Colac Quarry, Northern Development Area

Colac Quarry Northern Development Area: Acoustic Assessment.

Holcim (Australia) Pty Ltd

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1 Overview

1.1 Introduction

Aurecon Australasia Pty Ltd (Aurecon) was engaged by Holcim Australia Pty Ltd (Holcim) through a Request for Quotation (RFQ) process in July 2019. The RFQ scope involved a Colac Quarry Work Authority Application, Work Plan, Planning Permit Application and Supporting Assessment at 170 Ondit-Warrion Road, Ondit in Victoria (herein referred to as 'the Site').

Holcim are seeking to expand their existing basalt quarry extraction area "existing quarry", known as Colac Quarry, at Ondit, 15 kilometres north of Colac in Victoria's western district (the Project). The current Work Authority 158 (WA158) comprises land located at 75-95 Potters Road, Ondit. Holcim have finalised the purchase of approximately 41 hectares at the Site to the north of the existing site to form a new Work Authority adjacent to WA158.

1.2 Scope of Works

Holcim Australia Pty Ltd has instructed Aurecon to assess the Northern Development Area (NDA) Colac Quarry extension with respect to the potential noise impacts on the closest Noise Sensitive Areas (NSAs).

The scope of the assessment has been split into two key periods, construction and operation. They have been assessed to their respective guidelines.

Additionally, the cumulative noise assessment of the current Holcim Colac Quarry operations have been included in both scenarios as this remains constant during the construction and future operation of the quarry.

1.3 References

The following documents are referred to in this report:

- Planning Permit, (283/95)
- Environment Protection Act 2017 (the EP Act)
- EPA Publication 1826.4, Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues, May 2021 (Noise Protocol)
- Readymix Colac Quarry, Potters Road, Ondit: Proposed Quarry Extension Southern Development Area, Noise Impact Assessment, Watson Moss Growcott Acoustics, 2006 (WMG Report)
- ISO 9613-2:1996, Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation (ISO 9613)
- EPA Publication 1996, Noise Guidelines: Assessing low frequency noise, June 2021 (EPA 1996)
- EPA Publication 1891, Managing Truck Noise, May 2021 (EPA 1891)

1.4 Noise Sensitive Receptors

The closest NSAs have been marked up on the map below highlighted with green points. The assessment NSAs are identified on the map shown in Figure 1:

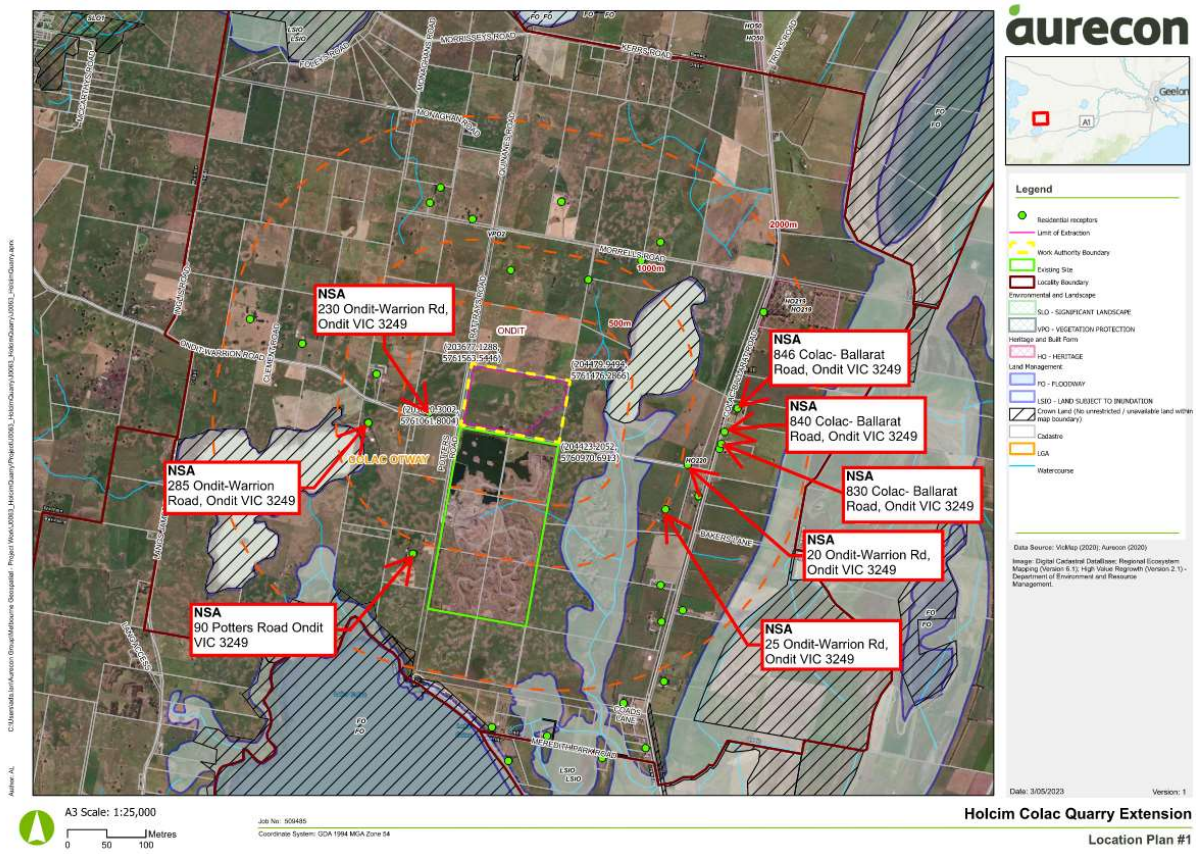


Figure 1: Noise Sensitive Areas within proximity of the Holcim Colac Quarry

As these are the closest NSAs to the Holcim Quarry and the NDA, compliance at these NSAs would subsequently mean compliance with the noise criteria at NSAs further away from the quarry operations.

The dwelling at 230 Ondit-Warrion Road has not been habitable for an extended period, however, has been included in the assessment in case the property is made habitable during the project construction and operation.

1.5 Methodology

The noise assessment methodology in this report is as follows:

- Identify the NSAs within proximity of the quarry extension
- Define the criteria for construction and operation activities for the noise assessment based on applicable guidelines and planning permits
- Identify the noise emitting equipment for the proposed future construction and future operations and determine Sound Power Levels (SWLs)
- Undertake onsite noise source measurements of equipment being utilised for the NDA operation to acquire additional SWL data
- Predict the construction and operational noise levels at the NSAs and assess during which time periods the predicted noise levels comply with the defined noise criteria.

1.6 Assumptions

This assessment has been based on the following assumptions.

- Current quarry operations will occur concurrently with the construction and operation of the NDA extension.
- The construction of the NDA extension will be assessed with respect to the Noise Protocol Earth Resources derived noise limits.
- The assessment of the current plant was taken from the sales area north of the office as per the current operations of the Holcim Quarry. This is shown graphically in Figure 3.
- The assessment considers noise propagation loss due to topography, distance, ground absorption and atmospheric absorption as per the ISO 9613-2:1996 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation noise model in the computational acoustic software in SoundPlan 9.0.

1.7 Regulations and Guidelines

The regulations and guidelines which the quarry is required to operate under are addressed in the three documents below. These three documents highlight the operational noise requirements with respect to NSAs.

Planning Permit *(No. PPA/283/95)*

Condition 30 of the current Planning Permit for the quarry (Planning Permit No. PPA/283/95), sets a noise limit of 47dB(A) at the existing 90 Potters Road NSR, for the operational hours of 0600 to 1800 Monday to Saturday.

However, for any new proposed operations for the quarry, the noise limit is to be assessed with respect to the Protocol. This planning permit was amended in 2021 (PP283/1995-2) to allow for blasting to occur within 20 metres of the Ondit-Warrion Road Reserve. This permit does not apply for quarry NDA operations outside the hours prescribed above.

EP Act 2017

The *Environment Protection Act 2017* (the EP Act) mandates that businesses have a General Environmental Duty (GED) to manage their activities to avoid the risk of environmental damage. Under the Act the GED requires that *'any person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable'*.

Noise is included in the definition of pollution within the Act. Consequently, an asset owner is required to eliminate or reduce the risk of harm from emissions of noise as far as reasonably practicable. This may require reducing noise to below the regulatory Noise Limits, if reasonably practicable to do so, to avoid risk of harm to human health.

For noise, harm may include:

- Adverse health effects such as sleep disturbance or stress
- Impacts on amenity that unreasonably interfere with enjoyment of the place or premises such as noise that disturbs or interferes with residents talking together, reading, watching television, listening to music, or enjoying a backyard barbecue.

Victorian EPA guideline 1856 'Reasonably Practicable' provides guidance concerning what must be considered when assessing the proportionate controls to mitigate or minimise the risk of harm. These measures include a hierarchy of controls, defined as follows:

- Eliminate risk
- Likelihood of the risk - how often harm would occur
- Degree of harm (consequence)

- State of knowledge - awareness of the risks the activities pose
- Availability and suitability of controls
- Cost and effectiveness of controls.

Separate and in addition to the GED, Section 166 of the Act describes an obligation on any individual not to emit an *unreasonable noise* or permit an unreasonable noise to be emitted.

EPA Publication 1826.4 *Noise Protocol*

The 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) applies to noise from industrial activities applies for industries such as Holcim Colac.

The Noise Protocol is applicable outside of Major Urban Areas. As the NSAs are located outside of the Major Urban Area of Colac, the Rural Area Noise Limit method applies. The noise limits are determined from the relevant land zoning around the NSAs and the relative location of the industrial site to the NSA (and the existing noise levels in some circumstances).

1.8 Operational Noise Limits

The noise limits for the NSAs are as follows.

For 90 Potters Road, Ondit, the Planning Permit No. PPA/283/95 stipulates a noise limit of 47 dBA for operations from the existing quarry. However, for any new quarry works, noise levels at the receptor of 90 Potters Road is required to comply with the below operational noise limits.

For all NSA's the following noise limits apply:

Day:	**46 dBA**
	0700 to 1800 hours Monday to Saturday
Evening:	**41 dBA**
	1800 to 2200 Monday to Saturday
	0700 to 1800 hours Sundays and Public Holidays
Night:	**36 dBA**
	1800 to 2200 Sundays and Public Holidays
	2200 to 0700 hours all days and Public Holidays

The Holcim Quarry has been assessed as an earth resource industry as defined by the Noise Protocol for all assessed scenarios.

1.9 Noise Monitoring

1.9.1 Long Term Noise Monitoring

Long term noise monitoring was conducted between the 27th of November and the 4th of December 2020 at 90 Potters Road, Ondit.

After post processing, it was deemed that the recorded noise levels were adversely affected by the wind conditions over the monitoring period. Data on the Thursday 3rd of December was deemed useable, however the existing operation during the time of the long-term noise monitoring was not representative of the future operation of the quarry.

1.9.2 Attended Noise Measurements

Additional background daytime and evening period measurements were undertaken to understand the current noise environment within proximity of the current quarry works. Measurements were undertaken on the 15th of February 2023 and the 2nd of March 2023.

The local weather conditions during measurements were appropriate for noise measurements, with no rainfall and wind speeds less than 5 m/s.

The sound level meter utilised for the noise measurements was a Bruel and Kjaer 2270 Type 1 (SN: 3029475) sound level meter. Calibration was conducted before and after the noise measurements and no drift in calibration noise levels was detected. All instrumentation used have been certified by National Association of Testing Authorities, Australia (NATA).

Measurements were undertaken at three locations which are detailed in orange in Figure 2. Two measurements were undertaken at each location during the day and evening period. The noise levels measured are summarised in Table 1-1. All noise measurements undertaken were at least 10 minutes in duration.

Figure 2: Background Noise Measurement Locations

Table 1-1: Noise Measurement Summary

Location	Measurement Period	Measurement Period	Average (dBA)		Notes
			Leq	L90	
Location 1	Day (15/02/2023)	**(1)** 11:34 to 11:49 **(2)** 13:06 to 13:21	59	34	Regular truck and car pass bys. Holcim works inaudible from the location. Distant road traffic noise west and east of location audible.
Location 2	Day (15/02/2023)	**(1)** 12:04 to 12:19 **(2)** 13:25 to 13:40	49	37	Cows audible during measurement. Constant truck movement in and out of the quarry audible. Holcim activities in the North- East of the pit barely audible.

Location	Measurement Period	Measurement Period	Average (dBA)		Notes
			Leq	L90	
Location 3	Day (15/02/2023)	**(1)** 12:28 to 12:43 **(2)** 13:45 to 14:00	60	31	Regular truck and car pass bys. Holcim works marginally audible from the location, mainly the rock breaker. Distant road traffic noise west and east of location audible. Helicopter pass by during the first measurement.
Location 1*	Evening (03/03/2023)	**(1)** 20:43 to 20:59 **(2)** 21:00 to 21:15	45	37	Crickets audible during measurement. Sporadic car pass bys.
Location 2	Evening (03/03/2023)	**(1)** 19:45 to 20:00 **(2)** 20:25 to 20:40	44	40	Crickets and bird noise audible throughout measurement. Long grass rustling audible.
Location 3	Evening (03/03/2023)	**(1)** 19:25 to 19:40 **(2)** 20:05 to 20:20	61	50	Distant traffic noise audible along Ondit Warrion Road. Crickets prominent throughout measurements. Sporadic car pass bys.

Note* - Location 1 for the evening measurements was located away from the day-time measurement due to audible excavation works at a nearby property. Construction at this location was not audible at other measurement locations. Location for the measurement can be observed in Figure 2 with the location marked 1*.

An additional measurement was undertaken within proximity of the current Holcim Operations, specifically the operation of the rock breaker. The measurement was undertaken in the position highlighted in purple Figure 2, approximately 300 m from the operational rock breaker. From that measurement it was deemed the rock breaker is impulsive in nature as it was clearly audible from that measurement position and marginally audible from measurement Location 3.

New plant was installed at the quarry as a part of a scheduled upgrade. Attended source noise measurements were undertaken to ascertain operational sound power levels. These noise measurements have been incorporated into the assessment and the sound power levels are detailed in Table 2-1.

2 Proposed Construction and Operations

2.1 Current Operations

The existing quarry operations within the sales area are proposed to continue between 0700 and 1800, Monday to Saturday. The locality of the sales area is shown in Figure 3 as an orange symbol. The blue symbols are auxiliary buildings.

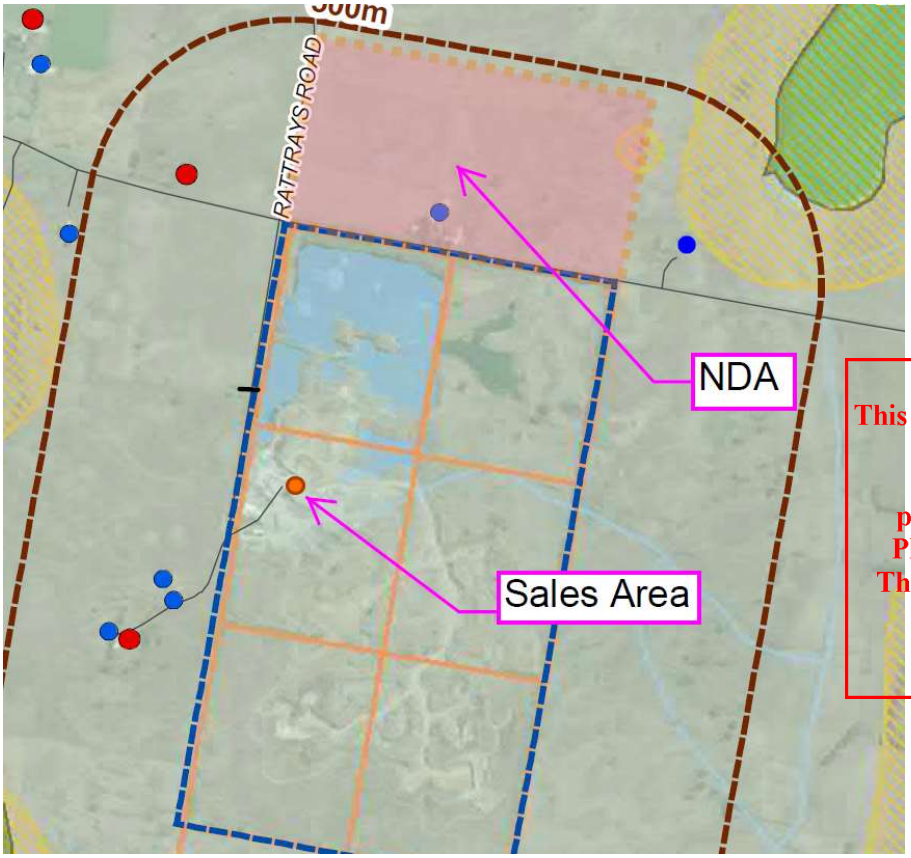


Figure 3: Sales Area and NDA area

The equipment operating in the existing quarry (Sales Area) are listed in Table 2-1.

2.2 Construction of the Northern Development Area

The construction of the NDA is proposed to be staged as construction progresses until its final design. Figure 4 and Figure 5 below detail the Stage 1 and the Final NDA Extension Design proposed. As Stage 1 is expected to be the noisiest construction stage for the construction of the NDA since the works start at existing ground surface level. Subsequent construction of other stages will be within the pit. As construction of the NDA falls within the definition of Clause 52 of the Noise Protocol, the construction of the NDA will be assessed to the Earth Resources, operational noise limits as derived above in Section 1.8.

