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Report R01 Rev2 22194

30 December 2022

Costerfield Mine Operations
Review of Brunswick West TSF Noise Control Requirements

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PROJECT SUMMARY:

R01 Rev2 22194

Costerfield Mine Operations

Review of Brunswick West TSF Noise Control Requirements

PREPARED FOR:

Mandalay Resources Costerfield Operations
McNicols Lane

Costerfield VIC 3523

ATTENTION:

Shannon Green

REFERENCE	REV	STATUS	DATE	AUTHOR	REVIEWER
R01 22194	-	ISSUED	20 DEC 2022	R LEO	A CHANDHOK
R01 22194	1	ISSUED	30 DEC 2022	R LEO	A CHANDHOK
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Contents

1.0 INTRODUCTION

Mandalay Resources Costerfield Operations (MRCO) operate a mine at Costerfield in central Victoria. MRCO are seeking to construct a Tailing Storage Facility (TSF) to the north-west of the Brunswick Plant which will be known as Brunswick West TSF as well as an adjacent Return Water Pond (RWP).

Clarity Acoustics Pty Ltd (Clarity Acoustics) has been engaged by MRCO to review noise from the proposed construction and operation of the TSF and RWP in terms of noise controls to enable compliance with the relevant environmental noise criteria. This report provides details of the proposed night time site operations, measured background noise environment, relevant noise criteria, an assessment of operational noise from the proposed site operations and recommended noise controls.

A glossary of acoustic terminology used in this report is provided in APPENDIX A.

2.0 PROJECT DESCRIPTION

2.1 Subject site

The subject site is located at 200 Bradleys Lane in Costerfield. The nearest affected receivers are dwellings:

- to the south and south-east of the subject site on Bradleys Lane, Phillips Lane and Heathcote-Nagambie Road
- to the east on Heathcote-Nagambie Road
- to the north-east on Heathcote-Nagambie Road, Ward Lane and Donellys Lane
- to the north on Heathcote-Costerfield Road.

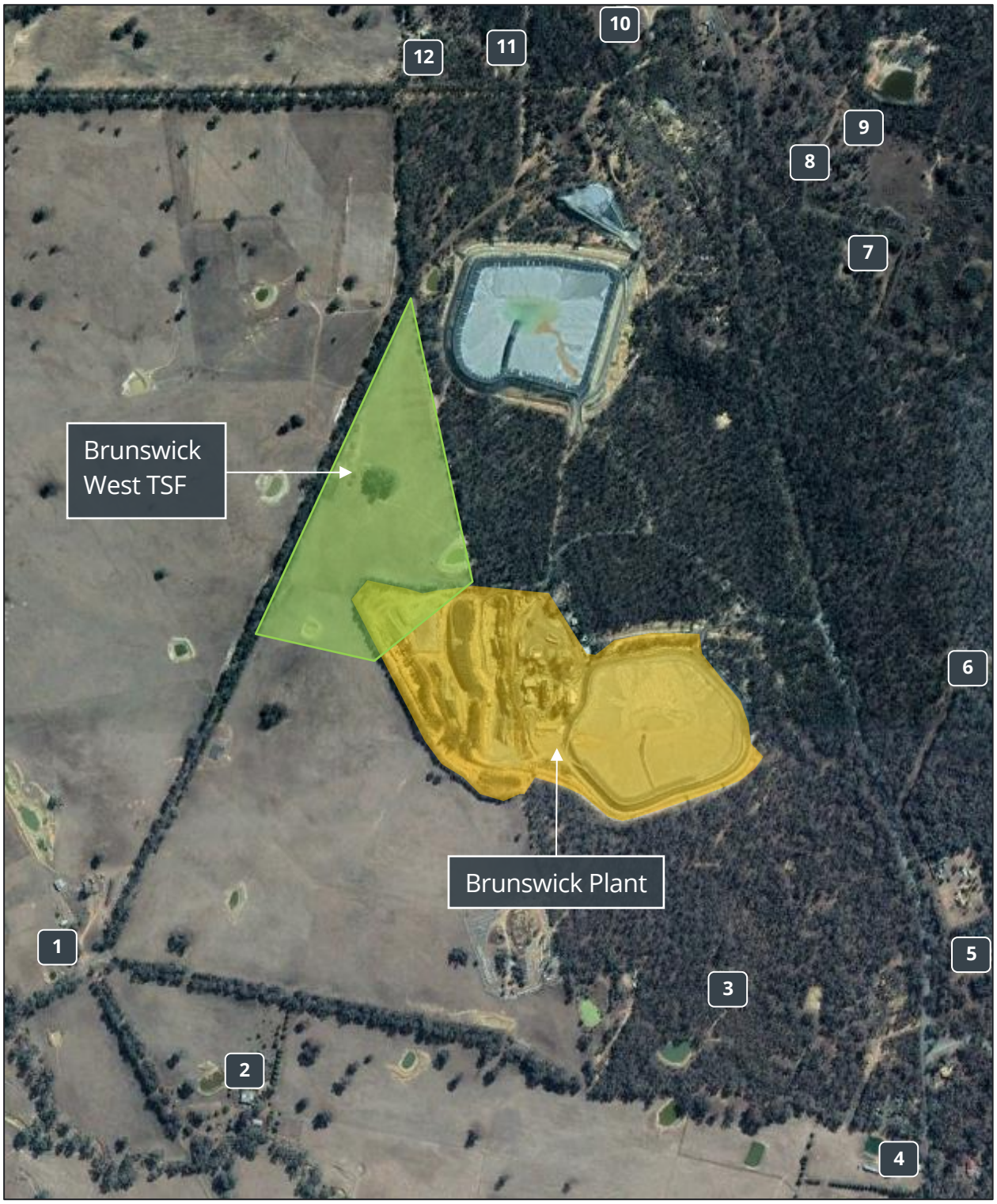
Table 1 provides details of the nearest affected receivers that have been considered in the following assessment.

