Noise Assessment - Modification 6

Northparkes Mine Step Change Project

Prepared for: Umwelt (Australia) Pty Limited
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Muller Acoustic Consulting

Document Information

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Umwelt (Australia) Pty Limited (Umwelt) on behalf of CMOC Mining Service Pty Ltd (CMOC) to prepare a Noise Assessment (NA) to qualify potential noise emissions from minor alterations to disturbance areas, and operating locations of various mining operations and infrastructure at the Northparkes Mine (Modification 6 – the 'project').

The NA has qualified the potential operational noise emissions resulting from the proposed modification and recommends reasonable and feasible noise controls where required.

1.1 Assessment Requirements

The assessment has been undertaken in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPfI) 2017; and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures.

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

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2 Project Description

2.1 Background

CMOC is proposing to undertake a modification to Project Approval PA 11_0060 (Northparkes Consent) under section 4.55(2) of the Environmental Planning and Assessment Act 1979 (EP&A Act).

A Noise Impact Assessment (NIA) was completed by Umwelt (Australia) Pty Ltd (Umwelt) as part of the Environmental Impact Statement (EIS) for the Northparkes Step Change Project in July 2013. The NIA for the Step Change Project is the base case from which the proposed modification is made. To determine the likely impacts resulting from the proposed modification, qualitative and quantitative assessments have been completed and compared to the predicted noise levels made in the Step Change Project NIA.

The Proposed Modification includes:

- construction and use of a new underground portal access (including associated drive, conveyor, and other ancillary infrastructure) for E22 underground mining operations;
- TSF2 embankment buttressing (including associated amendments to the approved disturbance area);
- changes to TSF construction within the approved disturbance footprint associated with increased safety requirements for TSFs since first approved;
- minor changes to the E31 and E31N open cut pits to reflect updated geological data and improved resource recovery, including:
  - minor adjustments to disturbance areas for the approved pits and associated infrastructure (roads, safety bunds, water management etc); and
  - minor increases to maximum approved mining depths.
- Establishment of temporary waste rock stockpile areas for the E31 and E31N pits to avoid unnecessary material re-handling in the future due to the proposed Rocklands TSF;
- Additional detail regarding the approved methods and locations of rehabilitation material (soils and vegetation);
- establishment of additional clay and filter material borrow pits for TSF construction and lifts;
- relocation of the Contractor area facilities (eg site offices, crib huts and a workshop) which would also service the E31 and E31 mining operations;

- relocation of the main water supply pipeline and Rosedale (TSF3) tailings pipeline; and
- clarification regarding approved disturbance boundaries and the location of ancillary infrastructure within the E31 Precinct.

2.2 Proposed Activities

The E31 and E31N open cut pits are located to the south of the approved Rosedale Tailings Storage Facility (TSF). A review of the design of the E31 and E31N pits has identified that minor adjustments to the pits are required, relative to their identified approved location and disturbance footprint.

Northparkes has identified the potential to utilise waste rock from the E31 and E31N pits in the construction of the upcoming E44 Rocklands Project. To avoid rehandling, alternate stockpiling locations within the E31 Precinct have been identified to improve the integration of these approved mining operations within the proposed Rocklands TSF construction (see **Figure 1**). New topsoil stockpiles will also be located outside of areas proposed for the Rocklands TSF.

Waste rock from the E31/E31N and other approved waste stockpiles will continue to be utilised for lifts to approved TSF across the site.

Northparkes also proposes to establish a new rehabilitation material stockpiling area for topsoil, subsoil and vegetative material to the west of the Mine Access Road. This area would contain topsoil, subsoil and vegetation stockpiles associated with disturbance to the west of the access road (including the new E22 portal) as well as topsoil and subsoil material associated with the construction of the western E31 waste rock stockpile.

