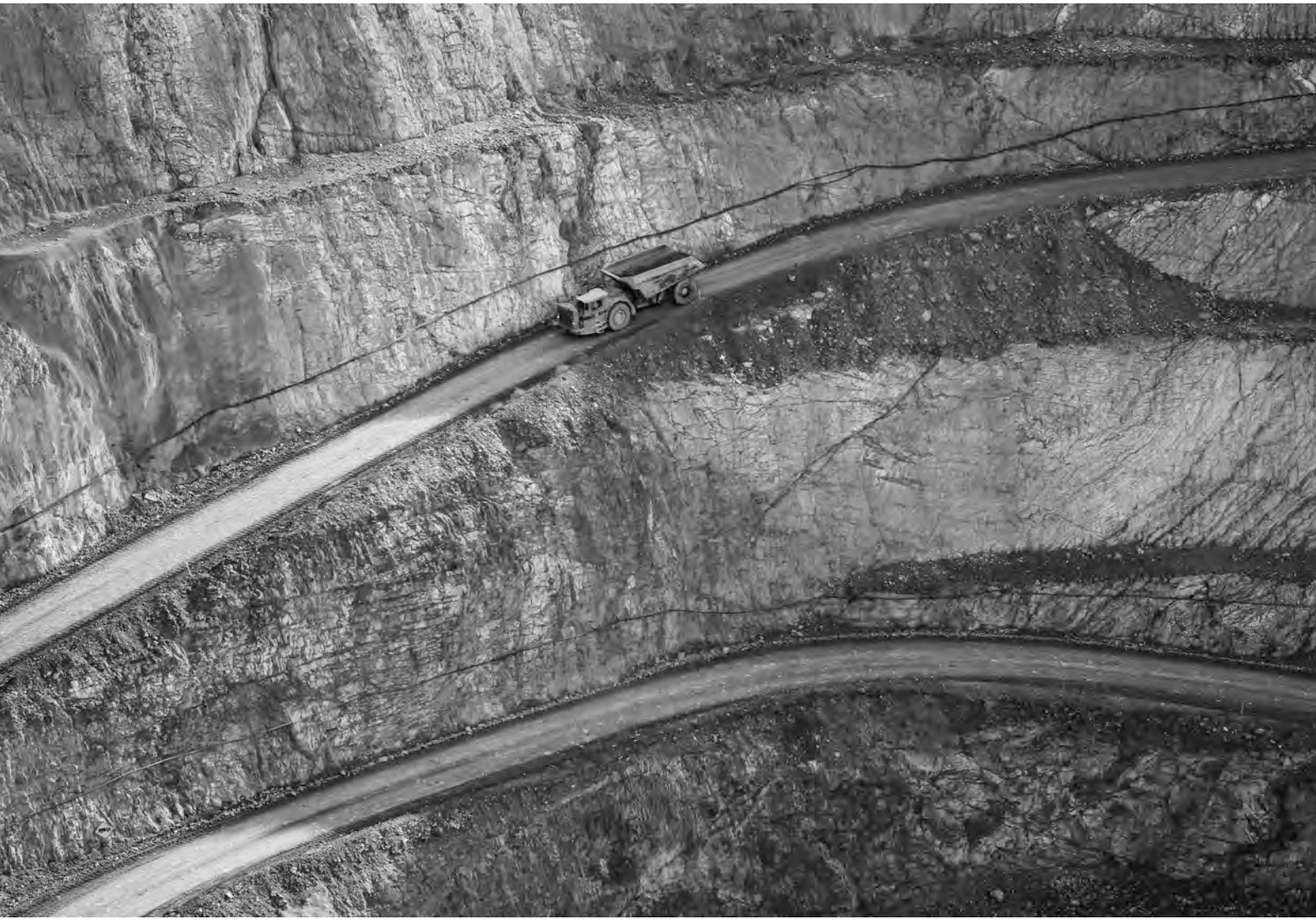
Appendix G

Noise, vibration and blasting impact assessment



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creating opportunities

aurelia
METALS Ltd.

New Cobar Complex Project State Significant Development (SSD-10419)

Noise and vibration impact assessment

Prepared for Peak Gold Mines Pty Ltd
December 2020

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New Cobar Complex Project State Significant Development (SSD-10419)

Noise and vibration impact assessment

Report Number

J190278.10

Client

Peak Gold Mines Pty Ltd

Date

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Version

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1 Introduction

1.1 Overview

Peak Gold Mines Pty Ltd (PGM), a wholly owned and operated subsidiary of Aurelia Metals Limited (Aurelia), owns and operates the PGM operation south-east of Cobar in far western New South Wales (NSW) see Figure 1.1.

The PGM operation comprises the New Cobar Complex located 3 kilometres (km) to the south-east of Cobar town centre and the Peak Complex located 10 km south-east of the town centre. Both complexes are located adjacent to Kidman Way, which connects Cobar to Hillston and Griffith to the south.

PGM has been operational since modern mining commenced at the Peak Complex in 1991 and all current mining operates under development approvals issued by Cobar Shire Council (CSC).

The New Cobar Complex Project State Significant Development (SSD) is an amalgamation of underground mining at New Cobar, Chesney, and Jubilee deposits and development of new underground workings of the Great Cobar and Gladstone deposits to create the New Cobar Complex Project (the Project).

PGM is also seeking to consolidate all existing development approvals applicable to the New Cobar Complex into a single modern consent issued by the NSW Department of Planning, Industry and Environment (DPIE). Approval will be sought for project elements accessed from, and undertaken within, the existing New Cobar Complex located within consolidated mining lease (CML) 6, mining purposes lease (MPL) 0854, and mining leases (ML) ML 1483 and ML 1805 (see Figure 1.2).

1.1.1 Background

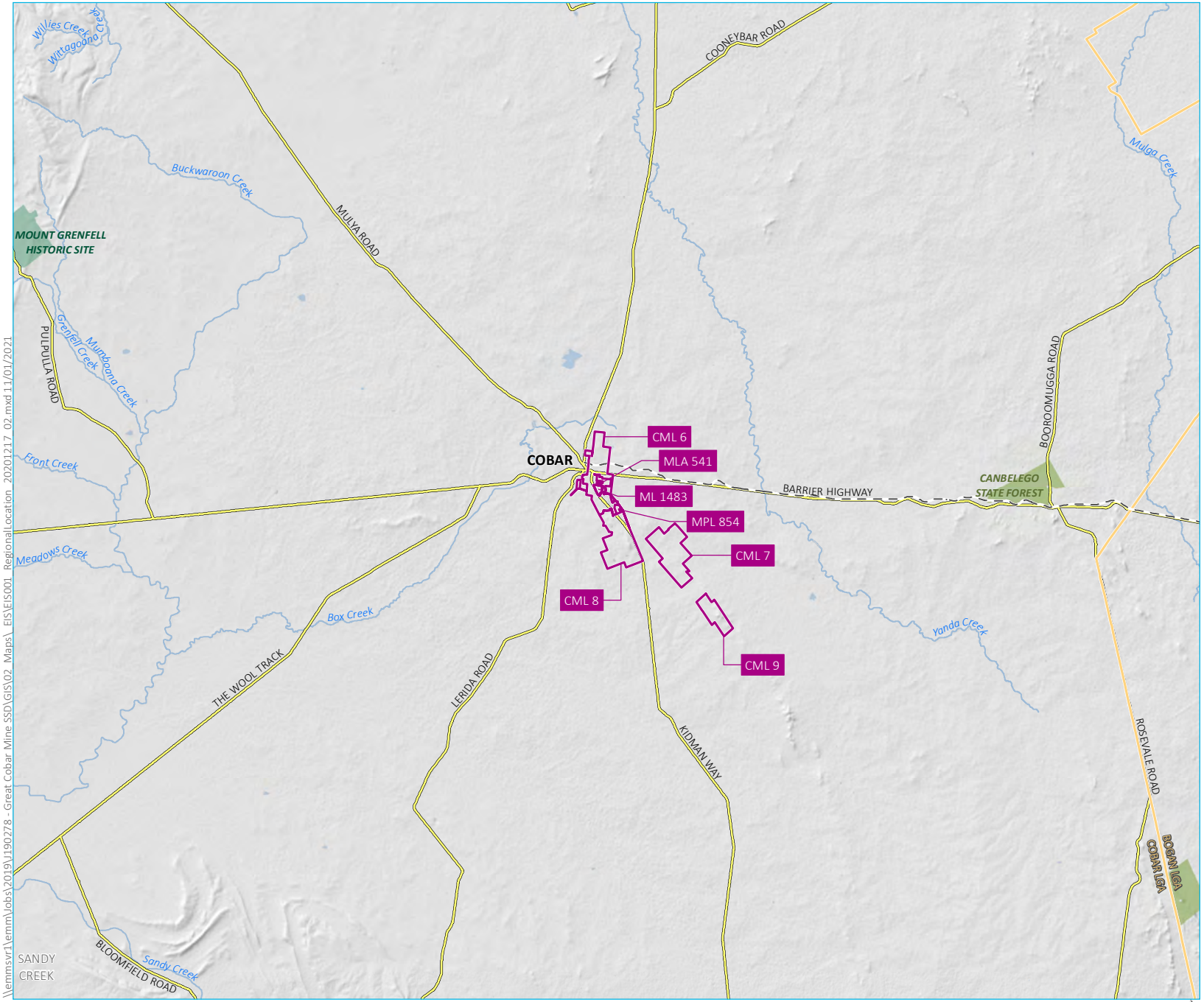
PGM has been operational since mining commenced at the Peak deposit in 1991 producing gold, copper, lead, zinc and silver. Mining at the New Cobar Complex commenced with the open cut in 2000, then transitioned to underground mining in 2004.

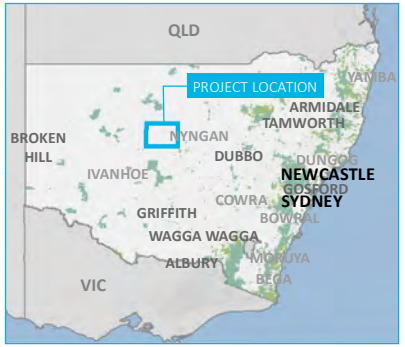
The current CSC development approvals at Peak Complex and New Cobar Complex allow for the operations to continue indefinitely and process up to 800,000 tonnes per annum (tpa) of ore. Ore processing, tailings storage and concentrate handling is undertaken at the Peak Complex with ore from the New Cobar Complex trucked by public road to processing facilities at the Peak Complex. Both the processing plant and the tailings storage facility (TSF) are located at the Peak Complex, and activities at those facilities are outside the scope of this project.

PGM has identified the Gladstone and Great Cobar deposits as targets for further mining to extend the life of operations at the New Cobar Complex. The Great Cobar deposit was historically exploited by surface and shallow underground mining between 1870 and 1919, but no mining of that deposit has been undertaken since that time.

PGM has obtained conditional approval for development of an exploration decline to facilitate exploration activities within the Great Cobar deposit. The objectives of the exploration activities are to:

- further define the mineral resource through underground drilling from an exploration decline; and
- taking of a bulk sample to provide further samples for metallurgical, geotechnical and associated test work.





KEY

- Mining lease boundary
- Rail line
- Major road
- Named watercourse
- Waterbody
- Local government area
- NPWS reserve
- State forest

Source: EMM (2020); DFSI (2017); GA (2011); DPE (2019)

0 10 20 km

GDA 1994 MGA Zone 55

N

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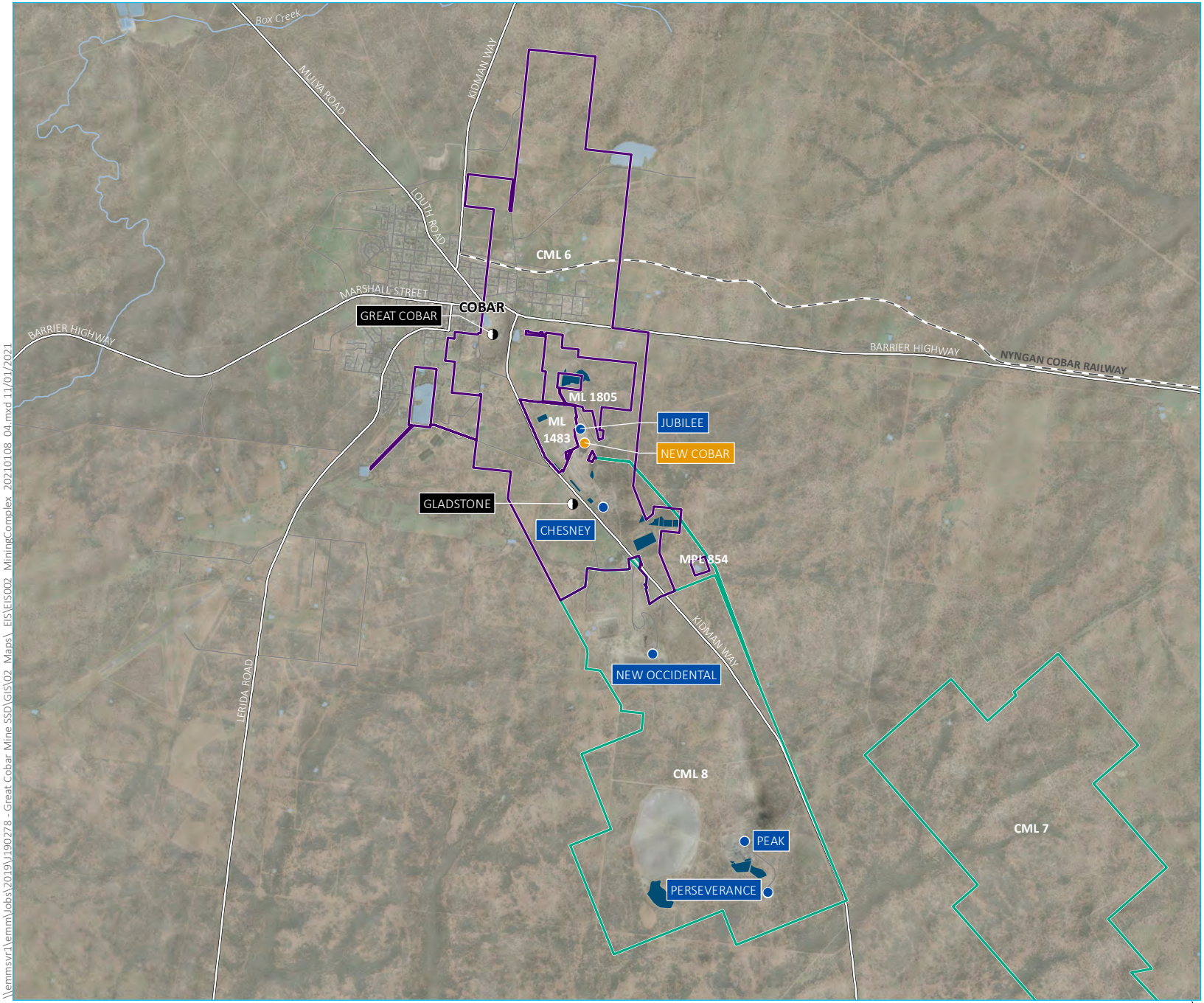
Regional location of the Peak Gold Mine

Peak Gold Mines
New Cobar Complex Project
Noise and vibration impact assessment
Figure 1.1

EMM creating opportunities



KEY

- Completed working
- Current working
- Future working
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Mine water management storage

Mining lease boundaries

- New Cobar Complex
- Peak Complex

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Source: EMM (2020); DFSI (2017); GA (2011); DPE (2019)

0 1 2 km

GDA 1994 MGA Zone 55

N

Mining leases and mining complexes

Peak Gold Mines
New Cobar Complex Project
Noise and vibration impact assessment
Figure 1.2

EMM creating opportunities

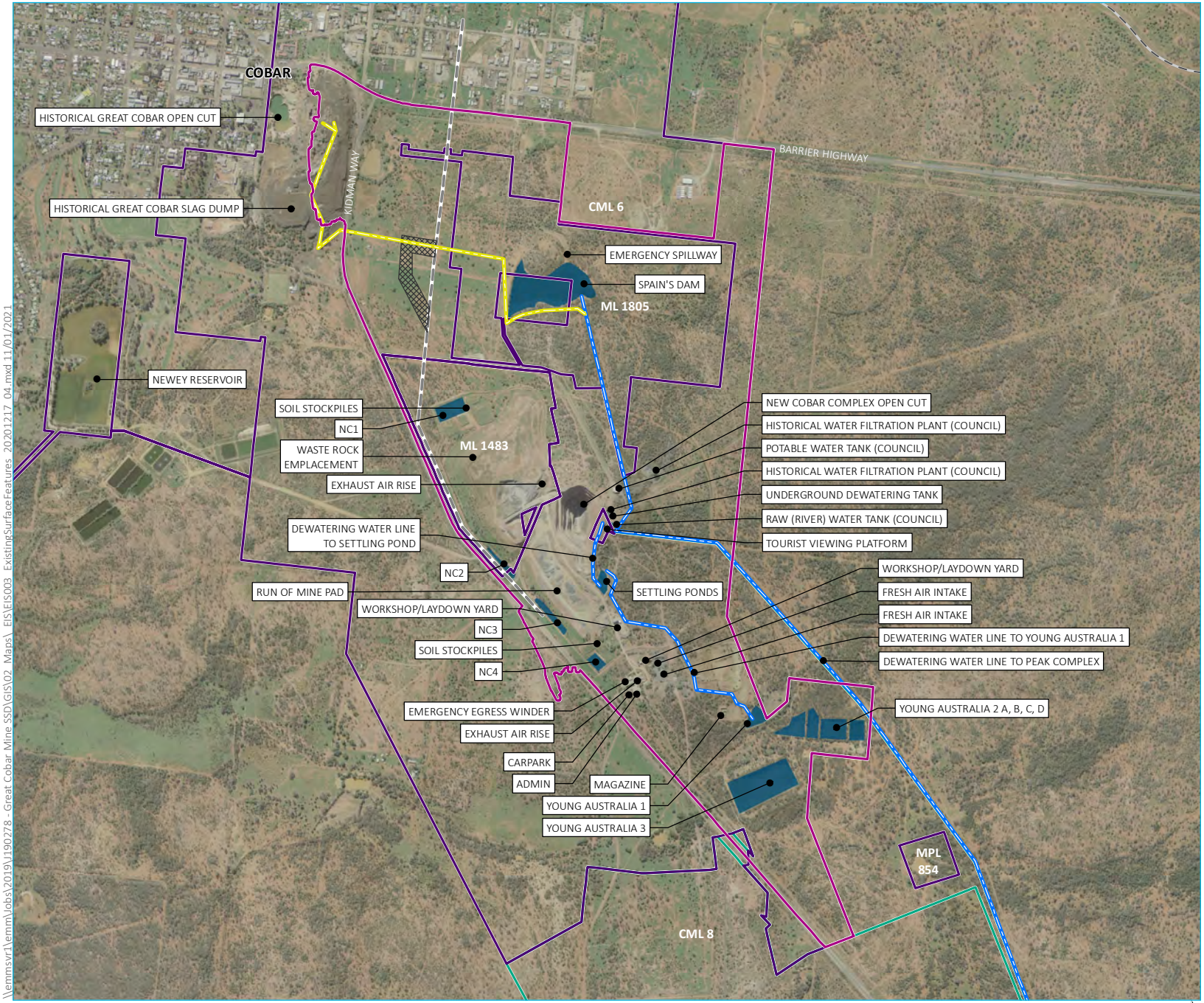
1.1.2 Project overview

All surface works associated with the project will be located underground or in the existing, operational mining New Cobar Complex except for a short (no more than 400 m) power line from an existing 22 kV line servicing PGM to a compact substation within the fresh air intake footprint.

PGM proposes to use the decline, infrastructure and intake and exhaust ventilation elements developed for the Great Cobar exploration drive (approved, but not yet constructed) to facilitate project development. Surface ventilation fans are not required during the development of exploration activities, however as they will be necessary during operation of mining, construction of a new powerline and compact substation, to be located adjacent to the fresh air intake is required. The power line will continue to the exhaust air rise where a ventilation fan will be installed at a depth of approximately 100 m or greater below ground level (bgl). An emergency egress winder headframe and winder house will be installed at the fresh air intake for the purpose of mine rescue in the event of an incident below ground preventing evacuation by conventional means. No additional new surface infrastructure is proposed.

The existing surface infrastructure and facilities at the New Cobar Complex currently support underground mining of the New Cobar, Chesney and Jubilee deposits, and will continue to be used for this project (Figure 1.3 and Figure 1.4). Access to all underground workings in the complex is from a portal and decline at the base of the New Cobar Complex open cut. SSD approval will be sought for the following project elements accessed from, and undertaken within, the existing New Cobar Complex:

- Underground mining of the New Cobar Complex including, but not limited to, New Cobar, Jubilee and Chesney (existing development approval issued by CSC).
- Underground mining of the New Cobar Complex including Great Cobar and Gladstone (not yet approved).
- Groundwater dewatering of the relevant historic and proposed underground workings via the historic Great Cobar Shaft (existing development approval issued by CSC).
- Increase of the number of ore haulage trucks between the New Cobar Complex and Peak Complex from 25 loaded trips per day (50 movements in and out) to 50 loaded trips (100 movements in and out) per day (daylight hours only) averaged over a calendar year. The increase of daily truck movements will provide flexibility to PGM if there are unforeseen production disruptions (eg bad weather).
- Crushing and screening of ore within the existing New Cobar Complex ROM pad (existing approval by CSC).
- Transportation of ore to the Peak Complex via Kidman Way for processing, using road registered heavy vehicles (existing approval by CSC).
- Harvesting of waste rock and:
    - immediately deploying the material underground for use in stope backfilling operations (waste rock will remain underground and will not be transported to the surface as a preference); and
    - transportation of non-acid forming material to the surface and storage within the existing waste rock emplacement (WRE) prior to use across the complexes for construction / rehabilitation tasks (eg tailings dam lifts).
- Deposition of potentially acid forming waste rock brought to the surface and stored within the WRE where at end of mine life it would be capped, or progressively returned underground for disposal.
- Continuation of all other approved activities within the New Cobar Complex.



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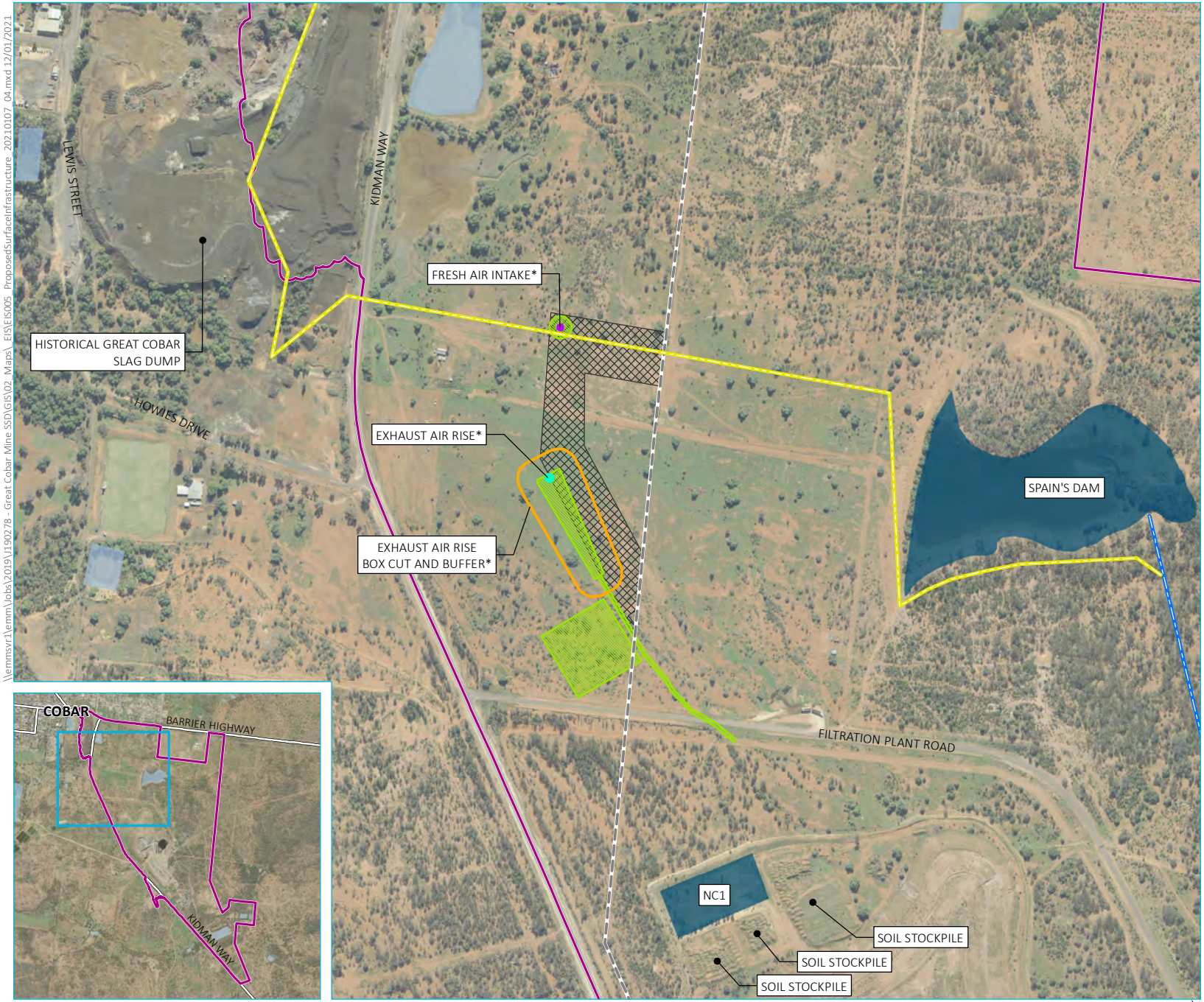
Source: EMM (2020); DFSI (2017); GA (2011); DPE (2019)

Existing surface features

Peak Gold Mines
New Cobar Complex Project
Noise and vibration impact assessment
Figure 1.3

EMM creating opportunities



KEY

- Project area
- Major road
- Existing indicative pipeline route
- Existing Great Cobar dewatering pipeline
- Existing 22 kV powerline
- Exhaust air rise*
- Exhaust air rise buffer*
- Fresh air intake*
- Proposed power line corridor
- Waterbody
- Mine water management storage
- Area of approved vegetation clearance (indicative)*

*Approved under existing REF approvals, but not yet constructed.

Source: EMM (2020); DFSI (2017); DPE (2019); ELA (2018)

0 100 200 m

GDA 1994 MGA Zone 55

N

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Proposed surface infrastructure

Peak Gold Mines
New Cobar Complex Project
Noise and vibration impact assessment
Figure 1.4

EMM creating opportunities

Processing will remain at the Peak Complex at the existing approved rate of up to 800,000 tpa, with production of ore from the Great Cobar and Gladstone deposits making up for the future decrease in production from other workings across PGM.

Additionally, there are remaining resources in the New Cobar, Jubilee and Chesney deposits that are mineral rich, but which are currently not economical to mine in isolation. Keeping the New Cobar Complex operational and gaining access to Great Cobar and Gladstone deposits will lead to increases in economies of scale and maximise opportunities to mine these resources, and keep PGM operational until 2035.

1.2 Purpose of this report

EMM Consulting (EMM) has been engaged by PGM to prepare and submit an environmental impact statement (EIS) to support an SSD application for development consent under section 4.12 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). It has been prepared to the form and content requirements set out in clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) as well as clause 8(1) and Clause 5 of Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP). The Peak Complex, which is not part of this SSD application will continue to operate under local government (CSC) approvals, as there is no proposed change to this arrangement.

This report presents an assessment of potential noise and blasting impact from the Project. Potential noise impacts from the proposed construction works and proposed future mining operations on the surrounding community have been assessed. Potential blasting impacts from the proposed future underground mining operations on the surrounding community have also been assessed.

The noise and vibration impact assessment (NVIA) references the New Cobar Complex development consent, noise policies, and blasting assessment guidelines as follows:

- CSC, Development Consent (2004/LDA-00003), reviewed in June 2004;
- NSW Environment Protection Authority (EPA), *Industrial Noise Policy* (INP)*, 2000* (superseded);
- NSW EPA*, Noise Policy for Industry* (NPfI)*, 2017*;
- NSW EPA, Environmental Protection Licence (EPL) 3596;
- NSW Department of Environment and Climate Change (DECC), *Interim Construction Noise Guideline, 2009*;
- NSW Department of Environment, Climate Change and Water (DECCW), *Road Noise Policy* (RNP)*, 2011*;
- Australian and New Zealand Environment and Conservation Council (ANZECC), *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC Guidelines), 1990*;*
- Secretary Environmental Assessment Requirements (SEARs) issued on 13 February 2020; and
- PGM, approved Mining Operations Plan (MOP) (Amendment A), amended in August 2019.

A number of technical terms are required for the discussion of noise and blasting. These are explained in Appendix A

1.3 Noise and blasting assessment requirements

PGM requested SEARs from DPIE for the SSD EIS in December 2019; these were received 13 February 2020 and were reissued in October 2020 following the receipt of a Biodiversity Development Assessment Report waiver. The SEARs included a requirement to assess potential noise and vibration risks associated with the construction and operation of the Project.

This NVIA has been prepared in accordance with the SEARs relevant to the Project. EPA has also provided details of key issues requiring assessment for the Project. The matters relevant to this assessment and where they are addressed in this report are shown in Table 1.1.

Table 1.1 Noise and blasting assessment requirements

Relevant authority and assessment requirement	Relevant section of this report
DPIE	
Noise, Vibration and Blasting – including an assessment of: - the likely construction, operational and non-Project area noise impacts of the development, in accordance with *the Interim Construction Noise Guideline*, NPfI (EPA 2017) and RNP (DECCW 2011), and having regard to the *Voluntary Land Acquisition and Mitigation Policy* (VLAMP);	Sections 6.1, 6.2, 6.3, 6.4, 6.5
- the likely blasting impacts of the development on people, animals, buildings and infrastructure, and significant natural features, having regard to the relevant ANZECC Guidelines (ANZECC 1990);	Section 6.6
EPA	
1.2. Impacts related to the following environmental issues need to be assessed, quantified and reported on: • Noise and vibration impacts associated with blasting, and operational noise particularly fixed infrastructure, machinery and plant movements;	Sections 6.1, 6.2, 6.3, 6.4, 6.6
4.1. Construction noise associated with the proposed development should be assessed using the *Interim Construction Noise Guideline* (DECC 2009).	Section 6.3 – assessed against the more stringent NPfI PNTLs in Section 6.3
4.2. Vibration from all activities (including construction and operation) to be undertaken on the premises should be assessed using the guidelines contained in *Assessing Vibration: a technical guideline* (DEC 2006).	No vibration intensive plant or equipment items are proposed as part of the Project.
4.3. If blasting is required for any reason during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying with the ANZECC Guidelines (ANZECC 1990).	Section 6.6
4.4. Operational noise from all industrial activities, including private haul roads and private railway lines, should be assessed using the NPfI (EPA 2017).	Sections 6.1, 6.2, 6.3, 6.4
4.5. Noise on public roads from increased road traffic generated by land use developments should be assessed using the guidelines contained in the RNP and associated application notes (EPA 2011).	Section 6.5

2 Existing operations and project description

2.1 Project locality

PGM operations comprise the Peak Complex and the New Cobar Complex located approximately 10 km and 3 km to the south-east of the Cobar town centre, respectively. Both complexes are located adjacent to the Kidman Way which connects Cobar to Hillston and Griffith to the south.

Geologically, the area around Cobar comprises a series of polymetallic high-grade ore bodies dominated by gold, silver, copper, lead and zinc, with a long history of stable, large-scale, low cost production that has produced more than 200,000 tonnes (t) of copper and three million ounces of gold since mining began in the area in 1870.

2.2 Existing operations

The current approvals for the Peak Complex and New Cobar Complex allow for the operations to continue indefinitely and process up to 800,000 tonnes per annum (tpa) of ore at the Peak processing facility; tailings are placed at the Peak tailings storage facility (TSF), both located at the Peak Complex. The ore deposits with approval for mining at the Peak and New Cobar complexes, as shown in Figure 1.2, include:

- New Cobar Complex:
  - New Cobar;
  - Chesney; and
  - Jubilee.
- Peak Complex:
  - Peak;
  - Perseverance;
  - Chronos;
  - New Occidental;
  - Kairos; and
  - S400.

Access to the New Cobar and Jubilee underground workings is from a portal and decline at the base of the New Cobar open cut. Access to the Chesney workings is from a 700 metre (m) decline off the New Cobar decline at a depth of approximately 300 m below ground level (m bgl). Mining operations at the Peak Complex and the New Cobar Complex are undertaken under development consents issued by CSC. All current mining activities undertaken at the New Cobar Complex are approved activities.

2.3 Project description

2.3.1 Operation

The Project involves the development of new underground workings to mine the Great Cobar and Gladstone deposits. This will be an extension of the existing operation as the mining of the New Cobar and Chesney deposits (currently mined under an existing CSC approval) will ramp down as the mining of the Great Cobar and Gladstone deposits ramp up. Existing surface infrastructure within the Peak and New Cobar complexes is suitable and adequate to facilitate mining these deposits (Figure 1.3). Key aspects of the Project include:

- development of underground mining operations to access and mine the Great Cobar and Gladstone deposits using underground stope mining methods;
- extension of the life of mine by 12 years from 2023 to 2035 (based on current market assumptions);
- continuing use of the underground mining fleet and associated workforce;
- increase of the currently capped 25 trips (50 movements in and out) per day averaged monthly to 50 trips (100 movements in and out) per day (daylight hours) averaged annually for ore transport movements between the New Cobar Complex and the Peak Cobar Complex. The increase of daily truck movements will provide greater flexibility to PGM e.g. catching up production following any disruption of the mine production due to bad weather;
- continued use of the existing power supply;
- continued use of the existing water supply; and
- negligible additional surface disturbance outside of surface disturbance areas permitted under the current approval (subject to detailed design).

PGM is currently investigating options for extending the life of the New Cobar Complex, and has identified the Great Cobar and Gladstone deposits as targets. The Great Cobar deposit was historically exploited by surface and underground mining between 1870 and 1919, but no mining activity has been undertaken since that time.

