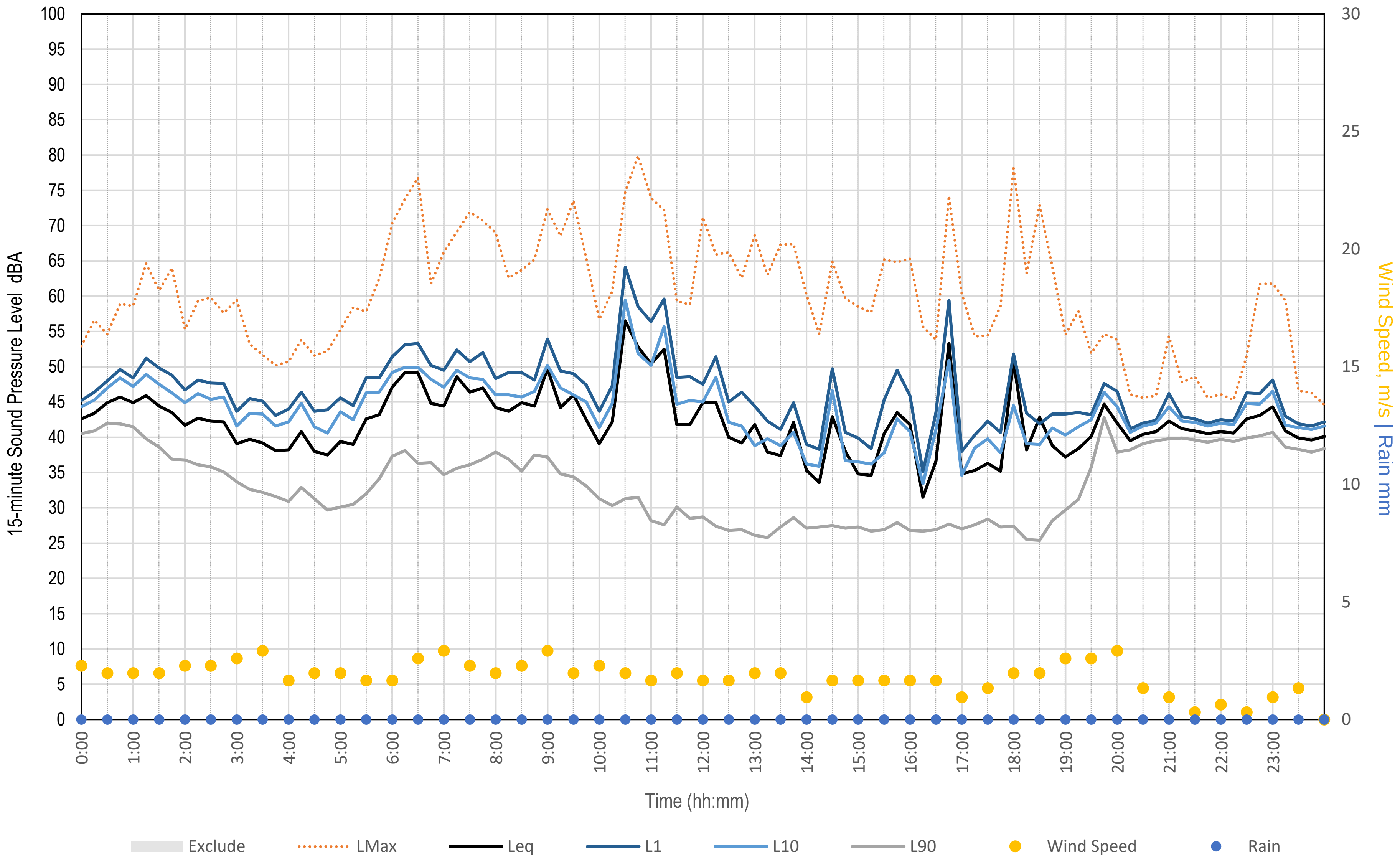
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

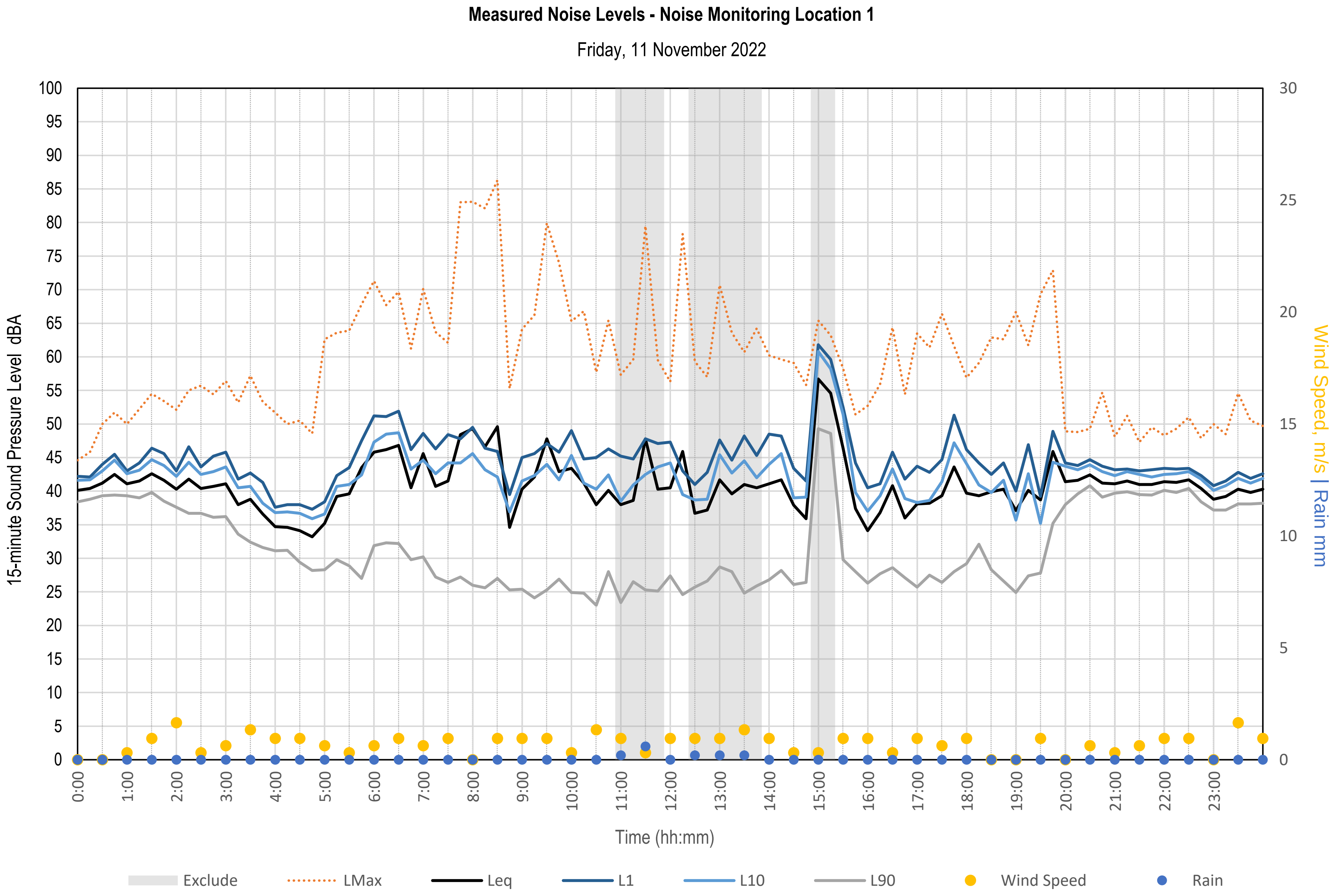


Measured Noise Levels - Noise Monitoring Location 1
Wednesday, 09 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

Measured Noise Levels - Noise Monitoring Location 1

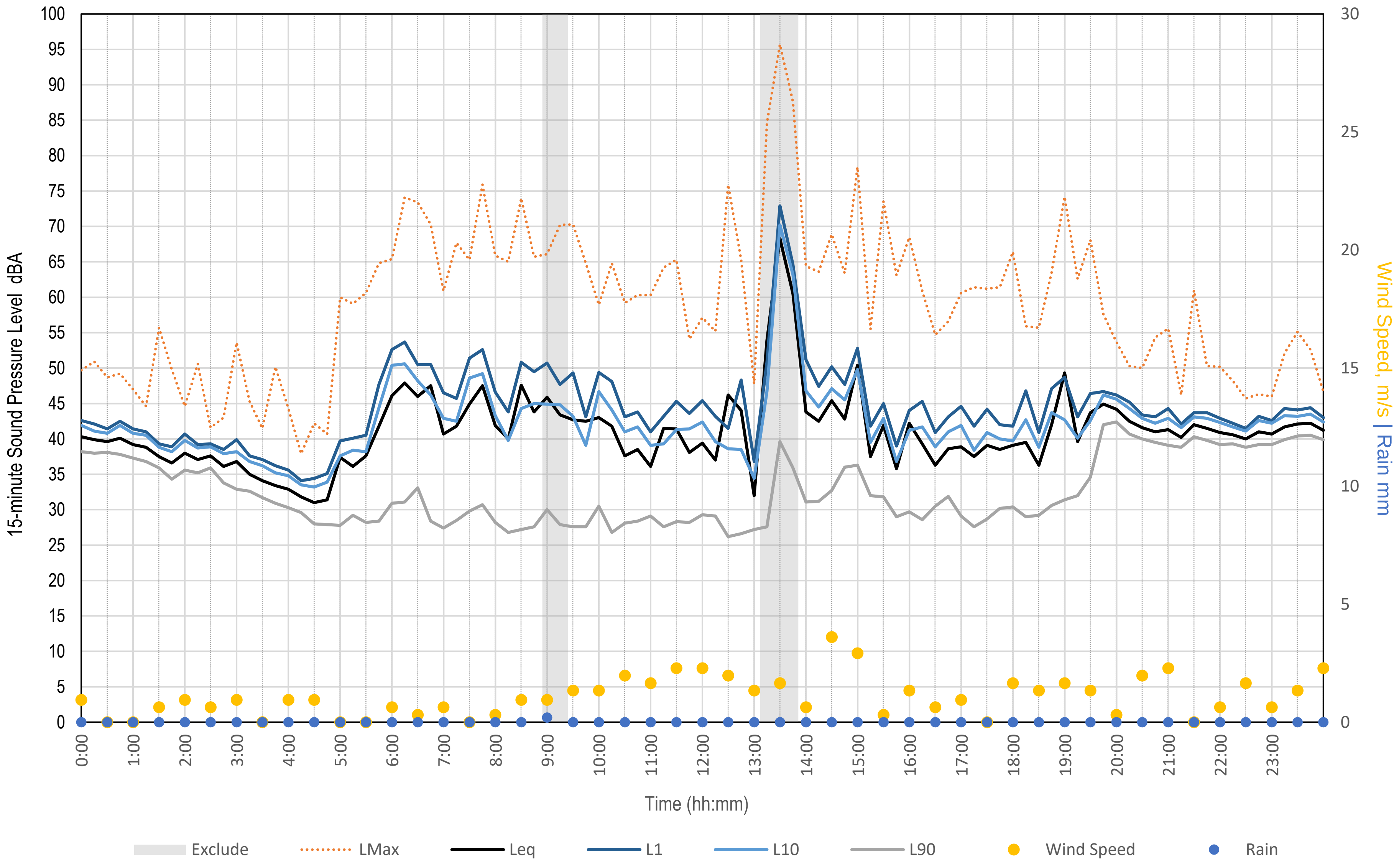
Thursday, 10 November 2022

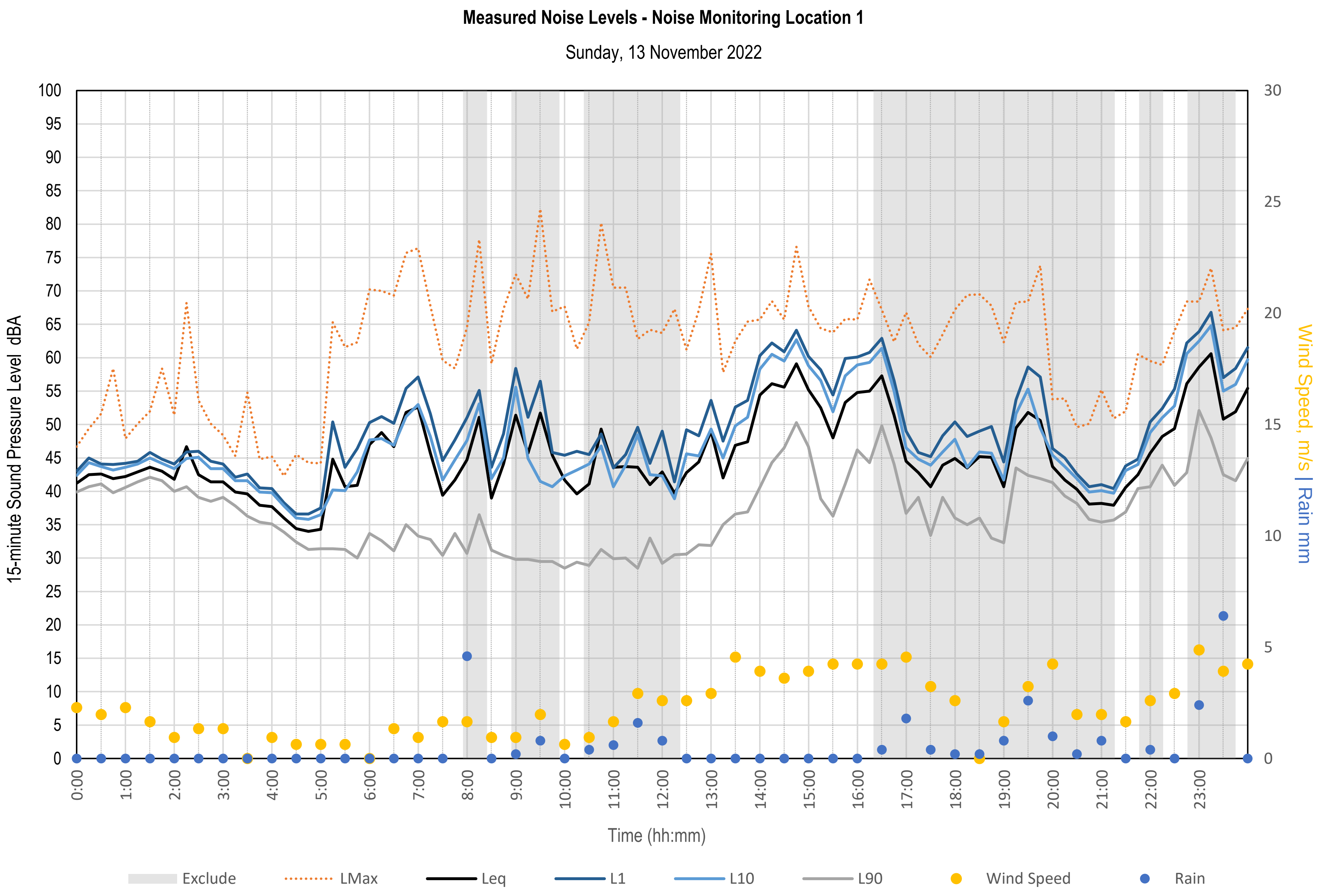


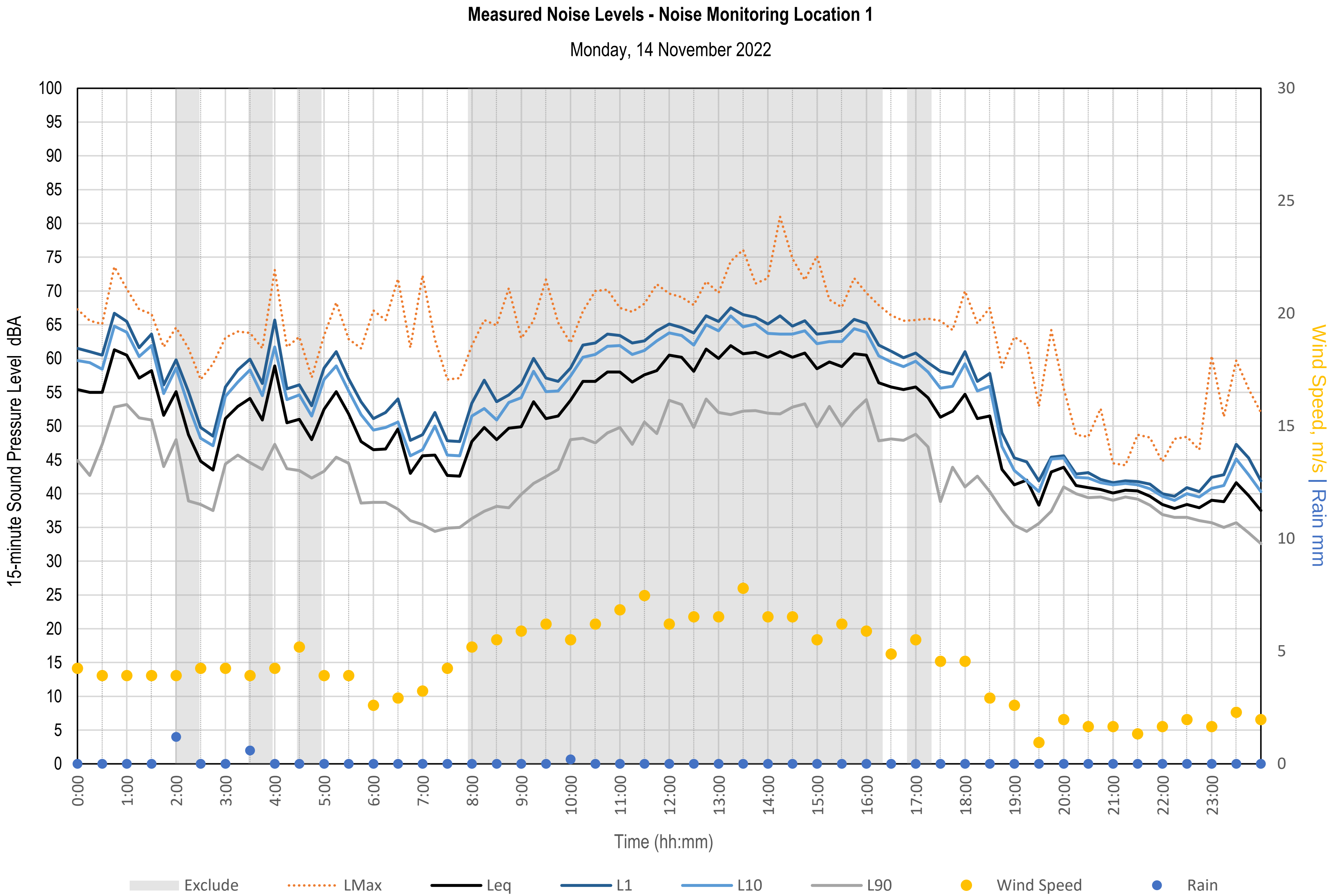

Measured Noise Levels - Noise Monitoring Location 1
Friday, 11 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

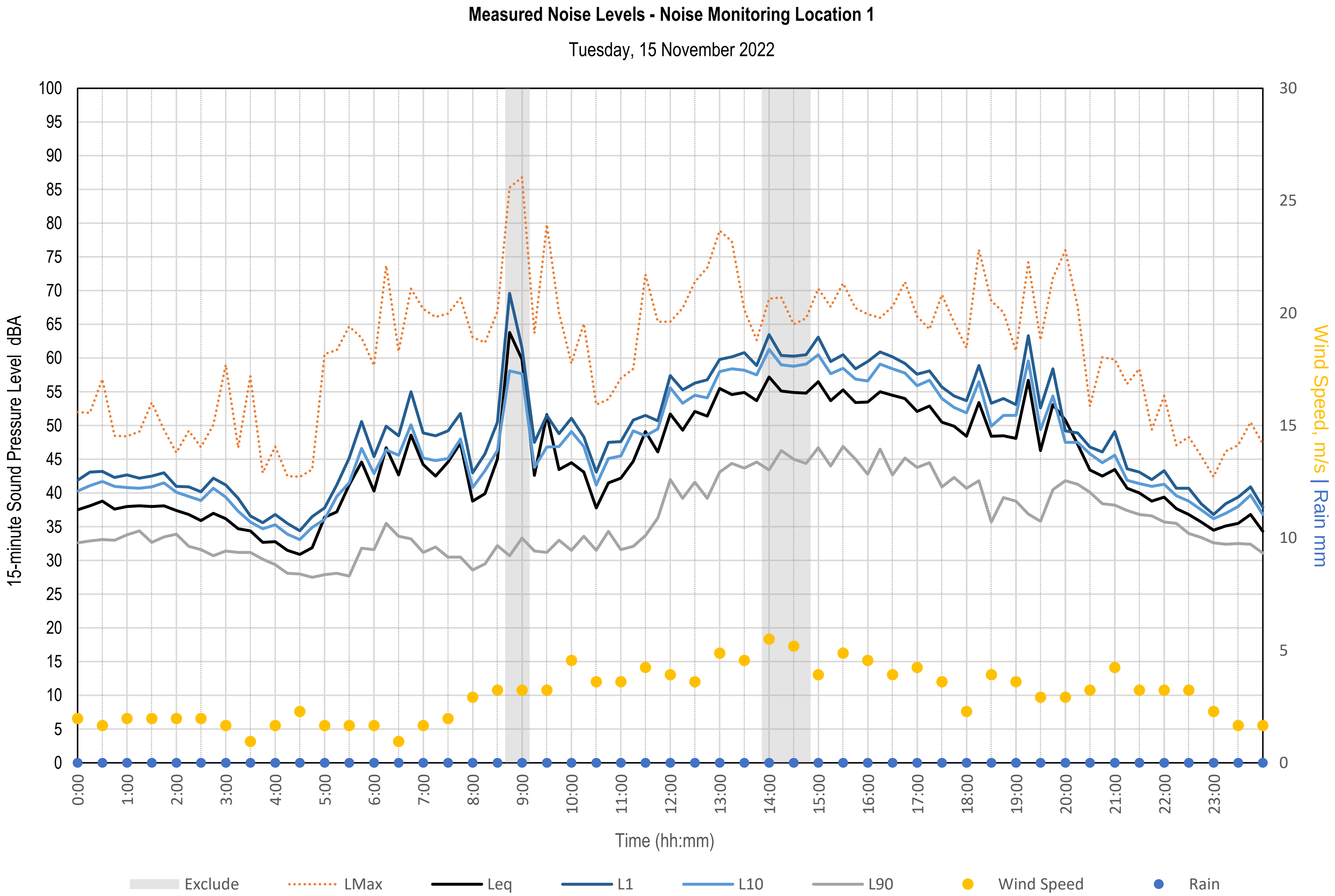
Measured Noise Levels - Noise Monitoring Location 1

Saturday, 12 November 2022




Measured Noise Levels - Noise Monitoring Location 1
Sunday, 13 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 1
Monday, 14 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 1
Tuesday, 15 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
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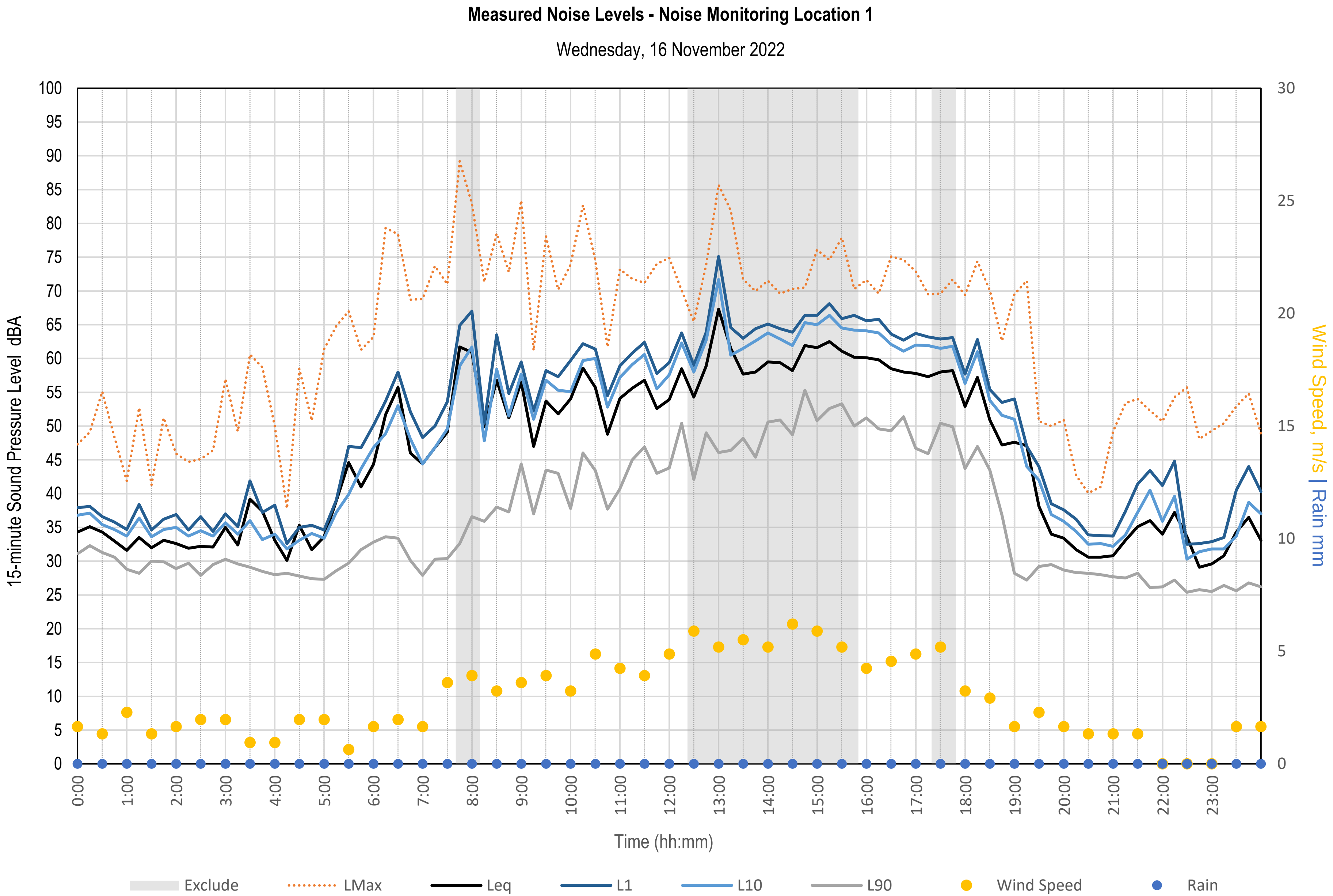
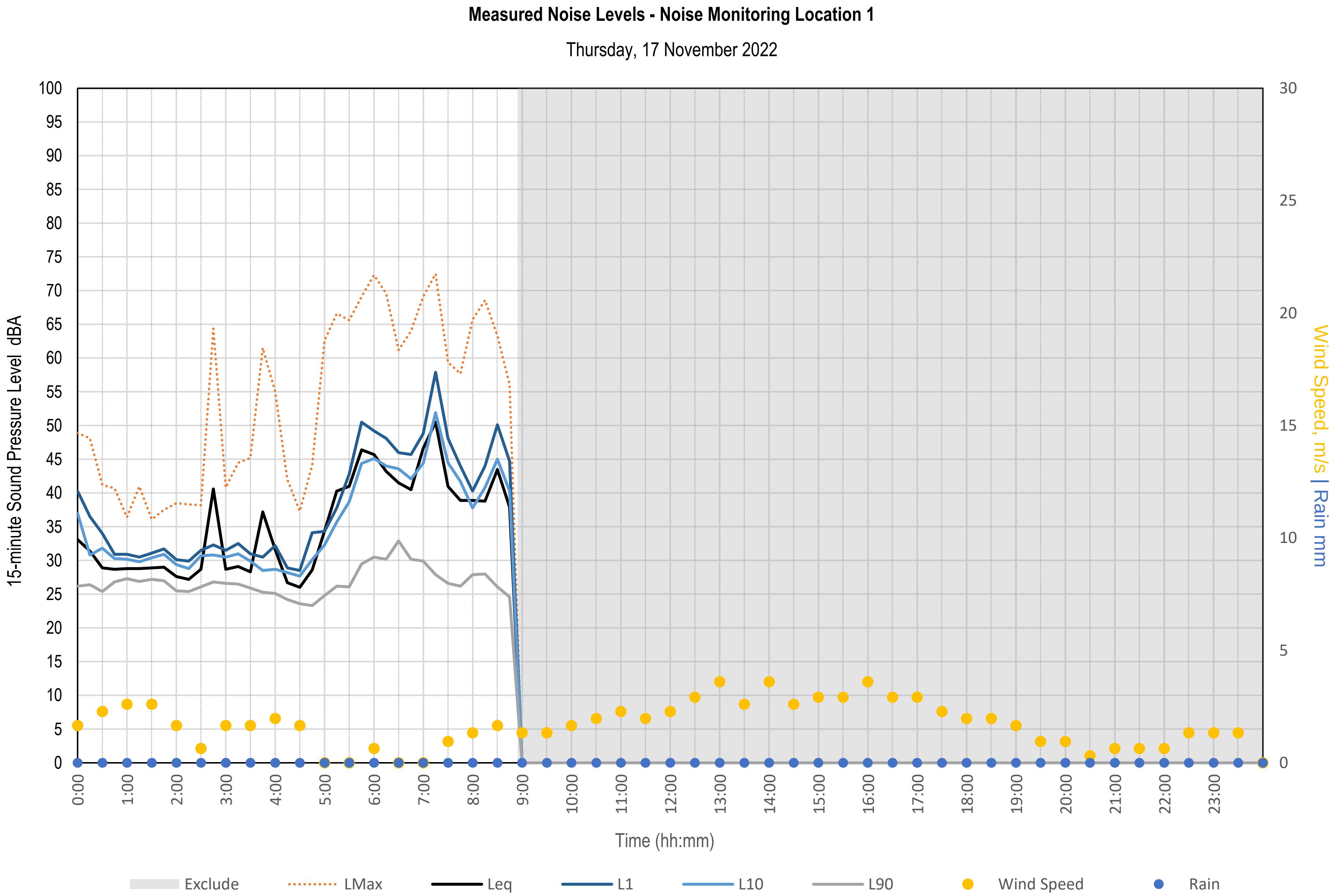
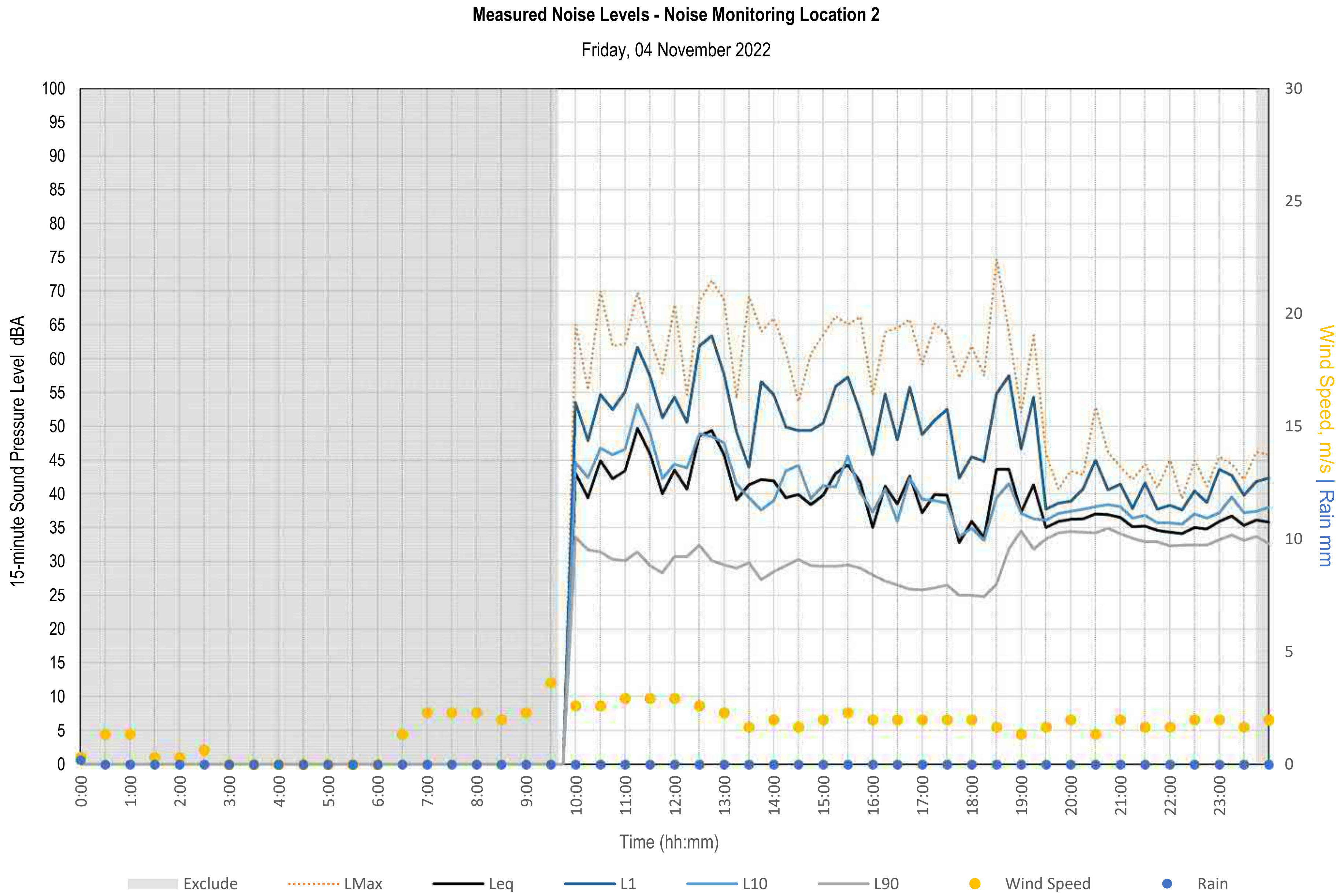
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 1
Wednesday, 16 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 1
Thursday, 17 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 2
Friday, 04 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
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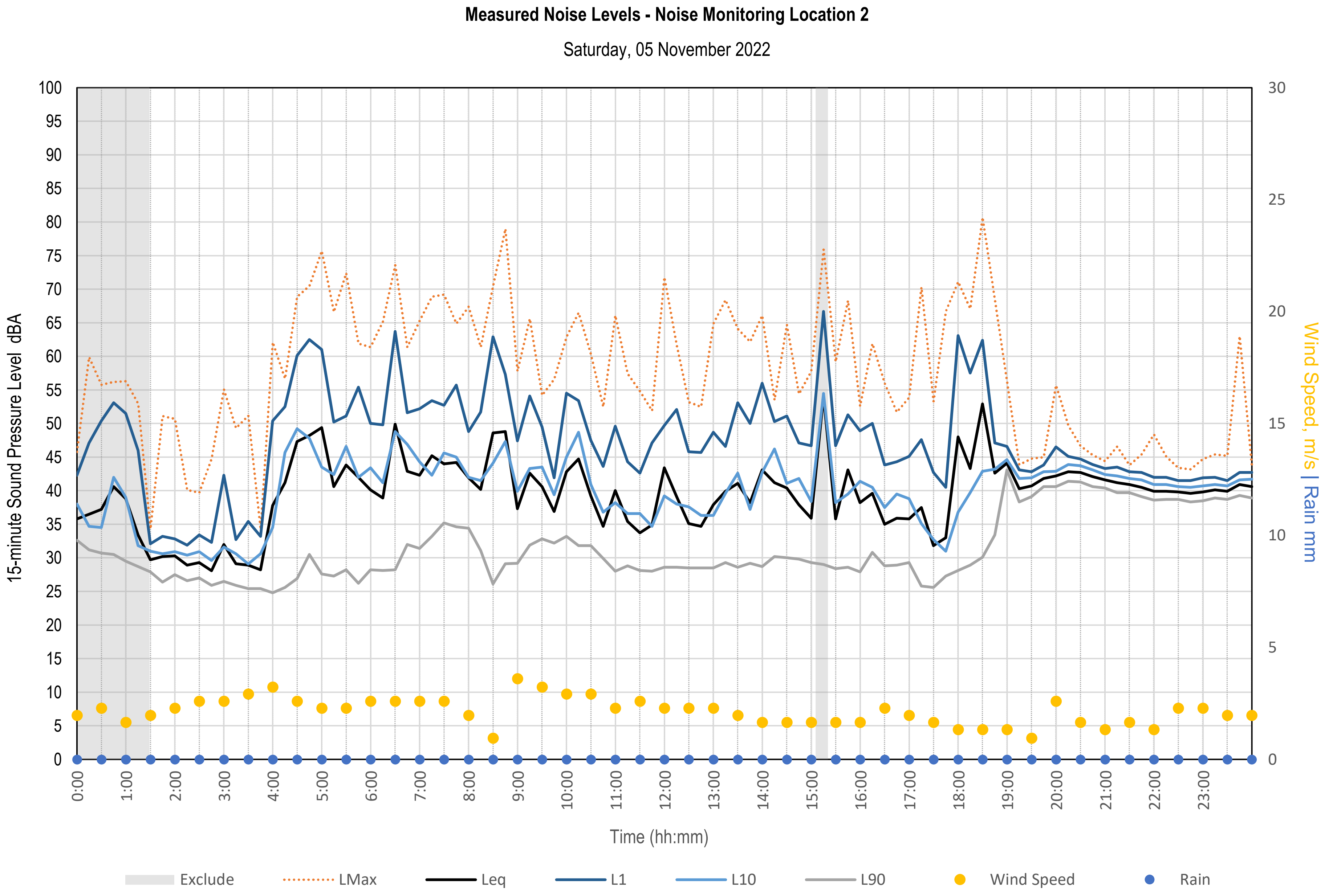
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 2
Saturday, 05 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
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17:00
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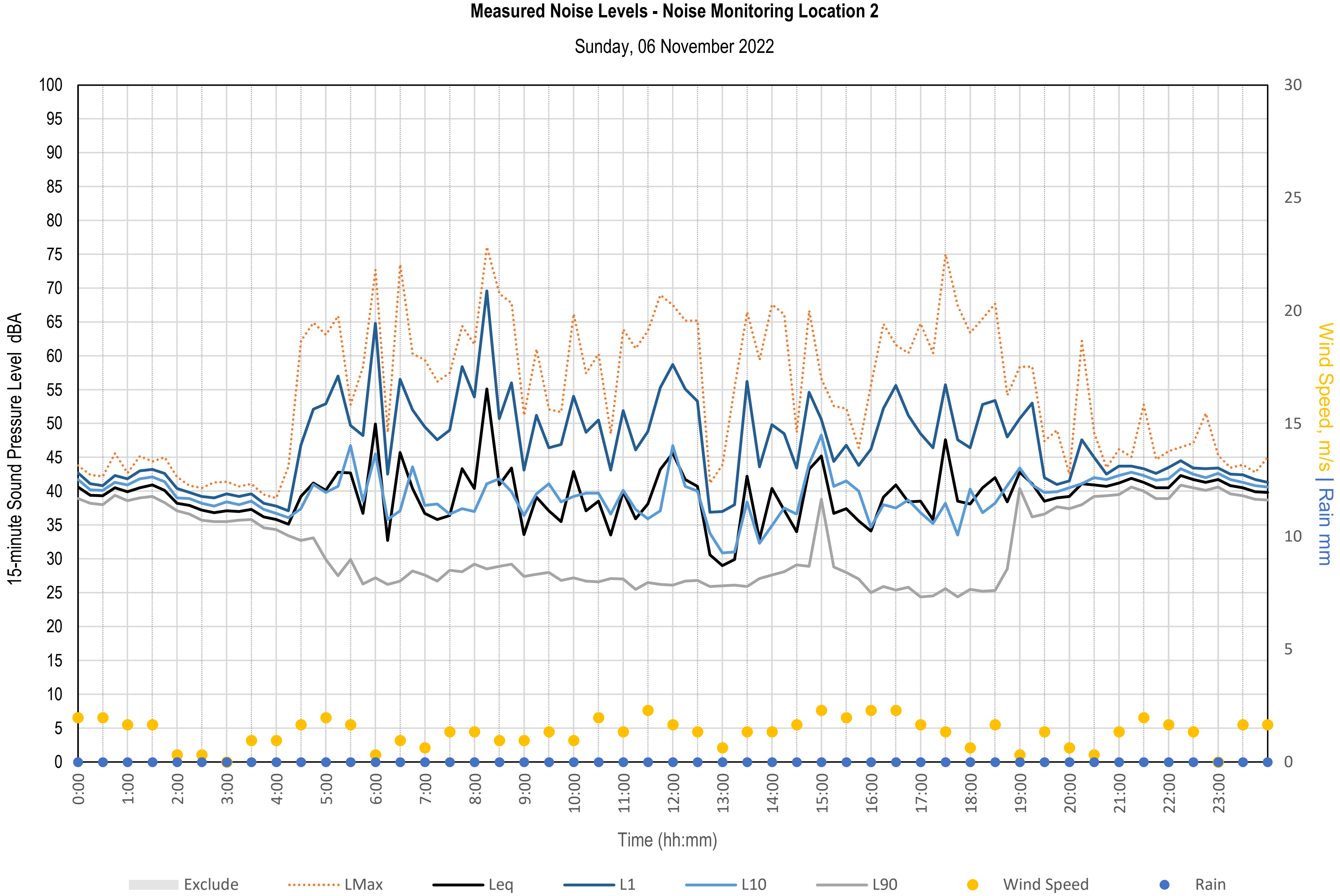
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 2
Sunday, 06 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
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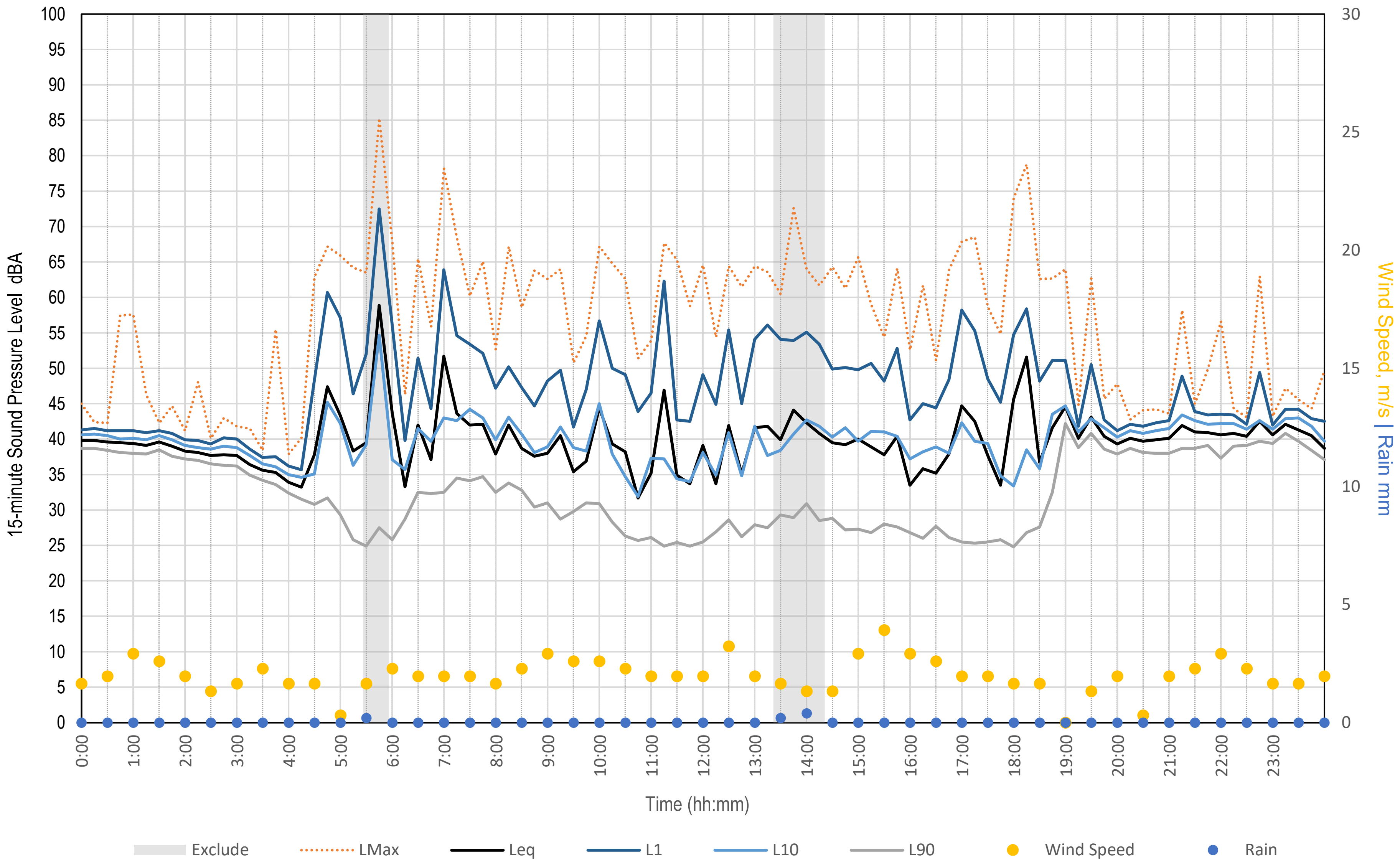
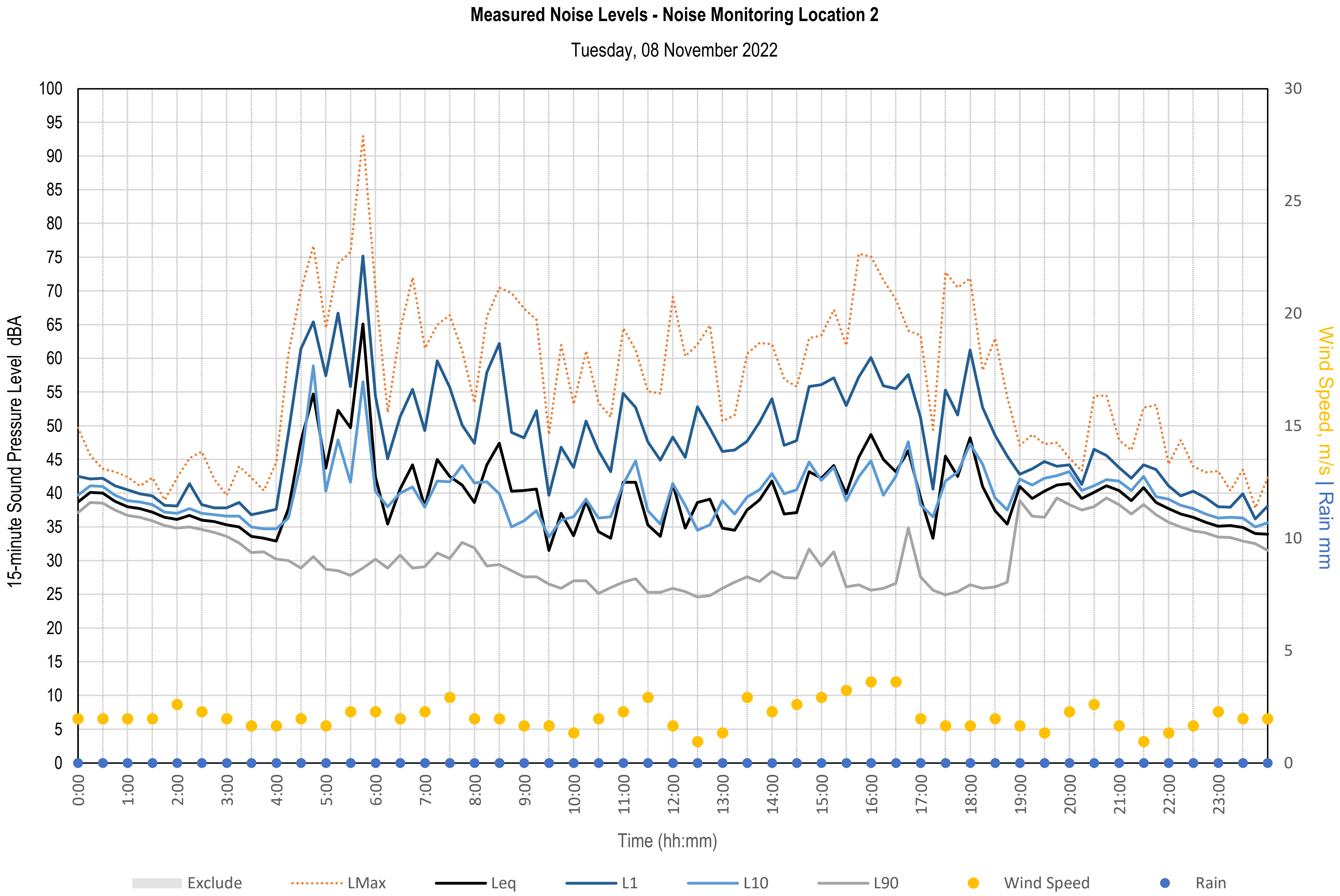
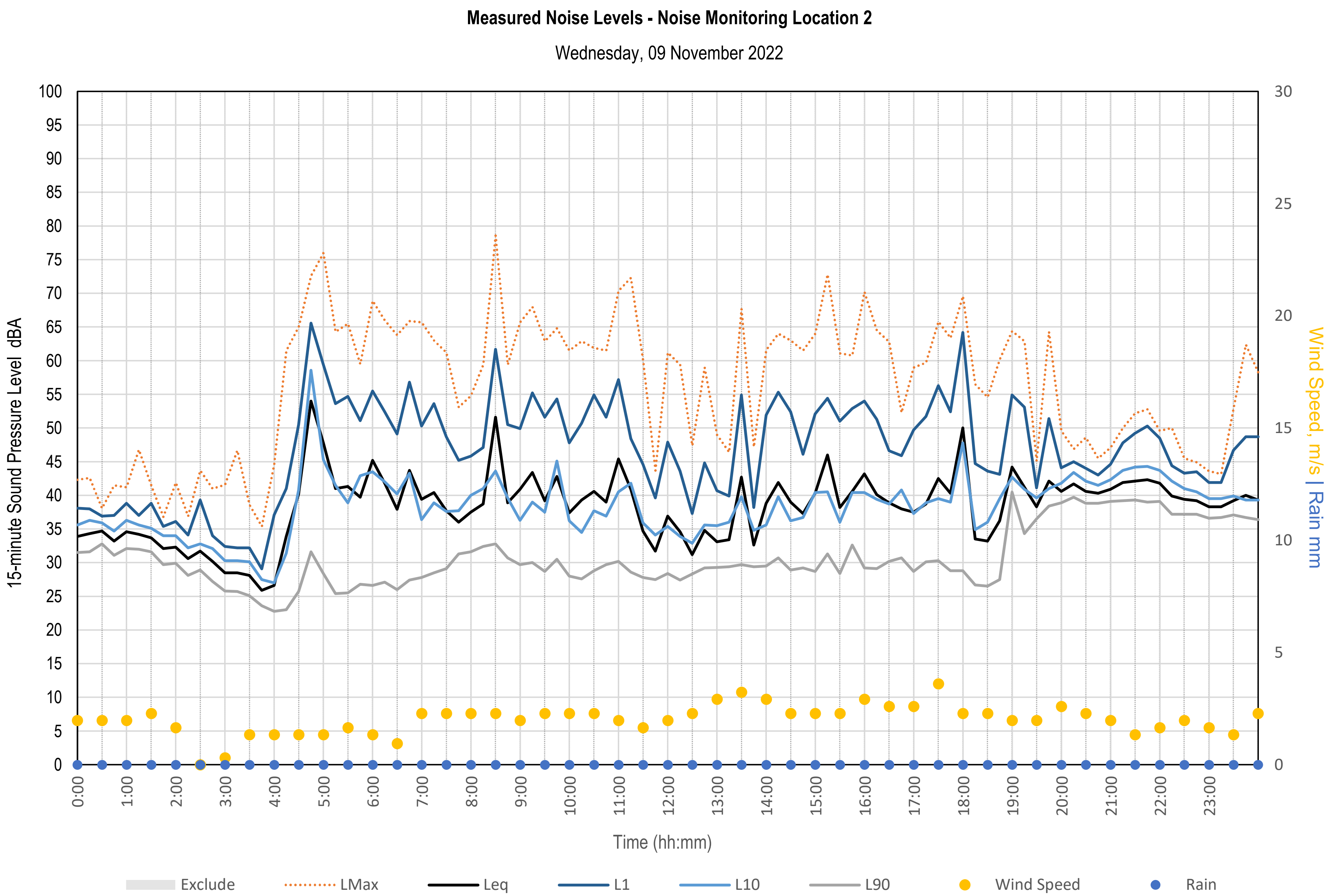
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