Table 1 - Details of the nearest noise sensitive receivers

ID	Address	Description
R1	200 Bradleys Lane	Single storey dwelling to the south of subject site
R2	121 Phillips Lane	Single storey dwelling to the south of subject site
R3	48 Phillips Lane	Single storey dwelling to the south-east of the subject site
R4	3 Phillips Lane	Single storey dwelling to the south-east of the subject site
R5	964 Heathcote-Nagambie Road	Single storey dwelling to the south-east of subject site
R6	1014 Heathcote-Nagambie Road	Single storey dwelling to the east of the subject site
R7	1080 Heathcote-Nagambie Road	Single storey dwelling to the north-east of the subject site
R8	5 Ward Lane	Single storey dwelling to the north-east of the subject site
R9	1133 Heathcote-Nagambie Road	Single storey dwelling to the north-east of the subject site
R10	9 Donellys Lane	Single storey dwelling to the north-east of the subject site
R11	1099 Heathcote-North Costerfield Road	Single storey dwelling to the north of the subject site
R12	1097 Heathcote-North Costerfield Road	Single storey dwelling to the north of the subject site

An aerial photograph of the subject site and nearest affected receivers is provided in Figure 1. MRCO's Sensitive Receptor plan is provided in APPENDIX B.

Figure 1 - Aerial photograph of the subject site and receivers (source: Google)



The subject site is located on freehold private land zoned Farming Zone (FZ) with further FZ and Public Conservation and Resource Zone (PCRZ) in the immediate environs. The relevant planning map for the subject site is provided in APPENDIX C.

2.2 Proposed construction and operations

As outlined in Section 1.0, it is proposed to construct a TSF to the north-west of the Brunswick Plant. As part of this assessment, we have considered two construction options as follows:

- **Excavator Truck Option -** Cat 330-345 excavator x 1 & Cat 740/John Deere 400D 40t articulated dump truck x 4
- **Dozer Scraper Option -** Cat D9T Dozer x 1 & Cat 631G Scraper x 4

In addition, both construction options will include the following auxiliary equipment:

- Cat 16-20t Pad foot x 2
- Cat 740 Water Truck x 2
- Cat 14H/M Grader x 1
- CASE Steiger 600 Tractor Scoop x 2.

In terms of operation, the only noise source associated with the TSF and RWP will be a submersed pump such as a Flygt BS 2750 or similar.

3.0 VICTORIAN GUIDELINES AND LEGISLATION

The following sections outline the key noise legislation in Victoria and related guidelines and standards relevant to the application.

3.1 Environment Protection Act 2017

The Environment Protection Act 2017 (the Act) provides a legislative framework for the protection of the environment in Victoria and establishes obligations for environmental noise control. The Act does not specify noise limits but sets out the legal requirements for compliance with the subordinate legislation tools. Subordinate legislation tools have been designed to support the Act which include the Environment Protection Regulations.

3.2 Environment Protection Regulations 2021

The Environment Protection Regulations 2021 (S.R. No. 47/2021) set out the framework for noise from residential, commercial, industrial and trade premises as well as from indoor and outdoor entertainment venues and events. The Regulations require that noise levels from commercial, industrial and trade premises and indoor and outdoor entertainment venues and events are set to protect noise sensitive areas from unreasonable noise.

The Environment Protection Regulations replace the following legislative instruments:

- *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* (SEPP N-1)
- *State Environment Protection Policy (Control of Music Noise from Public Premises) No. N-2* (SEPP N-2)
- *Environment Protection (Residential noise) Regulations 2018*.

For commercial, industrial and trade premises the Regulations outline:

- noise limits that apply to commercial, industrial and trade premises in both urban and rural areas of Victoria
- noise sensitive areas where noise limits apply
- how the noise level at noise sensitive areas is determined
- the levels at which noise is considered to be aggravated.

Regulation 113 (Part 5.3) of the Regulations requires that the prediction, measurement and analysis of noise from commercial, industrial and trade premises and indoor and outdoor entertainment venues and events must be undertaken in accordance with the Noise Protocol (i.e., EPA Publication 1826-4).

3.3 1826-4

EPA Publication 1826-4 Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (Noise Protocol) is incorporated into the Environment Protection Regulations and outlines the EPA's approach to the determination of noise limits and to the measurement, prediction and analysis of noise.

Part I of the Noise Protocol outlines the methodology to establish noise limits applicable to noise from commercial, industrial or trade premises in both urban and rural areas of Victoria. The subject site is located outside a Major Urban Area (MUA) boundary and, therefore, noise limits for the subject site are derived using the rural area method.

For commercial, industrial or trade premises in rural areas, the noise limits are determined based on the land zoning designations near the noise generator and the noise sensitive receiver area.

Once a noise limit is established, the noise level from the premises is measured or predicted as a 30-minute equivalent average noise level ($L_{Aeq,\ 30\ min}$) and, if necessary, adjusted to account for duration, measurement position and noise character (such as tonality, intermittency and impulsiveness) to determine the effective noise level (L_{eff}).

It should be noted that noise from site clearing and preparation works associated with mines, quarries and landfills may be exempt from noise limits during the day period.

Refer to APPENDIX D for further detail on the derivation of noise limits and the assessment of noise from commercial, industrial or trade premises under the Noise Protocol.

3.4 Planning Permit noise requirements

The following is an excerpt from the Planning Permit for the existing mining and process operations. Equivalent noise limits have been proposed by MRCO for the subject site:

"Maximum noise levels at adjoining residences shall be:

Day:		
Monday – Friday	*(0700-1800 hours)*	*45 dB (A)*
Saturday	*(0700-1300 hours)*	*45 dB (A)*
Evening:		
Monday – Sunday	*(1800-2200 hours)*	*42 dB (A)*
Saturday	*(1300-1800 hours)*	*42 dB (A)*
Sunday and Public Holidays	*(0700-1800 hours)*	*42 dB (A)*
Night:		
Monday – Sunday	*(2200-0700 hours)*	*36 dB (A)*
Construction:		
Monday – Friday	*(0700-1800 hours)*	*55 dB (A)*

Noise levels under this condition must be assessed in accordance with the procedures set in State Environment Protection Policy No. N-1"

3.5 EPA publication 1996

EPA Publication *1996: Noise guideline – assessing low frequency noise* is a guideline to address low frequency noise emissions (10 Hz to 160 Hz) associated with commercial, industrial and trade premises. The guideline applies to low frequency noise from existing premises as well as new commercial, industrial and trade premises or to the installation of new plant or equipment at existing premises.

The guideline provides threshold levels for assessing low frequency noise. Low frequency noise associated with commercial, industrial and trade premises should be assessed by comparing the Z-frequency weighted (i.e., linear or unweighted) noise levels in one-third octave bands from 10 Hz to 160 Hz against the low frequency threshold levels set out in the guideline. Threshold levels are provided separately for indoor measurements and outdoor measurements.

Low frequency noise threshold levels nominated in Publication 1996 for indoor low frequency noise are outlined in Table 2.