PGM has obtained conditional approval for development of an exploration decline to target deeper resources (700 – 800 m bgl) within the Great Cobar deposit for ore evaluation. PGM proposes to use the decline, infrastructure and fresh air intake and exhaust air rise ventilation elements developed for the Great Cobar exploration decline to facilitate the proposed development. Ventilation fans will not be required during the development of exploration activities, however, as they will be necessary during operation of mining, construction of a short (no more than 400 m) power line between an existing 22 kilovolts (kV) line servicing PGM will be required (Figure 1.4). No additional new surface infrastructure is proposed for the Project.

Processing of ore would remain at the existing approved rate of up to 800,000 tpa, with production of ore from the Great Cobar and Gladstone deposits making up for the future decrease in production from other underground workings across PGM. Further, there are remaining resources in the New Cobar and Chesney deposits that are mineral rich, but which are currently not economical to mine in isolation. Keeping the New Cobar Complex operational and gaining access to Great Cobar and Gladstone deposits would maximise opportunities to mine these resources.

All surface operations associated with mining the Great Cobar and Gladstone deposits will be located in the New Cobar Complex. The existing surface infrastructure and facilities at the New Cobar Complex currently support underground mining of the New Cobar, Chesney and Jubilee deposits. All underground workings in the New Cobar Complex are accessed from a portal and decline at the base of the New Cobar Pit. The New Cobar Project area was operated as an open cut mine between 2000 and 2004, before mining transferred to an underground operation.

Existing surface facilities at the New Cobar Complex include:

- administration and car parking;
- workshop and laydown yard;
- magazine;
- Run-of-Mine (RoM) pad;
- waste rock emplacement (WRE);
- soil stockpile;
- sediment basins (stormwater);
- settling ponds (mine dewatering); and
- water storage (Spain's and Young Australia dams) and mine dewatering lines.

Current underground mining operations at the New Cobar Complex are undertaken by bench and open stoping methods. Mining progresses from the base upwards in each panel. Drifts are driven along strikes in the ore, a slot is developed, and ore is blasted into the void created by the slot. Ore is then extracted. Waste rock is then used to backfill mining stopes. Waste rock from the Peak Complex is transported to the New Cobar Complex to be used as backfill and vice versa.

Ore is transported by underground haul trucks to the surface RoM pad, where if necessary, oversized material is broken up by a rock breaker or alternatively crushed, graded, and loaded onto road registered trucks for transportation along Kidman Way to the Peak Complex for processing. Road trucks returning from the Peak Complex processing facility are backloaded with waste rock and transported to the New Cobar Complex for backfilling purposes, as required. All ore processing and tailings storage occur at the Peak Complex.

2.3.2 Construction

The construction of a new power line and substation is proposed to supply power for the ventilation fan and winder at the Great Cobar deposit.

The power line corridor will be 20 m wide and up to 400 m long and will extend westward from an existing 22 kV power line to the new compact substation (transformer and switch room) located within the previously cleared and fenced area surrounding the boxcut hosting the exhaust air rise.

The surface features relating to the ventilation shafts, boxcut, and power line are shown in Figure 1.4.

The construction of the power line will be undertaken during daylight hours between 6 am – 6 pm seven days per week, and hence has been assessed for the day and night periods described as follows:

- Day period: 7 am – 6 pm Monday to Saturday and 8 am – 6 pm on Sundays and public holidays; and

- Night period: 6 pm – 7 am Monday to Saturday and 6 pm – 8 am on Sundays and public holidays.

The construction of the substation will be undertaken during the day period between 7 am – 6 pm Monday to Friday, and hence has been assessed for the day period only.

The construction phase is expected to take six months to complete.

2.4 Project approval

PGM is seeking to consolidate all existing development consents applicable to the New Cobar Complex within a single modern consent issued by DPIE.

This means that all existing CSC development consents for the New Cobar Complex will be surrendered. SSD approval will be sought for the following Project elements accessed from and undertaken within the existing New Cobar Complex, located within mining leases CML 6 and ML 1483 (see Figure 1.2):

- underground mining of the New Cobar Complex including, but not limited to, New Cobar, Jubilee and Chesney (existing development approval issued by CSC).
- underground mining of the New Cobar Complex including Great Cobar and Gladstone (not yet approved).
- groundwater dewatering of the relevant historic and proposed underground workings via the historic Great Cobar Shaft (existing development approval issued by CSC).
- increase of the number of ore haulage trucks between the New Cobar Complex and Peak Complex from 25 loaded trips per day (50 movements in and out) to 50 loaded trips (100 movements in and out) per day (daylight hours only) averaged over a calendar year. The increase of daily truck movements will provide flexibility to PGM if there are unforeseen production disruptions (e.g. bad weather).
- crushing and screening of ore within the existing New Cobar Complex ROM pad (existing approval by CSC).
- transportation of ore to the Peak Complex via Kidman Way for processing, using road registered heavy vehicles (existing approval by CSC).
- harvesting of waste rock and:
    - immediately deploying the material underground for use in stope backfilling operations (waste rock will remain underground and will not be transported to the surface as a preference); and
    - transportation of non-acid forming material to the surface and storage within the existing WRE prior to use across the complexes for construction / rehabilitation tasks (e.g. tailings dam lifts).
- deposition of potentially acid forming waste rock brought to the surface and stored within the WRE where at end of mine life it would be capped, or progressively returned underground for disposal.
- continuation of all other approved activities within the New Cobar Complex.

Operational activities associated with minerals processing and tailings storage will remain at the Peak Complex which operates under CSC approvals. Increased capacity within the footprint of the TSF will be required to accommodate an additional 12 years of tailings generated by the New Cobar Complex. Preliminary assessments undertaken by PGM have identified that a further three TSF wall lifts would be required to maintain storage capacity functionality to 2035. It is noted that the TSF wall lifts are being assessed under a separate development application and therefore do not form part of this assessment.

2.5 Project summary

Specific details of the Project are presented in Table 2.1 in the context of existing PGM approvals.

Table 2.1 Detailed overview of the project

Development component	Approved New Cobar Complex operations	New Cobar Complex Project SSD
Tenement	Development approved to occur within the Development Application areas, including CML 6, CML 8, ML 1483, ML 1805 and MPL 854. Mining of the following deposits using underground mining methods, with each deposit accessed via the New Cobar Complex open cut: • New Cobar deposit; • Chesney deposit; and • Jubilee deposit. Minerals processing occurs at the Peak Complex within CML 8 and also includes CML 7 and CML 9.	No change to mine lease area. Mining of the following deposits using underground mining methods, with each deposit accessed via the New Cobar open cut: • New Cobar deposit; • Chesney deposit; • Jubilee deposit; • Gladstone deposit; and • Great Cobar deposit. Processing of materials from the New Cobar Complex will continue at the Peak Complex within CML8 under existing approvals and is therefore outside the scope for this project.
Approvals	***Cobar Shire Council Development Consent*** • New Cobar South Open Cut - LDA 98/99:08 • New Cobar Open Cut - LDA 99/00:22 • New Cobar Underground – 2004/LDA 00003 PGM has received approval from CSC and the Resources Regulator (reference number MAAG0006783, approved in May 2020) to construct an exploration decline, ventilation shafts, and associated infrastructure to facilitate exploration activities within the Great Cobar deposit. This is detailed in the MOP for 2019-2022. ***Other Authorisations and Licences*** • EPL -3596 (EPA) • Licence to Manufacture Explosives (New Cobar) - XMNKF200002 (SafeWork NSW) • Dangerous Goods Notification - New Cobar: 35/035154 (SafeWork NSW). • Water Supply Works Approval reference 85WA753861 (Natural Resources Access Regulator)	PGM is seeking to consolidate all existing development consents applicable to the New Cobar Complex including existing mining, proposed underground mining of the Great Cobar and Gladstone deposits and existing surface infrastructure within a single consent issued by DPIE. Once approved, relevant CSC development consents for the New Cobar Complex will be surrendered. The Project will used infrastructure that has been approved but not yet constructed as a result of the exploration decline and associated infrastructure. Other approvals related to the Peak Complex, will be unaffected.
Mining method	Underground stope mining operations commence above a centrally positioned crown pillar and stopes will be extracted from the bottom-up. Bench stopes are backfilled progressively using waste from development and rock from the WRE. Upon completion of each stoping level, voids are backfilled. In some instances, mining against rock fill is required. In these instances, a	Expansion of underground stope mining operations will access new deposits at Great Cobar and Gladstone, as well as continued mining of New Cobar, Chesney and Jubilee deposits. The mining method will not change. There is no recorded history of significant subsidence or geotechnical failure associated with the current, modern

Table 2.1 Detailed overview of the project

Development component	Approved New Cobar Complex operations	New Cobar Complex Project SSD
	rock and cement slurry is placed in the stope to provide additional stability. PGM undertake detailed geotechnical assessments of all stopes during the detailed stope design stage prior to mining.	mining operations at the Peak and New Cobar complexes.
Blasting	Blasting will be used for the development of the underground workings and is proposed to occur under independent firing conditions (in the preliminary phases). Delays will be used to adjust sequencing and prevent any interaction or vibration enhancement from adjacent blastholes. The approximate number of blasts will be three per 24-hour period, 20 per 7-day period. Explosives are stored in the existing magazine at New Cobar Complex.	No change to blasting method.
Life of mine	Presently, the council approvals have no end date. Current mine plans envisage mining at New Cobar Complex to continue until 2023 under current market assumptions.	The Project will extend the life of mine by 12 years to 2035 under current market assumptions.
Production	Approved for the mining and processing of 800,000 tpa of ore to produce lead, zinc, copper, gold, and silver from both the Peak and New Cobar complexes. Processing occurs at the Peak Complex.	The Project will produce ore within the mining and processing limit of 800,000 tpa for the Peak and New Cobar complexes. Ore will be transported to the existing processing plant at the Peak Complex. The ore will be processed at the Peak Complex processing plant, and tailings will be disposed of at the TSF at the Peak Complex under existing approvals. Processing of ore will only take place at the Peak Complex, therefore is outside the scope of this project.
Mining extent	The New Cobar Complex comprises a surface disturbance area of approximately 425 hectares. The New Cobar open cut pit extends to a depth of approximately 100 m bgl. Development of underground working at Chesney, Jubilee and New Cobar deposits extends from a portal at the base of the New Cobar open cut pit.	Development of New Cobar Complex Project will be in stages. The Great Cobar and Gladstone deposits will be accessed via a decline extending from the existing New Cobar Complex underground workings. The proposed underground working depths are approximately 150–800 m bgl for Great Cobar and 350-500 m bgl for Gladstone. The Great Cobar deposit will be accessed by the approved exploration decline off the existing Jubilee workings at approximately 500 m bgl, and the Gladstone deposit will be accessed by a decline off the existing New Cobar underground workings at approximately 350 m bgl.
Tailings storage	All ore is processed at the Peak Complex, with tailings placed within the TSF.	No change.

Table 2.1 Detailed overview of the project

Development component	Approved New Cobar Complex operations	New Cobar Complex Project SSD
Project area access	Access to the New Cobar and Peak complexes is via Kidman Way.	No change.
Ore transportation	Ore is transported from the New Cobar Complex along 5 km of public road (Kidman Way) in road registered trucks at the rate of 25 trucks (50 truck movements) per day, seven days a week.	Ore will continue to be transported from the New Cobar Complex but at a maximum rate of 100 truck movements per day (in and out of site) (daylight hours only), seven days a week averaged over a calendar year. This is an increase in truck movements from a current maximum rate of 50 truck movements per day. The increase of daily truck movements will provide flexibility to PGM if there are unforeseen production disruptions such as poor weather or machinery breakdowns.
Waste rock management	Waste rock generated from underground workings is used preferentially as backfill in previously mined underground stopes. Some waste rock material may be brought to the surface and stored within the existing WRE at the New Cobar Complex until it's required for use in construction or rehabilitation across the Peak and New Cobar complexes.	No change.
Soil management	Application of soil resources management strategies/objectives in accordance with the existing MOP (PGM 2019) and Water Management Plan (PGM 2020)).	No change.
Mine ventilation	There are two existing exhaust air rises at the New Cobar Complex – one at the Jubilee workings and one at the Chesney workings. Fresh air is drawn down the portal at the base of the New Cobar Complex open cut and also via two fresh air intakes located near the Chesney ventilation fan. The infrastructure developed as part of the Great Cobar exploration decline will include an exhaust air rise and a fresh air intake.	No new ventilation shafts will be required; the ventilation shafts installed as part of the exploration decline will be required for ongoing mining operations and will remain in place. A new ventilation fan will be required to maintain a safe volume of air flow in the underground workings.
Surface infrastructure	All existing New Cobar Complex surface infrastructure operates under existing CSC approvals.	The Project will require the construction of a short (no more than 400 m long) power line spur between an existing 22 kV line and ventilation shaft (approved, but not yet constructed as part of the Great Cobar exploration decline approvals). This power line will connect to a pad-mounted compact substation to supply power for an emergency egress winder at the fresh air intake and a ventilation fan to be installed at the exhaust air rise. No additional surface infrastructure will be required.

Table 2.1 Detailed overview of the project

Development component	Approved New Cobar Complex operations	New Cobar Complex Project SSD
Water supply sources and infrastructure	The water requirements for the Peak Complex and the New Cobar Complex (combined) are approximately 580 ML/year. The source of this water is typically, comprised of approximately 212 ML/year from dewatering underground workings at the New Cobar Complex and approximately 368 ML/year of town water from Burrendong Dam. PGM is licenced to take up to 1,186ML/year from Burrendong Dam, however approximately 50% of this water is lost through seepage, evaporation and other methods before arriving at the New Cobar Complex. Following approval for the dewatering of the Great Cobar shaft in 2019, up to 400 ML/year can be extracted to replace the town water currently being used. This is as part of a move for PGM's operations to be more self-reliant and sustainable in times of drought. The water from the Great Cobar shaft will be used to make up any shortfall in Project area demand that cannot be made up by dewatering of underground workings. It will also reduce PGM's reliance on the town water supply during times of drought.	No change.
Project area water management infrastructure	A water management system is in place at the New Cobar Complex and is operated and managed in accordance with PGM's current water management plan (WMP). Dewatering water that is used in the New Cobar Complex underground workings is pumped to the New Cobar Complex settling pond for re-use. The water from these settling ponds is preferentially pumped back underground for reuse, or to the Peak Complex for use in the processing circuit. While it is PGM's preference to use water from dewatered mine workings for processing, this may not always be possible due to poor water quality and additional treatment requirements. Dewatering water excess to Project area requirements is pumped to Spain's Dam or Young Australia Dams for evaporation or storage for future reuse.	No change.
Power supply	Electricity to the Project area is via a 22 kilovolt (kV) electricity transmission line (ETL) to the Peak Complex substation.	No change to power supply, but an additional power line spur will be required for the ventilation fan to be installed in the exhaust air rise and the emergency egress winder.
Hours of operation	Underground and above ground activities, 24-hour operations, seven days a week.	No change.
Employment	The 2019/2020 workforce at PGM (including both the Peak and New Cobar complexes) totalled 404 full time equivalents (FTE).	Annual labour estimates for New Cobar Complex, being mining and underground maintenance staff range from 57 FTE in 2020/21 to a peak of 272 FTE in 2026/27. These however are not new employees; during the same period, as mining at the Peak Complex ramps down, staff will relocate to New Cobar Complex as their primary location of employment activity. PGM will continue to maintain operational control across the complexes.

Table 2.1 Detailed overview of the project

Development component	Approved New Cobar Complex operations	New Cobar Complex Project SSD
Mining fleet	The existing/approved indicative mobile equipment fleet used for underground ore extraction, transport and waste rock handling includes: • articulated dump trucks; • cabletec; • compactors; • dozers; • drill rigs. • excavators; • graders; • haul trucks (50 t); • jumbos; • Load haul dump trucks; • loaders; • rollers; • scrapers; • service truck; • underground development drill; • underground diamond drill rigs; • waste rock dump trucks; and • water trucks.	No change.
Rehabilitation and mine closure	Current rehabilitation requirements as per MOP	Mine closure concepts and management measures will continue to be developed via the MOP, which outlines specific soil handling, rehabilitation and post mining landform objectives, in consultation with relevant regulatory authorities. The MOP will be updated and extended as required.

3 Existing environment

3.1 Assessment locations

The area surrounding the Project includes a number of privately-owned residential properties with the closest located approximately 900 m to the south-west of the New Cobar Complex and more than 4 km to the north-west of the Peak Complex. The majority of the assessment locations are located near the town of Cobar. No further potentially affected residential receivers have been identified further south of the New Cobar Complex or the Peak Complex.

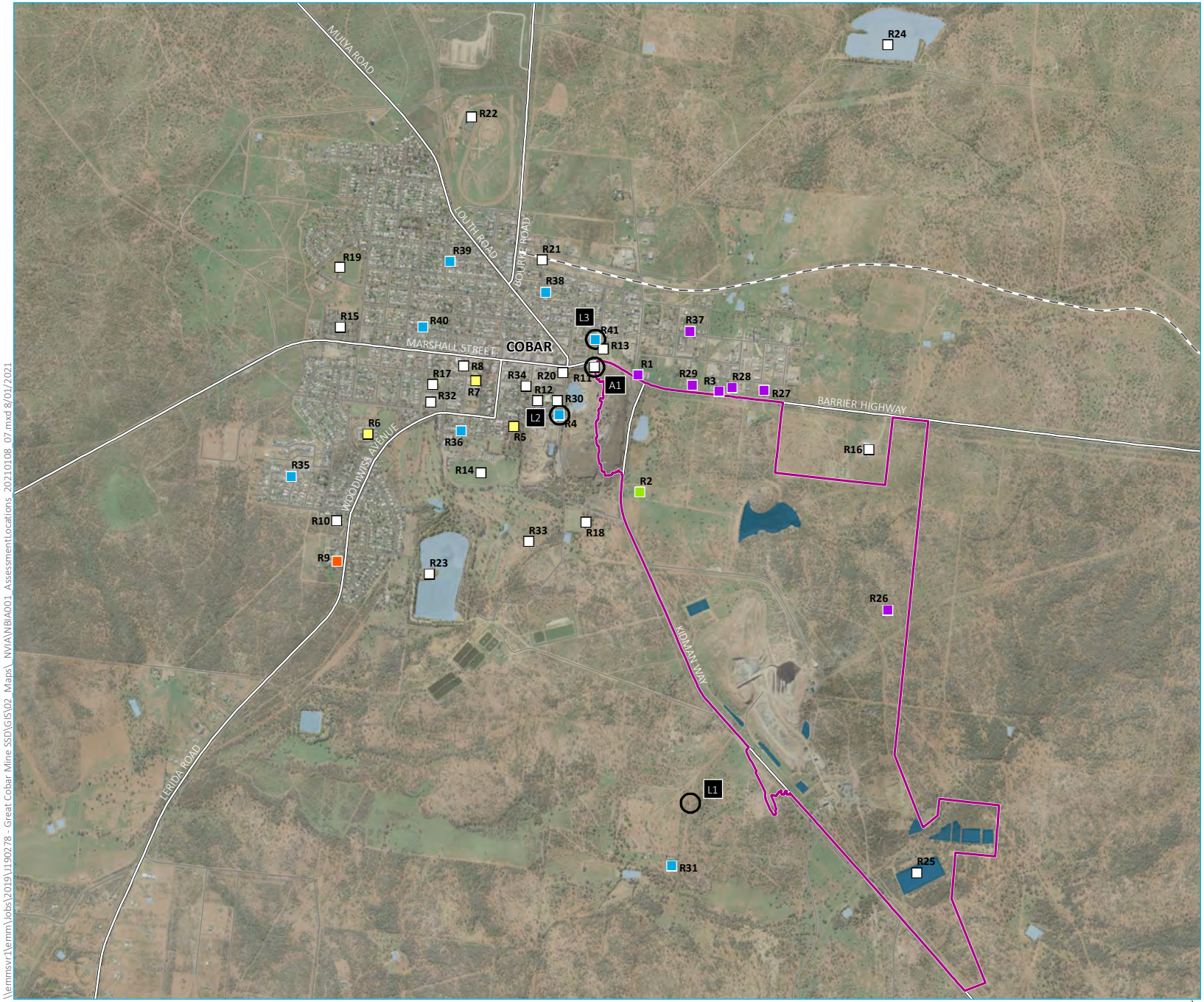
The nearest representative noise assessment locations to the Project have been identified for the purpose of assessing potential noise impacts. Details are provided in Table 3.1 and their locations are shown in Figure 3.1.

Table 3.1 Noise assessment locations

Assessment location ID	Type	Description	Easting	Northing
R1	Industrial (residence)	82 Old Bourke Road	390352	6514550
R2	Mine-owned residence	Cornish Town House (PGM Owned)	390363	6513810
R3	Industrial (residence)	13 Nyngan Road	390861	6514443
R4	Privately-owned residence	2-4 Harcourt Street	389856	6514298
R5	School	Cobar Public School	389571	6514224
R6	School	Cobar High School	388655	6514176
R7	School	St Johns Primary School	389332	6514512
R8	Child Care Centre	Kubby Child Care	389258	6514603
R9	Hospital	Cobar Hospital	388463	6513378
R10	Nursing Home	Lillian Brady Nursing Home	388460	6513631
R11	Cultural centre	Great Cobar Heritage Centre	390079	6514596
R12	Active recreation	Drummond Park	389722	6514385
R13	Passive recreation	Cobar Miners Heritage Park	390135	6514712
R14	Active recreation	Ward Oval	389366	6513933
R15	Caravan Park	Cobar Caravan Park	388481	6514847
R16	Mine camp	TJ Hospitality Group Accommodation	391805	6514080
R17	Active recreation	Cobar Swimming Pool	389063	6514487
R18	Active recreation	Cobar Rugby Club (ground)	390025	6513624
R19	Active recreation	Cobar Rugby League Club (ground)	388479	6515223
R20	Commercial	Cobar Memorial Services Club	389880	6514562
R21	Commercial	Cobar Railway Station	389752	6515270
R22	Commercial	Cobar Racetrack	389308	6516170
R23	Passive recreation	Newey Reserve	389042	6513297

Table 3.1 Noise assessment locations

Assessment location ID	Type	Description	Easting	Northing
R24	Passive recreation	Old Reservoir	391920	6516624
R25	Passive recreation	Young Australia Reservoir	392104	6511417
R26	Industrial	Cobar water treatment plant	391920	6513070
R27	Industrial (residence)	10 Dapville Street	391145	6514450
R28	Industrial (residence)	12 Dunstan Street	390945	6514467
R29	Industrial (residence)	27 Nyngan Street	390695	6514486
R30	Child Care Centre	Ngali Child Care Centre, Harcourt Street	389846	6514386
R31	Privately-owned residence	Kidman Way – Dellavale	390563	6511460
R32	Commercial	Cobar Bowling and Golf Club	389051	6514377
R33	Active recreation	Cobar Golf Course	389666	6513501
R34	Child Care Centre	Far West Family Day Care	389649	6514476
R35	Privately-owned residence	15 James Place	388174	6513910
R36	Privately-owned residence	3 Maidens Ave	389242	6514198
R37	Industrial (residence)	39 Cornish Street	390680	6514822
R38	Privately-owned residence	10 Linsley Street	389773	6515067
R39	Privately-owned residence	24 Leah Street	389170	6515264
R40	Privately-owned residence	49 Becker Street	389000	6514850
R41	Privately-owned residence	5 Conduit Street	390083	6154772



KEY

- Noise monitoring location
- Project area
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Mine water management storage

Type of receiver

- Hospital
- Mine-owned residence
- Privately-owned residence
- Industrial
- School
- Other

Source: EMM (2020); DFSI (2017); GA (2011); PGM (2020)

0 1 2 km

GDA 1994 MGA Zone 55

N

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Noise monitoring and assessment locations

Peak Gold Mines
New Cobar Complex Project
Noise and vibration impact assessment
Figure 3.1

EMM
creating opportunities

3.2 Existing noise limits and emissions

Condition L4 of the EPL (3596) provides noise limits the site's approved existing operations must meet. These noise limits are based on the $L_{A10,15min}$ noise descriptor and were derived from noise guidelines prior to the release of the INP (EPA 2000). It is noted that the INP is now superseded by the NPfI (EPA 2017).

Operational noise limits from the EPL are provided in Table 3.2. The aim of this assessment is to demonstrate that the Project area can achieve contemporary target noise levels in accordance with the NPfI.

Table 3.2 EPL noise limits

Location	Operational noise limits, $L_{A10,15min}$, decibel (dB)		
	Monday to Friday (7 am - 6 pm) & Saturday (7 am - 1 pm)	Monday to Friday (6 pm - 10 pm)	All other times
Nearest or most affected privately-owned residence	45	40	35

The EPL states that the noise limits in Table 3.2 apply under all meteorological conditions except during the following:

- rain and wind speeds (at 10 m height) greater than 3 m/s; and
- "non-significant weather conditions" (as described in Chapter 5 and Appendix E of the INP (EPA 2000)).

It is noted that the noise limits presented in Table 3.2 do not apply if PGM owns the residence or land or has an agreement with the owner(s) of the relevant residence or land to generate higher noise levels, and PGM has advised DPIE in writing of this agreement.

PGM undertakes attended noise monitoring at the nearest privately-owned residence to the New Cobar Complex, assessment location R31 (Dellavale). A review of the attended noise monitoring data recorded at R31 since January 2017 during the day, evening, and night periods identified that noise from the New Cobar Complex satisfied the relevant noise limits during all monitoring surveys. This shows a compliant history and good performance of noise emissions from the New Cobar Complex.

3.3 Existing blasting limits and emissions

Condition 4 of the development consent (2004/LDA 00003) and Condition L4 of the EPL (3596) provide blasting emission limits the Project area must meet. The development consent includes ground vibration limits and the EPL includes limits for both airblast overpressure and ground vibration. Ground vibration limits provided in the development consent and EPL are consistent. Airblast overpressure and ground vibration limits are summarised in Table 3.3.

Table 3.3 Existing blasting limits

Location	Airblast overpressure (LinPeak)	Ground vibration	Allowable exceedance
Any residence or noise sensitive location (e.g. school or hospital) that is not owned by the licensee or subject of a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative overpressure level or ground vibration level.	120 dB	10 mm/s	0%
	115 dB	5 mm/s	5% of the total number of blasts within the 12 months annual reporting period.

All operational blast activities at the New Cobar Complex and the Peak Complex are conducted underground. Hence, potential impacts associated with flyrock and overpressure are negligible. Potential impacts from ground vibration at receivers outside of the Project area is currently managed by PGM through the implementation of mitigation measures including the following:

- reducing the maximum instantaneous charge (MIC);
- optimising blasting underground through the use of electronic detonators; and
- using a ground vibration prediction model throughout the planning process and altering the blast design where required.

PGM undertakes blast ground vibration monitoring at six monitoring locations, consisting of four near field Project area locations and two locations outside of the Project area. The four Project area blast monitoring locations are on properties owned by PGM and hence where blasting limits do not apply. Nonetheless, these blast monitoring locations are intermediate locations between the Project area (i.e. blast locations) and privately-owned residential receivers, and hence are considered conservative monitoring locations for the purpose of blast ground vibration management. One of the two monitoring locations outside the Project area is located at the Great Cobar Heritage Centre and hence where consent or EPL blasting limits also do not apply. The other monitoring location outside the Project area is at the privately-owned residential assessment location R31 (Dellavale) and hence blasting limits apply at this location.

A review of the blast monitoring data recorded at R31 since May 2014 identified three blasts at the New Cobar deposit where ground vibration emissions where above 5 mm/s. These were on 23 September 2015, 7 February 2018, and 25 May 2018 when ground vibration levels (peak particle velocity (PPV)) were recorded at 5.7 mm/s, 5.3 mm/s and 5.1 mm/s, respectively. With more than 600 blasts in 2015, 688 blasts in 2017, 342 blasts in 2018, and 423 blast 2019, the recorded ground vibration levels at R31 did not exceed the 5% allowable exceedance threshold for total blasts within the relevant 12 months annual reporting periods. No blast ground vibration levels have been recorded above the strict 10 mm/s limit at R31. This shows a compliant history and good performance of ground vibration from blasts at the New Cobar underground deposit.

Other blasting standards such as the Australian Standard AS2187.2, the German Standard DIN4150, and the British Standard BS7385, indicate similar levels of ground vibration that are considered appropriate to protect the amenity and eliminate the risk of superficial damage or structural damage to buildings (e.g. Great Cobar Heritage Centre). However, the limits provided in the development consent and EPL are more stringent than the values provided in these standards.

3.4 Ambient noise environment

A key element in assessing environmental noise impact from industry is to quantify the existing ambient acoustic environment. To establish the ambient noise levels in the area, both unattended and short-term operator-attended noise surveys were conducted at representative monitoring locations in general accordance with the procedures described in Australian Standard 'AS 1055-1997 - Acoustics - Description and Measurement of Environmental Noise'. Monitoring results are provided in the following sections.

The locations of background and ambient noise monitoring used in this assessment are shown in Figure 3.1.

3.4.1 Unattended noise monitoring

Unattended noise monitoring using noise loggers was completed at representative residential properties potentially affected by Project area noise. The noise monitoring locations were also selected after a desktop review and inspection of the area surrounding the site, giving due consideration to other noise sources which may influence the readings (e.g. domestic air conditioning units), the proximity of assessment locations to the Project, security issues for the noise loggers and gaining permission to access properties from the residents or landowners. Three noise loggers were deployed as follows:

- Logger 1 – 'Dellavale' on Kidman Way, Cobar (L1);
- Logger 2 – Harcourt Street, Cobar (L2); and
- Logger 3 – Conduit Street, Cobar (L3).

The unattended measurements were carried out using three Rion NL-42EX noise loggers (s/n 117362, 106094 and 873125). The loggers were in place between 29 October and 10 November 2019 (12 consecutive days).

The noise loggers were programmed to record statistical noise level indices continuously in 15-minute intervals, including the L_{Amin}, L_{Aeq}, L_{Amax}, L_{A1}, L_{A10}, L_{A50}, and L_{A90}. Calibration of all instrumentation was checked prior to and following measurements. All equipment carried appropriate and current NATA calibration certificates.

Weather data for the survey period was obtained from a mobile automatic weather station installed at one of the logger locations. Wind speed and the rainfall data were used to exclude noise data during periods when the average wind speed was in excess of 5 m/s and/or during rainfall events in accordance with NPfI methods.

A summary of existing Rating Background Levels (RBL) and ambient L_{Aeq} noise levels is given in Table 3.4. Results are also provided graphically for each day in Appendix B.

Table 3.4 Summary of existing background and ambient noise levels

Unattended monitoring location	Assessment period[1]	RBL[2], dB	Measured $L_{Aeq,period}$ noise level[3], dB
L1 – Kidman Way, Cobar	Day	28	43
	Evening	28	40
	Night	27	41
L2 – Harcourt St, Cobar	Day	35	57
	Evening	29	48
	Night	26	46

Table 3.4 Summary of existing background and ambient noise levels

Unattended monitoring location	Assessment period[1]	RBL[2], dB	Measured $L_{Aeq,period}$ noise level[3], dB
L3 – Conduit St, Cobar	Day	38	53
	Evening	33	49
	Night	29	47

Notes: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: remaining periods.
2. The rating background d level (RB)L is an NPfI term and is used represent the background noise level.
3. The energy averaged noise level over the measurement period and representative of general ambient noise.

3.4.2 Attended noise monitoring

EMM completed 15-minute attended noise measurements on 29 October 2019 at the three logger locations (L1, L2 and L3) (Table 3.5), to identify noise sources contributing to the ambient noise environment.

Operator-attended measurements were conducted using two Brüel & Kjær (B&K) 2,250 integrating sound analysers (s/n 2759405 and 3008201) to quantify and qualify the existing noise sources. Field calibration of the instrument was completed using a B&K 4230 calibrator (s/n 1276091). Attended measurements were undertaken in accordance with AS 1055-1997 'Description and Measurement of Environmental Noise'. Meteorological conditions throughout the survey period were relatively calm with no winds above 5 m/s and no rain.

A summary of results of the attended noise monitoring is provided in Table 3.5.

Table 3.5 Summary of attended noise measurements

Attended monitoring location	Date	Start time (hours)	Measured noise levels (15-minute), dB			Comments
			L_{A90}	L_{Aeq}	L_{Amax}	
L1 – Kidman Way, Cobar	29/10/19	16:58	28	42	76	Insect and bird noise. Road traffic on Kidman Way frequently audible. Mobile equipment engine revving and reversing alarms and bang from the New Cobar site.
		21:18	29	33	50	Road traffic on Kidman Way frequently audible. Consistent hum from ventilation fan at the New Cobar site.
		22:30	27	37	63	Road traffic on Kidman Way frequently audible. Consistent hum from ventilation fan and truck engine revs at the New Cobar site.
L2 – Harcourt St, Cobar	29/10/19	15:43	36	52	71	Bird noise. Road traffic noise frequently audible. Noise from nearby residents and dog barking. Reversing alarms occasionally audible from the north. Industrial noise inaudible.
		21:05	35	48	72	Insect noise constant. Road traffic noise frequently audible. Noise from nearby residents and dogs barking. Constant urban hum noise (e.g. fans). Industrial noise inaudible.

Table 3.5 Summary of attended noise measurements

Attended monitoring location	Date	Start time (hours)	Measured noise levels (15-minute), dB			Comments
			L_{A90}	L_{Aeq}	L_{Amax}	
		22:18	34	51	77	Insect noise constant. Road traffic noise frequently audible. Dogs barking. Constant urban hum noise (e.g. fans). Industrial noise inaudible.
L3 – Conduit St, Cobar	29/10/19	14:51	36	48	77	Bird noise, wind in foliage. Road traffic noise consistently audible. Noise from nearby residents. Police sirens and aircraft noise occasionally audible. Industrial noise inaudible.
		21:23	39	45	67	Insect noise constant. Road traffic noise frequently audible. Dogs barking. Constant air-conditioning noise just audible from motel. Industrial noise inaudible.
		22:36	37	45	65	Insect noise constant. Bird noise frequently audible. Road traffic noise frequently audible. Dogs barking occasionally audible. Constant air-conditioning noise just audible from motel. Industrial noise inaudible.
A1 – Great Cobar Heritage Centre	29/10/19	16:02	43	54	69	Bird noise. Road traffic noise consistently audible. Nearby water fountain consistently audible. Noise from nearby residents. Industrial noise inaudible.
		21:41	40	54	72	Bird and bat noise occasionally audible. Road traffic noise frequently audible. Nearby water fountain consistently audible. Industrial noise inaudible.
		22:00	40	56	75	Birds, bats and dogs barking occasionally audible. Road traffic noise frequently audible. Insect noise and nearby water fountain consistently audible. Industrial noise inaudible.