Measured Noise Levels - Noise Monitoring Location 2

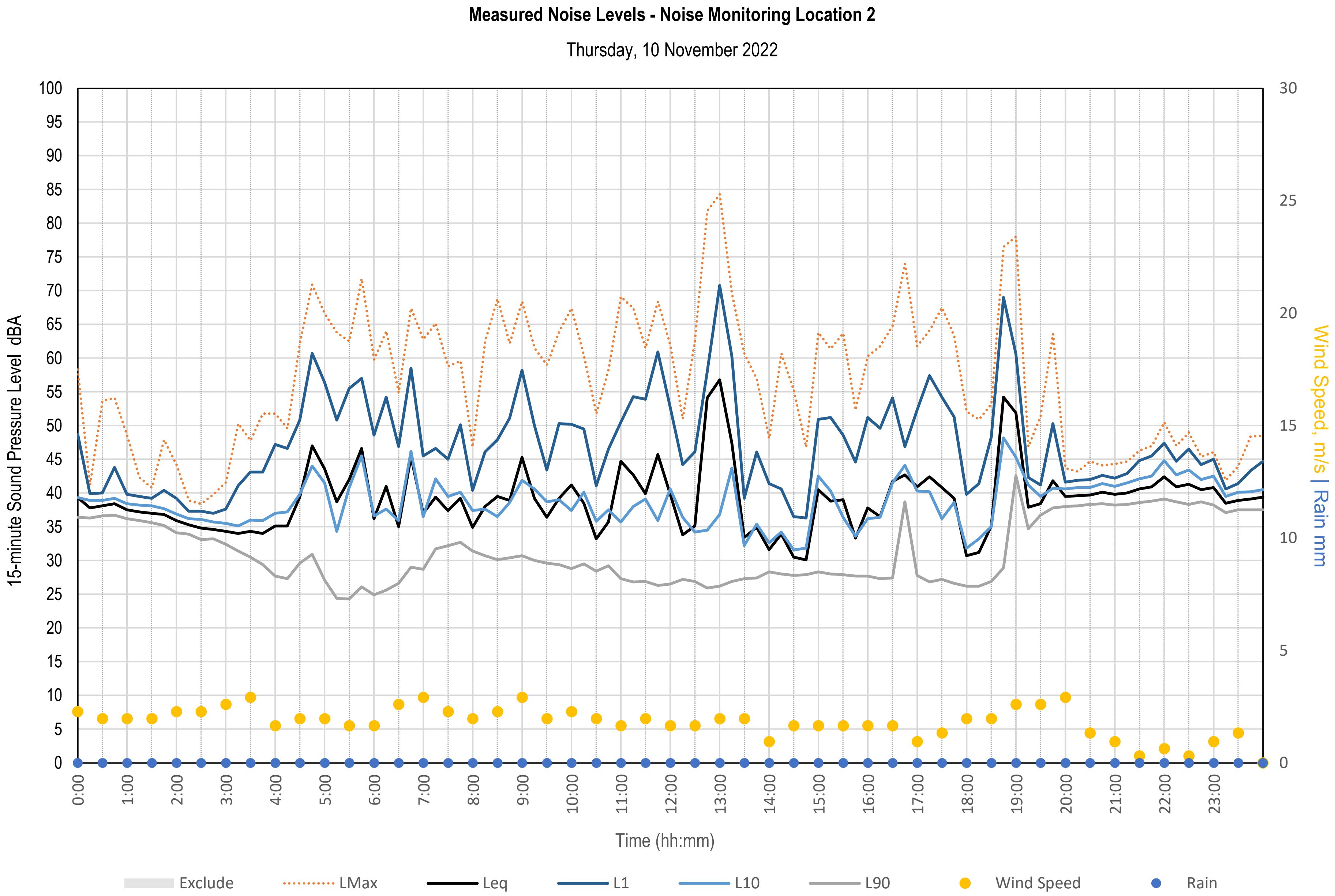
Monday, 07 November 2022




Measured Noise Levels - Noise Monitoring Location 2
Tuesday, 08 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 2
Wednesday, 09 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 2
Thursday, 10 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30
25
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15
10
5
0
0:00
1:00
2:00
3:00
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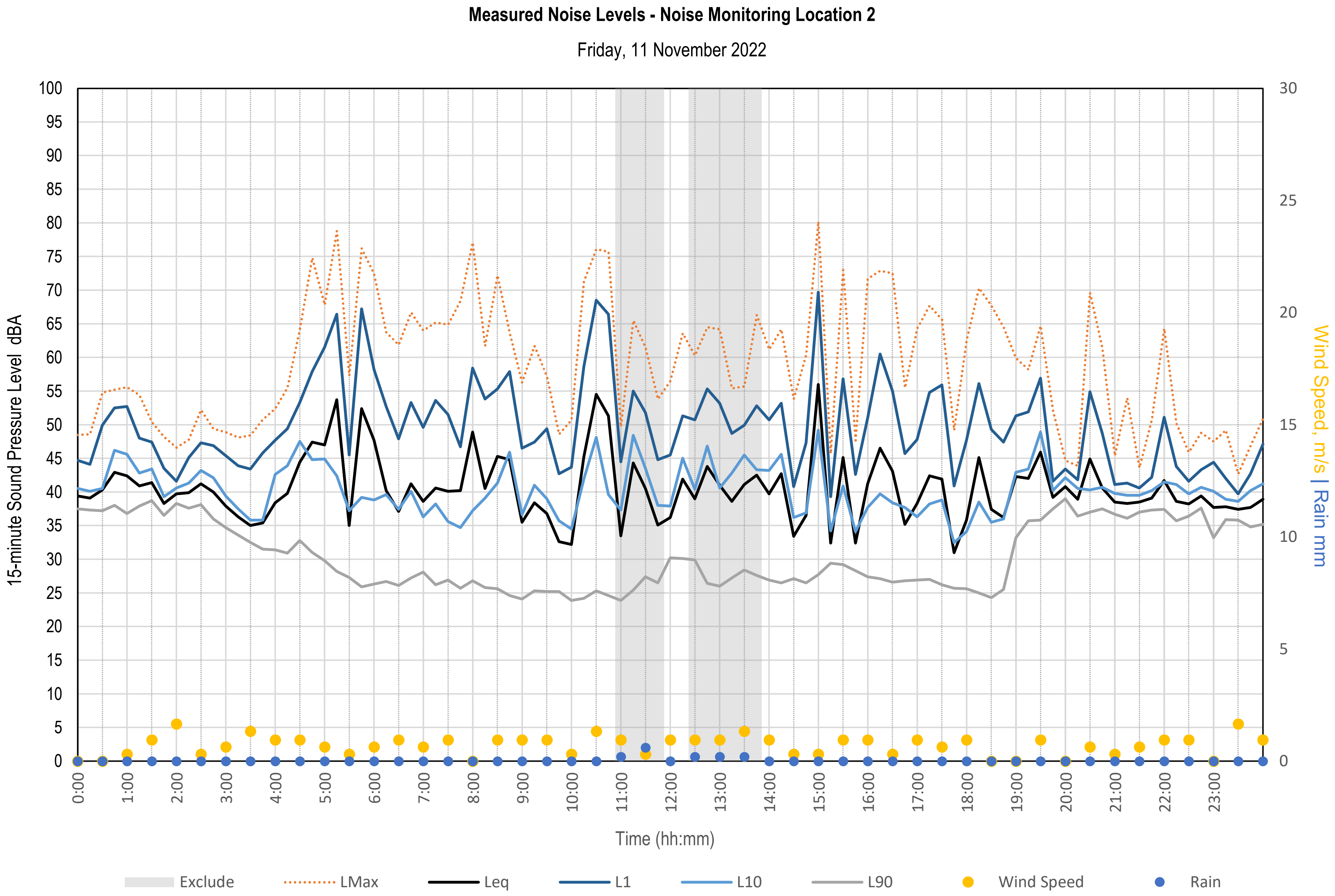
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 2
Friday, 11 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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16:00
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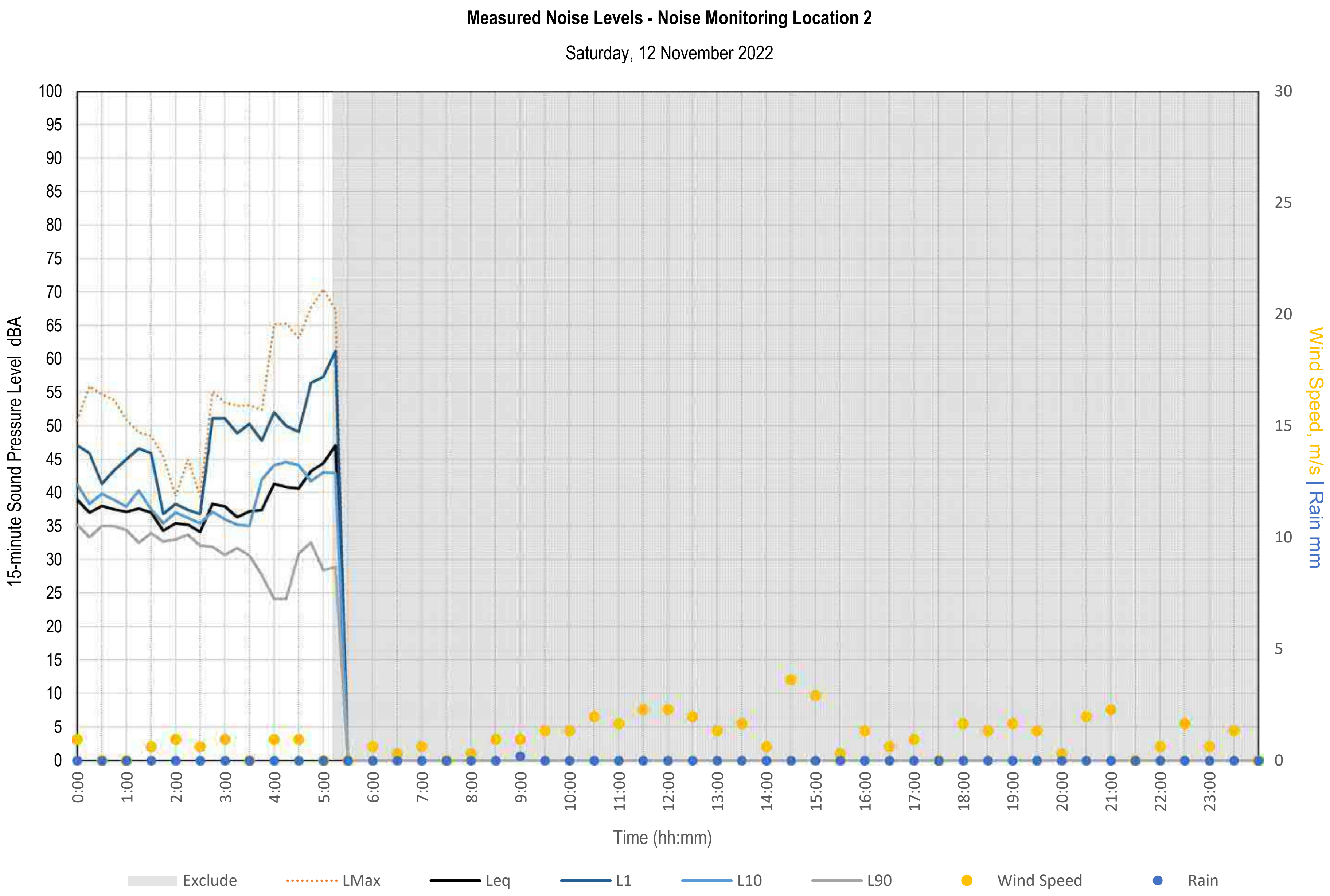
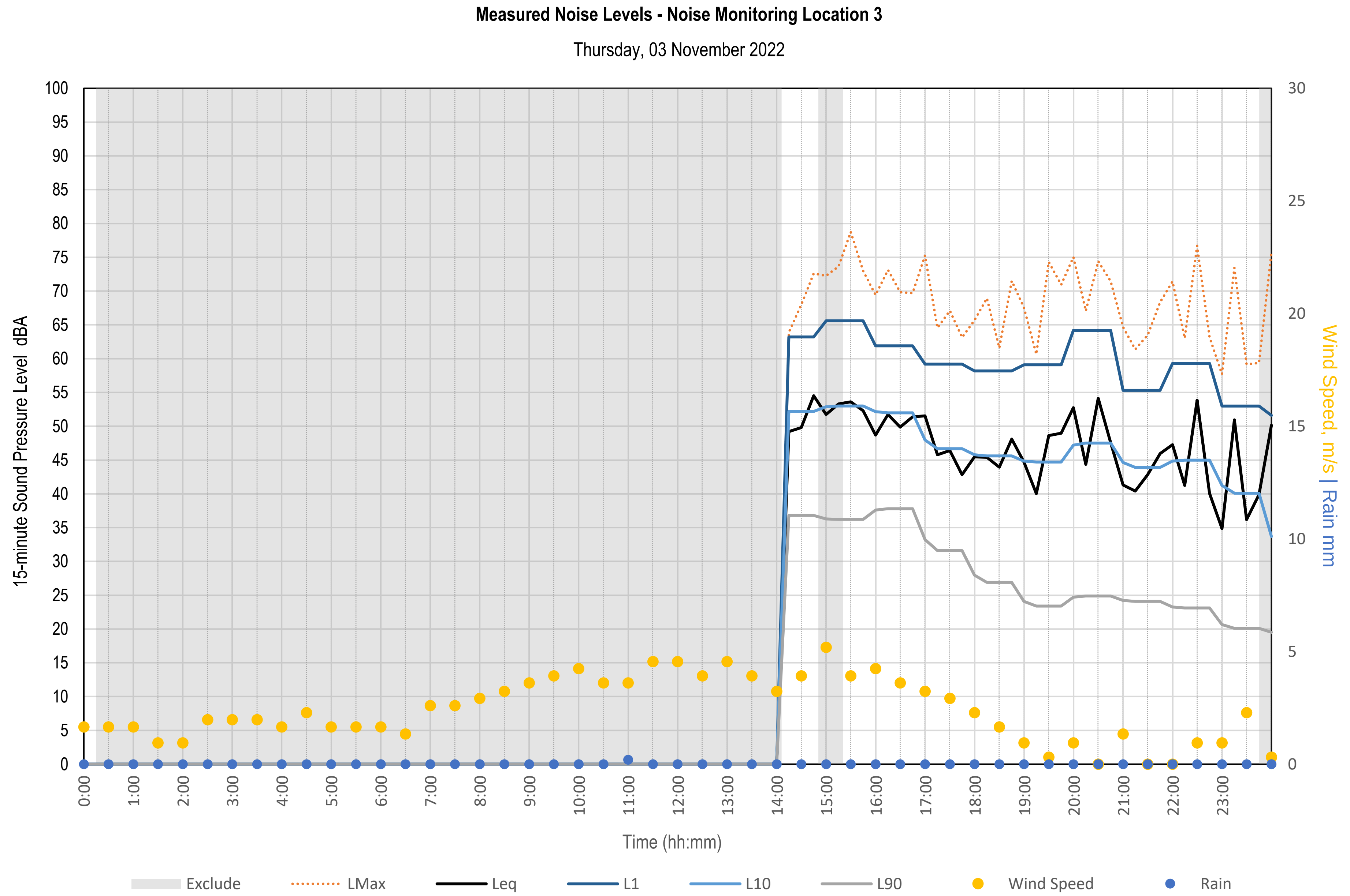
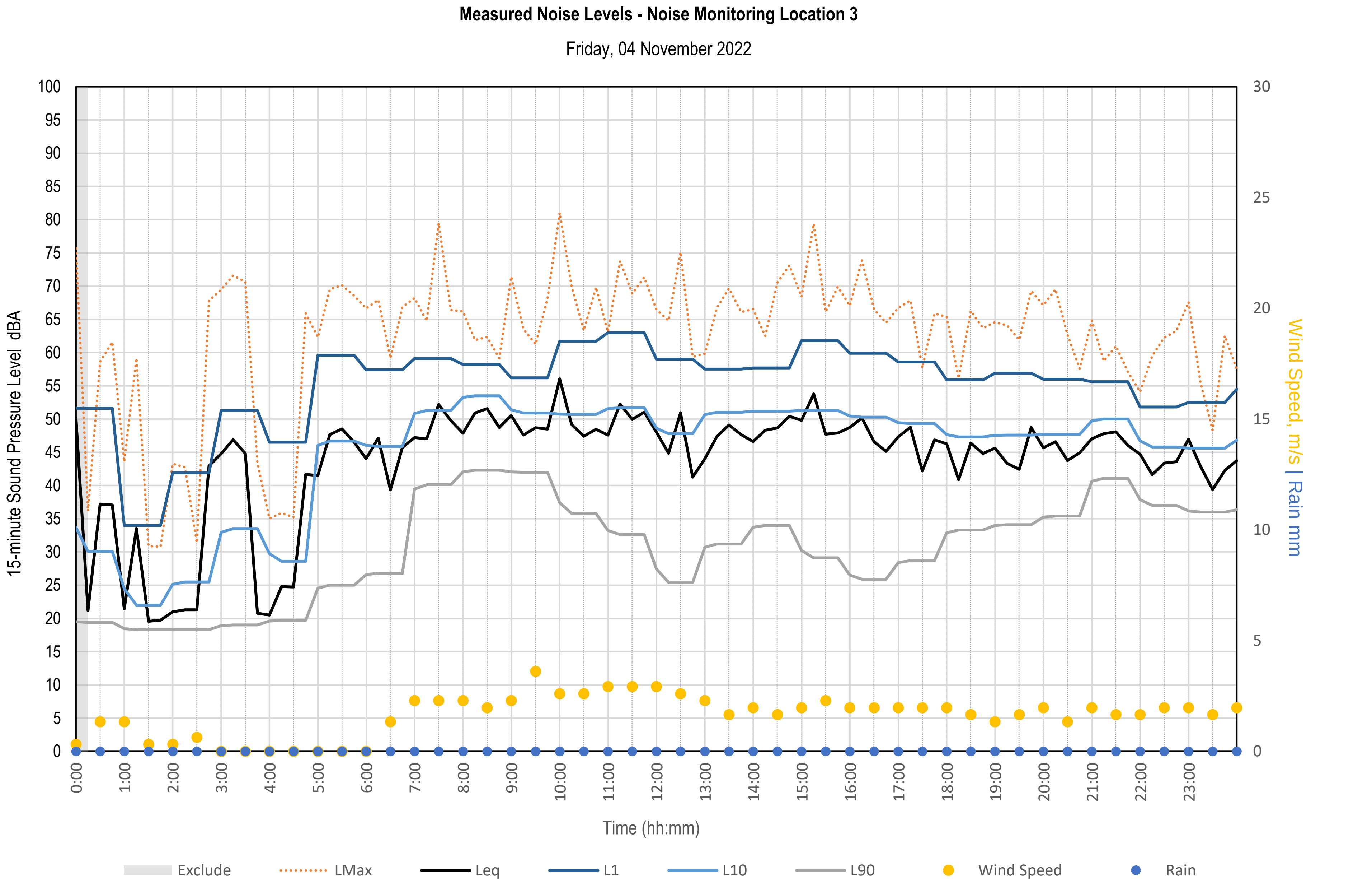
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 2
Saturday, 12 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Thursday, 03 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
0 5 10 15 20 25 30
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Friday, 04 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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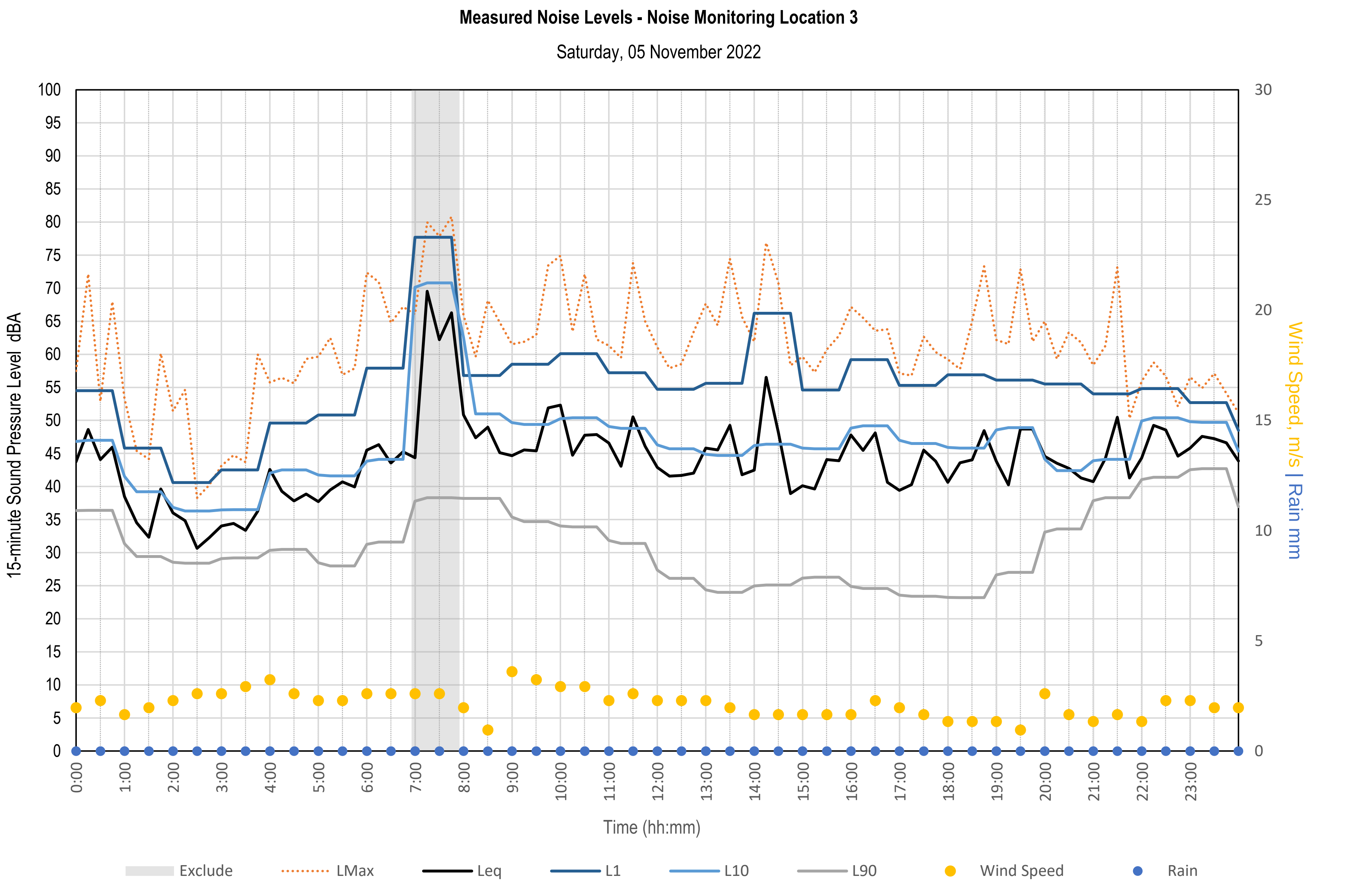
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Saturday, 05 November 2022
15-minute Sound Pressure Level dBA
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30
25
20
15
10
5
0
Wind Speed, m/s | Rain mm
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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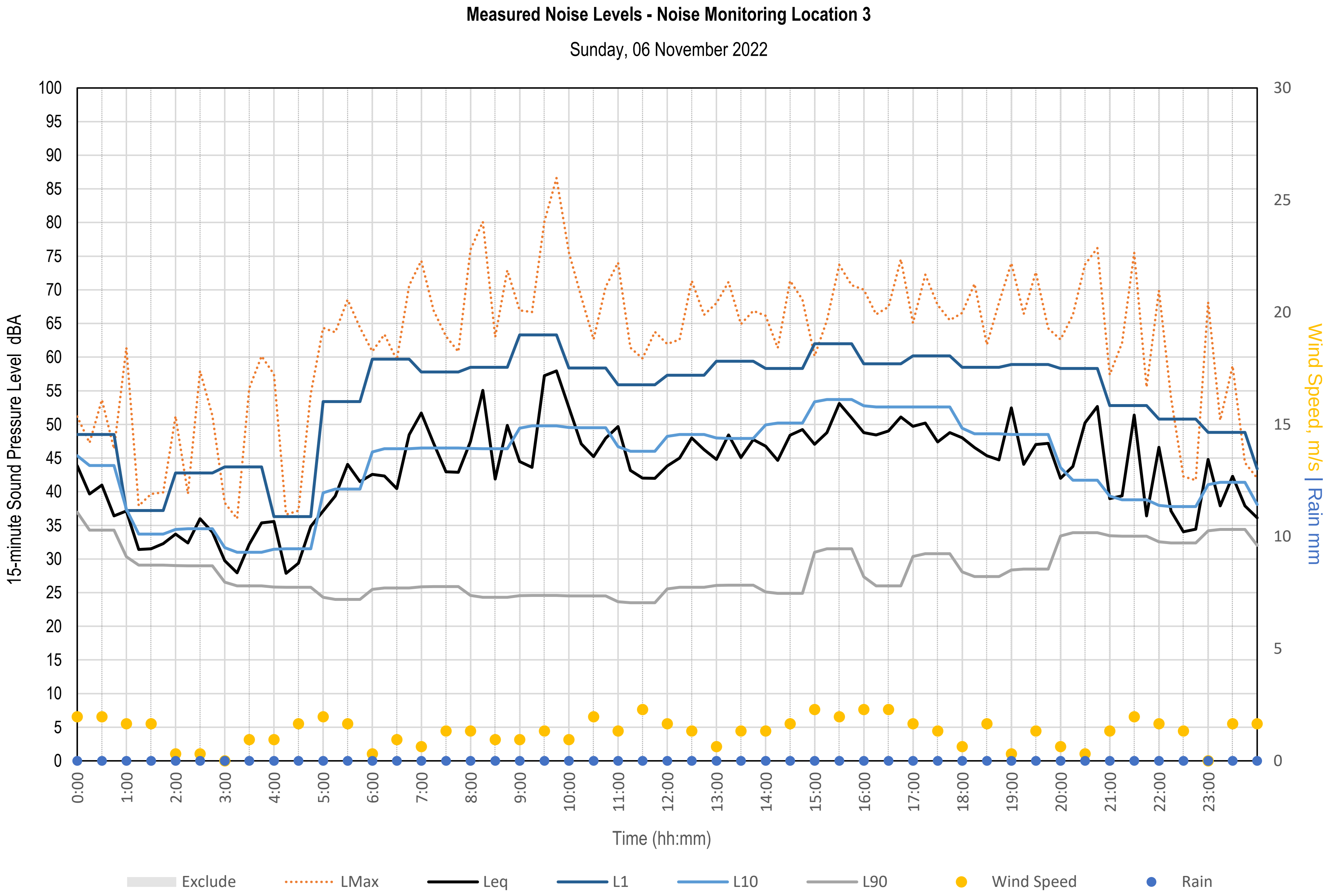
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Sunday, 06 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
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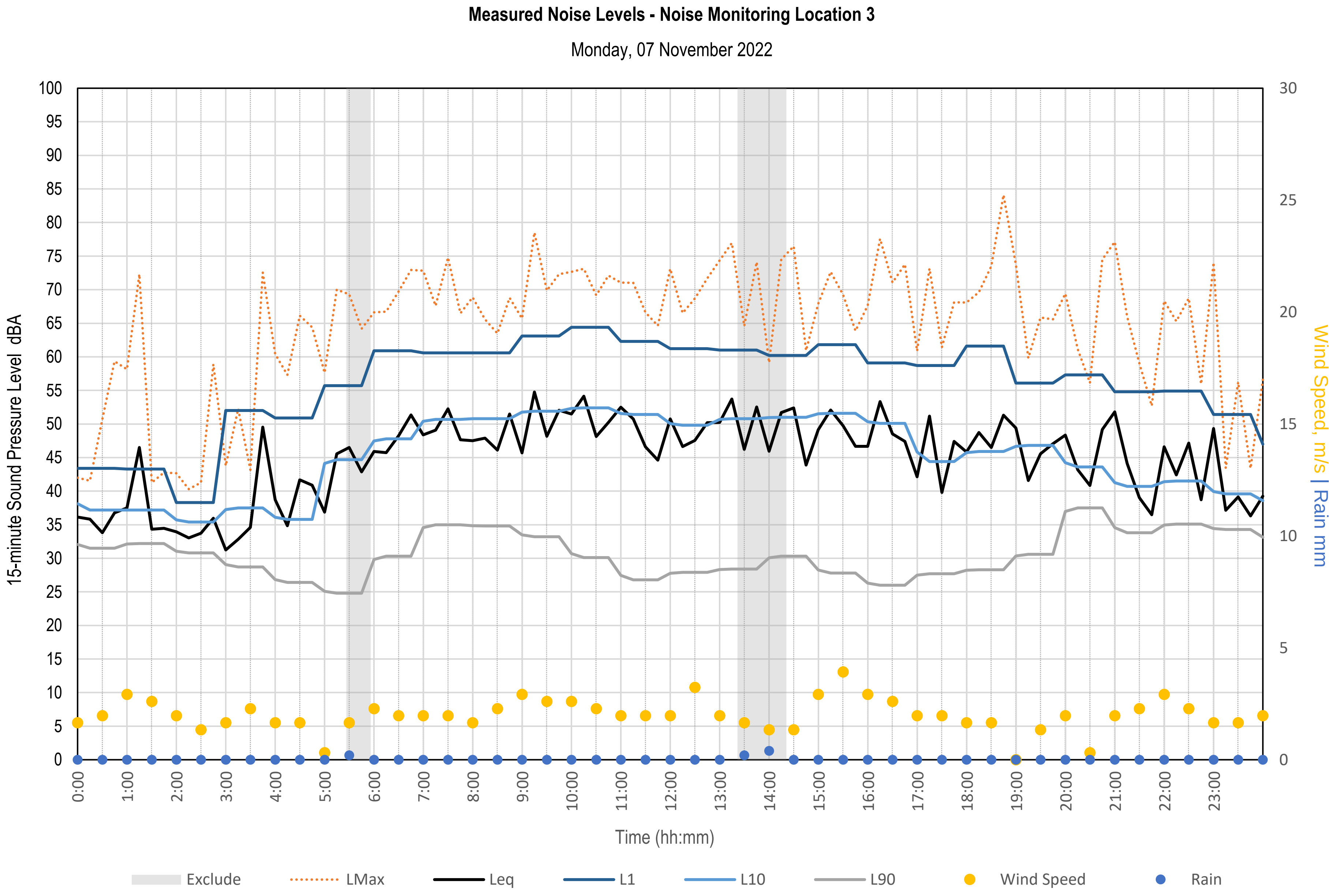
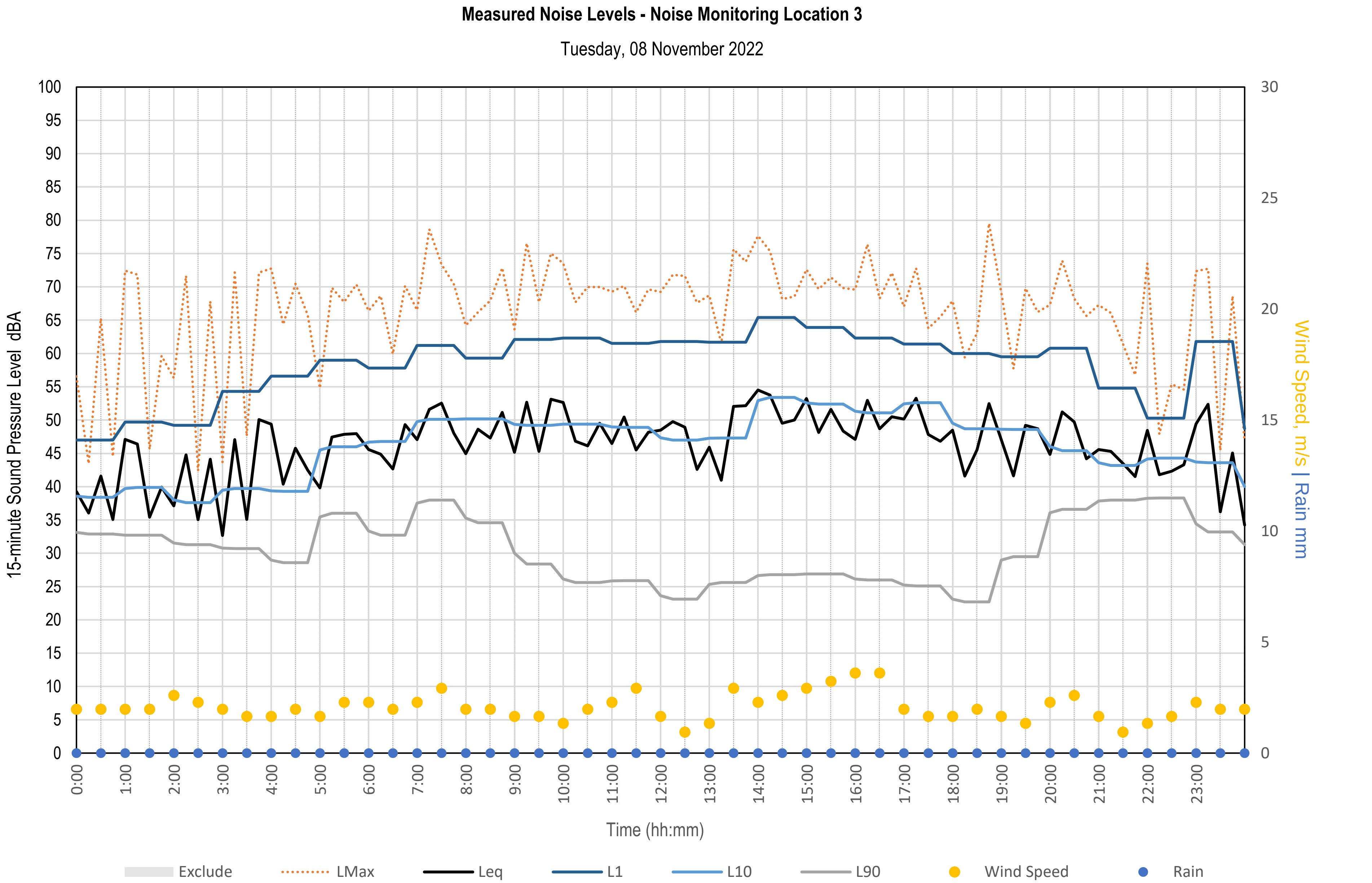
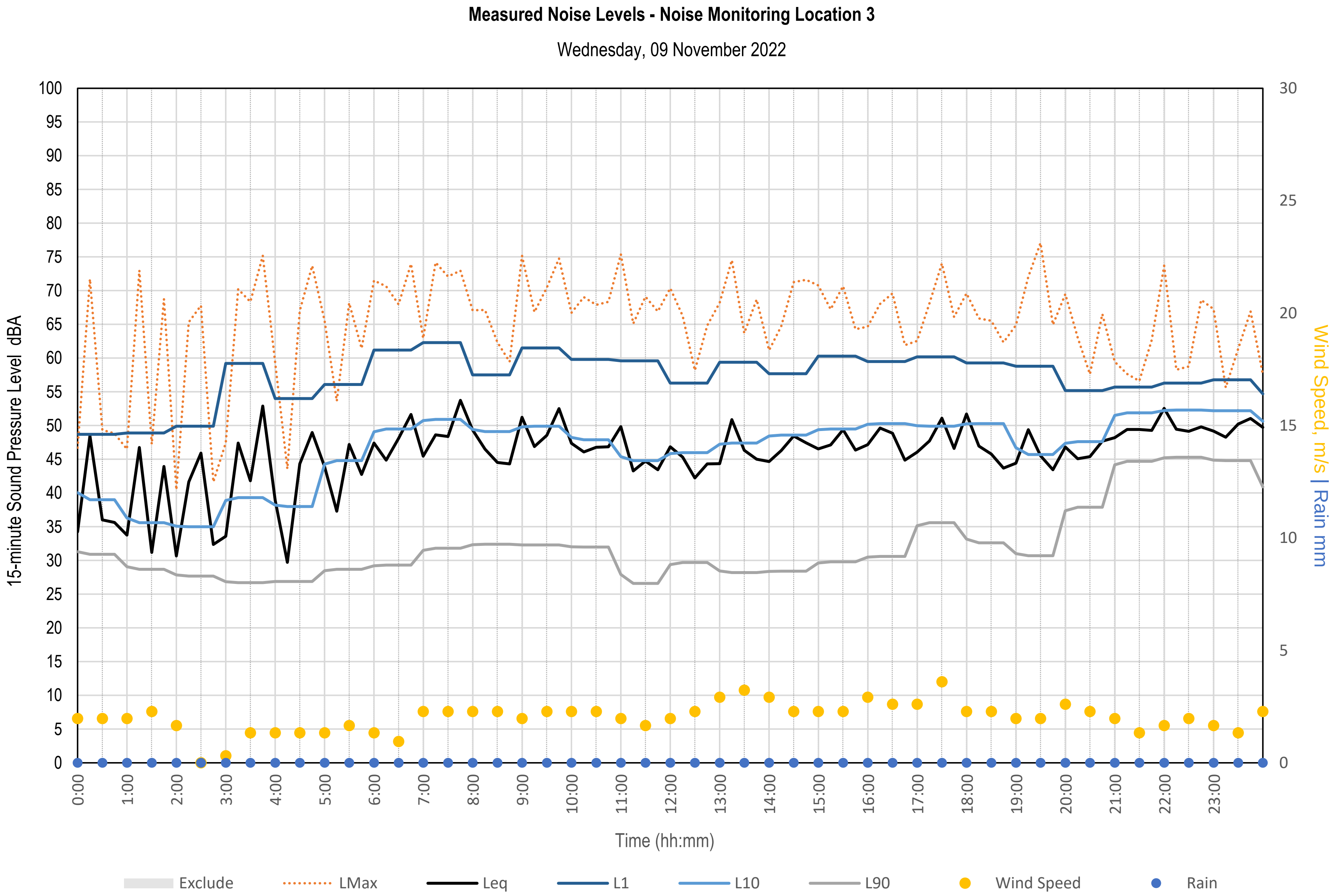
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Monday, 07 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Tuesday, 08 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Wednesday, 09 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
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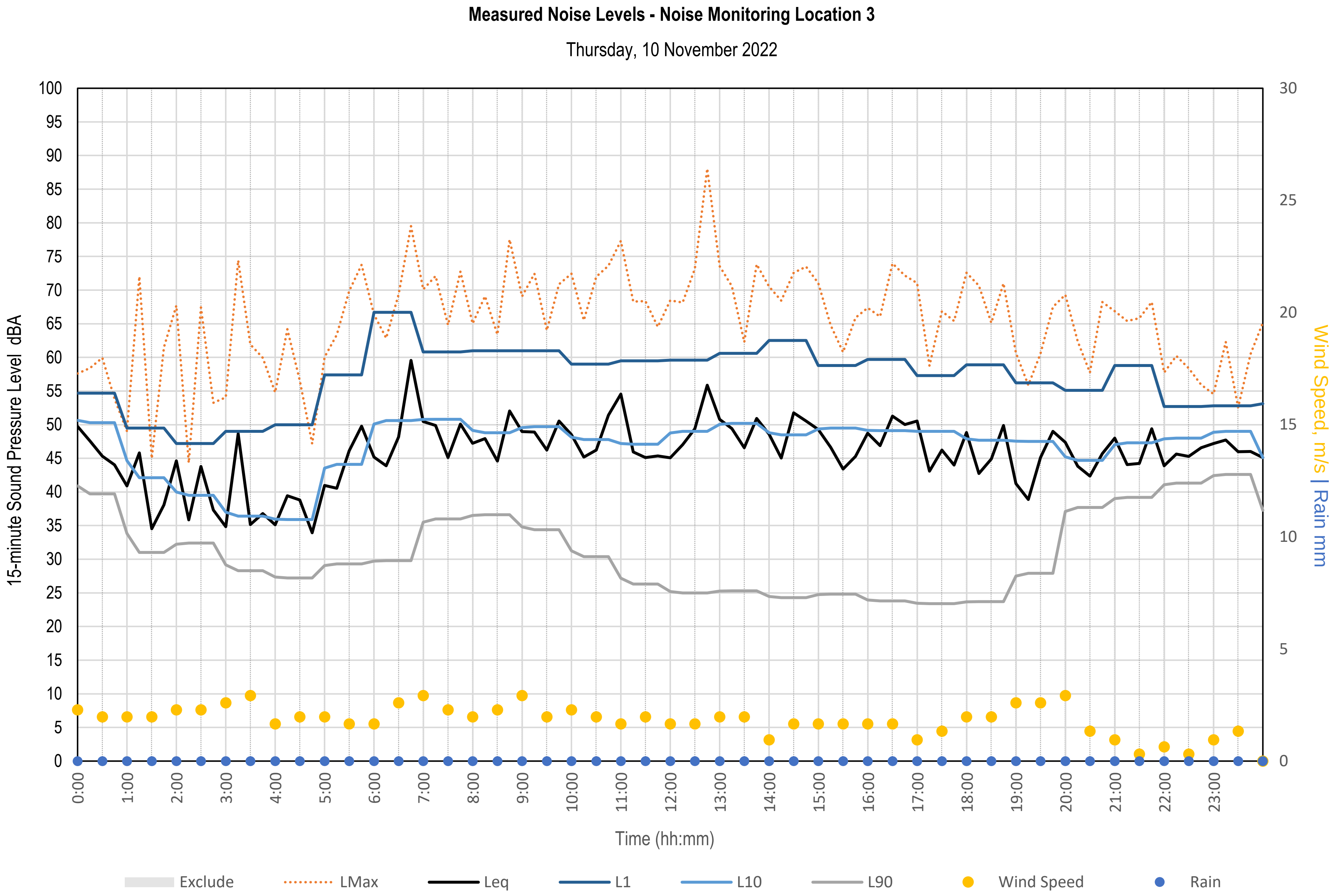
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 3
Thursday, 10 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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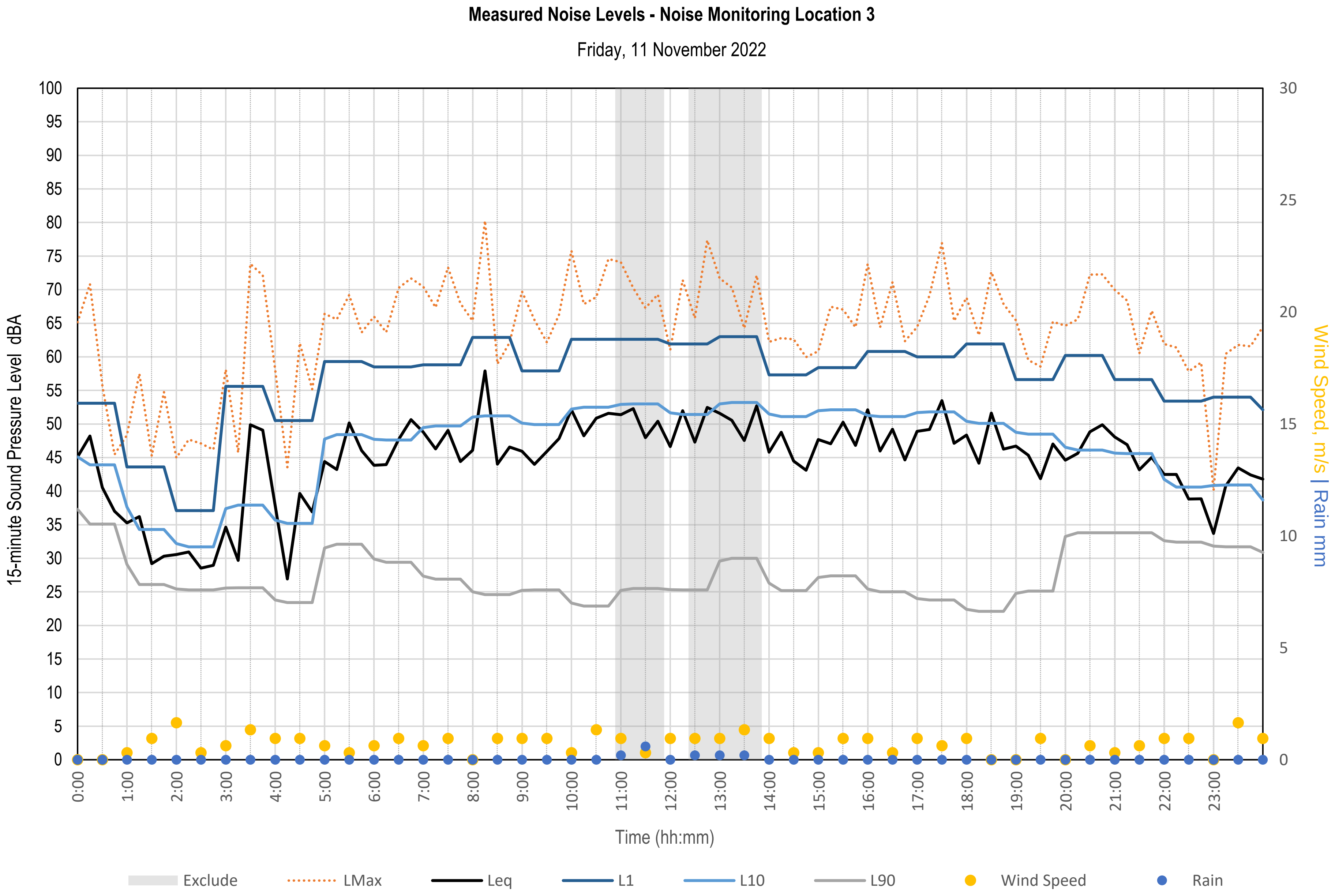
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Friday, 11 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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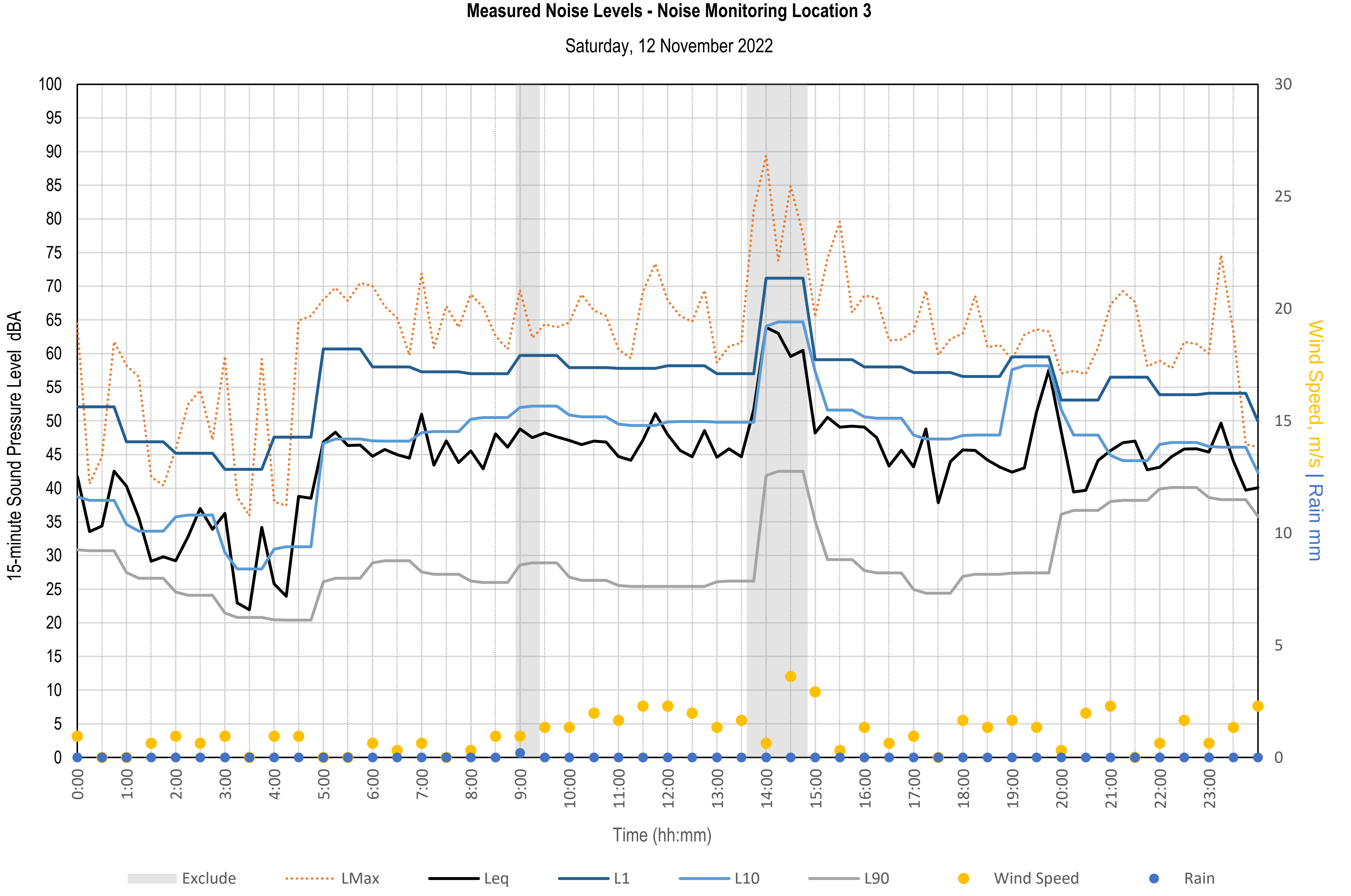
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 3
Saturday, 12 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
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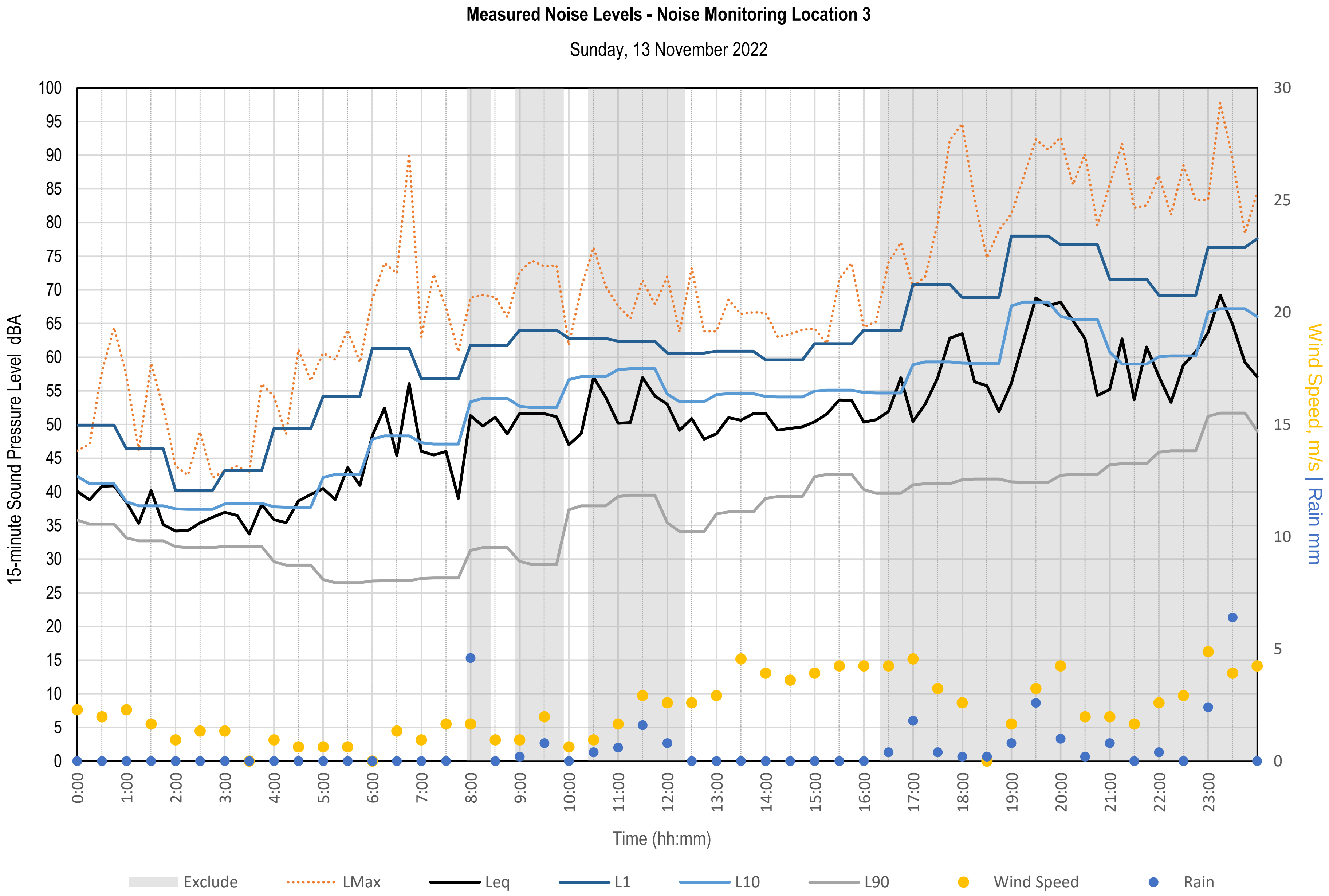
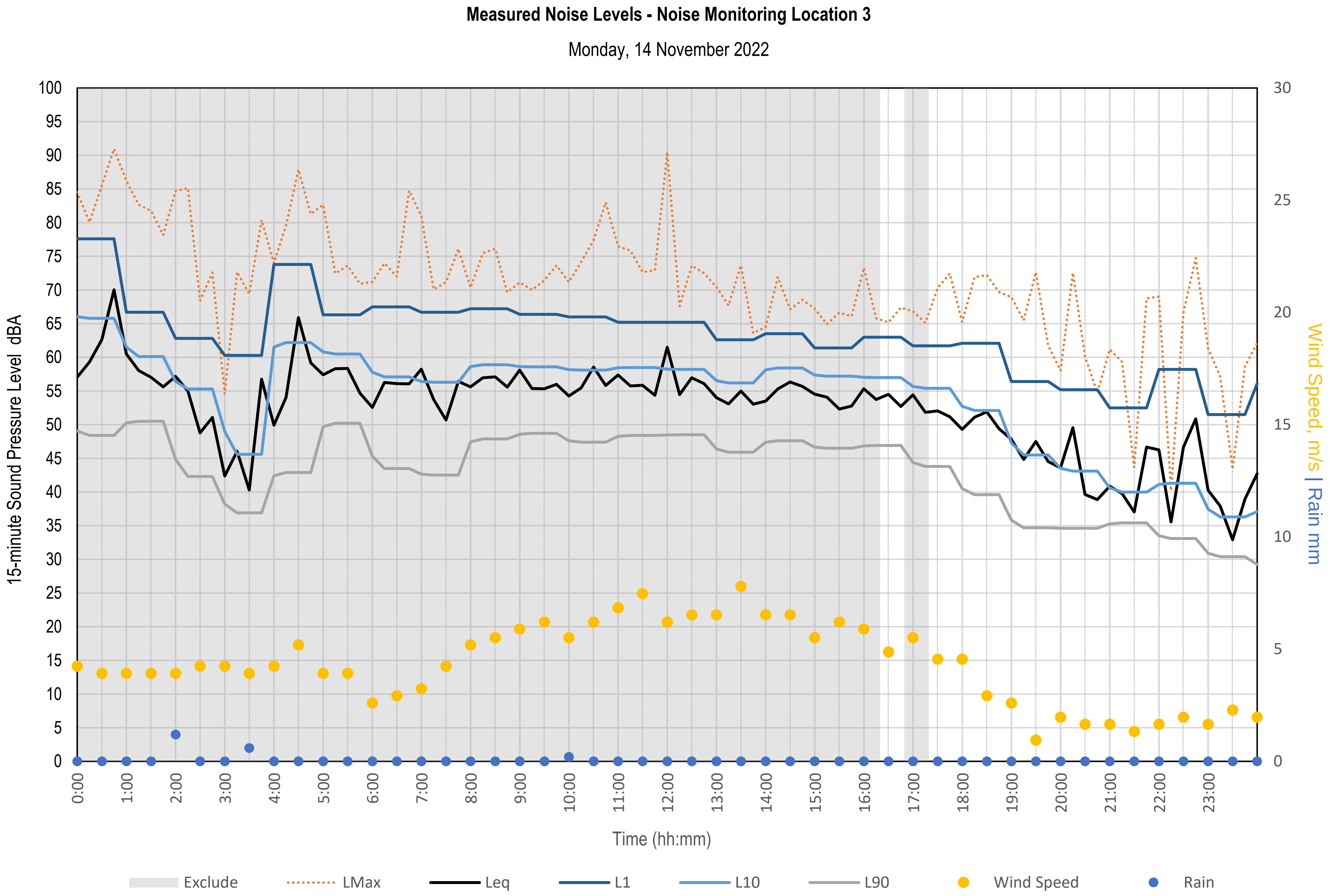
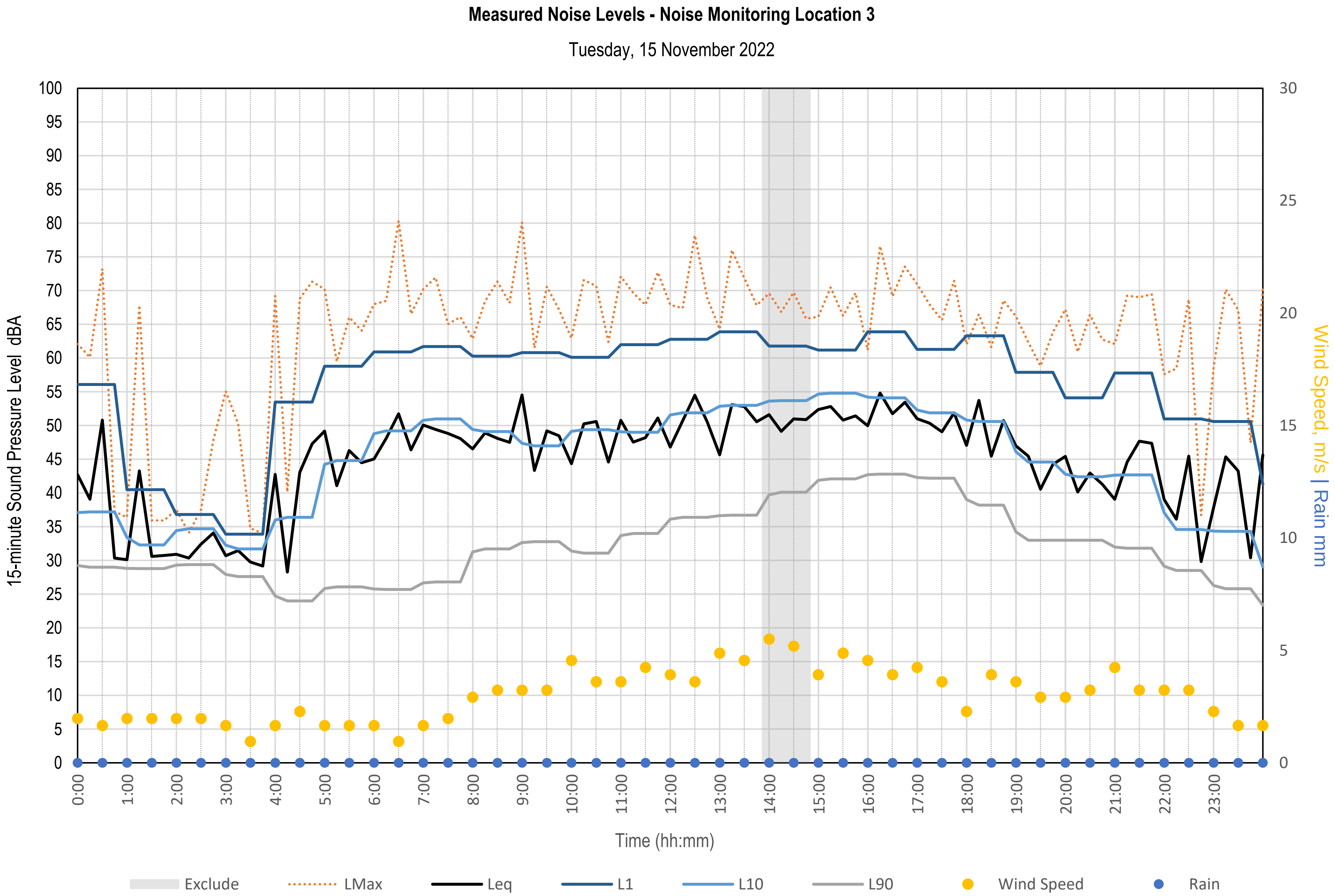
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Sunday, 13 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Monday, 14 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 3
Tuesday, 15 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
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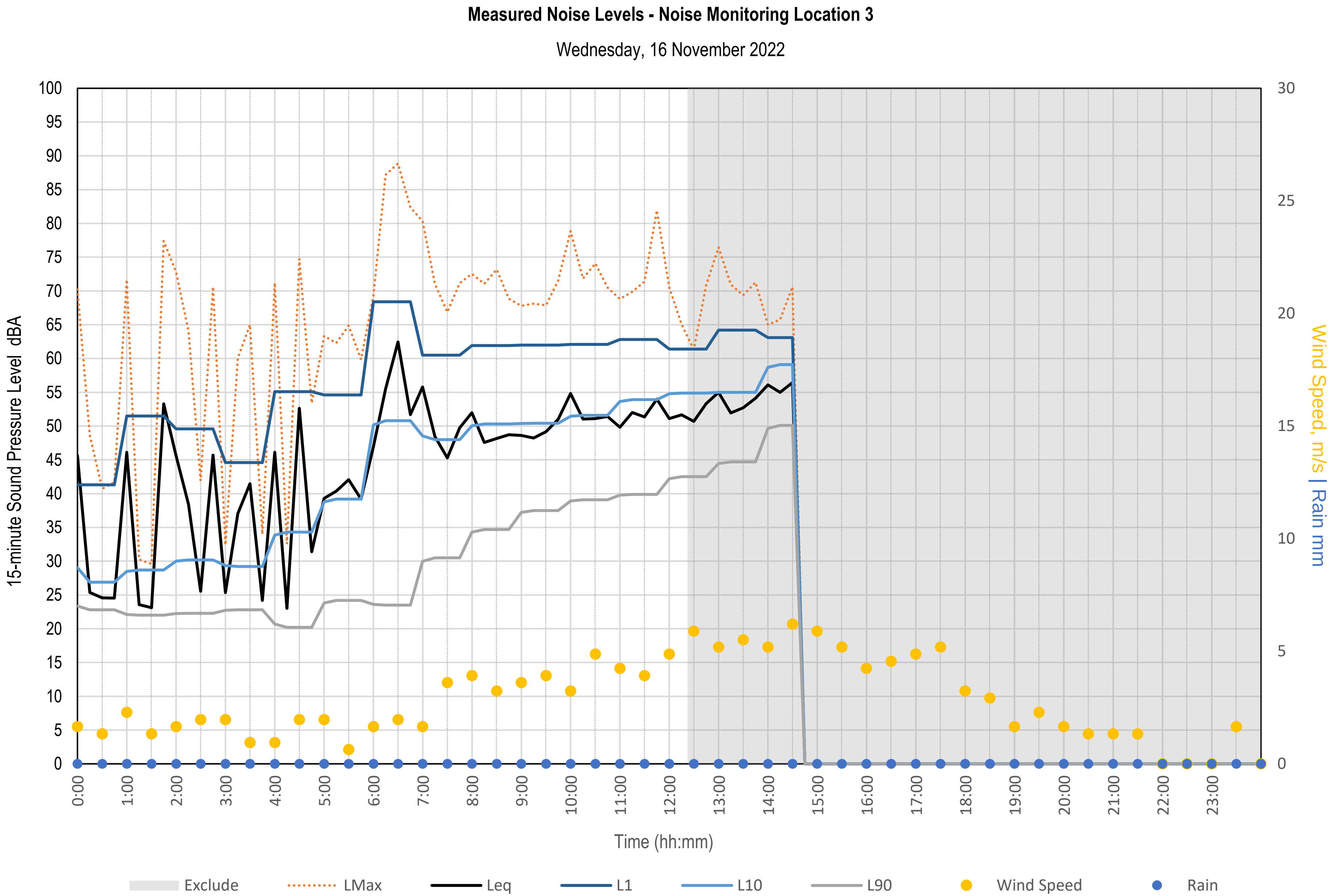
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 3
Wednesday, 16 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
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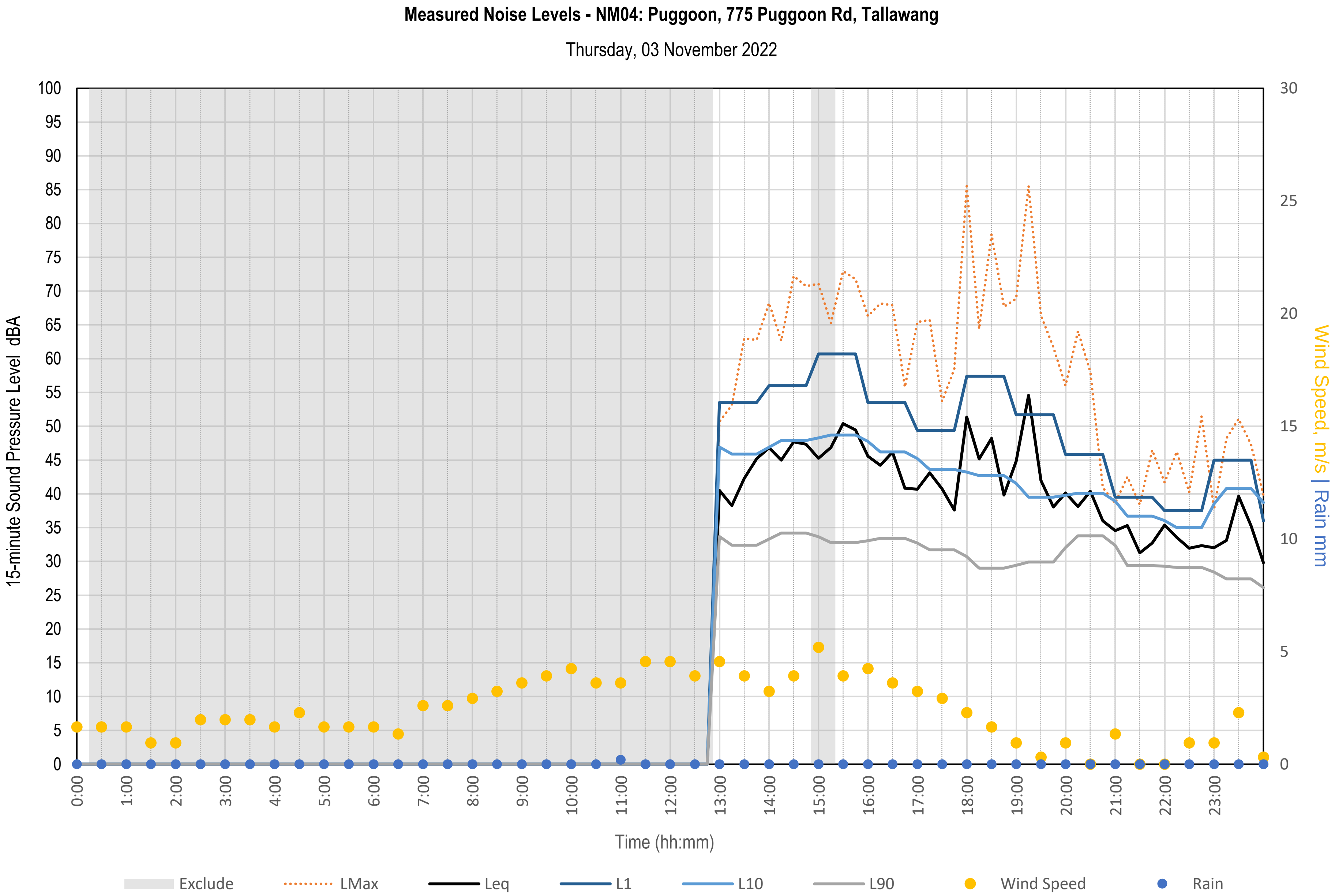
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Thursday, 03 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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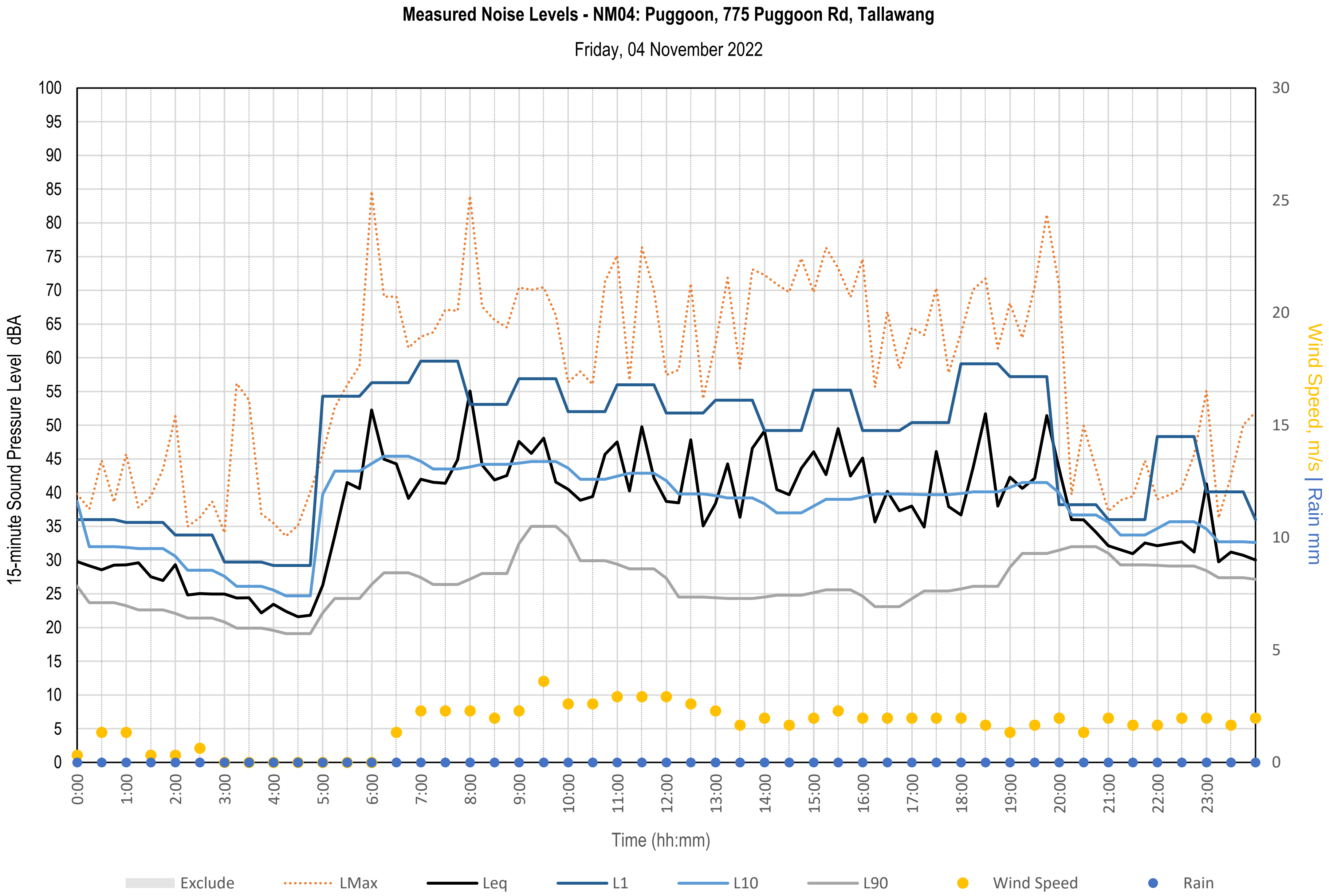
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Friday, 04 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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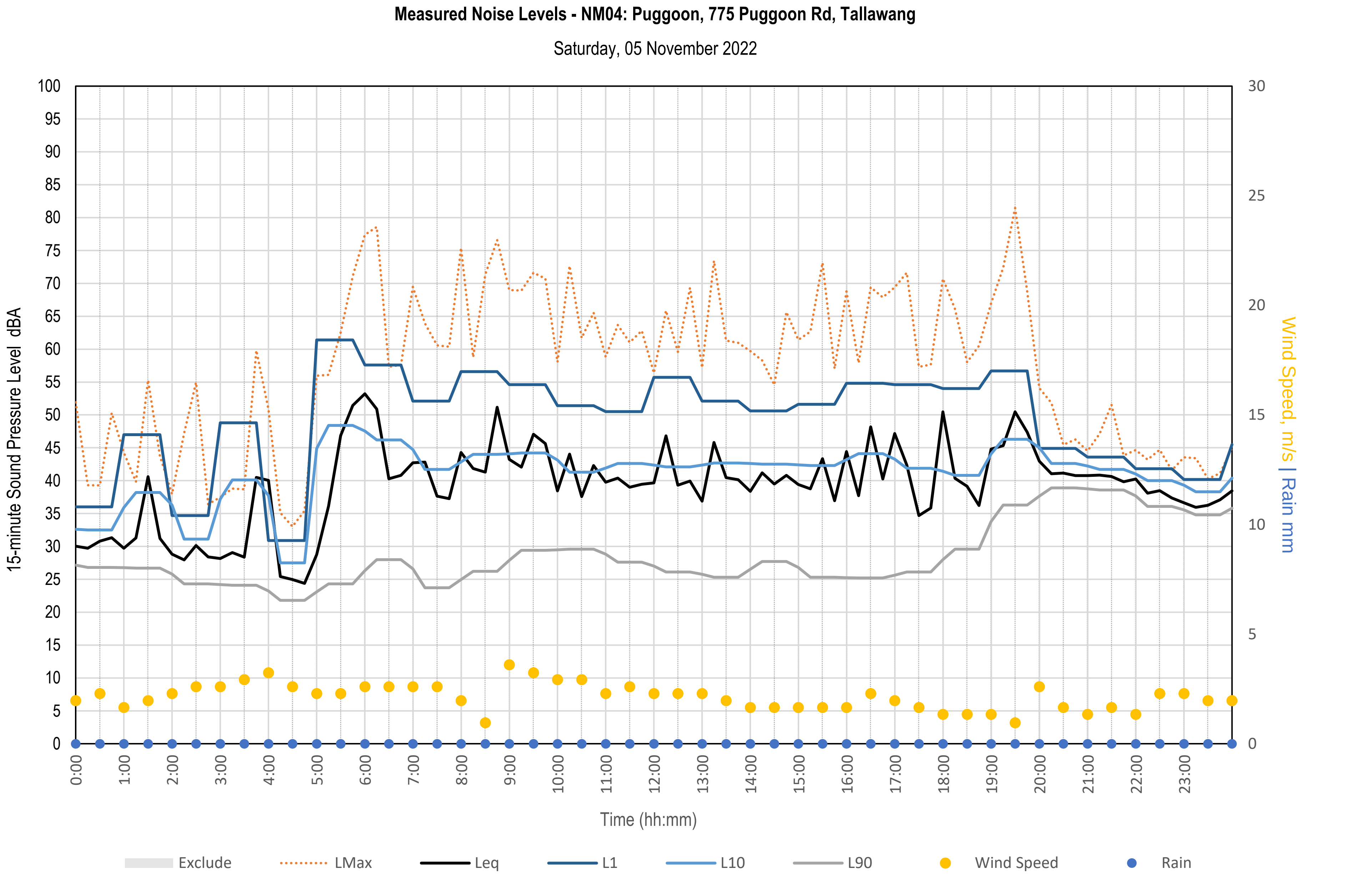
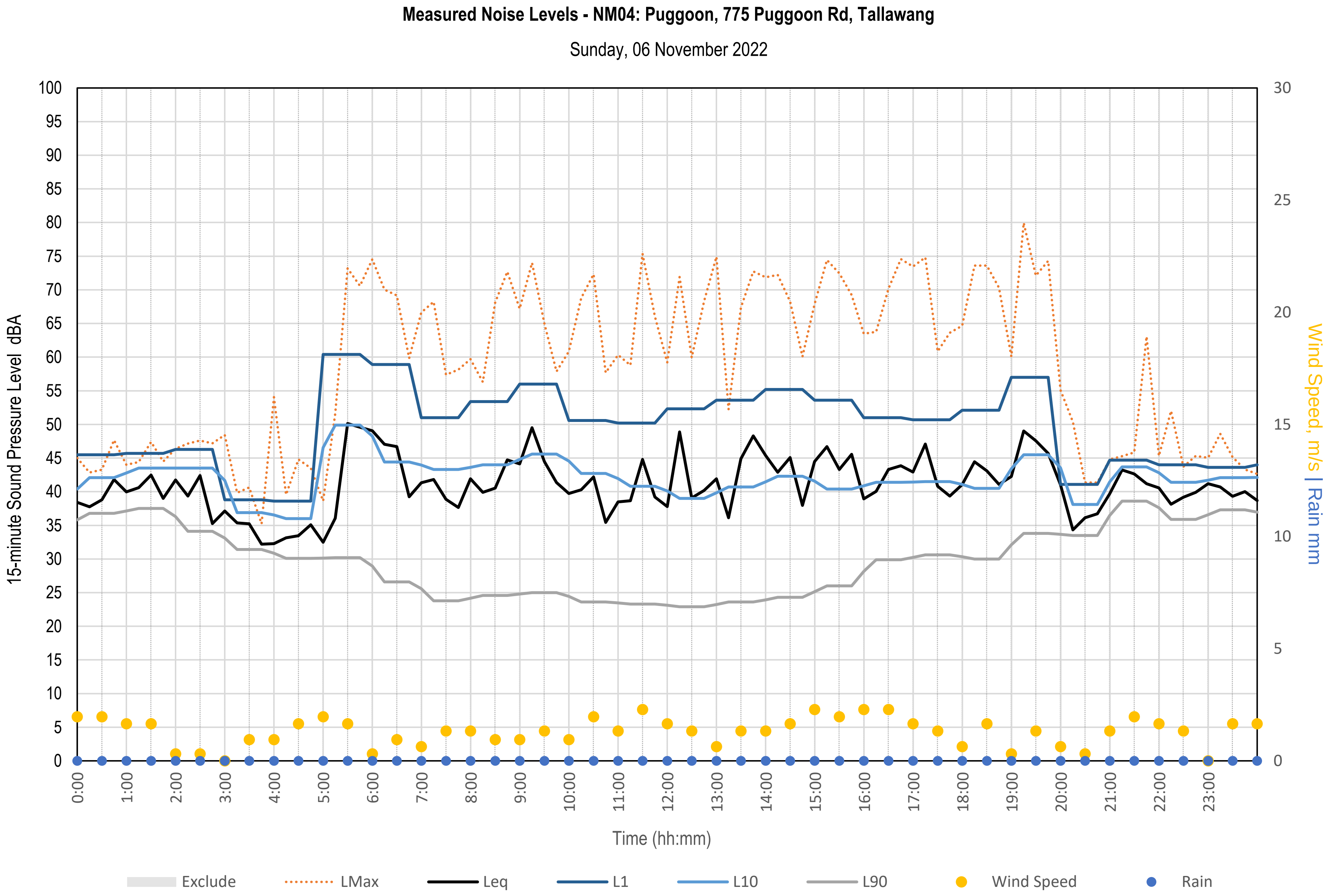
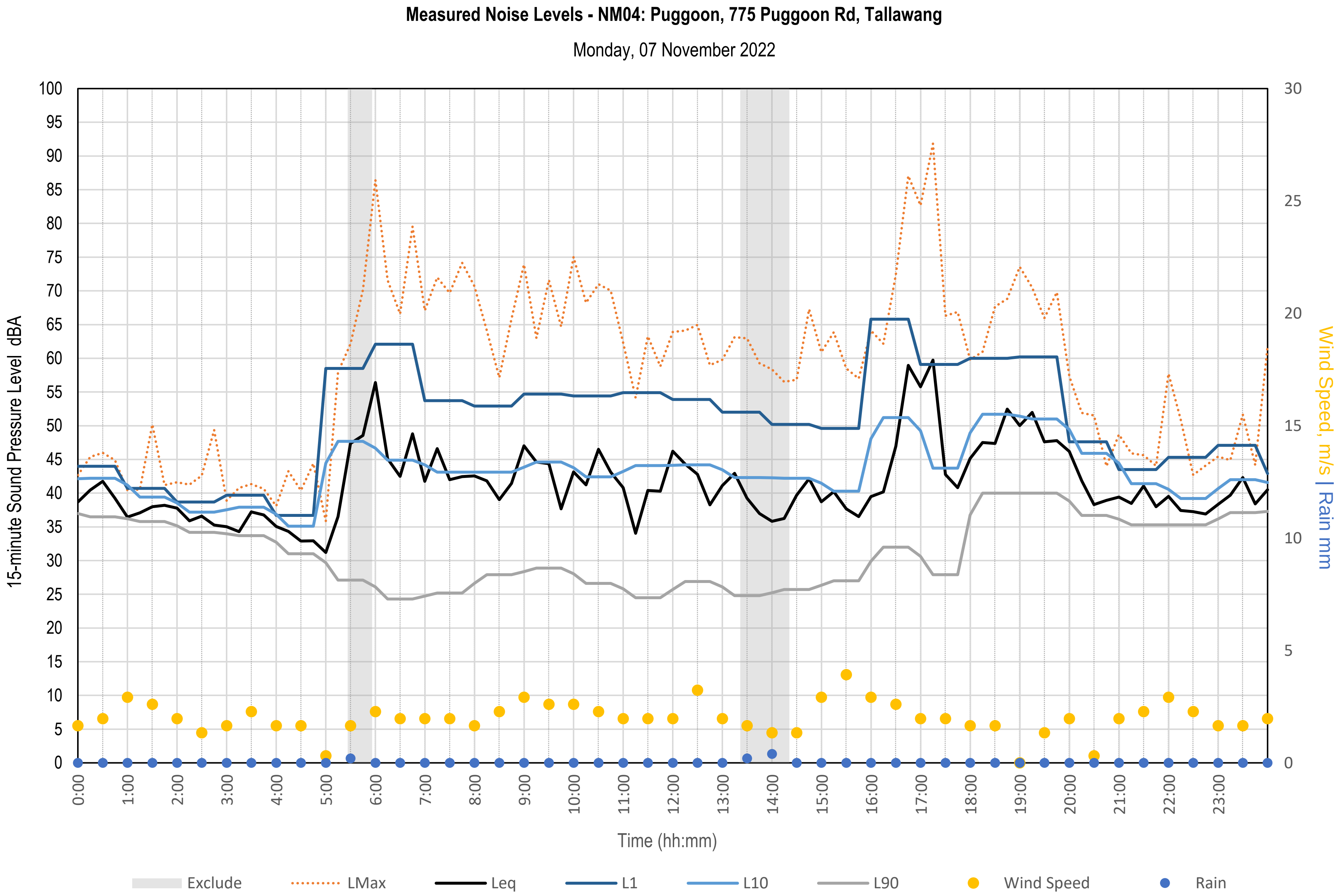
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Saturday, 05 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Sunday, 06 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Monday, 07 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
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Exclude
LMax
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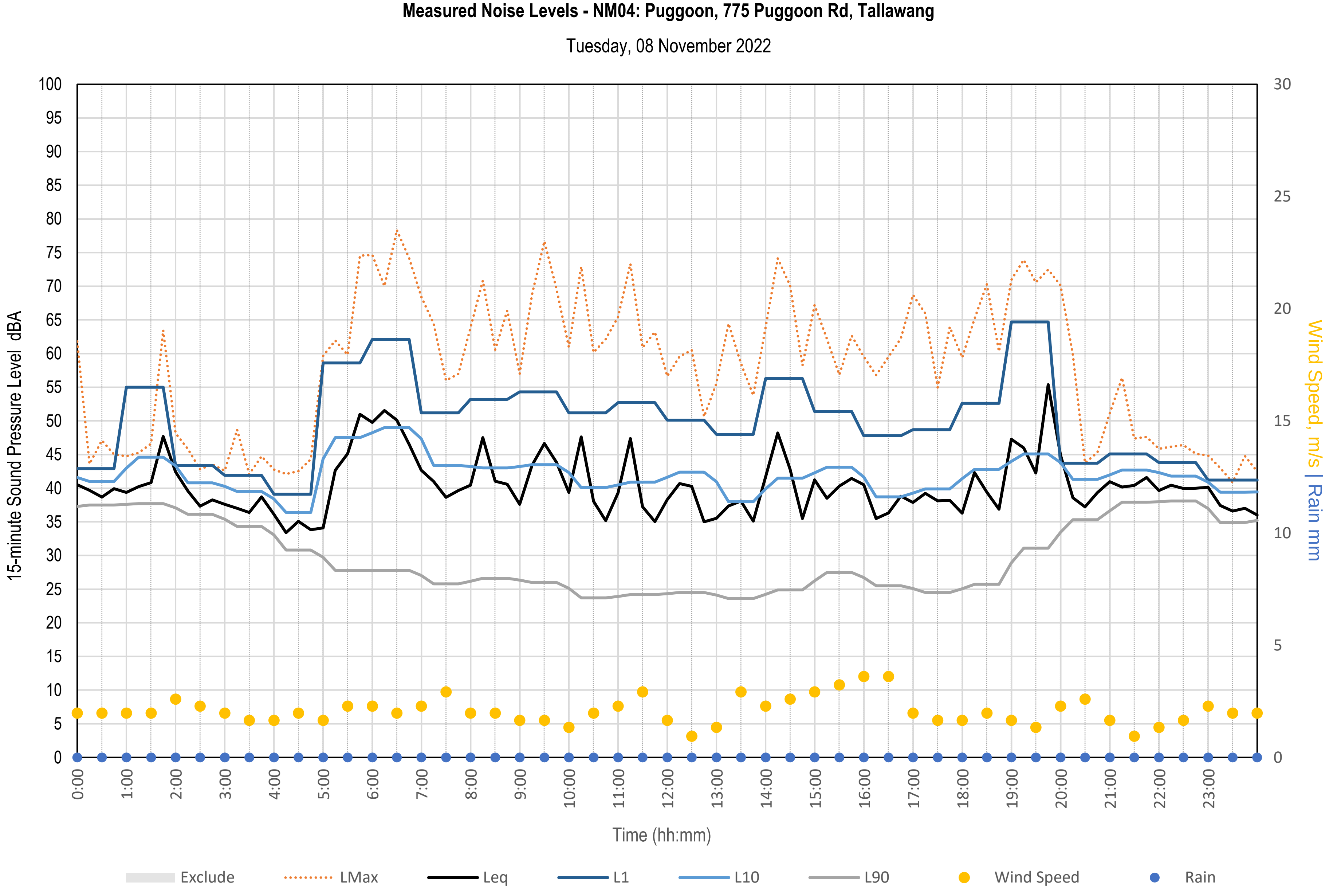
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Tuesday, 08 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
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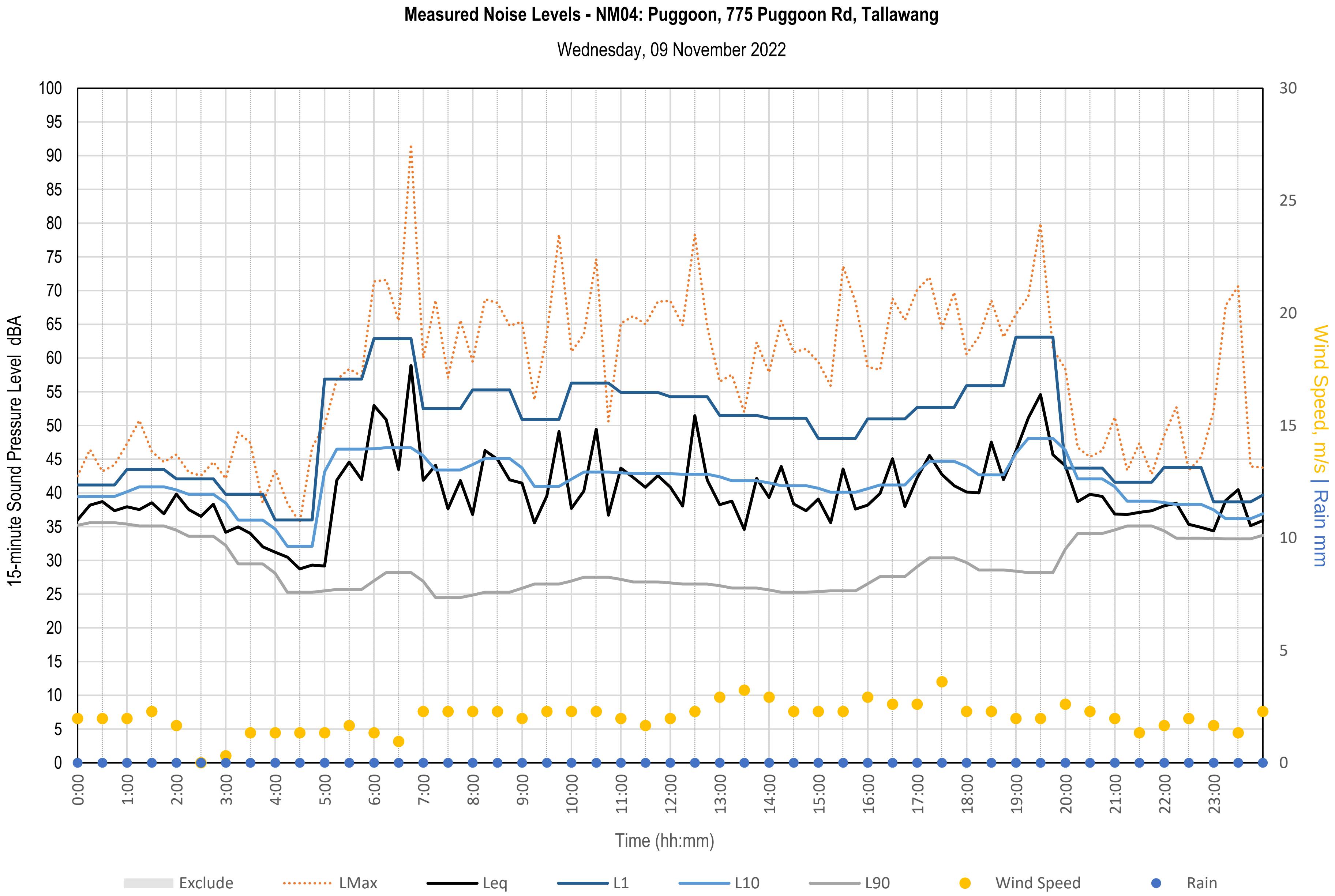
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Wednesday, 09 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
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Exclude
LMax
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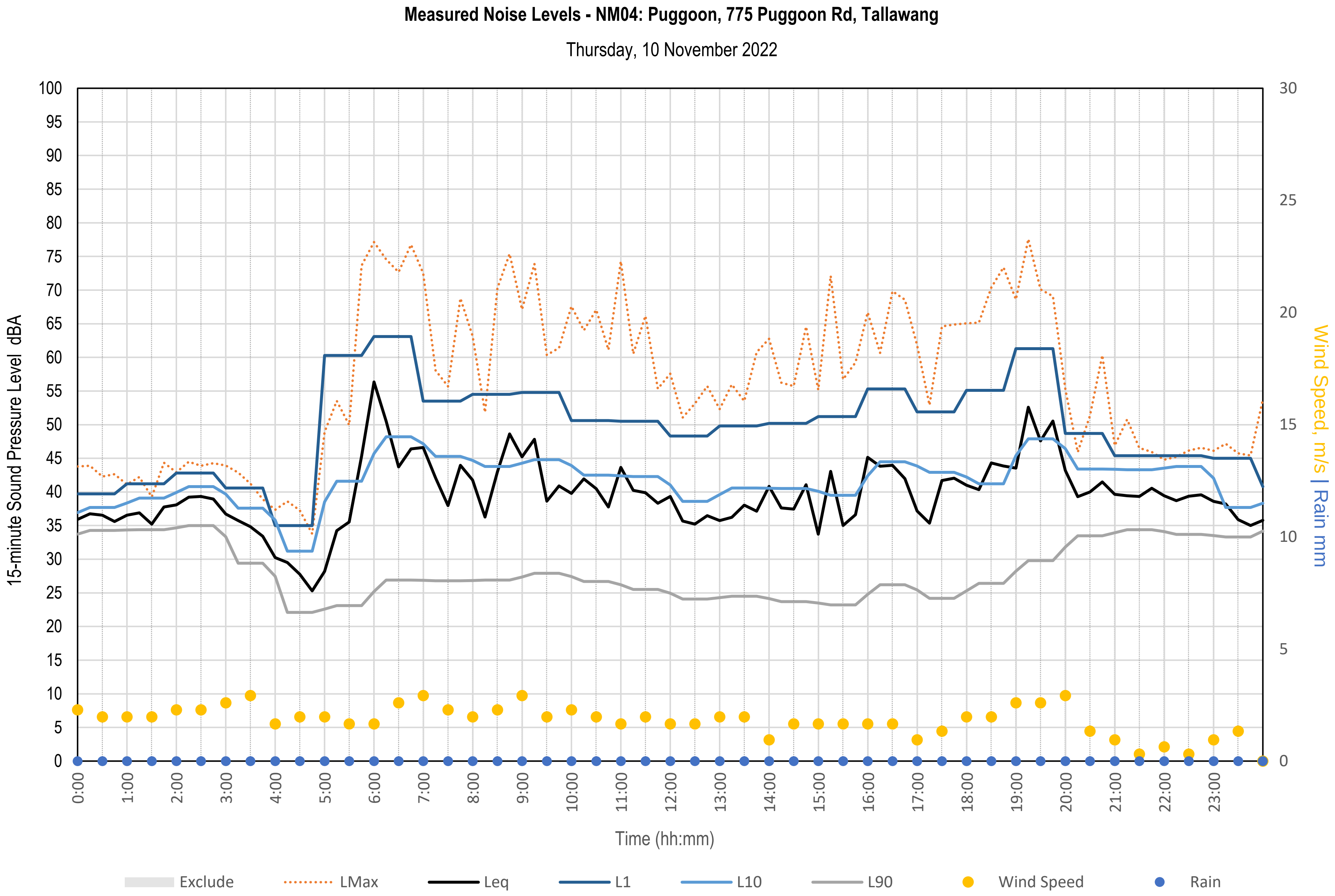
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Thursday, 10 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
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Exclude
LMax
Leq
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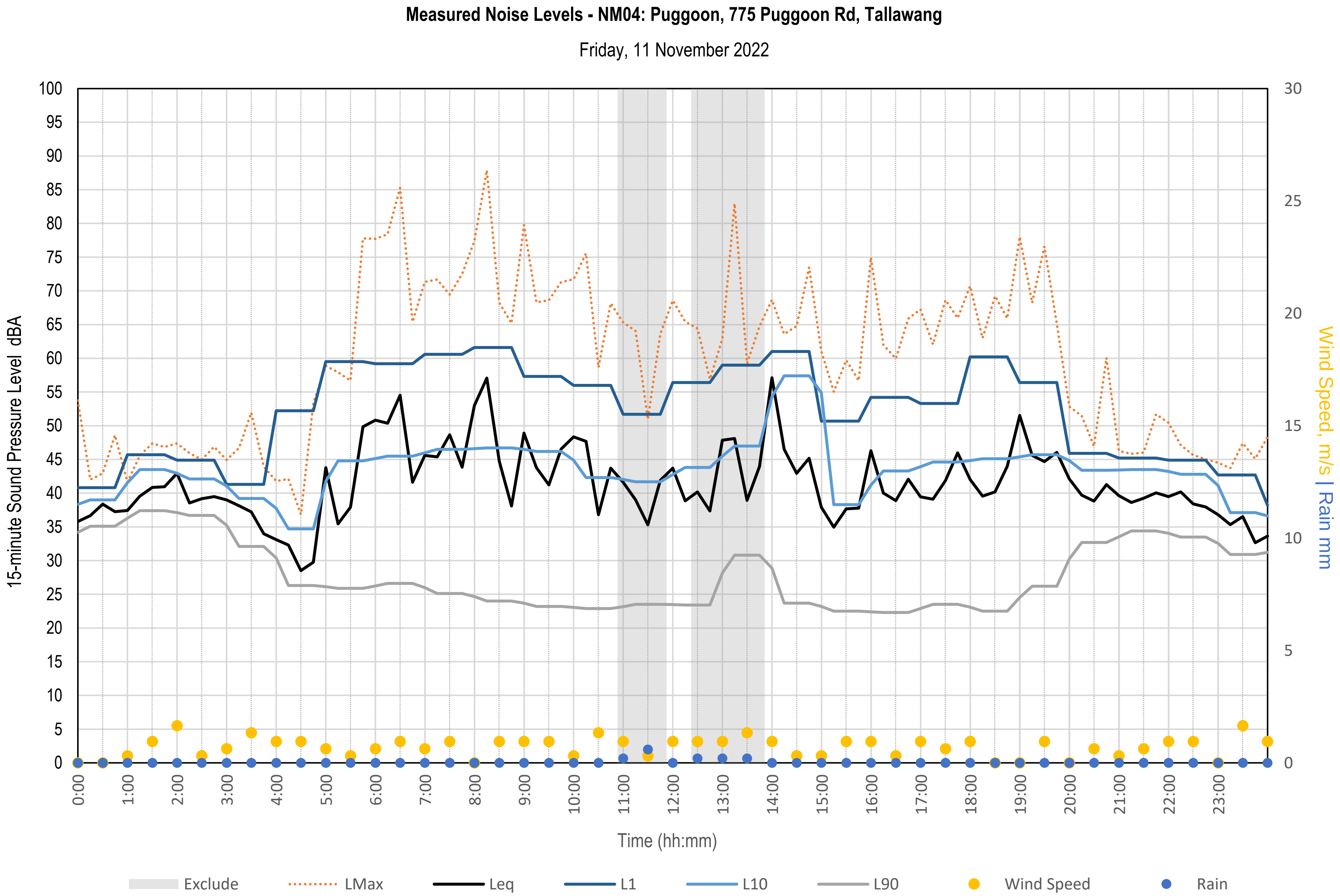
L10
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Friday, 11 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
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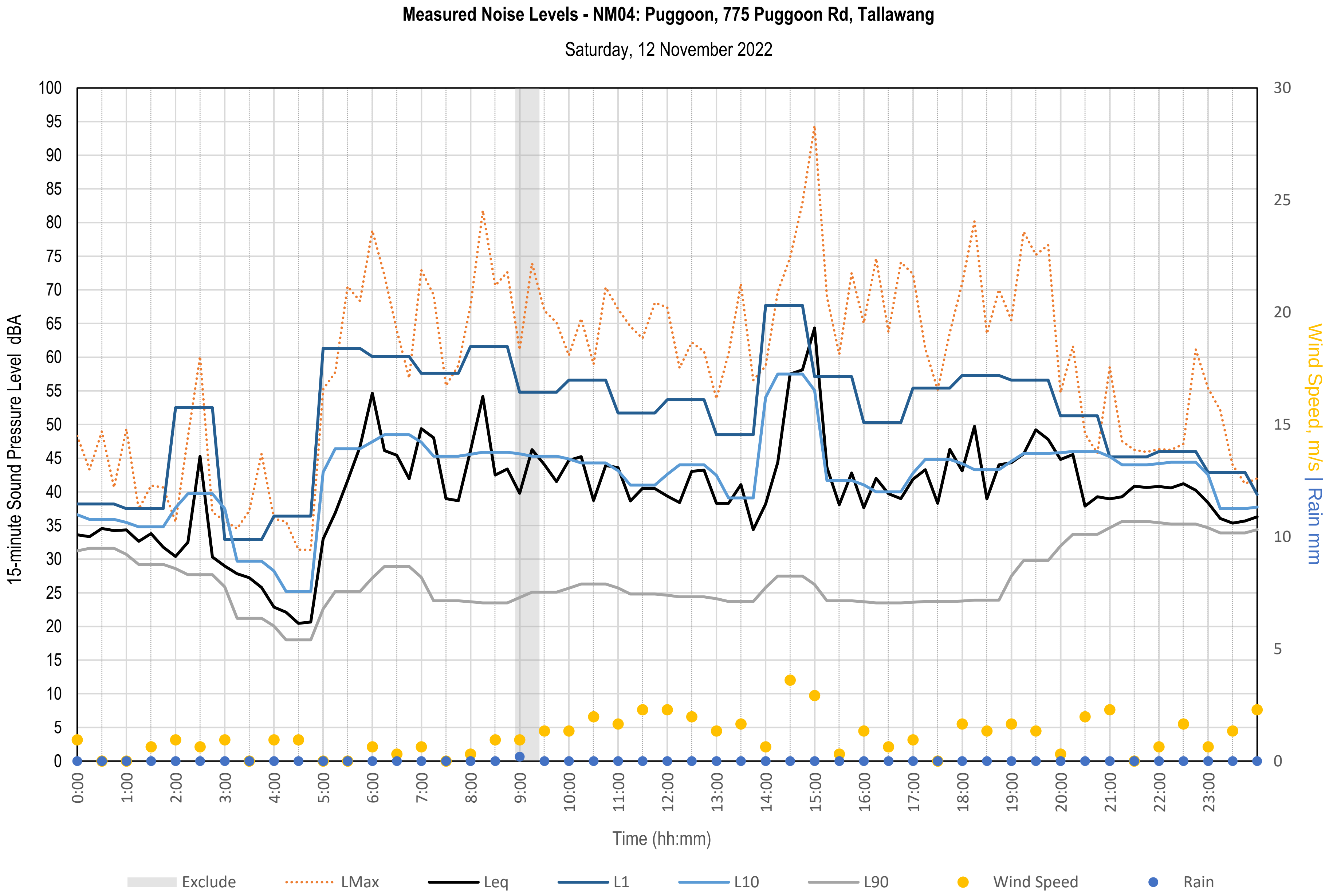
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Saturday, 12 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
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Exclude
LMax
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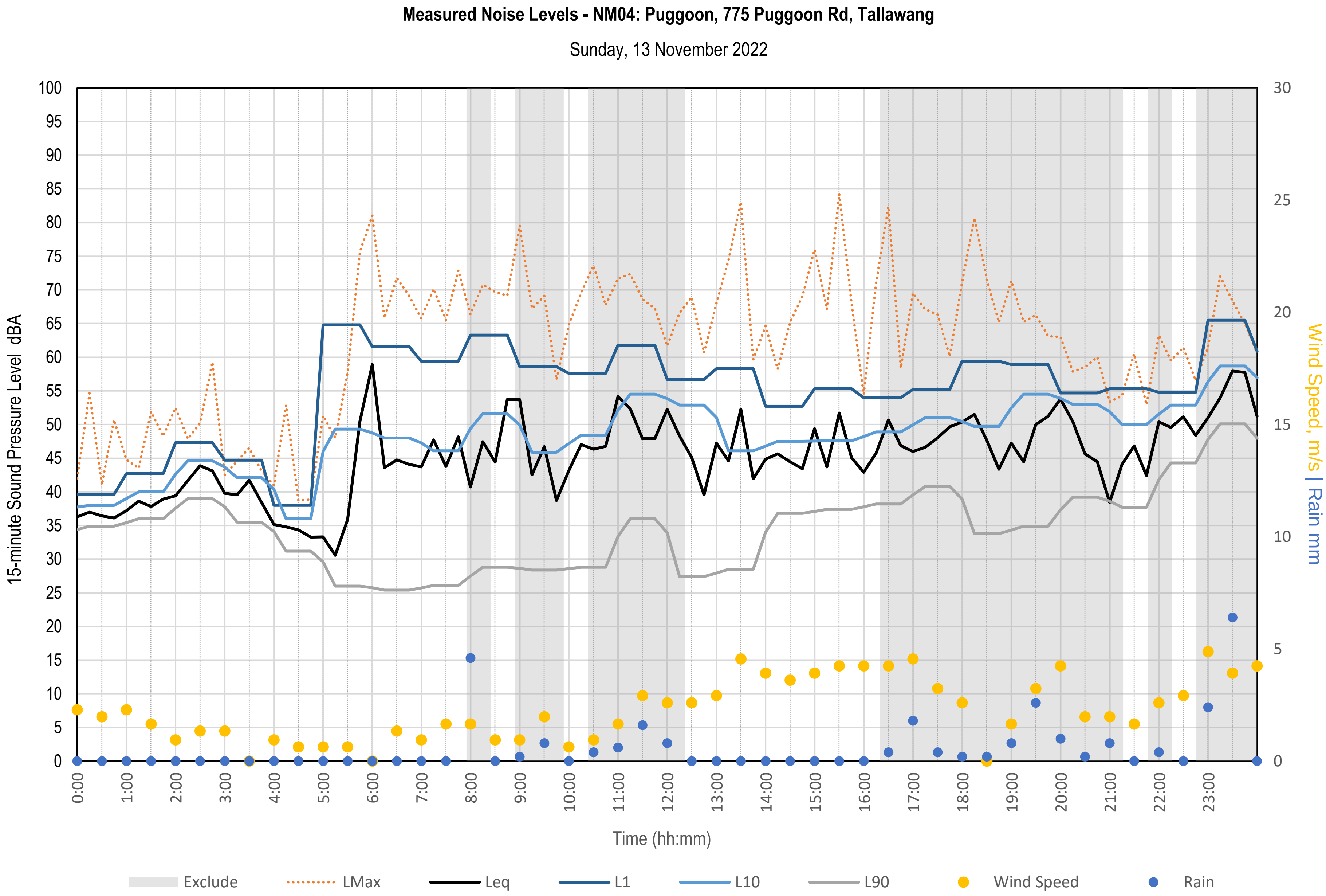
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Sunday, 13 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
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Exclude
LMax
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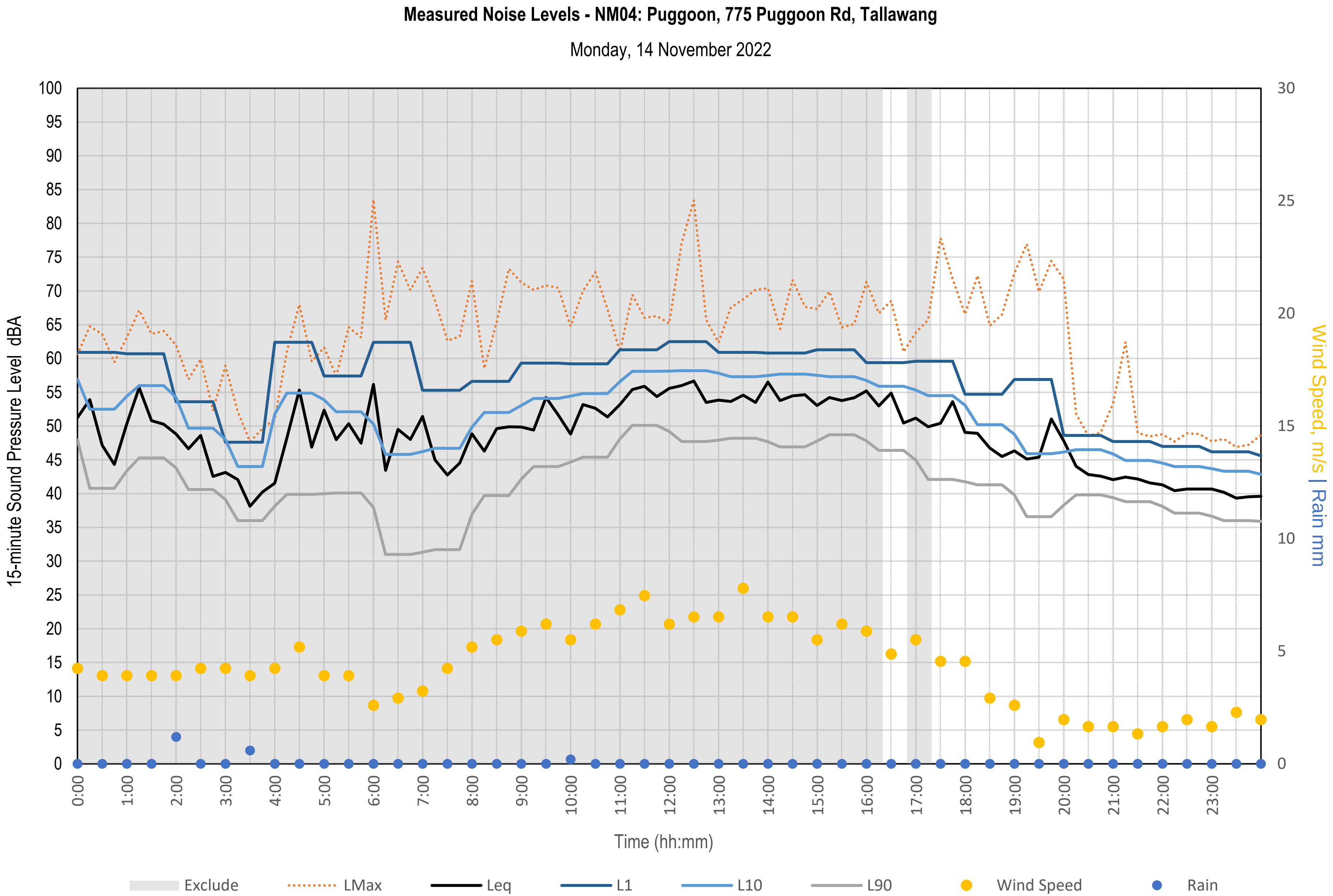
L90
Wind Speed
Rain



Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Monday, 14 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
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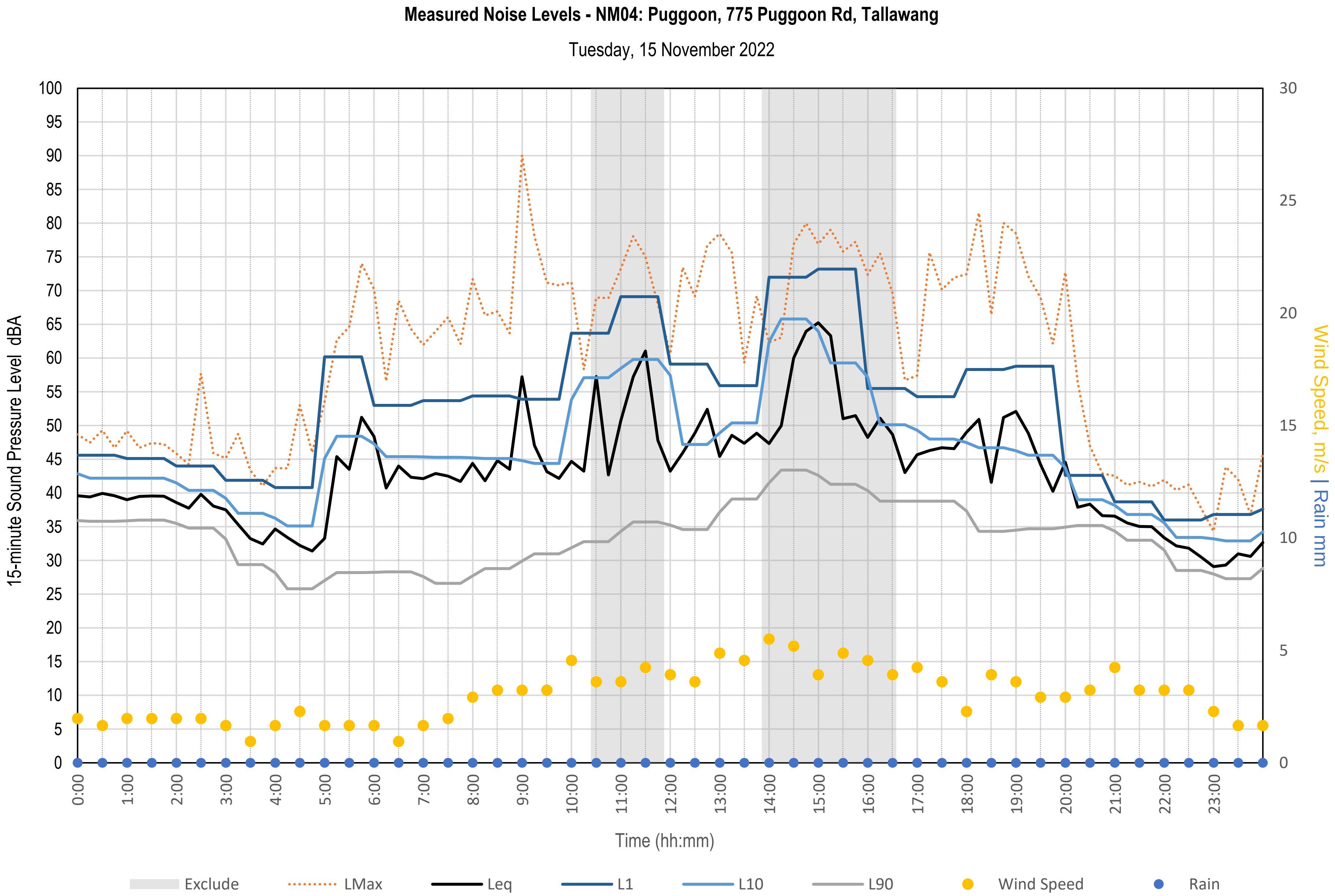
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Tuesday, 15 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
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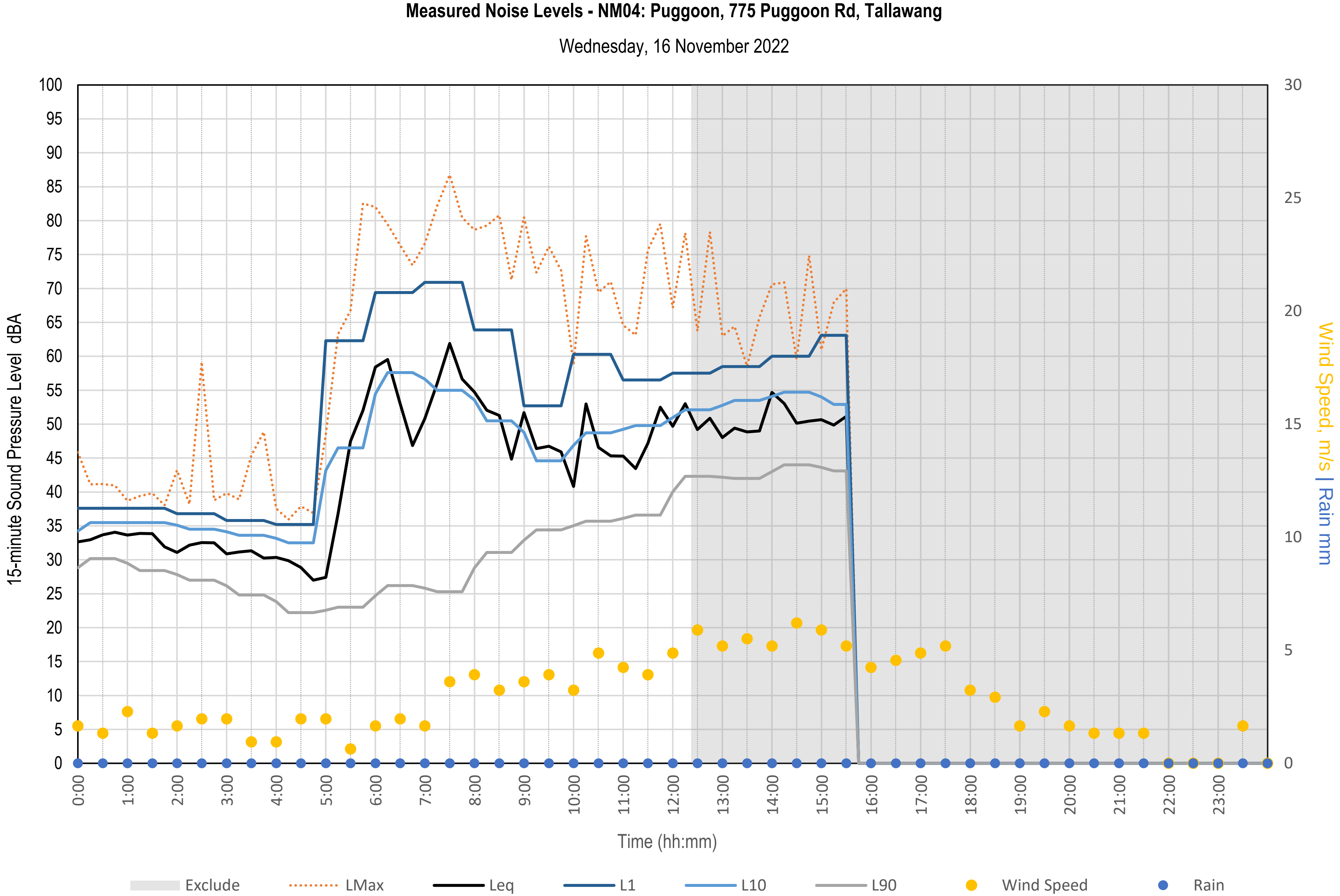
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - NM04: Puggoon, 775 Puggoon Rd, Tallawang
Wednesday, 16 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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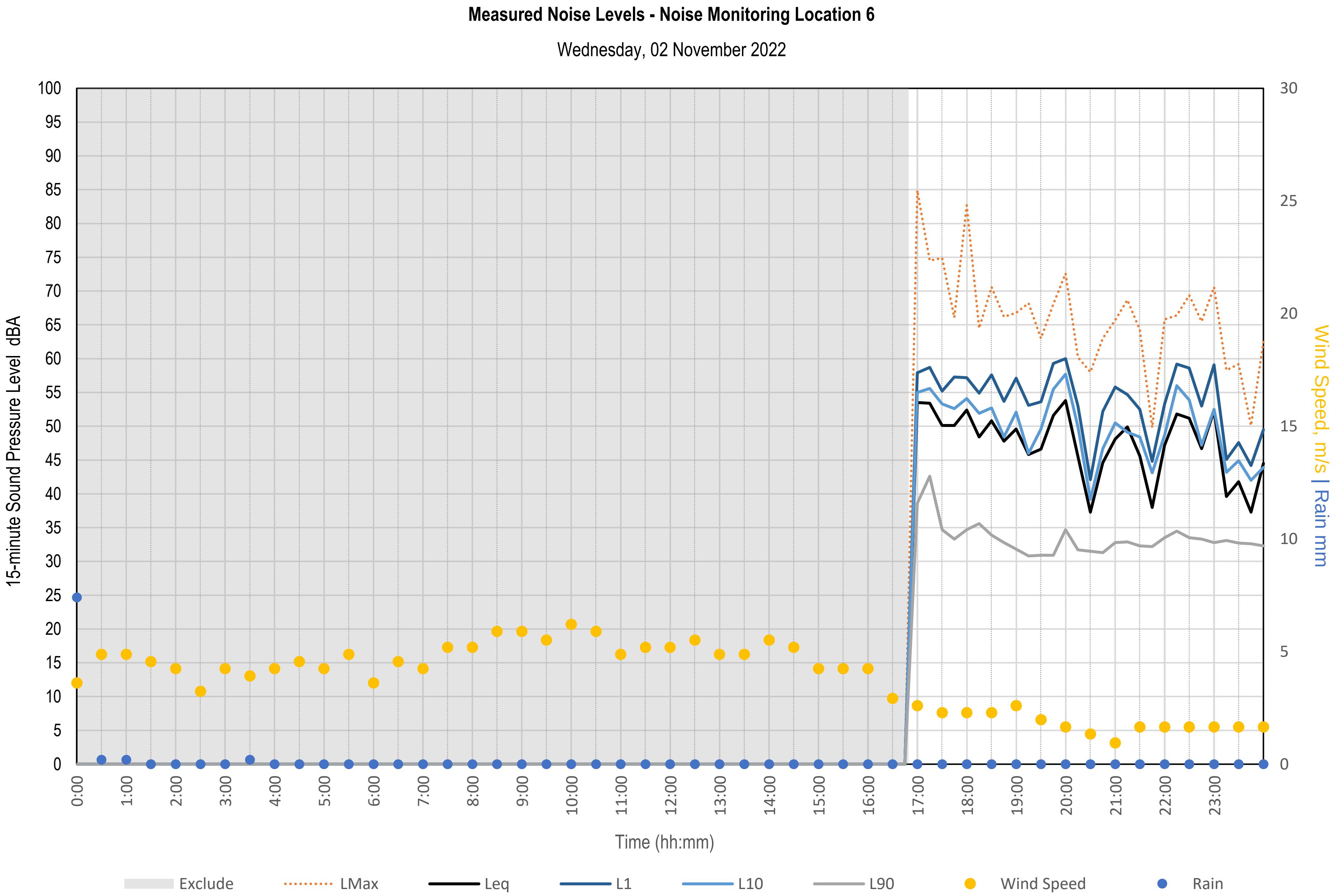
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Wednesday, 02 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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Exclude
LMax
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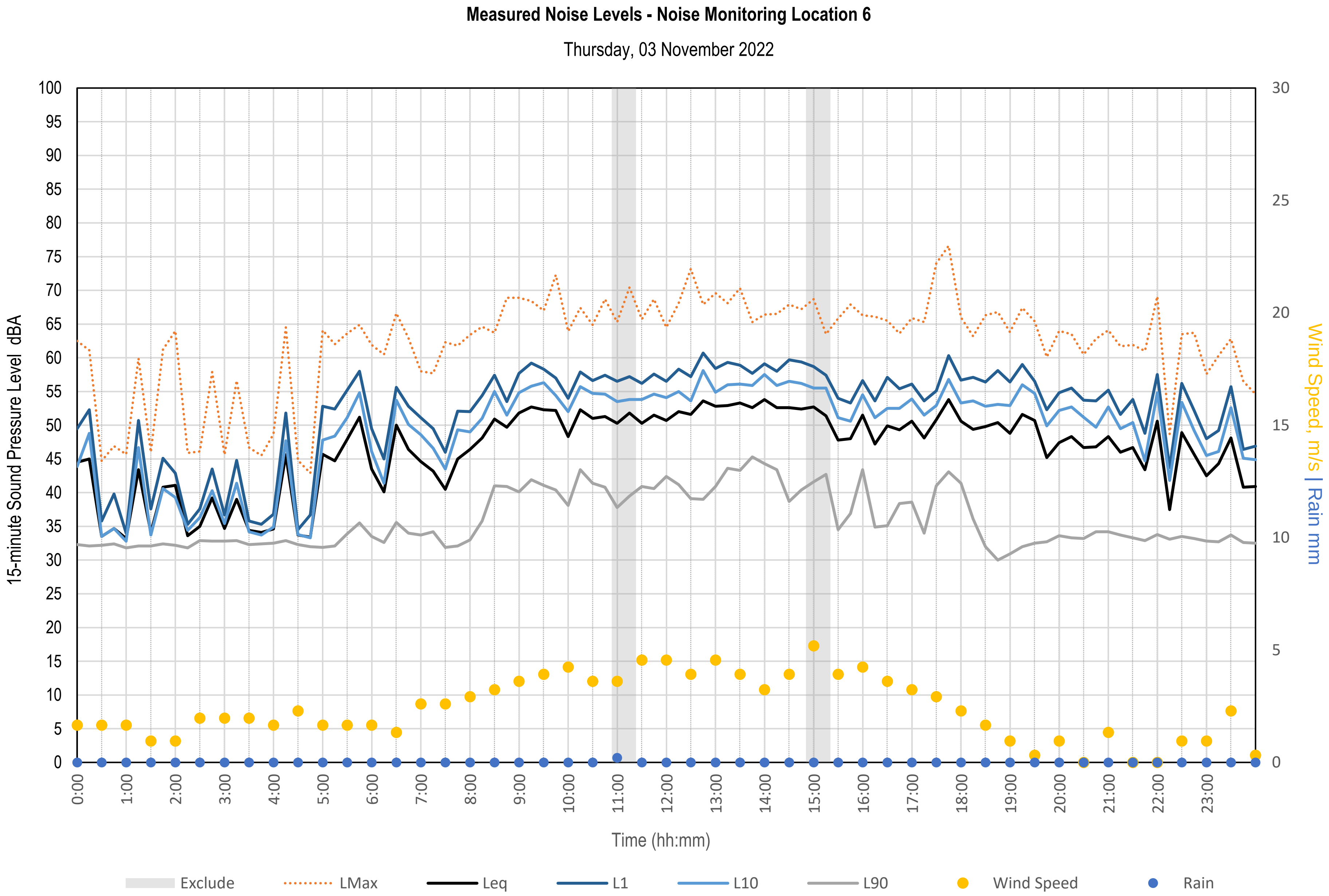
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Thursday, 03 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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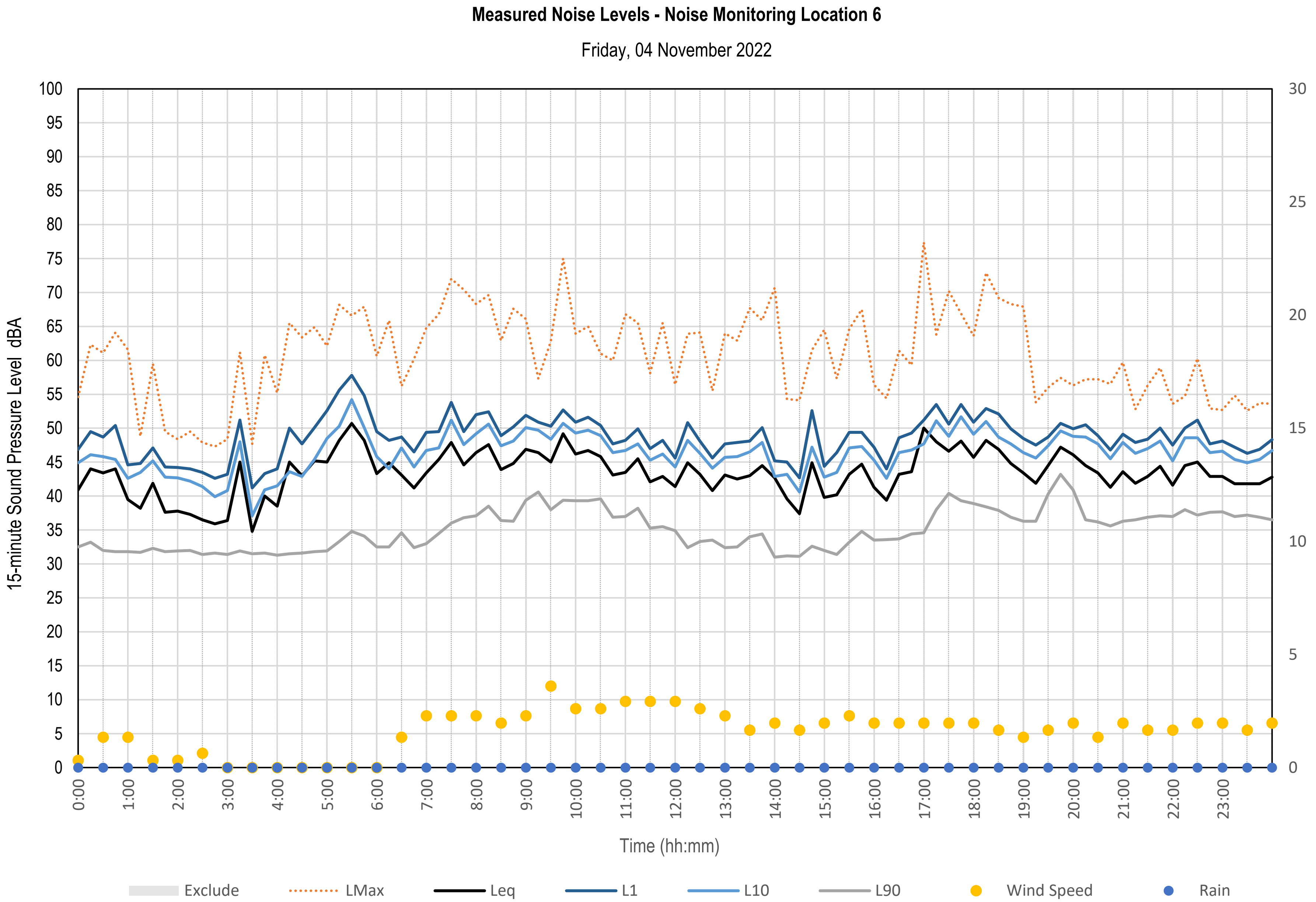
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Friday, 04 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
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Exclude
LMax
Leq
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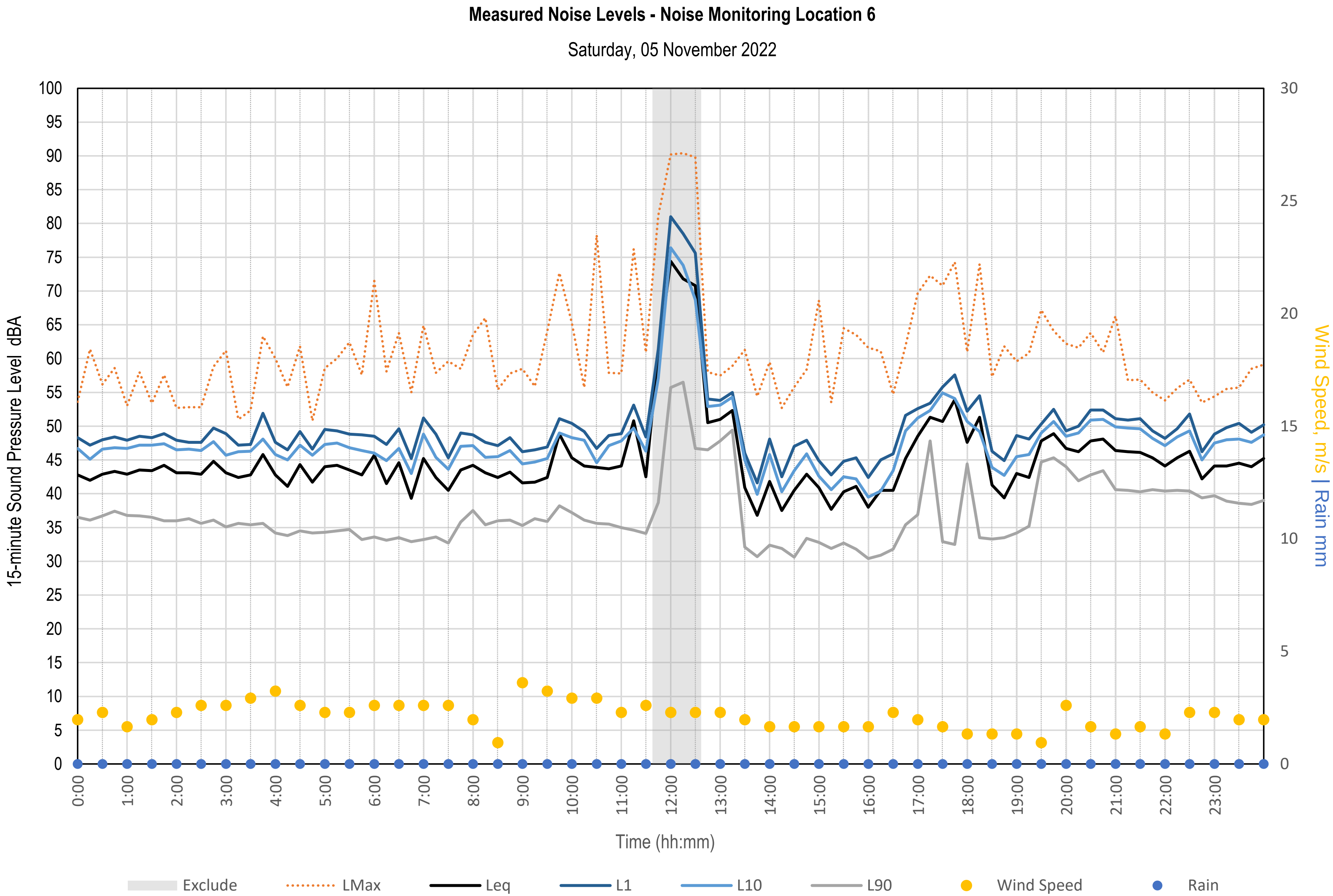
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 6
Saturday, 05 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
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Exclude
LMax
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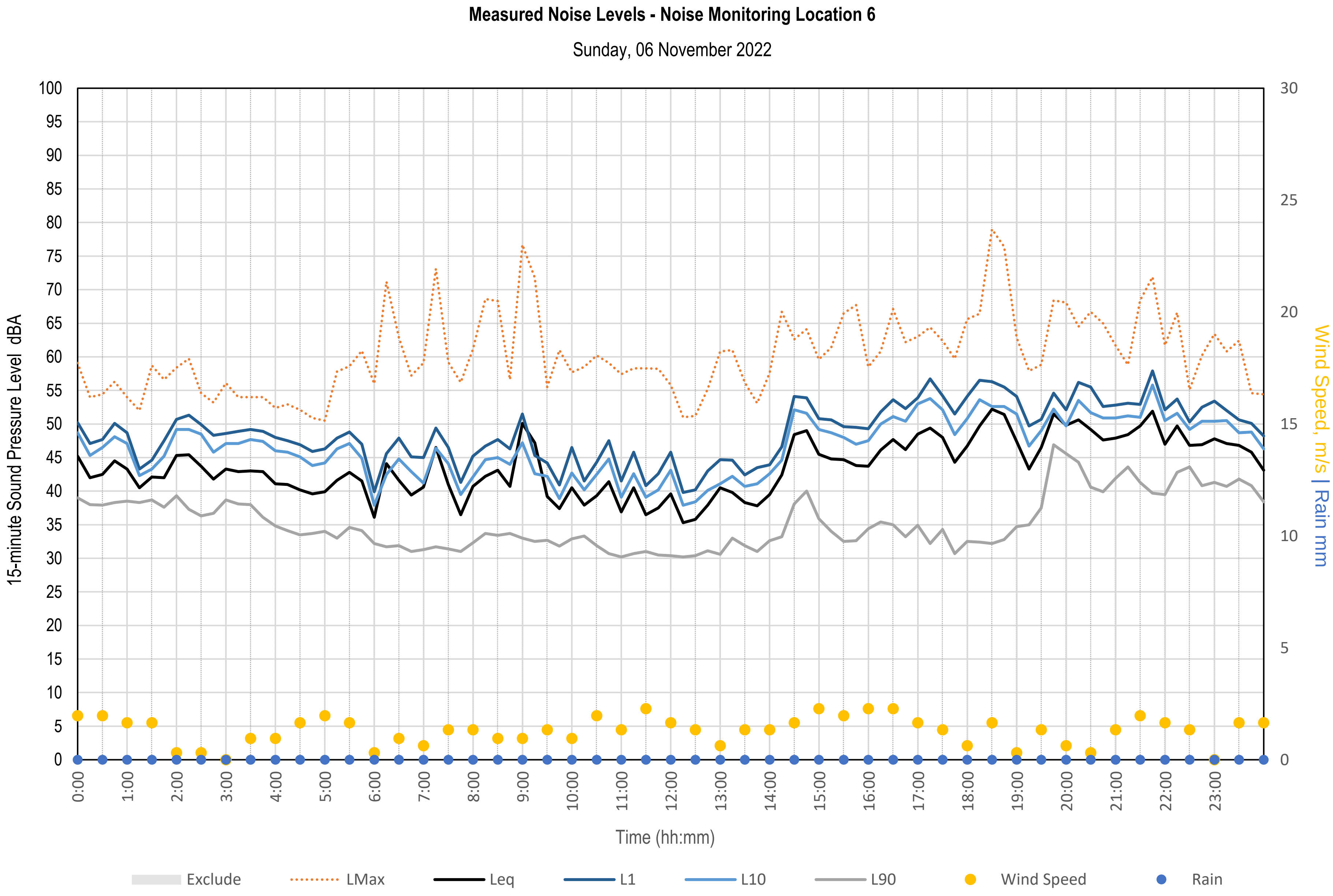
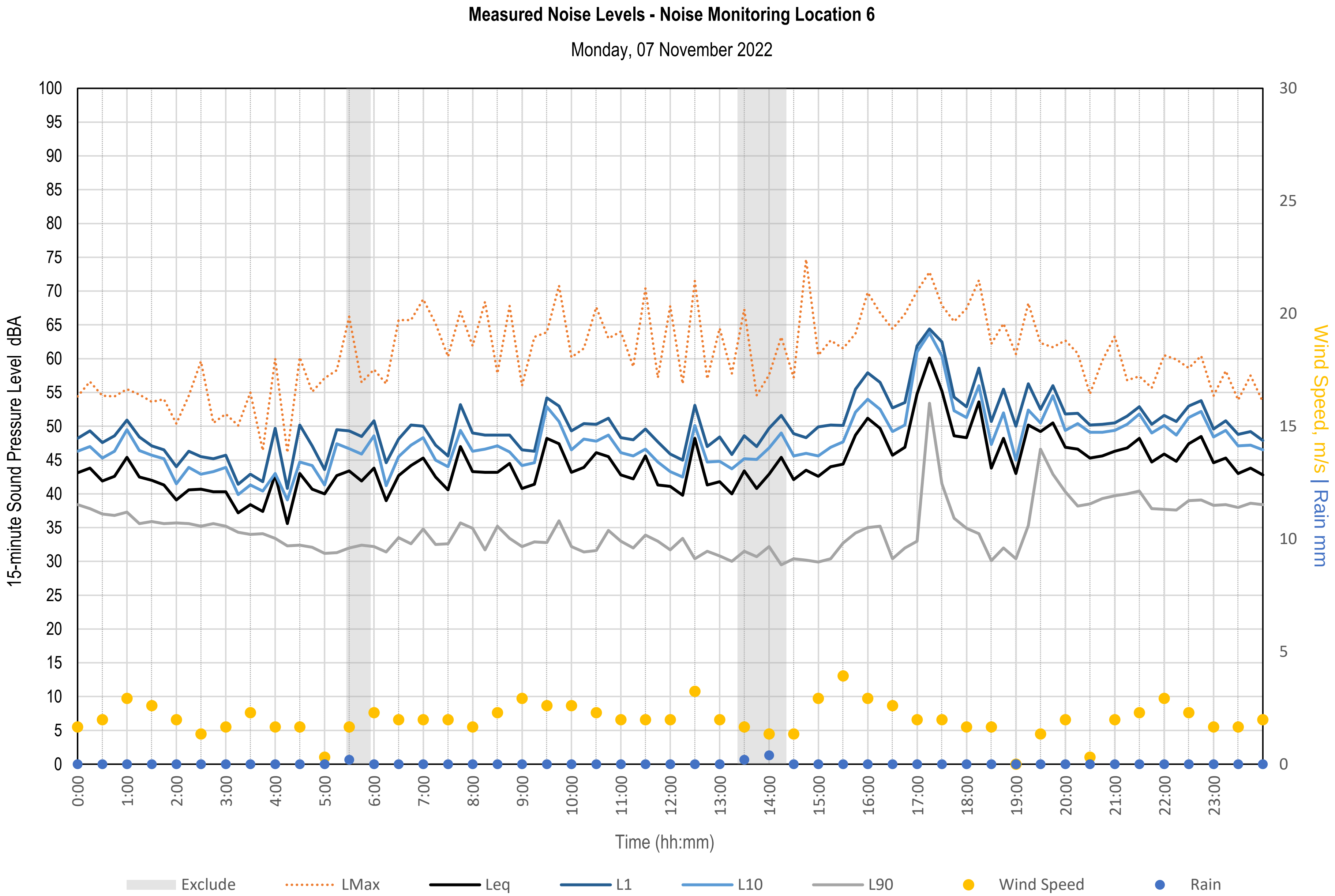
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Sunday, 06 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 6
Monday, 07 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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Exclude
LMax
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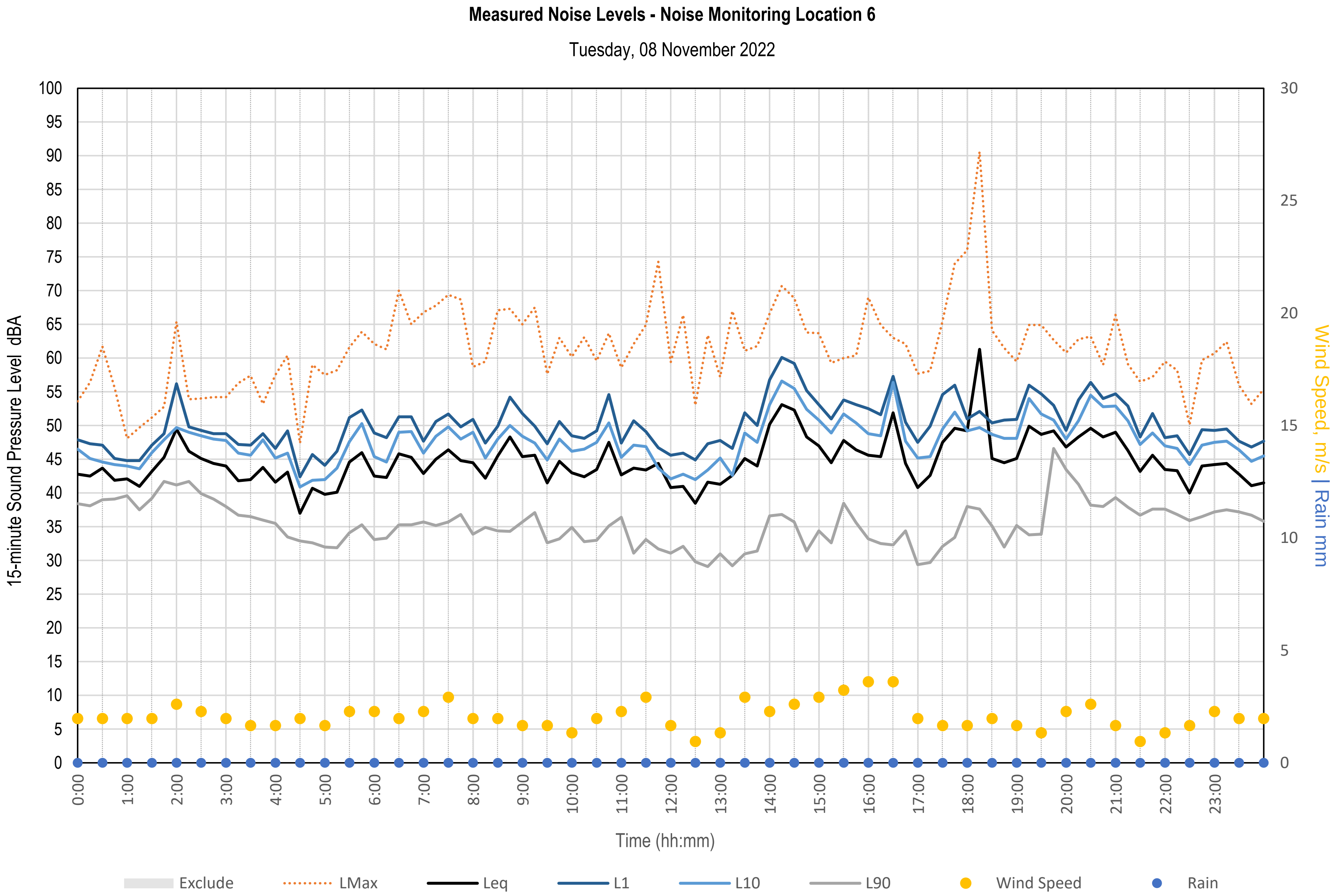
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Tuesday, 08 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
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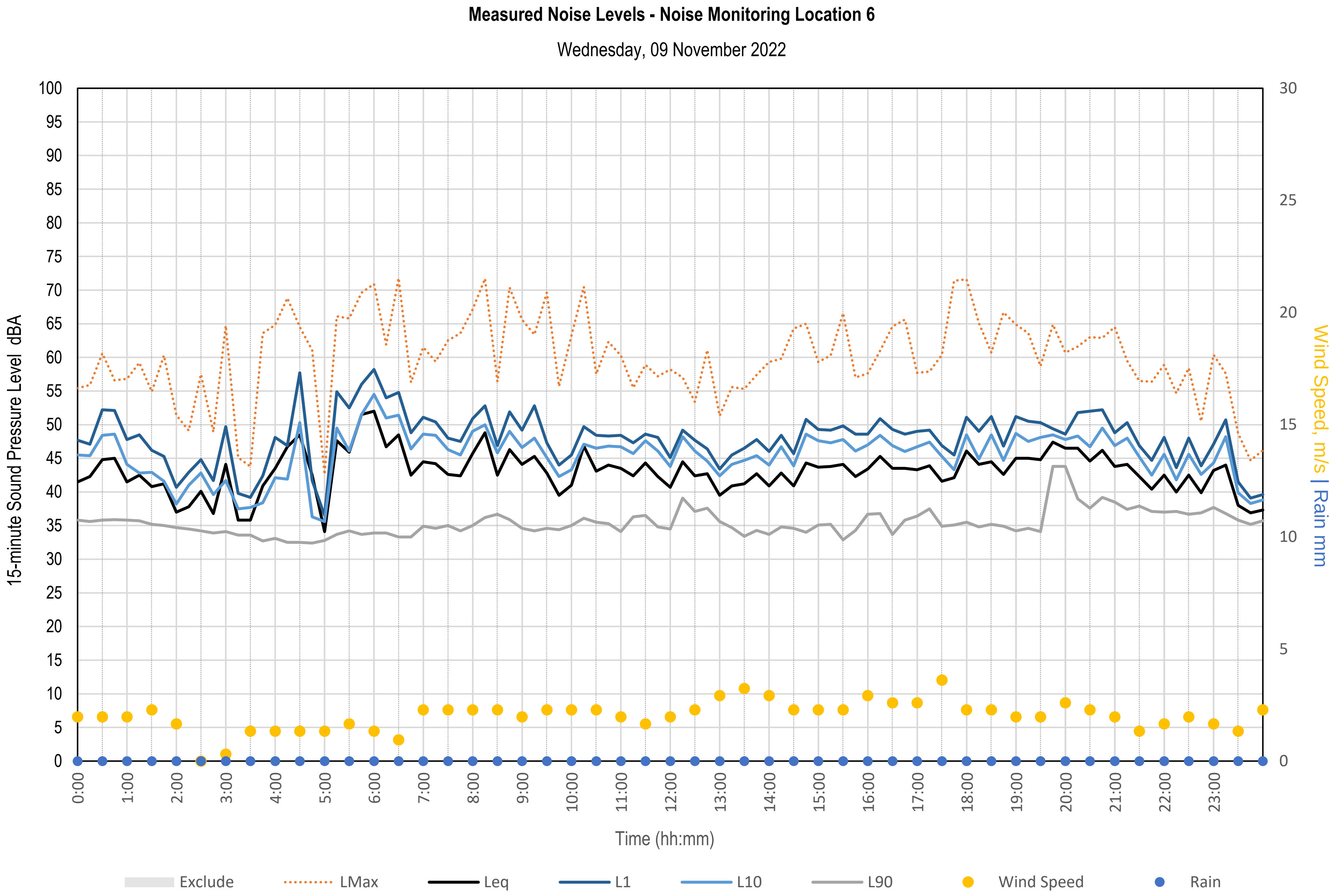
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 6
Wednesday, 09 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
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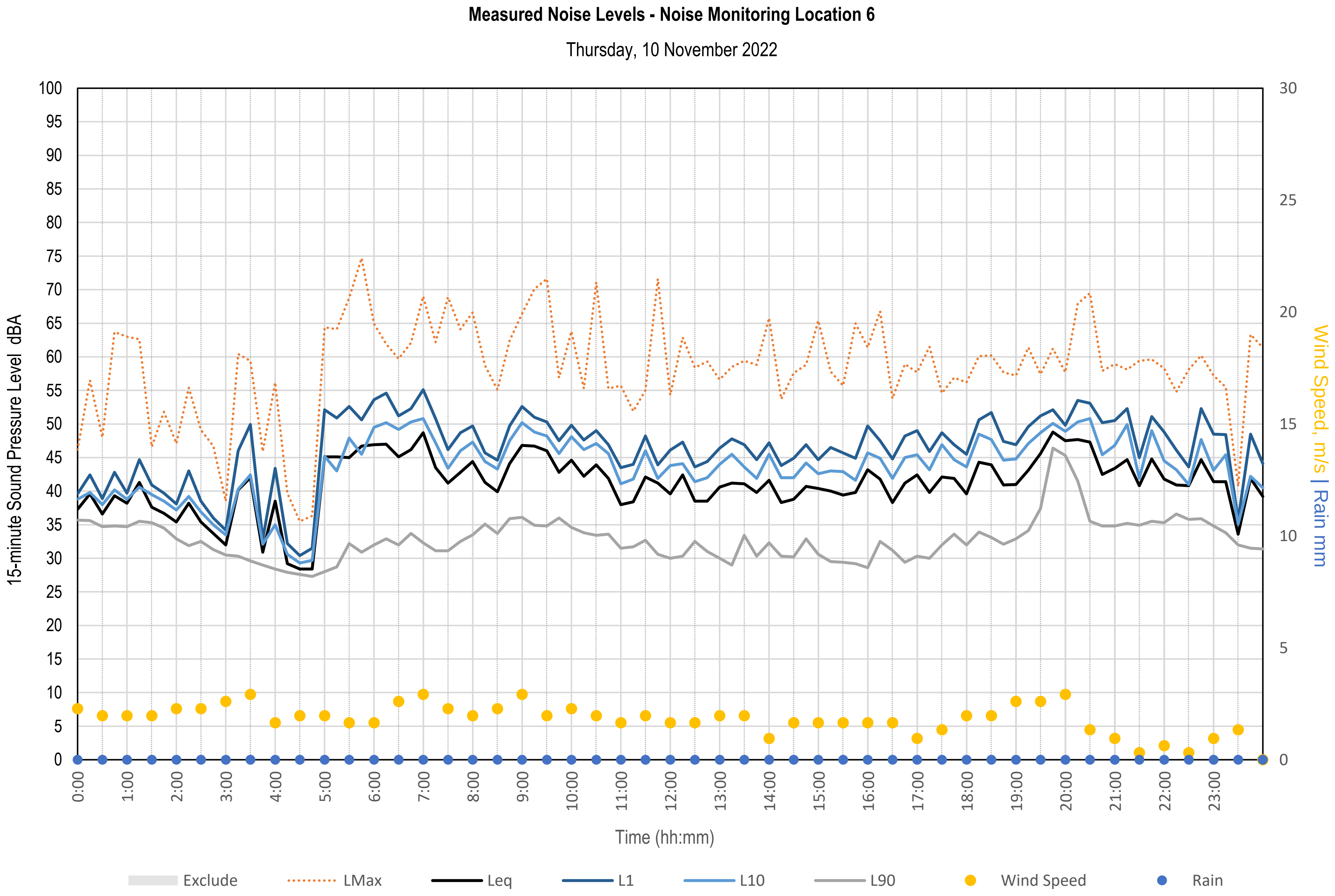
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 6
Thursday, 10 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
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6:00
7:00
8:00
9:00
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19:00
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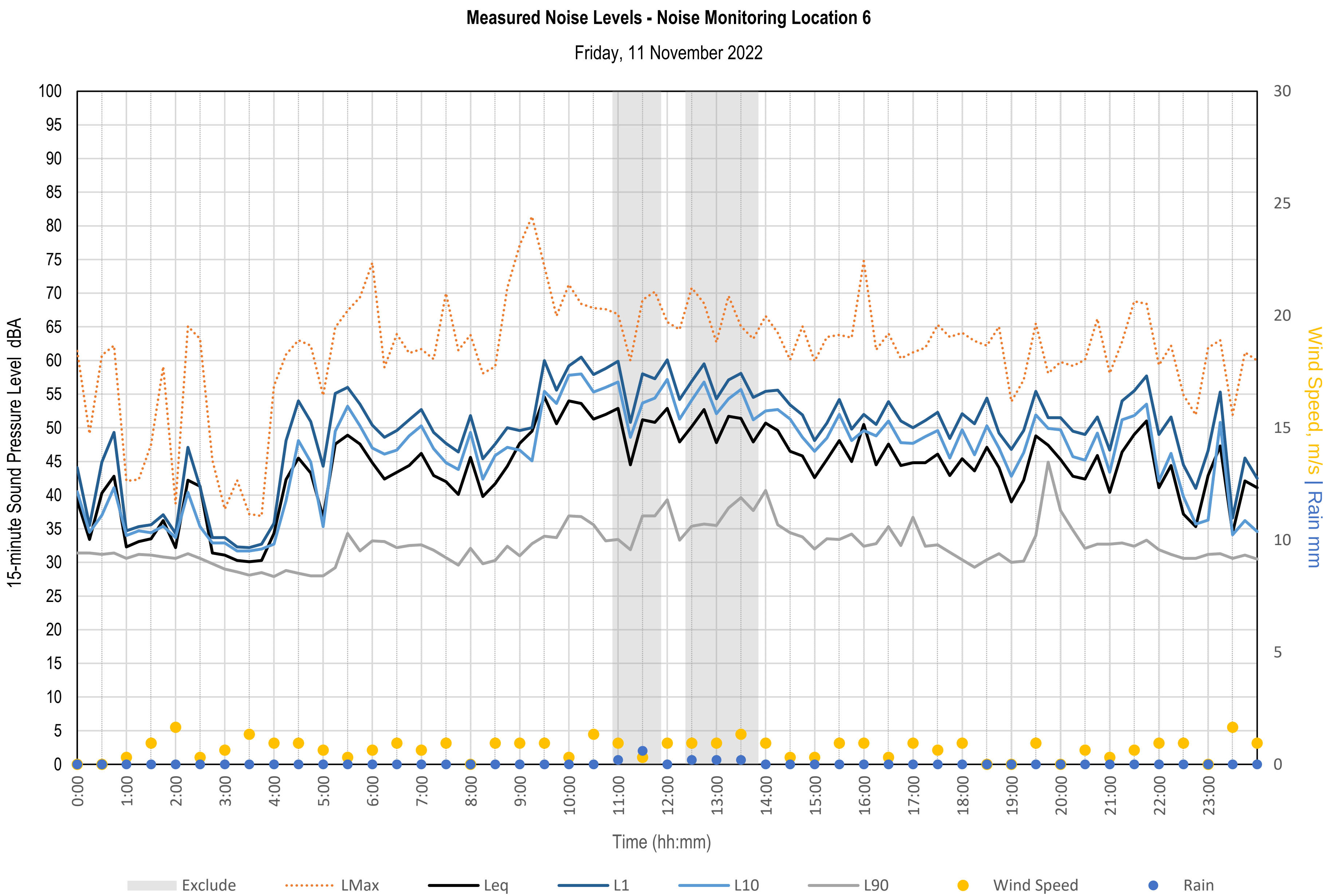
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Friday, 11 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
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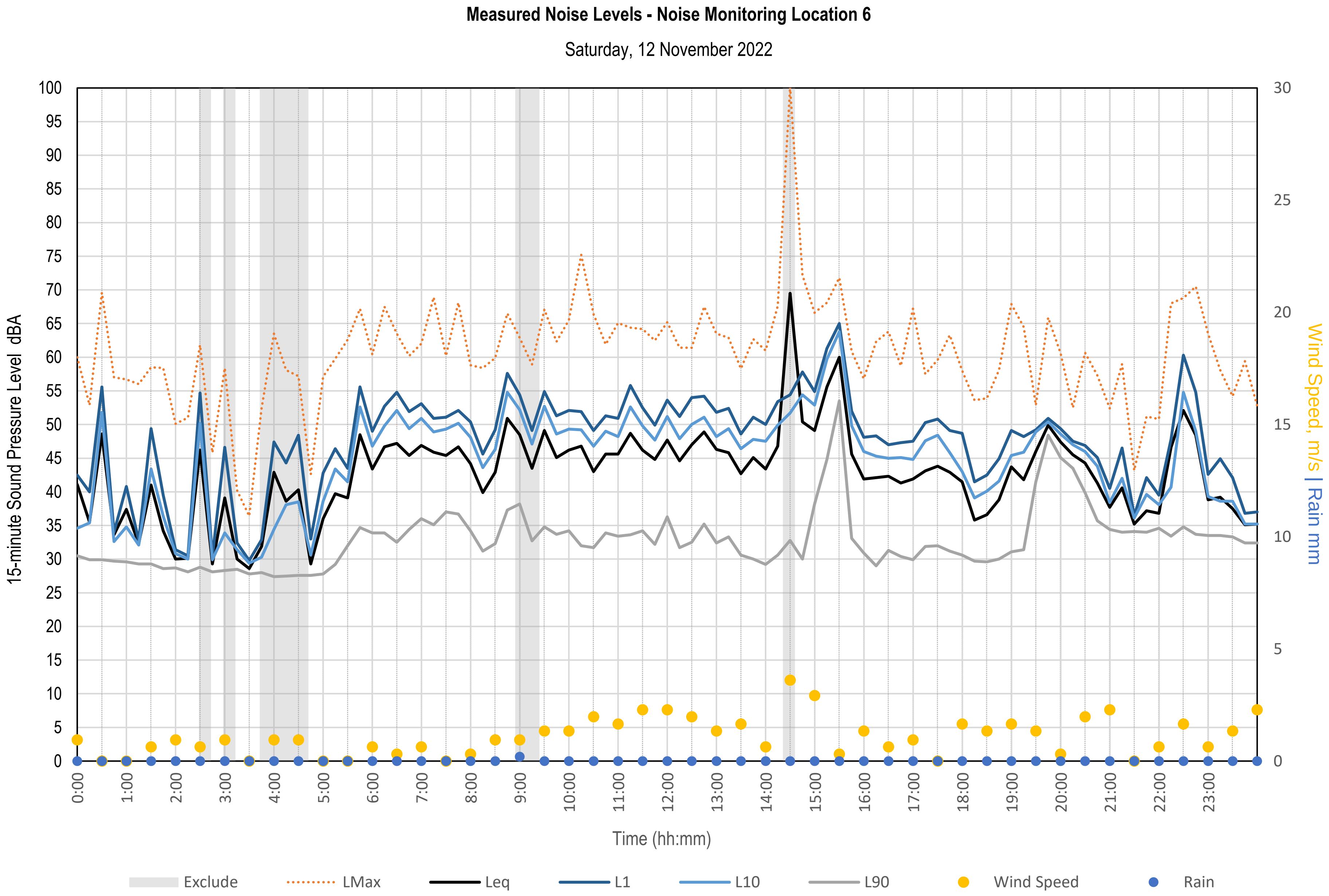
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Saturday, 12 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
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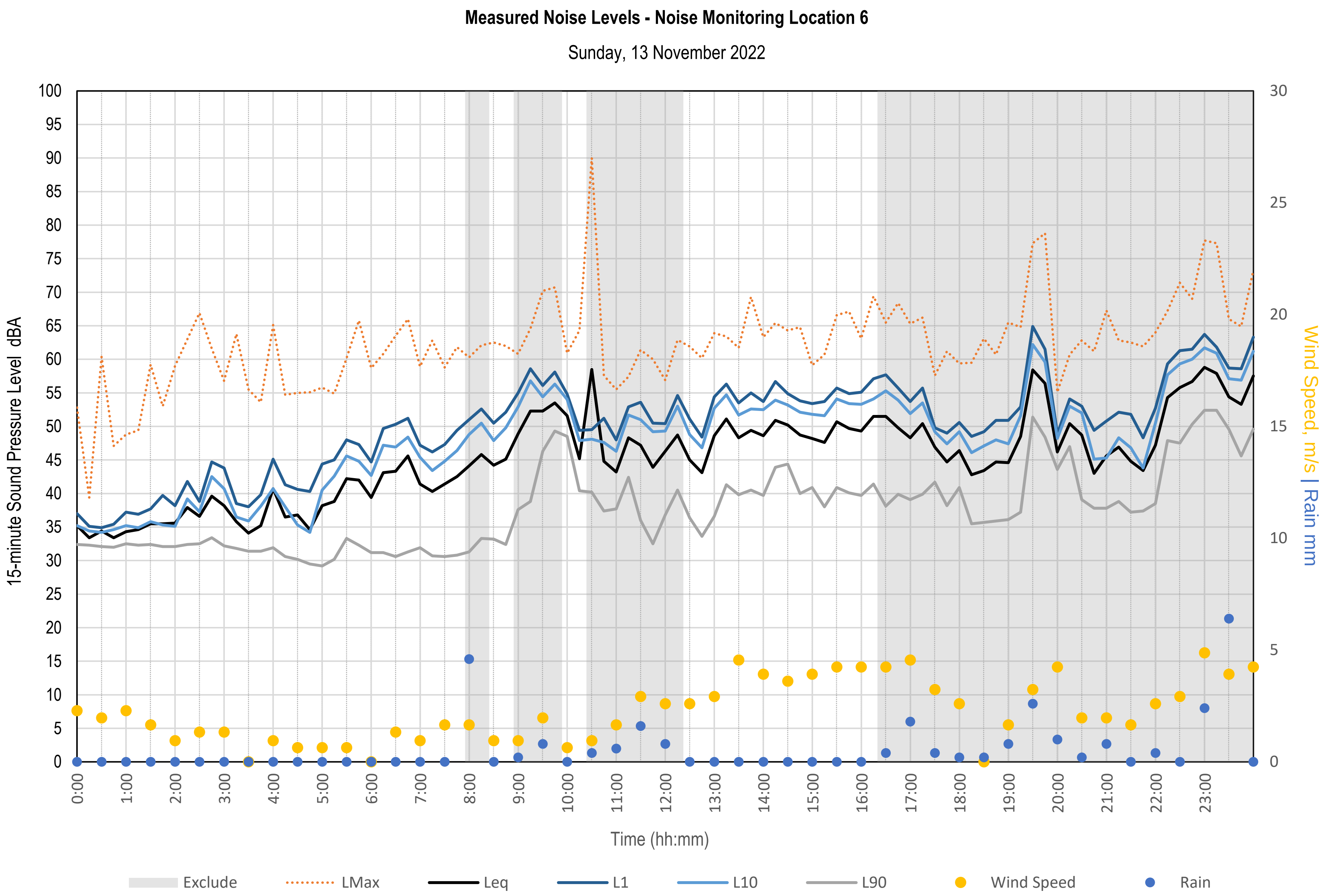
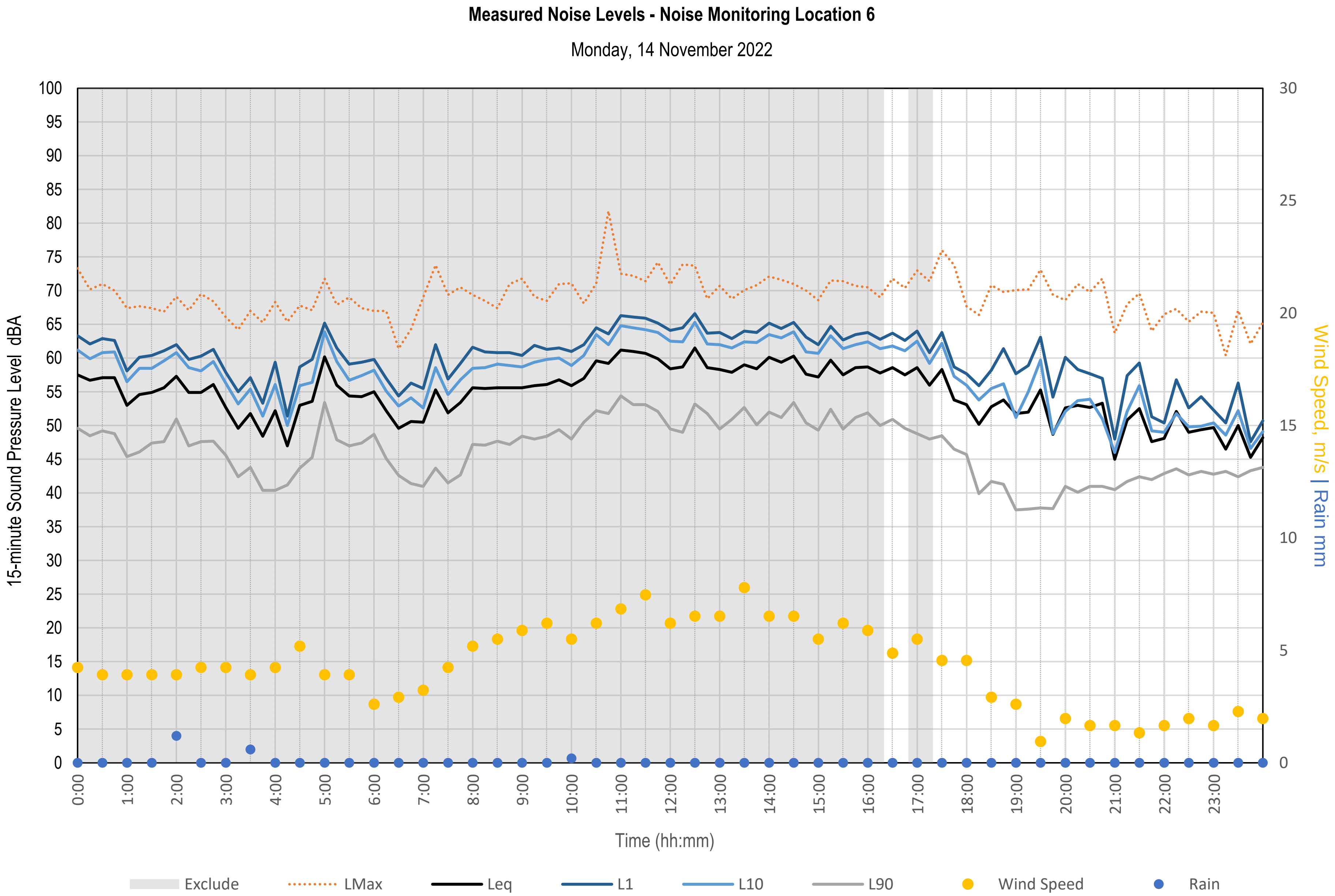
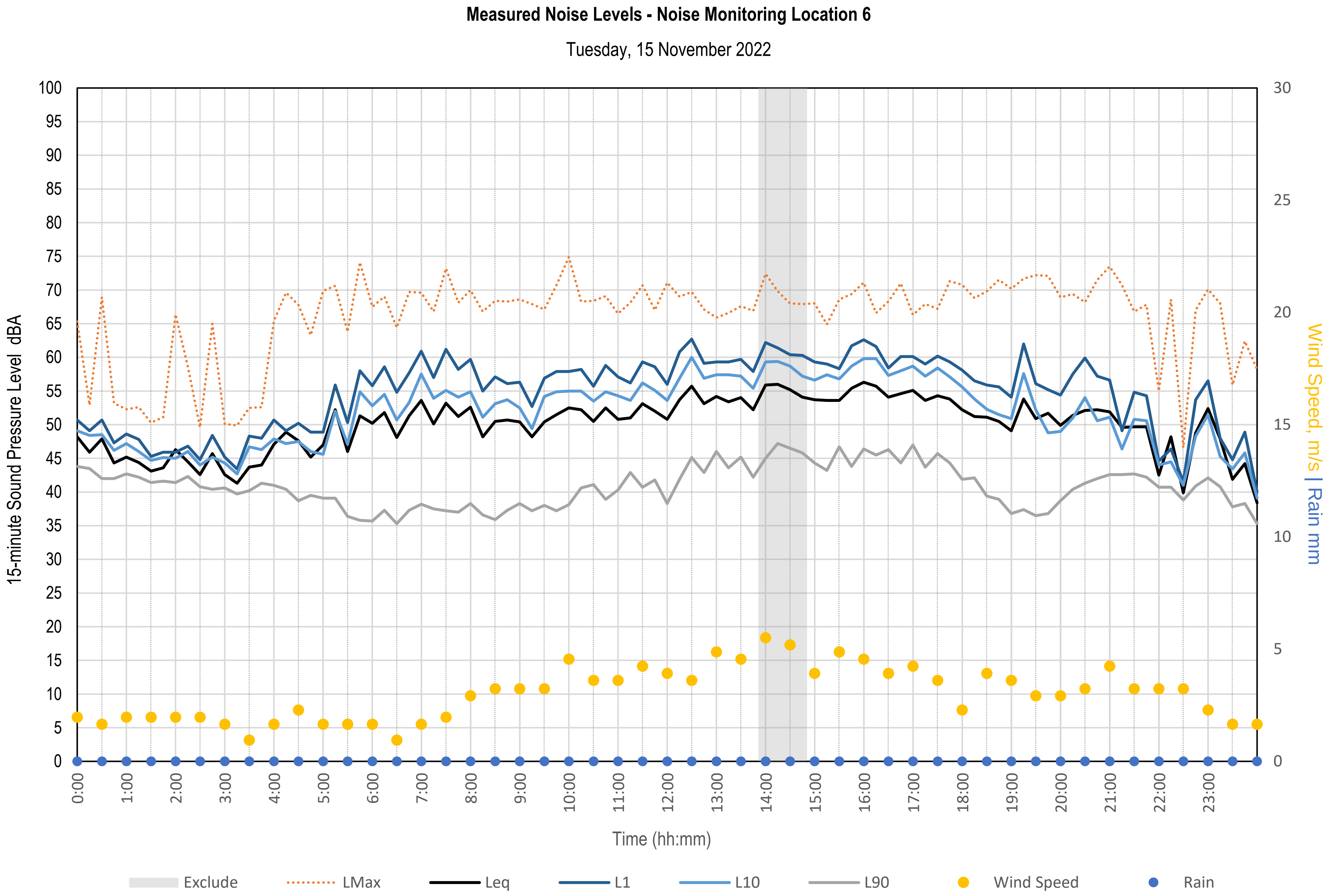
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Sunday, 13 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Monday, 14 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Tuesday, 15 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
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7:00
8:00
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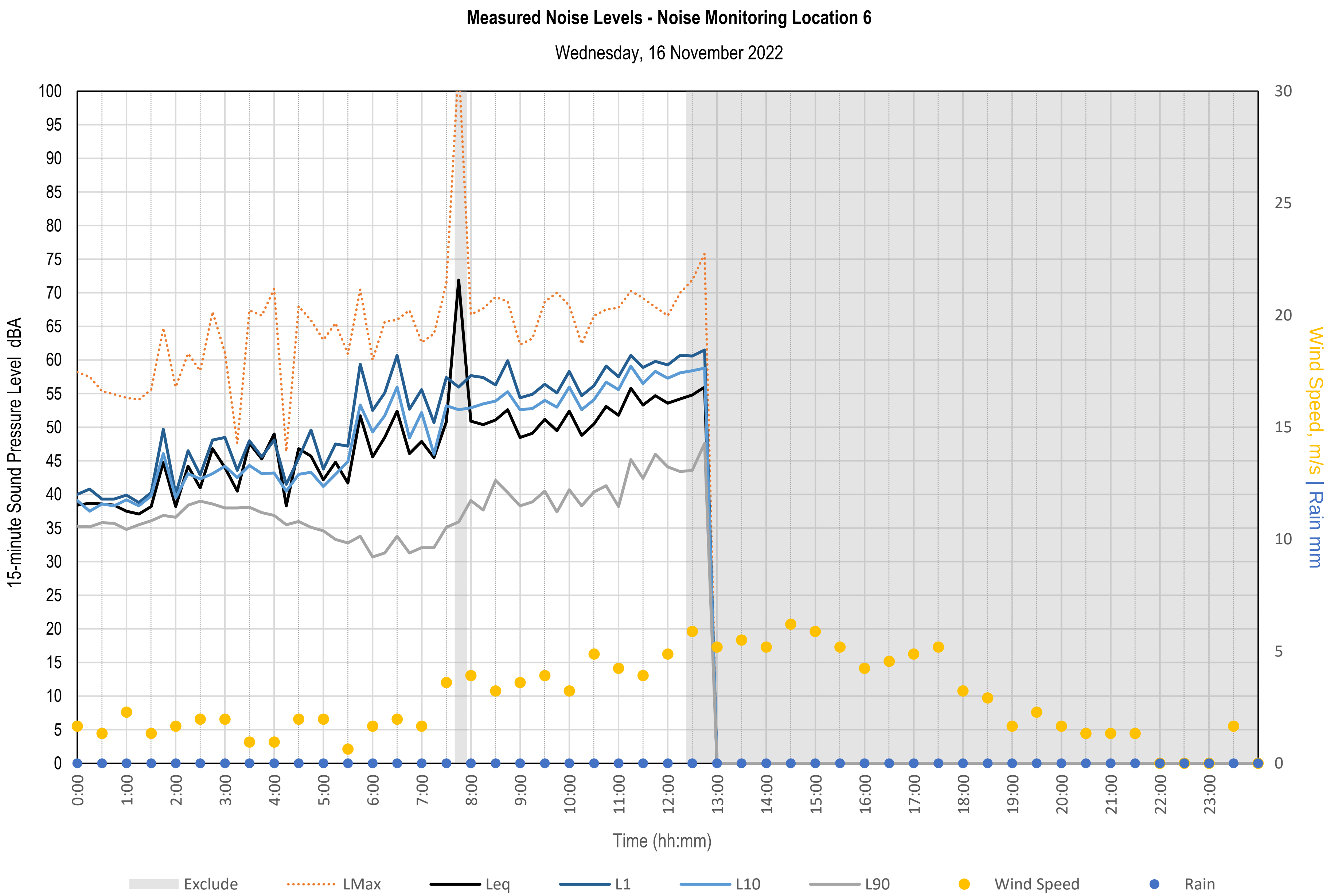
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 6
Wednesday, 16 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
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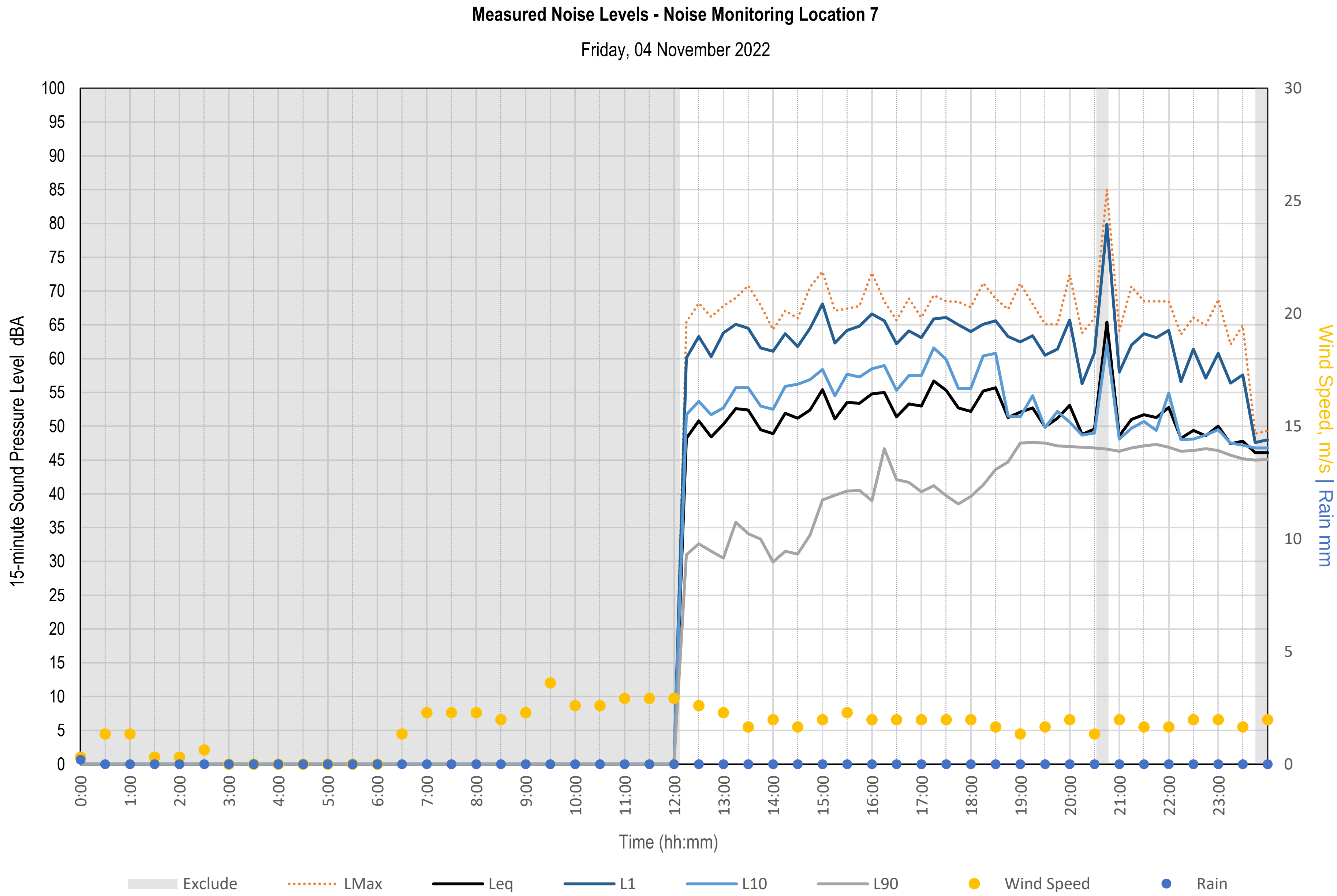
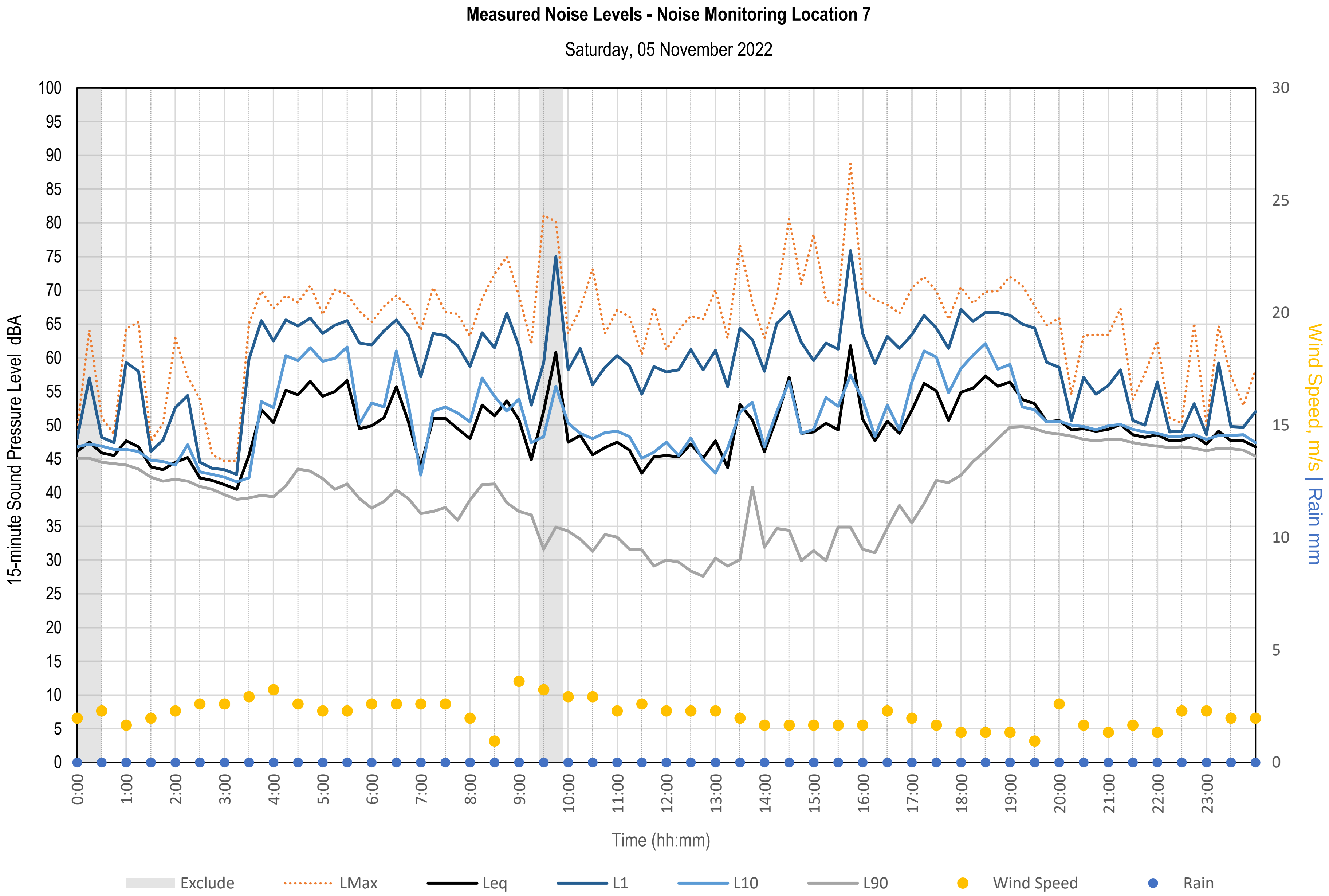
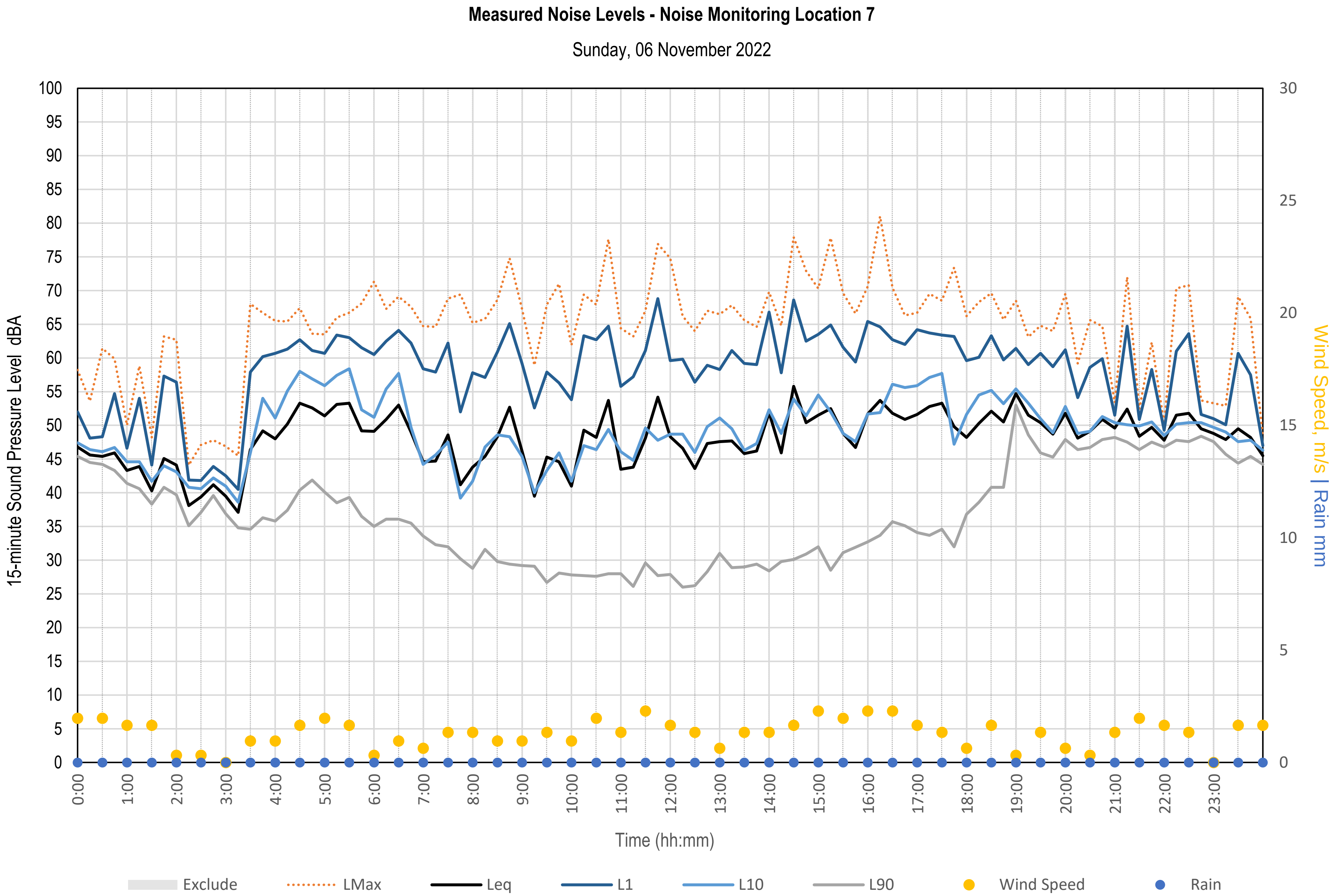
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Friday, 04 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Saturday, 05 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Sunday, 06 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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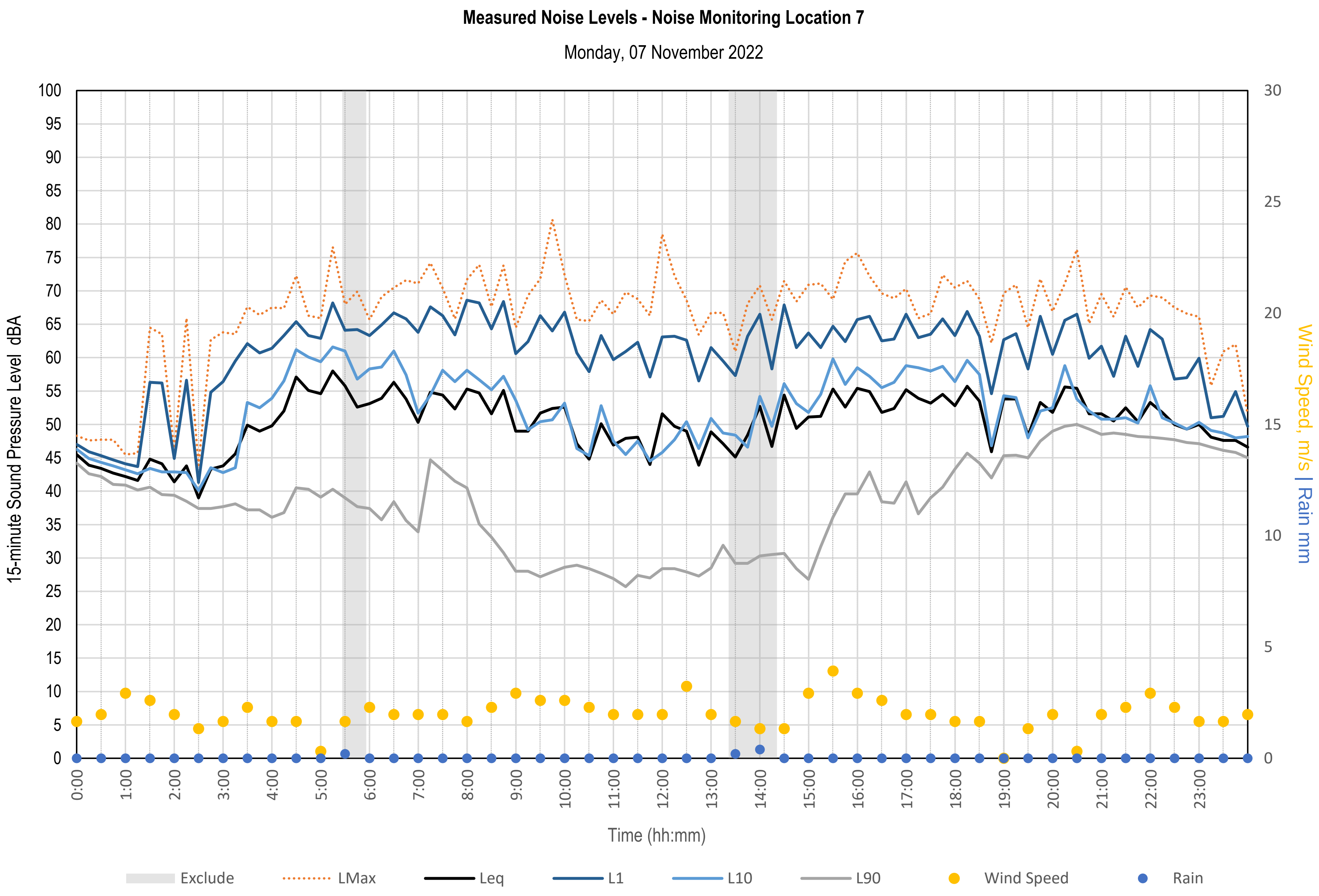