Table 2 – Indoor one-third octave low frequency noise threshold levels, dB L_{eq}

Description	One-third Octave Band Centre Frequency (Hz)												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Indoor low frequency noise threshold level	92	87	83	74	64	56	49	43	42	40	38	36	34

Low frequency noise threshold levels nominated in Publication 1996 for outdoor low frequency noise measurements are outlined in Table 3.

Table 3 – Outdoor one-third octave low frequency noise threshold levels, dB L_{eq}

Description	One-third Octave Band Centre Frequency (Hz)												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Outdoor low frequency noise threshold level	92	89	86	77	69	61	54	50	50	48	48	46	44

The guideline sets out the procedure to measure low frequency noise from commercial, industrial and trade premises and subject to the measurement location (indoor or outdoor) requires that the measured noise levels in the one-third octave bands between 10 Hz and 160 Hz are compared to the relevant threshold levels outlined in Table 2 or Table 3.

The threshold levels set out in the guideline are not set limits. Rather, they are levels that indicate a potential risk of problematic low frequency noise. The general environmental duty (GED) which is at the centre of the Act requires that businesses must reduce the risk of harm from activities to human health and the environment and from pollution or waste. As such, if a risk of problematic low frequency noise is identified when the measured noise levels from commercial, industrial and trade premises exceed the thresholds outlined in Table 2 or Table 3, further analysis is required to address the low frequency noise and consideration should be given to reasonable and feasible mitigation options to minimise the low frequency noise.

4.0 ASSESSMENT OF TSF/RWP CONSTRUCTION AND OPERATIONAL NOISE

Noise associated with the construction and operation of the TSF/RWP must comply with the permit requirements. Compliance is determined by comparing the predicted effective noise level (L_{eff}) from the construction and operation of the TSF/RWP to the noise limits at the nearest affected receivers.

The following sections detail the methodology for noise prediction from the proposed construction and use of the TSF/RWP, the noise limits applicable and compare the predicted noise levels with the noise limits for the subject site.

4.1 Assessment methodology

Noise levels from the construction and operation of the TSF/RWP have been calculated using the proprietary noise modelling software SoundPLAN v8.2 which implements International Standard ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2).

The noise modelling considers the following:

- The noise prediction methodology outlined in APPENDIX E
- Source noise levels for noise sources associated with the construction and operation of the TSF/RWP operation as summarised in APPENDIX F
- Attenuation of noise provided by distance between the source and receiver, and screening provided by terrain
- Existing terrain for the subject site and surrounding area and the future terrain for the single level TSF/RWP supplied by MRCO
- Reflections from built form, adjacent buildings, screening structures and the ground surface. 50 % hard ground surface has been assumed for the subject site and surrounding area
- Adjustments for specific noise characteristics such as tonality or intermittency, where necessary
- Duration of exposure at the receiver locations, assessed over a 30-minute period in accordance with the requirements of the Noise Protocol. For the purpose of this assessment, we have assumed that all relevant equipment may operate at full capacity over a 30-minute assessment period.

4.2 Noise sensitive receiver grouping

For brevity, receivers have been grouped together based on the predicted noise exposure and only predicted noise levels for the most affected dwelling of each group have been presented. Receiver locations have been grouped as outlined in Table 4.

Table 4 – Receiver groups based on predicted noise exposure

Receivers	Address
R1 and R2	200 Bradley Lane and 121 Phillips Lane
R3	48 Phillips Lane
R4	3 Phillips Lane
R5	964 Heathcote-Nagambie Road
R6	1014 Heathcote-Nagambie Road
R7, R8 and R9	1080 Heathcote-Nagambie Road, 5 Ward Lane and 1133 Heathcote-Nagambie Road
R10, R11 and R12	9 Donellys Lane, 1099 Heathcote-North Costerfield Road and 1097 Heathcote-North Costerfield Road

4.3 Construction noise

The following provides an assessment of the noise associated with the construction of the TSF and RWP against the proposed construction noise limits.

4.3.1 Construction noise limits

As outlined in Section 3.4, noise levels associated with the proposed day time construction of the TSF and RWP should not exceed 55 dB L_{eff} at neighbouring residential receivers. It is noted that construction is not proposed to occur outside of the day period.

4.3.2 Construction noise predictions

Predicted noise levels from the proposed construction of the TSF & RWP are presented in Table 5.

Table 5 - Predicted construction noise levels, dB L_{eff}

	Predicted noise level at receiver						
Description	**R1 & R2**	**R3**	**R4**	**R5**	**R6**	**R7, R8 & R9**	**R10, R11 & R12**
Excavator Truck option	37	36	31	33	36	39	39
Dozer Scraper option	40	39	34	36	39	42	42
Construction noise limit	**55**	**55**	**55**	**55**	**55**	**55**	**55**
Compliance?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

As detailed in Table 5, the construction of the proposed TSF and RWP is predicted to comply with the proposed day time construction noise limit of 55 dB at all nearby dwellings. It should be noted that the predicted noise levels are based on all equipment at grade which is considered a worst-case scenario due to the additional screening that will be provided by the TSF/RWP walls and the permanent topsoil stockpile (to be located in the northern extents of the subject site) as the construction proceeds.

Noise contours for each scenario above are provided in APPENDIX G.

4.4 Operational noise

The following provides an assessment of the operational noise associated with the RWP against the construction noise limits.

4.4.1 Operational night time noise limits

The noise limits for the subject site have been calculated in accordance with the methodologies prescribed in the Noise Protocol and are provided in Table 6 as well as with the criteria included in the planning permit and the noise limits derived in accordance with the now superseded SEPP N-1.

Table 6 – Night time noise limits

Description	Noise limit, dB L_{eff}
Noise Protocol	36
Planning permit	36
SEPP N-1	37
Lowest limit	**36**

It can be seen from Table 6 that the criteria derived in accordance with the Noise Protocol is the most stringent and is consistent with the requirements of the proposed noise limits. As outlined in Section 3.2, as of 1 July 2021, compliance with the Noise Protocol is mandatory for all commercial, trade and industrial premises in Victoria.

To comply with the requirements of the Noise Protocol, the total noise level from all of the subject site noise sources covered under the Noise Protocol must not exceed the above night-time noise limit when assessed over a 30-minute period.

For the purposes of this assessment, noise from the pump associated with the RWP should achieve a noise level at least 10 dB below the night period noise limit (i.e., < 26 dB L_{eff}) which will result in cumulative compliance with the night time noise limits for all equipment associated with the proposed and existing operation of the subject site.