The ambient noise environment at the logger locations (L1, L2 and L3) was found to be dominated by local and distant road traffic, local urban and suburban noise, insect and bird noise, and occasional aircraft noise. Road traffic noise was observed to be more influential to the ambient noise environment at monitoring locations within the town of Cobar, in particular in areas closer to the Barrier Highway, Louth Road, and Kidman Way to the south. Additional attended noise monitoring at A1 (Cobar Cultural Centre) showed that the ambient noise environment was dominated by road traffic noise from the Barrier Highway with higher background (L_{A90}) and ambient noise levels than at the logger locations. Industrial noise from the New Cobar Complex was inaudible at most monitoring locations. The exception was at L1 (Dellavale) where noise from the New Cobar Complex was audible, including from operations at the New Cobar RoM pad (e.g. mobile equipment engine revving and reversing alarms and banging noise) during the day period and ventilation fan noise during the evening and the night periods.

3.5 Meteorology

Noise propagation over distance can be significantly affected by meteorological conditions. Of most interest are source-to-receiver winds, the presence of temperature inversions and drainage flow (katabatic winds), as these conditions can enhance received noise levels. To account for the influence of weather conditions in the noise impact assessment (NIA), the NPfI requires assessment of noise under standard and noise-enhancing weather conditions, if found relevant. The NPfI defines these as follows:

- standard meteorological conditions: defined by stability categories A through to D with wind speeds up to 0.5 m/s at 10 m above ground level (m agl) for day, evening, and night periods.

- noise-enhancing meteorological condition: defined by stability categories A through to D with light winds (up to 3 m/s at 10 m agl) for the day and evening periods; and stability categories A through to D with light winds (up to 3 m/s at 10 m agl) and/or stability category F with winds up to 2 m/s at 10 m agl.

Fact Sheet D of the NPfI specifies two options in regard to meteorological data analysis procedures to determine the presence of significant meteorological conditions, as follows:

1. Adopt the noise-enhancing meteorological conditions for all assessment periods for NIA purposes without an assessment of how often these conditions occur – a conservative approach that considers source-to-receiver wind vectors for all receivers and F class temperature inversions with wind speeds up to 2 m/s at night; or

2. Determine the significance of noise-enhancing conditions. This involves assessing the significance of temperature inversions (F and G class stability categories) for the night-time period and the significance of light winds up to and including 3 m/s for all assessment periods during stability categories other than E, F, or G. Significance is based on a threshold of occurrence of 30% determined in accordance with the NPfI provisions. Where noise-enhancing meteorological conditions occur for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.

This assessment has adopted the NPfI Option 1 to account for the influence of weather conditions in the NIA. Meteorological conditions adopted for NIA purposes, in accordance with the NPfI (Option 1 approach), are provided in Section 5.3. However, it is noted that the NPfI Option 2 to determine the presence of significant meteorological conditions was also undertaken for completeness, as discussed in the following sections.

3.5.1 Winds

The NPfI recommends consideration of wind effects if they are “significant”. The NPfI defines “significant” as the presence of source-to-receiver wind speed (measured at 10 m above ground level) of 3 m/s or less, occurring for 30% of the time in any assessment period and season.

This is further clarified by defining source-to-receiver wind direction as being the directional component of wind. The NPfI states that where wind is identified to be a significant feature of the area then assessment of noise impacts should consider the highest wind speed up to 3 m/s, which is considered to prevail for at least 30% of the time.

An analysis of the vector components of half hourly wind data recorded by the Bureau of Meteorology (BoM) automatic weather station (AWS) located at Cobar Airport was undertaken based on data recorded between 2016 and 2020. No wind directions were identified to trigger the NPfI 30% threshold and hence winds are not considered significant in accordance with the NPfI.

3.5.2 Temperature inversions

The NPfI states that the assessment of noise impact with influence from temperature inversion conditions (stability category F or G) be confined to the night-time assessment period when they typically occur.

The frequency of temperature inversions was determined based on sigma-theta data recorded between 2016 and 2020 obtained from the BoM AWS located at Cobar Airport. It was found from the analysis of the data that F stability category and G stability category temperature inversions (F and G combined) did occur for 30% or greater of the night period, and hence stability category F or G temperature inversion conditions are not considered significant in accordance with the NPfI.

3.5.3 Drainage winds

The NPfI states that a default drainage wind value should be applied where noise sources from the development are at significantly higher altitude than the assessment location(s) and no intervening topography is present. All assessment locations are at a similar or higher elevation than the subject Project area with intervening topography and therefore drainage winds were found not to be relevant to this assessment.

4 Criteria

4.1 Operation

Noise from industrial sites or processes (e.g. Project area truck movements or material processing etc.) in NSW is regulated by the local council, DPIE, and/or EPA, and generally projects requiring development approvals which contain such potentially intrusive noise generating activities have a licence and/or development consent conditions stipulating noise limits. These limits are generally derived from project specific noise trigger levels or operational noise levels predicted at assessment locations. They are based on EPA guidelines (i.e. NPfI, previous INP, or earlier noise guidelines) or noise levels that can be achieved by a specific Project area following the application of all reasonable and feasible noise mitigation.

The objectives of noise trigger levels for industry are to protect the community from excessive intrusive noise and preserve amenity for specific land uses. It should be noted that the audibility of a noise source does not necessarily equate to disturbance at an assessment location.

To ensure these objectives are met, EPA provides project specific noise trigger levels, namely intrusiveness and amenity noise levels as described in the NPfI.

It is noted that the original noise assessment for the New Cobar Project was completed in 2000. Since then, the INP was published by EPA in 2000, was superseded by the NPfI (EPA 2017). In accordance with the SEARs for the Project (refer to Table 1.1), and EPA's *Implementation and transitional arrangements for the Noise Policy for Industry (2017)*, this assessment has adopted the NPfI approach. Hence, assessment requirements for operational noise (e.g. criteria) and modelling methodologies (e.g. modelled meteorological conditions) have been updated where applicable.

4.1.1 Intrusiveness noise levels

The intrusiveness noise levels require that $L_{Aeq,15min}$ noise levels from the Project area during the relevant operational periods do not exceed the RBL by more than 5 dB.

Table 4.1 presents the intrusiveness noise levels determined for the Project based on the adopted RBLs for the day, evening and night periods (refer to Table 3.4). Where assessment locations have been grouped together in the following tables, it has been assumed that the ambient noise environment at these assessment locations is similar. It is noted that intrusiveness noise levels are only applicable at residential assessment locations.

Table 4.1 Project intrusiveness noise levels

Residential assessment locations[1]	Representative noise logger	Adopted RBL[1], dB(A)			Project intrusiveness noise level (RBL + 5 dB), $L_{Aeq,15min}$, dB		
		Day	Evening	Night	Day	Evening	Night
R31	L1	35[2]	30[3]	30[3]	40	35	35
R4, R36	L2	35	30[3]	30[3]	40	35	35
R38, R41	L3	38	33	30[3]	43	38	35
R35, R39, R40	N/A	35[2]	30[3]	30[3]	40	35	35

Notes: 1. Based on noise monitoring completed by EMM in October/November 2019.
2. The NPfI minimum RBL of 35 dB for the day period has been adopted.
3. The NPfI minimum RBL of 30 dB for the evening period or night period has been adopted.
4. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: remaining periods.

4.1.2 Amenity noise levels

The assessment of amenity is based on noise levels specific to the land use. The noise levels assessed relate only to industrial noise and exclude road or rail traffic noise. Where the measured existing industrial noise approaches recommended amenity noise levels, it needs to be demonstrated that noise levels from new industry will not contribute to existing industrial noise such that amenity noise levels are exceeded.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, the amenity noise levels for an industrial development is the recommended amenity noise levels (outlined in Table 2.2 of the NPfI) minus 5 dB. This approach has been adopted for this assessment and assumes that a receiver can be impacted by three or four individual industrial sites (or noise sources). It is noted that this is not true in all cases for the Project as some assessment locations (e.g. R31) may not be impacted by other industrial developments currently or in the future, and hence this is a conservative approach.

Residential assessment locations surrounding the Project area have been categorised in the NPfI 'rural' or 'suburban' amenity categories. The NPfI provides the following definitions:

- rural – an area with an acoustical environment that is dominated by natural sounds, having little to no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse.

- suburban – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic: evening ambient noise levels defined by the natural environment and human activity.

The corresponding project amenity noise levels for the Project are given in Table 4.2.

Table 4.2 Project amenity noise levels

Assessment locations	Land use/amenity area	Time period[1]	Project amenity noise level, $L_{Aeq,period}$, dB (Recommended amenity noise level - 5 dB)
R4, R35, R36, R38-R41	Residential – suburban	Day	50
		Evening	40
		Night	35
R31	Residential – rural	Day	45
		Evening	40
		Night	35
R10	Nursing home – rural[2]	Day	50
		Evening	45
		Night	40
R15	Caravan park – rural[2]	Day	50
		Evening	45
		Night	40
R16	Mine camp – rural[2]	Day	50
		Evening	45
		Night	40
R5-R7	School (classroom) – internal	Noisiest 1-hour when in use	30 (40 external)[3]
R9	Hospital (ward) – internal	Noisiest 1-hour	30
	Hospital (ward) – external	Noisiest 1-hour	45
R13, R23-R25	Passive recreation	When in use	45
R12, R14, R17-R19, R33	Active recreation	When in use	50
R8, R11, R20-R22, R30, R32, R34	Commercial	When in use	60
R1, R3, R26-R29, R37	Industrial[4]	When in use	65

Notes: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: 10 pm to 7 am Monday to Saturday; 10 pm to 8 am Sundays and public holidays.
2. Project amenity noise level for this type of receiver is 5 dB above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day in accordance with Table 2.2 of the NPfI.
3. External level based on an external-to-internal noise reduction of 10 dB as per the NPfI.
4. Residences located on Industrial zoned land.

4.1.3 Project noise trigger levels

It is commonly acknowledged and accepted amongst regulators and industry that average noise levels are typically 3 dB higher over a 15-minute worst-case assessment period when compared to an entire day (11 hour), evening (4 hour), and night (9 hour) assessment periods. To standardise the time periods for the intrusiveness and amenity noise levels, the NPfI states that the $L_{Aeq,15min}$ is equivalent to the $L_{Aeq,period}$ + 3 dB, unless robust evidence is provided for an alternative approach for the particular project being considered. This assessment has adopted the NPfI approach.

The NPfI's project noise trigger levels (PNTLs) is the lower of the calculated intrusiveness or amenity noise levels and are provided in Table 4.3 for all assessment locations.

Table 4.3 PNTLs

Assessment location	Project intrusiveness noise level $L_{Aeq,15min}$, dB			Project amenity noise level[1] $L_{Aeq,15min}$, dB			PNTL[2] $L_{Aeq,15min}$, dB		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
R1 (industrial)	N/A	N/A	N/A	68	68	68	68	68	68
R2 (PGM)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
R3 (industrial)	N/A	N/A	N/A	68	68	68	68	68	68
R4 (residential)	40	35	35	53	43	38	40	35	35
R5 (school)	N/A	N/A	N/A	40[3]	N/A	N/A	40	N/A	N/A
R6 (school)	N/A	N/A	N/A	40[3]	N/A	N/A	40	N/A	N/A
R7 (school)	N/A	N/A	N/A	40[3]	N/A	N/A	40	N/A	N/A
R8 (commercial)	N/A	N/A	N/A	63	63	63	63	63	63
R9 (hospital)	N/A	N/A	N/A	48[3]	48[3]	48[3]	48	48	48
R10 (nursing home)	N/A	N/A	N/A	53	48	43	53	48	43
R11 (commercial)	N/A	N/A	N/A	63	63	63	63	63	63
R12 (recreation)	N/A	N/A	N/A	53	53	53	53	53	53
R13 (recreation)	N/A	N/A	N/A	48	48	48	48	48	48
R14 (recreation)	N/A	N/A	N/A	53	53	53	53	53	53
R15 (caravan park)	N/A	N/A	N/A	53	48	43	53	48	43
R16 (mine camp)	N/A	N/A	N/A	53	48	43	53	48	43
R17 (recreation)	N/A	N/A	N/A	53	53	53	53	53	53
R18 (recreation)	N/A	N/A	N/A	53	53	53	53	53	53
R19 (recreation)	N/A	N/A	N/A	53	53	53	53	53	53
R20 (commercial)	N/A	N/A	N/A	63	63	63	63	63	63
R21 (commercial)	N/A	N/A	N/A	63	63	63	63	63	63
R22 (commercial)	N/A	N/A	N/A	63	63	63	63	63	63
R23 (recreation)	N/A	N/A	N/A	48	48	48	48	48	48
R24 (recreation)	N/A	N/A	N/A	48	48	48	48	48	48
R25 (recreation)	N/A	N/A	N/A	48	48	48	48	48	48
R26 (industrial)	N/A	N/A	N/A	68	68	68	68	68	68
R27 (industrial)	N/A	N/A	N/A	68	68	68	68	68	68
R28 (industrial)	N/A	N/A	N/A	68	68	68	68	68	68
R29 (industrial)	N/A	N/A	N/A	68	68	68	68	68	68
R30 (commercial)	N/A	N/A	N/A	63	63	63	63	63	63
R31 (residential)	40	35	35	48	43	38	40	35	35

Table 4.3 PNTLs

Assessment location	Project intrusiveness noise level $L_{Aeq,15min}$, dB			Project amenity noise level[1] $L_{Aeq,15min}$, dB			PNTL[2] $L_{Aeq,15min}$, dB		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
R32 (commercial)	N/A	N/A	N/A	63	63	63	63	63	63
R33 (recreation)	N/A	N/A	N/A	53	53	53	53	53	53
R34 (commercial)	N/A	N/A	N/A	63	63	63	63	63	63
R35 (residential)	40	35	35	53	43	38	40	35	35
R36 (residential)	40	35	35	53	43	38	40	35	35
R37 (Industrial)	N/A	N/A	N/A	68	68	68	68	68	68
R38 (residential)	43	38	35	53	43	38	43	38	35
R39 (residential)	40	35	35	53	43	38	40	35	35
R40 (residential)	40	35	35	53	43	38	40	35	35
R41 (residential)	43	38	35	53	43	38	43	38	35

Notes: 1. Project amenity $L_{Aeq,15min}$ noise level is the Project amenity noise level $L_{Aeq,period}$ + 3 dB as per the NPfI.
2. PNTLs are the lower of the calculated intrusiveness or amenity noise levels.
3. External amenity noise level has been adopted.
4. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: remaining periods.

It is noted that the PNTLs shown in Table 4.3 for assessment location R31 (Dellavale) differ from the existing EPL limits of 45 dB $L_{A10,15min}$, 40 dB $L_{A10,15min}$, 35 dB $L_{A10,15min}$ for the day, evening and night periods respectively (refer to Table 3.2). Existing limits were established prior to the release of the INP in 2000 (now superseded) and the subsequent release of the NPfI in 2017.

4.1.4 Sleep disturbance

The Project area will continue to operate during the night-time period and therefore, in accordance with the NPfI, the potential for sleep disturbance has been assessed.

The NPfI suggests that a detailed maximum noise level event assessment should be undertaken where the development night-time noise levels at a residential location exceed:

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

The sleep disturbance criteria for all residential assessment locations are provided in Table 4.4.

Table 4.4 Maximum noise level event screening criteria

Residential assessment locations[1]	Adopted night RBL, dB(A)	Maximum noise level event screening criteria, dB	
		RBL +5 dB or standard[2]	RBL +15 dB or standard[2]
		$L_{Aeq,15min}$	L_{Amax}
R31	30	40	52
R4, R36	30	40	52
R38, R41	30	40	52
R35, R39, R40	30	40	52

Notes: 1. Residential assessment locations only.
2. Whichever is greater.

4.1.5 Voluntary land acquisition and mitigation policy

In September 2018, NSW Government released the revised *VLAMP for State Significant Mining, Petroleum and Extractive Industry Developments*. The VLAMP describes the voluntary mitigation and land acquisition policy to address dust and noise impacts, and outlines mitigation and acquisition criteria for noise.

Under the VLAMP, if a development cannot comply with the relevant impact assessment criteria, or if the mitigation or acquisition criteria are likely to be exceeded, the applicant should consider a negotiated agreement with the affected landowner or acquisition of the land. In doing so, the land is then no longer subject to the impact assessment, mitigation, or acquisition criteria, with the exception of the provisions that apply under the "Use of acquired land", which is primarily related to informing and protecting existing or prospective tenants.

In relation to noise, the VLAMP states the following with regard to the application of voluntary mitigation and voluntary land acquisition:

> A consent authority can apply voluntary mitigation and voluntary land acquisition rights to reduce:
>
> - operational noise impacts of a development on privately owned land; and
> - rail noise impacts of a development on privately owned land near a non-network rail line (private rail line), that is on, or exclusively servicing an industrial site (see Appendix 3 of the [Rail Infrastructure Noise Guideline] RING);
>
> But not:
>
> - construction noise impacts, as these impacts are shorter term and can be controlled;
> - noise impacts on the public road or rail network; or
> - modifications of existing developments with legacy noise issues, where the modification would have beneficial or negligible noise impacts[13].
>
> [13] Noise issues for existing premises may be addressed through site-specific pollution reduction programs under the *Protection of the Environment Operations Act 1997*.

Voluntary mitigation or voluntary acquisition rights apply when a development contributes to exceedances of the criteria set out in Table 1 of the VLAMP.

Voluntary mitigation rights apply to any residence on privately-owned land if, even with the implementation of best practice management at the mine site, in the opinion of the consent authority:

- the noise generated by the development would meet the requirements in Table 4.5, such that the impacts would be characterised as marginal, moderate or significant, at any residence on privately-owned land; or
- the development would increase the total industrial noise level at any residence on privately-owned land by more than 1 dB and noise levels at the residence are already above the recommended amenity noise levels in Table 2.2 of the NPfI; or
- the development includes a private rail line, and the use of that private rail line would cause exceedances of the recommended acceptable levels in Table 6 of Appendix 3 of the RING (EPA 2013) by greater than or equal to 3 dB at any residence on privately-owned land.

Voluntary acquisition rights apply to any residence on privately-owned land if, even with the implementation of best practice management at the mine site, in the opinion of the consent authority:

- the noise generated by the development would be characterised as significant, according to Table 4.5, at any residence on privately-owned land; or
- the noise generated by the development would contribute to exceedances of the acceptable noise levels plus 5 dB in Table 2.2 of the NPfI on more than 25% of any privately-owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls; or
- the development includes a private rail line, and the use of that private rail line would cause exceedances of the recommended maximum criteria in Table 6 of Appendix 3 of the RING at any residence on privately-owned land.

The NSW Government's interpretation of the significance of any potential exceedances of the relevant noise assessment criteria and potential treatment for those are shown in Table 1 of the VLAMP, which is reproduced in Table 4.5.

Table 4.5 VLAMP characterisation of noise impacts and potential treatments

If the predicted noise level minus the PNTL is:	And the total cumulative industrial noise level is:	Characterisation of impacts	Potential treatment
All time periods 0-2 dB	Not applicable	Impacts are considered to be **negligible**	The exceedances would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls.
All time periods 3-5 dB	< recommended amenity noise level > recommended amenity noise level but the increase in total cumulative industrial noise level resulting from development is <1 dB	Impacts are considered to be **marginal**	Provide mechanical ventilation / comfort condition systems to enable windows to be closed without compromising internal air quality / amenity.

Table 4.5 VLAMP characterisation of noise impacts and potential treatments

If the predicted noise level minus the PNTL is:	And the total cumulative industrial noise level is:	Characterisation of impacts	Potential treatment
All time periods 3-5 dB	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is >1 dB	Impacts are considered to be **moderate**	As for marginal impacts but also upgraded façade elements like windows, doors or roof insulation, to further increase the ability of the building façade to reduce noise levels.
Day and evening > 5 dB	< recommended amenity noise level	Impacts are considered to be **moderate**	As for marginal impacts but also upgraded façade elements like windows, doors or roof insulation, to further increase the ability of the building façade to reduce noise levels.
Day and evening > 5 dB	> recommended amenity noise level	Impacts are considered to be **significant**	Provide mitigation as for moderate impacts and refer to voluntary land acquisition provisions.
Night > 5 dB	Not applicable	Impacts are considered to be **significant**	Provide mitigation as for moderate impacts and refer to voluntary land acquisition provisions.

Source: VLAMP (NSW Government 2018).

4.2 Construction

The SEARs specifically reference DECC Interim Construction Noise Guideline (ICNG) (2009) for the assessment of noise from proposed construction activities. However, noise associated with construction activities for extractive industries are generally assessed as operational noise, as noise emissions from plant and equipment items associated with construction are like those used for operations. Furthermore, operational noise trigger levels are generally more stringent than those provided in the ICNG. Therefore, the PNTLs presented in Table 4.3 have been adopted as the construction noise criteria for the Project.

4.3 Road traffic noise

Construction and operational related traffic require assessment for potential noise impact. The principal guidance to assess the impact of road traffic noise at assessment locations is in DECCW's RNP (2011). The road traffic noise assessment criteria for residential assessment locations, reproduced from Table 3 of the RNP for road categories relevant to the Project are provided in Table 4.6.

Table 4.6 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/development	Assessment criteria, dB	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	60 $L_{Aeq,15hr}$	55 $L_{Aeq,9hr}$

Source: RNP (DECCW 2011).

Additionally, the RNP states where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB.

In addition to meeting the assessment criteria (Table 4.6), any significant increase in total traffic noise at assessment locations must be considered. Assessment locations experiencing increases in total traffic noise levels above those presented in Table 4.7 should be considered for mitigation. It is noted that the relative increase criteria do not apply to local roads.

Table 4.7 Road traffic relative increase criteria for residential land uses

Road category	Type of project/development	Total traffic noise level increase, dB	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic $L_{Aeq(15hr)}$ + 12 dB	Existing traffic $L_{Aeq(9hr)}$ + 12 dB

Source: RNP (DECCW 2011).

4.4 Blasting

The criteria adopted by EPA for blasting are provided in the ANZECC Guidelines (ANZECC 1990).

The blasting criteria address two main effects of blasting:

- airblast noise overpressure; and
- ground vibration.

Airblast overpressure and ground vibration limits exist for the Project area (refer to Table 3.3) as specified in the development consent and EPL. The development consent includes ground vibration limits and the EPL includes limits for both airblast overpressure and ground vibration. Ground vibration limits provided in the development consent and EPL are consistent with the criteria recommended in the ANZECC Guidelines (ANZECC 1990), as shown in the following sections.

4.4.1 Airblast overpressure

The recommended maximum level for airblast overpressure is 115 dB linear peak. The vibration level of 115 dB may be exceeded on up to 5% of the total number of blasts over 12 months. However, the level should not exceed 120 dB linear peak at any time. Airblast overpressure criteria are summarised in Table 4.8.

Table 4.8 Airblast overpressure

Airblast overpressure level dB (L_{peak})	Allowable exceedance
115	5% of the total number of blasts over 12 months
120	0%

4.4.2 Ground vibration

PPV from ground vibration should not exceed 5 mm/s for more than 5% of the total number of blasts over 12 months. However, the maximum level should not exceed 10 mm/s at any time. Ground vibration criteria are summarised in Table 4.9.

Table 4.9 Ground vibration limits

PPV (mm/s)	Allowable exceedance
5	5% of the total number of blasts over 12 months
10	0%

5 Noise modelling methodology

5.1 Noise modelling software

Quantitative modelling of construction and operational noise was completed using DGMR iNoise noise prediction software (from the developers of the long standing Predictor product). This software applies the EPA accepted International Organisation for Standardisation (ISO) 9613 approach and calculates total noise levels at assessment locations from the concurrent operation of multiple noise sources. The model incorporated factors such as:

- the lateral and vertical location of plant and equipment;
- source-to-receiver distances;
- ground effects;
- atmospheric absorption;
- topography; and
- meteorological conditions.

Three-dimensional digitised ground contours of the Project area and surrounding land were incorporated into model topographic effects. Plant and equipment items were modelled at locations and heights representative of proposed construction activities and future mining operations.

5.2 Operational noise modelling

The operational noise modelling was based on information provided by PGM. This included approved existing and proposed future mining operations at the New Cobar Complex.

Noise from approved existing mining operations was modelled and validated based on operator-attended noise measurements completed within the Project area at the New Cobar Complex and at Project area boundary locations in October 2019. Noise contributions from the New Cobar Complex were also measured at the nearest residential receiver (assessment location R31) during daytime, evening, and night-time operator-attended noise monitoring. The attended monitoring results showed that noise levels from the New Cobar Complex (and other nearby PGM mining operations) satisfied the relevant noise limits at R31. Historic results from operator-attended noise monitoring completed since January 2017 (as provided by PGM) also showed that noise from the New Cobar Complex satisfied the relevant noise limits at R31. This demonstrates a strong history of noise performance from approved existing mining operations.

For future mining operations, the location of the new ventilation fan (and boxcut) and future road truck movements (between the New Cobar Complex and the Peak Complex) were provided by PGM. The approved existing plant and equipment items used for underground ore extraction, waste rock handling and transport are not proposed to change as a result of the Project.

Modelled surface operational noise sources for approved existing and proposed future mining operations (including haul trucks working between underground and surface operations) at the New Cobar Complex, and associated sound power levels are summarised in Table 5.1. The sound power levels are based on Project area measurements (completed in October 2019) or otherwise have been supplemented using EMM's database for similar projects. Single octave sound power levels are provided in Appendix C.

Table 5.1 Modelled acoustically significant noise sources for operations

Plant or equipment item	Indicative location at the New Cobar Complex	Quantity[1]		Sound power level, dB(A)
		Approved existing	Proposed future	
Vent fan (ML 1483)	North-west of New Cobar pit	1	1	104[2]
Vent fan (CML 6)	North of admin offices	1	1	105[2]
Haul truck (CAT AD55B)	New Cobar pit (underground) to RoM pad	1	1	112[2]
Rock breaker[3]	Breaking rock at RoM pad	1	1	106[2]
Front-end loader (FEL)	Loading road truck at RoM pad	1	1	102[2]
FEL	Working on ore stockpiles at RoM pad	1	1	104[2]
Road truck	Access road to RoM pad	1	1	105[4]
Water cart	Internal roads	1	1	105[4]
Vent fan (proposed)	North-west of New Cobar pit (within boxcut)	Nil	1	105[5]

Notes: 1. Assumed in any 15-minute period.
2. Determined from Project area noise measurements.
3. Assumed to only operate during the day period.
4. From EMM's database.
5. Assumed to be same as for the vent fan (CML 6).

5.3 Construction noise modelling

The construction noise modelling was based on information received from PGM, including the location of the power line and pad-mounted substation construction areas and construction hours.

The power line construction was modelled during daylight hours between 6 am – 6 pm seven days per week (including the NPfI day and night periods) at the worst-case location (closest to receivers outside the Project area) within the proposed construction area and hence the modelled construction scenario is considered worst-case.

The construction of the substation was modelled during the day period between 7 am – 6 pm Monday to Friday at the proposed location to the east of the boxcut.

Construction activities associated with the power line and substation have been assumed to occur at the same time during the day period (as per NPfI) and hence have been modelled to occur concurrently. This scenario is only likely to occur during the construction of the substation which is expected to be of shorter duration than the power line, and hence is considered worst-case.

Further, proposed construction works during the day and night periods will occur concurrently with existing mining operations at the New Cobar Complex and hence predicted construction noise levels have been combined with modelled existing operations (refer to Section 5.2) before comparison to the operational PNTLs.

Plant and equipment items and sound power levels modelled for the power line and substation construction are summarised in Table 5.2. These were taken from EMM's database for similar projects.

Table 5.2 Modelled worst-case acoustically significant noise sources for construction

Construction works[1]	Plant or equipment item	Quantity[2]	Sound power level, dB(A)
Power line[3]	Crane	1	106
	Forklift	1	106
	Light vehicle	2	76
	Road truck	1	103
	Elevated work platform	1	105
Substation[4]	Concrete truck	1	113
	Powered hand tools	1	97
	Generator	1	98
	Light vehicle	2	76

Notes: 1. The list of plant and equipment items and sound power levels were obtained from EMM's database for similar projects.
2. Based on a typical 15-minute period.
3. During daylight hours between 6 am and 6 pm seven days per week (include the NPfI day and night periods).
4. During the NPfI day period between 7 am and 6 pm Monday to Friday.

5.4 Modelled meteorological conditions

Winds and temperature inversions were not identified applicable to the Project area in accordance with the NPfI (refer to Section 2.7 of the NPfI). As a conservative approach however, this assessment has adopted the meteorological conditions within the ISO 9613-2:1996 'Acoustics – Attenuation of sound during propagation outdoors' (ISO 9613). As per Section 1 of ISO 9613:

> The method predicts the equivalent continuous A-weighted sound pressure level (as described in parts 1 to 3 of ISO 1996) under meteorological conditions favourable to propagation from sources of known sound emission.
>
> These conditions are for downwind propagation, as specified in 5.4.3.3 of ISO 1996-2:1987 or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.

The ISO meteorological conditions adopted in this assessment to account for the influence of wind and temperature inversion conditions on modelled noise levels are considered to be equivalent to the 'noise-enhancing' meteorological conditions shown in Table D1 of the NPfI.

A summary of modelling meteorological conditions for which noise predictions have been provided for construction and operations are shown in Table 5.3.

Table 5.3 Meteorological parameters adopted for the noise modelling

Assessment period[1]	Meteorological conditions	Air temperature	Relative humidity
Day	ISO 9613	20°C	70%
Evening	ISO 9613	10°C	90%
Night	ISO 9613	10°C	90%

Notes: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: remaining periods.

6 Assessment results

6.1 Operations

To assess potential noise impacts from the Project, proposed future operational noise predictions have been compared to modelled existing operational noise levels.

Modelled existing operational noise levels and predicted proposed future operational noise levels following the commissioning of the new ventilation fan are shown in Table 6.1. All plant and equipment items were modelled at locations and heights representative of typical operational activities. Noise levels have been predicted based on noise-enhancing (ISO 9613) meteorological conditions (refer to Table 5.3).

Operational noise levels are predicted to satisfy the relevant PNTLs during the day, evening and night periods at all assessment locations.

When comparing modelled existing and predicted future Project area noise levels during noise-enhancing (ISO 9613) meteorological conditions for the day, evening and night periods, no material increase is predicted at all assessment locations. Therefore, no noise impact is anticipated from the Project.

Table 6.1 Predicted future operational noise levels

Assessment location	Modelled existing $L_{Aeq,15min}$ noise levels, dB			Predicted future $L_{Aeq,15min}$ noise levels, dB			PNTLs, $L_{Aeq,15min}$, dB			Future exceedance, dB		
	ISO 9613			ISO 9613						ISO 9613		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
R1 (industrial)	<68	<68	<68	<68	<68	<68	68	68	68	Nil	Nil	Nil
R2 (PGM)	<40	<35	<35	<40	<35	<35	N/A	N/A	N/A	N/A	N/A	N/A
R3 (industrial)	<68	<68	<68	<68	<68	<68	68	68	68	Nil	Nil	Nil
R4 (residential)	<40	<35	<35	<40	<35	<35	40	35	35	Nil	Nil	Nil
R5 (school)	<40	N/A	N/A	<40	N/A	N/A	40	N/A	N/A	Nil	N/A	N/A
R6 (school)	<40	N/A	N/A	<40	N/A	N/A	40	N/A	N/A	Nil	N/A	N/A
R7 (school)	<40	N/A	N/A	<40	N/A	N/A	40	N/A	N/A	Nil	N/A	N/A
R8 (commercial)	<63	<63	<63	<63	<63	<63	63	63	63	Nil	Nil	Nil
R9 (hospital)	<48	<48	<48	<48	<48	<48	48	48	48	Nil	Nil	Nil
R10 (nursing home)	<53	<48	<43	<53	<48	<43	53	48	43	Nil	Nil	Nil
R11 (commercial)	<63	<63	<63	<63	<63	<63	63	63	63	Nil	Nil	Nil
R12 (recreation)	<53	<53	<53	<53	<53	<53	53	53	53	Nil	Nil	Nil
R13 (recreation)	<48	<48	<48	<48	<48	<48	48	48	48	Nil	Nil	Nil
R14 (recreation)	<53	<53	<53	<53	<53	<53	53	53	53	Nil	Nil	Nil
R15 (caravan park)	<53	<48	<43	<53	<48	<43	53	48	43	Nil	Nil	Nil
R16 (mine camp)	<53	<48	<43	<53	<48	<43	53	48	43	Nil	Nil	Nil
R17 (recreation)	<53	<53	<53	<53	<53	<53	53	53	53	Nil	Nil	Nil

Table 6.1 Predicted future operational noise levels

Assessment location	Modelled existing $L_{Aeq,15min}$ noise levels, dB			Predicted future $L_{Aeq,15min}$ noise levels, dB			PNTLs, $L_{Aeq,15min}$, dB			Future exceedance, dB		
	ISO 9613			ISO 9613						ISO 9613		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
R18 (recreation)	<53	<53	<53	<53	<53	<53	53	53	53	Nil	Nil	Nil
R19 (recreation)	<53	<53	<53	<53	<53	<53	53	53	53	Nil	Nil	Nil
R20 (commercial)	<63	<63	<63	<63	<63	<63	63	63	63	Nil	Nil	Nil
R21 (commercial)	<63	<63	<63	<63	<63	<63	63	63	63	Nil	Nil	Nil
R22 (commercial)	<63	<63	<63	<63	<63	<63	63	63	63	Nil	Nil	Nil
R23 (recreation)	<48	<48	<48	<48	<48	<48	48	48	48	Nil	Nil	Nil
R24 (recreation)	<48	<48	<48	<48	<48	<48	48	48	48	Nil	Nil	Nil
R25 (recreation)	<48	<48	<48	<48	<48	<48	48	48	48	Nil	Nil	Nil
R26 (industrial)	<68	<68	<68	<68	<68	<68	68	68	68	Nil	Nil	Nil
R27 (industrial)	<68	<68	<68	<68	<68	<68	68	68	68	Nil	Nil	Nil
R28 (industrial)	<68	<68	<68	<68	<68	<68	68	68	68	Nil	Nil	Nil
R29 (industrial)	<68	<68	<68	<68	<68	<68	68	68	68	Nil	Nil	Nil
R30 (commercial)	<63	<63	<63	<63	<63	<63	63	63	63	Nil	Nil	Nil
R31 (residential)	<40	<35	<35	<40	<35	<35	40	35	35	Nil	Nil	Nil
R32 (commercial)	<63	<63	<63	<63	<63	<63	63	63	63	Nil	Nil	Nil
R33 (recreation)	<53	<53	<53	<53	<53	<53	53	53	53	Nil	Nil	Nil
R34 (commercial)	<63	<63	<63	<63	<63	<63	63	63	63	Nil	Nil	Nil
R35 (residential)	<40	<35	<35	<40	<35	<35	40	35	35	Nil	Nil	Nil
R36 (residential)	<40	<35	<35	<40	<35	<35	40	35	35	Nil	Nil	Nil
R37 (Industrial)	<68	<68	<68	<68	<68	<68	68	68	68	Nil	Nil	Nil
R38 (residential)	<40	<35	<35	<40	<35	<35	43	38	35	Nil	Nil	Nil
R39 (residential)	<40	<35	<35	<40	<35	<35	40	35	35	Nil	Nil	Nil
R40 (residential)	<40	<35	<35	<40	<35	<35	40	35	35	Nil	Nil	Nil
R41 (residential)	<40	<35	<35	<40	<35	<35	43	38	35	Nil	Nil	Nil

Notes: 1. Day period: 7 am to 6 pm Monday to Saturday and 8 am to 6 pm on Sunday and public holidays.
2. Evening period: 6 pm to 10 pm on any day.
2. Night period: 10 pm to 7 am Monday to Saturday and 10 pm to 8 am on Sunday and public holidays.