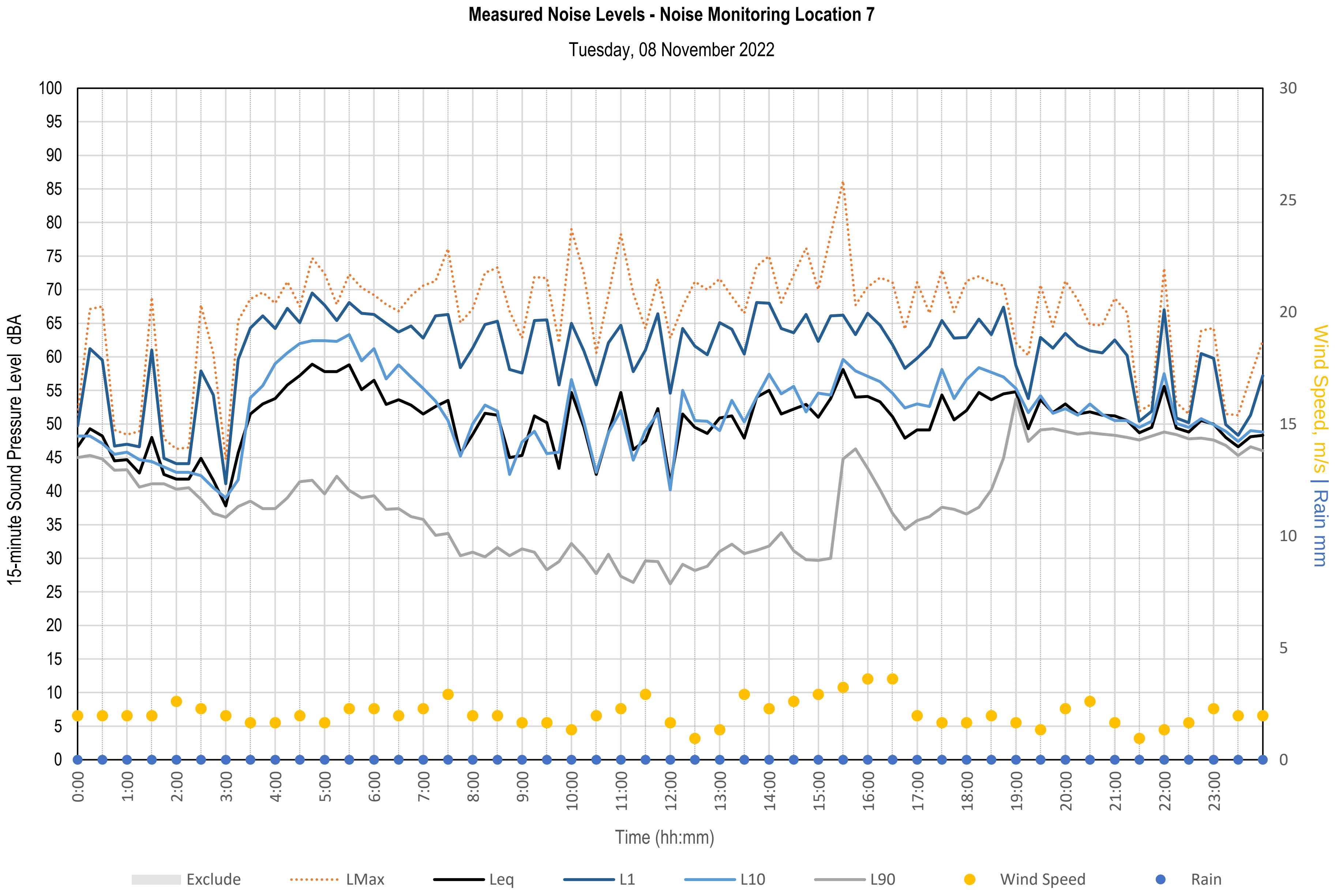
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Monday, 07 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Tuesday, 08 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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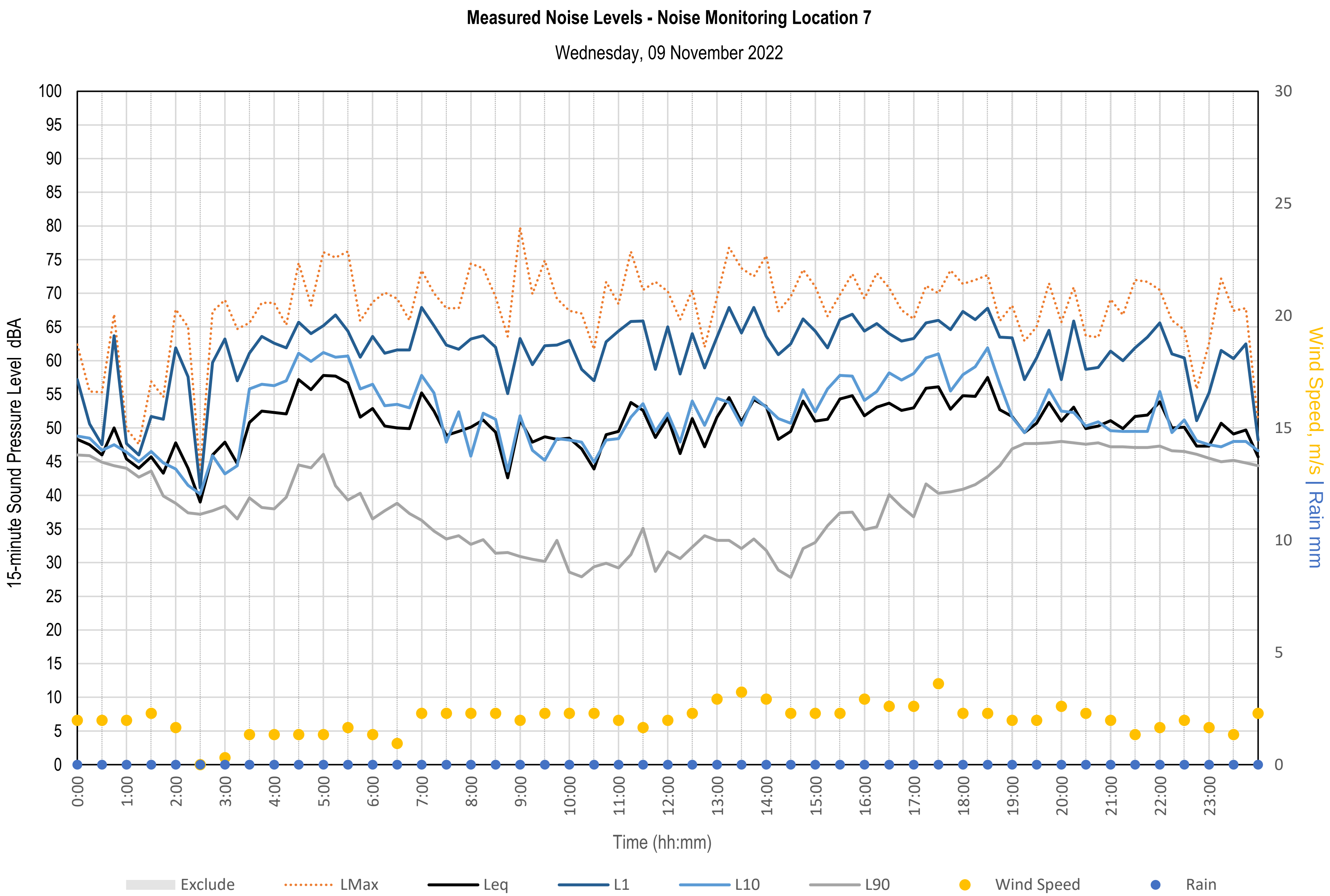
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 7
Wednesday, 09 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
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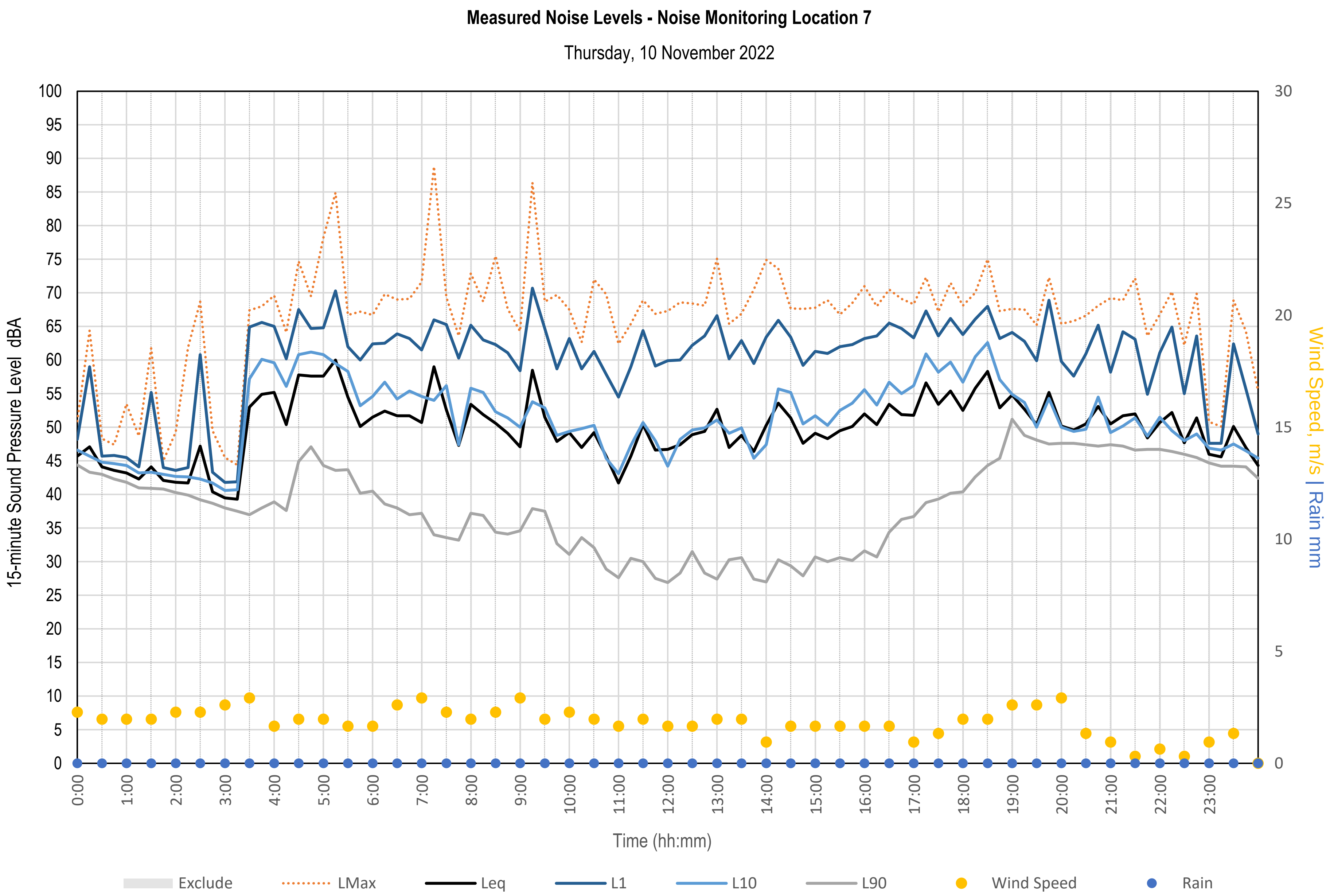
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Thursday, 10 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
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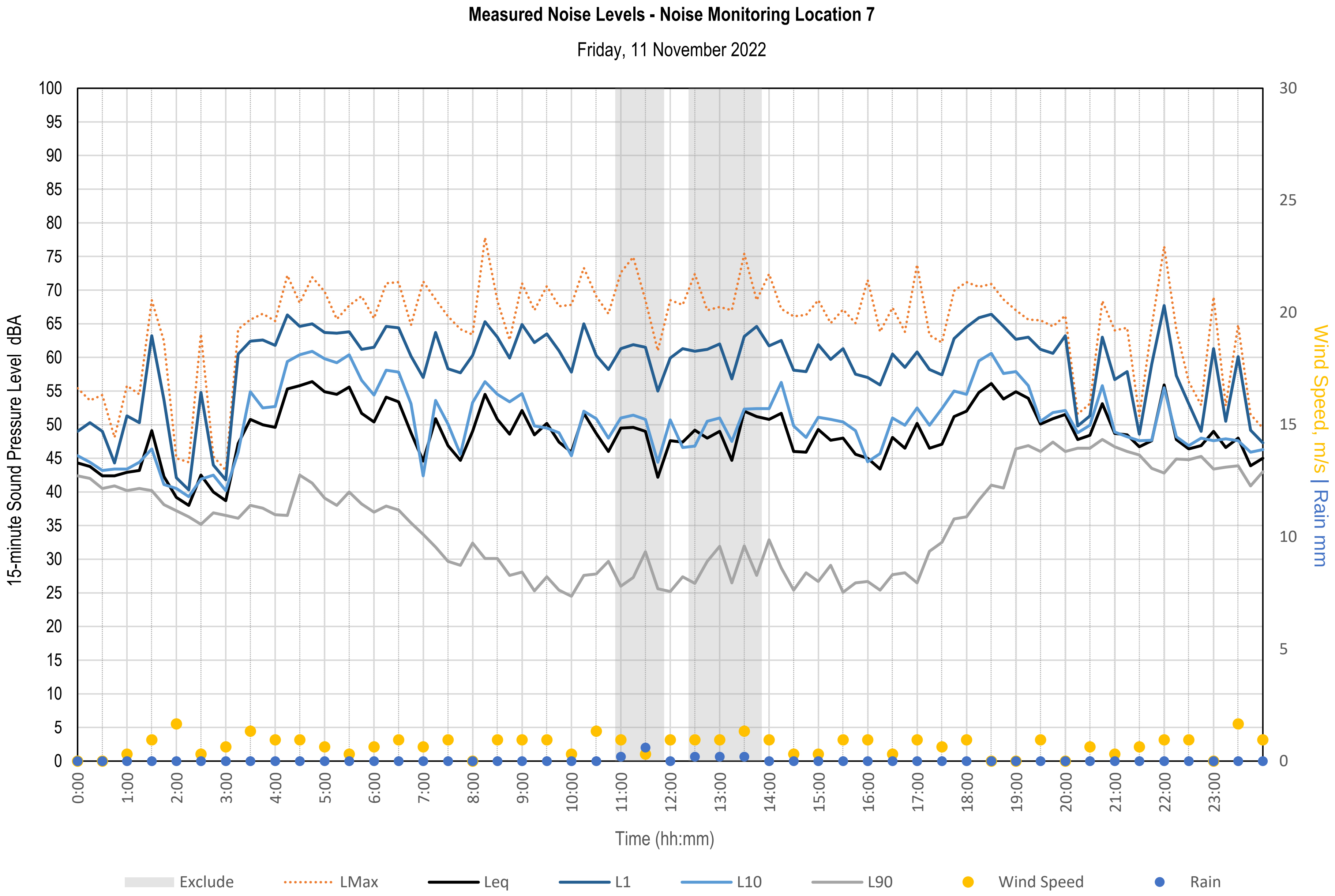
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Friday, 11 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
100
95
90
85
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75
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65
60
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25
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Exclude
LMax
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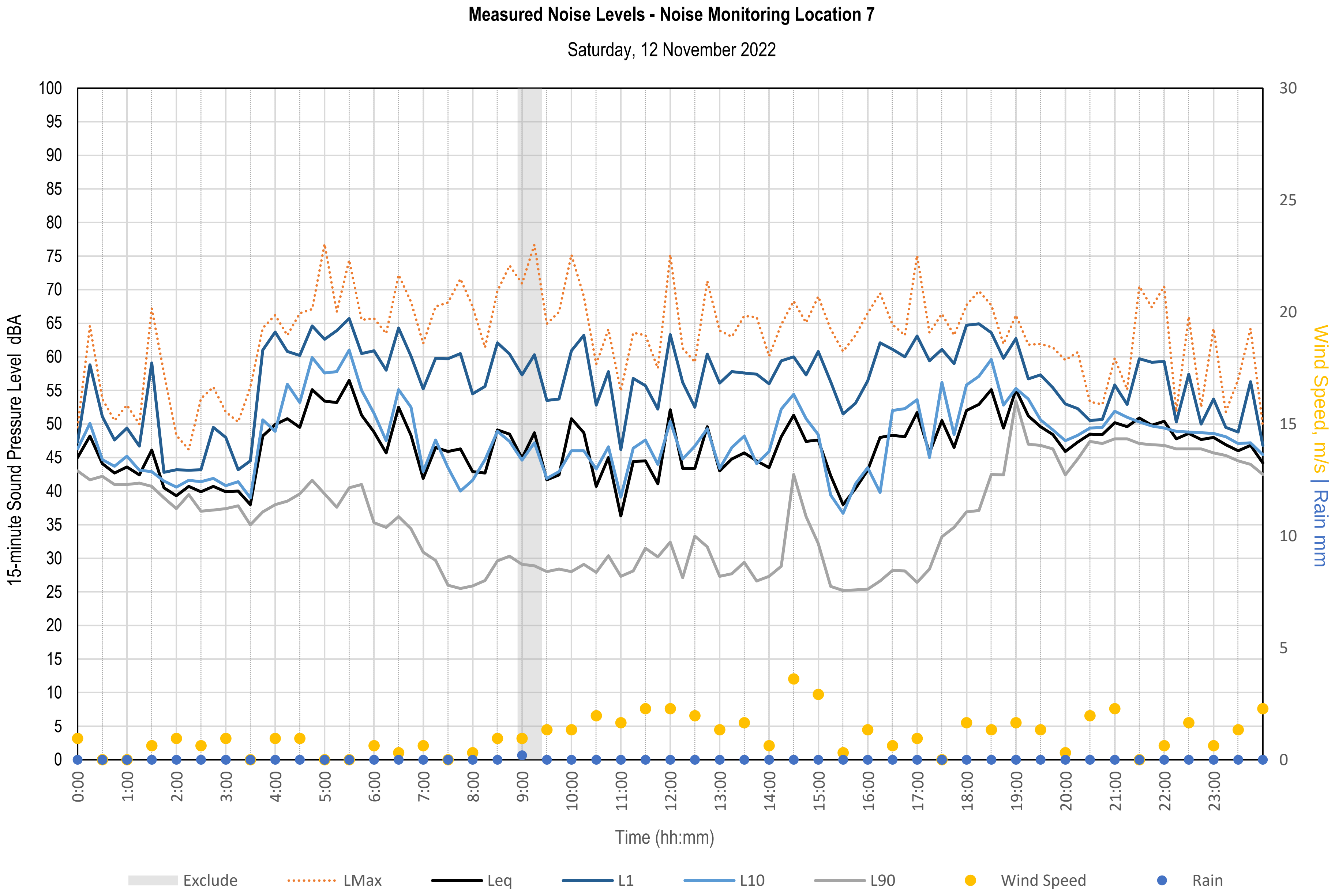
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Saturday, 12 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
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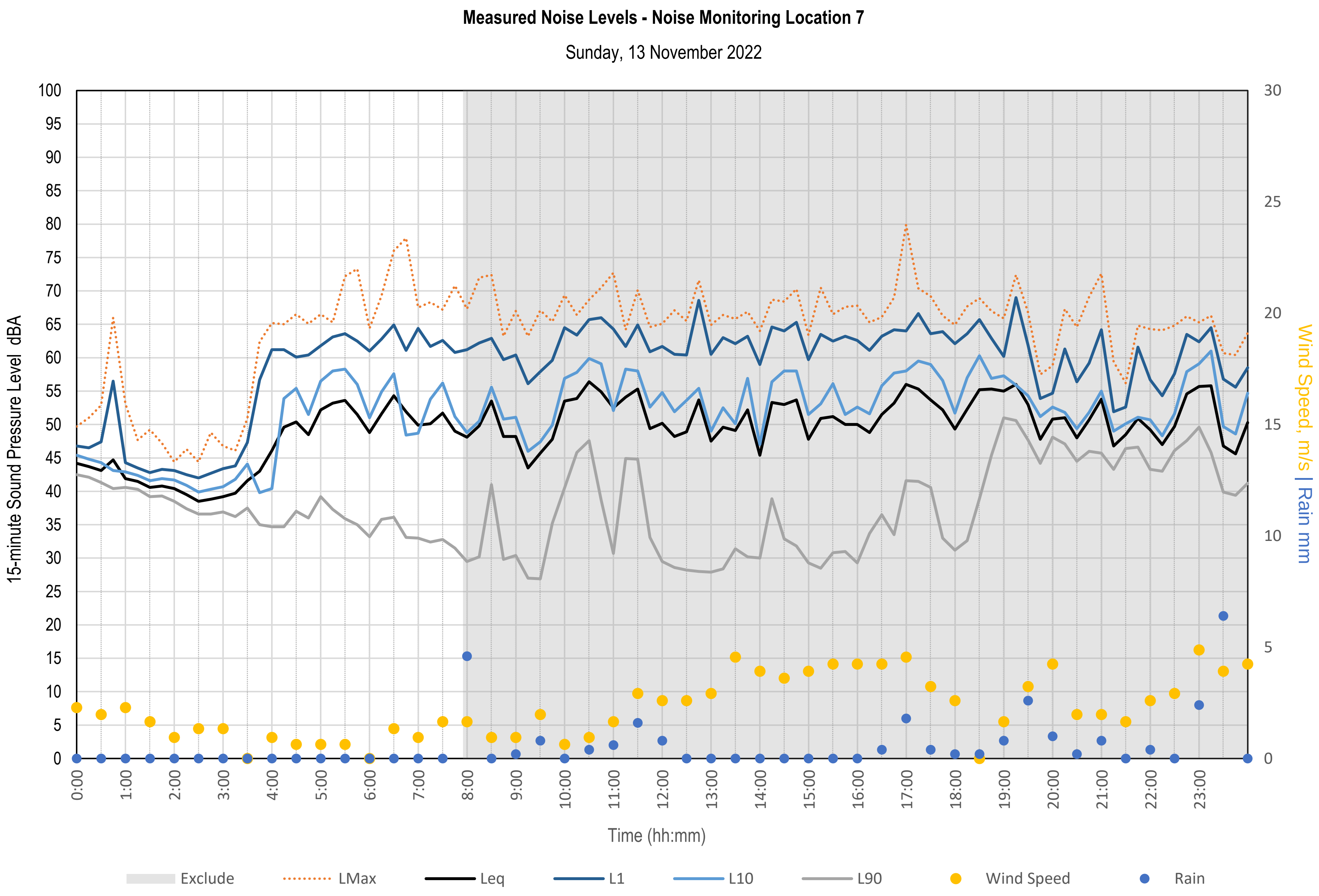
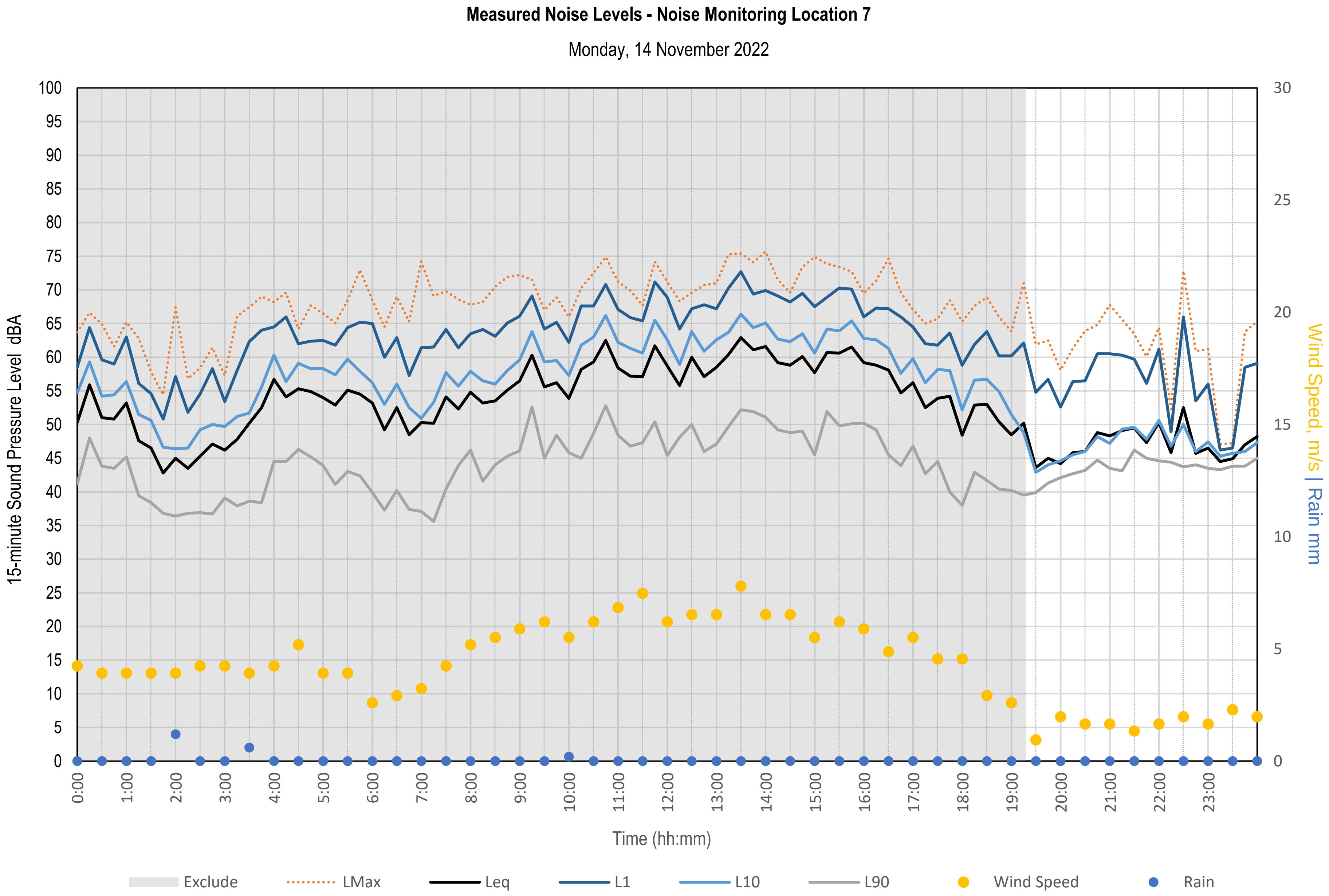
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Sunday, 13 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Monday, 14 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
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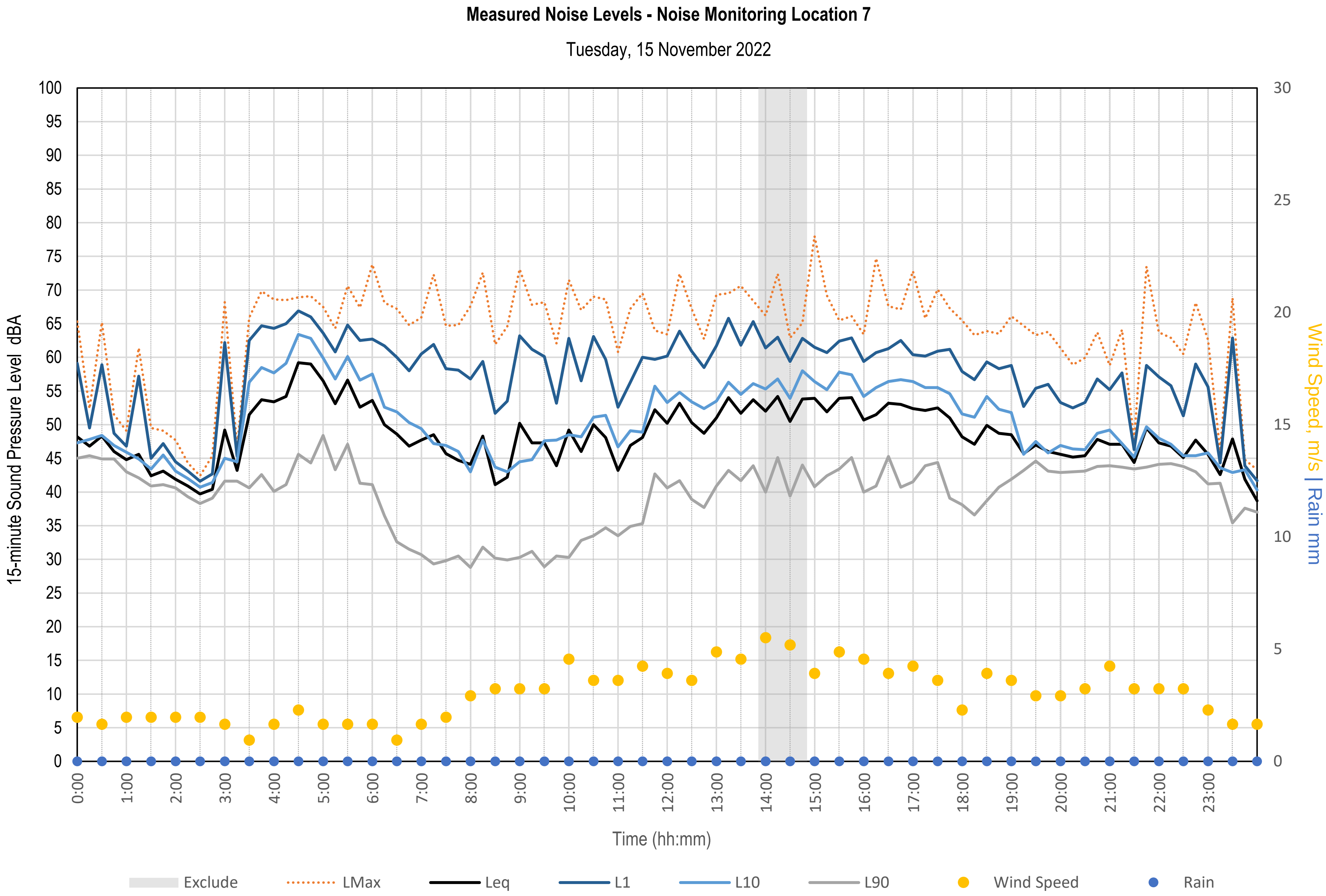
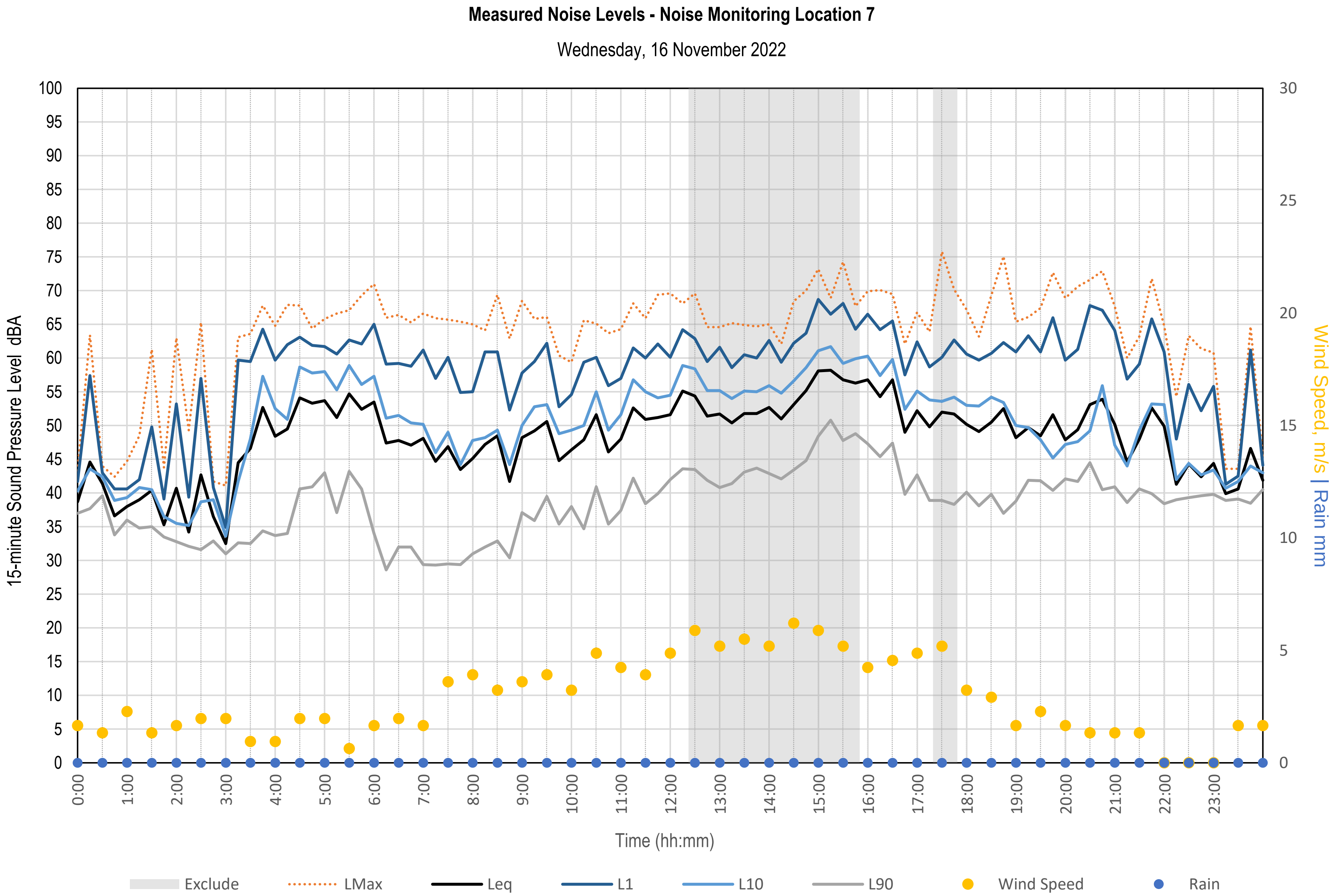
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Tuesday, 15 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 7
Wednesday, 16 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
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7:00
8:00
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Exclude
LMax
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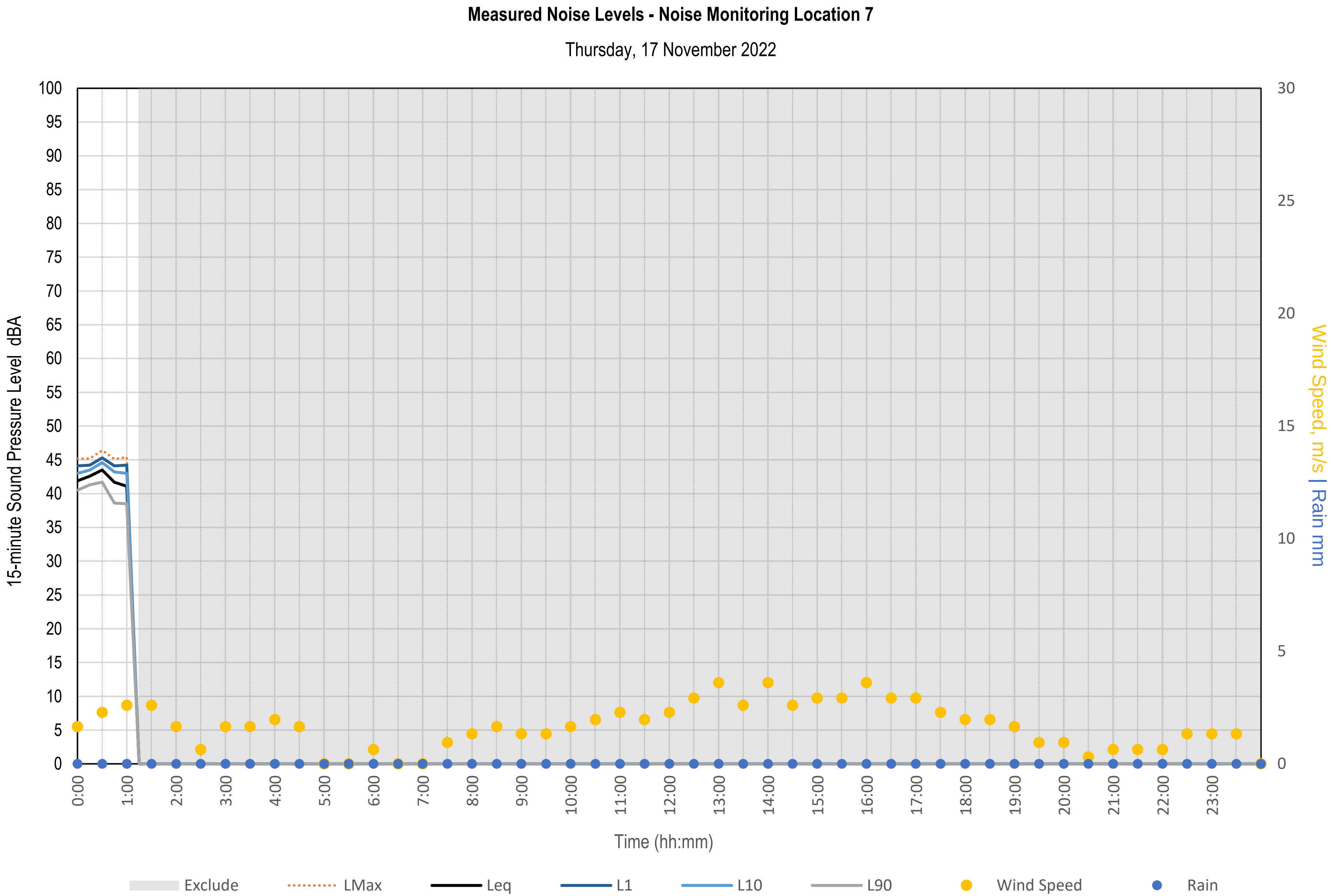
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 7
Thursday, 17 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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15
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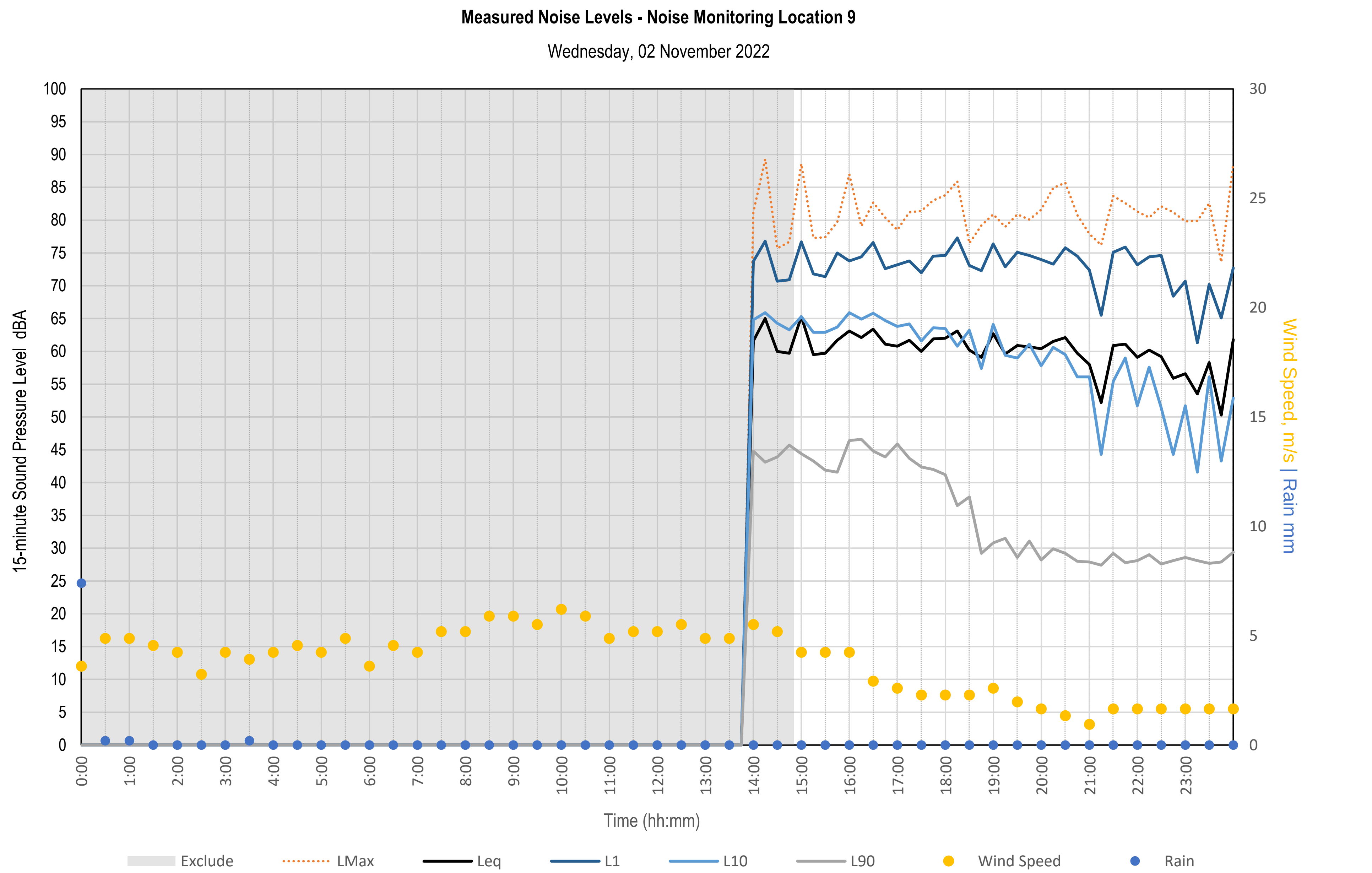
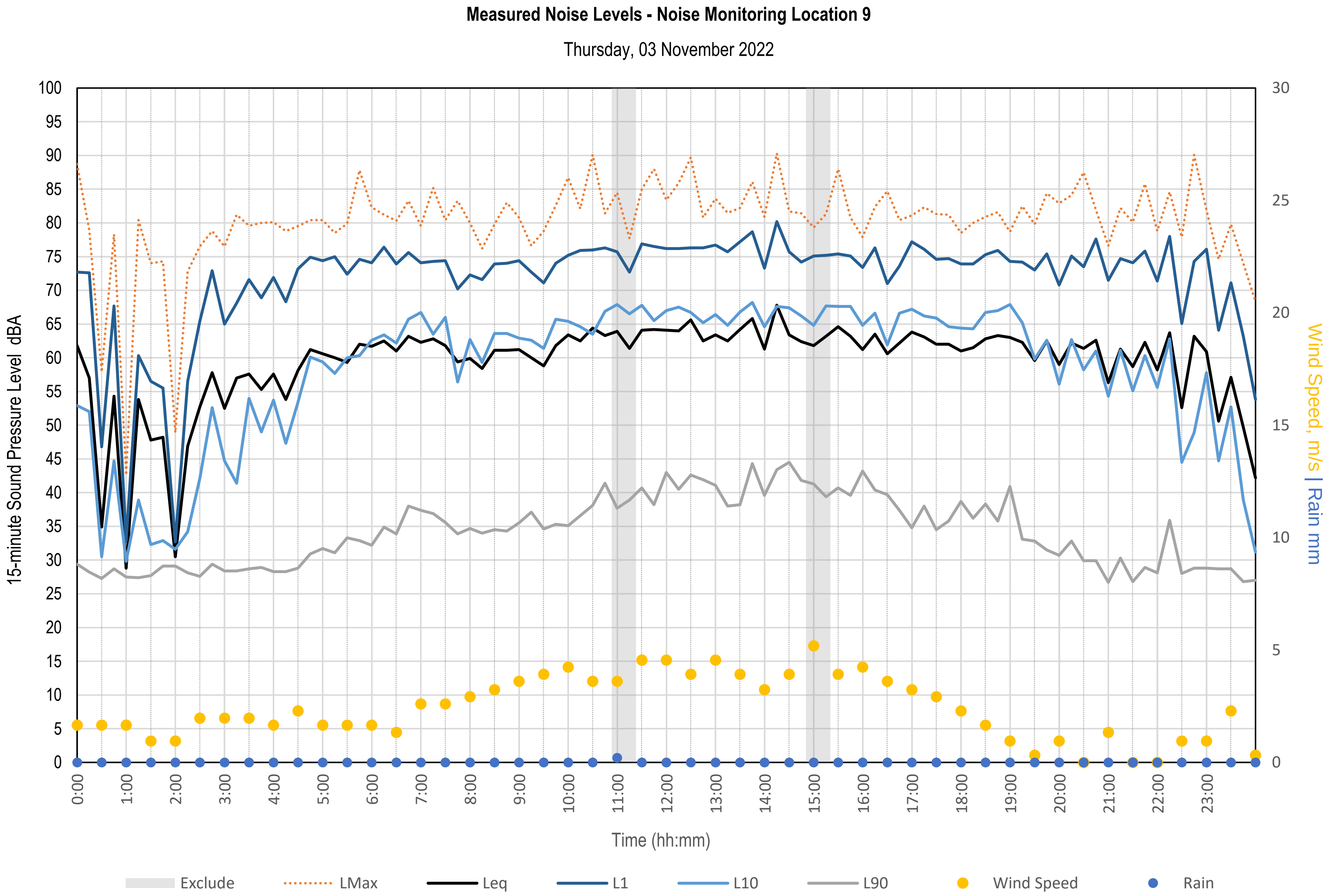
0
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 9
Wednesday, 02 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 9
Thursday, 03 November 2022
15-minute Sound Pressure Level dBA
100
95
90
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75
70
65
60
55
50
45
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35
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25
20
15
10
5
0
30
25
20
15
10
5
0
Wind Speed, m/s | Rain mm
0:00
1:00
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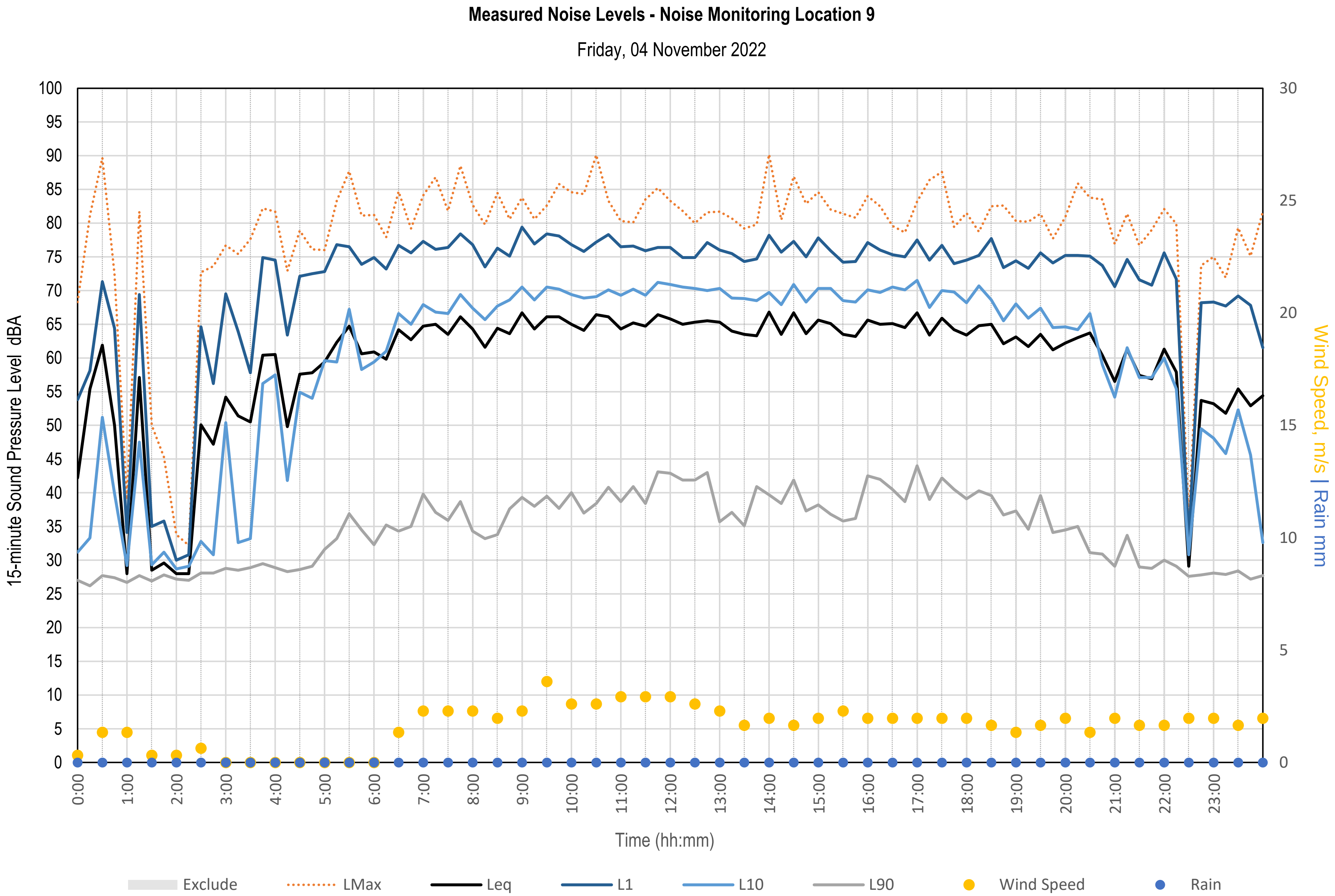
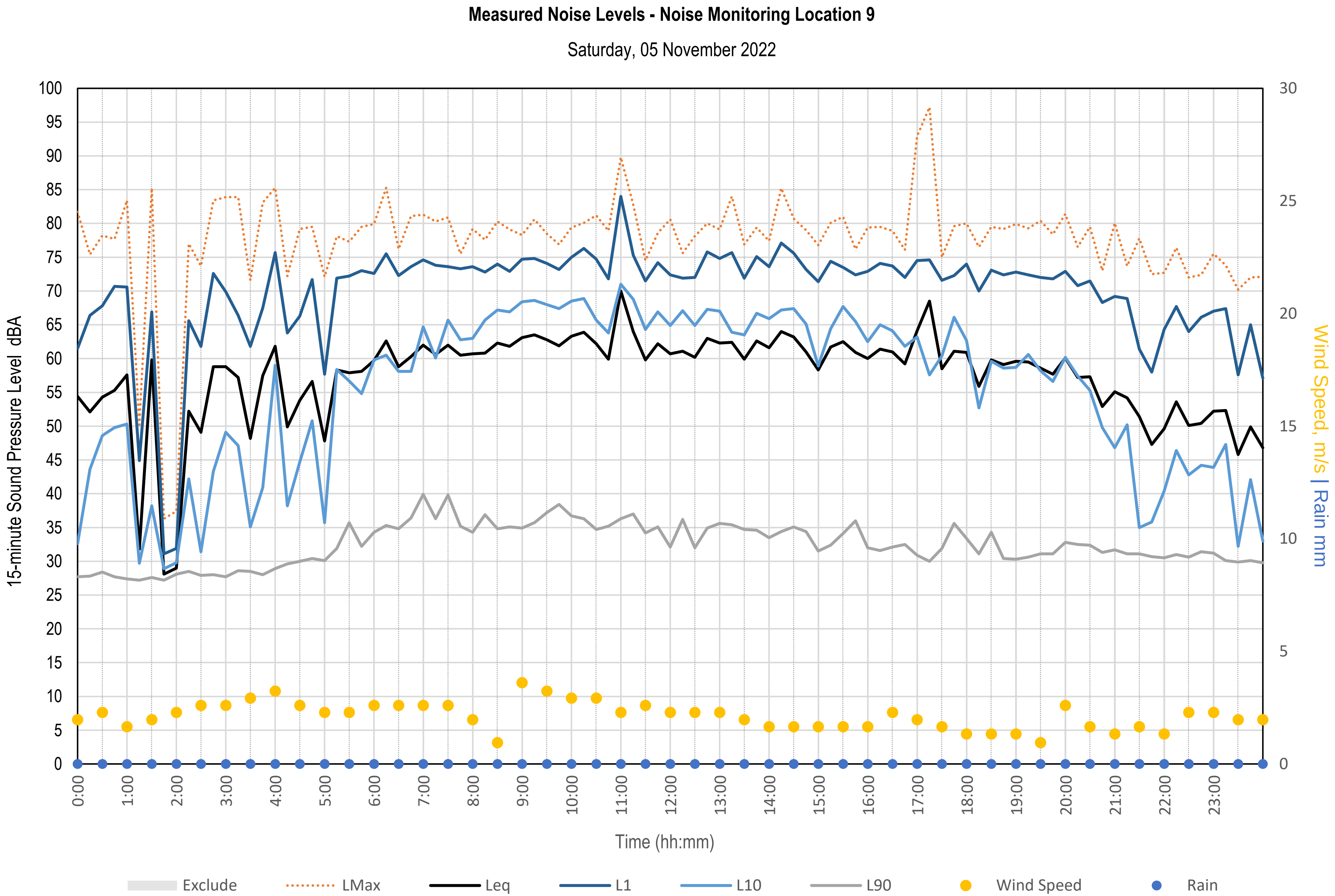
22:00
23:00
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 9
Friday, 04 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 9
Saturday, 05 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
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1:00
2:00
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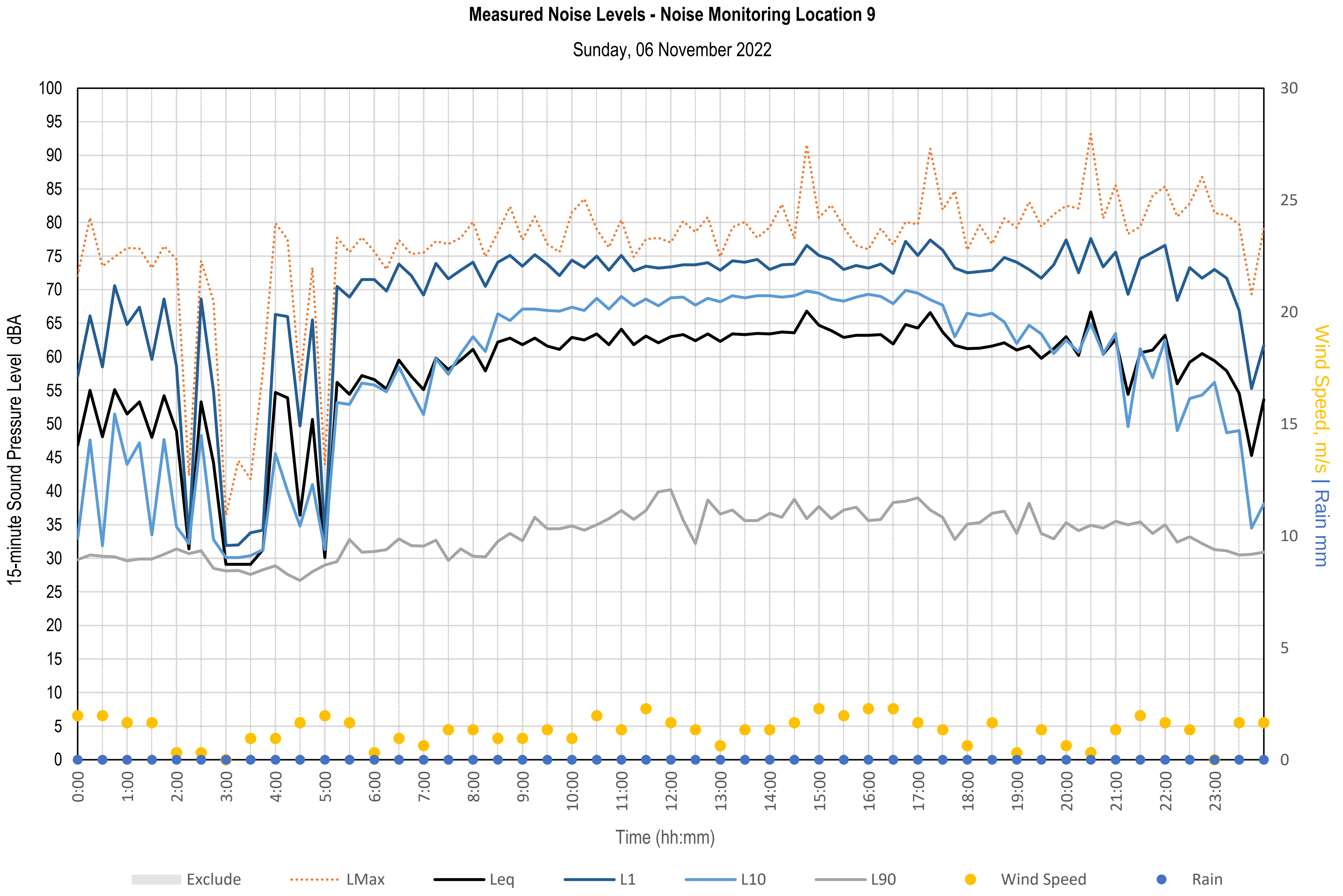
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 9
Sunday, 06 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
100
95
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85
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75
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Exclude
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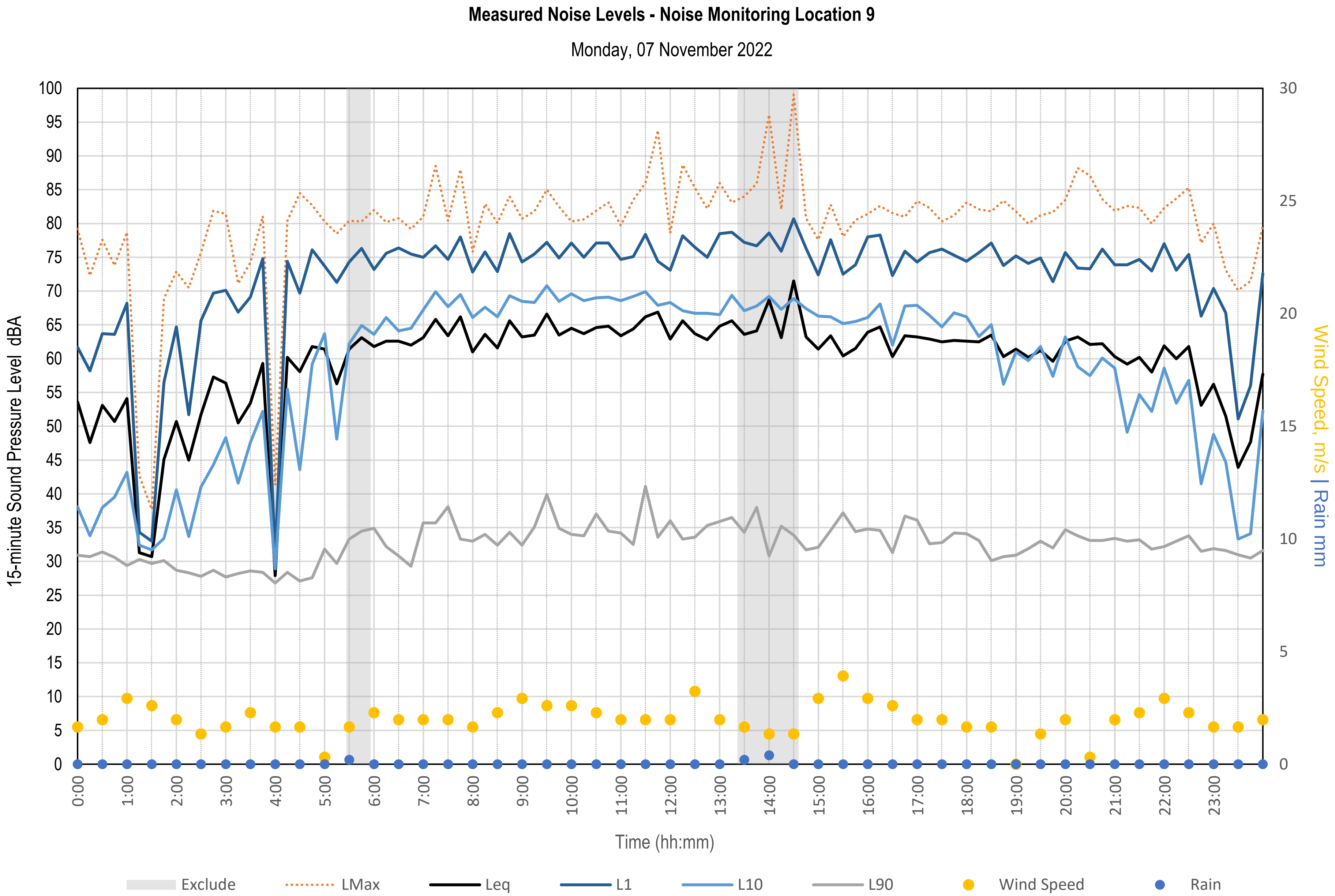
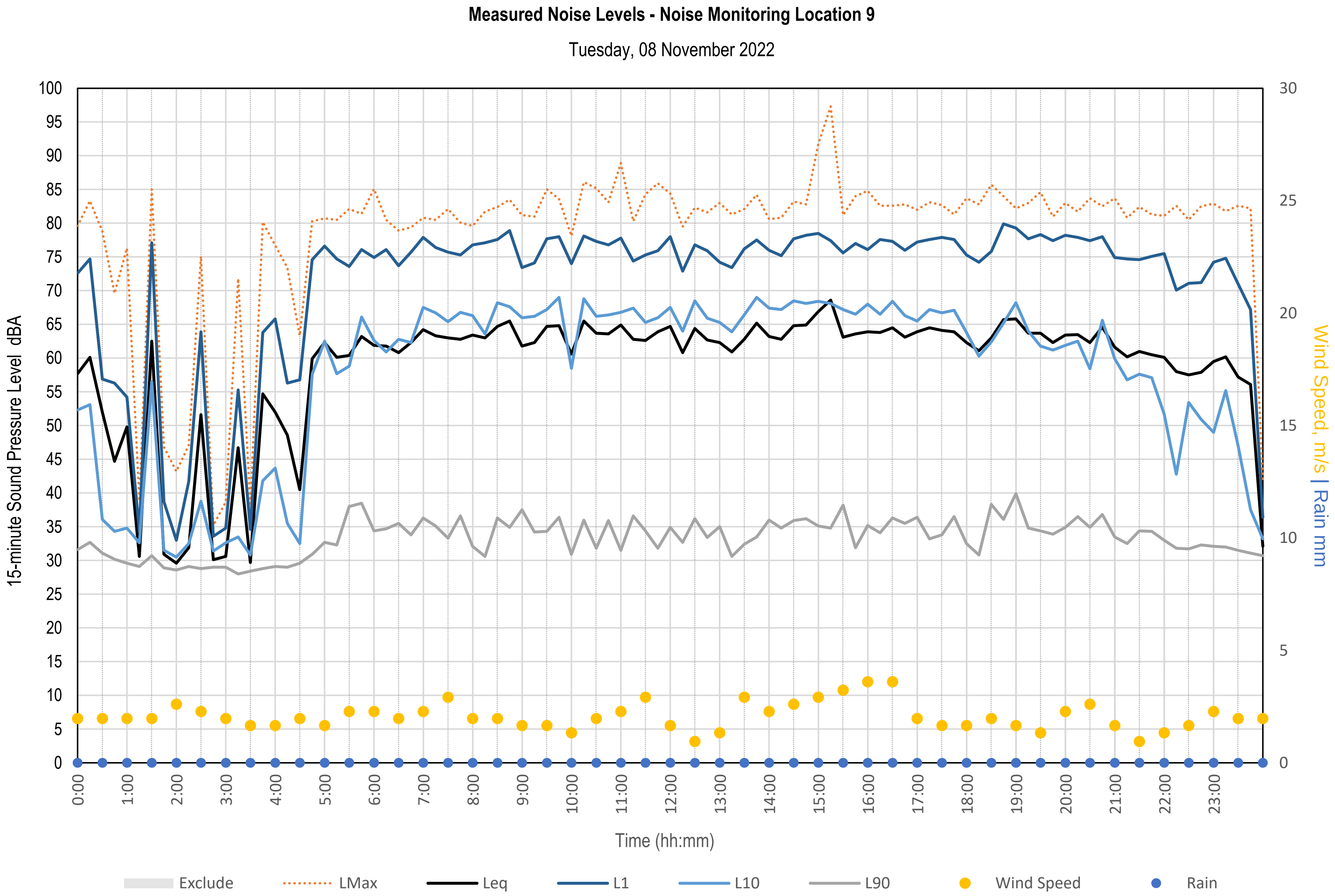
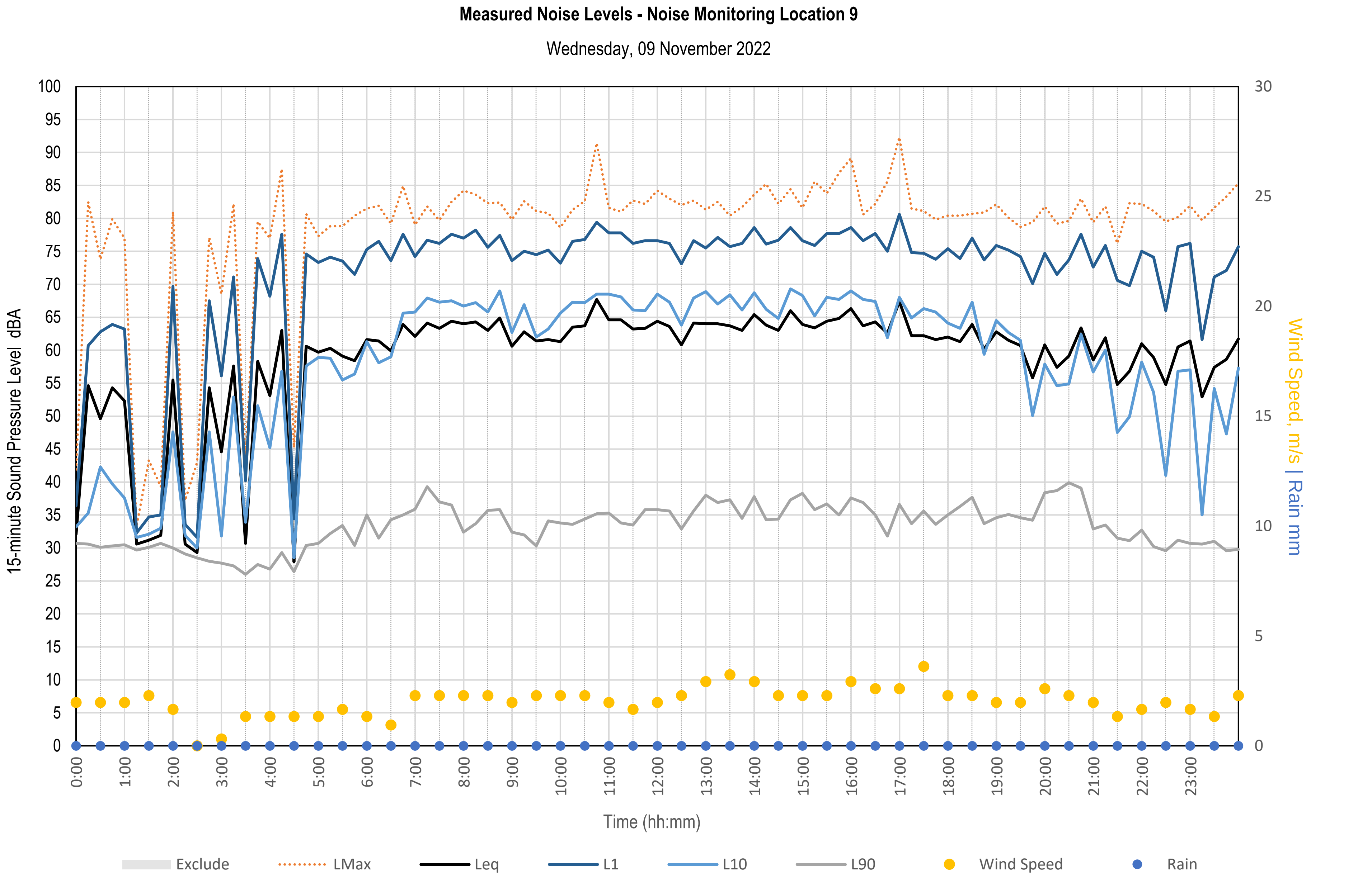
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 9
Monday, 07 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 9
Tuesday, 08 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 9
Wednesday, 09 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
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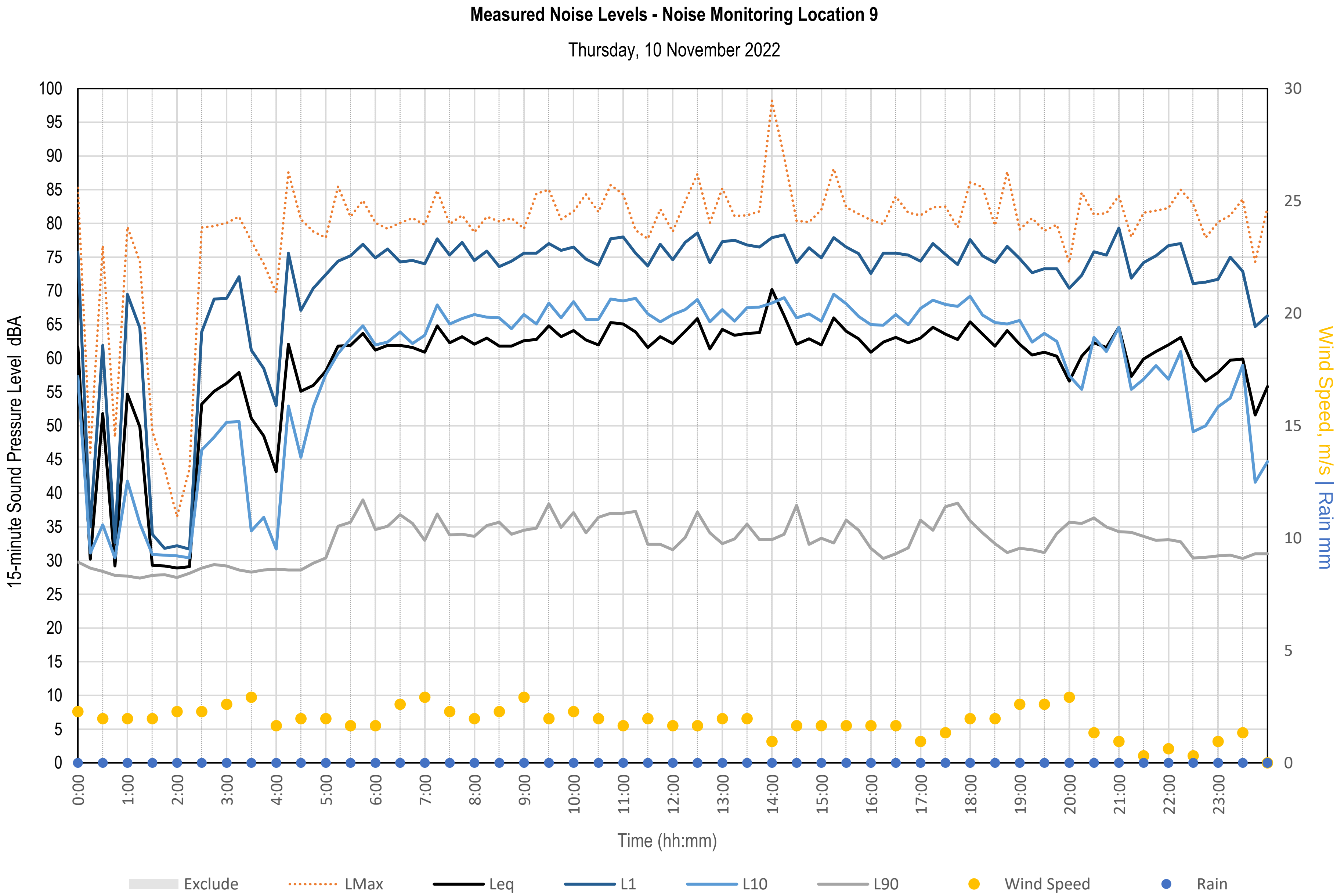
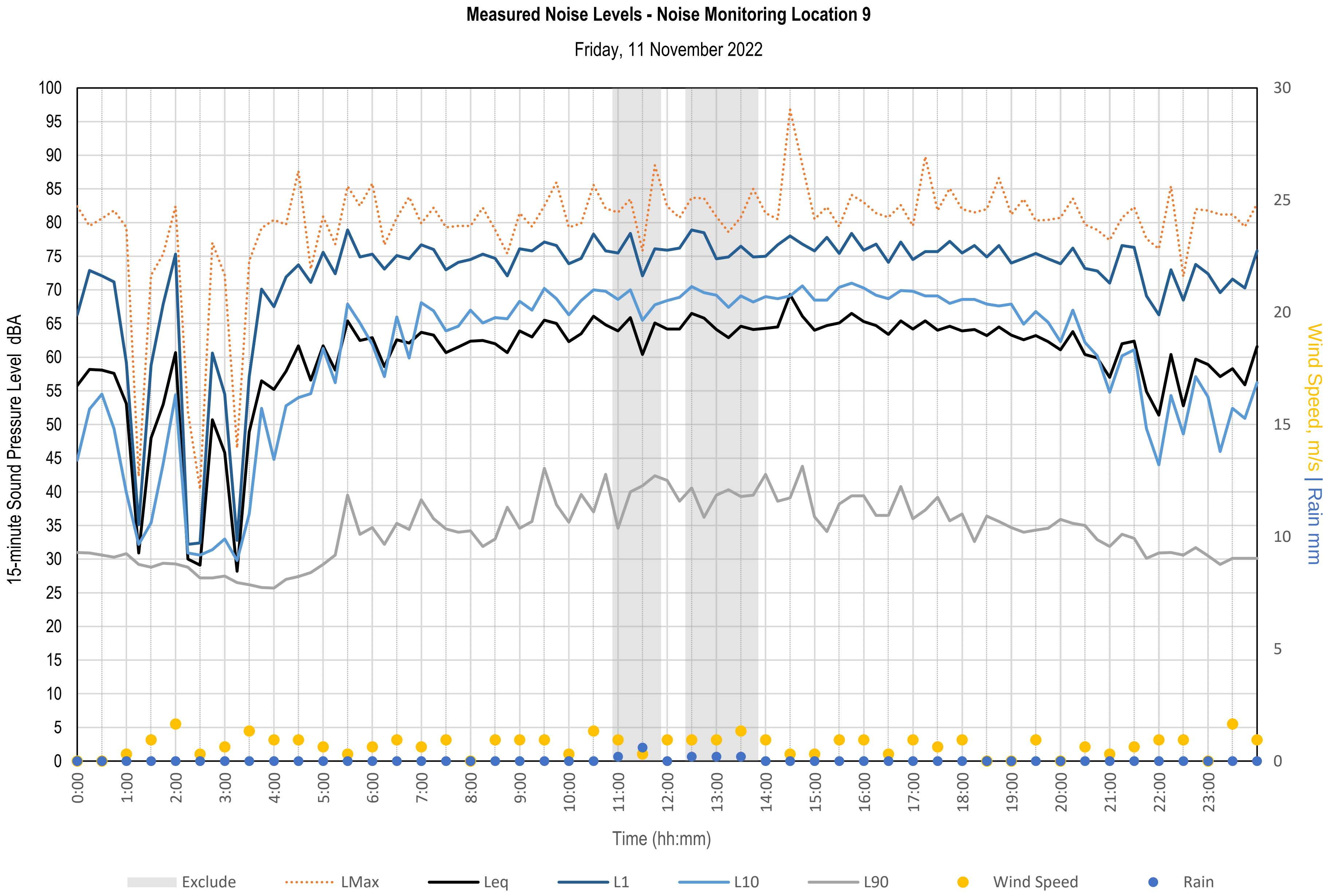
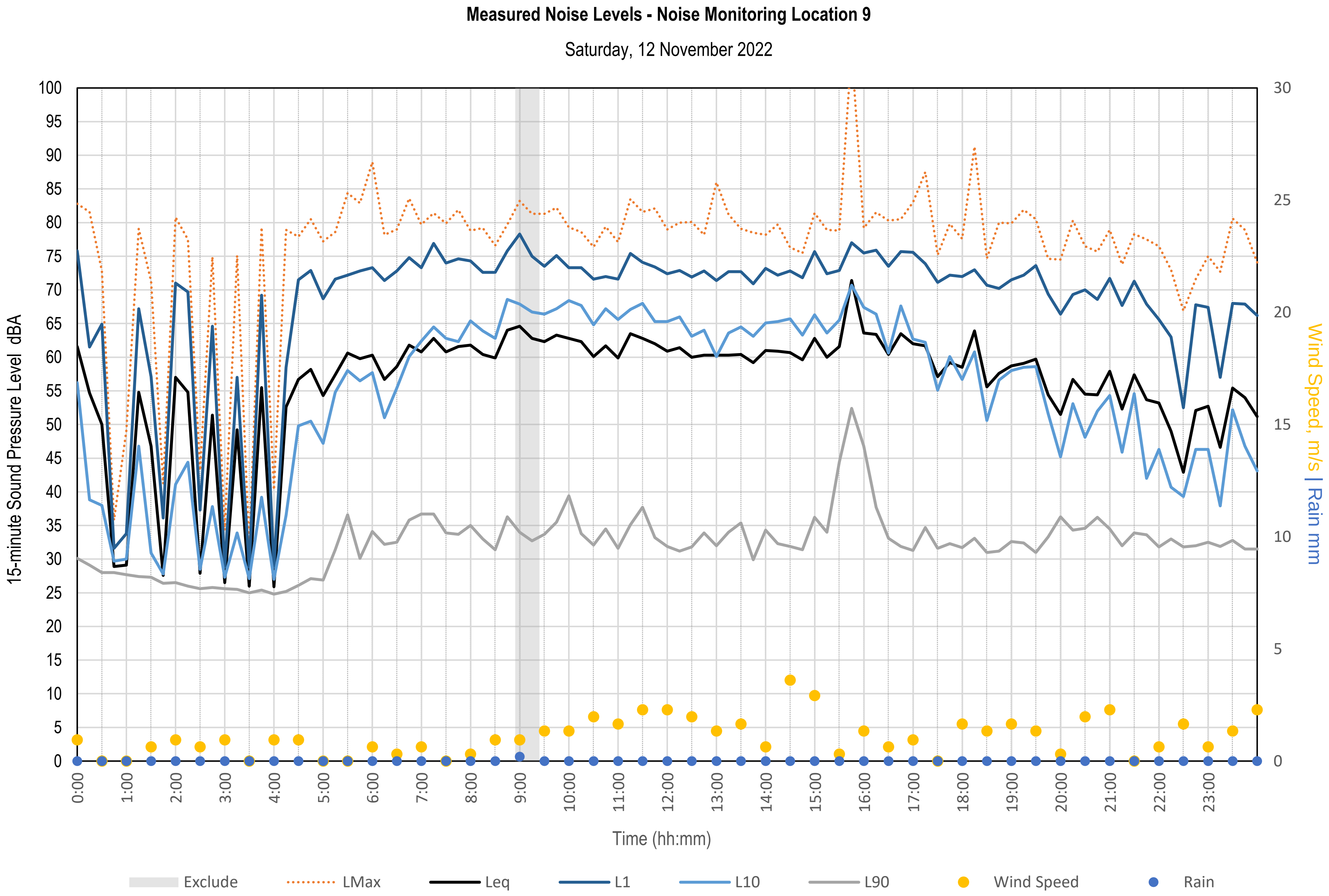
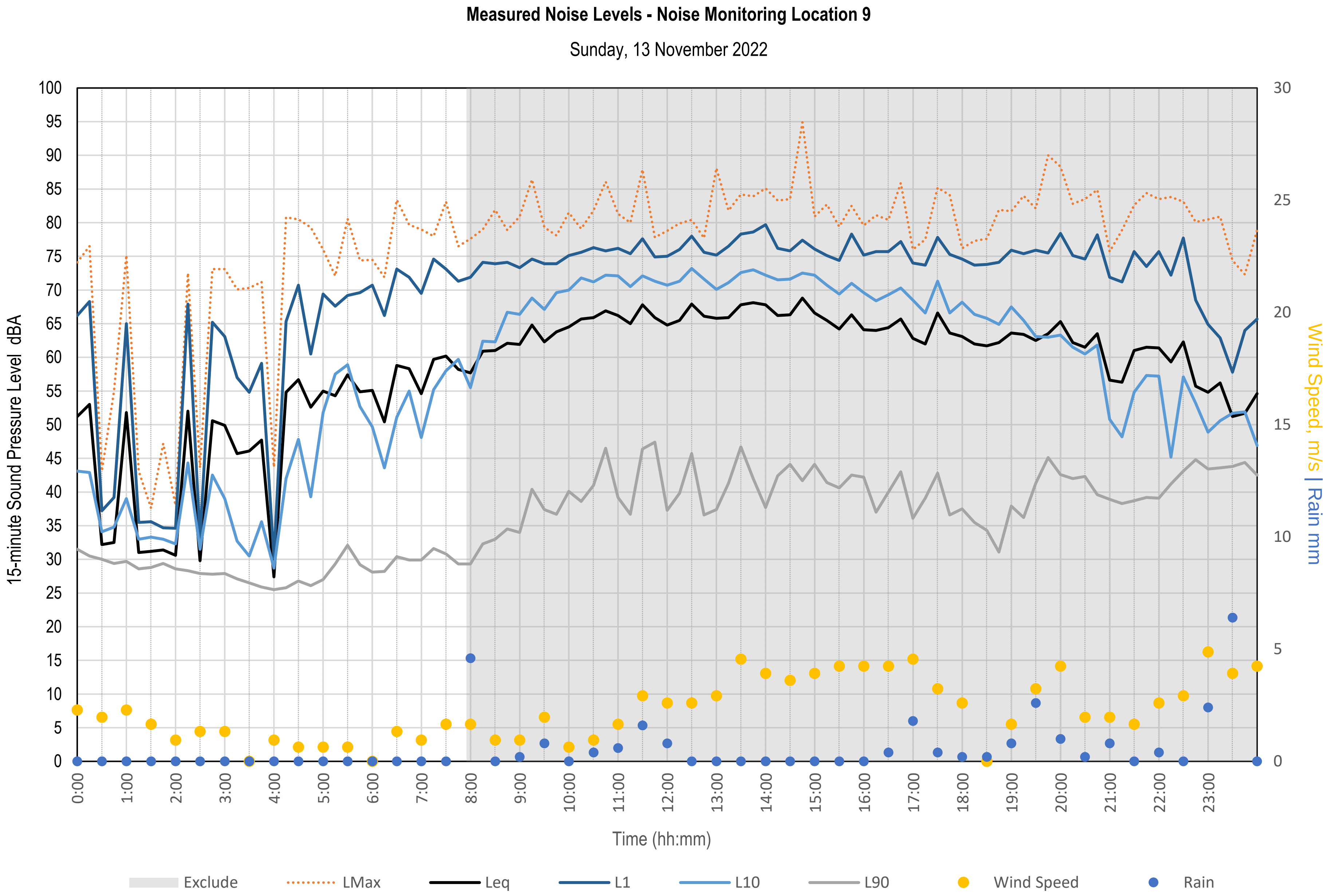
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