2.3 Future Operations of the Northern Development Area

The NDA location with respect to the existing quarry is detailed in Figure 5, with the proposed extraction limit boundary detailed in blue and the cadastral boundary highlighted in red. For the purpose of this

assessment, the mobile equipment is assumed to be operating throughout the quarry within the red boundary, and with additional plant operating at the Sales Area of the existing quarry.

The operation of the quarry within the NDA has been proposed for 0700 to 2200 Monday to Saturday. This operational time period spans over the Day Period 0700 to 1800 hours and the Evening Period 1800 to 2200 hours as highlighted in the EP Act. The proposed equipment during each of the operating scenarios in the new NDA is detailed in Table 2-1.

Figure 4 & Figure 5 details the proposed Stage 1 pit design and the finalised rehabilitated design for the NDA. Stage 1 has been highlighted as it is the worse-case for the construction of the NDA

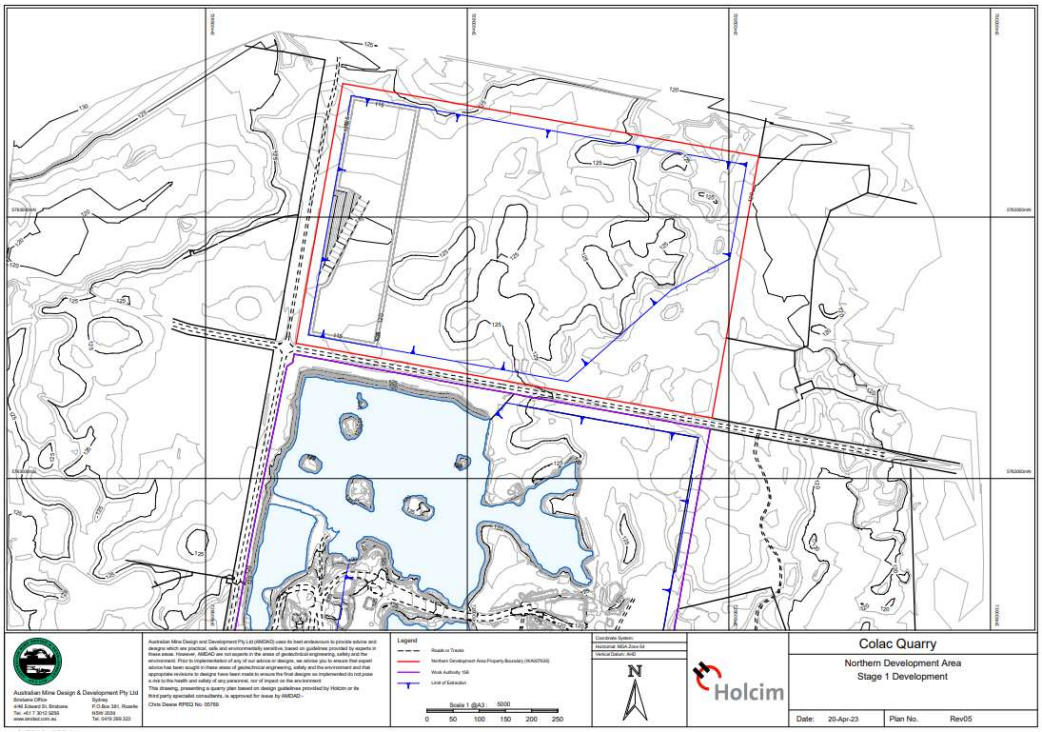


Figure 4: Northern Development Area Holcim Colac Extension Stage 1

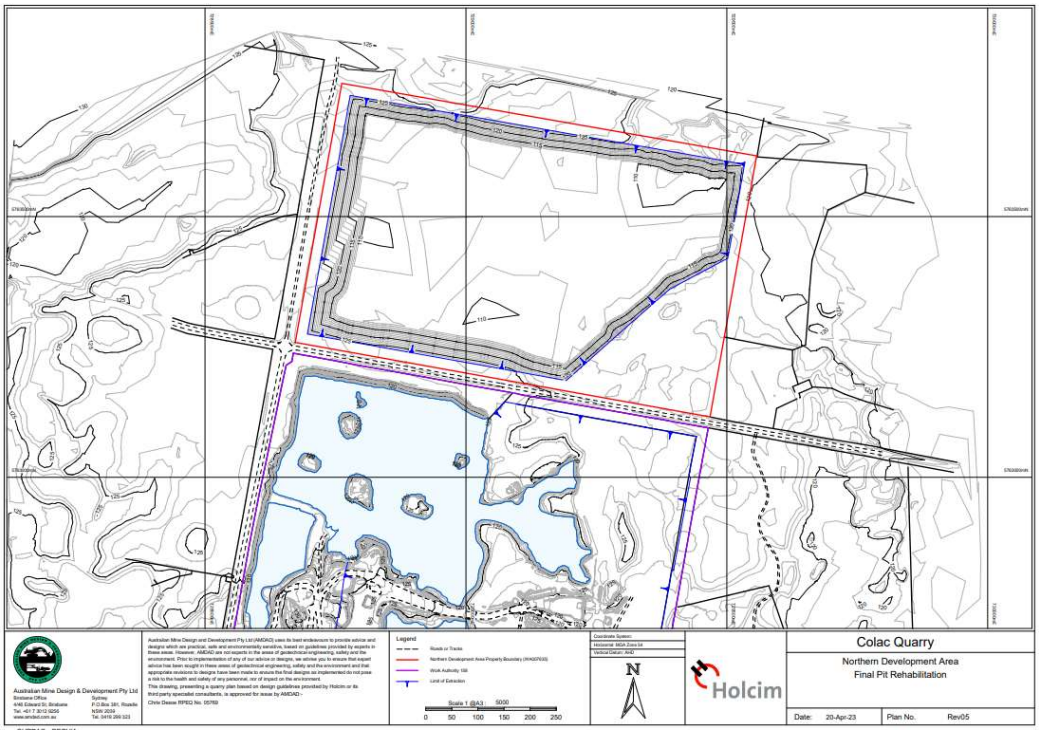


Figure 5: Northern Development Area Holcim Colac Extension Final Design

2.4 Schedule of Construction and Operational Equipment

A schedule of equipment, sound power levels and operational duty for both the existing and NDA construction and future operation are detailed in Table 2-1. The sound power levels have been used for the noise emissions assessment. These sound power levels have been derived taking into account the data provided, number of plant and the operational duration correction factor. Other correction factors have been taken into consideration when calculating the Effective Noise Levels later in the assessment.

Table 2-1: Schedule of plant and equipment, sound power levels and duty

Equipment	#	Derived Sound Power Level (dB) Octave Band Centre Frequency (Hz)								Total (dBA)	Source of Data	Duration: % in operation for an indicative 30-minute period.	Duration Correction Factor (dB)	Equipment in operation	
		63	125	250	500	1k	2k	4k	8k					Day Period (0700 – 1800 hours)	Evening Period (1800 – 2200 hours) (Operation Only)
Construction and Future Operation NDA Works															
Truck and Dog	1	122	108	100	99	103	98	97	90	**106**	BS5228:12009 - Table C.6 Road Lorry (full 39t) Line 21	Assumed to be under acceleration 60% within a given 30 min period, moving to and from NDA operations area to Sales Area	- 2	✓	✓
Rock Breaker	1	113	116	116	117	116	116	112	108	**122**	Based on on-site measurements	Operational 30% of the time	-5	✓	✗
Crushing Operations Terex J-1480 Mobile rock crusher, Terex Tracked cone crusher, CAT 972 Loader ,CAT 336 Hex Excavator	1	121	109	109	107	107	103	101	101	**111**	Based on on-site measurements	Operational at all times	0	✓	✓
Dewatering pumps	2	30	54	64	75	77	81	81	74	**86**	FLO0KWIP Super Silent Auto Priming 4". Based on 58 dBA at 7 m.	Operational at all times	0	✓	✓
Current Operations (Sales Area)															
Terex Heavy Duty Screen 893 and tertiary crushers.	1	112	104	103	102	103	102	98	92	**108**	BS5228-1:2009+A1:2014, Based on on-site measurements	Operational at all times	0	✓	✗
Sales Loader (CAT 972s)	2	108	111	105	101	97	95	90	90	**104**	Previous WMG Report, based on CAT 988.	Assumed to be loading 15% within a given 30 min period.	-8	✓	✗

2.5 Acoustic Noise Modelling

A computational acoustic model for the construction and operational scenarios for the new NDA area has been modelled based on the following inputs in Table 2-2.

Table 2-2: Noise Modelling Inputs

Item	Details
Noise Source Data	Noise data has been based on the following: ▪ Based on on-site measurements ▪ Previous WMG Report (CAT Sales Loader, CAT 972) ▪ BS5228-1:2009+A1:2014 ▪ FLO0KWIP Super Silent Auto Priming 4".
Existing Ground Model	Provided by Holcim, both contained in the Stage 1 and Rehabilitation Models as detailed below.
Prediction Methodology	ISO 9613-2:1996, Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation
Design Ground Model	Design Ground Models are provided by Holcim: ▪ Stage 1: 1298colac_nth20220822_stg1_topo.dxf ▪ Rehabilitation: colac_final_topo_rehab2022_08.dxf* *Note: An older rehabilitation design has been used for the acoustic modelling. The updated design has been noted to have small adjustment to the design but would not affect the overall predicted noise levels.
Ground Absorption	Ground Absorption coefficients for the acoustic modelling is detailed as follows: ▪ Farm Areas, Open Areas: 1.0 ▪ Quarry: 0.4
Building Data (NSRs)	Building Data has been observed and acquired from Google Street View and Google Maps.
Meteorological Conditions	ISO 9613-2:1996 within SoundPlan 9.0 assumed worse case downwind conditions.
Façade Correction	+2.5 dB Façade Correction applied
Impulsivity Correction	As the rock breaker is deemed impulsive based on onsite measurements a +5 dB correction factor is applied to the predicted noise level to determine the effective noise level at each of the assessed NSRs
Acoustic Modelling Uncertainty	A + 3.0 dBA acoustic modelling uncertainty correction factor has been applied to all predicted noise levels from the acoustic modelling.

The modelled scenarios for development the operation of the NDA area are detailed below:

Operational Scenarios (Stage 1)

- **Scenario 1:** Location 1 - North-East Corner of early quarry pit development within Stage 1. (At surface level, site preparation)
- **Scenario 2:** Location 2 - South-West Corner, Pit Level of Stage 1, Final Design. (Pit Level) at closest point of noise sources to sensitive receptors located to the West of the site.

Stage 1 is proposed to be operational during the day-time period only.

Operational Scenarios (subsequent pit development Scenario)

- **Scenario 3:** NDA Works located on Eastern Border
- **Scenario 4:** NDA Works located on Southwestern Corner

The subsequent pit development scenarios are proposed to be operational during the day and evening period and have been assessed with respect to those noise limits.

These locations have been highlighted in Figure 6 to Figure 8 in orange.

All scenarios consider of the ongoing operations within the Sales Area on the existing quarry, as these works add to the overall noise level from the quarry.