6.2 Sleep disturbance

Maximum noise levels from proposed future night operations with the potential to cause sleep disturbance at nearby residences have been assessed in accordance with the NPfI. Predicted $L_{Aeq,15min}$ noise levels for the night period were taken from Table 6.1 and compared against the $L_{Aeq,15min}$ sleep disturbance trigger levels.

Maximum noise events from future night operations considered in this assessment included potential maximum noise events from the following operations at the New Cobar Complex:

- FEL loading material into a road truck at the RoM pad; or
- FEL bucket hitting the ground;
- haul truck unloading material at the WRE; or
- haul truck unloading material at the RoM pad.

A sound power level 125 dB L_{Amax} was conservatively adopted to cover any of these possible events in the prediction of sleep disturbance impacts at residential assessment locations during night-time noise-enhancing (ISO 9613) meteorological conditions. Results are therefore considered conservative and are provided in Table 6.2.

Noise modelling results show that maximum L_{Aeq} and L_{Amax} noise levels are predicted to satisfy the NPfI screening criteria for sleep disturbance at all residential assessment locations during night-time noise-enhancing (ISO 9613) meteorological conditions. Therefore, it is unlikely that the proposed future mining operations will cause sleep disturbance at any residential receivers.

Table 6.2 Predicted night-time maximum noise levels at residential assessment locations

Residential assessment location	Predicted night-time maximum noise levels, dB ISO 9613		Sleep disturbance screening criteria, dB		Exceedance, dB ISO 9613	
	$L_{Aeq,15min}$	L_{Amax}	$L_{Aeq,15min}$	L_{Amax}	$L_{Aeq,15min}$	L_{Amax}
R4	<35	39	40	52	Nil	Nil
R31	<35	46	40	52	Nil	Nil
R35	<35	<35	40	52	Nil	Nil
R36	<35	37	40	52	Nil	Nil
R38	<35	35	40	52	Nil	Nil
R39	<35	<35	40	52	Nil	Nil
R40	<35	<35	40	52	Nil	Nil
R41	<35	37	40	52	Nil	Nil

Notes: 1. Night: 10 pm to 7 am Monday to Saturday, 10 pm to 8 am Sundays and public holidays.

6.3 Construction

Predicted Project area noise levels for the construction of the power line and substation during noise-enhancing (ISO 9613) meteorological conditions (refer to Table 5.3) for the relevant periods are shown in Table 6.3.

All plant and equipment items were modelled at the worst-case location within the proposed construction area and hence predicted construction noise levels are considered worst-case. The construction of the power line and substation were also assumed to occur concurrently with existing mining operations at the New Cobar Complex and hence predicted Project area noise levels shown also include noise from existing operations for the relevant periods.

Construction noise levels combined with noise from approved existing operations are predicted to satisfy the relevant PNTLs during the day and night periods at all assessment locations.

Table 6.3 Predicted construction noise levels

Assessment location	Predicted construction $L_{Aeq,15min}$ noise levels, dB ISO 9613		PNTLs, $L_{Aeq.15min}$, dB		Exceedance, dB ISO 9613	
	Day[1]	Night[2]	Day[3]	Night[4]	Day[3]	Night[4]
R1 (industrial)	<68	<68	68	68	Nil	Nil
R2 (PGM)	57	57	N/A	N/A	N/A	N/A
R3 (industrial)	<68	<68	68	68	Nil	Nil
R4 (residential)	<40	35	40	35	Nil	Nil
R5 (school)	<40	N/A	40	N/A	Nil	N/A
R6 (school)	<40	N/A	40	N/A	Nil	N/A
R7 (school)	<40	N/A	40	N/A	Nil	N/A
R8 (commercial)	<63	<63	63	63	Nil	Nil
R9 (hospital)	<48	<48	48	48	Nil	Nil
R10 (nursing home)	<53	<43	53	43	Nil	Nil
R11 (commercial)	<63	<63	63	63	Nil	Nil
R12 (recreation)	<53	<53	53	53	Nil	Nil
R13 (recreation)	<48	<48	48	48	Nil	Nil
R14 (recreation)	<53	<53	53	53	Nil	Nil
R15 (caravan park)	<53	<43	53	43	Nil	Nil
R16 (mine camp)	<53	<43	53	43	Nil	Nil
R17 (recreation)	<53	<53	53	53	Nil	Nil
R18 (recreation)	<53	<53	53	53	Nil	Nil
R19 (recreation)	<53	<53	53	53	Nil	Nil
R20 (commercial)	<63	<63	63	63	Nil	Nil
R21 (commercial)	<63	<63	63	63	Nil	Nil
R22 (commercial)	<63	<63	63	63	Nil	Nil
R23 (recreation)	<48	<48	48	48	Nil	Nil
R24 (recreation)	<48	<48	48	48	Nil	Nil
R25 (recreation)	<48	<48	48	48	Nil	Nil
R26 (industrial)	<68	<68	68	68	Nil	Nil
R27 (industrial)	<68	<68	68	68	Nil	Nil
R28 (industrial)	<68	<68	68	68	Nil	Nil
R29 (industrial)	<68	<68	68	68	Nil	Nil
R30 (commercial)	<63	<63	63	63	Nil	Nil
R31 (residential)	<40	<35	40	35	Nil	Nil
R32 (commercial)	<63	<63	63	63	Nil	Nil

Table 6.3 Predicted construction noise levels

Assessment location	Predicted construction $L_{Aeq,15min}$ noise levels, dB ISO 9613		PNTLs, $L_{Aeq.15min}$, dB		Exceedance, dB ISO 9613	
	Day[1]	Night[2]	Day[3]	Night[4]	Day[3]	Night[4]
R33 (recreation)	<53	<53	53	53	Nil	Nil
R34 (commercial)	<63	<63	63	63	Nil	Nil
R35 (residential)	<40	<35	40	35	Nil	Nil
R36 (residential)	<40	<35	40	35	Nil	Nil
R37 (Industrial)	<68	<68	68	68	Nil	Nil
R38 (residential)	<40	<35	43	35	Nil	Nil
R39 (residential)	<40	<35	40	35	Nil	Nil
R40 (residential)	<40	<35	40	35	Nil	Nil
R41 (residential)	<40	<35	43	35	Nil	Nil

Notes: 1. Modelling scenario includes the power line construction, the substation construction and existing modelled mining operations.
2. Modelling scenario includes the power line construction and existing modelled mining operations.
3. NPfI day period: 7 am to 6 pm Monday to Saturday and 8 am to 6 pm on Sunday and public holidays.
4. NPfI night period: 10 pm to 7 am Monday to Saturday and 10 pm to 8 am on Sunday and public holidays.

6.4 VLAMP assessment

A VLAMP assessment has been completed to determine if noise from proposed future operations is likely to contribute to exceedances of the NPfI recommended acceptable noise levels (Table 2.2 of the NPfI) plus 5 dB on more than 25% of any privately-owned land where a dwelling could be built under existing planning controls.

Predicted noise levels from proposed future operations for the day, evening and night periods (refer to Table 6.1) show that noise from the Project will satisfy the PNTLs at all privately-owned residential assessment locations. The results also show that the period with the highest potential to generate noise closest to applicable noise targets is the night period, as it is the period with the most stringent amenity level. Hence, the proposed future night operational scenario was used for the VLAMP assessment. To assess noise from the Project across private land, night $L_{Aeq,15min}$ noise contours were produced and reviewed in the context of land ownership for properties surrounding the New Cobar Complex.

The nearest and potentially most affected residential land uses surrounding the New Cobar Complex can be categorised as rural amenity areas as per the NPfI. Therefore, the VLAMP private land (vacant or not) criterion adopted for this assessment is as follows:

- rural residential land = 40 + 5 = 45 dB $L_{Aeq,night}$.

It is noted that an $L_{Aeq,15min}$ noise level equates to an $L_{Aeq,period}$ + 3 dB noise level as per the NPfI, and hence the predicted night 48 dB $L_{Aeq,15min}$ (equivalent to 45 dB $L_{Aeq,night}$) noise level contour was adopted.

Night $L_{Aeq,15min}$ noise contours for proposed future operations, including the predicted night 48 dB $L_{Aeq,15min}$ noise level contour, are provided in Appendix D. The noise predictions show that the 48 dB $L_{Aeq,15min}$ noise level contour for the night period is confined to areas close to the Project and is nowhere near enveloping 25% of adjacent privately-owned land (vacant or otherwise). Therefore, noise levels from proposed future operations are predicted to satisfy the VLAMP 25% privately-owned land assessment.

6.5 Road traffic noise

Road traffic volumes associated with construction and operation for the Project including light vehicles (LV) movements, heavy vehicles (HV) movements, percentage of heavy vehicles (HV%) and day and night splits have been referenced from the traffic impact assessment (TIA) (EMM 2020).

6.5.1 Construction

Road traffic movements associated with the power line construction are anticipated to be relatively minimal, between two to four vehicle movements per day during the six-month construction period. All roads that will be used to access the power line construction site where adjacent residential assessment locations exist will experience nil to negligible (<2 dB) noise level increases. Therefore, road traffic noise levels associated with the power line construction are predicted to satisfy the relevant RNP criteria.

6.5.2 Operations

The only change proposed for the Project during operations is an increase in HV movements for the dispatch of ore from the New Cobar Complex to the Peak Complex and the transport of backfilling material from the Peak Complex to the New Cobar Complex via Kidman Way. Existing road traffic movements adopted in this assessment were derived from data recorded during the 24-hour road traffic survey completed by EMM in April 2020 at the intersection of Kidman Way and the New Cobar Complex access road.

Existing road traffic movements on Kidman Way adopted in the operational road traffic noise assessment are presented in Table 6.4.

Table 6.4 Existing road traffic movements

Road traffic survey location[1]	Period	Light vehicle movements	Heavy vehicle movements	Total vehicle movements
Intersection of Kidman Way and the New Cobar Complex access road	Day (7 am to 10 pm)	455	133	588
	Night (10 pm to 7 am)	206	19	225
	24-hour	661	152	813

Notes: 1. From 24-hour road traffic survey completed by EMM in April 2020.

Project and future (existing + project) related road traffic movements during operations on Kidman Way are presented in Table 6.5.

Table 6.5 Project and future road traffic movements during operations

Road section	Period	Project traffic movements[1]		Future traffic movements[2]	
		LV[3]	HV[4]	LV	HV[4]
Kidman Way – between the New Cobar Complex and the Peak Complex	Day (7 am to 10 pm)	10	44	465	177
	Night (10 pm to 7 am)	10	6	216	25
	24-hour	20	50	681	202

Notes: 1. Based on data provided in the TIA (EMM 2020) unless noted otherwise.
2. Include existing and additional project related traffic movements.
3. Additional project related LV traffic movements have been assumed to be evenly distributed between the day and night periods.
4. HV% has been assumed to be consistent with existing road traffic survey data (EMM 2020).

The Federal Highway Traffic Noise Model (FHWA) (US Department of Transportation 1978) method was used to calculate road traffic noise levels at the nearest residential façade. The nearest residential assessment location on Kidman Way is R31 (Dellavale) and is located approximately 850 m to the west of Kidman Way. The FHWA road traffic noise calculation method considers traffic volumes, average travelling speed, road gradient to establish noise source strength, and includes attenuation due to distance, ground absorption, and screening from buildings or barriers.

Road traffic noise during operations has been assessed by calculating road traffic noise levels from existing and future (existing + project) traffic movements, as well as calculating the potential increase between existing and future road traffic noise levels at the nearest residential façade.

Road traffic noise levels calculated at the nearest residential assessment location (R31) for the day and night periods are presented in Table 6.6. Increases in road traffic noise levels due to project related road traffic movements during operations have also been provided for comparison. Road traffic noise levels for the day and night periods are predicted to satisfy the relevant RNP criteria during operations. Furthermore, the increases in road traffic noise levels are predicted to be negligible (<2 dB). Therefore, road traffic noise is unlikely to cause an impact at any of the residential receivers along Kidman Way between the New Cobar Complex and the Peak Complex as a result of the Project.

Table 6.6 Road traffic noise assessment during operations

Road section	Distance to nearest residence	Speed	Assessment period	Existing road traffic noise levels $L_{Aeq,period}$, dB	Future[1] road traffic noise levels $L_{Aeq,period}$, dB	RNP criteria $L_{Aeq,period}$, dB	Increase due to the Project, dB
Kidman Way – east of R31	850 m	100 km/h	Day (7 am to 10 pm)	44	45	60	1.1
			Night (10 pm to 7 am)	39	40	55	0.9

Notes: 1. Existing and project related road traffic movements combined.

6.6 Blasting

All operational blast activities at the New Cobar Complex are conducted underground. Hence, potential impacts associated with airblast overpressure are negligible, and the only potential impact is related to ground vibration.

Blast ground vibration monitoring data relevant to the New Cobar underground mining operations was supplied to EMM by PGM. This data included blast ID information, maximum instantaneous charge (MIC) and measured ground vibration levels at a number of monitoring locations. Blast monitoring results between April 2019 and March 2020 were used to develop prediction site laws for ground vibration for this assessment.

Project area specific relationships between the level of blast emissions and scaled distances have been developed based on the measured data as shown graphically in Figure 6.1.

The scaled distance is determined from the following equation:

$$SD = \frac{D}{\sqrt[3]{MIC}}$$

Where *D* is the distance between the monitoring location and the blast site and *MIC* is the maximum instantaneous charge (kg) detonated in an eight-millisecond interval.

Two scaled distance methods were initially used to develop prediction site laws, namely the square root scaled distance, or the cube root scaled distance. Analysis of the blast ground vibration monitoring data showed a marginally higher degree of correlation (76%) between the cube root scaled distance and the measured vibration data than the square root scaled distance (75%). A square root scaled distance is commonly used for the purpose of open cut mining blast vibration predictions to account for the cylindrical dispersion of energy from a blast. As a result, the cube root scaled distance has been adopted for the purpose of assessing the potential blast vibration impacts from the Project.

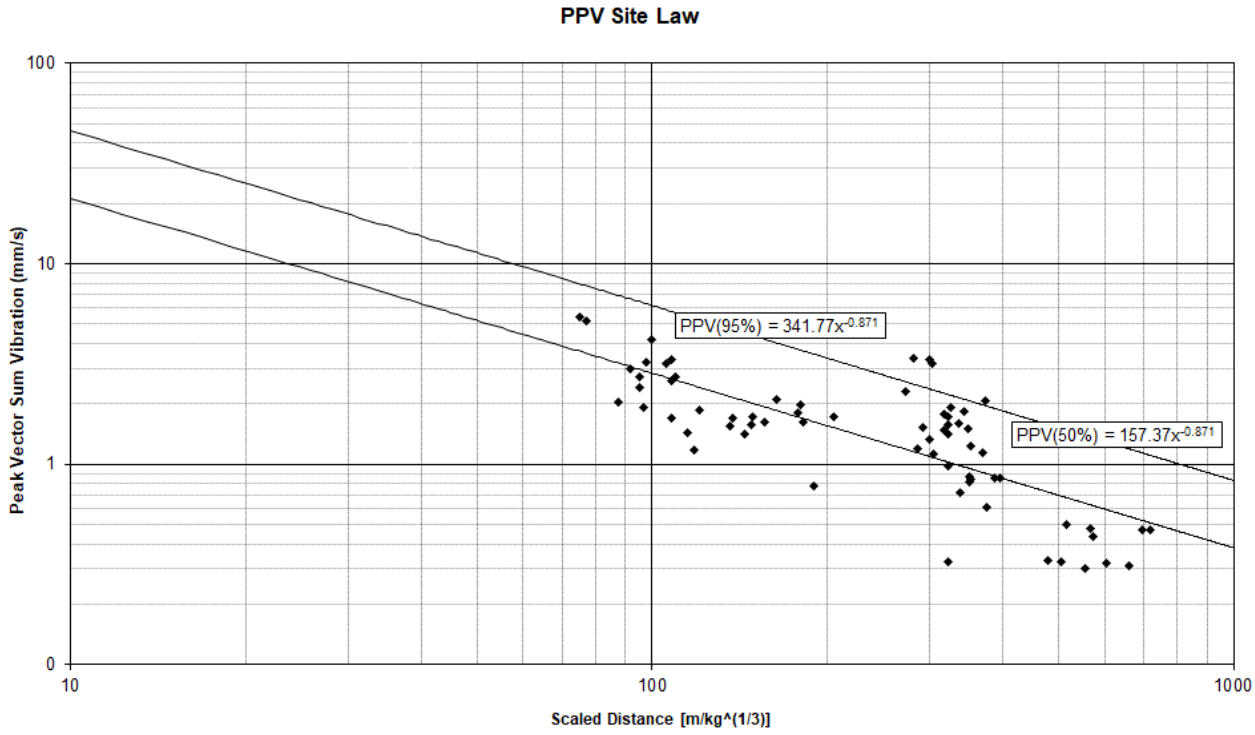

Figure 6.1 Ground vibration monitoring data and site law

The site laws for ground vibration emissions have been calculated to be:

$$PPV(95\%) = 341.77SD^{-0.871}$$

Where PPV (95%) is the level of ground vibration (peak particle velocity, mm/s) above which 5% of the total population of data points will lie, assuming that the population has the same statistical distribution as the underlying measured sample.

The purpose of this blasting assessment was to determine the limiting factors to the blast design for the Project with the aim of achieving the relevant criteria outlined in Section 4.4. Calculations were conducted using the respective blast emissions site law equations developed based on measured data, in order to determine the allowable MICs and the resulting potential impacts at surrounding sensitive receivers.

The results of the allowable MIC calculations based on the site laws developed for ground vibration predictions from blasting are provided in Table 6.7 for the nearest residences from the Great Cobar deposits and the Gladstone deposits.

Table 6.7 Blasting ground vibration results

Proposed deposit	Assessment location	Ground vibration criteria PPV (mm/s)	Approx. distance to potential blast[1]	Limiting MIC (kg) based on ground vibration predictions
Great Cobar	Nearest residence (R4)	≤5	470 m	50
Gladstone	Nearest residence (R31)	≤5	741 m	195

Notes: 1. Based on the approximate geographical distance and depth to the nearest proposed blast location.

The results demonstrate that strict control of MIC values is needed to achieve the 95% 5 mm/s PPV ground vibration criteria at the nearest residential receivers. The MIC values in Table 6.8 should be used as a guide for proposed blasts.

Table 6.8 Recommended blast MIC for the Project based on distance to receiver

Blast distance to receiver (m)	MIC_{8ms} to satisfy 95% PPV ground vibration criteria (kg)
470	50
500	60
550	80
600	104
650	132
700	164
750	202
800	245
900	349
1000	479

Blasting have the potential to impact on non-residential receivers (e.g. items of historic heritage significance) surrounding the proposed Great Cobar and the Gladstone underground mines. The blast ground vibration criterion used in this assessment for residential receivers (i.e. 5 mm/s PPV) is lower than the criterion for structural damage to buildings (refer to Section 3.3). Therefore, no impacts from blasting on non-residential receivers (i.e. structural damage to buildings) is anticipated from the Project if the limiting MICs provided for the nearest residential receivers are followed.

Potential impacts from blast ground vibration at non-Project area receivers is currently managed by PGM in accordance with the limits provided in the EPL (3596), including through blast monitoring. Further, PGM will continue to implement mitigation measures currently in place at the PGM (refer to Section 3.3) to reduce the potential impact of blast ground vibration at nearby receivers.

7 Conclusion

This NVIA has been prepared to support the SSD application for development consent for the proposed New Cobar Complex Project under section 4.12 of the EP&A Act. The assessment has considered the potential impacts from noise and blasting for the Project and has been prepared in accordance with the methodologies outlined in the NPfI, VLAMP, RNP, as well as other relevant guidelines and standards.

Noise trigger levels for the construction and operation of the Project have been established based on the results of ambient noise monitoring and methodology provided in the NPfI.

Construction and operational activities were modelled at all assessment locations for adverse noise-enhancing meteorological conditions. Modelled construction activities represent the construction of a power line. Modelled operational activities included approved existing operations and proposed future operational activities. Proposed future operations included the operation of a new ventilation fan and an increase in traffic movements (LV and HV) between the New Cobar Complex and the Peak Complex.

Findings of the assessment are summarised as follows:

- proposed future operational noise levels were assessed for the day, evening and night periods for noise-enhancing (ISO 9613) meteorological conditions. The assessment found that noise levels during operation are predicted to satisfy the relevant PNTLs at all assessment locations. Further, no material increase is predicted at all assessment locations when comparing modelled existing and predicted future Project area noise levels. Therefore, no noise impact is anticipated from the Project.

- the sleep disturbance assessment demonstrated that night-time maximum noise levels are predicted to satisfy the relevant screening criteria at all residential assessment locations and hence sleep disturbance impacts from the Project are unlikely.

- noise levels during the construction of the power line were assessed against the operational PNTLs for the day and night periods. Predictions satisfied the relevant PNTLs at all assessment locations and hence proposed construction activities are unlikely to cause noise impacts at any sensitive receivers.

- a VLAMP assessment has been completed for the Project. Night $L_{Aeq,15min}$ noise contours for proposed future operations were produced and reviewed in the context of land ownership for properties surrounding the New Cobar Complex. The VLAMP assessment showed that the noise levels from proposed future operations are predicted to satisfy the VLAMP 25% privately-owned land assessment.

- the Project will result in additional road traffic movements during proposed future operations, however, the overall increase in average road traffic noise at nearest residential facades is predicted to satisfy relevant RNP criteria during both the day and night periods. Therefore, noise impacts from road traffic noise associated with the Project is shown to be unlikely.

- a blasting assessment was completed for the Project. Project area specific relationships between the level of blast emissions and scaled distances have been developed based on Project area related monitoring data. The results demonstrate that control of MIC values is needed to achieve the 95% 5 mm/s PPV ground vibration criteria at the nearest residential receivers. Recommendations in relation to the MIC values for the Project based on distance to receiver are provided herein.

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Appendix A

Glossary of acoustics terms

A.1 Glossary of acoustics terms

Several technical terms are required for the discussion of acoustics. Acoustic terms and abbreviations used in this report are explained in Table A.1.

Table A.1 Glossary of acoustic terms and acronyms/abbreviations

Term	Description
ABL	The assessment background level (ABL) is defined in the NPfI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L_{A90} statistical noise levels or the measured L_{A90} statistical noise level for each entire monitoring period.
Amenity noise level	The amenity noise levels relate to the overall level of industrial noise subject to land zoning or use.
ANZECC	Australia and New Zealand Environment and Conservation Council
ANZECC Guidelines	*Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (1990)*
Aurelia	Aurelia Metals Limited
A-weighting	There are several different weightings utilised for describing noise, the most common being the 'A-weighting'. This attempt to closely approximate the frequency response of the human ear.
AWS	Automatic weather station
BoM	Bureau of Meteorology
CML	Consolidated mining lease
CSC	Cobar Shire Council
Day period	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
dB	Noise is measured in the unit called the decibel (dB).
DECC	Department of Environment and Climate Change (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW)
DPIE	NSW Department of Planning, Industry and Environment
DECCW	NSW Department of Environment, Climate Change and Water
EIS	Environmental impact statement
EMM	EMM Consulting Pty Limited
EPA	Environment Protection Authority (NSW)
EP&A Act	*Environmental and Planning Assessment Act 1979* (NSW)
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000* (NSW)
EPL	Environmental Protection Licence
ETL	Electricity transmission line
Evening period	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
FHWA	Federal Highway Traffic Noise Model
FTE	Full time equivalent
ICNG	*Interim Construction Noise Guideline* (DECC 2009) (NSW)
INP	*Industrial Noise Policy* (EPA 2000) (NSW) (superseded)

Table A.1 Glossary of acoustic terms and acronyms/abbreviations

Term	Description
Intrusiveness noise level	The intrusiveness noise level refers to noise that intrudes above the background level by more than 5 dB. The intrusiveness noise level is described in detail in this report.
ISO	International Organisation for Standardisation
ISO 9613-2:1996	Standard that describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level under meteorological conditions.
km	Kilometres
kV	Kilovolt
$L_{A1,1min}$	The 'A-weighted' noise level exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The 'A-weighted' noise level exceeded for 10% of the time. It is approximately equivalent to the average of maximum noise levels.
L_{A90}	Commonly referred to as the background noise level. The 'A-weighted' noise level exceeded 90% of the time.
L_{Aeq}	The energy average noise from a source. This is the equivalent continuous 'A-weighted' sound pressure level over a given period. The $L_{Aeq,15min}$ descriptor refers to an L_{Aeq} noise level measured over a 15-minute period.
L_{Amin}	The minimum 'A-weighted' noise level received during a measuring interval.
L_{Amax}	The maximum root mean squared 'A-weighted' sound pressure level (or maximum noise level) received during a measuring interval.
m	Metres
m agl	Metres above ground level
m bgl	Metres below ground level
MIC	Maximum instantaneous charge
ML	Mining lease
MOP	Mining Operations Plan 2019 – 2022 (PGM 2019)
MPL	Mining purposes lease
NIA	Noise impact assessment
Night period	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
NPfI	*Noise Policy for Industry* (EPA 2017) (NSW)
NSW	New South Wales
NVIA	Noise and vibration impact assessment
PGM	Peak Gold Mines Pty Ltd
PNTL	Project noise trigger levels – targets for a particular industrial noise source or industry. The PNTLs are the lower of either the Project intrusive noise level or Project amenity noise level.
PPV	Peak particle velocity
RBL	The Rating Background Level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period.
RING	*Rail Infrastructure Noise Guideline*

Table A.1 Glossary of acoustic terms and acronyms/abbreviations

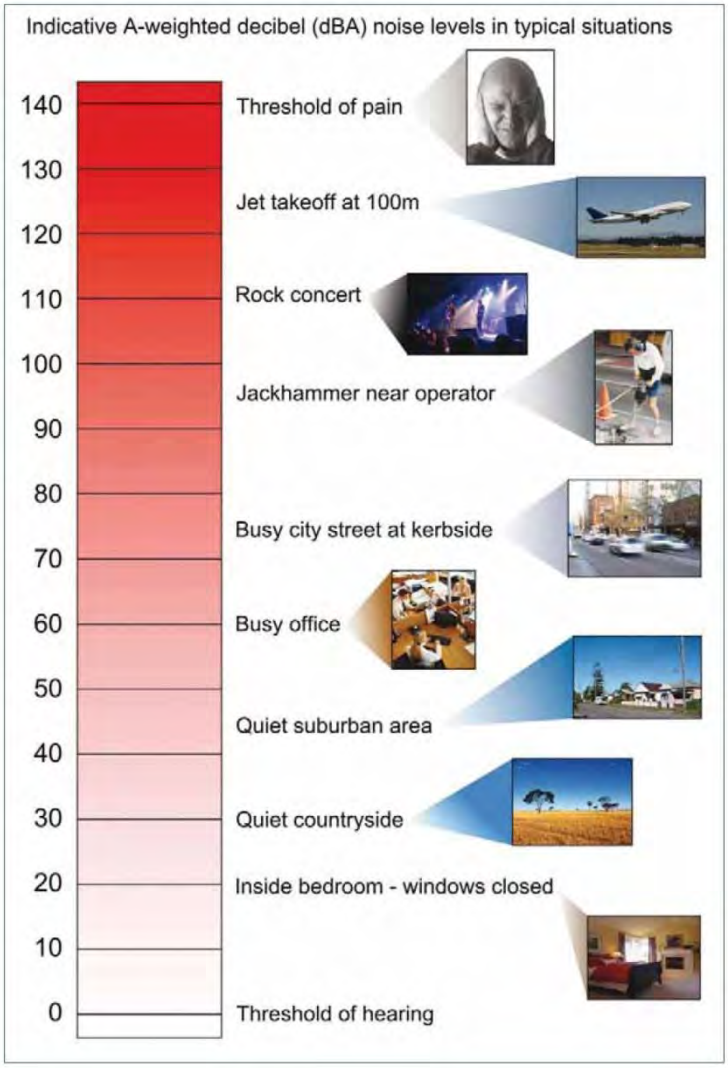
Term	Description
RoM	Run-of-Mine
RNP	Road Noise Policy (DECCW 2011) (NSW)
SEARs	Secretary Environmental Assessment Requirements
Sound power level	This is a measure of the total power radiated by a source. The sound power level of a source is a fundamental property of the source and is independent of the surrounding environment.
SRD SEPP	*State Environmental Planning Policy (State and Regional Development) 2011* (NSW)
SSD	State significant development
Temperature inversion	A positive atmospheric temperature gradient where atmospheric temperature increases with altitude.
The Project	New Cobar Complex Project
TSF	Tailings storage facility
VLAMP	Voluntary Land Acquisition and Mitigation Policy
WMP	Water management plan
WRE	Waste rock emplacement

It is useful to have an appreciation of the dB, the unit of noise measurement. Table A.2 gives an indication as to what an average person perceives about changes in noise levels.

Table A.2 Perceived change in noise in the environment

Change in sound pressure level (dB)	Perceived change in noise
1-2	typically indiscernible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times (or quarter) as loud

Examples of common noise levels are provided in Figure A.1.



Source: RNP (DECCW 2011).