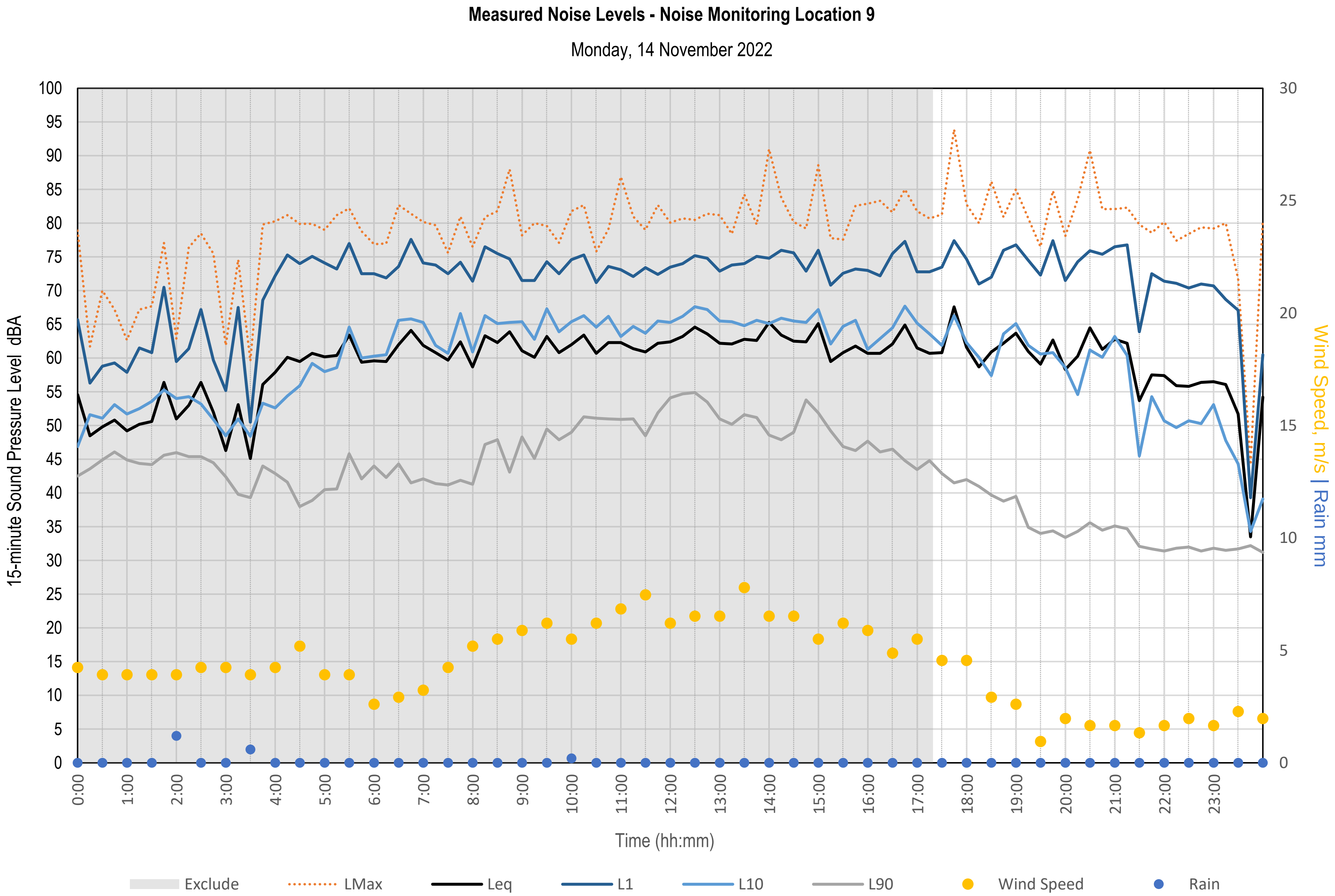


Measured Noise Levels - Noise Monitoring Location 9
Thursday, 10 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

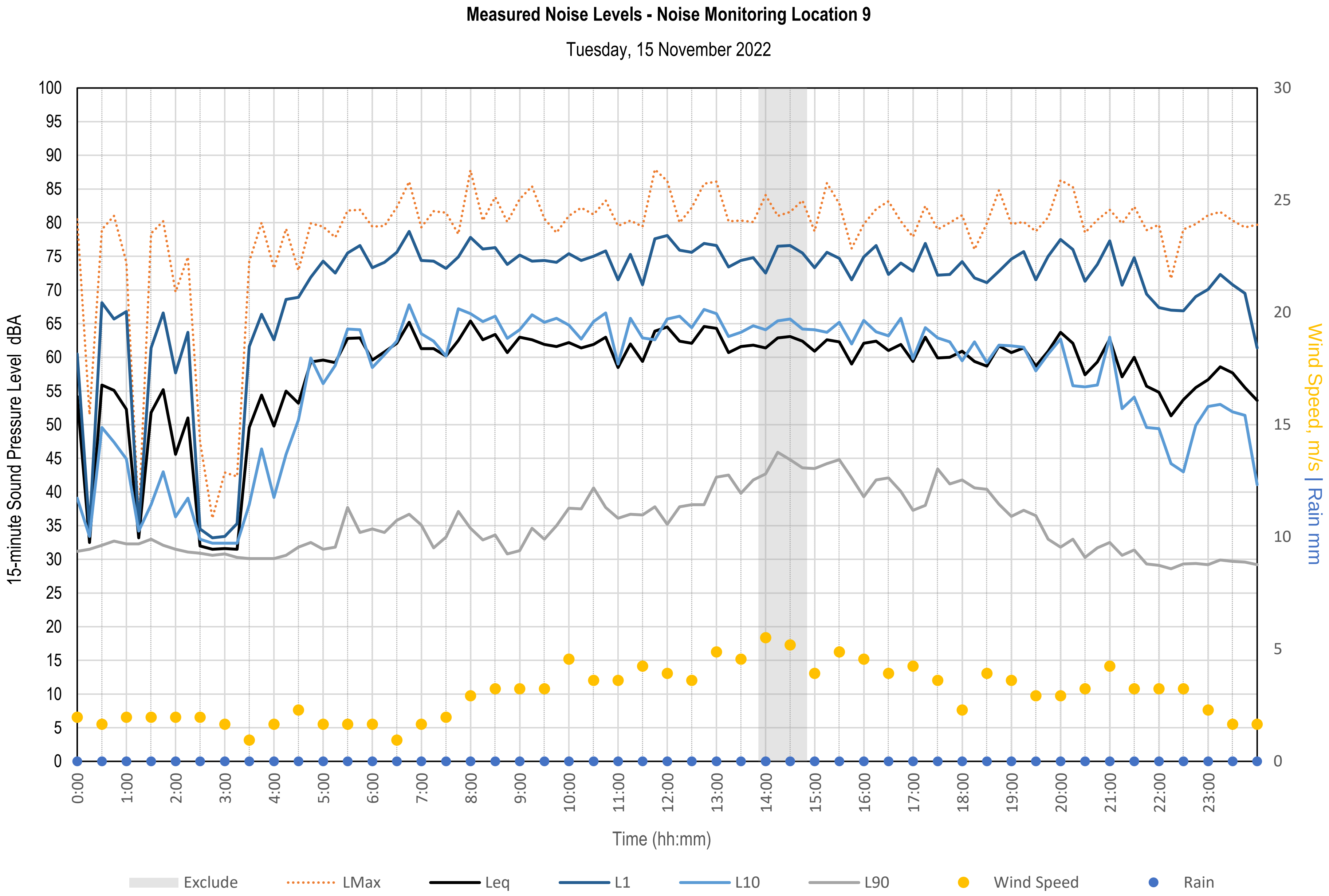

Measured Noise Levels - Noise Monitoring Location 9
Friday, 11 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

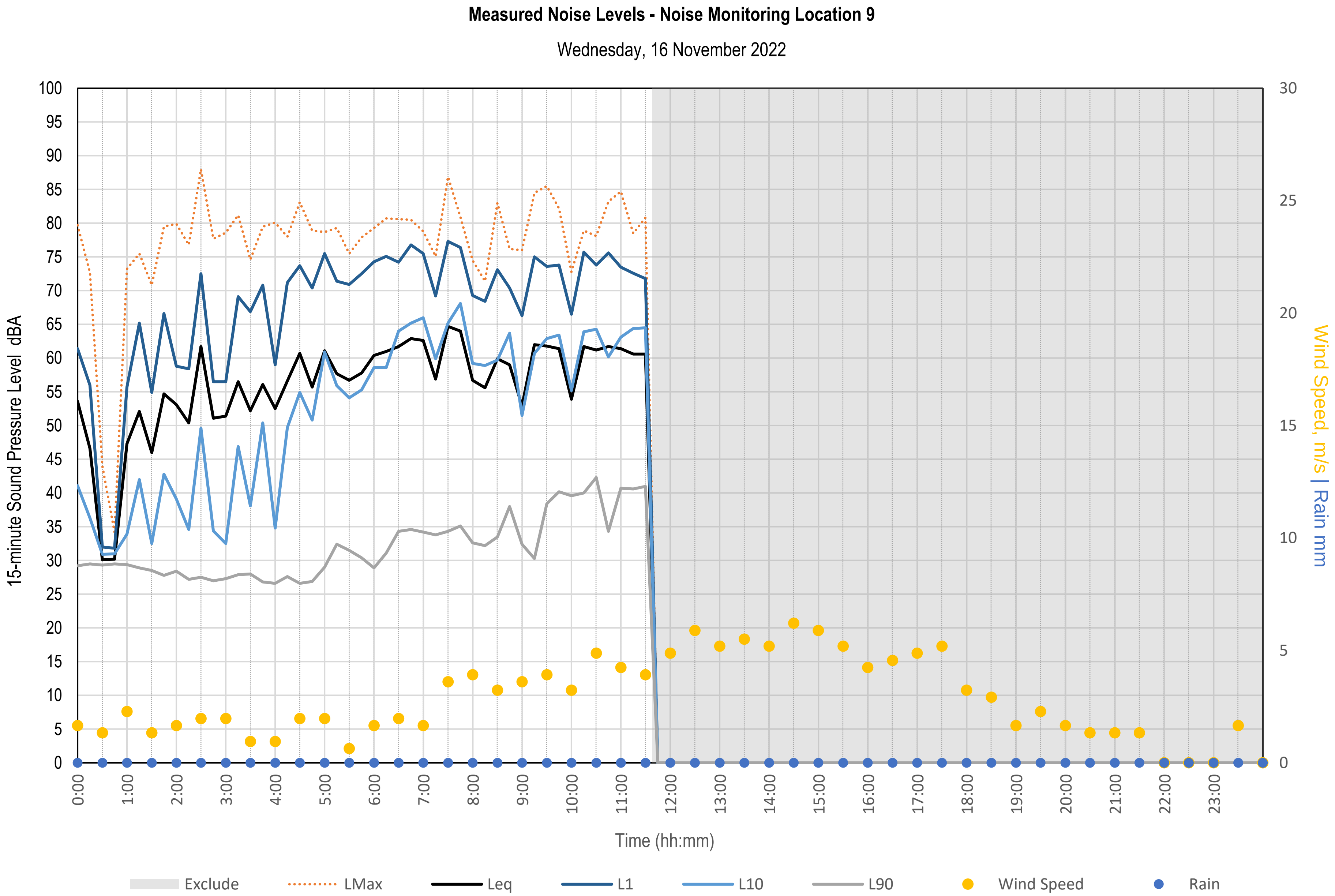

Measured Noise Levels - Noise Monitoring Location 9
Saturday, 12 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

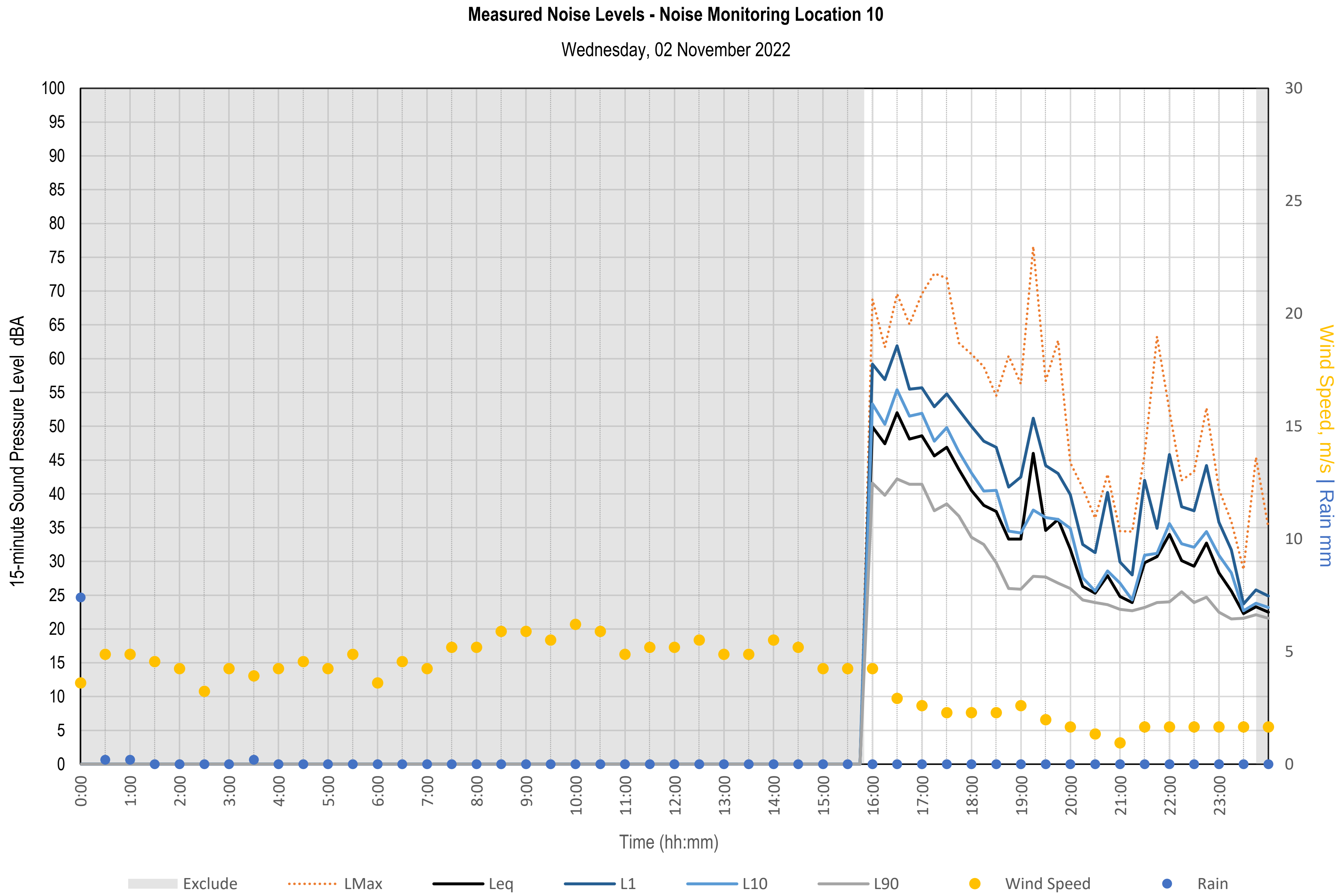

Measured Noise Levels - Noise Monitoring Location 9
Sunday, 13 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

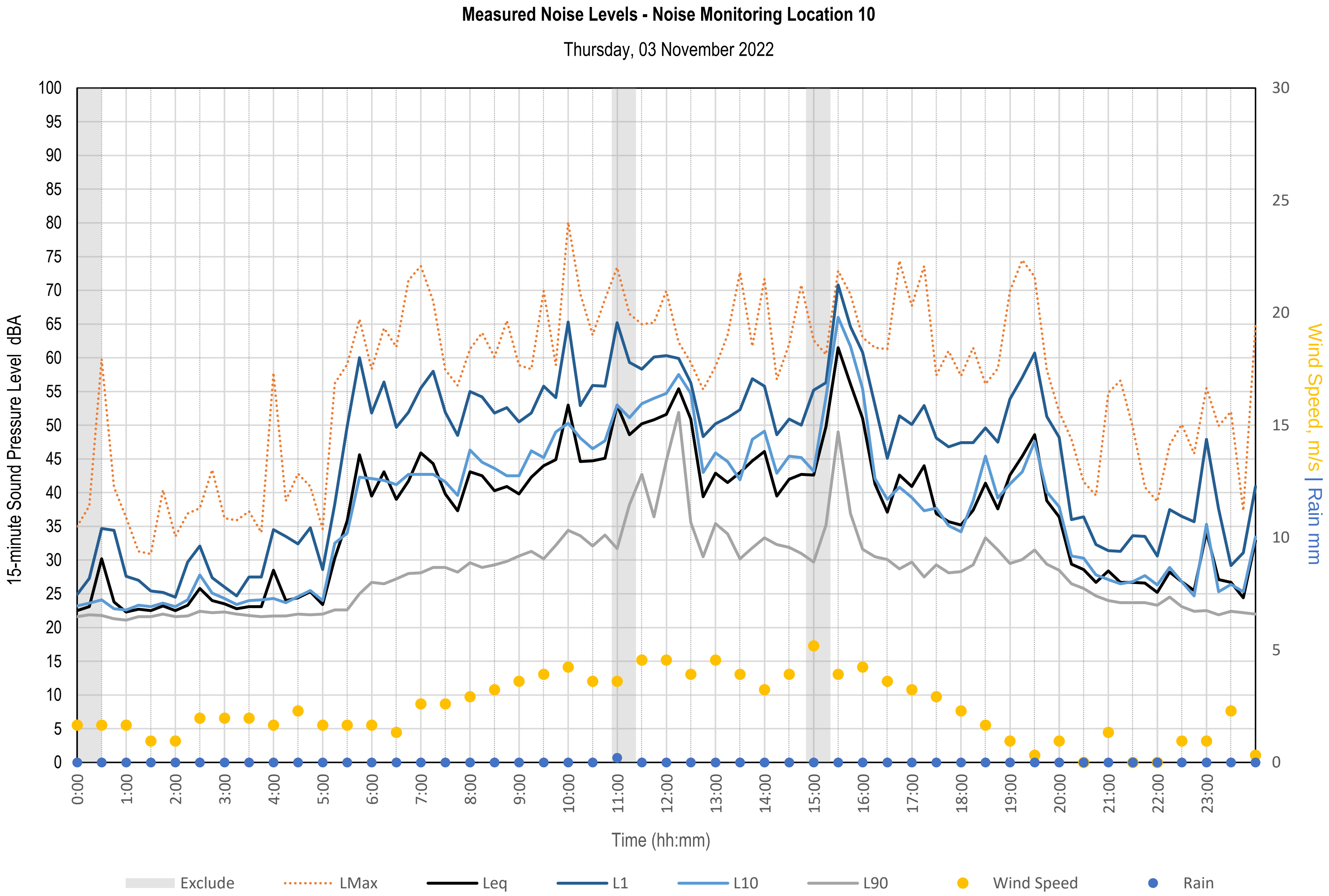


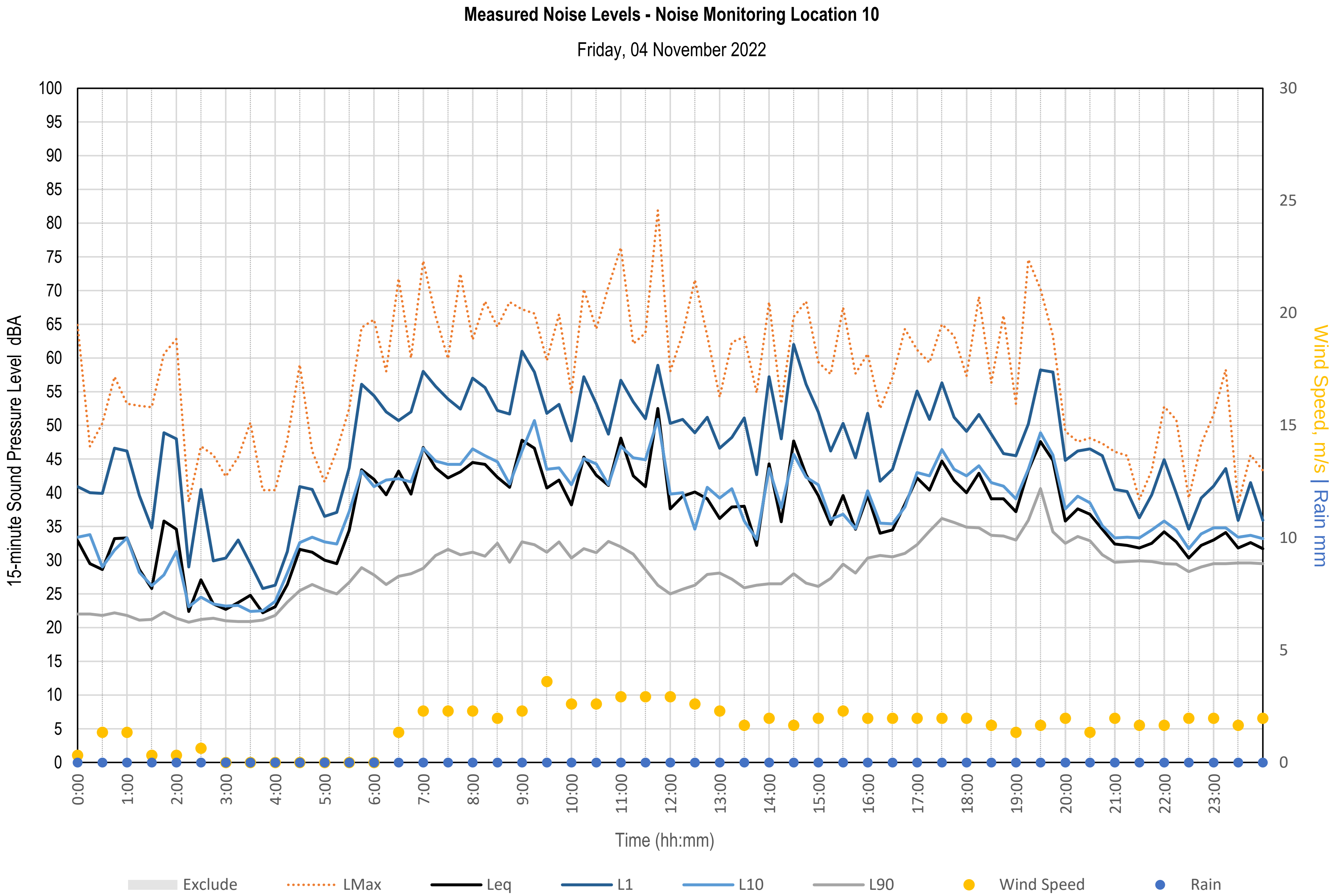
Measured Noise Levels - Noise Monitoring Location 9
Monday, 14 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

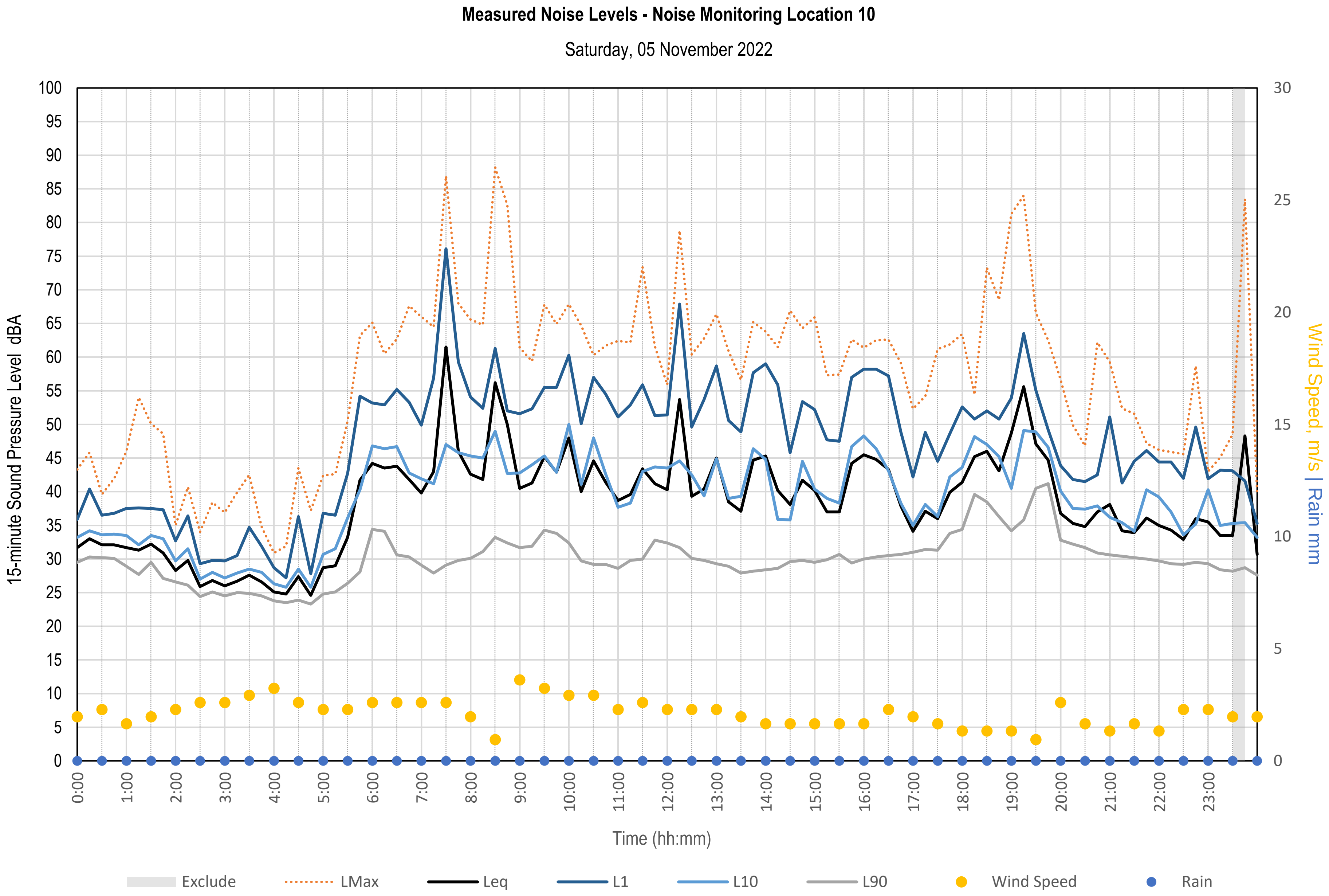

Measured Noise Levels - Noise Monitoring Location 9
Tuesday, 15 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