4.4.2 Operational noise predictions

Predicted noise levels from the proposed night time operation of the RWP pump are presented in Table 7.

Table 7 - Predicted operational noise levels (Night), dB L_{eff}

Description	Predicted noise level at receiver						
	R1 & R2	R3	R4	R5	R6	R7, R8 & R9	R10, R11 & R12
RWP pump	<20	<20	<20	<20	<20	<20	<20
Noise Limit	**26**	**26**	**26**	**26**	**26**	**26**	**26**
Compliance?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

As detailed in Table 7, noise levels from the operation of the RWP pump is predicted to comply with the "night time noise limit minus 10 dB criterion" at all nearby dwellings. By extension, compliance with the less stringent day and evening noise limits will also be achieved.

4.5 Low frequency noise assessment

As outlined in Section 3.5, low frequency noise from the proposed construction and the operation of the RWP should not exceed the thresholds outlined in EPA publication 1996. Table 8 provides the predicted low frequency noise levels for construction of the TSF and RWP and the night time operation of the RWP pump. It should be noted that only the highest predicted noise levels are provided for each scenario.

Table 8 – Predicted one-third octave low frequency noise levels, dB L_{eq}

Description	One-third Octave Band Centre Frequency (Hz)												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Construction													
Excavator Truck option	24	25	32	28	24	39	36	31	36	36	41	41	34
Dozer Scraper option	25	26	29	26	27	30	36	36	37	43	45	46	35
Operation													
RWP pump	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Outdoor low frequency noise threshold level	**92**	**89**	**86**	**77**	**69**	**61**	**54**	**50**	**50**	**48**	**48**	**46**	**44**
Compliance?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

It can be seen from Table 8 that the EPA Publication 1996 low frequency noise threshold levels are not predicted to be exceeded at the nearest affected receivers.

5.0 SUMMARY

MRCO operate a mine at Costerfield in central Victoria. MRCO are seeking to construct a Tailing Storage Facility (TSF) to the north-west of the Brunswick Plant which will be known as Brunswick West TSF as well as an adjacent Return Water Pond (RWP).

Clarity Acoustics has carried out an environmental noise assessment of the proposed construction of the TSF and RWP and the operation of the RWP pump and found that compliance with the proposed acoustic criteria are predicted to be achieved at all nearby noise sensitive receivers .

It was also found that low frequency noise from the subject site would not exceed the EPA publication 1996 low frequency noise thresholds during the proposed construction of the TSF and RWP and the operation of the RWP pump.

APPENDIX A GLOSSARY OF TERMINOLOGY

dB	Decibel (dB) a relative unit of measurement widely used in acoustics, electronics and communications. The dB is a logarithmic unit used to describe a ratio between the measured sound level and a reference or threshold level of 0 dB.
A-weighting	The A-weighting filter covers the full audio range - 20 Hz to 20 kHz and the shape is similar to the response of the human ear at lower levels. A-weighted measurements correlate well with the perceived loudness at low sound levels, as originally intended.
Hz	Hertz (Hz) the unit of Frequency or Pitch of a sound. One hertz equals one cycle per second. 1 kHz = 1000 Hz, 2 kHz = 2000 Hz, etc.
$L_{A90\,(t)}$	The sound level exceeded for 90% of the measurement period, A-weighted and averaged over time (t) and commonly referred to as the background sound level.
$L_{Aeq\,(t)}$	A –weighted equivalent continuous sound Level is the sound level equivalent to the total sound energy over a given period of time (t). Commonly referred to as the average sound level.
L_{eff}	The level of noise emitted from the commercial, industrial or trade premises and adjusted, if appropriate, for character and duration.
L_{wA}	Sound Power Level in decibels is ten times the logarithm of the ratio of the sound power (W) to the reference sound power (Wo) of 1 picowatt.

ADVERTISED PLAN

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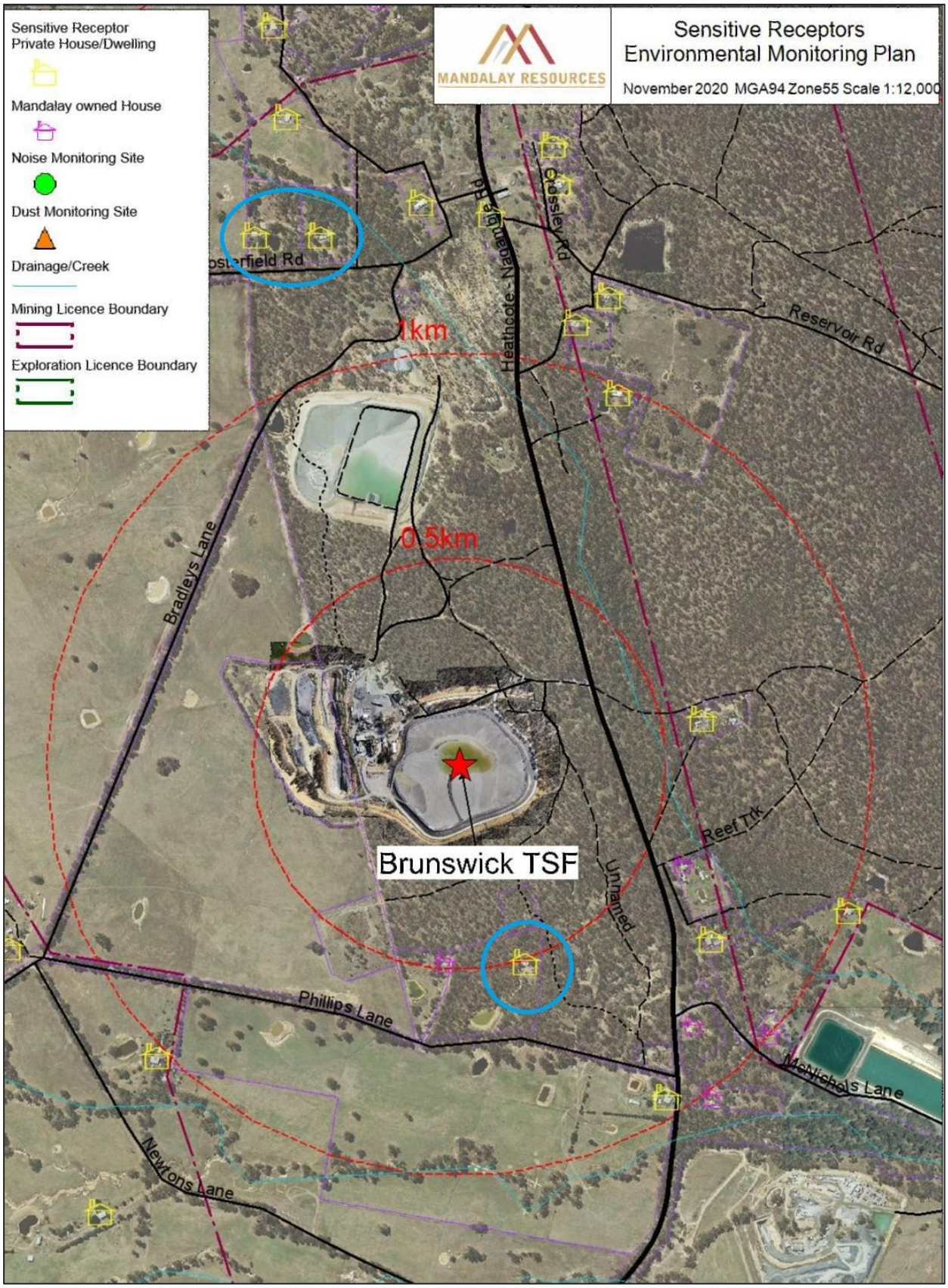
APPENDIX B NOISE SENSITIVE RECEPTOR PLAN