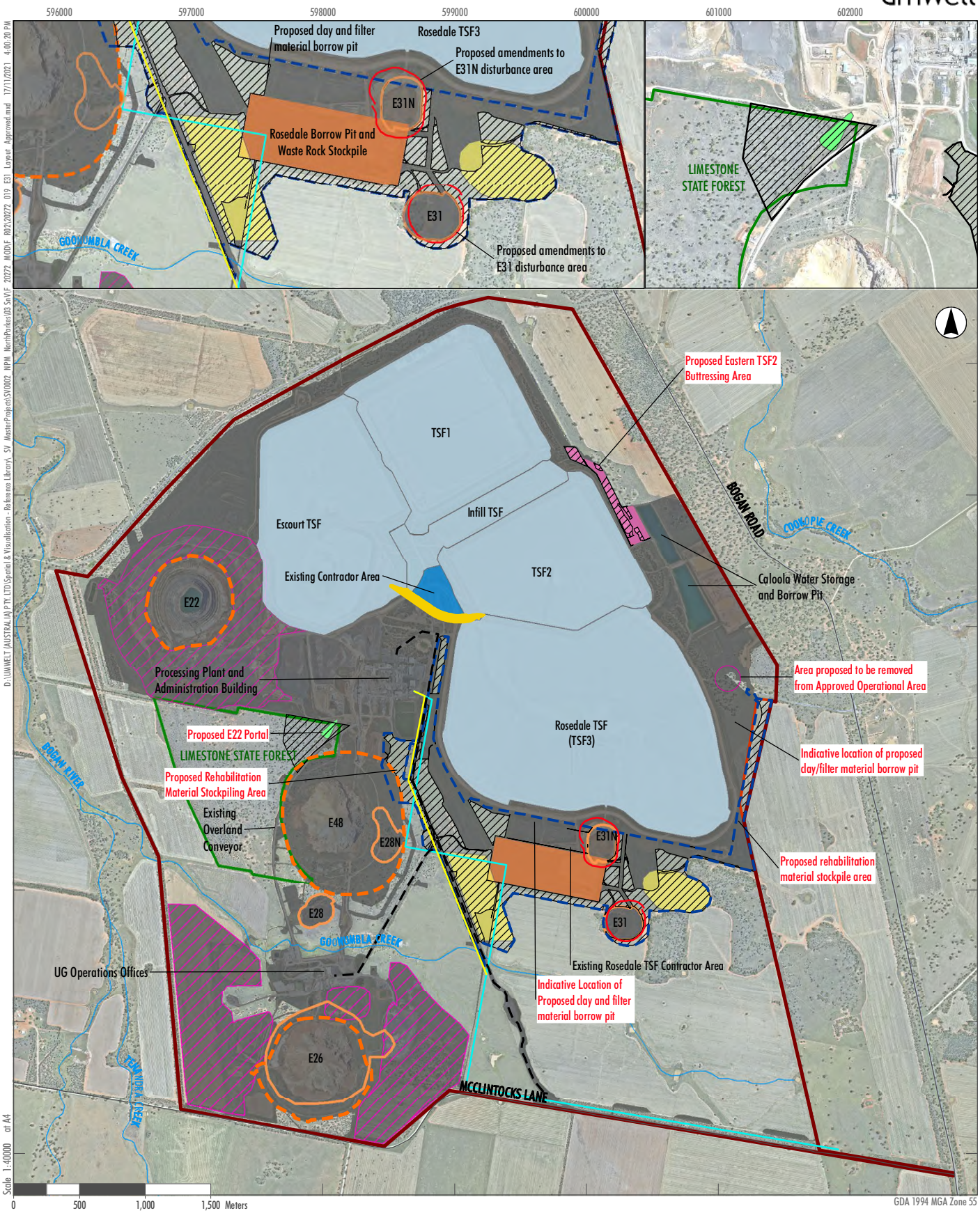
The proposed modification also includes an extension to the approved Infill TSF area (refer to **Figure 1**) This extension is required to meet increased safety design standards for tailings storage facilities.

The modification does not require any change to approved mining methods, processing or transportation. The proposed changes are located wholly within existing approved disturbance areas referred to as the E31 Precinct and does not involve any material changes in equipment use, intensity or significant change in location of works relative to existing approved operations (refer to **Figure 1**) except the extension to the Infill TSF. The E31 Precinct is located entirely within the existing approved project area located within existing mining lease.

The realignment of a tailings pipeline to Rosedale TSF will be required to accommodate the proposed modifications to other mining areas and activities.

The proposed modification involves the construction and use of a new E22 portal access via a box cut and decline development (blasting) with the installation of associated conveyor and water management infrastructure. Northparkes also proposes to realign part of the Main Water Supply Pipeline and relocate an existing Contractor Area within existing Approved Operational Area to accommodate the modifications.