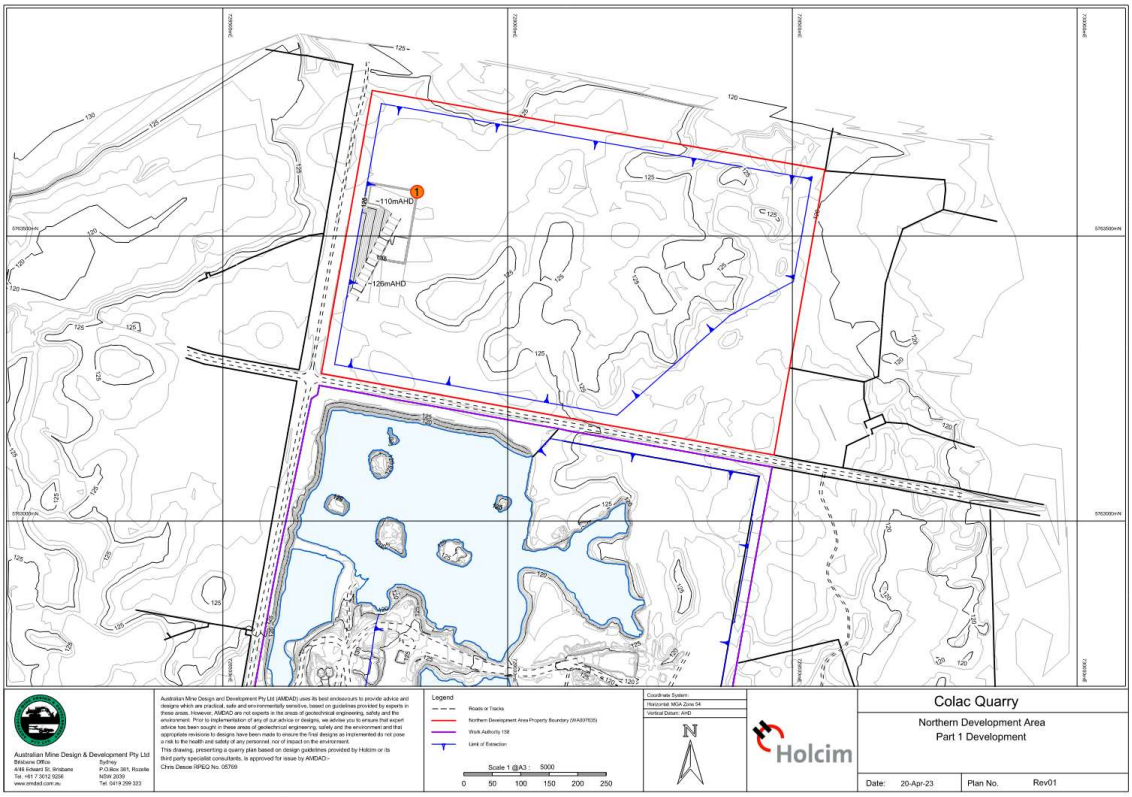


Figure 6: Location of NDA plant for Scenario 1

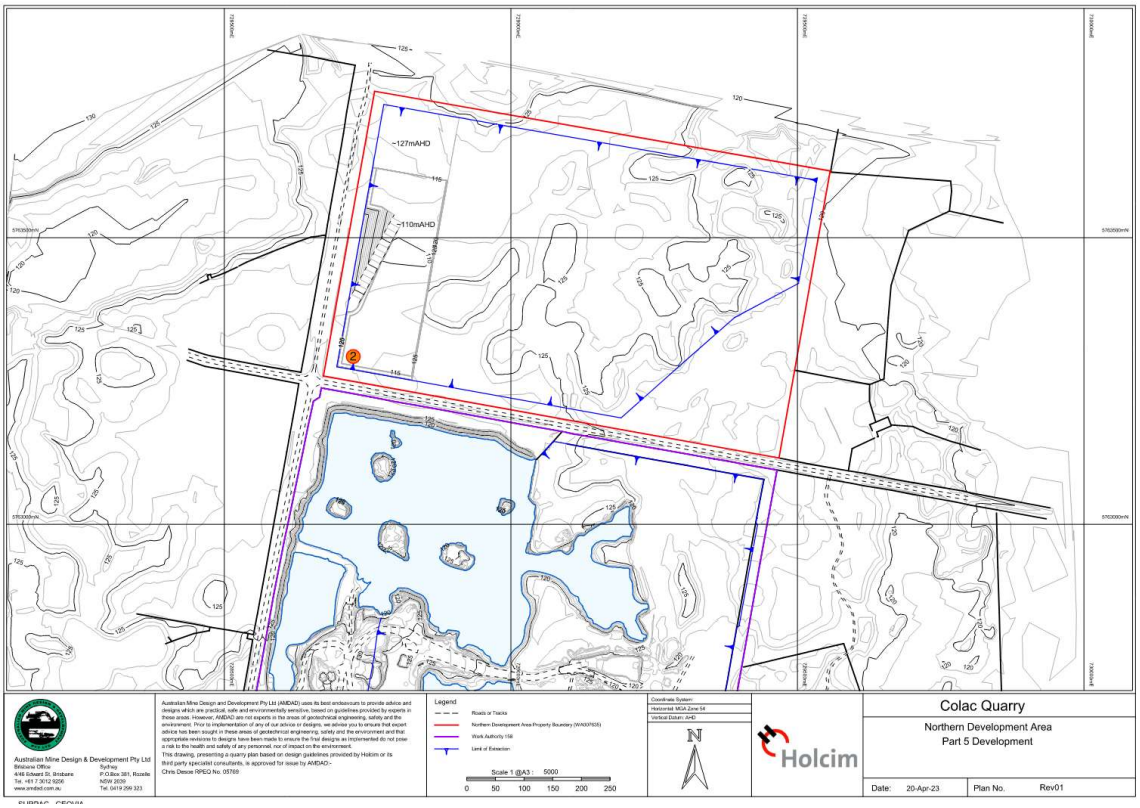


Figure 7: Location of NDA plant for Scenario 2

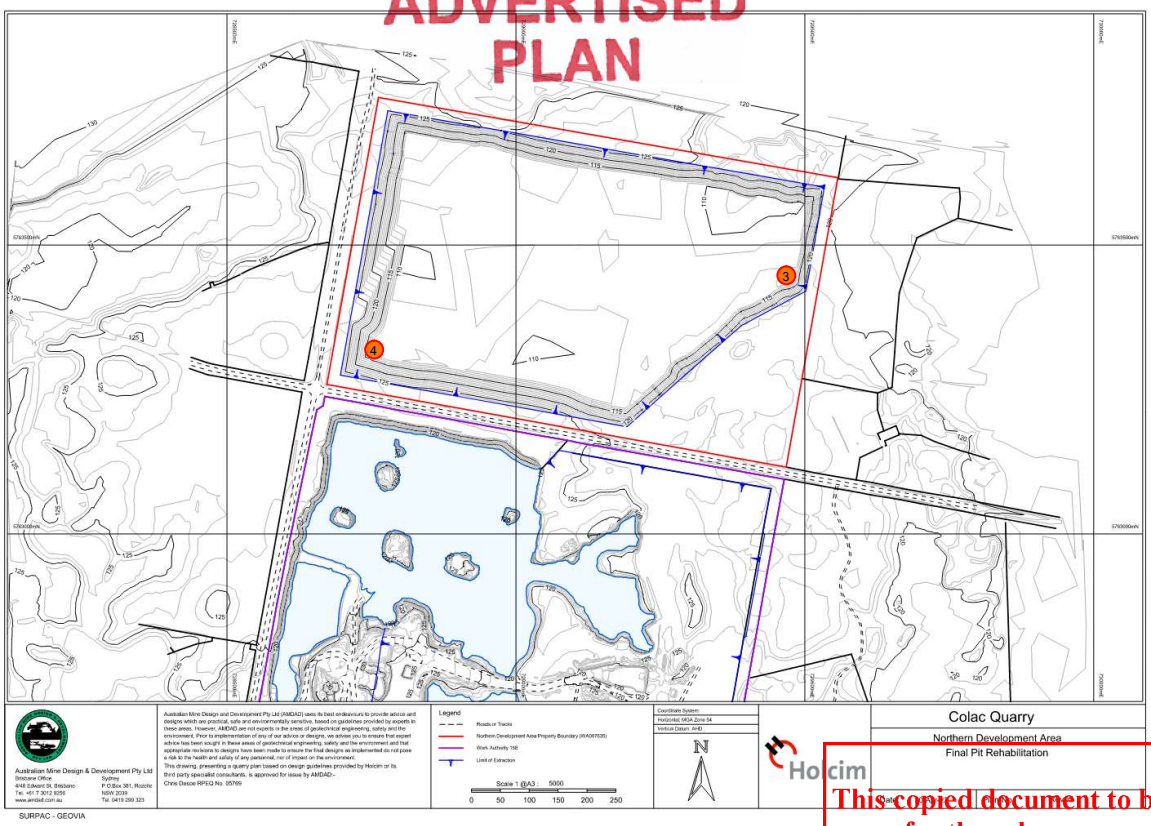


Figure 8: Locations for the NDA plant for the in-pit future operational scenarios 3 and 4

3 Results

Effective noise levels for each of the highlighted scenarios have been calculated for each of the NDA scenarios in the sections below. Predicted noise levels for each of the scenarios are detailed in Section 3.1. Levels of exceedances of the noise limits are show in red, in brackets in each of the tables.

3.1 Effective Noise Levels for Operational Scenarios

Table 3-1: Predicted noise levels – Operational Scenario (Stage 1) - Location 1 (Site preparation works)

Scenario 1 – Predicted Noise Level (dB_{LAeq})				Effective Noise Level (dB_{LAeq}) (Exceedances of noise limit)	Exceeds Guideline Level
Noise Sensitive Receptor	**Predicted Noise Level**	**Noise Limit (Day)**	**Correction Factors[1]**		
90 Potters Road, Ondit	41	47	+8	49 (+2 dBA)	Yes
25 Ondit-Warrion Road, Ondit	36	46	+8	44	No
285 Ondit-Warrion Road, Ondit	44	46	+8	52 (+6 dBA)	Yes
230 Ondit-Warrion Road, Ondit	52	46	+8	60 (+14 dBA)	Yes
20 Ondit Warrion Road, Ondit	36	46	+8	44	No
830 Colac-Ballarat Road, Ondit	34	46	+8	42	No
840 Colac-Ballarat Road, Ondit	34	46	+8	42	No
846 Colac-Ballarat Road, Ondit	34	46	+8	42	No

Notes:
1. Correction factors include, +5 dB for Impulsivity and + 3 dB modelling uncertainty

Table 3-2: Predicted noise levels – Operational Scenario (Stage 1) - Location 2 (In-pit scenario)

Scenario 2 – Predicted Noise Level (dB_{LAeq})				Effective Noise Level (dB_{LAeq})	Exceeds Guideline Level
Noise Sensitive Receptor	**Predicted Noise Level**	**Noise Limit (Day)**	**Correction Factors[1]**		
90 Potters Road, Ondit	34	47	+8	42	No
25 Ondit-Warrion Road, Ondit	29	46	+8	37	No
285 Ondit-Warrion Road, Ondit	32	46	+8	40	No

Scenario 2 – Predicted Noise Level (dB_{LAeq})				Effective Noise Level (dB_{LAeq})	Exceeds Guideline Level
Noise Sensitive Receptor	Predicted Noise Level	Noise Limit (Day)	Correction Factors[1]		
230 Ondit-Warrion Road, Ondit	39	46	+8	47 (+1 dBA)	Yes
20 Ondit Warrion Road, Ondit	32	46	+8	40	No
830 Colac-Ballarat Road, Ondit	31	46	+8	39	No
840 Colac-Ballarat Road, Ondit	31	46	+8	39	No
846 Colac-Ballarat Road, Ondit	31	46	+8	39	No

Notes:
1. Correction factors include, +5 dB for Impulsivity and + 3 dB modelling uncertainty

The predicted noise levels and compliance for the proposed future operations of the Holcim Quarry Extension are detailed in Table 3-3 and Table 3-4 for the day and evening period respectively.

Table 3-3: Predicted operational noise levels – Scenario 3 - Location 1

Noise Sensitive Receptor	Daytime				Evening			
	Predicted Quarry Noise Level (dB_{LAeq})				Predicted Quarry Noise Level (dB_{LAeq})			
	Predicted Noise Level	Correction Factors[1]	Effective Noise Level	Compliance with the Day Period Noise Protocol Limit and the Planning Permit (No. PPA/283/95)	Predicted Noise Level	Correction Factors[2]	Effective Noise Level	Compliance with the Noise Protocol Evening Period (41 dBA)
90 Potters Road, Ondit	39	+8	47	Y	39	+3	42	N (+1 dBA)
25 Ondit-Warrion Road, Ondit	31	+8	39	Y	30	+3	33	Y
285 Ondit-Warrion Road, Ondit	37	+8	45	Y	36	+3	39	Y
230 Ondit-Warrion Road, Ondit	41	+8	49	N (+3 dBA)	39	+3	42	N (+1 dBA)
20 Ondit Warrion Road, Ondit	33	+8	41	Y	33	+3	36	Y
830 Colac-Ballarat Road, Ondit	32	+8	40	Y	31	+3	34	Y
840 Colac-Ballarat Road, Ondit	32	+8	40	Y	31	+3	34	Y
846 Colac-Ballarat Road, Ondit	32	+8	40	Y	31	+3	34	Y

1. Correction factors include, +5 dB for Impulsivity and + 3 dB modelling uncertainty
2. Correction factors include + 3 dB modelling uncertainty only

Table 3-4: Predicted operational noise levels – Scenario 4 - Location 2

Noise Sensitive Receptor	Daytime				Evening			
	Predicted Quarry Noise Level (dB_{LAeq})				Predicted Quarry Noise Level (dB_{LAeq})			
	Predicted Noise Level	Correction Factors[1]	Effective Noise Level	Compliance with the Day Period Noise Protocol Limit and the Planning Permit (No. PPA/283/95)	Predicted Noise Level	Correction Factors[2]	Effective Noise Level	Compliance with the Noise Protocol Evening Period (41 dBA)
90 Potters Road, Ondit	39	+8	47	Y	39	+3	42	N (+1 dBA)
25 Ondit-Warrion Road, Ondit	34	+8	42	Y	31	+3	34	Y
285 Ondit-Warrion Road, Ondit	36	+8	44	Y	36	+3	39	Y
230 Ondit-Warrion Road, Ondit	41	+8	49	N (+ 3 dBA)	40	+3	43	N (+2 dBA)
20 Ondit Warrion Road, Ondit	33	+8	41	Y	31	+3	34	Y
830 Colac-Ballarat Road, Ondit	31	+8	39	Y	29	+3	32	Y
840 Colac-Ballarat Road, Ondit	31	+8	39	Y	29	+3	32	Y
846 Colac-Ballarat Road, Ondit	31	+8	39	Y	29	+3	32	Y

1. Correction factors include, +5 dB for Impulsivity and + 3 dB modelling uncertainty
2. Correction factors include + 3 dB modelling uncertainty only

3.2 Discussion

3.2.1 Noise Protocol Assessment

The outcomes of the environmental noise assessment of the future construction and operation of the quarry in the NDA and sales area are as follows.

Scenario 1: Location 1 – Site Preparation

The effective noise levels calculated for Scenario 1 exceeds the derived noise limits for 3 noise sensitive locations. These locations include 90 Potters Road, 230 Ondit-Warrion Road and 285 Ondit-Warrion Road. Exceedances of the permit and protocol noise limits by up to 14 dB for 230 Ondit-Warrion Road has been calculated. However, as the scenario is defined as site preparation works for the NDA, Table 4 of the Noise Protocol stipulates that *"noise from the activity may be exempted from the noise limits during the day period".* So long as this scenario remains only operational during the day period, this exemption is valid.

Scenario 2: Location 2 - South-West Corner, Pit Level of Stage 1.

The effective noise levels calculated for Scenario 2 exceeds the day period noise limits at 230 Ondit-Warrion Road. The exceedance is 1 dBA inclusive of impulsivity and modelling uncertainty. With that uncertainty and given that 230 Ondit-Warrion Road is currently uninhabitable, the exceedance would be considered minor and negligible. However, if the property does become inhabitable and occupied, if monitoring demonstrates noise level exceedance, specific management measures must be applied and is discussed in Section 5 of this report.

Scenario 3: NDA Works located on Eastern Border

The effective noise levels calculated for Scenario 3 exceeds the day and evening noise limits for 2 properties. 230 Ondit-Warrion Road and 90 Potters Road. 230 Ondit-Warrion Road exceeds both the day and evening period noise limits by 3 and 1 dBA respectively, whilst 90 Potters Road has a minor exceedance the evening noise limit by 1 dBA.

Scenario 4: NDA Works located on Southwestern Corner

The effective noise levels calculated for Scenario 3 exceeds the day and evening noise limits for 2 properties. 230 Ondit-Warrion Road and 90 Potters Road. 230 Ondit-Warrion Road exceeds both the day and evening period noise limits by 3 and 2 dBA respectively, whilst 90 Potters Road has a minor exceedance the evening noise limit by 1 dBA.

3.2.2 Low Frequency Noise Assessment

Assessing low frequency is defined in the EPA document, *Noise guideline - assessing low frequency noise, 1996.*

The low frequency assessment assesses the predicted noise level at the closest sensitive receptor, analysing the predicted 1/3 octave bands to assess whether the predicted noise levels at the low frequencies comply with the EPA 1996 noise threshold levels. These noise threshold levels are detailed in the table below, extracted from the EPA 1996.

Table 3: Outdoor one-third octave low frequency noise threshold levels from 10 Hz to 160 Hz

Outdoor one-third octave low frequency noise threshold levels													
One-third Octave (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
L_{eq} (dB)	92	89	86	77	69	61	54	50	50	48	48	46	44

Figure 9: EPA 1996 Threshold Outdoor one-third octave low frequency noise threshold levels.

On site noise measurements were undertaken for various equipment whilst on the Holcim site. Noise measurements were undertaken for the following equipment which were observed to have low frequency characteristics.

- Rock breaker
- Crushing equipment

Noise measurements were undertaken of the equipment, ascertaining the 1/3 octave data, which was then utilised for the predicted noise levels within the computational model. These are detailed in Table 3-5, with the predicted 1/3 octave band noise levels at each of the noise sensitive detailed in the table as well. These predicted 1/3 octave band noise levels are compared to the EPA 1996 low frequency thresholds. Exceedances of these thresholds have been highlighted in red in the table below.

Table 3-5: EPA 1996 Low Frequency Assessment to noise sensitive locations

	1/3 Octave Band Centre Frequency, Hz								
	25	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
Key Equipment									
Rock Breaker	100.0	103.9	103.8	106.4	107.1	109.5	112.7	110.5	111.5
Crushing Equipment	101.2	102.7	107.9	114.1	117.7	119.7	115.0	107.8	109.5
EPA Low Frequency Thresholds	**69.0**	**61.0**	**54.0**	**50.0**	**50.0**	**48.0**	**48.0**	**46.0**	**44.0**
Scenario 1									
20 Ondit-Warrion Road, Ondit	33.4	35.3	39.8	45.7	49.7	51.1	35.0	29.7	29.5
25 Ondit-Warrion Rd	33.7	35.5	40.0	46.0	49.9	51.4	35.4	30.8	30.0
90 Potters Rd	35.2	37.1	41.6	47.6	53.4	53.0	37.0	38.9	31.7
95 Potters Rd	31.4	33.0	37.4	43.3	49.2	48.2	34.8	33.0	29.3
230 Ondit-Warrion Rd	44.2	46.1	50.6	56.6	60.4	62.1	49.5	43.6	44.6
285 Ondit Warrion Road	38.8	40.7	45.2	51.2	55.3	56.6	40.8	35.8	35.7
830 Colac - Ballarat Rd	32.5	34.4	38.9	44.8	48.9	50.2	33.9	28.8	28.5
846 Colac-Ballarat Rd	32.7	34.6	39.1	45.1	49.1	50.4	34.2	29.0	28.7
Scenario 2									
25 Ondit-Warrion Rd	26.7	28.5	32.6	38.3	46.8	43.0	32.4	29.9	26.2
25 Ondit-Warrion Rd	26.8	28.6	32.6	38.3	47.0	43.1	32.6	30.1	26.4
830 Colac - Ballarat Rd	25.7	27.7	31.8	37.7	46.3	43.0	31.9	28.5	26.6
285 Ondit Warrion Road	26.2	27.3	30.4	35.4	45.0	38.8	28.6	32.5	21.8
846 Colac-Ballarat Rd	25.8	27.8	32.0	37.9	46.5	43.1	32.1	28.7	26.8
95 Potters Rd	20.9	22.1	25.5	30.6	46.5	34.1	23.0	31.2	15.8
20 Ondit-Warrion Road, Ondit	26.5	28.5	32.7	38.5	47.1	43.8	32.8	29.4	27.6
90 Potters Rd	26.5	27.5	30.6	35.4	50.3	38.2	26.9	37.7	19.5
230 Ondit-Warrion Rd	36.3	37.7	40.8	45.7	53.7	48.6	38.3	35.9	30.7

	1/3 Octave Band Centre Frequency, Hz								
	25	31.5	40	50	63	80	100	125	160
Scenario 3 – Day Period									
20 Ondit-Warrion Road, Ondit	30.2	32.1	36.4	42.2	49.8	47.5	35.2	31.5	30.0
25 Ondit-Warrion Rd	29.4	31.1	35.2	40.9	48.5	45.6	35.0	31.0	28.6
25 Ondit-Warrion Rd	23.2	24.4	27.8	32.9	42.3	36.4	25.4	27.3	18.4
90 Potters Rd	27.3	29.1	33.3	39.2	51.2	44.3	33.8	38.7	27.9
95 Potters Rd	25.2	27.0	31.1	36.8	48.0	41.5	30.9	32.3	24.7
230 Ondit-Warrion Rd	32.0	33.9	38.0	43.8	53.1	49.1	39.1	36.8	34.1
285 Ondit Warrion Road	28.6	30.6	34.8	40.6	50.4	45.9	35.1	33.4	30.1
830 Colac - Ballarat Rd	29.0	30.9	35.1	41.0	48.8	46.3	33.8	30.4	28.7
846 Colac-Ballarat Rd	29.3	31.2	35.5	41.3	49.0	46.6	34.2	30.6	29.0
Scenario 4 – Day Period									
20 Ondit-Warrion Road, Ondit	27.9	29.7	33.8	39.5	47.7	44.5	33.0	29.6	27.8
25 Ondit-Warrion Rd	27.5	29.6	33.7	39.6	48.3	44.9	34.0	31.0	28.9
25 Ondit-Warrion Rd	27.5	29.5	33.7	39.5	47.8	44.8	34.0	31.0	28.8
90 Potters Rd	30.2	32.1	36.2	41.9	52.4	46.7	36.3	39.0	30.0
95 Potters Rd	26.6	28.5	32.6	38.4	48.8	43.4	32.9	32.8	27.0
230 Ondit-Warrion Rd	39.3	41.1	44.8	50.2	57.6	54.2	44.1	39.3	36.9
285 Ondit Warrion Road	33.1	35.0	39.0	44.6	52.8	49.1	38.6	34.8	31.9
830 Colac - Ballarat Rd	27.0	28.7	32.8	38.6	46.7	43.6	32.0	28.6	26.8
846 Colac-Ballarat Rd	27.1	28.9	32.9	38.7	46.8	43.7	32.2	28.8	27.0
Scenario 3 – Evening Period Works									
20 Ondit-Warrion Road, Ondit	29.4	30.8	36.0	42.1	49.8	47.4	34.5	30.6	28.6
25 Ondit-Warrion Rd	28.7	30.0	34.9	40.8	48.5	45.6	34.6	30.5	27.8
25 Ondit-Warrion Rd	22.4	23.2	27.4	32.7	42.3	36.3	24.8	27.1	17.0