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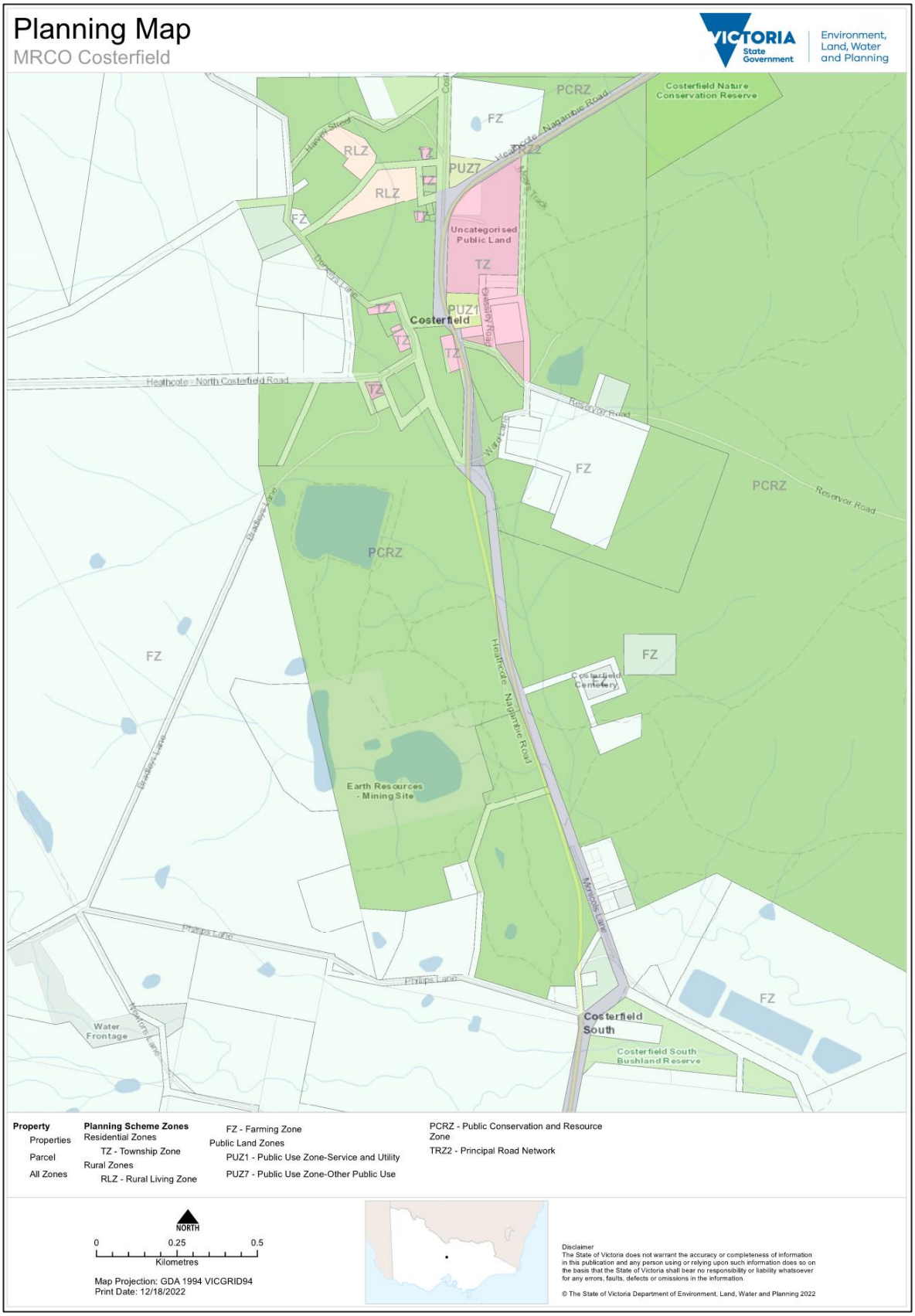
APPENDIX C PLANNING MAP



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APPENDIX D 1826-4 (NOISE PROTOCOL)

The Environment Protection Regulations 2021 (S.R. No. 47/2021) set out a framework for noise from residential, commercial, industrial and trade premises. Regulation 113 (Part 5.3) of the Regulations requires that the prediction, measurement and analysis of noise from commercial, industrial and trade premises and indoor and outdoor entertainment venues and events must be undertaken in accordance with the Noise Protocol (i.e., EPA Publication 1826-4 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*).

Part I of the Noise Protocol outlines the methodology to establish noise limits applicable to noise from commercial, industrial or trade premises in both urban and rural areas of Victoria. The Noise Protocol also outlines the methodology to undertake a measurement of prediction of the effective noise level at a noise sensitive area from the noise generator. The subject site is not located within a Major Urban Area (MUA) boundary and, therefore, noise limits for the subject site are derived using the rural area method.

Table 9 provides a summary of relevant definitions under the Noise Protocol.