It is noted that all the above activities are likely to be completed within a 24 to 30 month period commencing early in 2022. Importantly, these operations would not coincide with approved open cut mining operations at either E26 or E28 open cut pits and the bulk earthworks associated with the approved Rosedale TSF has already been completed.



Legend

- Northparkes Project Area
- E31 Precinct Area
- Proposed E31 and E31N Pit Extents
- Proposed Extension to Project Area Boundary
- Proposed Temporary Waste Rock Stockpile
- Proposed Eastern TSF2 Buttressing Area
- Proposed E22 Portal
- Proposed TSF Infill Area
- Proposed Additional Disturbance Areas
- Approved Open Cut Areas
- Approved Waste Dumps
- Approved Subsidence Limits
- Tailings Storage Facility
- Approved Rosedale Borrow Pit and Approved E31 Waste Rock Stockpile Area
- Approved Operational Area
- Proposed Infill TSF Bund (conceptual)
- Internal Access Road
- Existing Water Supply Pipeline
- Proposed Water Supply Pipeline
- Drainage Line
- Roads

Figure 1

Proposed Modification

Image source: NPM (2020) Data source: NPM (2021)

3 Project Approval

3.1 Consent Conditions

The Development Consent Conditions (PA11_110060) contains the following noise related conditions in Schedule 3 (Conditions 1 to 5).

The Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 1 at any residence on privately-owned land.

Table 1 Noise Criteria

Location	*Day*	*Evening*	*Night*	
	dB $LA_{eq(15min)}$	*dB $LA_{eq(15min)}$*	*dB $LA_{eq(15min)}$*	*dB $LA_{1(1min)}$*
All privately-owned land	*35*	*35*	*35*	*45*

Additionally, the conditions state:

Operational Noise generated by the project will be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy.

These limits apply under all meteorological conditions except the following:

- *during periods of rain or hail;*
- *average wind speeds at microphone height exceeds 5 m/s;*
- *wind speeds greater than 3 m/s at 10 metres above ground level; or*
- *temperature inversion conditions of up to 3 °C/100m or alternatively a stability class of G.*

Except for wind speed at the microphone height, the data to be used for determining meteorological conditions will be that recorded by the meteorological station located onsite. Operational noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 5 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

These limits do not apply if NPM have an agreement with the relevant owner/s of the residences or land to generate higher noise levels, and NPM has advised the Department in writing of the terms of the agreement.

It is noted that these criteria were based on the Project Specific Noise Levels (PSNL) determined in accordance with the NSW Environment Protection Authority (EPA) Industrial Noise Policy (INP). The INP has been superseded by the NPfI in 2017. A significant difference is that the NPfI methodology allows for a minimum applicable daytime RBL of 35dBA, resulting in a minimum applicable daytime Project Noise Trigger Level (criteria) of 40dB $LA_{eq(15min)}$, compared to the INP minimum RBL of 30dBA and PSNL of 35dB $LA_{eq(15min)}$. However, it is noted Northparkes does not propose to increase the current daytime noise criteria as part of the Proposed Modification.

3.2 Noise Management Plan

The Noise Management Plan (NMP) addresses the relevant components of schedule 3 conditions 1 – 5 of the NSW Project Approval (PA11_0060) and applies to all activities undertaken by Northparkes Mines including mining and exploration activities; processing of copper/gold ore resources; project development; maintenance activities; mine closure; logistics; associated service and support function.

The objectives of the NMP are

- ensure that environmental noise from operations is minimised and appropriately controlled;
- ensure that impacts on surrounding residents are minimised;
- keep the local community and regulators informed of activities where required and respond quickly and effectively to issues or complaints;
- carry out regular monitoring to ensure compliance against noise limits; and
- adequately manage and mitigate potential noise impacts from the construction and operational activities.