	1/3 Octave Band Centre Frequency, Hz								
	25	31.5	40	50	63	80	100	125	160
90 Potters Rd	26.5	27.9	33.0	39.0	51.2	44.2	33.4	38.6	27.0
95 Potters Rd	24.3	25.7	30.7	36.6	48.0	41.5	30.4	32.1	23.5
230 Ondit-Warrion Rd	31.1	32.4	37.5	43.6	53.0	49.0	38.4	36.2	32.6
285 Ondit Warrion Road	27.7	29.2	34.3	40.4	50.4	45.8	34.5	32.9	28.5
830 Colac - Ballarat Rd	28.1	29.6	34.7	40.9	48.7	46.2	33.0	29.4	27.1
846 Colac-Ballarat Rd	28.5	29.9	35.1	41.2	49.0	46.5	33.4	29.7	27.5
Scenario 4 – Evening Period Works									
20 Ondit-Warrion Road, Ondit	27.1	28.4	33.3	39.3	47.7	44.4	32.4	28.8	26.3
25 Ondit-Warrion Rd	26.6	28.1	33.2	39.4	48.2	44.8	33.4	30.3	27.4
25 Ondit-Warrion Rd	26.6	28.0	33.2	39.3	47.7	44.7	33.3	30.2	27.3
90 Potters Rd	29.3	30.7	35.7	41.7	52.4	46.6	35.7	38.8	28.8
95 Potters Rd	25.8	27.2	32.2	38.2	48.8	43.3	32.4	32.6	25.8
230 Ondit-Warrion Rd	38.4	39.6	44.3	50.0	57.5	54.1	43.5	38.6	35.6
285 Ondit Warrion Road	32.2	33.6	38.5	44.4	52.7	49.0	38.1	34.2	30.6
830 Colac - Ballarat Rd	26.3	27.5	32.4	38.4	46.6	43.4	31.4	27.8	25.3
846 Colac-Ballarat Rd	26.4	27.6	32.5	38.5	46.8	43.6	31.6	28.0	25.5

Exceedances of the low frequency thresholds have been predicted for 5 noise sensitive areas for Scenario 1 and 3 noise sensitive areas for all other scenarios. As Scenario 1 falls under the Site Preparation works, noise may be exempted from noise limits. However, for all other scenarios, minor exceedances of the 63 Hz band of the thresholds are noted for 90 Potters Road and 285 Ondit Warrion Road. Larger exceedances of the 50 to 80 Hz bands are noted for 230 Ondit Warrion Road, however, this residence is currently uninhabitable and unoccupied.

4 EP Act, General Environmental Duty

As the construction and operation of the Holcim Quarry upgrades are predicted to generate noise which may potentially affect NSAs, the GED has been considered in Table 4-1 below.

Table 4-1: General environmental duty review

Control measure	Comment
Eliminate Risk	Quarry activities and construction of new quarry developments will inherently generate noise during operation.
Likelihood of risk	Limits on operating hours reduce risk during the most sensitive hours (i.e. night period) when there is the highest likelihood of environmental harm occurring. Construction of the NDA area is to be restricted during the day. The quarry is being proposed to only operate during the day and evening period with reduced operational activities during the evening period. Truck movements on the public road network accessing / exiting from NDA are a part of operation. This has not formally been assessed in this assessment, however planning, design and operational controls are to be upheld as per EPA 1891.
Degree of harm	There are varying degrees of harm associated with noise, ranging from: ■ Hearing loss / permanent damage ■ Sleep disturbance ■ Audibility and annoyance At noise levels exceeding 85dB $L_{Aeq(8hr)}$ / 140 dB L_{Cmax} irreversible hearing damage may occur. Harm associated with hearing loss / permanent damage is covered by Worksafe Victoria compliance codes[1] and would only be applicable to employees or contractors within close proximity to quarry operations. The degree of audibility of noise depends on the level of noise emitted, together with the ambient background noise levels. Where there is a low level of ambient noise at a receiver location, noise emissions are more likely to be audible at times. This may occur where there is limited surrounding activity from roads and other noise sources. The audibility of noise can be classified as follows[2]: ■ 0 to 3 dB above background noise levels: not audible ■ 3 to 5 dB above background noise levels: marginally audible ■ >5 dB above background noise levels: generally audible Other factors such as the frequency content, tonality, impulsiveness and other characteristics may also impact the audibility of noise.
State of knowledge	Undertaking detailed reviews of environmental noise emissions from the site (such as this report) is part of the general environmental duty to understand the likely noise emission from the site and its compliance with the Noise Protocol and EP Act.

[1] Worksafe Victoria Compliance Code Noise, Edition 2, December 2019
[2] Engineering noise control: theory and practice, D Bies and CH Hanson, Fourth Edition, 2009

Control measure	Comment
Available suitable controls	It is considered that best practice to review available suitable controls to minimise risk associated with noise would be incorporating noise management measures into a Site Environmental Management Plan (EMP). The EMP would include but not be limited to: ■ Regular review of available technology assessing whether low-noise alternatives exist ■ Regular equipment maintenance to reduce noise ■ General plans for community consultation and procedures to address noise complaints ■ Engagement and notification to the community of schedule works ■ Managing truck noise to with the following in mind, <u>Planning and design controls</u> - Locate site vehicle entrances away from sensitive areas, such as residences. - If trucks are likely to arrive before site opening hours, nominate a truck waiting area away from residences. - Designate a truck route to and from the site that avoids sensitive areas. - Design internal road layout and traffic flow to avoid reversing. <u>Operational Controls:</u> - Wherever possible, plan for deliveries or collections to happen during day-time hours. - Signpost site vehicle movement requirements and, where appropriate (e.g. larger sites), consider traffic controllers to direct traffic. - Minimise diesel engine idling. While diesel motors may need to idle before use, manufacturers advise this can be limited to 3 to 5 minutes for modern engines. - Modify activities to minimise the amount or duration of reversing required to perform a task, while not reducing safety. See the Managing noise from reversing alarms guidance sheet (publication 1890). - Turn off engines when vehicles are stationary. - Turn off stationary external motors such as refrigeration units.
Cost of suitable controls	Cessation of mining activities or significant equipment replacement would impose unreasonable impacts on the quarry operator. It is considered that with appropriate management measures, risks of environmental harm can be appropriately managed. Management measures are considered and discussed in the section below.

5 Noise Control Measures

Noise as a whole is to be limited where practicable, which is in accordance with the General Environmental Duty. Where noise exceeds the noise limits stipulated within the Noise Protocol, it is expected that noise management measures be explored to minimise noise as practicably as possible.

Noise control measures have explored been with respect to the GED, with the following ideologies considered:

- Elimination
- Mitigation
- Management

Initial investigations into noise mitigation measures have been undertaken.

Noise barriers and earth bunds have also been explored as a method to reduce operational noise within the NDA area. However, as the western border of the NDA area requires access to the pit, which would require a discontinuous earth bund or noise wall. This would result in an unacceptable reduction in screening to 230 and 285 Ondit-Warrion Road. Indicatively a 4 m noise wall/bund was modelled and effective noise levels to the noise sensitive areas were predicted. The 4 m noise wall/bund provided no reduction in the effective noise levels.

The cost of both types of mitigation options is quite high. Considering that only up to 3 noise sensitive areas are affected by the new NDA and minor exceedances of 1 dBA is noted at 90 Potters Road, it is not a practicable option. Management measures are preferred to reduce the noise impact of the works.

As the crushing and rock breaking are the two highest contributors to noise, direct management of the plant is critical in minimising noise. It is understood that Holcim want to operate during the evening period, however restricting various equipment and reducing the operational time may be applied to the crushing equipment to allow for some respite during the evening period.

Furthermore, Holcim's bulk explosives and accessories supplier prepares specific blast designs for Holcim. Blast design optimization is an ongoing process which is undertaken to ensure optimal fragmentation of Colac's basalt resource which in turn aims to achieve a greater proportion of suitably sized material to be presented directly to the primary jaw crusher and reduce the need for secondary rock breaking of oversize material and thus potentially reducing the use of the rock breaker.

A detailed strategy to control noise emissions from the future operations has been workshopped with Holcim. The strategy attempts to reduce the unreasonable noise emitted from the Holcim site to the noise sensitive receptors exceeding the noise limits. The approach also reviews the effectiveness of the mitigation strategy, with commissioning measurements being undertaken during operational scenarios to understand the noise emissions at the residents. Additional mitigation measures may be explored if noise emissions still exceed the noise limits.

A staged approach has been proposed which implements initial mitigation measures to the operation of the site. Subsequent commissioning measurements as per the Victorian legislation is to be undertaken once the Stage 1 of the mitigation works are considered and implemented.

Stage 1 Mitigation Strategy

Table 2: Stage 1 Strategy

Control measure	Details
Elimination	Complete elimination of the rock breaker is not possible as the equipment is an integral part of the NDA. Upon discussions with Holcim, downsizing of the rock breaker it to be considered as the current rock breaker on site is oversized (75T). It is proposed that the rock breaker for the NDA works be downsized to 50T which will likely reduce the source noise levels emanating from the rock breaker, especially when combined with management control measures detailed below.

Control measure	Details
Mitigation	Noise mitigation has been considered at the source rather than at the receptors Rock breaker shrouds are currently available for use to mitigate rock breaker noise. They are generally used for construction areas within direct proximity to noise sensitive areas. They are relatively inexpensive, and installation is quick and straight forward. The performance of the shrouds varies and should be tested on site prior to operation to understand its effectiveness specifically on-site. A temporary noise barrier or shielding should be considered for the crushing equipment. Temporary barriers can be positioned in the most beneficial locations with respect to the noise sensitive receivers. Alternatively, stockpiles are able to act as temporary noise barriers. However, the effectiveness may be limited as they require more space to be implemented at an appropriate height. The locations and heights of the stockpiles to mitigate the crusher noise affectively should be investigated prior to the operation of the NDA.
Management	Operation of the rock breaker has been discussed with Holcim. Currently the modelling assumes the same use of the rock breaker as the current Holcim operations. Upon discussions with Holcim operations, there is an opportunity for the use of the rock breaker to be reduced (less than 30% over a 30 minute period) and have the operations extend for longer periods. This will need to be detailed further in the Site Environmental Management Plan. Communication with the stakeholders in and around the site would be an important part in managing noise emission from the site. It is understood that 230 Ondit-Warrion Road is not currently habitable and has not been habitable for a decade. Discussions with the current landowner indicate they will not reside into the property for the foreseeable future. It is suggested that contact with the stakeholder be continuous over the operational stages to clearly communicate the potential of noise emissions at the property when crushing and rock breaking are likely to occur. This notification would also be valid for 90 Potters Road and 285 Ondit-Warrion Road as noise limits were predicted to marginally exceeded for those noise sensitive areas for the evening scenarios.

Commissioning Measurements

Commissioning noise measurements are to be undertaken with respect to the Noise Protocol. This report flags three key locations where measurements are to be undertaken. These include:

- 90 Potters Road
- 285 Ondit-Warrion Road

Commissioning noise measurements at 230 Ondit-Warrion Road will only be undertaken if it is habitable.

Noise measurements are to be undertaken with NATA certified sound level meters, with capabilities of measuring 1/3 Octave bands at low frequencies.

In accordance with Noise Protocol, noise from Holcim Colac must be assessed at the above identified locations in a noise sensitive area where the maximum effective noise level occurs. (Clause 56)

- Measurement point is to be located within NSAs
- Measurement point within the NSAs are to be undertaken outdoors where the maximum noise level occurs
- Measurements to be undertaken during suitable atmospheric conditions

Alternative measurement locations can be determined based on Clause 71 to 90 if the above measurement conditions are not achievable…

Upon processing of noise measurements, if exceedances are still noted, an analysis of the measurements is to be undertaken. The analysis is to highlight the key noise sources causing the exceedances so Stage 2 of

the mitigation strategy can focus on minimising the noise emissions from that specific plant to reduce the unreasonable noise.

Stage 2: Additional Mitigation

If the commissioning measurements present exceedances of the noise limits at noise sensitive receptors, additional mitigation will be required to attempt to eliminate unreasonable noise emissions.

Further investigations would be undertaken to understand the most dominant noise source on site at the time of operation, with updated mitigation measures being workshopped with Holcim to mitigate the unreasonable noise further. These additional mitigations may include the following:

- Additional on-site screening with additional absorptive performance
- Additional hoardings around noise dominating plant to limit noise emissions
- Review of equipment to investigate whether machinery modifications could be made to reduce noise emissions.

6 Conclusion

The predicted noise levels for the operation of the new quarry assessed to the operational noise limits based on the Noise Protocol.

Predicted noise level for the future operation of the quarry and its extension do not meet the noise requirements of the Noise Protocol for the proposed scenarios during the day and evening periods for various operational scenarios and noise sensitive areas.

Noise management for the future operation of the quarry is required.

Noise Control Measures

Overall, it is considered that predicted noise impacts from the quarry development can be managed in accordance with the Noise Protocol and GED to an acceptable level. The noise sources cannot be eliminated or mitigated practicably with noise walls or noise bunds.

It is recommended that various management methods be applied whilst the quarry operational times are limited to the day and evening periods to minimise environmental harm and associated non-compliance with the Noise Protocol. These management measures include,

- Communication with stakeholders.
- Optimising rock breaker selection for the project and reducing operational times (introducing respite periods).
- Mitigation of the rock breaker with rock breaker shrouds.
- Minimising plant use during the evening period.
- Temporary noise barrier or stockpiles to be positioned between the noise sensitive receptor and the crushing equipment.
- Optimising blasting operations to limit use of the rock breaker and reduce noise emissions.

These initial mitigation measurements are to be implemented prior to the NDA works commencing and these measures are considered Stage 1 of the mitigation strategy.

Commissioning measurements are proposed to be undertaken post implementation of Stage 1 and during the proposed operational scenarios of the NDA. If commissioning measurements show exceedances of the noise limits, additional noise mitigation, Stage 2 is to be implemented and investigated. However, if compliance is achieved, no additional noise mitigation measures are required.

It is also recommended noise management measures be incorporated into a Site Environmental Management Plan to minimise the risk associated with noise emanating from the quarry works. This Site Environmental Management Plan should be tailored for all stages of operation for the quarry.

Appendix A - Planning Permit, (283/95)

CSR Ltd
World Trade Centre
Flinders Street
MELBOURNE 3005

PLANNING PERMIT

Assessment No. 1640 001 01

Permit No. 283/95

Planning Scheme Chapter 2- Colac-Otway Planning Scheme

Responsible Authority COLAC-OTWAY SHIRE

ADDRESS OF THE LAND:

Part CA, 6, 6c, 7 and 7c, Parish of Ondit, Corner of Warrion-Ondit and Potters Road, Ondit. The South-east corner of Warrion-Ondit Road and Potters Road Ondit.

THE PERMIT ALLOWS

Extractive Industry generally in accordance with plans tendered at the hearing and as amended hereunder, subject to the following conditions

THE FOLLOWING CONDITIONS APPLY TO THIS PERMIT

1. Before the use and development starts, amended plans to the satisfaction of the Responsible Authority must be submitted and approved by the Responsible Authority. When approved, the plans will be endorsed and will then form part of the permit. The plans must be drawn to scale with dimensions and three copies must be provided The plans must be generally in accordance with the plans tendered at the hearing, but modified as set out hereunder.

2. The use and development approved by this permit must at all times be in accordance with, to the satisfaction of the Responsible Authority:

   (a) the endorsed plans which shall not be altered without the written consent of the Responsible Authority;

   (b) the approved work plan and the work authority issued under the provisions of the Extractive Industries Development, Act 1995.

Date Issued 20/1/1997 **Signature for the Responsible Authority**

Planning and Environment Regulations 1988 Form 4.4

CONDITIONS CONTINUED FOR PERMIT NO. 283/95

3. The use and development shown on the endorsed plans shall not commence until a work authority for the operation of a quarry on the land which is the subject of this permit is issued by the Minerals Development Unit of the Department of Natural Resources and Environment.

4. The permit will expire if the work authority for the use, issued under the provisions of the Extractive -Industries Development Act 1995, is cancelled in accordance with Section 24 of that act.

5. Before the development starts, a Water Management Plan to the satisfaction of the Responsible Authority and Southern Rural Water must be submitted to and approved by the Responsible Authority. When approved, the Plan will be endorsed and will then form part of the permit. Three copies must be provided The Plan must be generally in accordance with the Water Management Plan contained in the CMPS & F Report dated October 1996, but modified to provide that.-

   (a) evaporation ponds are relocated from ground level to the floor of the existing quarry.