Figure A.1 Common noise levels

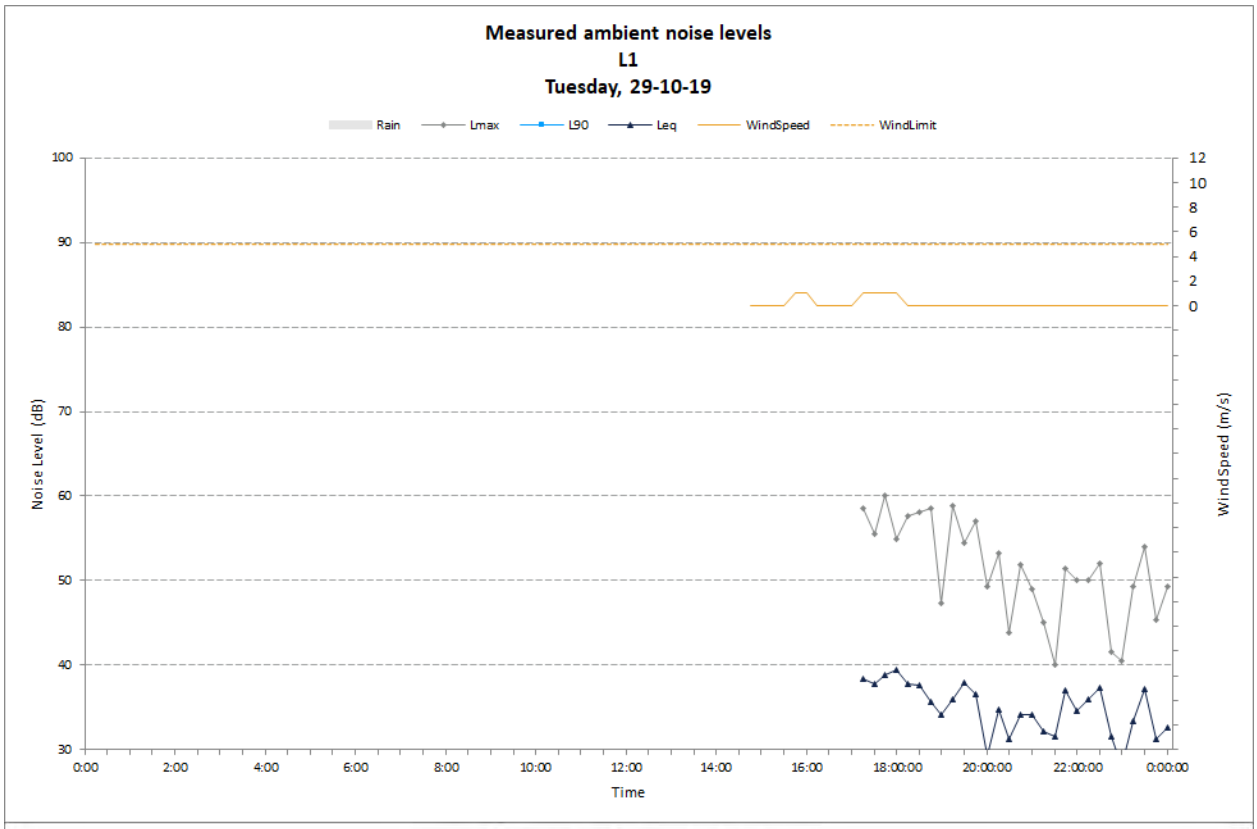
Appendix B

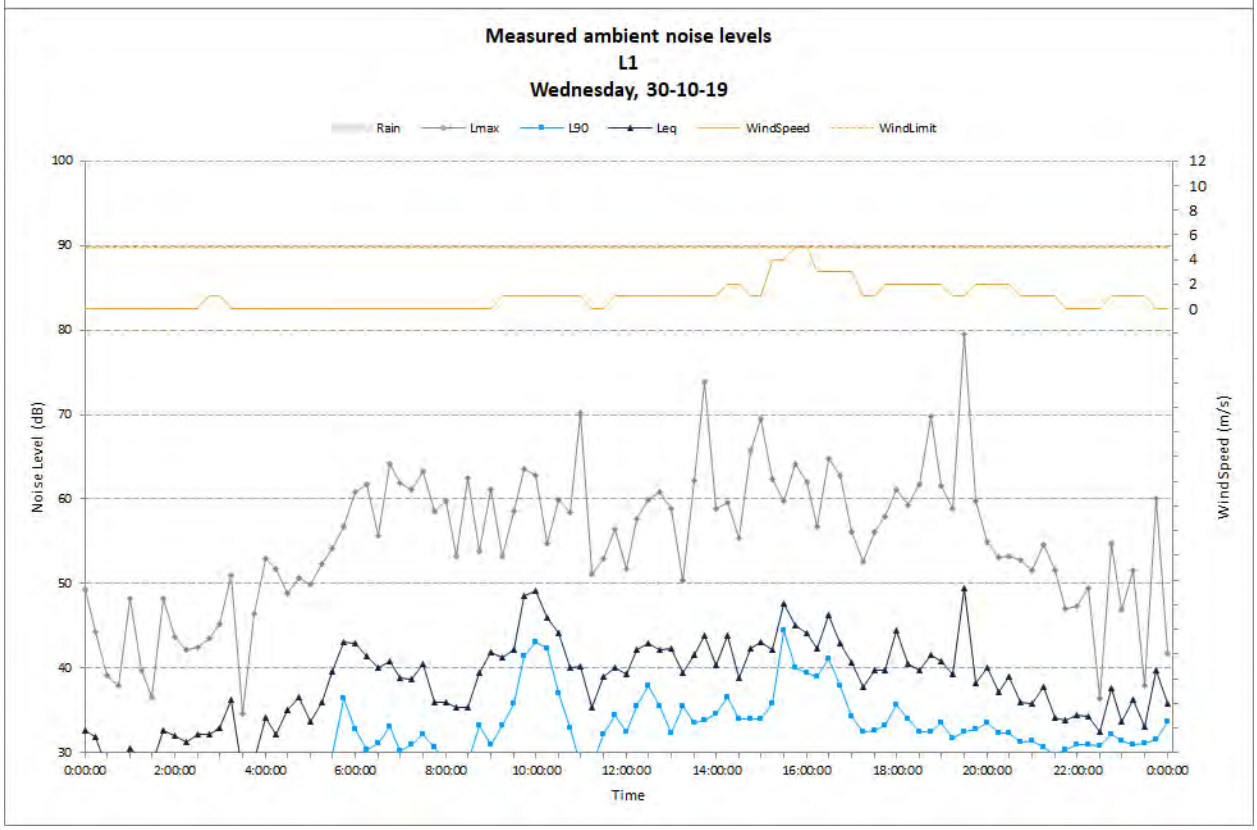
Background and ambient noise levels

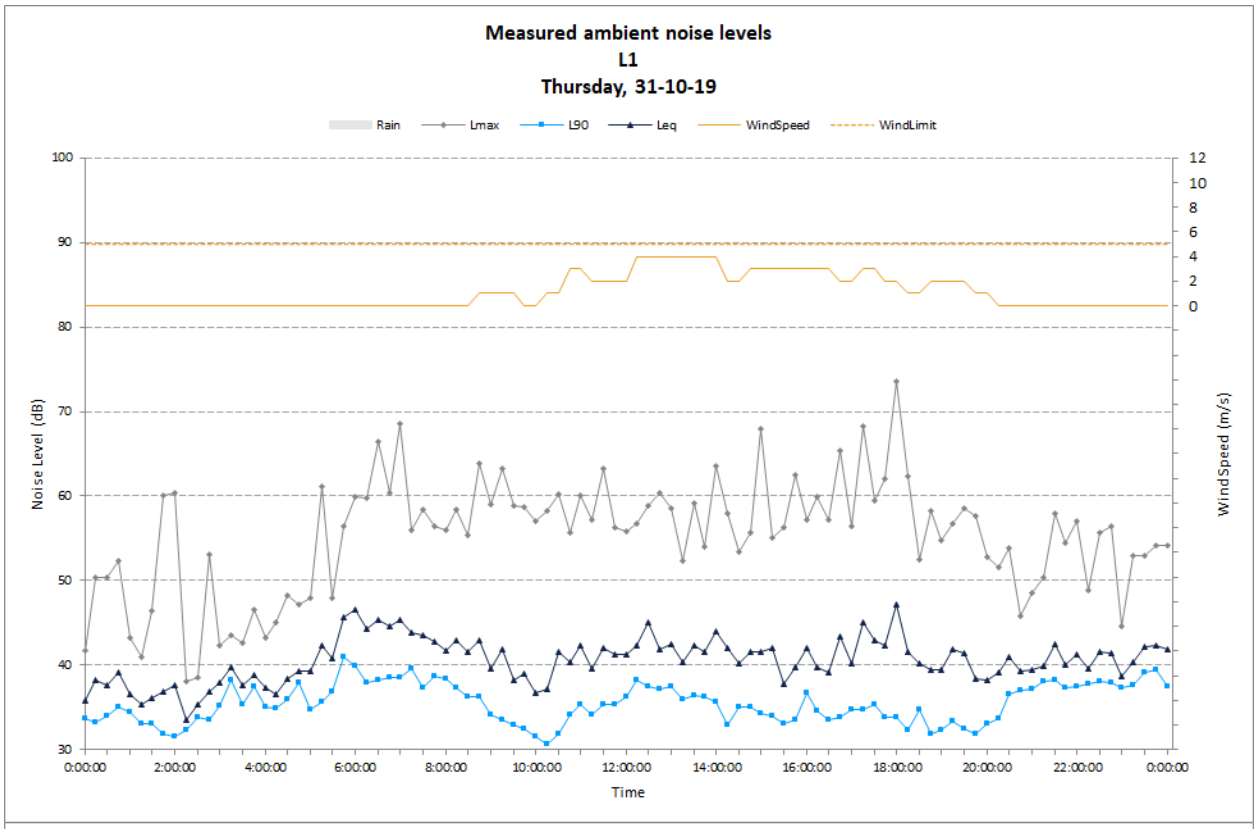
Table B.1 Unattended noise monitoring results – L1

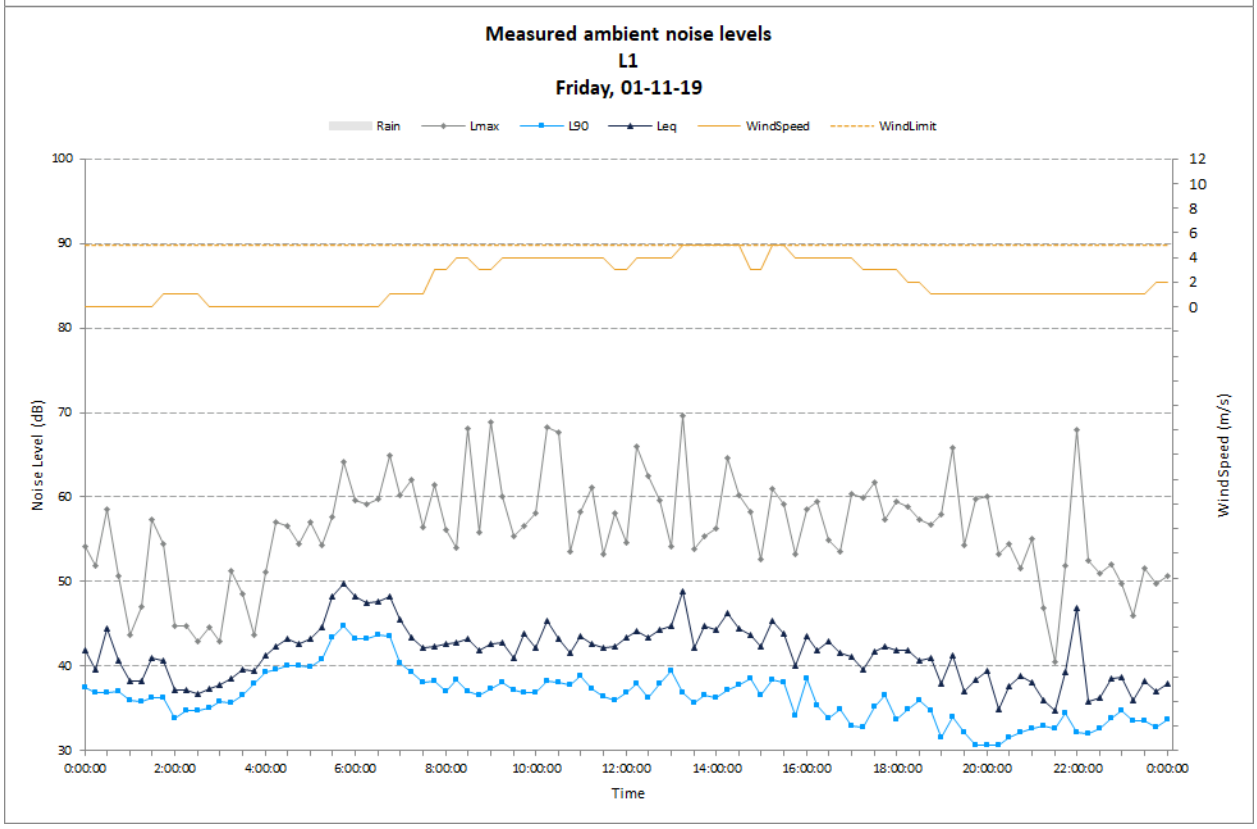
Date	ABL Day	ABL Evening	ABL Night	$L_{Aeq,11hour}$ Day	$L_{Aeq,4hour}$ Evening	$L_{Aeq,9hour}$ Night
Tuesday, 29-10-19	0	25	25	0	35	36
Wednesday, 30-10-19	29	30	31	43	41	40
Thursday, 31-10-19	33	32	35	42	40	44
Friday, 01-11-19	34	31	32	43	40	40
Saturday, 02-11-19	0	0	0	0	0	0
Sunday, 03-11-19	0	30	28	0	42	39
Monday, 04-11-19	25	26	25	40	41	45
Tuesday, 05-11-19	27	24	29	41	35	43
Wednesday, 06-11-19	29	29	24	41	40	38
Thursday, 07-11-19	27	24	24	41	38	36
Friday, 08-11-19	28	33	26	47	46	39
Saturday, 09-11-19	28	21	21	41	36	34
Sunday, 10-11-19	26	23	31	39	36	42
Summary Values	**28**	**28**	**27**	**43**	**40**	**41**

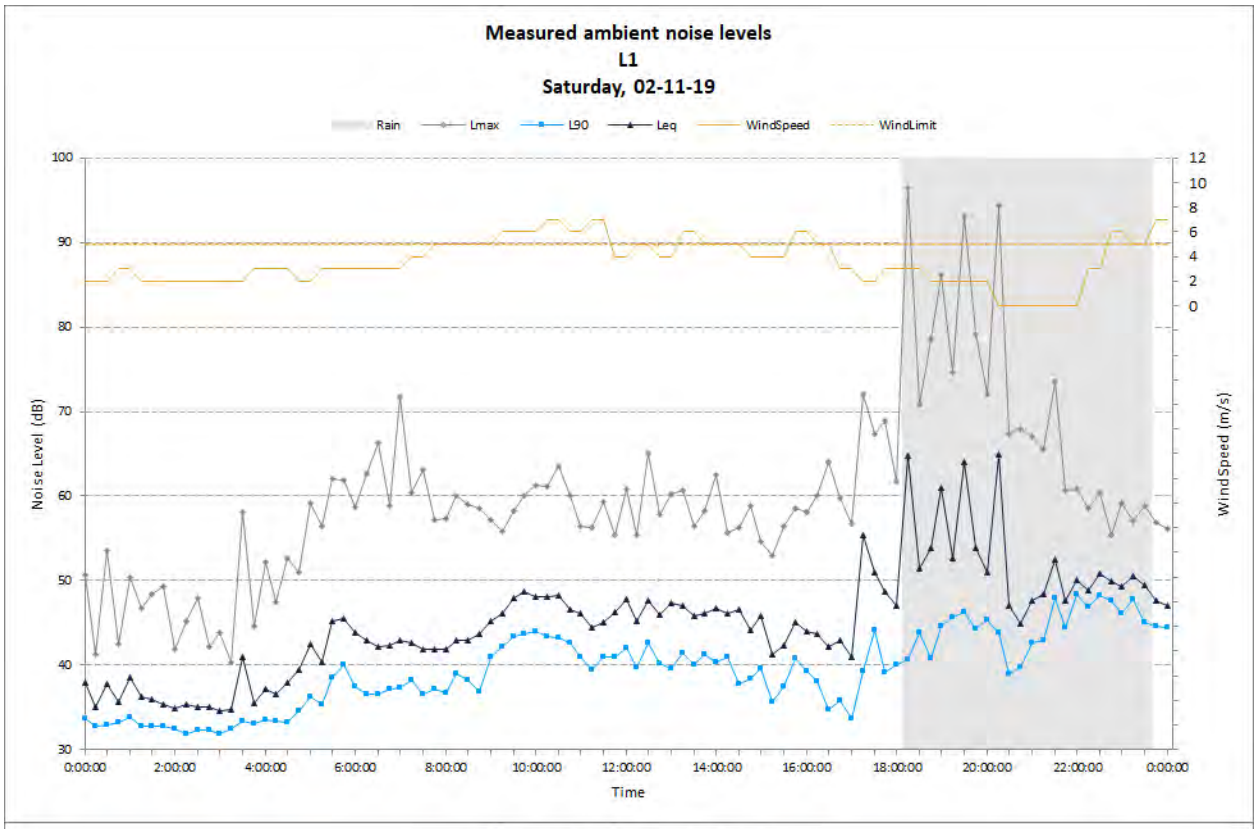
Notes: 1. “0” indicates periods with too few valid samples due to weather or logger operation.

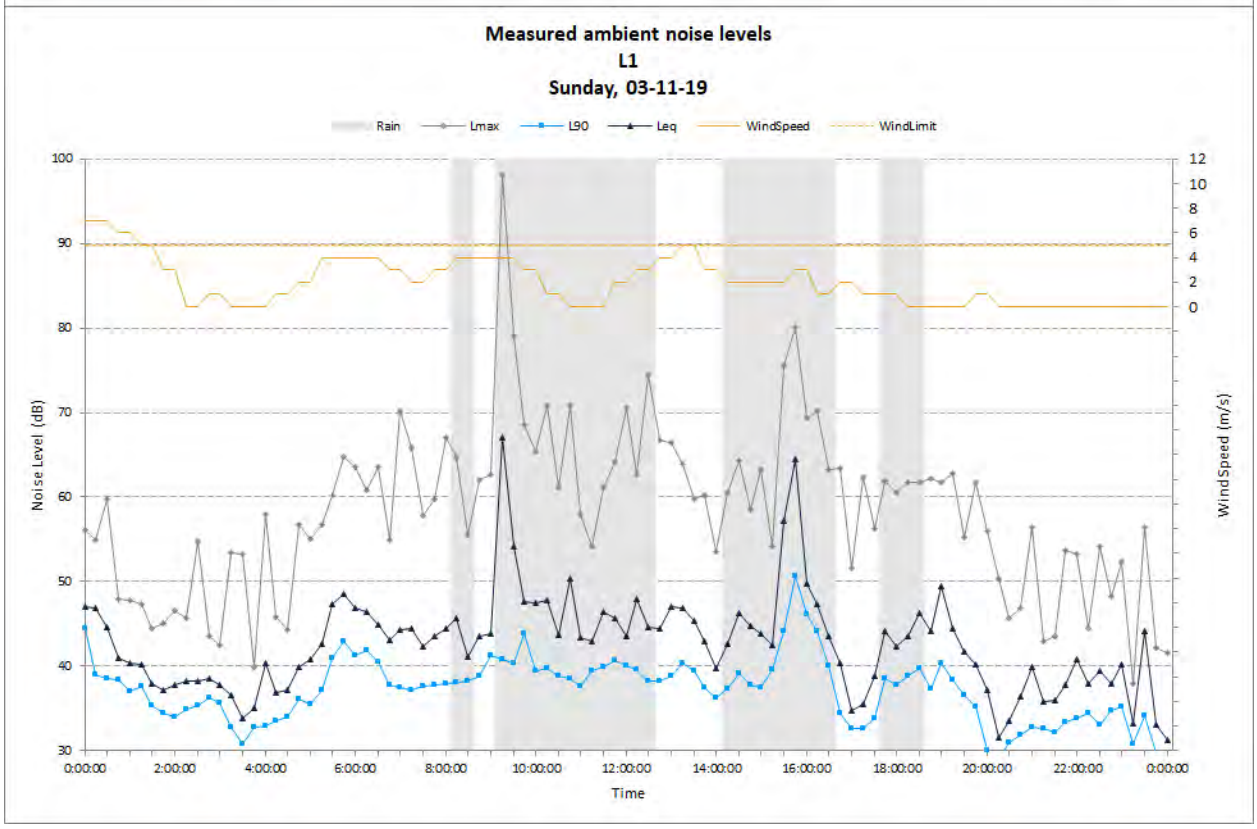

Measured ambient noise levels
L1
Tuesday, 29-10-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00:00
20:00:00
22:00:00
0:00:00

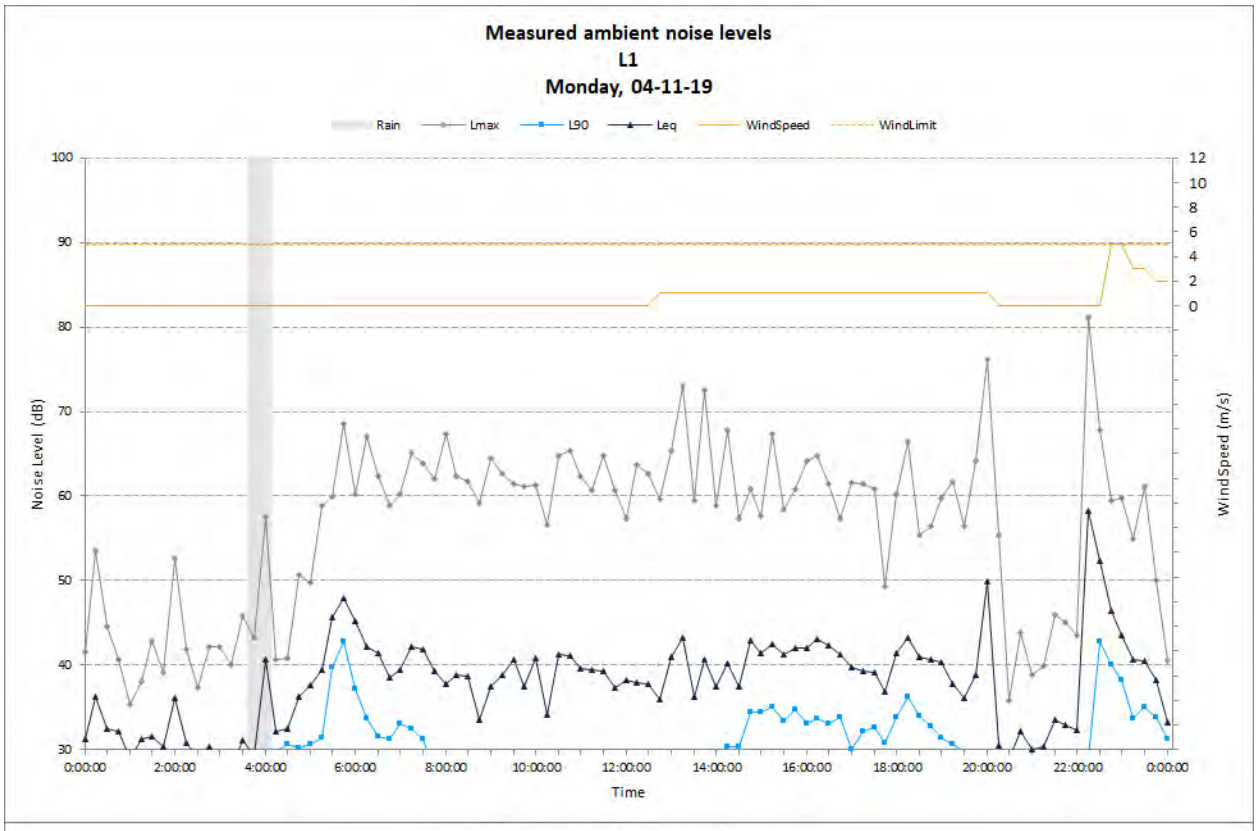

Measured ambient noise levels
L1
Wednesday, 30-10-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00

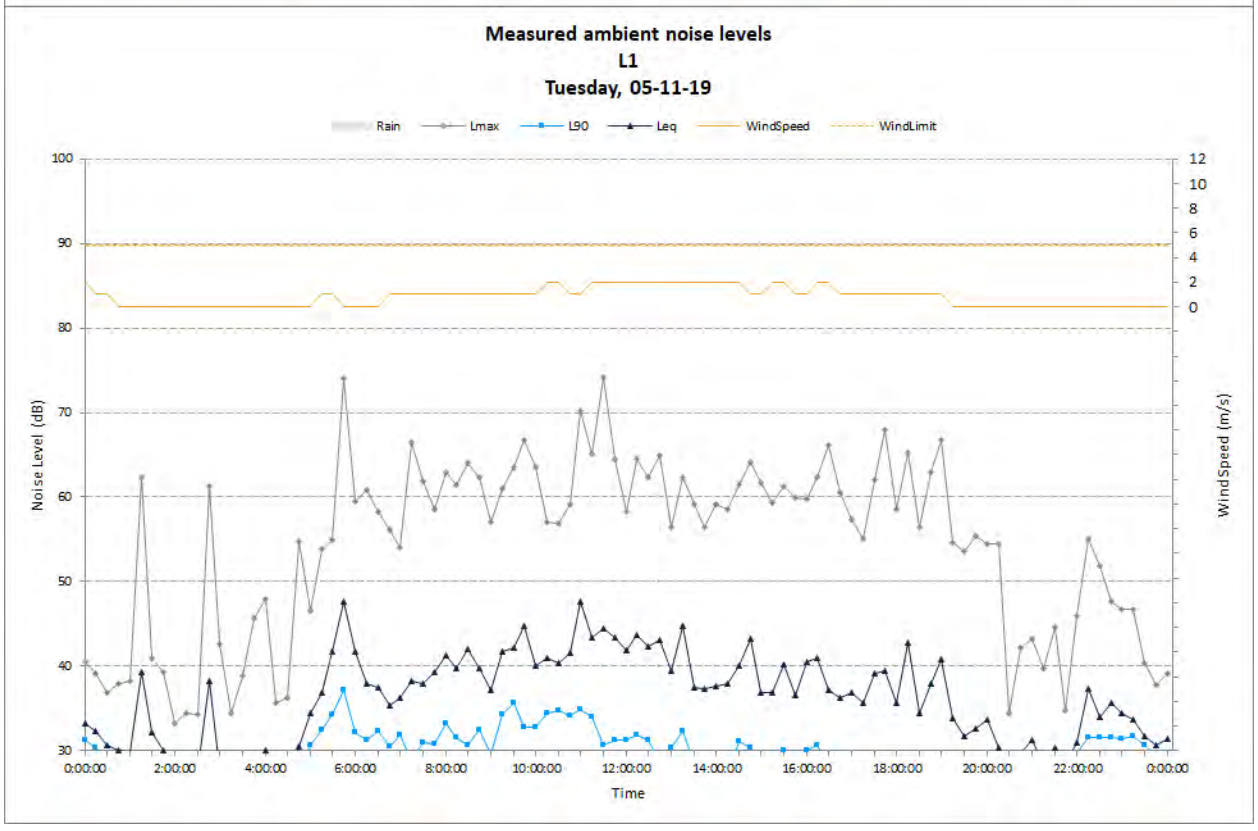

Measured ambient noise levels
L1
Thursday, 31-10-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

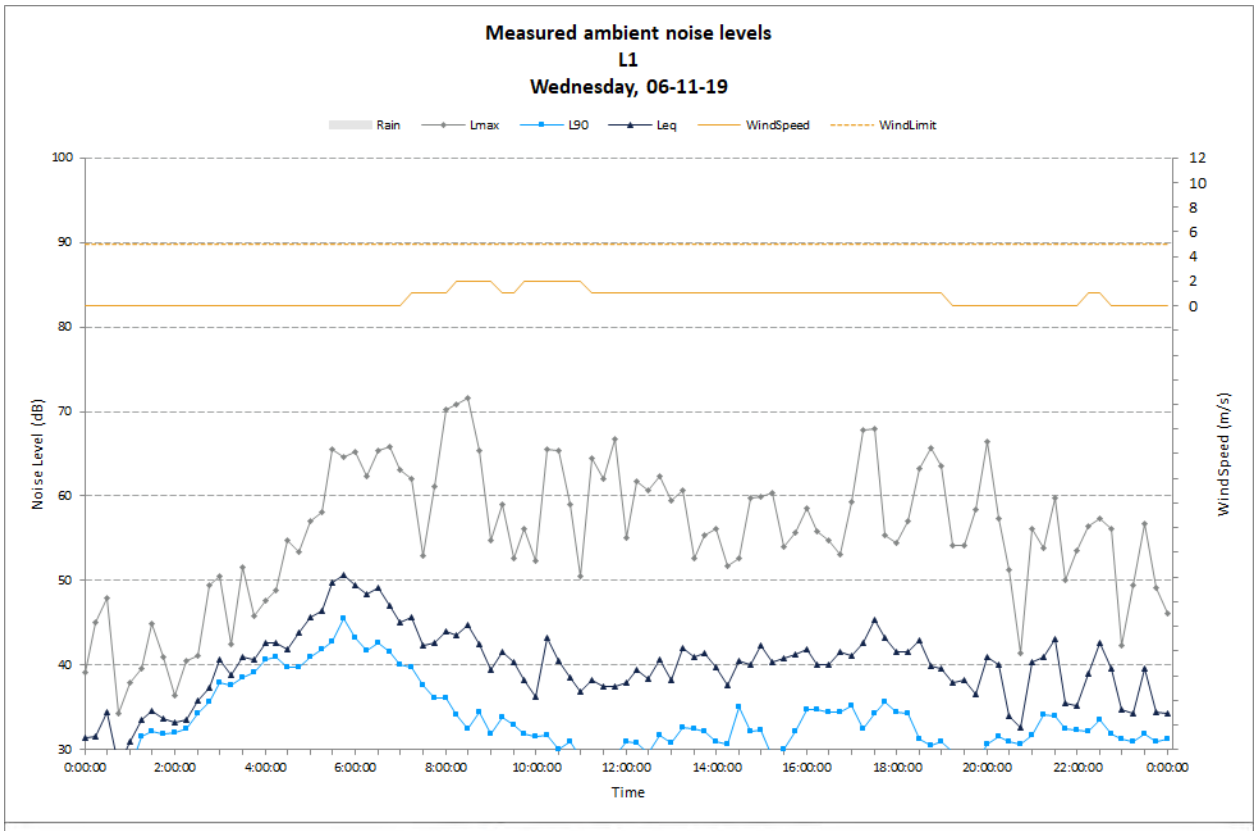

Measured ambient noise levels
L1
Friday, 01-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

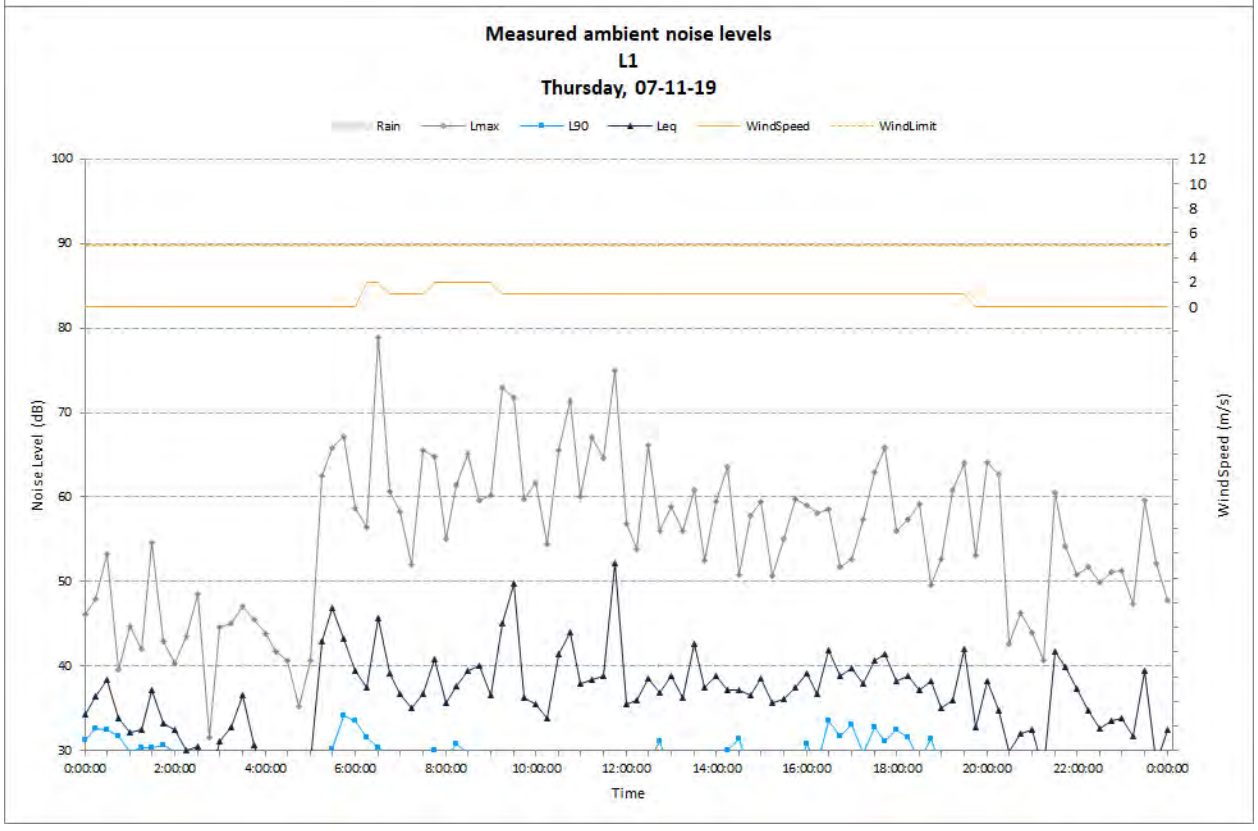

Measured ambient noise levels
L1
Saturday, 02-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

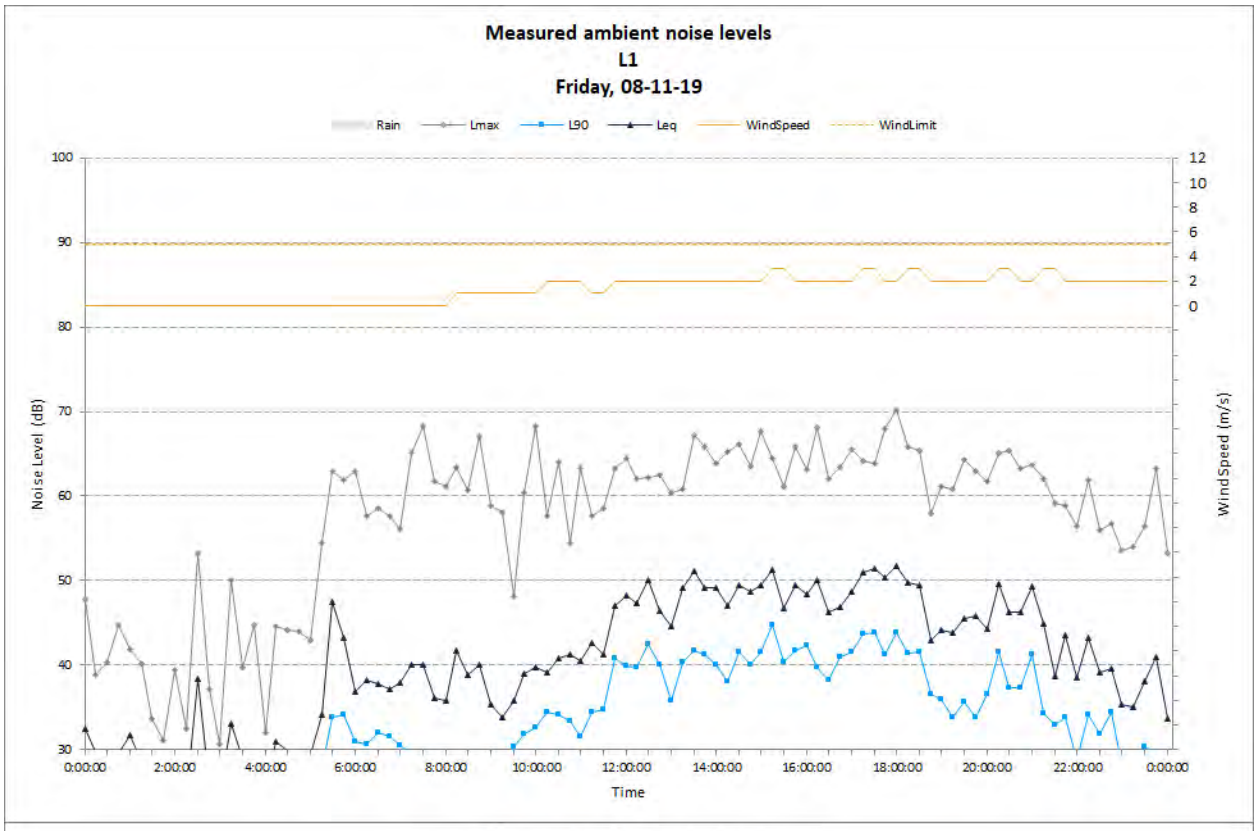

Measured ambient noise levels
L1
Sunday, 03-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