3.3 Noise Monitoring

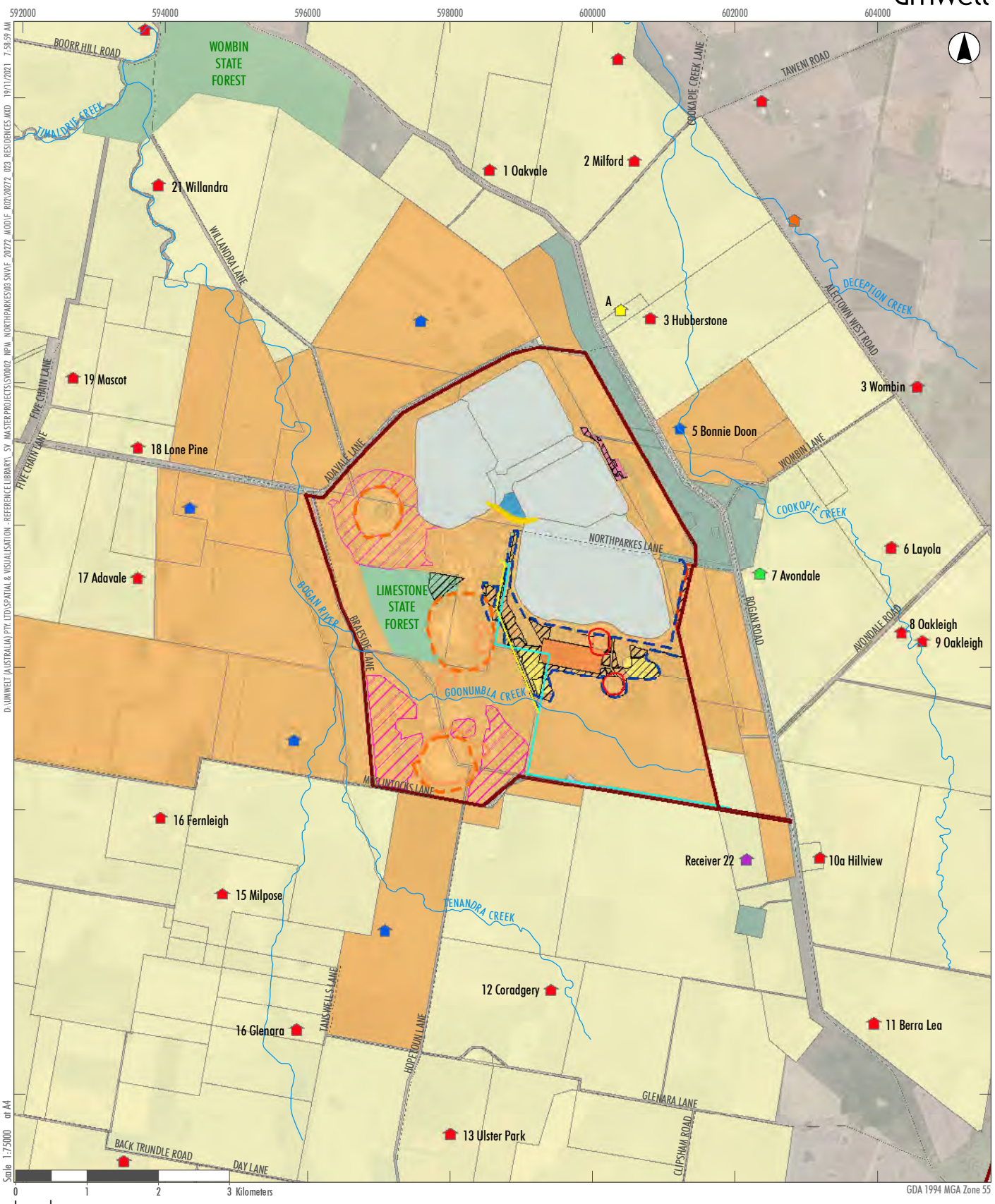
NPM undertakes regular background noise monitoring as a part of the noise monitoring program. Monitoring results at identified sensitive receivers surrounding NPM operations show that the existing background noise levels are at or below 30dBA. In addition to this, the surrounding land use is dominated by agricultural holdings with no other industrial noise sources in the area surrounding the site.

Currently noise compliance monitoring is completed on a quarterly basis in accordance with the NMP at the noise monitoring locations presented in **Table 2.** Results of the monitoring show continued compliance with the noise criteria in the PA consent conditions.