   (b) evaporation ponds shall not be provided at ground level without the approval of the Responsible Authority.

   (c) water storages are satisfactorily lined to prevent escape of water.

   (d) groundwater reinjection shall not proceed without the approval of the Responsible Authority and Southern Rural Water.

   (e) irrigation must be in accordance with appropriate farming practice, and runoff shall not exceed natural surface runoff.

6 Before any development for the provision of evaporation ponds at ground floor level or for reinjection of groundwater starts, appropriate amendments to the Water Management Plan to the satisfaction of the Responsible Authority and Southern Rural Water must be submitted to and approved by the Responsible Authority. When approved, the amendments will be endorsed and will then form part of the permit. Any plans must be drawn to scale with dimensions, and three copies of amendments must be provided The amendments must be generally in accordance with the endorsed Water Management Plan already forming part of the permit.

Date Issued 20/1/1997 **Signature for the Responsible Authority**

Planning and Environment Regulations 1988 Form 4.4

CONDITIONS CONTINUED FOR PERMIT NO. 283/95

7. Groundwater and surface water entering the site shall be managed in accordance with the endorsed Water Management Plan to the satisfaction of the Responsible Authority, and the Water Management Plan must not be altered without the approval of the Responsible Authority.

8. The hours of operation shall be between 6.00am to 6.00pm Monday to Saturday, inclusive, but not including public holidays, and these hours shall not be altered without the approval of the Responsible Authority.

9. Blasting, apart from maintaining safety of the site (to do with misfire), shall only occur between I 1.00am and 3.00pm Monday to Friday, but not including public holidays, and these hours shall not be altered without the approval of the Responsible Authority.

10. Blasting shall be carried out to the satisfaction of the Responsible Authority in accordance with General Recommended Blasting Practice contained in the Terrock Pty. Ltd. Report dated November 1996, except that blasting shall not take place in the areas identified as "Blasting in this area only with vibration reduction techniques" and within I 00 metres of the Warrion Ondit Road and Potters Road.

11. Blasting monitoring equipment shall be installed in the vicinity of the houses of L. Riches and the Linterns, to the satisfaction of the Responsible Authority. All blasting shall be recorded and records of all readings shall be kept to the satisfaction of the Responsible Authority, and made available to it on request.

12. Before the development starts, the permit holder shall construct and seal Potters Road at its cost to the satisfaction of the Responsible Authority. The permit holder shall for the duration of this permit maintain this section of Potters Road to the satisfaction of the Responsible Authority.

13. The wheels of all trucks leaving the site shall be clean to the satisfaction of the Responsible Authority so that the deposition of waste material on public roads is prevented All trucks leaving the site shall be loaded securely so that materials do not spill onto public roads. On dry windy days, loads shall be thoroughly wetted or adequately covered to prevent dust emissions. The permit holder shall promptly remove quarry material deposited on public roads from wheels or loads, to the satisfaction of the Responsible Authority.

Date Issued 20/1/1997 **Signature for the Responsible Authority** _____

CONDITIONS CONTINUED FOR PERMIT NO. 283/95

14. Before the development starts, a development plan to the satisfaction of the Responsible Authority must be submitted to and approved by the Responsible Authority. When approved, the plan will be endorsed and will then form part of the permit. Three copies must be provided. The plan must be annotated to show:

    a quarrying staging sequence
    b. methods of quarrying
    c. rehabilitation proposed and the proposed schedule of rehabilitation

15. The site shall be developed and the quarry operated to the satisfaction of the Responsible Authority in accordance with the approved development plan, which shall not be altered without the approval of the Responsible Authority.

16. Before the development starts, a landscaping plan to the satisfaction of the Responsible Authority must be submitted to and approved by the Responsible Authority. When approved, the plan will be endorsed and will then form part of the permit. The plan must be drawn to scale with dimensions and three copies must be provided. The plan must be generally in accordance with the C Frank-Mas plans No. 1982/1 to 1982/5 and show:

    a. the location, types and species of trees and other vegetation
    b. proposed scheduling of landscaping having regard to the proposed quarry staging sequence and reclamation

17. Landscaping shall be carried out to the satisfaction of the Responsible Authority in accordance with the approved landscape plan, which shall not be altered without the approval of the Responsible Authority. Landscaping of buffer areas along road boundaries shall be completed within one year of the date of this permit. Landscaping of each completed stage shall be completed within one year of completion of that stage, with all landscaping being completed within one year of closure. Landscaping shall be maintained to the satisfaction of the Responsible Authority.

18. Before the development starts, a rehabilitation plan to the satisfaction of the Responsible Authority must be submitted to and approved by the Responsible Authority. When approved, the plan will be endorsed and will then form part of the permit. The plan must be drawn to scale with dimensions and three copies must be provided. The plan must be generally in accordance with the C Frank-Mas plans No. 1982/1 to 1982/5 and must show:

Date Issued 24/4/1997 **Signature for the Responsible Authority**

CONDITIONS CONTINUED FOR PERMIT NO. 283/95

a the rehabilitation of worked out areas

b. method of rehabilitation
c. staging
d. the staging schedule

19. Disused quarry areas shall be rehabilitated at the earliest opportunity following removal of the material to be extracted and to the satisfaction of the Responsible Authority, in accordance with the rehabilitation plan which shall not be altered without the approval of the Responsible Authority.

20. All sewage and sullage shall be treated and disposed of to the satisfaction of the Responsible Authority within the curtilage of the property and shall not drain directly or indirectly to any adjoining property.

21. No new building shall be constructed on the site except with the approval of the Responsible Authority.

22. The visual appearance and building materials on all new buildings shall be harmonious with the environment to preserve the aesthetic amenity of the area to the satisfaction of the Responsible Authority.

23. The external fabric of all new buildings including the roofing shall be of muted tonings to blend with the environment and to preserve the aesthetic amenity of the area, to the satisfaction of the Responsible Authority.

24. The permit holder shall provide ten car spaces on site for employees and visitors to the quarry, clearly marked signed and delineated, to the satisfaction of the Responsible Authority.

25. The car park and accessways shall be formed, drained and surfaced to the satisfaction of the Responsible Authority.

26 The quarry pit and associated storage areas and their immediate surrounds shall be kept in a tidy state to the satisfaction of the Responsible Authority.

27. At the end of the project all stock-piles of surplus material and acoustic bunds are to be removed to the satisfaction of the Responsible Authority.

Date Issued 20/1/1997 **Signature for the Responsible Authority**

CONDITIONS CONTINUED FOR PERMIT NO. 283/95

28. The use must be conducted to the satisfaction of the Responsible Authority so that it has minimum impact on the amenity of the area by reason of the transportation of material, goods and commodities to and from the premises or by reason of the appearance of any building works or materials or by reason of the emission of noise, vibration, smell, fumes, smoke, vapour steam, ash, dust, waste-water, waste products, grit, oil or otherwise. In the event of any such nuisance in the opinion of the Responsible Authority occurring, suitable procedures for suppression shall be developed and implemented to the satisfaction of the Responsible Authority.

29. Dust control shall be to the satisfaction of the Responsible Authority, generally in accordance with the Dust Suppression Plan in the CMPS & F Report dated November 1996 The operator of the permit is to have available suitable equipment for the suppression of dust within the quarry and Potters Lane, and is to take all reasonable measures to control dust generated by, quarry trucks at these location to the satisfaction of the Responsible Authority.

30. Noise levels shall satisfy State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1, and shall not exceed 49dB(A) Leq. at the nearest residence to the north of the site, and 47dB(A) Leq) at the residence to the south west of the site.

31. Before the development starts and within six months of the date of this permit, the permit holder shall arrange for a thorough survey for Aboriginal archaeological sites within the area of the proposed quarry extension authorised by this permit. The survey shall be to the satisfaction of aboriginal Affairs Victoria and the Responsible Authority, and shall comply with the following.

    a. The permit holder is to undertake and fund a survey for Aboriginal places, sites and objects on all land likely to be affected by the development, including land which may be disturbed by associated works such as new access roads, buildings and services;

    b. The permit holder is to undertake and fund any archaeological sampling or salvage excavations which may be recommended as a result of the abovementioned survey, subject to the endorsement of such recommendations by Aboriginal Affairs Victoria; and

---

Date Issued 20/1/1997 **Signature for the Responsible Authority**

Planning and Environment Regulations 1988 Form 4.4

CONDITIONS CONTINUED FOR PERMIT NO. 283/95

c. The permit holder is to seek and obtain written consent to disturb any identified, Aboriginal places, sites or objects from the relevant local Aboriginal community, as nominated for the purposes of part IIA of the (Commonwealth) Aboriginal and Torres Strait Islander Heritage Protection Act 1984. (Note: Aboriginal Affairs can advise on procedures for satisfying this requirement).

All archaeological work undertaken as required by (a) and (b) above is to be carried out, or surveyed by, persons with appropriate qualifications and experience in Australian archaeology. Standards of field work and report production are generally to comply with guidelines issued by Aboriginal Affairs Victoria

32. Before the development starts, the Responsible Authority shall establish and provide for secretarial support for a Quarry Consultative Committee, comprising.-

    a. A Convenor and one other person (who may be the Secretary) nominated by and representing the Responsible Authority

    b. One or two representatives of the permit holder

    c. A representative of the Department of Natural Resources and Environment (with quarry responsibility)

    d. Two representatives of local residents

33. Meetings of the Consultative Committee shall be convened on a regular basis and at least twice per year by the Responsible Authority, and shall be attended by at least one representative of the Responsible Authority and at least one of the representative of the permit holder to the satisfaction of the Responsible Authority. The other representatives shall be provided with a reasonable opportunity to attend or be represented by alternates.

34. The Consultative Committee shall record and consider all matters raised by representatives which reasonably pertain to the impact of the quarry operations and the permit holder shall have regard to the recommendations of the Consultative Committee, to the satisfaction of the Responsible Authority.

35. The reasonable costs of the operation of the Consultative Committee shall be borne by the permit holder, to the satisfaction of the Responsible Authority.

Date Issued 20/1/1997 **Signature for the Responsible Authority**

CONDITIONS CONTINUED FOR PERMIT NO. 283/95

36 This permit will expire if the development is not started within two years of the date of this permit. The Responsible Authority may extend this period if a request is made in writing before the permit expires or within three months afterwards.

Date Issued 20/1/1997 **Signature for the Responsible Authority** _____

Planning and Environment Regulations 1988 Form 4.4

Appendix B - Readymix Colac Quarry, Potters Road, Ondit: Proposed Quarry Extension Southern Development Area, Noise Impact Assessment, WMG, 2006

WATSON MOSS GROWCOTT acoustics pty ltd

A.C.N. 005 446 579
ABN 44 445 257 249

CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

[redacted]

READYMIX COLAC QUARRY, POTTERS ROAD, ONDIT: PROPOSED QUARRY EXTENSION SOUTHERN DEVELOPMENT AREA

Noise Impact Assessment

[redacted]

Ref. NG9558-8.doc
22 December 2006

TABLE OF CONTENTS

1. INTRODUCTION

It is proposed to extend the existing Rinker Australia Pty Ltd (trading as Readymix) Colac Quarry located at Potters Road, Ondit, to the south of the currently approved extraction area. The proposed extension area is known as the Southern Development Area (SDA), illustrated in the attached development plan (Appendix One).

Watson Moss Growcott Acoustics Pty Ltd has been engaged to identify potential impacts of noise from the extended quarry operations, and determine noise control measures if necessary in order to achieve compliance with relevant noise limits at existing residential locations.

The proposed quarry extension involves new extraction areas, but the existing processing plant is to remain at the existing location. Therefore, the assessment of noise impacts associated with the proposal essentially involves the assessment of potential effects of noise from mobile equipment operating in the extended quarry areas, as the contribution of noise from the existing fixed processing plant will remain unchanged.

This report covers the following areas:

- Measurement of the existing background noise level in the vicinity of residential locations potentially exposed to noise from the proposed operational areas;
- Discussion of E.P.A. guideline noise levels for industrial noise emission to residential areas in country Victoria;
- Prediction of noise levels at all potentially affected residential locations resulting from the proposed quarry extension and associated operations;
- Noise control measures and management methodologies to minimise off-site noise effects and achieve compliance with the guideline noise limits.

2. NOISE CRITERIA AND GUIDELINES FOR THE CONTROL OF INDUSTRIAL NOISE EMISSIONS TO RESIDENTIAL PREMISES IN COUNTRY AREAS

Condition 20 of the current Planning Permit for the quarry (Planning Permit No. PPA/283/95), sets noise limits of 49dB(A) and 47dB(A) respectively at existing houses to the north and south west of the site (the L Richie and Prime residences respectively). The noise limits at these locations, as set out in the Planning Permit, have not been reviewed.

The proposed extended quarry extraction area moves quarrying activities further to the south than they are at present. Appendix Two illustrates the location of houses relative to the proposed quarry extension.

Within Victoria but outside Metropolitan Melbourne, noise assessments commonly adopt the methodology in the Environment Protection Authority's "*Interim Guidelines for Control of Noise from Industry in Country Victoria*" (N3/89) (Appendix 3).

The N3/89 Guideline recommends determining Noise Level Limits according to State Environment Protection Policy (*Control of Noise from Commerce, Industry and Trade*) No. N-1 (SEPP N-1) in provincial cities and rural areas where background sound levels are comparable with Melbourne urban areas.

The N3/89 document states that "where background sound levels are very low (i.e. less than 25 dB(A) at night or 30 dB(A) during the day or evening period) the minimum limits for noise from industry should be:

DAY	EVENING	NIGHT
45 dB(A)	37 dB(A)	32 dB(A)

(Measured at residential premises)".

Experience has shown that to minimize the likelihood of noise related complaints and to comply with the guidelines, the industry noise emissions (Effective Noise Level) should be controlled to not exceed the determined Noise Limits.

The Effective Noise Level of emission from the industry is the (L_{eq}) dB(A) noise level assessed over a 30-minute period. Leq is the equivalent continuous sound level that would have the same total acoustic energy over the measurement period as the varying sound actually measured. The effective noise level is the absolute measured industry emitted noise level with added and subtracted adjustments to acknowledge different human responses to noise character variations such as duration (audibility of the industrial noise only some of the observation time), intermittency (rapid increase and decrease in noise level during the observation period), impulsiveness or tonality.

Noise limits apply to time periods defined as follows:

"Day"	Monday-Friday	0700 - 1800 hrs.
	Saturday	0700 - 1300 hrs
"Evening"	Saturday	1300 - 1800 hrs
	Sunday, Pub. Hols.	0700 - 1800 hrs
	All days	1800 - 2200 hrs
"Night"	All days	2200 - 0700 hrs

The "day" noise limits are intended to protect the amenity of residents going about their normal daily activities. Special cases such as shift workers sleeping during the day are not specifically dealt with. The limits are aimed at satisfying most of the people most of the time.

Noise measurements, as detailed in the following section, have indicated that the 'low background' noise limits under the N3/89 Guidelines are applicable to the identified houses more distant from the quarry, that is, a noise limit for the 'day' period, which encompasses the period of potentially noise producing activity at the quarry, of 45dB(A).

In summary, the proposed noise limits are the already-applicable 47dB(A) and 49dB(A) at the houses south west of the quarry entrance and north of the quarry on Warrion-Ondit Rd respectively, and 45dB(A) at the more distant houses west and south of the quarry.

3. MEASUREMENT OF EXISTING BACKGROUND NOISE LEVELS IN THE VICINITY OF RESIDENTIAL LOCATIONS POTENTIALLY AFFECTED BY NOISE EMISSION FROM THE QUARRY

The background sound level was measured in dB(A) and quantified by the L_{90} level. The L_{90} sound level is the sound level exceeded for 90% of the measurement period. It represents the average minimum levels occurring in the environment, but not the absolute lowest level. The L_{90} is the conventional measure of the background sound level, and is the basis for determining noise limits in the EPA noise assessment guidelines and policies.

Background noise levels were measured on the afternoon of 23 November 2004 under conditions ideally suited to the measurement of background noise (fine and calm to light breeze), at locations as near as possible to houses without entering private property. The background measurements were conducted during the day period, between approximately 12 midday and 4pm.

The results at all measurement locations were consistently in the range L_{90} 27-29dB(A).

These results, being less than 30dB(A) during the day imply a noise limit of 45dB(A) for the day period under the N3/89 Guidelines, at the Armstrong, P Richie and Angus residences.

4. NOISE SOURCES

Prediction of noise levels at residential locations due to noise emission from a quarry requires the following information:

- The source noise level of stationary and mobile noise sources
- The nature of topography between the noise sources and receiver locations
- The presence or absence of noise barrier elements
- The influence of weather conditions on sound propagation, especially light breezes.

Noise source characteristics provide the starting point for calculating noise emission from the site. Quarry noise levels are commonly measured using only the overall dB(A) noise level for hearing conservation purposes and the assessment of noise emission at residential locations. However, for the purpose of predicting noise emission using computational methods, more information regarding the sound frequency spectrum is required. Noise data in octave frequency bands has been obtained for this purpose.

The following noise source data has been used in calculating noise emission from operation of the expanded site, based on measurements at the site and, in the case of the hydraulic drill which was not measured at the time of the site visit, on data from the previous noise study at the site. The table shows the noise level in octave frequency bands together with the corresponding overall dB(A) level.