Table 9 – Noise Protocol definitions

Term	Definition
Commercial, industrial and trade premises	any premises except the following: (a) residential premises (other than common plant under the control of an owner's corporation); b) a street or road, including every carriageway, footpath, reservation and traffic island on any street or road; (c) a railway track used by rolling stock in connection with the provision of a freight service or passenger service – (i) while travelling on a railway track or tramway track; or (ii) while entering or exiting a siding, yard, depot or workshop; (d) a railway track used by rolling stock in connection with the provision of a passenger service, while in a siding yard, depot or workshop and is – (i) powering up to commence to be used in connection with the provision of a passenger service; or (ii) shutting down after being used in connection with the provision of a passenger service; (e) the premises situated at Lower Esplanade, St Kilda and known as "Luna Park" and being the whole of the land more particularly described in Certificate of Title Volume 1204 Folio 109.
Residential premises	Any building or part of a building used as or for the purposes of a private residence or residential flat
Noise sensitive residential use	A community care accommodation, dependent person's unit, dwelling, residential aged care facility, residential village, retirement village or rooming house
Effective noise level	the level of noise emitted from commercial, industrial and trade premises and, if appropriate, adjusted to take into account the character and duration of the noise and the measurement conditions, as determined in accordance with the Noise Protocol

Term	Definition	
Background noise level	The arithmetic average of the hourly L_{A90} levels that represents the background sounds in a noise sensitive area, in the absence of noise from any commercial, industrial or trade premises which appears to be intrusive at the point where the background level is measured, when measured according to Part I, section A4 of the Noise Protocol	
Noise sensitive area	(a) that part of the land within the boundary of a parcel of land that is - (i) within 10 metres of the outside of the external walls of any of the following buildings – a dwelling (including a residential care facility but not including a caretaker's house), a residential building, a noise sensitive residential use; or (ii) within 10 metres of the outside of the external walls of any dormitory, ward, bedroom or living room of one of more of the following buildings – a caretaker's house, a hospital, a hotel, a residential hotel, a motel, a specialist disability accommodation, a corrective institution, a tourist establishment, a retirement village, a residential village; or (iii) within 10 metres of the outside of the external walls of a classroom or any room in which learning occurs in the following buildings (during their operating hours) – a child care centre, a primary school, a secondary school; or (b) in the case of a rural area only, that part of the land within the boundary of – (i) a tourist establishment, or (ii) a campground; or (iii) a caravan park.	
Day period	Monday-Saturday (excluding public holidays)	0700-1800 hours
Evening period	Monday-Saturday	1800-2200 hours
	Sunday and public holidays	0700-2200 hours
Night period	Monday-Sunday/Public Holidays	2200-0700 hours

For commercial, industrial or trade premises in rural areas of Victoria, the noise limits are defined based on the land zoning designations near the noise generator and the noise sensitive receiver area. An adjustment for the background noise level can be made if the noise sensitive receiver area is located within a background relevant area. The Noise Protocol also sets out the methodology to adjust the noise limit where the background-relevant area is affected by high traffic noise levels.

Once a noise limit is established, the noise level from the premises is measured or predicted as a 30-minute equivalent average noise level ($L_{Aeq,\ 30\ min}$) and if necessary, adjusted to account for duration, measurement position and noise character (such as tonality, intermittency and impulsiveness) to determine the effective noise level (L_{eff}).

Compliance with the Noise Protocol is achieved when the effective noise level from all of the subject site noise sources covered under the Noise Protocol/Environment Protection Regulations do not exceed the noise limit in the relevant noise period when assessed over a 30-minute period.

APPENDIX E PREDICTION METHODOLOGY

Predictions of noise from the subject site have been undertaken on the basis of:

- The sound emissions of noise sources associated with the subject site as outlined in 0
- A digital noise model of the site and surrounding environment
- International standard(s) used for the calculation of environmental noise propagation.

Details of the prediction methodology are summarised in Table 10 below.

Table 10 - Noise prediction methodology

Detail	Description
Software	Proprietary noise modelling software SoundPLAN v8.2
Method	International Standard ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2).
Ground conditions	Ground factor of G = 0.5 i.e., 50 % hard ground
Atmospheric conditions	Temperature 10°C and relative humidity 70% This represents conditions which result in relatively low levels of atmospheric sound absorption.
Receiver heights	1.5 m above floor level
Terrain	Current surfaces and future surfaces as well as surrounding area terrain supplied by MRCO

APPENDIX F EQUIPMENT NOISE LEVEL

The assumed sound power level data for these noise sources used in our assessment is summarised in Table 11.

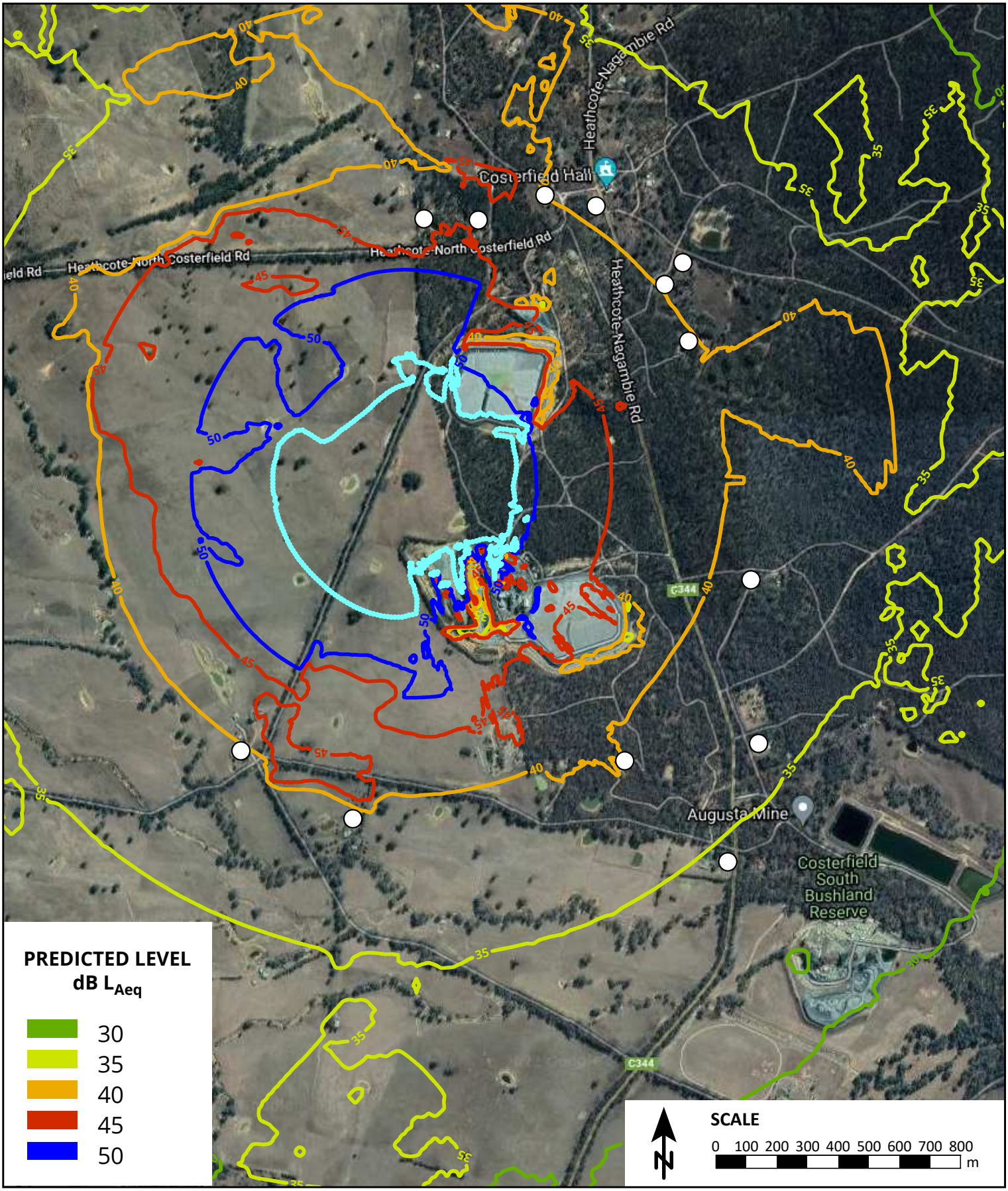
Table 11 - Sound power level of proposed equipment and activity, dB L_w