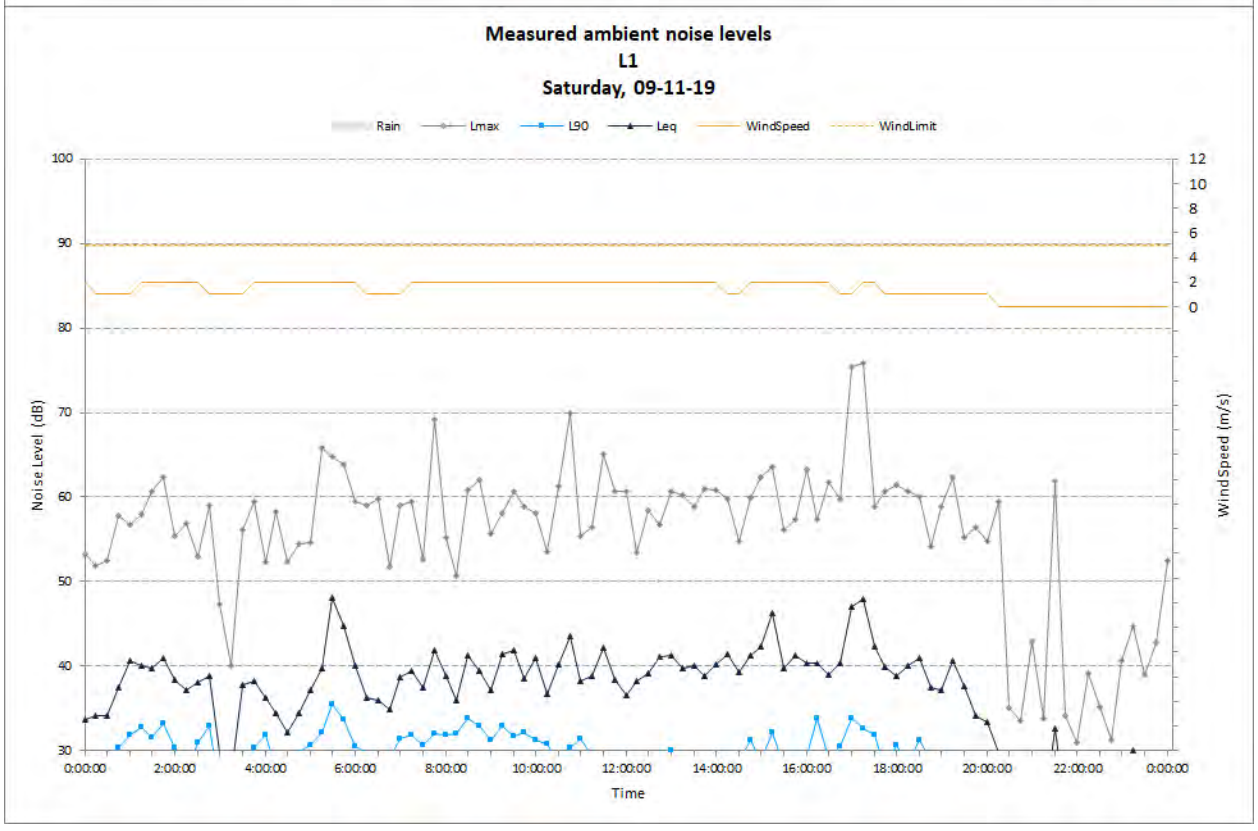

Measured ambient noise levels
L1
Monday, 04-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L1
Tuesday, 05-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L1
Wednesday, 06-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00


Measured ambient noise levels
L1
Thursday, 07-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00


Measured ambient noise levels
L1
Friday, 08-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00


Measured ambient noise levels
L1
Saturday, 09-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00

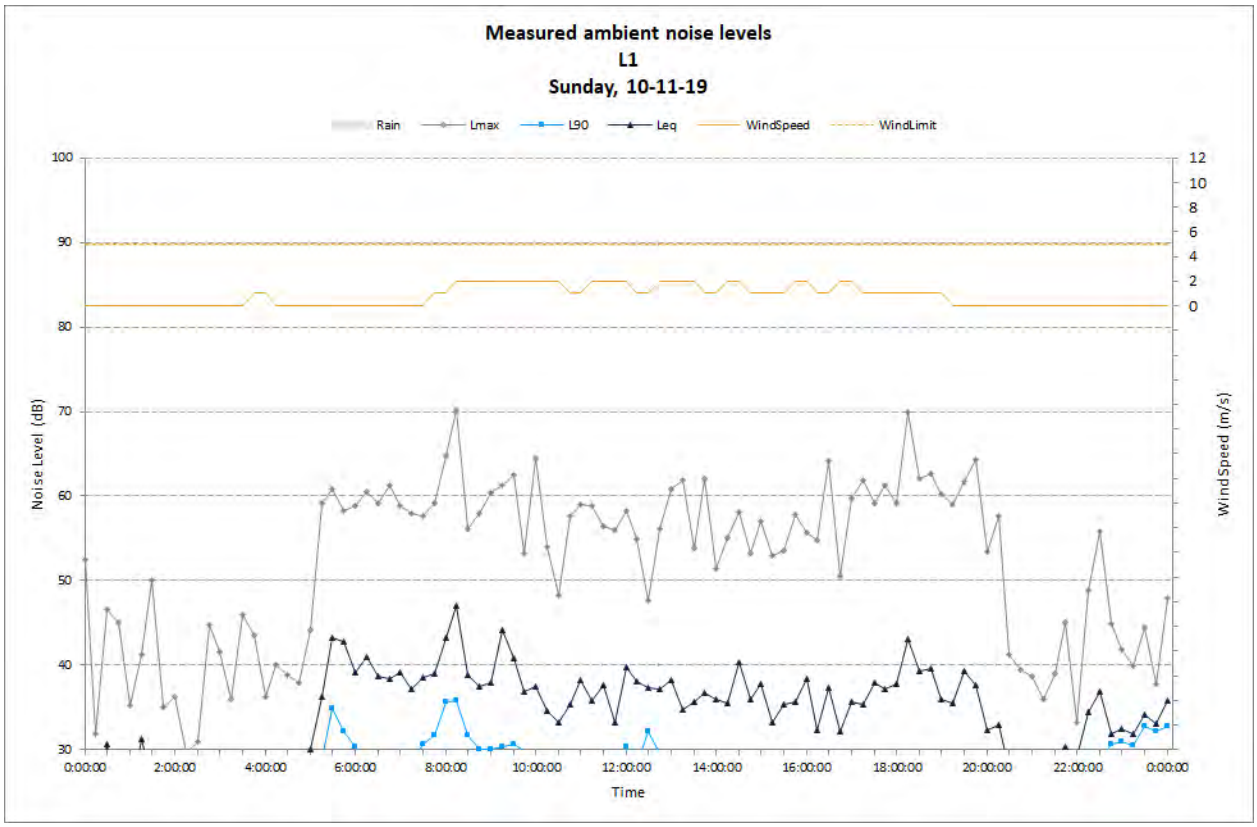
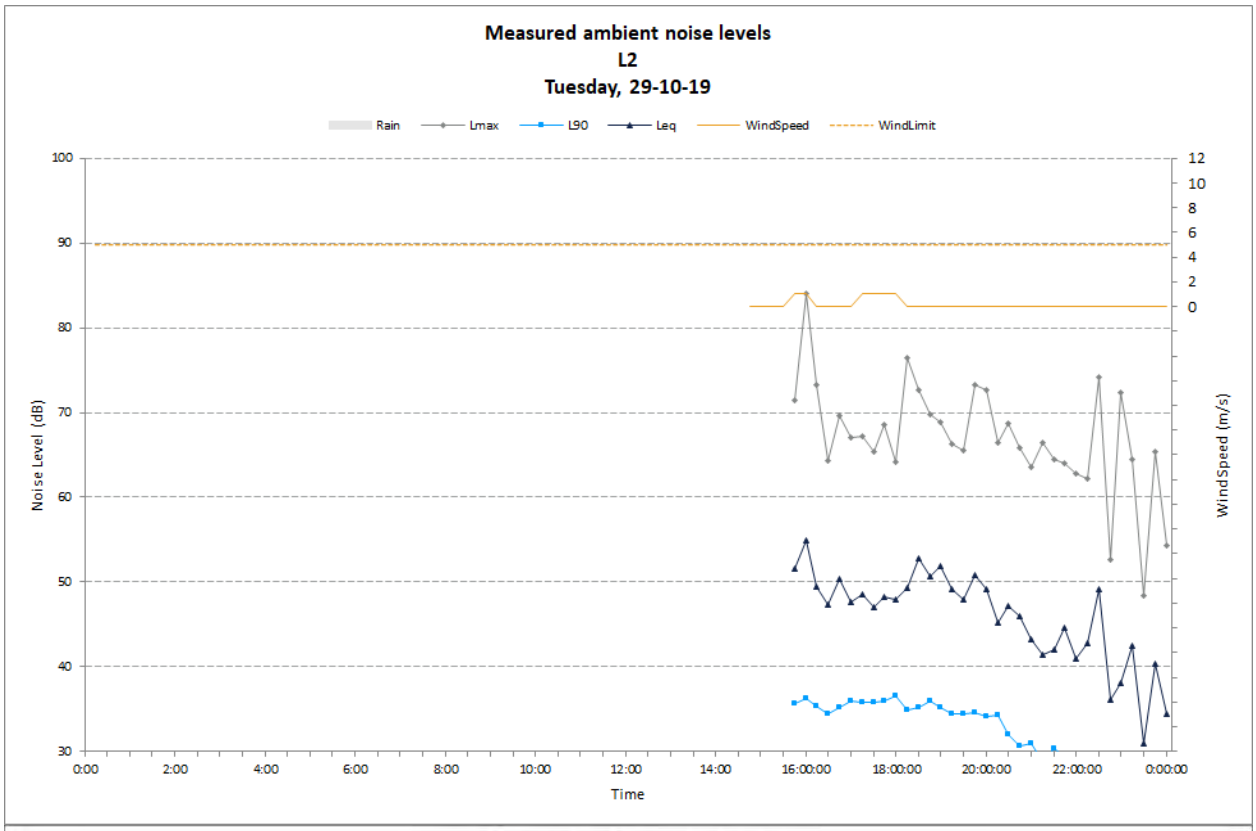
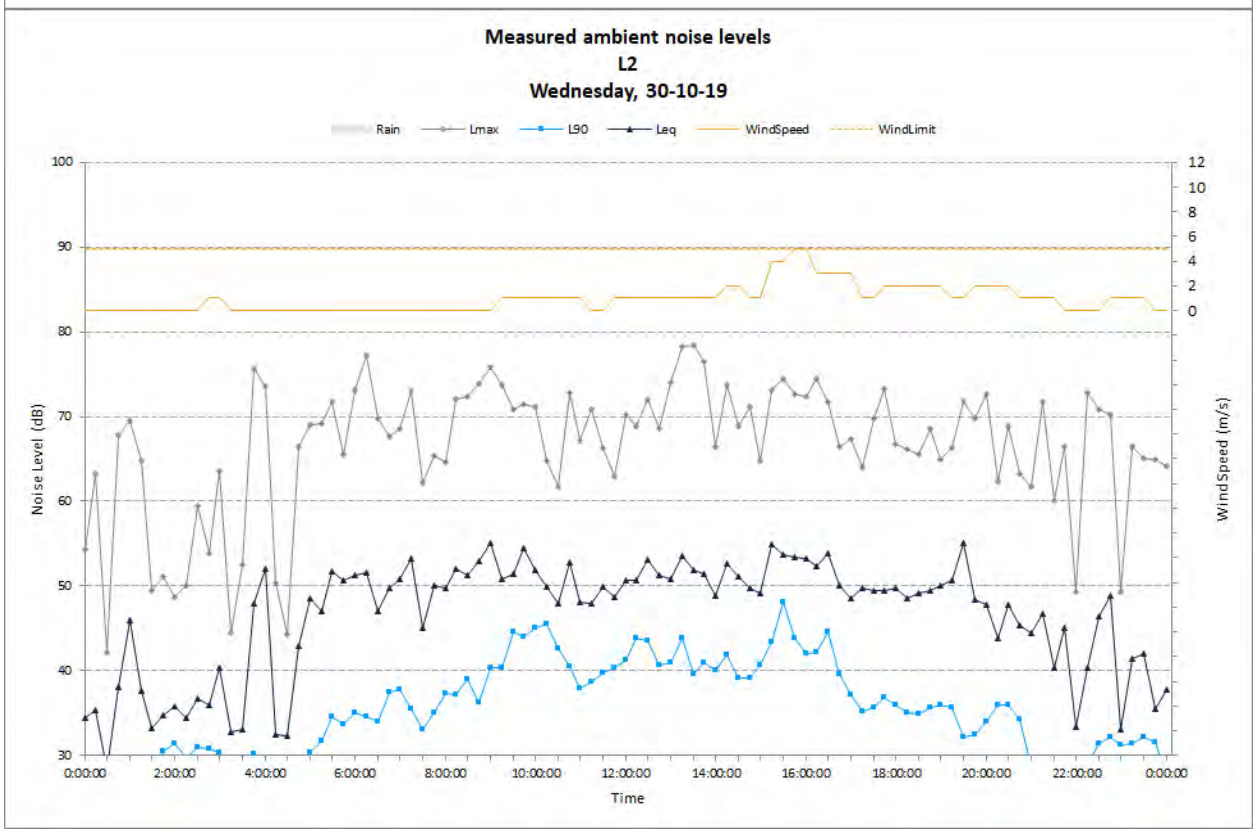

Measured ambient noise levels
L1
Sunday, 10-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
100
90
80
70
60
50
40
30
12
10
8
6
4
2
0
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00

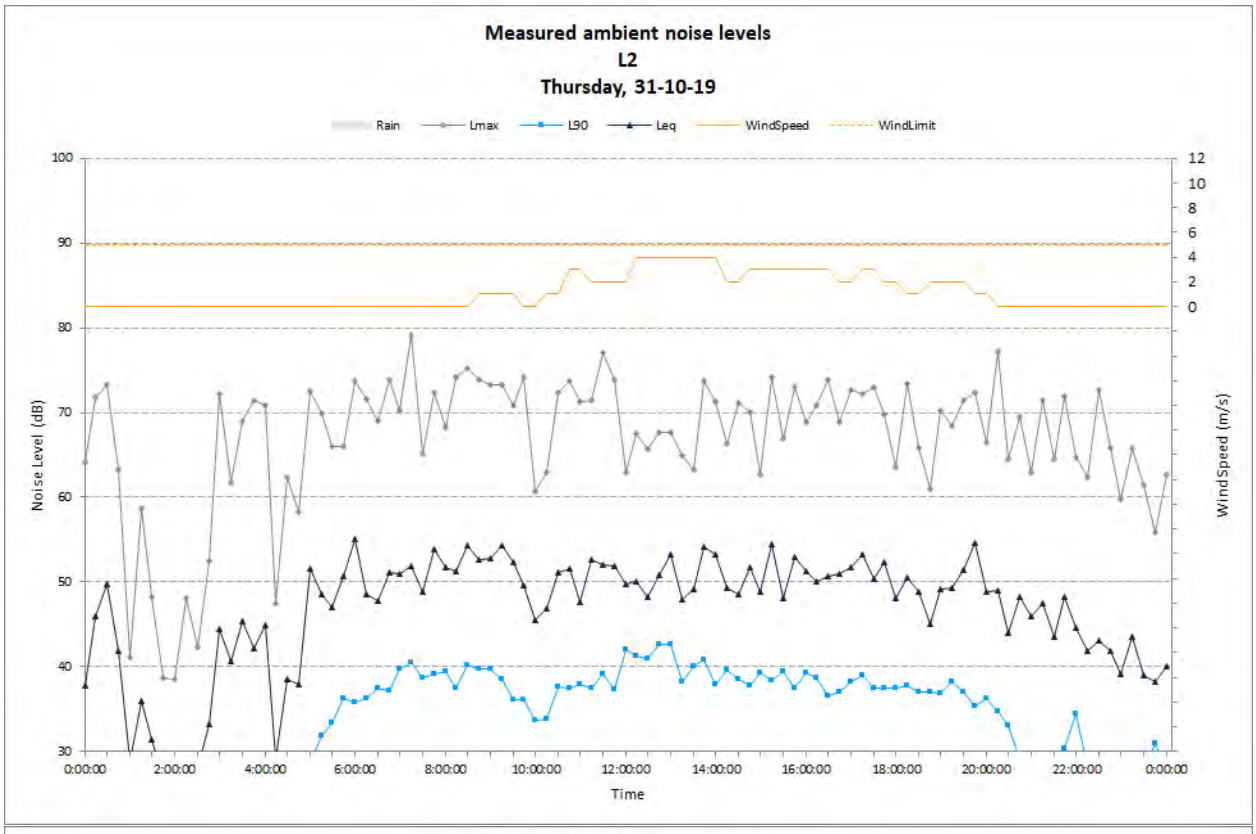
Table B.2 Unattended noise monitoring results – L2

Date	ABL Day	ABL Evening	ABL Night	$L_{Aeq,11hour}$ Day	$L_{Aeq,4hour}$ Evening	$L_{Aeq,9hour}$ Night
Tuesday, 29-10-19	0	30	26	0	48	46
Wednesday, 30-10-19	36	27	26	52	49	46
Thursday, 31-10-19	37	29	25	52	49	47
Friday, 01-11-19	39	30	30	52	47	46
Saturday, 02-11-19	0	0	0	0	0	0
Sunday, 03-11-19	0	28	24	0	48	46
Monday, 04-11-19	34	28	29	53	49	49
Tuesday, 05-11-19	35	27	26	51	47	47
Wednesday, 06-11-19	36	31	28	51	48	44
Thursday, 07-11-19	34	30	26	52	48	45
Friday, 08-11-19	36	36	31	52	52	45
Saturday, 09-11-19	34	27	25	49	47	44
Sunday, 10-11-19	32	26	25	65	46	47
Summary Values	**35**	**29**	**26**	**57**	**48**	**46**

Notes: 1. “0” indicates periods with too few valid samples due to weather or logger operation.


Measured ambient noise levels
L2
Tuesday, 29-10-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00


Measured ambient noise levels
L2
Wednesday, 30-10-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00


Measured ambient noise levels
L2
Thursday, 31-10-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
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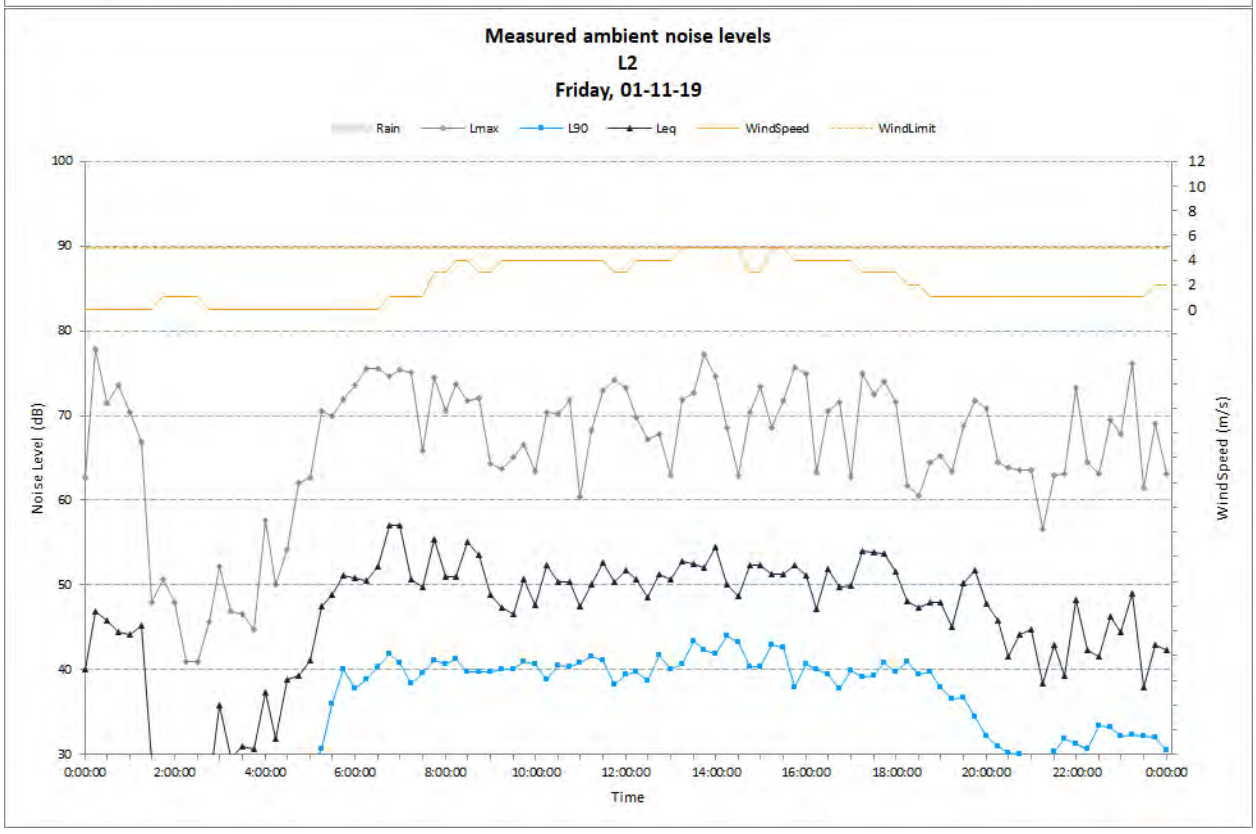
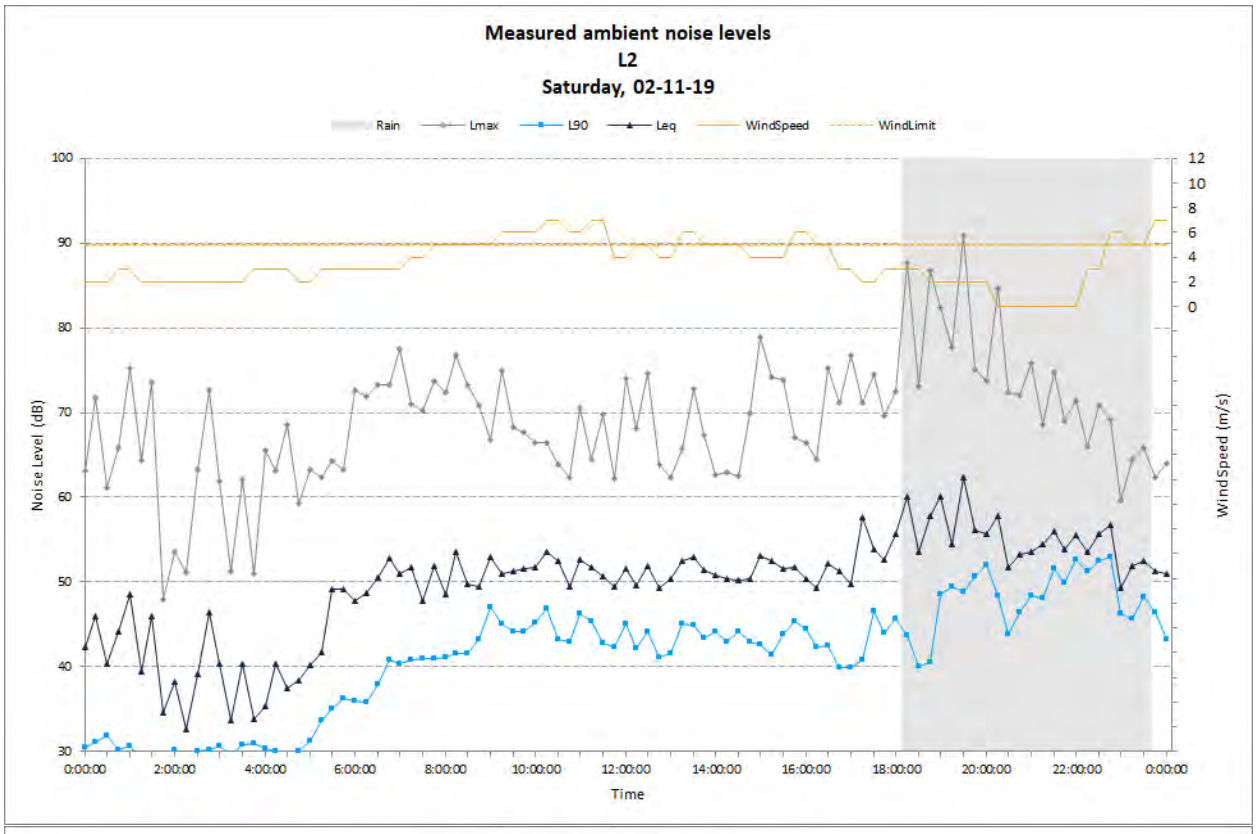
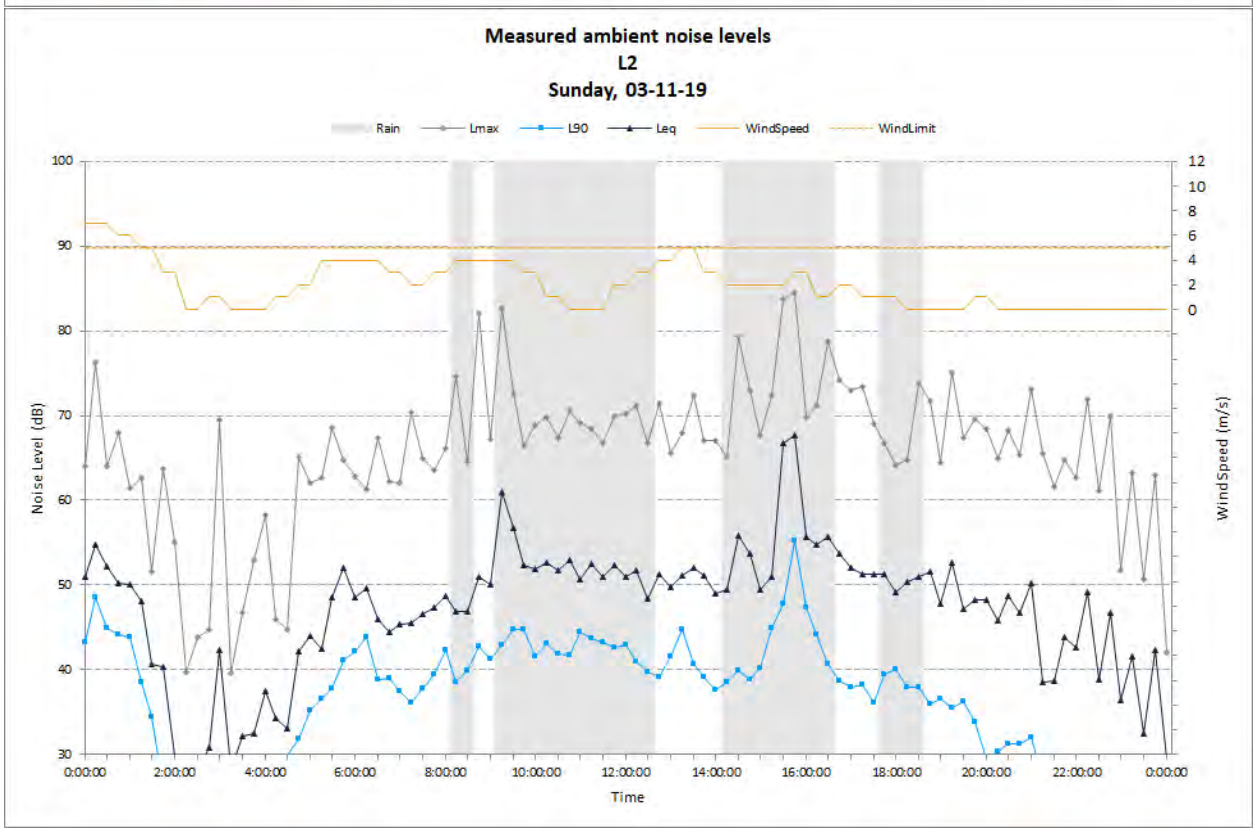
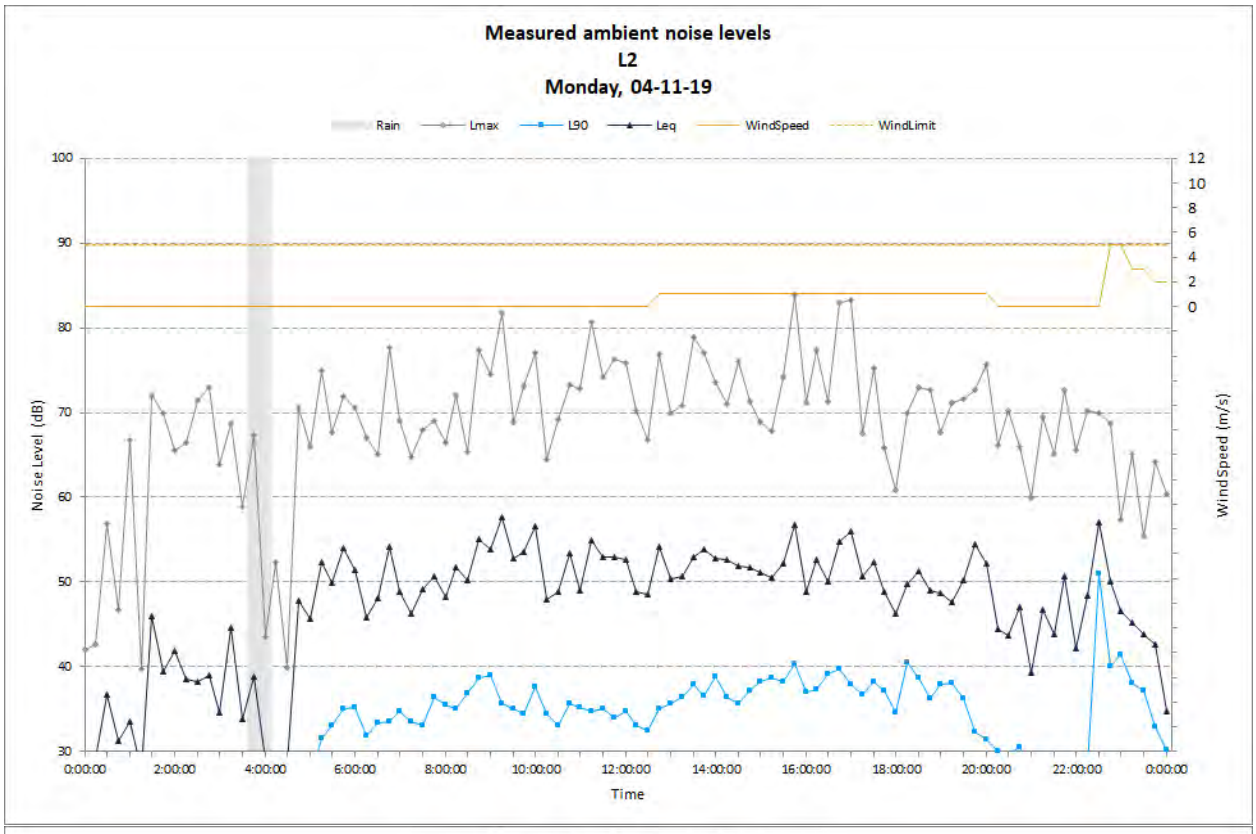
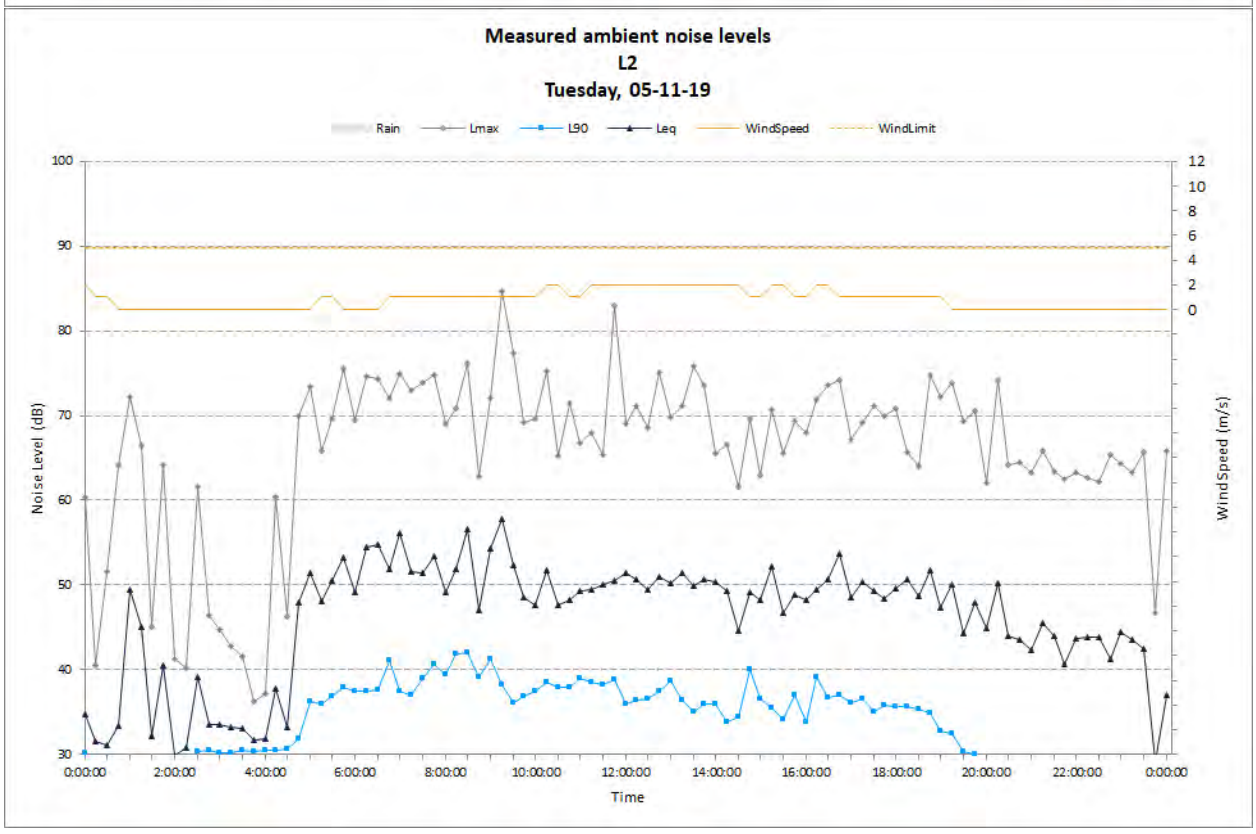
18:00:00
20:00:00
22:00:00
0:00:00