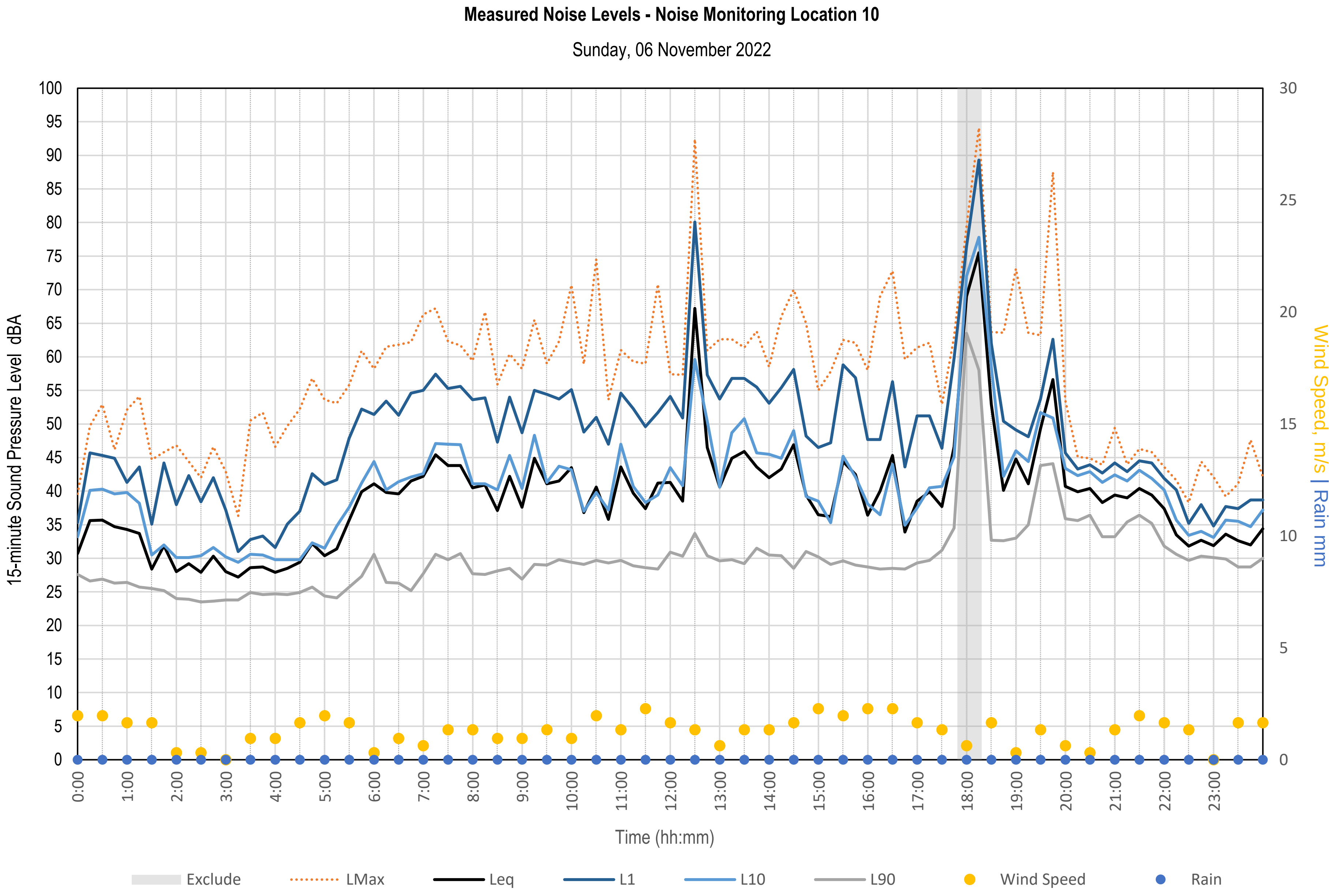

Measured Noise Levels - Noise Monitoring Location 9
Wednesday, 16 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

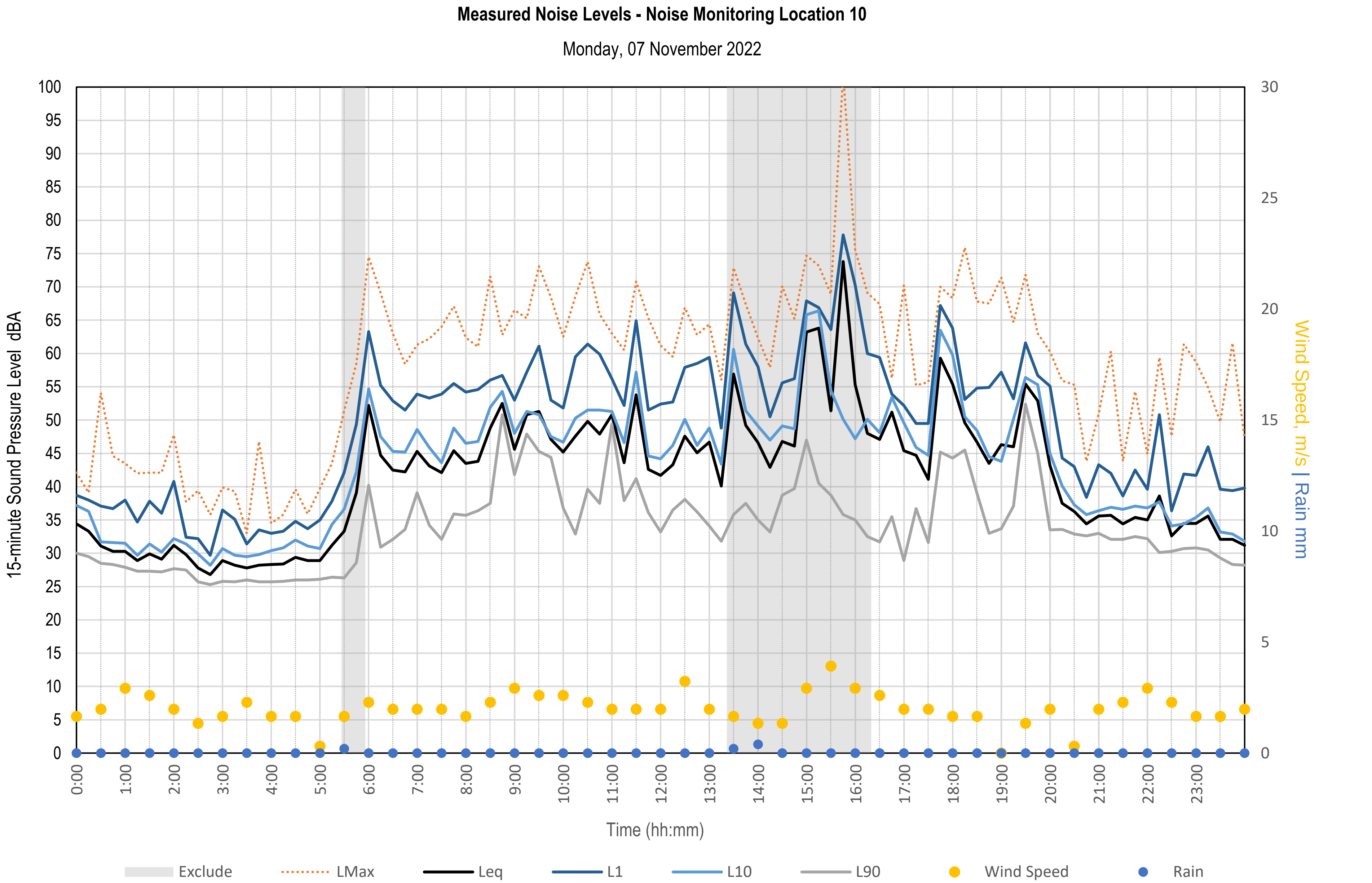

Measured Noise Levels - Noise Monitoring Location 10
Wednesday, 02 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 10
Thursday, 03 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

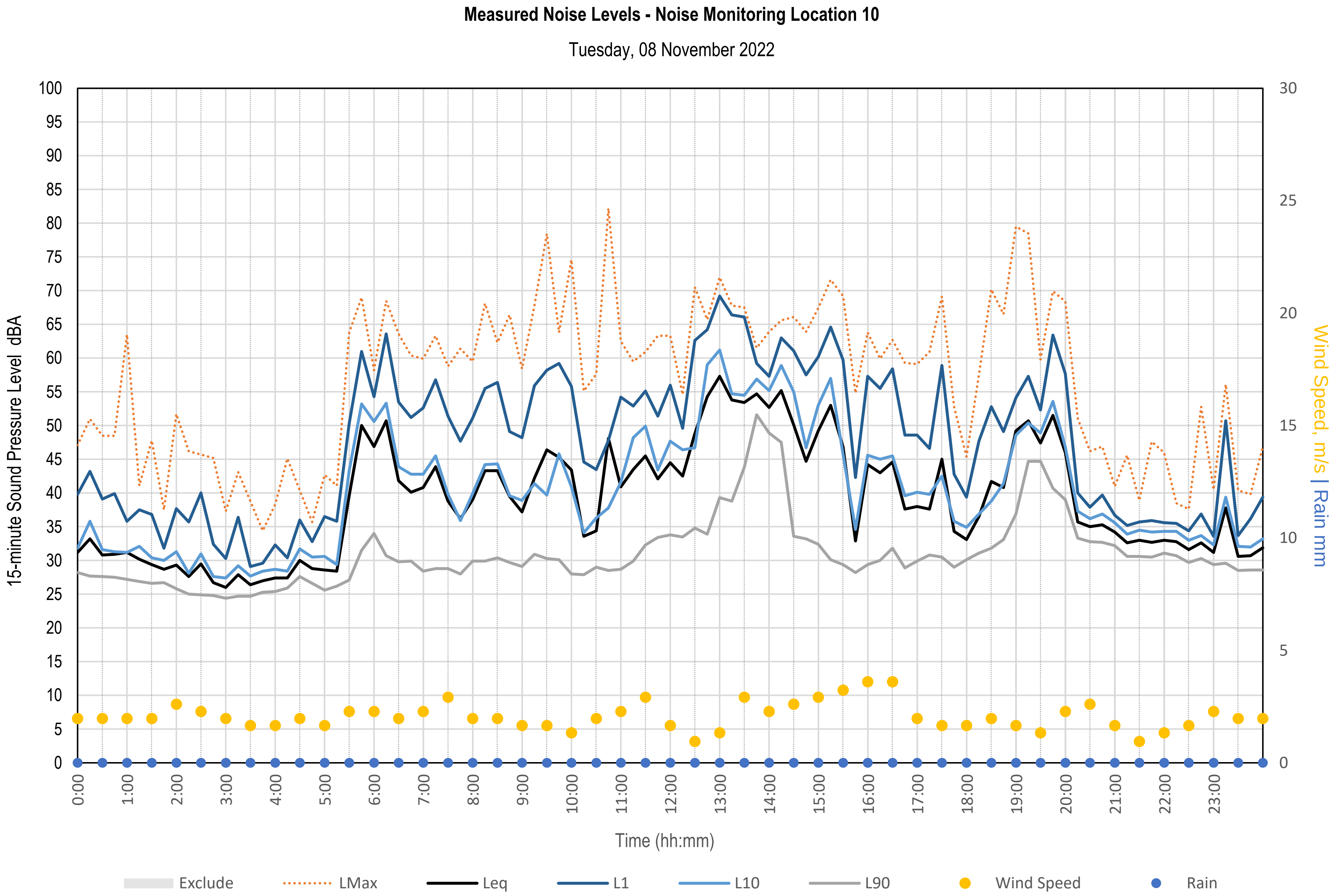

Measured Noise Levels - Noise Monitoring Location 10
Friday, 04 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

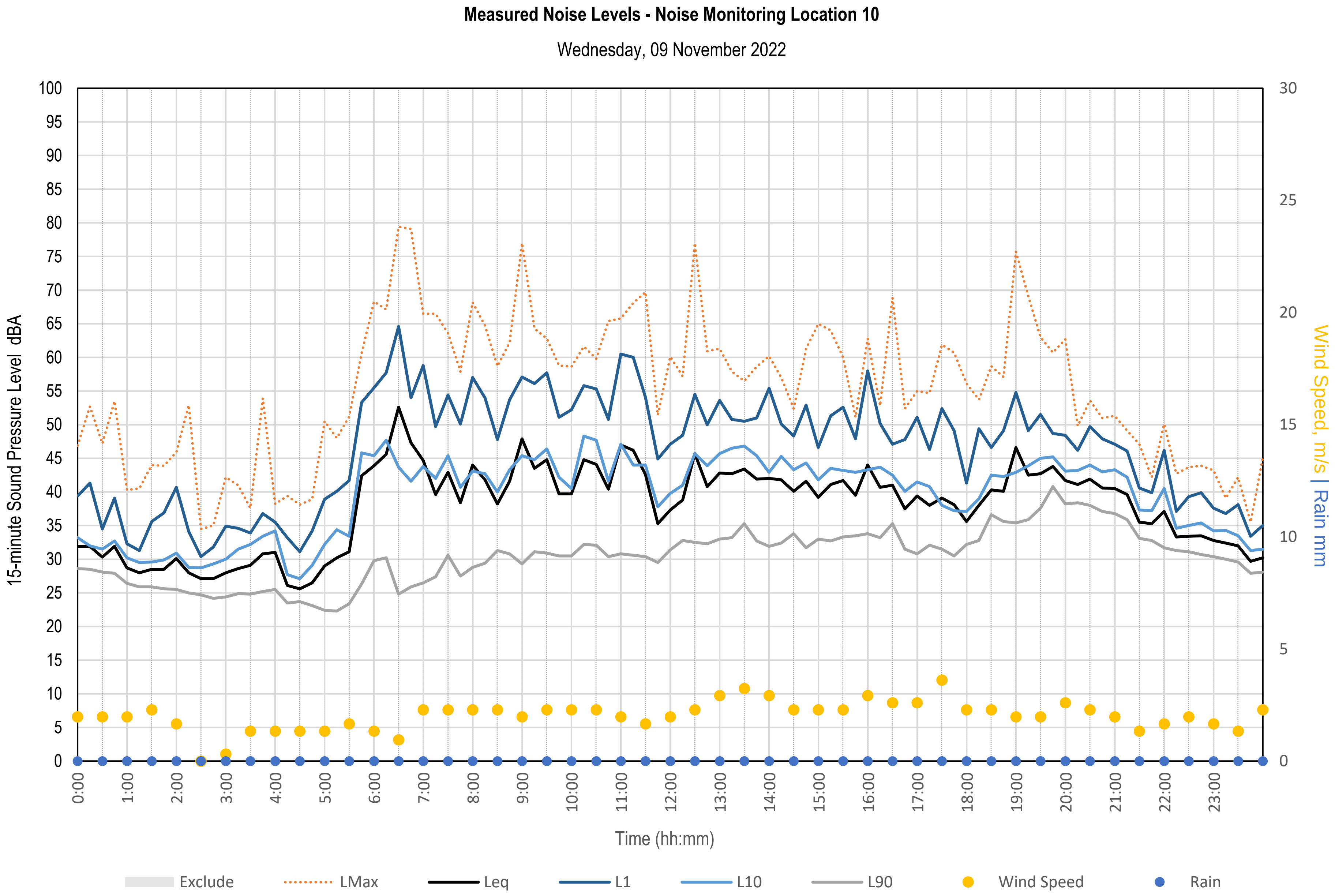

Measured Noise Levels - Noise Monitoring Location 10
Saturday, 05 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 10
Sunday, 06 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 10
Monday, 07 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 10
Tuesday, 08 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 10
Wednesday, 09 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
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6:00
7:00
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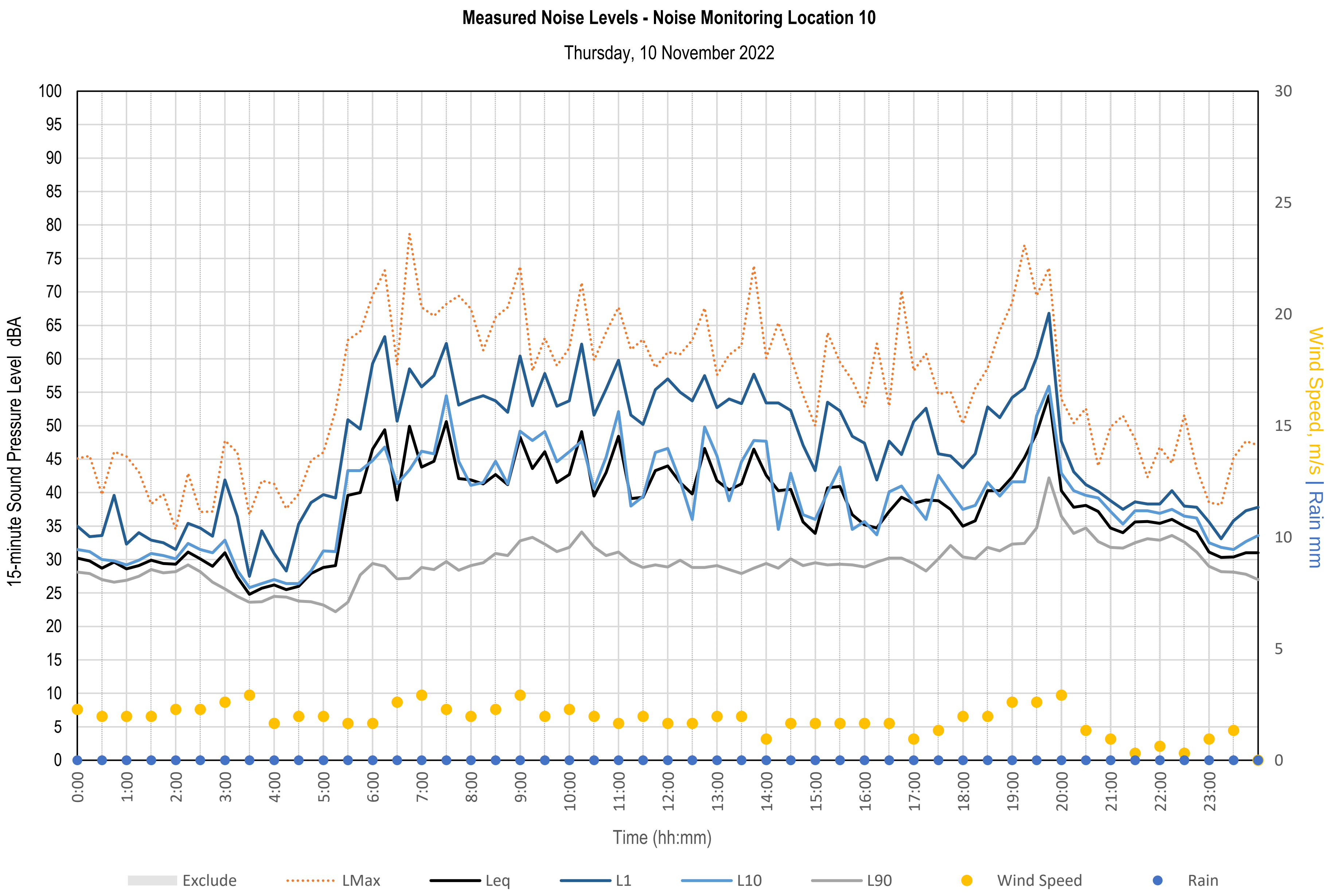
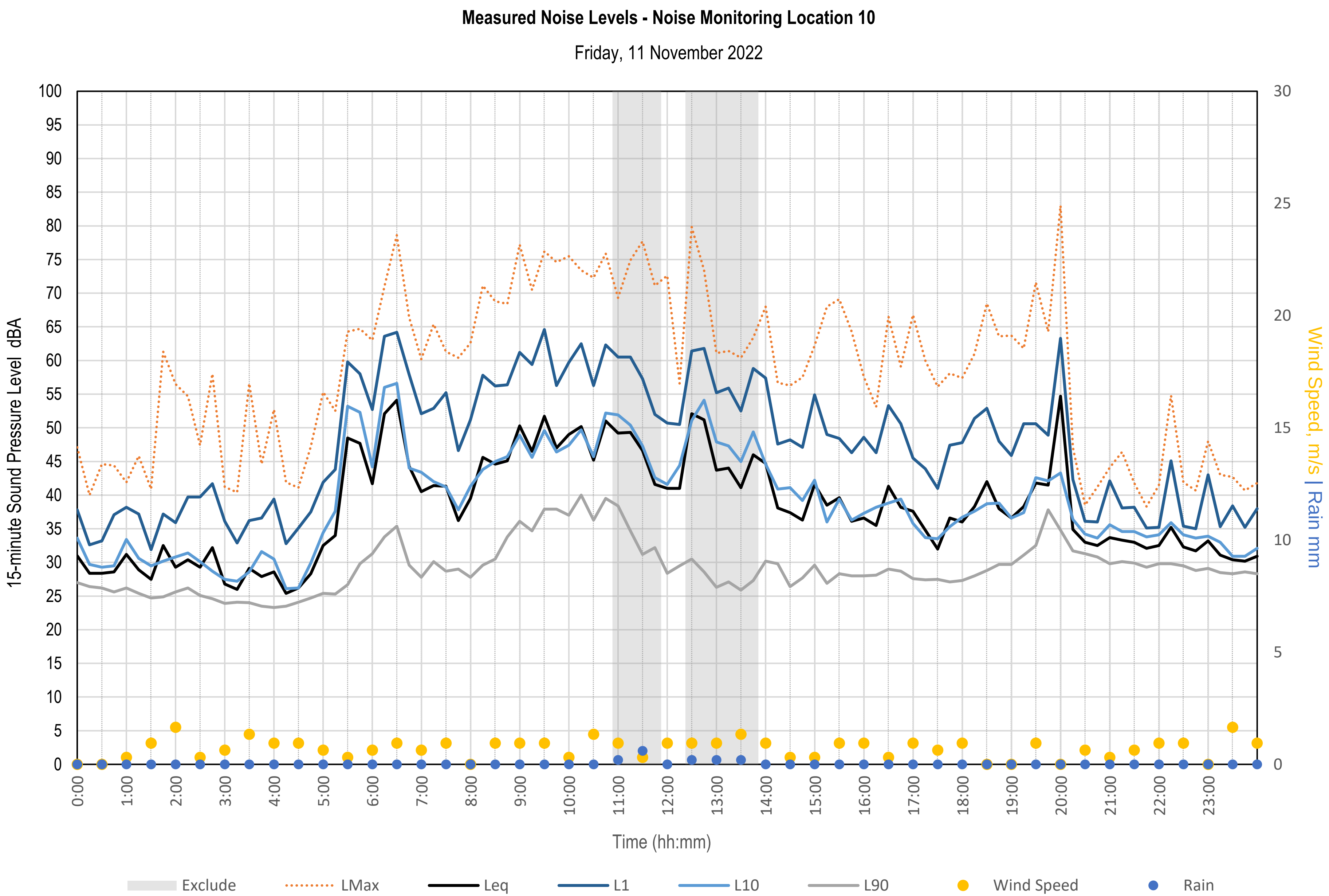
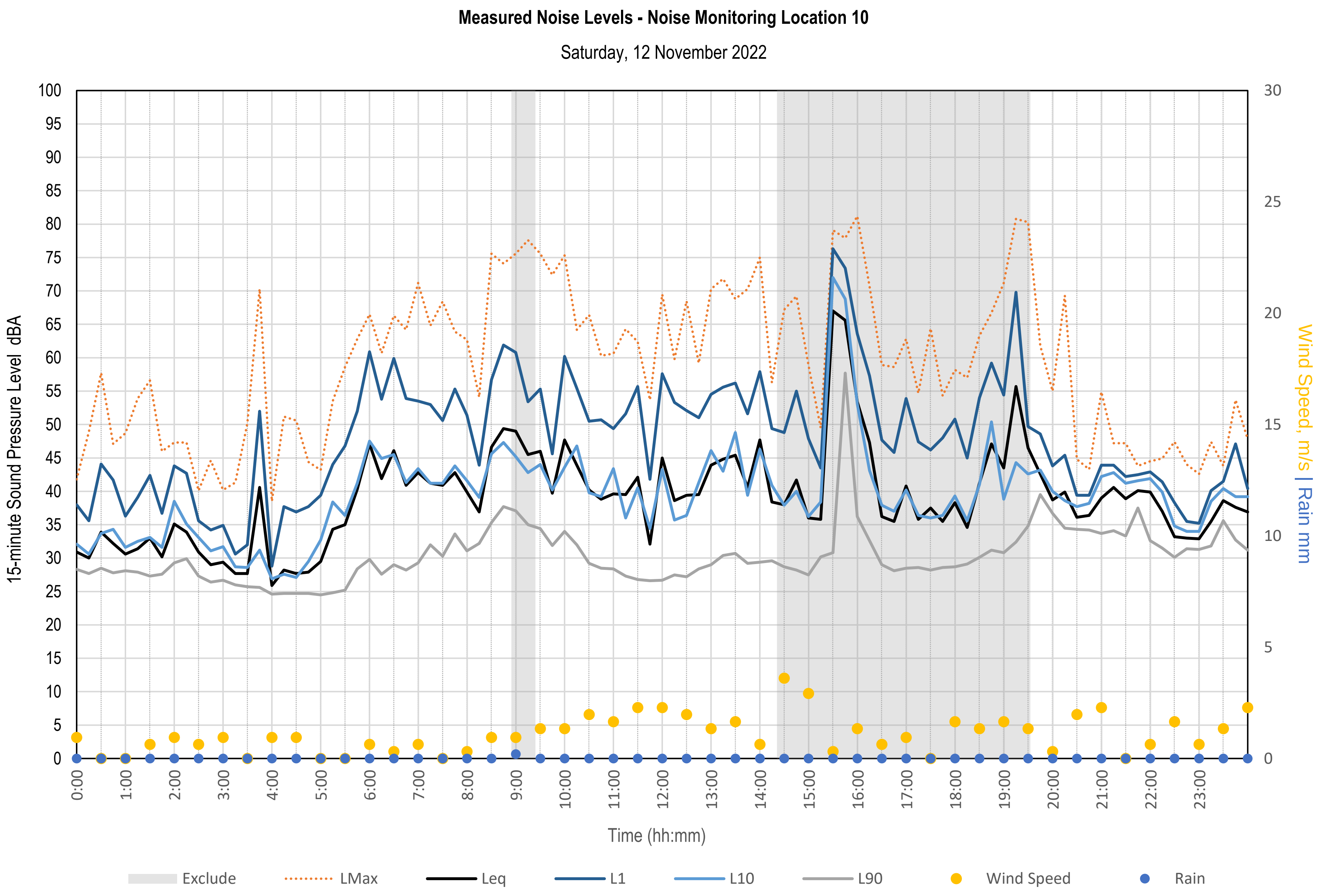
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

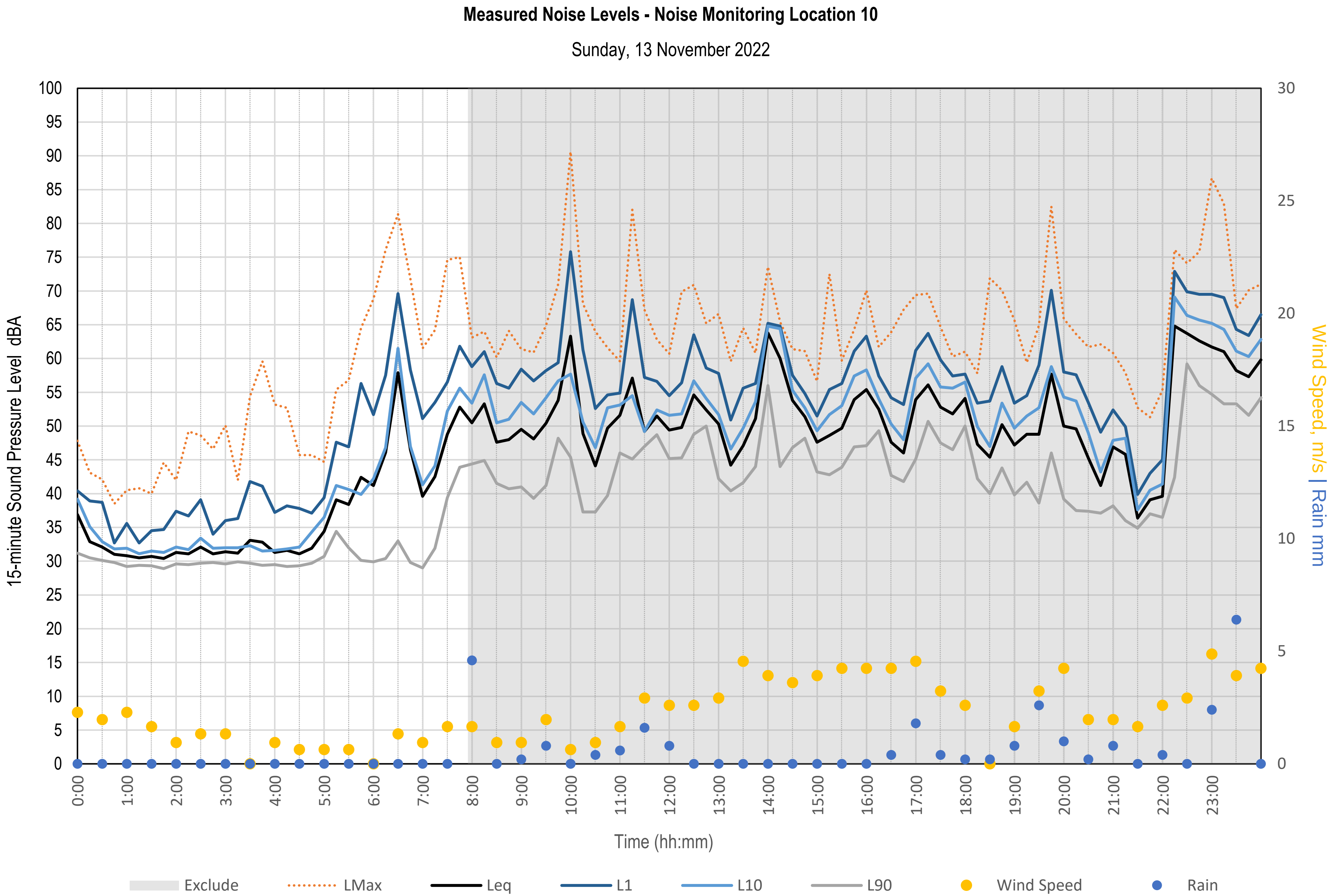


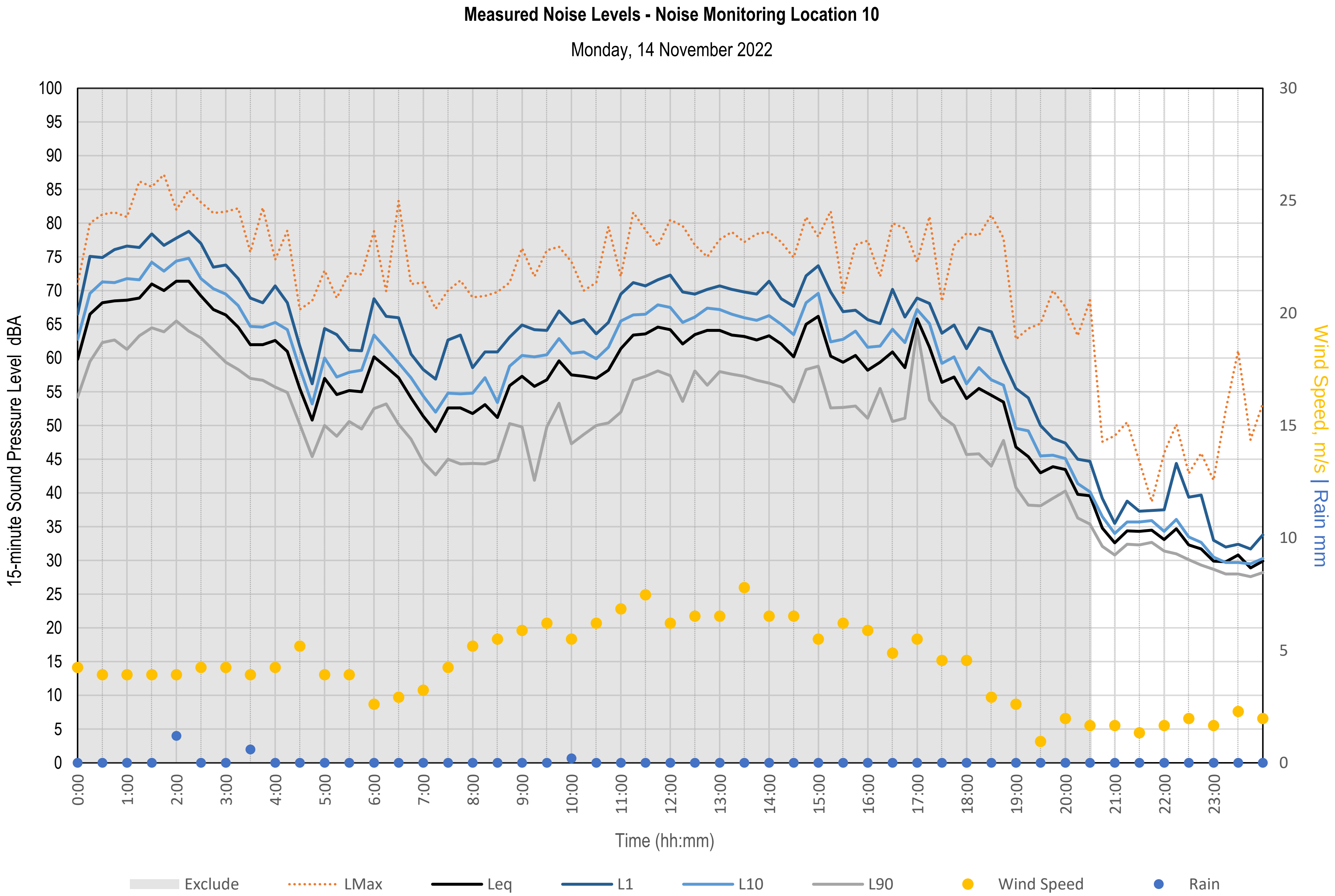
Measured Noise Levels - Noise Monitoring Location 10
Thursday, 10 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

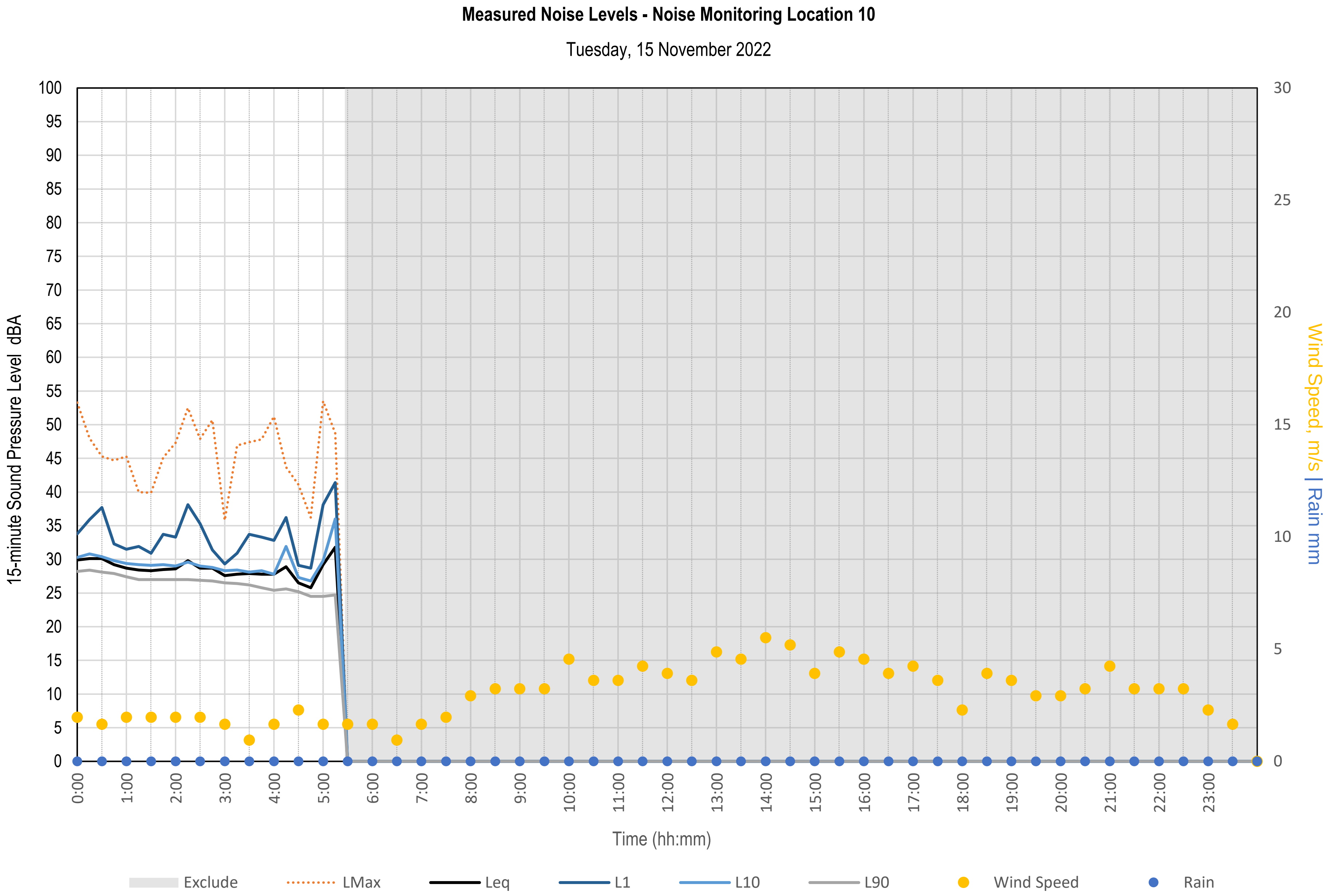

Measured Noise Levels - Noise Monitoring Location 10
Friday, 11 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain



Measured Noise Levels - Noise Monitoring Location 10
Saturday, 12 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 10
Sunday, 13 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 10
Monday, 14 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain


Measured Noise Levels - Noise Monitoring Location 10
Tuesday, 15 November 2022
15-minute Sound Pressure Level dBA
Wind Speed, m/s | Rain mm
Time (hh:mm)
Exclude
LMax
Leq
L1
L10
L90
Wind Speed
Rain

APPENDIX A-2
Noise sensitive receiver maps

Legend

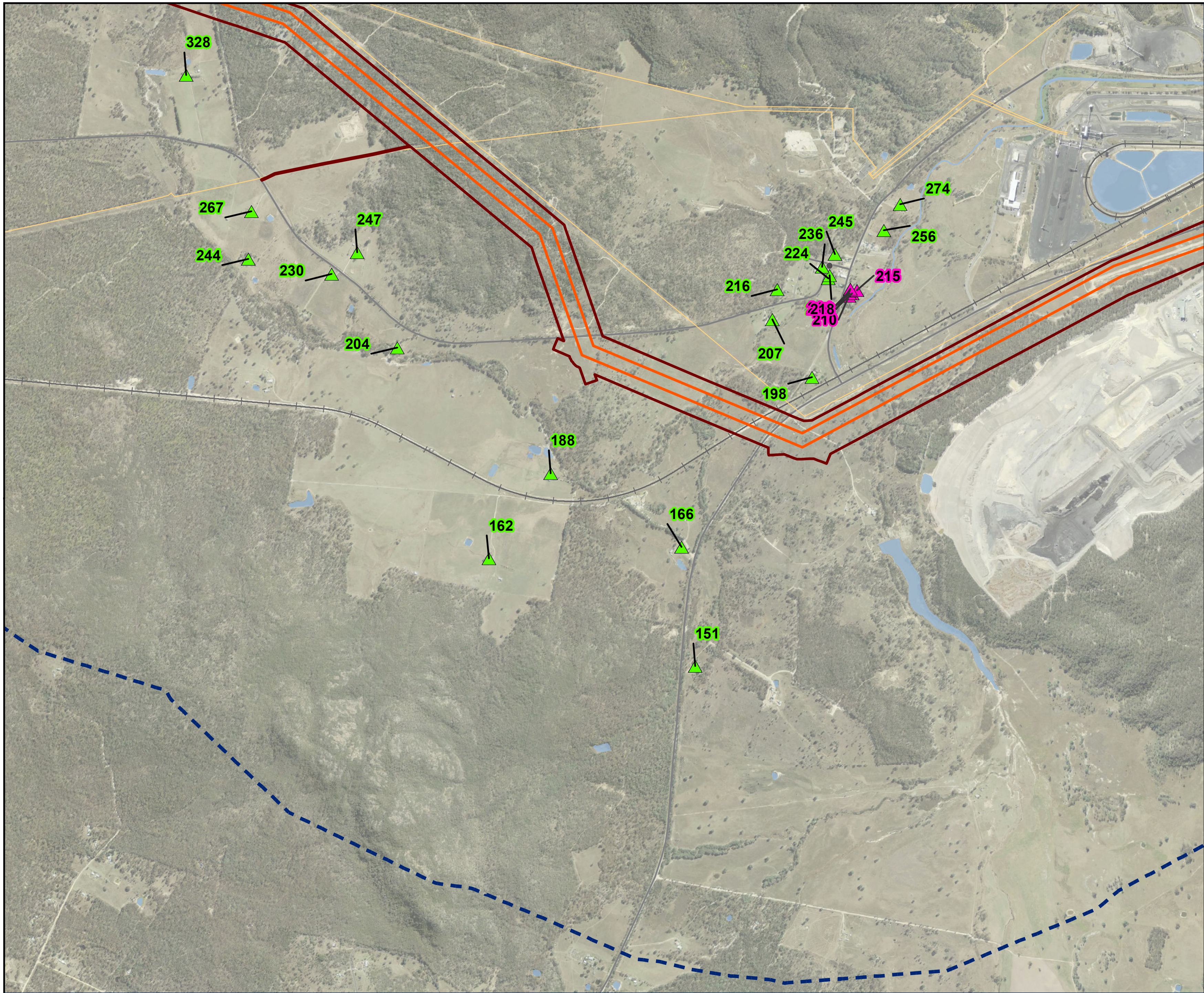
- Study area
- Construction area
- Construction compound
- Energy hub / 500 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Existing substation
- Existing transmission line
- Road
- Railway
- Watercourse
- Water body
- NPWS estate

Noise sensitive receivers

- House
- Unoccupied house

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:100,000
Data sources: WSP 2023, NSWSS, EnergyCo

Appendix A-2
Noise sensitive receivers

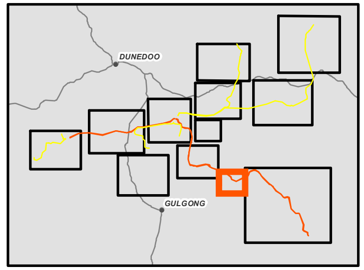


Legend

- Study area
- Construction area
- 500 kV transmission line
- 330 kV transmission line
- Existing transmission line
- Road
- Railway
- Watercourse
- Water body

Noise sensitive receivers

- House
- School



0 0.35 0.7 Km

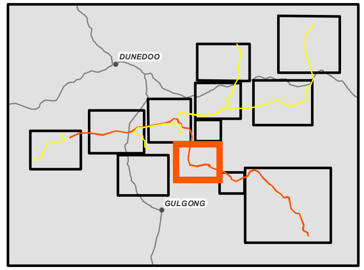
Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:30,000
Data sources: WSP 2023, NSWSS, EnergyCo

Legend

- Study area
- Construction area
- 500 kV transmission line
- 330 kV transmission line
- Existing transmission line
- Road
- Railway
- Water body

Noise sensitive receivers

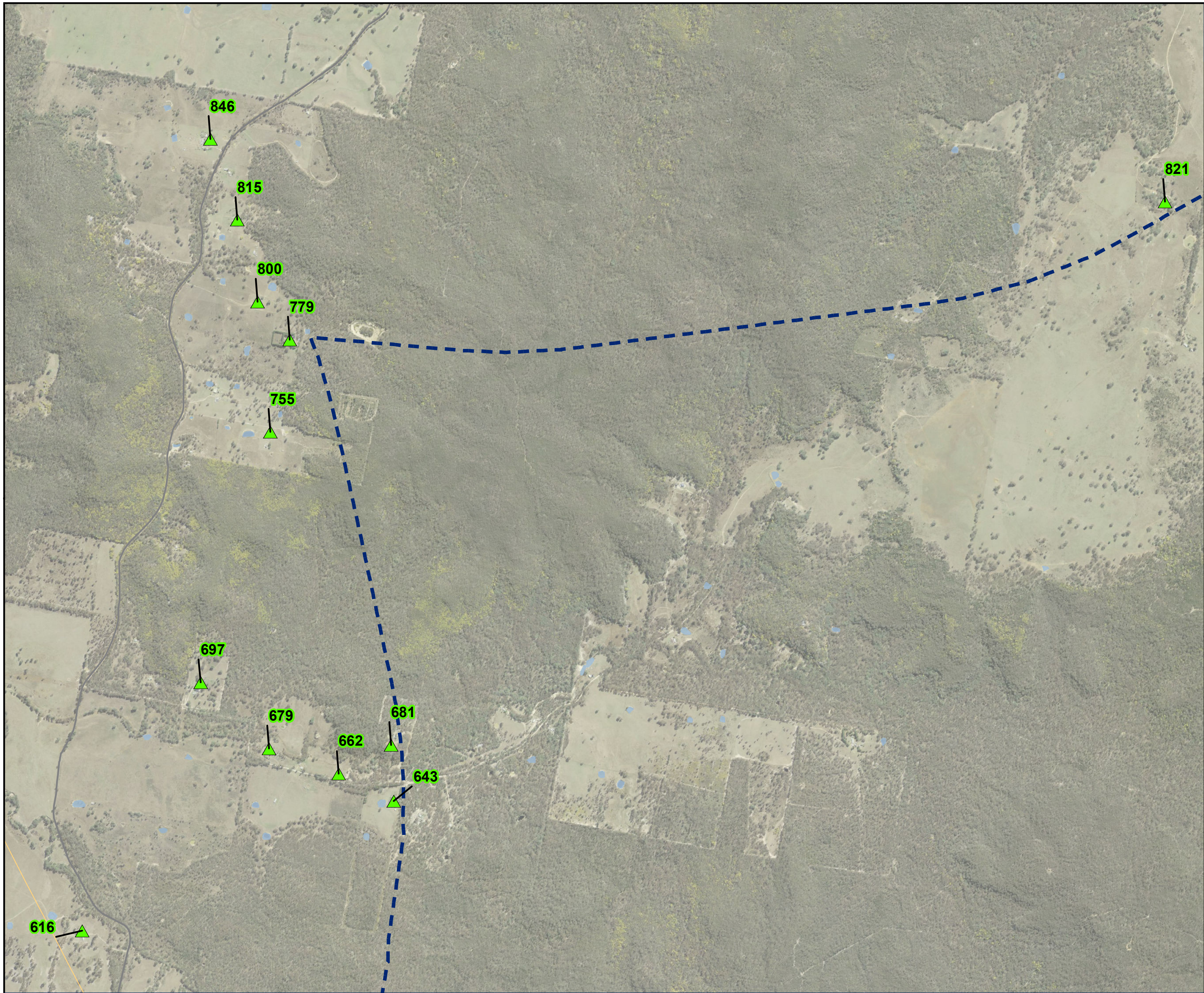
- House
- DA approved (no structure)



0 0.6 1.2 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:50,000
Data sources: WSP 2023, NSWSS, EnergyCo

Appendix A-2
Noise sensitive receivers

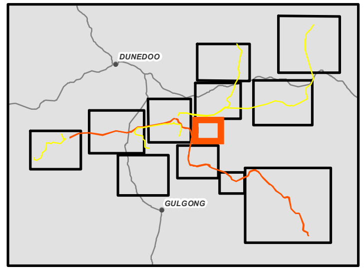


Legend

- Study area
- 500 kV transmission line
- 330 kV transmission line
- Existing transmission line
- Road
- Water body

Noise sensitive receivers

- House



0 0.35 0.7 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:30,000
Data sources: WSP 2023, NSWSS, EnergyCo

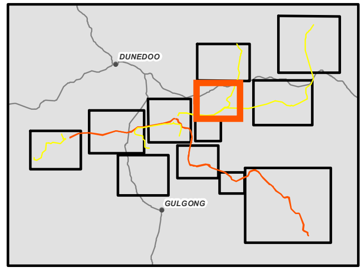
C:\Users\AUJB505996\WSP O365\AU-WKG - Geospatial - AIS - Projects\PS130593_EnergyCo_CWO_Substation\Mxd\14_Acoustics\01_Appendices\PS130593_ACS_A-2_NoiseSensitiveReceiver_r1v12.mxd

Legend

- Study area
- Construction area
- 500 kV transmission line
- 330 kV transmission line
- Road
- Watercourse
- Water body

Noise sensitive receivers

- House



0 0.6 1.2 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:50,000
Data sources: WSP 2023, NSWSS, EnergyCo

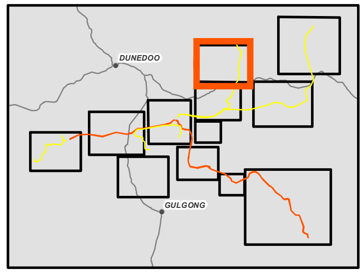
Appendix A-2
Noise sensitive receivers

Legend

- Study area
- Construction area
- 330 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Road
- Watercourse
- Water body

Noise sensitive receivers

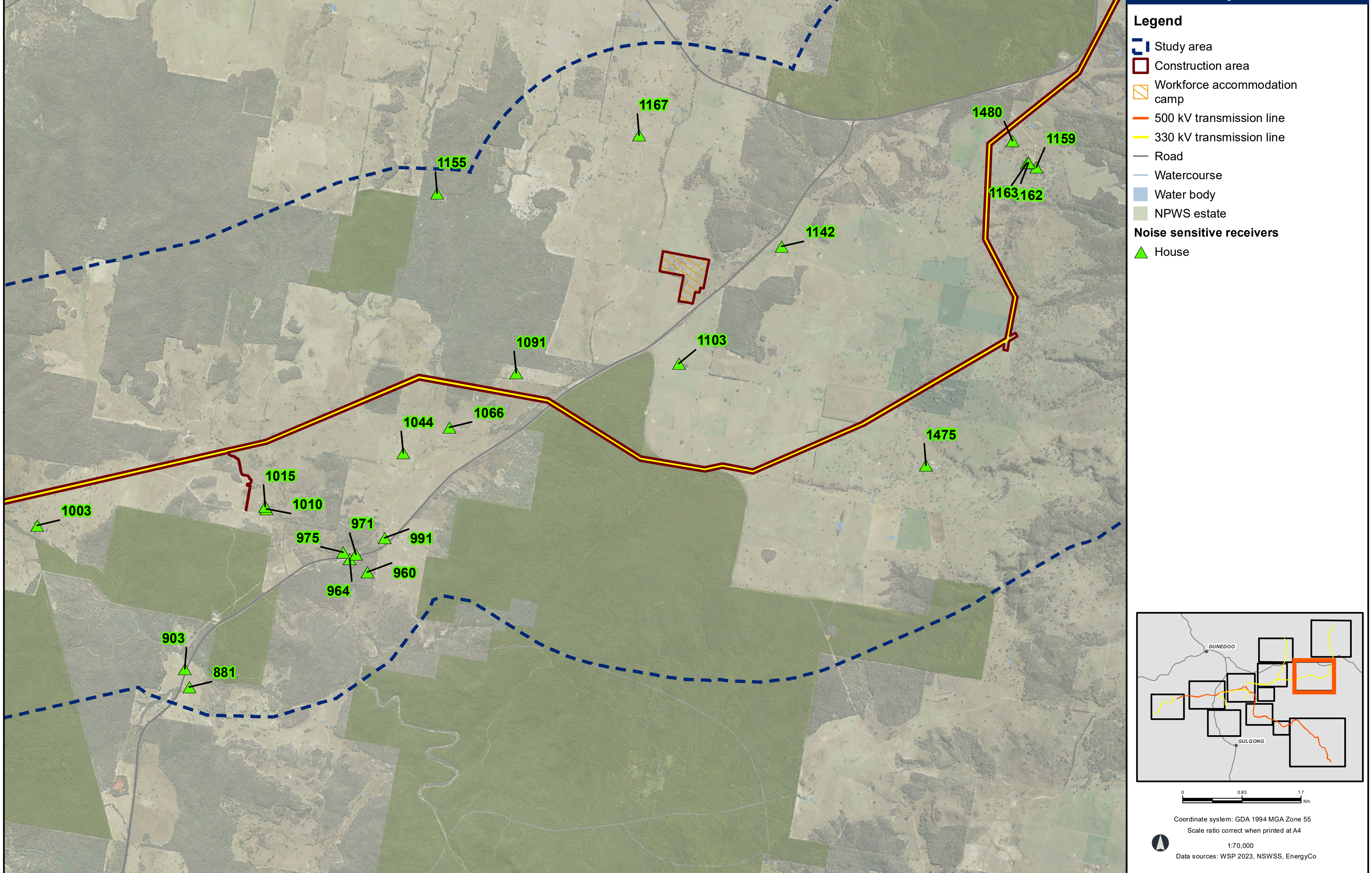
- House



0 0.75 1.5 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:62,000
Data sources: WSP 2023, NSWSS, EnergyCo

Appendix A-2
Noise sensitive receivers



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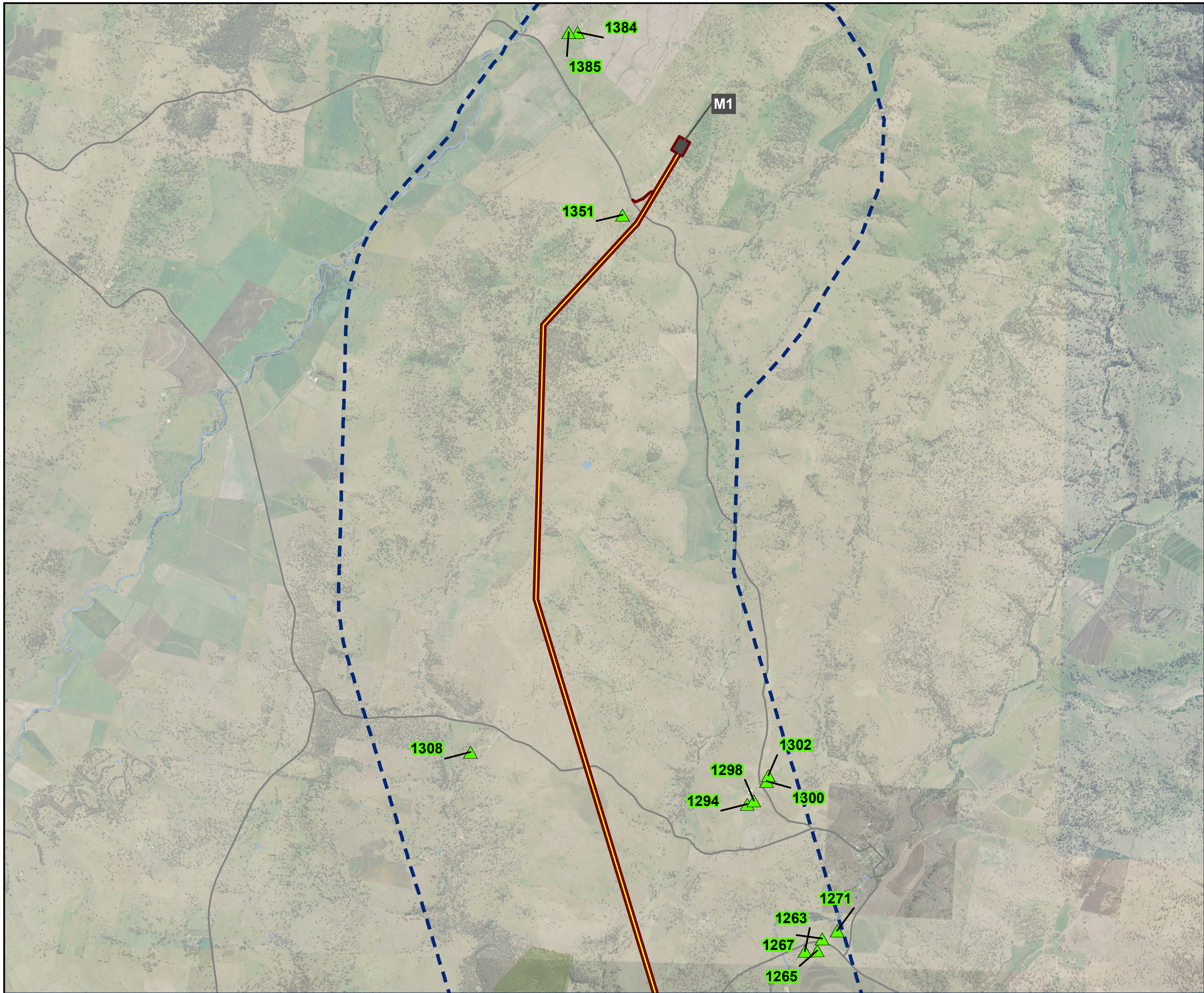
Appendix A-2
Noise sensitive receivers

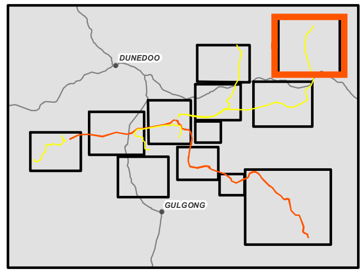


Legend

- Study area
- Construction area
- 330 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Road
- Watercourse
- Water body
- NPWS estate

Noise sensitive receivers

- House



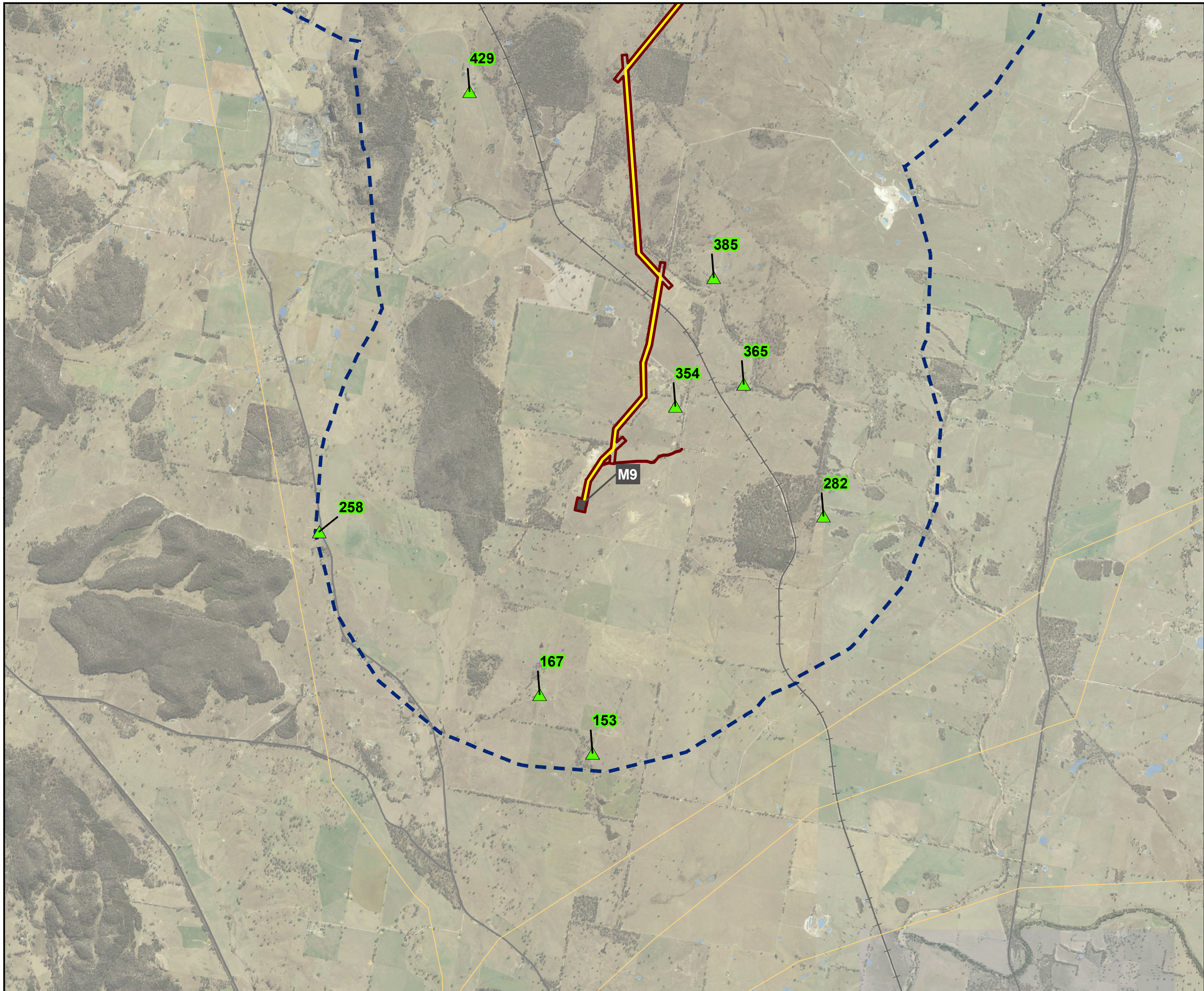
0 1 2 Km

Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A4

1:80,000

Data sources: WSP 2023, NSWSS, EnergyCo

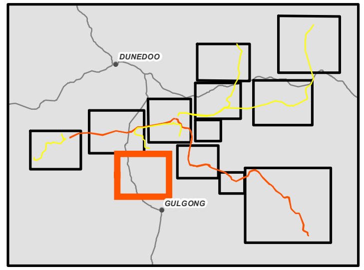


Legend

- Study area
- Construction area
- 330 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Existing transmission line
- Road
- Railway
- Water body

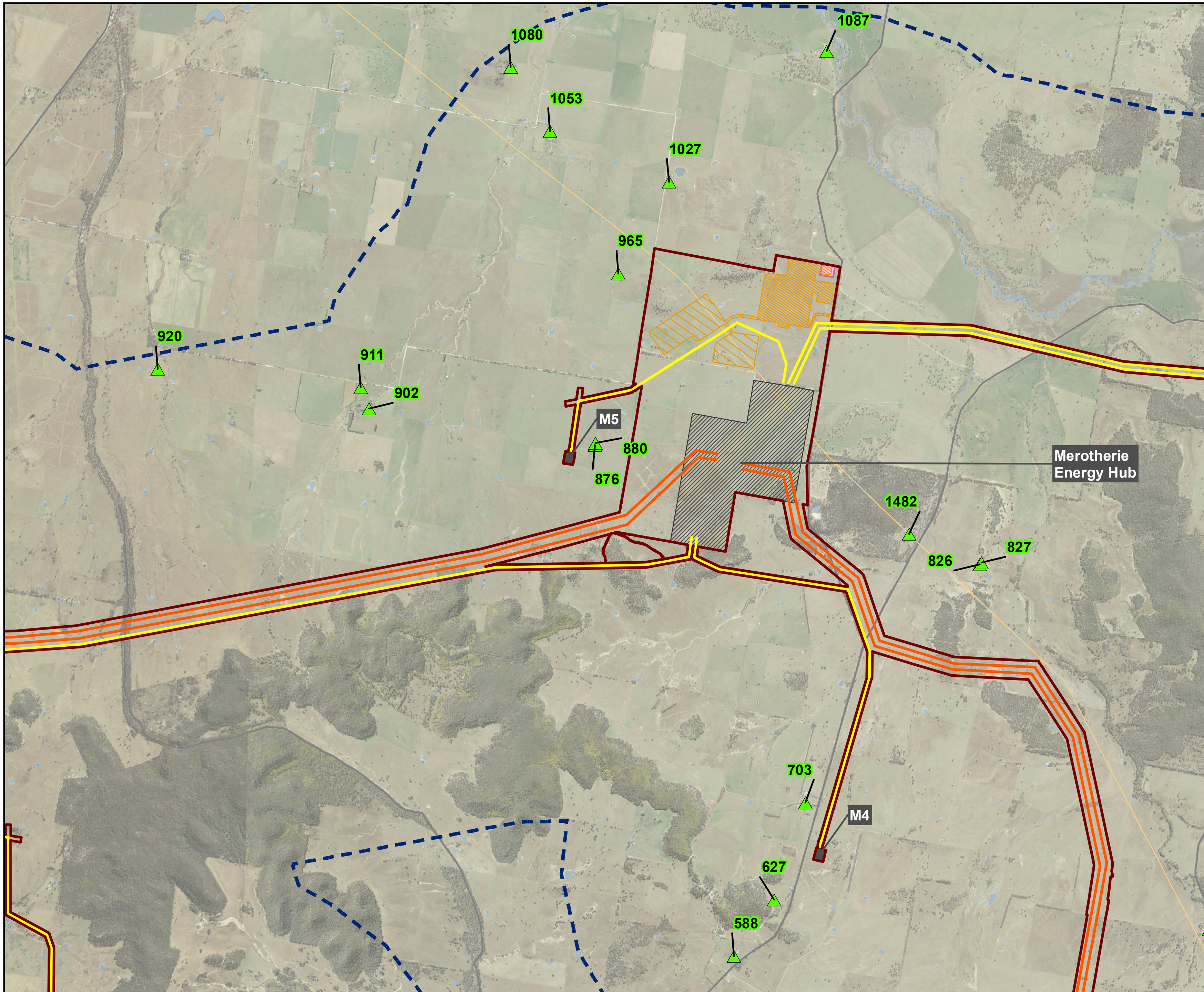
Noise sensitive receivers

- House



0 0.75 1.5 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:60,000
Data sources: WSP 2023, NSWSS, EnergyCo

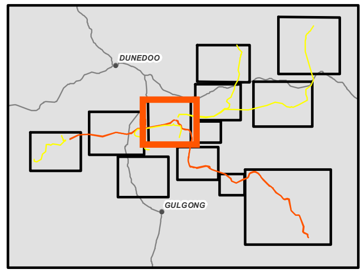


Legend

- Study area
- Construction area
- Construction compound
- Workforce accommodation camp
- Energy hub / 500 kV switching station
- Maintenance facility
- 330 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Existing transmission line
- Road
- Watercourse
- Water body

Noise sensitive receivers

- House

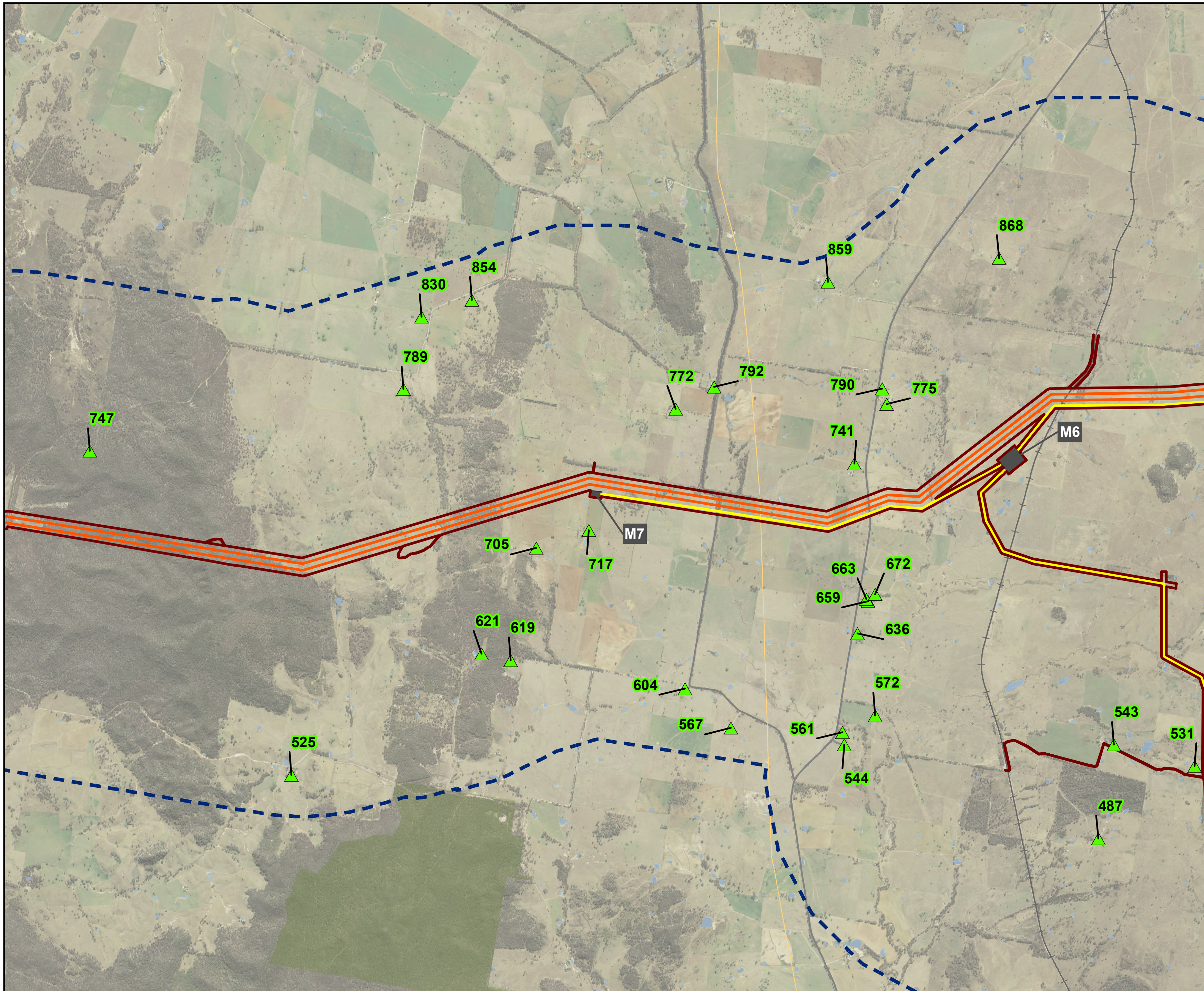


0 0.75 1.5 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4

1:62,000

Data sources: WSP 2023, NSWSS, EnergyCo



Legend

- Study area
- Construction area
- 330 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Existing transmission line
- Road
- Railway
- Water body
- NPWS estate