Description	One-third Octave Band Centre Frequency (Hz)																											
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	A
Construction																													
Excavator Truck option																													
CAT 330-345 Excavator	97	95	105	100	93	113	109	103	107	106	110	103	101	102	102	101	98	101	100	98	98	96	95	94	93	91	90	87	107
CAT 740/John Deer 400D 40t arctic dump truck	84	87	81	88	87	83	91	83	100	99	105	94	99	101	93	95	100	98	95	99	97	97	98	97	96	92	88	86	107
Dozer Scraper option																													
CAT D9T Dozer	99	99	1023	99	101	102	110	110	111	117	119	110	107	103	110	110	111	110	109	106	106	104	104	102	104	101	101	99	116
CAT 631G Scraper	81	85	88	85	85	90	89	84	83	85	86	88	91	94	96	99	100	98	100	102	101	99	97	97	97	93	92	85	109
Auxiliary Equipment																													
CAT 16t-20t Pad foot	85	88	92	89	88	94	92	94	101	100	106	105	100	102	94	96	101	99	96	100	99	98	99	98	97	93	89	87	108
CAT 740 Water Truck	84	87	81	88	87	83	91	83	100	99	105	104	99	101	93	95	100	98	95	99	97	97	98	97	96	92	88	86	107
CAT 14H/M Grader	86	89	93	90	89	95	93	95	102	101	107	96	101	103	95	97	102	100	97	101	100	99	100	99	98	94	90	88	109
Case Steiger 6 -Tractor Scoop [1]	81	85	88	85	85	90	89	84	83	85	86	88	91	94	96	99	100	98	100	102	101	99	97	97	97	93	92	85	109
Operation																													
RWP pump[2]	48	52	52	57	62	63	64	63	64	65	68	66	66	67	71	66	66	69	71	72	77	71	70	69	67	66	64	64	81

[1] Based on CAT 631 G Scraper one-third octave band data

[2] Assumed one- third octave data based on sound power level and typical octave band spectrum