Table 2 Noise Monitoring Locations

ID	Location	Coordinate Locations, MGA55	
		Easting (m)	Northing (m)
NM1	3 - Hubberstone	600687	6360754
NM2	18 - Lone Pine	593669	6358933
NM3	15 - Milpose	594827	6352971
NM4	10a - Hillview	602993	6353469
NM5	17 - Adavale	593568	6356920

Monitoring locations with respect to the mine site are shown visually in **Figure 2**.



Legend

- Northparkes Project Area
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- Proposed E22 Portal
- Proposed TSF Infill Area
- Proposed Additional Disturbance Areas
- Approved Subsidence Limits
- Tailings Storage Facility
- Approved Open Cut Areas
- Approved Waste Dumps
- Approved Rosedale Borrow Pit and Approved E31 Waste Rock Stockpile Area
- Proposed Infill TSF Bund (conceptual)
- Existing Water Supply Pipeline
- Proposed Water Supply Pipeline
- State Forest
- Northparkes
- Crown Land
- Private
- Telstra Corporation Ltd
- Private Residence
- New Residence (constructed after 2013)
- Agreement Residence
- Mine Owned
- Approved Private Residence (yet to be constructed)
- Derelict Residence

Figure 2

Sensitive Receiver Locations

Image Source: ESRI Basemap (2021); Nearmap (2021) Data source: DSFI (2021); Northparkes (2021); Umwelt (2019)

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4 Noise Assessment

4.1 E31 and E31N Open Cut Pits

The minor changes to disturbance areas for the E31 and E31N open cut pits and the associated infrastructure (roads, safety bunds, drainage etc) are activities that were included the project consent but will result in a slightly different footprint. The E31N pit will be extended by approximately 100m to the north west and 60m to the south whereas the E31 pit will be extended by approximately 80m to the north east (refer **Figure 1** inset). The distance between the pit locations to noise sensitive receivers is in the order of 3km to the north east and 4km to the west. The proposed pit depth increases of 30m (E31) and 25m (E31N) will also result in a negligible reduction in noise levels. Considering that the separation distance between the original and proposed pit locations is so minor, the difference in received noise levels at offsite receiver locations will be negligible.

4.1.1 Temporary Waste Rock Stockpiles for E31 Pits

Haulage and placement of waste rock to the proposed waste rock stockpile areas are within 300m of the original proposed stockpile area, resulting in a negligible difference in noise level at offsite receivers.

4.2 Infill TSF

The additional works for the Infill TSF will consist of the same activities as those which are approved for the existing TSF. The activities will occur adjacent to the existing TSF within 400m of the currently approved area. In the context of the nearest receivers within 3km to 4km, the difference in separation distance between the original and proposed activities is so minor, the difference in received noise levels at offsite receiver locations will be negligible.

4.3 Establishment of Clay and Filter Material Borrow Pits

This will involve the use of mining equipment similar to that used for load and haulage of waste and ore in an area within 500m of E31N pit and the approved Rosedale borrow pit location. The modification does not involve any substantial changes in equipment use, intensity or significant change in location of works relative to existing operations. Considering that the separation distance between the original and proposed pit locations is so minor, the difference in received noise levels at offsite receiver locations will be negligible.

4.4 Rosedale (TSF3) Tailings Pipeline

The realignment of a tailings pipeline to Rosedale TSF will be required to accommodate the proposed modifications to other mining areas and activities. The modification does not involve any substantial changes in equipment use, intensity or significant change in location of the pipeline relative to existing operations. Considering that the separation distance between the original and proposed pit locations is so minor, the difference in received noise levels at offsite receiver locations will be negligible.

4.5 TSF2 Buttressing

Additional buttressing of the eastern embankment of TSF2 is required to meet updated safety standards. This will involve the use of a mining dump truck to deliver material (2 movements/15minutes), a small dozer to push material into place, with a total sound power level of approximately 116dBA (re 10^{-12} Watts).

In the context of the nearest receivers being within 2km, and that these activities are to be carried out during the daytime hours, the potential for adverse noise impacts would be expected to be negligible compared to that of an operating mine site. However, to confirm this, a simple calculation shows that the received noise at the nearest privately owned (not owned by NPM) receivers – R03 (Hubberstone) and a newly constructed residence (Receiver A) to the immediate north west of R03 since Step Change Project Assessment - would be below 40dBA, the minimum applicable NPfI daytime noise criteria of 40dB $LA_{eq(15min)}$ and the existing INP criteria of 35dB $LA_{eq(15min)}$.