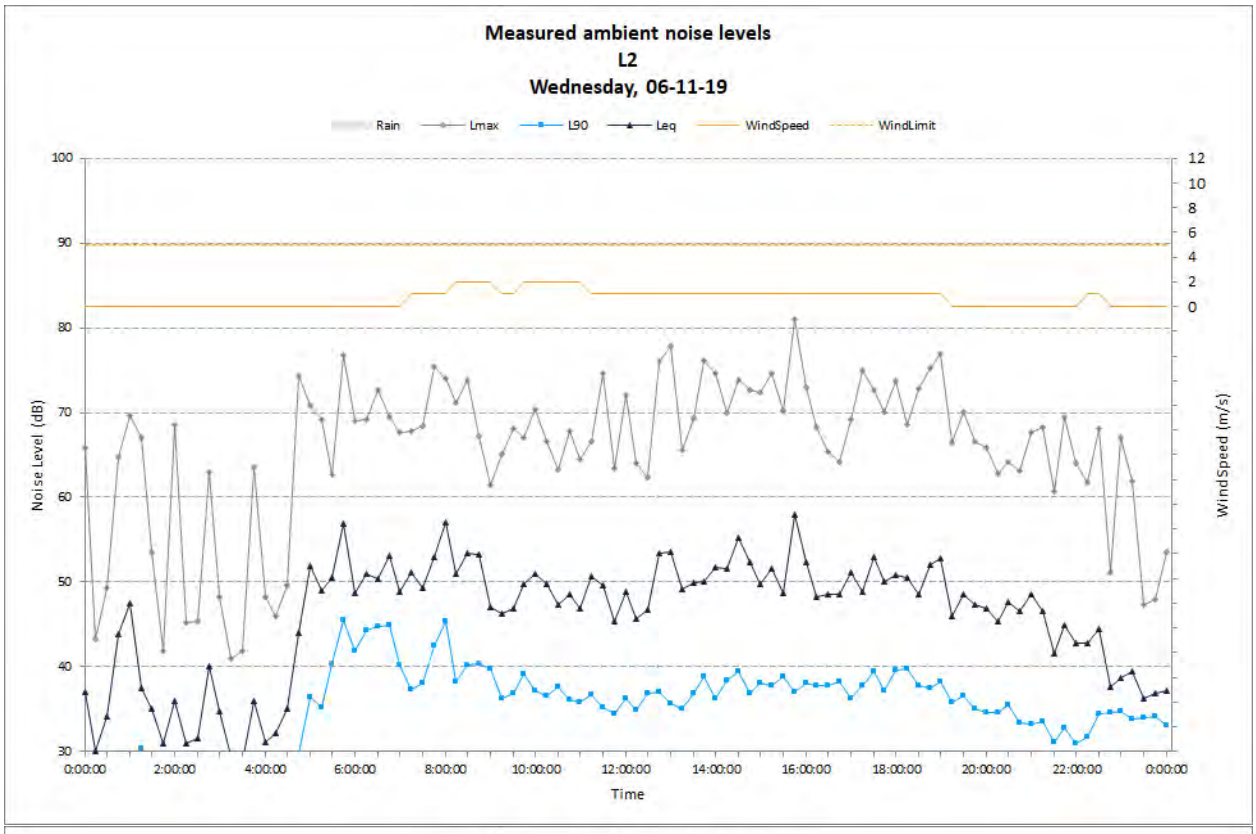

Measured ambient noise levels
L2
Friday, 01-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00

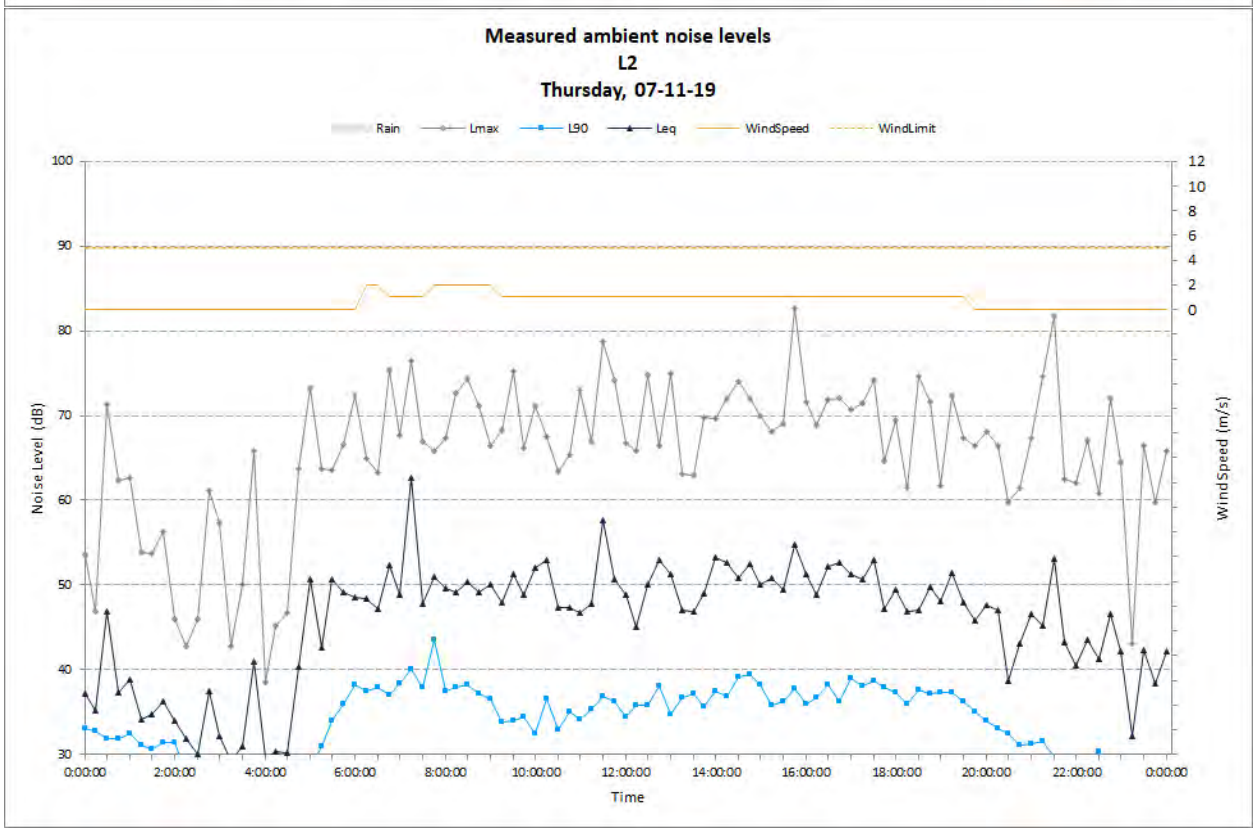

Measured ambient noise levels
L2
Saturday, 02-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

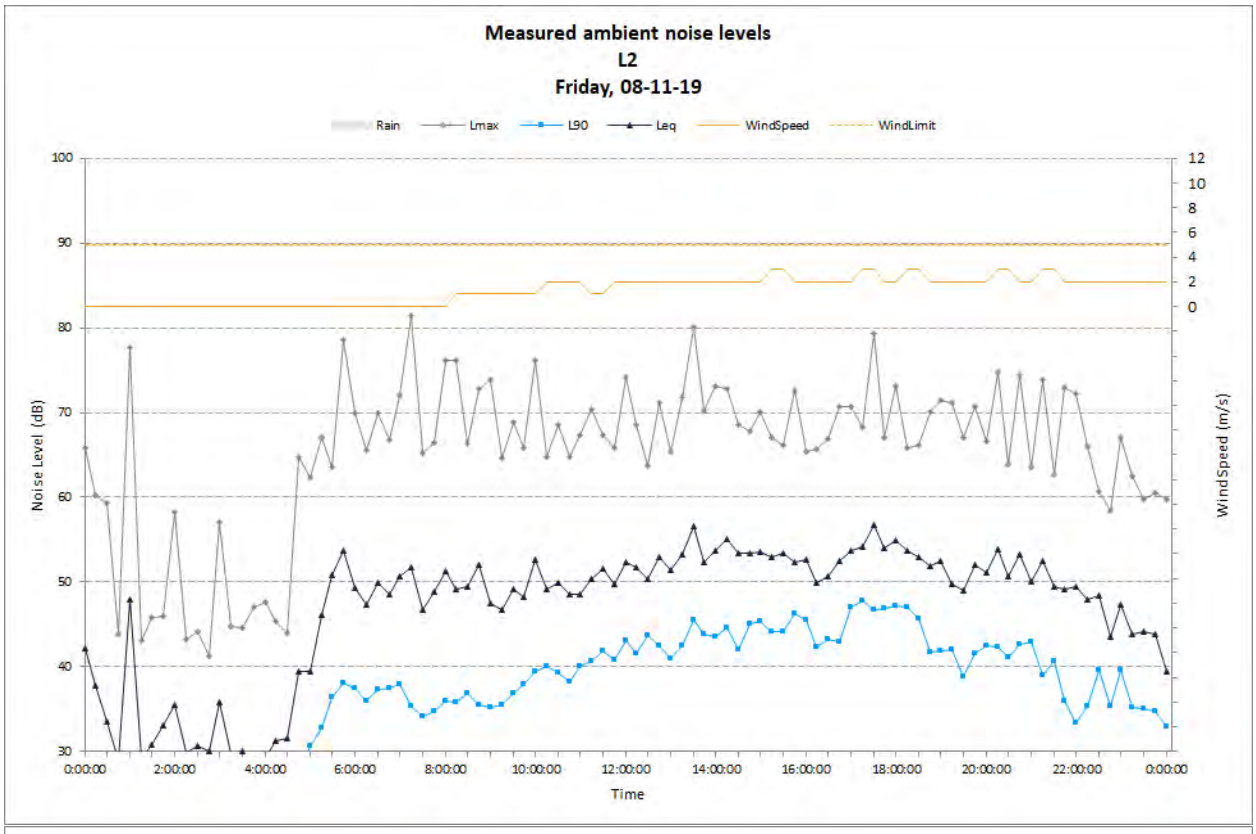

Measured ambient noise levels
L2
Sunday, 03-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

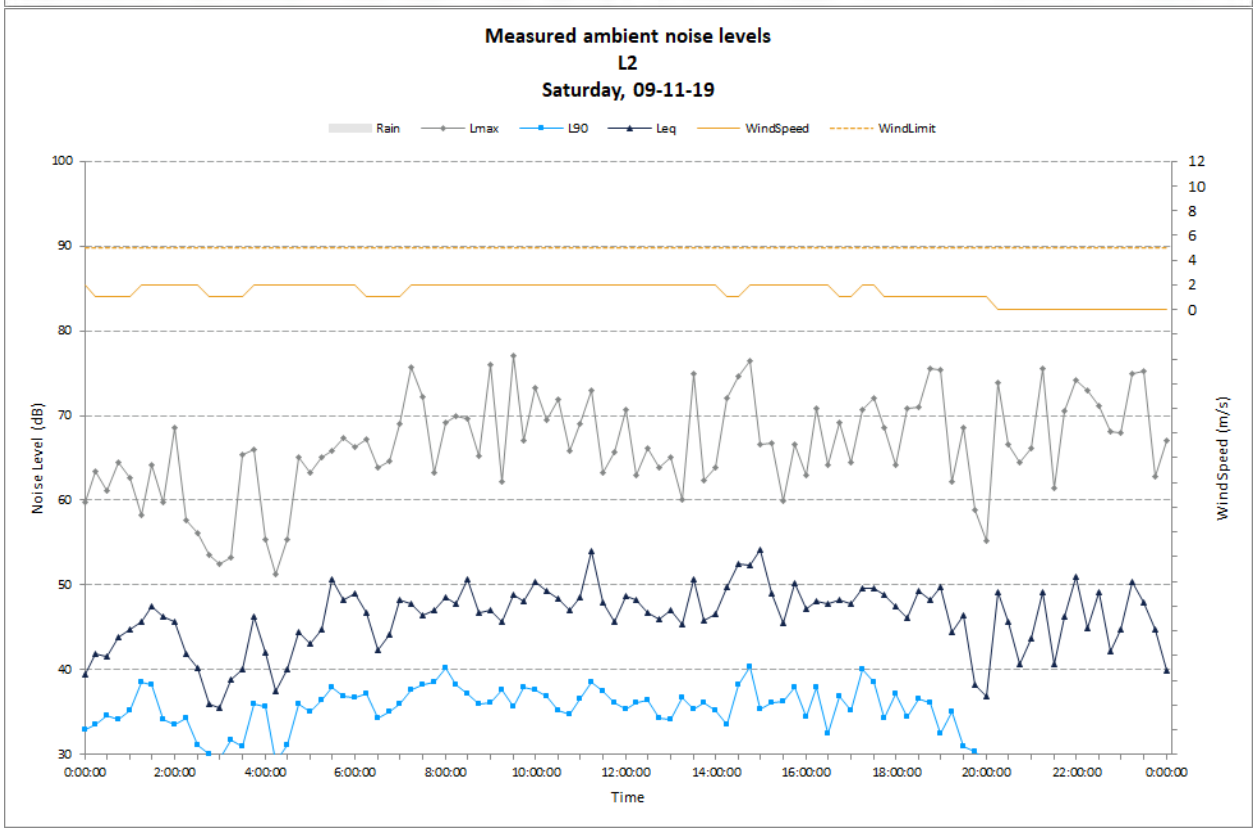

Measured ambient noise levels
L2
Monday, 04-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L2
Tuesday, 05-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L2
Wednesday, 06-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L2
Thursday, 07-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L2
Friday, 08-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L2
Saturday, 09-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

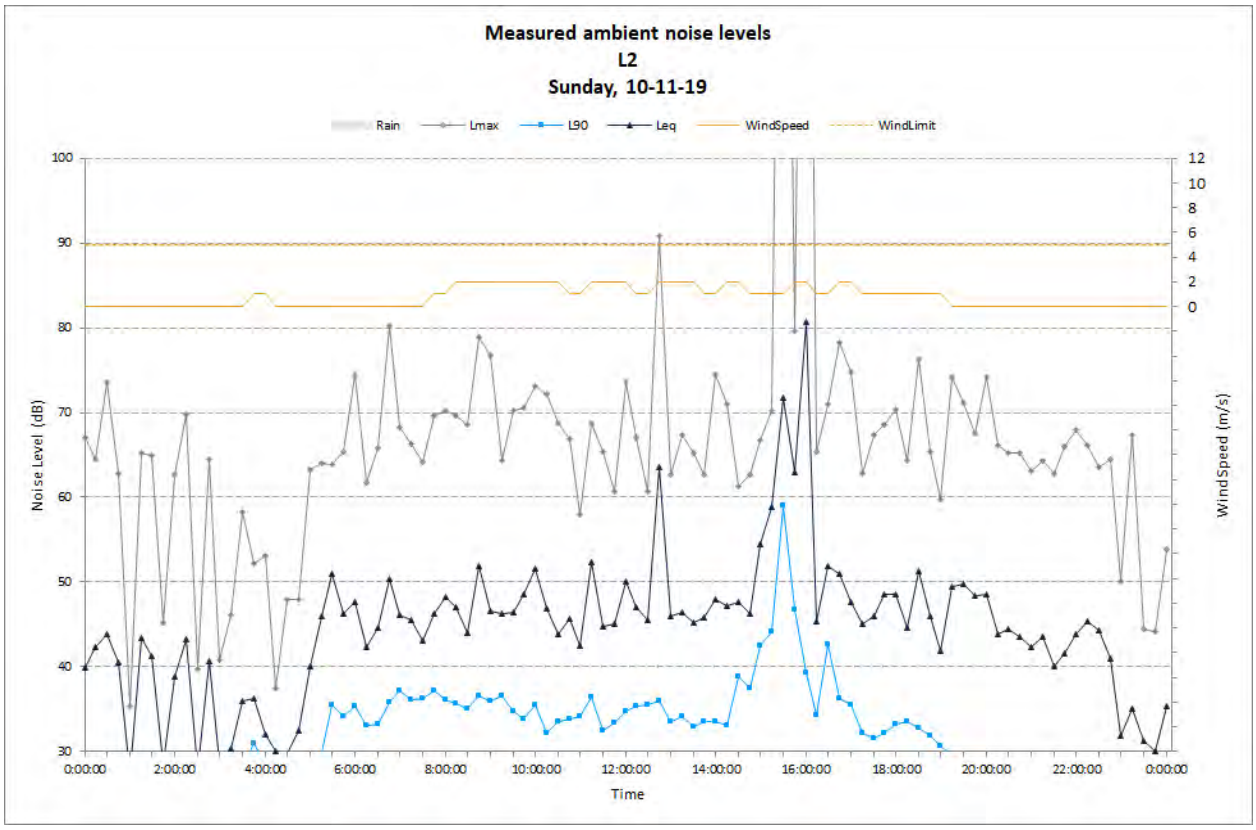
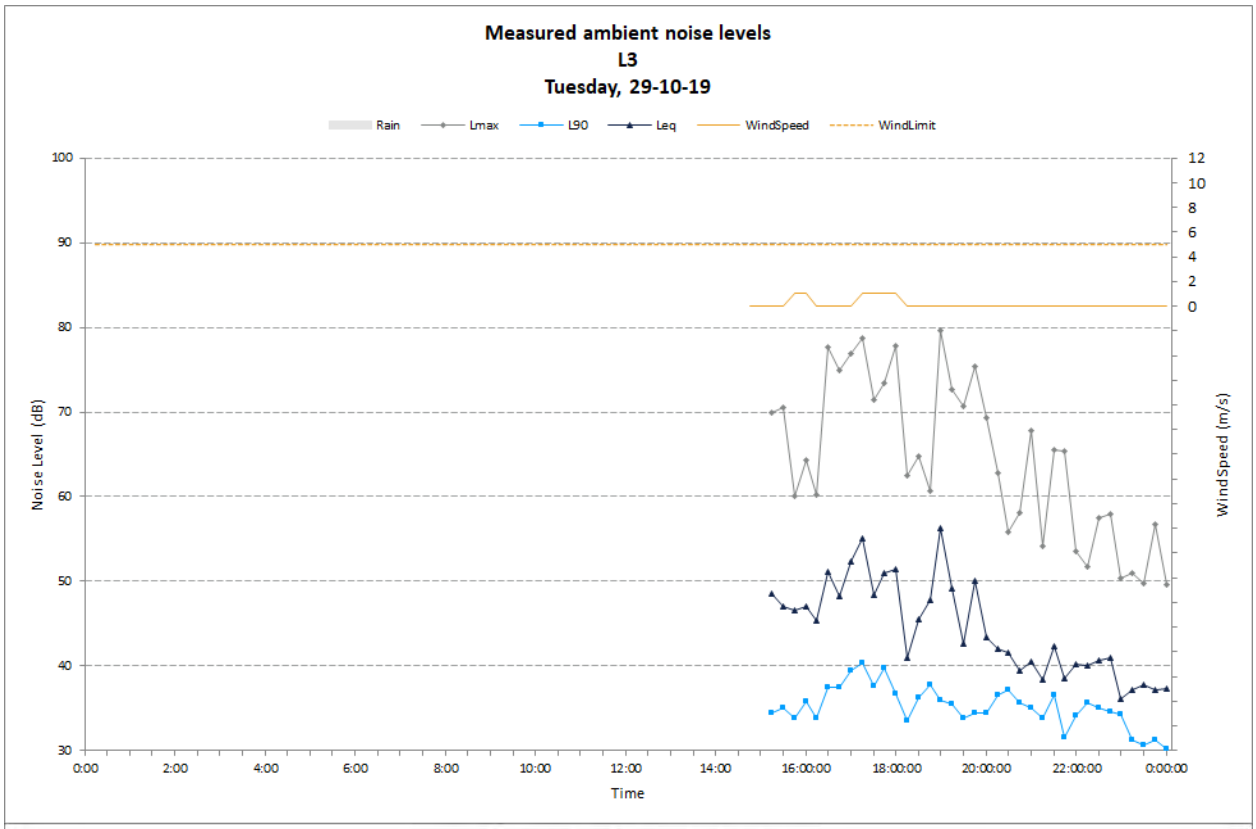
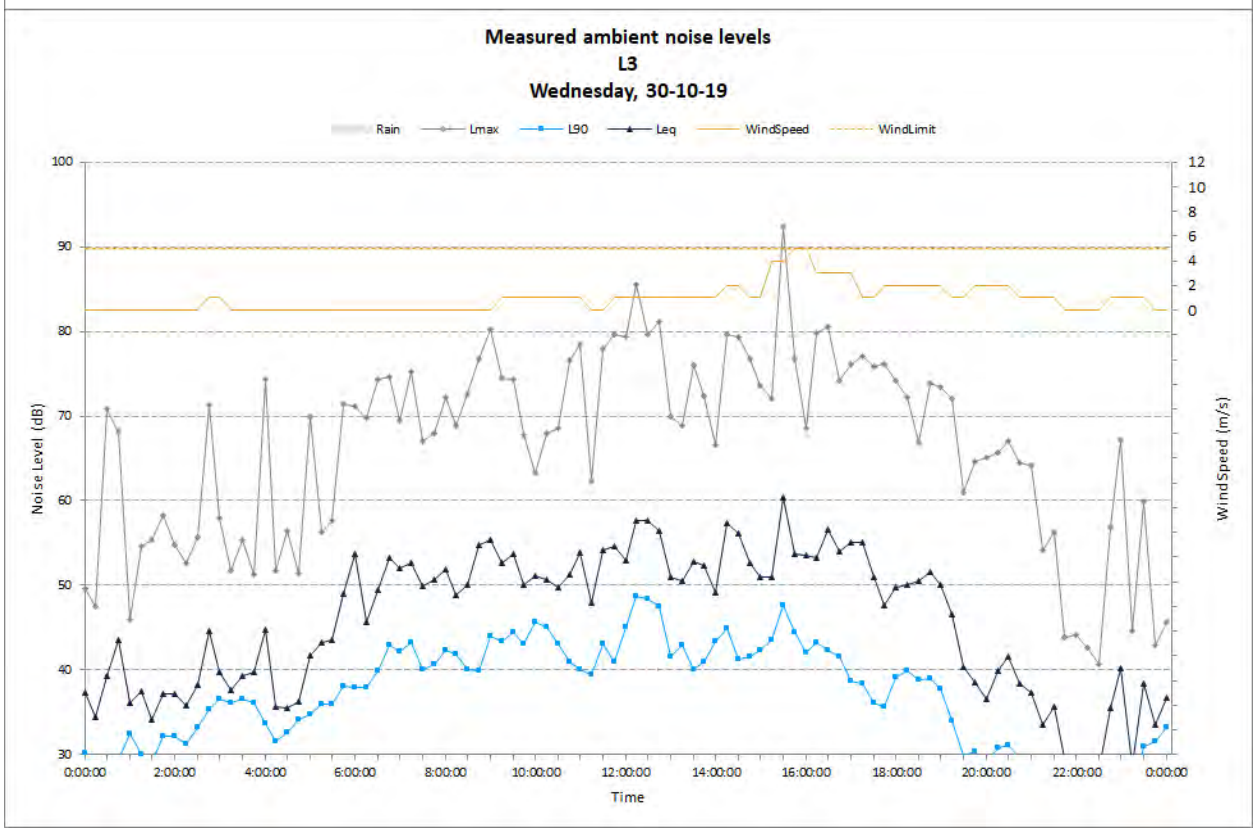

Measured ambient noise levels
L2
Sunday, 10-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
100
90
80
70
60
50
40
30
12
10
8
6
4
2
0
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00

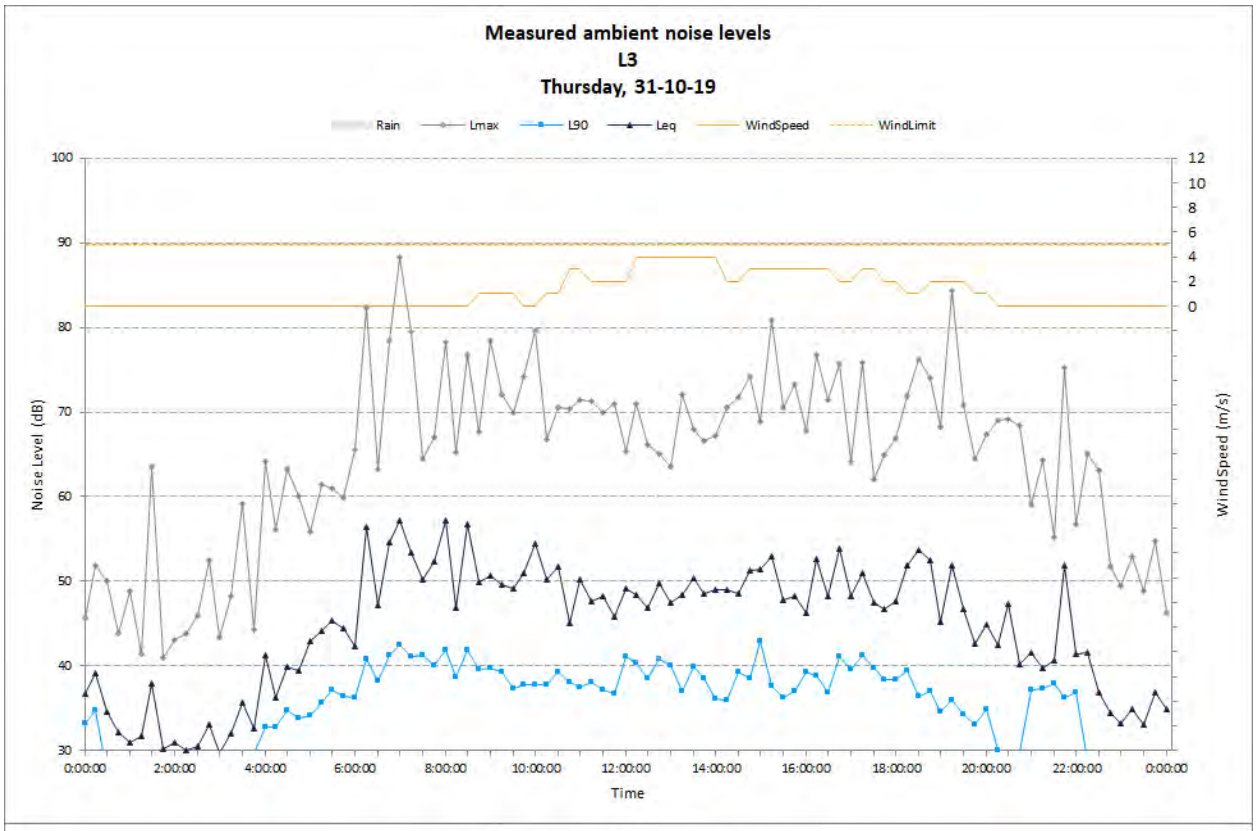
Table B.3 Unattended noise monitoring results – L3

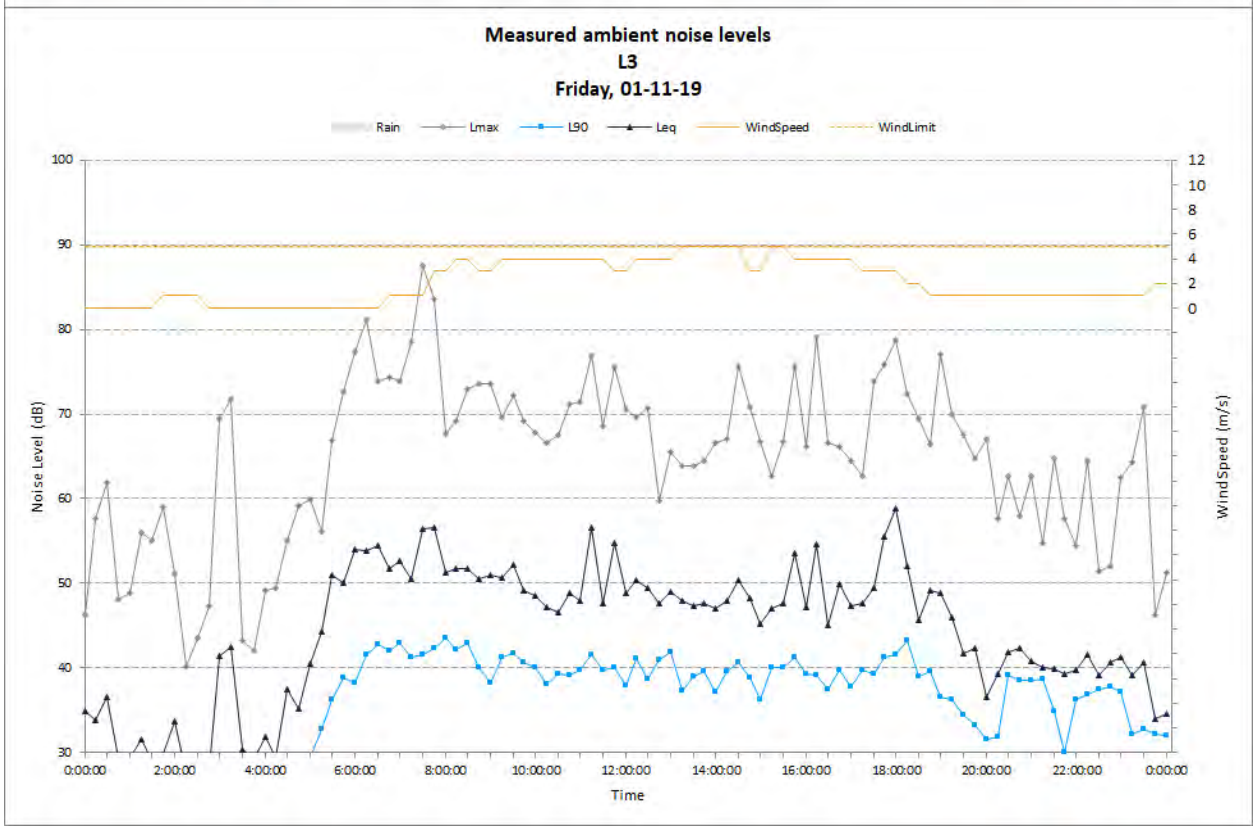
Date	ABL Day	ABL Evening	ABL Night	$L_{Aeq,11hour}$ Day	$L_{Aeq,4hour}$ Evening	$L_{Aeq,9hour}$ Night
Tuesday, 29-10-19	0	34	29	0	47	45
Wednesday, 30-10-19	39	25	24	54	46	46
Thursday, 31-10-19	37	30	24	51	49	46
Friday, 01-11-19	38	32	28	52	45	45
Saturday, 02-11-19	0	0	0	0	0	0
Sunday, 03-11-19	0	33	28	0	45	44
Monday, 04-11-19	36	35	30	52	47	47
Tuesday, 05-11-19	39	34	26	58	46	45
Wednesday, 06-11-19	37	34	30	51	53	52
Thursday, 07-11-19	38	35	30	51	49	47
Friday, 08-11-19	41	38	32	54	52	49
Saturday, 09-11-19	39	32	29	52	49	47
Sunday, 10-11-19	37	30	28	50	49	45
Summary Values	**38**	**33**	**29**	**53**	**49**	**47**

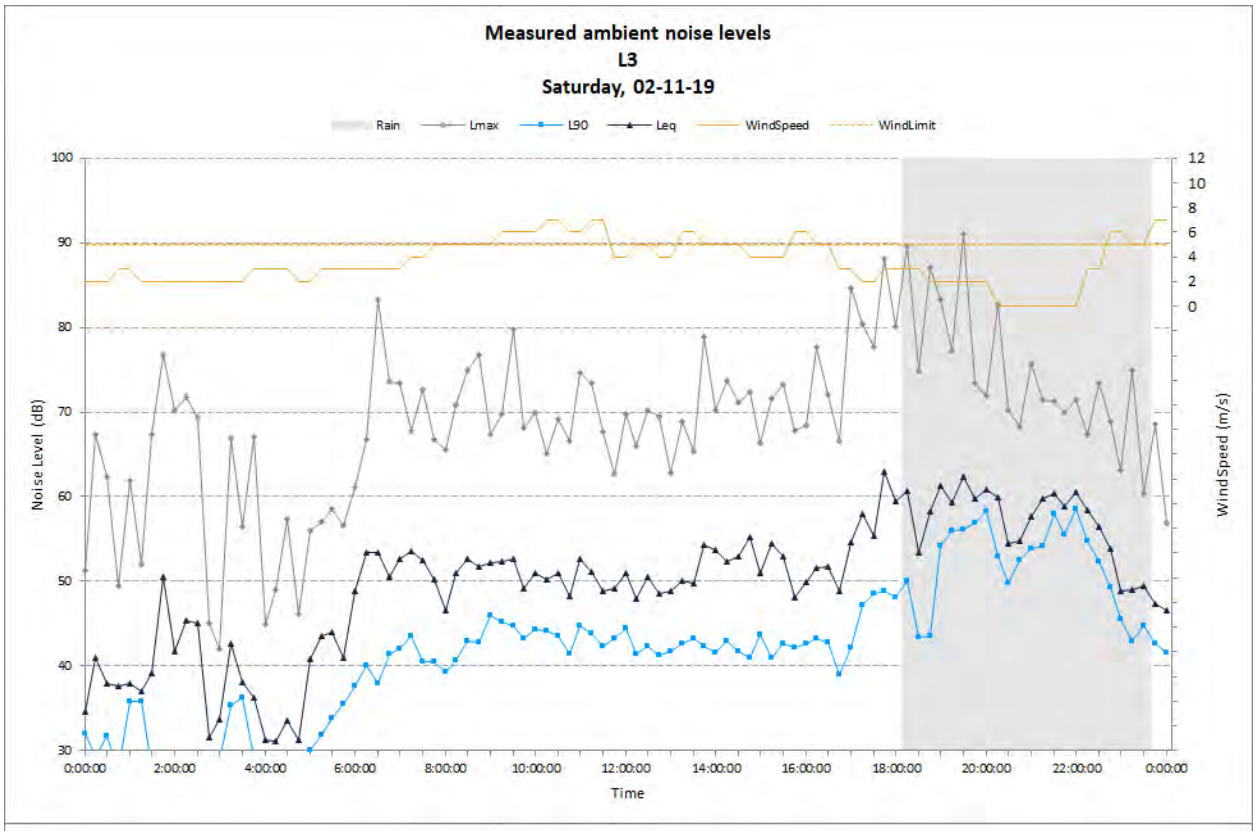
Notes: 1. “0” indicates periods with too few valid samples due to weather or logger operation.