Table 1: Leq Sound Pressure Level Data for Operational Noise Sources

	Leq SOUND PRESSURE LEVEL (dB re. 20µPa), dB(A) and OCTAVE FREQUENCY BAND (Hz) LEVEL							
NOISE SOURCE AND MEASUREMENT DISTANCE	**dB(A)**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
ROCK BREAKER @ 15m	81	80	85	81	79	76	72	68
CAT 988 FACE LOADER @ 20m	75	79	82	76	72	68	66	61
CAT 769 HAUL TRUCK LOADED AND UNDER ACCELERATION @ 15m	84	83	88	89	81	75	74	66
KOMATSU HD325 HAUL TRUCK LOADED @ 20m	80	77	86	74	80	74	71	66
KOMATSU HD325 HAUL TRUCK UNLOADED @ 20m	77	73	83	75	75	72	70	64
CRUSHING AND SCREENING PLANT @ 80m	73	73	67	62	63	67	69	64
HYDRAULIC ROCK DRILL @ 10m	89	83	81	78	83	81	84	84

The following assumptions have been used as the basis for predicting noise levels at residential locations:

- Single bench quarry operation, with a bench height of 12-15m
- Hydraulic rock drill operating as required at the top of the bench
- Rock breaker, loader and haul trucks operating at the bottom of the bench, haul trucks travelling to the existing primary crusher
- Existing crushing and screening plant to remain as-is

5. PREDICTED NOISE LEVELS

Propagation of sound to distant receivers can be influenced by wind. The most critical are light breezes up to about 10kph. Above this wind speed assistance to propagation still occurs, but generation of noise due to the interaction of wind with vegetation and other features in the environment acts to mask noise from the source under consideration.

The EPA document *'A guide to the measurement and analysis of noise'* in discussing the effects of weather conditions on sound propagation refers to allowing for weather conditions favouring propagation that occur for 20 per cent of the time. This implies that unless winds of up to 10kph blowing from the noise source to the receiver occur 20% of the time, there is no need to allow for enhanced sound propagation due to breezes.

In the case of the Colac quarry, the nearest receiver locations (ie houses) are located north, west and south of the quarry. This implies that the winds that have the potential to enhance sound propagation from the quarry to the houses are from the north, east and south.

Bureau of Meteorology historical wind data from the Colac Airport and Mt Gellibrand observation sites has been reviewed in order to assess the frequency of occurrence of winds of up to 10kph blowing from these directions.

This information has shown a frequency of occurrence of light breezes blowing in the direction of each house of less than 10% over a year. Therefore, enhanced sound propagation due to breezes blowing form the quarry to houses is not a relevant consideration at this location.

Reference has also been made to GHD Report 31/16100/93912 'Readymix Holdings **Dust Impact Assessment for Colac Quarry** Extension to Work Authority 158' May 2006. This report sets out the findings of wind modelling used to determine local winds at the site, as distinct from the Bureau of Meteorology Automatic Weather Station data discussed above.

The operational hours wind rose at Figure 7 of the report confirms a frequency of occurrence of light breezes blowing from the quarry in the direction of each house of less than 10% during operational hours. This confirms that enhanced sound propagation due to breezes blowing from the quarry to houses is not a relevant consideration at this location.

Preliminary noise predictions have indicated a need for additional acoustic shielding of the hydraulic rock drill operating at the top of the bench in order to meet the noise limit at the Prime residence, when operating at all possible locations around the site, including the SDA. The house to the south near Lake Colac is at a significantly lower elevation and receives a greater degree of shielding due to the topography.

A 2m high bund to the west of the SDA is proposed in the development plan, which would provide an appropriate degree of acoustic shielding to the Prime house. Predicted noise levels at residential locations have been calculated taking acoustic shielding into account.

Predicted noise levels have been determined on the basis of full addition of noise from fixed and mobile plant operating at the site, which is a 'worst-case' situation. The predicted noise levels at the various houses exposed to the development with the extraction occurring at the nearest point to each house and with the proposed noise control bunds in place are:

Table 2: Predicted Noise Levels

RESIDENTIAL LOCATION	PREDICTED QUARRY NOISE LEVEL, L_{eq} dB(A)		
	CONTRIBUTION DUE TO SOUTHERN DEVELOPMENT AREA OPERATIONS	CONTRIBUTION DUE TO EXISTING PLANT	TOTAL COMBINED LEVEL OF EXISTING PLANT AND SDA OPERATIONS
Armstrong	34	37	39
Prime	40	46	47
L Richie	33	44	44
P Richie	29	42	42
Angus	29	40	40

These predicted noise levels are within the respective noise limits for the houses.

An aspect that is not reflected in the overall noise level, but can contribute to audibility and potential annoyance, is noise due to reversing beepers. 'New generation' reversing beepers are available, which adjust to the ambient noise environment to produce a noise level that is no higher than necessary to achieve safety. The sound produced by these warning devices is also directional and of a different character than the traditional beepers, resulting in significantly reduced off-site effects.

6. NOISE CONTROL MEASURES

6.1 PERIMETER BUNDING

A nominally 2m high noise barrier is recommended to the west of the new extraction areas in order to reduce noise emission from the SDA to houses west of the site. This barrier is required to ensure that the noise levels at the Prime residence are within the required levels.

The northern part of this bund is to be a dedicated noise control bund as shown on the development plan.

It is proposed to construct the majority of this bund in the SDA by creating rock linkages joining existing stony knolls, which will serve the required noise control function of the recommended 2m high noise barrier along the western side of the Southern Development Area extraction zones, as well as providing habitat for the Corangamite Water Skink.

The rock linkages and stony knolls will need to form a continuous barrier, subject to the following notes:

- The 'meandering' path of the barrier formed by the rock linkages between the stony knolls is not a problem, but it will need to be built up to the full 2m height above the general level of the surroundings over the full length of the extent shown on the Development Plan attached as Appendix One. This may mean building up the height of some of the stony knolls as well as the rock linkages.
- The rock linkages will need sufficient width and 'solidity' to act as a noise barrier. At least some soil in addition to rocks will be required in constructing the rock linkages.

6.2 MOBILE EQUIPMENT REVERSING BEEPERS

It is recommended that the existing reversing beepers on mobile equipment be replaced with BBS-TEK or equivalent reversing alarms - http://reverseinsafety.co.uk/catalogue/product_range.php?range=BBS-TEK

7. OVERVIEW

The proposed extension of extraction operations to the south of the existing quarry boundaries has been considered in terms of the potential impact on noise emission to residential locations.

The houses at which an existing noise limit applies under the present Planning Permit are the nearest houses to the existing fixed processing plant, which is not going to change under the proposal.

Houses further afield to the north, west and south have been considered in relation to the extended extraction areas.

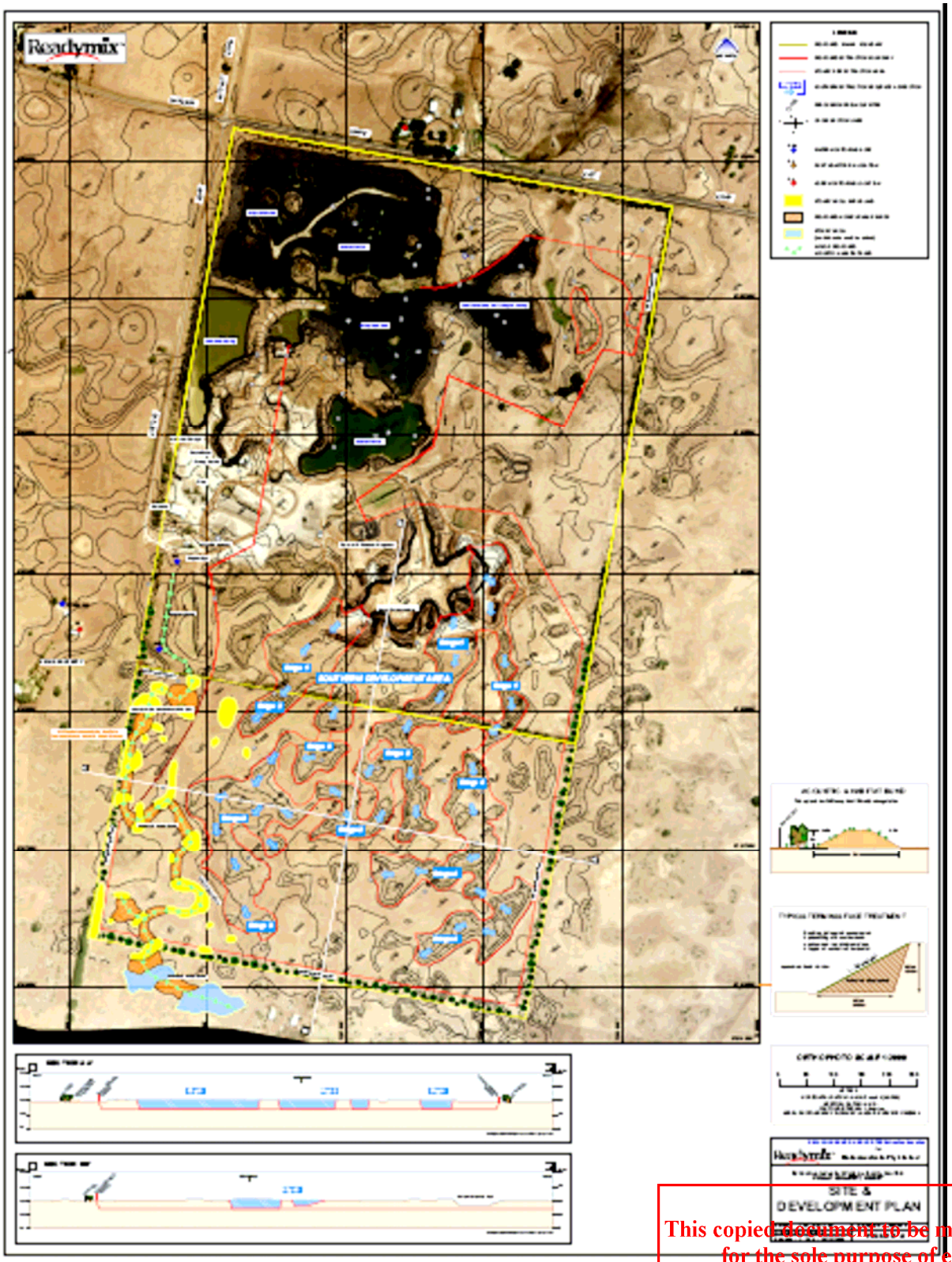
It has been concluded that with the incorporation of the 2m high bunds around the boundary proposed in the Development Plan, predicted noise levels are within the noise limits at all locations.

Low-noise reversing beepers have also been recommended in order to minimise potential audibility and annoyance, which is not necessarily reflected in the overall noise levels.

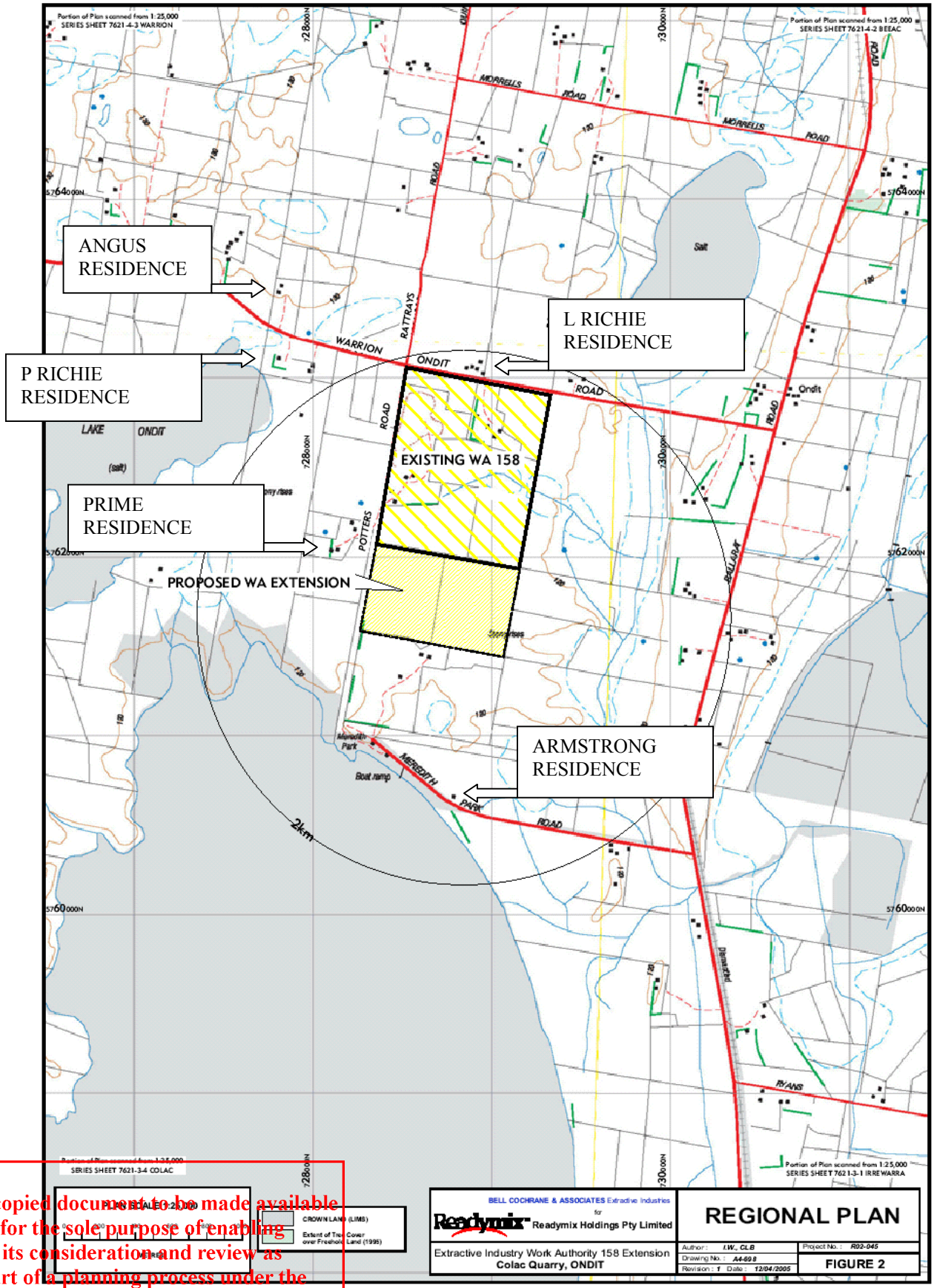
Neville Goddard

NEVILLE GODDARD
WATSON MOSS GROWCOTT
acoustics pty ltd

APPENDIX ONE: PROPOSED DEVELOPMENT PLAN



APPENDIX TWO: REGIONAL PLAN SHOWING HOUSE LOCATIONS



APPENDIX THREE: EPA GUIDELINES FOR CONTROL OF NOISE IN COUNTRY VICTORIA (N3/89)

INTERIM GUIDELINES FOR CONTROL OF NOISE FROM INDUSTRY IN COUNTRY VICTORIA

N3/89

18 April 1989

EPA VICTORIA

Application

1. These guidelines should be applied to industries in areas outside Metropolitan Melbourne. In some cases existing industries in rural areas may not be able to comply with these requirements. In these cases staged reductions may be appropriate and may be related to developments in noise control technology which shall be reviewed periodically.

Noise Limits

2. Noise limits in provincial cities and rural areas where background sound levels are comparable to Metropolitan Melbourne shall be determined using the procedures of State Environment Protection Policy N-1.

3. Where background sound levels are very low (ie. less than 25 dB(A) at night or 30 dB(A) during the day or evening period) the minimum limits for noise from industry should be:

Day	Evening	Night
45 dB(A)	37 dB(A)	32 dB(A)

(Measured at residential premises)

4. During construction of an industry the daytime limit shall be raised by 10 dB(A) except where this would result in a limit greater than 68 dB(A). In this case the daytime construction noise limit shall be 68 dB(A). Limits for other time periods shall be the same as those set for the ongoing industrial operation.

5. Activities related to the construction of noise control features may be exempted from the noise limits.

Measurement

6. Measurements of industry or background noise levels should be carried out in general accordance with the procedures laid down by SEPP No. N-1 and the 'Guide to the Measurement and Analysis of Noise' accompanying the policy.

Notes

(I) *Planning* - the propagation of sound in a rural environment is strongly influenced by atmospheric conditions. There will be occasions, particularly at night when propagation is enhanced by wind or temperature inversion and noise levels at a measurement point are elevated despite careful plant design. Thus new industries should be encouraged to design for the lowest levels of noise achievable with commonly available technology. Where possible designers should aim to meet octave band levels of L_{bg} plus 5~ 10dB.

The approach adopted in these guidelines will not avoid some change in the acoustic environment. The strategy is intended to provide reasonable protection in a situation of land use change but there may be some rural areas where such change is inappropriate. When in the opinion of the Authority a particularly quiet area should be preserved it may establish more stringent limits or to oppose the proposal at the outset.