APPENDIX G NOISE CONTOURS



COSTERFIELD MINE

TSF Construction Noise - Dozer + Scraper option

CLARITY ACOUSTICS

Project: Costerfield Mine - TSF Review

Project No.: 22194

Customer: Mandalay Resources Costerfield Operations

Run Date: 20/12/2022

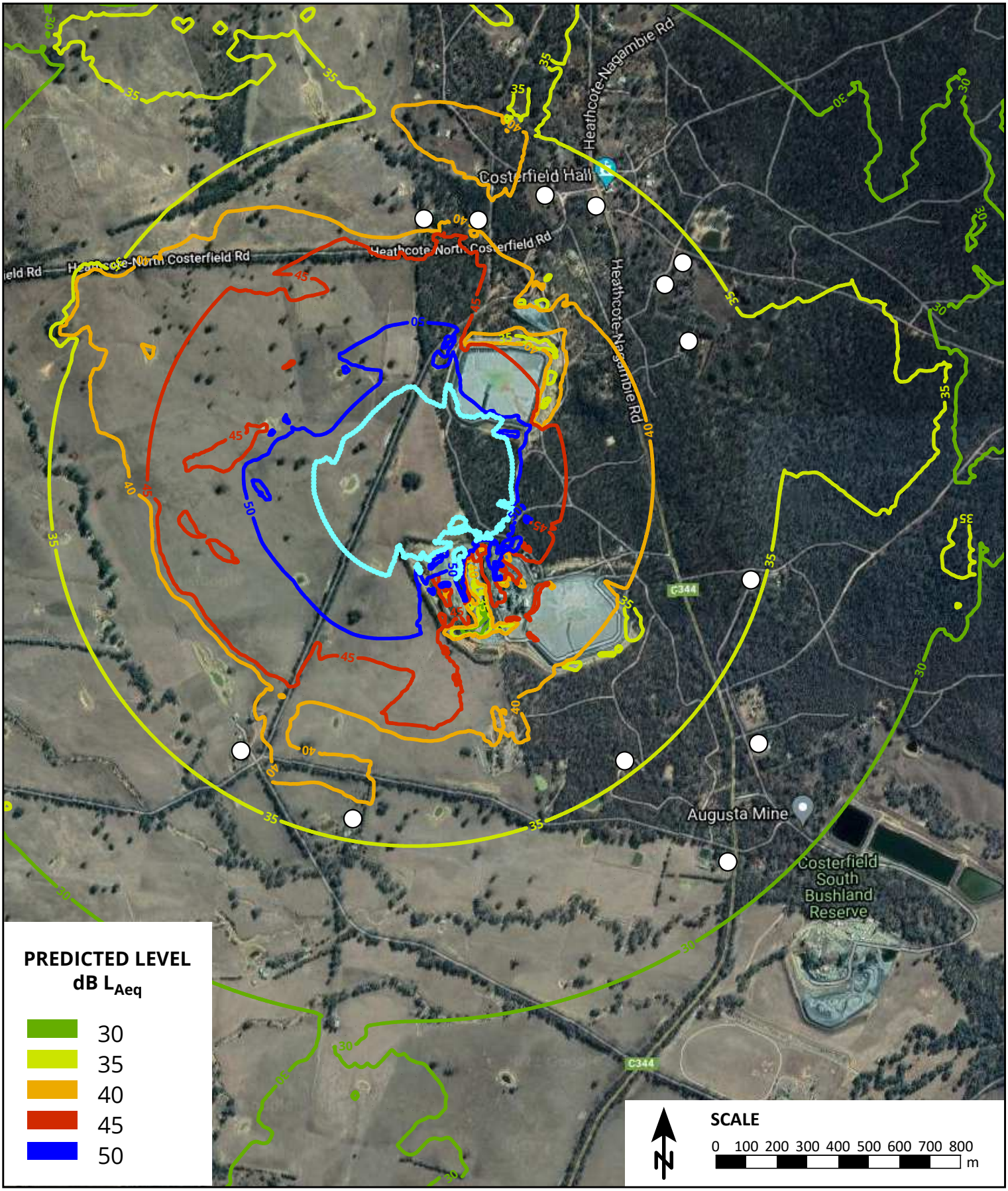
Receiver/Prediction height: 1.5 m

Prediction algorithm: ISO 9613-2: 1996

LEGEND

Construction noise limit

Residential receiver



COSTERFIELD MINE

TSF Construction Noise - Excavator + Truck option

CLARITY ACOUSTICS

Project: Costerfield Mine - TSF Review

Project No.: 22194

Customer: Mandalay Resources Costerfield Operations

Run Date: 20/12/2022

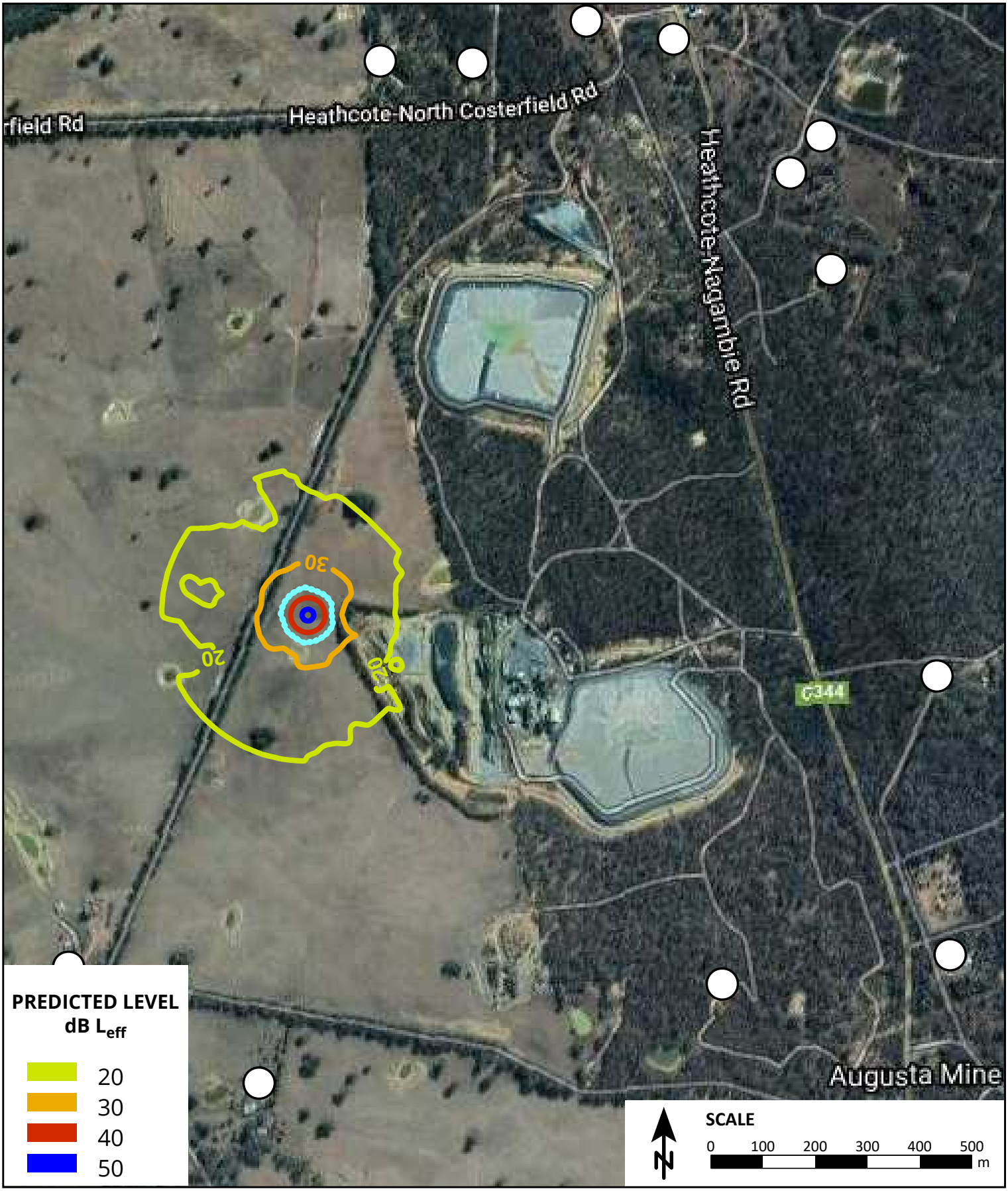
Receiver/Prediction height: 1.5 m

Prediction algorithm: ISO 9613-2: 1996

LEGEND

Construction noise limit

Residential receiver



ADVERTISED PLAN

COSTERFIELD MINE

RWP Operational Noise Levels

CLARITY ACOUSTICS

Project: Costerfield Mine - TSF Review

Project No.: 22194

Customer: Mandalay Resources Costerfield Operations

Run Date: 20/12/2022

Receiver/Prediction height: 1.5 m

Prediction algorithm: ISO 9613-2: 1996

LEGEND

Night time noise limit

Residential receiver