It is noted that these TSF 2 Buttressing works would only occur for a period of approximately 3 months.

4.6 Contractors Facilities

The relocation of contractor facilities is required because of the works required for buttressing the western side of TSF2 and construction of the Infill TSF (covered by existing approvals).

These contractor facilities will be relocated within the existing Approved Operational Area, in the general vicinity of the current facilities. These works will include construction of crib rooms, bath house, carparking and workshop facilities similar to those which require relocation. The use of mobile cranes, truck/ low loaders and minor civil and concreting works would be required to complete this task. In the context of an operating mine site, the noise emissions from such activities would be at least 10dB below that generated from mining and processing operations and are considered negligible.

4.7 E22 Portal

A new portal and associated decline to the existing approved E22 access heading is proposed to improve operational efficiencies and reduce overland ore transport. The new portal would be located in the north-eastern corner of Limestone National Forest (see **Figure 1**). This area is not currently approved for disturbance. The portal would be primarily used for ore transport to the surface, however it may also be used for personnel/vehicle/equipment access in the future. The new portal would also incorporate an associated conveyor (connecting into the mine's existing conveyor system) and water management infrastructure (e.g. surge dams, dewatering sumps etc).

4.7.1 Noise Emissions

Construction of the new E22 portal would be via a box cut using an excavator and haul truck followed by blasting the decline development once rock is encountered. This equipment team is estimated to have a sound power level of approximately 117dBA (re 10^{-12} Watts). In the context of the nearest receivers being within 2km, the potential for adverse noise impacts would be expected to be negligible compared to that of an of an operating mine site. However, to confirm this, a simple calculation shows that the received noise at an offsite receiver would be below 35dBA, the minimum applicable night time noise criteria.

4.7.2 Blasting Emissions

The development of the decline will be undertaken via blasting through and will have potential to generate airblast overpressure and ground vibration.

An estimation of air-blast overpressure and ground-borne vibration levels has been conducted in accordance with methods in AS2187.2. The estimation adopted a MIC of 350kg with blasting assumed to be within the E22 portal area.

Air-Blast Overpressure

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

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

Where:

P = Pressure, in kilopascals;

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

R = Distance from charge, in metres;

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

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

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

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

Ground-Borne Vibration

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

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

Where:

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

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

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

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

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

Airblast overpressure and ground vibration levels are predicted to meet the criteria at the closest receivers for blasts up to 350kg MIC from E22 portal are presented in **Table 3**.

Table 3 Blasting Emissions E22 Portal			
Receiver ID	Distance to Charge, m	Airblast Overpressure dBZ Peak	Ground Vibration mm/s
R02	5632	<100	0.12
R03	4389	<100	0.18
R04	4513	<100	0.18
R07	4100	<100	0.20
R08	6457	<100	0.10
R09	5954	<100	0.11
R10	6342	<100	0.10
R13	9783	<100	0.05
R16	5601	<100	0.12
R18	5347	<100	0.13
R56	4422	<100	0.18
R57	4775	<100	0.16

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5 Discussion and Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Assessment to qualify potential noise emissions from minor alterations to disturbance areas, and operating locations of various mining operations and infrastructure for the Northparkes Mines, located 27km north west of Parkes, NSW.

The assessment has been made in comparison to the approved operations resulting from the assessment completed for the Step Change Project. To determine the likely impacts resulting from the proposed modification, qualitative and quantitative assessments have been completed.

In summary, the proposed changes to operational areas or disturbance are relatively minor with the distance between the existing and proposed locations are in the order of 100m to 500m. In the context of these minor alterations in distance to receivers that are 3km to 4km from the project site, the difference in received noise levels at offsite receiver locations will be negligible.

Where a new work area is introduced, such as the TSF buttressing and the nearest receivers are 2km from the project site, a simple calculation shows that the received noise at those receivers (R03 Hubberstone and Receiver A) would be below the existing INP daytime noise criteria of 35dB LAeq(15min) and would not significantly add to existing noise levels from mining and processing operations. It is noted that NPM have an existing commercial agreement with the owner of Avondale regarding potential noise impacts. The Avondale Property is also presently vacant and is expected to remain vacant for the remaining life of the mine (i.e. until 2032).