(ii) *Qualification* - These guidelines are considered to be provisional in nature as the available information on the effects of noise in rural communities is limited. It should also be noted that this document will be superseded should a State Environment Protection Policy be published dealing with noise from industry in country Victoria.

APPENDIX FOUR: BUREAU OF METEOROLOGY WIND RECORDS FOR COLAC AIRPORT AND MOUNT GELLIBRAND

Wind Frequency analysis using available data between 1998 and 2000 for

Colac Airport

Site Number 090022 • Locality: Colac • Opened Oct 1998 • Still Open • Latitude 38°16'46"S • Longitude 143°39'41"E • Elevation 120m
Only the hours 9 am, 3 pm are included.
Values are percentage frequencies; * indicates the range has occurred but with a frequency of less than 0.5%.

9 am January

Calm	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	3	3	6		2	2	3	3	23
11–20		5	18	3	8	5	11		50
21–30			13	5	3		3		24
>30			3						3
All	3	8	40	8	13	6	18	3	100

9 am February

Calm 9	A total of 57 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	7	2	14	2	5	2	4		35
11–20	2		18	2	2	2	11		35
21–30	2		7	4		2	2		16
>30			5						5
All	11	2	44	7	7	5	16		100

9 am March

Calm 11	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	3	5	15	3	10	5	5		45
11–20	2		10	2	6	2	8	3	32
21–30			3				5		8
>30			2	2					3
All	5	5	29	6	16	6	18	3	100

9 am April

Calm 13	A total of 60 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	3		17	3	7	3	18		52
11–20	2		7	2	7		10	2	28
21–30			2		2			2	5
>30	2								2
All	7		25	5	15	3	28	3	100

9 am May

Calm 10	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	8	5	18		2	2	6	5	45
11–20	5	2					13	2	21
21–30	6						10	3	19
>30	3							2	5
All	23	6	18		2	2	29	11	100

9 am June

Calm 19	A total of 59 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	15	3	10		2	3	15	5	54
11–20	3		2				8	5	19
21–30	5							2	7
>30							2		2
All	24	3	12		2	3	25	12	100

9 am July

Calm 19	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	6		16		2		18		42
11–20	6	2	3				2	3	16
21–30	8		3				5	2	18
>30	2						2	2	5
All	23	2	23		2		26	6	100

9 am August

Calm 16	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	13	3	16		3		13	2	50
11–20	5		3		2	2	8	2	21
21–30	3						5	2	10
>30	2						2		3
All	23	3	19		5	2	27	5	100

9 am September

Calm 13	A total of 30 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	3	3	17	3	7	7	7		47
11–20	3		3		3		7		17
21–30	10						3		13
>30	3						7		10
All	20	3	20	3	10	7	23		100

9 am October

Calm 2	A total of 49 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	6	4	10			6	8	8	43
11–20			6		6	2	10		24
21–30	2					2	4	4	12
>30	2		2				6	8	18
All	10	4	18		6	10	29	20	100

9 am November

Calm 2	A total of 59 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10		3	10		5	5	12		36
11–20			15		7		8	2	32
21–30	2		8	2			8	2	22
>30			8						8
All	2	3	42	2	12	5	29	3	100

9 am December

Calm 2	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	3		5	3	8		3		23
11–20	3		15	2	3	5	16		44
21–30			10		6		6		23
>30	3		2				5		10
All	10		31	5	18	5	31		100

Wind Frequency analysis using available data between 1998 and 2000 for

Colac Airport

Site Number 090022 • Locality: Colac • Opened Oct 1998 • Still Open • Latitude 38°16'46"S • Longitude 143°39'41"E • Elevation 120m
Only the hours 9 am, 3 pm are included.
Values are percentage frequencies; * indicates the range has occurred but with a frequency of less than 0.5%.

3 pm January

Calm 2	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	2		3	5	3	3	2	2	19
11–20	3	2	8	6	2		15	2	37
21–30	2		13	2	5	5	5		31
>30			6			2	3		11
All	6	2	31	13	10	10	24	3	100

3 pm February

Calm 4	A total of 56 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	5	4	2			4	7	2	23
11–20	4	2	7	2	2	2	9	5	32
21–30	4	2	4	4	5		7		25
>30	4		5	2			5		16
All	16	7	18	7	7	5	29	7	100

3 pm March

Calm	A total of 61 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	2		3		3		3	2	13
11–20	3		5	8	8	11	18	2	56
21–30	7				2	3	5	2	18
>30	3		5	2			3		13
All	15		13	10	13	15	30	5	100

3 pm April

Calm 3	A total of 60 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10		2	3		5		7		17
11–20	3		7	3	12	5	17	2	48
21–30	3		5		3	2	15		28
>30	2		2						3
All	8	2	17	3	20	7	38	2	100

3 pm May

Calm	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	5	2			2	2	13		23
11–20	6		2				6	6	21
21–30	8		2	2	2	3	18	8	42
>30	3						5	6	15
All	23	2	3	2	3	5	42	21	100

3 pm June

Calm 5	A total of 59 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	5		7		2	2	8	2	25
11–20	15				7	2	8	3	36
21–30	8		2		2	2	12	5	31
>30							2	2	3
All	29		8		10	5	31	12	100

3 pm July

Calm 2	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	2		6			2	16	2	27
11–20	8		8		3	2	10	2	32
21–30	10		3		2		6	10	31
>30	5		2				2		8
All	24		19		5	3	34	13	100

3 pm August

Calm	A total of 59 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	12	2	5		2		7	2	29
11–20	3		2	2	2	3	15	5	32
21–30	7		5		3		7	2	24
>30	5						5	5	15
All	27	2	12	2	7	3	34	14	100

3 pm September

Calm 3	A total of 30 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	7	3	7				7	3	27
11–20	10		3	3		7	23		47
21–30	10			3			3		17
>30	3						3		7
All	30	3	10	7		7	37	3	100

3 pm October

Calm	A total of 51 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	6		2	2		4	6	4	24
11–20	8		4			10	8		29
21–30	4		4		2	6	18		33
>30	2			2			8	2	14
All	20		10	4	2	20	39	6	100

3 pm November

Calm	A total of 59 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	5	2	3		3	2	5	3	24
11–20	3		7	2	7	2	12		32
21–30			10	2	7	3	10	3	36
>30				3		2	2	2	8
All	8	2	20	7	17	8	29	8	100

3 pm December

Calm	A total of 62 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10		3	2	2	3	2	6	2	19
11–20		2	5	2	5	3	10		26
21–30	5	2	6		2	2	18		34
>30	5		2	2	3		10		21
All	10	6	15	5	13	6	44	2	100

Wind Frequency analysis using available data between 2000 and 2003 for Colac (Mt Gellibrand)

Site Number 090035 • Locality: Colac • Opened Jul 2000 • Still Open • Latitude 38°14'09"S • Longitude 143°47'29"E • Elevation 261m
Only the hours 9 am, 3 pm are included.
Values are percentage frequencies; * indicates the range has occurred but with a frequency of less than 0.5%.

9 am January

Calm	A total of 91 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1		1		3	2			8
11–20	1	2	4	7	4	5	2	2	29
21–30	1	1	14	7	7	3	5	1	40
>30	3		3	1		5	7	4	24
All	7	3	23	14	14	16	14	8	100

9 am February

Calm	A total of 83 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10						1	1		2
11–20		4	4	12	4	10	8		41
21–30	2	1	12	6	5	4	5	2	37
>30	6		6	2	1		2	1	19
All	8	5	22	20	10	14	17	4	100

9 am March

Calm 1	A total of 91 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10			1	2	2		1	2	9
11–20	4	4	4	5	5	3	7		34
21–30	1	3	5	2	9	10	1		32
>30	5	1	4	2		2	8	1	24
All	11	9	15	12	16	15	16	3	100

9 am April

Calm 1	A total of 89 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1	4	3			1	2		12
11–20	1	3	8	2	7	8	3	1	34
21–30	3		9	1	3	4	4	4	30
>30	3		7	1	2	1	6	2	22
All	9	8	27	4	12	15	16	8	100

9 am May

Calm 2	A total of 93 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	3	1	1	1	3	1	1	1	13
11–20	2	6	3	2	3	8	10	5	40
21–30	3	2	9	1		4	11	6	37
>30	2						2	4	9
All	11	10	13	4	6	13	24	17	100

9 am June

Calm	A total of 90 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10		1	1			2	1	1	7
11–20	1	3			1	3	7	3	19
21–30	6	1	1	1		3	7	12	31
>30	13		1			1	9	19	43
All	20	6	3	1	1	10	23	36	100

9 am July

Calm 1	A total of 116 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10				1	1	1	2		4
11–20	1	3	3	2	2	2	9	5	25
21–30	7	3	4			4	7	7	33
>30	15		3	1		1	4	13	37
All	22	6	10	3	3	8	22	25	100

9 am August

Calm	A total of 122 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1		2	2	2		1		7
11–20	2	2	3		3	5	7	7	30
21–30	6		2	1	2	2	7	9	30
>30	10	2				2	7	11	34
All	19	4	7	2	7	10	22	28	100

9 am September

Calm 1	A total of 118 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	2		2				2		5
11–20	2	3	1			3	4	6	19
21–30	3		5	2	1	2	5	7	25
>30	9	1	2			3	17	19	51
All	16	3	9	2	1	8	28	32	100

9 am October

Calm	A total of 121 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10						2	1		3
11–20	2	3	3	3	2	2	7	2	26
21–30	3	2	4		6	7	9	1	33
>30	3		2	1	1	3	21	7	38
All	9	6	9	4	9	15	38	10	100

9 am November

Calm	A total of 92 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10		2	1		3	1	2	1	11
11–20		3	1	4	8	2	9		27
21–30	1	2	13	2	2	7	3	1	32
>30	4		5	3	3	3	10	1	30
All	5	8	21	10	16	13	24	3	100

9 am December

Calm	A total of 92 observations analysed								
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1						4	1	7
11–20	2	1	5	2	4	7	5		27
21–30		2	4	3	10	5	10	1	36
>30	2		5	3		5	10	4	30
All	5	3	15	9	14	17	29	7	100

Wind Frequency analysis using available data between 2000 and 2003 for Colac (Mt Gellibrand)

Site Number 090035 • Locality: Colac • Opened Jul 2000 • Still Open • Latitude 38°14'09"S • Longitude 143°47'29"E • Elevation 261m
Only the hours 9 am, 3 pm are included.
Values are percentage frequencies; * indicates the range has occurred but with a frequency of less than 0.5%.

3 pm January

Calm | A total of 91 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10				1		1			2
11–20		1	2	9	5	1	1	1	21
21–30	1		7	8	2	7	3	4	32
>30	2		8	7	1	13	11	3	45
All	3	1	16	24	9	22	15	9	100

3 pm February

Calm | A total of 81 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1						1	1	4
11–20	1	1	5	2	5	1	1	1	19
21–30	5		12	12	6	4	4	4	47
>30	5		1	5	4	7	7	1	31
All	12	1	19	20	15	12	14	7	100

3 pm March

Calm | A total of 93 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10						1			1
11–20	1		2	5	5	4	4	2	25
21–30	3		4	9	3	8	8	1	35
>30	5		2	4	6	10	6	4	39
All	10		9	18	15	23	18	8	100

3 pm April

Calm | A total of 90 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10			1		1	1	1	2	7
11–20	1	1	6	2	3	3	4	2	23
21–30	1	1	4	12	3	1	6	1	30
>30	4		3	8	4	8	7	6	40
All	7	2	14	22	12	13	18	11	100

3 pm May

Calm 1 | A total of 91 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1	1	1		2	1	2	1	10
11–20	2		8	2	3	5	4	3	29
21–30	2		7	8		4	12		33
>30	7	1	1	1	1	3	8	5	27
All	12	2	16	11	7	14	26	10	100

3 pm June

Calm | A total of 90 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10				1	2	1		1	6
11–20	1	1	1		1	2	3		10
21–30	7		2	2	1	6	7	3	28
>30	11		1		1	2	18	23	57
All	19	1	4	3	6	11	28	28	100

3 pm July

Calm | A total of 116 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10		1	2	2	1	3		1	9
11–20	3		3	1		3	3	1	13
21–30	3	3	3	2	3	4	6	4	28
>30	13	1	1	3	1	6	12	13	50
All	19	4	9	8	4	16	22	19	100

3 pm August

Calm | A total of 123 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1	2			1		1		4
11–20	3		3		3	2	3	1	15
21–30	2	1	4	2	2	4	9	5	29
>30	11	2	1	1	2	3	15	16	51
All	18	4	8	3	7	9	28	22	100

3 pm September

Calm | A total of 118 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1			1			2	1	4
11–20		1	2				1	2	5
21–30	3		3			6	7	4	23
>30	14		6		1	8	24	16	68
All	18	1	10	1	1	14	33	23	100

3 pm October

Calm | A total of 123 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1	2					2		4
11–20	1		2	2	2	3	2	2	14
21–30	3	1	3	2	5	3	6	3	26
>30	6	1		1	3	11	24	11	56
All	11	3	6	5	10	17	33	16	100

3 pm November

Calm | A total of 87 observations analysed

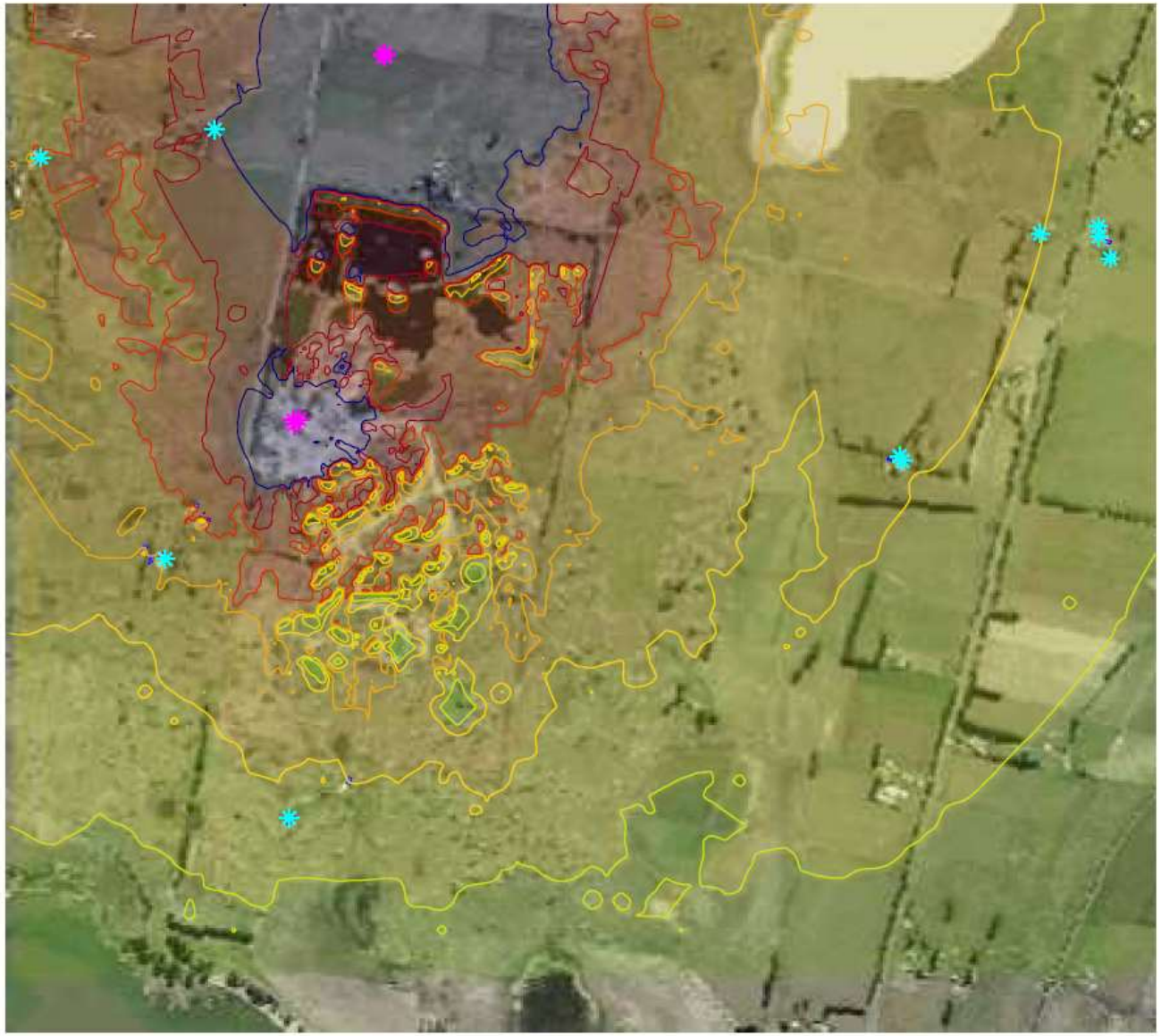
km/h	N	NE	E	SE	S	SW	W	NW	All
1–10	1					2			3
11–20	1		8	2	2	3	1		18
21–30	2	1	17	3	2	7	5	1	39
>30	2		3	3	7	5	13	6	39
All	7	1	29	9	11	17	18	7	100

3 pm December

Calm | A total of 87 observations analysed

km/h	N	NE	E	SE	S	SW	W	NW	All
1–10					1				1
11–20			5	5	5	2	2		18
21–30		1	6	5	2	13	13	1	40
>30	2	1	3	3	1	13	13	3	40
All	2	2	14	13	9	28	28	5	100