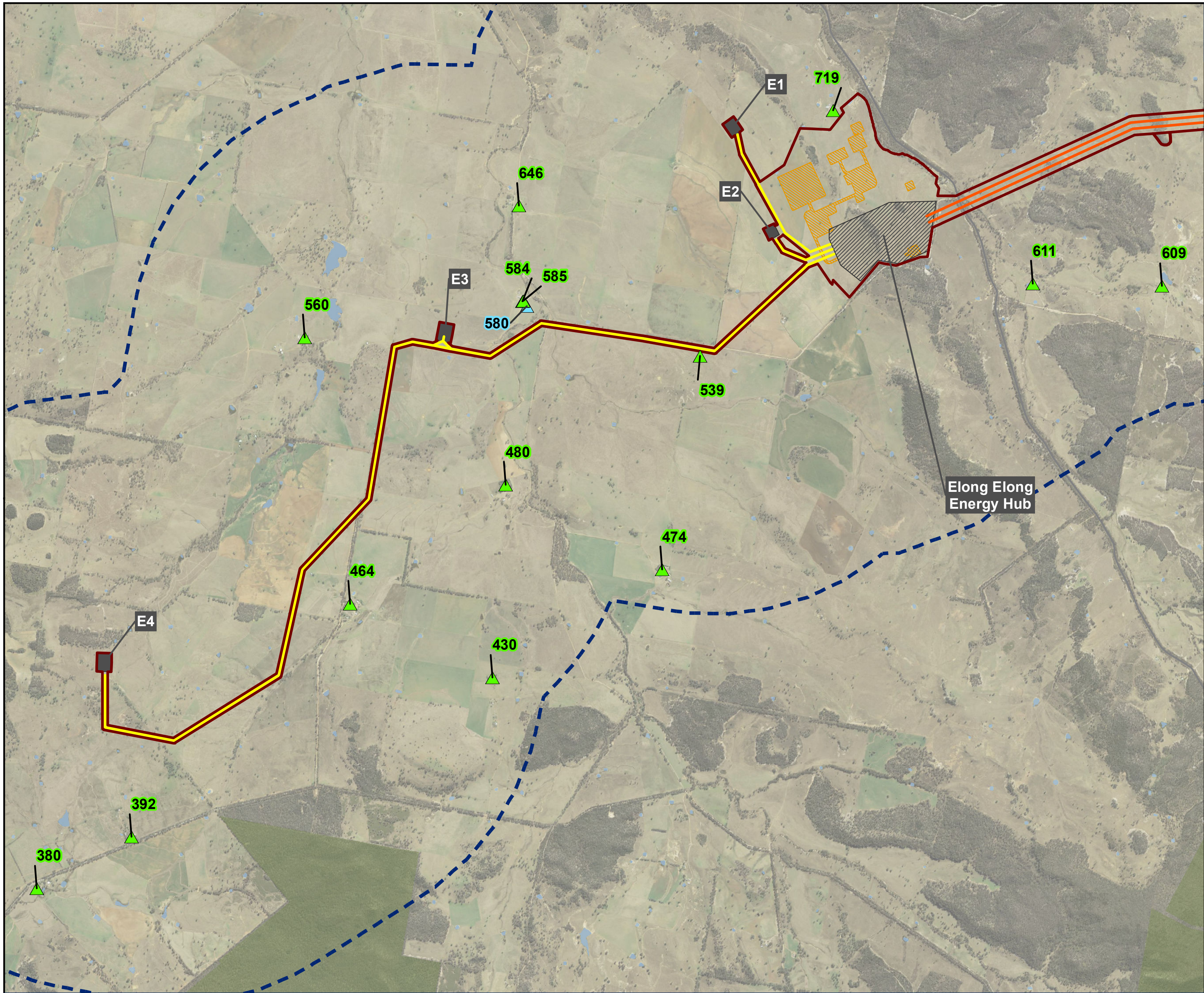
Noise sensitive receivers

- House

0 0.8 1.6 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:65,000
Data sources: WSP 2023, NSWSS, EnergyCo

Appendix A-2
Noise sensitive receivers

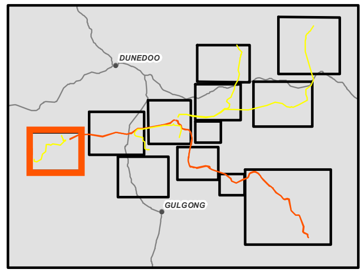


Legend

- Study area
- Construction area
- Construction compound
- Energy hub / 500 kV switching station
- 330 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Road
- Water body
- NPWS estate

Noise sensitive receivers

- House
- Unoccupied house



0 0.75 1.5 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:60,000
Data sources: WSP 2023, NSWSS, EnergyCo

APPENDIX A-3
Meteorological assessment

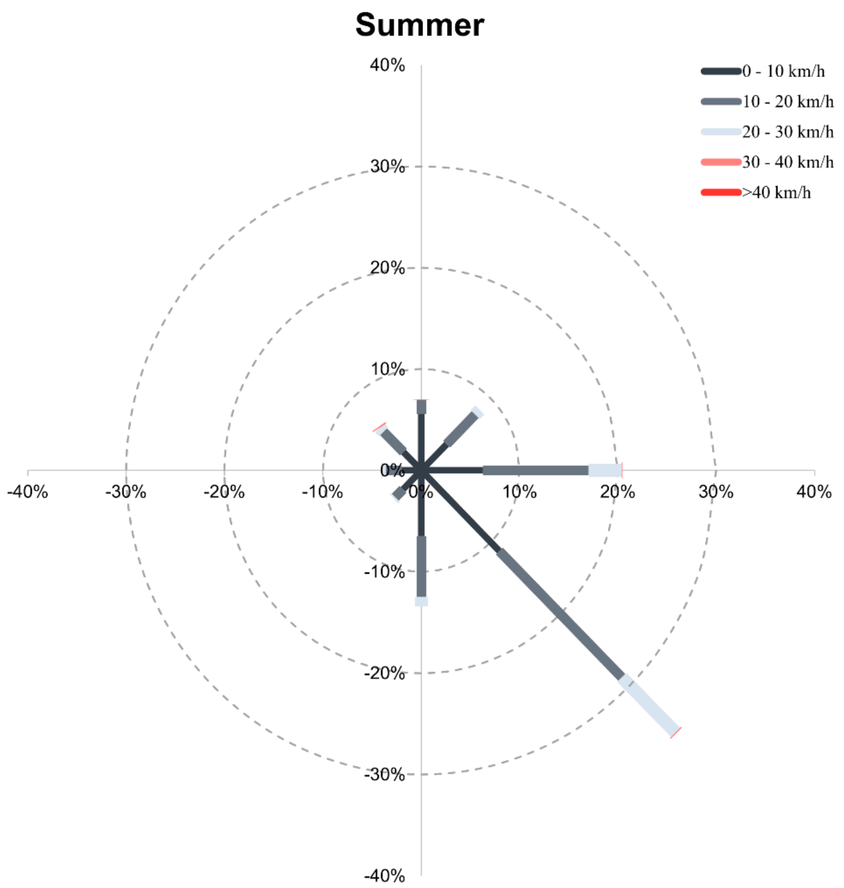
Weather Station Mudgee Airport
ID 62101

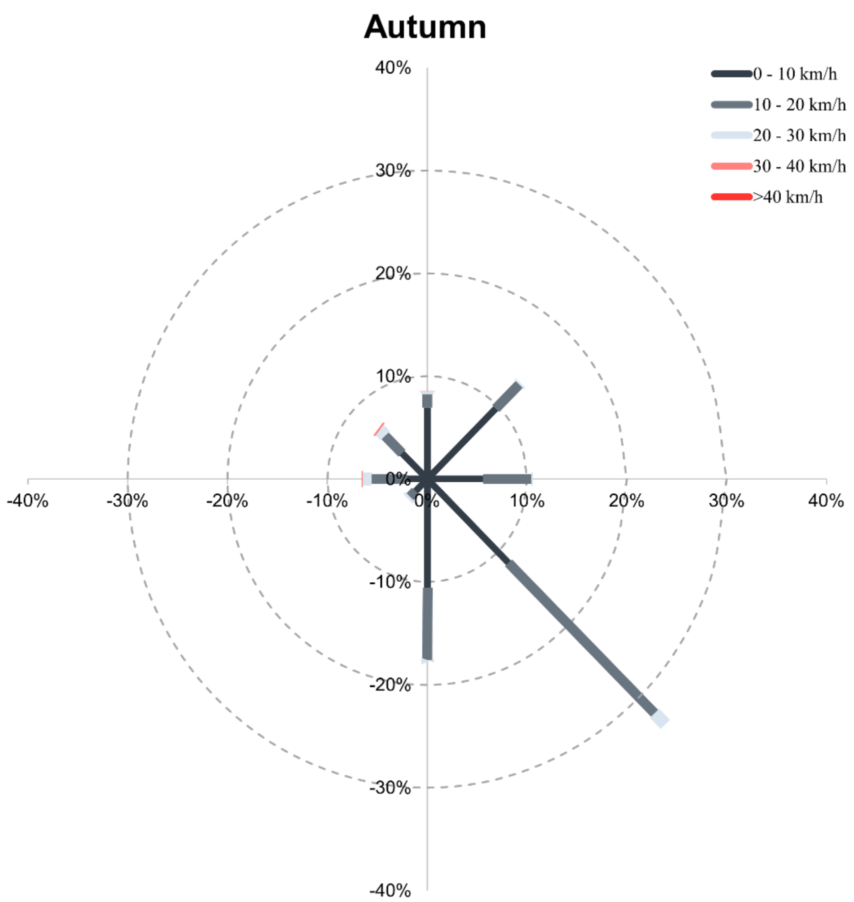
Percentage occurance of light winds, per season, per time period					
	Direction	**Summer**	**Autumn**	**Winter**	**Spring**
Day	N	4.0%	5.2%	5.4%	4.2%
	NE	3.7%	4.4%	4.1%	3.8%
	E	4.9%	5.4%	3.1%	4.3%
	SE	5.2%	6.9%	4.4%	5.1%
	S	4.7%	6.1%	4.4%	4.7%
	SW	3.3%	4.5%	4.3%	4.1%
	W	3.1%	3.5%	3.7%	3.8%
	NW	3.3%	4.6%	5.0%	4.3%
Evening	N	2.2%	6.5%	12.5%	5.3%
	NE	3.9%	8.5%	12.8%	7.5%
	E	5.7%	10.6%	10.8%	8.9%
	SE	5.4%	8.8%	5.2%	7.5%
	S	3.7%	6.9%	4.3%	4.8%
	SW	1.5%	3.9%	3.3%	2.5%
	W	0.7%	1.4%	3.7%	2.0%
	NW	1.1%	2.5%	6.5%	3.3%
Night	N	2.4%	6.2%	10.6%	6.4%
	NE	5.2%	7.7%	10.7%	8.3%
	E	12.0%	12.8%	10.4%	11.0%
	SE	14.9%	13.0%	5.8%	10.2%
	S	12.8%	11.6%	4.7%	9.1%
	SW	6.0%	5.6%	2.9%	5.3%
	W	2.7%	1.5%	3.2%	2.8%
	NW	2.0%	2.1%	5.2%	3.3%

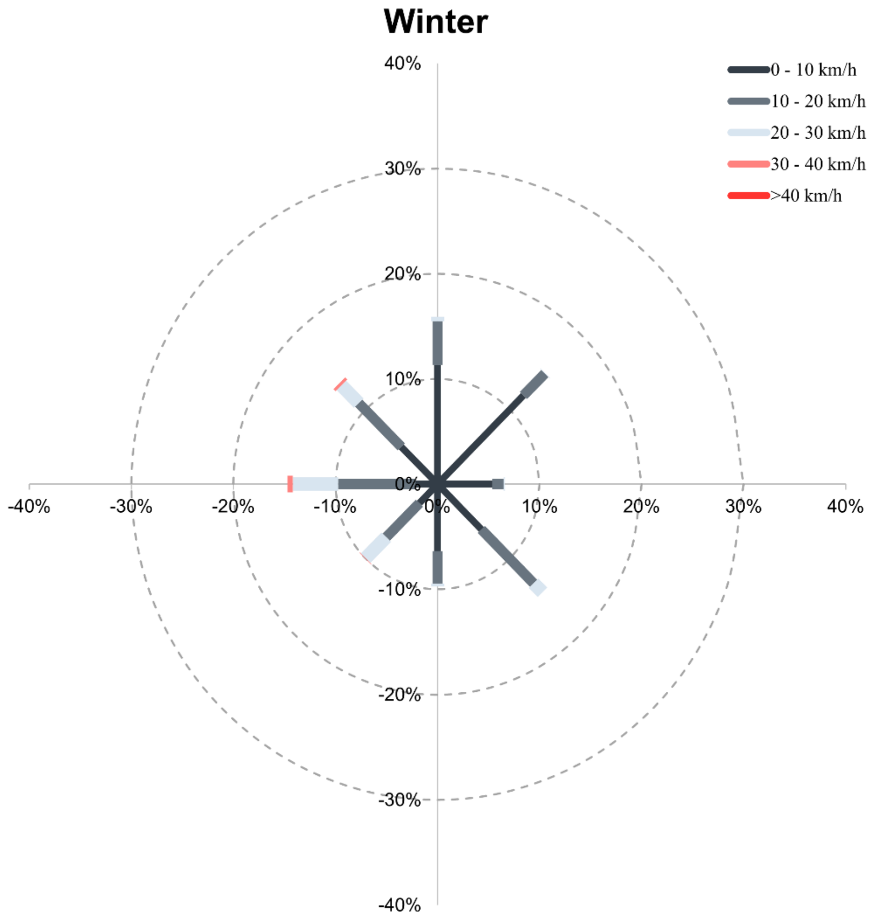
Percentage occurance of noise-enhancing conditions		
Time period	**Meteorological parameters**	**Occurance**
Daytime/evening	Stability categories A-D with light winds (up to 3m/s)	2.1%
Night-time	Stability categories A-D with light winds (up to 3m/s)	1.6%
	Stability category F and G with winds up to 2m/s	0.2%

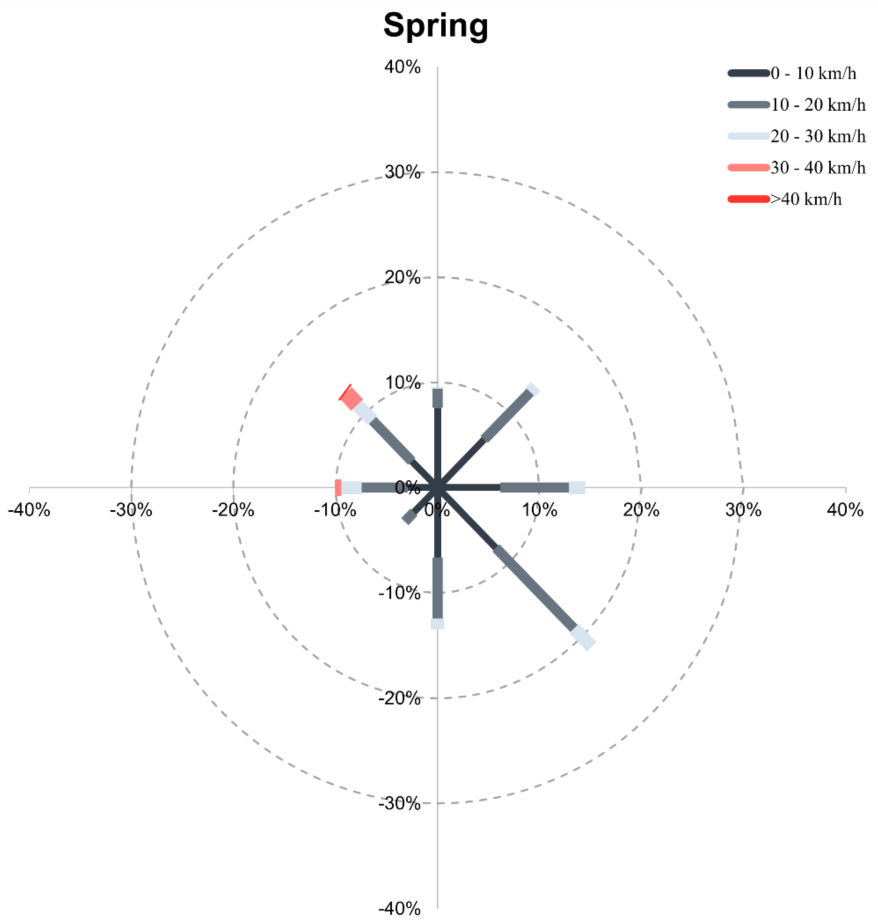
Percentage occurance of inversion		
Time period	**Meteorological parameters**	**Occurance**
Night-time, Winter	Stability categories F and G	0.2%

Seasonal Wind Roses






Winter
40%
30%
20%
10%
0%
-10%
-20%
-30%
-40%
-40%
-30%
-20%
-10%
0%
10%
20%
30%
40%
0 - 10 km/h
10 - 20 km/h
20 - 30 km/h
30 - 40 km/h
>40 km/h


Spring
40%
30%
20%
10%
0%
-10%
-20%
-30%
-40%
-40%
-30%
-20%
-10%
0%
10%
20%
30%
40%
0 - 10 km/h
10 - 20 km/h
20 - 30 km/h
30 - 40 km/h
>40 km/h

Appendix B

Construction noise assessment

APPENDIX B-1
Detailed construction noise scenarios

Transmission line construction - Equipment list and Sound Power Levels

Work stage	Equipment	Number of items	Usage factor per 15 minutes	Base SWL dBA	LAMax (Loudest Item)
Utility adjustment (Enabling works)	5T excavator	1	1	104	
	20T excavator	1	0.75	110	
	Telehandler	1	1	113	116
	10kL water cart	1	1	107	
	Hand tools	1	0.5	105	
	Plate compactor	1	1	104	
	Skid Steer	1	1	104	
	Tipper	1	0.5	110	
	Trench roller	1	1	105	
	TOTAL		**117**		**117**
Site access (Enabling works)	20T excavator	1	0.8	110	
	Pad foot roller	1	1	109	
	Smooth drum roller	1	1	109	
	D7 Dozer	1	1	115	121
	Generator	1	1	103	
	Grader	1	1	113	
	Hand tools	1	0.5	105	
	Skid Steer	1	1	104	
	Tipper	1	0.5	110	
	Truck and trailer	1	0.25	108	
	TOTAL		**119**		**121**
Vegetation Clearing and access	30T excavator	1	0.75	110	
	Pad foot roller	1	1	109	
	Smooth drum roller	1	1	109	
	10kL water cart	1	1	107	
	D7 Dozer	1	1	115	
	Grader	1	1	113	
	Hand tools	1	0.5	105	
	Skid Steer	1	1	104	
	Tipper	2	0.5	110	
	Chainsaw	1	0.5	114	
	Mulcher	1	0.5	116	128
	TOTAL		**121**		**128**
Foundations	30T excavator	2	0.75	112	
	20T franna crane	1	0.5	113	117
	Concrete batching plant	1	1	105	
	Concrete boom pump	1	0.25	109	
	Pad foot roller	1	1	109	
	Smooth drum roller	1	1	109	
	10kL water cart	1	1	107	
	Concrete agitator	4	0.3	109	
	Concrete vibrator	1	1	101	
	Grader	2	1	113	
	Truck and trailer	2	0.25	108	
	Hand tools	1	0.5	105	
	Bored piling rig	2	1	112	
	Skid Steer	1	1	104	
	Tipper	2	0.5	110	
	TOTAL		**124**		**124**
Tower erection	Telehandler	1	1	113	
	20T franna crane	2	0.5	113	117
	60T mobile crane	1	1	113	
	180T mobile crane	1	1	113	
	EWP Boom lift (Cherry picker)	2	0.25	99	
	Generator	1	1	103	
	Hand tools	1	0.5	105	
	Semi trailer	1	0.25	108	
	TOTAL		**119**		**119**
Conductor stringing	Telehandler	1	1	113	
	20T franna crane	1	0.5	113	
	EWP Boom lift (Cherry picker)	1	0.25	99	
	Hand tools	1	0.5	105	
	Helicopter	1	1	128	128
	Knuckle boom	2	0.25	99	
	Semi trailer	1	0.25	108	
	TOTAL		**128**		**128**
Conductor stringing (without helicopter)	Telehandler	1	1	113	
	20T franna crane	1	0.5	113	**117**

Work stage	Equipment	Number of items	Usage factor per 15 minutes	Base SWL dBA	LAMax (Loudest Item)
	EWP Boom lift (Cherry picker)	1	0.25	99	
	Hand tools	1	0.5	105	
	Knuckle boom	2	0.25	99	
	Semi trailer	1	0.25	108	
	TOTAL		**117**		**117**
Conductor brake & winch	Cable hauling winch	2	1	103	
	Cable heavy drum stand	4	1	-	
	Cable puller	1	1	103	
	Cable tensioner	1	1	103	
			108		**108**
Commissioning of RNI	Telehandler	1	1	113	116
	EWP Boom lift (Cherry picker)	2	0.25	99	
	Tipper	2	0.5	110	
	TOTAL		**115**		**116**
Demobilisation and rehabilitation	20T excavator	2	0.75	110	
	Telehandler	1	1	113	
	20T franna crane	2	0.5	113	
	60T mobile crane	2	1	113	
	10kL water cart	1	1	107	
	D7 Dozer	1	1	115	121
	EWP Boom lift (Cherry picker)	2	0.25	99	
	Generator	1	1	103	
	Hand tools	1	0.5	105	
	Skid Steer	2	1	104	
	Truck and trailer	4	0.25	108	
	TOTAL		**122**		**122**

Energy Hubs and Switching Station construction - Equipment list and Sound Power Levels

Work stage	Equipment	Number of items	Usage factor per 15 minutes	Base SWL dBA	LAMax (Loudest Item)
Utility adjustment (Enabling works)	5T excavator	1	1	104	
	20T excavator	1	0.75	110	
	Telehandler	1	1	113	116
	10kL water cart	1	1	107	
	Hand tools	1	0.5	105	
	Plate compactor	1	1	104	
	Skid Steer	1	1	104	
	Tipper	1	0.5	110	
	Trench roller	1	1	105	
	TOTAL		**117**		**117**
Site access (Enabling works)	20T excavator	1	0.8	110	
	Pad foot roller	1	1	109	
	Smooth drum roller	1	1	109	
	D7 Dozer	1	1	115	121
	Generator	1	1	103	
	Grader	1	1	113	
	Hand tools	1	0.5	105	
	Skid Steer	1	1	104	
	Tipper	1	0.5	110	
	Truck and trailer	1	0.25	108	
	TOTAL		**119**		**121**
Vegetation clearance	20T excavator	2	0.75	110	
	D10 Dozer	1	1	117	
	Generator	1	1	103	
	Hand tools	1	0.5	105	
	Skid Steer	1	1	104	
	Truck and trailer	1	0.25	108	
	Chainsaw	1	0.5	114	
	Mulcher	1	0.5	116	128
	TOTAL		**120**		**128**
Access and earthworks (including blasting & crushing)	30T excavator	3	0.75	110	
	Pad foot roller	2	1	109	
	Smooth drum roller	2	1	109	
	10kL water cart	2	1	107	
	D10 Dozer	2	1	117	126
	Grader	1	1	113	
	Hand tools	1	0.5	105	
	Scraper	5	1	110	
	Truck and trailer	3	0.25	108	
	30T articulated dump truck	5	0.25	110	
	Crusher	1	0.5	118	
	TOTAL		**125**		**126**
Foundations and pads (including piling and blasting)	30T excavator	2	0.75	110	
	20T franna crane	1	0.5	113	
	Concrete batching plant	1	1	105	
	Concrete boom pump	1	0.25	109	
	Pad foot roller	1	1	109	
	Smooth drum roller	1	1	109	
	10kL water cart	1	1	107	
	Concrete agitator	4	0.3	109	
	Concrete vibrator	1	1	113	
	Grader	2	1	113	121
	Hand tools	1	0.5	105	
	Bored piling rig	2	1	112	
	Skid Steer	1	1	104	
	Tipper	1	0.5	110	
	Truck and trailer	2	0.25	108	
	TOTAL		**122**		**122**
Equipment installation	Telehandler	1	1	113	
	20T franna crane	2	0.5	113	117
	60T mobile crane	1	1	113	
	180T mobile crane	2	1	113	
	EWP Boom lift (Cherry picker)	4	0.25	99	
	Generator	2	1	103	

Work stage	Equipment	Number of items	Usage factor per 15 minutes	Base SWL dBA	LAMax (Loudest Item)
	Hand tools	1	0.5	105	
	Tipper	1	0.5	110	
	TOTAL		**120**		**120**
Commissioning of RNI	Telehandler	1	1	113	117
	EWP Boom lift (Cherry picker)	2	0.25	99	
	Tipper	2	0.5	110	
	TOTAL		**115**		**117**
Demobilisation and rehabilitation	20T excavator	2	0.75	110	
	Telehandler	1	1	113	
	20T franna crane	2	0.5	113	
	60T mobile crane	2	1	113	
	10kL water cart	1	1	107	
	D7 Dozer	1	1	115	121
	EWP Boom lift (Cherry picker)	2	0.25	99	
	Generator	1	1	103	
	Hand tools	1	0.5	105	
	Skid Steer	2	1	104	
	Truck and trailer	4	0.25	108	
	TOTAL		**122**		**122**

Access tracks (Enabling works)

Work stage	Equipment	Number of items	Usage factor per 15 minutes	Base SWL dBA	LAMax (Loudest Item)
Earthworks and upgrades	20T excavator	2	0.75	110	
	20T franna crane	1	0.5	113	
	60T mobile crane	1	1	113	
	Concrete batching plant	1	1	105	
	Concrete boom pump	1	0.25	109	
	Pad foot roller	1	1	109	
	Smooth drum roller	1	1	109	
	10kL water cart	1	1	107	
	Concrete agitator	3	0.25	109	
	Concrete vibrator	1	1	113	
	Generator	1	1	103	
	Grader	1	1	113	121
	Hand tools	1	0.5	105	
	Bored piling rig	1	1	112	
	Skid Steer	1	1	104	
	Tipper	1	0.5	110	
	Truck and trailer	3	0.25	108	
	TOTAL	**122**			**122**
Vegetation clearance	20T excavator	2	0.75	110	
	D10 Dozer	1	1	117	128
	Generator	1	1	103	
	Hand tools	1	0.5	105	
	Skid Steer	1	1	104	
	Truck and trailer	1	0.25	108	
	Chainsaw	1	0.5	114	
	Mulcher	1	0.5	116	
	TOTAL	**120**			**128**

Construction compounds - Equipment list and Sound Power Levels

Work stage	Equipment	Number of items	Usage factor per 15 minutes	Base SWL dBA	LAMax (Loudest Item)
Vegetation clearance	20T excavator	2	0.75	110	
	D10 Dozer	1	1	117	128
	Generator	1	1	103	
	Hand tools	1	0.5	105	
	Skid Steer	1	1	104	
	Truck and trailer	1	0.25	108	
	Chainsaw	1	0.5	114	
	Mulcher	1	0.5	116	
	TOTAL		**120**		**128**
Construction	20T excavator	2	0.75	110	
	20T franna crane	2	0.5	113	
	60T mobile crane	1	1	113	
	Pad foot roller	1	1	109	
	Smooth drum roller	1	1	109	
	10kL water cart	1	1	107	
	Concrete agitator	3	0.3	109	
	Concrete vibrator	1	1	113	
	EWP Boom lift (Cherry picker)	3	0.25	99	
	Generator	2	1	103	
	Grader	1	1	113	121
	Hand tools	1	0.5	105	
	Semi trailer	2	0.25	108	
	Skid Steer	1	1	104	
	Tipper	1	0.5	110	
	TOTAL		**122**		**122**
Operation (without helicopter)	Light vehicles	20	0.1	88	
	30T excavator	2	0.75	110	
	20T franna crane	1	0.5	113	
	Concrete batching plant	1	1	105	
	Crushing / screening plant	1	1	118	
	Concrete boom pump	1	0.25	109	
	Pad foot roller	1	1	109	
	Smooth drum roller	1	1	109	
	10kL water cart	1	1	107	
	Concrete agitator	4	0.3	109	
	Concrete vibrator	1	1	113	
	Grader	2	1	113	121
	Hand tools	1	0.5	105	
	Bored piling rig	2	1	112	
	Skid Steer	1	1	104	
	Tipper	1	0.5	110	
	Truck and trailer	2	0.25	108	
	TOTAL		**123**		**123**
Operation (with helicopter)	As above plus:	-	-	123	
	Helicopter	1	1	128	128
	TOTAL		**129**		**129**

Accomodation camps - Equipment list and Sound Power Levels

Work stage	Equipment	Number of items	Usage factor per 15 minutes	Base SWL dBA	LAMax (Loudest Item)
Vegetation clearance	20T excavator	2	0.75	110	
	D10 Dozer	1	1	117	
	Generator	1	1	103	
	Hand tools	1	0.5	105	
	Skid Steer	1	1	104	
	Truck and trailer	1	0.25	108	
	Chainsaw	1	0.5	114	
	Mulcher	1	0.5	116	128
	TOTAL	**120**			**128**
Construction	20T excavator	2	0.75	110	
	20T franna crane	2	0.5	113	
	60T mobile crane	1	1	113	
	Pad foot roller	1	1	109	
	Smooth drum roller	1	1	109	
	10kL water cart	1	1	107	
	Concrete agitator	3	0.3	109	
	Concrete vibrator	1	1	113	
	EWP Boom lift (Cherry picker)	3	0.25	99	
	Generator	2	1	103	
	Grader	1	1	113	121
	Hand tools	1	0.5	105	
	Semi trailer	2	0.25	108	
	Skid Steer	1	1	104	
	Tipper	1	0.5	110	
	TOTAL	**122**			**122**
Operation	Light vehicles	200	0.1	88	
	Generator	6	1	103	105
	TOTAL	**111**			**111**

APPENDIX B-2
Modelled road traffic numbers

Table B-1 Construction traffic assessment parameters

Road ID	Road Name	Pavement Type (RM)	Road Classification (RM)	Speed km/hr	Existing traffic (vehicles/hr)				Construction traffic (vehicles/hr)[1]				Total traffic (vehicles/hr)			
					Day		Night		Day		Night		Day		Night	
					LV[4]	HV[5]	LV	HV	LV	HV	LV	HV	LV	HV	LV	HV
2_A	Golden Highway (Dunedoo) (EB)	sealed	Arterial Road	50	21	7	1	1	18	8	2	1	39	15	3	3
2_A	Golden Highway (Dunedoo) (WB)	sealed	Arterial Road	50	23	8	2	1	18	8	2	1	41	16	3	2
2_A	Golden Highway (Merotherie Rd to Castlereagh Highway) (EB) [3]	sealed	Arterial Road	100	21	7	1	1	18	8	2	1	39	15	3	3
2_A	Golden Highway (Merotherie Rd to Castlereagh Highway) (WB) [3]	sealed	Arterial Road	100	23	8	2	1	18	8	2	1	41	16	3	2
2_A	Golden Highway (Castlereagh Highway to Dunedoo) (EB) [3]	sealed	Arterial Road	100	21	7	1	1	18	8	2	1	39	15	3	3
2_A	Golden Highway (Castlereagh Highway to Dunedoo) (WB) [3]	sealed	Arterial Road	100	23	8	2	1	18	8	2	1	41	16	3	2
2_A	Golden Highway (Dunedoo to Spring Ridge Road) (EB)	sealed	Arterial Road	100	32	8	2	1	30	9	3	2	62	17	5	3
2_A	Golden Highway (Dunedoo to Spring Ridge Road) (WB)	sealed	Arterial Road	100	34	8	2	1	30	9	3	2	64	17	5	3
2_B	Golden Highway (Merotherie Rd to Ulan Rd) (EB)	sealed	Arterial Road	100	21	7	1	1	18	8	2	1	39	15	3	3
2_B	Golden Highway (Merotherie Rd to Ulan Rd) (WB)	sealed	Arterial Road	100	23	8	2	1	18	8	2	1	41	16	3	2
2_B	Golden Highway (east of Ulan Road) (EB)	sealed	Arterial Road	100	37	9	3	1	0	5	7	0	38	14	10	1
2_B	Golden Highway (east of Ulan Road) (WB)	sealed	Arterial Road	100	33	14	1	2	0	5	7	0	33	19	8	2
3_A	Castlereagh Highway (between Birriwa and Tucklan Road) (NB)	sealed	Arterial Road	100	19	3	1	0	14	3	1	1	33	6	2	1
3_A	Castlereagh Highway (between Birriwa and Tucklan Road) (SB)	sealed	Arterial Road	100	21	4	1	0	14	3	1	1	35	7	2	1
3_A	Castlereagh Highway (between Golden Highway and Birriwa) (NB)	sealed	Arterial Road	100	19	3	1	0	14	3	1	1	33	6	2	1
3_A	Castlereagh Highway (between Golden Highway and Birriwa) (SB)	sealed	Arterial Road	100	21	4	1	0	14	3	1	1	35	7	2	1
3_A	Castlereagh Highway (Birriwa) (NB)	sealed	Arterial Road	80	19	3	1	0	14	3	1	1	33	6	2	1
3_A	Castlereagh Highway (Birriwa) (SB)	sealed	Arterial Road	80	21	4	1	0	14	3	1	1	35	7	2	1
3_C	Castlereagh Highway (north of Laheys Creek Road) (NB)	sealed	Arterial Road	100	27	4	1	1	16	3	2	1	43	8	3	1
3_C	Castlereagh Highway (north of Laheys Creek Road) (SB)	sealed	Arterial Road	100	27	5	2	0	16	3	2	1	43	8	4	1
4_A	Merotherie Road (south of Golden Highway) (NB)	sealed	Local Road	100	0	0	0	0	20	5	2	1	20	5	2	1
4_A	Merotherie Road (south of Golden Highway) (SB)	sealed	Local Road	100	0	0	0	0	20	5	2	1	20	5	2	1
7	Tucklan Road (NB)	unsealed	Local Road	100	4	0	0	0	16	1	1	0	19	1	1	0
7	Tucklan Road (SB)	unsealed	Local Road	100	3	0	0	0	16	1	1	0	19	1	1	0

Road ID	Road Name	Pavement Type (RM)	Road Classification (RM)	Speed km/hr	Existing traffic (vehicles/hr)				Construction traffic (vehicles/hr)[1]				Total traffic (vehicles/hr)			
					Day		Night		Day		Night		Day		Night	
					LV[4]	HV[5]	LV	HV	LV	HV	LV	HV	LV	HV	LV	HV
8_A	Cope Road (east of Blue Springs Road) (EB)	sealed	Sub-arterial Road	100	24	3	12	1	12	2	5	1	36	4	18	2
8_A	Cope Road (east of Blue Springs Road) (WB)	sealed	Sub-arterial Road	100	30	4	3	0	12	2	5	1	42	5	9	1
8_B	Cope Road (west of Blue Springs Road) (EB)[2]	sealed	Sub-arterial Road	100	27	3	13	1	3	2	4	0	30	5	17	1
8_B	Cope Road (west of Blue Springs Road) (WB)[2]	sealed	Sub-arterial Road	100	30	4	3	0	3	2	4	0	33	5	7	0
11_A	Ulan Road (south of Ulan-Wollar Road) (NB)	sealed	Sub-arterial Road	100	53	4	4	0	18	3	8	1	71	6	12	1
11_A	Ulan Road (south of Ulan-Wollar Road) (SB)	sealed	Sub-arterial Road	100	39	5	2	1	18	3	8	1	56	8	10	2
11_B	Ulan Road (north of Ulan-Wollar Road) (NB)	sealed	Sub-arterial Road	100	30	3	2	0	18	3	8	1	48	6	10	1
11_B	Ulan Road (north of Ulan-Wollar Road) (SB)	sealed	Sub-arterial Road	100	24	5	1	1	18	3	8	1	41	7	9	2
13	Spring Ridge Road, south of Golden Highway (NB)	sealed	Local Road	100	2	1	0	0	20	5	2	1	22	5	2	1
13	Spring Ridge Road, south of Golden Highway (SB)	sealed	Local Road	100	2	1	0	0	20	5	2	1	22	5	2	1
14	Upper Laheys Creek Road (EB)	unsealed	Local Road	100	1	0	0	0	14	3	1	1	14	3	2	1
14	Upper Laheys Creek Road (WB)	unsealed	Local Road	100	1	0	0	0	14	3	1	1	29	4	1	1
15	Barigan Street (NB)	sealed	Local Road	50	2	1	0	0	8	2	1	0	11	3	1	0
15	Barigan Street (SB)	sealed	Local Road	50	2	0	0	0	8	2	1	0	11	2	1	0
16	Barigan Road (NB)	unsealed	Local Road	100	2	0	0	0	7	2	1	0	9	2	1	0
16	Barigan Road (SB)	unsealed	Local Road	100	3	1	0	0	7	2	1	0	9	2	1	0
17_A	Blue Springs Road (north) (NB)	sealed	Local Road	100	3	0	1	0	15	4	1	1	18	4	2	1
17_A	Blue Springs Road (north) (SB)	sealed	Local Road	100	1	0	0	0	15	4	1	1	16	4	2	1
17_B	Blue Springs Road (south) (NB)	sealed	Local Road	100	3	0	1	0	15	4	1	1	18	4	2	1
17_B	Blue Springs Road (south) (SB)	sealed	Local Road	100	1	0	0	0	15	4	1	1	16	4	2	1
18	Ulan-Wollar Road (EB)	sealed	Local Road	100	30	3	2	0	18	3	8	1	48	6	10	1
18	Ulan-Wollar Road (WB)	sealed	Local Road	100	23	3	1	0	18	3	8	1	41	6	9	2
37	Main Street (NB)	sealed	Sub-arterial Road	60	27	3	13	1	12	2	5	1	38	5	19	2
37	Main Street (SB)	sealed	Sub-arterial Road	60	30	4	3	0	12	2	5	1	42	5	9	1
38_A	Maitland Street (east of Barigan Street) (EB)	sealed	Sub-arterial Road	50	4	0	0	0	6	1	3	0	11	1	3	0

Road ID	Road Name	Pavement Type (RM)	Road Classification (RM)	Speed km/hr	Existing traffic (vehicles/hr)				Construction traffic (vehicles/hr)[1]				Total traffic (vehicles/hr)			
					Day		Night		Day		Night		Day		Night	
					LV[4]	HV[5]	LV	HV	LV	HV	LV	HV	LV	HV	LV	HV
38_A	Maitland Street (east of Barigan Street) (WB)	sealed	Sub-arterial Road	50	5	1	0	0	6	1	3	0	11	2	3	1
43	Phillip Street (EB)	sealed	Sub-arterial Road	50	4	0	0	0	13	3	1	1	17	4	2	1
43	Phillip Street (WB)	sealed	Sub-arterial Road	50	4	0	0	0	13	3	1	1	18	4	2	1
62_B	Wollar Road (west of Wollar) (EB)	sealed	Sub-arterial Road	100	4	0	0	0	13	3	1	1	17	4	2	1
62_B	Wollar Road (west of Wollar) (WB)	sealed	Sub-arterial Road	100	4	0	0	0	13	3	1	1	18	4	2	1

(1) Construction traffic volumes are split 50/50 in each direction along the construction routes

(2) Cope Road west of Blue Springs Road, construction-related traffic is equal to the difference between Blue Springs Rd and Cope Rd East of Blue Springs Road

(3) Golden Highway between Dunedoo and Merotherie Rd is the same as between Merotherie Rd and Ulan Rd

(4) LV – Light Vehicle

(5) HV – Heavy Vehicle

APPENDIX B-3
Predicted construction exceedances

Transmission lines

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	2		1	1	0	4
NCA 2	0		0	0	0	0
NCA 3	1		0	0	0	1
NCA 4	11		2	1	0	14
NCA 5	1		2	0	0	3
NCA 6	2		0	0	0	2
NCA 7	2		0	0	0	2
NCA 8	0		2	0	0	2
NCA 9	2		1	0	0	3
NCA 10	1		0	0	0	1
NCA 11	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	3	1	3	1	0	8
NCA 2	2	0	0	0	0	2
NCA 3	7	1	0	0	0	8
NCA 4	10	18	8	1	0	37
NCA 5	3	1	3	0	0	7
NCA 6	2	4	0	0	0	6
NCA 7	11	2	0	0	0	13
NCA 8	0	0	1	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	1	3	1	0	0	5
NCA 11	2	0	0	0	0	2
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	1	0	3	0	1	5
NCA 2	0	0	0	0	0	0
NCA 3	2	1	0	0	0	3
NCA 4	15	5	8	1	0	29
NCA 5	1	0	3	0	0	4
NCA 6	2	1	1	0	0	4
NCA 7	14	2	1	0	0	17
NCA 8	0	0	1	1	0	2
NCA 9	1	2	0	1	0	4
NCA 10	2	1	1	0	0	4
NCA 11	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	3	0	0	1	0	4
NCA 2	0	0	0	0	0	0
NCA 3	0	0	0	0	0	0
NCA 4	5	1	1	0	0	7
NCA 5	3	0	0	0	0	3
NCA 6	0	0	0	0	0	0
NCA 7	1	0	0	0	0	1
NCA 8	0	1	0	0	0	1
NCA 9	0	0	1	0	0	1
NCA 10	1	0	0	0	0	1
NCA 11	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML				
Standard Hours					
	0-10 dB	10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	3	1	1	1	5
NCA 2	0	0	0	0	0
NCA 3	1	0	0	0	1
NCA 4	15	5	1	0	21
NCA 5	0	3	0	0	3
NCA 6	4	0	0	0	4
NCA 7	2	1	0	0	3

NCA 8	0		2	0	0	2
NCA 9	3		1	0	0	4
NCA 10	2		1	0	0	3
NCA 11	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	2	2	3	1	1	8
NCA 2	3	0	0	0	0	3
NCA 3	4	4	0	0	0	8
NCA 4	14	19	10	1	0	44
NCA 5	3	1	3	0	0	7
NCA 6	4	3	1	0	0	8
NCA 7	14	2	1	0	0	17
NCA 8	0	0	1	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	3	3	1	0	0	7
NCA 11	1	1	0	0	0	2
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	1	1	3	0	1	6
NCA 2	2	0	0	0	0	2
NCA 3	4	1	0	0	0	5
NCA 4	11	9	10	1	0	31
NCA 5	2	0	3	0	0	5
NCA 6	1	3	1	0	0	5
NCA 7	12	3	2	0	0	17
NCA 8	0	0	1	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	1	2	1	0	0	4
NCA 11	1	0	0	0	0	1
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	2	1	0	1	0	4
NCA 2	0	0	0	0	0	0
NCA 3	1	0	0	0	0	1
NCA 4	7	5	1	0	0	13
NCA 5	0	3	0	0	0	3
NCA 6	1	0	0	0	0	1
NCA 7	1	1	0	0	0	2
NCA 8	0	1	1	0	0	2
NCA 9	0	0	1	0	0	1
NCA 10	0	1	0	0	0	1
NCA 11	0	0	0	0	0	0

3 - Vegetation clearance and access

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	1		3	1	1	5
NCA 2	0		0	0	0	0
NCA 3	1		0	0	0	1
NCA 4	16		5	1	0	22
NCA 5	0		3	0	0	3
NCA 6	4		0	0	0	4
NCA 7	2		1	0	0	3
NCA 8	0		2	0	0	2
NCA 9	3		0	1	0	4
NCA 10	2		1	0	0	3
NCA 11	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	2	2	3	1	1	8
NCA 2	1	2	0	0	0	3
NCA 3	5	4	1	0	0	10
NCA 4	13	20	11	2	0	46
NCA 5	2	2	3	0	0	7
NCA 6	3	3	1	0	0	7
NCA 7	14	2	1	0	0	17

NCA 8	1	0	0	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	3	3	1	0	0	7
NCA 11	1	1	0	0	0	2
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	1	1	3	0	1	6
NCA 2	2	0	0	0	0	2
NCA 3	4	0	1	0	0	5
NCA 4	12	9	11	2	0	34
NCA 5	3	0	3	0	0	6
NCA 6	2	3	1	0	0	6
NCA 7	9	7	2	0	0	18
NCA 8	0	0	0	1	0	1
NCA 9	0	3	0	1	0	4
NCA 10	1	2	1	0	0	4
NCA 11	1	0	0	0	0	1
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	1	0	3	0	1	5
NCA 2	0	0	0	0	0	0
NCA 3	0	1	0	0	0	1
NCA 4	11	7	5	1	0	24
NCA 5	1	0	3	0	0	4
NCA 6	3	1	0	0	0	4
NCA 7	11	1	1	0	0	13
NCA 8	0	0	2	0	0	2
NCA 9	3	0	0	1	0	4
NCA 10	3	0	1	0	0	4
NCA 11	0	0	0	0	0	0

4 - Foundations

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	2		3	1	1	6
NCA 2	0		0	0	0	0
NCA 3	4		0	0	0	4
NCA 4	19		10	1	0	30
NCA 5	1		3	0	0	4
NCA 6	4		1	0	0	5
NCA 7	13		1	0	0	14
NCA 8	0		1	1	0	2
NCA 9	3		0	1	0	4
NCA 10	3		1	0	0	4
NCA 11	1		0	0	0	1
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	4	3	3	2	1	12
NCA 2	1	2	0	0	0	3
NCA 3	5	7	1	0	0	13
NCA 4	19	18	15	6	0	58
NCA 5	1	4	0	3	0	8
NCA 6	3	4	2	0	0	9
NCA 7	4	13	1	0	0	18
NCA 8	2	0	0	2	0	4
NCA 9	3	0	3	1	0	7
NCA 10	4	3	2	1	0	10
NCA 11	0	2	0	0	0	2
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	2	1	3	1	1	8
NCA 2	3	0	0	0	0	3
NCA 3	4	3	1	0	0	8
NCA 4	14	9	15	5	1	44
NCA 5	3	1	0	3	0	7
NCA 6	4	1	4	0	0	9
NCA 7	3	11	4	1	0	19

NCA 8	0	0	0	2	0	2
NCA 9	0	0	3	1	0	4
NCA 10	3	1	2	1	0	7
NCA 11	1	1	0	0	0	2
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	1	2	1	1	0	5
NCA 2	0	0	0	0	0	0
NCA 3	1	0	0	0	0	1
NCA 4	9	6	2	1	0	18
NCA 5	0	1	2	0	0	3
NCA 6	1	1	0	0	0	2
NCA 7	2	0	1	0	0	3
NCA 8	0	0	2	0	0	2
NCA 9	2	0	1	0	0	3
NCA 10	1	0	0	0	0	1
NCA 11	0	0	0	0	0	0

5 - Tower erection

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	3		1	1	1	5
NCA 2	0		0	0	0	0
NCA 3	1		0	0	0	1
NCA 4	15		5	1	0	21
NCA 5	0		3	0	0	3
NCA 6	4		0	0	0	4
NCA 7	2		1	0	0	3
NCA 8	0		2	0	0	2
NCA 9	3		1	0	0	4
NCA 10	2		1	0	0	3
NCA 11	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	2	2	3	1	1	8
NCA 2	3	0	0	0	0	3
NCA 3	4	4	0	0	0	8
NCA 4	14	19	10	1	0	44
NCA 5	3	1	3	0	0	7
NCA 6	4	3	1	0	0	8
NCA 7	14	2	1	0	0	17
NCA 8	0	0	1	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	3	3	1	0	0	7
NCA 11	1	1	0	0	0	2
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	1	1	3	0	1	6
NCA 2	2	0	0	0	0	2
NCA 3	4	1	0	0	0	5
NCA 4	11	9	10	1	0	31
NCA 5	2	0	3	0	0	5
NCA 6	1	3	1	0	0	5
NCA 7	12	3	2	0	0	17
NCA 8	0	0	1	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	1	2	1	0	0	4
NCA 11	1	0	0	0	0	1
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	2	1	0	1	0	4
NCA 2	0	0	0	0	0	0
NCA 3	0	0	0	0	0	0
NCA 4	6	2	1	0	0	9
NCA 5	1	2	0	0	0	3
NCA 6	1	0	0	0	0	1

NCA 7	0	1	0	0	0	1
NCA 8	0	1	1	0	0	2
NCA 9	0	0	1	0	0	1
NCA 10	0	0	0	0	0	0
NCA 11	0	0	0	0	0	0

7 - Conductor stringing

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	2		1	1	0	4
NCA 2	0		0	0	0	0
NCA 3	1		0	0	0	1
NCA 4	11		2	1	0	14
NCA 5	1		2	0	0	3
NCA 6	2		0	0	0	2
NCA 7	2		0	0	0	2
NCA 8	0		2	0	0	2
NCA 9	2		1	0	0	3
NCA 10	1		0	0	0	1
NCA 11	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	3	1	3	1	0	8
NCA 2	2	0	0	0	0	2
NCA 3	7	1	0	0	0	8
NCA 4	10	18	8	1	0	37
NCA 5	3	1	3	0	0	7
NCA 6	2	4	0	0	0	6
NCA 7	11	2	0	0	0	13
NCA 8	0	0	1	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	1	3	1	0	0	5
NCA 11	2	0	0	0	0	2
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	1	0	3	0	1	5
NCA 2	0	0	0	0	0	0
NCA 3	2	1	0	0	0	3
NCA 4	15	5	8	1	0	29
NCA 5	1	0	3	0	0	4
NCA 6	2	1	1	0	0	4
NCA 7	14	2	1	0	0	17
NCA 8	0	0	1	1	0	2
NCA 9	1	2	0	1	0	4
NCA 10	2	1	1	0	0	4
NCA 11	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	3	0	0	1	0	4
NCA 2	0	0	0	0	0	0
NCA 3	0	0	0	0	0	0
NCA 4	5	1	1	0	0	7
NCA 5	3	0	0	0	0	3
NCA 6	0	0	0	0	0	0
NCA 7	1	0	0	0	0	1
NCA 8	0	1	0	0	0	1
NCA 9	0	0	1	0	0	1
NCA 10	1	0	0	0	0	1
NCA 11	0	0	0	0	0	0

8 - Conductor brake & winch

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	1		1	0	0	2
NCA 2	0		0	0	0	0
NCA 3	0		0	0	0	0

NCA 4	2		1	0	0	3
NCA 5	2		0	0	0	2
NCA 6	0		0	0	0	0
NCA 7	1		0	0	0	1
NCA 8	2		0	0	0	2
NCA 9	1		0	0	0	1
NCA 10	1		0	0	0	1
NCA 11	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	1	3	0	1	0	5
NCA 2	0	0	0	0	0	0
NCA 3	1	0	0	0	0	1
NCA 4	11	8	1	0	0	20
NCA 5	0	3	0	0	0	3
NCA 6	2	0	0	0	0	2
NCA 7	0	1	0	0	0	1
NCA 8	0	1	1	0	0	2
NCA 9	3	0	1	0	0	4
NCA 10	2	1	0	0	0	3
NCA 11	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	2	1	0	1	0	4
NCA 2	0	0	0	0	0	0
NCA 3	0	0	0	0	0	0
NCA 4	8	2	1	0	0	11
NCA 5	1	2	0	0	0	3
NCA 6	1	0	0	0	0	1
NCA 7	1	1	0	0	0	2
NCA 8	0	1	1	0	0	2
NCA 9	0	0	1	0	0	1
NCA 10	0	1	0	0	0	1
NCA 11	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	1	0	0	1
NCA 2	0	0	0	0	0	0
NCA 3	0	0	0	0	0	0
NCA 4	0	1	0	0	0	1
NCA 5	0	0	0	0	0	0
NCA 6	0	0	0	0	0	0
NCA 7	0	0	0	0	0	0
NCA 8	1	0	0	0	0	1
NCA 9	1	0	0	0	0	1
NCA 10	0	0	0	0	0	0
NCA 11	0	0	0	0	0	0

9 - Commissioning of RNI

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	2		1	1	0	4
NCA 2	0		0	0	0	0
NCA 3	1		0	0	0	1
NCA 4	10		2	1	0	13
NCA 5	3		0	0	0	3
NCA 6	2		0	0	0	2
NCA 7	2		0	0	0	2
NCA 8	0		2	0	0	2
NCA 9	1		1	0	0	2
NCA 10	2		0	0	0	2
NCA 11	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	2	1	3	1	0	7
NCA 2	2	0	0	0	0	2
NCA 3	7	1	0	0	0	8

NCA 4	12	16	6	1	0	35
NCA 5	3	1	3	0	0	7
NCA 6	1	4	0	0	0	5
NCA 7	7	2	0	0	0	9
NCA 8	0	0	1	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	1	3	1	0	0	5
NCA 11	1	0	0	0	0	1
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	1	0	3	0	1	5
NCA 2	0	0	0	0	0	0
NCA 3	0	1	0	0	0	1
NCA 4	13	5	6	1	0	25
NCA 5	1	0	3	0	0	4
NCA 6	2	2	0	0	0	4
NCA 7	12	1	1	0	0	14
NCA 8	0	0	1	1	0	2
NCA 9	1	1	0	1	0	3
NCA 10	2	1	1	0	0	4
NCA 11	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	3	0	0	1	0	4
NCA 2	0	0	0	0	0	0
NCA 3	0	0	0	0	0	0
NCA 4	5	1	1	0	0	7
NCA 5	3	0	0	0	0	3
NCA 6	0	0	0	0	0	0
NCA 7	1	0	0	0	0	1
NCA 8	0	1	0	0	0	1
NCA 9	0	0	1	0	0	1
NCA 10	1	0	0	0	0	1
NCA 11	0	0	0	0	0	0

10 - Demobilisation and rehabilitation

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	1		3	1	1	5
NCA 2	0		0	0	0	0
NCA 3	1		0	0	0	1
NCA 4	18		8	1	0	27
NCA 5	1		3	0	0	4
NCA 6	3		1	0	0	4
NCA 7	8		1	0	0	9
NCA 8	0		1	1	0	2
NCA 9	3		0	1	0	4
NCA 10	3		1	0	0	4
NCA 11	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	3	3	2	2	1	10
NCA 2	1	2	0	0	0	3
NCA 3	3	7	1	0	0	11
NCA 4	15	22	11	3	0	51
NCA 5	1	4	1	2	0	8
NCA 6	4	4	1	0	0	9
NCA 7	9	8	1	0	0	18
NCA 8	1	0	0	2	0	3
NCA 9	1	1	2	1	0	5
NCA 10	2	3	1	0	0	6
NCA 11	1	1	0	0	0	2
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	3	1	2	1	1	8
NCA 2	2	0	0	0	0	2
NCA 3	7	0	1	0	0	8

NCA 4	10	12	11	2	1	36
NCA 5	3	1	1	2	0	7
NCA 6	4	2	2	0	0	8
NCA 7	4	11	2	1	0	18
NCA 8	0	0	0	2	0	2
NCA 9	0	1	2	1	0	4
NCA 10	1	2	1	0	0	4
NCA 11	2	0	0	0	0	2
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	3	0	1	0	4
NCA 2	0	0	0	0	0	0
NCA 3	1	0	0	0	0	1
NCA 4	7	4	2	0	0	13
NCA 5	0	3	0	0	0	3
NCA 6	2	0	0	0	0	2
NCA 7	2	1	0	0	0	3
NCA 8	0	0	1	0	0	1
NCA 9	1	0	1	0	0	2
NCA 10	1	1	0	0	0	2
NCA 11	0	0	0	0	0	0

New Wollar sub-station

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 11	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 11	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 11	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 11	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 11	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 11	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 11	2		0	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 11	0	2	0	0	0	2

All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 11	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 11	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 11	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 11	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 11	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 11	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 11	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 11	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 11	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 11	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 11	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 11	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 11	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 11	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 11	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 11	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Merotherie energy hub

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	2	2	0	0	0	4
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	2		0	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	4	3	0	0	0	7
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	2	2	0	0	0	4
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	2	2	0	0	0	4
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	2	2	0	0	0	4
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 5	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 5	2	2	0	0	0	4
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 5	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Elong Elong energy hub

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0

Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	1	0	0	0	0	1
NCA 2	1	2	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	1	0	0	0	0	1
NCA 2	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	0	0	0	0	0

NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	1	0	0	0	0	1
NCA 2	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Cassilis switching station (M1)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	1	0	0	0	0	1

All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	2	1	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0

Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 10	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0

All other NCAs	0	0	0	0	0	0

Coolah switching station (M2)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML

Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 10	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total

NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 10	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 10	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Leadville switching station (M3)

No exceedances across all NCAs

Merotherie switching station (M4)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
NCA 5	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	1	1	0	0	0	2
NCA 5	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	1	0	0	0	0	1
NCA 5	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	1		0	0	0	1
NCA 5	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	1	1	0	0	0	2
NCA 5	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	1	0	0	0	1
NCA 5	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	1		0	0	0	1
NCA 5	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	1	1	0	0	0	2
NCA 5	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	1	0	0	0	1
NCA 5	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0

Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	1	0	0	0	0	1
NCA 5	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	1		0	0	0	1
NCA 5	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	0	1	1	0	0	2
NCA 5	0	0	1	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	1	0	1	0	0	2
NCA 5	0	0	1	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	1	0	0	0	0	1
NCA 5	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	1		0	0	0	1
NCA 5	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	1	1	0	0	0	2
NCA 5	0	0	1	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	1	1	0	0	0	2
NCA 5	0	0	1	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	1		0	0	0	1
NCA 5	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	1	1	0	0	0	2

NCA 5	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	1	0	0	0	1
NCA 5	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	1	0	0	0	1
NCA 5	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	1	0	0	0	0	1
NCA 5	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	1		0	0	0	1
NCA 5	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	1	1	0	0	0	2
NCA 5	0	0	1	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	1	1	0	0	0	2
NCA 5	0	0	1	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Merotherie switching station (M5)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
NCA 5	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
NCA 5	0		2	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
NCA 5	0		2	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0

Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	0		0	0	0	0
NCA 5	0		2	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	2	0	0	0	0	2
NCA 5	1	0	0	2	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
NCA 5	0	0	0	2	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	0		0	0	0	0
NCA 5	0		2	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	0	0	0	0	0	0
NCA 5	1	0	1	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
NCA 5	0	0	1	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
NCA 5	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	0		0	0	0	0
NCA 5	0		2	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	0	0	0	0	0	0

NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
NCA 5	2		0	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	2	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
NCA 5	0		2	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	1	0	1	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	0	1	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
NCA 5	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0

Tallawang switching station (M6)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0

All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	5	2	0	0	0	7
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**

NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Dunedoo switching station (M7)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 3	0		0	0	0	0
NCA 4	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 3	0	0	0	0	0	0
NCA 4	2	1	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 3	0	0	0	0	0	0
NCA 4	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 3	0	0	0	0	0	0
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 3	0		0	0	0	0
NCA 4	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 3	0	0	0	0	0	0
NCA 4	1	1	1	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 3	0	0	0	0	0	0
NCA 4	1	0	1	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 3	0	0	0	0	0	0
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 3	0		0	0	0	0
NCA 4	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 3	1	0	0	0	0	1
NCA 4	1	1	1	0	0	3

All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	1	0	1	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
NCA 4	1		1	0	0	2
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	2	0	0	0	0	2
NCA 4	3	2	1	0	0	6
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	1	0	0	0	0	1
NCA 4	1	1	1	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
NCA 4	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	1	0	0	0	0	1
NCA 4	0	2	1	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	2	0	1	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
NCA 4	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	1	0	0	0	0	1
NCA 4	1	1	1	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	1	0	1	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
NCA 4	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 3	0	0	0	0	0	0
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	0		0	0	0	0
NCA 4	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 3	1	0	0	0	0	1
NCA 4	0	2	1	0	0	3
All other NCAs	0	0	0	0	0	0

Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 3	0	0	0	0	0	0
NCA 4	2	0	1	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 3	0	0	0	0	0	0
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

Tallawang switching station (M8)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0

All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Tallawang switching station (M9)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0

All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	3	1	0	0	0	4
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**

NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 4	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 4	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Cobbora switching station (E1)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	1	0	0	0	1

All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	2	0	0	0	0	2
NCA 2	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0

Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Cobbora switching station (E2)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	1	0	0	0	0	1
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	1	0	0	0	0	1
NCA 2	1	0	0	0	0	1

All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	1	0	0	0	1
NCA 2	0	1	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	1	0	0	0	0	1
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	1	0	0	0	0	1
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	1	0	0	0	0	1
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	1	0	0	0	0	1
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Goolma switching station (E3)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	3	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	3	3	0	0	0	6
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	3	3	0	0	0	6
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	3	0	0	0	0	3

All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	3		0	0	0	3
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	6	0	0	0	6
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	3	3	0	0	0	6
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	3		0	0	0	3
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	6	0	0	0	6
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	3	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	3	3	0	0	0	6
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total

NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	3	0	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	**Number of Residential Receivers exceeding NML**					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	3		0	0	0	3
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	3	3	0	0	0	6
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	3	0	0	0	3
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Goolma switching station (E4)

1 - Utility adjustment (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Site access (Enabling works)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

4 - Access and earthworks (including blasting & crushing)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

5 - Foundations and pads (including piling and blasting)

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

6 - Equipment installation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

7 - Commissioning of RNI

NCA	Number of Residential Receivers exceeding NML
Standard Hours	

	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

8 - Demobilisation and rehabilitation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		**10-20 dB**	**>20 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	**5-15 dB**	**15-25 dB**	**>25 dB**	**Highly Affected (>75 dBA)**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Access track construction

1 - Earthworks and upgrades

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	1		3	1	0	5
NCA 2	0		0	0	0	0
NCA 3	1		0	0	0	1
NCA 4	20		6	3	1	29
NCA 5	1		3	0	0	4
NCA 6	3		1	0	0	4
NCA 7	7		2	0	0	9
NCA 8	0		2	0	0	2
NCA 9	3		1	0	0	4
NCA 10	3		1	0	0	4
NCA 11	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	3	3	2	2	0	10
NCA 2	1	2	0	0	0	3
NCA 3	6	6	1	0	0	13
NCA 4	17	20	13	3	1	53
NCA 5	1	4	3	0	0	8
NCA 6	4	4	1	0	0	9
NCA 7	9	7	2	0	0	18
NCA 8	2	0	1	1	0	4
NCA 9	1	1	1	1	0	4
NCA 10	2	3	2	0	0	7
NCA 11	1	1	0	0	0	2
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	2	1	2	1	1	7
NCA 2	2	0	0	0	0	2
NCA 3	7	0	1	0	0	8
NCA 4	11	13	13	1	2	40
NCA 5	3	1	3	0	0	7
NCA 6	4	2	2	0	0	8
NCA 7	4	12	3	1	0	20
NCA 8	0	0	1	1	0	2
NCA 9	0	1	1	1	0	3
NCA 10	1	2	2	0	0	5
NCA 11	2	0	0	0	0	2
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	3	1	0	0	4
NCA 2	0	0	0	0	0	0
NCA 3	0	0	0	0	0	0
NCA 4	8	5	1	1	0	15
NCA 5	1	2	0	0	0	3
NCA 6	2	0	0	0	0	2
NCA 7	2	1	1	0	0	4
NCA 8	0	1	1	0	0	2
NCA 9	0	0	1	0	0	1
NCA 10	0	1	0	0	0	1
NCA 11	0	0	0	0	0	0

2 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML				
Standard Hours					
	0-10 dB	10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	1	3	1	0	5
NCA 2	0	0	0	0	0
NCA 3	1	0	0	0	1
NCA 4	17	5	3	1	25

NCA 5	1	2	0	0	3
NCA 6	4	0	0	0	4
NCA 7	3	1	0	0	5
NCA 8	0	2	0	0	2
NCA 9	3	1	0	0	4
NCA 10	2	1	0	0	3
NCA 11	0	0	0	0	0

Out of Hours

	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	3	2	3	1	0	9
NCA 2	1	1	0	0	0	2
NCA 3	6	5	0	0	0	11
NCA 4	14	21	11	3	1	49
NCA 5	4	1	3	0	0	8
NCA 6	3	3	1	0	0	7
NCA 7	12	4	1	0	0	17
NCA 8	0	0	1	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	3	3	1	0	0	7
NCA 11	1	1	0	0	0	2

Sleep disturbance - LAeq

	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	1	1	3	1	0	6
NCA 2	2	0	0	0	0	2
NCA 3	4	1	0	0	0	5
NCA 4	10	11	11	1	1	34
NCA 5	4	0	3	0	0	7
NCA 6	2	3	1	0	0	6
NCA 7	9	6	2	1	0	18
NCA 8	0	0	1	1	0	2
NCA 9	0	3	0	1	0	4
NCA 10	1	2	1	0	0	4
NCA 11	1	0	0	0	0	1

Sleep awakening - LAMax

	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	1	0	3	1	0	5
NCA 2	0	0	0	0	0	0
NCA 3	0	0	0	0	0	0
NCA 4	13	8	5	2	1	29
NCA 5	1	0	3	0	0	4
NCA 6	2	2	0	0	0	4
NCA 7	12	2	2	0	0	16
NCA 8	0	0	2	0	0	2
NCA 9	3	0	1	0	0	4
NCA 10	3	0	1	0	0	4
NCA 11	0	0	0	0	0	0

Construction compound at Merotherie

1 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
NCA 6	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	3	1	0	0	0	4
NCA 6	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	1	0	0	0	0	1
NCA 6	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
NCA 6	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Construction

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
NCA 6	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	3	1	0	0	0	4
NCA 6	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	1	0	0	0	0	1
NCA 6	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
NCA 6	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Operation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
NCA 6	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	4	1	0	0	0	5
NCA 6	0	0	0	0	0	0

All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 5	2	0	0	0	0	2
NCA 6	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 5	0	0	0	0	0	0
NCA 6	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Construction compound at Elong Elong

1 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
NCA 1	0	0	0	0	0	0
NCA 2	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Construction

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	0	0	0	0	0
NCA 2	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Operation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 1	0		0	0	0	0
NCA 2	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 1	0	0	0	0	0	0
NCA 2	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						

	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 1	0	0	0	0	0	0
NCA 2	2	0	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	**5-10 dB**	**10-20 dB**	**20-30 dB**	**>30dB**	**Total**
NCA 1	0	0	0	0	0	0
NCA 2	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

Construction compound at New Wollar

1 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 11	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 11	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

2 - Construction

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 11	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 11	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	1	1	0	0	0	2
NCA 2	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Operation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 11	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 11	0	2	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	1	1	0	0	0	2
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 11	0	0	0	0	0	0

All other NCAs	0	0	0	0	0	0

Merotherie workforce accommodation camp

1 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	3	1	0	0	0	4
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0

2 - Construction

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	1		0	0	0	1
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	1	3	0	0	0	4
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	3	1	0	0	0	4
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Operation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dBA)	Total
NCA 5	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dBA)	Total
NCA 5	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 5	0	0	0	0	0	0

All other NCAs	0	0	0	0	0	0

Neeley's Lane workforce accommodation camp

1 - Vegetation clearance

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dB)	Total
NCA 4	0		0	0	0	0
NCA 9	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dB)	Total
NCA 4	0	2	0	0	0	2
NCA 9	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	2	0	0	0	0	2
NCA 9	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	1	0	0	0	0	1
NCA 9	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

2 - Construction

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dB)	Total
NCA 4	1		0	0	0	1
NCA 9	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dB)	Total
NCA 4	0	2	0	0	0	2
NCA 9	1	0	0	0	0	1
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	1	1	0	0	0	2
NCA 9	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
NCA 9	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

3 - Operation

NCA	Number of Residential Receivers exceeding NML					
Standard Hours						
	0-10 dB		10-20 dB	>20 dB	Highly Affected (>75 dB)	Total
NCA 4	0		0	0	0	0
NCA 9	0		0	0	0	0
All other NCAs	0		0	0	0	0
Out of Hours						
	0-5 dB	5-15 dB	15-25 dB	>25 dB	Highly Affected (>75 dB)	Total
NCA 4	1	0	0	0	0	1
NCA 9	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep disturbance - LAeq						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0
NCA 9	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0
Sleep awakening - LAMax						
	0-5 dB	5-10 dB	10-20 dB	20-30 dB	>30dB	Total
NCA 4	0	0	0	0	0	0

NCA 9	0	0	0	0	0	0
All other NCAs	0	0	0	0	0	0

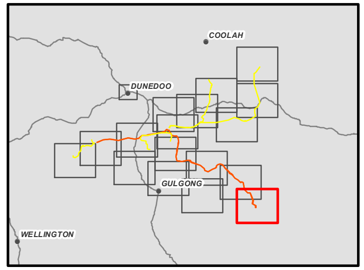
APPENDIX B-4
Construction noise exceedance mapping

Appendix B-4
Maximum construction noise exceedances

Legend
- Study area
- Construction area
- Construction compound
- Energy hub / 500 kV switching station
- 500 kV transmission line
- Existing substation
- Existing transmission line
- Road
- Railway
- Water body
- NPWS estate

Construction traffic exceedances
- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances
- Dwelling - Noticeable (0-5-dB)
- Dwelling - Clearly audible (5-15 dB)



0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:50,000
Data sources: WSP 2023, EnergyCo, NSWSS

Legend

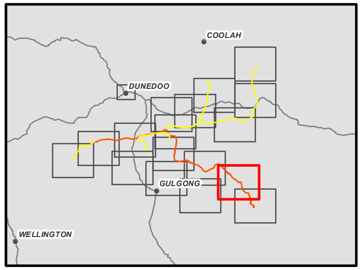
- Study area
- Construction area
- 500 kV transmission line
- Existing transmission line
- Road
- Railway
- Water body
- NPWS estate

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances

- Dwelling - Noticeable (0-5-dB)
- Dwelling - Highly intrusive (>25 dB)

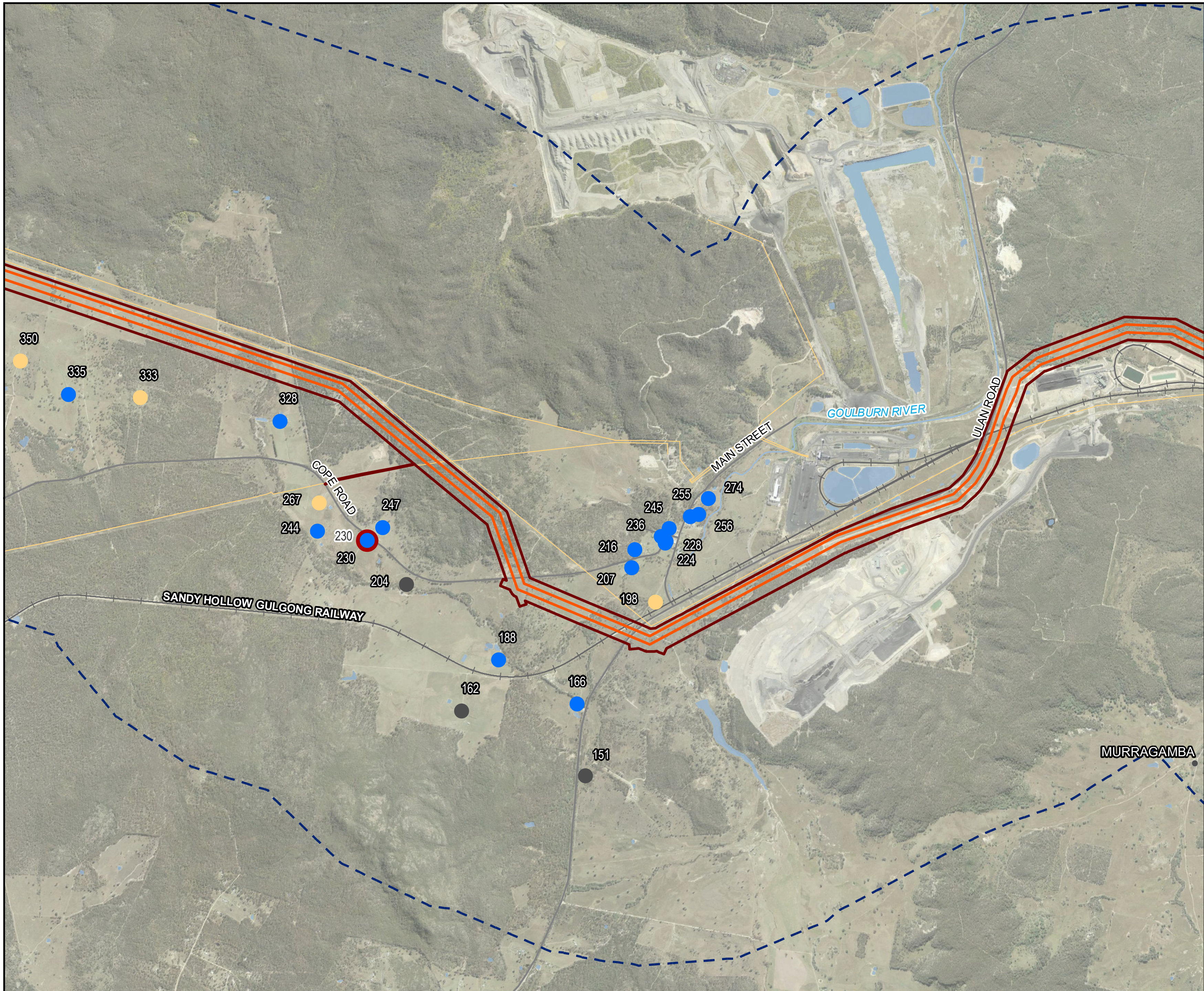


0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4

1:50,000
Data sources: WSP 2023, EnergyCo, NSWSS

Appendix B-4
Maximum construction noise exceedances
Page 3 of 18



Legend

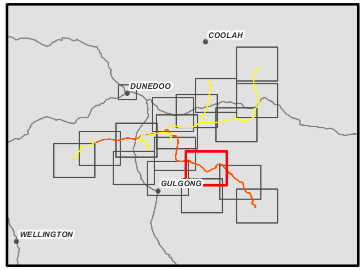
- Study area
- Construction area
- 500 kV transmission line
- Existing transmission line
- Road
- Railway
- Watercourse
- Water body