Similarly, the development of the new E22 portal is expected to result in negligible impacts compared to existing noise levels from mining and processing operations. Calculations shows that the received noise at offsite receivers would be below the minimum applicable night time noise criteria of 35dBA.

Blasting emissions (airblast overpressure and ground vibration) from the portal decline development are predicted to meet the relevant criteria at the nearest receivers for blasts up to 350kg MIC.

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Appendix A – Glossary of Terms

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

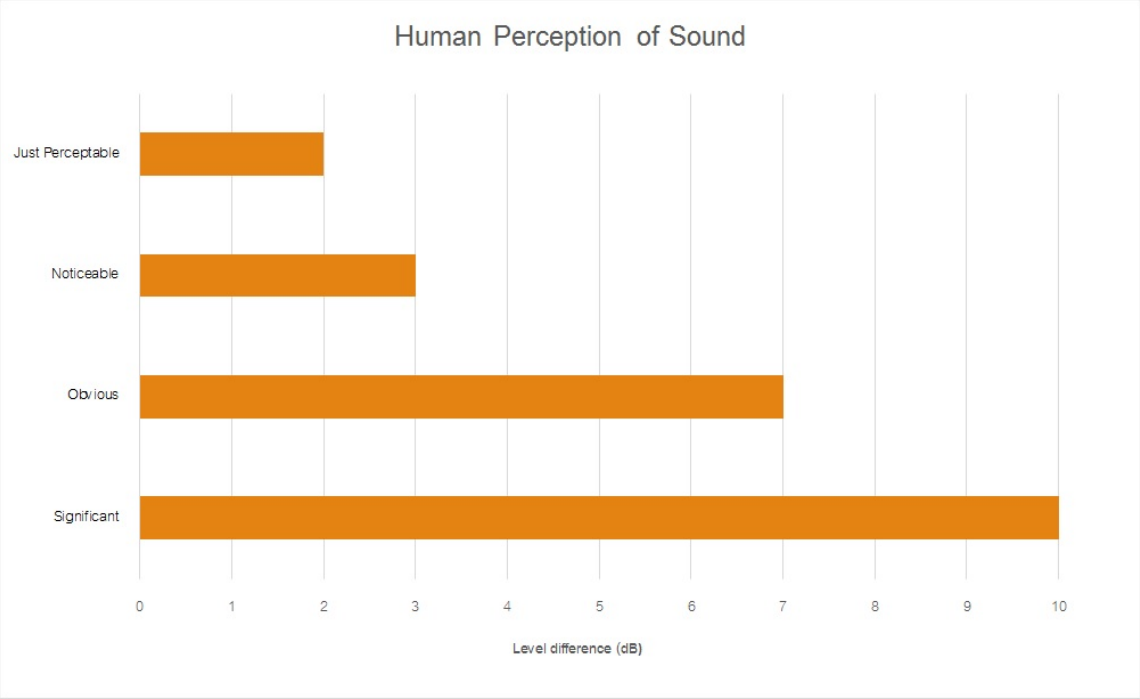
Table A1 Glossary of Acoustical Terms

Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPfI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The total noise associated with a given environment. Typically, a composite of sounds from all sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to sound.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is usually represented by the LA90 descriptor
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Z-weighted or decibels Linear (unweighted).
Extraneous Noise	Sound resulting from activities that are not typical of the area.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A sound level which is exceeded 10% of the time.
LA90	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
LAeq	Represents the average noise energy or equivalent sound pressure level over a given period.
LAmax	The maximum sound pressure level received at the microphone during a measuring interval.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
RBL	The Rating Background Level (RBL) as defined in the NPfI, is an overall single figure representing the background level for each assessment period over the whole monitoring period. The RBL, as defined is the median of ABL values over the whole monitoring period.
Sound power level (Lw or SWL)	This is a measure of the total power radiated by a source in the form of sound and is given by 10.log10 (W/Wo). Where W is the sound power in watts to the reference level of 10^{-12} watts.
Sound pressure level (Lp or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from Lw in that it is the sound level at a receiver position as opposed to the sound 'intensity' of the source.

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

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Pressure Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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