Appendix C –Operational Prediction Noise Level Contours



HOLCIM COLAC
Northern Development Area

Noise Contour Map

Operational Scenario 1

Note:
Noise Propgation is at 1.5m above ground

+2.5 dB Facade Correction included
+3.0 dB Modelling Uncertainty
+5.0 dB Impulsiviness Correction Included

Noise levels dBLAeq

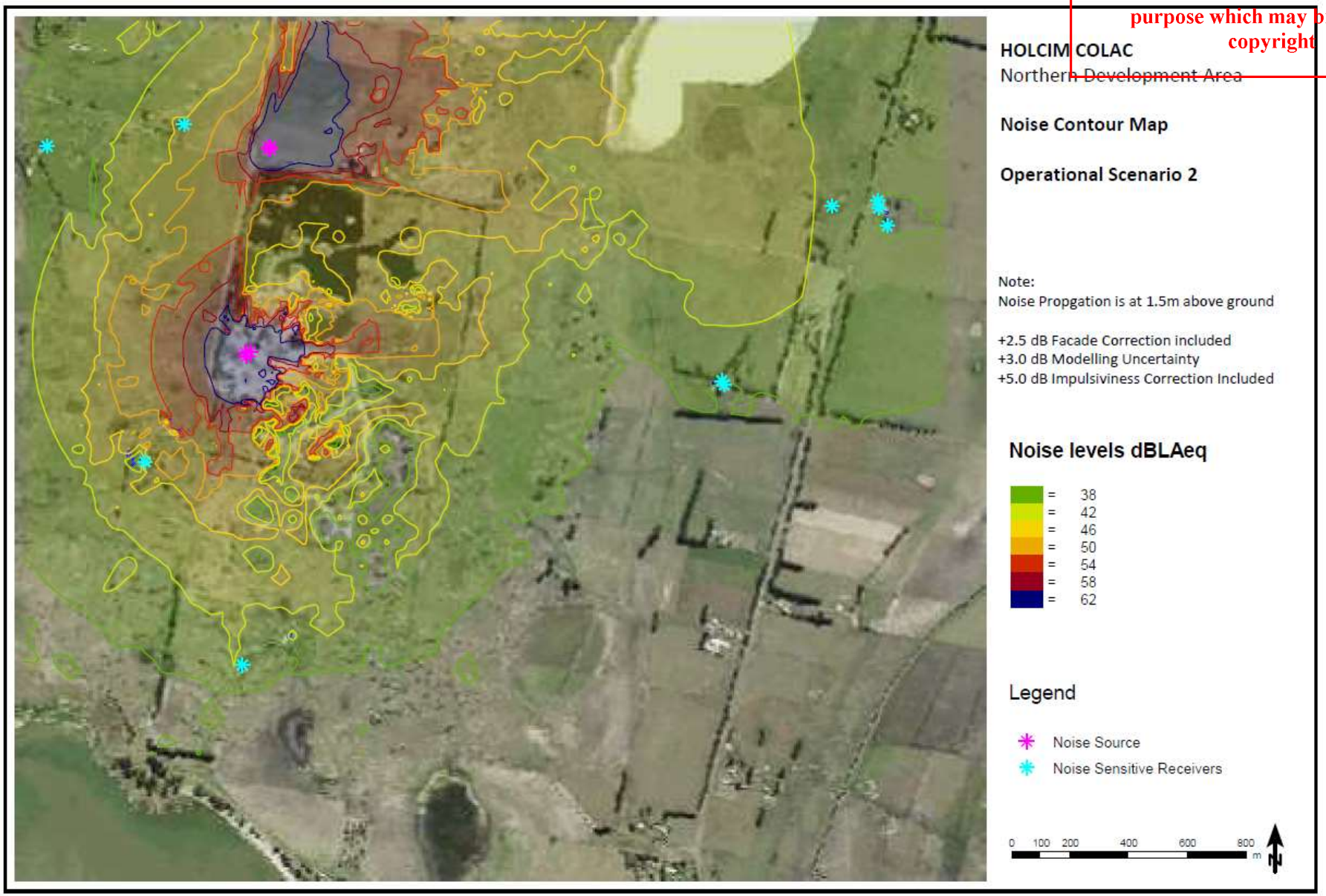
= 38
= 42
= 46
= 50
= 54
= 58
= 62

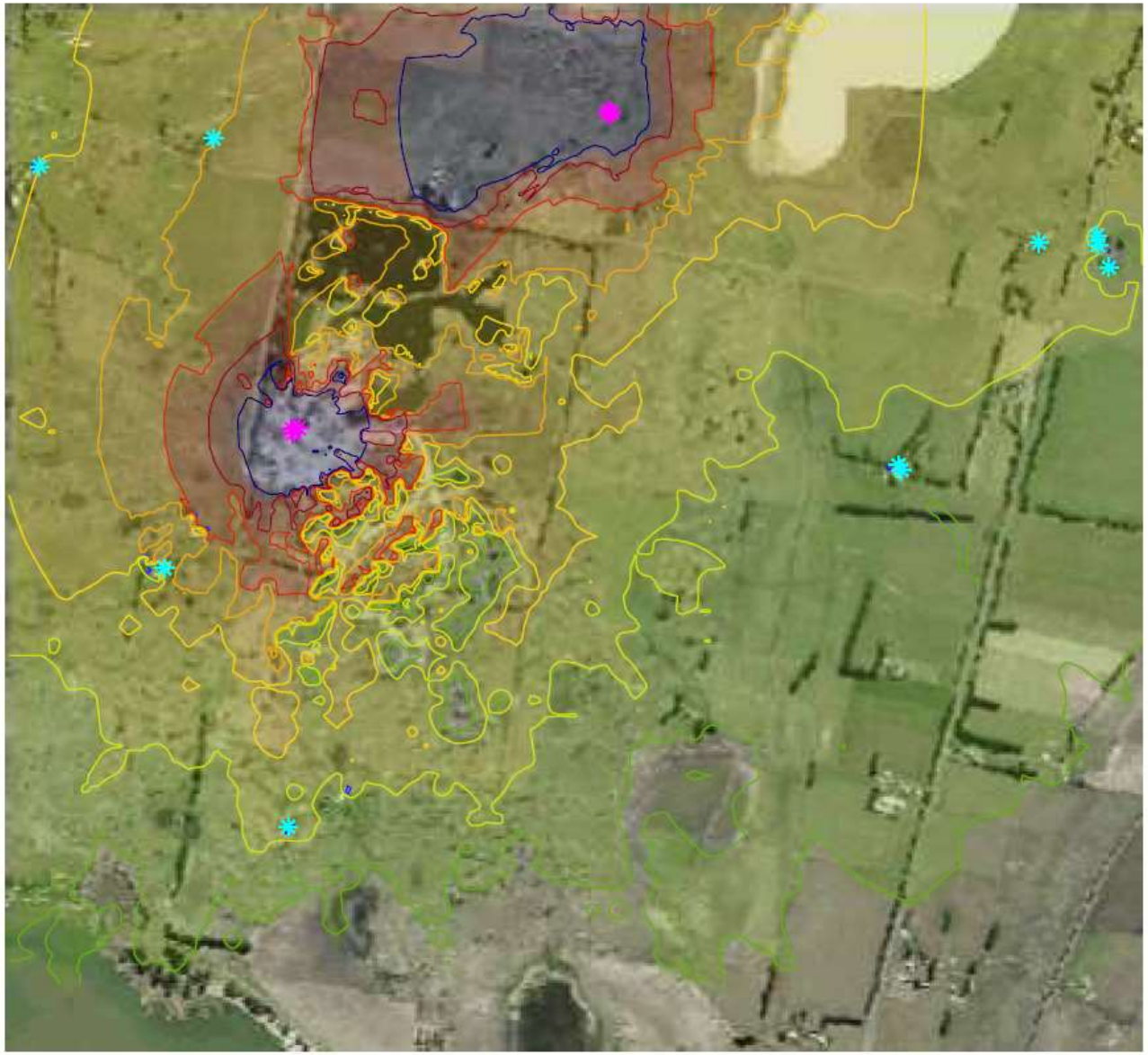
Legend

Noise Source
Noise Sensitive Receivers

0 100 200 400 600 800 m

N





HOLCIM COLAC
Northern Development Area

Noise Contour Map

Operational Scenario 3
Day Period Operation

Note:
Noise Propgation is at 1.5m above ground

+2.5 dB Facade Correction included
+3.0 dB Modelling Uncertainty
+5.0 dB Impulsiviness Correction Included

Noise levels dBLAeq

= 38
= 42
= 46
= 50
= 54
= 58
= 62

Legend

Noise Source
Noise Sensitive Receivers

0 100 200 400 600 800 m

HOLCIM COLAC
Northern Development Area

Noise Contour Map

Operational Scenario 3
Evening Period Operation

Note:
Noise Propgation is at 1.5m above ground

+2.5 dB Facade Correction included
+3.0 dB Modelling Uncertainty

Noise levels dBLAeq

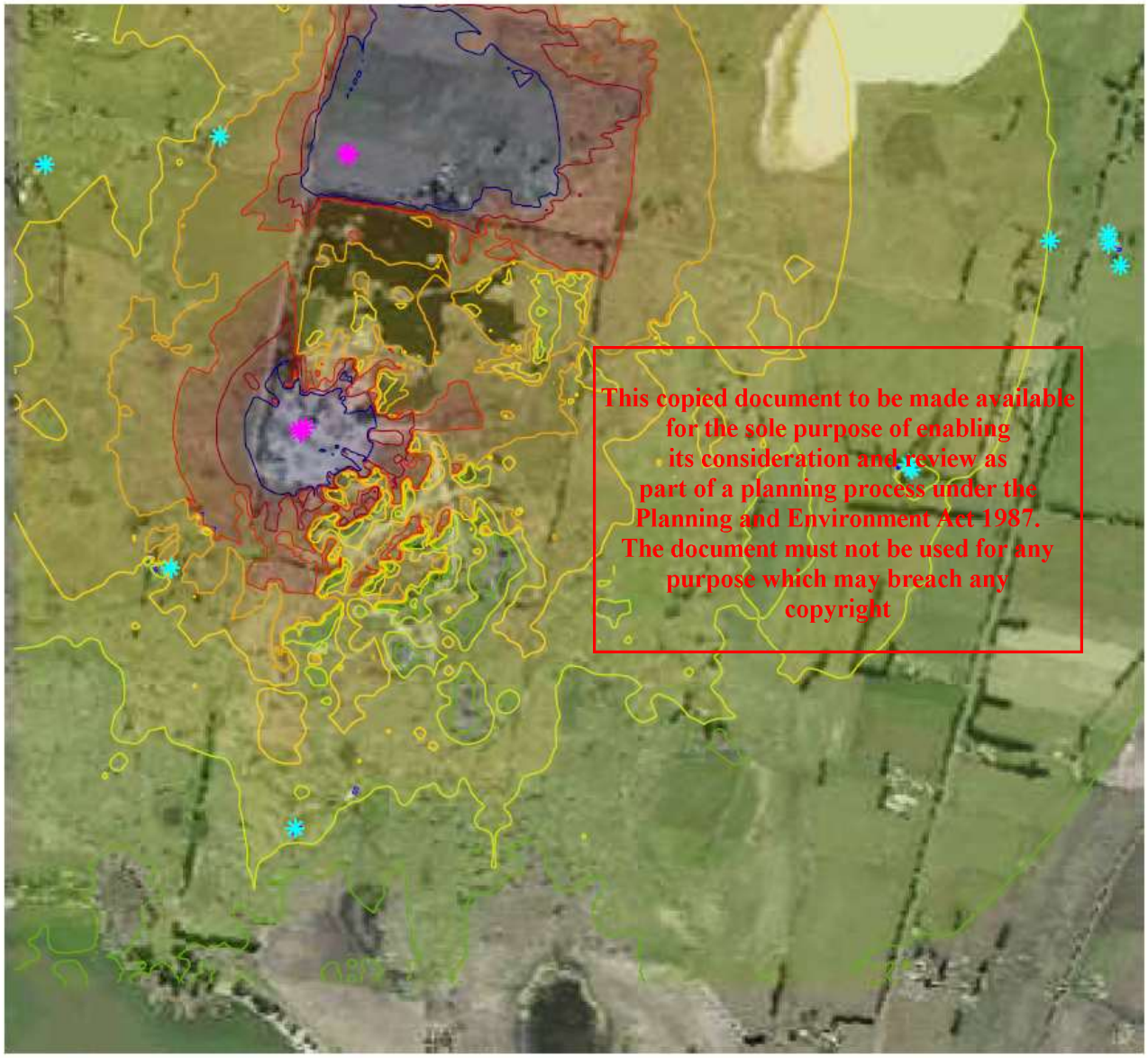
= 38
= 42
= 46
= 50
= 54
= 58
= 62

Legend

Noise Source
Noise Sensitive Receivers

0 100 200 400 600 800 m

N



HOLCIM COLAC
Northern Development Area

Noise Contour Map

Operational Scenario 4
Day Period Operation

Note:
Noise Propgation is at 1.5m above ground

+2.5 dB Facade Correction included
+3.0 dB Modelling Uncertainty
+5.0 dB Impulsiviness Correction Included

Noise levels dBLAeq

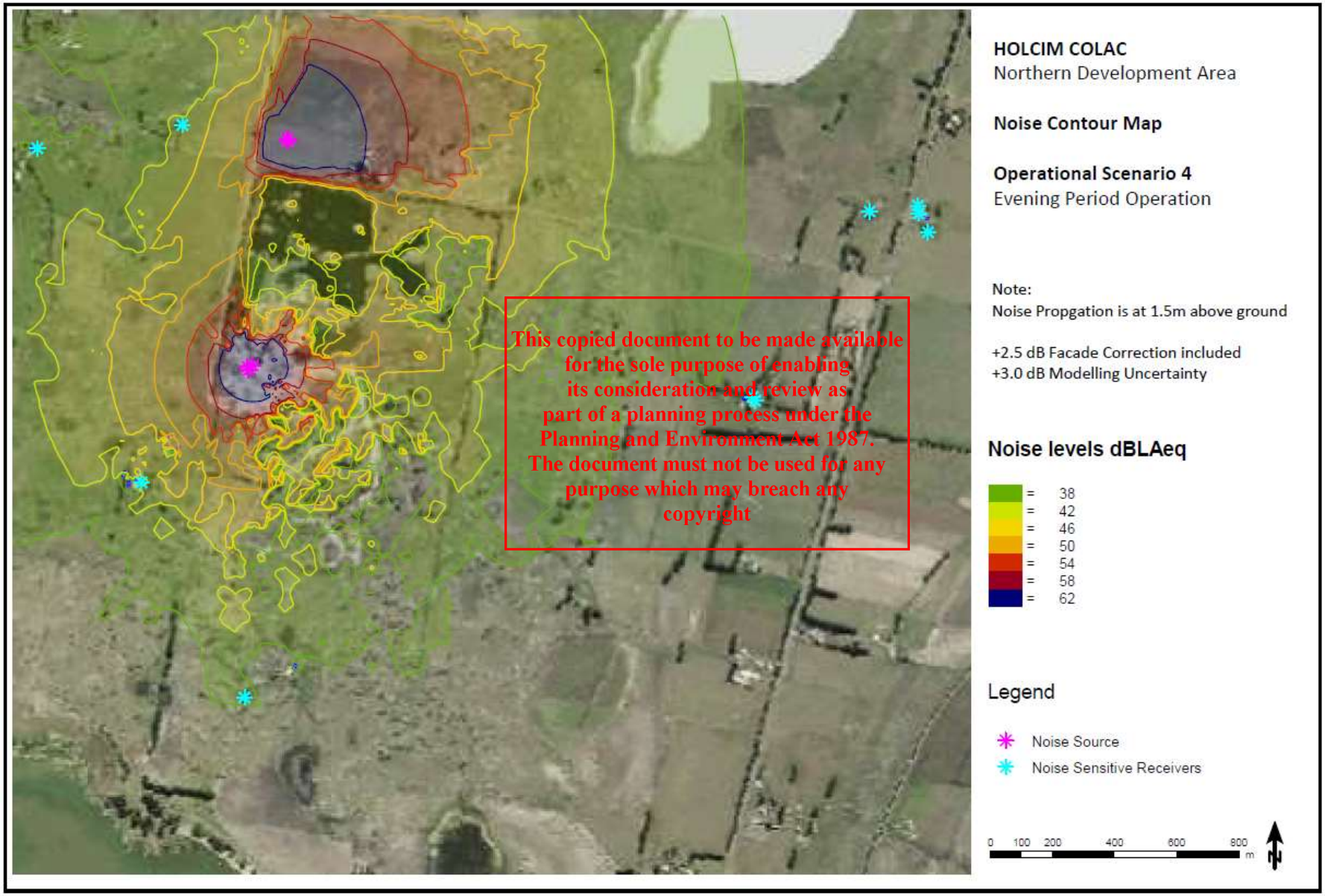
= 38
= 42
= 46
= 50
= 54
= 58
= 62

Legend

Noise Source
Noise Sensitive Receivers

0 100 200 400 600 800 m

N



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