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances

- Dwelling - Noticeable (0-5-dB)
- Dwelling - Clearly audible (5-15 dB)
- Dwelling - Moderately intrusive (15-25 dB)



0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
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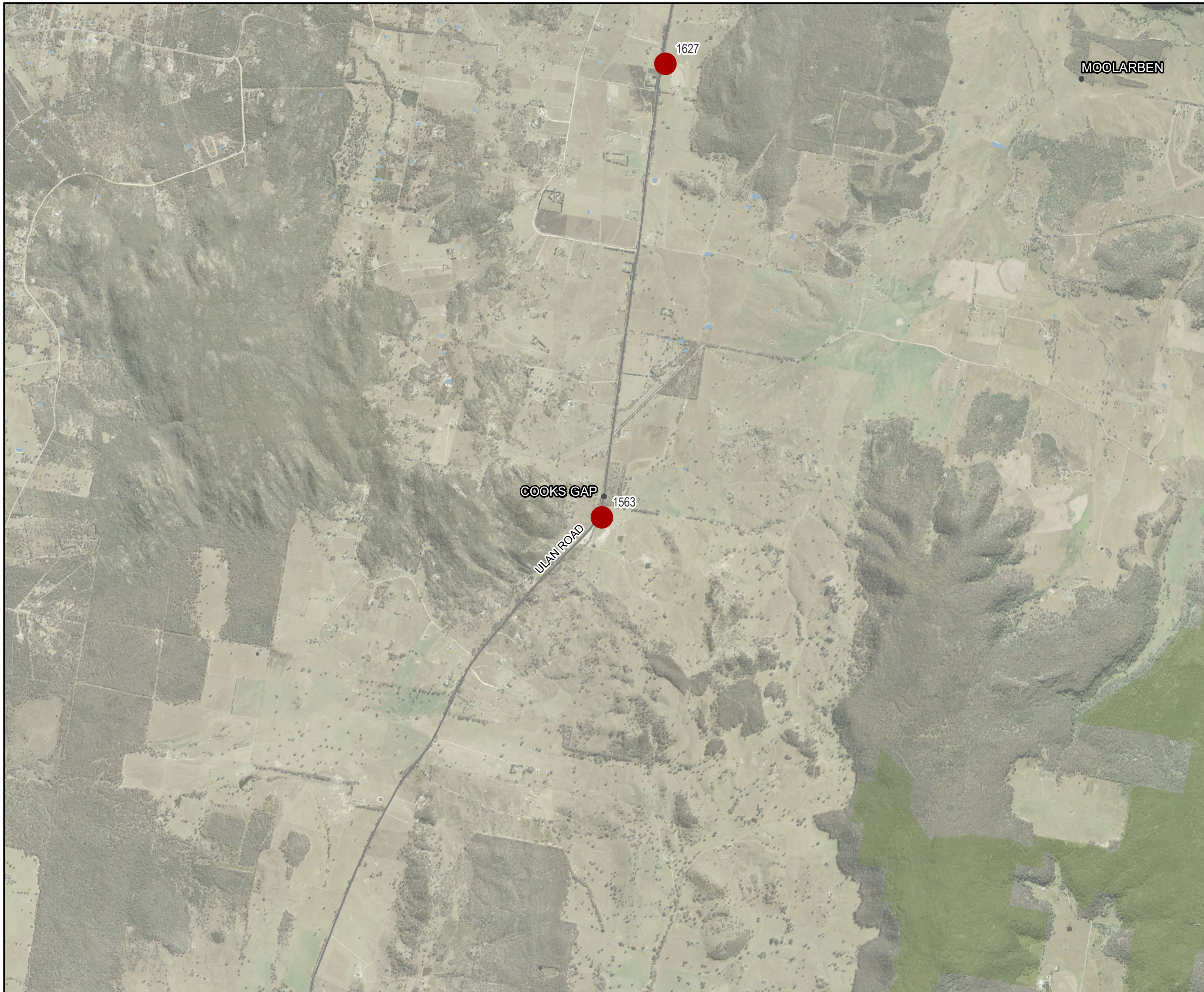
Data sources: WSP 2023, EnergyCo, NSWSS

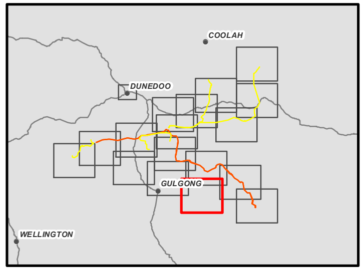


Legend

- Road
- Water body
- NPWS estate

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only



0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
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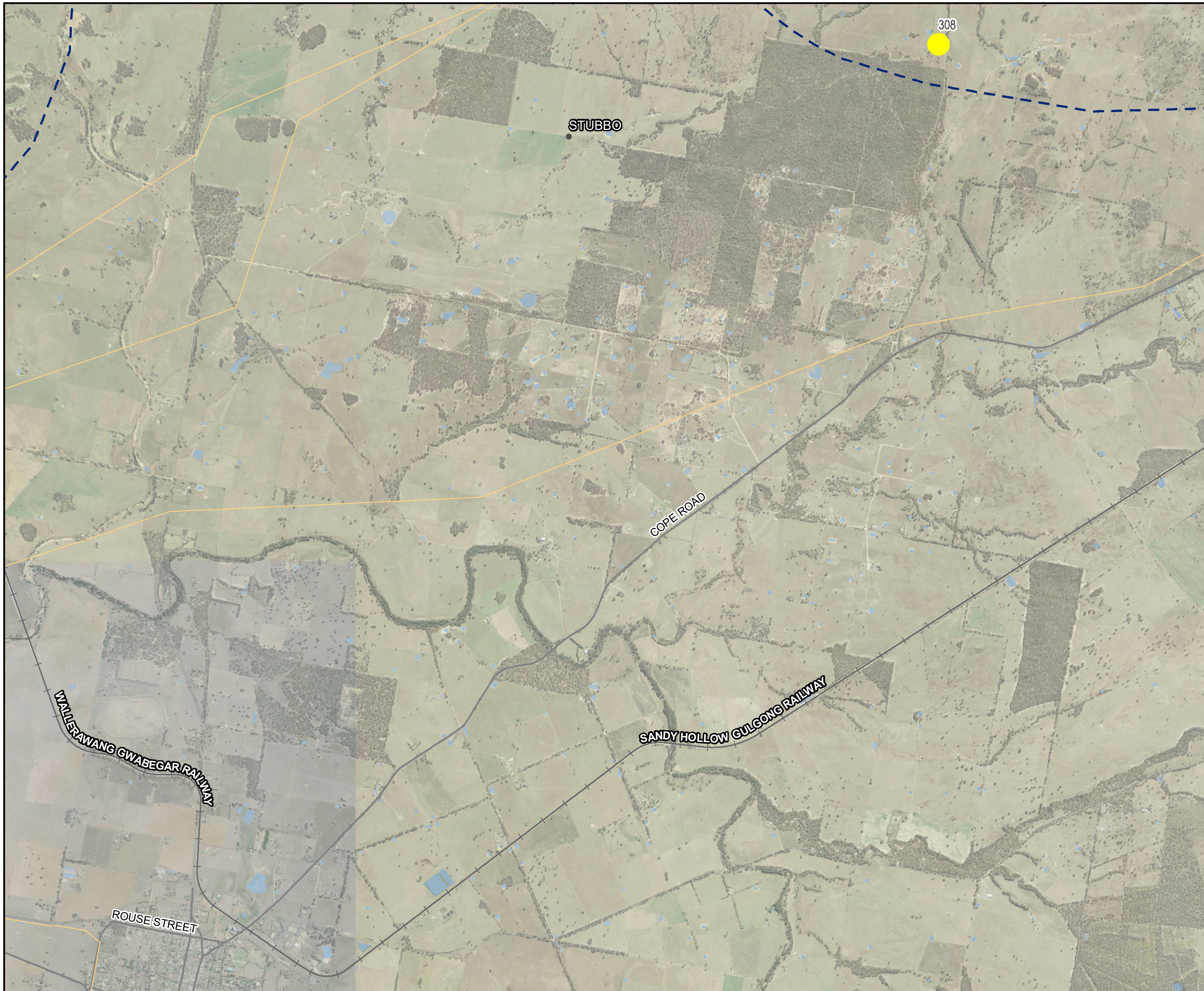
Data sources: WSP 2023, EnergyCo, NSWSS

Appendix B-4
Maximum construction noise exceedances

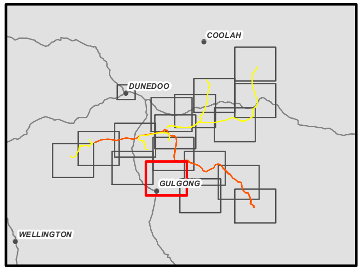


Legend

- Study area
- Existing transmission line
- Road
- Railway
- Water body

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only



0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
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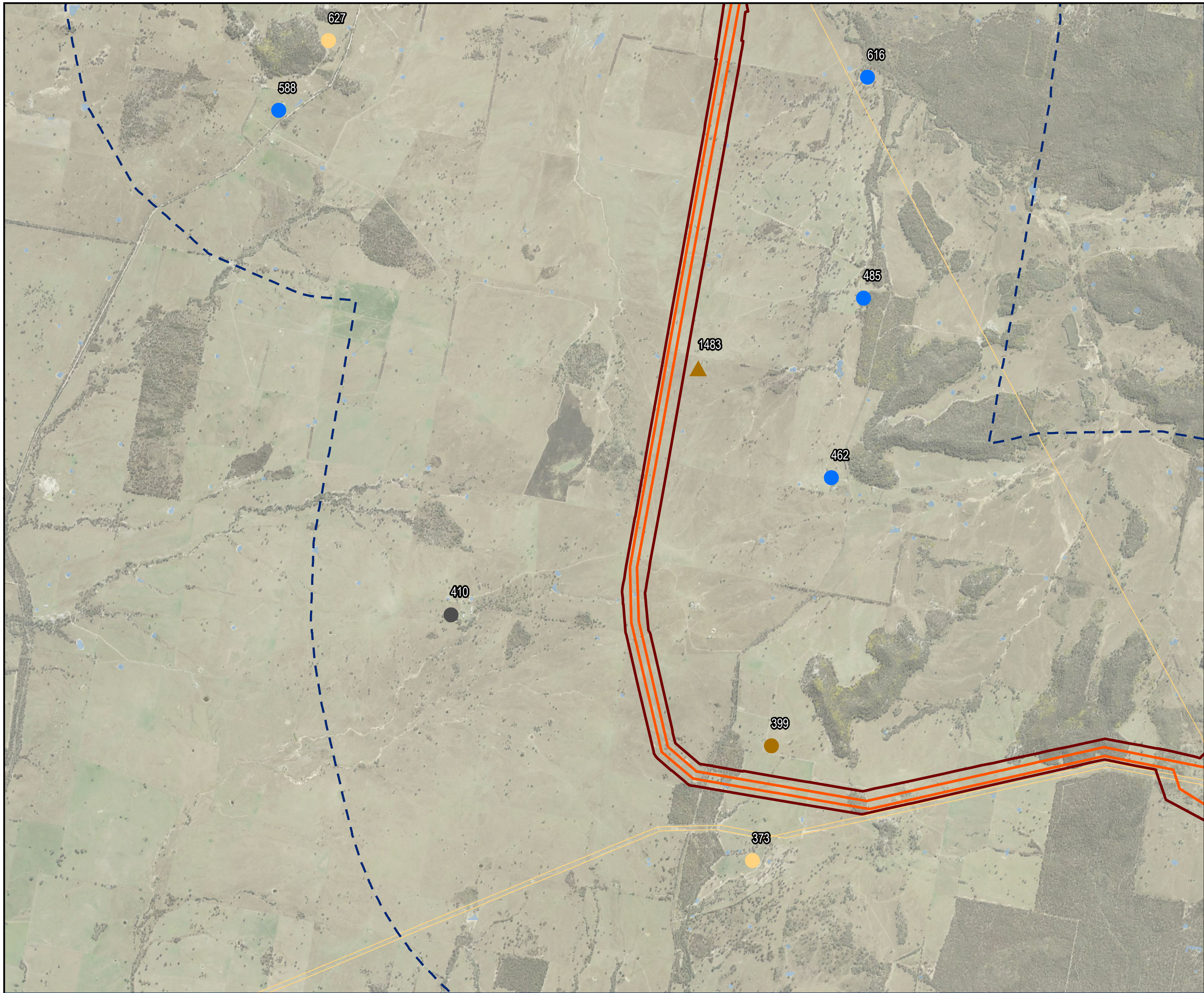
Data sources: WSP 2023, EnergyCo, NSWSS



Legend

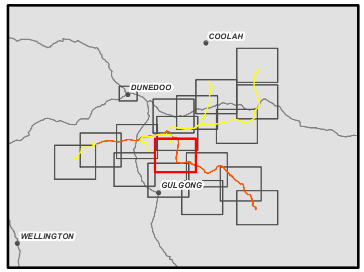
- Study area
- Construction area
- 500 kV transmission line
- Existing transmission line
- Water body

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances

- Dwelling - Noticeable (0-5-dB)
- Dwelling - Clearly audible (5-15 dB)
- Dwelling - Moderately intrusive (15-25 dB)
- Dwelling - Highly intrusive (>25 dB)
- DA approved (no structure) - Highly intrusive (>25 dB)



0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
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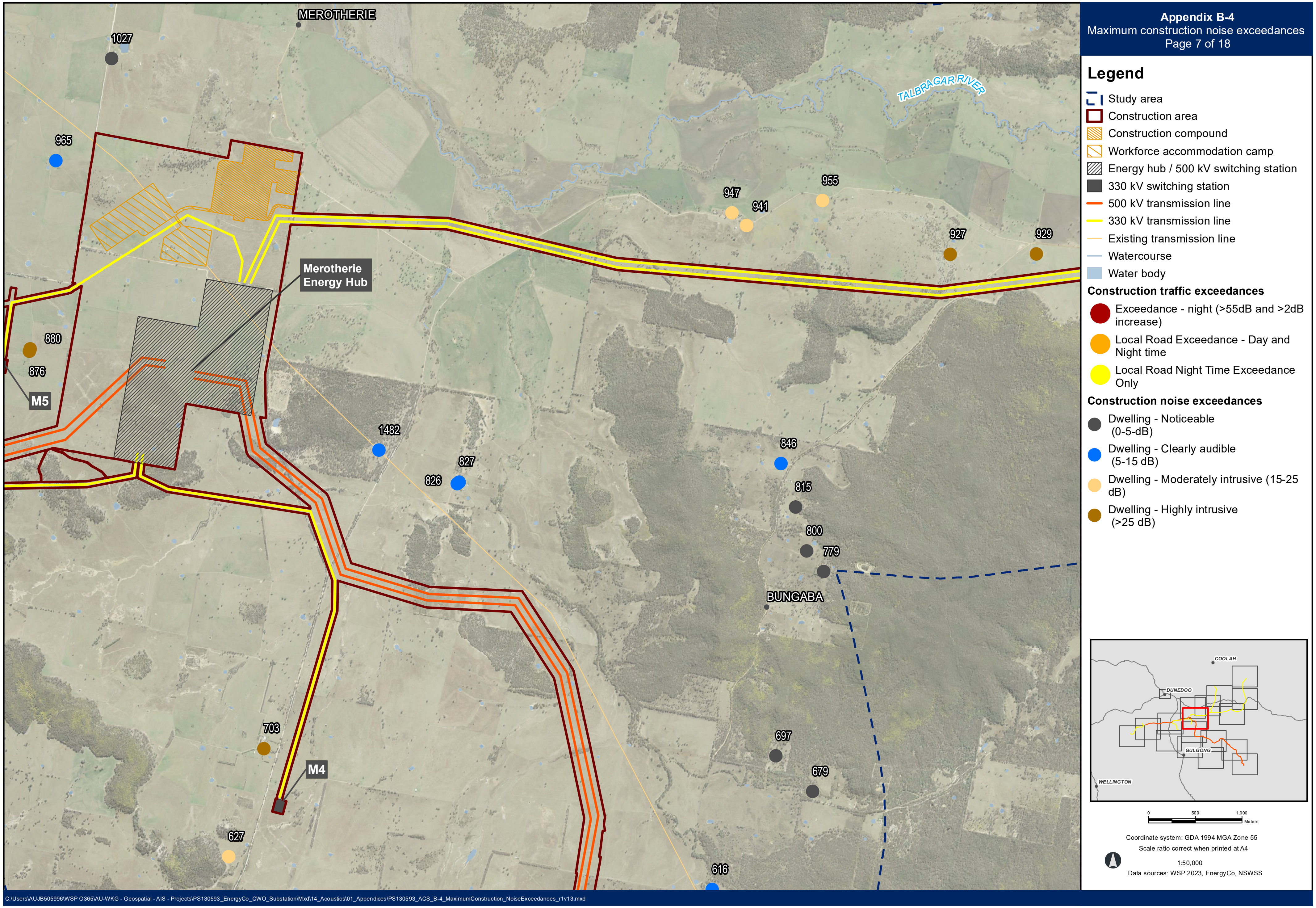
Data sources: WSP 2023, EnergyCo, NSWSS


Appendix B-4
Maximum construction noise exceedances
Page 7 of 18
Legend
Study area
Construction area
Construction compound
Workforce accommodation camp
Energy hub / 500 kV switching station
330 kV switching station
500 kV transmission line
330 kV transmission line
Existing transmission line
Watercourse
Water body
Construction traffic exceedances
Exceedance - night (>55dB and >2dB increase)
Local Road Exceedance - Day and Night time
Local Road Night Time Exceedance Only
Construction noise exceedances
Dwelling - Noticeable (0-5-dB)
Dwelling - Clearly audible (5-15 dB)
Dwelling - Moderately intrusive (15-25 dB)
Dwelling - Highly intrusive (>25 dB)
MEROTHERIE
TALBRAGAR RIVER
Merotherie Energy Hub
BUNGABA
M5
M4
1027
965
880
876
947
941
955
927
929
1482
827
826
846
815
800
779
703
697
679
627
616
COOLAH
DUNEDOO
GULGONG
WELLINGTON
0
500
1,000
Meters
Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:50,000
Data sources: WSP 2023, EnergyCo, NSWSS
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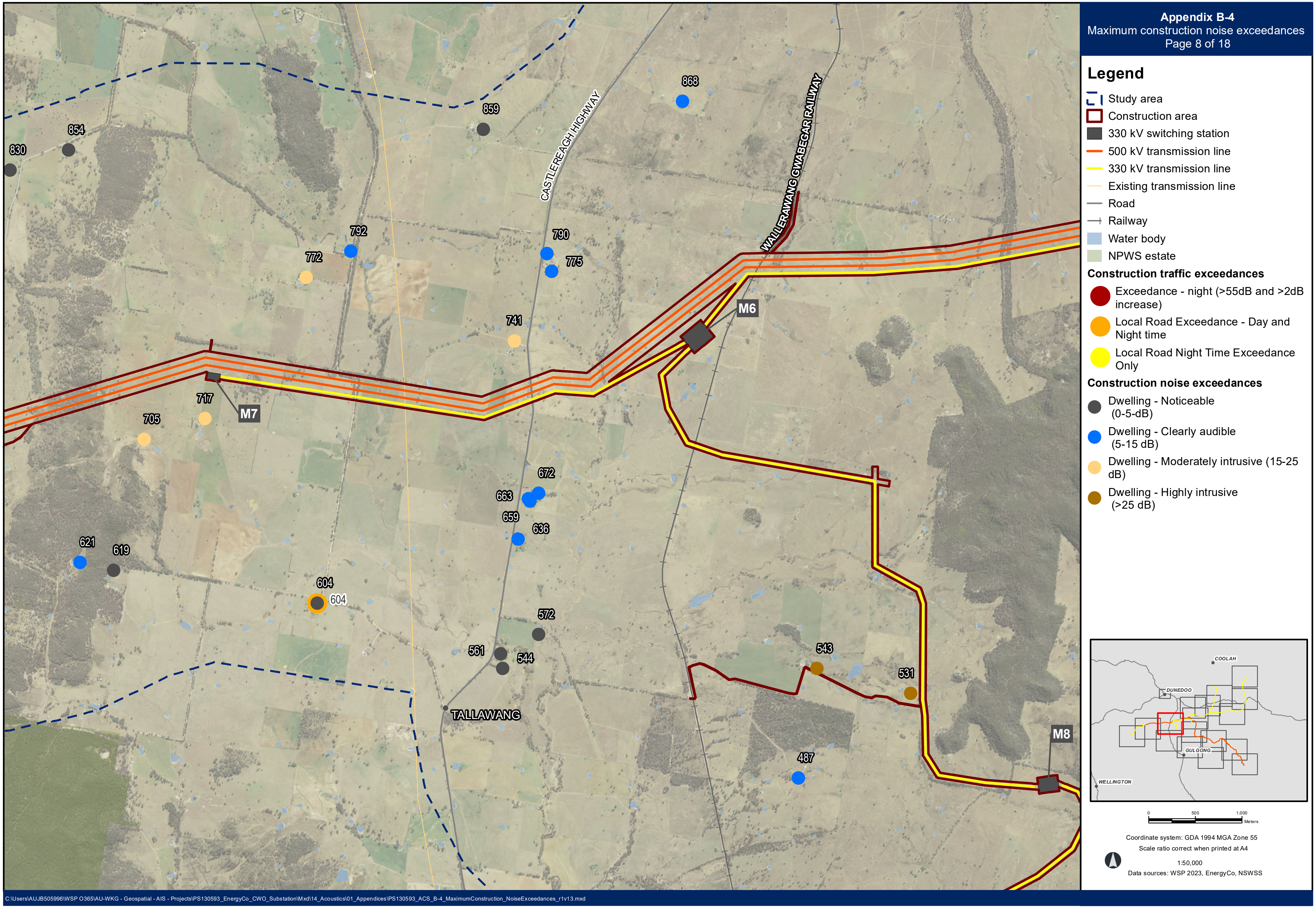
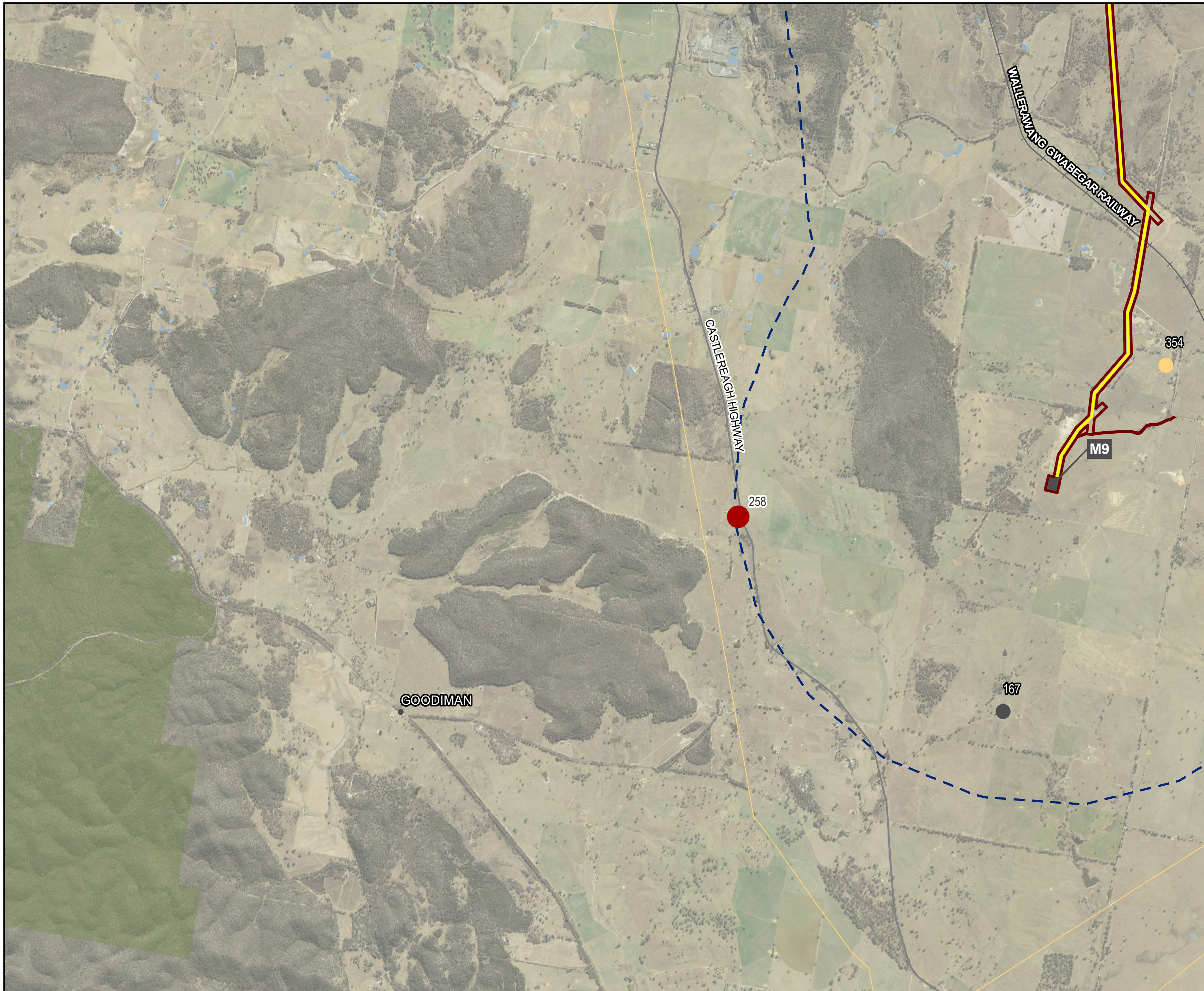
Appendix B-4
Maximum construction noise exceedances



Appendix B-4
Maximum construction noise exceedances



Legend

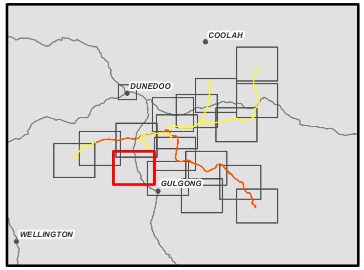
- Study area
- Construction area
- 330 kV switching station
- 330 kV transmission line
- Existing transmission line
- Road
- Railway
- Water body
- NPWS estate

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

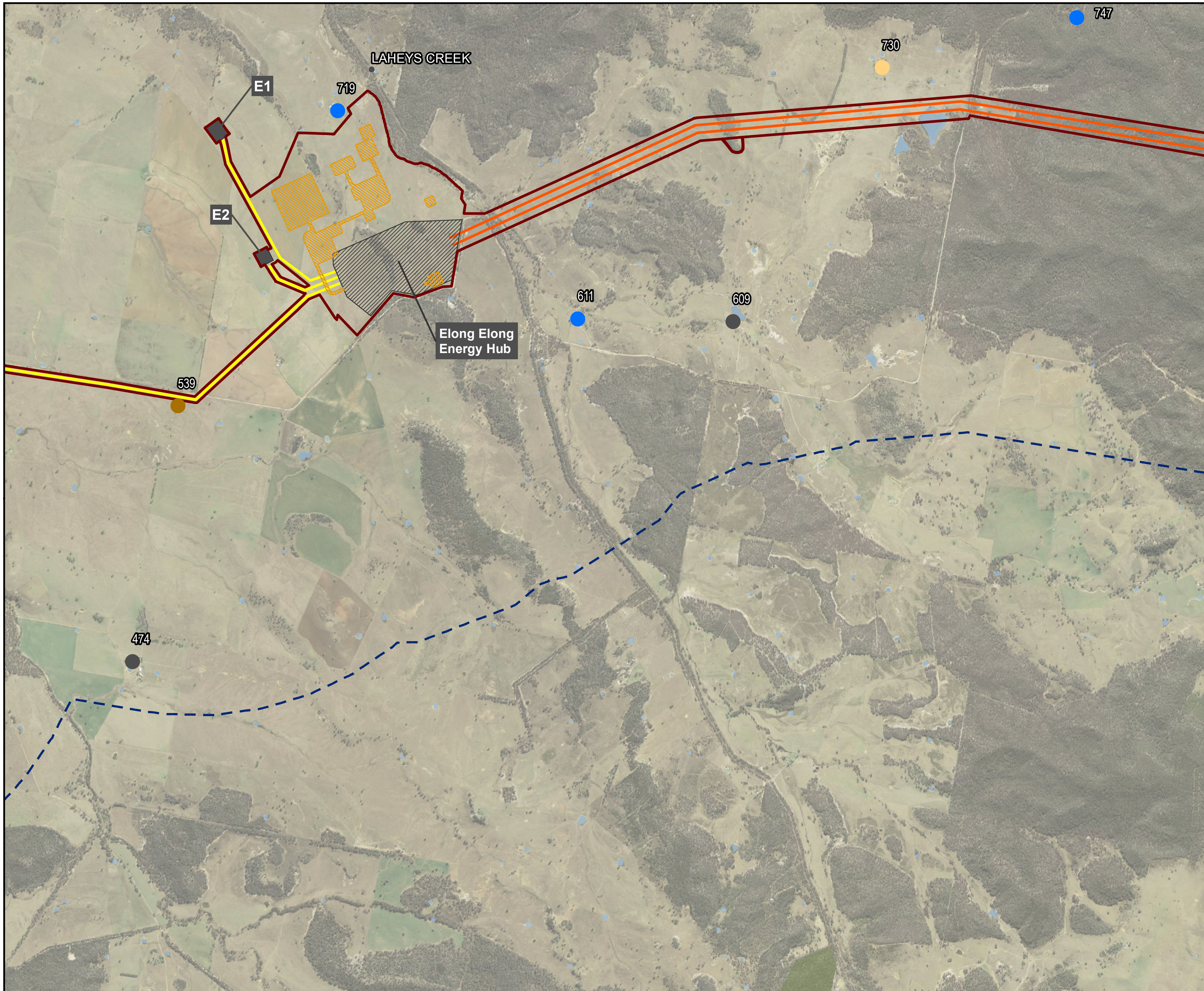
Construction noise exceedances

- Dwelling - Noticeable (0-5-dB)
- Dwelling - Moderately intrusive (15-25 dB)



0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:50,000
Data sources: WSP 2023, EnergyCo, NSWSS



Legend

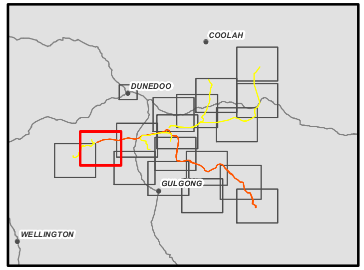
- Study area
- Construction area
- Construction compound
- Energy hub / 500 kV switching station
- 330 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Water body
- NPWS estate

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances

- Dwelling - Noticeable (0-5-dB)
- Dwelling - Clearly audible (5-15 dB)
- Dwelling - Moderately intrusive (15-25 dB)
- Dwelling - Highly intrusive (>25 dB)



0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4

1:50,000
Data sources: WSP 2023, EnergyCo, NSWSS

Appendix B-4
Maximum construction noise exceedances

Legend

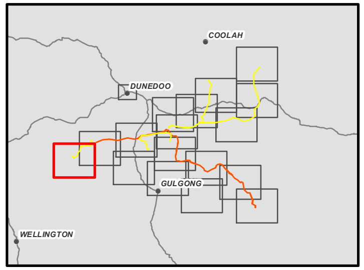
- Study area
- Construction area
- 330 kV switching station
- 330 kV transmission line
- Water body
- NPWS estate

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances

- Dwelling - Noticeable (0-5-dB)
- Dwelling - Clearly audible (5-15 dB)
- Dwelling - Moderately intrusive (15-25 dB)



0 500 1,000 Meters

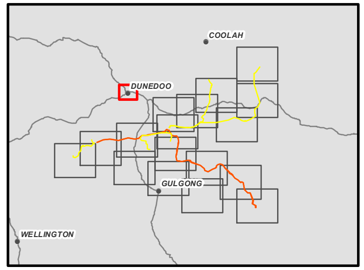
Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:50,000
Data sources: WSP 2023, EnergyCo, NSWSS

Legend

- Existing transmission line
- Road
- Railway
- Watercourse

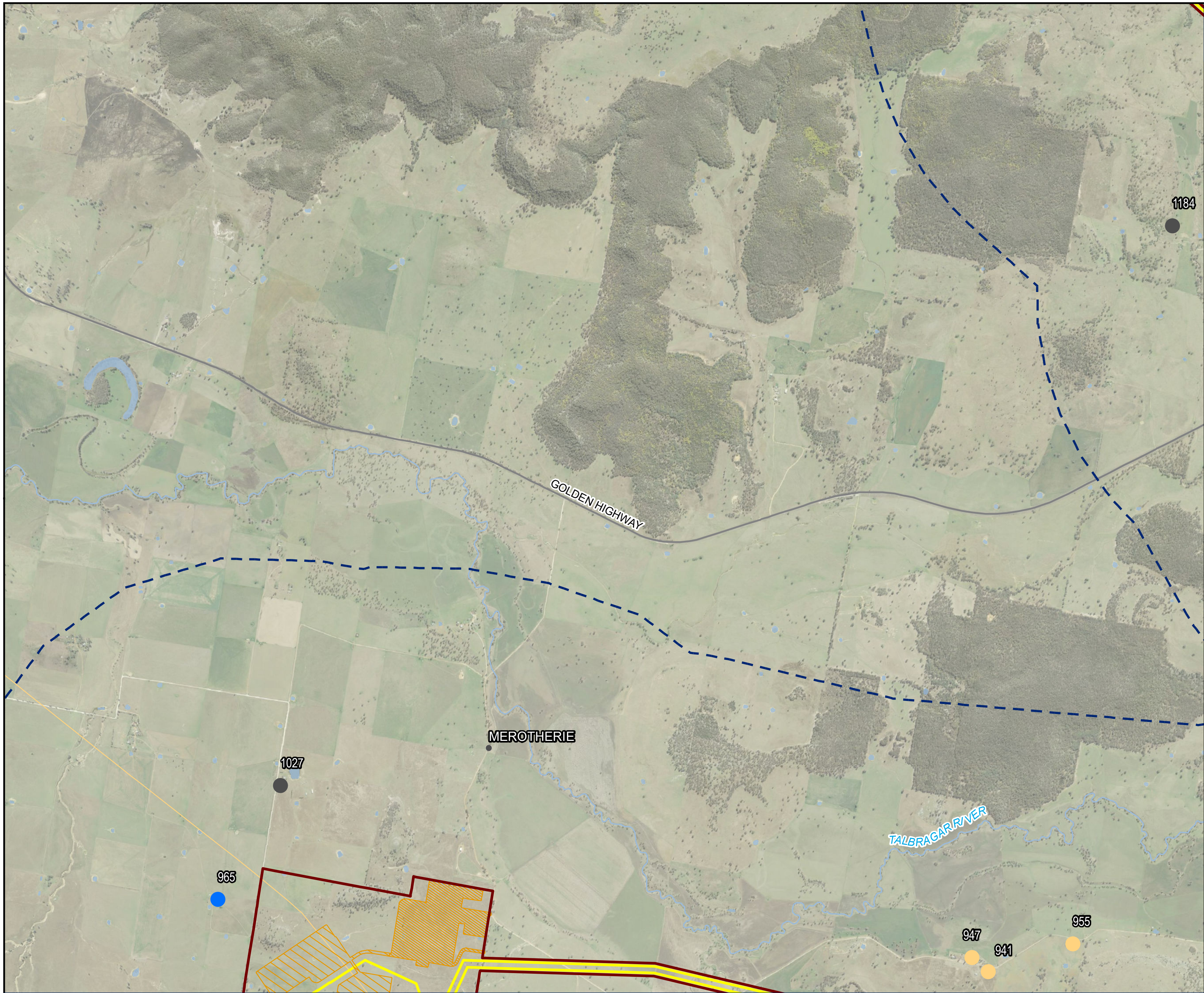
Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only



0 100 200 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:10,000
Data sources: WSP 2023, EnergyCo, NSWSS



Legend

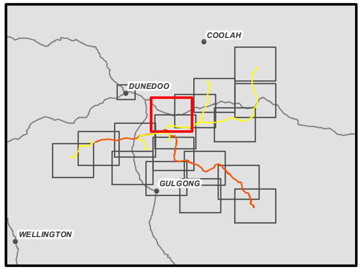
- Study area
- Construction area
- Construction compound
- Workforce accommodation camp
- 330 kV transmission line
- Existing transmission line
- Road
- Watercourse
- Water body

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

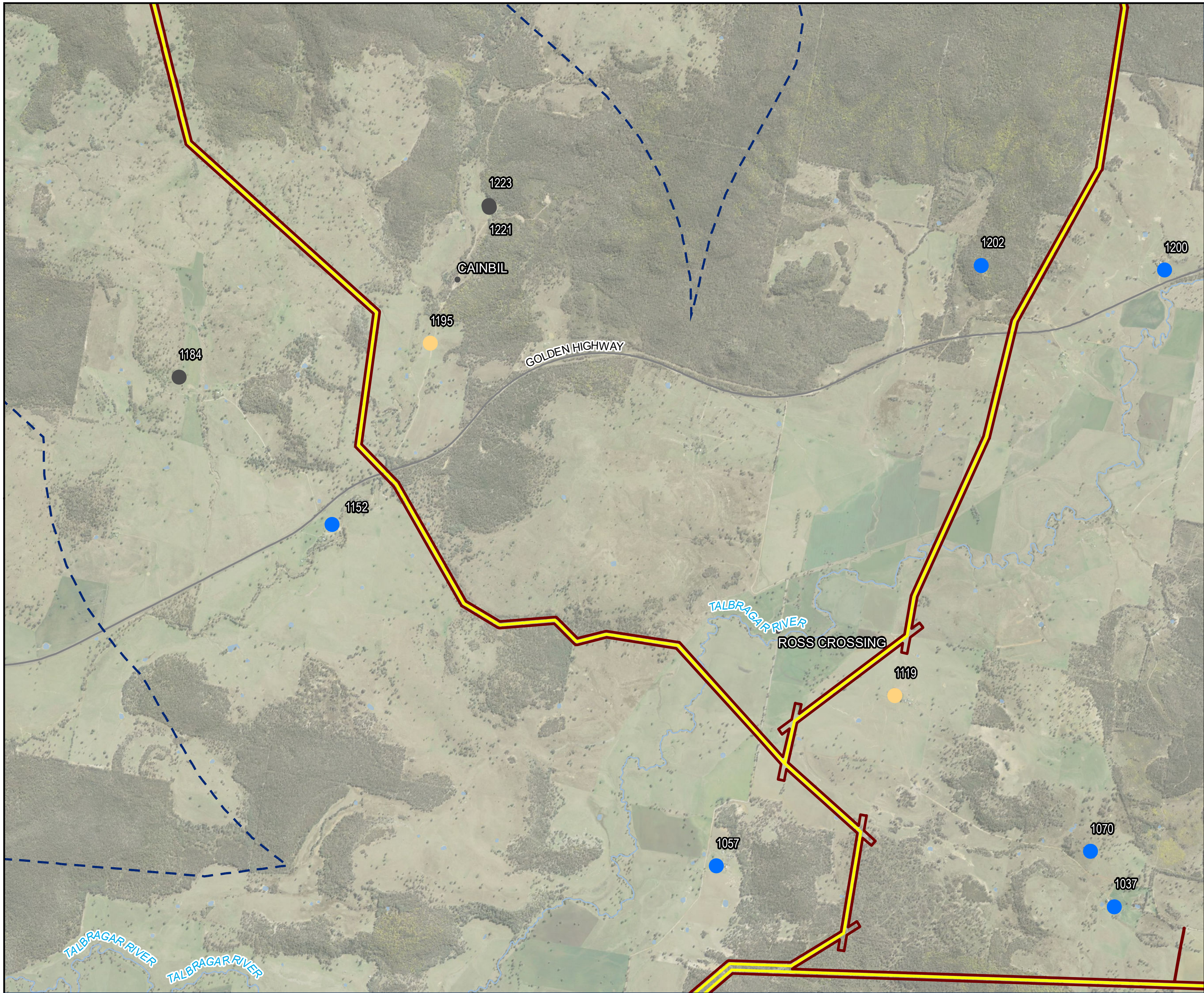
Construction noise exceedances

- Dwelling - Noticeable (0-5-dB)
- Dwelling - Clearly audible (5-15 dB)
- Dwelling - Moderately intrusive (15-25 dB)



0 500 1,000
Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:50,000
Data sources: WSP 2023, EnergyCo, NSWSS



Legend

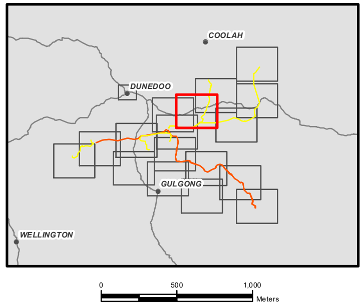
- Study area
- Construction area
- 330 kV transmission line
- Road
- Watercourse
- Water body

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances

- Dwelling - Noticeable (0-5-dB)
- Dwelling - Clearly audible (5-15 dB)
- Dwelling - Moderately intrusive (15-25 dB)



Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
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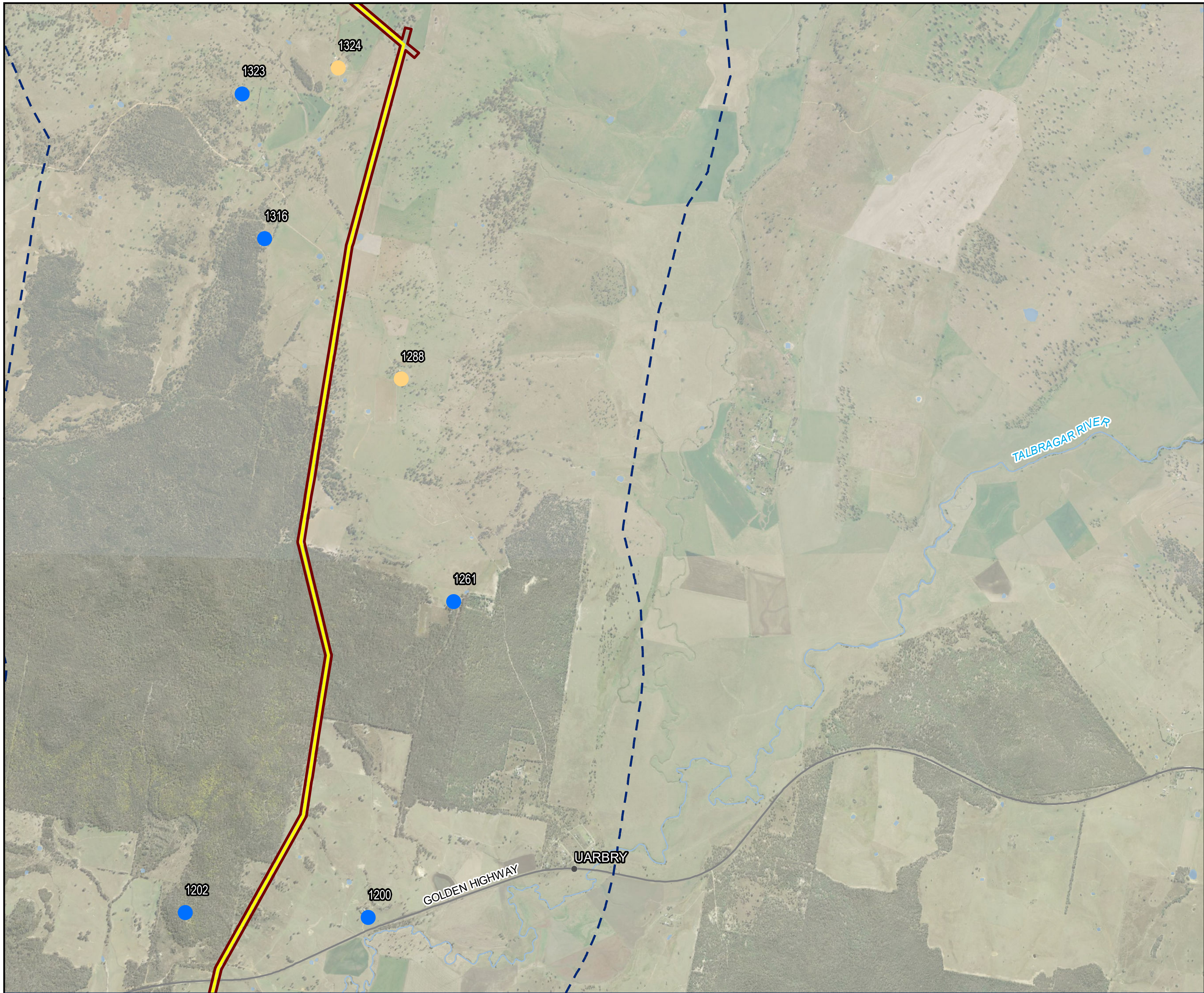
Data sources: WSP 2023, EnergyCo, NSWSS



Legend

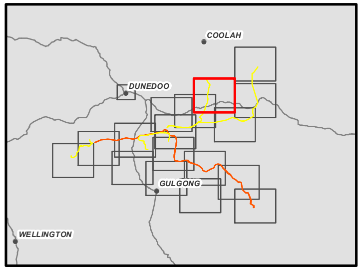
- Study area
- Construction area
- Road
- Watercourse
- Water body

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances

- Dwelling - Clearly audible (5-15 dB)
- Dwelling - Moderately intrusive (15-25 dB)



0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
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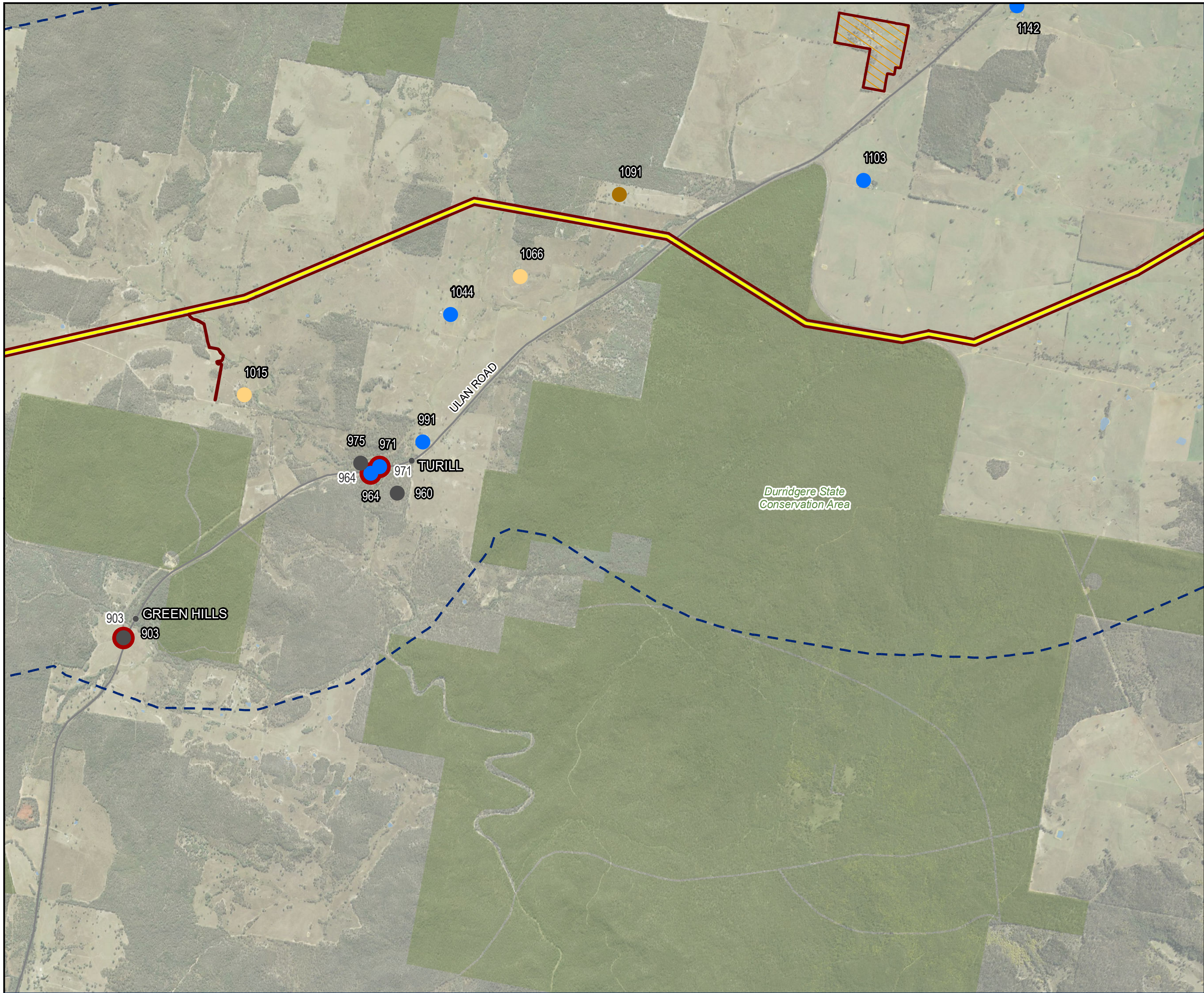
Data sources: WSP 2023, EnergyCo, NSWSS



Legend

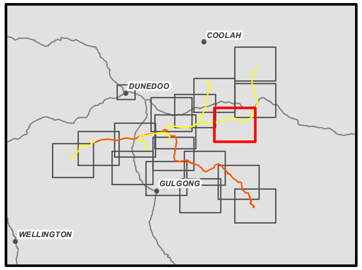
- Study area
- Construction area
- Workforce accommodation camp
- Road
- Water body
- NPWS estate

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances

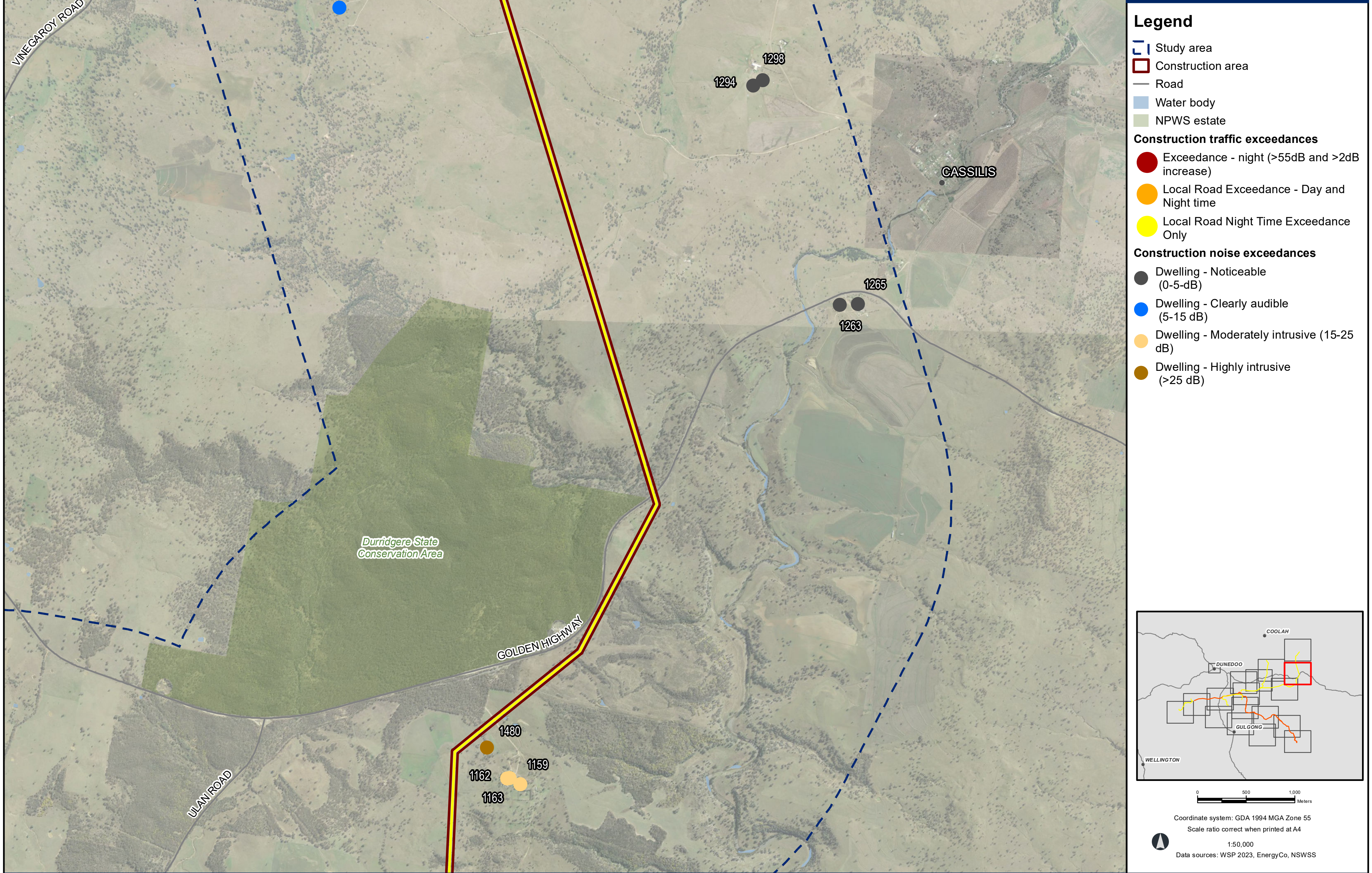
- Dwelling - Noticeable (0-5-dB)
- Dwelling - Clearly audible (5-15 dB)
- Dwelling - Moderately intrusive (15-25 dB)
- Dwelling - Highly intrusive (>25 dB)

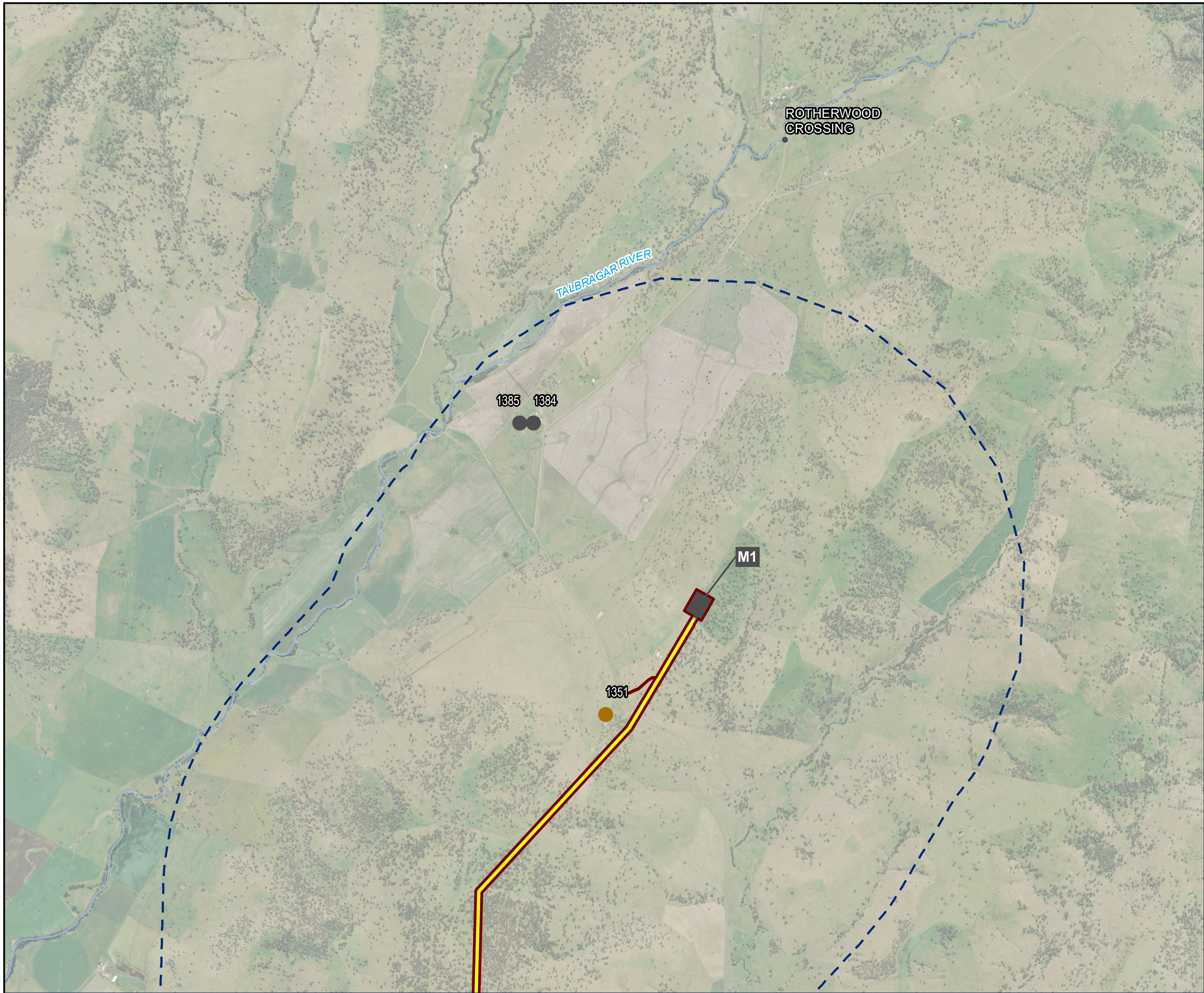


0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:50,000
Data sources: WSP 2023, EnergyCo, NSWSS

Appendix B-4
Maximum construction noise exceedances





Legend

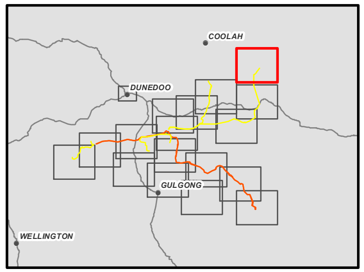
- Study area
- Construction area
- 330 kV switching station
- Watercourse

Construction traffic exceedances

- Exceedance - night (>55dB and >2dB increase)
- Local Road Exceedance - Day and Night time
- Local Road Night Time Exceedance Only

Construction noise exceedances

- Dwelling - Noticeable (0-5-dB)
- Dwelling - Highly intrusive (>25 dB)



0 500 1,000 Meters

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:50,000
Data sources: WSP 2023, EnergyCo, NSWSS

Appendix C

Transmission lines – Detailed operational noise assessment

APPENDIX C-1
Transmission lines – Detailed operational noise impacts

Receiver ID	NCA	PNTL dB $L_{Aeq(15min)}$			Predicted noise level dB $L_{Aeq(15min)}$	
		Day	OOH	Sleep disturbance	Transmission line maintenance (Neutral meteorological conditions)	Transmission line maintenance (Adverse meteorological conditions)
9	11	40	35	40	38	< 35
19	11	40	35	40	42	< 35
31	8	40	35	40	35	< 35
82	8	40	35	40	32	< 35
151	7	42	38	42	39	< 35
151	7	42	38	42	39	< 35
153	4	40	35	40	< 20	< 35
162	7	42	38	42	40	< 35
162	7	42	38	42	40	< 35
166	7	42	38	42	45	< 35
166	7	42	38	42	45	< 35
167	4	40	35	40	32	< 35
181	8	40	35	40	60	< 35
188	7	42	38	42	46	< 35
188	7	42	38	42	46	< 35
198	7	42	38	42	60	< 35
198	7	42	38	42	60	< 35
204	7	42	38	42	43	< 35
207	7	42	38	42	50	< 35
210	7	42	38	42	50	< 35
211	7	42	38	42	49	< 35
212	7	42	38	42	49	< 35
214	7	42	38	42	49	< 35
215	7	42	38	42	49	< 35
216	7	42	38	42	47	< 35
218	7	42	38	42	49	< 35
224	7	42	38	42	47	< 35
228	7	42	38	42	47	< 35
230	7	42	38	42	44	< 35
236	7	42	38	42	46	< 35
244	7	42	38	42	41	< 35
245	7	42	38	42	45	< 35
247	7	42	38	42	46	< 35
255	7	42	38	42	45	< 35
256	7	42	38	42	45	< 35
258	3	40	35	40	< 20	< 35
267	7	42	38	42	43	< 35
274	7	42	38	42	44	< 35
282	4	40	35	40	31	< 35
284	4	40	35	40	30	< 35
286	4	40	35	40	32	< 35
308	4	40	35	40	30	< 35

Receiver ID	NCA	PNTL dB $L_{Aeq(15min)}$			Predicted noise level dB $L_{Aeq(15min)}$	
		Day	OOH	Sleep disturbance	Transmission line maintenance (Neutral meteorological conditions)	Transmission line maintenance (Adverse meteorological conditions)
311	8	40	35	40	65	< 35
328	7	42	38	42	52	< 35
333	4	40	35	40	48	< 35
335	4	40	35	40	45	< 35
350	4	40	35	40	47	< 35
354	4	40	35	40	55	< 35
357	4	40	35	40	47	< 35
365	4	40	35	40	41	< 35
367	4	40	35	40	52	< 35
373	4	40	35	40	47	< 35
380	1	40	35	40	34	< 35
385	4	40	35	40	49	< 35
392	1	40	35	40	34	< 35
399	4	40	35	40	57	< 35
410	4	40	35	40	36	< 35
429	3	40	35	40	36	< 35
430	1	40	35	40	32	< 35
441	4	40	35	40	31	< 35
462	4	40	35	40	37	< 35
464	1	40	35	40	48	< 35
474	1	40	35	40	31	< 35
480	1	40	35	40	38	< 35
485	4	40	35	40	37	< 35
487	4	40	35	40	39	< 35
525	4	40	35	40	30	< 35
531	4	40	35	40	70	36
539	1	40	35	40	77	39
543	4	40	35	40	41	< 35
544	3	40	35	40	30	< 35
560	1	40	35	40	42	< 35
561	3	40	35	40	31	< 35
567	3	40	35	40	30	< 35
572	3	40	35	40	32	< 35
580	1	40	35	40	60	< 35
584	1	40	35	40	56	< 35
585	1	40	35	40	56	< 35
588	4	40	35	40	36	< 35
604	3	40	35	40	33	< 35
609	2	40	35	40	36	< 35
611	2	40	35	40	41	< 35
616	4	40	35	40	39	< 35
619	4	40	35	40	34	< 35

Receiver ID	NCA	PNTL dB $L_{Aeq(15min)}$			Predicted noise level dB $L_{Aeq(15min)}$	
		Day	OOH	Sleep disturbance	Transmission line maintenance (Neutral meteorological conditions)	Transmission line maintenance (Adverse meteorological conditions)
621	4	40	35	40	37	< 35
627	4	40	35	40	45	< 35
636	3	40	35	40	39	< 35
643	4	40	35	40	28	< 35
646	1	40	35	40	39	< 35
659	3	40	35	40	43	< 35
662	4	40	35	40	30	< 35
663	3	40	35	40	43	< 35
672	3	40	35	40	43	< 35
679	4	40	35	40	32	< 35
681	4	40	35	40	29	< 35
697	4	40	35	40	34	< 35
703	5	40	35	40	57	< 35
705	4	40	35	40	50	< 35
717	4	40	35	40	52	< 35
719	2	40	35	40	41	< 35
730	4	40	35	40	54	< 35
741	3	40	35	40	51	< 35
747	4	40	35	40	39	< 35
755	4	40	35	40	25	< 35
772	4	40	35	40	43	< 35
775	3	40	35	40	41	< 35
779	4	40	35	40	29	< 35
789	4	40	35	40	36	< 35
790	3	40	35	40	39	< 35
792	3	40	35	40	39	< 35
800	4	40	35	40	29	< 35
815	4	40	35	40	32	< 35
821	4	40	35	40	29	< 35
826	5	40	35	40	41	< 35
827	5	40	35	40	41	< 35
830	4	40	35	40	31	< 35
846	4	40	35	40	35	< 35
854	4	40	35	40	31	< 35
859	3	40	35	40	30	< 35
868	3	40	35	40	36	< 35
876	5	40	35	40	59	< 35
880	5	40	35	40	59	< 35
881	4	40	35	40	< 20	< 35
902	4	40	35	40	35	< 35
903	4	40	35	40	29	< 35
911	4	40	35	40	33	< 35

Receiver ID	NCA	PNTL dB $L_{Aeq(15min)}$			Predicted noise level dB $L_{Aeq(15min)}$	
		Day	OOH	Sleep disturbance	Transmission line maintenance (Neutral meteorological conditions)	Transmission line maintenance (Adverse meteorological conditions)
920	4	40	35	40	29	< 35
927	4	40	35	40	55	< 35
929	4	40	35	40	61	< 35
941	4	40	35	40	51	< 35
947	4	40	35	40	48	< 35
955	4	40	35	40	45	< 35
960	4	40	35	40	32	< 35
964	4	40	35	40	34	< 35
965	5	40	35	40	40	< 35
971	4	40	35	40	34	< 35
975	4	40	35	40	30	< 35
979	4	40	35	40	57	< 35
991	4	40	35	40	35	< 35
998	4	40	35	40	38	< 35
1003	4	40	35	40	52	< 35
1010	4	40	35	40	43	< 35
1015	4	40	35	40	44	< 35
1027	5	40	35	40	35	< 35
1037	4	40	35	40	46	< 35
1044	4	40	35	40	44	< 35
1053	5	40	35	40	< 20	< 35
1057	4	40	35	40	43	< 35
1066	4	40	35	40	48	< 35
1070	4	40	35	40	40	< 35
1080	5	40	35	40	< 20	< 35
1087	6	40	37	40	< 20	< 35
1091	4	40	35	40	57	< 35
1103	4	40	35	40	38	< 35
1119	6	40	37	40	54	< 35
1142	4	40	35	40	30	< 35
1150	6	40	37	40	31	< 35
1152	6	40	37	40	47	< 35
1155	4	40	35	40	30	< 35
1159	9	40	35	40	47	< 35
1162	9	40	35	40	50	< 35
1163	9	40	35	40	50	< 35
1167	9	40	35	40	< 20	< 35
1184	6	40	37	40	36	< 35
1195	6	40	37	40	50	< 35
1200	6	40	37	40	43	< 35
1202	6	40	37	40	47	< 35
1221	6	40	37	40	38	< 35

Receiver ID	NCA	PNTL dB $L_{Aeq(15min)}$			Predicted noise level dB $L_{Aeq(15min)}$	
		Day	OOH	Sleep disturbance	Transmission line maintenance (Neutral meteorological conditions)	Transmission line maintenance (Adverse meteorological conditions)
1222	6	40	37	40	29	< 35
1223	6	40	37	40	38	< 35
1224	6	40	37	40	31	< 35
1232	6	40	37	40	30	< 35
1240	6	40	37	40	31	< 35
1246	10	40	35	40	36	< 35
1261	6	40	37	40	40	< 35
1263	9	40	35	40	32	< 35
1265	9	40	35	40	31	< 35
1267	9	40	35	40	30	< 35
1271	9	40	35	40	29	< 35
1288	10	40	35	40	47	< 35
1294	9	40	35	40	33	< 35
1298	10	40	35	40	32	< 35
1300	10	40	35	40	26	< 35
1302	10	40	35	40	22	< 35
1308	10	40	35	40	37	< 35
1316	10	40	35	40	45	< 35
1323	10	40	35	40	39	< 35
1324	10	40	35	40	50	< 35
1351	10	40	35	40	58	< 35
1384	10	40	35	40	32	< 35
1385	10	40	35	40	31	< 35
1475	4	40	35	40	43	< 35
1480	9	40	35	40	66	< 35
1483	4	40	35	40	60	< 35

APPENDIX C-2
Transmission line – Operational noise exceedances mapping

Appendix C-2
Transmission line operational noise exceedances
Map 1 of 2

Legend

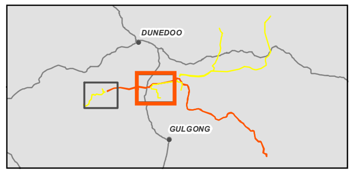
- Study area
- Construction area
- 330 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Existing transmission line
- Road
- Railway
- Water body

Noise sensitive receivers

- Dwelling - Night Time Only

Operational noise

- Negligible



0 0.8 1.6 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:65,000
Data sources: WSP 2023, NSWSS, EnergyCo

Appendix C-2
Transmission line operational noise exceedances
Map 2 of 2

Legend

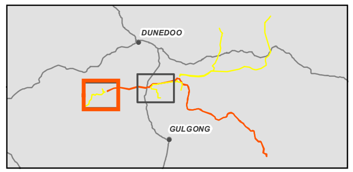
- Study area
- Construction area
- Energy hub / 500 kV switching station
- 330 kV switching station
- 500 kV transmission line
- 330 kV transmission line
- Road
- Water body
- NPWS estate

Noise sensitive receivers

- Dwelling - Night Time Only

Operational noise

- Moderate



0 0.75 1.5 Km

Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A4
1:60,000
Data sources: WSP 2023, NSWSS, EnergyCo

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