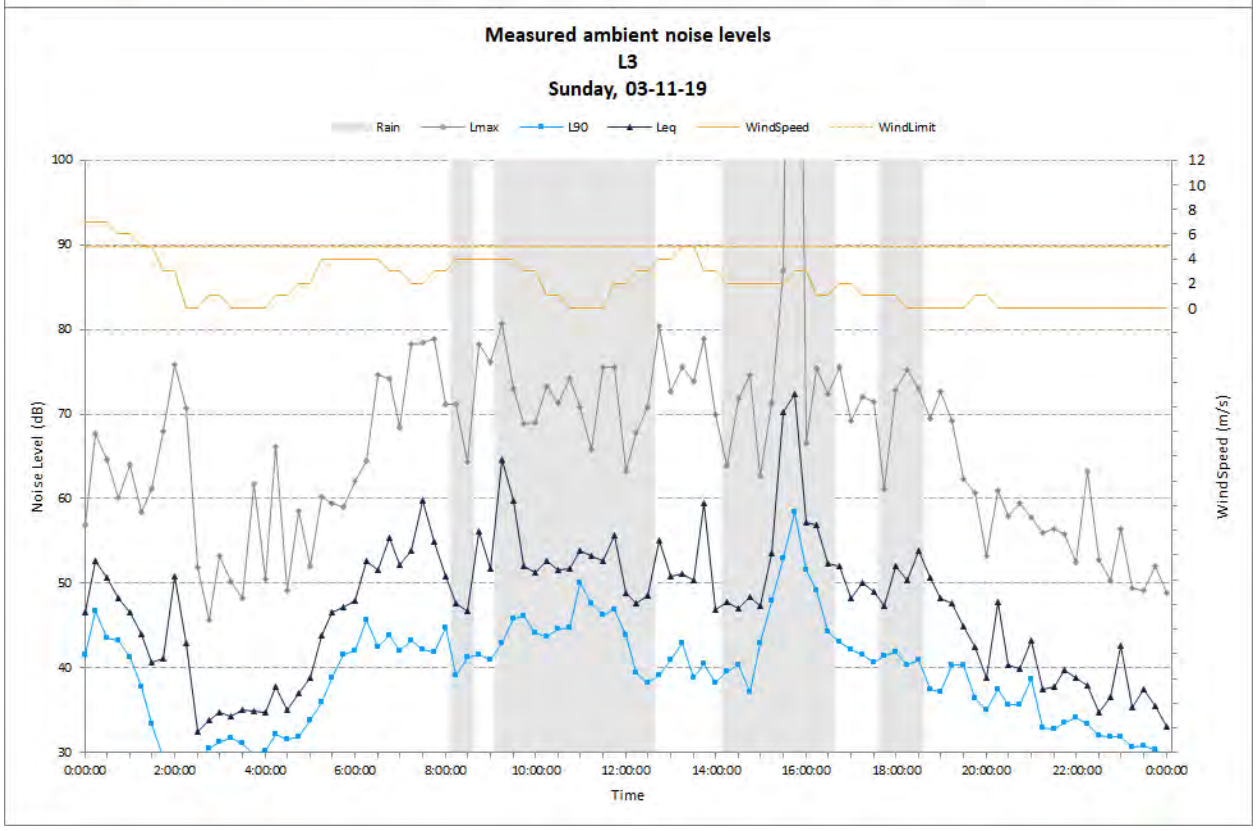

Measured ambient noise levels
L3
Tuesday, 29-10-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

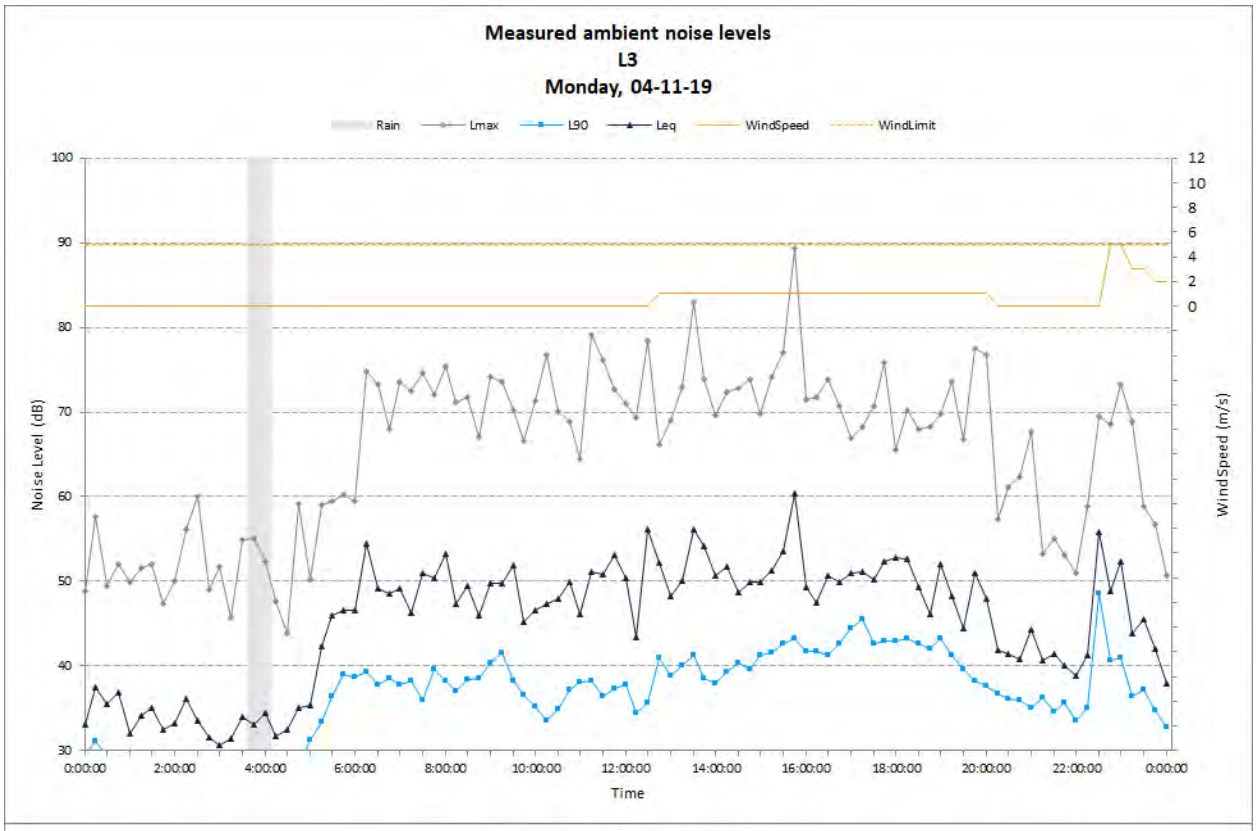

Measured ambient noise levels
L3
Wednesday, 30-10-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

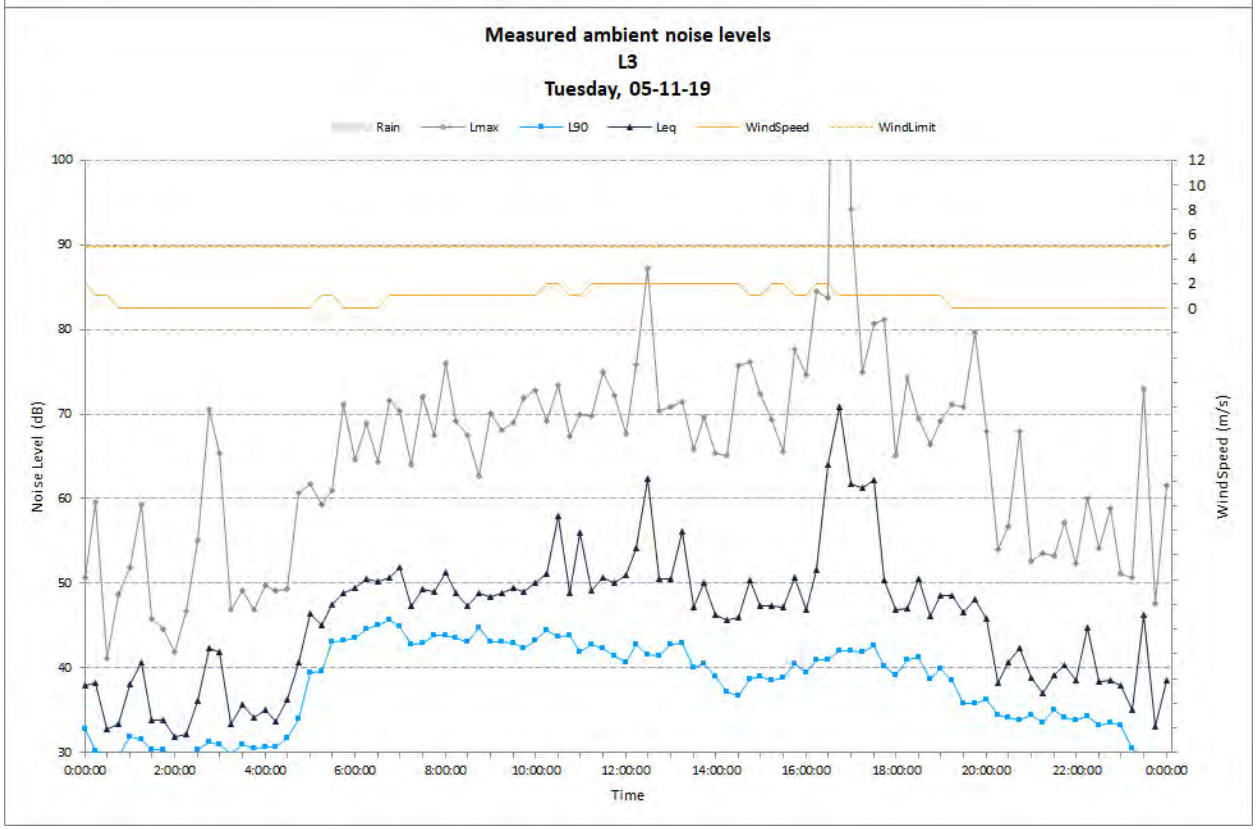

Measured ambient noise levels
L3
Thursday, 31-10-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00

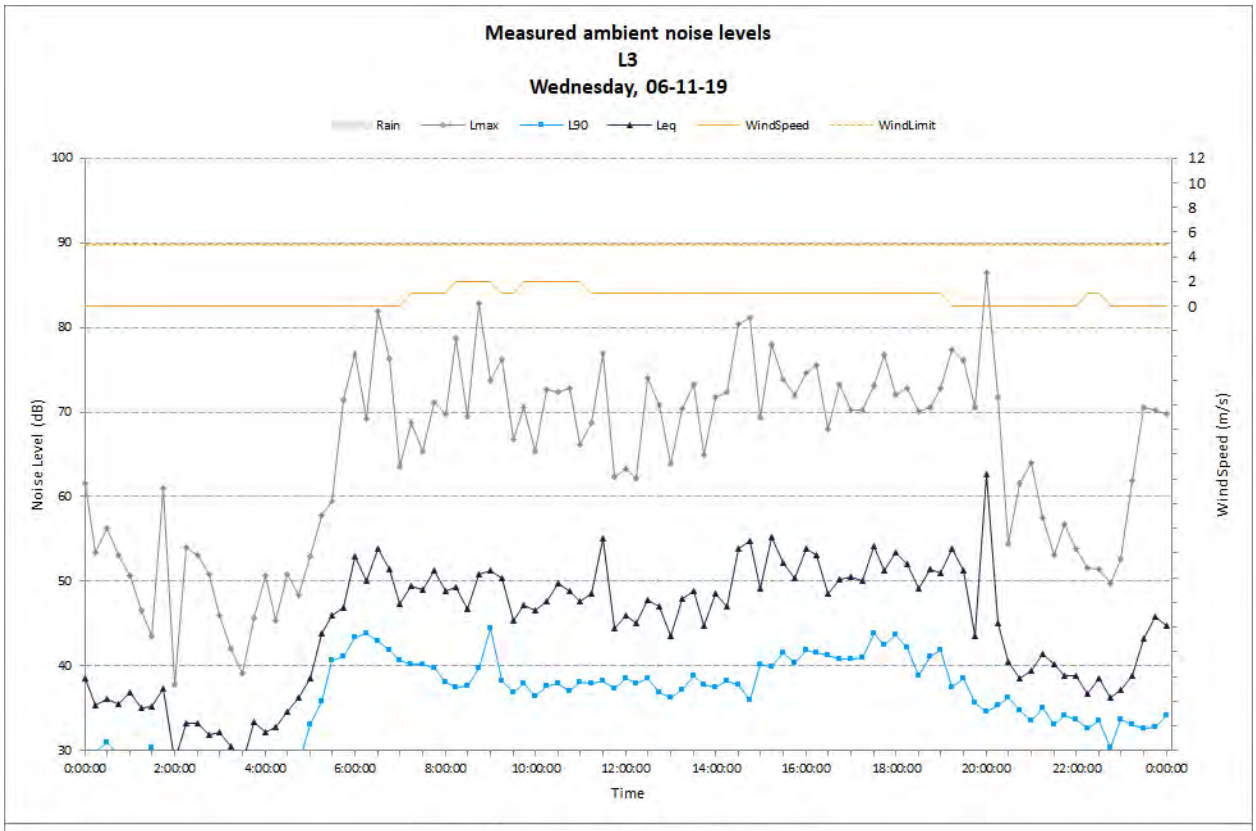

Measured ambient noise levels
L3
Friday, 01-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00

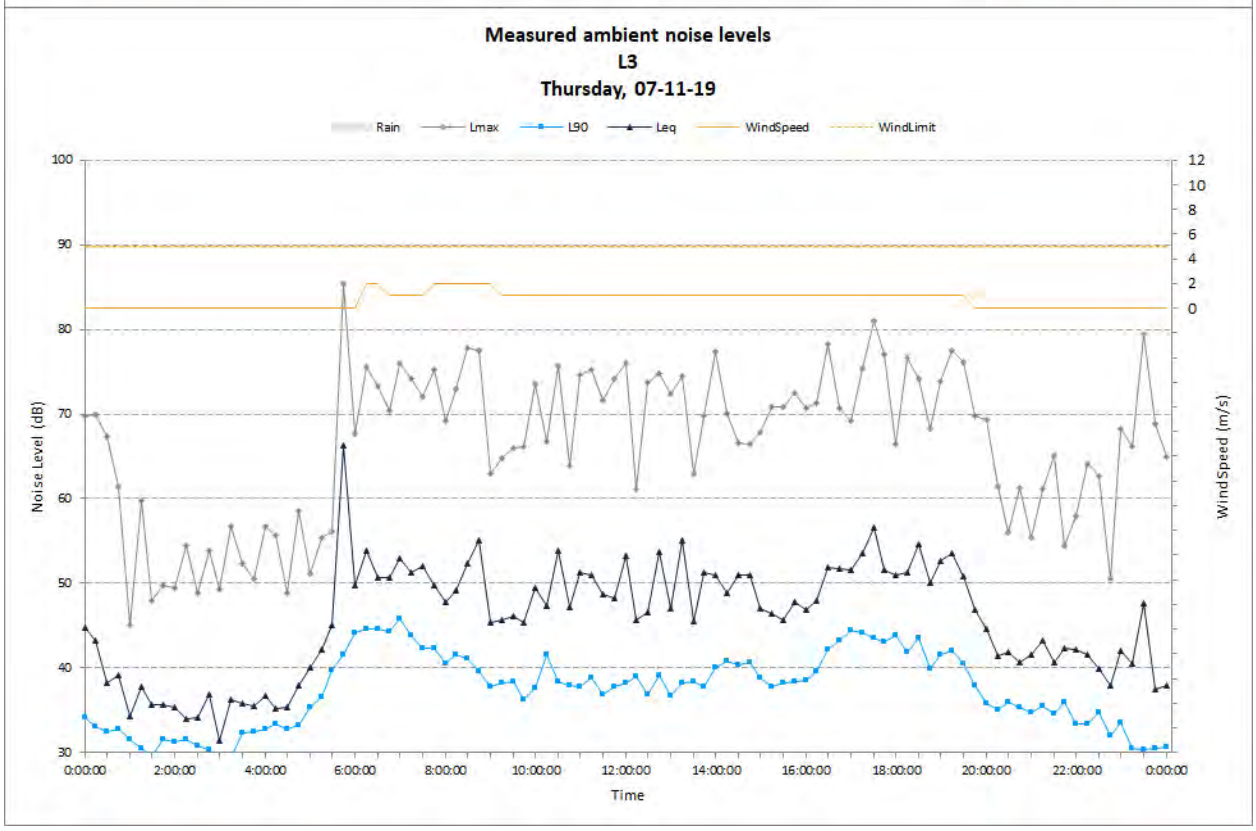

Measured ambient noise levels
L3
Saturday, 02-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

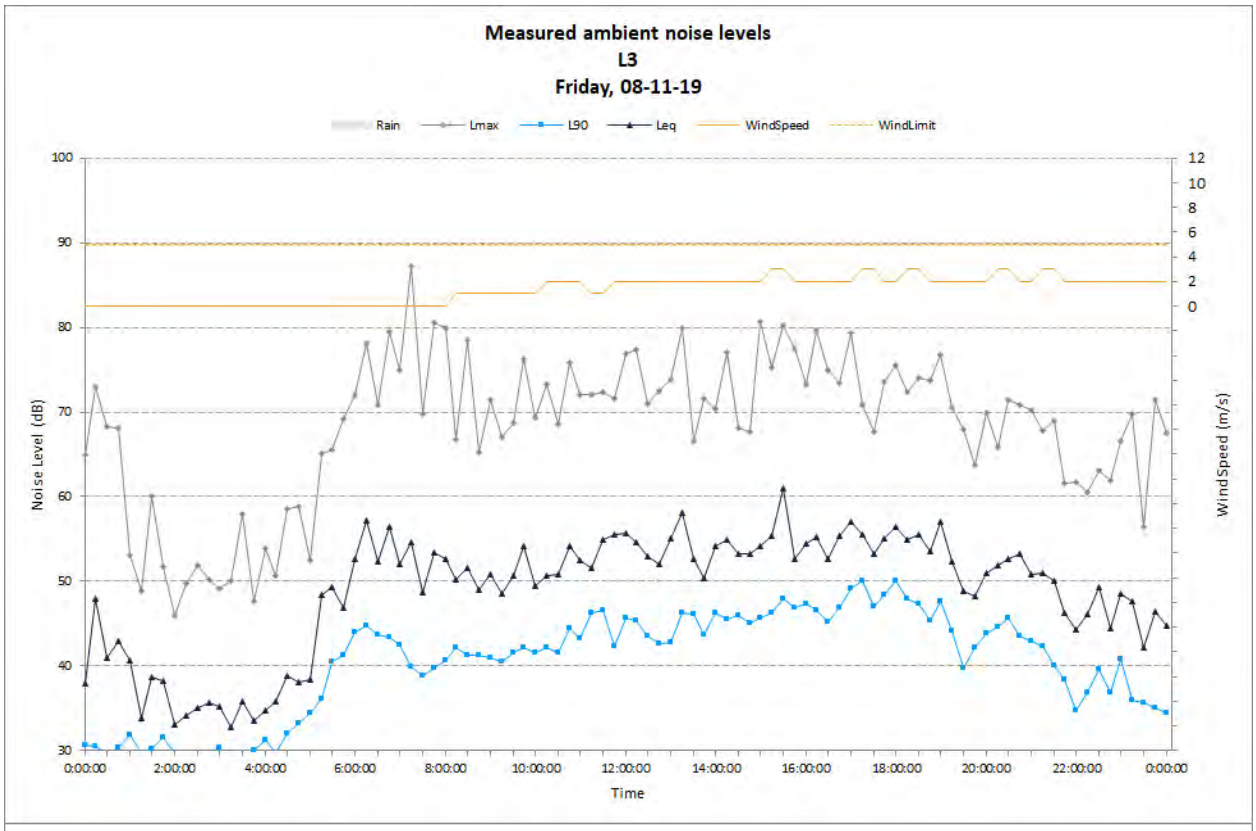

Measured ambient noise levels
L3
Sunday, 03-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

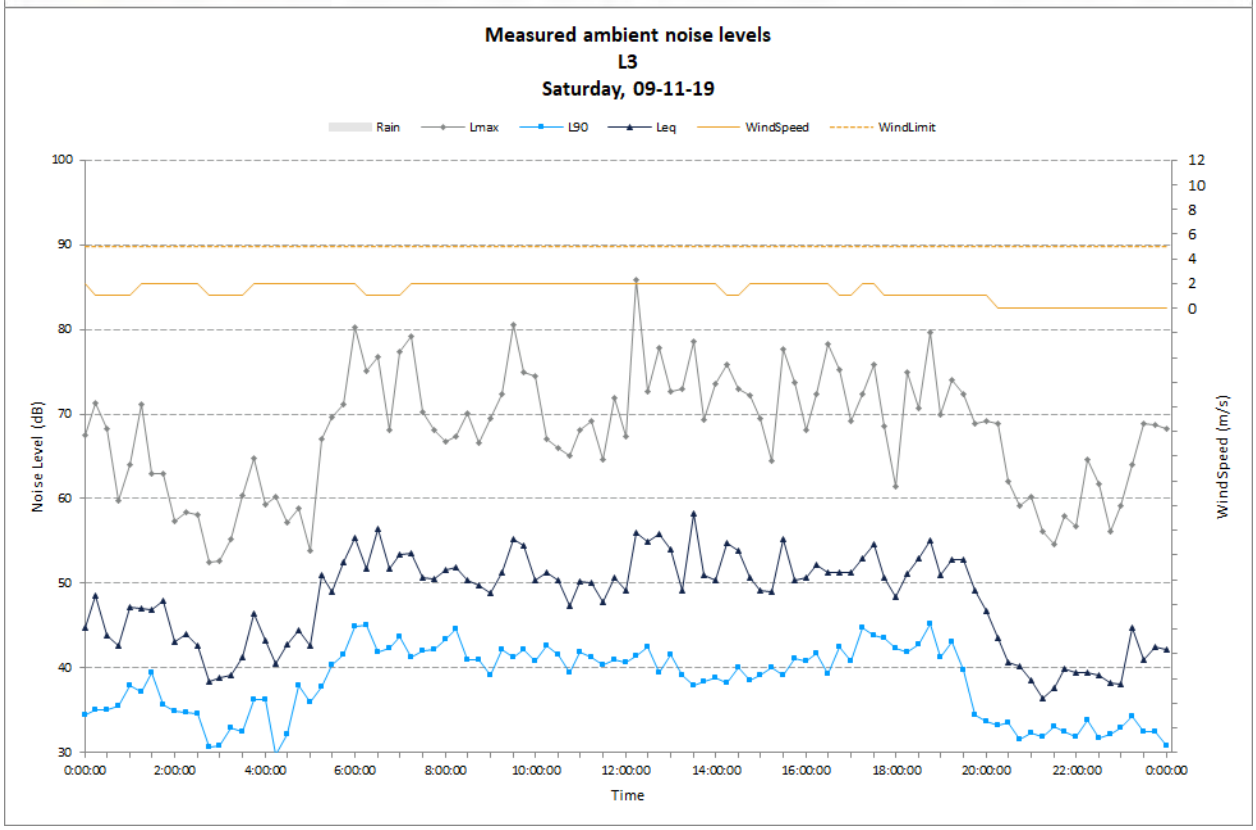

Measured ambient noise levels
L3
Monday, 04-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time

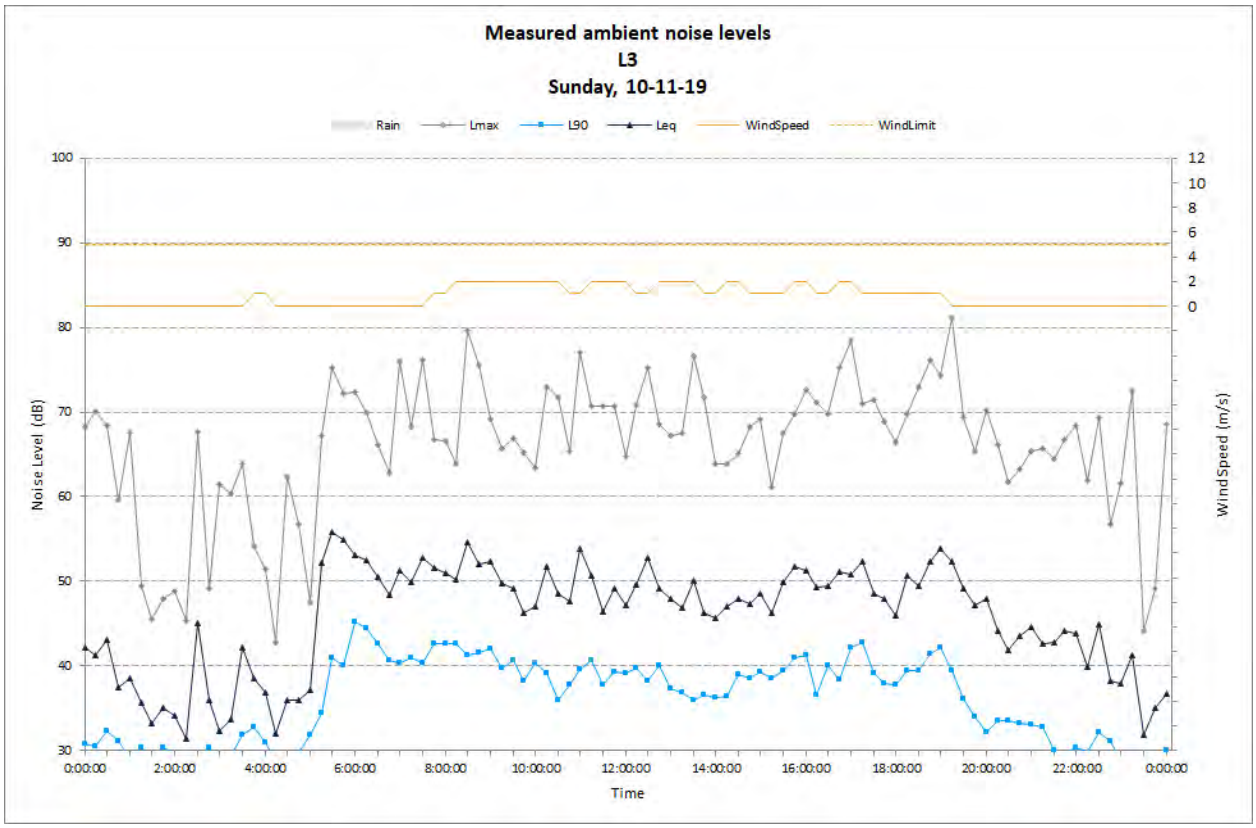

Measured ambient noise levels
L3
Tuesday, 05-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L3
Wednesday, 06-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00


Measured ambient noise levels
L3
Thursday, 07-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00


Measured ambient noise levels
L3
Friday, 08-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L3
Saturday, 09-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time


Measured ambient noise levels
L3
Sunday, 10-11-19
Rain
Lmax
L90
Leq
WindSpeed
WindLimit
Noise Level (dB)
WindSpeed (m/s)
Time
100
90
80
70
60
50
40
30
12
10
8
6
4
2
0
0:00:00
2:00:00
4:00:00
6:00:00
8:00:00
10:00:00
12:00:00
14:00:00
16:00:00
18:00:00
20:00:00
22:00:00
0:00:00

Appendix C

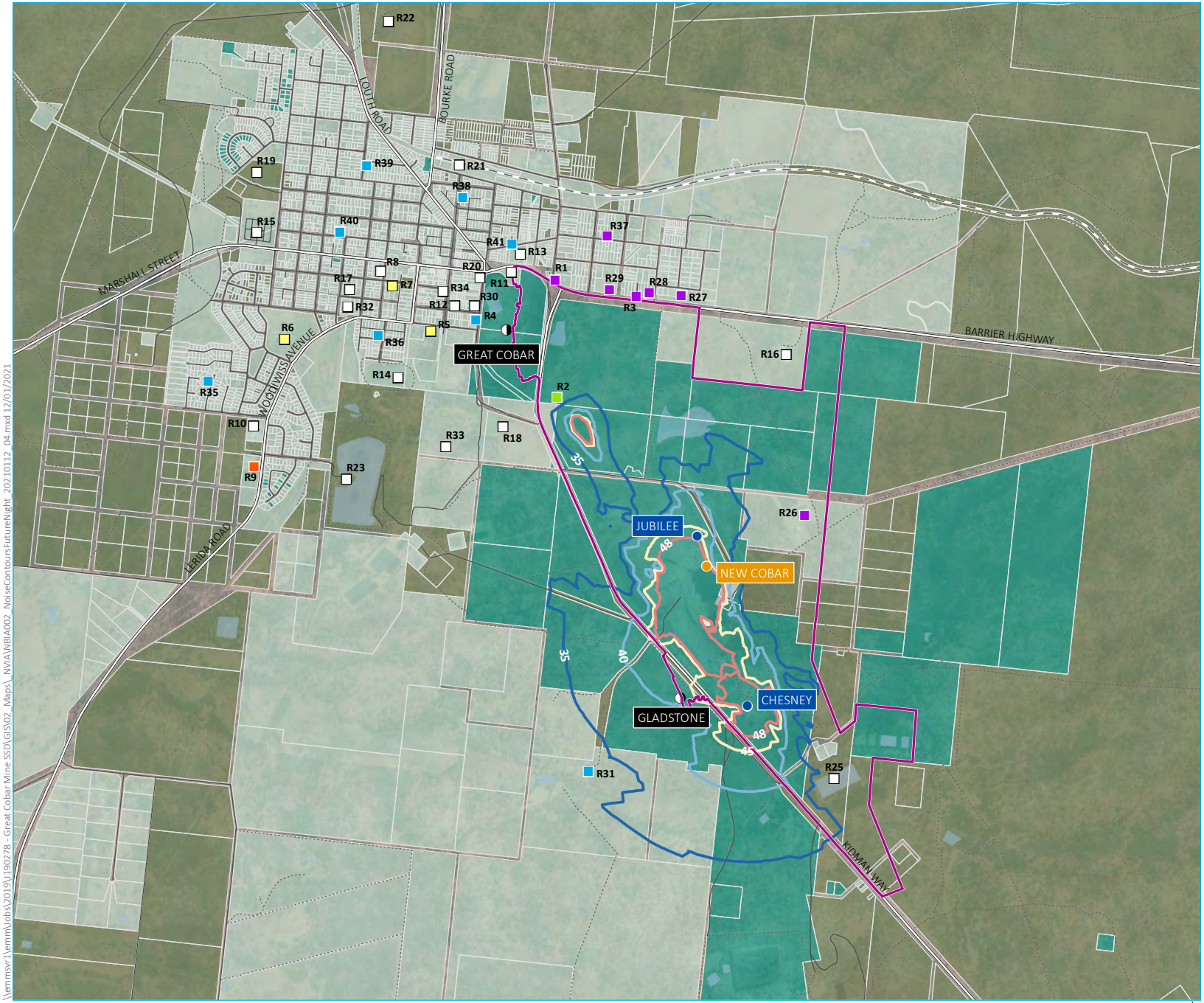
Sound power levels for acoustically significant plant and equipment

Table C.1 Single octave sound power levels for acoustically significant operational noise sources

Source	Single octave sound power level spectrum, dB(A)									Total, dB(A)
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Vent fan (ML 1483)	73	83	98	99	99	94	90	81	67	104
Vent fan (CML 6)	80	95	99	99	96	98	94	85	70	105
Haul truck (CAT AD55B)	68	86	99	101	105	106	108	95	81	112
Rock breaker	72	84	91	95	99	102	102	90	74	106
Front-end loader	83	93	98	94	93	94	90	82	74	102
Front-end loader	79	92	94	92	92	102	93	84	71	104
Road truck	63	80	89	95	102	99	97	89	80	105
Water cart	60	75	88	99	99	98	97	92	83	105
Vent fan (proposed)	80	95	99	99	96	98	94	85	70	105

Appendix D

Noise contours



KEY

- Project area
- Completed working
- Current working
- Future working
- Rail line
- Major road
- Minor road
- Vehicular track
- Waterbody

Type of receiver

- Hospital
- Mine-owned residence
- Privately-owned residence
- Industrial
- School
- Other

Night period $L_{Aeq, 15min}$ noise level contours

- 35 dB
- 40 dB
- 45 dB
- 48 dB

Land ownership

- Peak Gold Mines
- Private
- Government

Source: EMM (2020); PGM (2020); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 55

N

\\emmsvr1\emm\Jobs\2019\J190278 - Great Cobar Mine SSD\GIS\02_Maps_NVIA\NBIA002_NoiseContoursFutureNight_20210112_04.mxd 12/01/2021

Night period $L_{Aeq, 15min}$ noise level contours

Peak Gold Mines
New Cobar Complex Project
Noise and vibration impact assessment
Figure D.1

EMM
creating opportunities